Appendix D:
Geotechnical Study

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GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED QUICK QUACK CAR WASH 24-155
1800 NORTH PARK BOULEVARD
PITTSBURG, CALIFORNIA

KA PROJECT NO. 042-23029
DECEMBER 12, 2023

Prepared for:

MS. SUSIE BURKART-SMITH
QUICK QUACK CAR WASH
6020 WEST OAKS BOULEVARD, SUITE 300
ROCKLIN, CALIFORNIA 95765

Prepared by:

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Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

December 12, 2023 KA Project No. 042-23029

Ms. Susie Burkart-Smith
Quick Quack Car Wash
6020 West Oaks Boulevard, Suite 300
Rocklin, California 95765

RE: Geotechnical Engineering Investigation
Proposed Quick Quack Car Wash 24-155
1800 North Park Boulevard
Pittsburg, California

Dear Ms. Burkart-Smith:

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

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

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

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

DRJ:ht

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CONSTRUCTION TESTING & INSPECTION

December 12, 2023 KA Project No. 042-23029

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED QUICK QUACK CAR WASH 24-155
1800 NORTH PARK BOULEVARD
PITTSBURG, CALIFORNIA

INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed Quick Quack Car Wash to be located at 1800 North Park Boulevard in Pittsburg, California. Discussions regarding site conditions are presented herein, together with conclusions and recommendations pertaining to site preparation, Engineered Fill, utility trench backfill, drainage and landscaping, foundations, concrete floor slabs and exterior flatwork, retaining walls, pavement design 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 logs legend are presented in Appendix A. Appendix A contains a description of the laboratory testing phase of this study; along with the laboratory test results. Appendices B and C contain guides to earthwork and pavement specifications. When conflicts in the text of the report occur with the general specifications in the appendices, the recommendations in the text of the report have precedence.

PURPOSE AND SCOPE

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

Our scope of services 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 5 borings to depths ranging from approximately 10 to 50 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 development is currently underway; structural load information and other final details pertaining to the structures are unavailable. On a preliminary basis, it is understood that the development will include the construction of a new car wash facility. It is anticipated the building will be a single- or two-story structure utilizing concrete slab-on-grade construction. Footing loads are anticipated to be light to moderate. On-site paved areas and landscaping are also planned for the development.

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

SITE LOCATION AND SITE DESCRIPTION

The site is irregular in shape and encompasses approximately 0.9 acres. The site is located approximately 800 feet southeast of Loveridge Road, just north of North Park Boulevard in Pittsburg, California. The site has a street address of 1800 North Park Boulevard. Vacant lots are located north, south and east of the site. The site is predominately surrounded by vacant land and commercial developments. A drainage sump is located to the north. A monument sign is located southeast of the site.

Presently, the site predominately consists of a vacant lot. Some grading activities have been performed within the project site vicinity. The site is covered by a moderate weed growth and the surface soils have a loose consistency. Buried utility lines are located along the edges of the site and may extend into portions of the site. Overhead electric lines and concrete curbing trend along the southern edge of the site. A small pile of gravel fill is stockpiled in the western portion of the site. The site is relatively level with no major changes in grade.

GEOLOGIC SETTING

The project area is located in the northeastern portion of the San Francisco Bay Area, south of Suisun Bay adjacent to the Sacramento-San Joaquin delta along the eastern margin and within the northern portion of the Coast Ranges Geomorphic Province of California. The Coast Ranges generally consist of an alternating series of parallel mountains and valleys located adjacent to the Pacific Coast. The bedrock units that form the range have been disrupted by intense folding, faulting, and crushing that occurred when the range was formed by the processes of plate tectonics. During the Jurassic and Cretaceous Periods (about 150 to 80 million years ago), the Pacific Oceanic Plate, which was progressively moving towards the east, collided with the North American Continental Plate, which was moving toward the west. This collision caused the less rigid Pacific Oceanic Plate to be subducted beneath the North

American Continental Plate. The colliding motion of the two plates caused portions of the Pacific Oceanic Crust and overlying marine sediments to be piled onto the North American Continental Plate along the west coast of California. The resulting chaotic jumble of bedrock units scraped off onto the North American Plate, is known as the "Franciscan Assemblage" and comprises a large portion of the Coast Range Province. Subsequent development of a series of northwest-trending fault zones has further contributed to the deformation of the Coast Range.

The near-surface deposits in the vicinity of the subject site are indicated to be comprised of Quaternary alluvium consisting of sands, silt, and clays derived from erosion of local mountain ranges. Deposits encountered on the subject site during exploratory drilling are discussed in detail in this report.

Seven major faults are located near the site: the Great Valley fault, the Mount Diablo fault, the Greenville fault, the Concord/Green Valley fault, the Calaveras fault, the West Napa fault, and the Hayward fault. The Great Valley fault is located approximately 1 mile east of the site and is capable of producing an earthquake event of magnitude 6.5. The Mount Diablo Thrust fault is located approximately 13 miles southwest of the site and is considered capable of producing an earthquake of magnitude of 6.7. The Greenville fault is located approximately 9 miles south of the site and is considered capable of producing an earthquake of magnitude of 6.7. The Concord/Green Valley fault is approximately 10 miles west of the site and is considered capable of producing an earthquake of magnitude 6.7. The Calaveras fault is located approximately 15 miles southwest of the site and is capable of producing an earthquake of magnitude 6.9. The West Napa fault is located approximately 23 miles northwest of the site and is capable of producing an earthquake event of magnitude 6.5. The Hayward fault is located approximately 23 miles southwest of the site. The Hayward fault is considered capable of producing an earthquake event of magnitude 7.0. The last recorded movement of the Hayward fault was in 1868. The San Andreas fault is located approximately 40 miles southwest of the site, and was the source of the 1906 San Francisco Earthquake. Although the site is in close proximity to several faults, the site is not within a State of California Earthquake Fault Zone or Special Study Zone for faulting.

The probability of one or more earthquakes of magnitude 6.7 or higher occurring in the San Francisco Bay Area within a 30-year period of time was evaluated by the U.S. Geological Survey (USGS) Working Group on California Earthquake Probabilities on a periodic basis. The result of the 2008 evaluation indicated a 63 percent likelihood that such an earthquake event will occur in the Bay Area between 2007 and 2036 (USGS 2008). The faults with the greater probability of a magnitude 6.7 or higher earthquake are the Hayward fault at 31 percent and the San Andreas fault at 21 percent.

The Alquist-Priolo Earthquake Fault Zoning 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 CGS Special Publication 42 (SP 42), is to prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault-rupture." The act was renamed the Alquist-Priolo Earthquake Fault Zoning Act in 1994, and at that time, the originally designated "Special Studies Zones" was renamed the "Earthquake Fault Zones."

The area of the subject site is not included on any Earthquake Fault Zones Map as of this report date. In addition, the site is not within a Fault-Rupture Hazard Zone. The nearest zoned faults are a portion of the Greenville fault located more than 9 miles south of the subject site.

In 1990, the California State Legislature passed the Seismic Hazard Mapping Act to protect public safety from the effects of strong shaking, liquefaction, landslides, or other ground failure, and other hazards caused by earthquakes. The Act requires that the State Geologist delineate various seismic hazards zones on Seismic Hazards Zones Maps. Specifically, the maps identify areas where soil liquefaction and earthquake-induced landslides are most likely to occur. A site-specific geotechnical evaluation is required prior to permitting most urban developments within the mapped zones. The Act also requires sellers of real property within the zones to disclose this fact to potential buyers. The area of the subject site is not included on any of the State designated Seismic Hazard Zone Maps as of this report date. However, the site is included on the U.S. Geological Survey map entitled "Liquefaction Susceptibility, Central San Francisco Bay Region, California" (U.S. Geological Survey Open-File Report 2006-1037), dated 2006. In addition, the site is included on the U.S. Geological Survey map entitled "Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California" (U.S. Geological Survey Open-File Report 2000-444), dated 2000. The site is located within an area identified as a low susceptibility to liquefaction.

FIELD AND LABORATORY INVESTIGATIONS

Subsurface soil conditions were explored by drilling 5 borings to depths ranging from approximately 10 to 50 feet below existing site grade, using a truck-mounted drill rig. In addition, 2 bulk subgrade samples were obtained from the site for laboratory R-value testing. The approximate boring and bulk sample locations are shown on the site plan. During drilling operations, penetration tests were performed at regular intervals to evaluate the soil consistency and to obtain information regarding the engineering properties of the subsoils. Soil samples were retained for laboratory testing. The soils encountered were continuously examined and visually classified in accordance with the Unified Soil Classification System. A more detailed description of the field investigation is presented in Appendix A.

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

SOIL PROFILE AND SUBSURFACE CONDITIONS

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. In general, the upper soils consisted approximately 6 to 12 inches of very loose sandy clay or silty clay. These soils are disturbed, have low strength characteristics, and are highly compressible when saturated.

Below the loose surface soils, approximately 2 to 3 feet of stiff to hard silty clay or sandy clay was encountered. Field and laboratory tests suggest that these soils are moderately strong, slightly compressible and have a high expansion potential. Penetration resistance ranged from 25 to 49 blows per foot. Dry densities ranged from 103 to 118 pcf. A representative soil sample consolidated approximately 1½ percent under a 4 ksf load when saturated. Representative samples of the clayey soils had expansion indices of 98 to 101.

Below approximately 3 to 4 feet, layers of predominately medium dense silty sand and silty sand with clay or stiff to hard silty clay and sandy clay were encountered. Field and laboratory tests suggest that these soils are moderately strong and slightly compressible. Penetration resistance ranged from 16 to 65 blows per foot. Dry densities ranged from 87 to 111 pcf. Representative soil samples contained approximately 32 to 85 percent fines. These soils have similar strength characteristics to the upper soils and extended to the termination depth of our borings.

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

GROUNDWATER

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Groundwater was encountered at a depth of approximately 32 feet during our subsurface investigation. However, information obtained from the Department of Water Resources indicates that groundwater has been historically as shallow as 18 feet within the project site vicinity.

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

SOIL LIQUEFACTION

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

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

1) Soil type

2) Groundwater depth

3) Relative density

4) Initial confining pressure

5) Intensity and duration of groundshaking

The predominant soils within the project site consist of predominately silty clays, sandy clays and silty sands. Free groundwater was encountered at a depth of 32 feet below existing site grade during our exploratory drilling. However, historically, groundwater has been as shallow as 18 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. For the analysis, a maximum earthquake magnitude of 6.49 was used. A peak horizontal ground surface acceleration of 0.875g was considered conservative and appropriate for the liquefaction analysis. An estimated high groundwater depth of 18 feet was used for our analysis. The analysis indicates that soils above a depth of 18 feet are non-liquefiable due to the absence of groundwater. The soils below a depth of 18 feet have a slight potential for liquefaction under seismic shaking.

The analysis indicates that the estimated total seismic induced settlement is less than ½ inch. Differential settlement caused by a seismic event is estimated to be less than ⅓ inch. The anticipated differential settlement is estimated over a horizontal distance of 100 feet.

CONCLUSIONS AND RECOMMENDATIONS

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

Administrative Summary

In brief, the subject site and soil conditions, with the exception of the loose surface soils, expansive nature of the clayey soils and surrounding development, appear to be conducive to the development of the project. The surface soils have a loose consistency. These soils are disturbed, have low strength characteristics, and are highly compressible when saturated. Accordingly, it is recommended that the surface soils be recompacted. The compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation.

Fill material was not encountered in our borings. However, small piles of fill material were encountered in the western portion of the site. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill soil during the time of our field and laboratory investigations. The limited testing indicates that the fill material had varying strength characteristics ranging from loosely placed to compacted. Therefore, it is recommended that the fill soils be excavated and stockpiled so that the native soils can be properly prepared. Clayey fill soils will not be suitable for reuse as non-expansive Engineered Fill. However, the clayey fill material will be suitable for reuse as General Engineered Fill, provided it is cleansed of excessive organics and debris and moisture-conditioned to a minimum of 2 percent above optimum moisture content. The fill material should be compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Prior to fill placement, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

Clayey soils were encountered within the site. These clayey soils appear to have a moderate to high swell potential. The estimated swell pressure of the clayey material may cause movement affecting slabs and brittle exterior finishes. To reduce the potential soil movement, it is recommended that the upper 30 inches of soil within slab-on-grade and exterior flatwork areas be non-expansive fill. The fill material should be a well-graded silty sand or sandy silt soil. A clean sand or very sandy soil is not acceptable for this purpose. A sandy soil will allow the surface water to drain into the expansive clayey soils below, which may result in swelling. The replacement soil and/or the upper 30 inches of Imported Fill soils should meet the specifications as described under the subheading Engineered Fill. The replacement soils should extend 5 feet beyond the perimeter of the building. The non-expansive replacement soil should be compacted to at least 90 percent relative compaction based on ASTM Test Method D1557. The exposed native soils in the excavation should not be allowed to dry out and should be kept continuously moist prior to backfilling. In addition, it is recommended that slabs-on-grade continuous footings and slabs be nominally reinforced to reduce cracking and vertical off-set.

As an alternative to the use of non-expansive soils, the upper 30 inches of soil supporting the slab-on-grade and exterior flatwork areas can consist of lime-treated clayey soils. The lime-treated soils should be recompacted to a minimum of 90 percent of maximum density. Preliminary application rate of lime should be 5 percent by dry weight. The lime material should be calcium oxide, commonly known as quick-lime. The clayey soils should be at or near optimum moisture during the mixing operations. An acceptable alternate section consists of 18 inches of lime-treated clayey soil overlain by 12 inches of Class 2 aggregate base.

Structures are located within the project site vicinity. Associated with these developments are buried structures, such as utility lines and landscape irrigation lines that may extend into the project site. Any buried structures, including loosely backfilled excavations, encountered during construction should be properly removed and the resulting excavation backfilled with Engineered Fill. It is suspected demolition activities will disturb the upper soils. Areas disturbed by demolition activities should be excavated to firm native ground. The resulting excavations should be backfilled with Engineered Fill.

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed structure footings may be designed utilizing an allowable bearing pressure of 2,500 psf for dead-plus-live loads. Footings should have a minimum embedment of 18 inches.

Groundwater Influence on Structures/Construction

During our field investigation, groundwater was encountered at a depth of 32 feet below site grade. However, groundwater has historically been as shallow as 18 feet within the project site vicinity. Therefore, dewatering and/or waterproofing may be required should structures, caissons, or excavations extend below the groundwater table. If groundwater is encountered, our firm should be consulted prior to dewatering the site. Installation of a standpipe piezometer is suggested prior to construction should groundwater levels be a concern.

In addition to the groundwater level, if earthwork is performed during or soon after periods of precipitation, the subgrade soils may become saturated, "pump," or not respond to densification techniques. Typical remedial measures include: discing and aerating the soil during dry weather; mixing the soil with dryer materials; removing and replacing the soil with an approved fill material; or mixing the soil with an approved lime or cement product. Our firm should be consulted prior to implementing remedial measures to observe the unstable subgrade conditions and provide appropriate recommendations.

Site Preparation

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

Fill material was not encountered in our borings. However, small piles of fill material were encountered in the western portion of the site. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill soil during the time of our field and laboratory investigations. The limited testing indicates that the fill material had varying strength characteristics ranging from loosely placed to compacted. Therefore, it is recommended that the fill soils be excavated and stockpiled so that the native soils can be properly prepared. Clayey fill soils will not be suitable for reuse as non-expansive Engineered Fill. However, the clayey fill material will be suitable for reuse as General Engineered Fill, provided it is cleansed of excessive organics and debris and moisture-conditioned to a minimum of 2 percent above optimum moisture content. The fill material should be compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Prior to fill placement, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

The on-site upper soils are identified as silty clays and sandy clays. The clayey soils appear to have a moderate to high swell potential. The estimated swell pressure of the clayey material may cause movement affecting slabs and brittle exterior finishes. To reduce the potential soil movement, it is recommended that the upper 30 inches of soil within slab-on-grade or exterior flatwork areas be non-expansive or lime-treated Engineered Fill. The fill material should be a well-graded silty sand or sandy silt soil. The on-site soils that do not contain clay will be suitable for reuse as non-expansive Engineered Fill, provided they are cleansed of excessive organics and debris. A clean sand or very sandy soil is not acceptable for this purpose. A sandy soil will allow the surface water to drain into the expansive clayey soils below which may result in swelling. The replacement soil and/or the upper 30 inches of Imported Fill soils should meet the specifications as described under the subheading Engineered Fill. The placement soils should extend 5 feet beyond the perimeter of the building. The non-expansive replacement soil should be compacted to at least 90 percent relative compaction based on ASTM Test Method D1557. The exposed native soils in the excavation should not be allowed to dry out and should be kept continuously moist prior to backfilling. In addition, it is recommended that slab-on-grade continuous footings be nominally reinforced to reduce cracking and vertical off-set.

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

Structures are located within the project site vicinity. Associated with these developments are buried structures, such as utility lines and landscape irrigation lines that may extend into the project site. Any buried structures, including utilities or loosely backfilled excavations, encountered during construction should be properly removed and the resulting excavations backfilled. It is suspected that demolition activities of the existing structures will disturb the upper soils. After demolition activities, it is recommended that these disturbed soils be removed and/or recompacted. Excavations, depressions, or soft and pliant areas extending below planned finished subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill. In general, any septic tanks, debris pits, cesspools, or similar structures should be entirely removed. Concrete footings should be removed to an equivalent depth of at least 3 feet below proposed footing elevations or as recommended by the Soils Engineer. Any other buried structures should be removed in accordance with the recommendations of the Soils Engineer. Resulting excavations should be backfilled with Engineered Fill.

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

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

Engineered Fill

The on-site upper soils are predominately sandy clay and silty clay. Clayey soils with an expansion index greater than 15 will not be suitable for reuse as non-expansive Engineered Fill. These clayey soils will be suitable for reuse for fill placement within the upper 30 inches of slab-on-grade and exterior flatwork areas, provided they are lime-treated. The preliminary application rate of lime should be 5 percent by dry weight. The lime material should be calcium oxide, commonly known as quick-lime. The clayey soils should be at or near optimum moisture-condition during mixing operations. Additional testing is recommended to determine the appropriate application rate of lime prior to placement. The clayey soils will be suitable for reuse as General Engineered Fill, within pavement areas and below 30 inches from finished pad grade in building areas, provided they are cleansed of excessive organics, debris and are moisture-conditioned to at least 2 percent above optimum moisture.

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

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

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

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

Drainage and Landscaping

The ground surface should slope away from building pad and pavement areas toward appropriate drop inlets or other surface drainage devices. In accordance with Section 1804 of the 2022 California Building Code, it is recommended that the ground surface adjacent to foundations be sloped a minimum of 5 percent for a minimum distance of 10 feet away from structures, or to an approved alternative means of drainage conveyance. Swales used for conveyance of drainage and located within 10 feet of foundations should be sloped a minimum of 2 percent. Impervious surfaces, such as pavement and exterior concrete flatwork, within 10 feet of building foundations should be sloped a minimum of 1 percent away from the structure. Drainage gradients should be maintained to carry all surface water to collection facilities and off-site. These grades should be maintained for the life of the project.

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

Utility Trench Backfill

Utility trenches should be excavated according to accepted engineering practice following OSHA (Occupational Safety and Health Administration) standards by a Contractor experienced in such work. The responsibility for the safety of open trenches should be borne by the Contractor. Traffic and vibration adjacent to trench walls should be reduced; 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.

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

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.

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

Foundations - Conventional

The proposed structures may be supported on a shallow foundation system bearing on non-expansive or lime-treated Engineered Fill. Spread and continuous footings can be designed for the following maximum allowable soil bearing pressures:

Load	Allowable Loading
Dead Load Only	1,875 psf
Dead-Plus-Live Load	2,500 psf
Total Load, including wind or seismic loads	3,325 psf

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

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

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

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.30 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 250 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ⅓ increase in the above value may be used for short duration, wind, or seismic loads.

Floor Slabs and Exterior Flatwork

To reduce post-construction soil movement beneath floor slabs and exterior flatwork in expansive soils, it is recommended that mitigation measures be performed. For conventional slab-on-grade on expansive soils, it is recommended that the upper 30 inches of soil beneath the slabs-on-grade or exterior flatwork areas consist of non-expansive or lime-treated Engineered Fill.

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

It is recommended that the concrete slab be reinforced to reduce crack separation and possible vertical offset at the cracks. We recommend at least No. 3 reinforcing bars placed on 18-inch centers, be used for this purpose. Thicker floor slabs with increased concrete strength and reinforcement should be designed wherever heavy concentrated loads, heavy equipment, or machinery is anticipated.

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

Moisture within the structure may be derived from water vapors, which were transformed from the moisture within the soils. This moisture vapor can travel through the vapor membrane and penetrate the slab-on-grade. This moisture vapor penetration can affect floor coverings and produce mold and mildew in the structure. To reduce moisture vapor intrusion, it is recommended that a vapor retarder be installed. It is recommended that the utility trenches within the structure be compacted, as specified in our report, to reduce the transmission of moisture through the utility trench backfill. Special attention to the immediate drainage and irrigation around the building is recommended. Positive drainage should be established away from the structure and should be maintained throughout the life of the structure.

Ponding of water should not be allowed adjacent to the structure. Over-irrigation within landscaped areas adjacent to the structure should not be performed. In addition, ventilation of the structure (i.e. ventilation fans) is recommended to reduce the accumulation of interior moisture.

Lateral Earth Pressures and Retaining Walls

Walls retaining horizontal backfill and capable of deflecting a minimum of 0.1 percent of its height at the top may be designed using an equivalent fluid active pressure of 50 pounds per square foot per foot of depth. Walls incapable of this deflection or are fully constrained walls against deflection may be designed for an equivalent fluid at-rest pressure of 70 pounds per square foot per foot of depth. Expansive soils should not be used for backfill against walls. The wedge of non-expansive backfill material should extend from the bottom of each retaining wall outward and upward at a slope of 2:1 (horizontal to vertical) or flatter. The stated lateral earth pressures do not include the effects of hydrostatic water pressures generated by infiltrating surface water that may accumulate behind the retaining walls; or loads imposed by construction equipment, foundations, or roadways.

Retaining and/or below grade walls should be drained with either perforated pipe encased in free-draining gravel or a prefabricated drainage system. The gravel zone should have a minimum width of 12 inches and should extend upward to within 12 inches of the top of the wall. The upper 12 inches of backfill should consist of native soils, concrete, asphaltic concrete, or other suitable backfill to reduce surface drainage into the wall drain system. The aggregate should conform to Class 2 permeable materials graded in accordance with CalTrans Standard Specifications (2018). Prefabricated drainage systems, such as Miradrain®, Enkadrain®, or an equivalent substitute, are acceptable alternatives in lieu of gravel provided they are installed in accordance with the manufacturer's recommendations. If a prefabricated drainage system is proposed, our firm should review the system for final acceptance prior to installation.

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

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

Seismic Parameters – 2022 California Building Code

The Site Class per Section 1613 of the 2022 California Building Code (2022 CBC) and ASCE 7-16, Chapter 20 is based upon the site soil conditions. It is our opinion that a Site Class D is most consistent with the subject site soil conditions. For seismic design of the structures based on the seismic provisions of the 2022 CBC, we recommend the following parameters:

Seismic Item	Value	CBC Reference
Site Class	D	Section 1613.2.2
Site Coefficient F_a	1.200	Table 1613.2.3 (1)
S_s	1.759	Section 1613.2.1
S_{MS}	2.111	Section 1613.2.3
S_{DS}	1.407	Section 1613.2.4
Site Coefficient F_v	1.705	Table 1613.2.3 (2)
S_1	0.595	Section 1613.2.1
S_{M1}	1.014	Section 1613.2.3
S_{D1}	0.676	Section 1613.2.4
T_S	0.481	Section 1613.2

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

Soil Cement Reactivity

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

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

Compacted Material Acceptance

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

Testing and Inspection

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

LIMITATIONS

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

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

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

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

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

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

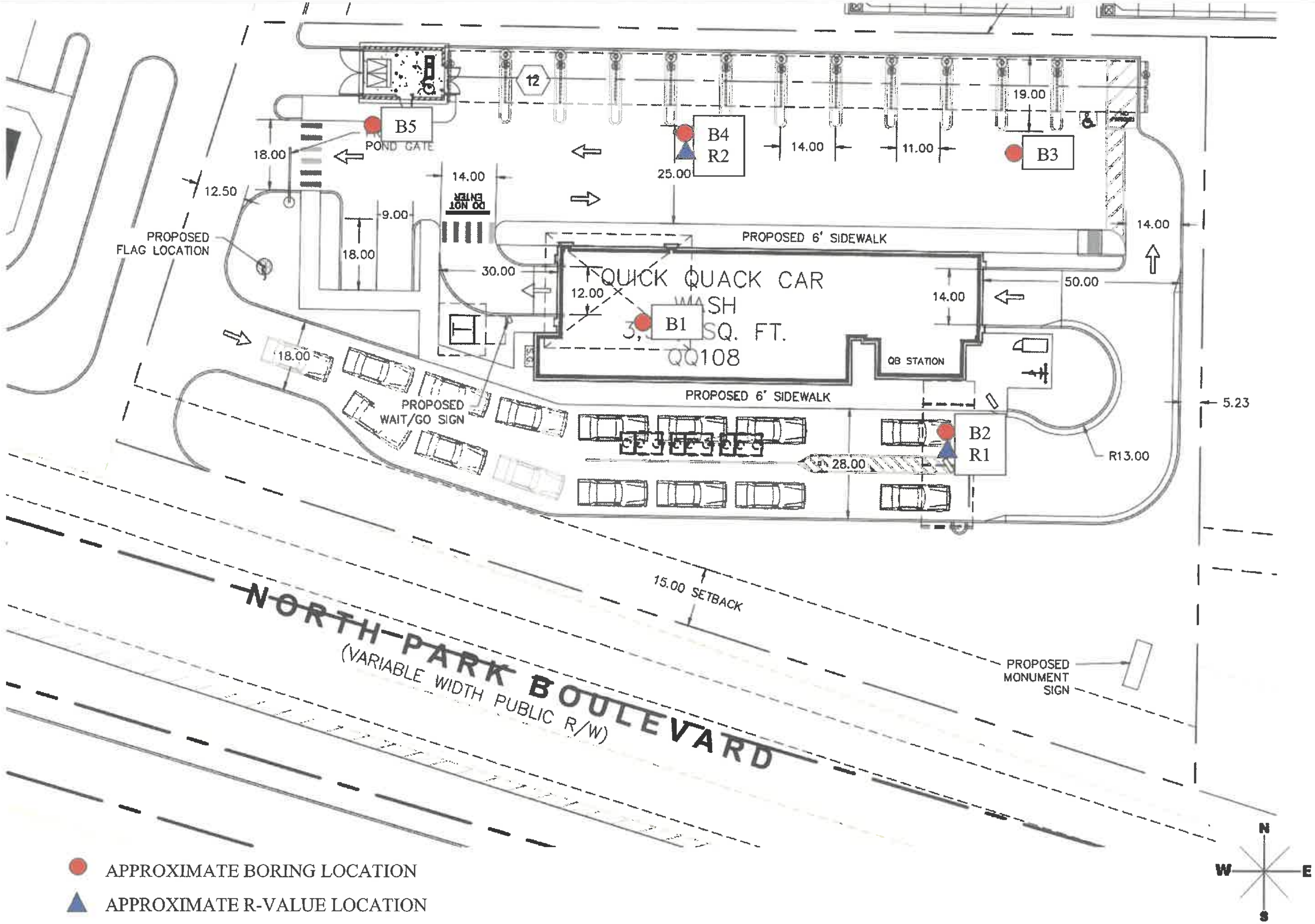
Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

Steve Nelson
Project Engineer

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

REGISTERED PROFESSIONAL ENGINEER
DAVID R. JAROSZ II
2698
GEOTECHNICAL
STATE OF CALIFORNIA

SN/DRJ:ht



● APPROXIMATE BORING LOCATION

▲ APPROXIMATE R-VALUE LOCATION

SITE MAP

Quick Quack Car Wash 24-155
1800 N Park Blvd
Pittsburg, California

Scale: NTS	**Date:** December 2023
Drawn by: HT	**Approved by:** DJ
Project No. 042-23029	**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. Five 4½-inch to 6½-inch diameter exploratory borings were advanced. The boring locations are shown on the site plan.

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

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

Laboratory Investigation

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

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

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

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

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

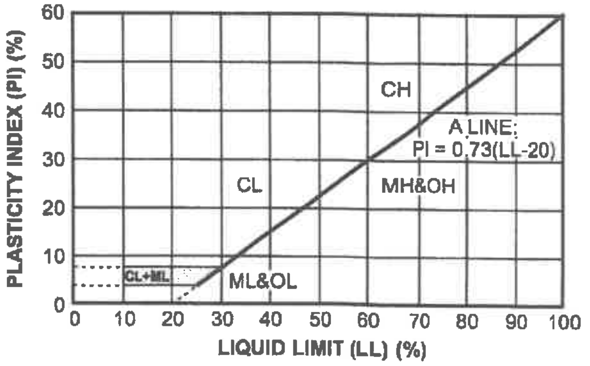
CONSISTENCY CLASSIFICATION

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

GRAIN SIZE CLASSIFICATION

Grain Type	*Standard Sieve Size*	*Grain Size in Millimeters*
Boulders	Above 12 inches	Above 305
Cobbles	12 to 13 inches	305 to 76.2
Gravel	3 inches to No. 4	76.2 to 4.76
Coarse-grained	3 to ¾ inches	76.2 to 19.1
Fine-grained	¾ inches to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.074
Coarse-grained	No. 4 to No. 10	4.76 to 2.00
Medium-grained	No. 10 to No. 40	2.00 to 0.42
Fine-grained	No. 40 to No. 200	0.42 to 0.074
Silt and Clay	Below No. 200	Below 0.074

PLASTICITY CHART



Log of Boring B1

Project: Quick Quack Car Wash 24-155
Project No: 042-23029

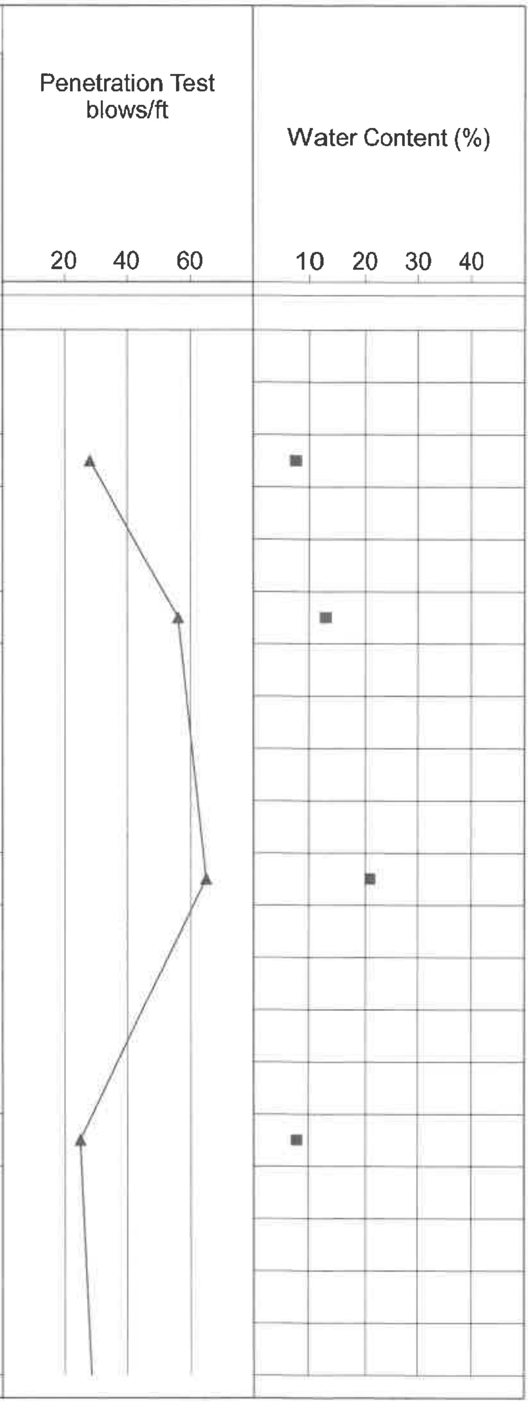
Client: Quick Quack Car Wash
Figure No.: A-1

Location: 1800 N Park Blvd, Pittsburg, California
Logged By: Emmett Gonzales

Depth to Water>
Initial: 33 Feet
At Completion: 32 Feet

SUBSURFACE PROFILE	SAMPLE			
Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
Ground Surface				
SILTY SANDY CLAY (CL) Very loose, fine-grained with surface GRAVEL; brown, moist, drills easily Firm below 12 inches Very stiff and drills firmly below 2 feet	106.8	7.8	■	28
Hard below 5 feet	97.6	12.8	■	56
	99.3	21.0	■	65
SILTY SAND (SM) Medium dense, fine-grained; light brown, moist, drills easily	96.3	8.0	◢	25

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



Drill Method: Hollow Stem
Drill Date: 11-9-23

Drill Rig: CME 55

Krazan and Associates

Hole Size: 6½ Inches

Driller: Eddie Tapia
Elevation: 50 Feet

Sheet: 1 of 3

Log of Boring B1

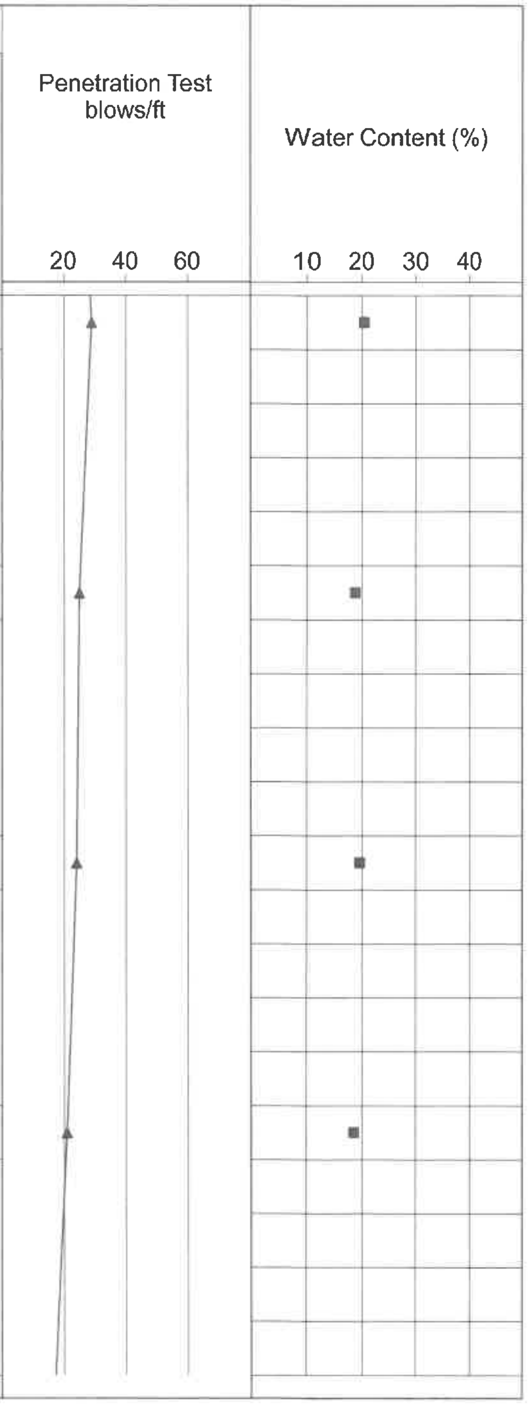
Project: Quick Quack Car Wash 24-155
Project No: 042-23029

Client: Quick Quack Car Wash
Figure No.: A-1

Location: 1800 N Park Blvd, Pittsburg, California
Logged By: Emmett Gonzales

Depth to Water>
Initial: 33 Feet
At Completion: 32 Feet

SUBSURFACE PROFILE		SAMPLE			
Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
	SILTY SANDY CLAY (CL) Very stiff, fine-grained; brown, moist, drills firmly	98.2	20.5	◢	29
22					
24					
		99.1	18.8	◢	25
26					
28					
30					
		108.9	19.6	◢	24
32	▼ Saturated below 32 feet ▽				
34					
		111.2	18.5	◢	21
36					
38					
40				◢	



Drill Method: Hollow Stem
Drill Date: 11-9-23

Drill Rig: CME 55
Hole Size: 6½ Inches

Krazan and Associates

Driller: Eddie Tapia
Elevation: 50 Feet

Log of Boring B1

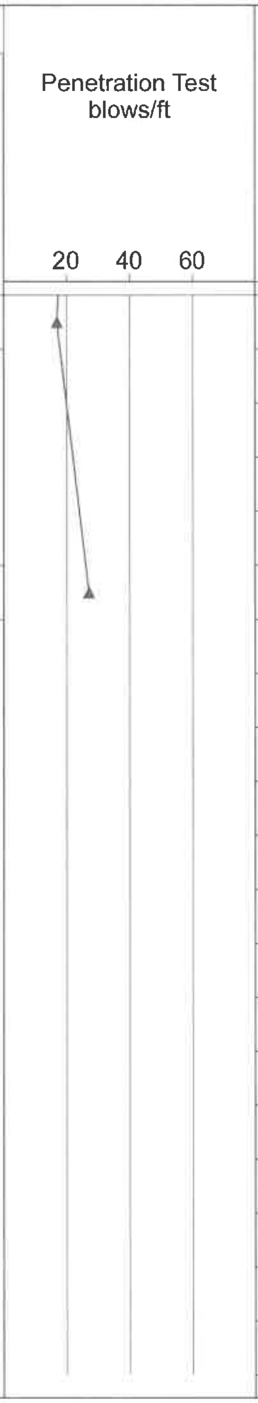
Project: Quick Quack Car Wash 24-155
Project No: 042-23029

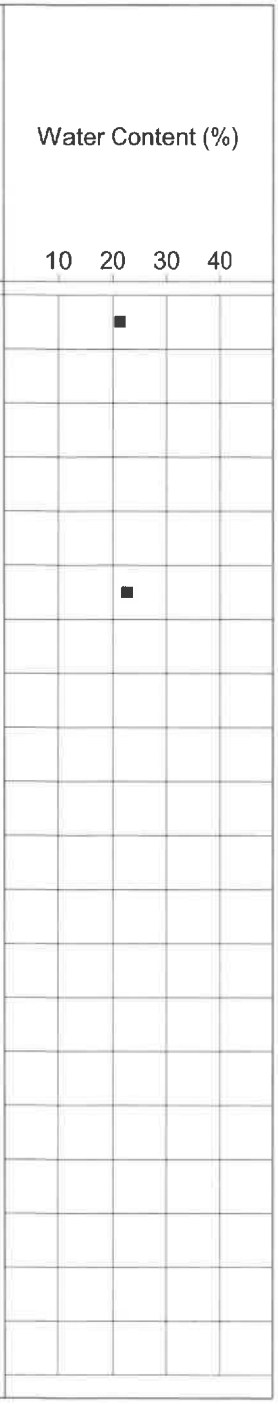
Client: Quick Quack Car Wash
Figure No.: A-1

Location: 1800 N Park Blvd, Pittsburg, California
Logged By: Emmett Gonzales

Depth to Water>
Initial: 33 Feet
At Completion: 32 Feet

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
	▨		106.1	21.4	◢	17
42	▨					
44	▨					
	▨		103.2	22.9	◢	27
46	▨					
48	▨					
50		End of Borehole				
52						
54						
56						
58						
60						





Drill Method: Hollow Stem
Drill Date: 11-9-23

Drill Rig: CME 55
Krazan and Associates
Hole Size: 6½ Inches

Driller: Eddie Tapia
Elevation: 50 Feet

Sheet: 3 of 3

Log of Boring B2

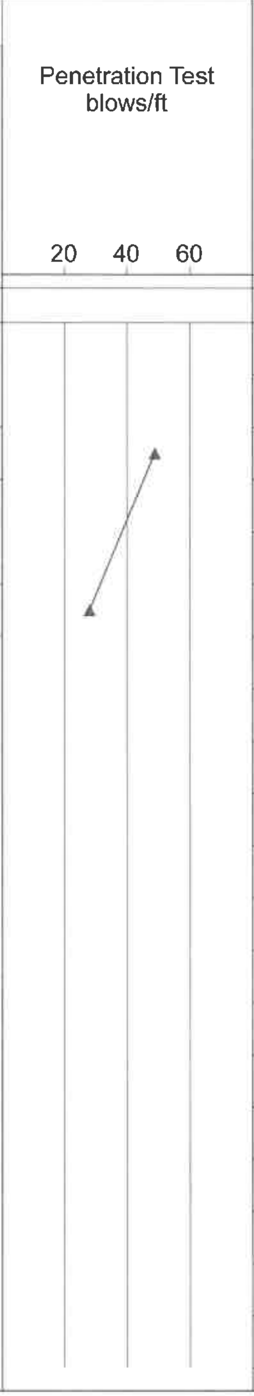
Project: Quick Quack Car Wash 24-155
Project No: 042-23029

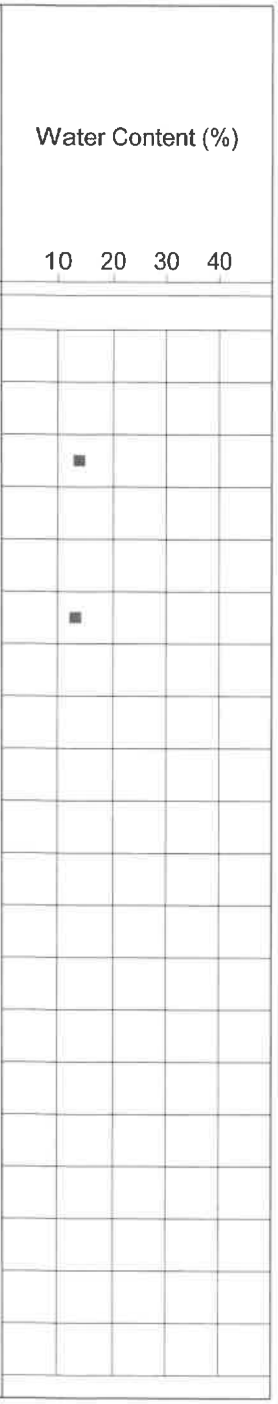
Client: Quick Quack Car Wash
Figure No.: A-2

Location: 1800 N Park Blvd, Pittsburg, California
Logged By: Emmett Gonzales

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

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0	▨	***SANDY CLAY (CL)*** Very loose, fine- to medium-grained; brown, moist, drills easily Firm below 12 inches Hard and drills firmly below 2 feet				
2	▨		103.1	13.8	■	49
4	▨					
6	▨	***SILTY SAND (SM)*** Medium dense, fine-grained with trace CLAY; brown, moist, drills easily	109.0	13.1	■	28
8	▨					
10		End of Borehole				
12						
14						
16						
18						
20						





Drill Method: Solid Flight
Drill Date: 11-9-23

Drill Rig: CME 55
Hole Size: 4½ Inches

Krazan and Associates

Driller: Eddie Tapia
Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B3

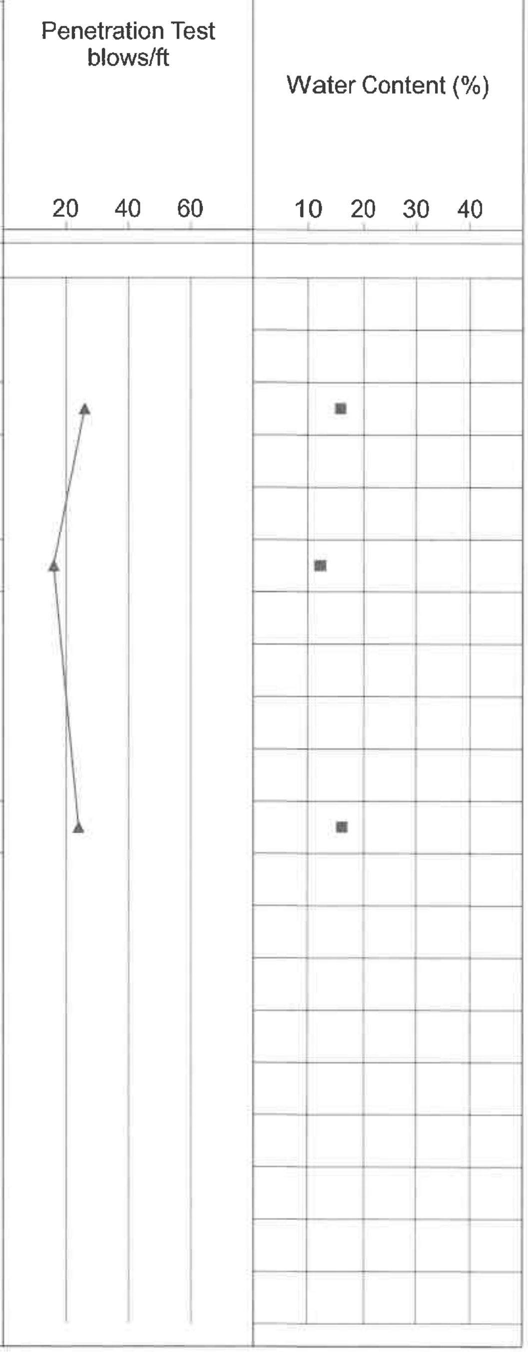
Project: Quick Quack Car Wash 24-155
Project No: 042-23029

Client: Quick Quack Car Wash
Figure No.: A-3

Location: 1800 N Park Blvd, Pittsburg, California
Logged By: Emmett Gonzales

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 CLAY (CL)*** Very loose; brown, moist, drills easily Firm below 12 inches Very stiff and drills firmly below 2 feet				
2	▨		106.6	15.7	■	26
4	▨	Stiff with trace SAND below 5 feet	86.6	12.2	■	16
6	▨					
8	▨					
10	▨		95.2	16.0	■	24
	░	***SILTY SAND (SM)*** Medium dense, fine-grained with trace CLAY; light brown, moist, drills easily				
12	░					
14	░					
		End of Borehole				
16						
18						
20						



Drill Method: Solid Flight
Drill Date: 11-9-23

Drill Rig: CME 55
Krazan and Associates
Hole Size: 4½ Inches

Driller: Eddie Tapia
Elevation: 15 Feet

Sheet: 1 of 1

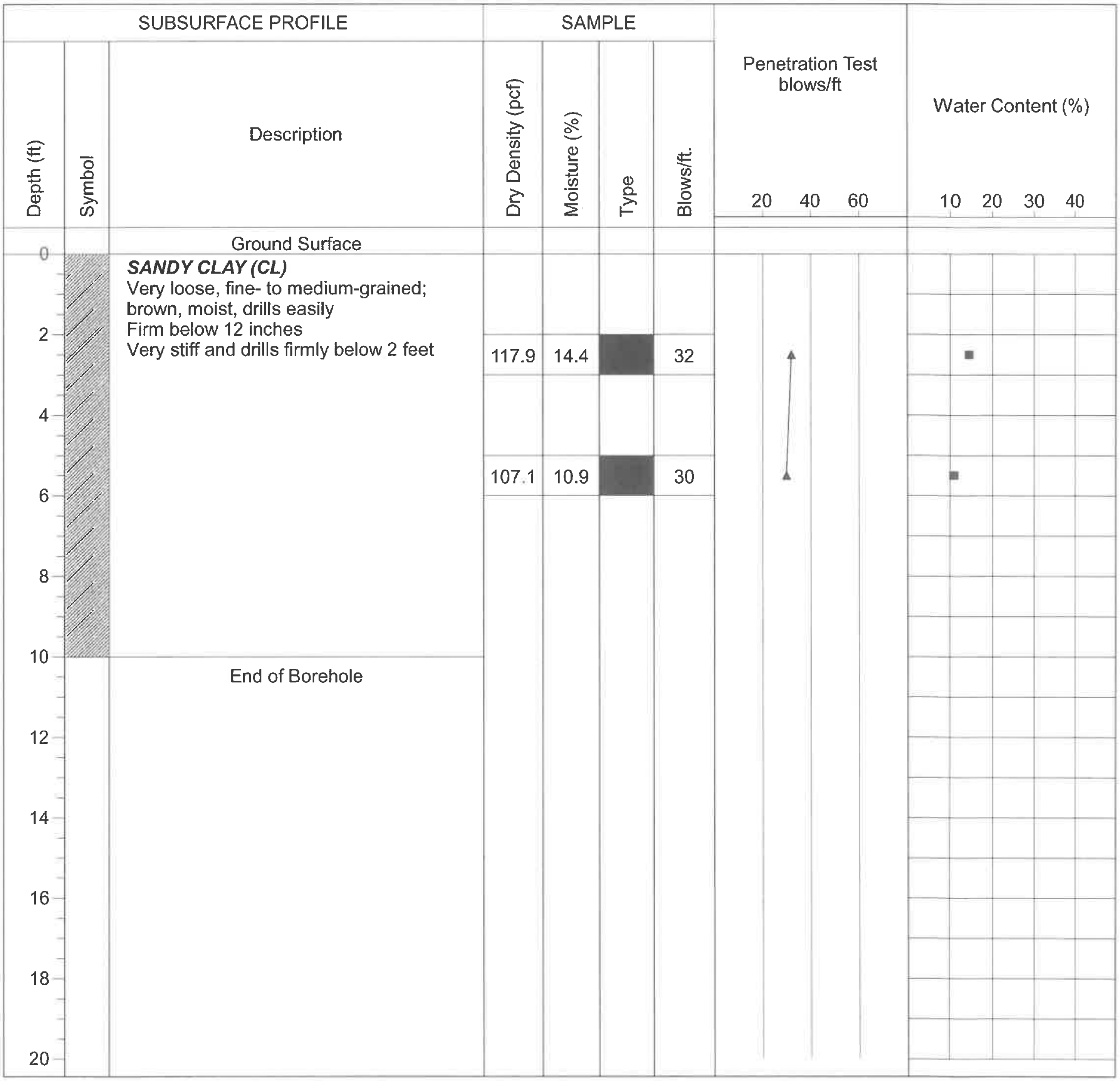
Log of Boring B4

Project: Quick Quack Car Wash 24-155
Project No: 042-23029

Client: Quick Quack Car Wash
Figure No.: A-4

Location: 1800 N Park Blvd, Pittsburg, California
Logged By: Emmett Gonzales

Depth to Water>
Initial: None
At Completion: None



Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
Ground Surface				
SANDY CLAY (CL) Very loose, fine- to medium-grained; brown, moist, drills easily Firm below 12 inches Very stiff and drills firmly below 2 feet	117.9	14.4	■	32
	107.1	10.9	■	30
End of Borehole				

Drill Method: Solid Flight
Drill Date: 11-9-23

Drill Rig: CME 55
Hole Size: 4½ Inches

Krazan and Associates

Driller: Eddie Tapia
Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B5

Project: Quick Quack Car Wash 24-155

Project No: 042-23029

Client: Quick Quack Car Wash

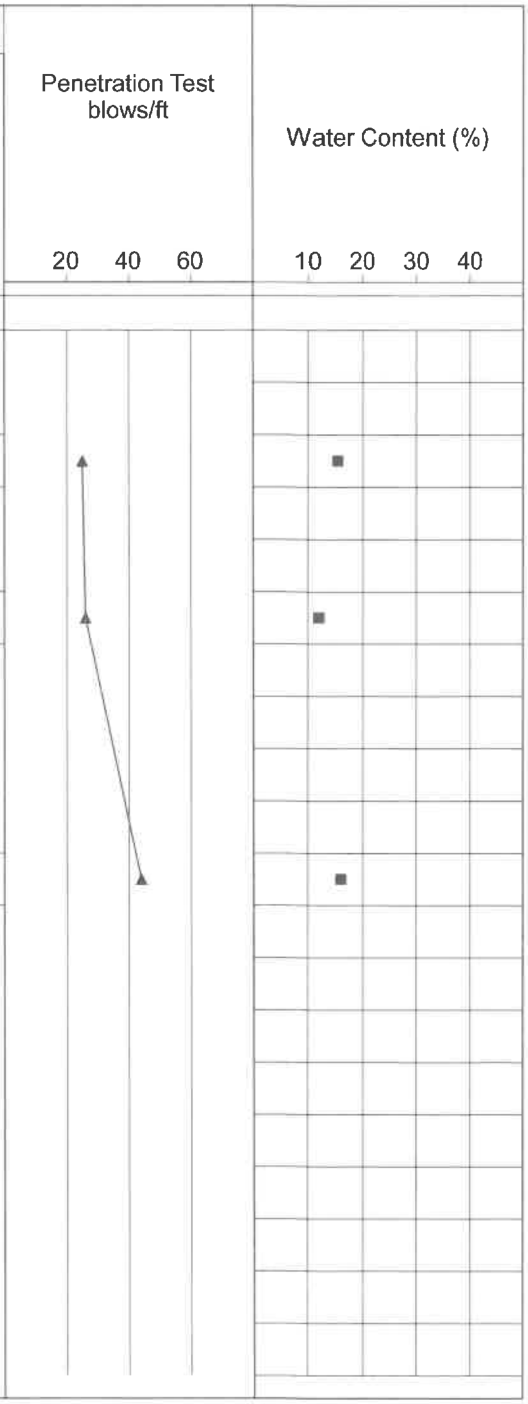
Figure No.: A-5

Location: 1800 N Park Blvd, Pittsburg, California

Logged By: Emmett Gonzales

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 2 4	▨	***SANDY CLAY (CL)*** Very loose, fine-grained; brown, moist, drills easily Firm below 12 inches Very stiff below 2 feet	110.9	15.4	■	25
6	▨	***SILTY SAND (SM)*** Medium dense, fine-grained; light brown, moist, drills easily	96.5	12.0	■	26
8 10 12 14	▨	***SANDY CLAY (CL)*** Hard, fine-grained; brown, moist, drills firmly	102.7	16.0	■	44
16 18 20		End of Borehole				



Drill Method: Solid Flight

Drill Date: 11-9-23

Drill Rig: CME 55

Krazan and Associates

Hole Size: 4½ Inches

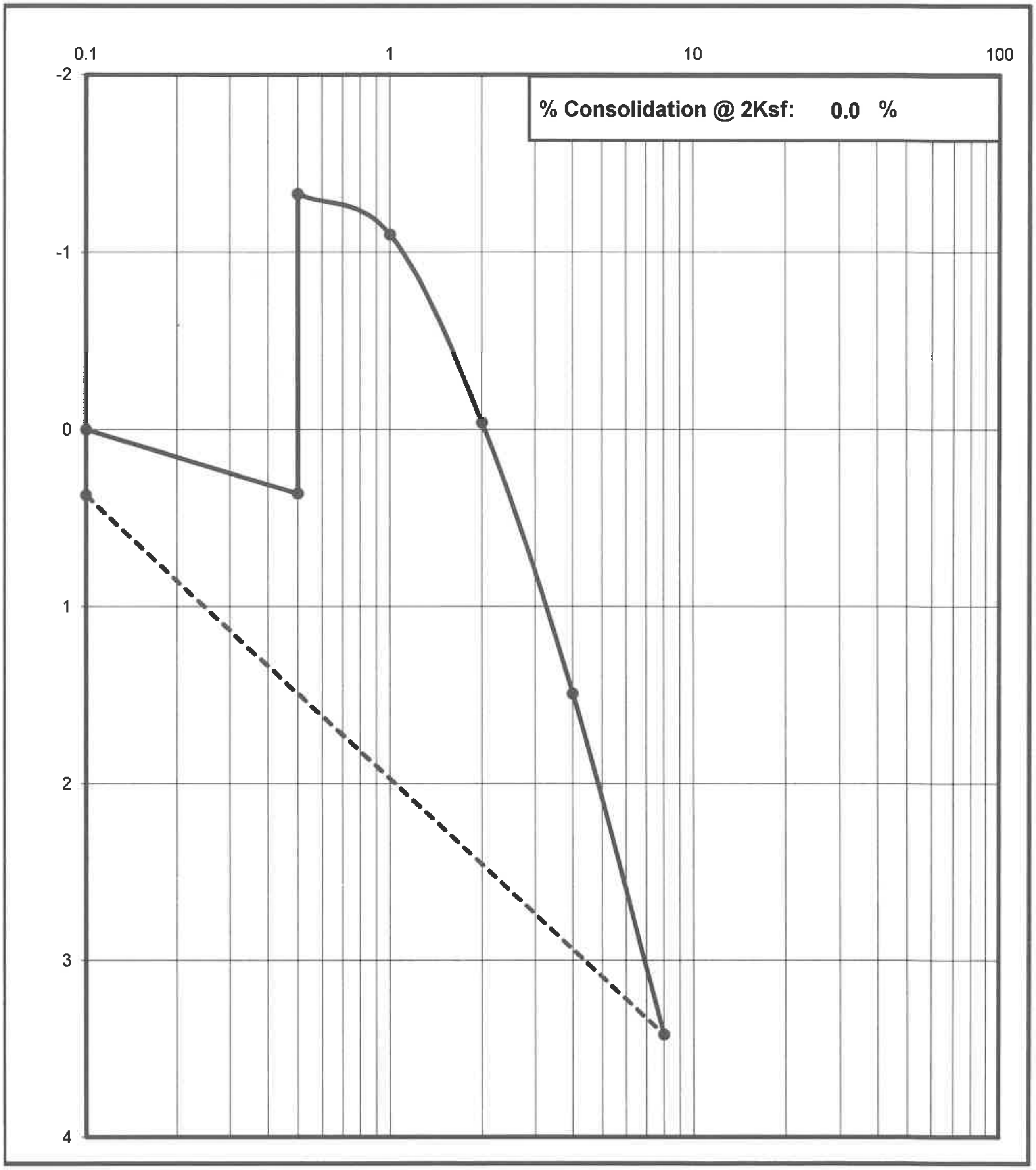
Driller: Eddie Tapia

Elevation: 15 Feet

Sheet: 1 of 1

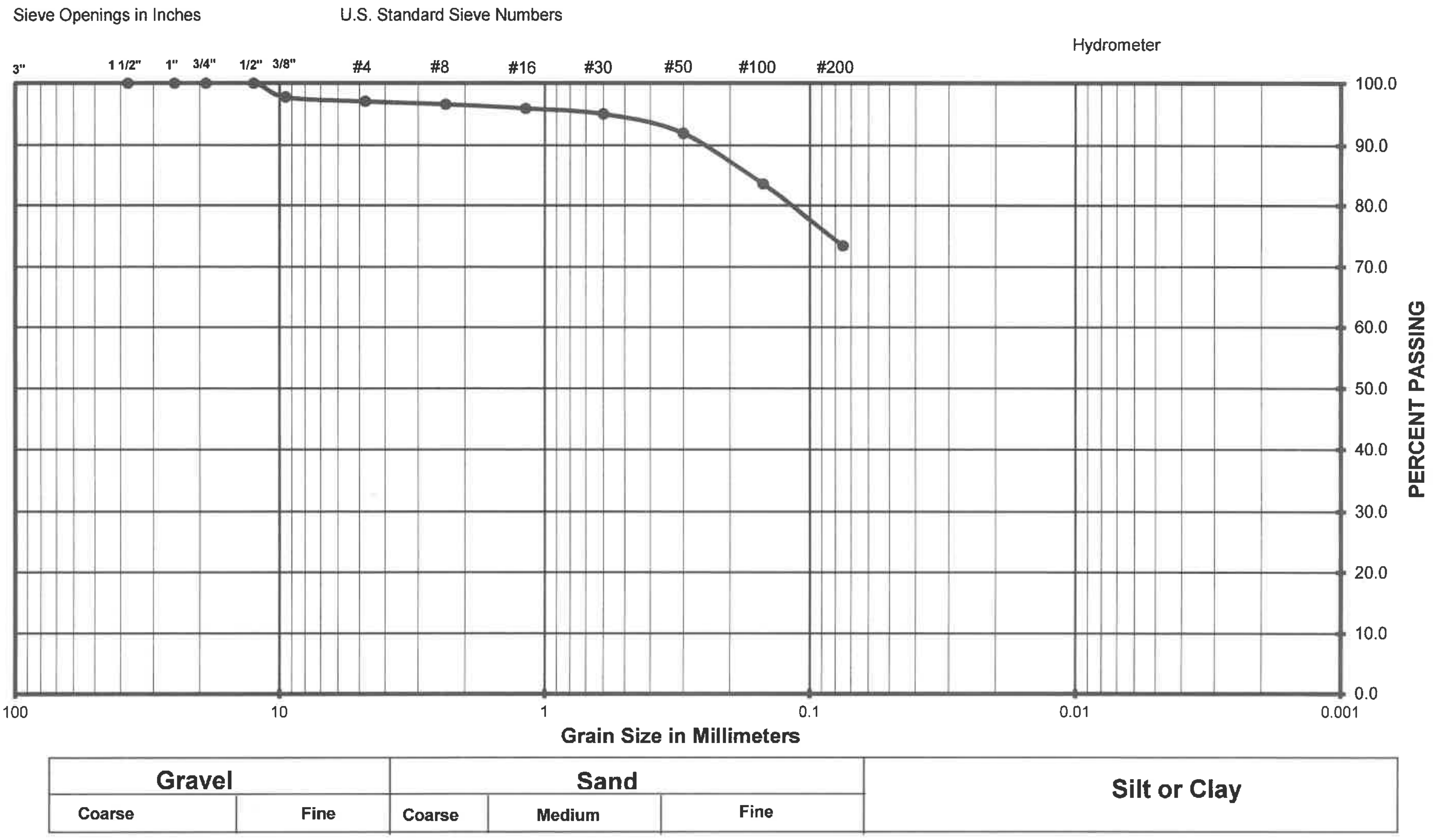
Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
042-23029	B5 @ 2-3'	11/22/2023	CL



Krazan Testing Laboratory

Grain Size Analysis



(Unified Soils Classification)

Project Name	Quick Quack 24-155 Pittsburg
Project Number	042-23029
Soil Classification	CL
Sample Number	B5 @ 2-3'

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829

Project Number	: 042-23029
Project Name	: Quick Quack 24-155 Pittsburg
Date	: 11/22/2023
Sample location/ Depth	: B1 @ 0-2'
Sample Number	: X1
Soil Classification	: CL

Trial #	1	2	3
Weight of Soil & Mold, gms	743.2		
Weight of Mold, gms	366.9		
Weight of Soil, gms	376.3		
Wet Density, Lbs/cu.ft.	113.5		
Weight of Moisture Sample (Wet), gms	200.0		
Weight of Moisture Sample (Dry), gms	177.8		
Moisture Content, %	12.5		
Dry Density, Lbs/cu.ft.	100.9		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	50.3		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.1012

Expansion Index $_{\text{measured}}$ = 101.2

Expansion Index = 101

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

Krazan Testing Laboratory

Expansion Index Test

ASTM D - 4829

Project Number	: 042-23029
Project Name	: Quick Quack 24-155 Pittsburg
Date	: 11/22/2023
Sample location/ Depth	: B4 @ 3-5'
Sample Number	: X2
Soil Classification	: CL

Trial #	1	2	3
Weight of Soil & Mold, gms	746.6		
Weight of Mold, gms	368.1		
Weight of Soil, gms	378.5		
Wet Density, Lbs/cu.ft.	114.2		
Weight of Moisture Sample (Wet), gms	200.0		
Weight of Moisture Sample (Dry), gms	179.0		
Moisture Content, %	11.7		
Dry Density, Lbs/cu.ft.	102.2		
Specific Gravity of Soil	2.7		
Degree of Saturation, %	48.8		

Time	Inital	30 min	1 hr	6hrs	12 hrs	24 hrs
Dial Reading	0	--	--	--	--	0.0977

Expansion Index $_{\text{measured}}$ = 97.7

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

Expansion Index = 98

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Quick Quack 24-155 Pittsburg**
Project Number: **042-23029**
Date Sampled: 11/9/2023
Sampled By: EG
Sample Number: -
Sample Location: B1 @ 10-11'
Sample Description: CL

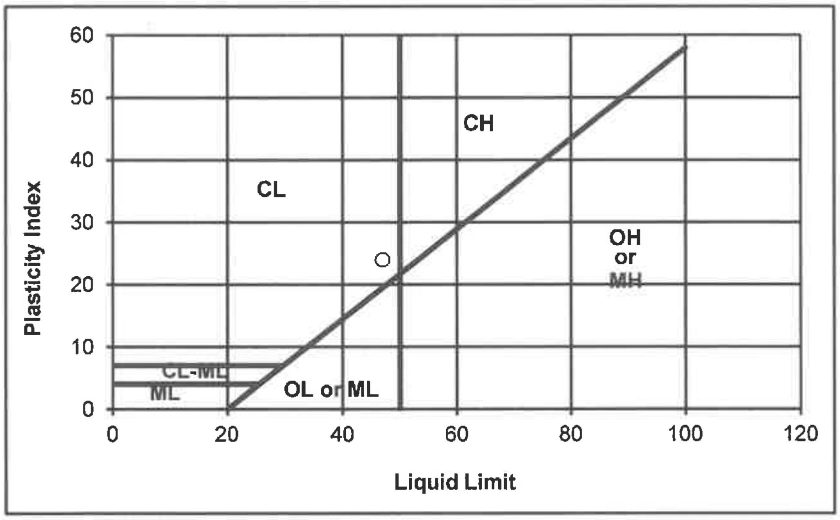
Date Tested: 11/21/2023
Tested By: JM
Verified By: JG

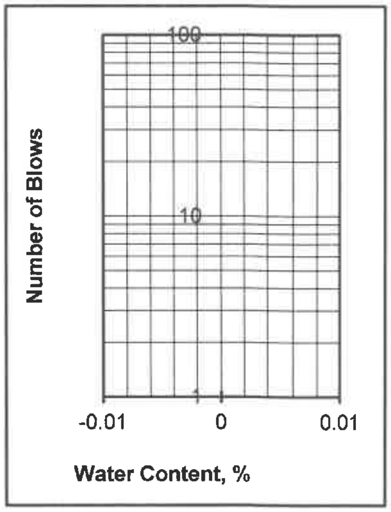
	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	30.89	27.48		36.79	33.98	
Weight of Dry Soil & Tare (g)	28.87	25.30		31.60	27.25	
Weight of Tare (g)	20.18	15.77		20.55	12.96	
Weight of water (g)	2.02	2.18		5.19	6.73	
Weight of Dry Soil (g)	8.69	9.53		11.05	14.29	
Water Content (% of dry wt.)	23.2%	22.9%		47.0%	47.1%	
Number of Blows				25	25	

Plastic Limit : 23 **Liquid Limit : 47**

Plasticity Index : 24
Unified Soil Classification : CL

Requirement:
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

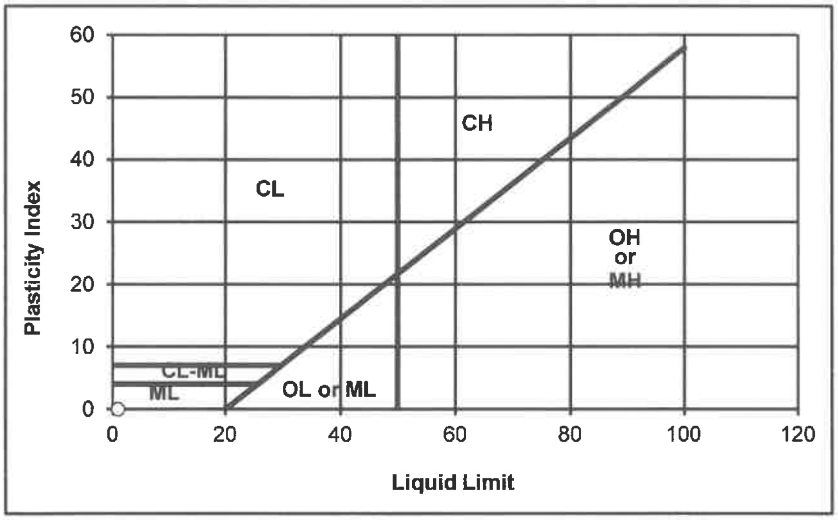
Project: **Quick Quack 24-155 Pittsburg**
Project Number: **042-23029**
Date Sampled: 11/9/2023
Sampled By: EG
Sample Number: -
Sample Location: B1 @ 15-16'
Sample Description: SM

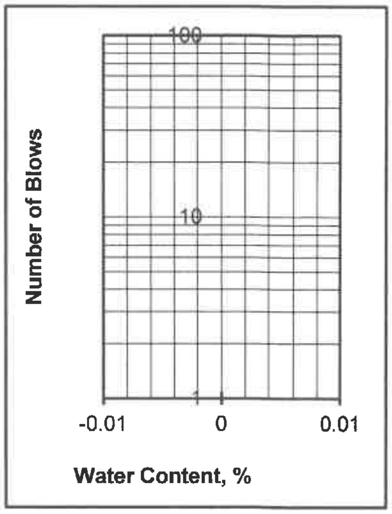
Date Tested: 11/21/2023
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)						
Weight of Dry Soil & Tare (g)						
Weight of Tare (g)						
Weight of water (g)						
Weight of Dry Soil (g)						
Water Content (% of dry wt.)						
Number of Blows						

Plastic Limit : N/D **Liquid Limit : N/D**

Plasticity Index : NON-PLASTIC
Unified Soil Classification : NON-PLASTIC
Requirement:
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

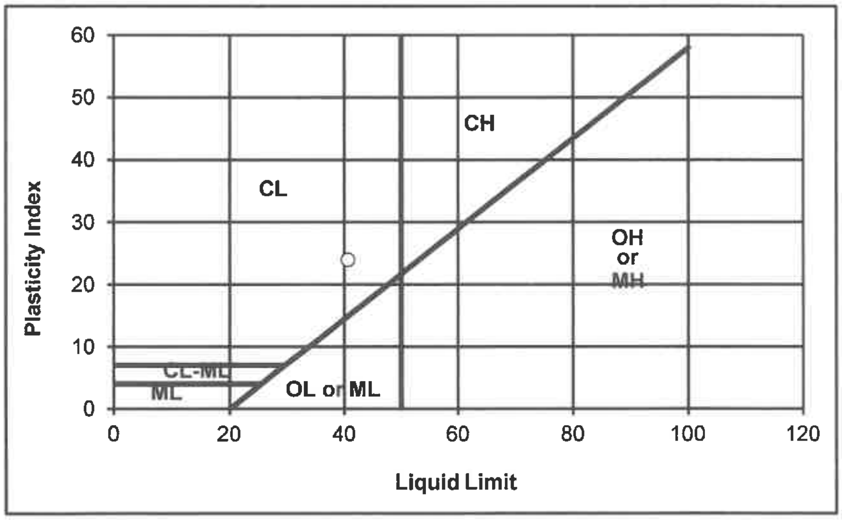
ASTM D4318/AASHTO T89 T90/CT 204

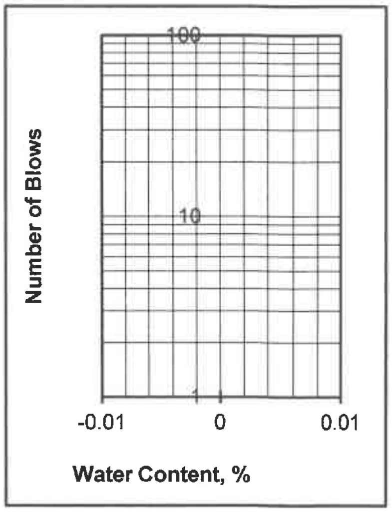
Project: **Quick Quack 24-155 Pittsburg**
Project Number: **042-23029**
Date Sampled: 11/9/2023
Date Tested: 11/21/2023
Sampled By: EG
Tested By: JM
Sample Number: -
Verified By: JG
Sample Location: B1 @ 20-21'
Sample Description: CL

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	37.33	39.31		36.20	31.41	
Weight of Dry Soil & Tare (g)	35.48	37.16		31.58	26.17	
Weight of Tare (g)	24.88	24.77		20.17	13.33	
Weight of water (g)	1.85	2.15		4.62	5.24	
Weight of Dry Soil (g)	10.60	12.39		11.41	12.84	
Water Content (% of dry wt.)	17.5%	17.4%		40.5%	40.8%	
Number of Blows				25	25	

Plastic Limit : 17 **Liquid Limit : 41**

Plasticity Index : 24
Unified Soil Classification : CL
Requirement:
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

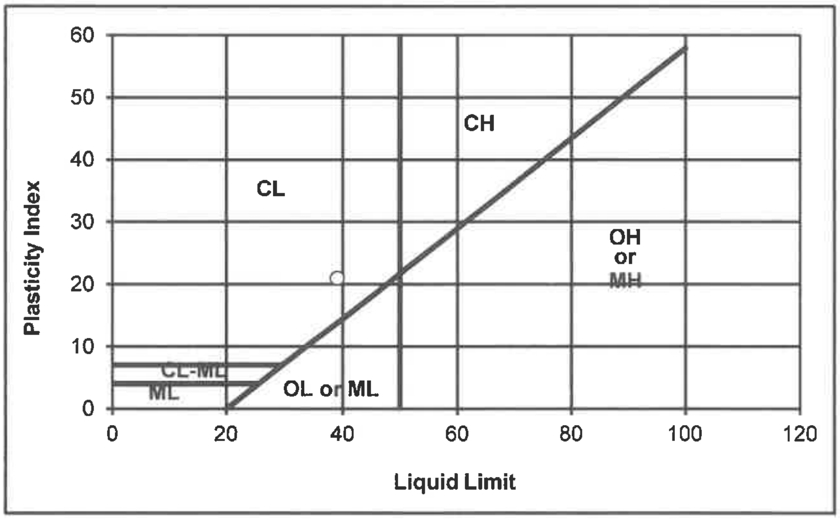
ASTM D4318/AASHTO T89 T90/CT 204

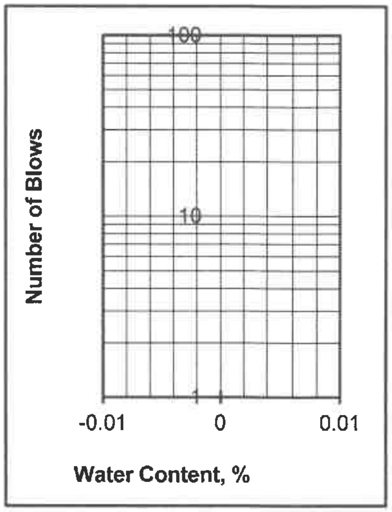
Project: **Quick Quack 24-155 Pittsburg**
Project Number: **042-23029**
Date Sampled: 11/9/2023
Date Tested: 11/21/2023
Sampled By: EG
Tested By: JM
Sample Number: -
Verified By: JG
Sample Location: B1 @ 25-26'
Sample Description: CL

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	38.34	40.66		39.03	33.70	
Weight of Dry Soil & Tare (g)	36.18	38.18		34.75	29.91	
Weight of Tare (g)	24.70	24.54		23.88	20.14	
Weight of water (g)	2.16	2.48		4.28	3.79	
Weight of Dry Soil (g)	11.48	13.64		10.87	9.77	
Water Content (% of dry wt.)	18.8%	18.2%		39.4%	38.8%	
Number of Blows				25	25	

Plastic Limit : 18 **Liquid Limit : 39**

Plasticity Index : 21
Unified Soil Classification : CL
Requirement:
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

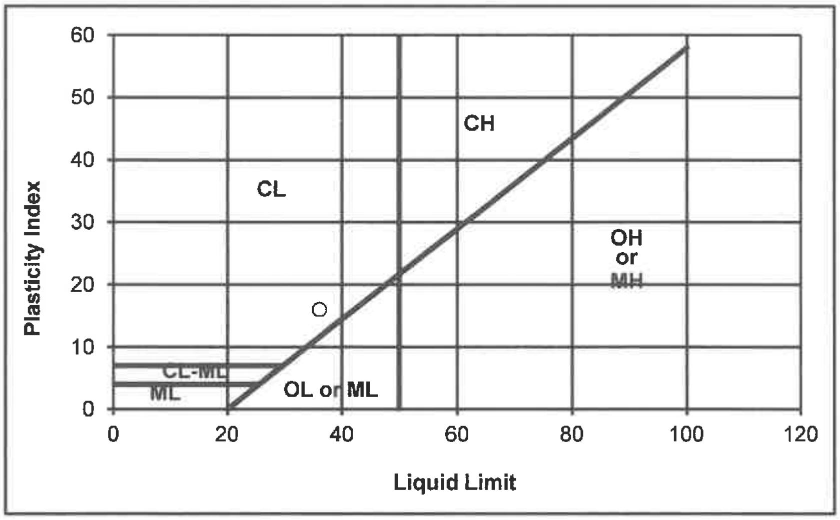
Project: **Quick Quack 24-155 Pittsburg**
Project Number: **042-23029**
Date Sampled: 11/9/2023
Sampled By: EG
Sample Number: -
Sample Location: B1 @ 30-31'
Sample Description: CL

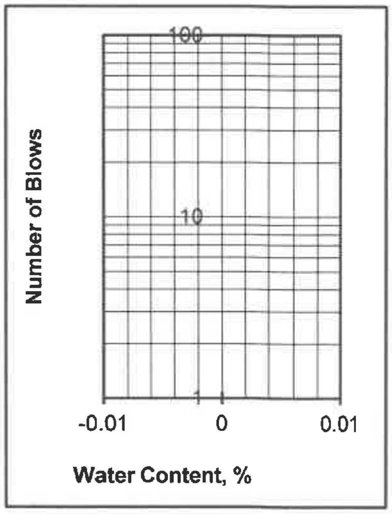
Date Tested: 11/21/2023
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	41.44	44.91		55.71	37.78	
Weight of Dry Soil & Tare (g)	38.67	41.40		47.23	33.11	
Weight of Tare (g)	24.70	24.57		23.88	20.13	
Weight of water (g)	2.77	3.51		8.48	4.67	
Weight of Dry Soil (g)	13.97	16.83		23.35	12.98	
Water Content (% of dry wt.)	19.8%	20.9%		36.3%	36.0%	
Number of Blows				25	25	

Plastic Limit : 20 **Liquid Limit : 36**

Plasticity Index : 16
Unified Soil Classification : CL
Requirement:
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils
ASTM D4318/AASHTO T89 T90/CT 204

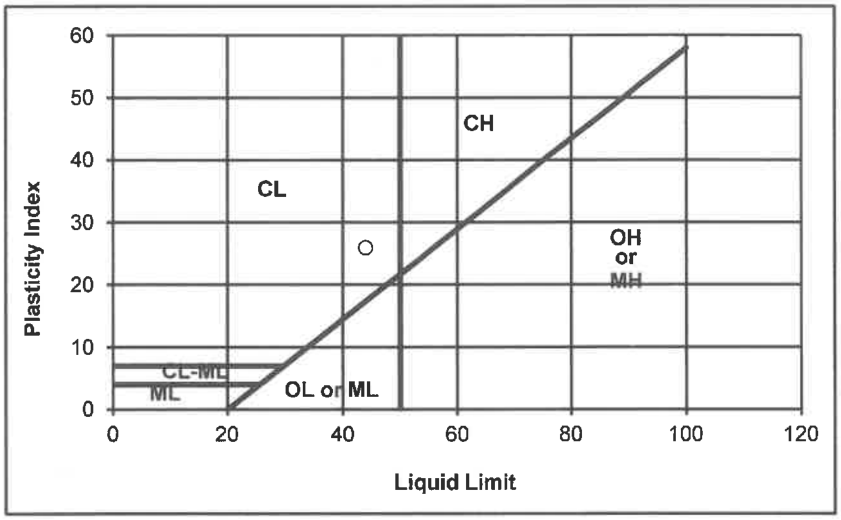
Project: **Quick Quack 24-155 Pittsburg**
Project Number: **042-23029**
Date Sampled: 11/9/2023
Sampled By: EG
Sample Number: -
Sample Location: B1 @ 35-36'
Sample Description: CL

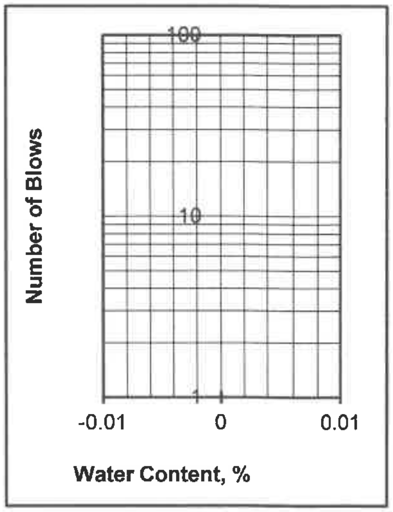
Date Tested: 11/21/2023
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	37.06	36.08		28.61	40.11	
Weight of Dry Soil & Tare (g)	35.02	33.83		24.43	34.05	
Weight of Tare (g)	23.53	21.30		14.93	20.27	
Weight of water (g)	2.04	2.25		4.18	6.06	
Weight of Dry Soil (g)	11.49	12.53		9.50	13.78	
Water Content (% of dry wt.)	17.8%	18.0%		44.0%	44.0%	
Number of Blows				25	25	

Plastic Limit : 18 **Liquid Limit : 44**

Plasticity Index : 26
Unified Soil Classification : CL
Requirement:
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Quick Quack 24-155 Pittsburg**
Project Number: **042-23029**
Date Sampled: 11/9/2023
Sampled By: EG
Sample Number: -
Sample Location: B1 @ 40-41'
Sample Description: CL

Date Tested: 11/21/2023
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	37.07	36.62		42.12	37.47	
Weight of Dry Soil & Tare (g)	35.19	34.85		36.09	30.84	
Weight of Tare (g)	24.87	24.78		20.18	13.32	
Weight of water (g)	1.88	1.77		6.03	6.63	
Weight of Dry Soil (g)	10.32	10.07		15.91	17.52	
Water Content (% of dry wt.)	18.2%	17.6%		37.9%	37.8%	
Number of Blows				25	25	

Plastic Limit : 18

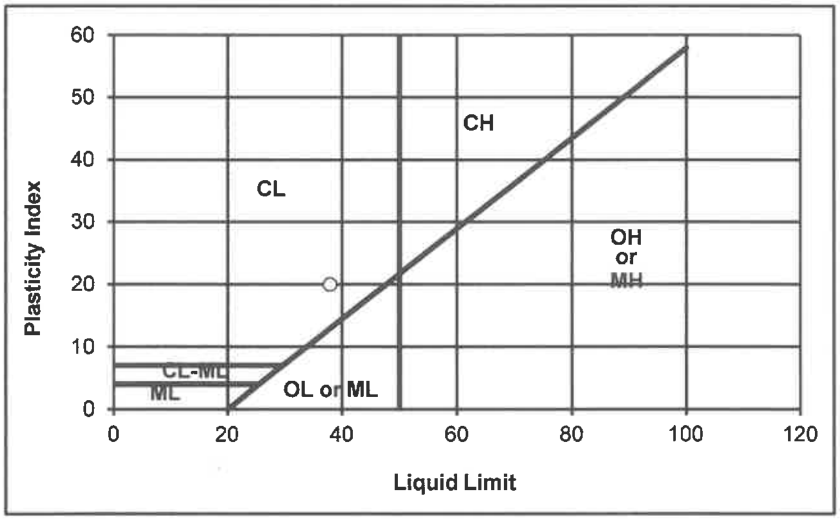
Liquid Limit : 38

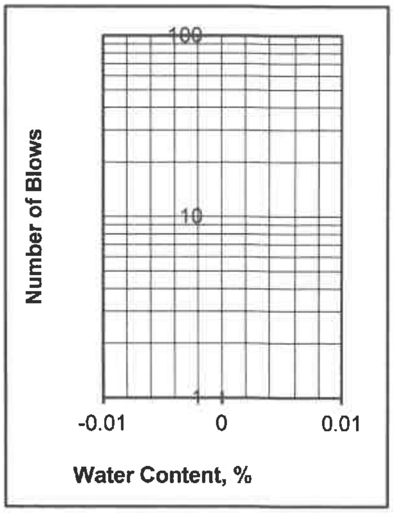
Plasticity Index : 20

Unified Soil Classification : CL

Requirement:

Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

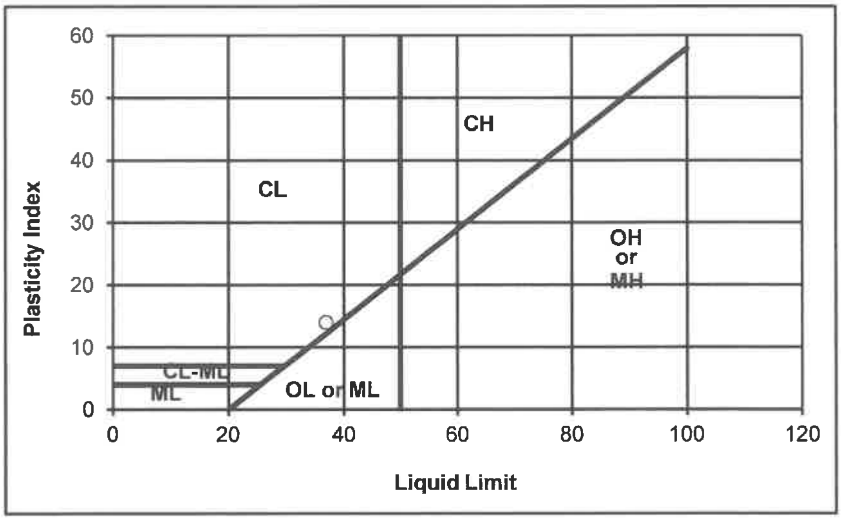
Project: **Quick Quack 24-155 Pittsburg**
Project Number: **042-23029**
Date Sampled: 11/9/2023
Sampled By: EG
Sample Number: -
Sample Location: B1 @ 45-46'
Sample Description: CL

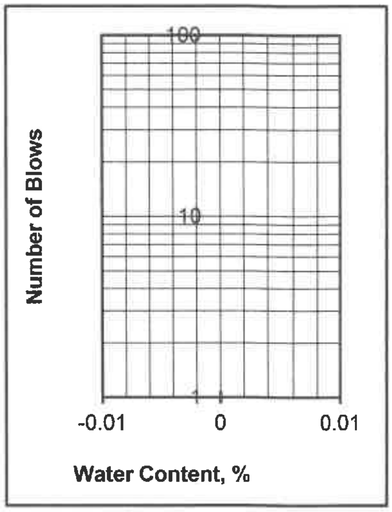
Date Tested: 11/21/2023
Tested By: JM
Verified By: JG

	Plastic Limit			Liquid Limit		
Trial Number	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	34.37	28.86		37.89	31.38	
Weight of Dry Soil & Tare (g)	31.68	26.43		33.23	26.34	
Weight of Tare (g)	20.16	15.76		20.50	12.74	
Weight of water (g)	2.69	2.43		4.66	5.04	
Weight of Dry Soil (g)	11.52	10.67		12.73	13.60	
Water Content (% of dry wt.)	23.4%	22.8%		36.6%	37.1%	
Number of Blows				25	25	

Plastic Limit : 23 **Liquid Limit : 37**

Plasticity Index : 14
Unified Soil Classification : CL
Requirement:
Approx. % of Material Retained on # 40 Sieve:





Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

APPENDIX B

EARTHWORK SPECIFICATIONS

GENERAL

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

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

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

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

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

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

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

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

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

SITE PREPARATION

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

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

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

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

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

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

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

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

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

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

APPENDIX C

PAVEMENT SPECIFICATIONS

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

The term “Standard Specifications”: hereinafter referred to is the 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 Soils Engineer prior to the placement of additional pavement courses.

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

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

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

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

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