GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED PRELIMINARY LOT STUDY – R1
MORNING DRIVE AT EAGLE RIDGE STREET
BAKERSFIELD, CALIFORNIA

KA PROJECT NO. 022-25028
JULY 3, 2025

Prepared For:

MR. ADAM STUBBS
DEWALT CORPORATION
1930 22ND STREET
BAKERSFIELD, CALIFORNIA 93301

Prepared By:

KRAZAN & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING DIVISION
2205 COY AVENUE
BAKERSFIELD, CALIFORNIA 93307
(661) 837-9200

Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

July 3, 2025

KA Project No. 022-25028

Mr. Adam Stubbs
Dewalt Corporation
1930 22nd Street
Bakersfield, California 93301

RE: Geotechnical Engineering Investigation
Proposed Preliminary Lot Study – R1
Morning Drive at Eagle Ridge Street
Bakersfield, California

Dear Mr. Stubbs:

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 (661) 837-9200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

Ryan K. Privett, PE
Project Engineer
RCE No. 59372

REGISTERED PROFESSIONAL ENGINEER
RYAN K. PRIVETT
NO. 59372
CIVIL
STATE OF CALIFORNIA

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CONSTRUCTION TESTING & INSPECTION

July 3, 2025 KA Project No. 022-25028

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED PRELIMINARY LOT STUDY – R1
MORNING DRIVE AT EAGLE RIDGE STREET
BAKERSFIELD, CALIFORNIA

INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed Preliminary Lot Study – R1 to be located on Morning Drive at Eagle Ridge Street in Bakersfield, 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 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 January 24, 2025 (KA Proposal No. P1015-25) 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 18 borings to depths ranging from approximately 1½ to 23 feet for evaluation of the subsurface conditions at the project site. Some of the borings were terminated at a shallow depth due to auger refusal in very dense 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 the project will consist of a new single-family residential subdivision with approximately 243 lots. It is anticipated the buildings will be single- or two-story structures utilizing conventional reinforced concrete foundations and concrete slab-on-grade construction. Footing loads are anticipated to be light to moderate. On-site paved areas, a storm water basin, and landscaping are also planned for the development.

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 64.4 acres. The site is located along the east side of Morning Drive at Eagle Ridge Street, in Bakersfield, California. The site is identified as a portion of Assessor's Parcel Number 531-011-02. A residential development currently under construction is located east of the site. The remainder of the site is predominately surrounded by vacant land. Four aboveground storage tanks were previously located in the southwest portion of the site, and were removed sometime in 2017 or 2018.

Presently, the site predominately consists of vacant land. No structures are located on the site. Numerous soil end-dump piles were observed in the southern portion of the site. The nature and origin of the materials are unknown. Some debris is anticipated to be intermixed with these materials. Buried and overhead utility lines are located along the edges of the site and may extend into the project site. The ground surface at the site contains short grasses and weeds and the surface soils have a loose consistency. The site topography varies from relatively flat and level to gently rolling terrain.

GEOLOGIC SETTING

Geologically, the property is situated on the eastern flank, near the south end of the Great Valley Geomorphic Province. This province is a large northwesterly trending geosyncline or structural trough between the Coast Range Mountains and the Sierra Nevada Mountains. Erosion from both of these mountain systems has resulted in the deposition of immense thickness of sediments in the Valley floor.

Heavily-laden streams from the Sierra Nevada have built very prominent alluvial fans along the margins of the San Joaquin Valley. This has resulted in a rather flat topography in the vicinity of the project site. The site is composed of alluvial deposits which are mostly cohesionless sands and silts.

The south end of the San Joaquin Valley is surrounded on all sides, excluding the north, by active fault systems (San Andreas, White Wolf-Breckenridge-Kern Canyon and Garlock Faults). Numerous smaller faults exist within the valley floor.

There is on-going seismic activity in the Kern County area, with the most noticeable earthquake being the July 21, 1952 Kern County Earthquake. The initial shock was 7.7 magnitude shake with the epicenter near Wheeler Ridge. Vertical displacements of as much as three feet occurred at the fault line. Estimated average value of the maximum bedrock accelerations from the 1952 event are about 0.25 gravity at the project site.

The closest known faults to the property are subsurface faults located at the Fruitvale Oil Field. These faults cut the older sediments and, although numerous, are not thought to be active in the last two million years.

No evidence was observed that indicated surface faulting has occurred across the property during the Holocene time. Faults not yet identified, however, may exist. The site is not within an Earthquake Fault Zone (special studies zone).

FIELD AND LABORATORY INVESTIGATIONS

Subsurface soil conditions were explored by drilling 18 borings to depths ranging from approximately 1½ to 23 feet below existing site grade, using a truck-mounted drill rig. Some of the borings were terminated at a shallow depth due to auger refusal in very dense cobbles. In addition, 6 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, R-value and moisture-density relationships of the materials encountered. In addition, chemical tests were performed to evaluate the soil-cement reactivity. 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 surface soils consisted of approximately 6 to 12 inches of loose or firm sandy clay, clayey sand/sandy clay or clayey sand. Some of these soils contained varying amounts of gravel. These soils are disturbed, have low strength characteristics, and are highly compressible when saturated.

Approximately 2 to 3 feet of fill material was encountered within the borings drilled in the southeast portion of the site. The fill material predominately consisted of clayey sand with possible organics. 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 soils during the time of our field and laboratory investigations. The limited testing indicates the fill soils have varying strength characteristics ranging from loosely placed to compacted.

Below the loose surface soils and fill material, approximately 1½ to 4½ feet of hard sandy clay, medium dense/very stiff to very dense/hard clayey sand/sandy clay or medium dense to very dense clayey sand were encountered. These soils contained varying amounts of clay and gravel. Field and laboratory tests suggest that these soils are moderately strong and moderately compressible. The clayey soils generally have a low to moderate swell potential. Penetration resistance ranged from 25 blows per foot to more than 50 blows per 6 inches. Dry densities ranged from 86 to 104 pcf. Representative soil samples consolidated approximately 7½ to 8 percent under a 2 ksf load when saturated. A representative soil sample had an angle of internal friction of 22 degrees. Representative samples of the clayey soils had expansion indices ranging from 22 to 65.

Below approximately 5 feet, predominately medium dense to very dense clayey sand, hard sandy clay, or very dense/hard clayey sand/sandy clay were encountered. These soils contained varying amounts of clay and occasional gravel or cobble. Field and laboratory tests suggest that these soils are moderately strong and moderately compressible. Penetration resistance ranged from 30 blows per foot to more than 50 blows per 6 inches. Dry densities ranged from 84 to 124 pcf. A representative soil sample consolidated approximately 5½ percent under a 2 ksf load when saturated. These soils had slightly higher strength characteristics than 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.

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

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 sandy clay, clayey sand/sandy clay, and clayey sand. Groundwater was not encountered within the depths explored. In addition, groundwater has been historically encountered at depths greater than 50 feet below site grade within the project site and vicinity since the 1950's. Therefore, the potential for liquefaction and related settlement is low at this site and no liquefaction mitigation procedures are necessary for this project.

Secondary hazards from earthquakes include rupture, seiche, landslides, lateral spreading, and subsidence. Since there are no known faults within the immediate area, ground rupture from surface faulting should not be a potential problem. Seiche, lateral spreading, and landslides are not hazards in the area either. In addition, there are no known occurrences of structural or architectural damage due to deep subsidence in the Bakersfield area. The total and differential seismic-induced settlements should be less than 1-inch.

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 loose surface soils, fill material, moderate expansion potential of the on-site clayey soils, moderately compressible upper native soils, and existing development, appear to be conducive to the development of the project. The upper soils within the project site are disturbed, have low strength characteristics, and are highly compressible when saturated. Accordingly, it is recommended that the surface soils be recompacted. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Because the majority of the upper on-site soils appear to be expansive clayey soils, it is anticipated that imported non-expansive Engineered Fill will be required to construct the proposed building pads.

Approximately 2 to 3 feet of fill material was encountered within the borings drilled in the southeast portion of the site. The fill material predominately consisted of clayey sand with possible organics. 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 soils during the time of our field and laboratory investigations. The limited testing indicates the fill soils have varying strength characteristics ranging from loosely placed to compacted. Therefore, it is recommended that the fill soils be excavated and stockpiled so that the native soils can be prepared properly. These clayey soils will not be suitable for reuse as non-expansive Engineered Fill. These soils will be suitable for reuse as General Engineered Fill in pavement or other non-structural areas, provided they are cleansed of excessive organics, debris and fragments greater than 4 inches in maximum dimension, and moisture-conditioned to a minimum of 2 percent above optimum moisture content. Fill soil intermixed with asphaltic concrete will not be suitable for re-use in building areas, but may be used in pavement areas provided it is cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

Clayey soils were encountered within the site. These clayey soils appear to have a moderate shrink/swell potential. The estimated swell pressure of the clayey material may cause movement affecting slabs and brittle exterior finishes. To reduce the potential soil movement, it is recommended that the upper 24 inches of soil within slab-on-grade and exterior flatwork areas consist 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 clayey soils below, which may result in swelling. The replacement soil and/or the upper 24 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 the building. The non-expansive replacement soil should be compacted to at least 90 percent 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 continuously moist prior to backfilling. In addition, it is recommended that slabs-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 24 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 at or near optimum moisture during the mixing operations. An acceptable alternate section consists of 18 inches of lime-treated clayey soils overlain by 6 inches of Class 2 aggregate base.

Existing residential developments are located in the site vicinity. In addition, above-ground storage tanks were previously located in the southwest portion of the 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/or relocated. The resulting excavations should be backfilled with Engineered Fill, compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

In order to reduce the amount of differential settlement and provide uniform building support for the structures, it is recommended following stripping, fill removal, and demolition operations, the exposed subgrade within proposed building areas be excavated an additional depth of 24 inches or to a minimum depth of 6 feet below existing site grade, whichever is deeper, worked until uniform and free from large clods, moisture-conditioned to at least 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 the proposed structure foundations be supported by a minimum of 12 inches of Engineered Fill. Over-excavation should extend to a minimum of 5 feet beyond structural elements. Prior to backfilling, the bottom of the excavation should be proof-rolled and observed by Krazan & Associates to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Soft or pliant areas encountered should be excavated to firm native ground. Fill material should be moisture-conditioned to at least 2 percent above optimum moisture content and compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

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.

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed structure footings supported by a minimum of 12 inches of Engineered Fill may be designed utilizing an allowable bearing pressure of 2,000 psf for dead-plus-live loads. Footings should have a minimum embedment of 24 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; irrigation lines; 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. However, deeper stripping may be required in localized areas due to repeated discing for crop production. This repeated cultivation may have resulted to mixing of the upper native soils with rubbish and other deleterious substances. These materials will not be suitable for use as Engineered Fill. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas.

Approximately 2 to 3 feet of fill material was encountered within the borings drilled in the southeast portion of the site. The fill material predominately consisted of clayey sand with possible organics. 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 soils during the time of our field and laboratory investigations. The limited testing indicates the fill soils have varying strength characteristics ranging from loosely placed to compacted. Therefore, it is recommended that the fill soils be excavated and stockpiled so that the native soils can be prepared properly. These clayey soils will not be suitable for reuse as non-expansive Engineered Fill. These soils will be suitable for reuse as General Engineered Fill in pavement or other non-structural areas, provided they are cleansed of excessive organics, debris and fragments greater than 4 inches in maximum dimension, and moisture-conditioned to a minimum of 2 percent above optimum moisture content. Fill soil intermixed with asphaltic concrete will not be suitable for re-use in building areas, but may be used in pavement areas provided it is cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

Existing residential developments are located in the site vicinity. In addition, above-ground storage tanks were previously located in the southwest portion of the site. Associated with these developments are buried structures, such as utility lines that may extend into the project site. Any buried structures encountered during construction should be properly removed and/or relocated. The resulting excavations should be backfilled with Engineered Fill, compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Excavations, depressions, or soft and pliant areas extending below planned finish subgrade level 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. Oil wells should be abandoned in accordance with state and federal guidelines. Existing 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 soils within the site predominately consist of sandy clay, clayey sand/sandy clay, or clayey sand. These soils contain varying amounts of clay and gravel. The clayey soils appear to have a moderate swell potential. The estimated swell pressures of the clayey soils may cause minor movement affecting slabs and possible stucco or similar brittle exterior finishes. It is recommended that the upper 24 inches of soil within proposed slab-on-grade and exterior flatwork areas consist of non-expansive Engineered Fill. The intent is to support slab-on-grade and exterior flatwork areas with 24 inches of non-expansive 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. In addition, it is recommended footings, concrete slabs-on-grade, and exterior flatwork be nominally reinforced to reduce cracking and vertical off-set.

As an alternative to the use of non-expansive soils, the upper 24 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 at or near optimum moisture during the mixing operations. An acceptable alternate section consists of 18 inches of lime-treated clayey soils overlain by 6 inches of Class 2 aggregate base.

In order to reduce the amount of differential settlement and provide uniform building support for the structures, it is recommended following stripping, fill removal, and demolition operations, the exposed subgrade within proposed building areas be excavated an additional depth of 24 inches or a minimum depth of 6 feet below existing site grade, whichever is deeper, worked until uniform and free from large clods, moisture-conditioned to at least 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 the proposed structure foundations be supported by a minimum of 12 inches of Engineered Fill. Over-excavation should extend to a minimum of 5 feet beyond structural elements. Prior to backfilling, the bottom of the excavation should be proof-rolled and observed by Krazan & Associates to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Soft or pliant areas encountered should be excavated to firm native ground. Fill material should be moisture-conditioned to at least 2 percent above optimum moisture content and compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Within pavement and exterior flatwork areas, following stripping, fill removal, and demolition activity, the exposed subgrade should be excavated/scarified to a depth of 12 inches, worked until uniform and free from large clods, moisture-conditioned to at least 2 percent above optimum moisture content and compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. This compaction effort should stabilize the upper soils and locate any unsuitable or pliant areas not found during our field investigation. Soft or pliant areas encountered should be excavated to firm native ground. Limits of recompaction should extend 2 feet beyond flatwork and pavement limits.

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 at least 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 to at least 2 percent above optimum moisture and recompacted to a minimum of 90 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 of the material and the 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, clayey sand/sandy clay, and sandy clay. These soils contained varying amounts of clay and gravel. The 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 24 inches of conventional 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 least 2 percent above 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 or non-structural areas, and below 24 inches from finished pad grade in building slab-on-grade and exterior flatwork areas, provided they are cleansed of excessive organics, debris, fragments greater than 4 inches in maximum dimension 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. Fill soil intermixed with asphaltic concrete will not be suitable for re-use in building areas, but may be used in pavement areas, provided it is cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension.

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
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 based on 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 2022 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 reduced and 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 shortly 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.

Utility trenches should be plugged with concrete or compacted clayey soils where they enter under the building.

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

After completion of the recommended site preparation, 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 12 inches of Engineered Fill. Spread and continuous footings can be designed for the following maximum allowable soil bearing pressures:

Load	Allowable Loading
Dead Load Only	1,500 psf
Dead-Plus-Live Load	2,000 psf
Total Load, Including Wind or Seismic Loads	2,650 psf

The footings should have a minimum embedment depth of 24 inches below pad subgrade (soil grade) or adjacent exterior grade. 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.

The total movement is not expected to exceed 1 inch. Differential movement measured across a horizontal distance of 20 feet or between column footings should be less than 1 inch. Most of the settlement is expected to occur during construction, as the loads are applied. However, additional post-construction movement may occur if the foundation soils are flooded or saturated.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.25 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 225 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.

Floor Slabs and Exterior Flatwork

In areas that will utilize moisture-sensitive floor coverings or where moisture-sensitive materials will be stored, 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. The water vapor retarder should consist of a vapor retarder sheeting underlain by a minimum of 3 inches of compacted, clean, gravel of ¾-inch maximum size. To aid in concrete curing an optional 2 to 4 inches of granular fill may be placed on top of the vapor retarder. The granular fill should consist of damp clean sand with at least 10 to 30 percent of the sand passing the 100 sieve. The sand should be free of clay, silt, or organic material. Rock dust, which is manufactured sand from rock crushing operations, is typically suitable for the granular fill. This granular fill material should be compacted.

The floor slab should be reinforced at a minimum with #3 reinforcement bars at 18 inches on-center each way within the slab's middle one-third. 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. 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 55 pounds per square foot per foot of depth. Walls incapable of this deflection or are fully constrained walls against deflection may be designed for an equivalent fluid at-rest pressure of 75 pounds per square foot per foot of 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.

The 2022 CBC requires determination of dynamic seismic lateral earth pressures on foundation walls and retaining walls supporting more than 6 feet of backfill height due to design earthquake ground motions. The Site Modified Peak Ground Acceleration (PGA_M), based on ASCE7-16 and information from the SEAOC and OSHPD Seismic Design Maps website (https://seismicmaps.org), is 0.477. We recommend an incremental seismic lateral pressure of 21 pcf be included in the stability analyses for the retaining wall. The incremental seismic lateral pressure should be applied in a reverse triangular distribution at the back side of the wall.

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 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 reduce surface drainage into the wall drain system. The aggregate should conform to Class 2 permeable materials graded in accordance with CalTrans Standard Specifications (2018). 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 four inches. Collector pipes may be either slotted or perforated. Slots should be no wider than ⅛ inch, 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 CalTrans Standard Specifications for "edge drains") should be affixed to the rear wall opening of each weep hole to retard soil piping.

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.

R-Value Test Results and Pavement Design

Six bulk 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. Results of the tests are as follows:

Sample	Depth	Description	R-Value at Equilibrium
1	12-24"	Clayey Sand (SC)	40
2	12-24"	Silty Sand (SM) w/ clay	57
3	12-24"	Clayey Sand (SC)	44
4	12-24"	Silty Sand (SM) w/ clay	52
5	12-24"	Silty Sand (SM) w/ clay	56
6	12-24"	Clayey Sand (SC)	48

The test results indicate moderate subgrade support characteristics under dynamic traffic loads. The following table shows the recommended pavement sections for various traffic indices. Following grading operations, supplemental R-value testing should be performed to verify the pavement design sections.

Traffic Index	Asphaltic Concrete	Class II Aggregate Base*	Compacted Subgrade**
4.0	2.0"	4.0"	12.0"
4.5	2.5"	4.0"	12.0"
5.0	2.5"	5.0"	12.0"
5.5	3.0"	5.0"	12.0"
6.0	3.0"	6.0"	12.0"
6.5	3.5"	6.0"	12.0"
7.0	4.0"	7.0"	12.0"
7.5	4.0"	8.0"	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*

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 at or 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 as necessary and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Seismic Parameters – 2022 California Building Code

The Site Class per Section 1613 of the 2022 California Building Code (2022 CBC) and ASCE 7-16, Chapter 20 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. A site modified peak ground acceleration (PGA_M) of 0.477 may be used for seismic analysis. If the project is being designed based on the 2022 CBC and the exception to Item 1 from Section 11.4.8 given in Supplement 3 of ASCE 7-16 is utilized, the value of S_{M1} (and the resulting values of S_{D1} and T_S) should be increased by 50 percent.

Seismic Item	Value	CBC Reference
Site Class	D	Section 1613.2.2
Site Coefficient F_a	1.200	Table 1613.2.3 (1)
S_s	0.916	Section 1613.2.1
S_{MS}	1.100	Section 1613.2.3
S_{DS}	0.733	Section 1613.2.4
Site Coefficient F_v	1.972	Table 1613.2.3 (2)
S_1	0.328	Section 1613.2.1
S_{M1}	0.647	Section 1613.2.3
S_{D1}	0.431	Section 1613.2.4
T_S	0.588	Section 1613.2

* Based on Equivalent Lateral Force (ELF) Design Procedure being used.

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 from these soil samples were less than 150 ppm (30.5 ppm and 73.5 ppm) and are below the maximum allowable values established by HUD/FHA and CBC. However, it is recommended that a Type II cement be used within the concrete to compensate for sulfate reactivity with the cement.

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 (661) 837-9200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

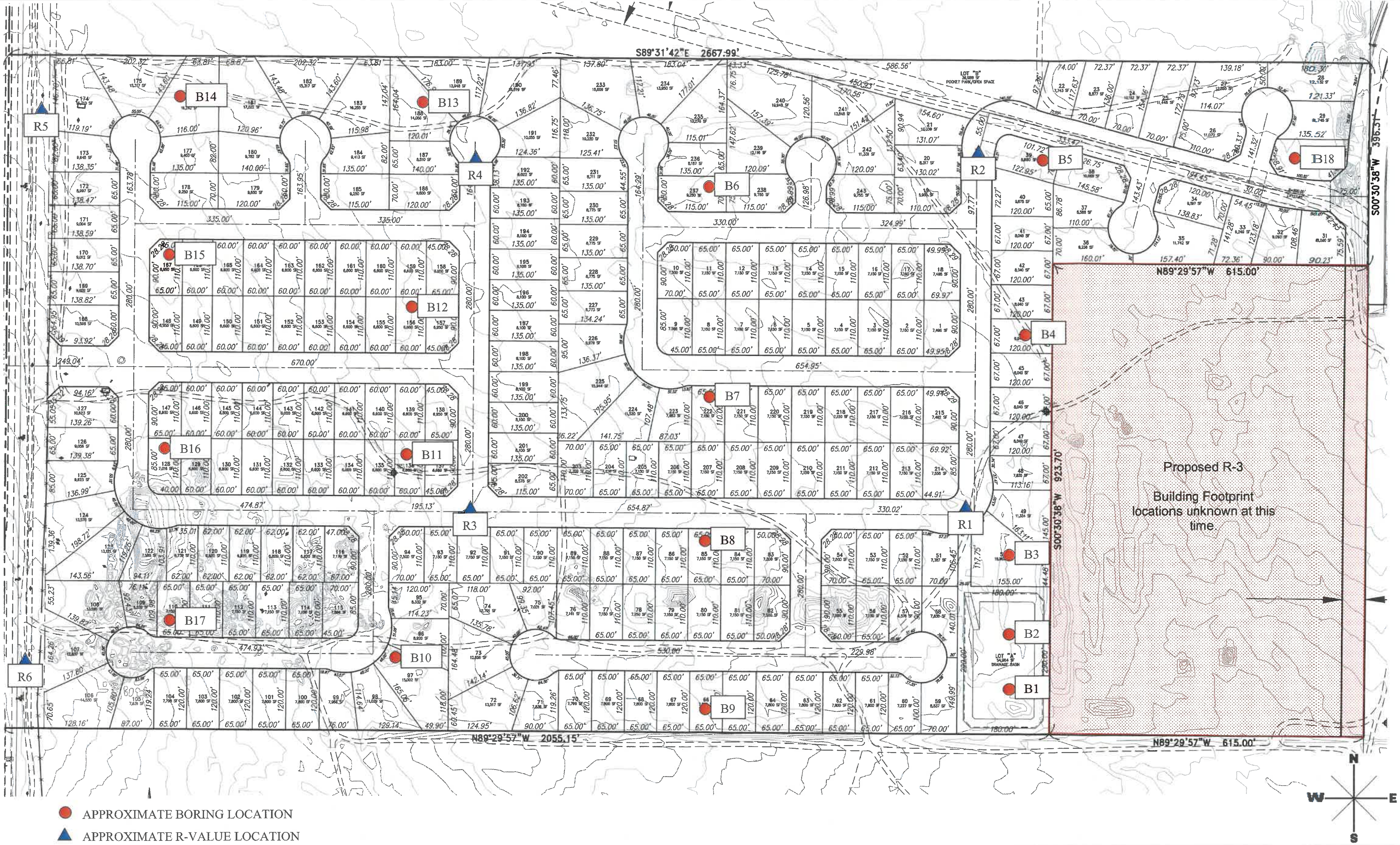
RYAN K. PRIVETT
NO. 59372
CIVIL

Ryan K. Privett, PE
Project Engineer
RCE No. 59372

DAVID R. JAROSZ II
2698
GEOTECHNICAL

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

RKP/DRJ:ht



● APPROXIMATE BORING LOCATION

▲ APPROXIMATE R-VALUE LOCATION

SITE MAP

Morning Drive Preliminary Lot Study – R1
Morning Drive
Bakersfield, California

Scale: NTS	**Date:** July 2025
Drawn by: HT	**Approved by:** DJ
Project No. 022-25028	**Figure No.** 1

Krazan
GEOTECHNICAL ENGINEERING

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploratory program. Eighteen 6-inch diameter exploratory borings were advanced. The boring locations are shown on the 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 were performed at selected depths. This test represents the resistance to driving a 2½-inch diameter core barrel sampler. 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. 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.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)		
	▨	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
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)		
	▨	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

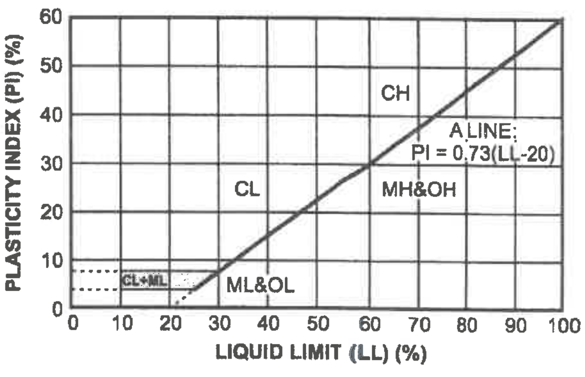
CONSISTENCY CLASSIFICATION

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	3 to 12 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 0.42
Fine-grained	No. 40 to No. 200	0.42 to 0.074
Silt and Clay	Below No. 200	Below 0.074

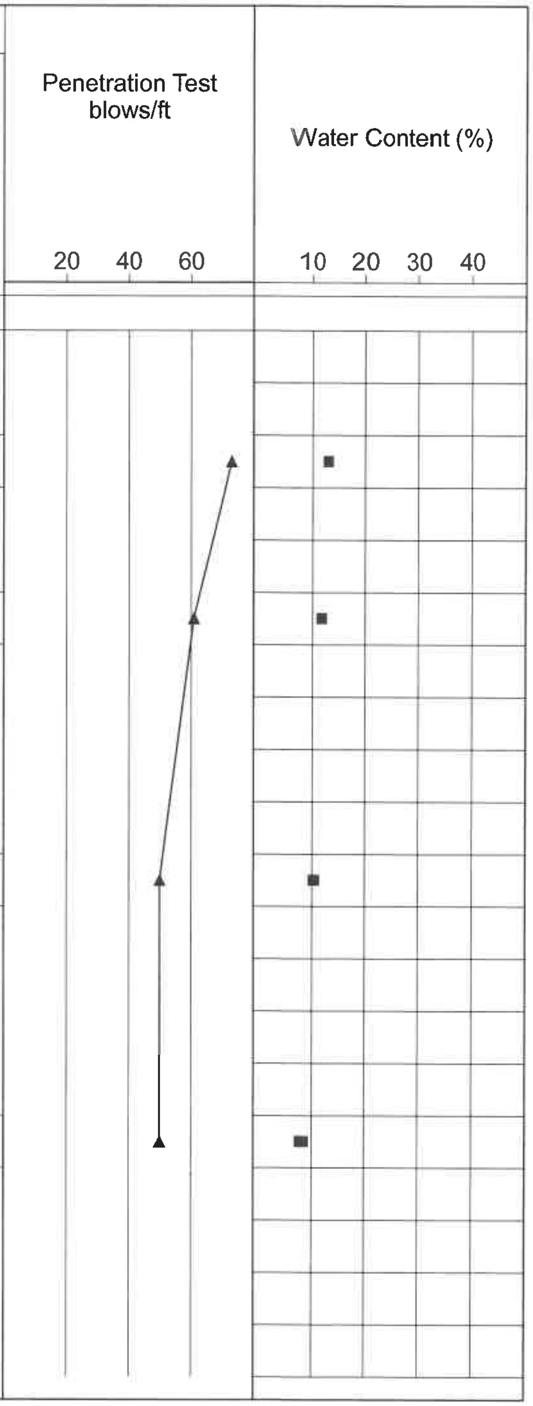
PLASTICITY CHART



Log of Boring B1

Project: Preliminary Lot Study - R1
Project No: 022-25028
Client: Dewalt Corporation
Figure No.: A-1
Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford
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	▨	***CLAYEY SAND (SC)*** FILL, fine- to coarse-grained; brown, moist, drills hard				
			90.7	13.1	■	73
	▨	***CLAYEY SAND (SC)*** Dense, fine- to coarse-grained with GRAVEL; brown, moist, drills firmly				
			122.7	11.8	■	61
10	▨	***CLAYEY SAND/SANDY CLAY (SC/CL)*** Very dense/hard, fine- to coarse-grained; brown, moist, drills hard	91.2	10.4	■	50+
			124.2	8.5	■	50+
		Auger refusal at 19 feet				
20		End of Borehole				



Drill Method: Hollow Stem
Drill Date: 3-5-25
Drill Rig: Mobile B-80
Hole Size: 6 Inches
Driller: David Lopez
Elevation: 19 Feet

Krazan and Associates

Sheet: 1 of 1

Log of Boring B2

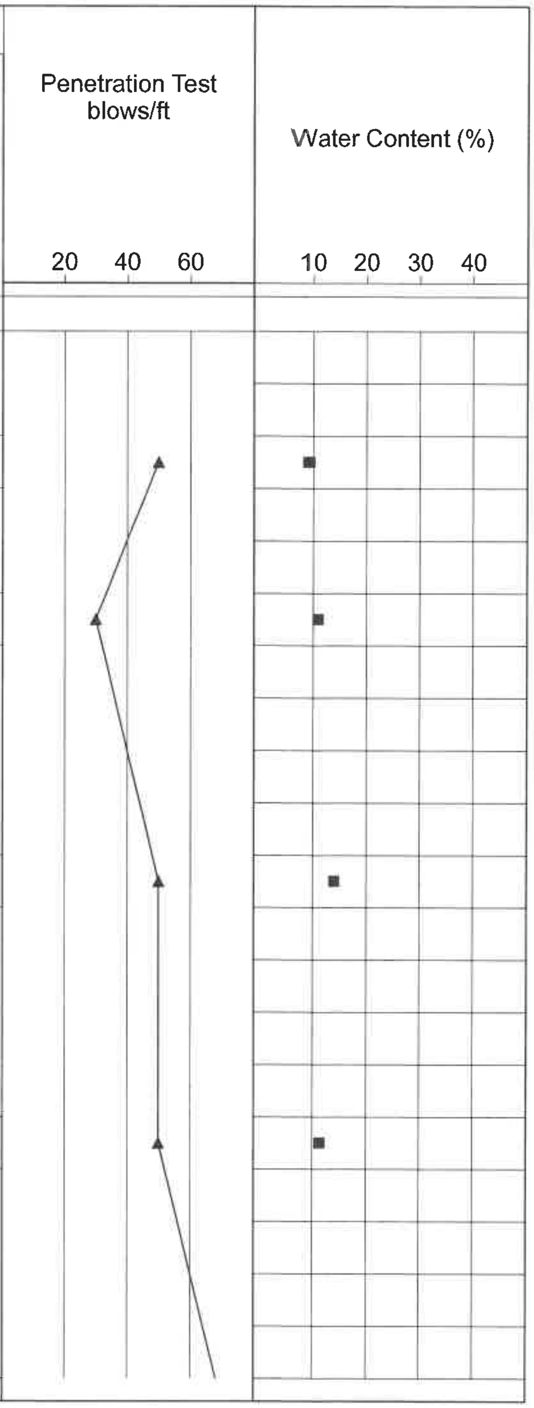
Project: Preliminary Lot Study - R1
Project No: 022-25028

Client: Dewalt Corporation
Figure No.: A-2

Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford

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		***CLAYEY SAND (SC)*** FILL, fine- to coarse-grained; brown, moist, drills hard				
2						
			98.8	9.4	■	50+
		CLAYEY SAND (SC) Medium dense, fine- to coarse-grained; brown, moist, drills easily				
4						
			109.2	11.0	■	30
6						
8						
10		Very dense below 10 feet				
			102.2	14.0	■	50+
12						
14						
			117.2	11.4	■	50+
16						
18						
20					■	



Drill Method: Hollow Stem
Drill Date: 3-5-25

Drill Rig: Mobile B-80
Hole Size: 6 Inches

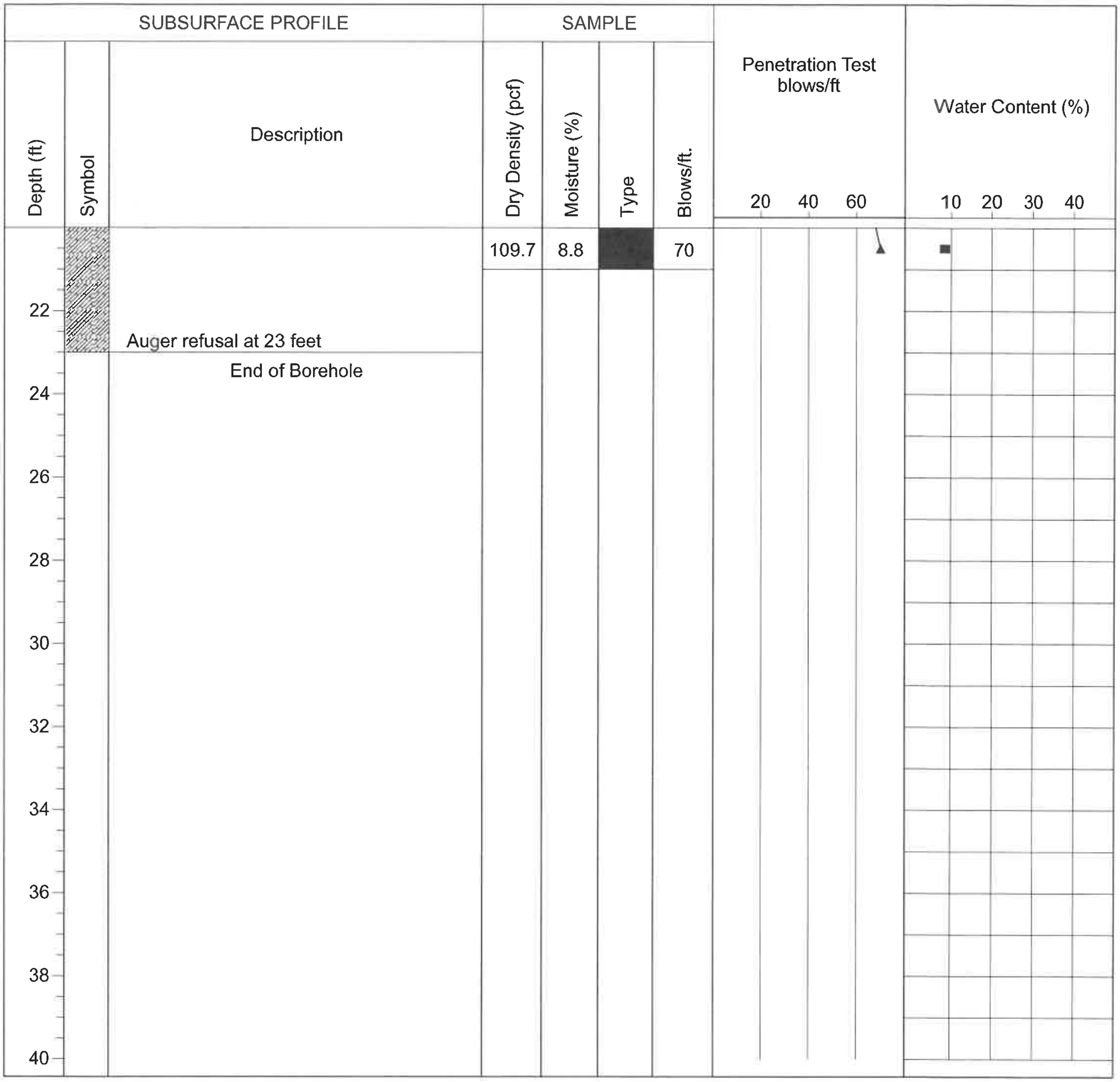
Krazan and Associates

Driller: David Lopez
Elevation: 23 Feet

Sheet: 1 of 2

Log of Boring B2

Project: Preliminary Lot Study - R1
Project No: 022-25028
Client: Dewalt Corporation
Figure No.: A-2
Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford
Depth to Water> **Initial:** None **At Completion:** None



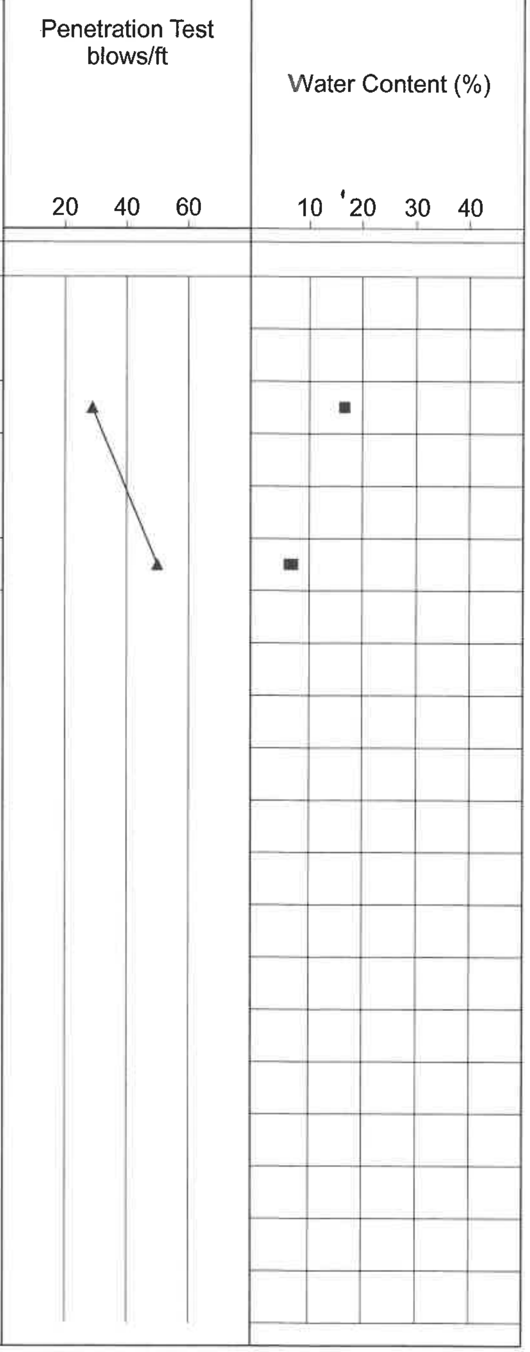
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
	▨		109.7	8.8	■	70
22	▨	Auger refusal at 23 feet				
		End of Borehole				

Drill Method: Hollow Stem
Drill Date: 3-5-25
Drill Rig: Mobile B-80
Krazan and Associates
Hole Size: 6 Inches
Driller: David Lopez
Elevation: 23 Feet
Sheet: 2 of 2

Log of Boring B3

Project: Preliminary Lot Study - R1
Project No: 022-25028
Client: Dewalt Corporation
Figure No.: A-3
Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford
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	▨	***CLAYEY SAND (SC)*** FILL, fine- to coarse-grained; brown, moist, drills easily				
2	▨	***CLAYEY SAND/SANDY CLAY (SC/CL)*** Medium dense/very stiff, fine- to coarse-grained; brown, moist, drills easiiy	91.9	16.8	■	29
4						
6	▨	***CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, moist, drills hard	108.2	7.2	■	50+
8						
10		End of Borehole				
12						
14						
16						
18						
20						



Drill Method: Hollow Stem
Drill Date: 3-5-25
Drill Rig: Mobile B-80
Hole Size: 6 Inches
Driller: David Lopez
Elevation: 10 Feet

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Sheet: 1 of 1

Log of Boring B4

Project: Preliminary Lot Study - R1

Project No: 022-25028

Client: Dewalt Corporation

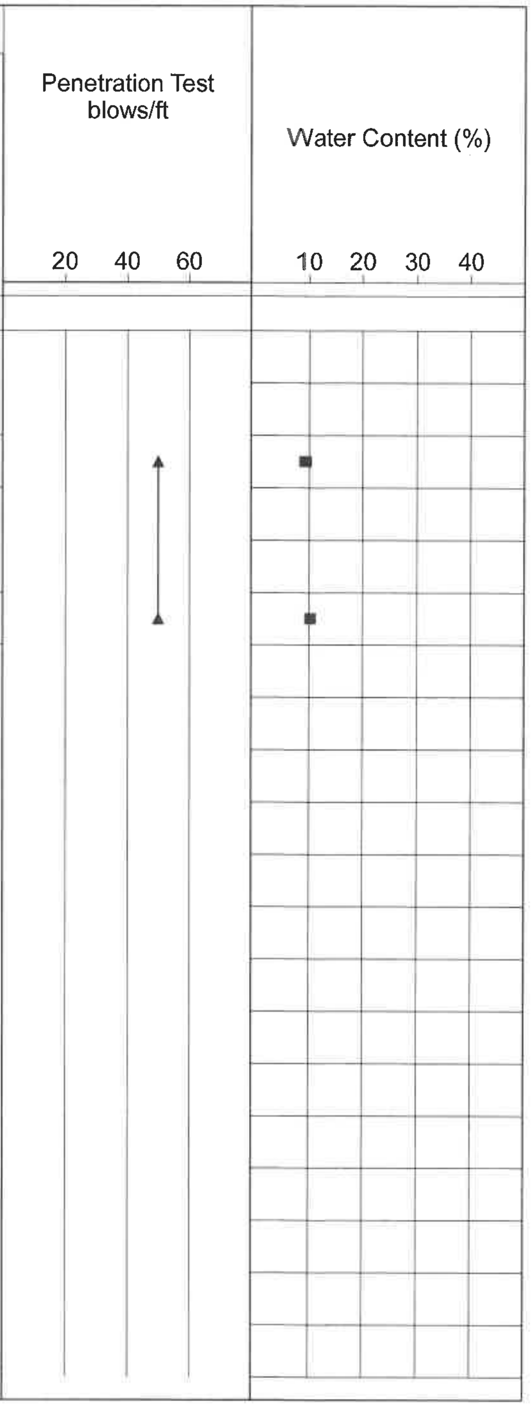
Figure No.: A-4

Location: Morning Drive, Bakersfield, California

Logged By: Kaleb Ledford

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				
	▨	***SANDY CLAY (CL)*** Firm, fine- to coarse-grained; brown, moist, drills easily Hard and drills hard below 12 inches				
2			92.4	9.5	■	50+
	▨	***CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, moist, drills hard With COBBLE below 7 feet Auger refusal at 8 feet	84.4	10.3	■	50+
8		End of Borehole				



Drill Method: Hollow Stem

Drill Date: 3-5-25

Drill Rig: Mobile B-80

Krazan and Associates

Hole Size: 6 Inches

Driller: David Lopez

Elevation: 8 Feet

Sheet: 1 of 1

Log of Boring B5

Project: Preliminary Lot Study - R1

Project No: 022-25028

Client: Dewalt Corporation

Figure No.: A-5

Location: Morning Drive, Bakersfield, California

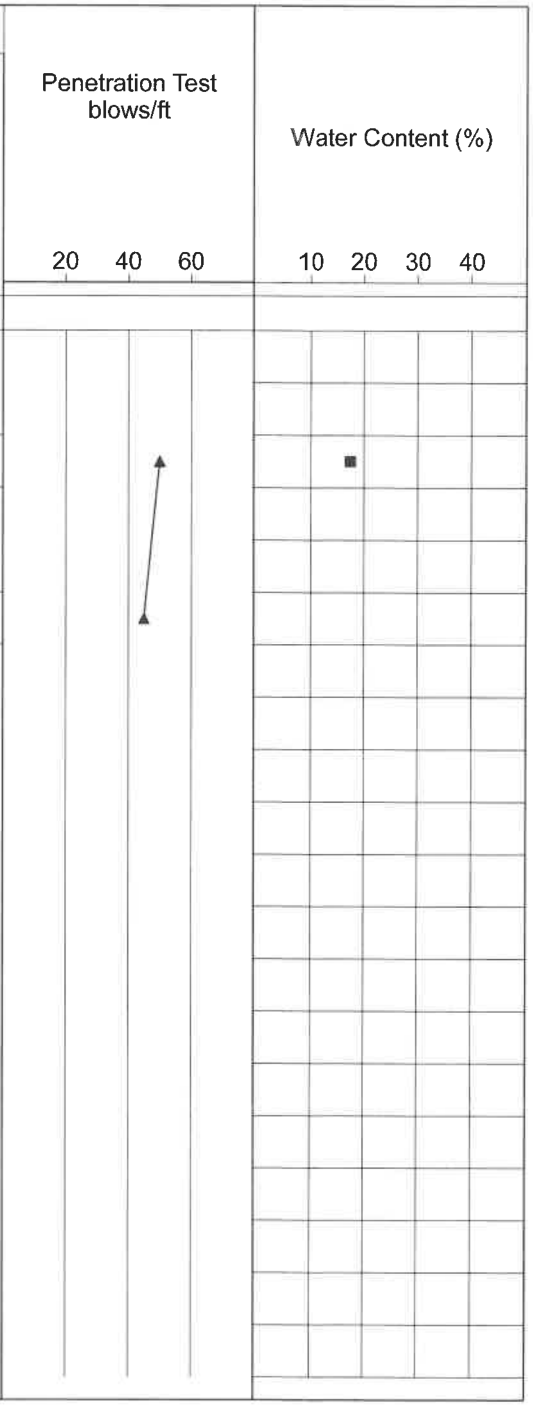
Logged By: Kaleb Ledford

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				
0–10	▨	***SANDY CLAY (CL)*** Firm, fine- to coarse-grained; brown, moist, drills easily Hard and drills hard below 12 inches				
2			86.8	17.6	■	50+
5					■	45
10		End of Borehole				
20						



Drill Method: Hollow Stem

Drill Date: 3-5-25

Drill Rig: Mobile B-80

Krazan and Associates

Hole Size: 6 Inches

Driller: David Lopez

Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B6

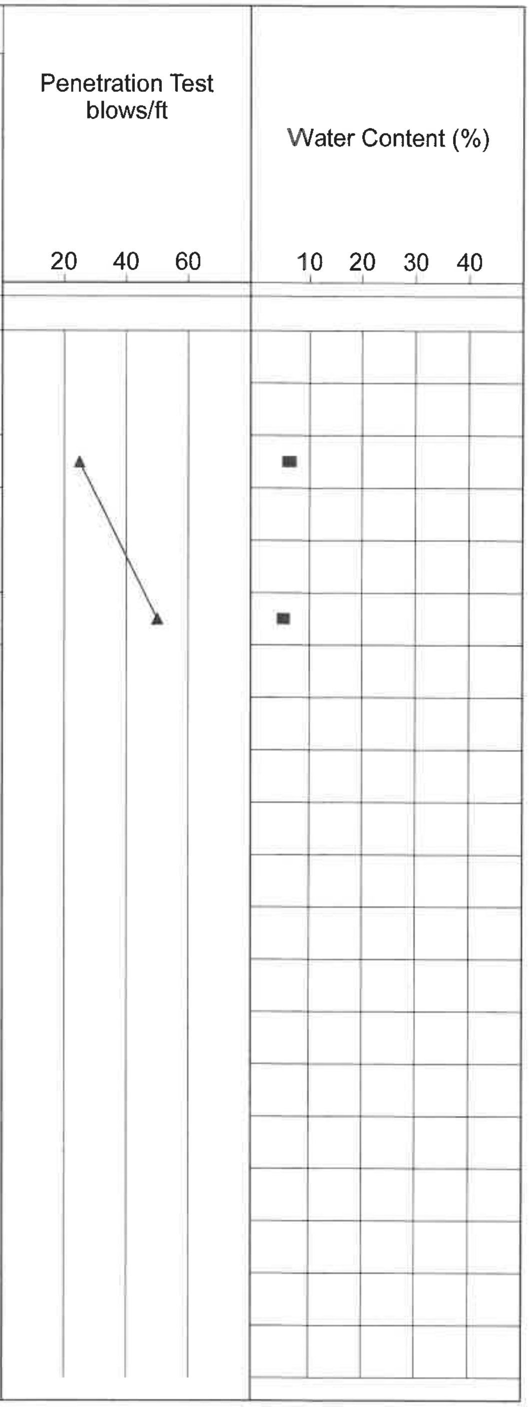
Project: Preliminary Lot Study - R1
Project No: 022-25028

Client: Dewalt Corporation
Figure No.: A-6

Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford

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	▨	***CLAYEY SAND (SC)*** Loose, fine- to coarse-grained; brown, moist, drills easily Medium dense below 12 inches				
2	▨		97.4	6.9	■	25
4	▨	Very dense below 5 feet Auger refusal at 6 feet	105.0	6.0	■	50+
6		End of Borehole				
8						
10						
12						
14						
16						
18						
20						



Drill Method: Hollow Stem
Drill Date: 3-5-25

Drill Rig: Mobile B-80
Hole Size: 6 Inches

Krazan and Associates

Driller: David Lopez
Elevation: 6 Feet

Sheet: 1 of 1

Log of Boring B7

Project: Preliminary Lot Study - R1
Project No: 022-25028
Client: Dewalt Corporation
Figure No.: A-7
Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford
Depth to Water>
Initial: None
At Completion: None

SUBSURFACE PROFILE			SAMPLE					
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	Penetration Test blows/ft 20 40 60	Water Content (%) 10 20 30 40
		Ground Surface						
0	▨	***CLAYEY SAND (SC)*** Fine- to coarse-grained; brown, moist Auger refusal at 1½ feet						
2		End of Borehole						
4								
6								
8								
10								
12								
14								
16								
18								
20								

Drill Method: Hollow Stem
Drill Date: 3-5-25
Drill Rig: Mobile B-80
Krazan and Associates
Hole Size: 6 Inches
Driller: David Lopez
Elevation: 1½ Feet
Sheet: 1 of 1

Log of Boring B8

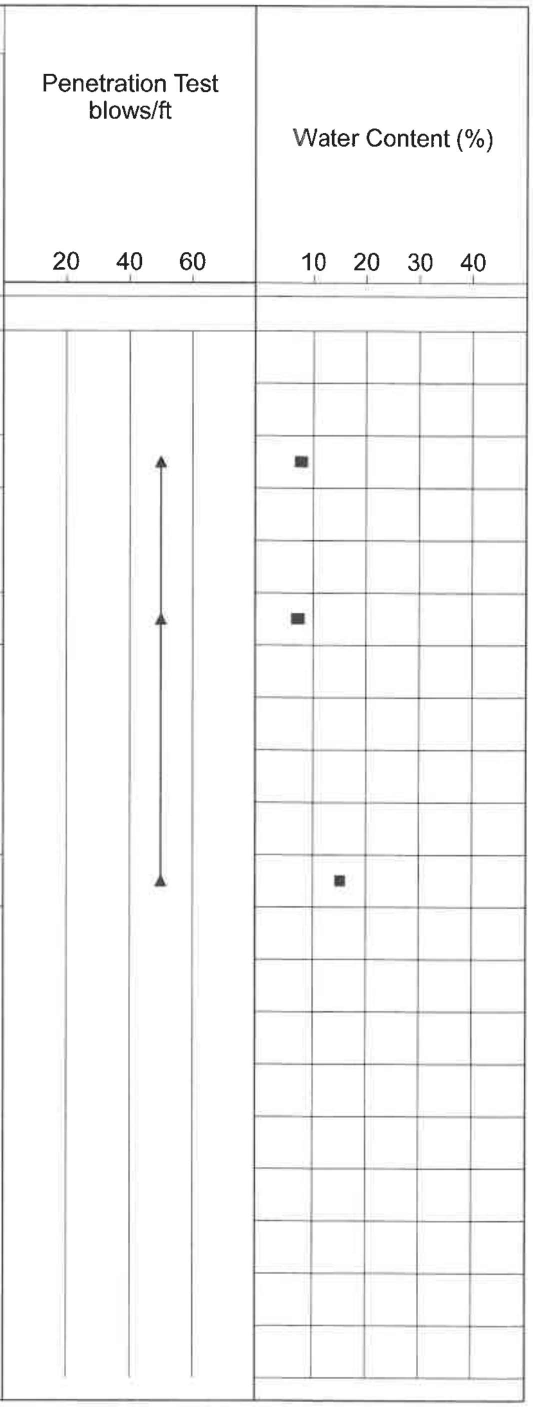
Project: Preliminary Lot Study - R1
Project No: 022-25028

Client: Dewalt Corporation
Figure No.: A-8

Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford

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		***CLAYEY SAND/SANDY CLAY (SC/CL)*** Loose, fine- to coarse-grained; brown, moist, drills easily Very dense/hard and drills hard below 12 inches				
2			104.3	8.0	■	50+
5			107.1	7.5	■	50+
10		***CLAYEY SAND (SC)*** Very dense, fine- to coarse-grained; brown, moist, drills hard	118.0	15.4	■	50+
15		End of Borehole				



Drill Method: Hollow Stem
Drill Date: 3-5-25

Drill Rig: Mobile B-80
Hole Size: 6 Inches

Krazan and Associates

Driller: David Lopez
Elevation: 15 Feet

Sheet: 1 of 1

Log of Boring B9

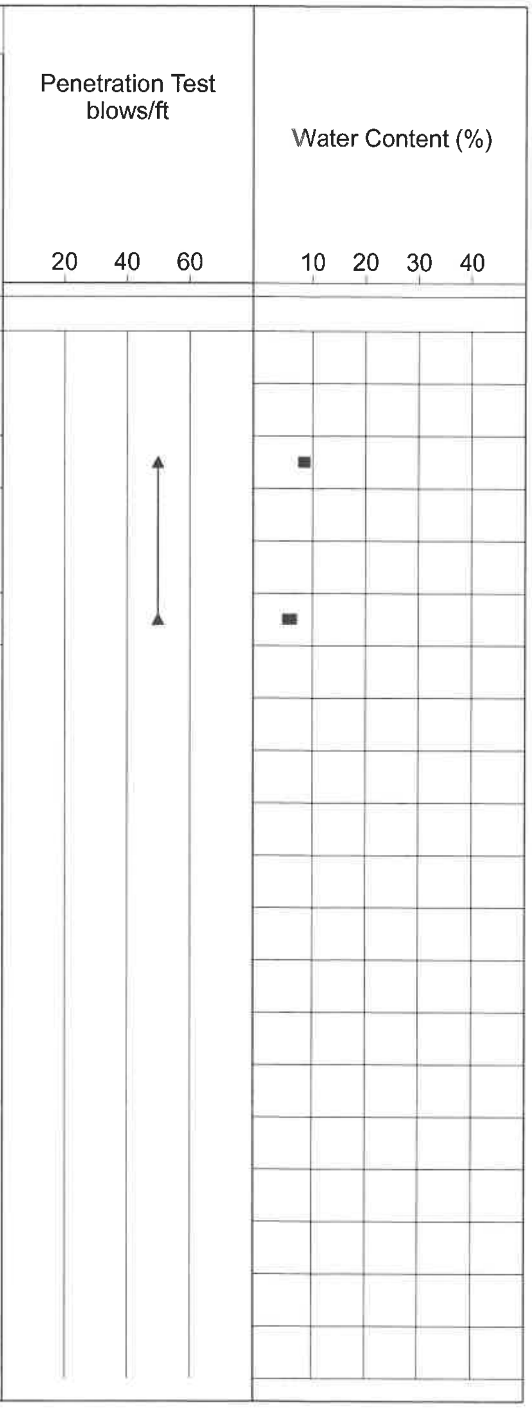
Project: Preliminary Lot Study - R1
Project No: 022-25028

Client: Dewalt Corporation
Figure No.: A-9

Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford

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	▨	***CLAYEY SAND (SC)*** Loose, fine-grained; brown, moist, drills easily Very dense below 12 inches				
	▨		93.1	8.6	■	50+
	▨		102.6	6.4	■	50+
10		End of Borehole				



Drill Method: Hollow Stem
Drill Date: 3-5-25

Drill Rig: Mobile B-80
Hole Size: 6 Inches

Krazan and Associates

Driller: David Lopez
Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B10

Project: Preliminary Lot Study - R1

Project No: 022-25028

Client: Dewalt Corporation

Figure No.: A-10

Location: Morning Drive, Bakersfield, California

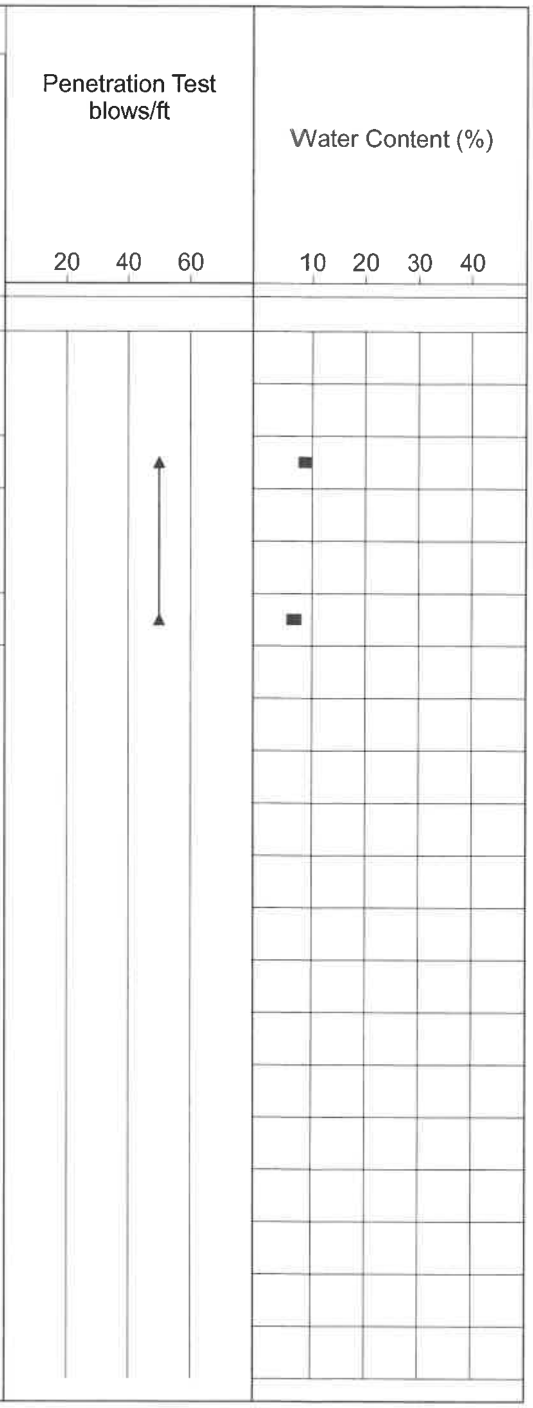
Logged By: Kaleb Ledford

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	▨	***SANDY CLAY (CL)*** Firm, fine- to coarse-grained; brown, moist, drills easily Hard and drills hard below 12 inches				
2	▨		98.9	8.9	■	50+
4	▨					
6	▨		120.8	7.3	■	50+
8	▨					
10		End of Borehole				
12						
14						
16						
18						
20						



Drill Method: Hollow Stem

Drill Date: 3-5-25

Drill Rig: Mobile B-80

Krazan and Associates

Hole Size: 6 Inches

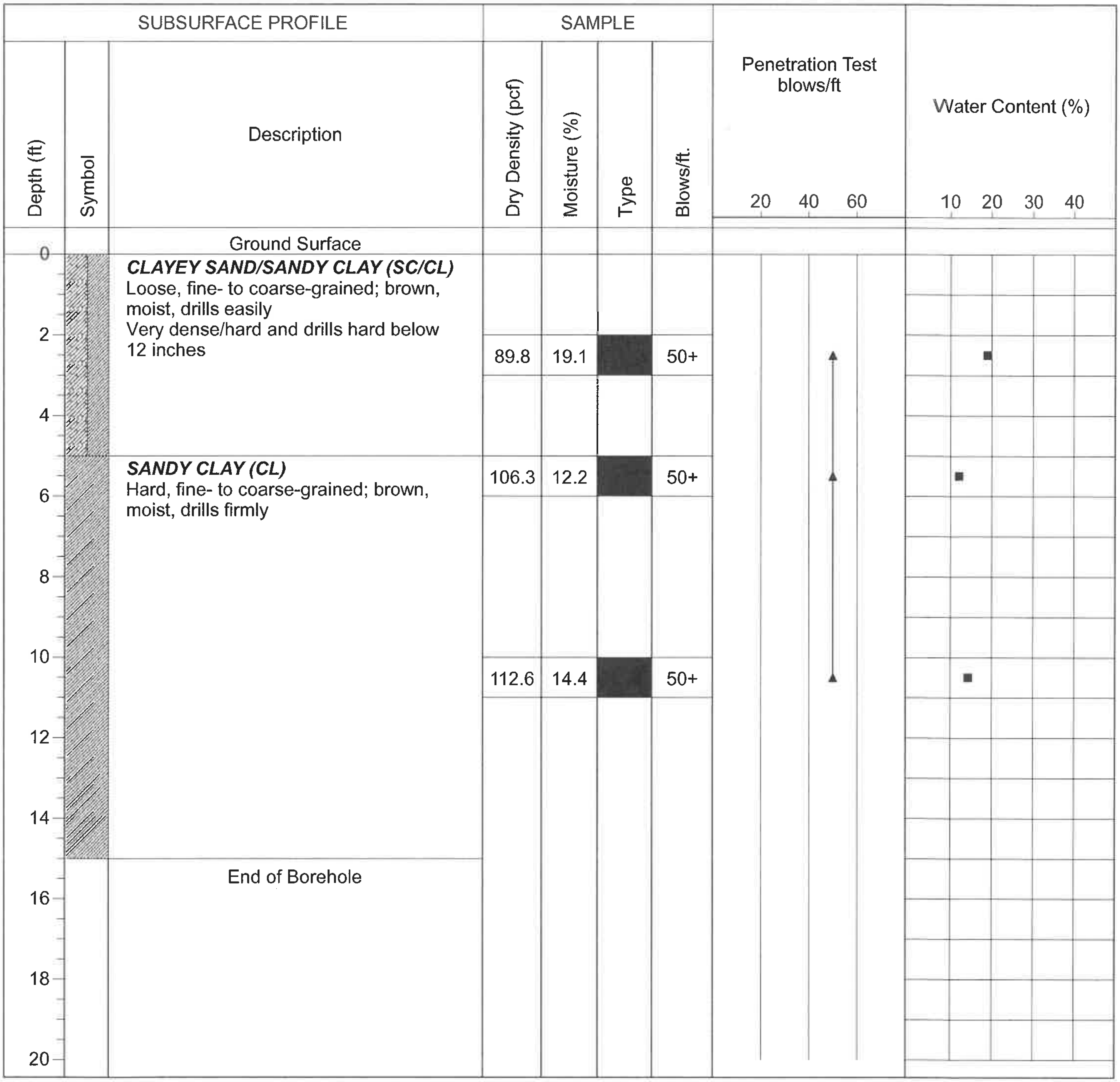
Driller: David Lopez

Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B11

Project: Preliminary Lot Study - R1
Project No: 022-25028
Client: Dewalt Corporation
Figure No.: A-11
Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford
Depth to Water> **Initial:** None **At Completion:** None



Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
Ground Surface				
CLAYEY SAND/SANDY CLAY (SC/CL) Loose, fine- to coarse-grained; brown, moist, drills easily Very dense/hard and drills hard below 12 inches	89.8	19.1	■	50+
SANDY CLAY (CL) Hard, fine- to coarse-grained; brown, moist, drills firmly	106.3	12.2	■	50+
	112.6	14.4	■	50+
End of Borehole				

Drill Method: Hollow Stem
Drill Date: 3-5-25
Drill Rig: Mobile B-80
Krazan and Associates
Hole Size: 6 Inches
Driller: David Lopez
Elevation: 15 Feet
Sheet: 1 of 1

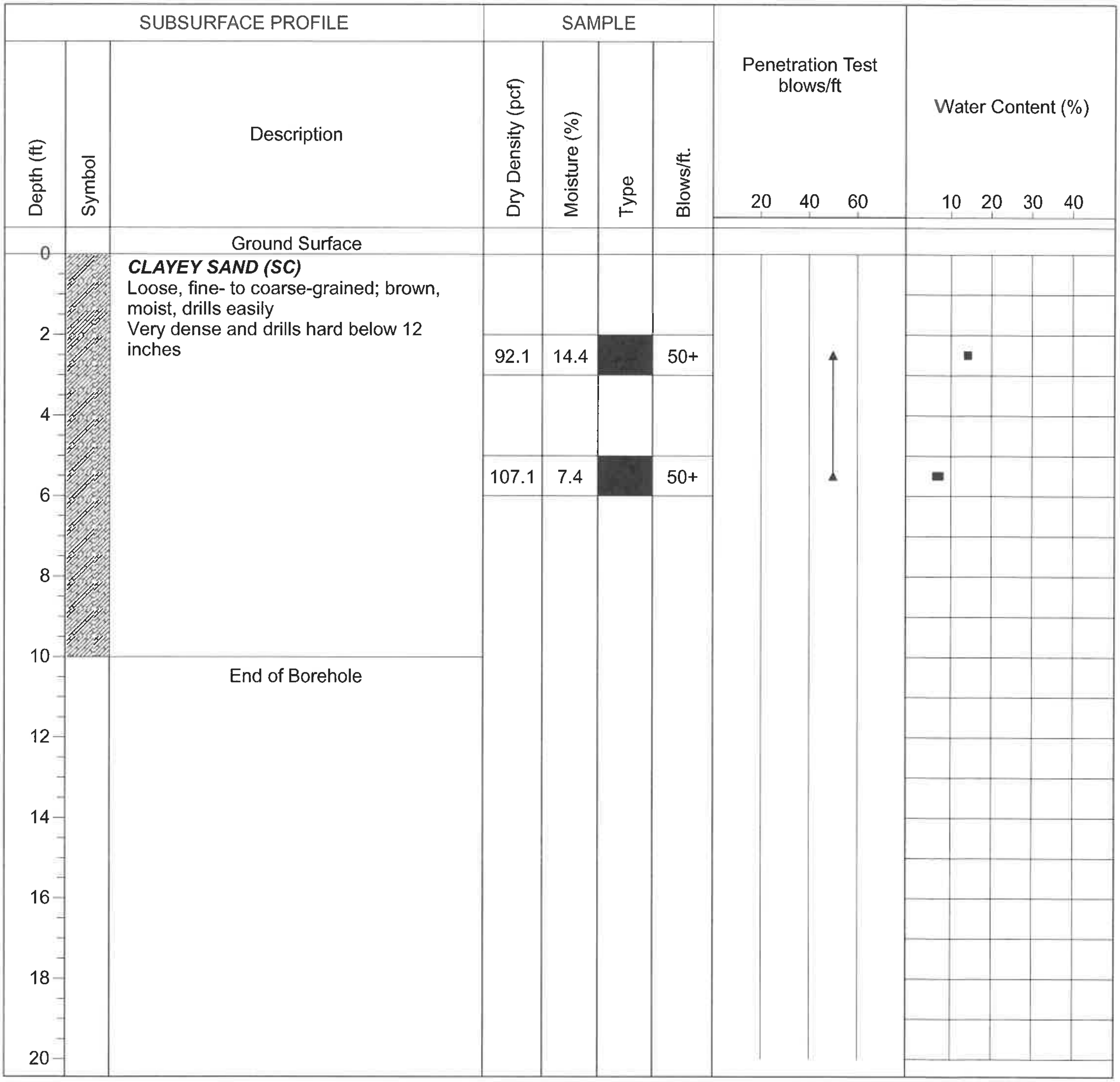
Log of Boring B12

Project: Preliminary Lot Study - R1
Project No: 022-25028

Client: Dewalt Corporation
Figure No.: A-12

Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford

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	▨	***CLAYEY SAND (SC)*** Loose, fine- to coarse-grained; brown, moist, drills easily Very dense and drills hard below 12 inches				
2			92.1	14.4	■	50+
6			107.1	7.4	■	50+
10		End of Borehole				

Drill Method: Hollow Stem
Drill Date: 3-5-25

Drill Rig: Mobile B-80
Krazan and Associates
Hole Size: 6 Inches

Driller: David Lopez
Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B13

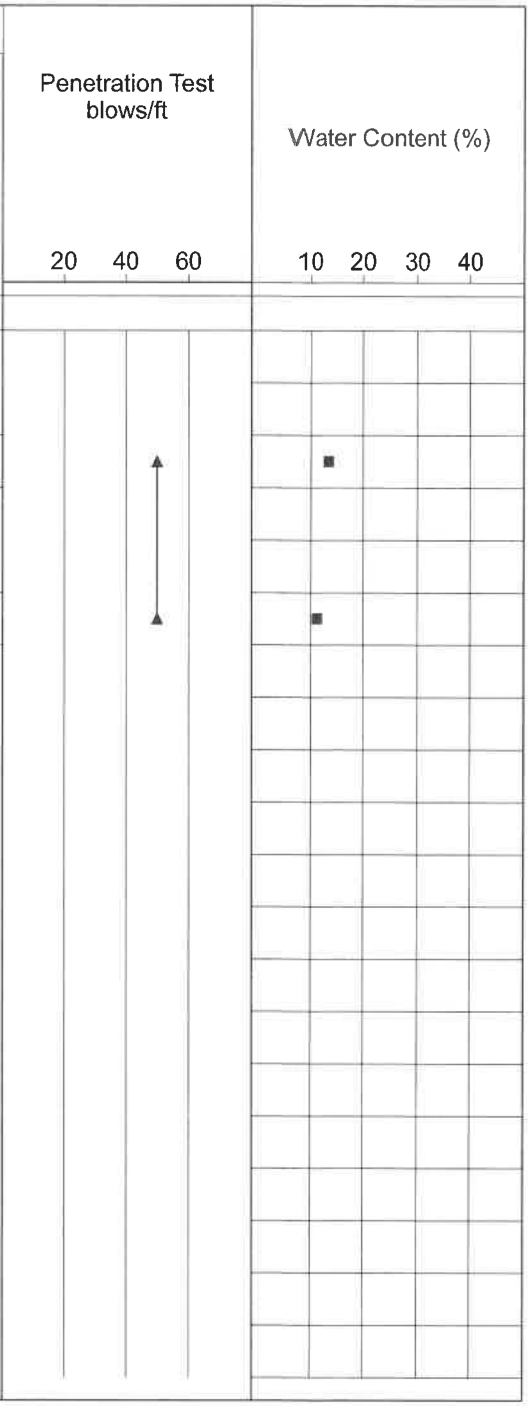
Project: Preliminary Lot Study - R1
Project No: 022-25028

Client: Dewalt Corporation
Figure No.: A-13

Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford

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	▨	***SANDY CLAY (CL)*** Firm, fine- to coarse-grained; brown, moist, drills easily Hard and drills hard below 12 inches				
2	▨		92.0	13.6	■	50+
4	▨					
6	▨		115.4	11.3	■	50+
8		Auger refusal at 8 feet End of Borehole				
10						
12						
14						
16						
18						
20						



Drill Method: Hollow Stem
Drill Date: 3-5-25

Drill Rig: Mobile B-80
Krazan and Associates
Hole Size: 6 Inches

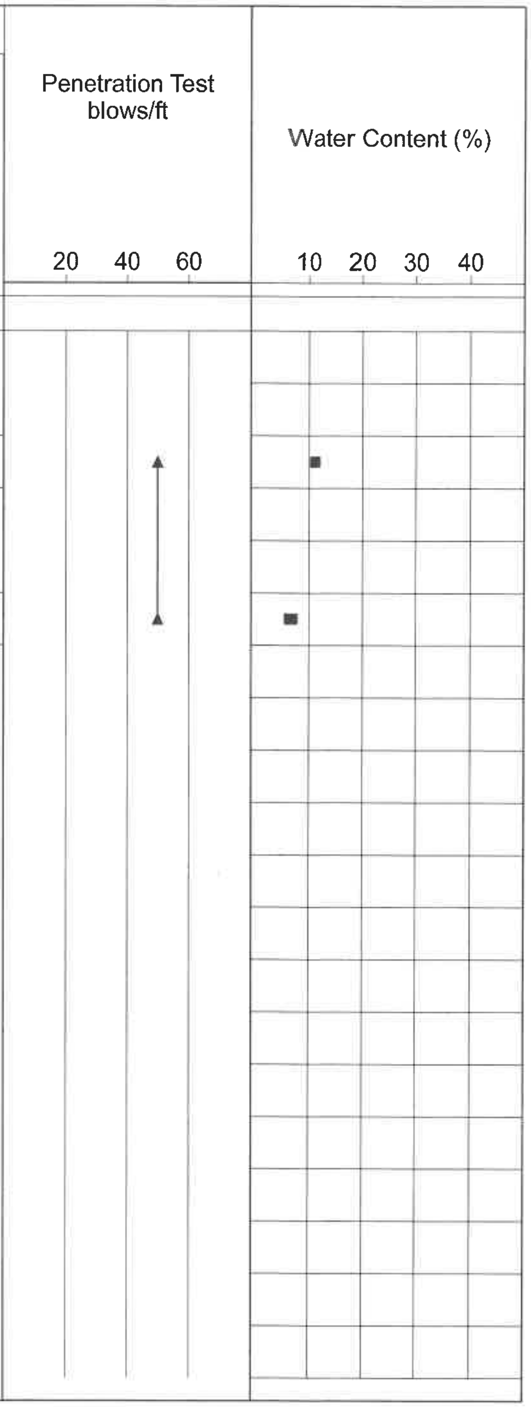
Driller: David Lopez
Elevation: 8 Feet

Sheet: 1 of 1

Log of Boring B14

Project: Preliminary Lot Study - R1
Project No: 022-25028
Client: Dewalt Corporation
Figure No.: A-14
Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford
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	▨	***SANDY CLAY (CL)*** Firm, fine- to coarse-grained; brown, moist, drills easily Hard and drills hard below 12 inches				
2	▨		102.9	11.3	■	50+
5	▨		105.0	7.1	■	50+
10		End of Borehole				
20						



Drill Method: Hollow Stem
Drill Date: 3-5-25
Drill Rig: Mobile B-80

Krazan and Associates

Hole Size: 6 Inches
Driller: David Lopez
Elevation: 10 Feet
Sheet: 1 of 1

Log of Boring B15

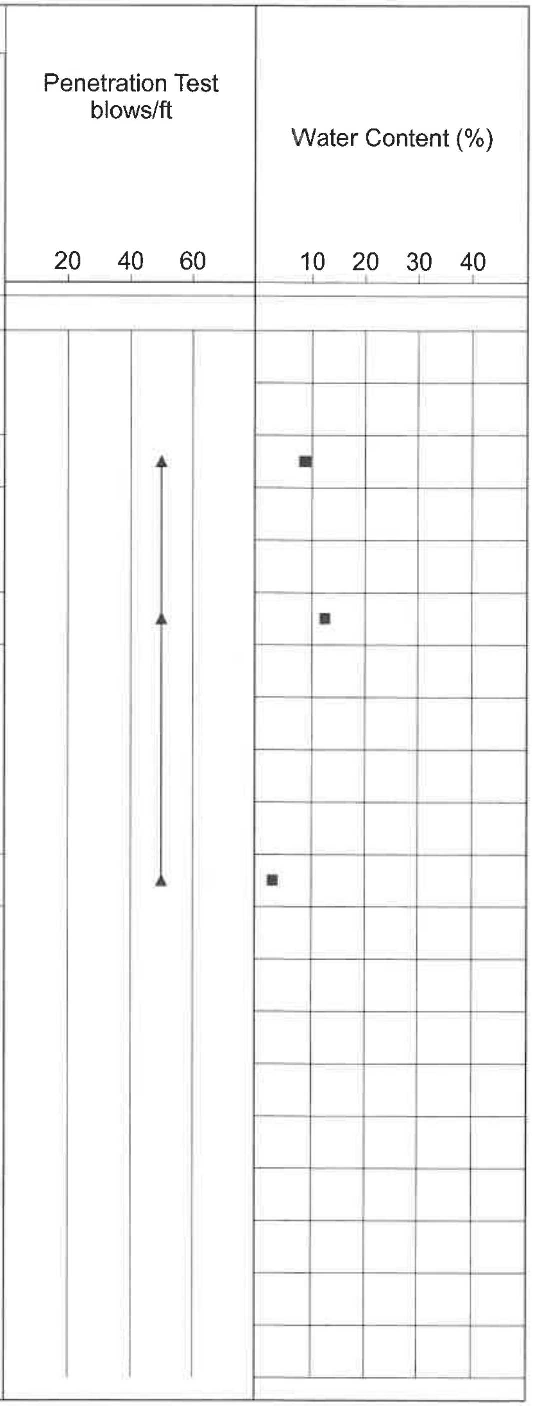
Project: Preliminary Lot Study - R1
Project No: 022-25028

Client: Dewalt Corporation
Figure No.: A-15

Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford

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	▨	***CLAYEY SAND (SC)*** Loose, fine- to coarse-grained; brown, moist, drills easily Very dense and drills hard below 12 inches				
			97.8	8.9	■	50+
			111.0	12.6	■	50+
			102.5	3.4	■	50+
		End of Borehole				



Drill Method: Hollow Stem
Drill Date: 3-6-25

Drill Rig: Mobile B-80
Hole Size: 6 Inches

Krazan and Associates

Driller: David Lopez
Elevation: 15 Feet

Sheet: 1 of 1

Log of Boring B16

Project: Preliminary Lot Study - R1

Project No: 022-25028

Client: Dewalt Corporation

Figure No.: A-16

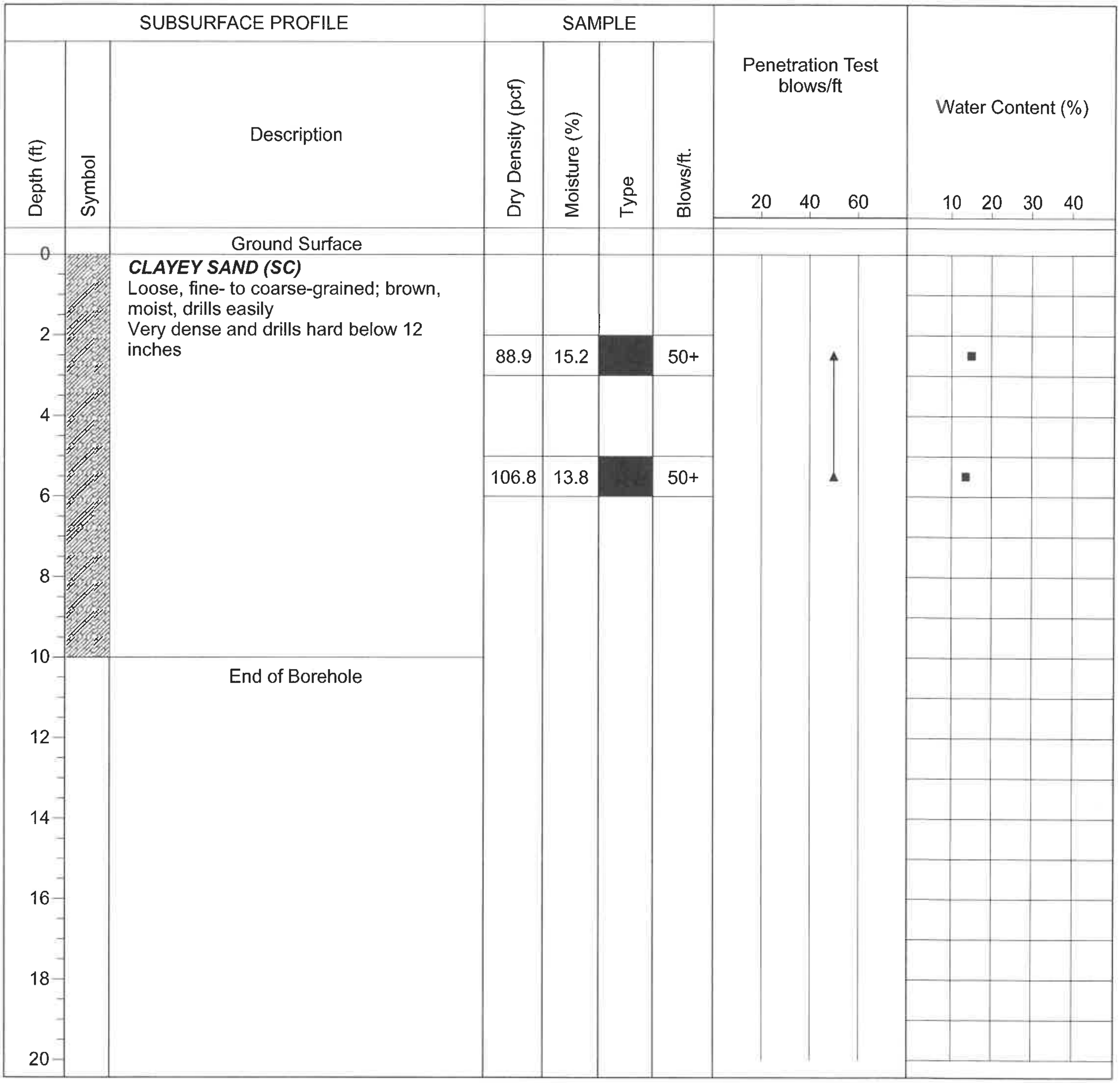
Location: Morning Drive, Bakersfield, California

Logged By: Kaleb Ledford

Depth to Water>

Initial: None

At Completion: None



Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
	▨	***CLAYEY SAND (SC)*** Loose, fine- to coarse-grained; brown, moist, drills easily Very dense and drills hard below 12 inches				
	▨		88.9	15.2	■	50+
	▨		106.8	13.8	■	50+
10		End of Borehole				

Drill Method: Hollow Stem

Drill Date: 3-6-25

Drill Rig: Mobile B-80

Krazan and Associates

Hole Size: 6 Inches

Driller: David Lopez

Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B17

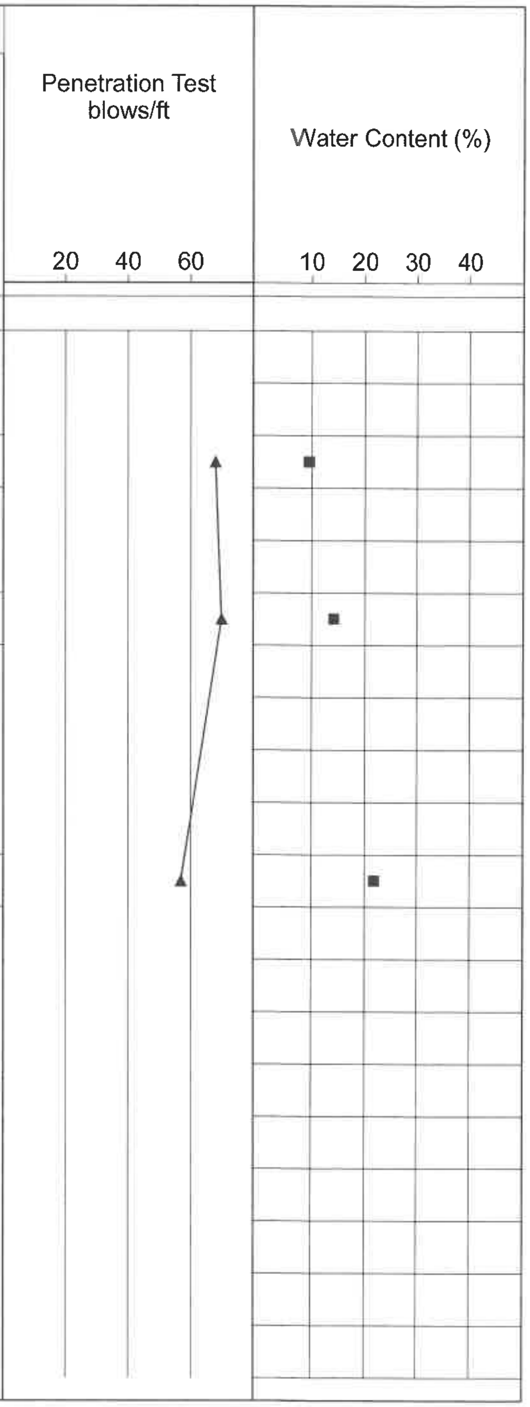
Project: Preliminary Lot Study - R1
Project No: 022-25028

Client: Dewalt Corporation
Figure No.: A-17

Location: Morning Drive, Bakersfield, California
Logged By: Kaleb Ledford

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				
	▨	***SANDY CLAY (CL)*** Firm, fine- to coarse-grained; brown, moist, drills easily Hard and drills hard below 12 inches				
	▨		103.1	9.6	■	68
	▨		100.9	14.4	■	70
10	▨	Drills firmly below 10 feet				
	▨		103.5	21.8	■	57
		End of Borehole				



Drill Method: Hollow Stem
Drill Date: 3-6-25

Drill Rig: Mobile B-80
Hole Size: 6 Inches

Krazan and Associates

Driller: David Lopez
Elevation: 15 Feet

Sheet: 1 of 1

Log of Boring B18

Project: Preliminary Lot Study - R1

Project No: 022-25028

Client: Dewalt Corporation

Figure No.: A-18

Location: Morning Drive, Bakersfield, California

Logged By: Kaleb Ledford

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.		
		Ground Surface						
0	▨	***CLAYEY SAND (SC)*** Loose, fine- to coarse-grained; brown, moist, drills easily Very dense and drills hard below 12 inches						
2	▨				■	50+	▲	
	▨	Auger refusal at 4 feet						
4		End of Borehole						
6								
8								
10								
12								
14								
16								
18								
20								

Drill Method: Hollow Stem

Drill Date: 3-6-25

Drill Rig: Mobile B-80

Krazan and Associates

Hole Size: 6 Inches

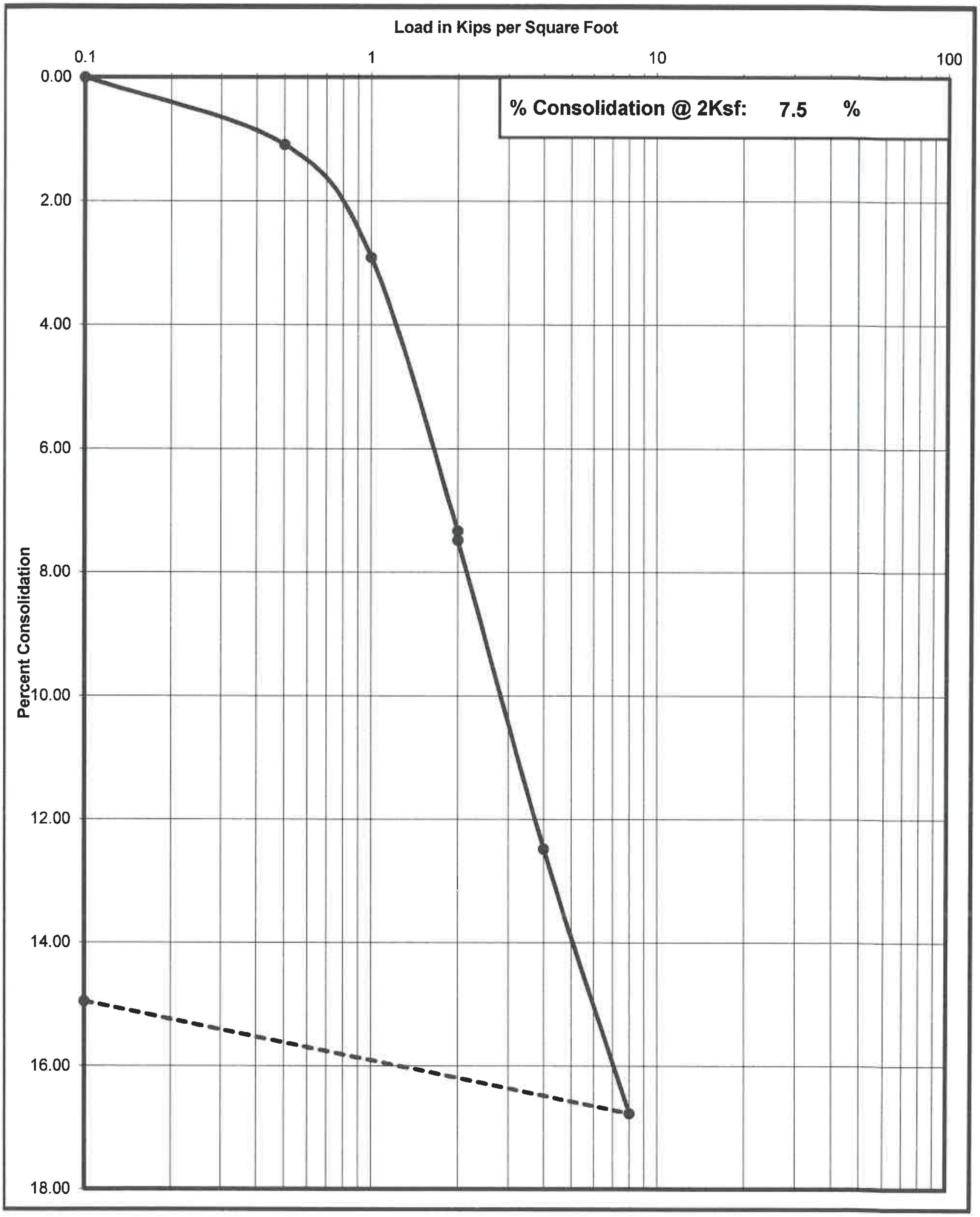
Driller: David Lopez

Elevation: 4 Feet

Sheet: 1 of 1

Consolidation Test

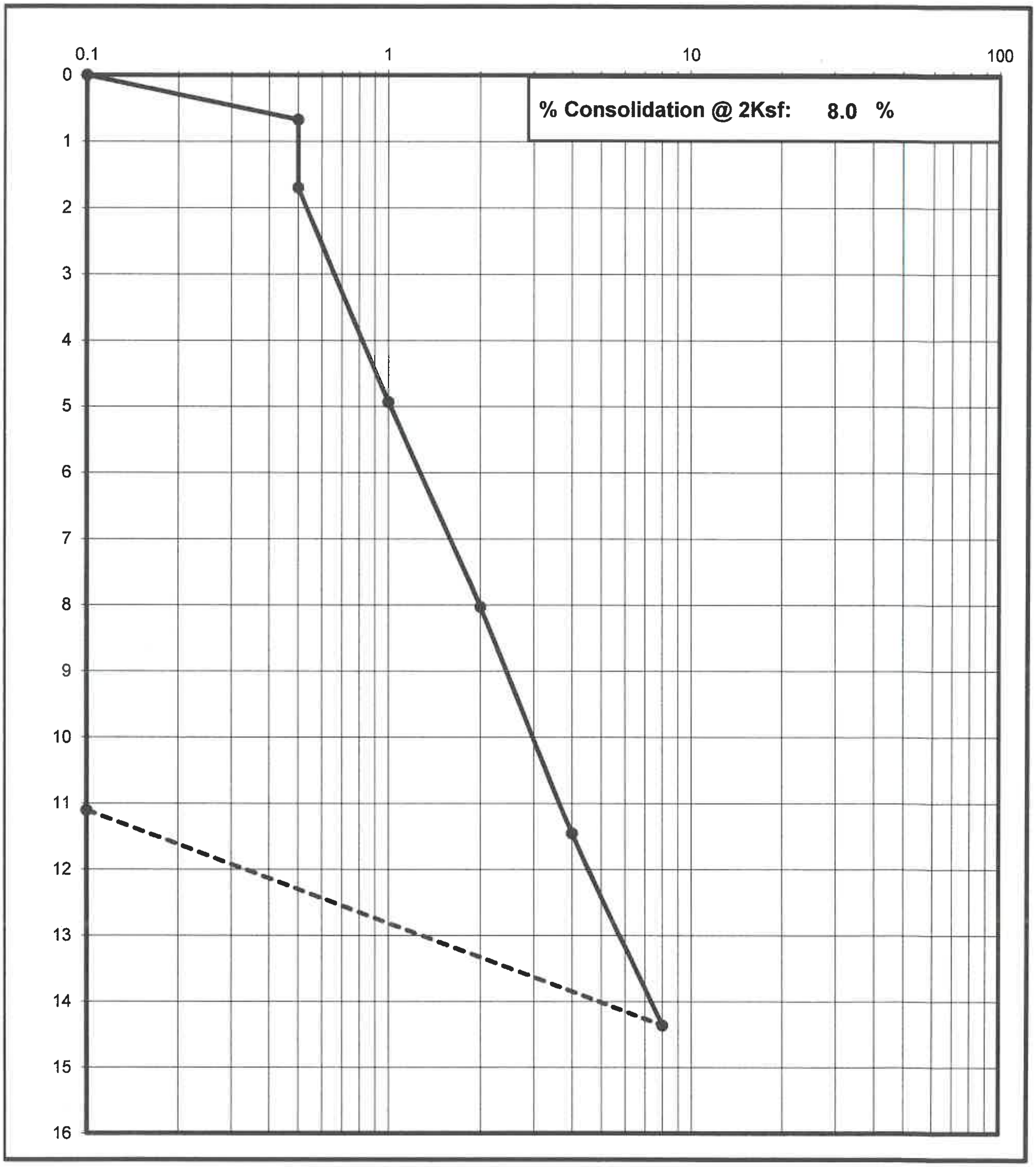
Project No	Boring No. & Depth	Date	Soil Classification
022-25028	B3 @ 2-3'	3/21/2025	SC/CL



Krazan Testing Laboratory

Consolidation Test

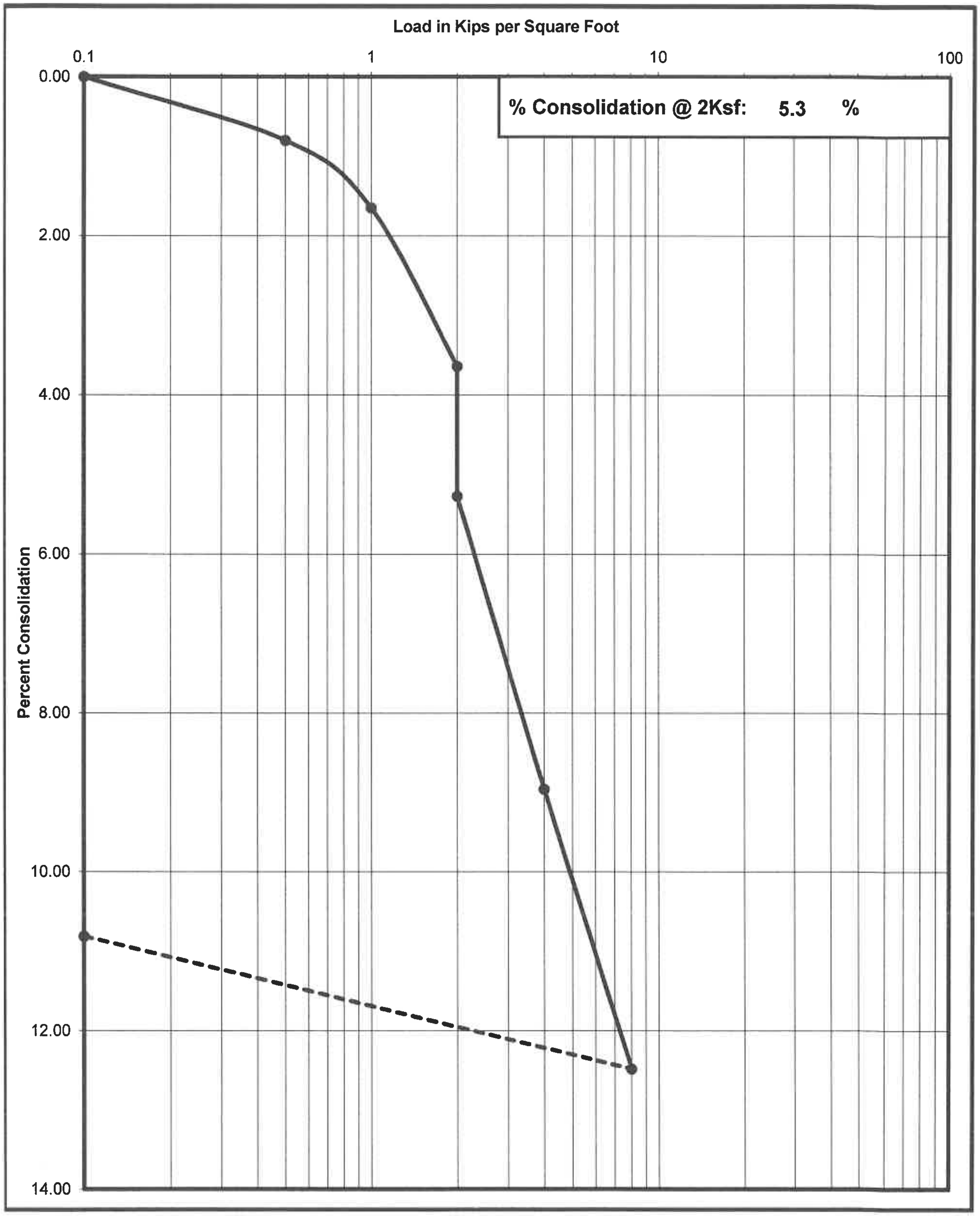
Project No	Boring No. & Depth	Date	Soil Classification
022-25028	B6 @ 2-3'	3/21/2025	SC



Krazan Testing Laboratory

Consolidation Test

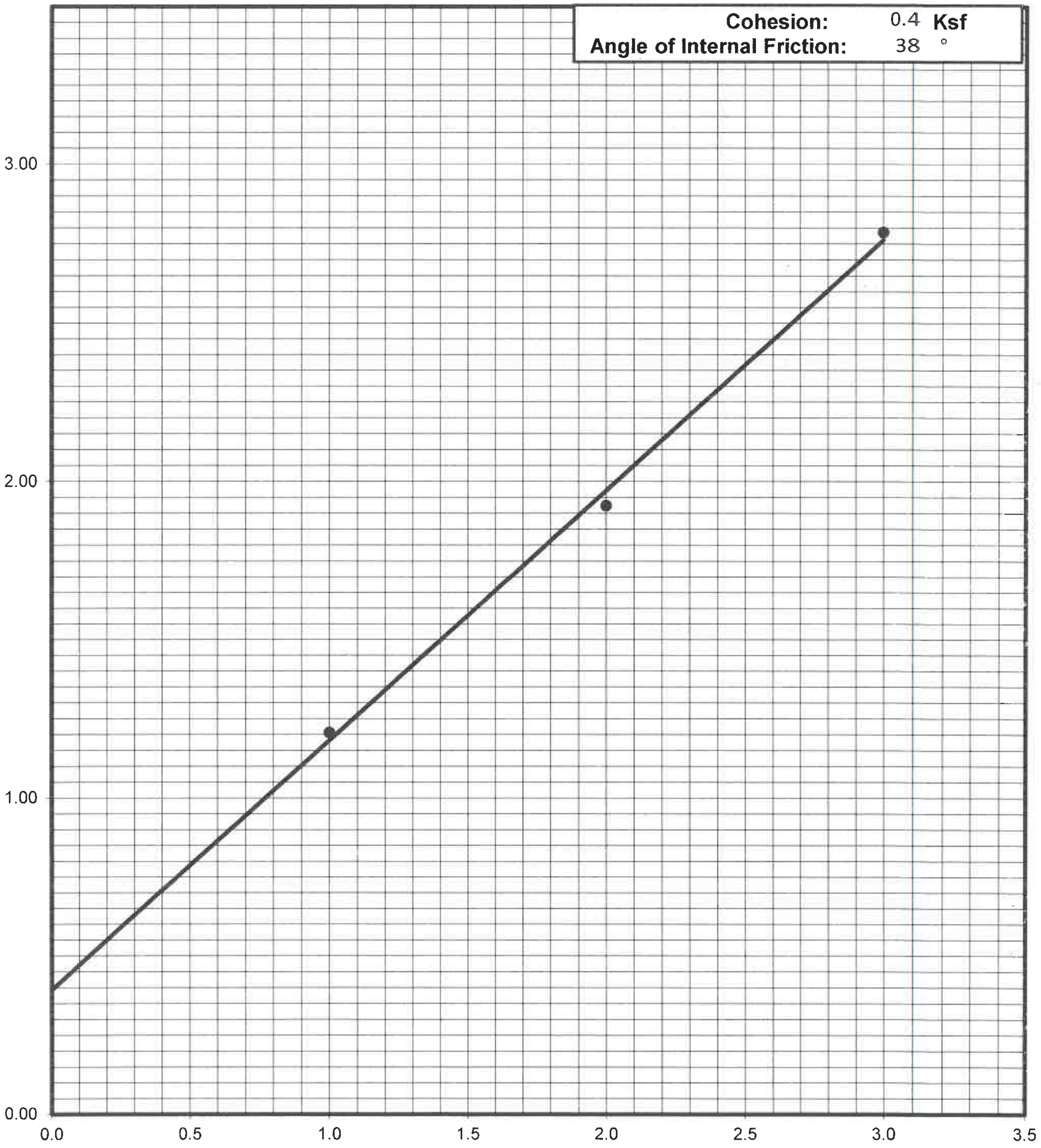
Project No	Boring No. & Depth	Date	Soil Classification
022-25028	B6 @ 5-6'	3/21/2025	SC



Krazan Testing Laboratory

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

Project Number	Boring No. & Depth	Soil Type	Date
022-25028	B1 @ 2-3'	SC	3/21/2025

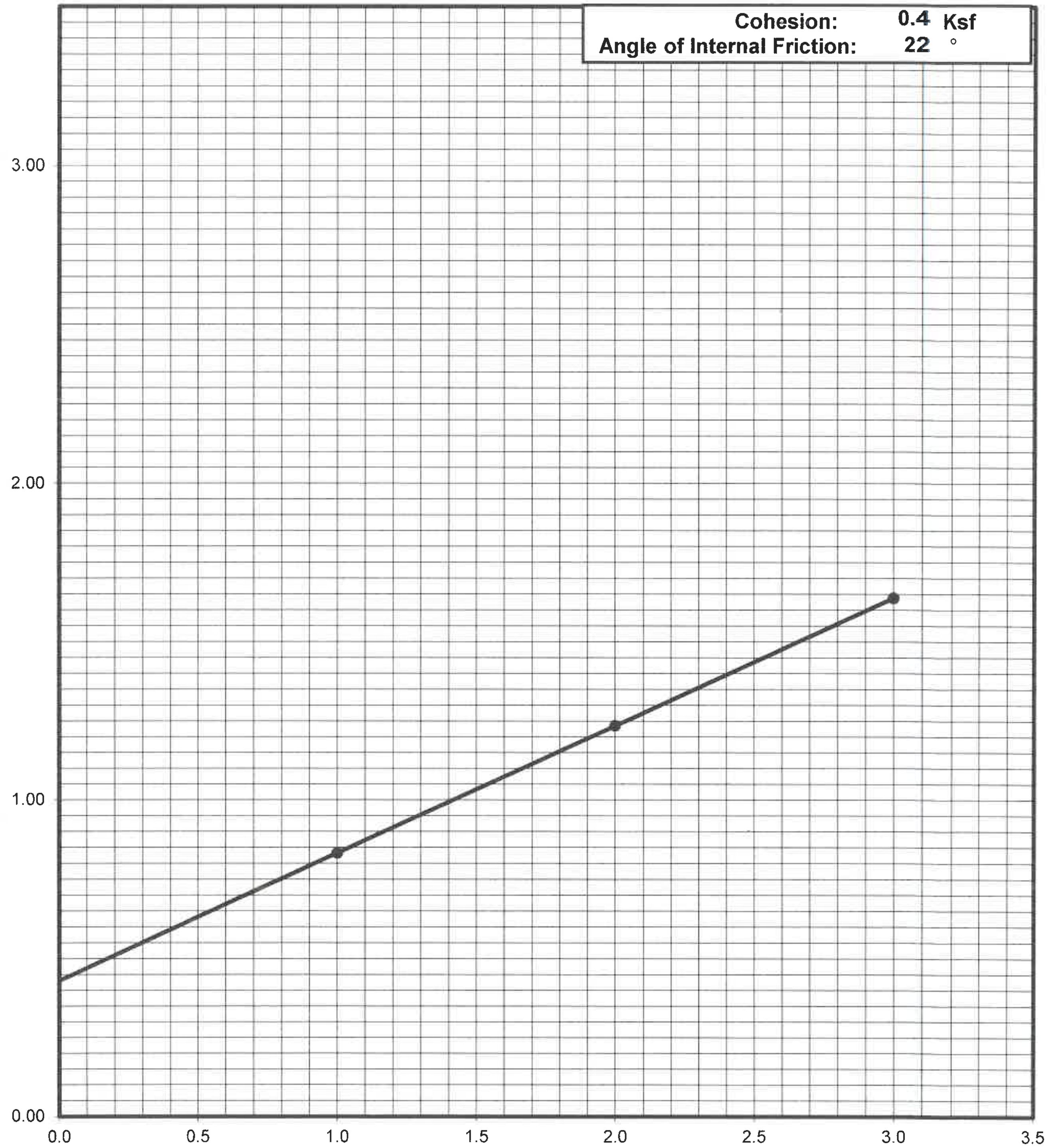


Krazan Testing Laboratory

Shear Strength Diagram (Direct Shear)

ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
022-25028	B17 @ 2-3'	CL	3/21/2025

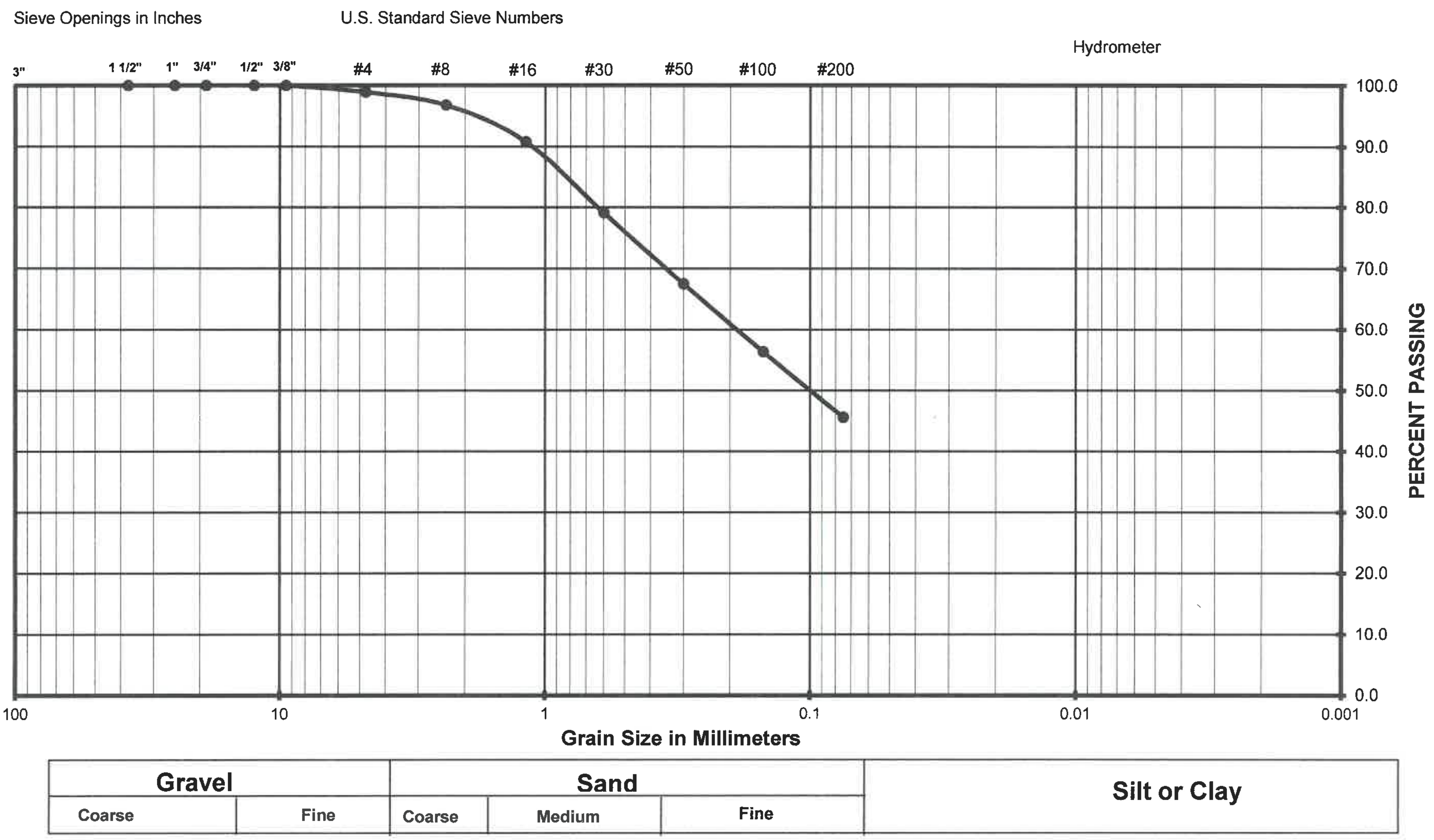


Cohesion: 0.4 Ksf

Angle of Internal Friction: 22 °

Krazan Testing Laboratory

Grain Size Analysis

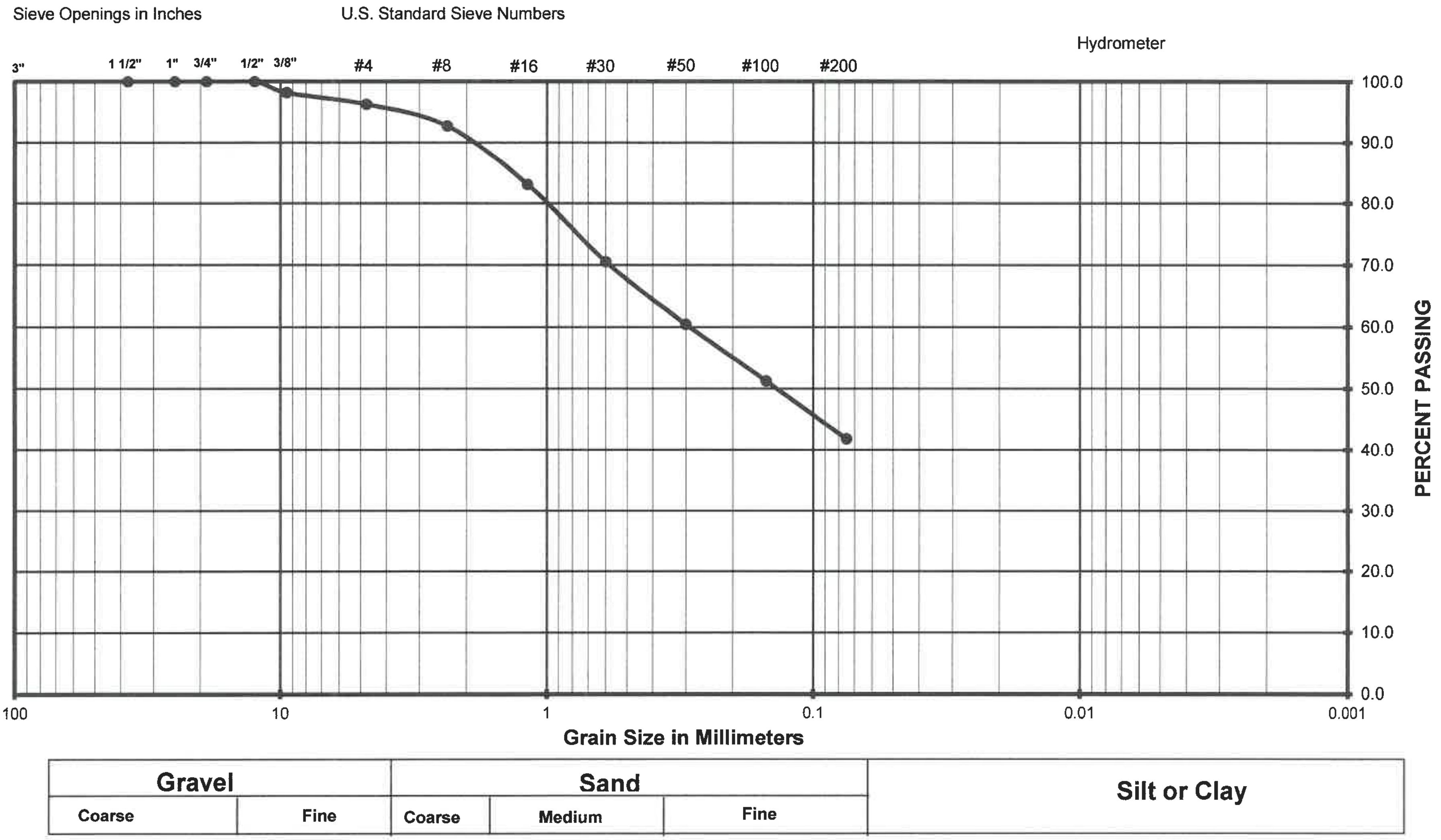


(Unified Soils Classification)

Project Name	Morning Drive Preliminary Lot Study - R1
Project Number	022-25028
Soil Classification	SC/CL
Sample Number	B3 @ 2-3'

Krazan Testing Laboratory

Grain Size Analysis



(Unified Soils Classification)

Project Name	Morning Drive Preliminary Lot Study - R1
Project Number	022-25028
Soil Classification	SC
Sample Number	B6 @ 2-3'

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829

Project Number : 022-25028
Project Name : Morning Drive Preliminary Lot Study - R1
Date : 3/21/2025
Sample location/ Depth : B10 @ 1-4'
Sample Number : X1
Soil Classification : CL

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	748.7		
Weight of Mold, gms	366.2		
Weight of Soil, gms	382.5		
Wet Density, Lbs/cu.ft.	115.4		
Weight of Moisture Sample (Wet), gms	200.0		
Weight of Moisture Sample (Dry), gms	178.7		
Moisture Content, %	11.9		
Dry Density, Lbs/cu.ft.	103.1		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	50.7		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.0647

Expansion Index $_{\text{measured}}$ = 64.7

Expansion Index = 65

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

Project Number : 022-25028
Project Name : Morning Drive Preliminary Lot Study - R1
Date : 3/21/2025
Sample location/ Depth : B12 @ 1-4'
Sample Number : X2
Soil Classification : SC

Trial #	1	2	3
Weight of Soil & Mold, gms	761.4		
Weight of Mold, gms	367.5		
Weight of Soil, gms	393.9		
Wet Density, Lbs/cu.ft.	118.8		
Weight of Moisture Sample (Wet), gms	200.0		
Weight of Moisture Sample (Dry), gms	181.2		
Moisture Content, %	10.4		
Dry Density, Lbs/cu.ft.	107.6		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	49.5		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.0463

Expansion Index $_{\text{measured}}$ = 46.3

Expansion Index = 46

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

Project Number : 022-25028
Project Name : Morning Drive Preliminary Lot Study - R1
Date : 3/21/2025
Sample location/ Depth : B14 @ 1-4'
Sample Number : X4
Soil Classification : CL

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	761.3		
Weight of Mold, gms	367.2		
Weight of Soil, gms	394.1		
Wet Density, Lbs/cu.ft.	118.9		
Weight of Moisture Sample (Wet), gms	200.0		
Weight of Moisture Sample (Dry), gms	180.4		
Moisture Content, %	10.9		
Dry Density, Lbs/cu.ft.	107.2		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	51.3		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.0421

Expansion Index $_{\text{measured}}$ = 42.1

Expansion Index = 42

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

Project Number : 022-25028
Project Name : Morning Drive Preliminary Lot Study - R1
Date : 3/21/2025
Sample location/ Depth : B17 @ 1-4'
Sample Number : X5
Soil Classification : CL

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	780.1		
Weight of Mold, gms	366.6		
Weight of Soil, gms	413.5		
Wet Density, Lbs/cu.ft.	124.7		
Weight of Moisture Sample (Wet), gms	200.0		
Weight of Moisture Sample (Dry), gms	183.3		
Moisture Content, %	9.1		
Dry Density, Lbs/cu.ft.	114.3		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	51.9		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.0323

Expansion Index $_{\text{measured}}$ = 32.3

Expansion Index = 32

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

Project Number : 022-25028
Project Name : Morning Drive Preliminary Lot Study - R1
Date : 3/21/2025
Sample location/ Depth : B18 @ 1-4'
Sample Number : X3
Soil Classification : SC

Trial #	**1**	**2**	**3**
Weight of Soil & Mold, gms	784.6		
Weight of Mold, gms	366.3		
Weight of Soil, gms	418.3		
Wet Density, Lbs/cu.ft.	126.2		
Weight of Moisture Sample (Wet), gms	200.0		
Weight of Moisture Sample (Dry), gms	184.5		
Moisture Content, %	8.4		
Dry Density, Lbs/cu.ft.	116.4		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	50.7		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.0221

Expansion Index $_{\text{measured}}$ = 22.1

Expansion Index = 22

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

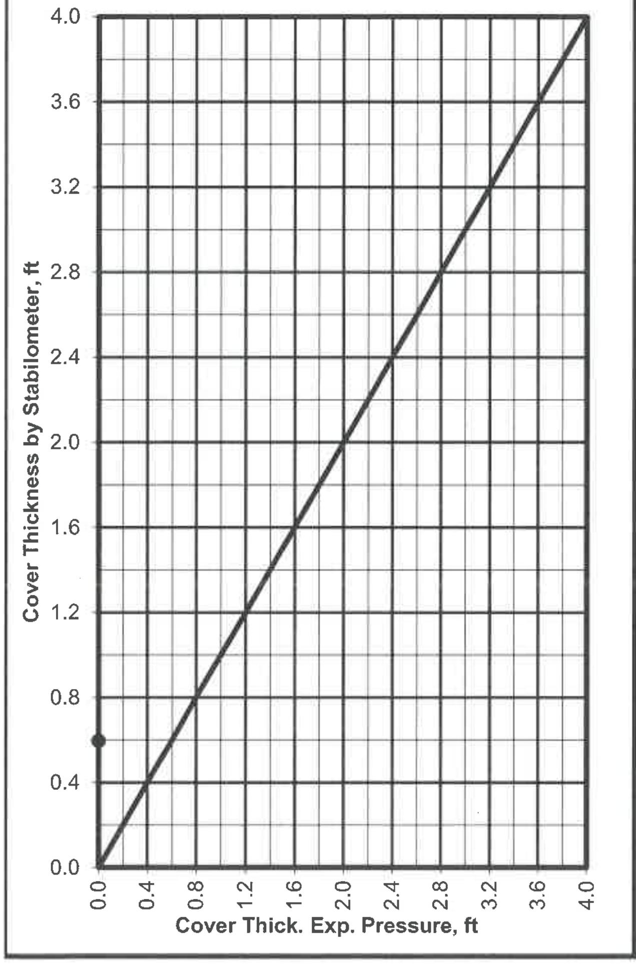
Krazan Testing Laboratory

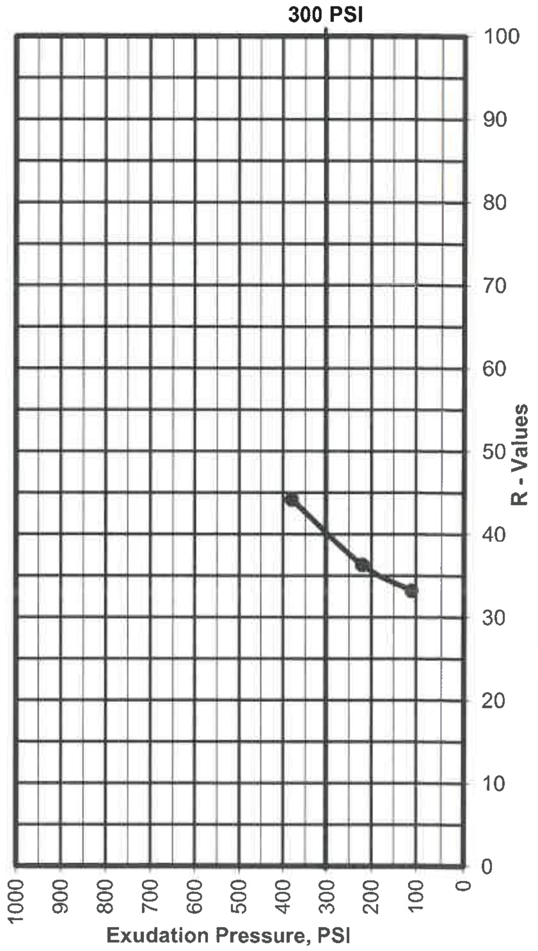
R - VALUE TEST
ASTM D - 2844 / CAL 301

Project Number : 2225028
Project Name : Morning Drive Prelim Lot Study R1
Date : 3/11/2025
Sample Location/Curve Number : R1
Soil Classification : Clayey Sand - SC

TEST	A	B	C
Percent Moisture @ Compaction, %	9.8	10.8	11.7
Dry Density, lbm/cu.ft.	129.5	128.9	128.1
Exudation Pressure, psi	380	220	110
Expansion Pressure, (Dial Reading)	0	0	0
Expansion Pressure, psf	0	0	0
Resistance Value R	44	36	33

R Value at 300 PSI Exudation Pressure	**40**
R Value by Expansion Pressure (TI =): 5	**Expansion Pressure nil**





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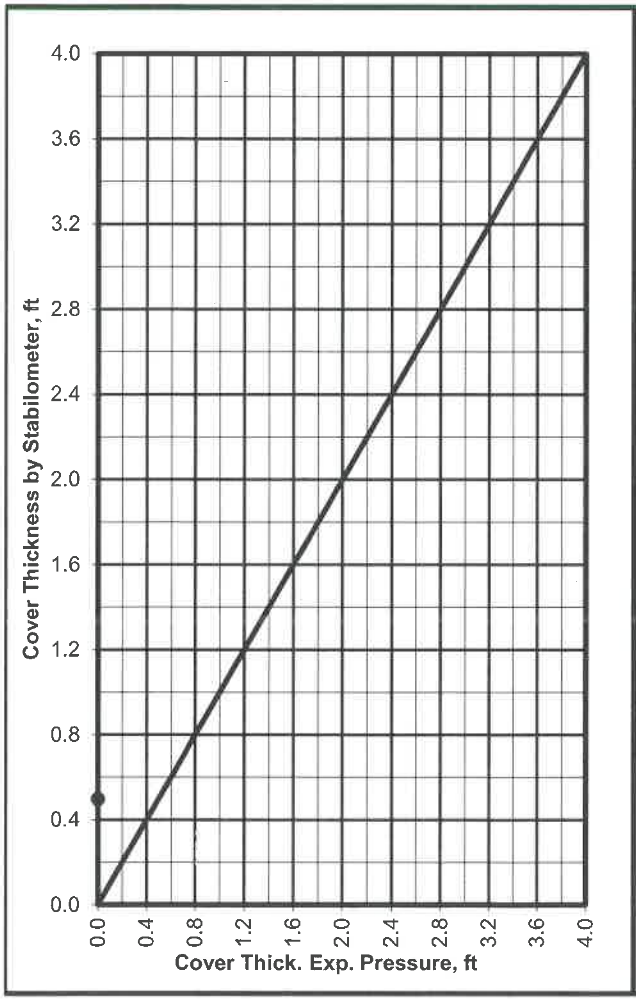
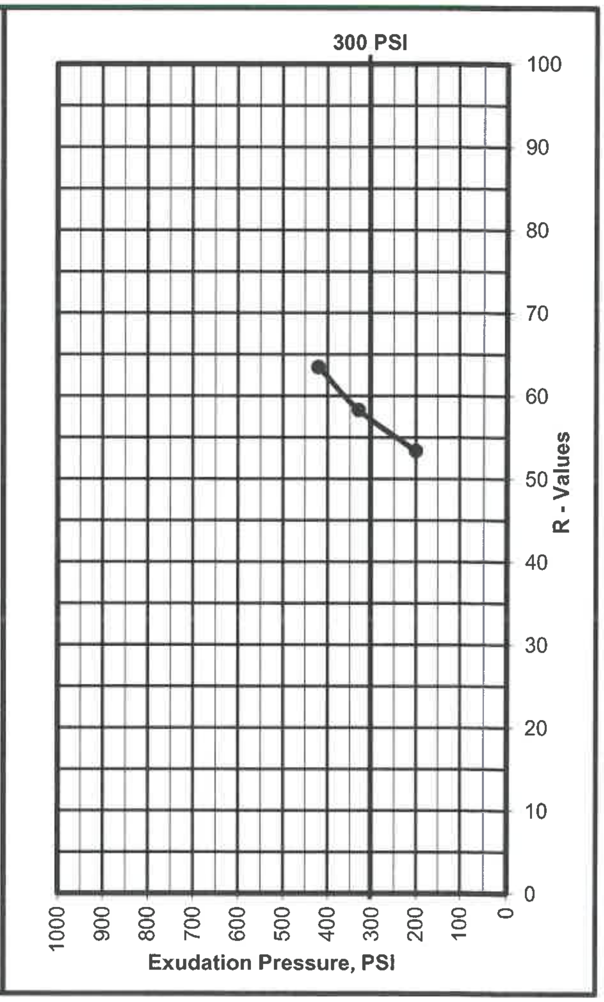
R - VALUE TEST
ASTM D - 2844 / CAL 301

Project Number	:	2225028
Project Name	:	Morning Drive Prelim Lot Study R1
Date	:	3/11/2025
Sample Location/Curve Number	:	R2
Soil Classification	:	Silty Sand w/clay - SM

TEST	A	B	C
Percent Moisture @ Compaction, %	10.6	10.1	9.7
Dry Density, lbm/cu.ft.	126.7	127.5	127.7
Exudation Pressure, psi	200	330	420
Expansion Pressure, (Dial Reading)	0	0	0
Expansion Pressure, psf	0	0	0
Resistance Value R	53	58	63

R Value at 300 PSI Exudation Pressure	**57**
R Value by Expansion Pressure (TI =): 5	**Expansion Pressure nil**





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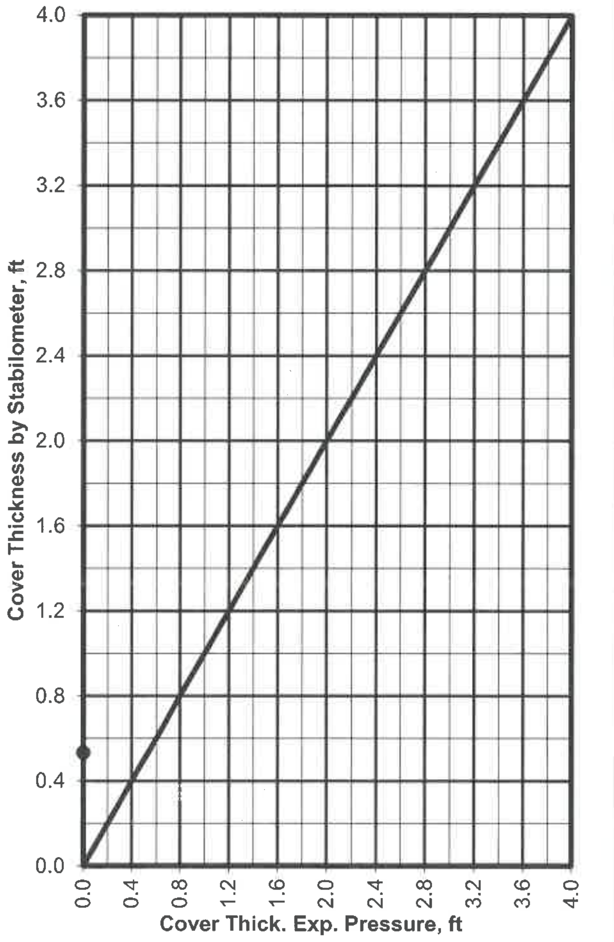
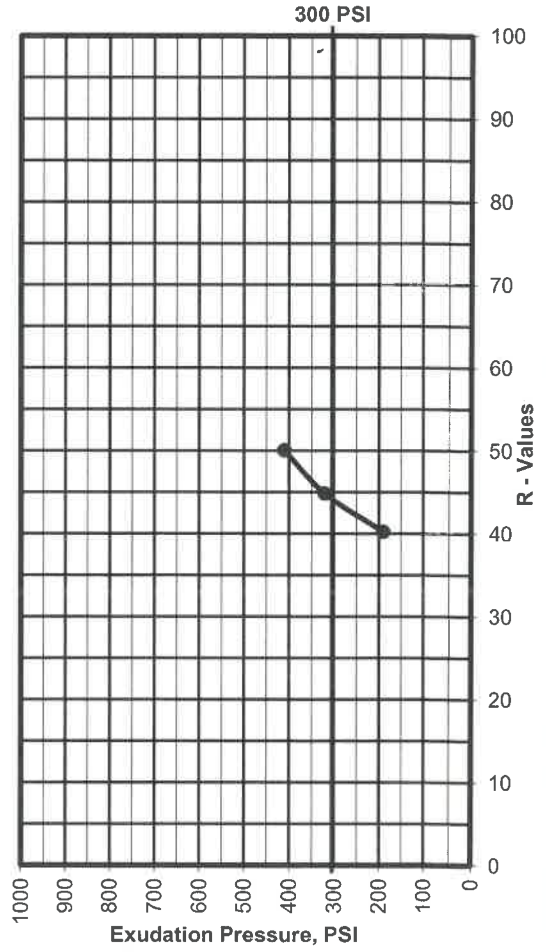
R - VALUE TEST
ASTM D - 2844 / CAL 301

Project Number	:	2225028
Project Name	:	Morning Drive Prelim Lot Study R1
Date	:	3/11/2025
Sample Location/Curve Number	:	R3
Soil Classification	:	Clayey Sand - SC

TEST	A	B	C
Percent Moisture @ Compaction, %	9.9	10.4	10.9
Dry Density, lbm/cu.ft.	130.3	130.1	129.7
Exudation Pressure, psi	410	320	190
Expansion Pressure, (Dial Reading)	0	0	0
Expansion Pressure, psf	0	0	0
Resistance Value R	50	45	40

R Value at 300 PSI Exudation Pressure	**44**
R Value by Expansion Pressure (TI =): 5	**Expansion Pressure nil**





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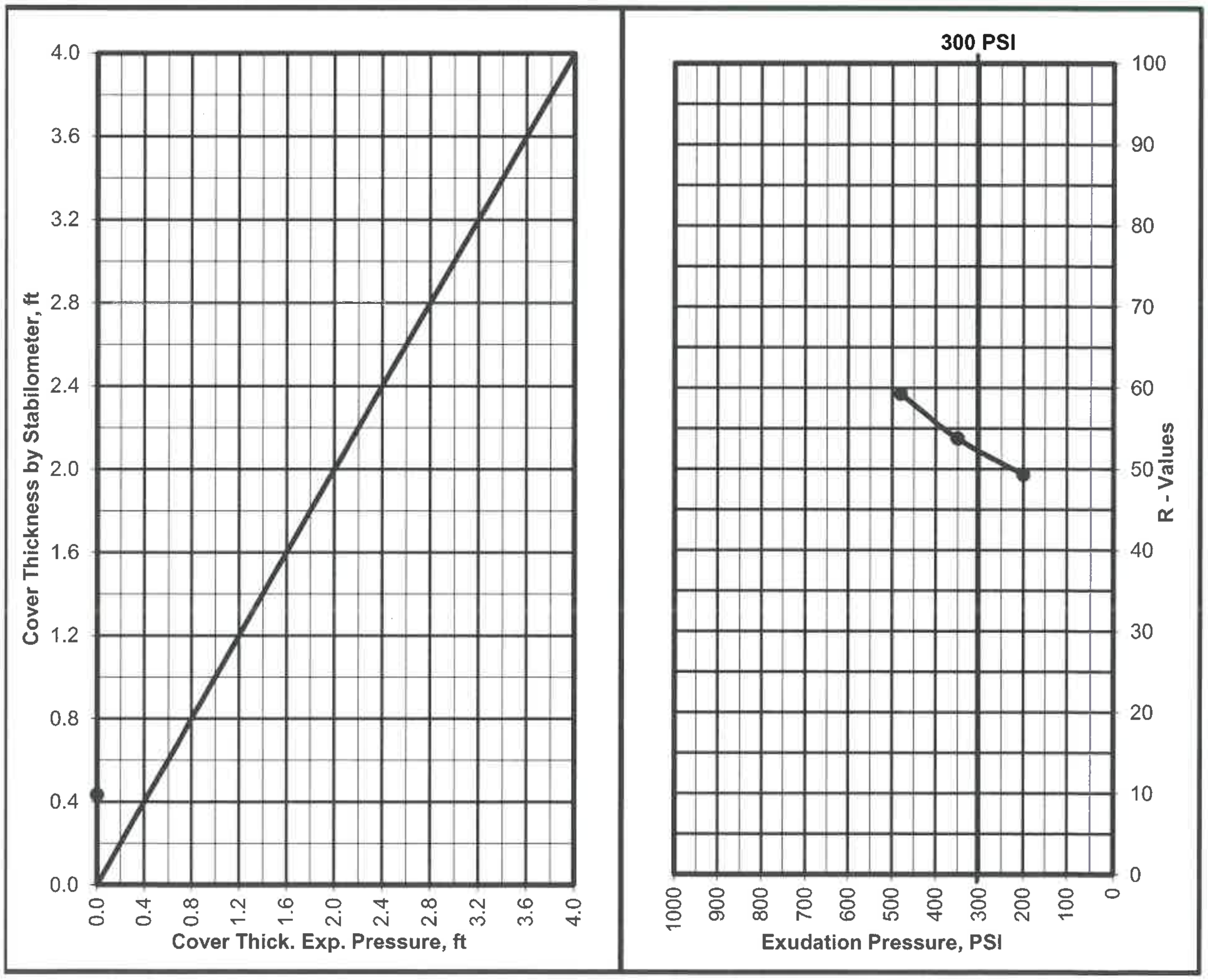
R - VALUE TEST
ASTM D - 2844 / CAL 301

Project Number : 2225028
Project Name : Morning Drive Prelim Lot Study R1
Date : 3/11/2025
Sample Location/Curve Number : R4
Soil Classification : Silty Sand w/clay - SM

TEST	A	B	C
Percent Moisture @ Compaction, %	9.4	9.8	10.3
Dry Density, lbm/cu.ft.	129.9	129.9	129.9
Exudation Pressure, psi	480	350	200
Expansion Pressure, (Dial Reading)	0	0	0
Expansion Pressure, psf	0	0	0
Resistance Value R	59	54	49

R Value at 300 PSI Exudation Pressure	**52**
R Value by Expansion Pressure (TI =): 5	**Expansion Pressure nil**

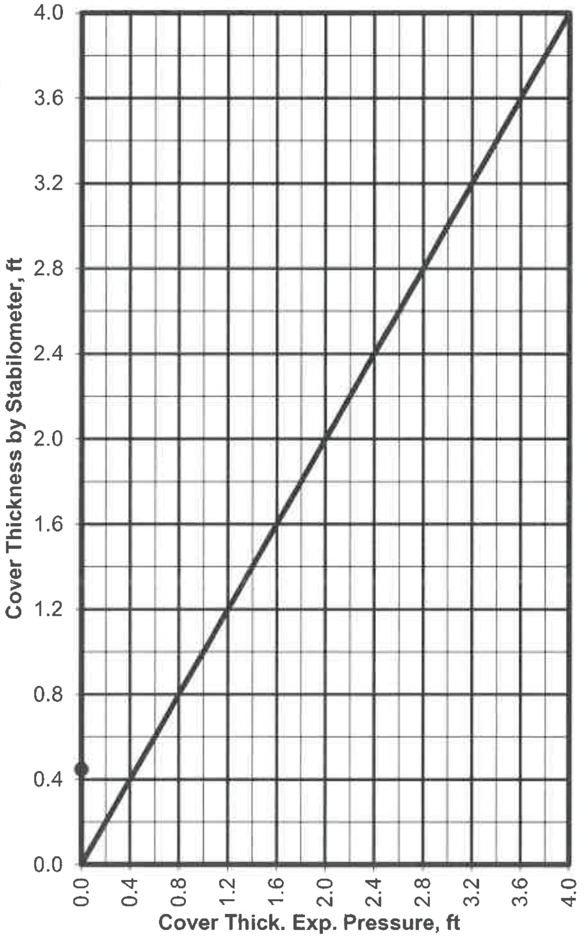


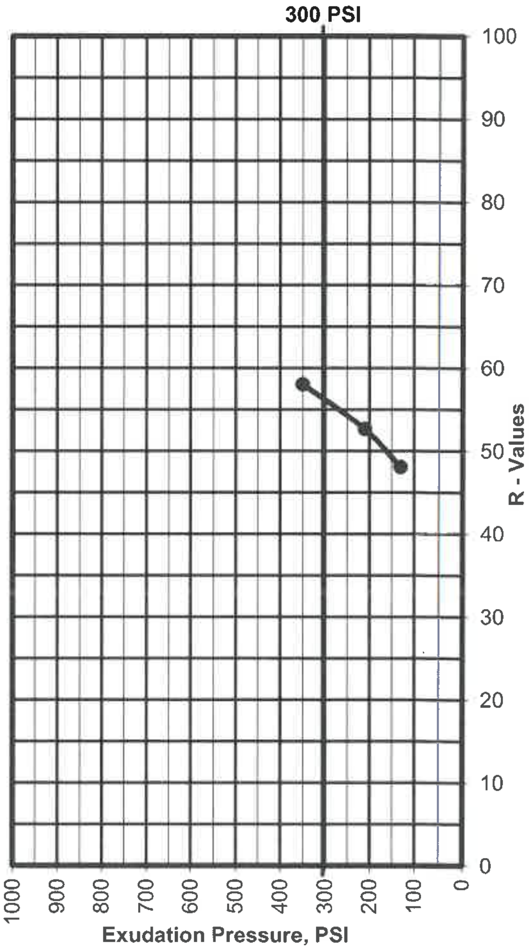
R - VALUE TEST
ASTM D - 2844 / CAL 301

Project Number	:	2225028
Project Name	:	Morning Drive Prelim Lot Study R1
Date	:	3/11/2025
Sample Location/Curve Number	:	R5
Soil Classification	:	Silty Sand w/clay - SM

TEST	A	B	C
Percent Moisture @ Compaction, %	10.2	10.6	11.1
Dry Density, lbm/cu.ft.	128.7	128.5	127.4
Exudation Pressure, psi	350	210	130
Expansion Pressure, (Dial Reading)	0	0	0
Expansion Pressure, psf	0	0	0
Resistance Value R	58	53	48

R Value at 300 PSI Exudation Pressure	**56**
R Value by Expansion Pressure (TI =): 5	**Expansion Pressure nil**





Krazan Testing Laboratory

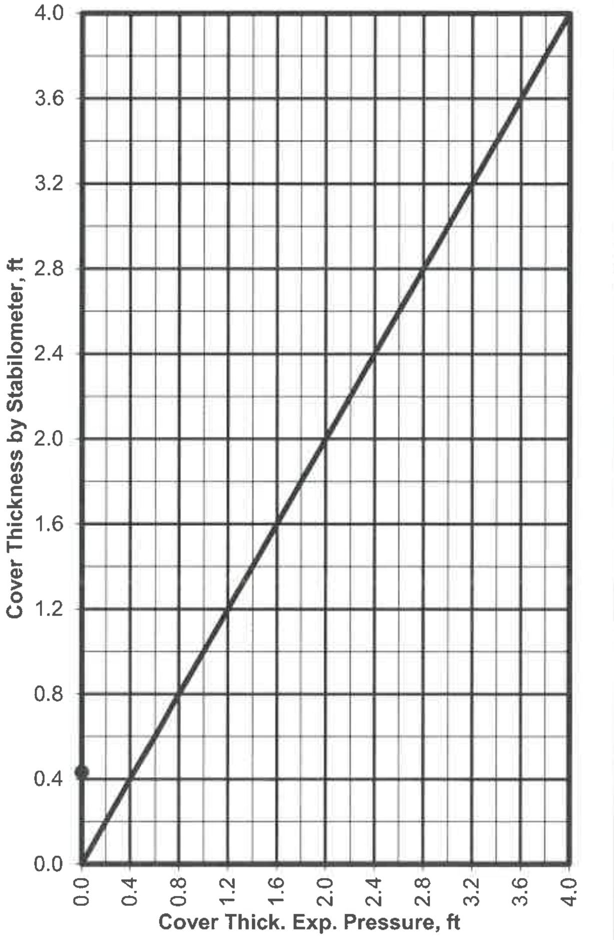
R - VALUE TEST

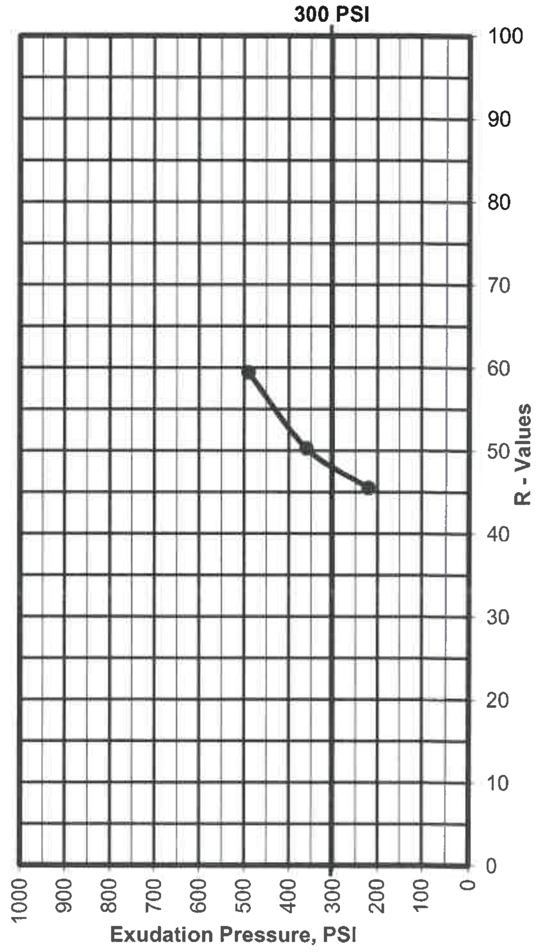
ASTM D - 2844 / CAL 301

Project Number : 2225028
Project Name : Morning Drive Prelim Lot Study R1
Date : 3/11/2025
Sample Location/Curve Number : R6
Soil Classification : Clayey Sand - SC

TEST	A	B	C
Percent Moisture @ Compaction, %	9.5	10.0	10.4
Dry Density, lbm/cu.ft.	130.8	130.8	130.8
Exudation Pressure, psi	490	360	220
Expansion Pressure, (Dial Reading)	0	0	0
Expansion Pressure, psf	0	0	0
Resistance Value R	59	50	46

R Value at 300 PSI Exudation Pressure	**48**
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 2024 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.