BID ADDENDUM #5

April 21, 2022

To:
Prospective Bidders/Planholders

CHILD DEVELOPMENT CENTER
PROJECT NUMBER ST-01828
California State University Stanislaus
One University Circle, Turlock, CA 95382

This Addendum forms a part of the contract documents and modifies the original bidding documents. Addendum shall be noted as received and acknowledged on the Bid Proposal Form when submitted as outlined in the Bid Package referenced above.

The following corrections, additions, deletions, and/or modifications to the above package, by this reference, shall be incorporated therein:

Addition:

1. Please see the attached CDC Geotechnical Report.

End of Addenda No. 5

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED CHILD DEVELOPMENT CENTER (BLDG #14)
CALIFORNIA STATE UNIVERSITY STANISLAUS
NORTHWEST OF MONTE VISTA AVE. AND GEER ROAD
TURLOCK, CALIFORNIA

KA PROJECT NO. 072-20075
FEBRUARY 18, 2021

Prepared for:

MS. MARY E. VAN EYK
CALIFORNIA STATE UNIVERSITY, STANISLAUS
ONE UNIVERSITY CIRCLE, CY600
TURLOCK, CALIFORNIA 95382

Prepared by:

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Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

February 18, 2021 KA Project No. 072-20075

Ms. Mary E. Van Eyk
California State University, Stanislaus
One University Circle, CY600
Turlock, California 95382

RE: Geotechnical Engineering Investigation
Proposed Child Development Center (Building #14)
California State University Stanislaus
Northwest of Monte Vista Avenue and Geer Road
Turlock, California

Dear Ms. Van Eyk:

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

If you have any questions or if we may be of further assistance, please do not hesitate to contact our office at (209) 572-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER
GEORGE P. HATTRUP
GE 2353
GEOTECHNICAL
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Senior Geotechnical Engineer
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GPH:ht

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February 18, 2021 KA Project No. 072-20075

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED CHILD DEVELOPMENT CENTER (BUILDING #14)
CALIFORNIA STATE UNIVERSITY STANISLAUS
NORTHWEST OF MONTE VISTA AVENUE AND GEER ROAD
TURLOCK, CALIFORNIA

INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed Child Development Center (Building #14) to be located at California State University (CSU) Stanislaus, Turlock, California. Discussions regarding site conditions are presented herein, together with conclusions and recommendations pertaining to site preparation, Engineered Fill, utility trench backfill, drainage and landscaping, foundations, retaining walls, and soil cement reactivity.

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

PURPOSE AND SCOPE

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

Our scope of services was outlined in our proposal dated October 9, 2020 (KA Proposal No. P714-20) and included the following:

- A site reconnaissance by a member of our engineering staff to evaluate the surface conditions at the project site.
- A field investigation consisting of drilling two borings to depths of 25 and 50 feet and performing two percolation tests at depths of 3 and 5 feet for evaluation of the subsurface conditions at the project site.
- Performing laboratory tests on representative soil samples obtained from the borings to evaluate the physical and index properties of the subsurface soils.

- Evaluation of the data obtained from the investigation and an engineering analysis to provide recommendations for use in the project design and preparation of construction specifications.
- Preparation of this report summarizing the results, conclusions, recommendations, and findings of our investigation.

PROPOSED CONSTRUCTION

We understand that design of the proposed Child Development Center is currently underway. Based on the Civil plans that were provided, the new building will have a footprint area of approximately 14,500 square feet. It is anticipated that the building will consist of a single-story structure with a wood frame, a concrete slab-on-grade floor, and conventional shallow foundations. Foundation loads are anticipated to be light to moderate. In addition, site improvements are expected to include exterior concrete flatwork, a paved parking area, underground utilities, drainage improvements including a bioretention basin or French drain, and landscaping. Since the project site is relatively flat and level, minor cuts and fills (less than two feet) are anticipated to achieve the desired finished ground surface in the planned building and paved areas.

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

SITE LOCATION AND SITE DESCRIPTION

The Child Development Center will be located near the north end of an existing parking lot, just south of Melones Drive in the southeast part of the CSU Stanislaus campus in Turlock, California. The site is surrounded by: Melones Drive and another parking lot to the north; a soccer field to the east; the majority of the parking lot, undeveloped property, and Mariposa Drive to the south; and a student garden to the west. The ground surface in the area of where the Child Development Center will be located is covered by a thin layer of gravel within the existing parking lot and is generally bare outside of the parking lot. The site is relatively level with no major changes in grade.

GEOLOGIC SETTING

The San Joaquin Valley which includes the Turlock area, is a topographic and structural basin that is bounded on the east by the Sierra Nevada Mountains and on the west by the Coast Ranges. The Sierra Nevadas, a fault block dipping gently southwestward, is made up of igneous and metamorphic rocks of pre-Tertiary age that comprise the basement complex beneath the Valley. The Coast Ranges contain folded and faulted sedimentary rocks of Mesozoic and Cenozoic age which are similar to those rocks that underlie the Valley at depth and nonconformably overlie the basement complex; gently dipping to nearly horizontal sedimentary rocks of Tertiary and Quaternary age overlie the older rocks. These younger rocks are mostly of continental origin and in the Turlock area; they were derived from the Sierra Nevadas.

The Coast Ranges evolved as a result of folding, faulting, and accretion of diverse geologic terrains. They are composed chiefly of sedimentary and metamorphic rocks that are sharply deformed into complex structures. They are broken by numerous faults, the San Andreas Fault being the most notable structural feature.

Both the Sierra Nevada and Coast Ranges are geologically young mountain ranges and possess active and potentially active fault zones. Major active faults and fault Zones occur at some distance to the west, southwest, and east-northeast of the Modesto area. Active and potentially active faults that bound the eastern edge of the Sierra Nevada block, such as the Owens Valley, Hartley Springs, and Hilton Creek Faults, are located a little over 100 miles east of the site.

The nearest active or potentially active earthquake fault zones to the project site are the San Joaquin (approximately 18 miles southwest), the Ortigalita (approximately 30 miles southwest), the Greenville (approximately 37 miles west), the Calaveras (approximately 48 miles southwest), and the Hayward (approximately 52 miles west). The San Andreas Fault is possibly the best-known fault and is located about 61 miles to the southwest.

There are no active fault traces in the project vicinity. Accordingly, the project area is not within an Earthquake Fault Zone (Special Studies Zone) and will not require a special site investigation by an Engineering Geologist. However, it is anticipated that the project site will be subject to moderate ground shaking during a design seismic event.

Turlock has experienced ground shaking from earthquakes in the historical past. According to the County Seismic Safety Element, ground shaking of VI intensity (Modified Mercali Scale) was felt in Turlock from the 1872 Owens Valley Earthquake. This is the largest known historical earthquake event to affect the Turlock area.

Secondary hazards from earthquakes include rupture, seiche, landslides, liquefaction, and subsidence. Since there are no known faults within the immediate area, ground rupture from surface faulting should not be a potential problem. Seiche and landslides are not hazards in the area either. Liquefaction potential (sudden loss of shear strength in a saturated cohesionless soil) is addressed later in this report. In addition, there are no known occurrences of structural or architectural damage due to deep subsidence in the Turlock area.

FIELD AND LABORATORY INVESTIGATIONS

Subsurface soil conditions were explored by drilling two borings to depths of 25 and 50 feet below site grade, using a truck-mounted drill rig. In addition, two percolation tests were performed near the test borings at depths of 3 and 5 feet below the existing site grade. The approximate boring and percolation test locations are shown on the attached site plan, Figure 1. During drilling operations, penetration tests were performed at regular intervals to evaluate the soil consistency and to obtain information regarding the engineering properties of the subsoils. Soil samples were retained for laboratory testing. The soils encountered were continuously examined and visually classified in accordance with the Unified Soil Classification System. A more detailed description of the field investigation is presented in Appendix A.

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

SOIL PROFILE AND SUBSURFACE CONDITIONS

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. Most of the project site was covered with a thin layer of gravel approximately 2 to 3 inches thick.

Beneath the gravel layer, approximately 1 to 2½ feet of fill material was encountered. The fill material consisted of silty sand and appeared similar to the underlying native soils. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill material during the time of our field and laboratory investigation. Based on our observations during drilling and our limited testing, it appeared the fill soils varied from relatively loose to compacted. A laboratory test performed on a representative sample in accordance with ASTM D1557 indicates the fill material has a maximum dry density of 128.0 pcf at an optimum moisture content of 9.6 percent.

Below the fill material, medium dense silty sand was encountered to a depth of approximately 13 feet. Field and laboratory tests suggest that these soils are moderately strong and slightly compressible. Penetration resistance ranged from 25 to 35 blows per foot. Dry densities ranged from approximately 105 to 122 pcf. A representative soil sample from a depth of 2 feet consolidated approximately 2 percent under a 2 ksf load when saturated. Another soil sample obtained from a depth of 2 feet had an angle of internal friction of 43 degrees. These soils contained approximately 32 to 37 percent fines (silt and clay).

Below 13 feet, layers of medium dense to very dense silty sand and sand with minor silt were encountered to the maximum depth explored of 50 feet. Some of these soils appeared weakly cemented in parts. Field and laboratory tests suggest that these soils have similar to better strength characteristics as the upper soils. Penetration resistance ranged from 26 blows per foot to greater than 50 blows per 6 inches. Dry densities of relatively undisturbed samples ranged from approximately 95 to 124. These soils contained approximately 4 to 43 percent fines (silt and clay).

For additional information about the soils encountered, please refer to the boring logs and laboratory test results in Appendix A.

GROUNDWATER

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Free groundwater was encountered at a depth of approximately 42 feet during our exploratory drilling. Information obtained from the Department of Water Resources indicates that historical high groundwater has been as shallow as 5 feet in the vicinity of the project site.

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

SOIL LIQUEFACTION

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

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

1) Groundwater depth;

2) Soil type;

3) Relative density;

4) Initial confining pressure;

5) Intensity and duration of groundshaking.

The soils encountered within the project site predominately consist of alternating layers of medium dense to very dense silty sand, sandy silt, silty sand/sand and sand. Groundwater was encountered at a depth of 42 feet during subsurface exploration. Available groundwater data, as well as our experience in the area, indicates that groundwater depth has been as shallow as 5 feet within the project site vicinity.

The potential for soil liquefaction during a seismic event was evaluated using the LIQUEFYPRO computer program (Version 5.8h) developed by CivilTech Software. Based on a USGS provided deaggregation analysis, a maximum earthquake magnitude of 6.3 was used. A peak horizontal ground surface acceleration of 0.36g was considered applicable for the liquefaction analysis. A groundwater depth of 5 feet was used for the analysis. The computer analysis indicates that soils above a depth of 5 feet are non-liquefiable to slightly liquefiable due to the absence of groundwater. Based on our analysis, the soils to a depth of approximately 38 feet are considered to be non-liquefiable with a factor of safety of at least 5.0. However, it appears there is a low potential for liquefaction to occur at the site with respect to the sandy soils between depths of approximately 38 and 50 feet. The analysis also indicates that the total and differential seismic induced settlement is not anticipated to exceed ¾ inch and ½ inch, respectively. Therefore, the potential for liquefaction during a design level seismic event should not have a significant effect on the proposed development. Accordingly, measures to mitigate liquefaction potential should not be required; however, the Project Structural Engineer should take into account the potential for seismic settlement as part of the design process.

SEISMIC SETTLEMENT

One of the most common phenomena during seismic shaking accompanying any earthquake is the induced settlement of loose unconsolidated soils. Based on the nature of the subsurface materials, the plan to excavate and recompact the upper soils and any loose fill soils within the proposed building areas and the relatively low to moderate seismicity of the region, we would not expect seismic settlement or lateral spread to represent a significant geologic hazard to the site provided that the recommendations of our referenced Geotechnical Engineering Investigation are followed.

The estimated seismic settlement was determined at the site using the settlement analysis method by Ishihara & Yoshimine (1992). The results of the settlement analysis indicate an unsaturated settlement (for existing groundwater at a depth of 42 feet) of less than ¼ inch, and a saturated settlement (for a high groundwater condition with a depth of 5 feet) of approximately ¾ of an inch, may occur during a design seismic event. Based on our analysis, we recommend the project be designed for a seismic induced differential settlement of ½ inch in 100 feet. The consolidation settlement (under the static building load) and differential settlement (per specified length in building area) are indicated in the Foundations section of this report.

PERCOLATION TESTING

Two percolation tests were performed at the site to evaluate the soils absorption characteristics for the planned subsurface drainage improvements. The percolation tests were performed inside test holes with a diameter of 4½ inches and at depths of approximately 3 and 5 feet below the existing ground surface. Results of the tests are as follows:

Test No.	Approx. Depth (feet)	Percolation Rate (min/in)	Estimated Absorption Rate (gallons/ day/ft^2)	Soil Type
P1	5	20	7.1	Silty Sand (SM)
P2	3	40	2.1	Silty Sand (SM)

The test results indicate that the soils tested have varying absorption characteristics, ranging from moderately poor at a depth of 3 feet to moderately good at a depth of 5 feet. The test results do not include a factor of safety. For design purposes, it is recommended that a factor-of-safety of at least 2.5 be applied to the absorption rates indicated above. Soil conditions can vary with depth and horizontal location at the project site, so the absorption rate could vary accordingly. The percolation rates given above are based on 1 inch of fall within a 4½-inch diameter hole with approximately a 6 to 12-inch head of water.

CONCLUSIONS AND RECOMMENDATIONS

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

Administrative Summary

In brief, the subject site and soil conditions, with the exception of the fill material, appear to be conducive to the development of the project. Approximately 1 to 2½ feet of fill material was encountered within the borings drilled at the site. Except for a relatively thin surface layer of gravel, the fill material consisted of silty sand. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Preliminary testing indicates that the fill soils had varying strength characteristics ranging from loosely placed to compacted. Therefore, it is recommended the fill soils within proposed building areas and 5 feet beyond be excavated and stockpiled so that the native soil can be properly prepared. These soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics and debris. Fill soil intermixed with asphaltic concrete will not be suitable for re-use in building areas, but may be used in pavement areas provided it is cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, Krazan & Associates, Inc., should inspect the bottom of the excavation to verify no additional removal is required.

Although the project site is located in an undeveloped area of the CSU Stanislaus campus, the site may contain subsurface improvements, such as underground utility lines. Demolition activities should include the proper removal of any surface and buried structures within the area of proposed construction. The resulting excavations should be backfilled with Engineered Fill. It is suspected that demolition activities will disturb the upper soils. After demolition activities, it is recommended that these disturbed soils be removed and/or recompacted. Prior to backfilling, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

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

After completion of the recommended site preparation, the site should be suitable to support the structure on shallow footings. The foundations for the new building may be designed utilizing an allowable bearing pressure of 2,500 psf for dead-plus-live loads. Isolated spread or continuous footings should have a minimum embedment of 18 inches and be supported on engineered fill or firm, undisturbed native soils. An allowable modulus of subgrade reaction of 65 pci may be used to design structural concrete slabs-on-grade or mat foundations.

Groundwater Influence on Structures/Construction

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

Site Preparation

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

Approximately 1 to 2½ feet of fill material was encountered within the borings drilled at the site. Except for a relatively thin surface layer of gravel, the fill material consisted of silty sand. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill material during our field and laboratory investigation. Preliminary testing indicates that the fill soils had varying strength characteristics ranging from loosely placed to compacted. Therefore, it is recommended the fill soils within proposed building areas and 5 feet beyond be excavated and stockpiled so that the native soil can be properly prepared. These soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics and debris. Fill soil intermixed with asphaltic concrete will not be suitable for re-use in building areas, but may be used in pavement areas provided it is cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum dimension. Prior to backfilling, Krazan & Associates, Inc., should inspect the bottom of the excavation to verify no additional removal is required.

Although the project site is located in an undeveloped area of the CSU Stanislaus campus, the site may contain subsurface improvements, such as underground utility lines. Within the area of new construction, any buried structures or utilities that will not remain in place should be removed and/or relocated. The resulting excavation should be backfilled with Engineered Fill. Excavations, depressions, or soft and pliant areas extending below planned finished subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill. In general, any septic tanks, debris pits, cesspools, or similar structures should be entirely removed. Concrete footings should be removed to an equivalent depth of at least 3 feet below proposed footing elevations, or as recommended by the

Geotechnical Engineer. Any other buried structures should be removed in accordance with the recommendations of the Geotechnical Engineer. The resulting excavations should be backfilled with Engineered Fill.

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

Following stripping operations, fill removal, and demolition activities, it is recommended that at a minimum, the upper 12 inches of exposed subgrade soils beneath the exterior flatwork and pavement areas be excavated/scarified, worked until uniform and free from large clods, moisture-conditioned to at or above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Limits of recompaction should extend a minimum of 2 feet beyond flatwork and pavements. This compaction effort should stabilize the upper soils and locate any unsuitable or pliant areas not found during our field investigation.

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

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

Engineered Fill

The upper, on-site native soils and fill material consist of silty sands, which will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics, debris, and fragments greater than 4 inches in maximum dimension.

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

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

Percent Passing No. 200 Sieve	20 to 50
Plasticity Index (ASTM D4318)	10 maximum
Expansion Index (ASTM D4829)	20 maximum

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

Drainage and Landscaping

The ground surface should slope away from building pad and pavement areas toward appropriate drop inlets or other surface drainage devices. In accordance with Section 1804 of the 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 1 percent away from the structure. Drainage gradients should be maintained to carry all surface water to collection facilities and off-site. These grades should be maintained for the life of the project.

Utility Trench Backfill

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

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

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

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

Foundations

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed structures may be supported on a shallow foundation system bearing on a minimum of 12 inches of Engineered Fill. Isolated spread and continuous footings can be designed for the following maximum allowable soil bearing pressures:

Load	Allowable Loading
Dead Load Only	1,800 psf
Dead-Plus-Live Load	2,500 psf
Total Load, including wind or seismic loads	3,350 psf

The footings should have a minimum embedment depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Continuous footings should have a minimum width of 12 inches and isolated spread footings should have a minimum width of 24 inches, regardless of load.

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

The total settlement is not expected to exceed 1 inch. Differential settlement should be less than ½ inch for similarly sized and loaded footings or less than ½ inch over a distance of 30 feet along a uniformly loaded continuous footing. Most of the settlement is expected to occur during construction as the loads are applied. However, additional post-construction movement may occur if the foundation soils are flooded or saturated.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.4 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 320 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ⅓ increase in the above value may be used for short duration, wind, or seismic loads.

Floor Slabs and Exterior Flatwork

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

The exterior floors should be poured separately in order to act independently of the walls and foundation system. Exterior finish grades should be sloped a minimum of 1 to 1½ percent away from all interior slab areas to preclude ponding of water adjacent to the structures. All fills required to bring the building pads to grade should be Engineered Fills.

The floor slabs should be reinforced at a minimum with #3 reinforcing bars at 24 inches on-center each way within the floor slabs middle-third. Thicker floor slabs with increased concrete strength and reinforcement should be designed wherever heavy concentrated loads, heavy equipment, or machinery is anticipated.

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 capillary break and penetrate the slab-on-grade. This moisture vapor penetration can affect floor coverings and produce mold and mildew in the structure. To reduce moisture vapor intrusion, it is recommended that a vapor retarder be installed. It is recommended that the utility trenches within the structure be compacted, as specified in our report, to reduce the transmission of moisture through the utility trench backfill. Special attention to the immediate drainage and irrigation around the buildings 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 structures (i.e. ventilation fans) is recommended to reduce the accumulation of interior moisture.

Lateral Earth Pressures and Retaining Walls

Walls retaining horizontal backfill and capable of deflecting a minimum of 0.1 percent of its height at the top may be designed using an equivalent fluid active pressure of 36 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 56 pounds per square foot per foot per depth. Expansive soils should not be used for backfill against walls. The wedge of non-expansive backfill material should extend from the bottom of each retaining wall outward and upward at a slope of 2:1 (horizontal to vertical) or flatter. The stated lateral earth pressures do not include the effects of hydrostatic water pressures generated by infiltrating surface water that may accumulate behind the retaining walls; or loads imposed by construction equipment, foundations, or roadways. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

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

Seismic Parameters – 2019 California Building Code

The Site Class per Section 1613 of the 2019 California Building Code (2019 CBC) and ASCE 7-16, Chapter 20 is based upon the site soil conditions. It is our opinion that a Site Class D is most consistent with the subject site soil conditions. For seismic design of the structures based on the seismic provisions of the 2019 CBC, and consistent with the information provided in the *CSU Seismic Requirements* publication dated March 5, 2020 (see Table 1 in Attachment B), we recommend the following parameters:

Seismic Item	Value*	CBC Reference
Site Class	D	Section 1613.2.2
Site Coefficient F_a	1.27	Table 1613.2.3 (1)
S_s	0.66	Section 1613.2.1
S_{MS}	0.84	Section 1613.2.3
S_{DS}	0.56	Section 1613.2.4
Site Coefficient F_v	2.08	Table 1613.2.3 (2)
S_1	0.26	Section 1613.2.1
S_{M1}	0.55	Section 1613.2.3
S_{D1}	0.36	Section 1613.2.4
T_S	0.64	Section 1613.2

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

Refer to Table 1 in Attachment B of the referenced *CSU Seismic Requirements* publication for more seismic design parameters, which may be applicable for the structural design of the planned Child Development Center.

Soil Cement Reactivity

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

A representative soil sample was obtained from the site (composite sample from Boring B2 at 2 to 3 feet and 5 to 6 feet) and tested in accordance with State of California Materials Manual Test Designation 417. The sulfate concentration detected in the soil sample was 0.00206 percent (20.6 ppm), which is well below the maximum allowable values established by HUD/FHA and CBC. Therefore, no special design requirements are necessary to compensate for sulfate reactivity with the cement.

The soil sample referenced above was also tested to evaluate the soluble chloride content, which was less than 0.1 ppm, indicating that there is a negligible soluble chloride content in the onsite soils. In addition, a soil reactivity (pH) of 7.5 was determined for the soil sample that was tested.

Compacted Material Acceptance

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

Testing and Inspection

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

LIMITATIONS

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 in accordance with the current standard of practice, 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, either due to excavation or fill placement, new agency regulations, or possible changes in the proposed structure after the soils report is completed may require the soils report to be professionally reviewed. In light of this, the Owner should be aware that there is a practical limit to the usefulness of this report without critical review. Although the time limit for this review is strictly arbitrary, it is suggested that 2 years be considered a reasonable time for the usefulness of this report.

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

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

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

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

If you have any questions or if we may be of further assistance, please do not hesitate to contact our office at (209) 572-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER
GEORGE P. HATTRUP
GE 2353
GEOTECHNICAL
STATE OF CALIFORNIA

George P. Hattrup

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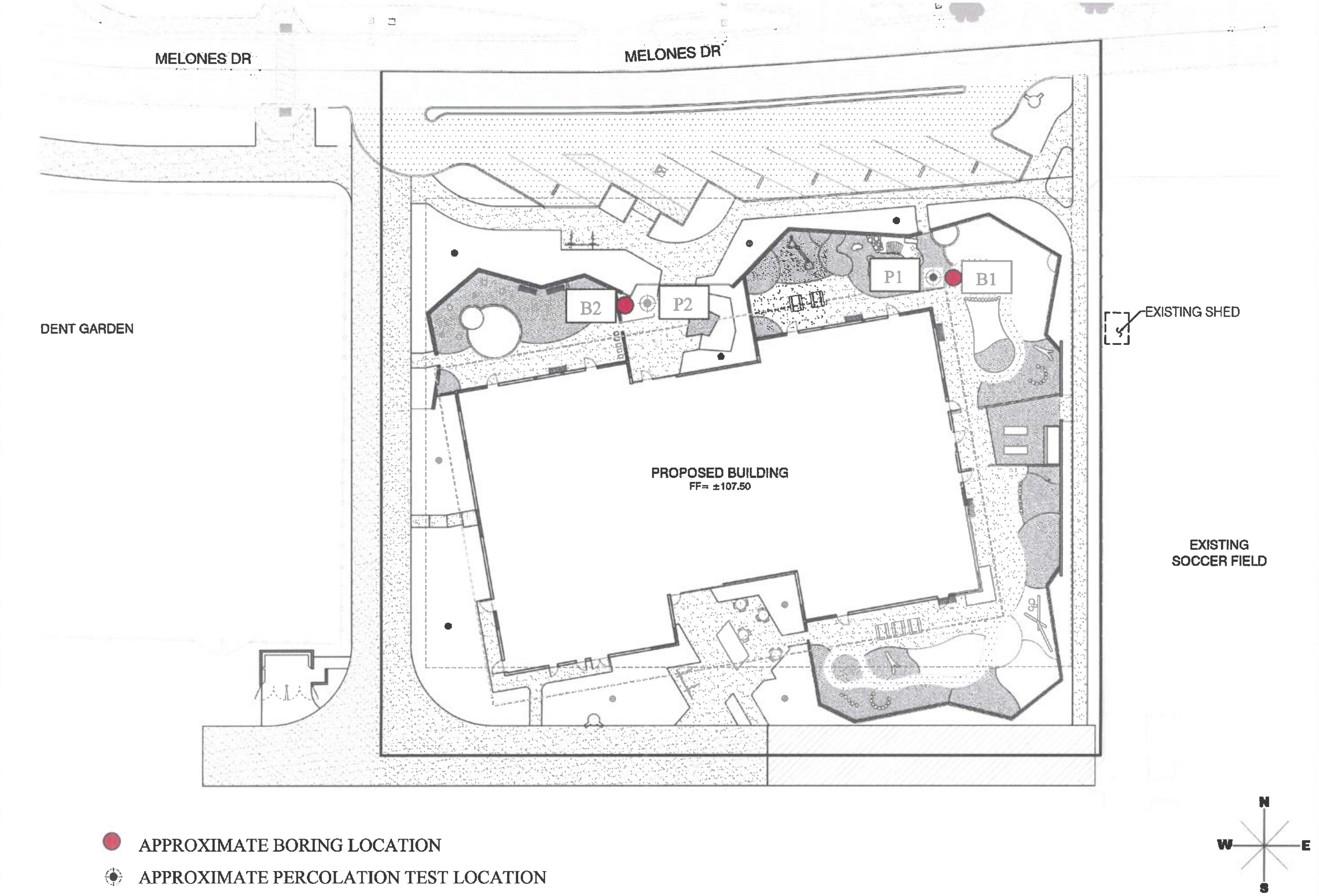
Ryan K. Privett, PE
Project Engineer
RCE No. 59372

GPH/RKP:ht



● APPROXIMATE BORING LOCATION

◉ APPROXIMATE PERCOLATION TEST LOCATION

SITE MAP	**Scale:** NTS	**Date:** February 2021
Child Development Center (Bldg #14) **NW of Monte Vista Avenue and Geer Road** **Turlock, California**	**Drawn by:** HT **Project No.** 072-20075	**Approved by:** DJ **Figure No.** 1

Krazan
GEOTECHNICAL ENGINEERING

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

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

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

Modified standard penetration tests and standard penetration tests were performed at selected depths. These tests represent the resistance to driving a 2½-inch and 1⅜-inch inside diameter split barrel sampler, respectively. The driving energy was provided by a hammer weighing 140 pounds falling 30 inches. Relatively undisturbed soil samples were obtained while performing this test. Bag samples of the disturbed soil were obtained from the auger cuttings. The modified standard penetration tests are identified in the sample type on the boring logs with a full shaded block. The standard penetration tests are identified in the sample type on the boring logs with half of the block shaded. All samples were returned to our Clovis laboratory for evaluation.

In addition to the test borings and soil sampling, two percolation tests were performed to evaluate the absorption characteristics of the soils at the project site.

Laboratory Investigation

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

In-situ moisture content, dry density, consolidation, direct shear, and sieve analysis tests were completed for the undisturbed samples representative of the subsurface material. In addition, a test to determine the compaction characteristics of the shallow subgrade soils was performed on a bag sample obtained from the auger cuttings. These tests, supplemented by visual observation, comprised the basis for our evaluation of the site material.

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

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

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

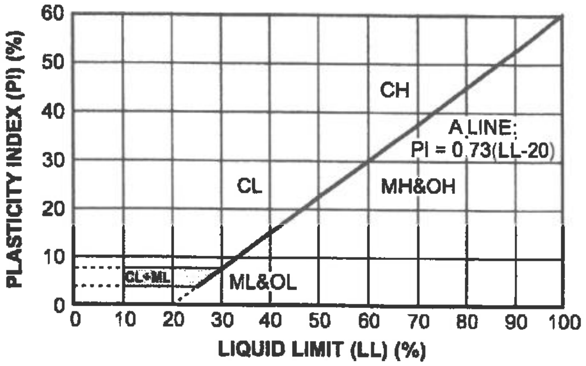
CONSISTENCY CLASSIFICATION

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

GRAIN SIZE CLASSIFICATION

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

PLASTICITY CHART



Log of Boring B1

Project: Child Development Center

Project No: 072-20075

Client: California State University, Stanislaus

Figure No.: A-1

Location: NW of Monte Vista Avenue and Geer Road, Turlock, California

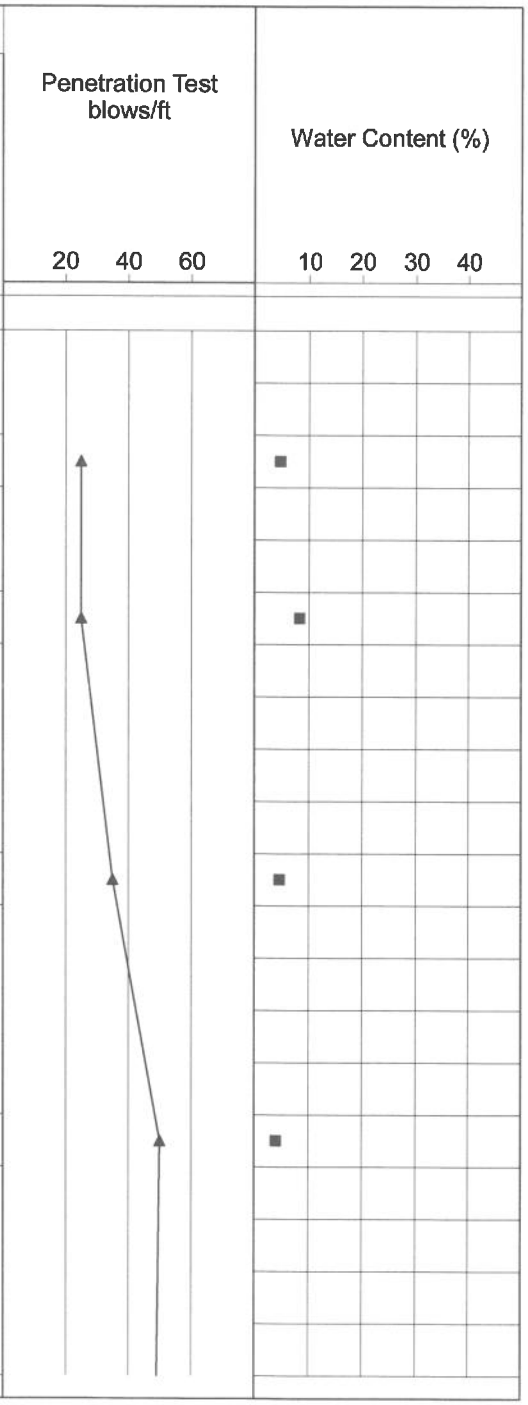
Logged By: R. Alexander

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0		***SILTY SAND (SM)*** FILL, fine- to medium-grained; brown, damp, drills easily				
2		***SILTY SAND (SM)*** Medium dense, fine- to medium-grained; brown, damp, drills easily	122.1	4.7	■	25
		Fine-grained, tan and moist below 5 feet	105.2	8.3	■	25
10		Damp below 10 feet	114.4	4.6	■	35
14		***SANDY SILT (ML)*** Very dense, fine-grained; gray, damp, drills hard	119.3	4.0	■	50+
		SILTY SAND (SM) Dense, fine- to medium-grained; brown, moist, drills firmly				
20					■	



Drill Method: Solid Flight

Drill Date: 1-29-21

Drill Rig: CME 45B

Krazan and Associates

Hole Size: 4½ Inches

Driller: Brent Snyder

Elevation: 25 Feet

Sheet: 1 of 2

Log of Boring B1

Project: Child Development Center

Project No: 072-20075

Client: California State University, Stanislaus

Figure No.: A-1

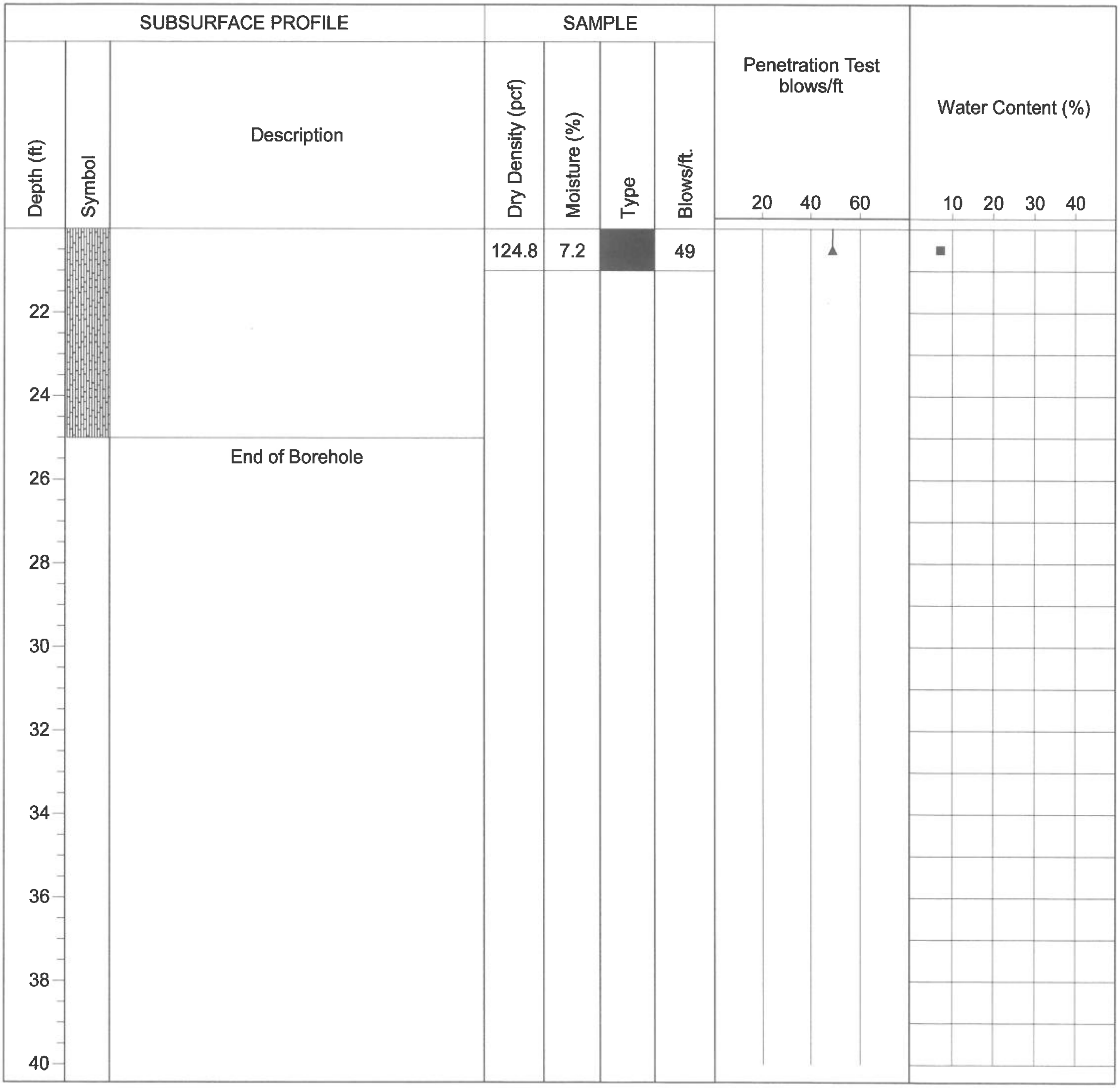
Location: NW of Monte Vista Avenue and Geer Road, Turlock, California

Logged By: R. Alexander

Depth to Water>

Initial: None

At Completion: None



Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
124.8	7.2	■	49

Drill Method: Solid Flight

Drill Rig: CME 45B

Driller: Brent Snyder

Krazan and Associates

Drill Date: 1-29-21

Hole Size: 4½ Inches

Elevation: 25 Feet

Sheet: 2 of 2

Log of Boring B2

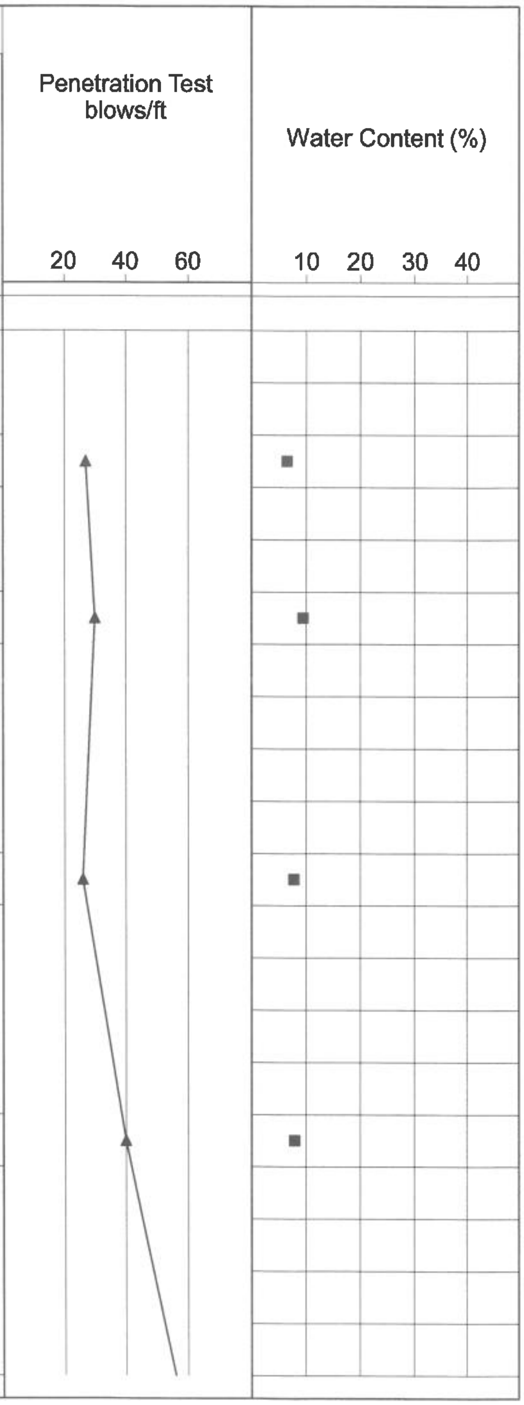
Project: Child Development Center
Project No: 072-20075

Client: California State University, Stanislaus
Figure No.: A-2

Location: NW of Monte Vista Avenue and Geer Road, Turlock, California
Logged By: R. Alexander

Depth to Water> **Initial:** 42 Feet **At Completion:** 42 Feet

SUBSURFACE PROFILE		SAMPLE			
Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0	Ground Surface				
0	***SILTY SAND (SM)*** FILL, fine- to medium-grained; brown, moist, drills easily				
2.5	***SILTY SAND (SM)*** Medium dense, fine- to medium-grained; brown, moist, drills firmly	125.2	6.5	■	27
5.5		116.5	9.5	■	30
8	Tan below 8 feet				
10.5		106.4	7.8	■	26
15	Dense below 15 feet				
15.5		114.2	8.0	■	40
17	Very dense, brown and drills hard below 17 feet				



Drill Method: Hollow Stem
Drill Date: 1-29-21

Drill Rig: CME 45B
Hole Size: 6½ Inches

Krazan and Associates

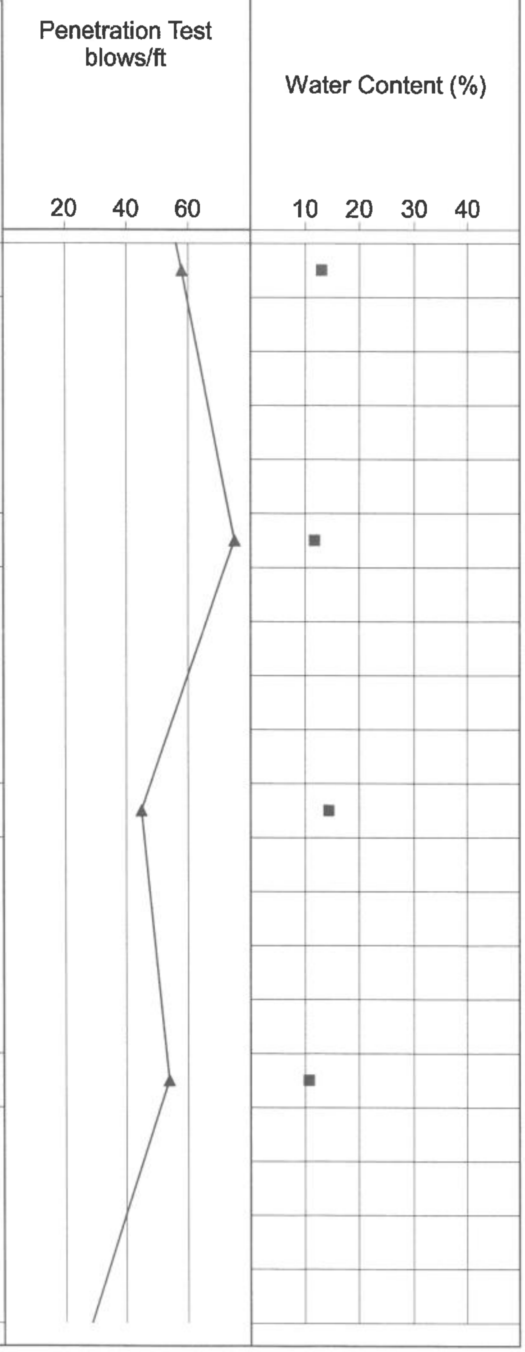
Driller: Brent Snyder
Elevation: 50 Feet

Sheet: 1 of 3

Log of Boring B2

Project: Child Development Center
Project No: 072-20075
Client: California State University, Stanislaus
Figure No.: A-2
Location: NW of Monte Vista Avenue and Geer Road, Turlock, California
Logged By: R. Alexander
Depth to Water> **Initial:** 42 Feet **At Completion:** 42 Feet

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
			120.2	13.1	◢	58
22						
24						
			118.6	11.8	◢	75
26						
28						
30		Dense below 30 feet				
			111.4	14.5	◢	45
32						
34						
		Very dense below 35 feet	122.9	10.8	◢	54
36						
38						
40					◢	



Drill Method: Hollow Stem
Drill Date: 1-29-21
Drill Rig: CME 45B

Krazan and Associates

Hole Size: 6½ Inches
Driller: Brent Snyder
Elevation: 50 Feet
Sheet: 2 of 3

Log of Boring B2

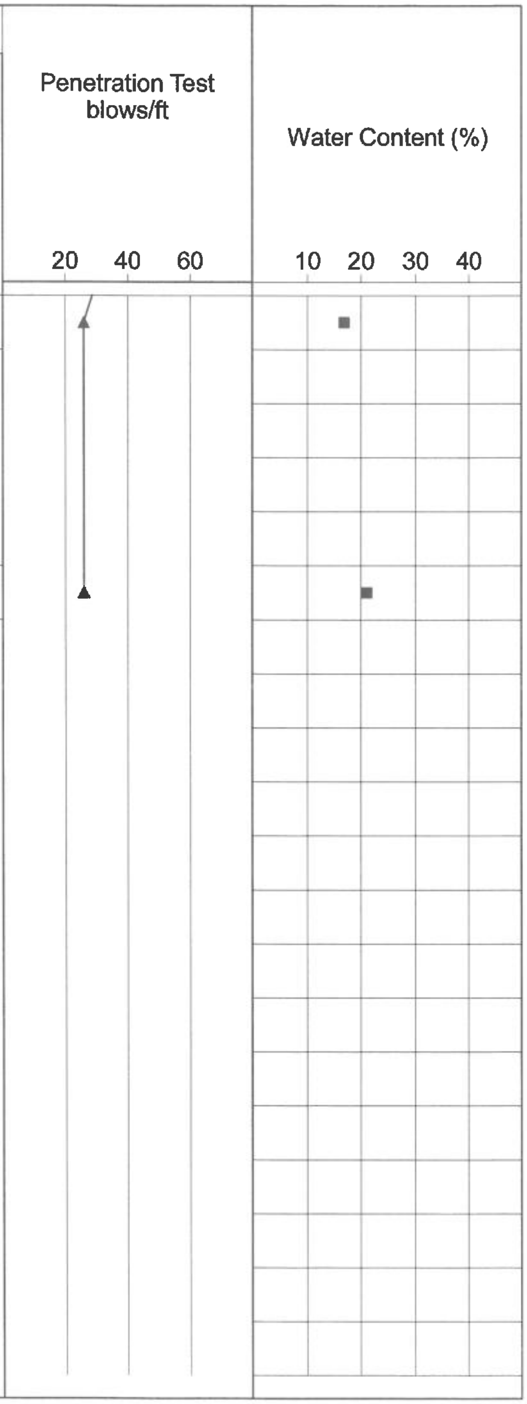
Project: Child Development Center
Project No: 072-20075

Client: California State University, Stanislaus
Figure No.: A-2

Location: NW of Monte Vista Avenue and Geer Road, Turlock, California
Logged By: R. Alexander

Depth to Water> **Initial:** 42 Feet **At Completion:** 42 Feet

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		SILTY SAND/SAND (SM/SP) Medium dense, fine- to medium-grained; brown, moist, drills easily	107.9	17.0	◢	26
42		Saturated below 42 feet				
		SAND (SP) Medium dense, fine- to medium-grained; brown, saturated, drills easily				
44						
			95.1	21.1	◢	26
46						
48						
50		End of Borehole				
52						
54						
56						
58						
60						



Drill Method: Hollow Stem
Drill Date: 1-29-21

Drill Rig: CME 45B
Hole Size: 6½ Inches

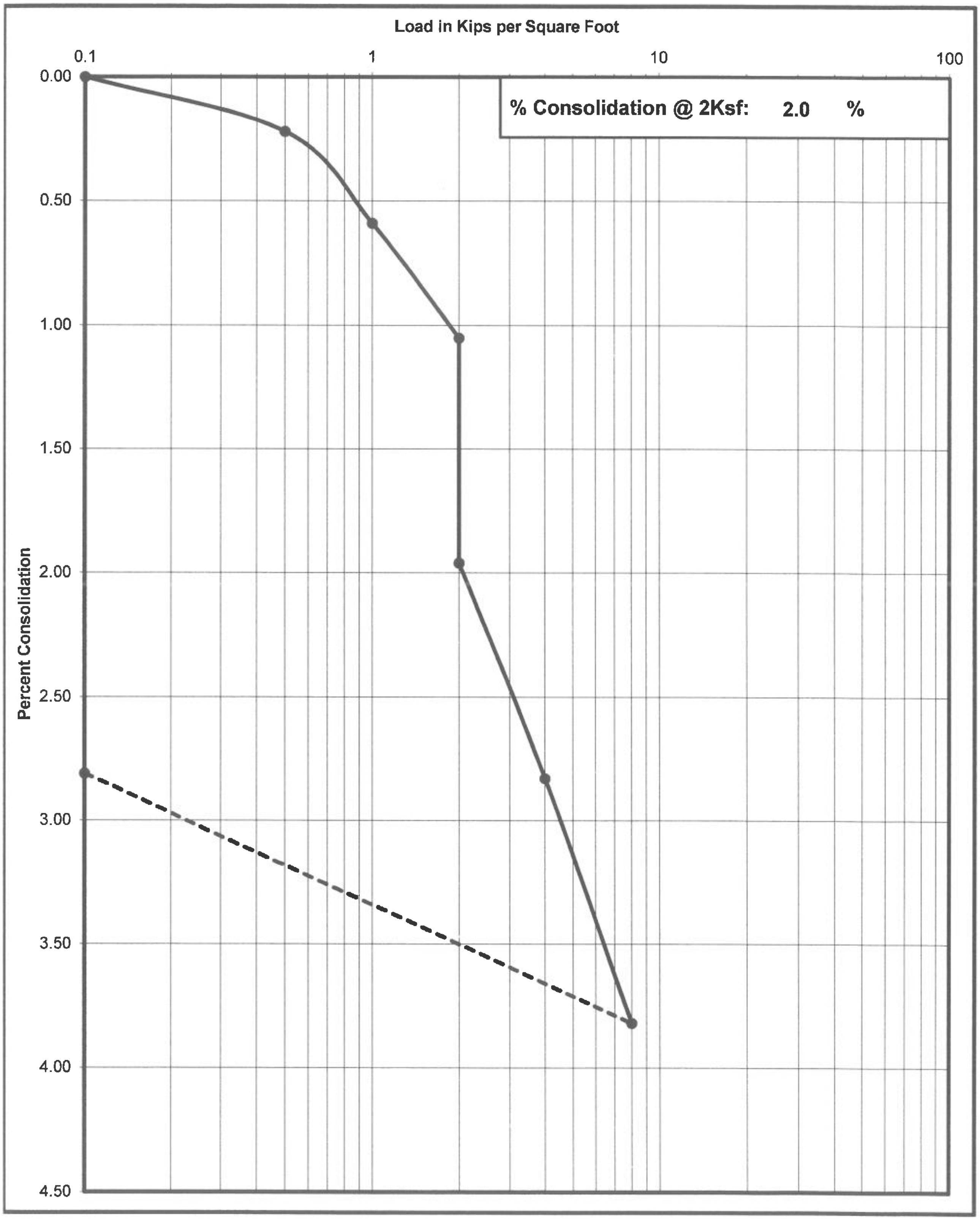
Krazan and Associates

Driller: Brent Snyder
Elevation: 50 Feet

Sheet: 3 of 3

Consolidation Test

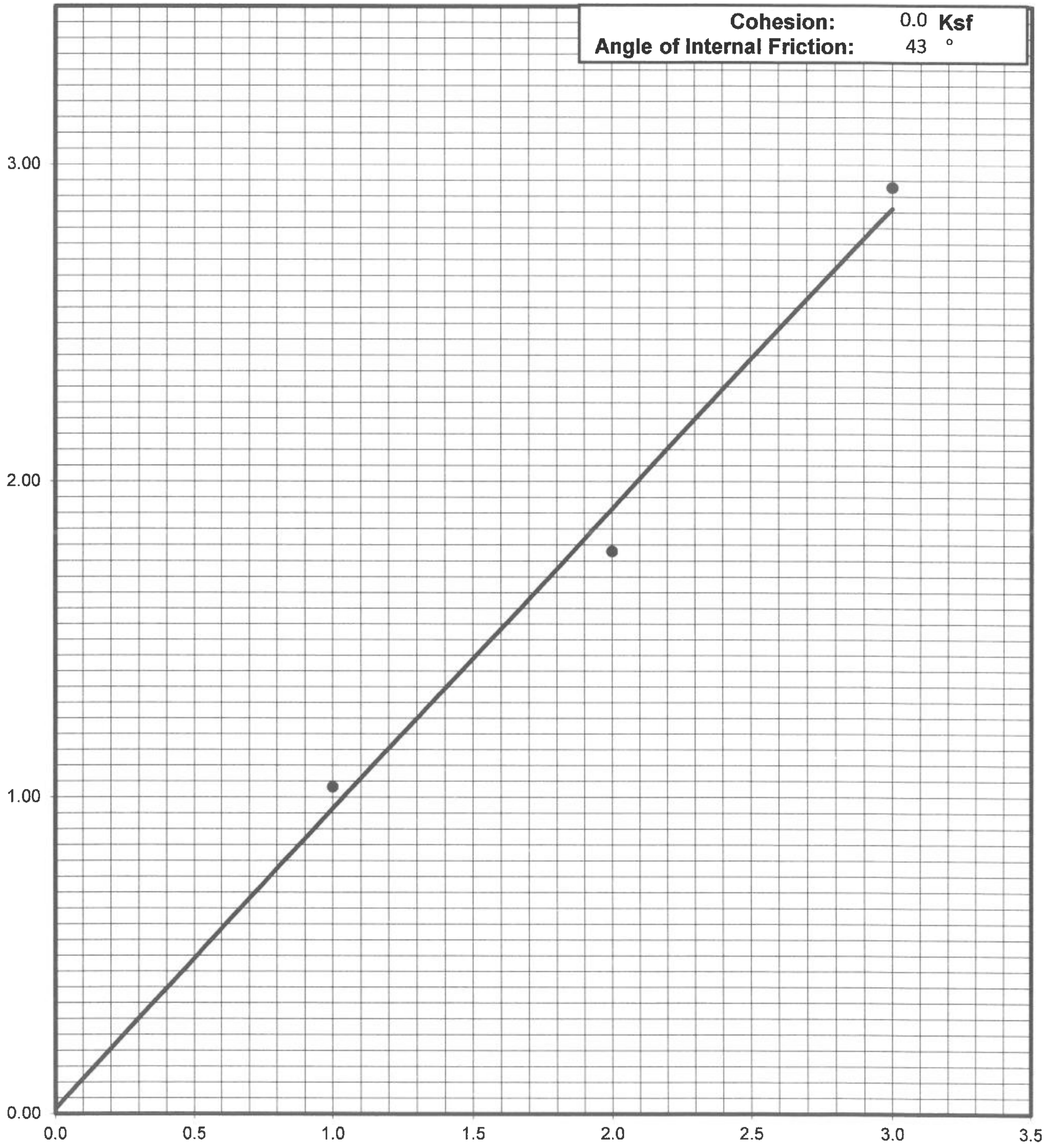
Project No	Boring No. & Depth	Date	Soil Classification
072-20075	B1 @ 2-3'	2/8/2021	SM



Krazan Testing Laboratory

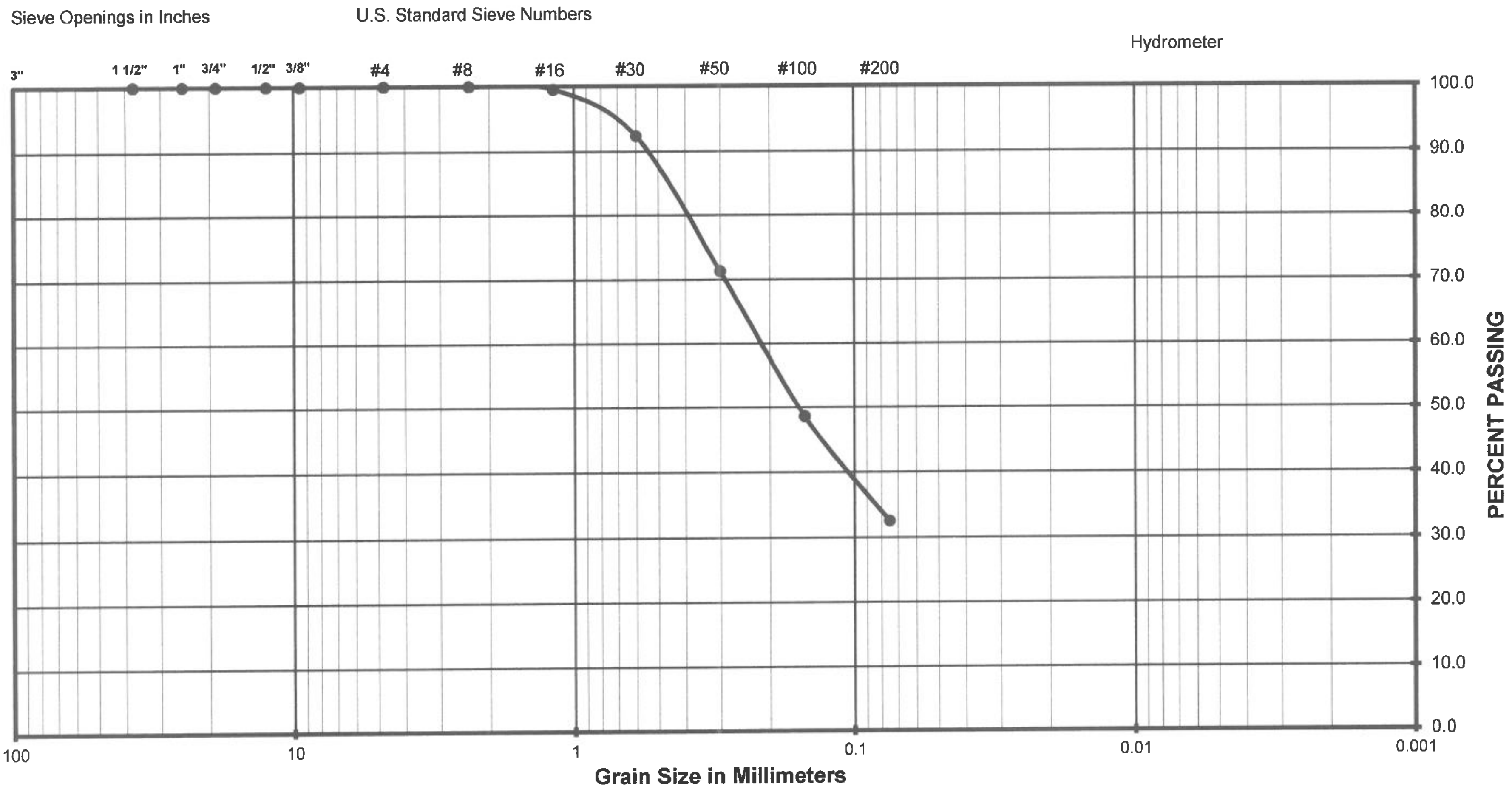
Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

Project Number	Boring No. & Depth	Soil Type	Date
072-20075	B2 @ 2-3'	SM	2/8/2021



Krazan Testing Laboratory

Grain Size Analysis



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Project Name	Child Development Center
Project Number	072-20075
Soil Classification	SM
Sample Number	B1 @ 2-3'

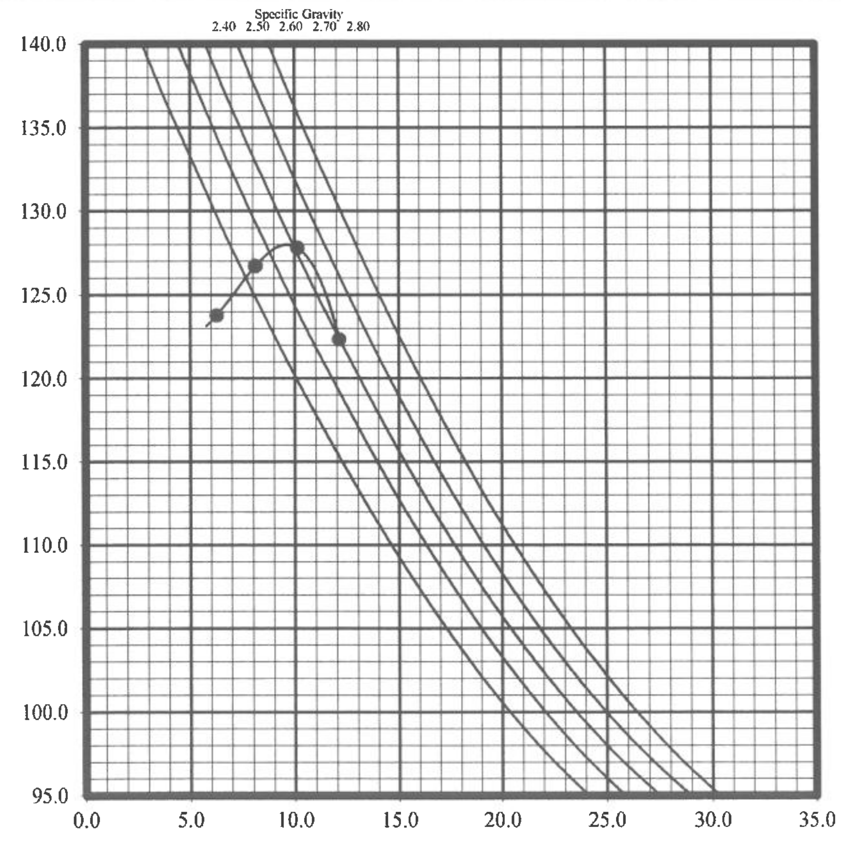
Krazan Testing Laboratory

Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft. - lbf/ft^3)

ASTM D1557

Project Number	072-20075	Sample Number	Blk-1
Project Name	Child Development Center	Soil Classification	SM
Technician	SW	Soil Description	Brn Silty Sand
Date	1/29/2021	Method	D1557a
Sample Location	B2 @ 0-2.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	4095.8	4150.2	4093.2	4011.1
Mass of Compaction Mold, gm	2024.0	2024.0	2024.0	2024.0
Mass of Moist Specimen, gm	2071.8	2126.2	2069.2	1987.1
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	137.2	140.8	137.0	131.6
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	178.4	181.6	185.0	188.2
Moisture Content (%)	12.1	10.1	8.1	6.3
Dry Density, lbs/cu.ft.	122.3	127.8	126.7	123.8



Maximum Dry Density, lbs.cu.ft.

128.0

Optimum Moisture Content

9.6%

SDS#: -

APPENDIX B

EARTHWORK SPECIFICATIONS

GENERAL

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

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

PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of Krazan and Associates, Inc., hereinafter known as the 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 readjustments 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 compacted to a density not less than 90 percent relative compaction based on ASTM Test Method D1557 or CTM-216, as specified in the technical portion of the Soil Engineer's report. The location and frequency of field density tests shall be as determined by the Geotechnical Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Geotechnical Engineer.

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

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

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

SITE PREPARATION

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

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

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

SUBGRADE PREPARATION: Surfaces to receive Engineered Fill, building or slab loads shall be prepared as outlined above, excavated/scarified to a depth of 18 inches, moisture-conditioned as necessary, and compacted to 90 percent relative compaction.

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

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

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

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

Both cut and fill areas 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 are as specified.

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 refers to the 2018 Standard Specifications of the State of California, Department of Transportation, and the "Materials Manual" is the Materials Manual of Testing and Control Procedures, State of California, Department of Public Works, Division of Highways. The term "relative compaction" refers to the field density expressed as a percentage of the maximum laboratory density as defined in the applicable tests outlined in the Materials Manual.

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

3. PREPARATION OF THE SUBGRADE - The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum relative compaction of 90 percent. The finished subgrades shall be tested and approved by the 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. 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. The aggregate base material shall be compacted to a minimum relative compaction of 95 percent.

5. AGGREGATE SUBBASE - The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of Section 25 of the Standard Specifications for Class 2 material. The aggregate subbase material shall be compacted to a minimum relative compaction of 95 percent, and it shall be spread and compacted in accordance with Section 25 of the Standard Specifications. Each layer of aggregate subbase shall be tested and approved by the 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 PG 64-10 and the asphalt concrete mix shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning and mixing of the materials shall conform to Section 39.

The prime coat, spreading and compacting equipment and spreading and compacting mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50° F. The compaction of asphalt concrete shall be performed as described in Section 39-2.01. 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.