GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED MULTI-USE RETAIL CENTER
42500 WASHINGTON STREET
BERMUDA DUNES, CALIFORNIA

PROJECT NO. 112-20102
DECEMBER 30, 2020

Prepared for:

MR. ARMAN MASHOOF
HI BERMUDA DUNES, LLC
20 NORTH RAYMOND AVENUE, SUITE 300
PASADENA, CA 91103

Prepared by:

KRAZAN & ASSOCIATES, INC.
1100 OLYMPIC DRIVE, SUITE 103
CORONA, CALIFORNIA 92881
(951) 273-1011

Krazan &ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

December 30, 2020 KA Project No. 112-20102

Mr. Arman Mashoof
HI Bermuda Dunes, LLC
20 North Raymond Avenue, Suite 300
Pasadena, CA 91103

RE: Geotechnical Engineering Investigation
Proposed Multi-Use Retail Center
42500 Washington Street
Bermuda Dunes, California

Dear Mr. Mashoof:

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 (951) 273-1011.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

James Kellogg
Managing Engineer
RGE No. 2902/RCE No. 65092

JK: jp

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INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed Multi-Use Retail Center to be located at the physical address of 42500 Washington Street, in the city of Bermuda Dunes, California. Discussions regarding site conditions are presented herein, together with conclusions and recommendations pertaining to site preparation, Engineered Fill, utility trench backfill, drainage and landscaping, foundations, concrete floor slabs and exterior flatwork, retaining walls, soil cement reactivity, and pavement design.

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

PURPOSE AND SCOPE

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

mendations may be made.as outlined in our Proposal dated October 7, 2020 (Proposal No. G19082CAC-R) 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 a total of six (6) borings to depths ranging from approximately ten (10) to thirty (30) feet below existing site grades for evaluation of the subsurface conditions at the project site.

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

- Performance of two (2) infiltration tests at the subject site in order to determine an estimated infiltration rate for the near surface soil conditions encountered at the subject site.

- Evaluation of the data obtained from the investigation and engineering analyses of the data with respect to the geotechnical aspects of structural design, site grading and paving.

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

Environmental services, such as a chemical analysis of soil and groundwater for possible environmental contaminates, were not in our scope of services.

PROPOSED CONSTRUCTION

We understand that design of the proposed development is currently underway and as such, specific structural load information and other final details pertaining to the structures are unavailable. On a preliminary basis, it is understood that the development will include the construction of a new Drive-Thru Restaurant building and a Child Care Facility. It is anticipated that the buildings will be of single-story structures utilizing concrete slab-on-grade construction and wood-framed construction. Footing loads are anticipated to be relatively light. On-site paved areas, drive thru, trash enclosures, 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, SITE HISTORY AND SITE DESCRIPTION

The site is a roughly rectangular shaped parcel and encompasses an approximate area of 1.4 acres. The subject site is located at the physical address of 42500 Washington Street, in the city of Bermuda Dunes, California. Currently, the subject site is undeveloped and free from any above grade structures. The site is bound to the north by an existing shopping center, to the east and south by residential developments, and to the west by Washington Street and a shopping center beyond.

Currently, the subject site is free of any above structure and utility lines are buried along the edge of Washington Street. Ground cover at the site consists of exposed soil and localized weed growth and some medium trees scattered throughout the site. The subject site is relatively flat and level with no major changes in topography. It is anticipated that cuts and fills will be minimal to establish the building pads and other structural elements.

GEOLOGIC SETTING

The subject site is situated at the base of the San Jacinto Mountains at the northwestern end of the Coachella Valley of Southern California. Near-surface materials consist of alluvial fan deposits of sand, silt, gravel, and cobbles derived from erosion of the Mesozoic granitic and metamorphic rocks of the adjacent San Jacinto Mountains.

A normal fault probably exists below Palm Desert along the eastern face of the San Jacinto Mountains, although specific history of the fault is beyond the scope of this discussion. The active San Andreas Fault Zone is located 4.4 miles away from the subject site.

The site does not appear to be located within an earthquake fault zone. Ground shaking at the site will occur during a seismic event. However, at the present time, particular seismic factors, such as earthquake magnitude, distance from seismic epicenter from the site, number of significant cycles, and maximum ground acceleration, cannot be totally evaluated until a seismic event has occurred.

The site is located in a seismically active area of Southern California. The nearest active faults are the San Andreas, Burnt Mountain, and Eureka Peak Fault Zones, and are located approximately 4.4, 14.4, and 15.4 miles away, respectively. The area in consideration shows no faults on-site according to maps prepared by the California Geologic Survey and published by the International Conference of Building Officials (ICBO). No evidence of surface faulting was observed on the property during our reconnaissance.

FIELD AND LABORATORY INVESTIGATIONS

Subsurface soil conditions were explored by drilling a total of six (6) borings to depths ranging from approximately ten (10) to thirty (30) feet below existing site grades, using a truck-mounted drill rig. 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 subsurface soils. 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, stability (R-Value) test and moisture density relationships of the materials encountered. In addition, chemical tests were performed to evaluate the corrosivity of the soils to buried concrete and metal. Details of the laboratory test program and results of the laboratory test 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. The subsurface soils encountered at the site generally consisted of medium dense to dense silty sand to the maximum depth explored, thirty (30) feet below site grades.

Field and laboratory tests suggest that these soils are moderately strong and slightly compressible. Penetration resistance, measured by the number of blows required to drive a Modified California sampler or Standard Penetration Test (SPT) ranged from 19 to 50 blows per foot. Representative samples of the near surface soils consolidated between 0.8 to 1.6 percent under a 2 ksf load when saturated. Representative samples of the near surface soils had angles of internal friction of 31 and 32 degrees.

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 at any of the borings drilled as part of this investigation. In addition, based on previous drilling in the area and groundwater data for the site vicinity, the depth to groundwater is expected to be encountered at a depth in excess of fifty (50) feet below existing site grade.

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

Seismicity is a general term relating to the abrupt release of accumulated strain energy in the rock materials of the earth's crust in a given geographical area. The recurrence of accumulation and subsequent release of strain have resulted in faults and fault systems. Fault patterns and density reflect relative degrees of regional stress through time, but do not necessarily indicate recent seismic activity; therefore, the degree of seismic risk must be determined or estimated by the seismic record in any given region.

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 under saturated conditions in soils such as sand in which the strength is purely frictional. However, liquefaction has occurred in soils other than clean sand. Liquefaction usually occurs under vibratory conditions such as those induced by seismic event.

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

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

The predominant soils encountered within the project site generally consist of medium dense to dense silty sand. Groundwater was not encountered below the site within a depth of 30 feet during our exploratory drilling. Available groundwater depth mapping, as well as our experience in the area, indicates that groundwater elevations measured in the vicinity of the project site were typically encountered at depths greater than 50 feet below site grade. A Liquefaction Hazard Map has not been prepared for the subject site. Also, according to the County of Riverside Liquefaction Map, groundwater is not expected in the upper 50 feet below current site grades. Therefore, the site is not located within a potential liquefaction zone.

Based on our analysis, the potential for soil liquefaction within the project site is very low due to the depth of groundwater and the dense nature of the subsurface soils encountered within this area. Accordingly, measures to mitigate seismic induced liquefaction are not considered necessary.

FAULT RUPTURE HAZARD ZONES

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

An Earthquake Fault Zones Map has not been prepared for the subject site. Therefore, the subject site is not located in an area designated as a Fault Hazard Zone.

SEISMIC HAZARD ZONES

In 1990, the California State Legislature passed the Seismic Hazard Mapping Act to protect public safety from the effects of strong shaking, liquefaction, landslides, or other ground failure, and other hazards caused by earthquakes. The Act requires that the State Geologist delineate various seismic hazard zones on Seismic Hazard Zones Maps. Specifically, the maps identify areas where soil liquefaction and earthquake-induced landslides are most likely to occur. A site-specific geotechnical evaluation is required prior to permitting most urban developments within the mapped zones. The Act also requires sellers of real property within the zones to disclose this fact to potential buyers.

A Liquefaction Hazard Map has not been prepared for the subject site. Therefore, the subject site is not located in an area designated as a Seismic Hazard Zone.

OTHER HAZARDS

Rockfall, Landslide, Slope Instability, and Debris Flow: The subject site is relatively flat and level. It is our understanding that there are no significant slopes proposed as part of the proposed development. Provided the recommendations presented in this report are implemented into the design and construction of the anticipated development, rockfalls, landslides, slope instability, and debris flows are not anticipated to pose a hazard to the subject site.

Seiches: Seiches are large waves generated within enclosed bodies of water. The site is not located in close proximity to any lakes or reservoirs. As such, seiches are not anticipated to pose a hazard to the subject site.

Tsunamis: Tsunamis are tidal waves generated by fault displacement or major ground movement. The site is several miles from the ocean. As such, tsunamis are not anticipated to pose a hazard to the subject site.

Hydroconsolidation: The near surface soils encountered at the subject site were found to be medium dense to dense, as well as, the underlying native soils. Provided the recommendations in this report are incorporated into the design and construction of the proposed development, hydroconsolidation is not anticipated to be a significant concern for the subject site.

EXPANSIVE SOIL

The near-surface silty sand soils encountered at the site have been identified through laboratory testing as having a low expansion potential. Expansive soils have the potential to undergo volume change, or shrinkage and swelling, with changes in soil moisture. As expansive soils dry, the soil shrinks; when moisture is reintroduced into the soil, the soil swells.

INFILTRATION TESTING

An estimated infiltration rate was determined using the results of open borehole percolation testing performed at the subject site. Infiltration rates were calculated using the Inverse Borehole Method. The percolation testing indicated that the near surface medium dense silty d sand soil was found to have infiltration rates of approximately 0.80 and 1.03 inches per hour. Detailed results of the infiltration testing are included in Appendix A in tabular format. The soil infiltration rates are based on tests conducted with clean water. The infiltration rates may vary with time as a result of soil clogging from water impurities. A factor of safety should be incorporated into the design of the infiltration system to compensate for these factors as determined appropriate by the designer. In addition, routine maintenance consisting of clearing the system of clogged soils and debris should be expected.

SOIL CORROSIVITY

Corrosion tests were performed to evaluate the soil corrosivity to the buried structures. The tests consisted of minimum resistivity, sulfate content and chloride content, and the results of the tests are included as follows:

Parameter	Results	Test Method
Resistivity	6,400 ohm-cm	CA 643
Sulfate	136 ppm	CA 417
Chloride	65 ppm	CA 422
pH Value	8.0	EPA 9045C

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

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 medium dense to dense silty sand with varying moisture-contents and in-place densities. These soils are moderately strong and slightly compressible when saturated.

In order to provide uniform foundation support, it is recommended that following stripping, fill removal operations and demolition activities, the upper three (3) feet below existing site grade or one (1) foot below the bottom of proposed foundations, whichever is deeper, should be excavated, moisture-conditioned to near optimum moisture-content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM Test Method D1557. Excavation should extend to a minimum of 5 feet beyond structural elements. The on-site, native soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, the bottom of the excavation should be proof-rolled and observed by Krazan and Associates, Inc. to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Fill material should be compacted to a minimum of 95 percent of maximum density based on ASTM Test Method D1557.

In pavement and exterior flatwork areas, the upper 12 inches of native soils should be excavated, moisture-conditioned to near optimum moisture-content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM Test Method D1557. Excavation should extend to a

minimum of 3 feet beyond the edge of pavements or back of curbs. The on-site, native soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, the bottom of the excavation should be proof-rolled and observed by Krazan and Associates, Inc. to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Fill material should be compacted to a minimum of 95 percent of maximum dry 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.

Sandy 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 soils.

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed structure footings may be designed utilizing an allowable bearing pressure of 2,600 psf for dead-plus-live loads. Footings should have a minimum embedment of 18 inches.

Groundwater Influence on Structures/Construction

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

Site Preparation

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

Any demolition or clearing activities should include proper removal of any buried structures. Any buried structures, including utilities or loosely backfilled excavations, encountered during construction

should be properly removed and the resulting excavations backfilled. Disturbed areas caused by demolition activities should be removed and/or recompacted. Excavations, depressions, or soft and pliant areas extending below planned finished subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill. In general, any septic tanks, debris pits, cesspools, or similar structures should be entirely removed. 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 cleaned to firm native ground and backfilled with Engineered Fill.

In order to provide uniform foundation support, it is recommended that following stripping, fill removal operations and demolition activities, the upper three (3) feet below existing site grade or one (1) foot below the bottom of proposed foundations, whichever is deeper, should be excavated, moisture-conditioned to near optimum moisture-content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM Test Method D1557. Excavation should extend to a minimum of 5 feet beyond structural elements. The on-site, native soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, the bottom of the excavation should be proof-rolled and observed by Krazan and Associates, Inc. to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Fill material should be compacted to a minimum of 95 percent of maximum density based on ASTM Test Method D1557.
In pavement and exterior flatwork areas, the upper 12 inches of native soils should be excavated, moisture-conditioned to near optimum moisture-content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM Test Method D1557. Excavation should extend to a minimum of 3 feet beyond the edge of pavements or back of curbs. The on-site, native soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, the bottom of the excavation should be proof-rolled and observed by Krazan and Associates, Inc. to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Fill material should be compacted to a minimum of 95 percent of the maximum dry 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 organic-free, on-site, native soils are predominately silty sands. Preliminary testing indicates these soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics 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 material should be predominantly non-expansive granular material with a plasticity index less than 10 and an expansion index less than 15. Imported Fill should be free from rocks and lumps greater than 4 inches in maximum dimension. All Imported Fill material should be submitted for approval to the Soils Engineer at least 48 hours prior to delivery to the site.

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 95 percent of maximum dry density based on ASTM Test Method 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 1804.4 of the 2019 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 2 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.

Utility Trench Backfill

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

Sandy 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 soils.

Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. The utility trench backfill placed in pavement areas should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Pipe bedding should be in accordance with pipe manufacturer's recommendations.

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

Foundations

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	2,000 psf
Dead-Plus-Live Load	2,600 psf
Total Load, Including Wind or Seismic Loads	3,500 psf

The footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Footings should have a minimum width of 15 inches, regardless of load. Ultimate design of foundations and reinforcement should be performed by the project Structural Engineer.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.30 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an equivalent fluid passive pressure of 250 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ⅓ increase in the above value may be used for short duration, wind, or seismic loads. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

Floor Slabs and Exterior Flatwork

Concrete slab-on-grade floors should be underlain by a water vapor retarder. The water vapor retarder should be installed in accordance with accepted engineering practices. 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.

Unless designed by the project structural engineer, concrete slabs-on-grade should be a minimum of five (5) inches thick. It is recommended that the concrete slab be reinforced to reduce crack separation and possible vertical offset at the cracks. We recommend at least No. 3 reinforcing bars placed on 18-inch centers, be used for this purpose. Thicker floor slabs with increased concrete strength and reinforcement should be designed wherever heavy concentrated loads, heavy equipment, or machinery is anticipated.

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

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

Lateral Earth Pressures and Retaining Walls

Walls retaining horizontal backfill and capable of deflecting a minimum of 0.1 percent of its height at the top may be designed using an equivalent fluid active pressure of 39 pounds per square foot per foot of depth. Walls that are incapable of this deflection or walls that are fully constrained against deflection may be designed for an equivalent fluid at-rest pressure of 59 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. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

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

R-Value Test Results and Pavement Design

One R-Value sample was obtained from the project site at the location shown on the attached site plan. The sample was 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
R-1	0-24"	Silty Sand (SM)	35

These test results are moderate and indicate good subgrade support characteristics under dynamic traffic loads. The following table shows the recommended pavement sections for various traffic indices.

Traffic Index	Asphaltic Concrete	Class II Aggregate Base*	Compacted Subgrade**
4.0	2.0"	5.0"	12.0"
4.5	2.5"	5.0"	12.0"
5.0	2.5"	6.0"	12.0"
5.5	3.0"	6.0"	12.0"
6.0	3.0"	7.0"	12.0"
6.5	3.5"	8.0"	12.0"
7.0	4.0"	8.0"	12.0"
7.5	4.0"	9.0"	12.0"

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

In pavement and exterior flatwork areas, the upper 12 inches of native soils within the proposed building and any foundation bearing areas should be excavated, moisture-conditioned to near optimum moisture-content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM Test Method D1557. Excavation should extend to a minimum of 3 feet beyond the edge of pavements or back of curbs. The on-site, native soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, the bottom of the excavation should be proof-rolled and observed by Krazan and Associates, Inc. to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Fill material should be compacted to a minimum of 95 percent of the maximum dry density based on ASTM Test Method D1557.

Seismic Parameters – 2019 California Building Code

The Site Class per Section 1613 of the 2019 California Building Code (2019 CBC) and Table 20.3-1 of ASCE 7-16 is based upon the site soil conditions. It is our opinion that a Site Class D is most consistent with the subject site soil conditions. For seismic design of the structures based on the seismic provisions of the 2019 CBC, we recommend the following parameters:

Seismic Item	Value	CBC Reference
Site Class	D	Section 1613.3.2
Site Coefficient F_a	1.200	Table 1613.3.3 (1)
S_S	1.875	Section 1613.3.1
S_{MS}	2.250	Section 1613.3.3
S_{DS}	1.500	Section 1613.3.4
Site Coefficient F_v	1.700	Table 1613.3.3 (2)
S_1	0.712	Section 1613.3.1
S_{M1}	1.210	Section 1613.3.3
S_{D1}	0.807	Section 1613.3.4
T_S	0.538	
PGA	0.928	

INFILTRATION TESTING

The shallow soil conditions present at the subject site were evaluated by drilling shallow borings in the vicinity of the infiltration test. The borings drilled at the site indicated the subsurface soil conditions consisted of medium dense silty sands.

Infiltration rates were determined using the results of open borehole infiltration testing performed at the subject site. Infiltration testing performed on the near surface sand soil indicates infiltration rates of approximately 0.80 and 1.03 inches per hour. Detailed results of the percolation tests and infiltration rates are attached in tabular format. The soil percolation rates are based on tests conducted with clean water. The infiltration rates may vary with time as a result of soil clogging from water impurities. A factor of safety should be incorporated into the design of the percolation system to compensate for these factors as determined appropriate by the designer. In addition, periodic maintenance consisting of clearing the bottom of the system of clogged soils should be expected.

It is recommended that the location of the infiltration systems not be closer than ten feet (10') as measured laterally from the edge of the adjacent property line, ten feet (10') from the outside edge of any foundation and five (5') from the edge of any right-of way to the outside edges of the infiltration system.

If the infiltration location is within ten feet (10') from the proposed foundation, it is recommended that this infiltration system should be impervious from the finished ground surface to a depth that will achieve a diagonal distance of a minimum of ten feet (10') below the bottom of the closest footing in the project.

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 UBC 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 below the maximum allowable values established by HUD/FHA and CBC. Therefore, no specific recommendations are considered warranted to compensate for sulfate reactivity with the cement.

Electrical resistivity testing of the soils indicates that the onsite soils have a moderate potential for metal loss from electrochemical corrosion process. A qualified corrosion engineer may be consulted regarding the corrosion effects of the onsite soils on underground metal utilities.

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 soley be used to predict the engineering performance of the compacted material. Therefore, the acceptance of compacted materials will also be dependent upon 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 building foundation and on-site drainage disposal designs. 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 potentially 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 (951) 273-1011.

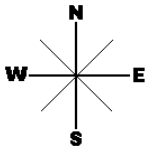
Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

James Kellogg
Managing Engineer
RGE No. 2902/RCE No. 65092

Jorge A. Pelayo, PE
Project Engineer
RCE No. 91269

JK:jp

Figures

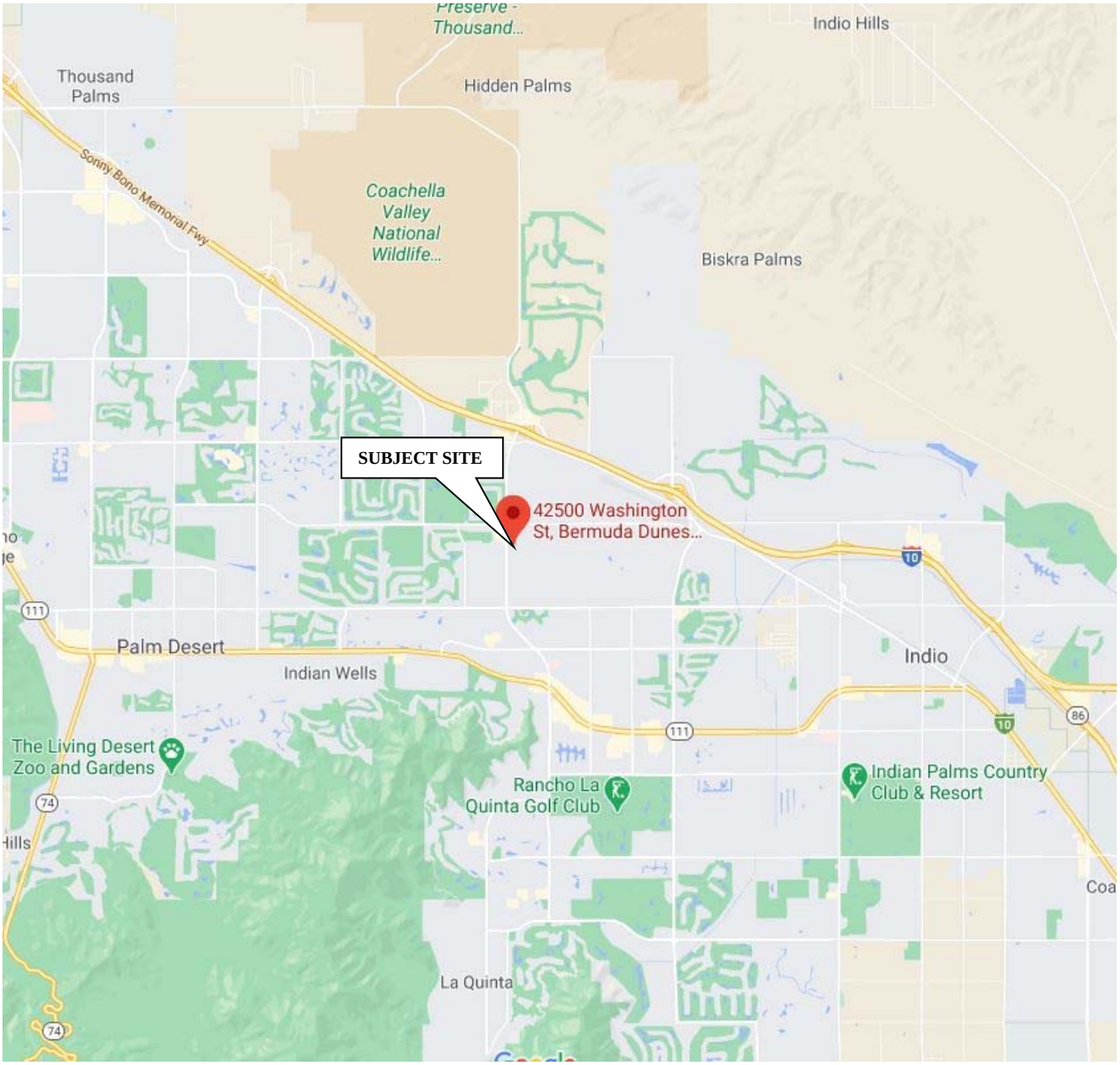


▲ APPROXIMATE R-VALUE LOCATION

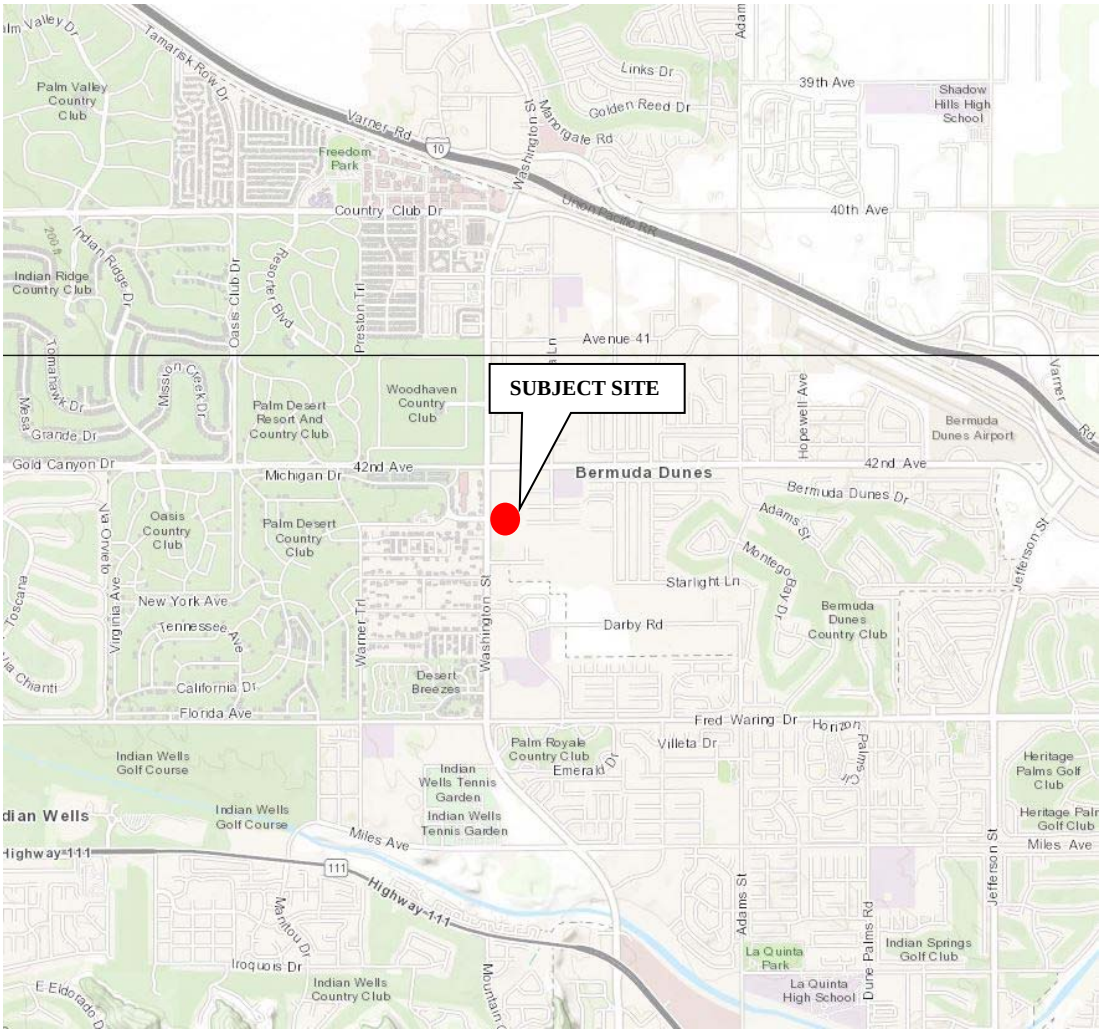
● APPROXIMATE BORING LOCATION

▲ APPROXIMATE INFILTRATION TEST LOCATION

SITE MAP	**Scale:** NTS	**Date:** December 29, 2020	Krazan GEOTECHNICAL ENGINEERING
PROPOSED MULTI-USE RETAIL CENTER **42500 WASHINGTON STREET** **BERMUDA DUNES, CALIFORNIA**	**Drawn by:** JP	**Approved by:** JK	
	Project No. 112-20102	**Figure No.** 1	



VICINITY MAP	Scale: NTS	Date: December 29, 2020	Krazan GEOTECHNICAL ENGINEERING
PROPOSED MULTI-USE RETAIL CENTER 42500 WASHINGTON STREET BERMUDA DUNES, CALIFORNIA	Drawn by: JP	Approved by: JK	
	Project No. 112-20102	Figure No. 2	



MAP EXPLANATION

Potentially Active Faults

Faults considered to have been active during Quaternary time; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep.

Aerial photo lineaments (not field checked); based on youthful geomorphic and other features believed to be the results of Quaternary faulting.

Special Studies Zone Boundaries

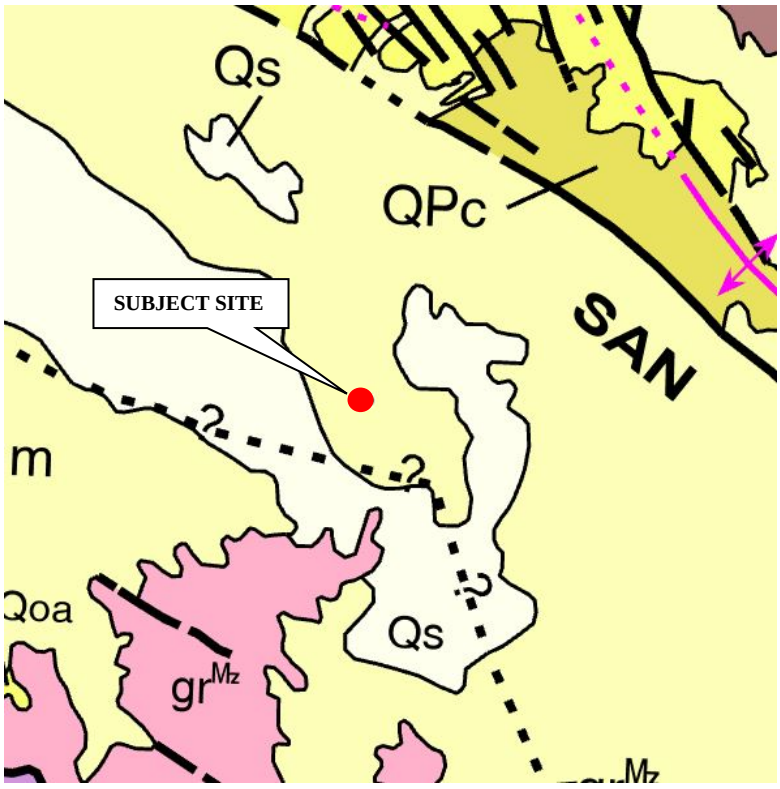
These are delineated as straight-line segments that connect consecutively numbered turning points so as to define one or more special studies zone segments.

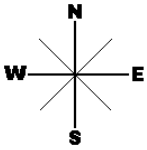
Seaward projection of zone boundary.

N
W E
S

Source: State of California Special Studies Zones Map

FAULT ZONE MAP	**Scale:** NTS	**Date:** December 29, 2020	Krazan GEOTECHNICAL ENGINEERING
PROPOSED MULTI-USE RETAIL CENTER 42500 WASHINGTON STREET BERMUDA DUNES, CALIFORNIA	**Drawn by:** JP	**Approved by:** JK	
	Project No. 112-20102	**Figure No.** 3	





DESCRIPTION OF MAP UNITS

QUATERNARY DEPOSITS

Qs	Extensive marine and nonmarine sand deposits, generally near the coast or desert playas
Q	Alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated
Qls	Selected large landslides
Qg	Glacial till and moraines. Found at high elevations mostly in the Sierra Nevada and Klamath Mountains
Qoa	Older alluvium, lake, playa, and terrace deposits
QPc	Pleistocene and/or Pliocene sandstone, shale, and gravels deposits; mostly loosely consolidated

QUATERNARY VOLCANIC ROCKS

Qrv	Recent (Holocene) volcanic flow rocks; minor pyroclastic deposits
Qrv^{p}	Recent (Holocene) pyroclastic and volcanic mudflow deposits
Qv	Quaternary volcanic flow rocks; minor pyroclastic deposits
Qv^{p}	Quaternary pyroclastic and volcanic mudflow deposits

Source: Department of Conservation: Geologic Map of California, 2010

GEOLOGIC MAP	**Scale:** NTS	**Date:** December 29, 2020	Krazan GEOTECHNICAL ENGINEERING
PROPOSED MULTI-USE RETAIL CENTER **42500 WASHINGTON STREET** **BERMUDA DUNES, CALIFORNIA**	**Drawn by:** JP	**Approved by:** JK	
	Project No. 112-20102	**Figure No.** 4	

Appendix A

Log of Borings & Laboratory Testing

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploratory program. Six (6) 8-1/2-inch diameter exploratory borings were previously 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 split 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 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 determined for the undisturbed samples representative of the subsurface material. 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

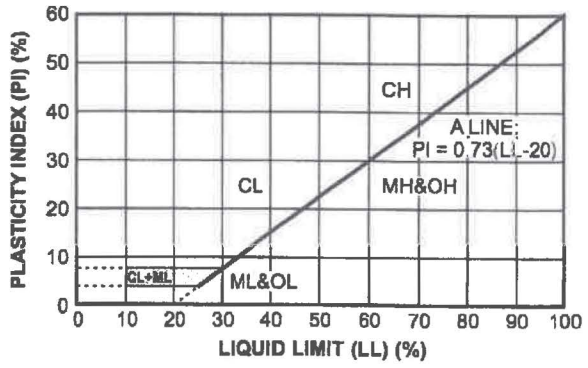
CONSISTENCY CLASSIFICATION

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	12 to 13 inches	305 to 76.2
Gravel	3 inches to No. 4	76.2 to 4.76
Coarse-grained	3 to ¾ inches	76.2 to 19.1
Fine-grained	¾ inches to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.074
Coarse-grained	No. 4 to No. 10	4.76 to 2.00
Medium-grained	No. 10 to No. 40	2.00 to 0.042
Fine-grained	No. 40 to No. 200	0.042 to 0.074
Silt and Clay	Below No. 200	Below 0.074

PLASTICITY CHART



Standard Penetration Split Spoon Sampler

California Modified Split Spoon Sampler

Log of Boring B1

Project: Retail Center

Project No: 112-20102

Client: HI Bermuda Dunes, LLC

Figure No.: A-1

Location: 42500 Washington Street, Bermuda Dunes, California

Logged By: Omar Batta

Depth to Water> Not Encountered

Initial: N/A

At Completion: N/A

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft	Water Content (%)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	20 40 60	10 20 30 40
0		Ground Surface						
0		***SILTY SAND (SM)*** Medium dense to dense, fine-grained; light brown, dry to damp						
6			111.4	7.6		28		
10			119.0	5.3		29		
15				1.1		26		
20								

Drill Method: Hollow Stem

Drill Date: 12-2-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: One Way Drilling

Elevation: 30 Feet

Log of Boring B1

Project: Retail Center

Project No: 112-20102

Client: HI Bermuda Dunes, LLC

Figure No.: A-1

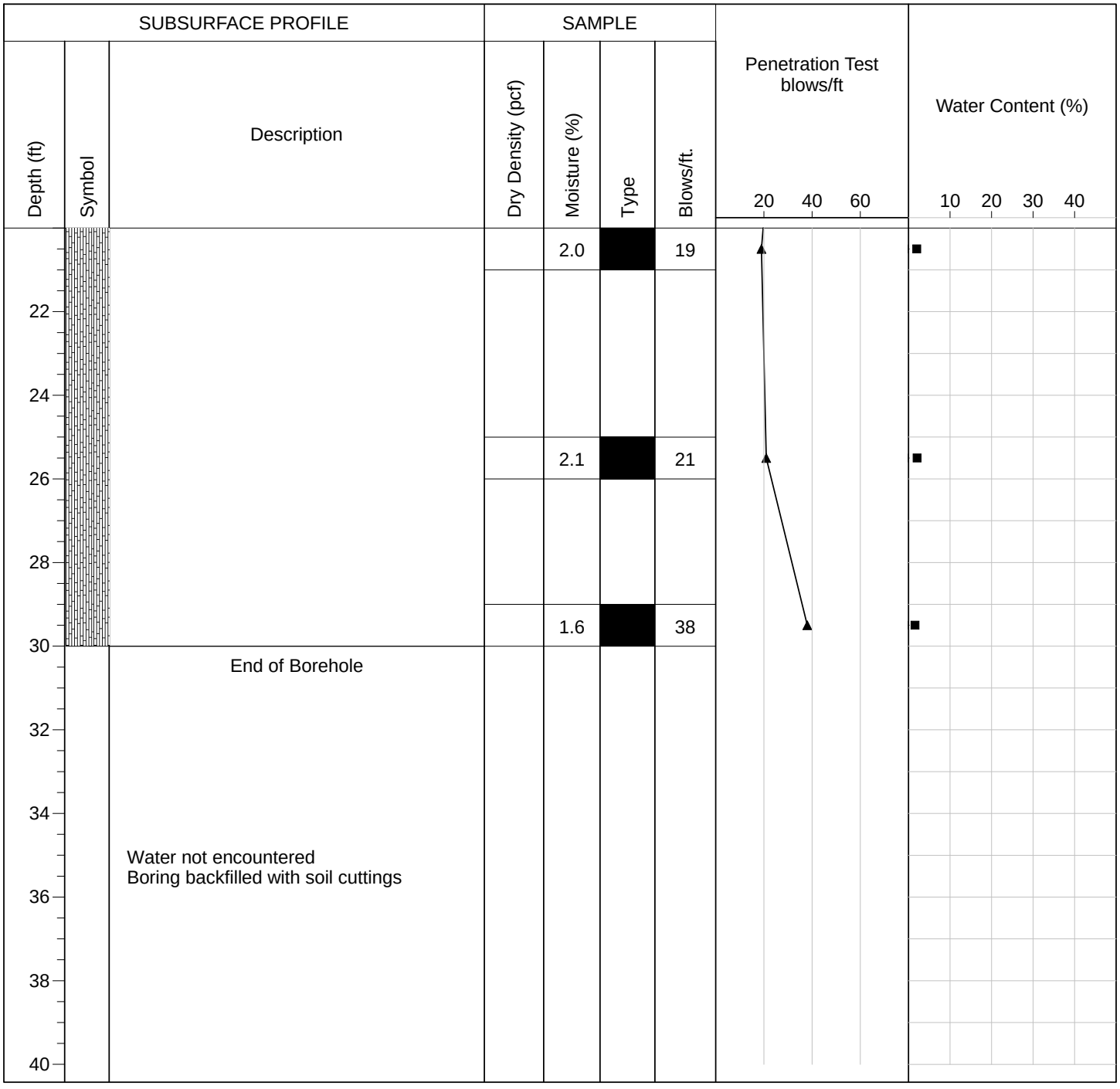
Location: 42500 Washington Street, Bermuda Dunes, California

Logged By: Omar Batta

Depth to Water> Not Encountered

Initial: N/A

At Completion: N/A



Drill Method: Hollow Stem

Drill Date: 12-2-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: One Way Drilling

Elevation: 30 Feet

Log of Boring B2

Project: Retail Center

Project No: 112-20102

Client: HI Bermuda Dunes, LLC

Figure No.: A-2

Location: 42500 Washington Street, Bermuda Dunes, California

Logged By: Omar Batta

Depth to Water> Not Encountered

Initial: N/A

At Completion: N/A

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY SAND (SM)*** Loose to medium dense, fine-grained; light brown, dry to damp				
6			106.8	1.4		21
10			116.5	0.8		36
12		End of Borehole				
18		Water not encountered Boring backfilled with soil cuttings				

Penetration Test blows/ft: 20, 40, 60

Water Content (%): 10, 20, 30, 40

Drill Method: Hollow Stem

Drill Date: 12-2-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: One Way Drilling

Elevation: 11½ Feet

Log of Boring B3

Project: Retail Center

Project No: 112-20102

Client: HI Bermuda Dunes, LLC

Figure No.: A-3

Location: 42500 Washington Street, Bermuda Dunes, California

Logged By: Omar Batta

Depth to Water> Not Encountered

Initial: N/A

At Completion: N/A

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY SAND (SM)*** Medium dense to dense, fine-grained; light brown, dry to damp				
6			104.9	0.5		21
10			108.8	1.1		32
16				1.0		20
18		Water not encountered Boring backfilled with soil cuttings				
20				0.9		22

Penetration Test blows/ft: 20, 40, 60

Water Content (%): 10, 20, 30, 40

Drill Method: Hollow Stem

Drill Date: 12-2-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: One Way Drilling

Elevation: 20 Feet

Log of Boring B4

Project: Retail Center

Project No: 112-20102

Client: HI Bermuda Dunes, LLC

Figure No.: A-4

Location: 42500 Washington Street, Bermuda Dunes, California

Logged By: Omar Batta

Depth to Water> Not Encountered

Initial: N/A

At Completion: N/A

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY SAND (SM)*** Medium dense to dense, fine-grained; light brown, dry to damp				
6			99.1	2.1		29
10			117.0	2.3		50
10		End of Borehole				
18		Water not encountered Boring backfilled with soil cuttings				

Penetration Test blows/ft: 20, 40, 60

Water Content (%): 10, 20, 30, 40

Drill Method: Hollow Stem

Drill Date: 12-2-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: One Way Drilling

Elevation: 10 Feet

Log of Boring B5

Project: Retail Center

Project No: 112-20102

Client: HI Bermuda Dunes, LLC

Figure No.: A-5

Location: 42500 Washington Street, Bermuda Dunes, California

Logged By: Omar Batta

Depth to Water> Not Encountered

Initial: N/A

At Completion: N/A

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY SAND (SM)*** Medium dense to dense, fine-grained; light brown, dry to damp				
6			112.2	4.6		22
10			116.5	1.6		31
16				0.6		20
18		Water not encountered Boring backfilled with soil cuttings				
20				1.5		31

Penetration Test blows/ft: 20, 40, 60

Water Content (%): 10, 20, 30, 40

Drill Method: Hollow Stem

Drill Date: 12-2-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: One Way Drilling

Elevation: 20 Feet

Log of Boring B6

Project: Retail Center

Project No: 112-20102

Client: HI Bermuda Dunes, LLC

Figure No.: A-6

Location: 42500 Washington Street, Bermuda Dunes, California

Logged By: Omar Batta

Depth to Water> Not Encountered

Initial: N/A

At Completion: N/A

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SILTY SAND (SM)*** Medium dense to dense, fine-grained; light brown, dry to damp				
6			102.5	0.4		28
10			115.5	1.0		30
15				1.4		26
18		Water not encountered Boring backfilled with soil cuttings				
20				1.9		33

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Hollow Stem

Drill Date: 12-2-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: One Way Drilling

Elevation: 20 Feet

Sieve Analysis

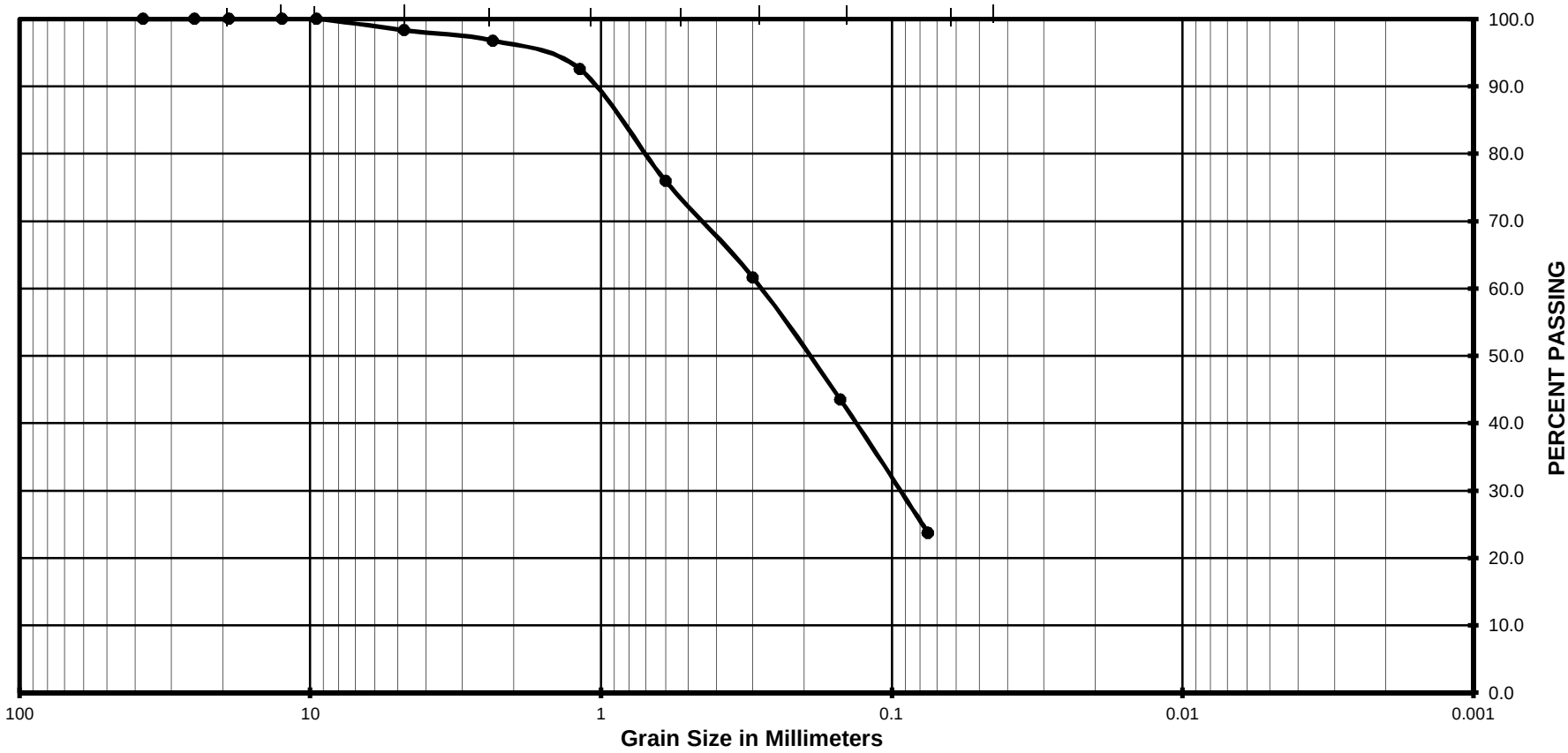
Project Number	:	11220102
Project Name	:	Multi-Use Retail Center
Date	:	12/29/2020
Sample Location	:	B-1 @ 5'
Soil Classification	:	SM

Wet Weight	:	516.10
Dry Weight	:	516.10
Moisture Content	:	0%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	8.6	1.7	1.7	98.3
#8	2.36	8.1	1.6	3.2	96.8
#16	1.18	21.9	4.2	7.5	92.5
#30	0.60	85.4	16.5	24.0	76.0
#50	0.30	74.1	14.4	38.4	61.6
#100	0.15	93.6	18.1	56.5	43.5
#200	0.08	102.0	19.8	76.3	23.7

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Multi-Use Retail Center
Project Number	11220102
Soil Classification	SM
Sample Number	B-1 @ 5'

Krazan Testing Laboratory

Sieve Analysis

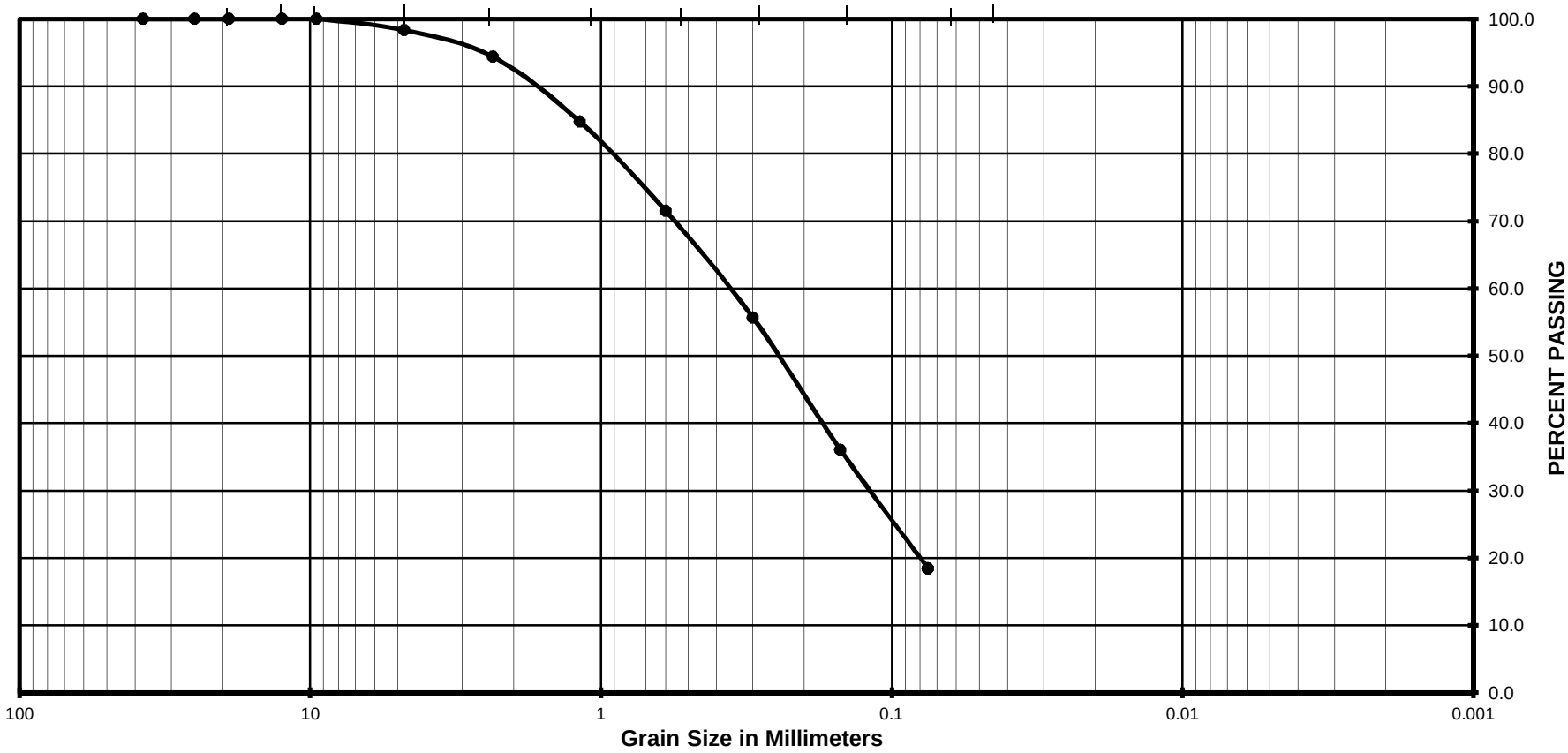
Project Number	:	11220102
Project Name	:	Multi-Use Retail Center
Date	:	12/29/2020
Sample Location	:	B-1 @ 10'
Soil Classification	:	SM

Wet Weight	:	607.40
Dry Weight	:	607.40
Moisture Content	:	0%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	10.1	1.7	1.7	98.3
#8	2.36	23.8	3.9	5.6	94.4
#16	1.18	58.9	9.7	15.3	84.7
#30	0.60	80.0	13.2	28.4	71.6
#50	0.30	96.4	15.9	44.3	55.7
#100	0.15	119.3	19.6	64.0	36.0
#200	0.08	106.7	17.6	81.5	18.5

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Multi-Use Retail Center
Project Number	11220102
Soil Classification	SM
Sample Number	B-1 @ 10'

Krazan Testing Laboratory

Sieve Analysis

Project Number	:	11220102
Project Name	:	Multi-Use Retail Center
Date	:	12/29/2020
Sample Location	:	B-1 @ 15'
Soil Classification	:	SM

Wet Weight	:	510.70
Dry Weight	:	510.70
Moisture Content	:	0%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50	26.6	5.2	5.2	94.8
#4	4.75	42.5	8.3	13.5	86.5
#8	2.36	39.2	7.7	21.2	78.8
#16	1.18	65.1	12.7	34.0	66.0
#30	0.60	99.9	19.6	53.5	46.5
#50	0.30	78.4	15.4	68.9	31.1
#100	0.15	46.3	9.1	77.9	22.1
#200	0.08	52.3	10.2	88.2	11.8

Krazan Testing Laboratory

Grain Size Analysis

Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Multi-Use Retail Center
Project Number	11220102
Soil Classification	SM
Sample Number	B-1 @ 15'

Krazan Testing Laboratory

Sieve Analysis

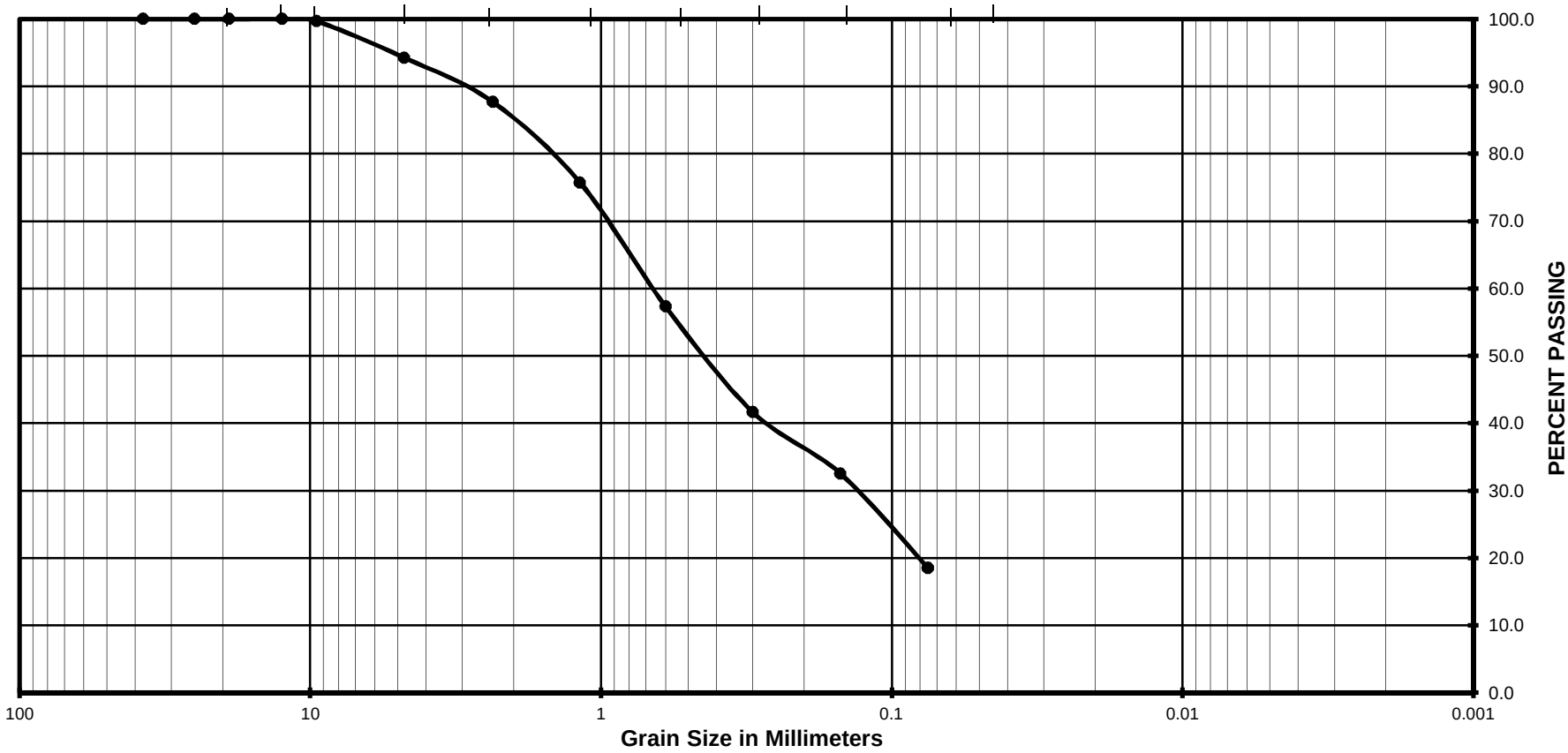
Project Number	:	11220102
Project Name	:	Multi-Use Retail Center
Date	:	12/29/2020
Sample Location	:	B-1 @ 20'
Soil Classification	:	SM

Wet Weight	:	492.40
Dry Weight	:	492.40
Moisture Content	:	0%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50	1.7	0.3	0.3	99.7
#4	4.75	26.6	5.4	5.7	94.3
#8	2.36	32.2	6.5	12.3	87.7
#16	1.18	59.1	12.0	24.3	75.7
#30	0.60	90.3	18.3	42.6	57.4
#50	0.30	77.5	15.7	58.4	41.6
#100	0.15	44.9	9.1	67.5	32.5
#200	0.08	68.9	14.0	81.5	18.5

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Multi-Use Retail Center
Project Number	11220102
Soil Classification	SM
Sample Number	B-1 @ 20'

Krazan Testing Laboratory

Sieve Analysis

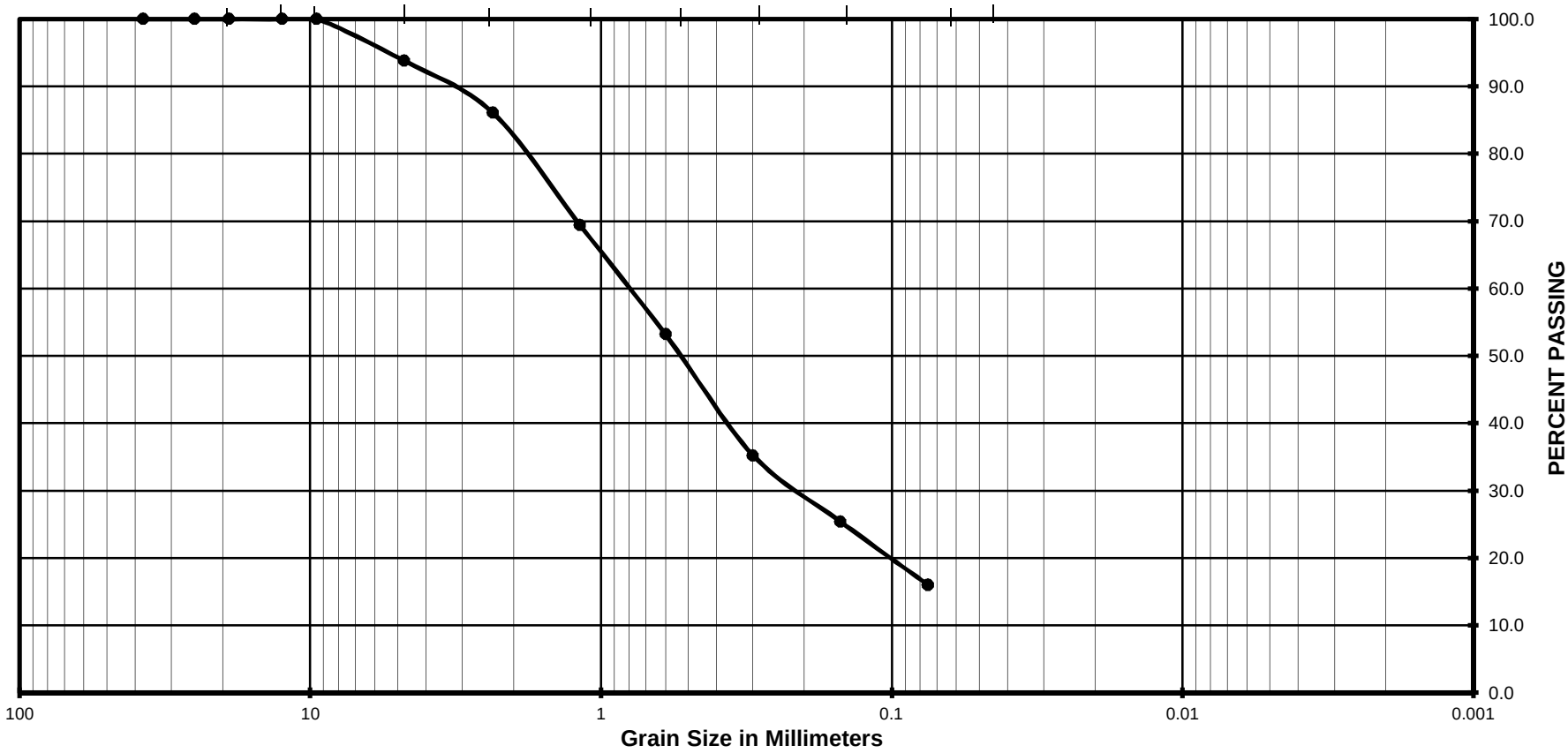
Project Number	:	11220102
Project Name	:	Multi-Use Retail Center
Date	:	12/29/2020
Sample Location	:	B-1 @ 25'
Soil Classification	:	SM

Wet Weight	:	553.00
Dry Weight	:	553.00
Moisture Content	:	0%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	34.4	6.2	6.2	93.8
#8	2.36	42.4	7.7	13.9	86.1
#16	1.18	92.4	16.7	30.6	69.4
#30	0.60	89.6	16.2	46.8	53.2
#50	0.30	99.3	18.0	64.8	35.2
#100	0.15	54.4	9.8	74.6	25.4
#200	0.08	52.0	9.4	84.0	16.0

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Multi-Use Retail Center
Project Number	11220102
Soil Classification	SM
Sample Number	B-1 @ 25'

Krazan Testing Laboratory

Sieve Analysis

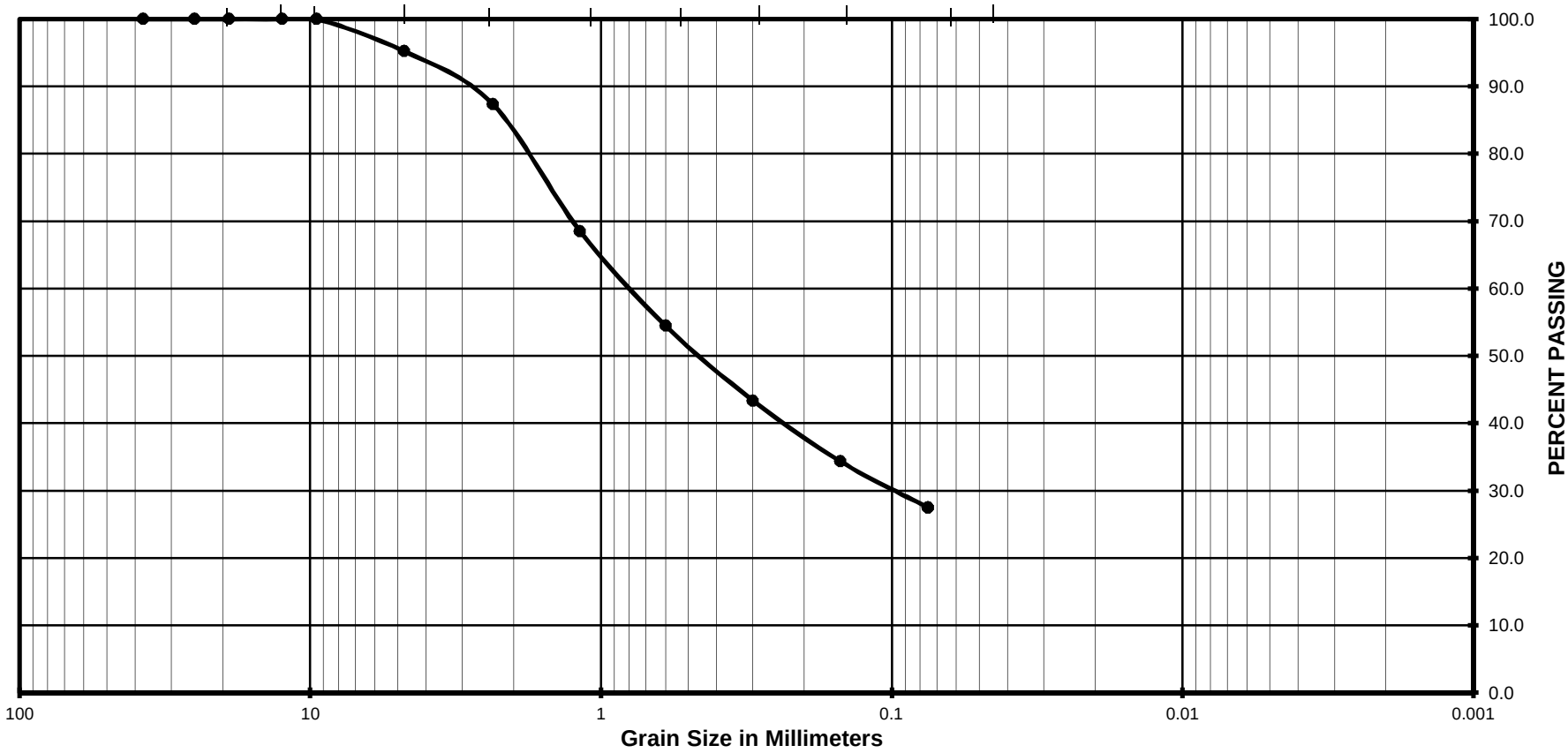
Project Number	:	11220102
Project Name	:	Multi-Use Retail Center
Date	:	12/29/2020
Sample Location	:	B-1 @ 30'
Soil Classification	:	SM

Wet Weight	:	529.00
Dry Weight	:	529.00
Moisture Content	:	0%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	25.4	4.8	4.8	95.2
#8	2.36	41.3	7.8	12.6	87.4
#16	1.18	100.0	18.9	31.5	68.5
#30	0.60	74.1	14.0	45.5	54.5
#50	0.30	58.8	11.1	56.6	43.4
#100	0.15	47.8	9.0	65.7	34.3
#200	0.08	36.2	6.8	72.5	27.5

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Multi-Use Retail Center
Project Number	11220102
Soil Classification	SM
Sample Number	B-1 @ 30'

Krazan Testing Laboratory

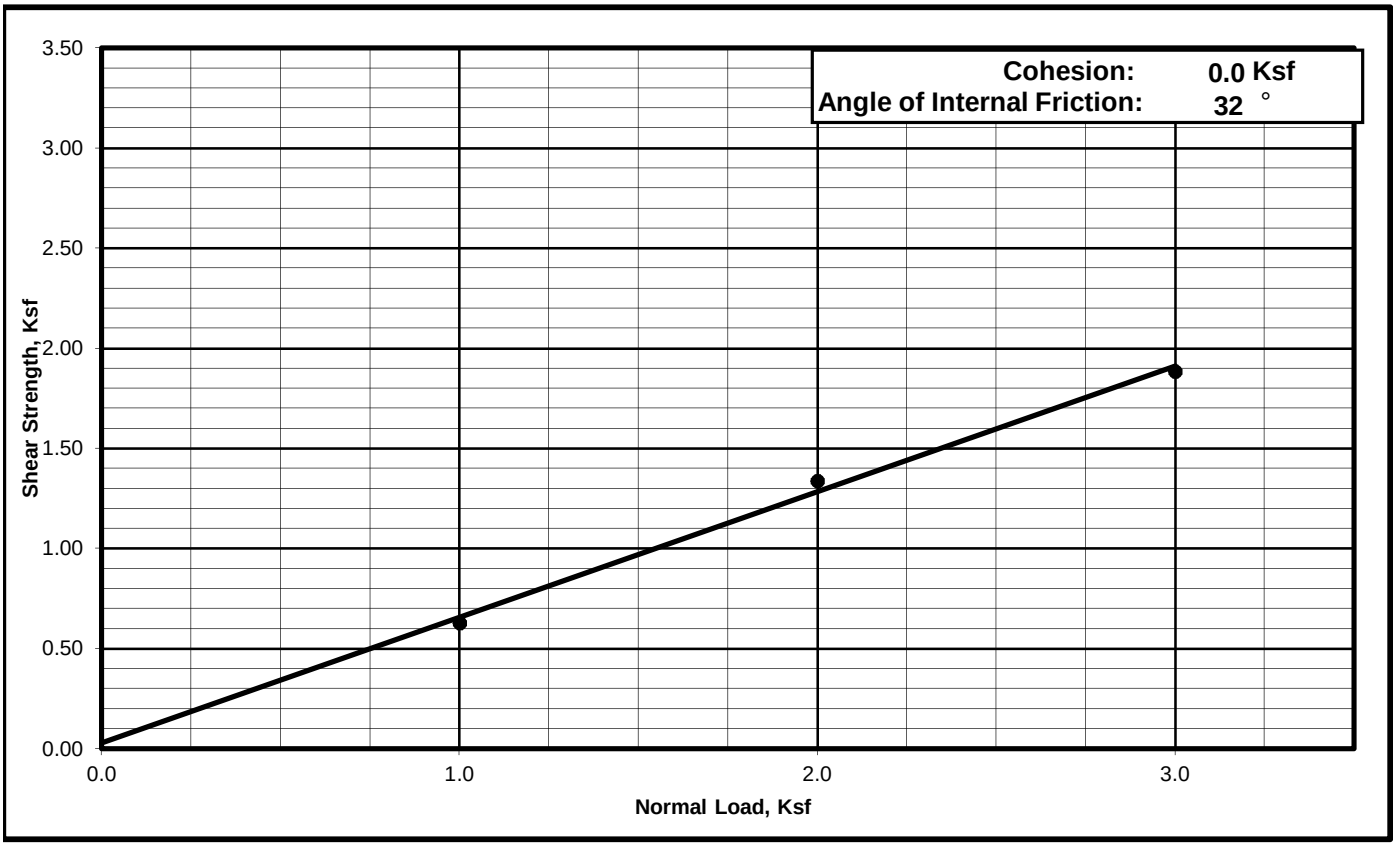
Direct Shear of Consolidated, Drained Soils
ASTM D - 3080 / AASHTO T - 236

Project Number	:	11220102
Project Name	:	Multi-Use Retail Center
Date	:	12/30/2020
Sample Location	:	B-3 @ 5'
Soil Classification	:	SM
Sample Surface Area	:	0.0289

STRESS DISPLACEMENT DATA

Lat. Disp. (in.)	Normal Load		
	1000	2000	3000
0	0	83.2	110.6
0.030	30.2	110.2	148.8
0.060	39.9	118.9	163.6
0.090	48.8	119.6	166.8
0.120	54	0	169
0.150	51.2	0	0
0.180	0	0	138.4
0.210	0	0	140.7
0.240	0	0	144.8
0.270	0	0	147.2
0.300	0	0	154.3
0.330	0	0	160.2
0.360	0	0	164.2

Normal Load psf	Shear force lbs	Shear Stress psf
1000	77.6	629
2000	171.1	1338
3000	243.7	1884

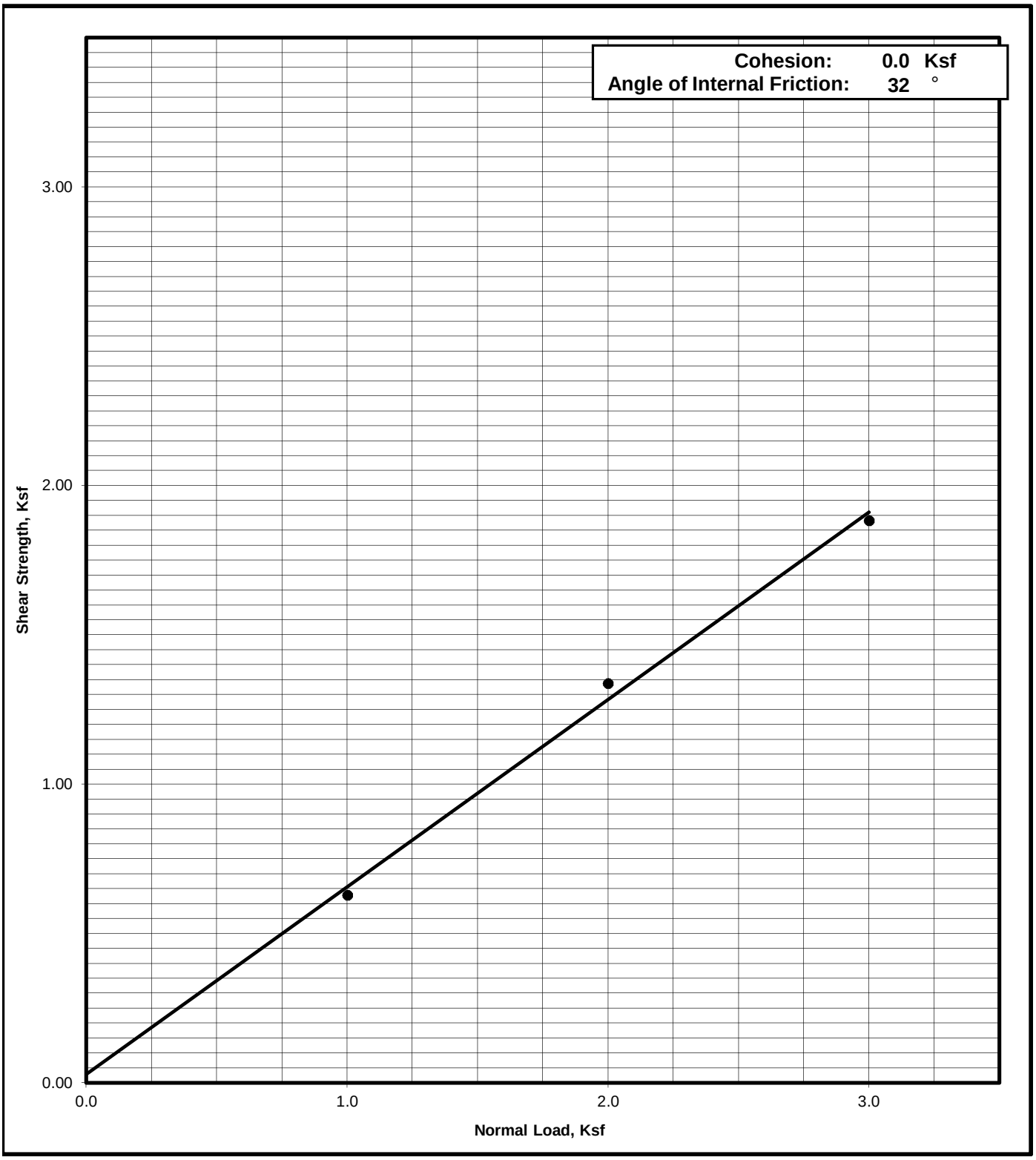


Shear Strength Diagram (Direct Shear)

Krazan Testing Laboratory

ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
11220102	B-3 @ 5'	SM	12/30/2020



Krazan Testing Laboratory

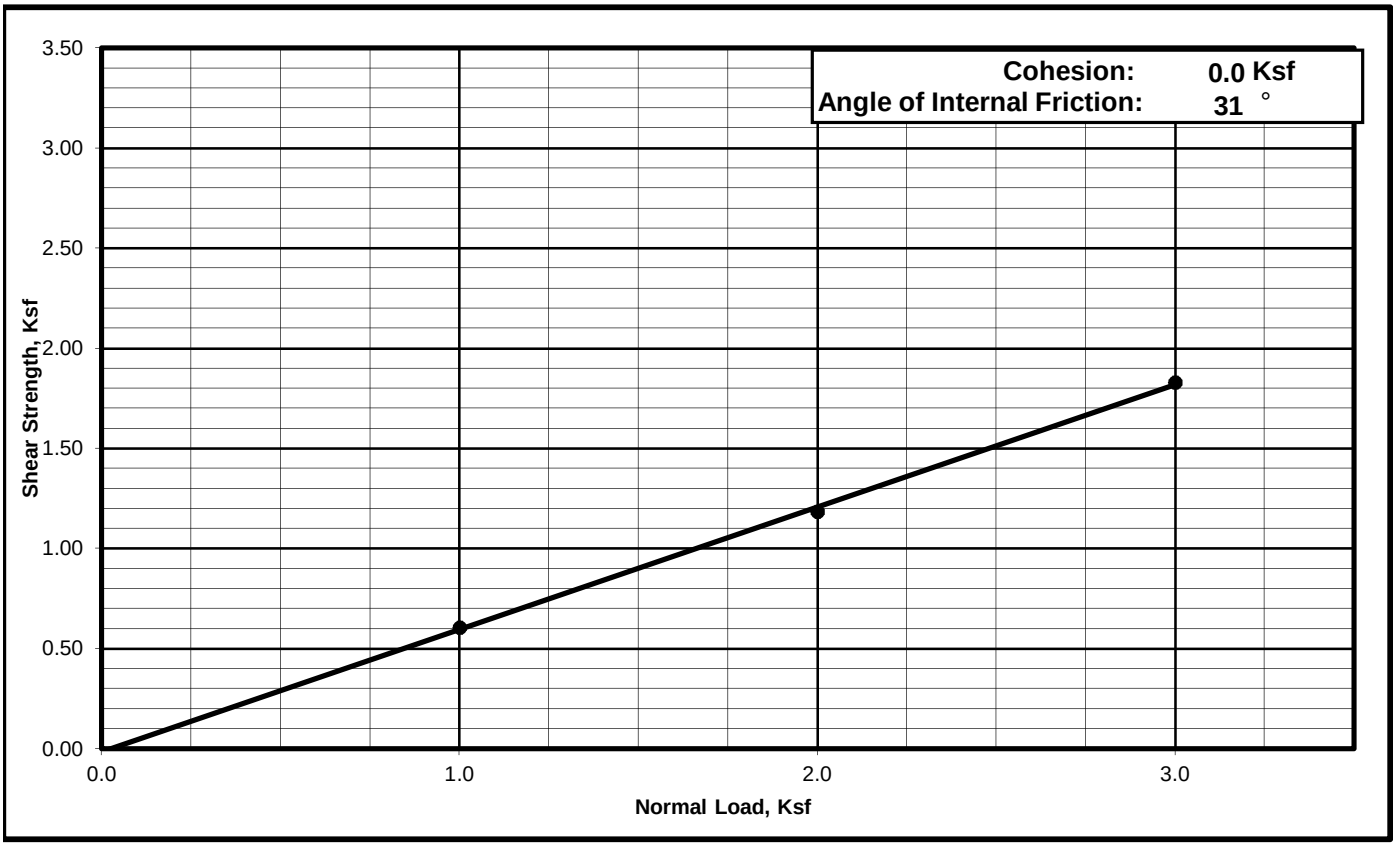
Direct Shear of Consolidated, Drained Soils
ASTM D - 3080 / AASHTO T - 236

Project Number	:	11220102
Project Name	:	Multi-Use Retail Center
Date	:	12/30/2020
Sample Location	:	B-5 @ 5'
Soil Classification	:	SM
Sample Surface Area	:	0.0289

STRESS DISPLACEMENT DATA

Lat. Disp. (in.)	Normal Load		
	1000	2000	3000
0	0	0	0
0.030	28.6	64.6	100
0.060	40	84	140
0.090	43.4	88	161.6
0.120	44	88	162
0.150	52	105	162
0.180	0	0	138.4
0.210	0	0	140.7
0.240	0	0	144.8
0.270	0	0	147.2
0.300	0	0	154.3
0.330	0	0	160.2
0.360	0	0	164.2

Normal Load psf	Shear force lbs	Shear Stress psf
1000	74.8	607
2000	151.0	1185
3000	236.4	1829

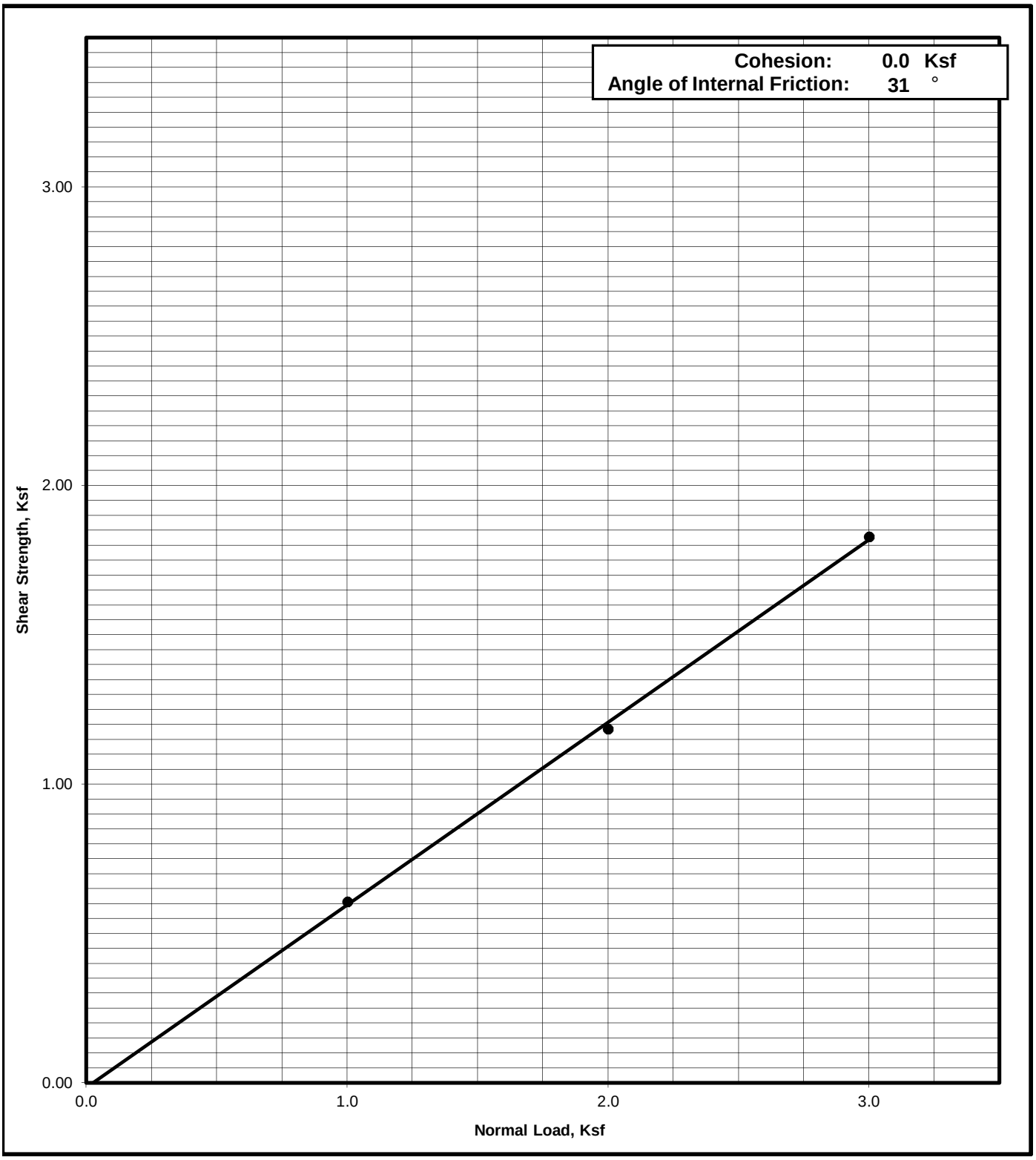


Shear Strength Diagram (Direct Shear)

Krazan Testing Laboratory

ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
11220102	B-5 @ 5'	SM	12/30/2020



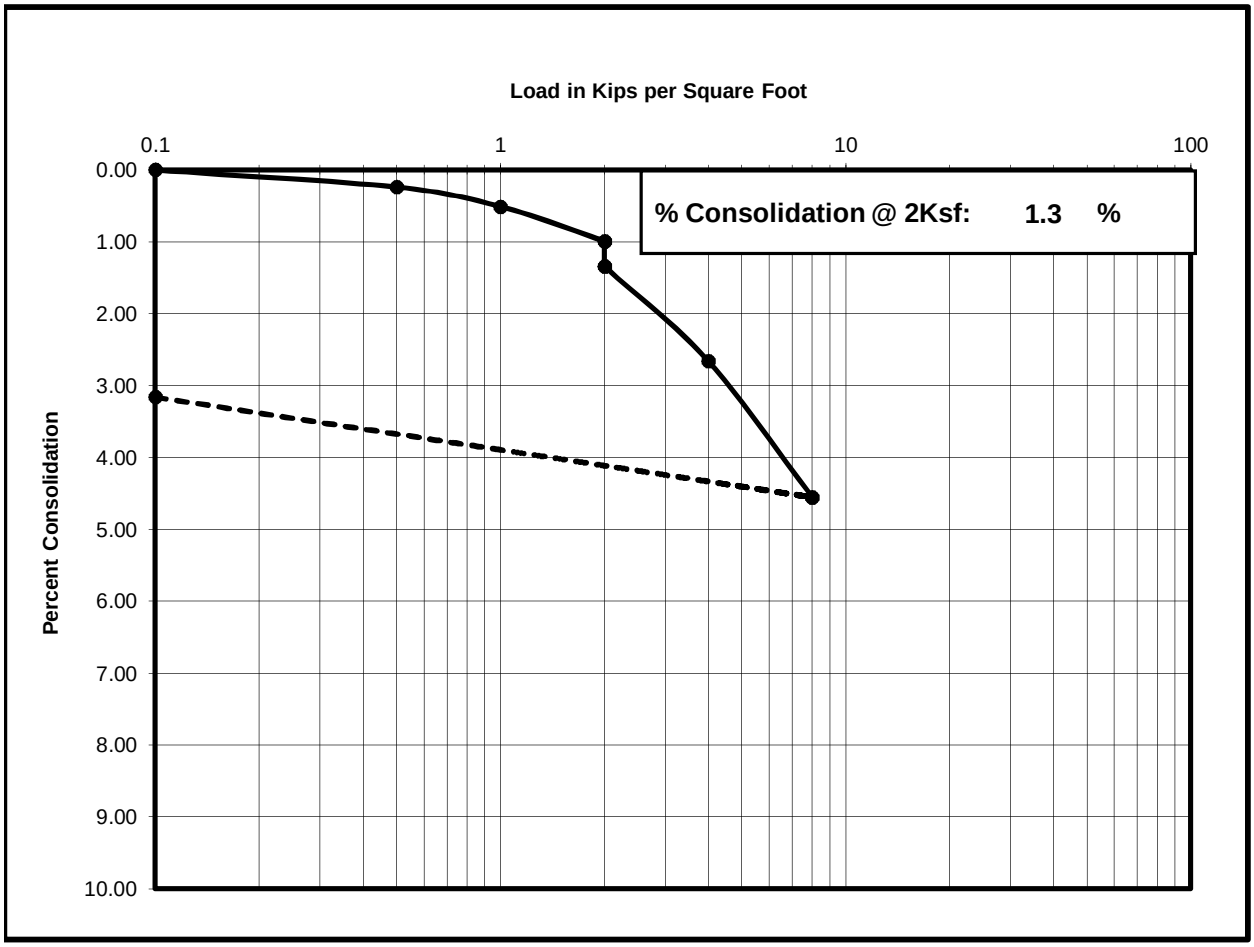
Krazan Testing Laboratory

One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

Project Number : 11220102
Project Name : Multi-Use Retail Center
Date : 12/30/2020
Sample Location : B-1 @ 5'
Soil Classification : SM
Sample Condition : Undisturbed

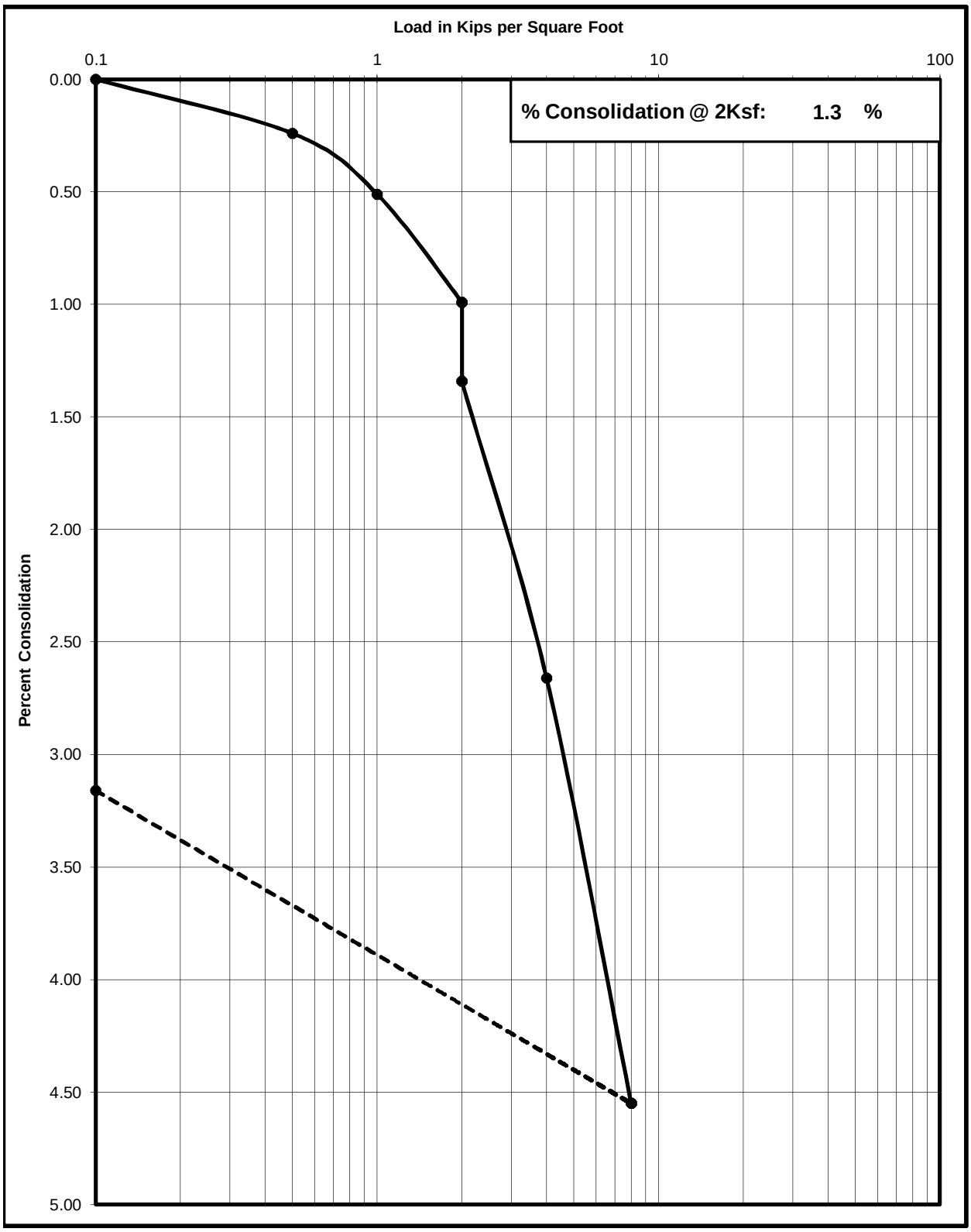
LOAD (ksf)	Reading	% Consolidation
0.1	0.0004	--
0.5	0.0024	0.24
1	0.0051	0.51
2	0.0099	0.99
Satur.	0.0134	1.34
4	0.0266	2.66
8	0.0455	4.55
0.1	0.0316	3.16



Krazan Testing Laboratory

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
11220102	B-1 @ 5'	12/30/2020	SM



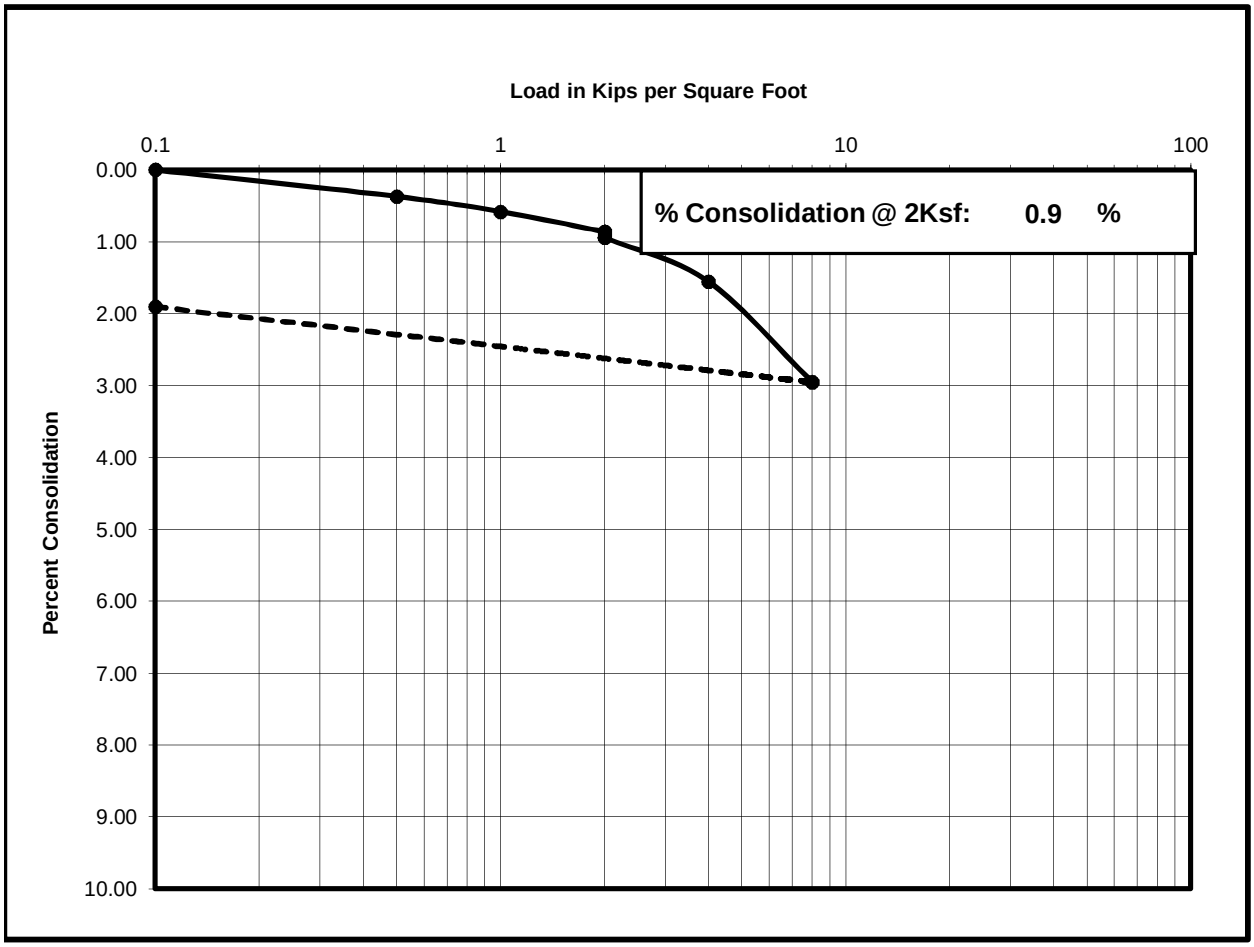
Krazan Testing Laboratory

One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

Project Number : 11220102
Project Name : Multi-Use Retail Center
Date : 12/30/2020
Sample Location : B-1 @ 10'
Soil Classification : SM
Sample Condition : Undisturbed

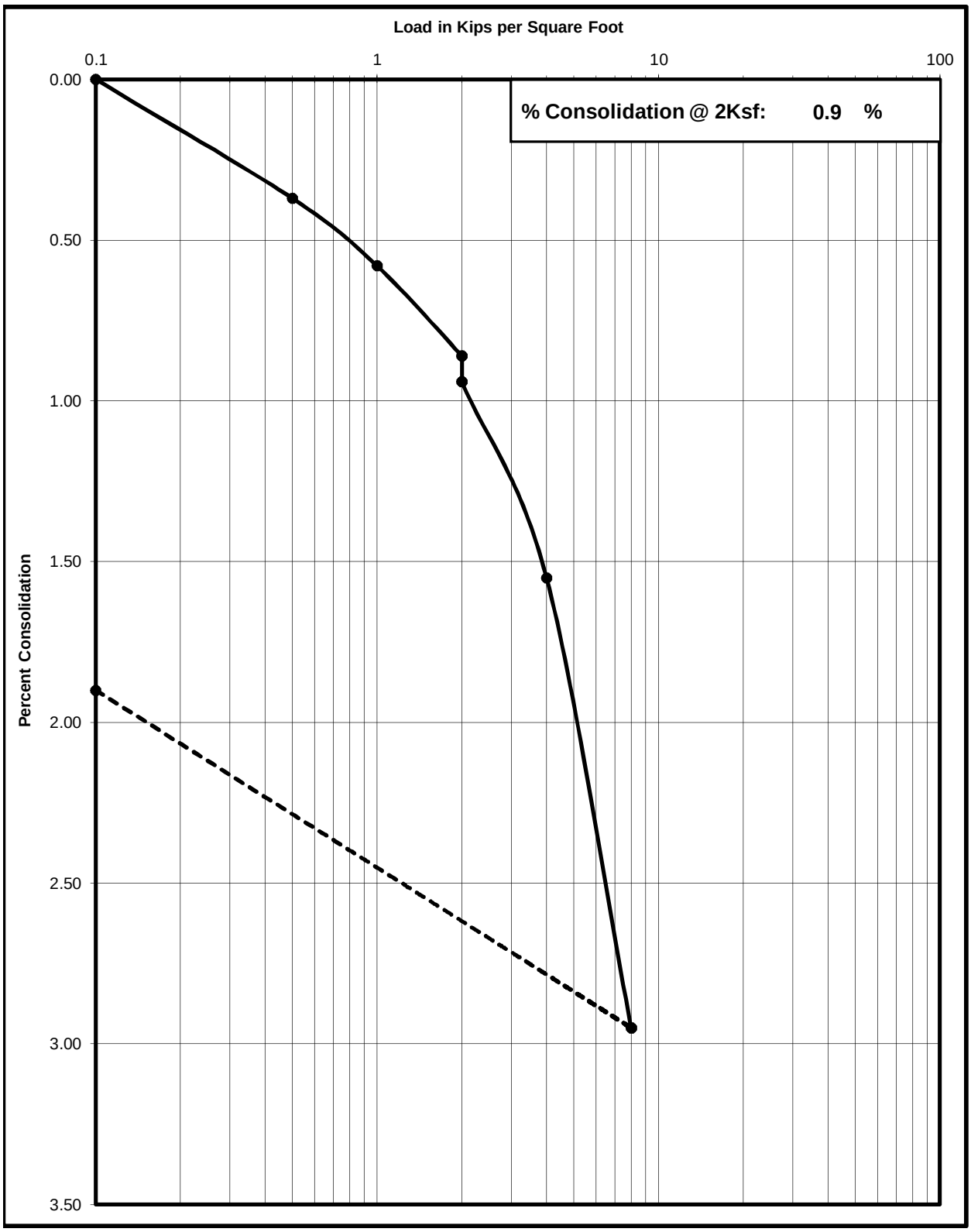
LOAD (ksf)	Reading	% Consolidation
0.1	0.0008	--
0.5	0.0037	0.37
1	0.0058	0.58
2	0.0086	0.86
Satur.	0.0094	0.94
4	0.0155	1.55
8	0.0295	2.95
0.1	0.019	1.90



Krazan Testing Laboratory

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
11220102	B-1 @ 10'	12/30/2020	SM



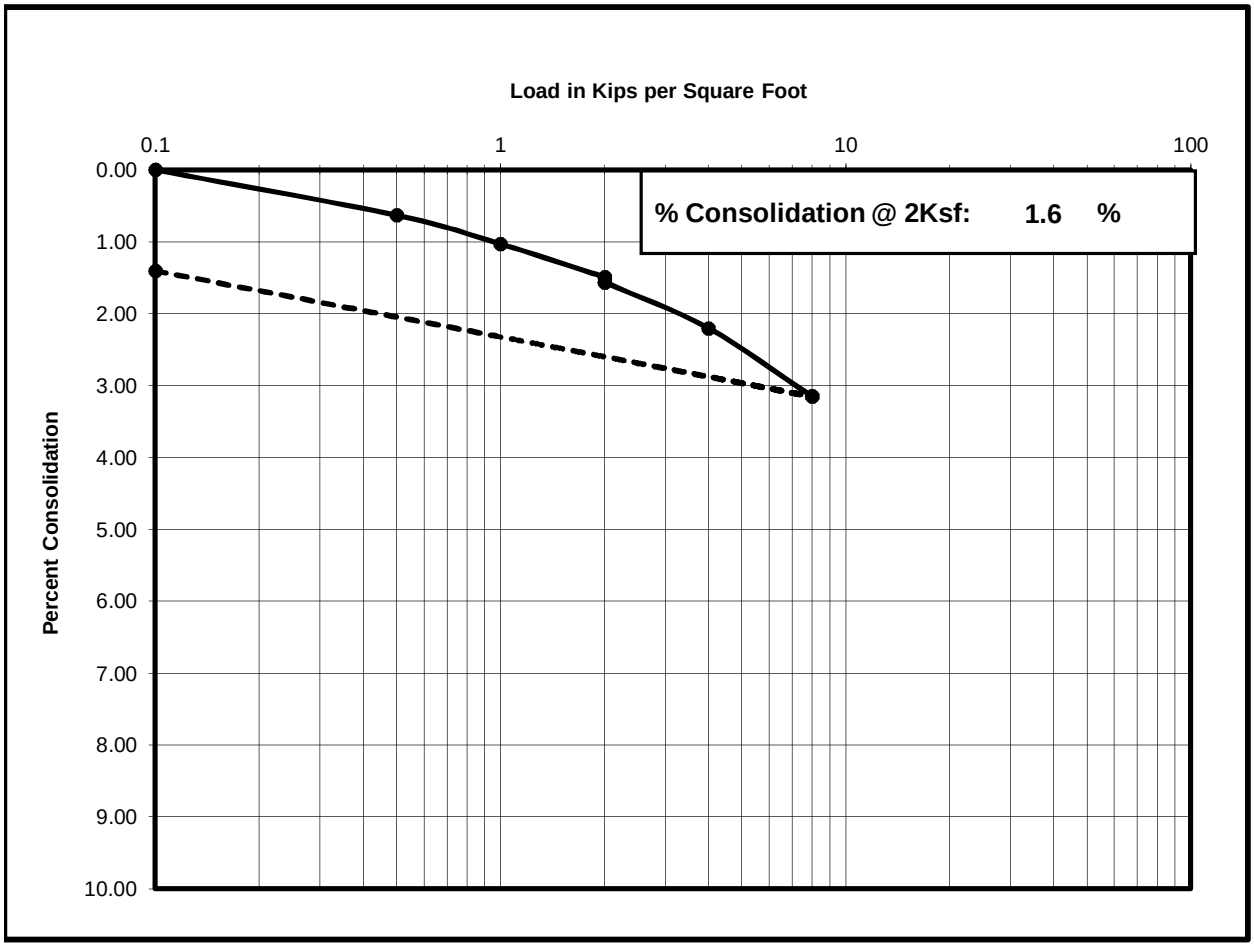
Krazan Testing Laboratory

One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

Project Number : 11220102
Project Name : Multi-Use Retail Center
Date : 12/30/2020
Sample Location : B-6 @ 5'
Soil Classification : SM
Sample Condition : Undisturbed

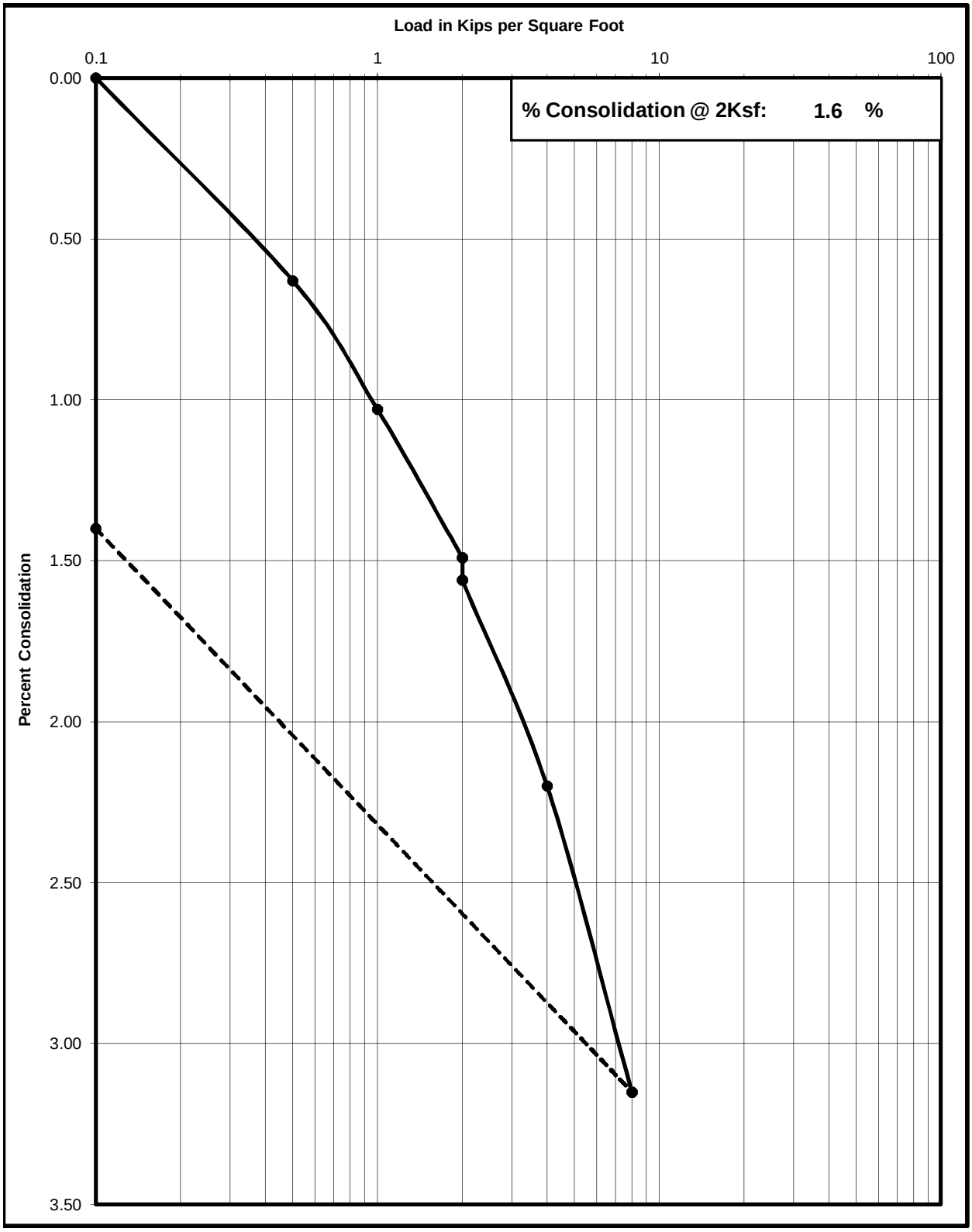
LOAD (ksf)	Reading	% Consolidation
0.1	0.0018	--
0.5	0.0063	0.63
1	0.0103	1.03
2	0.0149	1.49
Satur.	0.0156	1.56
4	0.022	2.20
8	0.0315	3.15
0.1	0.014	1.40



Krazan Testing Laboratory

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
11220102	B-6 @ 5'	12/30/2020	SM



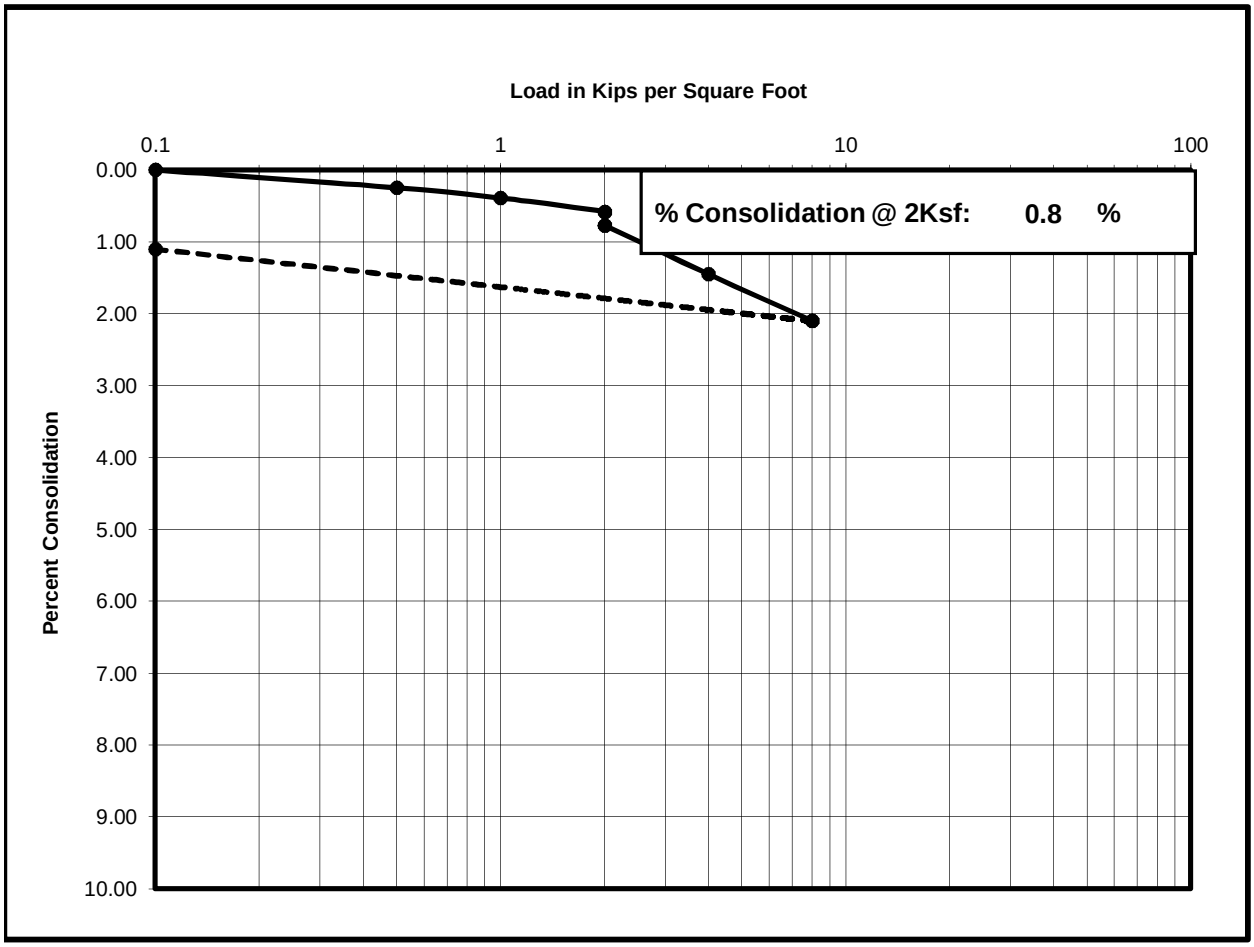
Krazan Testing Laboratory

One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

Project Number : 11220102
Project Name : Multi-Use Retail Center
Date : 12/30/2020
Sample Location : B-6 @ 10'
Soil Classification : SM
Sample Condition : Undisturbed

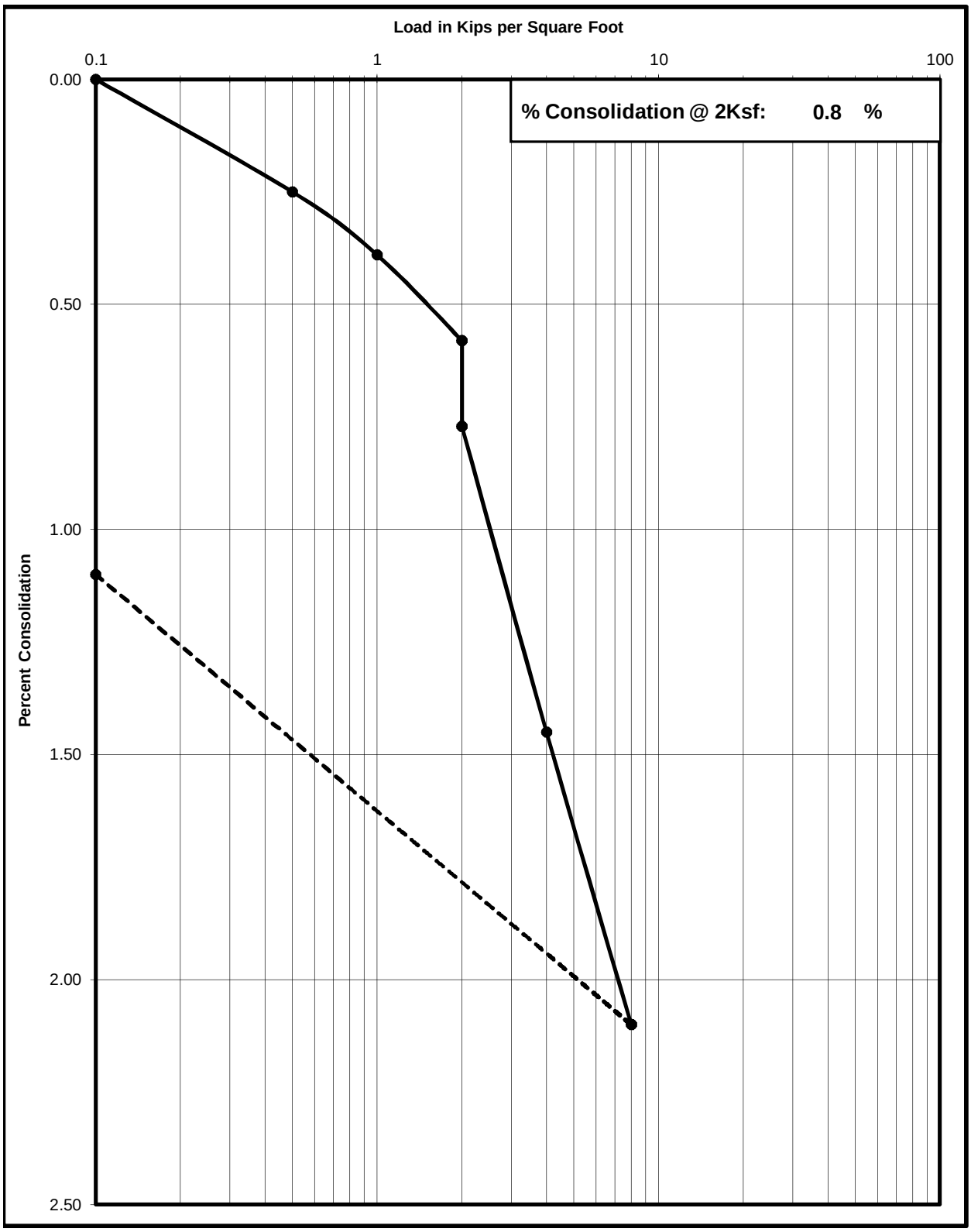
LOAD (ksf)	Reading	% Consolidation
0.1	0.0005	--
0.5	0.0025	0.25
1	0.0039	0.39
2	0.0058	0.58
Satur.	0.0077	0.77
4	0.0145	1.45
8	0.021	2.10
0.1	0.011	1.10



Krazan Testing Laboratory

Consolidation Test

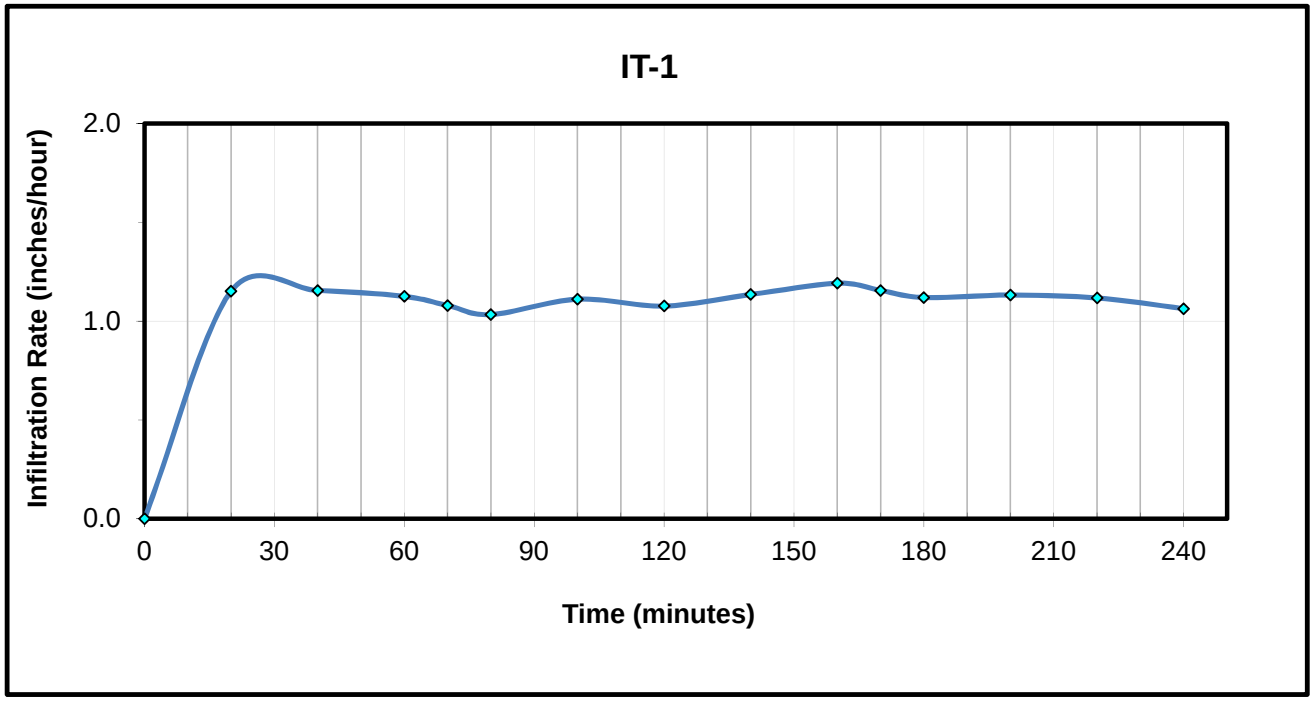
Project No	Boring No. & Depth	Date	Soil Classification
11220102	B-6 @ 10'	12/30/2020	SM



Krazan Testing Laboratory

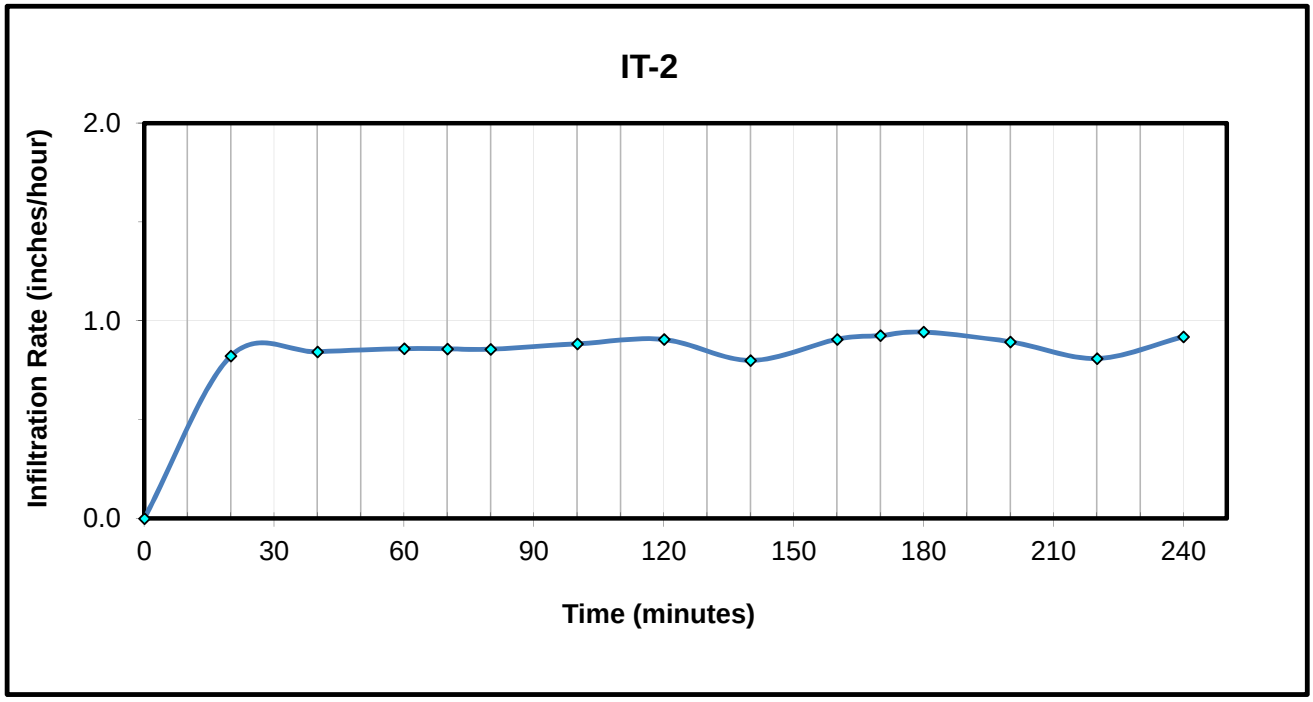
RESULTS OF INFILTRATION TESTS - REVERSE BOREHOLE						
Project #	**11218058**				**Date**	**6/11/2018**
Project Name	Quick Quack Car Wash Palm Springs					
Project Address	Palm Springs, CA					
Test No:	IT-1	**Total Depth (in.)**		60	**Test Size (in)**	9
Depth To Water	>50'	**Soil Classification**		SP		

Reading	Elasped Time(min.)	Incremental Time (min.)	Initial Depth To Water(in.)	Final Depth To Water(in.)	Incremental Fall of Water(in.)	Incremental Infiltration Rate (in/hr)
Start	0	0.00		7.0	--	--
1	20.00	20.00	7.0	14.5	7.50	1.15
2	40.00	20.00	14.5	21.0	6.50	1.15
3	60.00	20.00	21.0	26.5	5.50	1.13
Refilled	70.00				6.25	1.08
4	80.00	20.00	6.0	13.0	7.00	1.03
5	100.00	20.00	13.0	19.5	6.50	1.11
6	120.00	20.00	19.5	25.0	5.50	1.08
7	140.00	20.00	25.0	30.0	5.00	1.13
8	160.00	20.00	30.0	34.5	4.50	1.19
Refilled	170.00				6.25	1.16
9	180.00	20.00	2.0	10.0	8.00	1.12
10	200.00	20.00	10.0	17.0	7.00	1.13
11	220.00	20.00	17.0	23.0	6.00	1.12
12	240.00	20.00	23.0	28.0	5.00	1.06
	Infiltration Rate in Inches per Hour					**1.03**



RESULTS OF INFILTRATION TESTS - REVERSE BOREHOLE						
Project #	**11220102**				**Date**	**12/29/2020**
Project Name	Multi-Use Retail Center					
Project Address	42500 Washington Street, Bermuda Dunes, CA					
Test No:	IT-2	**Total Depth (in.)**		60	**Test Size (in)**	9
Depth To Water	>50'	**Soil Classification**		SP		

Reading	Elasped Time(min.)	Incremental Time (min.)	Initial Depth To Water(in.)	Final Depth To Water(in.)	Incremental Fall of Water(in.)	Incremental Infiltration Rate (in/hr)
Start	0	0.00		4.0	--	--
1	20.00	20.00	4.0	10.0	6.00	0.82
2	40.00	20.00	10.0	15.5	5.50	0.84
3	60.00	20.00	15.5	20.5	5.00	0.86
Refilled	70.00				5.50	0.86
4	80.00	20.00	6.0	12.0	6.00	0.86
5	100.00	20.00	12.0	17.5	5.50	0.88
6	120.00	20.00	17.5	22.5	5.00	0.91
7	140.00	20.00	22.5	26.5	4.00	0.80
8	160.00	20.00	26.5	30.5	4.00	0.91
Refilled	170.00				5.25	0.93
9	180.00	20.00	6.0	12.5	6.50	0.94
10	200.00	20.00	12.5	18.0	5.50	0.89
11	220.00	20.00	18.0	22.5	4.50	0.81
12	240.00	20.00	22.5	27.0	4.50	0.92
	Infiltration Rate in Inches per Hour					**0.80**



ANAHEIM TEST LAB, INC

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

Krazan & Associates, Inc.
1100 Olympic Drive, Ste. 103
Corona, CA 92881

DATE: 12/9/2020

P.O. NO: Verbal

LAB NO: C-4340

SPECIFICATION: CTM-643/417/422

MATERIAL: Soil

Project No: 11220102
42500 Washington Street, Bermuda Dunes
Sample ID: B-1 @ 0'-5'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	MIN. RESISTIVITY per CT. 643 ohm-cm	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm
8.0	6,400	136	65

RESPECTFULLY SUBMITTED

WES BRIDGER LAB MANAGER

Appendix B

General Earthwork Specifications

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

General Paving Specifications

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

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

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

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

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

6. ASPHALTIC CONCRETE SURFACING - Asphaltic concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades and dimensions shown on the plans. The viscosity grade of the asphalt shall be PG 64-10. The mineral aggregate shall be Type B, ½ inch maximum size, medium grading and shall conform to the requirements set forth in Section 39 of the 2010 Standard Specifications. The drying, proportioning and mixing of the materials shall conform to Section 39 of the 2010 Standard Specifications, as well.

The prime coat, spreading and compacting equipment and spreading and compacting mixture shall conform to the applicable chapters of Section 39 of the 2010 Standard Specifications, with the exception that no surface course shall be placed when the atmospheric temperature is below 50º F. The surfacing shall be rolled with a combination of steel wheel and pneumatic rollers, as described in Section 39-6 of the 2010 Standard Specifications. 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.

March 28, 2022 KA Project No. 112-20102

Mr. Connor Glasco
HI Bermuda Dunes LLC
225 Bella Vista Avenue
Pasadena, CA 91107
P: 626.243.5292
Connor.glasco@hridevelopment.com

RE: **Addendum Letter**
Geotechnical Engineering Investigation
Proposed Mixed-Use Center
42500 Washington Street
Bermuda Dunes, California

Reference: *Geotechnical Engineering Investigation, Proposed Mixed-Use Center, 42500 Washington Street, Bermuda Dunes, California*, Prepared by Krazan & Associates, dated December 30, 2020.

Dear Mr. Glasco:

In accordance with your request, we have prepared this letter to respond to a request for additional information following a review of the referenced Geotechnical Engineering Investigation report by the County of Riverside. This request was provided to our office by HRI Development. A request was made to provide this addendum in regards to the low liquefaction potential at the project site referenced above.

SOIL LIQUEFACTION

Seismicity is a general term relating to the abrupt release of accumulated strain energy in the rock materials of the earth's crust in a given geographical area. The recurrence of accumulation and subsequent release of strain have resulted in faults and fault systems. Fault patterns and density reflect relative degrees of regional stress through time, but do not necessarily indicate recent seismic activity; therefore, the degree of seismic risk must be determined or estimated by the seismic record in any given region.

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 under saturated conditions in soils such as sand in which the strength is purely frictional. However, liquefaction has occurred in soils other than clean sand. Liquefaction usually occurs under vibratory conditions such as those induced by seismic event.

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

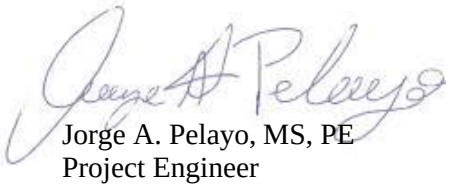
1) Soil type
2) Groundwater depth
3) Relative density
4) Initial confining pressure
5) Intensity and duration of ground shaking

The predominant soils encountered within the project site generally consist of medium dense to dense silty sand. Groundwater was not encountered below the site within a depth of 30 feet during our exploratory drilling. Available groundwater depth mapping, as well as our experience in the area, indicates that groundwater elevations measured in the vicinity of the project site were typically encountered at depths in excess of 50 feet below site grades. A Liquefaction Hazard Map has not been prepared for the subject site. Also, according to the County of Riverside Liquefaction Map, groundwater is not expected in the upper 50 feet below current site grades. Therefore, it is our opinion that the site is not located within a potential liquefaction zone.

Based on our analysis, the potential for soil liquefaction within the project site is very low due to the depth of groundwater and the dense nature of the subsurface soils encountered within this area. Accordingly, measures to mitigate seismic induced liquefaction are not considered warranted for the subject site.

If you have any questions, or if we can be of further assistance, please do not hesitate to contact our office at (951) 273-1011.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.



Jorge A. Pelayo, MS, PE
Project Engineer
RCE No. 91269

November 11, 2022 KA Project No. 112-20102

RE: Update to Geotechnical Engineering Investigation Report
Proposed Day Care Facility and Apartment Complex
42500 Washington Street
Bermuda Dunes, California

Reference: Geotechnical Engineering Investigation, Proposed Multi-Use Retail Center, 42500 Washington Street, Bermuda Dunes, California. Project No. 112-20102, dated December 30, 2020.

Addendum Letter to Geotechnical Engineering Investigation, Proposed Mixed-Use Center, 42500 Washington Street, Bermuda Dunes, California. Project No. 112-20102, dated March 28, 2022.

To Whom it May Concern:

In accordance with your request, we are providing this letter to update our previous Geotechnical Engineering Investigation report, KA Project No. 112-20102, dated December 30, 2020 and Addendum Letter, KA Project No. 112-20102, dated March 28, 2022 for the above-referenced project site.

Based on our review of the proposed site plan and our discussions with the project representative, we understand that the proposed site plan and development would be similar to those described in the referenced Geotechnical Engineering Investigation report with the exception of replacing the Drive-Thru restaurant building with a 4-story apartment complex . It is understood that development of the site will consist of a new 4-story multi-family residential apartment consisting of approximately 43 units with grade-level parking, trash enclosures and localized planter areas at the eastern portion of the site. For the western portion, a 1-story day-care facility is proposed including a trash enclosure, on-site parking and driving areas, and localized planter areas. The proposed buildings are understood to be a wood, steel, or masonry framed structures. It is anticipated that the proposed buildings will be utilizing a shallow foundation system and slab-on-grade construction. Foundation loads are anticipated to be relatively moderate. Concrete slabs and buried utility lines may be associated with the proposed development.

Based on our recent observation of the subject site, review of the previous geotechnical investigation report including the addendum letter, and review of the proposed development site plan, the site and proposed development is consistent with the conclusions and recommendations of the previous Geotechnical Engineering Investigation report including the addendum letter for the majority of the proposed development except for the 4-story building pad. Additional information to conform to seismic design requirements of the 2019 California Building Code (2019 CBC) and remedial grading for the 4-story building pad are provided below.

In the event these structural or grading details are inconsistent with the final design criteria, we should be notified so that we can evaluate the potential impacts of the changes on the recommendations presented in this report and provide an updated report as necessary.

The Site Class per Section 1613 of the 2019 California Building Code (2019 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. For seismic design of the structures based on the seismic provisions of the 2019 CBC, we recommend the following parameters:

Seismic Item	Value	CBC Reference
Site Class	D	Section 1613.2.2
Site Coefficient F_a	1.000	Table 1613.2.3 (1)
S_S	1.874	Section 1613.2.1
S_{MS}	1.874	Section 1613.2.3
S_{DS}	1.250	Section 1613.2.4
Site Coefficient F_v	1.700	Table 1613.2.3 (2)
S_1	0.712	Section 1613.2.1
S_{M1}	1.210	Section 1613.2.3
S_{D1}	0.807	Section 1613.2.4
T_S	0.646	Section 1613.2
PGA_M	0.851	Figure 22.7

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

Site Preparation – Clearing and Stripping

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

Any excavations that result from clearing operations should be backfilled with Engineered Fill. Krazan & Associates' field staff should be present during site clearing operations to enable us to locate areas where depressions or disturb soils are present and to allow our staff to observe and test the backfill as it is placed. If site clearing and backfilling operations occur without appropriate observation and testing by a qualified geotechnical consultant, there may be the need to over-excavate the building areas to identify uncontrolled fills prior to mass grading of the building pads.

As with site clearing operations, any buried structures encountered during construction should be properly removed and backfilled. The resulting excavations should be backfilled with Engineered Fill.

Overexcavation and Recompaction – Building and Foundation Areas for the 4-Story Apartment

Presently, the site consists of a vacant parcel free from any above grade structures. The site is surrounded by the adjacent existing commercial developments, residential developments, and city streets beyond.

Associated with the existing and surrounding developments may be buried structures, such as utility lines and irrigation lines that extend into the project site. Demolition activities should include proper removal of any buried structures or loosely backfilled excavations encountered. The resulting excavations should be backfilled with Engineered Fill. It is suspected that demolition activities of the existing structures will disturb the upper soils. After demolition activities, it is recommended that these disturbed soils be removed and/or recompacted. This compaction effort should stabilize the upper soils and locate any unsuitable or pliant areas not found during our field investigation.

To reduce post-construction soil movement and provide uniform support for the building, overexcavation and recompaction within the proposed building footprint areas should be performed to a minimum depth of at least five (5) feet below existing grades or three (3) feet below the bottom of the proposed foundation bearing grades, whichever is deeper. In addition, any fill soil present in the building area should be removed and re-placed as compacted Engineered Fill. The actual depth of the overexcavation and recompaction should be determined by our field representative during construction. The exposed subgrade at the base of the overexcavation should then be scarified, moisture-conditioned as necessary, and compacted. The overexcavation and recompaction should also extend laterally five feet (5') beyond edges of the proposed footings or building limits. Any undocumented fill encountered during grading should be removed and replaced with Engineered Fill. Over excavated soil should be worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture-content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM Test Method D1557. Prior to backfilling, the exposed subgrade soils should be scarified to a depth of 6 inches, moisture-conditioned to a minimum of 2 percent above optimum moisture-content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM Test Method D1557.

Foundations - Conventional

After completion of the proposed site preparation, the site should be suitable for shallow foundation support bearing on a minimum of three (3) feet of Engineered Fill. Spread and continuous footings can be designed for the following maximum allowable soil bearing pressures:

Load	Allowable Loading
Dead Load Only	2,000 psf
Dead-Plus-Live Load	2,600 psf
Total Load, including wind or seismic loads	3,500 psf

The footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Footings should have a minimum width of 15 inches, regardless of load. Ultimate design of foundations and reinforcement should be performed by the project Structural Engineer.

The total soil movement is not expected to exceed 1 inch. Differential movement measured across a horizontal distance of 30 feet should be less than ½ inch. Most of the settlement is expected to occur during construction as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.30 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 250 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ⅓ increase in the above value may be used for short duration, wind, or seismic loads. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

The recommendations and limitations provided in the Geotechnical Investigation report, KA Project No. 112-20102 and addendum letter apply to this letter and should be incorporated into the design and construction of the proposed development.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (951) 273-1011.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

Jorge A. Pelayo, PE
Project Engineer
RCE No. 91269