<u>Appendix C</u>
Geotechnical Report

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED SHOE PALACE DISTRIBUTION CENTER
JARVIS AND SERENE DRIVE
MORGAN HILL, CALIFORNIA

KA PROJECT NO. 042-17031
DECEMBER 14, 2017

Prepared for:

MR. GEORGE MERSHO
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755 JARVIS DRIVE
MORGAN HILL, CALIFORNIA 95037

Prepared by:

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December 14, 2017

KA Project No. 042-17031

Mr. George Mersho
Bridge Group Investments, Inc.
755 Jarvis Drive
Morgan Hill, California 95037

RE: Geotechnical Engineering Investigation
Proposed Shoe Palace Distribution Center
Jarvis and Serene Drive
Morgan Hill, California

Dear Mr. Mersho:

In accordance with your request, we have completed a Geotechnical Engineering Investigation for the above-referenced site. The results of our investigation are presented in the attached report.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (925) 307-1160

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

David R. Jarosz, II
Managing Engineer
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CONSTRUCTION TESTING & INSPECTION

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GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED SHOE PALACE DISTRIBUTION CENTER
JARVIS AND SERENE DRIVE
MORGAN HILL, CALIFORNIA

INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed Shoe Palace Distribution Center to be located at the northeast corner of Jarvis and Serene Drives in Morgan Hill, California. Discussions regarding site conditions are presented herein, together with conclusions and recommendations pertaining to site preparation, Engineered Fill, utility trench backfill, drainage and landscaping, foundations, concrete floor slabs and exterior flatwork, retaining walls, soil cement reactivity, and pavement design.

A site plan showing the approximate boring locations is presented following the text of this report. A description of the field investigation, boring logs, and the boring log legend are presented in Appendix A. Appendix A also contains a description of the laboratory testing phase of this study, along with the laboratory test results. Appendices B and C contain guides to earthwork and pavement specifications. When conflicts in the text of the report occur with the general specifications in the appendices, the recommendations in the text of the report have precedence.

PURPOSE AND SCOPE

This investigation was conducted to evaluate the soil and groundwater conditions at the site, to make geotechnical engineering recommendations for use in design of specific construction elements, and to provide criteria for site preparation and Engineered Fill construction.

Our scope of services was outlined in our proposal dated November 1, 2017 (KA Proposal No. P625-17) and included the following:

- A site reconnaissance by a member of our engineering staff to evaluate the surface conditions at the project site.
- A field investigation consisting of drilling 16 borings to depths ranging from approximately 10 to 27 feet for evaluation of the subsurface conditions at the project site. Some of the borings were terminated due to auger refusal in cobbles.

- Performing laboratory tests on representative soil samples obtained from the borings to evaluate the physical and index properties of the subsurface soils.

- Evaluation of the data obtained from the investigation and an engineering analysis to provide recommendations for use in the project design and preparation of construction specifications.

- Preparation of this report summarizing the results, conclusions, recommendations, and findings of our investigation.

PROPOSED CONSTRUCTION

We understand that design of the proposed development is currently underway; structural load information and other final details pertaining to the structures are unavailable. On a preliminary basis, it is understood that the planned development will include a new distribution center building covering approximately 461,371 square feet. It is anticipated the structure will utilize concrete tilt-up construction supported on shallow conventional foundations and will utilize concrete slab-on-grade. Foundation loads are anticipated to be moderate. On-site paved areas and landscaping are also planned.

In the event, these structural or grading details are inconsistent with the final design criteria, the Soils Engineer should be notified so that we may update this writing as applicable.

SITE LOCATION AND SITE DESCRIPTION

The project site is irregular in shape and encompasses approximately 23.07 acres. The site is located at the northeast corner of Serene and Jarvis Drives in Morgan Hill, California. The site is predominately surrounded by commercial and industrial developments. A rural residence and vacant land are located to the south within a portion of the site. Highway 101 is located east of the site.

Presently, the northern and western portions of the site are predominately vacant. Olive trees are located in the northwest portion of the site. A basketball court is located in the southeast portion of the site. An existing asphalt parking lot associated with the development southeast of the site extends into a portion of the site. A depression approximately 2 to 3 feet deep is located in the western portion of the site. In addition, four excavations three to four feet deep and approximately 20 foot square in dimension are located in the eastern portion of the site. A soil berm approximately 4 feet high is located along the northeast edge of the site. Trees and shrubs are located within portions of the site. Chain link fencing is located along the northwest and southwest property lines. Concrete curb and gutter are located along Jarvis Drive and the existing parking lot. Concrete curb is located along the northern edge of the site. The site is covered with a moderate weed growth and the surface soils have a loose consistency. With the exception of the fill piles and excavations, the site is relatively level with no major changes in grade.

GEOLOGIC SETTING

General

The project site is within the Santa Clara Valley area and more specifically the southerly extension of the valley into Coyote Valley. This region is within the Coast Range Geomorphic Province. The Coast Range Geomorphic Province borders the Coast of California and generally consists of more or less discontinuous series of nearly parallel northwest-southeast trending mountain ranges, ridges, and intervening valleys characterized by intense, complex folding and faulting. Numerous northwest to southeast trending faults parallel the trend of the Coast Ranges. The ridges are most often comprised of granitic, metavolcanic, and metasedimentary rocks.

The San Andreas Fault System (SAF) controls the geomorphic and strong northwestern geologic structural orientation in the area. Basement rocks east of the San Andreas fault are generally Franciscan Complex and west of the fault are generally Paleocene and Eocene sedimentary rocks. Older Cenozoic and Mesozoic rocks of the Santa Cruz Mountains and the Diablo Range underlie the thick accumulations of alluvial sediments and overly the basement rock. Mesozoic and Tertiary marine and continental sedimentary rocks, as well as some Tertiary volcanic rocks overlie the basement rocks under Santa Clara Valley. The Mesozoic and Tertiary rocks are typically folded and faulted into a series of generally northwest-trending folds and faulted blocks.

Coyote Valley is located between the Santa Cruz Mountains to the southwest and the Diablo Range to the northeast. The valley is a broad northwesterly-southeasterly trending alluvial filled basin. The alluvial sediments are divided into older alluvial deposits that make up the majority of the valley fill, with younger deposits of alluvium confined to active stream channels. The Quaternary age older alluvium is comprised of gravel, sand, silt and clay as mapped on the Preliminary Geologic Map of the Morgan Hill Quadrangle, (Dibblee, 1973). Mapping by Wentworth (Wentworth, et.al., 1999) shows the area to be underlain by Upper Pleistocene alluvial fan deposits. The geologic map contained in the California Geologic Survey (CGS) publication Seismic Hazard Zone Report 096 (CGS, 2004) also shows the site to be underlain by latest Pleistocene alluvial fan deposits. The Santa Clara Valley Water District performed detailed subsurface geology and hydrogeology study of the Morgan Hill/Gilroy area of the Coyote Valley in 1981. Based on the data collected, the SCVWD generated geologic cross sections. Those cross sections indicate alluvial deposits on the order of several hundred feet in the Morgan Hill area.

Structure and Faults

The San Francisco Bay region is tectonically dominated by horizontal shear caused by the relative motion of the Pacific and North American plates. The northwest-southeast shear, probably with some other superposed influences, produces right-lateral strike-slip, plus a variety of other types of crustal movements. Since the boundary of the plates is generally diffuse, the various structural responses occur over a relatively broad band from the foot of the continental slope to the Central Valley. Transform-type plate movement did not begin at the latitude of San Francisco until about 10 to 7 million years ago, a time interval of transition in tectonics and sedimentation. The recent and current transform movement has superimposed a structural fabric on the pre-existing highly deformed structure created by Jurassic and Cretaceous subduction and emplacement of the Franciscan Formation.

Active faults in the region of the subject site are predominately characterized by strike-slip motion (right-lateral). Major nearby faults showing evidence of earthquake activity within historic time (past 200 years) in relation to the site include the Calaveras (4.1 miles northeast), the San Andreas (10.2 miles southwest), the Monte Vista-Shannon (11.6 miles northwest), the Zayante-Vergeles (13.6 miles west), Quien Sabe (21.3 miles southeast), and the Hayward-Rodgers Creek (24.8 miles north) faults. These faults are considered to be active, as they have demonstrated geologic displacement with the past 12,000 years.

Fault Rupture Hazard Zones in California

The Alquist-Priolo Geologic Hazards Zones Act went into affect in March, 1973. Since that time, the act has been amended 11 times (Hart, 2007). The purpose of the Act, as provided in CGS Special Publication 42 (SP 42), is to prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault-rupture." The act was renamed the Alquist-Priolo Earthquake Fault Zoning Act in 1994, and at that time, the originally designated "Special Studies Zones" was renamed the "Earthquake Fault Zones."

The area of the subject site is included on the Earthquake Fault Zones Map entitled "Morgan Hill Quadrangle", Revised Official Map, dated January 1, 1982. The site is not within a Fault-Rupture Hazard Zone. The nearest zoned faults are a portion of the Calaveras fault located more than 3.5 miles northeast of the subject site.

Seismic Hazard Zones in California

In 1990, the California State Legislature passed the Seismic Hazard Mapping Act to protect public safety from the effects of strong shaking, liquefaction, landslides, or other ground failure, and other hazards caused by earthquakes. The Act requires that the State Geologist delineate various seismic hazards zones on Seismic Hazards Zones Maps. Specifically, the maps identify areas where soil liquefaction and earthquake-induced landslides are most likely to occur. A site-specific geotechnical evaluation is required prior to permitting most urban developments within the mapped zones. The Act also requires sellers of real property within the zones to disclose this fact to potential buyers. The area of the subject site is included on the Seismic Hazard Zone Map entitled "Morgan Hill Quadrangle", Official Map dated October 19, 2004. However, the site is not located within areas identified as susceptible to liquefaction hazards or landslide hazards.

Geologic Hazard Zones in Santa Clara County

The area of the subject site is located on the Santa Clara County Geologic Hazard Zones map, No. 53, dated October 18, 2006. However, the site is not located in a Liquefaction Hazard zone and is not located in a Fault Rupture Hazard zone.

FIELD AND LABORATORY INVESTIGATIONS

Subsurface soil conditions were explored by drilling 16 borings to depths ranging from approximately 10 to 27 feet below existing site grade, using a truck-mounted drill rig. In addition, 4 bulk subgrade samples were obtained from the site for laboratory R-value testing. The approximate boring and bulk sample locations are shown on the site plan. During drilling operations, penetration tests were performed at regular intervals to evaluate the soil consistency and to obtain information regarding the engineering properties of the subsoils. Soil samples were retained for laboratory testing. The soils encountered were continuously examined and visually classified in accordance with the Unified Soil Classification System. A more detailed description of the field investigation is presented in Appendix A.

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory testing program was formulated with emphasis on the evaluation of natural moisture, density, gradation, shear strength, consolidation potential, expansion potential, stability (R-value) test, and moisture-density relationships of the materials encountered. In addition, chemical tests were performed to evaluate the corrosivity of the soils to buried concrete and metal. Details of the laboratory test program and results of the laboratory tests are summarized in Appendix A. This information, along with the field observations, was used to prepare the final boring logs in Appendix A.

SOIL PROFILE AND SUBSURFACE CONDITIONS

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. In general, the upper soils within the project site consisted of approximately 1½ to 4½ feet of fill material. The fill material predominately consisted of clayey silty sand with gravel, clayey silty sand, clayey sand and gravelly clayey sand. In addition to the fill encountered in our borings, fill piles and a soil berm are located within the site. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill soil during the time of our field and laboratory investigations. This limited testing indicates that the fill soils had varying strength characteristics ranging from loosely placed to compacted. These soils are disturbed, have low strength characteristics, and are highly compressible when saturated.

Below the loose surface soils and fill material, approximately 1½ to 3 feet of medium dense to very dense clayey silty sand, clayey sand and gravelly clayey sand or very stiff sandy clayey silt and sandy silty clay were encountered. Field and laboratory tests suggest that these soils are moderately strong, slightly compressible, and have a moderate potential for expansion. Penetration resistance ranged from 16 blows per foot to greater than 50 blows per 6 inches. Dry densities ranged from 99 to 129 pcf. Representative soil samples consolidated approximately 6 to 9 percent under a 2 ksf load when saturated. Representative soil samples had angles of internal friction of 27 to 37 degrees. Representative samples of the clayey soils had expansion indices of 20 to 34.

Below 4 to 7 feet, alternating layers of predominately medium dense to very dense gravelly clayey sand, gravelly silty sand, clayey sand and sandy clayey gravel or hard sandy clayey silt and silty clay were encountered. Penetration resistance ranged from 17 blows per foot to greater than 50 blows per 6 inches. Dry densities ranged from 113 to 135 pcf. These soils had similar strength characteristics as the upper soils and extended to the termination depth of our borings.

For additional information about the soils encountered, please refer to the logs of borings in Appendix A.

GROUNDWATER

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Free groundwater was not encountered within a depth of 27 feet during our subsurface investigation. However, historical groundwater has been as shallow as 22 feet within the project site vicinity.

It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

SOIL LIQUEFACTION

Soil liquefaction is a state of soil particles suspension caused by a complete loss of strength when the effective stress drops to zero. Liquefaction normally occurs under saturated conditions in soils such as sand in which the strength is purely frictional. However, liquefaction has occurred in soils other than clean sand. Liquefaction usually occurs under vibratory conditions such as those induced by seismic event.

To evaluate the liquefaction potential of the site, the following items were evaluated:

1) Soil type
2) Groundwater depth
3) Relative density
4) Initial confining pressure
5) Intensity and duration of groundshaking

The predominant soils within the project site consist of layers of clayey silty sand, clayey sand, gravelly clayey sand, sandy clayey silt, sandy silty clay and gravelly silty sand. Groundwater was not encountered within a depth of 27 feet during our exploratory drilling. However, groundwater has been historically encountered at depths as shallow as 22 feet below site grade within the project site and vicinity.

The potential for soil liquefaction during a seismic event was evaluated using the "LiquefyPro" computer program (version 5.8h) developed by CivilTech Software. For the analysis, a maximum earthquake magnitude of 7.9 was used. A peak horizontal ground surface acceleration of 0.4g was considered conservative and appropriate for the liquefaction analysis within the area. A high groundwater depth of 22 feet was used for the analysis. The computer analysis indicates that soils above a depth of 22 feet are non-liquefiable due to the absence of groundwater. The soils below depths of 22 feet have a very low potential for liquefaction with a factor of safety of 5.0. The analysis also indicates that the estimated total seismic induced settlement due to soil liquefaction is less than approximately ¼ inch. The estimated differential seismic settlements were less than ¼ inch over the width of the building. Due to the relative density of the granular soils encountered at the site, the stiff consistency of the cohesive soils, as well as the anticipated low to moderate seismicity of the area, warrant the conclusion that the potential for liquefaction and related settlement is low at this site and no liquefaction mitigation procedures are necessary for this project.

SEISMIC SETTLEMENT

One of the most common phenomena during seismic shaking accompanying any earthquake is the induced settlement of loose unconsolidated soils. Based on site subsurface conditions and the moderate seismicity of the region, any loose fill materials or unconsolidated native soils at the site could be vulnerable to this potential hazard. However, this hazard can be mitigated by following the design and construction recommendations of our Geotechnical Engineering Investigation (over-excavation and rework of the loose soils and/or fill). Based on the penetration resistance measured, the native deposits underlying the fill materials appear to be subject to low to moderate seismic settlement.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of our field and laboratory investigations, along with previous geotechnical experience in the project area, the following is a summary of our evaluations, conclusions, and recommendations.

Administrative Summary

In brief, the subject site and soil conditions, with the exception of the fill material, moderate shrink/swell potential of the upper clayey soil, and existing development appear to be conducive to the development of the project. Approximately 1½ to 4½ feet of fill material was encountered within the borings drilled across the project site. In addition to the fill encountered in our borings, fill piles and a soil berm are located within the site. The fill material predominately consisted of clayey sand, gravelly clayey sand, clayey silty sand with gravel and clayey silty sand. The thickness and extent of fill material was determined based on limited test borings and visual observations. Thicker fill may be present at the site. Limited testing was performed on the fill soil during the time of our field and laboratory investigations. The limited testing indicates that the fill material was predominately loosely placed and not properly compacted. Therefore, it is recommended that the fill soil be excavated and stockpiled so that the native soils can be properly prepared. These clayey fill soils will not be suitable for reuse as non-expansive Engineered Fill. However, the clayey fill material will be suitable for reuse as General Engineered Fill, provided it is cleansed of excessive organics and debris and moisture-conditioned to a minimum of 2 percent above optimum moisture-content. The fill material should be compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Prior to fill placement Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

Mitigation measures are recommended to reduce the potential for excessive total and differential soil settlements. It is recommended that following stripping and fill removal operations, the upper 3 feet of native soils within the proposed structural areas be excavated, worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. In addition, it is recommended shallow foundations be supported by a minimum of 2 feet of Engineered Fill. Prior to backfilling, the exposed subgrade soils should be proof-rolled under observation by Krazan to verify stability. Soft or pliant areas should be excavated to firm native ground.

The on-site clayey soils appear to have a moderate shrink/swell potential. To reduce potential soil movement related to shrink/swell of the clayey soils, it is recommended that slab-on-grade and exterior flatwork areas be supported by at least 12 inches of non-expansive Engineered Fill. The fill material should be a well-graded silty sand or sandy silt soil. A clean sand or very sandy soil is not acceptable for this purpose. A sandy soil will allow the surface water to drain into the expansive soils below, which may result in soil swelling. The replacement soils and/or upper 12 inches of Imported Fill soils should meet the specifications as described under the subheading Engineered Fill. The replacement soils should extend 5 feet beyond the perimeter of slab-on-grade areas. The non-expansive replacement soils should be compacted to at least 90 percent of relative compaction based on ASTM Test Method D1557. The exposed native soils in the excavation should not be allowed to dry out and should be kept continually moist, prior to backfilling. In addition, it is recommended that slab-on-grade, continuous footings and slabs be nominally reinforced to reduce cracking and vertical off-set.

As an alternative to the use of non-expansive soils, the upper 12 inches of soil supporting the slab areas can consist of lime-treated clayey soils. The lime-treated soils should be recompacted to a minimum of 90 percent of maximum density. Preliminary application rate of lime should be 5 percent by dry weight. The lime material should be calcium oxide, commonly known as quick-lime. The clayey soils should be above optimum moisture during the mixing operations.

Structures are located in the vicinity of the site. In addition, asphaltic concrete is located within portions of the project site. Associated with these developments are buried structures, such as utility lines that may extend into the project site. Demolition activities should include proper removal of any buried structures. Any buried structures including utilities or loosely backfilled excavations, encountered during construction should be properly removed and the resulting excavations backfilled. After demolition activities, it is recommended that these disturbed soils be removed and/or recompacted. This compaction effort should stabilize the upper soils and locate any unsuitable or pliant areas not found during our field investigation.

Tree and bush removal operations should include roots greater than 1 inch in diameter. The resulting excavations should be cleaned to firm native ground and backfilled with Engineered Fill compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Depressions and multiple excavations are located within the site. All deleterious materials and loose soils should be removed from these areas and the resulting excavations should be cleaned to firm native soil, and backfilled with Engineered Fill compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

After completion of the recommended site preparation and over-excavation, the site should be suitable for shallow footing support. The proposed structure footings may be designed utilizing an allowable bearing pressure of 3,500 psf for dead-plus-live loads. Footings should have a minimum embedment of 18 inches.

Groundwater Influence on Structures/Construction

Based on our findings and historical records, it is not anticipated that groundwater will rise within the zone of structural influence or affect the construction of foundations and pavements for the project. However, if earthwork is performed during or soon after periods of precipitation, the subgrade soils may become saturated, "pump," or not respond to densification techniques. Typical remedial measures include: discing and aerating the soil during dry weather; mixing the soil with dryer materials; removing and replacing the soil with an approved fill material; or mixing the soil with an approved lime or cement product. Our firm should be consulted prior to implementing remedial measures to observe the unstable subgrade conditions and provide appropriate recommendations.

Site Preparation

General site clearing should include removal of vegetation; existing utilities; structures including foundations; basement walls and floors; existing stockpiled soil; trees and associated root systems; rubble; rubbish; and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 2 to 4 inches, or until all organics in excess of 3 percent by volume are removed. Deeper stripping may be required in localized areas. These materials will not be suitable for reuse as Engineered Fill. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas.

Approximately 1½ to 4½ feet of fill material was encountered within the borings drilled across the project site. In addition to the fill encountered in our borings, fill piles and a soil berm are located within the site. The fill material predominately consisted of clayey sand, gravelly clayey sand, clayey silty sand with gravel and clayey silty sand. The thickness and extent of fill material was determined based on limited test borings and visual observations. Thicker fill may be present at the site. Limited testing was performed on the fill soil during the time of our field and laboratory investigations. The limited testing indicates that the fill material was predominately loosely placed and not properly compacted. Therefore, it is recommended that the fill soil be excavated and stockpiled so that the native soils can be properly prepared. These clayey fill soils will not be suitable for reuse as non-expansive Engineered Fill. However, the clayey fill material will be suitable for reuse as General Engineered Fill, provided it is cleansed of excessive organics and debris and moisture-conditioned to a minimum of 2 percent above optimum moisture-content. The fill material should be compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Prior to fill placement Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

Existing structures are located in the vicinity of the site. In addition, portions of the site are covered with asphalt. Associated with these developments are buried structures, such as utility lines. Any buried structures, such as utilities or loosely backfilled excavations, encountered during construction should be properly removed and the resulting excavations backfilled. After demolition activities, it is recommended that these disturbed soils be removed and/or recompacted. Excavations, depressions, or soft and pliant areas extending below planned, finished subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill. In general, any septic tanks, debris pits, cesspools, or similar structures should be entirely removed. Water wells should be abandoned in accordance with county standards. Concrete footings should be removed to an equivalent depth of at least 3 feet below proposed footing elevations or as recommended by the Soils Engineer. Any other buried structures should be removed in accordance with the recommendations of the Soils Engineer. The resulting excavations should be backfilled with Engineered Fill.

The upper native soils are moderately compressible under saturated conditions. In order to reduce the potential for excessive total and differential movement, it is recommended that following stripping and fill removal operations, the upper 3 feet of native soils within the proposed structural areas be excavated, worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. In addition, it is recommended shallow foundations be supported by a minimum of 2 feet of Engineered Fill. Prior to backfilling, the exposed subgrade soils should be proof-rolled under observation by Krazan to verify stability. Limits of removal and recompaction should extend 5 feet beyond structural elements.

Following stripping, fill removal operations, demolition activities, and prior to fill placement, the exposed subgrade in pavement and exterior flatwork areas should be excavated to a depth of at least 12 inches, worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation.

Tree and bush removal operations should include roots greater than 1 inch in diameter. The resulting excavations should be cleaned to firm native ground and backfilled with Engineered Fill compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Depressions and multiple excavations are located within the site. All deleterious materials and loose soils should be removed from these areas and the resulting excavations should be cleaned to firm native soil, and backfilled with Engineered Fill compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

It is recommended that the upper 12 inches of soil within proposed slab-on-grade and exterior flatwork areas consist of non-expansive Engineered Fill or lime-treated Engineered Fill. The fill placement serves two functions: 1) it provides a uniform amount of soil which will more evenly distribute the soil pressures and 2) it reduces moisture content fluctuation in the clayey material beneath the building area. The non-expansive fill material should be a well-graded silty sand or sandy silt soil. A clean sand or very sandy soil is not acceptable for this purpose. A sandy soil will allow the surface water to drain into the expansive clayey soil below, which may result in soil swelling. Imported Fill should be approved by the Soils Engineer prior to placement. The fill should be placed as specified as Engineered Fill.

As indicated previously, fill material is located across the site. It is recommended that any uncertified fill material encountered within pavement areas, be removed and/or recompacted. The fill material should be moisture-conditioned to a minimum of 2 percent above optimum moisture and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. As an alternative, the Owner may elect not to recompact the existing fill within paved areas. However, the Owner should be aware that the paved areas may settle which may require annual maintenance. At a minimum, it is recommended that the upper 12 inches of subgrade soil be moisture-conditioned and recompacted to a minimum of 95 percent of maximum density based on ASTM Test Method D1557.

The upper soils, during wet winter months, become very moist due to the absorptive characteristics of the soil. Earthwork operations performed during winter months may encounter very moist unstable soils, which may require removal to grade a stable building foundation. Project site winterization consisting of placement of aggregate base and protecting exposed soils during the construction phase should be performed.

A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service, as acceptance of earthwork construction is dependent upon compaction and stability of the material. The Soils Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section and the Engineered Fill section.

Engineered Fill

The on-site upper native soils and fill material are predominately clayey sand, gravelly clayey sand, clayey silty sand with gravel, clayey silty sand, sandy clayey silt and sandy silty clay. These clayey soils will not be suitable for reuse as non-expansive Engineered Fill. The clayey soils will be suitable for reuse for fill placement within the upper 12 inches of slab-on-grade and exterior flatwork areas, provided they are lime-treated. The preliminary application rate of lime should be 5 percent by dry weight. The lime material should be calcium oxide, commonly known as quick-lime. The clayey soils should be at or near optimum moisture-condition during mixing operations. Additional testing is recommended to determine the appropriate application rate of lime prior to placement. These clayey soils will be suitable for reuse as General Engineered Fill, within pavement areas and below 12 inches from finished grade in slab-on-grade areas, provided they are cleansed of excessive organics, debris, and moisture-conditioned to at least 2 percent above optimum moisture. It is recommended that additional testing be performed on the on-site soils and fill material to evaluate the physical and index properties prior to reuse as Engineered Fill. The asphaltic concrete will not be suitable for reuse as Engineered Fill outside of the proposed building area.

The preferred materials specified for Engineered Fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the construction phase should be the sole responsibility of the Contractor, since he has complete control of the project site at that time.

Imported Fill should consist of a well-graded, slightly cohesive, fine silty sand or sandy silt soil, with relatively impervious characteristics when compacted. This material should be approved by the Soils Engineer prior to use and should typically possess the following characteristics:

Percent Passing No. 200 Sieve	20 to 50
Plasticity Index	10 maximum
UBC Standard 29-2 Expansion Index	15 maximum

Fill soils should be placed in lifts approximately 6 inches thick, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and compacted to achieve at least 90 percent of maximum density as determined by ASTM D1557. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

Drainage and Landscaping

The ground surface should slope away from building pad and pavement areas toward appropriate drop inlets or other surface drainage devices. In accordance with Section 1804 of the 2016 California Building Code, it is recommended that the ground surface adjacent to foundations be sloped a minimum of 5 percent for a minimum distance of 10 feet away from structures, or to an approved alternative means of drainage conveyance. Swales used for conveyance of drainage and located within 10 feet of foundations should be sloped a minimum of 2 percent. Impervious surfaces, such as pavement and exterior concrete flatwork, within 10 feet of building foundations should be sloped a minimum of 1 percent away from the structure. Drainage gradients should be maintained to carry all surface water to collection facilities and off-site. These grades should be maintained for the life of the project.

Slots or weep holes should be placed in drop inlets or other surface drainage devices in pavement areas to allow free drainage of adjoining base course materials. Cutoff walls should be installed at pavement edges adjacent to vehicular traffic areas these walls should extend to a minimum depth of 12 inches below pavement subgrades to limit the amount of seepage water that can infiltrate the pavements. Where cutoff walls are undesirable subgrade drains can be constructed to transport excess water away from planters to drainage interceptors. If cutoff walls can be successfully used at the site, construction of subgrade drains is considered unnecessary.

Utility Trench Backfill

Utility trenches should be excavated according to accepted engineering practice following OSHA (Occupational Safety and Health Administration) standards by a Contractor experienced in such work. The responsibility for the safety of open trenches should be borne by the Contractor. Traffic and vibration adjacent to trench walls should be minimized; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced; especially during or following periods of precipitation.

Sandy and gravelly soil conditions were encountered at the site. These cohesionless soils have a tendency to cave in trench wall excavations. Shoring or sloping back trench sidewalls may be required within these sandy and gravelly soils.

Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. The utility trench backfill placed in pavement areas should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. Pipe bedding should be in accordance with pipe manufacturer's recommendations.

The Contractor is responsible for removing all water-sensitive soils from the trench regardless of the backfill location and compaction requirements. The Contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

Foundations - Conventional

After completion of the recommended site preparation and over-excavation, the site should be suitable for shallow footing support. The proposed structures may be supported on a shallow foundation system bearing on a minimum of 2 feet of Engineered Fill. Spread and continuous footings can be designed for the following maximum allowable soil bearing pressures:

Load	Allowable Loading
Dead Load Only	2,625 psf
Dead-Plus-Live Load	3,500 psf
Total Load, Including Wind or Seismic Loads	4,650 psf

The footings should have a minimum embedment depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Footings should have a minimum width of 12 inches, regardless of load.

The footing excavations should not be allowed to dry out any time prior to pouring concrete. It is recommended that footings be reinforced by at least one No. 4 reinforcing bar in both top and bottom.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.3 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 250 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ⅓ increase in the value above may be used for short duration, wind, or seismic loads. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

Floor Slabs and Exterior Flatwork

Concrete slab-on-grade floors should be underlain by a water vapor retarder. The water vapor retarder should be installed in accordance with accepted engineering practice. In areas subject to forklift traffic, the slab should be underlain by a minimum of 4 inches of Class 2 aggregate base compacted to a minimum of 95 percent of maximum density based on ASTM Test Method D1557.

It is recommended that the concrete slabs be reinforced at a minimum with No. 3 reinforcing bars, placed at 18 inches on center in each direction within the slabs middle third, to reduce crack separation and possible vertical offset at the cracks. Thicker floor slabs with increased concrete strength and reinforcement should be designed wherever heavy concentrated loads, heavy equipment, or machinery is anticipated.

The exterior floors should be poured separately in order to act independently of the walls and foundation system. Exterior finish grades should be sloped a minimum of 2 percent away from all interior slab areas to preclude ponding of water adjacent to the structures. All fills required to bring the building pads to grade should be Engineered Fills.

Moisture within the structure may be derived from water vapors, which were transformed from the moisture within the soils. This moisture vapor can travel through the vapor membrane and penetrate the slab-on-grade. This moisture vapor penetration can affect floor coverings and produce mold and mildew in the structure. To reduce moisture vapor intrusion, it is recommended that a vapor retarder be installed. It is recommended that the utility trenches within the structure be compacted, as specified in our report, to reduce the transmission of moisture through the utility trench backfill. Special attention to the immediate drainage and irrigation around the building is recommended. Positive drainage should be established away from the structure and should be maintained throughout the life of the structure. Ponding of water should not be allowed adjacent to the structure. Over-irrigation within landscaped areas adjacent to the structure should not be performed. In addition, ventilation of the structure (i.e. ventilation fans) is recommended to reduce the accumulation of interior moisture.

Lateral Earth Pressures and Retaining Walls

Walls retaining horizontal backfill and capable of deflecting a minimum of 0.1 percent of its height at the top may be designed using an equivalent fluid active pressure of 50 pounds per square foot per foot of depth. Walls that are incapable of this deflection or walls that are fully constrained against deflection may be designed for an equivalent fluid at-rest pressure of 70 pounds per square foot per foot per depth.

Expansive soils should not be used for backfill against walls. The wedge of non-expansive backfill material should extend from the bottom of each retaining wall outward and upward at a slope of 2:1 (horizontal to vertical) or flatter. The stated lateral earth pressures do not include the effects of hydrostatic water pressures generated by infiltrating surface water that may accumulate behind the retaining walls; or loads imposed by construction equipment, foundations, or roadways. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

During grading and backfilling operations adjacent to any walls, heavy equipment should not be allowed to operate within a lateral distance of 5 feet from the wall, or within a lateral distance equal to the wall height, whichever is greater, to avoid developing excessive lateral pressures. Within this zone, only hand operated equipment ("whackers," vibratory plates, or pneumatic compactors) should be used to compact the backfill soils.

Retaining and/or below grade walls should be drained with either perforated pipe encased in free-draining gravel or a prefabricated drainage system. The gravel zone should have a minimum width of 12 inches wide and should extend upward to within 12 inches of the top of the wall. The upper 12 inches of backfill should consist of native soils, concrete, asphaltic concrete or other suitable backfill to minimize surface drainage into the wall drain system. The aggregate should conform to Class 2 permeable materials graded in accordance with the CalTrans Standard Specifications (2010). Prefabricated drainage systems, such as Miradrain®, Enkadrain®, or an equivalent substitute, are acceptable alternatives in lieu of gravel provided they are installed in accordance with the manufacturer's recommendations. If a prefabricated drainage system is proposed, our firm should review the system for final acceptance prior to installation.

Drainage pipes should be placed with perforations down and should discharge in a non-erosive manner away from foundations and other improvements. The pipes should be placed no higher than 6 inches above the heel of the wall in the center line of the drainage blanket and should have a minimum diameter of 4 inches. Collector pipes may be either slotted or perforated. Slots should be no wider than ⅛ inch in diameter, while perforations should be no more than ¼ inch in diameter. If retaining walls are less than 6 feet in height, the perforated pipe may be omitted in lieu of weep holes on 4 feet maximum spacing. The weep holes should consist of 4-inch diameter holes (concrete walls) or unmortared head joints (masonry walls) and not be higher than 18 inches above the lowest adjacent grade. Two 8-inch square overlapping patches of geotextile fabric (conforming to the CalTrans Standard Specifications for "edge drains") should be affixed to the rear wall opening of each weep hole to retard soil piping.

R-Value Test Results and Pavement Design

Four subgrade soil samples were obtained from the project site for R-value testing at the locations shown on the attached site plan. The samples were tested in accordance with the State of California Materials Manual Test Designation 301. The results of the tests are as follows:

Sample	Depth	Description	R-Value at Equilibrium
1	12-24"	Silty Sand (SM)	43
2	12-24"	Clayey Sand (SC)	25
3	12-24"	Silty Sand (SM)	54
4	12-24"	Clayey Sand (SC)	26

The test results are low and indicate fair to moderate subgrade support characteristics under dynamic traffic loads. The following table shows the recommended pavement sections for various traffic indices based on the CalTrans design procedure.

Traffic Index	Asphaltic Concrete	Class II Aggregate Base*	Class III Aggregate Subbase*	Compacted Subgrade**
4.0	2.0"	6.0"	--	12.0"
4.0	2.0"	4.5"	2.0"	12.0"
4.5	2.5"	6.0"	--	12.0"
4.5	2.5"	4.5"	2.0"	12.0"
5.0	2.5"	7.5"	--	12.0"
5.0	2.5"	5.0"	2.5"	12.0"
5.5	3.0"	7.5"	--	12.0"
5.5	3.0"	5.0"	3.0"	12.0"
6.0	3.0"	9.5"	--	12.0"
6.0	3.0"	6.5"	3.0"	12.0"
6.5	3.5"	9.5"	--	12.0"
6.5	3.5"	6.0"	4.0"	12.0"
7.0	4.0"	10.5"	--	12.0"
7.0	4.0"	6.5"	4.5"	12.0"
7.5	4.0"	12.0"	--	12.0"
7.5	4.0"	7.5"	5.0"	12.0"

**** 95% compaction based on ASTM Test Method D1557 or CAL 216***
***** 90% compaction based on ASTM Test Method D1557 or CAL 216***

If traffic indices are not available, an estimated (typical value) index of 4.5 may be used for light automobile traffic and an index of 7.0 may be used for light truck traffic.

The following recommendations are for light-duty and heavy-duty Portland Cement Concrete pavement sections.

PORTLAND CEMENT PAVEMENT
LIGHT DUTY

Traffic Index	Portland Cement Concrete***	Class II Aggregate Base*	Compacted Subgrade**
4.5	5.0"	4.0"	12.0"

HEAVY DUTY

Traffic Index	Portland Cement Concrete***	Class II Aggregate Base*	Compacted Subgrade**
7.0	6.5"	4.0"	12.0"

**** 95% compaction based on ASTM Test Method D1557 or CAL 216***
***** 90% compaction based on ASTM Test Method D1557 or CAL 216***
******Minimum compressive strength of 3000 psi***

As indicated previously, fill material is located across the site. It is recommended that any uncertified fill material encountered within pavement areas be removed and/or recompacted. The fill materials should be moisture-conditioned to a minimum of 2 percent above optimum moisture and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. As an alternative, the Owner may elect not to recompact the existing fill within paved areas. However, the Owner should be aware that the paved areas may settle which may require annual maintenance. At a minimum, it is recommended that the upper 12 inches of subgrade soil be moisture-conditioned and recompacted to a minimum of 95 percent of maximum density based on ASTM Test Method D1557.

Seismic Parameters – 2016 California Building Code

The Site Class per Section 1613 of the 2016 California Building Code (2016 CBC) and Table 20.3-1 of ASCE 7-10 is based upon the site soil conditions. It is our opinion that a Site Class D is most consistent with the subject site soil conditions. For seismic design of the structures based on the seismic provisions of the 2016 CBC, we recommend the following parameters:

Seismic Item	Value	CBC Reference
Site Class	D	Section 1613.3.2
Site Coefficient F_a	1.000	Table 1613.3.3 (1)
S_s	1.641	Section 1613.3.1
S_{MS}	1.641	Section 1613.3.3
S_{DS}	1.094	Section 1613.3.4
Site Coefficient F_v	1.500	Table 1613.3.3 (2)
S_1	0.607	Section 1613.3.1
S_{M1}	0.910	Section 1613.3.3
S_{D1}	0.607	Section 1613.3.4

Soil Cement Reactivity

Excessive sulfate in either the soil or native water may result in an adverse reaction between the cement in concrete (or stucco) and the soil. HUD/FHA and CBC have developed criteria for evaluation of sulfate levels and how they relate to cement reactivity with soil and/or water.

Soil samples were obtained from the site and tested in accordance with State of California Materials Manual Test Designation 417. The sulfate concentrations detected in these soil samples were greater than 150 ppm and are above the maximum allowable values established by HUD/FHA and CBC. Therefore, it is recommended that a Type II cement be used within the concrete to compensate for sulfate reactivity with the cement.

Chemical tests were performed on a near-surface soil sample. The test results indicate that the soils are slightly to moderately corrosive to buried metal objects. Therefore, buried metal should be protected using either non-corrosive backfill, protective coatings, wrappings, sacrificial anodes, or a combination of these methods in accordance with the manufacturer's recommendations.

Compacted Material Acceptance

Compaction specifications are not the only criteria for acceptance of the site grading or other such activities. However, the compaction test is the most universally recognized test method for assessing the performance of the Grading Contractor. The numerical test results from the compaction test cannot be used to predict the engineering performance of the compacted material. Therefore, the acceptance of compacted materials will also be dependent on the stability of that material. The Soils Engineer has the option of rejecting any compacted material regardless of the degree of compaction if that material is considered to be unstable or if future instability is suspected. A specific example of rejection of fill material passing the required percent compaction is a fill which has been compacted with an in situ moisture content significantly less than optimum moisture. This type of dry fill (brittle fill) is susceptible to future settlement if it becomes saturated or flooded.

Testing and Inspection

A representative of Krazan & Associates, Inc. should be present at the site during the earthwork activities to confirm that actual subsurface conditions are consistent with the exploratory fieldwork. This activity is an integral part of our service, as acceptance of earthwork construction is dependent upon compaction testing and stability of the material. This representative can also verify that the intent of these recommendations is incorporated into the project design and construction. Krazan & Associates, Inc. will not be responsible for grades or staking, since this is the responsibility of the Prime Contractor.

LIMITATIONS

Soils Engineering is one of the newest divisions of Civil Engineering. This branch of Civil Engineering is constantly improving as new technologies and understanding of earth sciences advance. Although your site was analyzed using the most appropriate and most current techniques and methods, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to advancements in the field of Soils Engineering, physical changes in the site, either due to excavation or fill placement, new agency regulations, or possible changes in the proposed structure after the soils report is completed may require the soils report to be professionally reviewed. In light of this, the Owner should be aware that there is a practical limit to the usefulness of this report without critical review. Although the time limit for this review is strictly arbitrary, it is suggested that 2 years be considered a reasonable time for the usefulness of this report.

Foundation and earthwork construction is characterized by the presence of a calculated risk that soil and groundwater conditions have been fully revealed by the original foundation investigation. This risk is derived from the practical necessity of basing interpretations and design conclusions on limited sampling of the earth. The recommendations made in this report are based on the assumption that soil conditions do not vary significantly from those disclosed during our field investigation. If any variations or undesirable conditions are encountered during construction, the Soils Engineer should be notified so that supplemental recommendations may be made.

The conclusions of this report are based on the information provided regarding the proposed construction. If the proposed construction is relocated or redesigned, the conclusions in this report may not be valid. The Soils Engineer should be notified of any changes so the recommendations may be reviewed and re-evaluated.

This report is a Geotechnical Engineering Investigation with the purpose of evaluating the soil conditions in terms of foundation design. The scope of our services did not include any Environmental Site Assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater, or atmosphere; or the presence of wetlands. Any statements, or absence of statements, in this report or on any boring log regarding odors, unusual or suspicious items, or conditions observed, are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessment.

The geotechnical engineering information presented herein is based upon professional interpretation utilizing standard engineering practices and a degree of conservatism deemed proper for this project. It is not warranted that such information and interpretation cannot be superseded by future geotechnical engineering developments. We emphasize that this report is valid for the project outlined above and should not be used for any other sites.

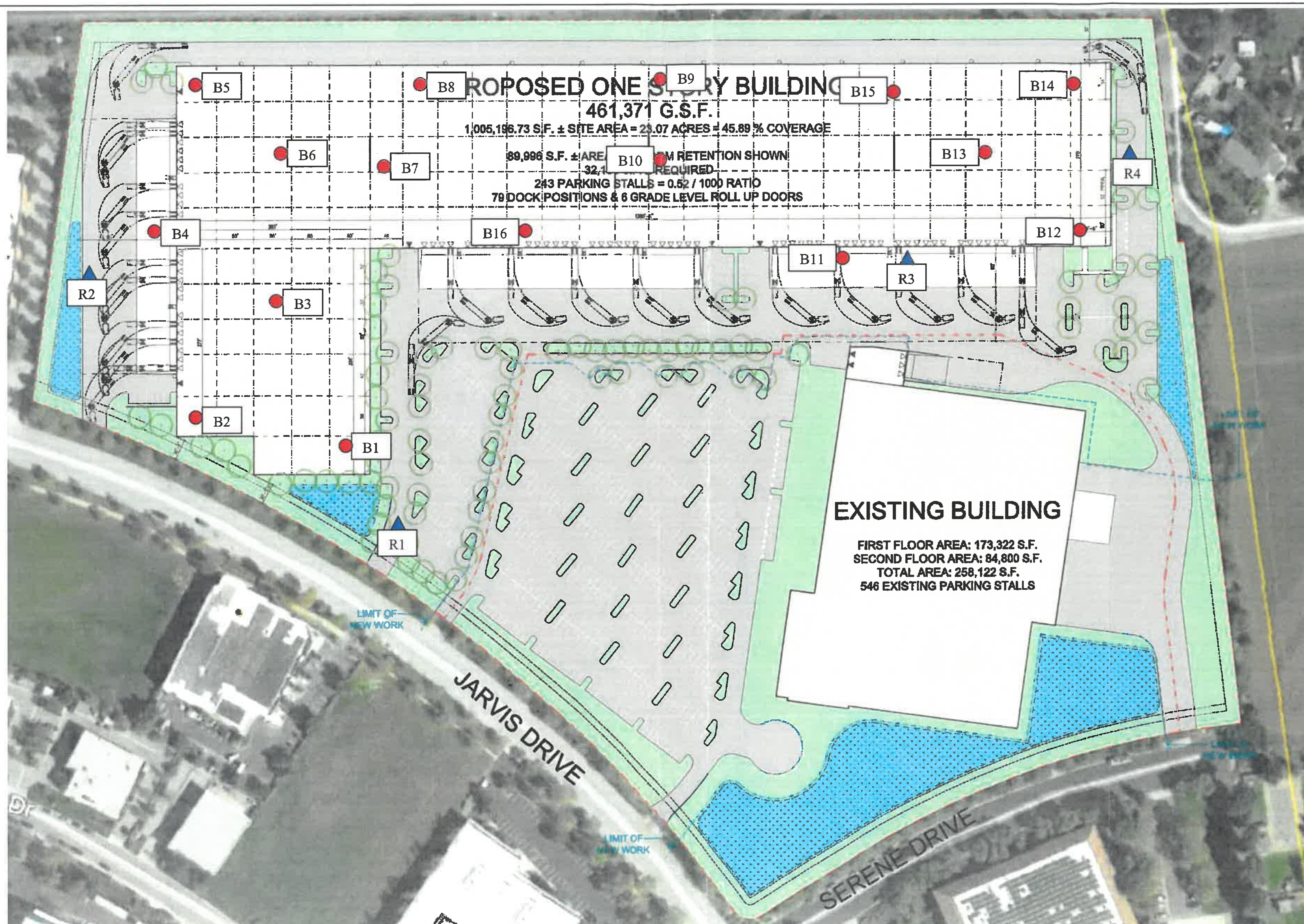
If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (925) 307-1160.

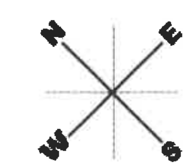
Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

David R. Jarosz, II
Managing Engineer
RGE No. 2698/RCE No. 60185

REGISTERED PROFESSIONAL ENGINEER
DAVID R. JAROSZ II
No. 2698
EXP JUNE 30 2018
GEOTECHNICAL
STATE OF CALIFORNIA

DRJ:ht





● APPROXIMATE BORING LOCATION

▲ APPROXIMATE R-VALUE LOCATION

SITE MAP	Scale: NTS	Date: December 2017	Krazan GEOTECHNICAL ENGINEERING
Shoe Palace Distribution Center Jarvis and Serene Drive Morgan Hill, California	Drawn by: HT	Approved by: DJ	
	Project No. 042-17031	Figure No. 1	

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploratory program. Sixteen 4½-inch to 6½-inch diameter exploratory borings were advanced. The boring locations are shown on the attached site plan.

The soils encountered were logged in the field during the exploration and with supplementary laboratory test data are described in accordance with the Unified Soil Classification System.

Modified standard penetration tests and standard penetration tests were performed at selected depths. These tests represent the resistance to driving a 2½-inch and 1½-inch diameter split barrel sampler, respectively. The driving energy was provided by a hammer weighing 140 pounds falling 30 inches. Relatively undisturbed soil samples were obtained while performing this test. Bag samples of the disturbed soil were obtained from the auger cuttings. The modified standard penetration tests are identified in the sample type on the boring logs with a full shaded in block. The standard penetration tests are identified in the sample type on the boring logs with half of the block shaded. All samples were returned to our Clovis laboratory for evaluation.

Laboratory Investigation

The laboratory investigation was programmed to determine the physical and mechanical properties of the foundation soil underlying the site. Test results were used as criteria for determining the engineering suitability of the surface and subsurface materials encountered.

In-situ moisture content, dry density, consolidation, direct shear, and sieve analysis tests were completed for the undisturbed samples representative of the subsurface material. Expansion index and R-value tests were completed for select bag samples obtained from the auger cuttings. These tests, supplemented by visual observation, comprised the basis for our evaluation of the site material.

The logs of the exploratory borings and laboratory determinations are presented in this Appendix.

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)		
	Clean Gravels (Less than 5% fines)	
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	
	GM	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
	Clean Sands (Less than 5% fines)	
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

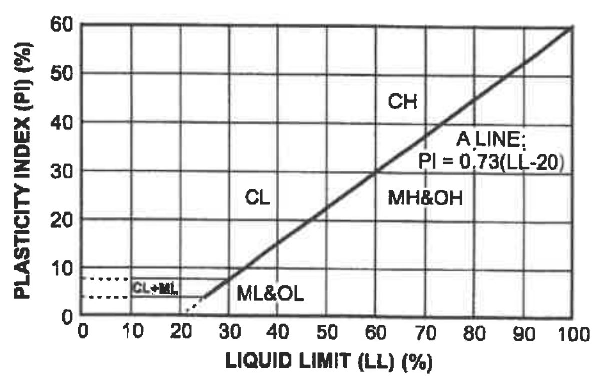
CONSISTENCY CLASSIFICATION

Description	Blows per Foot
Granular Soils	
Very Loose	< 5
Loose	5 – 15
Medium Dense	16 – 40
Dense	41 – 65
Very Dense	> 65
Cohesive Soils	
Very Soft	< 3
Soft	3 – 5
Firm	6 – 10
Stiff	11 – 20
Very Stiff	21 – 40
Hard	> 40

GRAIN SIZE CLASSIFICATION

Grain Type	*Standard Sieve Size*	*Grain Size in Millimeters*
Boulders	Above 12 inches	Above 305
Cobbles	12 to 13 inches	305 to 76.2
Gravel	3 inches to No. 4	76.2 to 4.76
Coarse-grained	3 to ¾ inches	76.2 to 19.1
Fine-grained	¾ inches to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.074
Coarse-grained	No. 4 to No. 10	4.76 to 2.00
Medium-grained	No. 10 to No. 40	2.00 to 0.042
Fine-grained	No. 40 to No. 200	0.042 to 0.074
Silt and Clay	Below No. 200	Below 0.074

PLASTICITY CHART



Log of Boring B1

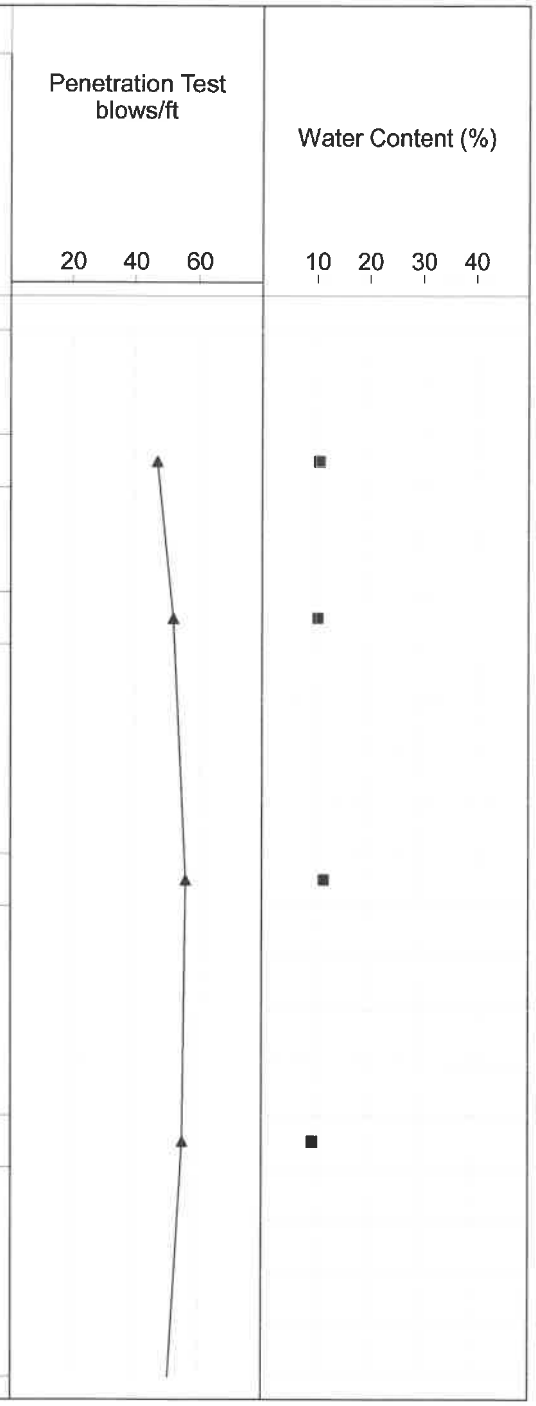
Project: Shoe Palace Distribution Center | **Project No:** 042-17031

Client: Bridge Group Investments, Inc. | **Figure No.:** A-1

Location: Jarvis and Serene Drives, Morgan Hill, CA | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

SUBSURFACE PROFILE		SAMPLE			
Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
	Ground Surface				
0	***CLAYEY SILTY SAND (SM/SC)*** FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily				
2		120.0	10.7	■	47
	CLAYEY SILTY SAND (SM/SC) Dense, fine- to coarse-grained with trace GRAVEL; light brown, damp, drills firmly				
4	***GRAVELLY CLAYEY SAND (SC)*** Dense, fine- to coarse-grained; light brown, damp, drills firmly				
6		127.2	10.4	■	52
8					
10		129.4	11.5	■	56
12					
14					
16		130.8	9.5	■	55
18					
20	Very dense with increased GRAVEL below 20 feet			■	



Drill Method: Solid Flight | **Drill Date:** 11-28-17

Drill Rig: CME 45C-1 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Chris Wyneken | **Elevation:** 25 Feet

Log of Boring B1

Project: Shoe Palace Distribution Center | **Project No:** 042-17031

Client: Bridge Group Investments, Inc. | **Figure No.:** A-1

Location: Jarvis and Serene Drives, Morgan Hill, CA | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft (20 40 60)	Water Content (%) (10 20 30 40)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.		
			134.5	10.3		50+		
22								
24								
		End of Borehole						
26								
28								
30								
32								
34								
36								
38								
40								

Drill Method: Solid Flight | **Drill Date:** 11-28-17

Drill Rig: CME 45C-1 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Chris Wyneken | **Elevation:** 25 Feet

Log of Boring B2

Project: Shoe Palace Distribution Center

Project No: 042-17031

Client: Bridge Group Investments, Inc.

Figure No.: A-2

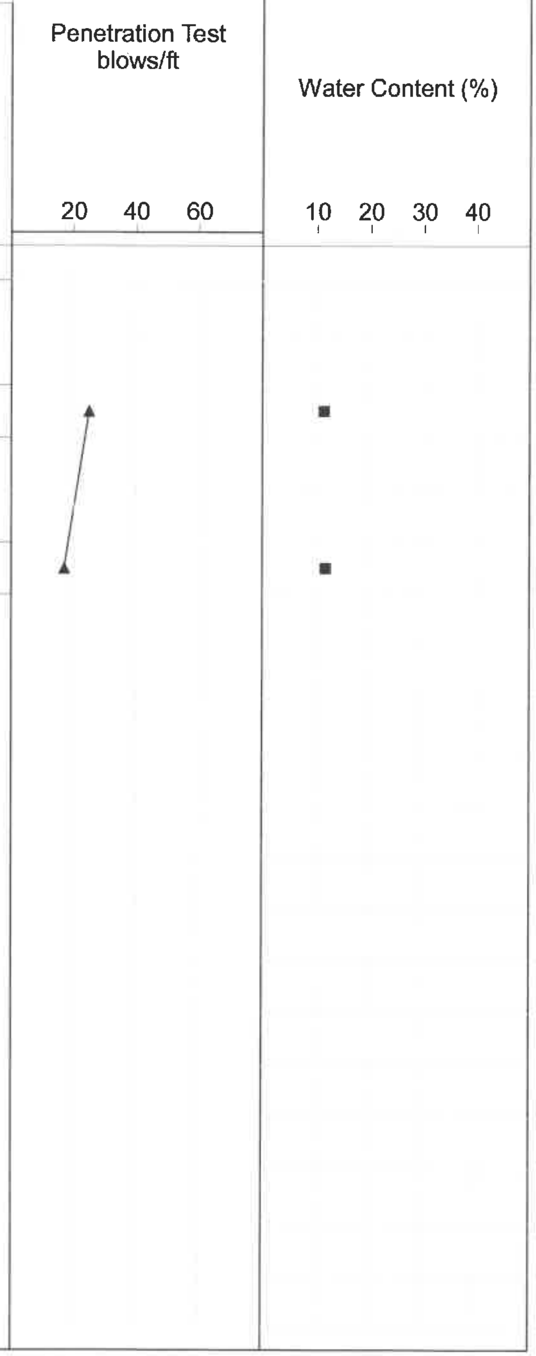
Location: Jarvis and Serene Drives, Morgan Hill, CA

Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft	Water Content (%)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	20 40 60	10 20 30 40
		Ground Surface						
0–2.5		***CLAYEY SILTY SAND (SM/SC)*** FILL, fine- to coarse-grained; brown, damp, drills easily						
2.5–4		***CLAYEY SAND (SC)*** Medium dense, fine- to coarse-grained; light brown, damp, drills easily	126.5	11.4	■	25		
4–10		***GRAVELLY CLAYEY SAND (SC)*** Medium dense, fine- to coarse-grained; brown, damp, drills easily	117.3	11.7	■	17		
10		End of Borehole						

Depth scale (ft): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20



Drill Method: Solid Flight

Drill Date: 11-28-17

Drill Rig: CME 45C-1

Krazan and Associates

Hole Size: 4½ Inches

Driller: Chris Wyneken

Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B3

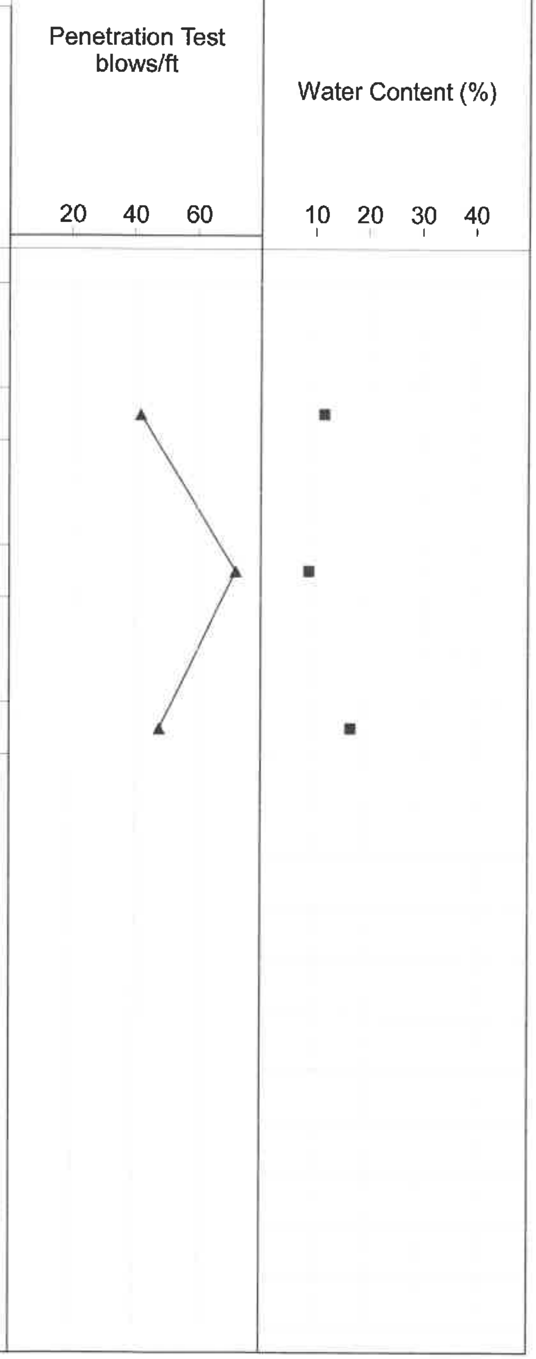
Project: Shoe Palace Distribution Center | **Project No:** 042-17031

Client: Bridge Group Investments, Inc. | **Figure No.:** A-3

Location: Jarvis and Serene Drives, Morgan Hill, CA | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0	Ground Surface				
0–2.2	***CLAYEY SILTY SAND (SM/SC)*** FILL, fine- to coarse-grained; brown, damp, drills easily				
2.2–7	***GRAVELLY SANDY SILT (ML)*** Dense, fine- to coarse-grained with CLAY; light brown, damp, drills firmly	116.6	11.8	■	42
	Very dense below 5 feet	129.1	9.0	■	72
7–9.5	***SANDY CLAYEY SILT (ML)*** Hard, fine-grained; light brown, moist, drills firmly	128.6	16.8	■	48
9.5–15	***GRAVELLY CLAYEY SAND (SC)*** Dense, fine- to coarse-grained; brown, damp, drills firmly				
15	End of Borehole				



Drill Method: Solid Flight | **Drill Date:** 11-28-17

Drill Rig: CME 45C-1 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Chris Wyneken | **Elevation:** 15 Feet

Sheet: 1 of 1

Log of Boring B4

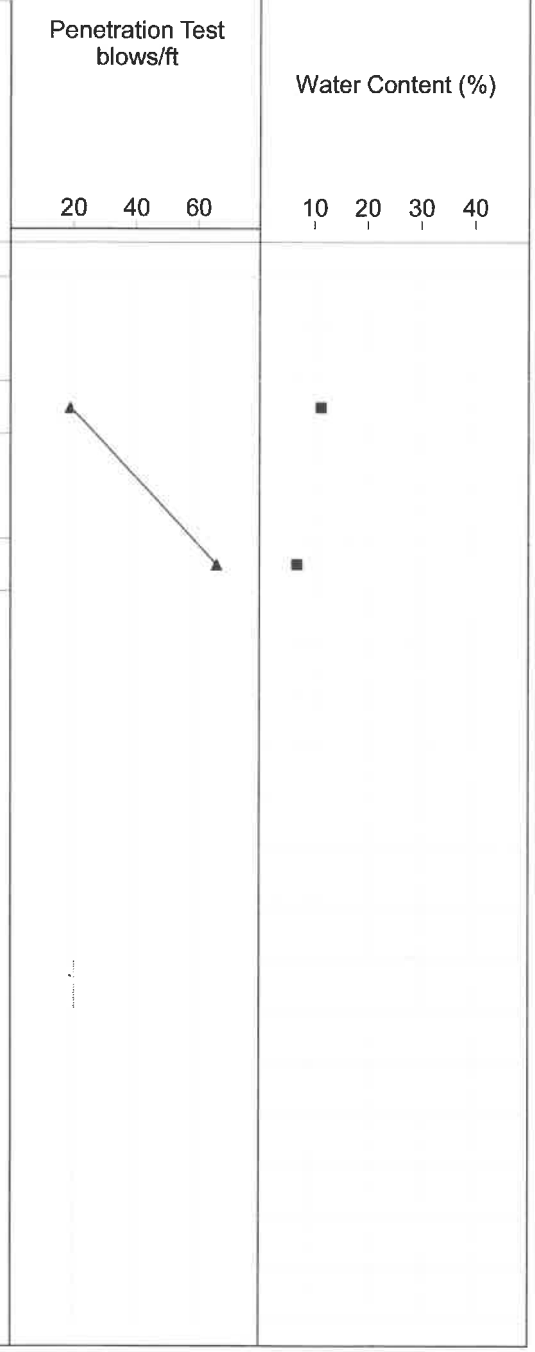
Project: Shoe Palace Distribution Center | **Project No:** 042-17031

Client: Bridge Group Investments, Inc. | **Figure No.:** A-4

Location: Jarvis and Serene Drives, Morgan Hill, CA | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
	Ground Surface				
0–3.5	***CLAYEY SILTY SAND (SM/SC)*** FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily				
~2.5		119.4	11.4	■	19
3.5–10	***GRAVELLY CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, damp, drills hard				
~5.5		121.1	7.0	■	66
	With increased CLAY between 7 and 9 feet				
10	End of Borehole				



Drill Method: Solid Flight | **Drill Date:** 11-28-17

Drill Rig: CME 45C-1 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Chris Wyneken | **Elevation:** 10 Feet

Sheet: 1 of 1

Log of Boring B5

Project: Shoe Palace Distribution Center

Project No: 042-17031

Client: Bridge Group Investments, Inc.

Figure No.: A-5

Location: Jarvis and Serene Drives, Morgan Hill, CA

Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

SUBSURFACE PROFILE		SAMPLE				Penetration Test blows/ft	Water Content (%)
Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	20 40 60	10 20 30 40
0	Ground Surface						
0–2	***CLAYEY SILTY SAND (SM/SC)*** FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily						
2–4.3	***GRAVELLY CLAYEY SAND (SC)*** Dense, fine- to coarse-grained; light brown, damp, drills firmly	126.3	7.8		47		
4.3–20	***GRAVELLY SILTY SAND (SM)*** Dense, fine- to coarse-grained; brown, damp, drills firmly	133.2	7.4		53		
		132.5	8.6		45		
		125.1	8.9		43		
20							

Drill Method: Solid Flight

Drill Date: 11-28-17

Drill Rig: CME 45C-1

Krazan and Associates

Hole Size: 4½ Inches

Driller: Chris Wyneken

Elevation: 20 Feet

Sheet: 1 of 1

Log of Boring B6

Project: Shoe Palace Distribution Center

Project No: 042-17031

Client: Bridge Group Investments, Inc.

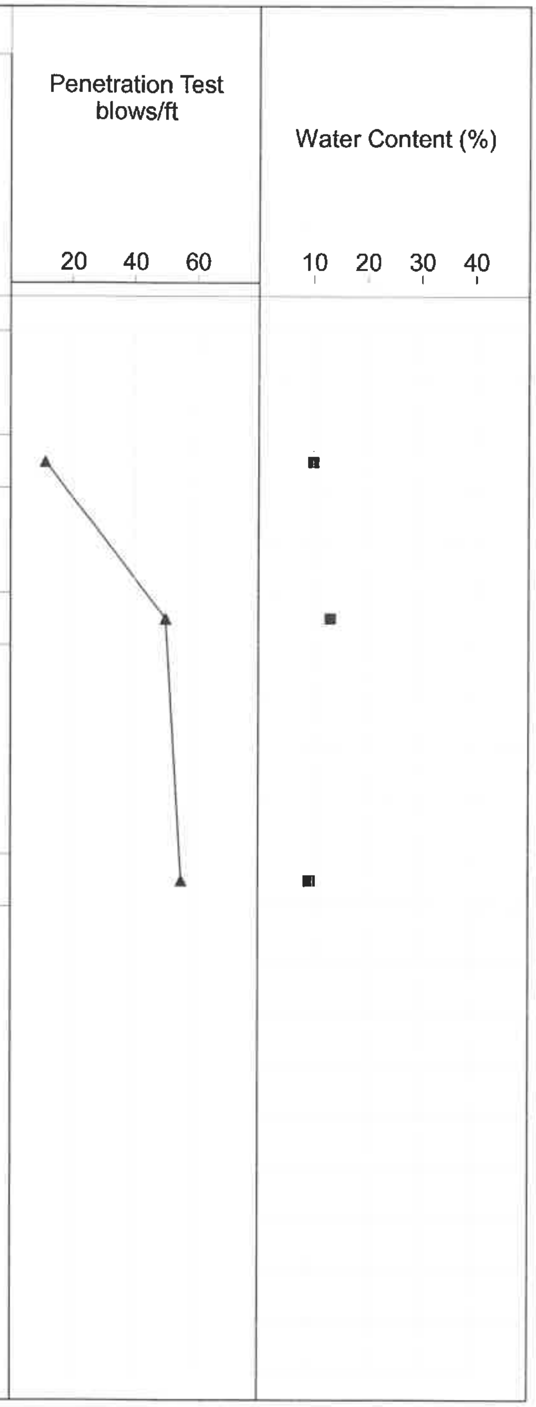
Figure No.: A-6

Location: Jarvis and Serene Drives, Morgan Hill, CA

Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

Depth (ft)	Symbol	Description (SUBSURFACE PROFILE)	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0–5		***GRAVELLY CLAYEY SAND (SC)*** FILL, fine- to medium-grained; brown, damp, drills easily				
2		With decreased GRAVEL and decreased CLAY below 2 feet	125.3	10.0	■	11
5		***GRAVELLY CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, damp, drills hard	125.7	13.3	■	50+
9		Dense and drills firmly below 9 feet				
10			127.9	9.5	■	55
15		End of Borehole				



Drill Method: Solid Flight

Drill Date: 11-28-17

Drill Rig: CME 45C-1

Krazan and Associates

Hole Size: 4½ Inches

Driller: Chris Wyneken

Elevation: 15 Feet

Sheet: 1 of 1

Log of Boring B7

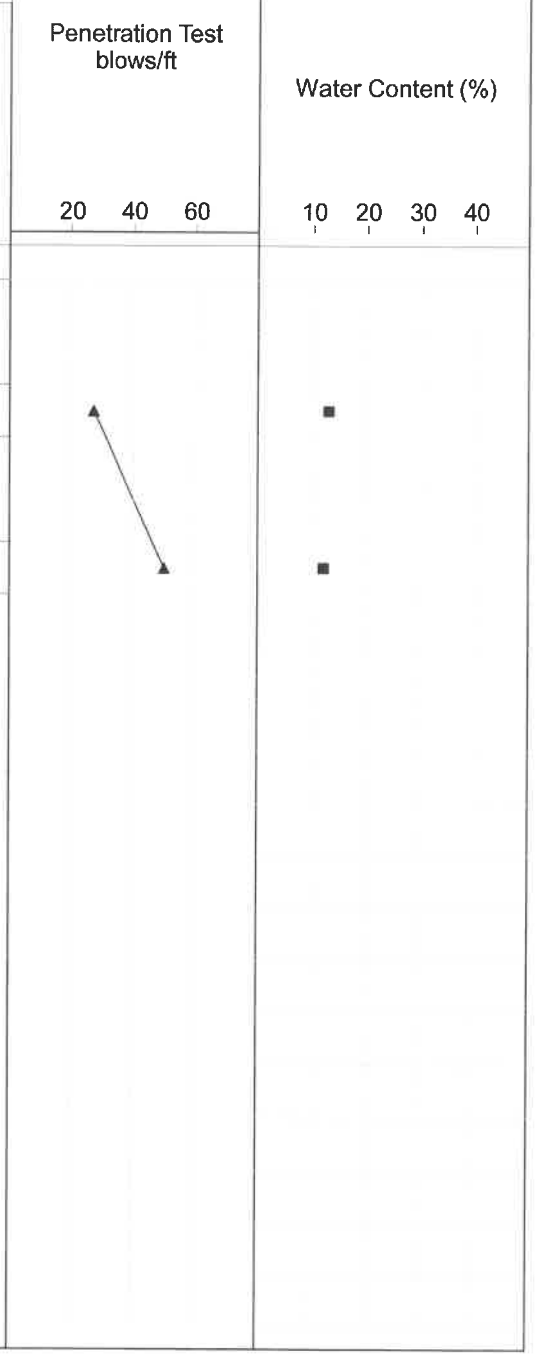
Project: Shoe Palace Distribution Center | **Project No:** 042-17031

Client: Bridge Group Investments, Inc. | **Figure No.:** A-7

Location: Jarvis and Serene Drives, Morgan Hill, CA | **Logged By:** Wayne Andrade

Depth to Water> **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0		***CLAYEY SAND (SC)*** FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily				
2		***CLAYEY SAND (SC)*** Medium dense, fine- to coarse-grained with trace GRAVEL; light brown, damp, drills easily	115.4	13.0	■	27
4		***GRAVELLY CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, damp, drills hard	123.5	12.1	■	50+
6						
8						
10		End of Borehole				
12						
14						
16						
18						
20						



Drill Method: Solid Flight | **Drill Date:** 11-28-17

Drill Rig: CME 45C-1 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Chris Wyneken | **Elevation:** 10 Feet

Sheet: 1 of 1

Log of Boring B8

Project: Shoe Palace Distribution Center

Project No: 042-17031

Client: Bridge Group Investments, Inc.

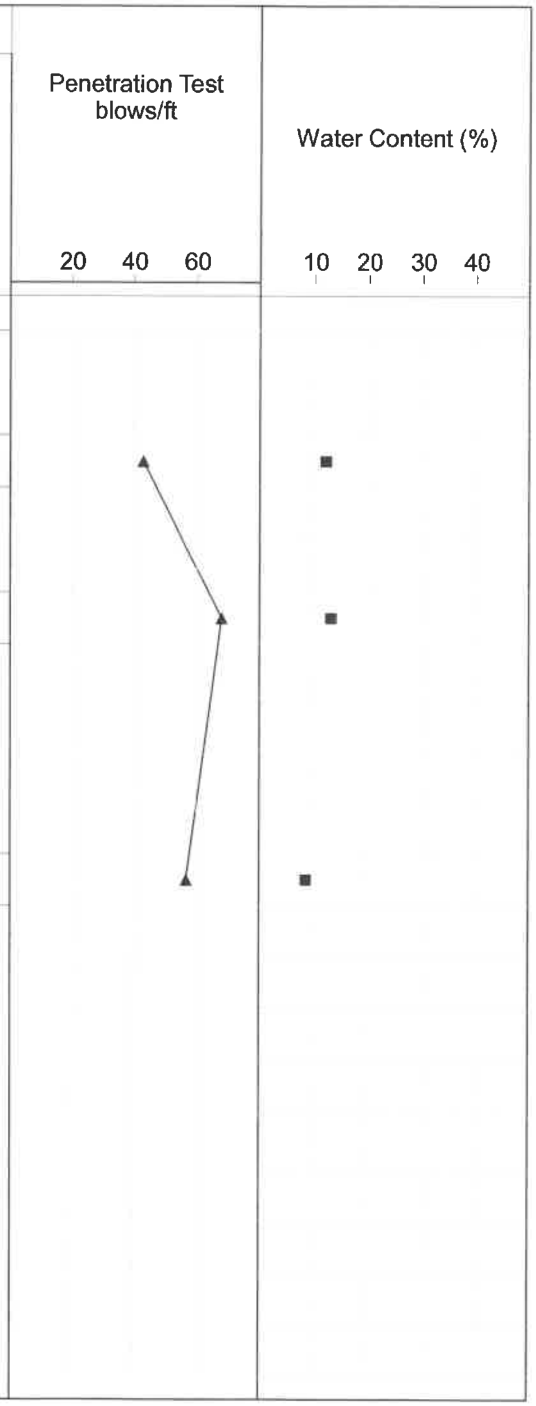
Figure No.: A-8

Location: Jarvis and Serene Drives, Morgan Hill, CA

Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0	Ground Surface				
0–2	***CLAYEY SAND (SC)*** FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily				
2–4	***GRAVELLY CLAYEY SAND (SC)*** Dense, fine- to coarse-grained; light brown, damp, drills firmly	115.6	12.2		43
4–13	***CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, damp, drills hard	124.9	13.1		68
	Dense and drills firmly below 8 feet				
		116.6	8.6		57
	Very dense with GRAVEL and trace COBBLES below 12 feet Auger refusal at 13 feet				
13	End of Borehole				



Drill Method: Solid Flight

Drill Date: 11-28-17

Drill Rig: CME 45C-1

Krazan and Associates

Hole Size: 4½ Inches

Driller: Chris Wyneken

Elevation: 13 Feet

Log of Boring B9

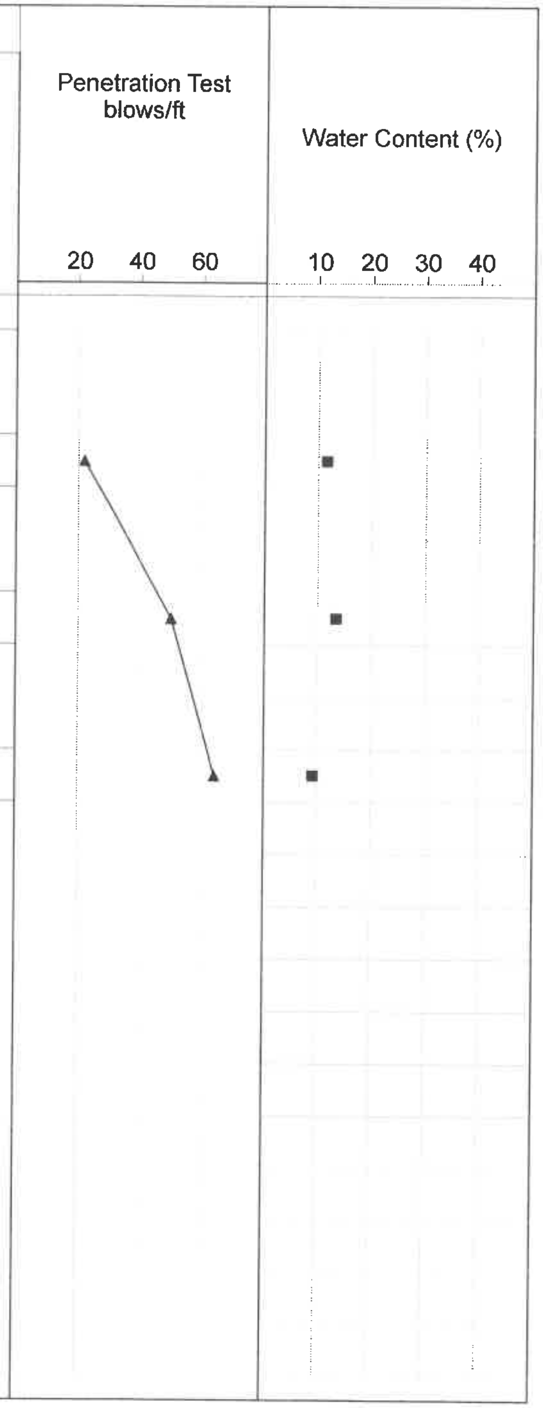
Project: Shoe Palace Distribution Center
Project No: 042-17031

Client: Bridge Group Investments, Inc.
Figure No.: A-9

Location: Jarvis and Serene Drives, Morgan Hill, CA
Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0–2		***GRAVELLY CLAYEY SAND (SC)*** FILL, fine- to coarse-grained; brown, damp, drills easily				
2–4		***SANDY CLAYEY SILT (ML)*** Very stiff; light brown, damp, drills easily	105.0	11.7		22
4–15		***GRAVELLY CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; light brown, damp, drills hard	133.1	13.5		50+
8		Dense below 8 feet	116.7	9.3		64
15		End of Borehole				



Drill Method: Solid Flight
Drill Date: 11-28-17

Drill Rig: CME 45C-1
Hole Size: 4½ Inches

Krazan and Associates

Driller: Chris Wyneken
Elevation: 15 Feet

Sheet: 1 of 1

Log of Boring B10

Project: Shoe Palace Distribution Center | **Project No:** 042-17031

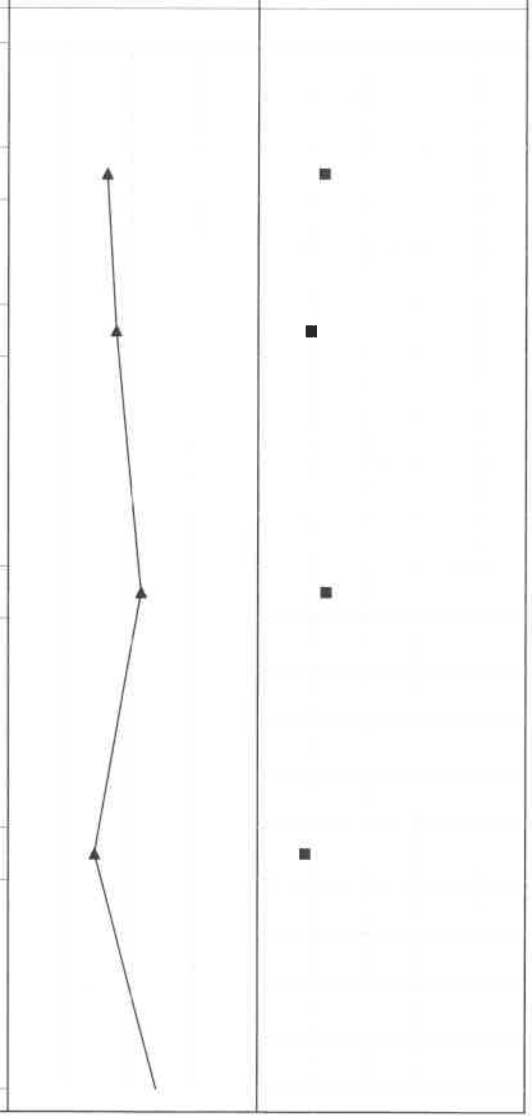
Client: Bridge Group Investments, Inc. | **Figure No.:** A-10

Location: Jarvis and Serene Drives, Morgan Hill, CA | **Logged By:** Wayne Andrade

Depth to Water> **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0		***GRAVELLY CLAYEY SAND (SC)*** FILL, fine- to coarse-grained; brown, damp, drills easily				
2		***CLAYEY SILTY SAND (SM/SC)*** Medium dense, fine-grained with trace GRAVEL; light brown, damp, drills easily	108.3	12.2		32
4		***GRAVELLY CLAYEY SAND (SC)*** Medium dense, fine- to coarse-grained; brown, damp, drills easily	122.8	9.6		35
8		Dense and drills firmly below 8 feet				
10			111.8	12.6		43
14		Medium dense below 14 feet				
15			119.8	8.8		28
18		***SANDY CLAYEY GRAVEL (GC)*** Very dense, fine- to coarse-grained with trace COBBLES; brown, damp, drills hard				

Penetration Test blows/ft (20, 40, 60) | Water Content (%) (10, 20, 30, 40)



Drill Method: Hollow Stem | **Drill Date:** 11-29-17

Drill Rig: CME 45C-1 | **Krazan and Associates** | **Hole Size:** 6½ Inches

Driller: Chris Wyneken | **Elevation:** 27 Feet

Sheet: 1 of 2

Log of Boring B10

Project: Shoe Palace Distribution Center | **Project No:** 042-17031

Client: Bridge Group Investments, Inc. | **Figure No.:** A-10

Location: Jarvis and Serene Drives, Morgan Hill, CA | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	Penetration Test blows/ft (20 40 60)	Water Content (%) (10 20 30 40)
			114.7	6.8		50+		
22								
24								
			113.9	7.9		67		
26		Auger refusal at 27 feet						
		End of Borehole						
28								
30								
32								
34								
36								
38								
40								

Drill Method: Hollow Stem | **Drill Date:** 11-29-17

Drill Rig: CME 45C-1 | **Krazan and Associates** | **Hole Size:** 6½ Inches

Driller: Chris Wyneken | **Elevation:** 27 Feet

Log of Boring B11

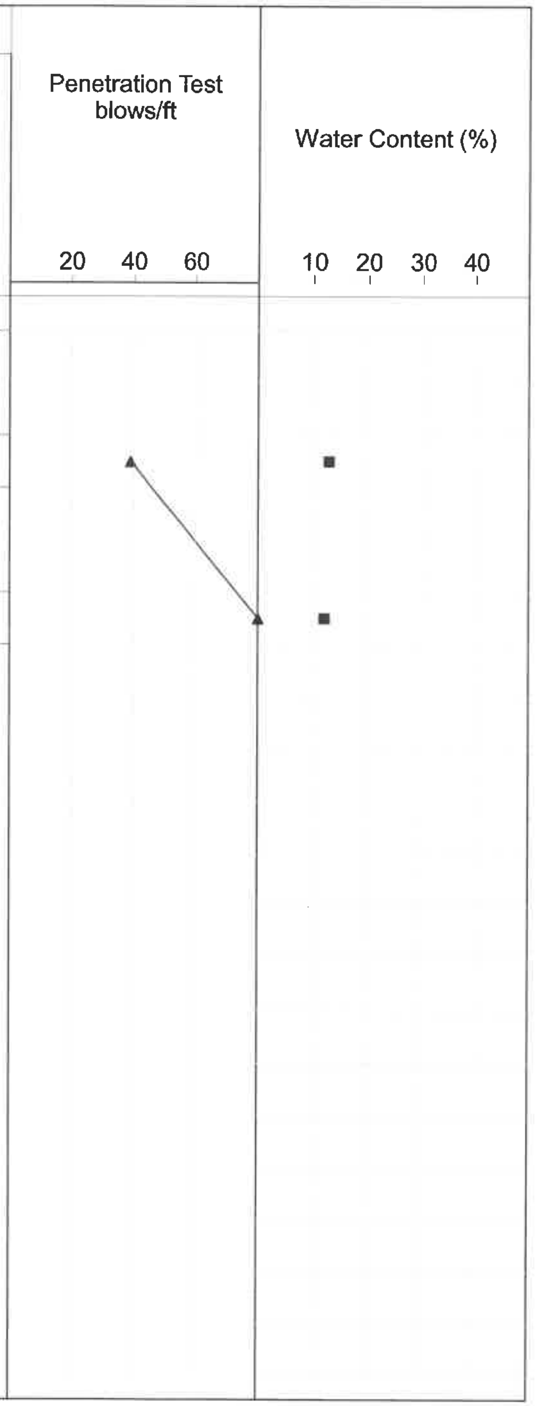
Project: Shoe Palace Distribution Center
Project No: 042-17031

Client: Bridge Group Investments, Inc.
Figure No.: A-11

Location: Jarvis and Serene Drives, Morgan Hill, CA
Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0–2		***CLAYEY SAND (SC)*** FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily				
2–4.5		***SANDY SILTY CLAY (CL)*** Very stiff, fine-grained; light brown, damp, drills easily	98.9	12.9		39
4.5–10		***GRAVELLY CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, damp, drills hard	117.7	12.1		80
10		End of Borehole				



Drill Method: Solid Flight
Drill Date: 11-29-17

Drill Rig: CME 45C-1
Krazan and Associates
Hole Size: 4½ Inches

Driller: Chris Wyneken
Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B12

Project: Shoe Palace Distribution Center

Project No: 042-17031

Client: Bridge Group Investments, Inc.

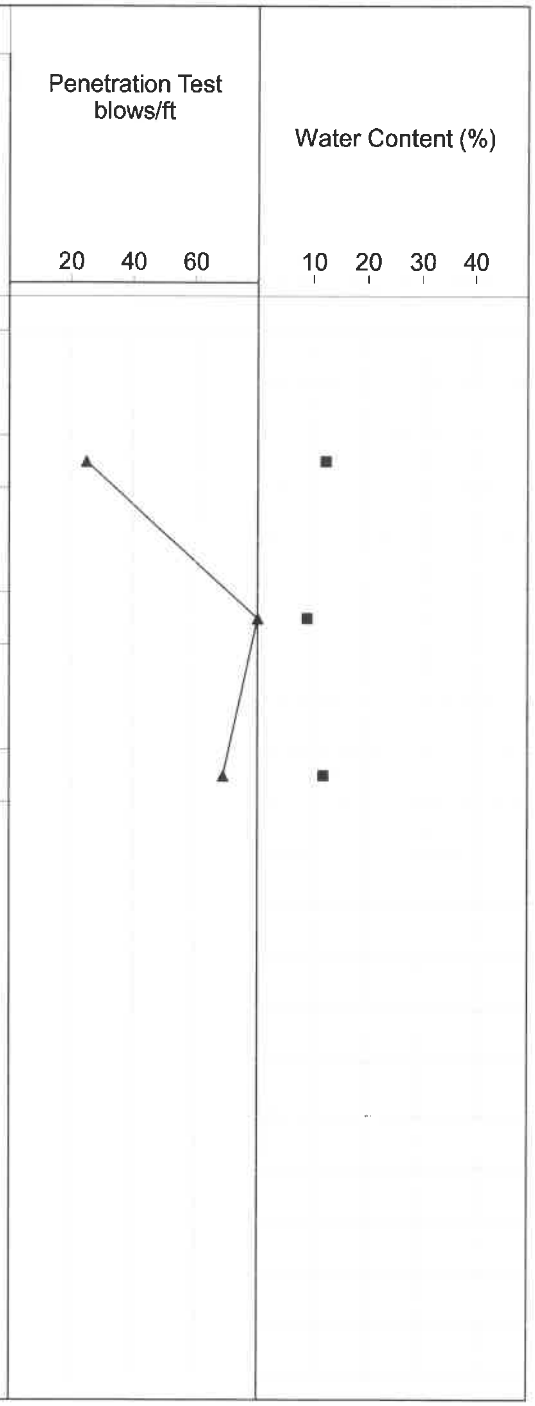
Figure No.: A-12

Location: Jarvis and Serene Drives, Morgan Hill, CA

Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0		***GRAVELLY CLAYEY SAND (SC)*** FILL, fine- to coarse-grained; brown, damp, drills easily				
2		***CLAYEY SAND (SC)*** Medium dense, fine- to coarse-grained with trace GRAVEL; light brown, damp, drills easily	103.3	12.4	■	25
4						
6		***SILTY CLAY (CL)*** Hard; light brown, damp, drills hard	113.9	9.1	■	91
8		***GRAVELLY CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, damp, drills hard	129.2	12.0	■	69
10						
12						
14						
16		End of Borehole				
18						
20						



Drill Method: Solid Flight

Drill Date: 11-29-17

Drill Rig: CME 45C-1

Krazan and Associates

Hole Size: 4½ Inches

Driller: Chris Wyneken

Elevation: 15 Feet

Sheet: 1 of 1

Log of Boring B13

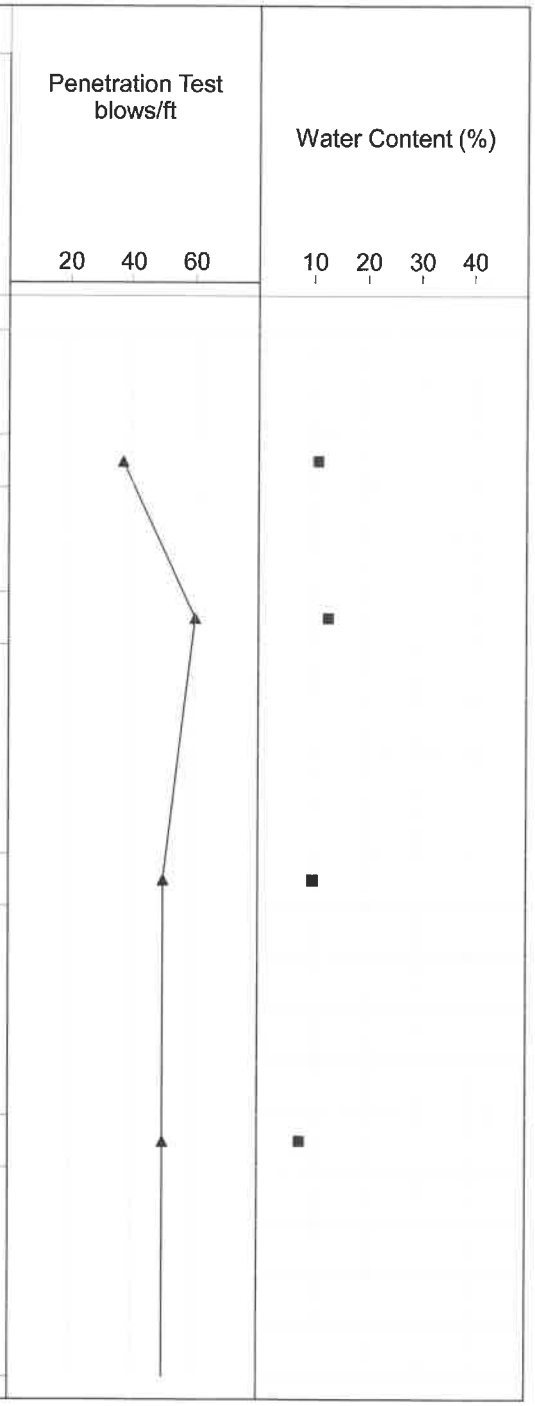
Project: Shoe Palace Distribution Center
Project No: 042-17031

Client: Bridge Group Investments, Inc.
Figure No.: A-13

Location: Jarvis and Serene Drives, Morgan Hill, CA
Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

Depth (ft)	Description (SUBSURFACE PROFILE)	Dry Density (pcf)	Moisture (%)	Blows/ft.
0	Ground Surface			
0–2	***GRAVELLY CLAYEY SAND (SC)*** FILL, fine- to coarse-grained; brown, damp, drills easily			
2–4.5	***CLAYEY SAND (SC)*** Medium dense, fine-grained; light brown, damp, drills easily	124.5	10.9	37
4.5–8	***GRAVELLY CLAYEY SAND (SC)*** Dense, fine- to coarse-grained; brown, damp, drills firmly	124.0	12.9	60
8–20	Very dense with increased GRAVEL and drills hard below 8 feet			
~10.5		113.3	10.0	50+
~15.5		122.5	7.8	50+



Drill Method: Solid Flight
Drill Date: 11-29-17

Drill Rig: CME 45C-1
Krazan and Associates
Hole Size: 4½ Inches

Driller: Chris Wyneken
Elevation: 25 Feet

Log of Boring B13

Project: Shoe Palace Distribution Center | **Project No:** 042-17031

Client: Bridge Group Investments, Inc. | **Figure No.:** A-13

Location: Jarvis and Serene Drives, Morgan Hill, CA | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft (20 40 60)	Water Content (%) (10 20 30 40)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.		
			130.2	11.0		50+		
22								
24								
		End of Borehole						
26								
28								
30								
32								
34								
36								
38								
40								

Drill Method: Solid Flight | **Drill Date:** 11-29-17

Drill Rig: CME 45C-1 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Chris Wyneken | **Elevation:** 25 Feet

Log of Boring B14

Project: Shoe Palace Distribution Center | **Project No:** 042-17031

Client: Bridge Group Investments, Inc. | **Figure No.:** A-14

Location: Jarvis and Serene Drives, Morgan Hill, CA | **Logged By:** Wayne Andrade

Depth to Water> | **Initial:** None | **At Completion:** None

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	Penetration Test blows/ft (20 40 60)	Water Content (%) (10 20 30 40)
0		Ground Surface						
		CLAYEY SAND (SC) FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily						
2		***GRAVELLY CLAYEY SAND (SC)*** Medium dense, fine- to coarse-grained; brown, damp, drills easily	117.4	10.0	■	25	▲	■
4								
		Dense and drills firmly below 5½ feet	122.5	7.2	■	60	▲	■
6								
8								
10		End of Borehole						
12								
14								
16								
18								
20								

Drill Method: Solid Flight | **Drill Date:** 11-29-17

Drill Rig: CME 45C-1 | **Krazan and Associates** | **Hole Size:** 4½ Inches

Driller: Chris Wyneken | **Elevation:** 10 Feet

Sheet: 1 of 1

Log of Boring B15

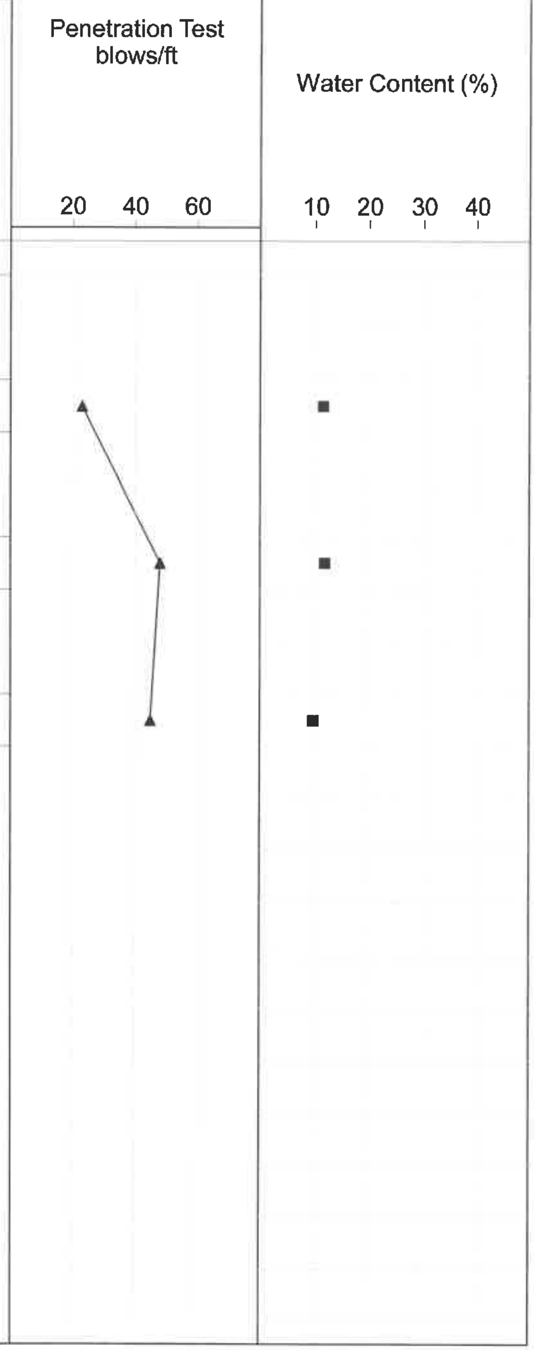
Project: Shoe Palace Distribution Center
Project No: 042-17031

Client: Bridge Group Investments, Inc.
Figure No.: A-15

Location: Jarvis and Serene Drives, Morgan Hill, CA
Logged By: Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0–1.5		***CLAYEY SAND (SC)*** FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily				
1.5–5.5		***SANDY SILTY CLAY (CL)*** Very stiff, fine-grained; light brown, damp, drills easily	109.3	11.6		23
5.5–15		***GRAVELLY CLAYEY SAND (SC)*** Dense, fine- to coarse-grained; brown, damp, drills firmly	130.7	11.9		48
			131.7	9.8		45
12		Very dense with increased GRAVEL below 12 feet				
15		End of Borehole				



Drill Method: Solid Flight
Drill Date: 11-29-17

Drill Rig: CME 45C-1
Krazan and Associates
Hole Size: 4½ Inches

Driller: Chris Wyneken
Elevation: 15 Feet

Log of Boring B16

Project: Shoe Palace Distribution Center **Project No:** 042-17031

Client: Bridge Group Investments, Inc. **Figure No.:** A-16

Location: Jarvis and Serene Drives, Morgan Hill, CA **Logged By:** Wayne Andrade

Depth to Water> **Initial:** None **At Completion:** None

SUBSURFACE PROFILE		SAMPLE				Penetration Test blows/ft	Water Content (%)
Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	20 40 60	10 20 30 40
0	Ground Surface						
0–2	***CLAYEY SAND (SC)*** FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily						
2–5.5	***SANDY CLAY (CL)*** Stiff, fine- to coarse-grained with trace GRAVEL; light brown, damp, drills easily	116.9	13.1	■	16		
		124.7	11.9	■	50+		
5.5–10	***GRAVELLY CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, damp, drills hard						
10	End of Borehole						

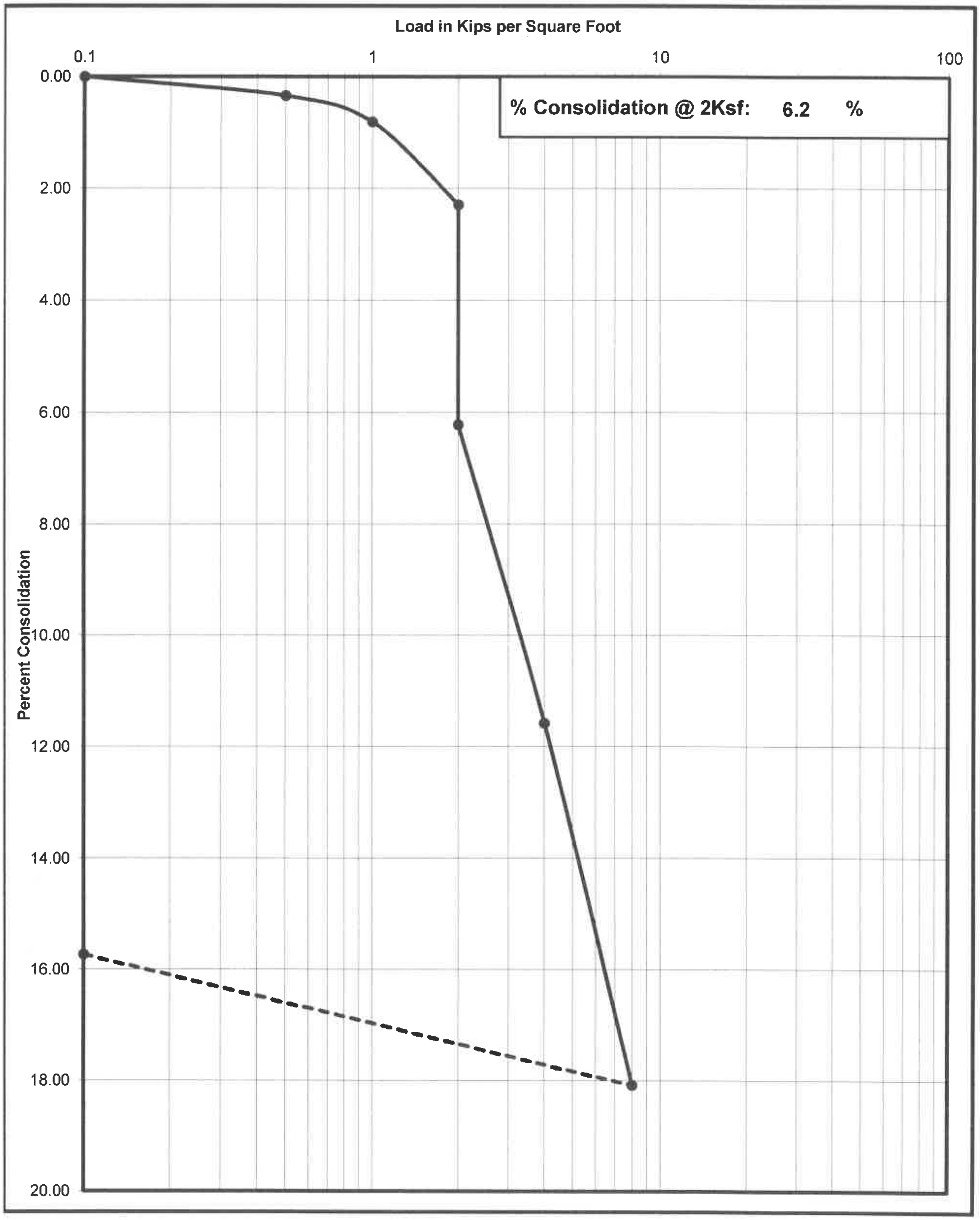
Drill Method: Solid Flight **Drill Date:** 11-29-17

Drill Rig: CME 45C-1 **Krazan and Associates** **Hole Size:** 4½ Inches

Driller: Chris Wyneken **Elevation:** 10 Feet

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
4217031	B9 @ 2-3'	12/9/2017	ML



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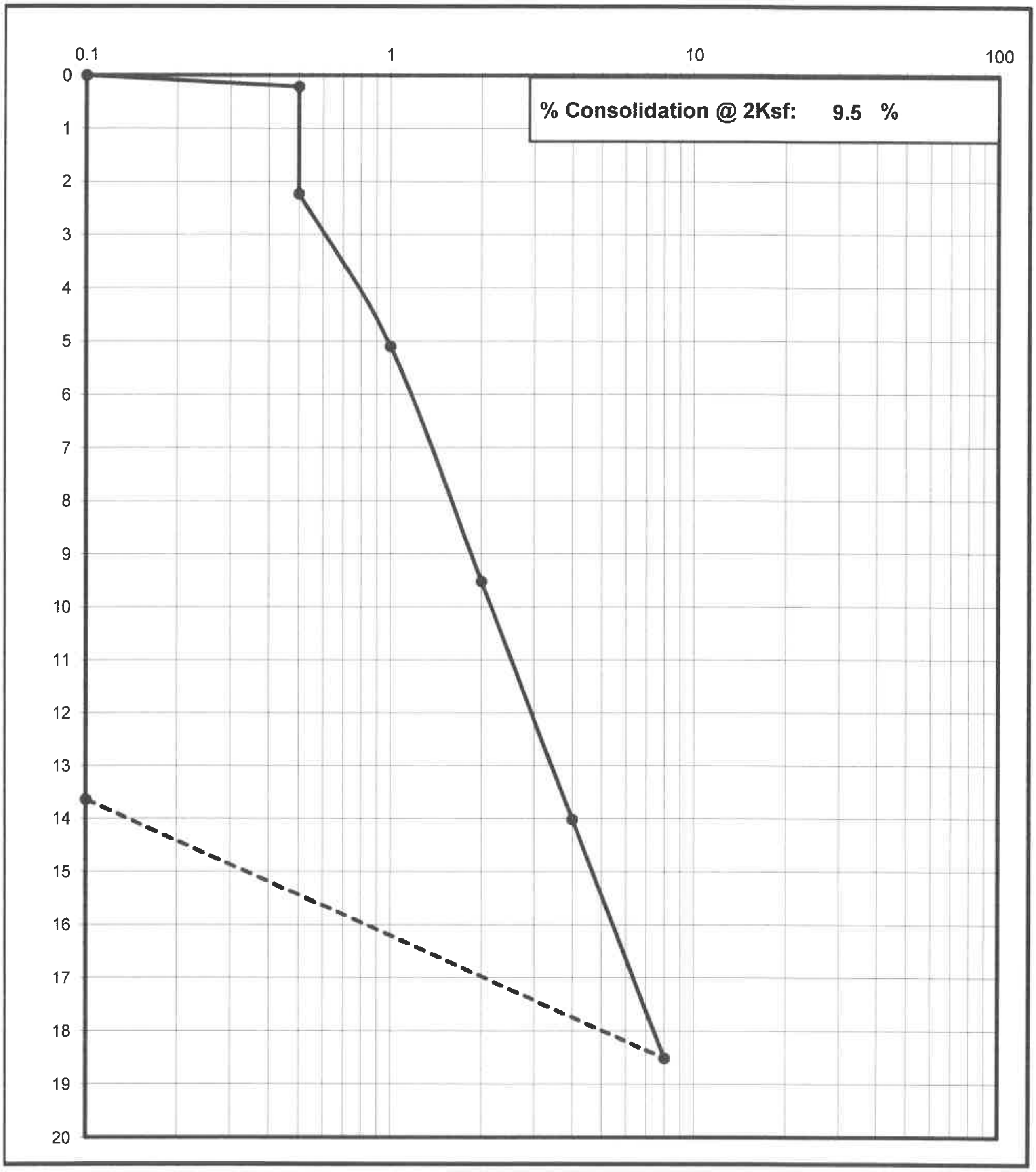
Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
4217031	B16 @ 2-3	12/7/2017	CL

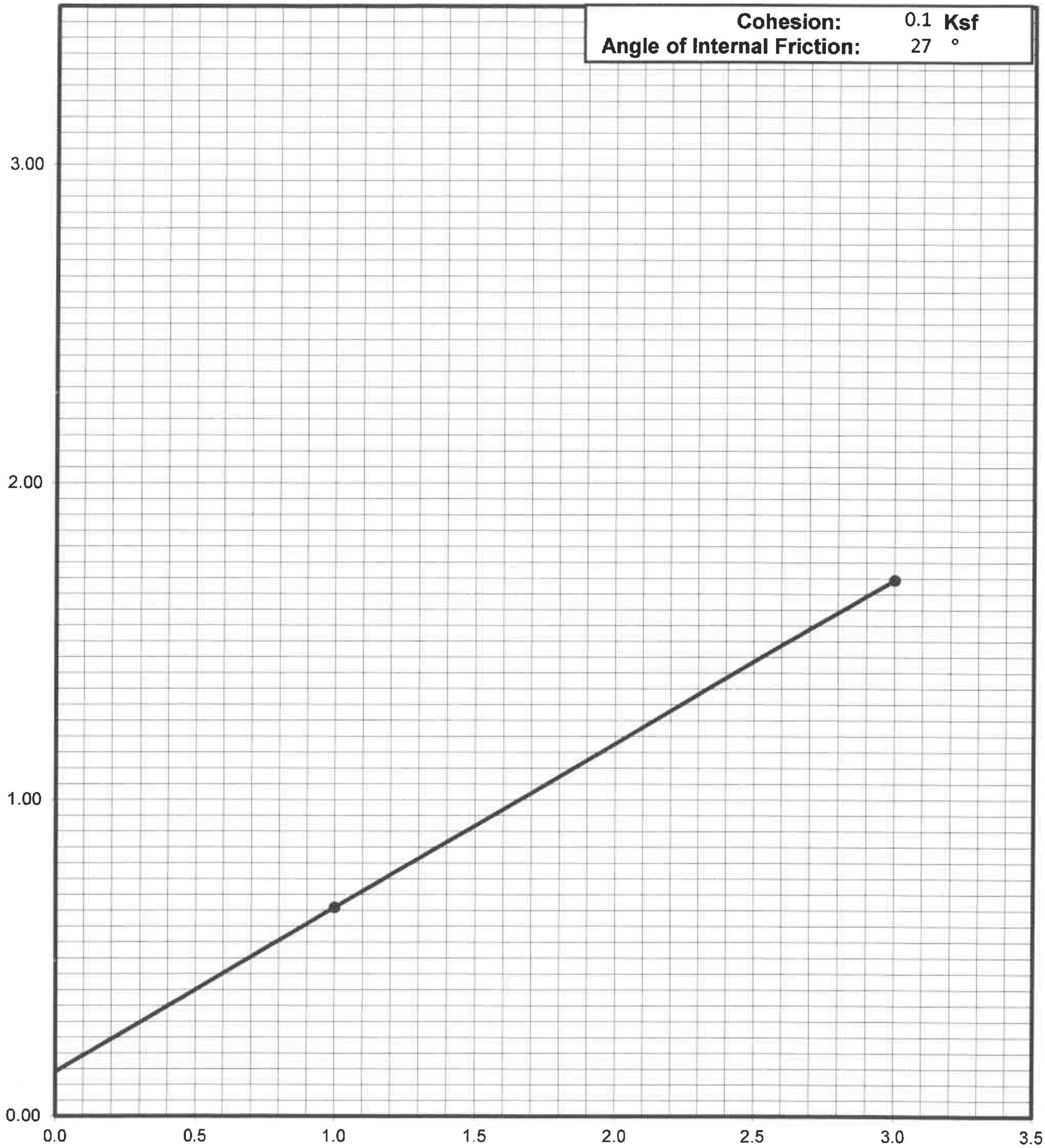


Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)

ASTM D - 3080 / AASHTO T - 236

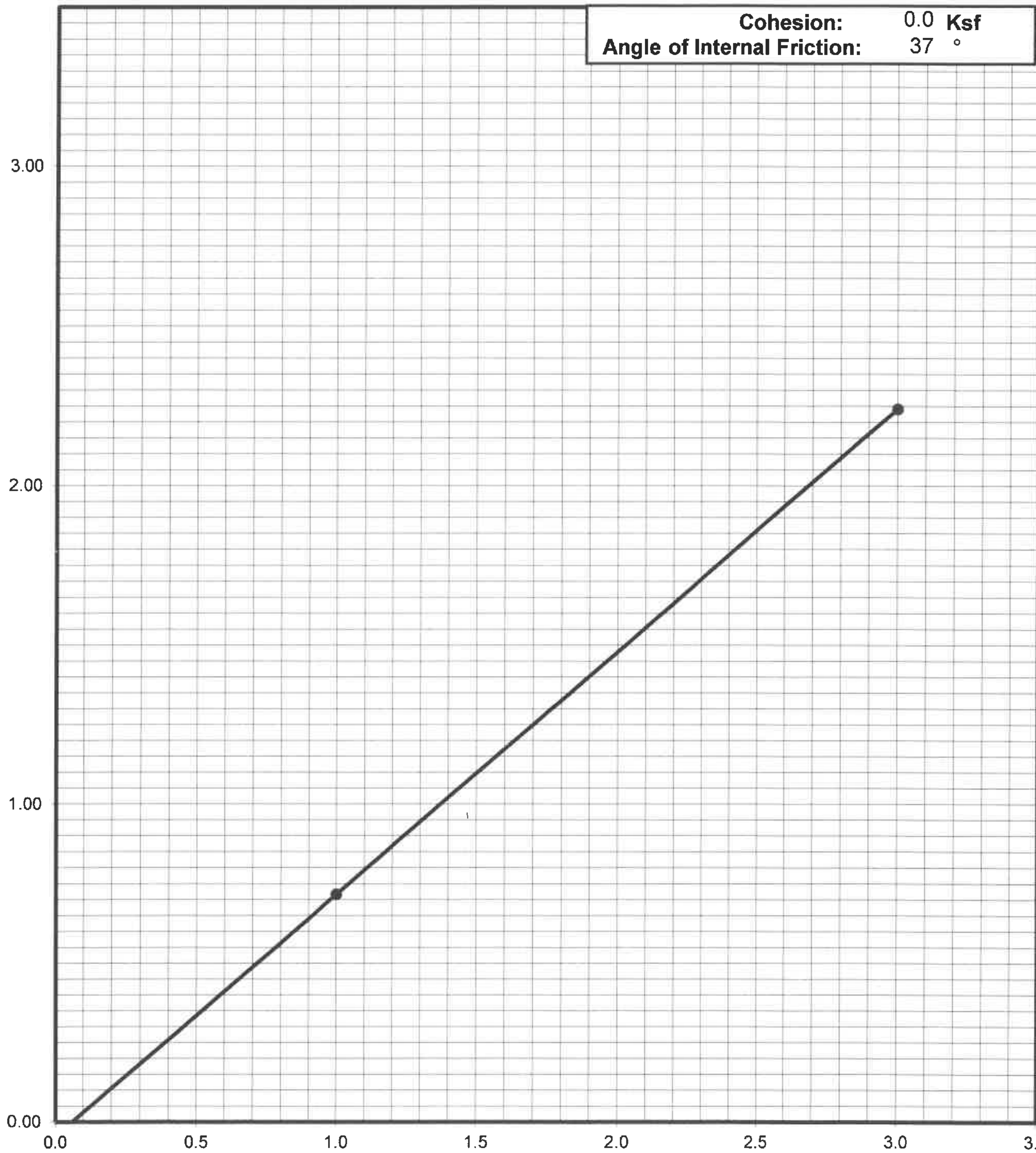
Project Number	Boring No. & Depth	Soil Type	Date
4217031	B3 @ 2-3'	ML	12/9/2017



Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
4217031	B10 @ 2-3'	SM/SC	12/9/2017



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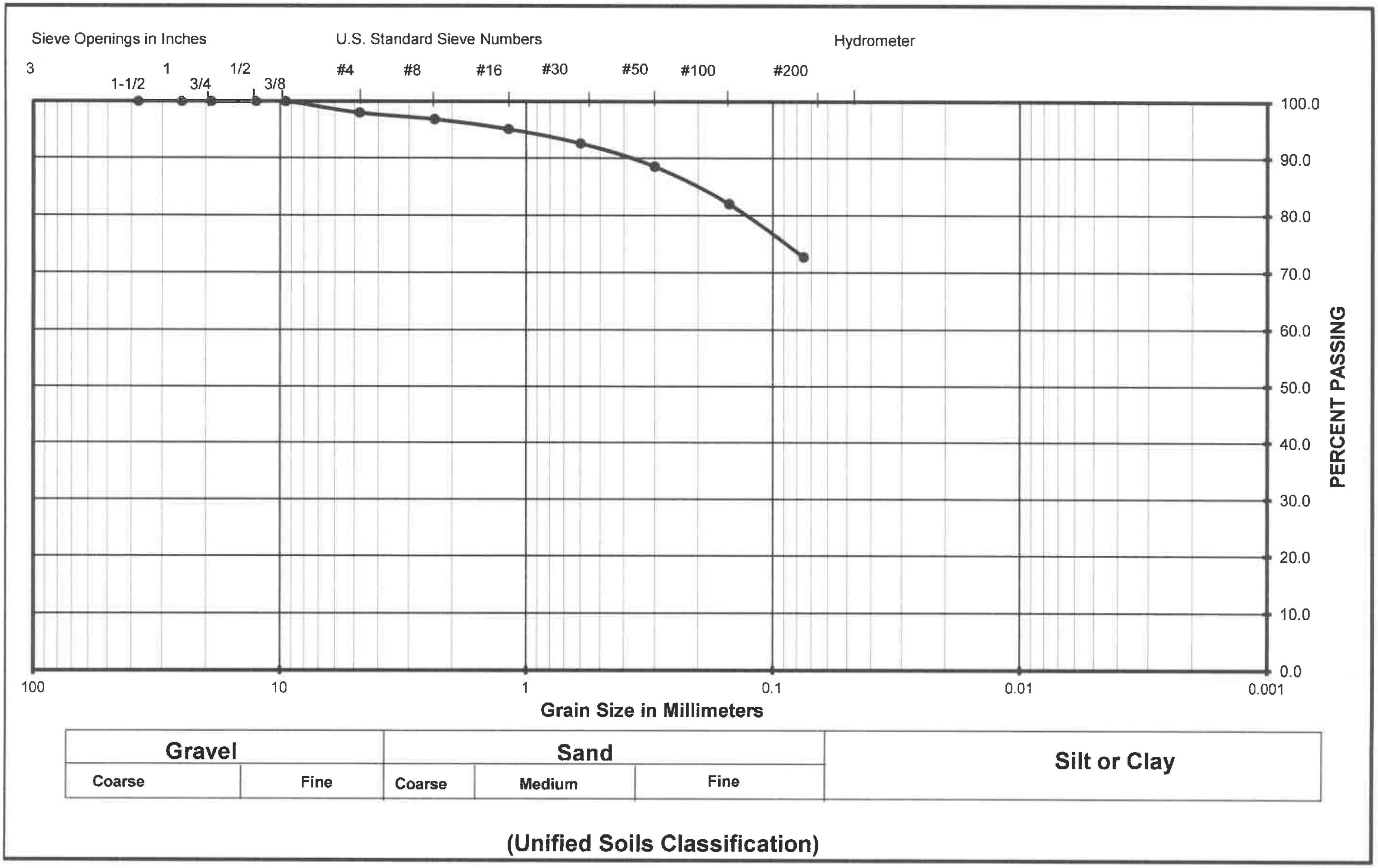
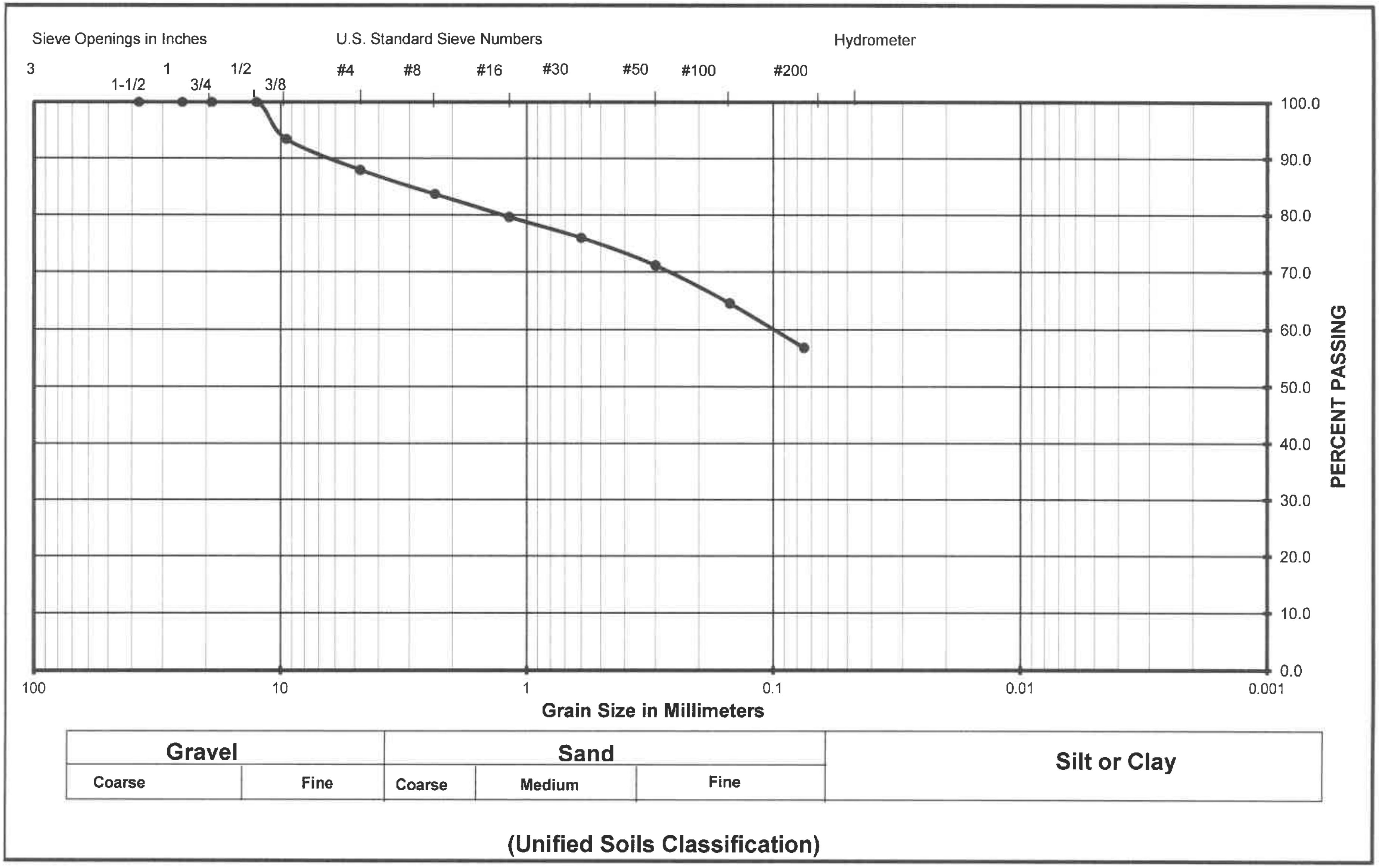
Grain Size Analysis



Project Name	Shoe Palace
Project Number	4217031
Soil Classification	ML
Sample Number	B9 @ 2-3

Krazan Testing Laboratory

Grain Size Analysis



Project Name	Shoe Palace
Project Number	4217031
Soil Classification	CL
Sample Number	B16 @ 2-3

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829/ UBC Std. 18-2

Project Number	: 4217031
Project Name	: Shoe Palace
Date	: 12/8/2017
Sample location/ Depth	: X1 @ 0-2.5'
Sample Number	: X1 @ 0-2.5'
Soil Classification	: SC

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	584.2		
Weight of Mold, gms	182.8		
Weight of Soil, gms	401.4		
Wet Density, Lbs/cu.ft.	121.1		
Weight of Moisture Sample (Wet), gms	300.0		
Weight of Moisture Sample (Dry), gms	273.5		
Moisture Content, %	9.7		
Dry Density, Lbs/cu.ft.	110.4		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	49.7		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.02

Expansion Index $_{measured}$ = 20

Expansion Index = 20

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829/ UBC Std. 18-2

Project Number	: 4217031
Project Name	: Shoe Palace
Date	: 12/8/2017
Sample location/ Depth	: X2 @ 2-5'
Sample Number	: X2 @ 2-5'
Soil Classification	: SC

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	582.6		
Weight of Mold, gms	184.7		
Weight of Soil, gms	397.9		
Wet Density, Lbs/cu.ft.	120.0		
Weight of Moisture Sample (Wet), gms	300.0		
Weight of Moisture Sample (Dry), gms	272.7		
Moisture Content, %	10.0		
Dry Density, Lbs/cu.ft.	109.1		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	49.6		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.0232

Expansion Index $_{measured}$ = 23.2

Expansion Index = 23

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

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Expansion Index Test

ASTM D - 4829/ UBC Std. 18-2

Project Number	: 4217031
Project Name	: Shoe Palace
Date	: 12/8/2017
Sample location/ Depth	: X3 @ 1-4'
Sample Number	: X3 @ 1-4'
Soil Classification	: SC

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	583.1		
Weight of Mold, gms	183.4		
Weight of Soil, gms	399.7		
Wet Density, Lbs/cu.ft.	120.5		
Weight of Moisture Sample (Wet), gms	300.0		
Weight of Moisture Sample (Dry), gms	274.0		
Moisture Content, %	9.5		
Dry Density, Lbs/cu.ft.	110.1		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	48.3		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.034

Expansion Index $_{measured}$ = 34

Expansion Index = 34

Expansion Potential Table	
Exp. Index	Potential Exp.
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

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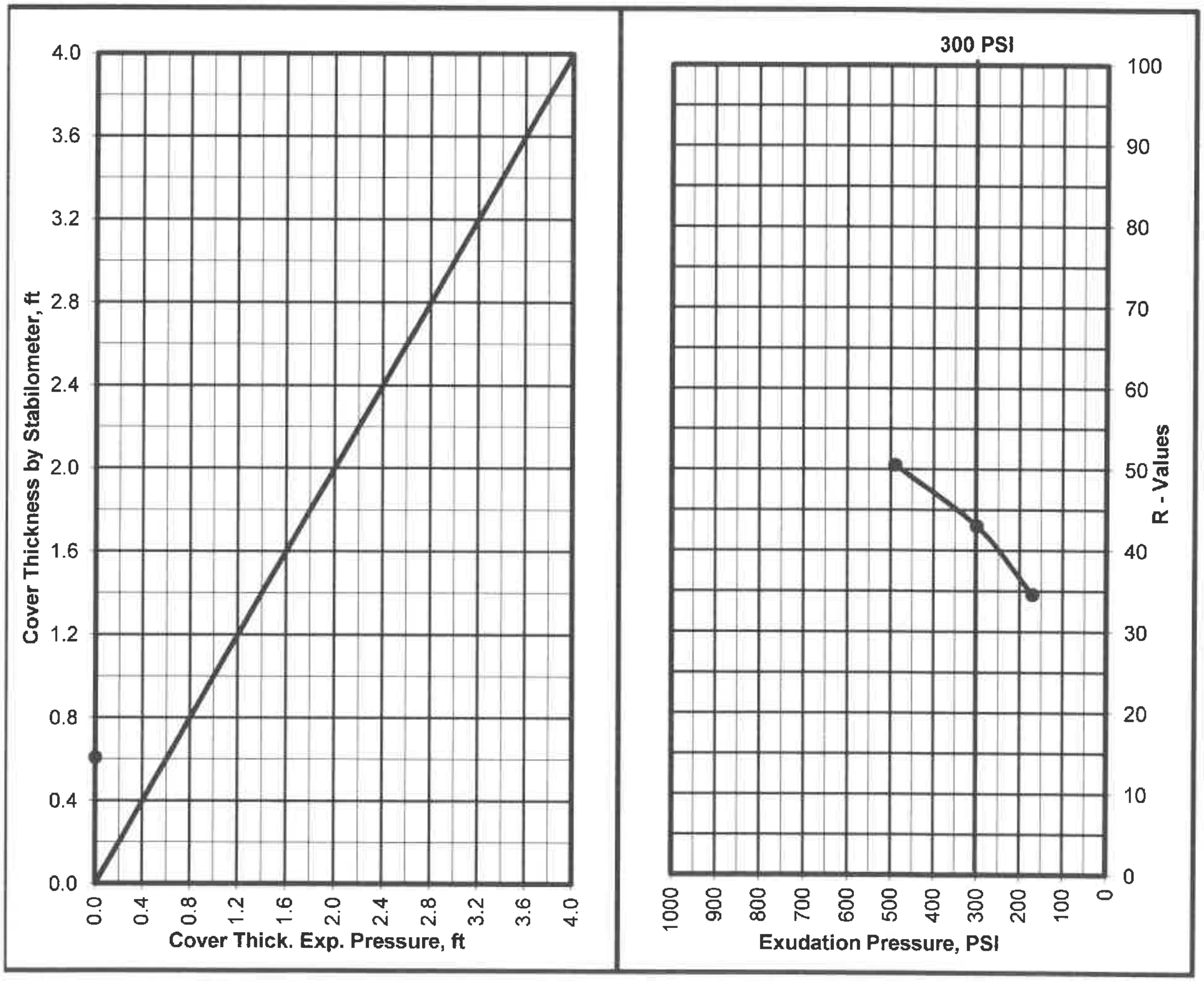
R - VALUE TEST
ASTM D - 2844 / CAL 301

Project Number	:	4217031
Project Name	:	Shoe Palace
Date	:	12/8/2017
Sample Location/Curve Number	:	RV # 1 @ 1-3'
Soil Classification	:	SM

TEST	A	B	C
Percent Moisture @ Compaction, %	16.9	17.6	16.3
Dry Density, lbm/cu.ft.	113.3	112.8	112.5
Exudation Pressure, psi	300	170	490
Expansion Pressure, (Dial Reading)	0	0	0
Expansion Pressure, psf	0	0	0
Resistance Value R	43	35	51

R Value at 300 PSI Exudation Pressure	**43**
R Value by Expansion Pressure (TI =): 5	**Expansion Pressure nil**



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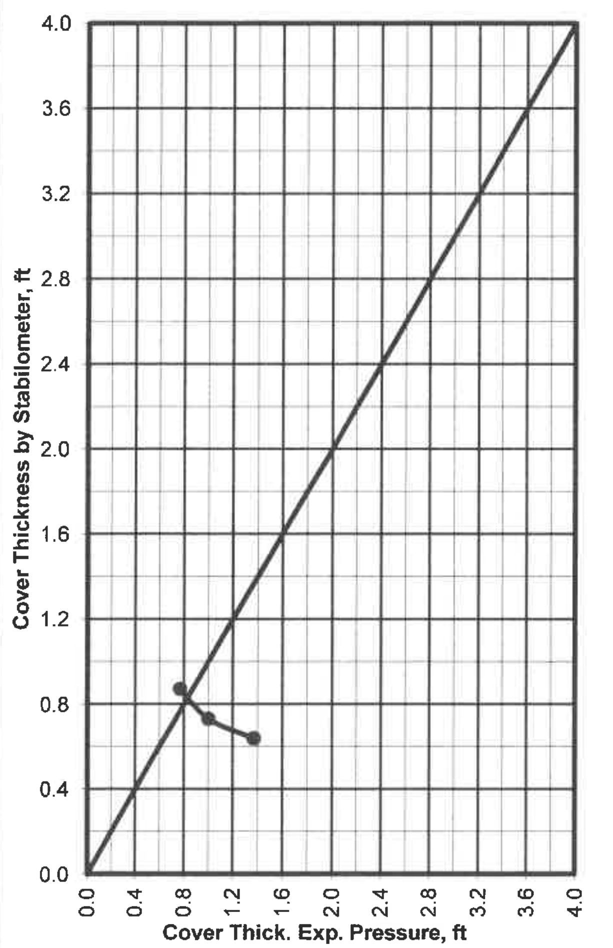
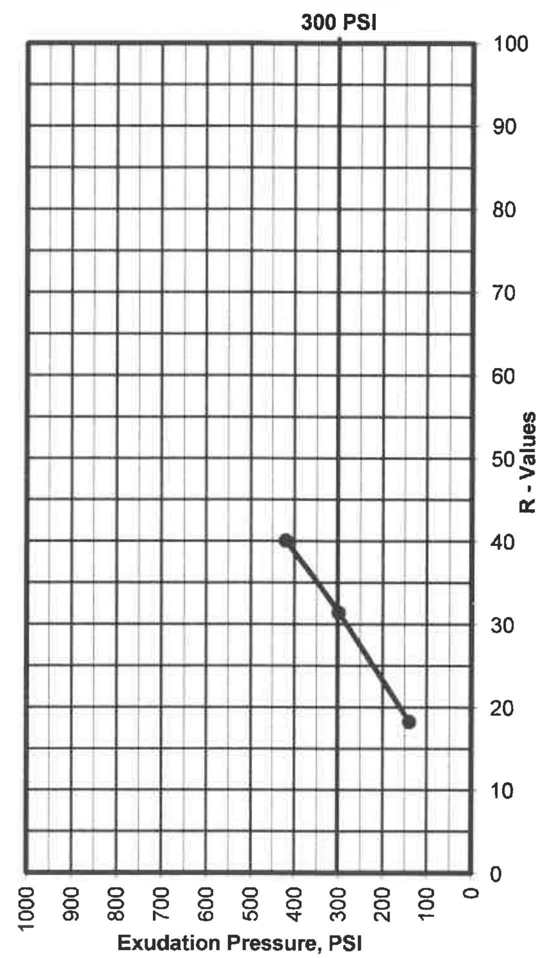
R - VALUE TEST
ASTM D - 2844 / CAL 301

Project Number	:	4217031
Project Name	:	Shoe Palace
Date	:	12/8/2017
Sample Location/Curve Number	:	RV # 2 @ 1-3'
Soil Classification	:	SC

TEST	A	B	C
Percent Moisture @ Compaction, %	17.4	18.3	16.7
Dry Density, lbm/cu.ft.	114.0	113.4	114.9
Exudation Pressure, psi	300	140	420
Expansion Pressure, (Dial Reading)	30	23	41
Expansion Pressure, psf	130	100	178
Resistance Value R	31	18	40

R Value by Expansion Pressure (TI =): 5	**25**
R Value at 300 PSI Exudation Pressure	**31**





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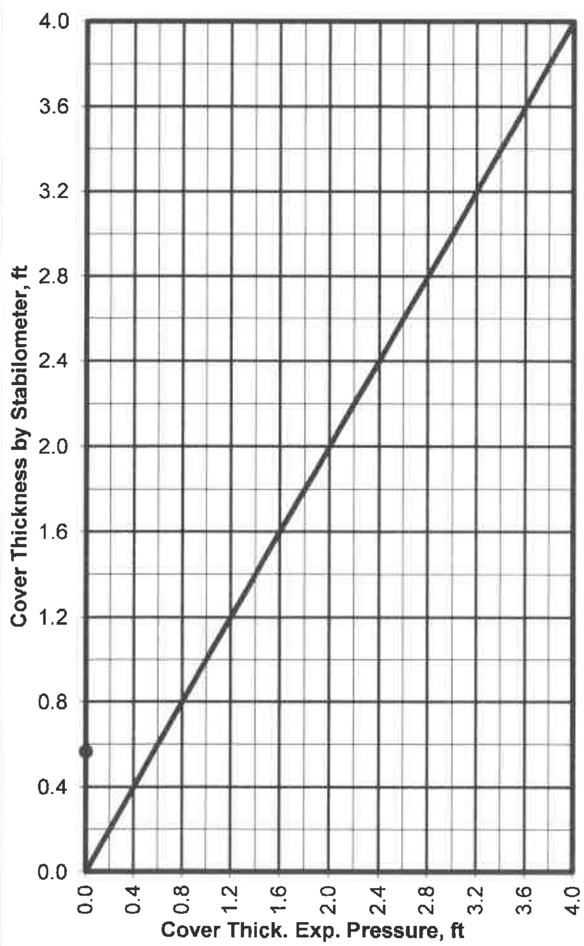
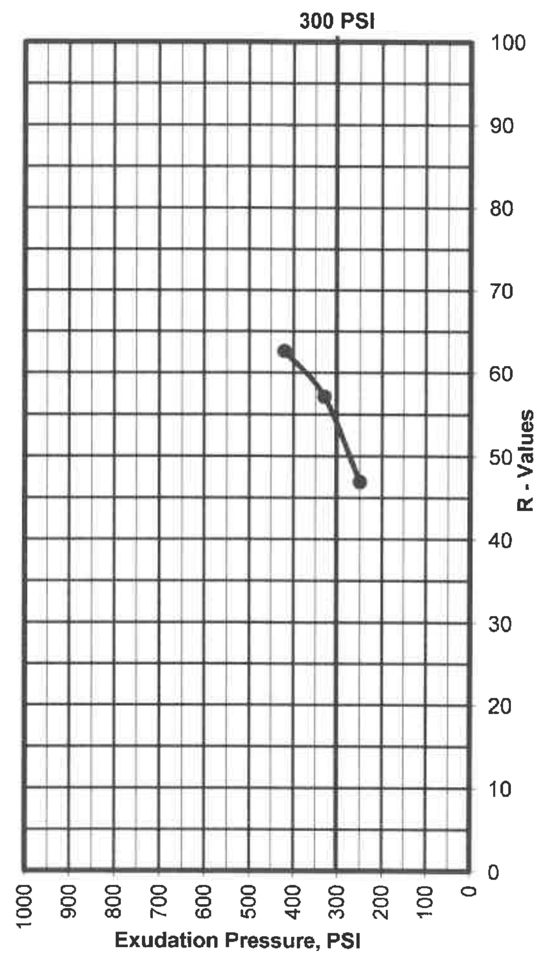
R - VALUE TEST
ASTM D - 2844 / CAL 301

Project Number	:	4217031
Project Name	:	Shoe Palace
Date	:	12/8/2017
Sample Location/Curve Number	:	RV # 3 @ 1-3
Soil Classification	:	SM

TEST	A	B	C
Percent Moisture @ Compaction, %	16.5	15.4	14.6
Dry Density, lbm/cu.ft.	110.5	112.2	112.0
Exudation Pressure, psi	250	330	420
Expansion Pressure, (Dial Reading)	0	0	0
Expansion Pressure, psf	0	0	0
Resistance Value R	47	57	63

R Value at 300 PSI Exudation Pressure	**54**
R Value by Expansion Pressure (TI =): 5	**Expansion Pressure nil**





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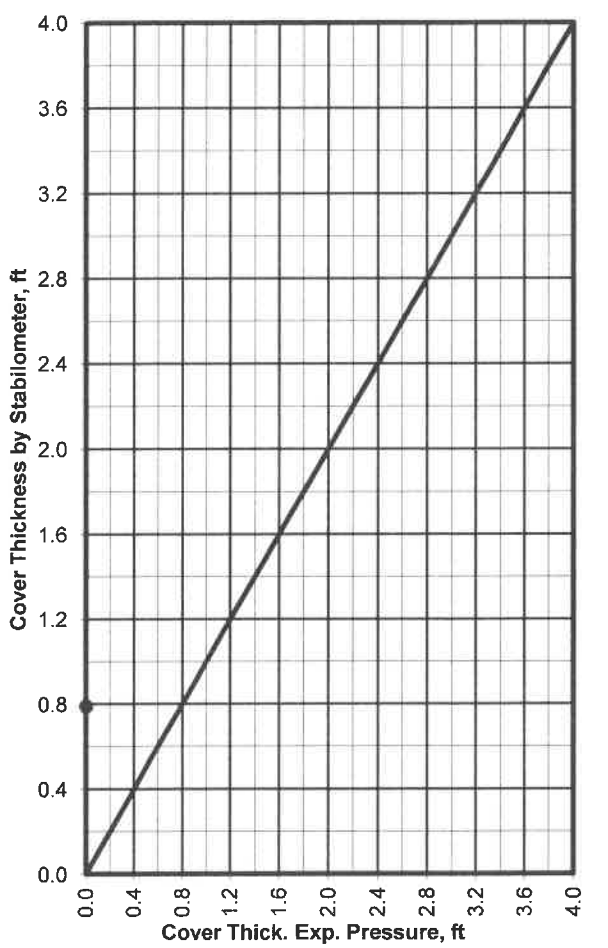
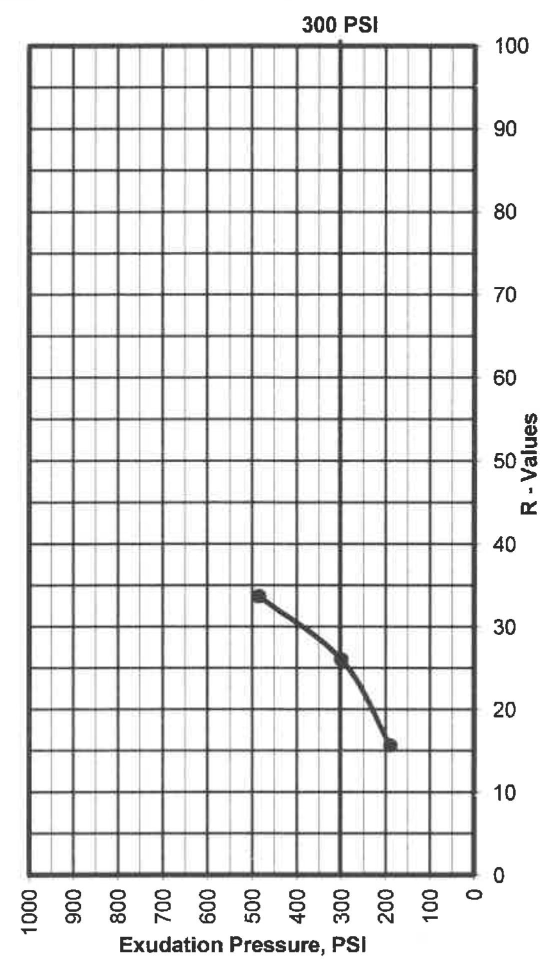
R - VALUE TEST
ASTM D - 2844 / CAL 301

Project Number	:	4217031
Project Name	:	Shoe Palace
Date	:	12/8/2017
Sample Location/Curve Number	:	RV # 4 @ 1-3
Soil Classification	:	SC

TEST	A	B	C
Percent Moisture @ Compaction, %	15.3	16.0	14.5
Dry Density, lbm/cu.ft.	116.0	115.2	116.0
Exudation Pressure, psi	300	190	485
Expansion Pressure, (Dial Reading)	0	0	0
Expansion Pressure, psf	0	0	0
Resistance Value R	26	16	34

R Value at 300 PSI Exudation Pressure	**26**
R Value by Expansion Pressure (TI =): 5	**Expansion Pressure nil**





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APPENDIX B

EARTHWORK SPECIFICATIONS

GENERAL

When the text of the report conflicts with the general specifications in this appendix, the recommendations in the report have precedence.

SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including but not limited to the furnishing of all labor, tools, and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans, and disposal of excess materials.

PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of Krazan and Associates, Inc., hereinafter known as the Soils Engineer and/or Testing Agency. Attainment of design grades when achieved shall be certified by the project Civil Engineer. Both the Soils Engineer and the Civil Engineer are the Owner's representatives. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory as determined by both the Soils Engineer and the Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Soils Engineer, Civil Engineer or project Architect.

No earthwork shall be performed without the physical presence or approval of the Soils Engineer. The Contractor shall notify the Soils Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner or the Engineers.

TECHNICAL REQUIREMENTS: All compacted materials shall be densified to a density not less than 90 percent relative compaction based on ASTM Test Method D1557 or CAL-216, as specified in the technical portion of the Soil Engineer's report. The location and frequency of field density tests shall be as determined by the Soils Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Soils Engineer.

SOILS AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the soil report.

The Contractor shall make his own interpretation of the data contained in said report, and the Contractor shall not be relieved of liability under the Contract documents for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

DUST CONTROL: The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including court costs of codefendants, for all claims related to dust or windblown materials attributable to his work.

SITE PREPARATION

Site preparation shall consist of site clearing and grubbing and the preparations of foundation materials for receiving fill.

CLEARING AND GRUBBING: The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter, and all other matter determined by the Soils Engineer to be deleterious or otherwise unsuitable. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed building areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots larger than 1 inch. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavations should not be permitted until all exposed surfaces have been inspected and the Soils Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

SUBGRADE PREPARATION: Surfaces to receive Engineered Fill, building or slab loads shall be prepared as outlined above, excavated/scarified to a depth of 12 inches, moisture-conditioned as necessary, and compacted to 90 percent relative compaction.

Loose soil areas, areas of uncertified fill, and/or areas of disturbed soils shall be moisture-conditioned as necessary and recompacted to 90 percent relative compaction. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill materials shall be approved by the Soils Engineer prior to the placement of any of the fill material.

EXCAVATION: All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over-excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence of the Soils Engineer. Material from the required site excavation may be utilized for construction site fills provided prior approval is given by the Soils Engineer. All materials utilized for constructing site fills shall be free from vegetation or other deleterious matter as determined by the Soils Engineer.

PLACEMENT, SPREADING AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. However, compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Soils Engineer.

Both cut and fill areas shall be surface-compacted to the satisfaction of the Soils Engineer prior to final acceptance.

SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Soils Engineer indicates that the moisture content and density of previously placed fill are as specified.

APPENDIX C

PAVEMENT SPECIFICATIONS

1. DEFINITIONS - The term "pavement" shall include asphaltic concrete surfacing, untreated aggregate base, and aggregate subbase. The term "subgrade" is that portion of the area on which surfacing, base, or subbase is to be placed.

The term "Standard Specifications": hereinafter referred to is the 2010 Standard Specifications of the State of California, Department of Transportation, and the "Materials Manual" is the Materials Manual of Testing and Control Procedures, State of California, Department of Public Works, Division of Highways. The term "relative compaction" refers to the field density expressed as a percentage of the maximum laboratory density as defined in the applicable tests outlined in the Materials Manual.

2. SCOPE OF WORK - This portion of the work shall include all labor, materials, tools, and equipment necessary for, and reasonably incidental to the completion of the pavement shown on the plans and as herein specified, except work specifically noted as "Work Not Included."

3. PREPARATION OF THE SUBGRADE - The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum relative compaction of 90 percent. The finished subgrades shall be tested and approved by the Soils Engineer prior to the placement of additional pavement courses.

4. UNTREATED AGGREGATE BASE - The aggregate base material shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base material shall conform to the requirements of Section 26 of the Standard Specifications for Class 2 material, 1½ inches maximum size. The aggregate base material shall be spread and compacted in accordance with Section 26 of the Standard Specifications. The aggregate base material shall be spread in layers not exceeding 6 inches and each layer of aggregate material course shall be tested and approved by the Soils Engineer prior to the placement of successive layers. The aggregate base material shall be compacted to a minimum relative compaction of 95 percent.

5. AGGREGATE SUBBASE - The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of Section 25 of the Standard Specifications for Class 2 material. The aggregate subbase material shall be compacted to a minimum relative compaction of 95 percent, and it shall be spread and compacted in accordance with Section 25 of the Standard Specifications. Each layer of aggregate subbase shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

6. ASPHALTIC CONCRETE SURFACING - Asphaltic concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades and dimensions shown on the plans. The viscosity grade of the asphalt shall be PG 64-10. The mineral aggregate shall be Type B, ½ inch maximum size, medium grading and shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning and mixing of the materials shall conform to Section 39.

The prime coat, spreading and compacting equipment and spreading and compacting mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50° F. The surfacing shall be rolled with a combination of steel wheel and pneumatic rollers, as described in Section 39-6. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

7. FOG SEAL COAT - The fog seal (mixing type asphaltic emulsion) shall conform to and be applied in accordance with the requirements of Section 37.