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September 6, 2023
File No. 20489

Aragon (Sunset/Everett) Properties Corp.
1750 Glendale Boulevard, Suite 102
Los Angeles, California 90026

Attention: Jeff Farrington

Subject: Updated Geotechnical Engineering Investigation
Proposed Apartment Complex
1185 West Sunset Boulevard, Los Angeles, California

References: *Reports by Geotechnologies, Inc.:*
Geotechnical Engineering Investigation, dated April 9, 2013, updated June 24, 2014;
Follow Up to Geotechnical Engineering Investigation, dated March 4, 2014;
Response to Soils Report Correction Letter, dated May 22, 2014;
Response to Geotechnical and Engineering Geology Review, dated September 10, 2014;
Response to Geotechnical and Engineering Geology Response to Comments and Review, dated May 15, 2017;
Corrosion Testing Results, dated June 25, 2018.

City of Los Angeles, Department of Building and Safety:
Correction Letter, Log #83257, dated March 13, 2014;
Geology and Soils Report Approval Letter, Log #83257-01, dated June 24, 2014;
Geology and Soils Report Approval Letter, Log #85606, dated September 23, 2014.

Communications by Others:
Desktop Fault Evaluation, by Lettis Consultants International, Inc., dated May 2, 2017.

Ladies and Gentlemen:

This letter transmits the Geotechnical Engineering Investigation for the subject site prepared by Geotechnologies, Inc. This report provides geotechnical recommendations for the development of the site, including earthwork, seismic design, retaining walls, excavations, shoring and foundation design. Engineering for the proposed project should not begin until approval of the geotechnical investigation is granted by the local building official. Significant changes in the geotechnical recommendations may result due to the building department review process.

The validity of the recommendations presented herein is dependent upon review of the geotechnical aspects of the project during construction by this firm. The subsurface conditions described herein have been projected from limited subsurface exploration and laboratory testing. The exploration and testing presented in this report should in no way be construed to reflect any variations which may occur between the exploration locations or which may result from changes in subsurface conditions.

Should you have any questions please contact this office.

Respectfully submitted,
GEOTECHNOLOGIES, INC.

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ENCLOSURES - continued

UPDATED GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED APARTMENT COMPLEX
1185 WEST SUNSET BOULEVARD
LOS ANGELES, CALIFORNIA

INTRODUCTION

This report presents the results of the updated geotechnical engineering investigation performed on the subject site. The purpose of this investigation was to identify the distribution and engineering properties of the geologic materials underlying the site, and to provide geotechnical recommendations for the design of the proposed development.

This investigation presents the most recent building design based on the work by KTGY Architecture and Planning, includes updates through the 2022 California Building Code, and consolidates the recommendations presented in the referenced reports. No subsurface work or laboratory testing was performed as part of this report. The results of the exploration and the laboratory testing from previous reports by Geotechnologies, Inc. (GTI) are presented in the Appendix of this report (Files 20489 and 19267). Boring logs from a Geotechnical Engineering Report by Petra Geotechnical (2004 are also attached to this report. The excavation locations are shown on the enclosed Plot Plan and Geologic Map.

PROPOSED DEVELOPMENT

Information concerning the proposed development was furnished by KTGY Architecture + Planning. The site is proposed to be developed with an apartment complex that is seven stories in height with one and two levels of subterranean parking. Retaining walls will range of to 30 feet in height. Column loads are estimated to be between 500 and 900 kips. Wall Loads are estimated to be between 4 and 17 kips per lineal foot. These loads reflect the dead plus live load, of which the dead load is approximately 75 percent. The proposed structure is shown relative site boundaries on the attached Geologic Map.

The lowest finish floor elevations of the structure will range from 409 feet above mean sea level at the north end of the site to 400 feet at the south end. A walkway on the east side of the structure, located at the toe of the westerly descending slope, is at 439.5 feet.

Excavations for the subterranean parking levels at the northeast corner of the structure will be as much as 62 feet, including foundation excavations. The basement excavations will be as much as 20 feet below Sunset Boulevard at the northern end of the structure and 8feet at the southern end of the structure. The presence of uncertified fill at the southern end of the structure will require removal and recompaction. Up to 10 feet to of compacted fill will be necessary to locally raise grades and backfill walls.

A permanent cut is proposed on the east side of the structure that will provide a 15 foot setback between the east side of the structure and the toe of the proposed slope. The slope will be inclined as steep as 27 degrees and be up to 65 feet high. The top of the slope will require a 10 foot setback from the western and northern property lines. Appropriate terrace drains and downdrains will be required. Due to surface drainage from offsite properties to the subject site, a brow ditch will be required at the top of the slope to intercept the offsite water.

Any changes in the design of the project or location of any structure, as outlined in this report, should be reviewed by this office. The recommendations contained in this report should not be considered valid until reviewed and modified or reaffirmed, in writing, subsequent to such review.

SITE CONDITIONS

The site is located at West 1185 West Sunset Boulevard in Los Angeles, California. The site is irregular in shape and approximately 2.66 acres in area. The site is bordered by a westerly-descending slope to the north, at grade single and multi-family residential properties and Everett Street to the east, and West Sunset Boulevard to the west. The site is shown relative to nearby topographic features on the attached Vicinity Map. Topographic relief across the site is 95 feet from highest to lowest points. Prior to development, the site was a westerly descending slope, inclined at a 4 to 1 gradient and up to 70 feet high. In the 1920's to 1930's, the toe of the slope was cut to provide room for several 1-story, at-grade structures. The work resulted in a cut up to 45 feet high and inclined at a 1 to 1 gradient. Due to the descent of the ridgeline on the east side of the site from north to south, the slope and the cut reduce to zero at the south end of the site, at the intersection of West Sunset Boulevard and Everett Street.

No indications of seeps, springs, or slope instability, such as tension crack in the exposed soils, distorted buildings, or surficial and deep seated failure were noted during the initial site investigation in 2013 or 2016. On the north side of the site, raveling and sloughing was observed. Some of the slough materials have accumulated against the walls of an existing building.

Previous development on the site consisted of several 1-story, at-grade retail structures. Some of the areas between former structures is paved.

This firm performed a site visit on June 20, 2023 as part of this investigation. No indications of seeps, springs, or slope instability such as tension cracks in the exposed soils, distorted buildings, or surficial and deep seated failures were noted. Al of the onsite structures have been demolished.

The site is vegetated with annual grasses and trees.

LOCAL GEOLOGY

The site is located in the Elysian Hills which are located to the northeast of downtown Los Angeles. The Elysian Hills are characterized by low, rolling topography. The hills are underlain by Tertiary-age, interlayered siltstone and sandstone of the Puente Formation. Bedding orientation in the Elysian Hills is very uniform, dipping from 20 to 50 degrees to the south and southwest (Lamar, 1970 and Dibblee, 1989). Two local geology maps, reflecting the work of Lamar (1970) and Dibblee (1989), are attached.

The bedrock is well bedded and planar and has few mapped folds or faults in the area. According to the geologic map prepared by Lamar (1970), an un-named fault is shown to trend in a northwest-southeast direction and bisects the site. Evidence of a fault was not observed during the site investigation, although a rock exposure near Boring B6 (Geotechnologies, 2006) yielded bedding attitudes indicative of an open, local fold. The fault is shown on the map by Dibblee (1989).

A review letter (described below) by the firms Wilson GeoSciences, Inc and Geo-Dynamics, Inc. prepared on behalf of a nearby property owner (Hoover Tang) commented on the presence and impact of an un-named fault shown on geologic map by Lamar (1970). Lettis Consultants International (LCI) performed a comprehensive review of the geologic literature and geologic interpretation of the site vicinity. Geotechnologies, Inc., in coordination with Lettis Consultants International (LCI) excavated 13 test pits on the site, to map bedding orientations and attempt to identify evidence of the fault. No fault was identified in the excavations on the site. The excavation locations are shown on the attached Geologic Map. The results are included in the report by LCI dated May 2, 2017 and in the response letter by Geotechnologies dated May 18, 2017. The report by LCI is attached as Appendix F, Desktop Fault Evaluation.

PREVIOUS WORK

A summary of the previous work on the site is presented in the chronological list below.

Kovacs-Byer and Associates, Report dated June 11, 1986, Preliminary Geologic and Soils Engineering Exploration, Proposed Commercial Structure and Housing, Lots 1, 2, 3, 4, 7, 9, 11, 13, 15, 16, 17, 18, 19, 21, and 23, Tract 38559, Sunset Boulevard and Vicinity, Los Angeles, California.

The scope of this investigation included excavation of 5 test pits and drilling 4 borings to depths ranging from 4 to 18 feet. Laboratory testing of the geologic materials was provided. No faults were encountered during the investigation. The fault identified by Lamar (1970) was considered a groundwater barrier. No existing landslides were identified during the investigation. Minor folding was observed in the slope cut. A map identifying the excavation locations was not included with the report. Therefore, the borings are not indicated on the attached Geologic Map so the borings would have limited value and are therefore not included with this report.

Geotechnologies, Inc., Report dated October 18, 2006, Preliminary Results of Geotechnical Engineering Investigation, Proposed Residential Development, 1187 Sunset Boulevard, Los Angeles, California, File No 19267.

This firm performed an investigation on the subject site that included drilling 6 borings and excavating 6 test pits. The investigation was preliminary in scope and did not include laboratory testing of the geologic materials. The report was not updated nor was it submitted to the City of Los Angeles Grading Division for review. No landslides or deep seated instability was noted during the investigation. The excavation locations are shown on the attached Geologic Map and the boring logs are also included with this report as Appendix A1. The information presented in the report provided additional identification of the bedrock structure and the distribution of the geologic materials groundwater.

Geotechnologies, Inc., April 9, 2013, updated June 24, 2014, Geotechnical Engineering Investigation Proposed Apartment Complex, 1185 Sunset Boulevard, Los Angeles, California, File No 20489.

The project consisted of a 4 story multi-family apartment structure with 2 levels of subterranean parking. The easterly-ascending slope was planned to be cut for the proposed structure. Three borings were drilled with a hollowstem auger and six tests pits were excavated with hand tools. The excavation locations are shown on the attached Geologic Map and the boring logs are also included with this report as Appendix A2. Groundwater was identified in the borings at elevations of 414.7 and 402.5 feet.

Geotechnologies, Inc., March 4, 2014, Follow Up to Geotechnical Engineering Investigation, dated April 9, 2013, 1185-1245 W. Sunset Boulevard and 959 Everett Street, Los Angles, California Grading Division Log# 83357, VTTM#'s 72552 (959 Everett St.) and 72553 (1185-1245 W. Sunset Blvd.), File No 20489.

This letter was prepared for administrative purposes and does not provide additional geotechnical engineering conclusions or recommendations.

Geotechnologies, Inc., May 22, 2014, Response to Soils Report Correction Letter, Proposed Apartment Complex, 1185 West Sunset Boulevard, Los Angeles, California, File No. 20489.

The City of Los Angeles, Department of Building and Safety prepared a letter dated March 13, 2014 with comments that required clarification. This letter provided responses to the comments. An approval letter was issued by LADBS dated June 24, 2014 (LOG# 83257-01).

Geotechnologies, Inc., September 10, 2014, Response to Geotechnical and Engineering Geology Review by Geo-Dynamics, Inc. and Wilson Geosciences, Inc., Proposed Apartment Complex, 1185 West Sunset Boulevard, Los Angeles, California. File No 20489.

Geotechnologies, Inc,. received a letter from a neighbor (Hoover Tang) identifying geotechnical concerns regarding the proposed development dated August 4, 2014. The letter was also submitted to the Los Angeles Planning Department for consideration. The letter included combined commentary by the firms Wilson GeoSciences, Inc and Geo-Dynamics, Inc. Geotechnologies, Inc. provided a response letter to the comments and submitted it LADBS.

The LADBS reviewed the response and issued Geology and Soils Report Approval Letter September 23, 2014, (LOG# 85606).

Geotechnologies, Inc., May 18, 2017, Response to Geology and Engineering Geology Response to Comments and Recommendations, Proposed Apartment Complex, 1185 West Sunset Boulevard, Los Angeles, California, File No 20489.

Geotechnologies, Inc. received a rebuttal to the geotechnical-related comments provided in the letter by Mr. Hoover Tang (referenced above). The rebuttal comments were prepared by the firms Wilson GeoSciences, Inc and Geo-Dynamics, Inc.

The comments required supplemental geotechnical investigation work including Geotechnologies, Inc. provided a response letter to the comments and submitted it LADBS. The supplemental investigation included 4 borings and 17 test pits. Test pits TP7 and TP8 were excavated, sampled and logged. Test Pits TP-9 through TP-24 were shallow excavations to expose bedrock and bedding orientations, therefore the test pits logs were not prepared, however photographs were taken of the excavations. The boring and test pit locations are shown on the attached Geologic Map. The boring logs for B4 through B5 as well as the Logs for Test Pits TP7 and TP8 are included in Appendix A3. The Photographs Logs for test pits TP9 through TP24 are included in Appendix A4.

In addition, the firm Lettis Consultants International, Inc. was retained as a subconsultant to assist with the geologic interpretation of an unnamed fault that appears on the published Geologic Map by Lamar, (1970). A copy of the report by Lettis Consultants is in Appendix F, Desktop Fault Evaluation.

Geotechnologies, Inc., June 25, 2018, Corrosion Testing Results, 1185 West Sunset Boulevard, Los Angeles, California, File No. 20489.

Corrosion testing of the on-site soil was requested by the client. Soil samples were taken by Geotechnologies from several locations on the site. The samples were provided to the laboratory operated by Project X for testing and report preparation. A copy of the report by Project X, dated June 20, 2018 is included as Appendix G, Corrosion Evaluation Report.

Petra Geotechnical, Inc., Report dated October 7, 2004, Due diligence Geotechnical Evaluation, Proposed Residential Development, Approximately 2 ¾ acre site 1185 through 1247 West Sunset Boulevard, City of Los Angeles, California, Job Number J.N. 588-04.

This investigation included drilling 2 borings near the elevation of Sunset Boulevard. The borings identified alluvial soils and Puente Formation bedrock. No landslides were identified during the investigation. The boring locations are shown on the attached Geologic Map and the boring logs are attached to this report in Appendix A5, Excavation Logs.

GEOTECHNICAL EXPLORATION

FIELD EXPLORATION

The subsurface field investigation work was performed by Geotechnologies, Inc. in 2006, 2013, and 2016. Work was also performed by a previous consultant, in 2004. A total of 15 borings and 30 test pits have been excavated. The borings ranged in depth from 10 to 60 feet and were excavated with either a truck-mounted 8-inch diameter hollowstem auger or a truck mounted 24-inch diameter bucket auge drilling rigs.

Samples for the hollowstem auger were taken with an automatic trip hammer using a 140-pound weight dropped from a height of 30 inches. Samples for the 24-inch diameter bucket auger were taken with a telescoping kelley bar dropped from a height of 12 inches. Both sampling methods were collected in a California-modified, split-spoon sampler lined with 2.5-inch diameter brass rings.

The test pits were excavated using hand labor. The test pits were excavated approximately 30 inches square to a depth of 3 to 18 feet, then deepened to a depth ranging from 8 to 11 feet using a 5-inch diameter hand auger. Samples were taken using hand tools in a sampler lined with 2.5-inch diameter brass rings. Test Pit 1 was used to perform a percolation test (File No. 20489).

Test pits TP23 and TP24 were excavated with backhoe equipped with a 24-inch-wide bucket. Test pits TP9 through TP24 were excavated into a cut slope to remove talus covering the rock exposures. Due to their shallow depth, the test pits were only mapped for bedding orientations. The bedding orientations are represented on the attached Geologic Map. No test pit logs were prepared for these excavations.

The exploration locations are shown on the Geologic Map and the geologic materials encountered are in Appendix A. The location of exploratory excavations was determined by measurement from hardscape features shown on the Geologic Map. Elevations were determined by interpolation from the elevation contours shown on the map. The location and elevation of the exploratory excavations should be considered accurate only to the degree implied by the method used.

Geologic Materials

The geologic materials consist of artificial fill, colluvium, alluvium, and interbedded siltstone and sandstone bedrock of the Puente Formation. More detailed descriptions of the geologic materials are presented in the following paragraphs. The distribution of the geologic materials can be identified on the Geologic Map and Cross Sections A-A’ through G-G’.

Fill

The fill consists of mixtures of clay, silt, sand and gravel that is dark brown, and yellowish brown, medium dense or firm, and moist. The fill was found to have some glass, wood and metal pieces. The fill was found to extend to a depth of 7 feet. The deepest fill is encountered along Sunset Boulevard and the southern end of the site.

Colluvium

Colluvium consists of silty clay and clayey silt that is dark brown to medium brown in color, moist, and firm. Near the base of the colluvium, gravel-sized fragments of the underlying siltstone bedrock are included. The deepest colluvium was identified in Test Pit 7 and was 6 feet thick (File No. 20489). The colluvium thins southward from Test Pit 5.

Alluvium

Alluvium consists of sandy silt and silty clay that is dark brown to medium brown in color, moist to wet, and has some gravel-sized siltstone fragments near the base of the deposit. The thickest alluvium was identified in Boring 4 (File No 19267) at 16 ½ feet. A nearby boring (Boring 2 by Petra Geotechnical) identified alluvium with a thickness of 12 feet. The alluvium is found primarily on the western part of the site along Sunset Boulevard.

Bedrock (Puente Formation)

The site is underlain by sedimentary bedrock of the Puente Formation. The bedrock consists of well bedded, clayey siltstone and sandstone that is yellow and grayish brown, and brown in color. The bedrock is also moist and moderately hard and moderately weathered to slightly weathered. The weathering diminishes with depth. Bedding is relatively uniform across the site, dipping from southeast to southwest from 16 to 36 degrees. An indication of a slight open fold was found near to the toe of the cut slope near Boring B3 (File No. 20489). The hard concretions were not identified in the bedrock. The attached Bedrock Contour Plan shows the bedrock elevations across the western portion of the site, along Sunset Boulevard and Everett Street.

Groundwater

Groundwater was encountered in all the borings drilled along Sunset Boulevard. Seepage occurred at depth of 9.3 feet to 24 feet. These depths correspond to elevations of 414.7 and 402.5, respectively. Groundwater was found at a similar elevation in the borings drilled by this firm in 2006.

In general, the ground water surface descends to the south, down Sunset Boulevard. The groundwater elevations range from 414 feet at the north end of the site to about 403 feet at the south end of the site. In general, water is approximately 9 feet below the ground surface. The water is identified in the alluvium and in the joints and fractures in the bedrock. The ground water level is above the proposed basement finish floor elevation at both ends of the site.

Based on a review of the California Geological Survey Seismic Hazard Evaluation Report for the Hollywood 7.5-Minute Quadrangle (CDMG, 2006) indicates the historically highest groundwater level at the site is approximately 20 feet below the ground surface.

Water seepage into the excavations will occur primarily at the alluvium-bedrock contact, along Sunset Boulevard. The water will occur along a distinct zone above the contact. Some seepage may occur through fractures in the rock and along bedding planes in deeper excavation near Sunset Boulevard.

Caving

Caving could not be directly observed in the hollowstem auger borings due to the continuously cased design of the hollowstem auger borings.

Sloughing (or caving) was identified in Borings B6 and B7 (File No. 20489) located near the south end of the site. These borings were drilled with a rig equipped with a 24-inch diameter bucket auger. Caving of the boring walls was identified within 2 feet below the ground water level.

In general, caving is not anticipated above the groundwater level, or in unfractured Puente Formation bedrock. Caving was not encountered in the test pits.

Caving may occur in large diameter boring at or below the water level where the rock is highly fractured. Where sandy alluvium occurs below the groundwater level, raveling or light caving can be expected.

SEISMIC EVALUATION

REGIONAL GEOLOGIC SETTING

The Los Angeles Basin is located at the northern end of the Peninsular Ranges Geomorphic Province. The basin is bounded by the east and southeast by the Santa Ana Mountains and San Joaquin Hills, to the northwest by the Santa Monica Mountains. Over 22 million years ago the Los Angeles basin was a deep marine basin formed by tectonic forces between the North American and Pacific plates. Since that time, over 5 miles of marine and non-marine sedimentary rock as well as intrusive and extrusive igneous rocks have filled the basin. During the last 2 million years, defined by the Pleistocene and Holocene epochs, the Los Angeles basin and surrounding mountain ranges have been uplifted to form the present-day landscape. Erosion of the surrounding mountains has resulted in deposition of unconsolidated sediments in low-lying areas by rivers such as the Los Angeles River. Areas that have experienced subtle uplift have been eroded with gullies.

REGIONAL FAULTING

Based on criteria established by the California Division of Mines and Geology (CDMG) now called California Geologic Survey (CGS), faults may be categorized as active, potentially active, or inactive. Active faults are those which show evidence of surface displacement within the last 11,000 years (Holocene-age). Potentially-active faults are those that show evidence of most recent surface displacement within the last 1.6 million years (Quaternary-age). Faults showing no evidence of surface displacement within the last 1.6 million years are considered inactive for most purposes, with the exception of the design of some critical structures.

Buried thrust faults are faults without a surface expression but are a significant source of seismic activity. They are typically broadly defined based on the analysis of seismic wave recordings of hundreds of small and large earthquakes in the southern California area. Due to the buried nature of these thrust faults, their existence is usually not known until they produce an earthquake. The risk for surface rupture potential of these buried thrust faults is inferred to be low (Leighton, 1990). However, the seismic risk of these buried structures in terms of recurrence and maximum potential magnitude is not well established. Therefore, the potential for surface rupture on these surface-verging splays at magnitudes higher than 6.0 cannot be precluded.

SEISMIC HAZARDS AND DESIGN CONSIDERATIONS

The primary geologic hazard at the site is moderate to strong ground motion (acceleration) caused by an earthquake on any of the local or regional faults. The potential for other earthquake-induced hazards was also evaluated including surface rupture, liquefaction, dynamic settlement, inundation and landsliding.

Surface Rupture

Surface rupture is defined as displacement of the ground surface which occurs along the trace of the causative fault during an earthquake. Based on research of available literature and results of site reconnaissance, no known active or potentially active faults underlie the subject site. In addition, the subject site is not located within an Earthquake Fault Zone (CGS, 2017). Based on these considerations, the potential for surface rupture at the subject site is considered low.

Liquefaction

Liquefaction is a phenomenon in which saturated silty to cohesionless soils below the groundwater table are subject to a temporary loss of strength due to the buildup of excess pore pressure during cyclic loading conditions such as those induced by an earthquake. Liquefaction-related effects include loss of bearing strength, amplified ground oscillations, lateral spreading, and flow failures.

The site is not in a potentially "Liquefiable" area (CGS, 2017). This determination is based on groundwater depth records, soil type, and distance to a fault capable of producing a substantial earthquake. The proposed structure will be supported in the siltstone bedrock of the Puente Formation. This rock will not liquefy due to its moderately hard consistency and it's long tectonic history.

Lateral Spreading

Lateral spreading is the most pervasive type of liquefaction-induced ground failure. Due to the moderately hard consistency of the bedrock, the potential for lateral spreading is remote.

Dynamic Dry Settlement

Seismically induced settlement or compaction of dry or moist, cohesionless soils can be an effect related to earthquake ground motion. Such settlements are typically most damaging when the settlements are differential in nature across the length of structures.

Due to the moderately hard consistency of the bedrock, the potential for dynamic dry settlement is considered remote.

Tsunamis, Seiches and Flooding

Tsunamis are large ocean waves generated by sudden water displacement caused by a submarine earthquake, landslide, or volcanic eruption. Review of the County of Los Angeles Flood and Inundation Hazards Map, Leighton (1990), indicates the site does not lie within the mapped tsunami inundation boundaries.

Seiches are oscillations generated in enclosed bodies of water which can be caused by ground shaking associated with an earthquake. Review of the County of Los Angeles Flood and Inundation Hazards Map, Leighton (1990), indicates the site does not lie within mapped inundation boundaries due to a seiche or a breached upgradient reservoir.

Landslides and Slope Stability

No landslides were noted on the available geologic maps of the site vicinity (Dibblee, 1989, and Lamar, 1970). Indications of deep-seated landslides were not noted during the current site investigation, previous site investigations or investigations by others. The bedding orientation on the west-facing slope is neutral to favorable with respect to the slope face with respect to slope stability. Therefore, the potential for landsliding is very low. However, south facing cuts will expose adversely oriented bedrock creating a potential unstable condition if the cut is made steeper than the dip of the bedding. Site specific stability analysis are presented in the section “Slope Stability Analyses” below.

Shallow-seated raveling was noted at the face of the slope cuts made to the north and east sides of the former structures. Indications of calving, such as cracks at the top of the cut, and talus at the toe of the slope were observed. No seeps, springs, or sites of lush vegetation, which can be associated with instability, were noted. Indications of surficial creep such as flexural folding in the test its exposing shallow bedrock or hummocky topography were noted.

SLOPE STABILITY ANALYSES

Slope stability calculations were performed to determine the factor of safety of the proposed cut on the west-facing slope. Slope stability calculations were performed along Cross Section B-B’ and G-G’ which are considered the most critical relative to the proposed cut.

The purpose of the slope stability analyses was to address the requirements of City of Los Angeles, Information Bulletin P/BC 2020-49. These sections represent the most critical sections in terms of slope inclination, bedding plane orientation, and surcharge to the slope by the proposed fill. Therefore, all other slopes of flatter gradient or lesser heights or more favorable geologic conditions are considered stable.

The procedure for the stability analyses conforms with the "Recommended Procedures for Implementation of California Division of Mines and Geology Special Publication 117 Guideline for Analyzing and Mitigating Landslide Hazards in California" (Blake, Hollingsworth, and Stewart, 2002). The analyses were performed using the computer program SLIDE2 by RocScience using Janbu's method for planar surfaces.

Proposed Slope Configuration

The proposed slope configuration is shown on the attached Grading Plan by Site Tech dated October 7, 2013. The slope was analyzed two steps. The first step considered only the upper part to the slope with the inclined cut face. The second part of the analysis considered the lower part of the slope that required the installation of tiebacks. For the pseudostatic analysis of the lower portion of the slope, the vertical load of the building was added. A distributed load of 1,100 psf was used.

A discussion of the parameters used in the stability analysis is presented below.

Soil Strength

The slope is comprised of colluvium, and the Puente Formation bedrock. The strength of the geologic materials was determined by performing direct shear tests at various normal loads. All of the samples were saturated prior to shearing. The displacement of each shear test was 0.25 inches and performed at a rate of 0.025 inches per minute. The strength across bedding was determined using shearing the rock once.

During downhole logging of the large-diameter borings (Borings 4 and 5), bag samples of fine grained rock were obtained for later laboratory testing. The samples were run through a No. 4 sieve and remolded to the density of the rock (at field moisture content) based on adjacent samples. The remolded sample samples were saturated prior to shearing. The samples then sheared at rate of 0.01 inches per minute for a total offset of 0.25 inches. The sample was realigned and re-sheared again for a total of 5 trials resulting a total offset of 1.25 inches for each sample. Similar sample processing and shear tests were performed on the remaining material from each bag at successively higher normal loads. The results of the laboratory testing showing the residual strength for each shear test are plotted on the attached Plate B-6.

The geologic material properties are presented in the A and B Plates of the report Appendix. It should be noted that the bedding dips to the south and southeast, which is favorable with respect to the proposed slope cut. The weakest shear envelope was drawn from the testing results and is shown and was used in the slope stability analyses and the wall pressure calculations where along bedding shear strengths was needed. A summary of the material strengths used in the analysis is tabulated below.

Table 1- Summary of Geologic Material Strengths Used in Stability Analysis

Geologic Material	Modeled Strength Characteristic	Moist Unit (pcf)	Saturated Unit (pcf)	Cohesion (pcf)	Angle of Internal Friction (degrees)
Alluvium	Isotropic	105	120	800	14
Compacted Fill	Isotropic	120	125	390	21
Colluvium	Isotropic	106	120	580	23
Puente Formation – Interbedded Siltstone and Sandstone, Slightly weathered	Anisotropic	120	125	530	25
				335 (0 to -4)[1] (0 to 4)[2]	20 (0 to -4)[1] (0 to 4)[2]

Note: [1] Denotes inclination for along bedding strength for Cross Section B-B' (in degrees)
[2] Denotes inclination for along bedding strength for Cross Section E-E' (in degrees)

Water

Seepage was encountered in borings and tests pits along Sunset Boulevard. No seepage was encountered in the borings or test pits excavated on the slope. Groundwater was modeled at elevation 410 feet and rises from the base of the proposed excavation to the east.

External Loads

An external pseudostatic load was applied to the Cross Sections B-B' and G-G' in the form of a seismic coefficient. The seismic coefficient was calculated using the Bray and Rathje procedure (1998) spreadsheet. The Probabilistic Seismic Hazard Analysis website calculator for a 475 year return period and a shear wave velocity of 560 m/s provided the Earthquake magnitude and distance. A magnitude 6.9 earthquake at a distance of 7.02 kilometers with a peak ground acceleration was returned. A pseudostatic seismic coefficient of 0.33 was calculated. The calculation sheets are attached to this report.

On Cross Section G-G', the adjacent single-story structure upslope of the site was modeled with load of 100 psf.

In the pseudostatic analyses of both Cross Sections where the lower portion of the slope is analyzed, the proposed structure was included with a load of 1,100 psf. The displacement of each shear test was 0.25 inches and performed at a rate of 0.025 inches per minute. The strength across bedding was determined using shearing the rock once. This load was added to the analysis since an earthquake event would most likely occur after the proposed structure is built.

Analysis Parameters

The stability analyses were performed using Bishop's simplified method to analyze curved failure surfaces and Janbu's method to analyze for bedding parallel (block-type) failures.

Results

The stability analyses indicated that the existing slope with proposed improvements has a factor of safety in excess of the City of Los Angeles, Department of Building and Safety minimum requirement of 1.5 for static conditions and 1.0 for pseudostatic conditions. The computer output files are included in the Appendix. The results are summarized below.

Table 2 – Results of Slope Stability Analyses

Cross Section	Analysis Type	Condition	Factor of Safety (Minimum Required)
B-B' Upper Slope, Cut	Bishop (curved)	Static	2.27 (1.50)
	Bishop (curved)	Pseudo-static	1.11 (1.00)
	Janbu (block)	Static	1.71 (1.50)
	Janbu (block)	Pseudo-static	1.02 (1.00)
B-B' Lower Slope, Tiebacks	Bishop (curved)	Static	1.96 (1.50)
	Bishop (curved)	Pseudo-static (Includes Building Load)	1.35 (1.00)
	Janbu (block)	Static	1.64 (1.50)
	Janbu (block)	Pseudo-static (Includes Building Load)	1.01 (1.00)

Cross Section	Analysis Type	Condition	Factor of Safety (Minimum Required)
G-G' Upper Slope, Cut	Bishop (curved)	Static	2.06 (1.5)
	Bishop (curved)	Pseudo-static	1.10 (1.00)
	Janbu (block)	Static	1.82 (1.50)
	Janbu (block)	Pseudo-static	1.01 (1.00)
G-G' Lower Slope, Tiebacks	Bishop (curved)	Static	2.31 (1.50)
	Bishop (curved)	Pseudo-static (Includes Building Load	1.29 (1.00)
	Janbu (block)	Static	1.83 (1.50)
	Janbu (block)	Pseudo-static (Includes Building Load)	1.02 (1.00)

Commentary on Slope Stability

Based on the results of the analyses, the proposed cut will require an inclination of 2 to 1 (horizontal to vertical). The proposed design calls for a terrace at elevation 439.5 feet. A retaining wall will be required at the toe of the cut slope at elevation 439.5’. A retaining wall up to 17 feet in height will be needed. The wall was modeled with cantilevered piles with a spacing of 8 feet and with a shear resistance of 160,000 lbs. Tiebacks may be used as an alternative support installation.

The proposed cut from the terrace (elevation 439.5 feet) to the proposed basement (elevation 409 feet) was modeled with 6 rows of tieback supports and an out-of-plane spacing of 6 feet. The tiebacks are modeled to be 100 feet long and have a tensile load of 200 kips each. The length of tiebacks was determined by the slope stability analysis. More details can be found in Appendix D–Slide 2 Printouts.

The north wall of the site has a nearly horizontal backslope as seen on Cross Section D-D’. This slope did not require a slope stability analysis. Lateral loads for this wall are provided in the shoring and retaining wall sections of this report.

Based on the analyses, the wall will require a cantilevered pile system. The piles used in the analysis extended to a depth of 20 feet below the ground surface. The final wall configuration will be designed by the shoring or structural engineer.

Surficial Stability

Under saturated conditions, the surficial soils (fill and colluvium) have a factor of safety of 2.74. This value is above the minimally acceptable value of 1.5.

Oil Wells

The site is located approximately 600 feet north of the City of Los Angeles Oil field, (Lamar, 1970). According to the Oil Well Location Map for the City of Los Angeles, Oil Field, (DOGGR, 2001), no oil wells have been drilled on the site.

Methane

The site is within a City of Los Angeles, designated Methane Zone according to the Methane Risk Zone Map by the City of Los Angeles, Department of Public Works, (2003). A qualified methane expert should be retained to identify the presence of methane seepage at the site.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the exploration, laboratory testing, and research, it is the finding of Geotechnologies, Inc. that construction of the proposed apartment structure is considered feasible from a geotechnical engineering standpoint provided the advice and recommendations presented herein are followed and implemented during construction.

The site is underlain by a thin cover of fill soil over much of the site. The fill may extend locally to 10 feet in depth at the southern building corner. The fill soil located adjacent to Sunset Boulevard, is underlain by alluvial soils consisting of silty clay to sandy silt that extends to a depth of as great as 18.5 feet. The alluvium is deepest at the southern portion of the site along Sunset Boulevard. Up to 4 feet of colluvium consisting of silty clay is found in the undeveloped portion of the slope. Bedrock consisting of well bedded clayey siltstone and sandstone of the Tertiary-age Puente Formation that underlies the site. The bedrock is exposed in the steep cuts on the east side of the site. The bedrock is moderately hard and moderately weathered. Bedding dips from 16 to 40 degrees to the southeast and southwest. No faults were identified in the rock.

Water was identified in several borings between depths of 9.3 and 17.5 feet. Water was identified in the earlier investigations at depths of 9 and 24 feet. It is the recommendation of this firm that the structure is designed for groundwater at a depth of 10 feet below the ground surface as measured at the adjacent sidewalk elevation.

The existing fill soils and alluvium are not suitable for support of the proposed structure. The proposed basement excavation will remove all of the fill on the north end of the structure, and will expose the bedrock.

The proposed structure should be supported on conventional foundations or a mat foundation bearing in the bedrock. If the structure will have a hydrostatic design, a mat foundation should be used.

The southern half of the structure will expose alluvium and fill soils. Deepened foundations or cast-in-place drilled friction piles may be used where the depth to bedrock is greater than 5 feet. A combination of conventional foundations, mat foundation or friction piles may be used as long as all foundation types are supported in the bedrock. The finish floor slab may be designed and constructed as a conventional slab where the slab is above the ground water surface. Where the finish floor is below the groundwater surface, the slab must be designed to accommodate the hydrostatic uplift. Where the hydrostatic pressure is too great for a structural slab, a mat foundation may be used.

The slab must be supported by a single, unform, geologic material, such as bedrock or a compacted fil blanket. The slab may not be supported by a combination of geologic materials (fill, alluvium, or bedrock). Where the slab is not supported by the bedrock, all of the existing fill must be removed and compacted. In addition, the other geologic materials must be removed and compacted to create a 2 foot this fill blanket. As an alternative, a structural slab may be used that is supported by the footings bearing in the bedrock.

Groundwater will be encountered at the bedrock-alluvium contact along Sunset Boulevard. The rate of flow should not require pre-construction dewatering or pumping. The water may be captured by allowing it to seep through the lagging and be directed to a sump or french drain. To better identify groundwater elevation on the site prior to construction, monitoring wells may be installed at the north and south ends of the site, near Sunset Boulevard.

The slope stability calculations required leaving the terrace in place at the top of the slope near Cross Section E-E'. The terrace should be regarded to include a 2-foot thick layer of relatively-impermeable soil to prevent infiltration. The layer should be graded so that water flows toward the face of the slope and is near elevation 486 feet. The over steepened slope on the east side of the terrace should be supported with a retaining wall or permanent shoring. The top of the new cut should be set back from the property no greater than 10 feet from the property line. Clarification of the required setback for the exiting cut shown on Cross Section E-E' should be obtained from the building official.

V-ditches will be required at the top, mid-height, and toe of the proposed cut slope with appropriate downdrains. The slope must be planted with erosion resistant ground cover. Approved shrubs will also be necessary.

Foundations for small outlying structures, such as property line walls, which will not be tied-in to the proposed apartment building, may be supported on conventional foundations bearing in bedrock or alluvium.

A stormwater infiltration system is not feasible on this site due to the occurrence of water at a depth of 9 feet along Sunset Boulevard and the construction of at least 1 subterranean level along Sunset Boulevard. The proposed subterranean levels will likely be in contact with the water, leaving no room for infiltration. Some other means of Stormwater infiltration should be implemented.

SEISMIC DESIGN CONSIDERATIONS

2022 California Building Code Seismic Parameters

Based on information derived from the subsurface investigation, the subject site is classified as Site Class C, which corresponds to a "Very Dense Soil or Soft Rock" Profile, according to Table 1613.5.2 of the 2019 California Building Code. This information and the site coordinates were input into the USGS Ground Motion Parameter Calculator (Version 5.1.0) to calculate the Maximum Considered Earthquake (MCE) Ground Motions for the site. The Maximum Considered Earthquake Ground motions are equivalent to the 2475-year recurrence interval ground motions adjusted by a deterministic limit.

Table 3 – 2022 California Building Code Seismic Parameters

Site Class	C
Mapped Spectral Acceleration at Short Periods (S_S)	2.025g
Site Coefficient (F_a)	1.2
Maximum Considered Earthquake Spectral Response for Short Periods (S_{MS})	2.429g
Five-Percent Damped Design Spectral Response Acceleration at Short Periods (S_{DS})	1.62g
Mapped Spectral Acceleration at One-Second Period (S_1)	0.722g
Site Coefficient (F_v)	1.4
Maximum Considered Earthquake Spectral Response for One-Second Period (S_{M1})	1.011g
Five-Percent Damped Design Spectral Response Acceleration for One-Second Period (S_{D1})	0.674g

FILL SOILS

The maximum depth of fill encountered on the site was 6 feet in Boring B2 as part of an earlier investigation by this firm File No. 19267. It is estimated that fill soil in localized areas may reach a depth of 10 feet. The fill may also be removed and recompacted as controlled fill at the southern end of the site.

EXPANSIVE SOILS

The onsite geologic materials are in the moderate to high expansion range. The Expansion Index was found to be 54 for bulk samples for alluvium and 110 for bedrock samples remolded to 90 percent of the laboratory maximum density. Reinforcing beyond the minimum required by the City of Los Angeles Department of Building and Safety is not required.

WATER-SOLUBLE SULFATES

The Portland cement portion of concrete is subject to attack when exposed to water-soluble sulfates. Usually the two most common sources of exposure are from soil and marine environments.

The source of natural sulfate minerals in soils include the sulfates of calcium, magnesium, sodium, and potassium. When these minerals interact and dissolve in subsurface water, a sulfate concentration is created, which will react with exposed concrete. Over time sulfate attack will destroy improperly proportioned concrete well before the end of its intended service life.

The water-soluble sulfate content of the onsite geologic materials was tested by California Test 417. The water-soluble sulfate content was determined to be less than 0.1% percentage by weight for the soils tested. Based on American Concrete Institute (ACI) Standard 318-08, the sulfate exposure is considered to be negligible for geologic materials with less than 0.1% and Type I cement may be utilized for concrete foundations in contact with the site soils.

In 2018, this firm obtained 3 samples of the bedrock from various exposures on the site using hand tools. The samples were sent to an outside laboratory, Project X, for testing and corrosion recommendations.

The results of soil corrosion potential testing performed by Project X indicate that the electrical resistivities of the soils are corrosive to general metals. Soil pH values of the samples were 8.6 and are considered to not be detrimental of copper or aluminum alloys. Corrosion of steel and iron is possible. Sulfate concentrations ranged between 210 mg/kg to 240 mg/kg. This concentration is considered low and any type of cement can be used where in contact with the bedrock.

The City of Los Angeles, Department of Building and Safety permits the use of PVC pipe where the underlying soil is identified to be corrosive toe stee or cast iron pipes. The report identifies that the on-site soils have high soil resistivity and pH and are corrosive to general metals, steel and iron. The reader is directed to the report for discussion of the results and recommendations for corrosion protection. The report by Project X, is included in Appendix G, Corrosion Evaluation Report.

GRADING GUIDELINES

Site Preparation

- A thorough search should be made for possible underground utilities and/or structures. Any existing or abandoned utilities or structures located within the footprint of the proposed grading should be removed or relocated as appropriate.

- All vegetation, existing fill, and soft or disturbed geologic materials should be removed from the areas to receive controlled fill. All existing fill materials and any disturbed geologic materials resulting from grading operations shall be completely removed and properly recompacted prior to foundation excavation.

- Any vegetation or associated root system located within the footprint of the proposed structures should be removed during grading.

- Subsequent to the indicated removals, the exposed grade shall be scarified to a depth of six inches, moistened to optimum moisture content, and recompacted in excess of the minimum required comparative density.

- The excavated areas shall be observed by the geotechnical engineer prior to placing compacted fill.

Recommended Overexcavation

If the structure will be designed with a structural joint at the transition between a bedrock supported portion and the fill supported portion, the fill supported portion shall be excavated to a minimum depth of 3 feet below the bottom of all foundations.

Compaction

The City of Los Angeles Department of Building and Safety requires a minimum comparative compaction of 95 percent of the laboratory maximum density where the soils to be utilized in the fill have less than 15 percent finer than 0.005 millimeters. The soils tested by this firm would not require the 95 percent compaction requirement.

Comparative compaction is defined, for purposes of these guidelines, as the ratio of the in-place density to the maximum density as determined by applicable ASTM testing.

All fill should be mechanically compacted in layers not more than 8 inches thick. All fill shall be compacted to at least 90 percent of the maximum laboratory density for the materials used. The maximum density shall be determined by the laboratory operated by Geotechnologies, Inc. using the test method described in the most recent revision of ASTM D 1557.

Field observation and testing shall be performed by a representative of the geotechnical engineer during grading to assist the contractor in obtaining the required degree of compaction and the proper moisture content. Where compaction is less than required, additional compactive effort shall be made with adjustment of the moisture content, as necessary, until a minimum of 90 percent compaction is obtained.

Acceptable Materials

The excavated onsite materials are considered satisfactory for reuse in the controlled fills as long as any debris and/or organic matter is removed.

Clayey soils should be selectively used for the 2-foot-thick cap near the top of the slope. The purpose of the cap is to prevent the infiltration of water into the bedrock.

Any imported materials shall be observed and tested by the representative of the geotechnical engineer prior to use in fill areas. Imported materials should contain sufficient fines so as to be relatively impermeable and result in a stable subgrade when compacted. Any required import materials should consist of geologic materials with an expansion index of less than 50. The water-soluble sulfate content of the import materials should be less than 0.1% percentage by weight.

Imported materials should be free from chemical or organic substances which could affect the proposed development. A competent professional should be retained in order to test imported materials and address environmental issues and organic substances which might affect the proposed development.

Utility Trench Backfill

Utility trenches should be backfilled with controlled fill. The utility should be bedded with clean sands at least one foot over the crown. The remainder of the backfill may be onsite soil compacted to 90 percent of the laboratory maximum density. Utility trench backfill should be tested by representatives of this firm in accordance with the most recent revision of ASTM D-1557.

Wet Soils

At the time of exploration the soils which will be excavated from the subterranean portion below Sunset Boulevard were well above optimum moisture content. Bedrock from the slope, above the elevation of Sunset Boulevard were near optimum moisture content. It is anticipated that the excavated material to be placed as compacted fill, and the materials exposed at the bottom of excavated plane will require significant drying and aeration prior to recompaction. It is recommended that bedrock excavated from the slope cut be selectively stockpiled for reuse as fill during backfilling procedures.

Pumping (yielding or vertical deflection) of the high-moisture content soils at the bottom of the excavation may occur during operation of heavy equipment in the areas underlain by alluvium (the southern half). Where pumping is encountered, angular minimum ¾-inch gravel should be placed and worked into the subgrade. The exact thickness of the gravel would be a trial and error procedure, and would be determined in the field. It would likely be on the order of 1 to 2 feet thick.

The gravel will help to densify the subgrade as well as function as a stabilization material upon which heavy equipment may operate. It is not recommended that rubber tire construction equipment attempt to operate directly on the pumping subgrade soils prior to placing the gravel. Direct operation of rubber tire equipment on the soft subgrade soils will likely result in excessive disturbance to the soils, which in turn will result in a delay to the construction schedule since those disturbed soils would then have to be removed and properly recompacted. Extreme care should be utilized to place gravel as the subgrade becomes exposed.

Shrinkage

Shrinkage results when a volume of soil removed at one density is compacted to a higher density. A shrinkage factor of 5 percent should be anticipated when excavating and recompacting the bedrock to an average comparative compaction of 92 percent.

Weather Related Grading Considerations

When rain is forecast all fill that has been spread and awaits compaction shall be properly compacted prior to stopping work for the day or prior to stopping due to inclement weather. These fills, once compacted, shall have the surface sloped to drain to an area where water can be removed.

Temporary drainage devices should be installed to collect and transfer excess water to the street in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. Drainage should not be allowed to flow uncontrolled over any descending slope.

Work may start again, after a period of rainfall, once the site has been reviewed by a representative of this office. Any soils saturated by the rain shall be removed and aerated so that the moisture content will fall within three percent of the optimum moisture content.

Surface materials previously compacted before the rain shall be scarified, brought to the proper moisture content and recompacted prior to placing additional fill, if considered necessary by a representative of this firm.

Abandoned Seepage Pits

No abandoned seepage pits were encountered during exploration and none are known to exist on the site. However, should such a structure be encountered during grading, options to permanently abandon seepage pits include complete removal and backfill of the excavation with compacted fill, or drilling out the loose materials and backfilling to within a few feet of grade with slurry, followed by a compacted fill cap.

If the subsurface structures are to be removed by grading, the entire structure should be demolished. The resulting void may be refilled with compacted soil. Concrete and brick generated during the seepage pit removal may be reused in the fill if all fragments are less than 6 inches in longest dimension and the debris comprises less than 15 percent of the fill by volume. All grading should comply with the recommendations of this report.

Where the seepage pit structure is to be left in place, the seepage pits should be cleaned of all soil and debris. This may be accomplished by drilling. The pits should be filled with minimum 1-1/2 sack concrete slurry to within 5 feet of the bottom of the proposed foundations. In order to provide a more uniform foundation condition, the remainder of the void should be filled with controlled fill.

Geotechnical Observations and Testing During Grading

Geotechnical observations and testing during grading are considered to be a continuation of the geotechnical investigation. It is critical that the geotechnical aspects of the project be reviewed by representatives of Geotechnologies, Inc. during the construction process. Compliance with the design concepts, specifications or recommendations during construction requires review by this firm during construction. Any fill which is placed should be observed, tested, and verified if used for engineering purposes. Please advise this office at least twenty-four hours prior to any required site visit.

LEED Considerations

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System encourages adoption of sustainable green building and development practices. Credit for LEED Certification can be assigned for reuse of construction waste and diversion of materials from landfills in new construction.

To provide the design team with a viable option in this regard, demolition debris could be crushed onsite in order to use it in the ongoing grading operations. The environmental ramifications of this option, if any, should be considered by the team.

The demolition debris should be limited to concrete, asphalt, and other non-deleterious materials. All deleterious materials should be removed including, but not limited to, paper, garbage, ceramic materials, and wood.

For structural fill applications, the materials should be crushed to 2 inches in maximum dimension or smaller. The crushed materials should be thoroughly blended and mixed with onsite soils prior to placement as compacted fill. The amount of crushed material should not exceed 20 percent. The blended and mixed materials should be tested by this office prior to placement to insure it is suitable for compaction purposes. The blended and mixed materials should be tested by Geotechnologies, Inc. during placement to ensure that they have been compacted in a suitable manner.

Hillside Grading Issues

A clay cap fill will be necessary at the top of the slope as shown by Cross Section E-E’. The cap should be at least 2 feet thick and not extended higher than elevation 486. The cap surface should flow toward the face of the slope, so water does not accumulate. A V-ditch will be required at the brow of the slope to prevent water from flowing over the slope face.

A minimum compaction of 90 percent out to the finish face of fill slopes will be required. Compaction on slopes may be achieved by overbuilding the slope and cutting back to the compacted core or by direct compaction of the slope face with suitable equipment. Direct compaction on the slope faces shall be accomplished by backrolling the slopes in three foot to four foot increments of elevation gain.

FOUNDATION DESIGN

Conventional

Conventional foundations shall bear in the siltstone and sandstone bedrock. All conventional foundations for each side of the structure must bear in the same material.

For smaller structurally independent portion of the development, conventional foundations bearing in compacted fill, which in turn bears on dense alluvium or bedrock may be utilized.

Foundations in Bedrock

Continuous foundations in bedrock may be designed for a bearing capacity of 4,500 pounds per square foot, and should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material.

Column foundations may be designed for a bearing capacity of 5,000 pounds per square foot, and should be a minimum of 24 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material.

The bearing capacity increase for each additional foot of width is 100 pounds per square foot. The bearing capacity increase for each additional foot of depth is 400 pounds per square foot. The maximum recommended bearing capacity is 7,000 pounds per square foot.

The bearing capacities indicated above are for the total of dead and frequently applied live loads and may be increased by one third for short duration loading, which includes the effects of wind or seismic forces.

Foundations in Compacted Fill

Foundations in compacted fil may be used only for improvement structurally isolated from the main building that is anticipated to be supported on the bedrock.

Continuous foundations in compacted fill that extends at least 2 feet below the proposed footings, may be designed for a bearing capacity of 2,500 pounds per square foot, and should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material.

Column foundations may be designed for a bearing capacity of 3,000 pounds per square foot, and should be a minimum of 24 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material.

The bearing capacity increase for each additional foot of width is 50 pounds per square foot. The bearing capacity increase for each additional foot of depth is 250 pounds per square foot. The maximum recommended bearing capacity is 4,000 pounds per square foot.

The bearing capacities indicated above are for the total of dead and frequently applied live loads, and may be increased by one third for short duration loading, which includes the effects of wind or seismic forces.

Miscellaneous Foundations

Conventional foundations for structures such as privacy walls or trash enclosures which will not be rigidly connected to the proposed apartment structure may bear in bedrock or alluvial soils. Continuous footings may be designed for a bearing capacity of 1,500 pounds per square foot, and should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade and 18 inches into the recommended bearing material. No bearing capacity increases are recommended.

Since the recommended bearing capacity is a net value, the weight of concrete in the foundations may be taken as 50 pounds per cubic foot and the weight of the soil backfill may be neglected when determining the downward load on the foundations.

Foundation Reinforcement

All foundations should be reinforced with a minimum of four #4 steel bars. Two should be placed near the top of the foundation, and two should be placed near the bottom.

Lateral Design

Resistance to lateral loading may be provided by friction acting at the base of foundations and by passive geologic pressure. An allowable coefficient of friction of 0.3 may be used with the dead load forces in the bedrock. An allowable coefficient of friction of 0.3 may be used with the dead load forces in the compacted fill blanket .

Passive geologic pressure for the sides of foundations poured against undisturbed bedrock or compacted fill soil may be computed as an equivalent fluid having a density of 350 pounds per cubic foot with a maximum earth pressure of 3500 pounds per square foot.

When combining passive and friction for lateral resistance, the passive component should be reduced by one third. A one-third increase in the passive value may be used for wind or seismic loads.

Foundation Settlement

Settlement of the foundation system is expected to occur on initial application of loading. The maximum settlement is expected to be ¼ inch in the bedrock and occur below the heaviest loaded columns. Differential settlement is not expected to exceed 1/4 inch.

The maximum settlement is expected to be ¾ inch in the fill and occur below the heaviest loaded columns. Differential settlement is not expected to exceed 1/2 inch.

Foundation Observations

It is critical that all foundation excavations are observed by a representative of this firm to verify penetration into the recommended bearing materials. The observation should be performed prior to the placement of reinforcement. Foundations should be deepened to extend into satisfactory geologic materials, if necessary.

Foundation excavations should be cleaned of all loose soils prior to placing steel and concrete. Any required foundation backfill should be mechanically compacted, flooding is not permitted.

FOUNDATION DESIGN - FRICTION PILES

Vertical Capacities

A deepened foundation system consisting of friction piles may be utilized for support of the southern half of the proposed structure where the depth to bedrock is too great to be reached with deepened foundations. The capacities of drilled cast-in-place piles are shown on the enclosed "Friction Pile Capacity Calculations" chart. Capacities based on dead plus live load are indicated. A one-third increase may be used for transient loading such as wind or seismic forces. The capacities presented are based on the strength of the bedrock. The compressive and tensile strength of the pile sections should be checked to verify the structural capacity of the piles.

Piles in groups should be spaced at least 2-1/2 diameters on center. If the piles are so spaced, no reduction in the downward or upward capacities need be considered due to group action.

Lateral Design

Lateral loads may be resisted by the piles, and by the passive resistance of the soils against the pile caps. The passive resistance of the existing soils against pile caps and grade beams may be assumed to be equal to the pressure developed by a fluid with a density of 350 pounds per cubic foot. A one-third increase in this value may be used for wind or seismic loads. The resistance of the piles and the passive resistance of the soils against pile caps and grade beams may be combined without reduction in determining the total lateral resistance.

Analyses of the proposed piles using a varying shear load were performed using the program RSPile (Version 3.005) by RocScience. The results of the analysis are attached to this report. The printouts show the calculated shear, moment, and deflection of the proposed piles. Scenarios where the bedrock is at the ground surface and at 10 feet deep were analyzed. The analyses were performed for 24-inch, 30-inch, and 36-inch drilled, cast-in-place friction piles. Assumed as part of these lateral capacity calculations are:

- A Free Head Condition
- A concrete shear strength (f’c) of 4,000 psi
- Lateral deflection of ½ inch

If any of these assumptions are not valid, please contact this firm and a modified analysis can be performed. The printouts from the RSPile program are included in Appendix E, RSPile Printouts.

Pile Installation

Due to the moderately hard consistency of the bedrock and the cohesive composition of the alluvium encountered during exploration, caving is not anticipated during drilling of the proposed piles above the water table. Some caving should be anticipated below the water level and near the alluvium-bedrock contact. Where the bottom of the proposed piles will be below the water level, casing or the use of drilling mud will be required in order to achieve the required depth and maintain an open hole to allow the placement of the steel and concrete. If casing is used, extreme care should be employed so that the pile is not pulled apart as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet.

Piles placed below the water level require the use of a tremie to place the concrete into the bottom of the hole. A tremie shall consist of a water-tight tube having a diameter of not less than 4 inches and be delivered with a concrete pump. The tube shall be equipped with a valve that will close the discharge end and prevent water from entering the tube while it is being charged with concrete. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of the work to prevent water entering the tube and shall be entirely sealed at all times, except when the concrete is being placed. The tremie tube shall be kept full of concrete. The flow shall be continuous until the work is completed and the resulting concrete seal shall be monolithic and homogeneous. The tip of the tremie tube shall always be kept about five feet below the surface of the concrete and definite steps and safeguards should be taken to ensure that the tip of the tremie tube is never raised above the surface of the concrete.

Closely spaced piles should be drilled and filled alternately, with the concrete permitted to set at least overnight before drilling an adjacent hole. Pile excavations should be filled with concrete as soon after drilling and inspection as possible; the shafts should not be left open overnight.

Settlement

The maximum settlement of pile-supported foundations is not expected to exceed ¼ inch. Differential settlement is expected to be negligible.

FOUNDATION DESIGN - MAT FOUNDATION

Mat Foundation

A mat foundation is recommended where hydrostatic pressure caused by groundwater exceeds the capability of a structural slab, a mat foundation may be used. The mat should be supported exclusively by the bedrock. The bottom of the mat foundation should extend a minimum of 18 inches in depth below the lowest adjacent grade. An allowable bearing pressure of 5,000 pounds per square foot, with locally higher pressures up to 8,000 pounds per square foot may be utilized in the mat foundation design. The mat foundation may be designed utilizing a modulus of subgrade reaction of 350 pounds per cubic inch. This value is a unit value for use with a one-foot square footing. The modulus should be reduced in accordance with the following equation when used with larger foundations.

$K = K_1 * [(B + 1) / (2 * B)]^2$

where K = Reduced Subgrade Modulus
K1 = Unit Subgrade Modulus
B = Foundation Width (feet)

Lateral Design for Mat Foundation

Resistance to lateral loading may be provided by soil friction, and by the passive resistance of the soils. A coefficient of friction of 0.3 may be used with the dead load forces between footings and the underlying supporting soils.

Passive earth pressure for the sides of footings poured against undisturbed soil may be computed as an equivalent fluid having a density of 350 pounds per cubic foot, with a maximum earth pressure of 3,500 pounds per square foot. When combining passive and friction for lateral resistance, the passive component should be reduced by one third. A one-third increase in the passive value may be used for wind or seismic loads. A minimum safety factor of 2 has been utilized in determining the allowable passive pressure.

Foundation Settlement

The majority of the foundation settlement is expected to occur on initial application of loading. The maximum settlement is not expected to exceed approximately ½ inch, and will occur below the most heavily loaded area of the mat foundation. Differential settlement is not expected to exceed ¼ inch across a distance of 30 feet.

Building Setback

The City of Los Angeles Building Code requires that the foundations be set back horizontally from the retaining wall, located at the toe of the adjacent ascending slopes. The required setback corresponds to a horizontal distance equal to one-half of the vertical height of the slope above the retaining wall, with a minimum distance of 3 feet and a maximum distance of 15 feet.

RETAINING WALL DESIGN

The lateral loads on retaining walls will reflect the orientation of bedding exposed in the cuts. The east, south and west wall excavations will expose neutrally-oriented siltstone and sandstone rock. The north wall will expose daylighted bedding, and as a result, the lateral loads will be higher. The east wall will have a surcharge imposed by the ascending slope and as a result the loads will be higher as well. Due to the number of combination of slope geometries and conditions, not all possible loads combinations are presented. If another condition is needed, please contact this office.

Cantilever Retaining Walls

Retaining walls supporting a level backslope may be designed utilizing a triangular distribution of active pressure in accordance the following table.

In addition to the recommended lateral earth pressure, the upper ten feet of the retaining wall adjacent to streets, driveways or parking areas should be designed to resist a uniform lateral pressure of 100 pounds per square foot, acting as a result of an assumed 300 pounds per square foot surcharge behind the walls due to normal street traffic. If the traffic is kept back at least ten feet from the retaining walls, the traffic surcharge may be neglected.

Restrained Drained Retaining Walls

Restrained retaining walls may be designed to resist a triangular pressure distribution with loads as identified in the table below. Additional earth pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures.

Table 4 – Cantilever Retaining Wall Pressures, Drained

HEIGHT (feet)	**EQUIVALENT FLUID PRESSURE (Active) - Drained**	
	East Wall, South Wall and West Wall (along Sunset Boulevard) Neutral Bedding (pounds per cubic foot)	**North Wall (Adverse Bedding) (pounds per cubic foot)**
Up to 25	30	47
25 to 35	36	54

Table 5 – Cantilever Retaining Wall Pressures, Undrained

HEIGHT (feet)	**EQUIVALENT FLUID PRESSURE (Active) - Hydrostatic**	
	East Wall, South Wall and West Wall (along Sunset Boulevard) Neutral Bedding (pounds per cubic foot)	**North Wall (Adverse Bedding) (pounds per cubic foot)**
Up to 25	66	76
25 to 35	71	80.5

For this equivalent fluid pressure to be valid, walls which are to be restrained at the top should be backfilled prior to the upper connection being made. Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures.

All walls retaining an ascending slope should maintain a minimum of 2 feet of freeboard. In addition, a concrete swale at least 2 feet in width shall be provided behind the proposed retaining walls to aid in facilitating drainage. Drainage shall be collected and discharged to an acceptable drainage area.

Restrained Retaining Walls, Drained

Restrained retaining walls may be designed to resist a triangular pressure distribution with loads as identified in the figure below. Additional earth pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures.

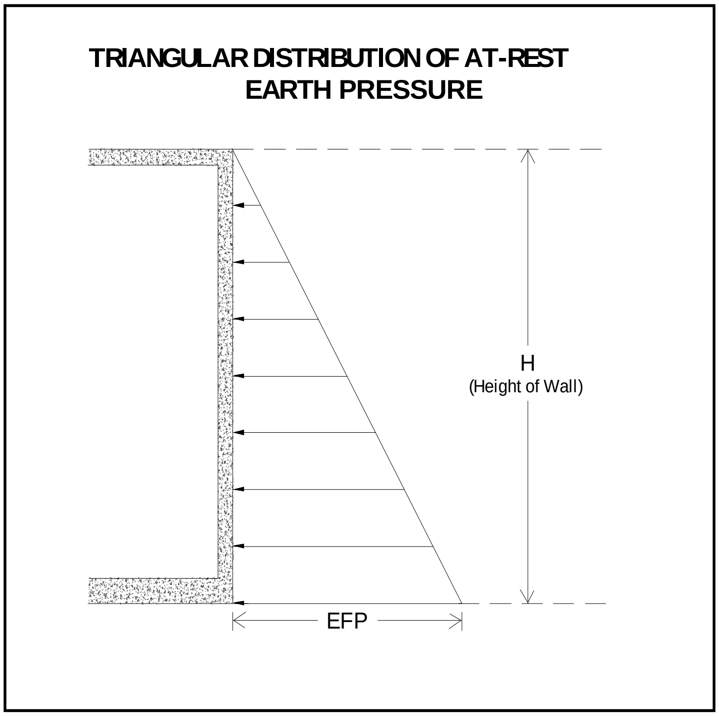


Table 6 - Restrained Retaining Wall Pressures - Drained

HEIGHT (feet)	**EQUIVALENT FLUID PRESSURE (At Rest)**	
	East Wall, South Wall and West Wall (along Sunset Boulevard) Wall Neutral Bedding (pounds per cubic foot)	**North Wall Adverse Bedding) (pounds per cubic foot)**
Up to 35	69	-
Up to 65	-	79

The lateral earth pressures recommended above for retaining walls assume that a permanent drainage system will be installed so that external water pressure will not be developed against the walls.

The lateral earth pressures recommended above for retaining walls assume that a permanent drainage system will be installed so that external water pressure will not be developed against the walls. Also, where necessary, the retaining walls should be designed to accommodate any surcharge pressures that may be imposed by existing buildings on the adjacent property.

Restrained Retaining Walls, Undrained (Hydrostatic)

Restrained retaining walls may be designed to resist a triangular pressure distribution of at-rest earth pressure and hydrostatic pressure as indicated in the diagram below. The values below include the hydrostatic pressure surcharge.

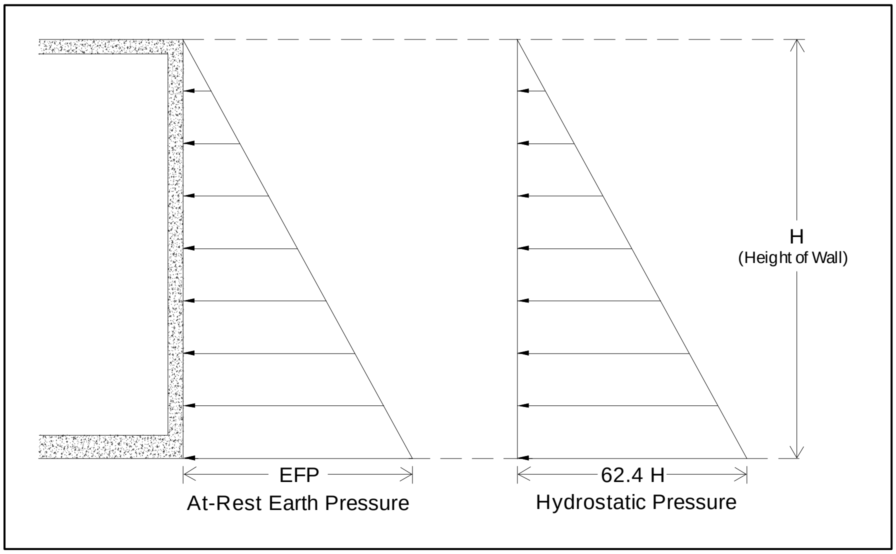


Table 7 - Restrained Retaining Wall Pressures – Hydrostatic

HEIGHT (feet)	EQUIVALENT FLUID PRESSURE (At Rest)	
	East Wall, South Wall and West Wall (along Sunset Boulevard) Wall Neutral Bedding (pounds per cubic foot)	North Wall Adverse Bedding) (pounds per cubic foot)
Up to 35	97	-
Up to 65	-	102

Retaining Wall Drainage

Subdrains may consist of 4-inch diameter perforated pipes, places with perforated facing down. The pipe shall be encased in at least one foot of gravel around the pipe. The gravel shall be wrapped in filter fabric. The gravel may consist of three-quarter inch to one-inch crushed rock. As an alternative, the use of gravel pockets and weepholes is an acceptable drainage method. Weepholes shall be a minimum of 2 inches in diameter, placed at 8 feet on center along the base of the wall. Gravel pockets shall be a minimum of 1 cubic foot in dimension, and may consist of three-quarter inch to once inch crushed rock, wrapped in non-decomposable filter fabric.

Certain types of subdrain pipe are not acceptable to the various municipal agencies, it is recommended that prior to purchasing subdrainage pipe, the type and brand is cleared with the proper municipal agencies. Subdrainage pipes should outlet to an acceptable location.

Where retaining walls are to be constructed adjacent to property lines there is usually not enough space for emplacement of a standard pipe and gravel drainage system. Under these circumstances, the use of a flat drainage product is acceptable. Some municipalities do not allow the use of flat-drainage products. The use of such a product should be researched with the building official.

Rock Pockets

Where shoring will not allow the installation of a standard subdrainage system outside the wall, rock pockets may be utilized. The rock pockets with should drain through the wall. The pockets should be a minimum of 12 inches in length, width and depth. The pocket should be filled with gravel. The rock pockets should be no more than 8 feet on center. A collector is placed within the gravel which directs collected waters through the wall to a sump or standard pipe and gravel system constructed under the slab. This method should be approved by the retaining wall designer prior to implementation.

Sump Pump Design

The purpose of the recommended retaining wall backdrainage system is to relieve hydrostatic pressure. Groundwater was encountered during exploration at a depth of 15 feet. The purpose of a retaining wall backdrainage system is to relieve hydrostatic pressure.

Based on these considerations the retaining wall backdrainage system is not expected to experience some flow of water, and in particular, no groundwater will affect it. However, for the purposes of design, a flow of 10 gallons per minute may be assumed.

Dynamic (Seismic) Earth Pressure

Retaining walls exceeding 6 feet in height shall be designed to resist the additional earth pressure caused by seismic ground shaking. A triangular pressure distribution should be utilized for the additional seismic loads, with an equivalent fluid pressure of 28.2 pounds per cubic foot. When using the load combination, the greater of the sum of the seismic earth pressure and the active pressure or the at-rest pressure should be used for that depth interval. The comparison is made in the following tables. Note the values below do not include the surcharge caused by the ascending east slope.

Table 8 – Seismic Pressure Values, Favorable Bedding, Drained

WALL PRESSURE INCLUDING SEISMIC PRESSURE Favorable Bedding, Drained Conditions (All Pressure Distributions are Triangular)			
Wall Height (feet)	**Active pressure (pcf)**	**Active + Seismic (pcf)**	**At-Rest (pcf)**
Up to 25	30	(30+28.2)= 58	69*
25 to 35	36	64	69*
35 to 45	42	70*	69
45 to 55	45	73*	69
55 to 65	48	76*	69

Note: * denotes value to be used in design

Table 9 – Seismic Wall Pressure Values – Favorable Bedding, Undrained (Hydrostatic)

WALL PRESSURE INCLUDING SEISMIC PRESSURE Favorable Bedding, Undrained (Hydrostatic) Conditions (All Pressure Distributions are Triangular)			
Wall Height (feet)	**Active Pressure +Hydrostatic (pcf)**	**Active + Hydrostatic + Seismic (pcf)**	**At-Rest +Hydrostatic (pcf)**
Up to 25	(3+63) = 66	(66+28.2)=94	98*
25 to 35	(13+63)=76	(76+28.2)=104*	98

Note: * denotes value to be used in design

Table 10 – Seismic Pressure Values, Daylighted Bedding, Drained

WALL PRESSURE INCLUDING SEISMIC PRESSURE Daylighted Bedding, Drained Conditions (All Pressure Distributions are Triangular)			
Wall Height (feet)	**Active pressure (pcf)**	**Active + Seismic (pcf)**	**At-Rest (pcf)**
Up to 25	47	(47+28.2)= 75	79*
25 to 35	54	82*	79
35 to 45	58	86*	79
45 to 55	61	89*	79
55 to 65	63	91*	79

Note: * denotes value to be used in design

Table 11 – Seismic Wall Pressure Values – Daylighted Bedding, Undrained (Hydrostatic)

WALL PRESSURE INCLUDING SEISMIC PRESSURE Daylighted Bedding, Undrained (Hydrostatic) Conditions (All Pressure Distributions are Triangular)			
Wall Height (feet)	**Active Pressure +Hydrostatic (pcf)**	**Active + Hydrostatic + Seismic (pcf)**	**At-Rest +Hydrostatic (pcf)**
Up to 25	(13+63) = 76	(76+28.2)=104*	98
25 to 35	(18+63)=81	(81+28.2)=109*	98

Note: * denotes value to be used in design

Surcharge from Adjacent Structures

Additional active pressure should be added for a surcharge condition due to the eastern ascending slope, vehicular traffic or adjacent structures for retaining walls and shoring design.

The following surcharge equation provided in the LADBS Information Bulletin Document No. P/BC 2020-83, may be utilized to determine the surcharge loads on basement walls and shoring system for existing structures located within the 1:1 (h:v) surcharge influence zone of the excavation and basement.

Resultant lateral force: $R = (0.3*P*h^2)/(x^2+h^2)$

Location of lateral resultant: $d = x*[(x^2/h^2+1)*\tan^{-1}(h/x)-(x/h)]$

where:

R = resultant lateral force measured in pounds per foot of wall width.

P = resultant surcharge loads of continuous or isolated footings measured in pounds per foot of length parallel to the wall.

x = distance of resultant load from back face of wall measured in feet.

h = depth below point of application of surcharge loading to top of wall footing measured in feet.

d = depth of lateral resultant below point of application of surcharge loading measure in feet.

$\tan^{-1}(h/x)$ = the angle in radians whose tangent is equal to h/x.

The structural engineer and shoring engineer may use this equation to determine the surcharge loads based on the loading of the adjacent structures located within the surcharge influence zone.

Waterproofing

Moisture effecting retaining walls is one of the most common post construction complaints. Poorly applied or omitted waterproofing can lead to efflorescence or standing water inside the building. Efflorescence is a process in which a powdery substance is produced on the surface of the concrete by the evaporation of water. The white powder usually consists of soluble salts such as gypsum, calcite, or common salt. Efflorescence is common to retaining walls and does not affect their strength or integrity.

Waterproofing is recommended for retaining walls. Waterproofing design and inspection of its installation is not the responsibility of the geotechnical engineer. A qualified waterproofing consultant should be retained to recommend a product or method which would provide protection to below grade walls.

Retaining Wall Backfill

Any required backfill should be mechanically compacted in layers not more than 8 inches thick, to at least 90 percent of the maximum density in general accordance with the most recent revision of ASTM D 1557 method of compaction. Flooding should not be permitted. Compaction within 5 feet, measured horizontally, behind a retaining structure should be achieved by use of light weight, hand operated compaction equipment.

Proper compaction of the backfill will be necessary to reduce settlement of overlying walks and paving. Some settlement of required backfill should be anticipated, and any utilities supported therein should be designed to accept differential settlement, particularly at the points of entry to the structure.

TEMPORARY EXCAVATIONS

Excavations on the order of 65 feet in vertical height will be required for the subterranean levels. The excavations are expected to expose fill, alluvium, and siltstone and sandstone bedrock. Unshored cuts in accordance with the following table will be made.

Table 12 – Temporary Excavation Allowable Dimensions

HEIGHT OF CUT (feet)	ALLOWABLE CUT HEIGHT (IN FEET)			
	Fill soils	**Alluvium**	**Bedrock-Neutral Bedding**	**Bedrock – Adverse Bedding**
Up to 5	Vertical	Vertical	Vertical	Cut to angle of bedding
5 to 7	Cut to 1 to 1 Inclination	Vertical	Vertical	Cut to angle of bedding
7 to 15	Cut to 1 to 1 Inclination	Cut to 1 to 1 (H to V)	Cut to ½ to 1 (H to V)	Cut to angle of bedding
15 to 25	Cut to 1 to 1 Inclination	Cut to 1 to 1 Inclination	Cut to 1 to 1 Inclination	

All inclinations recommended above refer to uniform cuts. A uniform sloped excavation is sloped from bottom to top and does not have a vertical component.

Where sloped embankments are utilized, the tops of the slopes should be barricaded to prevent vehicles and storage loads near the top of slope within a horizontal distance equal to the depth of the excavation. If the temporary construction embankments are to be maintained during the rainy season, berms are strongly recommended along the tops of the slopes to prevent runoff water from entering the excavation and eroding the slope faces. Water should not be allowed to pond on top of the excavation nor to flow towards it.

Temporary Dewatering

Currently it is proposed that the structure will extend to a depth of 25 feet below existing site grades. Continuous groundwater seepage is expected from the bedrock. However, due to the low permeability of the rock, the water should attenuate with time until a base flow rate is achieved.

Temporary dewatering should be installed as necessary. Temporary dewatering should consist of gravel-filled drainage trenches leading to a sump area. The collected water should be pumped to an acceptable disposal area.

Dewatering wells may also be considered. An experienced dewatering contractor should be consulted for dewatering system design.

Where the exposed subgrade is wet pumping may be encountered. Under these conditions please refer to the “Wet Soils” section of this report.

Excavation Observations

It is critical that the soils and bedrock exposed in the cut slopes are observed by a representative of Geotechnologies, Inc. during excavation so that modifications of the slopes can be made if variations in the geologic material conditions occur. Many building officials require that temporary excavations should be made during the continuous observations of the geotechnical engineer. All excavations should be stabilized within 30 days of initial excavation.

SHORING DESIGN

The following information on the design and installation of the shoring is as complete as possible at this time. It is suggested that Geotechnologies, Inc. review the final shoring plans and specifications prior to bidding or negotiating with a shoring contractor.

One method of shoring would consist of steel soldier piles, placed in drilled holes and backfilled with concrete. The soldier piles may be designed as cantilevers or laterally braced utilizing drilled tied-back anchors or raker braces.

Soldier Piles

Drilled cast-in-place soldier piles should be placed no closer than 2 diameters on center. The minimum diameter of the piles is 18 inches. Structural concrete should be used for the soldier piles below the excavation; lean-mix concrete may be employed above that level. As an alternative, lean-mix concrete may be used throughout the pile where the reinforcing consists of a wideflange section. The slurry must be of sufficient strength to impart the lateral bearing pressure developed by the wideflange section to the geologic materials. For design purposes, an allowable passive value for the bedrock below the bottom plane of excavation may be assumed to be 600 pounds per square foot per foot. The allowable passive value for the alluvium below the bottom plane of excavation may be assumed to be 350 pounds per square foot. To develop the full lateral value, provisions should be implemented to assure firm contact between the soldier piles and the undisturbed geologic materials.

Groundwater was encountered during exploration at a depth of 9 to 17 feet below grade. Proposed piles are to be in excess of 9 feet in depth and will, therefore, encounter water. Piles placed below the water level require the use of a tremie to place the concrete into the bottom of the hole. A tremie shall consist of a water-tight tube having a diameter of not less than 4 inches charged with a concrete pump. The tube shall be equipped with a device that will close the discharge end and prevent water from entering the tube while it is being charged with concrete. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of the work to prevent water entering the tube and shall be entirely sealed at all times, except when the concrete is being placed. The tremie tube shall be kept full of concrete. The flow shall be continuous until the work is completed and the resulting concrete seal shall be monolithic and homogeneous. The tip of the tremie tube shall always be kept about five feet below the surface of the concrete and definite steps and safeguards should be taken to insure that the tip of the tremie tube is never raised above the surface of the concrete.

A special concrete mix should be used for concrete to be placed below water. The design shall provide for concrete with a strength p.s.i. of 1,000 over the initial job specification. An admixture that reduces the problem of segregation of paste/aggregates and dilution of paste shall be included. The slump shall be commensurate to any research report for the admixture, provided that it shall also be the minimum for a reasonable consistency for placing when water is present.

Casing may be required should caving be experienced in the granular (saturated) geologic materials. If casing is used, extreme care should be employed so that the pile is not pulled apart as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet.

The frictional resistance between the soldier piles and retained geologic material may be used to resist the vertical component of the anchor load. The coefficient of friction may be taken as 0.3 based on uniform contact between the steel beam and lean-mix concrete and retained earth. The portion of soldier piles below the plane of excavation may also be employed to resist the downward loads. The downward capacity may be determined using a frictional resistance of 250 pounds per square foot. The minimum depth of embedment for shoring piles is 5 feet below the bottom of the footing excavation or 7 feet below the bottom of excavated plane whichever is deeper.

Lagging

Soldier piles and anchors should be designed for the full anticipated pressures. Due to arching in the geologic materials, the pressure on the lagging will be less. It is recommended that the lagging should be designed for the full design pressure but be limited to a maximum of 400 pounds per square foot. It is recommended that a representative of this firm observe the installation of lagging to insure uniform support of the excavated embankment.

Tied-Back Anchors

Tied-back anchors may be used to resist lateral loads. Friction anchors are recommended. For design purposes, it may be assumed that the active wedge adjacent to the shoring is defined by a plane drawn 35 degrees with the vertical through the bottom plane of the excavation. Friction anchors should extend a minimum of 20 feet beyond the potentially active wedge.

Depending on the techniques utilized, and the experience of the contractor performing the installation, it is anticipated that a skin friction of 2,000 pounds per square foot could be utilized for post-grouted anchors. This value assumes that a grout pressure of 100 psi can be installed. Only the frictional resistance developed beyond the active wedge would be effective in resisting lateral loads.

Anchors should be placed at least 6 feet on center to be considered isolated. It is recommended that at least 3 of the initial anchors have their capacities tested to 200 percent of their design capacities for a 24-hour period to verify their design capacity.

The total deflection during this test should not exceed 12 inches. The anchor deflection should not exceed 0.75 inches during the 24 hour period, measured after the 200 percent load has been applied. All anchors should be tested to at least 150 percent of design load. The total deflection during this test should not exceed 12 inches.

The rate of creep under the 150 percent test load should not exceed 0.1 inch over a 15 minute period in order for the anchor to be approved for the design loading. After a satisfactory test, each anchor should be locked-off at the design load. This should be verified by rechecking the load in the anchor. The load should be within 10 percent of the design load. Where satisfactory tests are not attained, the anchor diameter and/or length should be increased or additional anchors installed until satisfactory test results are obtained. The installation and testing of the anchors should be observed by the geotechnical engineer. Minor caving during drilling of the anchors should be anticipated.

Anchor Installation

Tied-back anchors may be installed between 20 and 40 degrees below the horizontal. Caving of the anchor shafts, particularly within sand deposits, should be anticipated and the following provisions should be implemented in order to minimize such caving. The anchor shafts should be filled with concrete by pumping from the tip out, and the concrete should extend from the tip of the anchor to the active wedge. In order to minimize the chances of caving, it is recommended that the portion of the anchor shaft within the active wedge be backfilled with sand before testing the anchor. This portion of the shaft should be filled tightly and flush with the face of the excavation. The sand backfill should be placed by pumping; the sand may contain a small amount of cement to facilitate pumping.

Lateral Pressures

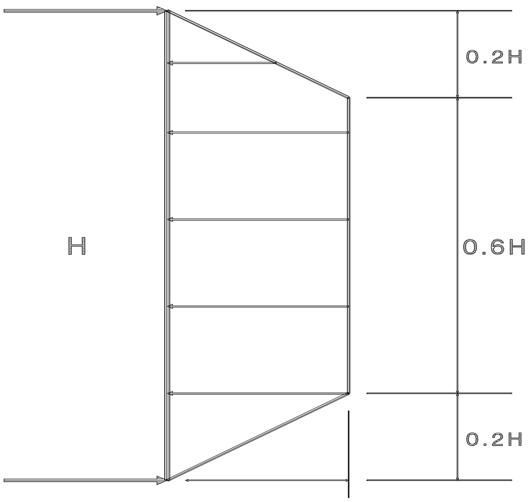
Cantilevered shoring supporting a level backslope may be designed utilizing a triangular distribution of pressure as indicated in the following table.

Table 13 – Cantilevered Shoring Design Lateral loads

HEIGHT OF WALL (feet)	CANTELEVERED SHORING EQUIVALENT FLUID PRESSURE (Active)		
	West Wall (along Sunset Boulevard), and South Wall Neutral Bedding (pounds per cubic foot)	East Wall (At Toe of Slope) Neutral Bedding, and Slope Surcharge (pounds per cubic foot)	North Wall (Adverse Bedding) (pounds per cubic foot)
Up to 15	-	35	-
Up to 25	30	42	30
25 to 35	37	49	37
35 to 45	41	55	41
45 to 55	44	-	44
55 to 65	47	-	47

A trapezoidal distribution of lateral earth pressure would be appropriate where shoring is to be restrained at the top by bracing or tie backs, with the trapezoidal distribution as shown in the diagram below.

TRAPEZOIDAL DISTRIBUTION OF PRESSURE



Restrained shoring supporting a level backslope may be designed utilizing a trapezoidal distribution of pressure as indicated in the following table:

Table 14 – Restrained Shoring Design Lateral Loads

HEIGHT OF WALL (feet)	**RESTRAINED SHORING EQUIVALENT FLUID PRESSURE (Active)**		
	West Wall (along Sunset Boulevard), and South Wall Neutral Bedding (pounds per cubic foot)	**East Wall (At Toe of Slope) Neutral Bedding, and Slope Surcharge (pounds per cubic foot)**	**North Wall (Adverse Bedding) (pounds per cubic foot)**
Up to 15	-	22H	-
Up to 25	18H	26H	19H
25 to 35	19H	31H	23H
35 to 45	22H	34H	26H
45 to 55	24H	-	28H
55 to 65	26H	-	29H

Where a combination of sloped embankment and shoring is utilized, the pressure will be greater and must be determined for each combination. Additional active pressure should be applied where the shoring will be surcharged by adjacent traffic or structures. Where a combination of sloped embankment and shoring is utilized, the pressure will be greater and must be determined for each combination.

Deflection

It is difficult to accurately predict the amount of deflection of a shored embankment. It should be realized that some deflection will occur. It is estimated that the deflection could be on the order of one inch at the top of the shored embankment. If greater deflection occurs during construction, additional bracing may be necessary to minimize settlement of adjacent buildings and utilities in adjacent street and alleys. If desired to reduce the deflection, a greater active pressure could be used in the shoring design. Where internal bracing is used, the rakers should be tightly wedged to minimize deflection. The proper installation of the raker braces and the wedging will be critical to the performance of the shoring.

Monitoring

Because of the depth of the excavation, some means of monitoring the performance of the shoring system is suggested. The monitoring should consist of periodic surveying of the lateral and vertical locations of the tops of all soldier piles and the lateral movement along the entire lengths of selected soldier piles. Also, some means of periodically checking the load on selected anchors will be necessary, where applicable.

Some movement of the shored embankments should be anticipated as a result of the relatively deep excavation. It is recommended that photographs of the existing buildings on the adjacent properties be made during construction to record any movements for use in the event of a dispute.

Shoring Observations

It is critical that the installation of shoring is observed by a representative of Geotechnologies, Inc. Many building officials require that shoring installation should be performed during continuous observation of a representative of the geotechnical engineer. The observations ensure that the recommendations of the geotechnical report are implemented and so that modifications of the recommendations can be made if variations in the geologic material or groundwater conditions warrant. The observations will allow for a report to be prepared on the installation of shoring for the use of the local building official, where necessary.

SLABS ON GRADE

Concrete Slabs-on Grade

Concrete floor slabs should be a minimum of 4 inches in thickness. Slabs-on-grade should be cast over undisturbed natural geologic materials or properly controlled fill materials. Any geologic materials loosened or over-excavated should be wasted from the site or properly compacted to 90 percent of the maximum dry density.

Outdoor concrete flatwork should be a minimum of 3 inches in thickness. Outdoor concrete flatwork should be cast over undisturbed natural geologic materials or properly controlled fill materials. Any geologic materials loosened or over-excavated should be wasted from the site or properly compacted to 90 percent of the maximum dry density.

Design of Slabs That Receive Moisture-Sensitive Floor Coverings

Geotechnologies, Inc. does not practice in the field of moisture vapor transmission evaluation and mitigation. Therefore it is recommended that a qualified consultant be engaged to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. The qualified consultant should provide recommendations for mitigation of potential adverse impacts of moisture vapor transmission on various components of the structure.

Where dampness would be objectionable, it is recommended that the floor slabs should be waterproofed. A qualified waterproofing consultant should be retained in order to recommend a product or method which would provide protection for concrete slabs-on-grade.

All concrete slabs-on-grade should be supported on vapor retarder. The design of the slab and the installation of the vapor retarder should comply with the most recent revisions of ASTM E 1643 and ASTM E 1745. Where a vapor retarder is used, a low-slump concrete should be used to minimize possible curling of the slabs. The barrier can be covered with a layer of trimmable, compactible, granular fill, where it is thought to be beneficial. See ACI 302.2R-32, Chapter 7 for information on the placement of vapor retarders and the use of a fill layer.

Concrete Crack Control

The recommendations presented in this report are intended to reduce the potential for cracking of concrete slabs-on-grade due to settlement. However even where these recommendations have been implemented, foundations, stucco walls and concrete slabs-on-grade may display some cracking due to minor soil movement and/or concrete shrinkage. The occurrence of concrete cracking may be reduced and/or controlled by limiting the slump of the concrete used, proper concrete placement and curing, and by placement of crack control joints at reasonable intervals, in particular, where re-entrant slab corners occur.

For standard control of concrete cracking, a maximum crack control joint spacing of 15 feet should not be exceeded. Lesser spacings would provide greater crack control. Joints at curves and angle points are recommended. The crack control joints should be installed as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness. Construction joints should be designed by a structural engineer.

Complete removal of the existing fill soils beneath outdoor flatwork such as walkways or patio areas, is not required, however, due to the rigid nature of concrete, some cracking, a shorter design life and increased maintenance costs should be anticipated. In order to provide uniform support beneath the flatwork it is recommended that a minimum of 12 inches of the exposed subgrade beneath the flatwork be scarified and recompacted to 90 percent relative compaction.

Slab Reinforcing

Concrete slabs-on-grade should be reinforced with a minimum of #4 steel bars on 16-inch centers each way. Where a floor slab will occur below the water level, a structural slab is recommended.

Outdoor flatwork should be reinforced with a minimum of #3 steel bars on 24-inch centers each way.

PAVEMENTS

Prior to placing paving, the existing grade should be scarified to a depth of 12 inches, moistened as required to obtain optimum moisture content, and recompacted to 90 percent of the maximum density as determined by the most recent revision of ASTM D 1557. The following pavement sections are recommended:

Table 15 – Paving Recommendations

Service	Asphalt Pavement Thickness Inches	Base Course Inches
Passenger Cars (TI=5)	3	4
Moderate Truck (TI=7)	4	6

Aggregate base should be compacted to a minimum of 95 percent of the most recent revision of ASTM D 1557 laboratory maximum dry density. Base materials should conform with Sections 200-2.2 or 200-2.4 of the “Standard Specifications for Public Works Construction”, (Green Book), 1991 Edition.

The performance of pavement is highly dependent upon providing positive surface drainage away from the edges. Ponding of water on or adjacent to pavement can result in saturation of the subgrade materials and subsequent pavement distress. If planter islands are planned, the perimeter curb should extend a minimum of 12 inches below the bottom of the aggregate base.

Concrete paving may be used on the project. Based on the highway design manual, for Traffic Index of 7 concrete paving should be 8 inches of concrete over 4 inches of compacted base.

The occurrence of concrete cracking may be reduced and/or controlled by limiting the slump of the concrete used, proper concrete placement and curing, and by placement of crack control joints at reasonable intervals, in particular, where re-entrant slab corners occur.

For standard control of concrete cracking, a maximum crack control joint spacing of 12 feet should not be exceeded. Lesser spacings would provide greater crack control. Joints at curves and angle points are recommended. The crack control joints should be installed as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness. Construction joints should be designed by a structural engineer. Concrete paving should be reinforced with a minimum of #3 steel bars on 18-inch centers each way.

For crack control, steel reinforcement may be considered in rigid (PCC) pavements, typically consisting of No. 3 bars at a maximum spacing of 24-inches in each direction. Reinforcing bars, if used, should be placed at mid-height of the concrete slab and maintained at mid height during placement of concrete. However, it is understood that Safeway’s specifications for concrete pavement do not allow the use of steel reinforcement.

The management of pavement wear primarily is focused on the distress caused by vertical loads. The reduction of vertical loading from large vehicles is assisted by increasing the number of axles. Multi-axle groups reduce the peak vertical loading and, when closely spaced, reduce the magnitude of the strain cycles to which the pavement is subjected. However, where tight low-speed turns are executed, non-steering axle groups lead to transverse shear forces (scuffing) at the pavement-tire interface.

With asphaltic concrete pavements, tensile shear stresses from tires can cause surface cracking and raveling, thus, the increased use of non-steering axle groups results in increased pavement wear in the vicinity of intersections and turnarounds where tight low speed turns are executed.

When designing intersections and turnarounds the turn radius should be as large as possible. This will lead to reduced “scuffing” forces. Where tight radius turns are unavoidable, the pavement surface design should take into account the high level of “scuffing” forces that will occur and thickened pavement and subgrade and base course keyways should be considered to assist in the reduction of lateral deflection.

SITE DRAINAGE

Proper surface drainage is critical to the future performance of the project. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Proper site drainage should be maintained at all times.

All site drainage, with the exception of any required to disposed of onsite by stormwater regulations, should be collected and transferred to the street in non-erosive drainage devices. The proposed structure should be provided with roof drainage. Discharge from downspouts, roof drains and scuppers should not be permitted on unprotected soils within five feet of the building perimeter. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. Drainage should not be allowed to flow uncontrolled over any descending slope. Planters which are located within a distance equal to the depth of a retaining wall should be sealed to prevent moisture adversely affecting the wall. Planters which are located within five feet of a foundation should be sealed to prevent moisture affecting the earth materials supporting the foundation.

Slope Drainage

A diverter V-ditch shall be placed at the top of the cut slopes. The V-ditch should be constructed of concrete and be at least 2 feet in width. The purpose of the diverter ditch is to collect water from offsite properties that drain toward the site.

Concrete V-ditches must also be placed behind all retaining walls where there is an inclined slope behind the wall. The V ditches shall discharge to a collection point and transferred to an appropriate facility.

A paved interceptor terrace shall be located on the slope at vertical intervals not exceeding 25 feet. The terrace shall have a minimum width of 8 feet. The down drain shall be connected to the interceptor terrace at 150 foot spacings.

Water from these facilities shall be collected and transferred to an appropriate disposal facility.

STORMWATER INFILTRATION

Introduction

A percolation test was performed on the site when the building design was at-grade at the southern end of the building for an earlier design of the proposed structure. However, the current design has a subterranean level, and does not permit the use of an onsite stormwater infiltration system.

It is the recommendation of this firm that some other means of stormwater infiltration, such as flow through planters, should be used.

DESIGN REVIEW

Engineering of the proposed project should not begin until approval of the geotechnical report by the Building Official is obtained in writing. Significant changes in the geotechnical recommendations may result during the building department review process.

It is recommended that the geotechnical aspects of the project be reviewed by this firm during the design process. This review provides assistance to the design team by providing specific recommendations for particular cases, as well as review of the proposed construction to evaluate whether the intent of the recommendations presented herein are satisfied.

CONSTRUCTION MONITORING

Geotechnical observations and testing during construction are considered to be a continuation of the geotechnical investigation. It is critical that this firm review the geotechnical aspects of the project during the construction process. Compliance with the design concepts, specifications or recommendations during construction requires review by this firm during the course of construction. All foundations should be observed by a representative of this firm prior to placing concrete or steel. Any fill which is placed should be observed, tested, and verified if used for engineered purposes. Please advise Geotechnologies, Inc. at least twenty-four hours prior to any required site visit.

If conditions encountered during construction appear to differ from those disclosed herein, notify Geotechnologies, Inc. immediately so the need for modifications may be considered in a timely manner.

It is the responsibility of the contractor to ensure that all excavations and trenches are properly sloped or shored. All temporary excavations should be cut and maintained in accordance with applicable OSHA rules and regulations.

EXCAVATION CHARACTERISTICS

The exploration performed for this investigation is limited to the geotechnical excavations described. Direct exploration of the entire site would not be economically feasible. The owner, design team and contractor must understand that differing excavation and drilling conditions may be encountered based on boulders, gravel, oversize materials, groundwater and many other conditions. Fill materials, especially when they were placed without benefit of modern grading codes, regularly contain materials which could impede efficient grading and drilling. The Puente Formation is known to contain concretions, but none were encountered in this or the previous investigations. Concretions are typically lenticular and follow the bedding. They are formed by mineral deposits. Concretions can be very hard. Excavation and drilling in these areas may require full size equipment and coring capability. The contractor should be familiar with the site and the geologic materials in the vicinity.

CLOSURE AND LIMITATIONS

The purpose of this report is to aid in the design and completion of the described project. Implementation of the advice presented in this report is intended to reduce certain risks associated with construction projects. The professional opinions and geotechnical advice contained in this report are sought because of special skill in engineering and geology and were prepared in accordance with generally accepted geotechnical engineering practice. Geotechnologies, Inc. has a duty to exercise the ordinary skill and competence of members of the engineering profession. Those who hire Geotechnologies, Inc. are not justified in expecting infallibility, but can expect reasonable professional care and competence.

The scope of the geotechnical services provided did not include any environmental site assessment for the presence or absence of organic substances, hazardous/toxic materials in the soil, surface water, groundwater, or atmosphere, or the presence of wetlands.

Proper compaction is necessary to reduce settlement of overlying improvements. Some settlement of compacted fill should be anticipated. Any utilities supported therein should be designed to accept differential settlement. Differential settlement should also be considered at the points of entry to the structure.

The City of Los Angeles does not require corrosion testing. However, if corrosion sensitive improvements are planned, it is recommended that a comprehensive corrosion study should be commissioned. The study will develop recommendations to avoid premature corrosion of buried pipes and concrete structures in direct contact with the soils.

GEOTECHNICAL TESTING

Classification and Sampling

The soil is continuously logged by a representative of this firm and classified by visual examination in accordance with the Unified Soil Classification system. The field classification is verified in the laboratory, also in accordance with the Unified Soil Classification System. Laboratory classification may include visual examination, Atterberg Limit Tests and grain size distribution. The final classification is shown on the excavation logs.

Samples of the geologic materials encountered in the exploratory excavations were collected and transported to the laboratory. Undisturbed samples of soil are obtained at frequent intervals. Unless noted on the excavation logs as an SPT sample, samples acquired while utilizing a hollow-stem auger drill rig are obtained by driving a thin-walled, California Modified Sampler with successive 30-inch drops of a 140-pound hammer. Samples from bucket-auger drilling are obtained utilizing a California Modified Sampler with successive 12-inch drops of a kelly bar, whose weight is noted on the excavation logs. The soil is retained in brass rings of 2.50 inches outside diameter and 1.00 inch in height. The central portion of the samples are stored in close fitting, waterproof containers for transportation to the laboratory. Samples noted on the excavation logs as SPT samples are obtained in accordance with the most recent revision of ASTM D 1586. Samples are retained for 30 days after the date of the geotechnical report.

Grain Size Distribution

These tests cover the quantitative determination of the distribution of particle sizes in soils. Sieve analysis is used to determine the grain size distribution of the soil larger than the Number 200 sieve.

The most recent revision of ASTM D 422 is used to determine particle sizes smaller than the Number 200 sieve. A hydrometer is used to determine the distribution of particle sizes by a sedimentation process.

The grain size distributions are plotted on the E-Plates presented in the Appendix of this report.

Moisture and Density Relationships

The field moisture content and dry unit weight are determined for each of the undisturbed soil samples, and the moisture content is determined for SPT samples by the most recent revision of ASTM D 4959 or ASTM D 4643. This information is useful in providing a gross picture of the soil consistency between exploration locations and any local variations. The dry unit weight is determined in pounds per cubic foot and shown on the "Excavation Logs", A-Plates. The field moisture content is determined as a percentage of the dry unit weight.

Direct Shear Testing

Shear tests are performed by the most recent revision of ASTM D 3080 with a strain controlled, direct shear machine manufactured by Soil Test, Inc. or a Direct Shear Apparatus manufactured by GeoMatic, Inc. The rate of deformation is approximately 0.025 inches per minute. Each sample is sheared under varying confining pressures in order to determine the Mohr-Coulomb shear strength parameters of the cohesion intercept and the angle of internal friction. Samples are generally tested in an artificially saturated condition. Depending upon the sample location and future site conditions, samples may be tested at field moisture content. The results are plotted on the "Shear Test Diagram," B-Plates.

The most recent revision of ASTM 3080 limits the particle size to 10 percent of the diameter of the direct shear test specimen. The sheared sample is inspected by the laboratory technician running the test. The inspection is performed by splitting the sample along the sheared plane and observing the soils exposed on both sides. Where oversize particles are observed in the shear plane, the results are discarded and the test run again with a fresh sample.

Consolidation Testing

Settlement predictions of the soil's behavior under load are made on the basis of the consolidation tests using the most recent revision of ASTM D 2435. The consolidation apparatus is designed to receive a single one-inch high ring. Loads are applied in several increments in a geometric progression, and the resulting deformations are recorded at selected time intervals. Porous stones are placed in contact with the top and bottom of each specimen to permit addition and release of pore fluid. Samples are generally tested at increased moisture content to determine the effects of water on the bearing soil. The normal pressure at which the water is added is noted on the drawing. Results are plotted on the "Consolidation Test," C-Plates.

Expansion Index Testing

The expansion tests performed on the remolded samples are in accordance with the Expansion Index testing procedures, as described in the most recent revision of ASTM D4829. The soil sample is compacted into a metal ring at a saturation degree of 50 percent. The ring sample is then placed in a consolidometer, under a vertical confining pressure of 1 lbf/square inch and inundated with distilled water. The deformation of the specimen is recorded for a period of 24 hour or until the rate of deformation becomes less than 0.0002 inches/hour, whichever occurs first. The expansion index, EI, is determined by dividing the difference between final and initial height of the ring sample by the initial height, and multiplied by 1,000.

Laboratory Compaction Characteristics

The maximum dry unit weight and optimum moisture content of a soil are determined by use of the most recent revision of ASTM D 1557. A soil at a selected moisture content is placed in five layers into as mold of given dimensions, with each layer compacted by 25 blows of a 10 pound hammer dropped from a distance of 18 inches subjecting the soil to a total compactive effort of about 56,000 pounds per cubic foot. The resulting dry unit weight is determined. The procedure is repeated for a sufficient number of moisture contents to establish a relationship between the dry unit weight and the water content of the soil. The data when plotted represent a curvilinear relationship known as the compaction curve. The values of optimum moisture content and modified maximum dry unit weight are determined from the compaction curve.

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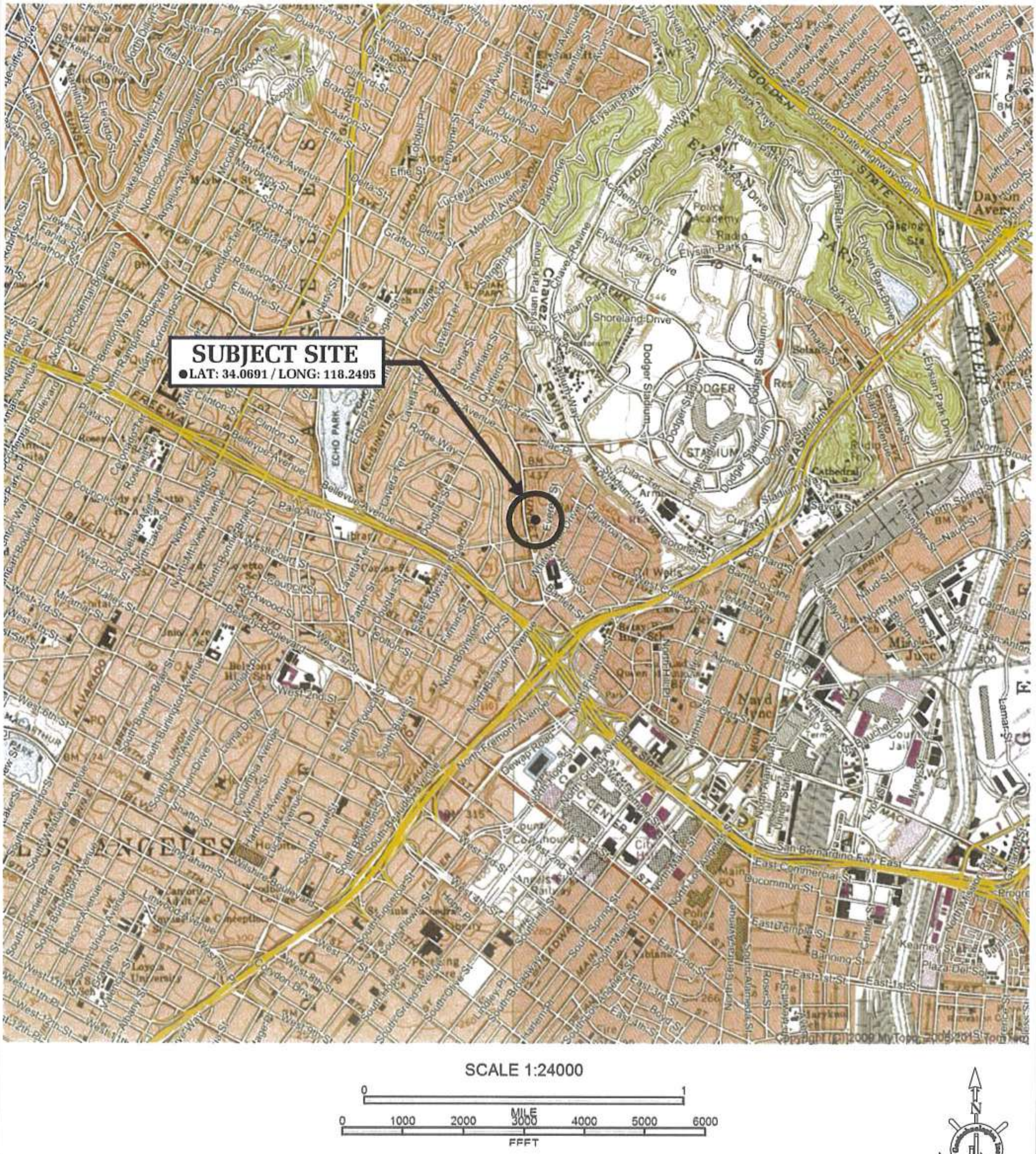
FIGURES



REFERENCE: U.S.G.S. TOPOGRAPHIC MAPS, 7.5 MINUTE SERIES,
LOS ANGELES, CA QUADRANGLE

VICINITY MAP

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Consulting Geotechnical Engineers

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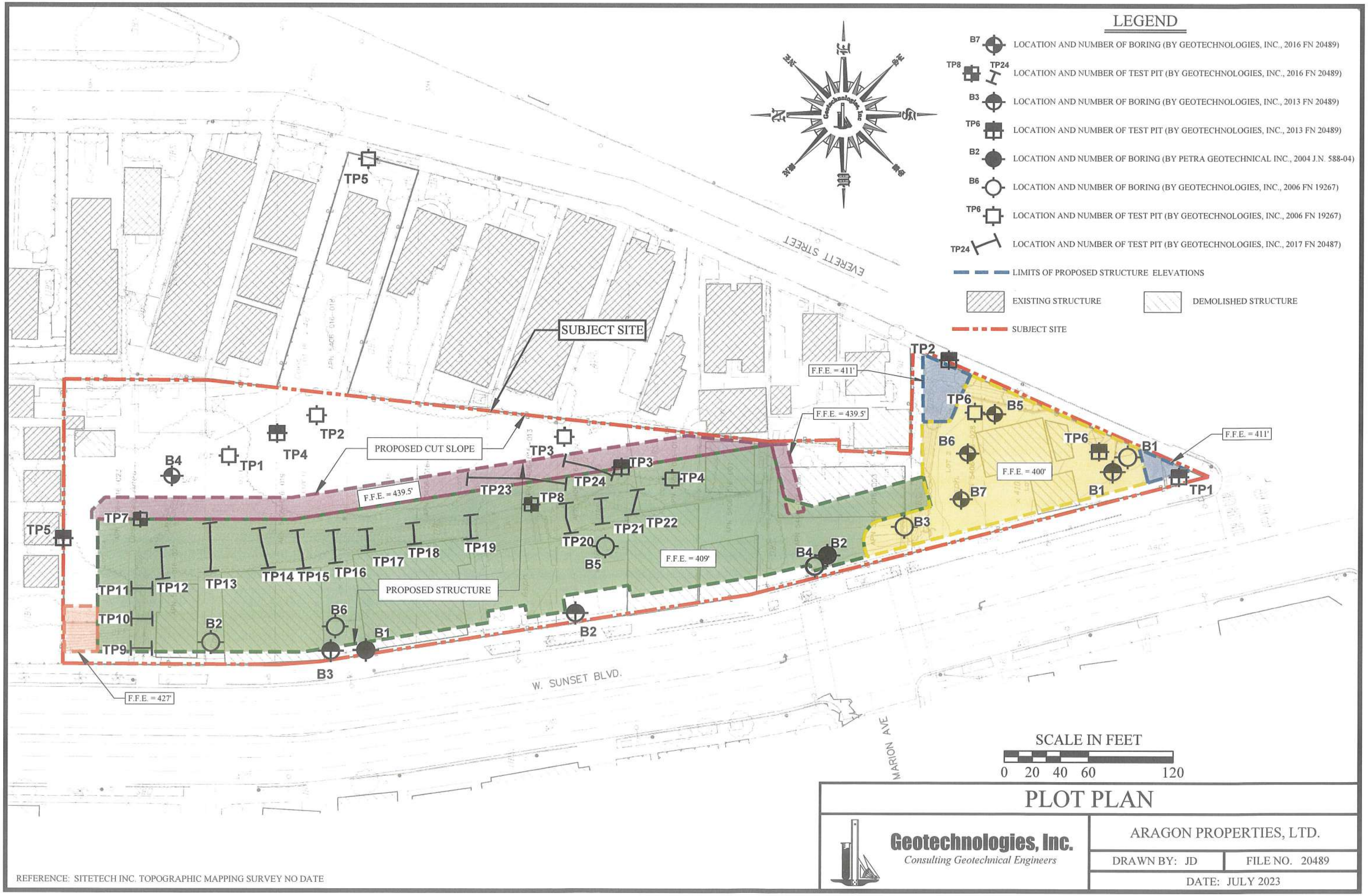
FILE NO. 20489



PLOT PLAN

Geotechnologies, Inc.
Consulting Geotechnical Engineers

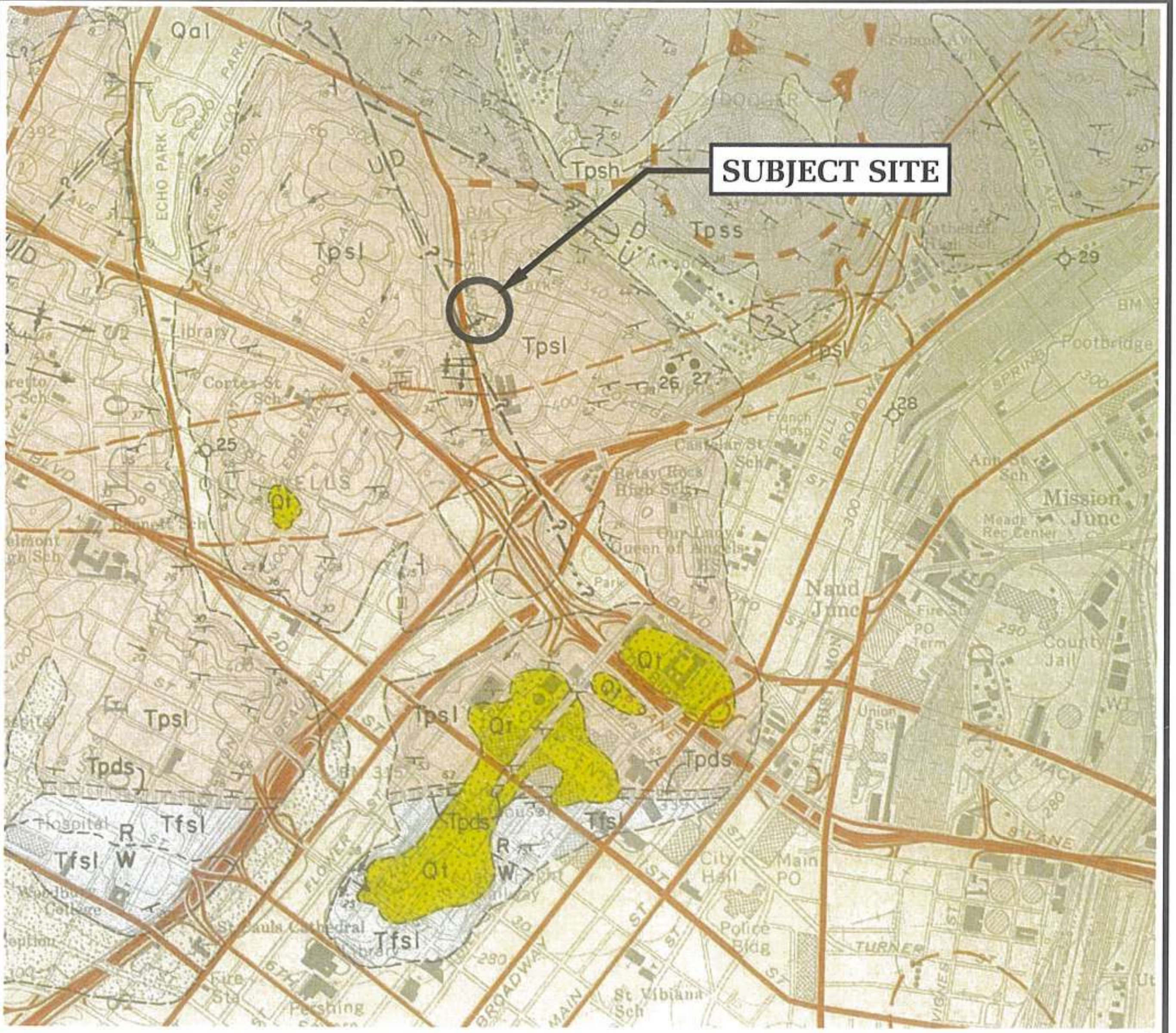
ARAGON PROPERTIES, LTD.

DRAWN BY: JD

FILE NO. 20489

DATE: JULY 2023

REFERENCE: SITETECH INC. TOPOGRAPHIC MAPPING SURVEY NO DATE



SCALE IN FEET
0 500 1000 2000

LEGEND

Qal: Alluvium - silt, sand and gravel

Qt: Terrace Deposits - silt, sand and gravel forming alluvial terrace and dissected alluvial plain deposits

Tpsl: Puente Formation - siltstone, well bedded, light brown and light gray

Tpsh: Puente Formation - shale, well bedded, light gray siliceous

Tpds: Puente Formaion - diatomaceous shale, punky, dull white

Tpss: Puente Formation - sandstone, well bedded, medium-to-coarse grained, light brown to gray

N

REFERENCE: LAMAR, D.L., (1961-1965), GEOLOGIC MAP OF THE ELYSIAN PARK - REPETTO HILLS AREA, LOS ANGELES COUNTY, CALIFORNIA

LOCAL GEOLOGIC MAP (LAMAR)

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Consulting Geotechnical Engineers

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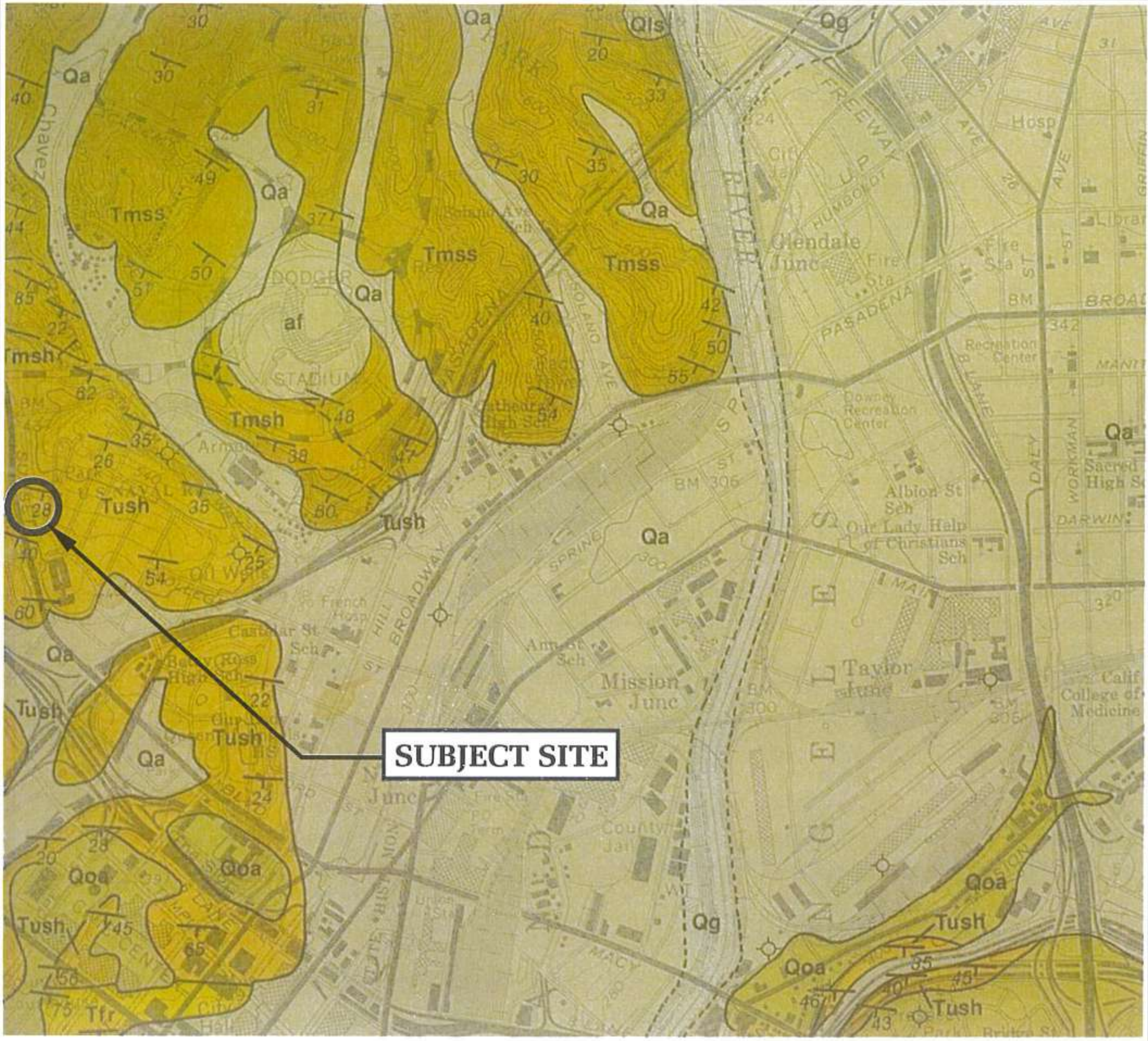
FILE NO. 20489



SCALE IN FEET
0 500 1000 2000

LEGEND

af: Surficial Sediments - artificial fill

Qa: Surficial Sediments - alluvium: unconsolidated floodplain deposits of silt, sand and gravel

Tush: Unnamed Shale - gray to light brown, thin bedded, silty clay shale, locally contains scattered large calcareous nodules, in places contains thnin interbeds of fine-grained sandstone

Tmsh: Monterey Formation - white-weathering, thin bedded, platy siliceous shale,clocally porcelaneous and silty

Tmss: Monterey Formation - tan to light gray semi-friable arkosic sandstone; includes some interbedded silty shale

N

REFERENCE: DIBBLEE, T.W., (1989) - GEOLOGIC MAP OF THE LOS ANGELES QUADRANGLE, LOS ANGELES COUNTY, CALIFORNIA, MAP #DF-22

LOCAL GEOLOGIC MAP (DIBBLEE)

Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO. 20489

BORINGS AND TEST PITS BY GEOTECHNOLOGIES, INC. (2016)

B4 (elev. 478')	B4 (cont.)	B4 (cont.)	B4 (cont.)	B5 (elev. 412')	B6 (elev. 412')	B7 (elev. 411')	TP7 (elev. 468')	TP8 (elev. 447')
0-4' af 4 - 60' Tp @ 7.6' 19 @ 10.2' 15 @ 12.4' 14 @ 13.4' 15	@ 15.6' 16 @ 17.1' 13 @ 21.0' 15 @ 23.4' 14 @ 25.1' 14	@ 27.7" 14 @ 29.9' 14 @ 32.9' 14 @ 33.9' 17 @ 40.8' 13	@ 43.8' 13 @ 49.0' 12 @ 52.6' 13 No Seepage	0-0.8' af 0.8-20' Tp @ 4.0' 41 @ 7.0' 51 @ 11.0' 49 @ 14.4' 45 @ 9' and 12' Seepage	0-3.5' Qcol 3.5'-20' Tp @ 5' 25 @ 6.3' 19 @10.2' 20 @12.8' 23 @ 11.5' Seepage	0-0.75' af 0.75'-6.5' Qcol 6.5-20' Tp @ 10.4' 18 @ 14.0' 22 @ 12.0' Seepage	0-4.5' af 4.5--9.0' Qcol 9.0'-18.0' Tp @ 10.0' 18 @ 11.4' 18 @ 17.0' 16 No Seepage	0-2.5' af 2.5'-13' Tp @ 3.5' 33 @ 8.0' 34 @10.0' 33 No Seepage

BORINGS BY PETRA GEOTECHNICAL (2004) JN 588-04

B1 (elev. 424')	B2 (elev. 416')
0-30' Tp Seepage @ 24'	0-12' Qal 12'-31' Tp Seepage @ 17'

BORINGS AND TEST PITS BY GEOTECHNOLOGIES, INC. (2013) FILE NO 20489

B1 (elev. 409')	B2 (elev. 419.5')	B3 (elev. 424')	TP1 (elev. 407')	TP2 (elev. 425')	TP3 (elev. 444')	TP4 (elev. 480')	TP5 (elev. 470')	TP6 (elev. 409')
0-3' af 3'-10' Qal 10'-30' Tp Seepage @ 17.5'	0-3' af 3'-30' Tp Seepage @ 17'	0-3' af 3'-40' Tp Seepage @ 9.3'	0-4' af 4'-6' Qal No Seepage	0-1' af 1'-10' Qcol 10'-11' Tp No Seepage	0-1.5' af 1.5'-10' Tp No Seepage	0-1' af 1'-4' Tp No Seepage	0-2' af 2'-6.5' Qcol 6.5'-8' Tp @ 7' 18 No Seepage	0-6' af No Seepage

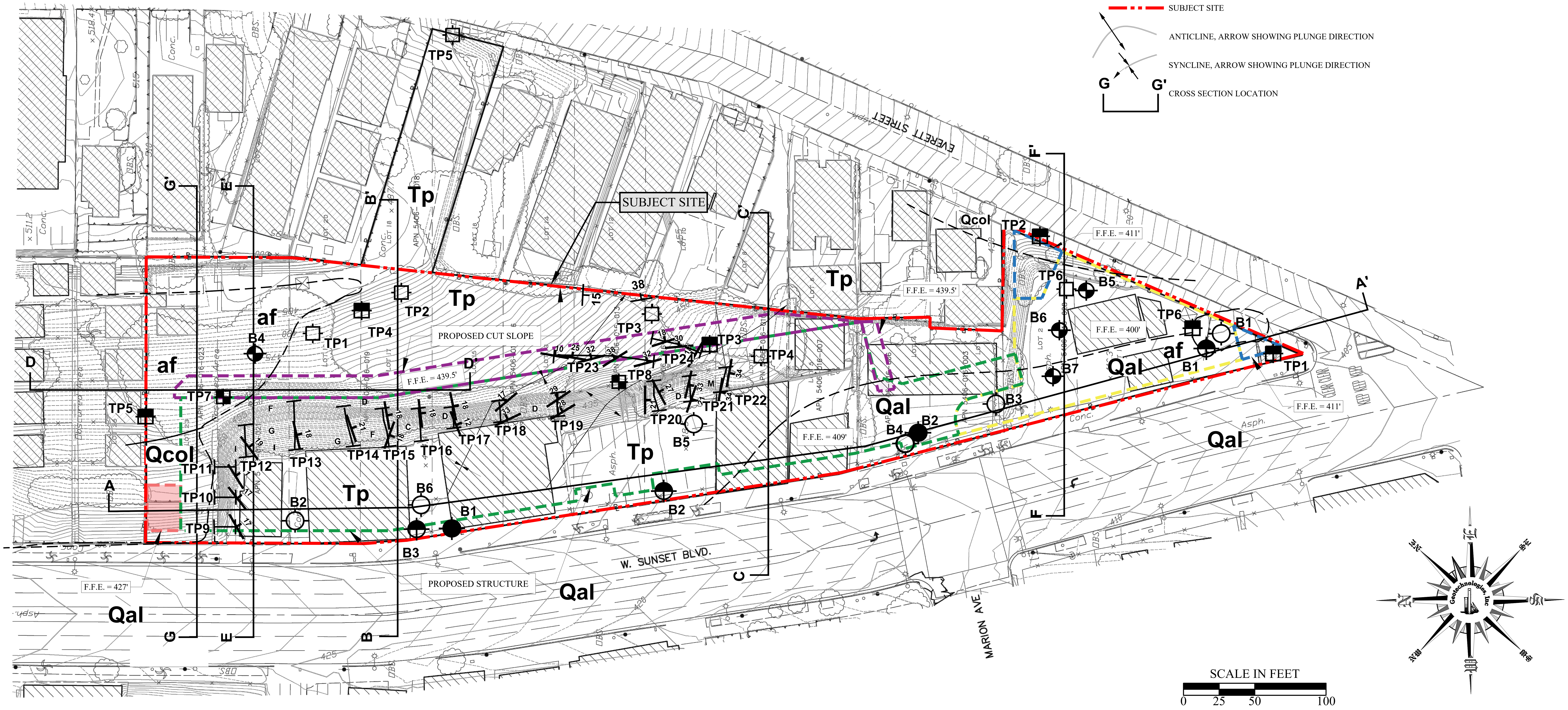
BORINGS AND TEST PITS BY GEOTECHNOLOGIES, INC. (2006) FILE NO 19267

B1 (elev. 408')	B2 (elev. 423')	B3 (elev. 414')	B4 (elev. 413')	B5 (elev. 419')	B6 (elev. 421.5')	TP1 (elev. 477')	TP2 (elev. 479')	TP3 (elev. 452')	TP4 (elev. 434')	TP5 (elev. 476')	TP6 (elev. 409')
0-5.5' af 5.5'-20' Tp No Seepage	0-15' Tp @ 2' 20 @ 3.5' @ 3.5' @ 6' 20 9'-15' Seepage	0-7' af 7'-15' Qal 15'-25' Tp 15'-25' Seepage	0-2' af 2'-18.5' Qal 18.5'-20' Tp 12'-20' Seepage	0-2' af 2'-10' Tp @ 4.5' 36 @ 5.5' 25 @ 9.5'-10' Seepage	0-1.5' af 1.5'-12' Tp @ 4' 18 @ 6.5' 22 @ 11.5'-12' Seepage	0-0.5' af 0.5'-2' Qcol 2'-4' Tp @ 3' 18 @ 3' 22 No Seepage	0-2.5' af 2.5-5' Tp @ 4' 12 @ 4' 20 No Seepage	0-0.5' af 0.5'-3' Tp @ 2.5' 40 @ 2.5' 40 No Seepage	0-2' af 2'-5' Tp @ 4' 20 @ 4' 25 No Seepage	0-2' af 2'-4' Tp @ 3' 17 @ 3.5' @ 3.5' No Seepage	0-2.5' af 2.5'-4' Tp @ 3' 45 @ 3' 43 @ 3' 55 No Seepage

LEGEND

af	ARTIFICIAL FILL (where > 4' thick)
Qal	ALLUVIUM (where > 4' thick)
Qcol	COLLUVIUM (where > 4' thick)
Tp	BEDROCK (PUENTE FORMATION)
C, D, E, F G, I, K, L	MARKER BEDS
40	BEDDING ORIENTATION
	VERTICAL FRACTURE
	GEOLOGIC CONTACT

B7	LOCATION AND NUMBER OF BORING (BY GEOTECHNOLOGIES, INC., 2016, FN 20489)
TP8 TP24	LOCATION AND NUMBER OF TEST PIT (BY GEOTECHNOLOGIES, INC., 2016, FN 20489)
B3	LOCATION AND NUMBER OF BORING (BY GEOTECHNOLOGIES, INC., 2013, FN 20489)
TP6	LOCATION AND NUMBER OF TEST PIT (BY GEOTECHNOLOGIES, INC., 2013, FN 20489)
B2	LOCATION AND NUMBER OF BORING (BY PETRA GEOTECHNICAL INC., 2004, J.N. 588-04)
B6	LOCATION AND NUMBER OF BORING (BY GEOTECHNOLOGIES, INC., 2006, FN 19267)
TP6	LOCATION AND NUMBER OF TEST PIT (BY GEOTECHNOLOGIES, INC., 2006, FN 19267)
TP24	LOCATION AND NUMBER OF TEST PIT (BY GEOTECHNOLOGIES, INC., 2017, FN 20487)
🟦	LIMITS OF PROPOSED STRUCTURE ELEVATIONS
▨	DEMOLISHED STRUCTURE
▨	EXISTING STRUCTURE
🟥	SUBJECT SITE
	ANTICLINE, ARROW SHOWING PLUNGE DIRECTION
	SYNCLINE, ARROW SHOWING PLUNGE DIRECTION
G G'	CROSS SECTION LOCATION



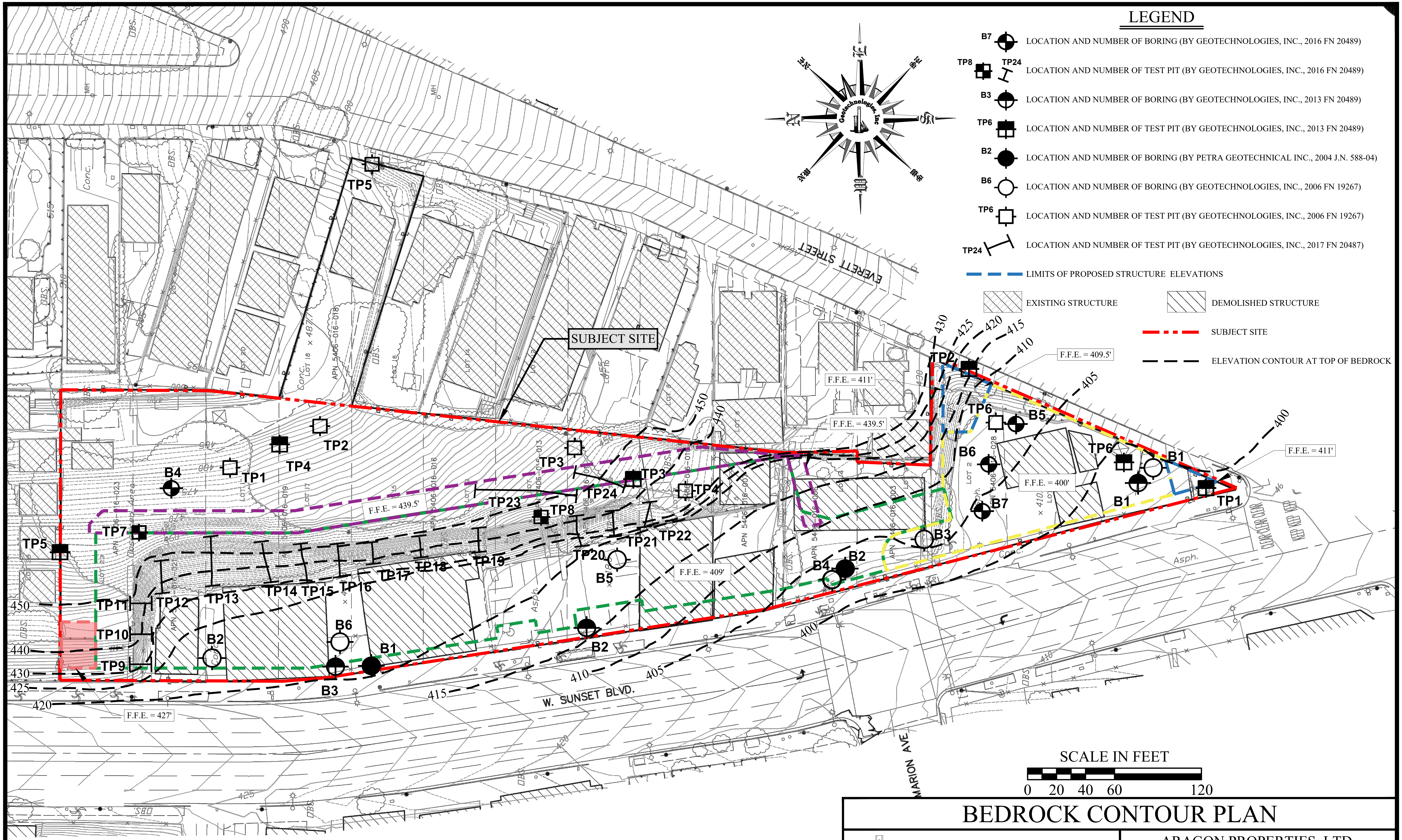
REFERENCE: SITETECH INC. TOPOGRAPHIC MAPPING SURVEY NO DATE

GEOLOGIC MAP

Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

DRAWN BY: JD
FILE NO. 20489
DATE: JULY 2023



LEGEND

B7	LOCATION AND NUMBER OF BORING (BY GEOTECHNOLOGIES, INC., 2016 FN 20489)
TP8 TP24	LOCATION AND NUMBER OF TEST PIT (BY GEOTECHNOLOGIES, INC., 2016 FN 20489)
B3	LOCATION AND NUMBER OF BORING (BY GEOTECHNOLOGIES, INC., 2013 FN 20489)
TP6	LOCATION AND NUMBER OF TEST PIT (BY GEOTECHNOLOGIES, INC., 2013 FN 20489)
B2 ●	LOCATION AND NUMBER OF BORING (BY PETRA GEOTECHNICAL INC., 2004 J.N. 588-04)
B6 ○	LOCATION AND NUMBER OF BORING (BY GEOTECHNOLOGIES, INC., 2006 FN 19267)
TP6 ☐	LOCATION AND NUMBER OF TEST PIT (BY GEOTECHNOLOGIES, INC., 2006 FN 19267)
TP24	LOCATION AND NUMBER OF TEST PIT (BY GEOTECHNOLOGIES, INC., 2017 FN 20487)
	LIMITS OF PROPOSED STRUCTURE ELEVATIONS
▨	EXISTING STRUCTURE
▨	DEMOLISHED STRUCTURE
	SUBJECT SITE
	ELEVATION CONTOUR AT TOP OF BEDROCK

SCALE IN FEET

0 20 40 60 120

REFERENCE: SITETECH INC. TOPOGRAPHIC MAPPING SURVEY NO DATE

BEDROCK CONTOUR PLAN

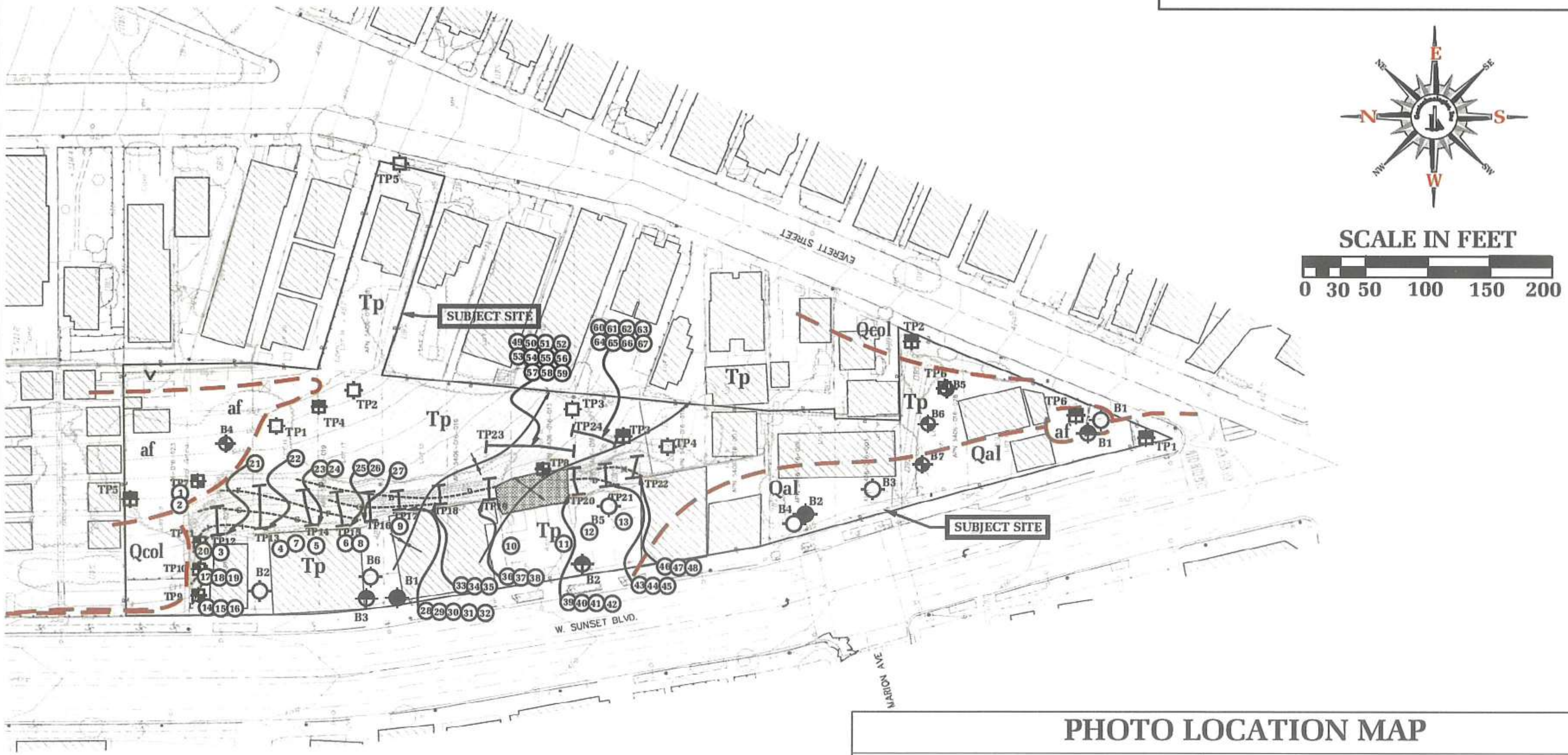
Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

DRAWN BY: JD
FILE NO. 20489
DATE: AUGUST 2023

LEGEND

⑥⑦	PHOTO LOCATION AND NUMBER
af	ARTIFICIAL FILL (where > 4' thick)
Qal	ALLUVIUM (where > 4' thick)
Qcol	COLLUVIUM (where > 4' thick)
Tp	BEDROCK (PUENTE FORMATION)
C, D, E, F G, I, K, L	MARKER BEDS
	BEDDING ORIENTATION
	VERTICAL FRACTURE
	GEOLOGIC CONTACT
	ANTICLINE, ARROW SHOWING PLUNGE DIRECTION
	SYNCLINE, ARROW SHOWING PLUNGE DIRECTION
▨	EXISTING STRUCTURE



REFERENCE: TOPOGRAPHIC MAP BY SITETECH INC.
NOT DATED

PHOTO LOCATION MAP

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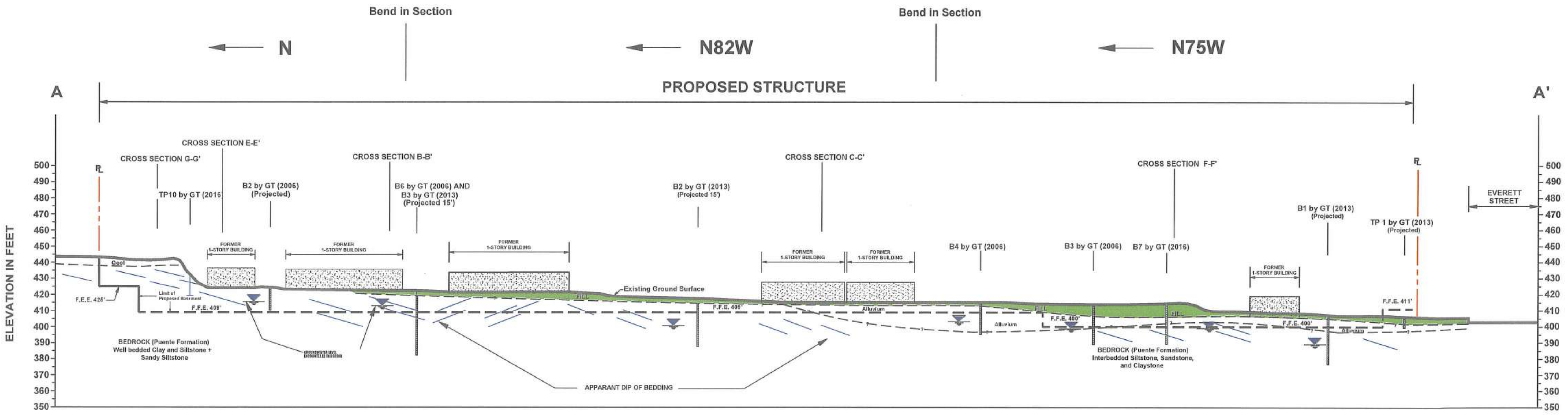
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE No. 20489

DATE: January 2016



REFERENCE: TOPOGRAPHIC MAP PROVIDED BY SITETECH INC.
NOT DATED

SCALE IN FEET
0 20 40 60 120

CROSS SECTION A-A'

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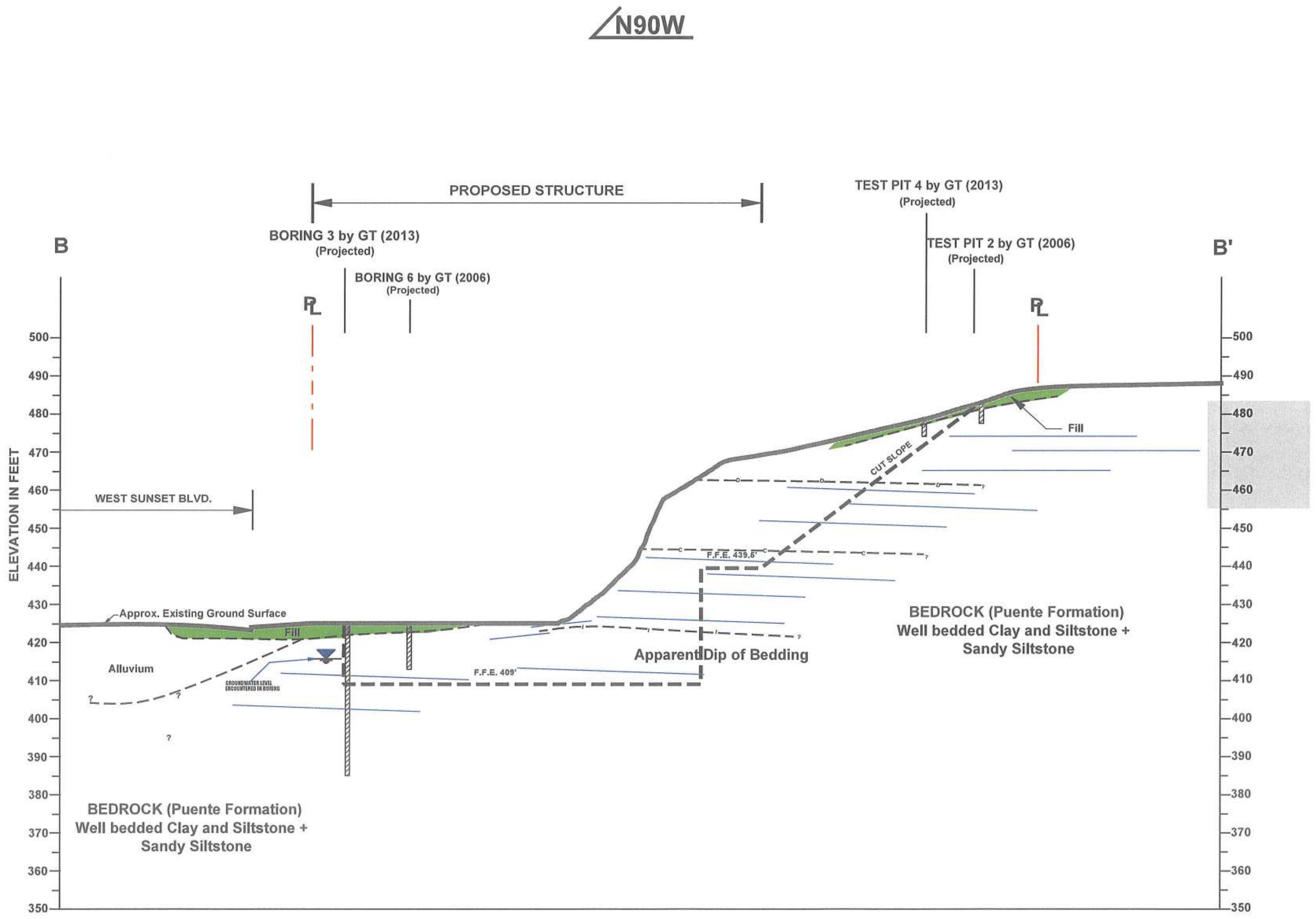
DRAWN BY: JD	FILE NO. 20489
DATE: JULY 2023	



SCALE IN FEET

0 30 60

REFERENCE: TOPOGRAPHIC MAP BY SITETECH INC.
NOT DATED

CROSS SECTION B-B'

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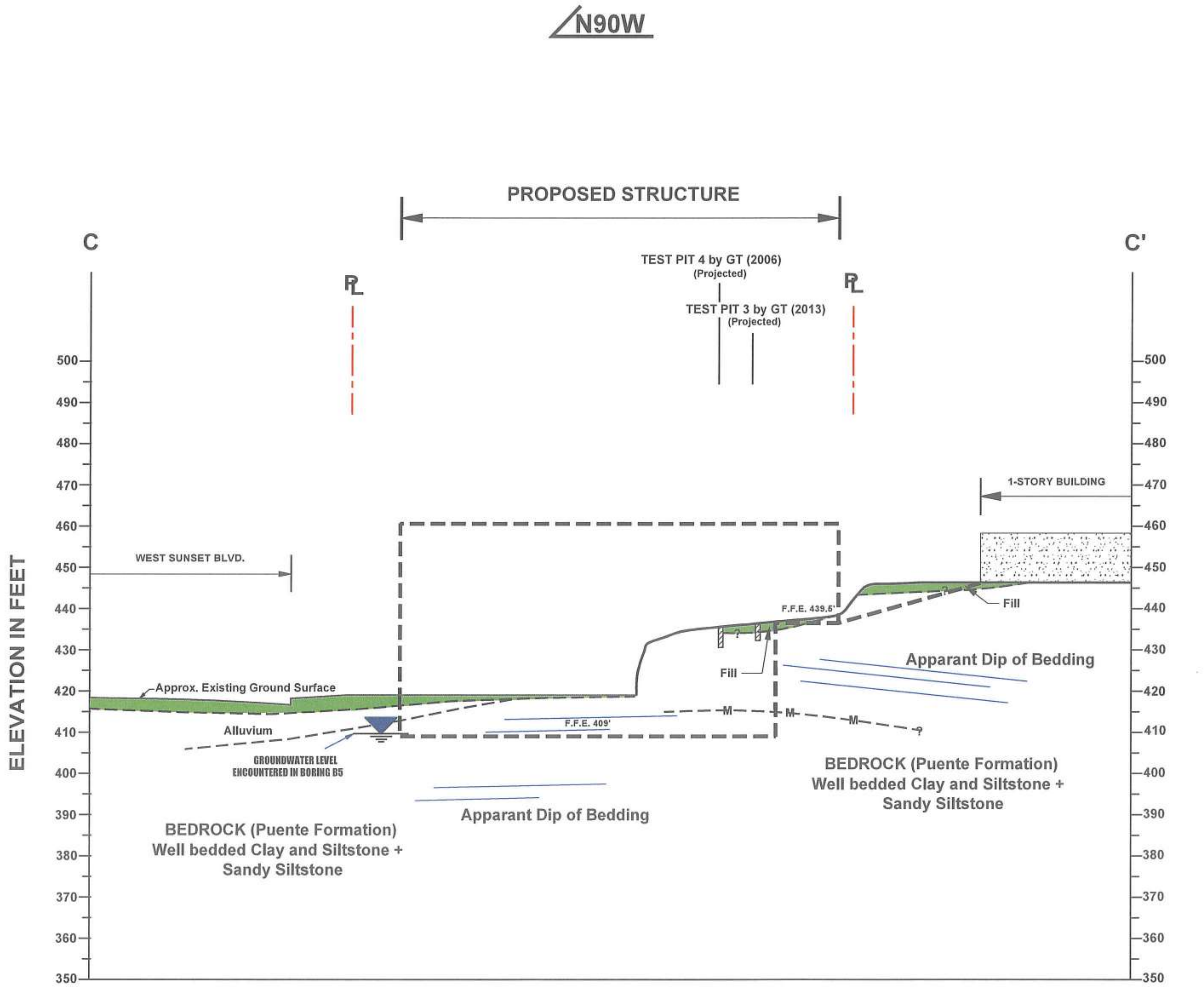
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

DRAWN BY: JD

FILE NO. 20489

DATE: JULY 2023



SCALE IN FEET

0 30 60

REFERENCE: TOPOGRAPHIC MAP BY SITETECH INC.
NOT DATED

CROSS SECTION C-C'

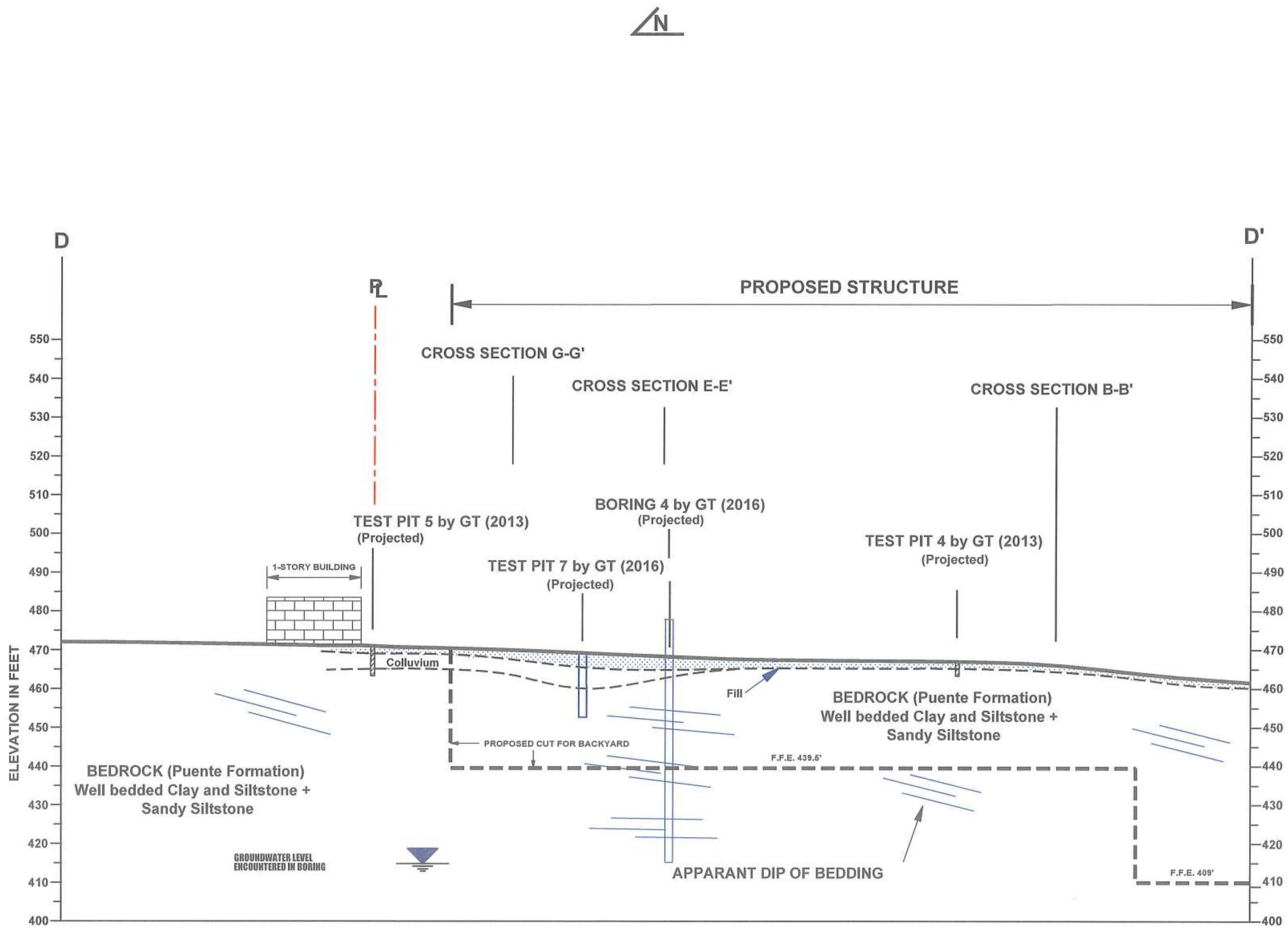
Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

DRAWN BY: JD

FILE NO. 20489

DATE: JULY 2023



SCALE IN FEET

0 30 60

REFERENCE: TOPOGRAPHIC MAP BY SITETECH INC.
NOT DATED

CROSS SECTION D-D'

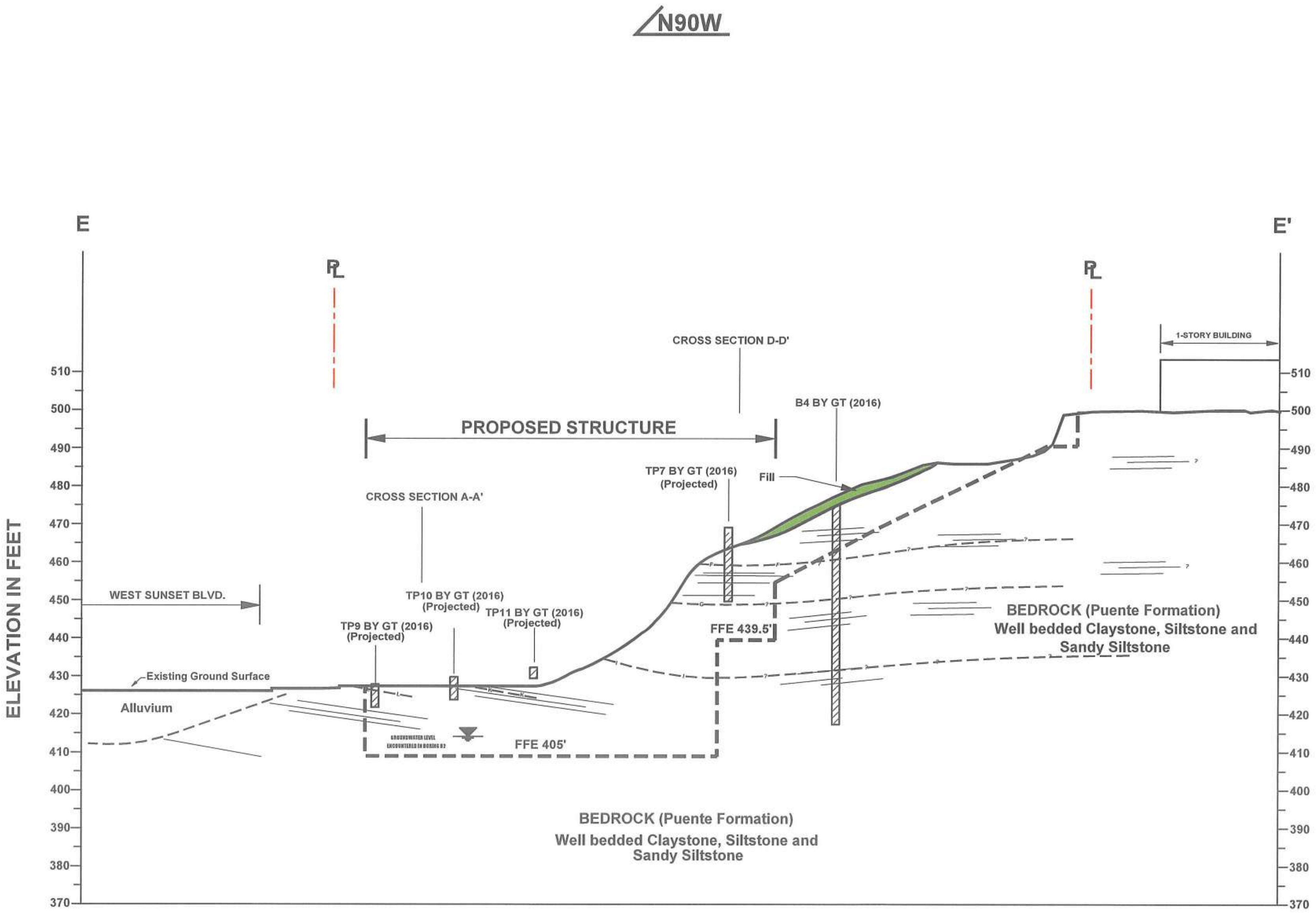
Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

DRAWN BY: JD

FILE NO. 20489

DATE: JULY 2023



SCALE IN FEET

0 30 60

REFERENCE: TOPOGRAPHIC MAP BY SITETECH INC.
NOT DATED

CROSS SECTION E-E'

Geotechnologies, Inc.
Consulting Geotechnical Engineers

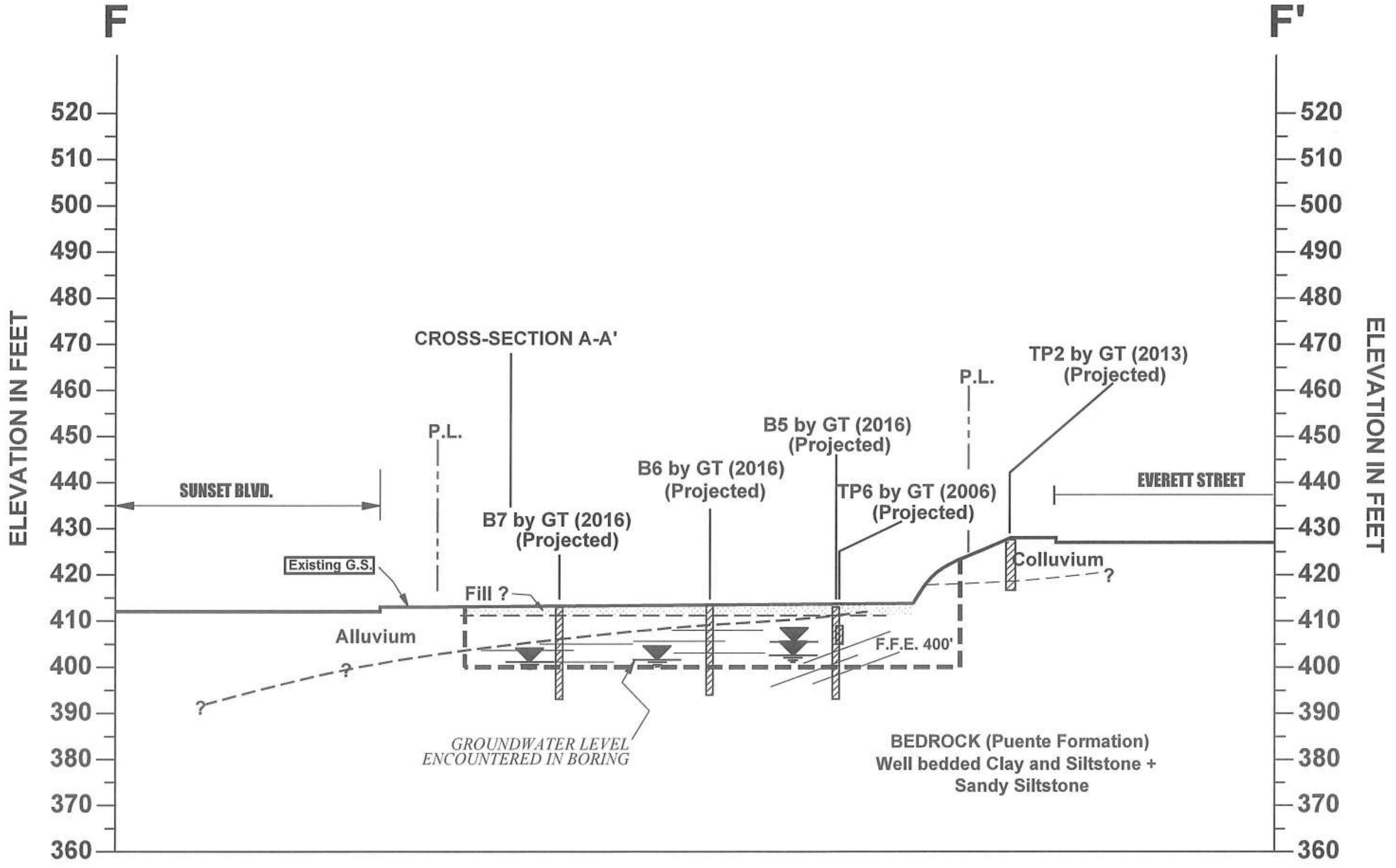
ARAGON PROPERTIES, LTD.

DRAWN BY: JD

FILE NO. 20489

DATE: JULY 2023

E



SCALE IN FEET

0 30 60

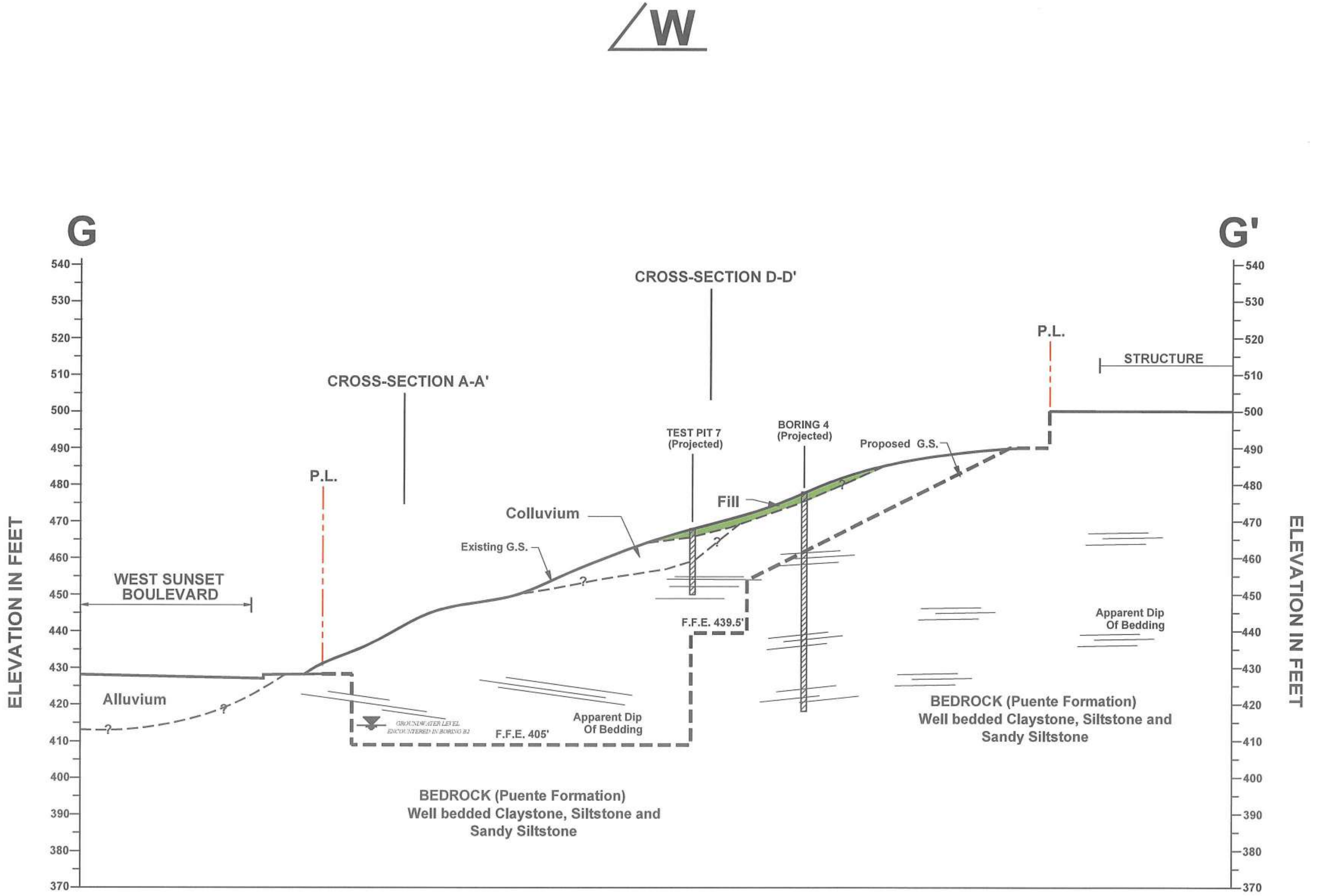
REFERENCE: TOPOGRAPHIC MAP BY SITETECH INC. NOT DATED

CROSS SECTION F-F'

Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

DRAWN BY: JD
FILE NO. 20489
DATE: JULY 2023



SCALE IN FEET

0 30 60

CROSS SECTION G-G'

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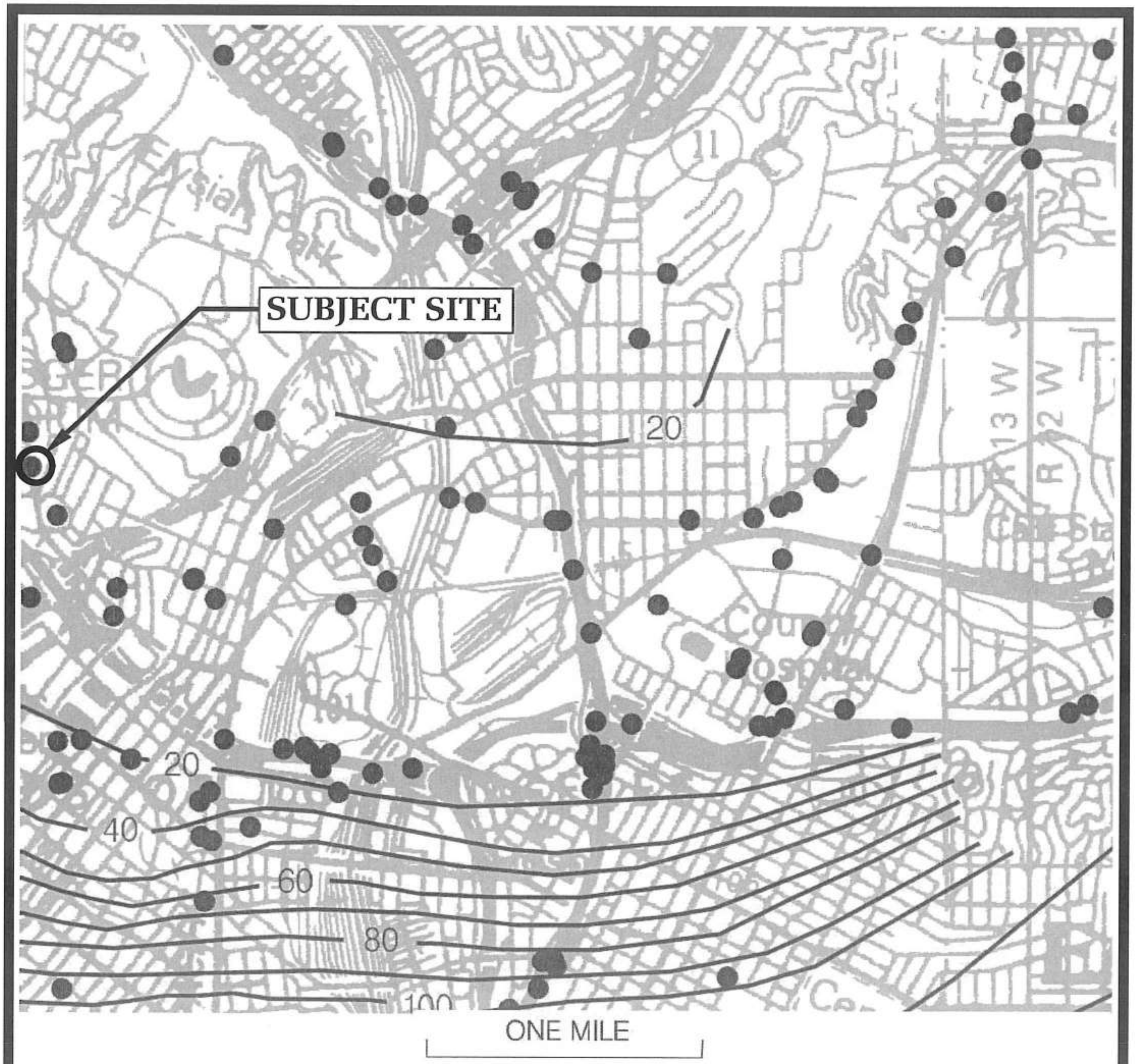
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

DRAWN BY: JD
FILE NO. 20489
DATE: JULY 2023

REFERENCE: TOPOGRAPHIC MAP BY SITETECH INC.
NOT DATED



20 Depth to groundwater in feet

REFERENCE: CDMG, SEISMIC HAZARD ZONE REPORT, 029
LOS ANGELES 7.5 - MINUTE QUADRANGLE, LOS ANGELES COUNTY, CALIFORNIA (1998, REVISED 2006)

HISTORICALLY HIGHEST GROUNDWATER LEVELS

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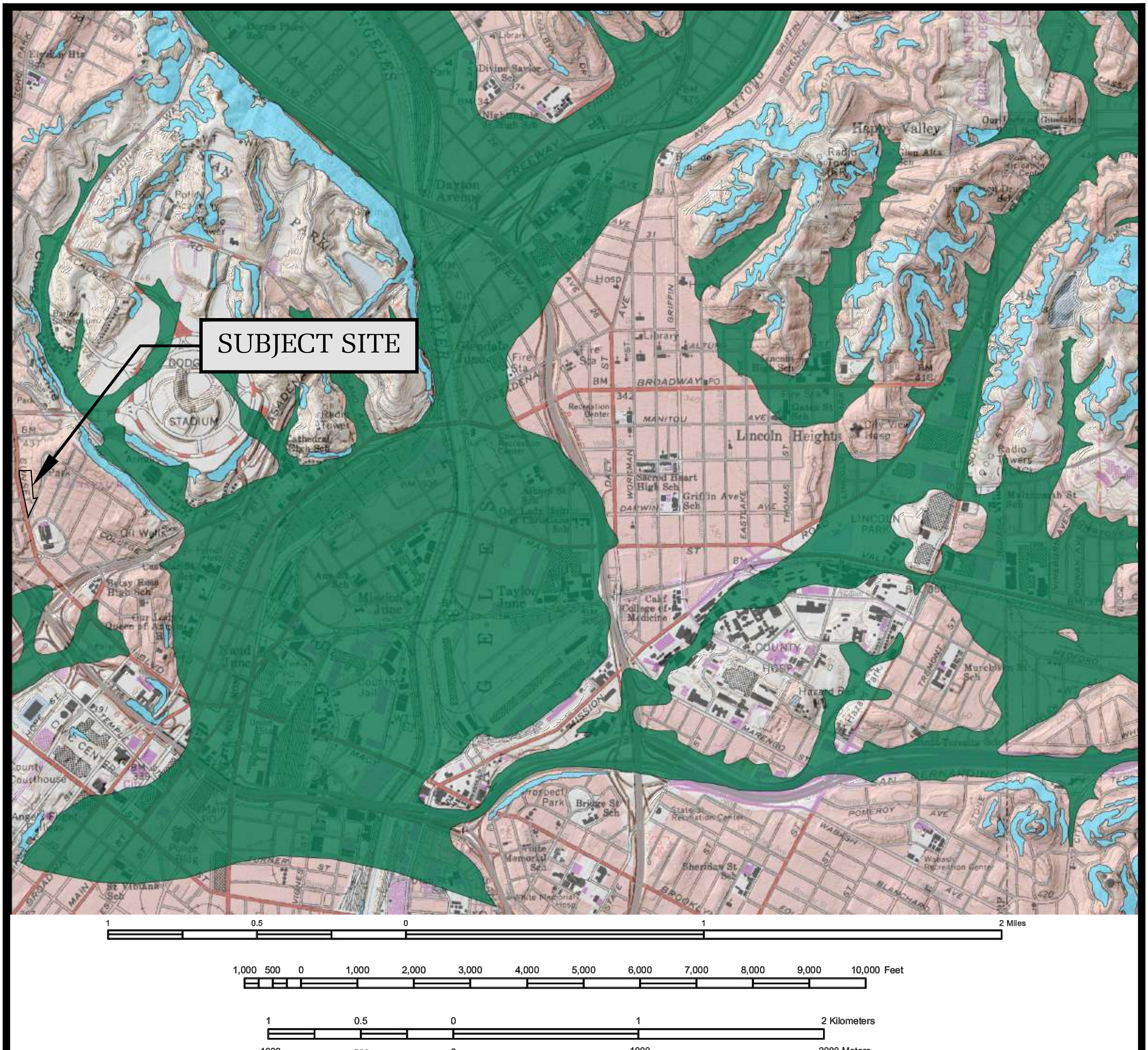
FILE No. 20489



🟩 LIQUEFACTION ZONES

🟦 EARTHQUAKE INDUCED LANDSLIDE ZONES

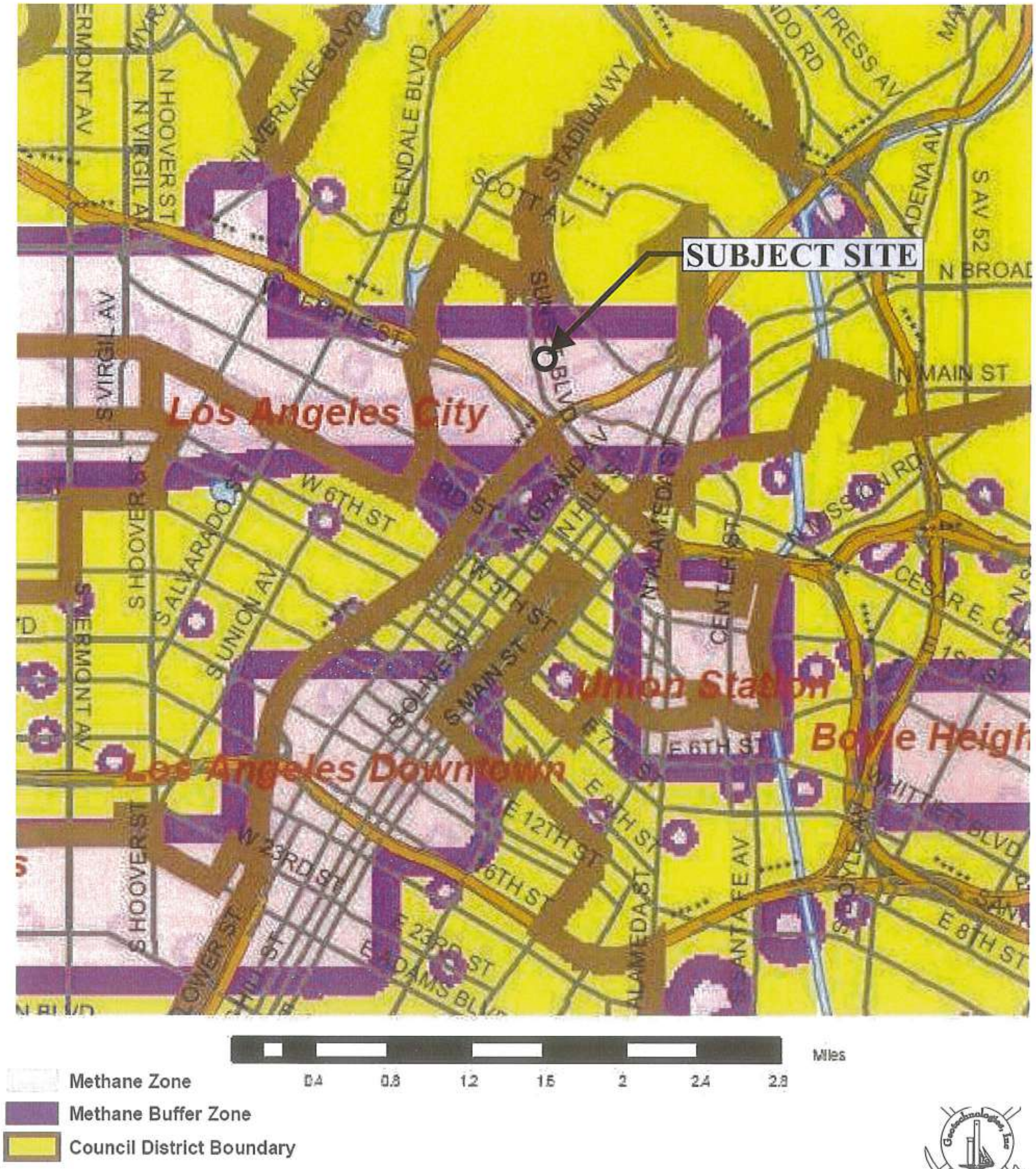
REFERENCE: EARTHQUAKE ZONES OF REQUIRED INVESTIGATION, LOS ANGELES QUADRANGLE (CGS, 2017)

EARTHQUAKE ZONES OF REQUIRED INVESTIGATION

Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO: 20489



REFERENCE: GIS Mapping, Bureau of Engineering, Department fo Public Works - 09/24/03

METHANE ZONE RISK MAP

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Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO. 20489

Appendix A1

Excavation Logs

Boring Logs B1 through B6
Test Pits TP1 through TP6

File No. 19267, Report dated October 18, 2006

BORING LOG NUMBER 1

Drilling Date: 09/01/06 **Elevation: 408'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: 3-inch Asphalt, No Base
				0 --		FILL: Sandy Clay, brown and medium brown, moist, firm
				-		
				1 --		
				-		
				2 --		
				-		
3	39			3 --		
				-		
				4 --		
				-		
5	77			5 --		
				-		
				6 --		BEDROCK (PUENTE FORMATION): Sandstone, light gray and gray, moist, hard, fine grained, moderately weathered, well bedded
				-		
7	70			7 --		
				-		grayish-brown and orange-brown
				8 --		
				-		
				9 --		
				-		
10	35			10 --		
	50/5"			-		some interbedded Siltstone
				11 --		
				-		
				12 --		
				-		
				13 --		
				-		
				14 --		
				-		
15	33			15 --		
	50/5"			-		
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		
				19 --		
				-		
20	36		Disturbed	20 --		
	50/5"			-		Total depth: 20 feet
				21 --		No Water
				-		Fill to 5½ feet
				22 --		
				-		
				23 --		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				-		
				24 --		
				-		Used 8-inch diameter Hollow-Stem Auger
				25 --		140-lb. Slide Hammer, 30-inch drop
				-		Modified California Sampler used unless otherwise noted
				26 --		
				-		SPT=Standard Penetration Test
				27 --		
				-		
				28 --		
				-		
				29 --		
				-		
				30 --		
				-		

BORING LOG NUMBER 2

Drilling Date: 08/31/06 **Elevation: 423'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: 3-inch Concrete, No Base
				0 --		BEDROCK (PUENTE FORMATION): Interbedded Sandstone and Siltstone, light gray, brown and orange-brown, moist, hard, slightly weathered, well bedded
				-		
				1 --		
				-		
2	8			2 --		Bedding: [N85W, 20S]
				-		
				3 --		
				-		minor vertical joints [N32E, 90] [N40E, 90]
				4 --		some caliche on joint surfaces
				-		
5	3			5 --		
				-		
				6 --		Bedding: [N85W, 20S]
				-		
				7 --		
				-		
				8 --		
				-		
				9 --		
				-		light to moderate seepage
10	8			10 --		
				-		moderate seepage
				11 --		
				-		
				12 --		
				-		
				13 --		
				-		
				14 --		
				-		heavy seepage
				15 --		
				-		Total depth: 15 feet
				16 --		Seepage at 9 to 15 feet
				-		Standing Water at 14 feet
				17 --		No Caving
				-		No Fill
				18 --		
				-		
				19 --		
				-		
				20 --		
				-		
				21 --		
				-		
				22 --		
				-		
				23 --		
				-		
				24 --		
				-		
				25 --		
				-		
				26 --		
				-		
				27 --		
				-		
				28 --		
				-		
				29 --		
				-		
				30 --		
				-		

BORING LOG NUMBER 3

Drilling Date: 08/30/06 **Elevation: 414'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: 5-inch Asphalt, No Base
				0 --		FILL: Silty Sand, orange-brown, moist, medium dense, fine grained, some gravel
				-		
				1 --		
				-		
2	Push			2 --		
				-		Sandy Clay, brown, moist, stiff, some gravel
				3 --		
				-		
				4 --		
				-		
5	1			5 --		
				-		Sandy Silt, medium brown, moist, firm
				6 --		
				-		
7	1			7 --		
				-	CL	Sandy Clay, medium brown, moist, firm
				8 --		
				-		
				9 --		
				-		
10	Push			10 --		
				-	ML	Clayey Silt, grayish-brown, orange-brown, very moist, soft
				11 --		
				-		
				12 --		
				-		
				13 --		
				-		
				14 --		
				-		
15	1			15 --		
				-		BEDROCK (PUENTE FORMATION): Interbedded Sandstone and Siltstone, gray and light brown, very moist, hard, fine grained, highly weathered
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		
				19 --		
				-		
20	1			20 --		
				-		gray, dark gray and orange-brown, slightly weathered, well bedded
				21 --		
				-		
				22 --		
				-		
				23 --		
				-		
				24 --		
				-		
25	3			25 --		
				-		Total depth: 25 feet Seepage at 15 to 25 feet Standing Water at 15 feet No Caving Fill to 7 feet
				26 --		
				-		
				27 --		
				-		
				28 --		
				-		
				29 --		
				-		
				30 --		
				-		

BORING LOG NUMBER 4

Drilling Date: 08/30/06 **Elevation: 413'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: 5-inch Asphalt, No Base
				0 --		FILL: Silty Sand, orange-brown, moist, medium dense, fine grained, some gravel
				-		
				1 --		
				-		
2	Push			2 --		
				-	ML	Clayey Silt, grayish-brown, moist, firm
				3 --		
				-		
				4 --		
				-		
5	Push			5 --		
				-		medium to dark brown
				6 --		
				-		
7	1			7 --		
				-	ML	Sandy Silt, medium brown, moist, firm to stiff, some caliche
				8 --		
				-		
				9 --		
				-		
10	1			10 --		
				-	SM	Silty Sand, medium brown and gray, moist to very moist, medium dense, fine grained
				11 --		
				-		
				12 --		
12½	Push			-		
				13 --	ML	Sandy silt, medium brown and gray, very moist to wet, soft to firm
				-		
				14 --		
				-		
15	Push			15 --		
				-		
				16 --		
				-		
				17 --		
17½	Push			-		
				18 --		
				-		
				19 --		BEDROCK (PUENTE FORMATION): Sandstone, gray, light gray, orange-brown, moist, hard, slightly weathered, fine grained, bedded
				-		
20	1			20 --		
				-		Total depth: 20 feet Seepage at 12 to 20 feet Standing Water at 12 feet No Caving Fill to 2 feet
				21 --		
				-		
				22 --		
				-		
				23 --		
				-		
				24 --		
				-		
				25 --		
				-		
				26 --		
				-		
				27 --		
				-		
				28 --		
				-		
				29 --		
				-		
				30 --		
				-		

BORING LOG NUMBER 5

Drilling Date: 08/31/06 **Elevation: 416'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: 6-inch Asphalt, No Base
				0 --		FILL: Silty Sand to Sandy Silt, orange-brown, moist, dense to firm, fine grained, minor steel and plastic debris
				-		
1	3			1 --		
				-		
				2 --		
				-		BEDROCK (PUENTE FORMATION): Interbedded Siltstone and Sandstone, light gray, gray, brown and orange-brown, moist, hard, slightly weathered, fine grained, well bedded
3	3			3 --		
				-		
				4 --		
				-		Bedding: [N78W, 36S]
5	5			5 --		
				-		Bedding: [N85E, 25S]
				6 --		
				-		
7	8			7 --		
				-		
				8 --		
				-		
				9 --		
				-		
10	6			10 --		moderate seepage
				-		
				11 --		Total depth: 10 feet Seepage at 9½ to 10 feet No Caving Fill to 2 feet
				-		
				12 --		
				-		
				13 --		
				-		
				14 --		
				-		
				15 --		
				-		
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		
				19 --		
				-		
				20 --		
				-		
				21 --		
				-		
				22 --		
				-		
				23 --		
				-		
				24 --		
				-		
				25 --		
				-		
				26 --		
				-		
				27 --		
				-		
				28 --		
				-		
				29 --		
				-		
				30 --		
				-		

BORING LOG NUMBER 6

Drilling Date: 08/31/06 **Elevation: 421.5'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: 4-inch Concrete, No Base
				0 --		FILL: Sandy Silt to Silty Sand, light brown to medium brown, moist, firm to dense, fine grained
				-		
				1 --		
				-		
2	3			2 --		BEDROCK (PUENTE FORMATION): Interbedded Sandstone and Siltstone, gray, orange-brown, light brown and brown, moist, hard, fine grained, moderately weathered, well bedded
				-		
				3 --		
				-		
				4 --		Bedding: [N40E, 18S]
				-		
5	8			5 --		
				-		slightly weathered
				6 --		
				-		Bedding: [N40E, 22S]
				7 --		
				-		
				8 --		
				-		
				9 --		
				-		
10	7			10 --		
				-		
				11 --		
				-		
				12 --		moderate to heavy seepage
				-		
				13 --		Total depth: 12 feet Seepage at 11½ to 12 feet No Caving Fill to 1½ feet
				-		
				14 --		
				-		
				15 --		
				-		
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		
				19 --		
				-		
				20 --		
				-		
				21 --		
				-		
				22 --		
				-		
				23 --		
				-		
				24 --		
				-		
				25 --		
				-		
				26 --		
				-		
				27 --		
				-		
				28 --		
				-		
				29 --		
				-		
				30 --		
				-		

LOG OF TEST PIT NUMBER 1

Drilling Date: 09/06/06 **Elevation: 477'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground Gently Slopes towards West
			0 --		FILL: Clayey Sand, medium brown, slightly moist, medium dense, fine grained, minor debris
			-		
1			1 --		
			-	CL	Sandy Clay, dark brown, slightly moist, stiff, trace rootlets
			2 --		
			-		BEDROCK (PUENTE FORMATION): interbedded Sandstone and Siltstone, light brown and gray, moist, hard, fine grained, moderately weathered, well bedded Bedding: [N84E, 18S], [N87E, 22S]
3			3 --		
			-		
			4 --		
			-		
			5 --		Total depth: 4 feet No Water No Caving Fill to ½ foot
			-		
			6 --		
			-		
			7 --		
			-		
			8 --		
			-		
			9 --		
			-		
			10 --		
			-		
			11 --		
			-		
			12 --		
			-		
			13 --		
			-		
			14 --		
			-		
			15 --		
			-		
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		
			26 --		
			-		
			27 --		
			-		
			28 --		
			-		
			29 --		
			-		
			30 --		
			-		

LOG OF TEST PIT NUMBER 2

Drilling Date: 09/06/06 **Elevation: 479'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground Gently Slopes towards West
			0 --		FILL: Clayey Sand, medium brown, slightly moist, dense, fine grained
			-		
			1 --		
			-		
2			2 --		abundant glass, metal debris
			-		
			3 --		BEDROCK (PUENTE FORMATION): interbedded Sandstone and Siltstone, light brown, gray and orange-brown, moist, hard fine grained, slightly weathered, well bedded Bedding: [N80E, 12S], [N85E, 20S]
			-		
4			4 --		
			-		
			5 --		
			-		Total depth: 5 feet No Water No Caving Fill to 2½ feet
			6 --		
			-		
			7 --		
			-		
			8 --		
			-		
			9 --		
			-		
			10 --		
			-		
			11 --		
			-		
			12 --		
			-		
			13 --		
			-		
			14 --		
			-		
			15 --		
			-		
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		
			26 --		
			-		
			27 --		
			-		
			28 --		
			-		
			29 --		
			-		
			30 --		
			-		

LOG OF TEST PIT NUMBER 3

Drilling Date: 09/06/06 **Elevation: 452'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground Gently Slopes to Southwest
			0 --		FILL: Clayey Sand, medium brown, slightly moist, medium dense, fine grained
			-		
			1 --		
			-		BEDROCK (PUENTE FORMATION): interbedded Sandstone and Siltstone, light brown, light gray, orange-brown, slightly moist, hard, fine grained, moderately weathered, well bedded Bedding: [N27E, 40NE], [N20W, 40NE]
2			2 --		
			-		
			3 --		
			-		
			4 --		Total depth: 3 feet
			-		No Water
			5 --		No Caving
			-		Fill to ½ foot
			6 --		
			-		
			7 --		
			-		
			8 --		
			-		
			9 --		
			-		
			10 --		
			-		
			11 --		
			-		
			12 --		
			-		
			13 --		
			-		
			14 --		
			-		
			15 --		
			-		
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		
			26 --		
			-		
			27 --		
			-		
			28 --		
			-		
			29 --		
			-		
			30 --		
			-		

LOG OF TEST PIT NUMBER 4

Drilling Date: 09/06/06 **Elevation: 434'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground and Weeds Gently Slopes to Southwest
			0 --		FILL: Clayey Sand, medium brown, slightly moist, medium dense, fine to medium grained, some concrete debris
			-		
			1 --		
			-		
2			2 --		
			-		BEDROCK (PUENTE FORMATION): interbedded Siltstone and Sandstone, light brown, gray, and orange-brown, moist, hard, slightly weathered, fine grained, well bedded Bedding: [N82E, 20S], [N85W, 25S]
			3 --		
			-		
4			4 --		
			-		
			5 --		
			-		Total depth: 5 feet No Water No Caving Fill to 2 feet
			6 --		
			-		
			7 --		
			-		
			8 --		
			-		
			9 --		
			-		
			10 --		
			-		
			11 --		
			-		
			12 --		
			-		
			13 --		
			-		
			14 --		
			-		
			15 --		
			-		
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		
			26 --		
			-		
			27 --		
			-		
			28 --		
			-		
			29 --		
			-		
			30 --		
			-		

LOG OF TEST PIT NUMBER 5

Drilling Date: 09/08/06 **Elevation: 476'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Grass
			0 --		FILL: Sandy Clay to Clayey Sand, dark brown, slightly moist, stiff to medium dense, fine grained, abundant roots
			-		
1			1 --		
			-		
			2 --		
			-		BEDROCK (PUENTE FORMATION): interbedded Sandstone and Siltstone, light brown, gray, orange-brown, moist, hard, fine grained, moderately weathered, well bedded Bedding: [N89E, 17S] Minor Vertical Fractures [N57W, 90], [N87E, 90] some caliche on bedding and fracture surfaces
3			3 --		
			-		
			4 --		
			-		
			5 --		
			-		
			6 --		Total depth: 4 feet No Water No Caving Fill to 2 feet
			-		
			7 --		
			-		
			8 --		
			-		
			9 --		
			-		
			10 --		
			-		
			11 --		
			-		
			12 --		
			-		
			13 --		
			-		
			14 --		
			-		
			15 --		
			-		
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		
			26 --		
			-		
			27 --		
			-		
			28 --		
			-		
			29 --		
			-		
			30 --		
			-		

LOG OF TEST PIT NUMBER 6

Drilling Date: 09/08/06 **Elevation: 409'**

Project: File No. 19267 **Mercy Housing California**

km

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: 3-inch Asphalt, No Base
			0 --		FILL: Silty Sand to Sandy Silt, light brown and grayish-brown, moist, dense to stiff, fine grained, abundant gravel
			-		
1			1 --		
			-		
			2 --		
			-		
3			3 --		BEDROCK (PUENTE FORMATION): interbedded Sandstone and Siltstone, light gray, light brown, brown, orange-brown and medium brown, moist, hard, fine grained, moderately to highly weathered, bedded Bedding: [N85W, 45S], [N82W, 43S], [N80W, 55S] Depth to bedrock varies between 1 and 2½ feet
			-		
			4 --		
			-		
			5 --		
			-		
			6 --		
			-		Total depth: 4 feet No Water No Caving Fill to 2½ feet
			7 --		
			-		
			8 --		
			-		
			9 --		
			-		
			10 --		
			-		
			11 --		
			-		
			12 --		
			-		
			13 --		
			-		
			14 --		
			-		
			15 --		
			-		
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		
			26 --		
			-		
			27 --		
			-		
			28 --		
			-		
			29 --		
			-		
			30 --		
			-		

Appendix A2

Excavation Logs

Boring Logs B1 through B3
Test Pits TP1 through TP6

File No. 20489, Report dated April 09, 2013,
updated June 24, 2014

BORING LOG NUMBER 1

Aragon Properties, LLC **Date: 02/20/13** **Elevation: 409'***

File No. 20489 **Method: 8-inch diameter Hollow Stem Auger**

km

*Reference: Topographic Map by Site Tech, Inc., not dated

Sample	Blows	Moisture	Dry Density	Depth in	USCS	Description
Depth ft.	per ft.	content %	p.c.f.	feet	Class.	Surface Conditions: Asphalt Driveway
				0 --		4-inch Asphalt over 4-inch Base
				-		
				1 --		
				-		FILL: Sandy to Clayey Silt, dark brown, moist, stiff
				2 --		
2.5	32	19.1	110.1	-		
				3 --		
				-	ML	ALLUVIUM: Sandy to Clayey Silt, dark to medium brown, moist, stiff
				4 --		
				-		
5	30	22.9	104.4	5 --		
				-	ML/CL	Clayey Silt to Silty Clay, dark and grayish brown mottling
				6 --		
				-		
				7 --		
7.5	47	31.1	94.2	-		
				8 --	ML/SM	Sandy Silt to Silty Sand, yellow and grayish brown mottling, moist, stiff, medium dense, fine grained, minor rock fragments
				-		
				9 --		
				-		
10	37	26.6	96.5	10 --		
				-		BEDROCK (PUENTE FORMATION): Interbedded Siltstone and Sandstone, well bedded, moderately weathered, yellow and grayish brown mottling, moist, moderately hard
				11 --		
				-		
				12 --		
				-		
				13 --		
				-		
				14 --		
				-		
15	44	32.9	92.7	15 --		
				-		
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		
				19 --		
				-		
20	35	24.3	100.4	20 --		
	50/4"			-		dark and yellowish brown
				21 --		
				-		
				22 --		
				-		
				23 --		
				-		
				24 --		
				-		
25	59	23.9	97.6	25 --		
				-		yellow and grayish brown

BORING LOG NUMBER 1

Aragon Properties, LLC

File No. 20489

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				-		
				26 --		
				-		
				27 --		
				-		
				28 --		
				-		
				29 --		
				-		
30	44	31.3	93.2	30 --		
	50/5"			-		Total depth: 30 feet
				31 --		Water at 17½ feet
				-		Fill to 3 feet
				32 --		
				-		
				33 --		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual
				-		
				34 --		
				-		Used 8-inch diameter Hollow-Stem Auger
				35 --		140-lb. Automatic Hammer, 30-inch drop
				-		Modified California Split Spoon Sampler
				36 --		
				-		
				37 --		
				-		
				38 --		
				-		
				39 --		
				-		
				40 --		
				-		
				41 --		
				-		
				42 --		
				-		
				43 --		
				-		
				44 --		
				-		
				45 --		
				-		
				46 --		
				-		
				47 --		
				-		
				48 --		
				-		
				49 --		
				-		
				50 --		
				-		

BORING LOG NUMBER 2

Aragon Properties, LLC **Date: 02/20/13** **Elevation: 419.5'***

File No. 20489 **Method: 8-inch diameter Hollow Stem Auger**

km

***Reference: Topographic Map by Site Tech, Inc., not dated**

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Asphalt Parking Lot
				0 --		4-inch Asphalt, No Base
				-		
				1 --		FILL: Clayey Silt to Silty Clay, dark to yellowish brown, moist, stiff
				-		
				2 --		
2.5	29	27.8	9.9	-		
				3 --		
				-		BEDROCK (PUENTE FORMATION): interbedded Siltstone and Sandstone (fine grained), yellow and dark brown mottling, moist, moderately hard, well bedded, not weathered
				4 --		
				-		
5	39	27.0	98.6	5 --		
				-		
				6 --		
				-		
				7 --		
7.5	80	26.3	100.8	-		
				8 --		dark and yellowish brown mottling
				-		
				9 --		
				-		
10	81	27.8	99.4	10 --		
				-		
				11 --		
				-		
				12 --		
				-		
				13 --		
				-		
				14 --		
				-		
15	74	26.0	99.2	15 --		
				-		
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		
				19 --		
				-		
20	80	28.5	98.0	20 --		
				-		
				21 --		
				-		
				22 --		
				-		
				23 --		
				-		
				24 --		
				-		
25	53	26.8	95.0	25 --		
				-		Siltstone, yellow and grayish brown mottling

BORING LOG NUMBER 2

Aragon Properties, LLC

File No. 20489

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				-		
				26 --		
				-		
				27 --		
				-		
				28 --		
				-		
				29 --		
				-		
30	97	22.2	104.7	30 --		
				-		Total depth: 30 feet
				31 --		Water at 17 feet
				-		Fill to 3 feet
				32 --		
				-		
				33 --		NOTE: The stratification lines represent the approximate
				-		boundary between earth types; the transition may be gradual
				34 --		
				-		Used 8-inch diameter Hollow-Stem Auger
				35 --		140-lb. Automatic Hammer, 30-inch drop
				-		Modified California Split Spoon Sampler
				36 --		
				-		
				37 --		
				-		
				38 --		
				-		
				39 --		
				-		
				40 --		
				-		
				41 --		
				-		
				42 --		
				-		
				43 --		
				-		
				44 --		
				-		
				45 --		
				-		
				46 --		
				-		
				47 --		
				-		
				48 --		
				-		
				49 --		
				-		
				50 --		
				-		

BORING LOG NUMBER 3

Aragon Properties, LLC **Date: 02/20/13** **Elevation: 424'***

File No. 20489 **Method: 8-inch diameter Hollow Stem Auger**

km

*Reference: Topographic Map by Site Tech, Inc., not dated

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Concrete Driveway
				0 --		4½-inch Concrete, No Base
				-		
				1 --		FILL: Clayey Silt to Silty Clay, yellowish brown, moist, stiff
				-		
				2 --		
2.5	68	35.6	87.2	-		
				3 --		
				-		BEDROCK (PUENTE FORMATION): Siltstone, yellow and dark brown, moist, moderately hard, well bedded, moderately weathered
				4 --		
				-		
5	81	35.5	90.0	5 --		- - - - - - - - - - -
				-		Siltstone interbedded with Sandstone, yellow and gray
				6 --		
				-		
				7 --		
7.5	94	33.2	92.8	-		
				8 --		
				-		
				9 --		
				-		
10	55	28.2	98.3	10 --		
				-		
				11 --		
				-		
				12 --		
				-		
				13 --		
				-		
				14 --		
				-		
15	57	26.6	98.8	15 --		
				-		
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		
				19 --		
				-		
20	70	26.6	101.6	20 --		- - - - - - - - - - -
	50/5"			-		Siltstone interbedded with Sandstone, yellow and grayish brown mottling, moist, moderately hard to hard
				21 --		
				-		
				22 --		
				-		
				23 --		
				-		
				24 --		
				-		
25	75	24.9	100.7	25 --		
				-		

BORING LOG NUMBER 3

Aragon Properties, LLC

File No. 20489

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				-		
				26 --		
				-		
				27 --		
				-		
				28 --		
				-		
				29 --		
				-		
30	80	25.0	102.1	30 --		
				-		
				31 --		
				-		
				32 --		
				-		
				33 --		
				-		
				34 --		
				-		
35	86	26.3	100.6	35 --		
				-		
				36 --		
				-		
				37 --		
				-		
				38 --		
				-		
				39 --		
				-		
40	48	25.4	103.3	40 --		
	50/2.5"			-		Total depth: 40 feet
				41 --		Water at 9½ feet
				-		Fill to 3 feet
				42 --		
				-		
				43 --		NOTE: The stratification lines represent the approximate
				-		boundary between earth types; the transition may be gradual
				44 --		
				-		Used 8-inch diameter Hollow-Stem Auger
				45 --		140-lb. Automatic Hammer, 30-inch drop
				-		Modified California Split Spoon Sampler
				46 --		
				-		
				47 --		
				-		
				48 --		
				-		
				49 --		
				-		
				50 --		
				-		

LOG OF TEST PIT NUMBER 1

Aragon Properties, LLC **Drilling Date: 02/21/13** **Elevation: 407'***

File No. 20489 **Method: Hand Dug Test Pit**

km

*Reference: Topographic Map by Site Tech, Inc., not dated

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Planter Box
			0 --		FILL: Silty Sand, dark brown, moist, medium dense, fine grained, minor gravel
			-		
			1 --		
No Sample Taken			-		Sandy Silt, dark brown, moist, stiff, some gravel
			2 --		
			-		
			3 --		Clayey Silt to Silty Clay, dark brown
			-		
			4 --		
			-	ML	ALLUVIUM: Sandy Silt, dark to medium brown, moist, stiff
			5 --		
			-		
			6 --		
			-		Total depth: 6 feet
			7 --		No Water
			-		Fill to 4 feet
			8 --		
			-		
			9 --		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
			-		
			10 --		
			-		Excavated 30" x 30" Test Pit to 5 feet
			11 --		Performed Percolation Test at Bottom
			-		Cut 1' x 1' x1' cube at base of Test Pit
			12 --		
			-		
			13 --		
			-		
			14 --		
			-		
			15 --		
			-		
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		

LOG OF TEST PIT NUMBER 2

Aragon Properties, LLC **Drilling Date: 02/21/13** **Elevation: 425'***

File No. 20489 **Method: Hand Dug Test Pit**

km

*Reference: Topographic Map by Site Tech, Inc., not dated

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Asphalt Slope Cover
			0 --		3½-inch Asphalt over 1½-inch Base
			-		
1	15.9	113.4	1 --		FILL: Clayey Silt to Silty Clay, dark brown, moist, stiff
			-		
			2 --		ALLUVIUM: Clayey Silt to Silty Clay, dark brown, moist, stiff
			-		
3	14.3	116.5	3 --		
			-		
			4 --		
			-		
5	17.9	109.7	5 --		
			-		dark and medium brown
			6 --		
			-		
7	14.9	105.1	7 --		
			-		
			8 --		
			-		
			9 --		
			-	ML	Sandy Silt, medium brown, moist, stiff, minor rock fragments
10	19.8	85.4	10 --		
			-		BEDROCK (PUENTE FORMATION): Siltstone, yellowish brown, moist, moderately hard
			11 --		
			-		
			12 --		Total depth: 11 feet
			-		No Water
			13 --		Fill to 1 foot
			-		
			14 --		
			-		NOTE: The stratification lines represent the approximate
			15 --		boundary between earth types; the transition may be gradual.
			-		
			16 --		Excavated 30" x 30" Test Pit to 5 feet
			-		Deepened with 5" diameter Hand Auger to 11 feet
			17 --		Hand Tools and Hand Sampling Equipment
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		

LOG OF TEST PIT NUMBER 3

Aragon Properties, LLC **Drilling Date: 02/21/13** **Elevation: 444'***

File No. 20489 **Method: Hand Dug Test Pit**

km

*Reference: Topographic Map by Site Tech, Inc., not dated

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground, Southwest Descending Slope
			0 --		FILL: Sandy to Clayey Silt, dark brown, moist, stiff, pieces of wood and metal
			-		
1	9.2	86.3	1 --		
			-		
			2 --		BEDROCK (PUENTE FORMATION): Siltstone, light yellow, slightly moist, moderately hard
			-		
3	7.4	94.7	3 --		
			-		Siltstone to Sandstone, light yellow, slightly moist, moderately hard
			4 --		
			-		
5	13.2	86.9	5 --		
			-		
			6 --		
			-		
7	19.1	93.2	7 --		
			-		Siltstone, yellowish brown, moist, moderately hard
			8 --		
			-		
			9 --		
			-		Siltstone, yellow and grayish brown, moist, moderately hard
10	22.5	91.3	10 --		
			-		Total depth: 10 feet
			11 --		No Water
			-		Fill to 1½ feet
			12 --		
			-		
			13 --		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
			-		
			14 --		
			-		Excavated 30" x 30" Test Pit to 5 feet
			15 --		Deepened with 5" diameter Hand Auger to 10 feet
			-		Hand Tools and Hand Sampling Equipment
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		

LOG OF TEST PIT NUMBER 4

Aragon Properties, LLC **Drilling Date: 02/21/13** **Elevation: 480'***

File No. 20489 **Method: Hand Dug Test Pit**

km

*Reference: Topographic Map by Site Tech, Inc., not dated

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground, West Descending Slope
			0 --		FILL: Sandy to Clayey Silt, dark brown, moist, firm, pieces glass
			-		
1	8.0	88.1	1 --		
			-		BEDROCK (PUENTE FORMATION): interbedded Siltstone and Sandstone
			2 --		(fine grained), light yellow, moist, moderately hard, weathered, well bedded
			-		
3	7.7	95.5	3 --		
3.5	10.2	92.5	-		less weathered
			4 --		
			-		Total depth: 4 feet
			5 --		No Water
			-		Fill to 1 foot
			6 --		
			-		
			7 --		NOTE: The stratification lines represent the approximate
			-		boundary between earth types; the transition may be gradual.
			8 --		
			-		Excavated 30" x 30" Test Pit to 5 feet
			9 --		Hand Tools and Hand Sampling Equipment
			-		
			10 --		
			-		
			11 --		
			-		
			12 --		
			-		
			13 --		
			-		
			14 --		
			-		
			15 --		
			-		
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		

LOG OF TEST PIT NUMBER 5

Aragon Properties, LLC **Drilling Date: 02/21/13** **Elevation: 470'***

File No. 20489 **Method: Hand Dug Test Pit**

km

***Reference: Topographic Map by Site Tech, Inc., not dated**

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground, West Descending Slope
			0 --		FILL: Sandy Silt to Silty Clay, dark brown, moist, loose, pieces of concrete
			-		
1	15.4	81.3	1 --		
			-		
			2 --		
			-	ML/CL	COLLUVIUM: Clayey Silt to Silty Clay, dark brown, moist, stiff
3	15.9	92.0	3 --		
			-		
			4 --		
			-		
5	16.0	89.8	5 --		
			-	ML	Silty to Clayey Silt, medium brown, moist, stiff, minor rock fragments
			6 --		
			-		
7	14.6	92.7	7 --		BEDROCK (PUENTE FORMATION): Siltstone, light yellow, moist, moderately hard, well bedded, moderately weathered
			-		
			8 --		
			-		Total depth: 8 feet
			9 --		No Water
			-		No Caving
			10 --		Fill to 2 feet
			-		
			11 --		
			-		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
			12 --		
			-		
			13 --		Excavated 30" x 30" Test Pit to 8 feet
			-		Hand Tools and Hand Sampling Equipment
			14 --		
			-		
			15 --		
			-		
			16 --		
			-		
			17 --		
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		

LOG OF TEST PIT NUMBER 6

Aragon Properties, LLC **Drilling Date: 02/21/13** **Elevation: 409'***

File No. 20489 **Method: Hand Dug Test Pit**

km

***Reference: Topographic Map by Site Tech, Inc., not dated**

	Depth in feet	USCS Class.	Description Surface Conditions: Asphalt Parking Lot
	0 --		4-inch Asphalt over 2-inch Base
	-		
	1 --		FILL: Silty Sand to Sand, yellowish brown, moist, medium dense, fine grained
	-		
	2 --		
	-		Sand, yellowish brown, moist, medium dense, fine grained
	3 --		
	-		
	4 --		Silty Sand, dark brown, moist, medium dense, fine grained
	-		
	5 --		
	-		
	6 --		Excavated top of steel storage tank
	-		
	7 --		Total depth: 6 feet
	-		No Water
	8 --		Fill to 6 feet
	-		
	9 --		
	-		NOTE: The stratification lines represent the approximate
	10 --		boundary between earth types; the transition may be gradual.
	-		
	11 --		Excavated 30" x 30" Test Pit to 6 feet
	-		Hand Tools and Hand Sampling Equipment
	12 --		
	-		
	13 --		
	-		
	14 --		
	-		
	15 --		
	-		
	16 --		
	-		
	17 --		
	-		
	18 --		
	-		
	19 --		
	-		
	20 --		
	-		
	21 --		
	-		
	22 --		
	-		
	23 --		
	-		
	24 --		
	-		
	25 --		
	-		

Appendix A3

Excavation Logs

Boring Logs B4 though B6
Test Pits TP7 and TP8

File No. 20489, Report dated May 18, 2017

BORING LOG NUMBER 4

Aragon Properties **Date: 12/13/16** **Elevation: 478'***

File No. 20489 **Method: 24-inch diameter Bucket Auger**

km

*Reference: Topographic Map by Site Tech, not dated

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
				0 --		FILL: Silty Clay, grayish brown to dark brown, moist, stiff,
				-		Siltstone fragments to ½", porous, roots to 1" diameter
				1 --		
				-		
				2 --		
				-		
				3 --		stiff
				-		
				4 --		
				-		BEDROCK (PUENTE FORMATION): Siltstone, yellowish
5	40/10"	3.4	103.8	5 --		brown, slightly moist, moderately hard to hard, well bedded,
				-		very weathered, moderately fractured, caliche on fracture
				6 --		surfaces, not planar but sharp contact
				-		6.1' Sandstone, light greenish gray
				7 --		7.0' gopher hole
				-		7.6' Siltstone, Bedding [N59W, 19SE]
				8 --		8.2' Caliche filling with fractures, light reddish brown with
				-		blueish gray
				9 --		8.5' Sandstone, fine grained, coarse as with depth
				-		9.4' Siltstone, bluish gray and reddish brown mottled, fractures
10	45/10"	7.3	92.7	10 --		into 1" pieces, caliche on fracture surfaces
				-		10.0' Sandstone, light grayish brown
				11 --		10.2' Siltstone, less weathered, fractured, moderately well
				-		bedded, Bedding [N69W, 15SW]
				12 --		11.4' Sandstone, light grayish brown
				-		11.6' Siltstone, reddish brown to bluish gray mottled
				13 --		12.1' Sandstone, light gray, fissile
				-		12.4' Siltstone, mottled bluish gray to reddish brown,
				14 --		Bedding [N85W, 14SW]
				-		13.2' Sandstone, light gray
15	50/10"	10.3	96.2	15 --		13.4' Siltstone, Bedding [N78W, 15SW]
				-		13.7' Sandstone
				16 --		13.9' Siltstone, light bluish gray and reddish brown, well
				-		bedded, fissile
				17 --		15.6' Sandstone, fine grained, Bedding [N79W, 16SW]
				-		16.0' Siltstone, root to 1/4" diameter
				18 --		17.1' Sandstone, light reddish brown, Bedding [N69W, 13SW]
				-		17.3' Siltstone
				19 --		17.4' Sandstone and Siltstone, interbeds 1/2-1" thick
				-		18.3' Sandstone, fissile, moderately hard
20	60/10"	6.5	104.1	20 --		18.8' Sandstone, medium grained, hard
				-		19.5' Sandstone
				21 --		20.5' Siltstone, well bedded, fissile, interbedded with Sandstone
				-		1/4-2" thick
				22 --		21.0' Siltstone, Bedding [N71W,15SW]
				-		21.6' Interbedded Sandstone and Siltstone
				23 --		22.5' Sandstone grayish blue, Siltstone reddish brown
				-		23.4' Sandstone, light bluish gray, Bedding [N69W, 14SW]
				24 --		24.1' Sandstone 4" thick, reddish brown
				-		24.6' Siltstone, bluish gray
25	60/6"	14.2	91.9	25 --		25.1' Sandstone, dark red, 1/8" thick, Siltstone gray and
				-		Sandstone reddish brown, 2" thick, Beds [N73W, 14SW]

BORING LOG NUMBER 4

Aragon Properties

File No. 20489

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				-		
				26 --		
				-		
				27 --		
				-		27.7' Siltstone, moderately hard to hard, slightly moist, vertical fractures brakes to 8" pieces, Bedding [N79W, 14SW], well bedded
				28 --		
				-		
				29 --		28.1' interbedded Sandstone, Siltstone
				-		29.9' Sandstone, light bluish gray, friable, [N75W, 14SW]
30	60/6"	13.6	93.9	30 --		30.2' Interbedded Sandstone and Siltstone, 1/2-1" thick, reddish brown, light gray
				-		
				31 --		
				-		
				32 --		32.9' Sandstone, light reddish brown, fissile, Beds [N76W, 14SW]
				-		33.3' interbedded Sandstone (reddish brown), Clayey Siltstone (greenish brown), well bedded, poorly fissile
				33 --		
				-		33.9' gypsum 1/8" thick along bedding, Bedding [N74W, 17SW]
				34 --		34.4' Sandstone bed reddish brown
				-		34.6' interbedded Siltstone and Sandstone
35	70/8"	16.1	90.4	35 --		
				-		
				36 --		
				-		37.3' Sandstone, grayish brown, gypsum crystals, interbedded with Clayey Siltstone
				37 --		
				-		38.2' Sandstone (light gray) with 1/4 inch thick Clayey Siltstone beds (reddish brown), gypsum layer 1/4" thick
				38 --		
				-		39.3' Sandstone, grayish brown, not friable
				39 --		
				-		40.0' Clayey Siltstone with gypsum beds 1/4" thick grayish brown
40	70/8"	6.8	99.6	40 --		40.8' Sandstone, grayish brown, light brown, mottled, internal laminations, not fissile, Bedding [N66W, 13SW]
				-		
				41 --		41.2' Interbedded Sandy Siltstone with Clayey Siltstone, moderately hard
				-		
				42 --		42.0' Gypsum layer 1/4" thick on Sandstone, light gray
				-		42.4' interbedded Clayey Siltstone (light gray), and Sandy Siltstone (reddish brown)
				43 --		
				-		43.3' Sandstone, mottled grayish brown and reddish brown
				44 --		43.8' Interbedded Sandstone and Clayey Siltstone, with gypsum layers 1/4" thick along Bedding [N71N, 13SW]
				-		
				45 --		
				-		thick concretion
				46 --		
				-		45.4' Concretion Sandstone 3" thick, gray, very hard
				47 --		45.7' Interbedded Sandstone and Clayey Siltstone, beds 2-3" thick, Sandstone 5" thick
				-		
				48 --		
				-		
				49 --		49.0' Sandstone, gray to light gray, Bedding [N75W, 12SW]
				-		49.3' Interbedded Sandstone (light brown and reddish brown), with Clayey Siltstone (gray), beds 1/2 - 1" thick, poorly fissile
50	80/8"	18.5	88.0	50 --		
				-		

BORING LOG NUMBER 4

Aragon Properties

File No. 20489

km

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description
				-		
				51 --		
				-		
				52 --		
				-		52.6' Sandstone reddish brown, moist, fissile,
				53 --		Bedding [N71W, 13SW]
				-		53.1' Clayey Siltstone
				54 --		53.3' Sandstone
				-		53.6' Clayey Siltstone, light gray
				55 --		54.6' Concretion Sandstone, very hard, grayish brown
				-		55.0' Interbedded Clayey Siltstone (mottled bluish gray and
				56 --		brown) with Sandstone (brown and light brown)
				-		56.7' Sandstone, grayish brown, fissile
				57 --		57.3' Clayey Siltstone, reddish brown and brown
				-		
				58 --		
				-		
				59 --		
				-		
60	105/8"	19.2	94.0	60 --		
				-		Total Depth 60 feet
				61 --		No Seepage
				-		No Caving
				62 --		Downhole logged by Geologist
				-		Fill to 4 feet
				63 --		
				-		
				64 --		Kelly Weights 0 - 6.5' = 2141 lbs.
				-		6.5 - 13' = 1583 lbs.
				65 --		13 - 19.5' = 1308 lbs.
				-		19.5 - 26' = 1071 lbs.
				66 --		
				-		
				67 --		NOTE: The stratification lines represent the approximate
				-		boundary between earth types; the transition may be gradual.
				68 --		
				-		Used 24-inch diameter Bucket Auger, 12-inch drop
				69 --		
				-		
				70 --		
				-		
				71 --		
				-		
				72 --		
				-		
				73 --		
				-		
				74 --		
				-		
				75 --		
				-		

BORING LOG NUMBER 5

Aragon Properties **Date: 10/17/16** **Elevation: 412'***

File No. 20489 **Method: 24-inch diameter Bucket Auger**

km

*Reference: Topographic Map by Site Tech, not dated

Sample	Blows	Moisture	Dry Density	Depth in	USCS	Description
Depth ft.	per ft.	content %	p.c.f.	feet	Class.	Surface Conditions: Flat Asphalt Parking Lot
				0 --		5-inch Asphalt over 5" Base, Sandy Gravel, gray
				-		
				1 --		
				-		BEDROCK (PUENTE FORMATION): Silty Sandstone and
				2 --		Sandy Siltstone, light yellowish brown, moist, moderately hard,
				-		well bedded, thinly bedded 1/4" - 1" thick
				3 --		
				-		3.8' Caliche beds 1/4" thick, 2 to 6" apart
				4 --		4.0' Bedding [N69W, 41SW]
				-		
5	1/12"	23.6	100.0	5 --		
				-		
				6 --		
				-		
				7 --		7.0' Bedding [N67W, 51SW]
				-		7.4' Sandstone, bluish gray and reddish brown, micaceus
				8 --		7.8' interbedded Sandstone and Silty Claystone, reddish brown
				-		
				9 --		9.0' Sandstone, bluish gray, moist to wet, seepage from bedding
				-		9.6' reddish brown
10	1/12"	24.9	99.1	10 --		
				-		
				11 --		11.0' Bedding [N67W, 49SW]
				-		
				12 --		12.0' Sandstone, seepage
				-		
				13 --		
				-		
				14 --		
				-		14.4' concretion, Bedding [N68W, 45SW], brownish gray
15	1/12"	24.2	101.5	15 --		
				-		
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		
				19 --		19.0' water surface in boring at end of logging
				-		
20	1/12"	23.0	95.9	20 --		
				-		Total Depth 20 feet
				21 --		Seepage at 9 and 12 feet
				-		Sloughing at 12 feet
				22 --		Downhole logged by Geologist
				-		
				23 --		Kelly Weights 0-25' = 5000 lbs.
				-		25-49' = 3800 lbs.
				24 --		
				-		NOTE: The stratification lines represent the approximate
				25 --		boundary between earth types; the transition may be gradual.
				-		
						Used 24-inch diameter Bucket Auger, 12-inch drop

BORING LOG NUMBER 6

Aragon Properties **Date: 10/17/16** **Elevation: 412'***

File No. 20489 **Method: 24-inch diameter Bucket Auger**

km

*Reference: Topographic Map by Site Tech, not dated

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Flat Asphalt Parking Lot
				0 --		3-inch Asphalt over 4" Base
				-		
				1 --		COLLUVIUM: Clay (reddish brown), Sandy Gravel (gray),
				-		moist, stiff
				2 --		
				-		
				3 --		
				-		
				4 --		BEDROCK (PUENTE FORMATION): Siltstone, mottled reddish
				-		brown and bluish gray, well bedded, moderately hard, moist
5	1/12"	26.2	94.5	5 --		5.0' Bedding [N81E, 25SE]
				-		5.7' Caliche layers along bedding
				6 --		6.0' Sandstone, reddish brown, friable
				-		6.3' Bedding [N72E, 19SE]
				7 --		
				-		7.9' Sandstone, bluish gray, friable
				8 --		8.0' Interbedded Sandy Siltstone and Clayey Siltstone, reddish
				-		brown and bluish gray, caliche along beds
				9 --		8.1' Concretion, hard, 16" thick
				-		
10	2/12"	22.7	104.8	10 --		10.1' Claystone, bluish gray
				-		10.2' Bedding [N86E, 20SE], Sandstone, reddish brown, friable
				11 --		
				-		11.5' Seepage from Sandstone bed
				12 --		
				-		12.8' Bedding [N82E, 23SE]
				13 --		
				-		
				14 --		
				-		
15	2/12"	25.9	99.0	15 --		
				-		
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		18.5' water surface at end of logging
				19 --		
				-		
20	2/12"	20.9	102.4	20 --		
				-		Total Depth 20 feet
				21 --		Seepage 11½ feet
				-		Sloughing below 12 feet
				22 --		Downhole logged by Geologist
				-		
				23 --		Kelly Weights 0-25' = 5000 lbs.
				-		25-50' = 3800 lbs.
				24 --		
				-		NOTE: The stratification lines represent the approximate
				25 --		boundary between earth types; the transition may be gradual.
				-		
						Used 24-inch diameter Bucket Auger, 12-inch drop

BORING LOG NUMBER 7

Aragon Properties **Date: 10/17/16** **Elevation: 411'***

File No. 20489 **Method: 24-inch diameter Bucket Auger**

km

*Reference: Topographic Map by Site Tech, not dated

Sample Depth ft.	Blows per ft.	Moisture content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Flat Asphalt Parking Lot
				0 --		4½-inch Asphalt over 5" Base
				-		
				1 --		COLLUVIUM: Clay (reddish brown), Sandy Gravel (gray), moist, few roots to 1/8" diameter
				-		
				2 --		
				-		
				3 --		
				-		
				4 --		
				-		
5	PUSH/ 12"	26.7	96.7	5 --		
				-		
				6 --		
				-		
				7 --		BEDROCK (PUENTE FORMATION): Interbedded Clayey Siltstone and Silty Sandstone, grayish brown and reddish brown, moderately hard, moist, weathered, sharp inclined contact, roots
				-		
				8 --		
				-		
				9 --		7.5' 1" thick caliche layer, white
				-		7.7' Sandstone, reddish brown, 4" thick
10	1/10"	24.3	98.3	10 --		8.0' Interbedded Silty Sandstone and Clayey Siltstone, well bedded, beds 1/4 - 1" thick
				-		
				11 --		8.7' Sandstone, greenish gray
				-		9.0' Siltstone, reddish brown and brownish gray and white mottling, with concretions
				12 --		
				-		9.7' Silty Sandstone, light reddish brown, moist
				13 --		10.4' Bedding [N79W, 22SW], interbedded Silty Sandstone reddish brown, with Clayey Siltstone grayish brown, beds 1/2-3" deep
				-		
				14 --		
				-		12.0' Seepage from Sandstone bed
15	2/10"	20.1	104.8	15 --		14.0' Bedding [N77W, 15SW]
				-		
				16 --		
				-		
				17 --		
				-		
				18 --		
				-		18.5' water surface at end of logging
				19 --		
				-		
20	1/10"	27.8	98.1	20 --		
				-		Total Depth 20 feet
				21 --		Seepage 12 feet
				-		Sloughing below 14 feet
				22 --		Downhole logged by Geologist
				-		
				23 --		Kelly Weights 0-25' = 5000 lbs.
				-		25-50' = 3800 lbs.
				24 --		
				-		NOTE: The stratification lines represent the approximate boundary between earth types; the transition may be gradual.
				25 --		
				-		
						Used 24-inch diameter Bucket Auger, 12-inch drop

LOG OF TEST PIT NUMBER 7

Aragon Properties | **Drilling Date: 10/13/16** | **Elevation: 468'***

File No. 20489 | **Method: Hand Tools**

km

*Reference: Topographic Map by Site Tech, not dated

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
			0 --		FILL Silty Sand, trace gravel to 1", light yellowish brown, slightly moist,
			-		firm to soft, roots 10" diameter
1	6.7	87.0	1 --		
			-		
			2 --		
			-		
3	10.0	87.2	3 --		
			-		
			4 --		Sandy Gravel, gravel to 3", light brown, horizontal contact
			-		
5	14.1	105.0	5 --		COLLUVIUM: Clay, dark gray to black, moist, stiff
			-		
			6 --		
			-		
7	14.4	106.8	7 --		
			-		Silty Sand, reddish brown, slightly moist, medium dense, siltstone fragments
			8 --		to 4", roots to 1/8"
			-		
			9 --		
			-		BEDROCK (PUENTE FORMATION): Silty Sandstone, reddish brown and
10	13.4	86.6	10 --		bluish gray, fractures to 1/4" to 1" sized pieces, abundant caliche on fracture
			-		surfaces
			11 --		
			-		Sandstone, reddish brown, Bedding [N72E, 18SE]
			12 --		
			-		11.4' Bedding [N77W, 18SW], light brown and light gray mottled
			13 --		12.9' interbedded Siltstone and Sandstone
			-		13.1' caliche bed, white, 1/2" thick, along bedding
			14 --		13.6' mottled light reddish brown and bluish gray, slightly moist, moderately
			-		hard
			15 --		14.0' Siltstone, reddish brown
			-		14.3' Sandstone, light bluish gray
			16 --		14.5' interbedded Siltstone and Sandstone
			-		15.6' Sandstone, dark reddish brown
			17 --		16.4' interbedded Siltstone and Sandstone
			-		17.0' Bedding [N82W, 16SW]
			18 --		
			-		Total Depth 18 feet
			19 --		No Water
			-		No Caving
			20 --		Downhole logged by Geologist
			-		
			21 --		
			-		NOTE: The stratification lines represent the approximate
			22 --		boundary between earth types; the transition may be gradual.
			-		
			23 --		Used 4-inch diameter Hand-Augering Equipment; Hand Sampler
			-		
			24 --		
			-		
			25 --		
			-		

LOG OF TEST PIT NUMBER 8

Aragon Properties | **Drilling Date: 10/17/16** | **Elevation: 447'***

File No. 20489 | **Method: Hand Tools**

km

*Reference: Topographic Map by Site Tech, not dated

Sample Depth ft.	Moisture Content %	Dry Density p.c.f.	Depth in feet	USCS Class.	Description Surface Conditions: Bare Ground
			0 --		FILL: Clayey Silt, light grayish brown, slightly moist to dry, pieces of
			-		plastic and glass, soft
			1 --		
			-		
			2 --		
			-		
			3 --		BEDROCK (PUENTE FORMATION): Siltstone and Sandstone, well bedded,
			-		fissile, moderately hard
			4 --		3.5' Bedding [N05W, 33NE]
			-		4.5' Sandstone bed 5" thick, reddish brown
			5 --		
			-		interbedded Siltstone and Sandstone
			6 --		
			-		6.9' caliche layer 1/2" thick
			7 --		7.0' Sandstone greenish gray 5" thick
			-		7.5' caliche beds 1/2" thick, interbedded Siltstone and Sandstone, thinly bedded
			8 --		8.0' Bedding [N15W, 34NE]
			-		
	NO SAMPLES TAKEN		9 --		
			-		
			10 --		10.0' Bedding [N12W, 33NE]
			-		
			11 --		
			-		12.0' Sandstone, grayish brown and reddish brown mottled, slightly moist,
			12 --		moderately hard
			-		12.5' Siltstone
			13 --		
			-		Total Depth 13 feet
			14 --		No Water
			-		No Caving
			15 --		Downhole logged by Geologist
			-		
			16 --		
			-		NOTE: The stratification lines represent the approximate
			17 --		boundary between earth types; the transition may be gradual.
			-		
			18 --		
			-		
			19 --		
			-		
			20 --		
			-		
			21 --		
			-		
			22 --		
			-		
			23 --		
			-		
			24 --		
			-		
			25 --		
			-		

Appendix A4

Excavation Logs (Photos)

Test Pits TP9 through TP24

File No. 20489, Report dated May 18, 2017

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 1 – Looking West

Photo 2 – Looking South

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 3 - Test Pit 11, 12

Photo 4 – Test Pit 11, 12, 13

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 5 - Test Pit 11, 12, 13

Photo 6 - Test Pit 11, 12, 13, 14

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 7 - Test Pit 13, 14

Photo 8 – Test Pit 15, 16

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 9 - Test Pit 17, 18, 19

Photo 10 – Test Pit 19, 8

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 11 - Test Pit 19, 8, 20

Photo 12 – Test Pit 20, 21

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 13 - Test Pit 21, 22

Photo 14 – Test Pit 9 A

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 15 - Test Pit 9 B

Photo 16 – Test Pit 9 C

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 17 - Test Pit 10 A

Photo 18 – Test Pit 10 B

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 19 - Test Pit 10 C

Photo 20 – Test Pit 11

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 21 - Test Pit 12

Photo 22 – Test Pit 13

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 23 - Test Pit 14 A

Photo 24 – Test Pit 14 B

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 25 - Test Pit 15 A

Photo 26 – Test Pit 15 B

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 27 - Test Pit 16

Photo 28 – Test Pit 17 A

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 29 - Test Pit 17 B

Photo 30 – Test Pit 17 C

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 31 - Test Pit 17 D

Photo 32 – Test Pit 17 E

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD


Photo 33 - Test Pit 18 A

Photo 34 – Test Pit 18 B

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 35 - Test Pit 18 C

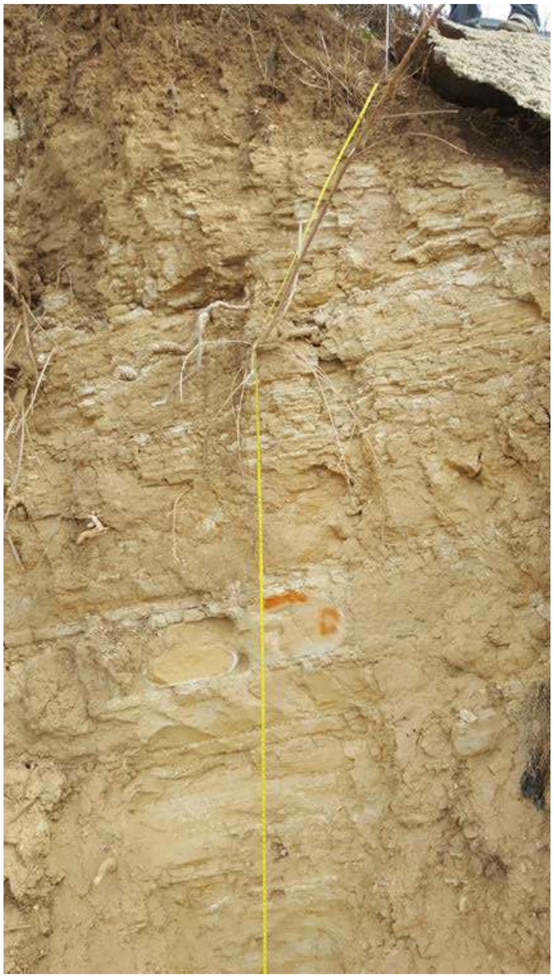


Photo 36 – Test Pit 19 A

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 37 - Test Pit 19 B

Photo 38 – Test Pit 19 C

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 39 - Test Pit 20 A

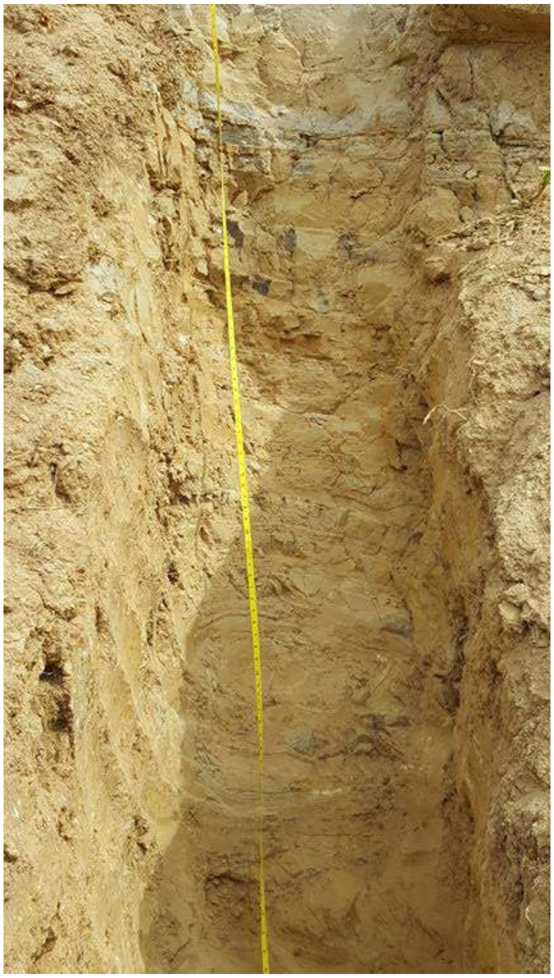


Photo 40 – Test Pit 20 B

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 41 - Test Pit 20 C

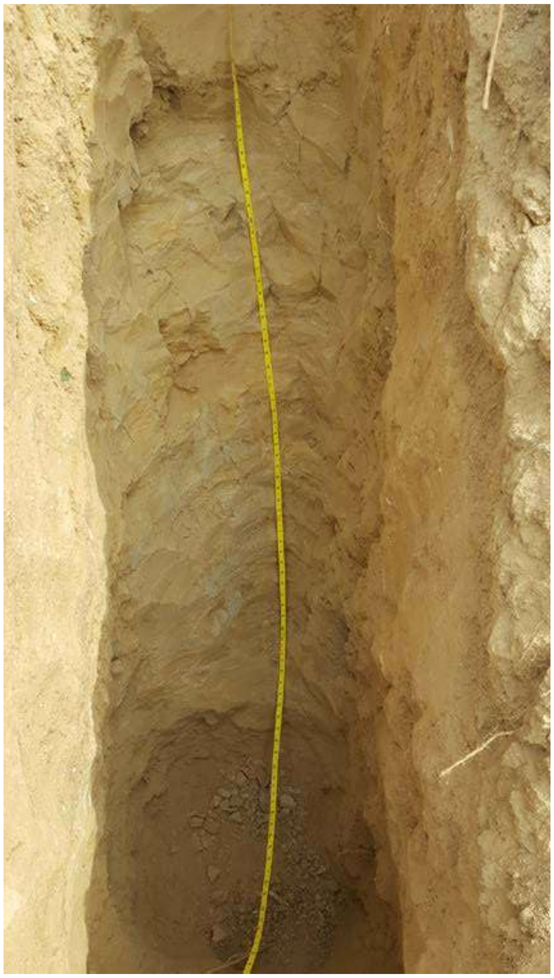


Photo 42 – Test Pit 20 D

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 43 - Test Pit 21 A

Photo 44 – Test Pit 21 B

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 45 - Test Pit 21 C

Photo 46 – Test Pit 22 A

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 47 - Test Pit 22 B

Photo 48 – Test Pit 22 C

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 49 – Test Pit 23 General Vicinity

Photo 50 – Test Pit 23 A

Photo 51 – Test Pit 23 B

Photo 52 – Test Pit 23 C

Photo 53 – Test Pit 23 D

Photo 54 – Test Pit 23 E

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD


Photo 55 – Test Pit 23 F


Photo 56 – Test Pit 23 G


Photo 57 – Test Pit 23 H


Photo 58 – Test Pit 23 I


Photo 59 – Test Pit 23 J


Photo 60 – Test Pit 23 K

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 61 – Test Pit 23 L

Photo 62 – Test Pit 24 General Vicinity

Photo 63 – Test Pit 24 A

Photo 64 – Test Pit 24 B

Photo 65 – Test Pit 24 C

Photo 66 – Test Pit 24 D

PHOTO SHEET

File No.: 20489
File Name: Aragon Properties LTD

Photo 67 – Test Pit 24 E

Photo 68 – Test Pit 24 F

Photo 69 – Test Pit 24 G

Appendix A5

Excavation Logs By Petra Geotechnical

Boring Logs B-1 and B-2

Job Number 558-04
Report dated October 07, 2004

APPENDIX A

LOGS OF BORINGS

Boring Number	Depth (ft.)	Description
B-1		BEDROCK – Puente Formation (Tp)
	0.0 – 7.0	CLAYSTONE – yellow brown, moist, hard, slightly weathered
	7.0 – 10.0	SILTSTONE AND CLAYSTONE - – interbedded, yellow brown to greenish gray, moist, hard, very thinly bedded
	10.0 – 30.0	SILTSTONE AND CLAYSTONE - – interbedded, yellow brown to greenish gray, very moist, hard, laminations in SILTSTONE, very thinly bedded, moderately weathered
		Groundwater seepage at 24 feet.
		End of boring at 31.0 feet. No caving. Groundwater seepage encountered at 24 feet.

APPENDIX A

LOGS OF BORINGS

Boring Number	Depth (ft.)	Description
B-2		ALLUVIUM (Qal)
	0.0 – 12.0	CLAY (CH) – dark brown, very moist, firm
		BEDROCK – Puente Formation (Tp)
	12.0 – 20.0	**SILTSTONE AND CLAYSTONE** - – interbedded, yellow brown to greenish gray, very moist, hard, laminations in SILTSTONE, very thinly bedded, slight weathering
	20.0 – 31.0	**SILTSTONE** – yellow brown, wet, hard, laminations, moderate weathering

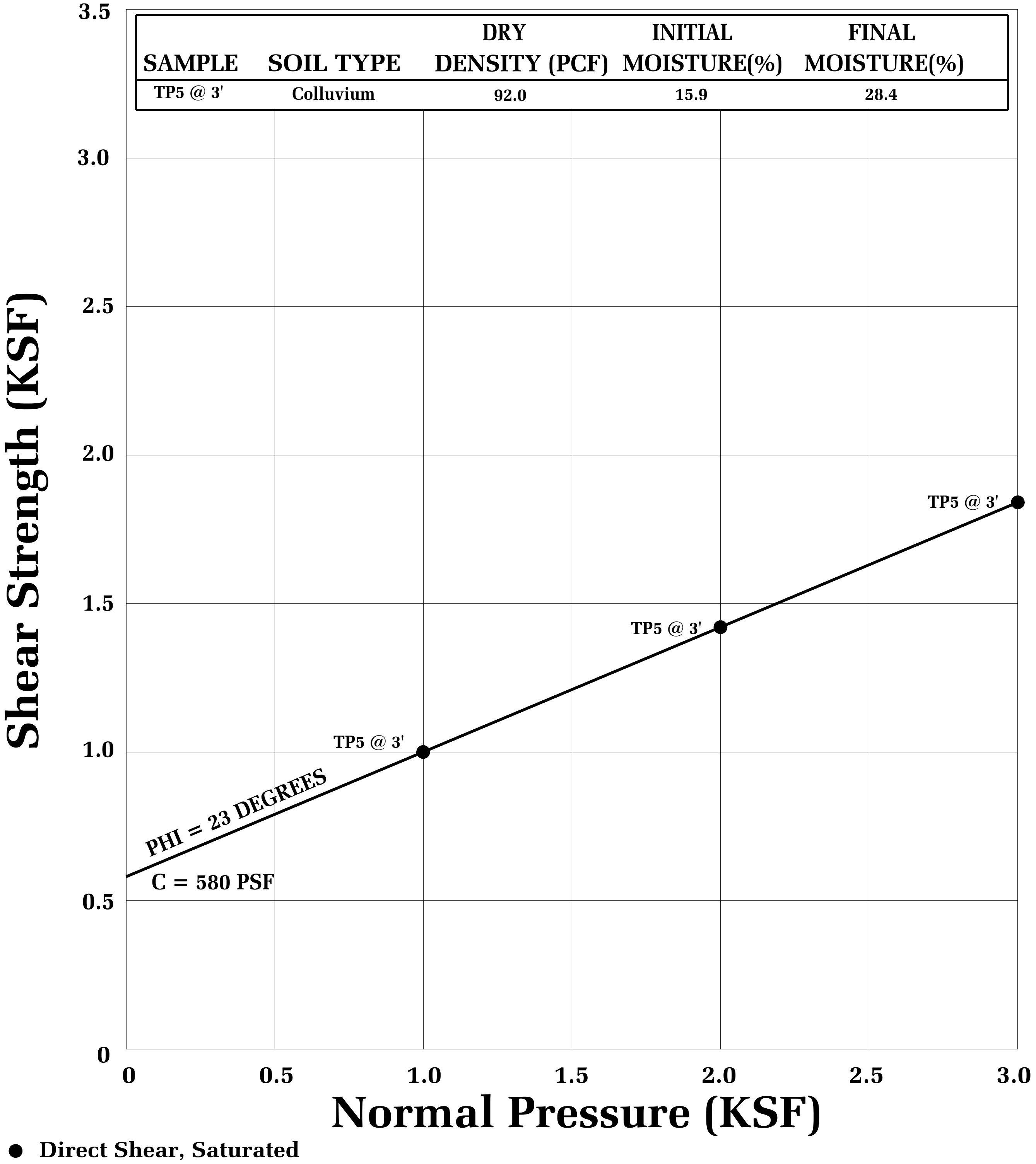
End of boring at 31.0 feet.
No caving.
Groundwater seepage encountered at 17 feet.

Appendix B1

Laboratory Testing Results

Plates B1 thought B4
Plate C
Plate D

File No. 20487, Report dated June 24, 2014



SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
TP5 @ 3'	Colluvium	92.0	15.9	28.4

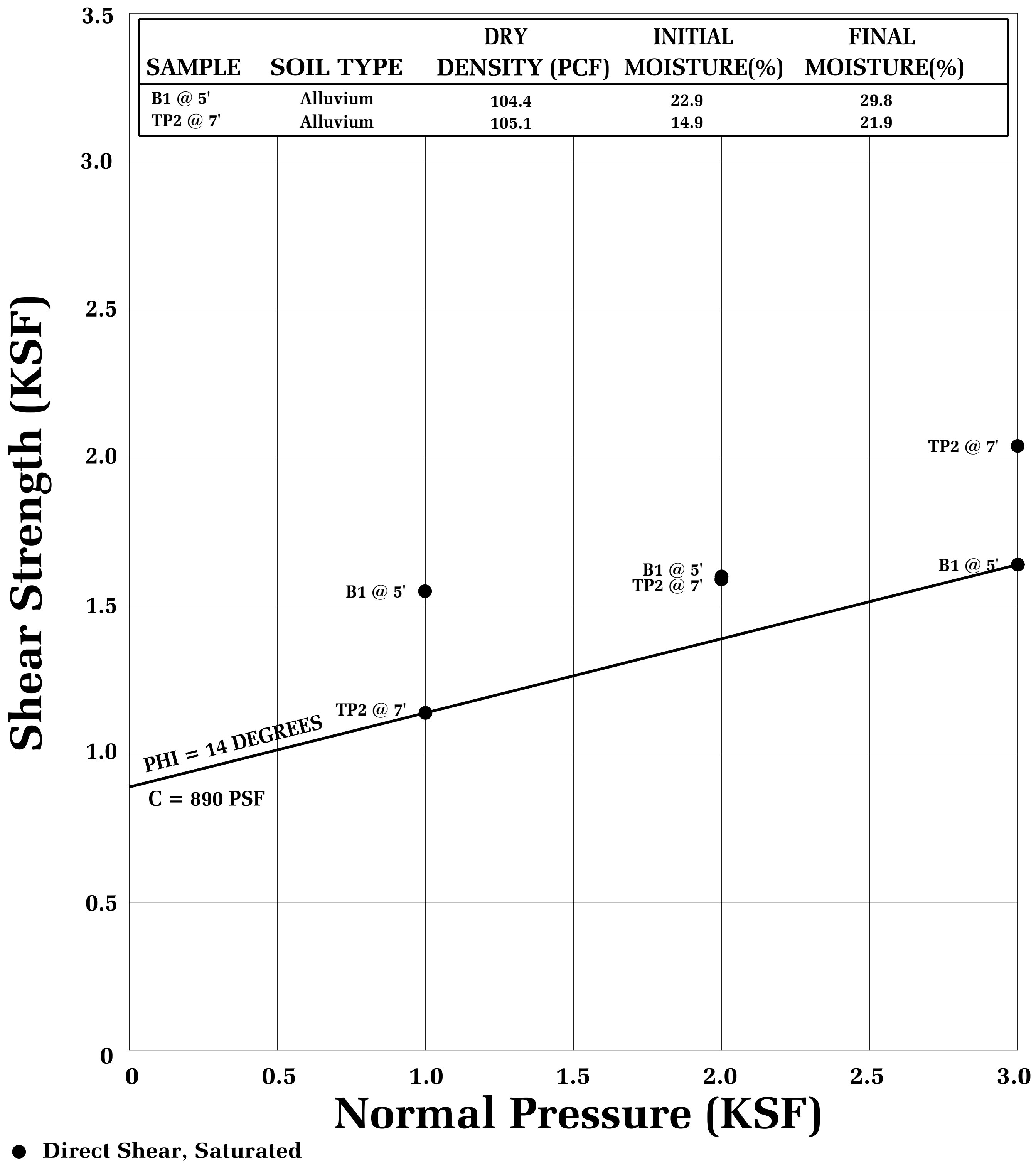
SHEAR TEST DIAGRAM

Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO. 20489

PLATE: B-1



SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
B1 @ 5'	Alluvium	104.4	22.9	29.8
TP2 @ 7'	Alluvium	105.1	14.9	21.9

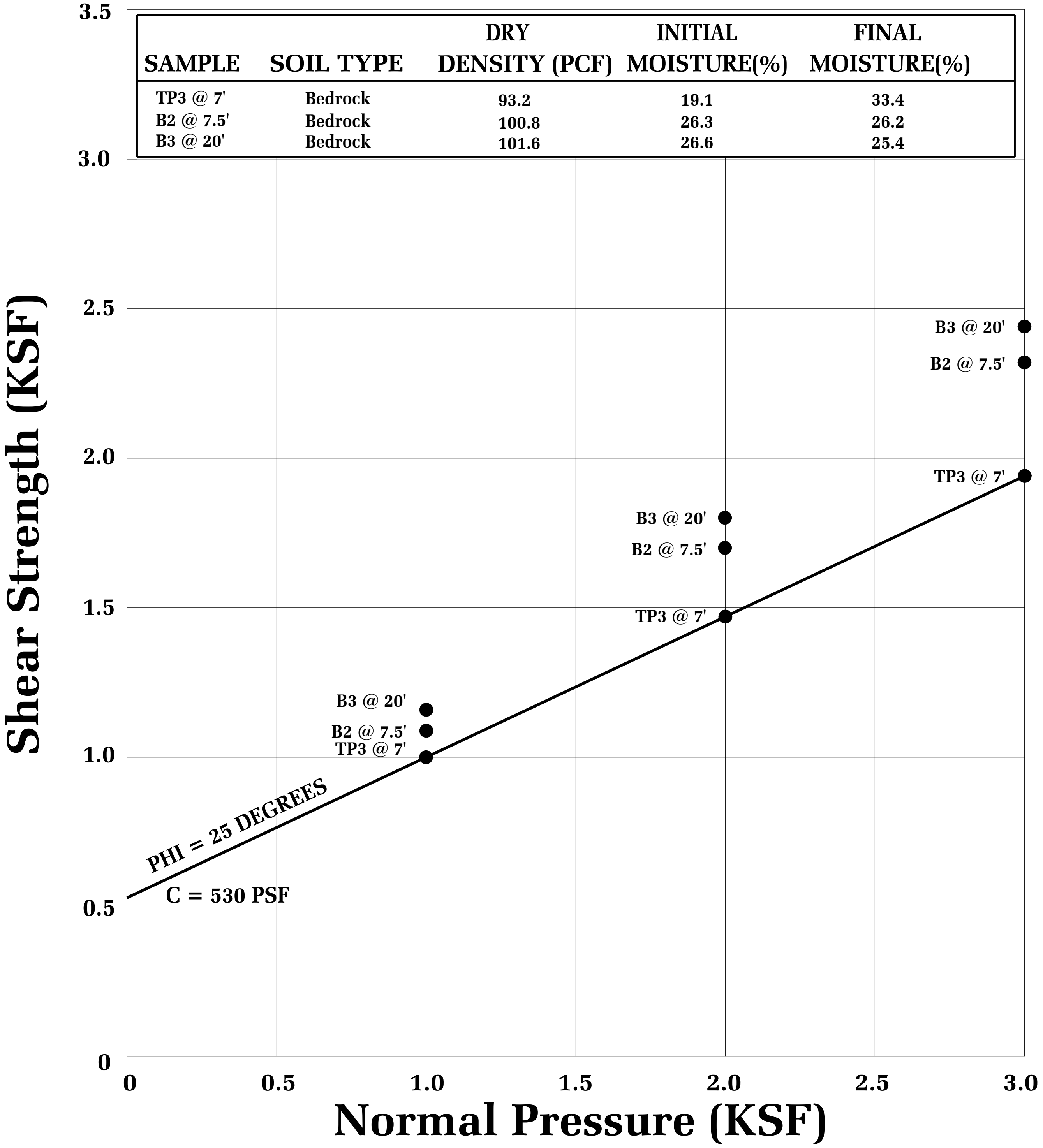
SHEAR TEST DIAGRAM

Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO. 20489

PLATE: B-2



SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
TP3 @ 7'	Bedrock	93.2	19.1	33.4
B2 @ 7.5'	Bedrock	100.8	26.3	26.2
B3 @ 20'	Bedrock	101.6	26.6	25.4

● Direct Shear, Saturated

SHEAR TEST DIAGRAM

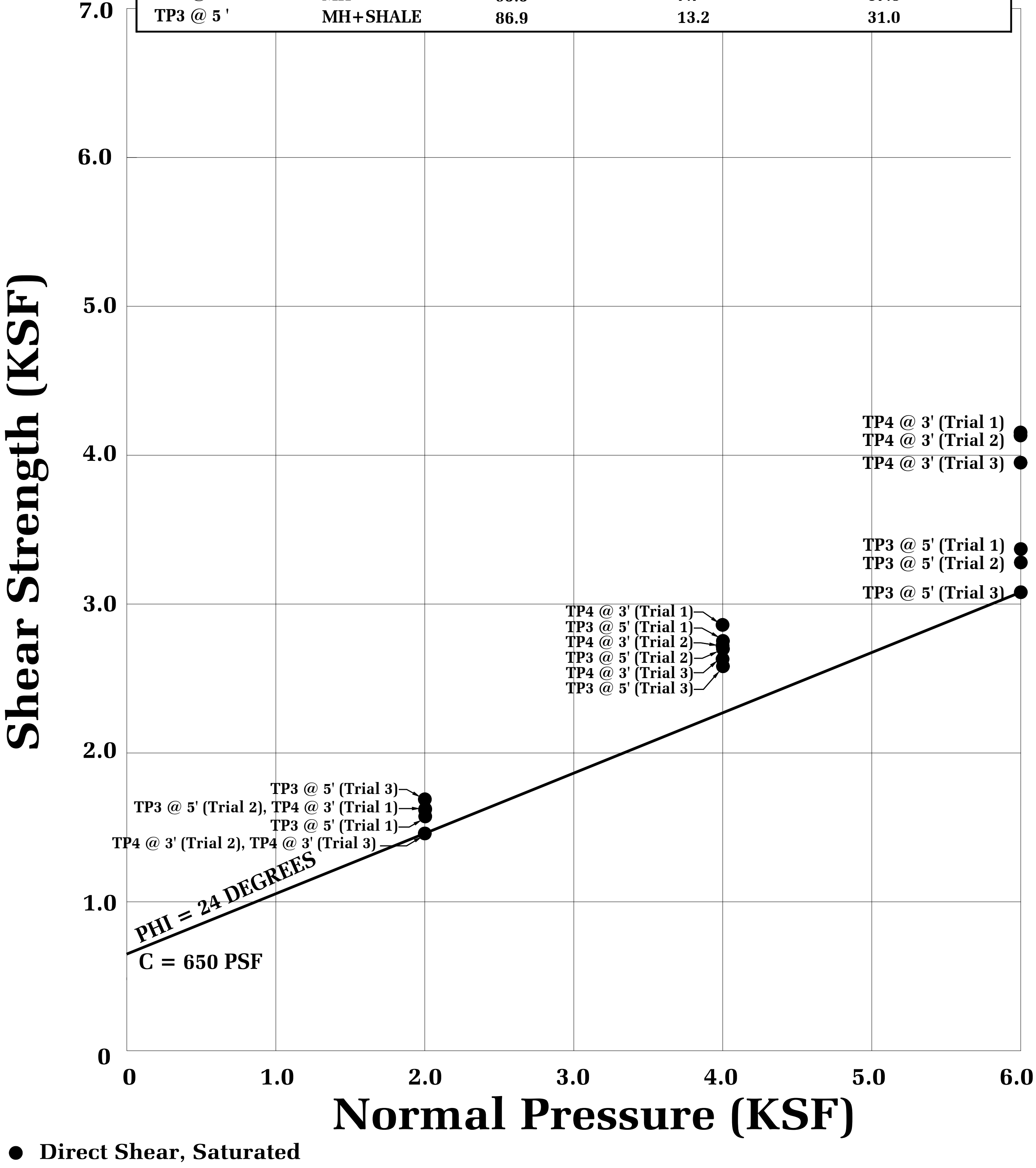
Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO. 20489

PLATE: B-3

SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
TP4 @ 3'	MH	95.5	7.7	37.8
TP3 @ 5 '	MH+SHALE	86.9	13.2	31.0



SHEAR TEST DIAGRAM

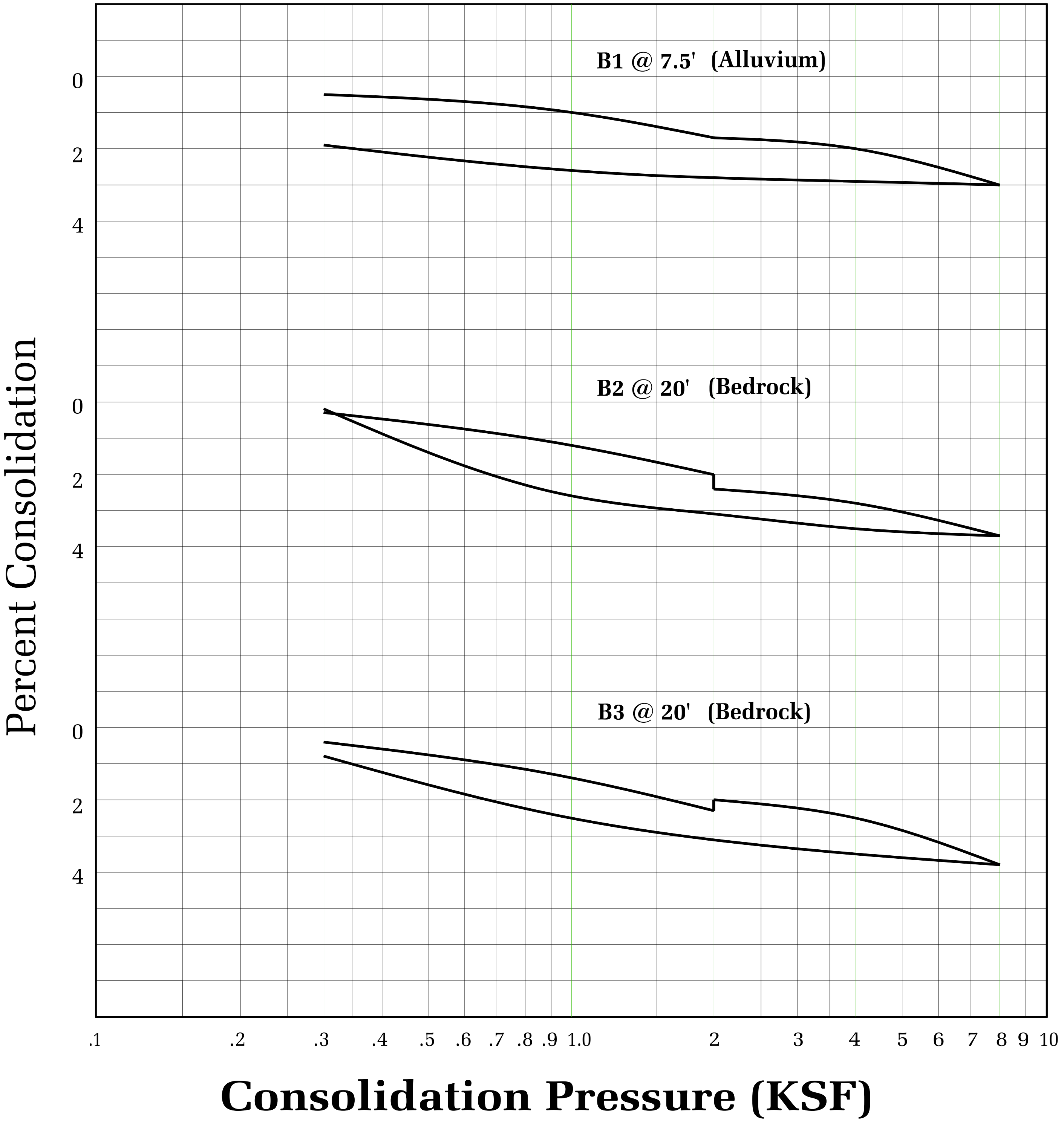
Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO. 20489

PLATE: B-4

WATER ADDED AT 2 KSF



CONSOLIDATION TEST

Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO. 20489

PLATE: C

ASTM D-1557

SAMPLE	TP2 @ 1- 5'	TP3 @ 1- 5'
SOIL TYPE:	ALLUVIUM	BEDROCK
MAXIMUM DENSITY pcf.	112.8	106.1
OPTIMUM MOISTURE %	16.4	19.2

ASTM D 4829-03

SAMPLE	TP2 @ 1- 5'	TP3 @ 1- 5'
SOIL TYPE:	ALLUVIUM	BEDROCK
EXPANSION INDEX UBC STANDARD 18-2	54	110
EXPANSION CHARACTER	MODERATE	HIGH

SULFATE CONTENT

SAMPLE	TP2 @ 1- 5'	TP3 @ 2- 5'	TP4 @ 0- 1.5'	TP5 @ 5- 8'
SULFATE CONTENT: (percentage by weight)	< 0.1	< 0.1	< 0.1	< 0.1

COMPACTION/EXPANSION/SULFATE DATA SHEET

Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO. 20489

PLATE: D

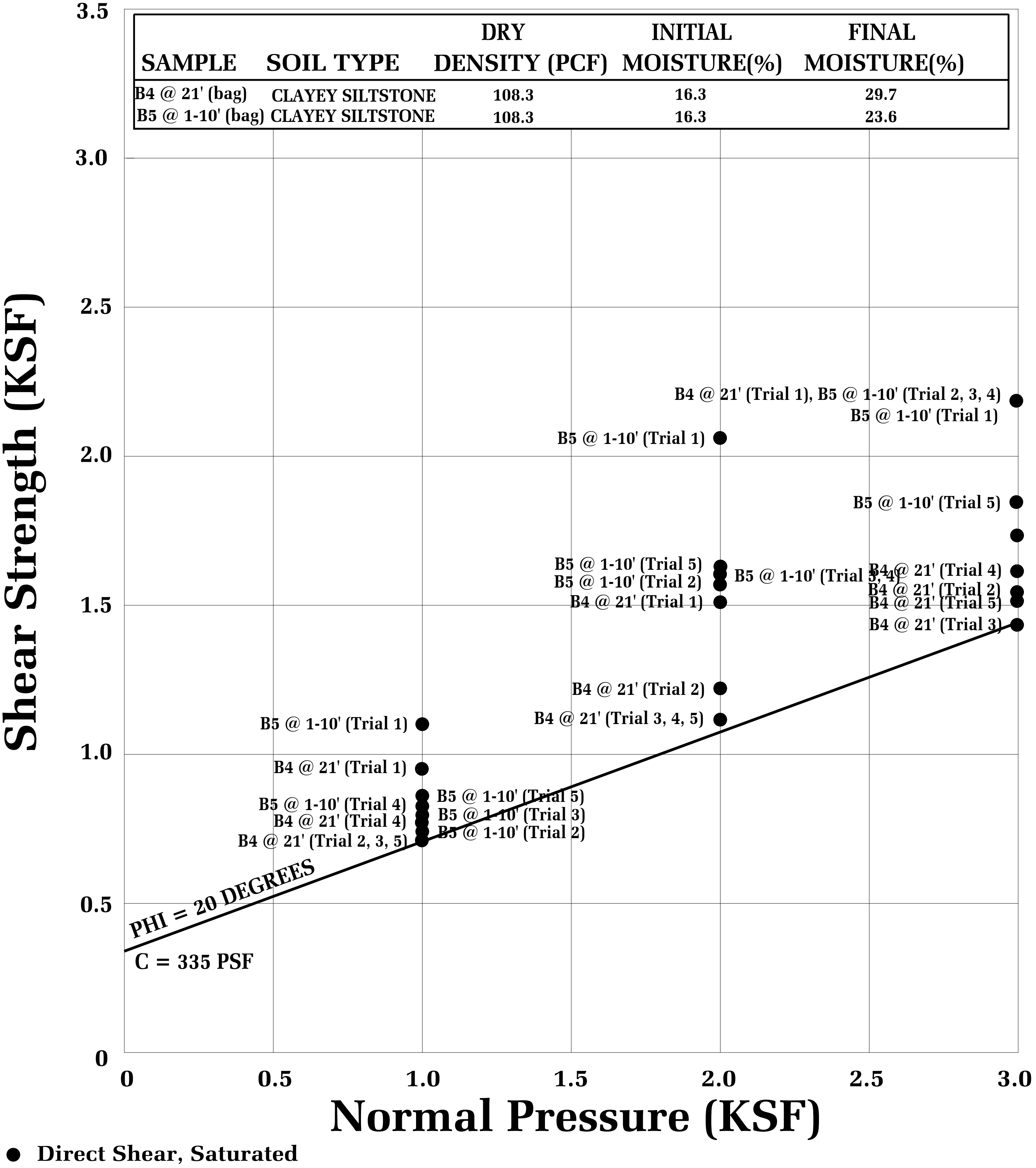
Appendix B2

Laboratory Testing Results

Plate B-6

File No. 20487, Report dated May 18, 2017

BEDROCK REMOLDED



SAMPLE	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE(%)	FINAL MOISTURE(%)
B4 @ 21' (bag)	CLAYEY SILTSTONE	108.3	16.3	29.7
B5 @ 1-10' (bag)	CLAYEY SILTSTONE	108.3	16.3	23.6

SHEAR TEST DIAGRAM

Geotechnologies, Inc.
Consulting Geotechnical Engineers

ARAGON PROPERTIES, LTD.

FILE NO. 20489

PLATE: B-6

Appendix C

Calculation Sheets

Project:	Aragon Development
Date:	8/3/2023
File No.:	20489
Cross Section	E-E'
Description:	Bedrock

ESTIMATION OF PERMANENT SEISMIC DISPLACEMENT USING THE BRAY AND RATHJE (1998) PROCEDURE.

INPUT PARAMETERS:

Yield Acceleration, ky (g):	0	
Vertical Thickness, H (m):	0	
Shear Wave Vel., Vs (m/s):	560	
Earthquake Magnitude, M:	6.90	*
Peak Ground Acceleration, PGAm (g)	1.04	*
Earthquake Accel., Firm Rock, MHAr, (g):	0.70	2/3 PGAm
Earthquake Distance, r (km):	7.02	*
Landslide factor, 0.8 for large slide, 1.0 for small slid	1	*

Normalized MHEA Sigma:	0	
Mean Period Sigma:	0	
Significant Duration Sigma:	0	
Normalized Displacement Sigma	0	
Allowable screen displacement (c	5	*

CALCULATIONS:

Site Period (Ts): 0.000

(eqn. 11.5) $Ts = 4*H/Vs$

NRF Factor: 0.815

(eqn. 11.3) $NRF= 0.6225+ 0.9196*\exp(-MHAr/0.4449)$

Mean Period (Tm): 0.501

(eqn. 10.2a) $Tm = (C1+C2*(M-6)+C3*r)*EXP(e_T)$ for M<7.25

(eqn. 10.2b) $Tm = (C1+ 1.25* C2+C3*r)*EXP(e_T)$ for 7.25<M<8.0

where:
C1 = 0.411
C2= 0.0837
C3 = 0.00208
$e_T = 0.437$

Duration, D_{5-95} (s): 12.801

(eqn. 10.1a) $\ln(D_{5-95}) = \ln(\exp(5.204+0.851*(M-6)))/power(10,1.5*M+16.05), -1/3)/(15.7*10^6))+0.063*(r-10))+0.8664$ for r>10 k

(eqn. 10.1b) $\ln(D_{5-95}) = \ln(\exp(5.204+0.851*(M-6))/power(10,1.5*M+16.05), -1/3)/(15.7*10^6)+0.8664)$ for r<10 k

Ts/Tm:	0.0000
MHEA/MHA*NRF:	#NUM!
MHEA, kmax:	#NUM!
ky/kmax:	#NUM!
Normalized Disp. (cm/sec):	#NUM!

(Input values marked with asterisks are use
for calculation of seismic coefficient for scre

Estimated Displacement (cm):	#NUM!
Estimated Displacement (in):	#NUM!

Median f_{eq} for Screen Procedure:	0.476
Seismic Coefficient for Screen Procedu	0.331

Geotechnologies, Inc.

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Please also see the new USGS Earthquake Hazard Toolbox for access to the most recent NSHMs for the conterminous U.S. and Hawaii.

^ Input

Edition

Dynamic: Conterminous U.S. 2014 (4....

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

34.0691

Time Horizon

Return period in years

475

Longitude

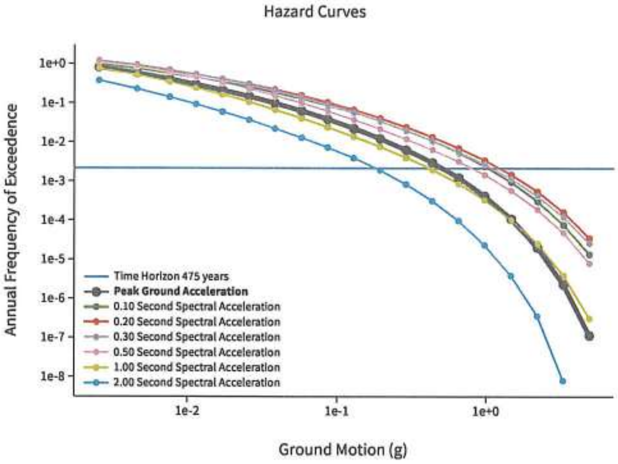
Decimal degrees, negative values for western longitudes

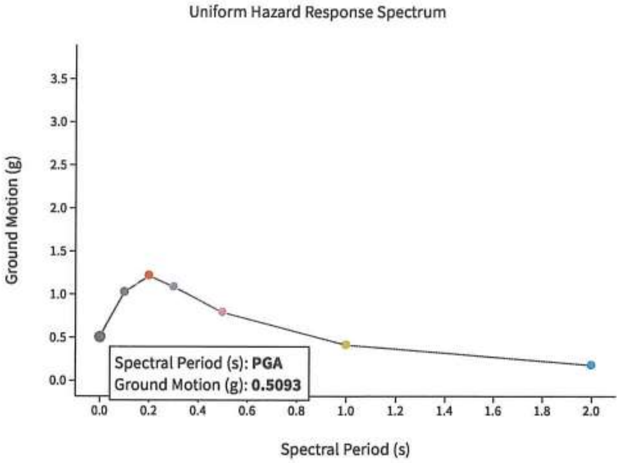
-118.2495

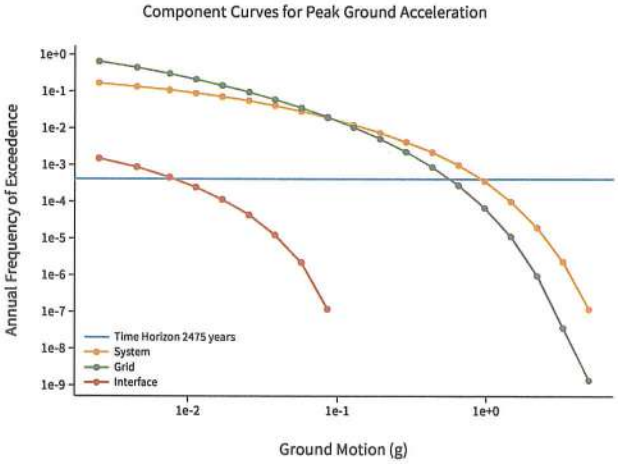
Site Class

537 m/s (Site class C)

^ Hazard Curve


Hazard Curves


Uniform Hazard Response Spectrum

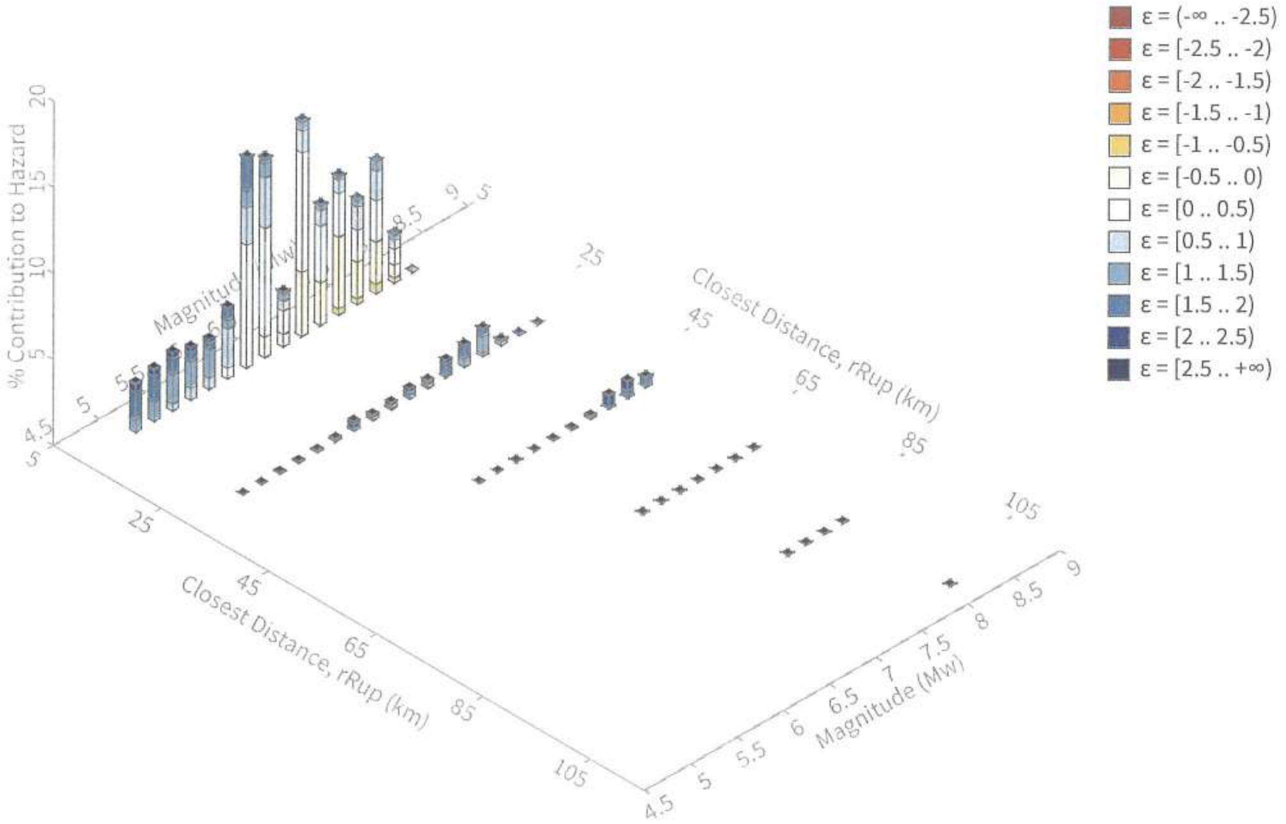

Component Curves for Peak Ground Acceleration

View Raw Data

Deaggregation

Component

Total



ε = (-∞ .. -2.5)
ε = [-2.5 .. -2)
ε = [-2 .. -1.5)
ε = [-1.5 .. -1)
ε = [-1 .. -0.5)
ε = [-0.5 .. 0)
ε = [0 .. 0.5)
ε = [0.5 .. 1)
ε = [1 .. 1.5)
ε = [1.5 .. 2)
ε = [2 .. 2.5)
ε = [2.5 .. +∞)
% Contribution to Hazard
20
15
10
5
Closest Distance, rRup (km)
5
25
45
65
85
105
Magnitude (Mw)
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9

Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.50931752 g

Recovered targets

Return period: 496.22242 yrs
Exceedance rate: 0.0020152254 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.1 %

Mean (over all sources)

m: 6.76
r: 10.93 km
ε_0: 0.66 σ

Mode (largest m-r bin)

m: 6.9
r: 7.02 km
ε_0: 0.17 σ
Contribution: 12.51 %

Mode (largest m-r-ε_0 bin)

m: 6.34
r: 4.69 km
ε_0: 0.27 σ
Contribution: 7.16 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							39.40
Elysian Park (Upper) [2]		4.52	6.86	0.01	118.239°W	34.081°N	35.12	10.87
Elysian Park (Upper) [1]		4.52	6.35	0.26	118.239°W	34.081°N	35.12	6.12
Compton [2]		15.18	7.38	0.09	118.364°W	33.847°N	203.21	3.50
Newport-Inglewood alt 1 [8]		12.98	6.74	1.16	118.377°W	34.021°N	245.68	2.23
Puente Hills [4]		6.17	7.07	-0.10	118.266°W	34.056°N	227.53	1.96
Hollywood [0]		6.32	7.33	0.18	118.264°W	34.123°N	347.65	1.94
Sierra Madre [5]		17.91	7.68	0.95	118.179°W	34.219°N	21.39	1.42
Verdugo [1]		10.84	7.49	0.49	118.220°W	34.163°N	14.70	1.41
Raymond [2]		6.77	6.71	0.54	118.224°W	34.124°N	21.14	1.40
San Andreas (Mojave S) [7]		53.61	8.07	2.11	117.992°W	34.502°N	26.09	1.15
UC33brAvg_FM32	System							35.82
Elysian Park (Upper) [2]		4.52	7.03	-0.01	118.239°W	34.081°N	35.12	8.64
Compton [2]		15.18	7.40	0.06	118.364°W	33.847°N	203.21	3.45
Elysian Park (Upper) [1]		4.52	7.05	-0.06	118.239°W	34.081°N	35.12	3.21
Puente Hills (Santa Fe Springs) [1]		13.41	7.00	0.58	118.144°W	33.926°N	148.44	2.51
Hollywood [0]		6.32	7.11	0.27	118.264°W	34.123°N	347.65	2.49
Newport-Inglewood alt 2 [8]		12.76	6.84	0.98	118.370°W	34.015°N	241.47	1.95
Puente Hills (LA) [1]		5.48	7.16	-0.36	118.281°W	34.029°N	212.76	1.58
Sierra Madre [5]		17.91	7.71	0.94	118.179°W	34.219°N	21.39	1.37
San Vicente [0]		6.12	6.49	0.45	118.306°W	34.066°N	265.71	1.37
Verdugo [1]		10.84	7.48	0.50	118.220°W	34.163°N	14.70	1.19
San Andreas (Mojave S) [7]		53.61	8.07	2.11	117.992°W	34.502°N	26.09	1.15
UC33brAvg_FM32 (opt)	Grid							12.77
PointSourceFinite: -118.250, 34.119		7.32	5.70	1.10	118.249°W	34.119°N	0.00	3.38
PointSourceFinite: -118.250, 34.119		7.32	5.70	1.10	118.249°W	34.119°N	0.00	3.38
PointSourceFinite: -118.250, 34.146		9.09	5.86	1.27	118.249°W	34.146°N	0.00	1.68
PointSourceFinite: -118.250, 34.146		9.09	5.86	1.27	118.249°W	34.146°N	0.00	1.68
UC33brAvg_FM31 (opt)	Grid							12.00
PointSourceFinite: -118.250, 34.119		7.35	5.68	1.12	118.249°W	34.119°N	0.00	3.17
PointSourceFinite: -118.250, 34.119		7.35	5.68	1.12	118.249°W	34.119°N	0.00	3.17
PointSourceFinite: -118.250, 34.146		9.11	5.85	1.28	118.249°W	34.146°N	0.00	1.54
PointSourceFinite: -118.250, 34.146		9.11	5.85	1.28	118.249°W	34.146°N	0.00	1.54

OSHPD

File No. 20489

Latitude, Longitude: 34.0691, -118.2495

Date	8/3/2023, 9:45:25 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	2.025	MCE_R ground motion. (for 0.2 second period)
S_1	0.722	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.429	Site-modified spectral acceleration value
S_{M1}	1.011	Site-modified spectral acceleration value
S_{DS}	1.62	Numeric seismic design value at 0.2 second SA
S_{D1}	0.674	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.4	Site amplification factor at 1.0 second
PGA	0.87	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.044	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.025	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.266	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.479	Factored deterministic acceleration value. (0.2 second)
S1RT	0.722	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.807	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.778	Factored deterministic acceleration value. (1.0 second)
PGAd	0.999	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.87	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.894	Mapped value of the risk coefficient at short periods
C_{R1}	0.895	Mapped value of the risk coefficient at a period of 1 s
C_V	1.3	Vertical coefficient

Project: Aragon Properties, Inc.
File No.: 20489
Description: Bedrock , Puente Formation Cross bedded

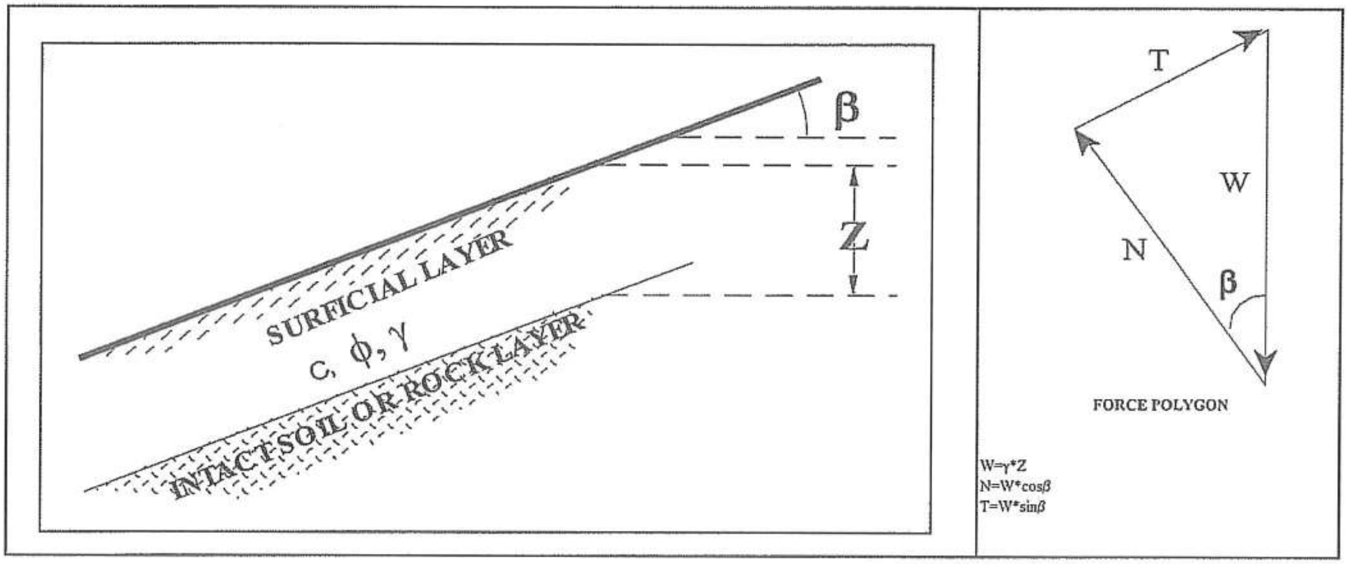
SURFICIAL SLOPE STABLITY FOR INFINITE SLOPE

Input Slope Properties:

Vertical Thickness of Surficial Materials	(Z)	5.00 feet	
Slope Angle	(β)	27.0 degrees	0.4712389 radians
Saturated Thickness	(h_s)	3.0 feet	

Input Soil Properties:

Unit Weight of Saturated Surficial Soils	(γ)	125.0 pcf	
Friction Angle of Surficial Soils	(ϕ)	25.0 degrees	0.43633231 radians
Cohesion of Surficial Soils	(c)	530.0 psf	
Density of Water	(γ_ω)	62.4 pcf	



Equation $$F= \frac{c' + (\gamma\text{-}m*\gamma w)*z*\cos\text{^}2\beta*\tan\varphi}{\gamma*z*\sin\beta\cos\beta}$$

Factor of Safety	**2.74**

Ref: Blake, T.F., Hollingsworth, R.A., and Stewart, J.P., 2002, Recommended Procedures for Implementation of DMG Special Publication 117 Guidelines for analyzing and Mitigating Landslide Hazards in California, Southern California Earthquake Center

Geotechnologies, Inc.

Project: Aragon Properties, Inc.
File No.: 20489
Description: Friction Capacity in rock, 7 foot overburden
4/1/2013

Friction Pile Capacity Calculation

Input Data:

Unit Weight of Overlying Soil Layer	γ_1	120 pcf
Thickness of Overlying Soil Layer	H_1	7 feet
Unit Weight of Bearing Strata	γ_2	119 pcf
Friction Angle of Bearing Strata	ϕ_2	25 degrees
Cohesion of Bearing Strata	c_2	530 psf
Minimum Embedment into Bearing Strata	H_2	20 feet
Unit Weight of Water	γ_w	62.4 pcf
Depth to Groundwater from Pile Cap	H_w	10 feet

Pile Design:

driven <<Driven/Drilled
Circular <<Circular/Square Pile

Pile Dimension:

24	in. Diam.	3.14 ft^2 Area
30	in. Diam.	4.91 ft^2 Area
36	in. Diam.	7.07 ft^2 Area

Critical Depth Limit (Dc):

30 B

Lateral Earth Pressure Coefficient: $K_c = 0.80$

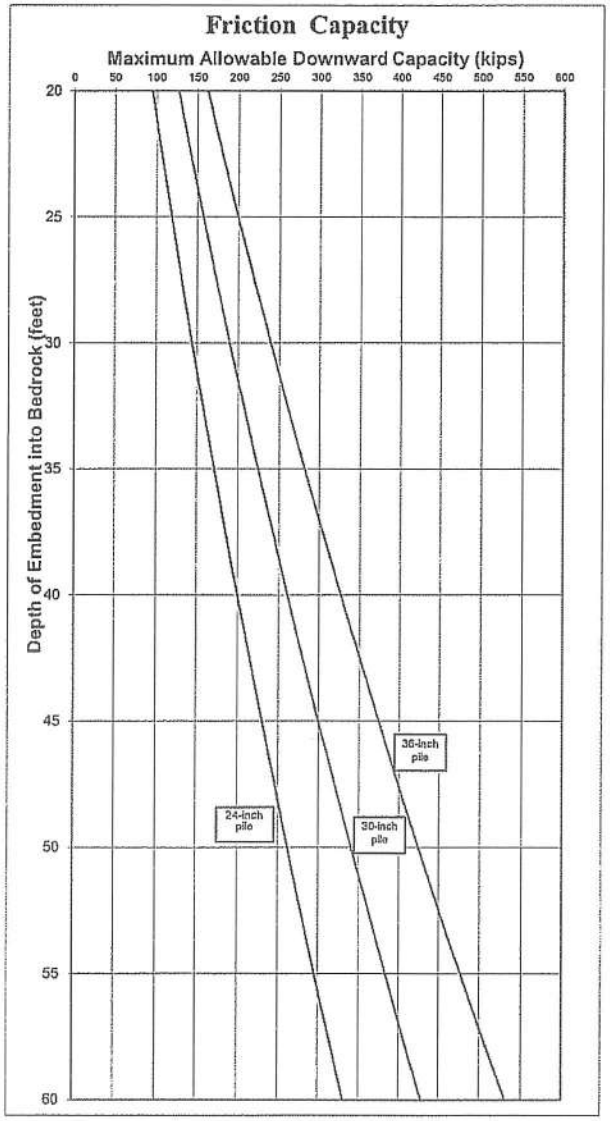
Applied Factor of Safety: $FS = 2$

Factored Skin Friction $fult = [c_2+K_c*\sigma'_v*(\tan \phi_2)]/FS$

$f_{allow} = f_{ult}/FS$

Pile Capacity:

Total Depth of Pile (feet)	Depth of Embedment into Bearing Strata (feet)	Maximum Allowable Downward Pile Capacity Capacity of 24 inch diameter pile (kips)	Capacity of 30 inch diameter pile (kips)	Capacity of 36 inch diameter pile (kips)
27	20	94.8	126.8	162.0
28	21	99.4	132.7	169.3
29	22	104.1	138.7	176.7
30	23	108.9	144.8	184.2
31	24	113.7	151.0	191.8
32	25	118.6	157.2	199.5
33	26	123.5	163.6	207.3
34	27	128.5	170.0	215.2
35	28	133.6	176.5	223.2
36	29	138.8	183.1	231.3
37	30	144.0	189.8	239.5
38	31	149.3	196.5	247.8
39	32	154.6	203.4	256.2
40	33	160.0	210.3	264.7
41	34	165.5	217.3	273.3
42	35	171.1	224.4	282.0
43	36	176.7	231.6	290.8
44	37	182.3	238.8	299.6
45	38	188.1	246.2	308.6
46	39	193.9	253.6	317.7
47	40	199.8	261.1	326.9
48	41	205.7	268.7	336.2
49	42	211.7	276.3	345.6
50	43	217.8	284.1	355.1
51	44	223.9	291.9	364.7
52	45	230.2	299.8	374.4
53	46	236.4	307.8	384.1
54	47	242.8	315.9	394.0
55	48	249.2	324.1	404.0
56	49	255.7	332.3	414.1
57	50	262.2	340.7	424.3
58	51	268.8	349.1	434.6
59	52	275.5	357.6	444.9
60	53	282.2	366.1	455.4
61	54	289.0	374.8	466.0
62	55	295.9	383.6	476.7
63	56	302.8	392.4	487.5
64	57	309.8	401.3	498.4
65	58	316.9	410.3	509.3
66	59	324.0	419.4	520.4
67	60	331.2	428.5	531.6



Note: 1. Minimum pile embedment depth of 20 feet
2. Uplift capacity may be designed using 50% of the downward capacity
3. Pile should be spaced a minimum of 2-1/2 diameters on center
4. See text of report for pile details and installation recommendations

Geotechnologies, Inc.

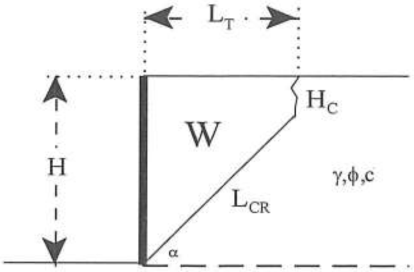
Project: Aragon Poroperties, LTD>
File No.: 20489
Description: Favoraby Oriented Bedrock - Drained

Retaining Wall Design with Level Backfill
(Vector Analysis)

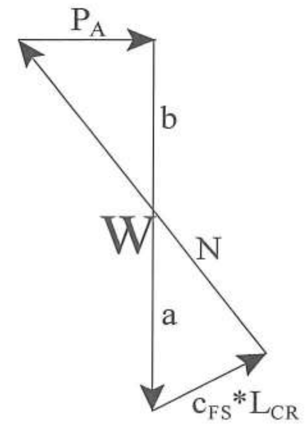
Input:

Retaining Wall Height	(H)	25.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	25.0 degrees
Cohesion of Retained Soils	(c)	530.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	17.3 degrees
	(c_{FS})	353.3 psf

28



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
20	62.8	-4559	-547076.8	-110.5	-782601.3	235524.6	0.0
21	46.3	-1976	-237135.8	-59.4	-307937.9	70802.1	0.0
22	36.8	-900	-107944.5	-31.4	-128509.8	20565.3	0.0
23	30.6	-366	-43913.5	-14.3	-48328.4	4414.9	0.0
24	26.3	-72	-8699.0	-3.1	-8912.7	213.7	0.0
25	23.1	100	11983.7	4.6	11500.6	483.2	65.6
26	20.6	205	24638.1	10.0	22265.9	2372.2	364.3
27	18.7	271	32551.5	13.9	27833.1	4718.3	809.1
28	17.1	313	37520.9	16.8	30482.8	7038.1	1333.8
29	15.8	338	40590.1	19.0	31451.7	9138.4	1897.6
30	14.7	353	42395.4	20.5	31439.9	10955.5	2475.2
31	13.8	361	43340.1	21.7	30857.5	12482.6	3050.1
32	13.0	364	43688.3	22.6	29950.5	13737.7	3612.0
33	12.4	363	43617.4	23.2	28869.1	14748.3	4154.2
34	11.8	360	43249.7	23.6	27706.1	15543.6	4672.5
35	11.3	356	42670.6	23.9	26518.8	16151.9	5164.4
36	10.8	350	41941.2	24.1	25342.5	16598.6	5628.3
37	10.4	343	41105.2	24.2	24198.6	16906.6	6063.8
38	10.1	335	40194.9	24.2	23099.4	17095.5	6470.4
39	9.8	327	39233.6	24.2	22051.3	17182.2	6848.4
40	9.5	319	38238.9	24.1	21057.4	17181.5	7198.1
41	9.3	310	37223.7	24.0	20117.9	17105.8	7520.0
42	9.0	302	36197.8	23.8	19232.0	16965.8	7814.5
43	8.9	293	35168.3	23.7	18397.6	16770.7	8082.4
44	8.7	285	34140.5	23.5	17612.3	16528.2	8324.1
45	8.5	276	33118.5	23.3	16873.4	16245.2	8540.1



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$
$b = W-a$
$P_A = b*\tan(\alpha-\phi_{FS})$
$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\ max}$ 8540.1 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$
EFP 27.3 pcf

Design Wall for an Equivalent Fluid Pressure: 30 pcf

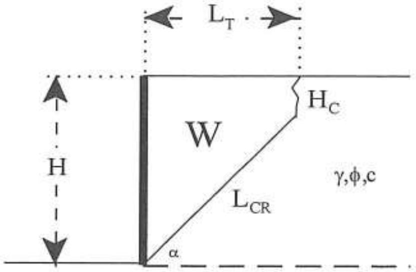
Geotechnologies, Inc.

Project: Aragon Poroperties, LTD>
File No.: 20489
Description: Favoraby Oriented Bedrock ~ Drained

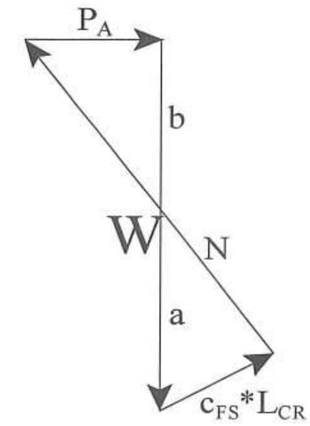
Retaining Wall Design with Level Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	35.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	25.0 degrees
Cohesion of Retained Soils	(c)	530.0 psf
Factor of Safety	(FS)	1.50
		28
Factored Parameters:	(ϕ_{FS})	17.3 degrees
	(c_{FS})	353.3 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
20	62.8	-3735	-448167.6	-81.3	-575556.1	127388.6	0.0
21	46.3	-1195	-143352.6	-31.5	-163251.8	19899.2	0.0
22	36.8	-157	-18841.4	-4.7	-19305.5	464.1	0.0
23	30.6	341	40897.2	11.3	38146.6	2750.6	276.1
24	26.3	601	72158.4	21.5	61862.5	10295.8	1215.1
25	23.1	743	89186.0	28.2	70849.0	18337.0	2489.4
26	20.6	820	98449.0	32.8	72970.9	25478.1	3912.8
27	18.7	860	103205.4	36.0	71803.5	31401.9	5385.1
28	17.1	877	105227.0	38.1	69081.0	36146.0	6850.1
29	15.8	879	105535.8	39.6	65681.7	39854.2	8275.9
30	14.7	873	104749.2	40.5	62061.1	42688.1	9644.5
31	13.8	860	103254.2	41.1	58456.9	44797.3	10946.1
32	13.0	844	101300.3	41.4	54990.2	46310.1	12176.0
33	12.4	825	99052.6	41.6	51718.8	47333.8	13332.6
34	11.8	805	96621.9	41.5	48665.6	47956.3	14415.9
35	11.3	784	94084.0	41.4	45834.2	48249.8	15427.2
36	10.8	762	91490.9	41.1	43218.1	48272.9	16368.6
37	10.4	741	88878.9	40.8	40805.2	48073.6	17242.2
38	10.1	719	86272.8	40.5	38581.5	47691.3	18050.5
39	9.8	697	83689.9	40.1	36531.9	47158.0	18796.0
40	9.5	676	81142.0	39.7	34641.8	46500.2	19481.0
41	9.3	655	78637.0	39.2	32897.1	45739.9	20107.9
42	9.0	635	76179.8	38.8	31284.9	44894.9	20678.8
43	8.9	615	73773.5	38.3	29793.0	43980.5	21195.7
44	8.7	595	71419.6	37.9	28410.7	43008.9	21660.4
45	8.5	576	69118.5	37.4	27127.9	41990.7	22074.6



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$
$b = W-a$
$P_A = b*\tan(\alpha-\phi_{FS})$
$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\ max}$ 22074.6 | lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$
EFP 36.0 pcf

Design Wall for an Equivalent Fluid Pressure: **36 pcf**

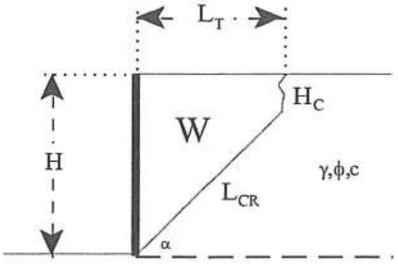
Geotechnologies, Inc.

Project: Aragon Properties, Ltd.
File No.: 20489
Description: Daylighted Bedrock, ~Drained

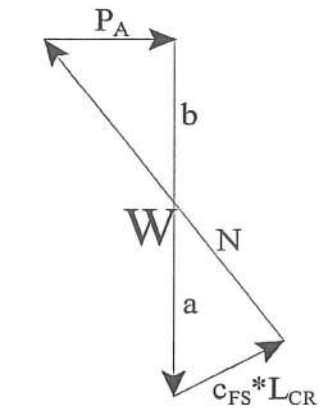
Retaining Wall Design with Level Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	25.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.50
		28
Factored Parameters:	(ϕ_{FS})	13.6 degrees
	(c_{FS})	223.3 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
20	17.4	444	53279.9	22.3	43688.6	9591.3	1069.2
21	15.1	516	61952.3	27.6	46697.9	15254.5	1970.6
22	13.4	551	66090.2	30.9	46159.2	19931.0	2929.3
23	12.1	564	67718.3	33.1	44122.3	23596.0	3889.8
24	11.0	566	67896.2	34.4	41513.3	26382.9	4823.6
25	10.1	560	67213.9	35.2	38764.7	28449.3	5716.2
26	9.4	550	66016.2	35.6	36079.0	29937.2	6560.7
27	8.8	538	64511.8	35.7	33547.0	30964.8	7354.6
28	8.3	524	62830.7	35.7	31203.8	31626.9	8097.4
29	7.8	509	61055.5	35.5	29056.7	31998.8	8790.5
30	7.4	494	59239.6	35.2	27099.5	32140.1	9435.6
31	7.1	478	57417.3	34.8	25319.5	32097.8	10034.8
32	6.8	463	55611.1	34.4	23701.9	31909.2	10590.6
33	6.5	449	53835.3	34.0	22231.4	31603.9	11105.3
34	6.3	434	52098.8	33.5	20893.3	31205.5	11581.0
35	6.1	420	50407.0	33.0	19673.9	30733.1	12020.0
36	5.9	406	48762.6	32.5	18560.8	30201.8	12424.2
37	5.7	393	47167.0	32.1	17543.0	29624.0	12795.5
38	5.6	380	45620.1	31.6	16610.5	29009.6	13135.5
39	5.4	368	44121.2	31.1	15754.5	28366.7	13445.8
40	5.3	356	42669.1	30.6	14967.2	27701.8	13727.8
41	5.2	344	41262.2	30.2	14241.8	27020.4	13982.7
42	5.1	332	39898.8	29.7	13572.0	26326.7	14211.6
43	5.0	321	38577.0	29.3	12952.6	25624.4	14415.6
44	5.0	311	37295.0	28.8	12378.6	24916.4	14595.5
45	4.9	300	36050.7	28.4	11845.7	24205.0	14752.1



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\max}$ 14752.1 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$

EFP 47.2 pcf

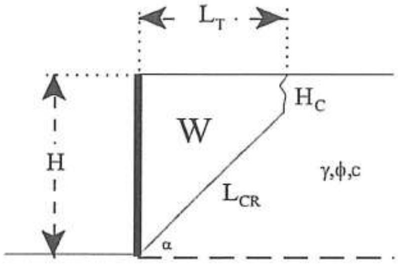
Design Wall for an Equivalent Fluid Pressure: 47 pcf

Retaining Wall Design with Level Backfill
(Vector Analysis)

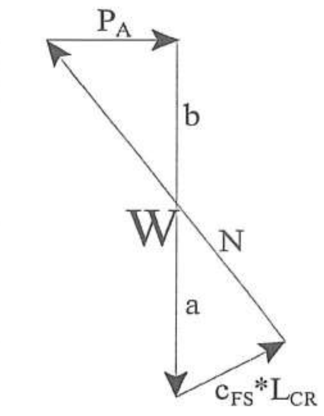
Input:

Retaining Wall Height	(H)	35.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	13.6 degrees
	(c_{FS})	223.3 psf

28



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
20	17.4	1268	152189.1	51.5	100964.4	51224.7	5710.4
21	15.1	1298	155735.6	55.5	93967.8	61767.8	7979.4
22	13.4	1293	155193.3	57.6	86003.3	69190.0	10168.9
23	12.1	1271	152529.0	58.7	78272.2	74256.8	12241.2
24	11.0	1240	148753.5	59.0	71182.7	77570.8	14182.3
25	10.1	1203	144416.2	58.8	64834.6	79581.6	15990.0
26	9.4	1165	139827.1	58.4	59206.7	80620.4	17668.0
27	8.8	1126	135165.7	57.7	54234.7	80931.1	19222.2
28	8.3	1088	130536.8	57.0	49842.6	80694.3	20660.2
29	7.8	1050	126001.2	56.1	45956.4	80044.8	21989.4
30	7.4	1013	121593.4	55.2	42509.1	79084.3	23217.2
31	7.1	978	117331.4	54.2	39441.8	77889.5	24350.8
32	6.8	944	113223.2	53.3	36703.9	76519.3	25396.7
33	6.5	911	109270.5	52.3	34251.7	75018.7	26360.8
34	6.3	879	105471.0	51.4	32048.4	73422.6	27248.7
35	6.1	849	101820.3	50.5	30062.3	71758.0	28065.3
36	5.9	819	98312.4	49.5	28266.5	70045.9	28815.0
37	5.7	791	94940.6	48.7	26637.9	68302.7	29502.0
38	5.6	764	91698.0	47.8	25156.8	66541.1	30129.7
39	5.4	738	88577.5	47.0	23806.3	64771.2	30701.6
40	5.3	713	85572.2	46.2	22571.5	63000.7	31220.3
41	5.2	689	82675.5	45.4	21439.8	61235.7	31688.6
42	5.1	666	79880.8	44.6	20400.2	59480.6	32108.7
43	5.0	643	77182.3	43.9	19443.1	57739.2	32482.6
44	5.0	621	74574.0	43.2	18559.9	56014.1	32812.0
45	4.9	600	72050.7	42.5	17743.5	54307.2	33098.5



Design Equations (Vector Analysis):

$a = c_{FS}{*}L_{CR}{*}\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b{*}\tan(\alpha-\phi_{FS})$

$EFP = 2{*}P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\max}$ 33098.5 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2{*}P_A/H^2$

EFP 54.0 pcf

Design Wall for an Equivalent Fluid Pressure: 54 pcf

Geotechnologies, Inc.

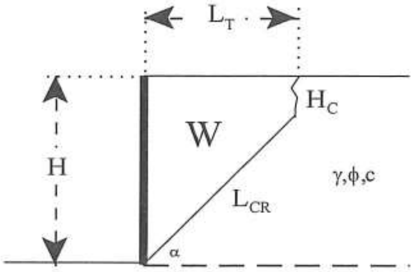
Project: Aragon Poroperties, LTD>
File No.: 20489
Description: Favorably oriented Bedrock , Hydrostatic

Retaining Wall Design with Level Backfill
(Vector Analysis)

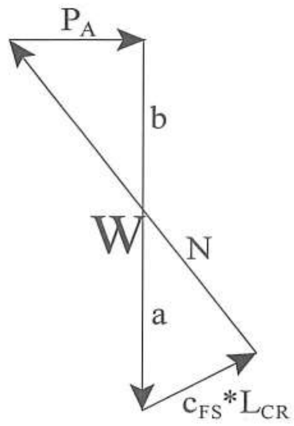
Input:

Retaining Wall Height	(H)	35.00 feet
Unit Weight of Retained Soils	(γ)	58.0 pcf
Friction Angle of Retained Soils	(ϕ)	25.0 degrees
Cohesion of Retained Soils	(c)	530.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	17.3 degrees
	(c_{FS})	353.3 psf

28



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
20	129.9	-21508	-1247445.2	-277.6	-1965440.5	717995.3	0.0
21	95.8	-10348	-600198.9	-169.5	-879087.9	278889.0	0.0
22	76.1	-5645	-327438.6	-109.6	-448517.1	121078.5	0.0
23	63.3	-3275	-189945.5	-72.4	-244611.8	54666.3	0.0
24	54.3	-1939	-112468.9	-47.5	-136805.4	24336.6	0.0
25	47.7	-1128	-65406.6	-30.1	-75460.9	10054.3	0.0
26	42.6	-608	-35262.9	-17.4	-38732.4	3469.5	0.0
27	38.6	-262	-15201.9	-8.0	-15950.9	749.0	0.0
28	35.4	-25	-1476.2	-0.8	-1484.3	8.1	0.0
29	32.7	140	8099.1	4.7	7825.7	273.4	56.8
30	30.5	256	14862.5	9.0	13836.9	1025.6	231.7
31	28.6	339	19667.6	12.4	17685.7	1981.9	484.3
32	27.0	398	23077.5	15.1	20090.0	2987.5	785.5
33	25.6	439	25474.4	17.3	21515.1	3959.2	1115.2
34	24.4	468	27123.8	19.0	22270.0	4853.9	1459.1
35	23.3	486	28214.5	20.4	22563.0	5651.4	1807.0
36	22.4	498	28882.6	21.5	22537.6	6345.0	2151.5
37	21.6	504	29228.2	22.3	22293.0	6935.2	2487.4
38	20.9	506	29325.9	23.0	21899.3	7426.6	2810.9
39	20.2	504	29231.7	23.5	21405.9	7825.7	3119.1
40	19.7	500	28988.3	23.9	20848.1	8140.2	3410.3
41	19.2	494	28628.7	24.2	20251.1	8377.6	3682.9
42	18.7	486	28178.3	24.3	19632.8	8545.5	3936.1
43	18.3	477	27656.8	24.5	19006.0	8650.8	4169.1
44	18.0	467	27079.9	24.5	18379.8	8700.1	4381.6
45	17.7	456	26459.9	24.5	17760.6	8699.3	4573.2



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\ max}$ 4573.2 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$

EFP 7.5 pcf

Design Wall for an Equivalent Fluid Pressure: **8 pcf** **62.5** Water

Total 70.5 Psf

Project: Aragon Poroperties, LTD>
File No.: 20489
Description: Favorably oriented Bedrock , Hydrostatic

Retaining Wall Design with Level Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	25.00 feet
Unit Weight of Retained Soils	(γ)	58.0 pcf
Friction Angle of Retained Soils	(ϕ)	25.0 degrees
Cohesion of Retained Soils	(c)	530.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	17.3 degrees
	(c_{FS})	353.3 psf

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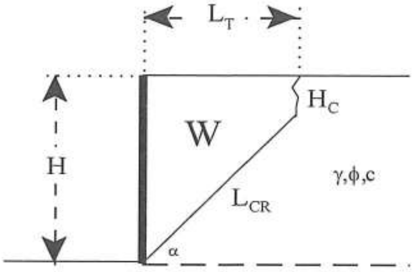
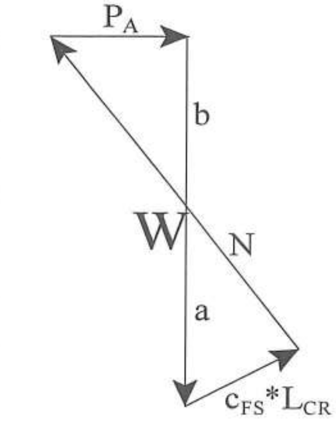


Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
20	129.9	-22332	-1295251.3	-306.8	-2172485.7	877234.4	0.0
21	95.8	-11130	-645527.4	-197.4	-1023774.1	378246.6	0.0
22	76.1	-6388	-370505.1	-136.3	-557721.3	187216.3	0.0
23	63.3	-3982	-230937.3	-98.0	-331086.8	100149.5	0.0
24	54.3	-2613	-151549.9	-72.1	-207580.6	56030.7	0.0
25	47.7	-1771	-102721.0	-53.7	-134809.3	32088.3	0.0
26	42.6	-1223	-70938.2	-40.2	-89437.4	18499.2	0.0
27	38.6	-851	-49351.3	-30.0	-59921.3	10570.0	0.0
28	35.4	-590	-34200.9	-22.1	-40082.5	5881.6	0.0
29	32.7	-402	-23291.3	-15.9	-26404.4	3113.0	0.0
30	30.5	-263	-15275.2	-11.0	-16784.3	1509.1	0.0
31	28.6	-160	-9290.9	-7.0	-9913.6	622.7	0.0
32	27.0	-82	-4768.3	-3.7	-4949.7	181.3	0.0
33	25.6	-23	-1319.3	-1.1	-1334.5	15.2	0.0
34	24.4	23	1327.3	1.1	1310.5	16.8	5.1
35	23.3	58	3364.7	2.9	3247.6	117.1	37.4
36	22.4	85	4933.5	4.4	4662.0	271.5	92.1
37	21.6	106	6137.6	5.7	5686.4	451.2	161.8
38	20.9	122	7054.9	6.7	6417.2	637.7	241.4
39	20.2	134	7744.5	7.6	6925.4	819.1	326.5
40	19.7	142	8251.8	8.3	7263.7	988.1	414.0
41	19.2	148	8612.3	8.9	7471.8	1140.5	501.4
42	18.7	153	8853.6	9.4	7579.8	1273.8	586.7
43	18.3	155	8997.6	9.8	7610.5	1387.1	668.5
44	18.0	156	9061.7	10.1	7581.4	1480.3	745.5
45	17.7	156	9059.9	10.4	7506.1	1553.8	816.8



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$
$b = W-a$
$P_A = b*\tan(\alpha-\phi_{FS})$
$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\ max}$ 816.8 | lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$
EFP 2.6 pcf

Design Wall for an Equivalent Fluid Pressure: **3 pcf** **62.5** Water

Total 65.5 Psf

Geotechnologies, Inc.

Project: Aragon Poroperties, LTD>
File No.: 20489
Description: Daylighted bedrock, Hydrostatic

Retaining Wall Design with Level Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	25.00 feet
Unit Weight of Retained Soils	(γ)	58.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	13.6 degrees
	(c_{FS})	223.3 psf

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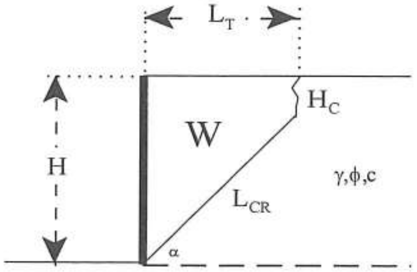
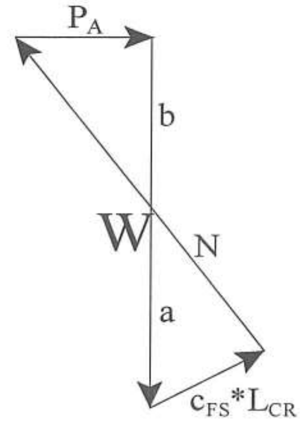


Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
20	35.9	-916	-53134.1	-32.0	-62674.6	9540.5	0.0
21	31.3	-461	-26724.5	-17.5	-29708.6	2984.1	0.0
22	27.8	-180	-10433.3	-7.4	-10978.2	544.9	0.0
23	25.0	0	25.0	0.0	25.0	0.0	0.0
24	22.8	119	6922.8	5.5	6600.5	322.4	58.9
25	21.0	199	11548.4	9.6	10533.1	1015.2	204.0
26	19.4	253	14671.7	12.7	12839.3	1832.4	401.6
27	18.2	289	16773.4	15.0	14121.5	2652.0	629.9
28	17.1	313	18164.2	16.9	14749.0	3415.2	874.4
29	16.2	328	19050.9	18.3	14954.3	4096.6	1125.4
30	15.3	337	19574.8	19.3	14886.9	4687.9	1376.3
31	14.6	342	19834.4	20.1	14644.5	5189.9	1622.5
32	14.0	343	19899.7	20.7	14292.0	5607.7	1861.2
33	13.5	342	19821.2	21.2	13872.9	5948.2	2090.2
34	13.0	339	19635.8	21.5	13416.5	6219.3	2308.1
35	12.5	334	19370.9	21.7	12942.4	6428.4	2514.2
36	12.2	328	19046.9	21.8	12464.1	6582.8	2708.0
37	11.8	322	18679.2	21.9	11990.4	6688.8	2889.1
38	11.5	315	18279.5	21.9	11527.1	6752.4	3057.5
39	11.2	308	17856.7	21.9	11077.9	6778.9	3213.2
40	11.0	300	17417.7	21.8	10645.0	6772.7	3356.3
41	10.8	293	16967.8	21.7	10229.7	6738.1	3486.9
42	10.6	285	16510.9	21.5	9832.4	6678.4	3605.1
43	10.4	277	16050.2	21.4	9453.2	6597.0	3711.3
44	10.3	269	15588.1	21.2	9091.6	6496.5	3805.5
45	10.2	261	15126.4	21.0	8747.2	6379.2	3887.9



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$
$b = W-a$
$P_A = b*\tan(\alpha-\phi_{FS})$
$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A, max}$ 3887.9 |lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$
EFP 12.4 pcf

Design Wall for an Equivalent Fluid Pressure: **13 pcf** **62.5** Water

Total 75.5 Psf

Geotechnologies, Inc.

Project: Aragon Poroperties, LTD>
File No.: 20489
Description: Daylighted bedrock. Hydrostatic

Retaining Wall Design with Level Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	35.00 feet
Unit Weight of Retained Soils	(γ)	58.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(ϕ_{FS})	13.6 degrees
	(c_{FS})	223.3 psf

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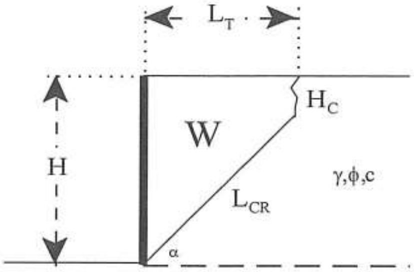
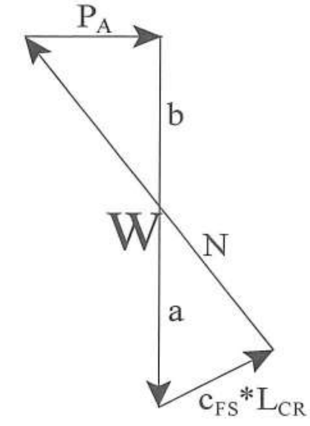


Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
20	35.9	-92	-5327.9	-2.8	-5398.7	70.8	0.0
21	31.3	321	18604.1	10.4	17561.4	1042.7	134.7
22	27.8	563	32633.2	19.3	28865.9	3767.3	553.7
23	25.0	707	41016.9	25.6	34174.9	6842.0	1127.9
24	22.8	793	46003.9	30.1	36269.9	9734.0	1779.7
25	21.0	842	48862.8	33.2	36603.1	12259.7	2463.3
26	19.4	868	50347.0	35.5	35967.0	14380.0	3151.4
27	18.2	878	50922.9	37.1	34809.2	16113.7	3827.2
28	17.1	877	50888.8	38.2	33387.8	17501.1	4480.8
29	16.2	870	50441.3	38.9	31854.0	18587.3	5106.2
30	15.3	857	49712.5	39.3	30296.5	19416.0	5700.1
31	14.6	841	48792.9	39.5	28766.8	20026.0	6260.8
32	14.0	823	47745.5	39.6	27293.9	20451.6	6787.9
33	13.5	804	46614.8	39.6	25893.2	20721.6	7281.4
34	13.0	783	45432.4	39.4	24571.6	20860.8	7741.9
35	12.5	762	44220.7	39.2	23330.9	20889.8	8170.2
36	12.2	741	42995.9	38.9	22169.8	20826.2	8567.3
37	11.8	720	41769.8	38.5	21085.3	20684.5	8934.2
38	11.5	699	40550.5	38.2	20073.4	20477.1	9272.0
39	11.2	678	39343.9	37.8	19129.6	20214.3	9581.6
40	11.0	658	38154.2	37.3	18249.2	19905.0	9864.0
41	10.8	638	36984.2	36.9	17427.7	19556.5	10120.2
42	10.6	618	35835.5	36.5	16660.6	19174.9	10351.0
43	10.4	598	34709.4	36.0	15943.7	18765.7	10557.1
44	10.3	579	33606.3	35.6	15273.0	18333.3	10739.3
45	10.2	561	32526.4	35.1	14645.0	17881.5	10898.2



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A, max}$ 10898.2 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$

EFP 17.8 pcf

Design Wall for an Equivalent Fluid Pressure: **18 pcf** **62.5** Water

Total 81 Psf

Geotechnologies, Inc.

Project: Aragon Properties, LTD
File No.: 20489
Geologic Material Bedrock-Oblique / Favorable Oriented - Drained

Soil Weight	γ	120 pcf
Internal Friction Angle	ϕ	25 degrees
Cohesion	c	530 psf
Height of Retaining Wall	H	15 feet

Cantilever Retaining Wall Design based on At Rest Earth Pressure

$\sigma'_h = K_o\sigma'_v$

$K_o = 1 - \sin\phi$	0.577
$\sigma'_v = \gamma H$	1800.0 psf

$\sigma'_h =$ 1039.3 psf

EFP = 69.3 pcf

$P_o =$ 7794.7 lbs/ft (based on a triangular distribution of pressure)

Design wall for an EFP of 69 pcf

Geotechnologies, Inc.

Project: Aragon Properties, Ltd.
File No.: 20489
Geologic Material Bedrock - Daylighted -Drained

Soil Weight	γ	120 pcf
Internal Friction Angle	ϕ	20 degrees
Cohesion	c	335 psf
Height of Retaining Wall	H	65 feet

Cantilever Retaining Wall Design based on At Rest Earth Pressure

$\sigma'_h = K_o\sigma'_v$

$K_o = 1 - \sin\phi$	0.658
$\sigma'_v = \gamma H$	7800.0 psf

$\sigma'_h =$ 5132.2 psf
EFP = 79.0 pcf
$P_o =$ 166797.9 lbs/ft (based on a triangular distribution of pressure)

Design wall for an EFP of 79 pcf

Geotechnologies, Inc.

Project: Aragon Properties, LTD
File No.: 20489
Geologic Material Bedrock-Oblique / Favorable Oirented -Hydrostatic

Soil Weight	γ	58 pcf
Internal Friction Angle	ϕ	25 degrees
Cohesion	c	530 psf
Height of Retaining Wall	H	15 feet

Cantilever Retaining Wall Design based on At Rest Earth Pressure

$\sigma'_h = K_o\sigma'_v$

$K_o = 1 - \sin\phi$ 0.577

$\sigma'_v = \gamma H$ 870.0 psf

$\sigma'_h =$ 502.3 psf

EFP = 33.5 pcf

$P_o =$ 3767.4 lbs/ft (based on a triangular distribution of pressure)

Design wall for an EFP of 34 pcf + 62.4 (hydrostatic) = 96.4 say 97 psf

Geotechnologies, Inc.

Project: Aragon Properties, Ltd.
File No.: 20489
Geologic Material Bedrock - Daylighted - hydrostatic

Soil Weight	γ	58.6 pcf
Internal Friction Angle	ϕ	20 degrees
Cohesion	c	335 psf
Height of Retaining Wall	H	65 feet

Cantilever Retaining Wall Design based on At Rest Earth Pressure

$\sigma'_h = K_o\sigma'_v$

$K_o = 1 - \sin\phi$ 0.658

$\sigma'_v = \gamma H$ 3809.0 psf

$\sigma'_h =$ 2506.2 psf

EFP = 38.6 pcf

$P_o =$ 81453.0 lbs/ft (based on a triangular distribution of pressure)

SOIL

Design wall for an EFP of 39 pcf +62.4 = 101.4 say 102 pcf

Geotechnologies, Inc.

Project: Aragon Properties, LTD
File No.: 20489

Seismically Induced Lateral Soil Pressure on Retaining Wall

(Based on City of Los Angeles P/BC 2020-083)

Input:

Height of Retaining Wall:	(H)	30.0 feet	
Retained Soil Unit Weight:	(γ)	120.0 pcf	
Short Duration Acceleration	PGAm	1.044 g	
Horizontal Ground Acceleration:	(k_h)	0.35 g	(1/2 *2/3*PGAm)

Seismic Increment (ΔP_{AE}):

$\Delta P_{AE} = (0.5*\gamma*H^2)*(0.75*k_h)$

$\Delta P_{AE} =$ 14094.0 lbs/ft

Force applied at 0.6H above the base of the wall
Transfer load to 2/3 of the height of the wall

$T*(2/3)*H = \Delta P_{AE}*0.6*H$

$T =$ 12684.6 lbs/ft

$EFP = 2*T/H^2$

EFP = 28.2 pcf Triangular shape

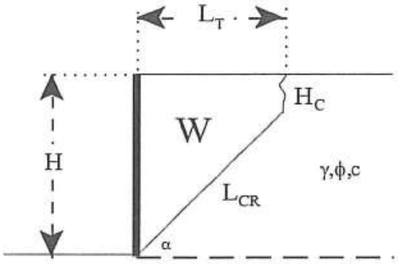
Geotechnologies, Inc.

Project: Aragon Properties, LTD
File No.: 20489
Description: Bedrock -adverse

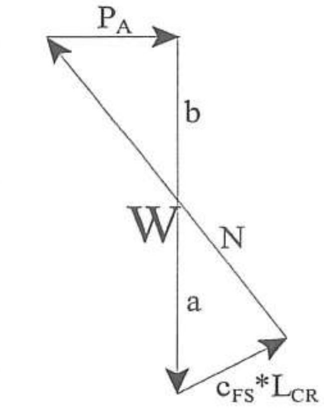
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	25.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	16.2 degrees
	(c_{FS})	268.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
15	-103.1	-18652	-2238228.1	494.8	-5910189.9	3671961.8	0.0
16	-545.5	-517769	-62132322.2	2069.7	-130233265.1	68100942.8	0.0
17	167.8	-45020	-5402439.1	-488.4	-9403751.7	4001312.6	0.0
18	73.2	-7278	-873314.2	-155.9	-1301844.9	428530.7	0.0
19	47.0	-2300	-276017.3	-67.6	-360356.2	84338.8	0.0
20	34.7	-800	-95971.6	-28.5	-111624.9	15653.2	0.0
21	27.6	-181	-21770.8	-7.4	-22864.9	1094.1	0.0
22	23.0	118	14114.5	5.3	13532.7	581.7	58.7
23	19.8	276	33079.4	13.4	29217.7	3861.7	458.1
24	17.4	363	43561.7	18.8	35718.3	7843.4	1069.6
25	15.5	412	49405.2	22.4	37854.3	11550.9	1781.1
26	14.1	438	52549.7	24.9	37840.4	14709.3	2531.7
27	12.9	450	54051.6	26.7	36764.3	17287.3	3287.0
28	11.9	454	54520.8	27.9	35185.0	19335.8	4027.4
29	11.1	453	54326.4	28.7	33398.7	20927.7	4741.5
30	10.4	447	53699.7	29.2	31564.1	22135.6	5423.0
31	9.8	440	52790.3	29.5	29765.8	23024.5	6068.6
32	9.3	431	51697.0	29.6	28047.2	23649.8	6676.9
33	8.9	421	50486.4	29.6	26428.9	24057.5	7247.7
34	8.5	410	49204.2	29.5	24918.3	24285.9	7781.3
35	8.1	399	47881.9	29.4	23515.6	24366.4	8278.7
36	7.8	388	46541.4	29.2	22216.8	24324.6	8741.0
37	7.6	377	45198.0	29.0	21016.1	24181.9	9169.3
38	7.3	366	43862.3	28.7	19906.7	23955.5	9564.9
39	7.1	355	42541.6	28.4	18881.6	23660.0	9929.1
40	6.9	344	41241.0	28.1	17933.7	23307.3	10263.1



Design Equations (Vector Analysis):
$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$
$b = W-a$
$P_A = b*\tan(\alpha-\phi_{FS})$
$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\max}$ 10263.1 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

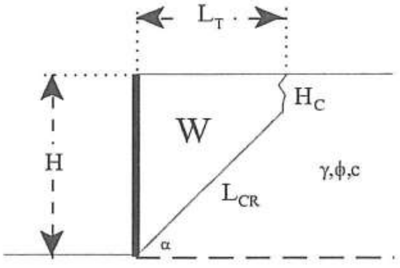
EFP 32.8 pcf

Design Shoring for an Equivalent Fluid Pressure: 33 pcf

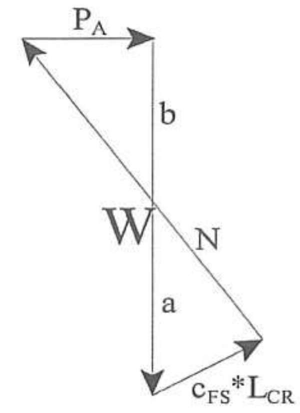
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	35.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	16.2 degrees
	(c_{FS})	268.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
15	-103.1	-17532	-2103874.3	533.4	-6371721.9	4267847.6	0.0
16	-545.5	-516723	-62006775.3	2106.0	-132516090.9	70509315.6	0.0
17	167.8	-44039	-5284688.4	-454.2	-8745175.5	3460487.1	0.0
18	73.2	-6354	-762517.6	-123.5	-1031601.0	269083.5	0.0
19	47.0	-1429	-171465.7	-36.9	-196558.4	25092.7	0.0
20	34.7	24	2937.6	0.7	2926.8	10.8	0.7
21	27.6	600	72012.4	20.5	63558.5	8453.9	704.8
22	23.0	860	103217.6	32.0	81906.8	21310.7	2151.8
23	19.8	982	117890.1	39.0	85116.8	32773.3	3888.1
24	17.4	1037	124419.0	43.3	82537.4	41881.7	5711.5
25	15.5	1055	126607.5	46.1	77807.1	48800.4	7524.8
26	14.1	1053	126360.6	47.8	72446.0	53914.7	9279.4
27	12.9	1039	124705.5	48.7	67107.1	57598.5	10951.8
28	11.9	1019	122227.0	49.2	62064.2	60162.8	12531.1
29	11.1	994	119272.1	49.3	57418.5	61853.6	14013.9
30	10.4	967	116053.6	49.2	53191.5	62862.1	15400.5
31	9.8	939	112704.4	48.9	49368.2	63336.1	16693.6
32	9.3	911	109309.0	48.5	45918.6	63390.5	17896.7
33	8.9	883	105921.6	48.0	42807.3	63114.3	19014.1
34	8.5	855	102576.4	47.4	39999.1	62577.3	20050.1
35	8.1	827	99295.3	46.8	37460.7	61834.6	21008.9
36	7.8	801	96091.2	46.2	35161.8	60929.3	21894.7
37	7.6	775	92971.6	45.6	33075.5	59896.1	22711.4
38	7.3	750	89940.2	44.9	31177.9	58762.3	23462.4
39	7.1	725	86997.9	44.3	29447.8	57550.1	24151.3
40	6.9	701	84144.1	43.6	27867.0	56277.1	24780.9



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\ max}$ 24780.9 | lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 40.5 pcf

Design Shoring for an Equivalent Fluid Pressure: 41 pcf

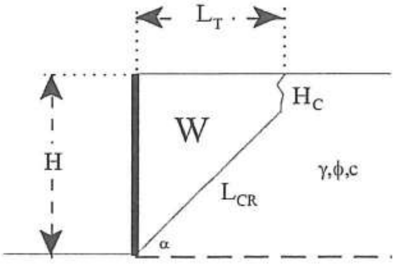
Geotechnologies, Inc.

Project: Aragon Properties, LTD
File No.: 20489
Description: Bedrock -adverse

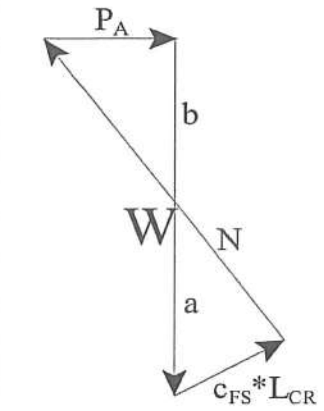
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	35.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	16.2 degrees
	(c_{FS})	268.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) $feet^2$	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
15	-103.1	-17532	-2103874.3	533.4	-6371721.9	4267847.6	0.0
16	-545.5	-516723	-62006775.3	2106.0	-132516090.9	70509315.6	0.0
17	167.8	-44039	-5284688.4	-454.2	-8745175.5	3460487.1	0.0
18	73.2	-6354	-762517.6	-123.5	-1031601.0	269083.5	0.0
19	47.0	-1429	-171465.7	-36.9	-196558.4	25092.7	0.0
20	34.7	24	2937.6	0.7	2926.8	10.8	0.7
21	27.6	600	72012.4	20.5	63558.5	8453.9	704.8
22	23.0	860	103217.6	32.0	81906.8	21310.7	2151.8
23	19.8	982	117890.1	39.0	85116.8	32773.3	3888.1
24	17.4	1037	124419.0	43.3	82537.4	41881.7	5711.5
25	15.5	1055	126607.5	46.1	77807.1	48800.4	7524.8
26	14.1	1053	126360.6	47.8	72446.0	53914.7	9279.4
27	12.9	1039	124705.5	48.7	67107.1	57598.5	10951.8
28	11.9	1019	122227.0	49.2	62064.2	60162.8	12531.1
29	11.1	994	119272.1	49.3	57418.5	61853.6	14013.9
30	10.4	967	116053.6	49.2	53191.5	62862.1	15400.5
31	9.8	939	112704.4	48.9	49368.2	63336.1	16693.6
32	9.3	911	109309.0	48.5	45918.6	63390.5	17896.7
33	8.9	883	105921.6	48.0	42807.3	63114.3	19014.1
34	8.5	855	102576.4	47.4	39999.1	62577.3	20050.1
35	8.1	827	99295.3	46.8	37460.7	61834.6	21008.9
36	7.8	801	96091.2	46.2	35161.8	60929.3	21894.7
37	7.6	775	92971.6	45.6	33075.5	59896.1	22711.4
38	7.3	750	89940.2	44.9	31177.9	58762.3	23462.4
39	7.1	725	86997.9	44.3	29447.8	57550.1	24151.3
40	6.9	701	84144.1	43.6	27867.0	56277.1	24780.9



Design Equations (Vector Analysis):
$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$
$b = W-a$
$P_A = b*\tan(\alpha-\phi_{FS})$
$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\ max}$ 24780.9 |lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$
EFP 40.5 pcf

Design Shoring for an Equivalent Fluid Pressure: 41 pcf

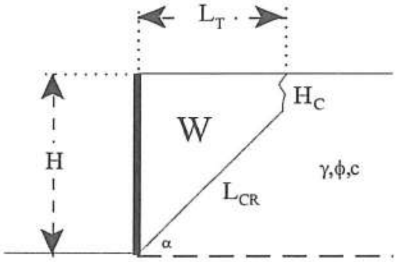
Geotechnologies, Inc.

Project: Aragon Properties, LTD
File No.: 20489
Description: Bedrock -adverse

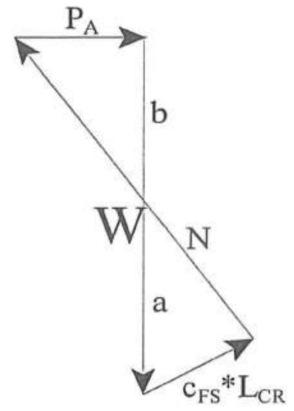
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	45.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	16.2 degrees
	(c_{FS})	268.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
15	-103.1	-16039	-1924735.9	572.0	-6833253.8	4908517.9	0.0
16	-545.5	-515328	-61839379.4	2142.3	-134798916.7	72959537.3	0.0
17	167.8	-42731	-5127687.5	-420.0	-8086599.3	2958911.8	0.0
18	73.2	-5123	-614788.7	-91.2	-761357.1	146568.4	0.0
19	47.0	-267	-32063.6	-6.1	-32760.7	697.1	0.0
20	34.7	1123	134816.5	30.0	117478.5	17338.0	1141.2
21	27.6	1642	197056.7	48.4	149981.8	47074.9	3924.6
22	23.0	1850	222021.7	58.7	150281.0	71740.8	7243.8
23	19.8	1925	230971.0	64.6	141015.9	89955.1	10671.9
24	17.4	1935	232228.8	67.9	129356.4	102872.4	14029.0
25	15.5	1913	229543.8	69.7	117759.8	111784.0	17236.6
26	14.1	1873	224775.2	70.6	107051.5	117723.7	20261.8
27	12.9	1824	218910.8	70.7	97449.8	121461.0	23094.6
28	11.9	1771	212501.9	70.5	88943.3	123558.5	25735.5
29	11.1	1716	205866.4	69.9	81438.3	124428.1	28191.0
30	10.4	1660	199192.0	69.2	74818.9	124373.1	30470.0
31	9.8	1605	192589.8	68.3	68970.7	123619.1	32582.4
32	9.3	1551	186125.1	67.4	63789.9	122335.2	34538.3
33	8.9	1499	179835.1	66.3	59185.7	120649.4	36347.4
34	8.5	1448	173739.4	65.3	55079.9	118659.5	38019.0
35	8.1	1399	167846.4	64.3	51405.8	116440.5	39561.8
36	7.8	1351	162157.5	63.2	48106.9	114050.6	40983.6
37	7.6	1306	156669.7	62.2	45134.9	111534.8	42291.7
38	7.3	1261	151377.4	61.2	42449.0	108928.4	43492.6
39	7.1	1219	146273.0	60.2	40014.1	106258.9	44592.3
40	6.9	1178	141348.3	59.2	37800.3	103548.0	45596.1



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\max}$ 45596.1 | lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 45.0 pcf

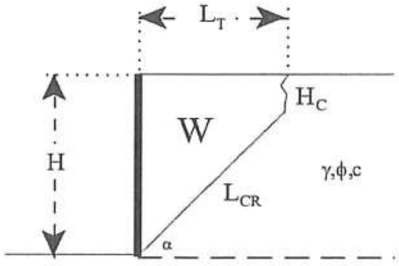
Design Shoring for an Equivalent Fluid Pressure: 45 pcf

Project: Aragon Properties, LTD
File No.: 20489
Description: Bedrock -adverse

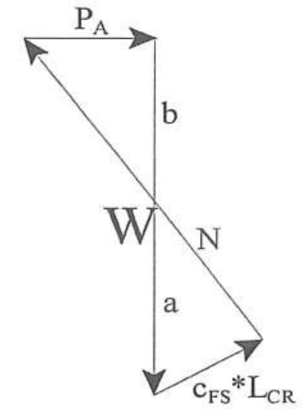
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	55.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	16.2 degrees
	(c_{FS})	268.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
15	-103.1	-14173	-1700812.8	610.7	-7294785.7	5593972.9	0.0
16	-545.5	-513584	-61630134.6	2178.6	-137081742.5	75451607.9	0.0
17	167.8	-41095	-4931436.3	-385.8	-7428023.1	2496586.8	0.0
18	73.2	-3584	-430127.7	-58.8	-491113.3	60985.5	0.0
19	47.0	1185	142189.0	24.6	131037.1	11152.0	538.7
20	34.7	2497	299665.1	59.2	232030.2	67635.0	4451.6
21	27.6	2945	353362.1	76.3	236405.2	116956.9	9750.6
22	23.0	3088	370527.0	85.4	218655.1	151871.9	15334.7
23	19.8	3103	372322.1	90.2	196915.1	175407.1	20809.5
24	17.4	3058	366991.0	92.5	176175.5	190815.6	26022.1
25	15.5	2985	358214.2	93.4	157712.6	200501.7	30916.4
26	14.1	2898	347793.5	93.4	141657.0	206136.4	35478.9
27	12.9	2806	336667.5	92.8	127792.6	208874.8	39715.4
28	11.9	2711	325345.4	91.8	115822.5	209523.0	43640.7
29	11.1	2618	314109.3	90.6	105458.1	208651.2	47273.0
30	10.4	2526	303115.1	89.2	96446.3	206668.8	50631.6
31	9.8	2437	292446.5	87.7	88573.1	203873.4	53735.1
32	9.3	2351	282145.1	86.2	81661.2	200483.9	56601.6
33	8.9	2269	272227.0	84.7	75564.1	196662.9	59247.6
34	8.5	2189	262693.0	83.2	70160.6	192532.4	61688.3
35	8.1	2113	253535.2	81.7	65350.9	188184.3	63937.5
36	7.8	2040	244740.4	80.2	61051.9	183688.5	66007.7
37	7.6	1969	236292.4	78.8	57194.4	179098.1	67910.3
38	7.3	1901	228173.9	77.4	53720.1	174453.7	69655.4
39	7.1	1836	220366.8	76.1	50580.3	169786.4	71252.1
40	6.9	1774	212853.5	74.8	47733.6	165119.9	72708.5



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\max}$ 72708.5 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 48.1 pcf

Design Shoring for an Equivalent Fluid Pressure: 48 pcf

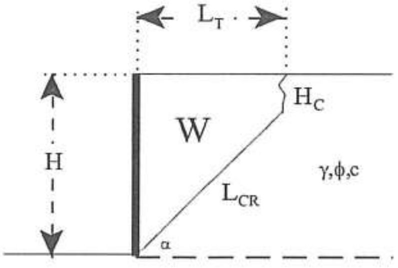
Geotechnologies, Inc.

Project: Aragon Properties, LTD
File No.: 20489
Description: Bedrock -adverse

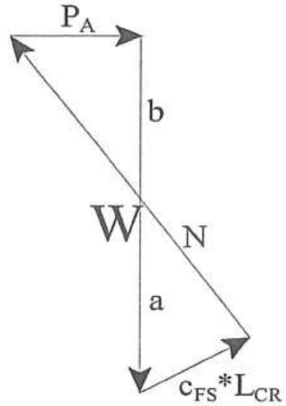
Shoring Design with Level Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	65.00 feet
Unit Weight of Retained Soils	(γ)	120.0 pcf
Friction Angle of Retained Soils	(ϕ)	20.0 degrees
Cohesion of Retained Soils	(c)	335.0 psf
Factor of Safety	(FS)	1.25
Factored Parameters:	(ϕ_{FS})	16.2 degrees
	(c_{FS})	268.0 psf



Failure Angle (α) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
15	-103.1	-11934	-1432105.2	649.3	-7756317.7	6324212.5	0.0
16	-545.5	-511492	-61379040.7	2214.8	-139364568.3	77985527.6	0.0
17	167.8	-39133	-4695934.9	-351.6	-6769446.9	2073512.0	0.0
18	73.2	-1738	-208534.5	-26.4	-220869.4	12334.9	0.0
19	47.0	2927	351292.2	55.3	294834.8	56457.4	2727.3
20	34.7	4146	497483.5	88.5	346581.8	150901.7	9932.1
21	27.6	4508	540928.5	104.2	322828.5	218099.9	18182.9
22	23.0	4573	548733.2	112.1	287029.2	261704.0	26424.6
23	19.8	4516	541943.5	115.7	252814.2	289129.3	34301.0
24	17.4	4406	528705.7	117.1	222994.5	305711.2	41690.8
25	15.5	4272	512618.7	117.1	197665.3	314953.4	48564.3
26	14.1	4128	495415.3	116.2	176262.5	319152.8	54930.5
27	12.9	3983	477975.4	114.8	158135.4	319840.0	60814.3
28	11.9	3840	460757.7	113.1	142701.6	318056.1	66246.7
29	11.1	3700	444000.7	111.2	129477.9	314522.8	71259.8
30	10.4	3565	427822.7	109.2	118073.6	309749.1	75885.1
31	9.8	3436	412274.7	107.1	108175.6	304099.1	80151.7
32	9.3	3311	397369.2	105.1	99532.6	297836.6	84086.7
33	8.9	3192	383097.2	103.1	91942.4	291154.8	87714.7
34	8.5	3079	369437.4	101.1	85241.4	284196.0	91057.7
35	8.1	2970	356361.9	99.1	79296.1	277065.8	94135.8
36	7.8	2865	343839.9	97.3	73997.0	269842.9	96967.0
37	7.6	2765	331839.7	95.4	69253.8	262585.9	99567.2
38	7.3	2669	320329.6	93.7	64991.3	255338.4	101950.8
39	7.1	2577	309279.4	92.0	61146.6	248132.8	104130.7
40	6.9	2489	298659.8	90.3	57666.9	240992.9	106118.2



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\ max}$ 106118.2 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

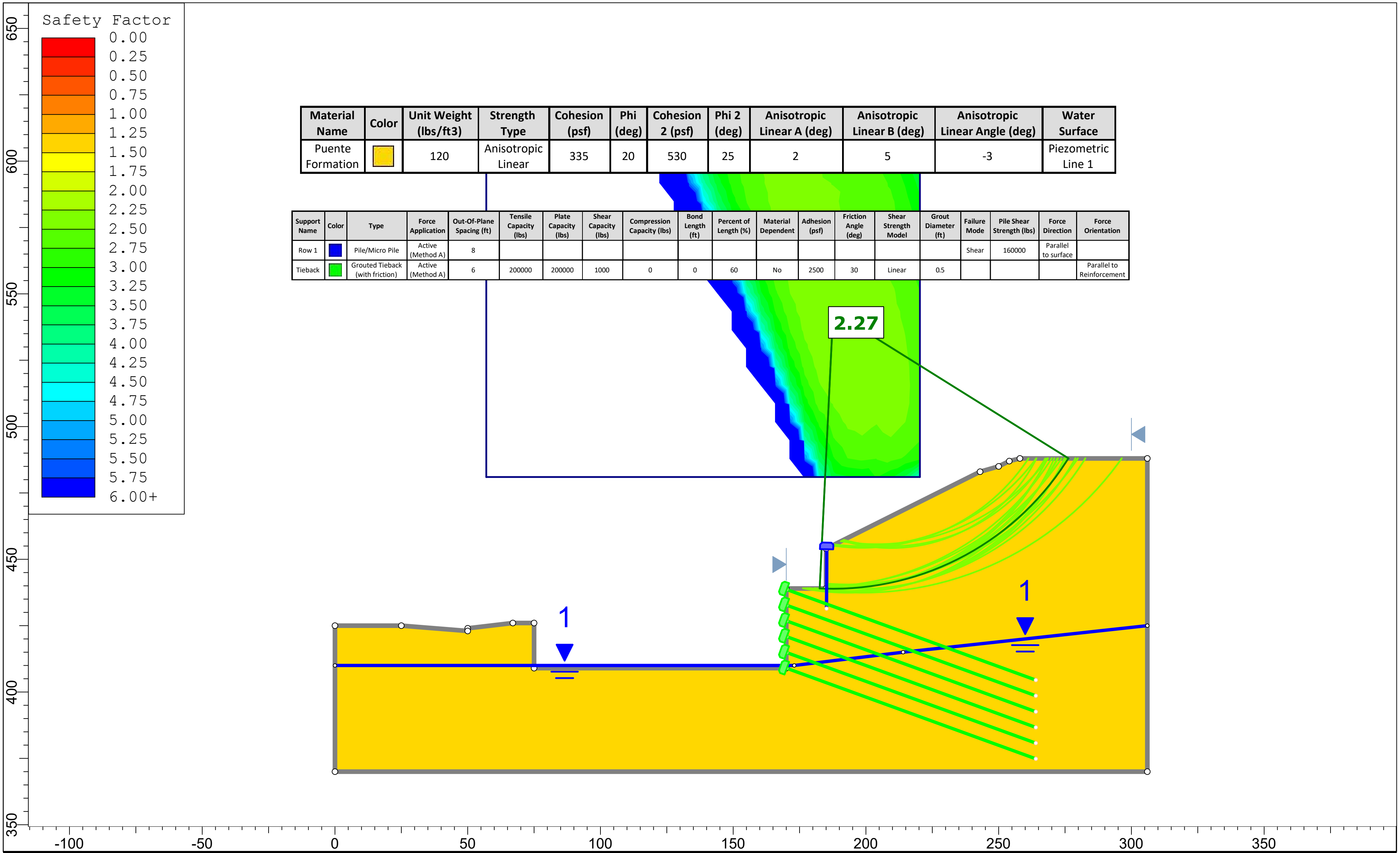
EFP 50.2 pcf

Design Shoring for an Equivalent Fluid Pressure: 50 pcf

Appendix D

Slide2 Printouts

20489 BB Updated Profile upper
File No 20489
Geotechnologies, inc.
Date Created: 5/9/2017, 8:44:53 PM
Software Version: 9.012



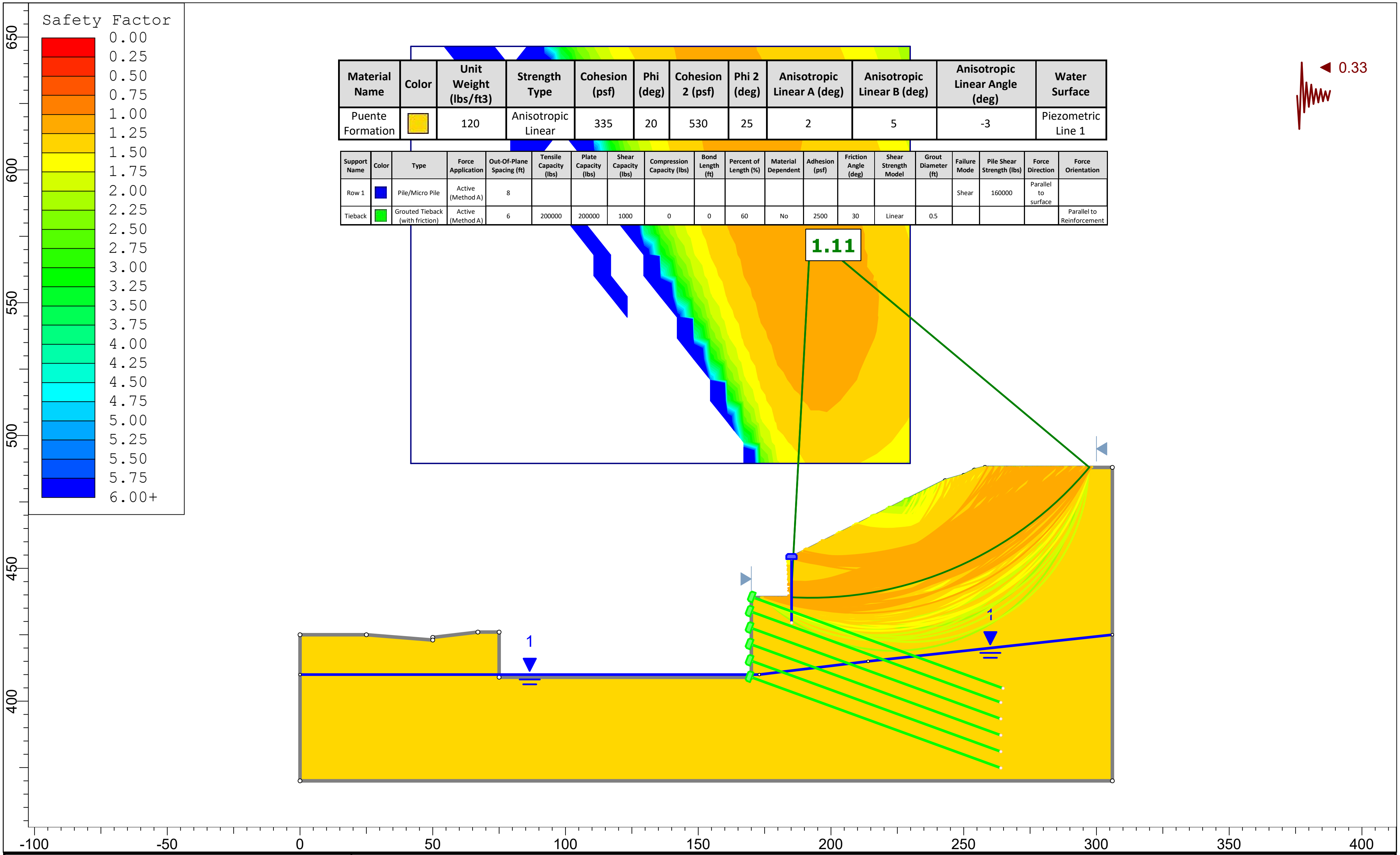
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface
Puente Formation	🟨	120	Anisotropic Linear	335	20	530	25	2	5	-3	Piezometric Line 1

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	160000	Parallel to surface	
Tieback	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

SLIDEINTERPRET 9.012

Project	File No 20486 Aragon- Sunset		
Analysis	Cross Section B-B', Upper Slope, Proposed Cut		
Scale	1:600	*Comment 1*	Curved Static
Date	9/5/2023	*Location of Analysis*	Proposed Cut



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface
Puente Formation	🟨	120	Anisotropic Linear	335	20	530	25	2	5	-3	Piezometric Line 1

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	160000	Parallel to surface	
Tieback	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

SLIDEINTERPRET 9.012

Project
File No 20486 Aragon- Sunset

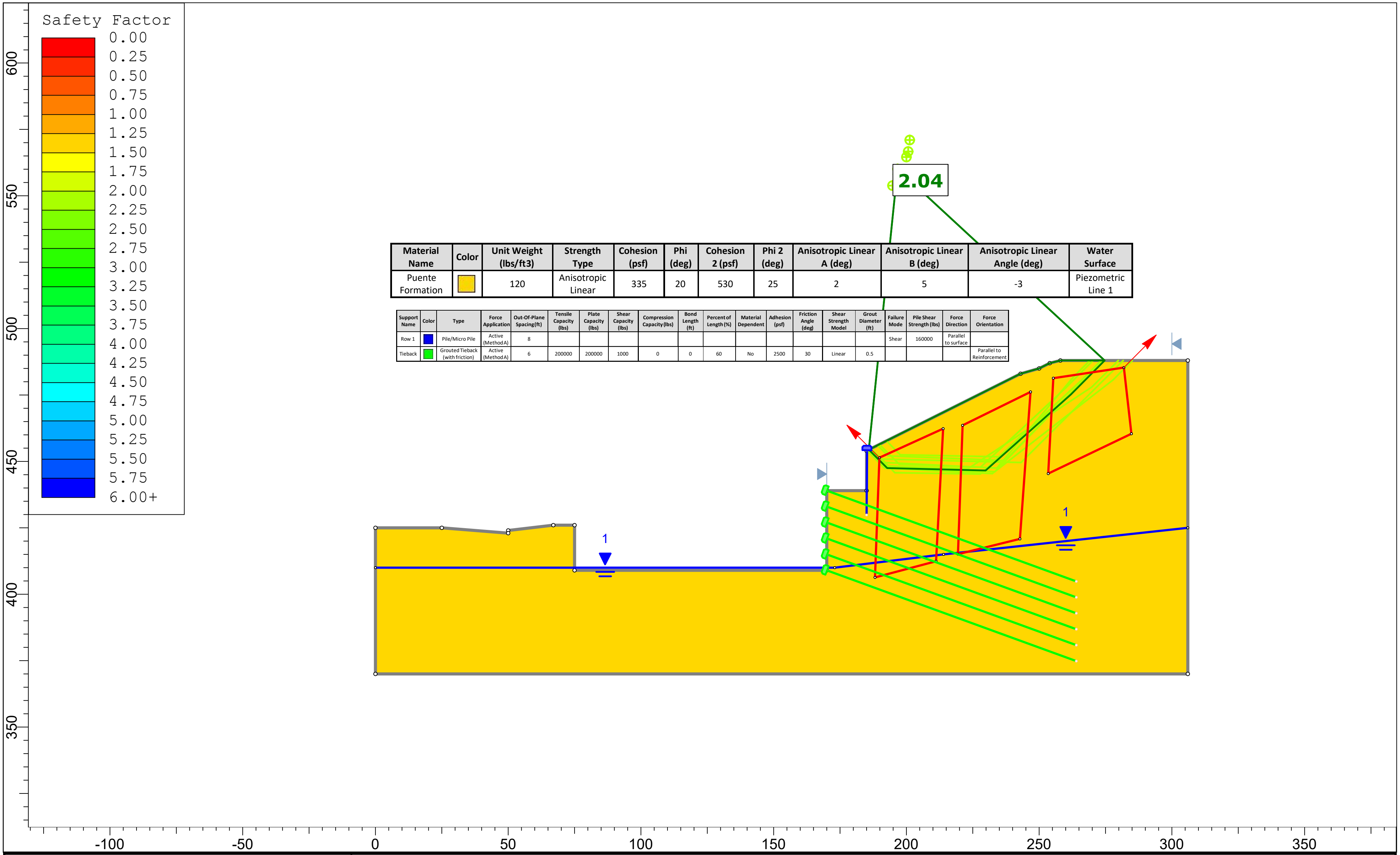
Analysis
Cross Section B-B', Upper Slope, Proposed Cut

Scale
1:600

Comment 1
Curved PseudoStatic

Date
9/5/2023

Location of Analysis
Proposed Cut



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface
Puente Formation	🟨	120	Anisotropic Linear	335	20	530	25	2	5	-3	Piezometric Line 1

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Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	160000	Parallel to surface	
Tieback	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

SLIDEINTERPRET 9.012

Project File No 20486 Aragon- Sunset

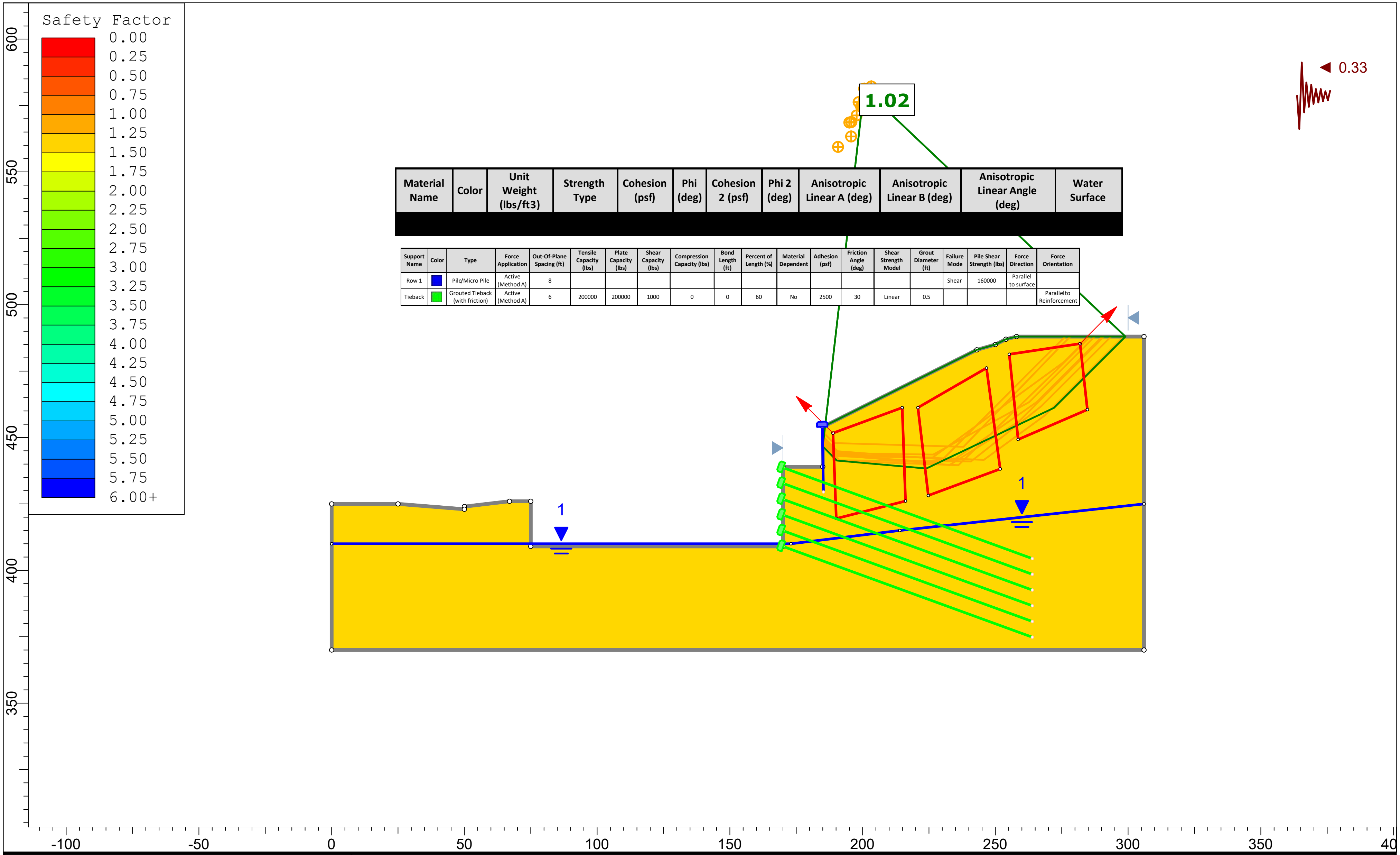
Analysis Cross Section B-B', Upper Slope, Proposed Cut

Scale 1:600

Comment 1 Block Static

Date 9/5/2023

Location of Analysis Proposed Cut



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	160000	Parallel to surface	
Tieback	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallelto Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

SLIDEINTERPRET 9.012

Project	File No 20486 Aragon- Sunset
Analysis	Cross Section B-B', Upper Slope, Proposed Cut

Scale	1:600	*Comment 1*	Block Static
Date	9/5/2023	*Location of Analysis*	Proposed Cut

Table of Contents

Slide Analysis Information

20489 BB Updated Profile upper

Project Summary

File Name:	20489 BB Updated Profile upper.slmd
Last saved with Slide version:	9.012
Project Title:	File No 20489
Analysis:	Cross Section B-B' Upper Slope
Author:	RTK
Company:	Geotechnologies, inc.
Date Created:	5/9/2017, 8:44:53 PM

Currently Open Scenarios

Group Name	Scenario Name	Compute Time
Block ◆	Master Scenario	
	Block Static	
	Block Pstatic	
	Curved Static	
	Curved PStatic	

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

All Open Scenarios

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	74
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

All Open Scenarios

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

All Open Scenarios

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

Surface Options

Block - Curved Static

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined
Minimum Area: Not Defined
Minimum Weight: Not Defined

All other Scenarios

Surface Type: Non-Circular Block Search
Number of Surfaces: 8000
Multiple Groups: Disabled
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle) [deg]: 135
Left Projection Angle (End Angle) [deg]: 135
Right Projection Angle (Start Angle) [deg]: 45
Right Projection Angle (End Angle) [deg]: 45
Minimum Elevation: Not Defined
Minimum Depth: Not Defined
Minimum Area: Not Defined
Minimum Weight: Not Defined

Seismic Loading

Block - Master Scenario

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Block - Block Static

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Block - Block Pstatic

Advanced seismic analysis: No
Staged pseudostatic analysis: No
Seismic Load Coefficient (Horizontal): 0.33

Block - Curved Static

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Block - Curved PStatic

Advanced seismic analysis: No
Staged pseudostatic analysis: No
Seismic Load Coefficient (Horizontal): 0.33

Materials

Puente Formation	
Color	🟨
Strength Type	Anisotropic Linear
Unit Weight [lbs/ft3]	120
Cohesion 1 [psf]	335
Cohesion 2 [psf]	530
Friction Angle 1 [deg]	20
Friction Angle 2 [deg]	25
A [deg]	2
B [deg]	5
Anisotropic Definition	Angle
Angle from 1 [deg]	-3
Anisotropic Surface	
Water Surface	Assigned per scenario
Hu Value	Automatically Calculated
Fill	
Color	🟩
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	390
Friction Angle [deg]	21
Water Surface	Assigned per scenario
Ru Value	0

Materials In Use

Material		Block	Block Static	Block Pstatic	Curved Static	Curved PStatic
Puente Formation	🟨	✓	✓	✓	✓	✓

Support

Row 1	
Color	🟦
Support Type	Pile/Micro Pile
Force Application	Active
Out-of-Plane Spacing [ft]	8
Failure Mode	Shear
Pile Shear Strength [lb]	160000
Force Direction	Parallel to surface

Tieback	
Color	🟩
Support Type	Grouted Tieback (with friction)
Force Application	Active
Force Orientation	Parallel to Reinforcement
Bond Length [percent]	60
Out-of-Plane Spacing [ft]	6
Tensile Capacity [lb]	200000
Plate Capacity [lb]	200000
Pullout Strength Adhesion [psf]	2500
Pullout Strength Friction Angle [degrees]	30
Material Dependent	No
Shear Strength Model	Linear
Use External Loads for Strength	yes
Shear Capacity [lb]	1000
Grout Diameter [ft]	0.5

Entity Information

Block

Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 425 0, 370 306, 370 306, 488 258, 488 254, 487 250, 485 243, 483 185, 454 185, 439 170, 439 170, 409 75, 409 75, 426 67, 426 50, 424 50, 423 25, 425

Scenario-based Entities

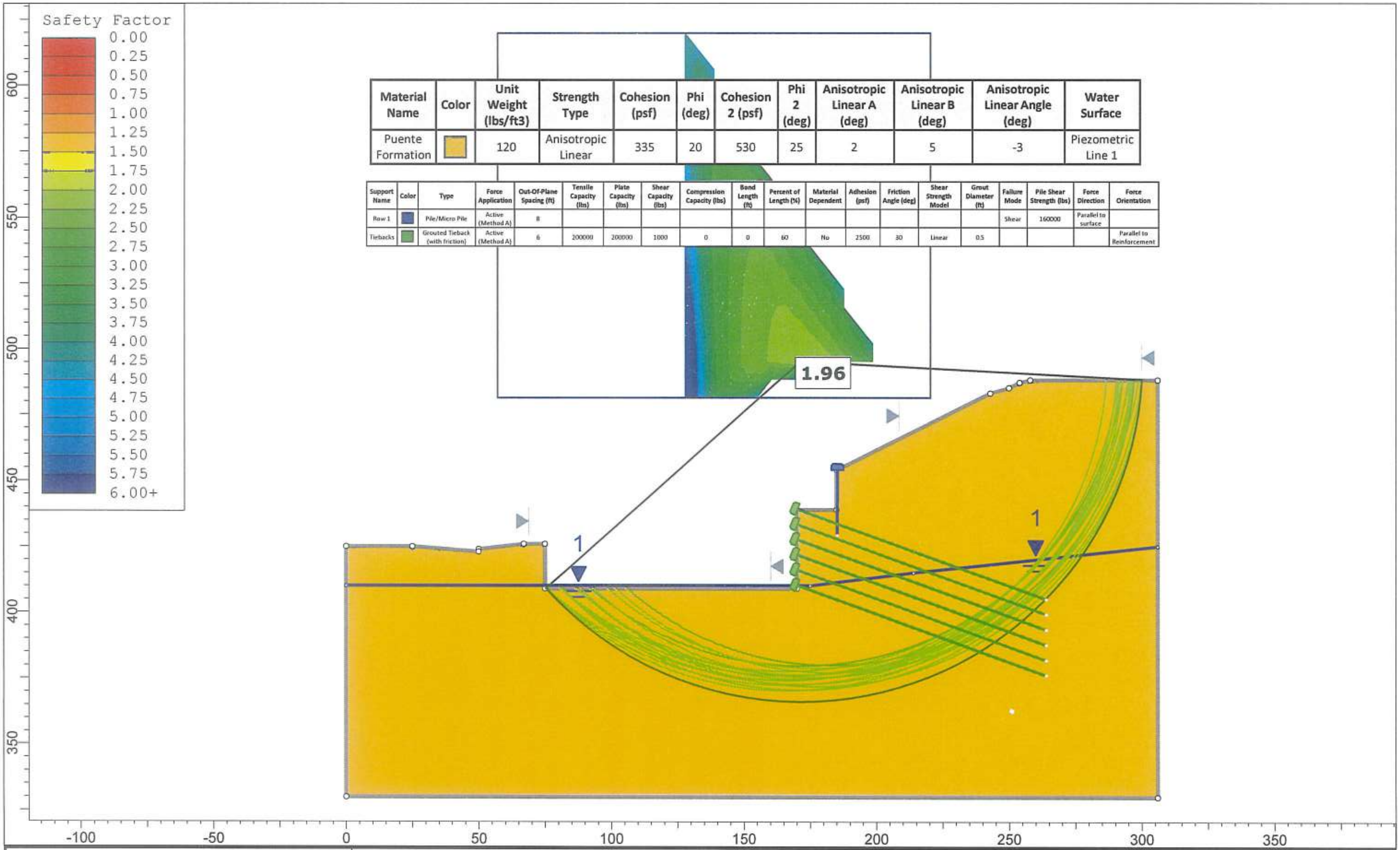
Type	Coordinates (x,y)	Master Scenario	Block Static	Block Pstatic	Curved Static	Curved PStatic
Piezoline	0, 410 173, 410 214, 415 306, 425	Assigned to: 🟨 Puente Formatio	Assigned to: 🟨 Puente Formatio	Assigned to: 🟨 Puente Formatio	Assigned to: 🟨 Puente Formatio	Assigned to: 🟨 Puente Formatio
Block Search Window	224.746, 428.163 251.812, 438.157 246.718, 476.149 222.665, 458.268					
Block Search Window	255.267, 481.297 258.604, 449.193 284.71, 460.442 281.904, 485.321					

Bolt	185.143, 454.31 184.985, 429.823	✗	🟦 Row 1	✗	✗	✗
Bolt	170, 439 263.969, 404.798	✗	🟩 Tieback	✗	✗	✗
Bolt	170, 433 263.969, 398.798	✗	🟩 Tieback	✗	✗	✗
Bolt	170, 427 263.969, 392.798	✗	🟩 Tieback	✗	✗	✗
Bolt	170, 421 263.969, 386.798	✗	🟩 Tieback	✗	✗	✗
Bolt	170, 415 263.969, 380.798	✗	🟩 Tieback	✗	✗	✗
Bolt	170, 409 263.969, 374.798	✗	🟩 Tieback	✗	✗	✗
Block Search Window	188.122, 406.314 211.173, 412.381 213.842, 462.365 189.821, 451.446					
Bolt	184.87, 454.178 185.263, 429.461	✗	✗	🟦 Row 1	✗	✗
Bolt	170, 438.602 263.969, 404.4	✗	✗	🟩 Tieback	✗	✗
Bolt	170, 432.682 263.969, 398.48	✗	✗	🟩 Tieback	✗	✗
Bolt	170, 426.761 263.969, 392.559	✗	✗	🟩 Tieback	✗	✗

Bolt	170, 420.841 263.969, 386.639	✗	✗	🟩 Tieback	✗	✗
Bolt	170, 414.92 263.969, 380.718	✗	✗	🟩 Tieback	✗	✗
Bolt	170, 409 263.969, 374.798	✗	✗	🟩 Tieback	✗	✗
Block Search Window	190.076, 419.487 216.185, 426.014 214.941, 461.254 188.803, 451.645					
Bolt	185.222, 454.029 185.134, 431.408	✗	✗	✗	🟦 Row 1	✗
Bolt	170, 438.683 263.969, 404.481	✗	✗	✗	🟩 Tieback	✗
Bolt	170, 432.746 263.969, 398.544	✗	✗	✗	🟩 Tieback	✗
Bolt	170, 426.81 263.969, 392.608	✗	✗	✗	🟩 Tieback	✗
Bolt	170, 420.873 263.969, 386.671	✗	✗	✗	🟩 Tieback	✗
Bolt	170, 414.937 263.969, 380.735	✗	✗	✗	🟩 Tieback	✗
Bolt	170, 409 263.969, 374.798	✗	✗	✗	🟩 Tieback	✗

Bolt	185.111, 453.673 185.111, 429.428	✗	✗	✗	✗	🟦 Row 1
Bolt	170.828, 439 264.797, 404.798	✗	✗	✗	✗	🟩 Tieback
Bolt	170, 433.662 263.969, 399.46	✗	✗	✗	✗	🟩 Tieback
Bolt	170, 427.497 263.969, 393.295	✗	✗	✗	✗	🟩 Tieback
Bolt	170, 421.331 263.969, 387.129	✗	✗	✗	✗	🟩 Tieback
Bolt	170, 415.166 263.969, 380.964	✗	✗	✗	✗	🟩 Tieback
Bolt	170, 409 263.969, 374.798	✗	✗	✗	✗	🟩 Tieback

20489 BB upd9-2-23 lower tiebacks
File No 20489
Geotechnologies, inc.
Date Created: 5/9/2017, 8:44:53 PM
Software Version: 9.012



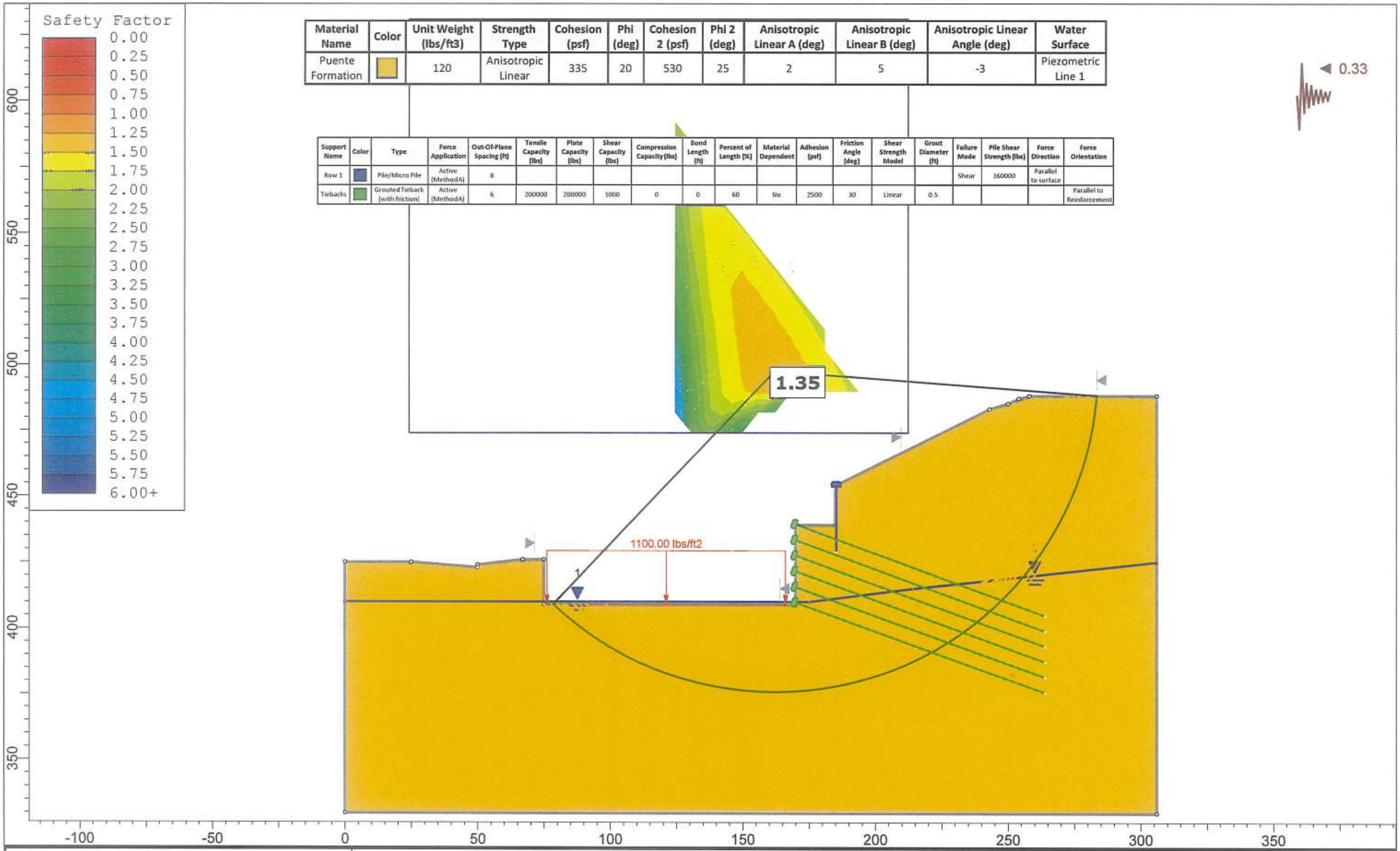
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface
Puente Formation	🟨	120	Anisotropic Linear	335	20	530	25	2	5	-3	Piezometric Line 1

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	160000	Parallel to surface	
Tiebacks	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Project	File No 20486 Aragon- Sunset		
Analysis	Cross Section B-B', Upper Slope, Proposed Tiebacks		
Scale	1:600	*Comment 1*	Curved Static
Date	9/5/2023	*Location of Analysis*	Proposed Cut

SLIDEINTERPRET 9.012



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface
Puente Formation	🟨	120	Anisotropic Linear	335	20	530	25	2	5	-3	Piezometric Line 1

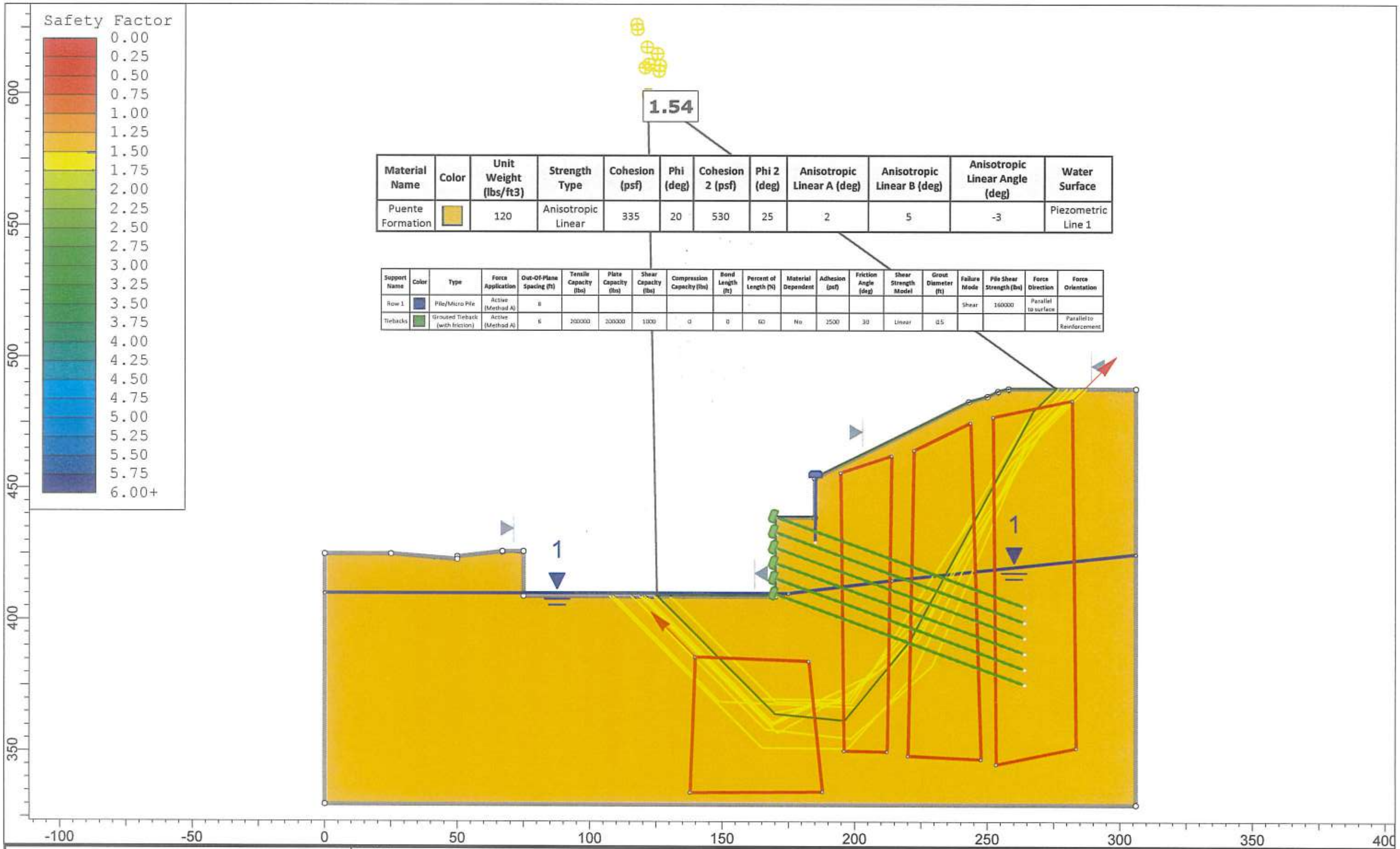
Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (MethodA)	8												Shear	160000	Parallel to surface	
Tiebacks	🟩	Grouted Tieback (with friction)	Active (MethodA)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Project	File No 20486 Aragon- Sunset
Analysis	Cross Section B-B', Lower Slope, Proposed Tiebacks

Scale	1:600	*Comment 1*	Curved PseudoStatic
Date	9/5/2023	*Location of Analysis*	Proposed Cut

SLIDEINTERPRET 9.012



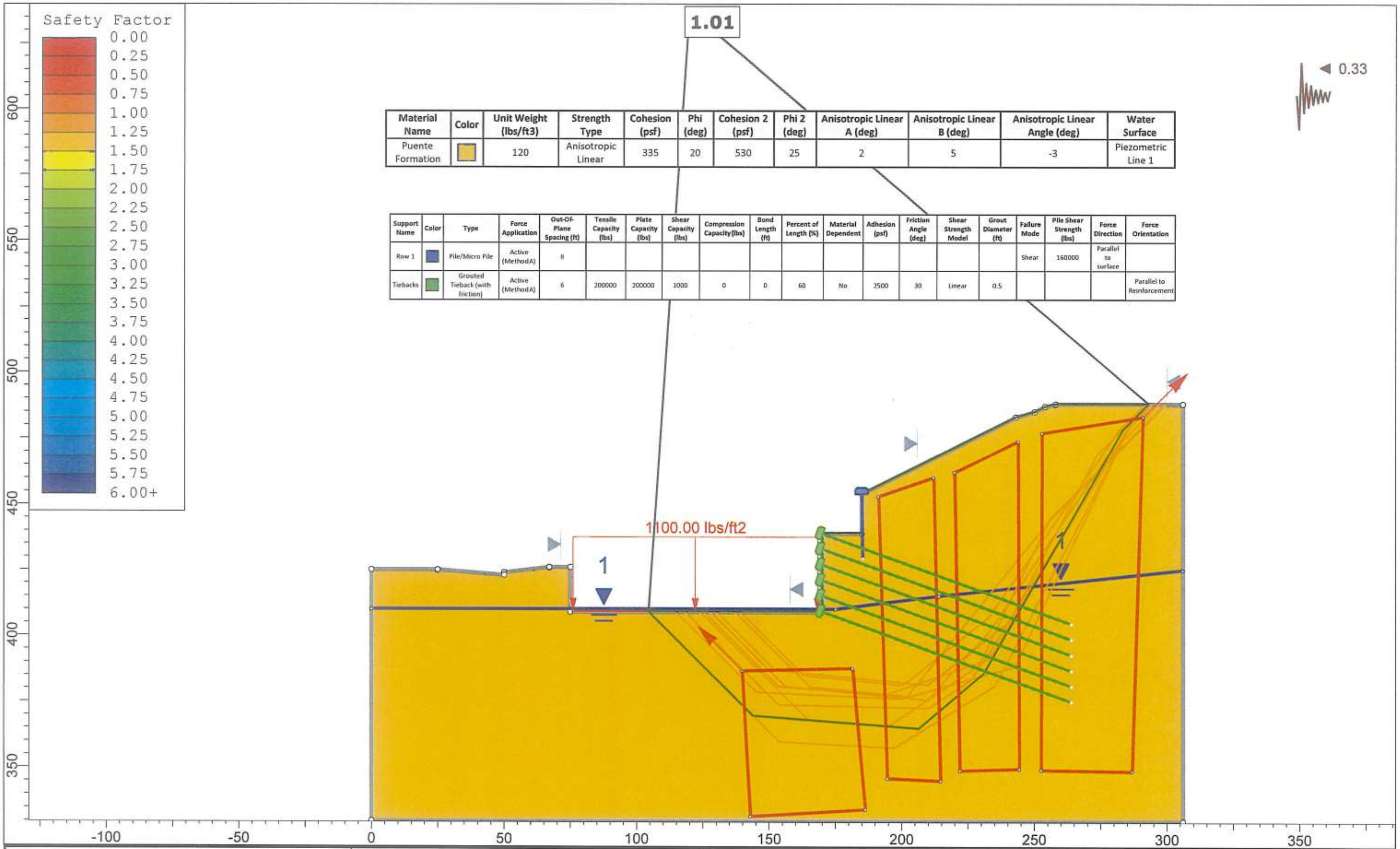
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface
Puente Formation	🟨	120	Anisotropic Linear	335	20	530	25	2	5	-3	Piezometric Line 1

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	160000	Parallel to surface	
Tiebacks	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Project	File No 20486 Aragon- Sunset
Analysis	Cross Section B-B', Lower Slope, Proposed Tiebacks
Scale	1:600
Comment 1	Block Static
Date	9/5/2023
Location of Analysis	Proposed Tiebacks

SLIDEINTERPRET 9.012



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface
Puente Formation	🟨	120	Anisotropic Linear	335	20	530	25	2	5	-3	Piezometric Line 1

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (MethodA)	8												Shear	160000	Parallel to surface	
Tiebacks	🟩	Grouted Tieback (with friction)	Active (MethodA)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Project	File No 20486 Aragon- Sunset
Analysis	Cross Section B-B', Lower Slope, Proposed Tiebacks

Scale	1:600	*Comment 1*	Block PStatic
Date	9/5/2023	*Location of Analysis*	Proposed Tiebacks

SLIDEINTERPRET 9.012

Table of Contents

Slide Analysis Information

20489 BB upd9-2-23 lower tiebacks

Project Summary

File Name:	20489 BB upd9-2-23 lower tiebacks.slmd
Slide Modeler Version:	9.012
Project Title:	File No 20489
Analysis:	Cross Section B-B'. Lower Slooe, Tiebacks
Author:	RTK
Company:	Geotechnologies, inc.
Date Created:	5/9/2017, 8:44:53 PM

Currently Open Scenarios

Group Name	Scenario Name	Global Minimum	Compute Time
Block ◆	Block Static	Bishop Simplified: 1.644630 Janbu Simplified: 1.542880	00h:00m:01.153s
	Block Pstatic	Bishop Simplified: 1.113180 Janbu Simplified: 1.012540	00h:00m:01.124s
	Curved Static	Bishop Simplified: 1.961330 Janbu Simplified: 1.643690	00h:00m:00.368s
	Curved PStatic	Bishop Simplified: 1.352350 Janbu Simplified: 1.017860	00h:00m:00.360s

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

All Open Scenarios

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	74
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

All Open Scenarios

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

All Open Scenarios

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

Surface Options

Block - Curved Static

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Invalid Surfaces
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

All other Scenarios

Surface Type:	Non-Circular Block Search
Number of Surfaces:	8000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [deg]:	135
Left Projection Angle (End Angle) [deg]:	135
Right Projection Angle (Start Angle) [deg]:	45
Right Projection Angle (End Angle) [deg]:	45
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

◆ Block - Block Static

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

◆ Block - Block Pstatic

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.33

◆ Block - Curved Static

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

◆ Block - Curved PStatic

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.33

Loading

◆ Block - Block Pstatic

Distribution:	Constant
Magnitude [psf]:	1100
Orientation:	Normal to boundary

◆ Block - Curved PStatic

Distribution:	Constant
Magnitude [psf]:	1100
Orientation:	Normal to boundary

Materials

Puente Formation

Color	🟨
Strength Type	Anisotropic Linear
Unit Weight [lbs/ft3]	120
Cohesion 1 [psf]	335
Cohesion 2 [psf]	530
Friction Angle 1 [deg]	20
Friction Angle 2 [deg]	25
A [deg]	2
B [deg]	5
Anisotropic Definition	Angle
Angle from 1 [deg]	-3
Anisotropic Surface	
Water Surface	Assigned per scenario
Hu Value	Automatically Calculated

Materials In Use

Material	Block Static	Block Pstatic	Curved Static	Curved PStatic
Puente Formation 🟨	✓	✓	✓	✓

Support

Row 1	
Color	🟦
Support Type	Pile/Micro Pile
Force Application	Active
Out-of-Plane Spacing [ft]	8
Failure Mode	Shear
Pile Shear Strength [lb]	160000
Force Direction	Parallel to surface

Tiebacks	
Color	🟩
Support Type	Grouted Tieback (with friction)
Force Application	Active
Force Orientation	Parallel to Reinforcement
Bond Length [percent]	60
Out-of-Plane Spacing [ft]	6
Tensile Capacity [lb]	200000
Plate Capacity [lb]	200000
Pullout Strength Adhesion [psf]	2500
Pullout Strength Friction Angle [degrees]	30
Material Dependent	No
Shear Strength Model	Linear
Use External Loads for Strength	yes
Shear Capacity [lb]	1000
Grout Diameter [ft]	0.5

Global Minimums

Block - Block Static

Method: bishop simplified

FS	1.644630
Axis Location:	121.797, 610.724
Left Slip Surface Endpoint:	119.686, 409.000
Right Slip Surface Endpoint:	281.909, 488.000
Resisting Moment:	1.14166e+08 lb-ft
Driving Moment:	6.9417e+07 lb-ft
Active Support Moment:	-3.19e+07 lb-ft
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	7702.3 ft2
Surface Horizontal Width:	162.224 ft
Surface Average Height:	47.4796 ft

Method: janbu simplified

FS	1.542880
Axis Location:	121.589, 599.231
Left Slip Surface Endpoint:	125.223, 409.000
Right Slip Surface Endpoint:	275.954, 488.000
Resisting Horizontal Force:	347131 lb
Driving Horizontal Force:	224989 lb
Active Horizontal Support Force:	-188281 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	7566.63 ft2
Surface Horizontal Width:	150.731 ft
Surface Average Height:	50.1996 ft

Block - Block Pstatic

Method: bishop simplified

FS	1.113180
Axis Location:	119.776, 637.240
Left Slip Surface Endpoint:	104.406, 409.000
Right Slip Surface Endpoint:	293.146, 488.000
Resisting Moment:	1.51175e+08 lb-ft
Driving Moment:	1.35805e+08 lb-ft
Active Support Moment:	-3.68683e+07 lb-ft
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	10117.3 ft2
Surface Horizontal Width:	188.74 ft
Surface Average Height:	53.6046 ft

Method: janbu simplified

FS	1.012540
Axis Location:	119.776, 637.240
Left Slip Surface Endpoint:	104.406, 409.000
Right Slip Surface Endpoint:	293.146, 488.000
Resisting Horizontal Force:	470171 lb
Driving Horizontal Force:	464349 lb
Active Horizontal Support Force:	-188281 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	10117.3 ft2
Surface Horizontal Width:	188.74 ft
Surface Average Height:	53.6046 ft

◆ Block - Curved Static

Method: bishop simplified

FS	1.961330
Center:	171.306, 494.878
Radius:	128.878
Left Slip Surface Endpoint:	75.211, 409.000
Right Slip Surface Endpoint:	300.000, 488.000
Resisting Moment:	9.92559e+07 lb-ft
Driving Moment:	5.06064e+07 lb-ft
Active Support Moment:	-9.46974e+06 lb-ft
Maximum Single Support Force:	33333.3 lb
Total Support Force:	130830 lb
Total Slice Area:	13198.2 ft2
Surface Horizontal Width:	224.789 ft
Surface Average Height:	58.7137 ft

Method: janbu simplified

FS	1.643690
Center:	171.306, 494.878
Radius:	128.878
Left Slip Surface Endpoint:	75.211, 409.000
Right Slip Surface Endpoint:	300.000, 488.000
Resisting Horizontal Force:	608785 lb
Driving Horizontal Force:	370378 lb
Active Horizontal Support Force:	-123282 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	130830 lb
Total Slice Area:	13198.2 ft2
Surface Horizontal Width:	224.789 ft
Surface Average Height:	58.7137 ft

◆ Block - Curved PStatic

Method: bishop simplified

FS	1.352350
Center:	162.010, 497.369
Radius:	121.737
Left Slip Surface Endpoint:	78.280, 409.000
Right Slip Surface Endpoint:	283.386, 488.000
Resisting Moment:	8.00365e+07 lb-ft
Driving Moment:	5.91833e+07 lb-ft
Active Support Moment:	-1.32857e+07 lb-ft
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	9870.6 ft2
Surface Horizontal Width:	205.106 ft
Surface Average Height:	48.1244 ft

Method: janbu simplified

FS	1.017860
Center:	168.282, 489.519
Radius:	115.114
Left Slip Surface Endpoint:	86.015, 409.000
Right Slip Surface Endpoint:	283.386, 488.000
Resisting Horizontal Force:	526609 lb
Driving Horizontal Force:	517369 lb
Active Horizontal Support Force:	-182813 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	194181 lb
Total Slice Area:	10132.9 ft2
Surface Horizontal Width:	197.371 ft
Surface Average Height:	51.3396 ft

Global Minimum Coordinates

🟩 Block - Block Static

Method: bishop simplified

X	Y
119.686	409
168.539	360.146
209.328	381.107
221.965	394.064
261.697	467.787
281.909	488

Method: janbu simplified

X	Y
125.223	409
169.847	364.376
196.132	361.873
220.946	392.416
267.33	479.376
275.954	488

🟩 Block - Block Pstatic

Method: bishop simplified

X	Y
104.406	409
143.84	369.566
206.418	364.785
230.86	385.616
283.364	478.219
293.146	488

Method: janbu simplified

X	Y
104.406	409
143.84	369.566
206.418	364.785
230.86	385.616
283.364	478.219
293.146	488

Global Minimum Support Data

Block - Block Static

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
185.143, 454.31	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
170, 439	100	67.7765	32.2235	27.7765	32.2235	33333.3
170, 433.138	100	64.9659	35.0341	24.9659	35.0341	33333.3
170, 427.276	100	62.1554	37.8446	22.1554	37.8446	33333.3
170, 421.415	100	59.3449	40.6551	19.3449	40.6551	33333.3
170, 415.553	100	56.5343	43.4657	16.5343	43.4657	33333.3
170, 409.691	100	52.7822	47.2178	12.7822	47.2178	33333.3

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
185.143, 454.31	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
170, 439	100	67.5447	32.4553	27.5447	32.4553	33333.3
170, 433.138	100	64.7583	35.2417	24.7583	35.2417	33333.3
170, 427.276	100	61.972	38.028	21.972	38.028	33333.3
170, 421.415	100	59.1856	40.8144	19.1856	40.8144	33333.3
170, 415.553	100	56.3992	43.6008	16.3992	43.6008	33333.3
170, 409.691	100	53.3695	46.6305	13.3695	46.6305	33333.3

Block - Block Pstatic

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
184.87, 454.178	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
170, 438.629	100	80.2016	19.7984	40.2016	19.7984	33333.3
170, 432.703	100	77.2377	22.7623	37.2377	22.7623	33333.3
170, 426.777	100	74.2739	25.7261	34.2739	25.7261	33333.3
170, 420.852	100	71.31	28.69	31.31	28.69	33333.3
170, 414.926	100	68.3462	31.6538	28.3462	31.6538	33333.3
170, 409	100	65.3824	34.6176	25.3824	34.6176	33333.3

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
184.87, 454.178	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
170, 438.629	100	80.2016	19.7984	40.2016	19.7984	33333.3
170, 432.703	100	77.2377	22.7623	37.2377	22.7623	33333.3
170, 426.777	100	74.2739	25.7261	34.2739	25.7261	33333.3
170, 420.852	100	71.31	28.69	31.31	28.69	33333.3
170, 414.926	100	68.3462	31.6538	28.3462	31.6538	33333.3
170, 409	100	65.3824	34.6176	25.3824	34.6176	33333.3

Block - Curved Static

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
185.222, 454.029	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
170, 439	100	99.5957	0.404282	59.5957	0.404282	814.961
170, 433.234	100	95.0351	4.96491	55.0351	4.96491	10244.6
170, 427.468	100	90.1428	9.85722	50.1428	9.85722	20765.7
170, 421.701	100	84.8951	15.1049	44.8951	15.1049	32338
170, 415.935	100	79.266	20.734	39.266	20.734	33333.3
170, 410.169	100	73.2259	26.7741	33.2259	26.7741	33333.3

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
185.222, 454.029	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
170, 439	100	99.5957	0.404282	59.5957	0.404282	814.961
170, 433.234	100	95.0351	4.96491	55.0351	4.96491	10244.6
170, 427.468	100	90.1428	9.85722	50.1428	9.85722	20765.7
170, 421.701	100	84.8951	15.1049	44.8951	15.1049	32338
170, 415.935	100	79.266	20.734	39.266	20.734	33333.3
170, 410.169	100	73.2259	26.7741	33.2259	26.7741	33333.3

Block - Curved PStatic

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
185.111, 453.673	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
170, 438.984	100	82.5261	17.4739	42.5261	17.4739	33333.3
170, 433.115	100	77.7324	22.2676	37.7324	22.2676	33333.3
170, 427.245	100	72.5541	27.4459	32.5541	27.4459	33333.3
170, 421.375	100	66.983	33.017	26.983	33.017	33333.3
170, 415.505	100	60.9926	39.0074	20.9926	39.0074	33333.3
170, 409.636	100	54.4703	45.5297	14.4703	45.5297	33333.3

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
185.111, 453.673	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
170, 438.984	100	86.198	13.802	46.198	13.802	27514.5
170, 433.115	100	81.5491	18.4509	41.5491	18.4509	33333.3
170, 427.245	100	76.5289	23.4711	36.5289	23.4711	33333.3
170, 421.375	100	71.1151	28.8849	31.1151	28.8849	33333.3
170, 415.505	100	65.2186	34.7814	25.2186	34.7814	33333.3
170, 409.636	100	58.818	41.182	18.818	41.182	33333.3

Valid and Invalid Surfaces

Block - Block Static

Method: bishop simplified

Number of Valid Surfaces:	4486
Number of Invalid Surfaces:	3514
Error Codes	
Error Code -105 reported for 55 surfaces	
Error Code -108 reported for 18 surfaces	
Error Code -111 reported for 3377 surfaces	
Error Code -112 reported for 64 surfaces	

Method: janbu simplified

Number of Valid Surfaces:	1634
Number of Invalid Surfaces:	6366
Error Codes	
Error Code -105 reported for 55 surfaces	
Error Code -108 reported for 9 surfaces	
Error Code -111 reported for 6296 surfaces	
Error Code -112 reported for 6 surfaces	

Block - Block Pstatic

Method: bishop simplified

Number of Valid Surfaces:	4945
Number of Invalid Surfaces:	3055
Error Codes	
Error Code -105 reported for 49 surfaces	
Error Code -108 reported for 8 surfaces	
Error Code -111 reported for 2930 surfaces	
Error Code -112 reported for 68 surfaces	

Method: janbu simplified

Number of Valid Surfaces:	4205
Number of Invalid Surfaces:	3795
Error Codes	
Error Code -105 reported for 49 surfaces	
Error Code -108 reported for 3 surfaces	
Error Code -111 reported for 3735 surfaces	
Error Code -112 reported for 8 surfaces	

Block - Curved Static

Method: bishop simplified

Number of Valid Surfaces:	3302
Number of Invalid Surfaces:	10369

Error Codes

Error Code -107 reported for 44 surfaces
Error Code -108 reported for 3 surfaces
Error Code -112 reported for 18 surfaces
Error Code -114 reported for 413 surfaces
Error Code -1000 reported for 9891 surfaces

Method: janbu simplified

Number of Valid Surfaces:	3320
Number of Invalid Surfaces:	10351

Error Codes

Error Code -107 reported for 44 surfaces
Error Code -108 reported for 2 surfaces
Error Code -112 reported for 1 surface
Error Code -114 reported for 413 surfaces
Error Code -1000 reported for 9891 surfaces

◆ Block - Curved PStatic

Method: bishop simplified

Number of Valid Surfaces:	2060
Number of Invalid Surfaces:	11611

Error Codes

Error Code -112 reported for 5 surfaces
Error Code -114 reported for 392 surfaces
Error Code -1000 reported for 11214 surfaces

Method: janbu simplified

Number of Valid Surfaces:	2065
Number of Invalid Surfaces:	11606

Error Codes

Error Code -114 reported for 392 surfaces
Error Code -1000 reported for 11214 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.

-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

-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.

-114 = Surface with Reverse Curvature.

-1000 = No valid slip surface is generated

Slice Data

Block - Block Static

Global Minimum Query (bishop simplified) - Safety Factor: 1.64463

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.25692	636.452	-45	Puente Formation	530	25	462.62	760.839	659.047	164.011	495.036	196.427	32.4161
2	3.25692	1909.36	-45	Puente Formation	530	25	536.924	883.042	1124.34	367.243	757.101	587.42	220.177
3	3.25692	3182.26	-45	Puente Formation	530	25	611.229	1005.25	1589.64	570.475	1019.17	978.413	407.938
4	3.25692	4455.17	-45	Puente Formation	530	25	685.533	1127.45	2054.94	773.707	1281.23	1369.41	595.698
5	3.25692	5728.07	-45	Puente Formation	530	25	759.837	1249.65	2520.24	976.939	1543.31	1760.41	783.468
6	3.25692	7000.97	-45	Puente Formation	530	25	834.141	1371.85	2985.53	1180.17	1805.36	2151.39	971.219
7	3.25692	8273.88	-45	Puente Formation	530	25	908.446	1494.06	3450.84	1383.4	2067.44	2542.39	1158.99
8	3.25692	9546.78	-45	Puente Formation	530	25	982.75	1616.26	3916.12	1586.63	2329.49	2933.37	1346.74
9	3.25692	10819.7	-45	Puente Formation	530	25	1057.05	1738.46	4381.43	1789.87	2591.56	3324.38	1534.51
10	3.25692	12092.6	-45	Puente Formation	530	25	1131.36	1860.67	4846.72	1993.1	2853.62	3715.36	1722.26
11	3.25692	13365.5	-45	Puente Formation	530	25	1205.66	1982.87	5312.03	2196.33	3115.7	4106.36	1910.03
12	3.25692	14638.4	-45	Puente Formation	530	25	1279.97	2105.07	5777.31	2399.56	3377.75	4497.35	2097.79
13	3.25692	15911.3	-45	Puente Formation	530	25	1354.27	2227.28	6242.62	2602.79	3639.83	4888.35	2285.56
14	3.25692	17184.2	-45	Puente Formation	530	25	1428.58	2349.48	6707.91	2806.03	3901.88	5279.33	2473.3
15	3.25692	18457.1	-45	Puente Formation	530	25	1502.88	2471.68	7173.21	3009.26	4163.95	5670.34	2661.08
16	3.13761	24128	27.198	Puente Formation	530	25	1426.53	2346.11	6955.25	3060.57	3894.68	7688.32	4627.75
17	3.13761	28778.9	27.198	Puente Formation	530	25	1818.16	2990.2	8235.87	2959.96	5275.91	9170.2	6210.24
18	3.13761	28171.8	27.198	Puente Formation	530	25	1803.93	2966.79	8049.71	2823.99	5225.72	8976.72	6152.73
19	3.13761	27564.7	27.198	Puente Formation	530	25	1774.44	2918.29	7871.41	2749.7	5121.71	8783.26	6033.56
20	3.13761	26957.6	27.198	Puente Formation	530	25	1744.95	2869.79	7693.1	2675.41	5017.69	8589.8	5914.39
21	3.13761	30775.6	27.198	Puente Formation	530	25	2064.38	3395.14	8745.42	2601.12	6144.3	9806.27	7205.15
22	3.13761	32131.8	27.198	Puente Formation	530	25	2189.7	3601.24	9113.14	2526.83	6586.31	10238.4	7711.56
23	3.13761	32115.4	27.198	Puente Formation	530	25	2206.78	3629.34	9099.11	2452.54	6646.57	10233.1	7780.6
24	3.13761	32099	27.198	Puente Formation	530	25	2223.87	3657.44	9085.07	2378.25	6706.82	10227.9	7849.64
25	3.13761	32082.6	27.198	Puente Formation	530	25	2240.95	3685.54	9071.04	2303.96	6767.08	10222.6	7918.68
26	3.13761	32066.1	27.198	Puente Formation	530	25	2258.04	3713.64	9057.01	2229.67	6827.34	10217.4	7987.72
27	3.13761	32049.7	27.198	Puente Formation	530	25	2275.13	3741.74	9042.98	2155.38	6887.6	10212.1	8056.75
28	3.13761	32033.3	27.198	Puente Formation	530	25	2292.21	3769.84	9028.97	2081.09	6947.88	10206.9	8125.82
29	3.15906	31929.4	45.7183	Puente Formation	530	25	2039.04	3353.47	8011.88	1956.95	6054.93	10102.7	8145.75

30	3.15906	31300.3	45.7183	Puente Formation	530	25	2031.74	3341.46	7820.22	1791.01	6029.21	9903.55	8112.54
31	3.15906	30671.1	45.7183	Puente Formation	530	25	2027.22	3334.03	7625.69	1612.42	6013.27	9704.38	8091.96
32	3.15906	30041.9	45.7183	Puente Formation	530	25	2804.19	4611.86	10187.4	1433.83	8753.58	13062.8	11629
33	3.12018	28569.7	61.6783	Puente Formation	530	25	2361.5	3883.79	8368.69	1176.46	7192.23	12750.5	11574
34	3.12018	26986.1	61.6783	Puente Formation	530	25	2329.68	3831.46	7920.33	840.33	7080	12243.1	11402.8
35	3.12018	25402.5	61.6783	Puente Formation	530	25	2966.87	4879.41	9831.53	504.196	9327.33	15336.6	14832.4
36	3.12018	23818.9	61.6783	Puente Formation	530	25	2266.04	3726.79	7023.6	168.062	6855.54	11228.3	11060.2
37	3.4064	24195.6	61.6783	Puente Formation	530	25	1529.68	2515.75	4258.45	0	4258.45	7096.79	7096.79
38	3.4064	22308.2	61.6783	Puente Formation	530	25	1426.81	2346.57	3895.66	0	3895.66	6543.12	6543.12
39	3.4064	20385.1	61.6783	Puente Formation	530	25	1322	2174.2	3526	0	3526	5978.99	5978.99
40	3.4064	18238.3	61.6783	Puente Formation	530	25	1205	1981.78	3113.34	0	3113.34	5349.24	5349.24
41	3.4064	16080.5	61.6783	Puente Formation	530	25	1087.4	1788.37	2698.58	0	2698.58	4716.27	4716.27
42	3.4064	14133.5	61.6783	Puente Formation	530	25	981.285	1613.85	2324.33	0	2324.33	4145.12	4145.12
43	3.4064	11992.1	61.6783	Puente Formation	530	25	864.581	1421.92	1912.72	0	1912.72	3516.96	3516.96
44	3.4064	9554.12	61.6783	Puente Formation	530	25	731.709	1203.39	1444.09	0	1444.09	2801.79	2801.79
45	3.36878	7490.13	45	Puente Formation	530	25	741.865	1220.09	1479.91	0	1479.91	2221.77	2221.77
46	3.36878	6128.29	45	Puente Formation	530	25	652.608	1073.3	1165.11	0	1165.11	1817.71	1817.71
47	3.36878	4766.44	45	Puente Formation	530	25	563.351	926.504	850.305	0	850.305	1413.66	1413.66
48	3.36878	3404.6	45	Puente Formation	530	25	474.094	779.709	535.503	0	535.503	1009.6	1009.6
49	3.36878	2042.76	45	Puente Formation	530	25	384.837	632.915	220.701	0	220.701	605.539	605.539
50	3.36878	680.921	45	Puente Formation	530	25	295.581	486.121	-94.0996	0	-94.0996	201.481	201.481

Global Minimum Query (janbu simplified) - Safety Factor: 1.54288

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.97493	531.013	-45	Puente Formation	530	25	502.337	775.045	680.714	155.213	525.501	178.377	23.1642
2	2.97493	1593.04	-45	Puente Formation	530	25	576.55	889.548	1111.9	340.849	771.053	535.352	194.503
3	2.97493	2655.06	-45	Puente Formation	530	25	650.764	1004.05	1543.09	526.485	1016.61	892.326	365.841
4	2.97493	3717.09	-45	Puente Formation	530	25	724.978	1118.55	1974.28	712.12	1262.16	1249.3	537.181
5	2.97493	4779.11	-45	Puente Formation	530	25	799.192	1233.06	2405.46	897.756	1507.7	1606.26	708.507
6	2.97493	5841.14	-45	Puente Formation	530	25	873.406	1347.56	2836.65	1083.39	1753.26	1963.24	879.85
7	2.97493	6903.16	-45	Puente Formation	530	25	947.619	1462.06	3267.84	1269.03	1998.81	2320.22	1051.19
8	2.97493	7965.19	-45	Puente Formation	530	25	1021.84	1576.57	3699.03	1454.66	2244.37	2677.19	1222.53
9	2.97493	9027.22	-45	Puente Formation	530	25	1096.05	1691.07	4130.22	1640.3	2489.92	3034.17	1393.87
10	2.97493	10089.2	-45	Puente Formation	530	25	1170.26	1805.57	4561.41	1825.93	2735.48	3391.15	1565.22
11	2.97493	11151.3	-45	Puente Formation	530	25	1244.47	1920.07	4992.6	2011.57	2981.03	3748.13	1736.56
12	2.97493	12213.3	-45	Puente Formation	530	25	1318.69	2034.58	5423.79	2197.21	3226.58	4105.1	1907.89
13	2.97493	13275.3	-45	Puente Formation	530	25	1392.9	2149.08	5854.98	2382.84	3472.14	4462.08	2079.24
14	2.97493	14337.3	-45	Puente Formation	530	25	1467.11	2263.58	6286.15	2568.48	3717.67	4819.03	2250.55
15	2.97493	15399.4	-45	Puente Formation	530	25	1541.33	2378.09	6717.34	2754.11	3963.23	5176.01	2421.9
16	2.92047	25651.7	-5.43978	Puente Formation	363.586	20.7553	1732.19	2672.57	8948.35	2855.61	6092.74	8783.4	5927.79
17	2.92047	26298.6	-5.43978	Puente Formation	363.586	20.7553	1783.54	2751.79	9174.73	2872.96	6301.77	9004.88	6131.92
18	2.92047	26396.1	-5.43978	Puente Formation	363.586	20.7553	1795.07	2769.58	9209.22	2860.49	6348.73	9038.28	6177.79
19	2.92047	26493.5	-5.43978	Puente Formation	363.586	20.7553	1793.38	2766.98	9242.42	2900.55	6341.87	9071.64	6171.09
20	2.92047	26591	-5.43978	Puente Formation	363.586	20.7553	1791.71	2764.39	9275.62	2940.61	6335.01	9105	6164.39
21	2.92047	31123.4	-5.43978	Puente Formation	363.586	20.7553	2171.95	3351.06	10863.8	2980.67	7883.09	10656.9	7676.26
22	2.92047	32714	-5.43978	Puente Formation	363.586	20.7553	2298.86	3546.87	11420.5	3020.73	8399.78	11201.6	8180.86
23	2.92047	33323.2	-5.43978	Puente Formation	363.586	20.7553	2341.25	3612.27	11633.1	3060.78	8572.36	11410.2	8349.41
24	2.92047	33932.4	-5.43978	Puente Formation	363.586	20.7553	2383.64	3677.67	11845.8	3100.84	8744.93	11618.8	8517.94
25	3.10181	35941.1	50.9084	Puente Formation	530	25	2138.62	3299.63	8955.36	3015.89	5939.47	11587.7	8571.83
26	3.10181	35097.2	50.9084	Puente Formation	530	25	2124.94	3278.53	8700.16	2805.91	5894.25	11315.7	8509.77
27	3.10181	34253.4	50.9084	Puente Formation	530	25	2111.27	3257.43	8444.95	2595.94	5849.01	11043.6	8447.7
28	3.10181	33409.6	50.9084	Puente Formation	530	25	2097.6	3236.34	8189.72	2385.97	5803.75	10771.6	8385.62
29	3.10181	32565.8	50.9084	Puente Formation	530	25	2083.92	3215.24	7934.51	2176	5758.51	10499.5	8323.55
30	3.10181	31721.9	50.9084	Puente Formation	530	25	2070.25	3194.14	7679.29	1966.02	5713.27	10227.5	8261.47
31	3.10181	30878.1	50.9084	Puente Formation	530	25	2055.42	3171.26	7425.5	1761.31	5664.19	9955.45	8194.14
32	3.10181	30034.3	50.9084	Puente Formation	530	25	2841.36	4383.87	9811.29	1546.65	8264.64	13308.6	11762
33	3.30372	30639.6	61.9247	Puente Formation	530	25	2422.3	3737.32	8137.53	1259.4	6878.13	12678.8	11419.4

34	3.30372	28839	61.9247	Puente Formation	530	25	2386.57	3682.19	7659.47	899.57	6759.9	12133.8	11234.2
35	3.30372	27038.4	61.9247	Puente Formation	530	25	3007.49	4640.2	9354.09	539.74	8814.35	14992.5	14452.7
36	3.30372	25237.8	61.9247	Puente Formation	530	25	2315.11	3571.94	6703.36	179.91	6523.45	11043.7	10863.8
37	3.01535	21463.1	61.9247	Puente Formation	530	25	1592.61	2457.2	4132.89	0	4132.89	7118.67	7118.67
38	3.01535	19963.1	61.9247	Puente Formation	530	25	1496.63	2309.12	3815.33	0	3815.33	6621.18	6621.18
39	3.01535	18462.6	61.9247	Puente Formation	530	25	1400.61	2160.98	3497.65	0	3497.65	6123.49	6123.49
40	3.01535	16830.2	61.9247	Puente Formation	530	25	1296.17	1999.83	3152.06	0	3152.06	5582.08	5582.08
41	3.01535	15096.4	61.9247	Puente Formation	530	25	1185.23	1828.67	2785.01	0	2785.01	5007.05	5007.05
42	3.01535	13427.9	61.9247	Puente Formation	530	25	1078.47	1663.95	2431.77	0	2431.77	4453.66	4453.66
43	3.01535	11896.3	61.9247	Puente Formation	530	25	980.472	1512.75	2107.52	0	2107.52	3945.68	3945.68
44	3.01535	10168.1	61.9247	Puente Formation	530	25	869.895	1342.14	1741.65	0	1741.65	3372.51	3372.51
45	3.01535	8234.51	61.9247	Puente Formation	530	25	746.173	1151.26	1332.29	0	1332.29	2731.19	2731.19
46	3.01535	6188.98	61.9247	Puente Formation	530	25	615.29	949.319	899.232	0	899.232	2052.76	2052.76
47	3.01535	4143.45	61.9247	Puente Formation	530	25	484.407	747.382	466.178	0	466.178	1374.33	1374.33
48	2.87482	2479.37	45	Puente Formation	530	25	463.976	715.86	398.578	0	398.578	862.554	862.554
49	2.87482	1487.62	45	Puente Formation	530	25	383.907	592.322	133.65	0	133.65	517.557	517.557
50	2.87482	495.875	45	Puente Formation	530	25	303.837	468.785	-131.277	0	-131.277	172.561	172.561

Block - Block Pstatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.11318

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.94343	933.037	-45	Puente Formation	530	25	1653.22	1840.33	2995.44	185.43	2810.01	1342.22	1156.79
2	3.94343	2799.11	-45	Puente Formation	530	25	1817.36	2023.05	3633.34	431.5	3201.84	1815.98	1384.48
3	3.94343	4665.19	-45	Puente Formation	530	25	1981.49	2205.76	4271.27	677.57	3593.7	2289.77	1612.2
4	3.94343	6531.26	-45	Puente Formation	530	25	2145.64	2388.48	4909.17	923.64	3985.53	2763.53	1839.89
5	3.94343	8397.33	-45	Puente Formation	530	25	2309.78	2571.2	5547.08	1169.71	4377.37	3237.3	2067.59
6	3.94343	10263.4	-45	Puente Formation	530	25	2473.92	2753.92	6184.98	1415.78	4769.2	3711.06	2295.28
7	3.94343	12129.5	-45	Puente Formation	530	25	2638.06	2936.64	6822.9	1661.85	5161.05	4184.84	2522.99
8	3.94343	13995.6	-45	Puente Formation	530	25	2802.2	3119.35	7460.81	1907.92	5552.89	4658.61	2750.69
9	3.94343	15861.6	-45	Puente Formation	530	25	2966.34	3302.07	8098.71	2153.99	5944.72	5132.37	2978.38
10	3.94343	17727.7	-45	Puente Formation	530	25	3130.48	3484.79	8736.62	2400.06	6336.56	5606.14	3206.08
11	3.68106	17481.3	-4.36879	Puente Formation	335	20	1421.14	1581.98	5957.92	2531.87	3426.05	5849.35	3317.48
12	3.68106	17605.5	-4.36879	Puente Formation	335	20	1426.57	1588.03	5992.08	2549.42	3442.66	5883.09	3333.67
13	3.68106	17729.8	-4.36879	Puente Formation	335	20	1432.01	1594.08	6026.26	2566.97	3459.29	5916.86	3349.89
14	3.68106	17854	-4.36879	Puente Formation	335	20	1437.44	1600.13	6060.42	2584.51	3475.91	5950.6	3366.09
15	3.68106	17978.2	-4.36879	Puente Formation	335	20	1442.87	1606.17	6094.58	2602.06	3492.52	5984.34	3382.28
16	3.68106	18102.4	-4.36879	Puente Formation	335	20	1448.3	1612.22	6128.73	2619.61	3509.12	6018.09	3398.48
17	3.68106	18226.7	-4.36879	Puente Formation	335	20	1309.93	1458.19	5723.1	2637.16	3085.94	5623.03	2985.87
18	3.68106	30190.3	-4.36879	Puente Formation	335	20	2168.9	2414.38	8367.78	2654.71	5713.07	8202.08	5547.37
19	3.68106	31726.9	-4.36879	Puente Formation	335	20	2317.17	2579.43	8796.6	2630.06	6166.54	8619.57	5989.51
20	3.68106	31851.2	-4.36879	Puente Formation	335	20	2312.99	2574.77	8830.02	2676.3	6153.72	8653.32	5977.02
21	3.68106	31975.4	-4.36879	Puente Formation	335	20	2308.8	2570.11	8863.45	2722.53	6140.92	8687.06	5964.53
22	3.68106	37795.3	-4.36879	Puente Formation	335	20	2823.52	3143.09	10483.9	2768.77	7715.17	10268.2	7499.46
23	3.68106	39921.7	-4.36879	Puente Formation	335	20	3001.75	3341.49	11075.3	2815.01	8260.27	10845.9	8030.94
24	3.68106	40859	-4.36879	Puente Formation	335	20	3071.63	3419.28	11335.2	2861.25	8473.98	11100.6	8239.32
25	3.68106	41796.2	-4.36879	Puente Formation	335	20	3141.51	3497.07	11595.2	2907.48	8687.73	11355.2	8447.73
26	3.68106	42733.4	-4.36879	Puente Formation	335	20	3211.39	3574.86	11855.2	2953.72	8901.45	11609.8	8656.11
27	3.68106	43670.7	-4.36879	Puente Formation	335	20	3281.28	3652.65	12115.2	2999.96	9115.19	11864.5	8864.51
28	4.07364	48495.8	40.4405	Puente Formation	530	25	3117.71	3470.57	9238.6	2932.53	6306.07	11895.8	8963.25
29	4.07364	47794.3	40.4405	Puente Formation	530	25	3120.44	3473.61	9064.05	2751.45	6312.6	11723.6	8972.11
30	4.07364	47092.8	40.4405	Puente Formation	530	25	3120.52	3473.7	8891.77	2578.98	6312.79	11551.3	8972.37
31	4.07364	46391.3	40.4405	Puente Formation	530	25	3125.02	3478.71	8715.7	2392.17	6323.53	11379.1	8986.94
32	4.07364	45689.8	40.4405	Puente Formation	530	25	3129.53	3483.73	8539.65	2205.36	6334.29	11206.9	9001.55

33	4.07364	44988.2	40.4405	Puente Formation	530	25	3134.03	3488.74	8363.58	2018.55	6345.03	11034.7	9016.12
34	3.77234	40256.9	60.4473	Puente Formation	530	25	3857.88	4294.51	9805.66	1732.63	8073.03	16609.8	14877.2
35	3.77234	38098.9	60.4473	Puente Formation	530	25	3095.85	3446.24	7601.5	1347.6	6253.9	13061.7	11714.1
36	3.77234	35941	60.4473	Puente Formation	530	25	3050.86	3396.16	7109.06	962.571	6146.49	12489.9	11527.3
37	3.77234	33671.1	60.4473	Puente Formation	530	25	3715.77	4136.32	8311.33	577.541	7733.79	14864.9	14287.3
38	3.77234	31155.9	60.4473	Puente Formation	530	25	2213.93	2464.5	4341.07	192.511	4148.56	8245.79	8053.28
39	3.73807	28537.2	60.4473	Puente Formation	530	25	2109.93	2348.73	3900.27	0	3900.27	7621.57	7621.57
40	3.73807	26263.9	60.4473	Puente Formation	530	25	1963.63	2185.87	3551.02	0	3551.02	7014.29	7014.29
41	3.73807	23600.8	60.4473	Puente Formation	530	25	1792.24	1995.09	3141.9	0	3141.9	6302.89	6302.89
42	3.73807	20653.1	60.4473	Puente Formation	530	25	1602.54	1783.92	2689.03	0	2689.03	5515.45	5515.45
43	3.73807	17695.7	60.4473	Puente Formation	530	25	1412.22	1572.06	2234.7	0	2234.7	4725.45	4725.45
44	3.73807	14738.4	60.4473	Puente Formation	530	25	1221.9	1360.2	1780.37	0	1780.37	3935.46	3935.46
45	3.73807	11781	60.4473	Puente Formation	530	25	1031.59	1148.34	1326.03	0	1326.03	3145.44	3145.44
46	3.73807	8823.67	60.4473	Puente Formation	530	25	841.266	936.48	871.699	0	871.699	2355.44	2355.44
47	3.73807	5866.31	60.4473	Puente Formation	530	25	650.946	724.62	417.364	0	417.364	1565.44	1565.44
48	3.26047	3189.2	45	Puente Formation	530	25	623.701	694.291	352.322	0	352.322	976.023	976.023
49	3.26047	1913.52	45	Puente Formation	530	25	508.306	565.837	76.8518	0	76.8518	585.158	585.158
50	3.26047	637.841	45	Puente Formation	530	25	392.913	437.382	-198.619	0	-198.619	194.294	194.294

Global Minimum Query (janbu simplified) - Safety Factor: 1.01254

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.94343	933.037	-45	Puente Formation	530	25	1952.36	1976.84	3288.2	185.43	3102.77	1335.84	1150.41
2	3.94343	2799.11	-45	Puente Formation	530	25	2146.2	2173.11	3955.17	431.5	3523.67	1808.98	1377.48
3	3.94343	4665.19	-45	Puente Formation	530	25	2340.05	2369.39	4622.14	677.57	3944.57	2282.1	1604.53
4	3.94343	6531.26	-45	Puente Formation	530	25	2533.89	2565.66	5289.12	923.64	4365.48	2755.23	1831.59
5	3.94343	8397.33	-45	Puente Formation	530	25	2727.72	2761.93	5956.11	1169.71	4786.4	3228.38	2058.67
6	3.94343	10263.4	-45	Puente Formation	530	25	2921.56	2958.2	6623.08	1415.78	5207.3	3701.51	2285.73
7	3.94343	12129.5	-45	Puente Formation	530	25	3115.4	3154.47	7290.05	1661.85	5628.2	4174.65	2512.8
8	3.94343	13995.6	-45	Puente Formation	530	25	3309.24	3350.74	7957.02	1907.92	6049.1	4647.78	2739.86
9	3.94343	15861.6	-45	Puente Formation	530	25	3503.09	3547.02	8623.99	2153.99	6470	5120.9	2966.91
10	3.94343	17727.7	-45	Puente Formation	530	25	3696.93	3743.29	9290.98	2400.06	6890.92	5594.05	3193.99
11	3.68106	17481.3	-4.36879	Puente Formation	335	20	1566.23	1585.87	5968.59	2531.87	3436.72	5848.94	3317.07
12	3.68106	17605.5	-4.36879	Puente Formation	335	20	1572.21	1591.93	6002.81	2549.42	3453.39	5882.69	3333.27
13	3.68106	17729.8	-4.36879	Puente Formation	335	20	1578.2	1597.99	6037.02	2566.97	3470.05	5916.45	3349.48
14	3.68106	17854	-4.36879	Puente Formation	335	20	1584.18	1604.05	6071.2	2584.51	3486.69	5950.17	3365.66
15	3.68106	17978.2	-4.36879	Puente Formation	335	20	1590.18	1610.12	6105.41	2602.06	3503.35	5983.93	3381.87
16	3.68106	18102.4	-4.36879	Puente Formation	335	20	1596.16	1616.18	6139.62	2619.61	3520.01	6017.68	3398.07
17	3.68106	18226.7	-4.36879	Puente Formation	335	20	1443.67	1461.77	5732.94	2637.16	3095.78	5622.64	2985.48
18	3.68106	30190.3	-4.36879	Puente Formation	335	20	2390.34	2420.31	8384.06	2654.71	5729.35	8201.45	5546.74
19	3.68106	31726.9	-4.36879	Puente Formation	335	20	2553.74	2585.76	8813.99	2630.06	6183.93	8618.89	5988.83
20	3.68106	31851.2	-4.36879	Puente Formation	335	20	2549.12	2581.09	8847.39	2676.3	6171.09	8652.64	5976.34
21	3.68106	31975.4	-4.36879	Puente Formation	335	20	2544.51	2576.42	8880.79	2722.53	6158.26	8686.39	5963.86
22	3.68106	37795.3	-4.36879	Puente Formation	335	20	3111.79	3150.81	10505.1	2768.77	7736.38	10267.4	7498.64
23	3.68106	39921.7	-4.36879	Puente Formation	335	20	3308.21	3349.69	11097.8	2815.01	8282.8	10845.1	8030.06
24	3.68106	40859	-4.36879	Puente Formation	335	20	3385.22	3427.67	11358.3	2861.25	8497.03	11099.7	8238.41
25	3.68106	41796.2	-4.36879	Puente Formation	335	20	3462.23	3505.65	11618.8	2907.48	8711.3	11354.3	8446.79
26	3.68106	42733.4	-4.36879	Puente Formation	335	20	3539.26	3583.64	11879.3	2953.72	8925.56	11608.9	8655.17
27	3.68106	43670.7	-4.36879	Puente Formation	335	20	3616.27	3661.62	12139.8	2999.96	9139.81	11863.5	8863.54
28	4.07364	48495.8	40.4405	Puente Formation	530	25	3343.59	3385.52	9056.22	2932.53	6123.69	11905.9	8973.39
29	4.07364	47794.3	40.4405	Puente Formation	530	25	3346.53	3388.5	8881.51	2751.45	6130.06	11733.7	8982.27
30	4.07364	47092.8	40.4405	Puente Formation	530	25	3346.61	3388.58	8709.24	2578.98	6130.26	11561.5	8982.53
31	4.07364	46391.3	40.4405	Puente Formation	530	25	3351.44	3393.47	8532.91	2392.17	6140.74	11389.3	8997.13
32	4.07364	45689.8	40.4405	Puente Formation	530	25	3356.27	3398.36	8356.58	2205.36	6151.22	11217.1	9011.72
33	4.07364	44988.2	40.4405	Puente Formation	530	25	3361.1	3403.25	8180.26	2018.55	6161.71	11044.9	9026.34

34	3.77234	40256.9	60.4473	Puente Formation	530	25	4076.07	4127.18	9446.81	1732.63	7714.18	16635.8	14903.2
35	3.77234	38098.9	60.4473	Puente Formation	530	25	3270.94	3311.96	7313.53	1347.6	5965.93	13082.5	11734.9
36	3.77234	35941	60.4473	Puente Formation	530	25	3223.4	3263.82	6825.28	962.571	5862.7	12510.4	11547.8
37	3.77234	33671.1	60.4473	Puente Formation	530	25	3925.92	3975.15	7965.7	577.541	7388.15	14889.9	14312.3
38	3.77234	31155.9	60.4473	Puente Formation	530	25	2339.14	2368.47	4135.13	192.511	3942.62	8260.68	8068.17
39	3.73807	28537.2	60.4473	Puente Formation	530	25	2229.26	2257.21	3704.02	0	3704.02	7635.77	7635.77
40	3.73807	26263.9	60.4473	Puente Formation	530	25	2074.67	2100.69	3368.37	0	3368.37	7027.49	7027.49
41	3.73807	23600.8	60.4473	Puente Formation	530	25	1893.6	1917.35	2975.19	0	2975.19	6314.95	6314.95
42	3.73807	20653.1	60.4473	Puente Formation	530	25	1693.18	1714.41	2539.97	0	2539.97	5526.24	5526.24
43	3.73807	17695.7	60.4473	Puente Formation	530	25	1492.09	1510.8	2103.34	0	2103.34	4734.95	4734.95
44	3.73807	14738.4	60.4473	Puente Formation	530	25	1291.01	1307.2	1666.7	0	1666.7	3943.67	3943.67
45	3.73807	11781	60.4473	Puente Formation	530	25	1089.93	1103.59	1230.08	0	1230.08	3152.39	3152.39
46	3.73807	8823.67	60.4473	Puente Formation	530	25	888.844	899.99	793.446	0	793.446	2361.11	2361.11
47	3.73807	5866.31	60.4473	Puente Formation	530	25	687.76	696.385	356.814	0	356.814	1569.82	1569.82
48	3.26047	3189.2	45	Puente Formation	530	25	666.896	675.259	311.509	0	311.509	978.405	978.405
49	3.26047	1913.52	45	Puente Formation	530	25	543.51	550.326	43.5892	0	43.5892	587.1	587.1
50	3.26047	637.841	45	Puente Formation	530	25	420.125	425.393	-224.331	0	-224.331	195.794	195.794

Block - Curved Static

Global Minimum Query (bishop simplified) - Safety Factor: 1.96133

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.49608	1289.55	-46.7546	Puente Formation	530	25	385.54	756.172	696.567	211.539	485.028	286.66	75.1205
2	4.49608	3746.62	-43.9084	Puente Formation	530	25	454.454	891.334	1270.6	495.715	774.884	833.141	337.426
3	4.49608	5975.68	-41.1928	Puente Formation	530	25	513.974	1008.07	1778.75	753.519	1025.23	1328.91	575.394
4	4.49608	8004.95	-38.5858	Puente Formation	530	25	565.878	1109.87	2231.77	988.218	1243.55	1780.26	792.042
5	4.49608	9856.19	-36.0706	Puente Formation	530	25	611.407	1199.17	2637.36	1202.33	1435.03	2192	989.668
6	4.49608	11546.6	-33.6336	Puente Formation	530	25	651.465	1277.74	3001.35	1397.83	1603.52	2567.97	1170.14
7	4.49608	13089.8	-31.2638	Puente Formation	530	25	686.729	1346.9	3328.17	1576.31	1751.86	2911.22	1334.91
8	4.49608	14497.2	-28.9523	Puente Formation	530	25	717.726	1407.7	3621.31	1739.09	1882.22	3224.25	1485.16
9	4.49608	15778	-26.6914	Puente Formation	530	25	744.871	1460.94	3883.63	1887.22	1996.41	3509.14	1621.92
10	4.49608	16939.9	-24.4745	Puente Formation	530	25	768.497	1507.28	4117.38	2021.6	2095.78	3767.57	1745.97
11	4.49608	17989.3	-22.2961	Puente Formation	530	25	788.878	1547.25	4324.47	2142.97	2181.5	4000.99	1858.02
12	4.49608	18931.7	-20.1512	Puente Formation	530	25	806.234	1581.29	4506.47	2251.97	2254.5	4210.61	1958.64
13	4.49608	19771.7	-18.0354	Puente Formation	530	25	820.754	1609.77	4664.69	2349.12	2315.57	4397.45	2048.33
14	4.49608	20513.2	-15.9448	Puente Formation	530	25	832.593	1632.99	4800.23	2434.87	2365.36	4562.35	2127.48
15	4.49608	21159.3	-13.8758	Puente Formation	530	25	841.888	1651.22	4914.07	2509.6	2404.47	4706.1	2196.5
16	4.49608	21712.9	-11.8252	Puente Formation	530	25	848.74	1664.66	5006.91	2573.63	2433.28	4829.21	2255.58
17	4.49608	22176.1	-9.78977	Puente Formation	530	25	853.258	1673.52	5079.49	2627.2	2452.29	4932.27	2305.07
18	4.49608	22550.8	-7.76679	Puente Formation	514.842	24.6245	837.214	1642.05	5129.81	2670.54	2459.27	5015.62	2345.08
19	4.49608	22838.4	-5.75353	Puente Formation	383.979	21.2896	681.438	1336.52	5148.26	2703.8	2444.46	5079.6	2375.8
20	4.49608	23040.1	-3.74738	Puente Formation	335	20	623.26	1222.42	5165.28	2727.13	2438.15	5124.46	2397.33
21	4.49608	23156.5	-1.74582	Puente Formation	335	20	621.507	1218.98	5169.3	2740.59	2428.71	5150.36	2409.77
22	4.49608	38036.1	0.253598	Puente Formation	416.484	22.1332	1396.34	2738.68	8453.65	2744.24	5709.41	8459.83	5715.59
23	4.49608	39320.9	2.25333	Puente Formation	530	25	1690.66	3315.94	8679.09	2704.63	5974.46	8745.61	6040.98
24	4.49608	39182.9	4.25582	Puente Formation	530	25	1665.04	3265.7	8591.05	2724.31	5866.74	8714.96	5990.65
25	4.49608	43867.2	6.26353	Puente Formation	530	25	1890.51	3707.91	9549.32	2734.28	6815.04	9756.82	7022.54
26	4.49608	48054.2	8.27901	Puente Formation	530	25	2088.95	4097.12	10384.2	2734.44	7649.71	10688.1	7953.67
27	4.49608	48870	10.3049	Puente Formation	530	25	2115.26	4148.72	10485	2724.65	7760.37	10869.6	8144.96
28	4.49608	49597	12.3439	Puente Formation	530	25	2138.6	4194.51	10563.3	2704.75	7858.57	11031.3	8326.58
29	4.49608	50233	14.3989	Puente Formation	530	25	2158.93	4234.37	10618.6	2674.5	7944.05	11172.8	8498.32
30	4.49608	50775.9	16.473	Puente Formation	530	25	2176.15	4268.14	10650.1	2633.65	8016.46	11293.6	8659.95
31	4.49608	51222.6	18.5697	Puente Formation	530	25	2190.15	4295.61	10657.2	2581.86	8075.36	11393	8811.14
32	4.49608	51569.9	20.6924	Puente Formation	530	25	2199.05	4313.07	10639.7	2526.85	8112.8	11470.3	8943.43

33	4.49608	51813.7	22.8454	Puente Formation	530	25	2207.5	4329.63	10594.5	2446.21	8148.33	11524.5	9078.33
34	4.49608	51949.2	25.0331	Puente Formation	530	25	2212.26	4338.97	10521.6	2353.19	8168.38	11554.7	9201.53
35	4.49608	51970.7	27.2605	Puente Formation	530	25	2213.13	4340.68	10419.2	2247.15	8172.03	11559.5	9312.38
36	4.49608	51871.4	29.5337	Puente Formation	530	25	2209.85	4334.24	10285.5	2127.31	8158.2	11537.5	9410.19
37	4.49608	51643.4	31.8592	Puente Formation	530	25	2720.15	5335.12	12297.3	1992.74	10304.6	13987.8	11995.1
38	4.49608	51156.3	34.2451	Puente Formation	530	25	2695.77	5287.29	12044.4	1842.34	10202	13879.5	12037.2
39	4.49608	50150.1	36.7008	Puente Formation	530	25	2633.94	5166.02	11616.7	1674.76	9941.98	13580.1	11905.3
40	4.49608	49252.3	39.2379	Puente Formation	530	25	2418.65	4743.77	10524.8	1488.33	9036.46	12500.1	11011.7
41	4.49608	47922.7	41.8707	Puente Formation	530	25	2206.72	4328.11	9426.07	1280.98	8145.09	11404	10123
42	4.49608	45769	44.6171	Puente Formation	530	25	1982.39	3888.13	8251.58	1050.05	7201.53	10207.7	9157.6
43	4.49608	43248.6	47.5008	Puente Formation	530	25	1881	3689.26	7567.13	792.091	6775.04	9619.94	8827.85
44	4.49608	40450.7	50.5535	Puente Formation	530	25	1776.61	3484.51	6838.4	502.423	6335.97	8997.7	8495.28
45	4.49608	37318.2	53.82	Puente Formation	530	25	1662.02	3259.76	6028.49	174.492	5854	8301.01	8126.52
46	4.49313	33744.7	57.3656	Puente Formation	530	25	1499.36	2940.73	5169.82	0	5169.82	7511.2	7511.2
47	4.49313	29640.9	61.2981	Puente Formation	530	25	1282.13	2514.68	4256.16	0	4256.16	6597.83	6597.83
48	4.49313	24731.2	65.8171	Puente Formation	530	25	1032.45	2024.97	3205.98	0	3205.98	5505.11	5505.11
49	4.49313	18437.3	71.3866	Puente Formation	530	25	730.411	1432.58	1935.58	0	1935.58	4104.28	4104.28
50	4.49313	7420.41	80.7289	Puente Formation	530	25	269.908	529.379	-1.33271	0	-1.33271	1652.13	1652.13

Global Minimum Query (janbu simplified) - Safety Factor: 1.64369

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.49608	1289.55	-46.7546	Puente Formation	530	25	492.073	808.815	809.46	211.539	597.921	286.287	74.7475
2	4.49608	3746.62	-43.9084	Puente Formation	530	25	575.116	945.313	1386.36	495.715	890.641	832.747	337.032
3	4.49608	5975.68	-41.1928	Puente Formation	530	25	645.955	1061.75	1893.86	753.519	1140.34	1328.52	574.998
4	4.49608	8004.95	-38.5858	Puente Formation	530	25	707.083	1162.22	2344.02	988.218	1355.81	1779.85	791.636
5	4.49608	9856.19	-36.0706	Puente Formation	530	25	760.198	1249.53	2745.36	1202.33	1543.03	2191.61	989.277
6	4.49608	11546.6	-33.6336	Puente Formation	530	25	806.514	1325.66	3104.12	1397.83	1706.29	2567.6	1169.77
7	4.49608	13089.8	-31.2638	Puente Formation	530	25	846.93	1392.09	3425.07	1576.31	1848.76	2910.86	1334.55
8	4.49608	14497.2	-28.9523	Puente Formation	530	25	882.132	1449.95	3711.93	1739.09	1972.84	3223.91	1484.82
9	4.49608	15778	-26.6914	Puente Formation	530	25	912.657	1500.13	3967.66	1887.22	2080.44	3508.82	1621.6
10	4.49608	16939.9	-24.4745	Puente Formation	530	25	938.93	1543.31	4194.65	2021.6	2173.05	3767.26	1745.66
11	4.49608	17989.3	-22.2961	Puente Formation	530	25	961.307	1580.09	4394.89	2142.97	2251.92	4000.71	1857.74
12	4.49608	18931.7	-20.1512	Puente Formation	530	25	980.063	1610.92	4570.01	2251.97	2318.04	4210.36	1958.39
13	4.49608	19771.7	-18.0354	Puente Formation	530	25	995.431	1636.18	4721.33	2349.12	2372.21	4397.21	2048.09
14	4.49608	20513.2	-15.9448	Puente Formation	530	25	1007.62	1656.21	4850.04	2434.87	2415.17	4562.16	2127.29
15	4.49608	21159.3	-13.8758	Puente Formation	530	25	1016.79	1671.28	4957.08	2509.6	2447.48	4705.91	2196.31
16	4.49608	21712.9	-11.8252	Puente Formation	530	25	1023.08	1681.62	5043.27	2573.63	2469.64	4829.06	2255.43
17	4.49608	22176.1	-9.78977	Puente Formation	530	25	1026.6	1687.41	5109.28	2627.2	2482.08	4932.14	2304.94
18	4.49608	22550.8	-7.76679	Puente Formation	514.842	24.6245	1005.37	1652.52	5152.64	2670.54	2482.1	5015.52	2344.98
19	4.49608	22838.4	-5.75353	Puente Formation	383.979	21.2896	816.333	1341.8	5161.8	2703.8	2458	5079.55	2375.75
20	4.49608	23040.1	-3.74738	Puente Formation	335	20	745.468	1225.32	5173.25	2727.13	2446.12	5124.42	2397.29
21	4.49608	23156.5	-1.74582	Puente Formation	335	20	742.425	1220.32	5172.97	2740.59	2432.38	5150.34	2409.75
22	4.49608	38036.1	0.253598	Puente Formation	416.484	22.1332	1665.89	2738.2	8452.45	2744.24	5708.21	8459.82	5715.58
23	4.49608	39320.9	2.25333	Puente Formation	530	25	2013.79	3310.04	8666.44	2704.63	5961.81	8745.68	6041.05
24	4.49608	39182.9	4.25582	Puente Formation	530	25	1980.18	3254.81	8567.7	2724.31	5843.39	8715.05	5990.74
25	4.49608	43867.2	6.26353	Puente Formation	530	25	2244.86	3689.85	9510.61	2734.28	6776.33	9757	7022.72
26	4.49608	48054.2	8.27901	Puente Formation	530	25	2476.7	4070.92	10328	2734.44	7593.54	10688.4	7953.93
27	4.49608	48870	10.3049	Puente Formation	530	25	2504.06	4115.9	10414.6	2724.65	7689.99	10869.9	8145.28
28	4.49608	49597	12.3439	Puente Formation	530	25	2527.83	4154.97	10478.5	2704.75	7773.77	11031.7	8326.95
29	4.49608	50233	14.3989	Puente Formation	530	25	2547.93	4188.01	10519.1	2674.5	7844.63	11173.3	8498.77
30	4.49608	50775.9	16.473	Puente Formation	530	25	2564.27	4214.86	10535.9	2633.65	7902.2	11294.1	8660.46
31	4.49608	51222.6	18.5697	Puente Formation	530	25	2576.71	4235.32	10528	2581.86	7946.1	11393.6	8811.74
32	4.49608	51569.9	20.6924	Puente Formation	530	25	2583.05	4245.74	10495.3	2526.85	7968.43	11470.9	8944.09
33	4.49608	51813.7	22.8454	Puente Formation	530	25	2588.74	4255.08	10434.7	2446.21	7988.45	11525.3	9079.07

34	4.49608	51949.2	25.0331	Puente Formation	530	25	2589.97	4257.1	10346	2353.19	7992.81	11555.5	9202.35
35	4.49608	51970.7	27.2605	Puente Formation	530	25	2586.5	4251.4	10227.7	2247.15	7980.57	11560.5	9313.3
36	4.49608	51871.4	29.5337	Puente Formation	530	25	2578	4237.44	10077.9	2127.31	7950.62	11538.5	9411.18
37	4.49608	51643.4	31.8592	Puente Formation	530	25	3167.36	5206.15	12020.8	1992.74	10028	13989.1	11996.4
38	4.49608	51156.3	34.2451	Puente Formation	530	25	3132.74	5149.26	11748.4	1842.34	9906.03	13881	12038.6
39	4.49608	50150.1	36.7008	Puente Formation	530	25	3054.45	5020.57	11304.8	1674.76	9630.07	13581.6	11906.9
40	4.49608	49252.3	39.2379	Puente Formation	530	25	2798.49	4599.85	10216.1	1488.33	8727.81	12501.6	11013.3
41	4.49608	47922.7	41.8707	Puente Formation	530	25	2547.07	4186.59	9122.56	1280.98	7841.58	11405.6	10124.6
42	4.49608	45769	44.6171	Puente Formation	530	25	2282.04	3750.97	7957.44	1050.05	6907.39	10209.2	9159.13
43	4.49608	43248.6	47.5008	Puente Formation	530	25	2158.9	3548.57	7265.44	792.091	6473.35	9621.54	8829.45
44	4.49608	40450.7	50.5535	Puente Formation	530	25	2032.26	3340.4	6529.34	502.423	6026.92	8999.37	8496.94
45	4.49608	37318.2	53.82	Puente Formation	530	25	1893.79	3112.8	5713.33	174.492	5538.83	8302.75	8128.26
46	4.49313	33744.7	57.3656	Puente Formation	530	25	1700.5	2795.09	4857.5	0	4857.5	7512.98	7512.98
47	4.49313	29640.9	61.2981	Puente Formation	530	25	1445.67	2376.23	3959.25	0	3959.25	6599.61	6599.61
48	4.49313	24731.2	65.8171	Puente Formation	530	25	1155.02	1898.49	2934.75	0	2934.75	5506.82	5506.82
49	4.49313	18437.3	71.3866	Puente Formation	530	25	807.271	1326.9	1708.97	0	1708.97	4105.87	4105.87
50	4.49313	7420.41	80.7289	Puente Formation	530	25	289.078	475.155	-117.615	0	-117.615	1653.29	1653.29

Block - Curved PStatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.35235

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.1238	923.474	-42.1471	Puente Formation	530	25	1143.45	1546.35	2358.4	178.843	2179.56	1323.5	1144.66
2	4.1238	2690.42	-39.5789	Puente Formation	530	25	1199.41	1622.02	2743.5	401.65	2341.85	1752.01	1350.36
3	4.1238	4305.64	-37.1028	Puente Formation	530	25	1247.8	1687.46	3087.5	605.325	2482.18	2143.7	1538.38
4	4.1238	5784.06	-34.7054	Puente Formation	530	25	1289.7	1744.12	3395.45	791.75	2603.7	2502.25	1710.5
5	4.1238	7137.65	-32.3757	Puente Formation	530	25	1325.91	1793.1	3671.17	962.434	2708.73	2830.5	1868.07
6	4.1238	8376.16	-30.1048	Puente Formation	530	25	1357.06	1835.22	3917.66	1118.61	2799.05	3130.85	2012.24
7	4.1238	9507.64	-27.885	Puente Formation	530	25	1383.63	1871.15	4137.37	1261.28	2876.09	3405.24	2143.96
8	4.1238	10538.8	-25.7099	Puente Formation	530	25	1406	1901.4	4332.3	1391.31	2940.99	3655.34	2264.03
9	4.1238	11475.3	-23.5739	Puente Formation	530	25	1424.49	1926.41	4504.03	1509.4	2994.63	3882.46	2373.06
10	4.1238	12321.9	-21.4721	Puente Formation	530	25	1439.38	1946.54	4653.93	1616.15	3037.78	4087.75	2471.6
11	4.1238	13082.6	-19.4003	Puente Formation	530	25	1450.87	1962.08	4783.19	1712.07	3071.12	4272.25	2560.18
12	4.1238	13760.8	-17.3546	Puente Formation	530	25	1459.16	1973.29	4892.72	1797.59	3095.13	4436.72	2639.13
13	4.1238	14359.4	-15.3316	Puente Formation	530	25	1464.38	1980.36	4983.38	1873.07	3110.31	4581.9	2708.83
14	4.1238	14880.8	-13.3279	Puente Formation	530	25	1466.7	1983.49	5055.85	1938.83	3117.02	4708.39	2769.56
15	4.1238	15327.2	-11.3407	Puente Formation	530	25	1466.2	1982.82	5110.7	1995.11	3115.59	4816.64	2821.53
16	4.1238	15700.1	-9.36731	Puente Formation	530	25	1463	1978.49	5148.45	2042.14	3106.31	4907.11	2864.97
17	4.1238	16001.1	-7.40506	Puente Formation	491.329	24.0375	1378.86	1864.7	5159.31	2080.09	3079.22	4980.11	2900.02
18	4.1238	16231.1	-5.45151	Puente Formation	364.348	20.7753	1120.47	1515.27	5142.84	2109.09	3033.75	5035.91	2926.82
19	4.1238	16390.9	-3.50431	Puente Formation	335	20	1057.88	1430.63	5139.46	2129.25	3010.21	5074.68	2945.43
20	4.1238	16481.2	-1.56115	Puente Formation	335	20	1050.99	1421.31	5125.24	2140.63	2984.61	5096.59	2955.96
21	4.1238	16502.3	0.380203	Puente Formation	424.713	22.3452	1210.84	1637.48	5093.69	2143.29	2950.4	5101.72	2958.43
22	4.1238	16454.1	2.322	Puente Formation	530	25	1112.49	1504.47	4226.97	2137.22	2089.75	4272.08	2134.86
23	4.1238	27595.6	4.26647	Puente Formation	530	25	1918.18	2594.05	6548.76	2122.4	4426.36	6691.86	4569.46
24	4.1238	30995	6.21588	Puente Formation	530	25	2188.9	2960.16	7277.83	2066.34	5211.49	7516.24	5449.9
25	4.1238	30737.4	8.17255	Puente Formation	530	25	2143.27	2898.45	7145.97	2066.83	5079.14	7453.78	5386.95
26	4.1238	31313.9	10.1389	Puente Formation	530	25	2166.88	2930.38	7206.12	2058.47	5147.65	7593.62	5535.15
27	4.1238	38063.3	12.1174	Puente Formation	530	25	2672.98	3614.81	8656.51	2041.12	6615.39	9230.4	7189.28
28	4.1238	38608.1	14.1107	Puente Formation	530	25	2692.22	3640.83	8685.76	2014.58	6671.18	9362.53	7347.95
29	4.1238	39077	16.1216	Puente Formation	530	25	2707.37	3661.31	8693.74	1978.63	6715.11	9476.28	7497.65
30	4.1238	39467.9	18.1531	Puente Formation	530	25	2718.31	3676.11	8679.84	1932.99	6746.85	9571.11	7638.12
31	4.1238	39778.1	20.2086	Puente Formation	530	25	2724.92	3685.04	8643.37	1877.35	6766.02	9646.4	7769.05
32	4.1238	40004.5	22.2916	Puente Formation	530	25	2727.01	3687.87	8583.4	1811.32	6772.08	9701.36	7890.04

33	4.1238	40143.6	24.4062	Puente Formation	530	25	2724.39	3684.33	8498.92	1734.45	6764.47	9735.12	8000.67
34	4.1238	40191	26.5569	Puente Formation	530	25	2715.47	3672.27	8389.4	1650.8	6738.6	9746.66	8095.86
35	4.1238	40141.6	28.7489	Puente Formation	530	25	3494.92	4726.36	10544.2	1545.12	8999.13	12461.5	10916.4
36	4.1238	39989.4	30.9879	Puente Formation	530	25	2687.42	3634.33	8083.9	1426.64	6657.26	9697.89	8271.25
37	4.1238	39727.2	33.2809	Puente Formation	530	25	3431.26	4640.26	10108.9	1294.44	8814.48	12361.2	11066.8
38	4.1238	39346.3	35.6359	Puente Formation	530	25	3389	4583.12	9839.41	1147.46	8691.95	12268.9	11121.5
39	4.1238	38836.2	38.0627	Puente Formation	530	25	3338.83	4515.27	9530.81	984.375	8546.43	12145.3	11160.9
40	4.1238	38183.2	40.5731	Puente Formation	530	25	3279.74	4435.35	9178.6	803.56	8375.04	11987	11183.4
41	4.1238	37129.7	43.1818	Puente Formation	530	25	2484.85	3360.39	6672.77	602.982	6069.79	9004.71	8401.73
42	4.1238	35730.1	45.9075	Puente Formation	530	25	3089.5	4178.08	8203.36	380.037	7823.32	11392.3	11012.3
43	4.1238	34404.3	48.7751	Puente Formation	530	25	2313.37	3128.48	5703.74	131.3	5572.44	8343.96	8212.66
44	3.9689	31328.5	51.7568	Puente Formation	530	25	2166.32	2929.62	5146	0	5146	7894.63	7894.63
45	3.9689	28871.2	54.89	Puente Formation	530	25	1946.14	2631.86	4507.45	0	4507.45	7275.5	7275.5
46	3.9689	25997.1	58.2914	Puente Formation	530	25	1701.35	2300.82	3797.54	0	3797.54	6551.34	6551.34
47	3.9689	22685.1	62.0627	Puente Formation	530	25	1432.03	1936.6	3016.46	0	3016.46	5716.83	5716.83
48	3.9689	18740.6	66.3892	Puente Formation	530	25	1129.47	1527.44	2139.01	0	2139.01	4722.94	4722.94
49	3.9689	13721.1	71.6973	Puente Formation	530	25	775.691	1049.01	1113.01	0	1113.01	3458.11	3458.11
50	3.9689	5431.85	80.1295	Puente Formation	530	25	289.787	391.893	-296.17	0	-296.17	1369.29	1369.29

Global Minimum Query (janbu simplified) - Safety Factor: 1.01786

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.95504	914.01	-44.2414	Puente Formation	530	25	1890.07	1923.83	3171.65	182.568	2989.08	1330.97	1148.41
2	3.95504	2659.89	-41.552	Puente Formation	530	25	1925.92	1960.32	3479.45	412.112	3067.33	1772.41	1360.3
3	3.95504	4250.97	-38.9705	Puente Formation	530	25	1957.96	1992.93	3758.57	621.305	3137.27	2174.71	1553.41
4	3.95504	5704.17	-36.4802	Puente Formation	530	25	1985.87	2021.34	4010.56	812.368	3198.19	2542.15	1729.78
5	3.95504	7032.82	-34.0677	Puente Formation	530	25	2009.61	2045.5	4237.06	987.056	3250	2878.1	1891.05
6	3.95504	8247.64	-31.7222	Puente Formation	530	25	2029.24	2065.48	4439.64	1146.78	3292.86	3185.27	2038.49
7	3.95504	9357.38	-29.4348	Puente Formation	530	25	2044.91	2081.43	4619.73	1292.69	3327.04	3465.85	2173.16
8	3.95504	10369.3	-27.1978	Puente Formation	530	25	2056.76	2093.49	4778.66	1425.73	3352.93	3721.73	2296
9	3.95504	11289.3	-25.005	Puente Formation	530	25	2064.94	2101.82	4917.47	1546.69	3370.78	3954.35	2407.66
10	3.95504	12122.6	-22.8507	Puente Formation	530	25	2069.59	2106.55	5037.16	1656.25	3380.91	4165.03	2508.78
11	3.95504	12873.3	-20.7301	Puente Formation	530	25	2070.83	2107.82	5138.6	1754.95	3383.65	4354.86	2599.91
12	3.95504	13545	-18.6388	Puente Formation	530	25	2068.81	2105.76	5222.51	1843.27	3379.24	4524.72	2681.45
13	3.95504	14140.9	-16.573	Puente Formation	530	25	2063.61	2100.47	5289.5	1921.61	3367.89	4675.37	2753.76
14	3.95504	14663.5	-14.5291	Puente Formation	530	25	2055.35	2092.06	5340.17	1990.32	3349.85	4807.5	2817.18
15	3.95504	15114.8	-12.504	Puente Formation	530	25	2044.1	2080.61	5374.95	2049.66	3325.29	4921.63	2871.97
16	3.95504	15496.8	-10.4947	Puente Formation	530	25	2029.94	2066.19	5394.25	2099.89	3294.36	5018.21	2918.32
17	3.95504	15810.9	-8.49841	Puente Formation	530	25	2012.93	2048.88	5398.43	2141.18	3257.25	5097.65	2956.47
18	3.95504	16058.3	-6.51244	Puente Formation	433.309	22.566	1725.42	1756.24	5357.17	2173.71	3183.46	5160.2	2986.49
19	3.95504	16239.9	-4.53431	Puente Formation	335	20	1445.93	1471.75	5320.79	2197.58	3123.21	5206.13	3008.55
20	3.95504	16356.3	-2.56159	Puente Formation	335	20	1432.9	1458.49	5299.66	2212.89	3086.77	5235.55	3022.66
21	3.95504	16408	-0.591902	Puente Formation	361.526	20.7011	1160.6	1181.33	4389.08	2219.68	2169.4	4377.09	2157.41
22	3.95504	27288.1	1.37708	Puente Formation	489.51	23.9919	2501.65	2546.33	6839.45	2217.99	4621.46	6899.59	4681.6
23	3.95504	30555.8	3.3477	Puente Formation	530	25	2984.99	3038.3	7551.2	2172.13	5379.07	7725.8	5553.67
24	3.95504	30413.4	5.32229	Puente Formation	530	25	2918.12	2970.24	7417.98	2184.85	5233.13	7689.83	5504.98
25	3.95504	30205.7	7.30325	Puente Formation	530	25	2849.36	2900.25	7272.14	2189.11	5083.03	7637.31	5448.2
26	3.95504	37298.3	9.29304	Puente Formation	530	25	3572.4	3636.2	8846.09	2184.81	6661.28	9430.65	7245.84
27	3.95504	38091.8	11.2942	Puente Formation	530	25	3607.95	3672.39	8910.73	2171.83	6738.9	9631.29	7459.46
28	3.95504	38620.9	13.3095	Puente Formation	530	25	3617.32	3681.93	8909.34	2149.99	6759.35	9765.07	7615.08
29	3.95504	39079.9	15.3417	Puente Formation	530	25	3621.51	3686.19	8887.56	2119.1	6768.46	9881.13	7762.03
30	3.95504	39467	17.3939	Puente Formation	530	25	3620.37	3685.03	8844.88	2078.89	6765.99	9979.01	7900.12
31	3.95504	39779.7	19.4694	Puente Formation	530	25	3613.73	3678.27	8780.56	2029.07	6751.49	10058.1	8029.01
32	3.95504	40015.4	21.5719	Puente Formation	530	25	3601.39	3665.71	8693.83	1969.28	6724.55	10117.7	8148.4
33	3.95504	40170.8	23.7054	Puente Formation	530	25	3580.03	3643.97	8585.06	1907.12	6677.94	10157	8249.86

34	3.95504	40242	25.8744	Puente Formation	530	25	3557.44	3620.98	8449.57	1820.93	6628.64	10175	8354.08
35	3.95504	40224.5	28.0842	Puente Formation	530	25	3528.19	3591.2	8287.97	1723.21	6564.76	10170.6	8447.38
36	3.95504	40113	30.3404	Puente Formation	530	25	4518.87	4599.58	10340.5	1613.27	8727.25	12985.4	11372.1
37	3.95504	39900.8	32.65	Puente Formation	530	25	4454.69	4534.25	10077.4	1490.26	8587.14	12931.8	11441.5
38	3.95504	39580.3	35.0211	Puente Formation	530	25	3395.51	3456.15	7628.32	1353.16	6275.16	10007.7	8654.58
39	3.95504	39141.9	37.4632	Puente Formation	530	25	4298.15	4374.92	9446.23	1200.76	8245.47	12739.9	11539.2
40	3.95504	38555	39.9881	Puente Formation	530	25	4202.02	4277.07	9067.14	1031.52	8035.62	12591.6	11560.1
41	3.95504	37537.2	42.6104	Puente Formation	530	25	4069.78	4142.47	8590.52	843.56	7746.96	12334.2	11490.7
42	3.95504	36318.3	45.3485	Puente Formation	530	25	3763.63	3830.85	7713.14	634.437	7078.71	11522.8	10888.4
43	3.95504	35148.1	48.2268	Puente Formation	530	25	2913.97	2966.01	5624.99	400.971	5224.02	8887.16	8486.19
44	3.95504	33386.6	51.2782	Puente Formation	530	25	2752.02	2801.17	5009.38	138.847	4870.54	8441.78	8302.94
45	3.89153	30478.2	54.5207	Puente Formation	530	25	2501.17	2545.84	4322.98	0	4322.98	7832.17	7832.17
46	3.89153	27748.2	58.0184	Puente Formation	530	25	2184.62	2223.64	3632.03	0	3632.03	7130.65	7130.65
47	3.89153	24591	61.9041	Puente Formation	530	25	1838.27	1871.1	2875.99	0	2875.99	6319.35	6319.35
48	3.89153	20811.3	66.3786	Puente Formation	530	25	1450.9	1476.82	2030.45	0	2030.45	5348.07	5348.07
49	3.89153	15950.6	71.9183	Puente Formation	530	25	998.092	1015.92	1042.05	0	1042.05	4099.02	4099.02
50	3.89153	6583.81	82.1422	Puente Formation	530	25	300	305.358	-481.746	0	-481.746	1691.98	1691.98

Interslice Data

Block - Block Static

Global Minimum Query (bishop simplified) - Safety Factor: 1.64463

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	119.686	409	0	0	0
2	122.943	405.743	3656.47	0	0
3	126.199	402.486	9070.91	0	0
4	129.456	399.229	16243.3	0	0
5	132.713	395.972	25173.7	0	0
6	135.97	392.715	35862	0	0
7	139.227	389.458	48308.4	0	0
8	142.484	386.202	62512.6	0	0
9	145.741	382.945	78474.9	0	0
10	148.998	379.688	96195.1	0	0
11	152.255	376.431	115673	0	0
12	155.512	373.174	136909	0	0
13	158.769	369.917	159904	0	0
14	162.026	366.66	184656	0	0
15	165.283	363.403	211166	0	0
16	168.539	360.146	239434	0	0
17	171.677	361.759	232705	0	0
18	174.815	363.371	225143	0	0
19	177.952	364.983	217836	0	0
20	181.09	366.596	210724	0	0
21	184.227	368.208	203807	0	0
22	187.365	369.82	196197	0	0
23	190.503	371.433	188389	0	0
24	193.64	373.045	180657	0	0
25	196.778	374.658	173001	0	0
26	199.916	376.27	165422	0	0
27	203.053	377.882	157919	0	0
28	206.191	379.495	150492	0	0
29	209.328	381.107	143142	0	0
30	212.487	384.346	123645	0	0
31	215.646	387.586	104746	0	0
32	218.806	390.825	86462.1	0	0
33	221.965	394.064	93720.4	0	0
34	225.085	399.854	84034	0	0
35	228.205	405.643	76843.8	0	0
36	231.325	411.433	91961.2	0	0
37	234.445	417.222	89763.7	0	0
38	237.852	423.543	68069.7	0	0
39	241.258	429.864	48317.6	0	0
40	244.665	436.184	30544.2	0	0
41	248.071	442.505	14979.6	0	0
42	251.477	448.825	1635.09	0	0
43	254.884	455.146	-9706.17	0	0
44	258.29	461.467	-18844.2	0	0
45	261.697	467.787	-25473.8	0	0
46	265.065	471.156	-27954.7	0	0
47	268.434	474.525	-29676.4	0	0
48	271.803	477.894	-30638.9	0	0
49	275.172	481.262	-30842.3	0	0
50	278.54	484.631	-30286.5	0	0
51	281.909	488	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.54288

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	125.223	409	0	0	0
2	128.198	406.025	3519.14	0	0
3	131.173	403.05	8541.77	0	0
4	134.148	400.075	15067.9	0	0
5	137.123	397.1	23097.5	0	0
6	140.098	394.125	32630.6	0	0
7	143.073	391.15	43667.1	0	0
8	146.048	388.175	56207.2	0	0
9	149.023	385.201	70250.7	0	0
10	151.998	382.226	85797.7	0	0
11	154.973	379.251	102848	0	0
12	157.948	376.276	121402	0	0
13	160.923	373.301	141460	0	0
14	163.898	370.326	163021	0	0
15	166.872	367.351	186085	0	0
16	169.847	364.376	210653	0	0
17	172.768	364.098	218199	0	0
18	175.688	363.82	225958	0	0
19	178.609	363.542	233761	0	0
20	181.529	363.264	241567	0	0
21	184.45	362.985	249378	0	0
22	187.37	362.707	258741	0	0
23	190.291	362.429	268630	0	0
24	193.211	362.151	278701	0	0
25	196.132	361.873	288955	0	0
26	199.233	365.691	261396	0	0
27	202.335	369.509	234769	0	0
28	205.437	373.327	209074	0	0
29	208.539	377.145	184311	0	0
30	211.641	380.963	160480	0	0
31	214.742	384.781	137581	0	0
32	217.844	388.599	115605	0	0
33	220.946	392.416	118338	0	0
34	224.25	398.61	107317	0	0
35	227.554	404.804	99139.2	0	0
36	230.857	410.998	113896	0	0
37	234.161	417.191	111404	0	0
38	237.176	422.845	92841.6	0	0
39	240.192	428.498	75784.9	0	0
40	243.207	434.151	60234.7	0	0
41	246.222	439.804	46323.2	0	0
42	249.238	445.457	34152.4	0	0
43	252.253	451.11	23656.5	0	0
44	255.268	456.763	14698.3	0	0
45	258.284	462.416	7475.01	0	0
46	261.299	468.069	2192.9	0	0
47	264.314	473.722	-1035.67	0	0
48	267.33	479.376	-2210.71	0	0
49	270.205	482.25	-2023.02	0	0
50	273.079	485.125	-1303.84	0	0
51	275.954	488	0	0	0

Block - Block Pstatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.11318

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	104.406	409	0	0	0
2	108.349	405.057	18045.9	0	0
3	112.293	401.113	38641	0	0
4	116.236	397.17	61785.3	0	0
5	120.18	393.226	87478.9	0	0
6	124.123	389.283	115722	0	0
7	128.066	385.339	146514	0	0
8	132.01	381.396	179855	0	0
9	135.953	377.453	215745	0	0
10	139.897	373.509	254185	0	0
11	143.84	369.566	295174	0	0
12	147.521	369.285	296329	0	0
13	151.202	369.003	297474	0	0
14	154.883	368.722	298607	0	0
15	158.564	368.441	299729	0	0
16	162.246	368.16	300839	0	0
17	165.927	367.878	301938	0	0
18	169.608	367.597	302371	0	0
19	173.289	367.316	302773	0	0
20	176.97	367.035	303335	0	0
21	180.651	366.753	303851	0	0
22	184.332	366.472	304319	0	0
23	188.013	366.191	305224	0	0
24	191.694	365.91	306252	0	0
25	195.375	365.629	307301	0	0
26	199.056	365.347	308373	0	0
27	202.737	365.066	309466	0	0
28	206.418	364.785	310582	0	0
29	210.492	368.257	275246	0	0
30	214.566	371.729	240759	0	0
31	218.639	375.201	207102	0	0
32	222.713	378.673	174307	0	0
33	226.786	382.144	142372	0	0
34	230.86	385.616	111298	0	0
35	234.632	392.27	110137	0	0
36	238.405	398.923	90087.3	0	0
37	242.177	405.576	73856.2	0	0
38	245.949	412.23	84271.9	0	0
39	249.722	418.883	53488.2	0	0
40	253.46	425.476	26270.7	0	0
41	257.198	432.069	1557.38	0	0
42	260.936	438.661	-20222.7	0	0
43	264.674	445.254	-38755.9	0	0
44	268.412	451.847	-54031.6	0	0
45	272.15	458.44	-66050	0	0
46	275.888	465.033	-74810.8	0	0
47	279.626	471.626	-80314.2	0	0
48	283.364	478.219	-82560.2	0	0
49	286.625	481.479	-82720.9	0	0
50	289.885	484.74	-81940	0	0
51	293.146	488	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.01254

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	104.406	409	0	0	0
2	108.349	405.057	20354.8	0	0
3	112.293	401.113	43488.1	0	0
4	116.236	397.17	69399.8	0	0
5	120.18	393.226	98090	0	0
6	124.123	389.283	129559	0	0
7	128.066	385.339	163806	0	0
8	132.01	381.396	200831	0	0
9	135.953	377.453	240635	0	0
10	139.897	373.509	283218	0	0
11	143.84	369.566	328579	0	0
12	147.521	369.285	330252	0	0
13	151.202	369.003	331915	0	0
14	154.883	368.722	333569	0	0
15	158.564	368.441	335214	0	0
16	162.246	368.16	336849	0	0
17	165.927	367.878	338475	0	0
18	169.608	367.597	339385	0	0
19	173.289	367.316	340575	0	0
20	176.97	367.035	341981	0	0
21	180.651	366.753	343338	0	0
22	184.332	366.472	344646	0	0
23	188.013	366.191	346578	0	0
24	191.694	365.91	348698	0	0
25	195.375	365.629	350865	0	0
26	199.056	365.347	353080	0	0
27	202.737	365.066	355341	0	0
28	206.418	364.785	357651	0	0
29	210.492	368.257	323820	0	0
30	214.566	371.729	290839	0	0
31	218.639	375.201	258688	0	0
32	222.713	378.673	227401	0	0
33	226.786	382.144	196977	0	0
34	230.86	385.616	167416	0	0
35	234.632	392.27	169409	0	0
36	238.405	398.923	151892	0	0
37	242.177	405.576	138156	0	0
38	245.949	412.23	151611	0	0
39	249.722	418.883	122638	0	0
40	253.46	425.476	97130.1	0	0
41	257.198	432.069	74008.1	0	0
42	260.936	438.661	53680.5	0	0
43	264.674	445.254	36446	0	0
44	268.412	451.847	22314.7	0	0
45	272.15	458.44	11286.7	0	0
46	275.888	465.033	3361.82	0	0
47	279.626	471.626	-1459.81	0	0
48	283.364	478.219	-3178.24	0	0
49	286.625	481.479	-3072.8	0	0
50	289.885	484.74	-2074.98	0	0
51	293.146	488	0	0	0

Block - Curved Static

Global Minimum Query (bishop simplified) - Safety Factor: 1.96133

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	75.2106	409	0	0	0
2	79.7067	404.22	5062.53	0	0
3	84.2027	399.892	12604.1	0	0
4	88.6988	395.957	21913.5	0	0
5	93.1949	392.369	32462.9	0	0
6	97.691	389.094	43848.3	0	0
7	102.187	386.103	55753.3	0	0
8	106.683	383.374	67924.8	0	0
9	111.179	380.886	80158	0	0
10	115.675	378.626	92284.4	0	0
11	120.171	376.579	104165	0	0
12	124.668	374.736	115683	0	0
13	129.164	373.086	126742	0	0
14	133.66	371.622	137259	0	0
15	138.156	370.337	147167	0	0
16	142.652	369.227	156409	0	0
17	147.148	368.285	164937	0	0
18	151.644	367.509	172712	0	0
19	156.14	366.896	179621	0	0
20	160.636	366.443	185015	0	0
21	165.132	366.149	189338	0	0
22	169.628	366.012	192839	0	0
23	174.124	366.032	198947	0	0
24	178.621	366.209	205010	0	0
25	183.117	366.543	209619	0	0
26	187.613	367.037	213403	0	0
27	192.109	367.691	215998	0	0
28	196.605	368.508	216934	0	0
29	201.101	369.492	216152	0	0
30	205.597	370.646	213598	0	0
31	210.093	371.976	209219	0	0
32	214.589	373.486	202965	0	0
33	219.085	375.185	194780	0	0
34	223.581	377.079	184633	0	0
35	228.077	379.179	172483	0	0
36	232.574	381.495	158292	0	0
37	237.07	384.043	142024	0	0
38	241.566	386.837	151269	0	0
39	246.062	389.897	157901	0	0
40	250.558	393.249	161251	0	0
41	255.054	396.921	153046	0	0
42	259.55	400.951	134661	0	0
43	264.046	405.387	107787	0	0
44	268.542	410.294	79110.5	0	0
45	273.038	415.758	49726.2	0	0
46	277.534	421.906	20135	0	0
47	282.027	428.922	-9404.4	0	0
48	286.521	437.129	-38572.8	0	0
49	291.014	447.134	-66013.5	0	0
50	295.507	460.475	-88555	0	0
51	300	488	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.64369

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	75.2106	409	0	0	0
2	79.7067	404.22	6079.59	0	0
3	84.2027	399.892	14662.8	0	0
4	88.6988	395.957	25016.5	0	0
5	93.1949	392.369	36601.3	0	0
6	97.691	389.094	49007	0	0
7	102.187	386.103	61913.9	0	0
8	106.683	383.374	75067.6	0	0
9	111.179	380.886	88262.5	0	0
10	115.675	378.626	101330	0	0
11	120.171	376.579	114132	0	0
12	124.668	374.736	126553	0	0
13	129.164	373.086	138495	0	0
14	133.66	371.622	149877	0	0
15	138.156	370.337	160633	0	0
16	142.652	369.227	170706	0	0
17	147.148	368.285	180048	0	0
18	151.644	367.509	188623	0	0
19	156.14	366.896	196299	0	0
20	160.636	366.443	202303	0	0
21	165.132	366.149	207175	0	0
22	169.628	366.012	211219	0	0
23	174.124	366.032	218533	0	0
24	178.621	366.209	226045	0	0
25	183.117	366.543	232072	0	0
26	187.613	367.037	237462	0	0
27	192.109	367.691	241829	0	0
28	196.605	368.508	244563	0	0
29	201.101	369.492	245607	0	0
30	205.597	370.646	244909	0	0
31	210.093	371.976	242419	0	0
32	214.589	373.486	238090	0	0
33	219.085	375.185	231868	0	0
34	223.581	377.079	223731	0	0
35	228.077	379.179	213640	0	0
36	232.574	381.495	201563	0	0
37	237.07	384.043	187471	0	0
38	241.566	386.837	199490	0	0
39	246.062	389.897	208983	0	0
40	250.558	393.249	215260	0	0
41	255.054	396.921	209888	0	0
42	259.55	400.951	194248	0	0
43	264.046	405.387	170018	0	0
44	268.542	410.294	144066	0	0
45	273.038	415.758	117513	0	0
46	277.534	421.906	90896	0	0
47	282.027	428.922	64446.5	0	0
48	286.521	437.129	38445	0	0
49	291.014	447.134	14265.5	0	0
50	295.507	460.475	-4909.89	0	0
51	300	488	0	0	0

Block - Curved PStatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.35235

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	78.2801	409	0	0	0
2	82.4039	405.268	13210.9	0	0
3	86.5277	401.859	26619.6	0	0
4	90.6515	398.74	39972.6	0	0
5	94.7753	395.884	53077.6	0	0
6	98.8991	393.269	65786.3	0	0
7	103.023	390.878	77983	0	0
8	107.147	388.696	89576.9	0	0
9	111.271	386.71	100497	0	0
10	115.394	384.911	110686	0	0
11	119.518	383.289	120102	0	0
12	123.642	381.837	128712	0	0
13	127.766	380.548	136491	0	0
14	131.89	379.417	143423	0	0
15	136.013	378.44	149498	0	0
16	140.137	377.613	154710	0	0
17	144.261	376.933	159062	0	0
18	148.385	376.397	162231	0	0
19	152.509	376.004	163517	0	0
20	156.632	375.751	163767	0	0
21	160.756	375.639	163236	0	0
22	164.88	375.666	162643	0	0
23	169.004	375.833	161092	0	0
24	173.128	376.141	157877	0	0
25	177.251	376.59	153403	0	0
26	181.375	377.182	147862	0	0
27	185.499	377.92	141147	0	0
28	189.623	378.805	131940	0	0
29	193.746	379.842	121293	0	0
30	197.87	381.034	109195	0	0
31	201.994	382.386	95639.7	0	0
32	206.118	383.904	80625	0	0
33	210.242	385.594	64153.5	0	0
34	214.365	387.466	46233.2	0	0
35	218.489	389.527	26871.7	0	0
36	222.613	391.789	35557.3	0	0
37	226.737	394.266	13417.7	0	0
38	230.861	396.973	18468.4	0	0
39	234.984	399.929	21746.1	0	0
40	239.108	403.158	23296.9	0	0
41	243.232	406.689	23184.8	0	0
42	247.356	410.559	-4649.07	0	0
43	251.48	414.816	-7242.79	0	0
44	255.603	419.522	-35904.7	0	0
45	259.572	424.558	-63562.8	0	0
46	263.541	430.203	-90814.4	0	0
47	267.51	436.627	-117039	0	0
48	271.479	444.111	-141420	0	0
49	275.448	453.191	-162545	0	0
50	279.417	465.19	-177351	0	0
51	283.386	488	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.01786

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	86.015	409	0	0	0
2	89.9701	405.148	19389.3	0	0
3	93.9251	401.643	38325.3	0	0
4	97.8802	398.443	56690.8	0	0
5	101.835	395.519	74390.8	0	0
6	105.79	392.844	91349.5	0	0
7	109.745	390.4	107507	0	0
8	113.7	388.168	122816	0	0
9	117.655	386.136	137240	0	0
10	121.61	384.291	150752	0	0
11	125.565	382.624	163332	0	0
12	129.52	381.127	174965	0	0
13	133.475	379.793	185644	0	0
14	137.431	378.616	195364	0	0
15	141.386	377.591	204127	0	0
16	145.341	376.714	211937	0	0
17	149.296	375.982	218803	0	0
18	153.251	375.391	224737	0	0
19	157.206	374.939	228680	0	0
20	161.161	374.625	230708	0	0
21	165.116	374.449	231915	0	0
22	169.071	374.408	231269	0	0
23	173.026	374.503	231507	0	0
24	176.981	374.734	231482	0	0
25	180.936	375.103	230253	0	0
26	184.891	375.609	227867	0	0
27	188.846	376.257	223962	0	0
28	192.801	377.046	218622	0	0
29	196.756	377.982	211847	0	0
30	200.711	379.067	203629	0	0
31	204.666	380.306	193964	0	0
32	208.621	381.704	182851	0	0
33	212.576	383.268	170295	0	0
34	216.531	385.005	156288	0	0
35	220.486	386.923	140868	0	0
36	224.441	389.033	124056	0	0
37	228.396	391.348	136133	0	0
38	232.351	393.882	146425	0	0
39	236.306	396.654	125650	0	0
40	240.261	399.685	132482	0	0
41	244.216	403.002	137678	0	0
42	248.172	406.64	141512	0	0
43	252.127	410.644	139445	0	0
44	256.082	415.071	114464	0	0
45	260.037	420.004	89619.8	0	0
46	263.928	425.464	65691.6	0	0
47	267.82	431.696	42400.1	0	0
48	271.711	438.986	20473.8	0	0
49	275.603	447.884	1184.25	0	0
50	279.494	459.803	-12615.9	0	0
51	283.386	488	0	0	0

Entity Information

Block

Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 425 0, 330 306, 330 306, 488 258, 488 254, 487 250, 485 243, 483 185, 454 185, 439 170, 439 170, 409 75, 409 75, 426 67, 426 50, 424 50, 423 25, 425

Scenario-based Entities

Type	Coordinates (x,y)	Block Static	Block Pstatic	Curved Static	Curved PStatic
Piezoline	0, 410 175, 410 214, 415 306, 425	Assigned to: 🟨 Puente Formation	Assigned to: 🟨 Puente Formation	Assigned to: 🟨 Puente Formation	Assigned to: 🟨 Puente Formation
Block Search Window	195.874, 350.427 212.198, 350.072 213.842, 462.365 194.544, 455.873				
Block Search Window	137.769, 334.501 187.807, 334.856 182.566, 384.502 139.621, 386.054				

Block Search Window	220.041, 348.468 247.661, 347.213 243.581, 474.957 222.238, 464.6				
Block Search Window	253.311, 345.33 283.442, 351.607 281.873, 483.432 252.055, 477.154				
Distributed Load	168.173, 409 75.8372, 409		Constant DistributionOrientation: Normal to boundaryMagnitude: 1100 lbs/ft2Creates Excess Pore Pressure: No		
Block Search Window	194.632, 346.064 214.703, 345.166 212.061, 460.136 191.22, 452.965				
Block Search Window	142.867, 331.744 186.304, 334.44 181.424, 387.634 139.818, 386.636				
Block Search Window	221.921, 348.985 244.33, 349.657 243.882, 473.806 219.904, 462.153				
Block Search Window	252.622, 349.209 286.909, 348.761 290.942, 482.994 252.846, 476.944				

Distributed Load	165.937, 409 75.8873, 409				Constant DistributionOrientation: Normal to boundaryMagnitude: 1100 lbs/ft2Creates Excess Pore Pressure: No

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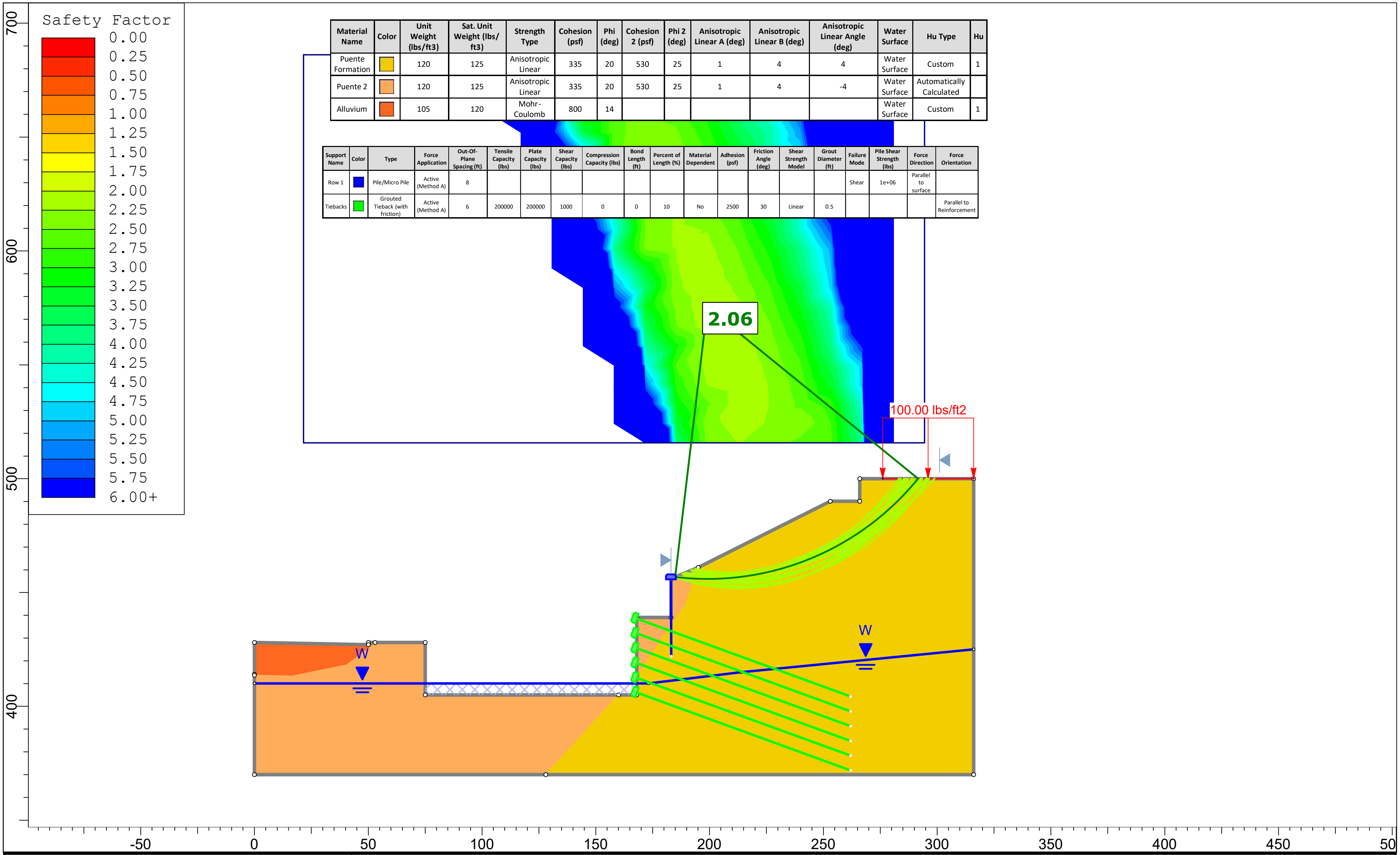
SLIDE - An Interactive Slope Stability Program
Geotechnologies, Inc.
Date Created: 5/10/2017, 12:08:26 AM
Software Version: 9.012



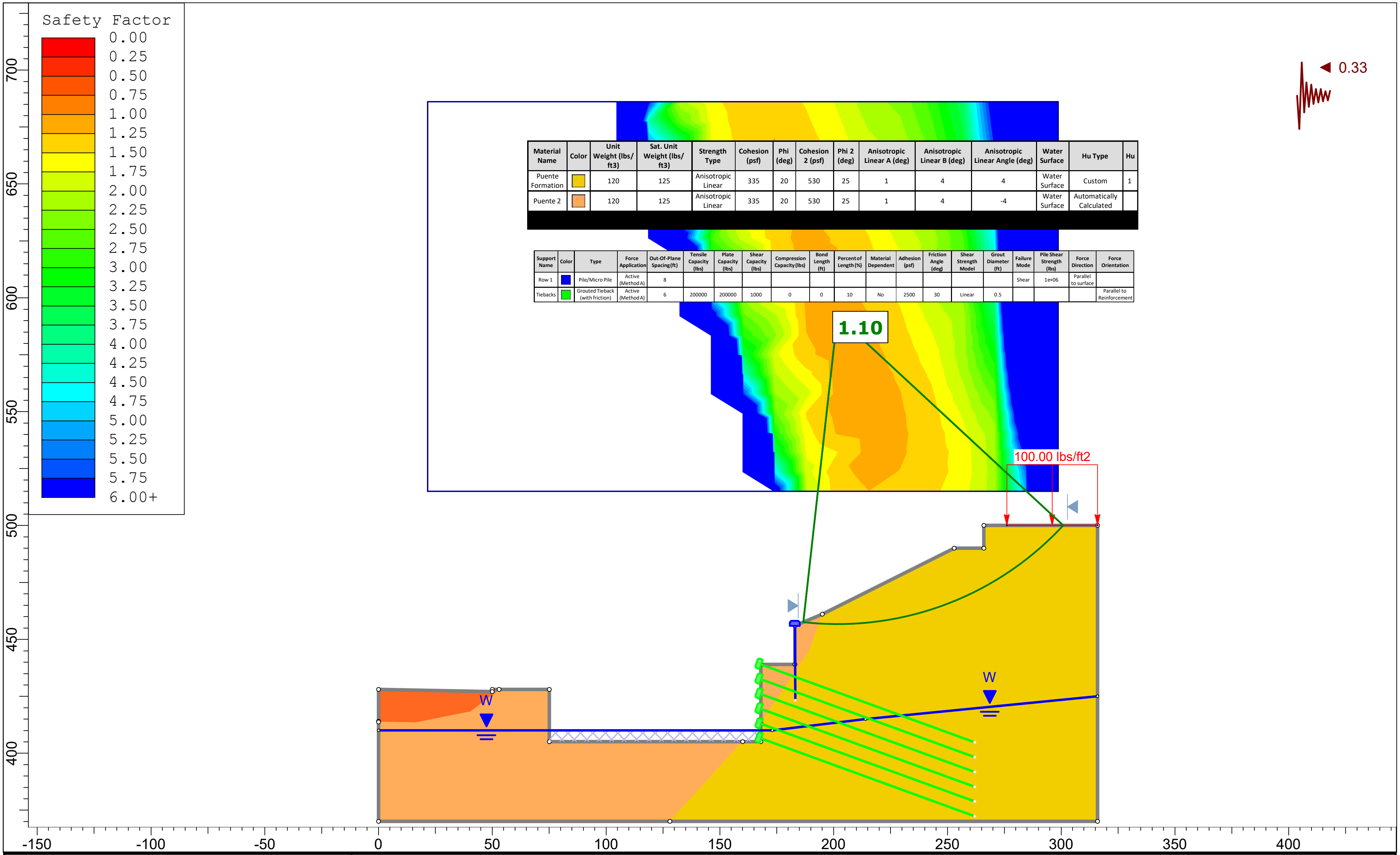
Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface	Hu Type	Hu
Puente Formation	🟨	120	125	Anisotropic Linear	335	20	530	25	1	4	4	Water Surface	Custom	1
Puente 2	🟧	120	125	Anisotropic Linear	335	20	530	25	1	4	-4	Water Surface	Automatically Calculated	
Alluvium	🟧	105	120	Mohr-Coulomb	800	14						Water Surface	Custom	1

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	1e+06	Parallel to surface	
Tiebacks	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	10	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Project	File No 20486 Aragon- Sunset
Analysis	Cross Section G-G''', Proposed Cut
Scale	1:700
Comment 1	Curved Static
Date	9/5/2023
Location of Analysis	Proposed Cut

SLIDEINTERPRET 9.012



Material Name	Color	Unit Weight (lbs/ ft3)	Sat. Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface	Hu Type	Hu
Puente Formation	🟨	120	125	Anisotropic Linear	335	20	530	25	1	4	4	Water Surface	Custom	1
Puente 2	🟧	120	125	Anisotropic Linear	335	20	530	25	1	4	-4	Water Surface	Automatically Calculated	

[redacted]

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	1e+06	Parallel to surface	
Tiebacks	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	10	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
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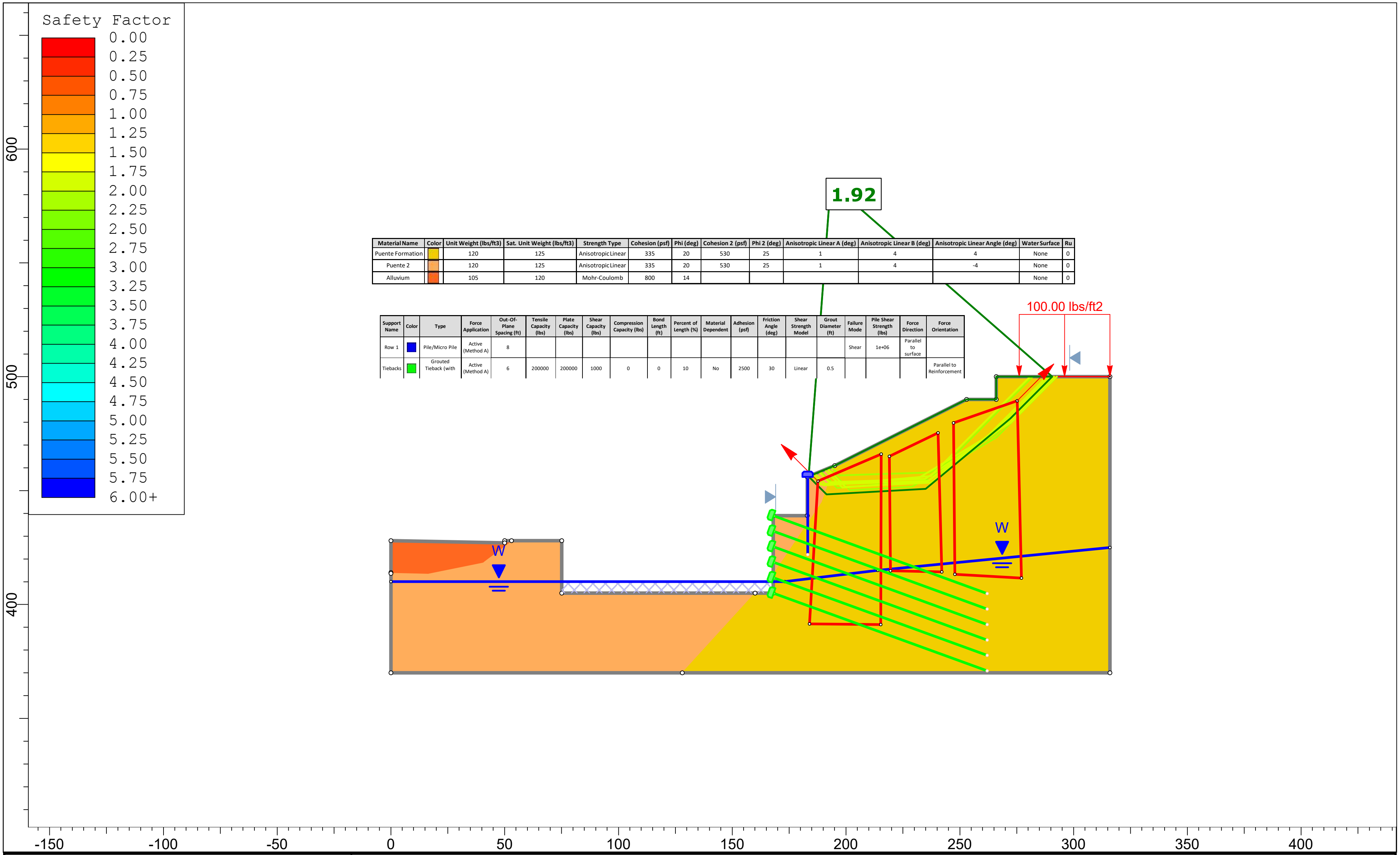
SLIDEINTERPRET 9.012

Project	File No 20486 Aragon- Sunset
Analysis	Cross Section G-G''', Proposed Cut

Scale	1:700	*Comment 1*	Curved Static
Date	9/5/2023	*Location of Analysis*	Proposed Cut



Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface	Ru
Puente Formation	🟨	120	125	Anisotropic Linear	335	20	530	25	1	4	4	None	0
Puente 2	🟧	120	125	Anisotropic Linear	335	20	530	25	1	4	-4	None	0
Alluvium	🟧	105	120	Mohr-Coulomb	800	14						None	0

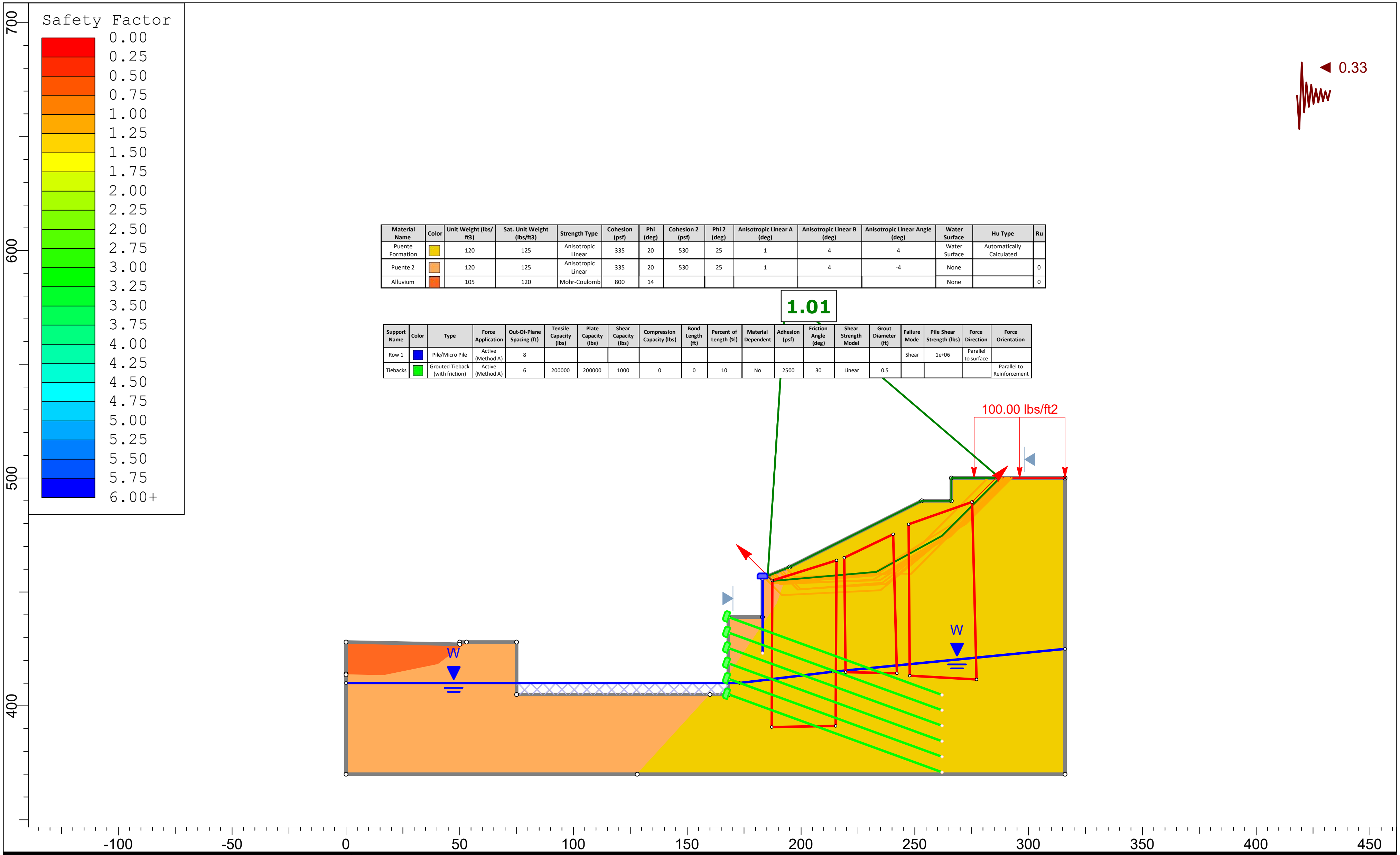
Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	1e+06	Parallel to surface	
Tiebacks	🟩	Grouted Tieback (with	Active (Method A)	6	200000	200000	1000	0	0	10	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

SLIDEINTERPRET 9.012

Project	File No 20486 Aragon- Sunset
Analysis	Cross Section G-G''', Upper Slope, Proposed Cut

Scale	1:700	*Comment 1*	Block Static
Date	9/5/2023	*Location of Analysis*	Proposed Cut



Material Name	Color	Unit Weight (lbs/ ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface	Hu Type	Ru
Puente Formation	🟨	120	125	Anisotropic Linear	335	20	530	25	1	4	4	Water Surface	Automatically Calculated	
Puente 2	🟧	120	125	Anisotropic Linear	335	20	530	25	1	4	-4	None		0
Alluvium	🟥	105	120	Mohr-Coulomb	800	14						None		0

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	1e+06	Parallel to surface	
Tiebacks	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	10	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
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Project	File No 20486 Aragon- Sunset
Analysis	Cross Section G-G''', Upper Slope, Proposed Cut
Scale 1:700	*Comment 1* Block PStatic
Date 9/5/2023	*Location of Analysis* Proposed Cut

SLIDEINTERPRET 9.012

Table of Contents

Slide Analysis Information

20489 GG upd9-2-23 upper

Project Summary

File Name:	20489 GG upd9-2-23 upper.slmd
Slide Modeler Version:	9.012
Project Title:	SLIDE - An Interactive Slope Stability Program
Author:	RTK
Company:	Geotechnologies, Inc.
Date Created:	5/10/2017, 12:08:26 AM

Currently Open Scenarios

Group Name	Scenario Name	Global Minimum	Compute Time
Curved ◆	Master Scenario	Bishop Simplified: 2.030130 Janbu Simplified: 1.972090	00h:00m:00.467s
	Curved Static	Bishop Simplified: 2.062770 Janbu Simplified: 1.904080	00h:00m:00.578s
	Curved Pstatic	Bishop Simplified: 1.101530 Janbu Simplified: 1.005160	00h:00m:00.571s
	Block Static	Bishop Simplified: 1.915030 Janbu Simplified: 1.819370 Gle/morgenstern-price: 1.971930	00h:00m:01.265s
	Block Psuedostatic	Bishop Simplified: 1.062130 Janbu Simplified: 1.007220 Gle/morgenstern-price: 1.078950	00h:00m:01.870s

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Curved - Block Static

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	GLE/Morgenstern-Price with interslice force function (Half Sine)
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

All other Scenarios

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

All Open Scenarios

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

All Open Scenarios

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

Surface Options

Curved - Block Static

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Multiple Groups: Disabled
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle) [deg]: 135
Left Projection Angle (End Angle) [deg]: 135
Right Projection Angle (Start Angle) [deg]: 45
Right Projection Angle (End Angle) [deg]: 45
Minimum Elevation: Not Defined
Minimum Depth: Not Defined
Minimum Area: Not Defined
Minimum Weight: Not Defined

All other Scenarios

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation [ft]: 395
Minimum Depth: Not Defined
Minimum Area: Not Defined
Minimum Weight: Not Defined

Seismic Loading

Curved - Master Scenario

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Curved - Curved Static

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Curved - Curved Pstatic

Advanced seismic analysis: No
Staged pseudostatic analysis: No
Seismic Load Coefficient (Horizontal): 0.33

Curved - Block Static

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Curved - Block Psuedostatic

Advanced seismic analysis: No
Staged pseudostatic analysis: No
Seismic Load Coefficient (Horizontal): 0.33

Loading

All Open Scenarios

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

Materials

Puente Formation	
Color	🟨
Strength Type	Anisotropic Linear
Unsaturated Unit Weight [lbs/ft3]	120
Saturated Unit Weight [lbs/ft3]	125
Cohesion 1 [psf]	335
Cohesion 2 [psf]	530
Friction Angle 1 [deg]	20
Friction Angle 2 [deg]	25
A [deg]	1
B [deg]	4
Anisotropic Definition	Angle
Angle from 1 [deg]	4
Anisotropic Surface	
Water Surface	Assigned per scenario
Hu Value	Automatically Calculated
Puente 2	
Color	🟧
Strength Type	Anisotropic Linear
Unsaturated Unit Weight [lbs/ft3]	120
Saturated Unit Weight [lbs/ft3]	125
Cohesion 1 [psf]	335
Cohesion 2 [psf]	530
Friction Angle 1 [deg]	20
Friction Angle 2 [deg]	25
A [deg]	1
B [deg]	4
Anisotropic Definition	Angle
Angle from 1 [deg]	-4
Anisotropic Surface	
Water Surface	Assigned per scenario
Ru Value	0
Alluvium	
Color	🟥
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	105
Saturated Unit Weight [lbs/ft3]	120
Cohesion [psf]	800
Friction Angle [deg]	14
Water Surface	Assigned per scenario
Ru Value	0

Materials In Use

Material	Curved	Curved Static	Curved Pstatic	Block Static	Block Psuedostatic
Puente Formation 🟨	✓	✓	✓	✓	✓
Puente 2 🟧	✓	✓	✓	✓	✓
Alluvium 🟥	✓	✓	✓	✓	✓

Support

Row 1	
Color	🟦
Support Type	Pile/Micro Pile
Force Application	Active
Out-of-Plane Spacing [ft]	8
Failure Mode	Shear
Pile Shear Strength [lb]	1e+06
Force Direction	Parallel to surface

Row 2	
Color	🟩
Support Type	Pile/Micro Pile
Force Application	Active
Out-of-Plane Spacing [ft]	6
Failure Mode	Shear
Pile Shear Strength [lb]	1.2e+06
Force Direction	Parallel to surface

Tiebacks	
Color	🟩
Support Type	Grouted Tieback (with friction)
Force Application	Active
Force Orientation	Parallel to Reinforcement
Bond Length [percent]	10
Out-of-Plane Spacing [ft]	6
Tensile Capacity [lb]	200000
Plate Capacity [lb]	200000
Pullout Strength Adhesion [psf]	2500
Pullout Strength Friction Angle [degrees]	30
Material Dependent	No
Shear Strength Model	Linear
Use External Loads for Strength	yes
Shear Capacity [lb]	1000
Grout Diameter [ft]	0.5

Global Minimums

Curved - Master Scenario

Method: bishop simplified

FS	2.030130
Center:	183.904, 621.223
Radius:	168.731
Left Slip Surface Endpoint:	183.000, 452.494
Right Slip Surface Endpoint:	301.272, 500.000
Left Slope Intercept:	183.000 456.000
Right Slope Intercept:	301.272 500.000
Resisting Moment:	2.76617e+07 lb-ft
Driving Moment:	1.36256e+07 lb-ft
Total Slice Area:	1829.92 ft2
Surface Horizontal Width:	118.272 ft
Surface Average Height:	15.4721 ft

Method: janbu simplified

FS	1.972090
Center:	183.904, 613.107
Radius:	160.250
Left Slip Surface Endpoint:	183.000, 452.860
Right Slip Surface Endpoint:	297.424, 500.000
Left Slope Intercept:	183.000 456.000
Right Slope Intercept:	297.424 500.000
Resisting Horizontal Force:	139122 lb
Driving Horizontal Force:	70545.4 lb
Total Slice Area:	1681.13 ft2
Surface Horizontal Width:	114.424 ft
Surface Average Height:	14.6921 ft

Curved - Curved Static

Method: bishop simplified

FS	2.062770
Center:	198.986, 575.331
Radius:	119.401
Left Slip Surface Endpoint:	184.848, 456.770
Right Slip Surface Endpoint:	291.624, 500.000
Resisting Moment:	1.65683e+07 lb-ft
Driving Moment:	8.03209e+06 lb-ft
Total Slice Area:	1491.39 ft2
Surface Horizontal Width:	106.776 ft
Surface Average Height:	13.9674 ft

Method: janbu simplified

FS	1.904080
Center:	212.631, 532.710
Radius:	80.935
Left Slip Surface Endpoint:	184.750, 456.729
Right Slip Surface Endpoint:	286.662, 500.000
Resisting Horizontal Force:	143379 lb
Driving Horizontal Force:	75300.9 lb
Total Slice Area:	1896.84 ft2
Surface Horizontal Width:	101.912 ft
Surface Average Height:	18.6126 ft

Curved - Curved Pstatic

Method: bishop simplified

FS	1.101530
Center:	201.661, 592.014
Radius:	135.306
Left Slip Surface Endpoint:	186.693, 457.539
Right Slip Surface Endpoint:	300.863, 500.000
Resisting Moment:	1.95619e+07 lb-ft
Driving Moment:	1.77589e+07 lb-ft
Total Slice Area:	1723.31 ft2
Surface Horizontal Width:	114.17 ft
Surface Average Height:	15.0943 ft

Method: janbu simplified

FS	1.005160
Center:	215.511, 549.228
Radius:	96.319
Left Slip Surface Endpoint:	186.396, 457.415
Right Slip Surface Endpoint:	298.300, 500.000
Resisting Horizontal Force:	154061 lb
Driving Horizontal Force:	153270 lb
Total Slice Area:	2185.15 ft2
Surface Horizontal Width:	111.904 ft
Surface Average Height:	19.527 ft

Curved - Block Static

Method: bishop simplified

FS	1.915030
Axis Location:	193.228, 585.154
Left Slip Surface Endpoint:	183.496, 456.207
Right Slip Surface Endpoint:	290.546, 500.000
Resisting Moment:	2.10089e+07 lb-ft
Driving Moment:	1.09705e+07 lb-ft
Total Slice Area:	1976.86 ft2
Surface Horizontal Width:	107.05 ft
Surface Average Height:	18.4666 ft

Method: janbu simplified

FS	1.819370
Axis Location:	193.228, 585.154
Left Slip Surface Endpoint:	183.496, 456.207
Right Slip Surface Endpoint:	290.546, 500.000
Resisting Horizontal Force:	134242 lb
Driving Horizontal Force:	73784.7 lb
Total Slice Area:	1976.86 ft2
Surface Horizontal Width:	107.05 ft
Surface Average Height:	18.4666 ft

Method: gle/morgenstern-price

FS	1.971930
Axis Location:	196.887, 584.887
Left Slip Surface Endpoint:	186.385, 457.411
Right Slip Surface Endpoint:	292.567, 500.000
Resisting Moment:	1.83017e+07 lb-ft
Driving Moment:	9.2811e+06 lb-ft
Resisting Horizontal Force:	123887 lb
Driving Horizontal Force:	62825.5 lb
Total Slice Area:	1692.37 ft2
Surface Horizontal Width:	106.182 ft
Surface Average Height:	15.9384 ft

Curved - Block Psuedostatic

Method: bishop simplified

FS	1.062130
Axis Location:	193.292, 580.441
Left Slip Surface Endpoint:	185.340, 456.975
Right Slip Surface Endpoint:	287.294, 500.000
Resisting Moment:	1.42717e+07 lb-ft
Driving Moment:	1.34369e+07 lb-ft
Total Slice Area:	1396.54 ft2
Surface Horizontal Width:	101.954 ft
Surface Average Height:	13.6978 ft

Method: janbu simplified

FS	1.007220
Axis Location:	193.292, 580.441
Left Slip Surface Endpoint:	185.340, 456.975
Right Slip Surface Endpoint:	287.294, 500.000
Resisting Horizontal Force:	99656.9 lb
Driving Horizontal Force:	98942.2 lb
Total Slice Area:	1396.54 ft2
Surface Horizontal Width:	101.954 ft
Surface Average Height:	13.6978 ft

Method: gle/morgenstern-price

FS	1.078950
Axis Location:	193.292, 580.441
Left Slip Surface Endpoint:	185.340, 456.975
Right Slip Surface Endpoint:	287.294, 500.000
Resisting Moment:	1.41609e+07 lb-ft
Driving Moment:	1.31247e+07 lb-ft
Resisting Horizontal Force:	100642 lb
Driving Horizontal Force:	93277.7 lb
Total Slice Area:	1396.54 ft2
Surface Horizontal Width:	101.954 ft
Surface Average Height:	13.6978 ft

Global Minimum Coordinates

Curved - Block Static

Method: bishop simplified

X	Y
183.496	456.207
191.428	448.274
234.938	450.729
272.196	481.649
290.546	500

Method: janbu simplified

X	Y
183.496	456.207
191.428	448.274
234.938	450.729
272.196	481.649
290.546	500

Method: gle/morgenstern-price

X	Y
186.385	457.411
190.831	452.965
231.481	455.289
272.388	479.821
292.567	500

Curved - Block Psuedostatic

Method: bishop simplified

X	Y
185.34	456.975
187.498	454.818
233.066	458.84
261.992	474.698
287.294	500

Method: janbu simplified

X	Y
185.34	456.975
187.498	454.818
233.066	458.84
261.992	474.698
287.294	500

Method: gle/morgenstern-price

X	Y
185.34	456.975
187.498	454.818
233.066	458.84
261.992	474.698
287.294	500

Global Minimum Support Data

◆ Curved - Master Scenario

Method: bishop simplified

Number of Supports: 2

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.124, 451.843	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Row 2

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168.084, 439.15	60	Not Effective	Not Effective	Not Effective	Not Effective	0

Method: janbu simplified

Number of Supports: 2

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.124, 451.843	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Row 2

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168.084, 439.15	60	Not Effective	Not Effective	Not Effective	Not Effective	0

◆ Curved - Curved Static

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.03, 455.934	34.0911	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 438.488	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 431.991	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.493	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 418.996	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 412.499	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 406.002	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.03, 455.934	34.0911	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 438.488	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 431.991	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.493	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 418.996	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 412.499	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 406.002	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Curved - Curved Pstatic

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
182.917, 456.086	32.95	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 438.94	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 432.443	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.946	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 419.448	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 412.951	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 406.454	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
182.917, 456.086	32.95	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 438.94	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 432.443	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.946	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 419.448	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 412.951	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 406.454	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Curved - Block Static

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.2, 456.224	34.3811	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 432.2	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.4	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 418.6	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 411.8	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 405	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.2, 456.224	34.3811	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 432.2	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.4	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 418.6	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 411.8	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 405	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Method: gle/morgenstern-price

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.2, 456.224	34.3811	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 432.2	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.4	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 418.6	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 411.8	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 405	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Curved - Block Psuedostatic

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.068, 456.07	32.8977	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 432.205	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.411	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 418.616	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 411.821	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 405.026	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.068, 456.07	32.8977	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 432.205	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.411	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 418.616	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 411.821	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 405.026	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Method: gle/morgenstern-price

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.068, 456.07	32.8977	Not Effective	Not Effective	Not Effective	Not Effective	0

Tiebacks

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 432.205	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 425.411	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 418.616	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 411.821	100	Not Effective	Not Effective	Not Effective	Not Effective	0
168, 405.026	100	Not Effective	Not Effective	Not Effective	Not Effective	0

Valid and Invalid Surfaces

Curved - Master Scenario

Method: bishop simplified

Number of Valid Surfaces:	2776
Number of Invalid Surfaces:	6485

Error Codes

Error Code -106 reported for 358 surfaces
Error Code -107 reported for 4510 surfaces
Error Code -1000 reported for 1617 surfaces

Method: janbu simplified

Number of Valid Surfaces:	2544
Number of Invalid Surfaces:	6717

Error Codes

Error Code -106 reported for 351 surfaces
Error Code -107 reported for 4510 surfaces
Error Code -111 reported for 239 surfaces
Error Code -1000 reported for 1617 surfaces

Curved - Curved Static

Method: bishop simplified

Number of Valid Surfaces:	4993
Number of Invalid Surfaces:	4268

Error Codes

Error Code -106 reported for 179 surfaces
Error Code -108 reported for 603 surfaces
Error Code -1000 reported for 3486 surfaces

Method: janbu simplified

Number of Valid Surfaces:	4755
Number of Invalid Surfaces:	4506

Error Codes

Error Code -106 reported for 178 surfaces
Error Code -108 reported for 706 surfaces
Error Code -111 reported for 136 surfaces
Error Code -1000 reported for 3486 surfaces

Curved - Curved Pstatic

Method: bishop simplified

Number of Valid Surfaces:	5418
Number of Invalid Surfaces:	3843

Error Codes

Error Code -102 reported for 22 surfaces
Error Code -106 reported for 186 surfaces
Error Code -108 reported for 170 surfaces
Error Code -1000 reported for 3465 surfaces

Method: janbu simplified

Number of Valid Surfaces:	5259
Number of Invalid Surfaces:	4002

Error Codes

Error Code -102 reported for 22 surfaces
Error Code -106 reported for 186 surfaces
Error Code -108 reported for 237 surfaces
Error Code -111 reported for 92 surfaces
Error Code -1000 reported for 3465 surfaces

Curved - Block Static

Method: bishop simplified

Number of Valid Surfaces:	1677
Number of Invalid Surfaces:	3323

Error Codes

Error Code -108 reported for 9 surfaces
Error Code -111 reported for 3305 surfaces
Error Code -112 reported for 9 surfaces

Method: janbu simplified

Number of Valid Surfaces:	1759
Number of Invalid Surfaces:	3241

Error Codes

Error Code -108 reported for 15 surfaces
Error Code -111 reported for 3223 surfaces
Error Code -112 reported for 3 surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces:	910
Number of Invalid Surfaces:	4090

Error Codes

Error Code -108 reported for 31 surfaces
Error Code -111 reported for 4056 surfaces
Error Code -112 reported for 3 surfaces

Curved - Block Psuedostatic

Method: bishop simplified

Number of Valid Surfaces:	3599
Number of Invalid Surfaces:	1401

Error Codes

Error Code -108 reported for 8 surfaces
Error Code -111 reported for 1376 surfaces
Error Code -112 reported for 17 surfaces

Method: janbu simplified

Number of Valid Surfaces:	2809
Number of Invalid Surfaces:	2191

Error Codes

Error Code -108 reported for 17 surfaces
Error Code -111 reported for 2171 surfaces
Error Code -112 reported for 3 surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces:	740
Number of Invalid Surfaces:	4260

Error Codes

Error Code -108 reported for 43 surfaces
Error Code -111 reported for 4214 surfaces
Error Code -112 reported for 3 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.

-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

-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.

-1000 = No valid slip surface is generated

Slice Data

Curved - Master Scenario

Global Minimum Query (bishop simplified) - Safety Factor: 2.03013

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.28593	1091.92	0.0810848	Puente 2	530	25	370.664	752.497	477.145	0	477.145	477.669	477.669
2	2.28593	1348.06	0.857365	Puente 2	530	25	395.164	802.235	583.811	0	583.811	589.725	589.725
3	2.28593	1595.7	1.6338	Puente 2	530	25	418.664	849.942	686.116	0	686.116	698.057	698.057
4	2.28593	1834.83	2.41054	Puente 2	530	25	441.17	895.633	784.102	0	784.102	802.674	802.674
5	2.37236	2147.89	3.20243	Puente Formation	335	20	324.086	657.936	887.261	0	887.261	905.394	905.394
6	2.37236	2404.56	4.00963	Puente Formation	335	20	342.431	695.18	989.586	0	989.586	1013.59	1013.59
7	2.37236	2688.94	4.81763	Puente Formation	335	20	362.745	736.42	1102.89	0	1102.89	1133.47	1133.47
8	2.37236	2964.9	5.62659	Puente Formation	375.729	21.0739	414.551	841.592	1208.95	0	1208.95	1249.79	1249.79
9	2.37236	3231.21	6.43668	Puente Formation	428.384	22.4396	477.14	968.656	1308.23	0	1308.23	1362.06	1362.06
10	2.37236	3487.86	7.24807	Puente Formation	481.124	23.7811	541.182	1098.67	1401.42	0	1401.42	1470.25	1470.25
11	2.37236	3734.77	8.06092	Puente Formation	530	25	603.064	1224.3	1488.93	0	1488.93	1574.33	1574.33
12	2.37236	3971.9	8.8754	Puente Formation	530	25	623.286	1265.35	1576.97	0	1576.97	1674.3	1674.3
13	2.37236	4199.18	9.6917	Puente Formation	530	25	642.448	1304.25	1660.39	0	1660.39	1770.11	1770.11
14	2.37236	4416.54	10.51	Puente Formation	530	25	660.549	1341	1739.19	0	1739.19	1861.74	1861.74
15	2.37236	4623.92	11.3305	Puente Formation	530	25	677.591	1375.6	1813.39	0	1813.39	1949.16	1949.16
16	2.37236	4821.22	12.1533	Puente Formation	530	25	693.573	1408.04	1882.97	0	1882.97	2032.34	2032.34
17	2.37236	5008.35	12.9787	Puente Formation	530	25	708.495	1438.34	1947.93	0	1947.93	2111.22	2111.22
18	2.37236	5185.22	13.8068	Puente Formation	530	25	722.354	1466.47	2008.27	0	2008.27	2185.79	2185.79
19	2.37236	5351.72	14.6379	Puente Formation	530	25	735.148	1492.45	2063.97	0	2063.97	2255.98	2255.98
20	2.37236	5507.74	15.4721	Puente Formation	530	25	746.873	1516.25	2115.02	0	2115.02	2321.75	2321.75
21	2.37236	5653.14	16.3097	Puente Formation	530	25	757.528	1537.88	2161.4	0	2161.4	2383.05	2383.05
22	2.37236	5787.8	17.151	Puente Formation	530	25	767.104	1557.32	2203.08	0	2203.08	2439.82	2439.82
23	2.37236	5911.58	17.996	Puente Formation	530	25	775.596	1574.56	2240.06	0	2240.06	2492.01	2492.01
24	2.37236	6024.32	18.8451	Puente Formation	530	25	782.999	1589.59	2272.29	0	2272.29	2539.54	2539.54
25	2.37236	6125.85	19.6986	Puente Formation	530	25	789.304	1602.39	2299.75	0	2299.75	2582.34	2582.34
26	2.37236	6216	20.5566	Puente Formation	530	25	794.506	1612.95	2322.4	0	2322.4	2620.35	2620.35
27	2.37236	6294.58	21.4194	Puente Formation	530	25	798.599	1621.26	2340.21	0	2340.21	2653.49	2653.49
28	2.37236	6361.39	22.2874	Puente Formation	530	25	801.564	1627.28	2353.11	0	2353.11	2681.65	2681.65
29	2.37236	6416.2	23.1608	Puente Formation	530	25	803.392	1630.99	2361.09	0	2361.09	2704.77	2704.77
30	2.37236	6438.38	24.04	Puente Formation	530	25	802.284	1628.74	2356.25	0	2356.25	2714.12	2714.12
31	2.37236	6202.66	24.9252	Puente Formation	530	25	778.556	1580.57	2252.95	0	2252.95	2614.76	2614.76

32	2.37236	5882.36	25.8168	Puente Formation	530	25	747.579	1517.68	2118.09	0	2118.09	2479.76	2479.76
33	2.37236	5549.05	26.7152	Puente Formation	530	25	715.649	1452.86	1979.08	0	1979.08	2339.25	2339.25
34	2.37236	5202.41	27.6207	Puente Formation	530	25	682.757	1386.09	1835.88	0	1835.88	2193.14	2193.14
35	2.37236	4842.11	28.5338	Puente Formation	530	25	648.891	1317.33	1688.44	0	1688.44	2041.26	2041.26
36	2.37236	6938.71	29.4549	Puente Formation	530	25	825.819	1676.52	2458.72	0	2458.72	2925.09	2925.09
37	2.37236	6925.93	30.3844	Puente Formation	530	25	821.12	1666.98	2438.26	0	2438.26	2919.71	2919.71
38	2.37236	6522.44	31.3228	Puente Formation	530	25	783.167	1589.93	2273.02	0	2273.02	2749.62	2749.62
39	2.37236	6103.7	32.2707	Puente Formation	530	25	744.16	1510.74	2103.21	0	2103.21	2573.12	2573.12
40	2.37236	5669.25	33.2286	Puente Formation	530	25	716.477	1454.54	1982.69	0	1982.69	2452.05	2452.05
41	2.37236	5218.57	34.1972	Puente Formation	530	25	682.792	1386.16	1836.03	0	1836.03	2300.01	2300.01
42	2.37236	4751.1	35.1769	Puente Formation	530	25	640.422	1300.14	1651.57	0	1651.57	2102.95	2102.95
43	2.37236	4266.23	36.1687	Puente Formation	530	25	596.921	1211.83	1462.18	0	1462.18	1898.56	1898.56
44	2.37236	3763.3	37.1731	Puente Formation	530	25	552.266	1121.17	1267.77	0	1267.77	1686.56	1686.56
45	2.37236	3241.58	38.1911	Puente Formation	530	25	506.433	1028.13	1068.23	0	1068.23	1466.63	1466.63
46	2.37236	2700.3	39.2236	Puente Formation	530	25	459.398	932.638	863.461	0	863.461	1238.45	1238.45
47	2.37236	2138.57	40.2714	Puente Formation	530	25	411.135	834.657	653.34	0	653.34	1001.66	1001.66
48	2.37236	1555.45	41.3358	Puente Formation	530	25	361.615	734.126	437.749	0	437.749	755.836	755.836
49	2.37236	949.867	42.4179	Puente Formation	530	25	310.811	630.986	216.566	0	216.566	500.553	500.553
50	2.37236	320.663	43.519	Puente Formation	530	25	258.691	525.177	-10.3435	0	-10.3435	235.308	235.308

Global Minimum Query (janbu simplified) - Safety Factor: 1.97209

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.31887	1007.7	0.0912652	Puente 2	530	25	371.365	732.366	433.974	0	433.974	434.565	434.565
2	2.31887	1270.86	0.920415	Puente 2	530	25	396.83	782.585	541.668	0	541.668	548.044	548.044
3	2.31887	1524.68	1.74976	Puente 2	530	25	421.175	830.595	644.63	0	644.63	657.496	657.496
4	2.31887	1769.15	2.57947	Puente 2	530	25	444.409	876.415	742.889	0	742.889	762.91	762.91
5	2.28584	1974.12	3.4038	Puente Formation	335	20	325.683	642.276	844.231	0	844.231	863.602	863.602
6	2.28584	2210.64	4.22292	Puente Formation	335	20	343.669	677.747	941.692	0	941.692	967.068	967.068
7	2.28584	2472.37	5.04291	Puente Formation	337.789	20.074	365.72	721.233	1049.28	0	1049.28	1081.56	1081.56
8	2.28584	2726.01	5.86393	Puente Formation	391.156	21.4767	427.497	843.062	1148.6	0	1148.6	1192.51	1192.51
9	2.28584	2970.57	6.68617	Puente Formation	444.601	22.8549	490.881	968.061	1241.93	0	1241.93	1299.47	1299.47
10	2.28584	3205.99	7.50979	Puente Formation	498.136	24.208	555.616	1095.73	1329.2	0	1329.2	1402.45	1402.45
11	2.28584	3432.24	8.33497	Puente Formation	530	25	602.877	1188.93	1413.08	0	1413.08	1501.4	1501.4
12	2.28584	3649.25	9.1619	Puente Formation	530	25	622.468	1227.56	1495.93	0	1495.93	1596.32	1596.32
13	2.28584	3856.96	9.99076	Puente Formation	530	25	640.99	1264.09	1574.26	0	1574.26	1687.18	1687.18
14	2.28584	4055.31	10.8217	Puente Formation	530	25	658.442	1298.51	1648.07	0	1648.07	1773.93	1773.93
15	2.28584	4244.22	11.655	Puente Formation	530	25	674.826	1330.82	1717.36	0	1717.36	1856.56	1856.56
16	2.28584	4423.61	12.4908	Puente Formation	530	25	690.142	1361.02	1782.13	0	1782.13	1935.02	1935.02
17	2.28584	4593.39	13.3293	Puente Formation	530	25	704.388	1389.12	1842.38	0	1842.38	2009.27	2009.27
18	2.28584	4753.45	14.1708	Puente Formation	530	25	717.562	1415.1	1898.1	0	1898.1	2079.28	2079.28
19	2.28584	4903.71	15.0153	Puente Formation	530	25	729.662	1438.96	1949.27	0	1949.27	2144.99	2144.99
20	2.28584	5044.03	15.8632	Puente Formation	530	25	740.684	1460.7	1995.88	0	1995.88	2206.36	2206.36
21	2.28584	5174.3	16.7147	Puente Formation	530	25	750.624	1480.3	2037.92	0	2037.92	2263.33	2263.33
22	2.28584	5294.4	17.57	Puente Formation	530	25	759.478	1497.76	2075.37	0	2075.37	2315.85	2315.85
23	2.28584	5404.16	18.4294	Puente Formation	530	25	767.238	1513.06	2108.18	0	2108.18	2363.85	2363.85
24	2.28584	5503.45	19.2931	Puente Formation	530	25	773.899	1526.2	2136.35	0	2136.35	2407.26	2407.26
25	2.28584	5592.11	20.1614	Puente Formation	530	25	779.452	1537.15	2159.84	0	2159.84	2446.03	2446.03
26	2.28584	5669.94	21.0345	Puente Formation	530	25	783.889	1545.9	2178.61	0	2178.61	2480.06	2480.06
27	2.28584	5736.78	21.9128	Puente Formation	530	25	787.205	1552.44	2192.62	0	2192.62	2509.28	2509.28
28	2.28584	5792.41	22.7965	Puente Formation	530	25	789.381	1556.73	2201.83	0	2201.83	2533.6	2533.6
29	2.28584	5836.63	23.686	Puente Formation	530	25	790.41	1558.76	2206.18	0	2206.18	2552.92	2552.92
30	2.28584	5869.19	24.5816	Puente Formation	530	25	790.278	1558.5	2205.63	0	2205.63	2567.14	2567.14
31	2.28584	5860.26	25.4837	Puente Formation	530	25	786.227	1550.51	2188.49	0	2188.49	2563.22	2563.22
32	2.28584	5605.39	26.3926	Puente Formation	530	25	759.365	1497.54	2074.89	0	2074.89	2451.72	2451.72
33	2.28584	5287.94	27.3087	Puente Formation	530	25	726.887	1433.49	1937.53	0	1937.53	2312.85	2312.85
34	2.28584	4957.74	28.2324	Puente Formation	530	25	693.438	1367.52	1796.07	0	1796.07	2168.4	2168.4
35	2.28584	4614.46	29.1642	Puente Formation	530	25	659.007	1299.62	1650.45	0	1650.45	2018.22	2018.22

36	2.28584	4257.74	30.1045	Puente Formation	530	25	623.58	1229.76	1500.63	0	1500.63	1862.18	1862.18
37	2.28584	5937.14	31.0539	Puente Formation	530	25	772.736	1523.9	2131.43	0	2131.43	2596.73	2596.73
38	2.28584	6245.44	32.0128	Puente Formation	530	25	796.845	1571.45	2233.39	0	2233.39	2731.56	2731.56
39	2.28584	5845.99	32.9819	Puente Formation	530	25	757.138	1493.14	2065.47	0	2065.47	2556.82	2556.82
40	2.28584	5431.38	33.9618	Puente Formation	530	25	716.349	1412.7	1892.96	0	1892.96	2375.45	2375.45
41	2.28584	5001.09	34.953	Puente Formation	530	25	681.338	1343.66	1744.9	0	1744.9	2221.15	2221.15
42	2.28584	4554.54	35.9565	Puente Formation	530	25	651.616	1285.05	1619.2	0	1619.2	2091.87	2091.87
43	2.28584	4091.12	36.9728	Puente Formation	530	25	607.339	1197.73	1431.95	0	1431.95	1889.16	1889.16
44	2.28584	3610.15	38.0029	Puente Formation	530	25	561.888	1108.09	1239.73	0	1239.73	1678.77	1678.77
45	2.28584	3110.89	39.0477	Puente Formation	530	25	515.239	1016.1	1042.44	0	1042.44	1460.38	1460.38
46	2.28584	2592.51	40.1081	Puente Formation	530	25	467.364	921.683	839.965	0	839.965	1233.64	1233.64
47	2.28584	2054.13	41.1854	Puente Formation	530	25	418.235	824.797	632.193	0	632.193	998.142	998.142
48	2.28584	1494.74	42.2808	Puente Formation	530	25	367.824	725.383	419	0	419	753.468	753.468
49	2.28584	913.249	43.3955	Puente Formation	530	25	316.101	623.379	200.252	0	200.252	499.126	499.126
50	2.28584	308.415	44.5311	Puente Formation	530	25	263.032	518.723	-24.183	0	-24.183	234.579	234.579

Curved - Curved Static

Global Minimum Query (bishop simplified) - Safety Factor: 2.06277

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.11385	141.261	-6.29004	Puente 2	418.853	22.1943	221.087	456.052	91.1797	0	91.1797	66.8103	66.8103
2	2.11385	418.964	-5.27045	Puente 2	352.579	20.4654	210.29	433.781	217.585	0	217.585	198.186	198.186
3	2.11385	687.05	-4.25252	Puente 2	335	20	222.672	459.321	341.569	0	341.569	325.012	325.012
4	2.11385	945.562	-3.23594	Puente 2	335	20	243.761	502.823	461.089	0	461.089	447.307	447.307
5	2.13741	1210.16	-2.21473	Puente Formation	530	25	388.32	801.014	581.19	0	581.19	566.172	566.172
6	2.13741	1486.17	-1.18856	Puente Formation	530	25	416.068	858.253	703.939	0	703.939	695.307	695.307
7	2.13741	1766.75	-0.162774	Puente Formation	530	25	444.078	916.03	827.844	0	827.844	826.583	826.583
8	2.13741	2037.51	0.86296	Puente Formation	473.908	23.599	430.261	887.529	946.782	0	946.782	953.263	953.263
9	2.13741	2298.45	1.88897	Puente Formation	407.217	21.8937	404.316	834.01	1062.02	0	1062.02	1075.35	1075.35
10	2.13741	2549.56	2.91559	Puente Formation	340.487	20.1455	373.815	771.095	1173.8	0	1173.8	1192.84	1192.84
11	2.13741	2790.82	3.94314	Puente Formation	335	20	388.073	800.506	1278.97	0	1278.97	1305.72	1305.72
12	2.13741	3022.19	4.97197	Puente Formation	335	20	405.667	836.798	1378.68	0	1378.68	1413.97	1413.97
13	2.13741	3243.63	6.00241	Puente Formation	400.157	21.7107	477.235	984.426	1467.4	0	1467.4	1517.58	1517.58
14	2.13741	3455.09	7.0348	Puente Formation	467.262	23.4311	551.843	1138.33	1548.43	0	1548.43	1616.53	1616.53
15	2.13741	3656.52	8.06949	Puente Formation	530	25	623.684	1286.52	1622.36	0	1622.36	1710.78	1710.78
16	2.13741	3847.82	9.10684	Puente Formation	530	25	640.692	1321.6	1697.6	0	1697.6	1800.3	1800.3
17	2.13741	4028.94	10.1472	Puente Formation	530	25	656.504	1354.22	1767.54	0	1767.54	1885.04	1885.04
18	2.13741	4199.76	11.191	Puente Formation	530	25	671.12	1384.37	1832.19	0	1832.19	1964.97	1964.97
19	2.13741	4360.18	12.2385	Puente Formation	530	25	684.538	1412.04	1891.55	0	1891.55	2040.04	2040.04
20	2.13741	4510.09	13.2902	Puente Formation	530	25	696.756	1437.25	1945.6	0	1945.6	2110.18	2110.18
21	2.13741	4649.34	14.3465	Puente Formation	530	25	707.77	1459.97	1994.32	0	1994.32	2175.34	2175.34
22	2.13741	4777.8	15.4078	Puente Formation	530	25	717.575	1480.19	2037.69	0	2037.69	2235.45	2235.45
23	2.13741	4895.31	16.4746	Puente Formation	530	25	726.164	1497.91	2075.69	0	2075.69	2290.44	2290.44
24	2.13741	5001.68	17.5472	Puente Formation	530	25	733.53	1513.1	2108.27	0	2108.27	2340.22	2340.22
25	2.13741	5096.73	18.6263	Puente Formation	530	25	739.662	1525.75	2135.4	0	2135.4	2384.7	2384.7
26	2.13741	5180.24	19.7122	Puente Formation	530	25	744.547	1535.83	2157.01	0	2157.01	2423.78	2423.78
27	2.13741	5251.98	20.8056	Puente Formation	530	25	748.178	1543.32	2173.07	0	2173.07	2457.36	2457.36
28	2.13741	5311.71	21.907	Puente Formation	530	25	750.534	1548.18	2183.49	0	2183.49	2485.31	2485.31
29	2.13741	5359.14	23.0169	Puente Formation	530	25	751.601	1550.38	2188.22	0	2188.22	2507.51	2507.51
30	2.13741	5393.98	24.1361	Puente Formation	530	25	751.363	1549.89	2187.16	0	2187.16	2523.82	2523.82
31	2.13741	5415.9	25.2651	Puente Formation	530	25	749.793	1546.65	2180.22	0	2180.22	2534.09	2534.09
32	2.13741	5423.86	26.4048	Puente Formation	530	25	746.811	1540.5	2167.03	0	2167.03	2537.83	2537.83
33	2.13741	5263.14	27.5558	Puente Formation	530	25	727.788	1501.26	2082.87	0	2082.87	2462.64	2462.64
34	2.13741	4969.91	28.7191	Puente Formation	530	25	696.372	1436.46	1943.9	0	1943.9	2325.45	2325.45

35	2.13741	4662.13	29.8954	Puente Formation	530	25	663.803	1369.27	1799.82	0	1799.82	2181.46	2181.46
36	2.13741	4339.28	31.0858	Puente Formation	530	25	630.057	1299.66	1650.55	0	1650.55	2030.41	2030.41
37	2.13741	4000.79	32.2913	Puente Formation	530	25	595.11	1227.58	1495.95	0	1495.95	1872.04	1872.04
38	2.13741	3646.04	33.513	Puente Formation	530	25	558.935	1152.95	1335.93	0	1335.93	1706.06	1706.06
39	2.13741	5809.46	34.7523	Puente Formation	530	25	753.298	1553.88	2195.71	0	2195.71	2718.33	2718.33
40	2.13741	5449.84	36.0105	Puente Formation	530	25	715.796	1476.52	2029.82	0	2029.82	2550.08	2550.08
41	2.13741	5041.87	37.2891	Puente Formation	530	25	674.198	1390.72	1845.81	0	1845.81	2359.21	2359.21
42	2.13741	4614.4	38.5898	Puente Formation	530	25	631.181	1301.98	1655.52	0	1655.52	2159.2	2159.2
43	2.13741	4166.35	39.9145	Puente Formation	530	25	591.915	1220.99	1481.82	0	1481.82	1976.99	1976.99
44	2.13741	3696.52	41.2654	Puente Formation	530	25	559.574	1154.27	1338.76	0	1338.76	1829.76	1829.76
45	2.13741	3203.54	42.6449	Puente Formation	530	25	511.859	1055.85	1127.68	0	1127.68	1599.11	1599.11
46	2.13741	2685.86	44.0557	Puente Formation	530	25	462.51	954.051	909.381	0	909.381	1356.89	1356.89
47	2.13741	2141.69	45.5011	Puente Formation	530	25	411.46	848.748	683.559	0	683.559	1102.28	1102.28
48	2.13741	1568.96	46.9845	Puente Formation	530	25	358.642	739.796	449.911	0	449.911	834.299	834.299
49	2.13741	965.229	48.5104	Puente Formation	530	25	303.979	627.039	208.101	0	208.101	551.813	551.813
50	2.13741	327.645	50.0838	Puente Formation	530	25	247.391	510.311	-42.2224	0	-42.2224	253.484	253.484

Global Minimum Query (janbu simplified) - Safety Factor: 1.90408

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.98415	181.631	-19.406	Puente 2	530	25	329.164	626.754	207.489	0	207.489	91.5337	91.5337
2	1.98415	538.083	-17.9232	Puente 2	530	25	374.42	712.925	392.285	0	392.285	271.183	271.183
3	1.98415	881.081	-16.4527	Puente 2	530	25	417.276	794.527	567.279	0	567.279	444.051	444.051
4	1.98415	1210.94	-14.9933	Puente 2	530	25	457.842	871.767	732.923	0	732.923	610.303	610.303
5	2.04294	1577.86	-13.5225	Puente Formation	530	25	496.752	945.856	891.809	0	891.809	772.343	772.343
6	2.04294	1915.88	-12.0393	Puente Formation	530	25	536.011	1020.61	1052.12	0	1052.12	937.798	937.798
7	2.04294	2266.04	-10.5643	Puente Formation	530	25	576.313	1097.35	1216.68	0	1216.68	1109.2	1109.2
8	2.04294	2603.25	-9.09631	Puente Formation	530	25	614.51	1170.08	1372.65	0	1372.65	1274.26	1274.26
9	2.04294	2927.33	-7.63435	Puente Formation	530	25	650.621	1238.84	1520.1	0	1520.1	1432.89	1432.89
10	2.04294	3238.41	-6.17738	Puente Formation	530	25	684.705	1303.73	1659.28	0	1659.28	1585.17	1585.17
11	2.04294	3536.63	-4.72441	Puente Formation	530	25	716.813	1364.87	1790.38	0	1790.38	1731.14	1731.14
12	2.04294	3822.07	-3.27448	Puente Formation	530	25	746.989	1422.33	1913.6	0	1913.6	1870.86	1870.86
13	2.04294	4094.8	-1.82665	Puente Formation	530	25	775.272	1476.18	2029.09	0	2029.09	2004.36	2004.36
14	2.04294	4354.86	-0.37998	Puente Formation	530	25	801.694	1526.49	2136.98	0	2136.98	2131.66	2131.66
15	2.04294	4602.28	1.06644	Puente Formation	460.681	23.2643	747.463	1423.23	2238.86	0	2238.86	2252.77	2252.77
16	2.04294	4837.04	2.51355	Puente Formation	366.619	20.835	659.978	1256.65	2338.72	0	2338.72	2367.69	2367.69
17	2.04294	5059.12	3.96226	Puente Formation	335	20	640.823	1220.18	2432.01	0	2432.01	2476.39	2476.39
18	2.04294	5268.46	5.41351	Puente Formation	361.878	20.7104	689.149	1312.19	2513.55	0	2513.55	2578.86	2578.86
19	2.04294	5464.98	6.86826	Puente Formation	456.437	23.1564	818.451	1558.4	2576.48	0	2576.48	2675.06	2675.06
20	2.04294	5648.58	8.32748	Puente Formation	530	25	922.414	1756.35	2629.92	0	2629.92	2764.94	2764.94
21	2.04294	5819.12	9.79216	Puente Formation	530	25	936.347	1782.88	2686.81	0	2686.81	2848.42	2848.42
22	2.04294	5976.45	11.2633	Puente Formation	530	25	948.521	1806.06	2736.52	0	2736.52	2925.43	2925.43
23	2.04294	6120.37	12.7421	Puente Formation	530	25	958.93	1825.88	2779.03	0	2779.03	2995.87	2995.87
24	2.04294	6250.66	14.2295	Puente Formation	530	25	967.564	1842.32	2814.29	0	2814.29	3059.65	3059.65
25	2.04294	6367.05	15.7268	Puente Formation	530	25	974.413	1855.36	2842.24	0	2842.24	3116.63	3116.63
26	2.04294	6469.27	17.2352	Puente Formation	530	25	979.449	1864.95	2862.81	0	2862.81	3166.66	3166.66
27	2.04294	6556.97	18.7561	Puente Formation	530	25	982.658	1871.06	2875.91	0	2875.91	3209.6	3209.6
28	2.04294	6629.76	20.2907	Puente Formation	530	25	984.008	1873.63	2881.41	0	2881.41	3245.23	3245.23
29	2.04294	6687.23	21.8408	Puente Formation	530	25	983.462	1872.59	2879.19	0	2879.19	3273.36	3273.36
30	2.04294	6728.87	23.4079	Puente Formation	530	25	980.983	1867.87	2869.07	0	2869.07	3293.74	3293.74
31	2.04294	6754.14	24.9937	Puente Formation	530	25	976.529	1859.39	2850.89	0	2850.89	3306.12	3306.12
32	2.04294	6762.42	26.6003	Puente Formation	530	25	970.043	1847.04	2824.4	0	2824.4	3310.17	3310.17
33	2.04294	6753	28.2298	Puente Formation	530	25	961.467	1830.71	2789.38	0	2789.38	3305.56	3305.56
34	2.04294	6696.57	29.8847	Puente Formation	530	25	947.733	1804.56	2733.31	0	2733.31	3277.94	3277.94
35	2.04294	6433.05	31.5675	Puente Formation	530	25	912.257	1737.01	2588.44	0	2588.44	3148.95	3148.95

36	2.04294	6114.81	33.2812	Puente Formation	530	25	871.308	1659.04	2421.24	0	2421.24	2993.18	2993.18
37	2.04294	5774.9	35.0294	Puente Formation	530	25	828.416	1577.37	2246.1	0	2246.1	2826.8	2826.8
38	2.04294	5411.92	36.8158	Puente Formation	530	25	783.493	1491.83	2062.66	0	2062.66	2649.12	2649.12
39	2.04294	5024.25	38.645	Puente Formation	530	25	736.439	1402.24	1870.52	0	1870.52	2459.36	2459.36
40	2.04294	4888.64	40.5222	Puente Formation	530	25	714.768	1360.98	1782.03	0	1782.03	2392.98	2392.98
41	2.04294	6618.37	42.4537	Puente Formation	530	25	875.578	1667.17	2438.66	0	2438.66	3239.68	3239.68
42	2.04294	6143.65	44.4468	Puente Formation	530	25	818.274	1558.06	2204.69	0	2204.69	3007.31	3007.31
43	2.04294	5634.05	46.5105	Puente Formation	530	25	758.047	1443.38	1958.76	0	1958.76	2757.86	2757.86
44	2.04294	5085.46	48.656	Puente Formation	530	25	694.645	1322.66	1699.86	0	1699.86	2489.34	2489.34
45	2.04294	4492.75	50.8974	Puente Formation	530	25	631.189	1201.84	1440.75	0	1440.75	2217.36	2217.36
46	2.04294	3849.26	53.2527	Puente Formation	530	25	575.519	1095.84	1213.44	0	1213.44	1984.23	1984.23
47	2.04294	3146.15	55.7463	Puente Formation	530	25	500.134	952.295	905.614	0	905.614	1640.06	1640.06
48	2.04294	2371.18	58.4117	Puente Formation	530	25	419.877	799.479	577.901	0	577.901	1260.71	1260.71
49	2.04294	1506.58	61.2983	Puente Formation	530	25	334.041	636.04	227.403	0	227.403	837.497	837.497
50	2.04294	524.61	64.4831	Puente Formation	530	25	241.721	460.255	-149.568	0	-149.568	356.825	356.825

Curved - Curved Pstatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.10153

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.30461	165.491	-5.86061	Puente 2	390.939	21.4711	395.023	435.129	112.349	0	112.349	71.8023	71.8023
2	2.30461	490.972	-4.88036	Puente 2	335	20	385.387	424.515	245.94	0	245.94	213.034	213.034
3	2.30461	805.477	-3.90154	Puente 2	335	20	429.279	472.864	378.779	0	378.779	349.502	349.502
4	2.28204	1100.72	-2.92865	Puente Formation	530	25	700.505	771.627	518.173	0	518.173	482.336	482.336
5	2.28204	1430.16	-1.96138	Puente Formation	530	25	757.428	834.33	652.638	0	652.638	626.699	626.699
6	2.28204	1758.75	-0.994674	Puente Formation	530	25	813.381	895.964	784.81	0	784.81	770.688	770.688
7	2.28204	2076.79	-0.0282504	Puente Formation	530	25	866.583	954.567	910.487	0	910.487	910.06	910.06
8	2.28204	2384.29	0.938165	Puente Formation	469.019	23.4755	832.356	916.865	1031.18	0	1031.18	1044.81	1044.81
9	2.28204	2681.25	1.90485	Puente Formation	406.185	21.867	787.28	867.213	1148.76	0	1148.76	1174.94	1174.94
10	2.28204	2967.64	2.87207	Puente Formation	343.315	20.2205	734.201	808.744	1263.61	0	1263.61	1300.44	1300.44
11	2.28204	3243.46	3.84012	Puente Formation	335	20	756.964	833.819	1370.49	0	1370.49	1421.3	1421.3
12	2.28204	3508.66	4.80927	Puente Formation	335	20	790.185	870.413	1471.04	0	1471.04	1537.52	1537.52
13	2.28204	3763.2	5.77979	Puente Formation	385.687	21.3342	902.459	994.086	1557.72	0	1557.72	1649.06	1649.06
14	2.28204	4007.05	6.75199	Puente Formation	448.879	22.9641	1035.8	1140.96	1633.29	0	1633.29	1755.92	1755.92
15	2.28204	4240.12	7.72614	Puente Formation	512.199	24.5587	1169.95	1288.74	1699.33	0	1699.33	1858.06	1858.06
16	2.28204	4462.37	8.70254	Puente Formation	530	25	1229.29	1354.1	1767.29	0	1767.29	1955.46	1955.46
17	2.28204	4673.7	9.6815	Puente Formation	530	25	1257.34	1385	1833.56	0	1833.56	2048.07	2048.07
18	2.28204	4874.02	10.6633	Puente Formation	530	25	1283.04	1413.31	1894.27	0	1894.27	2135.85	2135.85
19	2.28204	5063.23	11.6483	Puente Formation	530	25	1306.41	1439.05	1949.46	0	1949.46	2218.77	2218.77
20	2.28204	5241.23	12.6368	Puente Formation	530	25	1327.45	1462.22	1999.16	0	1999.16	2296.77	2296.77
21	2.28204	5407.87	13.6292	Puente Formation	530	25	1346.18	1482.85	2043.4	0	2043.4	2369.8	2369.8
22	2.28204	5563.04	14.6257	Puente Formation	530	25	1362.61	1500.95	2082.21	0	2082.21	2437.8	2437.8
23	2.28204	5706.56	15.6268	Puente Formation	530	25	1376.74	1516.52	2115.61	0	2115.61	2500.7	2500.7
24	2.28204	5838.28	16.6328	Puente Formation	530	25	1388.59	1529.58	2143.6	0	2143.6	2558.42	2558.42
25	2.28204	5958.02	17.6441	Puente Formation	530	25	1398.16	1540.11	2166.19	0	2166.19	2610.89	2610.89
26	2.28204	6065.57	18.6611	Puente Formation	530	25	1405.44	1548.13	2183.38	0	2183.38	2658.03	2658.03
27	2.28204	6160.72	19.6843	Puente Formation	530	25	1410.42	1553.62	2195.16	0	2195.16	2699.73	2699.73
28	2.28204	6243.25	20.714	Puente Formation	530	25	1413.12	1556.59	2201.53	0	2201.53	2735.9	2735.9
29	2.28204	6312.89	21.7508	Puente Formation	530	25	1413.52	1557.03	2202.46	0	2202.46	2766.42	2766.42
30	2.28204	6221.25	22.7951	Puente Formation	530	25	1388.27	1529.22	2142.83	0	2142.83	2726.27	2726.27
31	2.28204	5951.92	23.8475	Puente Formation	530	25	1335.4	1470.98	2017.94	0	2017.94	2608.25	2608.25
32	2.28204	5668.71	24.9085	Puente Formation	530	25	1280.95	1411	1889.31	0	1889.31	2484.14	2484.14
33	2.28204	5371.35	25.9787	Puente Formation	530	25	1224.92	1349.29	1756.97	0	1756.97	2353.84	2353.84
34	2.28204	5059.49	27.0588	Puente Formation	530	25	1167.32	1285.83	1620.89	0	1620.89	2217.18	2217.18

35	2.28204	5491.33	28.1493	Puente Formation	530	25	1222.87	1347.03	1752.12	0	1752.12	2406.42	2406.42
36	2.28204	7128.96	29.2511	Puente Formation	530	25	1457.98	1606.01	2307.52	0	2307.52	3124.06	3124.06
37	2.28204	6770.9	30.3649	Puente Formation	530	25	1391.99	1533.32	2151.63	0	2151.63	2967.16	2967.16
38	2.28204	6396.42	31.4915	Puente Formation	530	25	1324.33	1458.78	1991.78	0	1991.78	2803.06	2803.06
39	2.28204	6004.93	32.6319	Puente Formation	530	25	1254.97	1382.38	1827.94	0	1827.94	2631.51	2631.51
40	2.28204	5595.79	33.787	Puente Formation	530	25	1212.32	1335.41	1727.2	0	1727.2	2538.38	2538.38
41	2.28204	5168.27	34.9579	Puente Formation	530	25	1143.76	1259.89	1565.26	0	1565.26	2364.88	2364.88
42	2.28204	4721.59	36.1458	Puente Formation	530	25	1068.89	1177.41	1388.38	0	1388.38	2169.14	2169.14
43	2.28204	4254.87	37.352	Puente Formation	530	25	992.236	1092.98	1207.31	0	1207.31	1964.62	1964.62
44	2.28204	3767.15	38.5779	Puente Formation	530	25	913.789	1006.57	1022	0	1022	1750.89	1750.89
45	2.28204	3257.34	39.8251	Puente Formation	530	25	833.526	918.154	832.4	0	832.4	1527.49	1527.49
46	2.28204	2724.24	41.0954	Puente Formation	530	25	751.429	827.722	638.468	0	638.468	1293.88	1293.88
47	2.28204	2166.48	42.3908	Puente Formation	530	25	667.48	735.249	440.159	0	440.159	1049.45	1049.45
48	2.28204	1582.52	43.7134	Puente Formation	530	25	581.664	640.72	237.441	0	237.441	793.552	793.552
49	2.28204	970.602	45.066	Puente Formation	530	25	493.97	544.123	30.2866	0	30.2866	525.397	525.397
50	2.28204	328.709	46.4515	Puente Formation	530	25	404.394	445.452	-181.314	0	-181.314	244.106	244.106

Global Minimum Query (janbu simplified) - Safety Factor: 1.00516

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.24298	217.471	-16.8975	Puente 2	530	25	666.082	669.519	299.201	0	299.201	96.8617	96.8617
2	2.24298	644.474	-15.5079	Puente 2	530	25	758.117	762.029	497.589	0	497.589	287.232	287.232
3	2.24298	1055.76	-14.1276	Puente 2	530	25	844.162	848.518	683.062	0	683.062	470.591	470.591
4	2.23777	1448.46	-12.7572	Puente Formation	530	25	924.633	929.404	856.523	0	856.523	647.178	647.178
5	2.23777	1859.92	-11.3958	Puente Formation	530	25	1006.98	1012.17	1034.02	0	1034.02	831.056	831.056
6	2.23777	2274.13	-10.0409	Puente Formation	530	25	1088.07	1093.68	1208.82	0	1208.82	1016.16	1016.16
7	2.23777	2673.72	-8.69161	Puente Formation	530	25	1164.09	1170.1	1372.69	0	1372.69	1194.73	1194.73
8	2.23777	3058.85	-7.34719	Puente Formation	530	25	1235.27	1241.64	1526.12	0	1526.12	1366.84	1366.84
9	2.23777	3429.66	-6.00683	Puente Formation	530	25	1301.8	1308.52	1669.55	0	1669.55	1532.56	1532.56
10	2.23777	3786.27	-4.66976	Puente Formation	530	25	1363.87	1370.91	1803.34	0	1803.34	1691.94	1691.94
11	2.23777	4128.78	-3.33524	Puente Formation	530	25	1421.64	1428.97	1927.86	0	1927.86	1845.01	1845.01
12	2.23777	4457.25	-2.00252	Puente Formation	530	25	1475.23	1482.85	2043.39	0	2043.39	1991.81	1991.81
13	2.23777	4771.73	-0.670896	Puente Formation	530	25	1524.79	1532.66	2150.21	0	2150.21	2132.36	2132.36
14	2.23777	5072.24	0.660371	Puente Formation	487.076	23.9307	1477.79	1485.42	2249.63	0	2249.63	2266.66	2266.66
15	2.23777	5358.78	1.99199	Puente Formation	400.52	21.7201	1329.2	1336.06	2348.49	0	2348.49	2394.73	2394.73
16	2.23777	5631.34	3.32469	Puente Formation	335	20	1218.88	1225.17	2445.73	0	2445.73	2516.53	2516.53
17	2.23777	5889.85	4.6592	Puente Formation	335	20	1249.48	1255.93	2530.24	0	2530.24	2632.07	2632.07
18	2.23777	6134.26	5.99625	Puente Formation	399.756	21.7003	1423.81	1431.16	2591.76	0	2591.76	2741.31	2741.31
19	2.23777	6364.47	7.33658	Puente Formation	486.878	23.9257	1646.25	1654.75	2632.26	0	2632.26	2844.22	2844.22
20	2.23777	6580.37	8.68096	Puente Formation	530	25	1766.41	1775.52	2671.03	0	2671.03	2940.72	2940.72
21	2.23777	6781.81	10.0302	Puente Formation	530	25	1786.69	1795.91	2714.75	0	2714.75	3030.76	3030.76
22	2.23777	6968.62	11.3851	Puente Formation	530	25	1803.55	1812.86	2751.1	0	2751.1	3114.27	3114.27
23	2.23777	7140.61	12.7464	Puente Formation	530	25	1817.01	1826.39	2780.12	0	2780.12	3191.15	3191.15
24	2.23777	7297.55	14.1151	Puente Formation	530	25	1827.1	1836.53	2801.85	0	2801.85	3261.3	3261.3
25	2.23777	7439.17	15.4921	Puente Formation	530	25	1833.81	1843.27	2816.33	0	2816.33	3324.61	3324.61
26	2.23777	7565.19	16.8784	Puente Formation	530	25	1837.16	1846.64	2823.54	0	2823.54	3380.95	3380.95
27	2.23777	7675.26	18.2748	Puente Formation	530	25	1837.13	1846.61	2823.48	0	2823.48	3430.16	3430.16
28	2.23777	7769.02	19.6827	Puente Formation	530	25	1833.73	1843.19	2816.14	0	2816.14	3472.08	3472.08
29	2.23777	7846.05	21.103	Puente Formation	530	25	1826.92	1836.35	2801.47	0	2801.47	3506.53	3506.53
30	2.23777	7896.97	22.5371	Puente Formation	530	25	1815.13	1824.5	2776.07	0	2776.07	3529.3	3529.3
31	2.23777	7724.6	23.9862	Puente Formation	530	25	1764.6	1773.71	2667.15	0	2667.15	3452.29	3452.29
32	2.23777	7447.92	25.4518	Puente Formation	530	25	1696.83	1705.59	2521.06	0	2521.06	3328.66	3328.66
33	2.23777	7152.25	26.9356	Puente Formation	530	25	1626.75	1635.14	2369.98	0	2369.98	3196.55	3196.55
34	2.23777	6836.87	28.4391	Puente Formation	530	25	1554.31	1562.33	2213.83	0	2213.83	3055.62	3055.62
35	2.23777	6500.93	29.9643	Puente Formation	530	25	1479.48	1487.12	2052.55	0	2052.55	2905.5	2905.5

36	2.23777	7308.99	31.5133	Puente Formation	530	25	1590.37	1598.58	2291.57	0	2291.57	3266.66	3266.66
37	2.23777	8448.82	33.0885	Puente Formation	530	25	1750.04	1759.07	2635.76	0	2635.76	3776.09	3776.09
38	2.23777	8045.05	34.6924	Puente Formation	530	25	1661.72	1670.29	2445.36	0	2445.36	3595.66	3595.66
39	2.23777	7616.13	36.3281	Puente Formation	530	25	1570.65	1578.75	2249.06	0	2249.06	3404	3404
40	2.23777	7160.46	37.9989	Puente Formation	530	25	1476.75	1484.37	2046.65	0	2046.65	3200.37	3200.37
41	2.23777	6676.21	39.7088	Puente Formation	530	25	1411.13	1418.41	1905.2	0	1905.2	3077.1	3077.1
42	2.23777	6161.22	41.4621	Puente Formation	530	25	1313.02	1319.8	1693.72	0	1693.72	2853.84	2853.84
43	2.23777	5612.97	43.2644	Puente Formation	530	25	1209.47	1215.71	1470.5	0	1470.5	2608.83	2608.83
44	2.23777	5028.46	45.1217	Puente Formation	530	25	1102.65	1108.34	1240.26	0	1240.26	2347.61	2347.61
45	2.23777	4404.05	47.0418	Puente Formation	530	25	992.456	997.577	1002.72	0	1002.72	2068.56	2068.56
46	2.23777	3735.33	49.0337	Puente Formation	530	25	878.747	883.281	757.613	0	757.613	1769.7	1769.7
47	2.23777	3016.81	51.1091	Puente Formation	530	25	761.397	765.326	504.658	0	504.658	1448.58	1448.58
48	2.23777	2241.49	53.2826	Puente Formation	530	25	640.288	643.592	243.598	0	243.598	1102.07	1102.07
49	2.23777	1400.29	55.5733	Puente Formation	530	25	515.328	517.987	-25.7611	0	-25.7611	726.104	726.104
50	2.23777	480.96	58.007	Puente Formation	530	25	386.496	388.49	-303.471	0	-303.471	315.219	315.219

Curved - Block Static

Global Minimum Query (bishop simplified) - Safety Factor: 1.91503

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.44473	508.021	-45	Puente 2	530	25	432.848	828.916	641.027	0	641.027	208.18	208.18
2	2.44473	1524.06	-45	Puente 2	530	25	566.657	1085.17	1190.56	0	1190.56	623.899	623.899
3	2.44473	2540.1	-45	Puente 2	530	25	700.468	1341.42	1740.09	0	1740.09	1039.62	1039.62
4	0.598035	776.038	-45	Puente Formation	530	25	783.739	1500.88	2082.07	0	2082.07	1298.33	1298.33
5	2.1755	3035.91	3.22913	Puente Formation	335	20	435.487	833.971	1370.91	0	1370.91	1395.48	1395.48
6	2.1755	3243.54	3.22913	Puente Formation	335	20	453.434	868.34	1465.34	0	1465.34	1490.92	1490.92
7	2.1755	3485.72	3.22913	Puente Formation	335	20	474.367	908.427	1575.48	0	1575.48	1602.24	1602.24
8	2.1755	3737.65	3.22913	Puente Formation	335	20	496.142	950.127	1690.05	0	1690.05	1718.04	1718.04
9	2.1755	3989.57	3.22913	Puente Formation	335	20	517.918	991.828	1804.62	0	1804.62	1833.84	1833.84
10	2.1755	4241.5	3.22913	Puente Formation	335	20	539.693	1033.53	1919.19	0	1919.19	1949.64	1949.64
11	2.1755	4493.42	3.22913	Puente Formation	335	20	561.468	1075.23	2033.76	0	2033.76	2065.44	2065.44
12	2.1755	4745.35	3.22913	Puente Formation	335	20	583.244	1116.93	2148.34	0	2148.34	2181.24	2181.24
13	2.1755	4997.27	3.22913	Puente Formation	335	20	605.02	1158.63	2262.91	0	2262.91	2297.04	2297.04
14	2.1755	5249.2	3.22913	Puente Formation	335	20	626.795	1200.33	2377.48	0	2377.48	2412.84	2412.84
15	2.1755	5501.12	3.22913	Puente Formation	335	20	648.571	1242.03	2492.05	0	2492.05	2528.64	2528.64
16	2.1755	5753.05	3.22913	Puente Formation	335	20	670.346	1283.73	2606.62	0	2606.62	2644.44	2644.44
17	2.1755	6004.97	3.22913	Puente Formation	335	20	692.121	1325.43	2721.19	0	2721.19	2760.24	2760.24
18	2.1755	6256.9	3.22913	Puente Formation	335	20	713.895	1367.13	2835.77	0	2835.77	2876.04	2876.04
19	2.1755	6508.82	3.22913	Puente Formation	335	20	735.67	1408.83	2950.34	0	2950.34	2991.84	2991.84
20	2.1755	6760.75	3.22913	Puente Formation	335	20	757.45	1450.54	3064.91	0	3064.91	3107.64	3107.64
21	2.1755	7012.67	3.22913	Puente Formation	335	20	779.225	1492.24	3179.48	0	3179.48	3223.44	3223.44
22	2.1755	7264.6	3.22913	Puente Formation	335	20	801.001	1533.94	3294.05	0	3294.05	3339.24	3339.24
23	2.1755	7516.52	3.22913	Puente Formation	335	20	822.776	1575.64	3408.62	0	3408.62	3455.04	3455.04
24	2.1755	7768.45	3.22913	Puente Formation	335	20	844.551	1617.34	3523.2	0	3523.2	3570.84	3570.84
25	2.19163	7857.88	39.6894	Puente Formation	530	25	956.366	1831.47	2791.02	0	2791.02	3584.71	3584.71
26	2.19163	7667.73	39.6894	Puente Formation	530	25	938.795	1797.82	2718.85	0	2718.85	3497.96	3497.96
27	2.19163	7477.57	39.6894	Puente Formation	530	25	921.223	1764.17	2646.69	0	2646.69	3411.21	3411.21
28	2.19163	7287.42	39.6894	Puente Formation	530	25	903.652	1730.52	2574.52	0	2574.52	3324.46	3324.46
29	2.19163	7097.27	39.6894	Puente Formation	530	25	886.08	1696.87	2502.35	0	2502.35	3237.71	3237.71
30	2.19163	6907.12	39.6894	Puente Formation	530	25	868.503	1663.21	2430.18	0	2430.18	3150.96	3150.96
31	2.19163	6716.96	39.6894	Puente Formation	530	25	850.932	1629.56	2358.02	0	2358.02	3064.21	3064.21
32	2.19163	6526.81	39.6894	Puente Formation	530	25	833.36	1595.91	2285.85	0	2285.85	2977.46	2977.46
33	2.19163	6253.72	39.6894	Puente Formation	530	25	808.123	1547.58	2182.21	0	2182.21	2852.87	2852.87
34	2.19163	5783.76	39.6894	Puente Formation	530	25	764.693	1464.41	2003.85	0	2003.85	2638.47	2638.47

35	2.19163	5305.41	39.6894	Puente Formation	530	25	720.487	1379.76	1822.31	0	1822.31	2420.24	2420.24
36	2.19163	4827.07	39.6894	Puente Formation	530	25	676.282	1295.1	1640.76	0	1640.76	2202.01	2202.01
37	2.19163	4348.72	39.6894	Puente Formation	530	25	632.077	1210.45	1459.22	0	1459.22	1983.78	1983.78
38	2.19163	3870.37	39.6894	Puente Formation	530	25	587.871	1125.79	1277.68	0	1277.68	1765.55	1765.55
39	2.19163	5567.06	39.6894	Puente Formation	530	25	744.667	1426.06	1921.61	0	1921.61	2539.61	2539.61
40	2.19163	5543.64	39.6894	Puente Formation	530	25	742.502	1421.91	1912.72	0	1912.72	2528.92	2528.92
41	2.19163	5065.29	39.6894	Puente Formation	530	25	698.297	1337.26	1731.17	0	1731.17	2310.69	2310.69
42	2.03895	4240.47	45	Puente Formation	530	25	629.704	1205.9	1449.48	0	1449.48	2079.18	2079.18
43	2.03895	3741.59	45	Puente Formation	530	25	583.697	1117.8	1260.54	0	1260.54	1844.24	1844.24
44	2.03895	3242.71	45	Puente Formation	530	25	553.476	1059.92	1136.42	0	1136.42	1689.9	1689.9
45	2.03895	2743.83	45	Puente Formation	530	25	505.573	968.187	939.695	0	939.695	1445.27	1445.27
46	2.03895	2244.95	45	Puente Formation	530	25	457.669	876.45	742.966	0	742.966	1200.63	1200.63
47	2.03895	1746.07	45	Puente Formation	530	25	409.766	784.714	546.237	0	546.237	956.003	956.003
48	2.03895	1247.2	45	Puente Formation	530	25	361.863	692.978	349.508	0	349.508	711.371	711.371
49	2.03895	748.318	45	Puente Formation	530	25	313.959	601.242	152.778	0	152.778	466.738	466.738
50	2.03895	249.439	45	Puente Formation	530	25	266.056	509.505	-43.9506	0	-43.9506	222.106	222.106

Global Minimum Query (janbu simplified) - Safety Factor: 1.81937

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.44473	508.021	-45	Puente 2	530	25	463.065	842.487	670.13	0	670.13	207.065	207.065
2	2.44473	1524.06	-45	Puente 2	530	25	606.217	1102.93	1228.66	0	1228.66	622.441	622.441
3	2.44473	2540.1	-45	Puente 2	530	25	749.369	1363.38	1787.19	0	1787.19	1037.82	1037.82
4	0.598035	776.038	-45	Puente Formation	530	25	838.453	1525.46	2134.77	0	2134.77	1296.32	1296.32
5	2.1755	3035.91	3.22913	Puente Formation	335	20	458.142	833.529	1369.7	0	1369.7	1395.54	1395.54
6	2.1755	3243.54	3.22913	Puente Formation	335	20	477.022	867.879	1464.07	0	1464.07	1490.99	1490.99
7	2.1755	3485.72	3.22913	Puente Formation	335	20	499.044	907.945	1574.15	0	1574.15	1602.31	1602.31
8	2.1755	3737.65	3.22913	Puente Formation	335	20	521.952	949.623	1688.67	0	1688.67	1718.11	1718.11
9	2.1755	3989.57	3.22913	Puente Formation	335	20	544.86	991.302	1803.17	0	1803.17	1833.92	1833.92
10	2.1755	4241.5	3.22913	Puente Formation	335	20	567.768	1032.98	1917.68	0	1917.68	1949.72	1949.72
11	2.1755	4493.42	3.22913	Puente Formation	335	20	590.676	1074.66	2032.2	0	2032.2	2065.52	2065.52
12	2.1755	4745.35	3.22913	Puente Formation	335	20	613.585	1116.34	2146.71	0	2146.71	2181.32	2181.32
13	2.1755	4997.27	3.22913	Puente Formation	335	20	636.493	1158.02	2261.22	0	2261.22	2297.13	2297.13
14	2.1755	5249.2	3.22913	Puente Formation	335	20	659.401	1199.7	2375.73	0	2375.73	2412.93	2412.93
15	2.1755	5501.12	3.22913	Puente Formation	335	20	682.309	1241.37	2490.24	0	2490.24	2528.73	2528.73
16	2.1755	5753.05	3.22913	Puente Formation	335	20	705.218	1283.05	2604.75	0	2604.75	2644.54	2644.54
17	2.1755	6004.97	3.22913	Puente Formation	335	20	728.126	1324.73	2719.26	0	2719.26	2760.34	2760.34
18	2.1755	6256.9	3.22913	Puente Formation	335	20	751.035	1366.41	2833.77	0	2833.77	2876.15	2876.15
19	2.1755	6508.82	3.22913	Puente Formation	335	20	773.944	1408.09	2948.28	0	2948.28	2991.95	2991.95
20	2.1755	6760.75	3.22913	Puente Formation	335	20	796.853	1449.77	3062.79	0	3062.79	3107.75	3107.75
21	2.1755	7012.67	3.22913	Puente Formation	335	20	819.756	1491.44	3177.3	0	3177.3	3223.55	3223.55
22	2.1755	7264.6	3.22913	Puente Formation	335	20	842.665	1533.12	3291.81	0	3291.81	3339.36	3339.36
23	2.1755	7516.52	3.22913	Puente Formation	335	20	865.574	1574.8	3406.33	0	3406.33	3455.16	3455.16
24	2.1755	7768.45	3.22913	Puente Formation	335	20	888.483	1616.48	3520.84	0	3520.84	3570.96	3570.96
25	2.19163	7857.88	39.6894	Puente Formation	530	25	998.258	1816.2	2758.26	0	2758.26	3586.72	3586.72
26	2.19163	7667.73	39.6894	Puente Formation	530	25	979.916	1782.83	2686.7	0	2686.7	3499.93	3499.93
27	2.19163	7477.57	39.6894	Puente Formation	530	25	961.575	1749.46	2615.13	0	2615.13	3413.15	3413.15
28	2.19163	7287.42	39.6894	Puente Formation	530	25	943.233	1716.09	2543.57	0	2543.57	3326.36	3326.36
29	2.19163	7097.27	39.6894	Puente Formation	530	25	924.892	1682.72	2472.01	0	2472.01	3239.58	3239.58
30	2.19163	6907.12	39.6894	Puente Formation	530	25	906.545	1649.34	2400.44	0	2400.44	3152.78	3152.78
31	2.19163	6716.96	39.6894	Puente Formation	530	25	888.203	1615.97	2328.88	0	2328.88	3066	3066
32	2.19163	6526.81	39.6894	Puente Formation	530	25	869.862	1582.6	2257.31	0	2257.31	2979.21	2979.21
33	2.19163	6253.72	39.6894	Puente Formation	530	25	843.517	1534.67	2154.53	0	2154.53	2854.57	2854.57
34	2.19163	5783.76	39.6894	Puente Formation	530	25	798.187	1452.2	1977.66	0	1977.66	2640.08	2640.08
35	2.19163	5305.41	39.6894	Puente Formation	530	25	752.045	1368.25	1797.63	0	1797.63	2421.75	2421.75

36	2.19163	4827.07	39.6894	Puente Formation	530	25	705.904	1284.3	1617.6	0	1617.6	2203.43	2203.43
37	2.19163	4348.72	39.6894	Puente Formation	530	25	659.762	1200.35	1437.57	0	1437.57	1985.11	1985.11
38	2.19163	3870.37	39.6894	Puente Formation	530	25	613.621	1116.4	1257.55	0	1257.55	1766.79	1766.79
39	2.19163	5567.06	39.6894	Puente Formation	530	25	777.284	1414.17	1896.1	0	1896.1	2541.17	2541.17
40	2.19163	5543.64	39.6894	Puente Formation	530	25	775.024	1410.06	1887.29	0	1887.29	2530.48	2530.48
41	2.19163	5065.29	39.6894	Puente Formation	530	25	728.883	1326.11	1707.26	0	1707.26	2312.16	2312.16
42	2.03895	4240.47	45	Puente Formation	530	25	656.384	1194.2	1424.39	0	1424.39	2080.78	2080.78
43	2.03895	3741.59	45	Puente Formation	530	25	608.428	1106.95	1237.28	0	1237.28	1845.71	1845.71
44	2.03895	3242.71	45	Puente Formation	530	25	576.926	1049.64	1114.37	0	1114.37	1691.3	1691.3
45	2.03895	2743.83	45	Puente Formation	530	25	526.993	958.795	919.552	0	919.552	1446.55	1446.55
46	2.03895	2244.95	45	Puente Formation	530	25	477.06	867.949	724.734	0	724.734	1201.79	1201.79
47	2.03895	1746.07	45	Puente Formation	530	25	427.127	777.102	529.913	0	529.913	957.04	957.04
48	2.03895	1247.2	45	Puente Formation	530	25	377.194	686.256	335.092	0	335.092	712.286	712.286
49	2.03895	748.318	45	Puente Formation	530	25	327.261	595.409	140.271	0	140.271	467.532	467.532
50	2.03895	249.439	45	Puente Formation	530	25	277.328	504.563	-54.5498	0	-54.5498	222.779	222.779

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.97193

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.22294	420.023	-45	Puente 2	530	25	419.428	827.083	637.095	0	637.095	217.667	217.667
2	2.22294	1260.07	-45	Puente 2	530	25	566.824	1117.74	1260.41	0	1260.41	693.583	693.583
3	1.43408	1128.23	3.27218	Puente 2	530	25	473.717	934.136	866.677	0	866.677	893.76	893.76
4	2.06397	1779.52	3.27218	Puente Formation	335	20	345.908	682.107	953.671	0	953.671	973.447	973.447
5	2.06397	1972.99	3.27218	Puente Formation	335	20	365.686	721.107	1060.82	0	1060.82	1081.73	1081.73
6	2.06397	2197.12	3.27218	Puente Formation	335	20	388.276	765.654	1183.21	0	1183.21	1205.41	1205.41
7	2.06397	2423.49	3.27218	Puente Formation	335	20	411.122	810.703	1306.99	0	1306.99	1330.49	1330.49
8	2.06397	2649.86	3.27218	Puente Formation	335	20	433.991	855.799	1430.88	0	1430.88	1455.7	1455.7
9	2.06397	2876.23	3.27218	Puente Formation	335	20	456.852	900.88	1554.74	0	1554.74	1580.86	1580.86
10	2.06397	3102.6	3.27218	Puente Formation	335	20	479.673	945.882	1678.39	0	1678.39	1705.81	1705.81
11	2.06397	3328.97	3.27218	Puente Formation	335	20	502.42	990.737	1801.62	0	1801.62	1830.35	1830.35
12	2.06397	3555.34	3.27218	Puente Formation	335	20	525.057	1035.38	1924.27	0	1924.27	1954.29	1954.29
13	2.06397	3781.72	3.27218	Puente Formation	335	20	547.548	1079.73	2046.12	0	2046.12	2077.42	2077.42
14	2.06397	4008.09	3.27218	Puente Formation	335	20	569.855	1123.72	2166.98	0	2166.98	2199.56	2199.56
15	2.06397	4234.46	3.27218	Puente Formation	335	20	591.942	1167.27	2286.64	0	2286.64	2320.48	2320.48
16	2.06397	4460.83	3.27218	Puente Formation	335	20	613.77	1210.31	2404.9	0	2404.9	2439.99	2439.99
17	2.06397	4687.2	3.27218	Puente Formation	335	20	635.304	1252.78	2521.57	0	2521.57	2557.89	2557.89
18	2.06397	4913.57	3.27218	Puente Formation	335	20	656.509	1294.59	2636.45	0	2636.45	2673.98	2673.98
19	2.06397	5139.94	3.27218	Puente Formation	335	20	677.347	1335.68	2749.35	0	2749.35	2788.08	2788.08
20	2.06397	5366.31	3.27218	Puente Formation	335	20	697.788	1375.99	2860.11	0	2860.11	2900	2900
21	2.06397	5592.69	3.27218	Puente Formation	335	20	717.804	1415.46	2968.55	0	2968.55	3009.59	3009.59
22	2.06397	5819.06	3.27218	Puente Formation	335	20	737.364	1454.03	3074.52	0	3074.52	3116.68	3116.68
23	2.15304	6160.52	30.9511	Puente Formation	530	25	794.739	1567.17	2224.23	0	2224.23	2700.83	2700.83
24	2.15304	6105.06	30.9511	Puente Formation	530	25	786.022	1549.98	2187.34	0	2187.34	2658.72	2658.72
25	2.15304	6049.61	30.9511	Puente Formation	530	25	777.771	1533.71	2152.46	0	2152.46	2618.89	2618.89
26	2.15304	5994.15	30.9511	Puente Formation	530	25	769.986	1518.36	2119.54	0	2119.54	2581.3	2581.3
27	2.15304	5938.69	30.9511	Puente Formation	530	25	762.651	1503.89	2088.53	0	2088.53	2545.89	2545.89
28	2.15304	5883.23	30.9511	Puente Formation	530	25	755.757	1490.3	2059.37	0	2059.37	2512.6	2512.6
29	2.15304	5827.77	30.9511	Puente Formation	530	25	749.29	1477.55	2032.02	0	2032.02	2481.37	2481.37
30	2.15304	5772.31	30.9511	Puente Formation	530	25	743.238	1465.61	2006.43	0	2006.43	2452.15	2452.15
31	2.15304	5716.85	30.9511	Puente Formation	530	25	737.59	1454.48	1982.55	0	1982.55	2424.88	2424.88
32	2.15304	5661.39	30.9511	Puente Formation	530	25	732.333	1444.11	1960.31	0	1960.31	2399.49	2399.49
33	2.15304	5465.43	30.9511	Puente Formation	530	25	715.344	1410.61	1888.47	0	1888.47	2317.46	2317.46
34	2.15304	5131.83	30.9511	Puente Formation	530	25	686.693	1354.11	1767.31	0	1767.31	2179.12	2179.12
35	2.15304	4798.24	30.9511	Puente Formation	530	25	658.099	1297.72	1646.39	0	1646.39	2041.05	2041.05

36	2.15304	4464.64	30.9511	Puente Formation	530	25	629.484	1241.3	1525.39	0	1525.39	1902.89	1902.89
37	2.15304	4131.05	30.9511	Puente Formation	530	25	600.773	1184.68	1403.97	0	1403.97	1764.26	1764.26
38	2.15304	3797.46	30.9511	Puente Formation	530	25	571.89	1127.73	1281.83	0	1281.83	1624.8	1624.8
39	2.15304	5962.75	30.9511	Puente Formation	530	25	764.004	1506.56	2094.24	0	2094.24	2552.42	2552.42
40	2.15304	5713.91	30.9511	Puente Formation	530	25	744.698	1468.49	2012.6	0	2012.6	2459.2	2459.2
41	2.15304	5380.32	30.9511	Puente Formation	530	25	717.805	1415.46	1898.88	0	1898.88	2329.34	2329.34
42	2.2421	5127.57	45	Puente Formation	530	25	609.444	1201.78	1440.64	0	1440.64	2050.08	2050.08
43	2.2421	4524.32	45	Puente Formation	530	25	575.435	1134.72	1296.82	0	1296.82	1872.26	1872.26
44	2.2421	3921.08	45	Puente Formation	530	25	545.592	1075.87	1170.62	0	1170.62	1716.21	1716.21
45	2.2421	3317.84	45	Puente Formation	530	25	503.466	992.799	992.474	0	992.474	1495.94	1495.94
46	2.2421	2714.59	45	Puente Formation	530	25	459.733	906.562	807.541	0	807.541	1267.27	1267.27
47	2.2421	2111.35	45	Puente Formation	530	25	414.135	816.645	614.713	0	614.713	1028.85	1028.85
48	2.2421	1508.11	45	Puente Formation	530	25	366.42	722.554	412.932	0	412.932	779.352	779.352
49	2.2421	904.865	45	Puente Formation	530	25	316.355	623.829	201.218	0	201.218	517.573	517.573
50	2.2421	301.622	45	Puente Formation	530	25	263.733	520.063	-21.3108	0	-21.3108	242.422	242.422

Curved - Block Psuedostatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.06213

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.15747	395.647	-45	Puente 2	530	25	1036.89	1101.31	1225.18	0	1225.18	188.293	188.293
2	1.84825	745.19	5.04473	Puente 2	530	25	650.672	691.098	345.476	0	345.476	402.915	402.915
3	1.84825	879.805	5.04473	Puente 2	530	25	681.45	723.788	415.58	0	415.58	475.736	475.736
4	1.84825	1014.42	5.04473	Puente 2	530	25	712.227	756.478	485.685	0	485.685	548.557	548.557
5	2.00119	1250.16	5.04473	Puente Formation	337.907	20.0772	517.324	549.465	578.822	0	578.822	624.489	624.489
6	2.00119	1428.87	5.04473	Puente Formation	337.907	20.0772	547.143	581.137	665.478	0	665.478	713.777	713.777
7	2.00119	1626.73	5.04473	Puente Formation	337.907	20.0772	580.159	616.204	761.422	0	761.422	812.636	812.636
8	2.00119	1824.59	5.04473	Puente Formation	337.907	20.0772	613.175	651.272	857.367	0	857.367	911.495	911.495
9	2.00119	2022.46	5.04473	Puente Formation	337.907	20.0772	646.191	686.339	953.311	0	953.311	1010.35	1010.35
10	2.00119	2220.32	5.04473	Puente Formation	337.907	20.0772	679.207	721.406	1049.26	0	1049.26	1109.21	1109.21
11	2.00119	2418.19	5.04473	Puente Formation	337.907	20.0772	712.224	756.474	1145.2	0	1145.2	1208.07	1208.07
12	2.00119	2616.05	5.04473	Puente Formation	337.907	20.0772	745.239	791.541	1241.14	0	1241.14	1306.93	1306.93
13	2.00119	2813.91	5.04473	Puente Formation	337.907	20.0772	778.256	826.609	1337.09	0	1337.09	1405.79	1405.79
14	2.00119	3011.78	5.04473	Puente Formation	337.907	20.0772	811.272	861.676	1433.04	0	1433.04	1504.65	1504.65
15	2.00119	3209.64	5.04473	Puente Formation	337.907	20.0772	844.287	896.743	1528.98	0	1528.98	1603.51	1603.51
16	2.00119	3407.51	5.04473	Puente Formation	337.907	20.0772	877.304	931.811	1624.93	0	1624.93	1702.37	1702.37
17	2.00119	3605.37	5.04473	Puente Formation	337.907	20.0772	910.32	966.878	1720.87	0	1720.87	1801.23	1801.23
18	2.00119	3803.23	5.04473	Puente Formation	337.907	20.0772	943.337	1001.95	1816.82	0	1816.82	1900.09	1900.09
19	2.00119	4001.1	5.04473	Puente Formation	337.907	20.0772	976.352	1037.01	1912.76	0	1912.76	1998.95	1998.95
20	2.00119	4198.96	5.04473	Puente Formation	337.907	20.0772	1009.37	1072.08	2008.7	0	2008.7	2097.81	2097.81
21	2.00119	4396.83	5.04473	Puente Formation	337.907	20.0772	1042.38	1107.15	2104.65	0	2104.65	2196.67	2196.67
22	2.00119	4594.69	5.04473	Puente Formation	337.907	20.0772	1075.4	1142.21	2200.59	0	2200.59	2295.52	2295.52
23	2.00119	4792.55	5.04473	Puente Formation	337.907	20.0772	1108.42	1177.28	2296.54	0	2296.54	2394.38	2394.38
24	2.00119	4990.42	5.04473	Puente Formation	337.907	20.0772	1141.43	1212.35	2392.48	0	2392.48	2493.24	2493.24
25	2.06612	5242.12	28.7329	Puente Formation	530	25	1298.81	1379.5	1821.76	0	1821.76	2533.81	2533.81
26	2.06612	5217.41	28.7329	Puente Formation	530	25	1294.58	1375.01	1812.13	0	1812.13	2521.86	2521.86
27	2.06612	5192.7	28.7329	Puente Formation	530	25	1290.35	1370.52	1802.5	0	1802.5	2509.91	2509.91
28	2.06612	5168	28.7329	Puente Formation	530	25	1286.12	1366.03	1792.87	0	1792.87	2497.96	2497.96
29	2.06612	5143.29	28.7329	Puente Formation	530	25	1281.89	1361.54	1783.24	0	1783.24	2486.02	2486.02
30	2.06612	5118.58	28.7329	Puente Formation	530	25	1277.67	1357.05	1773.61	0	1773.61	2474.07	2474.07
31	2.06612	5093.88	28.7329	Puente Formation	530	25	1273.44	1352.56	1763.98	0	1763.98	2462.12	2462.12
32	2.06612	5069.17	28.7329	Puente Formation	530	25	1269.21	1348.07	1754.35	0	1754.35	2450.18	2450.18
33	2.06612	5044.46	28.7329	Puente Formation	530	25	1264.98	1343.58	1744.72	0	1744.72	2438.23	2438.23
34	2.06612	5003.87	28.7329	Puente Formation	530	25	1258.04	1336.2	1728.9	0	1728.9	2418.6	2418.6

35	2.06612	4776.77	28.7329	Puente Formation	530	25	1219.18	1294.93	1640.39	0	1640.39	2308.78	2308.78
36	2.06612	4495.93	28.7329	Puente Formation	530	25	1171.13	1243.89	1530.93	0	1530.93	2172.98	2172.98
37	2.06612	4215.09	28.7329	Puente Formation	530	25	1123.07	1192.85	1421.48	0	1421.48	2037.18	2037.18
38	2.06612	3934.25	28.7329	Puente Formation	530	25	1075.02	1141.81	1312.02	0	1312.02	1901.38	1901.38
39	2.10848	3604.86	45	Puente Formation	530	25	867.116	920.99	838.479	0	838.479	1705.6	1705.6
40	2.10848	3322.38	45	Puente Formation	530	25	826.3	877.638	745.51	0	745.51	1571.81	1571.81
41	2.10848	5068.08	45	Puente Formation	530	25	1078.53	1145.54	1320.03	0	1320.03	2398.56	2398.56
42	2.10848	4534.59	45	Puente Formation	530	25	1001.45	1063.67	1144.46	0	1144.46	2145.91	2145.91
43	2.10848	4001.11	45	Puente Formation	530	25	924.368	981.799	968.886	0	968.886	1893.25	1893.25
44	2.10848	3467.63	45	Puente Formation	530	25	847.287	899.929	793.316	0	793.316	1640.6	1640.6
45	2.10848	2934.15	45	Puente Formation	530	25	779.965	828.424	639.971	0	639.971	1419.94	1419.94
46	2.10848	2400.67	45	Puente Formation	530	25	723.589	768.546	511.564	0	511.564	1235.15	1235.15
47	2.10848	1867.19	45	Puente Formation	530	25	646.508	686.676	335.991	0	335.991	982.499	982.499
48	2.10848	1333.7	45	Puente Formation	530	25	569.427	604.806	160.421	0	160.421	729.848	729.848
49	2.10848	800.222	45	Puente Formation	530	25	492.346	522.935	-15.1503	0	-15.1503	477.196	477.196
50	2.10848	266.741	45	Puente Formation	530	25	415.265	441.065	-190.722	0	-190.722	224.543	224.543

Global Minimum Query (janbu simplified) - Safety Factor: 1.00722

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.15747	395.647	-45	Puente 2	530	25	1136.69	1144.9	1318.66	0	1318.66	181.966	181.966
2	1.84825	745.19	5.04473	Puente 2	530	25	684.906	689.851	342.801	0	342.801	403.262	403.262
3	1.84825	879.805	5.04473	Puente 2	530	25	717.303	722.482	412.779	0	412.779	476.1	476.1
4	1.84825	1014.42	5.04473	Puente 2	530	25	749.7	755.113	482.757	0	482.757	548.937	548.937
5	2.00119	1250.16	5.04473	Puente Formation	337.907	20.0772	544.748	548.681	576.677	0	576.677	624.764	624.764
6	2.00119	1428.87	5.04473	Puente Formation	337.907	20.0772	576.148	580.308	663.208	0	663.208	714.068	714.068
7	2.00119	1626.73	5.04473	Puente Formation	337.907	20.0772	610.914	615.325	759.018	0	759.018	812.947	812.947
8	2.00119	1824.59	5.04473	Puente Formation	337.907	20.0772	645.681	650.343	854.828	0	854.828	911.826	911.826
9	2.00119	2022.46	5.04473	Puente Formation	337.907	20.0772	680.447	685.36	950.633	0	950.633	1010.7	1010.7
10	2.00119	2220.32	5.04473	Puente Formation	337.907	20.0772	715.213	720.377	1046.44	0	1046.44	1109.58	1109.58
11	2.00119	2418.19	5.04473	Puente Formation	337.907	20.0772	749.98	755.395	1142.25	0	1142.25	1208.45	1208.45
12	2.00119	2616.05	5.04473	Puente Formation	337.907	20.0772	784.746	790.412	1238.06	0	1238.06	1307.33	1307.33
13	2.00119	2813.91	5.04473	Puente Formation	337.907	20.0772	819.512	825.429	1333.86	0	1333.86	1406.21	1406.21
14	2.00119	3011.78	5.04473	Puente Formation	337.907	20.0772	854.279	860.447	1429.67	0	1429.67	1505.08	1505.08
15	2.00119	3209.64	5.04473	Puente Formation	337.907	20.0772	889.045	895.464	1525.48	0	1525.48	1603.96	1603.96
16	2.00119	3407.51	5.04473	Puente Formation	337.907	20.0772	923.811	930.481	1621.29	0	1621.29	1702.84	1702.84
17	2.00119	3605.37	5.04473	Puente Formation	337.907	20.0772	958.578	965.499	1717.1	0	1717.1	1801.72	1801.72
18	2.00119	3803.23	5.04473	Puente Formation	337.907	20.0772	993.344	1000.52	1812.9	0	1812.9	1900.59	1900.59
19	2.00119	4001.1	5.04473	Puente Formation	337.907	20.0772	1028.11	1035.53	1908.71	0	1908.71	1999.47	1999.47
20	2.00119	4198.96	5.04473	Puente Formation	337.907	20.0772	1062.88	1070.55	2004.52	0	2004.52	2098.34	2098.34
21	2.00119	4396.83	5.04473	Puente Formation	337.907	20.0772	1097.64	1105.57	2100.33	0	2100.33	2197.22	2197.22
22	2.00119	4594.69	5.04473	Puente Formation	337.907	20.0772	1132.41	1140.59	2196.13	0	2196.13	2296.1	2296.1
23	2.00119	4792.55	5.04473	Puente Formation	337.907	20.0772	1167.18	1175.6	2291.94	0	2291.94	2394.98	2394.98
24	2.00119	4990.42	5.04473	Puente Formation	337.907	20.0772	1201.94	1210.62	2387.75	0	2387.75	2493.85	2493.85
25	2.06612	5242.12	28.7329	Puente Formation	530	25	1356.87	1366.66	1794.23	0	1794.23	2538.11	2538.11
26	2.06612	5217.41	28.7329	Puente Formation	530	25	1352.45	1362.21	1784.69	0	1784.69	2526.14	2526.14
27	2.06612	5192.7	28.7329	Puente Formation	530	25	1348.03	1357.77	1775.15	0	1775.15	2514.18	2514.18
28	2.06612	5168	28.7329	Puente Formation	530	25	1343.62	1353.32	1765.61	0	1765.61	2502.22	2502.22
29	2.06612	5143.29	28.7329	Puente Formation	530	25	1339.2	1348.87	1756.07	0	1756.07	2490.26	2490.26
30	2.06612	5118.58	28.7329	Puente Formation	530	25	1334.78	1344.42	1746.53	0	1746.53	2478.3	2478.3
31	2.06612	5093.88	28.7329	Puente Formation	530	25	1330.37	1339.97	1736.99	0	1736.99	2466.34	2466.34
32	2.06612	5069.17	28.7329	Puente Formation	530	25	1325.95	1335.52	1727.45	0	1727.45	2454.38	2454.38
33	2.06612	5044.46	28.7329	Puente Formation	530	25	1321.53	1331.08	1717.91	0	1717.91	2442.42	2442.42
34	2.06612	5003.87	28.7329	Puente Formation	530	25	1314.28	1323.77	1702.24	0	1702.24	2422.76	2422.76
35	2.06612	4776.77	28.7329	Puente Formation	530	25	1273.68	1282.88	1614.55	0	1614.55	2312.82	2312.82

36	2.06612	4495.93	28.7329	Puente Formation	530	25	1223.48	1232.31	1506.11	0	1506.11	2176.86	2176.86
37	2.06612	4215.09	28.7329	Puente Formation	530	25	1173.27	1181.75	1397.68	0	1397.68	2040.9	2040.9
38	2.06612	3934.25	28.7329	Puente Formation	530	25	1123.07	1131.18	1289.24	0	1289.24	1904.94	1904.94
39	2.10848	3604.86	45	Puente Formation	530	25	901.083	907.589	809.742	0	809.742	1710.83	1710.83
40	2.10848	3322.38	45	Puente Formation	530	25	858.668	864.868	718.127	0	718.127	1576.8	1576.8
41	2.10848	5068.08	45	Puente Formation	530	25	1120.78	1128.87	1284.28	0	1284.28	2405.06	2405.06
42	2.10848	4534.59	45	Puente Formation	530	25	1040.68	1048.19	1111.27	0	1111.27	2151.95	2151.95
43	2.10848	4001.11	45	Puente Formation	530	25	960.579	967.514	938.25	0	938.25	1898.83	1898.83
44	2.10848	3467.63	45	Puente Formation	530	25	880.478	886.835	765.236	0	765.236	1645.71	1645.71
45	2.10848	2934.15	45	Puente Formation	530	25	810.518	816.37	614.121	0	614.121	1424.64	1424.64
46	2.10848	2400.67	45	Puente Formation	530	25	751.935	757.364	487.582	0	487.582	1239.52	1239.52
47	2.10848	1867.19	45	Puente Formation	530	25	671.833	676.684	314.566	0	314.566	986.399	986.399
48	2.10848	1333.7	45	Puente Formation	530	25	591.733	596.005	141.549	0	141.549	733.282	733.282
49	2.10848	800.222	45	Puente Formation	530	25	511.633	515.327	-31.4675	0	-31.4675	480.165	480.165
50	2.10848	266.741	45	Puente Formation	530	25	431.532	434.647	-204.484	0	-204.484	227.047	227.047

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.07895

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.15747	395.647	-45	Puente 2	530	25	1116.39	1204.53	1446.54	0	1446.54	330.146	330.146
2	1.84825	745.19	5.04473	Puente 2	530	25	726.326	783.669	543.995	0	543.995	608.112	608.112
3	1.84825	879.805	5.04473	Puente 2	530	25	779.954	841.531	668.079	0	668.079	736.93	736.93
4	1.84825	1014.42	5.04473	Puente 2	530	25	834.211	900.072	793.618	0	793.618	867.259	867.259
5	2.00119	1250.16	5.04473	Puente Formation	337.907	20.0772	610.83	659.055	878.661	0	878.661	932.582	932.582
6	2.00119	1428.87	5.04473	Puente Formation	337.907	20.0772	649.788	701.089	993.67	0	993.67	1051.03	1051.03
7	2.00119	1626.73	5.04473	Puente Formation	337.907	20.0772	691.021	745.577	1115.39	0	1115.39	1176.39	1176.39
8	2.00119	1824.59	5.04473	Puente Formation	337.907	20.0772	731.314	789.051	1234.33	0	1234.33	1298.89	1298.89
9	2.00119	2022.46	5.04473	Puente Formation	337.907	20.0772	770.546	831.381	1350.15	0	1350.15	1418.17	1418.17
10	2.00119	2220.32	5.04473	Puente Formation	337.907	20.0772	808.601	872.44	1462.49	0	1462.49	1533.87	1533.87
11	2.00119	2418.19	5.04473	Puente Formation	337.907	20.0772	845.367	912.109	1571.02	0	1571.02	1645.65	1645.65
12	2.00119	2616.05	5.04473	Puente Formation	337.907	20.0772	880.746	950.281	1675.46	0	1675.46	1753.21	1753.21
13	2.00119	2813.91	5.04473	Puente Formation	337.907	20.0772	914.651	986.863	1775.55	0	1775.55	1856.29	1856.29
14	2.00119	3011.78	5.04473	Puente Formation	337.907	20.0772	947.012	1021.78	1871.08	0	1871.08	1954.67	1954.67
15	2.00119	3209.64	5.04473	Puente Formation	337.907	20.0772	977.777	1054.97	1961.89	0	1961.89	2048.21	2048.21
16	2.00119	3407.51	5.04473	Puente Formation	337.907	20.0772	1006.91	1086.41	2047.91	0	2047.91	2136.79	2136.79
17	2.00119	3605.37	5.04473	Puente Formation	337.907	20.0772	1034.41	1116.08	2129.09	0	2129.09	2220.4	2220.4
18	2.00119	3803.23	5.04473	Puente Formation	337.907	20.0772	1060.29	1144	2205.48	0	2205.48	2299.08	2299.08
19	2.00119	4001.1	5.04473	Puente Formation	337.907	20.0772	1084.59	1170.22	2277.2	0	2277.2	2372.95	2372.95
20	2.00119	4198.96	5.04473	Puente Formation	337.907	20.0772	1107.37	1194.8	2344.45	0	2344.45	2442.21	2442.21
21	2.00119	4396.83	5.04473	Puente Formation	337.907	20.0772	1128.72	1217.84	2407.49	0	2407.49	2507.13	2507.13
22	2.00119	4594.69	5.04473	Puente Formation	337.907	20.0772	1148.77	1239.46	2466.67	0	2466.67	2568.08	2568.08
23	2.00119	4792.55	5.04473	Puente Formation	337.907	20.0772	1167.64	1259.83	2522.38	0	2522.38	2625.45	2625.45
24	2.00119	4990.42	5.04473	Puente Formation	337.907	20.0772	1185.5	1279.09	2575.09	0	2575.09	2679.74	2679.74
25	2.06612	5242.12	28.7329	Puente Formation	530	25	1135.72	1225.39	1491.26	0	1491.26	2113.9	2113.9
26	2.06612	5217.41	28.7329	Puente Formation	530	25	1122.33	1210.94	1460.28	0	1460.28	2075.58	2075.58
27	2.06612	5192.7	28.7329	Puente Formation	530	25	1110.72	1198.41	1433.41	0	1433.41	2042.34	2042.34
28	2.06612	5168	28.7329	Puente Formation	530	25	1100.86	1187.77	1410.6	0	1410.6	2014.12	2014.12
29	2.06612	5143.29	28.7329	Puente Formation	530	25	1092.74	1179.01	1391.81	0	1391.81	1990.88	1990.88
30	2.06612	5118.58	28.7329	Puente Formation	530	25	1086.33	1172.09	1376.97	0	1376.97	1972.53	1972.53
31	2.06612	5093.88	28.7329	Puente Formation	530	25	1081.6	1166.99	1366.03	0	1366.03	1958.99	1958.99
32	2.06612	5069.17	28.7329	Puente Formation	530	25	1078.51	1163.65	1358.88	0	1358.88	1950.15	1950.15
33	2.06612	5044.46	28.7329	Puente Formation	530	25	1077.01	1162.04	1355.42	0	1355.42	1945.87	1945.87
34	2.06612	5003.87	28.7329	Puente Formation	530	25	1075.19	1160.07	1351.2	0	1351.2	1940.65	1940.65
35	2.06612	4776.77	28.7329	Puente Formation	530	25	1052.34	1135.42	1298.32	0	1298.32	1875.25	1875.25

36	2.06612	4495.93	28.7329	Puente Formation	530	25	1023.06	1103.84	1230.59	0	1230.59	1791.47	1791.47
37	2.06612	4215.09	28.7329	Puente Formation	530	25	993.283	1071.7	1161.69	0	1161.69	1706.24	1706.24
38	2.06612	3934.25	28.7329	Puente Formation	530	25	962.641	1038.64	1090.79	0	1090.79	1618.53	1618.53
39	2.10848	3604.86	45	Puente Formation	530	25	750.093	809.313	598.986	0	598.986	1349.08	1349.08
40	2.10848	3322.38	45	Puente Formation	530	25	730.51	788.184	553.679	0	553.679	1284.19	1284.19
41	2.10848	5068.08	45	Puente Formation	530	25	912.808	984.874	975.479	0	975.479	1888.29	1888.29
42	2.10848	4534.59	45	Puente Formation	530	25	878.07	947.394	895.106	0	895.106	1773.18	1773.18
43	2.10848	4001.11	45	Puente Formation	530	25	839.257	905.516	805.299	0	805.299	1644.56	1644.56
44	2.10848	3467.63	45	Puente Formation	530	25	795.649	858.465	704.394	0	704.394	1500.04	1500.04
45	2.10848	2934.15	45	Puente Formation	530	25	755.185	814.807	610.771	0	610.771	1365.96	1365.96
46	2.10848	2400.67	45	Puente Formation	530	25	718.85	775.603	526.699	0	526.699	1245.55	1245.55
47	2.10848	1867.19	45	Puente Formation	530	25	657.329	709.225	384.35	0	384.35	1041.68	1041.68
48	2.10848	1333.7	45	Puente Formation	530	25	587.849	634.26	223.585	0	223.585	811.435	811.435
49	2.10848	800.222	45	Puente Formation	530	25	509.511	549.737	42.3266	0	42.3266	551.838	551.838
50	2.10848	266.741	45	Puente Formation	530	25	421.415	454.686	-161.511	0	-161.511	259.904	259.904

Interslice Data

Curved - Master Scenario

Global Minimum Query (bishop simplified) - Safety Factor: 2.03013

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	183	452.494	0	0	0
2	185.286	452.497	845.281	0	0
3	187.572	452.531	1728.11	0	0
4	189.858	452.597	2639.85	0	0
5	192.144	452.693	3572.3	0	0
6	194.516	452.826	4222.93	0	0
7	196.888	452.992	4870.27	0	0
8	199.261	453.192	5509.82	0	0
9	201.633	453.426	6210.15	0	0
10	204.005	453.693	6991.31	0	0
11	206.378	453.995	7851.61	0	0
12	208.75	454.331	8781.21	0	0
13	211.123	454.701	9674.81	0	0
14	213.495	455.107	10525.3	0	0
15	215.867	455.547	11326	0	0
16	218.24	456.022	12070.6	0	0
17	220.612	456.533	12753	0	0
18	222.984	457.08	13367.8	0	0
19	225.357	457.663	13909.7	0	0
20	227.729	458.282	14373.8	0	0
21	230.101	458.939	14755.7	0	0
22	232.474	459.633	15051.5	0	0
23	234.846	460.365	15257.3	0	0
24	237.218	461.136	15369.9	0	0
25	239.591	461.946	15386.5	0	0
26	241.963	462.795	15304.6	0	0
27	244.336	463.685	15122.3	0	0
28	246.708	464.615	14837.8	0	0
29	249.08	465.588	14450.2	0	0
30	251.453	466.603	13958.9	0	0
31	253.825	467.661	13367.6	0	0
32	256.197	468.763	12729.7	0	0
33	258.57	469.911	12071.3	0	0
34	260.942	471.105	11405.1	0	0
35	263.314	472.346	10745	0	0
36	265.687	473.636	10105.6	0	0
37	268.059	474.976	8769.55	0	0
38	270.431	476.367	7324.83	0	0
39	272.804	477.811	5900.12	0	0
40	275.176	479.309	4513.81	0	0
41	277.549	480.863	3131.23	0	0
42	279.921	482.475	1790.29	0	0
43	282.293	484.147	547.159	0	0
44	284.666	485.881	-573.428	0	0
45	287.038	487.68	-1544.69	0	0
46	289.41	489.546	-2337.54	0	0
47	291.783	491.483	-2920.38	0	0
48	294.155	493.493	-3258.72	0	0
49	296.527	495.58	-3314.82	0	0
50	298.9	497.747	-3047.33	0	0
51	301.272	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.97209

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	183	452.86	0	0	0
2	185.319	452.864	860.692	0	0
3	187.638	452.901	1761.94	0	0
4	189.957	452.972	2694.22	0	0
5	192.275	453.076	3648.52	0	0
6	194.561	453.212	4279.19	0	0
7	196.847	453.381	4906.87	0	0
8	199.133	453.583	5532.32	0	0
9	201.419	453.817	6241.16	0	0
10	203.705	454.085	7031.94	0	0
11	205.991	454.387	7903.15	0	0
12	208.276	454.722	8809.84	0	0
13	210.562	455.09	9683.1	0	0
14	212.848	455.493	10516.3	0	0
15	215.134	455.93	11303.3	0	0
16	217.42	456.401	12038.2	0	0
17	219.706	456.908	12715.4	0	0
18	221.991	457.449	13329.9	0	0
19	224.277	458.026	13876.8	0	0
20	226.563	458.64	14351.7	0	0
21	228.849	459.289	14750.6	0	0
22	231.135	459.976	15069.8	0	0
23	233.421	460.699	15306	0	0
24	235.706	461.461	15456.4	0	0
25	237.992	462.261	15518.3	0	0
26	240.278	463.101	15489.6	0	0
27	242.564	463.98	15368.8	0	0
28	244.85	464.899	15154.5	0	0
29	247.136	465.86	14846	0	0
30	249.422	466.863	14442.9	0	0
31	251.707	467.908	13945.4	0	0
32	253.993	468.998	13360.7	0	0
33	256.279	470.132	12745.2	0	0
34	258.565	471.312	12122.2	0	0
35	260.851	472.54	11505	0	0
36	263.137	473.815	10908	0	0
37	265.422	475.141	10346.5	0	0
38	267.708	476.517	9181.53	0	0
39	269.994	477.946	7813.75	0	0
40	272.28	479.429	6482.8	0	0
41	274.566	480.969	5208.03	0	0
42	276.852	482.567	3979.58	0	0
43	279.137	484.225	2786.25	0	0
44	281.423	485.946	1712.28	0	0
45	283.709	487.732	784.131	0	0
46	285.995	489.586	30.5778	0	0
47	288.281	491.511	-516.961	0	0
48	290.567	493.511	-824.105	0	0
49	292.853	495.59	-853.108	0	0
50	295.138	497.751	-562.386	0	0
51	297.424	500	0	0	0

◆ Curved - Curved Static

Global Minimum Query (bishop simplified) - Safety Factor: 2.06277

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	184.848	456.77	0	0	0
2	186.962	456.537	488.285	0	0
3	189.076	456.342	974.946	0	0
4	191.189	456.185	1499.02	0	0
5	193.303	456.065	2069.07	0	0
6	195.441	455.983	2946.56	0	0
7	197.578	455.938	3866.51	0	0
8	199.715	455.932	4820.09	0	0
9	201.853	455.964	5708.65	0	0
10	203.99	456.035	6497.41	0	0
11	206.128	456.144	7168.1	0	0
12	208.265	456.291	7808.6	0	0
13	210.403	456.477	8418.75	0	0
14	212.54	456.702	9108.34	0	0
15	214.677	456.965	9878.67	0	0
16	216.815	457.269	10719.2	0	0
17	218.952	457.611	11506.1	0	0
18	221.09	457.994	12232.3	0	0
19	223.227	458.417	12891	0	0
20	225.364	458.88	13476.2	0	0
21	227.502	459.385	13982.2	0	0
22	229.639	459.932	14403.8	0	0
23	231.777	460.521	14736.2	0	0
24	233.914	461.153	14975.3	0	0
25	236.051	461.829	15117.2	0	0
26	238.189	462.549	15158.8	0	0
27	240.326	463.315	15097.2	0	0
28	242.464	464.127	14930.5	0	0
29	244.601	464.987	14656.8	0	0
30	246.738	465.895	14275.3	0	0
31	248.876	466.852	13785.5	0	0
32	251.013	467.861	13187.8	0	0
33	253.151	468.922	12483.2	0	0
34	255.288	470.038	11714.7	0	0
35	257.426	471.209	10925.7	0	0
36	259.563	472.438	10131.9	0	0
37	261.7	473.726	9350.71	0	0
38	263.838	475.077	8601.2	0	0
39	265.975	476.493	7904.18	0	0
40	268.113	477.975	6257.22	0	0
41	270.25	479.529	4632.8	0	0
42	272.387	481.157	3068.61	0	0
43	274.525	482.862	1593.08	0	0
44	276.662	484.65	207.815	0	0
45	278.8	486.526	-1107.74	0	0
46	280.937	488.494	-2234.3	0	0
47	283.074	490.562	-3127.06	0	0
48	285.212	492.738	-3735	0	0
49	287.349	495.028	-3999.61	0	0
50	289.487	497.445	-3853.24	0	0
51	291.624	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.90408

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	184.75	456.729	0	0	0
2	186.734	456.03	798.092	0	0
3	188.718	455.388	1792.7	0	0
4	190.702	454.802	2952.98	0	0
5	192.686	454.271	4250.82	0	0
6	194.729	453.78	5703.74	0	0
7	196.772	453.344	7257.12	0	0
8	198.815	452.963	8897.99	0	0
9	200.858	452.636	10602.3	0	0
10	202.901	452.362	12347.6	0	0
11	204.944	452.141	14113.3	0	0
12	206.987	451.972	15879.9	0	0
13	209.03	451.855	17629.5	0	0
14	211.073	451.79	19345.4	0	0
15	213.116	451.777	21012.1	0	0
16	215.159	451.815	22453.8	0	0
17	217.202	451.904	23592.3	0	0
18	219.245	452.046	24557.3	0	0
19	221.288	452.239	25478.4	0	0
20	223.33	452.485	26516.4	0	0
21	225.373	452.784	27614.2	0	0
22	227.416	453.137	28579.7	0	0
23	229.459	453.544	29403.9	0	0
24	231.502	454.006	30079	0	0
25	233.545	454.524	30597.6	0	0
26	235.588	455.099	30953.1	0	0
27	237.631	455.733	31139.5	0	0
28	239.674	456.427	31151.8	0	0
29	241.717	457.182	30985.5	0	0
30	243.76	458.001	30637	0	0
31	245.803	458.885	30103.6	0	0
32	247.846	459.838	29383.4	0	0
33	249.889	460.861	28475.5	0	0
34	251.932	461.957	27380.2	0	0
35	253.975	463.131	26107.3	0	0
36	256.018	464.387	24721.8	0	0
37	258.06	465.728	23254.8	0	0
38	260.103	467.16	21730.6	0	0
39	262.146	468.689	20176.9	0	0
40	264.189	470.322	18625.9	0	0
41	266.232	472.069	16974.2	0	0
42	268.275	473.938	14205	0	0
43	270.318	475.941	11458.7	0	0
44	272.361	478.095	8788.89	0	0
45	274.404	480.417	6261.12	0	0
46	276.447	482.93	3929.04	0	0
47	278.49	485.667	1784.63	0	0
48	280.533	488.667	89.4245	0	0
49	282.576	491.989	-972.793	0	0
50	284.619	495.72	-1138.91	0	0
51	286.662	500	0	0	0

Curved - Curved Pstatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.10153

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	186.693	457.539	0	0	0
2	188.998	457.302	882.201	0	0
3	191.302	457.105	1656.61	0	0
4	193.607	456.948	2439.51	0	0
5	195.889	456.832	3735.1	0	0
6	198.171	456.753	5042.38	0	0
7	200.453	456.714	6348.97	0	0
8	202.735	456.713	7641.93	0	0
9	205.017	456.75	8715.77	0	0
10	207.299	456.826	9540.1	0	0
11	209.581	456.94	10091.3	0	0
12	211.863	457.094	10538.2	0	0
13	214.145	457.286	10900.9	0	0
14	216.427	457.517	11358.4	0	0
15	218.709	457.787	11958.1	0	0
16	220.991	458.096	12702.2	0	0
17	223.273	458.446	13417.2	0	0
18	225.555	458.835	14029.9	0	0
19	227.837	459.265	14535.1	0	0
20	230.12	459.735	14927.9	0	0
21	232.402	460.247	15204.3	0	0
22	234.684	460.8	15360.6	0	0
23	236.966	461.396	15393.9	0	0
24	239.248	462.034	15301.6	0	0
25	241.53	462.716	15082	0	0
26	243.812	463.441	14733.7	0	0
27	246.094	464.212	14256.1	0	0
28	248.376	465.028	13649.1	0	0
29	250.658	465.891	12913.4	0	0
30	252.94	466.802	12050	0	0
31	255.222	467.761	11109.5	0	0
32	257.504	468.77	10156.7	0	0
33	259.786	469.829	9206.69	0	0
34	262.068	470.941	8275.33	0	0
35	264.35	472.107	7379.68	0	0
36	266.632	473.328	6218.38	0	0
37	268.914	474.606	4243.34	0	0
38	271.196	475.943	2308.35	0	0
39	273.478	477.341	434.779	0	0
40	275.76	478.802	-1354.42	0	0
41	278.042	480.329	-3072.22	0	0
42	280.324	481.925	-4665.25	0	0
43	282.606	483.592	-6098.77	0	0
44	284.889	485.333	-7341.7	0	0
45	287.171	487.154	-8360.2	0	0
46	289.453	489.057	-9117.34	0	0
47	291.735	491.047	-9572.63	0	0
48	294.017	493.13	-9681.49	0	0
49	296.299	495.312	-9394.58	0	0
50	298.581	497.599	-8657.07	0	0
51	300.863	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.00516

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	186.396	457.415	0	0	0
2	188.639	456.734	1625.41	0	0
3	190.882	456.111	3422.06	0	0
4	193.125	455.547	5351.83	0	0
5	195.363	455.04	7375.94	0	0
6	197.6	454.589	9480.87	0	0
7	199.838	454.193	11643.1	0	0
8	202.076	453.851	13834.1	0	0
9	204.314	453.562	16027.9	0	0
10	206.552	453.327	18201	0	0
11	208.789	453.144	20331.8	0	0
12	211.027	453.014	22400.5	0	0
13	213.265	452.935	24389.2	0	0
14	215.503	452.909	26281.4	0	0
15	217.74	452.935	27854.9	0	0
16	219.978	453.013	28876.8	0	0
17	222.216	453.143	29426.8	0	0
18	224.454	453.325	29816.4	0	0
19	226.691	453.56	30367.6	0	0
20	228.929	453.848	31191.1	0	0
21	231.167	454.19	32058	0	0
22	233.405	454.586	32741.8	0	0
23	235.643	455.036	33236.5	0	0
24	237.88	455.543	33536.9	0	0
25	240.118	456.105	33638.8	0	0
26	242.356	456.725	33538.8	0	0
27	244.594	457.404	33234.4	0	0
28	246.831	458.143	32724.2	0	0
29	249.069	458.944	32007.7	0	0
30	251.307	459.808	31085.4	0	0
31	253.545	460.736	29961.4	0	0
32	255.782	461.732	28703.6	0	0
33	258.02	462.797	27356.1	0	0
34	260.258	463.934	25939.7	0	0
35	262.496	465.146	24477.1	0	0
36	264.733	466.436	22992.9	0	0
37	266.971	467.808	20994.1	0	0
38	269.209	469.266	18277	0	0
39	271.447	470.815	15550.9	0	0
40	273.685	472.461	12849.9	0	0
41	275.922	474.209	10211.9	0	0
42	278.16	476.067	7624.42	0	0
43	280.398	478.044	5179.29	0	0
44	282.636	480.151	2935.16	0	0
45	284.873	482.398	954.865	0	0
46	287.111	484.801	-688.389	0	0
47	289.349	487.378	-1908.15	0	0
48	291.587	490.153	-2600.69	0	0
49	293.824	493.153	-2639.11	0	0
50	296.062	496.418	-1864.45	0	0
51	298.3	500	0	0	0

Curved - Block Static

Global Minimum Query (bishop simplified) - Safety Factor: 1.91503

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	183.496	456.207	0	0	0
2	185.941	453.762	2626.26	0	0
3	188.385	451.317	6923.38	0	0
4	190.83	448.872	12891.4	0	0
5	191.428	448.274	14605.6	0	0
6	193.604	448.397	15385.6	0	0
7	195.779	448.52	16193.1	0	0
8	197.955	448.643	17032.6	0	0
9	200.13	448.765	17905.4	0	0
10	202.306	448.888	18811.6	0	0
11	204.481	449.011	19751.2	0	0
12	206.657	449.134	20724.1	0	0
13	208.832	449.256	21730.4	0	0
14	211.008	449.379	22770	0	0
15	213.183	449.502	23843	0	0
16	215.359	449.625	24949.3	0	0
17	217.534	449.747	26089	0	0
18	219.71	449.87	27262	0	0
19	221.885	449.993	28468.4	0	0
20	224.061	450.115	29708.1	0	0
21	226.236	450.238	30981.2	0	0
22	228.412	450.361	32287.6	0	0
23	230.587	450.484	33627.4	0	0
24	232.763	450.606	35000.5	0	0
25	234.938	450.729	36407	0	0
26	237.13	452.548	33428.4	0	0
27	239.321	454.367	30542.5	0	0
28	241.513	456.186	27749.4	0	0
29	243.705	458.005	25048.9	0	0
30	245.896	459.823	22441.2	0	0
31	248.088	461.642	19926.2	0	0
32	250.279	463.461	17503.9	0	0
33	252.471	465.28	15174.3	0	0
34	254.663	467.099	12977.8	0	0
35	256.854	468.918	11010.5	0	0
36	259.046	470.736	9276.48	0	0
37	261.238	472.555	7775.65	0	0
38	263.429	474.374	6508.04	0	0
39	265.621	476.193	5473.67	0	0
40	267.813	478.012	3612.03	0	0
41	270.004	479.831	1761.81	0	0
42	272.196	481.649	144.824	0	0
43	274.235	483.688	-1525.54	0	0
44	276.274	485.727	-2904.54	0	0
45	278.313	487.766	-4092.16	0	0
46	280.352	489.805	-4976.42	0	0
47	282.391	491.844	-5557.31	0	0
48	284.429	493.883	-5834.84	0	0
49	286.468	495.922	-5809	0	0
50	288.507	497.961	-5479.81	0	0
51	290.546	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.81937

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	183.496	456.207	0	0	0
2	185.941	453.762	2768.56	0	0
3	188.385	451.317	7251.97	0	0
4	190.83	448.872	13450.3	0	0
5	191.428	448.274	15227.5	0	0
6	193.604	448.397	16054.5	0	0
7	195.779	448.52	16910.9	0	0
8	197.955	448.643	17801.7	0	0
9	200.13	448.765	18728.1	0	0
10	202.306	448.888	19690.2	0	0
11	204.481	449.011	20688.1	0	0
12	206.657	449.134	21721.6	0	0
13	208.832	449.256	22790.8	0	0
14	211.008	449.379	23895.8	0	0
15	213.183	449.502	25036.4	0	0
16	215.359	449.625	26212.8	0	0
17	217.534	449.747	27424.8	0	0
18	219.71	449.87	28672.6	0	0
19	221.885	449.993	29956.1	0	0
20	224.061	450.115	31275.2	0	0
21	226.236	450.238	32630.1	0	0
22	228.412	450.361	34020.6	0	0
23	230.587	450.484	35446.9	0	0
24	232.763	450.606	36908.9	0	0
25	234.938	450.729	38406.5	0	0
26	237.13	452.548	35574	0	0
27	239.321	454.367	32831.5	0	0
28	241.513	456.186	30179.1	0	0
29	243.705	458.005	27616.7	0	0
30	245.896	459.823	25144.3	0	0
31	248.088	461.642	22761.9	0	0
32	250.279	463.461	20469.6	0	0
33	252.471	465.28	18267.3	0	0
34	254.663	467.099	16194.2	0	0
35	256.854	468.918	14343.7	0	0
36	259.046	470.736	12719.7	0	0
37	261.238	472.555	11322.2	0	0
38	263.429	474.374	10151.1	0	0
39	265.621	476.193	9206.53	0	0
40	267.813	478.012	7458.63	0	0
41	270.004	479.831	5721.82	0	0
42	272.196	481.649	4211.48	0	0
43	274.235	483.688	2643.42	0	0
44	276.274	485.727	1359.24	0	0
45	278.313	487.766	261.534	0	0
46	280.352	489.805	-540.59	0	0
47	282.391	491.844	-1047.13	0	0
48	284.429	493.883	-1258.09	0	0
49	286.468	495.922	-1173.47	0	0
50	288.507	497.961	-793.272	0	0
51	290.546	500	0	0	0

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.97193

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	186.385	457.411	0	0	0
2	188.608	455.188	2348.91	63.4641	1.54767
3	190.831	452.965	6411.17	345.692	3.08641
4	192.265	453.047	7019.7	499.513	4.07023
5	194.329	453.165	7621.36	729.64	5.46861
6	196.393	453.283	8251.21	989.789	6.84034
7	198.457	453.401	8913.25	1281.1	8.1791
8	200.521	453.519	9607.87	1604.21	9.47914
9	202.585	453.637	10335.1	1959.35	10.7349
10	204.649	453.755	11094.9	2346.47	11.9416
11	206.713	453.873	11887.2	2765.1	13.0948
12	208.777	453.991	12711.9	3214.39	14.1906
13	210.841	454.109	13569	3693.12	15.2256
14	212.905	454.227	14458	4199.62	16.197
15	214.969	454.345	15378.9	4731.81	17.1022
16	217.033	454.463	16331.2	5287.21	17.9393
17	219.097	454.581	17314.7	5862.87	18.7064
18	221.161	454.699	18328.9	6455.48	19.4024
19	223.225	454.817	19373.2	7061.28	20.0261
20	225.289	454.935	20447.3	7676.15	20.5767
21	227.353	455.053	21550.5	8295.59	21.0536
22	229.417	455.171	22682.3	8914.74	21.4561
23	231.481	455.289	23841.9	9528.46	21.7842
24	233.634	456.58	22681.8	9185.53	22.0466
25	235.787	457.871	21550.4	8806.68	22.2276
26	237.94	459.162	20446.4	8396.85	22.3268
27	240.093	460.453	19368.1	7960.92	22.3443
28	242.246	461.745	18314	7503.66	22.28
29	244.399	463.036	17282.8	7029.75	22.134
30	246.552	464.327	16272.9	6543.75	21.9063
31	248.705	465.618	15283	6050.11	21.5972
32	250.858	466.909	14311.8	5553.15	21.2069
33	253.011	468.2	13358	5057.04	20.7355
34	255.164	469.492	12460.4	4580.52	20.1837
35	257.317	470.783	11657.4	4140.1	19.5524
36	259.47	472.074	10949.1	3736.32	18.8419
37	261.623	473.365	10335.3	3368.89	18.0539
38	263.776	474.656	9816.49	3036.74	17.1895
39	265.929	475.948	9393.15	2737.98	16.2507
40	268.082	477.239	8334.62	2270.7	15.2399
41	270.235	478.53	7339.92	1851.8	14.1598
42	272.388	479.821	6434.14	1487.04	13.0135
43	274.631	482.063	4571	951.096	11.7539
44	276.873	484.305	2954.03	543.869	10.432
45	279.115	486.547	1553.08	247.468	9.05341
46	281.357	488.789	457.061	61.1864	7.62481
47	283.599	491.032	-322.398	-34.7574	6.15323
48	285.841	493.274	-771.789	-62.7267	4.64647
49	288.083	495.516	-875.79	-47.6276	3.11282
50	290.325	497.758	-617.393	-16.8247	1.56099
51	292.567	500	0	0	0

Curved - Block Psuedostatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.06213

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	185.34	456.975	0	0	0
2	187.498	454.818	4760.38	0	0
3	189.346	454.981	5666.39	0	0
4	191.194	455.144	6573.71	0	0
5	193.043	455.307	7482.31	0	0
6	195.044	455.484	8007.67	0	0
7	197.045	455.66	8518.71	0	0
8	199.046	455.837	9013.89	0	0
9	201.047	456.014	9493.2	0	0
10	203.049	456.19	9956.66	0	0
11	205.05	456.367	10404.3	0	0
12	207.051	456.544	10836	0	0
13	209.052	456.72	11251.9	0	0
14	211.053	456.897	11651.9	0	0
15	213.055	457.074	12036	0	0
16	215.056	457.25	12404.3	0	0
17	217.057	457.427	12756.8	0	0
18	219.058	457.604	13093.4	0	0
19	221.059	457.78	13414.1	0	0
20	223.061	457.957	13718.9	0	0
21	225.062	458.134	14007.9	0	0
22	227.063	458.31	14281.1	0	0
23	229.064	458.487	14538.3	0	0
24	231.065	458.664	14779.8	0	0
25	233.066	458.84	15005.3	0	0
26	235.133	459.973	13908.1	0	0
27	237.199	461.106	12821.1	0	0
28	239.265	462.238	11744.5	0	0
29	241.331	463.371	10678.1	0	0
30	243.397	464.504	9621.98	0	0
31	245.463	465.637	8576.16	0	0
32	247.529	466.769	7540.63	0	0
33	249.595	467.902	6515.39	0	0
34	251.662	469.035	5500.43	0	0
35	253.728	470.167	4502.37	0	0
36	255.794	471.3	3598.84	0	0
37	257.86	472.433	2812.21	0	0
38	259.926	473.566	2142.49	0	0
39	261.992	474.698	1589.67	0	0
40	264.101	476.807	469.096	0	0
41	266.209	478.915	-448.7	0	0
42	268.318	481.024	-2619.6	0	0
43	270.426	483.132	-4407.55	0	0
44	272.535	485.241	-5812.55	0	0
45	274.643	487.349	-6834.62	0	0
46	276.752	489.458	-7499.93	0	0
47	278.86	491.566	-7837.88	0	0
48	280.969	493.675	-7792.88	0	0
49	283.077	495.783	-7364.94	0	0
50	285.185	497.892	-6554.05	0	0
51	287.294	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.00722

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	185.34	456.975	0	0	0
2	187.498	454.818	5163.72	0	0
3	189.346	454.981	6126.17	0	0
4	191.194	455.144	7092.59	0	0
5	193.043	455.307	8062.97	0	0
6	195.044	455.484	8637.33	0	0
7	197.045	455.66	9200.19	0	0
8	199.046	455.837	9750.32	0	0
9	201.047	456.014	10287.7	0	0
10	203.049	456.19	10812.4	0	0
11	205.05	456.367	11324.3	0	0
12	207.051	456.544	11823.5	0	0
13	209.052	456.72	12310	0	0
14	211.053	456.897	12783.7	0	0
15	213.055	457.074	13244.7	0	0
16	215.056	457.25	13693	0	0
17	217.057	457.427	14128.5	0	0
18	219.058	457.604	14551.3	0	0
19	221.059	457.78	14961.3	0	0
20	223.061	457.957	15358.7	0	0
21	225.062	458.134	15743.3	0	0
22	227.063	458.31	16115.1	0	0
23	229.064	458.487	16474.3	0	0
24	231.065	458.664	16820.7	0	0
25	233.066	458.84	17154.4	0	0
26	235.133	459.973	16192.1	0	0
27	237.199	461.106	15239.6	0	0
28	239.265	462.238	14297	0	0
29	241.331	463.371	13364.2	0	0
30	243.397	464.504	12441.3	0	0
31	245.463	465.637	11528.3	0	0
32	247.529	466.769	10625	0	0
33	249.595	467.902	9731.66	0	0
34	251.662	469.035	8848.13	0	0
35	253.728	470.167	7980.78	0	0
36	255.794	471.3	7203.92	0	0
37	257.86	472.433	6538.97	0	0
38	259.926	473.566	5985.93	0	0
39	261.992	474.698	5544.79	0	0
40	264.101	476.807	4545.41	0	0
41	266.209	478.915	3743.09	0	0
42	268.318	481.024	1722.93	0	0
43	270.426	483.132	74.9388	0	0
44	272.535	485.241	-1200.88	0	0
45	274.643	487.349	-2104.53	0	0
46	276.752	489.458	-2660.84	0	0
47	278.86	491.566	-2897.66	0	0
48	280.969	493.675	-2762.31	0	0
49	283.077	495.783	-2254.78	0	0
50	285.185	497.892	-1375.09	0	0
51	287.294	500	0	0	0

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.07895

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	185.34	456.975	0	0	0
2	187.498	454.818	5399.71	316.143	3.35074
3	189.346	454.981	6407.94	695.32	6.19289
4	191.194	455.144	7450.65	1178.08	8.98509
5	193.043	455.307	8528.77	1767.28	11.7068
6	195.044	455.484	9183.8	2384.22	14.5534
7	197.045	455.66	9837.54	3059.68	17.2768
8	199.046	455.837	10487	3788.42	19.8622
9	201.047	456.014	11130.9	4564.79	22.2986
10	203.049	456.19	11767.5	5382.41	24.5792
11	205.05	456.367	12395.1	6234.18	26.7003
12	207.051	456.544	13011.9	7112.3	28.661
13	209.052	456.72	13615.8	8008.35	30.4626
14	211.053	456.897	14204.6	8913.32	32.1081
15	213.055	457.074	14776	9817.77	33.6017
16	215.056	457.25	15327.6	10711.9	34.9483
17	217.057	457.427	15857.1	11585.6	36.1528
18	219.058	457.604	16361.9	12428.7	37.2207
19	221.059	457.78	16839.8	13231.2	38.1571
20	223.061	457.957	17288.4	13983.2	38.9666
21	225.062	458.134	17705.4	14675.3	39.654
22	227.063	458.31	18088.7	15298.5	40.2228
23	229.064	458.487	18436.4	15844.6	40.6764
24	231.065	458.664	18746.8	16306.3	41.0173
25	233.066	458.84	19018.3	16677.5	41.2481
26	235.133	459.973	17946.5	15806.4	41.372
27	237.199	461.106	16890.4	14880.6	41.3804
28	239.265	462.238	15848.8	13910.6	41.2736
29	241.331	463.371	14820.9	12906.6	41.0506
30	243.397	464.504	13805.6	11878.9	40.71
31	245.463	465.637	12802	10837.7	40.25
32	247.529	466.769	11809.2	9792.83	39.6674
33	249.595	467.902	10826.2	8753.94	38.9586
34	251.662	469.035	9852.24	7730.48	38.1192
35	253.728	470.167	8892.67	6736.35	37.1446
36	255.794	471.3	8020.71	5833.64	36.0292
37	257.86	472.433	7257.65	5038.11	34.7676
38	259.926	473.566	6603.76	4346.76	33.3539
39	261.992	474.698	6059.53	3754.51	31.7825
40	264.101	476.807	5189.07	2997.22	30.0108
41	266.209	478.915	4466.06	2381.15	28.065
42	268.318	481.024	2662.11	1295.06	25.9419
43	270.426	483.132	1130.41	494.826	23.6409
44	272.535	485.241	-117.742	-45.584	21.164
45	274.643	487.349	-1069.08	-358.066	18.5172
46	276.752	489.458	-1732.31	-487.29	15.711
47	278.86	491.566	-2118.86	-479.866	12.7607
48	280.969	493.675	-2158.98	-368.532	9.68687
49	283.077	495.783	-1830.64	-209.058	6.51492
50	285.185	497.892	-1109.29	-63.4745	3.27494
51	287.294	500	0	0	0

Entity Information

Curved

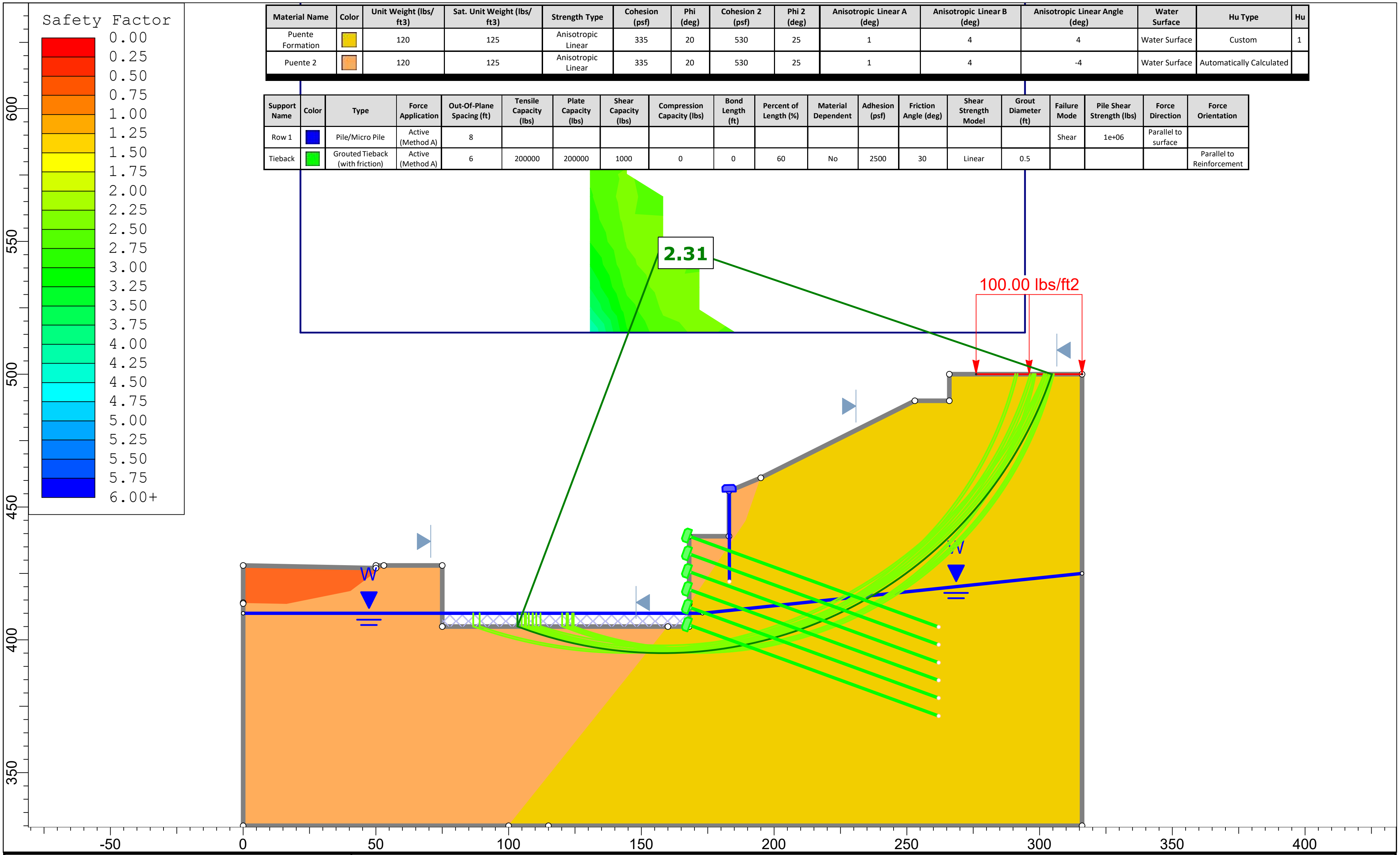
Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 428 0, 414 0, 413.654 0, 370 128, 370 316, 370 316, 500 266, 500 266, 490 253, 490 195, 461 183, 456 183, 439 168, 439 168, 413.426 168, 405 160, 405 75, 405 75, 428 53, 428 50, 428 50, 427
Material Boundary	0, 414 16.358, 413.654 40.287, 418.439 53, 428
Material Boundary	128, 370 160, 405
Material Boundary	168, 413.426 168.551, 413.97 189.424, 444.783 195, 461

Scenario-based Entities

Type	Coordinates (x,y)	Master Scenario	Curved Static	Curved Pstatic	Block Static	Block Psuedostatic
Water Table	0, 410 173, 410 214, 415 316, 425	Assigned to: 🟨 Puente Formation 🟧 Puente 2 🟥 Alluvium	Assigned to: 🟨 Puente Formation 🟧 Puente 2 🟥 Alluvium	✗	✗	✗
Distributed Load	316, 500 276.076, 500	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No
Water Table	0, 410 173, 410 214, 415 316, 425	✗	✗	Assigned to: 🟨 Puente Formation 🟧 Puente 2 🟥 Alluvium	Not assigned to any materials	Assigned to: 🟨 Puente Formation
Block Search Window	183.967, 391.464 215.196, 391.192 215.393, 466.009 187.619, 454.12					
Block Search Window	219.541, 414.818 242.08, 414.274 240.451, 475.374 218.998, 465.055					
Block Search Window	247.783, 413.188 277.111, 411.559 275.21, 489.495 247.24, 479.719					

20489 GG upd9-5-23 Lower Tiebacks
SLIDE - An Interactive Slope Stability Program
Geotechnologies, Inc.
Date Created: 5/10/2017, 12:08:26 AM
Software Version: 9.012



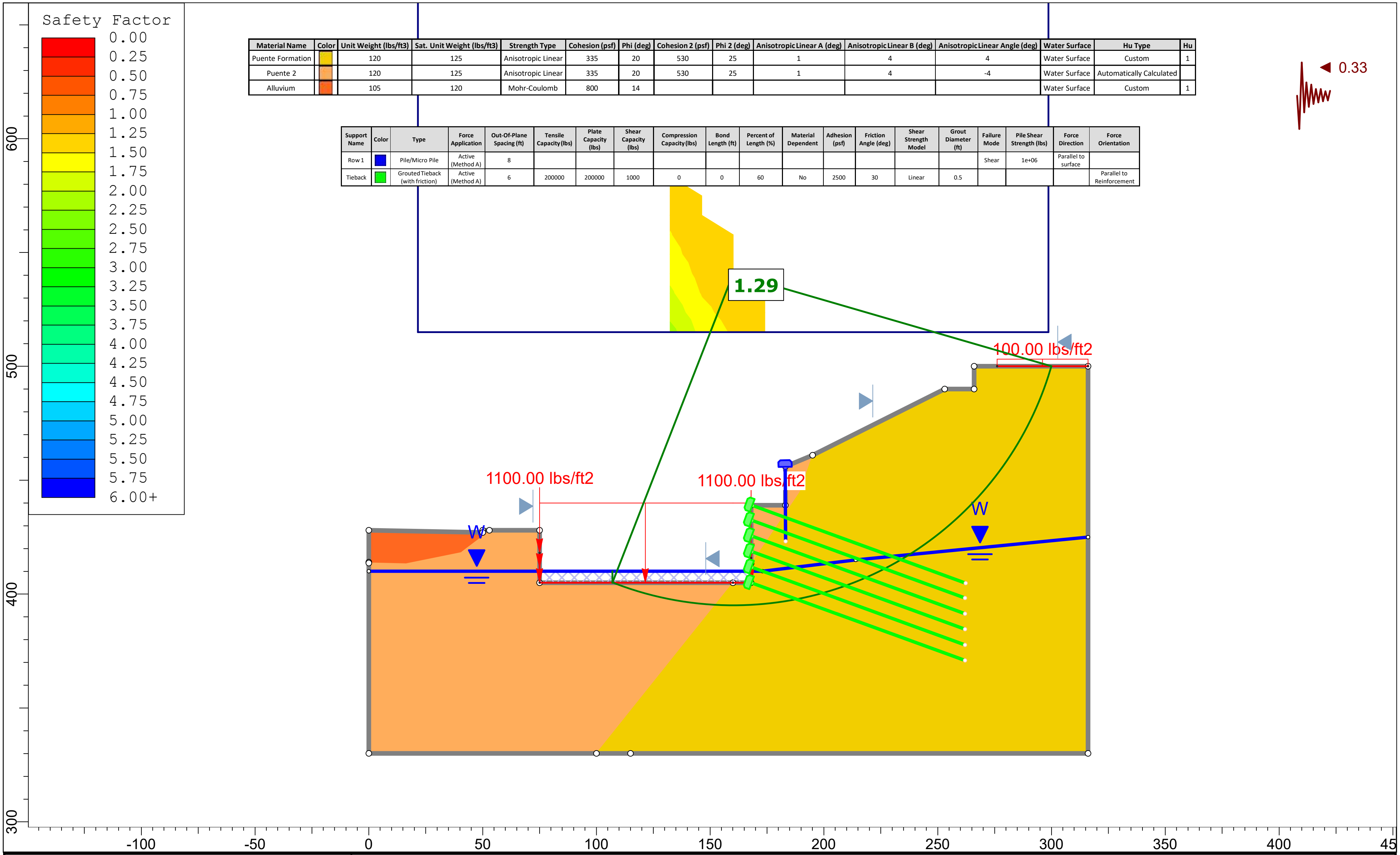
Material Name	Color	Unit Weight (lbs/ ft3)	Sat. Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface	Hu Type	Hu
Puente Formation	🟨	120	125	Anisotropic Linear	335	20	530	25	1	4	4	Water Surface	Custom	1
Puente 2	🟧	120	125	Anisotropic Linear	335	20	530	25	1	4	-4	Water Surface	Automatically Calculated	

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	1e+06	Parallel to surface	
Tieback	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

SLIDEINTERPRET 9.012

Project	File No 20486 Aragon- Sunset
Analysis	Cross Section G-G'', Proposed Cut
Scale	1:600
Comment 1	Curved Static
Date	9/5/2023
Location of Analysis	Temporary Cut



Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface	Hu Type	Hu
Puente Formation	🟨	120	125	Anisotropic Linear	335	20	530	25	1	4	4	Water Surface	Custom	1
Puente 2	🟧	120	125	Anisotropic Linear	335	20	530	25	1	4	-4	Water Surface	Automatically Calculated	
Alluvium	🟥	105	120	Mohr-Coulomb	800	14						Water Surface	Custom	1

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	1e+06	Parallel to surface	
Tieback	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

SLIDEINTERPRET 9.012

Project
File No 20486 Aragon- Sunset

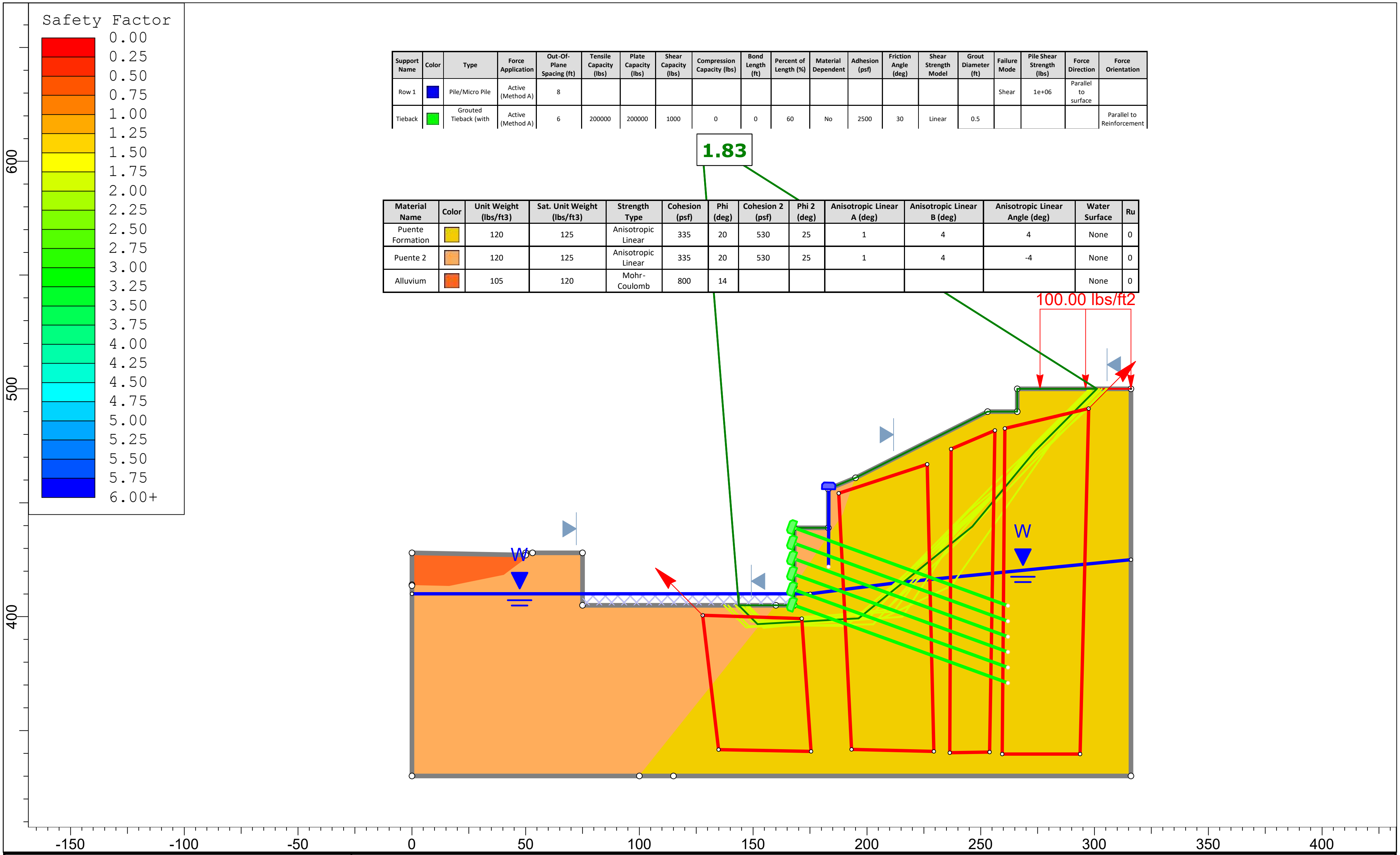
Analysis
Cross Section G-G''', Proposed Cut

Scale
1:700

Comment 1
Curved PesudoStatic

Date
9/5/2023

Location of Analysis
Proposed Cut



Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	1e+06	Parallel to surface	
Tieback	🟩	Grouted Tieback (with	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface	Ru
Puente Formation	🟨	120	125	Anisotropic Linear	335	20	530	25	1	4	4	None	0
Puente 2	🟧	120	125	Anisotropic Linear	335	20	530	25	1	4	-4	None	0
Alluvium	🟧	105	120	Mohr-Coulomb	800	14						None	0

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

SLIDEINTERPRET 9.012

Project File No 20486 Aragon- Sunset

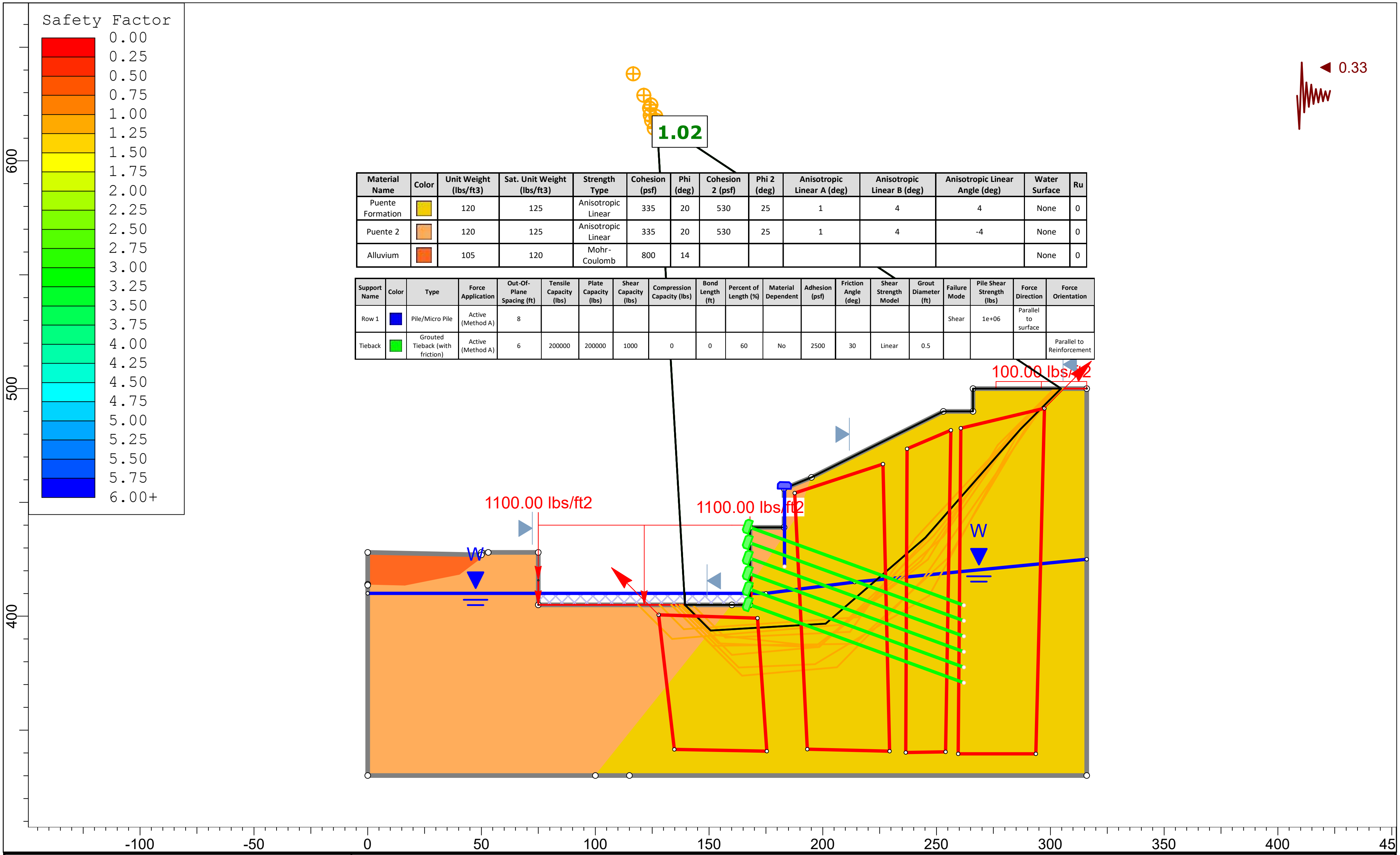
Analysis Cross Section G-G''', Proposed Cut

Scale 1:700

Comment 1 Block Static

Date 9/5/2023

Location of Analysis Proposed Cut



Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2 (psf)	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)	Anisotropic Linear Angle (deg)	Water Surface	Ru
Puente Formation	🟨	120	125	Anisotropic Linear	335	20	530	25	1	4	4	None	0
Puente 2	🟧	120	125	Anisotropic Linear	335	20	530	25	1	4	-4	None	0
Alluvium	🟧	105	120	Mohr-Coulomb	800	14						None	0

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (ft)	Tensile Capacity (lbs)	Plate Capacity (lbs)	Shear Capacity (lbs)	Compression Capacity (lbs)	Bond Length (ft)	Percent of Length (%)	Material Dependent	Adhesion (psf)	Friction Angle (deg)	Shear Strength Model	Grout Diameter (ft)	Failure Mode	Pile Shear Strength (lbs)	Force Direction	Force Orientation
Row 1	🟦	Pile/Micro Pile	Active (Method A)	8												Shear	1e+06	Parallel to surface	
Tieback	🟩	Grouted Tieback (with friction)	Active (Method A)	6	200000	200000	1000	0	0	60	No	2500	30	Linear	0.5				Parallel to Reinforcement

GEOTECHNOLOGIES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

SLIDEINTERPRET 9.012

Project	File No 20486 Aragon- Sunset		
Analysis	Cross Section G-G''', Proposed Cut		
Scale	1:700	*Comment 1*	Block PseudoStatic
Date	9/5/2023	*Location of Analysis*	Proposed Cut

Table of Contents

Slide Analysis Information

20489 GG upd9-5-23 Lower Tiebacks

Project Summary

File Name:	20489 GG upd9-5-23 Lower Tiebacks.slmd
Slide Modeler Version:	9.012
Project Title:	SLIDE - An Interactive Slope Stability Program
Author:	RTK
Company:	Geotechnologies, Inc.
Date Created:	5/10/2017, 12:08:26 AM

Currently Open Scenarios

Group Name	Scenario Name	Global Minimum	Compute Time
Curved ◆	Master Scenario	Bishop Simplified: 2.030130 Janbu Simplified: 1.972090	00h:00m:00.454s
	Curved Static	Bishop Simplified: 2.306060 Janbu Simplified: 1.844560	00h:00m:00.216s
	Curved Pstatic	Bishop Simplified: 1.294600 Janbu Simplified: 0.970038	00h:00m:00.179s
	Block Static	Bishop Simplified: 2.079010 Janbu Simplified: 1.828030 Gle/morgenstern-price: 2.239990	00h:00m:05.580s
	Block Pseudostatic	Bishop Simplified: 1.172670 Janbu Simplified: 1.017290 Gle/morgenstern-price: 1.461370	00h:00m:02.819s

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

🟩 Curved - Block Static

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	GLE/Morgenstern-Price with interslice force function (Half Sine)
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

All other Scenarios

Slices Type:	Vertical
Analysis Methods Used	
	Bishop simplified
	Janbu simplified
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

All Open Scenarios

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

All Open Scenarios

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

Surface Options

Curved - Block Static

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Multiple Groups: Disabled
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle) [deg]: 135
Left Projection Angle (End Angle) [deg]: 135
Right Projection Angle (Start Angle) [deg]: 45
Right Projection Angle (End Angle) [deg]: 45
Minimum Elevation: Not Defined
Minimum Depth: Not Defined
Minimum Area: Not Defined
Minimum Weight: Not Defined

All other Scenarios

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation [ft]: 395
Minimum Depth: Not Defined
Minimum Area: Not Defined
Minimum Weight: Not Defined

Seismic Loading

Curved - Master Scenario

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Curved - Curved Static

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Curved - Curved Pstatic

Advanced seismic analysis: No
Staged pseudostatic analysis: No
Seismic Load Coefficient (Horizontal): 0.33

Curved - Block Static

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Curved - Block Pseudostatic

Advanced seismic analysis: No
Staged pseudostatic analysis: No
Seismic Load Coefficient (Horizontal): 0.33

Loading

Curved - Master Scenario

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

Curved - Curved Static

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

Curved - Curved Pstatic

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

Distribution: Constant
Magnitude [psf]: 1100
Orientation: Vertical

Curved - Block Static

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

Curved - Block Pseudostatic

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

Distribution: Constant
Magnitude [psf]: 1100
Orientation: Vertical

Materials

Puente Formation	
Color	🟨
Strength Type	Anisotropic Linear
Unsaturated Unit Weight [lbs/ft3]	120
Saturated Unit Weight [lbs/ft3]	125
Cohesion 1 [psf]	335
Cohesion 2 [psf]	530
Friction Angle 1 [deg]	20
Friction Angle 2 [deg]	25
A [deg]	1
B [deg]	4
Anisotropic Definition	Angle
Angle from 1 [deg]	4
Anisotropic Surface	
Water Surface	Assigned per scenario
Ru Value	0
Puente 2	
Color	🟧
Strength Type	Anisotropic Linear
Unsaturated Unit Weight [lbs/ft3]	120
Saturated Unit Weight [lbs/ft3]	125
Cohesion 1 [psf]	335
Cohesion 2 [psf]	530
Friction Angle 1 [deg]	20
Friction Angle 2 [deg]	25
A [deg]	1
B [deg]	4
Anisotropic Definition	Angle
Angle from 1 [deg]	-4
Anisotropic Surface	
Water Surface	Assigned per scenario
Ru Value	0
Alluvium	
Color	🟥
Strength Type	Mohr-Coulomb
Unsaturated Unit Weight [lbs/ft3]	105
Saturated Unit Weight [lbs/ft3]	120
Cohesion [psf]	800
Friction Angle [deg]	14
Water Surface	Assigned per scenario
Ru Value	0

Materials In Use

Material	Curved	Curved Static	Curved Pstatic	Block Static	Block Pseudostatic
Puente Formation 🟨	✓	✓	✓	✓	✓
Puente 2 🟧	✓	✓	✓	✓	✓
Alluvium 🟥	✓	✓	✓	✓	✓

Support

Row 1	
Color	🟦
Support Type	Pile/Micro Pile
Force Application	Active
Out-of-Plane Spacing [ft]	8
Failure Mode	Shear
Pile Shear Strength [lb]	1e+06
Force Direction	Parallel to surface

Row 2	
Color	🟩
Support Type	Pile/Micro Pile
Force Application	Active
Out-of-Plane Spacing [ft]	6
Failure Mode	Shear
Pile Shear Strength [lb]	1e+06
Force Direction	Parallel to surface

Tieback	
Color	🟩
Support Type	Grouted Tieback (with friction)
Force Application	Active
Force Orientation	Parallel to Reinforcement
Bond Length [percent]	60
Out-of-Plane Spacing [ft]	6
Tensile Capacity [lb]	200000
Plate Capacity [lb]	200000
Pullout Strength Adhesion [psf]	2500
Pullout Strength Friction Angle [degrees]	30
Material Dependent	No
Shear Strength Model	Linear
Use External Loads for Strength	yes
Shear Capacity [lb]	1000
Grout Diameter [ft]	0.5

Global Minimums

Curved - Master Scenario

Method: bishop simplified

FS	2.030130
Center:	183.904, 621.223
Radius:	168.731
Left Slip Surface Endpoint:	183.000, 452.494
Right Slip Surface Endpoint:	301.272, 500.000
Left Slope Intercept:	183.000 456.000
Right Slope Intercept:	301.272 500.000
Resisting Moment:	2.76617e+07 lb-ft
Driving Moment:	1.36256e+07 lb-ft
Total Slice Area:	1829.92 ft2
Surface Horizontal Width:	118.272 ft
Surface Average Height:	15.4721 ft

Method: janbu simplified

FS	1.972090
Center:	183.904, 613.107
Radius:	160.250
Left Slip Surface Endpoint:	183.000, 452.860
Right Slip Surface Endpoint:	297.424, 500.000
Left Slope Intercept:	183.000 456.000
Right Slope Intercept:	297.424 500.000
Resisting Horizontal Force:	139122 lb
Driving Horizontal Force:	70545.4 lb
Total Slice Area:	1681.13 ft2
Surface Horizontal Width:	114.424 ft
Surface Average Height:	14.6921 ft

Curved - Curved Static

Method: bishop simplified

FS	2.306060
Center:	158.051, 549.758
Radius:	154.758
Left Slip Surface Endpoint:	103.323, 405.000
Right Slip Surface Endpoint:	304.592, 500.000
Left Slope Intercept:	103.323 410.000
Right Slope Intercept:	304.592 500.000
Resisting Moment:	8.90437e+07 lb-ft
Driving Moment:	3.86129e+07 lb-ft
Active Support Moment:	-2.33815e+07 lb-ft
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	8021.79 ft2
Surface Horizontal Width:	201.269 ft
Surface Average Height:	39.8561 ft

Method: janbu simplified

FS	1.844560
Center:	171.696, 524.186
Radius:	129.186
Left Slip Surface Endpoint:	121.859, 405.000
Right Slip Surface Endpoint:	298.598, 500.000
Left Slope Intercept:	121.859 410.000
Right Slope Intercept:	298.598 500.000
Resisting Horizontal Force:	455172 lb
Driving Horizontal Force:	246765 lb
Active Horizontal Support Force:	-188281 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	7948.19 ft2
Surface Horizontal Width:	176.739 ft
Surface Average Height:	44.9714 ft

Curved - Curved Pstatic

Method: bishop simplified

FS	1.294600
Center:	160.108, 540.671
Radius:	145.671
Left Slip Surface Endpoint:	107.067, 405.000
Right Slip Surface Endpoint:	299.986, 500.000
Left Slope Intercept:	107.067 410.000
Right Slope Intercept:	299.986 500.000
Resisting Moment:	8.06797e+07 lb-ft
Driving Moment:	6.23202e+07 lb-ft
Active Support Moment:	-2.18375e+07 lb-ft
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	7761.77 ft2
Surface Horizontal Width:	192.92 ft
Surface Average Height:	40.2332 ft

Method: janbu simplified

FS	0.970038
Center:	173.959, 523.556
Radius:	128.556
Left Slip Surface Endpoint:	124.249, 405.000
Right Slip Surface Endpoint:	300.339, 500.000
Left Slope Intercept:	124.249 410.000
Right Slope Intercept:	300.339 500.000
Resisting Horizontal Force:	455110 lb
Driving Horizontal Force:	469168 lb
Active Horizontal Support Force:	-188281 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	8117.93 ft2
Surface Horizontal Width:	176.09 ft
Surface Average Height:	46.101 ft

Curved - Block Static

Method: bishop simplified

FS	2.079010
Axis Location:	126.438, 606.213
Left Slip Surface Endpoint:	144.581, 405.000
Right Slip Surface Endpoint:	298.294, 500.000
Left Slope Intercept:	144.581 410.000
Right Slope Intercept:	298.294 500.000
Resisting Moment:	8.76275e+07 lb-ft
Driving Moment:	4.21486e+07 lb-ft
Active Support Moment:	-3.19193e+07 lb-ft
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	5400.37 ft2
Surface Horizontal Width:	153.713 ft
Surface Average Height:	35.1328 ft

Method: janbu simplified

FS	1.828030
Axis Location:	127.300, 609.917
Left Slip Surface Endpoint:	143.591, 405.000
Right Slip Surface Endpoint:	301.008, 500.000
Left Slope Intercept:	143.591 410.000
Right Slope Intercept:	301.008 500.000
Resisting Horizontal Force:	352487 lb
Driving Horizontal Force:	192824 lb
Active Horizontal Support Force:	-188281 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	5806.19 ft2
Surface Horizontal Width:	157.417 ft
Surface Average Height:	36.8842 ft

Method: gle/morgenstern-price

FS	2.239990
Axis Location:	127.708, 602.525
Left Slip Surface Endpoint:	147.695, 405.000
Right Slip Surface Endpoint:	297.720, 500.000
Left Slope Intercept:	147.695 410.000
Right Slope Intercept:	297.720 500.000
Resisting Moment:	9.17968e+07 lb-ft
Driving Moment:	4.09808e+07 lb-ft
Resisting Horizontal Force:	372261 lb
Driving Horizontal Force:	166188 lb
Active Support Moment:	-3.13107e+07 lb-ft
Active Horizontal Support Force:	-188281 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	5477.35 ft2
Surface Horizontal Width:	150.025 ft
Surface Average Height:	36.5095 ft

Curved - Block Pseudostatic

Method: bishop simplified

FS	1.172670
Axis Location:	127.034, 617.745
Left Slip Surface Endpoint:	139.412, 405.000
Right Slip Surface Endpoint:	304.657, 500.000
Left Slope Intercept:	139.412 410.000
Right Slope Intercept:	304.657 500.000
Resisting Moment:	1.01732e+08 lb-ft
Driving Moment:	8.67525e+07 lb-ft
Active Support Moment:	-3.4137e+07 lb-ft
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	6490.93 ft2
Surface Horizontal Width:	165.245 ft
Surface Average Height:	39.2806 ft

Method: janbu simplified

FS	1.017290
Axis Location:	127.034, 617.745
Left Slip Surface Endpoint:	139.412, 405.000
Right Slip Surface Endpoint:	304.657, 500.000
Left Slope Intercept:	139.412 410.000
Right Slope Intercept:	304.657 500.000
Resisting Horizontal Force:	374808 lb
Driving Horizontal Force:	368440 lb
Active Horizontal Support Force:	-188281 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	6490.93 ft2
Surface Horizontal Width:	165.245 ft
Surface Average Height:	39.2806 ft

Method: gle/morgenstern-price

FS	1.461370
Axis Location:	129.553, 603.876
Left Slip Surface Endpoint:	148.865, 405.000
Right Slip Surface Endpoint:	300.241, 500.000
Left Slope Intercept:	148.865 410.000
Right Slope Intercept:	300.241 500.000
Resisting Moment:	8.44511e+07 lb-ft
Driving Moment:	5.7789e+07 lb-ft
Resisting Horizontal Force:	371413 lb
Driving Horizontal Force:	254154 lb
Active Support Moment:	-3.16757e+07 lb-ft
Active Horizontal Support Force:	-188281 lb
Maximum Single Support Force:	33333.3 lb
Total Support Force:	200000 lb
Total Slice Area:	5331.99 ft2
Surface Horizontal Width:	151.376 ft
Surface Average Height:	35.2234 ft

Global Minimum Coordinates

Curved - Block Static

Method: bishop simplified

X	Y
144.581	405
154.565	395.016
198.199	399.547
255.597	458.054
272.965	474.67
298.294	500

Method: janbu simplified

X	Y
143.591	405
151.936	396.655
196.375	399.173
246.331	439.546
273.868	472.86
301.008	500

Method: gle/morgenstern-price

X	Y
147.695	405
156.431	396.264
190.845	395.807
252.202	449.762
273.052	475.332
297.72	500

Curved - Block Pseudostatic

Method: bishop simplified

X	Y
139.412	405
150.666	393.746
201.24	396.76
245.12	434.531
286.963	482.306
304.657	500

Method: janbu simplified

X	Y
139.412	405
150.666	393.746
201.24	396.76
245.12	434.531
286.963	482.306
304.657	500

Method: gle/morgenstern-price

X	Y
148.865	405
158.065	395.8
213.111	423.922
246.201	431.645
286.749	486.508
300.241	500

Global Minimum Support Data

◆ Curved - Master Scenario

Method: bishop simplified

Number of Supports: 2

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.124, 451.843	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Row 2

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168.084, 439.15	60	Not Effective	Not Effective	Not Effective	Not Effective	0

Method: janbu simplified

Number of Supports: 2

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.124, 451.843	25	Not Effective	Not Effective	Not Effective	Not Effective	0

Row 2

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168.084, 439.15	60	Not Effective	Not Effective	Not Effective	Not Effective	0

◆ Curved - Curved Static

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.03, 455.934	34.0911	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	70.2875	29.7125	30.2875	29.7125	33333.3
168, 432.305	100	62.2976	37.7024	22.2976	37.7024	33333.3
168, 425.61	100	53.6319	46.3681	13.6319	46.3681	33333.3
168, 418.915	100	44.1609	55.8391	4.16088	55.8391	33333.3
168, 412.22	100	33.6696	66.3304	0	60	33333.3
168, 405.525	100	21.8867	78.1133	0	60	33333.3

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.03, 455.934	34.0911	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	74.71	25.29	34.71	25.29	33333.3
168, 432.305	100	66.9833	33.0167	26.9833	33.0167	33333.3
168, 425.61	100	58.4762	41.5238	18.4762	41.5238	33333.3
168, 418.915	100	49.0069	50.9931	9.00692	50.9931	33333.3
168, 412.22	100	38.3094	61.6906	0	60	33333.3
168, 405.525	100	25.8995	74.1005	0	60	33333.3

Curved - Curved Pstatic

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
182.917, 456.086	32.95	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168.283, 439	100	69.8722	30.1278	29.8722	30.1278	33333.3
168, 432.427	100	62.3932	37.6068	22.3932	37.6068	33333.3
168, 425.57	100	53.7006	46.2994	13.7006	46.2994	33333.3
168, 418.713	100	44.1165	55.8835	4.11649	55.8835	33333.3
168, 411.857	100	33.4492	66.5508	0	60	33333.3
168, 405	100	21.3132	78.6868	0	60	33333.3

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
182.917, 456.086	32.95	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168.283, 439	100	75.8992	24.1008	35.8992	24.1008	33333.3
168, 432.427	100	68.4347	31.5653	28.4347	31.5653	33333.3
168, 425.57	100	59.6456	40.3544	19.6456	40.3544	33333.3
168, 418.713	100	49.8127	50.1873	9.81269	50.1873	33333.3
168, 411.857	100	38.6299	61.3701	0	60	33333.3
168, 405	100	25.5199	74.4801	0	60	33333.3

Curved - Block Static

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.2, 456.224	34.3811	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	54.0331	45.9669	14.0331	45.9669	33333.3
168, 432.2	100	48.8019	51.1981	8.80186	51.1981	33333.3
168, 425.4	100	43.5706	56.4294	3.5706	56.4294	33333.3
168, 418.6	100	38.3393	61.6607	0	60	33333.3
168, 411.8	100	33.1081	66.8919	0	60	33333.3
168, 405	100	19.5386	80.4614	0	60	33333.3

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.2, 456.224	34.3811	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	56.9783	43.0217	16.9783	43.0217	33333.3
168, 432.2	100	50.8047	49.1953	10.8047	49.1953	33333.3
168, 425.4	100	44.631	55.369	4.63101	55.369	33333.3
168, 418.6	100	38.4574	61.5426	0	60	33333.3
168, 411.8	100	32.2837	67.7163	0	60	33333.3
168, 405	100	18.8096	81.1904	0	60	33333.3

Method: gle/morgenstern-price

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.2, 456.224	34.3811	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	54.1638	45.8362	14.1638	45.8362	33333.3
168, 432.2	100	48.3436	51.6564	8.3436	51.6564	33333.3
168, 425.4	100	42.5234	57.4766	2.52344	57.4766	33333.3
168, 418.6	100	36.7033	63.2967	0	60	33333.3
168, 411.8	100	30.8831	69.1169	0	60	33333.3
168, 405	100	25.063	74.937	0	60	33333.3

Curved - Block Pseudostatic

Method: bishop simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.2, 456.224	34.3811	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	61.5632	38.4368	21.5632	38.4368	33333.3
168, 432.2	100	55.6547	44.3453	15.6547	44.3453	33333.3
168, 425.4	100	49.7462	50.2538	9.74625	50.2538	33333.3
168, 418.6	100	43.8378	56.1622	3.83778	56.1622	33333.3
168, 411.8	100	37.9293	62.0707	0	60	33333.3
168, 405	100	25.6803	74.3197	0	60	33333.3

Method: janbu simplified

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.2, 456.224	34.3811	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	61.5632	38.4368	21.5632	38.4368	33333.3
168, 432.2	100	55.6547	44.3453	15.6547	44.3453	33333.3
168, 425.4	100	49.7462	50.2538	9.74625	50.2538	33333.3
168, 418.6	100	43.8378	56.1622	3.83778	56.1622	33333.3
168, 411.8	100	37.9293	62.0707	0	60	33333.3
168, 405	100	25.6803	74.3197	0	60	33333.3

Method: gle/morgenstern-price

Number of Supports: 7

Row 1

Support Type: Pile/Micro Pile

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
183.2, 456.224	34.3811	Not Effective	Not Effective	Not Effective	Not Effective	0

Tieback

Support Type: Grouted Tieback (with friction)

Start (x, y)	Length (ft)	L Inside SS (ft)	L Outside SS (ft)	Li (ft)	Lo (ft)	Force (lb)
168, 439	100	46.3749	53.6251	6.37491	53.6251	33333.3
168, 432.2	100	38.1034	61.8966	0	60	33333.3
168, 425.4	100	29.8319	70.1681	0	60	33333.3
168, 418.6	100	21.5603	78.4397	0	60	33333.3
168, 411.8	100	13.2888	86.7112	0	60	33333.3
168, 405	100	5.01727	94.9827	0	60	33333.3

Valid and Invalid Surfaces

Curved - Master Scenario

Method: bishop simplified

Number of Valid Surfaces:	2966
Number of Invalid Surfaces:	6295

Error Codes

Error Code -106 reported for 358 surfaces
Error Code -107 reported for 4318 surfaces
Error Code -108 reported for 2 surfaces
Error Code -1000 reported for 1617 surfaces

Method: janbu simplified

Number of Valid Surfaces:	2734
Number of Invalid Surfaces:	6527

Error Codes

Error Code -106 reported for 351 surfaces
Error Code -107 reported for 4318 surfaces
Error Code -108 reported for 2 surfaces
Error Code -111 reported for 239 surfaces
Error Code -1000 reported for 1617 surfaces

Curved - Curved Static

Method: bishop simplified

Number of Valid Surfaces:	654
Number of Invalid Surfaces:	8607

Error Codes

Error Code -113 reported for 18 surfaces
Error Code -1000 reported for 8589 surfaces

Method: janbu simplified

Number of Valid Surfaces:	654
Number of Invalid Surfaces:	8607

Error Codes

Error Code -113 reported for 18 surfaces
Error Code -1000 reported for 8589 surfaces

Curved - Curved Pstatic

Method: bishop simplified

Number of Valid Surfaces:	551
Number of Invalid Surfaces:	8710

Error Codes

Error Code -113 reported for 16 surfaces
Error Code -1000 reported for 8694 surfaces

Method: janbu simplified

Number of Valid Surfaces:	551
Number of Invalid Surfaces:	8710

Error Codes

Error Code -113 reported for 16 surfaces
Error Code -1000 reported for 8694 surfaces

Curved - Block Static

Method: bishop simplified

Number of Valid Surfaces:	1601
Number of Invalid Surfaces:	2855

Error Codes

Error Code -105 reported for 2834 surfaces
Error Code -108 reported for 5 surfaces
Error Code -111 reported for 13 surfaces
Error Code -112 reported for 3 surfaces

Method: janbu simplified

Number of Valid Surfaces:	1498
Number of Invalid Surfaces:	2958

Error Codes

Error Code -105 reported for 2834 surfaces
Error Code -108 reported for 2 surfaces
Error Code -111 reported for 121 surfaces
Error Code -112 reported for 1 surface

Method: gle/morgenstern-price

Number of Valid Surfaces:	716
Number of Invalid Surfaces:	3740

Error Codes

Error Code -105 reported for 2834 surfaces
Error Code -108 reported for 39 surfaces
Error Code -111 reported for 865 surfaces
Error Code -112 reported for 2 surfaces

Curved - Block Pseudostatic

Method: bishop simplified

Number of Valid Surfaces:	3181
Number of Invalid Surfaces:	1819

Error Codes

Error Code -105 reported for 380 surfaces
Error Code -108 reported for 9 surfaces
Error Code -111 reported for 1417 surfaces
Error Code -112 reported for 13 surfaces

Method: janbu simplified

Number of Valid Surfaces:	2643
Number of Invalid Surfaces:	2357

Error Codes

Error Code -105 reported for 380 surfaces
Error Code -108 reported for 4 surfaces
Error Code -111 reported for 1971 surfaces
Error Code -112 reported for 2 surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces:	290
Number of Invalid Surfaces:	4710

Error Codes

Error Code -105 reported for 380 surfaces
Error Code -108 reported for 25 surfaces
Error Code -111 reported for 4299 surfaces
Error Code -112 reported for 6 surfaces

Error Code Descriptions

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.

-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

-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.

-113 = Surface intersects outside slope limits.

-1000 = No valid slip surface is generated

Slice Data

Curved - Master Scenario

Global Minimum Query (bishop simplified) - Safety Factor: 2.03013

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.28593	1091.92	0.0810848	Puente 2	530	25	370.664	752.497	477.145	0	477.145	477.669	477.669
2	2.28593	1348.06	0.857365	Puente 2	530	25	395.164	802.235	583.811	0	583.811	589.725	589.725
3	2.28593	1595.7	1.6338	Puente 2	530	25	418.664	849.942	686.116	0	686.116	698.057	698.057
4	2.28593	1834.83	2.41054	Puente 2	530	25	441.17	895.633	784.102	0	784.102	802.674	802.674
5	2.37236	2147.89	3.20243	Puente Formation	335	20	324.086	657.936	887.261	0	887.261	905.394	905.394
6	2.37236	2404.56	4.00963	Puente Formation	335	20	342.431	695.18	989.586	0	989.586	1013.59	1013.59
7	2.37236	2688.94	4.81763	Puente Formation	335	20	362.745	736.42	1102.89	0	1102.89	1133.47	1133.47
8	2.37236	2964.9	5.62659	Puente Formation	375.729	21.0739	414.551	841.592	1208.95	0	1208.95	1249.79	1249.79
9	2.37236	3231.21	6.43668	Puente Formation	428.384	22.4396	477.14	968.656	1308.23	0	1308.23	1362.06	1362.06
10	2.37236	3487.86	7.24807	Puente Formation	481.124	23.7811	541.182	1098.67	1401.42	0	1401.42	1470.25	1470.25
11	2.37236	3734.77	8.06092	Puente Formation	530	25	603.064	1224.3	1488.93	0	1488.93	1574.33	1574.33
12	2.37236	3971.9	8.8754	Puente Formation	530	25	623.286	1265.35	1576.97	0	1576.97	1674.3	1674.3
13	2.37236	4199.18	9.6917	Puente Formation	530	25	642.448	1304.25	1660.39	0	1660.39	1770.11	1770.11
14	2.37236	4416.54	10.51	Puente Formation	530	25	660.549	1341	1739.19	0	1739.19	1861.74	1861.74
15	2.37236	4623.92	11.3305	Puente Formation	530	25	677.591	1375.6	1813.39	0	1813.39	1949.16	1949.16
16	2.37236	4821.22	12.1533	Puente Formation	530	25	693.573	1408.04	1882.97	0	1882.97	2032.34	2032.34
17	2.37236	5008.35	12.9787	Puente Formation	530	25	708.495	1438.34	1947.93	0	1947.93	2111.22	2111.22
18	2.37236	5185.22	13.8068	Puente Formation	530	25	722.354	1466.47	2008.27	0	2008.27	2185.79	2185.79
19	2.37236	5351.72	14.6379	Puente Formation	530	25	735.148	1492.45	2063.97	0	2063.97	2255.98	2255.98
20	2.37236	5507.74	15.4721	Puente Formation	530	25	746.873	1516.25	2115.02	0	2115.02	2321.75	2321.75
21	2.37236	5653.14	16.3097	Puente Formation	530	25	757.528	1537.88	2161.4	0	2161.4	2383.05	2383.05
22	2.37236	5787.8	17.151	Puente Formation	530	25	767.104	1557.32	2203.08	0	2203.08	2439.82	2439.82
23	2.37236	5911.58	17.996	Puente Formation	530	25	775.596	1574.56	2240.06	0	2240.06	2492.01	2492.01
24	2.37236	6024.32	18.8451	Puente Formation	530	25	782.999	1589.59	2272.29	0	2272.29	2539.54	2539.54
25	2.37236	6125.85	19.6986	Puente Formation	530	25	789.304	1602.39	2299.75	0	2299.75	2582.34	2582.34
26	2.37236	6216	20.5566	Puente Formation	530	25	794.506	1612.95	2322.4	0	2322.4	2620.35	2620.35
27	2.37236	6294.58	21.4194	Puente Formation	530	25	798.599	1621.26	2340.21	0	2340.21	2653.49	2653.49
28	2.37236	6361.39	22.2874	Puente Formation	530	25	801.564	1627.28	2353.11	0	2353.11	2681.65	2681.65
29	2.37236	6416.2	23.1608	Puente Formation	530	25	803.392	1630.99	2361.09	0	2361.09	2704.77	2704.77
30	2.37236	6438.38	24.04	Puente Formation	530	25	802.284	1628.74	2356.25	0	2356.25	2714.12	2714.12
31	2.37236	6202.66	24.9252	Puente Formation	530	25	778.556	1580.57	2252.95	0	2252.95	2614.76	2614.76

32	2.37236	5882.36	25.8168	Puente Formation	530	25	747.579	1517.68	2118.09	0	2118.09	2479.76	2479.76
33	2.37236	5549.05	26.7152	Puente Formation	530	25	715.649	1452.86	1979.08	0	1979.08	2339.25	2339.25
34	2.37236	5202.41	27.6207	Puente Formation	530	25	682.757	1386.09	1835.88	0	1835.88	2193.14	2193.14
35	2.37236	4842.11	28.5338	Puente Formation	530	25	648.891	1317.33	1688.44	0	1688.44	2041.26	2041.26
36	2.37236	6938.71	29.4549	Puente Formation	530	25	825.819	1676.52	2458.72	0	2458.72	2925.09	2925.09
37	2.37236	6925.93	30.3844	Puente Formation	530	25	821.12	1666.98	2438.26	0	2438.26	2919.71	2919.71
38	2.37236	6522.44	31.3228	Puente Formation	530	25	783.167	1589.93	2273.02	0	2273.02	2749.62	2749.62
39	2.37236	6103.7	32.2707	Puente Formation	530	25	744.16	1510.74	2103.21	0	2103.21	2573.12	2573.12
40	2.37236	5669.25	33.2286	Puente Formation	530	25	716.477	1454.54	1982.69	0	1982.69	2452.05	2452.05
41	2.37236	5218.57	34.1972	Puente Formation	530	25	682.792	1386.16	1836.03	0	1836.03	2300.01	2300.01
42	2.37236	4751.1	35.1769	Puente Formation	530	25	640.422	1300.14	1651.57	0	1651.57	2102.95	2102.95
43	2.37236	4266.23	36.1687	Puente Formation	530	25	596.921	1211.83	1462.18	0	1462.18	1898.56	1898.56
44	2.37236	3763.3	37.1731	Puente Formation	530	25	552.266	1121.17	1267.77	0	1267.77	1686.56	1686.56
45	2.37236	3241.58	38.1911	Puente Formation	530	25	506.433	1028.13	1068.23	0	1068.23	1466.63	1466.63
46	2.37236	2700.3	39.2236	Puente Formation	530	25	459.398	932.638	863.461	0	863.461	1238.45	1238.45
47	2.37236	2138.57	40.2714	Puente Formation	530	25	411.135	834.657	653.34	0	653.34	1001.66	1001.66
48	2.37236	1555.45	41.3358	Puente Formation	530	25	361.615	734.126	437.749	0	437.749	755.836	755.836
49	2.37236	949.867	42.4179	Puente Formation	530	25	310.811	630.986	216.566	0	216.566	500.553	500.553
50	2.37236	320.663	43.519	Puente Formation	530	25	258.691	525.177	-10.3435	0	-10.3435	235.308	235.308

Global Minimum Query (janbu simplified) - Safety Factor: 1.97209

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.31887	1007.7	0.0912652	Puente 2	530	25	371.365	732.366	433.974	0	433.974	434.565	434.565
2	2.31887	1270.86	0.920415	Puente 2	530	25	396.83	782.585	541.668	0	541.668	548.044	548.044
3	2.31887	1524.68	1.74976	Puente 2	530	25	421.175	830.595	644.63	0	644.63	657.496	657.496
4	2.31887	1769.15	2.57947	Puente 2	530	25	444.409	876.415	742.889	0	742.889	762.91	762.91
5	2.28584	1974.12	3.4038	Puente Formation	335	20	325.683	642.276	844.231	0	844.231	863.602	863.602
6	2.28584	2210.64	4.22292	Puente Formation	335	20	343.669	677.747	941.692	0	941.692	967.068	967.068
7	2.28584	2472.37	5.04291	Puente Formation	337.789	20.074	365.72	721.233	1049.28	0	1049.28	1081.56	1081.56
8	2.28584	2726.01	5.86393	Puente Formation	391.156	21.4767	427.497	843.062	1148.6	0	1148.6	1192.51	1192.51
9	2.28584	2970.57	6.68617	Puente Formation	444.601	22.8549	490.881	968.061	1241.93	0	1241.93	1299.47	1299.47
10	2.28584	3205.99	7.50979	Puente Formation	498.136	24.208	555.616	1095.73	1329.2	0	1329.2	1402.45	1402.45
11	2.28584	3432.24	8.33497	Puente Formation	530	25	602.877	1188.93	1413.08	0	1413.08	1501.4	1501.4
12	2.28584	3649.25	9.1619	Puente Formation	530	25	622.468	1227.56	1495.93	0	1495.93	1596.32	1596.32
13	2.28584	3856.96	9.99076	Puente Formation	530	25	640.99	1264.09	1574.26	0	1574.26	1687.18	1687.18
14	2.28584	4055.31	10.8217	Puente Formation	530	25	658.442	1298.51	1648.07	0	1648.07	1773.93	1773.93
15	2.28584	4244.22	11.655	Puente Formation	530	25	674.826	1330.82	1717.36	0	1717.36	1856.56	1856.56
16	2.28584	4423.61	12.4908	Puente Formation	530	25	690.142	1361.02	1782.13	0	1782.13	1935.02	1935.02
17	2.28584	4593.39	13.3293	Puente Formation	530	25	704.388	1389.12	1842.38	0	1842.38	2009.27	2009.27
18	2.28584	4753.45	14.1708	Puente Formation	530	25	717.562	1415.1	1898.1	0	1898.1	2079.28	2079.28
19	2.28584	4903.71	15.0153	Puente Formation	530	25	729.662	1438.96	1949.27	0	1949.27	2144.99	2144.99
20	2.28584	5044.03	15.8632	Puente Formation	530	25	740.684	1460.7	1995.88	0	1995.88	2206.36	2206.36
21	2.28584	5174.3	16.7147	Puente Formation	530	25	750.624	1480.3	2037.92	0	2037.92	2263.33	2263.33
22	2.28584	5294.4	17.57	Puente Formation	530	25	759.478	1497.76	2075.37	0	2075.37	2315.85	2315.85
23	2.28584	5404.16	18.4294	Puente Formation	530	25	767.238	1513.06	2108.18	0	2108.18	2363.85	2363.85
24	2.28584	5503.45	19.2931	Puente Formation	530	25	773.899	1526.2	2136.35	0	2136.35	2407.26	2407.26
25	2.28584	5592.11	20.1614	Puente Formation	530	25	779.452	1537.15	2159.84	0	2159.84	2446.03	2446.03
26	2.28584	5669.94	21.0345	Puente Formation	530	25	783.889	1545.9	2178.61	0	2178.61	2480.06	2480.06
27	2.28584	5736.78	21.9128	Puente Formation	530	25	787.205	1552.44	2192.62	0	2192.62	2509.28	2509.28
28	2.28584	5792.41	22.7965	Puente Formation	530	25	789.381	1556.73	2201.83	0	2201.83	2533.6	2533.6
29	2.28584	5836.63	23.686	Puente Formation	530	25	790.41	1558.76	2206.18	0	2206.18	2552.92	2552.92
30	2.28584	5869.19	24.5816	Puente Formation	530	25	790.278	1558.5	2205.63	0	2205.63	2567.14	2567.14
31	2.28584	5860.26	25.4837	Puente Formation	530	25	786.227	1550.51	2188.49	0	2188.49	2563.22	2563.22
32	2.28584	5605.39	26.3926	Puente Formation	530	25	759.365	1497.54	2074.89	0	2074.89	2451.72	2451.72
33	2.28584	5287.94	27.3087	Puente Formation	530	25	726.887	1433.49	1937.53	0	1937.53	2312.85	2312.85
34	2.28584	4957.74	28.2324	Puente Formation	530	25	693.438	1367.52	1796.07	0	1796.07	2168.4	2168.4
35	2.28584	4614.46	29.1642	Puente Formation	530	25	659.007	1299.62	1650.45	0	1650.45	2018.22	2018.22

36	2.28584	4257.74	30.1045	Puente Formation	530	25	623.58	1229.76	1500.63	0	1500.63	1862.18	1862.18
37	2.28584	5937.14	31.0539	Puente Formation	530	25	772.736	1523.9	2131.43	0	2131.43	2596.73	2596.73
38	2.28584	6245.44	32.0128	Puente Formation	530	25	796.845	1571.45	2233.39	0	2233.39	2731.56	2731.56
39	2.28584	5845.99	32.9819	Puente Formation	530	25	757.138	1493.14	2065.47	0	2065.47	2556.82	2556.82
40	2.28584	5431.38	33.9618	Puente Formation	530	25	716.349	1412.7	1892.96	0	1892.96	2375.45	2375.45
41	2.28584	5001.09	34.953	Puente Formation	530	25	681.338	1343.66	1744.9	0	1744.9	2221.15	2221.15
42	2.28584	4554.54	35.9565	Puente Formation	530	25	651.616	1285.05	1619.2	0	1619.2	2091.87	2091.87
43	2.28584	4091.12	36.9728	Puente Formation	530	25	607.339	1197.73	1431.95	0	1431.95	1889.16	1889.16
44	2.28584	3610.15	38.0029	Puente Formation	530	25	561.888	1108.09	1239.73	0	1239.73	1678.77	1678.77
45	2.28584	3110.89	39.0477	Puente Formation	530	25	515.239	1016.1	1042.44	0	1042.44	1460.38	1460.38
46	2.28584	2592.51	40.1081	Puente Formation	530	25	467.364	921.683	839.965	0	839.965	1233.64	1233.64
47	2.28584	2054.13	41.1854	Puente Formation	530	25	418.235	824.797	632.193	0	632.193	998.142	998.142
48	2.28584	1494.74	42.2808	Puente Formation	530	25	367.824	725.383	419	0	419	753.468	753.468
49	2.28584	913.249	43.3955	Puente Formation	530	25	316.101	623.379	200.252	0	200.252	499.126	499.126
50	2.28584	308.415	44.5311	Puente Formation	530	25	263.032	518.723	-24.183	0	-24.183	234.579	234.579

Curved - Curved Static

Global Minimum Query (bishop simplified) - Safety Factor: 2.30606

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.06408	1641.88	-19.9097	Puente 2	530	25	258.013	594.994	497.301	357.92	139.381	403.852	45.9321
2	4.06408	2357.5	-18.317	Puente 2	530	25	275.384	635.052	671.106	445.822	225.284	579.941	134.119
3	4.06408	3009.71	-16.7389	Puente 2	530	25	290.893	670.816	827.916	525.934	301.982	740.429	214.495
4	4.06408	3600.14	-15.1738	Puente 2	530	25	304.621	702.474	968.33	598.458	369.872	885.716	287.258
5	4.06408	4130.23	-13.6201	Puente 2	530	25	316.639	730.189	1092.88	663.57	429.307	1016.16	352.586
6	4.06408	4601.22	-12.0767	Puente 2	530	25	327.011	754.108	1202.02	721.422	480.601	1132.06	410.635
7	4.06408	5014.19	-10.542	Puente 2	530	25	335.792	774.357	1296.17	772.149	524.025	1233.68	461.535
8	4.06408	5370.08	-9.01503	Puente 2	530	25	343.031	791.051	1375.69	815.863	559.826	1321.27	505.403
9	4.06408	5669.66	-7.49446	Puente 2	497.14	24.1831	329.634	760.156	1438.36	852.661	585.702	1395	542.337
10	4.06408	5913.58	-5.97919	Puente 2	398.647	21.6715	276.496	637.617	1484	882.623	601.375	1455.04	572.416
11	4.06408	6102.36	-4.4681	Puente 2	335	20	242.277	558.706	1520.44	905.812	614.626	1501.51	595.694
12	4.06408	6236.41	-2.96013	Puente 2	337.592	20.0688	245.393	565.891	1547.19	922.277	624.911	1534.5	612.222
13	4.04918	6292.79	-1.45696	Puente Formation	530	25	357.448	824.296	1563.17	932.047	631.12	1554.08	622.029
14	4.04918	6318.09	0.0424429	Puente Formation	527.241	24.9318	354.604	817.737	1560.08	935.166	624.911	1560.34	625.173
15	4.04918	6289.75	1.54187	Puente Formation	429.778	22.4754	296.468	683.672	1545.37	931.672	613.699	1553.35	621.679
16	4.04918	7302.1	3.04236	Puente Formation	335	20	282.083	650.5	1788.38	921.557	866.828	1803.38	881.82
17	4.04918	21430.3	4.54494	Puente Formation	335	20	827.424	1908.09	5226.85	904.8	4322.05	5292.62	4387.82
18	4.04918	21243.2	6.05067	Puente Formation	403.293	21.7921	913.347	2106.23	5149.66	890.283	4259.38	5246.47	4356.19
19	4.04918	21007.1	7.5606	Puente Formation	501.439	24.2905	1032.48	2380.97	5051.16	886.627	4164.53	5188.2	4301.57
20	4.04918	23801	9.07584	Puente Formation	530	25	1202.46	2772.95	5686.21	876.182	4810.03	5878.3	5002.11
21	4.04918	29340.1	10.5975	Puente Formation	530	25	1465.98	3380.64	6972.08	858.868	6113.22	7246.37	6387.5
22	4.04918	29756.6	12.1268	Puente Formation	530	25	2020.91	4660.33	9692.11	834.589	8857.52	10126.3	9291.75
23	4.04918	30129	13.6649	Puente Formation	530	25	1498.45	3455.51	7077.02	803.232	6273.79	7441.33	6638.1
24	4.04918	30564.3	15.2131	Puente Formation	530	25	2050.47	4728.51	9768.41	764.665	9003.75	10326	9561.35
25	4.04918	30969.1	16.7728	Puente Formation	530	25	1537.48	3545.53	7185.57	718.737	6466.84	7648.97	6930.23
26	4.04918	31312.8	18.3454	Puente Formation	530	25	1554.92	3585.74	7218.32	665.271	6553.05	7733.93	7068.66
27	4.04918	31593.8	19.9325	Puente Formation	530	25	2093.65	4828.08	9821.32	604.069	9217.25	10580.6	9976.48
28	4.04918	31810.1	21.5357	Puente Formation	530	25	1584.01	3652.82	7231.82	534.904	6696.91	7856.91	7322.01
29	4.04918	31959.8	23.1568	Puente Formation	530	25	2112.43	4871.4	9767.67	457.518	9310.15	10671.2	10213.7
30	4.04918	32040.4	24.7978	Puente Formation	530	25	1605.02	3701.27	7172.42	371.619	6800.8	7913.97	7542.35
31	4.04918	32049.3	26.4608	Puente Formation	530	25	2122.55	4894.73	9637.05	276.874	9360.18	10693.5	10416.6
32	4.04918	31983.3	28.1482	Puente Formation	530	25	1617.36	3729.72	7034.72	172.905	6861.81	7900.05	7727.15
33	4.04918	31839	29.8627	Puente Formation	530	25	2123.22	4896.27	9422.78	59.2795	9363.5	10641.8	10582.6
34	3.96867	31007	31.5895	Puente Formation	530	25	1609.82	3712.33	6824.51	0	6824.51	7814.47	7814.47
35	3.96867	30749.3	33.3313	Puente Formation	530	25	1585.97	3657.35	6706.61	0	6706.61	7749.65	7749.65
36	3.96867	30408.5	35.1088	Puente Formation	530	25	1558.04	3592.93	6568.48	0	6568.48	7663.84	7663.84
37	3.96867	29978.9	36.9259	Puente Formation	530	25	1525.79	3518.57	6409	0	6409	7555.67	7555.67
38	3.96867	28981.9	38.7874	Puente Formation	530	25	1468.27	3385.91	6124.53	0	6124.53	7304.51	7304.51

39	3.96867	27409.6	40.699	Puente Formation	530	25	1385.75	3195.63	5716.46	0	5716.46	6908.36	6908.36
40	3.96867	25725.8	42.6673	Puente Formation	530	25	1298.89	2995.31	5286.87	0	5286.87	6484.08	6484.08
41	3.96867	27368.2	44.7001	Puente Formation	530	25	1353.8	3121.95	5558.45	0	5558.45	6898.15	6898.15
42	3.96867	26740.2	46.8071	Puente Formation	530	25	1310.46	3022.01	5344.14	0	5344.14	6739.99	6739.99
43	3.96867	24646.4	49.0004	Puente Formation	530	25	1208.63	2787.18	4840.54	0	4840.54	6230.93	6230.93
44	3.96867	22379.9	51.2952	Puente Formation	530	25	1110.53	2560.95	4355.38	0	4355.38	5741.32	5741.32
45	3.96867	19913.5	53.7115	Puente Formation	530	25	991.93	2287.45	3768.87	0	3768.87	5119.78	5119.78
46	3.96867	17210.8	56.2763	Puente Formation	530	25	865.259	1995.34	3142.43	0	3142.43	4438.67	4438.67
47	3.96867	14220.6	59.0273	Puente Formation	530	25	729.296	1681.8	2470.04	0	2470.04	3685.1	3685.1
48	3.96867	10867.2	62.0212	Puente Formation	530	25	582.406	1343.06	1743.62	0	1743.62	2839.94	2839.94
49	3.96867	7029.01	65.349	Puente Formation	530	25	422.37	974.011	952.185	0	952.185	1872.55	1872.55
50	3.96867	2484.88	69.1778	Puente Formation	530	25	246.042	567.387	80.1758	0	80.1758	727.129	727.129

Global Minimum Query (janbu simplified) - Safety Factor: 1.84456

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.46887	1384.05	-21.8631	Puente 2	530	25	332.005	612.403	532.136	355.422	176.714	398.919	43.497
2	3.46887	1962.74	-20.2144	Puente 2	530	25	352.236	649.72	695.44	438.7	256.74	565.742	127.042
3	3.46887	2492.51	-18.5831	Puente 2	530	25	370.253	682.954	842.95	514.938	328.012	718.468	203.53
4	3.46887	2974.82	-16.9672	Puente 2	530	25	386.173	712.32	975.333	584.347	390.986	857.51	273.163
5	3.46887	3410.94	-15.3651	Puente 2	530	25	400.1	738.008	1093.18	647.108	446.074	983.238	336.13
6	3.46887	3801.98	-13.7753	Puente 2	530	25	412.122	760.183	1197.01	703.383	493.628	1095.97	392.59
7	3.46887	4148.91	-12.1962	Puente 2	530	25	422.318	778.99	1287.27	753.309	533.961	1195.99	442.682
8	3.46887	4452.57	-10.6265	Puente 2	530	25	430.757	794.558	1364.36	797.008	567.348	1283.54	486.527
9	3.46887	4713.66	-9.06481	Puente 2	530	25	437.503	807	1428.61	834.581	594.028	1358.81	524.227
10	3.51829	5004.35	-7.49885	Puente Formation	530	25	442.631	816.46	1480.61	866.298	614.315	1422.35	556.05
11	3.51829	5186.51	-5.92747	Puente Formation	530	25	446.169	822.986	1520.45	892.144	628.31	1474.13	581.986
12	3.51829	5325.83	-4.36055	Puente Formation	530	25	448.112	826.569	1547.91	911.911	635.995	1513.74	601.825
13	3.51829	5422.61	-2.7969	Puente Formation	530	25	448.497	827.28	1563.16	925.644	637.52	1541.25	615.609
14	3.51829	15605.4	-1.23533	Puente Formation	530	25	1179.1	2174.92	4460.9	933.374	3527.53	4435.48	3502.1
15	3.51829	18834.6	0.32532	Puente Formation	508.854	24.4755	1364.31	2516.55	5345.61	935.118	4410.49	5353.36	4418.24
16	3.51829	18809.8	1.88621	Puente Formation	407.396	21.8984	1170.47	2159	5307.77	950.174	4357.6	5346.32	4396.14
17	3.51829	18744.2	3.44851	Puente Formation	335	20	1030.61	1901.02	5265.57	962.973	4302.6	5327.67	4364.7
18	3.51829	22268.8	5.01338	Puente Formation	335.869	20.0231	1219.86	2250.1	6222.46	969.757	5252.71	6329.47	5359.72
19	3.51829	26279	6.58201	Puente Formation	437.83	22.6819	1666.3	3073.59	7277.1	970.49	6306.61	7469.36	6498.87
20	3.51829	26704.3	8.15561	Puente Formation	530	25	1893.58	3492.82	7318.93	965.122	6353.81	7590.3	6625.18
21	3.51829	27086.6	9.73544	Puente Formation	530	25	2684.1	4950.98	10434.4	953.586	9480.83	10894.9	9941.34
22	3.51829	27496.3	11.3228	Puente Formation	530	25	1928.88	3557.93	7429.23	935.802	6493.42	7815.45	6879.65
23	3.51829	27913.1	12.919	Puente Formation	530	25	1949.53	3596.02	7486.77	911.671	6575.1	7933.95	7022.28
24	3.51829	28284.4	14.5255	Puente Formation	530	25	2726.37	5028.96	10529.1	881.08	9648.05	11235.5	10354.4
25	3.51829	28609.2	16.1437	Puente Formation	530	25	1984.53	3660.58	7557.44	843.894	6713.55	8131.89	7288
26	3.51829	28886.4	17.7753	Puente Formation	530	25	1998.79	3686.89	7569.93	799.957	6769.98	8210.73	7410.77
27	3.51829	29114.8	19.422	Puente Formation	530	25	2752.67	5077.46	10501.1	749.091	9752.05	11471.7	10722.6
28	3.51829	29292.9	21.0855	Puente Formation	530	25	2020.58	3727.08	7547.25	691.091	6856.16	8326.34	7635.25
29	3.51829	29419.1	22.7679	Puente Formation	530	25	2758.43	5088.09	10400.6	625.723	9774.84	11558.3	10932.6
30	3.51829	29491.5	24.4713	Puente Formation	530	25	2032.9	3749.81	7457.62	552.722	6904.9	8382.84	7830.12
31	3.51829	29507.9	26.1981	Puente Formation	530	25	2035.3	3754.23	7386.16	471.783	6914.37	8387.57	7915.78
32	3.51829	29466	27.951	Puente Formation	530	25	2747.45	5067.83	10113.9	382.556	9731.39	11571.8	11189.2
33	3.51829	29362.8	29.7328	Puente Formation	530	25	2031.96	3748.08	7185.84	284.644	6901.2	8346.39	8061.75
34	3.51829	29195.2	31.5468	Puente Formation	530	25	2725.39	5027.14	9821.73	177.587	9644.15	11494.9	11317.3
35	3.51829	28959.3	33.3969	Puente Formation	530	25	2016.82	3720.14	6902.12	60.8529	6841.27	8231.81	8170.96
36	3.6029	29354.8	35.3106	Puente Formation	530	25	1990.77	3672.09	6738.23	0	6738.23	8148.32	8148.32
37	3.6029	28988.8	37.2941	Puente Formation	530	25	1946.74	3590.88	6564.07	0	6564.07	8046.77	8046.77
38	3.6029	28368.7	39.3315	Puente Formation	530	25	1887.15	3480.96	6328.36	0	6328.36	7874.71	7874.71

39	3.6029	27089.2	41.4302	Puente Formation	530	25	1789.13	3300.15	5940.61	0	5940.61	7519.61	7519.61
40	3.6029	25660.2	43.5992	Puente Formation	530	25	1682.9	3104.21	5520.42	0	5520.42	7122.97	7122.97
41	3.6029	24322.3	45.8496	Puente Formation	530	25	1582.15	2918.37	5121.87	0	5121.87	6751.66	6751.66
42	3.6029	26766.4	48.1954	Puente Formation	530	25	1688.39	3114.34	5542.12	0	5542.12	7430.18	7430.18
43	3.6029	24945.4	50.6544	Puente Formation	530	25	1557.61	2873.11	5024.83	0	5024.83	6924.77	6924.77
44	3.6029	22952.4	53.2502	Puente Formation	530	25	1422.76	2624.36	4491.37	0	4491.37	6396.69	6396.69
45	3.6029	20754	56.0152	Puente Formation	530	25	1286.62	2373.24	3952.84	0	3952.84	5861.42	5861.42
46	3.6029	18302.6	58.9959	Puente Formation	530	25	1124.19	2073.64	3310.35	0	3310.35	5181.02	5181.02
47	3.6029	15525.4	62.2642	Puente Formation	530	25	946.941	1746.69	2609.2	0	2609.2	4410.13	4410.13
48	3.6029	12299.6	65.9415	Puente Formation	530	25	750.752	1384.81	1833.14	0	1833.14	3514.73	3514.73
49	3.6029	8383.5	70.2689	Puente Formation	530	25	528.528	974.901	954.093	0	954.093	2427.7	2427.7
50	3.6029	3105.98	75.9228	Puente Formation	530	25	264.271	487.464	-91.2197	0	-91.2197	962.664	962.664

Curved - Curved Pstatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.2946

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.75885	1504.05	-20.5639	Puente 2	530	25	949.659	1229.43	1855.92	355.992	1499.93	1499.65	1143.66
2	3.75885	2139.27	-18.9925	Puente 2	530	25	972.374	1258.84	2003.35	440.353	1563	1668.67	1228.32
3	3.75885	2720.54	-17.4359	Puente 2	530	25	991.949	1284.18	2134.89	517.55	1617.34	1823.35	1305.8
4	3.75885	3249.3	-15.8924	Puente 2	530	25	1008.55	1305.67	2251.2	587.773	1663.43	1964.05	1376.28
5	3.75885	3726.81	-14.3607	Puente 2	530	25	1022.33	1323.5	2352.86	651.189	1701.67	2091.12	1439.93
6	3.75885	4154.16	-12.8394	Puente 2	530	25	1033.41	1337.85	2440.38	707.944	1732.44	2204.85	1496.9
7	3.75885	4532.31	-11.3273	Puente 2	530	25	1041.91	1348.85	2514.2	758.165	1756.03	2305.49	1547.32
8	3.75885	4862.1	-9.82309	Puente 2	530	25	1047.92	1356.64	2574.7	801.963	1772.74	2393.26	1591.3
9	3.75885	5144.22	-8.32572	Puente 2	530	25	1051.55	1361.34	2622.24	839.432	1782.81	2468.35	1628.92
10	3.75885	5379.29	-6.83407	Puente 2	454.215	23.0999	934.787	1210.17	2642.96	870.649	1772.32	2530.93	1660.28
11	3.75885	5567.77	-5.34706	Puente 2	357.559	20.5967	786.844	1018.65	2654.8	895.681	1759.12	2581.15	1685.47
12	3.75885	5710.06	-3.86366	Puente 2	335	20	752.248	973.86	2669.84	914.578	1755.26	2619.04	1704.46
13	3.88237	5998.1	-2.35855	Puente Formation	530	25	1043.48	1350.88	2687.88	927.487	1760.39	2644.9	1717.41
14	3.88237	6050.56	-0.830746	Puente Formation	530	25	1035.86	1341.02	2673.47	934.233	1739.24	2658.45	1724.22
15	3.88237	6052.77	0.696466	Puente Formation	484.73	23.8718	959.956	1242.76	2647.39	934.517	1712.87	2659.06	1724.54
16	3.88237	6004.73	2.22417	Puente Formation	385.429	21.3274	806.512	1044.11	2615.37	928.34	1687.03	2646.69	1718.35
17	3.88237	19503.9	3.75347	Puente Formation	335	20	2257.02	2921.94	8023.25	915.688	7107.56	8171.32	7255.63
18	3.88237	20485.1	5.28544	Puente Formation	353.554	20.4911	1496.36	1937.19	5138.2	900.539	4237.66	5276.63	4376.09
19	3.88237	20293.8	6.82122	Puente Formation	453.38	23.0787	1705.91	2208.47	5023.39	904.388	4119	5227.45	4323.06
20	3.88237	20526.5	8.36195	Puente Formation	530	25	1889.13	2445.67	5009.8	901.638	4108.16	5287.48	4385.84
21	3.88237	28099.9	9.90879	Puente Formation	530	25	2535.71	3282.73	6795.45	892.217	5903.24	7238.41	6346.19
22	3.88237	28507.2	11.463	Puente Formation	530	25	3524.74	4563.13	9525.12	876.039	8649.08	10239.9	9363.82
23	3.88237	28861	13.0258	Puente Formation	530	25	2566.24	3322.25	6840.98	852.998	5987.99	7434.66	6581.66
24	3.88237	29231.3	14.5985	Puente Formation	530	25	2582.96	3343.9	6857.41	822.971	6034.44	7530.15	6707.18
25	3.88237	29626.1	16.1825	Puente Formation	530	25	3547.81	4592.99	9498.92	785.814	8713.11	10528.5	9742.67
26	3.88237	29964.1	17.7794	Puente Formation	530	25	2620.11	3392	6878.94	741.364	6137.57	7719.12	6977.76
27	3.88237	30244	19.3907	Puente Formation	530	25	3559.54	4608.18	9435.12	689.431	8745.68	10688	9998.55
28	3.88237	30464.1	21.0181	Puente Formation	530	25	2643.54	3422.33	6832.41	629.799	6202.61	7848.13	7218.33
29	3.88237	30621.3	22.6635	Puente Formation	530	25	2650.87	3431.82	6781.86	558.892	6222.96	7888.76	7329.86
30	3.88237	30713.7	24.3289	Puente Formation	530	25	3552.44	4598.99	9203.27	477.298	8725.97	10809.4	10332.1
31	3.88237	30739.8	26.0165	Puente Formation	530	25	2655.63	3437.98	6623.35	387.161	6236.19	7919.53	7532.37
32	3.88237	30696.5	27.7287	Puente Formation	530	25	3529.39	4569.15	8950.11	288.117	8662	10805.3	10517.2
33	3.88237	30580.8	29.4683	Puente Formation	530	25	2644.37	3423.4	6384.66	179.752	6204.91	7878.85	7699.09
34	3.88237	30388.9	31.2384	Puente Formation	530	25	3488.65	4516.4	8610.44	61.5897	8548.85	10726.4	10664.8
35	3.90007	30274	33.0464	Puente Formation	530	25	2597.52	3362.75	6074.85	0	6074.85	7764.7	7764.7
36	3.90007	29956.3	34.8967	Puente Formation	530	25	2538.99	3286.97	5912.35	0	5912.35	7683.35	7683.35
37	3.90007	29549.9	36.7897	Puente Formation	530	25	2473.21	3201.82	5729.75	0	5729.75	7579.26	7579.26
38	3.90007	29047	38.7307	Puente Formation	530	25	2399.74	3106.7	5525.75	0	5525.75	7450.41	7450.41

39	3.90007	27943.3	40.7261	Puente Formation	530	25	2283.08	2955.68	5201.89	0	5201.89	7167.46	7167.46
40	3.90007	26313	42.7834	Puente Formation	530	25	2130.36	2757.96	4777.87	0	4777.87	6749.45	6749.45
41	3.90007	24558.5	44.9116	Puente Formation	530	25	1970.79	2551.39	4334.88	0	4334.88	6299.6	6299.6
42	3.90007	26008.8	47.1219	Puente Formation	530	25	2026.44	2623.43	4489.37	0	4489.37	6671.76	6671.76
43	3.90007	25297.2	49.4286	Puente Formation	530	25	1933.48	2503.08	4231.29	0	4231.29	6489.4	6489.4
44	3.90007	23069.5	51.8497	Puente Formation	530	25	1745.43	2259.63	3709.22	0	3709.22	5931.22	5931.22
45	3.90007	20632.5	54.4094	Puente Formation	530	25	1564.58	2025.5	3207.1	0	3207.1	5393.24	5393.24
46	3.90007	17944.3	57.1412	Puente Formation	530	25	1350.55	1748.42	2612.91	0	2612.91	4703.84	4703.84
47	3.90007	14944.7	60.0935	Puente Formation	530	25	1123.2	1454.1	1981.74	0	1981.74	3934.54	3934.54
48	3.90007	11540.1	63.3418	Puente Formation	530	25	880.401	1139.77	1307.64	0	1307.64	3061.31	3061.31
49	3.90007	7570.5	67.0162	Puente Formation	530	25	619.34	801.797	582.871	0	582.871	2043.09	2043.09
50	3.90007	2709.39	71.3843	Puente Formation	530	25	336.402	435.506	-202.642	0	-202.642	796.053	796.053

Global Minimum Query (janbu simplified) - Safety Factor: 0.970038

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.63546	1465.91	-21.8752	Puente 2	530	25	1359.5	1318.76	2049.04	357.535	1691.51	1503.21	1145.68
2	3.63546	2100.49	-20.1392	Puente 2	530	25	1382.93	1341.49	2184.92	444.672	1740.25	1677.77	1233.09
3	3.63546	2678.56	-18.4224	Puente 2	530	25	1401.88	1359.88	2303.73	524.049	1779.68	1836.77	1312.73
4	3.63546	3201.87	-16.7225	Puente 2	530	25	1416.67	1374.22	2406.35	595.908	1810.44	1980.72	1384.82
5	3.63546	3671.97	-15.0377	Puente 2	530	25	1427.56	1384.79	2493.55	660.458	1833.09	2110.03	1449.57
6	3.63546	4090.16	-13.3661	Puente 2	530	25	1434.77	1391.78	2565.98	717.882	1848.1	2225.07	1507.18
7	3.63546	4457.58	-11.706	Puente 2	530	25	1438.5	1395.4	2624.19	768.334	1855.86	2326.13	1557.8
8	3.63546	4775.22	-10.0558	Puente 2	530	25	1438.92	1395.8	2668.67	811.95	1856.72	2413.51	1601.56
9	3.49829	4849.56	-8.44484	Puente Formation	530	25	1436.28	1393.24	2699.5	848.269	1851.23	2486.26	1637.99
10	3.49829	5055.29	-6.87146	Puente Formation	530	25	1430.82	1387.95	2717.5	877.626	1839.87	2545.07	1667.45
11	3.49829	5218.47	-5.30328	Puente Formation	530	25	1422.64	1380.01	2723.77	900.911	1822.86	2591.72	1690.81
12	3.49829	5339.45	-3.73908	Puente Formation	530	25	1411.84	1369.54	2718.57	918.176	1800.39	2626.3	1708.13
13	3.49829	16129.6	-2.17766	Puente Formation	530	25	4127.52	4003.85	8379.15	929.459	7449.7	8222.2	7292.74
14	3.49829	18725.4	-0.617864	Puente Formation	530	25	2684.04	2603.62	5381.69	934.786	4446.9	5352.74	4417.96
15	3.49829	18727.1	0.941476	Puente Formation	468.804	23.4701	2432.91	2360.01	5313.25	957.542	4355.71	5353.23	4395.69
16	3.49829	18688.6	2.50151	Puente Formation	367.402	20.8556	2057.61	1995.96	5252.3	977.601	4274.7	5342.19	4364.59
17	3.49829	22397.6	4.06341	Puente Formation	335	20	2313.86	2244.53	6238.08	991.7	5246.38	6402.45	5410.75
18	3.49829	26246.3	5.62834	Puente Formation	375.842	21.0769	2859.13	2773.46	7220.85	999.811	6221.04	7502.62	6502.81
19	3.49829	26693.7	7.1975	Puente Formation	477.837	23.6982	3303.23	3204.26	7213.37	1001.89	6211.48	7630.52	6628.63
20	3.49829	27099	8.77211	Puente Formation	530	25	4967.06	4818.24	10194	997.887	9196.16	10960.5	9962.62
21	3.49829	27532.2	10.3534	Puente Formation	530	25	3543.63	3437.46	7222.78	987.726	6235.06	7870.18	6882.46
22	3.49829	27972.4	11.9428	Puente Formation	530	25	3561.14	3454.44	7242.8	971.32	6271.48	7996.03	7024.71
23	3.49829	28368.1	13.5415	Puente Formation	530	25	4959.44	4810.85	10128.9	948.568	9180.29	11323.3	10374.8
24	3.49829	28718.6	15.1511	Puente Formation	530	25	3584.21	3476.82	7238.81	919.348	6319.46	8209.33	7289.98
25	3.49829	29022.6	16.773	Puente Formation	530	25	3589.66	3482.11	7214.34	883.517	6330.83	8296.28	7412.76
26	3.49829	29279	18.4088	Puente Formation	530	25	4923.25	4775.74	9945.13	840.09	9105.04	11583.7	10743.6
27	3.49829	29485.5	20.0604	Puente Formation	530	25	3590.32	3482.75	7117.52	785.307	6332.21	8428.58	7643.27
28	3.49829	29641.6	21.7296	Puente Formation	530	25	3584.97	3477.56	7044.42	723.352	6321.07	8473.2	7749.85
29	3.49829	29745.7	23.4184	Puente Formation	530	25	4853.93	4708.5	9614.82	653.98	8960.84	11717.2	11063.2
30	3.49829	29796	25.1291	Puente Formation	530	25	3560.58	3453.9	6847.22	576.912	6270.31	8517.33	7940.41
31	3.49829	29790	26.8641	Puente Formation	530	25	4783.75	4640.42	9306.65	491.83	8814.82	11729.8	11238
32	3.49829	29725.4	28.6262	Puente Formation	530	25	3516.82	3411.45	6577.64	398.37	6179.27	8497.16	8098.79
33	3.49829	29599.1	30.4184	Puente Formation	530	25	4692.14	4551.55	8920.35	296.115	8624.24	11675.2	11379.1
34	3.49829	29407.8	32.2442	Puente Formation	530	25	3451.93	3348.5	6228.89	184.582	6044.31	8406.41	8221.82
35	3.49829	29147.6	34.1075	Puente Formation	530	25	3410.85	3308.65	6022.05	63.2135	5958.84	8332.02	8268.81
36	3.5035	28875.8	36.0144	Puente Formation	530	25	3340.95	3240.85	5813.42	0	5813.42	8242.04	8242.04
37	3.5035	28405.7	37.97	Puente Formation	530	25	3231.53	3134.71	5585.83	0	5585.83	8107.86	8107.86

38	3.5035	27301.1	39.9794	Puente Formation	530	25	3059.26	2967.6	5227.45	0	5227.45	7792.59	7792.59
39	3.5035	26019.3	42.0497	Puente Formation	530	25	2871.44	2785.41	4836.74	0	4836.74	7426.71	7426.71
40	3.5035	24639.1	44.1901	Puente Formation	530	25	2676.39	2596.2	4430.99	0	4430.99	7032.77	7032.77
41	3.5035	26518.3	46.4115	Puente Formation	530	25	2780.7	2697.38	4647.96	0	4647.96	7569.15	7569.15
42	3.5035	25740.9	48.7275	Puente Formation	530	25	2635.03	2556.08	4344.96	0	4344.96	7347.26	7347.26
43	3.5035	23987.2	51.1561	Puente Formation	530	25	2403.12	2331.12	3862.52	0	3862.52	6846.72	6846.72
44	3.5035	22069.3	53.7205	Puente Formation	530	25	2186.83	2121.31	3412.58	0	3412.58	6391.82	6391.82
45	3.5035	19955.3	56.453	Puente Formation	530	25	1931.91	1874.03	2882.27	0	2882.27	5795.88	5795.88
46	3.5035	17599.3	59.3998	Puente Formation	530	25	1659.98	1610.24	2316.57	0	2316.57	5123.41	5123.41
47	3.5035	14931.2	62.6323	Puente Formation	530	25	1370.46	1329.4	1714.33	0	1714.33	4361.87	4361.87
48	3.5035	11833	66.2714	Puente Formation	530	25	1059.44	1027.7	1067.32	0	1067.32	3477.54	3477.54
49	3.5035	8071.08	70.5582	Puente Formation	530	25	720.564	698.974	362.366	0	362.366	2403.77	2403.77
50	3.5035	2992.31	76.1731	Puente Formation	530	25	340.325	330.128	-428.627	0	-428.627	954.122	954.122

Curved - Block Static

Global Minimum Query (bishop simplified) - Safety Factor: 2.07901

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.85529	1400.39	-45	Puente 2	530	25	470.503	978.181	961.128	0	961.128	490.624	490.624
2	2.85529	2419.47	-45	Puente 2	530	25	573.714	1192.76	1421.29	0	1421.29	847.571	847.571
3	2.85529	3438.56	-45	Puente 2	530	25	676.924	1407.33	1881.45	0	1881.45	1204.52	1204.52
4	1.41778	2086.05	-45	Puente Formation	530	25	754.152	1567.89	2225.77	0	2225.77	1471.62	1471.62
5	3.11672	4798.92	5.92732	Puente Formation	395.276	21.584	473.751	984.934	1490.53	0	1490.53	1539.71	1539.71
6	3.11672	4672.85	5.92732	Puente Formation	395.276	21.584	466.204	969.243	1450.86	0	1450.86	1499.27	1499.27
7	3.11672	4546.79	5.92732	Puente Formation	395.276	21.584	458.657	953.552	1411.2	0	1411.2	1458.82	1458.82
8	3.11672	4420.72	5.92732	Puente Formation	395.276	21.584	451.109	937.86	1371.53	0	1371.53	1418.37	1418.37
9	3.11672	12444.7	5.92732	Puente Formation	395.276	21.584	931.504	1936.61	3896.15	0	3896.15	3992.86	3992.86
10	3.11672	15990.3	5.92732	Puente Formation	395.276	21.584	1143.78	2377.93	5011.69	0	5011.69	5130.44	5130.44
11	3.11672	15864.9	5.92732	Puente Formation	395.276	21.584	1136.26	2362.31	4972.24	0	4972.24	5090.21	5090.21
12	3.11672	15744.1	5.92732	Puente Formation	395.276	21.584	1129.03	2347.27	4934.23	0	4934.23	5051.45	5051.45
13	3.11672	15624.2	5.92732	Puente Formation	395.276	21.584	1121.86	2332.36	4896.51	0	4896.51	5012.98	5012.98
14	3.11672	21265	5.92732	Puente Formation	395.276	21.584	1459.57	3034.46	6671.28	0	6671.28	6822.82	6822.82
15	3.11672	22411.3	5.92732	Puente Formation	395.276	21.584	2201.37	4576.68	10569.7	0	10569.7	10798.2	10798.2
16	3.11672	22777.2	5.92732	Puente Formation	395.276	21.584	1550.1	3222.68	7147.05	0	7147.05	7307.98	7307.98
17	3.11672	23143.1	5.92732	Puente Formation	395.276	21.584	1572.01	3268.22	7262.19	0	7262.19	7425.4	7425.4
18	3.11672	23560	5.92732	Puente Formation	395.276	21.584	1596.97	3320.12	7393.39	0	7393.39	7559.19	7559.19
19	3.01365	22701.5	45.5485	Puente Formation	530	25	2263.63	4706.11	8955.72	0	8955.72	11263.1	11263.1
20	3.01365	22095	45.5485	Puente Formation	530	25	2226.9	4629.74	8791.94	0	8791.94	11061.9	11061.9
21	3.01365	21488.6	45.5485	Puente Formation	530	25	1509.09	3137.41	5591.61	0	5591.61	7129.87	7129.87
22	3.01365	20882.1	45.5485	Puente Formation	530	25	2153.43	4477	8464.38	0	8464.38	10659.4	10659.4
23	3.01365	20275.7	45.5485	Puente Formation	530	25	1435.62	2984.66	5264.05	0	5264.05	6727.42	6727.42
24	3.2561	21248.8	45.5485	Puente Formation	530	25	2029.1	4218.51	7910.03	0	7910.03	9978.35	9978.35
25	3.2561	20588.1	45.5485	Puente Formation	530	25	1992.05	4141.5	7744.88	0	7744.88	9775.44	9775.44
26	3.2561	19927.4	45.5485	Puente Formation	530	25	1324.64	2753.95	4769.29	0	4769.29	6119.54	6119.54
27	3.2561	19266.7	45.5485	Puente Formation	530	25	1287.6	2676.94	4604.13	0	4604.13	5916.63	5916.63
28	3.2561	18605.9	45.5485	Puente Formation	530	25	1250.56	2599.93	4438.98	0	4438.98	5713.72	5713.72
29	3.2561	17945.2	45.5485	Puente Formation	530	25	1213.52	2522.92	4273.84	0	4273.84	5510.82	5510.82
30	3.2561	17284.5	45.5485	Puente Formation	530	25	1176.48	2445.91	4108.69	0	4108.69	5307.91	5307.91
31	3.2561	16623.8	45.5485	Puente Formation	530	25	1139.44	2368.9	3943.53	0	3943.53	5104.99	5104.99
32	3.2561	15963	45.5485	Puente Formation	530	25	1102.39	2291.89	3778.4	0	3778.4	4902.1	4902.1
33	3.2561	15302.3	45.5485	Puente Formation	530	25	1065.35	2214.88	3613.24	0	3613.24	4699.19	4699.19
34	3.2561	14641.6	45.5485	Puente Formation	530	25	1028.31	2137.87	3448.11	0	3448.11	4496.3	4496.3

35	3.2561	13980.9	45.5485	Puente Formation	530	25	991.27	2060.86	3282.95	0	3282.95	4293.38	4293.38
36	3.2561	13117.8	45.5485	Puente Formation	530	25	942.891	1960.28	3067.23	0	3067.23	4028.35	4028.35
37	2.89464	10615.8	43.7336	Puente Formation	530	25	887.076	1844.24	2818.39	0	2818.39	3667.09	3667.09
38	2.89464	9653.83	43.7336	Puente Formation	530	25	825.71	1716.66	2544.78	0	2544.78	3334.77	3334.77
39	2.89464	8691.85	43.7336	Puente Formation	530	25	764.345	1589.08	2271.19	0	2271.19	3002.48	3002.48
40	2.89464	9140.25	43.7336	Puente Formation	530	25	792.945	1648.54	2398.73	0	2398.73	3157.37	3157.37
41	2.89464	10241.5	43.7336	Puente Formation	530	25	863.195	1794.59	2711.93	0	2711.93	3537.78	3537.78
42	2.89464	9279.48	43.7336	Puente Formation	530	25	801.829	1667.01	2438.32	0	2438.32	3205.47	3205.47
43	3.16623	9022.49	45	Puente Formation	530	25	730.547	1518.82	2120.52	0	2120.52	2851.07	2851.07
44	3.16623	7819.49	45	Puente Formation	530	25	678.947	1411.54	1890.46	0	1890.46	2569.41	2569.41
45	3.16623	6616.49	45	Puente Formation	530	25	609.345	1266.83	1580.15	0	1580.15	2189.49	2189.49
46	3.16623	5413.49	45	Puente Formation	530	25	539.742	1122.13	1269.83	0	1269.83	1809.57	1809.57
47	3.16623	4210.49	45	Puente Formation	530	25	470.14	977.425	959.506	0	959.506	1429.65	1429.65
48	3.16623	3007.5	45	Puente Formation	530	25	400.537	832.721	649.188	0	649.188	1049.72	1049.72
49	3.16623	1804.5	45	Puente Formation	530	25	330.934	688.016	338.867	0	338.867	669.801	669.801
50	3.16623	601.499	45	Puente Formation	530	25	261.332	543.312	28.5476	0	28.5476	289.88	289.88

Global Minimum Query (janbu simplified) - Safety Factor: 1.82803

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.78162	1351.46	-45	Puente 2	530	25	555.844	1016.1	1042.44	0	1042.44	486.599	486.599
2	2.78162	2318.63	-45	Puente 2	530	25	674.966	1233.86	1509.43	0	1509.43	834.464	834.464
3	2.78162	3285.81	-45	Puente 2	530	25	794.088	1451.62	1976.41	0	1976.41	1182.33	1182.33
4	1.4538	1962.57	3.24283	Puente 2	530	25	625.239	1142.96	1314.49	0	1314.49	1349.91	1349.91
5	3.07037	4095.68	3.24283	Puente Formation	335	20	443.838	811.349	1308.76	0	1308.76	1333.9	1333.9
6	3.07037	4028.92	3.24283	Puente Formation	335	20	439.557	803.523	1287.26	0	1287.26	1312.16	1312.16
7	3.07037	3962.15	3.24283	Puente Formation	335	20	435.276	795.697	1265.75	0	1265.75	1290.42	1290.42
8	3.07037	3895.39	3.24283	Puente Formation	335	20	430.994	787.87	1244.25	0	1244.25	1268.67	1268.67
9	3.07037	6642.4	3.24283	Puente Formation	335	20	607.141	1109.87	2128.94	0	2128.94	2163.34	2163.34
10	3.07037	15407.8	3.24283	Puente Formation	335	20	1169.2	2137.34	4951.89	0	4951.89	5018.13	5018.13
11	3.07037	15341	3.24283	Puente Formation	335	20	1164.92	2129.51	4930.36	0	4930.36	4996.37	4996.37
12	3.07037	15277	3.24283	Puente Formation	335	20	1160.82	2122.01	4909.78	0	4909.78	4975.55	4975.55
13	3.07037	15216.3	3.24283	Puente Formation	335	20	1156.92	2114.89	4890.2	0	4890.2	4955.75	4955.75
14	3.07037	17416.6	3.24283	Puente Formation	335	20	1298.01	2372.81	5598.82	0	5598.82	5672.36	5672.36
15	3.07037	21762	3.24283	Puente Formation	335	20	2297.65	4200.18	10619.5	0	10619.5	10749.7	10749.7
16	3.07037	22172.6	3.24283	Puente Formation	335	20	1602.98	2930.3	7130.54	0	7130.54	7221.37	7221.37
17	3.07037	22583.2	3.24283	Puente Formation	335	20	1629.32	2978.44	7262.79	0	7262.79	7355.11	7355.11
18	3.07037	23003.3	3.24283	Puente Formation	335	20	1656.25	3027.68	7398.06	0	7398.06	7491.9	7491.9
19	3.30901	24826.8	38.9443	Puente Formation	530	25	2545.18	4652.66	8841.06	0	8841.06	10898	10898
20	3.30901	24384.6	38.9443	Puente Formation	530	25	1798.45	3287.62	5913.73	0	5913.73	7367.19	7367.19
21	3.30901	23942.5	38.9443	Puente Formation	530	25	2488.67	4549.36	8619.56	0	8619.56	10630.8	10630.8
22	3.30901	23500.3	38.9443	Puente Formation	530	25	1741.95	3184.33	5692.23	0	5692.23	7100.02	7100.02
23	3.30901	23058.2	38.9443	Puente Formation	530	25	2432.16	4446.07	8398.03	0	8398.03	10363.6	10363.6
24	3.30901	22615.7	38.9443	Puente Formation	530	25	2403.89	4394.38	8287.19	0	8287.19	10229.9	10229.9
25	3.34463	22428	38.9443	Puente Formation	530	25	1658.17	3031.18	5363.8	0	5363.8	6703.89	6703.89
26	3.34463	22014.3	38.9443	Puente Formation	530	25	2342.83	4282.77	8047.84	0	8047.84	9941.26	9941.26
27	3.34463	21600.6	38.9443	Puente Formation	530	25	1605.86	2935.56	5158.75	0	5158.75	6456.56	6456.56
28	3.34463	21186.9	38.9443	Puente Formation	530	25	1579.71	2887.75	5056.22	0	5056.22	6332.9	6332.9
29	3.34463	20773.3	38.9443	Puente Formation	530	25	1553.56	2839.95	4953.69	0	4953.69	6209.24	6209.24
30	3.34463	20359.6	38.9443	Puente Formation	530	25	1527.4	2792.14	4851.17	0	4851.17	6085.58	6085.58
31	3.34463	19945.9	38.9443	Puente Formation	530	25	1501.25	2744.33	4748.64	0	4748.64	5961.91	5961.91
32	3.34463	19532.2	38.9443	Puente Formation	530	25	1475.1	2696.52	4646.14	0	4646.14	5838.27	5838.27
33	3.34463	19118.5	38.9443	Puente Formation	530	25	1448.95	2648.72	4543.61	0	4543.61	5714.61	5714.61
34	3.0597	16901.9	50.423	Puente Formation	530	25	1297.95	2372.7	3951.68	0	3951.68	5521.92	5521.92
35	3.0597	16104.5	50.423	Puente Formation	530	25	1247.17	2279.86	3752.59	0	3752.59	5261.39	5261.39

36	3.0597	15118.2	50.423	Puente Formation	530	25	1184.35	2165.02	3506.32	0	3506.32	4939.12	4939.12
37	3.0597	13768.1	50.423	Puente Formation	530	25	1098.37	2007.85	3169.24	0	3169.24	4498.03	4498.03
38	3.0597	12409	50.423	Puente Formation	530	25	1011.81	1849.62	2829.92	0	2829.92	4053.99	4053.99
39	3.0597	11050	50.423	Puente Formation	530	25	925.247	1691.38	2490.59	0	2490.59	3609.94	3609.94
40	3.0597	11789.4	50.423	Puente Formation	530	25	972.347	1777.48	2675.22	0	2675.22	3851.55	3851.55
41	3.0597	12003.4	50.423	Puente Formation	530	25	985.974	1802.39	2728.66	0	2728.66	3921.47	3921.47
42	3.0597	10644.4	50.423	Puente Formation	530	25	899.416	1644.16	2389.33	0	2389.33	3477.42	3477.42
43	3.39249	10358.1	45	Puente Formation	530	25	858.416	1569.21	2228.59	0	2228.59	3087	3087
44	3.39249	8977.01	45	Puente Formation	530	25	788.921	1442.17	1956.16	0	1956.16	2745.08	2745.08
45	3.39249	7595.93	45	Puente Formation	530	25	706.204	1290.96	1631.89	0	1631.89	2338.09	2338.09
46	3.39249	6214.85	45	Puente Formation	530	25	623.487	1139.75	1307.62	0	1307.62	1931.11	1931.11
47	3.39249	4833.77	45	Puente Formation	530	25	540.77	988.543	983.349	0	983.349	1524.12	1524.12
48	3.39249	3452.7	45	Puente Formation	530	25	458.052	837.333	659.078	0	659.078	1117.13	1117.13
49	3.39249	2071.62	45	Puente Formation	530	25	375.335	686.124	334.808	0	334.808	710.143	710.143
50	3.39249	690.539	45	Puente Formation	530	25	292.618	534.914	10.5378	0	10.5378	303.155	303.155

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 2.23999

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.41806	1796.63	-45	Puente 2	530	25	462.598	1036.21	1085.58	0	1085.58	622.982	622.982
2	3.41806	3257.03	-45	Puente 2	530	25	664.145	1487.68	2053.75	0	2053.75	1389.6	1389.6
3	1.90002	2442.03	-45	Puente Formation	530	25	870.343	1949.56	3044.26	0	3044.26	2173.92	2173.92
4	2.86784	4033.32	-0.760871	Puente Formation	530	25	642.63	1439.49	1950.4	0	1950.4	1941.86	1941.86
5	2.86784	4046.97	-0.760871	Puente Formation	530	25	657.389	1472.54	2021.29	0	2021.29	2012.56	2012.56
6	2.86784	4060.63	-0.760871	Puente Formation	530	25	671.935	1505.13	2091.17	0	2091.17	2082.25	2082.25
7	2.86784	4074.28	-0.760871	Puente Formation	530	25	686.133	1536.93	2159.37	0	2159.37	2150.26	2150.26
8	2.86784	14595.7	-0.760871	Puente Formation	530	25	1566.07	3507.98	6386.31	0	6386.31	6365.51	6365.51
9	2.86784	14979.3	-0.760871	Puente Formation	530	25	1605.81	3596.99	6577.17	0	6577.17	6555.84	6555.84
10	2.86784	14993.7	-0.760871	Puente Formation	530	25	1637.34	3667.62	6728.66	0	6728.66	6706.92	6706.92
11	2.86784	15012	-0.760871	Puente Formation	530	25	1667.59	3735.38	6873.98	0	6873.98	6851.84	6851.84
12	2.86784	15030.9	-0.760871	Puente Formation	530	25	1695.9	3798.8	7009.96	0	7009.96	6987.44	6987.44
13	2.86784	19464.4	-0.760871	Puente Formation	530	25	2094.25	4691.11	8923.5	0	8923.5	8895.69	8895.69
14	2.86784	21427.3	-0.760871	Puente Formation	530	25	2289.92	5129.39	9863.43	0	9863.43	9833.02	9833.02
15	2.86784	21857.4	-0.760871	Puente Formation	530	25	2354.63	5274.35	10174.3	0	10174.3	10143	10143
16	3.08563	23466.5	41.3273	Puente Formation	530	25	2649.42	5934.67	11590.4	0	11590.4	13920.2	13920.2
17	3.08563	22922.4	41.3273	Puente Formation	530	25	1248.72	2797.12	4861.86	0	4861.86	5959.94	5959.94
18	3.08563	22447.5	41.3273	Puente Formation	530	25	2604.24	5833.48	11373.4	0	11373.4	13663.4	13663.4
19	3.08563	21978.3	41.3273	Puente Formation	530	25	2589.83	5801.19	11304.1	0	11304.1	13581.5	13581.5
20	3.08563	21509.1	41.3273	Puente Formation	530	25	1140.3	2554.26	4341.04	0	4341.04	5343.79	5343.79
21	3.08563	21039.9	41.3273	Puente Formation	530	25	2541.64	5693.25	11072.6	0	11072.6	13307.7	13307.7
22	3.08563	20570.7	41.3273	Puente Formation	530	25	1070.83	2398.65	4007.34	0	4007.34	4948.99	4948.99
23	3.05823	19942.7	41.3273	Puente Formation	530	25	2504.65	5610.38	10894.9	0	10894.9	13097.4	13097.4
24	3.05823	19516.9	41.3273	Puente Formation	530	25	1009.72	2261.77	3713.8	0	3713.8	4601.72	4601.72
25	3.05823	19091.2	41.3273	Puente Formation	530	25	2453.81	5496.52	10650.7	0	10650.7	12808.5	12808.5
26	3.05823	18665.4	41.3273	Puente Formation	530	25	953.419	2135.65	3443.33	0	3443.33	4281.73	4281.73
27	3.05823	18239.6	41.3273	Puente Formation	530	25	927.196	2076.91	3317.36	0	3317.36	4132.7	4132.7
28	3.05823	17813.8	41.3273	Puente Formation	530	25	903.089	2022.91	3201.56	0	3201.56	3995.7	3995.7
29	3.05823	17388.1	41.3273	Puente Formation	530	25	880.888	1973.18	3094.91	0	3094.91	3869.54	3869.54
30	3.05823	16962.3	41.3273	Puente Formation	530	25	860.446	1927.39	2996.72	0	2996.72	3753.37	3753.37
31	3.05823	16536.5	41.3273	Puente Formation	530	25	841.656	1885.3	2906.45	0	2906.45	3646.58	3646.58
32	3.05823	16110.7	41.3273	Puente Formation	530	25	824.455	1846.77	2823.83	0	2823.83	3548.82	3548.82
33	3.05823	15685	41.3273	Puente Formation	530	25	808.807	1811.72	2748.66	0	2748.66	3459.9	3459.9
34	3.05823	15259.2	41.3273	Puente Formation	530	25	794.696	1780.11	2680.87	0	2680.87	3379.7	3379.7

35	3.05823	14833.4	41.3273	Puente Formation	530	25	782.106	1751.91	2620.39	0	2620.39	3308.15	3308.15
36	2.9787	13711	50.8054	Puente Formation	530	25	675.476	1513.06	2108.18	0	2108.18	2936.55	2936.55
37	2.9787	12424.4	50.8054	Puente Formation	530	25	633.653	1419.38	1907.27	0	1907.27	2684.36	2684.36
38	2.9787	11118.7	50.8054	Puente Formation	530	25	592.051	1326.19	1707.43	0	1707.43	2433.5	2433.5
39	2.9787	9812.95	50.8054	Puente Formation	530	25	550.675	1233.51	1508.67	0	1508.67	2183.99	2183.99
40	2.9787	9821.31	50.8054	Puente Formation	530	25	560.081	1254.58	1553.86	0	1553.86	2240.72	2240.72
41	2.9787	10775.9	50.8054	Puente Formation	530	25	609.921	1366.22	1793.27	0	1793.27	2541.25	2541.25
42	2.9787	9470.22	50.8054	Puente Formation	530	25	572.401	1282.17	1613.04	0	1613.04	2315.01	2315.01
43	3.08347	8557.04	45	Puente Formation	530	25	571.944	1281.15	1610.84	0	1610.84	2182.79	2182.79
44	3.08347	7416.1	45	Puente Formation	530	25	547.892	1227.27	1495.31	0	1495.31	2043.2	2043.2
45	3.08347	6275.16	45	Puente Formation	530	25	508.166	1138.29	1304.47	0	1304.47	1812.64	1812.64
46	3.08347	5134.22	45	Puente Formation	530	25	465.304	1042.28	1098.58	0	1098.58	1563.88	1563.88
47	3.08347	3993.28	45	Puente Formation	530	25	418.635	937.738	874.398	0	874.398	1293.03	1293.03
48	3.08347	2852.35	45	Puente Formation	530	25	367.416	823.009	628.359	0	628.359	995.775	995.775
49	3.08347	1711.41	45	Puente Formation	530	25	310.824	696.242	356.508	0	356.508	667.331	667.331
50	3.08347	570.469	45	Puente Formation	530	25	247.942	555.388	54.445	0	54.445	302.387	302.387

Curved - Block Pseudostatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.17267

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.75135	2049.96	-45	Puente 2	530	25	1836.65	2153.79	3482.24	0	3482.24	1645.58	1645.58
2	3.75135	3809.03	-45	Puente 2	530	25	2146.12	2516.69	4260.48	0	4260.48	2114.36	2114.36
3	3.75135	5568.11	-45	Puente 2	530	25	2455.58	2879.58	5038.69	0	5038.69	2583.12	2583.12
4	0.347657	597.087	3.41007	Puente 2	530	25	1535.94	1801.15	2725.98	0	2725.98	2817.5	2817.5
5	3.34841	5704.68	3.41007	Puente Formation	335	20	1134.9	1330.86	2736.1	0	2736.1	2803.73	2803.73
6	3.34841	5621.17	3.41007	Puente Formation	335	20	1127.3	1321.95	2711.61	0	2711.61	2778.79	2778.79
7	3.34841	5537.66	3.41007	Puente Formation	335	20	1119.7	1313.03	2687.13	0	2687.13	2753.85	2753.85
8	3.34841	5454.15	3.41007	Puente Formation	335	20	1112.1	1304.12	2662.64	0	2662.64	2728.91	2728.91
9	3.34841	5370.64	3.41007	Puente Formation	335	20	1104.5	1295.21	2638.15	0	2638.15	2703.96	2703.96
10	3.34841	17059.9	3.41007	Puente Formation	335	20	2583.63	3029.74	7403.72	0	7403.72	7557.67	7557.67
11	3.34841	17904.1	3.41007	Puente Formation	335	20	1909.97	2239.76	5233.29	0	5233.29	5347.1	5347.1
12	3.34841	17823.2	3.41007	Puente Formation	335	20	1902.6	2231.12	5209.56	0	5209.56	5322.93	5322.93
13	3.34841	17746.7	3.41007	Puente Formation	335	20	1895.64	2222.96	5187.14	0	5187.14	5300.1	5300.1
14	3.34841	20781.3	3.41007	Puente Formation	335	20	2171.83	2546.84	6076.97	0	6076.97	6206.38	6206.38
15	3.34841	24955.9	3.41007	Puente Formation	335	20	2551.76	2992.37	7301.05	0	7301.05	7453.1	7453.1
16	3.34841	25440.1	3.41007	Puente Formation	335	20	2595.83	3044.05	7443.07	0	7443.07	7597.75	7597.75
17	3.34841	25924.4	3.41007	Puente Formation	335	20	3663.24	4295.77	10882.1	0	10882.1	11100.4	11100.4
18	3.34841	26450.5	3.41007	Puente Formation	335	20	2687.78	3151.88	7739.32	0	7739.32	7899.47	7899.47
19	3.34841	27045.8	3.41007	Puente Formation	335	20	2741.96	3215.42	7913.9	0	7913.9	8077.28	8077.28
20	3.18202	25747.5	40.7213	Puente Formation	530	25	3781.07	4433.95	8372.05	0	8372.05	11626.7	11626.7
21	3.18202	25272	40.7213	Puente Formation	530	25	2689.85	3154.31	5627.87	0	5627.87	7943.24	7943.24
22	3.18202	24796.6	40.7213	Puente Formation	530	25	3692.53	4330.12	8149.37	0	8149.37	11327.8	11327.8
23	3.18202	24321.1	40.7213	Puente Formation	530	25	2601.32	3050.49	5405.19	0	5405.19	7644.36	7644.36
24	3.18202	23844.9	40.7213	Puente Formation	530	25	3603.92	4226.21	7926.56	0	7926.56	11028.7	11028.7
25	3.18202	23368	40.7213	Puente Formation	530	25	3559.51	4174.13	7814.88	0	7814.88	10878.8	10878.8
26	3.18202	22891	40.7213	Puente Formation	530	25	2468.15	2894.33	5070.31	0	5070.31	7194.85	7194.85
27	3.08667	21767.4	40.7213	Puente Formation	530	25	3505.44	4110.73	7678.89	0	7678.89	10696.3	10696.3
28	3.08667	21354.9	40.7213	Puente Formation	530	25	2386.56	2798.65	4865.13	0	4865.13	6919.44	6919.44
29	3.08667	20942.5	40.7213	Puente Formation	530	25	2346.97	2752.22	4765.56	0	4765.56	6785.79	6785.79
30	3.08667	20530	40.7213	Puente Formation	530	25	2307.38	2705.79	4666	0	4666	6652.14	6652.14
31	3.08667	20117.5	40.7213	Puente Formation	530	25	2267.78	2659.36	4566.41	0	4566.41	6518.47	6518.47
32	3.08667	19705	40.7213	Puente Formation	530	25	2228.19	2612.93	4466.84	0	4466.84	6384.83	6384.83
33	3.08667	19292.5	40.7213	Puente Formation	530	25	2188.6	2566.5	4367.28	0	4367.28	6251.18	6251.18
34	3.48688	21092.8	48.7872	Puente Formation	530	25	1965.46	2304.84	3806.16	0	3806.16	6050.28	6050.28

35	3.48688	20156.5	48.7872	Puente Formation	530	25	1892.02	2218.71	3621.44	0	3621.44	5781.7	5781.7
36	3.48688	19020.3	48.7872	Puente Formation	530	25	1802.89	2114.19	3397.3	0	3397.3	5455.79	5455.79
37	3.48688	17379	48.7872	Puente Formation	530	25	1674.15	1963.22	3073.53	0	3073.53	4985.03	4985.03
38	3.48688	15713.2	48.7872	Puente Formation	530	25	1543.47	1809.98	2744.92	0	2744.92	4507.22	4507.22
39	3.48688	14097.4	48.7872	Puente Formation	530	25	1416.72	1661.34	2426.18	0	2426.18	4043.75	4043.75
40	3.48688	16565.7	48.7872	Puente Formation	530	25	1610.34	1888.4	2913.11	0	2913.11	4751.76	4751.76
41	3.48688	14899.9	48.7872	Puente Formation	530	25	1479.67	1735.17	2584.48	0	2584.48	4273.94	4273.94
42	3.48688	13234	48.7872	Puente Formation	530	25	1352.34	1585.85	2264.26	0	2264.26	3808.33	3808.33
43	3.48688	11568.2	48.7872	Puente Formation	530	25	1245.67	1460.76	1996.03	0	1996.03	3418.31	3418.31
44	3.48688	9902.33	48.7872	Puente Formation	530	25	1115	1307.53	1667.41	0	1667.41	2940.49	2940.49
45	3.48688	8236.48	48.7872	Puente Formation	530	25	984.326	1154.29	1338.79	0	1338.79	2462.67	2462.67
46	3.53877	6762.34	45	Puente Formation	530	25	895.628	1050.28	1115.73	0	1115.73	2011.36	2011.36
47	3.53877	5259.6	45	Puente Formation	530	25	774.793	908.576	811.86	0	811.86	1586.65	1586.65
48	3.53877	3756.86	45	Puente Formation	530	25	653.958	766.877	507.984	0	507.984	1161.94	1161.94
49	3.53877	2254.11	45	Puente Formation	530	25	533.123	625.178	204.109	0	204.109	737.233	737.233
50	3.53877	751.372	45	Puente Formation	530	25	412.289	483.479	-99.7654	0	-99.7654	312.523	312.523

Query 1 (bishop simplified) - Safety Factor: 1.17267

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.75135	2049.96	-45	Puente 2	530	25	1836.65	2153.79	3482.24	0	3482.24	1645.58	1645.58
2	3.75135	3809.03	-45	Puente 2	530	25	2146.12	2516.69	4260.48	0	4260.48	2114.36	2114.36
3	3.75135	5568.11	-45	Puente 2	530	25	2455.58	2879.58	5038.69	0	5038.69	2583.12	2583.12
4	0.347657	597.087	3.41007	Puente 2	530	25	1535.94	1801.15	2725.98	0	2725.98	2817.5	2817.5
5	3.34841	5704.68	3.41007	Puente Formation	335	20	1134.9	1330.86	2736.1	0	2736.1	2803.73	2803.73
6	3.34841	5621.17	3.41007	Puente Formation	335	20	1127.3	1321.95	2711.61	0	2711.61	2778.79	2778.79
7	3.34841	5537.66	3.41007	Puente Formation	335	20	1119.7	1313.03	2687.13	0	2687.13	2753.85	2753.85
8	3.34841	5454.15	3.41007	Puente Formation	335	20	1112.1	1304.12	2662.64	0	2662.64	2728.91	2728.91
9	3.34841	5370.64	3.41007	Puente Formation	335	20	1104.5	1295.21	2638.15	0	2638.15	2703.96	2703.96
10	3.34841	17059.9	3.41007	Puente Formation	335	20	2583.63	3029.74	7403.72	0	7403.72	7557.67	7557.67
11	3.34841	17904.1	3.41007	Puente Formation	335	20	1909.97	2239.76	5233.29	0	5233.29	5347.1	5347.1
12	3.34841	17823.2	3.41007	Puente Formation	335	20	1902.6	2231.12	5209.56	0	5209.56	5322.93	5322.93
13	3.34841	17746.7	3.41007	Puente Formation	335	20	1895.64	2222.96	5187.14	0	5187.14	5300.1	5300.1
14	3.34841	20781.3	3.41007	Puente Formation	335	20	2171.83	2546.84	6076.97	0	6076.97	6206.38	6206.38
15	3.34841	24955.9	3.41007	Puente Formation	335	20	2551.76	2992.37	7301.05	0	7301.05	7453.1	7453.1
16	3.34841	25440.1	3.41007	Puente Formation	335	20	2595.83	3044.05	7443.07	0	7443.07	7597.75	7597.75
17	3.34841	25924.4	3.41007	Puente Formation	335	20	3663.24	4295.77	10882.1	0	10882.1	11100.4	11100.4
18	3.34841	26450.5	3.41007	Puente Formation	335	20	2687.78	3151.88	7739.32	0	7739.32	7899.47	7899.47
19	3.34841	27045.8	3.41007	Puente Formation	335	20	2741.96	3215.42	7913.9	0	7913.9	8077.28	8077.28
20	3.18202	25747.5	40.7213	Puente Formation	530	25	3781.07	4433.95	8372.05	0	8372.05	11626.7	11626.7
21	3.18202	25272	40.7213	Puente Formation	530	25	2689.85	3154.31	5627.87	0	5627.87	7943.24	7943.24
22	3.18202	24796.6	40.7213	Puente Formation	530	25	3692.53	4330.12	8149.37	0	8149.37	11327.8	11327.8
23	3.18202	24321.1	40.7213	Puente Formation	530	25	2601.32	3050.49	5405.19	0	5405.19	7644.36	7644.36
24	3.18202	23844.9	40.7213	Puente Formation	530	25	3603.92	4226.21	7926.56	0	7926.56	11028.7	11028.7
25	3.18202	23368	40.7213	Puente Formation	530	25	3559.51	4174.13	7814.88	0	7814.88	10878.8	10878.8
26	3.18202	22891	40.7213	Puente Formation	530	25	2468.15	2894.33	5070.31	0	5070.31	7194.85	7194.85
27	3.08667	21767.4	40.7213	Puente Formation	530	25	3505.44	4110.73	7678.89	0	7678.89	10696.3	10696.3
28	3.08667	21354.9	40.7213	Puente Formation	530	25	2386.56	2798.65	4865.13	0	4865.13	6919.44	6919.44
29	3.08667	20942.5	40.7213	Puente Formation	530	25	2346.97	2752.22	4765.56	0	4765.56	6785.79	6785.79
30	3.08667	20530	40.7213	Puente Formation	530	25	2307.38	2705.79	4666	0	4666	6652.14	6652.14
31	3.08667	20117.5	40.7213	Puente Formation	530	25	2267.78	2659.36	4566.41	0	4566.41	6518.47	6518.47
32	3.08667	19705	40.7213	Puente Formation	530	25	2228.19	2612.93	4466.84	0	4466.84	6384.83	6384.83
33	3.08667	19292.5	40.7213	Puente Formation	530	25	2188.6	2566.5	4367.28	0	4367.28	6251.18	6251.18
34	3.48688	21092.8	48.7872	Puente Formation	530	25	1965.46	2304.84	3806.16	0	3806.16	6050.28	6050.28
35	3.48688	20156.5	48.7872	Puente Formation	530	25	1892.02	2218.71	3621.44	0	3621.44	5781.7	5781.7

36	3.48688	19020.3	48.7872	Puente Formation	530	25	1802.89	2114.19	3397.3	0	3397.3	5455.79	5455.79
37	3.48688	17379	48.7872	Puente Formation	530	25	1674.15	1963.22	3073.53	0	3073.53	4985.03	4985.03
38	3.48688	15713.2	48.7872	Puente Formation	530	25	1543.47	1809.98	2744.92	0	2744.92	4507.22	4507.22
39	3.48688	14097.4	48.7872	Puente Formation	530	25	1416.72	1661.34	2426.18	0	2426.18	4043.75	4043.75
40	3.48688	16565.7	48.7872	Puente Formation	530	25	1610.34	1888.4	2913.11	0	2913.11	4751.76	4751.76
41	3.48688	14899.9	48.7872	Puente Formation	530	25	1479.67	1735.17	2584.48	0	2584.48	4273.94	4273.94
42	3.48688	13234	48.7872	Puente Formation	530	25	1352.34	1585.85	2264.26	0	2264.26	3808.33	3808.33
43	3.48688	11568.2	48.7872	Puente Formation	530	25	1245.67	1460.76	1996.03	0	1996.03	3418.31	3418.31
44	3.48688	9902.33	48.7872	Puente Formation	530	25	1115	1307.53	1667.41	0	1667.41	2940.49	2940.49
45	3.48688	8236.48	48.7872	Puente Formation	530	25	984.326	1154.29	1338.79	0	1338.79	2462.67	2462.67
46	3.53877	6762.34	45	Puente Formation	530	25	895.628	1050.28	1115.73	0	1115.73	2011.36	2011.36
47	3.53877	5259.6	45	Puente Formation	530	25	774.793	908.576	811.86	0	811.86	1586.65	1586.65
48	3.53877	3756.86	45	Puente Formation	530	25	653.958	766.877	507.984	0	507.984	1161.94	1161.94
49	3.53877	2254.11	45	Puente Formation	530	25	533.123	625.178	204.109	0	204.109	737.233	737.233
50	3.53877	751.372	45	Puente Formation	530	25	412.289	483.479	-99.7654	0	-99.7654	312.523	312.523

Global Minimum Query (janbu simplified) - Safety Factor: 1.01729

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.75135	2049.96	-45	Puente 2	530	25	2355.16	2395.88	4001.39	0	4001.39	1646.23	1646.23
2	3.75135	3809.03	-45	Puente 2	530	25	2751.99	2799.57	4867.11	0	4867.11	2115.12	2115.12
3	3.75135	5568.11	-45	Puente 2	530	25	3148.81	3203.25	5732.8	0	5732.8	2584	2584
4	0.347657	597.087	3.41007	Puente 2	530	25	1764.29	1794.79	2712.34	0	2712.34	2817.47	2817.47
5	3.34841	5704.68	3.41007	Puente Formation	335	20	1304.61	1327.17	2725.97	0	2725.97	2803.7	2803.7
6	3.34841	5621.17	3.41007	Puente Formation	335	20	1295.88	1318.28	2701.55	0	2701.55	2778.76	2778.76
7	3.34841	5537.66	3.41007	Puente Formation	335	20	1287.14	1309.39	2677.12	0	2677.12	2753.82	2753.82
8	3.34841	5454.15	3.41007	Puente Formation	335	20	1278.4	1300.51	2652.71	0	2652.71	2728.88	2728.88
9	3.34841	5370.64	3.41007	Puente Formation	335	20	1269.67	1291.62	2628.29	0	2628.29	2703.94	2703.94
10	3.34841	17059.9	3.41007	Puente Formation	335	20	2969.98	3021.33	7380.65	0	7380.65	7557.62	7557.62
11	3.34841	17904.1	3.41007	Puente Formation	335	20	2195.59	2233.55	5216.24	0	5216.24	5347.07	5347.07
12	3.34841	17823.2	3.41007	Puente Formation	335	20	2187.11	2224.93	5192.57	0	5192.57	5322.89	5322.89
13	3.34841	17746.7	3.41007	Puente Formation	335	20	2179.12	2216.8	5170.21	0	5170.21	5300.06	5300.06
14	3.34841	20781.3	3.41007	Puente Formation	335	20	2496.6	2539.77	6057.56	0	6057.56	6206.33	6206.33
15	3.34841	24955.9	3.41007	Puente Formation	335	20	2933.35	2984.07	7278.27	0	7278.27	7453.06	7453.06
16	3.34841	25440.1	3.41007	Puente Formation	335	20	2984.02	3035.61	7419.88	0	7419.88	7597.69	7597.69
17	3.34841	25924.4	3.41007	Puente Formation	335	20	4211.05	4283.86	10849.4	0	10849.4	11100.3	11100.3
18	3.34841	26450.5	3.41007	Puente Formation	335	20	3089.72	3143.14	7715.32	0	7715.32	7899.43	7899.43
19	3.34841	27045.8	3.41007	Puente Formation	335	20	3152.01	3206.51	7889.39	0	7889.39	8077.21	8077.21
20	3.18202	25747.5	40.7213	Puente Formation	530	25	4194.79	4267.32	8014.71	0	8014.71	11625.5	11625.5
21	3.18202	25272	40.7213	Puente Formation	530	25	2984.17	3035.77	5373.66	0	5373.66	7942.38	7942.38
22	3.18202	24796.6	40.7213	Puente Formation	530	25	4096.56	4167.39	7800.42	0	7800.42	11326.7	11326.7
23	3.18202	24321.1	40.7213	Puente Formation	530	25	2885.95	2935.85	5159.37	0	5159.37	7643.54	7643.54
24	3.18202	23844.9	40.7213	Puente Formation	530	25	3998.26	4067.39	7585.96	0	7585.96	11027.6	11027.6
25	3.18202	23368	40.7213	Puente Formation	530	25	3948.99	4017.27	7478.47	0	7478.47	10877.7	10877.7
26	3.18202	22891	40.7213	Puente Formation	530	25	2738.22	2785.56	4837.06	0	4837.06	7194.07	7194.07
27	3.08667	21767.4	40.7213	Puente Formation	530	25	3889	3956.24	7347.61	0	7347.61	10695.2	10695.2
28	3.08667	21354.9	40.7213	Puente Formation	530	25	2647.69	2693.47	4639.58	0	4639.58	6918.66	6918.66
29	3.08667	20942.5	40.7213	Puente Formation	530	25	2603.77	2648.79	4543.74	0	4543.74	6785.02	6785.02
30	3.08667	20530	40.7213	Puente Formation	530	25	2559.84	2604.1	4447.94	0	4447.94	6651.4	6651.4
31	3.08667	20117.5	40.7213	Puente Formation	530	25	2515.92	2559.42	4352.1	0	4352.1	6517.76	6517.76
32	3.08667	19705	40.7213	Puente Formation	530	25	2471.99	2514.73	4256.27	0	4256.27	6384.11	6384.11
33	3.08667	19292.5	40.7213	Puente Formation	530	25	2428.07	2470.05	4160.44	0	4160.44	6250.47	6250.47
34	3.48688	21092.8	48.7872	Puente Formation	530	25	2162.27	2199.66	3580.61	0	3580.61	6049.44	6049.44
35	3.48688	20156.5	48.7872	Puente Formation	530	25	2081.47	2117.46	3404.31	0	3404.31	5780.89	5780.89

36	3.48688	19020.3	48.7872	Puente Formation	530	25	1983.42	2017.71	3190.4	0	3190.4	5455.02	5455.02
37	3.48688	17379	48.7872	Puente Formation	530	25	1841.79	1873.63	2881.42	0	2881.42	4984.33	4984.33
38	3.48688	15713.2	48.7872	Puente Formation	530	25	1698.02	1727.38	2567.8	0	2567.8	4506.56	4506.56
39	3.48688	14097.4	48.7872	Puente Formation	530	25	1558.58	1585.53	2263.58	0	2263.58	4043.13	4043.13
40	3.48688	16565.7	48.7872	Puente Formation	530	25	1771.6	1802.23	2728.3	0	2728.3	4751.06	4751.06
41	3.48688	14899.9	48.7872	Puente Formation	530	25	1627.83	1655.98	2414.67	0	2414.67	4273.29	4273.29
42	3.48688	13234	48.7872	Puente Formation	530	25	1487.76	1513.48	2109.08	0	2109.08	3807.76	3807.76
43	3.48688	11568.2	48.7872	Puente Formation	530	25	1370.41	1394.11	1853.08	0	1853.08	3417.78	3417.78
44	3.48688	9902.33	48.7872	Puente Formation	530	25	1226.65	1247.86	1539.46	0	1539.46	2940.02	2940.02
45	3.48688	8236.48	48.7872	Puente Formation	530	25	1082.89	1101.62	1225.83	0	1225.83	2462.25	2462.25
46	3.53877	6762.34	45	Puente Formation	530	25	989.324	1006.43	1021.7	0	1021.7	2011.03	2011.03
47	3.53877	5259.6	45	Puente Formation	530	25	855.847	870.645	730.516	0	730.516	1586.36	1586.36
48	3.53877	3756.86	45	Puente Formation	530	25	722.371	734.861	439.326	0	439.326	1161.7	1161.7
49	3.53877	2254.11	45	Puente Formation	530	25	588.896	599.078	148.138	0	148.138	737.034	737.034
50	3.53877	751.372	45	Puente Formation	530	25	455.42	463.294	-143.051	0	-143.051	312.369	312.369

Query 1 (janbu simplified) - Safety Factor: 1.01729

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.75135	2049.96	-45	Puente 2	530	25	2355.16	2395.88	4001.39	0	4001.39	1646.23	1646.23
2	3.75135	3809.03	-45	Puente 2	530	25	2751.99	2799.57	4867.11	0	4867.11	2115.12	2115.12
3	3.75135	5568.11	-45	Puente 2	530	25	3148.81	3203.25	5732.8	0	5732.8	2584	2584
4	0.347657	597.087	3.41007	Puente 2	530	25	1764.29	1794.79	2712.34	0	2712.34	2817.47	2817.47
5	3.34841	5704.68	3.41007	Puente Formation	335	20	1304.61	1327.17	2725.97	0	2725.97	2803.7	2803.7
6	3.34841	5621.17	3.41007	Puente Formation	335	20	1295.88	1318.28	2701.55	0	2701.55	2778.76	2778.76
7	3.34841	5537.66	3.41007	Puente Formation	335	20	1287.14	1309.39	2677.12	0	2677.12	2753.82	2753.82
8	3.34841	5454.15	3.41007	Puente Formation	335	20	1278.4	1300.51	2652.71	0	2652.71	2728.88	2728.88
9	3.34841	5370.64	3.41007	Puente Formation	335	20	1269.67	1291.62	2628.29	0	2628.29	2703.94	2703.94
10	3.34841	17059.9	3.41007	Puente Formation	335	20	2969.98	3021.33	7380.65	0	7380.65	7557.62	7557.62
11	3.34841	17904.1	3.41007	Puente Formation	335	20	2195.59	2233.55	5216.24	0	5216.24	5347.07	5347.07
12	3.34841	17823.2	3.41007	Puente Formation	335	20	2187.11	2224.93	5192.57	0	5192.57	5322.89	5322.89
13	3.34841	17746.7	3.41007	Puente Formation	335	20	2179.12	2216.8	5170.21	0	5170.21	5300.06	5300.06
14	3.34841	20781.3	3.41007	Puente Formation	335	20	2496.6	2539.77	6057.56	0	6057.56	6206.33	6206.33
15	3.34841	24955.9	3.41007	Puente Formation	335	20	2933.35	2984.07	7278.27	0	7278.27	7453.06	7453.06
16	3.34841	25440.1	3.41007	Puente Formation	335	20	2984.02	3035.61	7419.88	0	7419.88	7597.69	7597.69
17	3.34841	25924.4	3.41007	Puente Formation	335	20	4211.05	4283.86	10849.4	0	10849.4	11100.3	11100.3
18	3.34841	26450.5	3.41007	Puente Formation	335	20	3089.72	3143.14	7715.32	0	7715.32	7899.43	7899.43
19	3.34841	27045.8	3.41007	Puente Formation	335	20	3152.01	3206.51	7889.39	0	7889.39	8077.21	8077.21
20	3.18202	25747.5	40.7213	Puente Formation	530	25	4194.79	4267.32	8014.71	0	8014.71	11625.5	11625.5
21	3.18202	25272	40.7213	Puente Formation	530	25	2984.17	3035.77	5373.66	0	5373.66	7942.38	7942.38
22	3.18202	24796.6	40.7213	Puente Formation	530	25	4096.56	4167.39	7800.42	0	7800.42	11326.7	11326.7
23	3.18202	24321.1	40.7213	Puente Formation	530	25	2885.95	2935.85	5159.37	0	5159.37	7643.54	7643.54
24	3.18202	23844.9	40.7213	Puente Formation	530	25	3998.26	4067.39	7585.96	0	7585.96	11027.6	11027.6
25	3.18202	23368	40.7213	Puente Formation	530	25	3948.99	4017.27	7478.47	0	7478.47	10877.7	10877.7
26	3.18202	22891	40.7213	Puente Formation	530	25	2738.22	2785.56	4837.06	0	4837.06	7194.07	7194.07
27	3.08667	21767.4	40.7213	Puente Formation	530	25	3889	3956.24	7347.61	0	7347.61	10695.2	10695.2
28	3.08667	21354.9	40.7213	Puente Formation	530	25	2647.69	2693.47	4639.58	0	4639.58	6918.66	6918.66
29	3.08667	20942.5	40.7213	Puente Formation	530	25	2603.77	2648.79	4543.74	0	4543.74	6785.02	6785.02
30	3.08667	20530	40.7213	Puente Formation	530	25	2559.84	2604.1	4447.94	0	4447.94	6651.4	6651.4
31	3.08667	20117.5	40.7213	Puente Formation	530	25	2515.92	2559.42	4352.1	0	4352.1	6517.76	6517.76
32	3.08667	19705	40.7213	Puente Formation	530	25	2471.99	2514.73	4256.27	0	4256.27	6384.11	6384.11
33	3.08667	19292.5	40.7213	Puente Formation	530	25	2428.07	2470.05	4160.44	0	4160.44	6250.47	6250.47
34	3.48688	21092.8	48.7872	Puente Formation	530	25	2162.27	2199.66	3580.61	0	3580.61	6049.44	6049.44
35	3.48688	20156.5	48.7872	Puente Formation	530	25	2081.47	2117.46	3404.31	0	3404.31	5780.89	5780.89

36	3.48688	19020.3	48.7872	Puente Formation	530	25	1983.42	2017.71	3190.4	0	3190.4	5455.02	5455.02
37	3.48688	17379	48.7872	Puente Formation	530	25	1841.79	1873.63	2881.42	0	2881.42	4984.33	4984.33
38	3.48688	15713.2	48.7872	Puente Formation	530	25	1698.02	1727.38	2567.8	0	2567.8	4506.56	4506.56
39	3.48688	14097.4	48.7872	Puente Formation	530	25	1558.58	1585.53	2263.58	0	2263.58	4043.13	4043.13
40	3.48688	16565.7	48.7872	Puente Formation	530	25	1771.6	1802.23	2728.3	0	2728.3	4751.06	4751.06
41	3.48688	14899.9	48.7872	Puente Formation	530	25	1627.83	1655.98	2414.67	0	2414.67	4273.29	4273.29
42	3.48688	13234	48.7872	Puente Formation	530	25	1487.76	1513.48	2109.08	0	2109.08	3807.76	3807.76
43	3.48688	11568.2	48.7872	Puente Formation	530	25	1370.41	1394.11	1853.08	0	1853.08	3417.78	3417.78
44	3.48688	9902.33	48.7872	Puente Formation	530	25	1226.65	1247.86	1539.46	0	1539.46	2940.02	2940.02
45	3.48688	8236.48	48.7872	Puente Formation	530	25	1082.89	1101.62	1225.83	0	1225.83	2462.25	2462.25
46	3.53877	6762.34	45	Puente Formation	530	25	989.324	1006.43	1021.7	0	1021.7	2011.03	2011.03
47	3.53877	5259.6	45	Puente Formation	530	25	855.847	870.645	730.516	0	730.516	1586.36	1586.36
48	3.53877	3756.86	45	Puente Formation	530	25	722.371	734.861	439.326	0	439.326	1161.7	1161.7
49	3.53877	2254.11	45	Puente Formation	530	25	588.896	599.078	148.138	0	148.138	737.034	737.034
50	3.53877	751.372	45	Puente Formation	530	25	455.42	463.294	-143.051	0	-143.051	312.369	312.369

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.46137

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.09316	1563.04	-45	Puente 2	530	25	1456.43	2128.39	3427.75	0	3427.75	1971.32	1971.32
2	3.09316	2758.99	-45	Puente 2	530	25	2180.33	3186.27	5696.39	0	5696.39	3516.06	3516.06
3	3.01404	3838.88	-45	Puente Formation	530	25	3408.51	4981.1	9545.42	0	9545.42	6136.91	6136.91
4	3.14339	4280.27	27.0619	Puente Formation	530	25	1436.15	2098.74	3364.19	0	3364.19	4097.9	4097.9
5	3.14339	3649.27	27.0619	Puente Formation	530	25	1358.27	1984.94	3120.13	0	3120.13	3814.05	3814.05
6	3.14339	3018.27	27.0619	Puente Formation	530	25	1285.49	1878.58	2892.04	0	2892.04	3548.79	3548.79
7	3.14339	12395.3	27.0619	Puente Formation	530	25	2313.64	3381.08	6114.16	0	6114.16	7296.17	7296.17
8	3.14339	13679.1	27.0619	Puente Formation	530	25	3954.32	5778.72	11255.9	0	11255.9	13276.1	13276.1
9	3.14339	13049.3	27.0619	Puente Formation	530	25	1630.46	2382.71	3973.16	0	3973.16	4806.15	4806.15
10	3.14339	12424.2	27.0619	Puente Formation	530	25	1519.39	2220.39	3625.05	0	3625.05	4401.29	4401.29
11	3.14339	12233.4	27.0619	Puente Formation	530	25	4184.5	6115.1	11977.3	0	11977.3	14115.1	14115.1
12	3.14339	17867.7	27.0619	Puente Formation	530	25	1806.03	2639.28	4523.36	0	4523.36	5446.04	5446.04
13	3.14339	17737.1	27.0619	Puente Formation	530	25	4673.22	6829.31	13508.9	0	13508.9	15896.4	15896.4
14	2.9515	16543.8	27.0619	Puente Formation	530	25	1724.27	2519.79	4267.11	0	4267.11	5148.01	5148.01
15	2.9515	16446.1	27.0619	Puente Formation	530	25	1641.77	2399.23	4008.57	0	4008.57	4847.33	4847.33
16	2.9515	16402.2	27.0619	Puente Formation	530	25	4985.13	7285.12	14486.4	0	14486.4	17033.2	17033.2
17	2.9515	16390.8	27.0619	Puente Formation	530	25	1573.67	2299.71	3795.13	0	3795.13	4599.1	4599.1
18	2.9515	16379.4	27.0619	Puente Formation	530	25	5055.63	7388.15	14707.4	0	14707.4	17290.2	17290.2
19	2.9515	16368.1	27.0619	Puente Formation	530	25	1497.53	2188.44	3556.54	0	3556.54	4321.6	4321.6
20	2.9515	16356.7	27.0619	Puente Formation	530	25	1433.03	2094.19	3354.42	0	3354.42	4086.54	4086.54
21	2.9515	16345.3	27.0619	Puente Formation	530	25	5061.16	7396.23	14724.7	0	14724.7	17310.4	17310.4
22	3.00819	16798.2	13.1381	Puente Formation	530	25	1811.91	2647.87	4541.79	0	4541.79	4964.7	4964.7
23	3.00819	17087.7	13.1381	Puente Formation	530	25	1758.85	2570.33	4375.49	0	4375.49	4786.02	4786.02
24	3.00819	17377.2	13.1381	Puente Formation	530	25	1709.85	2498.73	4221.95	0	4221.95	4621.04	4621.04
25	3.00819	17666.7	13.1381	Puente Formation	530	25	1665.63	2434.1	4083.36	0	4083.36	4472.13	4472.13
26	3.00819	17956.1	13.1381	Puente Formation	530	25	1626.84	2377.41	3961.8	0	3961.8	4341.52	4341.52
27	3.00819	18245.6	13.1381	Puente Formation	530	25	1594.08	2329.54	3859.12	0	3859.12	4231.19	4231.19
28	3.00819	18535.1	13.1381	Puente Formation	530	25	1567.89	2291.27	3777.06	0	3777.06	4143.01	4143.01
29	3.00819	18824.6	13.1381	Puente Formation	530	25	1548.75	2263.29	3717.04	0	3717.04	4078.53	4078.53
30	3.00819	19114.1	13.1381	Puente Formation	530	25	1537.02	2246.16	3680.29	0	3680.29	4039.05	4039.05
31	3.00819	19403.6	13.1381	Puente Formation	530	25	1533.03	2240.33	3667.83	0	3667.83	4025.65	4025.65
32	3.00819	19693.1	13.1381	Puente Formation	530	25	1537.01	2246.14	3680.26	0	3680.26	4039.01	4039.01
33	2.89629	18670.5	53.5326	Puente Formation	530	25	787.073	1150.2	1330.04	0	1330.04	2394.97	2394.97
34	2.89629	17811.9	53.5326	Puente Formation	530	25	762.257	1113.94	1252.26	0	1252.26	2283.62	2283.62

35	2.89629	16846	53.5326	Puente Formation	530	25	742.477	1085.03	1190.27	0	1190.27	2194.87	2194.87
36	2.89629	15514.4	53.5326	Puente Formation	530	25	717.06	1047.89	1110.62	0	1110.62	2080.82	2080.82
37	2.89629	14152.5	53.5326	Puente Formation	530	25	693.187	1013	1035.8	0	1035.8	1973.71	1973.71
38	2.89629	12790.5	53.5326	Puente Formation	530	25	669.52	978.417	961.633	0	961.633	1867.51	1867.51
39	2.89629	11998.5	53.5326	Puente Formation	530	25	665.365	972.345	948.612	0	948.612	1848.87	1848.87
40	2.89629	13542.1	53.5326	Puente Formation	530	25	752.478	1099.65	1221.62	0	1221.62	2239.74	2239.74
41	2.89629	12180.1	53.5326	Puente Formation	530	25	734.869	1073.91	1166.43	0	1166.43	2160.73	2160.73
42	2.89629	10818.1	53.5326	Puente Formation	530	25	714.027	1043.46	1101.11	0	1101.11	2067.21	2067.21
43	2.89629	9456.12	53.5326	Puente Formation	530	25	699.914	1022.83	1056.89	0	1056.89	2003.89	2003.89
44	2.89629	8094.14	53.5326	Puente Formation	530	25	675.223	986.75	979.503	0	979.503	1893.1	1893.1
45	2.89629	6732.15	53.5326	Puente Formation	530	25	638.731	933.423	865.142	0	865.142	1729.36	1729.36
46	2.89629	5370.17	53.5326	Puente Formation	530	25	593.622	867.501	723.772	0	723.772	1526.96	1526.96
47	3.37299	4778.35	45	Puente Formation	530	25	596.602	871.856	733.113	0	733.113	1329.72	1329.72
48	3.37299	3413.11	45	Puente Formation	530	25	532.771	778.575	533.072	0	533.072	1065.84	1065.84
49	3.37299	2047.87	45	Puente Formation	530	25	453.884	663.293	285.848	0	285.848	739.732	739.732
50	3.37299	682.622	45	Puente Formation	530	25	356.982	521.683	-17.8355	0	-17.8355	339.147	339.147

Query 1 (gle/morgenstern-price) - Safety Factor: 1.48998

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	N/A	N/A	N/A	Puente Formation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	Puente Formation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	Puente Formation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	Puente Formation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	Puente Formation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Interslice Data

Curved - Master Scenario

Global Minimum Query (bishop simplified) - Safety Factor: 2.03013

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	183	452.494	0	0	0
2	185.286	452.497	845.281	0	0
3	187.572	452.531	1728.11	0	0
4	189.858	452.597	2639.85	0	0
5	192.144	452.693	3572.3	0	0
6	194.516	452.826	4222.93	0	0
7	196.888	452.992	4870.27	0	0
8	199.261	453.192	5509.82	0	0
9	201.633	453.426	6210.15	0	0
10	204.005	453.693	6991.31	0	0
11	206.378	453.995	7851.61	0	0
12	208.75	454.331	8781.21	0	0
13	211.123	454.701	9674.81	0	0
14	213.495	455.107	10525.3	0	0
15	215.867	455.547	11326	0	0
16	218.24	456.022	12070.6	0	0
17	220.612	456.533	12753	0	0
18	222.984	457.08	13367.8	0	0
19	225.357	457.663	13909.7	0	0
20	227.729	458.282	14373.8	0	0
21	230.101	458.939	14755.7	0	0
22	232.474	459.633	15051.5	0	0
23	234.846	460.365	15257.3	0	0
24	237.218	461.136	15369.9	0	0
25	239.591	461.946	15386.5	0	0
26	241.963	462.795	15304.6	0	0
27	244.336	463.685	15122.3	0	0
28	246.708	464.615	14837.8	0	0
29	249.08	465.588	14450.2	0	0
30	251.453	466.603	13958.9	0	0
31	253.825	467.661	13367.6	0	0
32	256.197	468.763	12729.7	0	0
33	258.57	469.911	12071.3	0	0
34	260.942	471.105	11405.1	0	0
35	263.314	472.346	10745	0	0
36	265.687	473.636	10105.6	0	0
37	268.059	474.976	8769.55	0	0
38	270.431	476.367	7324.83	0	0
39	272.804	477.811	5900.12	0	0
40	275.176	479.309	4513.81	0	0
41	277.549	480.863	3131.23	0	0
42	279.921	482.475	1790.29	0	0
43	282.293	484.147	547.159	0	0
44	284.666	485.881	-573.428	0	0
45	287.038	487.68	-1544.69	0	0
46	289.41	489.546	-2337.54	0	0
47	291.783	491.483	-2920.38	0	0
48	294.155	493.493	-3258.72	0	0
49	296.527	495.58	-3314.82	0	0
50	298.9	497.747	-3047.33	0	0
51	301.272	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.97209

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	183	452.86	0	0	0
2	185.319	452.864	860.692	0	0
3	187.638	452.901	1761.94	0	0
4	189.957	452.972	2694.22	0	0
5	192.275	453.076	3648.52	0	0
6	194.561	453.212	4279.19	0	0
7	196.847	453.381	4906.87	0	0
8	199.133	453.583	5532.32	0	0
9	201.419	453.817	6241.16	0	0
10	203.705	454.085	7031.94	0	0
11	205.991	454.387	7903.15	0	0
12	208.276	454.722	8809.84	0	0
13	210.562	455.09	9683.1	0	0
14	212.848	455.493	10516.3	0	0
15	215.134	455.93	11303.3	0	0
16	217.42	456.401	12038.2	0	0
17	219.706	456.908	12715.4	0	0
18	221.991	457.449	13329.9	0	0
19	224.277	458.026	13876.8	0	0
20	226.563	458.64	14351.7	0	0
21	228.849	459.289	14750.6	0	0
22	231.135	459.976	15069.8	0	0
23	233.421	460.699	15306	0	0
24	235.706	461.461	15456.4	0	0
25	237.992	462.261	15518.3	0	0
26	240.278	463.101	15489.6	0	0
27	242.564	463.98	15368.8	0	0
28	244.85	464.899	15154.5	0	0
29	247.136	465.86	14846	0	0
30	249.422	466.863	14442.9	0	0
31	251.707	467.908	13945.4	0	0
32	253.993	468.998	13360.7	0	0
33	256.279	470.132	12745.2	0	0
34	258.565	471.312	12122.2	0	0
35	260.851	472.54	11505	0	0
36	263.137	473.815	10908	0	0
37	265.422	475.141	10346.5	0	0
38	267.708	476.517	9181.53	0	0
39	269.994	477.946	7813.75	0	0
40	272.28	479.429	6482.8	0	0
41	274.566	480.969	5208.03	0	0
42	276.852	482.567	3979.58	0	0
43	279.137	484.225	2786.25	0	0
44	281.423	485.946	1712.28	0	0
45	283.709	487.732	784.131	0	0
46	285.995	489.586	30.5778	0	0
47	288.281	491.511	-516.961	0	0
48	290.567	493.511	-824.105	0	0
49	292.853	495.59	-853.108	0	0
50	295.138	497.751	-562.386	0	0
51	297.424	500	0	0	0

Curved - Curved Static

Global Minimum Query (bishop simplified) - Safety Factor: 2.30606

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	103.323	405	780	0	0
2	107.387	403.528	1778.96	0	0
3	111.451	402.183	3799.32	0	0
4	115.515	400.96	5991.65	0	0
5	119.579	399.858	8295.01	0	0
6	123.643	398.873	10656	0	0
7	127.707	398.004	13028.2	0	0
8	131.771	397.248	15371.1	0	0
9	135.835	396.603	17650	0	0
10	139.9	396.068	19756.6	0	0
11	143.964	395.643	21510.3	0	0
12	148.028	395.325	22976.2	0	0
13	152.092	395.115	24297.1	0	0
14	156.141	395.012	25903.2	0	0
15	160.19	395.015	27332.2	0	0
16	164.239	395.124	28362.3	0	0
17	168.289	395.339	29897.9	0	0
18	172.338	395.661	31560.7	0	0
19	176.387	396.09	33043	0	0
20	180.436	396.628	34502.5	0	0
21	184.485	397.274	35685.9	0	0
22	188.534	398.032	36330.7	0	0
23	192.584	398.902	67448.5	0	0
24	196.633	399.886	66539.5	0	0
25	200.682	400.988	95453.1	0	0
26	204.731	402.208	92899.6	0	0
27	208.78	403.551	89493.9	0	0
28	212.829	405.019	114917	0	0
29	216.879	406.617	109765	0	0
30	220.928	408.349	132769	0	0
31	224.977	410.22	125840	0	0
32	229.026	412.235	146379	0	0
33	233.075	414.401	137677	0	0
34	237.125	416.726	155735	0	0
35	241.093	419.167	145458	0	0
36	245.062	421.777	134238	0	0
37	249.031	424.567	122085	0	0
38	252.999	427.55	109015	0	0
39	256.968	430.739	95299.6	0	0
40	260.937	434.153	81277.6	0	0
41	264.905	437.811	67085.2	0	0
42	268.874	441.738	50619.7	0	0
43	272.843	445.965	33221.4	0	0
44	276.811	450.531	15911.2	0	0
45	280.78	455.483	-1259.89	0	0
46	284.749	460.888	-17699.9	0	0
47	288.717	466.834	-32954.5	0	0
48	292.686	473.446	-46396.8	0	0
49	296.655	480.917	-57115	0	0
50	300.623	489.565	-63675.8	0	0
51	304.592	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.84456

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	121.859	405	780	0	0
2	125.328	403.608	1891.71	0	0
3	128.797	402.331	4001.16	0	0
4	132.266	401.165	6267.91	0	0
5	135.734	400.106	8639.01	0	0
6	139.203	399.153	11068.2	0	0
7	142.672	398.303	13515	0	0
8	146.141	397.553	15944.3	0	0
9	149.61	396.902	18325.6	0	0
10	153.079	396.349	20633.1	0	0
11	156.597	395.885	22875.2	0	0
12	160.115	395.52	24999.5	0	0
13	163.634	395.252	26990.5	0	0
14	167.152	395.08	28836.2	0	0
15	170.67	395.004	34100.8	0	0
16	174.189	395.024	38791.4	0	0
17	177.707	395.14	42292.1	0	0
18	181.225	395.352	44799.7	0	0
19	184.743	395.661	47168.6	0	0
20	188.262	396.067	50073.7	0	0
21	191.78	396.571	53041.9	0	0
22	195.298	397.174	87561.6	0	0
23	198.817	397.879	89110.5	0	0
24	202.335	398.686	89923.6	0	0
25	205.853	399.597	121293	0	0
26	209.371	400.616	120574	0	0
27	212.89	401.744	119064	0	0
28	216.408	402.984	147097	0	0
29	219.926	404.341	143964	0	0
30	223.445	405.817	169685	0	0
31	226.963	407.419	164892	0	0
32	230.481	409.15	159263	0	0
33	233.999	411.017	181423	0	0
34	237.518	413.026	174128	0	0
35	241.036	415.186	193877	0	0
36	244.554	417.506	184959	0	0
37	248.157	420.058	174931	0	0
38	251.76	422.802	163929	0	0
39	255.363	425.754	152041	0	0
40	258.966	428.934	139594	0	0
41	262.569	432.365	126714	0	0
42	266.172	436.076	113402	0	0
43	269.775	440.105	97152.8	0	0
44	273.378	444.5	80678.8	0	0
45	276.98	449.325	64131.5	0	0
46	280.583	454.669	47638.2	0	0
47	284.186	460.665	31839.9	0	0
48	287.789	467.517	17371.2	0	0
49	291.392	475.587	5281.02	0	0
50	294.995	485.632	-2400	0	0
51	298.598	500	0	0	0

Curved - Curved Pstatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.2946

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	107.067	405	780	0	0
2	110.826	403.59	6072.61	0	0
3	114.585	402.296	11995.5	0	0
4	118.343	401.116	17728.6	0	0
5	122.102	400.045	23238.4	0	0
6	125.861	399.083	28497.5	0	0
7	129.62	398.226	33483.5	0	0
8	133.379	397.473	38179	0	0
9	137.138	396.823	42570.8	0	0
10	140.896	396.272	46650	0	0
11	144.655	395.822	49961.4	0	0
12	148.414	395.47	52398.6	0	0
13	152.173	395.216	54402.9	0	0
14	156.055	395.056	57298.7	0	0
15	159.938	395	59868.4	0	0
16	163.82	395.047	61867.6	0	0
17	167.703	395.198	63018.4	0	0
18	171.585	395.453	64099.9	0	0
19	175.467	395.812	61296	0	0
20	179.35	396.276	58880.2	0	0
21	183.232	396.847	56571.9	0	0
22	187.114	397.525	52521.5	0	0
23	190.997	398.312	80661.3	0	0
24	194.879	399.211	74942.5	0	0
25	198.762	400.222	68376.6	0	0
26	202.644	401.348	93033.4	0	0
27	206.526	402.593	84739.8	0	0
28	210.409	403.96	107047	0	0
29	214.291	405.452	97051.3	0	0
30	218.173	407.073	86229.7	0	0
31	222.056	408.828	105093	0	0
32	225.938	410.723	92694.1	0	0
33	229.821	412.764	109363	0	0
34	233.703	414.957	95517.8	0	0
35	237.585	417.312	110120	0	0
36	241.485	419.85	94832.6	0	0
37	245.385	422.57	78751.9	0	0
38	249.285	425.486	61922.2	0	0
39	253.186	428.614	44398.7	0	0
40	257.086	431.972	26603.2	0	0
41	260.986	435.582	8971.98	0	0
42	264.886	439.47	-8310.74	0	0
43	268.786	443.67	-27857.4	0	0
44	272.686	448.225	-47948	0	0
45	276.586	453.19	-67178.9	0	0
46	280.486	458.639	-85370.9	0	0
47	284.386	464.677	-101810	0	0
48	288.286	471.458	-115804	0	0
49	292.186	479.226	-126342	0	0
50	296.086	488.422	-131788	0	0
51	299.986	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 0.970038

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	124.249	405	780	0	0
2	127.884	403.54	7823.64	0	0
3	131.52	402.207	15445.2	0	0
4	135.155	400.996	22821.6	0	0
5	138.791	399.904	29917.7	0	0
6	142.426	398.927	36705.4	0	0
7	146.062	398.064	43162.4	0	0
8	149.697	397.31	49271.9	0	0
9	153.332	396.666	55021.8	0	0
10	156.831	396.146	60208	0	0
11	160.329	395.725	65050.9	0	0
12	163.827	395.4	69550.2	0	0
13	167.326	395.171	73708.7	0	0
14	170.824	395.038	84788.9	0	0
15	174.322	395.001	88201.9	0	0
16	177.82	395.058	90227.3	0	0
17	181.319	395.211	90455.3	0	0
18	184.817	395.459	89608.2	0	0
19	188.315	395.804	88459.2	0	0
20	191.814	396.246	88018.9	0	0
21	195.312	396.786	122329	0	0
22	198.81	397.425	121024	0	0
23	202.309	398.165	118891	0	0
24	205.807	399.007	149725	0	0
25	209.305	399.955	145929	0	0
26	212.803	401.009	141302	0	0
27	216.302	402.173	168664	0	0
28	219.8	403.451	162401	0	0
29	223.298	404.845	155338	0	0
30	226.797	406.36	179314	0	0
31	230.295	408.001	170702	0	0
32	233.793	409.773	192494	0	0
33	237.291	411.682	182428	0	0
34	240.79	413.736	202132	0	0
35	244.288	415.943	190758	0	0
36	247.786	418.312	178803	0	0
37	251.29	420.859	166173	0	0
38	254.793	423.593	152848	0	0
39	258.297	426.531	139200	0	0
40	261.8	429.691	125389	0	0
41	265.304	433.097	111543	0	0
42	268.807	436.778	95427.3	0	0
43	272.311	440.769	78820.1	0	0
44	275.814	445.12	62519	0	0
45	279.318	449.893	46609.3	0	0
46	282.821	455.177	31563	0	0
47	286.325	461.101	17847.3	0	0
48	289.828	467.869	6118.27	0	0
49	293.332	475.84	-2581.95	0	0
50	296.835	485.765	-6317.69	0	0
51	300.339	500	0	0	0

Curved - Block Static

Global Minimum Query (bishop simplified) - Safety Factor: 2.07901

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	144.581	405	780	0	0
2	147.437	402.145	4088.2	0	0
3	150.292	399.289	9785.09	0	0
4	153.147	396.434	17090.7	0	0
5	154.565	395.016	21315.9	0	0
6	157.682	395.34	22310.7	0	0
7	160.799	395.664	23294.8	0	0
8	163.915	395.987	24268.2	0	0
9	167.032	396.311	25230.8	0	0
10	170.149	396.634	27654.4	0	0
11	173.265	396.958	29598.8	0	0
12	176.382	397.281	31532.6	0	0
13	179.499	397.605	33456.1	0	0
14	182.616	397.929	35369.4	0	0
15	185.732	398.252	37761.4	0	0
16	188.849	398.576	72584.8	0	0
17	191.966	398.899	75105.1	0	0
18	195.083	399.223	77656.5	0	0
19	198.199	399.547	80243.2	0	0
20	201.213	402.618	90936.4	0	0
21	204.227	405.69	102022	0	0
22	207.24	408.762	89394.6	0	0
23	210.254	411.834	101265	0	0
24	213.267	414.906	89422.3	0	0
25	216.524	418.225	101158	0	0
26	219.78	421.544	113321	0	0
27	223.036	424.863	101806	0	0
28	226.292	428.182	90719.2	0	0
29	229.548	431.501	80059.4	0	0
30	232.804	434.82	69827.1	0	0
31	236.06	438.139	60022.3	0	0
32	239.316	441.458	50645	0	0
33	242.572	444.777	41695.1	0	0
34	245.828	448.097	33172.8	0	0
35	249.085	451.416	25077.9	0	0
36	252.341	454.735	17410.5	0	0
37	255.597	458.054	10301.4	0	0
38	258.491	460.823	5064.79	0	0
39	261.386	463.592	408.168	0	0
40	264.281	466.362	-3668.45	0	0
41	267.175	469.131	-8015.42	0	0
42	270.07	471.901	-13026.3	0	0
43	272.965	474.67	-17457.3	0	0
44	276.131	477.836	-21857.4	0	0
45	279.297	481.003	-25692.6	0	0
46	282.463	484.169	-28765.6	0	0
47	285.63	487.335	-31076.6	0	0
48	288.796	490.501	-32625.6	0	0
49	291.962	493.668	-33412.4	0	0
50	295.128	496.834	-33437.1	0	0
51	298.294	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.82803

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	143.591	405	780	0	0
2	146.373	402.218	4447.92	0	0
3	149.155	399.437	10526.6	0	0
4	151.936	396.655	18236.1	0	0
5	153.39	396.738	19038	0	0
6	156.46	396.911	20174.9	0	0
7	159.531	397.085	21302.4	0	0
8	162.601	397.259	22420.4	0	0
9	165.671	397.433	23529.1	0	0
10	168.742	397.607	25805.4	0	0
11	171.812	397.781	28538.6	0	0
12	174.883	397.955	31262.5	0	0
13	177.953	398.129	33977.3	0	0
14	181.023	398.303	36683.6	0	0
15	184.094	398.477	39700.3	0	0
16	187.164	398.651	76297.2	0	0
17	190.234	398.825	79985.1	0	0
18	193.305	398.999	83731	0	0
19	196.375	399.173	87536.1	0	0
20	199.684	401.847	103706	0	0
21	202.993	404.522	93850.5	0	0
22	206.302	407.196	110426	0	0
23	209.611	409.87	100975	0	0
24	212.92	412.544	117956	0	0
25	216.229	415.219	135139	0	0
26	219.574	417.922	126194	0	0
27	222.918	420.625	143666	0	0
28	226.263	423.328	135100	0	0
29	229.608	426.031	126724	0	0
30	232.952	428.734	118537	0	0
31	236.297	431.437	110539	0	0
32	239.642	434.14	102731	0	0
33	242.986	436.843	95113	0	0
34	246.331	439.546	87684.2	0	0
35	249.391	443.248	77033.4	0	0
36	252.45	446.949	66964	0	0
37	255.51	450.651	57613.8	0	0
38	258.57	454.352	49247.8	0	0
39	261.629	458.054	41872.6	0	0
40	264.689	461.755	35488.3	0	0
41	267.749	465.457	28564.9	0	0
42	270.808	469.159	21485.4	0	0
43	273.868	472.86	15396.8	0	0
44	277.261	476.253	10752.4	0	0
45	280.653	479.645	6796.2	0	0
46	284.046	483.038	3659.05	0	0
47	287.438	486.43	1340.99	0	0
48	290.831	489.823	-157.986	0	0
49	294.223	493.215	-837.873	0	0
50	297.616	496.608	-698.672	0	0
51	301.008	500	0	0	0

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 2.23999

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	147.695	405	780	0	0
2	151.113	401.582	5293.3	332.218	3.59129
3	154.531	398.164	14585.4	1826.14	7.13648
4	156.431	396.264	22024.9	3516.38	9.07099
5	159.299	396.226	23943.9	5056.01	11.9235
6	162.167	396.188	25908	6785.42	14.6764
7	165.035	396.15	27916.5	8701.7	17.3125
8	167.902	396.112	29968.3	10800	19.8182
9	170.77	396.073	35487.1	14470.2	22.1836
10	173.638	396.035	40347.3	18304.1	24.4021
11	176.506	395.997	45303.7	22558.3	26.4703
12	179.374	395.959	50352.5	27211.1	28.3873
13	182.242	395.921	55487.8	32235	30.154
14	185.109	395.883	61839.4	38301.6	31.7729
15	187.977	395.845	68788.6	45095.8	33.2477
16	190.845	395.807	75935.3	52350.4	34.5827
17	193.931	398.52	84049.2	60770.5	35.8682
18	197.016	401.234	74713.9	56307.7	37.0033
19	200.102	403.947	83277.1	65048.4	37.9937
20	203.188	406.66	91983.6	74075.5	38.8449
21	206.273	409.374	83726.6	69171.1	39.562
22	209.359	412.087	92912.5	78376.2	40.1493
23	212.445	414.801	85346.4	73178	40.6106
24	215.503	417.49	95093.9	82507.6	40.9463
25	218.561	420.179	88197.3	77111.5	41.1634
26	221.619	422.869	98445.9	86375	41.2632
27	224.677	425.558	92104.4	80763.2	41.2464
28	227.736	428.247	86021.3	75075.3	41.1129
29	230.794	430.936	80175.9	69357	40.8618
30	233.852	433.626	74549.2	63651.9	40.4915
31	236.91	436.315	69124.2	58001	39.9995
32	239.969	439.004	63884.3	52442.9	39.3827
33	243.027	441.694	58814	47013.6	38.6375
34	246.085	444.383	53897.9	41746	37.7592
35	249.143	447.072	49120.9	36670.8	36.7429
36	252.202	449.762	44468.1	31816.2	35.5831
37	255.18	453.415	38781	26464.7	34.3102
38	258.159	457.067	33703.1	21795.4	32.8903
39	261.138	460.72	29231.2	17785.6	31.3182
40	264.116	464.373	25362	14401.6	29.5897
41	267.095	468.026	21355.8	11212.3	27.7005
42	270.074	471.679	16623.6	7982.08	25.6487
43	273.052	475.332	12437.9	5391.09	23.4339
44	276.136	478.416	9236.16	3540.21	20.9718
45	279.219	481.499	6316.47	2094.29	18.3435
46	282.303	484.583	3862.59	1075.49	15.5592
47	285.386	487.666	1911.29	428.426	12.6343
48	288.47	490.75	507.206	85.6871	9.58898
49	291.553	493.833	-296.31	-33.4887	6.44816
50	294.637	496.917	-436.249	-24.7036	3.24104
51	297.72	500	0	0	0

Curved - Block Pseudostatic

Global Minimum Query (bishop simplified) - Safety Factor: 1.17267

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	139.412	405	780	0	0
2	143.163	401.249	19659.5	0	0
3	146.914	397.497	42818.2	0	0
4	150.666	393.746	69476.2	0	0
5	151.013	393.767	69792.2	0	0
6	154.362	393.966	71506.8	0	0
7	157.71	394.166	73228.4	0	0
8	161.059	394.365	74957	0	0
9	164.407	394.565	76692.6	0	0
10	167.755	394.764	78435.2	0	0
11	171.104	394.964	80780.3	0	0
12	174.452	395.163	80220	0	0
13	177.801	395.363	79666.6	0	0
14	181.149	395.562	79119.6	0	0
15	184.497	395.762	78317.9	0	0
16	187.846	395.961	77166	0	0
17	191.194	396.161	75973.5	0	0
18	194.543	396.36	108887	0	0
19	197.891	396.56	107610	0	0
20	201.24	396.76	106283	0	0
21	204.422	399.499	118261	0	0
22	207.604	402.238	103061	0	0
23	210.786	404.977	115681	0	0
24	213.968	407.716	101124	0	0
25	217.15	410.455	114386	0	0
26	220.332	413.194	127971	0	0
27	223.514	415.933	114379	0	0
28	226.6	418.59	128988	0	0
29	229.687	421.247	116378	0	0
30	232.774	423.904	104046	0	0
31	235.86	426.561	91992.2	0	0
32	238.947	429.217	80217.2	0	0
33	242.034	431.874	68720.7	0	0
34	245.12	434.531	57502.8	0	0
35	248.607	438.513	42239	0	0
36	252.094	442.494	27763.6	0	0
37	255.581	446.475	14244.9	0	0
38	259.068	450.456	2108.04	0	0
39	262.555	454.438	-8626.19	0	0
40	266.042	458.419	-17999.9	0	0
41	269.529	462.4	-29452	0	0
42	273.015	466.381	-39501.4	0	0
43	276.502	470.362	-48170.1	0	0
44	279.989	474.344	-55592.8	0	0
45	283.476	478.325	-61612.9	0	0
46	286.963	482.306	-66230.4	0	0
47	290.502	485.845	-69242.4	0	0
48	294.041	489.384	-71110.6	0	0
49	297.579	492.922	-71834.9	0	0
50	301.118	496.461	-71415.3	0	0
51	304.657	500	0	0	0

Query 1 (bishop simplified) - Safety Factor: 1.17267

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	139.412	405	780	0	0
2	143.163	401.249	19659.5	0	0
3	146.914	397.497	42818.2	0	0
4	150.666	393.746	69476.2	0	0
5	151.013	393.767	69792.2	0	0
6	154.362	393.966	71506.8	0	0
7	157.71	394.166	73228.4	0	0
8	161.059	394.365	74957	0	0
9	164.407	394.565	76692.6	0	0
10	167.755	394.764	78435.2	0	0
11	171.104	394.964	80780.3	0	0
12	174.452	395.163	80220	0	0
13	177.801	395.363	79666.6	0	0
14	181.149	395.562	79119.6	0	0
15	184.497	395.762	78317.9	0	0
16	187.846	395.961	77166	0	0
17	191.194	396.161	75973.5	0	0
18	194.543	396.36	108887	0	0
19	197.891	396.56	107610	0	0
20	201.24	396.76	106283	0	0
21	204.422	399.499	118261	0	0
22	207.604	402.238	103061	0	0
23	210.786	404.977	115681	0	0
24	213.968	407.716	101124	0	0
25	217.15	410.455	114386	0	0
26	220.332	413.194	127971	0	0
27	223.514	415.933	114379	0	0
28	226.6	418.59	128988	0	0
29	229.687	421.247	116378	0	0
30	232.774	423.904	104046	0	0
31	235.86	426.561	91992.2	0	0
32	238.947	429.217	80217.2	0	0
33	242.034	431.874	68720.7	0	0
34	245.12	434.531	57502.8	0	0
35	248.607	438.513	42239	0	0
36	252.094	442.494	27763.6	0	0
37	255.581	446.475	14244.9	0	0
38	259.068	450.456	2108.04	0	0
39	262.555	454.438	-8626.19	0	0
40	266.042	458.419	-17999.9	0	0
41	269.529	462.4	-29452	0	0
42	273.015	466.381	-39501.4	0	0
43	276.502	470.362	-48170.1	0	0
44	279.989	474.344	-55592.8	0	0
45	283.476	478.325	-61612.9	0	0
46	286.963	482.306	-66230.4	0	0
47	290.502	485.845	-69242.4	0	0
48	294.041	489.384	-71110.6	0	0
49	297.579	492.922	-71834.9	0	0
50	301.118	496.461	-71415.3	0	0
51	304.657	500	0	0	0

Global Minimum Query (janbu simplified) - Safety Factor: 1.01729

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	139.412	405	780	0	0
2	143.163	401.249	23554.6	0	0
3	146.914	397.497	51264.7	0	0
4	150.666	393.746	83130.3	0	0
5	151.013	393.767	83526.2	0	0
6	154.362	393.966	85812.4	0	0
7	157.71	394.166	88101.9	0	0
8	161.059	394.365	90394.5	0	0
9	164.407	394.565	92690.4	0	0
10	167.755	394.764	94989.4	0	0
11	171.104	394.964	98636	0	0
12	174.452	395.163	99037.9	0	0
13	177.801	395.363	99442.9	0	0
14	181.149	395.562	99850.8	0	0
15	184.497	395.762	100143	0	0
16	187.846	395.961	100277	0	0
17	191.194	396.161	100392	0	0
18	194.543	396.36	135151	0	0
19	197.891	396.56	135228	0	0
20	201.24	396.76	135282	0	0
21	204.422	399.499	149559	0	0
22	207.604	402.238	135996	0	0
23	210.786	404.977	150862	0	0
24	213.968	407.716	137886	0	0
25	217.15	410.455	153341	0	0
26	220.332	413.194	169090	0	0
27	223.514	415.933	157000	0	0
28	226.6	418.59	173677	0	0
29	229.687	421.247	162475	0	0
30	232.774	423.904	151527	0	0
31	235.86	426.561	140835	0	0
32	238.947	429.217	130398	0	0
33	242.034	431.874	120216	0	0
34	245.12	434.531	110290	0	0
35	248.607	438.513	96612.7	0	0
36	252.094	442.494	83664.8	0	0
37	255.581	446.475	71601.7	0	0
38	259.068	450.456	60816.5	0	0
39	262.555	454.438	51328.3	0	0
40	266.042	458.419	43098.4	0	0
41	269.529	462.4	32946.5	0	0
42	273.015	466.381	24091.6	0	0
43	276.502	470.362	16514.8	0	0
44	279.989	474.344	10097.7	0	0
45	283.476	478.325	4977.82	0	0
46	286.963	482.306	1155.01	0	0
47	290.502	485.845	-1191.49	0	0
48	294.041	489.384	-2483.93	0	0
49	297.579	492.922	-2722.31	0	0
50	301.118	496.461	-1906.62	0	0
51	304.657	500	0	0	0

Query 1 (janbu simplified) - Safety Factor: 1.01729

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	139.412	405	780	0	0
2	143.163	401.249	23554.6	0	0
3	146.914	397.497	51264.7	0	0
4	150.666	393.746	83130.3	0	0
5	151.013	393.767	83526.2	0	0
6	154.362	393.966	85812.4	0	0
7	157.71	394.166	88101.9	0	0
8	161.059	394.365	90394.5	0	0
9	164.407	394.565	92690.4	0	0
10	167.755	394.764	94989.4	0	0
11	171.104	394.964	98636	0	0
12	174.452	395.163	99037.9	0	0
13	177.801	395.363	99442.9	0	0
14	181.149	395.562	99850.8	0	0
15	184.497	395.762	100143	0	0
16	187.846	395.961	100277	0	0
17	191.194	396.161	100392	0	0
18	194.543	396.36	135151	0	0
19	197.891	396.56	135228	0	0
20	201.24	396.76	135282	0	0
21	204.422	399.499	149559	0	0
22	207.604	402.238	135996	0	0
23	210.786	404.977	150862	0	0
24	213.968	407.716	137886	0	0
25	217.15	410.455	153341	0	0
26	220.332	413.194	169090	0	0
27	223.514	415.933	157000	0	0
28	226.6	418.59	173677	0	0
29	229.687	421.247	162475	0	0
30	232.774	423.904	151527	0	0
31	235.86	426.561	140835	0	0
32	238.947	429.217	130398	0	0
33	242.034	431.874	120216	0	0
34	245.12	434.531	110290	0	0
35	248.607	438.513	96612.7	0	0
36	252.094	442.494	83664.8	0	0
37	255.581	446.475	71601.7	0	0
38	259.068	450.456	60816.5	0	0
39	262.555	454.438	51328.3	0	0
40	266.042	458.419	43098.4	0	0
41	269.529	462.4	32946.5	0	0
42	273.015	466.381	24091.6	0	0
43	276.502	470.362	16514.8	0	0
44	279.989	474.344	10097.7	0	0
45	283.476	478.325	4977.82	0	0
46	286.963	482.306	1155.01	0	0
47	290.502	485.845	-1191.49	0	0
48	294.041	489.384	-2483.93	0	0
49	297.579	492.922	-2722.31	0	0
50	301.118	496.461	-1906.62	0	0
51	304.657	500	0	0	0

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.46137

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	148.865	405	780	0	0
2	151.958	401.907	14917.7	1130.49	4.33369
3	155.051	398.814	38700.9	5853.52	8.60081
4	158.065	395.8	76805.2	17219.1	12.6363
5	161.208	397.406	74835.7	22400.3	16.6638
6	164.352	399.011	73221.1	27325.1	20.4649
7	167.495	400.617	71951.9	32051.6	24.011
8	170.639	402.223	66159.4	34127.4	27.2863
9	173.782	403.829	87400	51043.3	30.2858
10	176.925	405.435	81846.9	53177.4	33.0125
11	180.069	407.041	76709.4	54667.2	35.4757
12	183.212	408.647	97993.4	75705.3	37.6881
13	186.356	410.253	90519.4	75056.1	39.6646
14	189.499	411.859	109066	96224.9	41.4208
15	192.45	413.367	102270	94977.9	42.8828
16	195.402	414.875	95652.4	92940.3	44.1761
17	198.353	416.382	114514	115768	45.312
18	201.305	417.89	108035	113055	46.3007
19	204.256	419.398	126779	136676	47.1514
20	207.208	420.906	120442	133162	47.8714
21	210.159	422.414	114223	128959	48.4677
22	213.111	423.922	132969	152671	48.9457
23	216.119	424.624	129697	150872	49.316
24	219.127	425.326	126285	148238	49.5721
25	222.136	426.028	122739	144811	49.716
26	225.144	426.73	119060	140638	49.7497
27	228.152	427.433	115255	135773	49.6727
28	231.16	428.135	111328	130279	49.4849
29	234.168	428.837	107284	124221	49.1843
30	237.176	429.539	103128	117670	48.7681
31	240.185	430.241	98868	110702	48.2319
32	243.193	430.943	94508.8	103395	47.5709
33	246.201	431.645	90057.4	95828.7	46.7783
34	249.097	435.564	80967.4	83505.1	45.884
35	251.994	439.483	72393.6	72022.5	44.8528
36	254.89	443.402	64324	61417.4	43.6758
37	257.786	447.32	56932.3	51882.6	42.343
38	260.682	451.239	50213.9	43410.1	40.8435
39	263.579	455.158	44167	35977.5	39.1655
40	266.475	459.077	38420.4	29265.3	37.297
41	269.371	462.995	31347.3	22134.2	35.2258
42	272.268	466.914	24888.9	16126.2	32.9403
43	275.164	470.833	19075.4	11205.3	30.4309
44	278.06	474.752	13843.7	7265.08	27.6902
45	280.956	478.671	9293.13	4277.32	24.715
46	283.853	482.589	5534.26	2180.94	21.5084
47	286.749	486.508	2647.98	864.486	18.0803
48	290.122	489.881	614.035	151.213	13.8345
49	293.495	493.254	-510.305	-84.1226	9.36089
50	296.868	496.627	-616.758	-50.9604	4.72341
51	300.241	500	0	0	0

Query 1 (gle/morgenstern-price) - Safety Factor: 1.48998

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A

Entity Information

Curved

Shared Entities

Type	Coordinates (x,y)
External Boundary	0, 428 0, 414 0, 413.654 0, 330 100, 330 115, 330 316, 330 316, 500 266, 500 266, 490 253, 490 195, 461 183, 456 183, 439 168, 439 168, 413.426 168, 405 160, 405 75, 405 75, 428 53, 428 50, 428 50, 427
Material Boundary	0, 414 16.358, 413.654 40.287, 418.439 53, 428
Material Boundary	100, 330 160, 405
Material Boundary	168, 413.426 168.551, 413.97 189.424, 444.783 195, 461

Scenario-based Entities

Type	Coordinates (x,y)	Master Scenario	Curved Static	Curved Pstatic	Block Static	Block Pseudostatic
Water Table	0, 410 173, 410 316, 425	Assigned to: 🟨 Puente Formation 🟧 Puente 2 🟥 Alluvium	Assigned to: 🟨 Puente Formation 🟧 Puente 2 🟥 Alluvium	✗	✗	✗

Distributed Load	316, 500 276.076, 500	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No	Constant DistributionOrientation: Normal to boundaryMagnitude: 100 lbs/ft2Creates Excess Pore Pressure: No
Water Table	0, 410 173, 410 214, 415 316, 425	✗	✗	Assigned to: 🟨 Puente Formation 🟧 Puente 2 🟥 Alluvium	Not assigned to any materials	Not assigned to any materials
Distributed Load	75, 418.042 75, 405 160, 405 168, 405 168, 413.426 168, 415.811			Constant DistributionOrientation: VerticalMagnitude: 1100 lbs/ft2Creates Excess Pore Pressure: No		
Block Search Window	193.2, 341.629 229.394, 340.753 226.475, 466.848 187.619, 454.12					
Block Search Window	236.399, 340.17 253.912, 340.462 256.247, 481.734 236.983, 473.561					
Block Search Window	259.458, 339.586 293.609, 339.586 297.403, 491.366 260.626, 482.61					

Block Search Window	134.797, 341.523 175.395, 340.753 171.309, 399.131 127.818, 400.59					
Distributed Load	75, 415.804 75, 405 160, 405 168, 405 168, 412.252					Constant DistributionOrientation: VerticalMagnitude: 1100 lbs/ft2Creates Excess Pore Pressure: No

Appendix E

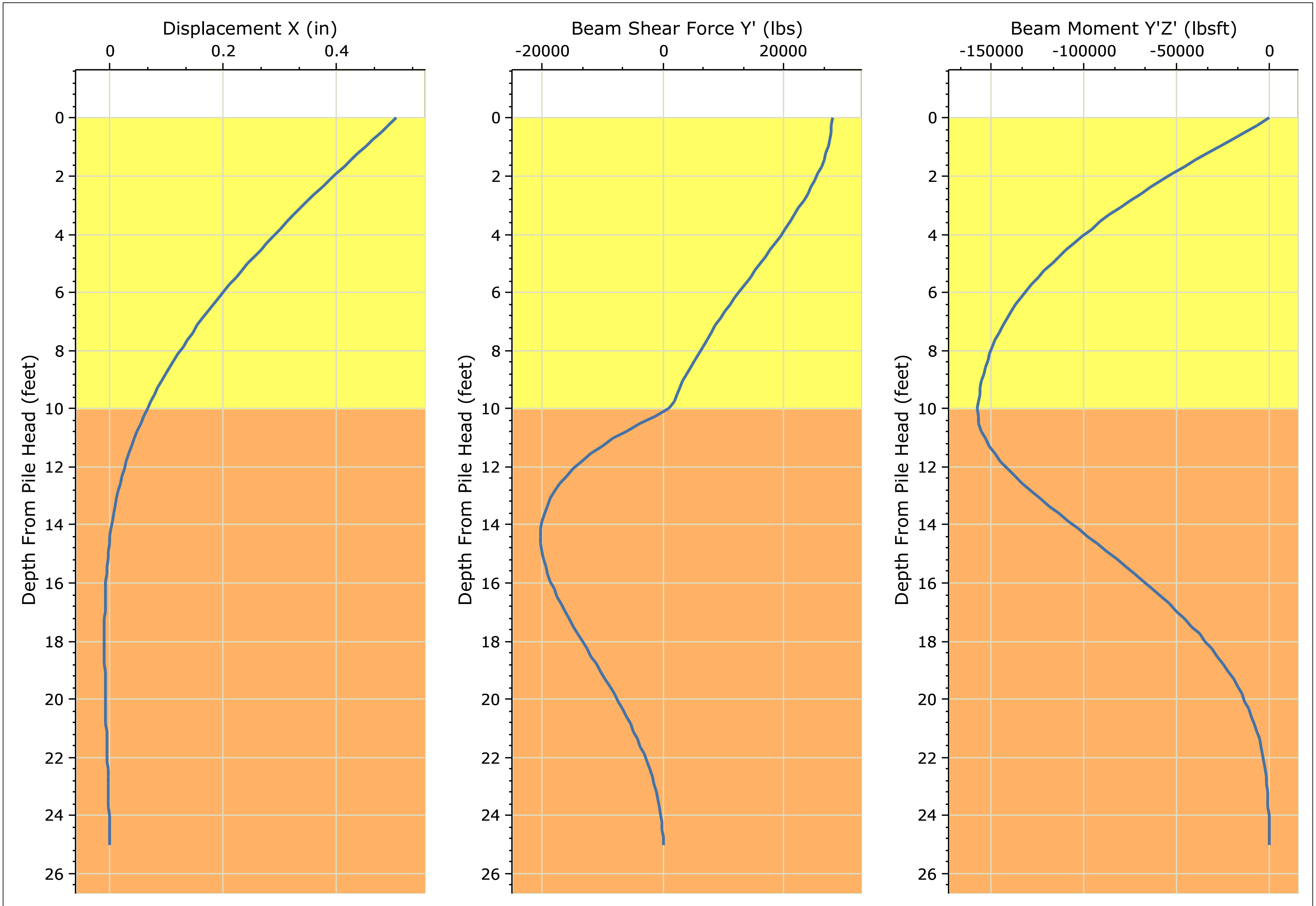
RSPile Printouts

RSPile Analysis Information

File No. 20489 Aragon Sunset

Project Summary

Document Name	20489 Free Head 24 inch.rspile2
Project Title	File No. 20489 Aragon Sunset
Analysis	24 inch Diam. Pile, 0.5 inch deflection
Author	RTK
Company	Geotechnologies, Inc.
Date Created	9/5/2023, 7:08:17 PM
Last saved with RSPile version	3.005



Geotechnologies, Inc.
Consulting Geotechnical Engineers

RSPILE 3.005

Project
File No. 20489 Aragon Sunset

Analysis Description
24 inch Diam. Pile, 0.5 inch deflection

Reinforcement:

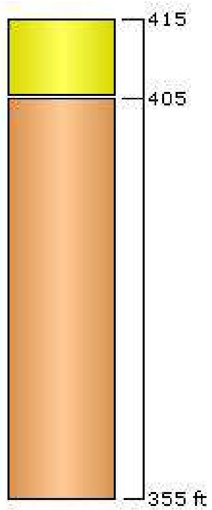
Comment
Geotechnologies, Inc.

Criteria:

File Name
20489 Free Head 24 inch.rspile2

Soil Layers

Layer Name	Color	Layer Type	Thickness [ft]	Depth [ft]
Alluvium	🟨	Silt (Cemented C - Phi Coil)	10	-415
Bedrock Siltstone and Sandstone	🟧	Silt (Cemented C - Phi Coil)	50	-405



Soil Properties

Alluvium

Property	Value
Name	Alluvium
Color	🟨
Soil Type	Silt (Cemented C - Phi Coil)
Unit Weight (lbs/ft3)	120
Sat. Unit Weight (lbs/ft3)	130

Bedrock Siltstone and Sandstone

Property	Value
Name	Bedrock Siltstone and Sandstone
Color	🟧
Soil Type	Silt (Cemented C - Phi Coil)
Unit Weight (lbs/ft3)	125
Sat. Unit Weight (lbs/ft3)	135

Pile Properties

Pile Property 1

Property	Value
Name	Pile Property 1
Color	🟦
Pile Type	Elastic
Pile Cross Section	Circular
Diameter (ft)	2
Young's Modulus (psf)	5.2e+08

Pile Settings

Pile 1

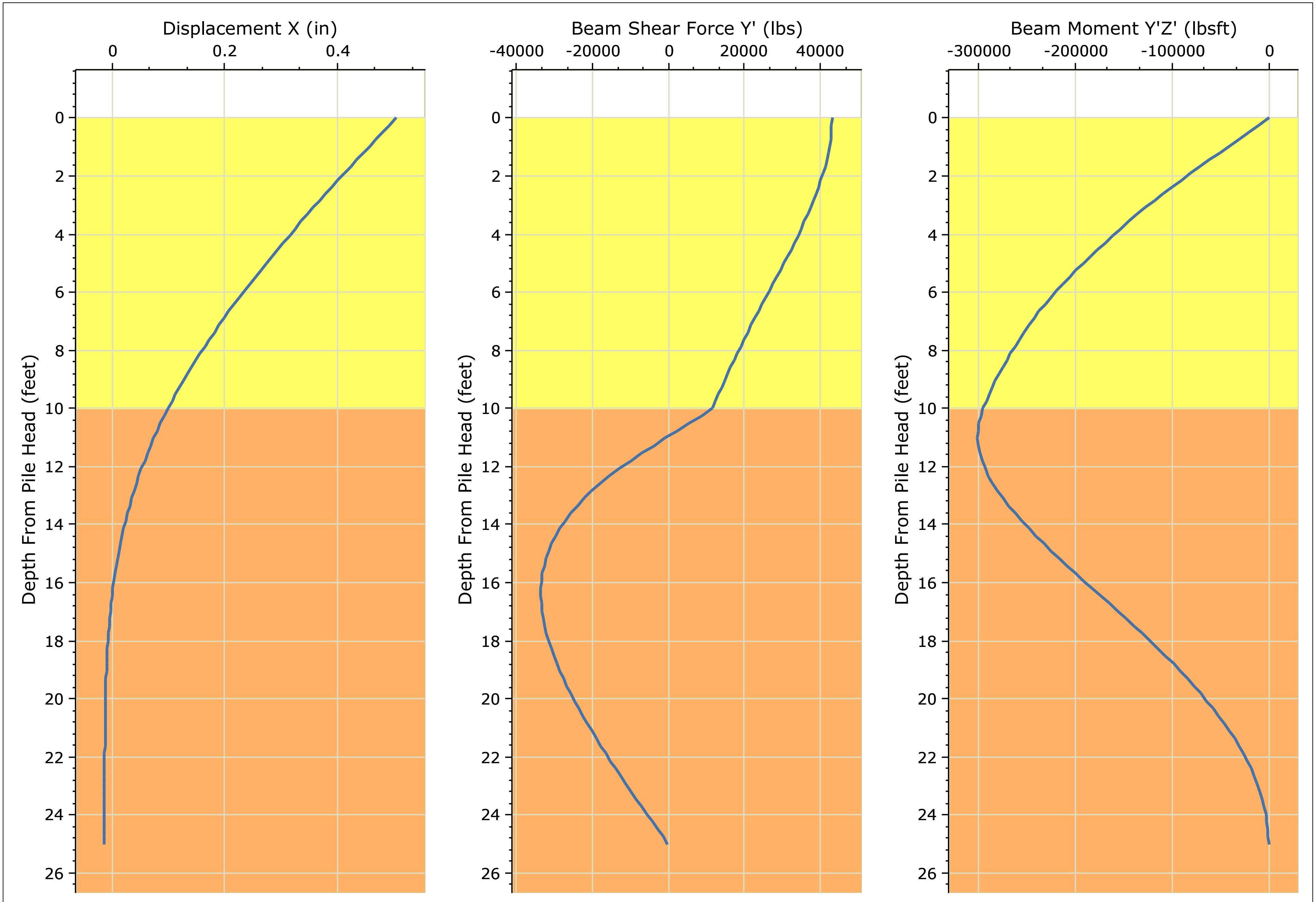
General		
Property	Pile Property 1	
Location	0, 0	
Elevation (ft)	415	
Length (ft)	25	
Orientation		
Ground Slope Angle (°)	0	
Alpha Angle (°)	0	
Beta Angle (°)	90	
Rotation Angle (°)	0	
Loading		
Loading Type		Static
Load Factor Profile		None
Type	Value	Depth
Deflection X, (ft)	0.042	0

RSPile Analysis Information

File No. 20489 Aragon Sunset

Project Summary

Document Name	20489 Free Head 30 inch.rspile2
Project Title	File No. 20489 Aragon Sunset
Analysis	30 inch Diam. Pile, 0.5 inch deflection, Free Head
Author	RTK
Company	Geotechnologies, Inc.
Date Created	9/5/2023, 7:08:17 PM
Last saved with RSPile version	3.005



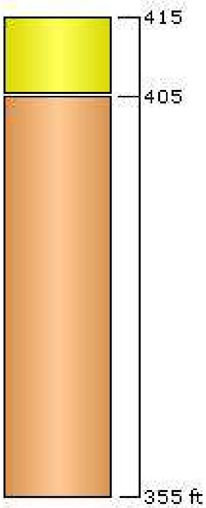
Geotechnologies, Inc.
Consulting Geotechnical Engineers

RSPILE 3.005

Project	File No. 20489 Aragon Sunset
Analysis Description	30 inch Diam. Pile, 0.5 inch deflection, Free Head
Reinforcement:	*Comment* Geotechnologies, Inc.
Criteria:	*File Name* 20489 Free Head 30 inch.rspile2

Soil Layers

Layer Name	Color	Layer Type	Thickness [ft]	Depth [ft]
Alluvium	🟨	Silt (Cemented C - Phi Coil)	10	-415
Bedrock Siltstone and Sandstone	🟧	Silt (Cemented C - Phi Coil)	50	-405



Soil Properties

Alluvium

Property	Value
Name	Alluvium
Color	🟨
Soil Type	Silt (Cemented C - Phi Coil)
Unit Weight (lbs/ft3)	120
Sat. Unit Weight (lbs/ft3)	130

Bedrock Siltstone and Sandstone

Property	Value
Name	Bedrock Siltstone and Sandstone
Color	🟧
Soil Type	Silt (Cemented C - Phi Coil)
Unit Weight (lbs/ft3)	125
Sat. Unit Weight (lbs/ft3)	135

Pile Properties

Pile Property 1

Property	Value
Name	Pile Property 1
Color	🟦
Pile Type	Elastic
Pile Cross Section	Circular
Diameter (ft)	2.5
Young's Modulus (psf)	5.2e+08

Pile Settings

Pile 1

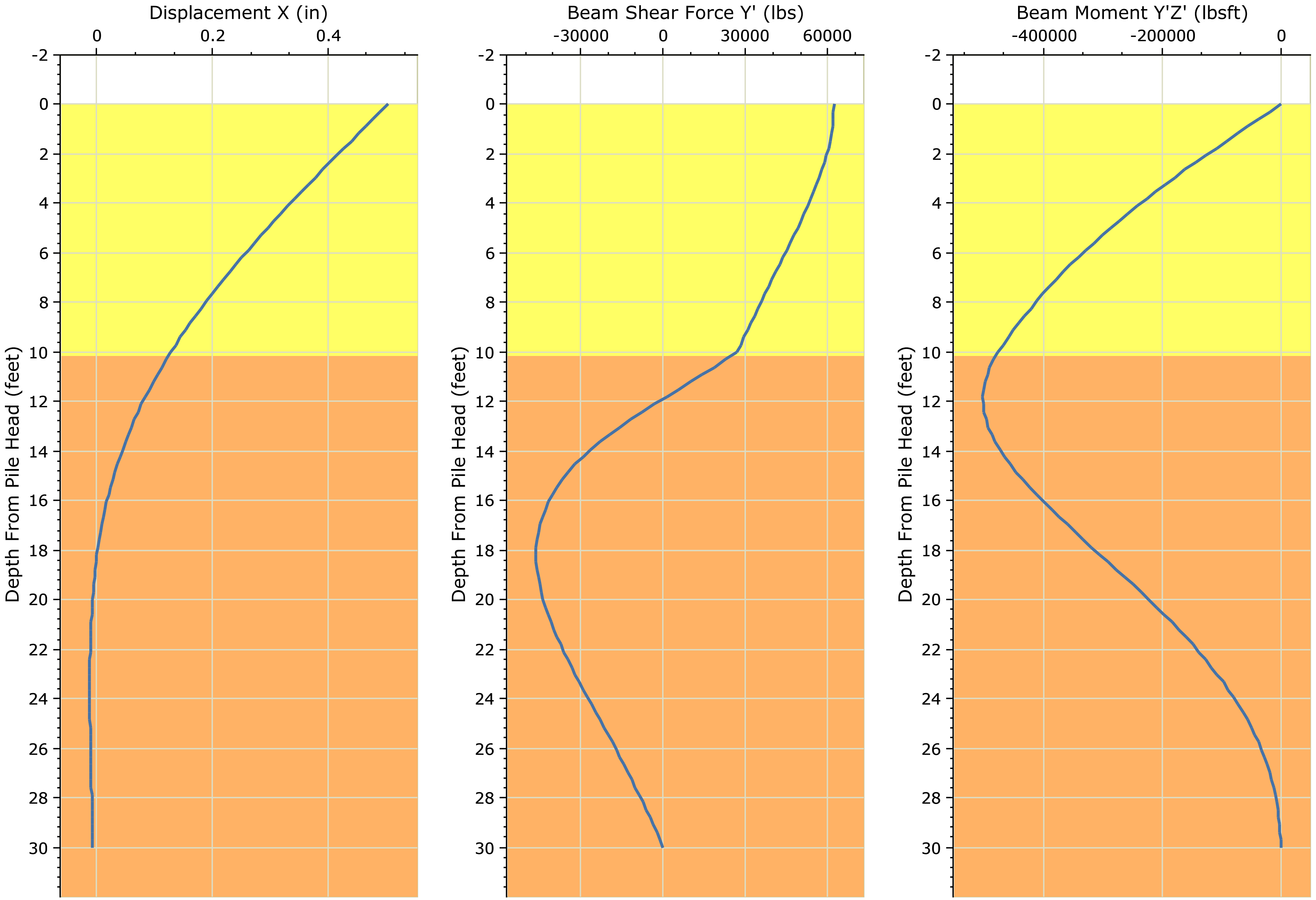
General		
Property	Pile Property 1	
Location	0, 0	
Elevation (ft)	415	
Length (ft)	25	
Orientation		
Ground Slope Angle (°)	0	
Alpha Angle (°)	0	
Beta Angle (°)	90	
Rotation Angle (°)	0	
Loading		
Loading Type		Static
Load Factor Profile		None
Type	Value	Depth
Deflection X, (ft)	0.042	0

RSPile Analysis Information

File No. 20489 Aragon Sunset

Project Summary

Document Name	20489 Free Head 36 inch.rspile2
Project Title	File No. 20489 Aragon Sunset
Analysis	36 inch Diam. Pile, 0.5 inch deflection, Free Head
Author	RTK
Company	Geotechnologies, Inc.
Date Created	9/5/2023, 7:08:17 PM
Last saved with RSPile version	3.005



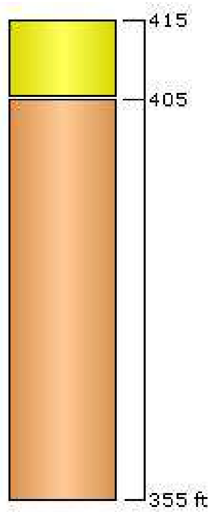
Geotechnologies, Inc.
Consulting Geotechnical Engineers

Project	File No. 20489 Aragon Sunset
Analysis Description	36 inch Diam. Pile, 0.5 inch deflection, Free Head
Reinforcement:	
Criteria:	
Comment	Geotechnologies, Inc.
File Name	20489 Free Head 36 inch.rspile2

RSPILE 3.005

Soil Layers

Layer Name	Color	Layer Type	Thickness [ft]	Depth [ft]
Alluvium	🟨	Silt (Cemented C - Phi Coil)	10	-415
Bedrock Siltstone and Sandstone	🟧	Silt (Cemented C - Phi Coil)	50	-405



Soil Properties

Alluvium

Property	Value
Name	Alluvium
Color	🟨
Soil Type	Silt (Cemented C - Phi Coil)
Unit Weight (lbs/ft3)	120
Sat. Unit Weight (lbs/ft3)	130

Bedrock Siltstone and Sandstone

Property	Value
Name	Bedrock Siltstone and Sandstone
Color	🟧
Soil Type	Silt (Cemented C - Phi Coil)
Unit Weight (lbs/ft3)	125
Sat. Unit Weight (lbs/ft3)	135

Pile Properties

Pile Property 1

Property	Value
Name	Pile Property 1
Color	🟦
Pile Type	Elastic
Pile Cross Section	Circular
Diameter (ft)	3
Young's Modulus (psf)	5.2e+08

Pile Settings

Pile 1

General		
Property	Pile Property 1	
Location	0, 0	
Elevation (ft)	415	
Length (ft)	30	
Orientation		
Ground Slope Angle (°)	0	
Alpha Angle (°)	0	
Beta Angle (°)	90	
Rotation Angle (°)	0	
Loading		
Loading Type		Static
Load Factor Profile		None
Type	Value	Depth
Deflection X, (ft)	0.042	0

Appendix F

Desktop Fault Evaluation
by Lettis Consultants International, Inc.

Report dated May 02, 2017

DESKTOP FAULT EVALUATION
1185 Sunset Boulevard, Los Angeles, CA

Prepared for:

Geotechnologies, Inc.
439 Western Ave.
Glendale, CA 91201

Prepared by:

Lettis Consultants International, Inc. (LCI)
27441 Tourney Road, Suite 220
Valencia, CA 91355

May 2, 2017

LCI
Lettis Consultants International, Inc.

LCI
EARTH SCIENCE CONSULTANTS

Lettis Consultants International, Inc.
27441 Tourney Road, Suite 220
Valencia, CA 91355
(661) 287-9900; fax (661) 287-9990

May 2, 2017

Reinard Knur, G.E., C.E.G.
Geotechnologies, Inc.
439 Western Ave.
Glendale, CA 91201

Subject: **Desktop Fault Evaluation**
1185 Sunset Boulevard, Los Angeles, California
LCI Project No. 1206

Dear Mr. Knur:

Lettis Consultants International, Inc. (LCI) is pleased to present the results of a desktop fault evaluation for the subject property located at 1185 Sunset Boulevard, located with the City of Los Angeles, California. This report includes the data, interpretation, and conclusions regarding the age and activity of the unnamed fault located west of the project site as mapped by Lamar (1970).

In addition to the evaluation of published geologic data for the region surrounding the subject property, we also performed a site visit and evaluated and interpreted structural geologic data collected at the project site by Geotechnologies, Inc. We appreciate the opportunity to submit this report. Should you have any questions, please do not hesitate to contact us.

Sincerely,
Lettis Consultants International, Inc.

Christopher D. Kemp
Project Geologist

RICHARD MICHAEL ORTIZ No. 2621

Richard M. Ortiz, C.E.G. 2621
Senior Geologist

SCOTT C. LINDVALL NO. 1711

Scott C. Lindvall, C.E.G. 1711
Vice President, Senior Principal Geologist

Table of Contents

1.0 INTRODUCTION

The purpose of this study was to better characterize an unnamed fault of Lamar (1970) mapped directly west of the subject property located at 1185 Sunset Boulevard, Los Angeles, California. (Figure 1). Specifically, LCI was requested to research the origin of the fault, characterize the most-recent movement on the fault given available data, and help address whether or not the fault projects through the subject property. Public comments on the EIR for the proposed development of subject property have raised concerns regarding the fault mapped by Lamar (1970). The fault is not zoned as an active fault by the City of Los Angeles or the State of California.

The LCI scope of work included:

- Review of published maps and literature related to faulting,
- Review of geotechnical reports prepared for the site (Geotechnologies, Inc., 2014a, 2014b),
- A geomorphic assessment to identify features in the landscape suggestive of the presence or absence of faulting,
- A site visit to observe bedrock exposures,
- Review of Geotechnologies' data from recent explorations and site work that included boreholes, test pits, trenches, mapping, and geologic cross-sections, and
- Preparation of this report.

2.0 SUMMARY OF GEOLOGIC LITERATURE

The southern portion of the Lamar (1970) fault was initially recognized by the petroleum industry in the late 19th century and was depicted as an unnamed fault on a number of early maps based on data from the Los Angeles City oil field. The fault was named the Sisters Hospital fault by Crowder (1961), but this naming convention was not utilized by later authors on maps published after 1961. In the earliest stages of the Los Angeles City oil field development, drilling progressed eastward from the initial discovery until an oil-barren section near Sisters Hospital (Figure 2a and Figure 2b) was encountered and this barrier was interpreted to represent a subsurface fault (Crowder, 1961). This fault has been included in several maps since its identification at the turn of the 19th to 20th centuries. Conversely, some geologic maps do not include the fault. Provided below is a summary of geologic maps and studies that cover the vicinity of the fault:

Eldridge and Arnold (1907). This early study of the Los Angeles City oil field appears to be the first mapping study to include the fault. Only a short section of the fault was mapped and its orientation is a more westerly strike than shown in later studies (Figure 3). Eldridge and Arnold

(1907) appear to show the fault running nearby but not encroaching on the subject property, however, the mapping scale is not appropriate to confidently determine the exact location of the fault with respect to the site boundary.

Soper and Grant (1932). This geologic study of the Los Angeles area provides a brief description of the Los Angeles City oil field. Citing Eldridge and Arnold (1907), they note that the oil field is offset, possibly by "a north-south fault of small throw, but the existence of such a fault has not been positively determined because the rock exposures at this locality are not very good." Their mapping was centered on the Downtown District of Los Angeles and does not extend as far north as the subject property. However, the mapping of Soper and Grant (1932) shows the fault oriented north-northwest along the base of the hill at Sisters Hospital (Figure 4), which was located east of the subject property along Sunset Boulevard between White Knoll Drive and North Beaudry Avenue (the current site of the Elysian Apartments and the former Holy Hill church). The fault terminates to the south at the intersection of Beaudry Avenue and Sunset Boulevard (Figure 4). Soper and Grant (1932) also map a conspicuous 20- to 50-ft-thick bed of east-west-oriented white to very light gray diatomite within the Puente Formation approximately one mile east of the subject property, which represents the uppermost part of the Miocene age section. This marker bed is unfaulted and was easily mapped across the area in a nearly straight line of aligned outcrops (Soper and Grant, 1932) (Figure 4) indicating that the fault does not extend that far to the south.

Soper (1943). This study of the Los Angeles oil field depicts the fault extending north-northwest along Sunset Boulevard from a few hundred feet south of Sisters Hospital to about the intersection of Sunset Boulevard and Marion Street. North of the site, Soper (1943) depicts a separate, short, east-northeast-striking fault that offsets the Tmss-Tmsh contact, which is the Tpss-Tpsl contact that Lamar (1970) shows to be offset by the subject fault. A mile south of the site, Soper (1943) depicts an unfaulted east-west trending diatomite marker bed at the top of the Miocene section (Figure 5), which corresponds to the diatomite mapped by Soper and Grant (1932). The fault is mapped by Soper (1943) in close proximity to the site, however the scale of Soper's (1943) map is not appropriate to confidently determine the exact location of the fault with respect to the site boundary.

Crowder (1961). As part of a summary of the Los Angeles City oil field, mapping by Crowder (1961) depicts the longest length of the fault to that point and with a similar orientation to that of Lamar (1970) and applies the name "Sisters Hospital fault" to the structure (Figure 2a). Note that Crowder (1961) is the only author to name the fault. The brief description of the fault by Crowder (1961) notes that the Sisters Hospital fault is a west-dipping normal fault with about 50 ft of displacement. The fault is also shown on a cross-section that spans the east-west length of the Los Angeles City oil field (Figure 2b). The fault is mapped in close proximity to the site, however the scale of Crowder's (1961) map is not appropriate to confidently determine the exact location of the fault with respect to the site boundary.

Lamar (1970). Mapping by Lamar (1970) appears to be based primarily on Crowder (1961), however, Soper (1943), Soper and Grant (1932), and Eldridge and Arnold (1907) are also referenced by Lamar. The fault is not specifically described by Lamar (1970). As shown by Lamar (1970) the fault is queried along its entire mapped length of nearly 2 km, which is more than twice the length of Crowder (1961) or any other previous mappers. The fault is shown offsetting a queried contact between the siltstone and sandstone members of the Miocene Puente Formation (Tpsl and Tpss) approximately 0.5 mi northwest of the project site (Lamar, 1970) (Figure 1). Lamar (1970) also maps the unfaulted diatomite (Tpds) at the top of the Miocene section south of the project site (Figure 1).

Several geologic maps that post-date Lamar (1970) include the unnamed fault with traces that are nearly identical to that of Lamar (1970). These maps include Yerkes et al. (1977) (Figure 6), Yerkes (1997) (Figure 7), and Bedrossian et al. (2012) (Figure 8).

Some geologic maps of the Los Angeles quadrangle that post-date Lamar (1970), however do not include the fault in question. Maps by Weber (1980) and Dibblee and Ehrenspeck (1989 and 1991) do not include the fault of Lamar (1970). Dibblee and Ehrenspeck (1989 and 1991) cite Lamar (1970) as a mapping reference yet does not include the fault suggesting that Dibblee and Ehrenspeck (1989 and 1991) found insufficient evidence to include the fault on his maps (Figure 9). Neither the Lamar (1970) fault nor the associated Elysian Park fault mapped to the northeast by Lamar (1970) are included in the U.S. Geological Survey Quaternary Fault and Fold Database, and are not zoned as an active fault by the City of Los Angeles or the State of California.

Despite its inclusion in the previous maps described above, the Lamar (1970) fault is poorly documented, has not been subject to any detailed studies, and its existence cannot be established on the basis of geologic exposures (Lamar, 1970). However, Lamar (1970) states that activity of the Elysian Park fault and other northwest-striking faults to the south (Figure 1) are pre-Pliocene in age. Map relationships support a pre-Pliocene age for the fault. The northern end of the fault is shown displacing a queried northwest-striking contact between the Upper Miocene Puente Formation sandstone (Tpss) and siltstone (Tpsl). The apparent right-lateral displacement of the contact is approximately 130 m. South of the project site, the fault is queried and dies out within the Puente siltstone member (Tpsl). This decrease in slip up-section is supported by (1) the apparent horizontal displacement of only about 30 m of the 700-ft structure contour mapped by Crowder (1961) (Figure 2a), and (2) the lack of offset of the Upper Miocene Puente Formation diatomaceous shale (Tpds). The presence of this thin unfaulted marker bed precludes the fault from continuing much farther south from its mapped southern terminus (Figure 1, Figure 4, Figure 5, Figure 7).

Apparent vertical displacement of the fault appears to be the secondary component of slip based on 15 m of maximum vertical separation in a cross-section by Crowder (1961) (Figure 2b).

Similar to the lack of horizontal displacement demonstrated by the continuous diatomaceous shale (Tpds) unit, the Quaternary terrace (Qt) deposits mapped by Lamar (1970) lack evidence of vertical displacement. Northeast of 2nd Street, the base of the deposit remnants lies vertically within about 15 ft of the 400 ft contour on the 1929 Los Angeles topographic map, and does not exhibit any abrupt steps or departures from a generally horizontal orientation (Figure 1 and Figure 10). To the southwest of 2nd Street, a second and lower terrace deposit is evident from the 1929 topography based on a lower terrace surface. The two terrace deposits appear to have been simplified as a single deposit by Lamar (1970). Similarly, the base of this lower deposit is oriented horizontal and lies vertically within 15 ft of the 375 ft contour in the 1929 topographic map (Figure 1 and Figure 10).

3.0 GEOMORPHIC ASSESSMENT

We completed a geomorphic assessment of the region surrounding the project site based on the review of historical aerial photographs and historical topographic maps from 1927 to 1941. Table 1 lists the air photo frames we reviewed as part of this study.

There is no expression of the fault in the reviewed historical aerial photographs, although concealment by development prevents a detailed topographic analysis from aerial photos. The Lamar (1970) fault, as mapped, is located within a small arroyo, which corresponds to Sunset Boulevard. However, the fault trends oblique and across the ridge forming the western margin of the arroyo, which suggests the location and formation of the arroyo was not controlled by the presence of the fault, indicating a lack of a structural relationship between the fault and the arroyo (Figure 10).

Table 1. Historical aerial photographs reviewed for this study.

Flight	Frame Number	Year	Scale	Source
C-113	266	1927	1:18,000	Fairchild Collection (UCSB)
C-113	267	1927	1:18,000	Fairchild Collection (UCSB)
C-113	268	1927	1:18,000	Fairchild Collection (UCSB)
C-300	K-188	1928	1:18,000	Fairchild Collection (UCSB)
C-300	K-189	1928	1:18,000	Fairchild Collection (UCSB)
C-5040b	1	1938	1:12,420	Fairchild Collection (UCSB)
C-5040b	2	1938	1:12,420	Fairchild Collection (UCSB)
C-5040b	3	1938	1:12,420	Fairchild Collection (UCSB)
C-7334	107	1941	1:4,500	Fairchild Collection (UCSB)
N/A	E-1935	1928	Oblique – no scale	Spence Collection (UCLA)

4.0 SITE VISIT

On October 14, 2016, Scott Lindvall of LCI met Reinard Knur of Geotechnologies, Inc. at the site to observe bedrock exposures in the cut slopes and in hand-dug test pits behind the existing buildings. Brush had been cleared from the steep slope behind the buildings and 14 test pits (test pits 8-11 and 13-22) had been excavated by hand into the steep slope to expose well-bedded siltstone of the Puente Formation. Where the slopes were not covered by a colluvial apron, continuous bedding was exposed. Interbeds of sandstone provide key marker horizons that can be mapped across portions of the slope and between test pits (Figure 11).

Observations made during the site visit include:

- Bedding attitudes measured in the test pit exposures (test pits 8-11 and 13-22) consistently strike easterly and dip moderately to the south. The exceptions to this regional bedding attitude is found in test pits 8, 18, and 19 near the shotcrete-covered section of the slope (Figure 11).

- The anomalous bedding attitudes confirm the presence of a small syncline mapped by Lamar (1970). From north to south along the cut slope, attitudes gradually change from a southerly dip to a northeast dip along continuous, unfaulted marker beds.

- Continuous bedrock exposures and several marker beds can be traced across the large, west-facing cut slope (paralleling Sunset Boulevard) and preclude the presence of any faults in the steep slope with the exception of the shotcrete-covered section.

5.0 EVALUATION OF GEOTECHNOLOGIES STRUCTURAL DATA

In addition to reviewing a majority of bedrock and test pit exposures at the site, LCI also reviewed draft maps, sections, logs, and field photos documenting the onsite structural information compiled by Geotechnologies, Inc. at the completion of their site mapping and exploration (Geotechnologies, Inc., 2017). In general, as observed during the site visit summarized above, the well bedded Puente Formation bedrock exposed at the project site generally strikes east-west and exhibits a moderate southern dip at both the northern and southern portions of the project site. The central section of the project site is characterized by anomalous northwest-southeast striking and moderate easterly dipping bedding orientations (Figure 12).

The change in bedding orientations through the central portion of the project site correspond to a pair of small folds. A syncline is exposed within the west-facing cut slope and an anticline is exposed within test pit 24, which is located south of the syncline (Figure 12). Nearly continuous exposures of both fold limbs and fold axes demonstrate that the anomalous bedding attitudes near the central portion of the site are explained by folding in the Puente Formation, and not fault displacement across the site.

6.0 FAULTS AT BELMONT LEARNING CENTER

Other nearby faults to the Lamar (1970) fault include a zone of faulting exposed at the Belmont Learning Center. Earth Consultants International (ECI) conducted a fault investigation at the Belmont School, located about 0.5 km to the south of the subject property. ECI concluded faults at the Belmont Learning Center are likely not active (ECI, 2003), however, given the lack of suitable surface material to rule out Holocene activity on faults located at the site, ECI (2003) considered the faults potentially active and treated them as such in their report. ECI (2003) notes, *“Although it is quite unlikely that all, or even most, of the faults breaking bedrock on the property are active, determination of this is not possible onsite.”*

ECI (2003) does not propose a structural link between the Elysian Park blind thrust fault and the faults located at the Belmont Learning Center either in text or figures. ECI’s report discusses the Elysian Park blind thrust fault and the process by which minor faults may occasionally develop above a blind thrust fault, however, neither the Elysian Park blind thrust fault nor faults that may develop above it are discussed in relation to faults identified at the Belmont Learning Center.

A key difference between the faults located at the Belmont Learning Center and the Lamar (1970) fault is that faults at the Belmont Learning Center have been observed first-hand. Given that Lamar (1970) dashes and queries the entire trace of the unnamed fault suggests that no direct observation of the fault was made by Lamar in bedrock exposures, roadcuts, or trenches.

The most significant faults at the Belmont Learning Center (Category A faults with 10s to 100s of feet of total displacement) are north-northeast- to northeast-striking and exhibit left-lateral and east-side-down displacement (ECI, 2003). This differs dramatically from the Lamar (1970) fault, which is interpreted as right-lateral and exhibits a west-side-down vertical component within the Los Angeles City oil field (Figure 2b). Based on the different orientations and kinematics, these faults likely are not related.

7.0 CONCLUSIONS

- The geologic basis for the Lamar (1970) fault appears to be limited to the offset contact at the northern end of the fault and the Sisters Hospital fault from oil field data associated with the Los Angeles City oil field. Mapping that postdates Lamar (1970) do not provide any additional evidence in support of the fault (e.g., no new offset contacts or disparate bedding attitudes on either side of fault) within the data gap between the offset beds of Lamar (1970) north of the project site and the subsurface data attributed to the Sisters Hospital fault of Crowder (1961) south of the project site.

- Lamar (1970) describes northwest-striking faults on his map, which includes the subject fault, as pre-Pliocene in age and, therefore, inactive. Map relationships from Lamar (1970) and subsequent geologic maps support this interpretation. The fault is depicted as dying out up section (towards the south) within the Puente Formation. A thin diatomaceous shale unit is mapped as undeformed across the southern projection of this fault (Soper and Grant, 1932; Soper, 1943; Lamar, 1970; Yerkes, 1997). Similarly, the mapped distribution of Quaternary terraces that cross the southern projection of the fault also appear undeformed in 1:24,000-scale of published geologic maps (Lamar, 1970; Dibblee and Ehrenspeck, 1989 and 1991; and Bedrossion, 2012).

- Mapping of continuous bedrock exposures and logging of multiple test pits and bucket auger boreholes by Geotechnologies, Inc. document continuous, well-bedded, locally folded but unfaulted, bedrock at the site (Figure 12). The subject fault of Lamar (1970) could not be found traversing the subject site and the absence of faulting can be demonstrated across the majority of the site containing bedrock slope and test pit exposures. The overall pattern of bedding attitudes provides additional confidence that no significant fault transects the site in areas between bedrock exposures. The only structural anomalies on the site consist of a northwest-striking syncline-anticline pair through the central portion of the site. These small folds disrupt the consistent east striking, south-dipping Puente Formation at the site. The fold axis of the syncline is exposed in the cut slope and the fold axis of the anticline was exposed in test pit 24 excavated east of the shotcrete-covered portion of the slope (Figure 12). These two small folds explain the change in bedding orientation on either side of the shotcrete. The fault of Lamar (1970) would appear to lie west of the site, as depicted by Lamar (1970) in Figure 1.

- Evaluation of historical aerial photos and geomorphic assessment of historical topographic maps do not yield any evidence for neotectonic features nor Holocene activity associated with the Lamar (1970) fault and are consistent with a pre-Pliocene age as determined by Lamar (1970).

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FIGURES

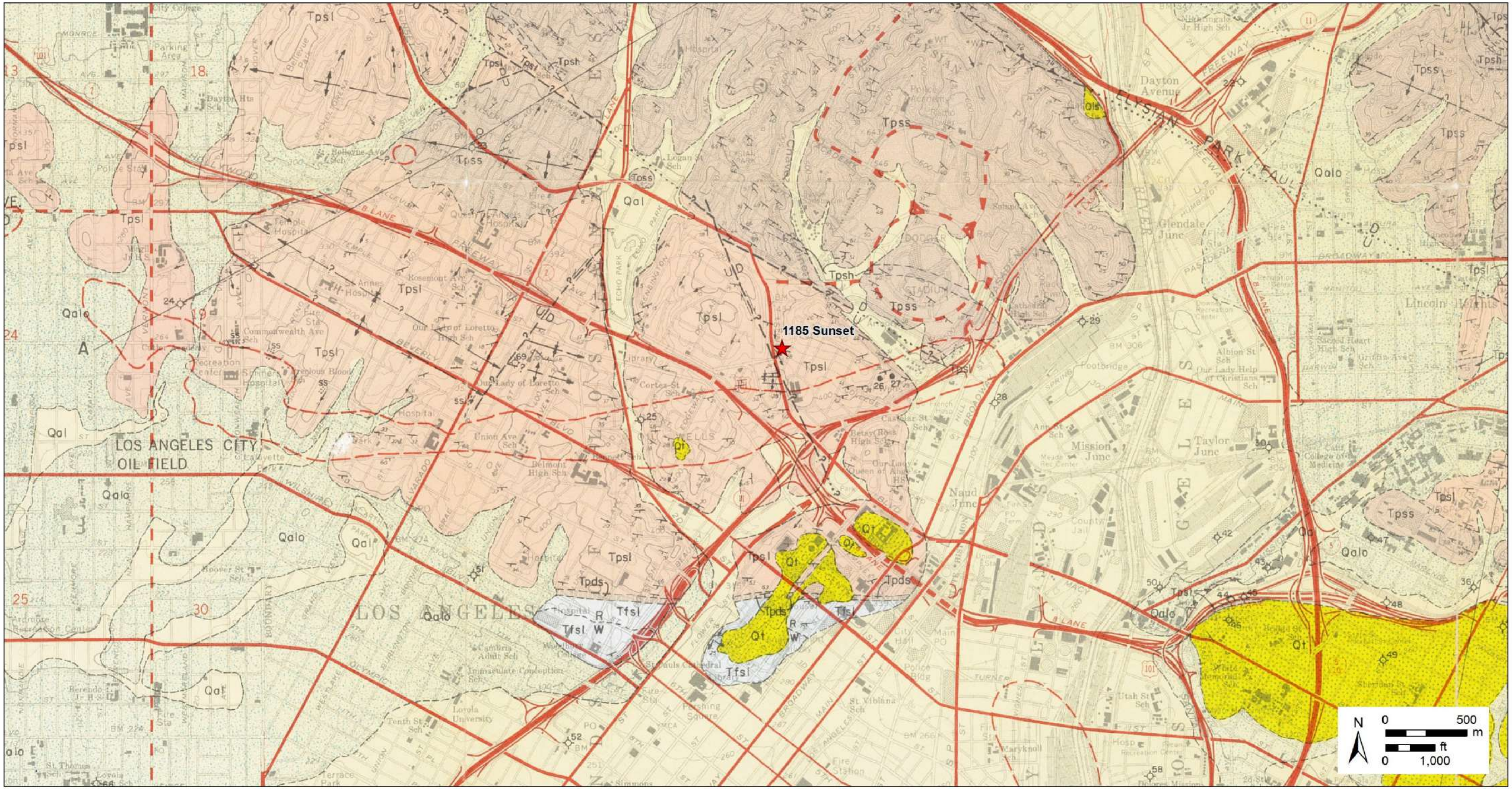

Figure 1. Geologic map of the Elysian Park-Repetto Hills Area by Lamar (1970).

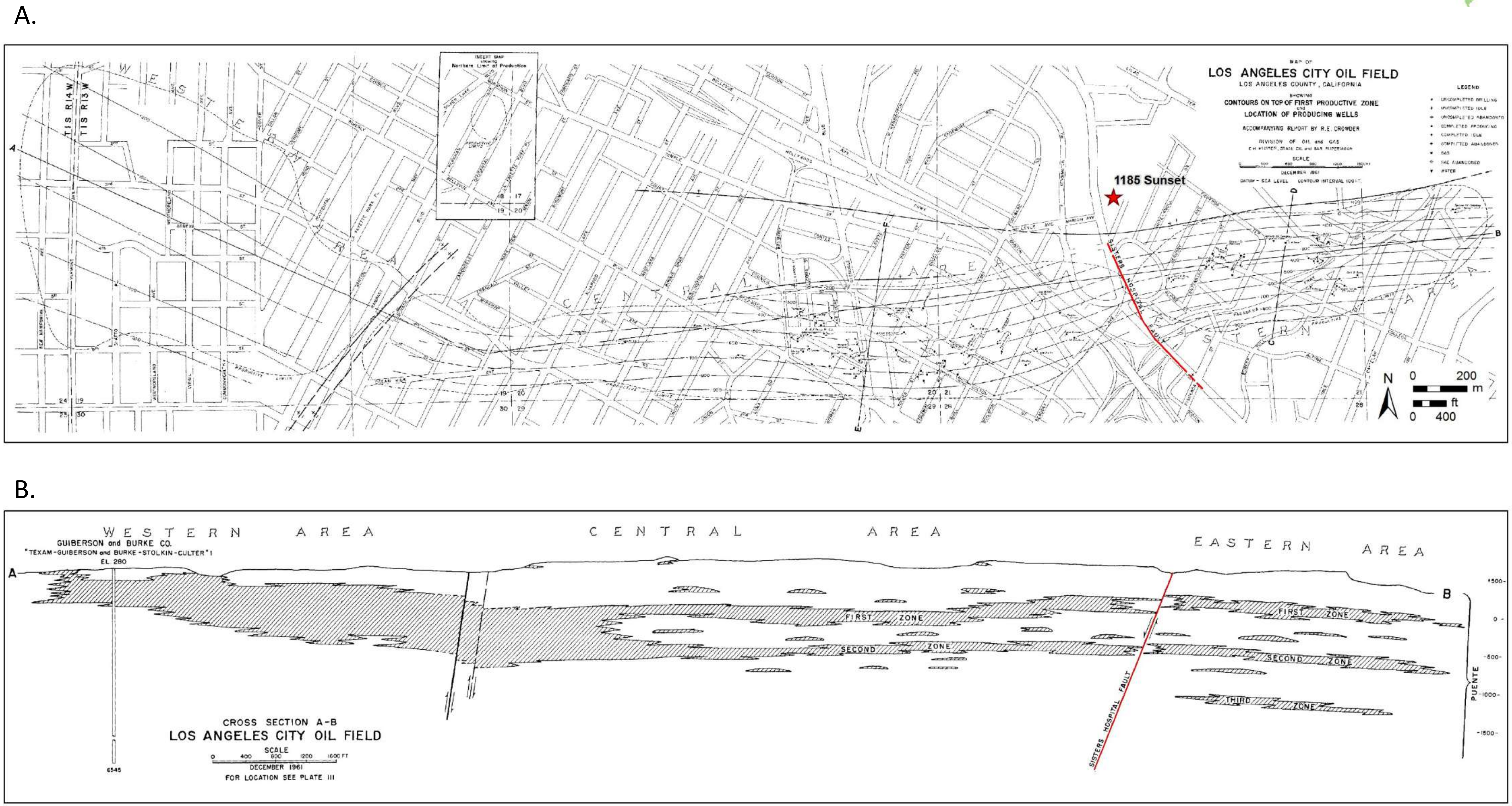

Figure 2. Crowder (1961) structure contour map shown in A and cross section A-B shown in B, depicting the subsurface structure of the Los Angeles City oil field.

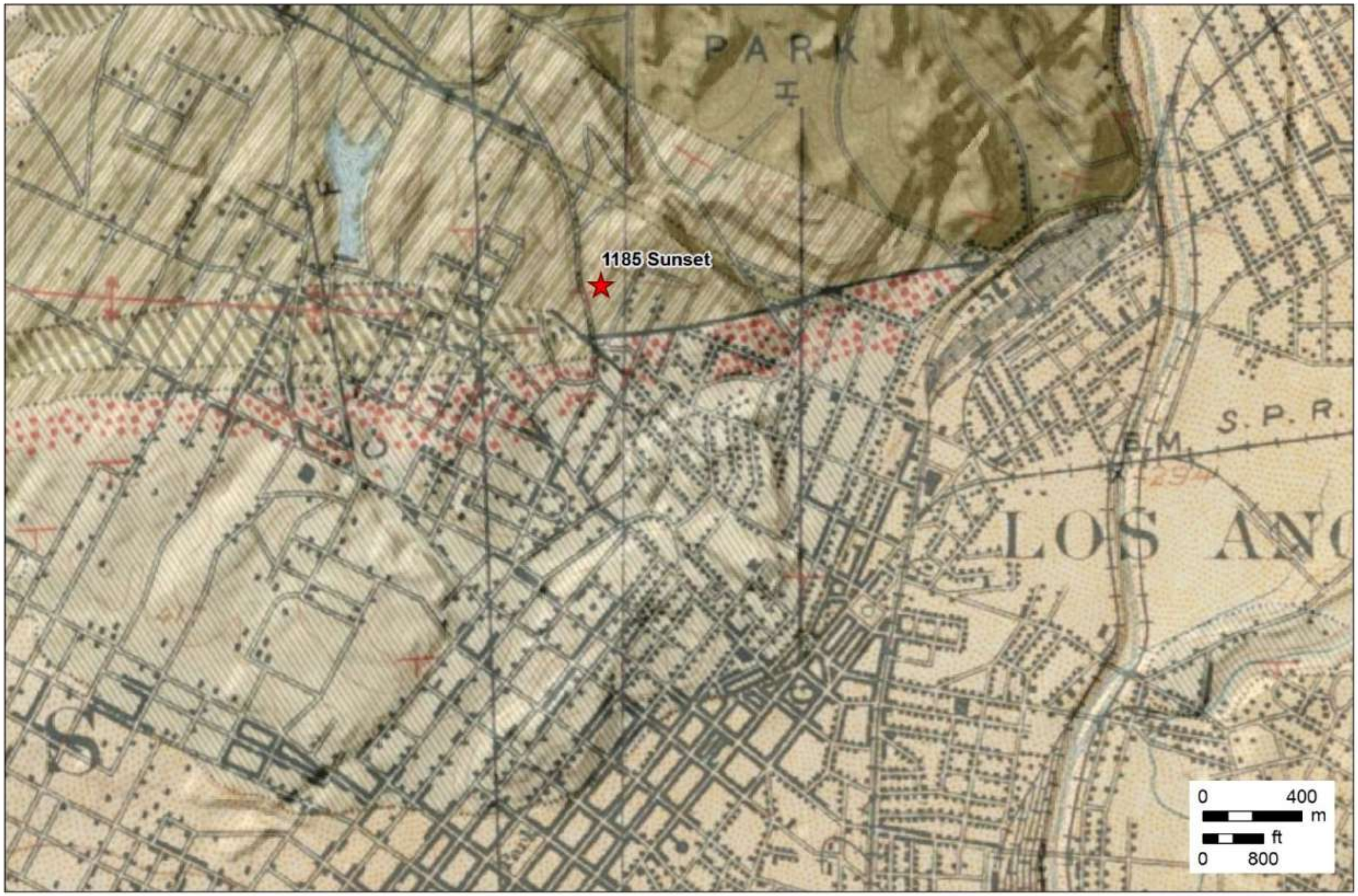

Figure 3. Geologic map of Eldridge and Arnold (1907).

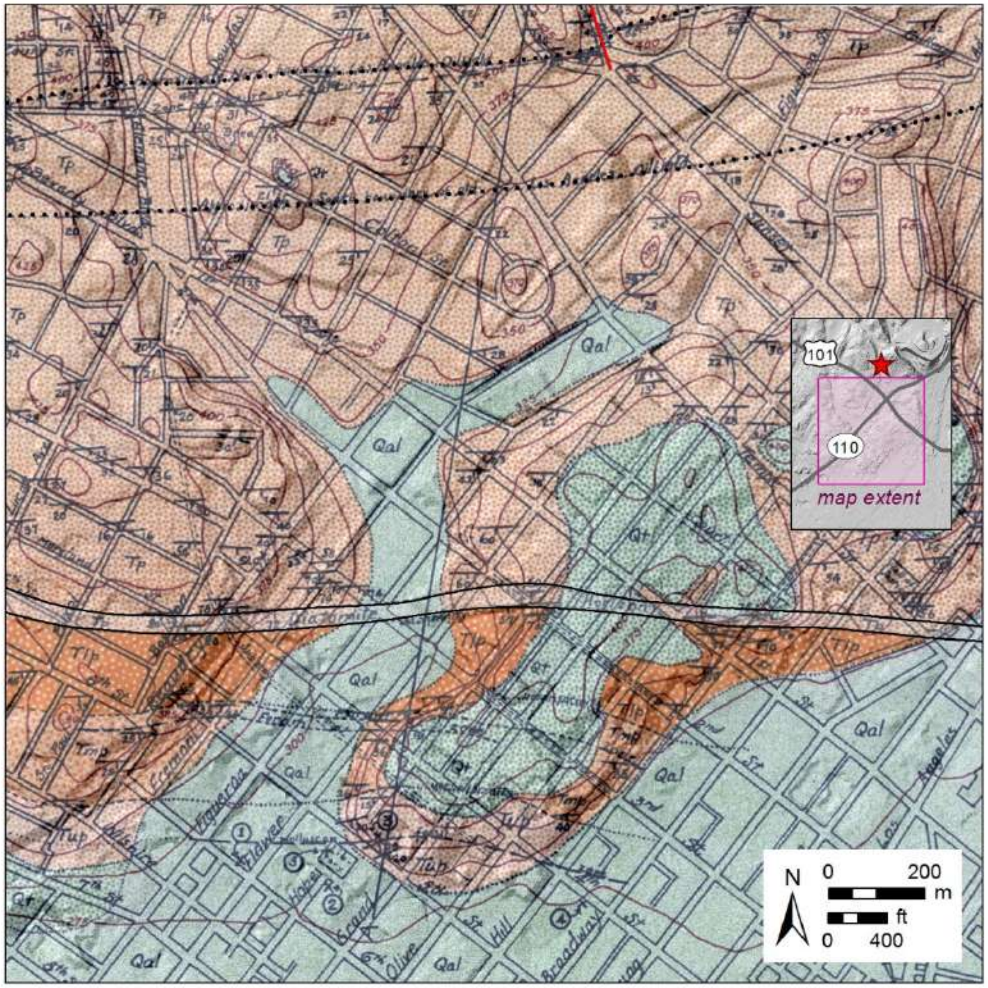

Figure 4. Geologic map of Soper and Grant (1932). Project site (red star) is located north of the northern edge of the map area (see inset). Unfaulted diatomite highlighted with light gray shading.

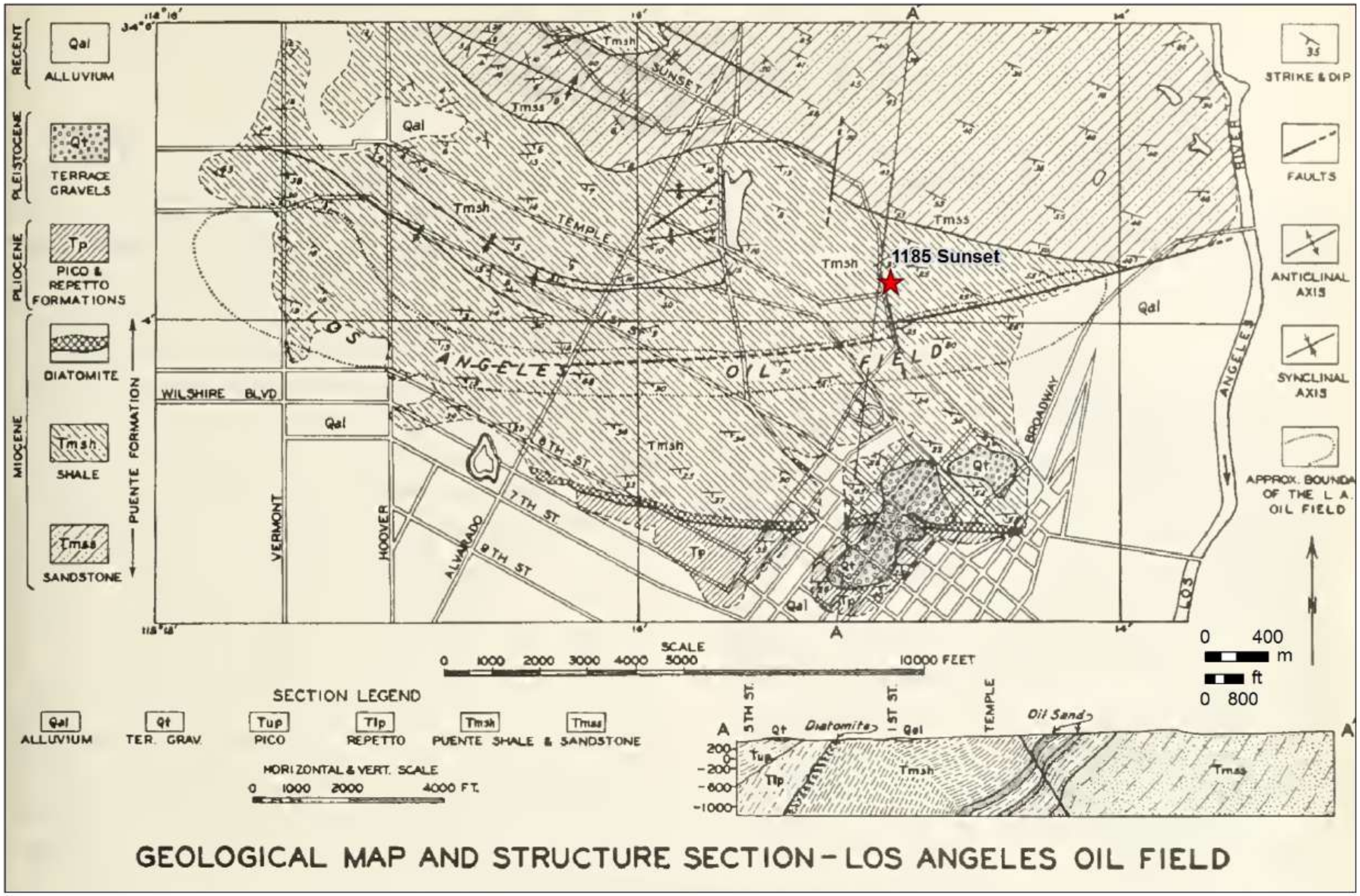

Figure 5. Geologic map of Soper (1943) showing oil field map south of project site and unfaulted diatomite bed south of project site.

Figure 6. Geologic map of Yerkes et al. (1977).

Figure 7. Geologic map of Yerkes (1997).

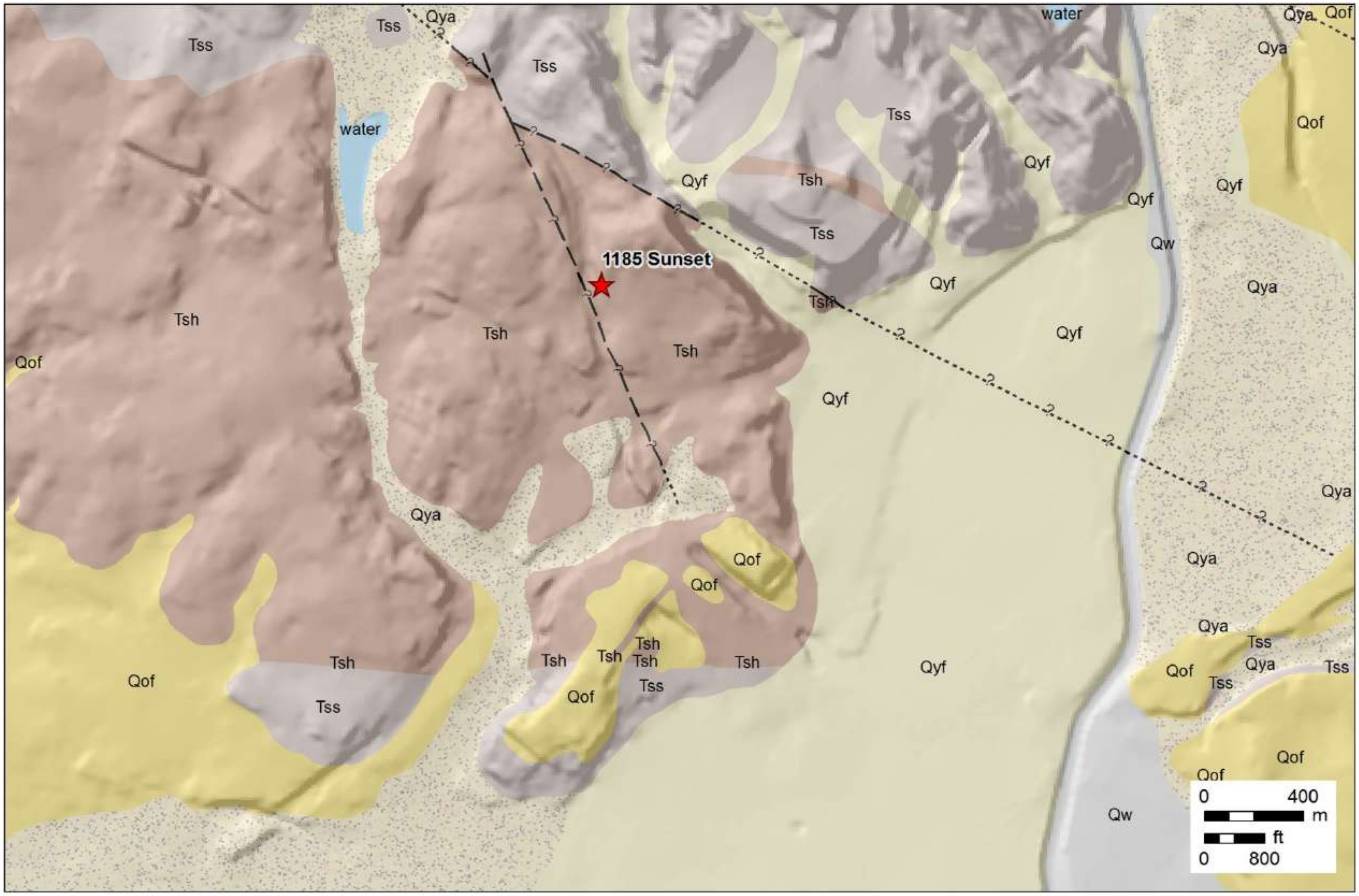

Figure 8. Geologic map of Bedrossian et al. (2012).

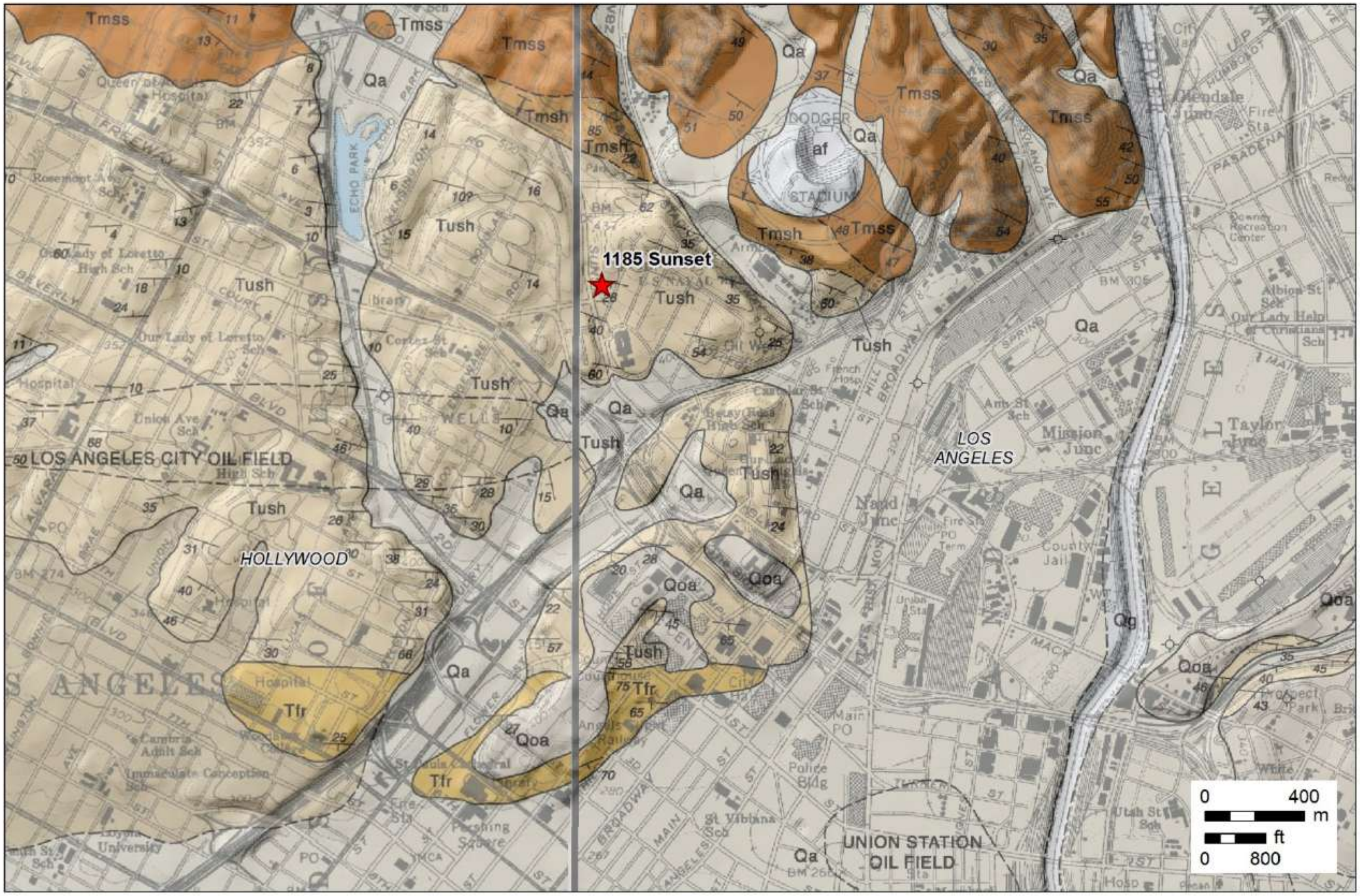

Figure 9. Geologic map of Dibblee and Ehrenspeck (1989).

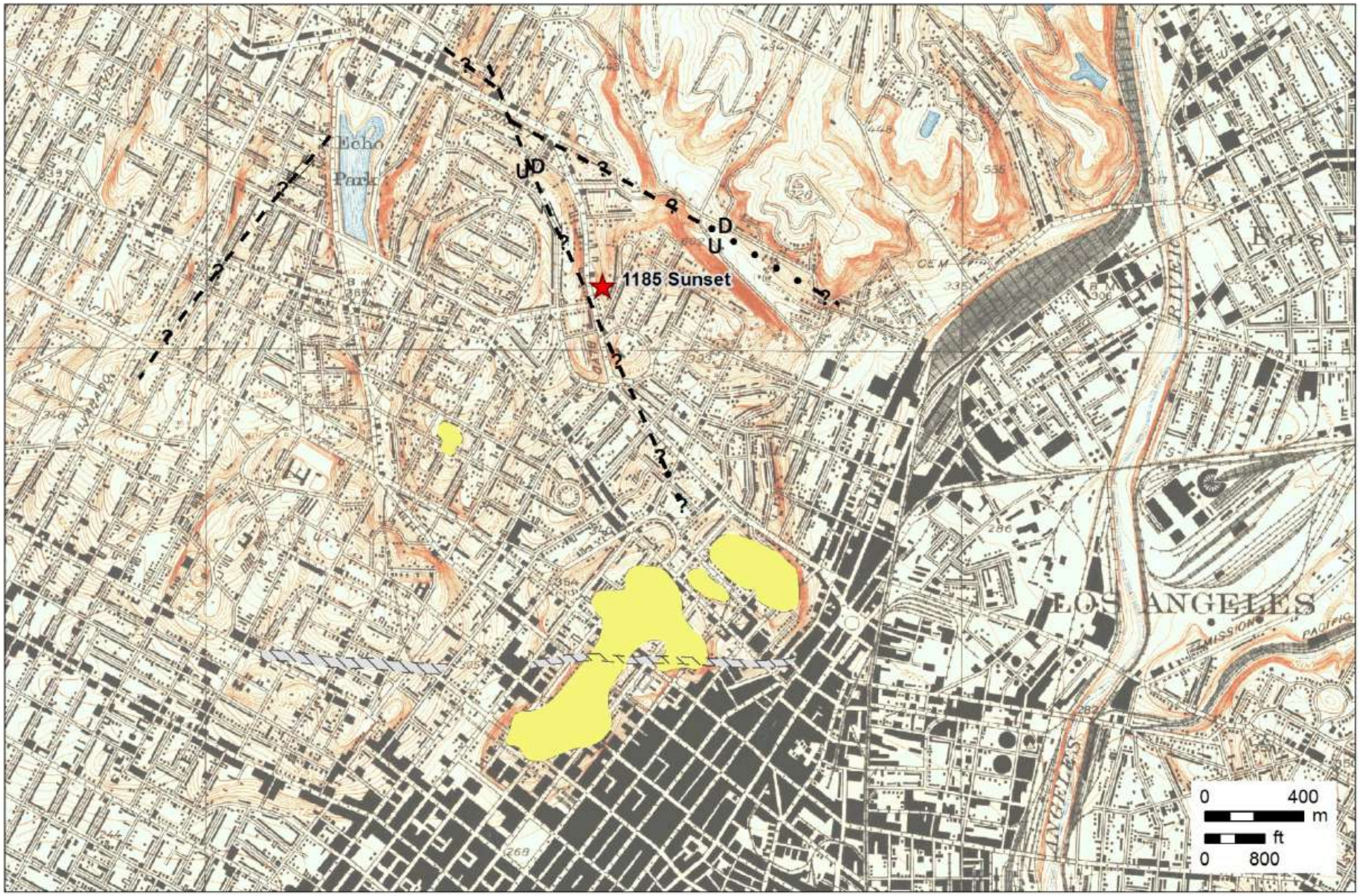

Figure 10. 1928 Los Angeles 6' quadrangle with overlay of key geologic features from Lamar (1970). Unnamed faults are dashed and queried, unfaulted diatomite bed is depicted as gray hatched polygons and quaternary terrace deposits are shown as yellow polygons.

Figure 11. Test pits reviewed by LCI on October 14, 2016.

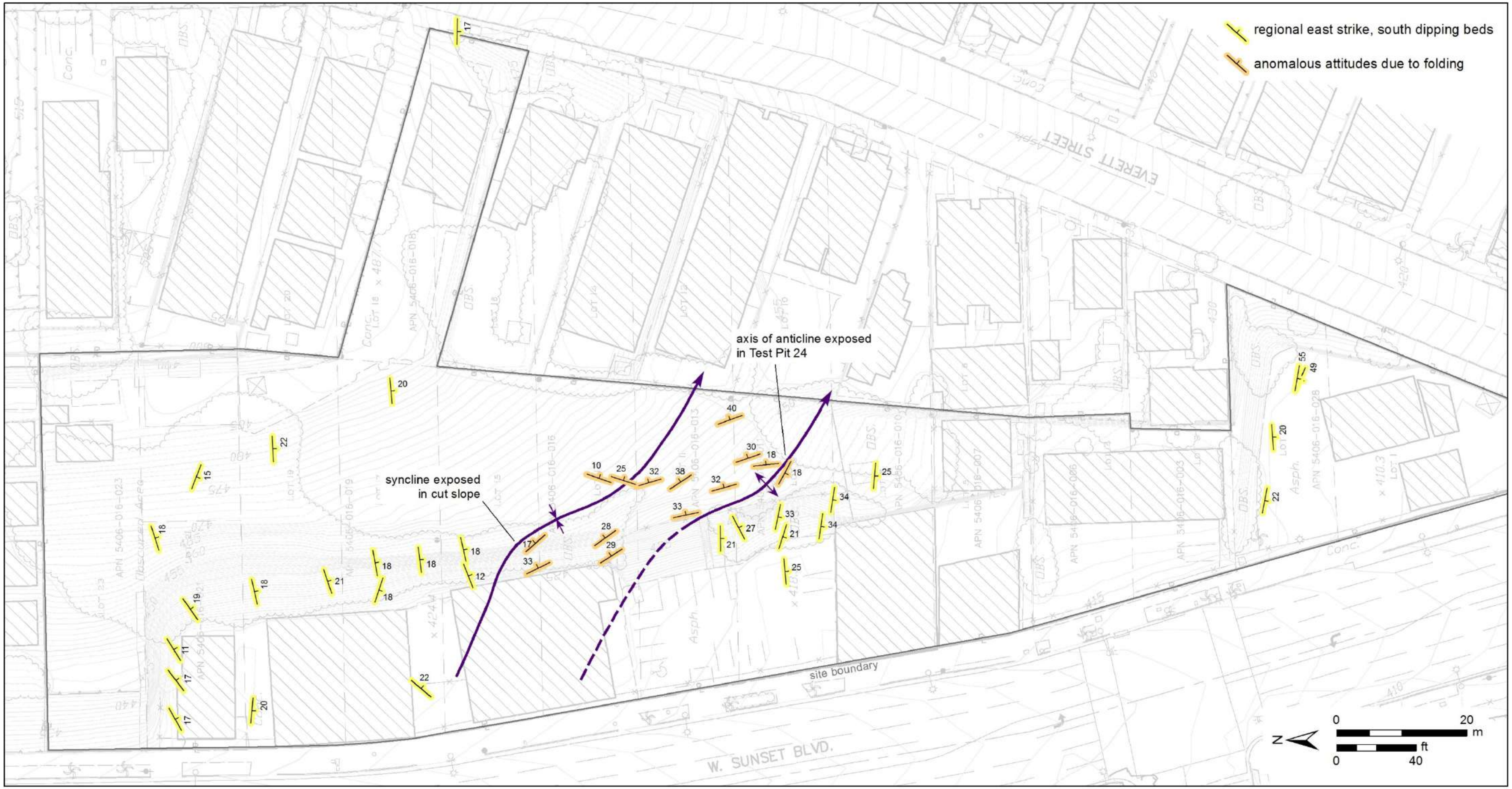

Figure 12. Bedding attitudes and folds identified at project site.

Appendix G

Corrosion Evaluation Report
by ProjectX Corrosion Engineering

Report dated June 20, 2018

Corrosion Evaluation Report for Aragon Sunset

June 20, 2018

Prepared for:
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Contents

1 Executive Summary

A corrosion evaluation of the soils at Aragon Sunset was performed to provide corrosion control recommendations for general construction materials. The site is located at 1229 Sunset Blvd, Los Angeles, CA 90026. Three (3) samples were tested to a depth of 1 ft. Site ground water and topography information was provided via Los Angeles Regional Water Quality Control Board and determined to be 20 feet below finished grade.

The recommendations outlined herein are not a substitute for any design documents previously prepared for the purpose of construction and apply only to the depth of samples collected.

Soil samples were tested for minimum resistivity, pH, chlorides, sulfates, ammonia, nitrates, sulfides and redox.

As-Received soil resistivities ranged between 80,400 ohm-cm and 100,500 ohm-cm. This data would be similar to a Wenner 4 pin test in the field and used in the design of a cathodic protection or grounding bed system. This resistivity can change seasonally depending on the weather and moisture in the ground. This reading alone can be misleading because condensation or minor water leaks will occur underground along pipe surfaces creating a saturated soil environment in the trench along infrastructure surfaces which is why minimum or saturated soil resistivity measurements are more important than as-received resistivities.

Saturated soil resistivities ranged between 1,474 ohm-cm to 1,675 ohm-cm. The worst of these values is considered to be corrosive to general metals.

PH levels ranged between 8.6 to 8.6 pH. PH levels were determined to be at levels not detrimental to copper or aluminum alloys. The pH of these samples can allow corrosion of steel and iron in moist environments.

Chlorides ranged between 24 mg/kg to 30 mg/kg. Chloride levels in these samples are low and may cause insignificant corrosion of metals.

Sulfates ranged between 210 mg/kg to 240 mg/kg. Sulfate levels in these samples are negligible for corrosion of metals and cement. Any type of cement can be used that does not contain encased metal.

Ammonia ranged between 1.0 mg/kg to 3.8 mg/kg. Nitrates ranged between 15.0 mg/kg to 24.0 mg/kg. Concentrations of these elements were not high enough to cause accelerated corrosion of copper and copper alloys such as brass.

Sulfides presence was determined to be negative. REDOX ranged between + 95 mV to + 107 mV. The probability of corrosive bacteria was determined to be low due to the sulfide and positive REDOX levels determined in these samples.

2 Corrosion Control Recommendations

The following recommendations are based upon the results of soil testing.

2.1 Cement

The highest reading for sulfates was 240 mg/kg or 0.0240 percent by weight.

Per ACI 318-14, Table 19.3.1.1, sulfate levels in these samples categorized as S0 and are negligible for corrosion of metals and cement. Per ACI 318-14 Table 19.3.2.1 any type of cement not containing steel or other metal can be used.

2.2 Steel Reinforced Cement/ Cement Mortar Lined & Coated (CML&C)

Chlorides in soil can overcome the corrosion inhibiting property of cement for steel, as it can also break through passivated surfaces of aluminum and stainless steels.[1,2] The highest concentration of chlorides was 24 mg/kg.

Chloride levels in these samples are not significantly corrosive to metals not in tension. Standard cement cover may be used in these soils.

2.3 Stainless Steel Pipe/Conduit/Fittings

Stainless steels derive their corrosion resistance from their chromium content and oxide layer which needs oxygen to regenerate if damaged. Thus stainless steel is not good for deep soil applications where oxygen levels are extremely low. Stainless steels should not be installed deeper than a plant root zone. Stainless steels typically have the same nobility as copper on the galvanic series and can be connected to copper. If steel must be used, it must be backfilled with soil having greater than 10,000 ohm-cm resistivity and excellent drainage. Steel will also corrode if in contact with carbon materials. Stainless steel welds should be pickled.

Stainless steel should not be used underground at this site.

2.4 Steel Post Tensioning Systems

The proper sealing of stressing holes is of utmost importance in PT Systems. Cut off excess strand 1/2" to 3/4" back in the hole. Coat or paint exposed anchorage, grippers, and stub of strands with "Rust-o-leum" or equal. After tendons have been coated, the cement contractor shall dry pack blockouts within ten (10) days. A non-shrink, non-metallic, non-porous moisture-insensitive grout (Master EMACO S 488 or equivalent), or epoxy grout shall be used for this purpose. If an encapsulated post-tension system is used, regular non-shrink grout can be used.

Due to the low chloride concentrations measured on samples obtained from this site, post-tensioned slabs should be protected in accordance with soil considered normal (non-corrosive).[3,4]

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[1] Design Manual 303: Cement Cylinder Pipe. Ameron. p.65

[2] *Chapter 19, Table 1904.2.2(1), 2012 International Building Code*

[3] *Post-Tensioning Manual, sixth edition. Post-Tensioning Institute (PTI), Phoenix, AZ, 2006.*

[4] *Specification for Unbonded Single Strand Tendons. Post-tensioning Institute (PTI), Phoenix, AZ, 2000.*

2.5 Steel Piles

Steel piles are most susceptible to corrosion in disturbed soil where oxygen is available. Further, a dissimilar environment corrosion cell would exist between the steel embedded in cement, such as pile caps and the steel in the soil. In the cell, the steel in the soil is the anode (corroding metal), and the steel in cement is the cathode (protected metal). This cell can be minimized by coating the part of the steel piles that will be embedded in cement to prevent contact with cement and reinforcing steel.

Piles driven into soils without disturbing soils will avoid oxygen introduction and low corrosion rates unless there is a probability for corrosive anaerobic bacteria. Galvanized steel's zinc coating can provide significant protection for driven piles. In corrosive soils in which normal zinc coatings are not enough, the life of piles can be extended by increasing zinc coating thickness, using sacrificial metal, or providing a combination of epoxy coatings and cathodic protection. Corrosion has been observed to be extremely localized even at and below underground water tables. Pit depths of this magnitude do not have an appreciable effect on the strength or useful life of piling structures because the reduction in pile cross section is not significant.[5] Pitting is of more importance to pipes transporting liquids or gases which should not be leaked into the ground.

The following recommendations are recommended to achieve desired life. We defer to structural engineers to use our estimated corrosion rates and to choose from the corrosion control options listed below.

1) Sacrificial metal by use of thicker piles per non-disturbed soil corrosion rates, or
2) Galvanized steel piles per non-disturbed soil corrosion rates, or
3) Combination of galvanized and sacrificial metal per non-disturbed soil corrosion rates, or
4) For no loss of metal, coat entire pile with abrasion resistant epoxy coating such as 3M Scotchkote 323, or PowercreteDD, or equivalent, or
5) Use high yield steel which will corrode at the same rate as mild steel but have greater yield strength and thus be able to suffer more material loss than mild steel.

2.5.1 *Expected Corrosion Rate of Steel and Zinc in disturbed soil*

In general, the corrosion rate of metals in soil depends on the electrical resistivity, the elemental composition, and the oxygen content of the soil. Soils can vary greatly from one acre to the next, especially at earthquake faults. The better a soil is for farming; the easier it will be for corrosion to take place. Expansive soils will also be considered disturbed simply because of their nature from dry to wet seasons.

In Melvin Romanoff's NBS Circular 579, the corrosion rates of carbon steels and various metals was studied over long term periods. Various metals were placed in various soil types to gather corrosion rate data of all metals in all soil types. Samples were collected and material loss measured over the course of 20 years in some sites. The following corrosion rates were estimated by comparing the worst results of soils tested with similar soils in Romanoff's studies

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[5] Melvin Romanoff, Corrosion of Steel Pilings in Soils, National Bureau of Standards Monograph 58, pg 20.

and Highway Research Board's publications.[6] The corrosion rate of zinc in disturbed soils is determined per Romanoff studies and King Nomograph.[7]

Expected Corrosion Rate for Steel = 1.74 mils/year for one sided attack

Expected Corrosion Rate for Zinc = 0.504 mils/year for one sided attack.

Note: 1 mil = 0.001 inch

In undisturbed soils, a corrosion rate of 1 mil/year for steel is expected with little change in the corrosion rate of zinc due to it's low nobility in the galvanic series.

Per CTM 643: Years to perforation of corrugated galvanized steel culverts

- 29.8 Years to Perforation for a 18 gage metal culvert
- 38.7 Years to Perforation for a 16 gage metal culvert
- 47.7 Years to Perforation for a 14 gage metal culvert
- 65.6 Years to Perforation for a 12 gage metal culvert
- 83.5 Years to Perforation for a 10 gage metal culvert
- 101.3 Years to Perforation for a 8 gage metal culvert

2.5.2 Expected Corrosion Rate of Steel and Zinc in Undisturbed soil

Expected Corrosion Rate for Steel = 1 mils/year for one sided attack

Expected Corrosion Rate for Zinc = 0.504 mils/year for one sided attack.

Note: 1 mil = 0.001 inch

2.6 Steel Storage tanks

Underground fuel tanks must be constructed and protected in accordance with California Underground Storage Tank Regulations, CCR, Title 23, Division 3, Chapter 16. Metals should be protected with cathodic protection or isolated from backfill material with an epoxy coating.

2.7 Steel Pipelines

Though a site may not be corrosive in nature at the time of construction, **installation of corrosion test stations and electrical continuity joint bonding should be performed during construction** so that future corrosion inspections can be performed. If steel pipes with gasket joints or other possibly non-conductive type joints are installed, their joints should be bonded across by welding or pin brazing a #8 AWG copper strand bond cable. Electrical continuity is necessary for corrosion inspections and for cathodic protection.

Corrosion test stations should be installed every 1,000 feet of pipeline.

Test stations shall have two #8 HMWPE copper strand wire test leads welded or pin brazed to the underground pipe, brought up into the test station hand hole and marked CTS. Wires should be brought into test station hand hole at finished grade with 12 inches of wire coiled within test station.

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[6] Field test for Estimating Service Life of Corrugated Metal Culverts, J.L. Beaton, Proc. Highway Research Board, Vol 41, P. 255, 1962

[7] King, R.A. 1977, Corrosion Nomograph, TRRC Supplementary Report, British Corrosion Journal

At isolation joints and pipe casings, 4 wire test stations shall be installed using #8 HMWPE copper strand wire test leads. Use different color wires to distinguish which wires are bonded to one side of isolation joint or to casing. Wires should be brought into test station hand hole at finished grade with 12 inches of wire coiled within test station.

Prevent dissimilar metal corrosion cells per NACE SP0286:

1) Electrically isolate dissimilar metal connections
2) Electrically isolate dissimilar coatings (Epoxy vs CML&C) segments connections
3) Electrically isolate river crossing segments
4) Electrically isolate freeway crossing segments
5) Electrically isolate old existing pipelines from new pipelines
6) Electrically isolate aboveground and underground pipe segments with flange isolation joint kits. **These are especially important for fire risers.**

The corrosivity at this site is corrosive to steel. Any piping that must be jack-bored should use abrasion resistant epoxy coating such as 3M Scotchkote 323, or PowercreteDD, or equivalent. The corrosion control options for this site are as follows:

1) Apply impermeable dielectric coating such as minimum 8 mil thick polyethylene, and install cathodic protection system per NACE SP0169, or
2) Wax tape, or
3) Coal tar enamel, or
4) Fusion bonded epoxy, or
5) Apply 3 inch coating of Type II cement or high pH slurry that will maintain pH higher than 12. Cement is both a corrosion inhibitor and a coating for ferrous metals. Cement naturally holds a pH of 12 or higher for many years if not exposed to high levels of carbon dioxide.

It is critical for the life of the pipe that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.8 Steel Fittings

The corrosivity at this site is corrosive to steel. The corrosion control options for this site are as follows:

1) Apply impermeable dielectric coating such as minimum 8 mil thick polyethylene, and install cathodic protection system per NACE SP0169, or
2) Tape coating system, or
3) Wax tape, or

4) Coal tar enamel, or
5) Fusion bonded epoxy, or
6) Apply 3 inch coating of Type II cement or high pH slurry that will maintain pH higher than 12. Cement is both a corrosion inhibitor and a coating for ferrous metals. Cement naturally holds a pH of 12 or higher for many years if not exposed to high levels of carbon dioxide.

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.9 Ductile Iron (DI) Fittings

AWWA C105 developed a 10 point system to classify sites as corrosive or non-corrosive to ductile iron materials. The criterion is based upon soil resistivities, soil drainage, pH, sulfide presence, and reduction-oxidation (REDOX) potential. The soil samples tested for this site resulted in a score of 8.5 out of 25.5. A score greater or equal to 10 points classifies soils as aggressive to iron materials.

The corrosivity at this site is corrosive to iron. The corrosion control options for this site are as follows:

1) Apply impermeable dielectric coating such as minimum 8 mil thick polyethylene, and install cathodic protection system per NACE SP0169, or
2) Wax tape, or
3) Coal tar enamel, or
4) Fusion bonded epoxy, or
5) Apply 3 inch coating of Type II cement or high pH slurry that will maintain pH higher than 12. Cement is both a corrosion inhibitor and a coating for ferrous metals. Cement naturally holds a pH of 12 or higher for many years if not exposed to high levels of carbon dioxide.

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.10 Ductile Iron Pipe

AWWA C105 developed a 10 point system to classify sites as corrosive or non-corrosive to ductile iron materials. The criterion is based upon soil resistivities, soil drainage, pH, sulfide presence, and reduction-oxidation (REDOX) potential. The soil samples tested for this site resulted in a score of 8.5 out of 25.5. A score greater or equal to 10 points classifies soils as aggressive to iron materials.

Though a site may not be corrosive in nature at the time of construction, **installation of corrosion test stations and electrical continuity joint bonding should be performed during construction** so that future corrosion inspections can be performed. If steel pipes with gasket joints or other possibly non-conductive type joints are installed, their joints should be bonded across by welding or pin brazing a #8 AWG copper strand bond cable. Electrical continuity is necessary for corrosion inspections and for cathodic protection.

Pea gravel is used by plumbers to lay pipes and establish slopes. If the gravel has more than 200 ppm chlorides or is not tested, a 25 mil plastic should be placed between the gravel and pipe to avoid corrosion.

Corrosion test stations should be installed every 1,000 feet of pipeline.

Test stations shall have two #8 HMWPE copper strand wire test leads welded or pin brazed to the underground pipe, brought up into the test station hand hole and marked CTS. Wires should be brought into test station hand hole at finished grade with 12 inches of wire coiled within test station.

At isolation joints and pipe casings, 4 wire test stations shall be installed using #8 HMWPE copper strand wire test leads. Use different color wires to distinguish which wires are bonded to one side of isolation joint or to casing. Wires should be brought into test station hand hole at finished grade with 12 inches of wire coiled within test station.

Prevent dissimilar metal corrosion cells per NACE SP0286:

1) Electrically isolate dissimilar metal connections
2) Electrically isolate dissimilar coatings (Epoxy vs CML&C) segments connections
3) Electrically isolate river crossing segments
4) Electrically isolate freeway crossing segments
5) Electrically isolate old existing pipelines from new pipelines
6) Electrically isolate aboveground and underground pipe segments with flange isolation joint kits**. These are especially important for fire risers.**

The corrosivity at this site is corrosive to iron. Any piping that must be jack-bored should use abrasion resistant epoxy coating such as 3M Scotchkote 323, or PowercreteDD, or equivalent. The corrosion control options for this site are as follows:

1) Apply impermeable dielectric coating such as minimum 8 mil thick polyethylene, and install cathodic protection system per NACE SP0169, or
2) Wax tape, or
3) Coal tar enamel, or

4) Fusion bonded epoxy, or
5) Apply 3 inch coating of Type II cement or high pH slurry that will maintain pH higher than 12. Cement is both a corrosion inhibitor and a coating for ferrous metals. Cement naturally holds a pH of 12 or higher for many years if not exposed to high levels of carbon dioxide.

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.11 Copper Materials

Copper is an amphoteric material which is susceptible to corrosion at very high and very low pH. It is one of the most noble metals used in construction thus typically making it a cathode when connected to dissimilar metals. Copper's nobility can change with temperature, similar to the phenomenon in zinc. When zinc is at room temperature, it is less noble than steel and can provide cathodic protection to steel. But when zinc is at a temperature above 140F such as in a water heater, it becomes nobler than the steel and the steel becomes the sacrificial anode. This is why zinc is not used in steel water heaters or boilers. Copper when cold has one native potential, but when heated develops a more electronegative electro-potential. Thus hot and cold copper pipes should be electrically isolated from each other to avoid creation of a thermo-galvanic corrosion cell.

2.11.1 Copper Pipes

The lowest pH for this area was measured to be 8.6. Soil with a pH less than 5.5 is considered aggressive to copper. Copper is also greatly affected by ammonia and nitrate concentrations[8]. The highest nitrate concentration was 24.0 mg/kg and the highest ammonia concentration was 0.5 mg/kg at this site.

These soils were determined mildly corrosive to copper and copper alloys such as brass.

Underground, aboveground, cold water, and hot water pipes should be electrically isolated from each other by use of dielectric unions and plastic in-wall pipe supports. The following are corrosion control options for underground copper water pipes.

1) Cover cold copper piping with minimum 8 mil polyethylene and backfill with clean sand with 2 inch minimum cover above and below tubing. Backfill should have a pH between 6 and 8 with minimum resistivity of 2,000 ohm-cm
2) Heat increases corrosion rates. Hot water pipes should be installed within PVC piping to prevent soil contact, or
3) Cover hot water pipes with minimum 10 mil polyethylene sleeve over a suitable primer

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[8] Corrosion Data Handbook, Table 6, Corrosion Resistance of copper alloys to various environments, 1995

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.11.2 <u>Brass Fittings</u>

Brass fittings should be electrically isolated from dissimilar metals by use of dielectric unions or isolation joint kits.

These soils were determined to be mildly corrosive to copper and copper alloys such as brass.

The following are corrosion control options for underground brass.

1) Cover with minimum 8 mil polyethylene or other impermeable coating and backfill with clean sand with 4 inch minimum cover above and below brass. Backfill should have a pH between 6 and 8 with minimum resistivity of 2,000 ohm-cm, or
2) Wrap fitting or valves in wax tape

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.11.3 <u>Bare Copper Grounding Wire</u>

It is assumed that corrosion will occur at all sides of the bare wire, thus the corrosion rate is calculated as a two sided attack determining the time it takes for the corrosion from two sides to meet at the center of the wire. The estimated life of bare copper wire for this site is the following:[9]

Size (AWG)	**Diameter (mils)**	**Est. Time to penetration (Yrs)**
14	64.1	35.6
13	72	40.0
12	80.8	44.9
11	90.7	50.4
10	101.9	56.6
9	114.4	63.6
8	128.5	71.4
7	144.3	80.2
6	162	90.0

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[9] Soil-Corrosion studies 1946 and 1948: Copper Alloys, Lead, and Zinc, Melvin Romanoff, National Bureau of Standards, Research Paper RP2077, 1950

Size (AWG)	**Diameter (mils)**	**Est. Time to penetration (Yrs)**
5	181.9	101.1
4	204.3	113.5
3	229.4	127.4
2	257.6	143.1
1	289.3	160.7

If the bare copper wire is being used as a grounding wire connected to less noble metals such as galvanized steel or carbon steel, the less noble metals will provide additional cathodic protection to the copper reducing the corrosion rate of the copper.

It is recommended that a corrosion inhibiting and water-repelling coating such as Corrosion X Part No. 90102 by Corrosion Technologies (no affiliation to Project X) be applied to aboveground and belowground copper-to-dissimilar metal connections to reduce risk of dissimilar corrosion.

2.12 Aluminum Pipe/Conduit/Fittings

Aluminum is an amphoteric material prone to pitting corrosion in environments that are very acidic or very alkaline or high in chlorides.

Conditions at this site are safe for aluminum.

Aluminum derives its corrosion resistance from its oxide layer which needs oxygen to regenerate if damaged, similar to stainless steels. Thus aluminum is not good for deep soil applications. Since aluminum corrodes at very alkaline environments, it cannot be encased or placed against cement or mortar such as brick wall mortar up against an aluminum window frame.

Aluminum is also very low on the galvanic series scale making it most likely to become a sacrificial anode when in contact with dissimilar metals in moist environments. Avoid electrical continuity with dissimilar metals by use of insulators, dielectric unions, or isolation joints. Pooling of water at post bottoms or surfaces should be avoided by integrating good drainage.

2.13 Carbon Fiber or Graphite Materials

Carbon fiber or other graphite materials are extremely noble on the galvanic series and should always be electrically isolated from dissimilar metals. They can conduct electricity and will create corrosion cells if placed in contact within a moist environment with any metal.

2.14 Plastic and Vitrified Clay Pipe

No special precautions are required for plastic and vitrified clay piping from a corrosion viewpoint.

Protect all metallic fittings and pipe restraining joints with wax tape per AWWA C217, cement if previously recommended, or epoxy.

3 CLOSURE

In addition to soils chemistry and resistivity, another contributing influence to the corrosion of buried metallic structures is stray electrical currents. These electrical currents flowing through the earth originate from buried electrical systems, grounding of electrical systems in residences, commercial buildings, and from high voltage overhead power grids. Therefore, it is imperative that the application of protective wraps and/or coatings and electrical isolation joints be properly applied and inspected.

It is the responsibility of the builder and/or contractor to closely monitor the installation of such materials requiring protection in order to assure that the protective wraps or coatings are not damaged.

The recommendations outlined herein are in conformance with current accepted standards of practice that meet or exceed the provisions of the Uniform Building Code (UBC), the International Building Code (IBC), California Building Code (CBC), the American Cement Institute (ACI), Nickel Institute, National Association of Corrosion Engineers (NACE International), Post-Tensioning Institute Guide Specifications and State of California Department of Transportation, Standard Specifications, American Water Works Association (AWWA) and the Ductile Iron Pipe Research Association (DIPRA).

Our services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions.

Respectfully Submitted,

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NACE Corrosion Technologist #16592
Professional Engineer
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EDUARDO HERNANDEZ
No. M37102

4 SOIL ANALYSIS LAB RESULTS

Client: Geotechnologies, Inc
Job Name: Aragon Sunset
Client Job Number: 20489
Project X Job Number: S180612A
June 20, 2018

	Method	ASTM G187		ASTM D516		ASTM D512B		SM 4500-NO3-E	SM 4500-NH3-C	SM 4500-S2-D	ASTM G200	ASTM G51
Bore# / Description	**Depth**	**Resistivity** **As Rec'd**	**Minimum**	**Sulfates**		**Chlorides**		**Nitrate**	**Ammonia**	**Sulfide**	**Redox**	**pH**
	(ft)	**(Ohm-cm)**	**(Ohm-cm)**	**(mg/kg)**	**(wt%)**	**(mg/kg)**	**(wt%)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mV)**	
A - North-end of Site	1.0	80,400	1,474	240	0.0240	24	0.0024	15	3.8	0.18	95	8.62
B - Center of Site	1.0	100,500	1,541	210	0.0210	30	0.0030	24	1.5	0.09	105	8.62
C - South-end of Site	1.0	80,400	1,675	210	0.0210	24	0.0024	21	1.0	0.09	107	8.55

Unk = Unknown
NT = Not Tested
ND = 0 = Not Detected
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
Chemical Analysis performed on 1:3 Soil-To-Water extract

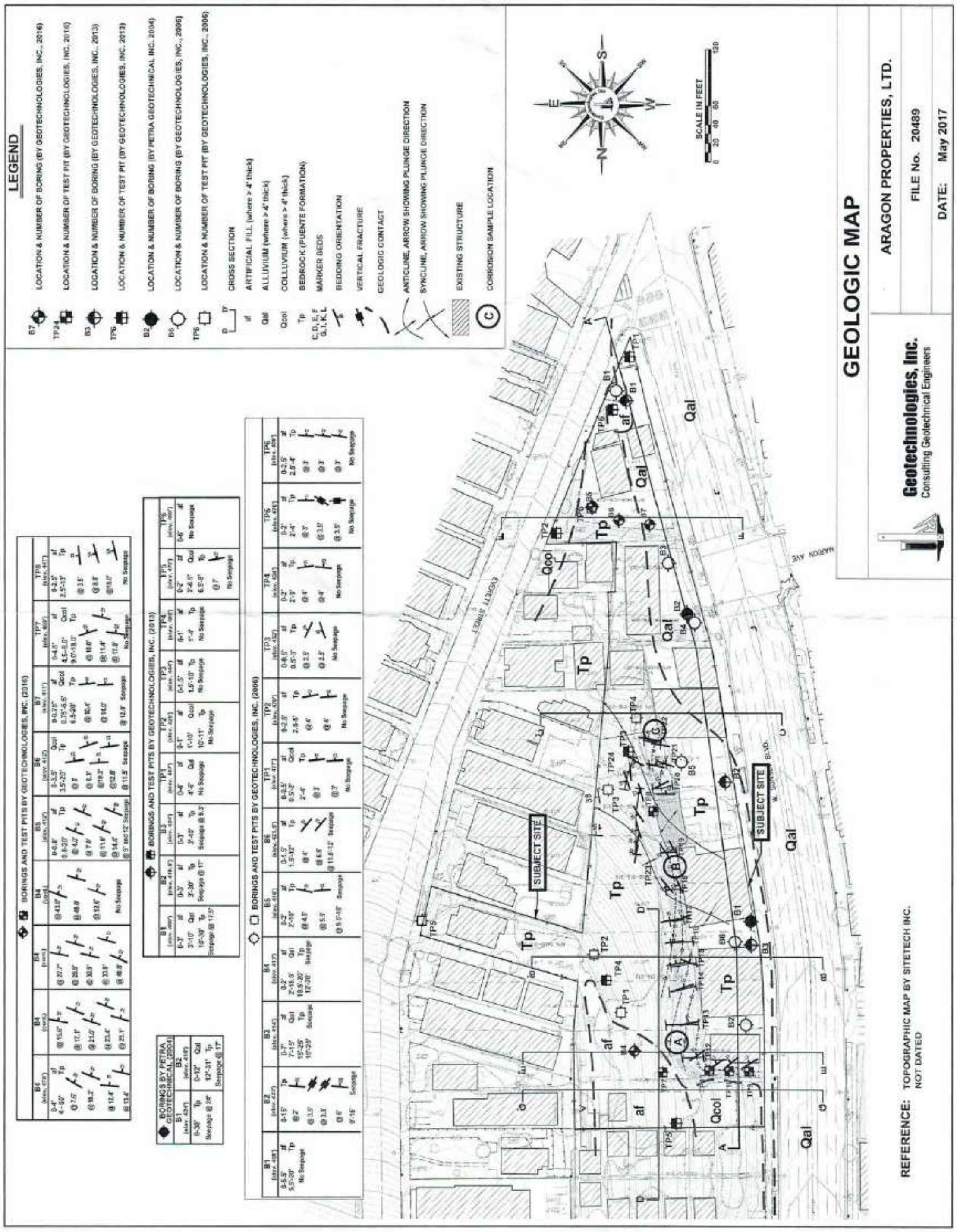


Figure 1 Soil Sample Location, 1229 Sunset Blvd, Los Angeles, CA 90026

Figure 2 Vicinity Map, 1229 Sunset Blvd, Los Angeles, CA 90026

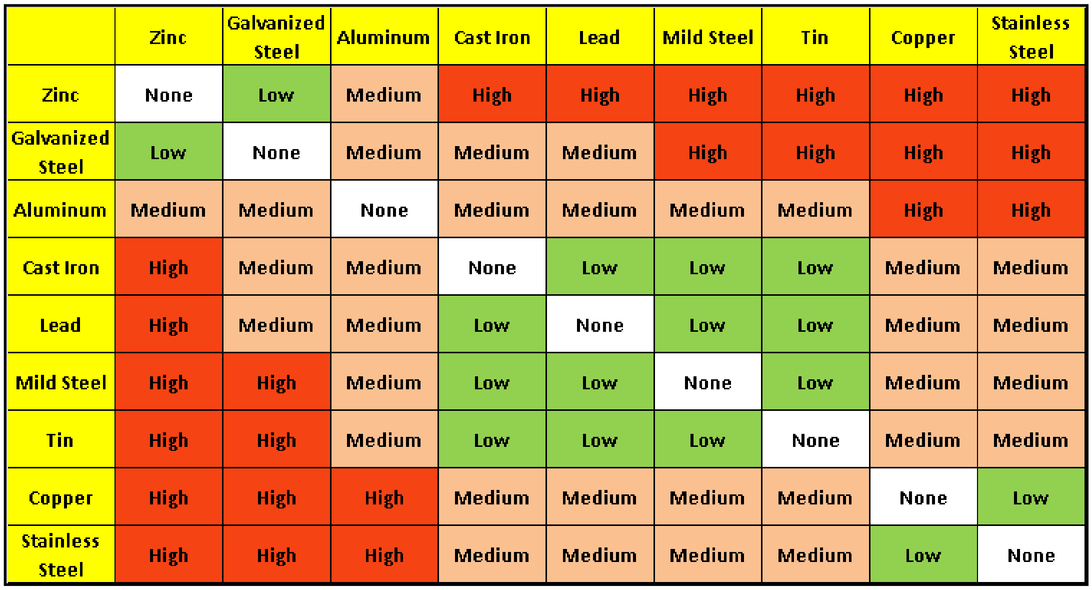
5 Corrosion Basics

In general, the corrosion rate of metals in soil depends on the electrical resistivity, the elemental composition, and the oxygen content of the soil. Soils can vary greatly from one acre to the next, especially at earthquake faults. The better a soil is for farming; the easier it will be for corrosion to take place. Oxygen content in soil can be increased during construction. These soils are considered disturbed soils. When construction equipment at a site is simply driving piles into soil without digging into the soil, the activity can still disturb soil down to 3 feet. Expansive soils will also be considered disturbed simply because of their nature from dry to wet seasons.

5.1 Galvanic Series

All metals have a natural electrical potential in soil. This electrical potential is measured using a high impedance voltmeter connected to the metal being tested and with the common lead connected to a copper copper-sulfate reference electrode (CSE). There are many types of reference electrodes. In laboratory measurements, a Standard Hydrogen Electrode (SHE) is commonly used. When different metal alloys are tested they can be ranked into an order from most noble (less corrosion), to least noble (more active corrosion). When a more noble metal is connected to a less noble metal, the less noble metal will become an anode and sacrifice itself through corrosion providing corrosion protection to the more noble metal. This hierarchy is known as the galvanic series named after Luigi Galvani whose experiments with electricity and muscles led Alessandro Volta to discover the reactions between dissimilar metals leading to the early battery. The greater the voltage difference between two metals, the faster the corrosion rate will be.

Table 1- Dissimilar Metal Corrosion Risk



	Zinc	Galvanized Steel	Aluminum	Cast Iron	Lead	Mild Steel	Tin	Copper	Stainless Steel
Zinc	None	Low	Medium	High	High	High	High	High	High
Galvanized Steel	Low	None	Medium	Medium	Medium	High	High	High	High
Aluminum	Medium	Medium	None	Medium	Medium	Medium	Medium	High	High
Cast Iron	High	Medium	Medium	None	Low	Low	Low	Medium	Medium
Lead	High	Medium	Medium	Low	None	Low	Low	Medium	Medium
Mild Steel	High	High	Medium	Low	Low	None	Low	Medium	Medium
Tin	High	High	Medium	Low	Low	Low	None	Medium	Medium
Copper	High	High	High	Medium	Medium	Medium	Medium	None	Low
Stainless Steel	High	High	High	Medium	Medium	Medium	Medium	Low	None

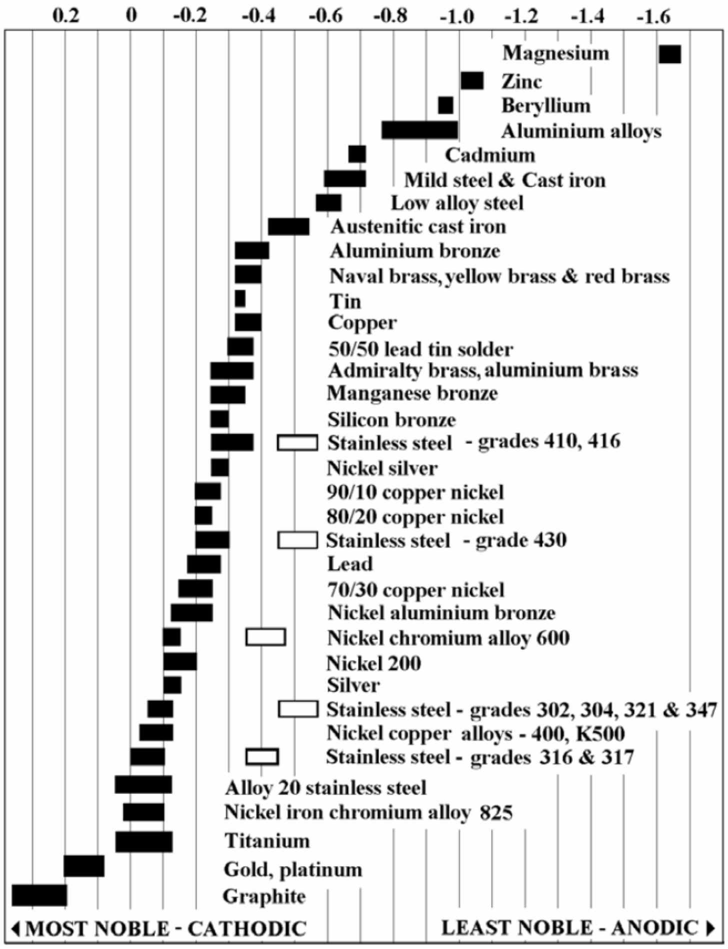


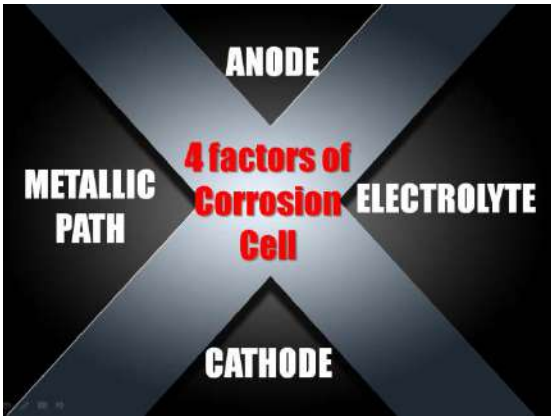
Figure 3 - Galvanic series of metals relative to CSE half cell.

5.2 Pourbaix Diagram

Every metal reacts differently in different environments. In the mid 1900's, Marcel Pourbaix developed the Pourbaix diagram which describes a metal's reaction to an environment dependant on pH and voltage conditions. It describes when a metal remains passive (non-corroding) and in which conditions metals become soluble (corrode). Steels are passive in pH over 12 such as the condition when it is encased in cement. If the cement were to carbonate and its pH reduce to below 12, the cement would no longer be able to act as a corrosion inhibitor and the steel will begin to corrode when moist.

Some metals such as aluminum are amphoteric, meaning that they react with acids and bases. They can corrode in low pH and in high pH conditions. Aluminum alloys are generally passive within a pH of 4 and 8.5 but will corrode outside of those ranges. This is why aluminum cannot be embedded in cement and why brick mortar should not be laid against an aluminum window frame.

5.3 Corrosion Cell



In order for corrosion to occur, four factors must be present. (1) The anode (2) the cathode (3) the electrolyte and (4) the metallic or conductive path joining the anode and the cathode. If any one of these is removed, corrosion activity will stop. This is how a simple battery produces electricity. An example of a non-metallic yet conductive material is graphite. Graphite is similar in nobility to gold. Do not connect graphite to anything in moist environments.

The anode is where the corrosion occurs, and the cathode is the corrosion free material. Sometimes the anode and cathode are different materials connected by a wire or union. Sometimes the anode and cathode are on the same pipe with one area of the pipe in a low oxygen zone while the other part of the pipe is in a high oxygen zone. A good example of this is a post in the ocean that is repeatedly splashed. Deep underwater, corrosion is minimal, but at the splash zone, the corrosion rate is greatest. Low oxygen zones and crevices can also harbor corrosive bacteria which in moist environments will lead to corrosion. This is why pipes are laid on backfill instead of directly on native cut soil in a trench. Filling a trench slightly with backfill before installing pipe then finishing the backfill creates a uniform environment around the entire surface of the pipe.

The electrolyte is generally water, seawater, or moist soil which allows for the transfer of ions and electrical current. Pure water itself is not very conductive. It is when salts and minerals dissolve into pure water that it becomes a good conductor of electricity and chemical reactions. Metal ores are turned into metal alloys which we use in construction. They naturally want to return to their natural metal ore state but it requires energy to return to it. The corrosion cell, creates the energy needed to return a metal to its natural ore state.

The metallic or conductive path can be a wire or coupling. Examples are steel threaded into a copper joint, or an electrician grounding equipment to steel pipes inadvertently connecting electrical grid copper grounding systems to steel or iron underground pipes.

The ratio of surface area between the anode and the cathode is very important. If the anode is very large, and the cathode is very small, then the corrosion rate will be very small and the anode may live a long life. An example of this is when short copper laterals were connected to a large and long steel pipeline. The steel had plenty of surface area to spread the copper’s attack, thus corrosion was not noticeable. But if the copper was the large pipe and the steel the short laterals, the steel would corrode at an amazing rate.

5.4 Design Considerations to Avoid Corrosion

The following recommendations are based upon typical observations and conclusions made by forensic engineers in construction defect lawsuits and NACE International (Corrosion Society) recommendations.

5.4.1 *Testing Soil Factors (Resistivity, pH, REDOX, SO, CL, NO3, NH3)*

As previously mentioned, different factors can cause corrosion. The most useful and common test for categorizing a soil's corrosivity has been the measure of soil resistivity which is typically measured in units of (ohm-cm) by corrosion engineers and geologists. Soil resistivity is the ability of soil to conduct or resist electrical currents and ion transfer. The lower the soil resistivity, the more conductive and corrosive it is. The following are generally accepted descriptions.

Table 2 - Corrosion Basics- An Introduction, NACE, 1984, pg 191

(Ohm-cm)	Corrosivity Description
0-500	Very Corrosive
500-1,000	Corrosive
1,000-2,000	Moderately Corrosive
2,000-10,000	Mildly Corrosive
Above 10,000	Progressively less corrosive

Testing a soil's pH provides information to reference the Pourbaix diagram of specific metals. Some elements such as ammonia and nitrates can create localized alkaline conditions which will greatly affect amphoteric materials such as aluminum and copper alloys.

Excess sulfates can break-down the structural integrity of cement and high concentrations of chlorides can overcome cement's corrosion inhibiting effect on encased ferrous metals and break down protective passivated surface layers on stainless steels and aluminum.

Corrosive bacteria are everywhere but can multiply significantly in anaerobic conditions with plentiful sulfates. The bacteria themselves do not eat the metal but their by-products can form corrosive sulfuric acids. The probability of corrosive bacteria is tested by measuring a soil's oxidation-reduction (REDOX) electro-potential and by testing for the presence of sulfides.

5.4.2 *Proper Drainage*

It cannot be emphasized enough that pooled stagnant water on metals will eventually lead to corrosion. This stands for internal corrosion and external corrosion situations. In soils, providing good drainage will lower soil moisture content reducing corrosion rates. Attention to properly sealing polyethylene wraps around valves and piping will avoid water intrusion which would allow water to pool against metals. Above ground structures should not have cupped or flat surfaces that will pond water after rain or irrigation events.

Buildings typically have swales when constructed to drain water away from buildings directing it towards an acceptable exit point such as a driveway where it continues draining to a local storm drain. Many homeowners, landscapers and flatwork contractors appear to not be aware of this and destroy swales during remodeling. The majority of garage floor and finished grade elevations are governed by drainage during design.

5.4.3 *Avoiding Crevices*

Crevices are excellent locations for oxygen differential induced corrosion cells to begin. Crevices can also harbor corrosive bacteria even in the most chemically treated waters. If water's total alkalinity is low, its ability to maintain a stable pH can also become more difficult within a crevice allowing the pH to drop to acidic levels continuing a pitting process.

5.4.4 *Coatings and Cathodic Protection*

When faced with a corrosive environment, the best defense against corrosion is removing the electrolyte from the corrosion cell by applying coatings to separate the metal from the soil. During construction and installation, there is always some scratch or damage made to a coating. NACE training recommends that coatings be used as a first line of defense and that sacrificial or impressed current cathodic protection is used as a 2nd line of defense to protect the scratched areas. Use of a good coating dramatically reduces the amount of anodes a CP system would need. If CP is not installed as a 2nd line of defense in an extremely corrosive environment, the small scratched zones will suffer accelerated corrosion. CP details such as anode installation instructions must be designed by corrosion engineers on a per project basis because it depends on soil resistivity, surface area of infrastructure to be protected, and system geometry.

There are two types of cathodic protection systems, a Galvanic Anode Cathodic Protection (GACP) system and an Impressed Current Cathodic Protection (ICCP) system. A Galvanic Anode Cathodic Protection (GACP) system is simpler to install and maintain than an Impressed Current Cathodic Protection (ICCP) system. To protect the metals, they must all be electrically continuous to each other. In a GACP system, sacrificial zinc or magnesium anodes are then buried at locations per the CP design and connected by wire to a structure at various points in system. At the connection points, a wire connecting to the structure and the wire from the anode are joined in a Cathodic Protection Test Station hand hole which looks similar in size and shape to an irrigation valve pull box. By coating the underground structures, one can reduce the number of anodes needed to provide cathodic protection by 80% in many instances.

An ICCP system requires a power source, a rectifier, significantly more trenching, and more expensive type anodes. These systems are typically specified when bare metal is requiring protection in severely corrosive environments in which galvanic anodes do not provide enough power to polarize infrastructure to -850 mV structure-to-soil potential or be able to create a 100 mV potential shift as required by NACE SP169 to control corrosion. In severely corrosive environments, a GACP system simply may not last a required lifetime due to the high rate of consumption of the sacrificial anodes. ICCP system rectifiers must be inspected and adjusted quarterly or at a minimum bi-annually per NACE recommendations. Different anode installations may be possible but for large sites, anodes are placed evenly throughout the site and all anode wires must be trenched to the rectifier. For a large site, it may be beneficial to use two or more rectifiers to reduce wire lengths or trenching.

To simplify, a GACP system can be installed and practically forgotten with minor trenching because the anodes can be installed very close to the structures. An ICCP system must be inspected annually and anode wires run back to the rectifier which itself connects to the pile system. If any type of trenching or development is expected to occur at the site during the life of the site, it is a good idea to inspect the anode connections once a year to make sure wires are not cut and that the infrastructure is still being provided adequate protection. A common situation that occurs with ICCP systems is that a contractor accidently cuts the wires during construction then reconnects them incorrectly, turning the once cathode, into a sacrificing anode.

Design of a cathodic protection system requires that Wenner Four Pin ground resistance measurements per ASTM G57 be performed by corrosion engineers at various locations of the site to determine the best depths and locations for anode installations. Ideally, a sample pile is installed and experiments determining current requirement are conducted. Using this data, the decision is made whether a GACP system is feasible or if an ICCP must be used.

Project X Corrosion Engineers can provide a proposal for cathodic protection design and field work if needed.

5.4.4.1 Good Electrical Continuity

In order for cathodic protection to protect a long pipeline or system of pipes, they must all be electrically continuous to each other so that the electric current from the anode can travel along the pipes, then return through the earth to the anode. Electrical continuity is achieved by welding or pin brazing #8 AWG copper strand bond cable to the end of pipe sticks which have rubber gaskets at bell and spigots. If steel pipes are joined by full weld, bonding wires are not needed.

Electrical continuity between dissimilar metals is not desirable. Isolation joints or di-electric unions should be installed between dissimilar metals, such as steel pipes connecting to a brass valve. Bonding wires should then be welded onto the steel pipes by-passing the brass valve so that the cathodic protection system's current can continue to travel. Another option would be to provide a separate cathodic protection system for steel pipes on both sides of the brass valve.

Typically, gas meters and water meters have dielectric unions installed in them to separate utility property from homeowner property. This also protects them in the case that a home owner somehow electrically connects water pipes or gas pipes to a neighborhood electrical grounding system which can potentially have less noble steel in soil now connected to much more noble copper in soil which will then create a corrosion cell. This is exactly how a lemon powered clock works when a galvanized zinc nail and a steel nail are inserted into a lemon then connected to a clock. The clock is powered by the corrosion cell created.

5.4.4.2 Bad Electrical Continuity

Bad electrical continuity is when two different materials or systems are made electrically continuous (aka shorted) when they were not designed to be electrically continuous. Examples of this would be when gas lines are shorted to water lines or to electrical grounding beds. Very often, fire risers are shorted to electrical grounding systems, and water pipes at business parks. Since fire risers usually have a very short ductile iron pipe in the ground which connects to PVC pipe systems, they tend to experience leaks after 7 to 10 years of being attacked by underground copper systems.

It is absolutely imperative that any copper water piping or other metal conduits penetrating cement slab or footings, not come in contact with the reinforcing steel or post-tensioning tendons to avoid creation of galvanic corrosion cells.

5.4.4.3 Corrosion Test Stations

Corrosion test stations should be installed every 1,000 feet along pipelines in order to measure corrosion activity in the future. For a simple pipeline, two #8 AWG copper strand bond cable welded or pin brazed onto the pipeline are run up to finished grade and left in a hand hole. Corrosion test stations are used to measure pipe-to-soil electro potential relative to a copper

copper-sulfate reference electrode to determine if the pipe is experiencing significant corrosion activity. By measuring test stations along a pipeline, hot spots can be determined, if any. The wires also allow for electrical continuity testing, condition assessment, and a multitude of other types of tests.

At isolation joints and pipe casings, two wires should be welded to either side of the isolation joint for a total of 4 wires to be brought up to the hand hole. This allows for future tests of the isolation joint, casing separation confirmation, and pipe-to-soil potential readings during corrosion surveys.

5.4.5 *Excess Flux in Plumbing*

Investigations of internal corrosion of domestic water plumbing systems almost always finds excess flux to be the cause of internal pitting of copper pipes. Some people believe that there is no such thing as too much flux. Flux runs have been observed to travel up to 20 feet with pitting occurring along the flux run. Flushing a soldered plumbing system with hot water for 15 minutes can remove significant amounts of excess flux left in the pipes. If a plumbing system is expected to be stagnant for some time, it should be drained to avoid stagnant water conditions that can lead to pitting and dezincification of yellow brasses.

5.4.6 *Landscapers and Irrigation Sprinkler Systems*

A significant amount of corrosion of fences is due to landscaper tools scratching fence coatings and irrigation sprinklers spraying these damaged fences. Recycled water typically has a higher salt content than potable drinking water, meaning that it is more corrosive than regular tap water. The same risk from damage and water spray exists for above ground pipe valves and backflow preventers. Fiber glass covers, cages, and cement footings have worked well to keep tools at an arm’s length.

5.4.7 *Roof Drainage splash zones*

Unbelievably, even the location where your roof drain splashes down can matter. We have seen drainage from a home’s roof valley fall directly down onto a gas meter causing it’s piping to corrode at an accelerated rate reaching 50% wall thickness within 4 years. It is the same effect as a splash zone in the ocean or in a pool which has a lot of oxygen and agitation that can remove material as it corrodes.

5.4.8 *Stray Current Sources*

Stray currents which cause material loss when jumping off of metals may originate from direct-current distribution lines, substations, or street railway systems, etc., and flow into a pipe system or other steel structure. Alternating currents may occasionally cause corrosion. The corrosion resulting from stray currents (external sources) is similar to that from galvanic cells (which generate their own current) but different remedial measures may be indicated. In the electrolyte and at the metal-electrolyte interfaces, chemical and electrical reactions occur and are the same as those in the galvanic cell; specifically, the corroding metal is again considered to be the anode from which current leaves to flow to the cathode. Soil and water characteristics affect the corrosion rate in the same manner as with galvanic-type corrosion.

However, stray current strengths may be much higher than those produced by galvanic cells and, as a consequence, corrosion may be much more rapid. Another difference between galvanic-type currents and stray currents is that the latter are more likely to operate over long distances since the anode and cathode are more likely to be remotely separated from one another. Seeking the path of least resistance, the stray current from a foreign installation may travel along a pipeline causing severe corrosion where it leaves the line. Knowing when stray currents are present becomes highly important when remedial measures are undertaken since a simple sacrificial anode system is likely to be ineffectual in preventing corrosion under such circumstances.[10] Stray currents can be avoided by installing proper electrical shielding, installation of isolation joints, or installation of sacrificial jump off anodes at crossings near protected structures such as metal gas pipelines or electrical feeders

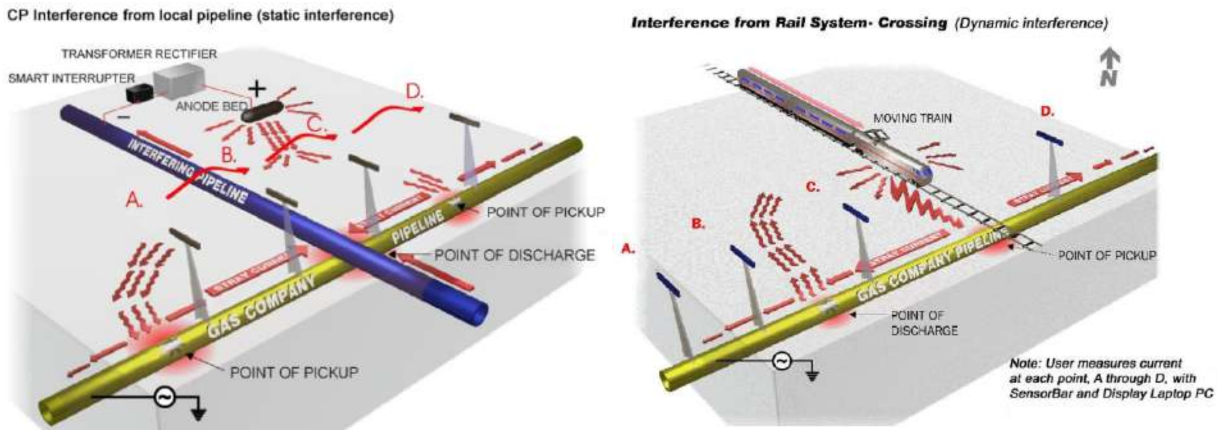


Figure 4 Examples of Stray Current[11]

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[10] http://corrosion-doctors.org/StrayCurrent/Introduction.htm

[11] http://www.eastcomassoc.com/

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Project X
Corrosion Engineering
Corrosion Control - Soil, Water, and Metallurgy Lab

Lab Request Sheet Chain of Custody
Phone: (213) 928-7213 · Fax (951) 226-1720 · www.projectxcorrosion.com
Ship Samples To: 29970 Technology Dr, Suite 105F, Murrieta, CA 92563

IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.

Project X Job #:
Date:

Company Name: Geotechnologies, Inc
Mailing Address: 439 Western Avenue
Accounting Contact: Deanne
Project Name: Aragon. Sunset.
Client Project No: 20489
Contact Name: Reinard Knur
Phone No.: 818 240-9600
Contact Email: rknur@geoteq.com.
Invoice Email:
P.O. #:

Turn Around Time: 5 Day Normal | 3 Day RUSH 75% mark-up | 2 Day RUSH 100% mark-up

Results By: ☐ Phone ☐ Fax ☑ Email ☐ Mail ☐ Overnight Mail (charges apply)

Received by:

Default Method

SPECIAL INSTRUCTIONS:

ANALYSIS REQUESTED (Please circle)

		SAMPLE ID - BORE #	DESCRIPTION	DEPTH (ft)	DATE COLLECTED	Min. Resistivity, Sulfate, Chloride, Sulfide, Redox, pH, Ammonia, Nitrate. CORROSION SERIES	Caltrans CTM643 AASHTO T288 ASTM G187 Soil Resistivity	Caltrans CTM643 AASHTO T 289 ASTM G 51 pH	Caltrans CTM417 AASHTO T 290 ASTM D516 Sulfate	Caltrans CTM422 AASHTO T 291 ASTM D512B Chloride	SM 2580B Redox Potential	SM 2320B BiCarbonate	SM 2520B Alkalinity	SM 2510B Acidity	SM 4500-NO3 Hach 835 Nitrate	SM 4500-NH3 Hach 830 Ammonia	SM 4500-S2 SM 4500-S2 Sulfide	ASTM D2216 Moisture Content	Soil Corrosivity Evaluation Report	Metallurgical Analysis	NOTES
50	1	A	North end of Site	Ground Surf	6/4	✓															+ report
51	2	B	Center of Site	″	″																
52	3	C	South end of Site	″	″																
	4																				
	5																				
	6																				
	7																				
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