GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED GOLDEN TRIANGLE APARTMENTS
SWC GOLDEN TRIANGLE ROAD & ISABELLA PARKWAY
SANTA CLARITA, CALIFORNIA

PROJECT NO. 112-20020
APRIL 6, 2020

PREPARED FOR:

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INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed development that will include construction of nine (9) three-story residential buildings. In addition, one community center is planned as part of the development. It is anticipated that the proposed construction will include retaining walls of up to approximately 13 feet, trash enclosures, associated parking and drive areas, and localized landscaped areas. Discussions regarding site conditions are presented herein, together with conclusions and recommendations pertaining to site preparation, grading, utility trench backfill, drainage and landscaping, foundations, concrete floor slabs and exterior concrete flatwork, retaining walls, soil corrosivity, and pavement design.

A Vicinity Map showing the location of the site is presented on Figure 1. A Site Plan showing the approximate boring locations is presented on Figure 2. Descriptions of the field and laboratory investigations, boring log legend, and boring logs are presented in Appendix A. Appendix A contains a description of the laboratory-testing phase of this study, along with the laboratory test results. Appendices B and C contain guide specifications for earthwork and flexible pavements, respectively. If 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 OF SERVICES

This geotechnical investigation was conducted to evaluate subsurface soil and groundwater conditions at the project site. Engineering analyses of the field and laboratory data were performed for the purpose of developing and providing geotechnical recommendations for use in the design and construction of the earthwork, foundation and pavement aspects of the project.

Our scope of services was outlined in our proposal dated January 8, 2020 (KA Proposal No. G20005CAC) and included the following:

- A site reconnaissance by a member of our engineering staff to evaluate the surface conditions at the project site.
- Review of selected published geologic maps, reports and literature pertinent to the site and surrounding area.

- A field investigation consisting of drilling a total of fourteen (14) borings to depths ranging from approximately 10 to 50 feet below the existing ground surface for evaluation of the subsurface conditions at the project site.

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

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

- Evaluation of the data obtained from the investigation and 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 chemical analyses of soil and groundwater for possible environmental contaminates, is beyond our scope of services.

PROPOSED CONSTRUCTION

Based on our review of the preliminary site plan and our discussions with the project representative, we understand that the proposed development will include construction of nine (9) three-story residential buildings. In addition, one community center is planned as part of the development. The proposed structure will be of wood-framed/stucco construction with a slab-on-grade floor. The proposed development will include patio areas, trash enclosures, associated parking and drive areas, localized landscaped areas, and retaining walls of up to approximately 13 feet along the southern and eastern perimeter of the subject site. It is anticipated that the proposed structure will be supported on a shallow foundation system.

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.

SITE LOCATION AND SITE DESCRIPTION

The subject site is currently vacant from any above-grade structures and the parcel is located at the southwest corner of Golden Triangle Road and Isabella Parkway, in the city of Santa Clarita, California. The subject site is understood to occupy an overall area of approximately 18.5 acres and groundcover throughout the site consists of exposed soil and localized weed and tree growth. The site is bound to the north by Golden Triangle Road/Soledad Canyon Road and light commercial buildings beyond, to the east by Isabella Parkway and residential buildings beyond, to the south by ascending slope terrain and vacant land beyond, and to the west by the existing shopping center. The site is relatively flat and level, with no major changes in elevation, except for the ascending slopes located along portions of the eastern perimeter and along the southern perimeter.

SITE INVESTIGATION

GEOLOGIC SETTING

The subject site is located within the San Gabriel Mountain Ranges which are geologically young mountain ranges and possess active and potentially active fault zones. Numerous moderate to large earthquakes have affected the area of the subject site within historic time. Based on the proximity of several dominant active faults and seismogenic structures, as well as the historic seismic record, the area of the subject site is considered subject to relatively high seismicity. The nearest significant active fault is the San Gabriel Fault Zone, which is approximately 1.3 miles away from the site. The Holser and Northridge Fault Zones are located approximately 3.1 and 5.0 miles from the site, respectively. The area in consideration shows no mapped 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 and sampling a total of fourteen (14) borings using a truck-mounted hollow-stem auger drill rig. Borings were drilled to depths ranging from approximately 10 to 50 feet below existing site grade. Driven tube samples were obtained at typically five (5) foot depth intervals in the borings using a 140-pound hammer falling 30-inches to drive the sampler rods. Relatively undisturbed samples were obtained using Modified California ring (drive tube) samplers to a depth of approximately ten (10) feet. Below a depth of approximately ten (10) feet, Standard Penetration Tests were generally performed to obtain driven tube samples and information on the consistency of the deeper soils.

In addition, bulk subgrade soil samples were also obtained for laboratory testing. The approximate boring and bulk sample locations are shown on the Site Plan, Figures 2. The approximate boring and sample locations were estimated in the field based on pacing and measuring from the limits of existing site features. During drilling operations, sampler 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 carefully examined and visually classified by our field professional 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 in-situ moisture and density, gradation, shear strength, expansion potential, consolidation potential, R-Value, maximum dry density, resistivity, pH value, sulfate and chloride contents of the materials encountered. Details of the laboratory testing program are discussed in Appendix A. The results of the laboratory tests are presented on the boring logs or on the test reports, which are also included 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 soil conditions encountered at the subject site consisted of interbeded layers of stiff to hard sandy silt and sandy clay and medium dense to very dense silty sand up to the maximum depth explored, 50 feet below site grades.

Penetration resistance, measured by the number of blows required to drive a Modified California Sampler or a Standard Penetration Test (SPT) sampler, ranged from 11 blows per foot to over 50 blows per six inches of embedment. Dry densities measured on relatively undisturbed samples from within 10 feet of the existing ground surface ranged from approximately 103 to 122 pcf. Relatively undisturbed soil samples consolidated approximately 0.5 to 2.9 percent under a 2-ksf load when saturated. Relatively undisturbed soil samples had angles of internal friction ranging from 28 degrees with cohesion values of approximately 100 and 200 psf, respectively.

The above is a general description of soil conditions encountered at the site in the borings drilled for this investigation. For a more detailed description of the soil conditions encountered, please refer to the boring logs in Appendix A.

GROUNDWATER

Test boring locations were checked for the presence of groundwater during drilling and immediately following the drilling operations. Free groundwater was not encountered in any of the borings drilled as part of this investigation. Based on a review of the Seismic Hazard Report for the Mint Canyon Quadrangle, historic depths to water in the near vicinity of the subject site are anticipated to be in excess of 25 feet below site grades.

It should be recognized that water table elevation might fluctuate with time. The depth to groundwater can be expected to fluctuate both seasonally and from year to year. Fluctuations in the groundwater levels may occur due to variations in precipitation, irrigation practices at the site and in the surrounding areas, climatic conditions, flow in adjacent or nearby canals, pumping from wells and possibly as the result of other factors that were not evident at the time of our investigation. Therefore, water level observations at the time of our 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. Long-term monitoring in observation wells, sealed from the influence of surface water, is often required to more accurately define the potential range of groundwater conditions on a site.

SEISMICITY AND LIQUEFACTION POTENTIAL

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. The nearest significant active fault is the San Gabriel Fault Zone, which is approximately 1.3

miles from the site. The Holser and Northridge Fault Zones are located approximately 3.1 and 5.0 miles from the site, respectively.

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

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

In accordance with the State of California, Seismic Hazard Zones Map, Mint Canyon Quadrangle, released: March 25, 1995, the site is located within a potential liquefaction zone. Based on the lack of shallow groundwater as well as the dense soil encountered at the boring locations, the potential for liquefaction-induced settlement at the subject site is expected to be low.

The potential for soil liquefaction during a seismic event was evaluated using the LiquefyPro computer program (version 5.8h) developed by CivilTech Software. For the analysis, a maximum earthquake magnitude of 7.0 M_w and a peak horizontal ground surface acceleration of 1.025g were considered appropriate for the liquefaction analysis. A groundwater depth of 25 feet was used for the analysis. The computer analysis indicates that an estimated total and differential seismic induced settlement is not anticipated to exceed 0.43 inch and 0.29 inch, respectively. Accordingly, the liquefaction potential at the site is considered low and measures to mitigate the liquefaction potential are not considered warranted.

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."

The subject site is located on the Mint Canyon Quadrangle, Earthquake Fault Zones Map. The nearest significant active fault is the San Gabriel Fault Zone, which is located approximately 1.3 miles from the site. The Holser Fault Zone is located approximately 3.1 miles away from the site. The area in consideration shows no mapped 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.

SEISMIC HAZARDS 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 hazards 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. The subject site is located on the Seismic Hazard Zone Map, Mint Canyon Quadrangle, dated March 25, 1999. The subject site is located in an area designated by the State of California as a Liquefaction 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 stiff to hard and dense to very dense 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 sandy silt 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.

SOIL CORROSIVITY

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

Parameter	Results	Test Method
Sulfate	189 ppm	CA 417
pH Value	7.2	EPA 9045C
Chloride	62 ppm	CA 422
Resistivity	1,100 ohm-cm	CA 643

INFILTRATION TESTING

The shallow soil conditions present at the subject site were evaluated by drilling shallow borings at the subject site to facilitate infiltration testing. The borings drilled at the site indicated the subsurface soil conditions consisted of stiff to hard sandy silt. Infiltration testing has been performed using the Borehole Percolation Testing Procedures described in the County of Los Angeles Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration. A total for two (2) infiltration tests were performed at the subject site.

Prior to infiltration testing, the borehole was pre-soaked using clean water. Following presaturation and draining, the borehole was refilled and measured at 10 and 20 minute increments. The water level at each interval were measured using a water level indicator. The depth of the borehole was measured to verify the overall depth below site grades following each reading.

The estimated infiltration rate was determined using the results of open Borehole Percolation Testing Procedures at two (2) locations at the subject site. The following reduction factors are recommended and have been utilized in determining the recommended design infiltration rate:

- RFt = Boring Percolation Procedure = 2
- RFv = Variability, Tests, Thoroughness = 2
- RFs = Long Term Siltation, Plugging, and Maintenance = 3
- Total Reduction Factor = 12

The average infiltration rates at the end of the tests indicated a factored infiltration rate of approximately 0.38 and 0.42 inch per hour at a depth of approximately 5 feet below current site grades. Detailed results of the infiltration testing are included as an attachment to this report. 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 and siltation.

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 the data collected during this investigation, and from a geologic and geotechnical engineering standpoint, it is our opinion that the proposed improvements may be made as anticipated provided that the recommendations presented in this report are considered in the design and construction of the project.

General site clearing should include removal of vegetation and existing utilities, structures; trees and associated root systems; rubble; rubbish; and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 2 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 either stockpiled and reused in planned landscape areas or non-structural areas, or hauled offsite to an approved disposal location.

To reduce post-construction soil movement and provide uniform support for the buildings to be constructed at the subject site, overexcavation and recompaction within the proposed building footprint area should be performed to a minimum depth of five (5) feet below existing grades or three (3) feet below bottom of the proposed footings, whichever is deeper. The actual depth of the overexcavation and recompaction should be determined by our field representative during construction. The overexcavation and recompaction should also extend laterally a minimum of five (5) feet beyond edges of the proposed footings and building appurtenances. Any undocumented fill encountered during grading should be removed and replaced with Engineered Fill.

Within the proposed exterior flatwork and pavement areas, the overexcavation and recompaction should be performed to a depth of at least one (1) foot below existing grade or one (1) foot below finished subgrade, whichever is deeper. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation.

Prior to placement of any fill soils, the upper eight (8) inches of native subgrade soils exposed in the over-excavation bottom should be scarified, moisture-conditioned to near optimum moisture content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM D1557 Test Method. All fill material should be compacted to a minimum of 95 percent of the maximum dry density based on ASTM D1557 Test Method.

The footings should have a minimum depth of 18 inches below either pad subgrade (soil grade) or adjacent exterior grade, whichever is lower in elevation. Minimum footing widths should be 15 inches for continuous footings and 24 inches for isolated footings. Foundations with the above-recommended minimum dimensions should be designed for a maximum allowable bearing load under dead-plus-live load of 2,600 psf.

For retaining walls with level backfill surface behind the walls, we recommend that retaining walls capable of deflecting a minimum of 0.1 percent of its height at the top be designed using an equivalent fluid active pressure of 44 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 64 pounds per square foot per foot of depth. This is anticipated to apply to the loading dock walls. A passive lateral pressure of 250 pounds per square foot may be used to calculate sliding

resistance. If walls are to be constructed above descending slopes, our office should be contacted to discuss further reduction in allowable passive pressures for resistance of lateral forces, and for overall retaining wall foundation design.

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, it is recommended that concrete in contact with soil utilize Type II Cement and have a minimum compressive strength of 4,000 psi.

Liquefaction potential was evaluated at the site. Based on our findings, it is our opinion that the potential for liquefaction at the site is low. Therefore, no liquefaction potential mitigation measures would be warranted.

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 such overwet and unstable subgrade conditions and provide appropriate recommendations.

SEISMIC CONSIDERATIONS

Ground Shaking

Although ground rupture is not considered to be a major concern at the subject site, the site will likely be subject to at least one moderate to severe earthquake and associated seismic shaking during its lifetime, as well as periodic slight to moderate earthquakes. Some degree of structural damage due to stronger seismic shaking should be expected at the site, but the risk can be reduced through adherence to seismic design codes.

Soil Liquefaction

Soil liquefaction is a state of soil particle suspension caused by a complete loss of strength when the effective stress drops to zero. Liquefaction normally occurs 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 events.

Based on our findings, it is our opinion that the potential for seismic-induced soil liquefaction within the project site is low due to absence of shallow groundwater as well as the dense soil conditions encountered

below groundwater depths. Therefore, measures to mitigate liquefaction potential are not considered warranted.

Seismic Induced Settlement

One of the most common phenomena during seismic shaking accompanying any earthquake is the induced settlement of loose unconsolidated soils. Based on site subsurface conditions and the moderate to high seismicity of the region, any loose fill materials at the site could be vulnerable to this potential hazard. However, this hazard can be mitigated by following the design and construction recommendations of our Geotechnical Engineering Investigation (over-excavation and rework of the loose soils and/or fill). Based on the moderate to strong penetration resistance measured, the native deposits underlying the surface materials do not appear to be subject to significant seismic settlement.

SITE COEFFICIENT

The site class, per Table 1613.5.2, 2019 CBC, is based upon the site soil conditions. It is our opinion that a Site Class D is appropriate for building design at this site. For seismic design of the structures, in accordance with the seismic provisions of the 2019 CBC, we recommend the following parameters:

2019 CALIFORNIA BUILDING CODE		
Seismic Item	**Value**	**CBC Reference**
Site Class	D	Table 1613.5.2
Fa	1.000	Table 1613.5.3 (1)
Ss	2.211	Figure 1613.5 (3)
SMS	2.211	Section 1613.5.3
SDS	1.474	Section 1613.5.4
Fv	1.700	Table 1613.5.3 (2)
S1	0.802	Figure 1613.5 (4)
SM1	1.363	Section 1613.5.3
SD1	0.909	Section 1613.5.4
Ts	0.617	

WEAK AND DISTURBED SOILS

Of primary importance in the development of this site is the removal/recompaction of potentially compressible soils from the areas of the proposed structures. In addition, it is anticipated that demolition activities will result in disturbed soil conditions near the surface. This is discussed in detail in the Earthwork section of this report.

COLLAPSIBLE SOILS

The surficial on-site disturbed native soils, and near surface alluvial/colluvial soils are moisture-sensitive and are moderately compressible under saturated conditions. Structures within the project vicinity have experienced excessive post-construction settlement, when similar foundation soils become nearly saturated. As recommended in the site preparation section of this report, the collapsible or weak soils should be removed, moisture-conditioned to at least optimum moisture content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM D1557 Test Method.

EARTHWORK

Site Preparation – Clearing and Stripping

General site clearing should include removal of vegetation and existing utilities, structures; trees and associated root systems; rubble; rubbish; and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 2 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 either stockpiled and reused in planned landscape areas or non-structural areas, or hauled offsite to an approved disposal location.

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 disturbed 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 area to identify uncontrolled fills prior to mass grading of the building pad.

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

Overexcavation and Recompaction – Building Area

To reduce post-construction soil movement and provide uniform support for the buildings to be constructed at the subject site, overexcavation and recompaction within the proposed building footprint area should be performed to a minimum depth of five (5) feet below existing grades or three (3) feet below bottom of the proposed footings, whichever is deeper. The actual depth of the overexcavation and recompaction should be determined by our field representative during construction. The overexcavation and recompaction should also extend laterally a minimum of five (5) feet beyond edges of the proposed footings and building appurtenances. Any undocumented fill encountered during grading should be removed and replaced with Engineered Fill.

Overexcavation and Recompaction – Parking and Drive Areas

Within the proposed exterior flatwork and pavement areas, the overexcavation and recompaction should be performed to a depth of at least one (1) foot below existing grade or one (1) foot below finished

subgrade, whichever is deeper. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation.

Expansive Soil Mitigation

When concrete slabs-on-grade and shallow foundations are placed on expansive soils that have been allowed to lose moisture, the soil is likely to swell as water re-enters the soil structure. Conversely, when slabs and foundations are constructed on moist to wet soils that are allowed to lose moisture, the soil will shrink, as the moisture is lost. This can result in distress to structures founded on these soils, and in particular, lightly loaded concrete slabs. Thus, it is very important that clayey soils not be used in the proposed building pad areas. The proposed building pad areas should be constructed using non-expansive fill within the upper 24 inches of Engineered Fill.

Fill Placement

Prior to placement of any fill soils, the upper eight (8) inches of native subgrade soils exposed in the over-excavation bottom should be scarified, moisture-conditioned to at or slightly above optimum moisture content, and recompacted to a minimum of 95 percent of the maximum dry density based on ASTM D1557 Test Method. Fill material should be compacted to a minimum of 95 percent of the maximum density based on ASTM D1557 Test Method.

The over-excavated native silty sand and sandy silt soils are generally suitable for use as Engineered Fill provided that they are free of organic material, debris and cobbles over 4 inches in diameter. Fill material should be moisture-conditioned to slightly above optimum moisture-content, placed in maximum 6 inch thick, loose lifts and compacted to a minimum of 95 percent of the maximum dry density based on ASTM D1557 Test Method.

The upper soils, during wet winter months, may 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.

ENGINEERED FILL

The organic-free, on-site, native soils are predominately silts and sands, often with traces of clay. These sand soils will be suitable for reuse as Non-Expansive Engineered Fill, provided they are cleansed of excessive organics, debris and rocks larger than 4 inches in diameter.

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 predominately non-expansive granular material. This material should be approved by the Geotechnical Engineer prior to use and should typically possess the following characteristics:

NON-EXPANSIVE FILL PROPERTIES	
Percent Passing No. 200 Sieve	10 to 50
Plasticity Index (PI)	12 maximum
Liquid Limit	35 maximum
UBC Standard 29-2 Expansion Index	20 maximum

Imported Fill should be free from rocks and clods greater than 4 inches in diameter. All Imported Fill material should be submitted to the Soils Engineer for approval at least 72 hours prior to delivery at the site, in order to allow time for appropriate laboratory testing. Fill soils should be placed in lifts approximately 6 inches thick, moisture-conditioned to slightly above optimum moisture content, and compacted to achieve at least 95 percent of the maximum dry density as determined by ASTM D1557-00 Test Method. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

TEMPORARY EXCAVATION STABILITY

All excavations should comply with the current requirements of Occupational Safety and Health Administration (OSHA). All cuts greater than 3 feet in depth should be sloped or shored. Temporary excavations should be sloped at 1:1 (horizontal to vertical) or flatter, up to a maximum depth of seven (7) feet, and at 2:1 (horizontal to vertical) for excavations greater than seven (7) feet. Heavy construction equipment, building materials, excavated soil, and vehicular traffic should not be allowed within five (5) feet of the top (edge) of the excavation. Where sloped excavations are not feasible due to site constraints, the excavations may require shoring. The design of the shoring system is normally the responsibility of the contractor or shoring designer, and therefore, is outside the scope of this report. The design of the temporary shoring should take into account lateral pressures exerted by the adjacent soil, and, where anticipated, surcharge loads due to adjacent buildings and any construction equipment or traffic expected to operate alongside the excavation.

The excavation/shoring recommendations provided herein are based on soil characteristics derived from our test borings within the area. The soil conditions encountered generally consist of granular material. As such, the on-site soil is subject to caving, sloughing, and erosion. Variations in soil conditions will likely be encountered during the excavations. Krazan & Associates, Inc. should be afforded the opportunity to provide field review to evaluate the actual conditions and account for field condition variations not otherwise anticipated in the preparation of this recommendation.

UTILITY TRENCH LOCATION, CONSTRUCTION AND BACKFILL

To maintain the desired support for existing or new foundations, new utility trenches should be located such that the base of the trench excavation is located above an imaginary plane having an inclination of 1.0 horizontal to 1.0 vertical, extending downward from the bottom edge of the adjacent footing.

Utility trenches should be excavated according to accepted engineering practices following OSHA 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 kept to a minimum; 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. For purposes of this section of the report, backfill is defined as material placed in a trench starting one foot above the pipe; bedding and shading (also referred to as initial backfill) is all material placed in a trench below the backfill. With the exception of specific requirements of the local utility companies or building department, pipe bedding and shading should consist of clean medium-grained sand. The sand should be placed in a damp state and should be compacted by mechanical means prior to the placement of backfill soils. Above the pipe zone, underground utility trenches may be backfilled with either free-draining sand, on-site soil or imported soil. The trench backfill should be compacted to at least 95 percent relative compaction.

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 solely be used to predict the engineering performance of the compacted material. Therefore, the acceptance of compacted materials will also be dependent upon the moisture content and the stability of that material. The Geotechnical Engineer has the option of rejecting any compacted material regardless of the degree of compaction if that material is considered to be too dry or excessively wet, 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 in-situ moisture content significantly less than optimum moisture. Where expansive soils are present, heaving of the soils may occur with the introduction of water. Where the material is a lean clay or silt, this type of dry fill (brittle fill) is susceptible to future settlement if it becomes saturated or flooded.

SURFACE DRAINAGE AND LANDSCAPING

The ground surface should slope away from building pad and pavement areas toward appropriate drop inlets or other surface drainage devices. In accordance with Section 1804 of the 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.

FOUNDATION

The proposed structures, including walls and other foundation elements may be supported on a shallow foundation system bearing on a minimum of three (3) feet of newly placed 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	3,400 psf

The footings should have a minimum depth of 18 inches below either pad subgrade (soil grade) or adjacent exterior grade, whichever is lower in elevation. Minimum footing widths should be 15 inches for continuous footings and 24 inches for isolated footings. Foundations with the above-recommended minimum dimensions should be designed for a maximum allowable bearing load under dead-plus-live load of 2,600 psf.

It is anticipated that new foundations will be constructed in close proximity to existing foundations. Foundations should be founded at similar bearing elevations in order to reduce the potential for additional loading on adjacent foundations.

Settlement

Provided the site is prepared as recommended and that the foundations are designed and constructed in accordance with our recommendations, the total settlement due to foundation loads is not expected to exceed 1 inch. The differential settlements are anticipated to be less than ¾-inch between adjacent columns and perimeter walls to adjacent columns, and less than ½-inch in 30 feet along perimeter walls. 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.

Lateral Load Resistance

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. Where a vapor barrier material is used below concrete slabs-on-grade, a coefficient of friction should be provided by the vapor barrier manufacturer. 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. Where equivalent fluid pressure against the sides of the footings or embedded slab edge are to be used, the footing or slab edge must be cast directly against undisturbed soils or the soils surrounding the structure must be recompacted to the requirements for Engineered Fill presented above. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A one-third increase in the value above may be used for short duration, wind, or seismic loads.

FLOOR SLABS AND EXTERIOR FLATWORK

The interior slabs-on-grade should be designed at least five inches (5") in thickness. It is recommended that the slabs be reinforced with number three (#3) bars, eighteen inches (18") on center in both directions.

Exterior slabs-on-grade should be designed at least five inches (5") in thickness. It is recommended that the slabs be reinforced with number three (#3) bars, eighteen inches (18") on center in both directions. The exterior floors should be poured separately in order to act independently of the walls and foundation system. All fills required to bring the building pads to grade should be Engineered Fills.

It is recommended that the slabs should be underlain by six inches (6") of compacted Class 2 Aggregate Base with a minimum 15 mil polyolefin membrane vapor barrier (i.e. Stego Wrap or equivalent) placed with two inches (2") of clean sand on top of the vapor barrier. As an alternative, well graded non-expansive compacted fill may be used directly below the slab on grade.

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 minimize moisture vapor intrusion, it is recommended that a vapor retarder be installed in accordance with ASTM guidelines. It is recommended that the utility trenches within the structure be compacted, as specified in our report, to minimize 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.

RETAINING WALLS

For retaining walls with level backfill surface behind the walls, we recommend that retaining walls capable of deflecting a minimum of 0.1 percent of its height at the top be designed using an equivalent fluid active pressure of 40 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 60 pounds per square foot per foot of depth. This is anticipated to apply to the loading dock walls. A passive lateral pressure of 250 pounds per square foot may be used to calculate sliding resistance. If walls are to be constructed above descending slopes, our office should be contacted to discuss further reduction in allowable passive pressures for resistance of lateral forces, and for overall retaining wall foundation design.

The surcharge effect from loads adjacent to the walls should be included in the wall design. The surcharge load for walls capable of deflecting (cantilever walls), we recommend applying a uniform surcharge pressure equal to one-third of the applied load over the full height of the wall. Where walls are restrained the surcharge load should be based on one-half of the applied load above the wall, also distributed over the full height of the wall. For other surcharges, such as from adjacent foundations, point loads or line loads, Krazan & Associates should be consulted.

Expansive soils should not be used for backfill against walls. The zone of non-expansive backfill material should extend from the bottom of each retaining wall laterally back a distance equal to the height of the wall, to a maximum of five (5) feet.

The above-recommended active and at-rest earth pressures do not include hydrostatic pressures. To reduce the build-up of hydrostatic pressures, drainage should be provided behind the retaining walls. Wall drains should consist of a minimum 12-inch wide zone of drainage material, such as ¾-inch by ½-inch drain rock wrapped in a non-woven polypropylene geotextile filter fabric such as Mirafi 140N or equivalent. Alternatively, drainage may be provided by the placement of a commercially produced composite drainage blanket, such as Miradrain, extending continuously up from where it is wrapped around a drain pipe located along the base of the wall. The drainage material should extend from the base of the wall to finished subgrade in paved areas and to within about 12 inches below the top of the wall in landscape areas. In landscape areas the top 12 inches should be backfilled with compacted native soil. A 4-inch minimum diameter, perforated, Schedule 40 PVC drain pipe should be placed with holes facing down in the lower portion of the wall drainage material, surrounded with drain rock wrapped in filter fabric. A solid drainpipe draining to a suitable discharge point should provide the necessary drainage outlet. As an alternative, weep holes may be used to provide drainage. If weep holes are used, the weep holes should be 2 inches in diameter and spaced about 8 feet on centers. The backside of the weep holes should be covered with a corrosion-resistant mesh to prevent loss of backfill and/or drainage material.

PAVEMENT DESIGN

Based on the established standard practice of designing flexible pavements in accordance with State of California Department of Transportation (Caltrans) for projects within California, we have developed pavement sections in accordance with the procedure presented in Caltrans Standard Test Method 301. This pavement design procedure is based on the volume of traffic (Traffic Index) and the soil resistance "R" value (R-Value).

Asphalt Concrete (Flexible) Pavements

One (1) near-surface soil sample was obtained from the soil borings at the project site for laboratory R-Value testing. The sample was tested in accordance with California Test 301. Results of the test are as follows:

R-VALUE TEST RESULTS			
Sample Number	**Sample Depth (ft)**	**Description**	**R-Value at Equilibrium**
RV #1	0-3'	Sandy Silt	25

The Civil Engineer should consult with the client to confirm the truck count prior to assigning the Traffic Index and selecting the pavement sections for incorporation into the project plans.

Based on our understanding of the project specifications, a Traffic Index of 5.5 has been used for design of pavements for automobile parking lots and drive lanes.

Based on a review of the boring logs and the R-Value data presented above, the near surface soil of the site consists of sandy silt with an R-Value of 25. If site grading exposes soil other than that assumed, we should perform additional tests to confirm or revise the recommended pavement sections for actual field conditions. Various alternative pavement sections based on the Caltrans Flexible Pavement Design Method are presented below:

Traffic Index	Asphaltic Concrete	Class II Aggregate Base*	Compacted Subgrade**
4.5	2.5"	6.0"	12.0"
5.0	2.5"	8.0"	12.0"
5.5	3.0"	8.0"	12.0"
6.0	3.0"	10.0"	12.0"
6.5	3.5"	10.0"	12.0"
7.0	4.0"	11.0"	12.0"

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

We recommend that the subgrade soil be prepared as discussed in this report. The compacted subgrade should be non-yielding when proof-rolled with a loaded ten-wheel truck, such as a water truck or dump truck, prior to pavement construction. Subgrade preparation should extend a minimum of 2 feet laterally behind the edge of pavement or back of curbs.

Pavement areas should be sloped and drainage gradients maintained to carry all surface water off the site. A cross slope of 2 percent is recommended in asphalt concrete pavement areas to provide good surface drainage and to reduce the potential for water to penetrate into the pavement structure.

Unless otherwise required by local jurisdictions, paving materials should comply with the materials specifications presented in the Caltrans Standard Specifications Section. Class 2 Aggregate should comply with the materials requirements for Class 2 Base found in Section 26.

The mineral aggregate shall be Type B, ½-inch or ¾-inch maximum, medium grading, for the wearing course and ¾-inch maximum, medium grading for the base course, and shall conform to the requirements set forth in Section 39 of the Standard Specifications. The asphalt concrete materials should comply with and be placed in accordance with the specifications presented in Section 39 of the Caltrans Standard Specifications, latest edition. Asphalt concrete should be compacted to a minimum of 95 percent of the maximum laboratory compacted (kneading compactor) unit weight.

ASTM Test procedures and should be used to assess the percent relative compaction of soils, aggregate base and asphalt concrete. Aggregate base and subbase, and the upper 12 inches of subgrade should be compacted to at least 95 percent based on the Modified Proctor maximum compacted unit weight obtained in accordance with ASTM Test Method D1557. Compacted aggregate base should also be stable and unyielding when proof-rolled with a loaded ten-wheel water truck or dump truck.

Portland Cement Concrete (Rigid) Pavement

A six-inch layer of compacted Class 2 Aggregate Base should be placed over the prepared subgrade prior to placement of the concrete. Based on soil conditions and project specifications, we recommend that the rigid pavement be a minimum of five (5) inches thick. The final rigid pavement design and section should be determined by the project Structural Engineer.

PORTLAND CEMENT PAVEMENT
LIGHT DUTY

Traffic Index	Portland Cement Concrete***	Class II Aggregate Base*	Compacted Subgrade**
4.5	5.0"	6.0”	12.0"

HEAVY DUTY

Traffic Index	Portland Cement Concrete***	Class II Aggregate Base*	Compacted Subgrade**
7.0	6.5"	6.0”	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***

Prior to the construction of any rigid pavement, we recommend that concrete mix histories with flexural strength data be obtained from the proposed supplier. In the absence of flexural strength history, we recommend that laboratory trial batching and testing be performed to allow for confirmation that the proposed concrete mix is capable of producing the required flexural strength.

The concrete pavements should be designed with both longitudinal and transverse joints. The saw-cut or formed joints should extend to a minimum depth of one-fourth of the pavement thickness plus ¼ inch. Joint spacing should not exceed 15 feet. Steel reinforcement of all rigid pavements is recommended to keep the joints tight and to control temperature cracking.

Keyed joints are recommended at all construction joints to transfer loads across the joints. Joints should be reinforced with a minimum of ½ inch diameter by 48-inch long deformed reinforcing steel placed at mid-slab depth on 18-inch center-to-center spacing to keep the joints tight for load transfer. The joints should be filled with a flexible sealer. Expansion joints should be constructed only where the pavements abut structures or fixed objects.

Smooth bar dowels, with a diameter of d/8, where d equals the thickness of the concrete, at least 14 inches in length, placed at a spacing of 12 inches on centers, may also be considered for construction joints to transfer loads across the joints. The dowels should be centered across the joints with one side of the dowel lubricated to reduce the bond strength between the dowel and the concrete and fitted with a plastic cap to allow for bar expansion.

SOIL CORROSIVITY

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 concentration detected from the soil sample indicated a moderate sulfate exposure value as established by HUD/FHA and CBC. Therefore, it is recommended that concrete in contact with soil utilize Type II cement and have a minimum compressive strength of 4,000 psi and a maximum water to cementitious material ratio of 0.50.

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

INFILTRATION TESTING

The shallow soil conditions present at the subject site were evaluated by drilling a total of two (2) shallow borings in the vicinity of the infiltration test. The borings drilled at the site indicated the subsurface soil conditions consisted of stiff sandy silt. The proposed infiltration system is understood to be located in landscaped areas. The proposed infiltration system is expected to be located a minimum of ten (10) feet from any proposed foundation elements. Based on the location of the proposed infiltration system, adverse impact to adjacent structures and proposed improvements is not anticipated.

In order to perform the infiltration tests, borings were drilled to depths on the order of five feet below site grades. Infiltration testing has been performed at each of the boring locations. Infiltration testing has been performed using the Borehole Percolation Testing Procedures described in the County of Los Angeles Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration. A total of two (2) infiltration tests were performed at the subject site. All two (2) tests were performed at a depth of approximately 5 feet below site grades.

Infiltration testing was performed using casing screened to a level of approximately four feet above the anticipated invert depth. Infiltration testing has been performed using the Borehole Percolation Testing Procedures described in the County of Los Angeles Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration.

Prior to infiltration testing, the borehole was pre-soaked using clean water. Following presaturation and draining, the borehole was refilled and measured at 10 and 20 minute increments. The water level at each interval was measured using a water level indicator. The depth of the borehole was measured to verify the overall depth below site grades following each reading.

The estimated infiltration rate was determined using the results of open Borehole Percolation Testing Procedures at two (2) locations at the subject site. The following reduction factors are recommended and have been utilized in determining the recommended design infiltration rate:

- RFt = Boring Percolation Procedure = 2
- RFv = Variability, Tests, Thoroughness = 2
- RFs = Long Term Siltation, Plugging, and Maintenance = 3
- Total Reduction Factor = 12

The average infiltration rates at the end of the tests indicated a factored infiltration rate of approximately 0.38 and 0.42 inch per hour at a depth of approximately 5 feet below current site grades. Detailed results of the infiltration testing are included as an attachment to this report. 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 and siltation.

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.

ADDITIONAL SERVICES

Krazan & Associates should be retained to review your final foundation and grading plans, and specifications. It has been our experience that this review provides an opportunity to detect misinterpretation or misunderstandings with respect to the recommendations presented in this report prior to the start of construction.

Variations in soil types and conditions are possible and may be encountered during construction. In order to permit correlation between the soil data obtained during this investigation and the actual soil conditions encountered during construction, a representative of Krazan & Associates, Inc. should be present at the site during the earthwork and foundation construction activities to confirm that actual subsurface conditions are consistent with those contemplated in our development of this report. This will allow us the opportunity to compare actual conditions exposed during construction with those encountered in our investigation and to expedite supplemental recommendations if warranted by the exposed conditions. This activity is an integral part of our service, as acceptance of earthwork construction is dependent upon compaction testing and stability of the material. Krazan & Associates, Inc. will not be responsible for grades or staking, since this is the responsibility of the Prime Contractor.

All earthworks should be performed in accordance with the recommendations presented in this report, or as recommended by Krazan & Associates during construction. Krazan & Associates should be notified at least five working days prior to the start of construction and at least two days prior to when observation and testing services are needed. Krazan & Associates, Inc. will not be responsible for grades or staking, since this is the responsibility of the Prime Contractor.

The review of plans and specifications, and the observation and testing of earthwork related construction activities by Krazan & Associates are important elements of our services if we are to remain in the role of Geotechnical Engineer-Of-Record. If Krazan & Associates is not retained for these services, the client and the consultants providing these services will be assuming our responsibility for any potential claims that may arise during or after construction.

LIMITATIONS

Geotechnical 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 appropriate and current techniques and methods, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to advancements in the field of Geotechnical Engineering, physical changes in the site due to site clearing or grading activities, new agency regulations, or possible changes in the proposed structure or development after issuance of this report will result in the need for professional review of this report. Updating or revisions to the recommendations in the report, and possibly additional study of the site may be required at that time. 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 two 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. The logs of the exploratory borings do not provide a warranty as to the conditions that may exist beneath the entire site. The extent and nature of subsurface soil and groundwater variations may not become evident until construction begins. It is possible that variations in soil conditions and depth to groundwater could exist beyond the points of exploration that may require additional studies, consultation, and possible design revisions.

If conditions are encountered in the field during construction, which differ from those described in this report, our firm should be contacted immediately to provide any necessary revisions to these recommendations.

This report presents the results of our Geotechnical Engineering Investigation, which was conducted for the purpose of evaluating the soil conditions in terms of foundation and retaining wall design, and grading and paving of the site. This report does not include reporting of any services related to environmental studies conducted to assess the presence or absence of hazardous and/or toxic materials in the soil, groundwater, or atmosphere, or the presence of wetlands. No analytical testing was performed for evaluation of environmental constituents. Any 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 professional judgment regarding the presence of potentially hazardous or toxic substances. Conversely, the absence of statements in this report or on any boring log regarding odors, unusual or suspicious items, or conditions observed, does not constitute our rendering professional judgment regarding the absence of potentially hazardous or toxic substances.

The conclusions of this report are based on the information provided regarding the proposed construction. We emphasize that this report is valid for the project as described in the text of this report and it should not be used for any other sites or projects. The geotechnical engineering information presented herein is based upon our understanding of the proposed project and professional interpretation of the data obtained in our studies of the site. It is not warranted that such information and interpretation cannot be superseded by future geotechnical engineering developments. The Geotechnical Engineer should be notified of any changes to the proposed project so the recommendations may be reviewed and re-evaluated. The work conducted through the course of this investigation, including the preparation of this report, has been performed in accordance with the generally accepted standards of geotechnical engineering practice, which existed in geographic area of the project at the time the report was written. No other warranty, express or implied, is made. This report is issued with the understanding that the owner chooses the risk they wish to bear by the expenditures involved with the construction alternatives and scheduling that are chosen.

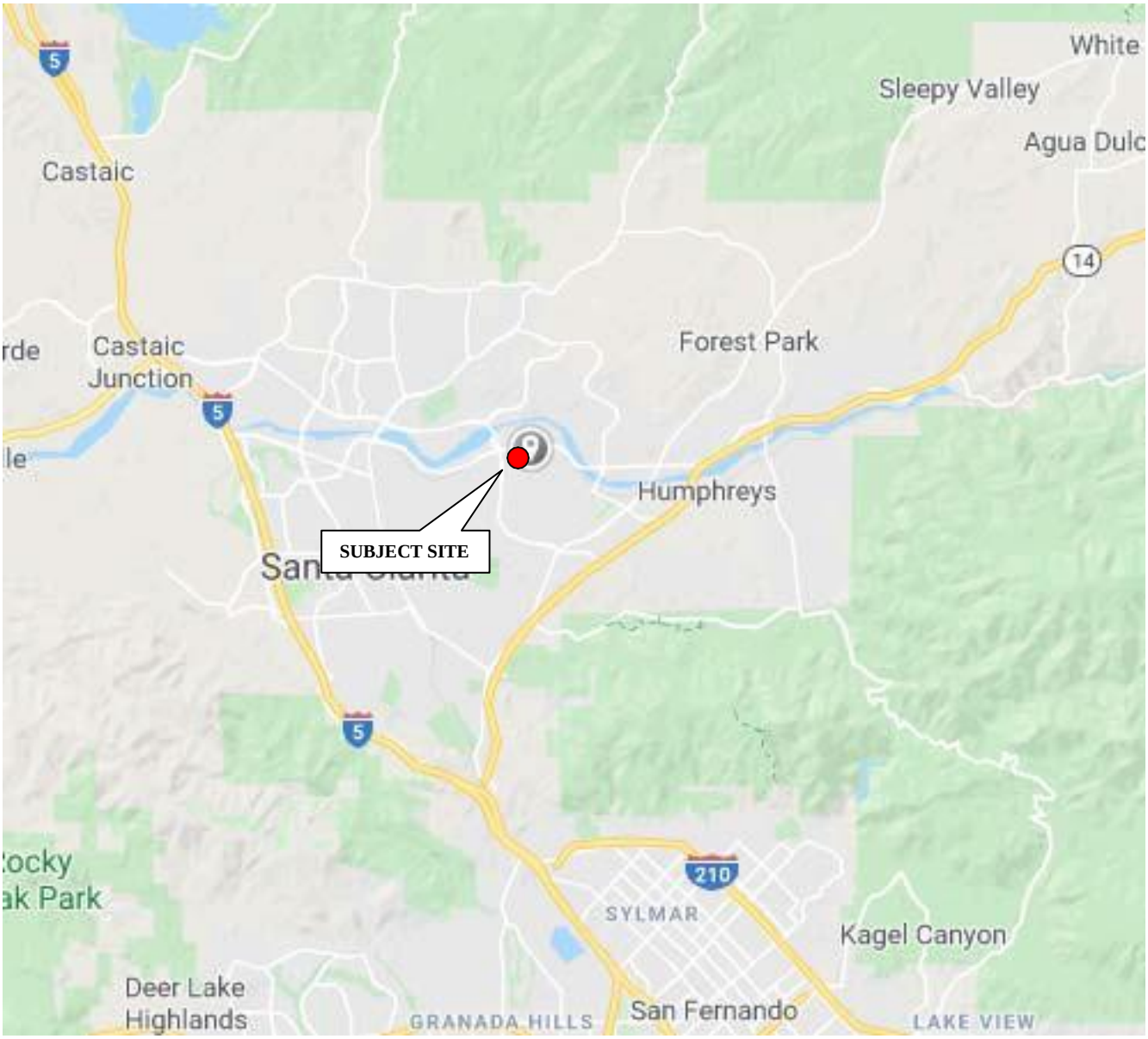
If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (951) 273-1011.

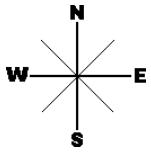
Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

James M. Kellogg, PE, GE
Managing Engineer
RCE No. 65092, GE No. 2902

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

Figures





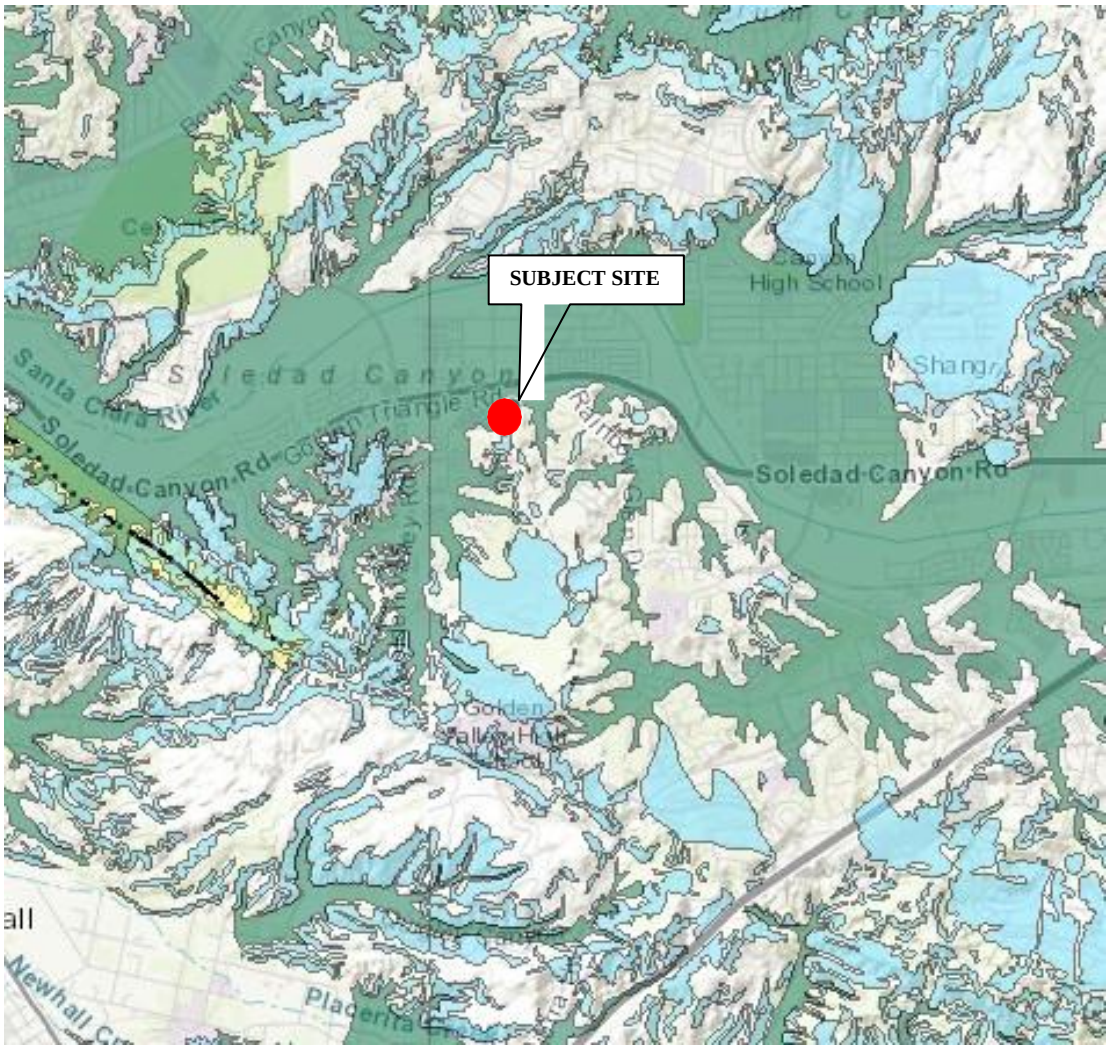
VICINITY MAP	Scale: NTS	Date: APRIL, 2020	Krazan GEOTECHNICAL ENGINEERING
PROPOSED GOLDEN TRIANGLE APARTMENTS SWC GOLDEN TRIANGLE ROAD & ISABELLA PARKWAY SANTA CLARITA, CALIFORNIA	Drawn by: JP	Approved by: JK	
	Project No. 112-20020	Figure No. 1	

APPROXIMATE INFILRTRATION TESTING LOCATION

APPROXIMATE BORING LOCATION

APPROXIMATE R-VALUE LOCATION

SITE MAP	**Scale:** NTS	**Date:** APRIL, 2020	Krazan GEOTECHNICAL ENGINEERING
PROPOSED GOLDEN TRIANGLE APARTMENTS SWC GOLDEN TRIANGLE ROAD & ISABELLA PARKWAY SANTA CLARITA, CALIFORNIA	**Drawn by:** JP	**Approved by:** JK	
	Project No. 112-20020	**Figure No.** 2	



MAP EXPLANATION

EARTHQUAKE FAULT ZONES

Earthquake Fault Zones
Zone boundaries are delineated by straight-line segments; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in Public Resources Code Section 2621.5(a) would be required.

Active Fault Traces
Faults considered to have been active during Holocene time and to have potential for surface rupture: Solid Line in Black or Red where Accurately Located; Long Dash in Black or Solid Line in Purple where Approximately Located; Short Dash in Black or Solid Line in Orange where Inferred; Dotted Line in Black or Solid Line in Rose where Concealed; Query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by fault creep.

SEISMIC HAZARD ZONES

Liquefaction Zones
Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslide Zones
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

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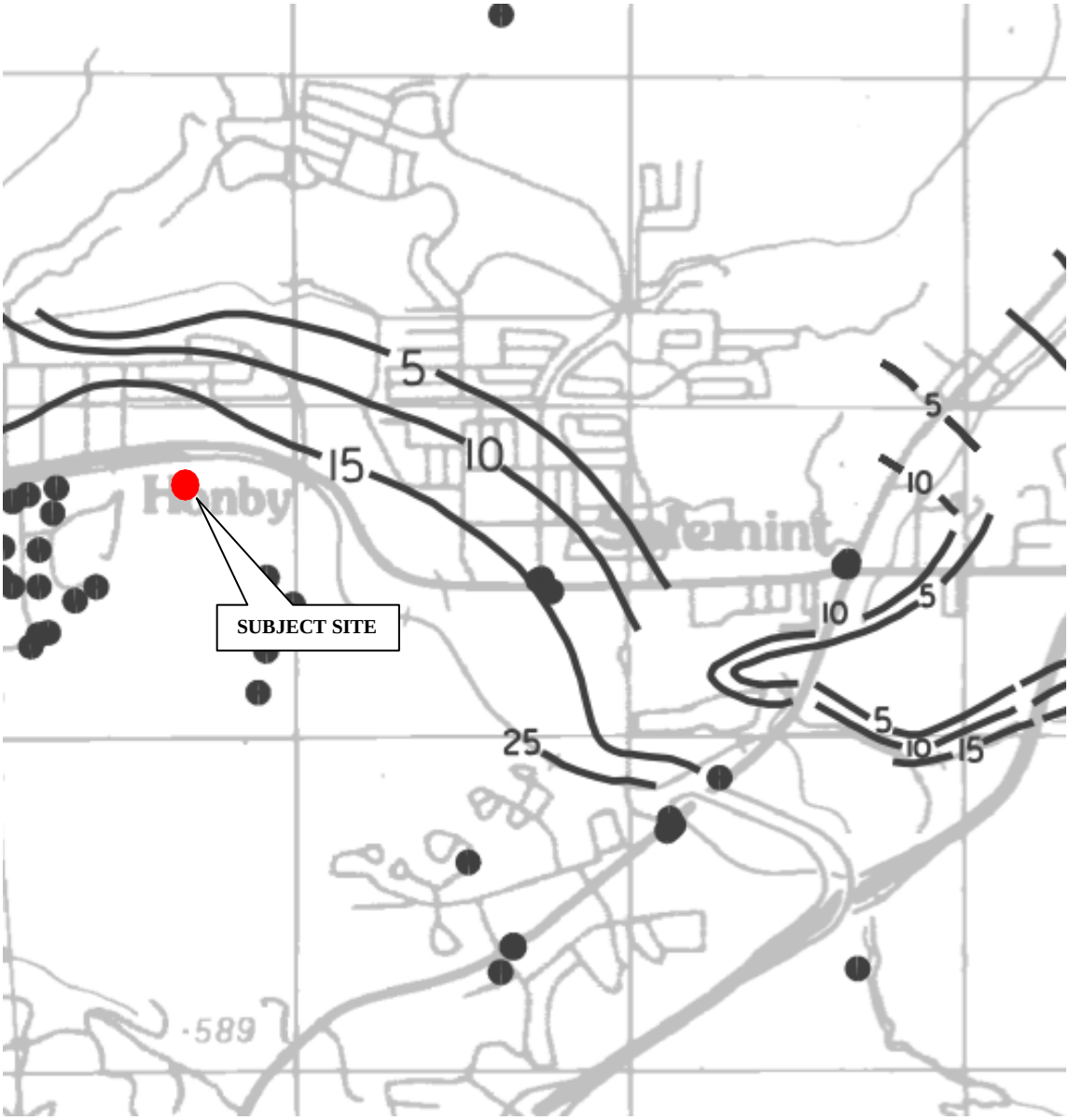
Source: State of California Seismic Hazard & Earthquake Fault Zones Map, Mint Canyon Quadrangle

ZONES OF REQUIRED INVESTIGATION MAP	**Scale:** NTS	**Date:** APRIL, 2020	Krazan GEOTECHNICAL ENGINEERING
PROPOSED GOLDEN TRIANGLE APARTMENTS SWC GOLDEN TRIANGLE ROAD & ISABELLA PARKWAY SANTA CLARITA, CALIFORNIA	**Drawn by:** JP	**Approved by:** JK	
	Project No. 112-20020	**Figure No.** 3	



Source: State of California Seismic Hazard Zone Report, Mint Canyon Quadrangle

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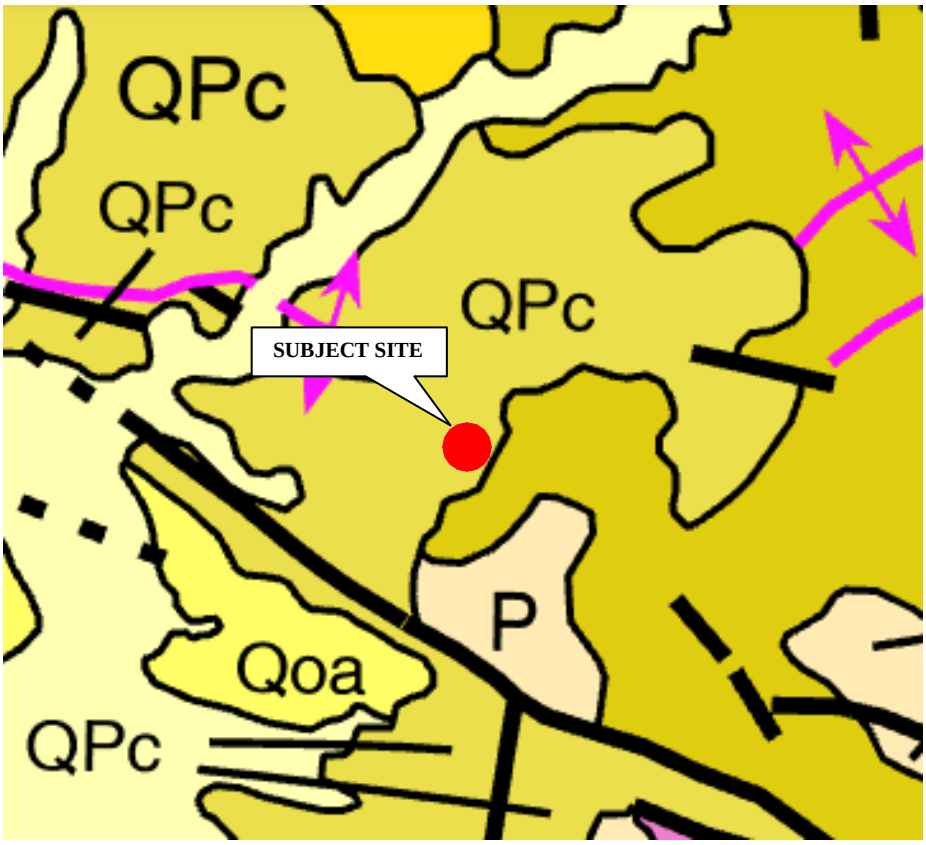
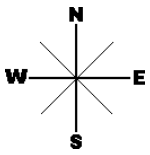
GROUNDWATER MAP	**Scale:** NTS	**Date:** APRIL, 2020	Krazan GEOTECHNICAL ENGINEERING
PROPOSED GOLDEN TRIANGLE APARTMENTS SWC GOLDEN TRIANGLE ROAD & ISABELLA PARKWAY SANTA CLARITA, CALIFORNIA	**Drawn by:** JP	**Approved by:** JK	
	Project No. 112-20020	**Figure No.** 4	





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

TERTIARY SEDIMENTARY ROCKS

Tc	Undivided Tertiary nonmarine sandstone, shale, conglomerate, breccia, and ancient lake deposits
P	Pliocene marine sandstone, siltstone, shale, and conglomerate; mostly moderately consolidated
M	Miocene marine sandstone, shale, siltstone, conglomerate, and breccia; moderately to well consolidated
Mc	Miocene nonmarine sandstone, shale, conglomerate, and fanglomerate; moderately to well consolidated
Oₘ	Oligocene marine sandstone, shale, and conglomerate; mostly well consolidated
Oₙc	Oligocene nonmarine sandstone, shale, and conglomerate; mostly well consolidated
E	Eocene marine shale, sandstone, conglomerate, and minor limestone; mostly well consolidated
Ec	Eocene nonmarine sandstone, shale, and conglomerate; moderately to well consolidated
Ep	Paleocene marine sandstone, shale, and conglomerate; mostly well consolidated

TERTIARY VOLCANIC ROCKS

Tv	Tertiary volcanic flow rocks; minor pyroclastic deposits
Tv^{p}	Tertiary pyroclastic and volcanic mudflow deposits.
Ti	Tertiary intrusive rocks; mostly shallow (hypabyssal) plugs and dikes

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

GEOLOGIC MAP	**Scale:** NTS	**Date:** APRIL, 2020	Krazan GEOTECHNICAL ENGINEERING
PROPOSED GOLDEN TRIANGLE APARTMENTS SWC GOLDEN TRIANGLE ROAD & ISABELLA PARKWAY SANTA CLARITA, CALIFORNIA	**Drawn by:** JP	**Approved by:** JK	
	Project No. 112-20020	**Figure No.** 5	

Log of Borings
&
Laboratory Testing

Appendix A

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

Our field investigation consisted of a surface reconnaissance and a subsurface exploration program consisted of drilling, logging and sampling a total of fourteen (14) borings. The depths of exploration extended to a depth of approximately 10 to 50 feet below the existing site surface.

A member of our staff carefully visually classified the soils in the field as the drilling progressed and recorded a continuous log of each boring. Visual classification of the soils encountered in our exploratory borings was made in general accordance with the Unified Soil Classification System (ASTM D2487). A key for the classification of the soil and the boring logs are presented in this Appendix.

During drilling operations, penetration tests were performed at regular intervals to evaluate the soil consistency and to obtain information regarding the engineering properties of the subsoils. Samples were obtained from the borings by driving either a 2.5-inch inside diameter Modified California tube sampler fitted with brass sleeves or a 2-inch outside diameter, 1-3/8-inch inside diameter Standard Penetration ("split-spoon") Test (SPT) sampler without sleeves. Soil samples were retained for possible laboratory testing. The samplers were driven up to a depth of 18 inches into the underlying soil using a 140-pound hammer falling 30 inches. The downhole ("safety") hammer was raised by a winch between blows. The number of blows required to drive the sampler was recorded for each 6-inch penetration interval and the number of blows required to drive the sampler the last 12 inches are shown as blows per foot on the boring logs.

The approximate locations of our borings and bulk samples are illustrated on the Site Plan, Figure 2. These approximate locations were estimated in the field based on pacing and measuring from the limits of existing site features.

Laboratory Investigation

The laboratory investigation was programmed to determine the physical and mechanical properties of the soil underlying the site. The laboratory testing program was formulated with emphasis on the evaluation of in-situ moisture, density, gradation, shear strength, consolidation potential, expansion potential and R-Value of the materials encountered. In addition, site soil samples were sent to a chemist for testing to evaluate the soil/cement reactivity and corrosivity. Test results were used in our engineering analysis with respect to site and building pad preparation through mass grading activities, foundation and retaining wall design recommendations, pavement section design, evaluation of the materials as possible fill materials and for possible exclusion of some soils from use at the structures as fill or backfill.

Select laboratory test results are presented on the boring logs, with graphic or tabulated results of selected tests included in this Appendix. The laboratory test data, along with the field observations, was used to prepare the final boring logs presented in the 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 sllts, micaceous or dlatomaceous 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**

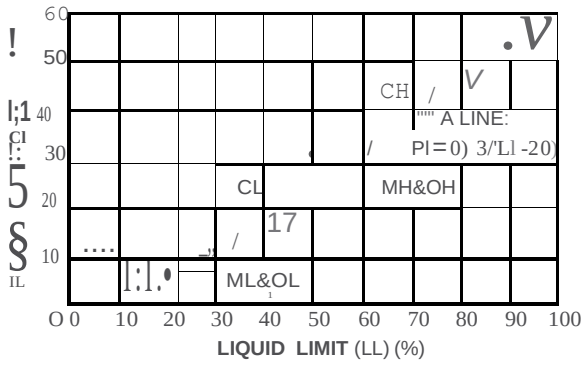
CONSISTENCY CLASSIFICATION

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 to¾ inches	76.2 to 19.1
Fine-grained	¾ inches to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.074
Coarse-grained	No. 4 to No. 10	4.76 to 2.00
Medium-grained	No. 10 to No. 40	2.00 to 0.042
Fine-grained	No. 40 to No. 200	0.042 to 0.074
Silt and Clay	Below No. 200	Below 0.074

PLASTICITY CHART



Log of Boring B1

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-1

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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						
2		***SANDY SILT (ML)*** Hard, medium- to fine-grained with trace CLAY; dark brown, damp to moist						
4								
6			117.6	8.5		50+		
8								
10		***SILTY SAND (SM)*** Medium dense, fine-grained; dark brown, moist	122.0	7.3		40		
12								
14		***SANDY SILT (ML)*** Very stiff to hard, fine-grained; dark brown, moist						
16				8.5		30		
18								
20								

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 50 Feet

Log of Boring B1

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-1

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

Depth to Water> Not Encountered

Initial: N/A

At Completion: N/A

Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
22	***SANDY CLAY (CL)*** Stiff, fine-grained with SILT; dark brown, moist		10.9		20
24	***SANDY SILT (ML)*** Hard, fine-grained; dark brown, moist		9.3		36
26					
28					
30	***SILTY SAND (SM)*** Dense, fine-grained; brown, moist		14.8		44
32					
34	***SANDY CLAY (CL)*** Medium dense, medium- to fine-grained with trace SILT; dark brown, moist		13.5		30
36					
38					
40					

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 50 Feet

Log of Boring B1

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-1

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

Depth to Water> Not Encountered

Initial: N/A

At Completion: N/A

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
42		***SILTY SAND (SM)*** Dense to very dense, medium- to fine-grained; light brown, moist		11.1		41
44		With trace GRAVEL		18.3		45
46						
48						
50				13.0		52
		End of Borehole				
52						
54		Water not encountered Boring backfilled with soil cuttings				
56						
58						
60						

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 50 Feet

Log of Boring B2

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-2

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
		SANDY SILT (ML) Very stiff, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
6			110.1	5.9		35
		SILTY SAND (SM) Medium dense, medium- to fine-grained; grayish-brown to brown, moist				
10			122.5	9.0		37
16				9.3		20
		Water not encountered Boring backfilled with soil cuttings				
20				5.8		11

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 20 Feet

Sheet: 1 of 1

Log of Boring B3

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-3

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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		***CLAYEY SILT (ML)*** Dense, medium- to SILT; dark brown, damp to moist				
6			119.8	4.4		48
10		***SILTY SAND (SM)*** Dense, medium- to fine-grained; dark brown, moist	120.1	9.2		51
14		***SANDY SILT (ML)*** Stiff, fine-grained; dark brown, moist		12.5		14
18		Water not encountered Boring backfilled with soil cuttings		4.4		14
20						

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 20 Feet

Log of Boring B4

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-4

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
2		***SANDY SILT (ML)*** Hard, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
4						
6			107.8	11.6		58
8		***SILTY SAND (SM)*** Medium dense, fine-grained; dark brown, moist				
10			118.6	10.2		37
		End of Borehole				
12						
14						
16						
18		Water not encountered Boring backfilled with soil cuttings				
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B5

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-5

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
2		***SANDY SILT (ML)*** Very stiff to hard, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
4						
6			117.6	8.5		50+
8		***SILTY SAND (SM)*** Medium dense, fine-grained; dark brown, moist				
10			122.0	7.3		40
12		End of Borehole				
14						
16						
18		Water not encountered Boring backfilled with soil cuttings				
20						

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B6

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-6

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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						
2		***SANDY SILT (ML)*** Hard, medium- to fine-grained with trace CLAY; dark brown, damp to moist						
4								
6			112.0	11.9		48		
8								
10		***SILTY SAND (SM)*** Medium dense to dense, fine-grained; dark brown to brown, moist	116.0	10.8		19		
12								
14								
16				10.0		30		
18		***SANDY SILT (ML)*** Hard, fine-grained; dark brown, moist Water not encountered Boring backfilled with soil cuttings						
20				7.2		32		

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 20 Feet

Log of Boring B7

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-7

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
2		***SANDY SILT (ML)*** Stiff, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
4						
6			109.3	11.2		19
8		***SILTY SAND (SM)*** Medium dense, fine-grained; dark brown, moist				
10			119.3	10.3		18
12		End of Borehole				
14						
16						
18		Water not encountered Boring backfilled with soil cuttings				
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B8

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-8

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
2		***SANDY SILT (ML)*** Very stiff, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
4						
6			113.6	8.7		27
8		***SILTY SAND (SM)*** Medium dense, fine-grained; dark brown, moist				
10			121.14	11.3		16
		End of Borehole				
12						
14						
16						
18		Water not encountered Boring backfilled with soil cuttings				
20						

Penetration Test blows/ft: 20 40 60

Water Content (%): 10 20 30 40

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B9

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-9

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
2		***SANDY SILT (ML)*** Stiff to very stiff, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
6			108.5	8.5		20
10			120.8	7.7		26
12		***SILTY SAND (SM)*** Medium dense, medium- to fine-grained; grayish-brown to brown, moist				
16				11.3		17
16		Water not encountered Boring backfilled with soil cuttings				
18		***CLAYEY SAND (SC)*** Medium dense, fine-grained; dark brown, moist				
20				9.6		11

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 20 Feet

Log of Boring B10

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-10

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
2		***SANDY SILT (ML)*** Hard, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
4						
6			114.1	9.9		50
8						
10		***SILTY SAND (SM)*** Medium dense, fine-grained; grayish-brown, moist	117.4	10.0		19
12						
14				12.8		15
16						
18		***CLAYEY SAND (SC)*** Medium dense, fine-grained; dark brown, moist Water not encountered Boring backfilled with soil cuttings		9.8		12
20						

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 20 Feet

Log of Boring B11

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-11

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
2		***SANDY SILT (ML)*** Very stiff, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
4						
6			103.9	10.6		32
8		***SILTY SAND (SM)*** Medium dense, fine-grained; dark brown, moist				
10			120.6	9.4		23
12		End of Borehole				
14						
16						
18		Water not encountered Boring backfilled with soil cuttings				
20						

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B12

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-12

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
2		***SANDY SILT (ML)*** Stiff to very stiff, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
4						
6			101.9	11.6		22
8						
10		***SILTY SAND (SM)*** Medium dense to dense, medium- to fine-grained; dark brown, moist	116.4	10.4		25
12						
14						
16				11.5		32
18		***SANDY SILT (ML)*** Stiff, medium- to fine-grained; brown, moist Water not encountered Boring backfilled with soil cuttings				
20				16.2		14

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 20 Feet

Log of Boring B13

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-13

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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				
2		***SANDY SILT (ML)*** Stiff, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
4						
6			106.8	12.3		17
8		***SILTY SAND (SM)*** Medium dense, fine-grained; dark brown, moist				
10			117.3	10.7		21
12		End of Borehole				
14						
16						
18		Water not encountered Boring backfilled with soil cuttings				
20						

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 10 Feet

Log of Boring B14

Project: Golden Triangle Apartments

Project No: 112-20020

Client: College Tuition, LLC

Figure No.: A-14

Location: Golden Triangle Road and Isabella Parkway, Santa Clarita, California

Logged By: Jorge Pelayo

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 – 9.5		***SANDY SILT (ML)*** Very stiff, medium- to fine-grained with trace CLAY; dark brown, damp to moist				
5			105.5	14.7		26
9.5 – 17.5		***SILTY SAND (SM)*** Medium dense to dense, medium- to fine-grained; grayish-brown to brown, moist				
10			113.3	12.0		18
15				15.0		39
17.5 – 20		***CLAYEY SAND (SC)*** Medium dense, fine-grained; dark brown, moist Water not encountered Boring backfilled with soil cuttings				
19				9.2		13

Penetration Test blows/ft: 20, 40, 60

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

Drill Method: Hollow Stem

Drill Date: 3-6-20

Drill Rig: CME 75

Krazan and Associates

Hole Size: 5½ Inches

Driller: Advanced Drilling

Elevation: 20 Feet

Sheet: 1 of 1

Sieve Analysis

Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 5'
Soil Classification	: ML

Wet Weight	:	472.90
Dry Weight	:	472.90
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	7.9	1.7	1.7	98.3
#4	4.75	4.3	0.9	2.6	97.4
#8	2.36	9.2	1.9	4.5	95.5
#16	1.18	16.0	3.4	7.9	92.1
#30	0.60	23.5	5.0	12.9	87.1
#50	0.30	23.2	4.9	17.8	82.2
#100	0.15	13.1	2.8	20.6	79.4
#200	0.08	37.8	8.0	28.5	71.5

Krazan Testing Laboratory

Grain Size Analysis

Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	ML
Sample Number	B-1 @ 5'

Krazan Testing Laboratory

Sieve Analysis

Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 10'
Soil Classification	: SM

Wet Weight	:	518.20
Dry Weight	:	518.20
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	2.3	0.4	0.4	99.6
#4	4.75	6.6	1.3	1.7	98.3
#8	2.36	13.5	2.6	4.3	95.7
#16	1.18	39.2	7.6	11.9	88.1
#30	0.60	23.1	4.5	16.3	83.7
#50	0.30	65.4	12.6	29.0	71.0
#100	0.15	79.0	15.2	44.2	55.8
#200	0.08	121.4	23.4	67.6	32.4

Krazan Testing Laboratory

Grain Size Analysis

Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	SM
Sample Number	B-1 @ 10'

Krazan Testing Laboratory

Sieve Analysis

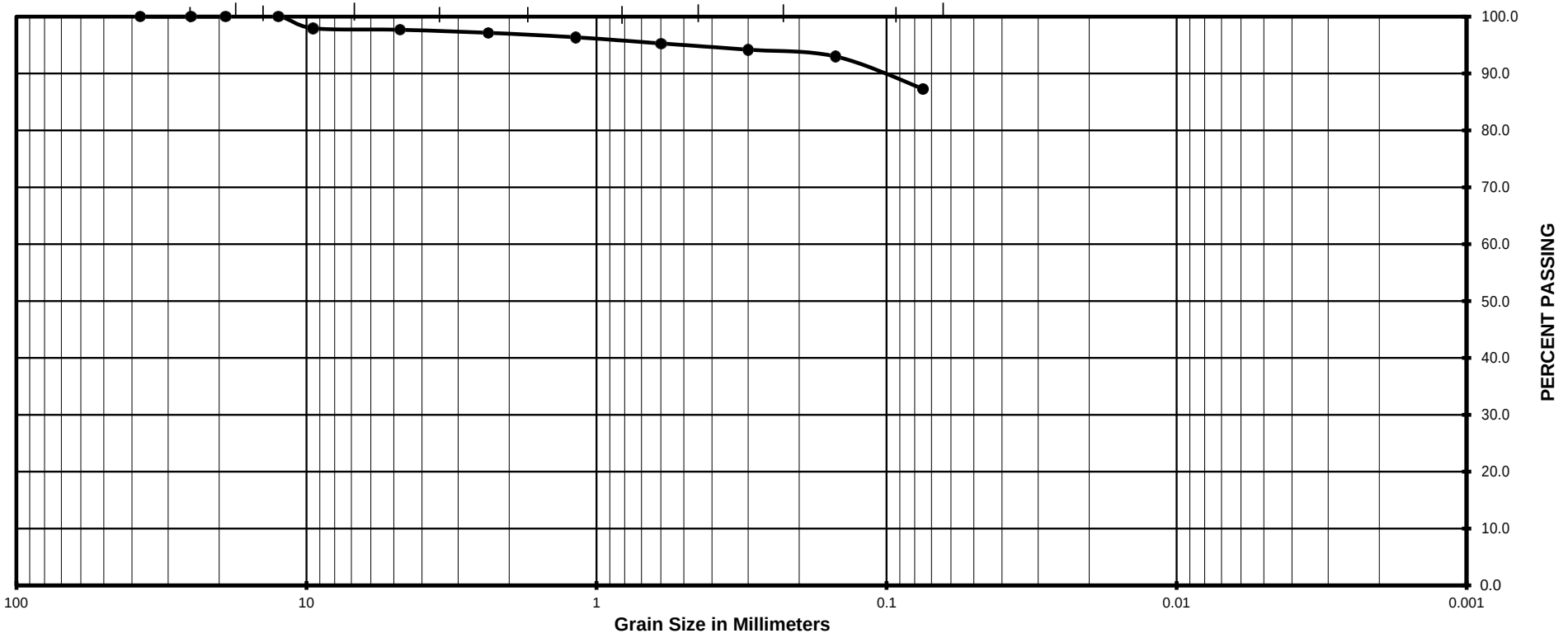
Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 15'
Soil Classification	: ML

Wet Weight	:	446.30
Dry Weight	:	446.30
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	9.2	2.1	2.1	97.9
#4	4.75	1.2	0.3	2.3	97.7
#8	2.36	2.4	0.5	2.9	97.1
#16	1.18	3.5	0.8	3.7	96.3
#30	0.60	4.8	1.1	4.7	95.3
#50	0.30	4.9	1.1	5.8	94.2
#100	0.15	5.3	1.2	7.0	93.0
#200	0.08	25.4	5.7	12.7	87.3

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	ML
Sample Number	B-1 @ 15'

Krazan Testing Laboratory

Sieve Analysis

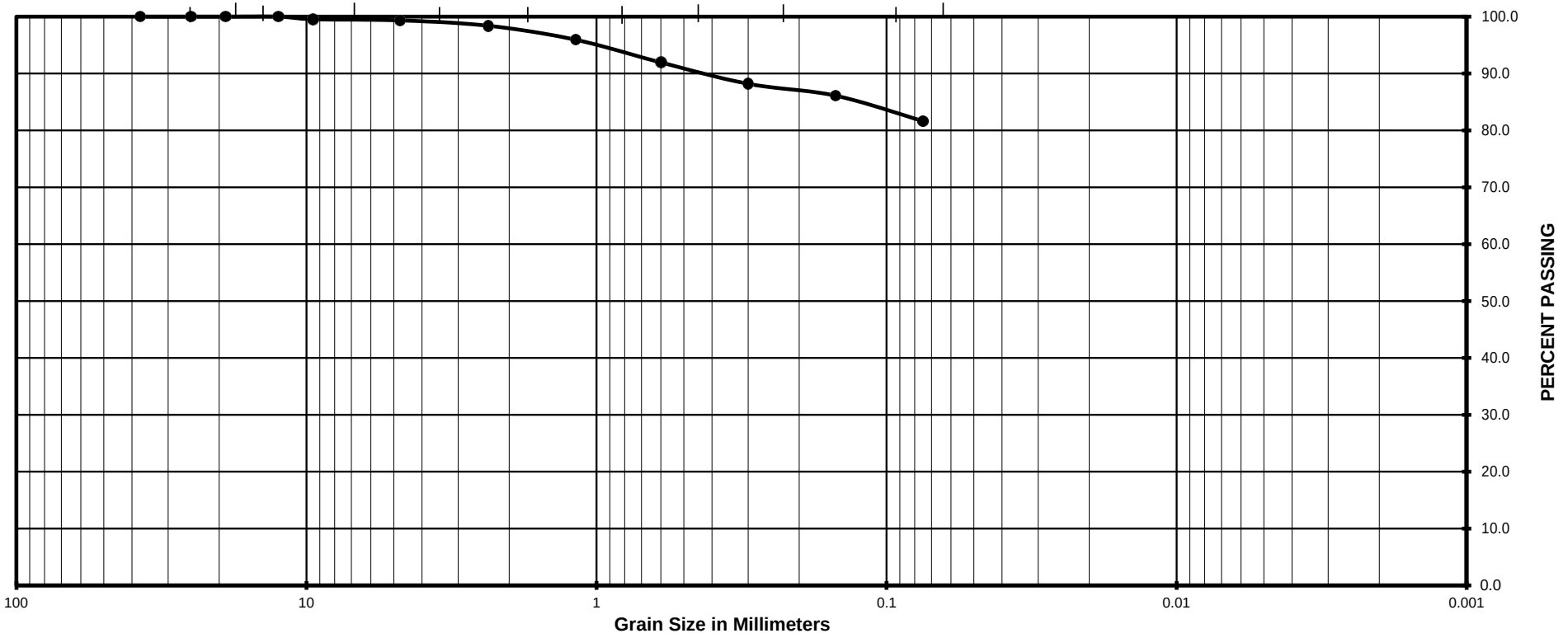
Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 20'
Soil Classification	: CL

Wet Weight	:	452.90
Dry Weight	:	452.90
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	2.1	0.5	0.5	99.5
#4	4.75	0.9	0.2	0.7	99.3
#8	2.36	4.3	0.9	1.6	98.4
#16	1.18	11.1	2.5	4.1	95.9
#30	0.60	18.1	4.0	8.1	91.9
#50	0.30	17.0	3.8	11.8	88.2
#100	0.15	9.4	2.1	13.9	86.1
#200	0.08	20.3	4.5	18.4	81.6

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	CL
Sample Number	B-1 @ 20'

Krazan Testing Laboratory

Sieve Analysis

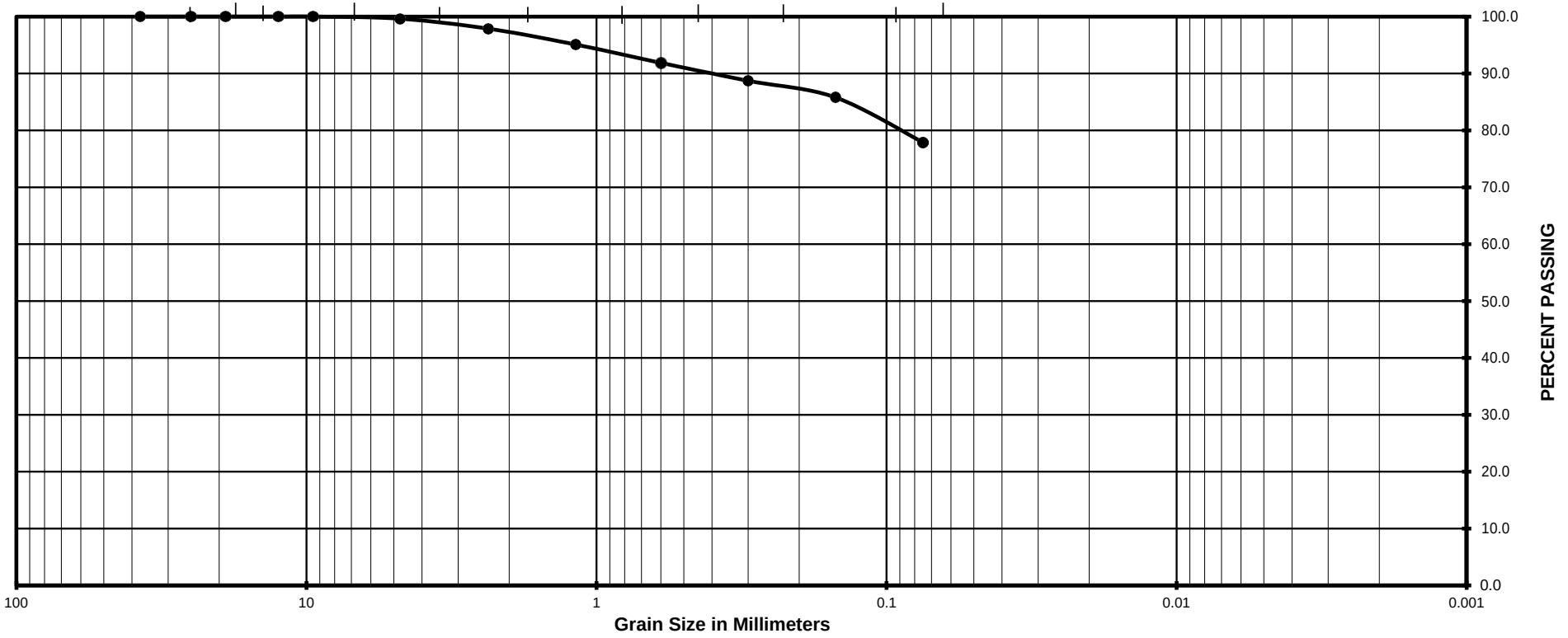
Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 25'
Soil Classification	: ML

Wet Weight	:	462.90
Dry Weight	:	462.90
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	1.8	0.4	0.4	99.6
#8	2.36	8.1	1.7	2.1	97.9
#16	1.18	12.9	2.8	4.9	95.1
#30	0.60	14.9	3.2	8.1	91.9
#50	0.30	14.6	3.2	11.3	88.7
#100	0.15	13.5	2.9	14.2	85.8
#200	0.08	36.6	7.9	22.1	77.9

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	ML
Sample Number	B-1 @ 25'

Krazan Testing Laboratory

Sieve Analysis

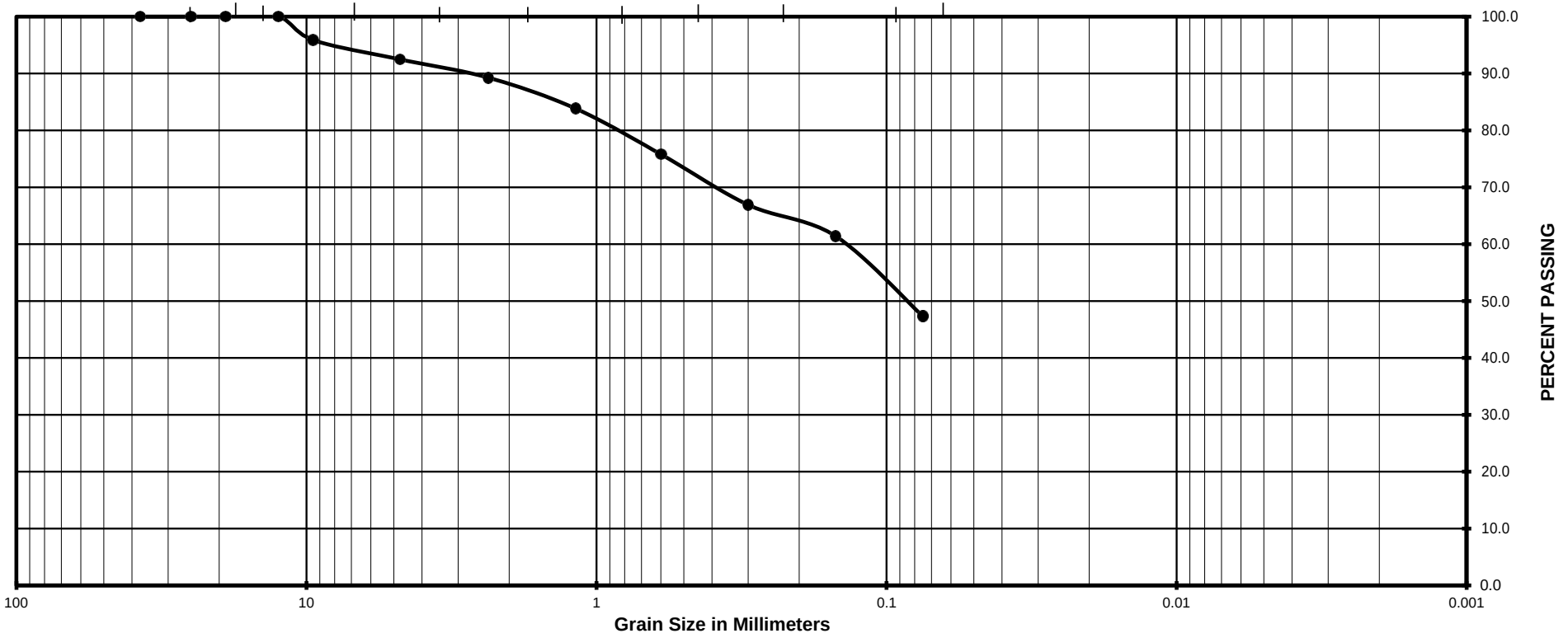
Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 30'
Soil Classification	: SM

Wet Weight	:	392.50
Dry Weight	:	392.50
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	16.2	4.1	4.1	95.9
#4	4.75	13.4	3.4	7.5	92.5
#8	2.36	12.6	3.2	10.8	89.2
#16	1.18	21.3	5.4	16.2	83.8
#30	0.60	31.5	8.0	24.2	75.8
#50	0.30	34.9	8.9	33.1	66.9
#100	0.15	21.5	5.5	38.6	61.4
#200	0.08	55.4	14.1	52.7	47.3

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	SM
Sample Number	B-1 @ 30'

Krazan Testing Laboratory

Sieve Analysis

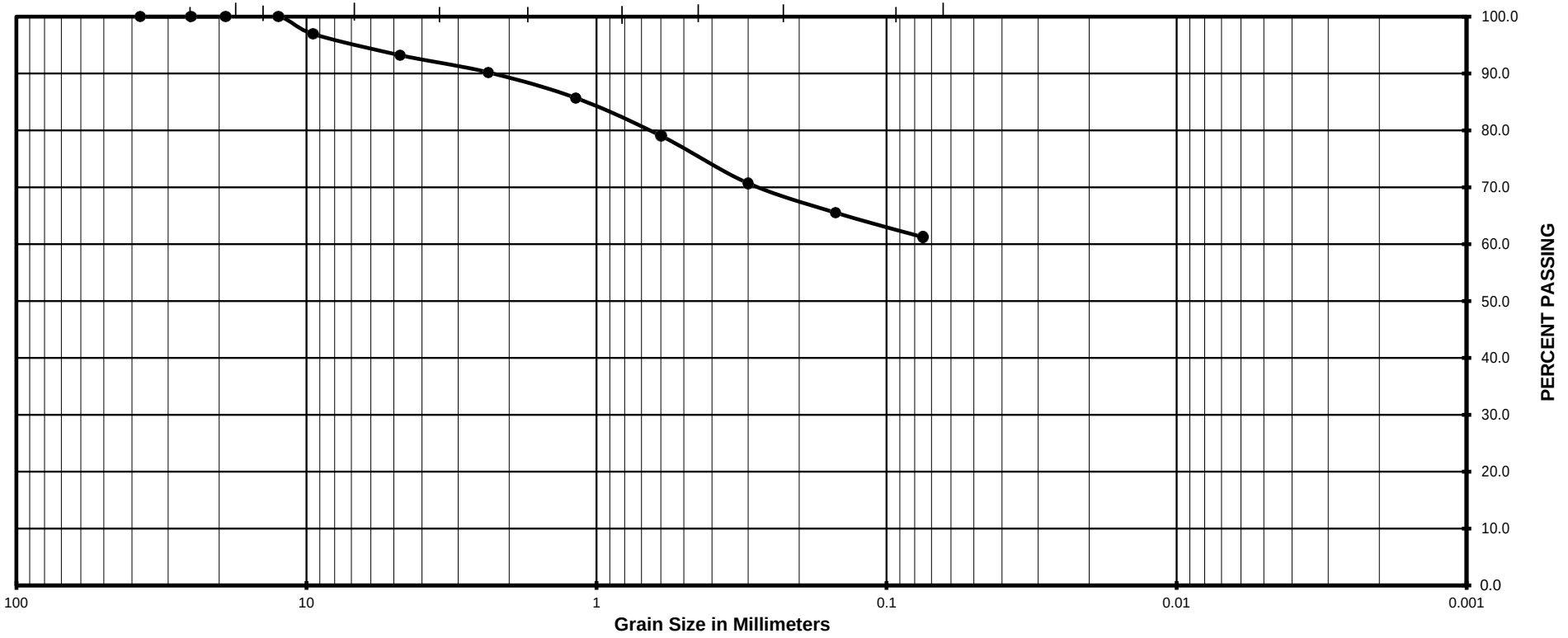
Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 35'
Soil Classification	: CL

Wet Weight	:	470.60
Dry Weight	:	470.60
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	14.4	3.1	3.1	96.9
#4	4.75	17.6	3.7	6.8	93.2
#8	2.36	14.2	3.0	9.8	90.2
#16	1.18	21.1	4.5	14.3	85.7
#30	0.60	31.3	6.7	21.0	79.0
#50	0.30	39.3	8.4	29.3	70.7
#100	0.15	24.3	5.2	34.5	65.5
#200	0.08	20.3	4.3	38.8	61.2

Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	CL
Sample Number	B-1 @ 35'

Krazan Testing Laboratory

Sieve Analysis

Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 40'
Soil Classification	: SM

Wet Weight	:	460.80
Dry Weight	:	460.80
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	10.3	2.2	2.2	97.8
#4	4.75	16.6	3.6	5.8	94.2
#8	2.36	16.9	3.7	9.5	90.5
#16	1.18	34.5	7.5	17.0	83.0
#30	0.60	51.4	11.2	28.1	71.9
#50	0.30	57.8	12.5	40.7	59.3
#100	0.15	33.2	7.2	47.9	52.1
#200	0.08	48.1	10.4	58.3	41.7

Krazan Testing Laboratory

Grain Size Analysis

Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	SM
Sample Number	B-1 @ 40'

Krazan Testing Laboratory

Sieve Analysis

Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 45'
Soil Classification	: SM w/ gravel

Wet Weight	:	381.90
Dry Weight	:	381.90
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	13.9	3.6	3.6	96.4
1/2"	12.50	28.0	7.3	11.0	89.0
3/8"	9.50	5.0	1.3	12.3	87.7
#4	4.75	38.0	10.0	22.2	77.8
#8	2.36	44.1	11.5	33.8	66.2
#16	1.18	54.3	14.2	48.0	52.0
#30	0.60	47.6	12.5	60.5	39.5
#50	0.30	25.6	6.7	67.2	32.8
#100	0.15	17.5	4.6	71.7	28.3
#200	0.08	26.4	6.9	78.7	21.3

Krazan Testing Laboratory

Grain Size Analysis

Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	SM w/ gravel
Sample Number	B-1 @ 45'

Krazan Testing Laboratory

Sieve Analysis

Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-1 @ 50'
Soil Classification	: SM w/ gravel

Wet Weight	:	400.10
Dry Weight	:	400.10
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	4.4	1.1	1.1	98.9
3/8"	9.50	7.7	1.9	3.0	97.0
#4	4.75	19.6	4.9	7.9	92.1
#8	2.36	29.0	7.2	15.2	84.8
#16	1.18	47.3	11.8	27.0	73.0
#30	0.60	56.5	14.1	41.1	58.9
#50	0.30	54.2	13.5	54.7	45.3
#100	0.15	26.1	6.5	61.2	38.8
#200	0.08	35.5	8.9	70.1	29.9

Krazan Testing Laboratory

Grain Size Analysis

Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Golden Triangle Apartments
Project Number	11220020
Soil Classification	SM w/ gravel
Sample Number	B-1 @ 50'

Krazan Testing Laboratory

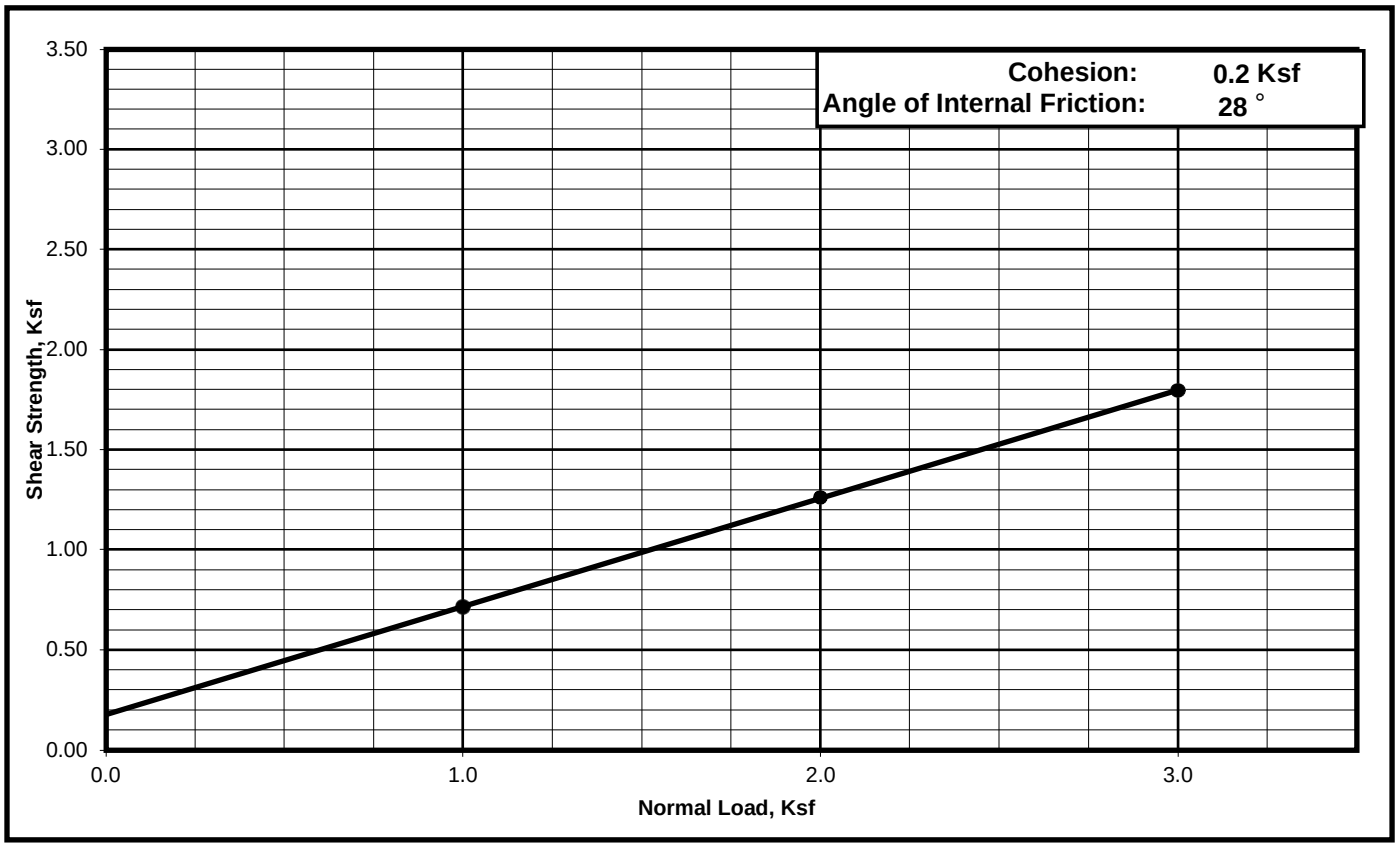
Direct Shear of Consolidated, Drained Soils
ASTM D - 3080 / AASHTO T - 236

Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-4 @ 5'
Soil Classification	: ML
Sample Surface Area	: 0.0289

STRESS DISPLACEMENT DATA

Lat. Disp. (in.)	Normal Load		
	1000	2000	3000
0	0	0	0
0.030	8	15	29
0.060	15	29	46
0.090	20	45	55
0.120	26	51	72
0.150	35	58	89
0.180	43	64	102
0.210	49	69	119
0.240	53	78	130
0.270	57	90	132
0.300	60	101	142
0.330	61	110	150
0.360	62	112	161

Normal Load psf	Shear force lbs	Shear Stress psf
1000	20.7	716
2000	36.5	1262
3000	51.9	1797

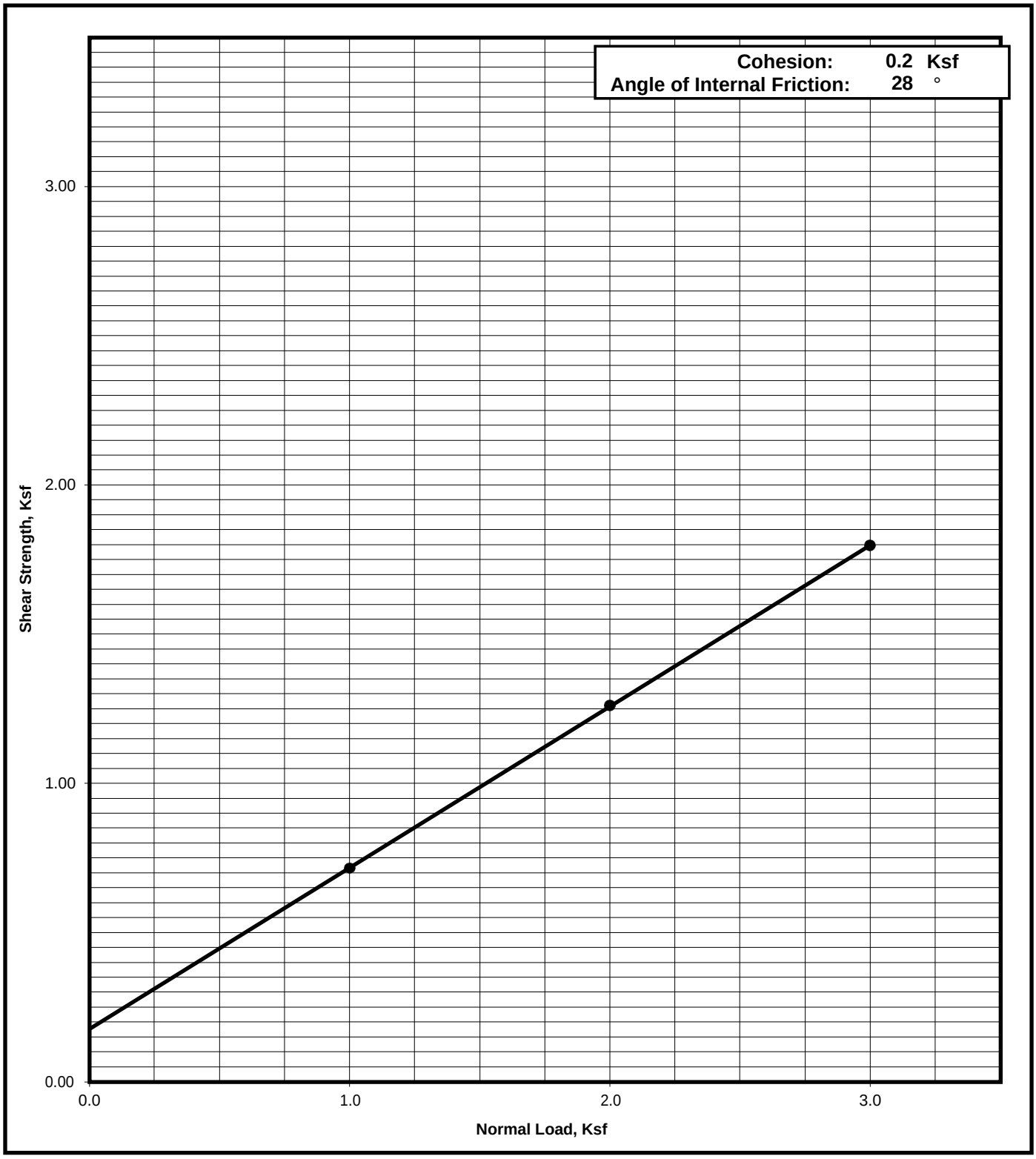


Shear Strength Diagram (Direct Shear)

Krazan Testing Laboratory

ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
11220020	B-4 @ 5'	ML	4/3/2020



Krazan Testing Laboratory

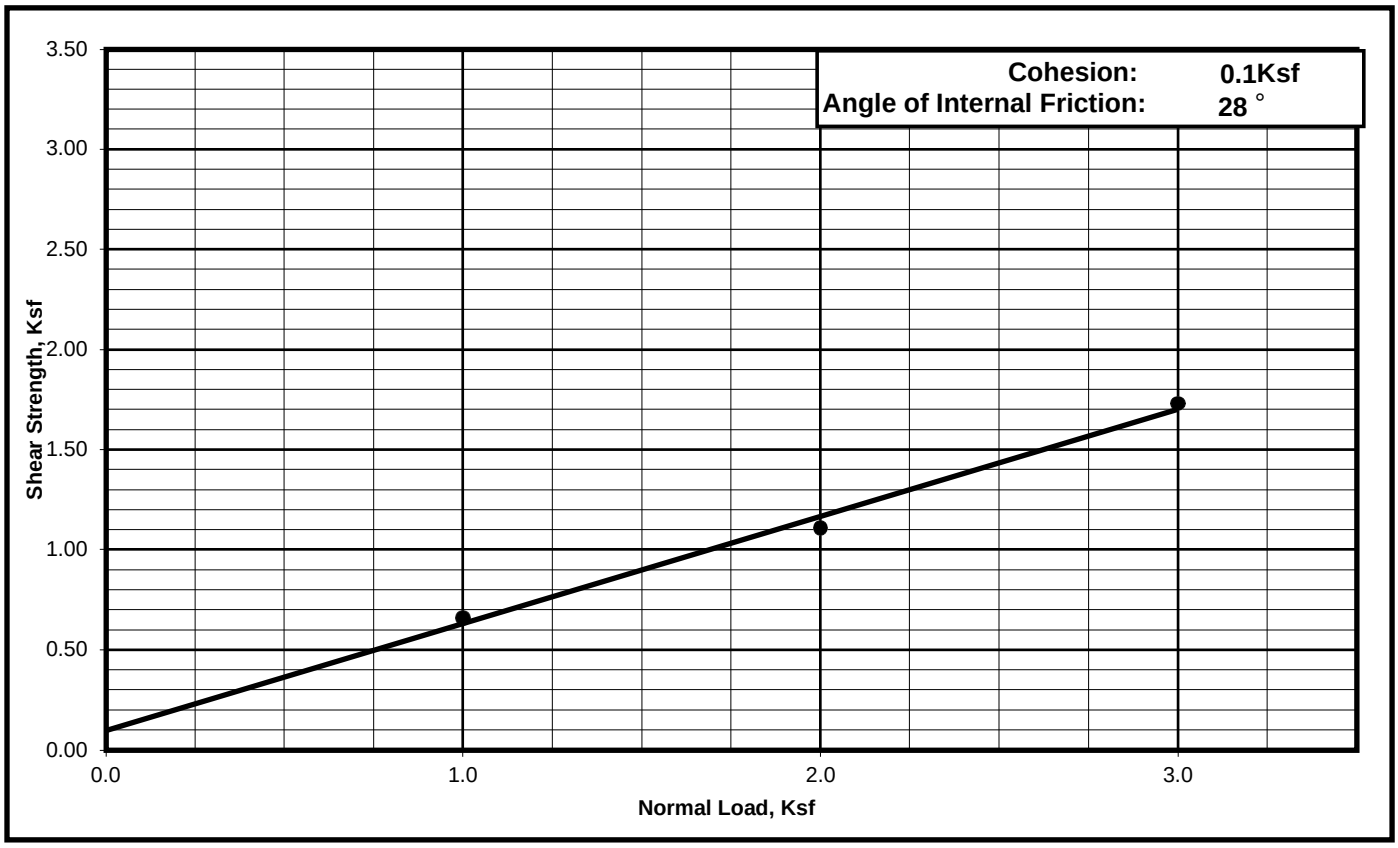
Direct Shear of Consolidated, Drained Soils
ASTM D - 3080 / AASHTO T - 236

Project Number	11220020
Project Name	: Golden Triangle Apartments
Date	: 4/3/2020
Sample Location	: B-12 @ 5'
Soil Classification	: ML
Sample Surface Area	: 0.0289

STRESS DISPLACEMENT DATA

Lat. Disp. (in.)	Normal Load		
	1000	2000	3000
0	0	0	0
0.030	7	23	33
0.060	13	25	53
0.090	28	33	61
0.120	23	35	75
0.150	31	41	77
0.180	38	48	88
0.210	43	51	99
0.240	46	57	103
0.270	51	66	115
0.300	53	73	125
0.330	55	83	138
0.360	57	98	155

Normal Load psf	Shear force lbs	Shear Stress psf
1000	19.1	661
2000	32.0	1109
3000	50.0	1731

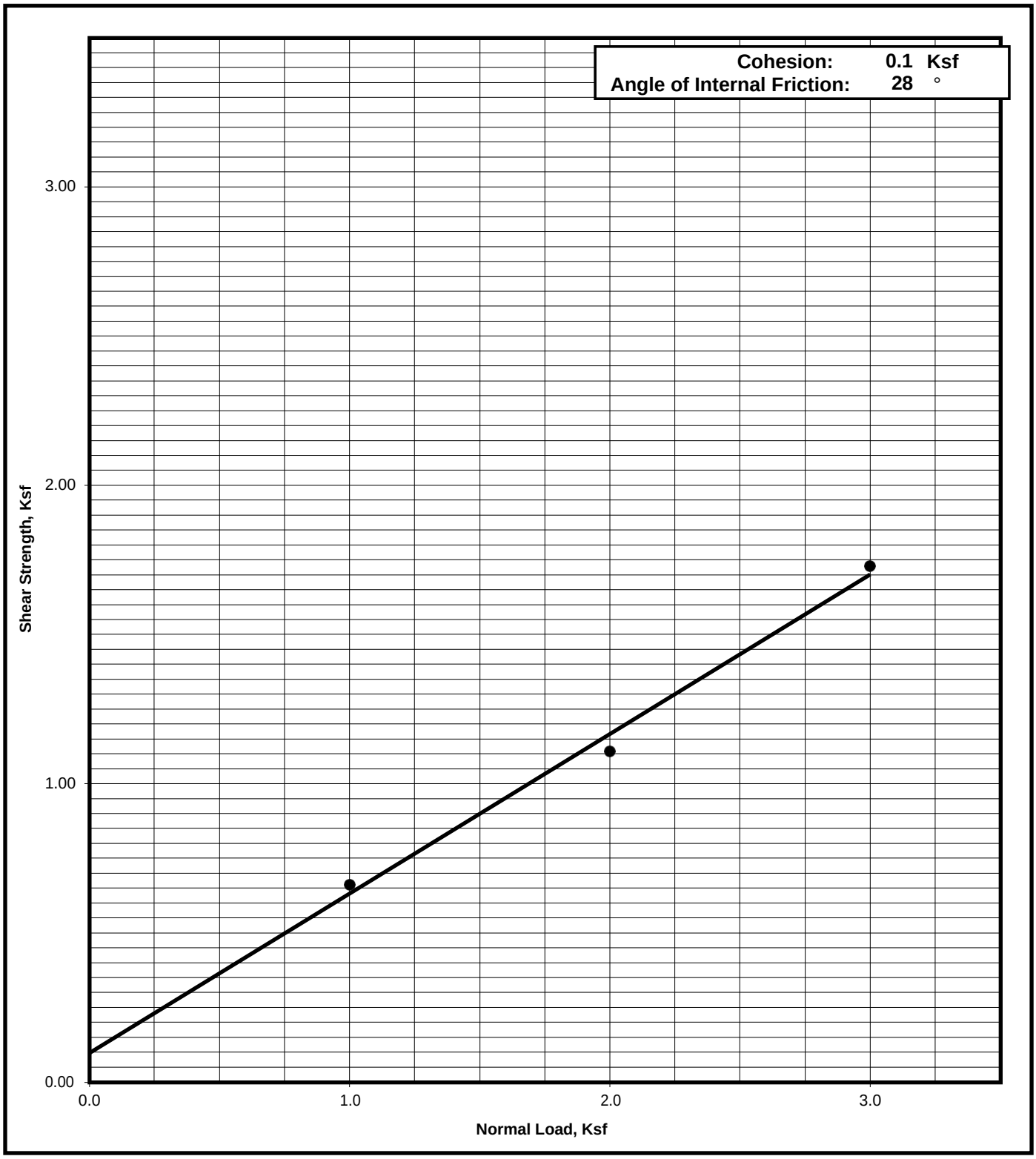


Shear Strength Diagram (Direct Shear)

Krazan Testing Laboratory

ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
11220020	B-12 @ 5'	ML	4/3/2020



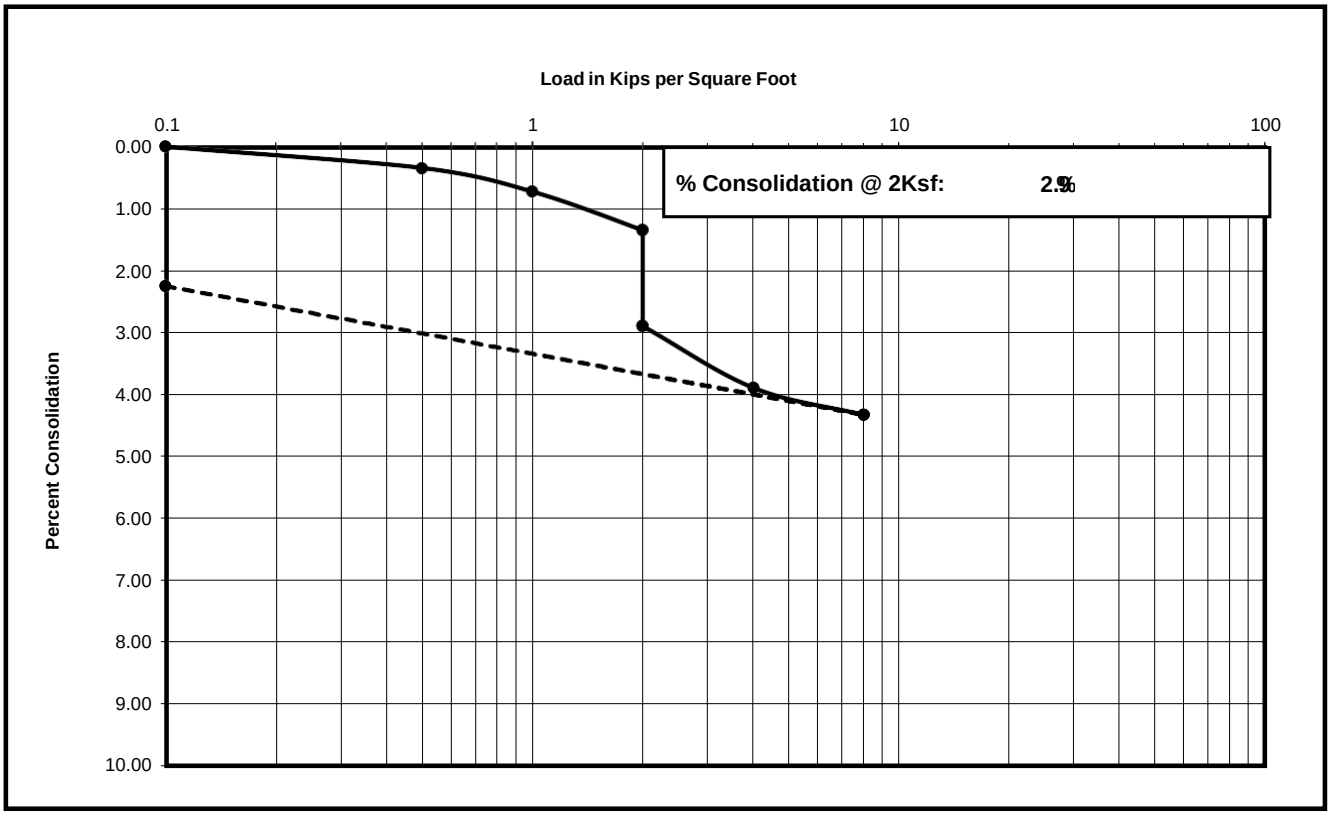
Krazan Testing Laboratory

One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

Project Number 11220020
Project Name : Golden Triangle Apartments
Date : 4/3/2020
Sample Location : B-6 @ 5'
Soil Classification : ML
Sample Condition : Undisturbed

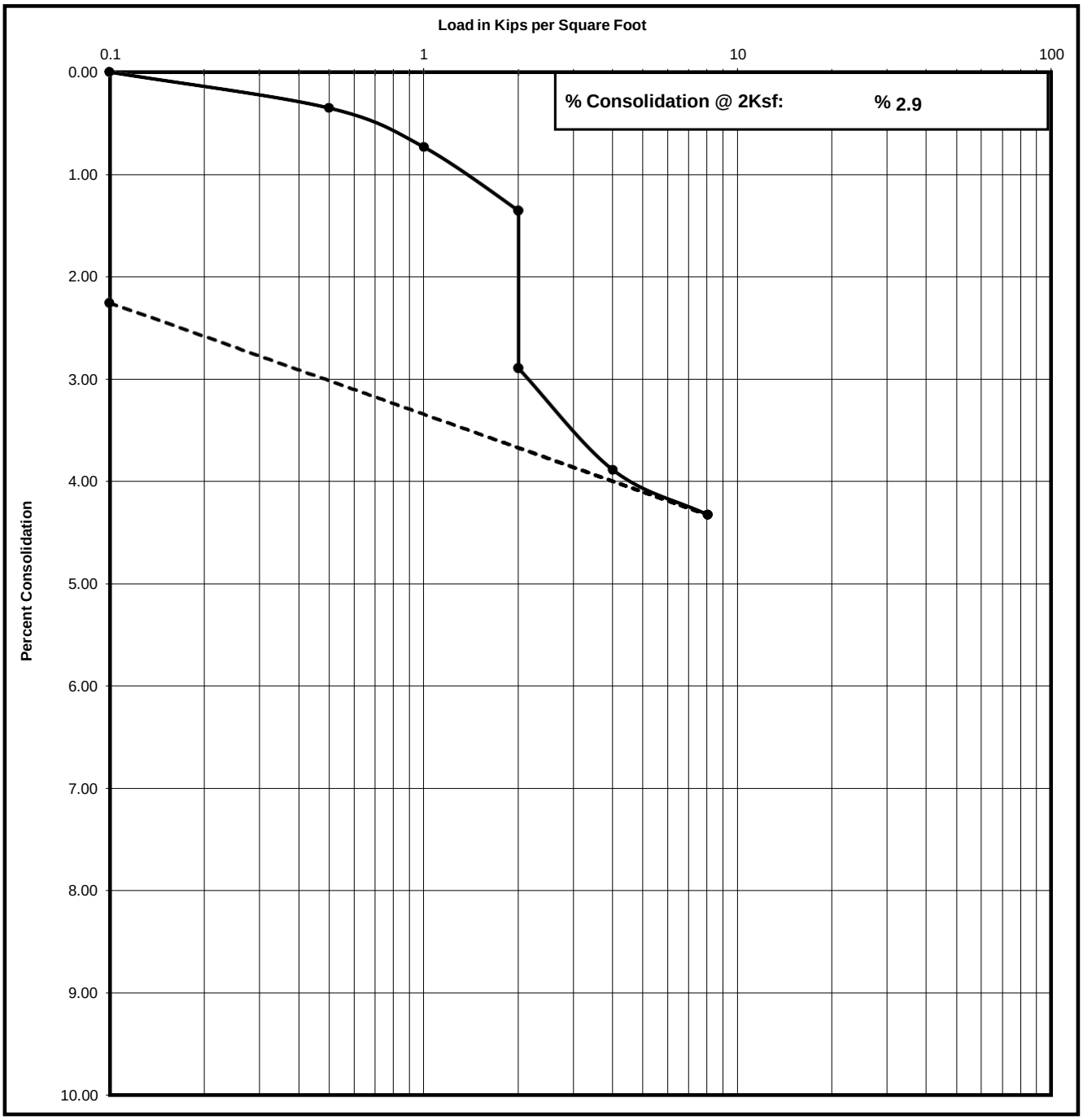
LOAD (ksf)	Reading	% Consolidation
0.1	0.001	--
0.5	0.0035	0.35
1	0.0073	0.73
2	0.0135	1.35
Satur.	0.0289	2.89
4	0.0388	3.88
8	0.0432	4.32
0.1	0.0225	2.25



Krazan Testing Laboratory

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
11220020	B-6 @ 5'	4/3/2020	ML



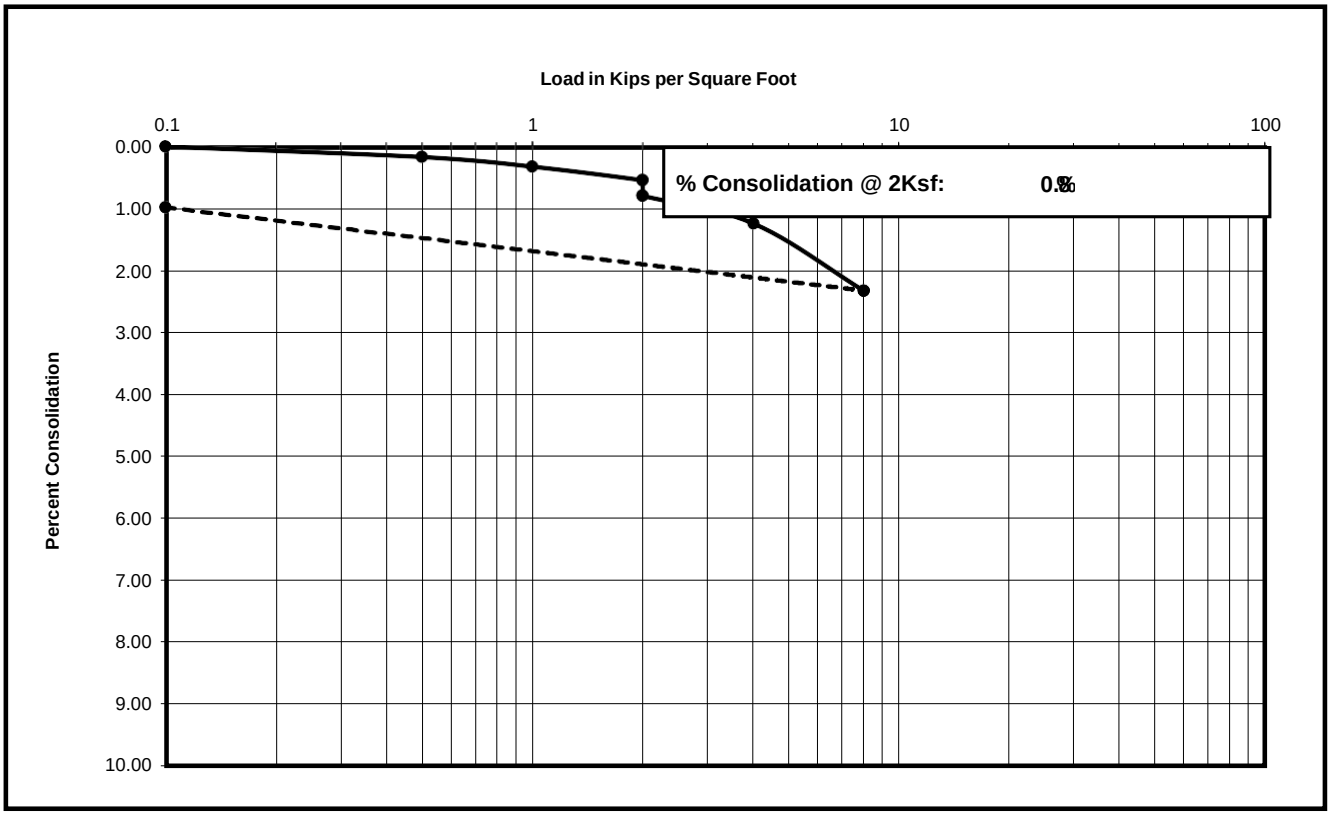
Krazan Testing Laboratory

One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

Project Number 11220020
Project Name : Golden Triangle Apartments
Date : 4/3/2020
Sample Location : B-6 @ 10'
Soil Classification : SM
Sample Condition : Undisturbed

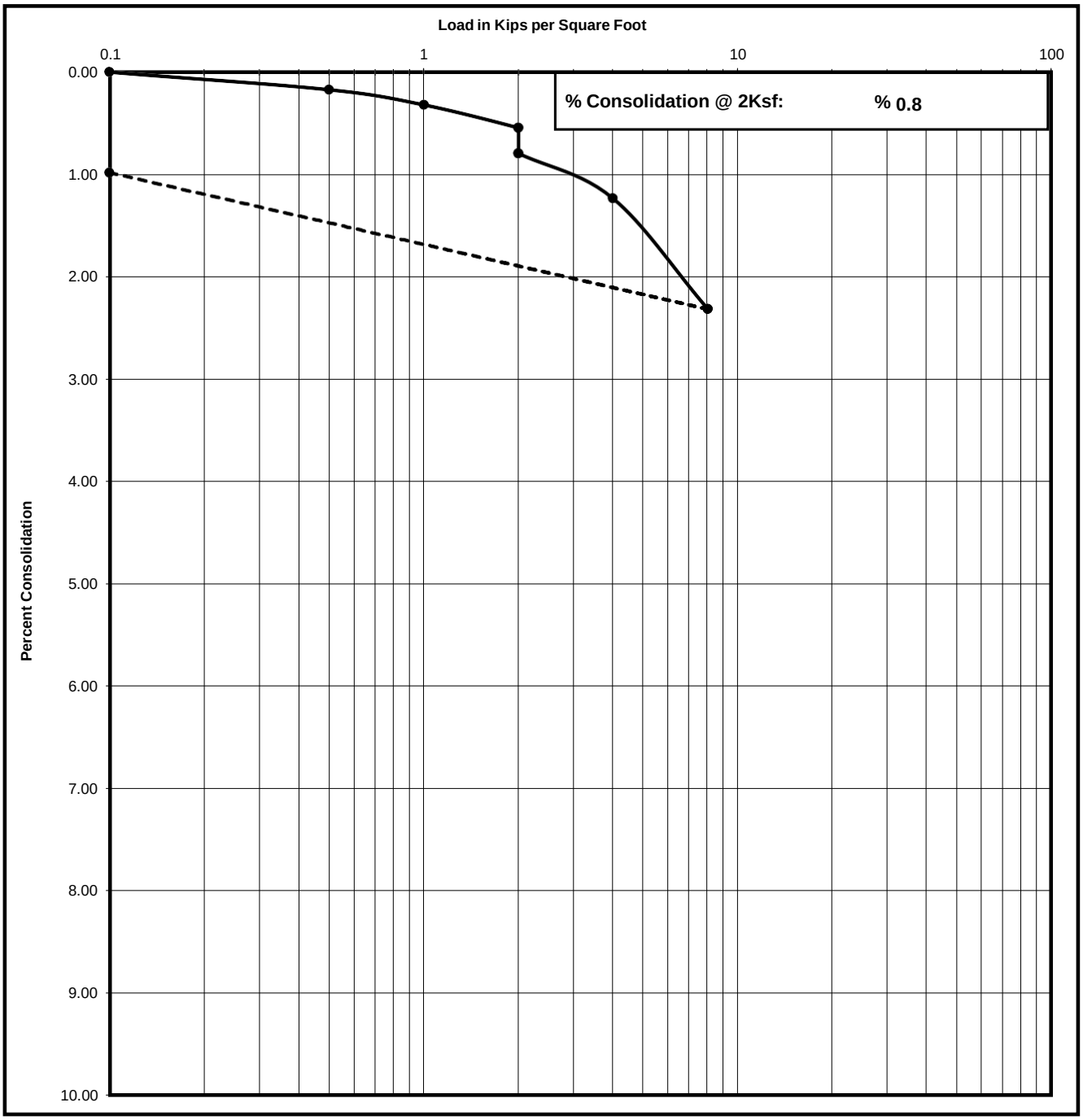
LOAD (ksf)	Reading	% Consolidation
0.1	0.0001	--
0.5	0.0017	0.17
1	0.0032	0.32
2	0.0054	0.54
Satur.	0.0079	0.79
4	0.0123	1.23
8	0.0231	2.31
0.1	0.0098	0.98



Krazan Testing Laboratory

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
11220020	B-6 @ 10'	4/3/2020	SM



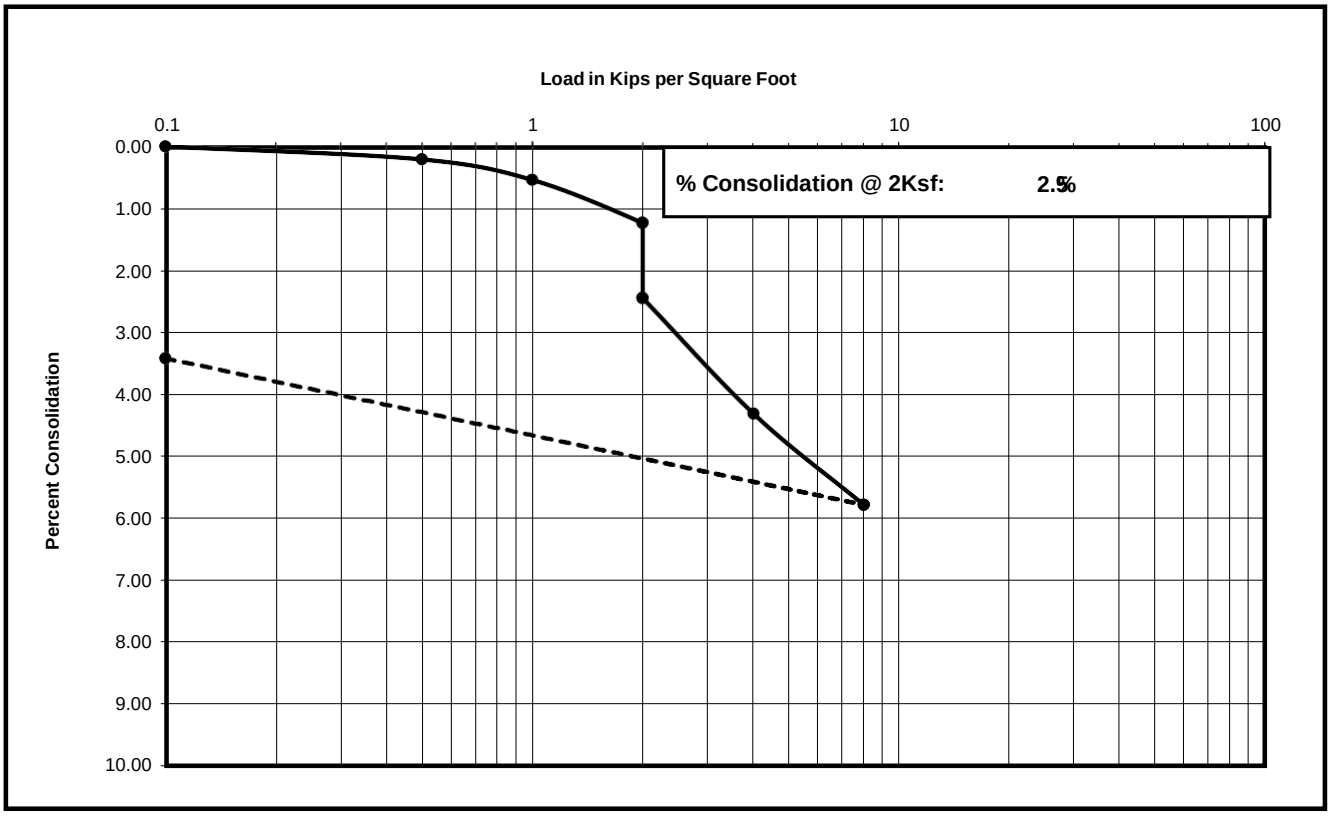
Krazan Testing Laboratory

One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

Project Number 11220020
Project Name : Golden Triangle Apartments
Date : 4/3/2020
Sample Location : B-13 @ 5'
Soil Classification : ML
Sample Condition : Undisturbed

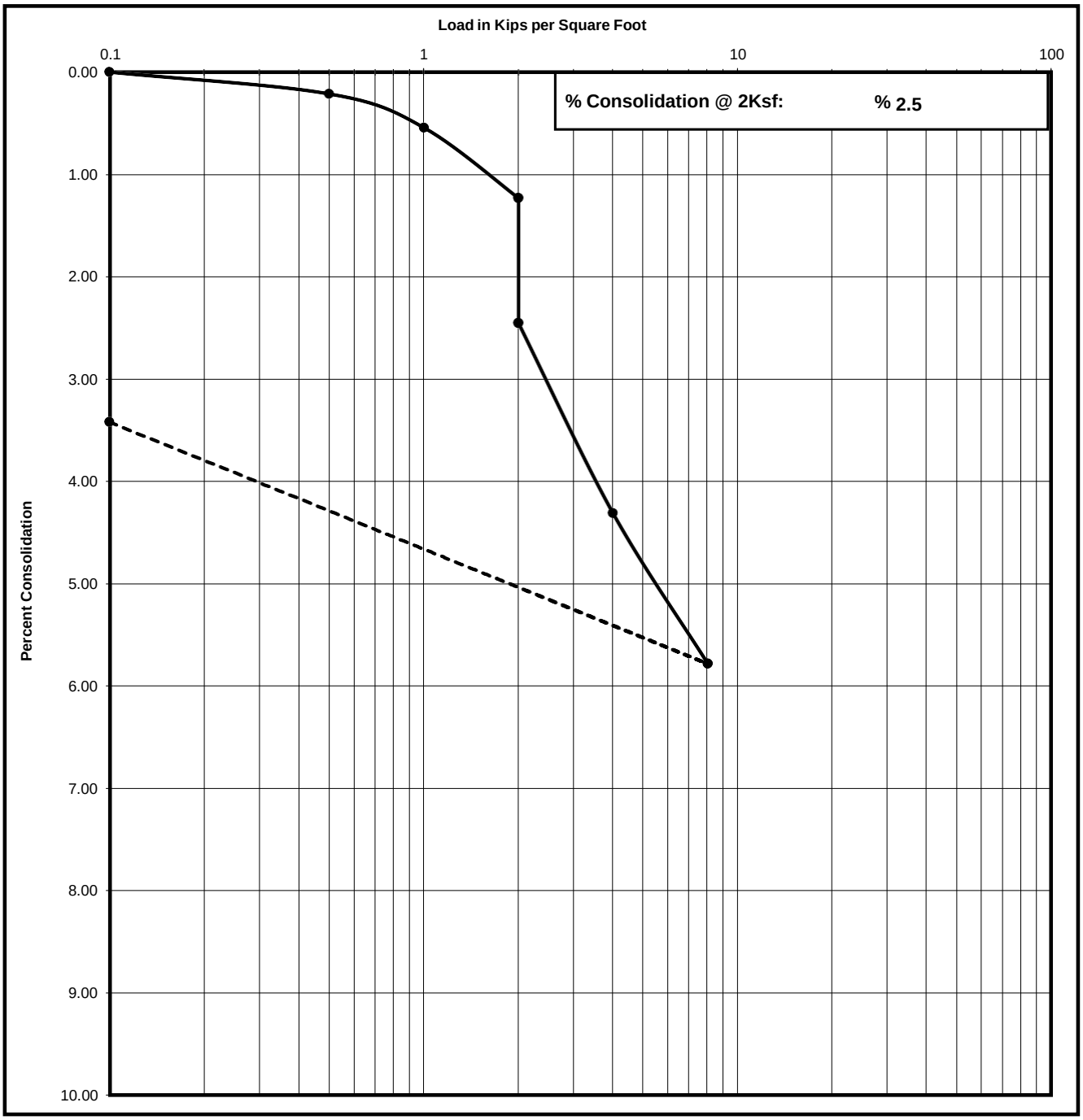
LOAD (ksf)	Reading	% Consolidation
0.1	0.0005	--
0.5	0.0021	0.21
1	0.0054	0.54
2	0.0123	1.23
Satur.	0.0245	2.45
4	0.0431	4.31
8	0.0578	5.78
0.1	0.0342	3.42



Krazan Testing Laboratory

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
11220020	B-13 @ 5'	4/3/2020	ML



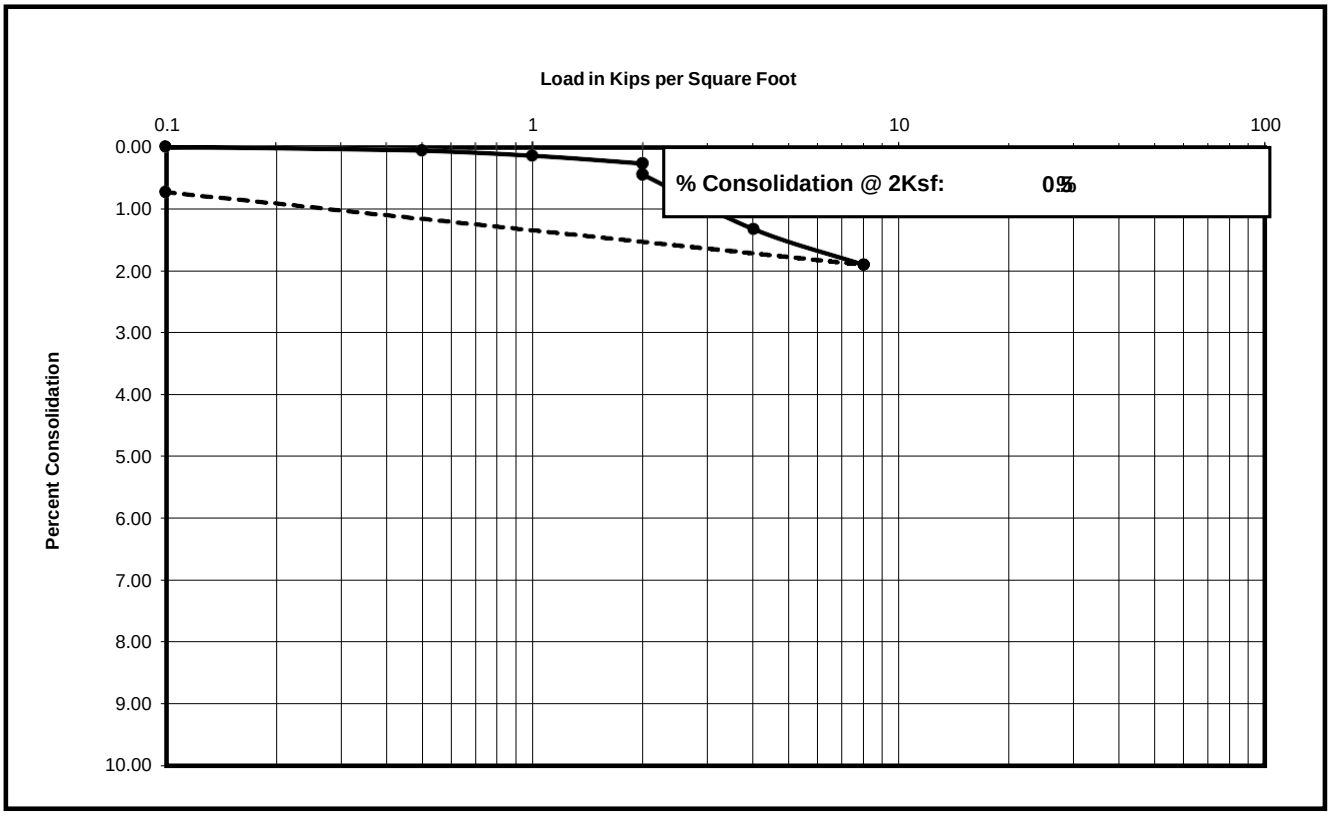
Krazan Testing Laboratory

One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

Project Number 11220020
Project Name : Golden Triangle Apartments
Date : 4/3/2020
Sample Location : B-13 @ 10'
Soil Classification : SM
Sample Condition : Undisturbed

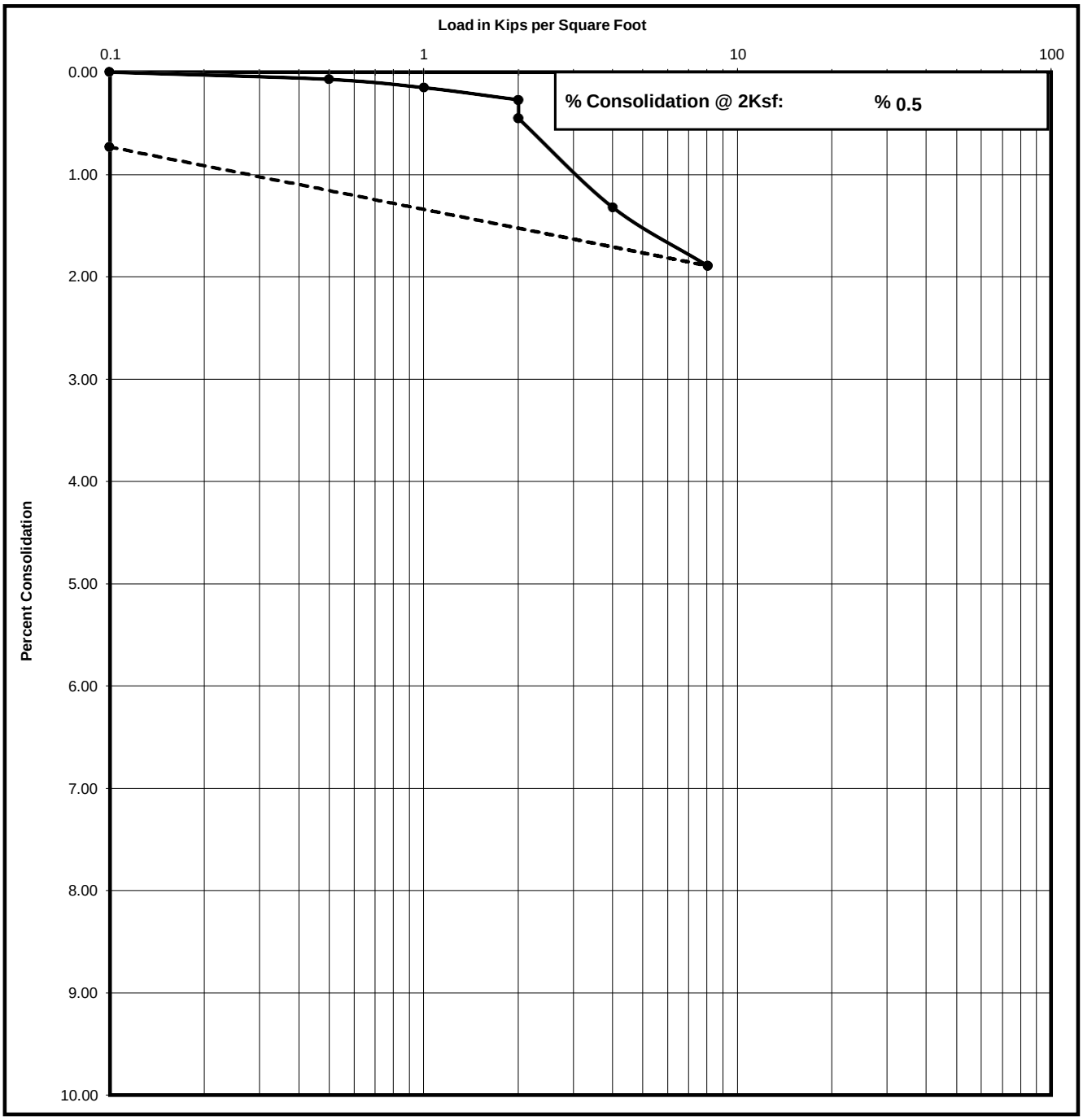
LOAD (ksf)	Reading	% Consolidation
0.1	0	--
0.5	0.0007	0.07
1	0.0015	0.15
2	0.0027	0.27
Satur.	0.0045	0.45
4	0.0132	1.32
8	0.0189	1.89
0.1	0.0073	0.73



Krazan Testing Laboratory

Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
11220020	B-13 @ 10'	4/3/2020	SM



Krazan Testing Laboratory

ANAHEIM TEST LAB, INC

3008 ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

DATE: 04/05/20

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

P.O. NO: Verbal

LAB NO: C-0575

SPECIFICATION: 417/422/643

MATERIAL: Soil

Project No: 112200 20
Golden Triangle Apartments
Composite @ 0-5'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	SOLUBLE SULFATES per CA. 417 ppm	SOLUBLE CHLORIDES per CA. 422 ppm	MIN. RESISTIVITY per CA. 643 ohm-c m
7.2	189	62	1,100

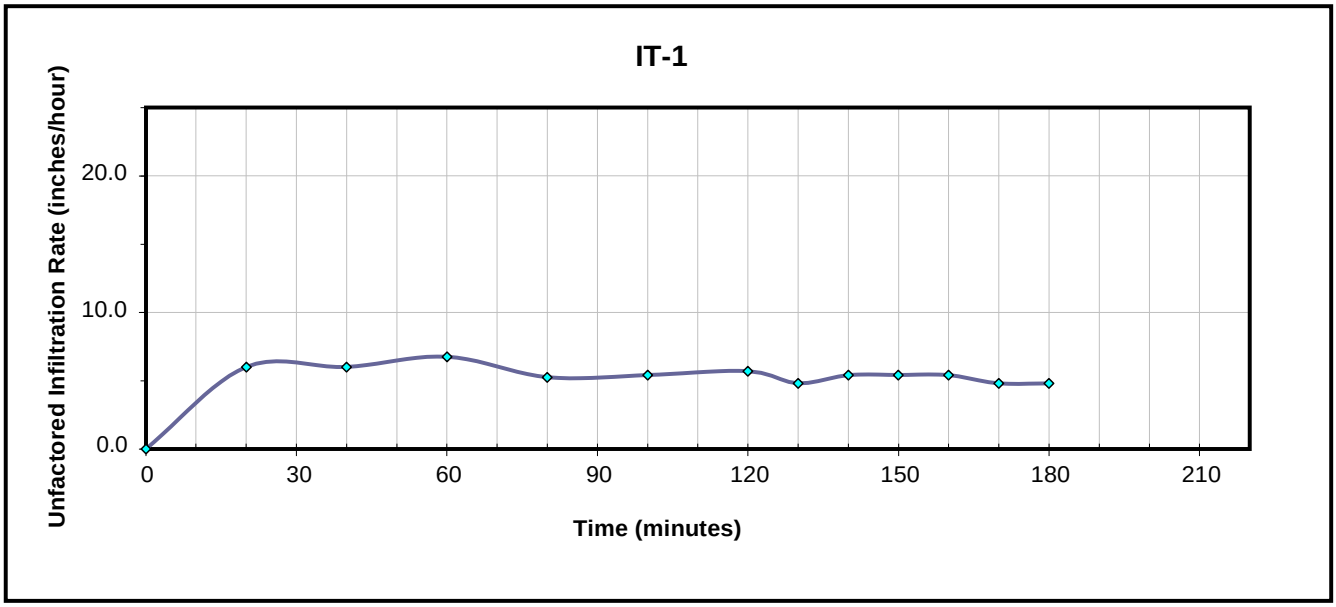
RESPECTFULLY SUBMITTED

WES BRIDGER CHEMIST

RESULTS OF INFILTRATION TESTS - BORING PERCOLATION TEST							
Project #	**11220020**				**Date**	**4/3/2020**	
Project Name	Golden Triangle Apartments						
Project Address	SWC Golden Triangle Road & Isabella Parkway, Santa Clarita, CA						
Test No:	IT-1	**Total Depth (in.)**		60	**Test Size (in)**	8	
Depth To Water	>50'	**Soil Classification**		SM	**Est Invert Depth (in)**	48	
					Screen Top (in)	36	

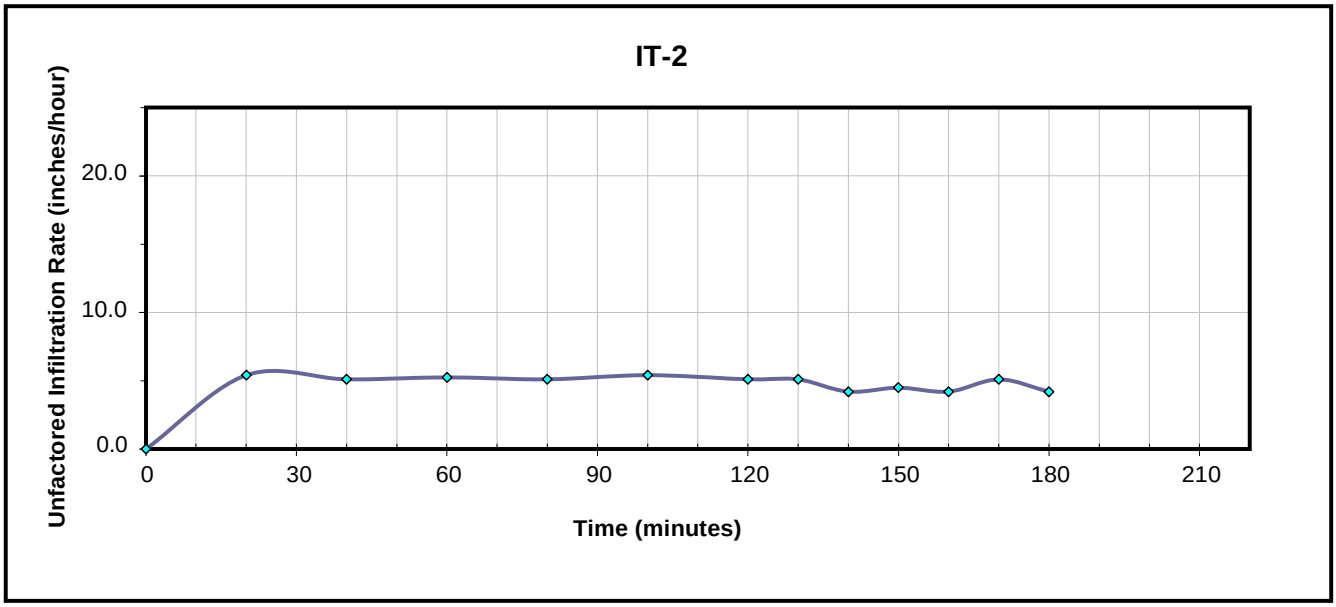
Reading	Elasped Time(min.)	Incremental Time (min.)	Initial Depth To Water(in.)	Final Depth To Water(in.)	Incremental Fall of Water(in.)	Unfactored Incremental Percolation Rate (in/hr)	
Start	0	0.00		30.00	--	--	
1	20.00	20.00	30.00	32.00	2.00	6.00	
2	40.00	20.00	30.00	32.00	2.00	6.00	
3	60.00	20.00	30.00	32.25	2.25	6.75	
4	80.00	20.00	30.00	31.75	1.75	5.25	
5	100.00	20.00	30.00	31.80	1.80	5.40	
6	120.00	20.00	30.00	31.90	1.90	5.70	
7	130.00	10.00	30.00	30.80	0.80	4.80	
8	140.00	10.00	30.00	30.90	0.90	5.40	
9	150.00	10.00	30.00	30.90	0.90	5.40	
10	160.00	10.00	30.00	30.90	0.90	5.40	
11	170.00	10.00	30.00	30.80	0.80	4.80	
12	180.00	10.00	30.00	30.80	0.80	4.80	
13	190.00	10.00	30.00	30.85	0.85	5.10	
14	200.00	10.00	30.00	30.90	0.90	5.40	

	Avg. Unfactored Infiltration Rate (in/hr)	**5.00**
	Recommended Reduction Factor (RFt*RFv*RFs)	**12.0**
	Factored Infiltration Rate in Inches per Hour (in/hr)	**0.42**



RESULTS OF INFILTRATION TESTS - BORING PERCOLATION TEST							
Project #	**11220020**				**Date**	**4/3/2020**	
Project Name	Golden Triangle Apartments						
Project Address	SWC Golden Triangle Road & Isabella Parkway, Santa Clarita, CA						
Test No:	IT-2	**Total Depth (in.)**		60	**Test Size (in)**	8	
Depth To Water	>50'	**Soil Classification**		SM	**Est Invert Depth (in)**	48	
					Screen Top (in)	36	

Reading	Elasped Time(min.)	Incremental Time (min.)	Initial Depth To Water(in.)	Final Depth To Water(in.)	Incremental Fall of Water(in.)	Unfactored Incremental Percolation Rate (in/hr)	
Start	0	0.00		30.00	--	--	
1	20.00	20.00	30.00	31.80	1.80	5.40	
2	40.00	20.00	30.00	31.70	1.70	5.10	
3	60.00	20.00	30.00	31.75	1.75	5.25	
4	80.00	20.00	30.00	31.70	1.70	5.10	
5	100.00	20.00	30.00	31.80	1.80	5.40	
6	120.00	20.00	30.00	31.70	1.70	5.10	
7	130.00	10.00	30.00	30.85	0.85	5.10	
8	140.00	10.00	30.00	30.70	0.70	4.20	
9	150.00	10.00	30.00	30.75	0.75	4.50	
10	160.00	10.00	30.00	30.70	0.70	4.20	
11	170.00	10.00	30.00	30.85	0.85	5.10	
12	180.00	10.00	30.00	30.70	0.70	4.20	
13	190.00	10.00	30.00	30.70	0.70	4.20	
14	200.00	10.00	30.00	30.80	0.80	4.80	
	Avg. Unfactored Infiltration Rate (in/hr)						**4.50**
	Recommended Reduction Factor (RFt*RFv*RFs)						**12.0**
	Factored Infiltration Rate in Inches per Hour (in/hr)						**0.38**



General Earthwork Specifications

Appendix B

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 earthworks in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of Krazan and Associates, Incorporated, hereinafter referred to as the Geotechnical Engineer and/or Testing Agency. Attainment of design grades, when achieved, shall be certified by the project Civil Engineer. Both the Geotechnical 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 adjustments until all work is deemed satisfactory as determined by both the Geotechnical Engineer and the Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Geotechnical Engineer, Civil Engineer, or project Architect.

No earthwork shall be performed without the physical presence or approval of the Geotechnical Engineer. The Contractor shall notify the Geotechnical 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 the minimum relative compaction of 95 percent. Soil moisture content requirements presented in the Geotechnical Engineer's report shall also be complied with. The maximum laboratory compacted dry unit weight of each soil placed as fill shall be determined in accordance with ASTM Test Method D1557-00 (Modified Proctor). The optimum moisture content shall also be determined in accordance with this test method. The terms "relative compaction" and "compaction" are defined as the in-place dry density of the compacted soil divided by the laboratory compacted maximum dry density as determined by ASTM Test Method D1557-00, expressed as a percentage as specified in the technical portion of the Geotechnical Engineer's report. The location and frequency of field density tests shall be as determined by the Geotechnical Engineer. The results of these tests and compliance with these specifications shall be the basis upon which the Geotechnical Engineer will judge satisfactory completion of work.

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 Geotechnical Engineering Investigation report.

The Contractor shall make his own interpretation of the data contained in the Geotechnical Engineering Investigation report and the Contractor shall not be relieved of liability under the Contract 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 wind-blown materials attributable to his work.

SITE PREPARATION

Site preparation shall consist of site clearing and grubbing, over-excavation of the building pad areas, preparation of foundation materials for receiving fill, construction of including the placement of non-expansive fill where recommended by the Geotechnical Engineer.

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 Geotechnical Engineer to be deleterious. Site stripping to remove organic materials and organic-laden soils in landscaped areas shall extend to a minimum depth of 2 inches or until all organic-laden soil with organic matter in excess of 3 percent of the soils by volume are removed. 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 that would permit removal of all roots greater than 1 inch in diameter. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavation should not be permitted until all exposed surfaces have been inspected and the Geotechnical Engineer is present for the proper control of backfill placement and compaction. Burning in areas that are to receive fill materials shall not be permitted.

Excavations required to achieve design grades, depressions, soft or pliant areas, or areas disturbed by demolition activities extending below planned finished subgrade levels should be excavated down to firm, undisturbed soil and backfilled with Engineered Fill.

EXCAVATION: Following clearing and grubbing operations, the building pad area shall be over-excavated to a depth of at least three feet below existing grades or the planned foundation bottom levels, whichever is deeper, and the remaining areas of the building and adjoining exterior concrete flatwork or pavements at the building perimeter shall be over-excavated to a depth of at least one foot below existing grade. The areas of over-excavation and recompaction beneath footings and slabs shall extend out laterally a minimum of five feet beyond the perimeter of these elements.

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**.

SUBGRADE PREPARATION: Surfaces to receive or to support structures directly, shall be scarified to a depth of 8 inches, moisture conditioned as necessary and compacted in accordance with the **TECHNICAL REQUIREMENTS**, above.

Loose soil areas and/or areas of disturbed soil shall be should be excavated down to firm, undisturbed soil, moisture-conditioned as necessary and backfilled with Engineered Fill. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas that are to receive fill materials shall be approved by the Geotechnical Engineer prior to the placement of any of the fill material.

FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence of the Geotechnical Engineer. Material from the required site excavation may be utilized for construction of site fills, with the limitations of their use presented in the Geotechnical Engineer's report, provided the Geotechnical Engineer gives prior approval. All materials utilized for constructing site fills shall be free from vegetation, debris, rubble, trash, rocks greater than 6 inches diameter or other deleterious matter as determined by the Geotechnical Engineer, and shall comply with the requirements for non-expansive fill, aggregate base or aggregate subbase as applicable for its proposed used on the site as presented in the Geotechnical Engineer's report.

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. Fill materials should be placed and compacted in horizontal lifts, each not exceeding 8 inches in uncompacted thickness. Due to equipment limitations, thinner lifts may be necessary to achieve the recommended level of compaction. Compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Geotechnical Engineer. Additional lifts should not be placed if the previous lift did not meet the required dry density (relative compaction) or if soil conditions are not stable. The compacted subgrade in pavement areas should be non-yielding when proof-rolled with a loaded ten-wheel truck, such as a water truck or dump truck, prior to pavement construction.

Both cut and fill shall be surface-compacted to the satisfaction of the Geotechnical 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 Geotechnical Engineer indicates that the moisture content and density of previously placed fill is as specified.

Appendix C

General Paving Specifications

APPENDIX C

PAVEMENT SPECIFICATIONS

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

The term “Standard Specifications”: hereinafter referred to is the January 1999 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 ASTM D1557-00.

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 notes 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 95 percent. The finished subgrades shall be tested and approved by the Geotechnical 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, ¾-inches maximum size. The aggregate base material shall be compacted to a minimum relative compaction of 95 percent. 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 Geotechnical Engineer prior to the placement of successive layers.

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 II 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 Geotechnical Engineer prior to the placement of successive layers.

6. ASPHALT CONCRETE SURFACING - Asphalt 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 AR-8000. The mineral aggregate shall be Type B, ½-inch or ¾-inch maximum, medium grading, for the wearing course and ¾-inch maximum, medium grading for the base course, and shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning, and mixing of the materials shall conform to Section 39.

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

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

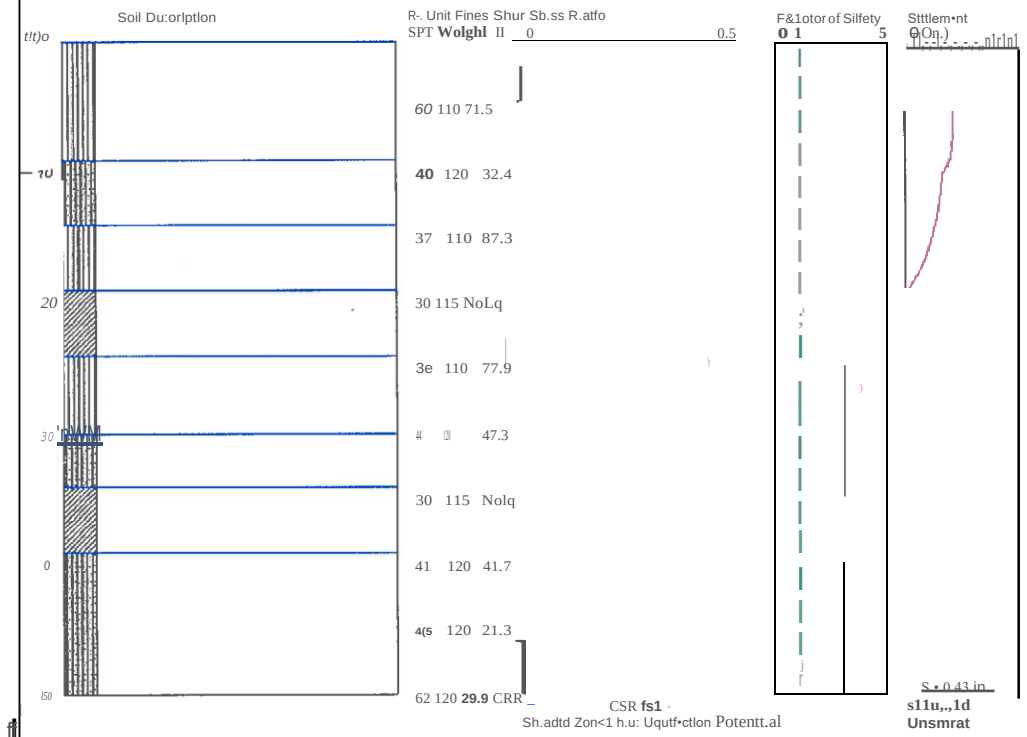
Appendix D

LIQUEFACTION ANALYSIS

Golden Triangle Apartments

Hole No.•B-1 Water Depth-2S ?

Msgnftude•7
Accelerstlon-1.025g



CivilTech **Corporation**

11220020

Plate A-1

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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: F:\Santa clarita\11220020.liq
Title: Golden Triangle Apartments
subtitle: 11220020

surface Elev.=
Hole NO.=B-1
Depth of Hole= 50.00 ft
water Table during Earthquake= 25.00 ft
Water Table during In-situ Testing= 50.00 ft
Max. Acceleration= 1.02 g
Earthquake Magnitude= 7.00

Input Data:
surface Elev.=
Hole **NO.=B-1**
Depth of Hole=50.00 ft
Water Table during Earthquake= 25.00 ft
Water Table during In-situ Testing= 50.00 ft
Max. Acceleration=1.02 g
Earthquake Magnitude=7.00
No-Liquefiable soils: CL, OL are Non-Liq. soil

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara/ Yoshimine
3. Fines correction for Liquefaction: Idriss/Seed
4. Fine correction for settlement: During Liquefaction*
5. settlement calculation in: All zones*
6. Hammer Energy Ratio, Ce= 1
7. Borehole Diameter, Cb= 1
8. sampling Method, CS= 1
9. user request factor of safety (apply to CSR) , user= 1
   Plot one CSR curve (fsl=1)
10. Use curve smoothing: Yes*

* Recommended Options

In-situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
5.00	55.00	110.00	71.50
10.00	40.00	120.00	32.40
15.00	37.00	110.00	87.30
20.00	30.00	115.00	NOLiq
25.00	36.00	110.00	77.90
30.00	44.00	120.00	47.30
35.00	30.00	115.00	NoLiq
40.00	41.00	120.00	41.70
45.00	45.00	120.00	21.30
50.00	52.00	120.00	29.90

Output Results:

settlement of saturated sands=0.00 in.
settlement of unsaturated sands=0.43 in.
Total settlement of Saturated and unsaturated sands=0.43 in.
Differential settlement=0.217 to 0.286 in.

Depth ft	CRRm	CSRfs	F.S.	s_sat. in.	-dry ,n.	s_all in.
5.00	2.39	0.66	5.00	0.00	0.43	0.43
5.05	2.39	0.66	5.00	0.00	0.43	0.43
5.10	2.39	0.66	5.00	0.00	0.43	0.43
5.15	2.39	0.66	5.00	0.00	0.43	0.43
5.20	2.39	0.66	5.00	0.00	0.43	0.43
5.25	2.39	0.66	5.00	0.00	0.43	0.43
5.30	2.39	0.66	5.00	0.00	0.43	0.43
5.35	2.39	0.66	5.00	0.00	0.43	0.43
5.40	2.39	0.66	5.00	0.00	0.43	0.43
5.45	2.39	0.66	5.00	0.00	0.43	0.43
5.50	2.39	0.66	5.00	0.00	0.43	0.43
5.55	2.39	0.66	5.00	0.00	0.43	0.43
5.60	2.39	0.66	5.00	0.00	0.43	0.43
5.65	2.39	0.66	5.00	0.00	0.43	0.43
5.70	2.39	0.66	5.00	0.00	0.43	0.43
5.75	2.39	0.66	5.00	0.00	0.43	0.43
5.80	2.39	0.66	5.00	0.00	0.43	0.43
5.85	2.39	0.66	5.00	0.00	0.43	0.43
5.90	2.39	0.66	5.00	0.00	0.43	0.43
5.95	2.39	0.66	5.00	0.00	0.43	0.43
6.00	2.39	0.66	5.00	0.00	0.43	0.43
6.05	2.39	0.66	5.00	0.00	0.43	0.43
6.10	2.39	0.66	5.00	0.00	0.43	0.43
6.15	2.39	0.66	5.00	0.00	0.43	0.43
6.20	2.39	0.66	5.00	0.00	0.43	0.43
6.25	2.39	0.66	5.00	0.00	0.43	0.43
6.30	2.39	0.66	5.00	0.00	0.43	0.43
6.35	2.39	0.66	5.00	0.00	0.43	0.43
6.40	2.39	0.66	5.00	0.00	0.43	0.43
6.45	2.39	0.66	5.00	0.00	0.43	0.43
6.50	2.39	0.66	5.00	0.00	0.43	0.43
6.55	2.39	0.66	5.00	0.00	0.43	0.43
6.60	2.39	0.66	5.00	0.00	0.43	0.43
6.65	2.39	0.66	5.00	0.00	0.43	0.43
6.70	2.39	0.66	5.00	0.00	0.43	0.43
6.75	2.39	0.66	5.00	0.00	0.43	0.43
6.80	2.39	0.66	5.00	0.00	0.43	0.43
6.85	2.39	0.66	5.00	0.00	0.43	0.43
6.90	2.39	0.66	5.00	0.00	0.43	0.43
6.95	2.39	0.66	5.00	0.00	0.43	0.43
7.00	2.39	0.66	5.00	0.00	0.43	0.43
7.05	2.39	0.66	5.00	0.00	0.42	0.42
7.10	2.39	0.66	5.00	0.00	0.42	0.42
7.15	2.39	0.66	5.00	0.00	0.42	0.42
7.20	2.39	0.66	5.00	0.00	0.42	0.42
7.25	2.39	0.65	5.00	0.00	0.42	0.42
7.30	2.39	0.65	5.00	0.00	0.42	0.42
7.35	2.39	0.65	5.00	0.00	0.42	0.42
7.40	2.39	0.65	5.00	0.00	0.42	0.42
7.45	2.39	0.65	5.00	0.00	0.42	0.42
7.50	2.39	0.65	5.00	0.00	0.42	0.42
7.55	2.39	0.65	5.00	0.00	0.42	0.42

7.60	2.39	0.65	5.00	0.00	0.42	0.42
7.65	2.39	0.65	5.00	0.00	0.42	0.42
7.70	2.39	0.65	5.00	0.00	0.42	0.42
7.75	2.39	0.65	5.00	0.00	0.42	0.42
7.80	2.39	0.65	5.00	0.00	0.42	0.42
7.85	2.39	0.65	5.00	0.00	0.42	0.42
7.90	2.39	0.65	5.00	0.00	0.42	0.42
7.95	2.39	0.65	5.00	0.00	0.42	0.42
8.00	2.39	0.65	5.00	0.00	0.42	0.42
8.05	2.39	0.65	5.00	0.00	0.41	0.41
8.10	2.39	0.65	5.00	0.00	0.41	0.41
8.15	2.39	0.65	5.00	0.00	0.41	0.41
8.20	2.39	0.65	5.00	0.00	0.41	0.41
8.25	2.39	0.65	5.00	0.00	0.41	0.41
8.30	2.39	0.65	5.00	0.00	0.41	0.41
8.35	2.39	0.65	5.00	0.00	0.41	0.41
8.40	2.39	0.65	5.00	0.00	0.41	0.41
8.45	2.39	0.65	5.00	0.00	0.41	0.41
8.50	2.39	0.65	5.00	0.00	0.41	0.41
8.55	2.39	0.65	5.00	0.00	0.41	0.41
8.60	2.39	0.65	5.00	0.00	0.41	0.41
8.65	2.39	0.65	5.00	0.00	0.40	0.40
8.70	2.39	0.65	5.00	0.00	0.40	0.40
8.75	2.39	0.65	5.00	0.00	0.40	0.40
8.80	2.39	0.65	5.00	0.00	0.40	0.40
8.85	2.39	0.65	5.00	0.00	0.40	0.40
8.90	2.39	0.65	5.00	0.00	0.40	0.40
8.95	2.39	0.65	5.00	0.00	0.40	0.40
9.00	2.39	0.65	5.00	0.00	0.40	0.40
9.05	2.39	0.65	5.00	0.00	0.39	0.39
9.10	2.39	0.65	5.00	0.00	0.39	0.39
9.15	2.39	0.65	5.00	0.00	0.39	0.39
9.20	2.39	0.65	5.00	0.00	0.39	0.39
9.25	2.39	0.65	5.00	0.00	0.39	0.39
9.30	2.39	0.65	5.00	0.00	0.39	0.39
9.35	2.39	0.65	5.00	0.00	0.38	0.38
9.40	2.39	0.65	5.00	0.00	0.38	0.38
9.45	2.39	0.65	5.00	0.00	0.38	0.38
9.50	2.39	0.65	5.00	0.00	0.37	0.37
9.55	2.39	0.65	5.00	0.00	0.37	0.37
9.60	2.39	0.65	5.00	0.00	0.37	0.37
9.65	2.39	0.65	5.00	0.00	0.36	0.36
9.70	2.39	0.65	5.00	0.00	0.36	0.36
9.75	2.39	0.65	5.00	0.00	0.36	0.36
9.80	2.39	0.65	5.00	0.00	0.35	0.35
9.85	2.39	0.65	5.00	0.00	0.35	0.35
9.90	2.39	0.65	5.00	0.00	0.35	0.35
9.95	2.39	0.65	5.00	0.00	0.34	0.34
10.00	2.39	0.65	5.00	0.00	0.34	0.34
10.05	2.39	0.65	5.00	0.00	0.34	0.34
10.10	2.39	0.65	5.00	0.00	0.33	0.33
10.15	2.39	0.65	5.00	0.00	0.33	0.33
10.20	2.39	0.65	5.00	0.00	0.33	0.33
10.25	2.39	0.65	5.00	0.00	0.33	0.33
10.30	2.39	0.65	5.00	0.00	0.33	0.33
10.35	2.39	0.65	5.00	0.00	0.33	0.33
10.40	2.39	0.65	5.00	0.00	0.33	0.33
10.45	2.39	0.65	5.00	0.00	0.33	0.33
10.50	2.39	0.65	5.00	0.00	0.33	0.33
10.55	2.39	0.65	5.00	0.00	0.33	0.33
10.60	2.39	0.65	5.00	0.00	0.33	0.33
10.65	2.39	0.65	5.00	0.00	0.32	0.32
10.70	2.39	0.65	5.00	0.00	0.32	0.32

10.75	2.39	0.65	5.00	0.00	0.32	0.32
10.80	2.39	0.65	5.00	0.00	0.32	0.32
10.85	2.39	0.65	5.00	0.00	0.32	0.32
10.90	2.39	0.65	5.00	0.00	0.32	0.32
10.95	2.39	0.65	5.00	0.00	0.32	0.32
11.00	2.39	0.65	5.00	0.00	0.32	0.32
11.05	2.39	0.65	5.00	0.00	0.32	0.32
11.10	2.39	0.65	5.00	0.00	0.32	0.32
11.15	2.39	0.65	5.00	0.00	0.32	0.32
11.20	2.39	0.65	5.00	0.00	0.32	0.32
11.25	2.39	0.65	5.00	0.00	0.32	0.32
11.30	2.39	0.65	5.00	0.00	0.32	0.32
11.35	2.39	0.65	5.00	0.00	0.32	0.32
11.40	2.39	0.65	5.00	0.00	0.32	0.32
11.45	2.39	0.65	5.00	0.00	0.32	0.32
11.50	2.39	0.65	5.00	0.00	0.31	0.31
11.55	2.39	0.65	5.00	0.00	0.31	0.31
11.60	2.39	0.65	5.00	0.00	0.31	0.31
11.65	2.39	0.65	5.00	0.00	0.31	0.31
11.70	2.39	0.65	5.00	0.00	0.31	0.31
11.75	2.39	0.65	5.00	0.00	0.31	0.31
11.80	2.39	0.65	5.00	0.00	0.31	0.31
11.85	2.39	0.65	5.00	0.00	0.31	0.31
11.90	2.39	0.65	5.00	0.00	0.31	0.31
11.95	2.39	0.65	5.00	0.00	0.31	0.31
12.00	2.39	0.65	5.00	0.00	0.31	0.31
12.05	2.39	0.65	5.00	0.00	0.31	0.31
12.10	2.39	0.65	5.00	0.00	0.31	0.31
12.15	2.39	0.65	5.00	0.00	0.30	0.30
12.20	2.39	0.65	5.00	0.00	0.30	0.30
12.25	2.39	0.65	5.00	0.00	0.30	0.30
12.30	2.39	0.65	5.00	0.00	0.30	0.30
12.35	2.39	0.65	5.00	0.00	0.30	0.30
12.40	2.39	0.65	5.00	0.00	0.30	0.30
12.45	2.39	0.65	5.00	0.00	0.30	0.30
12.50	2.39	0.65	5.00	0.00	0.30	0.30
12.55	2.39	0.65	5.00	0.00	0.30	0.30
12.60	2.39	0.65	5.00	0.00	0.30	0.30
12.65	2.39	0.65	5.00	0.00	0.30	0.30
12.70	2.39	0.65	5.00	0.00	0.30	0.30
12.75	2.39	0.65	5.00	0.00	0.29	0.29
12.80	2.39	0.65	5.00	0.00	0.29	0.29
12.85	2.39	0.65	5.00	0.00	0.29	0.29
12.90	2.39	0.65	5.00	0.00	0.29	0.29
12.95	2.39	0.65	5.00	0.00	0.29	0.29
13.00	2.39	0.65	5.00	0.00	0.29	0.29
13.05	2.39	0.65	5.00	0.00	0.29	0.29
13.10	2.39	0.65	5.00	0.00	0.29	0.29
13.15	2.39	0.65	5.00	0.00	0.29	0.29
13.20	2.39	0.65	5.00	0.00	0.29	0.29
13.25	2.39	0.65	5.00	0.00	0.28	0.28
13.30	2.39	0.65	5.00	0.00	0.28	0.28
13.35	2.39	0.65	5.00	0.00	0.28	0.28
13.40	2.39	0.65	5.00	0.00	0.28	0.28
13.45	2.39	0.65	5.00	0.00	0.28	0.28
13.50	2.39	0.65	5.00	0.00	0.28	0.28
13.55	2.39	0.65	5.00	0.00	0.28	0.28
13.60	2.39	0.65	5.00	0.00	0.28	0.28
13.65	2.39	0.65	5.00	0.00	0.27	0.27
13.70	2.39	0.64	5.00	0.00	0.27	0.27
13.75	2.39	0.64	5.00	0.00	0.27	0.27
13.80	2.39	0.64	5.00	0.00	0.27	0.27
13.85	2.39	0.64	5.00	0.00	0.27	0.27

13.90	2.39	0.64	5.00	0.00	0.27	0.27
13.95	2.39	0.64	5.00	0.00	0.27	0.27
14.00	2.39	0.64	5.00	0.00	0.27	0.27
14.05	2.39	0.64	5.00	0.00	0.26	0.26
14.10	2.39	0.64	5.00	0.00	0.26	0.26
14.15	2.39	0.64	5.00	0.00	0.26	0.26
14.20	2.39	0.64	5.00	0.00	0.26	0.26
14.25	2.39	0.64	5.00	0.00	0.26	0.26
14.30	2.39	0.64	5.00	0.00	0.26	0.26
14.35	2.39	0.64	5.00	0.00	0.26	0.26
14.40	2.39	0.64	5.00	0.00	0.25	0.25
14.45	2.39	0.64	5.00	0.00	0.25	0.25
14.50	2.39	0.64	5.00	0.00	0.25	0.25
14.55	2.39	0.64	5.00	0.00	0.25	0.25
14.60	2.39	0.64	5.00	0.00	0.25	0.25
14.65	2.39	0.64	5.00	0.00	0.25	0.25
14.70	2.39	0.64	5.00	0.00	0.25	0.25
14.75	2.39	0.64	5.00	0.00	0.24	0.24
14.80	2.39	0.64	5.00	0.00	0.24	0.24
14.85	2.39	0.64	5.00	0.00	0.24	0.24
14.90	2.39	0.64	5.00	0.00	0.24	0.24
14.95	2.39	0.64	5.00	0.00	0.24	0.24
15.00	2.39	0.64	5.00	0.00	0.24	0.24
15.05	2.39	0.64	5.00	0.00	0.24	0.24
15.10	2.39	0.64	5.00	0.00	0.23	0.23
15.15	2.39	0.64	5.00	0.00	0.23	0.23
15.20	2.39	0.64	5.00	0.00	0.23	0.23
15.25	2.39	0.64	5.00	0.00	0.23	0.23
15.30	2.39	0.64	5.00	0.00	0.23	0.23
15.35	2.39	0.64	5.00	0.00	0.23	0.23
15.40	2.39	0.64	5.00	0.00	0.23	0.23
15.45	2.39	0.64	5.00	0.00	0.22	0.22
15.50	2.39	0.64	5.00	0.00	0.22	0.22
15.55	2.39	0.64	5.00	0.00	0.22	0.22
15.60	2.39	0.64	5.00	0.00	0.22	0.22
15.65	2.39	0.64	5.00	0.00	0.22	0.22
15.70	2.39	0.64	5.00	0.00	0.22	0.22
15.75	2.39	0.64	5.00	0.00	0.21	0.21
15.80	2.39	0.64	5.00	0.00	0.21	0.21
15.85	2.39	0.64	5.00	0.00	0.21	0.21
15.90	2.39	0.64	5.00	0.00	0.21	0.21
15.95	2.39	0.64	5.00	0.00	0.21	0.21
16.00	2.39	0.64	5.00	0.00	0.20	0.20
16.05	2.39	0.64	5.00	0.00	0.20	0.20
16.10	2.39	0.64	5.00	0.00	0.20	0.20
16.15	2.39	0.64	5.00	0.00	0.20	0.20
16.20	2.39	0.64	5.00	0.00	0.20	0.20
16.25	2.39	0.64	5.00	0.00	0.19	0.19
16.30	2.39	0.64	5.00	0.00	0.19	0.19
16.35	2.39	0.64	5.00	0.00	0.19	0.19
16.40	2.39	0.64	5.00	0.00	0.19	0.19
16.45	2.39	0.64	5.00	0.00	0.19	0.19
16.50	2.39	0.64	5.00	0.00	0.18	0.18
16.55	2.39	0.64	5.00	0.00	0.18	0.18
16.60	2.39	0.64	5.00	0.00	0.18	0.18
16.65	2.39	0.64	5.00	0.00	0.18	0.18
16.70	2.39	0.64	5.00	0.00	0.18	0.18
16.75	2.39	0.64	5.00	0.00	0.17	0.17
16.80	2.39	0.64	5.00	0.00	0.17	0.17
16.85	2.39	0.64	5.00	0.00	0.17	0.17
16.90	2.39	0.64	5.00	0.00	0.17	0.17
16.95	2.39	0.64	5.00	0.00	0.16	0.16
17.00	2.39	0.64	5.00	0.00	0.16	0.16

17.05	2.39	0.64	5.00	0.00	0.16	0.16
17.10	2.39	0.64	5.00	0.00	0.16	0.16
17.15	2.39	**0.64**	5.00	0.00	0.15	0.15
17.20	2.39	0.64	5.00	0.00	0.15	0.15
17.25	2.39	0.64	5.00	0.00	0.15	0.15
17.30	2.39	0.64	5.00	0.00	0.14	0.14
17.35	2.39	0.64	5.00	0.00	0.14	0.14
17.40	2.39	0.64	5.00	0.00	0.14	0.14
17.45	2.39	0.64	5.00	0.00	0.14	0.14
17.50	2.39	0.64	5.00	0.00	0.13	0.13
17.55	2.39	0.64	5.00	0.00	0.13	0.13
17.60	2.39	0.64	5.00	0.00	0.13	0.13
17.65	2.39	0.64	5.00	0.00	0.12	0.12
17.70	2.39	0.64	5.00	0.00	0.12	0.12
17.75	2.39	0.64	5.00	0.00	0.12	0.12
17.80	2.39	0.64	5.00	0.00	0.12	0.12
17.85	2.39	0.64	5.00	0.00	0.11	0.11
17.90	2.39	**0.64**	5.00	0.00	0.11	0.11
17.95	2.39	0.64	5.00	0.00	0.11	0.11
18.00	2.39	0.64	5.00	0.00	0.10	0.10
18.05	2.39	0.64	5.00	0.00	0.10	0.10
18.10	2.39	0.64	5.00	0.00	0.09	0.09
18.15	2.39	0.64	5.00	0.00	0.09	0.09
18.20	2.39	0.64	5.00	0.00	0.09	0.09
18.25	2.39	**0.64**	5.00	0.00	0.08	0.08
18.30	2.39	0.64	5.00	0.00	0.08	0.08
18.35	2.39	0.64	5.00	0.00	0.08	0.08
18.40	2.39	0.64	5.00	0.00	0.07	0.07
18.45	2.39	0.64	5.00	0.00	0.07	0.07
18.50	2.39	0.64	5.00	0.00	0.07	0.07
18.55	2.39	0.64	5.00	0.00	0.06	0.06
18.60	2.39	0.64	5.00	0.00	0.06	0.06
18.65	2.39	**0.64**	5.00	0.00	0.06	0.06
18.70	2.39	0.64	5.00	0.00	0.05	0.05
18.75	2.39	0.64	5.00	0.00	0.05	0.05
18.80	2.39	0.64	5.00	0.00	0.05	0.05
18.85	2.39	0.64	5.00	0.00	0.04	0.04
18.90	2.39	0.64	5.00	0.00	0.04	0.04
18.95	2.39	0.64	5.00	0.00	0.03	0.03
19.00	2.39	0.64	5.00	0.00	0.03	0.03
19.05	2.00	0.64	5.00	0.00	0.03	0.03
19.10	2.00	0.64	5.00	0.00	0.03	0.03
19.15	2.00	0.64	5.00	0.00	0.03	0.03
19.20	2.00	0.64	5.00	0.00	0.03	0.03
19.25	2.00	0.64	5.00	0.00	0.03	0.03
19.30	2.00	**0.64**	5.00	0.00	0.03	0.03
19.35	2.00	0.64	5.00	0.00	0.03	0.03
19.40	2.00	0.64	5.00	0.00	0.03	0.03
19.45	2.00	0.64	5.00	0.00	0.03	0.03
19.50	2.00	0.64	5.00	0.00	0.03	0.03
19.55	2.00	0.64	5.00	0.00	0.03	0.03
19.60	2.00	0.64	5.00	0.00	0.03	0.03
19.65	2.00	0.64	5.00	0.00	0.03	0.03
19.70	2.00	0.64	5.00	0.00	0.03	0.03
19.75	2.00	0.64	5.00	0.00	0.03	0.03
19.80	2.00	0.64	5.00	0.00	0.03	0.03
19.85	2.00	0.64	5.00	0.00	0.03	0.03
19.90	2.00	0.64	5.00	0.00	0.03	0.03
19.95	2.00	0.64	5.00	0.00	0.03	0.03
20.00	2.00	0.64	5.00	0.00	0.03	0.03
20.05	2.00	0.64	5.00	0.00	0.03	0.03
20.10	2.00	0.64	5.00	0.00	0.03	0.03
20.15	2.00	0.63	5.00	0.00	0.03	0.03

20.20	2.00	0.63	5.00	0.00	0.03	0.03
20.25	2.00	0.63	5.00	0.00	0.03	0.03
20.30	2.00	0.63	5.00	0.00	0.03	0.03
20.35	2.00	0.63	5.00	0.00	0.03	0.03
20.40	2.00	0.63	5.00	0.00	0.03	0.03
20.45	2.00	0.63	5.00	0.00	0.03	0.03
20.50	2.00	0.63	5.00	0.00	0.03	0.03
20.55	2.00	0.63	5.00	0.00	0.03	0.03
20.60	2.00	0.63	5.00	0.00	0.03	0.03
20.65	2.00	0.63	5.00	0.00	0.03	0.03
20.70	2.00	0.63	5.00	0.00	0.03	0.03
20.75	2.00	0.63	5.00	0.00	0.03	0.03
20.80	2.00	0.63	5.00	0.00	0.03	0.03
20.85	2.00	0.63	5.00	0.00	0.03	0.03
20.90	2.00	0.63	5.00	0.00	0.03	0.03
20.95	2.00	0.63	5.00	0.00	0.03	0.03
21.00	2.00	0.63	5.00	0.00	0.03	0.03
21.05	2.00	0.63	5.00	0.00	0.03	0.03
21.10	2.00	0.63	5.00	0.00	0.03	0.03
21.15	2.00	0.63	5.00	0.00	0.03	0.03
21.20	2.00	0.63	5.00	0.00	0.03	0.03
21.25	2.00	0.63	5.00	0.00	0.03	0.03
21.30	2.00	0.63	5.00	0.00	0.03	0.03
21.35	2.00	0.63	5.00	0.00	0.03	0.03
21.40	2.00	0.63	5.00	0.00	0.03	0.03
21.45	2.00	0.63	5.00	0.00	0.03	0.03
21.50	2.00	0.63	5.00	0.00	0.03	0.03
21.55	2.00	0.63	5.00	0.00	0.03	0.03
21.60	2.00	0.63	5.00	0.00	0.03	0.03
21.65	2.00	0.63	5.00	0.00	0.03	0.03
21.70	2.00	0.63	5.00	0.00	0.03	0.03
21.75	2.00	0.63	5.00	0.00	0.03	0.03
21.80	2.00	0.63	5.00	0.00	0.03	0.03
21.85	2.00	0.63	5.00	0.00	0.03	0.03
21.90	2.00	0.63	5.00	0.00	0.03	0.03
21.95	2.00	0.63	5.00	0.00	0.03	0.03
22.00	2.00	0.63	5.00	0.00	0.03	0.03
22.05	2.00	0.63	5.00	0.00	0.03	0.03
22.10	2.00	0.63	5.00	0.00	0.03	0.03
22.15	2.00	0.63	5.00	0.00	0.03	0.03
22.20	2.00	0.63	5.00	0.00	0.03	0.03
22.25	2.00	0.63	5.00	0.00	0.03	0.03
22.30	2.00	0.63	5.00	0.00	0.03	0.03
22.35	2.00	0.63	5.00	0.00	0.03	0.03
22.40	2.00	0.63	5.00	0.00	0.03	0.03
22.45	2.00	0.63	5.00	0.00	0.03	0.03
22.50	2.00	0.63	5.00	0.00	0.03	0.03
22.55	2.00	0.63	5.00	0.00	0.03	0.03
22.60	2.00	0.63	5.00	0.00	0.03	0.03
22.65	2.00	0.63	5.00	0.00	0.03	0.03
22.70	2.00	0.63	5.00	0.00	0.03	0.03
22.75	2.00	0.63	5.00	0.00	0.03	0.03
22.80	2.00	0.63	5.00	0.00	0.03	0.03
22.85	2.00	0.63	5.00	0.00	0.03	0.03
22.90	2.00	0.63	5.00	0.00	0.03	0.03
22.95	2.00	0.63	5.00	0.00	0.03	0.03
23.00	2.00	0.63	5.00	0.00	0.03	0.03
23.05	2.00	0.63	5.00	0.00	0.03	0.03
23.10	2.00	0.63	5.00	0.00	0.03	0.03
23.15	2.00	0.63	5.00	0.00	0.03	0.03
23.20	2.00	0.63	5.00	0.00	0.03	0.03
23.25	2.00	0.63	5.00	0.00	0.03	0.03
23.30	2.00	0.63	5.00	0.00	0.03	0.03

23.35	2.00	0.63	5.00	0.00	0.03	0.03
23.40	2.00	0.63	5.00	0.00	0.03	0.03
23.45	2.00	0.63	5.00	0.00	0.03	0.03
23.50	2.00	0.63	5.00	0.00	0.03	0.03
23.55	2.00	0.63	5.00	0.00	0.03	0.03
23.60	2.00	0.63	5.00	0.00	0.03	0.03
23.65	2.00	0.63	5.00	0.00	0.03	0.03
23.70	2.00	0.63	5.00	0.00	0.03	0.03
23.75	2.00	0.63	5.00	0.00	0.03	0.03
23.80	2.00	0.63	5.00	0.00	0.03	0.03
23.85	2.00	0.63	5.00	0.00	0.03	0.03
23.90	2.00	0.63	5.00	0.00	0.03	0.03
23.95	2.00	0.63	5.00	0.00	0.03	0.03
24.00	2.00	0.63	5.00	0.00	0.03	0.03
24.05	2.39	0.63	5.00	0.00	0.03	0.03
24.10	2.39	0.63	5.00	0.00	0.03	0.03
24.15	2.39	0.63	5.00	0.00	0.03	0.03
24.20	2.39	0.63	5.00	0.00	0.02	0.02
24.25	2.39	0.63	5.00	0.00	0.02	0.02
24.30	2.39	0.63	5.00	0.00	0.02	0.02
24.35	2.39	0.63	5.00	0.00	0.02	0.02
24.40	2.39	0.63	5.00	0.00	0.02	0.02
24.45	2.39	0.63	5.00	0.00	0.02	0.02
24.50	2.39	0.63	5.00	0.00	0.02	0.02
24.55	2.39	0.63	5.00	0.00	0.01	0.01
24.60	2.39	0.63	5.00	0.00	0.01	0.01
24.65	2.39	0.63	5.00	0.00	0.01	0.01
24.70	2.39	0.63	5.00	0.00	0.01	0.01
24.75	2.39	0.63	5.00	0.00	0.01	0.01
24.80	2.39	0.63	5.00	0.00	0.01	0.01
24.85	2.39	0.63	5.00	0.00	0.01	0.01
24.90	2.39	0.63	5.00	0.00	0.00	0.00
24.95	2.39	0.63	5.00	0.00	0.00	0.00
25.00	2.39	0.63	5.00	0.00	0.00	0.00
25.05	2.39	0.63	3.80	0.00	0.00	0.00
25.10	2.39	0.63	3.80	0.00	0.00	0.00
25.15	2.39	0.63	3.80	0.00	0.00	0.00
25.20	2.39	0.63	3.79	0.00	0.00	0.00
25.25	2.39	0.63	3.79	0.00	0.00	0.00
25.30	2.39	0.63	3.78	0.00	0.00	0.00
25.35	2.39	0.63	3.78	0.00	0.00	0.00
25.40	2.39	0.63	3.78	0.00	0.00	0.00
25.45	2.39	0.63	3.77	0.00	0.00	0.00
25.50	2.39	0.63	3.77	0.00	0.00	0.00
25.55	2.39	0.63	3.77	0.00	0.00	0.00
25.60	2.39	0.63	3.76	0.00	0.00	0.00
25.65	2.39	0.63	3.76	0.00	0.00	0.00
25.70	2.39	0.64	3.76	0.00	0.00	0.00
25.75	2.39	0.64	3.75	0.00	0.00	0.00
25.80	2.39	0.64	3.75	0.00	0.00	0.00
25.85	2.39	0.64	3.74	0.00	0.00	0.00
25.90	2.39	0.64	3.74	0.00	0.00	0.00
25.95	2.39	0.64	3.74	0.00	0.00	0.00
26.00	2.39	0.64	3.73	0.00	0.00	0.00
26.05	2.39	0.64	3.73	0.00	0.00	0.00
26.10	2.39	0.64	3.73	0.00	0.00	0.00
26.15	2.39	0.64	3.72	0.00	0.00	0.00
26.20	2.39	0.64	3.72	0.00	0.00	0.00
26.25	2.39	0.64	3.72	0.00	0.00	0.00
26.30	2.39	0.64	3.71	0.00	0.00	0.00
26.35	2.39	0.64	3.71	0.00	0.00	0.00
26.40	2.39	0.64	3.71	0.00	0.00	0.00
26.45	2.39	0.64	3.70	0.00	0.00	0.00

26.50	2.39	0.64	3.70	0.00	0.00	0.00
26.55	2.39	0.65	3.70	0.00	0.00	0.00
26.60	2.39	0.65	3.69	0.00	0.00	0.00
26.65	2.39	0.65	3.69	0.00	0.00	0.00
26.70	2.39	0.65	3.69	0.00	0.00	0.00
26.75	2.39	0.65	3.68	0.00	0.00	0.00
26.80	2.39	0.65	3.68	0.00	0.00	0.00
26.85	2.39	0.65	3.68	0.00	0.00	0.00
26.90	2.39	0.65	3.67	0.00	0.00	0.00
26.95	2.39	0.65	3.67	0.00	0.00	0.00
27.00	2.39	0.65	3.67	0.00	0.00	0.00
27.05	2.39	0.65	3.67	0.00	0.00	0.00
27.10	2.39	0.65	3.66	0.00	0.00	0.00
27.15	2.39	0.65	3.66	0.00	0.00	0.00
27.20	2.39	0.65	3.66	0.00	0.00	0.00
27.25	2.39	0.65	3.65	0.00	0.00	0.00
27.30	2.39	0.65	3.65	0.00	0.00	0.00
27.35	2.39	0.65	3.65	0.00	0.00	0.00
27.40	2.39	0.65	3.64	0.00	0.00	0.00
27.45	2.39	0.66	3.64	0.00	0.00	0.00
27.50	2.39	0.66	3.64	0.00	0.00	0.00
27.55	2.39	0.66	3.63	0.00	0.00	0.00
27.60	2.39	0.66	3.63	0.00	0.00	0.00
27.65	2.39	0.66	3.63	0.00	0.00	0.00
27.70	2.39	0.66	3.63	0.00	0.00	0.00
27.75	2.39	0.66	3.62	0.00	0.00	0.00
27.80	2.39	0.66	3.62	0.00	0.00	0.00
27.85	2.39	0.66	3.62	0.00	0.00	0.00
27.90	2.39	0.66	3.61	0.00	0.00	0.00
27.95	2.39	0.66	3.61	0.00	0.00	0.00
28.00	2.39	0.66	3.61	0.00	0.00	0.00
28.05	2.39	0.66	3.60	0.00	0.00	0.00
28.10	2.39	0.66	3.60	0.00	0.00	0.00
28.15	2.39	0.66	3.60	0.00	0.00	0.00
28.20	2.39	0.66	3.60	0.00	0.00	0.00
28.25	2.39	0.66	3.59	0.00	0.00	0.00
28.30	2.39	0.66	3.59	0.00	0.00	0.00
28.35	2.39	0.66	3.59	0.00	0.00	0.00
28.40	2.39	0.67	3.58	0.00	0.00	0.00
28.45	2.39	0.67	3.58	0.00	0.00	0.00
28.50	2.39	0.67	3.58	0.00	0.00	0.00
28.55	2.39	0.67	3.58	0.00	0.00	0.00
28.60	2.39	0.67	3.57	0.00	0.00	0.00
28.65	2.39	0.67	3.57	0.00	0.00	0.00
28.70	2.39	0.67	3.57	0.00	0.00	0.00
28.75	2.39	0.67	3.57	0.00	0.00	0.00
28.80	2.40	0.67	3.58	0.00	0.00	0.00
28.85	2.40	0.67	3.58	0.00	0.00	0.00
28.90	2.40	0.67	3.58	0.00	0.00	0.00
28.95	2.40	0.67	3.57	0.00	0.00	0.00
29.00	2.40	0.67	3.57	0.00	0.00	0.00
29.05	2.40	0.67	3.57	0.00	0.00	0.00
29.10	2.40	0.67	3.56	0.00	0.00	0.00
29.15	2.40	0.67	3.56	0.00	0.00	0.00
29.20	2.39	0.67	3.55	0.00	0.00	0.00
29.25	2.39	0.67	3.55	0.00	0.00	0.00
29.30	2.39	0.67	3.55	0.00	0.00	0.00
29.35	2.39	0.68	3.54	0.00	0.00	0.00
29.40	2.39	0.68	3.54	0.00	0.00	0.00
29.45	2.39	0.68	3.54	0.00	0.00	0.00
29.50	2.39	0.68	3.53	0.00	0.00	0.00
29.55	2.39	0.68	3.53	0.00	0.00	0.00
29.60	2.39	0.68	3.53	0.00	0.00	0.00

29.65	2.39	0.68	3.52	0.00	0.00	0.00
29.70	2.39	0.68	3.52	0.00	0.00	0.00
29.75	2.39	0.68	3.51	0.00	0.00	0.00
29.80	2.39	0.68	3.51	0.00	0.00	0.00
29.85	2.39	0.68	3.51	0.00	0.00	0.00
29.90	2.38	0.68	3.50	0.00	0.00	0.00
29.95	2.38	0.68	3.50	0.00	0.00	0.00
30.00	2.38	0.68	3.50	0.00	0.00	0.00
30.05	2.38	0.68	3.50	0.00	0.00	0.00
30.10	2.38	0.68	3.49	0.00	0.00	0.00
30.15	2.38	0.68	3.49	0.00	0.00	0.00
30.20	2.38	0.68	3.49	0.00	0.00	0.00
30.25	2.38	0.68	3.49	0.00	0.00	0.00
30.30	2.38	0.68	3.48	0.00	0.00	0.00
30.35	2.38	0.68	3.48	0.00	0.00	0.00
30.40	2.38	0.68	3.48	0.00	0.00	0.00
30.45	2.38	0.68	3.48	0.00	0.00	0.00
30.50	2.38	0.68	3.47	0.00	0.00	0.00
30.55	2.38	0.68	3.47	0.00	0.00	0.00
30.60	2.38	0.68	3.47	0.00	0.00	0.00
30.65	2.37	0.68	3.47	0.00	0.00	0.00
30.70	2.37	0.69	3.47	0.00	0.00	0.00
30.75	2.37	0.69	3.46	0.00	0.00	0.00
30.80	2.37	0.69	3.46	0.00	0.00	0.00
30.85	2.37	0.69	3.46	0.00	0.00	0.00
30.90	2.37	0.69	3.46	0.00	0.00	0.00
30.95	2.37	0.69	3.45	0.00	0.00	0.00
31.00	2.37	0.69	3.45	0.00	0.00	0.00
31.05	2.37	0.69	3.45	0.00	0.00	0.00
31.10	2.37	0.69	3.45	0.00	0.00	0.00
31.15	2.37	0.69	3.45	0.00	0.00	0.00
31.20	2.37	0.69	3.44	0.00	0.00	0.00
31.25	2.37	0.69	3.44	0.00	0.00	0.00
31.30	2.37	0.69	3.44	0.00	0.00	0.00
31.35	2.37	0.69	3.44	0.00	0.00	0.00
31.40	2.36	0.69	3.43	0.00	0.00	0.00
31.45	2.36	0.69	3.43	0.00	0.00	0.00
31.50	2.36	0.69	3.43	0.00	0.00	0.00
31.55	2.36	0.69	3.43	0.00	0.00	0.00
31.60	2.36	0.69	3.43	0.00	0.00	0.00
31.65	2.36	0.69	3.42	0.00	0.00	0.00
31.70	2.36	0.69	3.42	0.00	0.00	0.00
31.75	2.36	0.69	3.42	0.00	0.00	0.00
31.80	2.36	0.69	3.42	0.00	0.00	0.00
31.85	2.36	0.69	3.42	0.00	0.00	0.00
31.90	2.36	0.69	3.41	0.00	0.00	0.00
31.95	2.36	0.69	3.41	0.00	0.00	0.00
32.00	2.36	0.69	3.41	0.00	0.00	0.00
32.05	2.36	0.69	3.41	0.00	0.00	0.00
32.10	2.36	0.69	3.41	0.00	0.00	0.00
32.15	2.35	0.69	3.40	0.00	0.00	0.00
32.20	2.35	0.69	3.40	0.00	0.00	0.00
32.25	2.35	0.69	3.40	0.00	0.00	0.00
32.30	2.35	0.69	3.40	0.00	0.00	0.00
32.35	2.35	0.69	3.40	0.00	0.00	0.00
32.40	2.35	0.69	3.39	0.00	0.00	0.00
32.45	2.35	0.69	3.39	0.00	0.00	0.00
32.50	2.35	0.69	3.39	0.00	0.00	0.00
32.55	2.35	0.69	3.39	0.00	0.00	0.00
32.60	2.35	0.69	3.39	0.00	0.00	0.00
32.65	2.35	0.69	3.38	0.00	0.00	0.00
32.70	2.35	0.69	3.38	0.00	0.00	0.00
32.75	2.35	0.69	3.38	0.00	0.00	0.00

32.80	2.35	0.69	3.38	0.00	0.00	0.00
32.85	2.35	0.69	3.38	0.00	0.00	0.00
32.90	2.34	0.69	3.37	0.00	0.00	0.00
32.95	2.34	0.69	3.37	0.00	0.00	0.00
33.00	2.34	0.70	3.37	0.00	0.00	0.00
33.05	2.34	0.70	3.37	0.00	0.00	0.00
33.10	2.34	0.70	3.37	0.00	0.00	0.00
33.15	2.34	0.70	3.37	0.00	0.00	0.00
33.20	2.34	0.70	3.36	0.00	0.00	0.00
33.25	2.34	0.70	3.36	0.00	0.00	0.00
33.30	2.34	0.70	3.36	0.00	0.00	0.00
33.35	2.34	0.70	3.36	0.00	0.00	0.00
33.40	2.34	0.70	3.36	0.00	0.00	0.00
33.45	2.34	0.70	3.35	0.00	0.00	0.00
33.50	2.34	0.70	3.35	0.00	0.00	0.00
33.55	2.34	0.70	3.35	0.00	0.00	0.00
33.60	2.34	0.70	3.35	0.00	0.00	0.00
33.65	2.33	0.70	3.35	0.00	0.00	0.00
33.70	2.33	0.70	3.35	0.00	0.00	0.00
33.75	2.33	0.70	3.34	0.00	0.00	0.00
33.80	2.33	0.70	3.34	0.00	0.00	0.00
33.85	2.33	0.70	3.34	0.00	0.00	0.00
33.90	2.33	0.70	3.34	0.00	0.00	0.00
33.95	2.33	0.70	3.34	0.00	0.00	0.00
34.00	2.33	0.70	3.34	0.00	0.00	0.00
34.05	2.00	0.70	5.00	0.00	0.00	0.00
34.10	2.00	0.70	5.00	0.00	0.00	0.00
34.15	2.00	0.70	5.00	0.00	0.00	0.00
34.20	2.00	0.70	5.00	0.00	0.00	0.00
34.25	2.00	0.70	5.00	0.00	0.00	0.00
34.30	2.00	0.70	5.00	0.00	0.00	0.00
34.35	2.00	0.70	5.00	0.00	0.00	0.00
34.40	2.00	0.70	5.00	0.00	0.00	0.00
34.45	2.00	0.70	5.00	0.00	0.00	0.00
34.50	2.00	0.70	5.00	0.00	0.00	0.00
34.55	2.00	0.70	5.00	0.00	0.00	0.00
34.60	2.00	0.70	5.00	0.00	0.00	0.00
34.65	2.00	0.70	5.00	0.00	0.00	0.00
34.70	2.00	0.70	5.00	0.00	0.00	0.00
34.75	2.00	0.70	5.00	0.00	0.00	0.00
34.80	2.00	0.70	5.00	0.00	0.00	0.00
34.85	2.00	0.70	5.00	0.00	0.00	0.00
34.90	2.00	0.70	5.00	0.00	0.00	0.00
34.95	2.00	0.70	5.00	0.00	0.00	0.00
35.00	2.00	0.70	5.00	0.00	0.00	0.00
35.05	2.00	0.70	5.00	0.00	0.00	0.00
35.10	2.00	0.70	5.00	0.00	0.00	0.00
35.15	2.00	0.70	5.00	0.00	0.00	0.00
35.20	2.00	0.70	5.00	0.00	0.00	0.00
35.25	2.00	0.70	5.00	0.00	0.00	0.00
35.30	2.00	0.70	5.00	0.00	0.00	0.00
35.35	2.00	0.70	5.00	0.00	0.00	0.00
35.40	2.00	0.70	5.00	0.00	0.00	0.00
35.45	2.00	0.70	5.00	0.00	0.00	0.00
35.50	2.00	0.70	5.00	0.00	0.00	0.00
35.55	2.00	0.70	5.00	0.00	0.00	0.00
35.60	2.00	0.70	5.00	0.00	0.00	0.00
35.65	2.00	0.70	5.00	0.00	0.00	0.00
35.70	2.00	0.70	5.00	0.00	0.00	0.00
35.75	2.00	0.70	5.00	0.00	0.00	0.00
35.80	2.00	0.70	5.00	0.00	0.00	0.00
35.85	2.00	0.70	5.00	0.00	0.00	0.00
35.90	2.00	0.70	5.00	0.00	0.00	0.00

35.95	2.00	0.70	5.00	0.00	0.00	0.00
36.00	2.00	0.70	5.00	0.00	0.00	0.00
36.05	2.00	0.70	5.00	0.00	0.00	0.00
36.10	2.00	0.70	5.00	0.00	0.00	0.00
36.15	2.00	0.70	5.00	0.00	0.00	0.00
36.20	2.00	0.70	5.00	0.00	0.00	0.00
36.25	2.00	0.70	5.00	0.00	0.00	0.00
36.30	2.00	0.70	5.00	0.00	0.00	0.00
36.35	2.00	0.71	5.00	0.00	0.00	0.00
36.40	2.00	0.71	5.00	0.00	0.00	0.00
36.45	2.00	0.71	5.00	0.00	0.00	0.00
36.50	2.00	0.71	5.00	0.00	0.00	0.00
36.55	2.00	0.71	5.00	0.00	0.00	0.00
36.60	2.00	0.71	5.00	0.00	0.00	0.00
36.65	2.00	0.71	5.00	0.00	0.00	0.00
36.70	2.00	0.71	5.00	0.00	0.00	0.00
36.75	2.00	0.71	5.00	0.00	0.00	0.00
36.80	2.00	0.71	5.00	0.00	0.00	0.00
36.85	2.00	0.71	5.00	0.00	0.00	0.00
36.90	2.00	0.71	5.00	0.00	0.00	0.00
36.95	2.00	0.71	5.00	0.00	0.00	0.00
37.00	2.00	0.71	5.00	0.00	0.00	0.00
37.05	2.00	0.71	5.00	0.00	0.00	0.00
37.10	2.00	0.71	5.00	0.00	0.00	0.00
37.15	2.00	0.71	5.00	0.00	0.00	0.00
37.20	2.00	0.71	5.00	0.00	0.00	0.00
37.25	2.00	0.71	5.00	0.00	0.00	0.00
37.30	2.00	0.71	5.00	0.00	0.00	0.00
37.35	2.00	0.71	5.00	0.00	0.00	0.00
37.40	2.00	0.71	5.00	0.00	0.00	0.00
37.45	2.00	0.71	5.00	0.00	0.00	0.00
37.50	2.00	0.71	5.00	0.00	0.00	0.00
37.55	2.00	0.71	5.00	0.00	0.00	0.00
37.60	2.00	0.71	5.00	0.00	0.00	0.00
37.65	2.00	0.71	5.00	0.00	0.00	0.00
37.70	2.00	0.71	5.00	0.00	0.00	0.00
37.75	2.00	0.71	5.00	0.00	0.00	0.00
37.80	2.00	0.71	5.00	0.00	0.00	0.00
37.85	2.00	0.71	5.00	0.00	0.00	0.00
37.90	2.00	0.71	5.00	0.00	0.00	0.00
37.95	2.00	0.71	5.00	0.00	0.00	0.00
38.00	2.00	0.71	5.00	0.00	0.00	0.00
38.05	2.00	0.71	5.00	0.00	0.00	0.00
38.10	2.00	0.71	5.00	0.00	0.00	0.00
38.15	2.00	0.71	5.00	0.00	0.00	0.00
38.20	2.00	0.71	5.00	0.00	0.00	0.00
38.25	2.00	0.71	5.00	0.00	0.00	0.00
38.30	2.00	0.71	5.00	0.00	0.00	0.00
38.35	2.00	0.71	5.00	0.00	0.00	0.00
38.40	2.00	0.71	5.00	0.00	0.00	0.00
38.45	2.00	0.71	5.00	0.00	0.00	0.00
38.50	2.00	0.71	5.00	0.00	0.00	0.00
38.55	2.00	0.71	5.00	0.00	0.00	0.00
38.60	2.00	0.71	5.00	0.00	0.00	0.00
38.65	2.00	0.71	5.00	0.00	0.00	0.00
38.70	2.00	0.71	5.00	0.00	0.00	0.00
38.75	2.00	0.71	5.00	0.00	0.00	0.00
38.80	2.00	0.71	5.00	0.00	0.00	0.00
38.85	2.00	0.71	5.00	0.00	0.00	0.00
38.90	2.00	0.71	5.00	0.00	0.00	0.00
38.95	2.00	0.71	5.00	0.00	0.00	0.00
39.00	2.00	0.71	5.00	0.00	0.00	0.00
39.05	2.27	0.71	3.20	0.00	0.00	0.00

39.10	2.27	0.71	3.20	0.00	0.00	0.00
39.15	2.27	0.71	3.19	0.00	0.00	0.00
39.20	2.27	0.71	3.19	0.00	0.00	0.00
39.25	2.27	0.71	3.19	0.00	0.00	0.00
39.30	2.26	0.71	3.19	0.00	0.00	0.00
39.35	2.26	0.71	3.19	0.00	0.00	0.00
39.40	2.26	0.71	3.19	0.00	0.00	0.00
39.45	2.26	0.71	3.19	0.00	0.00	0.00
39.50	2.26	0.71	3.19	0.00	0.00	0.00
39.55	2.26	0.71	3.19	0.00	0.00	0.00
39.60	2.26	0.71	3.19	0.00	0.00	0.00
39.65	2.26	0.71	3.18	0.00	0.00	0.00
39.70	2.26	0.71	3.18	0.00	0.00	0.00
39.75	2.26	0.71	3.18	0.00	0.00	0.00
39.80	2.26	0.71	3.18	0.00	0.00	0.00
39.85	2.26	0.71	3.18	0.00	0.00	0.00
39.90	2.26	0.71	3.18	0.00	0.00	0.00
39.95	2.26	0.71	**3.18**	0.00	0.00	0.00
40.00	2.26	0.71	3.18	0.00	0.00	0.00
40.05	2.26	0.71	3.18	0.00	0.00	0.00
40.10	2.25	0.71	3.18	0.00	0.00	0.00
40.15	2.25	0.71	3.17	0.00	0.00	0.00
40.20	2.25	0.71	3.17	0.00	0.00	0.00
40.25	2.25	0.71	3.17	0.00	0.00	0.00
40.30	2.25	0.71	3.17	0.00	0.00	0.00
40.35	2.25	0.71	3.17	0.00	0.00	0.00
40.40	2.25	0.71	3.17	0.00	0.00	0.00
40.45	2.25	0.71	3.17	0.00	0.00	0.00
40.50	2.25	0.71	3.17	0.00	0.00	0.00
40.55	2.25	0.71	3.17	0.00	0.00	0.00
40.60	2.25	0.71	3.17	0.00	0.00	0.00
40.65	2.25	0.71	3.16	0.00	0.00	0.00
40.70	2.25	0.71	3.16	0.00	0.00	0.00
40.75	2.25	0.71	3.16	0.00	0.00	0.00
40.80	2.25	0.71	3.16	0.00	0.00	0.00
40.85	2.25	0.71	3.16	0.00	0.00	0.00
40.90	2.25	0.71	3.16	0.00	0.00	0.00
40.95	2.24	0.71	3.16	0.00	0.00	0.00
41.00	2.24	0.71	3.16	0.00	0.00	0.00
41.05	2.24	0.71	3.16	0.00	0.00	0.00
41.10	2.24	0.71	3.16	0.00	0.00	0.00
41.15	2.24	0.71	3.16	0.00	0.00	0.00
41.20	2.24	0.71	3.15	0.00	0.00	0.00
41.25	2.24	0.71	3.15	0.00	0.00	0.00
41.30	2.24	0.71	3.15	0.00	0.00	0.00
41.35	2.24	0.71	3.15	0.00	0.00	0.00
41.40	2.24	0.71	3.15	0.00	0.00	0.00
41.45	2.24	0.71	3.15	0.00	0.00	0.00
41.50	2.24	0.71	3.15	0.00	0.00	0.00
41.55	2.24	0.71	3.15	0.00	0.00	0.00
41.60	2.24	0.71	3.15	0.00	0.00	0.00
41.65	2.24	0.71	3.15	0.00	0.00	0.00
41.70	2.24	0.71	3.15	0.00	0.00	0.00
41.75	2.23	0.71	3.15	0.00	0.00	0.00
41.80	2.23	0.71	3.14	0.00	0.00	0.00
41.85	2.23	0.71	3.14	0.00	0.00	0.00
41.90	2.23	0.71	3.14	0.00	0.00	0.00
41.95	2.23	0.71	3.14	0.00	0.00	0.00
42.00	2.23	0.71	3.14	0.00	0.00	0.00
42.05	2.23	0.71	3.14	0.00	0.00	0.00
42.10	2.23	0.71	3.14	0.00	0.00	0.00
42.15	2.23	0.71	3.14	0.00	0.00	0.00
42.20	2.23	0.71	3.14	0.00	0.00	0.00

42.25	2.23	0.71	3.14	0.00	0.00	0.00
42.30	2.23	0.71	3.14	0.00	0.00	0.00
42.35	2.23	0.71	3.14	0.00	0.00	0.00
42.40	2.23	0.71	3.13	0.00	0.00	0.00
42.45	2.23	0.71	3.13	0.00	0.00	0.00
42.50	2.23	0.71	3.13	0.00	0.00	0.00
42.55	2.23	0.71	3.13	0.00	0.00	0.00
42.60	2.22	0.71	3.13	0.00	0.00	0.00
42.65	2.22	0.71	3.13	0.00	0.00	0.00
42.70	2.22	0.71	3.13	0.00	0.00	0.00
42.75	2.22	0.71	3.13	0.00	0.00	0.00
42.80	2.22	0.71	3.13	0.00	0.00	0.00
42.85	2.22	0.71	3.13	0.00	0.00	0.00
42.90	2.22	0.71	3.13	0.00	0.00	0.00
42.95	2.22	0.71	3.13	0.00	0.00	0.00
43.00	2.22	0.71	3.13	0.00	0.00	0.00
43.05	2.22	0.71	3.13	0.00	0.00	0.00
43.10	2.22	0.71	3.12	0.00	0.00	0.00
43.15	2.22	0.71	3.12	0.00	0.00	0.00
43.20	2.22	0.71	3.12	0.00	0.00	0.00
43.25	2.22	0.71	3.12	0.00	0.00	0.00
43.30	2.22	0.71	3.12	0.00	0.00	0.00
43.35	2.22	0.71	3.12	0.00	0.00	0.00
43.40	2.22	0.71	3.12	0.00	0.00	0.00
43.45	2.21	0.71	3.12	0.00	0.00	0.00
43.50	2.21	0.71	3.12	0.00	0.00	0.00
43.55	2.21	0.71	3.12	0.00	0.00	0.00
43.60	2.21	0.71	3.12	0.00	0.00	0.00
43.65	2.21	0.71	3.12	0.00	0.00	0.00
43.70	2.21	0.71	3.12	0.00	0.00	0.00
43.75	2.21	0.71	3.12	0.00	0.00	0.00
43.80	2.21	0.71	3.11	0.00	0.00	0.00
43.85	2.21	0.71	3.11	0.00	0.00	0.00
43.90	2.21	0.71	3.11	0.00	0.00	0.00
43.95	2.21	0.71	3.11	0.00	0.00	0.00
44.00	2.21	0.71	3.11	0.00	0.00	0.00
44.05	2.21	0.71	3.11	0.00	0.00	0.00
44.10	2.21	0.71	3.11	0.00	0.00	0.00
44.15	2.21	0.71	3.11	0.00	0.00	0.00
44.20	2.21	0.71	3.11	0.00	0.00	0.00
44.25	2.21	0.71	3.11	0.00	0.00	0.00
44.30	2.21	0.71	3.11	0.00	0.00	0.00
44.35	2.20	0.71	3.11	0.00	0.00	0.00
44.40	2.20	0.71	3.11	0.00	0.00	0.00
44.45	2.20	0.71	3.11	0.00	0.00	0.00
44.50	2.20	0.71	3.11	0.00	0.00	0.00
44.55	2.20	0.71	3.11	0.00	0.00	0.00
44.60	2.20	0.71	3.10	0.00	0.00	0.00
44.65	2.20	0.71	3.10	0.00	0.00	0.00
44.70	2.20	0.71	3.10	0.00	0.00	0.00
44.75	2.20	0.71	3.10	0.00	0.00	0.00
44.80	2.20	0.71	3.10	0.00	0.00	0.00
44.85	2.20	0.71	3.10	0.00	0.00	0.00
44.90	2.20	0.71	3.10	0.00	0.00	0.00
44.95	2.20	0.71	3.10	0.00	0.00	0.00
45.00	2.20	0.71	3.10	0.00	0.00	0.00
45.05	2.20	0.71	3.10	0.00	0.00	0.00
45.10	2.20	0.71	3.10	0.00	0.00	0.00
45.15	2.20	0.71	3.10	0.00	0.00	0.00
45.20	2.19	0.71	3.10	0.00	0.00	0.00
45.25	2.19	0.71	3.10	0.00	0.00	0.00
45.30	2.19	0.71	3.10	0.00	0.00	0.00
45.35	2.19	0.71	3.10	0.00	0.00	0.00

45.40	2.19	0.71	3.10	0.00	0.00	0.00
45.45	2.19	0.71	3.10	0.00	0.00	0.00
45.50	2.19	0.71	3.09	0.00	0.00	0.00
45.55	2.19	0.71	3.09	0.00	0.00	0.00
45.60	2.19	0.71	3.09	0.00	0.00	0.00
45.65	2.19	0.71	3.09	0.00	0.00	0.00
45.70	2.19	0.71	3.09	0.00	0.00	0.00
45.75	2.19	0.71	3.09	0.00	0.00	0.00
45.80	2.19	0.71	3.09	0.00	0.00	0.00
45.85	2.19	0.71	3.09	0.00	0.00	0.00
45.90	2.19	0.71	3.09	0.00	0.00	0.00
45.95	2.19	0.71	3.09	0.00	0.00	0.00
46.00	2.19	0.71	3.09	0.00	0.00	0.00
46.05	2.19	0.71	3.09	0.00	0.00	0.00
46.10	2.18	0.71	3.09	0.00	0.00	0.00
46.15	2.18	0.71	3.09	0.00	0.00	0.00
46.20	2.18	0.71	3.09	0.00	0.00	0.00
46.25	2.18	0.71	3.09	0.00	0.00	0.00
46.30	2.18	0.71	3.09	0.00	0.00	0.00
46.35	2.18	0.71	3.09	0.00	0.00	0.00
46.40	2.18	0.71	3.09	0.00	0.00	0.00
46.45	2.18	0.71	3.09	0.00	0.00	0.00
46.50	2.18	0.71	3.08	0.00	0.00	0.00
46.55	2.18	0.71	3.08	0.00	0.00	0.00
46.60	2.18	0.71	3.08	0.00	0.00	0.00
46.65	2.18	0.71	3.08	0.00	0.00	0.00
46.70	2.18	0.71	3.08	0.00	0.00	0.00
46.75	2.18	0.71	3.08	0.00	0.00	0.00
46.80	2.18	0.71	3.08	0.00	0.00	0.00
46.85	2.18	0.71	3.08	0.00	0.00	0.00
46.90	2.18	0.71	3.08	0.00	0.00	0.00
46.95	2.18	0.71	3.08	0.00	0.00	0.00
47.00	2.17	0.71	3.08	0.00	0.00	0.00
47.05	2.17	0.71	3.08	0.00	0.00	0.00
47.10	2.17	0.71	3.08	0.00	0.00	0.00
47.15	2.17	0.71	3.08	0.00	0.00	0.00
47.20	2.17	0.71	3.08	0.00	0.00	0.00
47.25	2.17	0.71	3.08	0.00	0.00	0.00
47.30	2.17	0.71	3.08	0.00	0.00	0.00
47.35	2.17	0.71	3.08	0.00	0.00	0.00
47.40	2.17	0.71	3.08	0.00	0.00	0.00
47.45	2.17	0.71	3.08	0.00	0.00	0.00
47.50	2.17	0.71	3.08	0.00	0.00	0.00
47.55	2.17	0.70	3.08	0.00	0.00	0.00
47.60	2.17	0.70	3.08	0.00	0.00	0.00
47.65	2.17	0.70	3.08	0.00	0.00	0.00
47.70	2.17	0.70	3.08	0.00	0.00	0.00
47.75	2.17	0.70	3.07	0.00	0.00	0.00
47.80	2.17	0.70	3.07	0.00	0.00	0.00
47.85	2.17	0.70	3.07	0.00	0.00	0.00
47.90	2.16	0.70	3.07	0.00	0.00	0.00
47.95	2.16	0.70	3.07	0.00	0.00	0.00
48.00	2.16	0.70	3.07	0.00	0.00	0.00
48.05	2.16	0.70	3.07	0.00	0.00	0.00
48.10	2.16	0.70	3.07	0.00	0.00	0.00
48.15	2.16	0.70	3.07	0.00	0.00	0.00
48.20	2.16	0.70	3.07	0.00	0.00	0.00
48.25	2.16	0.70	3.07	0.00	0.00	0.00
48.30	2.16	0.70	3.07	0.00	0.00	0.00
48.35	2.16	0.70	3.07	0.00	0.00	0.00
48.40	2.16	0.70	3.07	0.00	0.00	0.00
48.45	2.16	0.70	3.07	0.00	0.00	0.00
48.50	2.16	0.70	3.07	0.00	0.00	0.00

48.55	2.16	0.70	3.07	0.00	0.00	0.00
48.60	2.16	0.70	3.07	0.00	0.00	0.00
48.65	2.16	0.70	3.07	0.00	0.00	0.00
48.70	2.16	0.70	3.07	0.00	0.00	0.00
48.75	2.16	0.70	3.07	0.00	0.00	0.00
48.80	2.15	0.70	3.07	0.00	0.00	0.00
48.85	2.15	0.70	3.07	0.00	0.00	0.00
48.90	2.15	0.70	3.07	0.00	0.00	0.00
48.95	2.15	0.70	3.07	0.00	0.00	0.00
49.00	2.15	0.70	3.07	0.00	0.00	0.00
49.05	2.15	0.70	3.07	0.00	0.00	0.00
49.10	2.15	0.70	3.07	0.00	0.00	0.00
49.15	2.15	0.70	3.07	0.00	0.00	0.00
49.20	2.15	0.70	3.07	0.00	0.00	0.00
49.25	2.15	0.70	3.06	0.00	0.00	0.00
49.30	2.15	0.70	3.06	0.00	0.00	0.00
49.35	2.15	0.70	3.06	0.00	0.00	0.00
49.40	2.15	0.70	3.06	0.00	0.00	0.00
49.45	2.15	0.70	3.06	0.00	0.00	0.00
49.50	2.15	0.70	3.06	0.00	0.00	0.00
49.55	2.15	0.70	3.06	0.00	0.00	0.00
49.60	2.15	0.70	3.06	0.00	0.00	0.00
49.65	2.15	0.70	3.06	0.00	0.00	0.00
49.70	2.15	0.70	3.06	0.00	0.00	0.00
49.75	2.14	0.70	3.06	0.00	0.00	0.00
49.80	2.14	0.70	3.06	0.00	0.00	0.00
49.85	2.14	0.70	3.06	0.00	0.00	0.00
49.90	2.14	0.70	3.06	0.00	0.00	0.00
49.95	2.14	0.70	3.06	0.00	0.00	0.00
50.00	2.14	0.70	3.06	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

units: unit: qc, fs, Stress or Pressure = atm (1.058ltsf); Unit weight= pcf; Depth= ft; settlement= in.

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1 atm (atmosphere)= 1 tsf (ton/ft2)
CRRm cyclic resistance ratio from soils
CSRsf cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of safety against liquefaction, F.S.=CRRm/CSRsf
s_sat Settlement from saturated sands
s_dry settlement from unsaturated sands
s_all Total settlement from saturated and unsaturated sands
NoLiq No-Liquefy soils