Revised Preliminary Geotechnical Feasibility Investigation, Beaumont Pointe Specific Plan, 539.9 Acre Industrial/Commercial Development, Jackrabbit Trail, Beaumont Area, Riverside County, California.

PN: 18060-01
July 23, 2021

KCG KLING
Consulting
Group, Inc.

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Mr. Michael Masterson
JRT BP 1 LLC
18032 Lemon Drive, Suite 367
Yorba Linda, Ca. 92866

Subject: **Revised** Preliminary Geotechnical Feasibility Investigation, **Beaumont Pointe Specific Plan**, 539.9 Acre Industrial/Commercial Development, Jackrabbit Trail, Beaumont Area, Riverside County, California.

Dear Mr. Masterson:

In accordance with your request and authorization, Kling Consultant Group, Inc. has conducted a Preliminary Geotechnical Feasibility Investigation for the proposed subject development as presented on the 150-scale "Conceptual Grading Plans”, prepared by Thienes Engineering, dated June 4, 2019. This plan was used as our base map during our limited geotechnical feasibility evaluation and constitutes our Geotechnical Map (Plate 1 and Plate 2). This report presents our findings from subsurface exploration, laboratory testing of selected soil samples, geotechnical analyses, and review of previous relevant reports, along with our conclusions and preliminary recommendations.

Kling Consulting Group, Inc. appreciates this opportunity to be of service to you on this project. Should you have any questions regarding the content of this report, please do not hesitate to contact our office at your earliest convenience.

Sincerely,

KLING CONSULTING GROUP, INC.

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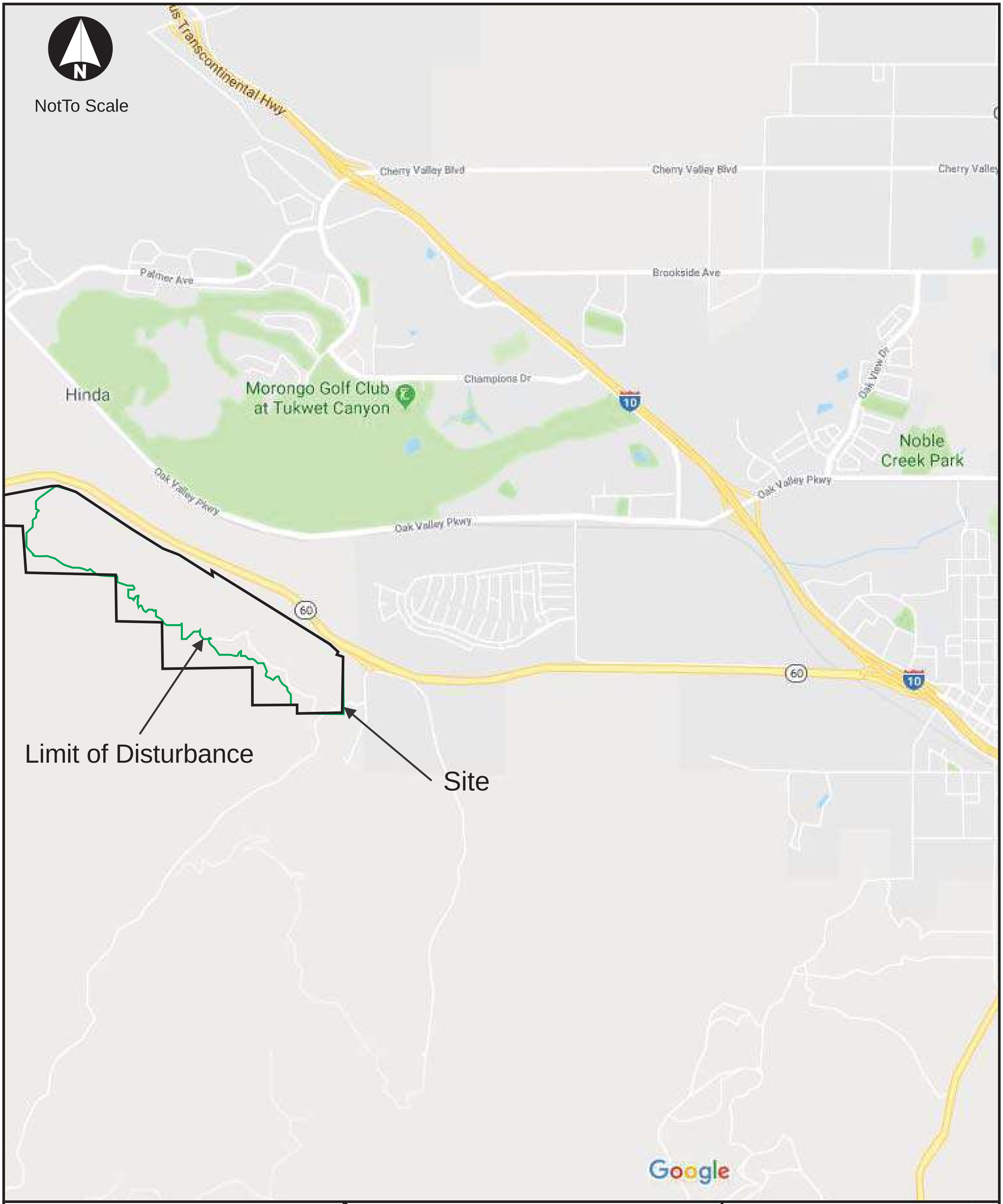

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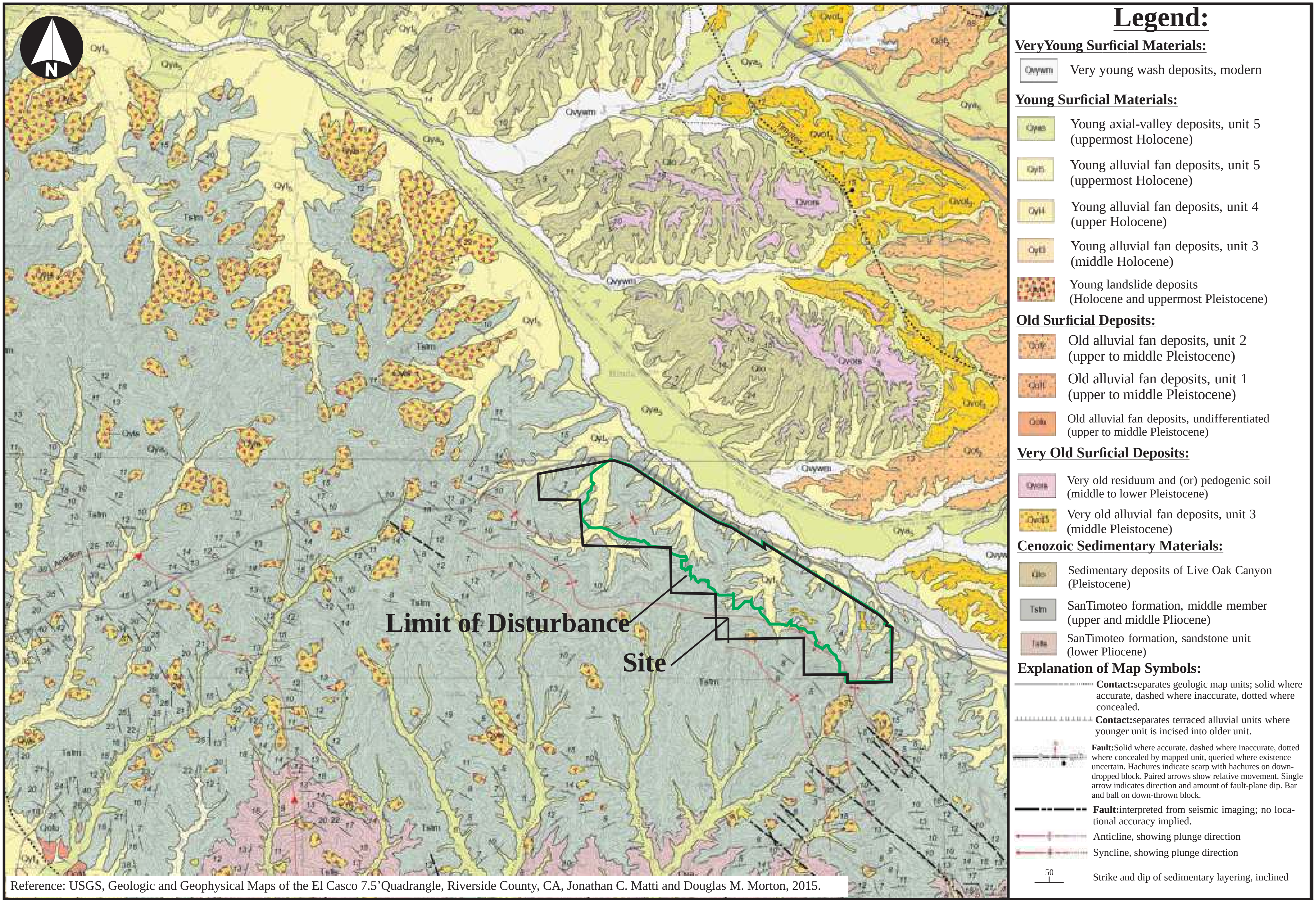
Site Location Map
Beaumont Pointe Specific Plan
Beaumont, CA

Figure:	**1**
PN:	**18060-01**
Date:	**July 23, 2021**



Legend:

VeryYoung Surficial Materials:

Qvywm	Very young wash deposits, modern

Young Surficial Materials:

Qya5	Young axial-valley deposits, unit 5 (uppermost Holocene)
Qyf5	Young alluvial fan deposits, unit 5 (uppermost Holocene)
Qyf4	Young alluvial fan deposits, unit 4 (upper Holocene)
Qyf3	Young alluvial fan deposits, unit 3 (middle Holocene)
Qyls	Young landslide deposits (Holocene and uppermost Pleistocene)

Old Surficial Deposits:

Qof2	Old alluvial fan deposits, unit 2 (upper to middle Pleistocene)
Qof1	Old alluvial fan deposits, unit 1 (upper to middle Pleistocene)
Qofu	Old alluvial fan deposits, undifferentiated (upper to middle Pleistocene)

Very Old Surficial Deposits:

Qvors	Very old residuum and (or) pedogenic soil (middle to lower Pleistocene)
Qvof3	Very old alluvial fan deposits, unit 3 (middle Pleistocene)

Cenozoic Sedimentary Materials:

Qlo	Sedimentary deposits of Live Oak Canyon (Pleistocene)
Tstm	SanTimoteo formation, middle member (upper and middle Pliocene)
Tsts	SanTimoteo formation, sandstone unit (lower Pliocene)

Explanation of Map Symbols:

Contact:separates geologic map units; solid where accurate, dashed where inaccurate, dotted where concealed.

Contact:separates terraced alluvial units where younger unit is incised into older unit.

Fault: Solid where accurate, dashed where inaccurate, dotted where concealed by mapped unit, queried where existence uncertain. Hachures indicate scarp with hachures on down-dropped block. Paired arrows show relative movement. Single arrow indicates direction and amount of fault-plane dip. Bar and ball on down-thrown block.

Fault:interpreted from seismic imaging; no locational accuracy implied.

Anticline, showing plunge direction

Syncline, showing plunge direction

50 Strike and dip of sedimentary layering, inclined

Reference: USGS, Geologic and Geophysical Maps of the El Casco 7.5'Quadrangle, Riverside County, CA, Jonathan C. Matti and Douglas M. Morton, 2015.

0 2000 4000

Scale: 1"= 2000'

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Regional Geology Map:
Beaumont Pointe Specific Plan
Beaumont, CA

Figure: 2
PN: 18060-01
Date: July 23, 2021

References: https://maps.conservation.ca.gov/cgs/fam/app/, http://scedc.caltech.edu/significant/index.html

Legend:

★ Site Location

Earthquake Epicenters:

🔵 M 5.0 to 5.9

🟡 M 6.0 to 6.9

🟠 M 7.0 to 7.9

Historic Earthquake Events:

1) North San Jacinto, 1923	M 6.3
2) San Jacinto, 1918	M 6.8
3) North Palm Springs, 1986	M 5.6
4) Greater LosAngelesArea, 1858	M 6.0
5) Elsinore, 1910	M 6.0
6) Lytle Creek, 1970	M 5.2
7)WhiteWash, 1980	M 5.5
8) JoshuaTree, 1992	M 6.1
9) Landers, 1992	M 7.3
10) Upland Earthquake, 1990	M 5.4
11) Chino Hills, 2008	M 5.4
12) Southern CaliforniaArea, 1812	M 6.9
13) Long Beach, 1933	M 6.4
14) Big Bear, 1992	M 6.4
15) Southern CaliforniaArea, 1890	M 6.8
16)Whittier Narrows, 1987	M 5.9
17) Hector Mine, 1999	M 7.1
18) Greater LosAngelesArea, 1855	M 6.0

Fault Activity levels:

Red: Latest Quaternary ~200 years
Orange: Holocene ~11,700 years
Green: Middle to Late Quaternary < 700,000 Years
Purple: Undifferentiated Quaternary 1.6 million years.

Scale:

0 20 40 miles

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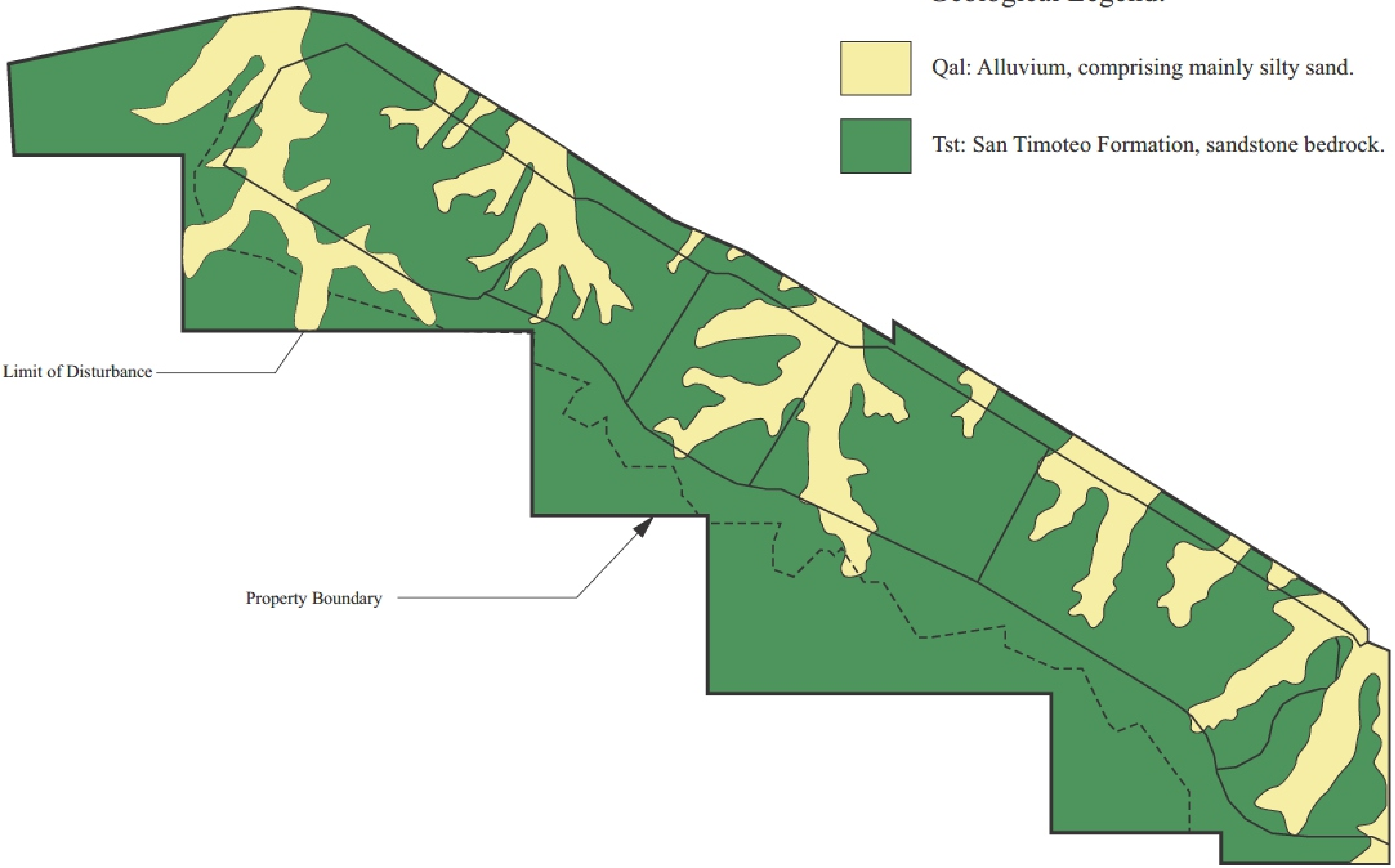
Regional Fault and Seismicity Map
Beaumont Pointe Specific Plan
Beaumont, CA

Figure: 3
PN 18060-01
Date: July 23, 2021



Geological Legend:

🟨 Qal: Alluvium, comprising mainly silty sand.

🟩 Tst: San Timoteo Formation, sandstone bedrock.

Notes:

Scale: 1":1200'

KCG KLING Consulting Group, Inc.

Client:
Beaumont Pointe Specific Plan

Address:
Jackrabbit Trail,
Beaumont, California

Geology Map

Drawn: S.W	**Date:** July 23, 2021
P/N: 18060-01	**Figure:** 4

1. INTRODUCTION

In accordance with your request and authorization, Kling Consulting Group, Inc. (KCG) has conducted a Feasibility Level Geotechnical Investigation for the proposed approximately 539.9 acre commercial/industrial park development in Beaumont, California. It is our understanding that the current development concept generally includes the proposed grading of five large super pads for five large warehouse type buildings and a commercial area, along with associated access roads, perimeter slopes, and related improvements, including a sewer lift station, and stormwater/water quality detention basin areas. The purpose of this geotechnical feasibility evaluation was to perform limited subsurface exploration along with laboratory testing to evaluate the overall geotechnical site conditions to support the proposed project conceptual design (Reference 18), as well as a review of a previous geotechnical evaluation previously performed at the site in 1989 by Leighton (Reference 14), and to prepare this Preliminary Geotechnical Feasibility Evaluation.

The 150-scale conceptual grading plans prepared by Thienes Engineering dated June 4, 2019 (Reference 18) were utilized as a base map for our Geotechnical Map (**Plate 1 and 2**).

1.1 Site Description and History

The proposed industrial/commercial development is an approximately 539.9-acre site located in the western portion of the City of Beaumont in Riverside County (**Figure 1**) and includes multiple contiguous parcels. The irregular shaped property is generally bounded to the south and west, by open land, along with existing industrial development immediately to the east, and to the north by Highway 60. Access to the site is via a frontage road west of the Highway 60 and Jack Rabbit Trail road intersection.

The site is situated along the northeasterly edge of an accumulation of sedimentary deposits that form an extensive hillside area known as "The Badlands". The subject site is characterized by rugged steep ridges and hillsides with narrow canyons that are generally situated on the southwest portion of the site and relatively gentle ridges and broad canyons/valleys on the northwest portion of the site. A roughly northwest trending drainage divide directs drainage to the north into San Timoteo Canyon and south through the badlands into San Jacinto Valley. Elevations range from approximately 2,230 feet mean sea level (msl) in the northwest portion of the site to approximately 2,510 feet (msl) in the southeast. Bedrock exposures at the surface are relatively limited with most exposures visible along existing dirt road cuts.

The site is generally undisturbed and includes a network of dirt roads and trails. The paved Jack Rabbit Trail road crosses the southeastern portion of the property. A residential property is located partially on the southeastern portion of the overall property to the south and east of Jack Rabbit Trail Road. The residential property is occupied by a main residence, multiple ancillary structures and related improvements. No subsurface exploration was performed in this area of the overall property. An above ground electric power pole transmission line easement parallels the northern property boundary. Reportedly 2 to 3 water wells are located on the site and we observed one well in the northern portion of the site. Reportedly, a gas pipeline alignment traverses the site in the extreme northwest corner of the site. Vegetation across the site is generally sparse to locally very dense, with a variety of grasses, brush and scattered trees.

Low-lying relatively flat portions of this parcel are understood to have been used for grazing and agricultural purposes in the past, various barbed wire fences generally separate this parcel from neighboring parcels.

1.2 Previous Geotechnical Evaluation/Investigations

A geotechnical evaluation and subsequent addendum report was performed by Leighton and Associates, Inc. for the subject site in 1989 (Leighton, 1989, reference 14).The evaluation was reviewed as part of our scope of work and is summarized below:

The report dated April 28, 1989, and subsequent addendum dated May 8, 1989 was prepared to assess geotechnical conditions as related to future development. No subsurface exploration or laboratory testing was performed as part of the geotechnical evaluation. The report summarized overall geotechnical conditions based on review of aerial photographs, review and research of geology, and surface geologic reconnaissance mapping. The report listed principle geotechnical constraints that could affect development along with possible mitigation measures which may be utilized. Leighton's report did not appear to list any geotechnical constraints that would preclude future development. Leighton recommended a comprehensive geotechnical investigation be performed to properly assess geotechnical site conditions, including seismic ground shaking and secondary phenomena, presence of onsite faulting, slope stability, and expansive soil potential to provide appropriate recommendations/corrective measures as necessary.

1.3 Proposed Development

The current approximate 150-scale Conceptual Grading Plan (Reference 18), prepared by Thienes Engineering, dated June 4, 2019, indicates the property is comprised of multiple parcels to be developed for commercial/industrial purposes. Based on a Land Use Plan- Beaumont Pointe Specific Plan, dated February 17, 2021, and a conceptual site plan dated October 6, 2019, by Herdman Architecture and Design, it is our understanding that five warehouse buildings ranging from approximately 612,120 square feet to 1,425,559 square feet are planned. A commercial pad area is also planned. Graded pads will be created to accommodate the future large warehouse structures. Three Phases of construction are being considered with one to two buildings per Phase. A primary access road is proposed which will be extended from 4th Street to the east.

No grading plans are available. No estimates of cut and fill earthwork quantities are indicated on the conceptual grading plan provided. However, it is our understanding that based on preliminary earthwork volume analysis the project is estimated at approximately 12 million cubic yards of cut and fill earthwork in three phases. It is currently unknown how much import/export is required for each phase of grading.

Relatively deep cuts and fills are anticipated in some areas of the site in order to achieve grades for the proposed pads and primary access road alignment. Perimeter slopes are planned of variable height. We understand that cut slopes may be up to approximately 125 feet in height, and fill slopes up to approximately 150 feet. Cut slopes up to approximately 125 feet in height are proposed along the southern edges of the project and fill slopes up to approximately 150 feet or in height are proposed along the northern and southern edges of the project. Cuts up to approximately 125 feet and fills up to approximately 145 feet are anticipated to accommodate the proposed grading. The proposed grading will likely also result in cut/fill transitions within the building pad areas, with some areas transitioning abruptly from cut to deep fills where ridges and canyon drainages exist.

A primary paved access road is planned for the site and appears the access road will connect to the western extension of 4th Street, immediately east of the subject project. A secondary/emergency access drive is planned off of Jackrabbit Trail. Access to the proposed subject site is from Jack Rabbit Trail near the northeast corner of the site.

1.4 Purpose and Scope of Work

Our scope of services has been performed in general accordance with our Work Authorization and Agreement dated February 6, 2019 and authorized May 16, 2019. The purpose of our geotechnical investigation was to assess the geologic and engineering characteristics of the alluvial soils and bedrock materials as well as general geotechnical conditions of the site relative to the proposed site development and future site improvements for feasibility purposes. Our subsurface field exploration was performed on June 24, 2019 and June 26, 2019 and July 8, 2019 and July 9, 2019.

The scope of the work undertaken for this investigation included the following tasks:

- § Notification and coordination with Underground Service Alert (USA) to mark and identify buried utilities;
- § Communication with the design team members, as necessary, to facilitate the development concept;
- § Coordination with a grading contractor for pioneering of access roads to help facilitate drill rig access;
- § A review of available pertinent geotechnical literature and publications (Appendix A) with respect to soils, geology, local and regional seismicity, faulting, groundwater, and liquefaction potential.
- § Limited site geologic mapping and reconnaissance to map the areal distribution of earth units and significance of surficial features, as compiled from available documentation, literature, aerial photographs and reviewed reports.
- § Drilling and logging of ten (10) hollow-stem auger borings to depths of approximately 51.5 feet below the existing ground surface. Bulk and drive samples were obtained from the borings and delivered to our laboratory for testing and evaluation;
- § Excavation and logging of eight (8) backhoe test-pits to depths ranging from 6 to 16 feet. Bulk and drive samples were obtained for testing in our laboratory;
- § Laboratory testing on select soil samples including moisture/density determinations, Maximum density, sieve analysis, direct shear, consolidation, hydro-collapse potential;
- § Preparation of geotechnical cross-sections;
- § Preparation of a site Geotechnical Map (150-scale) illustrating the locations of subsurface investigation, site geology, and cross-section locations;
- § Preliminary geotechnical analysis and evaluation of the compiled field and laboratory test data and information with respect to the current proposed Site Plan Concept;

- § Preparation of this Preliminary Geotechnical Feasibility report. The accompanying report incorporates data from our limited geotechnical evaluation and presents a description of our preliminary findings, conclusions and recommendations relative to the current site development concept.

2. GEOLOGIC FINDINGS

2.1 Regional Geology

The subject site is located within the Peninsular Ranges geomorphic province of southern California. This area lies along the southern boundary of the San Timoteo River Valley and is located within the western San Jacinto Mountains. This area is commonly known as the San Timoteo Badlands.

The site lies within the San Jacinto Fault block, which is comprised of weathered and eroded pre-Cenozoic metamorphic and granitic basement rocks, as well as Plio-Pleistocene aged sedimentary bedrock of the San Timoteo Formation. The San Jacinto Block is bordered by the Banning Fault on the north, and by the San Jacinto Fault on the south. Both the San Jacinto Fault and the Banning Fault are considered to belong to the seismically active San Andreas Fault System. The site is comprised primarily of relatively soft to locally hard San Timoteo Formation bedrock, as well as younger alluvium and older alluvium. The sediments composing the San Timoteo Formation were derived from eroded pre-Cenozoic units. The younger alluvium and older alluvium were derived from the pre-Cenozoic basement rocks as well as the San Timoteo Formation. Regional Geology of the site vicinity is presented on **Figure 2.**

2.2 Site Geology

Geologic units encountered during our subsurface investigation of the subject site included surficial soils and bedrock. The surficial soils include undocumented man-made fills, topsoil/slopewash/colluvium, and alluvium (Qal). The bedrock unit consists of the San Timoteo Formation (Tst). These materials are described in more detail below. Subsurface exploration boring logs and trench logs are presented in **Appendix B**, while results of laboratory testing on soil and bedrock samples obtained from the current investigation are presented in **Appendix C.** The distribution of geologic units and investigation activities are illustrated on the 150-scale **Geotechnical Map, Plates 1 and 2**.

2.2.1 Surficial Soils

2.2.1.1. Undocumented Artificial Fill

Undocumented artificial fill is locally present at the subject site and is typically associated with past site improvements such as development of the Jackrabbit Road through the drainage area near the southeastern portion of the site and a what appears to be a former borrow area along the east side of a ridge in the southeast portion of the site. Artificial fill materials would also be anticipated to be present in any of the existing utility easements on the subject site. These fill materials appear to be typically derived from onsite soils and are estimated to be between one and ten feet thick. In general, these fills are not considered suitable for support of additional fill placement or structures. However, the proposed grading for the site is anticipated to remove the majority of undocumented fill associated with the improvements and remedial removals will remove and reprocess undocumented fill materials in the lower portions of the site. Undocumented fill materials are not illustrated on any of the Geotechnical Maps.

2.2.1.2. Topsoil/Slopewash/Colluvium

Colluvium, topsoil, and slopewash materials are considered interchangeable designations for the purposes of this report and are typically referred to herein as “colluvium.” These materials were observed locally mantling natural slopes untouched by prior mining or grading activities as well as (rarely) observed beneath undocumented fill materials. Topsoil and colluvial materials are a result of weathering processes of the underlying bedrock materials. These materials were typically observed to be less than approximately 3 feet thick but do vary in thickness locally up to approximately 8 feet as observed in KTP-3, and were not considered a mapable unit on the attached Geotechnical Maps. These materials were generally observed to consist of sandy clay and silty sand and were damp to moist. These materials also ranged from very loose to loose and soft to stiff and contained plant roots, root hairs, and were porous.

2.2.1.3. Alluvium (Qal)

Holocene alluvial fan deposits (Qal/Qyf$_5$) were observed during our exploratory drilling in the canyon and drainage areas. Holocene aged Younger alluvium was encountered overlying Pleistocene aged older alluvium (alluvial fan) deposits in eight of our exploratory borings. As encountered in our exploratory borings alluvium generally consisted of silty sand with minor interbeds of sandy silt, clayey sand or sandy clay and traces of fine to coarse gravel. The younger alluvial deposits are locally porous, generally dry to moist, and loose to medium dense in the upper 7.5 feet to 30 feet and slightly porous; dry to wet, and medium dense to dense below. Older alluvium was encountered underlying the Younger alluvium at depths of approximately 15 to 50 feet in Borings KB-1 through KB-4, and KB-6 through KB-8 and generally consisted of dense to very dense silty sand, silty sands with gravel, very stiff to hard sandy and clayey silt and sandy clays which were damp to moist. Younger alluvium appears to be 50 feet thick to greater than 51.5 feet thick in the north-central and northwest drainage/canyon area of the site, as observed in borings KB-5, KB-9 and KB-10 (Appendix B). The results of the laboratory analyses for dry density and moisture contents of the alluvium encountered on site are found on the boring logs (Appendix B). Laboratory testing indicates that the younger alluvium on-site exhibits a collapse potential of essentially zero to as much as 4-1/2 percent (Appendix C), which is respectively considered slight to moderate.

2.2.2 Bedrock Unit

2.2.2.1. San Timoteo Formation (Tst)

Pliocene aged San Timoteo Formation (Tst) bedrock was observed during our investigation predominantly in the hillside areas and presumed to underlie the alluvial deposits at depth. The San Timoteo Formation has previously been mapped within the region by Dibblee (Reference 8) and Matti, et al (Reference 15), and at the site vicinity by Kling Consulting Group (References 12 and 13). Within the site, the San Timoteo Formation is composed of laminated and cross-bedded, to massively bedded arkosic and lithic sandstones, as well as some conglomerates, claystones and siltstones. The San Timoteo Formation is typically dry to damp. The San Timoteo Formation ranged from dense to very dense and stiff to hard where encountered during this study. The upper, approximately 5 feet of the San Timoteo Formation bedrock was moderately to heavily weathered where encountered in the recent site investigation.

2.3 Geologic Structure

Based on our experience within the site, site vicinity, geologic mapping and review of geologic and geotechnical literature for the region, the geologic structure reflects folded and warped bedding as exhibited by generally northwest trending anticlines and synclines mapped across the site and site vicinity. Typically, bedding within the San Timoteo Formation (Tst) bedrock is northerly dipping with some southerly dips. Bedding was measured during our field reconnaissance mapping and subsurface exploration dipping approximately 3 degrees to 19 degrees to the southwest and southeast. Locally bedding was also measured dipping approximately 20 degrees to the northeast.

Jointing within the San Timoteo Formation bedrock where observed was generally steeply inclined and generally trending northerly to northwesterly with steep dips to the west-southwest and east-northeast. Clay layers and seams are locally present within the San Timoteo Formation and were observed in several of the exploratory trenches/test pits.

Several northwest striking inactive faults have been mapped in the vicinity of the site and observed on the adjacent Hidden Canyon project to the east. No faulting was evident during our field mapping and exploration.

No evidence of recent active faulting was observed at the site during the course of this investigation and is not documented in our review of the available geologic and geotechnical literature of the site.

2.4 Groundwater

Groundwater was encountered during field subsurface exploration in two of our borings within the low-lying drainage areas in the northern-northwest portion of the site. Groundwater was encountered at approximately 40 feet below the ground surface (bgs) in Boring KB-5 and 48 feet below the ground surface (bgs) in Boring KB-7. It should be noted that variations in groundwater may result from fluctuations in the ground surface topography, subsurface stratification, rainfall, irrigation, and other factors that may not be evident at the time of our subsurface exploration.

2.5 Seismic Design Code Provisions

Presented below are the site seismic parameters utilizing geologic, seismic and geotechnical data gathered for the site. All structures should be designed for earthquake induced strong ground motions in accordance with the 2016 CBC procedures utilizing the following parameters:

Site Class (Soil Profile)	D
Latitude, Longitude	33.9390°, -117.0481°
Short Period Spectral Acceleration, Ss:	1.804
1-Second Period Spectral Acceleration, S1:	0.794
Site Coefficient, Fa:	1.0
Site Coefficient, Fv:	1.5
Maximum Considered Earthquake Spectral Response Acceleration, S_{MS}:	1.804
Maximum Considered Earthquake Spectral Response Acceleration, S_{M1}:	1.191
Design Spectral Response Acceleration, SDS:	1.203
Design Spectral Response Acceleration, SD1:	0.794
Site Modified Peak Ground Acceleration, PGA_m	0.705
Seismic Design Category	E

2.6 Faulting and Seismicity

2.6.1 Faulting

No evidence of active faulting was observed on-site during our site exploration. Maps reviewed during our investigation did not indicate the presence of active faulting at the site and no County Fault Hazard Zones are located within the subject site or adjacent properties per the Riverside County TLMA GIS website as indicated in Appendix A. Additionally, the site is not located within an Alquist-Priolo Earthquake Fault Hazard Zone (References 4 and 10). However, the Southern California region is seismically active with faults capable of producing seismic shaking at the site.

The Regional Fault and Seismicity Map (**Figure 3**) illustrates the spatial relationship between the subject property and the geographic locations of known historical earthquakes and active faults in the Southern California region.

It is anticipated that the site will periodically experience ground acceleration as a result of exposure to moderate to large magnitude earthquakes occurring on nearby and distant faults. Additionally, active "blind thrust faults" (faults which lack surface expression, commonly associated with fold belts and compressional deformation) or other potentially active sources (currently not zoned) may be capable of generating earthquakes. Blind thrust faults were responsible for both the 1987 Whittier Narrows (M5.9) and the 1994 Northridge (M6.7) earthquakes.

We have performed a computer aided search of known active and potentially active faults within a 50-mile (80-km) radius of the site and have researched the available geologic literature to determine the maximum magnitude earthquakes that may be expected to be generated on each fault. The site is located on the USGS El Casco, California 7.5 minute Quadrangle map, with the approximate center of the site being at latitude 33.9390°N and longitude 117.0481°W. Table 1 below, summarizes 12 of the known active and potentially active faults, which, in our opinion, may have the greatest impact on the site. Selection of these faults was based on the proximity of the fault to the site, and the potential of the fault to generate moderate to large ground motion at the site.

Table 1 was generated from information provided on the USGS online resource (USGS, 2008, National Seismic Hazards Maps, Source Parameters, Reference 19), with the approximate center of the site being at latitude 33.9390°N and longitude 117.0481°W. It is our opinion that the most significant faults that may affect the site are the San Jacinto and the San Andreas Fault systems during an earthquake event along those faults.

Table 1
Major Significant Faults in the Project Site Vicinity

Fault Name	Approximate Distance from Site [Miles (km)]	Maximum Event (Moment Magnitude), Mw
San Jacinto- San Jacinto Valley	3.4(5.4)	7.9
S. San Andreas – San Bernardino	9.3 (15.0)	8.1
Pinto Mountain	20.3 (32.7)	7.3
Elsinore-Glenn Ivy	25.1 (40.4)	6.9
Elsinore- W+ Glenn Ivy	25.1 (38.7)	7.3
Cleghorn	25.4 (40.9)	6.8
Elsinore – Glenn Ivy+Temecula+J+CM	25.6 (41.2)	7.4
Elsinore – Temecula+Julian	26.2 (42.2)	7.5
Cucamonga	28.1 (45.2)	6.7
North Frontal (West)	29.0 (46.7)	7.2
Helendale – S. Lockhardt	29.7 (47.8)	7.4
Chino-Alt 2	30.8 (49.6)	6.8

2.6.2 Historical Earthquakes

A computer search of major historical significant earthquakes that have occurred within a 62-mile (100 km) radius of the site from 1800 through 2019 has been performed. Our search was limited to those earthquakes with magnitudes greater than M5. Table 2 below was generated using information provided by the USGS, and the Southern California Earthquake Data center.

(http://scedc.caltech.edu/significant/chronindex.html,
https://earthquake.usgs.gov/earthquakes/map/).

The Regional Fault and Seismicity Map, **Figure 3**, presents the location of major faults and historical earthquake events relative to the subject site. The major historical earthquakes determined by those resources are tabulated below on Table 2:

Table 2
Historical Earthquakes

Earthquake Name/Location	**Date**	**Magnitude (Mw)**	**Approximate Distance (miles)**
North San Jacinto	7/22/1923	6.3	12
San Jacinto	4/21/1918	6.8	16
North Palm Springs	7/8/1986	5.6	25
Greater Los Angeles Area	12/16/1858	6.0	26
Elsinore	5/15/1910	6.0	26.5
Lytle Creek	9/12/1970	5.2	37
White Wash	2/25/1980	5.5	38
Joshua Tree	4/22/1992	6.1	39
Landers	6/28/1992	7.3	40
1990 Upland Earthquake	2/28/1990	5.4	40
Chino Hills	7/29/2008	5.4	41
Southern California Area	12/8/1812	6.9	46
Long Beach	3/10/1933	6.4	54
Big Bear	6/28/1992	6.4	57
Southern California Area	2/9/1890	6.8	57
Whittier Narrows	10/1/1987	5.9	59
Hector Mine	12/16/1999	7.1	60.5
Greater Los Angeles Area	7/11/1855	6.0	62

The historical earthquake that likely had the most significant impact on the project site occurred in 1923, approximately 12 miles northwest of the site, located on a fault known as the San Jacinto Fault and the San Jacinto earthquake. This earthquake had an estimated magnitude of 6.8 (USGS/SCEDC).

The closest fault to the subject site is the San Jacinto Fault located approximately three miles from the site. The estimated site modified peak ground acceleration (PGA_M) is 0.705g as generated from information provided on the USGS online resource (USGS, 2008, National Seismic Hazards Maps, Source Parameters, Reference 15).

2.7 Other Geologic Hazards

2.7.1 Liquefaction

The site is not located within a State of California Seismic Hazard Zone (California Geologic Survey (CGS)/California Department of Conservation) indicating a susceptibility for liquefaction potential. Information available in the County of Riverside Safety Element December, 2015, (Reference 7) indicates that portions of the site may have "very low" to "low" potential for liquefaction and information available on the Riverside County Mapping and Spatial Data Portal, GIS data, March 15, 2018 (Reference 16) indicates that portions of the site are in "Zone 109" and may have a "moderate" susceptibility to liquefaction.

Portions of the site appear to be susceptible to relatively minor amounts of liquefaction settlement. The magnitudes of seismic–induced liquefaction settlement appear to be relatively minor and somewhat localized, occurring generally below depths of 40 feet where groundwater was encountered in two (2) of our borings.

The total earthquake-induced liquefaction settlement potential was calculated using the LiquefyPro software. Our evaluation was based on the site class and adjusted peak ground acceleration of 0.705g, as presented in the **Seismic Design Parameters Table** above, and a probabilistic 2,475 year modal magnitude of 8.1. Our analysis indicates the estimated settlement due to earthquake-induced liquefaction settlement is approximately 0.00 inches to approximately 1 inch. Differential settlements are estimated to be negligible to approximately a little over 0.5 inches over a distance of 50 feet. Due to the lack of a shallow static groundwater level and the materials encountered underlying the site overall relatively dense and stiff nature, the materials are not considered to be susceptible to significant amounts of liquefaction induced seismic settlement. With the proposed fill depths and loads imposed from the fill, liquefaction is considered to be negligible.

The potential for lateral spreading is low based on our analysis and information which indicates that the site is not considered susceptible to significant amounts of liquefaction induced settlement as discussed above. Additionally, there are no free slopes adjacent to the project. The results of our analysis are included herein in **Appendix D–Seismic Settlement Analysis.**

2.7.2 Seismically Induced Dry Settlement

The total earthquake-induced dry sand settlement potential was calculated using the LiquefyPro software. Our evaluation was based on the site class and adjusted peak ground acceleration of 0.705g, as presented in the Seismic Design Parameters Table above, and a probabilistic 2,475 year modal magnitude of 8.1. Total earthquake-induced dry sand settlement was calculated using Boulanger and Idriss (2014) analysis method and theSPTblowcounts from our borings. Our analysis indicates the estimated settlement due to earthquake-induced dry settlement ranges from approximately 0.6 inches to 4.6 inches. Differential settlements are estimated to range from approximately a little over 0.25-inches to 3.0 inches over a distance of 50 feet. The majority of the seismic induced dry settlement occurs in the upper 10 to 30 feet within the younger alluvial materials. The majority of the alluvium that is potentially susceptible to seismic induced dry settlement would be removed during remedial earthwork and in our opinion would also be subject to additional settlement during construction due to fill loads, which would reduce the settlement significantly. The older alluvial materials underlying the younger alluvium at the site are overall relatively dense and the dry settlement potential is considered relatively minor to negligible within the Older Alluvial materials. Results of our analysis are included herein (**Appendix D**).

2.7.3 Seismically Induced Slope Instability/Landslides

The site is not mapped within a State of California designated Hazard Zone for Slope Instability. Information available in the County of Riverside Safety Element, December, 2015, (Reference 7) indicates that portions of the site may have "low" to "moderate" susceptibility for seismic induced slope instability. The potential for seismic induced slope instability is considered in section 3.2 of this report.

2.7.4 Tsunamis and Seiches

The site is not located near any ocean or landlocked bodies of water; therefore we do not consider Tsunamis or sieches to be a potential hazard to the project.

2.8 Flooding

According to the Federal Emergency Management Agency (FEMA), the subject site is located within an area of minimal flood Hazard- Zone X (Reference 9). It is our understanding the overall subject site will be elevated by proposed design grading to be situated well above local drainage courses. As such, the risk for flooding of the site is considered relatively low.

3. GEOTECHNICAL ENGINEERING ANALYSIS

The results of our geotechnical engineering analysis performed during our investigation are discussed and presented below.

3.1 Laboratory Testing

In order to perform the geotechnical analysis considered necessary for this project, soil mechanics laboratory testing was performed on selected soil samples obtained from the exploratory borings. The laboratory tests performed included moisture/density determinations, maximum density, sieve analysis, direct shear, consolidation, collapse potential and classification tests. Consolidation-related (dry) and hydro-collapse potential (wet) was evaluated along with the time-rate of settlement. Direct shear tests were performed on both relatively undisturbed ring samples as well as samples remolded to 90 percent relative compaction to represent both in-situ and fill conditions. The consolidation and hydro-collapse testing was performed on relatively undisturbed in-situ soil samples (natural soil deposits) in order to determine the long-term settlement deformation in response to the proposed fill loading. The exploratory boring and test pit logs for exploration conducted during this investigation is presented within Appendix B. test-pit logs. Laboratory test results are presented in Appendix C.

3.2 Slope Stability

3.2.1 Deep Seated Slope Stability

Approximate 2:1 (horizontal to vertical) cut and fill slopes of variable height are proposed throughout the site. Deep seated slope stability analysis was performed on selected geologic cross-sections considered representative of the various proposed conceptual slope configurations. The computer program Slide version 8.0 by Roc Science was employed for slope stability calculations. The sections assigned for stability analysis included both proposed fill and cut slopes. Stability analyses were conducted utilizing conventional limit equilibrium methodologies for both force and moment equilibrium. The results of our analysis are presented below and summarized in **Appendix E**. The locations of the cross sections are presented on **Plates 1 and 2** and the cross sections presented on **Plate 3**.

Samples collected on-site were tested and the soil strength parameters utilized for analysis are presented in the table below. Direct shear strength parameters utilized were based on laboratory testing and our past and recent experience with similar materials on projects in the site vicinity.

Soil Strength Parameters

Material Type	**Unit Weight, γ [pcf]**	**Cohesion, c [psf]**	**Friction Angle, φ [degrees]**
Artificial Fill (Af)	125	150	31
Alluvium (Qal)	120	100	29
San Timoteo Formation (Tst-Bedrock)	130	550	33

Stability analyses were conducted on the geologic cross sections indicated in the table below. Each cross section was analyzed for both static and pseudostatic conditions with a horizontal acceleration coefficient “K” of 0.15. Results of the analysis are presented below. Minimum factors of safety of 1.5 and 1.1 are considered acceptable for static and pseudostatic conditions respectively. Proposed 2:1 fill slopes and 2:1 cut slopes are considered grossly stable in the absence of adverse geologic conditions.

Slope Stability Analysis

	Factor of Safety	
Cross Section	Static	Pseudostatic (Seismic)
A - A'	2.18	1.53
B- B'	2.36	1.67
C - C'	2.26	1.59
D - D'	1.63	1.13

The results of detailed stability analyses summarized above are presented in **Appendix E**.

3.2.2 Surficial Slope Stability

Proposed 2:1 fill and cut slopes analyzed resulted in a factor of safety against surficial failure greater than 1.5 and are therefore considered surficially stable. Our analysis is summarized in **Appendix E**.

3.3 Erosion Potential

Fill slopes constructed with granular materials derived from on-site sandstone bedrock may be susceptible to erosion.

Bedrock units include the San Timoteo Formation (Tst) and the surficial units include undocumented artificial fill, colluvium (Qcol), and alluvium (Qal) Bedrock encountered during this investigation was moderately hard to hard and is considered to be slightly to moderately erodible. In general, surficial soils encountered are typically granular and appear to be readily erodible as evidenced by their soft to loose state and localized erosion gullies.

The erosion potential of cut slopes exposing on-site bedrock materials may range from low to medium depending on the bedrock materials exposed on the cut slope, as well as the orientation of bedding and joint planes within the slope. In general, cut slopes exposing well-indurated and/or cemented sandstones should have a low to moderate susceptibly to erosion. Friable, poorly cemented, sandstones should have a moderate to high erosion susceptibility.

3.4 Surface Drainage

Surficial drainage of the proposed development could significantly affect strength and compression characteristics of the proposed engineered fills, as well as the on-site bedrock materials. Maintenance of positive drainage from proposed roadways, building pad areas and slopes is paramount to the long-term performance of the site improvements, especially erosion on slopes. Recommendations for surface drainage are included in Section 5.6 below.

3.5 Rippability

The degree of rippability of bedrock material is, in general, dependent upon several factors which include the lithology of the bedrock, the geologic structure, the degree of weathering, as well as the type of earth moving equipment employed.

Difficult excavation could be encountered locally within the San Timoteo Formation (Tst). In general, the upper 15 to 30 feet of bedrock in natural areas has been affected by long-term weathering processes and should exhibit easier excavation characteristics above those depths. Local indurated or very hard zones could exist, which would make excavation difficult by conventional means, which may require special techniques including the use of single shank rippers, rock breakers mounted to excavators, etc.

Although not anticipated, in the event that non-rippable materials are encountered and blasting is required, a qualified, experienced licensed blasting contractor should perform the blasting using current and professionally accepted methods, products, and procedures to maximize safety during blasting operations in accordance with applicable laws and ordinances. The contractor would be responsible for all required permits, blasting procedures, safety, methodology, pre-blast monitoring, monitoring during blasting and post-blast monitoring, including appropriate pre-blast, blast and post-blast warning signals.

The blasting contractor should incorporate procedures that protect personal safety, property, and produce blast rock of appropriate sizes, make sure the blast will prevent/minimize production of flyrock and air blast hazards, minimize peak particle velocities, and minimize overblasting. Oversize materials generated from excavations and/or blasting can be used as fill (Section 5.3) and placed in accordance with oversize material placement (Section 5.8) as recommended in General Earthwork and Grading Specifications presented in Appendix F.

3.6 Fill Suitability

Materials generated from the excavation of undocumented fill, alluvium (Qal) and bedrock units San Timoteo Formation (Tst) are considered suitable for use as engineered fill, provided they are free of deleterious materials such as trash or organics.

3.7 Settlement Potential

The existing alluvium materials (Qal) have been evaluated on a preliminary basis for settlement. Loose younger alluvium should be removed as recommended in Section 5.3. Relatively competent alluvium can be left in place within the canyons beneath the proposed building pads and beneath proposed design fills of the site beneath proposed fill slopes of variable heights and configurations.

Based on our preliminary analyses, the amount of settlement varies from slight to severe. It should be understood that the amount of estimated consolidation-related and hydro-collapse settlement are generally independent of one another and therefore should be combined when evaluating the total amount of settlement. On the other hand, much of the normal consolidation-related settlement should occur as the new engineered fill is placed. This settlement should occur immediately upon fill placement and continue until grading is complete. We expect the majority of the predicted settlement to have occurred by the end of grading. However, in order to monitor the settlement, we recommend that settlement monuments be established in strategic locations along the northerly fill slopes. These monuments should be read periodically and the results evaluated by the geotechnical consultant prior to site improvements constructed within those areas.

3.8 Expansion Potential

The onsite geologic formations are comprised of mostly sandstone, which generates soils that are generally sandy and therefore low in expansion potential; however, siltstone/clay layers subject to excavation would produce clayey soils, which would be expansive. Minor amounts of siltstone exists onsite that if placed at pad grade would produce moderately expansive soils. Expansion potential of the soils exposed at finished grade should be evaluated at the completion of grading.

3.9 Preliminary Earthwork Shrinkage and Bulking

The volume change of excavated on-site materials upon excavation and placement as engineered fill will vary with bedrock/soil type, location and compactive effort. However, the overall earthwork shrinkage/bulking and subsidence of the onsite soils may be approximated by the following parameters:

§	San Timoteo (Tst)	5% bulking
§	Alluvium (Qal)	15% shrinkage
§	Alluvium (Qal)	1.0 feet subsidence (average)

4. CONCLUSIONS

The following preliminary conclusions are based on our review of the available geotechnical data as well as the results of our field investigation, laboratory testing and engineering analysis. It is our opinion that the subject property investigated herein is considered geotechnically suitable and feasible for the development of proposed improvements discussed above, provided that the recommendations presented herein are implemented during further design, grading, and construction. If the recommendations in this report are incorporated into design and construction of the project, the proposed grading should not adversely affect adjoining sites.

- Generally, undocumented fill, topsoil/colluvium and younger alluvium on site are considered potentially compressible and prone to settlement and portions of the younger alluvium prone to hydrocollapse. Alluvium left in place may support proposed fills provided the recommendations discussed in Section 5 are incorporated into grading operations and site development/design;

- Alluvial soils are subject to settlement upon loading by proposed fill soils and the majority of the settlement is expected to occur during grading and within a few months thereafter. However, as a precaution, we are recommending that surface monuments be installed at strategic locations along the top of slopes and pad areas of the project;

- Stability analyses indicate that the design cut and fill slopes are grossly stable under static and pseudostatic conditions, and generally should not be subject to earthquake induced failures or excessive deformation under seismic conditions in the absence of adverse geologic conditions and provided the recommendations in this report are implemented. Stability calculations are included in Appendix E. Supplemental subsurface exploration is recommended, see Section 5.1;

- Site soils subject to earthwork operations are generally sandstone and sandy alluvium. Fill materials derived from these types of materials will typically exhibit a very low to low expansion potential. However, a limited amount of siltstone and clay onsite could generate moderately expansive soil at finished surface and should be evaluated at the completion of grading;

- Fill soils derived from sandstone should be rippable and generally suitable for use as fill materials, provided they are free of vegetation, debris and over-sized cobbles and/or boulders. Deeper cuts of bedrock materials may locally be difficult to excavate by conventional methods and may generate oversize rocks. Local indurated or very hard zones could exist, which would make excavation difficult by conventional means, which may require special techniques including the use of single shank rippers, rock breakers mounted to excavators, etc. Blasting is not anticipated, however, oversize materials generated from excavations and/or blasting can be used as fill (Section 5.3 and 5.8) and placed in accordance with oversize material placement as recommended in General Earthwork and Grading Specifications presented in Appendix F.

- No active faulting is known to exist at the site and the risk of surface fault rupture is considered to be very low. However, the project site lies within a region of historical seismicity and will likely be subject to seismic shaking in the future;

- Groundwater was encountered at depth during the subsurface investigation in two (2) of our borings, KB-5 and KB-7, at depths of approximately 40 and 48 feet below the ground surface, within the low-lying canyon drainage areas located along the northerly edge of the site. Groundwater levels are not expected to have an impact on the project;

- The younger alluvium is also subject to minor amounts of liquefaction settlement of less than 1-inch at depths of 40 feet, which is not considered as significant. With the proposed fill depths and loads imposed from the fill, the materials would be subject to additional settlement during construction, and in our opinion, reduce the seismic induced settlement potential for liquefaction. Therefore, liquefaction is considered to be negligible. The upper portion of the younger alluvium is subject to seismic-induced dry settlement, which would occur primarily in the upper 10 to 30 feet. The maximum seismic induced settlement that could occur would be on the order of approximately 0.6-inches to 4.6 inches. The majority of the alluvium that is potentially susceptible to seismic induced dry settlement would be removed during remedial earthwork and in our opinion would also be subject to additional settlement during construction due to fill loads, which would reduce the settlement significantly;

- Preliminary remedial grading recommendations include leaving alluvium in place within the canyons. It is considered prudent to place survey settlement monuments at selected locations where alluvium has been left in place, deep fill areas and over cut/ fill transition areas.

5. RECOMMENDATIONS

Geotechnical recommendations presented below are based on our understanding of the intended site use and the preliminary geotechnical information gathered and analyzed to date for feasibility purposes. Recommendations contained herein are preliminary in that they would be subject to modifications based on additional subsurface exploration to further characterize the site conditions and refine the recommendations, specifically, the alluvial removal and over-excavation requirements intended to reduce the differential settlement that could be experienced at finished pad grades, based on development of detailed rough grading plans.

5.1 Supplemental Subsurface Exploration

Our preliminary geotechnical investigation is a feasibility level study, we recommend that a supplemental geotechnical investigation be performed that includes additional large and small diameter borings to further characterize site conditions when detailed grading plans are available and prior to final design and construction to supplement and check that the subsurface conditions are consistent with our findings, conclusions and our preliminary recommendations. Recommendations would be updated as warranted.

5.2 General Earthwork and Grading

Grading should be performed in accordance with the General Earthwork and Grading Specifications presented in Appendix F, unless specifically amended below, and should also conform to applicable governing agency requirements. Prior to commencement of grading operations, all vegetation, organic topsoil, and man-made structures (i.e., tanks, pipes, fences, etc.) should be cleared and disposed of off-site. Areas receiving fill should be scarified about 6 to 12 inches deep and/or over-excavated, moisture-conditioned to at least two percent above optimum moisture content, and compacted to a minimum of 90 percent relative compaction for areas to receive new fills up to 50 vertical feet and 95 percent for areas to receive greater than 50 feet of fill. All earthwork and grading operations should be performed under the observation and testing of the geotechnical consultant.

5.3 Fill Placement and Compaction

5.3.1 Fill Lifts

Fill material shall be placed in near-horizontal layers not exceeding 8 inches in loose thickness. Should abundant cobbles or rocks up to 12-inches in diameter be exposed, fill lift thicknesses could be increased to this dimension. Rocks greater than 12 inches should be collected and placed as over-sized material. Each fill layer should be spread evenly and should be thoroughly mixed during spreading to attain uniformity of material and moisture in each layer.

5.3.2 Fill Moisture

Fill layers at moisture contents less than optimum shall be watered and mixed; and fill layers shall be aerated by scarification or shall be blended with drier material. Moisture-conditioning and mixing of fill layers shall continue until the fill material is uniformly processed at a minimum of two percent above optimum moisture content.

5.3.3 Fill Compaction

After each layer has been evenly spread, moisture-conditioned, to a minimum of two percentage points above optimum moisture content and mixed, it shall be uniformly compacted to not less than 90 percent for fills up to 50 feet in depth, and 95 percent for fills greater than 50 feet in depth, of the maximum dry density. Compaction equipment shall be adequately sized and shall be either specifically designed for soil compaction or of proven reliability, to efficiently achieve the specified degree of compaction.

5.4 Remedial Grading

Preliminary remedial grading recommended for this project is based on the findings and conclusions generated during this limited feasibility level geotechnical investigation of the site, and with the expectations and specifications of the client based on the ultimate site development. As such, the remedial grading recommendations presented herein are based on preliminary site-specific project development and site conditions. Undocumented fill and surficial topsoil and colluvium should be completely removed and recompacted during remedial earthwork. Remedial removals of the alluvium could range from approximately 7.5 feet to 30 feet below existing grades or greater and 3 to 5 feet for the San Timoteo Formation bedrock.

5.4.1 Over-excavation Along Cut/Fill Transitions

In order to minimize the potential for differential settlement, proposed cut-fill transition lots should be overexcavated a minimum of three feet below design finish pad grades. In general, and on a preliminary basis, lots with steep fill transitions should be overexcavated 1/3 of the maximum depth of fill in the shallower fill portions of the pad (Appendix F-GD3).

5.4.2 Over-excavation of Cut Areas

In order to limit the fill differential between cut and fill, and to provide a more uniform foundation pad for the proposed improvements, proposed cut areas are recommended to be over-excavated prior to placing fill. In general, the over-excavation of the cut area should be at least 3 feet below design finish pad grades.

5.5 Manufactured Slopes

All design slopes should be constructed in accordance with City of Beaumont, County of Riverside requirements along with recommendations contained herein. Keyway backcuts, if any, greater than 5 feet in height should not be made steeper than a 2:1 slope gradient unless approved by the geotechnical consultant. Vertical benches with a minimum height of 4 feet should be established for all fills placed on ground sloping steeper than 5:1 (horizontal:vertical). Keyways should be constructed as depicted in the Grading Details (Appendix F) or as determined by the geotechnical field representative during grading. Slope maintenance guidelines are provided in Appendix M.

5.5.1 Slope Stabilization and Buttresses

Each fill slope stabilization, if any, should be provided with a subdrainage system as outlined in Appendix L. Keyways should be a minimum of 3 feet deep and a minimum of 15 feet wide, or half the slope height (whichever is greater). The locations of slope stabilization and buttress keyway dimensions should be evaluated and confirmed during grading.

All keyways and backcuts for proposed slope stabilization, if any, should be observed by the geotechnical consultant during grading. Keyway dimensions may be modified based on the actual geotechnical conditions encountered during grading. Stabilization and buttress fills should be provided with backdrains constructed in accordance with the specifications contained in Appendix G and applicable City of Beaumont or County of Riverside grading ordinances.

5.5.2 Fill Slopes

All fill slopes should be provided with a fill key excavated to a minimum depth of 3 feet into bedrock, or into alluvial materials after removals have been conducted, as determined by the geotechnical consultant during grading. Slopes higher than 30 feet should be provided with a keyway that has a minimum width of one-half the slope height and a depth of at least 3 feet into bedrock, or competent materials as determined by the geotechnical consultant during grading. Larger keyways may be required depending on slope height and soil conditions encountered beneath the proposed fill slopes. Vertical benches with a minimum height of 4 feet should be established for all fills placed on ground sloping steeper than 5:1. Oversize or cohesionless sandy material should not be utilized near the slope face. Fill slopes should be constructed of well-blended mixtures of sands, silts and clays where possible. Where considered necessary, fill slopes should be provided with backdrains constructed in accordance with the specifications contained in Appendix F and applicable City of Beaumont or County of Riverside grading ordinances.

5.5.3 Cut Slopes

In general, cut slopes proposed in the Timoteo Formation are considered stable when cut to design gradients of 2:1 horizontal to vertical, in the absence of adverse geologic conditions.

All cut slopes should be geologically mapped during grading. Cut slopes found during grading to expose adverse geologic structure should be provided with replacement stability fills constructed in accordance with the specifications presented herein and in Appendix F. Furthermore, cut slopes exposing earth materials that are susceptible to erosion should be constructed as replacement fill slopes. Keyway backcuts greater than 5 feet in height should not be made steeper than a 2:1 slope gradient. Stabilization fills should be provided with backdrains constructed in accordance with the specifications contained in Appendix F and applicable City of Beaumont and County of Riverside grading ordinances.

5.5.4 Cut/Fill Transition Slopes

In general, slopes that will have a cut/fill transition and bedrock/alluvium transitions can be cut to grade. However, where the resulting fill would be too thin, we would recommend replacement. Where bedrock/alluvium transitions occur, they should be evaluated in the field for suitability, and be treated with a replacement slope with keyways and drains as determined by the geotechnical consultant.

5.6 Surface Drainage

Appropriate surface drainage measures should be provided by the civil engineer, including terrace drains, surface gradients, and suitable non-erosive collection devices in accordance with the 2016 California Building Code and City of Beaumont regulations. Surface drainage should never be allowed to flow toward or over the top of slopes.

Consideration for the eventual settlement of the canyon areas should also be taken into account while designing local drainage. Currently, the site plan sheet flows across the entire site. However, it may be necessary to consider designing local low spots with area drains over the main canyon.

5.7 Subdrainage

Canyon fills and stabilization fills will require appropriate subdrain installation in accordance with the recommendations described in Appendix F, or as modified by the geotechnical consultant during grading. Subdrains should be installed in canyon bottoms with tributary drainages installed after the overexcavation of unsuitable soil materials, prior to the placement of compacted fills. Subdrainage should also be provided for any significant seepage encountered during grading. The necessity and locations of subdrains should be evaluated upon review of more detailed grading plans.

5.8 Oversized Rock Materials

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fills, unless the location, materials, and disposal methods are specifically recommended by the geotechnical consultant.

Any oversized materials, with a maximum dimension of 36-inches, generated during excavation that cannot be broken down to less than 12 inches nominal size should be disposed off-site or placed within a rock windrow as illustrated on Detail GD-5 in Appendix F. Oversize material shall not be placed within 10 feet vertically or within 20 feet horizontally of any finished surface, unless specifically recommended by the geotechnical consultant during grading. Oversized disposal operations shall be such that nesting of oversize material does not occur, and such that the oversize material is completely surrounded by compacted or densified fill.

Individual rocks with a maximum dimension of 36-inches to 72-inches may be disposed of within fill areas under the direction of the geotechnical consultant on a case by case basis. Individual oversized rock disposal operations shall be such that the oversize material is completely surrounded by compacted or densified fill. Individual oversize material shall not be placed within 20 feet vertically or within 20 feet horizontally of any finished surface, unless specifically recommended by the geotechnical consultant during grading.

5.9 Deep Fill Areas/Settlement Monitoring

Based upon our understanding of proposed concept grading, fills on the order of 145 feet deep (design grading) are planned. Engineered fills deeper than 50 feet should incorporate a minimum relative compaction of 95 percent, and a moisture content of at least two percentage points above optimum moisture content. Compaction requirements may be revised based on hydrocollapse testing conducted while fill is being placed. A settlement monitoring program should be implemented consisting of the surveying of surface monuments to monitor settlement of alluvial soils left in-place and/or proposed fills deeper than 50 feet.

Survey monument readings for both deep fill areas and for fill over natural ground (Qal) should be conducted following the completion of fill placement. These areas would preliminarily include the fill slopes along the north edge of the site and over the main north-south trending canyons/drainages under the proposed building pads. Survey monument locations should be selected by the geotechnical consultant. Construction of the monuments may be completed by the contractor or the geotechnical consultant in accordance with our grading details SM-2 and SM-3 (Appendix F). Survey readings should be taken weekly for the first month and on a monthly basis thereafter until vertical movement of the fill mass achieve 90 percent of primary compression, begin secondary compression or the estimated remaining settlement is less than one inch. Construction of proposed structures should not commence until approved by the geotechnical consultant based on the results of the settlement monitoring.

The survey bench marks used for the monitoring should be confirmed with the geotechnical consultant prior to initial readings being performed. Based on our analyses, it is estimated that primary consolidation settlement would require from a few months to a year following the completion of fill placement provided all recommendations presented herein have been implemented. It should also be remembered that the site improvements will need to be designed for a maximum tolerance deflection ratio (for differential settlement) with an estimated total settlement that is expected to occur in the deep canyons and fill areas. A portion of this settlement is also expected to occur during grading.

5.10 Preliminary Foundation Recommendations

All foundation criteria are considered minimum requirements that may be superseded by more stringent requirements from the architect, structural engineer, or governing agencies.

The following preliminary geotechnical design parameters are provided for the design of proposed foundations for the proposed buildings. The proposed buildings may be supported by continuous and square pad footings utilizing an allowable bearing pressure of 2000 pounds per square foot. The width of the continuous footings should be a minimum of 15 inches and embedded to a minimum depth of 18 inches below the lowest adjacent grade. For square pad footings, it is recommended that the width be at least 24 inches embedded a minimum of 18 inches below the lowest adjacent grade. Bearing pressures may be increased by 250 pounds per square foot per additional foot of width or depth to a maximum allowable bearing pressure of 2,500 pounds per square foot. A coefficient of friction of 0.40 may be used, along with a passive lateral resistance of 250 pounds per square foot per foot of embedment. Footings should bear on at least two feet of compacted fill.

If normal code requirements are used for seismic design, the allowable bearing value and coefficient of friction may be increased by 1/3 for short duration loads, such as the effect of wind or seismic forces.

If any utility lines are within a 1:1 (horizontal: vertical) projection from the bottom of a footing, they may be within the influence zone of the proposed footing load. If this condition exists, the proposed footing should be deepened so that the utility is outside the zone of influence; the utility line could also be relocated or encased with concrete slurry. These conditions should be evaluated on a case by case basis.

5.11 Retaining Walls

General guidelines are provided below for low retaining walls up to ten feet in retained height.

For preliminary purposes, retaining walls should be designed to resist an equivalent fluid pressure of 40 pounds per cubic foot for level backfill and 55 pounds per cubic foot for 2:1 sloping backfill. Backfill materials should consist of granular material (S.E. $\geq$ 30) and drainage systems should be installed as shown on retaining wall details in Appendix F. Please note that drainage recommendations are provided only as a means to create a drained condition behind proposed retaining walls. Surface drains should not be connected to retaining wall sub-drainage. These drains are not intended as a means of waterproofing. If moisture or salt deposition is not desired, or if stone facing, stucco, or paint is to be applied to the wall outer surface, the wall should be provided with suitable waterproofing. The waterproofing system for the wall should be designed by a qualified waterproofing consultant. Any waterproofing or drainage system damaged by soil placement and compaction efforts should be repaired prior to completion of backfilling.

Foundations for proposed retaining and perimeter (non-retaining) walls which are to be founded into compacted fill materials may be designed utilizing an allowable bearing pressure as presented above for conventional foundations.

5.12 Sulfate Potential

Based on the soluble sulfate test results at this time, the on-site soils possess a sulfate exposure that is considered “Class S0”. For preliminary purposes, concrete should be designed in accordance with ACI 318, Section 19 Table 3.1.1, utilizing “Class S0” sulfate exposure.

5.13 Corrosion Potential

Laboratory testing on surficial deposits within the subject site has preliminarily indicated the soil is “highly-corrosive” to ferrous metals when the soil is saturated, as per Caltrans guidelines.

5.14 Preliminary Pavement Design

For “preliminary” design, parameters are provided below. Laboratory R-Value test results indicated R-Values ranging from 13 to 41 on surficial soils tested. We have assumed an R-Value of 25 for preliminary design purposes and to account for soil variability. Additional R-Value testing should be performed on subgrade soils at the completion of rough grading to confirm final structural pavement sections. The selection of actual traffic index should be the purview of the project civil or traffic engineer.

Preliminary Pavement Section Design

R-Value	**Traffic Index**	**Multiple Layered**	
		Asphalt Concrete (inches)	**Aggregate Base* (inches)**
25	4.0	3.0	5.0
25	5.0	3.0	6.0
25	6.0	3.0	9.0
25	7.0	4.0	11.0

*Aggregate base material should consist of Class 2 aggregate base materials or Crushed Miscellaneous Base (CMB).

5.15 Temporary Excavations

Temporary excavations and trench walls to a depth of four feet may be made vertically without shoring, subject to verification of safety by the contractor. Deeper excavations should be no steeper than 1.5:1 (horizontal to vertical) or braced or shored in accordance with CAL OSHA standards and guidelines. The contractor is assumed responsible for maintaining safety at the jobsite. All excavation work should be in compliance with current CAL OSHA standards. Under no circumstances should excavations be made deeper than four feet or below groundwater without shoring, bracing or laying-back, in accordance with CAL OSHA standards and guidelines. No surcharge loads should be allowed within five feet from the top of the cuts.

Existing utility lines, roadways and other easements/right-of-ways may be impacted by the temporary excavations may require shoring to obtain the full depth of the excavation.

5.16 Grading Plan Review

Our office should review the 40-scale grading plans, produced in the future. Grading plan review will be necessary to verify that our recommendations in this report remain relevant and to provide updated geotechnical recommendations specific to the plans as necessary.

5.17 Geotechnical Testing and Observation

Geotechnical observation and testing should be conducted during the following stages of grading:

- Upon the completion of clearing and grubbing;
- During all phases of grading, including benching, backcut and key excavation, cut slope excavation, remedial removals of surficial soils, backdrain/subdrain/filter material installation and engineered fill placement;
- During Settlement Monument placement;
- During roadway subgrade preparation and compaction of roadway aggregate base;
- When any unusual conditions are encountered during grading.

6. PROFESSIONAL LIMITATIONS

Geotechnical services are provided by KCG in accordance with generally accepted professional engineering and geologic practice in the area where these services are to be rendered. Client acknowledges that the present standard in the engineering and geologic and environmental profession does not include a guarantee of perfection and, except as expressly set forth in the conditions above, no warranty, expressed or implied, is extended by KCG.

All excavations used for subsurface exploration were backfilled prior to leaving the site. As with any backfill, consolidation and subsidence may result in depression of the excavation area and a potentially hazardous condition. The client and/or owner of the property are hereby advised to periodically examine the excavation areas, and if necessary backfill any resulting depressions. KCG shall not be responsible for injury or damage resulting from subsidence of backfill.

Geotechnical reports are based on the project description and proposed scope of work as described in the proposal. Our conclusions and recommendations are based on the results of the field, laboratory, and office studies, combined with an interpolation and extrapolation of soil conditions as described in the report. The results reflect our geotechnical interpretation of the limited direct evidence obtained. Our conclusions and recommendations are made contingent upon the opportunity for KCG to continue to provide geotechnical services beyond the scope in the proposal to include all geotechnical services. If parties other than KCG are engaged to provide such services, they must be notified that they will be required to assume complete responsibility for the geotechnical work of the project by concurring with the recommendations in our report or providing alternate recommendations.

All locations of borings, limits of fill, contacts, elevations, etc., are represented herein to the best of our abilities. The approximate locations depicted on all plates and figures are based upon available control as provided in the field by others. Where no information was provided by others, locations were approximated using limited measuring methods and crude instrumentation. We do not verify the locations or elevations reported herein as accurate in survey or void of error. KCG assumes no responsibility for any future costs associated with errors in the area of survey.

It is the reader's responsibility to verify the correct interpretation and intention of the recommendations presented herein. KCG assumes no responsibility for misunderstandings or improper interpretations that result in unsatisfactory or unsafe work products. It is the reader's further responsibility to acquire copies of any supplemental reports, addenda or responses to public agency reviews that may supersede recommendations in this report.

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

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APPENDIX A

REFERENCES
(Continued)

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APPENDIX B

EXPLORATORY LOGS

LOG OF EXPLORATORY BORING

Sheet **1** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-1**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/25/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2348.0**

◪ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧓ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
		☒				**@ Surface - TOPSOIL** **Younger Alluvium (Qa):** **@ 0.5 feet - Sandy SILT (ML)** olive-brown, some mica grains, damp.			
2345		⧓	3 3 5	9	105	**@ 2.5 feet - SAME:** medium stiff.		DS	
	5	⧓	2 2 3	10	102	**@ 5.0 feet - SAME:** some calcium carbonate.			
2340		⧓	3 4 5	12	111	**@ 7.5 feet - SAME:** trace clay.			
	10	⧓	2 4 4	10	103	**@ 10.0 feet - SAME**		CN	
2335									
	15	⧓	14 22 37	6	124	**Older Alluvium (Qoa):** **@ 15.0 feet - Silty SAND (SM):** grey-brown, fine to medium-grained, some mica grains, little quartz grains, little feldspar grains, damp, dense.		CN	
2330									
	20	◪	24 26 34			**@ 20.0 feet - SAME:** trace gravel up to 3/4".			
2325									
	25	⧓	23 34 50/4"	11	117	**@ 25.0 feet - SAME:** large vein of calcium carbonate, trace gravel up to 1/4", very dense.			
2320									

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-1**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/25/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2348.0**

◪ Standard Split Spoon   ■ Shelby Tube   ▽ Water Level ATD

⧓ California   ☒ Bulk Sample   ▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
	30		◪	21 34 44			@ **30.0 feet - <u>Silty SAND (SM):</u>** light grey-brown, fine-grained, some mica grains, some quartz grains, damp, very dense.			
2315										
	35		⧓	21 50/3"	28	99	@ **35.0 feet - <u>Silty SAND (SM):</u>** grey-brown, fine to medium-grained, some mica grains, little gravel up to 1.0", trace clay, moist, very dense.			@ 35.0 feet - thin clay layer at the top of the sample.
2310										
	40		◪	24 50/5"			@ **40.0 feet - <u>Sandy SILT (ML):</u>** olive, trace clay, moist, hard.			
2305										
	45		⧓	27 50/3"	19	101	@ **45.0 feet - <u>Sandy SILT (ML):</u>** grey-brown, some mica grains, trace clay, some orange staining, moist, hard.			
2300										
	50		◪	15 37 50			@ **50.0 feet - SAME:** no clay, no staining.			

Total Depth: 51.5 feet.
No groundwater.
No caving.
Hole backfilled on 6/25/2019.

LOG OF EXPLORATORY BORING

Sheet **1** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-2**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/25/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2343.0**

◩	Standard Split Spoon	■	Shelby Tube	▽	Water Level ATD
⧗	California	☒	Bulk Sample	▼	Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			☒				**@ Surface - TOPSOIL**			
							<u>Younger Alluvium (Qa)</u>: **@ 0.5 feet - <u>Sandy SILT (ML)</u>:** olive-brown, trace clay, trace rootlets, moist.			
2340			⧗	2 2 2	9	101	**@ 2.5 feet - SAME:** medium stiff.		EI	
	5		⧗	2 3 5	8	107	**@ 5.0 feet - SAME:** trace mica grains, trace coarse sand, no roots.			
2335			⧗	3 3 4	11	104	**@ 7.5 feet - SAME**			
	10		⧗	3 3 5	11	107	**@ 10.0 feet - SAME:** trace gravel up to 1/4".		CN	
2330										
	15		⧗	4 4 5	11	107	**@ 15.0 feet - SAME**			
2325										
	20		◩	3 5 7			**@ 20.0 feet - SAME:** no gravel, stiff.			
2320										
	25		⧗	6 7 8	10	110	**@ 25.0 feet - <u>Silty SAND (SM)</u>:** brown, fine to medium-grained, little mica grains, few quartz grains, moist, medium dense.		CN	
2315										

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project: **Jack Rabbit Trail**
Project Number: **18060-01**
Date Drilled: **6/25/19**
Logged By: **DKL**

Boring No.: **KB-2**
Driller: **Cal Pac Drilling**
Drill Type: **Hollow Stem**
Hammer Wt. / Drop: **140lb / 30in**
Ground Elev. [ft]: **2343.0**

◪ Standard Split Spoon	■ Shelby Tube	▽ Water Level ATD
⧗ California	⊠ Bulk Sample	▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			◪	2 3 4			@ **30.0 feet - <u>Sandy SILT (ML):</u>** olive-brown, trace medium and coarse sand, moist, medium stiff.			
2310										
	35		⧗	5 5 8	12	110	@ **35.0 feet - SAME:** trace calcium carbonate, stiff.		CN	
2305										
	40		◪	8 15 29			**<u>Older Allluvium (Qoa):</u>** @ **40.0 feet - SAME:** some calcium carbonate, few mica grains, hard.			
2300										
	45		⧗	32 50/3"	11	111	@ **45.0 feet - <u>SILT (ML):</u>** brown, some mica grains, trace calcium carbonate, trace orange staining, moist, hard.			
2295										
	50		◪	29 50/6"			@ **50.0 feet - <u>Silty SAND (SM):</u>** grey-brown, fine to coarse-grained, some mica grains, trace granitic gravel up to 3/4", damp, very dense.			

Total Depth: 51.0 feet.
No groundwater.
No caving.
Hole backfilled on 6/25/2019.

HS BA TP 18060-01, JACK RABBIT TRAIL.GPJ Kling Consulting Group, Inc. 7/26/19

KCG KLING Consulting Group, Inc.

LOG OF EXPLORATORY BORING

Sheet **1** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-3**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/24/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2334.0**

◩ Standard Split Spoon

■ Shelby Tube

⊻ Water Level ATD

⧓ California

☒ Bulk Sample

▼ Static Water Table

Elevation [ft]	Depth [ft]	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
						@ **Surface - TOPSOIL**			
		Bulk Sample				**Younger Alluvium (Qa):** @ **0.5 feet - Sandy SILT (ML):** olive-brown, some mica grains, some calcium carbonate, trace rootlets, damp.			
		California	2 3 3	10	96	@ **2.5 feet - SAME:** medium stiff.		EI	
2330									
	5	California	3 2 4	14	104	@ **5.0 feet - SAME:** trace gravel up to 1/8", moist.			
		California	6 8 8	5	114	@ **7.5 feet - Silty SAND (SM):** olive-brown, fine to coarse-grained, some gravel up to 1/4", some mica grains, moist, medium dense.		GS	
2325									
	10	California	8 7 8	6	111	@ **10.0 feet - SAME**		CN	
2320									
	15	California	10 10 11	11	104	@ **15.0 feet - SAME:** some gravel up to 1.0".		GS	
2315									
	20	Standard Split Spoon	10 7 7			@ **20.0 feet - SAME:** some gravel up to 1/2".			
2310									
	25	California	8 10 14	6	109	@ **25.0 feet - SAME**			
2305									

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-3**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/24/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2334.0**

◩ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧓ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			◩	7 13 22			@ **30.0 feet - Silty fine SAND (SM):** grey-brown, fine-grained, some mica grains, moist, dense.			
2300										
	35		⧓	50/6"	11	106	**Older Alluvium (Qoa):** @ **35.0 feet - SAME:** very dense.			
2295										
	40		◩	22 50/3"			@ **40.0 feet - SAME:** olive.			
2290										
	45		⧓	23 50/3"	16	105	@ **45.0 feet - SAME:** grey-brown.			
2285										
	50		◩	34 50/4"			@ **50.0 feet - SAME**			

Total depth: 50.9 feet.
No groundwater.
No caving.
Hole backfilled on 6/24/2019.

LOG OF EXPLORATORY BORING

Sheet **1** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-4**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/24/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2308.0**

◩ Standard Split Spoon ■ Shelby Tube ▽ Water Level ATD

⧗ California ☒ Bulk Sample ▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			☒				@ **Surface - TOPSOIL**			
							<u>Younger Alluvium (Qa)</u>: @ **0.5 feet - <u>Sandy SILT (ML)</u>:** grey-brown, trace calcium carbonate, trace rootlets, damp.			
2305			⧗	3 5 6	5	101	@ **2.5 feet - SAME:** medium stiff.		DS	
	5		⧗	4 5 5	8	108	@ **5.0 feet - SAME:** moist.			
2300			⧗	4 4 7	8	106	@ **7.5 feet - SAME**			
	10		⧗	5 5 9	8	109	@ **10.0 feet - SAME:** some calcium carbonate.			
2295										
	15		⧗	8 9 11	6	110	@ **15.0 feet - <u>Silty SAND (SM)</u>:** brown, fine to medium-grained, some mica grains, damp, medium dense.		CN	
2290										
	20		◩	3 7 8			@ **20.0 feet - <u>Silty fine SAND (SM)</u>:** olive-brown, fine-grained, some mica grains, moist, medium dense.			
2285										
	25		⧗	5 8 9	7	107	@ **25.0 feet - <u>Silty SAND (SM)</u>:** olive-brown, fine to medium-grained, some mica grains, some quartz grains, moist, medium dense.		CN	
2280										

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project: **Jack Rabbit Trail**
Project Number: **18060-01**
Date Drilled: **6/24/19**
Logged By: **DKL**

Boring No.: **KB-4**
Driller: **Cal Pac Drilling**
Drill Type: **Hollow Stem**
Hammer Wt. / Drop: **140lb / 30in**
Ground Elev. [ft]: **2308.0**

◩ Standard Split Spoon ■ Shelby Tube ∇ Water Level ATD
⧗ California ☒ Bulk Sample ▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
	30		◩	9 10 11			@ **30.0 feet - <u>Silty gravelly SAND (SM)</u>:** olive-brown, fine to coarse-grained, gravel up to 1/2", some mica grains, some quartz grains, moist, medium dense.			
2275										
	35		⧗	6 7 7	12	107	@ **35.0 feet - SAME:** gravel up to 1/4", trace feldspar grains.			
2270										
	40		◩	11 11 12			@ **40.0 feet - SAME:** trace clay.			
2265										
	45		⧗	7 15 13	4	114	@ **45.0 feet - <u>Gravelly silty SAND (SP)</u>:** grey-brown, fine to coarse-grained, gravel up to 1/2", some mica grains, some quartz grains, damp, medium dense.			
2260										
	50		◩	14 50/6"			**<u>Older Alluvium (Qoa)</u>:** @ **50.0 feet - <u>Silty fine SAND (ML)</u>:** olive, some calcium carbonate veins, some mica grains, moist, very hard.			
							Total depth: 51.0 feet. No groundwater. No caving. Hole backfilled on 6/24/2019.			

LOG OF EXPLORATORY BORING

Sheet **1** of **2**

Project: **Jack Rabbit Trail**
Project Number: **18060-01**
Date Drilled: **6/24/19**
Logged By: **DKL**

Boring No.: **KB-5**
Driller: **Cal Pac Drilling**
Drill Type: **Hollow Stem**
Hammer Wt. / Drop: **140lb / 30in**
Ground Elev. [ft]: **2261.0**

◩ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
						@ **Surface - TOPSOIL**			
2260		☒				**Younger Alluvium (Qa):** @ **0.5 feet - Sandy SILT (ML):** brown, some calcium carbonate, little rootlets, damp.			
		⧗	4 3 4	6	99	@ **2.5 feet - SAME:** medium stiff.		EI	
	5	⧗	3 3 3	10	98	@ **5.0 feet - SAME:** moist.			
2255									
		⧗	1 2 4	9	99	@ **7.5 feet - SAME:** trace gravel up to 1/4".			
	10	⧗	7 8 9	5	100	@ **10.0 feet - Sandy CLAY (CL):** brown, some calcium carbonate, little rootlets, damp, stiff.		CN AL	
2250									
	15	⧗	10 11 11	5	117	@ **15.0 feet - SAME:** trace calcium carbonate, damp, very stiff.			
2245									
	20	◩	6 6 9			@ **20.0 feet - SAME:** stiff.			
2240									
	25	⧗	10 12 12	3	115	@ **25.0 feet - Silty clayey SAND (SM):** brown, fine to coarse-grained, some gravel up to 1/2", trace mica grains, damp, medium dense.		CN	
2235									

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-5**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/24/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2261.0**

◪ Standard Split Spoon   ■ Shelby Tube   ▽ Water Level ATD

⧓ California   ⊠ Bulk Sample   ▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
2230			◪	4 10 14			@ **30.0 feet - <u>Silty SAND (SM):</u>** brown, fine to coarse-grained, some gravel up to 3/4", little mica grains, moist, medium dense.			
2225	35		⧓	6 6 10	15	109	@ **35.0 feet - <u>Silty SAND (SM):</u>** olive-brown, fine to medium-grained, trace clay, trace mica grains, moist, medium dense.			
2220	40		◪	9 15 19			▽ @ **40.0 feet - <u>Silty SAND (SM):</u>** grey-brown, fine to coarse-grained, some mica grains, some gravel up to 1/4", moist, dense.			
2215	45		⧓	2 7 11	16	113	@ **45.0 feet - <u>Clayey SAND (SC):</u>** olive-brown, fine to ▼ medium-grained, some mica grains, wet, stiff.			
2210	50		◪	6 8 10			@ **50.0 feet - <u>Silty SAND (SM):</u>** brown, fine to coarse-grained, some mica grains, trace clay, wet, medium dense.			

Total depth: 51.5 feet.
Groundwater encountered at 40.0 feet.
No caving.
Hole backfilled on 6/24/2019.

LOG OF EXPLORATORY BORING

Sheet **1** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-6**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/24/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2276.0**

◩ Standard Split Spoon ■ Shelby Tube ▽ Water Level ATD

⧓ California ☒ Bulk Sample ▼ Static Water Table

Elevation [ft]	Depth [ft]	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
						@ Surface - TOPSOIL			
2275		☒				**<u>Younger Alluvium (Qa)</u>:** **@ 0.5 feet - <u>Sandy SILT (ML)</u>:** brown, trace mica grains, trace rootlets, moist.			
		⧓	2 1 2	11	96	**@ 2.5 feet - SAME:** medium stiff.		DS	
2270	5	⧓	2 2 3	11	102	**@ 5.0 feet - SAME**			
		⧓	3 4 6	9	110	**@ 7.5 feet - <u>Silty SAND (SM)</u>:** olive-brown, fine-grained, some mica grains, trace clay, moist, loose.		GS	
2265	10	⧓	3 4 6	12	106	**@ 10.0 feet - <u>Silty SAND (SM)</u>:** olive-brown, fine to coarse-grained, some mica grains, moist, loose.			
2260	15	⧓	14 17 24	11	112	**@ 15.0 feet - <u>Silty gravelly SAND (SM)</u>:** brown, fine to coarse-grained, some feldspar grains, some mica grains, moist, dense.		CN	
2255	20	◩	9 11 14			**@ 20.0 feet - <u>Sandy SILT (ML)</u>:** brown, some mica grains, trace quartz grains, moist, very stiff.			
2250	25	⧓	25 50	4	114	**<u>Older Alluvium (Qoa)</u>:** **@ 25.0 feet - <u>Gravelly silty SAND (SP)</u>:** light brown, fine to coarse-grained, gravel up to 1.0", damp, very dense.		CN	

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-6**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/24/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2276.0**

◩ Standard Split Spoon
■ Shelby Tube
∇ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
2245		░	◩	20 50			@ **30.0 feet - SAME:** trace quartz grains, moist.			
2240	35	▨	⧗	9 41 50/3"	20	111	@ **35.0 feet - <u>Silty sandy CLAY (CL):</u>** olive, some orange staining, moist, hard.			
2235	40	▥	◩	20 30 50			@ **40.0 feet - <u>Silty fine SAND (ML):</u>** olive-brown, some mica grains, moist, hard.			
2230	45	░	⧗	37 50/3"	11	141	@ **45.0 feet - <u>Silty SAND (SM):</u>** brown, fine to medium-grained, some mica grains, trace clay, moist, very dense.			
	50	░	◩	50			@ **50.0 feet - SAME:** fine-grained, no clay.			@ 50.0 feet - Poor recovery

Total depth: 50.5 feet.
No groundwater
No caving.
Hole backfilled on 6/24/2019.

LOG OF EXPLORATORY BORING

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-7**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/26/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2238.0**

◩ Standard Split Spoon ■ Shelby Tube ▽ Water Level ATD

⧓ California ☒ Bulk Sample ▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			☒				@ **Surface - TOPSOIL**			
							Younger Alluvium (Qa):			
							@ **0.5 feet - SILT (ML):** olive-brown, trace mica grains, trace rootlets, moist.			
2235			⧓	2 2 4	11	99	@ **2.5 feet - SAME:** medium stiff.			
	5		⧓	4 4 5	12	106	@ **5.0 feet - SAME:** few calcium carbonate stringers.			
2230			⧓	4 4 6	11	106	@ **7.5 feet - SAME:** few mica grains, no rootlets.			
	10		⧓	3 3 5	13	112	@ **10.0 feet - Sandy SILT (ML):** olive-brown, little mica grains, trace calcium carbonate, moist, medium stiff.			
2225										
	15		⧓	3 3 3	12	106	@ **15.0 feet - SAME:** trace clay.		CN	
2220										
	20		◩	2 2 4			@ **20.0 feet - Sandy SILT (ML):** brown, few mica grains, trace clay, moist, medium stiff.			
2215										
	25		⧓	4 4 6	12	116	@ **25.0 feet - SAME:** little mica grains, trace gravel up to 1/4".			
2210										

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-7**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/26/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2238.0**

◩ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			◩	9 8 7			@ **30.0 feet** - **<u>Sandy SILT (ML):</u>** olive-brown, little quartz grains, trace quartz gravel up to 3/4", trace clay, moist, stiff.			
2205										
	35		⧗	6 6 8	15	113	@ **35.0 feet** - **<u>Sandy SILT (ML):</u>** olive-brown, little mica grains, few clay, moist, stiff.		CN	
2200										
	40	▨	◩	4 6 10			@ **40.0 feet** - **<u>Silty CLAY (CL):</u>** grey-brown, few mica grains, moist, very stiff.			
2195		▨								
	45		⧗	14 24 41	16	120	**<u>Older Alluvium (Qoa):</u>** @ **45.0 feet** - **<u>Clayey sandy SILT (ML):</u>** olive, fine sand, few mica grains, moist, hard.			
2190							▼			
	50		◩	12 14 20			@ **50.0 feet** - **SAME**			
							Total depth: 51.5 feet. Groundwater encountered at 48.0 feet. No caving. Hole backfilled on 6/26/2019.			

LOG OF EXPLORATORY BORING

Sheet **1** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-8**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/26/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2295.0**

◪ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			☒				**@ Surface - TOPSOIL**			
							Younger Alluvium (Qa): **@ 0.5 feet - Sandy SILT (ML):** grey-brown, fine to medium sand, trace gravel up to 1/4", damp.			
			⧗	3 3 4	8	104	**@ 2.5 feet - SAME:** medium stiff.			
2290	5		⧗	3 4 5	9	110	**@ 5.0 feet - Sandy SILT (ML):** grey-brown, few calcium carbonate stringers, trace mica grains, trace clay, moist, medium stiff.			
			⧗	3 4 5	10	110	**@ 7.5 feet - SAME**			
2285	10		⧗	4 4 5	11	107	**@ 10.0 feet - Sandy SILT (ML):** olive-brown, few calcium carbonate stringers, trace mica grains, trace clay, moist, medium stiff.			
2280	15		⧗	4 4 5	8	105	**@ 15.0 feet - SAME**		CN	
2275	20		◪	4 4 4			**@ 20.0 feet - SAME:** trace gravel up to 3/4", no calcium carbonate.			
2270	25		⧗	4 8 8	11	115	**@ 25.0 feet - SAME:** damp, stiff.		CN	

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-8**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/26/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2295.0**

◩	Standard Split Spoon	■	Shelby Tube	▽	Water Level ATD
⧗	California	☒	Bulk Sample	▼	Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			◩	8 8 7			**@ 30.0 feet - Silty fine SAND (SM):** brown, fine-grained, trace mica grains, trace gravel up to 1/8", moist, medium dense.			
2260	35		⧗	7 10 12	5	114	**@ 35.0 feet - Silty gravelly SAND (SP):** grey-brown, fine to medium-grained, gravel up to 1/4", moist, medium dense.		GS	
2255	40		◩	4 4 6			**@ 40.0 feet - Sandy SILT (ML):** olive-brown, fine to medium sand, moist, stiff.		AL	
2250	45		⧗	18 31 50/3"	5	110	**Older Alluvium (Qoa):** **@ 45.0 feet - Silty SAND (SM):** grey-brown, fine to coarse-grained, few quartz grains, damp, very dense.			
2245	50		◩	50			**@ 50.0 feet - SAME**			
							Total depth: 50.5 feet. No groundwater. No caving. Hole backfilled on 6/26/2019.			

LOG OF EXPLORATORY BORING

Sheet **1** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-9**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/26/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2239.0**

◪ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧓ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
		☒				**@ Surface - TOPSOIL** **Younger Alluvium (Qa):** **@ 0.5 feet - Sandy SILT (ML):** brown, few quartz grains, few mica grains, damp.			
		⧓	3 4 6	9	109	**@ 2.5 feet - SAME:** medium stiff.		DS	
2235									
	5	⧓	3 4 5	12	101	**@ 5.0 feet - Sandy SILT (ML):** olive-brown, few calcium carbonate stringers, few mica grains, moist, medium stiff.			
		⧓	4 5 8	10	110	**@ 7.5 feet - SAME:** little calcium carbonate, few gravel up to 1/2", stiff.			
2230									
	10	⧓	6 8 9	7	98	**@ 10.0 feet - SILT (ML):** brown, some calcium carbonate, damp, stiff.		CN	
2225									
	15	⧓	10 17 17	5	117	**@ 15.0 feet - Sandy SILT (ML):** brown, trace feldspar grains, damp, very stiff.		CN	
2220									
	20	◪	6 5 11			**@ 20.0 feet - Sandy SILT (ML):** olive-brown, little quartz grains, little feldspar grains, trace granitic gravel up to 3/4", moist, very stiff.			
2215									
	25	⧓	7 7 7	4	114	**@ 25.0 feet - SAME:** brown, gravel up to 1/2", little mica grains, stiff.			
2210									

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project: **Jack Rabbit Trail**
Project Number: **18060-01**
Date Drilled: **6/26/19**
Logged By: **DKL**

Boring No.: **KB-9**
Driller: **Cal Pac Drilling**
Drill Type: **Hollow Stem**
Hammer Wt. / Drop: **140lb / 30in**
Ground Elev. [ft]: **2239.0**

◩ Standard Split Spoon
■ Shelby Tube
∇ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			◩	3 4 4			@ **30.0 feet - <u>Sandy SILT (ML):</u>** olive-brown, moist, medium stiff.			
2205										
	35		⧗	5 6 9	9	111	@ **35.0 feet - SAME:** trace clay, stiff.		CN	
2200										
	40		◩	3 4 5			@ **40.0 feet - <u>Silty SAND (SM):</u>** brown, fine-grained with trace medium sand, trace mica grains, moist, loose.			
2195										
	45		⧗	6 6 9	10	109	@ **45.0 feet - SAME:** trace gravel up to 1/4", medium dense.			
2190										
	50		◩	9 20 27			**<u>Older Alluvium (Qoa):</u>** @ **50.0 feet - <u>Silty SAND (SM):</u>** olive-brown, fine to coarse-grained, trace gravel up to 1/2", trace mica grains, trace quartz grains, moist, dense.			
							Total depth: 51.5 feet. No groundwater. No caving. Hole backfilled on 6/26/2019.			

LOG OF EXPLORATORY BORING

Sheet **1** of **2**

Project:	**Jack Rabbit Trail**	Boring No.:	**KB-10**
Project Number:	**18060-01**	Driller:	**Cal Pac Drilling**
Date Drilled:	**6/26/19**	Drill Type:	**Hollow Stem**
Logged By:	**DKL**	Hammer Wt. / Drop:	**140lb / 30in**
		Ground Elev. [ft]:	**2258.0**

◩ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
							@ Surface - TOPSOIL			
			☒				**<u>Younger Alluvium (Qa)</u>:** **@ 0.5 feet - <u>Sandy SILT (ML):</u>** olive-brown, trace clay, trace mica grains, moist.			
2255			⧗	2 7 6	9	80	**@ 2.5 feet - SAME:** stiff.		EI	
	5		⧗	3 3 3	14	106	**@ 5.0 feet - <u>Sandy SILT (ML):</u>** olive-brown, few calcium carbonate stringers, few mica grains, trace clay, moist, medium stiff.			
2250			⧗	3 3 5	12	104	**@ 7.5 feet - SAME**			
	10		⧗	2 3 5	16	102	**@ 10.0 feet - SAME**			
2245										
	15		⧗	4 5 8	6	104	**@ 15.0 feet - <u>Silty SAND (SM):</u>** brown, fine to coarse-grained, few mica grains, damp, medium dense.		CN	
2240										
	20		◩	5 6 4			**@ 20.0 feet - SAME:** trace gravel up to 1/4", loose.			
2235										
	25		⧗	5 5 7	10	100	**@ 25.0 feet - <u>Silty SAND (SM):</u>** brown, fine-grained with trace medium and coarse sand, some mica grains, damp, loose.		CN	
2230										

LOG OF EXPLORATORY BORING

Sheet **2** of **2**

Project: **Jack Rabbit Trail**
Project Number: **18060-01**
Date Drilled: **6/26/19**
Logged By: **DKL**
Boring No.: **KB-10**
Driller: **Cal Pac Drilling**
Drill Type: **Hollow Stem**
Hammer Wt. / Drop: **140lb / 30in**
Ground Elev. [ft]: **2258.0**

◩ Standard Split Spoon
■ Shelby Tube
∇ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Elevation [ft]	Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			◩	9 13 9			@ **30.0 feet** - **Silty SAND (SM):** grey-brown, fine to medium-grained with few coarse sand, little mica grains, few gravel up to 3/4", damp, medium dense.			
2225										
	35		⧗	7 9 16	8	106	@ **35.0 feet** - **Silty gravelly SAND (SP):** grey-brown, fine to coarse-grained, gravel up to 1/2", some quartz grains, little feldspar grains, little mica grains, damp, medium dense.			
2220										
	40		◩	17 20 14			@ **40.0 feet** - **SAME:** gravel up to 1.0", dense.			
2215										
	45		⧗	7 9 9	8	108	@ **45.0 feet** - **Silty fine SAND (SM):** olive-brown, fine-grained, trace gravel up to 1/4", trace quartz grains, trace mica grains, moist, medium dense.			
2210										
	50		◩	3 5 5			@ **50.0 feet** - **SAME:** loose.			
							Total depth: 51.5 feet. No groundwater. No caving. Hole backfilled on 6/26/2019.			

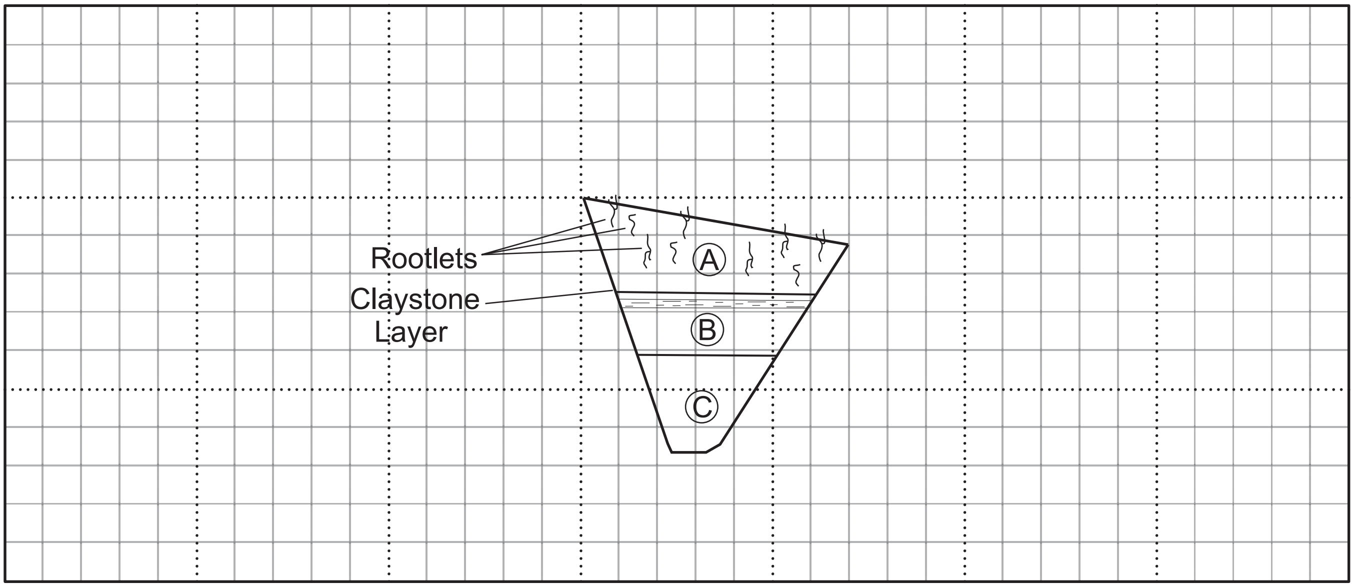
LOG OF EXPLORATORY TEST PIT

Sheet **1** of **1**

Project:	**Jack Rabbit trenches**	Test Pit No.:	**TP-1**
Project Number:	**18060-01**	Contractor:	**Bob Turner**
Date Drilled:	**7/8/19**	Backhoe:	**John Deere 410K**
Logged By:	**DKL**	Hammer Wt. / Drop:	
		Ground Elev. [ft]:	**---**

◩ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	Geologic Notes	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests
							(A) **@ Surface - TOPSOIL**		
							(B)San Timoteo Formation (Tst): **@ 2.0 feet - SILTSTONE:** olive-grey, severely weathered, closely fractured, weak, one 3" interbedded layer of polished claystone, calcium carbonate-rich, trace rootlets.		
5							**(C)** **@ 4.0 feet - SILTSTONE:** olive, severely weathered, moderately fractured, weak, some calicum carbonate.		
							Total depth: 6.0 feet No groundwater. No caving. Trench backfilled with spoils on 7/8/2019.		



Scale: H 5 [ft]
V 5 [ft]

Pit Orientation: N 79 W
Natural Slope Angle: ~10

B - Bedding Plane
J - Joint
C - Contact
F - Fault
S - Shear

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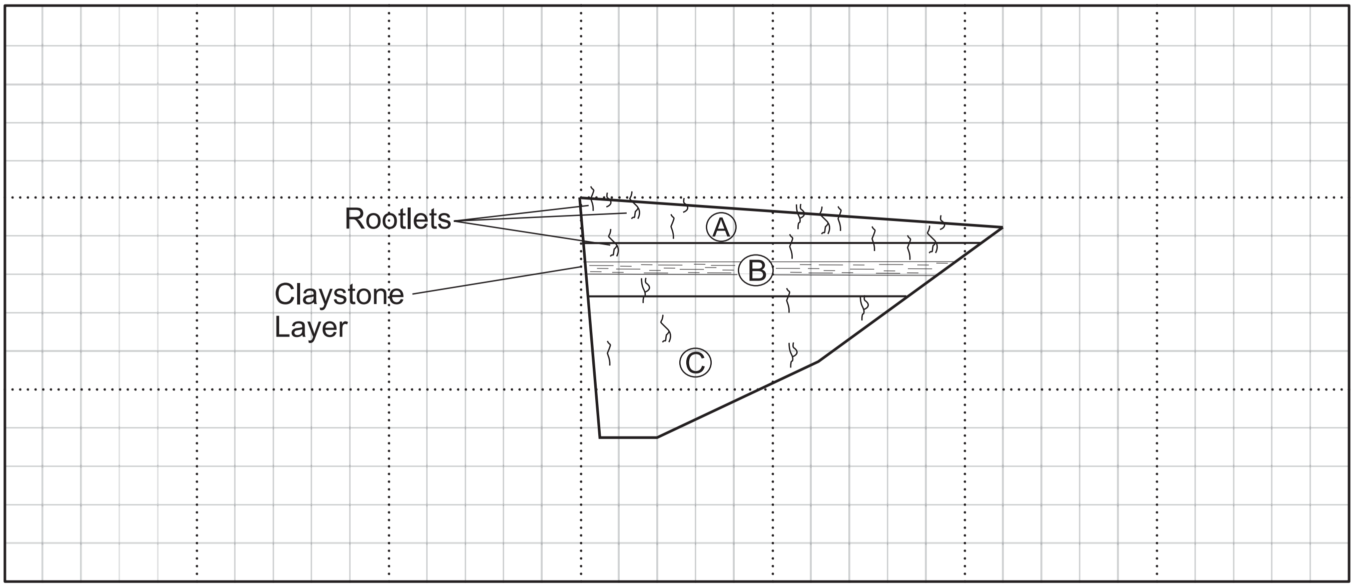
LOG OF EXPLORATORY TEST PIT

Sheet **1** of **1**

Project:	**Jack Rabbit trenches**	Test Pit No.:	**TP-2**
Project Number:	**18060-01**	Contractor:	**Bob Turner**
Date Drilled:	**7/8/19**	Backhoe:	**John Deere 410K**
Logged By:	**DKL**	Hammer Wt. / Drop:	
		Ground Elev. [ft]:	**---**

◩ Standard Split Spoon	■ Shelby Tube	▽ Water Level ATD
⧗ California	☒ Bulk Sample	▼ Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	Geologic Notes	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests
							(A) **@ Surface - TOPSOIL**		
5							**(B)San Timoteo Formation (Tst):** **@ 1.0 foot - Clayey SILTSTONE:** olive-brown, severely weathered, closely fractured, weak, calcium carbonate-rich, some rootlets. **(C)** **@ 2.5 feet - Sandy SILTSTONE:** olive-brown, severely weathered, closely fractured, weak, calcium carbonate-rich, trace rootlets.		
		⧗		11	108		Total depth: 6.0 feet. No groundwater. No caving. Trench backfilled with spoils on 7/8/2019.		AL CN



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Scale: H 5 [ft]
V 5 [ft]

Pit Orientation: N 49 E
Natural Slope Angle: ~4

B - Bedding Plane
J - Joint
C - Contact
F - Fault
S - Shear

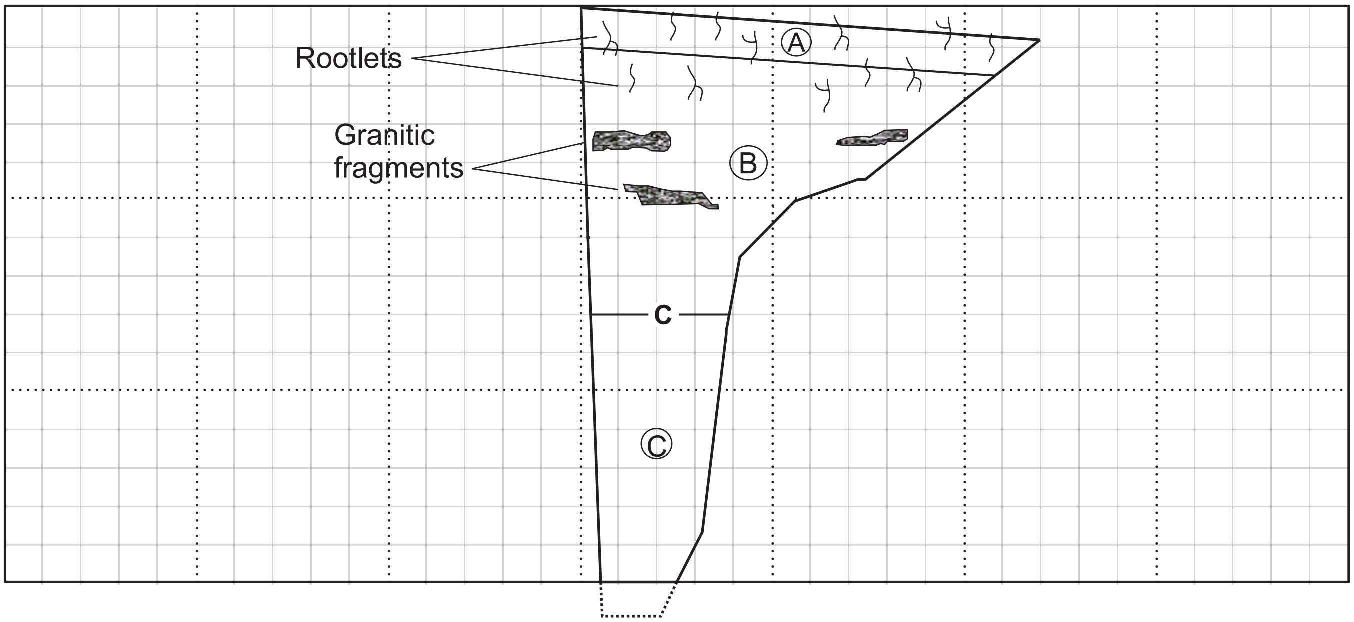
LOG OF EXPLORATORY TEST PIT

Sheet **1** of **1**

Project:	**Jack Rabbit trenches**	Test Pit No.:	**TP-3**
Project Number:	**18060-01**	Contractor:	**Bob Turner**
Date Drilled:	**7/8/19**	Backhoe:	**John Deere 410K**
Logged By:	**DKL**	Hammer Wt. / Drop:	
		Ground Elev. [ft]:	**---**

◩ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	Geologic Notes	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests
							(A) **@ Surface - TOPSOIL**		
							(B)<u>Colluvium (Col):</u> **@ 1.0 foot - <u>Silty gravelly SAND (SM):</u>** brown, fine to coarse-grained, gravel up to 1.0", some calcium carbonate, trace granitic fragments, porous, moist.		
5		☒							
		⧗		12	114				DS RV
		☒					**(C)<u>San Timoteo Formation (Tst):</u>** **@ 8.0 feet - <u>Silty SANDSTONE:</u>** brown, fine-grained, severely weathered, moderately fractured, weak, some calcium carbonate.		
10									
15		☒							
							Total depth: 16.0 feet. No groundwater. No caving. Trench backfilled with spoils on 7/8/2019.		



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Scale: H 5 [ft]
V 5 [ft]

Pit Orientation: N 42 W
Natural Slope Angle: ~4

B - Bedding Plane
J - Joint
C - Contact
F - Fault
S - Shear

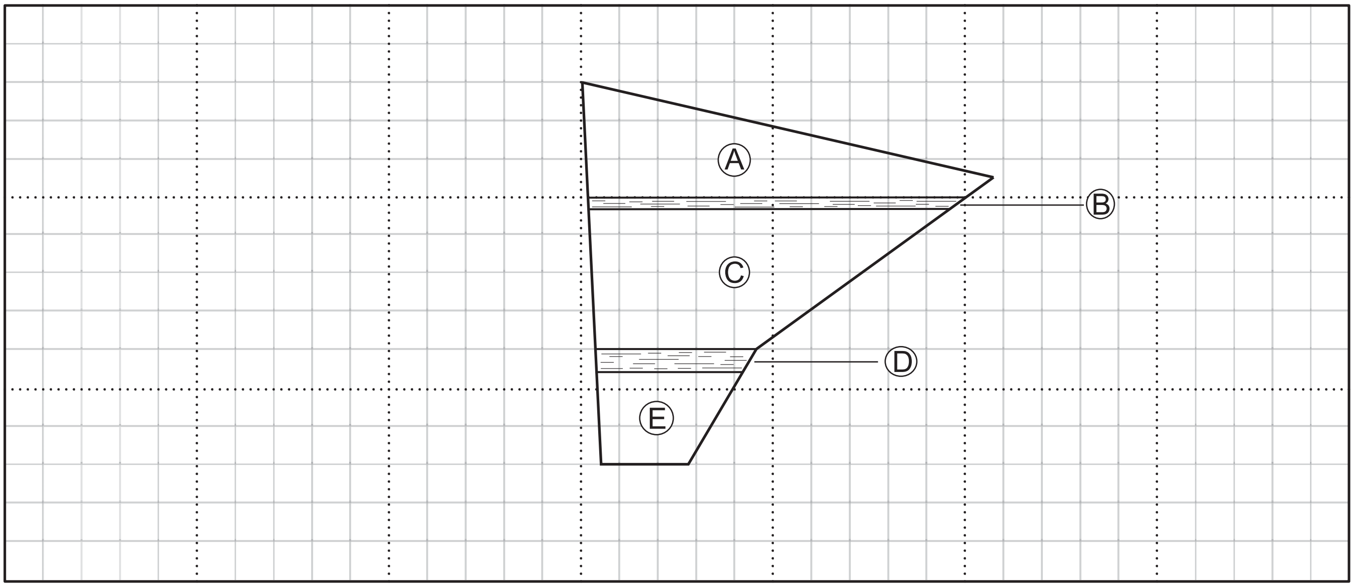
LOG OF EXPLORATORY TEST PIT

Sheet **1** of **1**

Project:	**Jack Rabbit trenches**	Test Pit No.:	**TP-4**
Project Number:	**18060-01**	Contractor:	**Bob Turner**
Date Drilled:	**7/8/19**	Backhoe:	**John Deere 410K**
Logged By:	**DKL**	Hammer Wt. / Drop:	
		Ground Elev. [ft]:	**---**

◪ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧓ California
☒ Bulk Sample
▼ Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	Geologic Notes	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests
						@ 3.0 feet - B: N 55 W, 8 SW	**(A)San Timoteo Formation (Tst):** **@ Surface - SILTSTONE:** light brown, severely weathered, moderately fractured, weak, calcium carbonate-rich. **(B)** **@ 3.0 feet - CLAY Layer:** dark olive-brown, severely weathered, closely fractured, weak, highly polished, sheared, oxidized, slightly plastic.		
5							**(C)** **@ 3.3 feet - Sandy SILTSTONE:** grey-brown, severely weathered, closely fractured, weak, calcium carbonate-rich.		
		⧓		21	106		**(D)** **@ 7.0 feet - CLAY Layer:** dark olive-brown, severely weathered, closely fractured, weak, highly polished, sheared, oxidized, medium plasticity.		
10							**(E)** **@ 7.6 feet - Clayey sandy SILTSTONE:** dark brown, severely weathered, moderately fractured, moderately strong. Total depth: 10.0 feet. No groundwater. No caving. Trench backfilled with spoils on 7/8/2019.		



Scale: H 5 [ft]
V 5 [ft]

Pit Orientation: N 57 W
Natural Slope Angle: ~13

B - Bedding Plane
J - Joint
C - Contact
F - Fault
S - Shear

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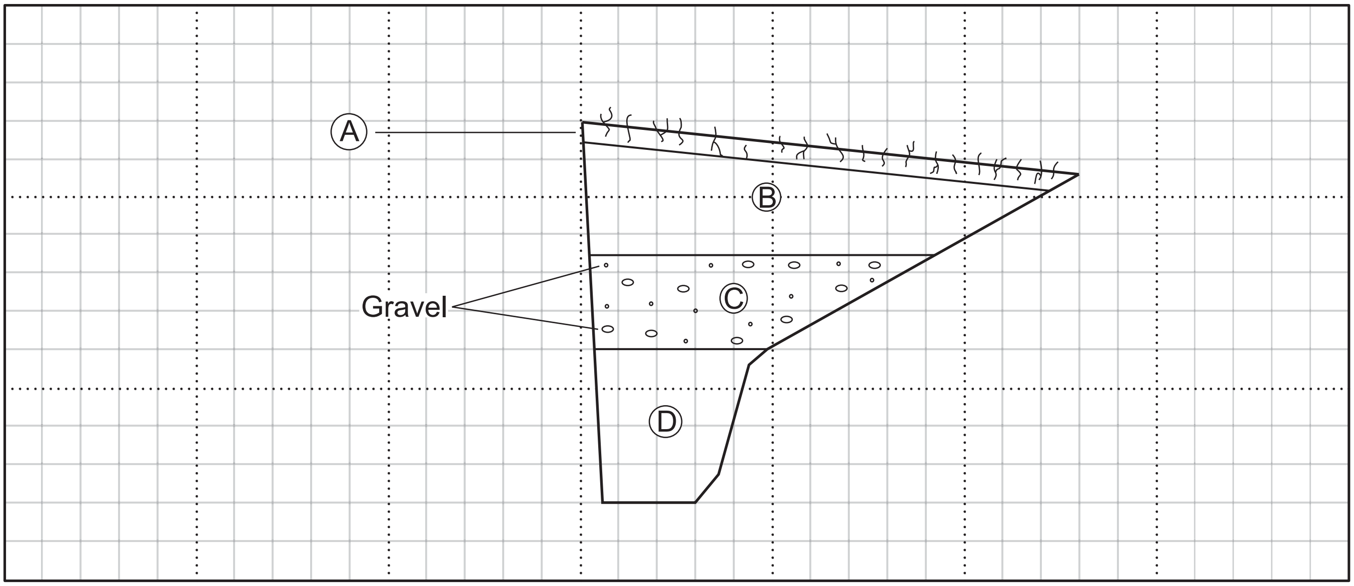
LOG OF EXPLORATORY TEST PIT

Sheet **1** of **1**

Project:	**Jack Rabbit trenches**	Test Pit No.:	**TP-5**
Project Number:	**18060-01**	Contractor:	**Bob Turner**
Date Drilled:	**7/8/19**	Backhoe:	**John Deere 410K**
Logged By:	**DKL**	Hammer Wt. / Drop:	
		Ground Elev. [ft]:	**---**

◩ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	Geologic Notes	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests
							(A) **@ Surface - TOPSOIL**		
							(B)<u>San Timoteo Formation (Tst):</u> **@ 0.5 feet - <u>Silty SANDSTONE:</u>** grey-brown, fine to medium-grained with few gravel up to 1/2", severely weathered, closely fractured, weak, some calcium carbonate.		
5							**(C)** **@ 3.5 feet - <u>CONGLOMERATE:</u>** grey-brown, fine to coarse-grained with gravel up to 3" and cobbles up to 5", severely weathered, moderately fractured, weak, some calcium carbonate.		
		⧗		4	112		**(D)** **@ 6.0 feet - <u>Silty SANDSTONE:</u>** brown, fine to medium-grained, severely weathered, moderately fractured, weak, some calcium carbonate.		
10							Total depth: 10.0 feet. No groundwater. No caving. Trench backfilled with spoils on 7/8/2019.		



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Scale: H 5 [ft]
V 5 [ft]

Pit Orientation: N 5 W
Natural Slope Angle: ~6

B - Bedding Plane
J - Joint
C - Contact
F - Fault
S - Shear

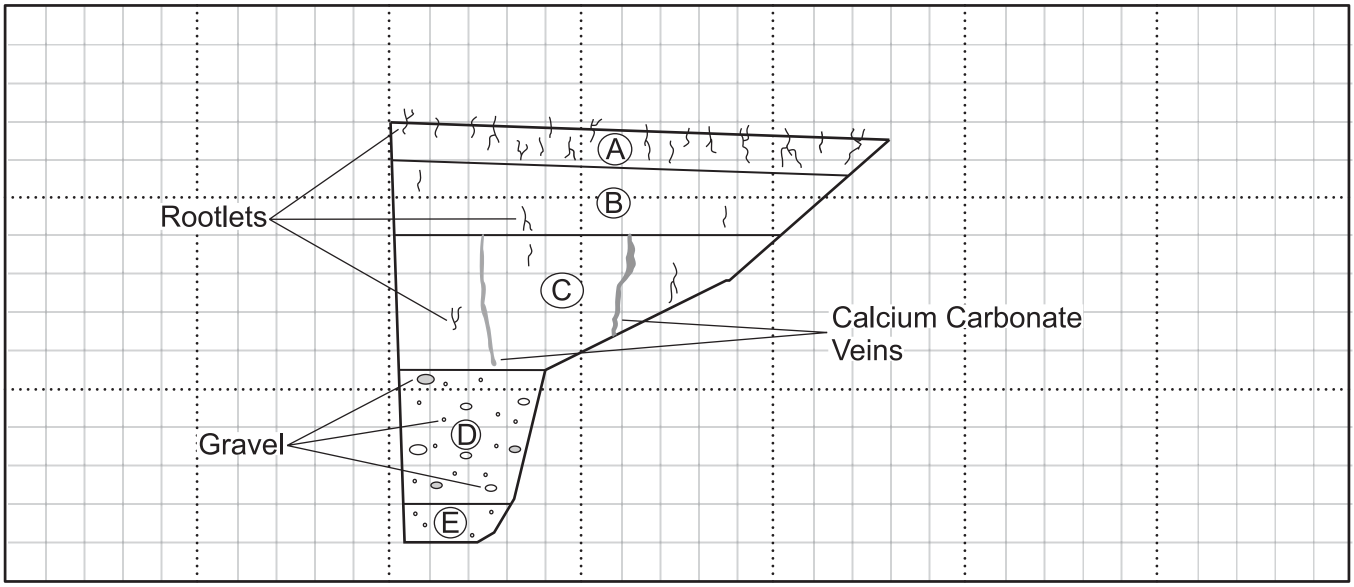
LOG OF EXPLORATORY TEST PIT

Sheet **1** of **1**

Project:	**Jack Rabbit trenches**	Test Pit No.:	**TP-6**
Project Number:	**18060-01**	Contractor:	**Bob Turner**
Date Drilled:	**7/8/19**	Backhoe:	**John Deere 410K**
Logged By:	**DKL**	Hammer Wt. / Drop:	
		Ground Elev. [ft]:	**---**

Legend: ◩ Standard Split Spoon; ■ Shelby Tube; ▽ Water Level ATD; ⧓ California; ☒ Bulk Sample; ▼ Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	Geologic Notes	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests
							(A) **@ Surface - TOPSOIL**		
							(B)San Timoteo Formation (Tst): **@ 1.0 foot - Sandy clayey SILTSTONE:** olive-brown, severely weathered, moderately fractured, weak, trace calcium carbonate, trace rootlets.		
5							**(C)** **@ 3.0 feet - Sandy SILTSTONE:** olive-brown, severely weathered, moderately fractured, weak, few calcium carbonate veins, trace rootlets.		
							(D) **@ 6.5 feet - CONGLOMERATE:** light brown, fine to coarse-grained with clasts up to 6.0", severely weathered, moderately fractured, weak, some calcium carbonate.		
10							**(E)** **@ 10.0 feet - Silty SANDSTONE:** grey-brown, fine to coarse-grained, severely weathered, moderately fractured, weak, trace gravel up to 1/2". Total depth: 11.0 feet. No groundwater. No caving. Trench backfilled with spoils on 7/8/2019.		



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Scale: H 5 [ft]
V 5 [ft]

Pit Orientation: N 19 E
Natural Slope Angle: ~2

B - Bedding Plane
J - Joint
C - Contact
F - Fault
S - Shear

LOG OF EXPLORATORY TEST PIT

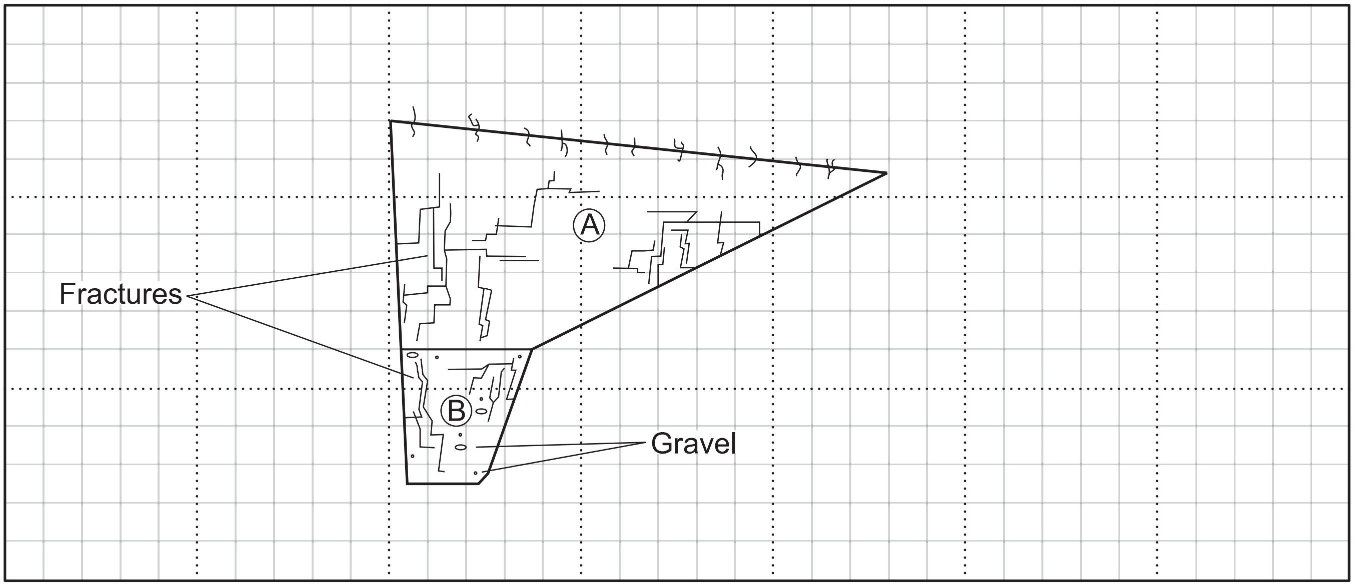
Sheet **1** of **1**

Project: **Jack Rabbit trenches**
Project Number: **18060-01**
Date Drilled: **7/9/19**
Logged By: **DKL**

Test Pit No.: **TP-7**
Contractor: **Bob Turner**
Backhoe: **John Deere 410K**
Hammer Wt. / Drop:
Ground Elev. [ft]: **---**

◩ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	Geologic Notes	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests
							(A)San Timoteo Formation (Tst): **@ Surface - Silty SANDSTONE:** grey-brown, fine-grained, severely weathered, very closely fractured, friable, calcium carbonate-rich.		
5		☒							DS EI SU
							(B) **@ 6.0 feet - Silty gravelly SANDSTONE:** grey-brown, fine to medium-grained, severely weathered, closely fractured, weak, gravel up to 2.0", calcium carbonate-rich.		
							Total depth: 9.5 feet. No groundwater. No caving. Trench backfilled with spoils on 7/9/2019.		



Scale: H 5 [ft]
V 5 [ft]

Pit Orientation: N 40 E
Natural Slope Angle: ~6

B - Bedding Plane
J - Joint
C - Contact
F - Fault
S - Shear

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LOG OF EXPLORATORY TEST PIT

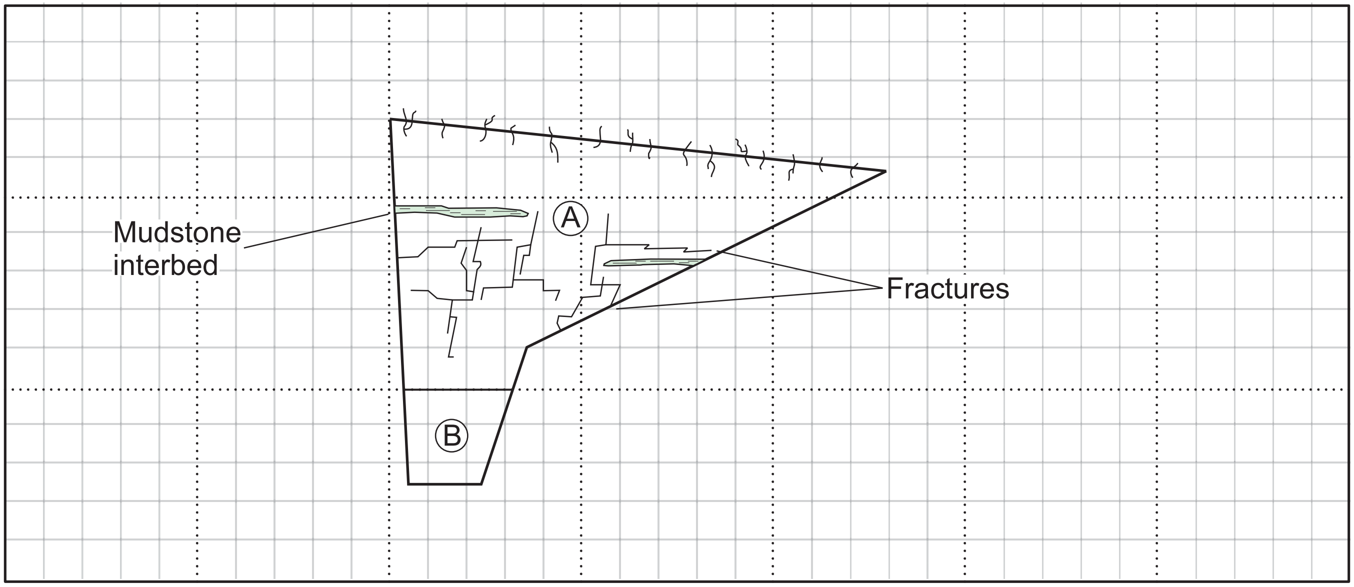
Sheet **1** of **1**

Project: **Jack Rabbit trenches**
Project Number: **18060-01**
Date Drilled: **7/9/19**
Logged By: **DKL**

Test Pit No.: **TP-8**
Contractor: **Bob Turner**
Backhoe: **John Deere 410K**
Hammer Wt. / Drop:
Ground Elev. [ft]: **---**

◩ Standard Split Spoon
■ Shelby Tube
▽ Water Level ATD
⧗ California
☒ Bulk Sample
▼ Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	Geologic Notes	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests
	××						**(A)San Timoteo Formation (Tst):** **@ Surface - Sandy SILTSTONE:** grey-brown, severely weathered, very closely fractured, weak, calcium carbonate-rich, trace mudstone interbedded.		
5	××								
	××	⧗		10					
	××						**(B)** **@ 7.0 feet - Sandy SILTSTONE:** grey-brown, severely weathered, closely fractured, weak, some calcium carbonate.		
							Total depth: 9.5 feet. No groundwater. No caving. Trench backfilled with spoils on 7/9/2019.		



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Scale: H 5 [ft]
V 5 [ft]

Pit Orientation: N 24 W
Natural Slope Angle: ~6

B - Bedding Plane
J - Joint
C - Contact
F - Fault
S - Shear

APPENDIX C

SUMMARY OF LABORTORY TEST PROCEDURES AND RESULTS

APPENDIX C

LABORATORY TEST PROCEDURES

VISUAL CLASSIFICATION OF SOILS

As a part of the routine laboratory soil testing, the soil samples are visually classified in accordance with the Unified Soil Classification System by experienced laboratory technicians. If necessary, in order to verify the visual classification, selected samples are classified utilizing the results of Standard Classification tests performed in accordance - with ASTM D2487-00.

MOISTURE AND DENSITY TESTING

Moisture content and dry density determinations are performed on relatively undisturbed samples obtained from the exploratory excavation. The results of these tests are presented in the boring logs. Where applicable, only moisture content is determined from "undisturbed" or disturbed samples.

MAXIMUM DENSITY TESTS

The maximum dry density and optimum moisture content of typical materials is determined in accordance with ASTM D1557 (five layers). The results of these tests are presented graphically as an attachment in this Appendix.

CONSOLIDATION TESTS

Consolidation tests were performed in general accordance with ASTM D2435-96 on selected, relatively undisturbed, ring samples recovered from the exploratory excavations. Samples are placed in a consolidometer where increasing load increments are applied in geometric progression. The soil specimen is placed between porous stones that allow water to infiltrate and flow on the soil sample. During the loading stages prior to the addition of water, the soil sample is sealed in order to prevent evaporation of soil water. The load increment where water was added is indicated on the consolidation pressure curves. The percent consolidation for each load cycle is recorded as the ratio of the amount of vertical compression to the original 1-inch height. The time-rate of consolidation was also performed on each soil specimen tested. The results of this test are presented graphically as an attachment in this Appendix.

HYDRO-COLLAPSE TESTS

Hydro-collapse tests were performed in general accordance with ASTM D5333-03 on selected undisturbed ring samples to determine the hydro-collapse potential. In general, the procedure entailed the application of normal stress roughly equal to the sum of the existing overburden and final fill load prior to inundating the sample with water. The resulting change in height of the sample indicates the collapse potential. The results of these tests are presented graphically as an attachment in the appropriate Appendix.

APPENDIX C

LABORATORY TEST PROCEDURES
(Continued)

DIRECT SHEAR TESTS

Direct shear tests were performed in accordance to ASTM D3080-98 on selected remolded and/or undisturbed samples which were pre-soaked for a minimum of 24 hours. The samples were then tested under various normal loads; a different specimen being used for each normal load. The samples were sheared in a motor driven, strain-controlled direct shear testing apparatus at a strain rate of 0.01 in. per minute. The test results are presented in the Laboratory Summary.

GRAIN SIZE DISTRIBUTION

A representative sample was dried, weighed, and soaked in water until individual soil particles were separated and then washed on the No. 200 sieve. That portion of the material retained on the No. 200 sieve was oven-dried and then run through a standard set of sieves in accordance with ASTM D422-63. The grain size distribution curves are attached to the Laboratory Summary.

EXPANSION INDEX TEST

The expansion potential of selected materials was evaluated by the Expansion Index Test, U.B.C. Standard No. 18-2. The specimen was molded under a given compactive energy and moisture content to achieve approximately 50 percent saturation. The prepared 1-inch thick by 4-inch diameter specimen was then loaded with a 144 psf surcharge and inundated with water until volumetric equilibrium is reached. The result of this test is presented in the Laboratory Summary.

SOLUBLE SULFATES

Soluble sulfate tests determined in general accordance with California Test Method No. 417 were also performed on representative samples collected during the field investigation. Soils with a sulfate concentration greater than 0.10% are considered potentially harmful to concrete and would require following the current ACI or C.B.C. for "moderate" or more severe sulfate exposure requirements. The results of this test are presented in the Laboratory Summary.

GRAIN SIZE DISTRIBUTION

A representative sample was dried, weighed, and soaked in water until individual soil particles were separated and then washed on the No. 200 sieve. That portion of the material retained on the No. 200 sieve was oven-dried and then run through a standard set of sieves in accordance with ASTM D422-63. The grain size distribution curves are attached to the Laboratory Summary.

ATTERBERG LIMITS

The Atterberg limits were performed in general accordance with ASTM D4318-00 and are used frequently in soil classification and identification. The soil descriptions defined by the United Soil Classification System (USCS) are based on these limits. Fine-grained soils are classified in the laboratory by performing several tests that define the plastic and liquid limits. The results of these tests are presented graphically as an attachment in this Appendix.

LABORATORY TEST SUMMARY

Atterberg Limits

Location	**Soil Description**	**Percent Passing #200 sieve**	**Liquid Limit**	**Plastic Limit**	**Plasticity Index**
KB-5 @ 10’	Brown Sandy Clay (CL)	N/A	30	19	11
KB-8 @ 40’	Brown Clayey Silt (CL-ML)	N/A	24	20	4
KTP-2- @ 6’	Brown Silt (ML)	N/A	30	27	3

Expansion Index and Soluble Sulfate

Location	Soil Description	Expansion Index	Soluble Sulfate (%)
KB-2 @0’-5’	Brown Clayey Sand (SC)	21	0.0009
KB-3 @0’-5’	Brown Clayey Sand (SC)	37	0.0036
KB-5 @0’-5’	Brown Clayey Sand (SC)	23	0.0030
KB-10 @0’-5’	Brown Clayey Sand (SC)	24	0.0021
TP-7 @4’-6’	Light Brown Silty Sand (SM)	1	0.0012

Direct Shear

Location	Soil Description	Cohesion	Friction angle
KB-1 @ 0-5'	Dark Brown clayey Sand (SC)	150 psf	29 degrees
KB-4 @ 0-5'	Dark Brown clayey Sand (SC)	200 psf	29 degrees
KB-6 @ 0-5'	Dark Brown clayey Sand (SC)	200 psf	29 degrees
KB-9 @ 0-5'	Dark Brown clayey Sand (SC)	150 psf	29 degrees
TP-3 @ 6’	Red Brown Sandy Clay (CL)	400	23 degrees
TP-7 @ 4-6'	Brown silty Sand (SM)	100 psf	28 degrees

* Test also plotted graphically following the tables.

R-VALUE

The suitability of selected soil samples for support of flexible pavement was evaluated by conducting stabilometer resistance (R-Value) testing. R-value testing was performed in accordance with California Standard Test Method No. 301. The results of this test are presented in the Laboratory Summary.

CORROSION TEST (BY OTHERS)

The corrosion test, including sulfate content, was performed by Anaheim Test Laboratory, and the results are presented in the attached results in this Appendix.

PROJECT NAME : JACK RABBIT TRAIL
PROJECT NO: 18060-01
DATE : 15-Jul-19
BORING NUMBER : KB-5
SAMPLE NO./DEPTH : 10'
TESTED BY : RB
SAMPLE DESCRIPTIONS/CLASSIFICATION : BROWN LEAN CLAY (CL)

PLASTIC LIMIT

DETERMINATION NO	1	2
DISH NO.	B	
MASS OF DISH + WET SOIL,(Gms)	23.56	
MASS OF DISH + DRY SOIL,(Gms)	21.58	
MASS OF WATER,(Gms)	1.98	
MASS OF DISH,(Gms)	10.94	
MASS OF DRY SOIL,(Gms)	10.64	
MOISTURE CONTENT,(%)	18.6	

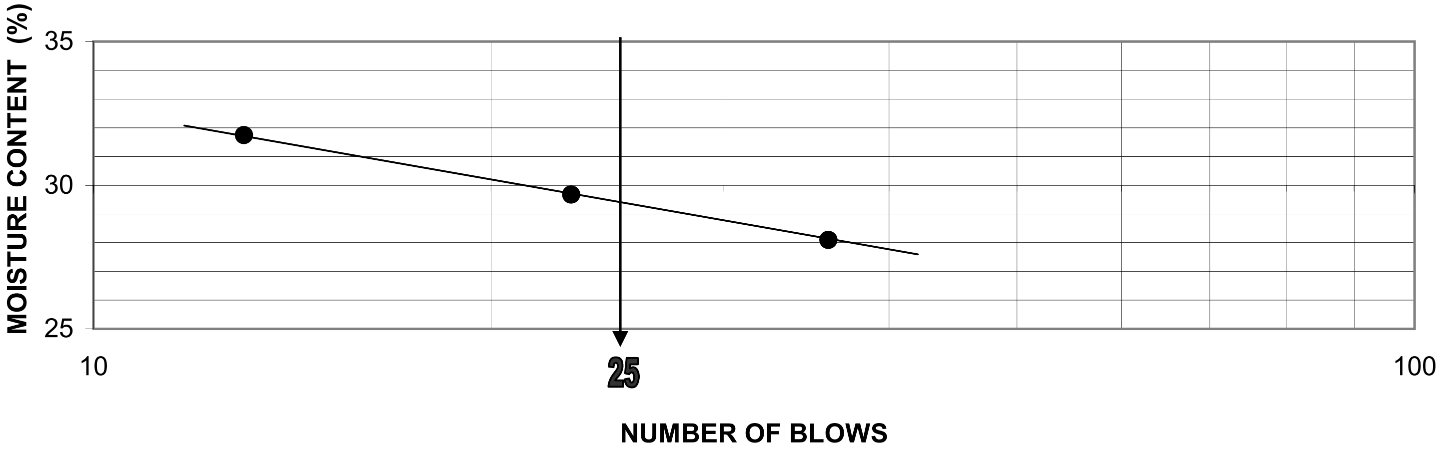
LIQUID LIMIT

DETERMINATION NO.	1	2	3
DISH NUMBER	15C	A1	8
MASS, DISH + WET SOIL,(Gms)	12.41	11.86	11.74
MASS, DISH + DRY SOIL,(Gms)	10.49	10.16	10.13
MASS OF WATER,(Gms)	1.92	1.70	1.61
MASS OF DISH,(Gms)	4.44	4.43	4.40
MOISTURE CONTENT,(%)	31.7	29.7	28.1
NUMBER OF BLOWS	13	23	36

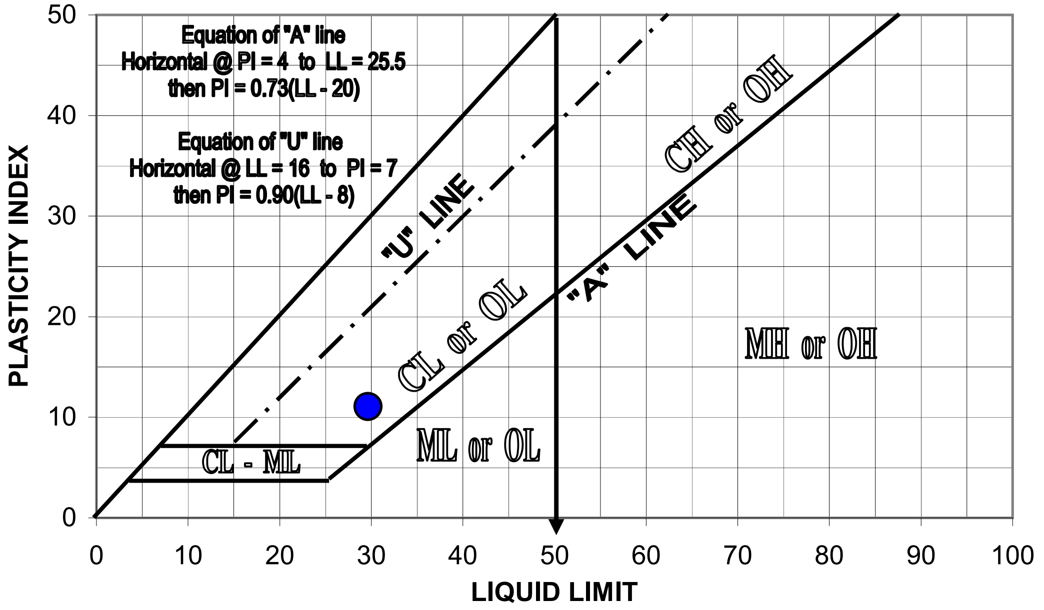
NATURAL MOISTURE CONTENT,%

0.00
#DIV/0!

FLOW CURVE



PLASTICITY CHART



RESULT SUMMARY

NATURAL MOISTURE CONTENT, (%) -
LIQUID LIMIT (LL) 30
PLASTIC LIMIT (PL) 19
PLASTICITY INDEX (PI) 11
SYMBOL FROM PLASTICITY CHART (CL)

METHOD OF PREPARATION		METHOD OF LL DETERMINATION	
DRY	X	MULTIPOINT	X
WET		ONE-POINT	

REMARKS :

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ATTERBERG LIMITS

(ASTM D4318-00)

PROJECT NAME : JACK RABBIT TRAIL
PROJECT NO: 18060-01
DATE : 24-Jul-19
BORING NUMBER : KB - 8
SAMPLE NO./DEPTH : 40'
TESTED BY : RB
SAMPLE DESCRIPTIONS/CLASSIFICATION : BROWN CLAY TO SILT (CL/ML)

PLASTIC LIMIT

DETERMINATION NO	1	2
DISH NO.	10	
MASS OF DISH + WET SOIL,(Gms)	27.46	
MASS OF DISH + DRY SOIL,(Gms)	24.81	
MASS OF WATER,(Gms)	2.65	
MASS OF DISH,(Gms)	11.37	
MASS OF DRY SOIL,(Gms)	13.44	
MOISTURE CONTENT,(%)	19.7	

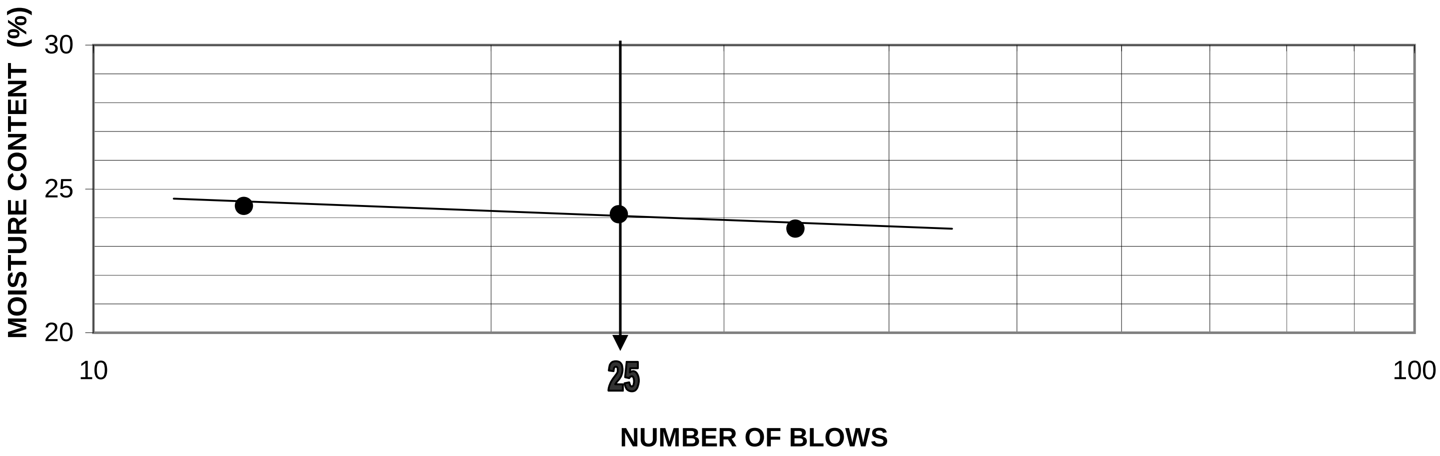
LIQUID LIMIT

DETERMINATION NO.	1	2	3
DISH NUMBER	6	8	A1
MASS, DISH + WET SOIL,(Gms)	12.00	11.84	11.60
MASS, DISH + DRY SOIL,(Gms)	10.47	10.40	10.23
MASS OF WATER,(Gms)	1.53	1.44	1.37
MASS OF DISH,(Gms)	4.20	4.43	4.43
MOISTURE CONTENT,(%)	24.4	24.1	23.6
NUMBER OF BLOWS	13	25	34

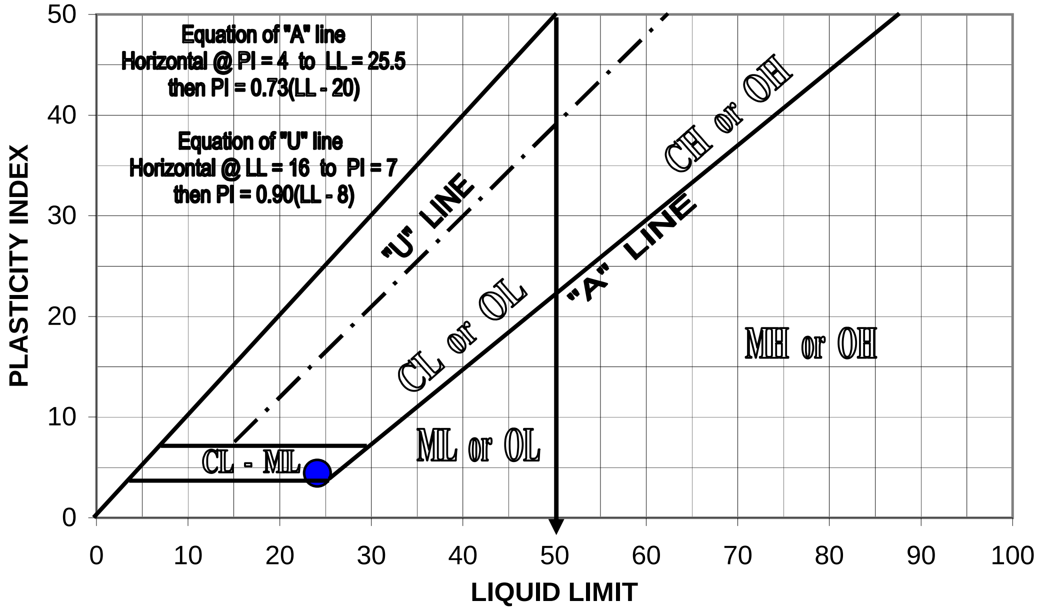
NATURAL MOISTURE CONTENT,%

0.00
#DIV/0!

FLOW CURVE



PLASTICITY CHART



RESULT SUMMARY

NATURAL MOISTURE CONTENT, (%) -
LIQUID LIMIT (LL) 24
PLASTIC LIMIT (PL) 20
PLASTICITY INDEX (PI) 4
SYMBOL FROM PLASTICITY CHART (CL/ML)

METHOD OF PREPARATION		METHOD OF LL DETERMINATION	
DRY	X	MULTIPOINT	X
WET		ONE-POINT	

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ATTERBERG LIMITS

(ASTM D4318-00)

PROJECT NAME : JACK RABBIT TRAIL PROJECT NO: 18060-01 DATE : 24-Jul-19

BORING NUMBER : KTP - 2 SAMPLE NO./DEPTH : 6' TESTED BY : RB

SAMPLE DESCRIPTIONS/CLASSIFICATION : OLIVE BROWN SILT (ML)

PLASTIC LIMIT

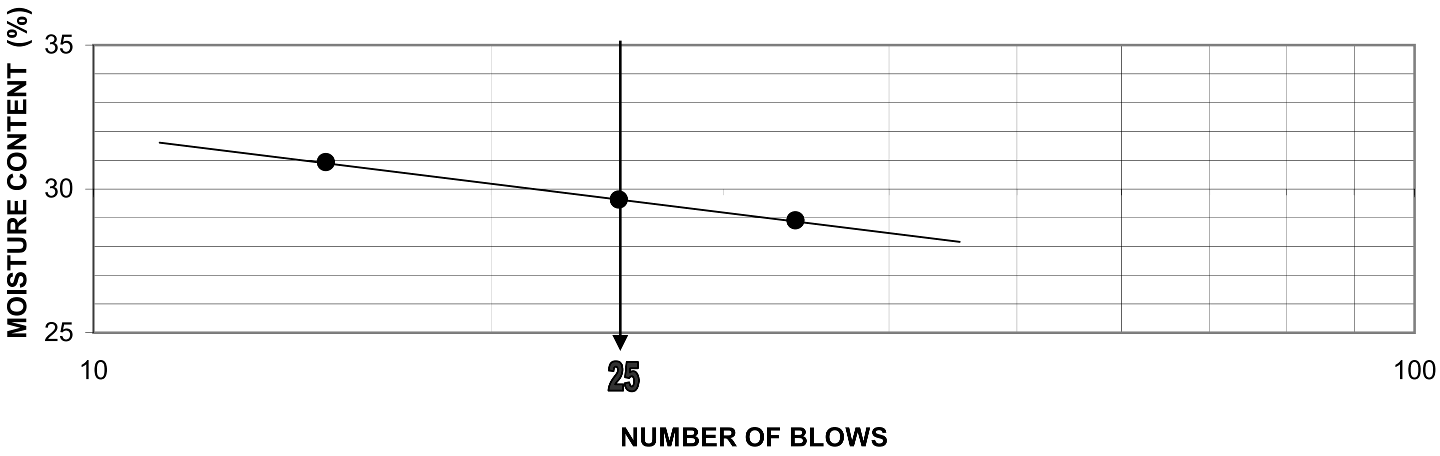
DETERMINATION NO	1	2
DISH NO.	R	
MASS OF DISH + WET SOIL,(Gms)	26.13	
MASS OF DISH + DRY SOIL,(Gms)	22.92	
MASS OF WATER,(Gms)	3.21	
MASS OF DISH,(Gms)	10.9	
MASS OF DRY SOIL,(Gms)	12.02	
MOISTURE CONTENT,(%)	26.7	

LIQUID LIMIT

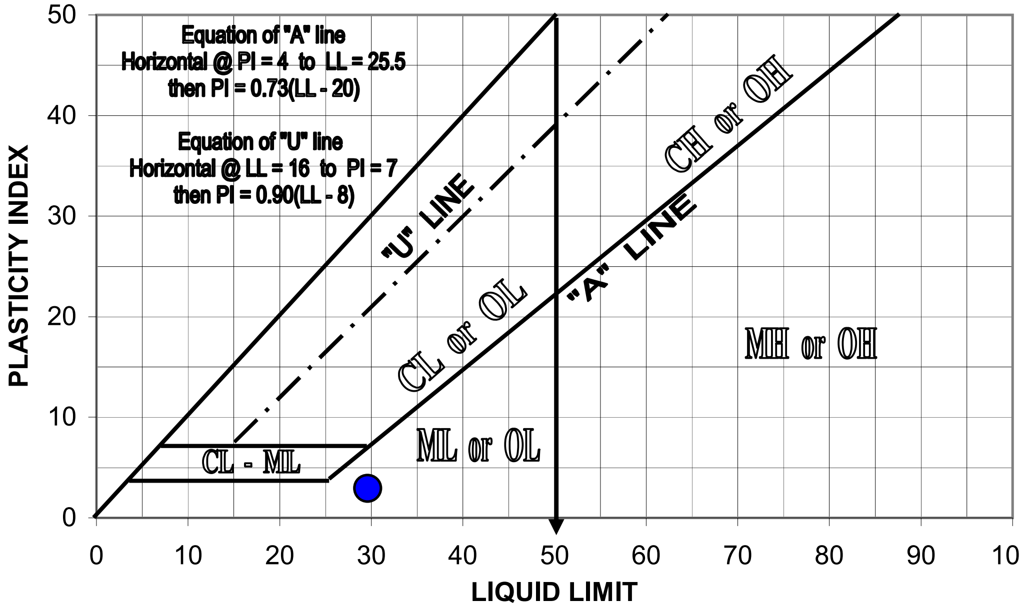
DETERMINATION NO.	1	2	3
DISH NUMBER	112	12	9
MASS, DISH + WET SOIL,(Gms)	11.99	11.55	11.44
MASS, DISH + DRY SOIL,(Gms)	10.19	9.87	9.81
MASS OF WATER,(Gms)	1.80	1.68	1.63
MASS OF DISH,(Gms)	4.37	4.20	4.17
MOISTURE CONTENT,(%)	30.9	29.6	28.9
NUMBER OF BLOWS	15	25	34

NATURAL MOISTURE CONTENT,%
0.00
#DIV/0!

FLOW CURVE



PLASTICITY CHART



RESULT SUMMARY

NATURAL MOISTURE CONTENT, (%)	-
LIQUID LIMIT (LL)	30
PLASTIC LIMIT (PL)	27
PLASTICITY INDEX (PI)	3
SYMBOL FROM PLASTICITY CHART	(ML)

METHOD OF PREPARATION		METHOD OF LL DETERMINATION	
DRY	X	MULTIPOINT	X
WET		ONE-POINT	

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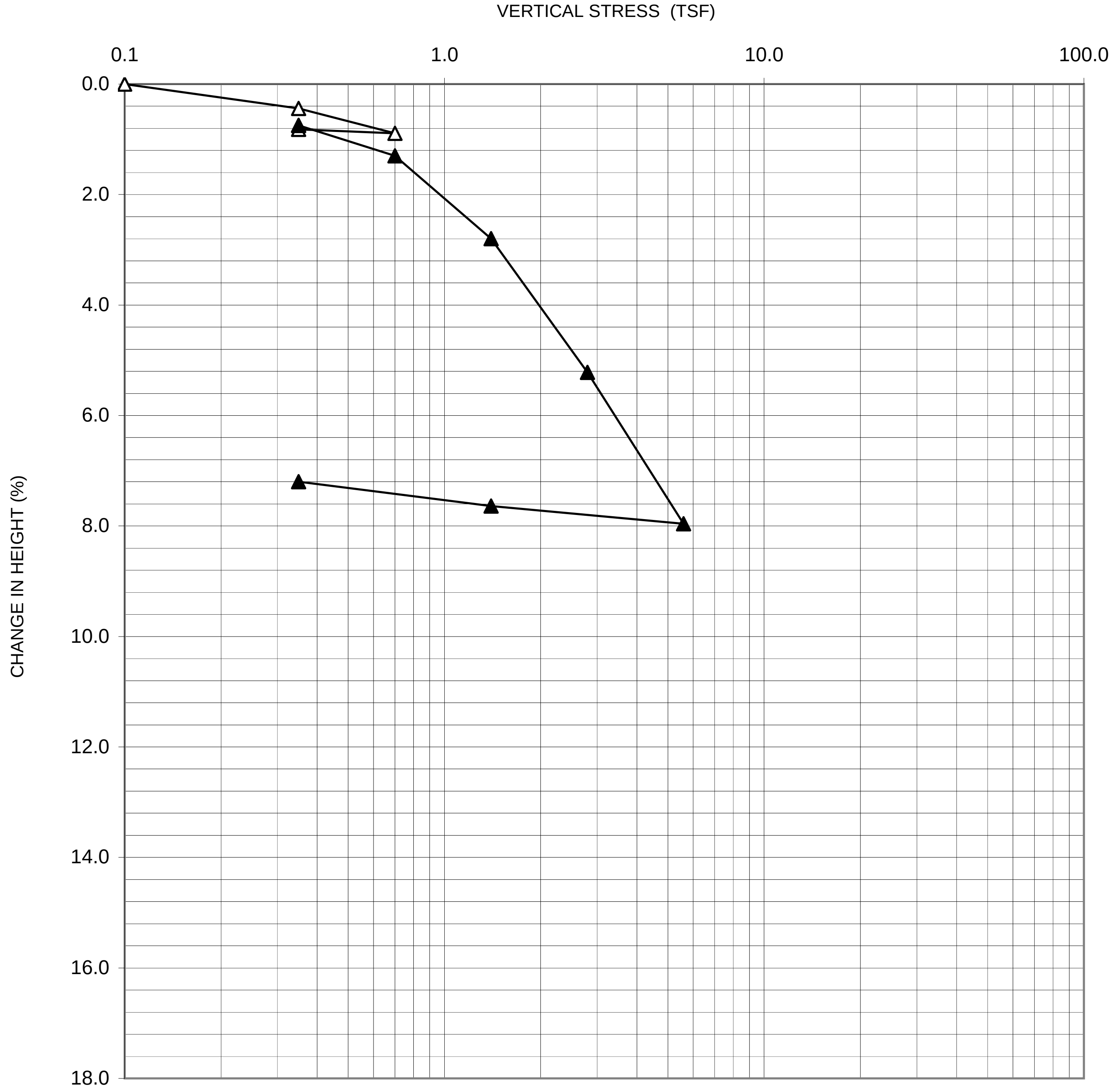
ATTERBERG LIMITS

(ASTM D4318-00)



PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: DK. BROWN SANDY CLAY (CL)

BORING NO./LOCATION : KB - 1

DEPTH / ELEV. : 10'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	12.1	107.2	58.2	0.559
FINAL	0.9280	18.5	115.5	110.9	0.448

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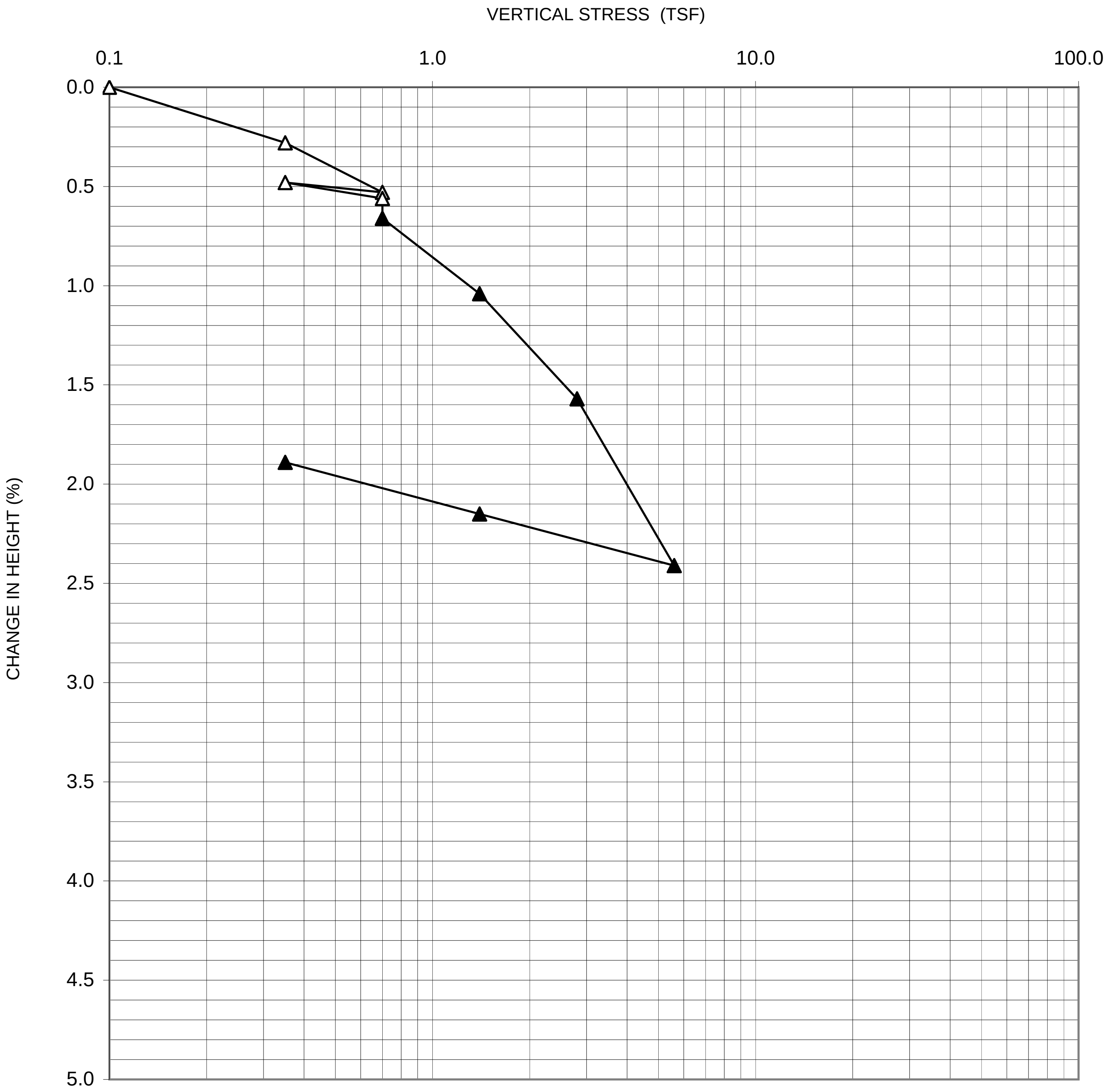
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-01
SOIL DESCRIPTIONS: LT. BROWN SILTY SAND (SM)
BORING NO./LOCATION : KB - 1
DEPTH / ELEV. : 15'
LIQUID LIMIT : -
SPECIFIC GRAVITY : 2.68 (Assumed)
PLASTIC LIMIT: -
REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	7.8	117.8	49.7	0.420
FINAL	0.9811	18.3	120.0	124.2	0.394

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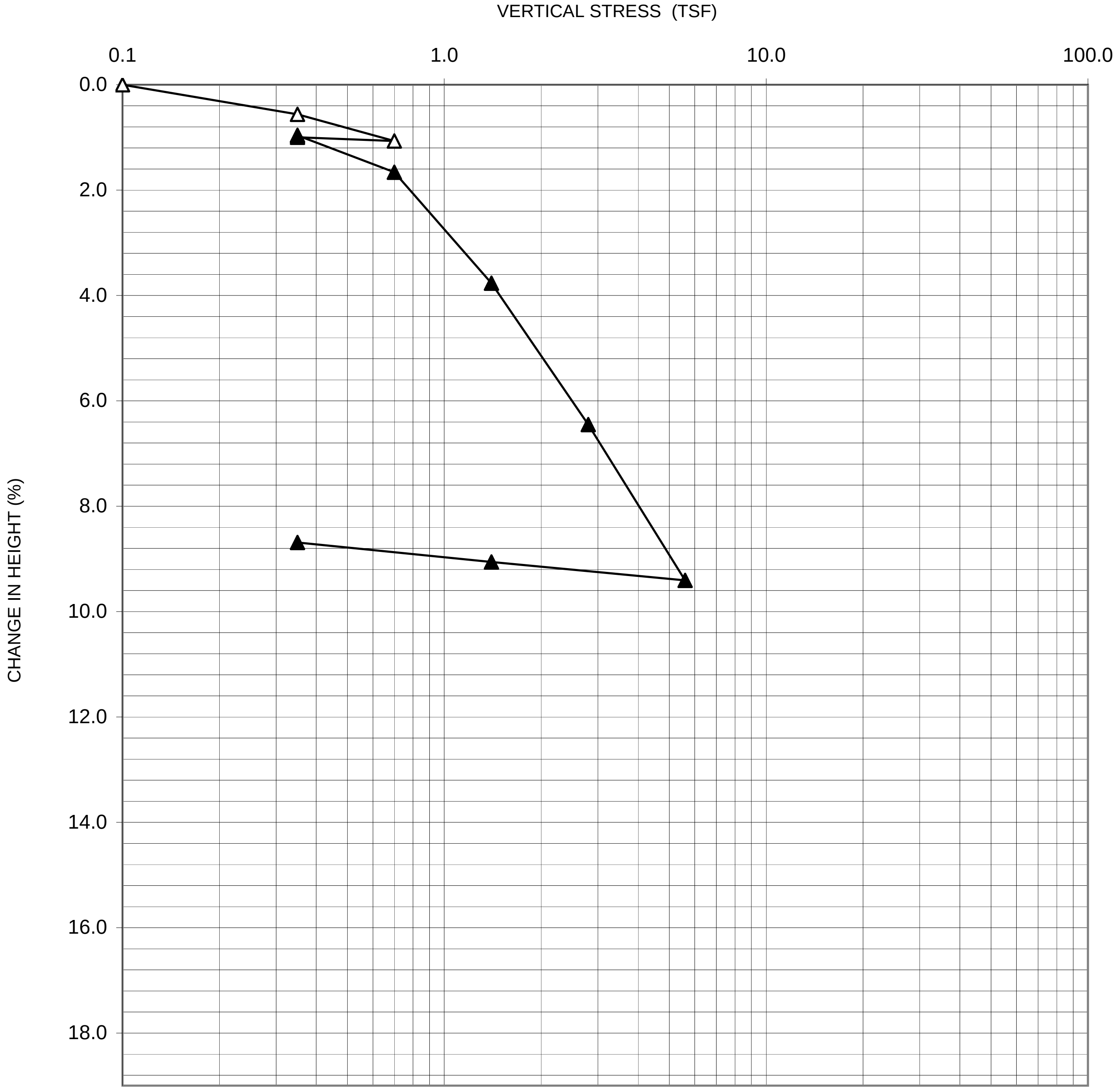
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: DK. BROWN CLAYEY SAND (SC)

BORING NO./LOCATION : KB - 2

DEPTH / ELEV. : 10'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	11.5	109.3	58.1	0.530
FINAL	0.9131	16.8	119.6	113.4	0.398

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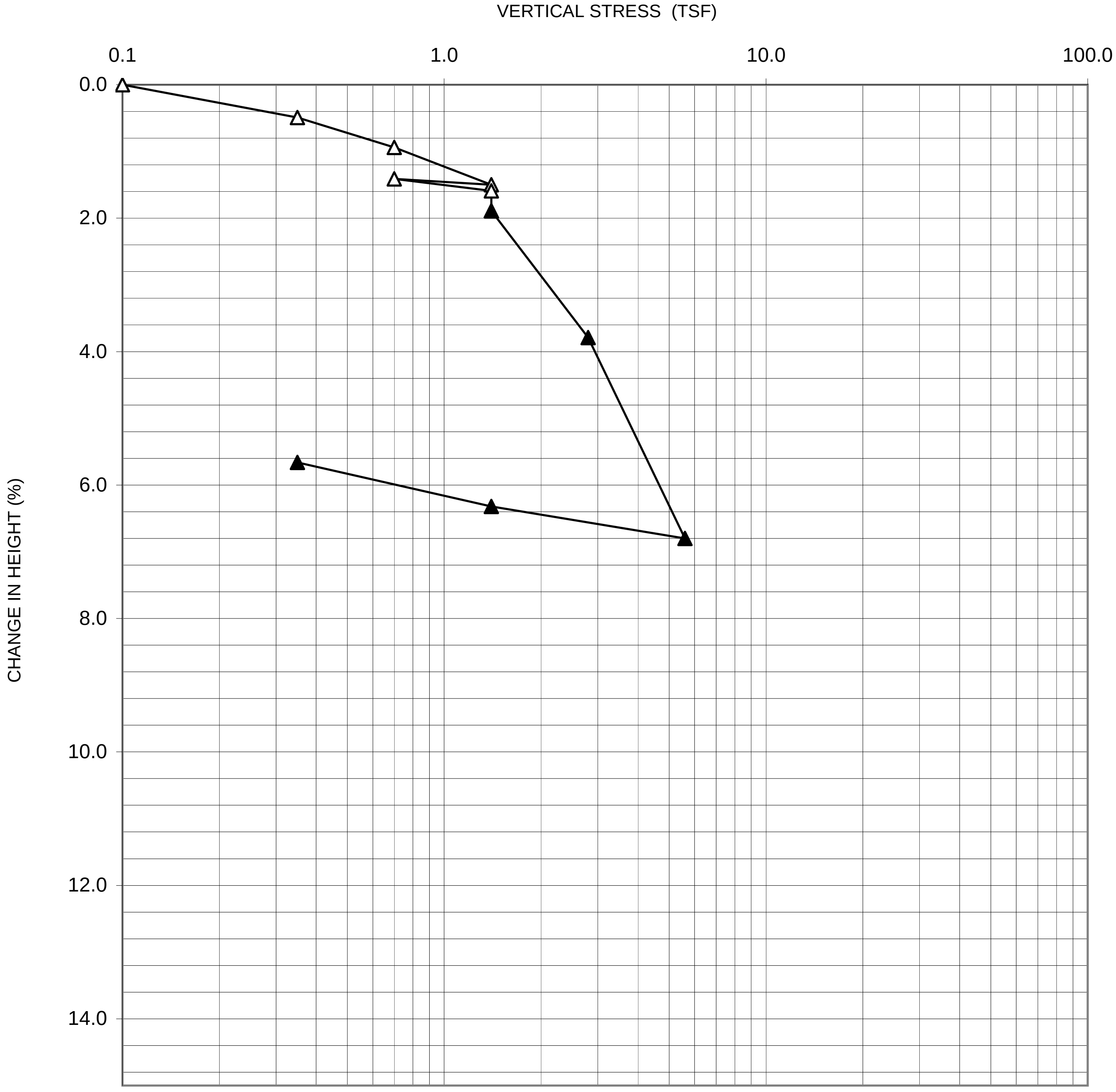
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-01 SOIL DESCRIPTIONS: DK. BROWN CLAYEY SAND (SC)

BORING NO./LOCATION : KB - 2 DEPTH / ELEV. : 25' LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed) PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	14.1	107.5	68.2	0.555
FINAL	0.9434	20.5	113.9	117.3	0.468

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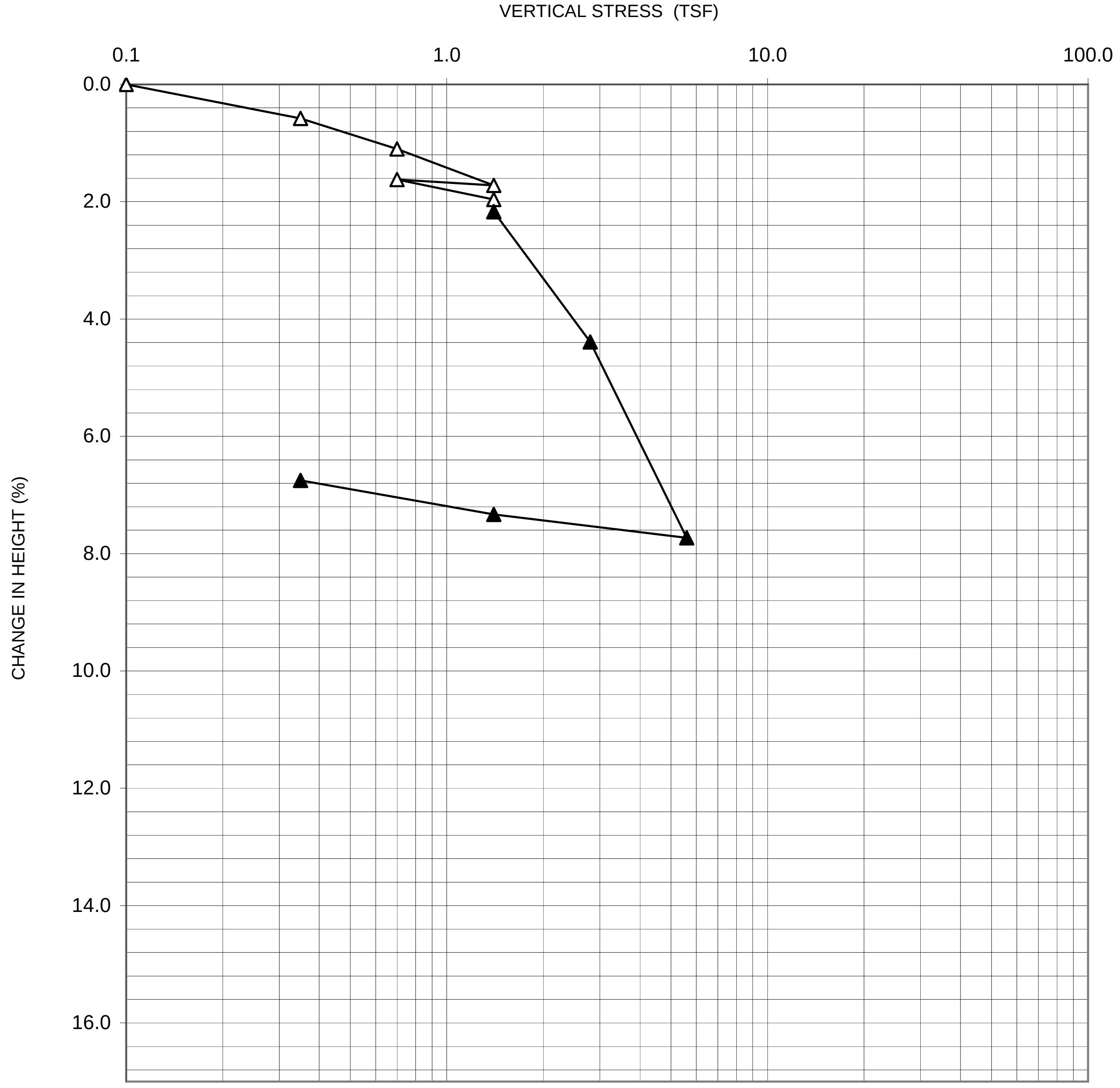
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: DK. BROWN SANDY CLAY (CL)

BORING NO./LOCATION : KB - 2

DEPTH / ELEV. : 35'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	13.0	108.1	63.6	0.547
FINAL	0.9325	17.8	115.9	107.6	0.443

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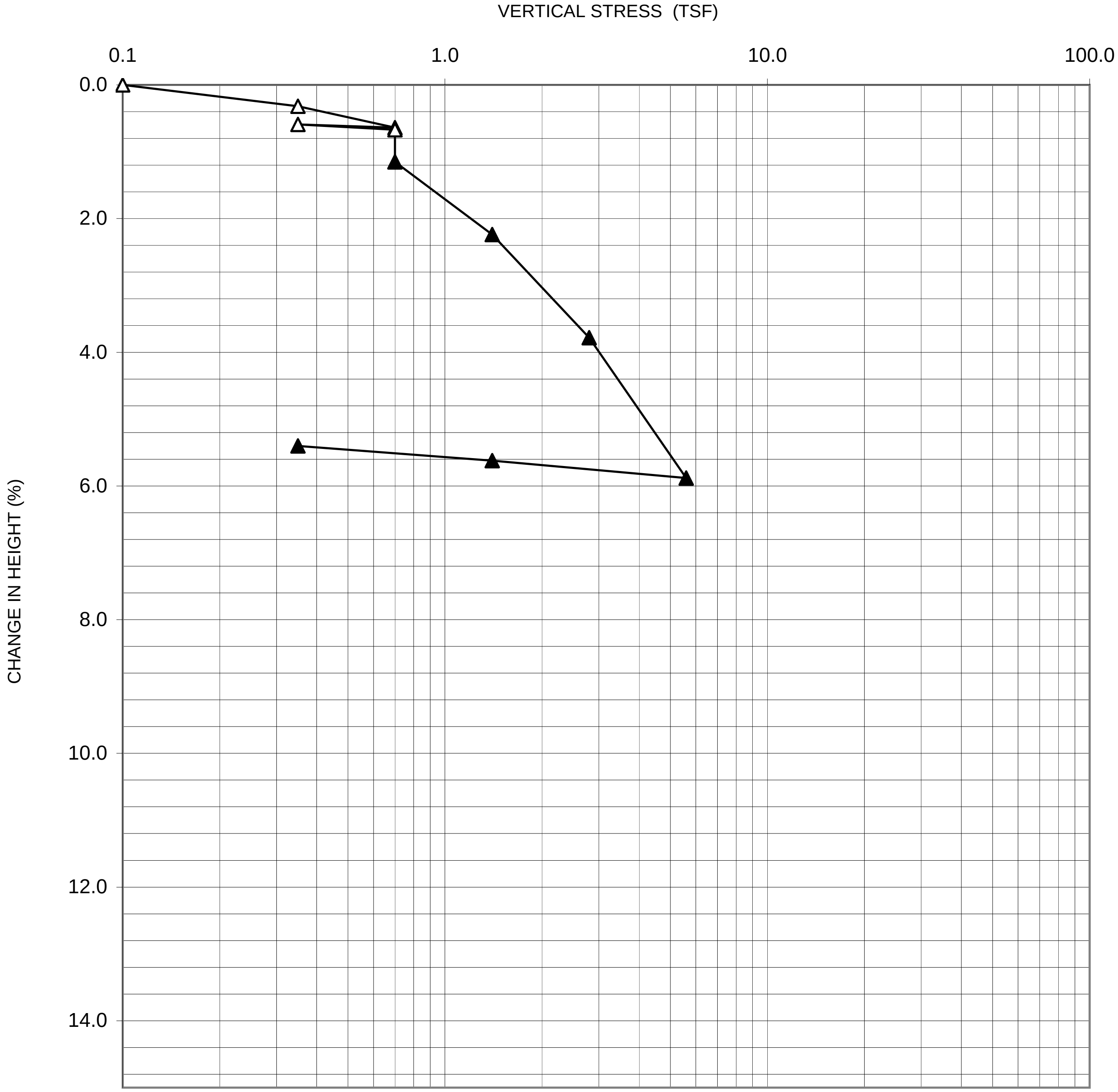
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-00

SOIL DESCRIPTIONS: BROWN SILTY SAND W/ GRAVEL (SM)

BORING NO./LOCATION : KB - 3

DEPTH / ELEV. : 10'

LIQUID LIMIT : -

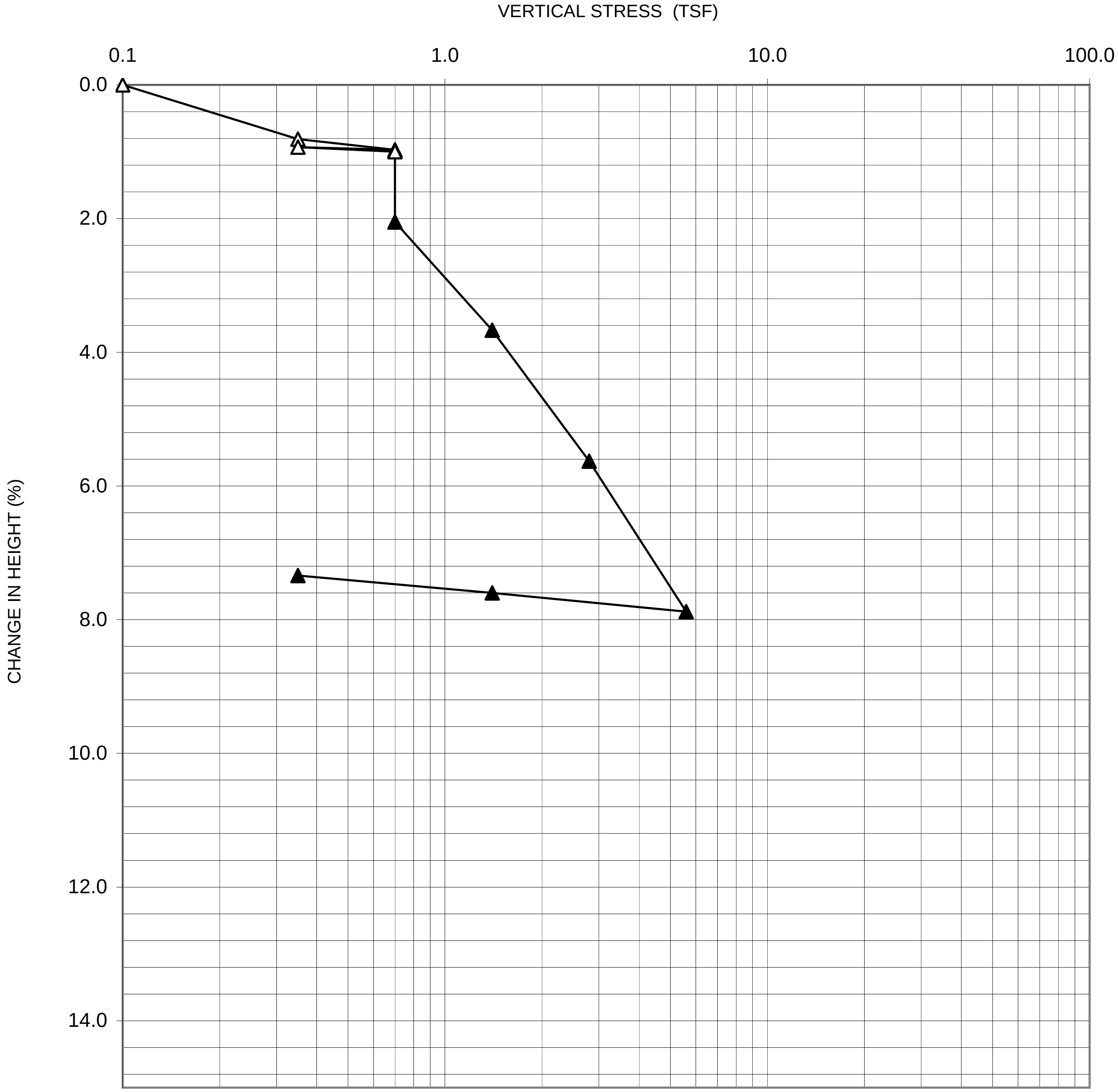
SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	6.8	112.5	37.4	0.487
FINAL	0.9460	16.4	118.9	107.9	0.407

CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-00

SOIL DESCRIPTIONS: BROWN SILTY SAND (SM)

BORING NO./LOCATION : KB - 4

DEPTH / ELEV. : 15'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	6.5	109.8	33.4	0.523
FINAL	0.9266	18.4	118.4	119.5	0.412

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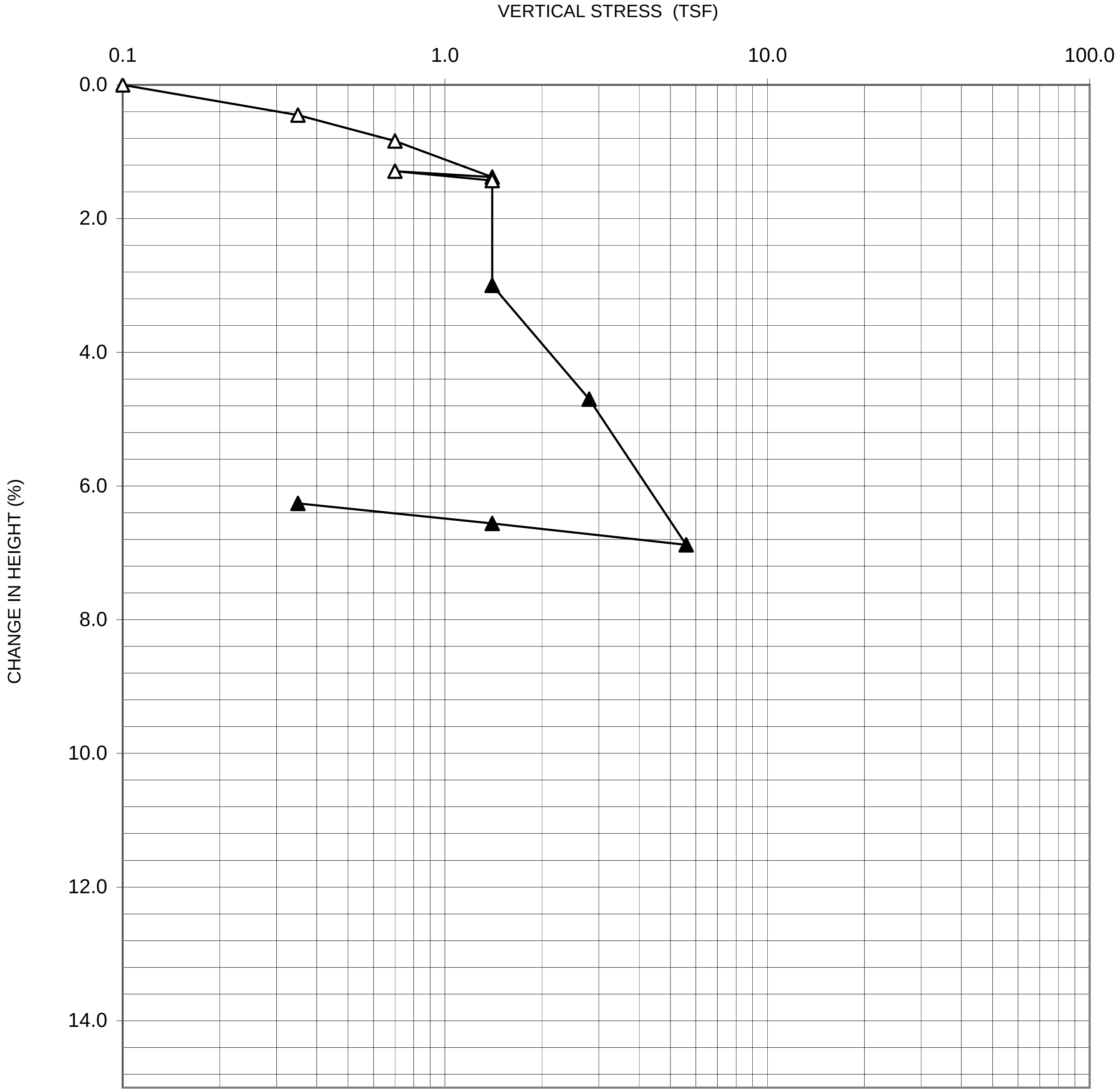

PROJECT NO.: 18060-00

SOIL DESCRIPTIONS: BR. SILTY FINE SAND W/ TR. OF CLAY (SM)

BORING NO./LOCATION : KB - 4

DEPTH / ELEV. : 25'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	7.4	105.3	33.9	0.588
FINAL	0.9374	20.8	112.3	114.3	0.489

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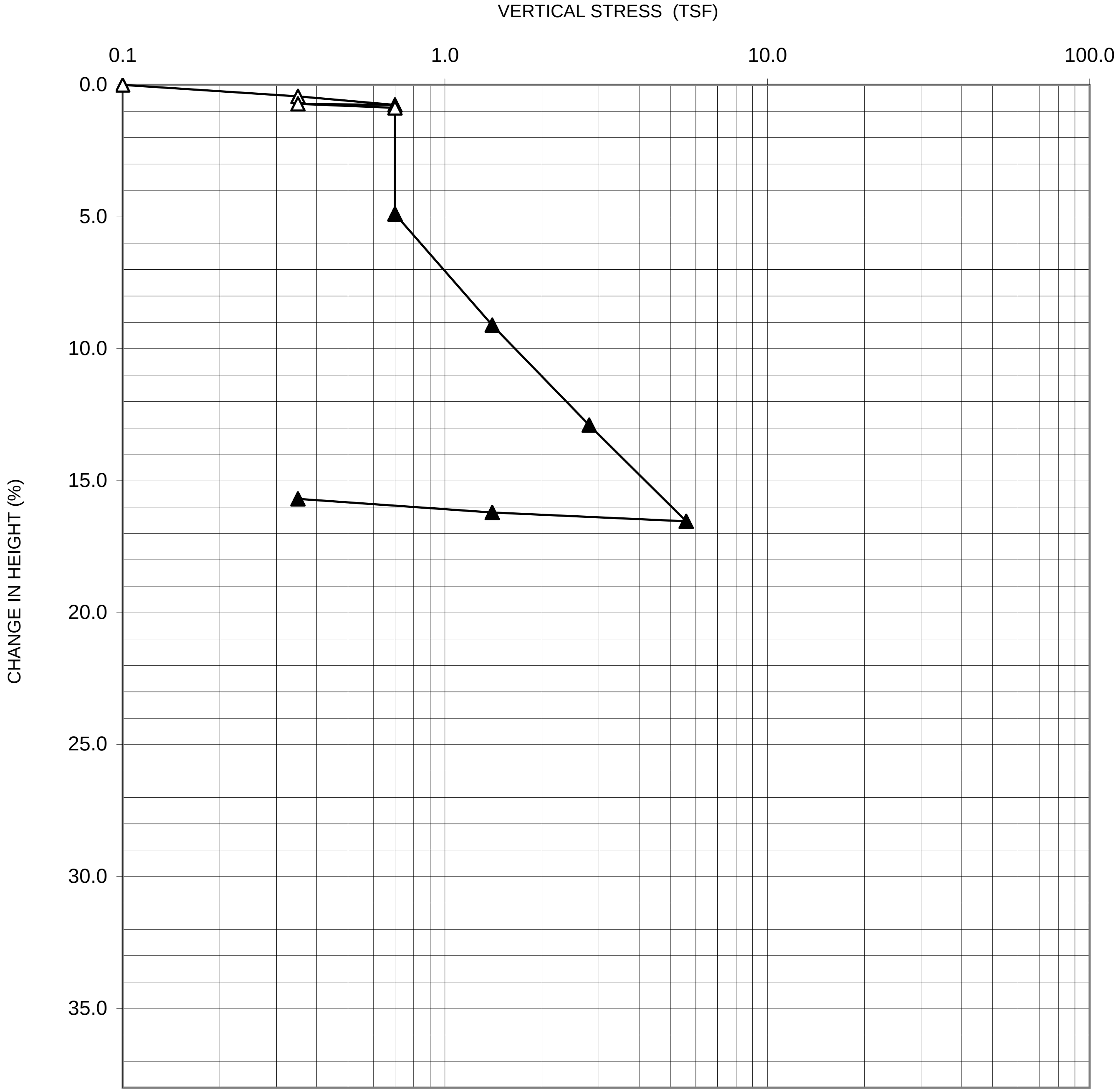

PROJECT NO.: 18060-00

SOIL DESCRIPTIONS: DK. BROWN SANDY CLAY (PORUOS) (CL)

BORING NO./LOCATION : KB - 5

DEPTH / ELEV. : 10'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	25.1	84.7	69.1	0.974
FINAL	0.8431	40.0	100.4	161.2	0.665

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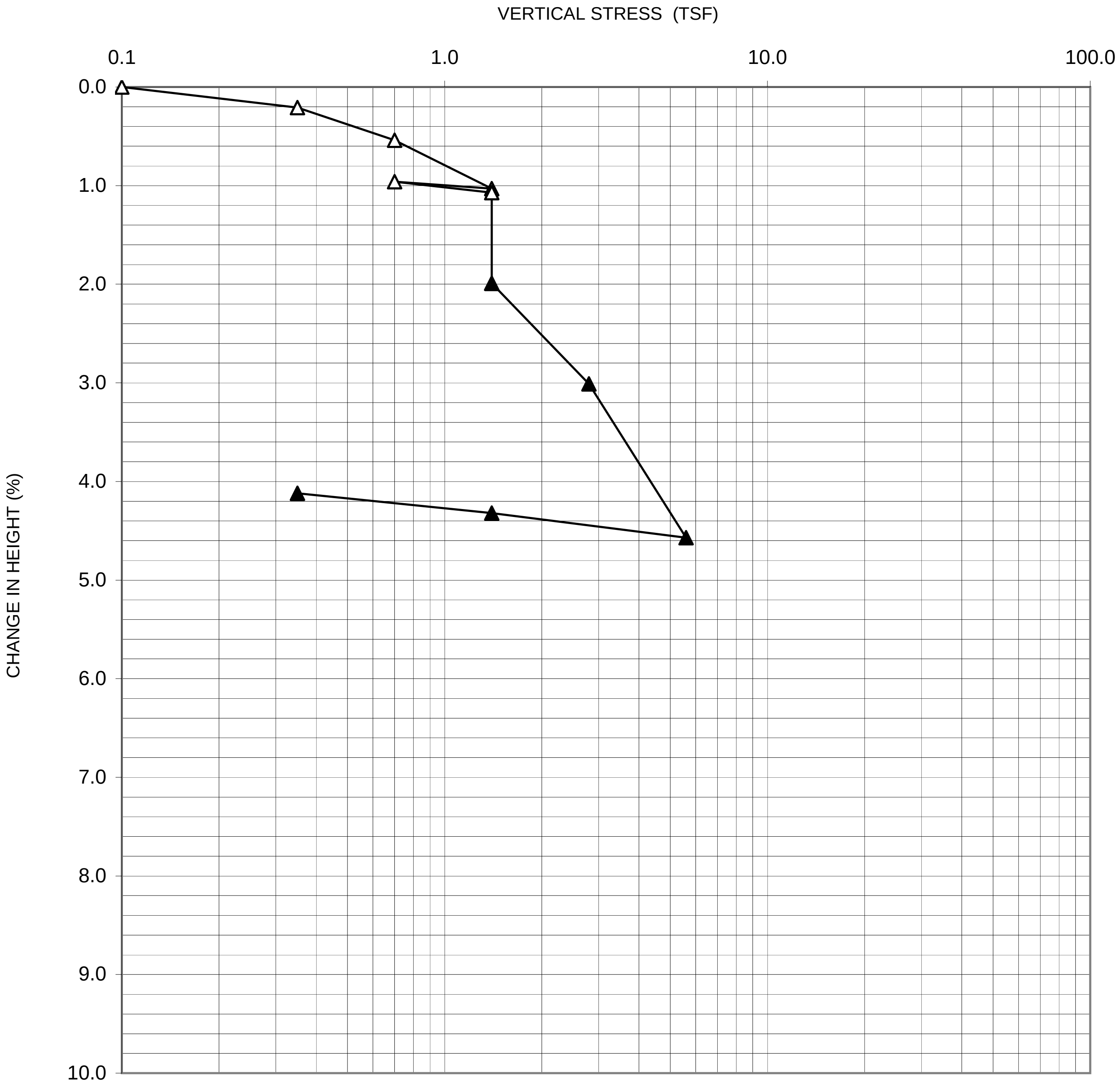
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-00

SOIL DESCRIPTIONS: LT. BROWN SILTY SAND W/ GRAVEL (SP/SM)

BORING NO./LOCATION : KB - 5

DEPTH / ELEV. : 25'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	3.2	117.6	20.1	0.423
FINAL	0.9588	18.9	122.6	139.0	0.365

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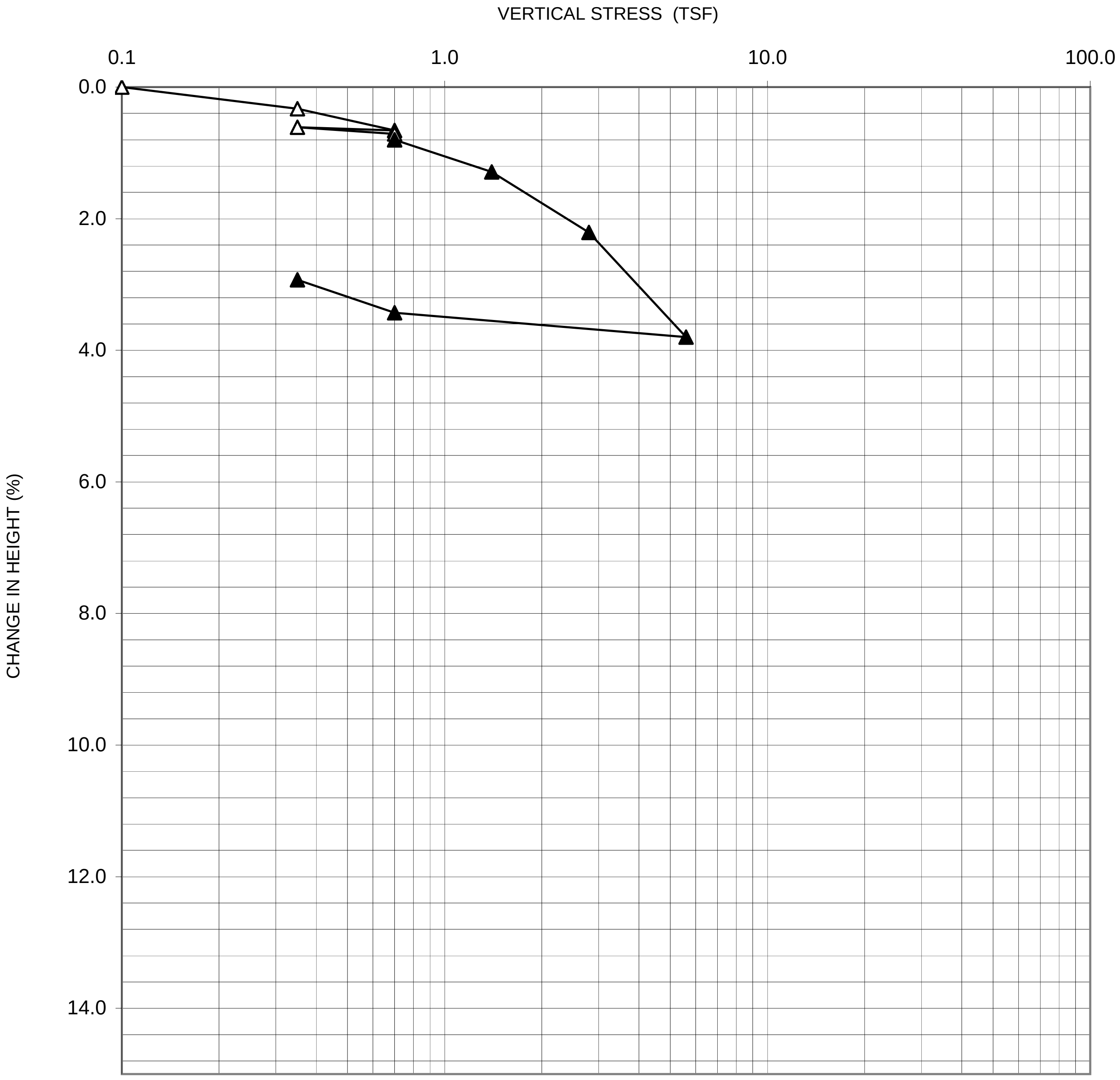

PROJECT NO.: 18060-00

SOIL DESCRIPTIONS: BROWN SILTY FINE SAND W/ CLAY (SM)

BORING NO./LOCATION : KB - 6

DEPTH / ELEV. : 15'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	9.9	116.1	60.2	0.440
FINAL	0.9707	18.4	119.6	123.9	0.399

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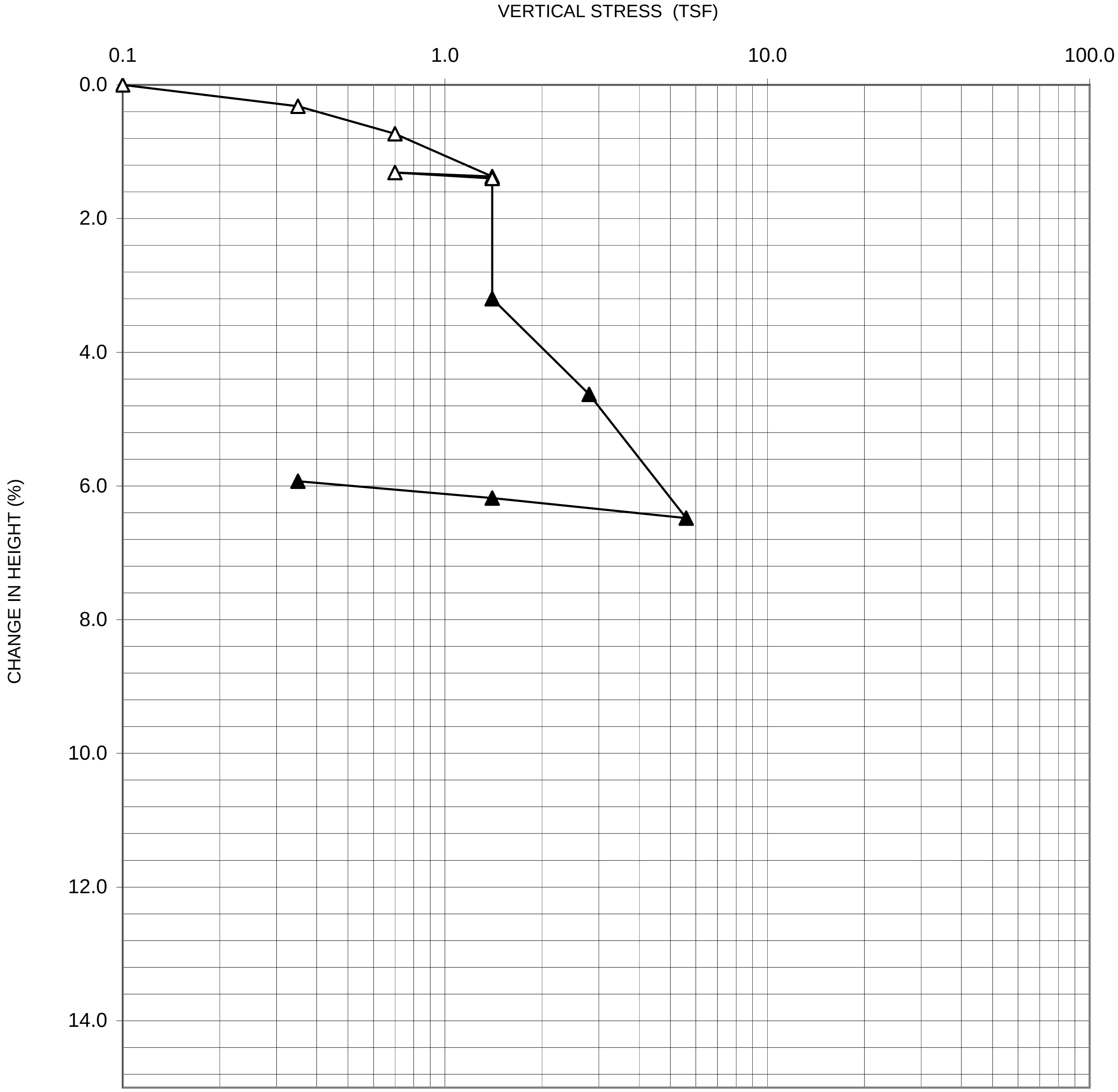

PROJECT NO.: 18060-00

SOIL DESCRIPTIONS: LT. BROWN SILTY SAND W/ GRAVEL (SP/SM)

BORING NO./LOCATION : KB - 6

DEPTH / ELEV. : 25'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	3.8	113.4	21.7	0.475
FINAL	0.9407	17.5	120.5	121.2	0.388

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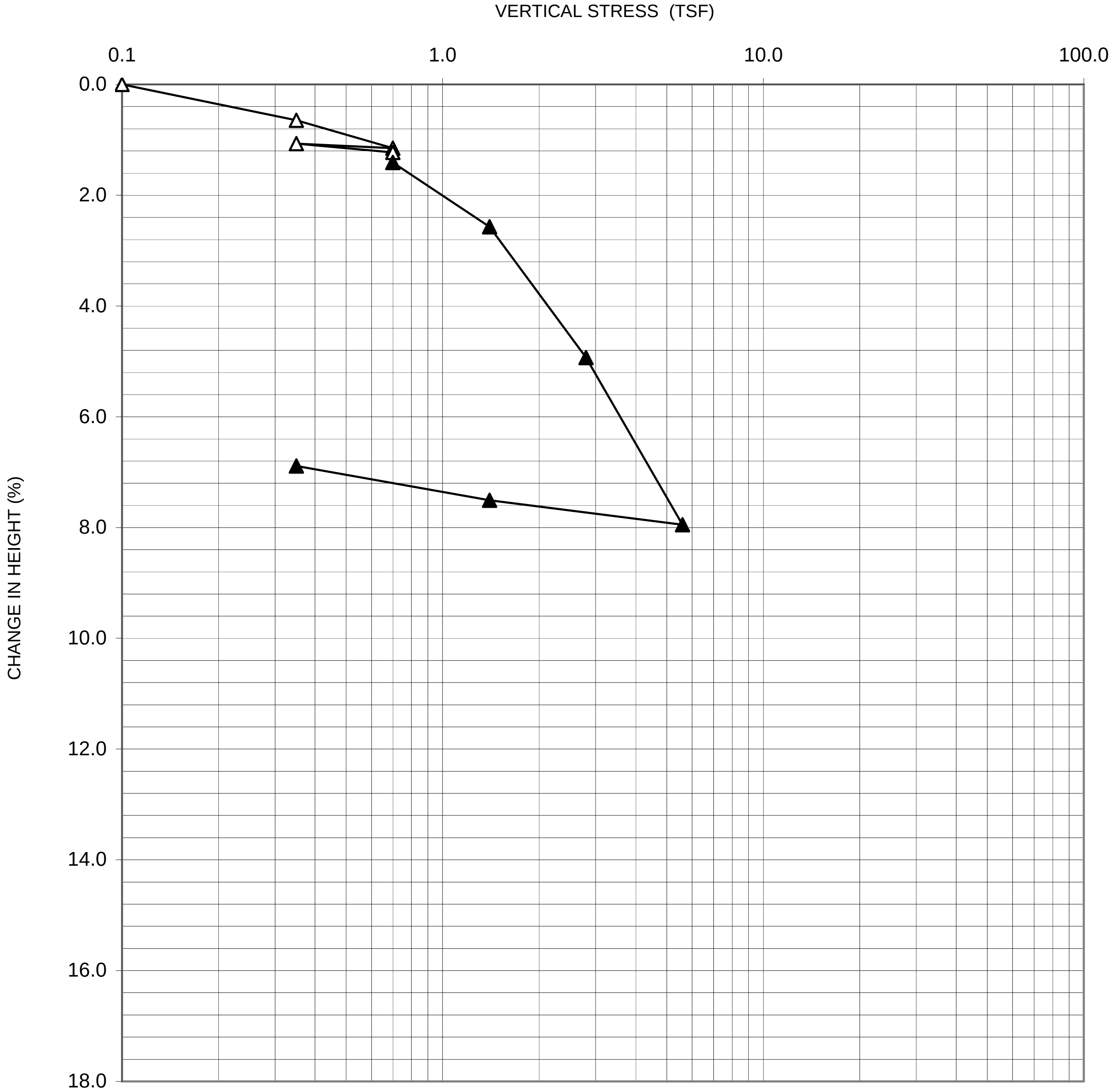

PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: DK. BROWN SANDY CLAY (CL)

BORING NO./LOCATION : KB - 7

DEPTH / ELEV. : 15'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	13.2	109.7	67.4	0.525
FINAL	0.9311	18.3	117.7	116.7	0.420

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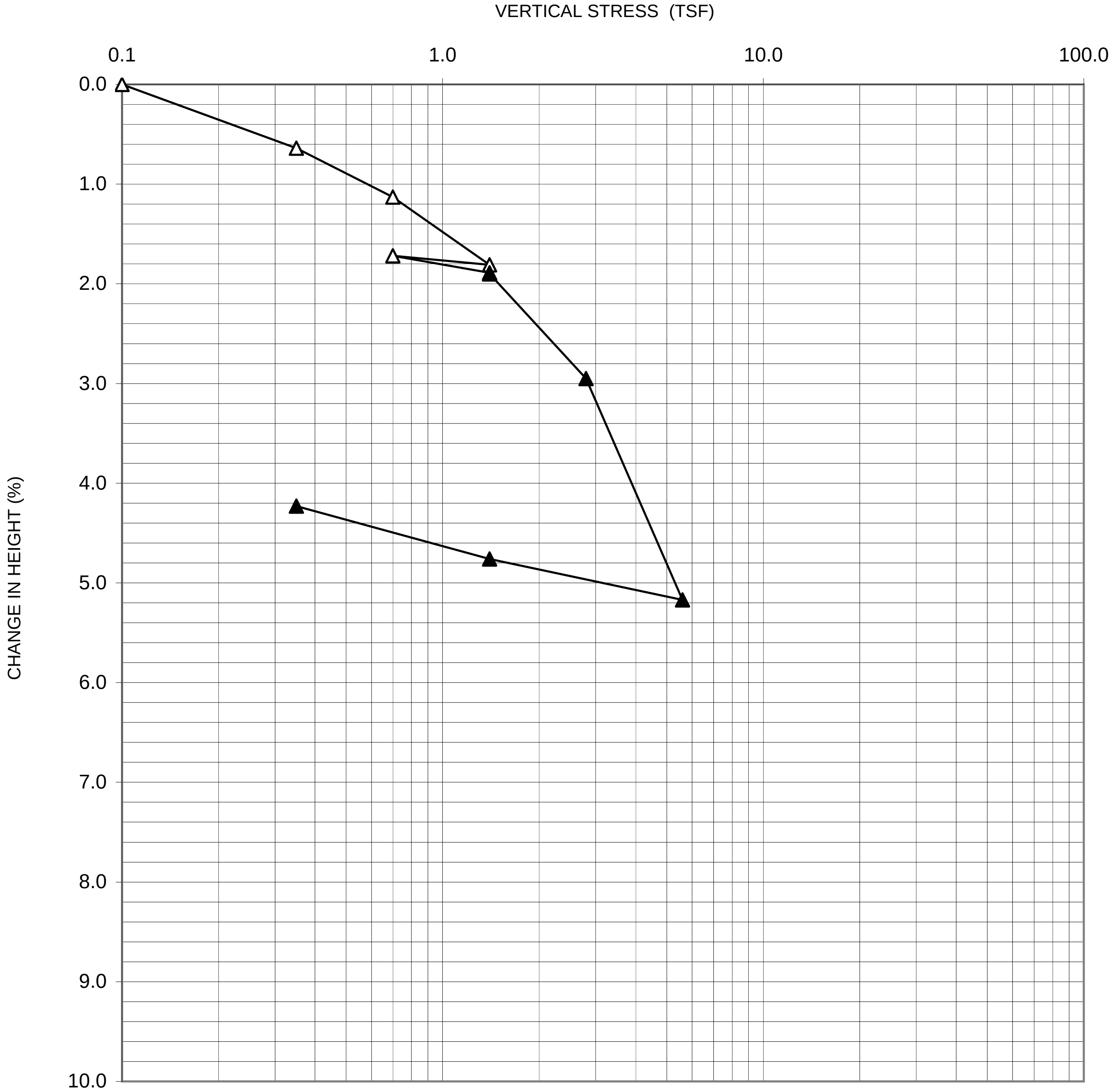
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: DK. BROWN SANDY CLAY (CL)

BORING NO./LOCATION : KB - 7

DEPTH / ELEV. : 35'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	14.4	115.4	86.0	0.450
FINAL	0.9577	16.8	120.4	115.5	0.389

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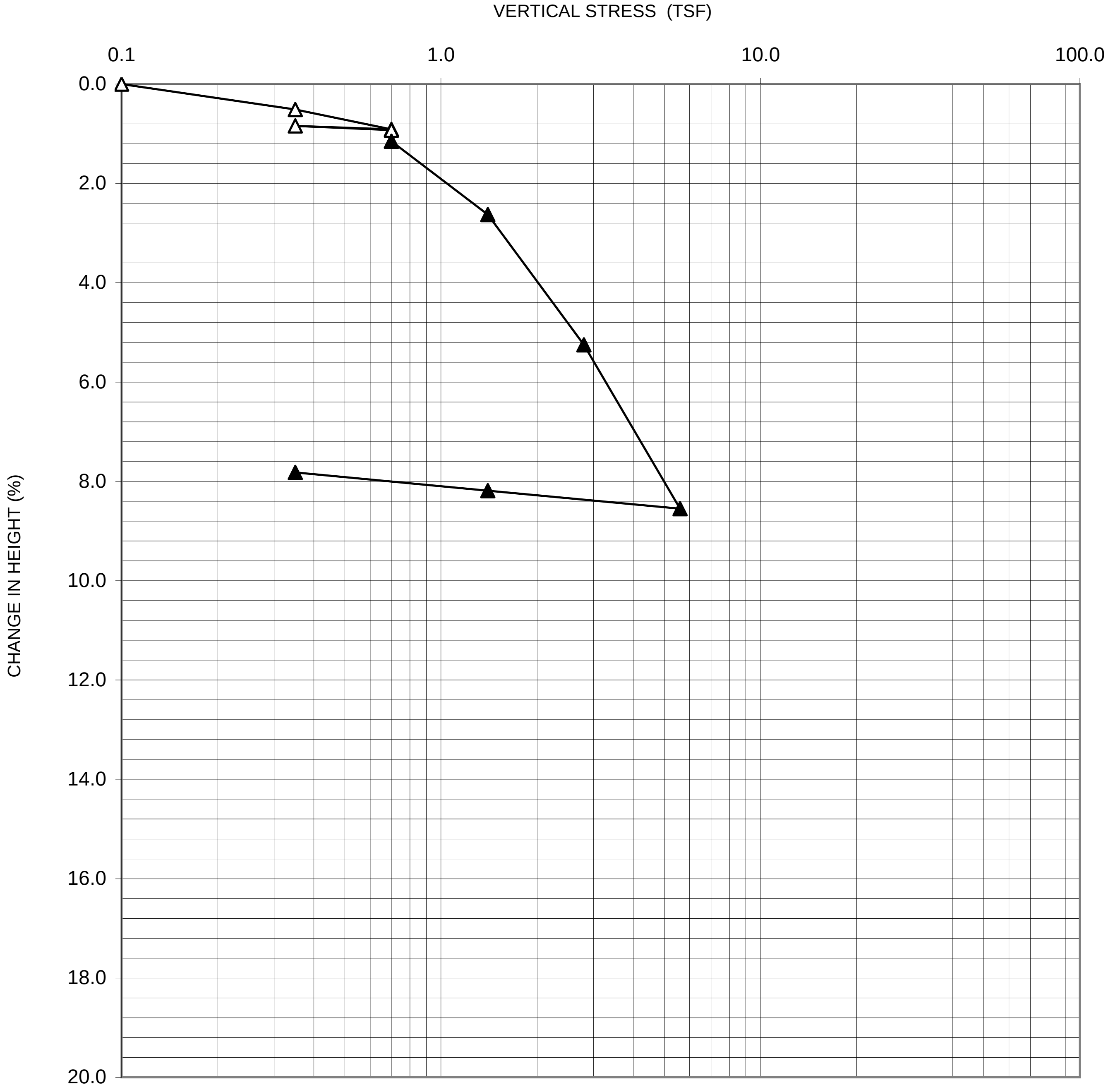

PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: BROWN CLAYEY SAND W/ GRAVEL (SC)

BORING NO./LOCATION : KB - 8

DEPTH / ELEV. : 15'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	9.5	105.6	43.5	0.584
FINAL	0.9218	19.4	114.5	112.8	0.460

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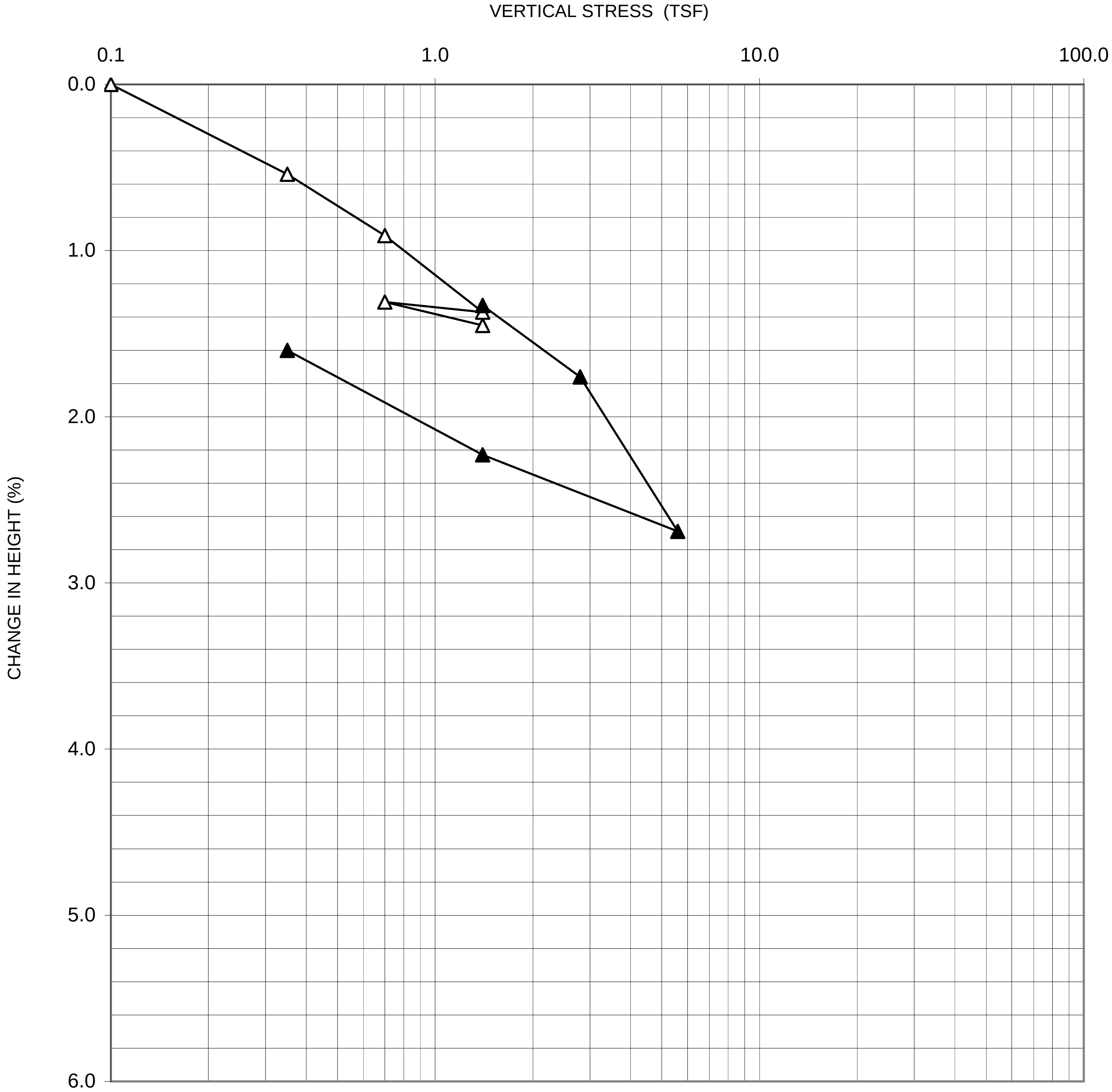
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: BROWN SANDY CLAY (CL)

BORING NO./LOCATION : KB - 8

DEPTH / ELEV. : 25'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	12.9	120.1	88.1	0.392
FINAL	0.9840	17.1	122.1	123.6	0.370

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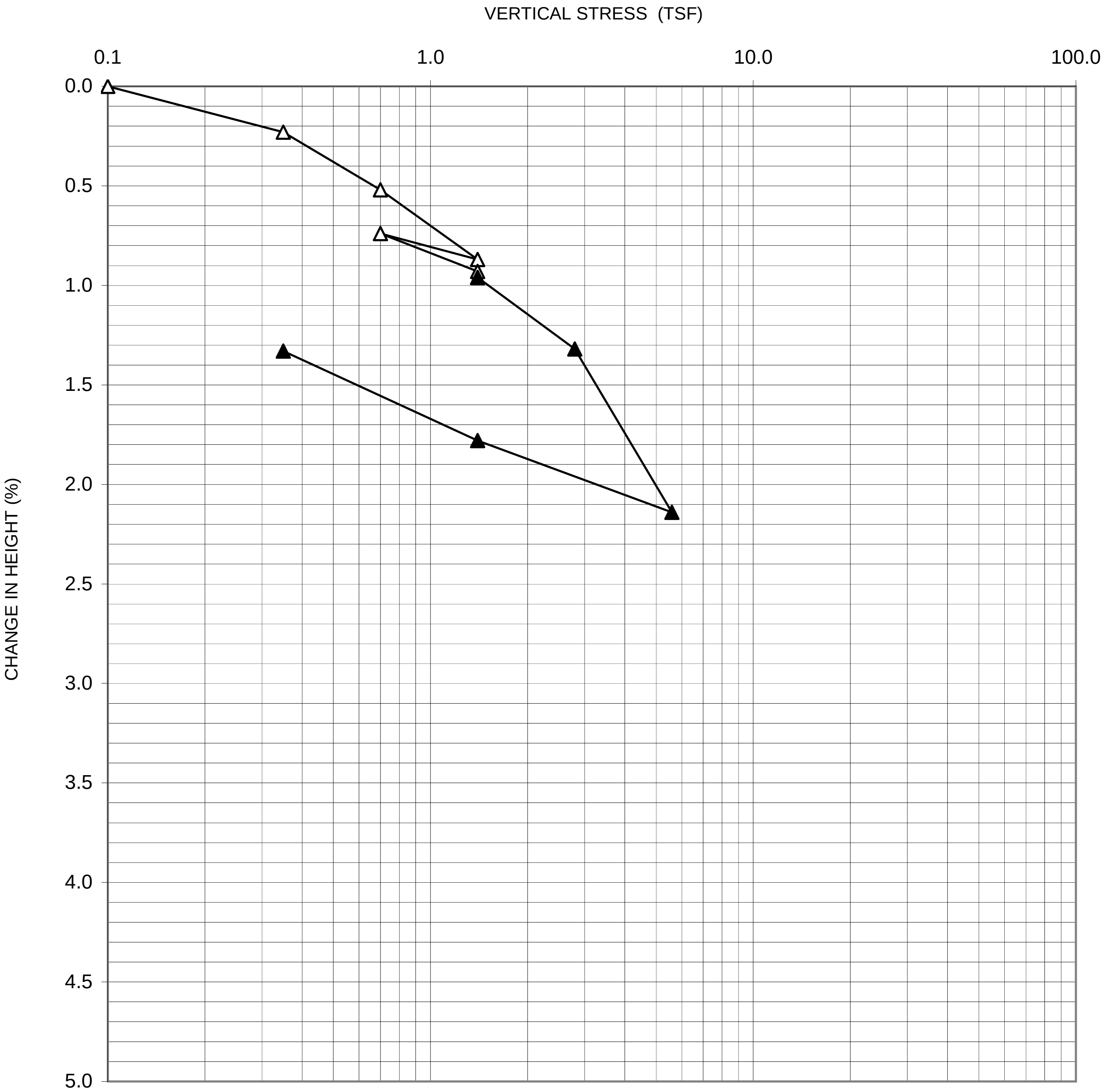

PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: BROWN SILTY SAND (SM)

BORING NO./LOCATION : KB - 8

DEPTH / ELEV. : 35'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	10.0	113.8	57.4	0.469
FINAL	0.9867	18.4	115.3	109.6	0.450

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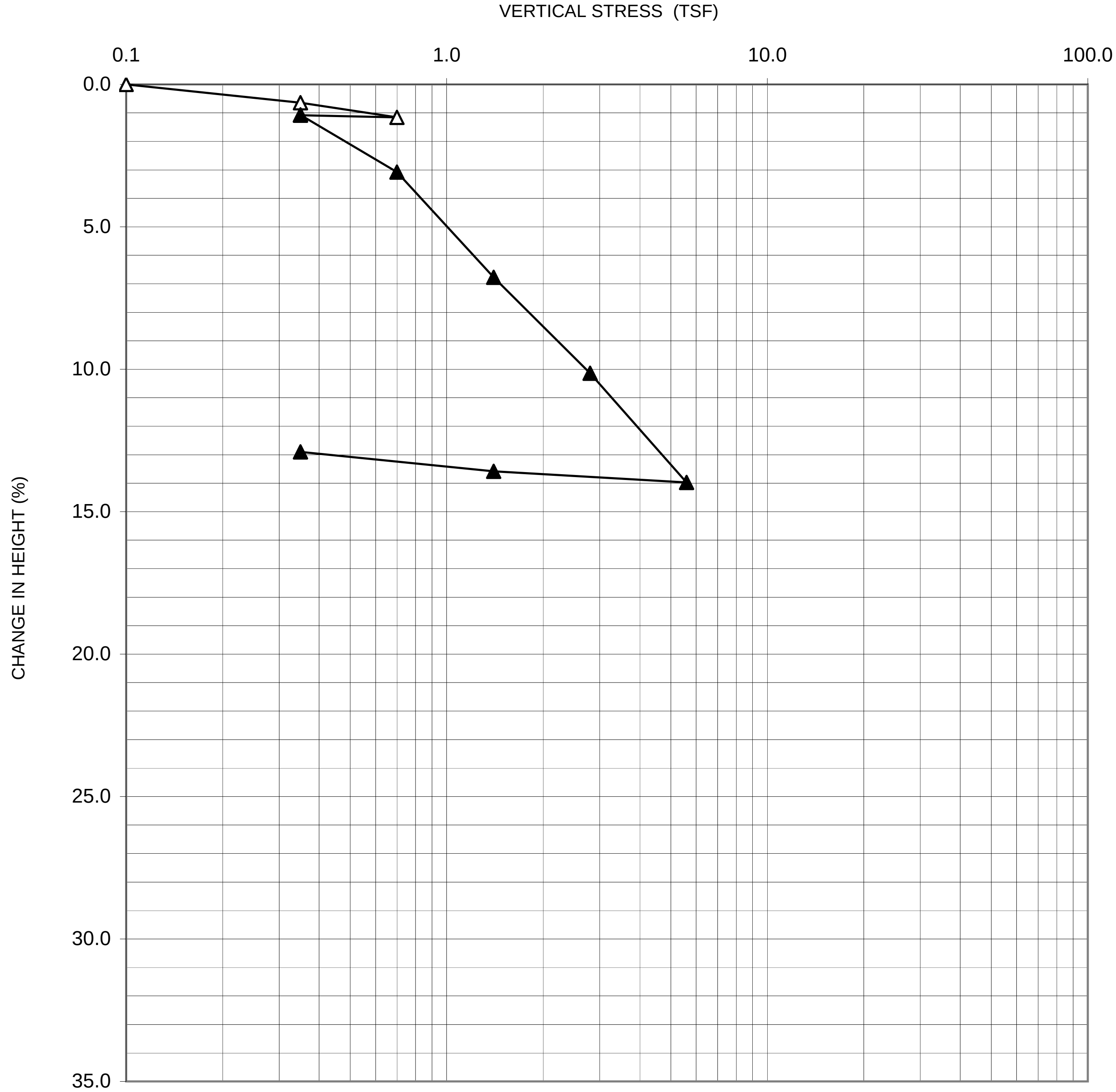

PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: DK. BROWN SANDY CLAY (CL)

BORING NO./LOCATION : KB - 9

DEPTH / ELEV. : 10'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	9.1	102.7	39.0	0.629
FINAL	0.8710	20.3	117.8	130.0	0.419

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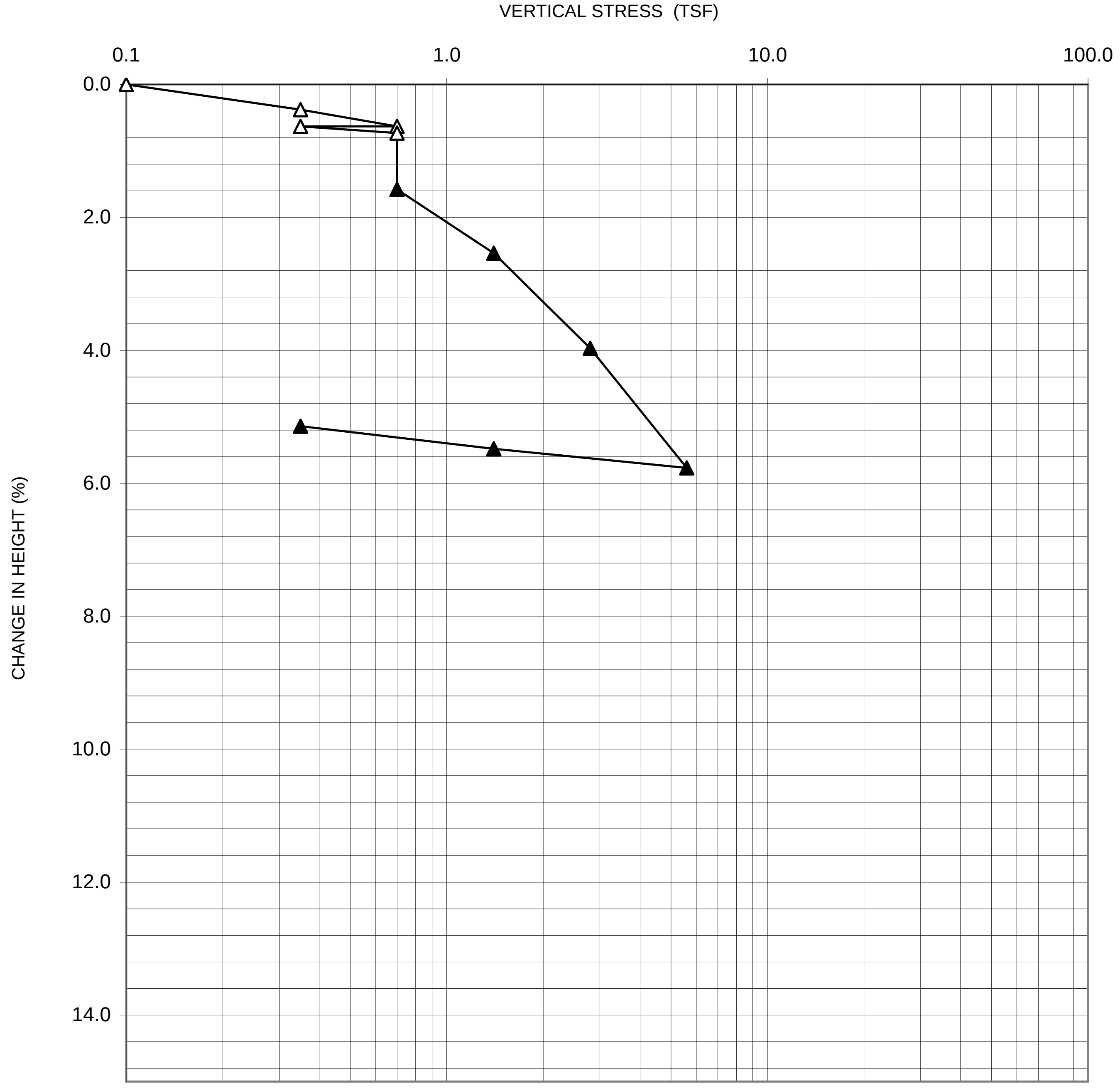
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: BROWN CLAYEY SAND W/ GRAVEL (SC)

BORING NO./LOCATION : KB - 9

DEPTH / ELEV. : 15'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	4.2	118.1	26.9	0.415
FINAL	0.9486	15.8	124.5	123.4	0.343

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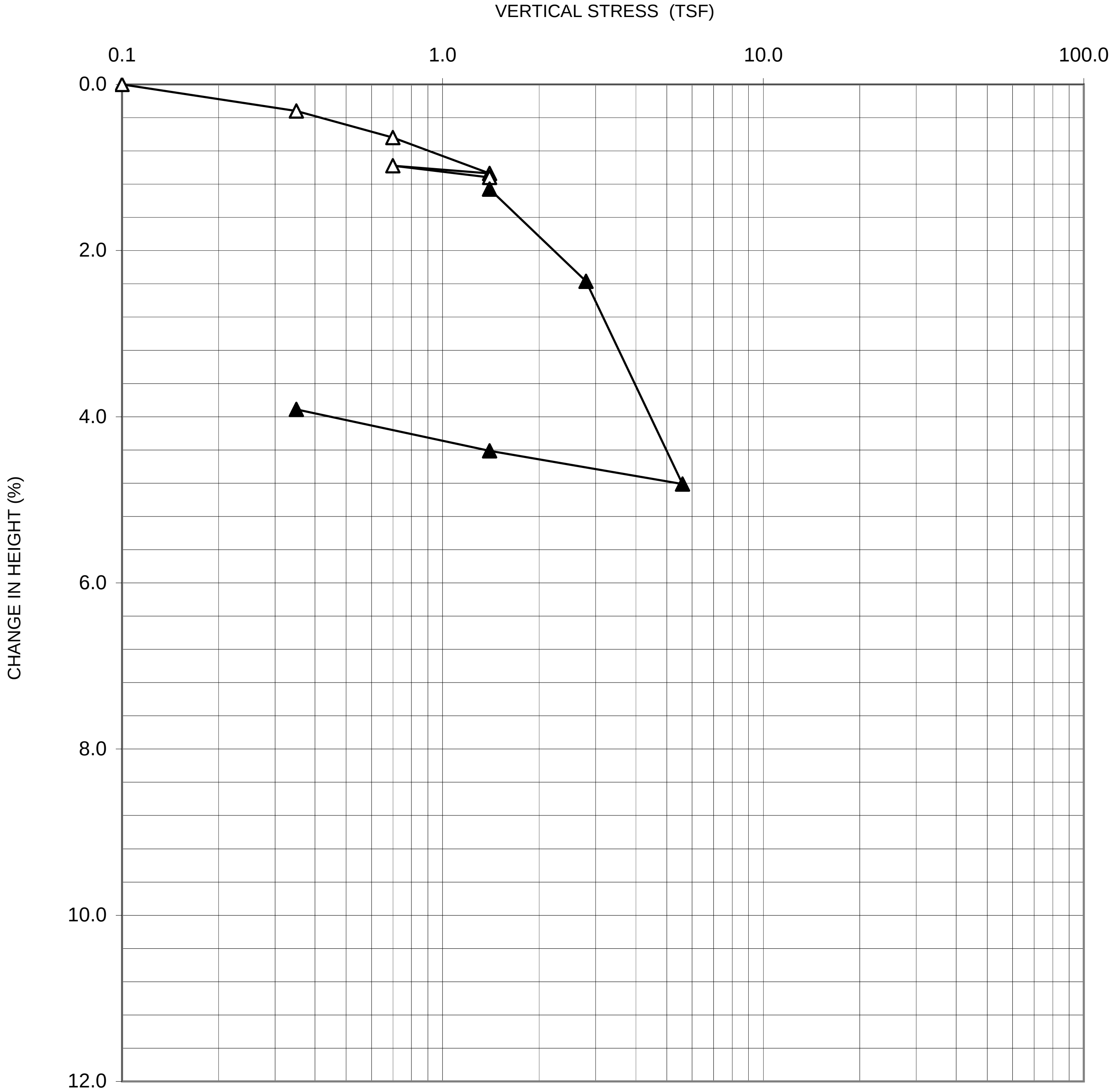

PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: BROWN CLAYEY SAND (SC)

BORING NO./LOCATION : KB - 9

DEPTH / ELEV. : 35'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	10.7	104.5	47.6	0.601
FINAL	0.9609	19.8	108.7	98.3	0.539

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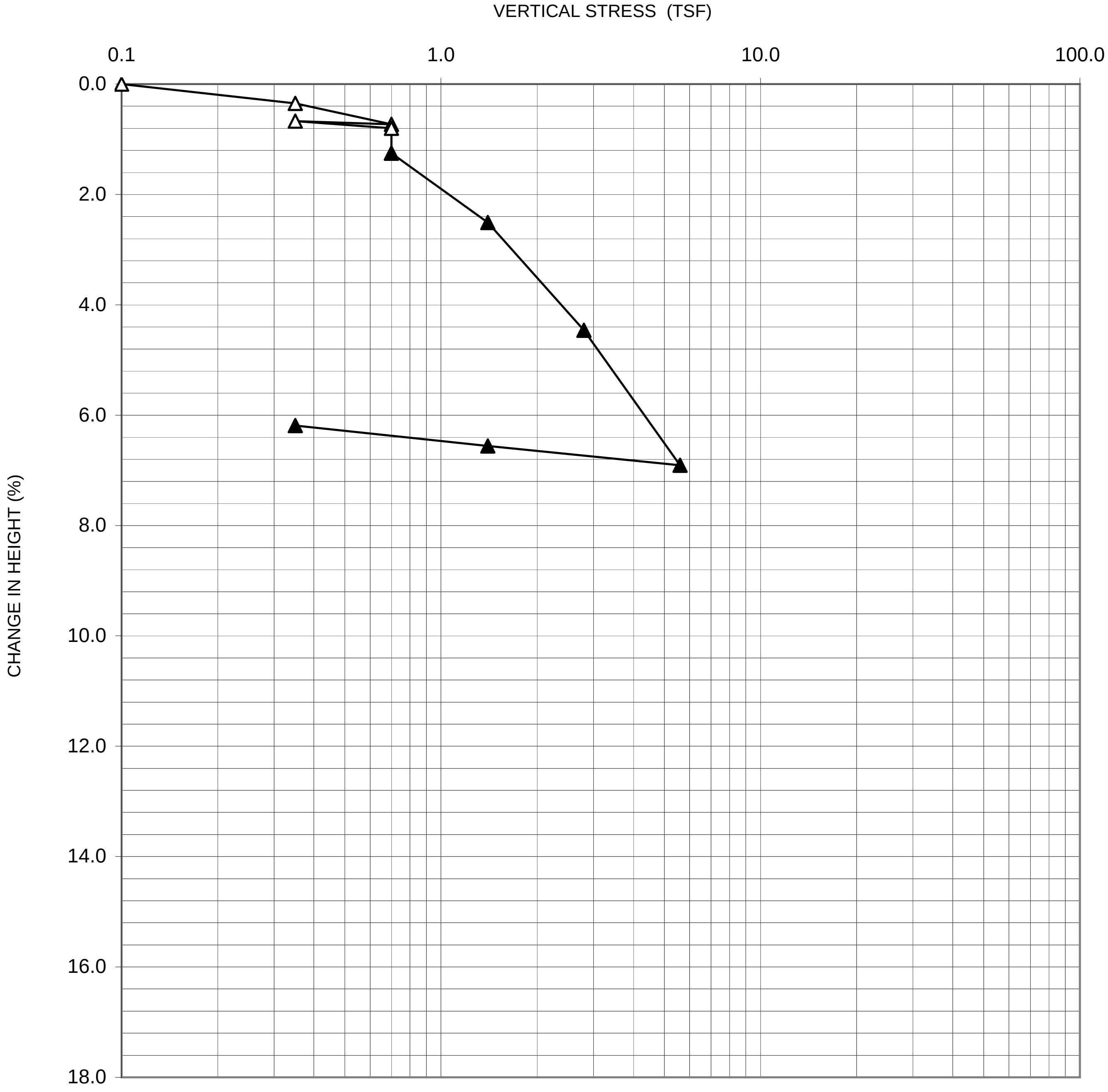
CONSOLIDATION TEST CURVE



PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: BROWN CLAYEY SAND (SC)

BORING NO./LOCATION : KB - 10

DEPTH / ELEV. : 15'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	7.3	111.7	39.6	0.497
FINAL	0.9381	17.7	119.0	117.4	0.405

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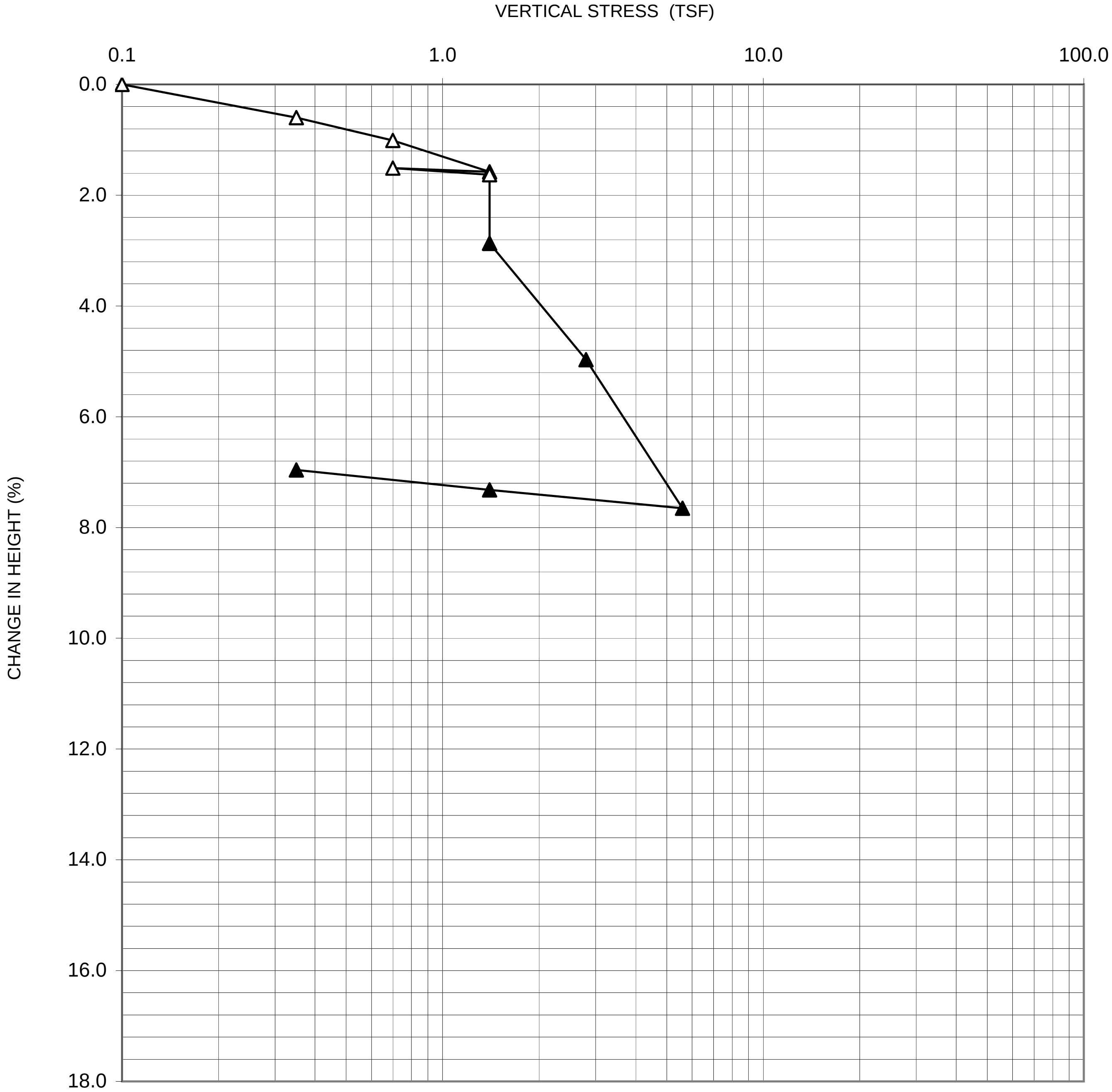

PROJECT NO.: 18060-00

SOIL DESCRIPTIONS: BROWN CLAYEY SAND (SC)

BORING NO./LOCATION : KB - 10

DEPTH / ELEV. : 25'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	10.1	103.2	43.8	0.620
FINAL	0.9304	22.7	110.9	119.8	0.508

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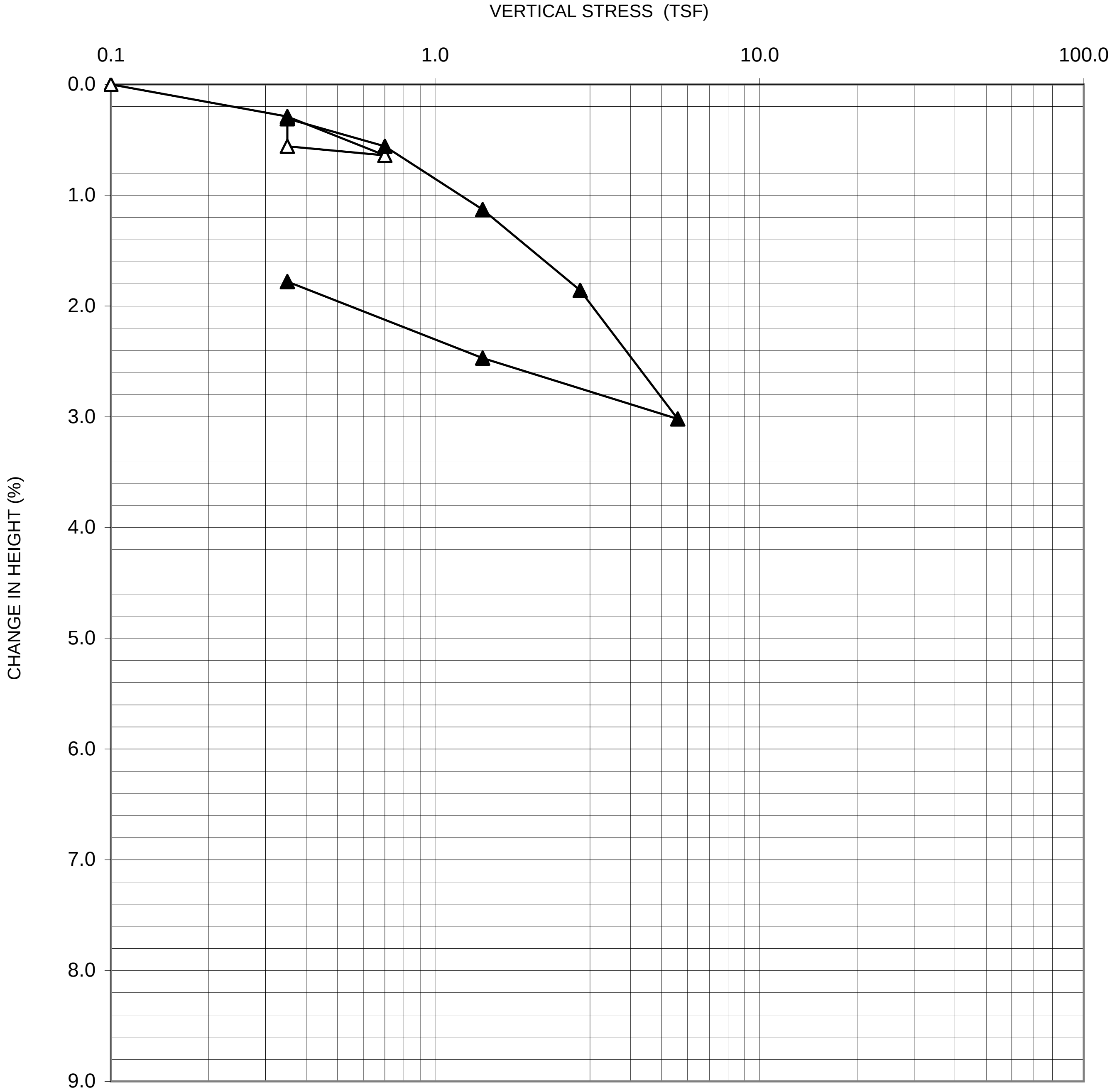

PROJECT NO.: 18060-01

SOIL DESCRIPTIONS: OLIVE BROWN CLAYEY SAND (SC)

BORING NO./LOCATION : KTP - 2

DEPTH / ELEV. : 6'

LIQUID LIMIT : -

SPECIFIC GRAVITY : 2.68 (Assumed)

PLASTIC LIMIT: -

REMARKS :

	SPECIMEN HEIGHT (INCHES)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SATURATION (%)	VOID RATIO
INITIAL	1.0000	14.3	104.5	64.1	0.600
FINAL	0.9822	22.7	106.4	106.2	0.572

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CONSOLIDATION TEST CURVE

Project Name : JACK RABBIT TRAIL
Project No. : 18060-01
Boring / Sample No : B - 2 / KB - 6
Depth : 0' - 5' (ft.)
Tested By : RB
Date: 16-Jul-19
Sample Descriptions / Classification : DK BROWN CLAYEY SAND (SC)

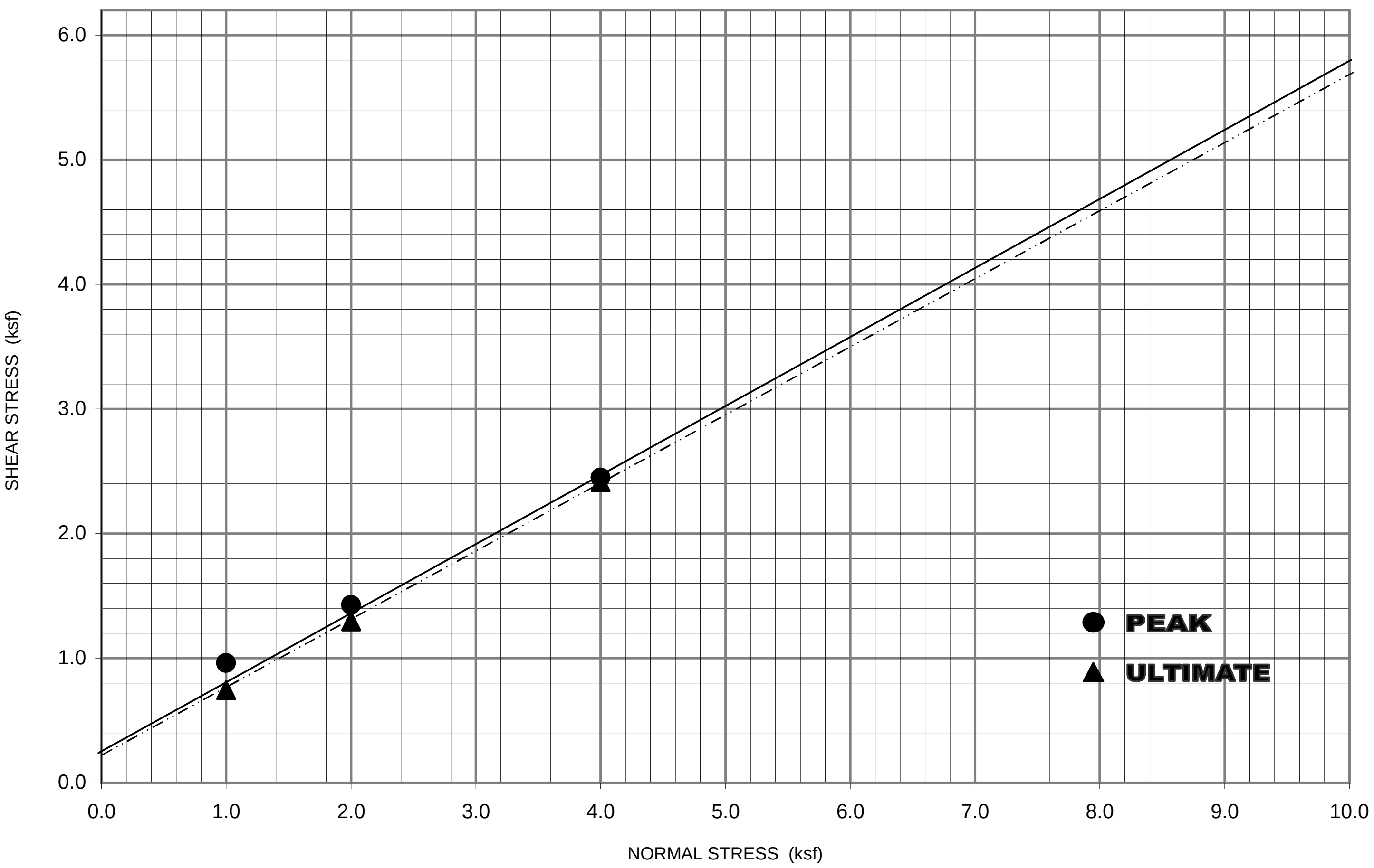
Applied Normal Load	(ksf)	1.0		2.0		4.0	
Shear Stress,(Peak)	(ksf)	0.960		1.428		2.448	
Shear Stress,(Ultimate)	(ksf)	0.744		1.296		2.412	
Density and Saturation		Initial	Final	Initial	Final	Initial	Final
Wet Weight of Soil + Ring	(gms)	196.32	203.02	197.2	204.88	196.81	203.48
Dry Weight of Soil + Ring	(gms)		181.66		182.54		182.15
Weight of Water	(gms)	-	46.54	-	47.28	-	45.81
Weight of Ring	(gms)	-	42.04	-	42.92	-	42.53
Weight of Dry Soil	(gms)	-	139.62	-	139.62	-	139.62
Moisture Content	(%)	10.5	33.3	10.5	33.9	10.5	32.8
Wet Density	(pcf)	128.8	134.4	128.8	135.2	128.8	134.3
Dry Density	(pcf)	-	100.8	-	101.0	-	101.2
Specific Gravity,G_s	(Assumed)	2.68					
Thickness of Specimen,	(in.)	1.00					
Degree of Saturation,	(%)	42.7	135.5	42.9	138.3	43.1	134.6
Void Ratio		-	0.659	-	0.656	-	0.653

Lateral Displacement, d_h 0.36 (in.)
Displacement Rate, d_r 0.05 (in./min.)
Elapsed Time of Test, t_e 7.20 (min.)

Specimen : Undisturbed : -
Remolded : X
Reconstituted : -

	PEAK	ULTIMATE
Cohesion,c (psf)	250	200
Friction Angle, ϕ	29	29

Remarks : SAMPLE REMOLDED TO 90% OF (129.5 PCF @ 10.5%)



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DIRECT SHEAR TEST

(ASTM D3080)

Project Name : JACK RABBIT TRAIL

Project No. : 18060-00

Boring / Sample No : B - 4 / KB - 4

Depth : 0' - 5' (ft.)

Tested By : RB

Date: 9-Jul-19

Sample Descriptions / Classification : DK. BROWN CLAYEY SAND (SC)

Applied Normal Load (ksf)	1.0		2.0		4.0	
Shear Stress,(Peak) (ksf)	0.924		1.356		2.472	
Shear Stress,(Ultimate) (ksf)	0.684		1.344		2.448	
Density and Saturation	Initial	Final	Initial	Final	Initial	Final
Wet Weight of Soil + Ring (gms)	198.07	206.36	199.88	208.53	196.33	205.13
Dry Weight of Soil + Ring (gms)		185.36		187.17		183.78
Weight of Water (gms)	-	46.54	-	47.28	-	45.81
Weight of Ring (gms)	-	44.12	-	45.93	-	44.38
Weight of Dry Soil (gms)	-	141.24	-	141.24	-	139.40
Moisture Content (%)	9.0	33.0	9.0	33.5	9.0	32.9
Wet Density (pcf)	128.5	135.4	128.5	135.7	126.9	134.2
Dry Density (pcf)	-	101.9	-	101.7	-	101.0
Specific Gravity,G_s (Assumed)	2.68					
Thickness of Specimen, (in.)	1.00					
Degree of Saturation, (%)	37.6	137.6	37.4	139.2	36.8	134.3
Void Ratio	-	0.642	-	0.645	-	0.656

Lateral Displacement, d_h 0.36 (in.)

Displacement Rate, d_r 0.05 (in./min.)

Elapsed Time of Test, t_e 7.20 (min.)

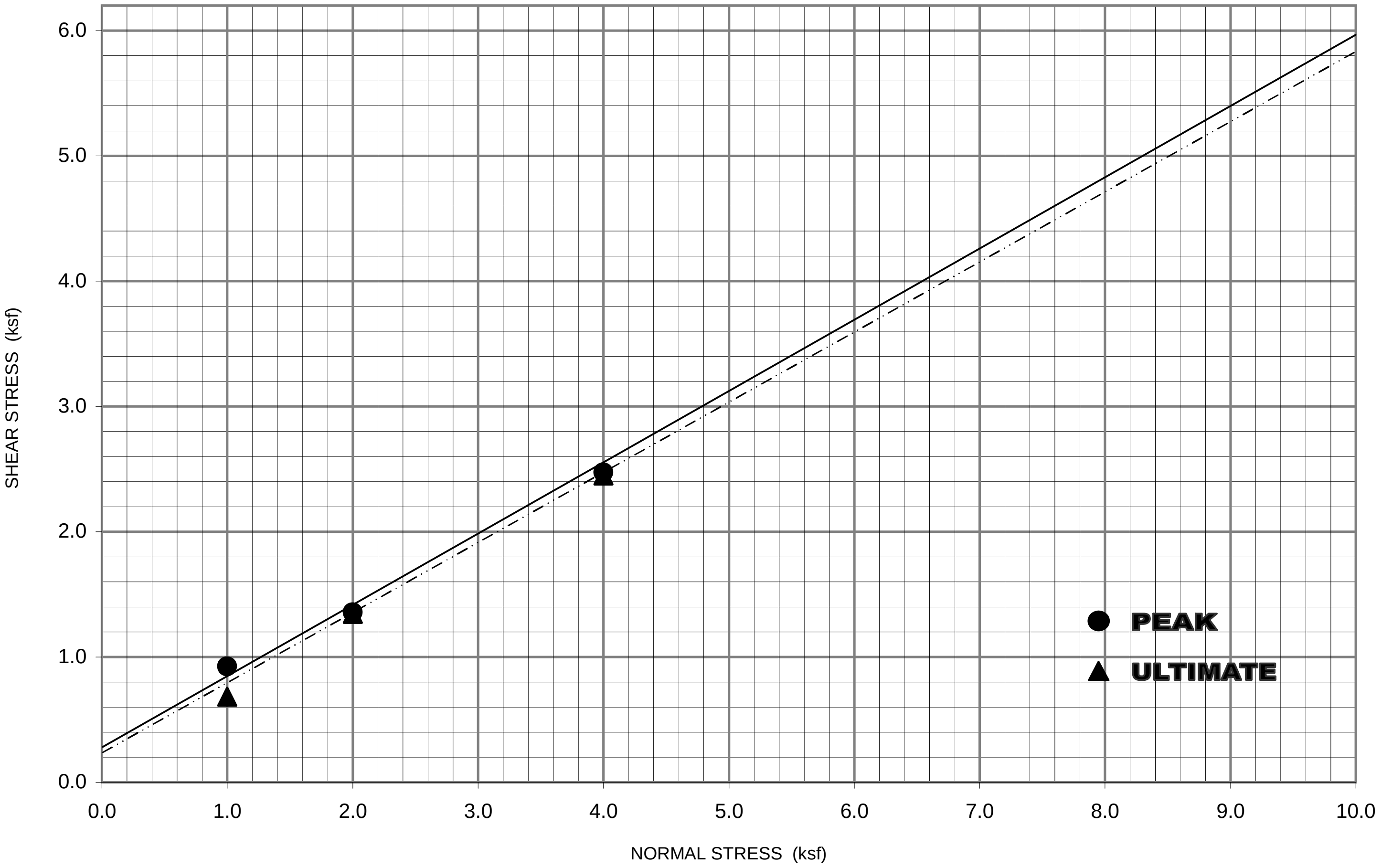
Specimen : Undisturbed : -

Remolded : X

Reconstituted : -

	PEAK	ULTIMATE
Cohesion,c (psf)	250	200
Friction Angle, ϕ	30	29

Remarks : SAMPLE REMOLDED TO 90% OF (131.0 PCF @ 9.0%)



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8008 Sky Park Circle, Suite 250
Irvine, Ca. 92614
Tel: (949)797-6241 Fax: (949)797-6260

DIRECT SHEAR TEST

(ASTM D3080)

Project Name : JACK RABBIT TRAIL

Project No. : 18060-01

Boring / Sample No : B - 5 / KB - 1

Depth : 0' - 5' (ft.)

Tested By : RB

Date: 23-Jul-19

Sample Descriptions / Classification : DK. BROWN CLAYEY SAND (SC)

Applied Normal Load	(ksf)	1.0		2.0		4.0	
Shear Stress,(Peak)	(ksf)	0.924		1.320		2.328	
Shear Stress,(Ultimate)	(ksf)	0.672		1.224		2.328	
Density and Saturation		Initial	Final	Initial	Final	Initial	Final
Wet Weight of Soil + Ring	(gms)	197.51	204.07	197.94	205.22	197.84	205.39
Dry Weight of Soil + Ring	(gms)		182.96		183.39		183.29
Weight of Water	(gms)	-	46.54	-	47.28	-	45.81
Weight of Ring	(gms)	-	44.42	-	44.85	-	44.75
Weight of Dry Soil	(gms)	-	138.54	-	138.54	-	138.54
Moisture Content	(%)	10.5	33.6	10.5	34.1	10.5	33.1
Wet Density	(pcf)	127.8	133.3	127.8	133.9	127.8	134.1
Dry Density	(pcf)	-	99.8	-	99.8	-	100.8
Specific Gravity,G_s	(Assumed)	2.68					
Thickness of Specimen,	(in.)	1.00					
Degree of Saturation,	(%)	41.6	133.1	41.6	135.3	42.7	134.3
Void Ratio		-	0.676	-	0.676	-	0.660

Lateral Displacement, d_h 0.36 (in.)

Displacement Rate, d_r 0.05 (in./min.)

Elapsed Time of Test, t_e 7.20 (min.)

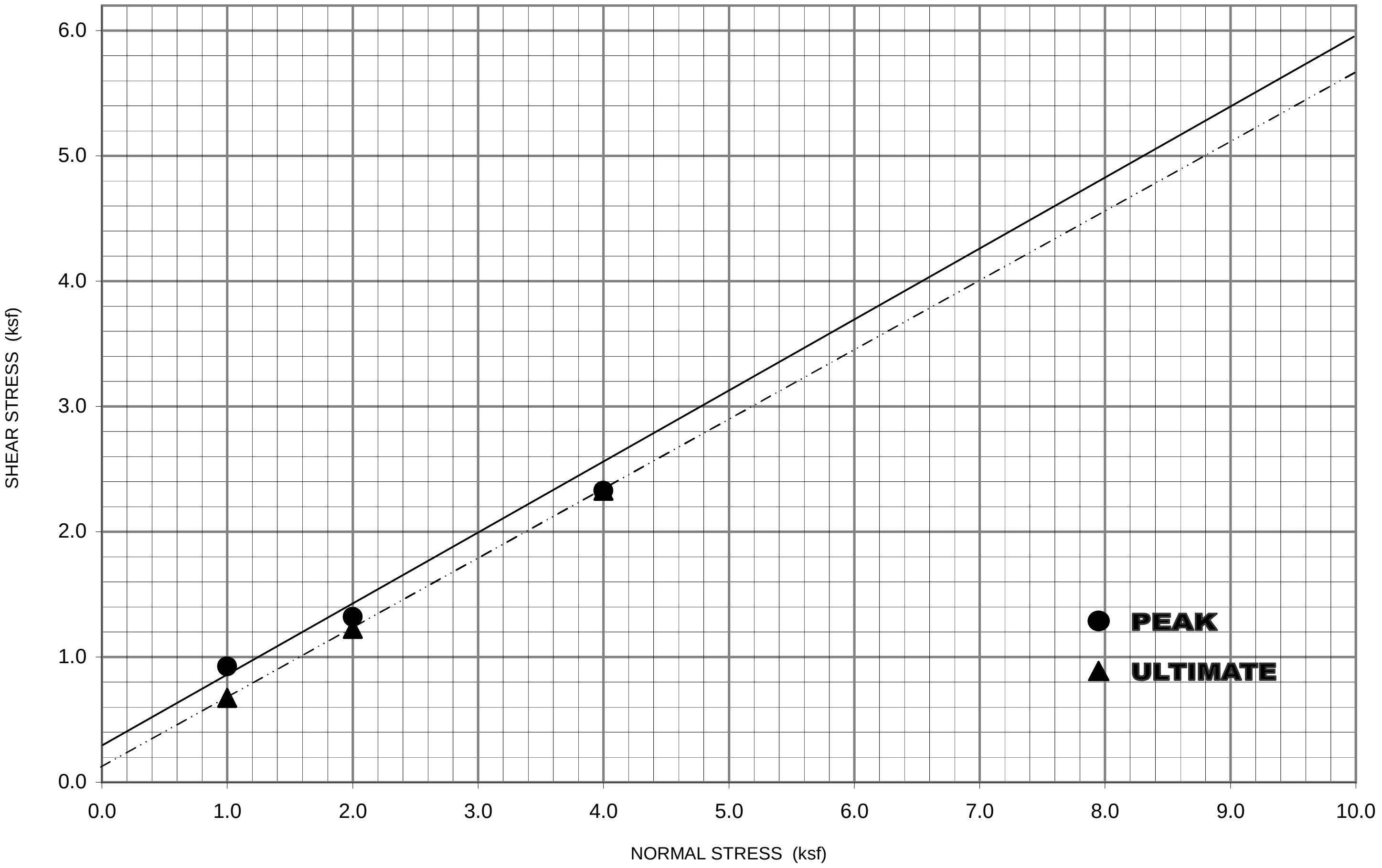
Specimen : Undisturbed : -

Remolded : X

Reconstituted : -

	PEAK	ULTIMATE
Cohesion,c (psf)	350	150
Friction Angle, ϕ	29	29

Remarks : SAMPLE REMOLDED TO 90% OF (128.5 PCF @ 10.5%)



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Irvine, Ca. 92614
Tel: (949)797-6241 Fax: (949)797-6260

DIRECT SHEAR TEST
(ASTM D3080)

Project Name : JACK RABBIT TRAIL

Project No. : 18060-01

Boring / Sample No : B - 7 / KB - 9

Depth : 0' - 5' (ft.)

Tested By : RB

Date: 23-Jul-19

Sample Descriptions / Classification : DK. BROWN CLAYEY SAND (SC)

Applied Normal Load (ksf)	1.0		2.0		4.0	
Shear Stress,(Peak) (ksf)	0.780		1.344		2.352	
Shear Stress,(Ultimate) (ksf)	0.672		1.236		2.316	
Density and Saturation	Initial	Final	Initial	Final	Initial	Final
Wet Weight of Soil + Ring (gms)	200.57	207.75	201.14	207.68	201.15	208.59
Dry Weight of Soil + Ring (gms)		187.10		187.67		187.68
Weight of Water (gms)	-	46.54	-	47.28	-	45.81
Weight of Ring (gms)	-	45.33	-	45.90	-	45.91
Weight of Dry Soil (gms)	-	141.77	-	141.77	-	141.77
Moisture Content (%)	9.5	32.8	9.5	33.3	9.5	32.3
Wet Density (pcf)	129.6	135.6	129.6	135.0	129.6	135.8
Dry Density (pcf)	-	102.1	-	101.3	-	102.6
Specific Gravity,G_s (Assumed)	2.68					
Thickness of Specimen, (in.)	1.00					
Degree of Saturation, (%)	39.9	137.8	39.1	137.2	40.4	137.5
Void Ratio	-	0.638	-	0.651	-	0.630

Lateral Displacement, d_h 0.36 (in.)

Displacement Rate, d_r 0.05 (in./min.)

Elapsed Time of Test, t_e 7.20 (min.)

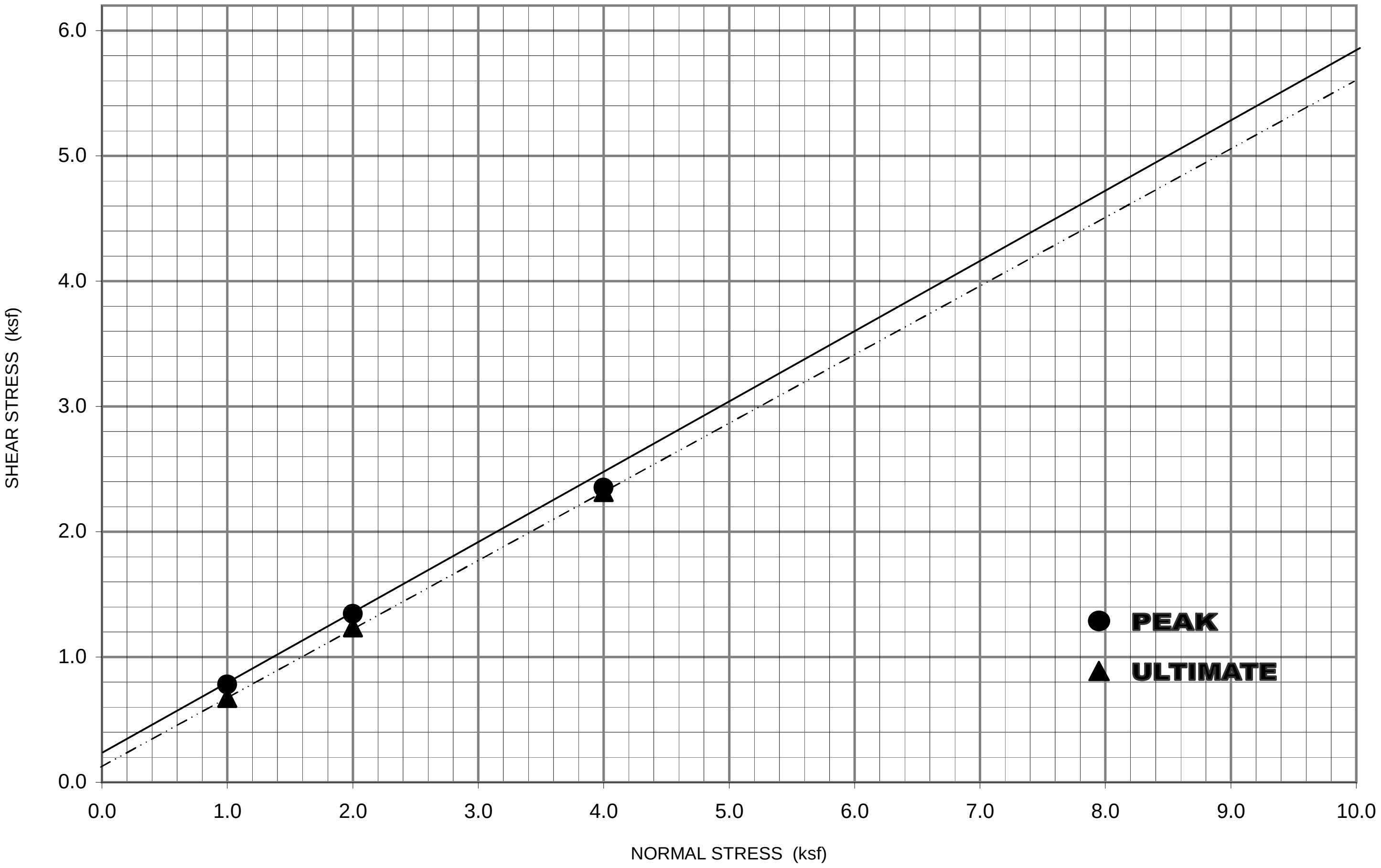
Specimen : Undisturbed : -

Remolded : X

Reconstituted : -

	PEAK	ULTIMATE
Cohesion,c (psf)	300	150
Friction Angle, ϕ	29	29

Remarks : SAMPLE REMOLDED TO 90% OF (131.5 PCF @ 9.5%)



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DIRECT SHEAR TEST

(ASTM D3080)

Project Name : JACK RABBIT TRAIL
Project No. : 18060-01
Boring / Sample No : B - 11 / KTP-3
Depth : 6' (ft.)
Tested By : RB
Date: 24-Jul-19
Sample Descriptions / Classification : REDDISH BROWN SANDY CLAY (CL)

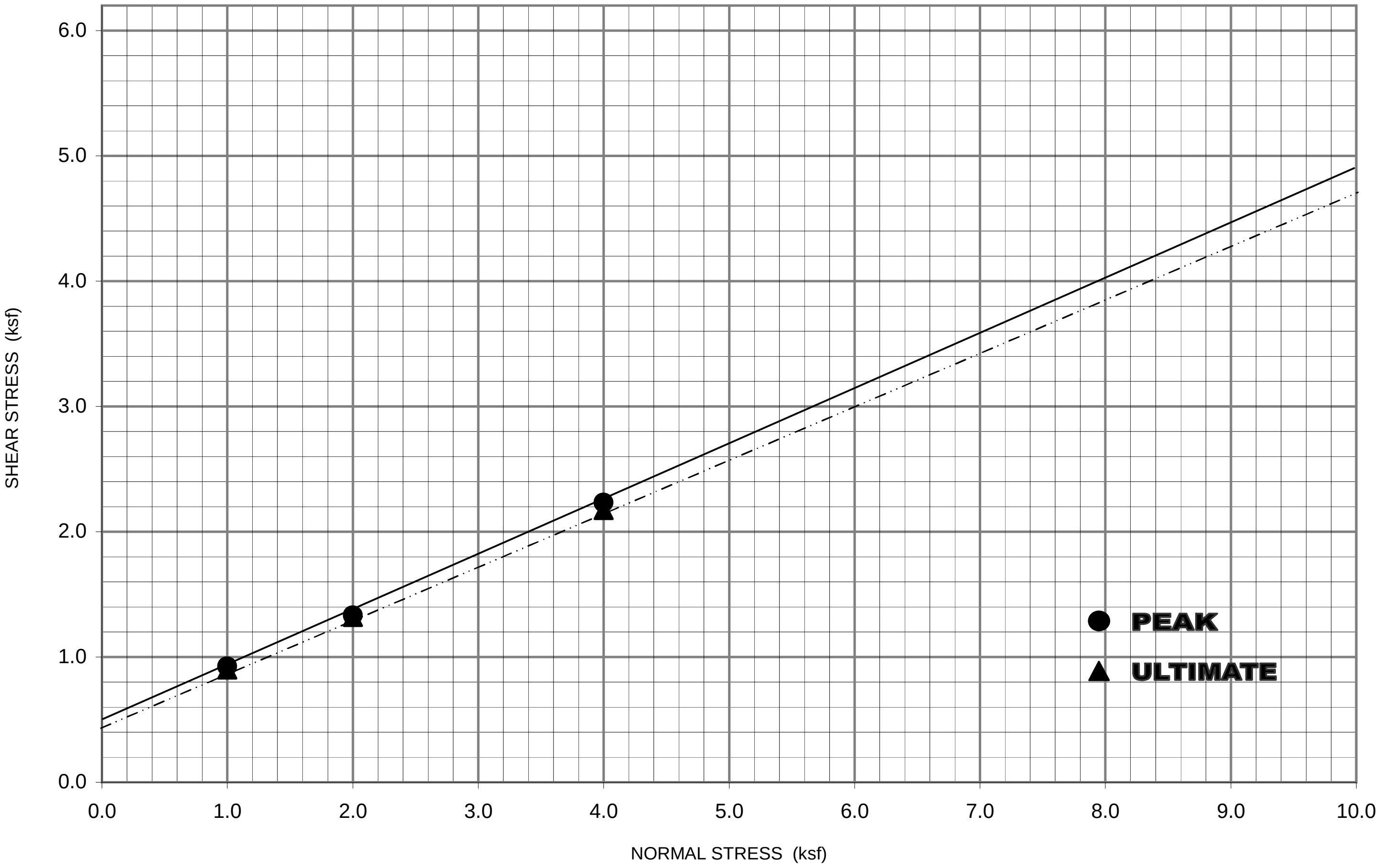
Applied Normal Load (ksf)	1.0		2.0		4.0	
Shear Stress,(Peak) (ksf)	0.924		1.332		2.232	
Shear Stress,(Ultimate) (ksf)	0.900		1.320		2.172	
Density and Saturation	Initial	Final	Initial	Final	Initial	Final
Wet Weight of Soil + Ring (gms)	195.39	204.04	195.23	204.01	194.96	203.91
Dry Weight of Soil + Ring (gms)		179.35		179.19		178.92
Weight of Water (gms)	-	46.54	-	47.28	-	45.81
Weight of Ring (gms)	-	45.66	-	45.5	-	45.23
Weight of Dry Soil (gms)	-	133.69	-	133.69	-	133.69
Moisture Content (%)	12.0	34.8	12.0	35.4	12.0	34.3
Wet Density (pcf)	125.0	132.2	125.0	132.3	125.0	132.5
Dry Density (pcf)	-	98.1	-	97.7	-	98.6
Specific Gravity,G_s (Assumed)	2.68					
Thickness of Specimen, (in.)	1.00					
Degree of Saturation, (%)	45.6	132.3	45.2	133.3	46.3	132.1
Void Ratio	-	0.705	-	0.711	-	0.695

Lateral Displacement, d_h 0.36 (in.)
Displacement Rate, d_r 0.05 (in./min.)
Elapsed Time of Test, t_e 7.20 (min.)

Specimen : Undisturbed : -
Remolded : X
Reconstituted : -

	PEAK	ULTIMATE
Cohesion,c (psf)	500	400
Friction Angle, ϕ	24	23

Remarks : SAMPLE REMOLDED TO 90% OF (124.0 PCF @ 12.0%)



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Irvine, Ca. 92614
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DIRECT SHEAR TEST

(ASTM D3080)

Project Name : JACK RABBIT TRAIL
Project No. : 18060-01
Boring / Sample No : B - 13 / KTP - 7
Depth : 4' - 6' (ft.)
Tested By : RB
Date: 29-Jul-19
Sample Descriptions / Classification : LT. BROWN SILTY FINE SAND (SM)

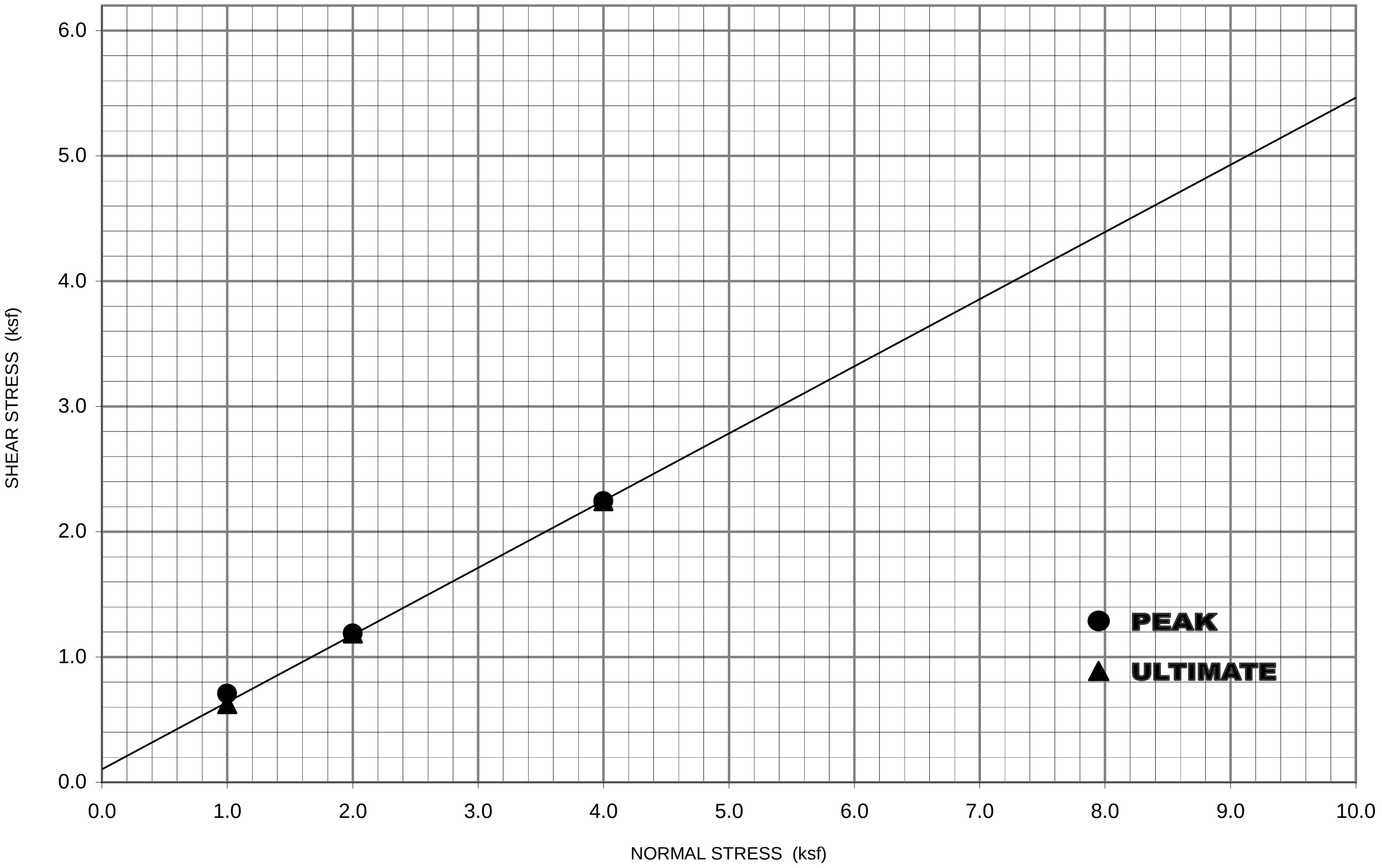
Applied Normal Load (ksf)	**1.0**		**2.0**		**4.0**	
Shear Stress,(Peak) (ksf)	0.708		1.188		2.244	
Shear Stress,(Ultimate) (ksf)	0.624		1.188		2.244	
Density and Saturation	Initial	Final	Initial	Final	Initial	Final
Wet Weight of Soil + Ring (gms)	191.98	200.61	192.02	200.63	191.74	199.86
Dry Weight of Soil + Ring (gms)		175.74		175.78		175.50
Weight of Water (gms)	-	46.54	-	47.28	-	45.81
Weight of Ring (gms)	-	45.83	-	45.87	-	45.59
Weight of Dry Soil (gms)	-	129.91	-	129.91	-	129.91
Moisture Content (%)	12.5	35.8	12.5	36.4	12.5	35.3
Wet Density (pcf)	122.0	129.2	122.0	129.2	122.0	128.8
Dry Density (pcf)	-	95.1	-	94.7	-	95.2
Specific Gravity,G_s (Assumed)	2.68					
Thickness of Specimen, (in.)	1.00					
Degree of Saturation, (%)	44.2	126.6	43.7	127.4	44.3	124.9
Void Ratio	-	0.758	-	0.766	-	0.757

Lateral Displacement, d_h 0.36 (in.)
Displacement Rate, d_r 0.05 (in./min.)
Elapsed Time of Test, t_e 7.20 (min.)

Specimen : Undisturbed : -
Remolded : x
Reconstituted : -

	PEAK	ULTIMATE
Cohesion,c (psf)	100	100
Friction Angle, ϕ	28	28

Remarks : SAMPLE REMOLDED TO 90% OF (120.5 PCF @ 12.5%)



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DIRECT SHEAR TEST
(ASTM D3080)

PROJECT NAME : JACK RABBIT TRAIL

PROJECT NUMBER : 18060-01

TRACT NUMBER :

TESTED BY : RB DATE : 17-Jul-19

LOT NUMBER :

SAMPLED BY: DKL DATE : 25-Jun-19

SAMPLE NO. :

LOCATION : B - 1 / KB - 5 @ 0' - 5'

SOIL DESCRIPTIONS / CLASSIFICATION : DK. BROWN CLAYEY SAND (SC)

TRIAL NUMBER		1	2	3	4
WET WT. OF SOIL + RING	(g)	619.35	627.48		
WEIGHT OF RING	(g)	204.33	204.33		
WET WEIGHT OF SOIL	(g)	415.02	423.15		
FACTOR		0.3030	0.3030		
WET DENSITY	(pcf)	125.8	128.2		
DRY DENSITY	(pcf)	117.4	119.0		
DEGREE OF SATURATION	(%)	44.0	50.1		

MOISTURE DETERMINATION

WET WEIGHT OF SOIL	(g)	347.58	321.05		
DRY WEIGHT OF SOIL	(g)	324.59	298.10		
MOISTURE CONTENT	(%)	7.1	7.7		

RACK NO. : 4

SURCHARGE : 144 psf

FINAL DENSITY & SATURATION

WET WT. + RING	(g)	
DRY WT. + RING	(g)	
MOISTURE CONTENT	(%)	
SAMPLE LENGTH	(cm)	
SAMPLE AREA	(cm^2)	
VOLUME	(cc)	
WT. OF RING	(g)	
DRY DENSITY	(pcf)	
SPEC.GRAVITY (assumed)		2.70
SATURATION	(%)	
% RETAINED ON #4 SIEVE		

DATE	TIME	ELAPSED TIME (min.)	DIAL READING (in.)	DEFLECTION (in.)
17-Jul	8:38		0.443	
18-Jul	5:07		0.466	
18-Jul	10:40		0.466	0.023

E. I. 23

SO_4 30 ppm

REMARKS :

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EXPANSION INDEX

(UBC 18-2)

PROJECT NAME : JACK RABBIT TRAIL

PROJECT NUMBER : 18060-01

TRACT NUMBER :

TESTED BY : RB

DATE : 17-Jul-19

LOT NUMBER :

SAMPLED BY: DKL

DATE : 25-Jun-19

SAMPLE NO. :

LOCATION : B - 3 / KB - 3 @ 0' - 5'

SOIL DESCRIPTIONS / CLASSIFICATION : DK. BROWN CLAYEY SAND (SC)

TRIAL NUMBER		1	2	3	4
WET WT. OF SOIL + RING	(g)	644.75	617.66		
WEIGHT OF RING	(g)	204.45	204.45		
WET WEIGHT OF SOIL	(g)	440.30	413.21		
FACTOR		0.3030	0.3030		
WET DENSITY	(pcf)	133.4	125.2		
DRY DENSITY	(pcf)	120.6	115.6		
DEGREE OF SATURATION	(%)	72.2	49.0		

MOISTURE DETERMINATION

WET WEIGHT OF SOIL	(g)	320.50	307.16		
DRY WEIGHT OF SOIL	(g)	289.76	283.62		
MOISTURE CONTENT	(%)	10.6	8.3		

RACK NO. : 3

SURCHARGE : 144 psf

FINAL DENSITY & SATURATION

WET WT. + RING	(g)	
DRY WT. + RING	(g)	
MOISTURE CONTENT	(%)	
SAMPLE LENGTH	(cm)	
SAMPLE AREA	(cm^2)	
VOLUME	(cc)	
WT. OF RING	(g)	
DRY DENSITY	(pcf)	
SPEC.GRAVITY (assumed)		2.70
SATURATION	(%)	
% RETAINED ON #4 SIEVE		

DATE	TIME	ELAPSED TIME (min.)	DIAL READING (in.)	DEFLECTION (in.)
17-Jul	7:54		0.589	
18-Jul	5:07		0.626	
18-Jul	10:38		0.626	0.037
E. I.	37		SO_4 36 ppm	

REMARKS :

KCG KLING Consulting Group, Inc.

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Irvine, Ca. 92614
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EXPANSION INDEX

(UBC 18-2)

PROJECT NAME : JACK RABBIT TRAIL
PROJECT NUMBER : 18060-01
TRACT NUMBER :
TESTED BY : RB DATE : 17-Jul-19
LOT NUMBER :
SAMPLED BY: DKL DATE : 25-Jun-19
SAMPLE NO. :
LOCATION : B - 6 / KB - 2 @ 0' - 5'
SOIL DESCRIPTIONS / CLASSIFICATION : DK. BROWN CLAYEY SAND (SC)

TRIAL NUMBER		1	2	3	4
WET WT. OF SOIL + RING	(g)	630.27	623.81		
WEIGHT OF RING	(g)	204.42	204.42		
WET WEIGHT OF SOIL	(g)	425.85	419.39		
FACTOR		0.3030	0.3030		
WET DENSITY	(pcf)	129.0	127.1		
DRY DENSITY	(pcf)	118.9	117.7		
DEGREE OF SATURATION	(%)	55.2	50.0		

MOISTURE DETERMINATION

WET WEIGHT OF SOIL	(g)	328.73	305.41		
DRY WEIGHT OF SOIL	(g)	302.92	282.79		
MOISTURE CONTENT	(%)	8.5	8.0		

RACK NO. : 2
SURCHARGE : 144 psf

FINAL DENSITY & SATURATION

WET WT. + RING	(g)	
DRY WT. + RING	(g)	
MOISTURE CONTENT	(%)	
SAMPLE LENGTH	(cm)	
SAMPLE AREA	(cm^2)	
VOLUME	(cc)	
WT. OF RING	(g)	
DRY DENSITY	(pcf)	
SPEC.GRAVITY (assumed)		2.70
SATURATION	(%)	
% RETAINED ON #4 SIEVE		

DATE	TIME	ELAPSED TIME (min.)	DIAL READING (in.)	DEFLECTION (in.)
17-Jul	7:34		0.234	
18-Jul	5:07		0.255	
18-Jul	10:38		0.255	0.021

E. I. 21
SO_4 9 ppm

REMARKS :

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EXPANSION INDEX
(UBC 18-2)

PROJECT NAME : JACK RABBIT TRAIL
PROJECT NUMBER : 18060-01
TRACT NUMBER :
TESTED BY : RB DATE : 16-Jul-19
LOT NUMBER :
SAMPLED BY: DKL DATE : 25-Jun-19
SAMPLE NO. :
LOCATION : B - 8 / KB - 10 @ 0' - 5'
SOIL DESCRIPTIONS / CLASSIFICATION : DK. BROWN CLAYEY SAND (SC)

TRIAL NUMBER		1	2	3	4
WET WT. OF SOIL + RING	(g)	628.32	619.06		
WEIGHT OF RING	(g)	203.61	203.61		
WET WEIGHT OF SOIL	(g)	424.71	415.45		
FACTOR		0.3030	0.3030		
WET DENSITY	(pcf)	128.7	125.9		
DRY DENSITY	(pcf)	118.0	116.3		
DEGREE OF SATURATION	(%)	57.1	49.4		

MOISTURE DETERMINATION

WET WEIGHT OF SOIL	(g)	335.51	311.46		
DRY WEIGHT OF SOIL	(g)	307.66	287.86		
MOISTURE CONTENT	(%)	9.1	8.2		

RACK NO. : 1
SURCHARGE : 144 psf

FINAL DENSITY & SATURATION

WET WT. + RING	(g)	
DRY WT. + RING	(g)	
MOISTURE CONTENT	(%)	
SAMPLE LENGTH	(cm)	
SAMPLE AREA	(cm^2)	
VOLUME	(cc)	
WT. OF RING	(g)	
DRY DENSITY	(pcf)	
SPEC.GRAVITY (assumed)		2.70
SATURATION	(%)	
% RETAINED ON #4 SIEVE		

DATE	TIME	ELAPSED TIME (min.)	DIAL READING (in.)	DEFLECTION (in.)
16-Jul	9:51		0.436	
16-Jul	11:43		0.459	
17-Jul	9:15		0.460	0.024

E. I. 24

SO_4 21 ppm

REMARKS :

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EXPANSION INDEX
(UBC 18-2)

PROJECT NAME : JACK RABBIT TRAIL

PROJECT NUMBER : 18060-01

TRACT NUMBER :

TESTED BY : RB DATE : 25-Jul-19

LOT NUMBER :

SAMPLED BY: DKL DATE : 28-Jun-19

SAMPLE NO. :

LOCATION : B - 13 / KTP - 7 @ 4' - 6'

SOIL DESCRIPTIONS / CLASSIFICATION : LT. BROWN SILTY FINE SAND (SM)

TRIAL NUMBER		1	2	3	4
WET WT. OF SOIL + RING	(g)	583.59	609.61		
WEIGHT OF RING	(g)	204.42	204.42		
WET WEIGHT OF SOIL	(g)	379.17	405.19		
FACTOR		0.3030	0.3030		
WET DENSITY	(pcf)	114.9	122.8		
DRY DENSITY	(pcf)	108.0	112.6		
DEGREE OF SATURATION	(%)	30.6	49.0		

MOISTURE DETERMINATION

WET WEIGHT OF SOIL	(g)	336.95	311.56		
DRY WEIGHT OF SOIL	(g)	316.88	285.83		
MOISTURE CONTENT	(%)	6.3	9.0		

RACK NO. : 2

SURCHARGE : 144 psf

FINAL DENSITY & SATURATION

WET WT. + RING	(g)	
DRY WT. + RING	(g)	
MOISTURE CONTENT	(%)	
SAMPLE LENGTH	(cm)	
SAMPLE AREA	(cm^2)	
VOLUME	(cc)	
WT. OF RING	(g)	
DRY DENSITY	(pcf)	
SPEC.GRAVITY (assumed)		2.70
SATURATION	(%)	
% RETAINED ON #4 SIEVE		

DATE	TIME	ELAPSED TIME (min.)	DIAL READING (in.)	DEFLECTION (in.)
25-Jul	10:47		0.255	
25-Jul	12:00		0.256	
26-Jul	12:20		0.256	0.001
E. I.	1	SO_4	12	ppm

REMARKS :

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EXPANSION INDEX

(UBC 18-2)

ANAHEIM TEST LAB, INC

197 Technology Drive, Unit D
Irvine, CA 92618
Phone (949) 336-6544

DATE: 07/03/2019

KLING CONSULTING GROUP, INC.
18008 SKY PARK CIRCLE, STE 250
IRVINE, CA 92614

P.O. NO. Verbal

LAB NO: C-3031

SPECIFICATION: CTM-417/422/643

MATERIAL: Soil

Project No.: 18060-00
Project: Jack Rabbit Trail

ANALYTICAL REPORT

CORROSION SERIES

SUMMARY OF DATA

	pH	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm	MIN. RESISTIVITY per CT. 643 ohm-cm
B5/KB1 @ 0-5’	6.8	94	29	2,800

RESPECTFULLY SUBMITTED

WES BRIDGER LAB MANAGER

ANAHEIM TEST LAB, INC
197 Technology Drive, Unit D
Irvine, CA 92618
Phone (949) 336-6544

DATE: 07/12/2019

KLING CONSULTING GROUP, INC.
18008 SKY PARK CIRCLE, STE 250
IRVINE, CA 92614

P.O. NO. Verbal

LAB NO: C-3039

SPECIFICATION: CTM-417/422/643

MATERIAL: Soil

Project No.: 18060-01
Project: Jack Rabbit Trail

ANALYTICAL REPORT

CORROSION SERIES

SUMMARY OF DATA

	pH	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm	MIN. RESISTIVITY per CT. 643 ohm-cm
B-1/KB-5 @ 0-5’	7.0	148	59	2,500

RESPECTFULLY SUBMITTED

WES BRIDGER LAB MANAGER

- ANALYSIS
- DESIGN

LaBelle • Marvin

PROFESSIONAL PAVEMENT ENGINEERING

A CALIFORNIA CORPORATION

- SOILS, ASPHALT TECHNOLOGY

July 11, 2019

RECEIVED
JUL 15 2019
KLING CONSULTING GROUP

Mr. Dante Domingo
Kling Consulting Group
18008 Sky Park Circle #250
Irvine, California 92614

Project No. 45094

Dear Mr. Domingo:

Testing of the bulk soil samples delivered to our laboratory on 7/9/2019 has been completed.

Reference:	J.N. 18060-01 (JB)
Project:	Jack Rabbit Trail
Samples:	B-9 / KB-7 @ 0'-5' B-10 / KB-8 @ 0'-5'

Data sheets are attached for your use and file. Any untested portion of the sample will be retained for a period of 60 days prior to disposal. The opportunity to be of service is sincerely appreciated and should you have any questions, kindly call.

Respectfully Submitted,

STEVEN R. MARVIN
NO. 30659

Steven R. Marvin
RCE 30659

SRM:jw
Enclosure

2700 S. GRAND AVENUE • SANTA ANA, CA 92705-5404 • (714) 546-3468 • FAX (714) 546-5841
INFO@LABELLEMARVIN.COM

LaBelle Marvin

R - VALUE DATA SHEET

PROJECT No. 45094
DATE: 7/11/2019

BORING NO. B-9 / KB-7 @ 0'-5'
Jack Rabbit Trail
P.N. 18060-01

SAMPLE DESCRIPTION: Brown Silty Fine Sand

R-VALUE TESTING DATA | CA TEST 301

	SPECIMEN ID		
	a	b	c
Mold ID Number	4	5	6
Water added, grams	75	55	39
Initial Test Water, %	12.7	10.7	9.2
Compact Gage Pressure,psi	70	185	350
Exudation Pressure, psi	171	296	553
Height Sample, Inches	2.62	2.57	2.43
Gross Weight Mold, grams	3121	3076	3079
Tare Weight Mold, grams	1957	1944	1955
Sample Wet Weight, grams	1164	1132	1124
Expansion, Inches x 10exp-4	5	26	68
Stability 2,000 lbs (160psi)	47 / 111	28 / 62	19 / 39
Turns Displacement	4.72	4.00	3.92
R-Value Uncorrected	19	50	66
R-Value Corrected	20	52	65
Dry Density, pcf	119.5	120.5	128.3

DESIGN CALCULATION DATA

Traffic Index Assumed:	4.0	4.0	4.0
G.E. by Stability	0.82	0.49	0.36
G. E. by Expansion	0.17	0.87	2.27

Equilibrium R-Value	**41** by EXPANSION	Examined & Checked: 7 /11/ 19

REMARKS:
Gf = 1.25
0.6% Retained on the
3/4" Sieve.

C 30659

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

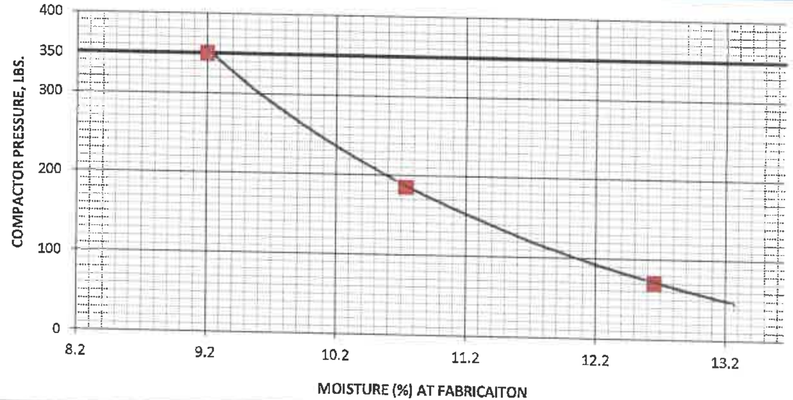
PROJECT NO. 45094

DATE: 7 /11/ 19

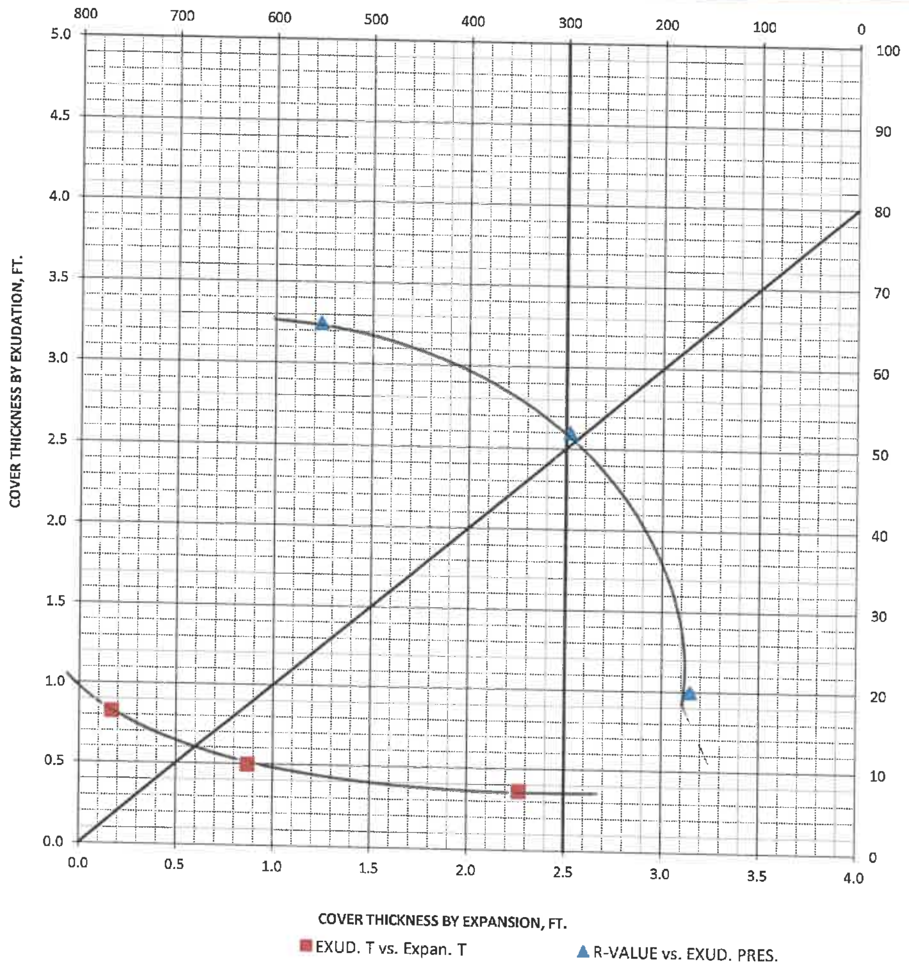
BORING NO. B-9 / KB-7 @ 0'-5'
Jack Rabbit Trail
P.N. 18060-01

REMARKS:

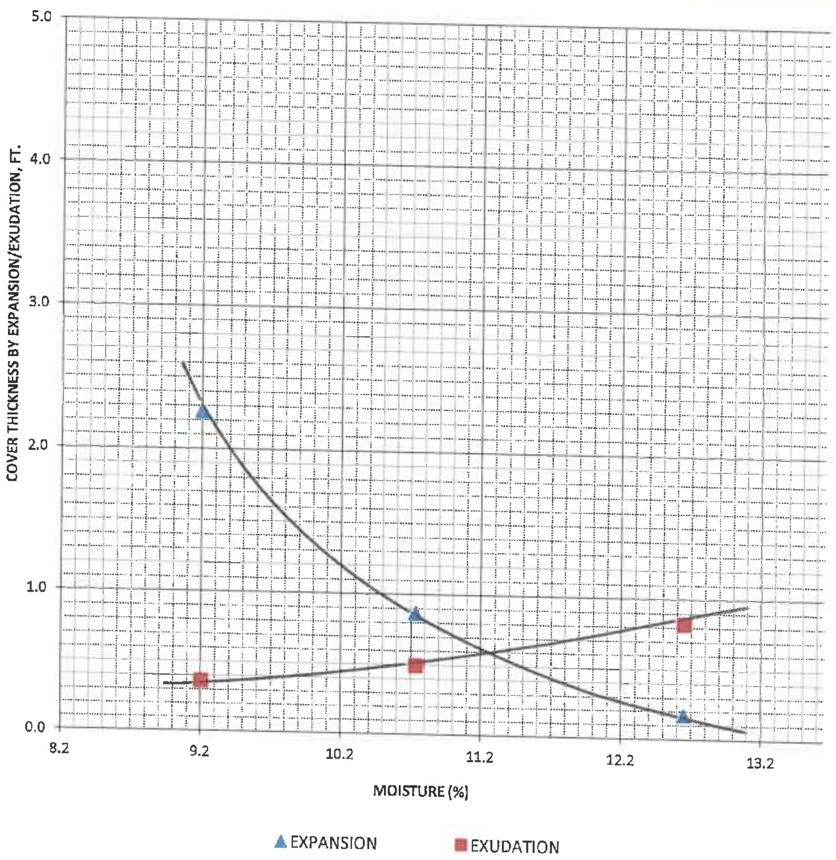
COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %



LaBelle Marvin

R - VALUE DATA SHEET

PROJECT No. 45094
DATE: 7/11/2019

BORING NO. B-10 / KB-8 @ 0'-5'
Jack Rabbit Trail
P.N. 18060-01

SAMPLE DESCRIPTION: Brown Silty Fine Sand

R-VALUE TESTING DATA | CA TEST 301

	SPECIMEN ID		
	a	b	c
Mold ID Number	1	2	3
Water added, grams	85	66	57
Initial Test Water, %	11.1	9.3	8.4
Compact Gage Pressure,psi	90	350	350
Exudation Pressure, psi	188	417	669
Height Sample, Inches	2.58	2.49	2.45
Gross Weight Mold, grams	3122	3099	3109
Tare Weight Mold, grams	1954	1946	1958
Sample Wet Weight, grams	1168	1153	1151
Expansion, Inches x 10exp-4	2	12	33
Stability 2,000 lbs (160psi)	43 / 96	24 / 61	15 / 27
Turns Displacement	4.73	3.88	3.65
R-Value Uncorrected	26	51	77
R-Value Corrected	27	51	77
Dry Density, pcf	123.5	128.4	131.3

DESIGN CALCULATION DATA

Traffic Index Assumed:	4.0	4.0	4.0
G.E. by Stability	0.75	0.50	0.24
G. E. by Expansion	0.07	0.40	1.10

Equilibrium R-Value 40 by EXUDATION

Examined & Checked: 7 /11/ 19

REMARKS:
Gf = 1.25
0.5% Retained on the
3/4" Sieve.

STEVEN R. MARVIN
C 30659

Steven R. Marvin, RCE 30659

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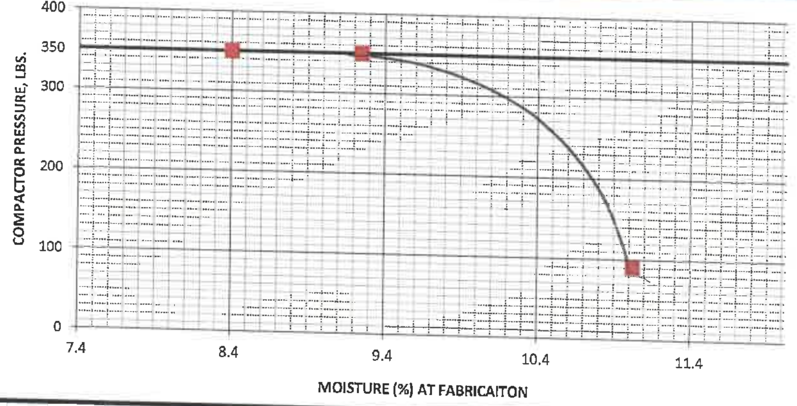
LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

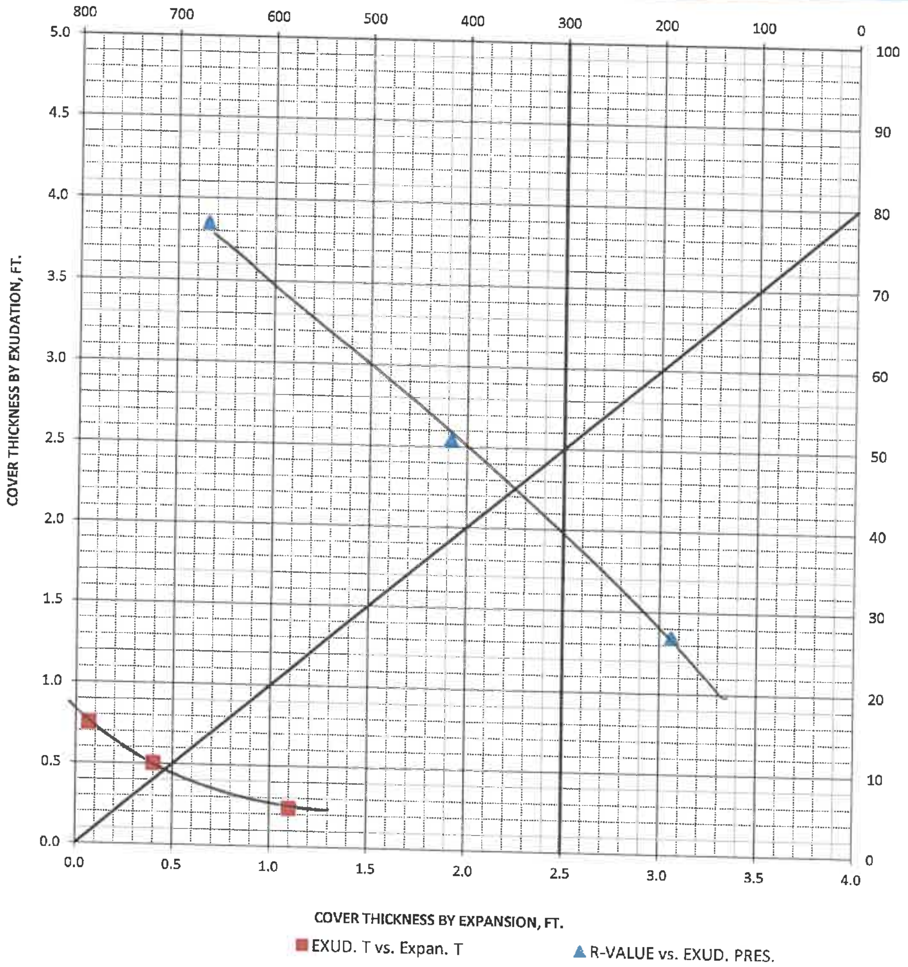
PROJECT NO. 45094
DATE: 7 /11/ 19
BORING NO. B-10 / KB-8 @ 0'-5'
Jack Rabbit Trail
P.N. 18060-01

REMARKS:

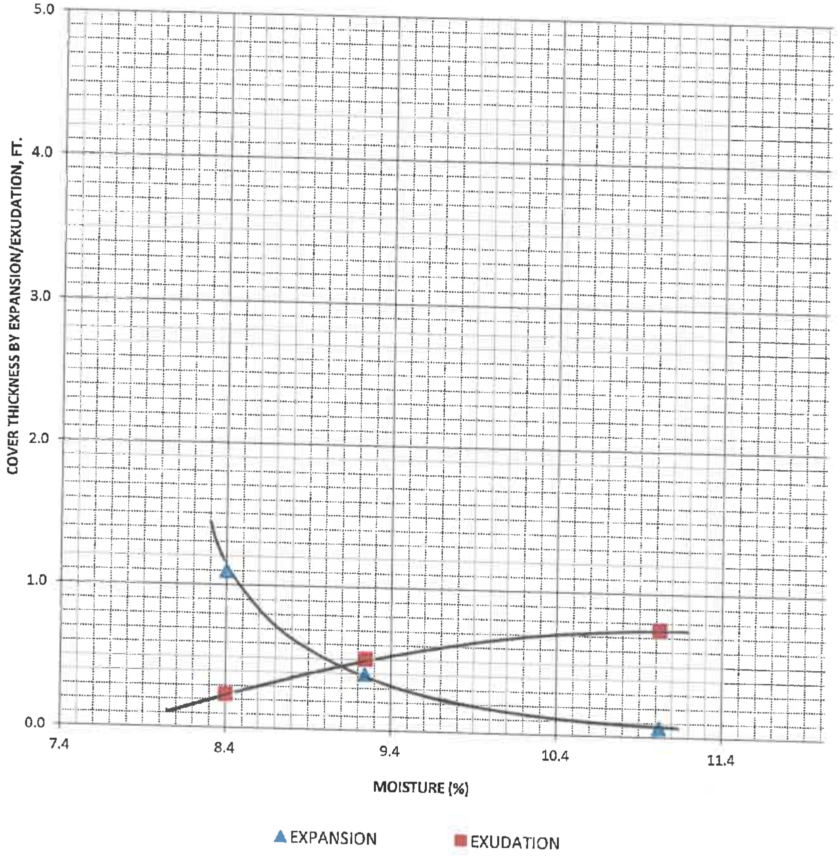
COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %



- ANALYSIS
- DESIGN

LaBelle • Marvin

PROFESSIONAL PAVEMENT ENGINEERING

A CALIFORNIA CORPORATION

- SOILS, ASPHALT TECHNOLOGY

July 25, 2019

Mr. Dante Domingo
Kling Consulting Group
18008 Sky Park Circle #250
Irvine, California 92614

Project No. 45149

Dear Mr. Domingo:

Testing of the bulk soil sample delivered to our laboratory on 7/23/2019 has been completed.

Reference: J.N. 18060-01
Project: Jack Rabbit Trail, 7/8/2019
Sample: KTP-3 @ 6'

Data sheets are attached for your use and file. Any untested portion of the sample will be retained for a period of 60 days prior to disposal. The opportunity to be of service is sincerely appreciated and should you have any questions, kindly call.

Respectfully Submitted,

STEVEN R. MARVIN
NO. 30659

Steven R. Marvin
RCE 30659

SRM:jw
Enclosure

2700 S. GRAND AVENUE • SANTA ANA, CA 92705-5404 • (714) 546-3468 • FAX (714) 546-5841
INFO@LABELLEMARVIN.COM

LaBelle Marvin

R - VALUE DATA SHEET

PROJECT No. 45149
DATE: 7/25/2019

BORING NO. KTP-3 @ 6'
Jack Rabbit Trail, 7/8/19
P.N. 18060-01

SAMPLE DESCRIPTION: Brown Sandy Clay

R-VALUE TESTING DATA | CA TEST 301

	SPECIMEN ID		
	a	b	c
Mold ID Number	4	5	6
Water added, grams	80	55	122
Initial Test Water, %	15.7	13.2	20.0
Compact Gage Pressure,psi	60	140	30
Exudation Pressure, psi	320	504	215
Height Sample, Inches	2.55	2.42	2.67
Gross Weight Mold, grams	3070	3031	3057
Tare Weight Mold, grams	1957	1944	1955
Sample Wet Weight, grams	1113	1087	1102
Expansion, Inches x 10exp-4	32	95	0
Stability 2,000 lbs (160psi)	53 / 127	36 / 90	69 / 150
Turns Displacement	3.78	3.25	5.27
R-Value Uncorrected	15	37	3
R-Value Corrected	15	35	3
Dry Density, pcf	114.3	120.2	104.2

DESIGN CALCULATION DATA

Traffic Index Assumed:	4.0	4.0	4.0
G.E. by Stability	0.87	0.67	0.99
G. E. by Expansion	1.07	3.17	0.00

Equilibrium R-Value	**13** by EXUDATION	Examined & Checked: 7 /25/ 19

REMARKS:
Gf = 1.25
0.0% Retained on the
3/4" Sieve.

STEVEN R. MARVIN
C 30659

Steven R. Marvin, RCE 30659

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LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

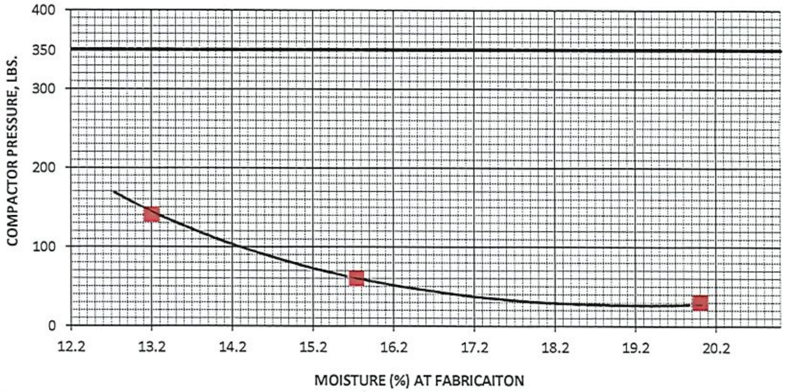
PROJECT NO. 45149

DATE: 7 /25/ 19

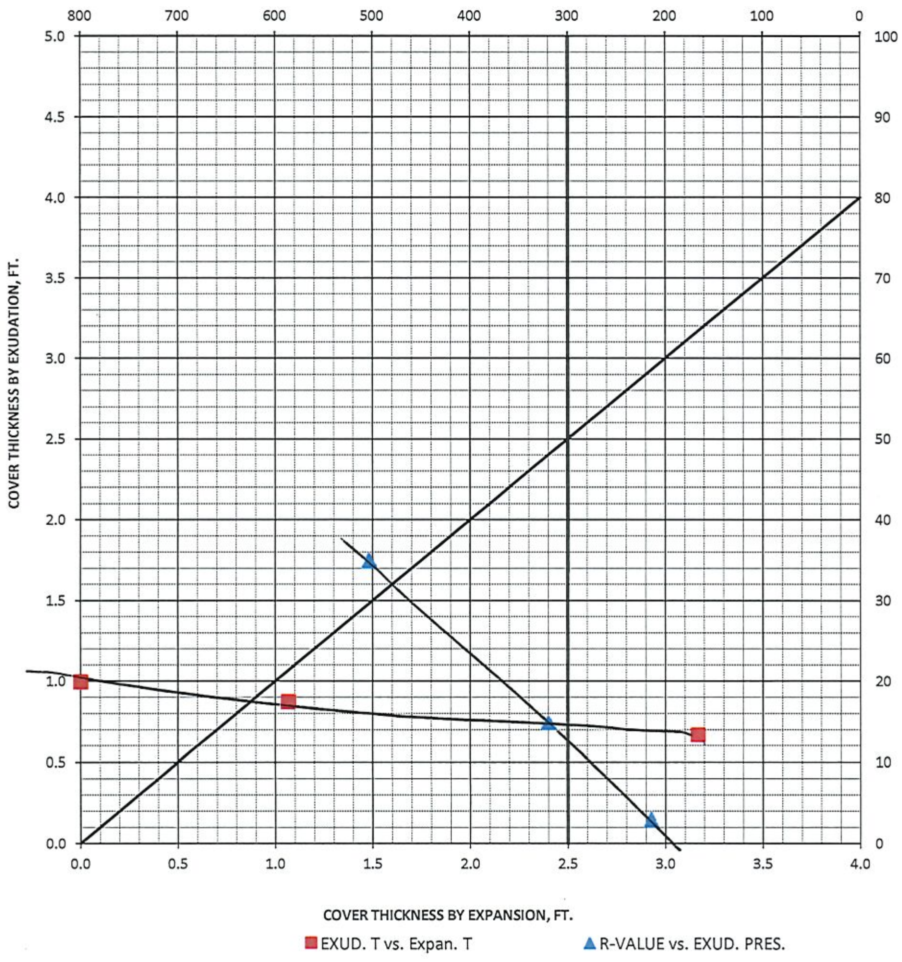
BORING NO. KTP-3 @ 6'
Jack Rabbit Trail, 7/8/19
P.N. 18060-01

REMARKS:

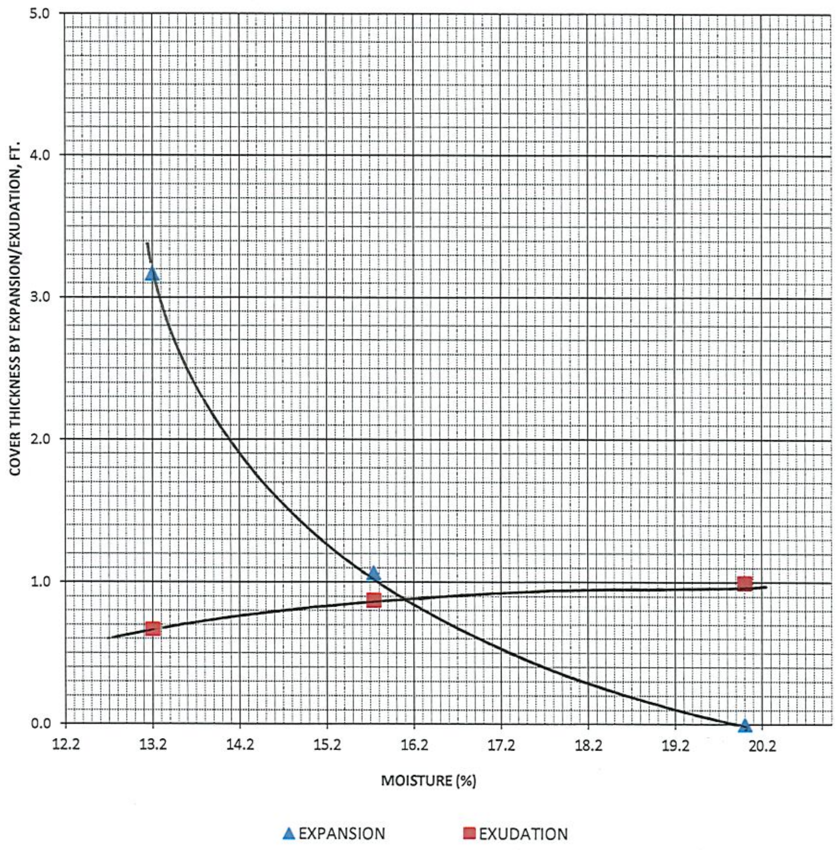
COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %



JOB NAME : JACK RABBIT TRAIL
JOB NUMBER: 18060-00
SAMPLE NUMBER :
TESTED BY : RB
SAMPLE LOCATION : B - 2 / KB - 6 @ 0' - 5'
DATE : 12-Jul-19
SAMPLE DESCRIPTIONS / CLASSIFICATION : DK. BROWN CLAYEY SAND (SC)

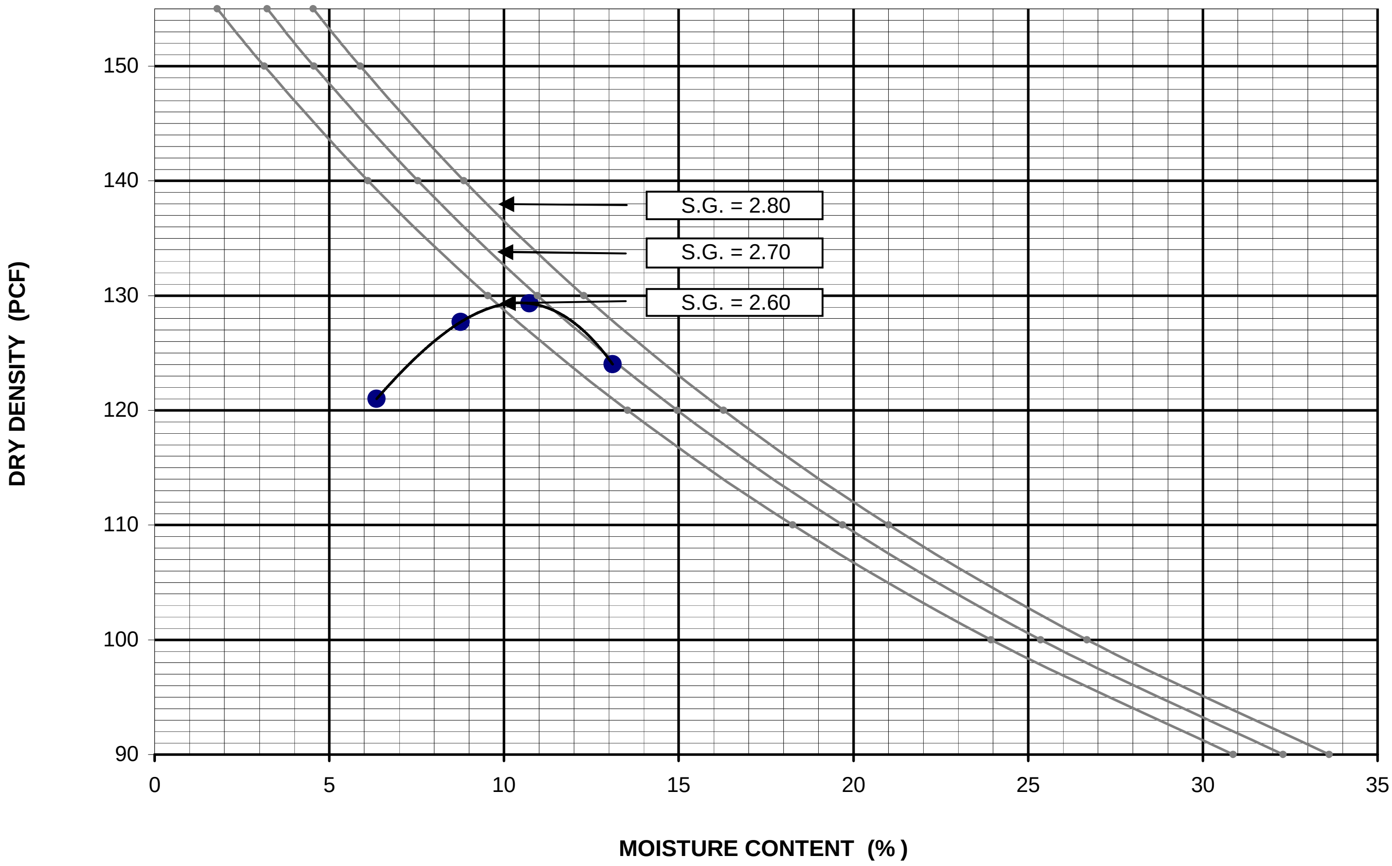
TEST STANDARD	ASTM D-698 - 00			**ASTM D 1557-02**		
METHOD	A	B	C	**A**	B	C

TRIAL NUMBER	1	2	3	4	5
WATER ADDED (ML)	-100	-50	0	50	
WT. SOIL + MOLD (GMS)	3920	4074	4139	4095	
WT.OF MOLD (GMS)	1974	1974	1974	1974	
WT. OF WET SOIL (GMS)	1946	2100	2165	2121	
WET DENSITY (PCF)	128.7	138.9	143.2	140.3	
CAN NUMBER	R	M	N	S	
WET SOIL + TARE (GMS)	306.04	310.51	316.51	319.81	
DRY SOIL + TARE (GMS)	287.75	285.50	285.85	282.75	
TARE (GMS)	0.00	0.00	0.00	0.00	
DRY SOIL (GMS)	287.75	285.50	285.85	282.75	
WATER (GMS)	18.29	25.01	30.66	37.06	
MOISTURE CONTENT (%)	6.4	8.8	10.7	13.1	
DRY DENSITY (PCF)	121.0	127.7	129.3	124.0	

DIAMETER OF MOLD: 4 In.
VOLUME OF MOLD: 0.0333 Cu.Ft.
SCALPED ON SIEVE SIZE/NO.: #4
PERCENT RETAINED,(%) :
MAXIMUM DRY DENSITY: 129.5 Pcf.
OPT. MOIST. CONTENT : 10.5 %

FOR OVERSIZE CORRECTION (ASTM D4718):
%,Finer Fraction = - % Moisture = -
%,Oversize Fraction = - Assumed Sp.Gr. 2.64
Corrected MDD of Total Materials,(PCF) = **-**
Corrected OMC of Total Materials, (%) = **-**

REMARKS :



KCG KLING Consulting Group, Inc.

18008 Sky Park Circle, Suite 250
Irvine,Ca. 92614
Tel: (949)797-6241 Fax: (949)797-6260

MAXIMUM DENSITY TEST

JOB NAME : JACK RABBIT TRAIL

JOB NUMBER: 18060-00

SAMPLE NUMBER :

TESTED BY : RB

SAMPLE LOCATION : B - 4 / KB - 4 @ 0' - 5'

DATE : 3-Jul-19

SAMPLE DESCRIPTIONS / CLASSIFICATION : DK. BROWN CLAYEY SAND (SC)

TEST STANDARD	ASTM D-698 - 00			**ASTM D 1557-02**		
METHOD	A	B	C	**A**	B	C

TRIAL NUMBER	1	2	3	4	5
WATER ADDED (ML)	0	50	100	150	
WT. SOIL + MOLD (GMS)	4018	4119	4144	4090	
WT.OF MOLD (GMS)	1974	1974	1974	1974	
WT. OF WET SOIL (GMS)	2044	2145	2170	2116	
WET DENSITY (PCF)	135.2	141.9	143.5	139.9	
CAN NUMBER	M	N	S	R	
WET SOIL + TARE (GMS)	308.45	311.01	315.00	319.81	
DRY SOIL + TARE (GMS)	289.89	286.79	285.84	284.59	
TARE (GMS)	0.00	0.00	0.00	0.00	
DRY SOIL (GMS)	289.89	286.79	285.84	284.59	
WATER (GMS)	18.56	24.22	29.16	35.22	
MOISTURE CONTENT (%)	6.4	8.4	10.2	12.4	
DRY DENSITY (PCF)	127.1	130.8	130.2	124.5	

DIAMETER OF MOLD: 4 In.

VOLUME OF MOLD: 0.0333 Cu.Ft.

SCALPED ON SIEVE SIZE/NO.: #4

PERCENT RETAINED,(%) : -

MAXIMUM DRY DENSITY: 131.0 Pcf.

OPT. MOIST. CONTENT : 9.0 %

FOR OVERSIZE CORRECTION (ASTM D4718):

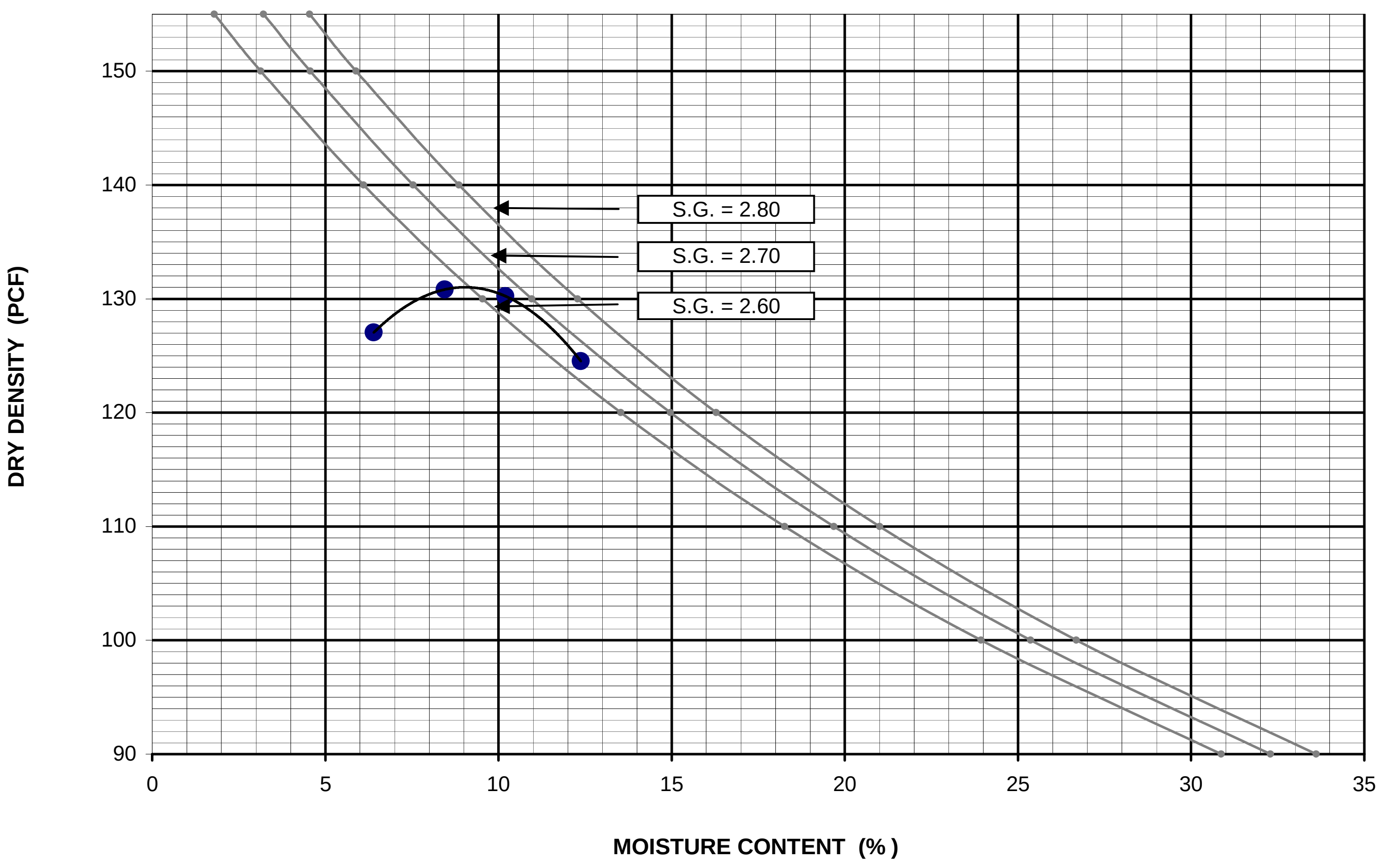
%,Finer Fraction = - % Moisture = -

%,Oversize Fraction = - Assumed Sp.Gr. 2.64

Corrected MDD of Total Materials,(PCF) = **-**

Corrected OMC of Total Materials, (%) = **-**

REMARKS :



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Tel: (949)797-6241 Fax: (949)797-6260

MAXIMUM DENSITY TEST

JOB NAME : JACK RABBIT TRAIL

JOB NUMBER: 18060-01

SAMPLE NUMBER :

TESTED BY : RB

SAMPLE LOCATION : B - 5 / KB - 1 @ 0' - 5'

DATE : 18-Jul-19

SAMPLE DESCRIPTIONS / CLASSIFICATION : DK. BROWN CLAYEY SAND (SC)

TEST STANDARD	ASTM D-698 - 00			**ASTM D 1557-02**		
METHOD	A	B	C	**A**	B	C

TRIAL NUMBER	1	2	3	4	5
WATER ADDED (ML)	-	0	50	100	
WT. SOIL + MOLD (GMS)	3999	4095	4123	4052	
WT.OF MOLD (GMS)	1974	1974	1974	1974	
WT. OF WET SOIL (GMS)	2025	2121	2149	2078	
WET DENSITY (PCF)	133.9	140.3	142.1	137.4	
CAN NUMBER		M	R	N	
WET SOIL + TARE (GMS)	308.74	316.16	318.83	322.53	
DRY SOIL + TARE (GMS)	287.02	288.70	286.42	284.41	
TARE (GMS)	0.00	0.00	0.00	0.00	
DRY SOIL (GMS)	287.02	288.70	286.42	284.41	
WATER (GMS)	21.72	27.46	32.41	38.12	
MOISTURE CONTENT (%)	7.6	9.5	11.3	13.4	
DRY DENSITY (PCF)	124.5	128.1	127.7	121.2	

DIAMETER OF MOLD: 4 In.

VOLUME OF MOLD: 0.0333 Cu.Ft.

SCALPED ON SIEVE SIZE/NO.: #4

PERCENT RETAINED,(%) : -

MAXIMUM DRY DENSITY: 128.5 Pcf.

OPT. MOIST. CONTENT : 10.5 %

FOR OVERSIZE CORRECTION (ASTM D4718):

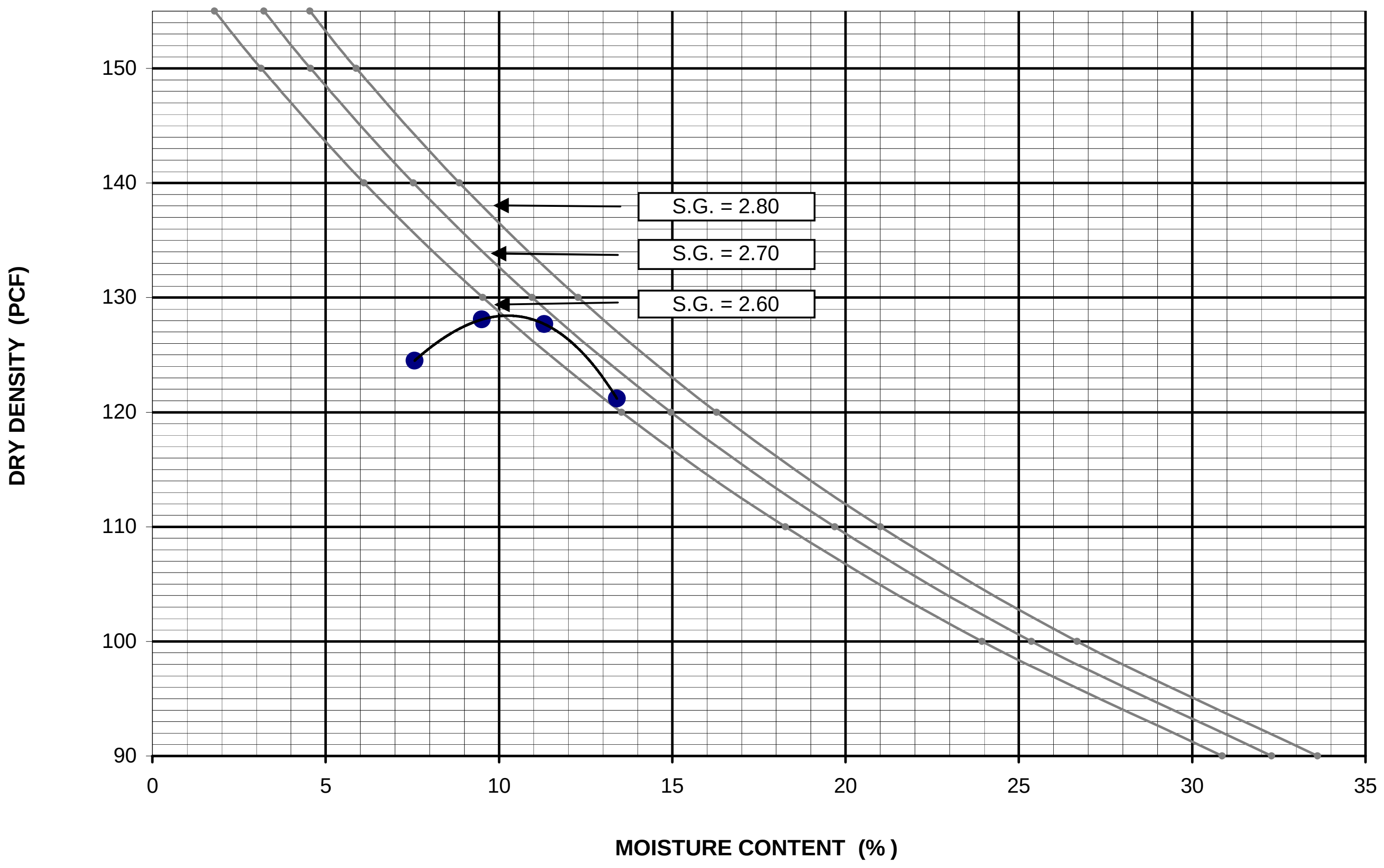
%,Finer Fraction = - % Moisture = -

%,Oversize Fraction = - Assumed Sp.Gr. 2.64

Corrected MDD of Total Materials,(PCF) = **-**

Corrected OMC of Total Materials, (%) = **-**

REMARKS :



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Irvine,Ca. 92614
Tel: (949)797-6241 Fax: (949)797-6260

MAXIMUM DENSITY TEST

JOB NAME : JACK RABBIT TRAIL
JOB NUMBER: 18060-01
SAMPLE NUMBER :
TESTED BY : RB
SAMPLE LOCATION : B - 7 / KB - 9 @ 0' - 5'
DATE : 19-Jul-19
SAMPLE DESCRIPTIONS / CLASSIFICATION : DK. BROWN CLAYEY SAND (SC)

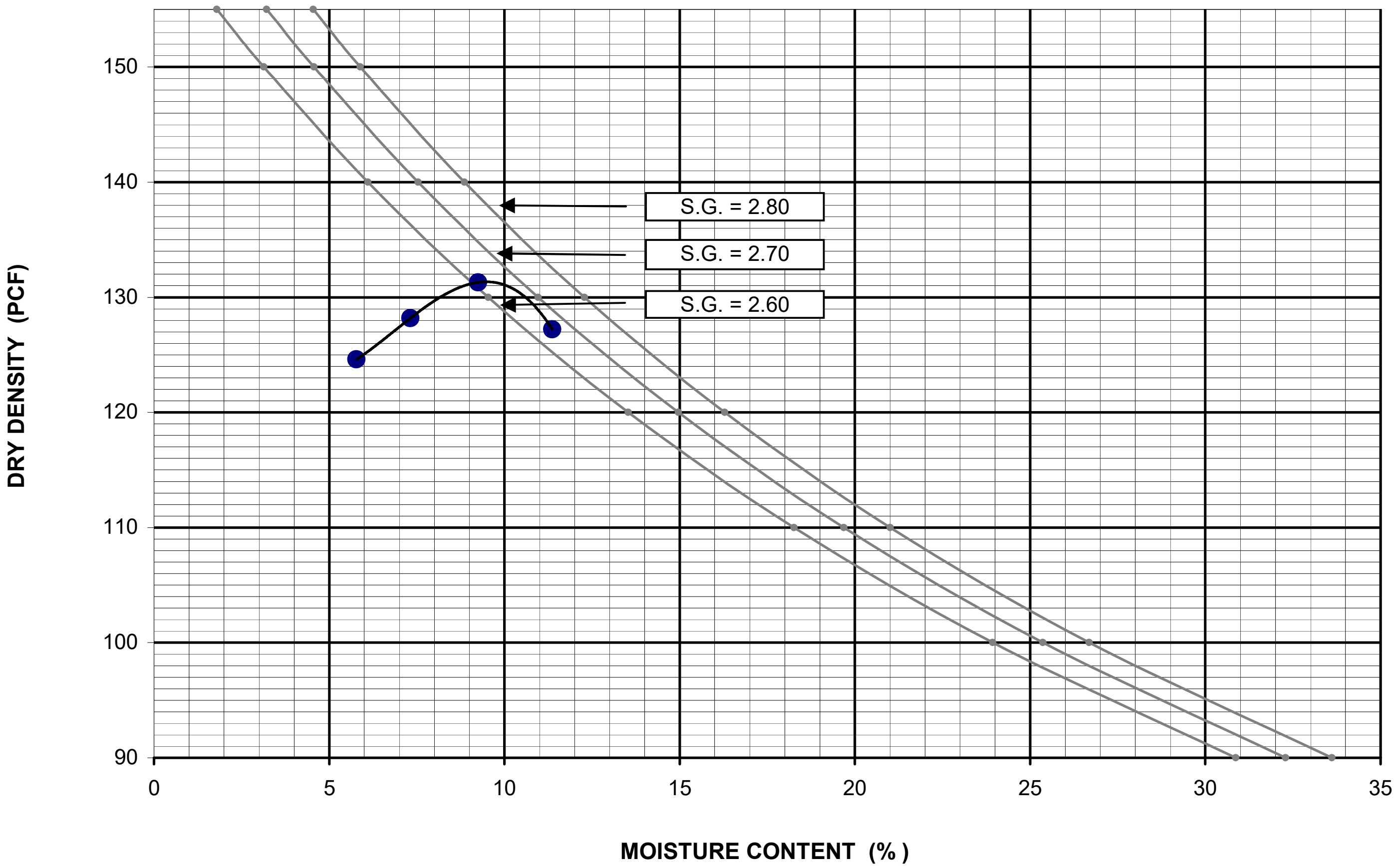
TEST STANDARD	ASTM D-698 - 00			**ASTM D 1557-02**		
METHOD	A	B	C	**A**	B	C

TRIAL NUMBER	1	2	3	4	5
WATER ADDED (ML)	-	0	50	100	
WT. SOIL + MOLD (GMS)	3967	4054	4143	4116	
WT.OF MOLD (GMS)	1974	1974	1974	1974	
WT. OF WET SOIL (GMS)	1993	2080	2169	2142	
WET DENSITY (PCF)	131.8	137.6	143.5	141.7	
CAN NUMBER	N	M	R	S	
WET SOIL + TARE (GMS)	307.32	310.19	313.99	318.89	
DRY SOIL + TARE (GMS)	290.52	289.04	287.39	286.34	
TARE (GMS)	0.00	0.00	0.00	0.00	
DRY SOIL (GMS)	290.52	289.04	287.39	286.34	
WATER (GMS)	16.80	21.15	26.60	32.55	
MOISTURE CONTENT (%)	5.8	7.3	9.3	11.4	
DRY DENSITY (PCF)	124.6	128.2	131.3	127.2	

DIAMETER OF MOLD: 4 In.
VOLUME OF MOLD: 0.0333 Cu.Ft.
SCALPED ON SIEVE SIZE/NO.: #4
PERCENT RETAINED,(%) : 5.9
MAXIMUM DRY DENSITY: 131.5 Pcf.
OPT. MOIST. CONTENT : 9.5 %

FOR OVERSIZE CORRECTION (ASTM D4718):
%,Finer Fraction = - % Moisture = -
%,Oversize Fraction = - Assumed Sp.Gr. 2.64
Corrected MDD of Total Materials,(PCF) = **-**
Corrected OMC of Total Materials, (%) = **-**

REMARKS :



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MAXIMUM DENSITY TEST

JOB NAME : JACK RABBIT TRAIL
JOB NUMBER: 18060-01
SAMPLE NUMBER :
TESTED BY : RB
SAMPLE LOCATION : B - 13 / KTP - 7 @ 4' - 6'
DATE : 26-Jul-19
SAMPLE DESCRIPTIONS / CLASSIFICATION : LT. BROWN SILTY FINE SAND (SM)

TEST STANDARD	ASTM D-698 - 00			**ASTM D 1557-02**		
METHOD	A	B	C	**A**	B	C

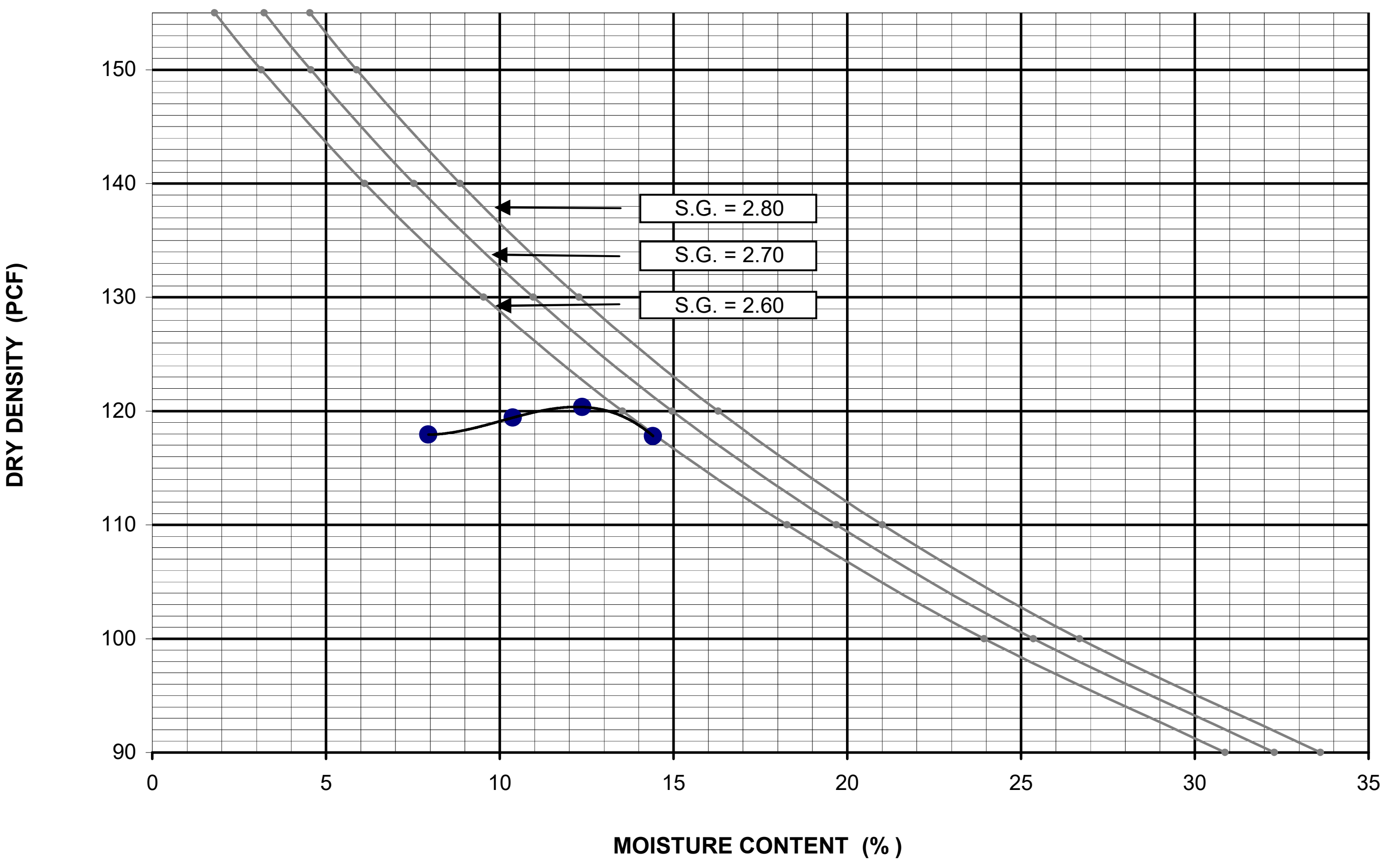
TRIAL NUMBER	1	2	3	4	5
WATER ADDED (ML)	50	100	150	200	
WT. SOIL + MOLD (GMS)	3899	3967	4019	4012	
WT.OF MOLD (GMS)	1974	1974	1974	1974	
WT. OF WET SOIL (GMS)	1925	1993	2045	2038	
WET DENSITY (PCF)	127.3	131.8	135.3	134.8	
CAN NUMBER	R	S	N	M	
WET SOIL + TARE (GMS)	311.18	315.68	321.64	325.12	
DRY SOIL + TARE (GMS)	288.26	286.01	286.23	284.16	
TARE (GMS)	0.00	0.00	0.00	0.00	
DRY SOIL (GMS)	288.26	286.01	286.23	284.16	
WATER (GMS)	22.92	29.67	35.41	40.96	
MOISTURE CONTENT (%)	8.0	10.4	12.4	14.4	
DRY DENSITY (PCF)	117.9	119.4	120.4	117.8	

DIAMETER OF MOLD: 4 In.
VOLUME OF MOLD: 0.0333 Cu.Ft.
SCALPED ON SIEVE SIZE/NO.: #4
PERCENT RETAINED,(%) :
MAXIMUM DRY DENSITY: 120.5 Pcf.
OPT. MOIST. CONTENT : 12.5 %

FOR OVERSIZE CORRECTION (ASTM D4718):

%,Finer Fraction = - % Moisture = -
%,Oversize Fraction = - Assumed Sp.Gr. 2.64
Corrected MDD of Total Materials,(PCF) = **-**
Corrected OMC of Total Materials, (%) = **-**

REMARKS :



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Irvine,Ca. 92614
Tel: (949)797-6241 Fax: (949)797-6260

MAXIMUM DENSITY TEST

JOB NAME : JACK RABBIT TRAIL
JOB NUMBER: 18060-01
SAMPLE NUMBER :
TESTED BY : RB
SAMPLE LOCATION : KTP - 3 / B - 11 @ 6'
DATE : 22-Jul-19
SAMPLE DESCRIPTIONS / CLASSIFICATION : REDDISH BROWN SANDY CLAY (CL)

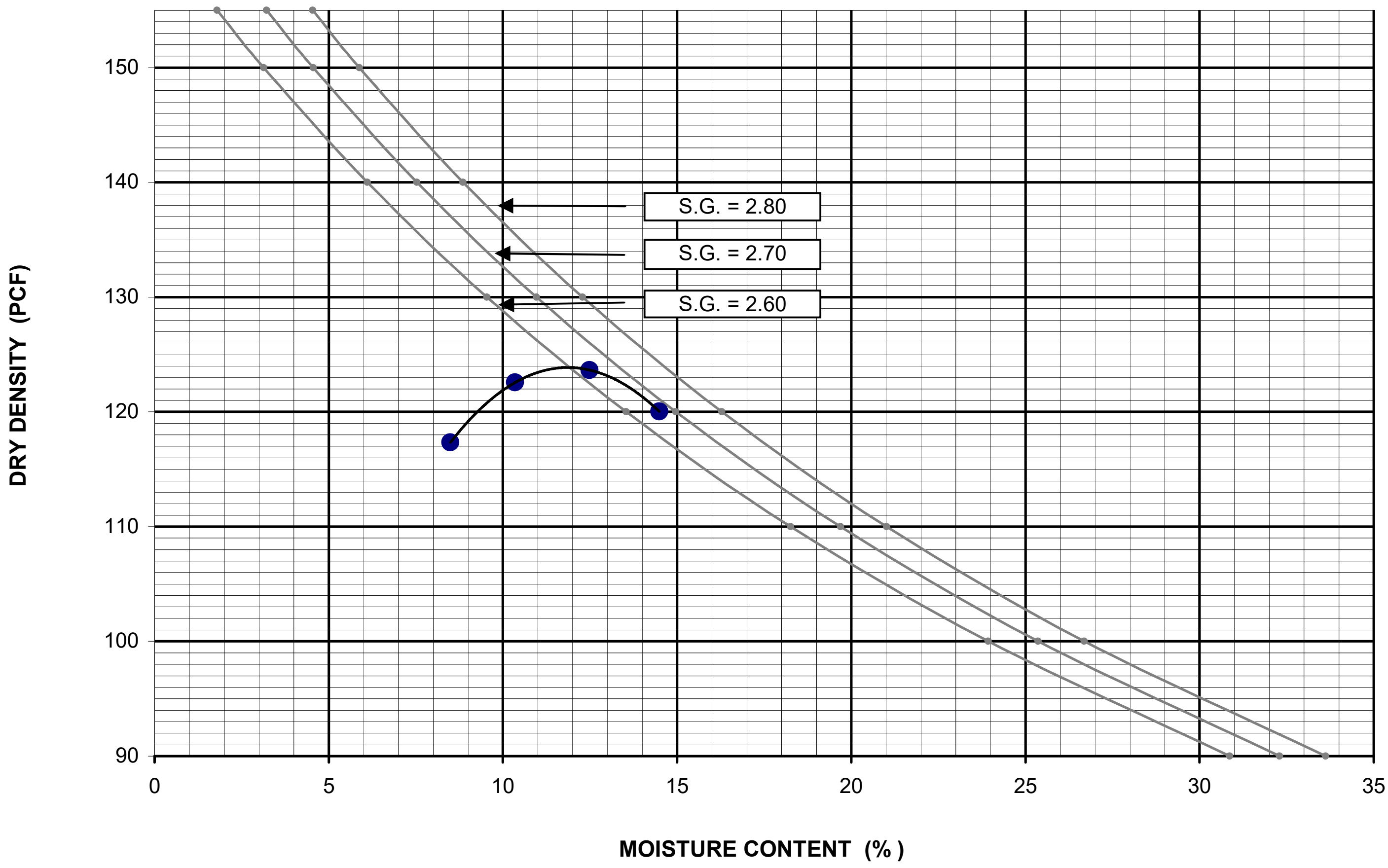
TEST STANDARD	ASTM D-698 - 00			**ASTM D 1557-02**		
METHOD	A	B	C	**A**	B	C

TRIAL NUMBER	1	2	3	4	5
WATER ADDED (ML)	-	0	50	100	
WT. SOIL + MOLD (GMS)	3899	4019	4077	4052	
WT.OF MOLD (GMS)	1974	1974	1974	1974	
WT. OF WET SOIL (GMS)	1925	2045	2103	2078	
WET DENSITY (PCF)	127.3	135.3	139.1	137.4	
CAN NUMBER	N	S	R	M	
WET SOIL + TARE (GMS)	307.52	315.56	320.22	323.81	
DRY SOIL + TARE (GMS)	283.44	285.96	284.67	282.83	
TARE (GMS)	0.00	0.00	0.00	0.00	
DRY SOIL (GMS)	283.44	285.96	284.67	282.83	
WATER (GMS)	24.08	29.60	35.55	40.98	
MOISTURE CONTENT (%)	8.5	10.4	12.5	14.5	
DRY DENSITY (PCF)	117.3	122.6	123.6	120.0	

DIAMETER OF MOLD: 4 In.
VOLUME OF MOLD: 0.0333 Cu.Ft.
SCALPED ON SIEVE SIZE/NO.: #4
PERCENT RETAINED,(%) : -
MAXIMUM DRY DENSITY: 124.0 Pcf.
OPT. MOIST. CONTENT : 12.0 %

FOR OVERSIZE CORRECTION (ASTM D4718):
%,Finer Fraction = - % Moisture = -
%,Oversize Fraction = - Assumed Sp.Gr. 2.64
Corrected MDD of Total Materials,(PCF) = **-**
Corrected OMC of Total Materials, (%) = **-**

REMARKS :



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Tel: (949)797-6241 Fax: (949)797-6260

MAXIMUM DENSITY TEST

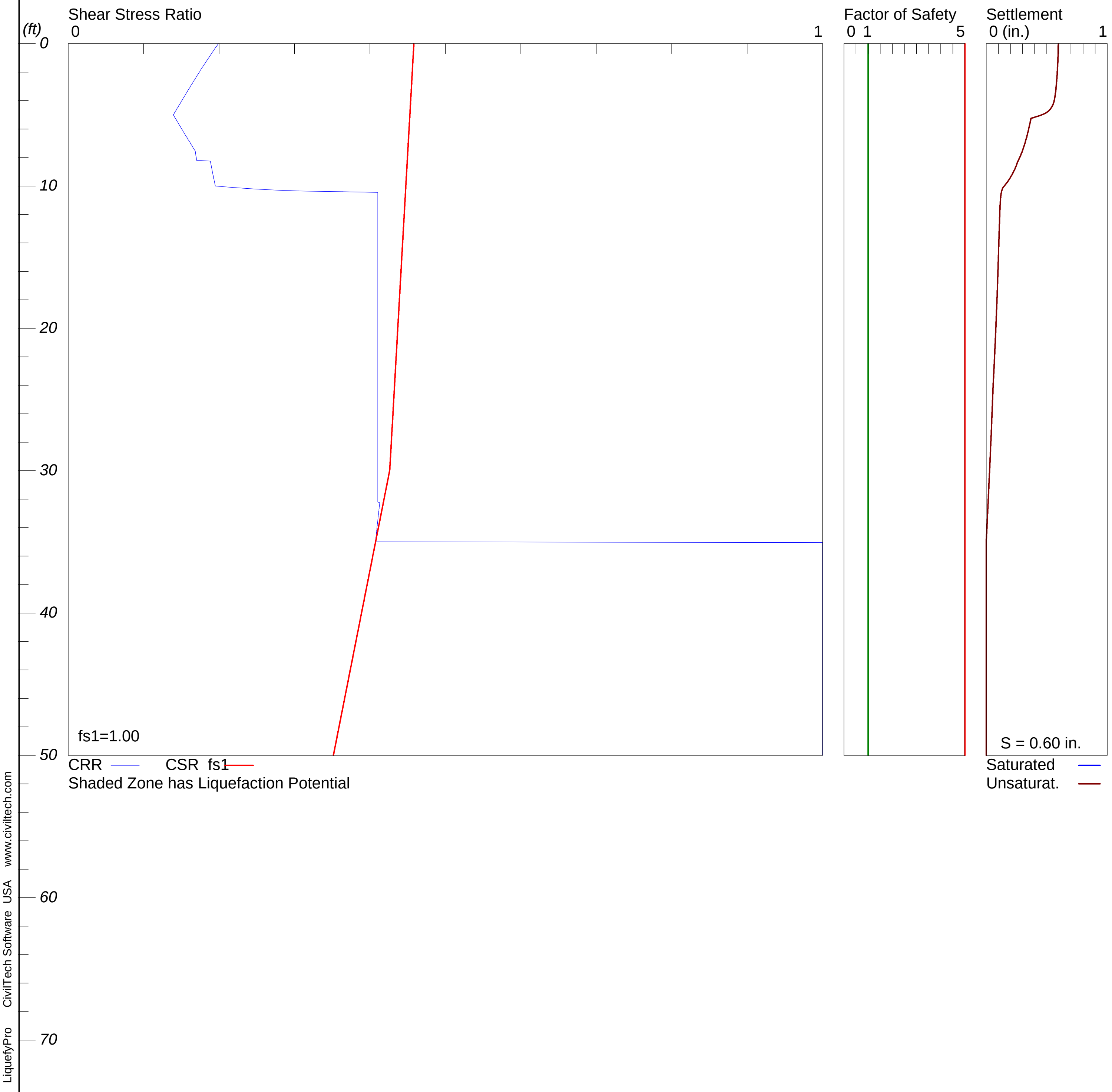
APPENDIX D

SEISMIC SETTLEMENT/LIQUEFACTION ANALYSIS

18060-00

Hole No.=KB-1   Water Depth=100 ft

Magnitude=8.1
Acceleration=0.705g



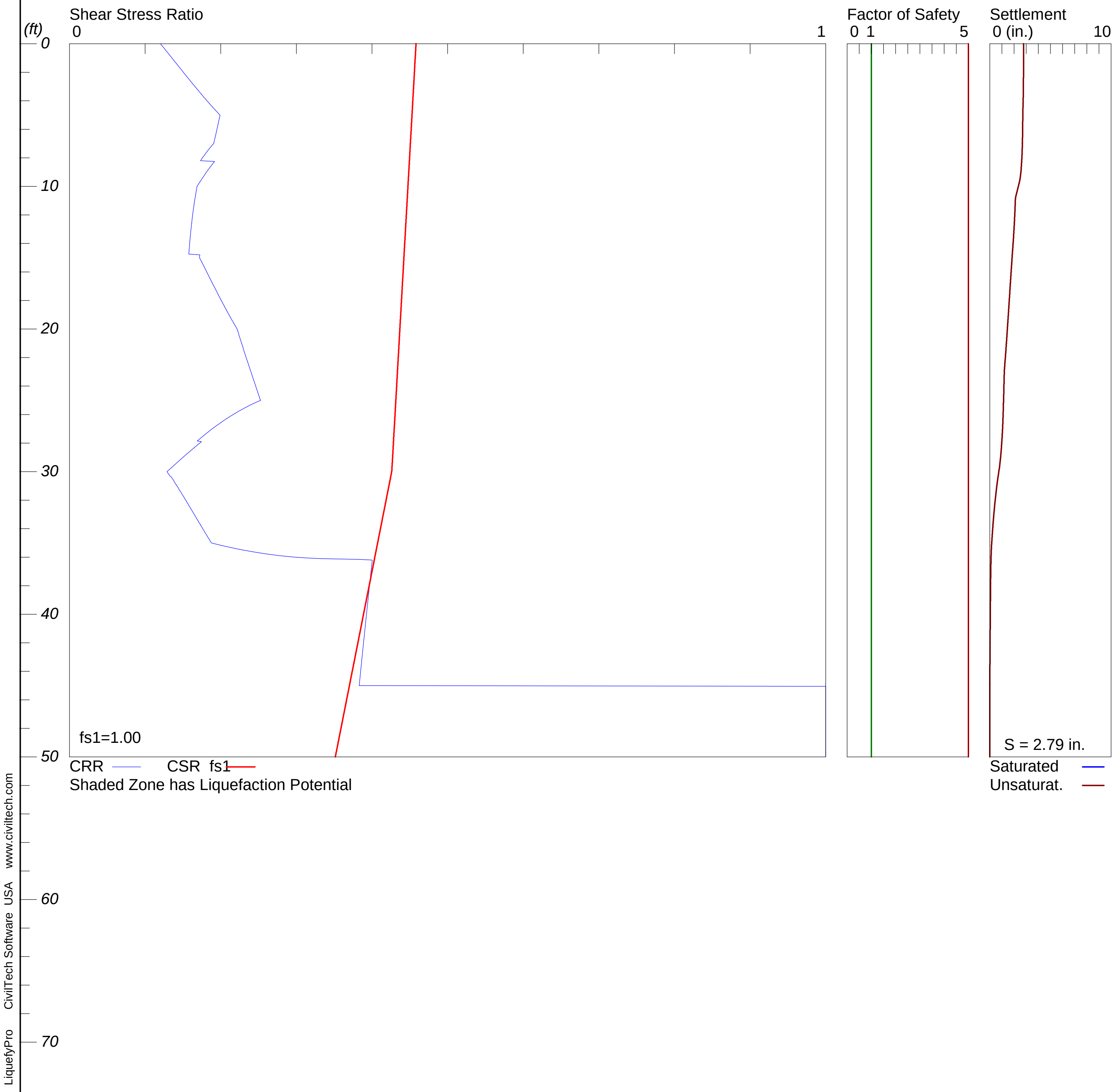
Jack Rabbit Trail

KB-1

18060-00

Hole No.=KB-2 Water Depth=100 ft

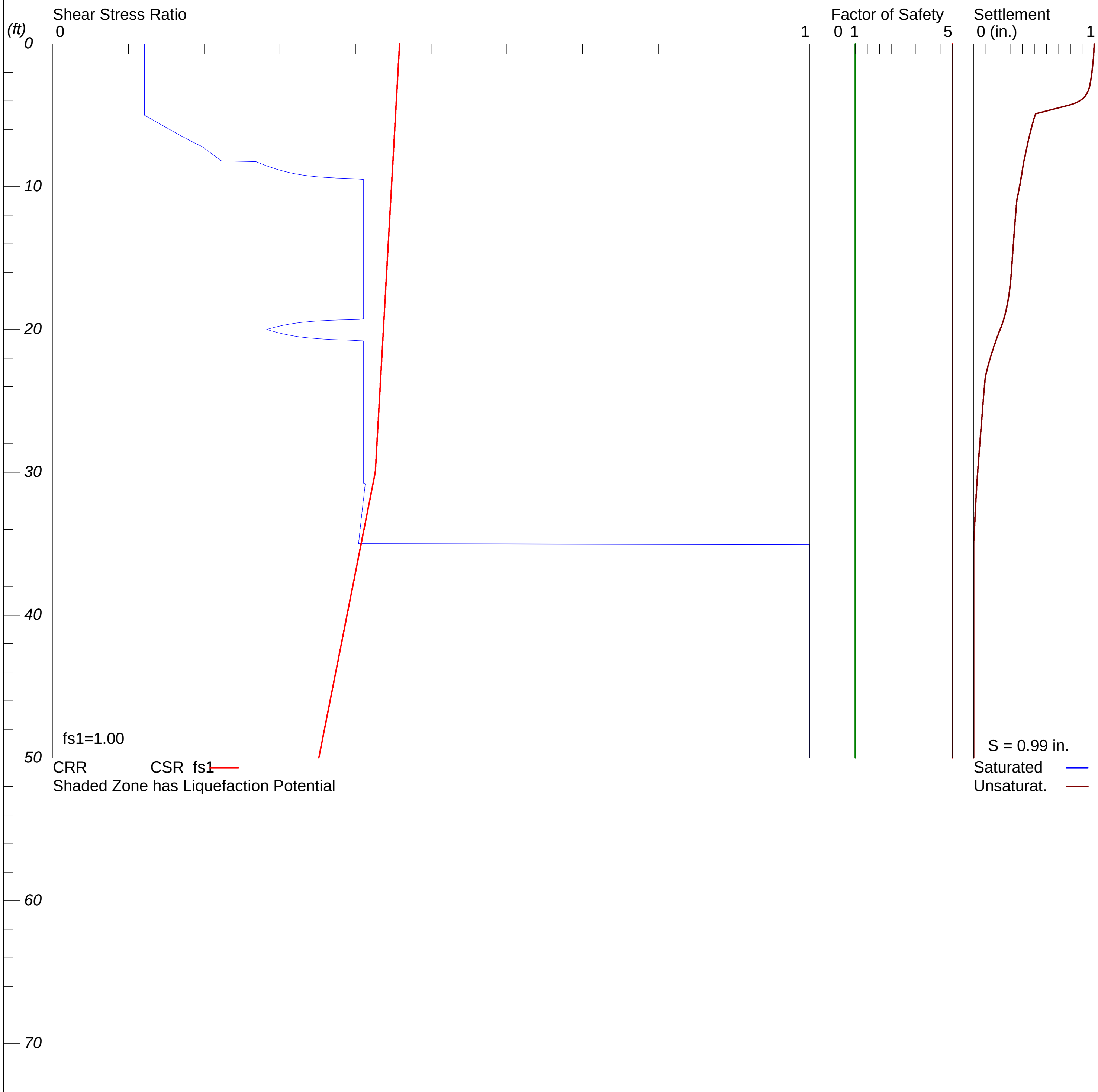
Magnitude=8.1
Acceleration=0.705g



18060-00

Hole No.=KB-3 Water Depth=100 ft

Magnitude=8.1
Acceleration=0.705g

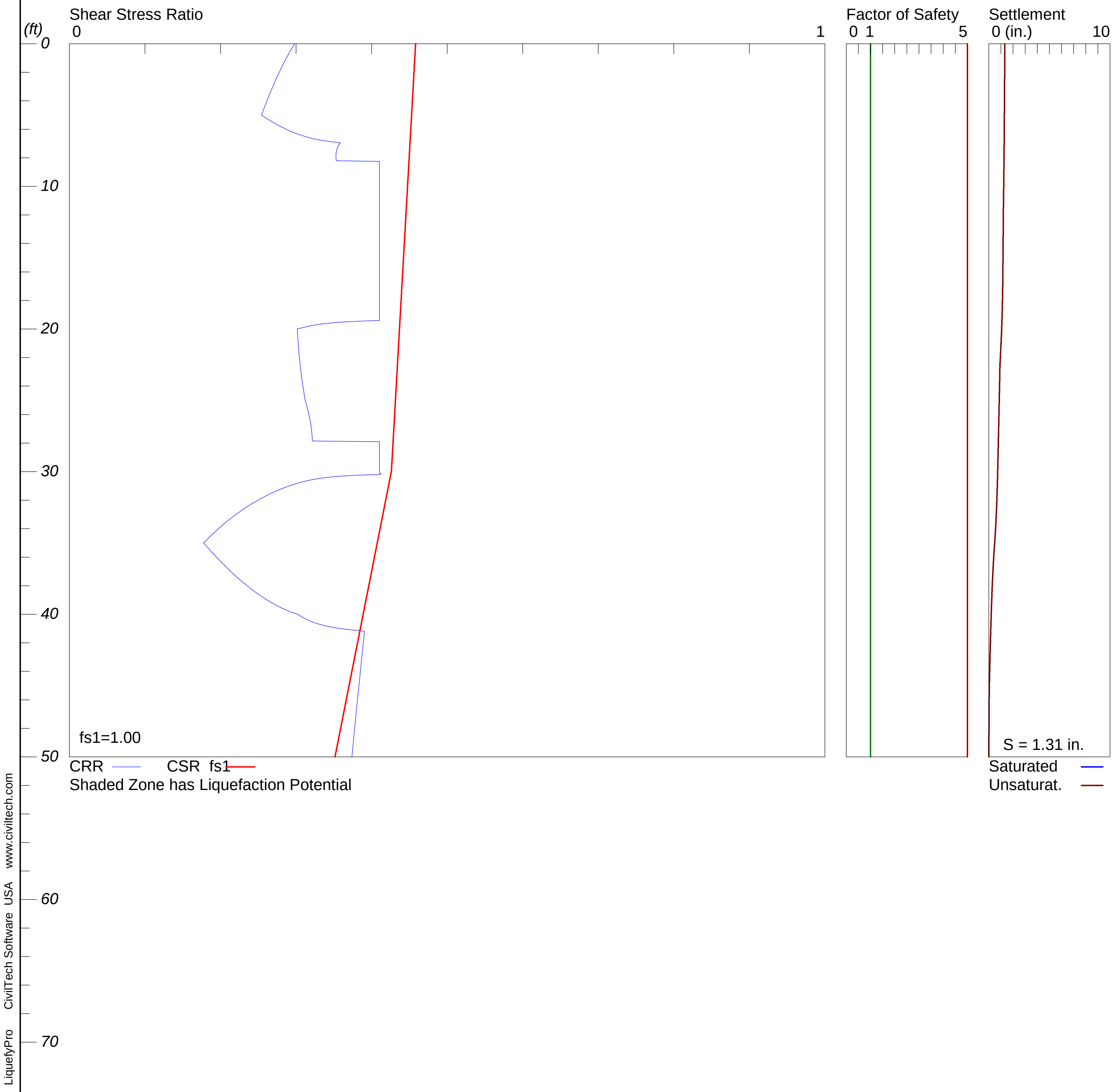


Jack Rabbit Trail

18060-00

Hole No.=KB-4 Water Depth=100 ft

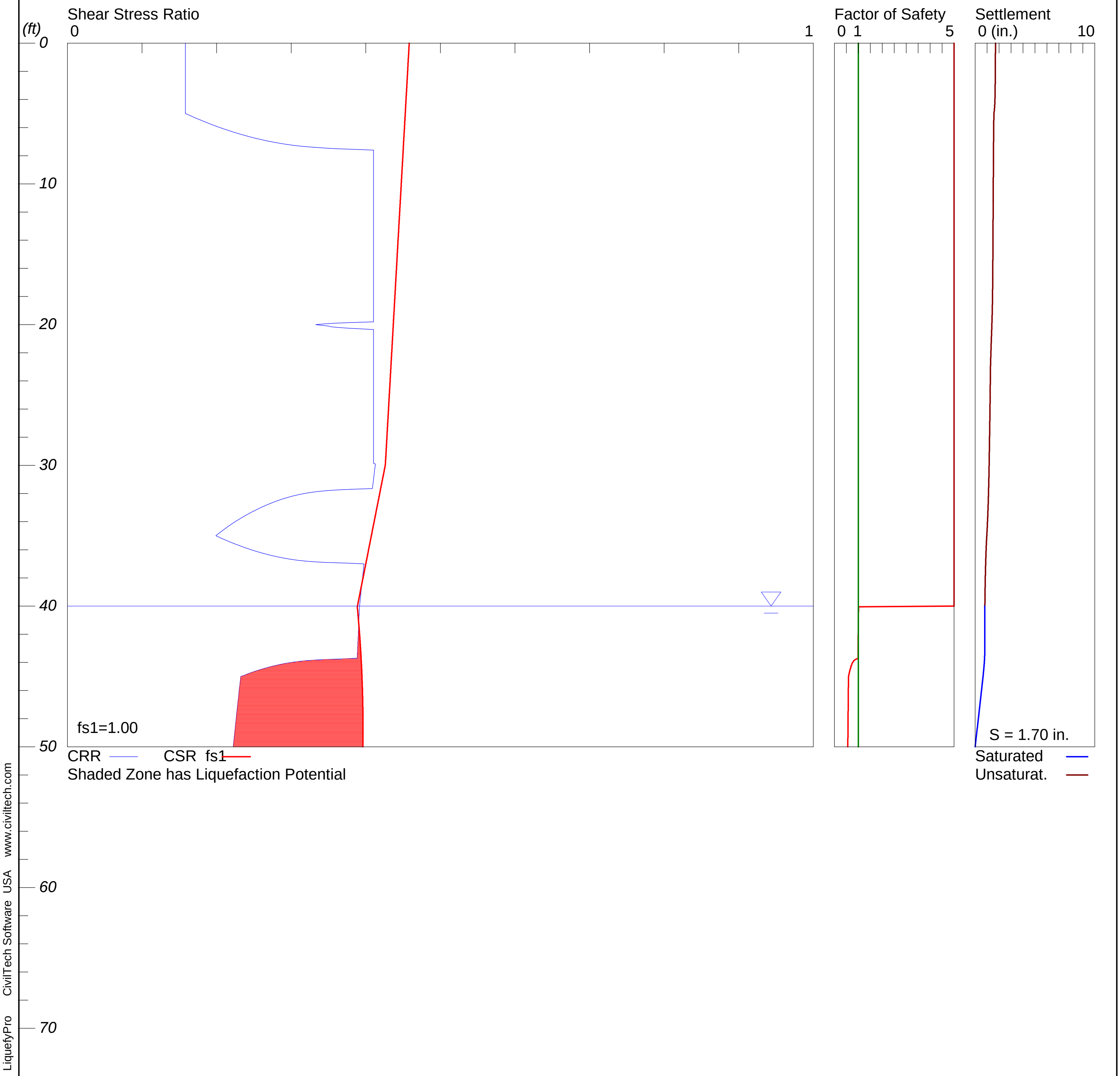
Magnitude=8.1
Acceleration=0.705g



18060-00

Hole No.=KB-5 Water Depth=40 ft

Magnitude=8.1
Acceleration=0.705g

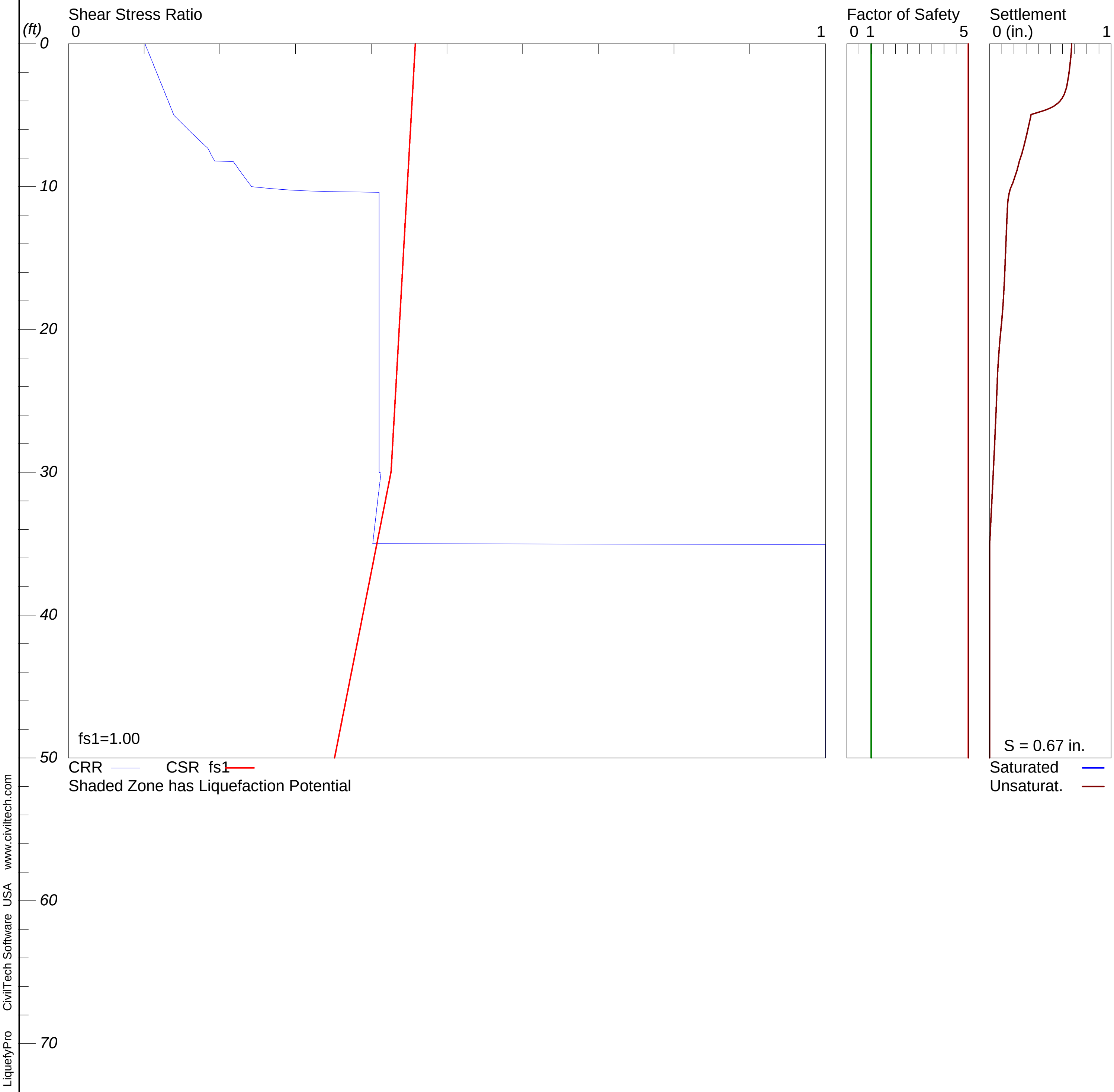


Jack Rabbit Trail **KB-5**

18060-00

Hole No.=KB-6   Water Depth=100 ft

Magnitude=8.1
Acceleration=0.705g



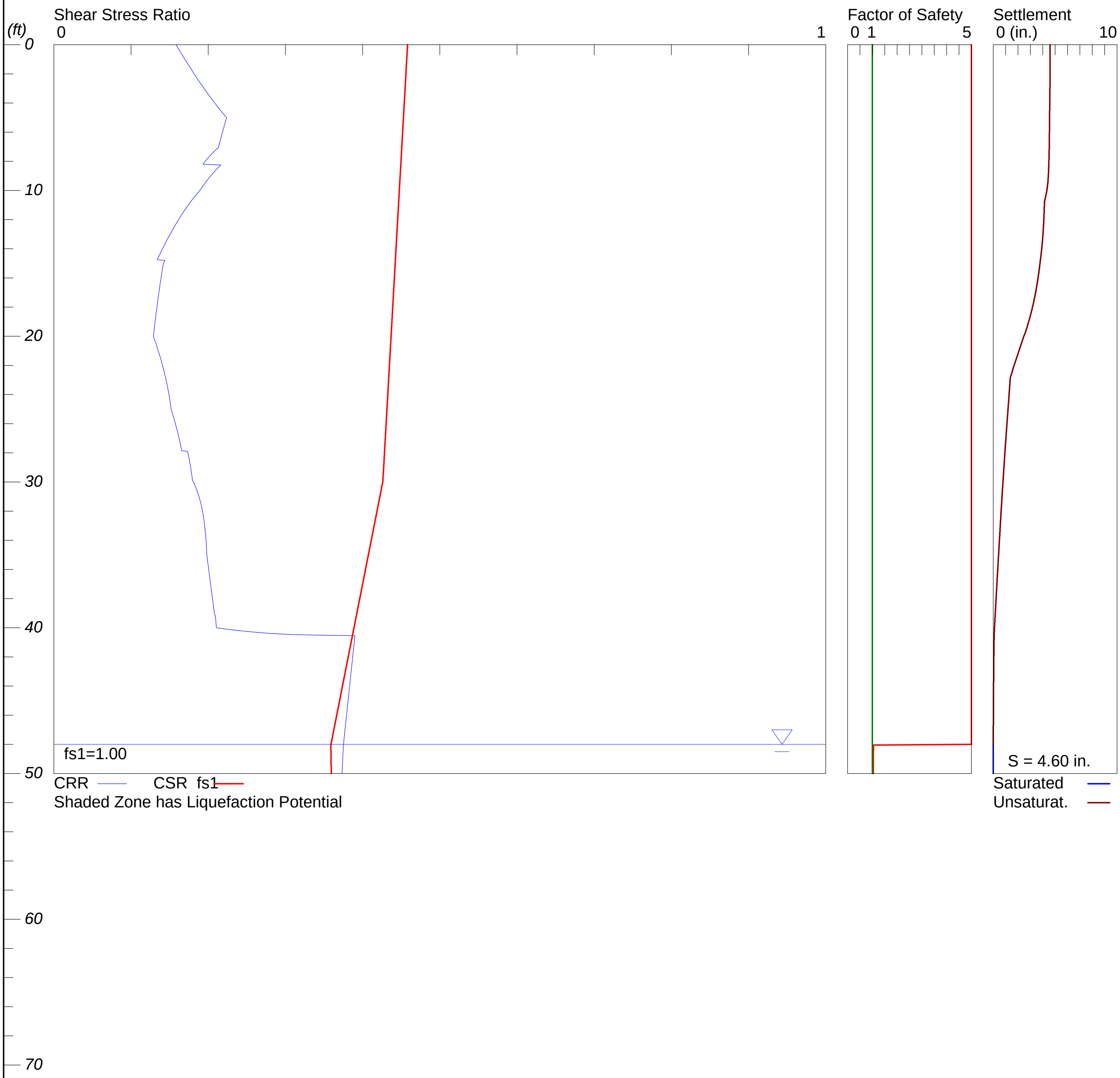
Jack Rabbit Trail

Plate A-1

18060-00

Hole No.=KB-7 Water Depth=48 ft

Magnitude=8.1
Acceleration=0.705g



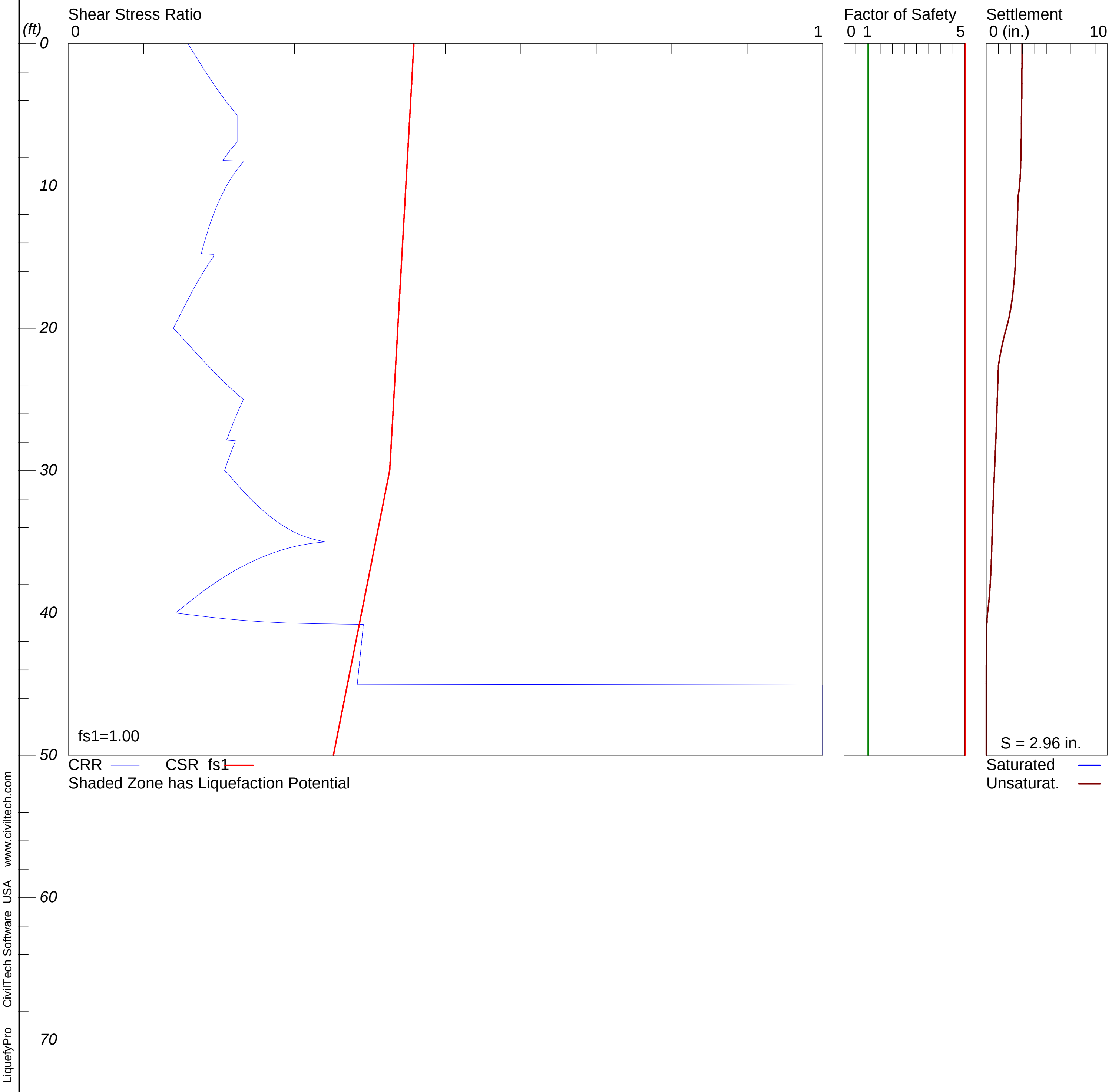
LiquefyPro CivilTech Software USA www.civiltech.com

Jack Rabbit Trail **KB-7**

18060-00

Hole No.=KB-8   Water Depth=100 ft

Magnitude=8.1
Acceleration=0.705g

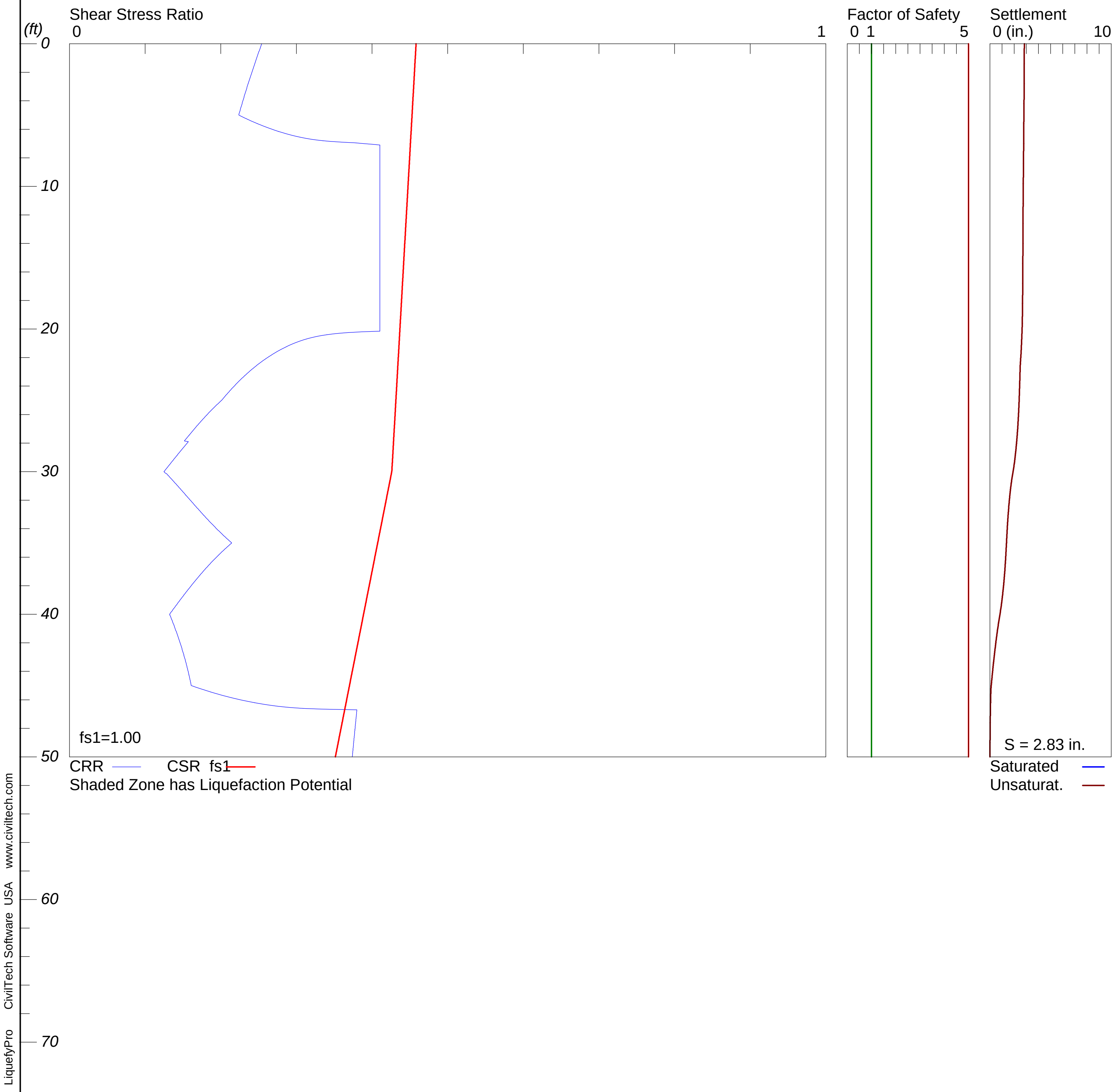


Jack Rabbit Trail **KB-8**

18060-00

Hole No.=KB-9   Water Depth=100 ft

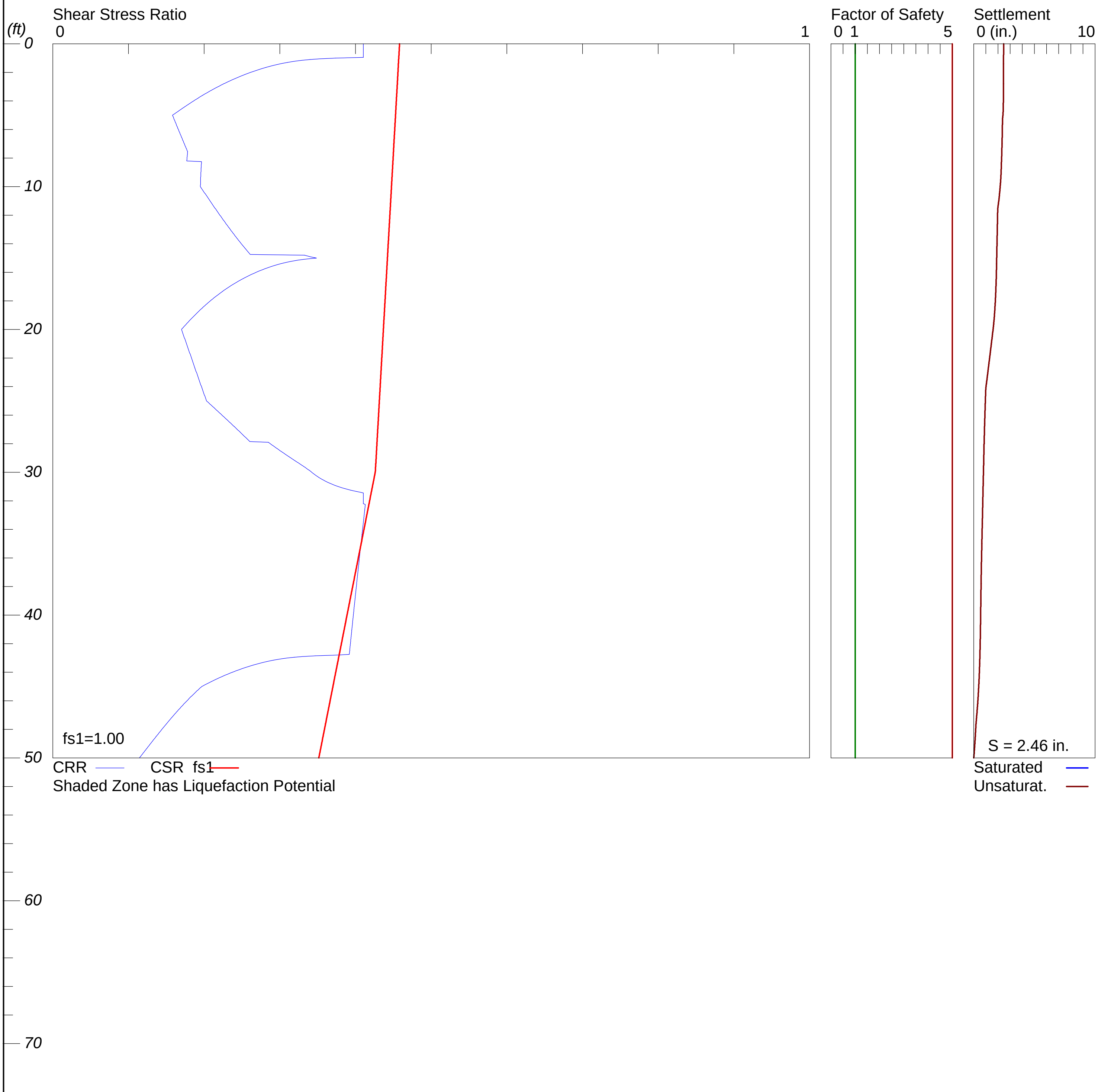
Magnitude=8.1
Acceleration=0.705g



18060-00

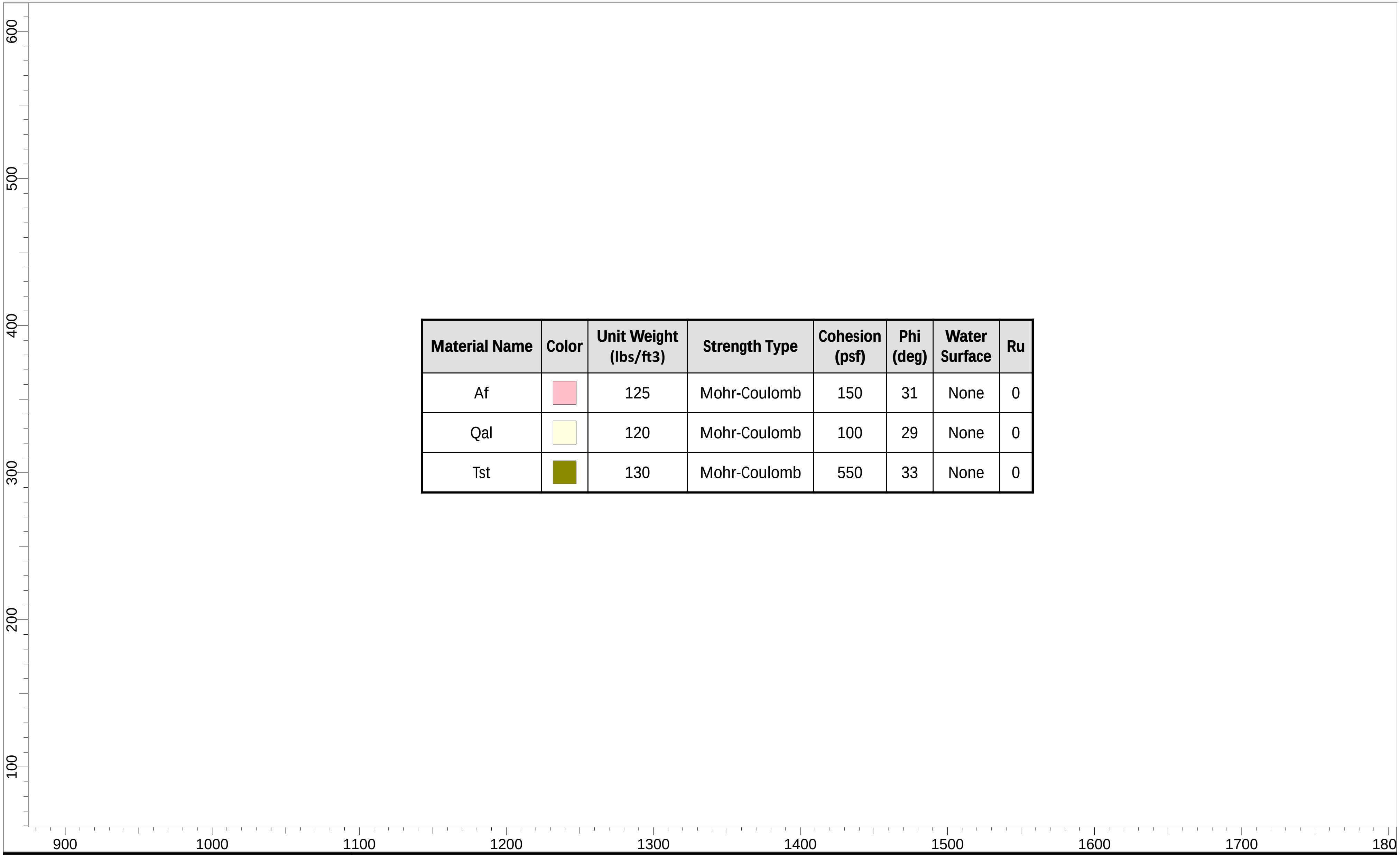
Hole No.=KB-10   Water Depth=100 ft

Magnitude=8.1
Acceleration=0.705g



APPENDIX E

SLOPE STABILITY ANALYSIS



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Af	🟥	125	Mohr-Coulomb	150	31	None	0
Qal	🟨	120	Mohr-Coulomb	100	29	None	0
Tst	🟩	130	Mohr-Coulomb	550	33	None	0

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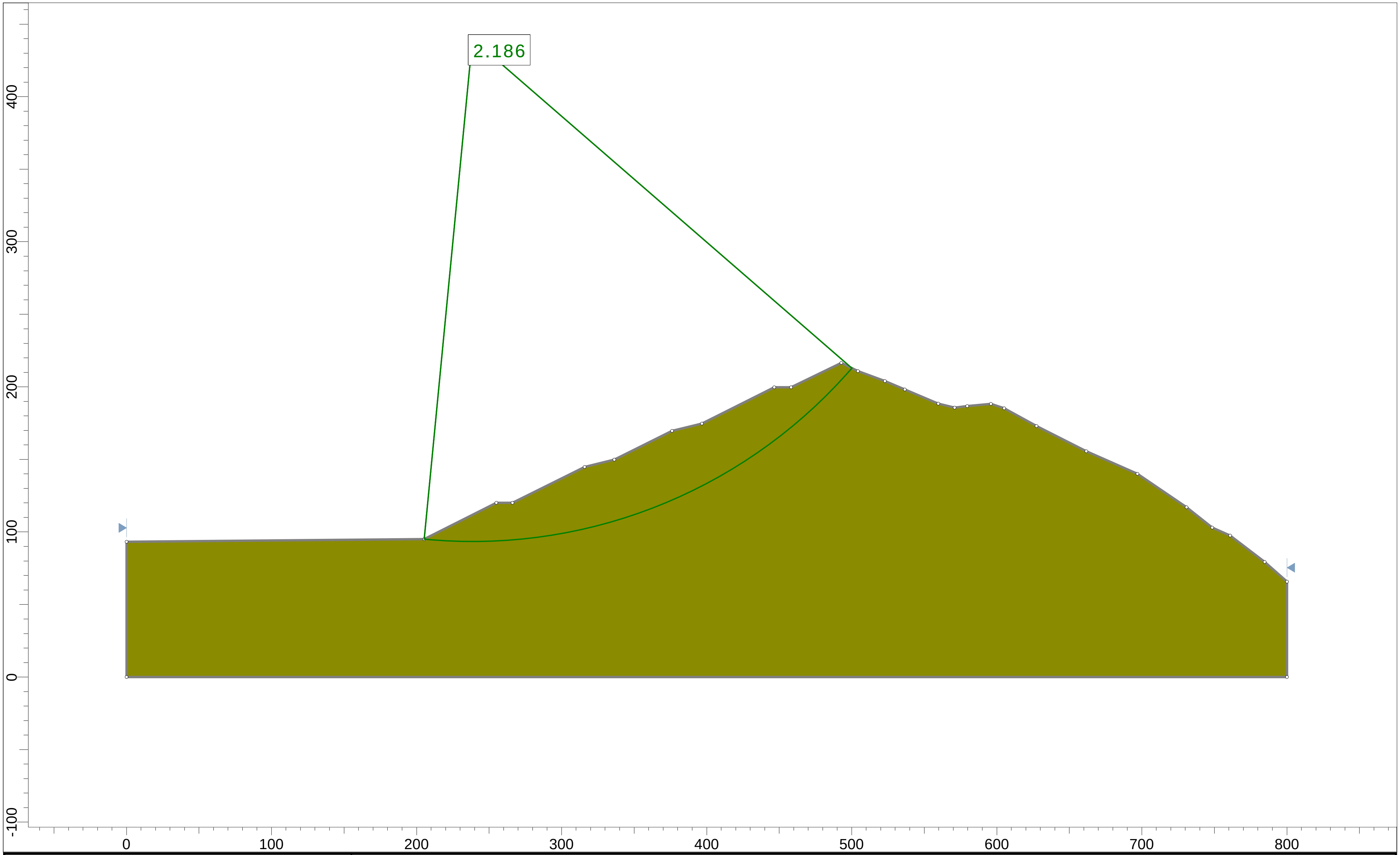
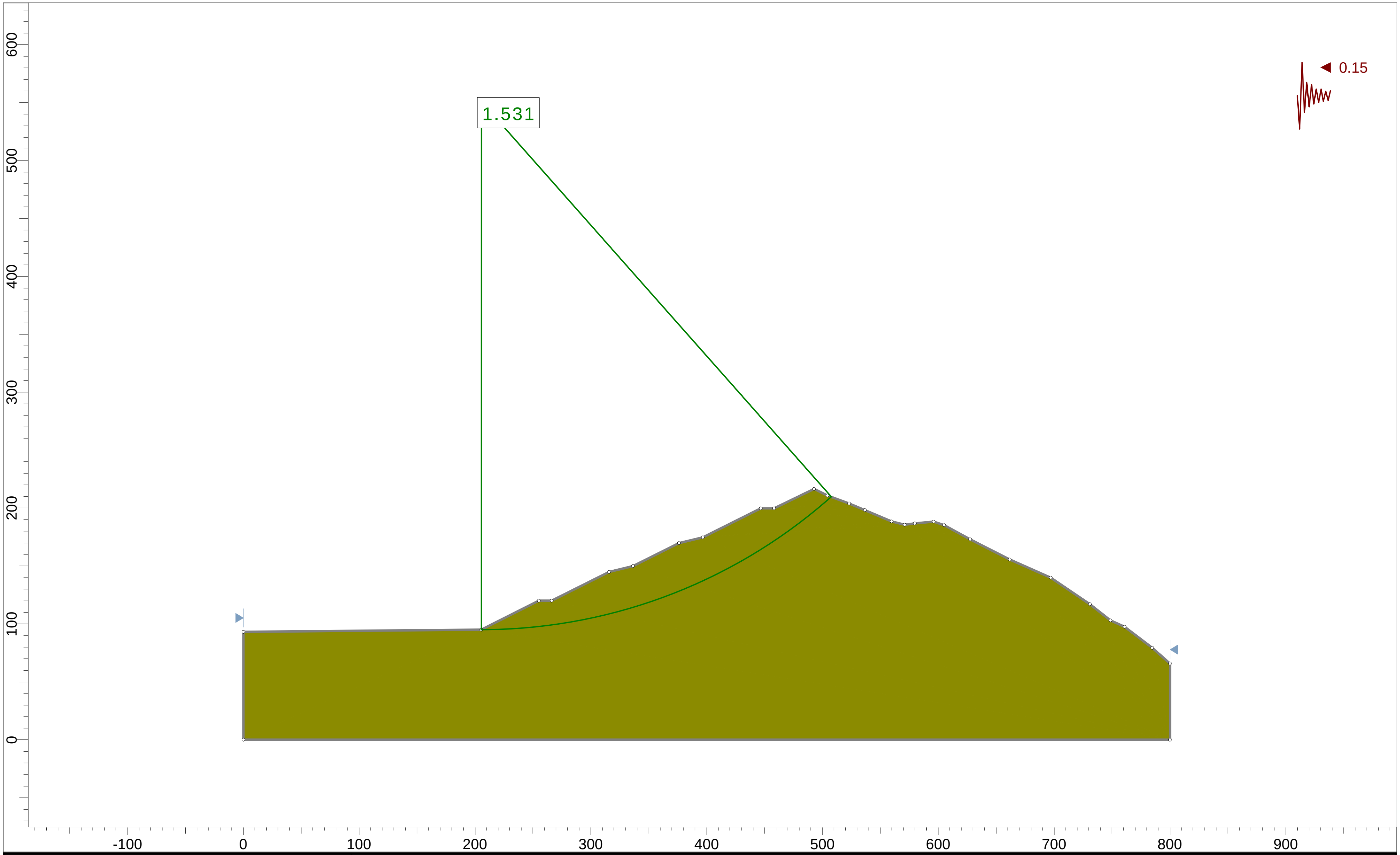
SLIDEINTERPRET 8.016

Project	18060-00 Jack Rabbit Trail		
Analysis Description			
Drawn By	CJO	*Project Number*	18060-00
Date	8/16/2019	*Figure*	



Project	18060-00 Jack Rabbit Trail		
Analysis Description	Cross Section A-A' Static		
Drawn By	CJO	*Project Number*	18060-00
Date	8/16/2019	*Figure*	

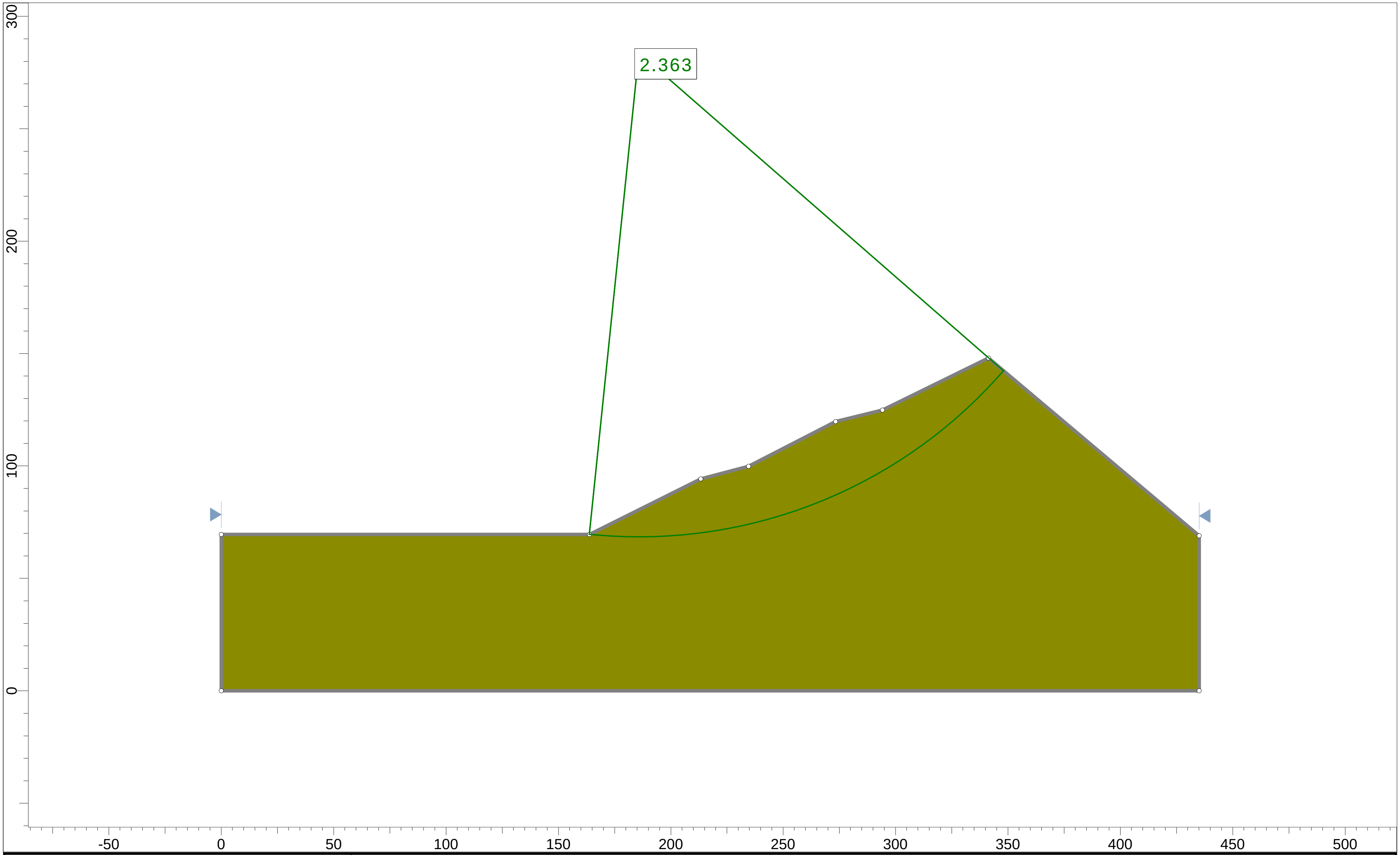
SLIDEINTERPRET 8.016



Project	18060-00 Jack Rabbit Trail		
Analysis Description	Cross Section A-A' Puesdo Static		
Drawn By	CJO	Project Number	18060-00
Date	8/16/2019	Figure	

KCG KLING Consulting Group, Inc.

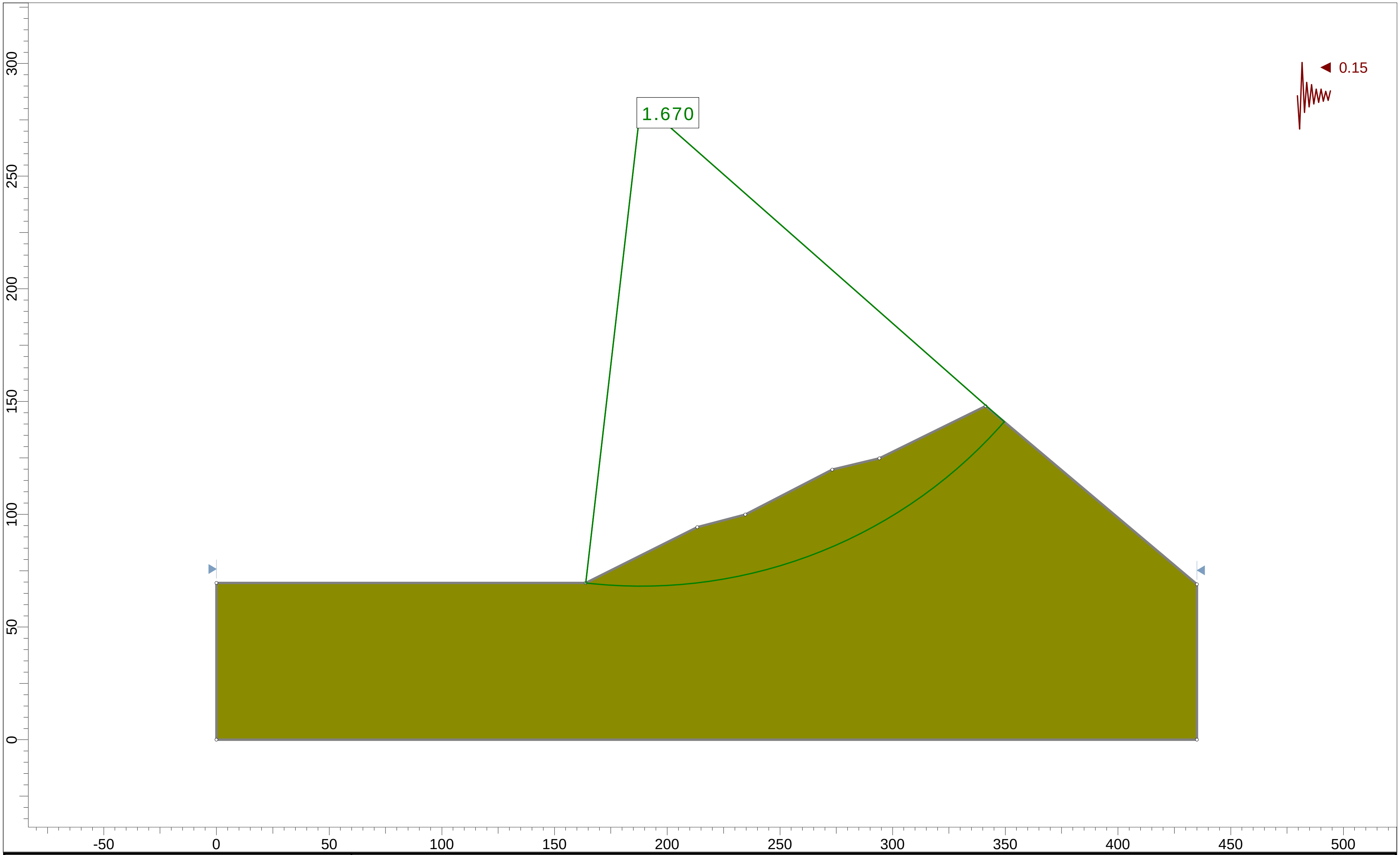
SLIDEINTERPRET 8.016



KCG KLING Consulting Group, Inc.

Project	18060-00 Jack Rabbit Trail		
Analysis Description	Cross Section B-B' Static		
Drawn By	CJO	*Project Number*	18060-00
Date	8/16/2019	*Figure*	

SLIDEINTERPRET 8.016

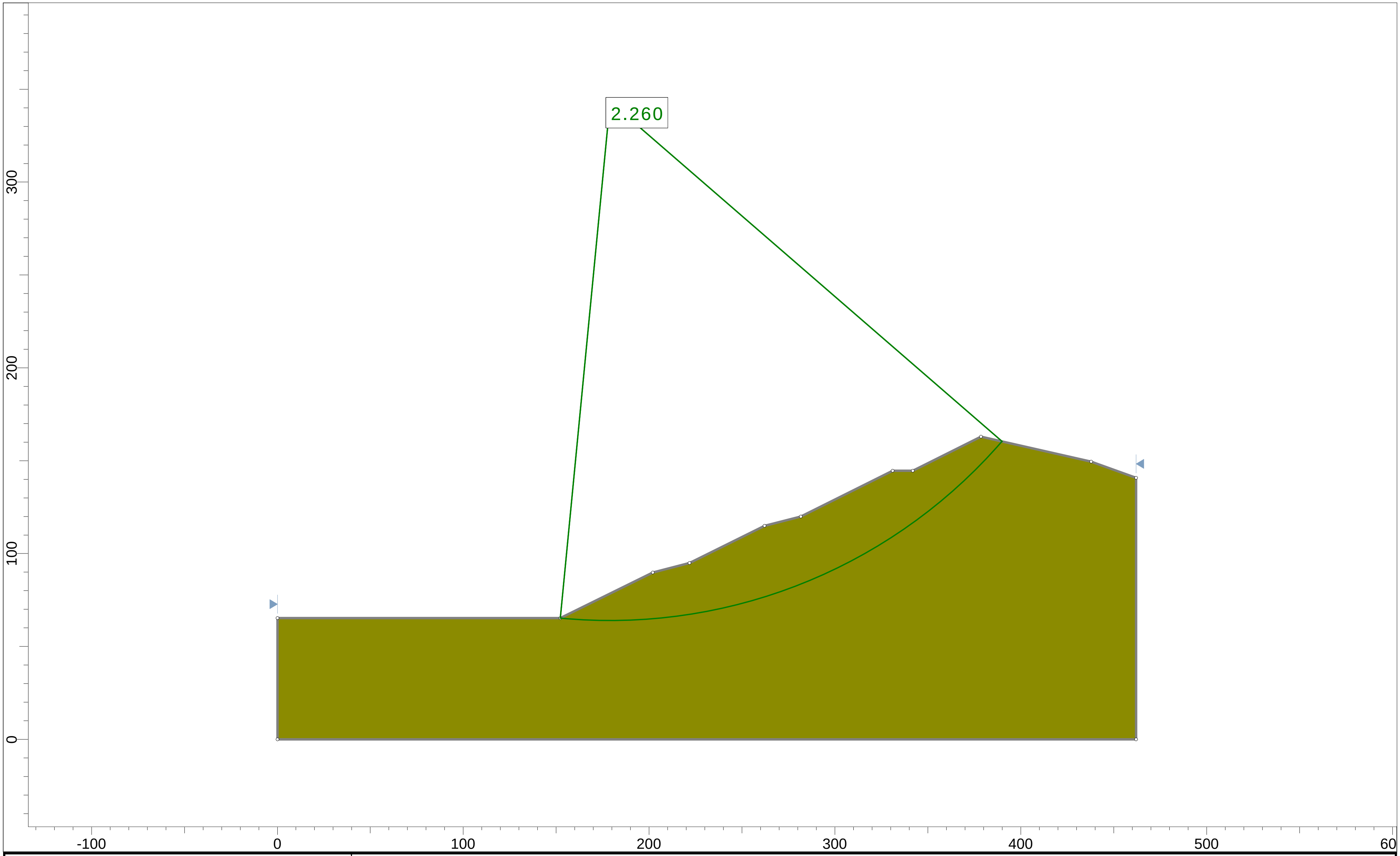


KCG KLING Consulting Group, Inc.

SLIDEINTERPRET 8.016

Project	18060-00 Jack Rabbit Trail
Analysis Description	Cross Section B-B' Pusedo Static

Drawn By	CJO	*Project Number*	18060-00
Date	8/16/2019	*Figure*	



Project

18060-00 Jack Rabbit Trail

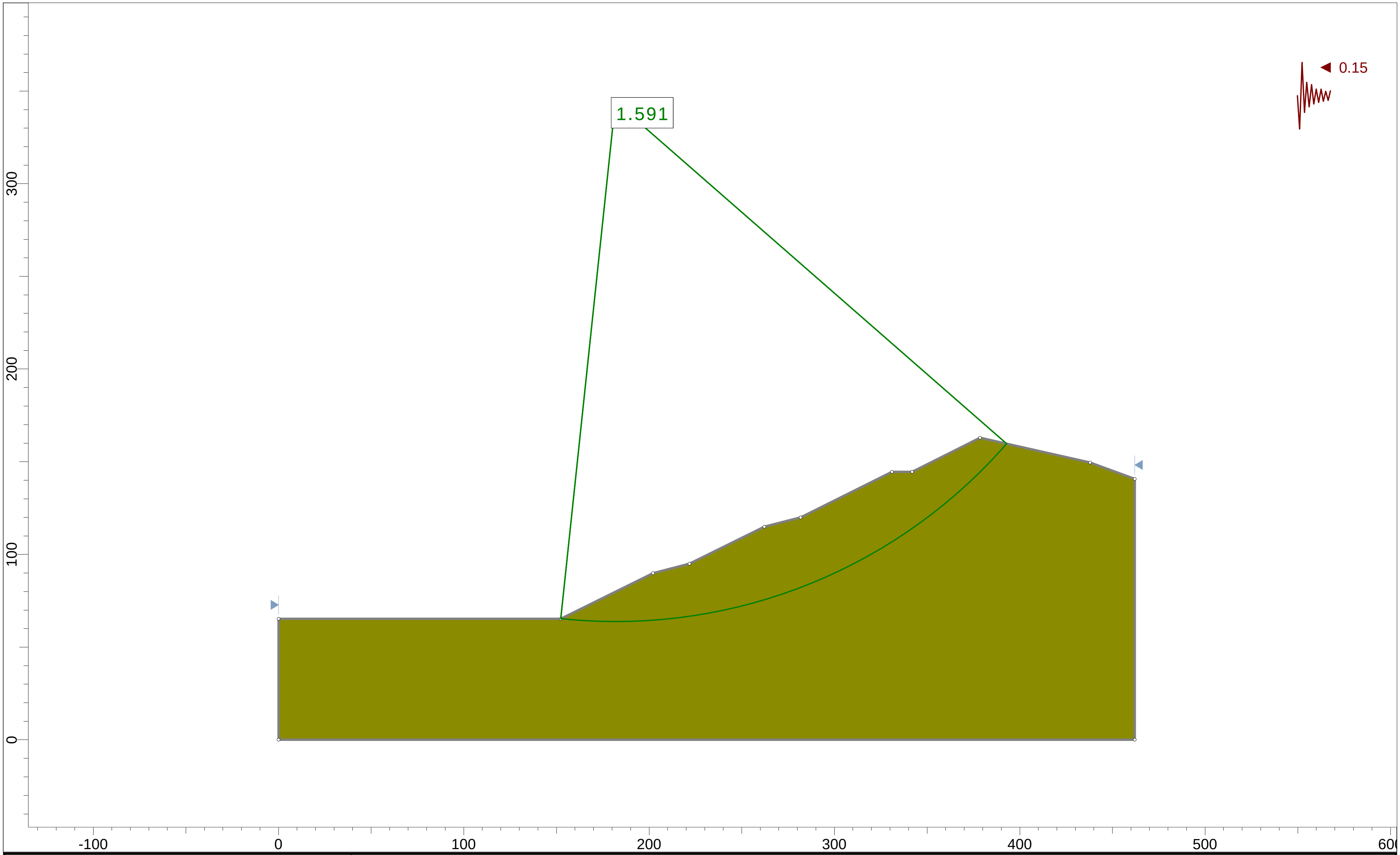
Analysis Description

Cross Section C-C' Static

Drawn By	CJO	Project Number	18060-00
Date	8/16/2019	Figure	

KCG KLING Consulting Group, Inc.

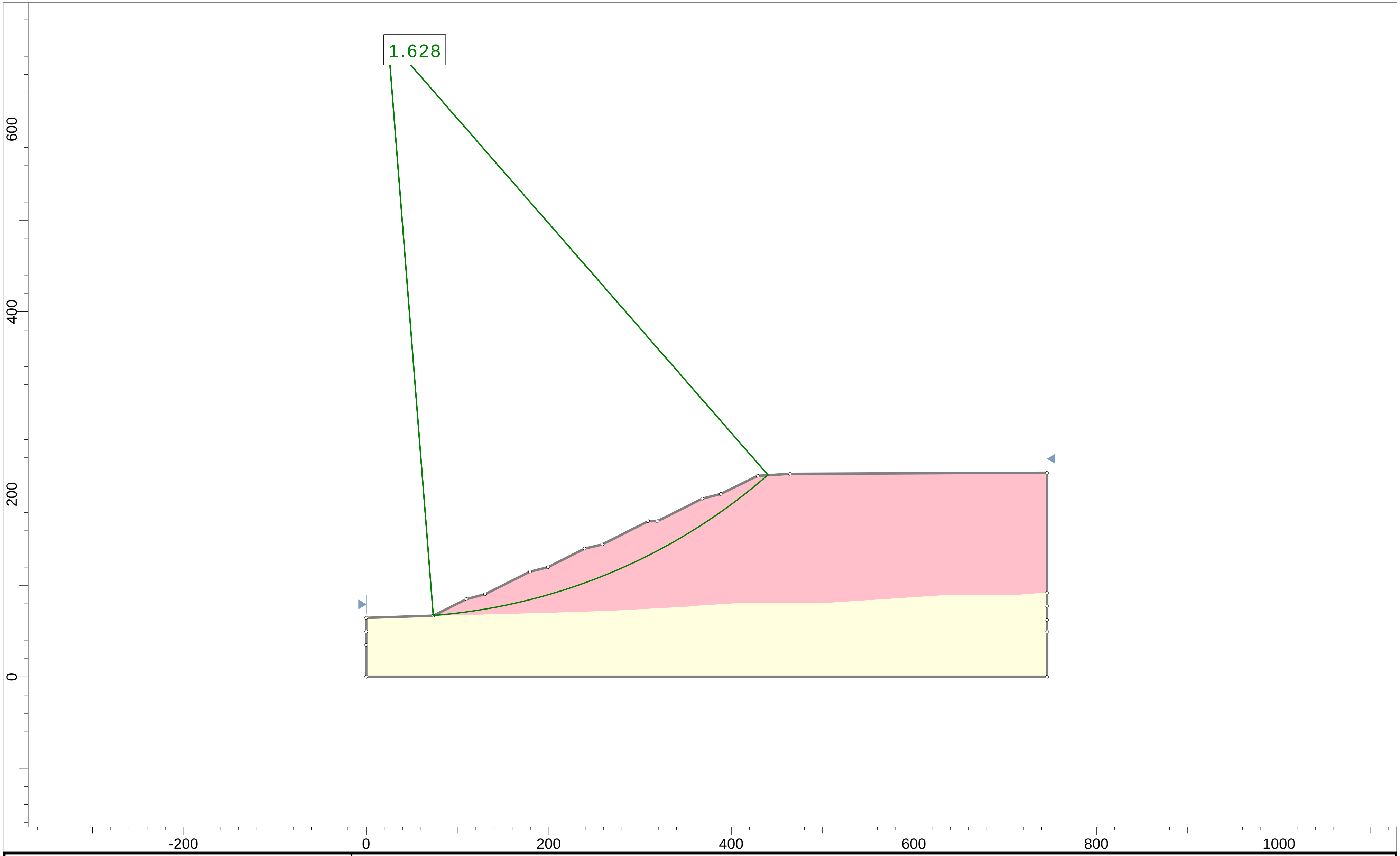
SLIDEINTERPRET 8.016



Project	18060-00 Jack Rabbit Trail		
Analysis Description	Cross Section C-C' Pusedo Static		
Drawn By	CJO	*Project Number*	18060-00
Date	8/16/2019	*Figure*	

KCG KLING Consulting Group, Inc.

SLIDEINTERPRET 8.016

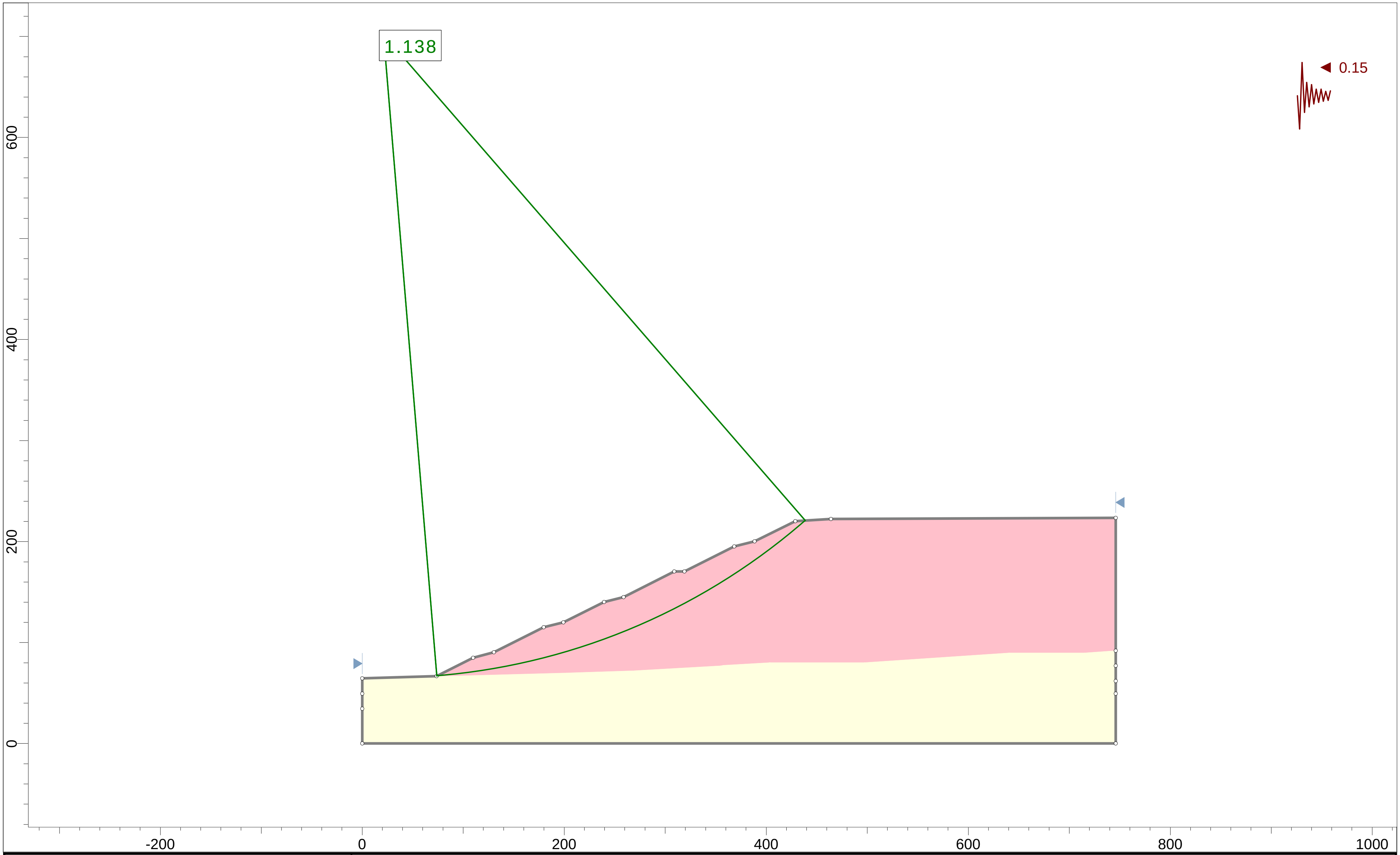


Project	18060-00 Jack Rabbit Trail
Analysis Description	Cross Section D-D' Static

Drawn By	CJO	*Project Number*	18060-00
Date	8/16/2019	*Figure*	

KCG KLING Consulting Group, Inc.

SLIDEINTERPRET 8.016



Project	18060-00 Jack Rabbit Trail		
Analysis Description	Cross Section D-D' Puesdo Static		
Drawn By	CJO	*Project Number*	18060-00
Date	8/16/2019	*Figure*	

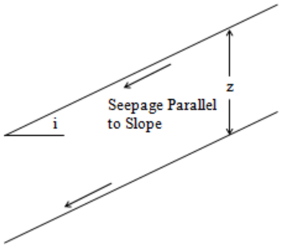
KCG KLING Consulting Group, Inc.

SLIDEINTERPRET 8.016

KCG KLING
Consulting
Group, Inc.

Jack Rabbit Trail
Surficial Stability Calculation 2:1 Cut Slope

August, 2019



Soil Properties

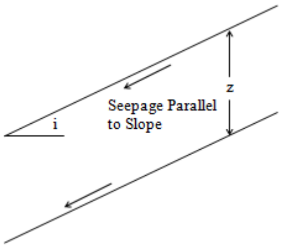
$\gamma := 130\ \text{pcf}$	Unit Weight of Soil	$\phi' := 33\ \text{deg}$	Angle of Internal Friction
$\gamma_w := 62.4\ \text{pcf}$	Unit Weight of Water	$i := 26.6\ \text{deg}$	Slope Angle
$c := 550\ \text{psf}$	Cohesion	$z := 4\ \text{ft}$	Depth of Saturation

Surficial Stability Calculation

$$FS := \frac{c + \left(\left(\gamma - \gamma_w\right) \cdot z \cdot \cos(i)^2 \cdot \tan(\phi')\right)}{\gamma \cdot z \cdot \sin(i) \cdot \cos(i)} = 3.32$$

Jack Rabbit Trail
Surficial Stability Calculation 2:1 Fill Slope

August, 2019



Soil Properties

$\gamma := 125\ \mathrm{pcf}$	Unit Weight of Soil	$\phi' := 31\ \mathrm{deg}$	Angle of Internal Friction
$\gamma_w := 62.4\ \mathrm{pcf}$	Unit Weight of Water	$i := 26.6\ \mathrm{deg}$	Slope Angle
$c := 350\ \mathrm{psf}$	Cohesion	$z := 4\ \mathrm{ft}$	Depth of Saturation

Surficial Stability Calculation

$$FS := \frac{c + \left(\left(\gamma - \gamma_w\right) \cdot z \cdot \cos(i)^2 \cdot \tan(\phi')\right)}{\gamma \cdot z \cdot \sin(i) \cdot \cos(i)} = 2.35$$

APPENDIX F

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

1.0 GENERAL INTENT

These specifications present general procedures and requirements for grading and earthwork as shown on the project grading plans, including preparation of areas to be filled, placement of fill, installation of subsurface drainage, and excavations. The recommendations contained in the geotechnical report(s) are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict. Evaluations performed by the geotechnical consultant during the course of grading may result in new specifications or recommendations in addition to those contained in the geotechnical report(s).

2.0 EARTHWORK OBSERVATION AND TESTING

Prior to the commencement of grading, a qualified geotechnical consultant (soils engineer and engineering geologist, and their representatives) shall be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report and these specifications. It will be necessary that the geotechnical consultant provide adequate testing and observation so that he may determine that the work was accomplished as specified. If conditions exposed during grading differ significantly from those interpreted during the preliminary design investigation, the geotechnical consultant shall inform the client, recommend appropriate changes in the geotechnical design to account for the observed conditions, and notify City or County grading authorities, as necessary. It shall be the responsibility of the contractor to assist the geotechnical consultant and keep him apprised of work schedules and changes so that he may schedule his personnel accordingly.

The Project Geotechnical Consultant shall observe processing, moisture conditioning, and compaction of fill and subgrade materials. Testing of compacted fill in representative locations shall be performed by the Project Geotechnical Consultant's field representative. Daily reports and test results shall be provided to the client representative on a regular and frequent basis. Maximum dry density tests used to determine the degree of compaction and optimum moisture content shall be performed in accordance with the American Society for Testing and Materials test method ASTM D1557.

It shall be the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the work in accordance with the geotechnical report(s) applicable grading codes and project grading plans. If, in the opinion of the geotechnical consultant, unsatisfactory conditions, such as questionable soil, poor moisture condition, inadequate compaction, adverse weather, etc., are resulting in the quality of work less than required in these specifications, the geotechnical consultant will be empowered to reject the work and recommend that construction be stopped until the conditions are rectified.

3.0 PREPARATION OF AREA TO BE FILLED

3.1 Clearing and Grubbing

All brush, vegetation, trash, debris and other deleterious material shall be removed from fill areas and disposed of off site. Vegetation cleared from the site shall not be placed within engineered compacted fill areas.

3.2 Processing

The existing ground which is determined to be satisfactory for support of fill shall be scarified to a minimum depth of six (6) inches. Existing ground which is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until the soils are broken down and free of large clay lumps or clods and until the working surface is reasonably uniform and free of uneven features which would inhibit uniform compaction.

3.3 Overexcavation

Soft, dry, spongy, highly fractured or otherwise unsuitable ground, extending to such a depth that surface processing cannot adequately improve the condition, shall be overexcavated to firm ground, and verified by the project geotechnical consultant.

3.4 Moisture Conditioning

Overexcavated and processed soils shall be watered, dried-back, blended, and/or mixed as required to attain a uniform moisture content near optimum.

3.5 Recompaction

Overexcavated and processed soils which have been properly mixed and moisture-conditioned shall be recompacted to a minimum relative compaction of 90 percent, ASTM D1557.

3.6 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal: vertical units), the ground shall be stepped or benched. The lowest bench shall be a minimum of 15 feet wide, shall be at least 2 feet deep, shall expose firm material, and shall be verified by the geotechnical consultant. Other benches shall be excavated in firm material for a minimum width of 4 feet. Ground sloping flatter than 5:1 shall be benched or otherwise overexcavated when considered necessary by the geotechnical consultant.

3.7 Evaluation of Areas to Receive Fill

All areas to receive fill, including processed areas, removal areas and toe-of-fill benches shall be observed, tested, and/or mapped by the geotechnical consultant prior to fill placement. A written evaluation of the area to be filled shall be obtained by the Contractor prior to placement of fill.

4.0 FILL MATERIAL

4.1 General

Material to be placed as fill shall be free of roots, grasses, branches, wood or other organic matter and other deleterious materials, and shall be tested by the geotechnical consultant prior to use as fill. Soils of poor gradation, expansion, or strength characteristics shall be placed in areas designated by the geotechnical consultant or shall be mixed with other soils to serve as satisfactory fill material.

4.2 Oversize Material

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fills, unless the location, materials, and disposal methods are specifically recommended by the geotechnical consultant. Oversized disposal operations shall be such that nesting of oversize material does not occur, and such that the oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet vertically of finish grade or construction, unless specifically recommended by the geotechnical consultant.

4.3 Import

If importing of fill material is required for grading, the import material shall meet the requirements of Section 4.1. Samples of import soils shall be provided for testing a minimum of 48 hours before the import materials are brought on site.

5.0 FILL PLACEMENT AND COMPACTION

5.1 Fill Lifts

Fill material shall be placed in prepared areas in near-horizontal layers not exceeding 8 inches in loose thickness. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to attain uniformity of material and moisture in each layer.

5.2 Fill Moisture

Fill layers at a moisture content less than optimum shall be watered and mixed, and wet fill layers shall be aerated by scarification or shall be blended with drier material. Moisture-conditioning and mixing of fill layers shall continue until the fill material is at a uniformly processed at a minimum of 125 percent of the optimum moisture content.

5.3 Fill Compaction

Each layer of fill shall be evenly spread, moisture-conditioned, mixed, and shall be uniformly compacted to not less than 90 percent of the maximum dry density at a minimum of 125 percent of the optimum moisture content. Compaction equipment shall be adequately sized and shall be either specifically designed for soil compaction or of proven reliability, to efficiently achieve the specified degree of compaction.

5.4 Fill Slopes

Compacting of slopes shall be accomplished, in addition to normal compacting procedures, by overfilling and compacting the slope face a minimum of four feet horizontally from finish grade, and cutting the slope face back to the core of compacted fill. In restricted spaces where overfilling is not possible, fill slopes may be compacted by back-rolling of slopes, with sheepsfoot rollers at frequent increments of 1 to 2 feet in fill elevation gain. At the completion of grading, the relative compaction of the slope out to the slope face shall be a minimum of 90 percent.

5.5 Compaction Testing

Field tests to check the fill moisture and degree of compaction will be performed by the geotechnical consultant. The location and frequency of tests shall be at the geotechnical consultant's discretion. In general, the tests will be taken at an interval not exceeding 2 feet in vertical elevation and/or 1,000 cubic yards of fill placed.

6.0 SUBDRAIN INSTALLATION

Subdrain systems shall be installed in locations recommended by the geotechnical consultant to conform to the approximate alignment and details shown on the plans or herein. The subdrain location or materials shall not be changed or modified without the recommendation of the geotechnical consultant. The geotechnical consultant; however, may recommend changes in subdrain line, grade or material. All subdrains should be surveyed for line and grade after installation. Sufficient time shall be allowed for the surveys, prior to commencement of filling over subdrain areas.

7.0 EXCAVATION

Excavation and cut slopes will be geologically mapped and examined during grading. Sufficient time shall be allowed by the contractor to permit geologic mapping of excavation bottoms and cut slopes. If directed by the geotechnical consultant, further excavation or overexcavation and refilling of cut areas shall be performed, and/or remedial grading of cut slopes. All fill-over-cut slopes are to be graded, unless otherwise stated, shall be constructed as a fill slope with the use of minimum width stabilization fills, as necessary.

APPENDIX G

SLOPE MAINTENANCE GUIDELINES

SLOPE MAINTENANCE GUIDELINES

INTRODUCTION

Permanent slope maintenance measures should be initiated as soon as possible after completion of slope construction. However, all soil slopes will undergo some erosion when subjected to sustained water application. To reduce long-term erosion, we have outlined below some important points to be considered when planning, designing, and installing or implementing slope erosion control plans. The following general guidelines are provided to mitigate slope maintenance problems and should be implemented by the responsible party, during landscaping improvements and subsequent maintenance:

1. Manufactured or natural slopes, terraces, berms (ridges at crown of slopes) and proper drainage should not be disturbed or altered. Surface drainage should be positively maintained to the street.

2. Construction delays, climate/weather conditions, and plant growth rates may be such that additional short-term, non-plant erosion control measures may be needed; examples would be matting, netting, plastic sheets, deep (5-feet) staking, etc.

3. Roof, and drive runoff should be positively conducted away from structures to either the street or storm drain by nonerosive devices such as sidewalks, drainage pipes, ground gutters, and driveway pavement. Drainage should meet the minimum requirements of Section 1804 of the California Building Code.

4. Drains and "V" ditches, etc., should be periodically cleared and unclogged, including gutters and downspouts. During heavy rain periods, drainage should be inspected for performance often, as this is when trouble occurs. Problems such as gullying or ponding should be corrected as soon as possible.

5. High water content in slope soils is a major factor in slope erosion or slope failures. Therefore, all possible precautions should be taken to minimize soil moisture. Leakage from waterlines, irrigation systems, etc., or bypassing of clogged drains should be promptly repaired.

6. Animal burrows should be periodically filled or eliminated in order to minimize infiltration of water and slope failures.

7. If completion of new slopes occurs during the rainy season, contingency plans should be developed to provide prompt temporary protection against major erosion or sloughing. One method would be to place plastic sheeting over the slopes. This should be carefully coordinated with the Landscape Architect/Contractor.

8. The above guidelines are general maintenance procedures but may be superseded under specific direction of the geotechnical consultant/landscape architect/contractor.

APPENDIX H

AFSE INSERT

Important Information About Your

Geotechnical Engineering Report

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

The following information is provided to help you manage your risks.

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

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

Read the Full Report

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

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

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

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

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

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

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

Subsurface Conditions Can Change

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

Most Geotechnical Findings Are Professional Opinions

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

A Report's Recommendations Are *Not* Final

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

A Geotechnical Engineering Report Is Subject to Misinterpretation

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

Do Not Redraw the Engineer's Logs

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

Give Contractors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

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

Obtain Professional Assistance To Deal with Mold

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

Rely on Your ASFE-Member Geotechnical Engineer For Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

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Telephone:' 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

EXPLANATION

Locations Approximate

Qal Alluvium and Older Alluvium undifferentiated.

Tst San Timoteo Formation- sandstone, siltstone, and conglomerate, undifferentiated.

Strike and dip of bedding

Approximate Geologic Contact

KB-5 Approximate Boring Location

Approximate Trench/Test Pit Location

D D' Approximate Location of Geologic Cross Section

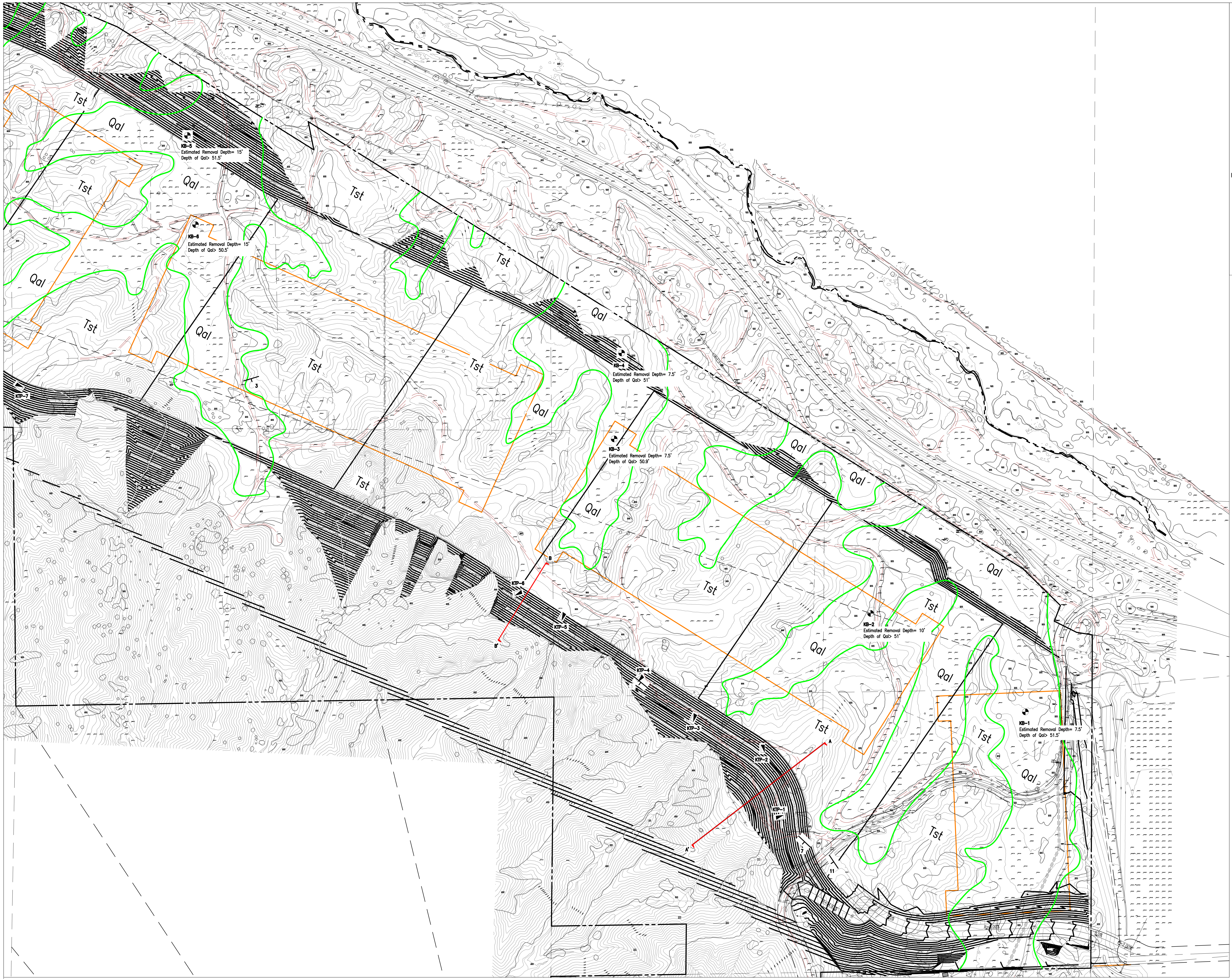
N

150 0 150

KCG KLING Consulting Group, Inc.

Beaumont Pointe Specific Plan
Beaumont, CA

Plate: 1
PN: 18060-01
Date: July 23, 2021



EXPLANATION

Locations Approximate

Qal	Alluvium and Older Alluvium undifferentiated.
Tst	San Timoteo Formation- sandstone, siltstone, and conglomerate, undifferentiated.
┼	Strike and dip of bedding
—	Approximate Geologic Contact
◐ KB-5	Approximate Boring Location
◣	Approximate Trench/Test Pit Location
D ⌐¬ D'	Approximate Location of Geologic Cross Section

N

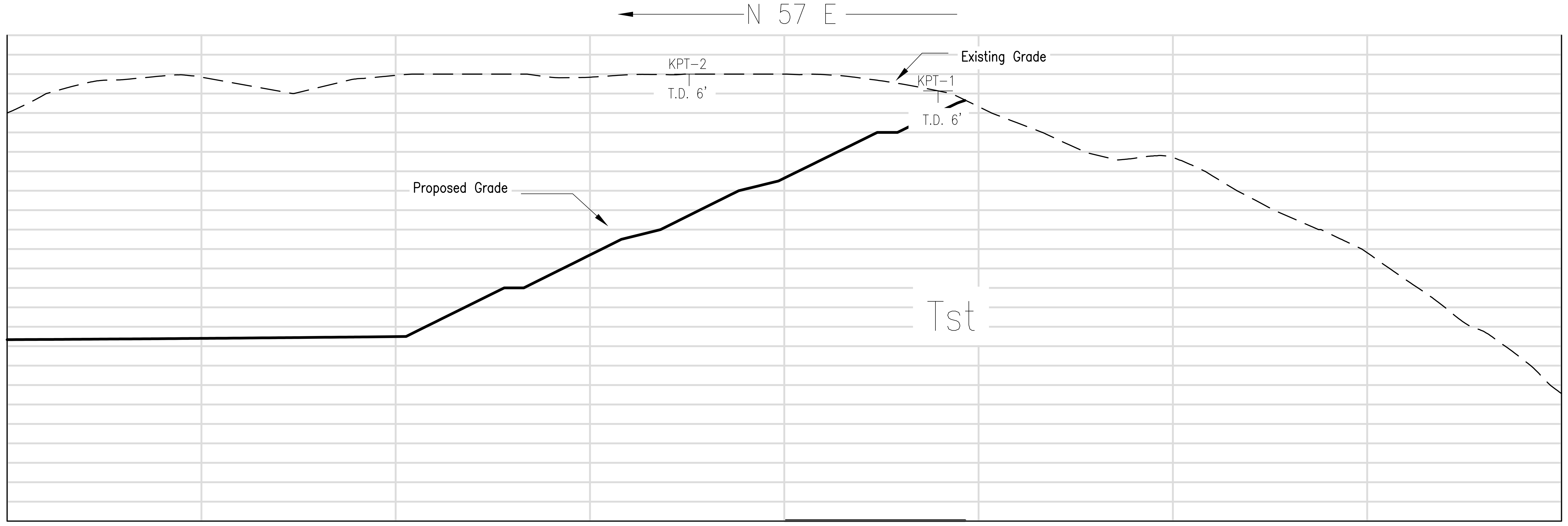
150 0 150

KCG KLING Consulting Group, Inc.

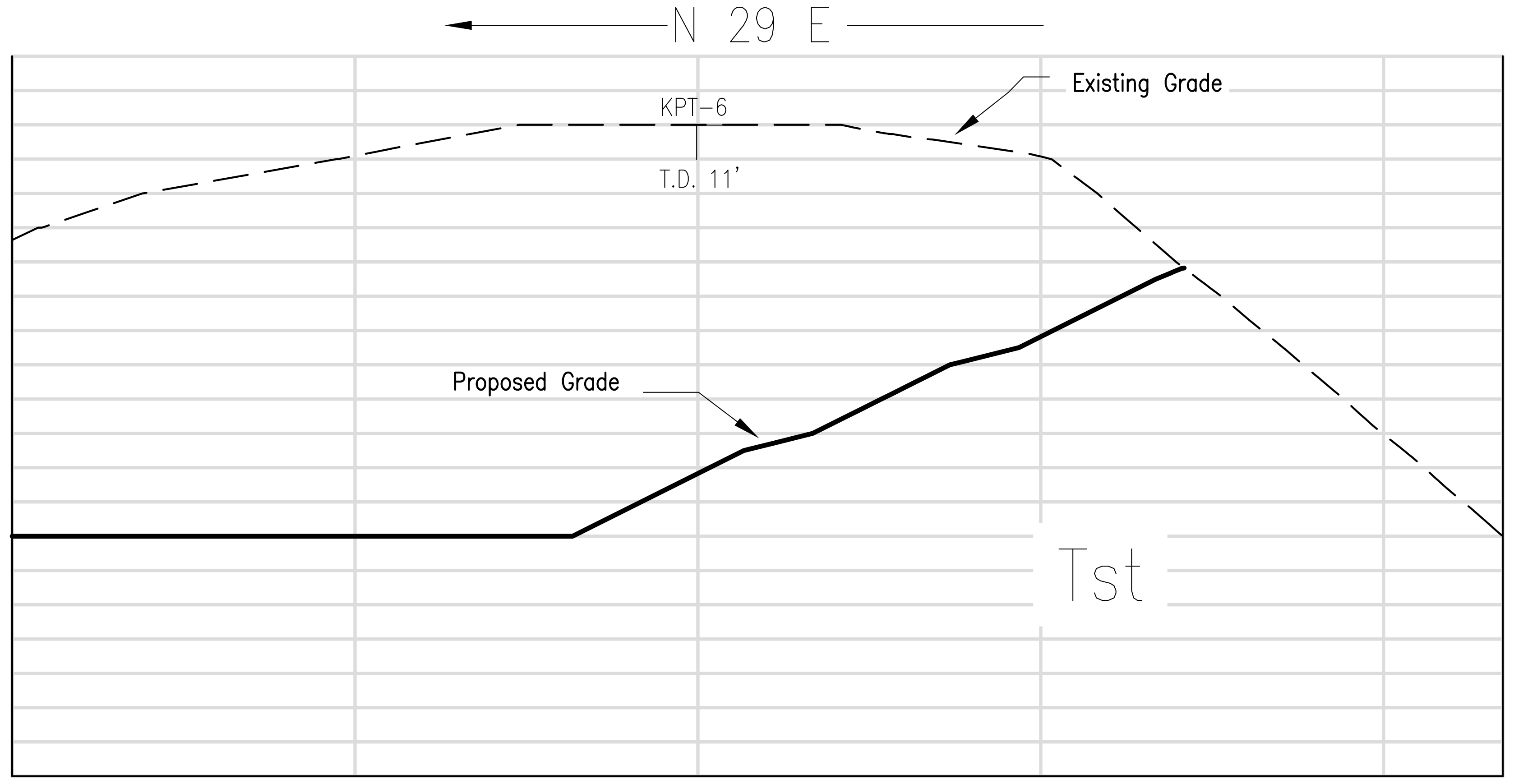
Beaumont Pointe Specific Plan
Beaumont, CA

Plate: 2
PN: 18060-01
Date: July 23, 2021

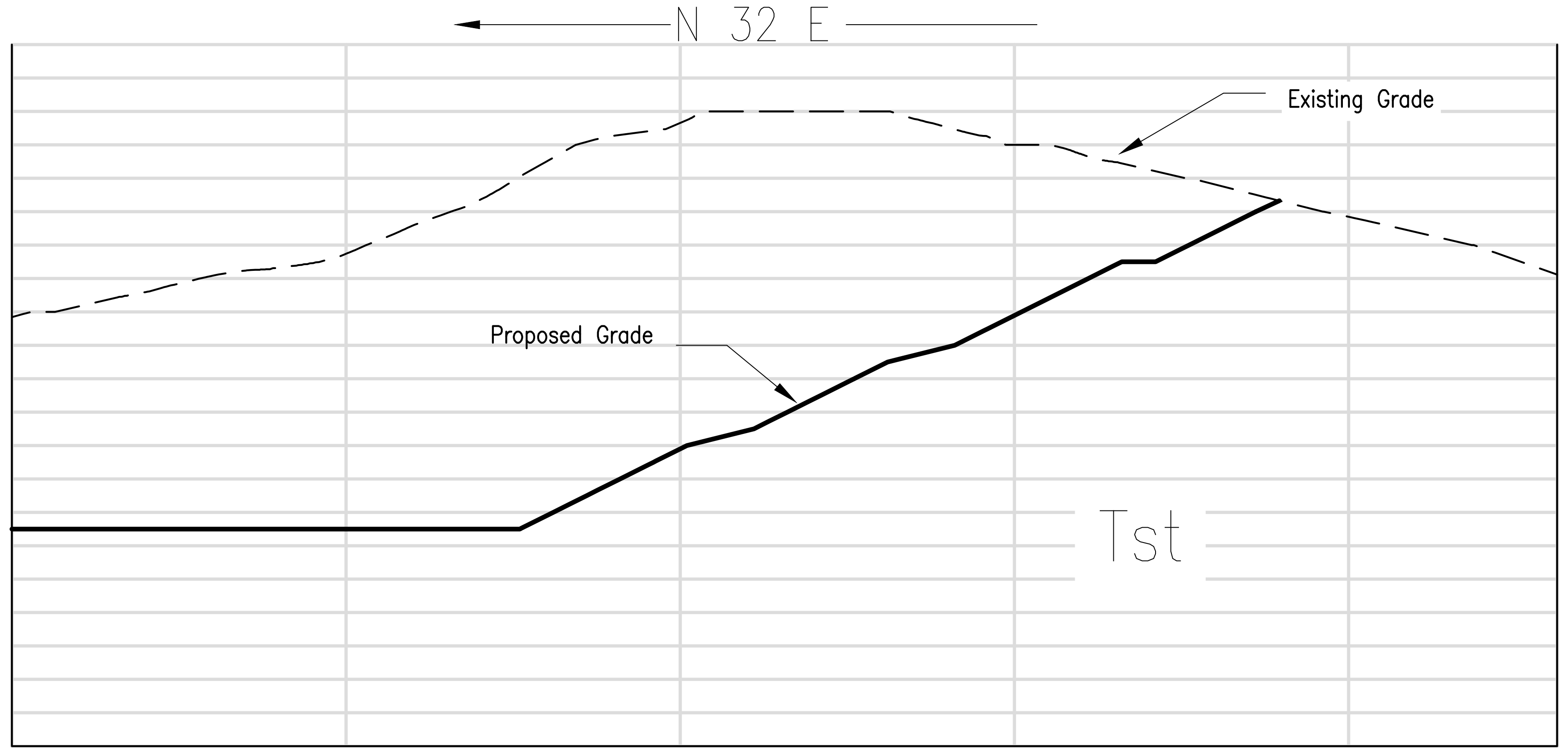
Cross Section A–A'



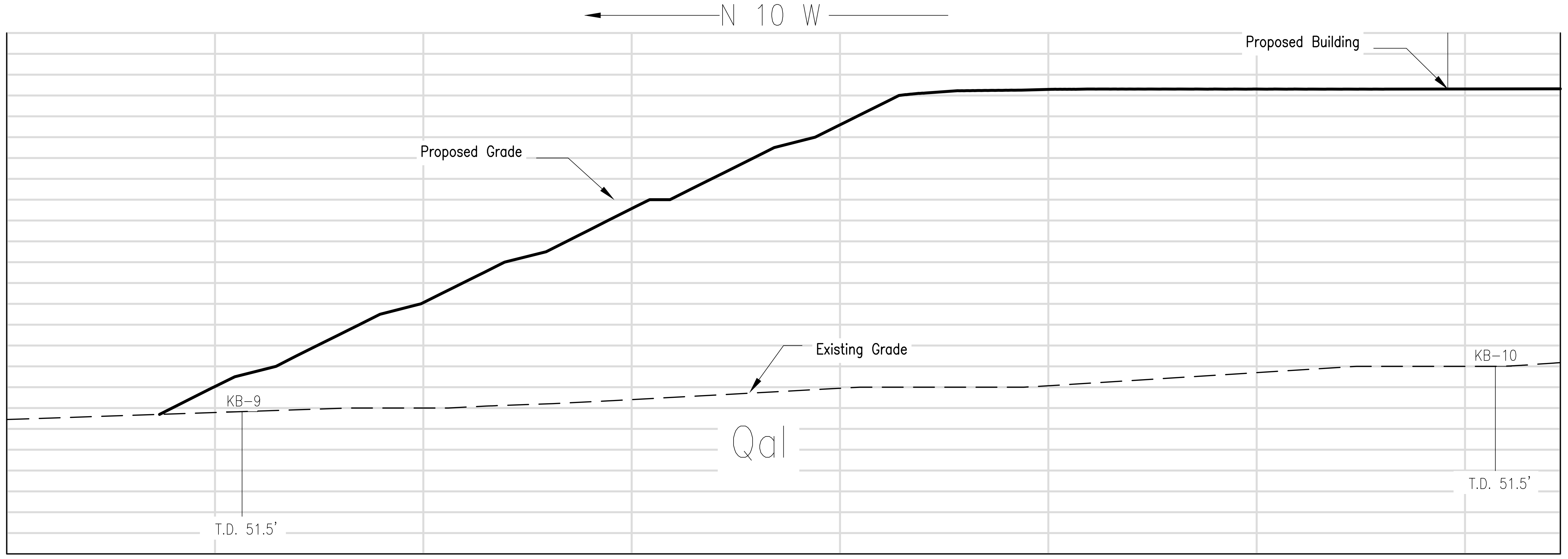
Cross Section B–B'



Cross Section C–C'



Cross Section D–D'



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Cross Sections
Beaumont Pointe Specific Plan
Beaumont, CA

Plate:	3
PN:	18060-01
Date:	July 23, 2021