Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

TRANSMITTAL

To: Aurora Borealis, LLC
12961 Gladstone Avenue
Sylmar, California 91342

Date: August 18, 2015

Project No. 11065.001

Attention: Mr. Woodrow Gruninger

Transmitted:		The Following:		For:	
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Subject: Preliminary Geotechnical Review of 50-Scale Site Plan: Maple Ridge Assisted Living & Memory Care Facility, A Portion of Tentative Tract No. 7027, City of Bakersfield, California.

LEIGHTON AND ASSOCIATES, INC.

By: Gareth I. Mills

Distribution: (1) Addressee (via email)

PRELIMINARY GEOTECHNICAL REVIEW OF 50-SCALE SITE PLAN:
MAPLE RIDGE ASSISTED LIVING & MEMORY CARE FACILITY
A PORTION OF TENTATIVE TRACT NO. 7027
CITY OF BAKERSFIELD, CALIFORNIA

Prepared for:

AURORA BOREALIS, LLC

12961 Gladstone Avenue
Sylmar, California 91342

Project No. 11065.001

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Aurora Borealis, LLC
12961 Gladstone Avenue
Sylmar, California 91342

Attention: Mr. Woodrow Gruninger, it's Manager

Subject: Preliminary Geotechnical Review of 50-Scale Site Plan: Proposed Maple Ridge Assisted Living & Memory Care Facility A Portion of Tentative Tract No. 7027 City of Bakersfield, California

In accordance with your authorization, Leighton and Associates, Inc. (Leighton) has conducted geotechnical exploration for the proposed Maple Ridge Assisted Living & Memory Care Facility on a portion of Tentative Tract No. 7027 in the City of Bakersfield, Kern County, California. The proposed improvements will include an assisted living and memory care residential development.

The purpose of this study has been to evaluate the geotechnical conditions onsite, and to provide preliminary geotechnical recommendations for design and construction of the proposed improvements. Our exploration was based on the site plan "Maple Ridge – Bakersfield, Assisted Living and Memory Care," by Douglas Pancake Architects dated April 9, 2015.

Leighton has previously provided geotechnical services for a larger residential development on Tentative Tract 7027 (Leighton, 2007) but development did not proceed. The currently proposed development is depicted on a site plan at a scale of 1 inch = 50 feet (Douglas Pancake Architects, 2015). Based upon our previous and current explorations, the proposed development is feasible from a geotechnical viewpoint, provided our recommendations are incorporated into the design and construction of the project. Geotechnical issues at the site are discussed in the attached

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report. Additional geotechnical investigation and / or analysis may be necessary when grading plans for the proposed improvements are made available if there are substantial differences in the proposed improvements.

We appreciate the opportunity to be of service. If you have any questions, or if we can be of further service, please call us at your convenience at (661) 257-7434.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

Renee S. Morales, PE C82772
Project Engineer

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Distribution: (3) Addressee (2 hard copies, 1 copy via e-mail)

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1.0 INTRODUCTION

1.1 Site Location and Description

The proposed development is located on a portion of Tentative Tract No. 7027, an approximately 37.43-acre irregularly shaped parcel, located near the northeast corner of the intersection of Alfred Harrell Highway and Highway 178, in the City of Bakersfield, California. The site is bounded by Alfred Harrell Highway to the west, Tract 6000 to the south, vesting Tentative Tract No. 6148 to the north, and an undeveloped parcel to the east.

The proposed project site consists of undeveloped hillside terrain. Elevations range from approximately 740 feet above mean sea level (msl) to approximately 794 feet (msl), based on the topographic contours on the site plan (Douglas Pancake Architects, 2015). The site margins consist of ascending and descending slopes covered with mild to moderate brush and vegetation. The site drains to the west and north.

1.2 Proposed Improvements

Based on our review of the site plan prepared by Douglas Pancake Architects, we understand that the proposed residential development will consist of a 1- to 3-story irregular shaped structure. We anticipate the proposed residential building to be a wood-framed structure with conventional foundations. A parking lot, driveway, concrete pedestrian walkways, garden, and appurtenant utilities necessary for site development are also planned for the site.

At this time, no retaining walls are planned. However, cutting of the existing natural slope at the south margin of the improvement area is proposed; this would create a cut slope approximately 35 feet in vertical height at a gradient of approximately 2:1 (horizontal:vertical; h:v) descending towards the development. The maximum planned cuts are on the order of 25 feet in vertical height. Fills on the order of 5 to 25 feet are planned for the slope at the north margin of the improvement area; this will create a fill slope approximately 40 feet in vertical height at a gradient of 2:1 (h:v) ascending towards the development. The maximum planned fills are on the order of 25 feet in vertical height. Slopes descending towards the improvement area, around the east, and west perimeter are also proposed with a maximum gradient of 2:1 (h:v) and terraced development is proposed with interior slopes. A schematic layout showing the proposed improvements is shown on Plate 1, Geotechnical Map.

1.3 Purpose and Scope of Work

The purpose of this study has been to: (1) evaluate the general site geotechnical conditions, (2) evaluate characteristics of the subsurface materials, and (3) provide preliminary geotechnical recommendations for design and construction of the proposed improvements. Leighton's prior subsurface exploration at the site (Leighton, 2007) contains data from borings and test pits that was used along with additional test pits that were excavated and logged during the current study. The scope of work of this study was based on conversations with you and our proposal dated June 18, 2015. It included the following tasks:

- **Background Review:** A review of the prior report prepared for the site (Leighton, 2007).
- **Pre-field Investigation Activities:** We coordinated with Underground Service Alert (USA) and City representatives to have existing underground utilities located and marked prior to our subsurface investigation.
- **Field Exploration:** Our field exploration program consisted of the excavation of four (4) test pits (T-10, T-11, T-13, and T-17) with a rubber-tired backhoe. Multiple test pits were marked for utility clearance at the site. However, based on the exposed conditions in some of the test pits and also due to time constrictions, four (4) of the marked test pits were selected for excavation. This resulted in non-sequential numbering of the test pits. The test pits were excavated, logged, and sampled in the proposed improvement area. The test pits were excavated to depths ranging from approximately 6 feet to 8 feet below the existing ground surface. Each test pit was logged by a member of our technical staff. Relatively undisturbed soil samples were obtained at selected depth intervals within each test pit using a Modified California Ring Sampler. Logs of the test pits are provided in Appendix B. Test pit locations are shown on the accompanying Geotechnical Map, Plate 1. A geologist from our office mapped the geologic conditions of the bedrock encountered in the test pits at the northern and southern margin of the site in the areas of the proposed cut and fill slopes.

- **Laboratory Tests:** Laboratory testing was performed on a selected sample of the bedrock material in order to assess relevant soil engineering properties. Test results are included in Appendix C. Laboratory tests performed included:

  - Direct shear
  - Atterberg Limits

- **Engineering Analysis**: Data obtained from our background review and field exploration was evaluated and analyzed to provide geotechnical conclusions and preliminary recommendations presented in the following sections.

- **Report Preparation**: Results of our geotechnical exploration have been summarized in this report, presenting our findings, conclusions and preliminary recommendations for design and construction of the proposed Maple Ridge Assisted Living and Memory Care Facility.

2.0 GEOLOGICAL FINDINGS

2.1 Regional Geologic Setting

The site is located in the southeastern part of the Great Valley Geomorphic Province of California, a 400-mile long by 50-mile wide alluvial plain. The province is bounded on all sides by major mountain ranges; to the north are the Klamath Mountains, to the east are the Sierra Nevada, to the south the Transverse Ranges and to the west are the Coast Ranges. The Great Valley is underlain by crystalline rocks predominately of Mesozoic age, quartz diorite. The crystalline complex is overlain by Tertiary-Quaternary marine and non-marine sedimentary rocks that range from fine-grained claystones, siltstones, and shales located in the interior of the basin that grade into coarser sandstones and conglomerates along the basins margins. The bedrock underlying the site consists of Kern River Formation siltstones and sandstones of Miocene age; which are in turn overlain by younger alluvial deposits. The site is situated near four main faults. The trace of the Round Mountain fault is mapped through the southwest corner of the site, but outside the area proposed for development. The White Wolf fault, a lateral, reverse, southeast-dipping, northeast-striking, oblique slip fault that generated a 7.7 magnitude earthquake in 1952 is located approximately 18 miles to the southeast. In addition, the Edison Fault, an east-west to northwest-southeast striking, north dipping fault is situated approximately 4 miles due east (United States Geological Survey, 1981; State of California, Department of Conservation, California Geological Survey, 2010).

2.2 Subsurface Soil Conditions

Based on our subsurface exploration, the site is underlain by Artificial ill (Afu), Quaternary Soil (Qs), Alluvium (Qal), and Miocene-age Kern River Formation bedrock (QTKr). Our exploration generally encountered artificial fill, soil, and alluvial deposits to depths of 1 to 7½ feet below ground surface. However, soil and alluvium in Test Pit T-9 extended to the bottom of the test pit at a depth of 11 feet. The fill and alluvium overlay Kern River Formation bedrock.

The earth materials encountered are described below:

- **Artificial Fill (Afu – not separately mapped)**: Artificial fill was encountered in the exploratory test pits and previous explorations at the site. The fill consists of a mixture of brown to olive-brown, silty sand, silt, and clay. The fill is dense, slightly moist, contains gravel and rounded cobbles. Where encountered in Test Pits T-1o and T-11, the fill was approximately 1 foot in thickness. However, in other offsite areas fill has been documented up to 7 ½ feet in thickness (Leighton, 2007).

- **Quaternary Soil (Qs):** Weakly developed soils between 1 foot and 2 feet in thickness were encountered in Test Pits 3, 4 and 9, and consisted of medium brown, moist, clayey silt and silty clay with rootlets.

- **Quaternary Alluvial Deposits (Qal):** Alluvial soils were encountered within all exploration performed at the site, except in Test Pit T-6 and T-10.. The surficial alluvial soils range in thickness from approximately 2 feet to at least 9 feet – the bottom of the alluvium was not encountered in Test Pit T-9. The alluvium consisted of medium to dark brown, moist, moderately porous silty clays and silty sands that contain rootlets. The underlying alluvial deposits consisted of reddish brown to orange, slightly moist to moist, medium stiff, sandy clays, silty sands, and sandy silts. Interbeds of gravel, clean sands, as well as cobbles and small boulders were also encountered. Layers containing abundant oversize material were encountered in the alluvial deposits.

- **Kern River Formation (QTKr) / Pleistocene Non-Marine (Qp)**: Siltstones, sandstones and conglomerates of the Kern River Formation underlies the alluvial deposits. The siltstones, sandstones and conglomerates encountered during Leighton's previous and current explorations were primarily varying shades of olive brown or yellowish brown, slightly moist and moderately hard.

The locations of all subsurface exploration at the site are presented on the Geotechnical Map, Plate 1. The Test Pit logs are presented in Appendix B.

2.2.1 Expansive Soil

The soils encountered in the test pits have a low to medium expansion potential. Laboratory test results indicate a Plasticity Index of 13.

2.2.2 Sulfate Content, Resistivity, Chloride and pH

For screening of corrosion potential of the onsite soils to commonly used construction materials, a bulk sample of the near-surface soil was tested during the previous exploration (Leighton, 2007) for water-soluble sulfate and chloride, pH, and electrical resistivity. Test results are discussed below.

Water-soluble sulfates in soil can react adversely with concrete. Caltrans Corrosions Guidelines indicate that concrete in contact with soil containing sulfate concentrations of greater than 2000 ppm are considered corrosive. Laboratory test results indicate that the soils have 519 ppm soluble sulfate, or negligible exposure for concrete.

Soil corrosivity to ferrous metals can be estimated by the soil's electrical resistivity, chloride content and pH. In general, soil having a minimum resistivity less than 2,000 ohm-cm is considered corrosive. Soil with a chloride content of 500 parts-per-million (ppm) or more is considered corrosive to ferrous metals.

Laboratory test results indicated a minimum resistivity of 696 ohm-cm, a soluble chloride content of 159 ppm, and pH of 7.38. Based on the minimum resistivity, the onsite soil has very severe corrosion potential for ferrous metals.

2.3 Groundwater

Data that indicates historic groundwater depths at the site are not available. During prior subsurface exploration (Leighton, 2007), groundwater was not encountered to 51.5 feet below ground surface, the maximum explored depth. Similarly, during current Leighton's field exploration groundwater was not encountered.

2.4 Seismic and Geologic Hazards

In general, the primary seismic hazards for sites in the region could include strong ground shaking and surficial ground rupture. The potential for fault rupture and seismic shaking are discussed below.

2.4.1 Ground Shaking

Using the United States Geological Survey (USGS) (http://geohazards.usgs.gov/hazards/designmaps) seismic design maps and tools application, the Peak Ground Acceleration (PGA) for the site was calculated at 0.447g. The modal earthquake is a Magnitude 6.41 earthquake with a distance of 7.6 kilometers from the site. The ground motion study and results are included in Appendix E.

2.4.2 Surficial Fault Rupture

The project site lies within a seismically active region in California, which contains a complex network of active and potentially active faults. Numerous east-west trending and northwesterly trending faults have been mapped east of Bakersfield (State of California, 2010; Kern County Planning Department, 1975; State of California, Department of Natural Resources, Division of Mines, 1955). Ground ruptures in this area were mapped following the 1952 Arvin-Tehachapi earthquake.

Ground rupture is generally considered to most likely occur along pre-existing active faults. The project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone, (State of California, 1985, and see: http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm), however the Round Mountain Fault is mapped as trending through the southwestern corner of the site (Kern County Planning Department, 1975) but in an area that is not proposed for development. As part of the state-wide effort to evaluate faults for recency of movement, the California Geological Survey has evaluated these east-west trending and northwesterly trending faults east of Bakersfield, (State of California, 1984). Published geologic maps compiled during the State of California's evaluation of these faults do not depict the Round Mountain Fault southeast of the Kern River State Park. However, a notation on the map states that mapping by United States Geological Survey (1981) concluded that the Round Mountain Fault does not cut the older alluvium in this area, is therefore pre-Holocene in age and not active. The Round Mountain Fault is located outside of the proposed improvement area. Based on our understanding of the current geologic framework in the general site vicinity, the potential for surface rupture onsite is considered low.

2.5 Secondary Seismic Hazards

2.5.1 Liquefaction Potential

Liquefaction is the loss of soil strength or stiffness due to a buildup of excess pore-water pressure during strong ground shaking. Liquefaction is associated primarily with loose (low density), saturated, fine- to medium-grained, cohesionless soils. As the shaking action of an earthquake progresses, the soil grains are rearranged and the soil densifies within a short period of time. Rapid densification of the soil results in a buildup of pore-water pressure. When the pore-water pressure approaches the total overburden pressure, the soil reduces greatly in strength and temporarily behaves similarly to a fluid. The following three conditions should all satisfy for liquefaction to occur:

- loose, clean granular soils,
- shallow groundwater, and
- strong, long-duration ground shaking

Effects of liquefaction can include sand boils, excessive settlement, bearing capacity failures below structural foundations, and lateral spreading.

Based on Leighton's previous explorations at the site, it is Leighton's opinion that the site has a very low potential for liquefaction due to the presence of shallow bedrock and the absence of groundwater.

2.5.2 Seismically-Induced Settlement

During a strong seismic event, seismically-induced settlement can occur within loose to moderately dense, dry or saturated granular soil. Settlement caused by ground shaking is often non-uniformly distributed, which can result in differential settlement. Based on the previous geotechnical investigation and revised analyses, the total seismically-induced settlement was estimated to be ¼ inch. The seismically induced differential settlement at the across the site may be taken as ¼ inch over a horizontal distance of 40 feet.

2.5.3 Seismically-Induced Landslides

Landslides or signs of incipient slope failure were not observed at the site. Joints and fractures within the bedrock may be exposed in cut slopes during grading. Depending on the orientation of the exposed joints and fractures, the slopes may be subject to localized block failures.

2.6 Slope Stability

Preliminary slope stability analyses were performed based on the Site Plan prepared by Douglas Pancake Architects (Douglas Pancake Architects, 2015) and a current topographic survey (City of Bakersfield, 2015). Based on our review of the site plan, we anticipate that the maximum cut and fill slopes will be on the order of up to 40 feet high and constructed at a maximum slope of 2:1 (horizontal:vertical). Geotechnical Cross-Section 1-1' (Plate 2) extends through the southern site margin of the proposed improvement area and depicts the slope geometry assumed for our analyses. Geotechnical Cross-Section 2-2' (Plate 2) extends through the northwestern site margin of the proposed improvement area and depicts the slope geometry assumed for our analyses. The slopes were analyzed using Roc Science's SLIDE 6.0 software and analyzed utilizing Bishop's and Spencer's methods of analyses modeling circular and block failure slip surfaces within anisotropic bedrock conditions on the slope. We utilized shear strength values from laboratory and in-situ testing. Geotechnical Cross Sections 1-1' and 2-2' were analyzed for gross stability. Cross sections were chosen based on representatively critical locations with respect to proposed slope height and subsurface conditions. The approximate locations of the analyzed geotechnical cross-sections are presented on the Geotechnical Map (Plate 1). Our analyses indicate that the proposed slopes have a factor of safety greater than 1.5 for the static case and 1.1 for the pseudo static loading case. A summary of the slope stability analyses is presented below. A more detailed explanation, material parameters and our calculations are presented in Appendix F, and are summarized as follows.

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Analyses performed included:

- Circular and block failure conditions for long-term stability,
- Seismic slope stability screening.

2.6.1 Shear Strength Parameters

Results from laboratory testing performed on samples recovered during subsurface exploration were utilized to determine shear strength parameters. Shear strength parameters are summarized below. Shear strength parameters were applied appropriately for along-bedding conditions and across-bedding conditions as depicted on the geologic cross-sections Section 1-1' and Section 2-2' (Plate 2).

TABLE 1 - SUMMARY OF SHEAR STRENGTHS

Material	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)	Strength	
			Cohesion (psf)	Friction Angle (degrees)
(Afc) Compacted Artificial Fill	120	130	200	30
(Qal) Quaternary Alluvium	120	125	200	26
(Qs) Quaternary Soil	120	125	200	26
(QTKr) Kern River Formation (Along bedding)	120	125	0	26
(QTKr) Kern River Formation (Across bedding)	120	125	100	32

2.6.2 Results of Stability Analysis

As modeled, the long-term static stability of the slopes meets or exceeds the required factor of safety (FOS) of 1.5 for both circular and block failure. The slopes also meet the screening criteria for seismic stability of the slope of a FOS greater than 1.1. Table 2 summarizes the results of the analysis.

TABLE 2 - SUMMARY OF STABILITY ANALYSIS

Geotechnical Cross Section	Circular Failure		Block Failure	
	Static	Seismic (force applied 0.15g)	Static	Seismic (force applied 0.15g)
	Factor of Safety			
Section 1-1'	1.691	1.227	1.820	1.261
Section 2-2'	1.891	1.344	1.907	1.362

2.7 <u>Flood Hazard</u>

Based on our review of the Federal Emergency Management Agency (FEMA) flood map public database, the site is located within Zone X, an area determined to be outside the 0.2% annual chance floodplain (FEMA, 2008).

3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on this investigation, construction of the proposed Maple Ridge Assisted Living and Memory Care Facility is considered feasible from a geotechnical standpoint provided the recommendations presented in this report are properly incorporated in the design and construction of the project. The recommendations included in this preliminary report are based on limited field explorations, laboratory testing, and geologic and engineering analyses. As the project plans and specifications become available, Leighton should review the documents to verify that the recommendations in this report have been properly incorporated and to determine if additional geotechnical investigation should be performed to develop final recommendations for use in design and construction of the proposed development.

Recommendations for geotechnical issues are provided in the following sections.

3.1 Earthwork and Grading

All grading should be performed in accordance with the *General Earthwork and Grading Specifications* presented in Appendix G, unless specifically revised or amended below.

3.1.1 Site Preparation

Prior to grading, the proposed improvement areas should be cleared of structures, vegetation, trash, organic materials, and debris. Any underground obstructions onsite should be removed. Resulting cavities should be properly backfilled and compacted. Efforts should be made to locate any existing utility lines. Those lines should be removed or rerouted if they interfere with the proposed construction, and the resulting cavities should be properly backfilled and compacted. Any existing water wells, septic tanks, seepage pits, or cesspools, if encountered, should be removed and abandoned in accordance with the County of Kern, Department of Health Services guidelines. Trees to be removed should be grubbed out and the resulting excavations should be backfilled with properly compacted fill. In addition, any uncontrolled artificial fill encountered onsite should be removed, evaluated by Leighton and based on that evaluation can be reused as compacted fill.

3.1.2 Overexcavation and Recompaction

To reduce the potential for adverse differential settlement of the proposed improvements, the underlying subgrade should be prepared in such a manner that a uniform response to the applied loads is achieved. As a minimum, we recommend that the upper 3 feet of on-site material be overexcavated and replaced with fill under the observation and testing of the geotechnical consultant-of-record for the project. However, if this does not result in at least 2 feet of compacted fill underneath footings, additional overexcavation is recommended. Additional overexcavation may be recommended during grading based on exposed conditions. Laterally, overexcavation should extend to a horizontal distance equal to the thickness of engineered fill between the bottom of the building footings and the bottom of the overexcavation.

Areas to receive fill, that are outside the overexcavation limits of building areas, should be overexcavated to a minimum depth of 12 inches below the existing ground surface or proposed subgrade of the improvements, whichever is deeper. Laterally, overexcavation should extend to a horizontal distance of at least 12 inches from the edge of the improvements.

Slopes where fills are planned should be overexcavated to competent bedrock, scarified, and compacted prior to the placement of any new fill. Geologic review during grading will be necessary to determine whether the potential for instability exists and whether remedial measures are required.

After completion of the overexcavation, and prior to fill placement, the exposed surfaces should be scarified to a minimum depth of 6 inches, moisture conditioned to 2 to 3 percent above optimum moisture content, and recompacted to a minimum 90 percent relative compaction, relative to the ASTM D 1557 laboratory maximum density.

Onsite soil free of debris and oversized material (greater than 6 inches in largest dimension) is suitable for use as compacted structural fill. Any soil to be placed as fill, whether onsite or imported material, should be assessed and possibly tested by Leighton and Associates, Inc. Fill should be placed in loose lifts that do not exceed approximately 8 inches in thickness.

Additional expansion index and plasticity testing should be performed during construction to better evaluate the as-graded finish grade soils.

3.1.3 Cut/Fill Transition Areas

To reduce the potential for adverse differential settlement in cut/fill transition conditions, we recommend overexcavation of the cut portion of transition area. Overexcavation should extend to a minimum depth of 3 feet below the bottom of the proposed footings or one-third of the maximum fill thickness on the area, whichever is deeper. This overexcavation does not include scarification or preprocessing prior to placement of fill. Overexcavation should extend laterally beyond the building limits a horizontal distance equal to the depth of overexcavation or to a minimum distance of 5 feet, whichever is greater.

After completion of the overexcavation, and prior to fill placement, the exposed surfaces should be scarified to a minimum depth of 6 inches, moisture conditioned to 2 to 3 percent above optimum moisture content, and recompacted to a minimum 90 percent relative compaction, relative to the ASTM D 1557 laboratory maximum density.

Onsite soil free of debris and oversized material (greater than 6 inches in largest dimension) is suitable for use as compacted stability fill. Any soil to be placed as fill, whether onsite or imported material, should be assessed and possibly tested by Leighton and Associates, Inc. Fill should be placed in loose lifts that do not exceed approximately 8 inches in thickness.

3.1.4 Fill Placement and Compaction

The onsite soils are suitable for reuse as compacted fill, provided they are relatively free of organic materials, debris and oversize materials. Within the upper 5 feet of finished grade, fill soils should not contain rock greater than 8 inches in maximum dimension in order to facilitate foundation and utility trench excavation. Below a depth of 5 feet below finished grade, the fill may contain rock up to 12 inches in maximum dimension if mixed with sufficient soil to eliminate voids and prevent oversize material from nesting together.

Fill soils should be placed at or above the optimum moisture content and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method D1557. All fills should be placed in 8 inch thick lifts and compacted in accordance with ASTM Test Method D1557. Placement and compaction of fill should be performed in accordance with local grading ordinances under the observation and testing of the geotechnical consultant.

Fill slope keyways should be constructed at the toe of all fill embankment slopes. The outer portion of fill slopes should be overbuilt by 2 feet (minimum) and trimmed back to the finished slope configuration or compacted in vertical increments of 4 feet (maximum) by a sheepsfoot roller as the fill is placed. The slope face should then be trackwalked by a dozer of appropriate weight to achieve the final configuration and compaction out to the slope face.

3.1.5 Shrinkage, Bulking and Subsidence Factor

The volume change of excavated onsite alluvial soils and Kern River Formation upon recompaction is expected to vary with materials, density, in-situ moisture content, location and ultimate compaction effort. However, based on our experience with similar materials, a shrinkage value range of 10% to 15% for the alluvial soils and Kern River Formation is recommended. Additional testing and evaluation should be performed during grading to verify these estimates.

3.1.6 Rippability and Oversized Materials

The onsite material is expected to be rippable using conventional heavy equipment in good working order. However, scattered boulders were observed along the ascending hills south of the property and in some test pits outside the limits of the current study (Leighton, 2007). Therefore, cobbles and boulders may be encountered in the subsurface during construction. In particular, and based on Test Pits T-3, T-10, and T-11, significant quantities of cobbles may be encountered in excavations along the northern margin of the site.

Any loose oversize materials (boulders) may represent a secondary rock fall hazard. Loose, out-of-place materials should be removed from the proposed natural and proposed slopes during grading. If loose rocks are exposed in the proposed cut slopes during grading, removal or stabilization may be needed to prevent rock fall.

3.2 Seismic Design Parameters (2013 CBC)

To accommodate effects of ground shaking produced by regional seismic events, seismic design can, at the discretion of the designing structural engineer, be performed in accordance with the 2013 edition of the California Building Code (CBC). Summary reports of the generated parameters are included in Appendix E, Seismic Design Parameters. Table 3, 2013 CBC Site-Specific Seismic Parameters, lists (below) site-specific seismic design parameters based on the 2013 CBC methodology, which is based on ASCE/SEI 7-10: The maximum peak horizontal ground acceleration (PGA_M) for the Maximum Credible Earthquake as Defined by CBC equation 11.8-1 is 0.447g.

TABLE 3 - 2013 CBC SITE-SPECIFIC SEISMIC PARAMETERS

2013 CBC Seismic Design Parameters	Value
Site Latitude (decimal degrees)	35.42099 N
Site Longitude (decimal degrees)	-118.85564 W
Site Class Definition (Table 1613.5.2) Stiff Soil	D
Mapped Spectral Response Acceleration at 0.2s Period, Ss (Figure 1613.3.1(1))	1.072
Mapped Spectral Response Acceleration at 1s Period, S1 (Figure 1613.3.1(2))	0.389
Short Period Site Coefficient at 0.2s Period, Fa (Table 1613.3.3(1))	1.071
Long Period Site Coefficient at 1s Period, Fv (Table 1613.3.3(2))	1.622
Adjusted Spectral Response Acceleration at 0.2s Period, SMS (Eq. 16-37)	1.149
Adjusted Spectral Response Acceleration at 1s Period, SM1 (Eq. 16-38)	0.631
Design Spectral Response Acceleration at 0.2s Period, SDS (Eq. 16-39)	0.766
Design Spectral Response Acceleration at 1s Period, SD1 (Eq. 16-40)	0.421

3.3 Foundation Recommendations

Conventional shallow foundations and slab-on-grade established in engineered fill may be used to support the proposed residential building. (See Section 3.1.2 for overexcavation and recompaction recommendations.)

3.3.1 Allowable Bearing Capacity

Building foundations for the proposed residential building should have a minimum depth of 18 inches and a minimum width of 12 inches with a minimum embedment of at least 18 inches below lowest adjacent grade. The foundation should be established on at least 1 foot of engineered fill.

The recommended allowable bearing pressure for these foundations may be taken as 2,000 pounds-per-square-foot (psf) for design of continuous wall footings or isolated column footings. The bearing pressure may be increased by 250 psf for every additional foot of foundation width to a maximum of 3,000 psf. The allowable bearing capacity may be increased by one-third for short-term loading (wind and seismic).

3.3.2 Lateral Load Resistance

Soil resistance available to withstand lateral loads on a shallow foundation is a function of the frictional resistance along the base of the footing and the passive resistance that may develop as the face of the structure tends to move into the subgrade. The allowable frictional resistance between the base of the foundation and the subgrade may be computed using a coefficient of friction of 0.35. The allowable passive resistance may be computed using an equivalent fluid pressure of 350 pounds per cubic foot (pcf), assuming there is a constant contact between the footing and the adjacent engineered fill. The maximum passive resistance should not exceed 3,500 psf. No reduction in passive pressure is required when combining frictional and passive resistance. The upper 12 inches of soil should be neglected when determining passive pressure capacity.

3.3.3 Settlement Estimates

The recommended allowable bearing capacity is generally based on a total allowable, post-construction settlement of less than ½ inch. Differential settlement due to static loading is estimated at less than ¼ inch over a horizontal distance of 40 feet. The majority of static settlement is expected to occur shortly after construction.

The total seismic settlement was estimated to be up to ¼ inch with differential settlements of ¼ inch across a horizontal distance of 40 feet.

The structural engineer should consider the potential combined effects of both static and dynamic settlement as presented in this report.

3.3.4 Slab-On-Grade

The following are minimum design recommendations, which are based on foundation on expansive soil for slab-on-grade:

- A minimum slab thickness of 5 inches. Reinforcement steel should be designed by the structural engineer, but as a minimum should be No. 3 rebar, placed 18 inches on-center. Reinforcement should be placed with appropriate cover. The structural engineer should specify concrete strength, water-cement ratio, and other pertinent concrete parameters.
- A subgrade reaction of 100 pci and an average allowable bearing pressure of 1,500 psf may be used for designing the slab.
- A 15-mil moisture retarder placed below slabs where moisture-sensitive floor coverings or equipment is planned. The moisture retarder should be underlain by 2 inches of sand. The structural engineer and/or architect should specify whether a sand blotter layer should be used between the moisture barrier and concrete.

Minor cracking of the concrete as it cures, due to drying and shrinkage, is normal and should be expected. However, cracking is often aggravated by a high water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low slump concrete can reduce the potential for shrinkage cracking. Additionally, our experience indicates that the use of reinforcement in slabs and foundations can generally reduce the potential for concrete cracking.

Moisture sensitive flooring should be underlain by a vapor retarder section. Moisture retarder can retard, but not eliminate moisture vapor movement from the underlying soils up through the slab. Floor covering manufacturers should be consulted for specific recommendations.

3.4 Exterior Concrete

Exterior concrete in contact with expansive soils such as driveways, ramps, curbs, gutters, and sidewalks, will generally crack over time subject to varying factors such as method of placement, curing, frequency of use, and weather. However, inclusion of joints at frequent intervals and reinforcement may help control the locations of the cracks, and thus reduce the unsightly appearance. As a minimum, exterior concrete slabs should be at least 4 inches thick, and driveways or ramps should have the edges thickened to at least 6 inches. Construction or weakened plane joints should be spaced at intervals of 8 feet or less for driveways, ramps, sidewalks, curbs and gutters. Presaturation of exterior concrete subgrade can reduce the severity of potential heave and cracking caused by expansive soils.

Landscape irrigation can introduce significant amounts of water into the subsurface soils that may result in soil expansion. We have observed sidewalk lifting and cracking around planter areas and tree wells where expansive soils are present. We suggest that the project landscaping be designed to reduce the amount of landscaping in small enclosed tree wells or planters, and that planted areas be provided with area drains to remove excess water. Landscaped areas immediately adjacent to the structure should be avoided.

3.5 Retaining Walls

We recommend that any site retaining walls be backfilled with very low expansive soil/sand, and constructed with adequate drainage provided by a subdrain system. Using expansive soil as retaining wall backfill will result in higher lateral earth pressures exerted on the wall. Based on these recommendations, the following parameters may be used for the design of conventional retaining walls up to 15 feet tall.

TABLE 4 - RETAINING WALLS

Conditions	Static Equivalent Fluid Pressure (pounds-per-cubic-foot) Level Backfill	2:1 (h:v) Backfill
Active (cantilever)	40	65
At-Rest (braced)	60	85
Passive	350 (allowable) (Maximum of 3,500 psf)	N/A (level condition)

Cantilever walls that are designed to deflect horizontally a distance equal to at least 0.001H, where H is equal to the wall height, may be designed using the active condition. Rigid walls and walls braced at the top should be designed using the at-rest condition. Passive pressure is used to compute soil resistance to lateral structural movement. In addition, for sliding resistance, a frictional resistance coefficient of 0.35 may be used at the concrete and soil interface. The lateral passive resistance should be taken into account only if it is ensured that soil providing passive resistance, embedded against the foundation elements, will remain intact with time. The above values do not contain an appreciable factor of safety (unless indicated), so the structural engineer should apply the applicable factors of safety and/or load factors during design.

For conventional retaining walls up to 6 feet tall, footings should have a minimum width of 24 inches and a minimum embedment of 18 inches below the lowest adjacent grade. An allowable bearing capacity of 2,000 psf may be used for retaining wall footing design, based on the minimum footing width and depth.

3.6 Pavement Design

Based on the design procedures outlined in the current Caltrans Highway Design Manual and a maximum R-value of 15, preliminary flexible pavement sections may consist of the following for the Traffic Indices indicated. The R-value used is based on limited laboratory testing from the previous exploration performed at the site (Leighton, 2007).

TABLE 5 - ASPHALTIC PAVEMENT SECTION THICKNESS

Traffic Index	Asphaltic Concrete (AC) Thickness (inches)	Class 2 Aggregate Base (AB) Thickness (inches)
5 or less	3.0	8.0
6	3.5	10.5
7	4.0	13.0

Final pavement design should be based on the Traffic Index determined by the project civil engineer and R-value testing conducted once finish grades have been achieved at the site.

If the pavement is to be constructed prior to construction of the residential development, we recommend that the full depth of the pavement section be placed in order to support heavy construction traffic.

All pavement construction should be performed in accordance with City of Bakersfield requirements. Field inspection and periodic testing, as needed during placement of the base course materials, should be undertaken to ensure that the requirements of the standard specifications are fulfilled. Prior to placement of aggregate base, the subgrade soil should be processed to a minimum depth of 6 inches, moisture-conditioned, as necessary, and recompacted to a minimum of 95 percent relative compaction as determined by ASTM Test Method D 1557. Aggregate base should be moisture conditioned, as necessary, and compacted to a minimum of 95 percent relative compaction.

3.7 Temporary Excavations

All temporary excavations, including utility trenches, retaining wall excavations and other excavations should be performed in accordance with project plans, specifications and all OSHA requirements.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the slope, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees downwards from the edge of any adjacent existing site foundation should be properly shored to maintain support of the adjacent structures.

Typical cantilever shoring should be designed based on an active fluid pressure of 40 pcf. If excavations are braced at the top and at specific design intervals, the active pressure may then be approximated by a rectangular soil pressure distribution with the pressure per foot of width equal to 25H (pcf), where H is equal to the depth of the excavation being shored.

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor should be responsible for providing the "competent person" required by OSHA, standards to evaluate soil conditions. Close coordination between the competent person and the geotechnical engineer should be maintained to facilitate construction while providing safe excavations.

3.8 Trench Backfill

Utility-type trenches onsite can be backfilled with the processed onsite material, provided it is free of debris, significant organic material and oversized material. Prior to backfilling the trench, pipes should be bedded and shaded in a granular material that has a sand equivalent of 30 or greater. The sand should extend 12 inches above the top of the pipe. The bedding/shading sand should be densified in-place. The native backfill should be placed in loose layers, moisture conditioned, as necessary, and mechanically compacted using a minimum standard of 90 percent relative compaction.

3.9 Surface Drainage and Erosion

Inadequate control of runoff water and/or poorly controlled irrigation can cause the onsite soils to expand and/or shrink, producing heaving and/or settlement of foundations, flatwork, walls, and other improvements. Maintaining adequate surface drainage, proper disposal of runoff water, and control of irrigation should help reduce the potential for future soil moisture problems. The goal should be to balance the total rate of water being introduced into the ground from the combination of irrigation, rainfall, and other possible sources against the water loss from evapotranspiration, in order to maintain nearly constant moisture content in subgrade soils.

Positive surface drainage should be provided to direct surface water away from concrete slabs, the building, and any manufactured slopes and towards suitable collective drainage facilities such that a potential for onsite ponding of water is minimal. In general, the areas around the building and the tennis courts buildings should slope away from them. We recommend that unpaved landscaped areas adjacent to each of these improvements and manufactured slopes be avoided. Roof runoff from the building should be carried to suitable drainage outlets by watertight drain pipes or over paved areas.

Surface waters should not drain over manufactured slopes in an uncontrolled manner. They should be collected via a lined drain at the top of the slope and directed to non-erodible outlets at toes of slopes.

All collected surface waters should be transported off the site in approved drainage devices, such as gutters, paved drainage swales, or watertight area drains and collector pipes designed by a licensed and experienced civil engineer.

Cut and fill slopes should be provided with appropriate surface drainage features and be vegetated to help reduce runoff velocities and to reduce the potential for erosion and sloughing over time.

3.10 Subsurface Drainage

Subdrains are recommended in canyon fills and in fill-over-cut keyways. Other subdrains may be recommended by the geotechnical consultant during grading, depending on the field conditions encountered.

The subdrain should consist of a perforated pipe with a minimum diameter of 6 inches and two rows of perforations that are separated by a 120-degree arc. The subdrain should be placed perforations facing down and enclosed in 1 cubic foot per foot of Class II gravel, and then wrapped in Mirafi 140NC filter fabric, or equivalent. The trench should be backfilled with granular material to the finish subgrade. Additional subdrain details are provided in the General Earthwork and Grading Specifications (Appendix G).

3.11 Corrosivity of Onsite Soils

Leighton does not practice corrosion engineering. A qualified corrosion engineer should be consulted for mitigation measures for corrosive soil if deemed necessary. Additional corrosion testing may be required.

3.12 Additional Geotechnical Exploration and Services

The geotechnical recommendations presented in this report are based on subsurface conditions as interpreted from limited subsurface explorations and limited laboratory testing. Our geotechnical recommendations provided in this report are based on information available at the time the report was prepared and may change as plans are developed. Additional geotechnical investigation and analysis may be necessary, based on the actual development plans for submittal with the project grading plans. Leighton should review the project grading plans when available and comment further on the geotechnical aspects of the project. Geotechnical observation and testing should be conducted during excavation and all phases of grading operations. Our conclusions and recommendations should be reviewed and verified by Leighton during construction and revised accordingly if geotechnical conditions encountered vary from our findings and interpretations. Geotechnical observation and testing should be provided:

- After completion of site clearing.
- During overexcavation operations.
- During compaction of all fill materials.
- After excavation of all footings and prior to placement of concrete.
- During utility trench backfilling and compaction.
- During pavement subgrade and base preparation.
- When any unusual conditions are encountered.

3.13 Limitations

This report was based in part on data obtained from a limited number of observations, site visits, soil excavations, samples, and tests. Such information is, by necessity, incomplete. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, our findings, conclusions, and recommendations presented in this report are based on the assumption that Leighton and Associates, Inc. will provide geotechnical observation and testing during construction.

Environmental services were not included as part of this study. This report was prepared for the sole use of you and your project specific subcontractors for application to the design of the proposed project in accordance with generally accepted geotechnical engineering practices at this time in California.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GBC GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX A

APPENDIX A

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APPENDIX B

TRENCH NO: T-10

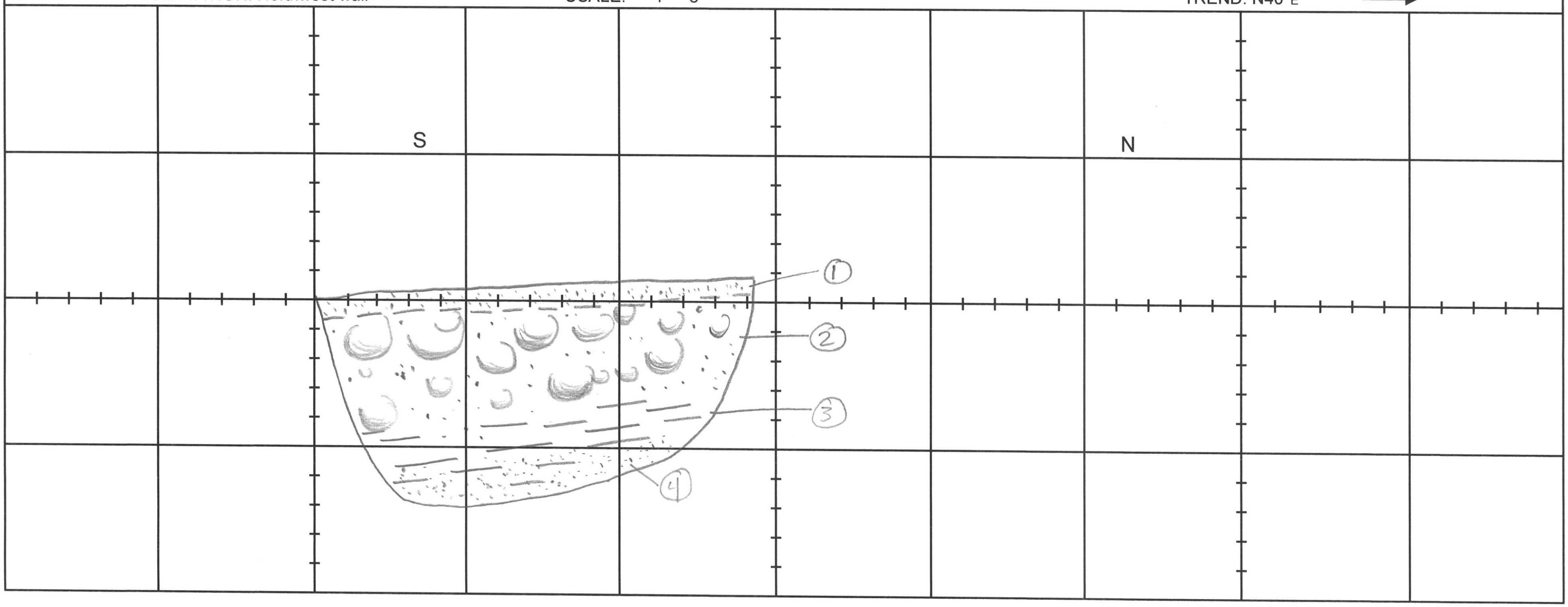
Project No: 11065.001 | Logged by : WBS | Location: See Geotechnical Map

Project Name: Aurora Maple Ridge | Equipment: Backhoe | Elevation: ~730' | Date: 7-17-2015

GEOLOGIC ATTITUDES	Description	GEOLOGIC UNIT	USCS Class	Sample No.	Moist. (%)	Density (pcf)
	Artificial Fill: **1) 0 - 1'** - SANDY SILT: brown, dry to moist, non-plastic fines with fine grained sand, slightly porous, contains some gravel and small cobbles, rootlets	Af	ML			
B: N54E/28SE @4'	**Kern River Formation :** **2) 1 - 4'** - CONGLOMERATE: light brown to white, friable to very friable, gravel and small cobbles in fine grained sand/CaCO3 matrix, matrix is weakly cemented, moderate to poor bedding	QTkr				
	3) 4 - 6' - SILTSTONE: brown, dry, friable, non-plastic fines, contains some CaCO3 streamers across bedding			T-10-7		
	4) 6 - 7' - SANDSTONE: dark brown to dark reddish brown, moist, less friable, fine grained sand					
	T.D. = 7' No groundwater encountered Backfilled and tamped with bucket.					

ENGINEERING PROPERTIES

GRAPHIC REPRESENTATION: Northwest wall   SCALE: 1" = 5'   TREND: N40°E →



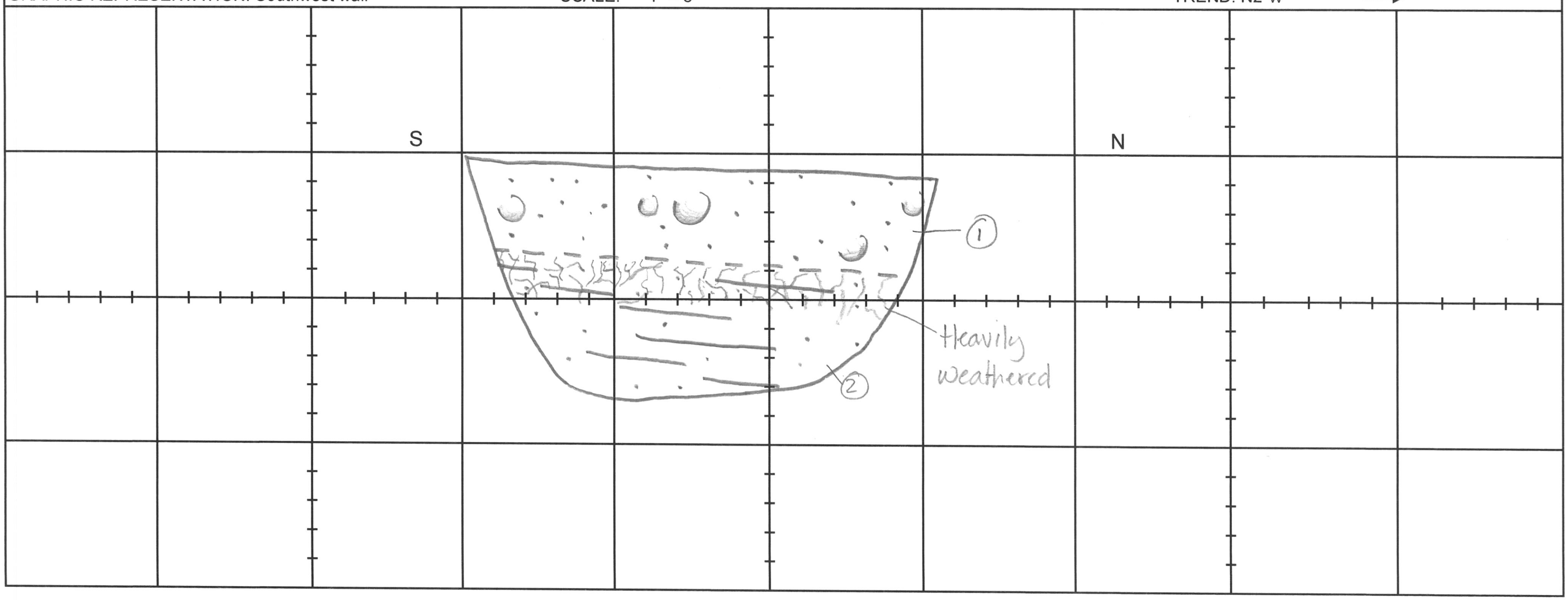
TRENCH NO: T-11

Project No: 11065.001	Logged by : WBS	Location: See Geotechnical Map	
Project Name: Aurora Maple Ridge	Equipment: Backhoe	Elevation: ~737'	Date: 7-17-2015

GEOLOGIC ATTITUDES		GEOLOGIC UNIT	USCS Class	Sample No.	Moist. (%)	Density (pcf)
	Quaternary Alluvium : **1) 0 - 3'** - SANDY SILT: dark brown, dry, non-plastic fines with fine grained sand, contains some gravel and cobbles	Qal	ML			
B: N32E/39NW @8'	**Kern River Formation :** **2) 3 - 8'** - SILTSTONE: light brown to light gray, dry, non-plastic fines, trace iron oxide staining, mostly poor bedding, heavily weathered from 3-5' **T.D. = 8'** No groundwater encountered Backfilled and tamped with bucket.	QTkr		T-11-8		

ENGINEERING PROPERTIES

GRAPHIC REPRESENTATION: Southwest wall SCALE: 1" = 5' TREND: N2°w →

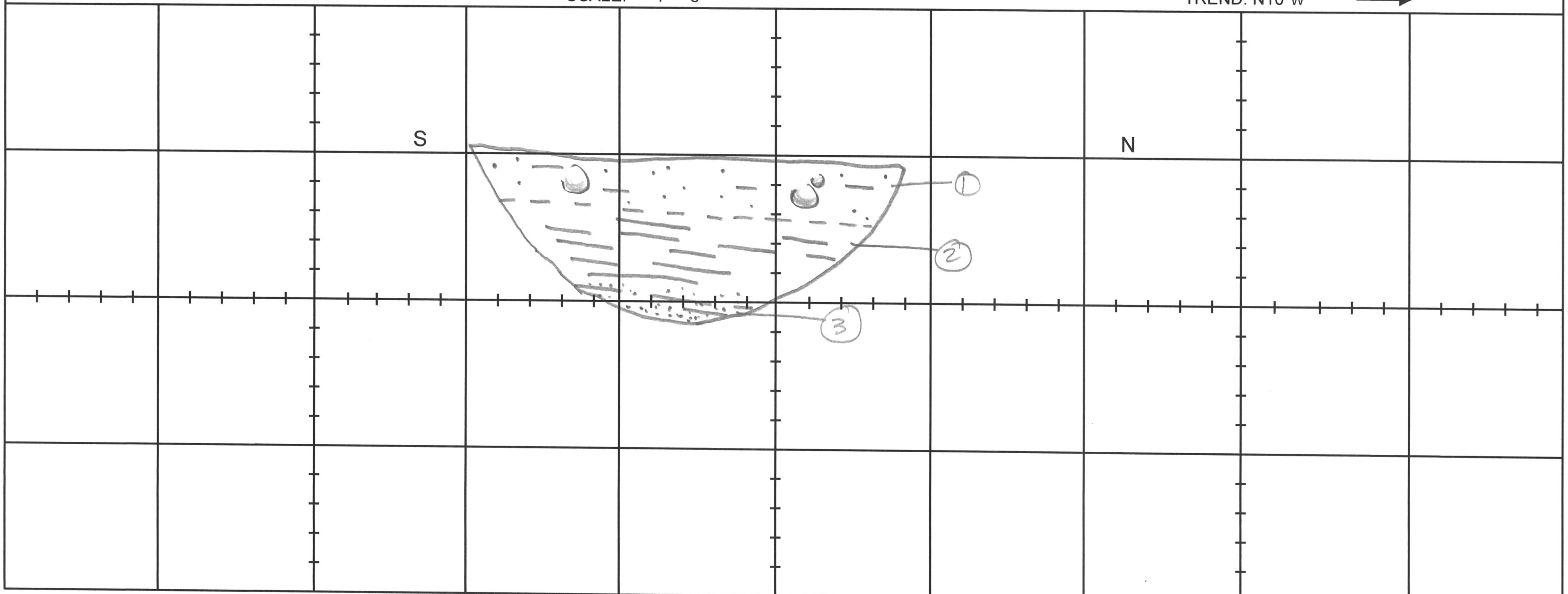


TRENCH NO: T-13

Project No: 11065.001
Project Name: Aurora Maple Ridge
Logged by : WBS
Equipment: Backhoe
Location: See Geotechnical Map
Elevation: ~792'
Date: 7-17-2015

GEOLOGIC ATTITUDES	Description	GEOLOGIC UNIT	USCS Class	Sample No.	Moist. (%)	Density (pcf)
	Quaternary Alluvium:					
	1) 0 - 2' - SANDY SILT: brown, dry to moist, non-plastic fines with fine grained sand, slightly porous, contains some gravel and small cobbles, rootlets	Qal	ML			
	Kern River Formation :					
	2) 2 - 5' - SILTSTONE: very light gray to white, transitions to light greenish gray at 4', dry to moist, non-plastic fines, highly weathered in upper 1.5', friable, less friable below 4'	QTkr		T-13-6 B-1		
	3) 5- 6' - SANDSTONE: light greenish gray, dry to moist, fine grained sand, contains trace shells (1")					
	T.D. = 6'					
	No groundwater encountered					
	Backfilled and tamped with bucket.					

GRAPHIC REPRESENTATION: Southwest wall SCALE: 1" = 5' TREND: N10°w



LEIGHTON

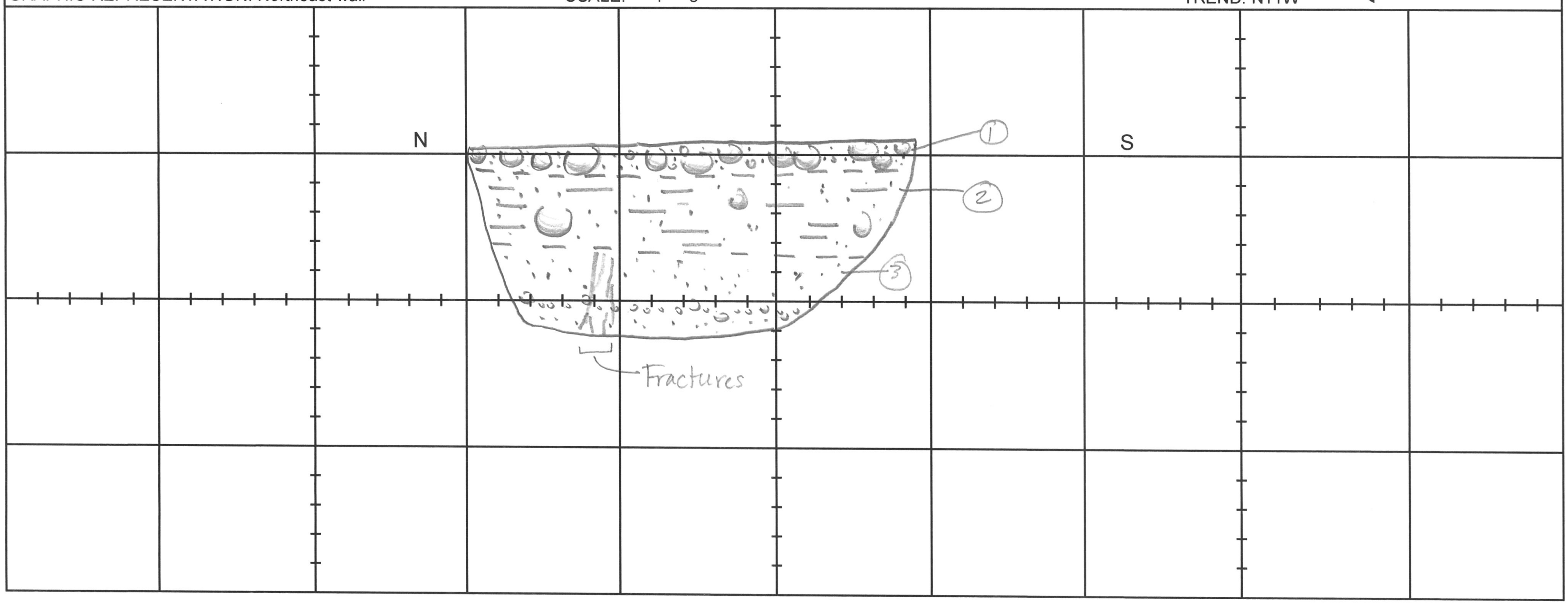
TRENCH NO: T-17

Project No: 11065.001	Logged by : WBS	Location: See Geotechnical Map	
Project Name: Aurora Maple Ridge	Equipment: Backhoe	Elevation: ~744'	Date: 7-17-2015

GEOLOGIC ATTITUDES		GEOLOGIC UNIT	USCS Class	Sample No.	Moist. (%)	Density (pcf)
Fracture: N85E/85NW @4' B: Horiz. @5'	**Artificial Fill:** **1) 0 - 1'** - BOULDERS/COBBLES/SANDY SILT: light brown, dry, non-plastic fines with loose gravel, cobbles, and boulders (3-18"), construction debris observed	Af	ML/GP			
	Quaternary Alluvium: **2) 1 - 3'** - SANDY SILT: dark brown, dry to moist, non-plastic fines with fine grained sand, contains trace subrounded gravel	Qal	ML			
	Kern River Formation : **3) 3 - 7'** - SANDSTONE: dark reddish brown, moist, fine grained sand, heavily weathered and fractured in upper 2', rootlets and CaCO3 stained fracture faces observed, mostly massive, fracture zone in northern 3' of trench, more prominent in weathered portion	QTkr		T-17-7		
	T.D. = 7' No groundwater encountered Backfilled and tamped with bucket.					

ENGINEERING PROPERTIES

GRAPHIC REPRESENTATION: Northeast wall SCALE: 1" = 5' TREND: N11W ←



LEIGHTON

APPENDIX A
FIELD EXPLORATION

Our field investigation consisted of a surface reconnaissance and a subsurface exploration program. Encountered soils were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D 2488-00).

On February 7 and 8, 2007, Leighton drilled eight (8) exploratory borings using a CME-75, truck mounted hollow-stem auger drill rig. These borings were advanced to depths of approximately 11 ½ to 51 ½ feet below the existing ground surface. In addition, nine (9) exploratory test trenches were excavated on March 1, 2007 with a rubber-tired backhoe. Approximate locations of the borings and test trenches are depicted on the *Geotechnical Map* (Figure 2).

The exploratory borings were sampled using a 140-pound automatic safety hammer dropping 30 inches. During drilling, bulk and relatively undisturbed soil samples were obtained from these borings for geotechnical laboratory testing and evaluation. These relatively undisturbed samples were obtained utilizing a modified California drive sampler (2⅜-inch inside diameter and 3-inch outside diameter) driven 18-inches where possible in general accordance with ASTM Test Method D 3550. Standard Penetration Tests (SPT) were also performed using a 24-inch long 1-3/8-inch I.D. and 2-inch O.D. split spoon sampler driven 18-inches with a 140-pound hammer dropping 30 inches in general accordance with ASTM Test Method D 1586. The number of blows to achieve the last 12-inches of penetration, or the number of blows and sampling penetration depth was recorded on the boring logs (Appendix A). Sampling and logging of these borings were conducted by our Staff Engineer. Soil materials were visually classified according to the Unified Soil Classification System (U.S.C.S.) and further classified in the laboratory. After logging and sampling, the borings were backfilled with spoils generated during excavation. Samples were transported to our laboratory for testing.

The attached subsurface exploration logs and related information depict subsurface conditions only at the locations indicated and at the particular date designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these locations. The passage of time may result in altered subsurface conditions due to environmental changes. In addition, any stratification lines on the logs represent the approximate boundary between soil types and the transition may be gradual.

GEOTECHNICAL BORING LOG B-1

Date 2-7-07 **Sheet** 1 **of** 1
Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 **Project No.** 142136-001
Drilling Co. ABC Liovin Drilling **Type of Rig** CME-75 HSA
Hole Diameter 8 inches **Drive Weight** 140 lbs with Auto Trip Hammer **Drop** 30 inches
Elevation Top of Hole +/- 715 ' **Location** (See Boring Location Map)

Logged By Roderick Marcia
Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Graphic Log	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
715	0		Bulk B1 @ 0 - 5'						**Quaternary Alluvium (Qal)** @ Surface: Silty SAND, brown, damp, with cobble and gravel, weeds	
				R2	62			SM	@ 1': Silty SAND, brown, damp, dense, with cobbles, gravel, rounded	
				R3	50/3"			SM	@ 3': Silty SAND, brown, damp, dense, with cobble and gravel	
									@ 4': Cobble	
710	5			R4	17	91.8	8.0	SM	@ 5': Silty SAND, brown, damp, medium dense, trace gravel	MC
				R5	35	94.1	6.4	SM	@ 7.5': Silty SAND, gray/light brown, dry, medium dense, orange, stanning, fine grained	MC
705	10			R6	50/6"			SM	@ 10': Silty SAND, gray, dry, dense, gravel	
								SP-SM	@10.5': SAND with Silt, gray, dry, dense	
									@ 13': Cobble	
				S7	50/6"			SP-SM		
				S8					Total Depth at 13 feet due to obstruction, cobble Groundwater was not encountered Hole backfilled with spoils 2/7/07	
700	15									
695	20									
690	25									
685	30									

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE
CS CORROSION SUITE
MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-2

Date 2-7-07 **Sheet** 1 **of** 1
Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 **Project No.** 142136-001
Drilling Co. ABC Liovin Drilling **Type of Rig** CME-75 HSA
Hole Diameter 8 inches **Drive Weight** 140 lbs with Auto Trip Hammer **Drop** 30 inches
Elevation Top of Hole +/- 711 ' **Location** (See Boring Location Map)

Logged By Roderick Marcia
Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
710	0		R1	50/5"	96.7	14.4	SM/CL	**Artificial Fill (Afu)** @ Surface: Silty SAND, brown, damp, with cobble and gravel, weeds @ 1': Silty SAND with gravel, brown, moist, dense	MC
			R2	82/8"	88.5	17.7	SM/CL	@ 3': Mixture of Silty SAND, SILT, CLAY, brown/olive, damp to moist, mottled, gravel (rounded)	MC
705	5			50/2"				@ 5': No recovery	
			S3	48/8"			SM/CL	@ 7.5': Cobble	
			S4				CL	**Quaternary Alluvium (Qal)** @ 8.5': CLAY, dark brown, moist, medium stiff	
700	10		R5	17	109.9	13.9	CL	@ 10': CLAY, brown, moist, stiff	MC
			R6	12	107.9	13.5	CL	@ 12.5': CLAY, brown, moist, medium stiff	MC, CN
		Bulk B9 @ 14' - 18'					ML	**Kern River Formation (QTKr)** @ 14': SILTSTONE, olive, very moist, stiff	
695	15		R7	28	84.2	32.2	ML	@ 15': SILTSTONE, olive, very moist, hard	MC
690	20		R8	47	93.9	27.3	ML	@ 20': SILTSTONE, olive, very moist, hard	MC
685	25		R10	79	75.5	43.7	ML	@ 25': SILTSTONE, reddish brown/purple, very moist, hard	MC
	30							Total Depth at 26.5 feet Groundwater was not encountered Hole backfilled with spoils 2/7/07	

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE
CS CORROSION SUITE
MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-3

Date 2-7-07 **Sheet** 1 of 2
Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 **Project No.** 142136-001
Drilling Co. ABC Liovin Drilling **Type of Rig** CME-75 HSA
Hole Diameter 8 inches **Drive Weight** 140 lbs with Auto Trip Hammer **Drop** 30 inches
Elevation Top of Hole +/- 810 ' **Location** (See Boring Location Map)

Logged By Roderick Marcia
Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
810	0							**Quaternary Alluvium (Qal)** @ Surface: CLAY, brown, moist	
			R1	37	103.0	15.7	CL	@ 2.5': CLAY, reddish brown, moist, stiff, porosity	
805	5		R2	78	112.7	5.0	ML	**Kern River Formation (QTKr)** @ 5': Sandy SILT, light brown, damp, hard, trace gravel	
			R3	39	94.5	8.6	SM-ML	@ 7.5': Silty SAND, to Sandy SILT, light brown/orange, damp, medium dense	
800	10		R4	53	100.9	9.4	SM-ML	@ 10': Silty SAND to Sandy SILT, light brown/orange, damp, dense, cementation	MC, DS
795	15		S5	34			SM-ML	@ 15': Silty SAND to Sandy SILT, light brown/orange, damp, dense, slight cementation	
790	20		R6	97	96.6	24.1	SM	@ 20': Silty SAND, light brown, moist, dense	
							ML	@ 21': SILT, olive, brown	
785	25		S7	34				@ 25': cobblestone	
			S8				SM	@ 26': Silty SAND, brown/olive, damp, dense	
							ML	@ 27': SILTSTONE, olive, damp, hard, plastic	
780	30								

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE
CS CORROSION SUITE
MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-3

Date 2-7-07 **Sheet** 2 **of** 2
Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 **Project No.** 142136-001
Drilling Co. ABC Liovin Drilling **Type of Rig** CME-75 HSA
Hole Diameter 8 inches **Drive Weight** 140 lbs with Auto Trip Hammer **Drop** 30 inches
Elevation Top of Hole +/- 810 ' **Location** (See Boring Location Map)

Logged By Roderick Marcia
Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Graphic Log	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
780	30			R9	50/5"			ML	@ 30': SILTSTONE, light brown/yellow, moist, hard	
775	35			S10	37			ML	@ 35': SILTSTONE, brown, moist, dense	
770	40			R11	94	88.4	34.7	ML	@ 40': SILTSTONE, olive/brown, very moist, hard, plastic	
765	45			S12	20			ML	@ 45': SILTSTONE, olive, moist, stiff	
760	50			R13	50/3"	91.9	18.1	ML	@ 50': SILTSTONE, olive/brown, moist, dense	
755	55									
750	60									

Total Depth at 51.5 feet
Groundwater not encountered
Hole backfilled with spoils 2/7/07

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE
CS CORROSION SUITE
MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-4

Date 2-7-07 **Sheet** 1 **of** 1
Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 **Project No.** 142136-001
Drilling Co. ABC Liovin Drilling **Type of Rig** CME-75 HSA
Hole Diameter 8 inches **Drive Weight** 140 lbs with Auto Trip Hammer **Drop** 30 inches
Elevation Top of Hole +/- 763 ' **Location** (See Boring Location Map)

Logged By Roderick Marcia
Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Graphic Log (N S)	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0		Bulk Sample @ 0-5'						**Quaternary Alluvium (Qal)** @ Surface: CLAY, brown, moist, grass/weeds	
				R1	31	79.8	17.5	CL	@ 1': Sandy CLAY, stiff, brown, damp, porosity	CS, RV, MC
760				R3	39			CL	@ 3': CLAY, reddish/brown, moist, stiff	
	5			R4	63			CL	@ 5': Sandy CLAY, reddish/brown, moist, hard, trace gravel	
755				R5	65			SM	**Kern River Formation (QTKr)** @ 7.5': Silty SAND with gravel, brown, damp, dense	
	10			R6	61	113.1	9.1	SM	@ 10': Silty SAND, light brown, moist, dense, cemented	MC
750									Total Depth at 11.5 feet Groundwater was not encountered Hole backfilled with spoils 2/7/07	
	15									
745										
	20									
740										
	25									
735										
	30									

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE
CS CORROSION SUITE
MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-5

Date 2-7-07 **Sheet** 1 **of** 1
Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 **Project No.** 142136-001
Drilling Co. ABC Liovin Drilling **Type of Rig** CME-75 HSA
Hole Diameter 8 inches **Drive Weight** 140 lbs with Auto Trip Hammer **Drop** 30 inches
Elevation Top of Hole +/- 744 ' **Location** (See Boring Location Map)

Logged By Roderick Marcia
Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Graphic Log (N S)	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0								**Quaternary Alluvium (Qal)**	
									@ Surface: Sandy CLAY, brown, damp	
				R1	20	92.3	6.6	SC	@ 1': Clayey SAND, brown, damp, medium dense, carbonate, porosity	
				R2	29	94.5	19.6	CL	@ 3': Sandy CLAY, reddish brown, moist, stiff, porosity, traces of carbonate	
740	5			R3	64	111.4	9.5	CL	@ 5': Sandy CLAY, reddish/brown, damp, stiff, porosity, traces of carbonate	
735	10			R4	69	128.5	6.3	CL	@ 10': Sandy CLAY, reddish brown, damp, hard, with carbonates	
									Total Depth at 11.5 feet Groundwater was not encountered Hole backfilled with spoils 2/7/07	
730	15									
725	20									
720	25									
715	30									

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE
CS CORROSION SUITE
MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-6

Date 2-7-07 **Sheet** 1 **of** 1
Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 **Project No.** 142136-001
Drilling Co. ABC Liovin Drilling **Type of Rig** CME-75 HSA
Hole Diameter 8 inches **Drive Weight** 140 lbs with Auto Trip Hammer **Drop** 30 inches
Elevation Top of Hole +/- 762 ' **Location** (See Boring Location Map)

Logged By Roderick Marcia
Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Graphic Log (N S)	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0		Bulk Sample @ 0-5' B1						**Quaternary Alluvium (Qal)** @ Surface: CLAY, brown, dry, gravel, cobbles, weeds	MD, RDS
760				R2	34			CL	@ 2.5': Sandy CLAY, reddish brown, damp, stiff, porosity	
	5			R3	62			CL	@ 5': Sandy CLAY, reddish brown, damp, hard	
755				R4	32			ML	**Kern River Formation (QTKr)** @ 7.5': Sandy SILT, ligth brown, damp, medium dense, traces of porosity, cementation	
	10			R5	88	117.1	7.4	ML	@ 10': Sandy SILT, light brown, damp, dense, cementation	MC
750										
	15			R6	60	110.9	7.1	CL	@ 15': Sandy CLAY, reddish brown, moist, hard, fine grained	MC
745									Total Depth at 16.5 feet Groundwater was not encountered Hole backfilled with spoils 2/7/07	
	20									
740										
	25									
735										
	30									

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE
CS CORROSION SUITE
MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-7

Date: 2-7-07 | Sheet 1 of 2
Project: Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 | Project No.: 142136-001
Drilling Co.: ABC Liovin Drilling | Type of Rig: CME-75 HSA
Hole Diameter: 8 inches | Drive Weight: 140 lbs with Auto Trip Hammer | Drop: 30 inches
Elevation Top of Hole +/- 737 ' | Location: (See Boring Location Map)

Logged By: Roderick Marcia
Sampled By: Roderick Marcia

Elevation Feet	Depth Feet	Graphic Log (N–S)	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)** @ Surface: Silty SAND, light brown, dry, grass/weeds	
735										
	5			R1	83	123.2	7.3	SM	**Kern River Formation (QTKr)** @ 5': Silty SAND, light brown, damp, dense	MC
730										
	10			R2	50			SM	@ 10': Silty SAND, light brown, damp, gravel @ 11.5': gravel/cobble layer	
725										
	15			R3	51	119.7	3.8	ML	@ 15': Sandy SILT, light brown, damp, hard	MC
									@ 16': Silty SAND, light brown, damp, trace gravel	
720										
	20			R4	55	116.5	7.7	SM	@ 20': Silty SAND, light brown, moist, dense with silt layers	MC
715										
	25			R5	68	108.7	14.5	ML	@ 25': SILT, olive/brown, moist, hard	PRM
710										
	30									

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE
CS CORROSION SUITE
MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-7

Date 2-7-07 **Sheet** 2 **of** 2

Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 **Project No.** 142136-001

Drilling Co. ABC Liovin Drilling **Type of Rig** CME-75 HSA

Hole Diameter 8 inches **Drive Weight** 140 lbs with Auto Trip Hammer **Drop** 30 inches

Elevation Top of Hole +/- 737 ' **Location** (See Boring Location Map)

Logged By Roderick Marcia

Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Graphic Log (N S)	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	30			R6	69	105.8	2.2	SP-SM	@ 30': SAND with Silt, light gray, damp, dense, fine grain	MC
705										
	35			R7	49			SP-SM	@ 35': SAND with Silt, light gray, damp, dense, fine grain	-200
700									Total Depth at 36.5 feet Groundwater was not encountered Hole backfilled with spoils 2/7/07	
	40									
695										
	45									
690										
	50									
685										
	55									
680										
	60									

SAMPLE TYPES:
- S SPT
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:
- SU SULFATE
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- HCO HYDROCOLLAPSE
- HD HYDROMETER
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE
- CS CORROSION SUITE
- MC MOISTURE CONTENT
- SE SAND EQUIVALENT
- -200 200 WASH
- RDS REMOLDED DS
- PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-8

Date 2-7-07 | Sheet 1 of 2
Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 | Project No. 142136-001
Drilling Co. ABC Liovin Drilling | Type of Rig CME-75 HSA
Hole Diameter 8 inches | Drive Weight 140 lbs with Auto Trip Hammer | Drop 30 inches
Elevation Top of Hole +/- 731 ' | Location (See Boring Location Map)

Logged By Roderick Marcia
Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Graphic Log (N S)	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
730	0								**Quaternary Alluvium (Qal)** @ Surface: Clayey Silty SAND, light brown, dry	
725	5			R1	50	110.8	5.7	SM	@ 5': Silty SAND, light brown, damp, dense with gravel and cobble	MC
720	10			R2	47	97.5	5.2	SM-ML	**Kern River Formation (QTKr)** @ 10': Silty SAND, to sandy silt, light brown, damp, medium dense, carbonates, fine, traces of porosity	MC
715	15			R3	76	114.1	8.1	SM-ML	@ 15': Silty SAND, to sandy silt, light brown, damp, dense, silt lens, traces of porosity	MC
710	20			R4	48			SP-SM	@ 20': SAND with Silt, light gray/light brown, dry, dense	
705	25			R5	73			SP-SM	@ 25': SAND with Silt, light gray/light brown, dry, dense @ 26': gravel/cobble layer	
	30									

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE
CS CORROSION SUITE
MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

GEOTECHNICAL BORING LOG B-8

Date 2-7-07 **Sheet** 2 **of** 2
Project Bakersfield Residential Builders, LP-Tuscany North Tract No. 7027 **Project No.** 142136-001
Drilling Co. ABC Liovin Drilling **Type of Rig** CME-75 HSA
Hole Diameter 8 inches **Drive Weight** 140 lbs with Auto Trip Hammer **Drop** 30 inches
Elevation Top of Hole +/- 731 ' **Location** (See Boring Location Map)

Logged By Roderick Marcia
Sampled By Roderick Marcia

Elevation Feet	Depth Feet	Graphic Log (N S)	Notes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
700	30			R6	50/3"			SM	@ 30': Silty SAND with gravel, light brown, dry, dense, siltstone?	
				S7	44			ML	@ 32.5': SILTSTONE, olive/green, very moist, hard	
695	35			R8	89/11"	87.9	28.3	ML	@ 35': SILTSTONE, olive/green, very moist, hard	MC
690	40			R9	50/6"	81.7	35.3	ML	@ 40': SILTSTONE, olive/green, very moist hard	MC, PRM
685	45			R10	50/5"	71.8	49.2	ML	@ 45': SILTSTONE, olive/green, very moist, hard, clay lens	MC
680	50			R11	50/6"	82.3	37.1	ML	@ 50': SILTSTONE, olive/green, very moist, hard	MC
									Total Depth at 51.5 feet Groundwater was not encountered Hole backfilled with spoils 2/7/07	
675	55									
	60									

SAMPLE TYPES:
S SPT
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
SU SULFATE
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
HCO HYDROCOLLAPSE
HD HYDROMETER
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
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MC MOISTURE CONTENT
SE SAND EQUIVALENT
-200 200 WASH
RDS REMOLDED DS
PRM PERMEABILITY

LEIGHTON

TRENCH NO: T-1

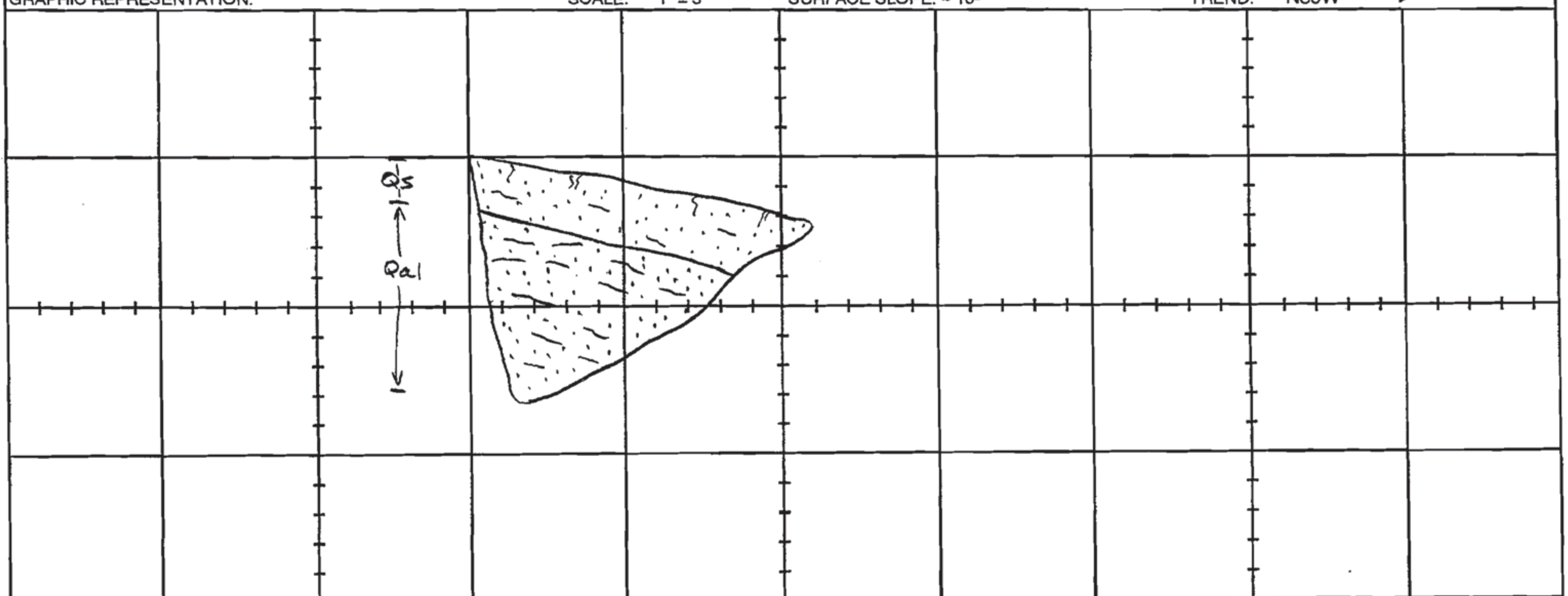
Project No: 142136-001 | Logged by : JBW | Location: See Map

Project Name: McMillin-Tuscany North Tract No. 7027 | Equipment: Backhoe | Elevation: ~845 | Date: 3-1-2007

GEOLOGIC ATTITUDES		Samples	USCS Class	Sample No.	Moist. (%)	Density (pcf)
	Quaternary Soil (Qs): Silty CLAY, medium brown to dark brown, moist, moderately stiff, moderately porous, contains rootlets.	B-1 0-2.5'				
	Quaternary Alluvium (Qal): @2.5' Silty CLAY, reddish brown to orange, slightly moist to moist, stiff @3.5' Silty CLAY with abundant caliche/calcium carbonate meneralization, white to very light gray, slightly moist, contains abundant gravel.	B-2 2.5'-3.5'				
	@4.5' Silty CLAY with abundant gravel, cobbles and boulders, grain size coarsens with depth.	B-3 8'				
	Total Depth: 8' No groundwater/seepage encountered Backfilled with excavated materials					

ENGINEERING PROPERTIES

GRAPHIC REPRESENTATION: SCALE: 1" = 5' SURFACE SLOPE: ~ 10º TREND: N35W →



LEIGHTON

TP logs 142136001;

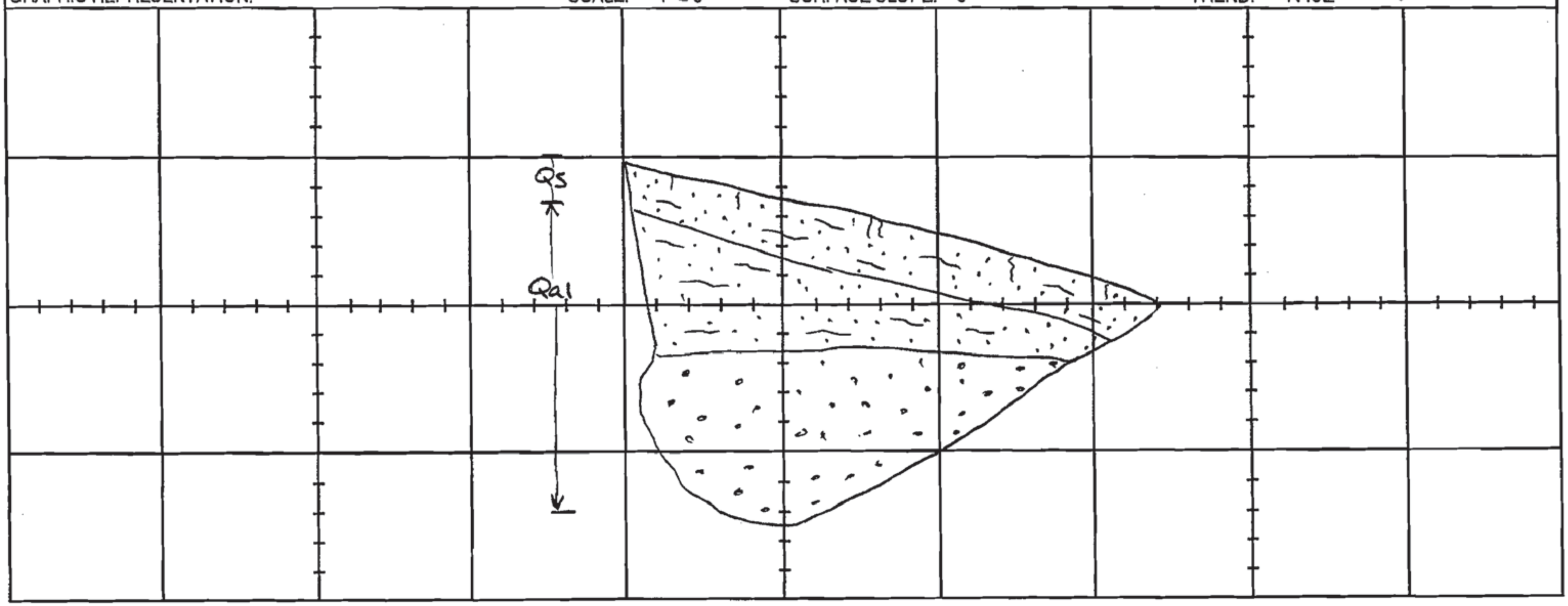
TRENCH NO: T-2

Project No: 142136-001 | Logged by : JBW | Location: See Map

Project Name: McMillin-Tuscany North Tract No. 7027 | Equipment: Backhoe | Elevation: ~745 | Date: 3-1-2007

GEOLOGIC ATTITUDES	Description	Samples	USCS Class	Sample No.	Moist. (%)	Density (pcf)
	Quaternary Soil (Qs): Silty CLAY, medium brown to dark brown, moist, moderately stiff, moderately porous, contains rootlets. **Quaternary Alluvium (Qal):** @2.5' Sandy, Clayey SILT, reddish brown to orange, slightly moist, stiff @5.5' SAND, light gray, slightly moist, loose, clean with little fines; contact is sharp and nearly horizontal. Total Depth: 12' No groundwater/seepage encountered Minor caving below 5.5' Backfilled with excavated materials	B-1 5' B-2 13'-15'				

GRAPHIC REPRESENTATION: SCALE: 1" = 5' SURFACE SLOPE: ~ 8º TREND: N45E →



LEIGHTON

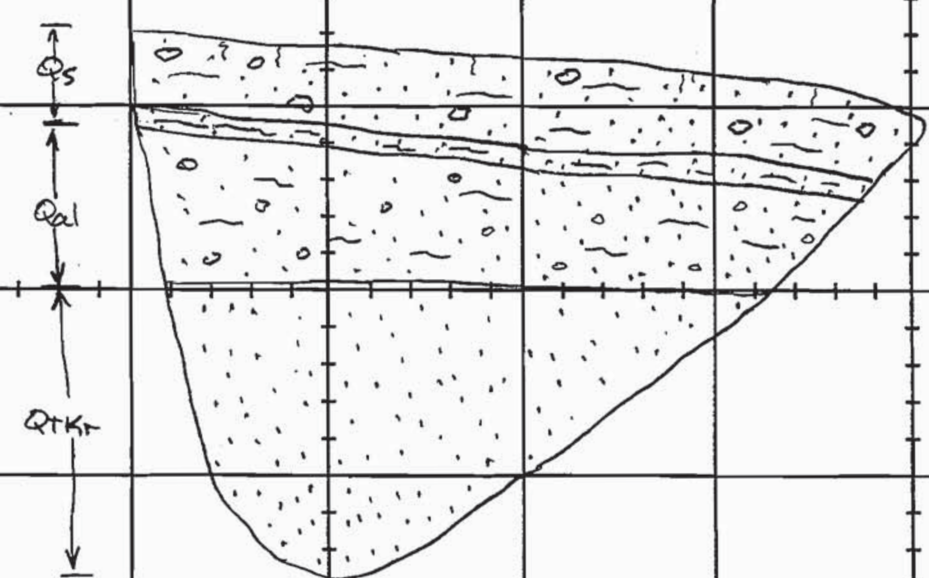
TRENCH NO: T-3

Project No: 142136-001	Logged by : JBW	Location: See Map	
Project Name: McMillin-Tuscany North Tract No. 7027	Equipment: Backhoe	Elevation: ~744	Date: 3-1-2007

GEOLOGIC ATTITUDES	Description	Samples	USCS Class	Sample No.	Moist. (%)	Density (pcf)
	Quaternary Soil (Qs): Gravelly, Clayey SILT, medium brown, moist, moderately stiff, porous, contains rootlets. **Quaternary Alluvium (Qal):** @2.0' Silty CLAY with abundant caliche/calcium carbonate meineralization, white to very light gray, approximately 6" thick. @2.5' Gravelly, Clayey SILT, with Sand, reddish brown to orange, moist, coarsens with depth. **Kern River Formation (QTKr):** @7' Silty SANDSTONE, light brown, slightly moist, moderately hard, not well bedded. Total Depth: 15' No groundwater/seepage encountered Backfilled with excavated materials	B-1 14'-15'				

ENGINEERING PROPERTIES

GRAPHIC REPRESENTATION: SCALE: 1" = 5' SURFACE SLOPE: ~ 3º TREND: N35W →



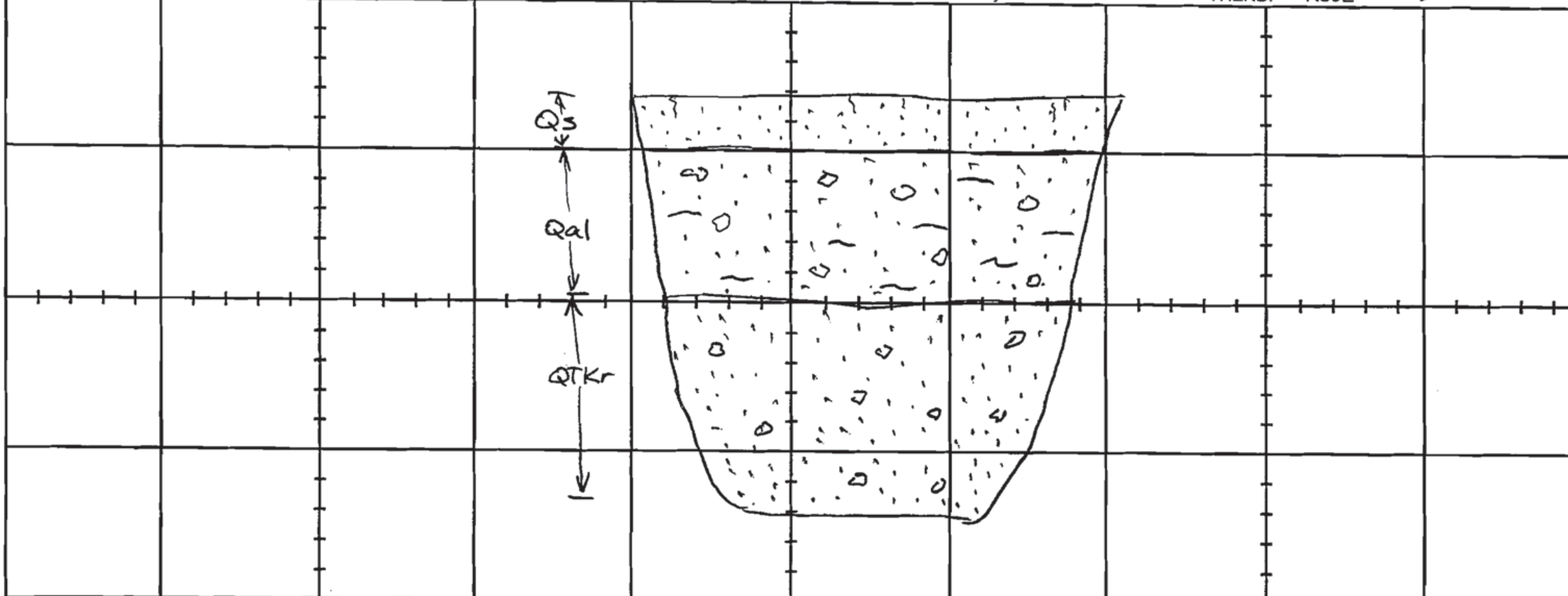
TRENCH NO: T-4

Project No: 142136-001
Project Name: McMillin-Tuscany North Tract No. 7027
Logged by : JBW
Equipment: Backhoe
Location: See Map
Elevation: ~770
Date: 3-1-2007

GEOLOGIC ATTITUDES	Description	Samples	USCS Class	Sample No.	Moist. (%)	Density (pcf)
	Quaternary Soil (Qs): Clayey SILT, medium brown, slightly moist, moderately stiff, porous, contains rootlets. **Quaternary Alluvium (Qal):** @2.0' Gravelly, Clayey SILT, reddish brown to orange, slightly moist, contains abundant cobbles and boulders, coarsens with depth. **Kern River Formation (QTKr):** @7.0' SILTSTONE, yellowish brown to light brown, moist, soft to moderately hard, contains cobbles and boulders. Total Depth: 14' No groundwater/seepage encountered Backfilled with excavated materials	B-1 10'				

ENGINEERING PROPERTIES

GRAPHIC REPRESENTATION: SCALE: 1" = 5' SURFACE SLOPE: nearly level TREND: N80E →



TRENCH NO: T-5

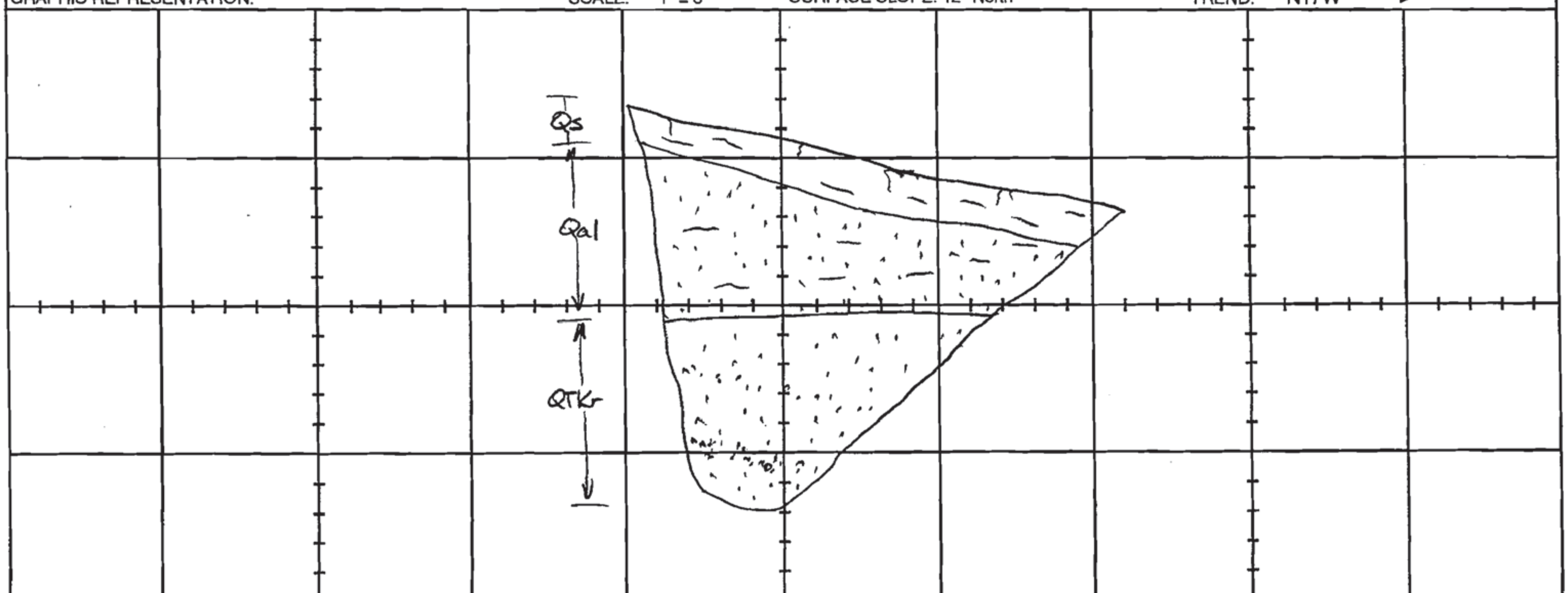
Project No: 142136-001 | Logged by : JBW | Location: See Map

Project Name: McMillin-Tuscany North Tract No. 7027 | Equipment: Backhoe | Elevation: ~815 | Date: 3-1-2007

GEOLOGIC ATTITUDES	Description	Samples	USCS Class	Sample No.	Moist. (%)	Density (pcf)
@7.5' C: nearly level @9' B:N80E, 05NW @11' B: N10W, 05NE	**Quaternary Soil (Qs):** Silty CLAY, dark brown, slightly moist to moist, moderately stiff, porous, contains rootlets. **Quaternary Alluvium (Qal):** @2.0' Clayey SILT, reddish brown to orange, slightly moist, stiff, contains carbonate stringers **Kern River Formation (QTKr):** @7.0' Interbedded SILTSTONE and SANDSTONE, yellowish brown to light brown, slightly moist, soft to moderately hard; sharp, undulatory, nearly horizontal contact, moderately well bedded. Total Depth: 14' No groundwater/seepage encountered Backfilled with excavated materials	B-1 13'-14'				

ENGINEERING PROPERTIES

GRAPHIC REPRESENTATION: SCALE: 1" = 5' SURFACE SLOPE: 12° North TREND: N17W →



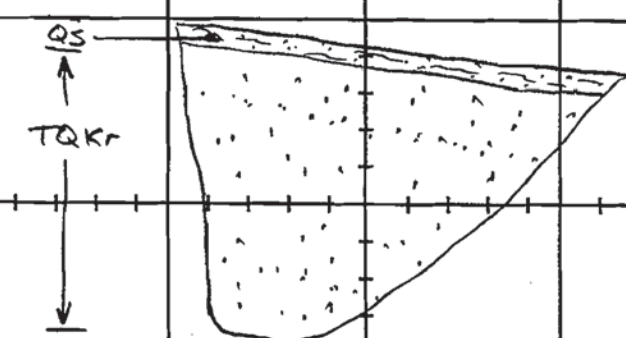
LEIGHTON

TRENCH NO: T-6

Project No: 142136-001
Project Name: McMillin-Tuscany North Tract No. 7027
Logged by : JBW
Equipment: Backhoe
Location: See Map
Elevation: ~735
Date: 3-1-2007

GEOLOGIC ATTITUDES	Description	Samples	ENGINEERING PROPERTIES: USCS Class	Sample No.	Moist. (%)	Density (pcf)
@5' B: N05E, 60NW	**Quaternary Soil (Qs):** Silty CLAY, dark brown, slightly moist to moist, moderately stiff, porous, contains rootlets. **Kerr# River Formation (QTKr):** @1' SILTSTONE, yellowish brown to light brown, dry to very slightly moist, soft to moderately hard. Total Depth: 9' No groundwater/seepage encountered Backfilled with excavated materials					

GRAPHIC REPRESENTATION: SCALE: 1" = 5' SURFACE SLOPE: 6° TREND: N-S →



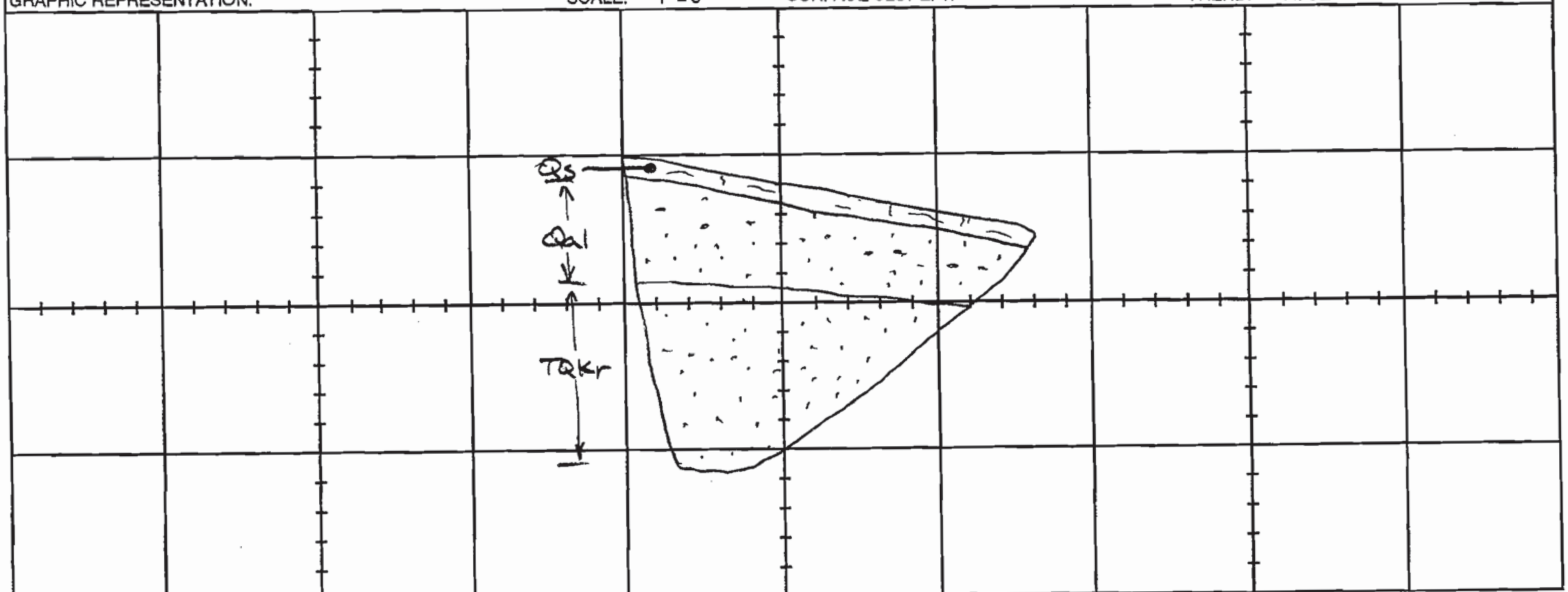
TRENCH NO: T-7

Project No: 142136-001 | Logged by : JBW | Location: See Map

Project Name: McMillin-Tuscany North Tract No. 7027 | Equipment: Backhoe | Elevation: ~725 | Date: 3-1-2007

GEOLOGIC ATTITUDES	Description	Samples	USCS Class	Sample No.	Moist. (%)	Density (pcf)
@3.5' C: N04E, 11NW @8.0' B: N45W, 4SW	**Quaternary Soil (Qs):** Silty CLAY, dark brown, slightly moist to moist, moderately stiff, porous, contains rootlets. **Quaternary Alluvium (Qal):** @0.5' Sandy SILT, light brown, slightly moist, loose to moderately dense, slightly porous. **Kern River Formation (QTKr):** @3.5' SILTSTONE, yellowish brown to light brown, dry to very slightly moist, moderately hard; sharp contact; moderately cemented and well bedded. Total Depth: 11' No groundwater/seepage encountered Backfilled with excavated materials	B-1 10'-12'				

GRAPHIC REPRESENTATION: SCALE: 1" = 5' SURFACE SLOPE: 17° TREND: N70E →



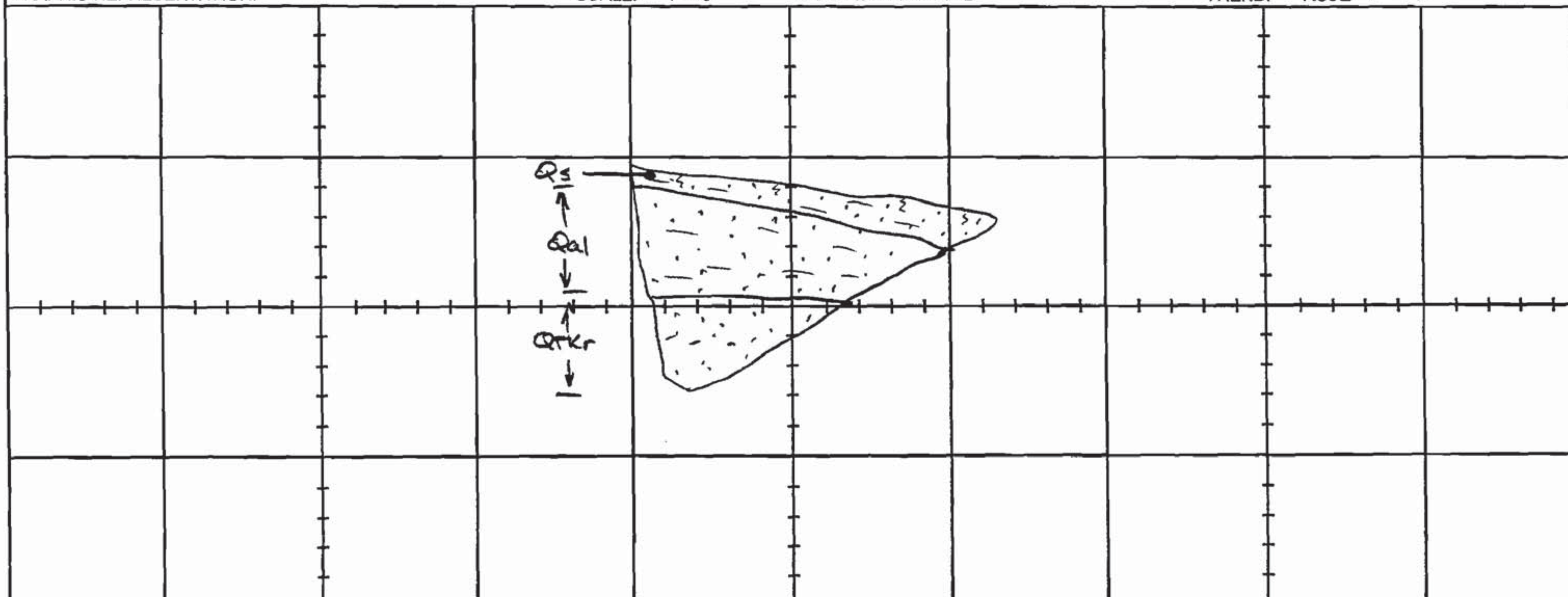
TRENCH NO: T-8

Project No: 142136-001 | Logged by : JBW | Location: See Map

Project Name: McMillin-Tuscany North Tract No. 7027 | Equipment: Backhoe | Elevation: ~770 | Date: 3-1-2007

GEOLOGIC ATTITUDES		Samples	ENGINEERING PROPERTIES			
			USCS Class	Sample No.	Moist. (%)	Density (pcf)
@6.5' B: N27W,34SW	**Quaternary Soil (Qs):** Silty CLAY, dark brown, moist, moderately stiff, porous, contains rootlets and carbonate stringers. **Quaternary Alluvium (Qal):** @1.0' Clayey SILT, reddish brown to orange, slightly moist, stiff. **Kern River Formation (QTKr):** @4.0' SILTSTONE, white to light gray, slightly moist, soft to moderately hard, friable. Total Depth: 8' No groundwater/seepage encountered Backfilled with excavated materials					

GRAPHIC REPRESENTATION: SCALE: 1" = 5' SURFACE SLOPE: 12° TREND: N30E →



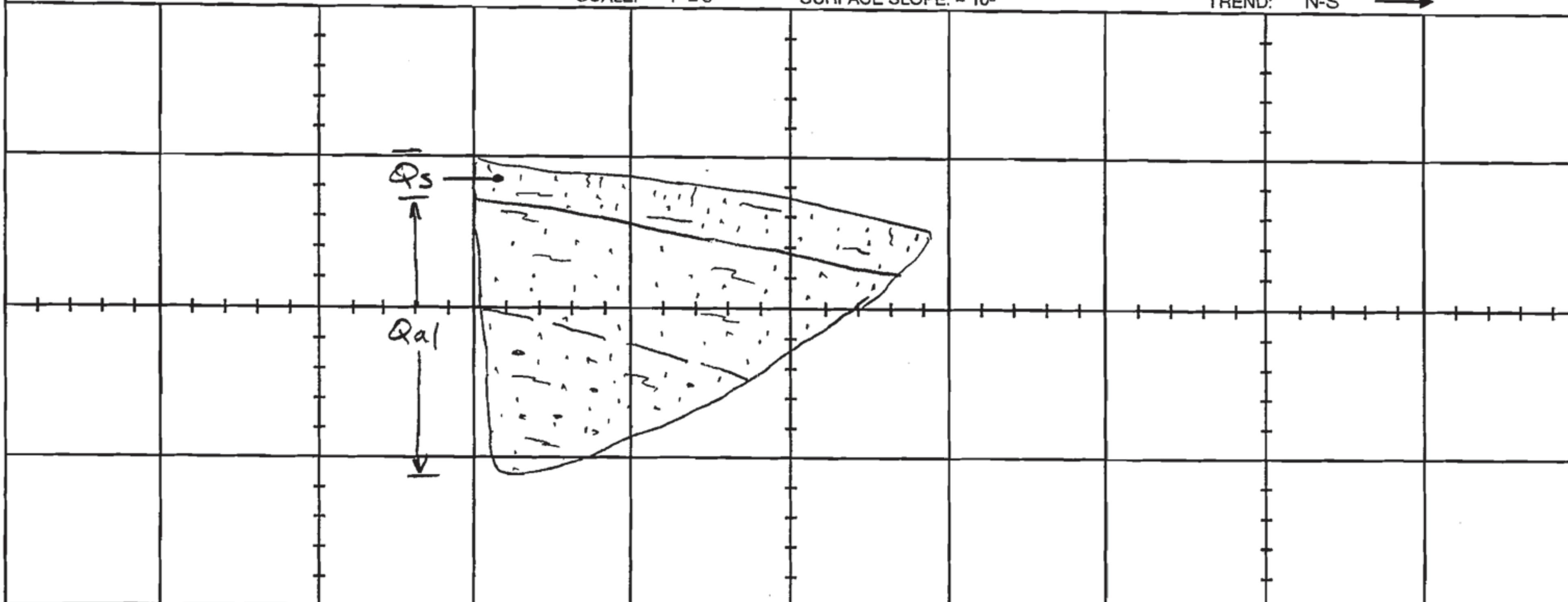
LEIGHTON

TRENCH NO: T-9

Project No: 142136-001
Project Name: McMillin-Tuscany North Tract No. 7027
Logged by : JBW
Equipment: Backhoe
Location: See Map
Elevation: ~770
Date: 3-1-2007

GEOLOGIC ATTITUDES	Description	Samples	ENGINEERING PROPERTIES: USCS Class	Sample No.	Moist. (%)	Density (pcf)
	Quaternary Soil (Qs): Silty CLAY, medium brown to dark brown, moist, moderately stiff, moderately porous, contains rootlets. **Quaternary Alluvium (Qal):** @2.0' Clayey SILT, reddish brown to orange, slightly moist @5.0' Clayey, Sandy SILT, reddish brown to orange, slightly moist Total Depth: 11' No groundwater/seepage encounted Backfilled with excavated materials	B-1 0.5'-1.5'				

GRAPHIC REPRESENTATION: SCALE: 1" = 5' SURFACE SLOPE: ~ 10º TREND: N-S →



LEIGHTON

APPENDIX C

ATTERBERG LIMITS

ASTM D 4318

Leighton

Project Name:	Maple Ridge Assisted Living	Tested By:	A. Santos	Date:	07/30/15
Project No. :	11065.001	Input By:	J. Ward	Date:	07/31/15
Boring No.:	T-13	Checked By:	J. Ward		
Sample No.:	T-13-6	Depth (ft.)	6.0		
Soil Identification:	Light olive brown silt (ML)				

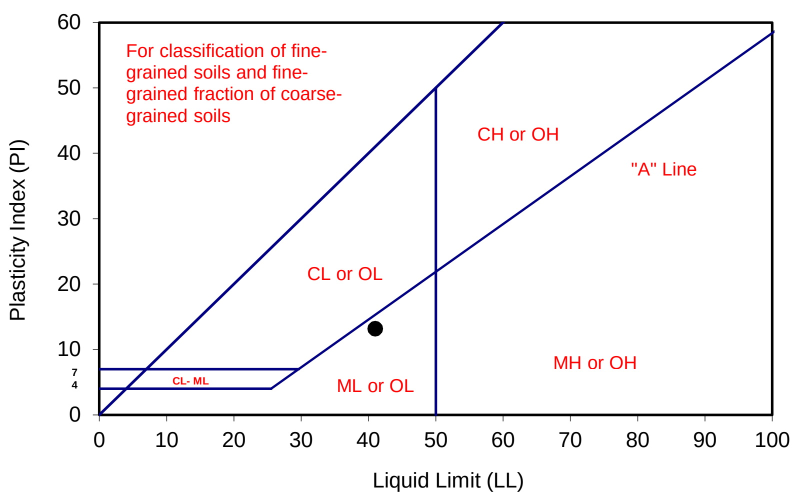
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			33	28	22	
Wet Wt. of Soil + Cont. (g)	9.51	8.55	20.00	19.11	19.92	
Dry Wt. of Soil + Cont. (g)	7.67	6.92	14.73	13.97	14.37	
Wt. of Container (g)	1.07	1.04	1.06	1.04	1.05	
Moisture Content (%) [Wn]	27.88	27.72	38.55	39.75	41.67	

Liquid Limit	**41**
Plastic Limit	**28**
Plasticity Index	**13**
Classification	**ML**

PI at "A" - Line = 0.73(LL-20) | 15.33

One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



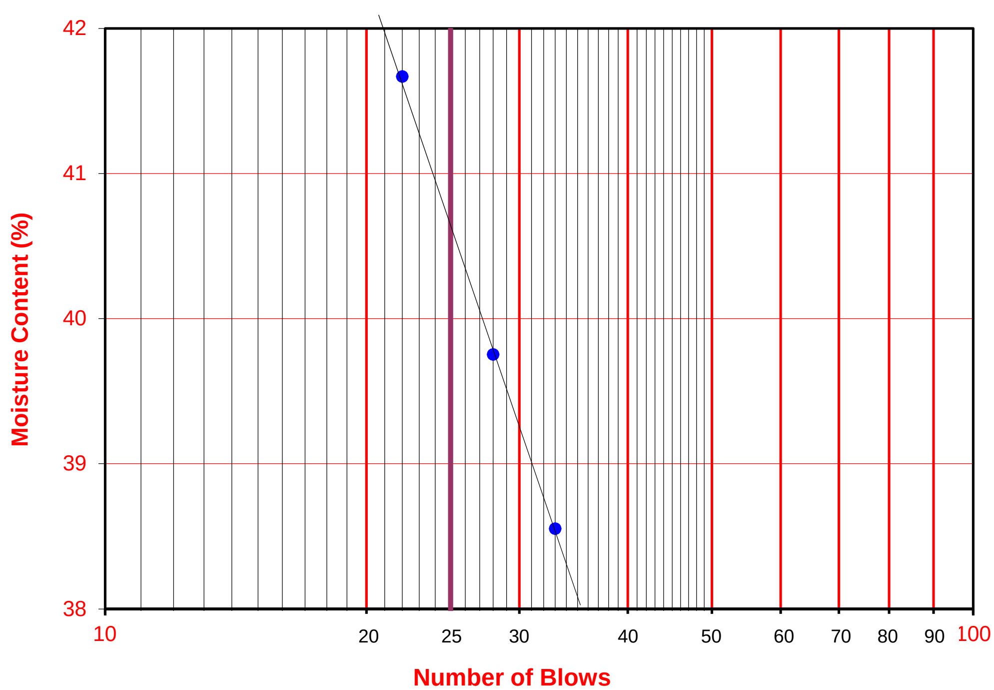
PROCEDURES USED

[ ] Wet Preparation
Multipoint - Wet

[X] Dry Preparation
Multipoint - Dry

[X] Procedure A
Multipoint Test

[ ] Procedure B
One-point Test

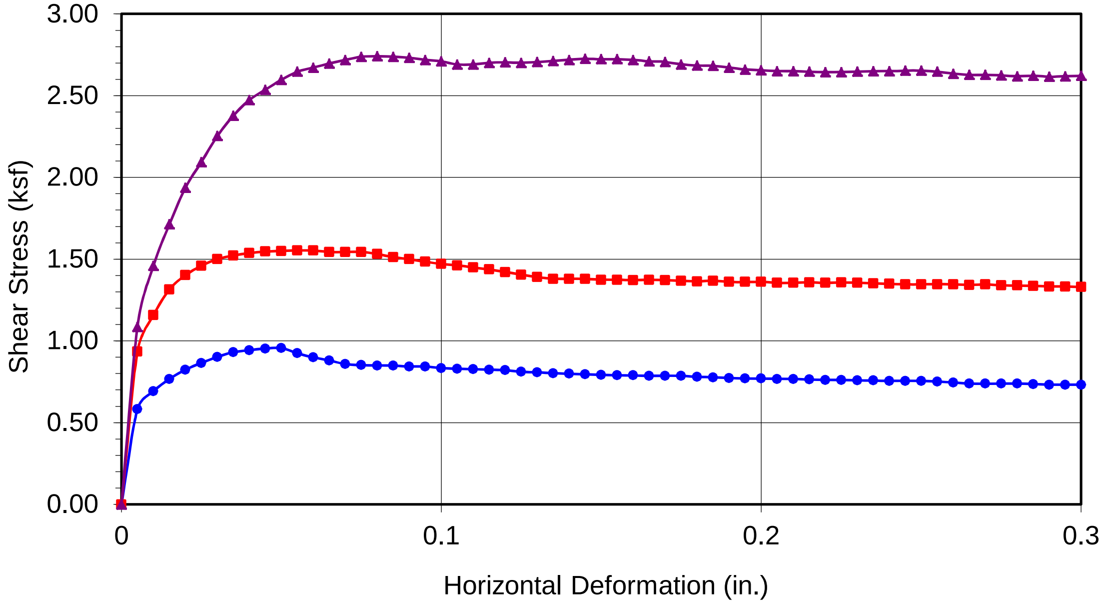


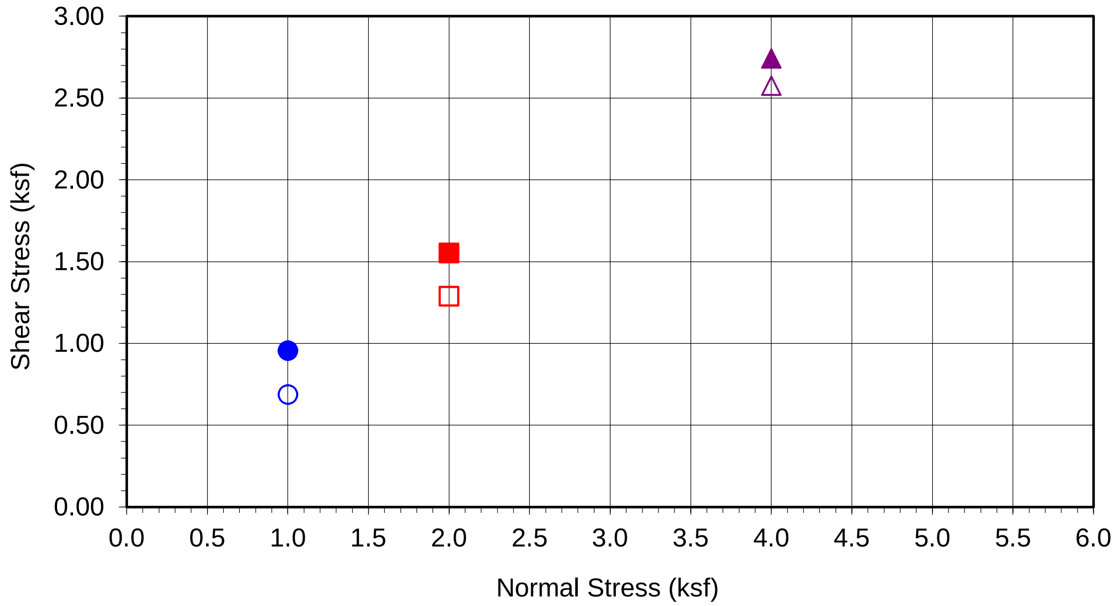
DIRECT SHEAR TEST

ASTM D3080

Project Name:	Maple Ridge Assisted Living	Tested By:	G. Bathala	Date:	07/29/15
Project No.:	11065.001	Checked By:	J. Ward		
Boring No.:	T-13	Sample Type:	Ring		
Sample No.:	T-13-6	Depth (ft.):	6.0		
Sample Description:	Light olive brown silt (ML)				

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	154.23	155.84	159.57
Weight of Ring(gm):	43.14	40.41	43.01
Before Shearing			
Weight of Wet Sample+Cont.(gm):	179.89	179.89	179.89
Weight of Dry Sample+Cont.(gm):	168.62	168.62	168.62
Weight of Container(gm):	36.85	36.85	36.85
Vertical Rdg.(in): Initial	0.2474	0.0000	0.2755
Vertical Rdg.(in): Final	0.2498	-0.0044	0.2980
After Shearing			
Weight of Wet Sample+Cont.(gm):	165.25	185.56	174.21
Weight of Dry Sample+Cont.(gm):	135.28	156.09	145.10
Weight of Container(gm):	37.76	52.74	39.55
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 0.956	■ 1.553	▲ 2.741
Shear Stress @ End of Pass 5 (ksf)	○ 0.688	□ 1.289	△ 2.575
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	8.55	8.55	8.55
Dry Density (pcf)	85.1	88.4	89.3
Saturation (%)	23.6	25.5	26.0
Soil Height Before Shearing (in.)	0.9976	0.9956	0.9775
Final Moisture Content (%)	30.7	28.5	27.6

DIRECT SHEAR TEST RESULTS
Consolidated Drained - ASTM D 3080

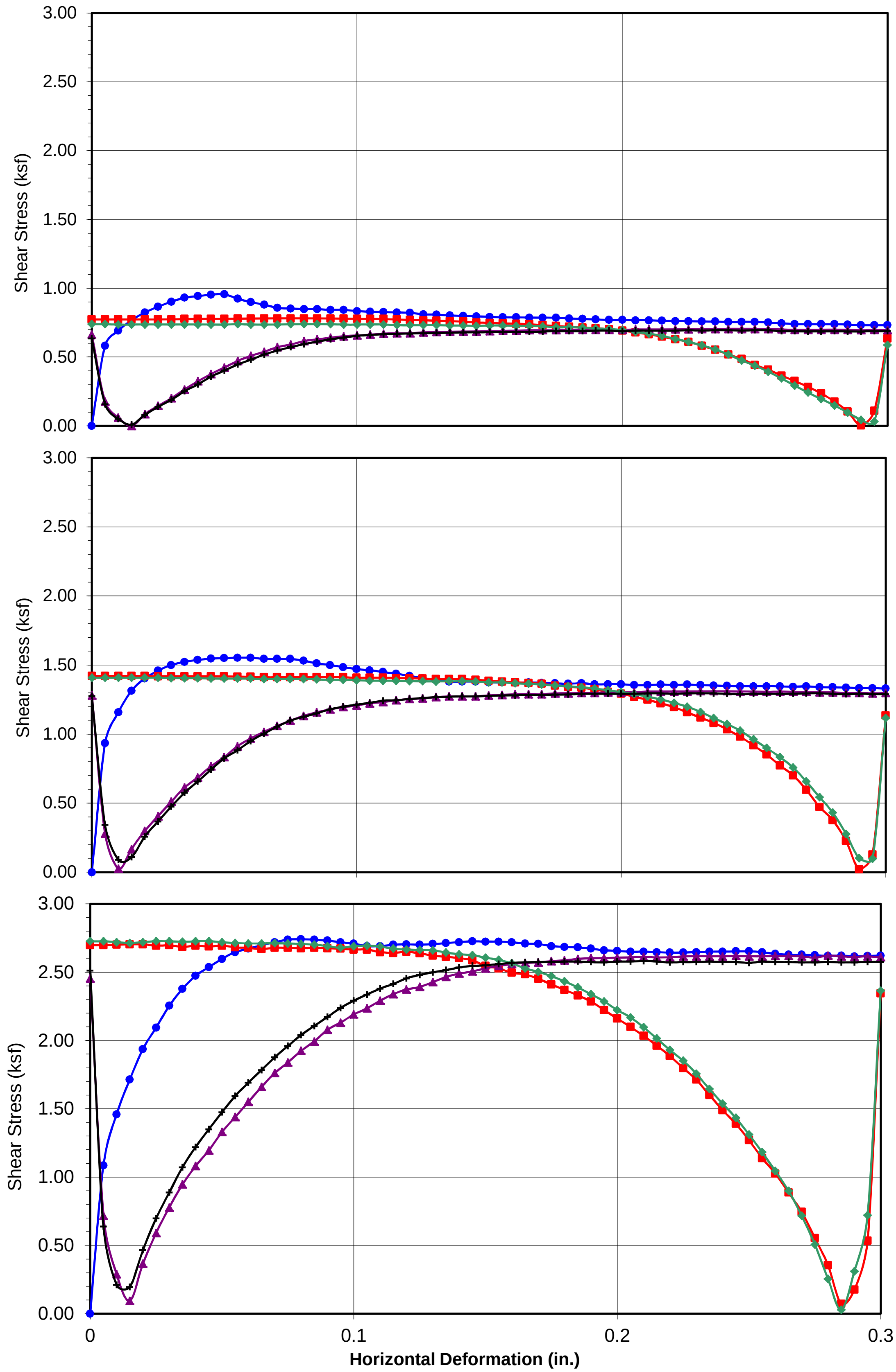
Leighton

Boring No.:	T-13
Sample No.:	T-13-6
Depth (ft)	6.0
Sample Type:	Ring
Soil Description:	Light olive brown silt (ML)

Project No.: 11065.001

Maple Ridge Assisted Living

07-15



Normal Stress (ksf) 1.00	
Shear Stress @ End of Pass (ksf)	
Pass No.	Shear Stress (ksf)
1	0.732
2	0.773
3	0.695
4	0.739
5	0.688
6	
7	
8	
9	
10	

Normal Stress (ksf) 2.00	
Shear Stress @ End of Pass (ksf)	
Pass No.	Shear Stress (ksf)
1	1.330
2	1.421
3	1.298
4	1.408
5	1.289
6	
7	
8	
9	
10	

Normal Stress (ksf) 4.00	
Shear Stress @ End of Pass (ksf)	
Pass No.	Shear Stress (ksf)
1	2.622
2	2.697
3	2.609
4	2.726
5	2.575
6	
7	
8	
9	
10	

Pass 1-5 0.05"/min

DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Leighton

Boring No.:	T-13
Sample No.:	T-13-6
Depth (ft)	6.0
Soil Type:	Ring
Soil Description:	Light olive brown silt (ML)

Project No.: 11065.001

Maple Ridge Assisted Living

07-15

APPENDIX B
GEOTECHNICAL LABORATORY TESTING

The geotechnical laboratory testing program was directed toward a quantitative and qualitative evaluation of the physical and mechanical properties of the soils underlying the proposed residential development of Tentative Tract No. 7027, and to aid in verifying soil classification.

Percent Fines (Percentage Passing Sieve No. 200): Selected soil samples were wet-wash sieved through a No. 200 U.S. Standard brass sieve in accordance with ASTM Test Methods D 1140 to determine the percent fines (silts and clays). This data was used to refine the Unified Soil Classification for tested soil samples. Test results are presented in this appendix.

Consolidation Test: Consolidation test was performed in accordance with ASTM Test Method D2435 on selected, relatively undisturbed ring samples. Samples were placed in a consolidometer and loads were applied in geometric progression. The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical compression to the original 1-inch height. The consolidation pressure curves are presented in the test data herein.

Direct Shear Tests: Direct shear tests were performed, in general accordance with ASTM Test Method D 3080, on selected undisturbed samples and samples remolded to 90 percent of maximum dry density (ASTM Test Method D1557) which were soaked for a minimum of 24 hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box, and reloading the sample, pore pressures set up in the sample due to the transfer were allowed to dissipate for a period of approximately 1 hour prior to application of shearing force. The samples were tested under various normal loads, a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of less than 0.001 to 0.5 inches per minute (depending upon the soil type). The test results are presented on test data sheets which follow in this appendix.

Expansion Index Tests: The expansion potential of selected materials was evaluated in accordance with ASTM Test Method 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.

Moisture and Density Determination Tests: Moisture content and dry density determinations were performed in accordance with ASTM Test Method D 2216 and D 2937 on relatively undisturbed samples obtained from the borings. The results of these tests are presented in the boring logs (see Appendix A).

Maximum Density Tests: The maximum dry density and optimum moisture content of representative soil samples were determined in accordance with ASTM Test Method D 1557. Results of these tests are presented on the sheets titled *Modified Proctor Compaction Test* in this appendix.

Permeability Tests: Permeability tests were performed on selected undisturbed soil samples in accordance with ASTM Test Method D 5084 Falling Head Method. Results of these tests are presented on the test data sheets in this appendix.

"R"-Value: The resistance "R"-value was determined by the California Test Method 301 for subgrade soils. One sample was prepared and exudation pressure and "R"-value determined on each one. The graphically determined "R"-value at exudation pressure of 300 psi is summarized on test data sheets in this appendix.

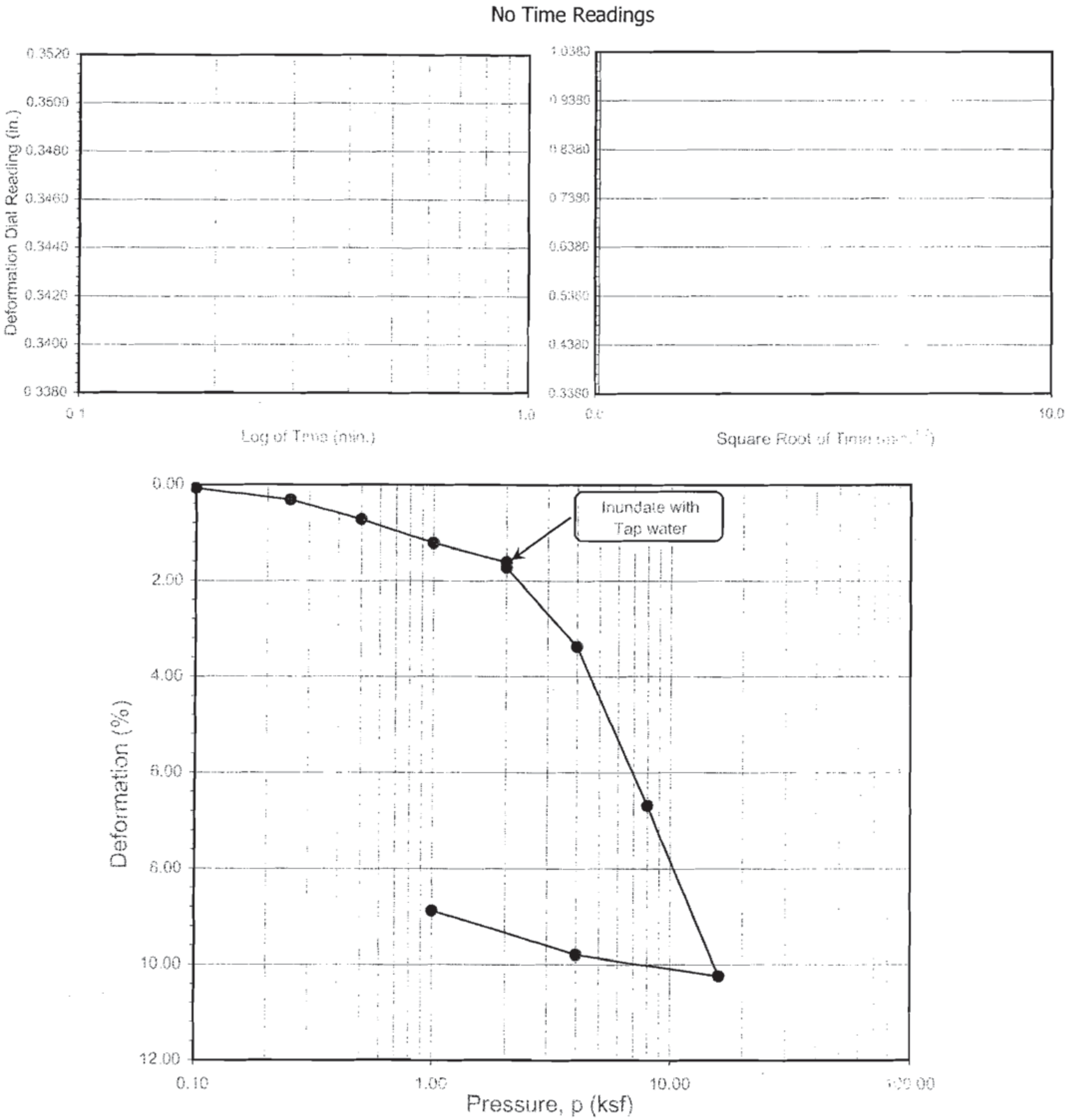
Chloride Content, Sulfate Content, Minimum Resistivity and pH Tests: Chloride content, Sulfate content, Minimum resistivity and pH tests were performed in general accordance with California Test Methods 422, 417, and 532. Test results are presented on test data sheets which follow in this appendix.

Boring No.	B-3	B-4	B-5	B-7				
Sample No.	R3	R6	R2	R6				
Depth (ft.)	7.5	10	3	35				
Sample Type	RING	RING	RING	RING				
Soil Identification	Light Brown, Sandy SILT (ML)	Light Brown, Silty SAND (SM)	Reddish Brown, Clayey SAND (SC), with gravel	Grey, SAND with silt (SP-SM)				
Moisture Correction								
Wet Weight of Soil + Container (g)	0.00	0.00	0.00	0.00				
Dry Weight of Soil + Container (g)	0.00	0.00	0.00	0.00				
Weight of Container (g)	1.00	1.00	1.00	1.00				
Moisture Content (%)	0.00	0.00	0.00	0.00				
Sample Dry Weight Determination								
Weight of Sample + Container (g)	491.90	408.00	447.10	392.10				
Weight of Container (g)	248.20	248.10	246.70	253.10				
Weight of Dry Sample (g)	243.70	159.90	200.40	139.00				
Container No.:	A-1	A-3	A-2	A-4				
After Wash								
Method (A or B)	B	B	B	B				
Dry Weight of Sample + Cont. (g)	355.10	337.70	362.80	382.00				
Weight of Container (g)	248.20	248.10	246.70	253.10				
Dry Weight of Sample (g)	106.90	89.60	116.10	128.90				
% Passing No. 200 Sieve	**56.1**	**44.0**	**42.1**	**7.3**				
% Retained No. 200 Sieve	43.9	56.0	57.9	92.7				

Leighton

PERCENT PASSING
No. 200 SIEVE
ASTM D 1140

Project Name: McMillin - Tuscany North Tract 7027
Project No.: 142136-001
Client Name: McMillin Land Development
Tested By: RM Date: 02/26/07



Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
B-2	**R6**	**12.5**	**13.5**	**16.7**	**107.9**	**118.0**	**0.562**	**0.423**	**65**	**100**

Soil Identification: Brown silty, clayey sand (SC-SM)

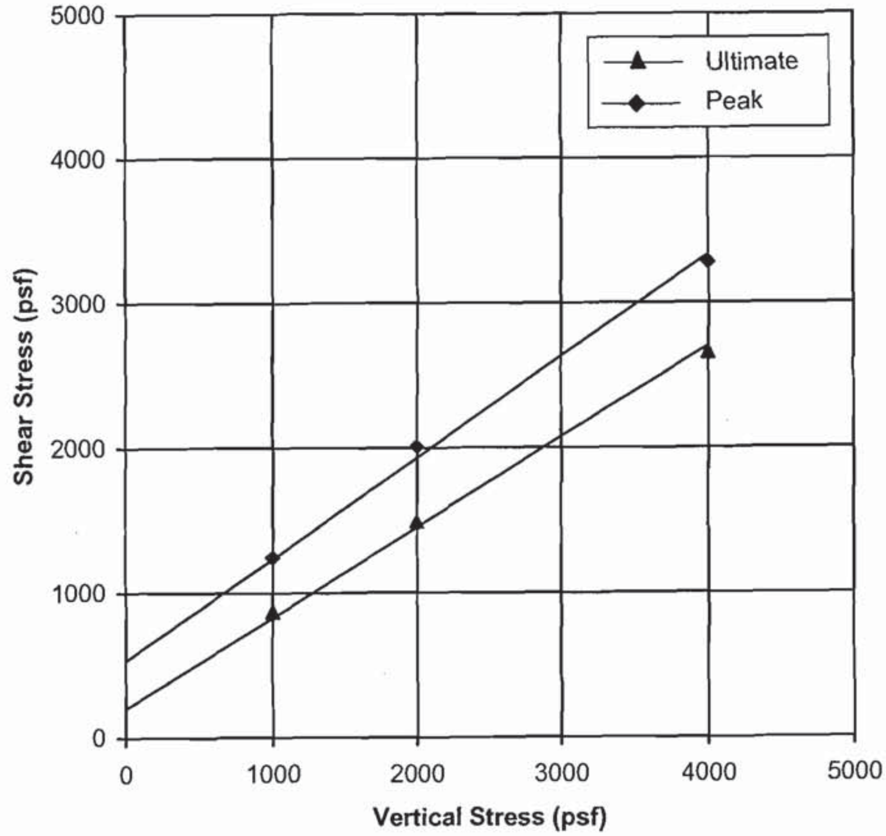
Leighton

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
(ASTM D 2435)

Project No.: 142136-001

McMillin - Tuscany North Tract 7027

02-07



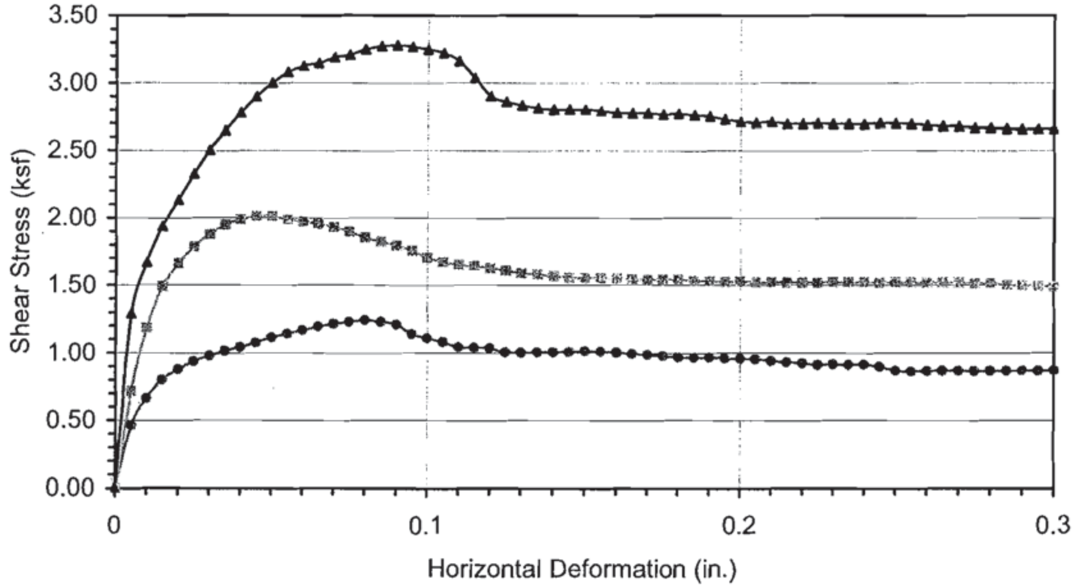
Boring Location	**B-3**
Sample Depth (feet)	**10**
Sample Description	**Yellow brown, SILT (ML)**
Sample Method	**Undisturbed**

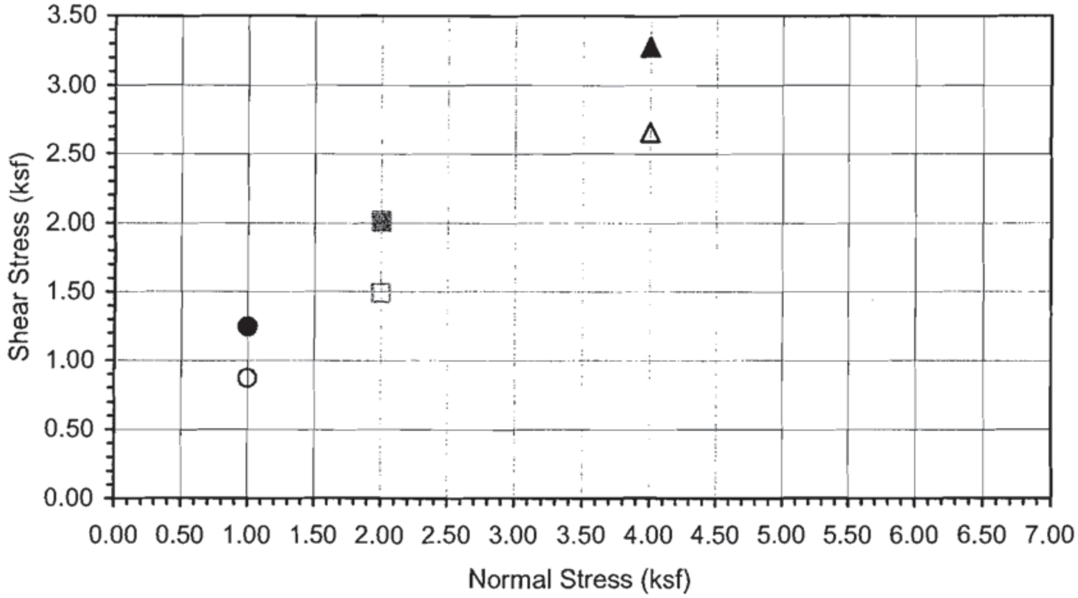
Average Strength Parameters

Friction Angle, ϕ'_{peak} (deg)	**35**
Cohesion, c'_{peak} (psf)	**530**
Friction Angle, ϕ'_{ult} (deg)	**32**
Cohesion, c'_{ult} (psf)	**200**

DIRECT SHEAR SUMMARY

Project No.	142136-001
Project Name	Bakersfield - Tuscany 7027
Date	February 20, 2007





Boring No.	**B-3**
Sample No.	**R4**
Depth (ft)	**10**

Sample Type:

Drive

Soil Identification:

Yellow silt (ML)

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.244	■ 2.010	▲ 3.279
Shear Stress @ End of Test (ksf)	○ 0.870	□ 1.489	△ 2.657
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	9.44	9.44	9.44
Dry Density (pcf)	96.5	100.9	102.7
Saturation (%)	34.2	38.0	39.8
Soil Height Before Shearing (in.)	0.9980	1.0009	0.9846
Final Moisture Content (%)	31.2	29.8	29.3

Leighton

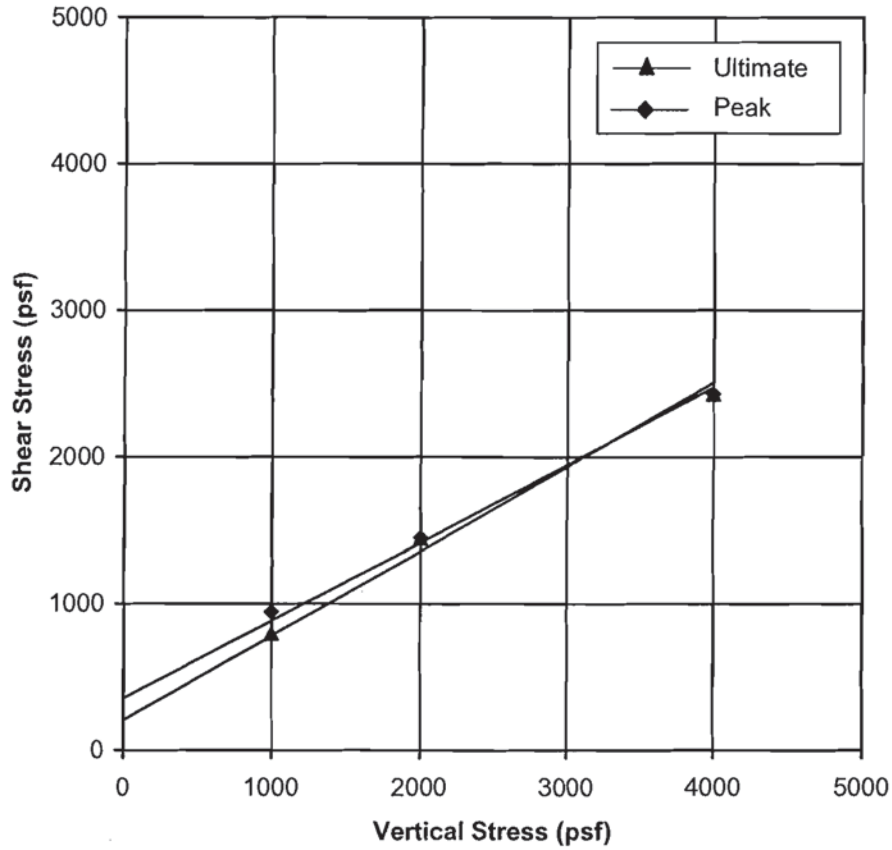
DIRECT SHEAR TEST RESULTS

Consolidated Undrained

Project No.: 142136-001

McMillin - Tuscany North Tract 7027

02-07



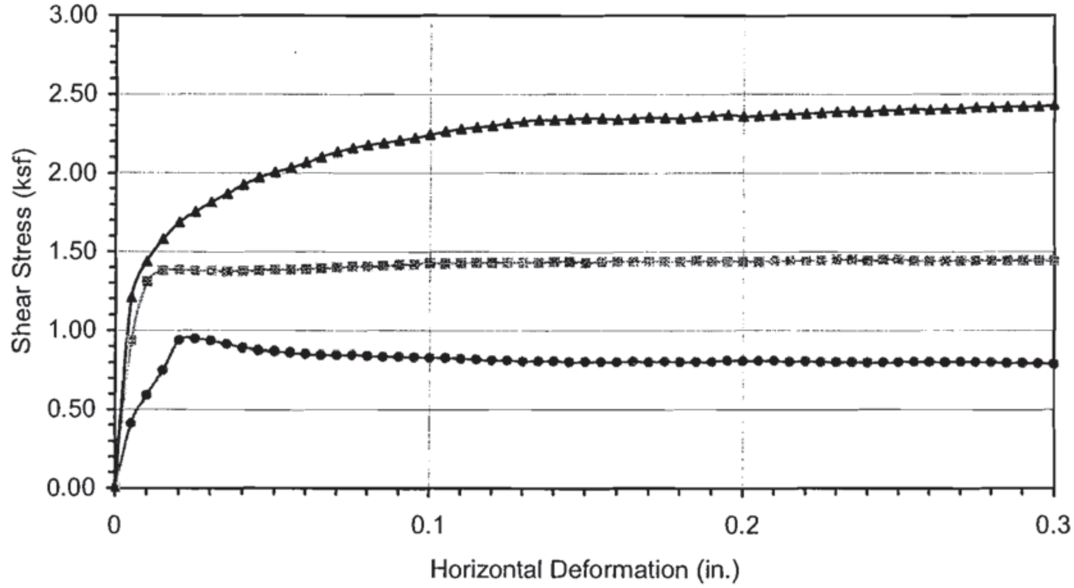
Boring Location	**B-6**
Sample Depth (feet)	**0 - 5**
Sample Description	**Yellow brown, Clayey SAND (SC)**
Sample Method	**Remolded to 90% R.C.**

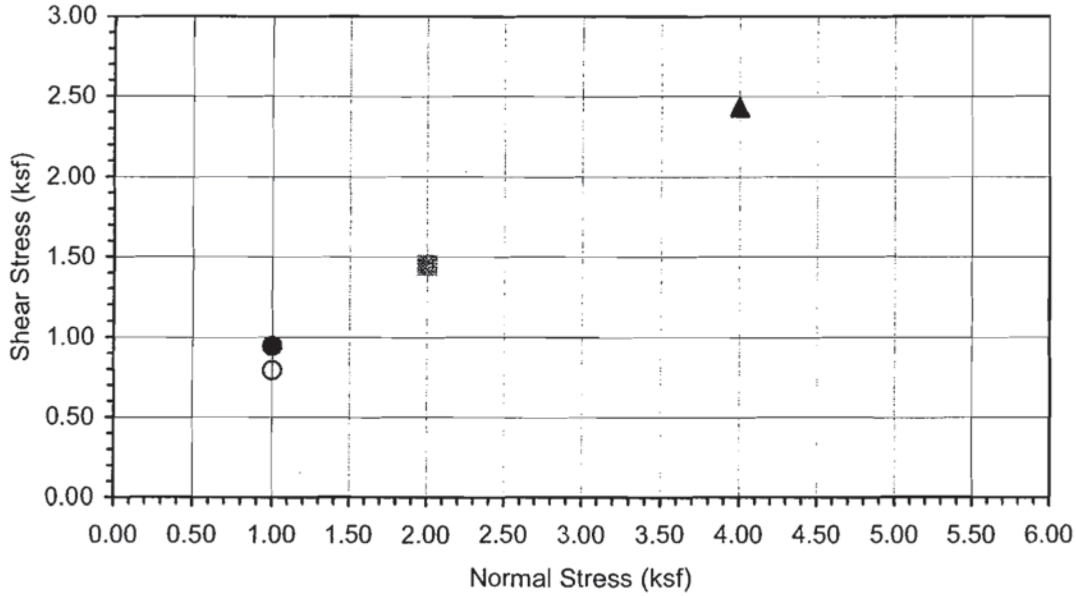
Average Strength Parameters

Friction Angle, ϕ'_{peak} (deg)	**28**
Cohesion, c'_{peak} (psf)	**350**
Friction Angle, ϕ'_{ult} (deg)	**30**
Cohesion, c'_{ult} (psf)	**200**

DIRECT SHEAR SUMMARY

Project No.	142072-001
Project Name	Bakersfield - Tuscany 7027
Date	February 20, 2007





Boring No.	**B-6**
Sample No.	**B1**
Depth (ft)	**0-5**
Sample Type: 90% Remold	
Soil Identification: Dark yellowish brown clayey sand (SC)	

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 0.945	■ 1.448	▲ 2.431
Shear Stress @ End of Test (ksf)	○ 0.792	□ 1.445	△ 2.431
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	18.50	18.50	18.50
Dry Density (pcf)	93.2	93.2	93.2
Saturation (%)	61.8	61.8	61.8
Soil Height Before Shearing (in.)	1.0148	1.0005	0.9798
Final Moisture Content (%)	31.5	30.2	28.4

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DIRECT SHEAR TEST RESULTS
Consolidated Undrained

Project No.: 142136-001

McMillin - Tuscany North Tract 7027

02-07

DS B-6 B1

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EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	McMillin - Tuscany North Tract 7027	Tested By:	GEB	Date:	02/13/07
Project No. :	142136-001	Checked By:	LF	Date:	02/14/07
Boring No.:	B-6	Depth (ft.)	0-5		
Sample No. :	B1				
Soil Identification:	Light olive brown sandy lean clay s(CL)				

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0645
Wt. Comp. Soil + Mold	(g)	531.80	425.90
Wt. of Mold	(g)	166.50	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	704.70	592.40
Dry Wt. of Soil + Cont.	(g)	610.10	482.80
Wt. of Container	(g)	0.00	166.50
Moisture Content	(%)	15.51	34.65
Wet Density	(pcf)	110.2	120.7
Dry Density	(pcf)	95.4	89.6
Void Ratio		0.767	0.881
Total Porosity		0.434	0.468
Pore Volume	(cc)	89.9	103.2
Degree of Saturation (%) [S_{meas}]		**54.6**	106.2

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
02/13/07	11:00	1.0	0	0.1570
02/13/07	11:10	1.0	10	0.1565
Add Distilled Water to the Specimen				
02/13/07	12:00	1.0	50	0.2175
02/14/07	7:16	1.0	1206	0.2215
02/14/07	7:38	1.0	1228	0.2215

Expansion Index (EI_{meas}) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	65.0
Expansion Index (EI)$_{50}$ = EI_{meas} - (50 - S_{meas})x((65+EI_{meas}) / (220-S_{meas}))	**69**

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	McMillin - Tuscany North Tract 7027	Tested By :	RDS	Date:	02/14/07
Project No.:	142136-001	Input By :	JHW	Date:	02/15/07
Boring No.:	B-6	Depth (ft.)	0-5		
Sample No. :	B1				
Soil Identification:	Dark Yellowish Brown Clayey Sand (SC)				

Preparation Method: [X] Moist [ ] Dry [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03321 *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3569.0	3639.0	3649.0			
Weight of Mold (g)	1786.0	1786.0	1786.0			
Net Weight of Soil (g)	1783.0	1853.0	1863.0			
Wet Weight of Soil + Cont. (g)	422.00	443.40	372.70			
Dry Weight of Soil + Cont. (g)	371.80	382.40	314.20			
Weight of Container (g)	54.10	54.40	49.70			
Moisture Content (%)	15.80	18.60	22.12			
Wet Density (pcf)	118.4	123.0	123.7			
Dry Density (pcf)	102.2	103.7	101.3			

Maximum Dry Density (pcf) 103.5 **Optimum Moisture Content (%)** 18.5

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

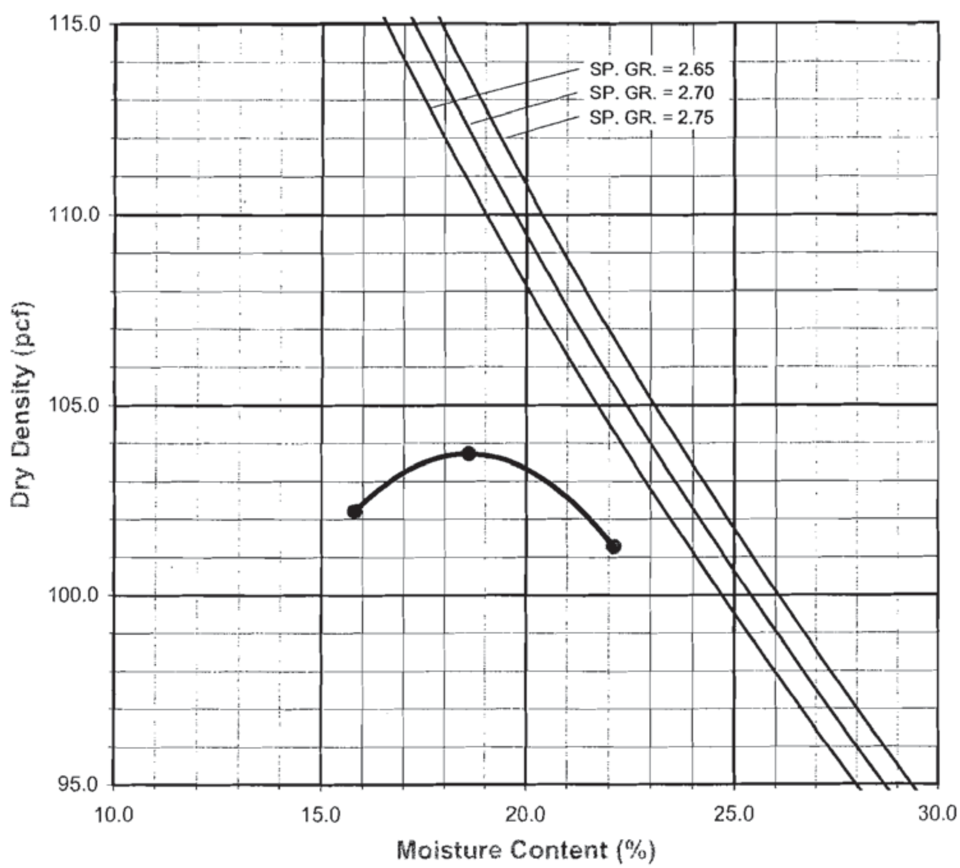
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



MX B-6, B1 @ 0-5

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SATURATED HYDRAULIC CONDUCTIVITY
FALLING HEAD METHOD
ASTM D 5084

Project Name:	McMillin - Tuscany North Tract 7027	Tested by:	RA	Date:	02/19/07
Project No.:	142136-001	Input By:	RA/JHW	Date:	02/23/07
Boring No.:	B-7	Depth (ft.)	25		
SAMPLE I.D.:	R-5	Sample Type:	Drive		

Soil Description: Brown Silt (ML) with 1" layer of (CL) at middle

		INITIAL CONDITION	FINAL CONDITION
Diameter (in)	1	2.425	2.492
	2	2.424	2.490
	3	2.424	2.493
	Average	2.424	2.492
Height (in)	1	3.025	3.181
	2	3.023	3.173
	3	3.024	3.178
	Average	3.024	3.177
Moisture Content (%)		14.45	27.24
Wt. Wet Sample + Container (g)		273.46	580.70
Wt. Dry Sample + Container (g)		246.56	472.50
Wt. Container (g)		60.43	75.22
Density and Saturation			
Wt. Wet Sample + Container (g)		455.90	580.70
Wt. Container (g)		0.00	75.22
Wet Density (pcf)		124.4	124.3
Dry Density (pcf)		108.7	97.7
Void Ratio		0.551	0.726
Total Porosity		0.355	0.420
Pore Volume (cc)		81.2	106.7
% Saturation		70.9	101.4

Specific Gravity Gs (assumed) = 2.70

Back Pressure Saturation

B Value (%) = 97

Consolidation

Cell Pressure (psi) =	97.65	Burette Area (sq. in.)=	0.036
Back Pressure(psi) =	90.90	Initial Burette Ht.(cm)=	1.7
Effective Pressure (psi) =	6.75	Final Burette Ht.(cm)=	24.8

Perm B7R5-25

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SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD (ASTM D 5084)

Project Name:	McMillin - Tuscany North Tract 7027	Cell Pressure:	101.25 psi	Initial Sample Height:	3.0007 in
Project No:	142136-001	Bottom Pressure (Pb):	92.78 psi	Initial Area of Sample:	4.6110 in.²
Boring No.:	B-8	Top Pressure (Pt):	90.82 psi	Final Sample Ht.* (L):	2.9862 in
SAMPLE I.D.:	R-9	Consolidation Pressure:	10.43 psi	Final Sample Area* (A):	4.5664 in.²
Depth(ft):	40.0	Burette Area (influent) (Ai):	0.037 in.²		
Sample Type:	Drive	Burette Area (effluent) (Ao):	0.040 in.²		
Soil Description:	Olive Lean Clay with Sand (CL)s	Vol. Change During Consol.:	0.200 in.³		

* After Consolidation

Date	Time (min.)	Incremental Elapsed Time (t) (min)	Temperature (°C)	Water Height Influent Burette (hi) (cm)	Water Height Effluent Burette (ho) (cm)	Uncorrected Hydraulic Conductivity (cm/sec)	Corrected Conductivity at 20 °C (cm/sec)	Inflow Rate / Outflow Rate	RESULTS	
22-Feb-07	08:40:00	0		27.7	1.5	Initial Reading			Hydraulic Conductivity (cm/sec)	
22-Feb-07	09:58:00	78	21.4	27.6	1.7	1.2E-08	1.2E-08	0.46		
22-Feb-07	10:56:00	58	21.9	27.5	1.8	1.1E-08	1.1E-08	0.93	Average of Last 4 Readings	1.5E-08
22-Feb-07	12:25:00	89	22.2	27.2	2.0	1.8E-08	1.7E-08	1.39		
22-Feb-07	13:36:00	71	22.6	27.0	2.2	1.8E-08	1.7E-08	0.92	Upper Limit	2.3E-08
22-Feb-07	15:20:00	104	22.7	26.7	2.4	1.6E-08	1.5E-08	1.39	Lower Limit	7.7E-09
23-Feb-07	08:54:00	1054	20.3	23.4	4.6	1.7E-08	1.7E-08	1.39	Remarks	
23-Feb-07	10:40:00	106	20.7	23.2	4.8	1.3E-08	1.3E-08	0.92		
23-Feb-07	12:40:00	120	21.2	22.8	5.1	2.0E-08	1.9E-08	1.23		
23-Feb-07	13:45:00	65	21.6	22.6	5.3	2.1E-08	2.0E-08	0.92		
23-Feb-07	14:54:00	69	21.8	22.5	5.4	9.9E-09	9.5E-09	0.93		

k=Ai.Ao.L.ln(h1/h2)/(A.t.(Ai+Ao)) where h1, h2= ((Pb-Pt)/Y+(hi-ho) at t0-(change in hi + change in ho) at t1 and t2

SATURATED HYDRAULIC CONDUCTIVITY
FALLING HEAD METHOD
ASTM D 5084

Project Name:	McMillin - Tuscany North Tract 7027	Tested by:	RA	Date:	02/19/07
Project No.:	142136-001	Input By:	RA/JHW	Date:	02/23/07
Boring No.:	B-8	Depth (ft.)	40		
SAMPLE I.D.:	R-9	Sample Type:	Drive		
Soil Description:	Olive Lean Clay with Sand (CL)s				

		INITIAL CONDITION	FINAL CONDITION
Diameter (in)	1	2.424	2.445
	2	2.423	2.443
	3	2.422	2.444
	Average	2.423	2.444
Height (in)	1	3.000	3.016
	2	3.001	3.015
	3	3.001	3.018
	Average	3.001	3.016
Moisture Content (%)		35.32	43.35
Wt. Wet Sample + Container (g)		193.98	488.40
Wt. Dry Sample + Container (g)		160.74	364.00
Wt. Container (g)		66.64	77.05
Density and Saturation			
Wt. Wet Sample + Container (g)		401.53	488.40
Wt. Container (g)		0.00	77.05
Wet Density (pcf)		110.6	110.7
Dry Density (pcf)		81.7	77.3
Void Ratio		1.063	1.182
Total Porosity		0.515	0.542
Pore Volume (cc)		116.8	125.6
% Saturation		89.7	99.0

Specific Gravity Gs (assumed) = 2.70

Back Pressure Saturation

B Value (%) = 98

Consolidation

Cell Pressure (psi) =	101.25	Burette Area (sq. in.)=	0.040
Back Pressure(psi) =	90.82	Initial Burette Ht.(cm)=	2.1
Effective Pressure (psi) =	10.43	Final Burette Ht.(cm)=	14.8

Perm B8R9-40

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SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD (ASTM D 5084)

Project Name:	McMillin - Tuscany North Tract 7027	Cell Pressure:	97.65 psi	Initial Sample Height:	3.0240 in
Project No:	142136-001	Bottom Pressure (Pb):	92.82 psi	Initial Area of Sample:	4.6161 $in.^2$
Boring No.:	B-7	Top Pressure (Pt):	90.90 psi	Final Sample Ht.* (L):	3.0004 in
SAMPLE I.D.:	R-5	Consolidation Pressure:	6.75 psi	Final Sample Area* (A):	4.5433 $in.^2$
Depth(ft):	25.0	Burette Area (influent) (Ai):	0.036 $in.^2$		
Sample Type:	Drive	Burette Area (effluent) (Ao):	0.036 $in.^2$		
Soil Description:	Brown Silt (ML) with 1" layer of (CL) at middle	Vol. Change During Consol.:	0.327 $in.^3$		

* After Consolidation

Date	Time (min.)	Incremental Elapsed Time (t) (min)	Temperature (°C)	Water Height Influent Burette (hi) (cm)	Water Height Effluent Burette (ho) (cm)	Uncorrected Hydraulic Conductivity (cm/sec)	Corrected Conductivity at 20 °C (cm/sec)	Inflow Rate / Outflow Rate
22-Feb-07	08:37:00	0		27.4	1.2	Initial Reading		
22-Feb-07	09:58:00	81	21.4	26.5	1.6	5.0E-08	4.9E-08	2.25
22-Feb-07	10:55:00	57	21.9	26.1	1.9	3.9E-08	3.7E-08	1.33
22-Feb-07	12:25:00	90	22.2	25.6	2.4	3.5E-08	3.3E-08	1.00
22-Feb-07	13:35:00	70	22.6	25.3	2.7	2.7E-08	2.6E-08	1.00
22-Feb-07	15:18:00	103	22.7	24.9	3.1	2.5E-08	2.3E-08	1.00
23-Feb-07	08:53:00	1055	20.3	18.3	8.2	3.7E-08	3.7E-08	1.29
23-Feb-07	09:40:00	47	20.5	17.8	8.7	7.4E-08	7.3E-08	1.00
23-Feb-07	10:40:00	60	20.7	17.5	9.0	3.5E-08	3.4E-08	1.00
23-Feb-07	11:40:00	60	21.0	17.2	9.3	3.5E-08	3.4E-08	1.00
23-Feb-07	12:40:00	60	21.2	16.9	9.6	3.5E-08	3.4E-08	1.00
23-Feb-07	13:44:00	64	21.6	16.5	10.0	4.4E-08	4.3E-08	1.00
23-Feb-07	14:53:00	69	21.8	16.2	10.3	3.1E-08	3.0E-08	1.00
23-Feb-07	16:05:00	72	22.0	15.9	10.7	3.5E-08	3.3E-08	0.75

RESULTS	
Hydraulic Conductivity (cm/sec)	
Average of Last 4 Readings	**3.5E-08**
Upper Limit	5.2E-08
Lower Limit	1.7E-08
Remarks	

k=Ai.Ao.L.ln(h1/h2)/(A.t.(Ai+Ao)) where h1, h2= ((Pb-Pt)/Y+(hi-ho) at t0-(change in hi + change in ho) at t1 and t2

R-VALUE TEST RESULTS

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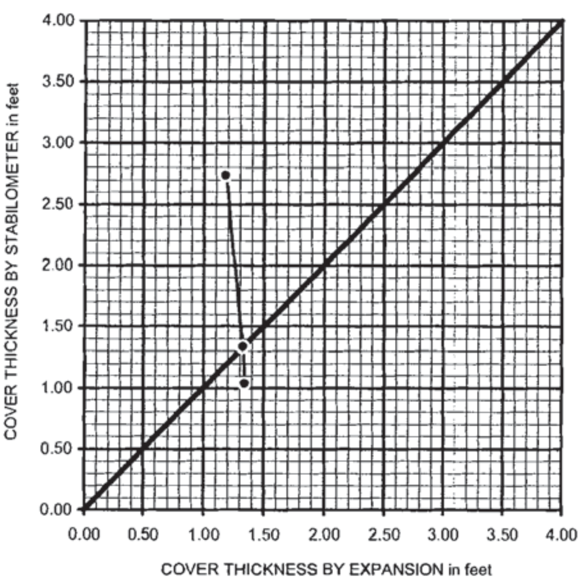
PROJECT NAME:	McMillin - Tuscany N. Tract 7027	PROJECT NUMBER:	142136-001
SAMPLE NUMBER:	B2	SAMPLE LOCATION:	B-4 @ 0-5'
SAMPLE DESCRIPTION:	CL	TECHNICIAN:	SCF
		DATE COMPLETED	2/16/2007

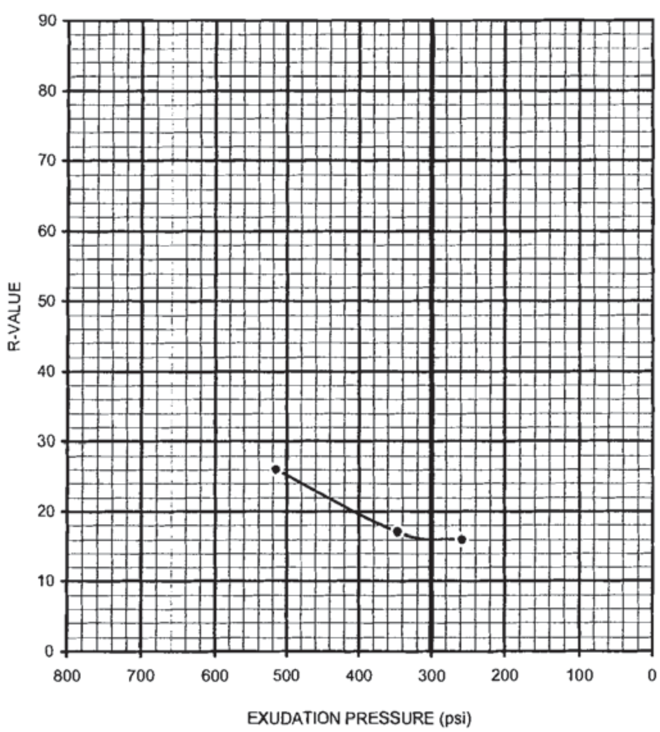
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	23.3	24.3	24.8
HEIGHT OF SAMPLE, Inches	2.38	2.43	2.61
DRY DENSITY, pcf	103.3	99.7	98.0
COMPACTOR PRESSURE, psi	50	50	50
EXUDATION PRESSURE, psi	515	346	258
EXPANSION, Inches x 10exp-4	82	40	31
STABILITY Ph 2,000 lbs (160 psi)	104	122	127
TURNS DISPLACEMENT	3.28	3.47	3.82
R-VALUE UNCORRECTED	29	18	15
R-VALUE CORRECTED	26	17	16

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.	1.18	1.33	1.34
EXPANSION PRESSURE THICKNESS, ft.	2.73	1.33	1.03

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	16
R-VALUE BY EXUDATION:	16
EQUILIBRIUM R-VALUE:	16

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SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

Project Name:	McMillin - Tuscany North Tract 7027	Tested By :	VJ
Project No. :	142136-001	Data Input By:	LF
Boring No.:	B-4	Depth (ft.) :	0-5
Sample No. :	B2		
Soil Identification:	CL		

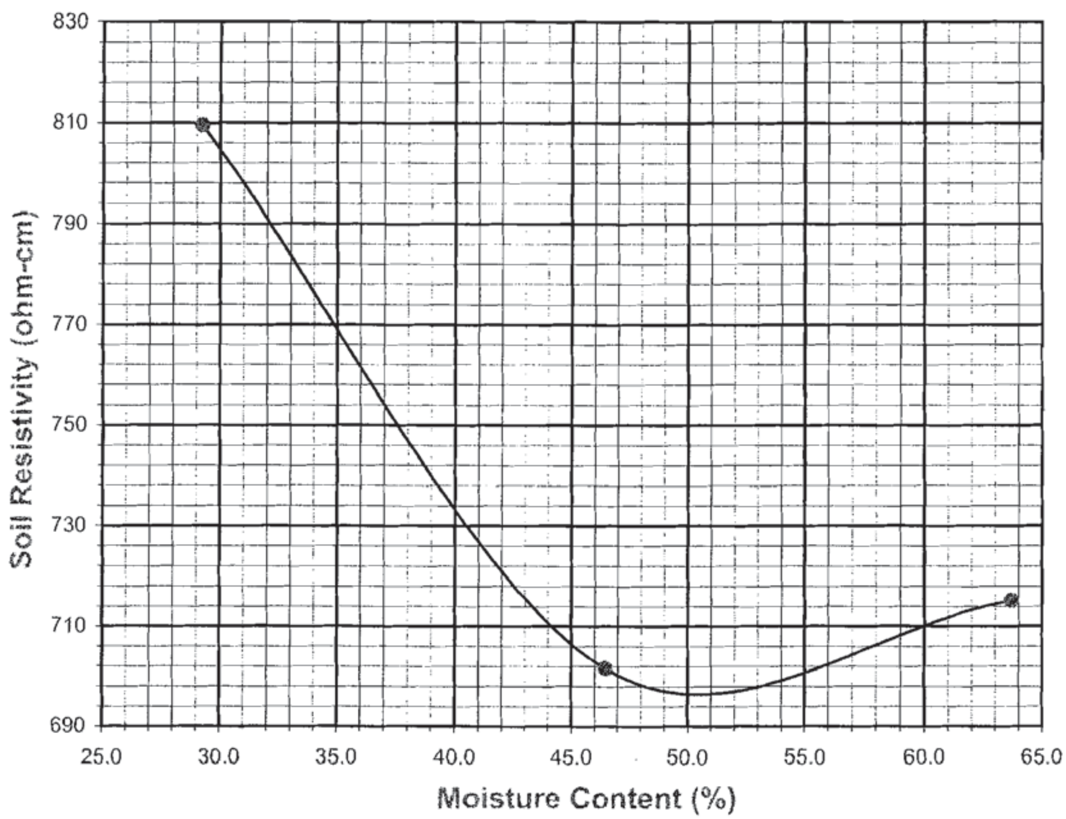
Date: 02/10/07

Date: 02/22/07

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	200	29.23	120	810
2	400	46.46	104	702
3	600	63.69	106	715
4				
5				

Moisture Content (%) (MCi)	12.00
Wet Wt. of Soil + Cont. (g)	206.14
Dry Wt. of Soil + Cont. (g)	189.70
Wt. of Container (g)	52.71
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
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	
696	**50.5**	**519**	**159**	**7.38**	**21.2**



APPENDIX D

USGS Design Maps Summary Report

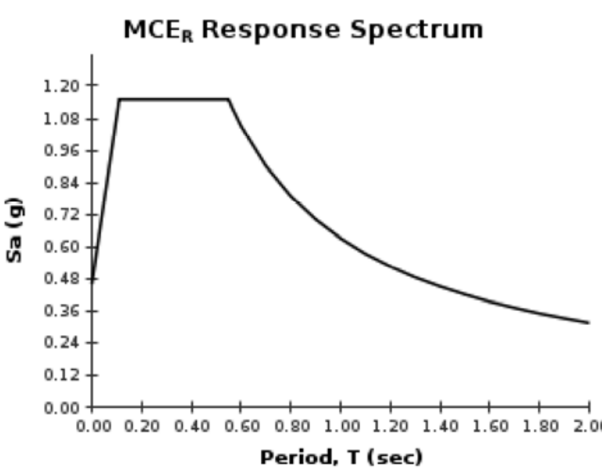
User–Specified Input

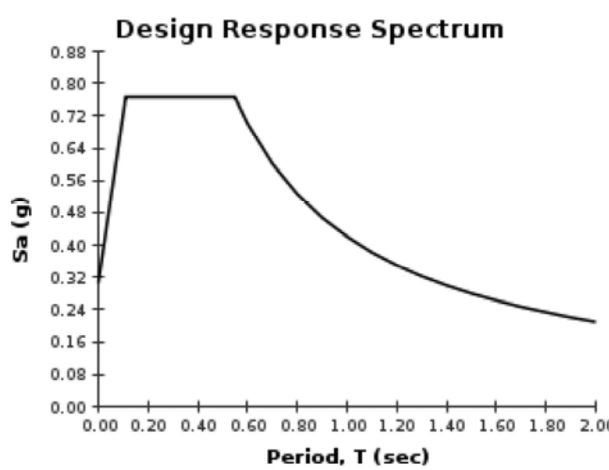
Report Title	11065.001 Aurora Maple Ridge Thu July 16, 2015 18:46:13 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	35.42099°N, 118.85564°W
Site Soil Classification	Site Class D – “Stiff Soil”
Risk Category	I/II/III

USGS–Provided Output

S_S =	1.072 g	S_{MS} =	1.149 g	S_{DS} =	0.766 g
S_1 =	0.389 g	S_{M1} =	0.631 g	S_{D1} =	0.421 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the “2009 NEHRP” building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

Design Maps Detailed Report

ASCE 7-10 Standard (35.42099°N, 118.85564°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1] S_S = 1.072 g

From Figure 22-2 [2] S_1 = 0.389 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index *PI* > 20, • Moisture content *w* ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 1.072 g, F_a = 1.071

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.389 g, F_v = 1.622

Equation (11.4–1): $S_{MS} = F_aS_S = 1.071 \times 1.072 = 1.149$ g

Equation (11.4–2): $S_{M1} = F_vS_1 = 1.622 \times 0.389 = 0.631$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

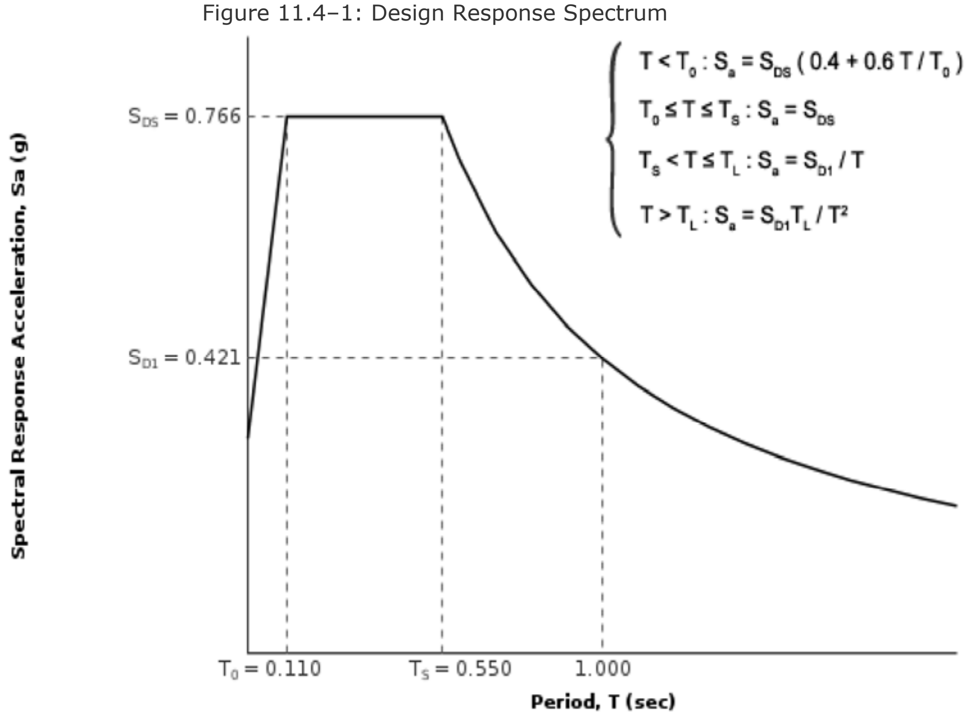
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.149 = 0.766$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.631 = 0.421$ g

Section 11.4.5 — Design Response Spectrum

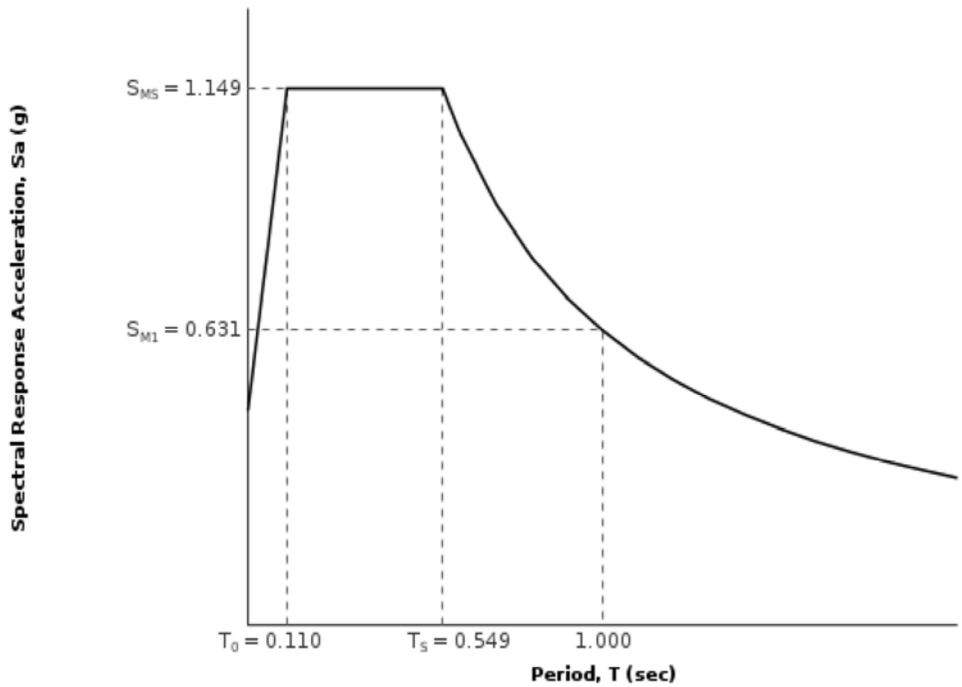
From Figure 22-12 [3] $T_L = 12$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.411

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.089 \times 0.411 = 0.447$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.411 g, F_{PGA} = 1.089

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 1.006

From Figure 22-18 [6] C_{R1} = 1.060

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.766 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.421 g, Seismic Design Category = D

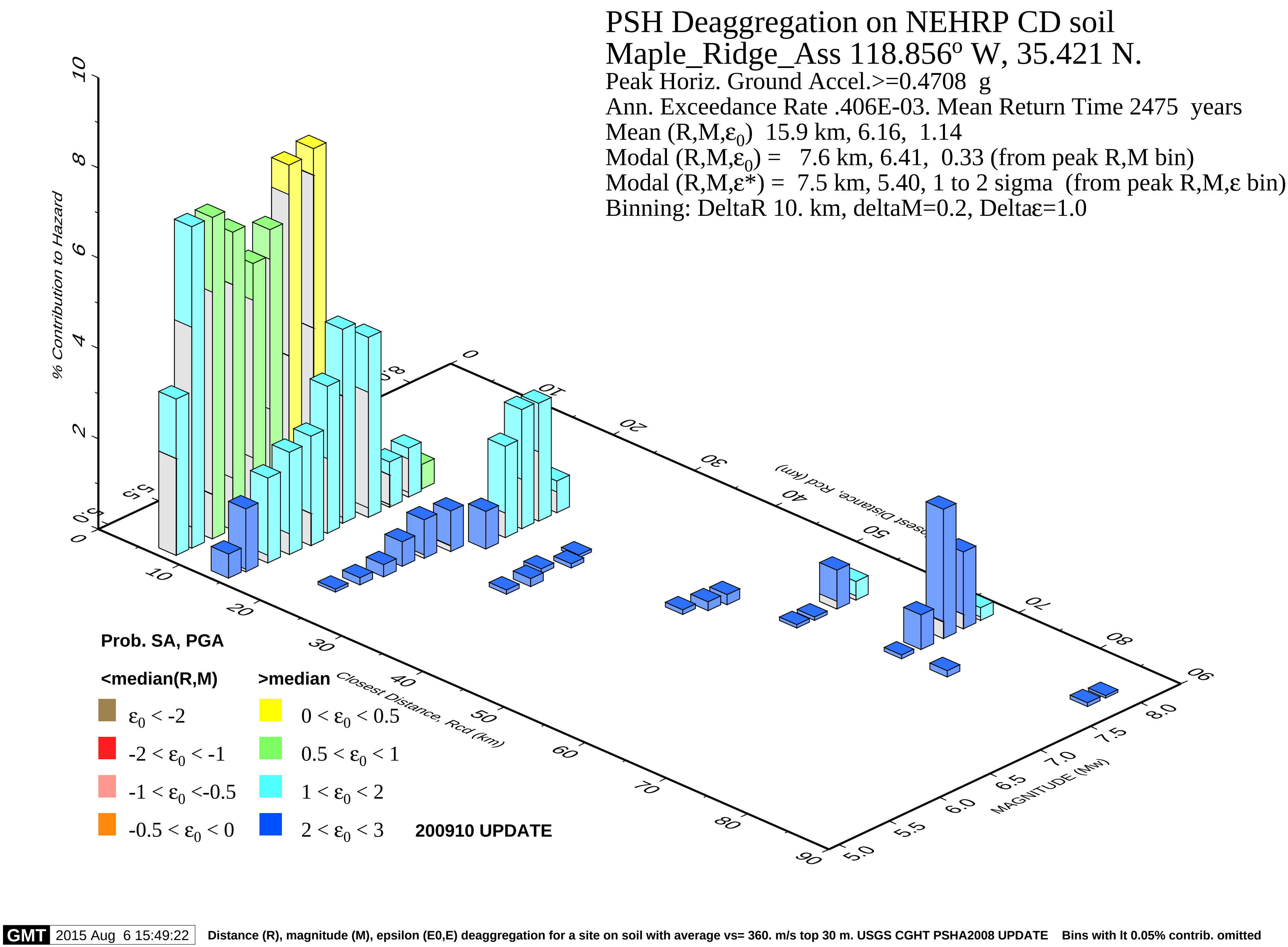
Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

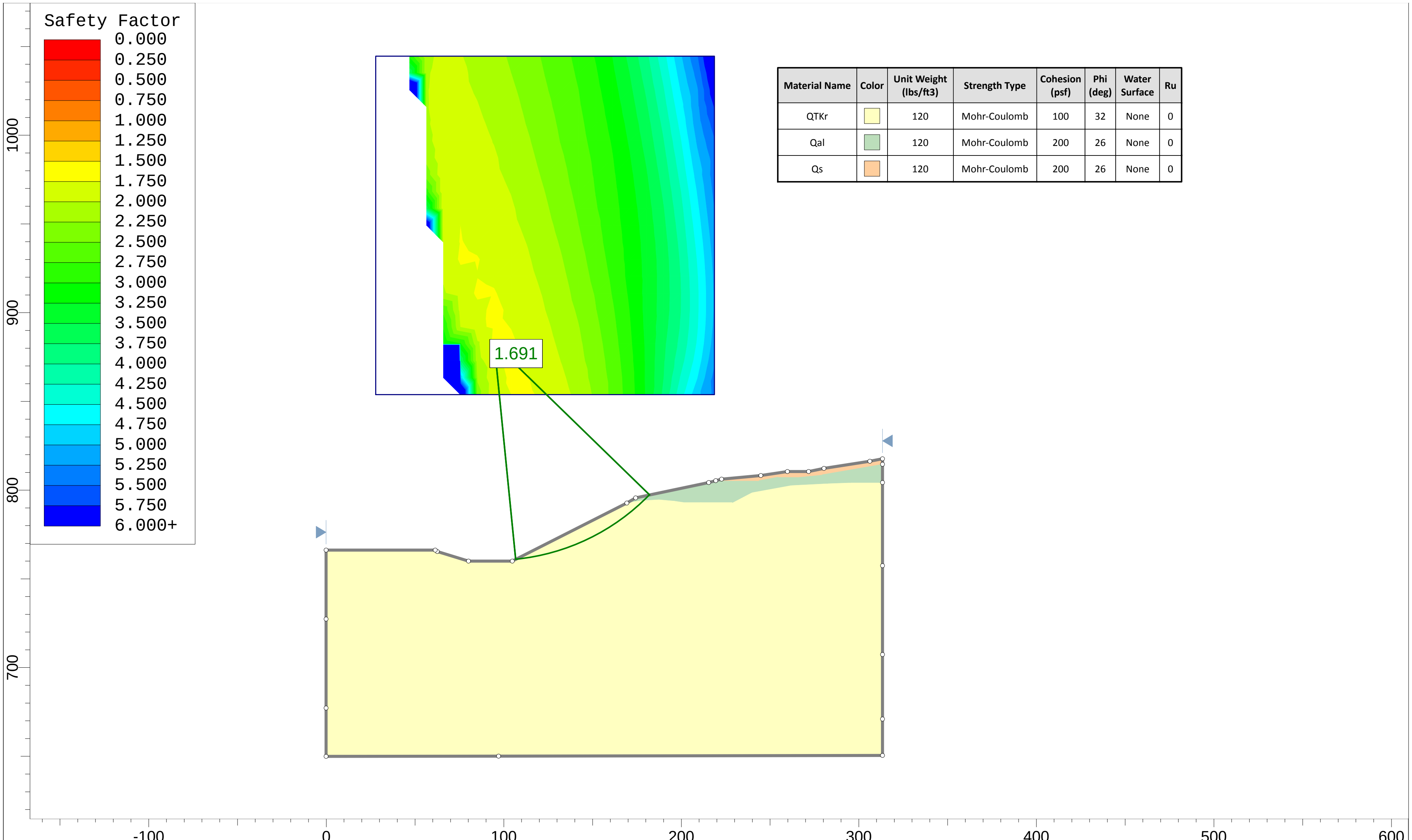
References

1. *Figure 22-1*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf



PSH Deaggregation on NEHRP CD soil
Maple_Ridge_Ass 118.856° W, 35.421 N.
Peak Horiz. Ground Accel.>=0.4708 g
Ann. Exceedance Rate .406E-03. Mean Return Time 2475 years
Mean (R,M,ε_0) 15.9 km, 6.16, 1.14
Modal (R,M,ε_0) = 7.6 km, 6.41, 0.33 (from peak R,M bin)
Modal (R,M,ε^*) = 7.5 km, 5.40, 1 to 2 sigma (from peak R,M,ε bin)
Binning: DeltaR 10. km, deltaM=0.2, Deltaε=1.0
% Contribution to Hazard
Closest Distance, Rcd (km)
MAGNITUDE (Mw)
Prob. SA, PGA
<median(R,M)
>median
$\varepsilon_0 < -2$
$-2 < \varepsilon_0 < -1$
$-1 < \varepsilon_0 < -0.5$
$-0.5 < \varepsilon_0 < 0$
$0 < \varepsilon_0 < 0.5$
$0.5 < \varepsilon_0 < 1$
$1 < \varepsilon_0 < 2$
$2 < \varepsilon_0 < 3$
200910 UPDATE
GMT 2015 Aug 6 15:49:22
Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

APPENDIX E



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
QTKr		120	Mohr-Coulomb	100	32	None	0
Qal		120	Mohr-Coulomb	200	26	None	0
Qs		120	Mohr-Coulomb	200	26	None	0

SLIDEINTERPRET 6.033	*Project*	11065.001 Maple Ridge Assisted Living	
	Analysis Description	Section 1-1': Static - Circular	
	Drawn By	RSM	*Company* Leighton and Associates, Inc.
	Date	8/3/2015, 12:17:07 PM	*File Name* Section 1-1' - Static.slim

Slide Analysis Information

11065.001 Maple Ridge Assisted Living

Project Summary

File Name: Section 1-1' - Static
Slide Modeler Version: 6.033
Project Title: 11065.001 Maple Ridge Assisted Living
Analysis: Section 1-1': Static - Circular
Author: RSM
Company: Leighton and Associates, Inc.
Date Created: 8/3/2015, 12:17:07 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	QTKr	Qal	Qs
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120
Cohesion [psf]	100	200	200
Friction Angle [deg]	32	26	26
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: bishop simplified

FS: 1.693510
Center: 94.615, 882.415
Radius: 122.081
Left Slip Surface Endpoint: 106.670, 760.931
Right Slip Surface Endpoint: 182.120, 797.288
Resisting Moment=5.16174e+006 lb-ft
Driving Moment=3.04795e+006 lb-ft
Total Slice Area=484.696 ft2

Method: spencer

FS: 1.691350
Center: 94.615, 882.415
Radius: 122.081

Left Slip Surface Endpoint: 106.670, 760.931
Right Slip Surface Endpoint: 182.120, 797.288
Resisting Moment=5.15515e+006 lb-ft
Driving Moment=3.04795e+006 lb-ft
Resisting Horizontal Force=37600.8 lb
Driving Horizontal Force=22231.3 lb
Total Slice Area=484.696 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 3919
Number of Invalid Surfaces: 932

Error Codes:

Error Code -106 reported for 1 surface
Error Code -107 reported for 578 surfaces
Error Code -108 reported for 353 surfaces

Method: spencer

Number of Valid Surfaces: 3918
Number of Invalid Surfaces: 933

Error Codes:

Error Code -106 reported for 1 surface
Error Code -107 reported for 578 surfaces
Error Code -108 reported for 354 surfaces

Error Codes

The following errors were encountered during the computation:

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.69351

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]

1	3.00975	215.409	QTKr	100	32	82.0764	138.997	62.4086	0	62.4086
2	3.00975	632.513	QTKr	100	32	130.027	220.202	192.364	0	192.364
3	3.00975	1022.05	QTKr	100	32	173.932	294.555	311.353	0	311.353
4	3.00975	1383.7	QTKr	100	32	213.845	362.149	419.526	0	419.526
5	3.00975	1717.11	QTKr	100	32	249.814	423.063	517.008	0	517.008
6	3.00975	2021.83	QTKr	100	32	281.875	477.358	603.897	0	603.897
7	3.00975	2297.37	QTKr	100	32	310.055	525.082	680.275	0	680.275
8	3.00975	2543.15	QTKr	100	32	334.376	566.269	746.185	0	746.185
9	3.00975	2758.52	QTKr	100	32	354.848	600.938	801.67	0	801.67
10	3.00975	2942.74	QTKr	100	32	371.475	629.096	846.729	0	846.729
11	3.00975	3094.97	QTKr	100	32	384.25	650.732	881.356	0	881.356
12	3.00975	3214.27	QTKr	100	32	393.163	665.826	905.51	0	905.51
13	3.00975	3299.58	QTKr	100	32	398.191	674.34	919.138	0	919.138
14	3.00975	3349.7	QTKr	100	32	399.303	676.224	922.151	0	922.151
15	3.00975	3363.27	QTKr	100	32	396.46	671.409	914.445	0	914.445
16	3.00975	3338.77	QTKr	100	32	389.614	659.815	895.893	0	895.893
17	3.00975	3274.46	QTKr	100	32	378.706	641.342	866.328	0	866.328
18	3.00975	3168.36	QTKr	100	32	363.667	615.873	825.571	0	825.571
19	3.00975	3018.23	QTKr	100	32	344.416	583.272	773.397	0	773.397
20	3.00975	2821.48	QTKr	100	32	320.863	543.385	709.563	0	709.563
21	3.00975	2576.79	QTKr	100	32	293.062	496.304	634.22	0	634.22
22	3.00975	2333.1	QTKr	100	32	265.841	450.205	560.446	0	560.446
23	3.00975	1996.83	QTKr	100	32	230.509	390.369	464.688	0	464.688
24	3.00975	1294.79	QTKr	100	32	162.517	275.224	280.417	0	280.417
25	3.21563	484.55	Qal	200	26	125.689	212.856	26.3577	0	26.3577

Global Minimum Query (spencer) - Safety Factor: 1.69135

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	3.00975	215.409	QTKr	100	32	95.2896	161.168	97.8893	0	97.8893
2	3.00975	632.513	QTKr	100	32	147.934	250.209	240.385	0	240.385
3	3.00975	1022.05	QTKr	100	32	194.844	329.55	367.359	0	367.359
4	3.00975	1383.7	QTKr	100	32	236.289	399.648	479.537	0	479.537
5	3.00975	1717.11	QTKr	100	32	272.513	460.915	577.585	0	577.585
6	3.00975	2021.83	QTKr	100	32	303.737	513.725	662.099	0	662.099
7	3.00975	2297.37	QTKr	100	32	330.16	558.416	733.617	0	733.617
8	3.00975	2543.15	QTKr	100	32	351.964	595.294	792.638	0	792.638
9	3.00975	2758.52	QTKr	100	32	369.313	624.637	839.594	0	839.594
10	3.00975	2942.74	QTKr	100	32	382.355	646.696	874.897	0	874.897
11	3.00975	3094.97	QTKr	100	32	391.225	661.698	898.906	0	898.906
12	3.00975	3214.27	QTKr	100	32	396.045	669.85	911.951	0	911.951
13	3.00975	3299.58	QTKr	100	32	396.924	671.337	914.331	0	914.331
14	3.00975	3349.7	QTKr	100	32	393.963	666.329	906.314	0	906.314

15	3.00975	3363.27	QTKr	100	32	387.25	654.976	888.147	0	888.147
16	3.00975	3338.77	QTKr	100	32	376.868	637.415	860.045	0	860.045
17	3.00975	3274.46	QTKr	100	32	362.886	613.768	822.202	0	822.202
18	3.00975	3168.36	QTKr	100	32	345.372	584.145	774.794	0	774.794
19	3.00975	3018.23	QTKr	100	32	324.381	548.641	717.977	0	717.977
20	3.00975	2821.48	QTKr	100	32	299.964	507.344	651.888	0	651.888
21	3.00975	2576.79	QTKr	100	32	272.309	460.569	577.03	0	577.03
22	3.00975	2333.1	QTKr	100	32	245.762	415.669	505.177	0	505.177
23	3.00975	1996.83	QTKr	100	32	212.818	359.949	416.004	0	416.004
24	3.00975	1294.79	QTKr	100	32	152.878	258.57	253.767	0	253.767
25	3.21563	484.55	Qal	200	26	134.201	226.981	55.3184	0	55.3184

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.69351

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	106.67	760.931	0	0	0
2	109.68	761.267	225.699	0	0
3	112.69	761.68	537.194	0	0
4	115.7	762.169	907.697	0	0
5	118.709	762.736	1312.68	0	0
6	121.719	763.381	1729.8	0	0
7	124.729	764.107	2138.84	0	0
8	127.739	764.914	2521.69	0	0
9	130.748	765.804	2862.33	0	0
10	133.758	766.78	3146.84	0	0
11	136.768	767.843	3363.4	0	0
12	139.778	768.995	3502.43	0	0
13	142.787	770.24	3556.59	0	0
14	145.797	771.581	3520.95	0	0
15	148.807	773.021	3393.13	0	0
16	151.817	774.565	3173.52	0	0
17	154.826	776.216	2865.51	0	0
18	157.836	777.979	2475.81	0	0
19	160.846	779.862	2014.9	0	0
20	163.856	781.869	1497.45	0	0
21	166.865	784.01	943.053	0	0
22	169.875	786.292	376.433	0	0
23	172.885	788.727	-188.908	0	0
24	175.895	791.325	-703.708	0	0
25	178.904	794.103	-994.142	0	0

26	182.12	797.288	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.69135

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	106.67	760.931	0	0	0
2	109.68	761.267	253.937	112.469	23.8886
3	112.69	761.68	600.168	265.815	23.8886
4	115.7	762.169	1007.08	446.036	23.8886
5	118.709	762.736	1446.65	640.722	23.8886
6	121.719	763.381	1894.2	838.945	23.8886
7	124.729	764.107	2328.19	1031.16	23.8886
8	127.739	764.914	2730.01	1209.12	23.8885
9	130.748	765.804	3083.86	1365.84	23.8885
10	133.758	766.78	3376.62	1495.51	23.8886
11	136.768	767.843	3597.8	1593.47	23.8886
12	139.778	768.995	3739.44	1656.21	23.8887
13	142.787	770.24	3796.16	1681.32	23.8886
14	145.797	771.581	3765.07	1667.55	23.8886
15	148.807	773.021	3645.91	1614.78	23.8886
16	151.817	774.565	3441.07	1524.05	23.8886
17	154.826	776.216	3155.75	1397.68	23.8885
18	157.836	777.979	2798.09	1239.28	23.8887
19	160.846	779.862	2379.42	1053.85	23.8887
20	163.856	781.869	1914.59	847.974	23.8886
21	166.865	784.01	1422.27	629.927	23.8887
22	169.875	786.292	925.11	409.733	23.8886
23	172.885	788.727	435.152	192.73	23.8887
24	175.895	791.325	-5.27766	-2.33748	23.8886
25	178.904	794.103	-249.917	-110.688	23.8885
26	182.12	797.288	0	0	0

List Of Coordinates

External Boundary

X	Y
313.317	650.465
313.317	670.984
313.317	707.344
313.317	757.457
313.317	804.245
313.317	814.552

313.317	817.656
306.157	816.293
280.317	812.226
271.691	810.456
259.757	810.456
244.747	808.248
222.651	806.202
219.372	805.324
215.388	804.258
174.239	795.637
169.268	792.737
104.795	759.978
80.114	759.978
62.459	765.388
61.354	766.218
-0.112	766.218
-0.112	727.316
-0.112	677.174
-0.112	649.942
97.0723	650.104

Material Boundary

X	Y
97.0723	650.104
313.317	670.984

Material Boundary

X	Y
-0.112	677.174
313.317	707.344

Material Boundary

X	Y
-0.112	727.316
313.317	757.457

Material Boundary

X	Y
219.372	805.324
243.593	805.324

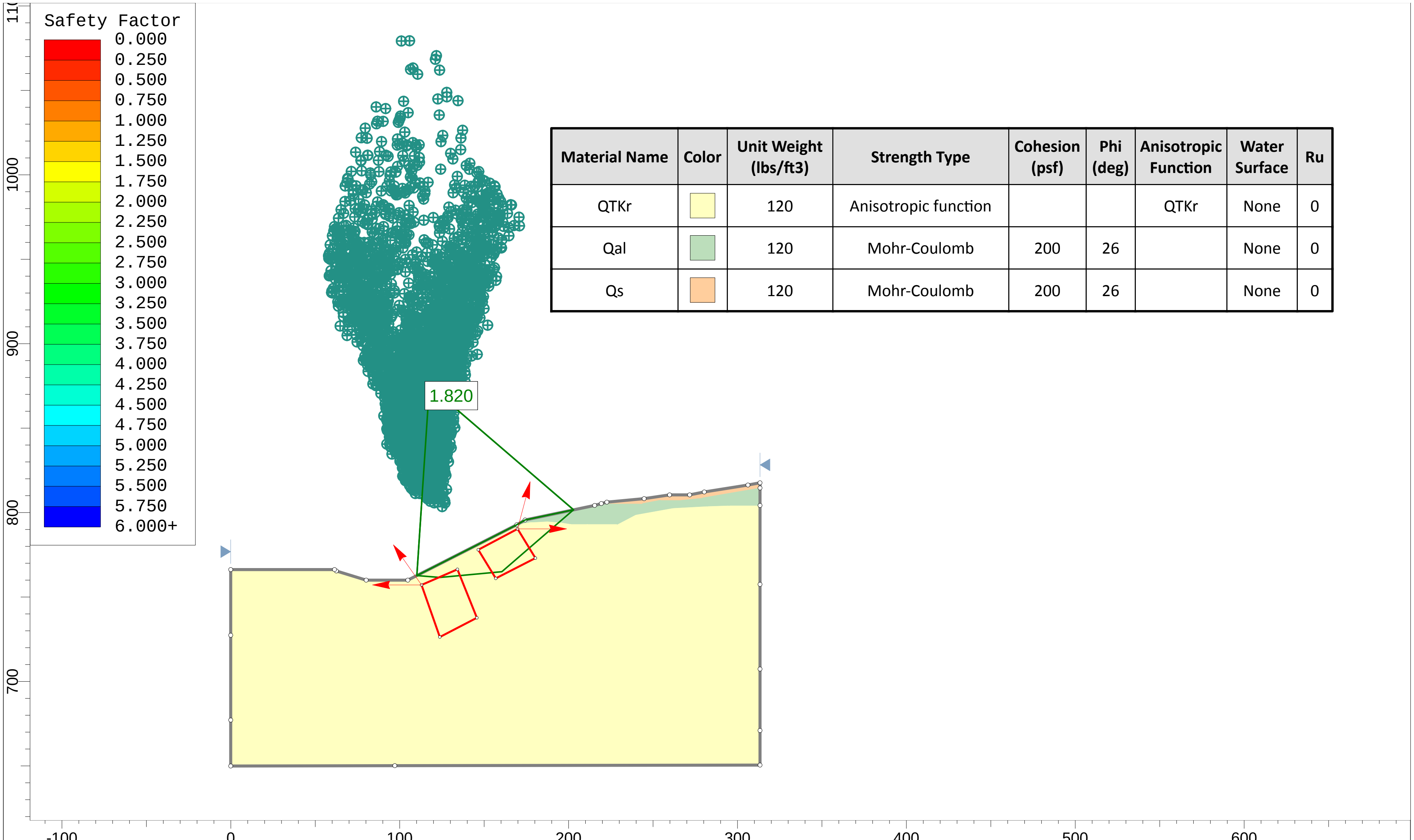
254.504	807.392
265.87	807.392
279.302	808.706

Material Boundary

X	Y
279.302	808.706
313.317	814.552

Material Boundary

X	Y
169.268	792.737
176.729	793.984
187.423	794.569
196.152	793.805
201.528	792.96
211.193	792.96
228.771	792.96
239.727	798.711
261.81	802.726
282.432	803.83
295.144	804.245
313.317	804.245



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Anisotropic Function	Water Surface	Ru
QTKr		120	Anisotropic function			QTKr	None	0
Qal		120	Mohr-Coulomb	200	26		None	0
Qs		120	Mohr-Coulomb	200	26		None	0

Project	11065.001 Maple Ridge Assisted Living
Analysis Description	Section 1-1': Static - Block
Drawn By	RSM
Company	Leighton and Associates, Inc.
Date	8/3/2015, 12:17:07 PM
File Name	Section 1-1' - Static_Block.slim

Slide Analysis Information

11065.001 Maple Ridge Assisted Living

Project Summary

File Name: Section 1-1' - Static_Block
Slide Modeler Version: 6.036
Project Title: 11065.001 Maple Ridge Assisted Living
Analysis: Section 1-1': Static - Block
Author: RSM
Company: Leighton and Associates, Inc.
Date Created: 8/3/2015, 12:17:07 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 125
Left Projection Angle (End Angle): 180
Right Projection Angle (Start Angle): 0
Right Projection Angle (End Angle): 75
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	QTKr	Qal	Qs
Color			
Strength Type	Anisotropic function	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120
Cohesion [psf]		200	200
Friction Angle [deg]		26	26
Water Surface	None	None	None
Ru Value	0	0	0

Anisotropic Functions

Name: QTKr

Angle From	Angle To	c	phi
-90	3	300	31
3	7	0	26
7	90	300	31

Global Minimums

Method: bishop simplified

FS: 1.820040
Axis Location: 117.538, 874.966

Left Slip Surface Endpoint: 110.103, 762.675
Right Slip Surface Endpoint: 202.910, 801.644
Resisting Moment=1.06004e+007 lb-ft
Driving Moment=5.82429e+006 lb-ft
Total Slice Area=1185.74 ft2

Method: spencer

FS: 1.894440
Axis Location: 117.538, 874.966
Left Slip Surface Endpoint: 110.103, 762.675
Right Slip Surface Endpoint: 202.910, 801.644
Resisting Moment=1.06025e+007 lb-ft
Driving Moment=5.59666e+006 lb-ft
Resisting Horizontal Force=82087.9 lb
Driving Horizontal Force=43330.9 lb
Total Slice Area=1185.74 ft2

Global Minimum Coordinates

Method: bishop simplified

X	Y
110.103	762.675
123.813	761.554
160.459	765.013
202.91	801.644

Method: spencer

X	Y
110.103	762.675
123.813	761.554
160.459	765.013
202.91	801.644

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4733
Number of Invalid Surfaces: 267

Error Codes:

Error Code -108 reported for 266 surfaces
Error Code -112 reported for 1 surface

Method: spencer

Number of Valid Surfaces: 3528
Number of Invalid Surfaces: 1472

Error Codes:

Error Code -108 reported for 888 surfaces
Error Code -111 reported for 583 surfaces
Error Code -112 reported for 1 surface

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.82004

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	3.4273	415.728	QTKr	300	31	210.545	383.2	138.468	0	138.468
2	3.4273	1247.18	QTKr	300	31	292.851	533	387.779	0	387.779
3	3.4273	2078.64	QTKr	300	31	375.157	682.801	637.088	0	637.088
4	3.4273	2910.1	QTKr	300	31	457.463	832.601	886.398	0	886.398
5	3.66463	3889.5	QTKr	0	26	277.425	504.924	1035.25	0	1035.25
6	3.66463	4556.23	QTKr	0	26	324.98	591.477	1212.71	0	1212.71
7	3.66463	5222.96	QTKr	0	26	372.536	678.031	1390.17	0	1390.17
8	3.66463	5889.7	QTKr	0	26	420.092	764.584	1567.63	0	1567.63
9	3.66463	6556.43	QTKr	0	26	467.648	851.138	1745.09	0	1745.09
10	3.66463	7223.17	QTKr	0	26	515.204	937.691	1922.55	0	1922.55
11	3.66463	7889.9	QTKr	0	26	562.762	1024.25	2100.01	0	2100.01
12	3.66463	8556.63	QTKr	0	26	610.316	1110.8	2277.48	0	2277.48
13	3.66463	9223.37	QTKr	0	26	657.87	1197.35	2454.93	0	2454.93
14	3.66463	9890.1	QTKr	0	26	705.43	1283.91	2632.4	0	2632.4
15	3.73123	10112.9	QTKr	300	31	825.169	1501.84	2000.2	0	2000.2
16	3.73123	9520.16	QTKr	300	31	784.329	1427.51	1876.49	0	1876.49
17	3.73123	8953.13	QTKr	300	31	745.258	1356.4	1758.15	0	1758.15
18	3.73123	8448.57	QTKr	300	31	710.493	1293.13	1652.84	0	1652.84

19	3.73123	7507.05	QTKr	300	31	645.62	1175.05	1456.33	0	1456.33
20	3.73123	6415.48	QTKr	300	31	570.407	1038.16	1228.51	0	1228.51
21	3.73123	5323.9	QTKr	300	31	495.195	901.274	1000.69	0	1000.69
22	3.73123	4232.33	QTKr	300	31	419.982	764.384	772.865	0	772.865
23	3.73123	3140.75	QTKr	300	31	344.769	627.494	545.042	0	545.042
24	4.43507	2313.35	Qal	200	26	202.879	369.247	347.009	0	347.009
25	4.43507	771.117	Qal	200	26	127.156	231.429	64.4382	0	64.4382

Global Minimum Query (spencer) - Safety Factor: 1.89444

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	3.4273	415.728	QTKr	300	31	231.36	438.298	230.166	0	230.166
2	3.4273	1247.18	QTKr	300	31	323.973	613.747	522.163	0	522.163
3	3.4273	2078.64	QTKr	300	31	416.586	789.197	814.159	0	814.159
4	3.4273	2910.1	QTKr	300	31	509.198	964.646	1106.16	0	1106.16
5	3.66463	3889.5	QTKr	0	26	283.198	536.501	1099.99	0	1099.99
6	3.66463	4556.23	QTKr	0	26	331.743	628.468	1288.55	0	1288.55
7	3.66463	5222.96	QTKr	0	26	380.289	720.434	1477.11	0	1477.11
8	3.66463	5889.7	QTKr	0	26	428.834	812.401	1665.67	0	1665.67
9	3.66463	6556.43	QTKr	0	26	477.38	904.368	1854.23	0	1854.23
10	3.66463	7223.17	QTKr	0	26	525.925	996.334	2042.79	0	2042.79
11	3.66463	7889.9	QTKr	0	26	574.471	1088.3	2231.35	0	2231.35
12	3.66463	8556.63	QTKr	0	26	623.018	1180.27	2419.91	0	2419.91
13	3.66463	9223.37	QTKr	0	26	671.56	1272.23	2608.47	0	2608.47
14	3.66463	9890.1	QTKr	0	26	720.107	1364.2	2797.02	0	2797.02
15	3.73123	10112.9	QTKr	300	31	725.824	1375.03	1789.15	0	1789.15
16	3.73123	9520.16	QTKr	300	31	691.529	1310.06	1681.03	0	1681.03
17	3.73123	8953.13	QTKr	300	31	658.722	1247.91	1577.59	0	1577.59
18	3.73123	8448.57	QTKr	300	31	629.53	1192.61	1485.55	0	1485.55
19	3.73123	7507.05	QTKr	300	31	575.055	1089.41	1313.79	0	1313.79
20	3.73123	6415.48	QTKr	300	31	511.899	969.761	1114.67	0	1114.67
21	3.73123	5323.9	QTKr	300	31	448.742	850.115	915.545	0	915.545
22	3.73123	4232.33	QTKr	300	31	385.585	730.468	716.419	0	716.419
23	3.73123	3140.75	QTKr	300	31	322.429	610.822	517.296	0	517.296
24	4.43507	2313.35	Qal	200	26	189.18	358.39	324.748	0	324.748
25	4.43507	771.117	Qal	200	26	127.382	241.317	84.7122	0	84.7122

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.82004

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]

1	110.103	762.675	0	0	0
2	113.531	762.395	758.484	0	0
3	116.958	762.115	1868.17	0	0
4	120.385	761.835	3329.05	0	0
5	123.813	761.554	5141.14	0	0
6	127.477	761.9	5797.04	0	0
7	131.142	762.246	6565.37	0	0
8	134.807	762.592	7446.13	0	0
9	138.471	762.938	8439.32	0	0
10	142.136	763.284	9544.95	0	0
11	145.8	763.63	10763	0	0
12	149.465	763.975	12093.5	0	0
13	153.13	764.321	13536.4	0	0
14	156.794	764.667	15091.8	0	0
15	160.459	765.013	16759.6	0	0
16	164.19	768.233	13390.4	0	0
17	167.921	771.452	10267.5	0	0
18	171.653	774.672	7380.2	0	0
19	175.384	777.892	4702.61	0	0
20	179.115	781.111	2416.28	0	0
21	182.846	784.331	583.574	0	0
22	186.578	787.551	-795.512	0	0
23	190.309	790.77	-1720.98	0	0
24	194.04	793.99	-2192.82	0	0
25	198.475	797.817	-2623.43	0	0
26	202.91	801.644	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.89444

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	110.103	762.675	0	0	0
2	113.531	762.395	856.687	311.396	19.9756
3	116.958	762.115	2112.31	767.8	19.9756
4	120.385	761.835	3766.87	1369.21	19.9756
5	123.813	761.554	5820.37	2115.63	19.9756
6	127.477	761.9	6476.75	2354.22	19.9756
7	131.142	762.246	7245.64	2633.7	19.9756
8	134.807	762.592	8127.05	2954.09	19.9756
9	138.471	762.938	9120.98	3315.37	19.9756
10	142.136	763.284	10227.4	3717.55	19.9757
11	145.8	763.63	11446.4	4160.63	19.9756
12	149.465	763.975	12777.9	4644.6	19.9755
13	153.13	764.321	14221.9	5169.47	19.9755

14	156.794	764.667	15778.4	5735.25	19.9756
15	160.459	765.013	17447.4	6341.92	19.9756
16	164.19	768.233	14392.6	5231.54	19.9756
17	167.921	771.452	11558.1	4201.24	19.9756
18	171.653	774.672	8934.36	3247.53	19.9756
19	175.384	777.892	6498.12	2361.99	19.9756
20	179.115	781.111	4411.8	1603.64	19.9756
21	182.846	784.331	2731.17	992.746	19.9756
22	186.578	787.551	1456.21	529.315	19.9756
23	190.309	790.77	586.938	213.345	19.9756
24	194.04	793.99	123.348	44.8355	19.9756
25	198.475	797.817	-281.225	-102.222	19.9756
26	202.91	801.644	0	0	0

List Of Coordinates

Block Search Window

X	Y
123.716	726.275
145.7	737.732
134.172	766.411
112.916	757.13

Block Search Window

X	Y
156.859	761.058
180.339	773.041
169.809	790.348
146.552	777.965

External Boundary

X	Y
313.317	650.465
313.317	670.984
313.317	707.344
313.317	757.457
313.317	804.245
313.317	814.552
313.317	817.656
306.157	816.293

280.317	812.226
271.691	810.456
259.757	810.456
244.747	808.248
222.651	806.202
219.372	805.324
215.388	804.258
174.239	795.637
169.268	792.737
104.795	759.978
80.114	759.978
62.459	765.388
61.354	766.218
-0.112	766.218
-0.112	727.316
-0.112	677.174
-0.112	649.942
97.0723	650.104

Material Boundary

X	Y
97.0723	650.104
313.317	670.984

Material Boundary

X	Y
-0.112	677.174
313.317	707.344

Material Boundary

X	Y
-0.112	727.316
313.317	757.457

Material Boundary

X	Y
219.372	805.324
243.593	805.324
254.504	807.392
265.87	807.392

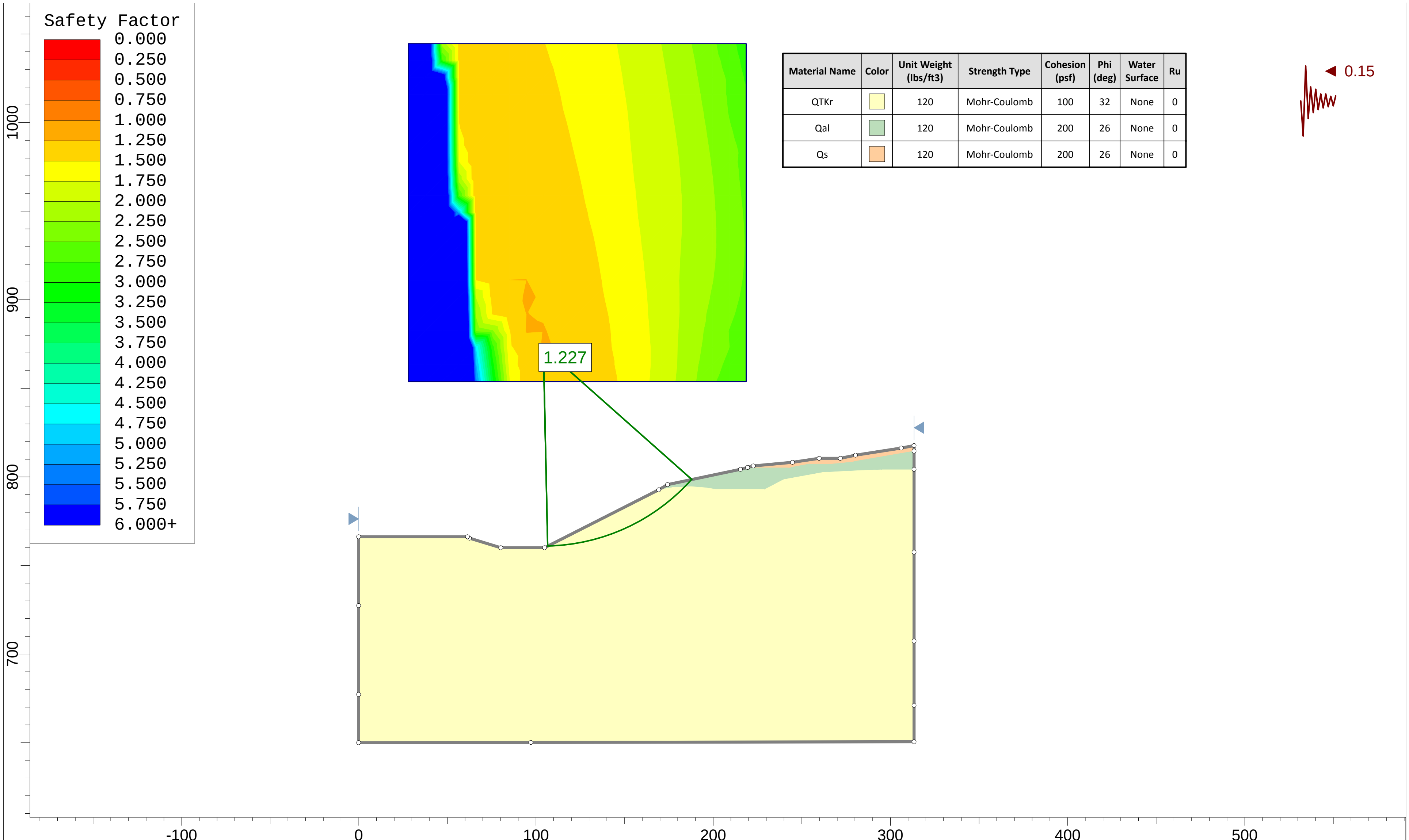
279.302	808.706

Material Boundary

X	Y
279.302	808.706
313.317	814.552

Material Boundary

X	Y
169.268	792.737
176.729	793.984
187.423	794.569
196.152	793.805
201.528	792.96
211.193	792.96
228.771	792.96
239.727	798.711
261.81	802.726
282.432	803.83
295.144	804.245
313.317	804.245



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
QTKr		120	Mohr-Coulomb	100	32	None	0
Qal		120	Mohr-Coulomb	200	26	None	0
Qs		120	Mohr-Coulomb	200	26	None	0

Project	11065.001 Maple Ridge Assisted Living
Analysis Description	Section 1-1': Pseudostatic - Circular
Drawn By	RSM
Company	Leighton and Associates, Inc.
Date	8/3/2015, 12:17:07 PM
File Name	Section 1-1' - Pseudo-Static_Circular.slim

SLIDEINTERPRET 6.033

Slide Analysis Information

11065.001 Maple Ridge Assisted Living

Project Summary

File Name: Section 1-1' - Pseudo-Static_Circular
Slide Modeler Version: 6.033
Project Title: 11065.001 Maple Ridge Assisted Living
Analysis: Section 1-1': Pseudostatic - Circular
Author: RSM
Company: Leighton and Associates, Inc.
Date Created: 8/3/2015, 12:17:07 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.15

Material Properties

Property	QTKr	Qal	Qs
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120
Cohesion [psf]	100	200	200
Friction Angle [deg]	32	26	26
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: bishop simplified

FS: 1.226860
Center: 104.153, 872.877
Radius: 112.032
Left Slip Surface Endpoint: 106.553, 760.871
Right Slip Surface Endpoint: 187.939, 798.507
Resisting Moment=6.15959e+006 lb-ft
Driving Moment=5.0206e+006 lb-ft
Total Slice Area=692.772 ft2

Method: spencer

FS: 1.228920
Center: 104.153, 872.877
Radius: 112.032
Left Slip Surface Endpoint: 106.553, 760.871
Right Slip Surface Endpoint: 187.939, 798.507
Resisting Moment=6.1699e+006 lb-ft
Driving Moment=5.0206e+006 lb-ft
Resisting Horizontal Force=49493.9 lb
Driving Horizontal Force=40274.4 lb
Total Slice Area=692.772 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4843
Number of Invalid Surfaces: 8

Error Codes:

Error Code -106 reported for 1 surface
Error Code -107 reported for 7 surfaces

Method: spencer

Number of Valid Surfaces: 4806
Number of Invalid Surfaces: 45

Error Codes:

Error Code -106 reported for 1 surface
Error Code -107 reported for 7 surfaces
Error Code -108 reported for 18 surfaces
Error Code -111 reported for 19 surfaces

Error Codes

The following errors were encountered during the computation:

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.22686

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	3.2308	295.75	QTKr	100	32	125.837	154.384	87.0331	0	87.0331
2	3.2308	869.118	QTKr	100	32	211.547	259.539	255.316	0	255.316
3	3.2308	1406.12	QTKr	100	32	289.352	354.995	408.077	0	408.077
4	3.2308	1906.49	QTKr	100	32	359.515	441.075	545.833	0	545.833
5	3.2308	2369.9	QTKr	100	32	422.262	518.056	669.029	0	669.029
6	3.2308	2795.89	QTKr	100	32	477.789	586.18	778.051	0	778.051
7	3.2308	3183.9	QTKr	100	32	526.264	645.652	873.225	0	873.225
8	3.2308	3533.27	QTKr	100	32	567.829	696.647	954.834	0	954.834
9	3.2308	3843.19	QTKr	100	32	602.602	739.308	1023.11	0	1023.11
10	3.2308	4112.74	QTKr	100	32	630.677	773.752	1078.23	0	1078.23
11	3.2308	4340.83	QTKr	100	32	652.128	800.07	1120.35	0	1120.35
12	3.2308	4526.21	QTKr	100	32	667.009	818.327	1149.56	0	1149.56
13	3.2308	4667.44	QTKr	100	32	675.353	828.563	1165.95	0	1165.95
14	3.2308	4762.86	QTKr	100	32	677.172	830.795	1169.52	0	1169.52
15	3.2308	4810.55	QTKr	100	32	672.462	825.017	1160.27	0	1160.27
16	3.2308	4808.34	QTKr	100	32	661.198	811.197	1138.15	0	1138.15
17	3.2308	4753.66	QTKr	100	32	643.334	789.281	1103.08	0	1103.08
18	3.2308	4643.57	QTKr	100	32	618.808	759.191	1054.93	0	1054.93
19	3.2308	4474.62	QTKr	100	32	587.533	720.821	993.522	0	993.522
20	3.2308	4259.11	QTKr	100	32	551.289	676.354	922.36	0	922.36
21	3.2308	4045.31	QTKr	100	32	515.833	632.855	852.745	0	852.745
22	3.2308	3509.77	QTKr	100	32	445.358	546.392	714.378	0	714.378
23	3.2308	2682.52	QTKr	100	32	345.584	423.983	518.48	0	518.48
24	3.2308	1766.45	QTKr	100	32	240.386	294.92	311.936	0	311.936
25	3.84708	765.081	Qal	200	26	169.854	208.388	17.1971	0	17.1971

Global Minimum Query (spencer) - Safety Factor: 1.22892

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	3.2308	295.75	QTKr	100	32	171.479	210.734	177.211	0	177.211
2	3.2308	869.118	QTKr	100	32	273.772	336.444	378.391	0	378.391
3	3.2308	1406.12	QTKr	100	32	361.203	443.889	550.338	0	550.338
4	3.2308	1906.49	QTKr	100	32	435.307	534.957	696.076	0	696.076
5	3.2308	2369.9	QTKr	100	32	497.392	611.255	818.179	0	818.179
6	3.2308	2795.89	QTKr	100	32	548.576	674.156	918.843	0	918.843
7	3.2308	3183.9	QTKr	100	32	589.817	724.838	999.95	0	999.95
8	3.2308	3533.27	QTKr	100	32	621.939	764.313	1063.12	0	1063.12

9	3.2308	3843.19	QTKr	100	32	645.656	793.46	1109.77	0	1109.77
10	3.2308	4112.74	QTKr	100	32	661.587	813.038	1141.1	0	1141.1
11	3.2308	4340.83	QTKr	100	32	670.271	823.709	1158.18	0	1158.18
12	3.2308	4526.21	QTKr	100	32	672.175	826.049	1161.92	0	1161.92
13	3.2308	4667.44	QTKr	100	32	667.711	820.564	1153.14	0	1153.14
14	3.2308	4762.86	QTKr	100	32	657.241	807.697	1132.55	0	1132.55
15	3.2308	4810.55	QTKr	100	32	641.081	787.837	1100.77	0	1100.77
16	3.2308	4808.34	QTKr	100	32	619.513	761.332	1058.35	0	1058.35
17	3.2308	4753.66	QTKr	100	32	592.786	728.487	1005.79	0	1005.79
18	3.2308	4643.57	QTKr	100	32	561.128	689.581	943.527	0	943.527
19	3.2308	4474.62	QTKr	100	32	524.743	644.867	871.969	0	871.969
20	3.2308	4259.11	QTKr	100	32	485.383	596.497	794.561	0	794.561
21	3.2308	4045.31	QTKr	100	32	447.91	550.446	720.865	0	720.865
22	3.2308	3509.77	QTKr	100	32	383.817	471.681	594.813	0	594.813
23	3.2308	2682.52	QTKr	100	32	299.323	367.844	428.639	0	428.639
24	3.2308	1766.45	QTKr	100	32	214.111	263.125	261.054	0	261.054
25	3.84708	765.081	Qal	200	26	186.288	228.933	59.3207	0	59.3207

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.22686

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	106.553	760.871	0	0	0
2	109.784	760.987	351.541	0	0
3	113.015	761.197	850.219	0	0
4	116.246	761.5	1448.99	0	0
5	119.476	761.899	2105.49	0	0
6	122.707	762.393	2781.7	0	0
7	125.938	762.984	3443.69	0	0
8	129.169	763.674	4061.35	0	0
9	132.4	764.465	4608.32	0	0
10	135.63	765.359	5061.77	0	0
11	138.861	766.358	5402.43	0	0
12	142.092	767.465	5614.52	0	0
13	145.323	768.685	5685.83	0	0
14	148.554	770.02	5607.8	0	0
15	151.784	771.476	5375.7	0	0
16	155.015	773.057	4988.84	0	0
17	158.246	774.77	4450.93	0	0
18	161.477	776.622	3770.54	0	0
19	164.708	778.621	2961.63	0	0

20	167.938	780.777	2044.33	0	0
21	171.169	783.1	1040.99	0	0
22	174.4	785.605	-37.5125	0	0
23	177.631	788.307	-1057.48	0	0
24	180.862	791.226	-1858.41	0	0
25	184.092	794.387	-2333.63	0	0
26	187.939	798.507	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.22892

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	106.553	760.871	0	0	0
2	109.784	760.987	489.357	300.833	31.5812
3	113.015	761.197	1164.63	715.96	31.5813
4	116.246	761.5	1954.17	1201.33	31.5812
5	119.476	761.899	2797.91	1720.02	31.5812
6	122.707	762.393	3645.74	2241.23	31.5813
7	125.938	762.984	4456.08	2739.39	31.5813
8	129.169	763.674	5194.82	3193.53	31.5812
9	132.4	764.465	5834.4	3586.71	31.5812
10	135.63	765.359	6353.12	3905.6	31.5812
11	138.861	766.358	6734.6	4140.11	31.5812
12	142.092	767.465	6967.29	4283.16	31.5812
13	145.323	768.685	7044.16	4330.41	31.5812
14	148.554	770.02	6962.51	4280.22	31.5812
15	151.784	771.476	6723.79	4133.47	31.5812
16	155.015	773.057	6333.56	3893.57	31.5812
17	158.246	774.77	5801.54	3566.51	31.5812
18	161.477	776.622	5141.75	3160.9	31.5812
19	164.708	778.621	4372.75	2688.16	31.5812
20	167.938	780.777	3517.99	2162.69	31.5812
21	171.169	783.1	2601.81	1599.47	31.5812
22	174.4	785.605	1637.15	1006.44	31.5812
23	177.631	788.307	743.981	457.364	31.5812
24	180.862	791.226	57.8208	35.5455	31.5812
25	184.092	794.387	-340.109	-209.083	31.5812
26	187.939	798.507	0	0	0

List Of Coordinates

External Boundary

X	Y

313.317	650.465
313.317	670.984
313.317	707.344
313.317	757.457
313.317	804.245
313.317	814.552
313.317	817.656
306.157	816.293
280.317	812.226
271.691	810.456
259.757	810.456
244.747	808.248
222.651	806.202
219.372	805.324
215.388	804.258
174.239	795.637
169.268	792.737
104.795	759.978
80.114	759.978
62.459	765.388
61.354	766.218
-0.112	766.218
-0.112	727.316
-0.112	677.174
-0.112	649.942
97.0723	650.104

Material Boundary

X	Y
97.0723	650.104
313.317	670.984

Material Boundary

X	Y
-0.112	677.174
313.317	707.344

Material Boundary

X	Y
-0.112	727.316
313.317	757.457

Material Boundary

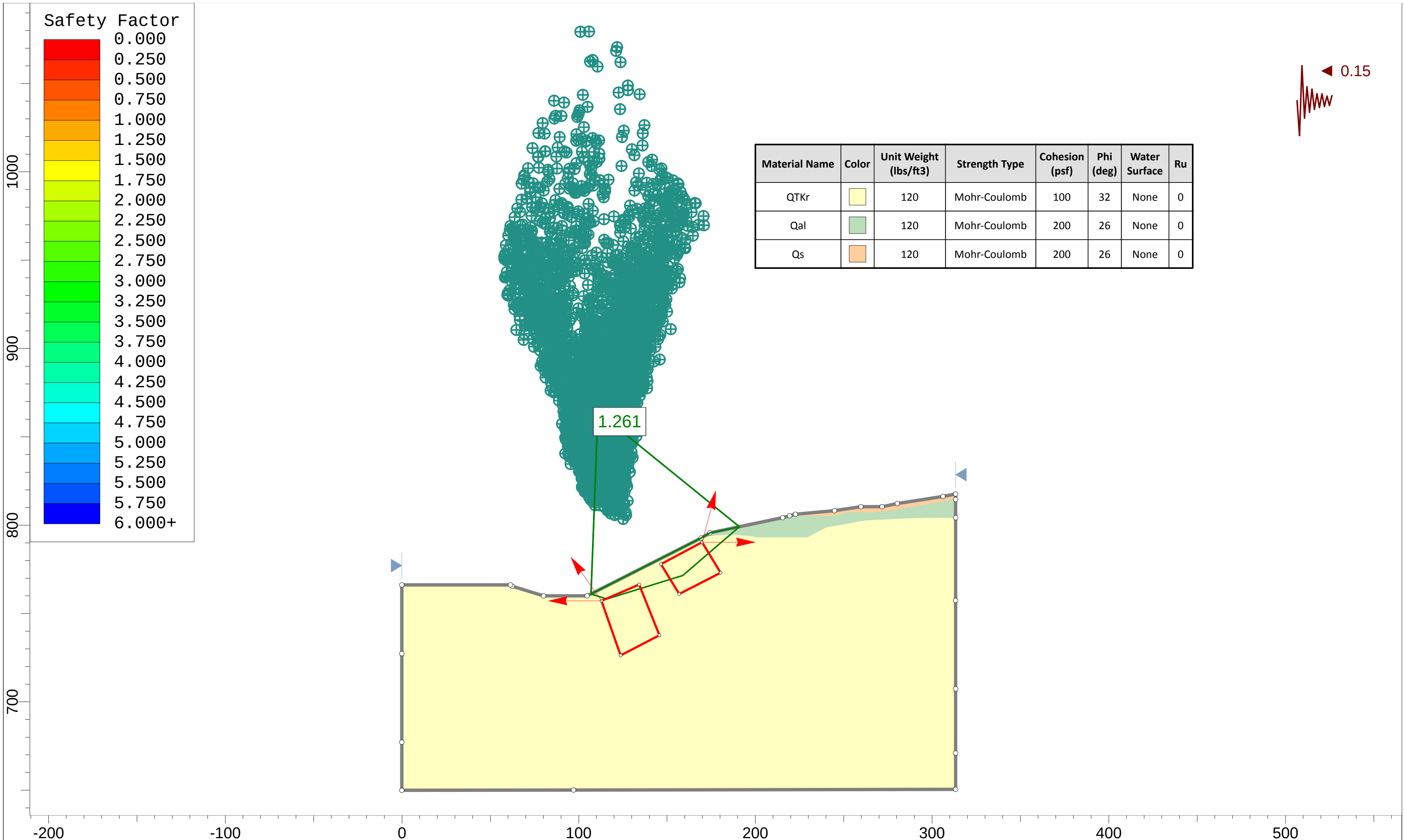
X	Y
219.372	805.324
243.593	805.324
254.504	807.392
265.87	807.392
279.302	808.706

Material Boundary

X	Y
279.302	808.706
313.317	814.552

Material Boundary

X	Y
169.268	792.737
176.729	793.984
187.423	794.569
196.152	793.805
201.528	792.96
211.193	792.96
228.771	792.96
239.727	798.711
261.81	802.726
282.432	803.83
295.144	804.245
313.317	804.245



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
QTKr		120	Mohr-Coulomb	100	32	None	0
Qal		120	Mohr-Coulomb	200	26	None	0
Qs		120	Mohr-Coulomb	200	26	None	0

Project	11065.001 Maple Ridge Assisted Living
Analysis Description	Section 1-1': Pseudostatic - Block
Drawn By	RSM
Company	Leighton and Associates, Inc.
Date	8/3/2015, 12:17:07 PM
File Name	Section 1-1' - Pseudo-Static_Block.slim

SLIDEINTERPRET 6.033

Slide Analysis Information

11065.001 Maple Ridge Assisted Living

Project Summary

File Name: Section 1-1' - Pseudo-Static_Block
Slide Modeler Version: 6.033
Project Title: 11065.001 Maple Ridge Assisted Living
Analysis: Section 1-1': Pseudostatic - Block
Author: RSM
Company: Leighton and Associates, Inc.
Date Created: 8/3/2015, 12:17:07 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 125
Left Projection Angle (End Angle): 180
Right Projection Angle (Start Angle): 0
Right Projection Angle (End Angle): 75
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.15

Material Properties

Property	QTKr	Qal	Qs
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120
Cohesion [psf]	100	200	200
Friction Angle [deg]	32	26	26
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: bishop simplified

FS: 1.261220
Axis Location: 110.843, 864.076
Left Slip Surface Endpoint: 106.921, 761.058
Right Slip Surface Endpoint: 190.904, 799.128
Resisting Moment=6.7412e+006 lb-ft
Driving Moment=5.34497e+006 lb-ft

Total Slice Area=828.989 ft2

Method: spencer

FS: 1.291990
Axis Location: 116.277, 876.595
Left Slip Surface Endpoint: 108.700, 761.962
Right Slip Surface Endpoint: 203.437, 801.754
Resisting Moment=8.04629e+006 lb-ft
Driving Moment=6.22782e+006 lb-ft
Resisting Horizontal Force=65317.6 lb
Driving Horizontal Force=50555.8 lb
Total Slice Area=901.696 ft2

Global Minimum Coordinates

Method: bishop simplified

X	Y
106.921	761.058
115.863	758.187
158.928	771.574
190.904	799.128

Method: spencer

X	Y
108.7	761.962
126.559	761.656
162.611	773.903
203.437	801.754

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4615
Number of Invalid Surfaces: 385

Error Codes:

Error Code -108 reported for 385 surfaces

Method: spencer

Number of Valid Surfaces: 3241

Number of Invalid Surfaces: 1759

Error Codes:

Error Code -108 reported for 1015 surfaces
Error Code -111 reported for 744 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.26122

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	2.98045	441.964	QTKr	100	32	181.625	229.069	206.553	0	206.553
2	2.98045	1325.89	QTKr	100	32	356.33	449.411	559.174	0	559.174
3	2.98045	2209.82	QTKr	100	32	531.037	669.754	911.796	0	911.796
4	3.58875	3345.44	QTKr	100	32	468.988	591.497	786.559	0	786.559
5	3.58875	3650.29	QTKr	100	32	505.463	637.5	860.18	0	860.18
6	3.58875	3955.14	QTKr	100	32	541.937	683.502	933.799	0	933.799
7	3.58875	4259.99	QTKr	100	32	578.412	729.505	1007.42	0	1007.42
8	3.58875	4564.84	QTKr	100	32	614.886	775.507	1081.04	0	1081.04
9	3.58875	4869.69	QTKr	100	32	651.361	821.51	1154.66	0	1154.66
10	3.58875	5174.54	QTKr	100	32	687.836	867.513	1228.28	0	1228.28
11	3.58875	5479.4	QTKr	100	32	724.311	913.515	1301.9	0	1301.9
12	3.58875	5784.25	QTKr	100	32	760.786	959.518	1375.52	0	1375.52
13	3.58875	6089.1	QTKr	100	32	797.26	1005.52	1449.14	0	1449.14
14	3.58875	6393.95	QTKr	100	32	833.735	1051.52	1522.75	0	1522.75
15	3.58875	6698.8	QTKr	100	32	870.209	1097.53	1596.37	0	1596.37
16	3.32027	6104.77	QTKr	100	32	694.167	875.497	1241.05	0	1241.05
17	3.32027	5636.97	QTKr	100	32	645.232	813.78	1142.29	0	1142.29
18	3.32027	5169.16	QTKr	100	32	596.298	752.063	1043.52	0	1043.52
19	3.32027	4740.42	QTKr	100	32	551.45	695.5	952.999	0	952.999
20	3.32027	4334.22	QTKr	100	32	508.96	641.91	867.237	0	867.237
21	3.32027	3563.86	QTKr	100	32	428.377	540.278	704.591	0	704.591
22	3.32027	2701.05	QTKr	100	32	338.123	426.447	522.425	0	522.425
23	3.32027	1838.23	QTKr	100	32	247.868	312.616	340.258	0	340.258
24	2.70683	860.175	Qal	200	26	211.167	266.328	135.993	0	135.993

25	2.70683	286.725	Qal	200	26	149.703	188.808	-22.947	0	-22.947

Global Minimum Query (spencer) - Safety Factor: 1.29199

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	3.5717	402.045	QTKr	100	32	180.2	232.817	212.552	0	212.552
2	3.5717	1206.14	QTKr	100	32	322.044	416.077	505.83	0	505.83
3	3.5717	2010.23	QTKr	100	32	463.887	599.337	799.107	0	799.107
4	3.5717	2814.32	QTKr	100	32	605.73	782.597	1092.38	0	1092.38
5	3.5717	3618.41	QTKr	100	32	747.573	965.857	1385.66	0	1385.66
6	4.00575	4671.16	QTKr	100	32	562.499	726.743	1003	0	1003
7	4.00575	4995.41	QTKr	100	32	595.573	769.475	1071.38	0	1071.38
8	4.00575	5319.66	QTKr	100	32	628.649	812.208	1139.77	0	1139.77
9	4.00575	5643.91	QTKr	100	32	661.723	854.94	1208.16	0	1208.16
10	4.00575	5968.17	QTKr	100	32	694.798	897.672	1276.54	0	1276.54
11	4.00575	6292.42	QTKr	100	32	727.873	940.405	1344.93	0	1344.93
12	4.00575	6616.67	QTKr	100	32	760.948	983.137	1413.32	0	1413.32
13	4.00575	6940.92	QTKr	100	32	794.022	1025.87	1481.7	0	1481.7
14	4.00575	7265.17	QTKr	100	32	827.098	1068.6	1550.09	0	1550.09
15	3.70885	6733.13	QTKr	100	32	628.251	811.694	1138.95	0	1138.95
16	3.70885	6448.39	QTKr	100	32	604.853	781.464	1090.57	0	1090.57
17	3.70885	6246.04	QTKr	100	32	588.225	759.981	1056.19	0	1056.19
18	3.70885	5852.26	QTKr	100	32	555.866	718.173	989.284	0	989.284
19	3.70885	5077.69	QTKr	100	32	492.216	635.938	857.679	0	857.679
20	3.70885	4297.46	QTKr	100	32	428.101	553.102	725.114	0	725.114
21	3.70885	3517.24	QTKr	100	32	363.986	470.266	592.55	0	592.55
22	3.70885	2737.01	QTKr	100	32	299.871	387.43	459.985	0	459.985
23	3.71871	1960.95	Qal	200	26	277.284	358.248	324.457	0	324.457
24	3.71871	1176.57	Qal	200	26	226.781	292.999	190.676	0	190.676
25	3.71871	392.19	Qal	200	26	176.464	227.99	57.3871	0	57.3871

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.26122

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	106.921	761.058	0	0	0
2	109.902	760.101	672.177	0	0
3	112.882	759.144	2069.44	0	0
4	115.863	758.187	4191.78	0	0
5	119.451	759.303	4493.9	0	0
6	123.04	760.418	4798.93	0	0

7	126.629	761.534	5106.87	0	0
8	130.218	762.649	5417.73	0	0
9	133.806	763.765	5731.49	0	0
10	137.395	764.881	6048.18	0	0
11	140.984	765.996	6367.77	0	0
12	144.573	767.112	6690.27	0	0
13	148.161	768.227	7015.69	0	0
14	151.75	769.343	7344.02	0	0
15	155.339	770.458	7675.26	0	0
16	158.928	771.574	8009.41	0	0
17	162.248	774.435	5845.36	0	0
18	165.568	777.296	3871.76	0	0
19	168.889	780.157	2088.61	0	0
20	172.209	783.019	480.005	0	0
21	175.529	785.88	-963.234	0	0
22	178.849	788.741	-2092.85	0	0
23	182.17	791.602	-2871.21	0	0
24	185.49	794.463	-3298.31	0	0
25	188.197	796.796	-3173.52	0	0
26	190.904	799.128	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.29199

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	108.7	761.962	0	0	0
2	112.272	761.901	597.513	351.231	30.4479
3	115.844	761.84	1599.93	940.473	30.4479
4	119.415	761.778	3007.24	1767.72	30.4479
5	122.987	761.717	4819.46	2832.99	30.448
6	126.559	761.656	7036.58	4136.26	30.448
7	130.565	763.017	7228.38	4249	30.4479
8	134.57	764.377	7411.21	4356.48	30.448
9	138.576	765.738	7585.08	4458.68	30.448
10	142.582	767.099	7749.99	4555.61	30.4479
11	146.588	768.46	7905.93	4647.28	30.448
12	150.593	769.821	8052.9	4733.67	30.4479
13	154.599	771.181	8190.91	4814.8	30.448
14	158.605	772.542	8319.95	4890.65	30.448
15	162.611	773.903	8440.03	4961.24	30.448
16	166.319	776.433	6882.74	4045.83	30.448
17	170.028	778.963	5403.63	3176.37	30.4479
18	173.737	781.493	3980.07	2339.57	30.4479
19	177.446	784.023	2664.62	1566.32	30.4479

20	181.155	786.553	1561.83	918.078	30.4479
21	184.864	789.084	673.252	395.753	30.448
22	188.572	791.614	-1.1148	-0.655302	30.4479
23	192.281	794.144	-461.271	-271.145	30.4479
24	196	796.681	-545.486	-320.649	30.448
25	199.719	799.217	-360.814	-212.094	30.4479
26	203.437	801.754	0	0	0

List Of Coordinates

Block Search Window

X	Y
123.716	726.275
145.7	737.732
134.172	766.411
112.916	757.13

Block Search Window

X	Y
156.859	761.058
180.339	773.041
169.809	790.348
146.552	777.965

External Boundary

X	Y
313.317	650.465
313.317	670.984
313.317	707.344
313.317	757.457
313.317	804.245
313.317	814.552
313.317	817.656
306.157	816.293
280.317	812.226
271.691	810.456
259.757	810.456
244.747	808.248
222.651	806.202
219.372	805.324

215.388	804.258
174.239	795.637
169.268	792.737
104.795	759.978
80.114	759.978
62.459	765.388
61.354	766.218
-0.112	766.218
-0.112	727.316
-0.112	677.174
-0.112	649.942
97.0723	650.104

Material Boundary

X	Y
97.0723	650.104
313.317	670.984

Material Boundary

X	Y
-0.112	677.174
313.317	707.344

Material Boundary

X	Y
-0.112	727.316
313.317	757.457

Material Boundary

X	Y
219.372	805.324
243.593	805.324
254.504	807.392
265.87	807.392
279.302	808.706

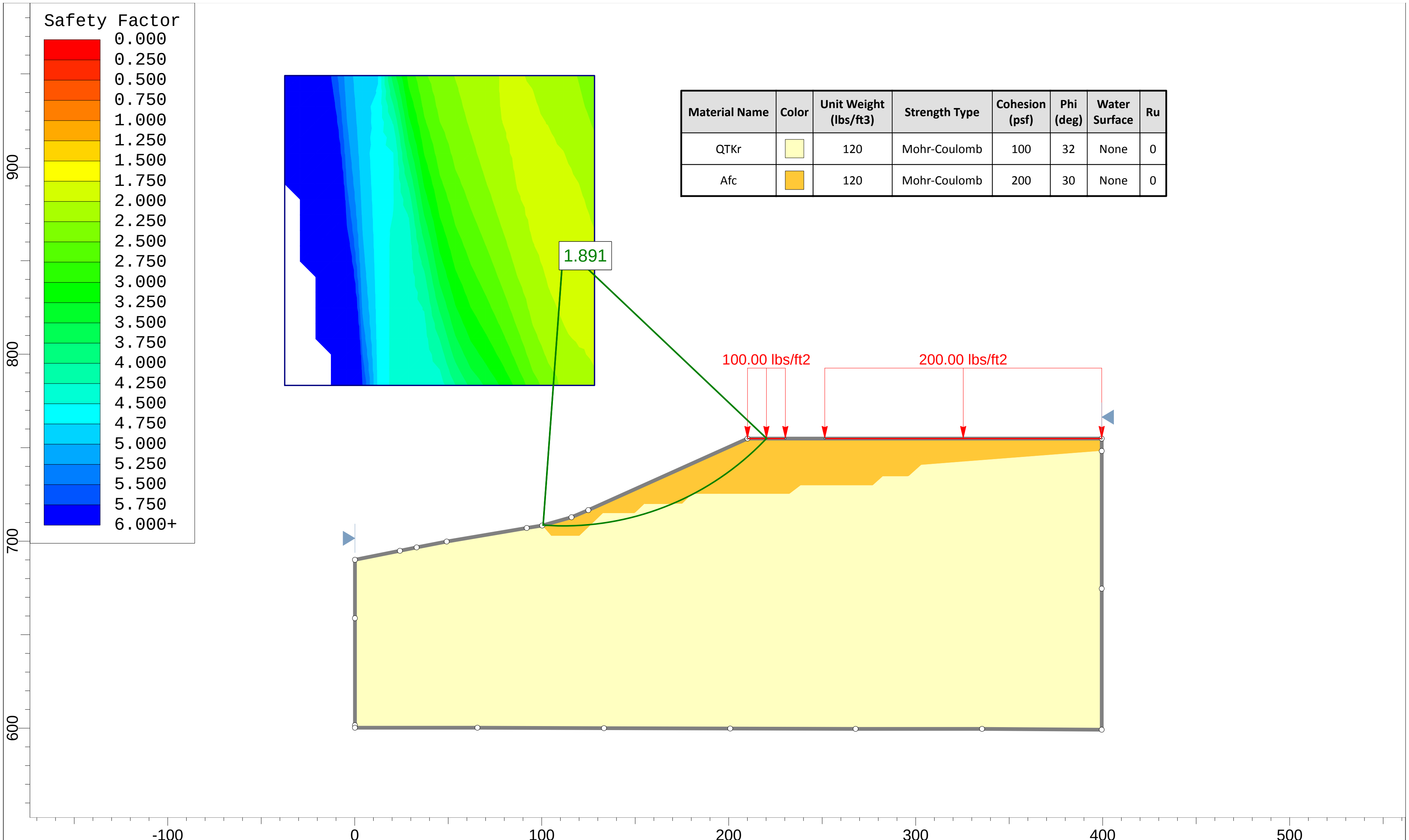
Material Boundary

X	Y
279.302	808.706

313.317	814.552

Material Boundary

X	Y
169.268	792.737
176.729	793.984
187.423	794.569
196.152	793.805
201.528	792.96
211.193	792.96
228.771	792.96
239.727	798.711
261.81	802.726
282.432	803.83
295.144	804.245
313.317	804.245



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
QTKr		120	Mohr-Coulomb	100	32	None	0
Afc		120	Mohr-Coulomb	200	30	None	0

Project	11065.001 Maple Ridge Assisted Living		
Analysis Description	Section 2-2': Static - Circular		
Drawn By	RSM	*Company*	Leighton and Associates, Inc.
Date	8/3/2015, 2:28:24 PM	*File Name*	Section 2-2'a - Static.slim

SLIDEINTERPRET 6.033

Slide Analysis Information

11065.001 Maple Ridge Assisted Living

Project Summary

File Name: Section 2-2'a - Static
Slide Modeler Version: 6.033
Project Title: 11065.001 Maple Ridge Assisted Living
Analysis: Section 2-2': Static - Circular
Author: RSM
Company: Leighton and Associates, Inc.
Date Created: 8/3/2015, 2:28:24 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 100
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 200
Orientation: Normal to boundary

Material Properties

Property	QTKr	Afc
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120
Cohesion [psf]	100	200
Friction Angle [deg]	32	30
Water Surface	None	None
Ru Value	0	0

Global Minimums

Method: bishop simplified

FS: 1.891360
Center: 111.689, 857.897
Radius: 149.753
Left Slip Surface Endpoint: 100.752, 708.544
Right Slip Surface Endpoint: 220.390, 754.892
Resisting Moment=1.72422e+007 lb-ft
Driving Moment=9.11631e+006 lb-ft
Total Slice Area=1355.63 ft2

Method: spencer

FS: 1.891640
Center: 111.689, 857.897
Radius: 149.753
Left Slip Surface Endpoint: 100.752, 708.544
Right Slip Surface Endpoint: 220.390, 754.892
Resisting Moment=1.72448e+007 lb-ft
Driving Moment=9.11631e+006 lb-ft
Resisting Horizontal Force=104794 lb
Driving Horizontal Force=55398.5 lb
Total Slice Area=1355.63 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4574
Number of Invalid Surfaces: 277

Error Codes:

Error Code -106 reported for 6 surfaces
Error Code -108 reported for 40 surfaces
Error Code -1000 reported for 231 surfaces

Method: spencer

Number of Valid Surfaces: 4543
Number of Invalid Surfaces: 308

Error Codes:

Error Code -106 reported for 6 surfaces
Error Code -108 reported for 67 surfaces
Error Code -111 reported for 4 surfaces
Error Code -1000 reported for 231 surfaces

Error Codes

The following errors were encountered during the computation:

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.89136

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	5.15544	538.167	Afc	200	30	139.996	264.784	112.208	0	112.208
2	5.15544	1559.46	Afc	200	30	199.382	377.103	306.751	0	306.751
3	5.15544	2471.46	Afc	200	30	251.082	474.886	476.116	0	476.116
4	5.15544	3521.05	Afc	200	30	309.738	585.826	668.271	0	668.271
5	5.15544	4665.14	Afc	200	30	372.631	704.78	874.304	0	874.304
6	4.83799	5376.16	QTKr	100	32	404.51	765.074	1064.34	0	1064.34
7	4.83799	6266.53	QTKr	100	32	458.237	866.692	1226.96	0	1226.96
8	4.83799	7063.04	QTKr	100	32	504.733	954.631	1367.7	0	1367.7
9	4.83799	7764.16	QTKr	100	32	544.081	1029.05	1486.79	0	1486.79
10	4.83799	8367.95	QTKr	100	32	576.339	1090.07	1584.44	0	1584.44
11	4.83799	8872.13	QTKr	100	32	601.541	1137.73	1660.71	0	1660.71
12	4.83799	9273.94	QTKr	100	32	619.692	1172.06	1715.65	0	1715.65
13	4.83799	9570.15	QTKr	100	32	630.774	1193.02	1749.19	0	1749.19
14	4.83799	9756.94	QTKr	100	32	634.739	1200.52	1761.19	0	1761.19
15	4.7501	9651.67	Afc	200	30	639.418	1209.37	1748.27	0	1748.27
16	4.7501	9609.35	Afc	200	30	629.82	1191.22	1716.84	0	1716.84
17	1.63463	3278.94	QTKr	100	32	611.396	1156.37	1690.55	0	1690.55
18	4.89801	9651.22	Afc	200	30	605.945	1146.06	1638.62	0	1638.62
19	4.89801	9295.58	Afc	200	30	579.371	1095.8	1551.57	0	1551.57
20	4.89801	8790.61	Afc	200	30	545.211	1031.19	1439.66	0	1439.66
21	4.89801	8125.03	Afc	200	30	503.195	951.722	1302.02	0	1302.02
22	4.89801	7285.25	Afc	200	30	453.004	856.794	1137.6	0	1137.6
23	4.89801	6246.93	Afc	200	30	396.533	749.986	952.604	0	952.604
24	4.89801	4224.15	Afc	200	30	312.008	590.12	675.707	0	675.707
25	4.89801	1450.08	Afc	200	30	173.377	327.918	221.561	0	221.561

Global Minimum Query (spencer) - Safety Factor: 1.89164

Slice	Width	Weight	Base	Base Cohesion	Base Friction Angle	Shear Stress	Shear Strength	Base Normal Stress	Pore Pressure	Effective Normal Stress

				[psf]	[degrees]	[psf]	[psf]	[psf]	[psf]	[psf]
1	5.15544	538.167	Afc	200	30	159.165	301.083	175.081	0	175.081
2	5.15544	1559.46	Afc	200	30	225.734	427.008	393.189	0	393.189
3	5.15544	2471.46	Afc	200	30	281.688	532.853	576.518	0	576.518
4	5.15544	3521.05	Afc	200	30	343.682	650.122	779.635	0	779.635
5	5.15544	4665.14	Afc	200	30	408.515	772.764	992.056	0	992.056
6	4.83799	5376.16	QTKr	100	32	440.195	832.691	1172.55	0	1172.55
7	4.83799	6266.53	QTKr	100	32	492.393	931.43	1330.57	0	1330.57
8	4.83799	7063.04	QTKr	100	32	535.615	1013.19	1461.41	0	1461.41
9	4.83799	7764.16	QTKr	100	32	570.283	1078.77	1566.36	0	1566.36
10	4.83799	8367.95	QTKr	100	32	596.763	1128.86	1646.53	0	1646.53
11	4.83799	8872.13	QTKr	100	32	615.376	1164.07	1702.87	0	1702.87
12	4.83799	9273.94	QTKr	100	32	626.398	1184.92	1736.24	0	1736.24
13	4.83799	9570.15	QTKr	100	32	630.072	1191.87	1747.36	0	1747.36
14	4.83799	9756.94	QTKr	100	32	626.604	1185.31	1736.86	0	1736.86
15	4.7501	9651.67	Afc	200	30	626.129	1184.41	1705.05	0	1705.05
16	4.7501	9609.35	Afc	200	30	610.455	1154.76	1653.7	0	1653.7
17	1.63463	3278.94	QTKr	100	32	585.355	1107.28	1611.98	0	1611.98
18	4.89801	9651.22	Afc	200	30	579.463	1096.14	1552.15	0	1552.15
19	4.89801	9295.58	Afc	200	30	548.697	1037.94	1451.35	0	1451.35
20	4.89801	8790.61	Afc	200	30	511.69	967.933	1330.1	0	1330.1
21	4.89801	8125.03	Afc	200	30	468.47	886.176	1188.49	0	1188.49
22	4.89801	7285.25	Afc	200	30	419.049	792.689	1026.57	0	1026.57
23	4.89801	6246.93	Afc	200	30	365.381	691.169	850.73	0	850.73
24	4.89801	4224.15	Afc	200	30	289.164	546.994	601.01	0	601.01
25	4.89801	1450.08	Afc	200	30	169.748	321.102	209.756	0	209.756

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.89136

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	100.752	708.544	0	0	0
2	105.908	708.255	753.406	0	0
3	111.063	708.145	1814.18	0	0
4	116.219	708.212	3075.39	0	0
5	121.374	708.457	4506.99	0	0
6	126.529	708.881	6055.86	0	0
7	131.367	709.442	7413.49	0	0
8	136.205	710.164	8742.6	0	0
9	141.043	711.049	9972.13	0	0
10	145.881	712.1	11039.9	0	0

11	150.719	713.32	11892.6	0	0
12	155.557	714.713	12485.5	0	0
13	160.395	716.286	12782.7	0	0
14	165.233	718.043	12757.1	0	0
15	170.071	719.993	12391.6	0	0
16	174.821	722.102	11739	0	0
17	179.572	724.413	10760.1	0	0
18	181.206	725.257	10331.8	0	0
19	186.104	727.942	8897.72	0	0
20	191.002	730.872	7186.63	0	0
21	195.9	734.065	5257.96	0	0
22	200.798	737.541	3193.77	0	0
23	205.696	741.327	1104	0	0
24	210.594	745.453	-885.949	0	0
25	215.492	749.958	-2403.36	0	0
26	220.39	754.892	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.89164

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	100.752	708.544	0	0	0
2	105.908	708.255	870.436	322.334	20.3203
3	111.063	708.145	2076.72	769.038	20.3203
4	116.219	708.212	3489.14	1292.07	20.3202
5	121.374	708.457	5068.67	1876.99	20.3202
6	126.529	708.881	6752.92	2500.69	20.3202
7	131.367	709.442	8222.74	3044.99	20.3203
8	136.205	710.164	9642.66	3570.8	20.3202
9	141.043	711.049	10939.1	4050.89	20.3202
10	145.881	712.1	12050.6	4462.48	20.3202
11	150.719	713.32	12926.9	4786.98	20.3202
12	155.557	714.713	13528.5	5009.78	20.3202
13	160.395	716.286	13826.3	5120.07	20.3203
14	165.233	718.043	13801.3	5110.8	20.3202
15	170.071	719.993	13444.5	4978.68	20.3203
16	174.821	722.102	12820.7	4747.67	20.3202
17	179.572	724.413	11896.4	4405.4	20.3203
18	181.206	725.257	11492.1	4255.68	20.3203
19	186.104	727.942	10161.2	3762.83	20.3203
20	191.002	730.872	8594.26	3182.57	20.3203
21	195.9	734.065	6851.92	2537.35	20.3202
22	200.798	737.541	5012.99	1856.37	20.3202
23	205.696	741.327	3177.82	1176.79	20.3203

24	210.594	745.453	1456.14	539.227	20.3202
25	215.492	749.958	163.766	60.6448	20.3203
26	220.39	754.892	0	0	0

List Of Coordinates

Distributed Load

X	Y
230.351	754.892
210.06	754.892

Distributed Load

X	Y
399.526	754.892
251.415	754.892

External Boundary

X	Y
399.526	599.186
399.526	674.632
399.526	748.264
399.526	754.892
210.06	754.892
124.992	716.643
115.94	712.82
100.266	708.407
92.019	707.073
49.193	699.855
33.1355	696.678
24.202	694.911
0.126	690.057
0.126	658.824
0.126	601.596
0.126	600.259
65.67	600.259
133.338	600.042
200.821	599.825
267.93	599.609
335.539	599.609

Material Boundary

X	Y
0.126	658.824
33.1355	696.678

Material Boundary

X	Y
0.126	601.596
92.019	707.073

Material Boundary

X	Y
200.821	599.825
325.315	742.508

Material Boundary

X	Y
267.93	599.609
395.51	747.953

Material Boundary

X	Y
335.539	599.609
399.526	674.632

Material Boundary

X	Y
105.092	702.799
120.208	702.799
133.008	715.114

Material Boundary

X	Y
133.008	715.114
149.936	715.114
154.381	719.316
155.097	719.993

159.067	719.993
170.415	719.993
175.191	719.993
177.884	722.71
180.408	725.257
195.522	725.257
232.511	725.257
238.519	729.842
248.128	729.842
277.107	729.842
282.635	734.812
296.421	734.812
303.011	740.778

Material Boundary

X	Y
100.266	708.407
105.092	702.799

Material Boundary

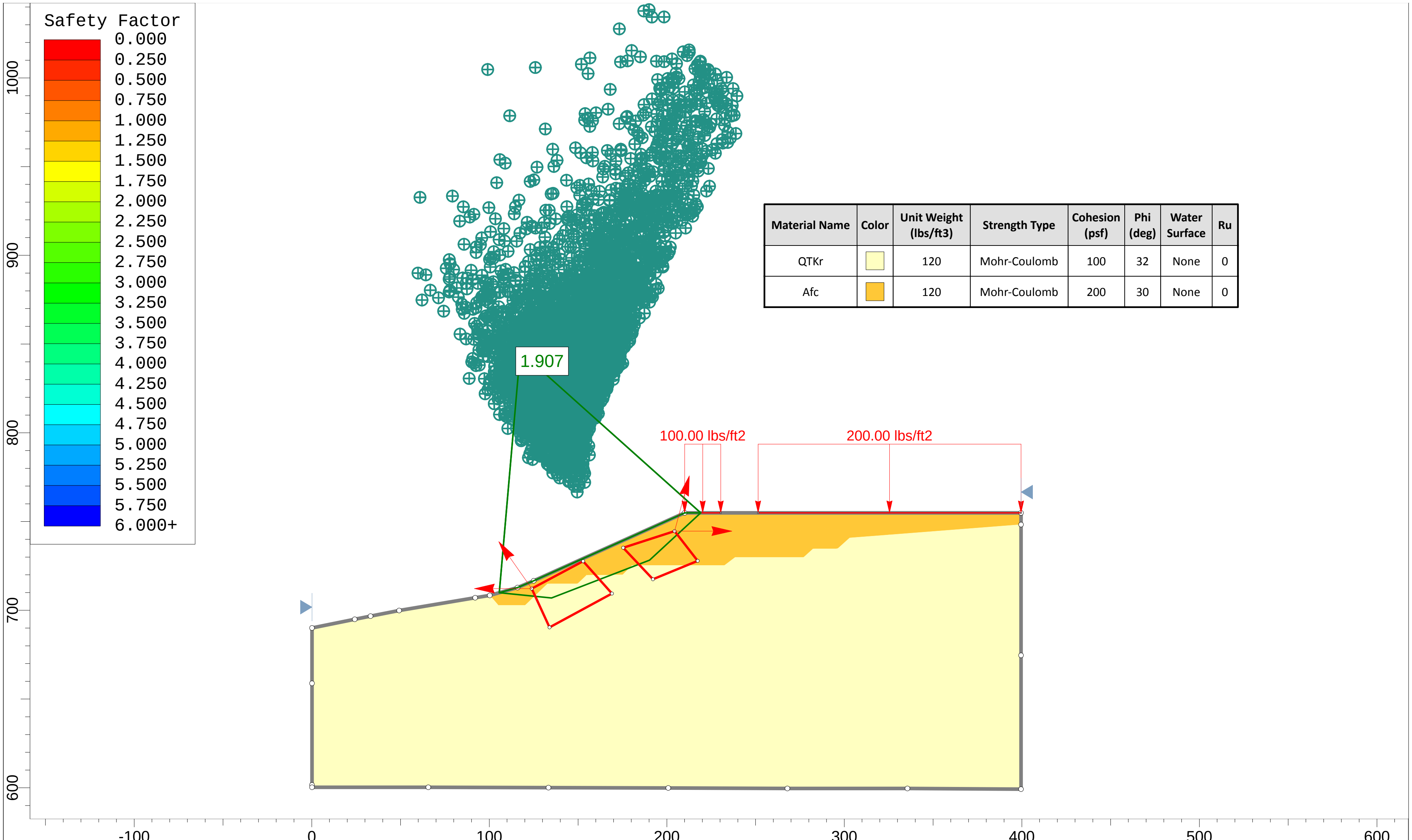
X	Y
303.011	740.778
325.315	742.508
395.51	747.953
399.526	748.264

Material Boundary

X	Y
133.338	600.042
248.128	729.842

Material Boundary

X	Y
65.67	600.259
170.415	719.993



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
QTKr		120	Mohr-Coulomb	100	32	None	0
Afc		120	Mohr-Coulomb	200	30	None	0

Project	11065.001 Maple Ridge Assisted Living
Analysis Description	Section 2-2': Static - Block
Drawn By	RSM
Company	Leighton and Associates, Inc.
Date	8/3/2015, 2:28:24 PM
File Name	Section 2-2'a - Static_Block.slim

SLIDEINTERPRET 6.033

Slide Analysis Information

11065.001 Maple Ridge Assisted Living

Project Summary

File Name: Section 2-2'a - Static_Block
Slide Modeler Version: 6.033
Project Title: 11065.001 Maple Ridge Assisted Living
Analysis: Section 2-2': Static - Block
Author: RSM
Company: Leighton and Associates, Inc.
Date Created: 8/3/2015, 2:28:24 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 125
Left Projection Angle (End Angle): 180
Right Projection Angle (Start Angle): 0
Right Projection Angle (End Angle): 75
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 100
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 200
Orientation: Normal to boundary

Material Properties

Property	QTKr	Afc
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120
Cohesion [psf]	100	200
Friction Angle [deg]	32	30
Water Surface	None	None
Ru Value	0	0

Global Minimums

Method: bishop simplified

FS: 1.907280
Axis Location: 117.402, 845.898
Left Slip Surface Endpoint: 105.630, 709.917
Right Slip Surface Endpoint: 219.123, 754.892
Resisting Moment=1.589e+007 lb-ft
Driving Moment=8.33126e+006 lb-ft
Total Slice Area=1373.38 ft2

Method: spencer

FS: 1.948900
Axis Location: 115.425, 847.349
Left Slip Surface Endpoint: 103.399, 709.289
Right Slip Surface Endpoint: 218.658, 754.892
Resisting Moment=1.48858e+007 lb-ft
Driving Moment=7.63806e+006 lb-ft
Resisting Horizontal Force=98318 lb
Driving Horizontal Force=50448 lb
Total Slice Area=1260.65 ft2

Global Minimum Coordinates

Method: bishop simplified

X	Y
105.63	709.917
135.057	706.921
190.277	728.235
219.123	754.892

Method: spencer

X	Y
103.399	709.289
131.016	708.142
195.659	731.74
218.658	754.892

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4992
Number of Invalid Surfaces: 8

Error Codes:

Error Code -108 reported for 8 surfaces

Method: spencer

Number of Valid Surfaces: 4765
Number of Invalid Surfaces: 235

Error Codes:

Error Code -108 reported for 78 surfaces
Error Code -111 reported for 157 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.90728

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	4.96825	567.781	Afc	200	30	143.888	274.435	128.925	0	128.925
2	4.96825	1703.34	Afc	200	30	215.276	410.591	364.754	0	364.754
3	4.96825	3017.3	Afc	200	30	297.878	568.136	637.631	0	637.631
4	4.96825	4569.15	Afc	200	30	395.435	754.206	959.912	0	959.912
5	4.77693	5902.19	QTKr	100	32	473	902.144	1283.7	0	1283.7
6	4.77693	7412.21	QTKr	100	32	580.135	1106.48	1610.71	0	1610.71
7	4.23337	7306.32	QTKr	100	32	548.538	1046.22	1514.26	0	1514.26
8	4.23337	7443.19	QTKr	100	32	557.942	1064.15	1542.97	0	1542.97
9	4.23337	7580.06	QTKr	100	32	567.346	1082.09	1571.67	0	1571.67
10	4.23337	7716.93	QTKr	100	32	576.748	1100.02	1600.37	0	1600.37
11	4.23337	7853.8	QTKr	100	32	586.154	1117.96	1629.08	0	1629.08
12	4.23337	7990.68	QTKr	100	32	595.56	1135.9	1657.78	0	1657.78
13	4.23337	8127.55	QTKr	100	32	604.961	1153.83	1686.48	0	1686.48
14	4.23337	8264.42	QTKr	100	32	614.367	1171.77	1715.19	0	1715.19

15	5.07473	10087.3	Afc	200	30	632.686	1206.71	1743.67	0	1743.67
16	5.07473	10284	Afc	200	30	643.188	1226.74	1778.37	0	1778.37
17	3.4884	7183.35	QTKr	100	32	645.49	1231.13	1810.18	0	1810.18
18	3.85743	8051.47	Afc	200	30	659.657	1258.15	1832.77	0	1832.77
19	3.85743	8165.11	Afc	200	30	667.642	1273.38	1859.15	0	1859.15
20	4.80778	9589.51	Afc	200	30	553.798	1056.25	1483.06	0	1483.06
21	4.80778	8273.44	Afc	200	30	489.041	932.738	1269.14	0	1269.14
22	4.80778	6957.37	Afc	200	30	424.284	809.228	1055.22	0	1055.22
23	4.80778	5641.29	Afc	200	30	359.527	685.719	841.29	0	841.29
24	4.80778	3836.63	Afc	200	30	291.669	556.295	617.12	0	617.12
25	4.80778	1281.62	Afc	200	30	168.667	321.695	210.782	0	210.782

Global Minimum Query (spencer) - Safety Factor: 1.9489

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	4.51609	395.339	Afc	200	30	147.906	288.254	152.86	0	152.86
2	4.51609	1186.02	Afc	200	30	208.346	406.045	356.882	0	356.882
3	4.51609	1985.26	Afc	200	30	269.441	525.114	563.113	0	563.113
4	4.51609	3016.51	Afc	200	30	348.271	678.745	829.212	0	829.212
5	4.51609	4153.37	Afc	200	30	435.173	848.109	1122.56	0	1122.56
6	5.03732	6028.12	QTKr	100	32	512.117	998.064	1437.2	0	1437.2
7	4.63769	6347.47	QTKr	100	32	438.552	854.694	1207.76	0	1207.76
8	4.63769	6565.78	QTKr	100	32	451.861	880.632	1249.27	0	1249.27
9	4.63769	6784.09	QTKr	100	32	465.17	906.57	1290.78	0	1290.78
10	4.63769	7002.4	QTKr	100	32	478.479	932.508	1332.29	0	1332.29
11	4.63769	7220.71	QTKr	100	32	491.789	958.447	1373.8	0	1373.8
12	4.63769	7439.02	QTKr	100	32	505.098	984.385	1415.31	0	1415.31
13	4.63769	7657.33	QTKr	100	32	518.407	1010.32	1456.82	0	1456.82
14	4.59694	7805.5	Afc	200	30	546.515	1065.1	1498.4	0	1498.4
15	4.59694	8020	Afc	200	30	558.699	1088.85	1539.53	0	1539.53
16	4.59694	8234.49	Afc	200	30	570.884	1112.6	1580.66	0	1580.66
17	4.59694	8448.98	Afc	200	30	583.068	1136.34	1621.79	0	1621.79
18	4.59694	8663.47	Afc	200	30	595.252	1160.09	1662.92	0	1662.92
19	4.59694	8877.96	Afc	200	30	607.437	1183.83	1704.05	0	1704.05
20	4.59694	9092.46	Afc	200	30	619.621	1207.58	1745.18	0	1745.18
21	4.59977	8498.2	Afc	200	30	438.602	854.791	1134.13	0	1134.13
22	4.59977	7083.89	Afc	200	30	380.701	741.948	938.682	0	938.682
23	4.59977	5669.57	Afc	200	30	322.8	629.105	743.232	0	743.232
24	4.59977	3824.07	Afc	200	30	263.614	513.757	543.443	0	543.443
25	4.59977	1277.95	Afc	200	30	161.505	314.758	198.766	0	198.766

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.90728

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	105.63	709.917	0	0	0
2	110.599	709.411	779.747	0	0
3	115.567	708.905	2033.29	0	0
4	120.535	708.4	3835.06	0	0
5	125.503	707.894	6284.31	0	0
6	130.28	707.407	9167.08	0	0
7	135.057	706.921	12720.4	0	0
8	139.291	708.555	12567.1	0	0
9	143.524	710.189	12406.8	0	0
10	147.757	711.823	12239.3	0	0
11	151.991	713.457	12064.7	0	0
12	156.224	715.091	11882.9	0	0
13	160.457	716.725	11694.1	0	0
14	164.691	718.359	11498.2	0	0
15	168.924	719.993	11295.1	0	0
16	173.999	721.952	11088.8	0	0
17	179.074	723.911	10867.9	0	0
18	182.562	725.257	10681.2	0	0
19	186.419	726.746	10495.7	0	0
20	190.277	728.235	10301.7	0	0
21	195.085	732.678	6373.95	0	0
22	199.892	737.121	3085.4	0	0
23	204.7	741.563	436.107	0	0
24	209.508	746.006	-1573.93	0	0
25	214.316	750.449	-2914.11	0	0
26	219.123	754.892	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.9489

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	103.399	709.289	0	0	0
2	107.915	709.101	697.579	267.565	20.9849
3	112.431	708.914	1706.75	654.646	20.985
4	116.947	708.726	3030.9	1162.54	20.9849
5	121.463	708.539	4761.45	1826.31	20.9849
6	125.979	708.351	6940.02	2661.93	20.9849
7	131.016	708.142	9823.98	3768.11	20.9849
8	135.654	709.835	9816.1	3765.08	20.9849
9	140.292	711.528	9799.75	3758.81	20.9849

10	144.929	713.221	9774.95	3749.3	20.9849
11	149.567	714.914	9741.68	3736.54	20.9849
12	154.205	716.607	9699.96	3720.54	20.9849
13	158.843	718.3	9649.77	3701.29	20.9849
14	163.48	719.993	9591.12	3678.79	20.9849
15	168.077	721.671	9592.6	3679.36	20.9849
16	172.674	723.349	9581.16	3674.97	20.9849
17	177.271	725.027	9556.8	3665.63	20.9849
18	181.868	726.705	9519.51	3651.32	20.9849
19	186.465	728.383	9469.29	3632.06	20.9849
20	191.062	730.062	9406.14	3607.84	20.9849
21	195.659	731.74	9330.07	3578.66	20.9849
22	200.259	736.37	6098.88	2339.3	20.9849
23	204.858	741.001	3506.01	1344.77	20.9849
24	209.458	745.631	1551.45	595.076	20.9849
25	214.058	750.262	249.365	95.6471	20.9849
26	218.658	754.892	0	0	0

List Of Coordinates

Distributed Load

X	Y
230.351	754.892
210.06	754.892

Distributed Load

X	Y
399.526	754.892
251.415	754.892

Block Search Window

X	Y
133.938	690.346
169.122	709.417
152.845	727.666
123.909	712.212

Block Search Window

X	Y

192.209	717.453
217.364	727.81
204.376	744.58
175.44	735.209

External Boundary

X	Y
399.526	599.186
399.526	674.632
399.526	748.264
399.526	754.892
210.06	754.892
124.992	716.643
115.94	712.82
100.266	708.407
92.019	707.073
49.193	699.855
33.1355	696.678
24.202	694.911
0.126	690.057
0.126	658.824
0.126	601.596
0.126	600.259
65.67	600.259
133.338	600.042
200.821	599.825
267.93	599.609
335.539	599.609

Material Boundary

X	Y
0.126	658.824
33.1355	696.678

Material Boundary

X	Y
0.126	601.596
92.019	707.073

Material Boundary

X	Y
200.821	599.825
325.315	742.508

Material Boundary

X	Y
267.93	599.609
395.51	747.953

Material Boundary

X	Y
335.539	599.609
399.526	674.632

Material Boundary

X	Y
105.092	702.799
120.208	702.799
133.008	715.114

Material Boundary

X	Y
133.008	715.114
149.936	715.114
154.381	719.316
155.097	719.993
159.067	719.993
170.415	719.993
175.191	719.993
177.884	722.71
180.408	725.257
195.522	725.257
232.511	725.257
238.519	729.842
248.128	729.842
277.107	729.842
282.635	734.812
296.421	734.812
303.011	740.778

Material Boundary

X	Y
100.266	708.407
105.092	702.799

Material Boundary

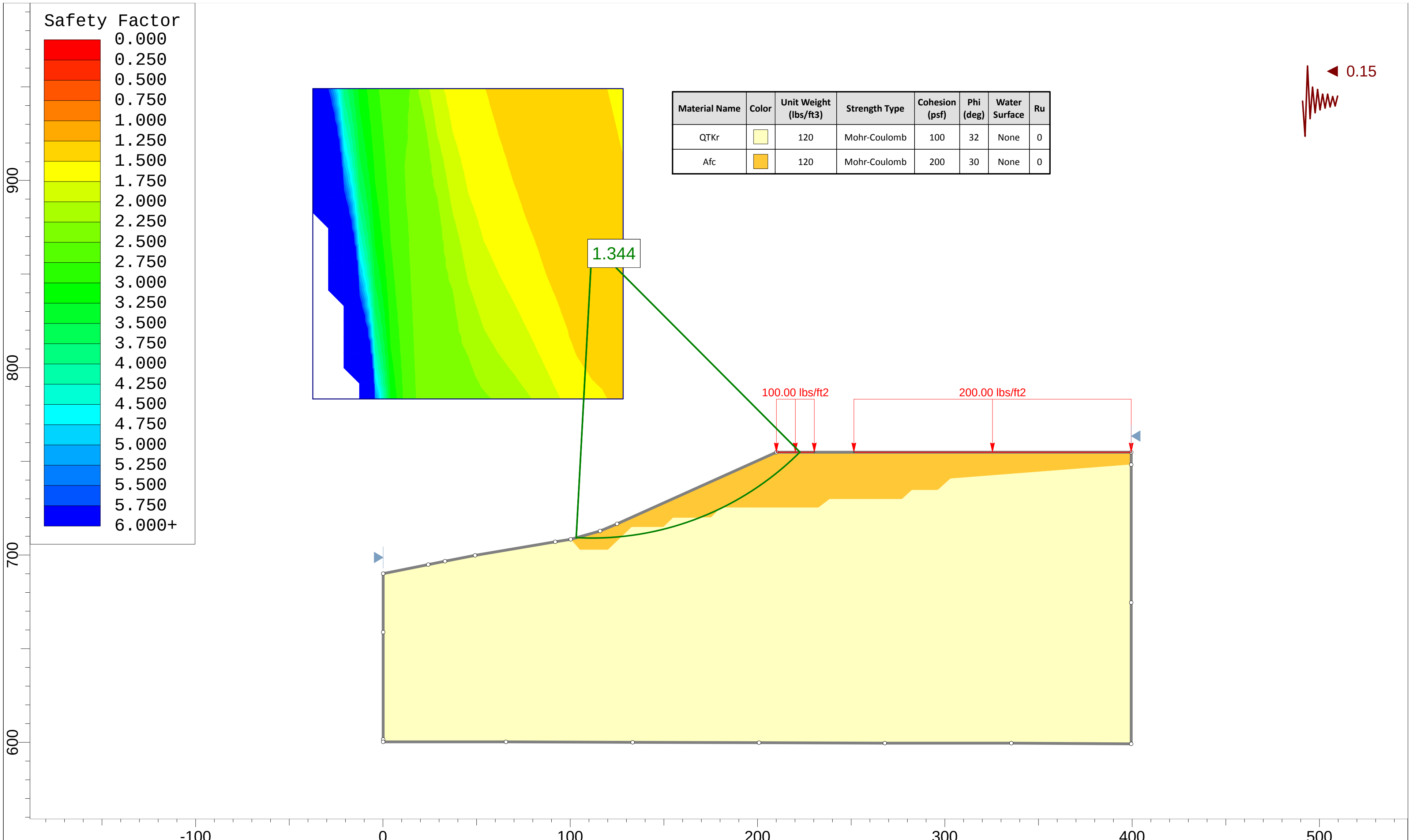
X	Y
303.011	740.778
325.315	742.508
395.51	747.953
399.526	748.264

Material Boundary

X	Y
133.338	600.042
248.128	729.842

Material Boundary

X	Y
65.67	600.259
170.415	719.993



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
QTKr		120	Mohr-Coulomb	100	32	None	0
Afc		120	Mohr-Coulomb	200	30	None	0

Project	11065.001 Maple Ridge Assisted Living
Analysis Description	Section 2-2': Pseudostatic - Circular
Drawn By	RSM
Company	Leighton and Associates, Inc.
Date	8/3/2015, 2:28:24 PM
File Name	Section 2-2'a - Pseudo-Static_Circular.slim

SLIDEINTERPRET 6.033

Slide Analysis Information

11065.001 Maple Ridge Assisted Living

Project Summary

File Name: Section 2-2'a - Pseudo-Static_Circular
Slide Modeler Version: 6.033
Project Title: 11065.001 Maple Ridge Assisted Living
Analysis: Section 2-2': Pseudostatic - Circular
Author: RSM
Company: Leighton and Associates, Inc.
Date Created: 8/3/2015, 2:28:24 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.15
2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 100
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 200
Orientation: Normal to boundary

Material Properties

Property	QTKr	Afc
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120
Cohesion [psf]	100	200
Friction Angle [deg]	32	30
Water Surface	None	None
Ru Value	0	0

Global Minimums

Method: bishop simplified

FS: 1.343850
Center: 111.689, 866.181
Radius: 157.169
Left Slip Surface Endpoint: 103.225, 709.240
Right Slip Surface Endpoint: 222.670, 754.892
Resisting Moment=1.71687e+007 lb-ft
Driving Moment=1.27758e+007 lb-ft
Total Slice Area=1345.34 ft2

Method: spencer

FS: 1.348340
Center: 111.689, 866.181
Radius: 157.169
Left Slip Surface Endpoint: 103.225, 709.240
Right Slip Surface Endpoint: 222.670, 754.892
Resisting Moment=1.72261e+007 lb-ft
Driving Moment=1.27758e+007 lb-ft
Resisting Horizontal Force=100314 lb
Driving Horizontal Force=74398 lb
Total Slice Area=1345.34 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4588
Number of Invalid Surfaces: 263

Error Codes:

Error Code -106 reported for 6 surfaces
Error Code -108 reported for 26 surfaces
Error Code -1000 reported for 231 surfaces

Method: spencer

Number of Valid Surfaces: 4570
Number of Invalid Surfaces: 281

Error Codes:

Error Code -106 reported for 6 surfaces
Error Code -108 reported for 44 surfaces
Error Code -1000 reported for 231 surfaces

Error Codes

The following errors were encountered during the computation:

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.34385

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	4.85374	452.332	Afc	200	30	192.029	258.058	100.56	0	100.56
2	4.85374	1313.3	Afc	200	30	265.93	357.37	272.572	0	272.572
3	4.85374	2115.69	Afc	200	30	332.761	447.181	428.13	0	428.13
4	4.85374	3123.48	Afc	200	30	415.619	558.529	620.99	0	620.99
5	4.85374	4130.18	Afc	200	30	496.228	666.856	808.617	0	808.617
6	4.65694	4881.86	QTKr	100	32	533.119	716.432	986.498	0	986.498
7	4.65694	5710.13	QTKr	100	32	603.51	811.027	1137.88	0	1137.88
8	4.65694	6458.73	QTKr	100	32	664.599	893.122	1269.26	0	1269.26
9	4.65694	7126.51	QTKr	100	32	716.586	962.984	1381.06	0	1381.06
10	4.65694	7712.03	QTKr	100	32	759.632	1020.83	1473.64	0	1473.64
11	4.65694	8213.58	QTKr	100	32	793.873	1066.85	1547.28	0	1547.28
12	4.65694	8629.16	QTKr	100	32	819.414	1101.17	1602.2	0	1602.2
13	4.65694	8956.43	QTKr	100	32	836.321	1123.89	1638.57	0	1638.57
14	4.65694	9192.66	QTKr	100	32	844.663	1135.1	1656.5	0	1656.5
15	5.09631	10217.5	Afc	200	30	857.504	1152.36	1649.53	0	1649.53
16	5.09631	10259	Afc	200	30	847.482	1138.89	1626.2	0	1626.2
17	1.67921	3370.09	QTKr	100	32	822.056	1104.72	1607.89	0	1607.89
18	5.1741	10256.6	Afc	200	30	818.923	1100.51	1559.73	0	1559.73
19	5.1741	9962.19	Afc	200	30	785.565	1055.68	1482.08	0	1482.08
20	5.1741	9507.07	Afc	200	30	741.93	997.043	1380.52	0	1380.52
21	5.1741	8879.91	Afc	200	30	687.815	924.32	1254.56	0	1254.56
22	5.1741	8067.09	Afc	200	30	622.968	837.175	1103.62	0	1103.62
23	5.1741	6913.99	Afc	200	30	552.547	742.54	939.707	0	939.707
24	5.1741	4460.68	Afc	200	30	409.288	550.022	606.255	0	606.255
25	5.1741	1530.6	Afc	200	30	226.39	304.234	180.539	0	180.539

Global Minimum Query (spencer) - Safety Factor: 1.34834

Slice	Width	Weight	Base	Base Cohesion	Base Friction Angle	Shear Stress	Shear Strength	Base Normal Stress	Pore Pressure	Effective Normal Stress

				[psf]	[degrees]	[psf]	[psf]	[psf]	[psf]	[psf]
1	4.85374	452.332	Afc	200	30	244.769	330.032	225.223	0	225.223
2	4.85374	1313.3	Afc	200	30	329.831	444.725	423.875	0	423.875
3	4.85374	2115.69	Afc	200	30	402.872	543.209	594.455	0	594.455
4	4.85374	3123.48	Afc	200	30	490.952	661.97	800.154	0	800.154
5	4.85374	4130.18	Afc	200	30	572.818	772.353	991.344	0	991.344
6	4.65694	4881.86	QTKr	100	32	604.081	814.506	1143.45	0	1143.45
7	4.65694	5710.13	QTKr	100	32	669.912	903.269	1285.5	0	1285.5
8	4.65694	6458.73	QTKr	100	32	723.26	975.201	1400.61	0	1400.61
9	4.65694	7126.51	QTKr	100	32	765.033	1031.52	1490.75	0	1490.75
10	4.65694	7712.03	QTKr	100	32	796.026	1073.31	1557.63	0	1557.63
11	4.65694	8213.58	QTKr	100	32	816.945	1101.52	1602.77	0	1602.77
12	4.65694	8629.16	QTKr	100	32	828.419	1116.99	1627.53	0	1627.53
13	4.65694	8956.43	QTKr	100	32	831.007	1120.48	1633.11	0	1633.11
14	4.65694	9192.66	QTKr	100	32	825.192	1112.64	1620.57	0	1620.57
15	5.09631	10217.5	Afc	200	30	829.226	1118.08	1590.16	0	1590.16
16	5.09631	10259	Afc	200	30	806.733	1087.75	1537.63	0	1537.63
17	1.67921	3370.09	QTKr	100	32	766.622	1033.67	1494.18	0	1494.18
18	5.1741	10256.6	Afc	200	30	764.263	1030.49	1438.44	0	1438.44
19	5.1741	9962.19	Afc	200	30	723.048	974.915	1342.19	0	1342.19
20	5.1741	9507.07	Afc	200	30	674.412	909.337	1228.61	0	1228.61
21	5.1741	8879.91	Afc	200	30	618.625	834.117	1098.32	0	1098.32
22	5.1741	8067.09	Afc	200	30	555.921	749.57	951.884	0	951.884
23	5.1741	6913.99	Afc	200	30	491.828	663.152	802.203	0	802.203
24	5.1741	4460.68	Afc	200	30	372.824	502.693	524.28	0	524.28
25	5.1741	1530.6	Afc	200	30	228.78	308.473	187.881	0	187.881

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.34385

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	103.225	709.24	0	0	0
2	108.078	709.053	881.06	0	0
3	112.932	709.017	1982.13	0	0
4	117.786	709.13	3228.05	0	0
5	122.64	709.394	4608.96	0	0
6	127.493	709.808	6057.72	0	0
7	132.15	710.349	7269.39	0	0
8	136.807	711.032	8440.93	0	0
9	141.464	711.858	9512.3	0	0
10	146.121	712.83	10431.4	0	0

11	150.778	713.95	11153.8	0	0
12	155.435	715.223	11642.5	0	0
13	160.092	716.651	11868.1	0	0
14	164.749	718.239	11808.6	0	0
15	169.406	719.993	11449.7	0	0
16	174.502	722.109	10787.4	0	0
17	179.598	724.44	9768.21	0	0
18	181.278	725.257	9326.89	0	0
19	186.452	727.932	7844.02	0	0
20	191.626	730.858	6069.55	0	0
21	196.8	734.051	4066.42	0	0
22	201.974	737.531	1920.04	0	0
23	207.148	741.322	-257.222	0	0
24	212.322	745.454	-2323.53	0	0
25	217.496	749.962	-3612.27	0	0
26	222.67	754.892	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.34834

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	103.225	709.24	0	0	0
2	108.078	709.053	1165.2	621.392	28.0706
3	112.932	709.017	2588.63	1380.49	28.0705
4	117.786	709.13	4164.21	2220.74	28.0706
5	122.64	709.394	5873.64	3132.37	28.0707
6	127.493	709.808	7630.29	4069.17	28.0706
7	132.15	710.349	9099.66	4852.78	28.0707
8	136.807	711.032	10493.3	5595.98	28.0706
9	141.464	711.858	11744.1	6263.04	28.0707
10	146.121	712.83	12798	6825.07	28.0706
11	150.778	713.95	13612.3	7259.33	28.0706
12	155.435	715.223	14155	7548.74	28.0706
13	160.092	716.651	14403.9	7681.47	28.0706
14	164.749	718.239	14346	7650.61	28.0707
15	169.406	719.993	13977.2	7453.96	28.0707
16	174.502	722.109	13316	7101.34	28.0707
17	179.598	724.44	12314.8	6567.37	28.0706
18	181.278	725.257	11879.3	6335.14	28.0707
19	186.452	727.932	10456.7	5576.48	28.0707
20	191.626	730.858	8785.79	4685.4	28.0707
21	196.8	734.051	6935	3698.38	28.0706
22	201.974	737.531	4989.67	2660.95	28.0706
23	207.148	741.322	3054.56	1628.97	28.0706

24	212.322	745.454	1254.41	668.968	28.0707
25	217.496	749.962	155.733	83.0511	28.0706
26	222.67	754.892	0	0	0

List Of Coordinates

Distributed Load

X	Y
230.351	754.892
210.06	754.892

Distributed Load

X	Y
399.526	754.892
251.415	754.892

External Boundary

X	Y
399.526	599.186
399.526	674.632
399.526	748.264
399.526	754.892
210.06	754.892
124.992	716.643
115.94	712.82
100.266	708.407
92.019	707.073
49.193	699.855
33.1355	696.678
24.202	694.911
0.126	690.057
0.126	658.824
0.126	601.596
0.126	600.259
65.67	600.259
133.338	600.042
200.821	599.825
267.93	599.609
335.539	599.609

Material Boundary

X	Y
0.126	658.824
33.1355	696.678

Material Boundary

X	Y
0.126	601.596
92.019	707.073

Material Boundary

X	Y
200.821	599.825
325.315	742.508

Material Boundary

X	Y
267.93	599.609
395.51	747.953

Material Boundary

X	Y
335.539	599.609
399.526	674.632

Material Boundary

X	Y
105.092	702.799
120.208	702.799
133.008	715.114

Material Boundary

X	Y
133.008	715.114
149.936	715.114
154.381	719.316
155.097	719.993

159.067	719.993
170.415	719.993
175.191	719.993
177.884	722.71
180.408	725.257
195.522	725.257
232.511	725.257
238.519	729.842
248.128	729.842
277.107	729.842
282.635	734.812
296.421	734.812
303.011	740.778

Material Boundary

X	Y
100.266	708.407
105.092	702.799

Material Boundary

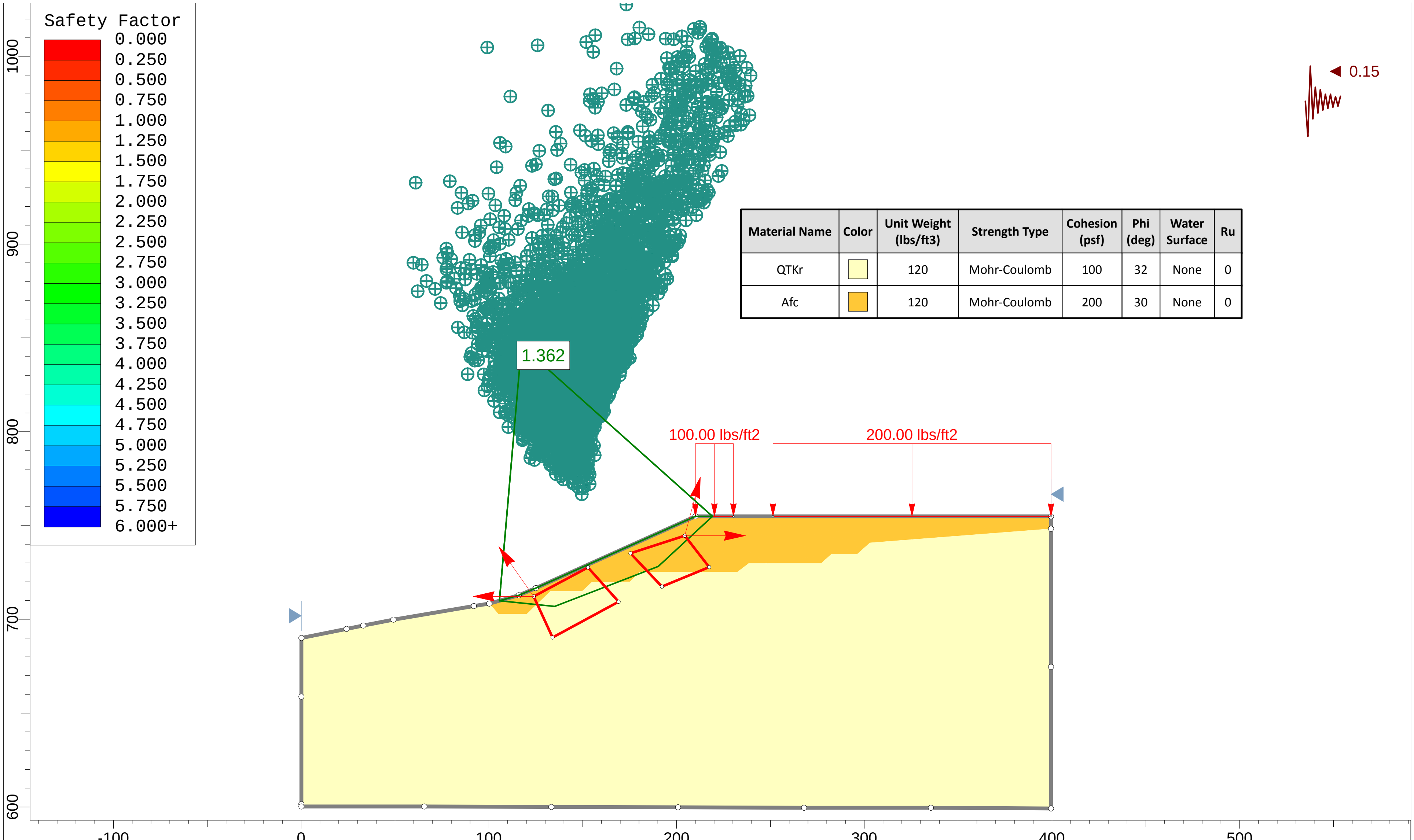
X	Y
303.011	740.778
325.315	742.508
395.51	747.953
399.526	748.264

Material Boundary

X	Y
133.338	600.042
248.128	729.842

Material Boundary

X	Y
65.67	600.259
170.415	719.993



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
QTKr		120	Mohr-Coulomb	100	32	None	0
Afc		120	Mohr-Coulomb	200	30	None	0

SLIDEINTERPRET 6.033	*Project* 11065.001 Maple Ridge Assisted Living		
	Analysis Description Section 2-2': Pseudostatic - Block		
	Drawn By RSM	*Company* Leighton and Associates, Inc.	
	Date 8/3/2015, 2:28:24 PM	*File Name* Section 2-2'a - Pseudostatic_Block.slim	

Slide Analysis Information

11065.001 Maple Ridge Assisted Living

Project Summary

File Name: Section 2-2'a - Pseudostatic_Block
Slide Modeler Version: 6.033
Project Title: 11065.001 Maple Ridge Assisted Living
Analysis: Section 2-2': Pseudostatic - Block
Author: RSM
Company: Leighton and Associates, Inc.
Date Created: 8/3/2015, 2:28:24 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified
Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 125
Left Projection Angle (End Angle): 180
Right Projection Angle (Start Angle): 0
Right Projection Angle (End Angle): 75
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.15
2 Distributed Loads present

Distributed Load 1

Distribution: Constant
Magnitude [psf]: 100
Orientation: Normal to boundary

Distributed Load 2

Distribution: Constant
Magnitude [psf]: 200
Orientation: Normal to boundary

Material Properties

Property	QTKr	Afc
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120
Cohesion [psf]	100	200
Friction Angle [deg]	32	30
Water Surface	None	None

Ru Value	0	0

Global Minimums

Method: bishop simplified

FS: 1.361560
Axis Location: 117.402, 845.898
Left Slip Surface Endpoint: 105.630, 709.917
Right Slip Surface Endpoint: 219.123, 754.892
Resisting Moment=1.52237e+007 lb-ft
Driving Moment=1.1181e+007 lb-ft
Total Slice Area=1373.38 ft2

Method: spencer

FS: 1.393440
Axis Location: 115.425, 847.349
Left Slip Surface Endpoint: 103.399, 709.289
Right Slip Surface Endpoint: 218.658, 754.892
Resisting Moment=1.42897e+007 lb-ft
Driving Moment=1.0255e+007 lb-ft
Resisting Horizontal Force=94976.7 lb
Driving Horizontal Force=68159.8 lb
Total Slice Area=1260.65 ft2

Global Minimum Coordinates

Method: bishop simplified

X	Y
105.63	709.917
135.057	706.921
190.277	728.235
219.123	754.892

Method: spencer

X	Y
103.399	709.289
131.016	708.142
195.659	731.74
218.658	754.892

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4990
Number of Invalid Surfaces: 10

Error Codes:

Error Code -108 reported for 10 surfaces

Method: spencer

Number of Valid Surfaces: 4529
Number of Invalid Surfaces: 471

Error Codes:

Error Code -108 reported for 150 surfaces
Error Code -111 reported for 321 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.36156

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	4.96825	567.781	Afc	200	30	204.151	277.963	135.036	0	135.036
2	4.96825	1703.34	Afc	200	30	305.436	415.87	373.897	0	373.897
3	4.96825	3017.3	Afc	200	30	422.633	575.44	650.282	0	650.282
4	4.96825	4569.15	Afc	200	30	561.049	763.902	976.708	0	976.708
5	4.77693	5902.19	QTKr	100	32	671.835	914.744	1303.86	0	1303.86
6	4.77693	7412.21	QTKr	100	32	824.011	1121.94	1635.44	0	1635.44
7	4.23337	7306.32	QTKr	100	32	735.439	1001.35	1442.45	0	1442.45
8	4.23337	7443.19	QTKr	100	32	748.047	1018.51	1469.92	0	1469.92
9	4.23337	7580.06	QTKr	100	32	760.655	1035.68	1497.4	0	1497.4
10	4.23337	7716.93	QTKr	100	32	773.264	1052.85	1524.87	0	1524.87
11	4.23337	7853.8	QTKr	100	32	785.872	1070.01	1552.34	0	1552.34
12	4.23337	7990.68	QTKr	100	32	798.48	1087.18	1579.82	0	1579.82
13	4.23337	8127.55	QTKr	100	32	811.084	1104.34	1607.29	0	1607.29
14	4.23337	8264.42	QTKr	100	32	823.695	1121.51	1634.76	0	1634.76

15	5.07473	10087.3	Afc	200	30	850.74	1158.33	1659.88	0	1659.88
16	5.07473	10284	Afc	200	30	864.866	1177.57	1693.2	0	1693.2
17	3.4884	7183.35	QTKr	100	32	865.419	1178.32	1725.68	0	1725.68
18	3.85743	8051.47	Afc	200	30	887.005	1207.71	1745.41	0	1745.41
19	3.85743	8165.11	Afc	200	30	897.742	1222.33	1770.74	0	1770.74
20	4.80778	9589.51	Afc	200	30	713.504	971.479	1336.24	0	1336.24
21	4.80778	8273.44	Afc	200	30	630.072	857.881	1139.48	0	1139.48
22	4.80778	6957.37	Afc	200	30	546.641	744.284	942.728	0	942.728
23	4.80778	5641.29	Afc	200	30	463.209	630.687	745.971	0	745.971
24	4.80778	3836.63	Afc	200	30	375.781	511.649	539.792	0	539.792
25	4.80778	1281.62	Afc	200	30	217.308	295.877	166.064	0	166.064

Global Minimum Query (spencer) - Safety Factor: 1.39344

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	4.51609	395.339	Afc	200	30	234.401	326.624	219.32	0	219.32
2	4.51609	1186.02	Afc	200	30	324.541	452.228	436.872	0	436.872
3	4.51609	1985.26	Afc	200	30	415.657	579.193	656.782	0	656.782
4	4.51609	3016.51	Afc	200	30	533.222	743.013	940.525	0	940.525
5	4.51609	4153.37	Afc	200	30	662.826	923.608	1253.33	0	1253.33
6	5.03732	6028.12	QTKr	100	32	780.634	1087.77	1580.76	0	1580.76
7	4.63769	6347.47	QTKr	100	32	580.819	809.337	1135.18	0	1135.18
8	4.63769	6565.78	QTKr	100	32	598.143	833.477	1173.81	0	1173.81
9	4.63769	6784.09	QTKr	100	32	615.467	857.617	1212.44	0	1212.44
10	4.63769	7002.4	QTKr	100	32	632.792	881.757	1251.07	0	1251.07
11	4.63769	7220.71	QTKr	100	32	650.116	905.897	1289.7	0	1289.7
12	4.63769	7439.02	QTKr	100	32	667.44	930.037	1328.34	0	1328.34
13	4.63769	7657.33	QTKr	100	32	684.764	954.177	1366.97	0	1366.97
14	4.59694	7805.5	Afc	200	30	727.317	1013.47	1408.98	0	1408.98
15	4.59694	8020	Afc	200	30	743.089	1035.45	1447.04	0	1447.04
16	4.59694	8234.49	Afc	200	30	758.862	1057.43	1485.11	0	1485.11
17	4.59694	8448.98	Afc	200	30	774.633	1079.41	1523.17	0	1523.17
18	4.59694	8663.47	Afc	200	30	790.405	1101.38	1561.24	0	1561.24
19	4.59694	8877.96	Afc	200	30	806.177	1123.36	1599.31	0	1599.31
20	4.59694	9092.46	Afc	200	30	821.949	1145.34	1637.37	0	1637.37
21	4.59977	8498.2	Afc	200	30	533.79	743.804	941.895	0	941.895
22	4.59977	7083.89	Afc	200	30	465.947	649.269	778.157	0	778.157
23	4.59977	5669.57	Afc	200	30	398.105	554.735	614.418	0	614.418
24	4.59977	3824.07	Afc	200	30	330.374	460.356	450.949	0	450.949
25	4.59977	1277.95	Afc	200	30	218.69	304.732	181.401	0	181.401

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.36156

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	105.63	709.917	0	0	0
2	110.599	709.411	995.865	0	0
3	115.567	708.905	2444.67	0	0
4	120.535	708.4	4417.57	0	0
5	125.503	707.894	7009.45	0	0
6	130.28	707.407	9962.69	0	0
7	135.057	706.921	13576.5	0	0
8	139.291	708.555	13232.2	0	0
9	143.524	710.189	12875.8	0	0
10	147.757	711.823	12507.2	0	0
11	151.991	713.457	12126.5	0	0
12	156.224	715.091	11733.7	0	0
13	160.457	716.725	11328.8	0	0
14	164.691	718.359	10911.7	0	0
15	168.924	719.993	10482.5	0	0
16	173.999	721.952	10028.8	0	0
17	179.074	723.911	9551.88	0	0
18	182.562	725.257	9165.14	0	0
19	186.419	726.746	8775.01	0	0
20	190.277	728.235	8371.49	0	0
21	195.085	732.678	4421.46	0	0
22	199.892	737.121	1142.5	0	0
23	204.7	741.563	-1465.4	0	0
24	209.508	746.006	-3402.24	0	0
25	214.316	750.449	-4572.04	0	0
26	219.123	754.892	0	0	0

Global Minimum Query (spencer) - Safety Factor: 1.39344

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	103.399	709.289	0	0	0
2	107.915	709.101	1041.22	574.911	28.9053
3	112.431	708.914	2412.02	1331.8	28.9053
4	116.947	708.726	4115.97	2272.64	28.9054
5	121.463	708.539	6249.78	3450.82	28.9053
6	125.979	708.351	8857.46	4890.65	28.9053
7	131.016	708.142	12219.2	6746.82	28.9052
8	135.654	709.835	12041	6648.45	28.9053
9	140.292	711.528	11845.1	6540.29	28.9054

10	144.929	713.221	11631.5	6422.32	28.9052
11	149.567	714.914	11400.1	6294.57	28.9053
12	154.205	716.607	11151	6157.01	28.9052
13	158.843	718.3	10884.1	6009.66	28.9053
14	163.48	719.993	10599.5	5852.51	28.9053
15	168.077	721.671	10410.3	5748.07	28.9054
16	172.674	723.349	10197.7	5630.66	28.9053
17	177.271	725.027	9961.55	5500.27	28.9053
18	181.868	726.705	9701.92	5356.92	28.9053
19	186.465	728.383	9418.8	5200.6	28.9053
20	191.062	730.062	9112.19	5031.3	28.9053
21	195.659	731.74	8782.09	4849.04	28.9053
22	200.259	736.37	5603.17	3093.79	28.9053
23	204.858	741.001	3082.27	1701.88	28.9054
24	209.458	745.631	1219.41	673.297	28.9053
25	214.058	750.262	78.5203	43.355	28.9053
26	218.658	754.892	0	0	0

List Of Coordinates

Distributed Load

X	Y
230.351	754.892
210.06	754.892

Distributed Load

X	Y
399.526	754.892
251.415	754.892

Block Search Window

X	Y
133.938	690.346
169.122	709.417
152.845	727.666
123.909	712.212

Block Search Window

X	Y

192.209	717.453
217.364	727.81
204.376	744.58
175.44	735.209

External Boundary

X	Y
399.526	599.186
399.526	674.632
399.526	748.264
399.526	754.892
210.06	754.892
124.992	716.643
115.94	712.82
100.266	708.407
92.019	707.073
49.193	699.855
33.1355	696.678
24.202	694.911
0.126	690.057
0.126	658.824
0.126	601.596
0.126	600.259
65.67	600.259
133.338	600.042
200.821	599.825
267.93	599.609
335.539	599.609

Material Boundary

X	Y
0.126	658.824
33.1355	696.678

Material Boundary

X	Y
0.126	601.596
92.019	707.073

Material Boundary

X	Y
200.821	599.825
325.315	742.508

Material Boundary

X	Y
267.93	599.609
395.51	747.953

Material Boundary

X	Y
335.539	599.609
399.526	674.632

Material Boundary

X	Y
105.092	702.799
120.208	702.799
133.008	715.114

Material Boundary

X	Y
133.008	715.114
149.936	715.114
154.381	719.316
155.097	719.993
159.067	719.993
170.415	719.993
175.191	719.993
177.884	722.71
180.408	725.257
195.522	725.257
232.511	725.257
238.519	729.842
248.128	729.842
277.107	729.842
282.635	734.812
296.421	734.812
303.011	740.778

Material Boundary

X	Y
100.266	708.407
105.092	702.799

Material Boundary

X	Y
303.011	740.778
325.315	742.508
395.51	747.953
399.526	748.264

Material Boundary

X	Y
133.338	600.042
248.128	729.842

Material Boundary

X	Y
65.67	600.259
170.415	719.993

APPENDIX F

APPENDIX F
LEIGHTON AND ASSOCIATES, INC.
GENERAL EARTHWORK AND GRADING SPECIFICATIONS FOR ROUGH GRADING

TABLE OF CONTENTS

TABLE OF CONTENTS (CONT'D)

Standard Details

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 the Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultants 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. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction.

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 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 "spreads" 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 observations and tests can be planned and accomplished. 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.

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 5 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.

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 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 large clay lumps or clods 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 Benching

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 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 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 Evaluation/Acceptance of Fill Areas

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

3.0 FILL MATERIAL

3.1 General

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 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 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 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import

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 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).

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). 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.

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 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.

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 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 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 100 feet and vertically less than 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 Safety

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

7.2 Bedding and Backfill

All bedding and backfill of utility trenches shall be performed 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 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 relative compaction from 1 foot above the top of the conduit to the surface.

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

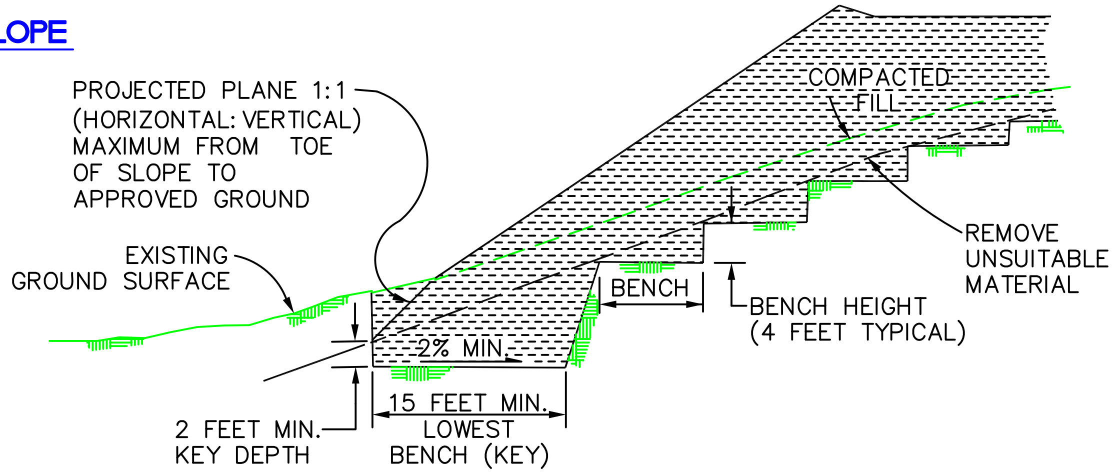
7.3 Lift Thickness

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.

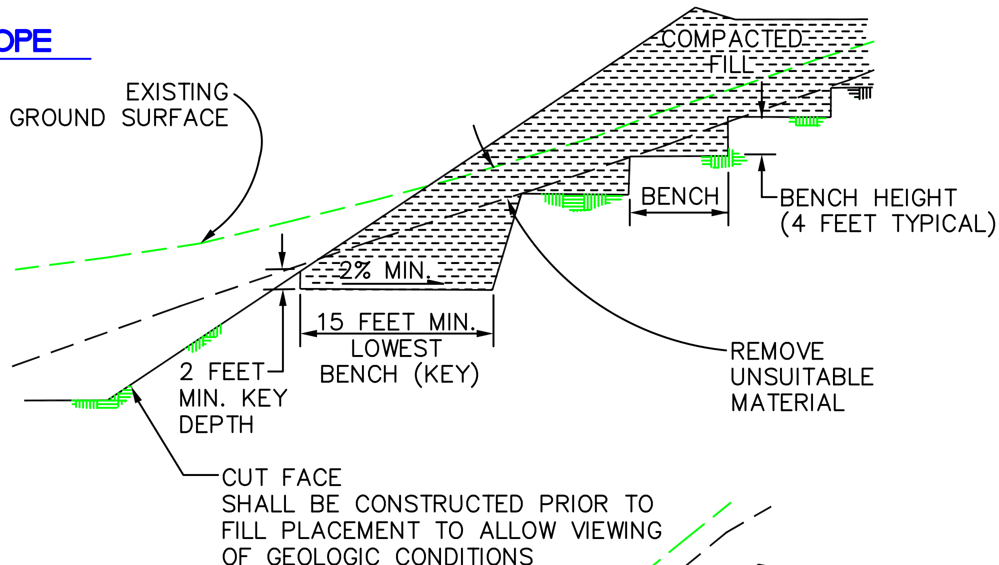
7.4 Observation and Testing

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

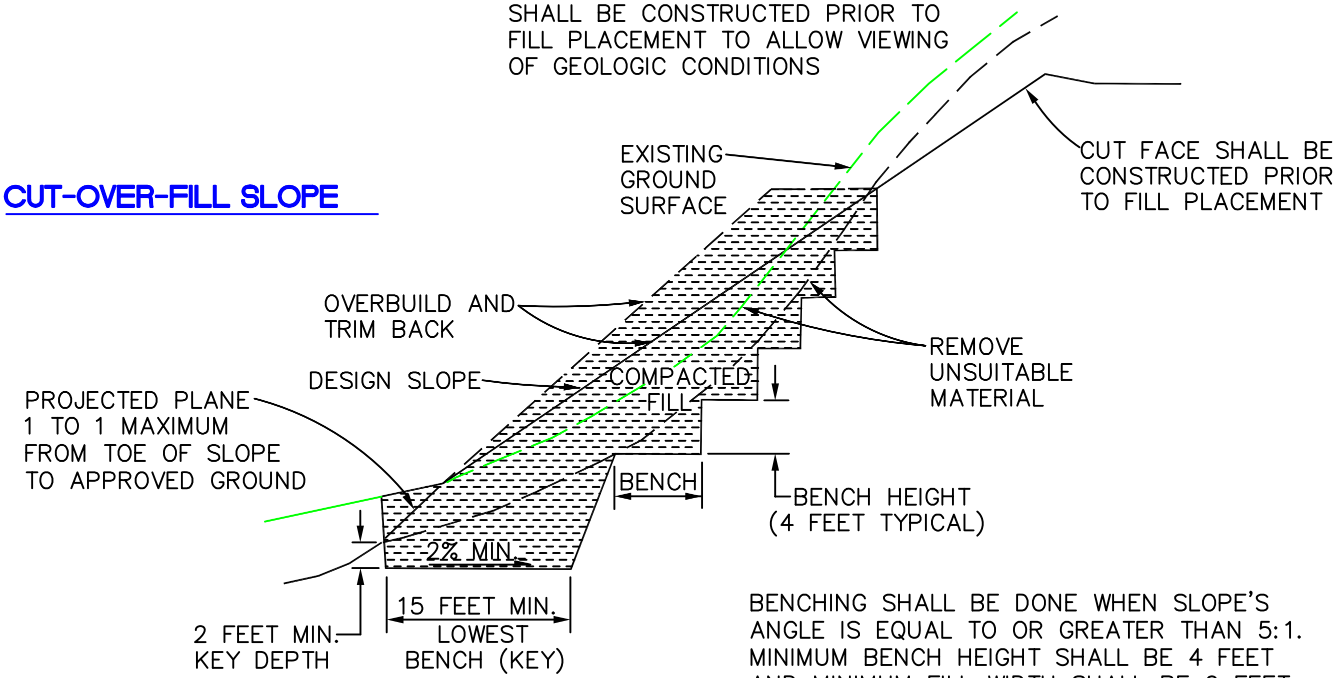
FILL SLOPE



FILL-OVER-CUT SLOPE

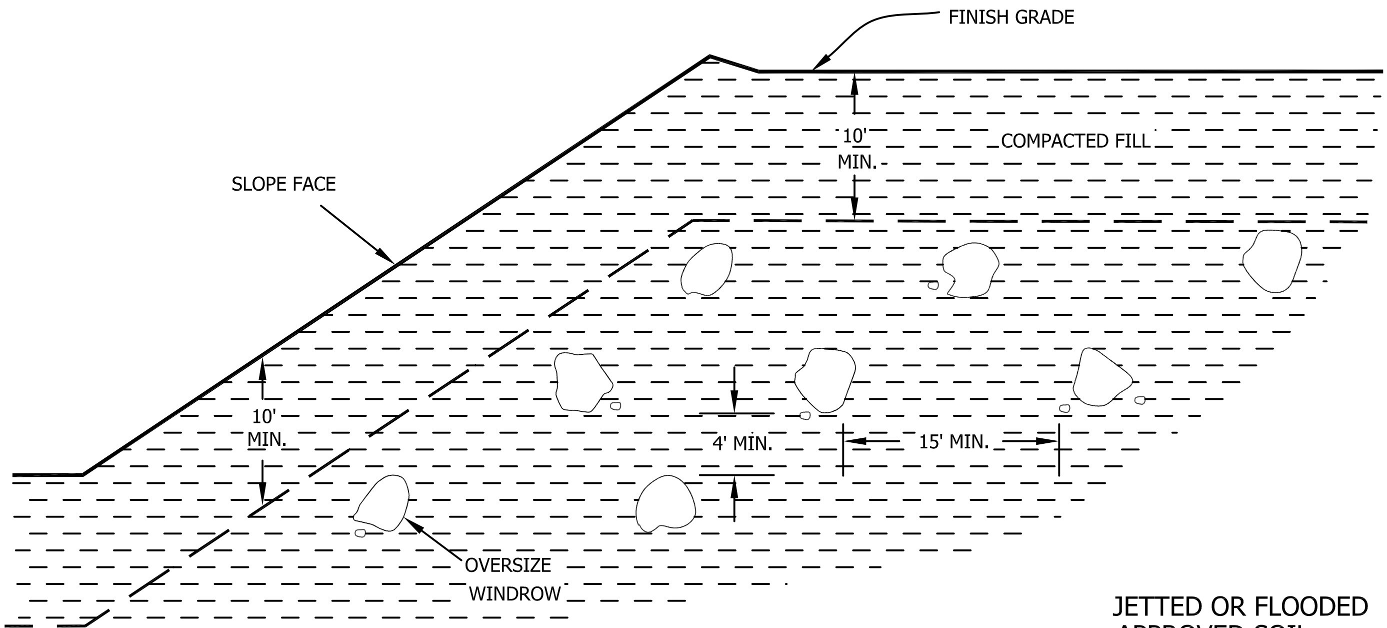


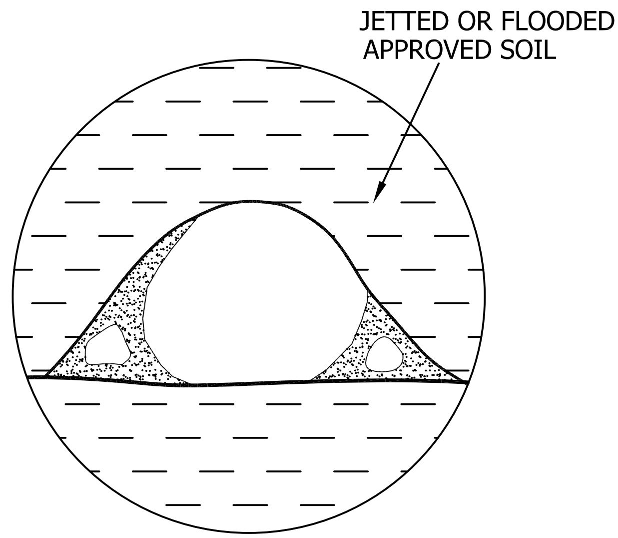
CUT-OVER-FILL SLOPE



BENCHING SHALL BE DONE WHEN SLOPE'S ANGLE IS EQUAL TO OR GREATER THAN 5:1. MINIMUM BENCH HEIGHT SHALL BE 4 FEET AND MINIMUM FILL WIDTH SHALL BE 9 FEET.

KEYING AND BENCHING	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS A	Leighton

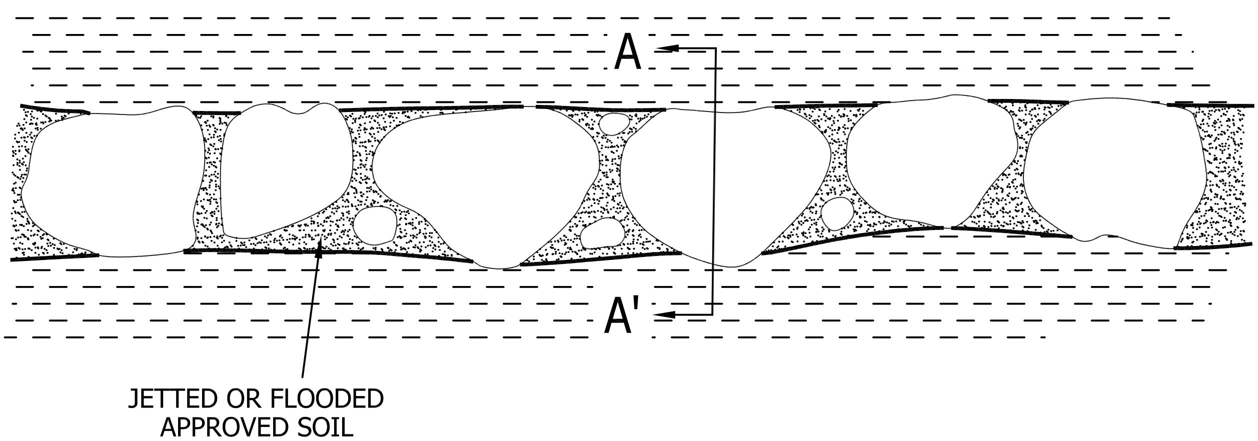




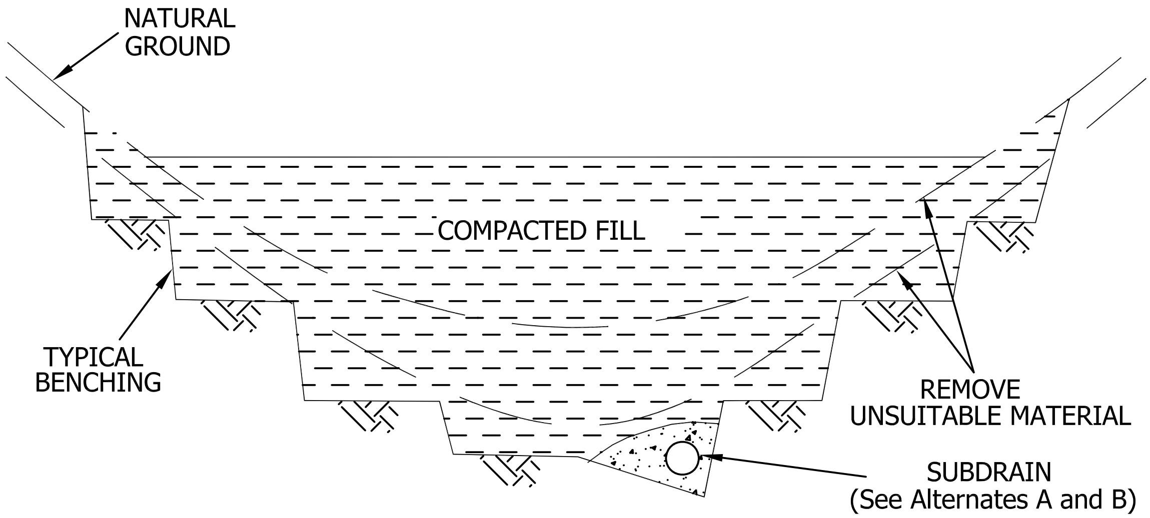
SECTION A-A'

- Oversize rock is larger than 8 inches in largest dimension.
- Backfill with approved soil jetted or flooded in place to fill all the voids.
- Do not bury rock within 10 feet of finish grade.
- Windrow of buried rock shall be parallel to the finished slope face.

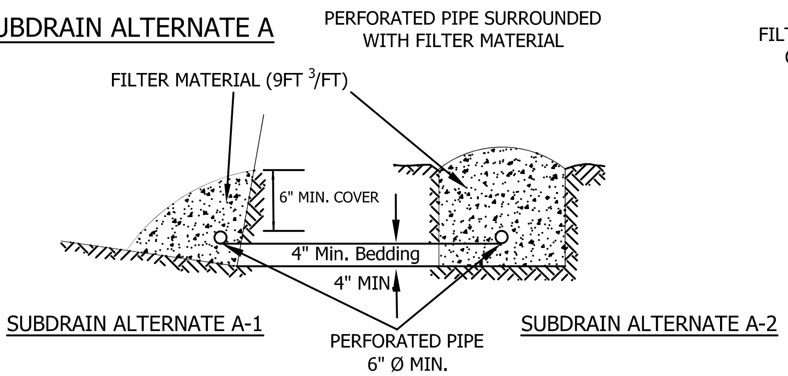
PROFILE ALONG WINDROW



OVERSIZE ROCK DISPOSAL	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS B	Leighton



SUBDRAIN ALTERNATE A

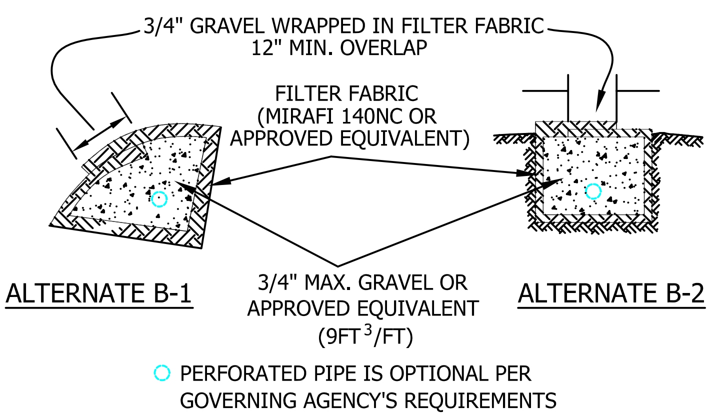


FILTER MATERIAL

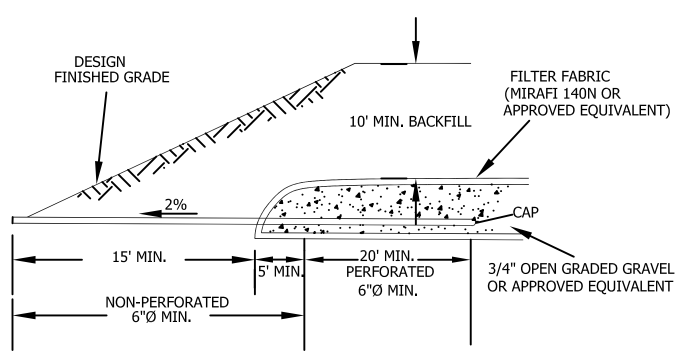
FILTER MATERIAL SHALL BE CLASS 2 PERMEABLE MATERIAL PER STATE OF CALIFORNIA STANDARD SPECIFICATION, OR APPROVED ALTERNATE. CLASS 2 GRADING AS FOLLOWS:

Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

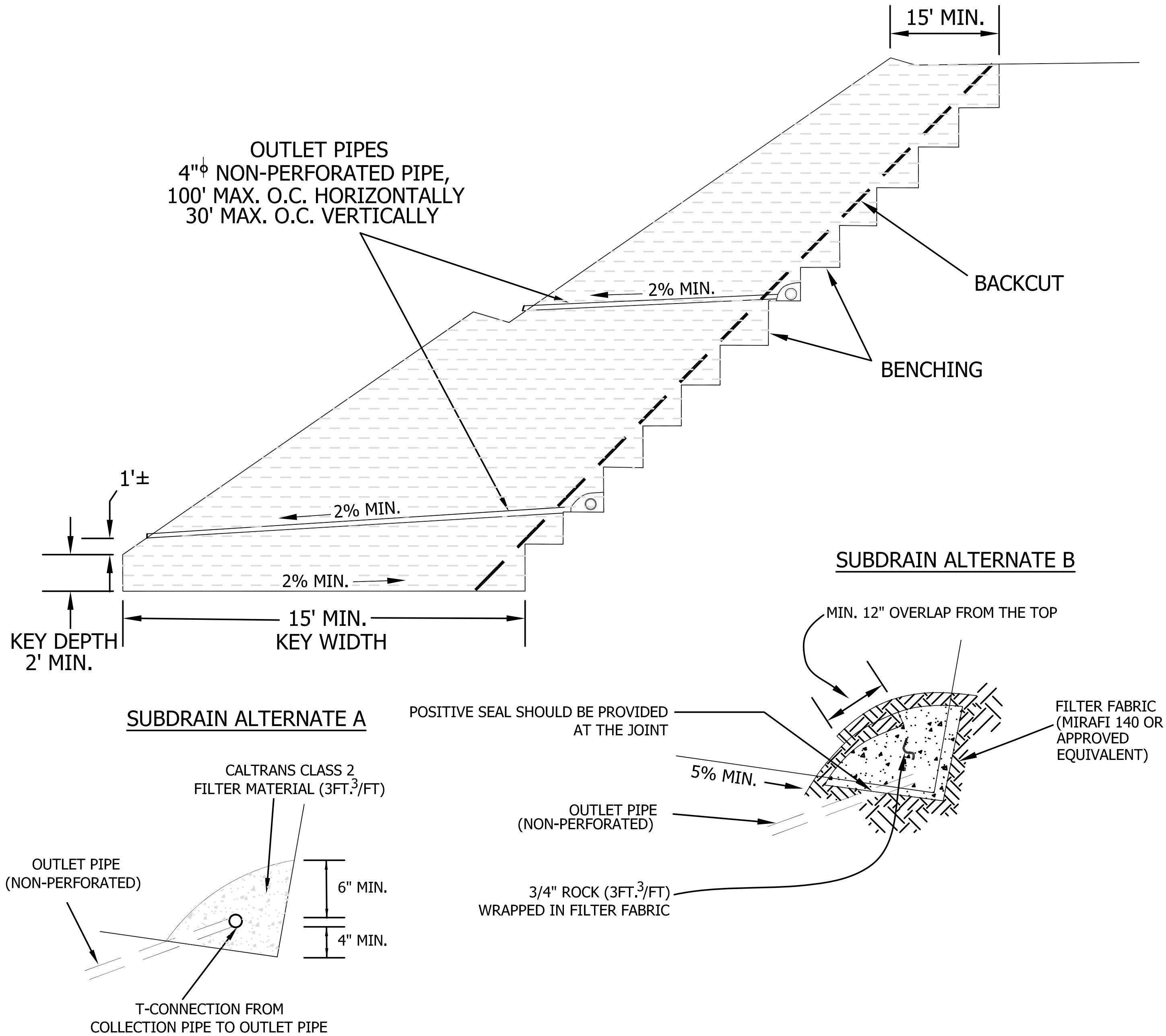
SUBDRAIN ALTERNATE B



DETAIL OF CANYON SUBDRAIN TERMINAL



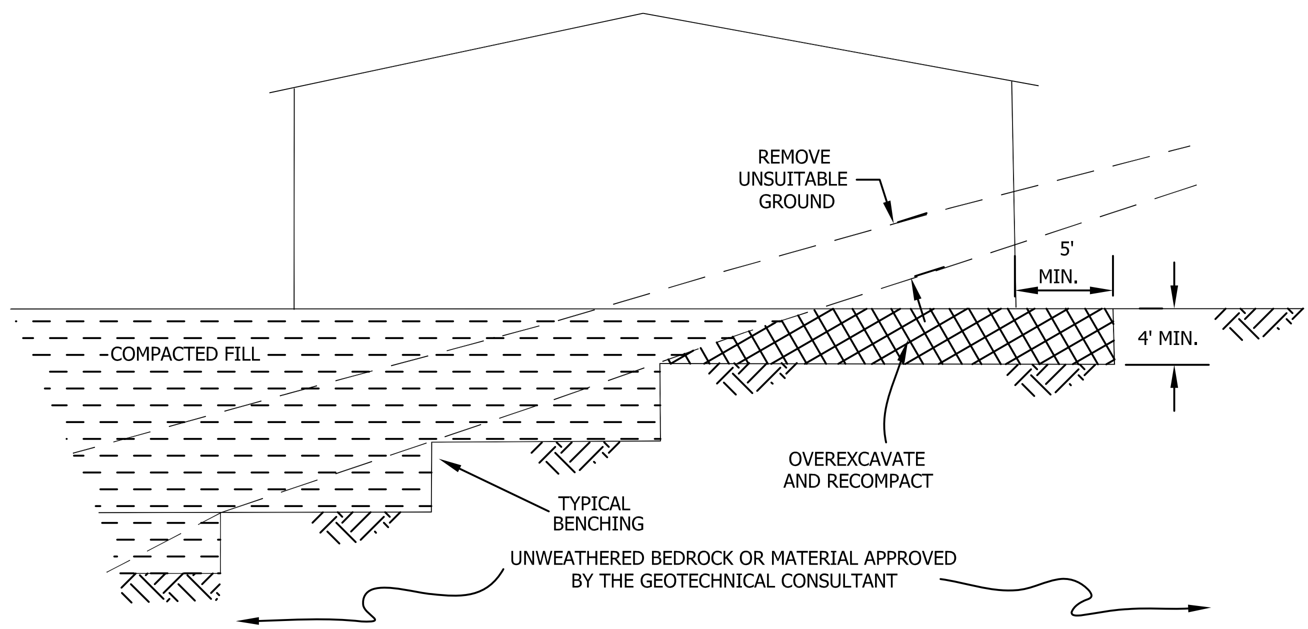
CANYON SUBDRAIN	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS C	Leighton



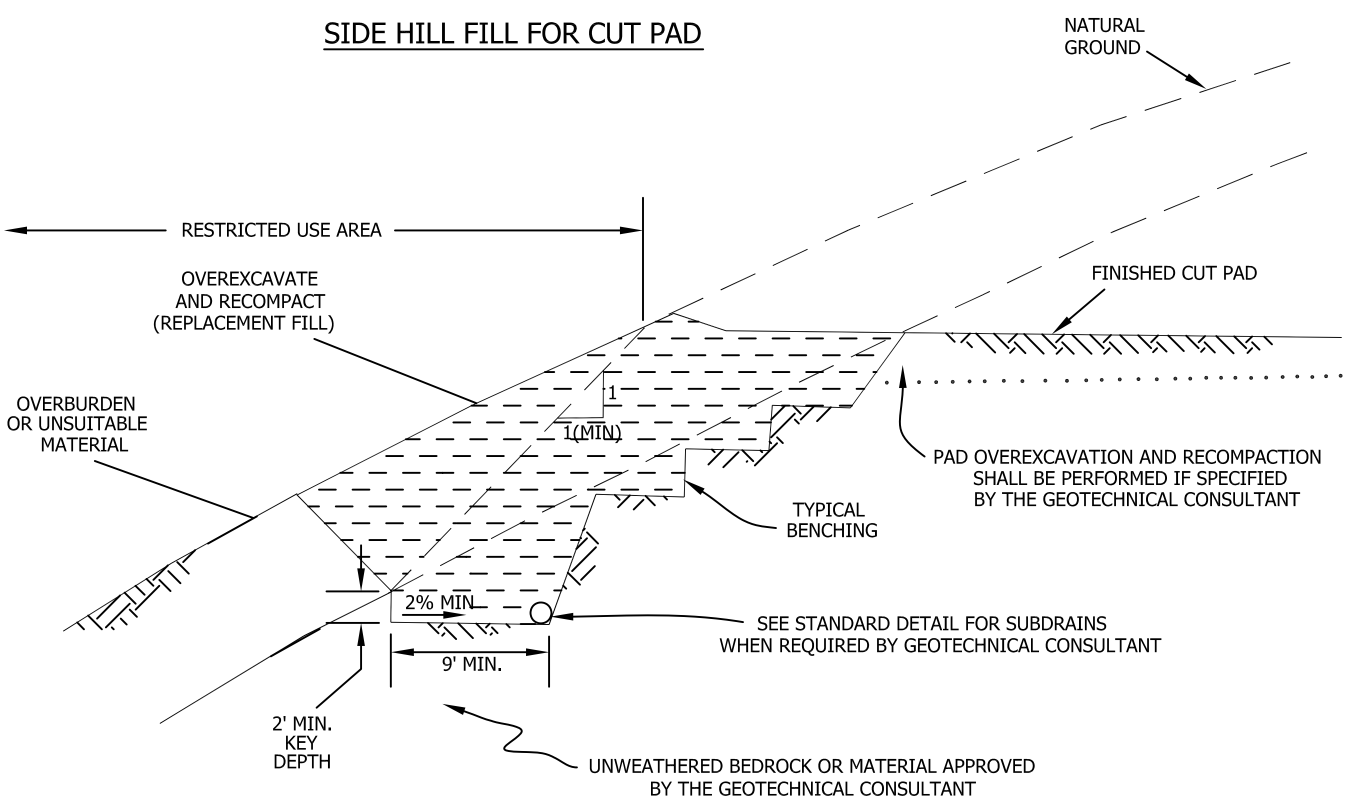
- SUBDRAIN INSTALLATION - Subdrain collector pipe shall be installed with perforations down or, unless otherwise designated by the geotechnical consultant. Outlet pipes shall be non-perforated pipe. The subdrain pipe shall have at least 8 perforations uniformly spaced per foot. Perforation shall be 1/4" to 1/2" if drilled holes are used. All subdrain pipes shall have a gradient at least 2% towards the outlet.
- SUBDRAIN PIPE - Subdrain pipe shall be ASTM D2751, ASTM D1527 (Schedule 40) or SDR 23.5 ABS pipe or ASTM D3034 (Schedule 40) or SDR 23.5 PVC pipe.
- All outlet pipe shall be placed in a trench and, after fill is placed above it, rodded to verify integrity.

BUTTRESS OR REPLACEMENT FILL SUBDRAINS	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS D	Leighton

CUT-FILL TRANSITION LOT OVEREXCAVATION



SIDE HILL FILL FOR CUT PAD



TRANSITION LOT FILLS AND SIDE HILL FILLS	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS E	Leighton

P:Drafting\templates\details\transition_fills.dwg (7/00)

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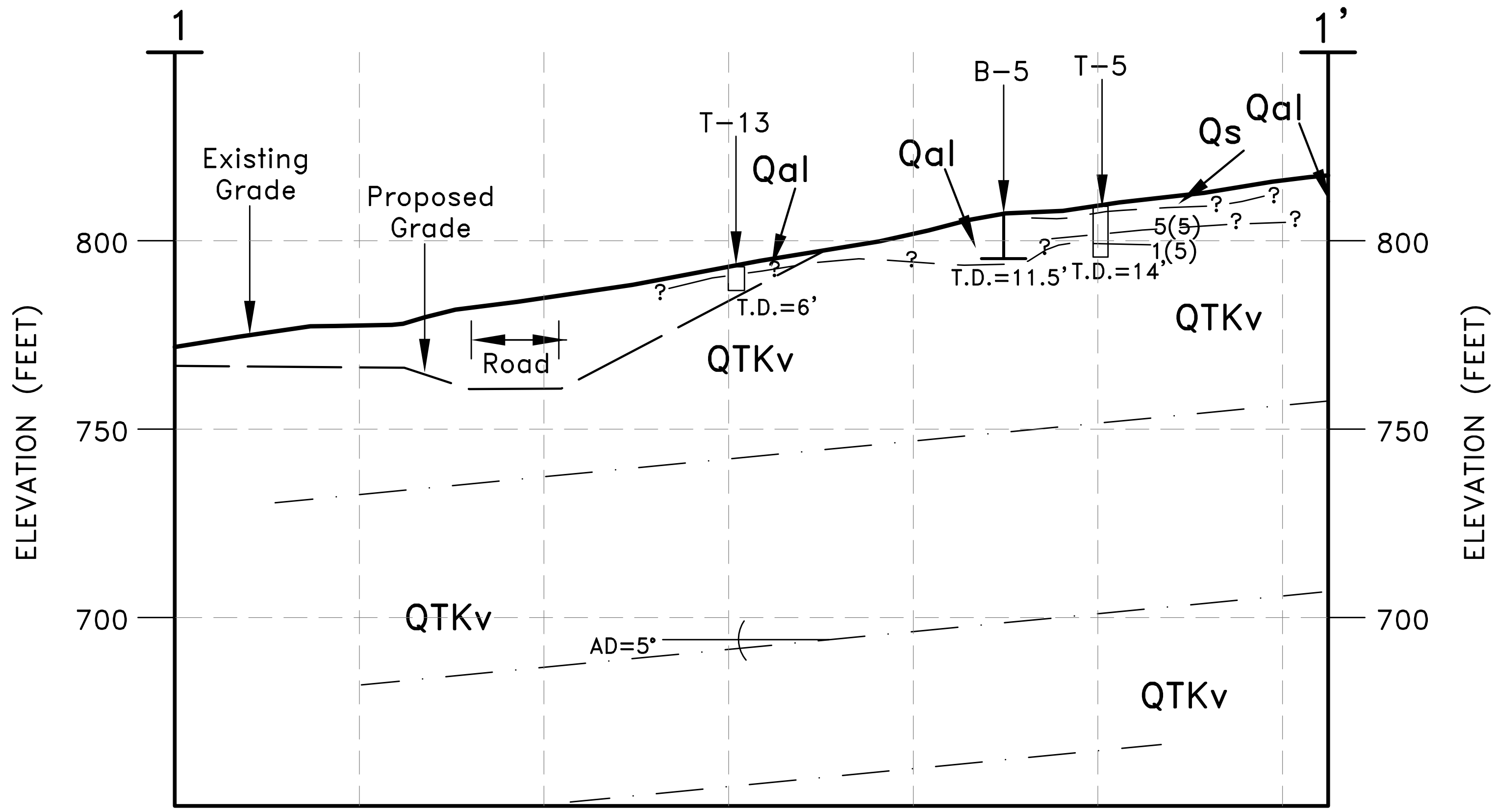
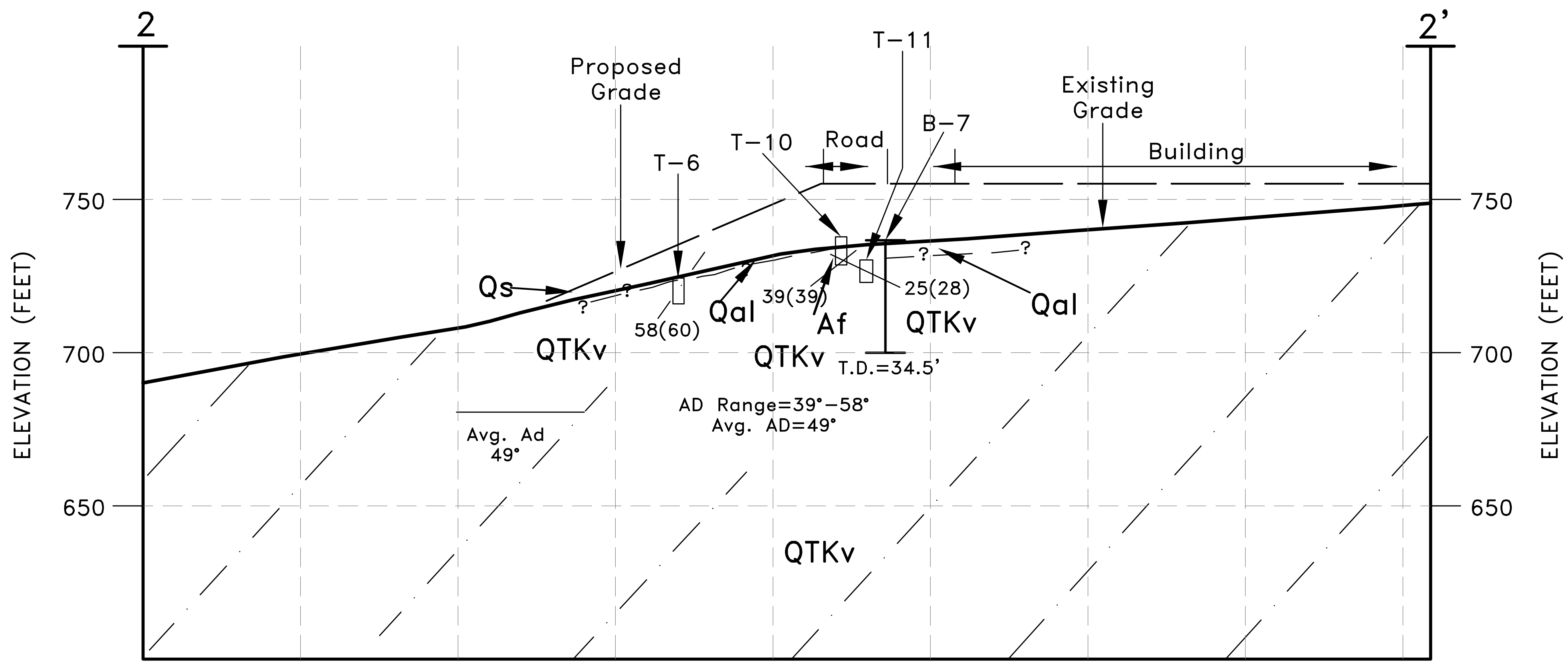
MAPLE RIDGE - BAKERSFIELD
Assisted Living & Memory Care

SITE PLAN
A1
PROJECT NO: 14015.00
PLOT DATE: 4/9/2015



T-5 Projected Along Contour Interval
B-5 Projected Along Contour Interval

N24°W



T-6 Projected Along Contour Interval
T-10 Projected 40' ⊥ to Section. T.D.=7'
T-11 Projected 70' ⊥ to Section. T.D.=8'
B-7 Projected 21' ⊥ to Section.

N64°W

GEOTECHNICAL CROSS SECTIONS 1-1' AND 2-2'

Maple Ridge Assisted Living & Memory Care
Bakersfield, California

PLATE 2

Proj: 11065.001	Eng/Geol: RSM/GIM
Scale: 1"=50'	Date: 08/2015

Leighton