August 15, 2025

Dr. Michelle M. Miller
Superintendent
South Fayette Township School District
3680 Old Oakdale Road
McDonald, Pennsylvania 15057

Dear Dr. Miller:

Subject: Revised Geotechnical Report
South Fayette Township School District - Bus Depot
South Fayette Township
Allegheny County, Pennsylvania
CEC Project 336-102

Civil & Environmental Consultants, Inc. (CEC) presents for your use our revised geotechnical report for the proposed project. This report presents CEC's opinions on the subsurface and groundwater conditions at the site, and our recommendations for site earthwork and foundation construction.

CEC appreciates the opportunity to be of service to you on this project. Please call us if you have any comments or questions, or if you would like to schedule a meeting to discuss the recommendations presented herein.

Very truly yours,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Tyler J. Reynolds, P.E.
Project Manager

Aaron W. Lavage, P.E.
Principal

TJR:AWL/ad
Attachment

R-336102.Aug15/P

GEOTECHNICAL REPORT

SOUTH FAYETTE TOWNSHIP SCHOOL DISTRICT - BUS DEPOT
SOUTH FAYETTE TOWNSHIP
ALLEGHENY COUNTY, PENNSYLVANIA

Prepared For:

SOUTH FAYETTE TOWNSHIP SCHOOL DISTRICT

Prepared By:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

CEC Project 336-102

June 9, 2025
Revised August 15, 2025

Civil & Environmental Consultants, Inc.

Monroeville 4350 Northern Pike, Suite 141 | Monroeville, PA 15146 | p: 800-899-3610 f: 724-327-5280 | www.cecinc.com

SUMMARY

Summary Limitations: This summary is presented for introductory purposes only and should be used in conjunction with the complete report. The geotechnical analyses, conclusions, and recommendations presented in this revised geotechnical report were developed for the currently proposed site grading and current building layout. If the grading or layout changes, additional analyses should be performed, and conclusions/recommendations should be developed accordingly.

Proposed Site Conditions: The proposed development will consist of a bus parking lot, in addition to a two (2)-story bus depot with the finished ground floor elevation (FFE) at Elevation (El.) 1179.33. The western portion of the building will be flush with the parking lot area for bus access, and the eastern portion of the building supports approximately 20 feet of earth to provide ground access to the second floor at approximate El. 1200. A retaining wall, integral to the building, will be required to support the grading in this location.

Based on the current grading plan (shown on Figure 2), cuts up to approximately 23 feet thick will be required to grade the eastern cutslope of the proposed bus parking lot and access road. Additionally, fills up to approximately 24 feet thick will be required to grade the western portion of the proposed parking lot fill slope. Cuts and fills of 21 and 9 feet on the easternmost and westernmost limits of the proposed building, respectively, will be required to facilitate grading within the proposed building footprint. A retaining wall, non-integral to the building, is proposed to the south of the proposed bus depot and will be a maximum of approximately 4 feet in height. A stormwater management pond is proposed in the southwestern portion of the site, with cuts and fills as thick as approximately 8 and 9 feet, respectively.

Generalized Site Geology: Sixteen (16) geotechnical borings and 10 infiltration test borings were performed at the site by Civil & Environmental Consultants, Inc. (CEC) to assess subsurface conditions. In general, the borings encountered topsoil, residual soil, weathered rock, and bedrock with alluvial soils encountered in Boring B-1, B-2, and B-4 as well as IT-1 through IT-4. The excavated materials are anticipated to consist of variable

(i.e., coarse-grained and fine-grained) alluvial soils, residual soils, and/or weathered rock/bedrock. Potentially expansive rock (carbonaceous shale) was encountered approximately 6 feet below FFE in Boring B-8. The depths of the geotechnical boring and infiltration tests ranged from approximately 2.0 to 40.0 feet below ground surface (bgs).

Bus Depot Building Foundations:

CEC recommends the proposed building be supported on:

- Shallow foundations on weathered rock/bedrock;
- Shallow foundations on controlled low strength material (CLSM) or imported Pennsylvania Department of Transportation (PennDOT) 2A gradation aggregate placed in overexcavations extending to weathered rock. The CLSM should have a minimum unconfined compressive strength of 500 psi; or
- Shallow foundations on ground improvements (grout piers or stone columns) extending to weathered rock.

Design foundations supported on weathered rock, CLSM or imported aggregate extended to weathered rock using a maximum allowable bearing capacity of 3,000 psf.

CEC recommends settlement monitoring, as detailed in Section 4.8, beneath the building foundations/footprint prior to foundation and floor slab installation if imported aggregate is utilized as backfill.

Grout piers and stone columns are typically designed by a specialty design/build contractor who will determine the spacing, diameter, and depth of the columns. CEC preliminarily recommends designing the building foundations for a maximum allowable bearing capacity of 3,000 psf; however, the allowable bearing capacity values will be determined as part of the formal ground improvement design by controlling the diameter and spacing of the improvements.

CEC recommends the ground improvement designer collaborate with SFSD, structural and civil designers during the design phase to minimize the likelihood of conflict in the field. Ground improvements with restricted zones may not be suitable in proximity to below grade vaults, pits, utilities, etc.

CEC recommends exterior foundations extend to a minimum depth of 42 inches below final, exterior grade for frost protection. Interior and/or heated foundations may be designed to a minimum depth of 24 inches below grade.

Lastly as an alternative to stone columns and/or grout piers, deep foundations such as auger cast in place (ACIP) piles may be utilized. CEC can provide deep foundation recommendations upon request.

Floor Slabs: CEC anticipates the floor slab on the eastern portion of the building will be directly underlain by weathered rock/bedrock. In these areas, CEC recommends supporting the proposed floor slabs on the weathered rock/bedrock provided it is non-expansive. Perform confirmation testing during construction.

CEC anticipates the floor slab in the central and western portions of the building will be underlain by residual and proposed fill, respectively. For these conditions, CEC recommends the following:

- Overexcavate residual soils to weathered rock and backfill with CLSM, PennDOT 2A aggregate, or approved alternate to floor slab subgrade elevation. CEC recommends settlement monitoring, as recommended in Section 4.8, beneath the building footprint prior to floor slab installation if imported aggregate is utilized as backfill; or
- Ground improvements (grout piers or stone columns) extending through proposed fill and residual soils into weathered rock.

In addition to proposed ground improvements if utilized, backfill beneath the floor slabs beneath the building footprint with well-graded, non-expansive/non-carbonaceous granular soils, as recommended in Section 4.1.2, within proposed fill areas.

Floor slabs constructed using the recommendations provided herein may utilize a modulus of subgrade reaction of 150 pounds per cubic inch. CEC recommends the top 6 inches of the overexcavation (i.e., directly beneath the slab), consist of non-expansive, AASHTO No. 57 gradation aggregate.

As indicated above, potentially expansive, carbonaceous shale was encountered in proximity to the proposed floor slab elevation. Expansive soils/rock are often discontinuous and isolated. As such, CEC recommends samples of the floor slab subgrade be subjected to testing during construction to further evaluate the presence of expansive materials at the proposed subgrade.

Embankments/Slope Stability: CEC recommends cut slopes be constructed no steeper than 2H:1V. Fill slopes constructed using earthen structural fill should be constructed no steeper than 2H:1V provided structural fill is placed in accordance with the recommendations presented herein. Toe-keys and/or fill compaction keys should be incorporated at the toe of all fill slopes greater than 5 feet in height at the approximate locations shown on Figure 2. Toe-keys should be supported in weathered rock/bedrock for the proposed bus depot pad, stormwater features, and access road fill slope. The actual depths of the toe-keys should be determined in the field by CEC personnel during construction. Deeper toe-keys, if necessary, should gradually transition into adjacent shallower toe-keys. Toe-keys adjacent to the existing floodway should be backfilled with a minimum of 5 feet thick of AASHTO No. 1 coarse aggregate at the locations indicated on Figure 2. The purpose of this aggregate is to facilitate construction in anticipated wet conditions.

TABLE OF CONTENTS

Page

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of our geotechnical engineering services was to perform a subsurface exploration at the site to provide field and laboratory test data on the soil, bedrock, and groundwater conditions. Civil & Environmental Consultants, Inc. (CEC) developed conclusions and recommendations for the design of building foundations, retaining walls, earthwork construction, pavements, and other pertinent geotechnical considerations.

1.2 SCOPE OF SERVICES

In order to achieve the above-stated purpose, CEC completed the following scope of services:

1. Planning and Coordination: CEC planned, coordinated, and executed the office and fieldwork for the geotechnical exploration, including coordination with drilling and laboratory testing subcontractors. CEC also prepared a site-specific health and safety plan (HASP) to be utilized by field staff.

2. Test Boring Stakeout: CEC personnel staked the proposed boring and infiltration test locations using handheld global positioning system (GPS) equipment at least three (3) days prior to drilling operations.

3. Test Drilling: CEC subcontracted Test Boring Services, Inc. (TBS) of Washington, Pennsylvania using a track-mounted drill rig to drill 16 test borings at the site, in addition to 10 infiltration borings, as shown on Figure 2.

4. Monitor Drilling and Log Samples: CEC provided a representative to monitor the test drilling, observe the materials encountered, prepare computer-generated field logs, and make modifications to the drilling program, if necessary. CEC's representative obtained water levels after soil sampling and after rock coring (if applicable).

5. Laboratory Testing: CEC subcontracted Geotechnics, Inc. (Geotechnics) of East Pittsburgh, Pennsylvania and Conti Laboratories, Inc, (Conti) of Bethel Park, Pennsylvania to perform geotechnical and geochemical testing on select soil and rock samples obtained during drilling operations. Laboratory testing included moisture content, Atterberg limits (plasticity), grain size analysis (mechanical sieve), standard Proctor, direct shear, total sulfur, and unconfined compressive strength of rock testing.

6. Geotechnical Analysis: CEC reviewed the results of the subsurface exploration and laboratory testing and performed geotechnical analyses to estimate the allowable bearing capacity and settlement for the proposed building. CEC also performed geotechnical slope stability analyses for anticipated proposed cut and fill slopes.

7. Geotechnical Report: CEC has prepared a geotechnical report summarizing the data obtained and presenting conclusions and recommendations in accordance with the purpose. This report also presents a site location map, test boring location plan, subsurface cross-sections, geotechnical details, test boring logs, and laboratory test results.

8. Infiltration Testing: CEC provided a representative to perform infiltration testing concurrently with geotechnical drilling operations to obtain infiltration parameters to aid in development of the infiltration basin.

1.3 AUTHORIZATION

CEC's geotechnical services were performed, and this report was prepared in general accordance with our Scope of Services Amendment for Geotechnical Engineering Services dated February 7, 2025[(1)]. CEC was authorized to proceed with our geotechnical services on March 25, 2025 by Mr. Joseph Welch via school board vote.

[(1)] Civil & Environmental Consultants, Inc., "Scope of Services Amendment for Geotechnical Engineering Services, South Fayette Township, Allegheny County, Pennsylvania," dated February 7, 2025.

1.4 STANDARD OF CARE

The services performed by CEC were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical engineering profession practicing contemporaneously under similar conditions in the locality of the project. No warranty, express or implied, is made. Appendix A contains a document entitled "Important Information About This Geotechnical-Engineering Report." This document further explains the realities of geotechnical engineering and the limitations that exist in evaluating geotechnical issues.

1.5 REPORT LIMITATIONS

This report was prepared for the purpose of providing information to support the design and construction of the subject project. Reliance on this report by any party other than South Fayette Township School District (SFSD) or its agents is expressly forbidden. CEC assumes no liability for the use of this report or information contained herein for any other purpose. Contractors should not rely on the information in this report for bid development or construction beyond the use of the factual data obtained and the construction recommendations presented herein.

2.0 DATA OBTAINED

2.1 GENERAL INFORMATION AND PROPOSED DEVELOPMENT

The proposed development is located in South Fayette Township, Allegheny County, Pennsylvania. CEC and the project architect, DRAW Collective (DRAW), have been working with SFSD on various improvements to the SFSD campus. Currently, SFSD occupies a parcel just west of the existing Middle School at 3700 Old Oakdale Road, McDonald, Allegheny County, Pennsylvania. SFSD is proposing to develop this parcel to serve as their bus depot and associated parking lot. The proposed access road is approximately 1,300 feet long just south of the intersection of Old Oakdale Road and Cannongate Drive. The depot is proposed as a two (2)-story building with a finished floor elevation (FFE) at Elevation (El.) 1179.33. The western portion of the building will be flush with the parking lot area for bus access, and the eastern portion of the building support approximately 20 feet of earth to provide ground access to the second floor at approximate El. 1200. A retaining wall, integral to the building will be required to support the grading in this location. A foundation plan, building loads and/or tolerable settlement criteria has not been provided to CEC as of the issuance of this report. Further, CEC understands there may be below grade vaults at the building which will house lifting equipment based on information provided by the design team via email on May 27, 2025 in the pdf titled “Pages SFTSD Bus Depot DRAFT DD SET (2025-05-23)”.

Based on the current grading plan (shown on Figure 2), cuts up to approximately 23 feet thick will be required to grade the eastern cut slope of the proposed bus parking lot and access road. Additionally, fills up to approximately 24 feet thick will be required to grade the western portion of the proposed bus parking lot fill slope. Cuts and fills of 21 and 9 feet on the easternmost and westernmost limits of the proposed building, respectively, will be required to facilitate grading within the proposed building footprint. A retaining wall, non-integral to the building, is proposed to the south of the proposed bus depot and will be a maximum of approximately 4 feet in height. A stormwater management pond is proposed in the southwestern portion of the site, with cuts and fills as thick as approximately 8 and 9 feet, respectively.

The approximate site location as well as the current grading and site layout plan are shown on Figures 1 and 2, respectively.

2.2 REVIEW OF EXISTING SITE CONDITIONS AND GEOLOGY

2.2.1 Site Topography and Existing Site Conditions

Existing topography at the site slopes generally downwards from east to west, ranging from approximately Els. 1247 to 1115, respectively. All elevations referred to herein are in feet. Based on a review of historical aerial imagery at the site between 1947 and 2022, the project area appears to have been used as farmland from 1947 until approximately the 1970s, at which point it the site appears to have transitioned into a forested area. The current condition of the site is forested. Lastly, a stream runs to the west of the site within close proximity to the limits of proposed grading, as shown on Figure 2.

2.2.2 Site Soils and Surficial Geology

According to the Pennsylvania Department of Conservation and Natural Resources (PADCNR) "Landslide and Related Features Map" of the Oakdale, Pennsylvania quadrangle as well as the Allegheny County online landslide portal, the site is characterized as being located in an area least prone to landslides.

The United States Department of Agriculture (USDA) soil survey indicates the near-surface site soils primarily consist of the Guernsey and Culleoka channery silt loams in the eastern portion of the site, and the Dormont silt loam in the western portion of the site. The Guernsey silt loam consists of colluvium derived from limestone and shale over residuum weathered from limestone and shale, and the Dormont and Culleoka channery silt loams consists of fine-loamy residuum weathered from limestone, sandstone, and shale. Refer to the definitions of standard terms and symbols in Appendix B for the definition of residual and colluvial soils.

According to publicly available mapping from the PADCNR, the bedrock geology at the site is generally Pennsylvanian-aged and belongs to the Monongahela Group. The Monongahela Group is generally characterized by cyclic sequences of limestone, shale, sandstone, and coal. The base of this formation generally corresponds with the top of the Pittsburgh Coal seam.

The United States Geological Survey (USGS) Mineral Resources Report 89, "Coal Resources of Allegheny County, Pennsylvania, Oakdale Quadrangle", indicates the Pittsburgh Coal seam is at approximate El. 1000 beneath the site, which is approximately 100 to 250 feet below existing site elevations and 180 feet below the proposed bus depot FFE. The mapping indicates the Pittsburgh Coal seam has been deep mined beneath the site. The Pennsylvania Department of Environmental Protection (PADEP) Mine Subsidence Insurance (MSI) website also indicates deep coal mining has occurred beneath the site. Lastly, based on published coal mine mapping from the Pennsylvania Mine Map Atlas, the deep mining operations appear to have been performed using room-and-pillar methods.

2.3 SUBSURFACE EXPLORATION

CEC's geotechnical subsurface exploration was performed at the site between April 14, 2025 and April 18, 2025 by TBS. Drilling operations were performed using one (1) track-mounted drill rig under the observation and guidance of CEC personnel. In total, TBS drilled 16 test borings, designated as Borings B-1 through B-16, in addition to 10 infiltration borings, designated as IT-01 through IT-10, at the approximate locations shown on Figure 2.

TBS drilled a total of 282.4 linear feet of soil and 81.7 lineal feet of bedrock at the site using hollow-stem auger/split spoon sampling and NQ-rock coring methods, respectively, to complete the geotechnical borings. Detailed soil and rock descriptions are presented on the boring logs completed by CEC's field representative in Appendix B. Appendix B also contains a summary of the definitions of standard terms and symbols used on the boring logs and in this report. A summary of the results of the subsurface exploration is presented on Table 1.

All borings were extended to the top of bedrock (at a minimum) or to a prescribed test depth at infiltration test locations. The geotechnical test borings performed by TBS were advanced through the topsoil, alluvial soil, residual soil, and weathered rock strata using hollow-stem augering methods. The soil zones were generally sampled on approximate 3-foot intervals (i.e., centers) or continuously using a split-spoon sampler to perform standard penetration tests (SPTs). In general, the SPT method consists of driving a 2-inch outside diameter split-spoon sampler 18 inches using a 140-pound hammer free-falling a distance of 30 inches. A split-spoon sampler is a steel sampling tube which can be split open lengthwise for easy removal and visual inspection of the soil obtained. The number of blows required to advance the split-spoon through successive 6-inch increments is recorded. The first increment is considered a seating of the sampler. The sum of the blows for the second and third increments is termed the penetration resistance or N-value. The N-value is considered to be an indication of the relative density of coarse-grained soils (sand and gravel) or consistency of fine-grained (silt and clay) soils. The details of the SPT method are described in the American Society for Testing and Materials (ASTM) Standard D1586. Bulk soil samples were obtained from auger cuttings generated during drilling for laboratory soil testing. In addition, one (1) relatively undisturbed Shelby tube sample was obtained from a boring by pushing a steel tube at the desired depth using the hydraulic pressure of the drill rig. The soil samples are captured in the tube, which is shaped to minimize disturbance to the soil. Pocket penetrometer testing was performed on soft, cohesive samples to estimate the unconfined compressive strength of the soils.

The top of bedrock, as herein defined, is the depth at which 50 blows of the 140-pound hammer are required to drive the split spoon sampler 6 inches or less in natural bedrock. Rock samples were obtained using a core barrel equipped with an NQ-sized (approximately 2-inch diameter) drill bit tipped with carbide steel or diamonds to drill through the rock. The rock sample is retrieved within the core barrel. Details of rock coring procedures are described in ASTM D 2113.

Percent recovery of the rock core is defined as the total length of rock core retrieved in the barrel divided by the total length of the core run expressed as a percentage. Rock quality designation (RQD) is defined as the sum of the lengths of rock core pieces greater than 4 inches

(excluding mechanical breaks) divided by the total length of the core run expressed as a percentage. Percent recovery and RQD indicate the relative consistency of the bedrock. Both the percent recovery and RQD were recorded by our field representatives during drilling monitoring and are shown on the drilling logs in Appendix B. Core box photographs of each rock core are presented in Appendix C.

CEC's project representative described the soil color, texture, apparent origin, and apparent moisture content of the samples obtained during drilling. Bulk soil samples were obtained from auger cuttings generated during drilling. CEC notes bulk and SPT samples obtained from auger cuttings may not include some larger diameter particles in the soil matrix.

2.4 WATER LEVEL MEASUREMENTS

CEC's representative measured subsurface water conditions at the completion of soil sampling/augering and/or at the end of drilling operations. Most borings were dry immediately following the completion of soil sampling/augering, with the exception of B-12, IT-01, and IT-04 where water levels of 11.8, 4.5 and 5.3 feet below ground surface (bgs), respectively, were recorded. Water was present in the borings at the completion of rock coring (where performed) at levels ranging from approximately 8.5 to 25.4 feet bgs; however, water was introduced into these borings during coring operations. As such, water measured in borings where rock coring was performed is not likely indicative of actual subsurface water conditions. The water level readings are summarized on Table 1.

2.5 GEOTECHNICAL LABORATORY TESTING

Laboratory testing was performed on select soil and rock samples obtained during the subsurface exploration to determine physical characteristics of the subsurface. The laboratory testing included grain size analysis, moisture content, Atterberg limit, standard Proctor, direct shear, total sulfur content, and unconfined compressive strength of rock testing. Unified Soil Classification System (USCS) designations were determined in accordance with ASTM D2487

from the results of the grain size and Atterberg limits testing. The laboratory test results are presented in Appendix D and are summarized in Table 2.

3.0 CONCLUSIONS

CEC presents the following conclusions based on the data obtained at the test boring and infiltration test locations during the subsurface exploration, laboratory test results, observations of existing site conditions, geotechnical analyses performed, proposed grading and site layout, and previous experience on similar projects.

3.1 SUBSURFACE CONDITIONS

3.1.1 Topsoil Conditions

Topsoil is defined herein as the surface layer of soil supporting vegetative growth with elevated concentrations (i.e., visually exceeding approximately 10 percent) of organic material. Topsoil was encountered in all geotechnical test boring locations. Approximately 2 to 7 inches of topsoil were encountered in the borings, with an average of approximately 6 inches. Topsoil thicknesses were based on observations/measurements performed by CEC personnel at the time of drilling. Topsoil thicknesses may be interpreted differently by others and may vary beyond the boring locations. The topsoil thickness recorded in the borings should not be the only consideration when estimating a volume (cubic yards) to be stripped by an earthwork contractor. It is generally not possible for a contractor to remove less than about 6 inches of material during stripping operations. Other factors can also impact the actual amount of material removed during stripping operations. CEC is not responsible for the final amount of material removed by the contractor. Topsoil is generally compressible and contains organic materials that decompose over time.

Topsoil is not suitable to support new fills and should be stripped from the site prior to earthwork operations. The topsoil is not suitable for reuse as fill or to support foundations, floor slabs, retaining walls, and new fills. The stripped topsoil may be suitable for reuse in landscaping applications. Testing the topsoil for fertility or landscaping suitability was outside of CEC's scope of work.

3.1.2 Alluvial Soil Conditions

Alluvial soils are defined herein as soils deposited by water in a river, stream, floodplain, or delta. Alluvial soil was encountered in Borings B-1, B-2, B-4, as well as Infiltration Tests IT-1 through IT-4 beneath the topsoil. The alluvial stratum generally ranged in thickness from approximately 2 to 18 feet thick within the test borings. IT-1 through IT-3 were all terminated within the alluvial soil stratum. The interface between alluvial soil, residual soil, and/or weathered rock may be interpreted differently by others and will vary between boring locations; as such, thicknesses may differ from those indicated herein.

Alluvial soils encountered within the borings generally consisted of soft to stiff, lean clay with varying amounts of sand. The alluvial soils were generally visually classified as dry to moist (on a scale of "dry", "moist", and "wet") by CEC's representative, with the exception of IT-1, which was classified as wet at approximately 4.5 feet bgs.

USCS classification testing was performed on two (2) composite samples obtained in the alluvial stratum from Borings B-1 and B-2 from approximately 12.0 to 16.5 and 4.5 to 10.5 feet bgs, respectively. The results of the testing are summarized below:

- A composite SPT sample obtained from Boring B-1 from approximately 12.0 to 16.5 feet bgs was classified as lean clay (CL) and was comprised of approximately 86 percent fine-grained materials. The liquid limit (LL), plastic limit (PL), and plasticity index (PI) of the sample were 42, 20, and 22 percent, respectively; and
- A composite SPT sample obtained from Boring B-2 from approximately 4.5 to 10.5 feet bgs was classified as lean clay with sand (CL) and was comprised of approximately 77 percent fine-grained materials. The LL, PL, and PI of the sample were 36, 19, and 17 percent, respectively.

The moisture content of the samples tested from the alluvial stratum ranged from approximately 18.8 to 28.7 percent, with an average value of 23.3 percent. Clayey alluvial soil will likely be

difficult to dry/properly compact during winter and spring months or during wet or inclement weather.

Undisturbed direct shear testing was also performed on the Shelby tube sample obtained from Boring B-2 within the alluvial stratum. The sample was confined using normal stresses of 0.5, 1, and 2 tons per square foot (tsf). The testing indicated an effective internal friction angle (φ) and cohesion (c) values of 25.5 degrees and 389 pounds per square foot (psf), respectively.

Alluvial soils materials will be encountered during excavations to grade the site and for fill toe-keys on the western end of the site adjacent to the existing stream and floodway. It is not suitable to support toe-keys on alluvial soils. Toe-keys should extend through the alluvial stratum into weathered rock/bedrock. Excavations through alluvial soils will likely be possible using conventional earthwork techniques. The contractor should anticipate temporary excavations through alluvial soils may result in sloughing, particularly when excavations will be open for longer periods of time in proximity to water features.

Upgradient of the toe-keys, stiff to hard, low to medium plasticity alluvial soils are suitable to support new fill. Soft/loose alluvial soils are not suitable to support new fills. The alluvial soil encountered in the borings is anticipated to be suitable for re-use as new fill provided it is moisture conditioned and placed and compacted in accordance with the recommendations presented herein. The need to moisture condition alluvial soils and/or blend wetter alluvial soils with drier residual soils, weathered rock, and/or excavated bedrock to achieve the recommended moisture content range should be anticipated.

3.1.3 Residual Soil Conditions

Residual soil is derived from the chemical and physical weathering of bedrock and may retain relic structures of the underlying parent bedrock, such as bedding planes. Residual soils were encountered beneath the topsoil and/or alluvial soils in all boring locations, with the exception of Borings IT-1 through IT-4, where the borings were generally terminated prior to encountering residual soils.

Residual soils generally ranged in thickness from approximately 3 to 18 feet in the borings and generally consisted of stiff to hard, lean clay with varying amounts of sand and gravel, with some softer blow counts generally at or near the existing ground surface. At select boring locations, loose to medium dense granular (sand and gravel) residual soils were encountered in Borings B-2 through B-4, as well as B-11, B-15 and B-16. Lastly a very soft to very stiff fat clay layer to approximately 9 feet bgs in Boring B-10. The residual soils were generally classified as dry to moist, with the exception of B-12, which was classified as wet at approximately 11.8 feet bgs. The interface between residual soil and weathered rock may be interpreted differently by others and will vary between boring locations; as such, thicknesses may differ from those indicated herein.

USCS classification testing was performed on five (5) composite samples obtained in the residuum stratum from Borings B-6, B-9, B-10, B-12, and B-14. The results of the testing are summarized below:

- A composite SPT sample obtained from Boring B-6 from approximately 9.0 to 13.5 feet bgs was classified as lean clay with sand (CL) and was comprised of approximately 82 percent fine-grained materials. The LL, PL, and PI of the sample were 29, 19, and 10 percent, respectively;
- A bag sample obtained from Boring B-9 from approximately 0.0 to 10.0 feet bgs was classified as lean clay with sand (CL) and was comprised of approximately 74 percent fine-grained materials. The LL, PL, and PI of the sample were 43, 21, and 22 percent, respectively;
- A bag sample obtained from Boring B-10 from approximately 0.0 to 10.0 feet bgs was classified as fat clay (CH) and was comprised of approximately 87 percent fine-grained materials. The LL, PL, and PI of the sample were 50, 25, and 25 percent, respectively;
- A composite SPT sample obtained from Boring B-12 from approximately 3.0 to 10.5 feet bgs was classified as sandy lean clay (CL) and was comprised of approximately 64 percent fine-grained materials. The LL, PL, and PI of the sample were 49, 25, and 24 percent, respectively; and

- A bag sample obtained from Boring B-14 from approximately 0.0 to 10.0 feet bgs was classified as lean clay with sand (CL) and was comprised of approximately 78 percent fine-grained materials. The LL, PL, and PI of the sample were 44, 21, and 23 percent, respectively.

The moisture content of the samples tested from the residual soil stratum ranged from approximately 13.2 to 32.5 percent, with an average value of 22.7 percent. Clayey residual soils can be difficult to dry/properly compact during winter and spring months or during wet or inclement weather.

Three (3) standard Proctor tests were performed on bag samples obtained from Borings B-9, B-10, and B-14. The tests indicated maximum dry densities (MDDs) of 106.0, 101.1, and 104.3 pounds per cubic foot (pcf), with optimum moisture contents (OMCs) of 18.9, 19.0, and 19.7 percent, respectively. Based on the testing, CEC anticipates the residual soils are generally at or above the OMC. As such, soils will likely need to be dried, mixed with granular soil materials, weathered rock/bedrock, or otherwise stabilized with lime/cement to facilitate placement as structural fill.

Residual soils will be encountered during bulk earthwork operations and foundation/floor slab construction at the site. CEC concludes it is not suitable to support proposed building foundations construction on or above residual soils.

Similarly, supporting retaining walls (if applicable) and floor slabs bearing directly on residual soils may result in excessive total and differential settlement, specifically due to the anticipated varying subsurface strata to be encountered at floor slab and retaining wall subgrades. As such, CEC concludes these features should not be supported directly on residual soils.

Excavations through the residual materials will likely be possible using conventional earthwork equipment. With the exception of fat clay, the residual soil is also generally suitable for reuse as structural fill provided it is moisture conditioned to meet the moisture criteria recommended herein. Fine-grained residual soils may be difficult to work with if the soils become wet, in

particular the fat (i.e, high plasticity) clay materials proposed to be encountered within the access road cutslope, or if earthwork is performed during winter and/or spring months. The contractor should anticipate the need to moisture condition residual soils and/or blend wetter residual soils with drier residual soils, weathered rock, and/or excavated bedrock to achieve the recommended moisture content range.

Fat clay residual soils are not suitable for reuse as fill. Residual soils are not suitable to support fill toe-keys. Fill toe-keys should extend through the residual stratum into weathered rock/bedrock.

3.1.4 Weathered Rock Conditions

Weathered rock is defined herein as materials which retain their parent bedrock's bedding but are soft/weathered enough to be sampled using SPT methods. Weathered rock was encountered beneath the residual soil strata in all boring locations excluding the infiltration test borings, as they were terminated prior to encountering weathered rock. The weathered rock ranged in thickness from approximately 0.2 to 9.1 feet. The weathered rock generally consisted of completely to highly weathered limestone, shale, and sandstone. The base of the weathered rock stratum was defined by auger and/or sample refusal on bedrock and ranged in depth from approximately 7.5 to 22.2 feet bgs. Weathered rock was directly underlain by bedrock.

CEC anticipates weathered rock will be encountered during excavations to grade the site and for fill toe-keys, as well as during proposed building foundations and floor slabs.

Weathered rock is suitable to support new fills, building/retaining wall foundations, and floor slabs, provided they are prepared in accordance with the recommendations provided herein. Fill toe-keys should be seated in weathered rock for the proposed pad, stormwater feature, and access road fill slopes. Excavations through weathered rock will likely be possible using conventional earthwork techniques. However, the presence of harder beddings and the use of more extensive earthwork methods (e.g., ripper-teeth, hoe-rams) should be anticipated. CEC anticipates excavated weathered rock materials will be suitable for reuse as structural fill provided they are

utilized outside of the proposed building footprint, sized and moisture conditioned in accordance with the recommendations indicated herein. Non-expansive weathered rock maybe reused as fill within the building footprint if ground improvements such as grout piers/stone columns are utilized to support the foundation/floor slab.

3.1.5 Bedrock Conditions

The top of bedrock is defined by CEC as the depth at which 50 blows or more are required to drive the sampling spoon 6 inches or less. Bedrock was encountered at depths ranging from approximately 7.5 feet bgs in Boring B-7 to 22.2 feet bgs in Boring B-1, respectively. Eight (8) borings (i.e., B-1, B-6, B-8, B-9, B-10, B-11, B-13, and B-14) were extended into bedrock to total depths ranging from approximately 20.0 to 40.0 feet bgs using NQ-sized rock coring equipment.

Bedrock at the site is primarily comprised of cyclic sequences of highly weathered to fresh, very broken to slightly broken shale, claystone, siltstone, sandstone, and limestone. A layer of carbonaceous shale was encountered near approximate El. 1173 in Boring B-8. Refer to Section 3.1.8 for more information on the expansive potential of the carbonaceous layer. The core recovery measured during the exploration generally ranged from 75 percent to 100 percent, with the exception of two (2) rock core samples from Borings B-6 and B-11 near the top of bedrock, which had recovery values of approximately 44 and 60 percent, respectively. The RQD values of the samples ranged from 0 to 68 percent, indicating very poor to fair quality bedrock (on a scale of very poor, poor, fair, good, and excellent). Recovery and RQD provide a relative indication of rock hardness and quality, as well as a qualitative indication of the capacity of the bedrock to support foundation loads.

Four (4) unconfined compression tests were performed on rock core samples obtained from the sandstone and siltstone strata at Borings B-8, B-9, and B-10. The tests resulted in unconfined compressive strength values of 1,920; 24,150; 17,060; and 11,860 pounds per square inch (psi), respectively, indicating soft to hard bedrock (on a scale of very soft, soft, medium hard, hard, and very hard).

CEC anticipates bedrock will be encountered during earthwork operations, particularly within deeper excavations for the eastern portion of the site for the proposed bus depot building and pad/access road cut slopes. Hard rock removal techniques (i.e., hoe-ramming, pre-splitting, etc.) should be anticipated to excavate the harder, intact sandstone and limestone. Limestone (if encountered) with clay seams may be an indication that hard limestone boulders exist within weathered clay seams, which could result in difficult excavations and or "pull outs" where larger boulders create cavities in excavations. Similar type concerns could also be encountered within cut slopes where completely weathered shale and clay seams are cyclically encountered between harder, more intact sandstone layers.

Non-expansive bedrock is suitable to support foundations, floor slabs, retaining walls, and toe-keys. Expansive bedrock is not suitable to support foundations, floor slabs, and/or retaining walls.

However, boulders interbedded with clay seams may be encountered during foundation, floor slab and retaining wall construction. Similar to cut slopes, the boulders in these locations may cause overdigging and subsequent backfilling to foundation grade. Bedrock is also suitable for reuse as new fill provided they are utilized outside of the proposed building footprint, processed (for gradation), placed, and compacted in accordance with the recommendations presented herein. Non-expansive bedrock may be reused as fill within the building footprint if ground improvements such as grout piers/stone columns are utilized to support the foundation/floor slab. Processing limestone and sandstone boulders may require additional effort in the form of ramming, screening, or crushing.

3.1.6 Mining Conditions

As mentioned in Section 2.2, online mine mapping indicates underground mining activities of the Pittsburgh Coal have likely occurred beneath portions (or the entirety) of the proposed site approximately 100 to 250 feet bgs, and 180 feet bgs the proposed bus depot building.

CEC has reviewed criteria for subsidence risk of structural damage from the document titled *Mining and Physiographic Study*, by A.C. Ackenheil and Associates, dated 1968. Based on this document, there is "slight risk" for structural damage to "small structures" and "moderate risk" for structural damage to "large heavy structures" located between 100 and 200 feet above deep mines, and "slight risk" for all structures greater than 200 feet above deep mines. Therefore, CEC's opinion there is "slight to moderate risk" of structural damage for the proposed bus depot building.

This opinion was developed considering the documented mining technique, the bedrock overburden and the reference. To reduce the risk of future subsidence at the site, mine grouting could be performed to fill void spaces with grout. Though recommendations are not provided in this report for mine grouting, CEC can develop more formal recommendations to reduce the risk of future subsidence at the site.

Deep mining of coal seams, other than the Pittsburgh Coal seam, have not been performed based on the references reviewed by CEC. Mine subsidence insurance through the PADEP may be available for structures located above deep mined sites.

3.1.7 Subsurface Water Conditions

Subsurface water was not encountered immediately after the completion of soil sampling/augering in the test borings, except at 11.8, 4.5, and 5.3 feet bgs in B-12, IT-1, and IT-4, respectively. Water present in borings where rock coring was performed ranged from approximately 8.5 to 25.4 feet bgs; however, CEC notes that water was introduced into the borings for rock coring purposes and is likely not representative of actual groundwater conditions.

Subsurface water will be encountered during construction operations; particularly within toe-key excavations adjacent to the existing streams. The contractor should anticipate the need to incorporate pumps, swales, and other dewatering methods during construction to facilitate earthwork, fill placement, and foundation construction.

3.1.8 Carbonaceous Shale - Expansive Potential and Environmental Consideration

Pyrite is a common iron disulphide mineral that is frequently associated with coal and carbonaceous shale deposits. Weathering, moisture, and oxygen exposure of layered rock formations containing pyrite can generate acid and result in a volume increase within the rock due to chemical reactions where iron oxides, sulfates, gypsum, or other minerals, are formed. This volume increase has been associated with floor slab and foundation heaving. The minimum amount of total sulfur in bedrock that will cause heaving is not known with certainty. Guidelines in the Pennsylvania Department of Transportation Acid Bearing Rock (ABR) policy indicate that rock with less than 0.5 percent total sulfur typically has very low potential for volume increase, rock with between 0.5 percent and 1.0 percent total sulfur has low potential for volume increase, rock with between 1.0 percent and 2.0 percent total sulfur has moderate potential for volume increase, and rock with greater than 2.0 percent total sulfur has high potential for volume increase.

Total sulfur testing was performed on two (2) bedrock samples at approximate El. 1179 and El. 1173 in Boring B-8. The total sulfur content ranged from 0.18 percent to 1.33 percent, respectively. Based on these results, CEC concludes the sampled materials have a very low to moderate potential for volume increase. Though the sample with elevated total sulfur content was approximately 6 feet below in elevation of the proposed FFE, pyrite deposits are often discontinuous and isolated and can vary significantly over limited areas. It is CEC's opinion that additional sulfur testing be performed during construction to further evaluate the presence of potential expansive rock and bearing elevations.

Further, CEC recommends acid producing rock (APR), as identified visually by dark gray shale and/or by sulfur testing performed during construction, should be segregated and mixed with a sufficient amount of neutralizing materials, such as limestone if encountered during earthwork operations. Recommendations for handling, managing, and treating the aforementioned pyritic and APR materials are presented in the recommendations in Section 4.7. Treated APR materials to remain on-site should be encapsulated in capping soil at the bottom of the deepest areas of fill and outside of the building footprint, if encountered.

3.2 SUBSURFACE PARAMETERS FOR ANALYSES

Following CEC's review of the available site information, laboratory testing data, and geologic references, estimates of internal strength, density, and material properties were developed for the proposed structural fill, imported aggregate, alluvial soil, residual soil, weathered rock, and bedrock strata.

Estimated engineering properties needed to analyze bearing capacity include total unit weight (γ), friction angle (ϕ), and cohesion (c). Estimated engineering properties for settlement analyses include the modulus of elasticity (E_s), and Poisson's ratio (μ). In addition, CEC estimated the lateral coefficients for at rest, active and passive earth pressures (K_o, K_a, and K_p, respectively) for proposed retaining walls. The table below summarizes the estimated engineering parameters for the various strata encountered at the site:

Material Description	γ (pcf)	ϕ (deg)	c (psf)	E_s (ksf)	μ (dim)	K_o(1) (dim)	K_a(1) (dim)	K_p(1) (dim)
Proposed Structural Fill*	130	28	150	500	0.3	0.53	0.36	2.77
Imported Aggregate*	135	32	0	1500	0.3	0.47	0.31	3.25
Alluvial Soil**	115	22	200	150	0.3	0.63	0.45	2.19
Residual Soil**	125	24	300	300	0.3	0.59	0.42	2.37
Weathered Rock	135	32	500	1500	0.35	0.47	0.31	3.25
Bedrock	140	Assumed Incompressible						

* Proposed structural fill and imported aggregate values were estimated assuming the materials are comprised of and are placed in accordance with the recommendations indicated in this geotechnical report.

** CEC does not recommend the proposed building foundations be constructed on/above alluvial soils and/or residual soils.

(1) Values were estimated from friction angle correlations.

3.3 BEARING CAPACITY AND SETTLEMENT ANALYSES

3.3.1 Bus Depot Building

CEC was not provided with anticipated loading conditions for the proposed additions. Allowable settlement criteria were not provided for the proposed building additions

development. However, CEC assumed typical maximum total and differential settlements of 1-inch and 0.5-inch over 50 feet, respectively. Settlement analyses were performed using assumed loading conditions, as well as the assumed settlement criteria indicated above. CEC developed the following conclusions:

The western portion of the proposed building will require proposed fill materials up to approximately 9 feet thick to achieve the proposed FFE of approximately 1179.33. In these areas, proposed structural fill is anticipated to be encountered at proposed shallow foundation bearing elevation. Weathered rock/bedrock is anticipated to be encountered in the eastern portion of the building at or near shallow foundation bearing elevation, as approximately indicated on Figure 2. CEC's analyses indicate the proposed structure will exceed allowable differential settlement criteria if the shallow foundations span multiple bearing strata. As such, CEC concludes the foundations should bear on:

- Shallow foundations on weathered rock/bedrock;
- Shallow foundations on CLSM or PennDOT 2A gradation aggregate (see Sections 3.3.2 and 4.8 regarding settlement of aggregate) placed in overexcavations extending to weathered rock. CEC anticipates weathered rock may be as deep as 20 feet below FFE in the western portion of the building. This may make overexcavations cost-prohibitive or unfeasible; and/or
- Shallow foundations on ground improvements (grout piers or stone columns) extending to weathered rock. The use of grout piers or stone columns could be considered on the western portion of the building where weathered rock will be encountered at deeper depths.

Foundations for the proposed building bearing on weathered rock, CLSM or imported aggregate extended to weathered rock may be designed using an allowable bearing capacity of 3,000 psf. The allowable bearing capacity of grout piers and/or stone columns are typically determined by a specialty contractor as part of their final design. However, based on CEC's experience these type of ground improvements can typically facilitate shallow foundations designed using an allowable bearing capacity of 3,000 psf.

CEC notes that placement of up to 20 feet of PennDOT 2A aggregate in overexcavations beneath the building will result in settlement overtime due to the settlement of the aggregate beneath its self weight. This settlement (as evaluated by settlement monitoring) should be allowed to dissipate prior to foundation and floor slab construction.

3.3.2 Settlement Due to Fill Placement

Based on CEC's experience, fills greater than 10 feet thick can result in excessive settlement over time due to settlement beneath its self-weight. The settlement is preliminarily anticipated to dissipate over a period of several [i.e., one (1) to three (3)] weeks to several months. This applies to settlement of aggregate placed to backfill proposed overexcavations beneath the building footprint, if applicable. This settlement can lead to total- and/or differential-settlement related distresses to the proposed building. This settlement (as evaluated by settlement monitoring) should be allowed to dissipate prior to foundation and floor slab construction.

Similarly, consideration for total and differential settlement to utilities and/or other sensitive features should be considered due fill thicknesses up to 24 feet elsewhere onsite. Care/consideration should be taken for any proposed utility/piping connections at this interface, as these settlements may impact the performance of utilities, the connections/joints, etc. If deemed necessary, settlement monitoring may also be performed at critical locations of the site in areas of maximum fills.

3.4 SEISMIC SITE CLASS

CEC estimated the seismic site class for the proposed foundations using the 2015 International Building Code (IBC) criteria. Based on the information obtained during the geotechnical explorations, geologic references, and the anticipated grading conditions, CEC recommends designing structures using Seismic Site Class C.

The maximum considered earthquake spectral response acceleration is based on the anticipated peak ground motion for a respective area with a 2 percent probability of exceedance within a

50-year period. The following design spectral response parameters at short (S_{DS}) and 1-second (S_{D1}) periods were estimated based on the site-specific evaluation for Site Class C.

Seismic Site Class	S_{DS}	S_{D1}
C	0.087	0.060

3.5 SLOPE STABILITY

CEC performed iterations of slope stability analyses at critical proposed slope locations. Slope stability analyses were performed using both Spencer and Morganstern GLE Methods for circular and non-circular surfaces in the computer modeling program SLIDE v9.038 (Rocscience, Inc. 2025). These methods utilize a limiting equilibrium approach to calculate the FOS of a sliding mass along a circular or planar surface. A slope FOS is determined by the slope's internal shear strength (shear forces resisting failure) divided by the downslope driving forces. FOS values must exceed 1.5 for permanent (long-term) conditions per typical industry standard.

CEC developed and analyzed representative cross-section profiles at cut and fill slopes using information obtained from the subsurface exploration, existing topography, and the proposed grading plan presented on Figure 2. CEC incorporated assumed traffic and building surcharge loads where necessary. Groundwater was conservatively modeled to be located at the existing ground surface or where encountered within the test borings.

CEC's analyses were performed at the deepest cuts, highest fills, and critical stormwater feature locations. Based on our stability analyses, CEC anticipates the proposed cut and fill slopes will achieve a FOS of 1.5 if constructed to the grades shown on the attached plan, provided the earthwork and the slopes are constructed in accordance with the recommendations presented herein. Toe-keys, compaction keys, and drainage should be incorporated into the slope construction.

4.0 RECOMMENDATIONS

CEC presents the following recommendations for the design of earthwork, building foundations, floor slabs, retaining wall, site drainage, and other applicable geotechnical considerations for construction. The recommendations provided herein are based on the proposed site layout, FFE, and grading information for construction shown on Figure 2. If the grading/layout changes from that indicated herein, it is imperative that CEC review the information and revise the recommendations indicated herein as necessary.

4.1 SITE DEVELOPMENT AND EARTHWORK

4.1.1 Preparation for New Fill

Clear and grub vegetation, and strip topsoil prior to earthwork operations. Do not reuse vegetation, topsoil, or root material as structural fill. Topsoil may be stockpiled for reuse in landscaping applications. A CEC representative should be present to observe conditions during stripping operations to verify the recommendations herein are applicable.

Proofroll all subgrade areas in which soil is exposed prior to placement of fill using a fully-loaded triaxle dump truck with a minimum static weight of 20 tons or similar equipment. Subgrades that display elasticity or deformation under the weight of the proofrolling equipment must be removed to firm, non-yielding surfaces and replaced with suitable fill material, or otherwise stabilized. Overexcavate/stabilize soils per the direction of CEC field personnel. Backfill overexcavations in accordance with the fill placement recommendations indicated herein.

4.1.2 Suitable Fill, Fill Placement and Compaction

Structural Fill - General Site

Soils suitable for use as structural fill (not including backfill for retaining walls, nor for filling beneath the proposed building footprint – refer to Section 4.4) include soils with a USCS

classification of GW, GP, GM, GC, SW, SP, SM, and SC (or combinations thereof) that are within their optimum moisture range, or controlled low strength material in accordance with the recommendations herein. CL soils may be utilized as structural fill provided the LL is less than 45 percent, the PI is less than 25 percent and the fines content of the material does not exceed 70 percent. Do not use soils/rock that contain more than 3 percent of organic material by volume as structural fill. CEC does not recommend using CL exceeding the criteria indicated above nor CH, MH, or ML soils as structural fill. If unsuitable soil classifications are encountered during earthwork operations, they should be mixed/blended with granular materials so they do not exceed 25 percent of the fill materials (by volume).

Structural Fill – Beneath Building Footprint

CEC notes that structural fill materials specified in this section should only be placed beneath the building footprint if ground improvements (stone columns or grout piers) are selected in proposed fill areas; otherwise PennDOT 2A gradation aggregate or CLSM should be utilized beneath the building footprint.

Do not use rock fill (see below) beneath the building footprint. CEC recommends soils with a USCS classification of GW, GM, GC, SW, SM, and SC (or combinations thereof) that are within their optimum moisture range, placed and compacted in accordance with the recommendations herein. Do not use carbonaceous soils/rock, or other potential expansive materials as fill beneath the building footprint.

Fill Placement and Compaction - Place suitable soil materials as structural fill in controlled and well-compacted fills in horizontal, loose lifts not exceeding 12 inches thick in areas where heavy compaction equipment (e.g., 10-ton vibratory roller) will be used to compact the material and 4 inches thick in areas where hand-operated compaction equipment will be used. CEC recommends maximum particle sizes not exceed 8 inches in areas where heavy compaction equipment is utilized, and CEC recommends maximum particle sizes not exceed 3 inches in areas where hand-operated compaction equipment is utilized. For larger diameter rock materials that do not break down to 8 inches or less, the contractor should anticipate the need to process

these larger particles into suitable fill sizes, or place the larger particles in the deepest areas of fill. Smaller diameter particles should be placed between the larger diameter materials to prevent voids forming, and subsequent settlement.

CEC recommends bedrock fill material that breaks down during excavation, hauling, placement and compaction to a soil-like material be placed and compacted in accordance with the recommendations for soil fill. Rock fill materials that do not break down during excavations should be placed in maximum 24-inch-thick loose layers. Oversize rock should be reduced in size until it can be readily incorporated in a 24-inch thick layer. Rock fill is defined as fill consisting of more than 80 percent of the particle sizes (by weight) between 3 and 12 inches. Perform a minimum of five (5) compaction passes on rock fill material lifts.

The placement of rock should be embedded as deep as possible within the fill. Large rock pieces should be spread out to allow the placement and compaction of soil/rock between them. Rock materials should be distributed by dozing and using compaction equipment with the intent to reduce voids, pockets, and bridging.

Carbonaceous soils and rock, if encountered during construction, should be placed in accordance with the recommendations in Section 4.7.

Each lift of structural fill material, as well as floor slab and overexcavation subgrades should be compacted to a minimum of 100 percent of the maximum dry density and within 3 percent of the OMC as determined by the standard Proctor test (ASTM D698). The contractor should anticipate the need to dry, amend, or stabilize excavated site soils. Segmented pad compactors will be required to adequately compact fine-grained fill material (silts and clays). Use vibratory smooth-drum compactors if the fill material is granular (sands and gravels) with less than 10 percent clays and silts. At the end of each workday, the fill should be compacted with a smooth-drum roller to “seal” the fill and reduce the impact of precipitation. If not possible, divert water to collect in a low point/sump area.

CEC recommends surfaces to receive fill materials (including previously placed lifts) meet the moisture-density criteria indicated above immediately prior to placement of new fill materials. Remove any subgrades damaged by water infiltration prior to additional fill placement. Do not place fill on the sealed surface until it has been scarified by the segmented pad roller or other tracked equipment. Do not place fill on frozen surfaces.

4.1.3 Fill Testing

Prior to fill placement, the materials to be used for structural fill should be submitted to a qualified geotechnical laboratory for appropriate testing to confirm suitability. The testing should include at a minimum, sieve analysis, Atterberg limits, moisture content, total sulfur content and standard Proctor testing. Perform remolded direct shear testing at the direction of the geotechnical engineer.

Perform testing on a representative sample of each type of fill material to be used at the site, including imported material. The purpose of the testing is to obtain representative samples of the materials for quality control purposes during construction and to verify the design parameters assumed in Section 3.2. The laboratory test data performed for this Geotechnical Report should be used to supplement the testing performed during construction, but should not be relied on solely.

Perform in-place nuclear density tests (NDTs) a minimum of every 10,000 square feet throughout each lift of fill to monitor the degree of compaction being obtained or a minimum of once per lift for smaller fill areas. Compare maximum dry density and moisture content results to the specified compaction range and moisture content criteria of the most representative standard Proctor test results. "Visual criteria" can be used to determine the suitability of compaction soils; however, CEC recommends visual observation of a proofroll be used to supplement the NDT results, as necessary. Clean coarse-grained, aggregate/cohesionless materials and rock fills may be evaluated on a visual basis. CEC recommends areas that do not meet the specified moisture/density criteria or that "fail" the proofroll be recompacted or

overexcavated and reworked, or stabilized with lime/cement until NDT and visual criteria are met.

4.1.4 Subsurface Drainage

CEC recommends subsurface drains be installed behind proposed basement walls and/or walls non-integral to the building, as well as at areas where seeps are encountered during construction. CEC recommends the installation of a 4-inch diameter polyvinyl chloride (PVC) or high density polyethylene (HDPE) drainage pipe in the aggregate drainage layer to increase the drainage capacity. Slope drains at a minimum grade of 1 percent and outlet the drains beyond the limits of fill placement or into the stormwater system.

Proposed drainage should be coordinated between the civil and structural engineers. Subsurface drains should be connected to the stormwater facilities or should daylight be beyond the limits of fill.

Groundwater may be encountered during excavations for the proposed buildings. CEC recommends sumps and swales or drawdown systems be used to divert groundwater and runoff to isolated low spots of the excavations, if encountered. Groundwater and runoff should be pumped out the excavations as necessary to provide a dry working area. Pumped water should be managed in accordance with local erosion and sedimentation control (E&S) and stormwater management requirements.

4.1.5 Temporary Excavations

CEC anticipated temporary excavations will be necessary during foundation overexcavations. CEC recommends temporary slopes into existing soils be excavated in accordance with any applicable Occupational Health and Safety Administration (OSHA) excavation standards. Excavations deeper than 20 feet require a formal engineering design per OSHA. CEC anticipates some excavations may be in excess of 20 feet deep. The contractor should protect the temporary excavations adjacent to the existing stream and floodway from sloughing to avoid

disturbance to the floodway. The use of dewatering techniques should be anticipated during toe-key construction.

If temporary excavations cannot be "laid-back", CEC recommends temporary shoring system such as sheet piling of similar retaining methods be utilized. If the required slope cannot be achieved based on-site constraints and a shoring system is selected to support below-grade excavations, refer to the lateral pressure parameters presented in Section 3.2 for the design of temporary shoring. Design the temporary excavation supports to resist lateral pressure applied from the soil being retained based on active pressure conditions and appropriate surcharges behind the wall including construction surcharges such as cranes, construction equipment, and stockpiled materials.

4.1.6 Slope Construction

CEC recommends proposed cut and fill slopes be constructed to a maximum gradient of approximately 2H:1V.

CEC recommends toe-keys be constructed at the base of all new fill slopes exceeding 5 feet in height, and CEC recommends the toe-keys be extended into weathered rock/bedrock. The base of the toe-key should be 10 feet wide with drainage on the inside of the toe-key. Toe-keys adjacent to the existing floodway should be backfilled with a minimum of 5 feet thick of AASHTO No. 1 coarse aggregate at the locations indicated on Figure 2. The purpose of this aggregate is to facilitate construction in anticipated wet conditions. CEC recommends temporary excavation measures to prevent sloughing of the excavations adjacent to the floodway should be anticipated as discussed in Section 4.1.5. CEC recommends the subsurface drain consist of a perforated, 4-inch diameter, polyvinyl chloride (PVC) pipe, overlain by a minimum of 2-foot of free draining material (i.e., AASHTO No. 57, AASHTO No. 4, etc.), and wrapped in a geotextile fabric. Slope the base of the toe-keys toward the drain with a minimum slope of 1 percent. Discharge the drains beyond the limits of fill placement [but within the limits of disturbance (LOD)]. The final drain locations should be determined once the grading is finalized. If groundwater is encountered at the base of the toe-key excavation and the proposed drain cannot

daylight within the LOD, the placement of imported aggregate may be required in the bottom of the toe-key.

Cut slopes should be continuously monitored during construction for sloughing/sliding. Any sloughed soils encountered along cut slopes during construction should be overexcavated and backfilled with structural fill materials as recommended herein. Similarly, any boulders that create void spaces in the cut slope should be overexcavated in a manner that allows for backfilling with structural fill in lifts in accordance with the recommendations herein.

Lastly, based on the proposed grading and subsurface conditions encountered within the borings, significant portions of the proposed final grades at proposed cut slope locations will likely consist of exposed weathered rock/bedrock at the surface. As such, specifications pertinent to vegetating these exposed rock areas should be considered by SFSD and the selected contractor, as necessary or otherwise remain unvegetated.

4.2 FOUNDATIONS

CEC recommends the proposed building be supported on:

- Shallow foundations on weathered rock/bedrock;
- Shallow foundations on CLSM or PennDOT 2A gradation aggregate placed in overexcavations extending to weathered rock. The CLSM should have a minimum unconfined compressive strength of 500 psi; or
- Shallow foundations on ground improvements (grout piers or stone columns) extending to weathered rock.

Design foundations supported on weathered rock, or on CLSM or PennDOT 2A aggregate extended to weathered rock using a maximum allowable bearing capacity of 3,000 psf. Further, if PennDOT 2A aggregate is utilized beneath the proposed building footprint in lieu of CLSM or ground improvements, perform settlement monitoring to confirm settlement from fill placement has dissipated prior to foundation and floor slab installation as recommended in Section 4.8.

Grout piers and stone columns are typically designed by a specialty design/build contractor who will determine the spacing, diameter, and depth of the columns. CEC preliminarily recommends designing the building foundations for a maximum allowable bearing capacity of 3,000 psf; however, the allowable bearing capacity values will be determined as part of the formal ground improvement design by controlling the diameter and spacing of the improvements. The type of ground improvement should be considered based on a variety of factors, including performance, cost, limitations and construction considerations. For instance, some ground improvements may have designated zones around them which cannot be disturbed during construction. These zones may not be apparent during construction after the ground improvements are installed. As such, CEC recommends the ground improvement designer collaborate with SFSD, structural and civil designers during the design phase to minimize the likelihood of conflict in the field. Ground improvements with restricted zones may not be suitable in proximity to below grade vaults, pits, utilities, etc.

CEC recommends a minimum/maximum foundation size of 3 feet by 3 feet to 8 feet by 8 feet for square foundations and 2 feet to 4 feet wide for continuous strip foundations. CEC recommends exterior foundations extend to a minimum depth of 42 inches below final, exterior grade for frost protection. Interior and/or heated foundations may be designed to a minimum depth of 24 inches below grade.

The foundation subgrade should be firm, stable, and free of any loose soil, rock, mud, water, or frost. Excavations for foundations should be trimmed by hand following excavation to remove loose material and minimize disturbance to the subgrade soils. Foundation subgrades should not be disturbed or left open longer than 24 hours, or exposed to rain, before structural fill or concrete placement unless a mud mat is used to protect conditions. Saturation of the subgrade soils can cause a loss of strength and increase soil compressibility. Concrete should not be placed on wet or frozen subgrades.

Lastly as an alternative to stone columns and/or grout piers, deep foundations such as auger cast in place (ACIP) piles may be utilized. CEC can provide deep foundations recommendations upon request.

4.3 SLABS-ON-GRADE

CEC anticipates the floor slab on the eastern portion of the building will be directly underlain by weathered rock/bedrock. In these areas, CEC recommends supporting the proposed floor slabs on the weathered rock/bedrock provided it is non-expansive. Perform confirmation testing during construction.

CEC anticipates the floor slab in the central and western portions of the building will be underlain by residual and proposed fill, respectively. For these conditions, CEC recommends the following:

- Overexcavate residual soils to weathered rock and backfill with CLSM, PennDOT 2A aggregate, or approved alternate to floor slab subgrade elevation. CEC recommends settlement monitoring as recommended in Section 4.8 beneath the building footprint prior to floor slab installation if imported aggregate is utilized as backfill; or
- Ground improvements (grout piers or stone columns) extending through proposed fill and residual soils into weathered rock.

In addition to proposed ground improvements if utilized, backfill beneath the floor slabs beneath the building footprint with the non-carbonaceous materials recommended in Section 4.1.2 within fill areas. If potentially expansive materials are encountered at/near floor slab elevations or within other on-site excavation such as utility trenching beneath the floor slab during construction, CEC recommends performing total sulfur testing at a minimum of one (1) test per every 2,000 tons of potential APR material encountered to confirm if the materials are expansive.

If materials exceed tolerable total sulfur limits (i.e., 0.5 percent), the weathered rock/bedrock materials should be overexcavated 3 feet beyond the proposed excavation limits to a depth of 3 feet below where encountered. The overexcavations will limit the potential for heaving and subsequent damage caused by the potentially expansive materials. CEC recommends backfilling using CLSM or imported PennDOT 2A gradation aggregate in cut/overexcavation areas.

Floor slabs constructed using the recommendations provided herein may utilize a modulus of subgrade reaction of 150 pounds per cubic inch. CEC recommends the top 6 inches of the overexcavation (i.e., directly beneath the slab), consist of non-expansive, AASHTO No. 57 gradation aggregate. Isolate floor slabs from columns and load bearing walls. Consult the floor covering manufacturer or installer during design of the floor slab if a moisture-sensitive floor covering is proposed in a humidity-controlled area.

Unreinforced concrete floor slabs will likely be subject to aesthetic cracking and/or localized slab movements. Therefore, depending on the level of risk, SFSD is prepared to assume with regard to the slabs-on-grade, additional construction practices, such as the use of reinforcing steel and/or specialty concrete mixes (i.e., fiber-reinforced, etc.), may be considered as construction alternatives to reduce, but not eliminate, the potential for damage to the slab.

4.4 RETAINING WALL RECOMMENDATIONS

4.4.1 Site Retaining Walls

One (1) exterior retaining wall (not integral to the building) is proposed to facilitate grading for the bus depot structure. The retaining wall should be designed to include (at a minimum) a 2-foot wide granular drainage zone immediately behind the walls with a perforated PVC or HDPE pipe to convey water from behind the walls. The pipe should be tied into the site stormwater drainage system. The retaining walls should be designed using the lateral earth pressure coefficients for the subsurface materials as presented in Section 3.2. The walls should bear on weathered rock, bedrock, or CLSM/PennDOT 2A aggregate, and may be designed using an allowable bearing capacity value of 3,000 psf. Retaining walls should also be designed to consider temporary excavations and their effect on the retained material and to account for any traffic, equipment, building, or construction loading. Retaining walls should also be designed for global stability.

CEC recommends retaining wall construction be staged after or concurrent to the construction of any necessary temporary excavations/backfill operations associated with building foundation

construction. Temporary excavations associated with retaining wall construction, specifically larger excavations associated with geogrid placement, may impact the foundation/basement wall performance of the proposed building.

4.4.2 Building/Basement Retaining Walls

CEC understands the proposed building will include a retaining wall on the eastern side of the building.

CEC recommends the basement retaining walls be designed using at-rest pressure conditions and include a 2-foot wide granular drainage zone immediately behind the wall with a 4-inch diameter, perforated PVC or HDPE pipe immediately behind the wall. The drainage system should be tied to the drainage system exterior to the building. Permanent drainage as well as waterproofing considerations should be incorporated, as recommended in Section 4.1.4. Further, CEC recommends backfilling the wall with AASHTO No. 57 in a controlled manner (placed in lifts) to promote drainage and to limit settlement to features above this backfilled area. Given the height of the wall, settlement of the backfill (even if well compacted and granular) should be anticipated behind the wall.

4.5 PAVEMENT DESIGN AND SUBGRADE PREPARATION

CEC estimated the following traffic loading conditions based on the proposed site development for the purposes of our pavement design:

- CEC has assumed the number of buses per day is approximately 82 buses based on the proposed number of bus parking stalls in the proposed site layout. CEC's design was based on 82 empty buses traversing in/out of the access drives two (2) times per day, five (5) days per week, for 40 weeks per year, for 20 years. Additionally, CEC assumed 50 empty buses per week traversing in/out of the access drives for after-school/evening activities, 52 weeks per year, for 20 years;

- CEC also assumed 100 personal vehicles per day for drivers and staff traversing in/out of the access drives two (2) times per day, five (5) days per week, for 40 weeks per year, for 20 years. To account for after hours and summer/weekend events, CEC estimated an additional 100 personal vehicles per week for 52 weeks per year, for 20 years;
- CEC assumed one (1) garbage truck traversing in/out of the access drives two (2) times per day, one (1) day per week, for 52 weeks per year, for 20 years;
- CEC assumed a design life of 20 years assuming 30 percent growth over the design life; and
- CEC assumed a California Bearing Ratio (CBR) of 3.

DRAW and SFSD should confirm these assumptions are correct.

Pavement subgrades should be cleared of any construction debris, organic matter, and other deleterious or compressible materials. Pavement construction should not proceed if wet subbase and subgrade conditions are present at the site. The subgrade should be proofrolled in accordance with the recommendations indicated in Section 4.1.1. Any subgrade areas that display excessive elastic deformation or rutting under the weight of the proofroll should be overexcavated and replaced with new fill material. Overexcavation should be extended to a depth at which the subgrade displays minimal elasticity under proofroll. Large diameter stone (e.g., AASHTO No. 1) can typically be utilized at the base of the overexcavation to "bridge" the existing subgrade materials and limit the depth of overexcavation. CEC recommends all pavement subgrades be sloped toward stormwater features, away from the center of the roadways. Subgrade drains should be incorporated into the pavement section if seeps/springs are identified during construction operations. Subsurface pavement drains should be tied-in to existing/proposed stormwater features.

For all new pavements (and concrete slabs-on-grade), the subgrade should be compacted to a minimum of 100 percent of the MDD, within ±3 percent of the OMC as determined by standard Proctor testing after the subgrade is prepared.

CEC recommends the pavement base course be constructed of an untreated, free-draining, crushed aggregate or non-expansive slag meeting PennDOT 2A (or similar). Place the aggregate in lifts not exceeding 6 inches in depth and compacted to 100 percent of the MDD and within ±3 percent of the OMC as determined by standard Proctor testing (or PennDOT test equivalent).

Based on PennDOT criteria, the asphalt binder and wearing courses should consist of 25- and 12-millimeter (mm) design mixes, respectively. Alternatively, a 9.5-millimeter (mm) wearing course may be utilized. The asphalt mixtures should meet PennDOT Superpave criteria. All flexible pavements should be constructed in general accordance with PennDOT Specification (Publication 408). In addition, pavement construction should meet the requirements of PennDOT as well as the local and county requirements. In the event of a conflict between the standards/specifications, CEC recommends the more stringent criteria be utilized.

At a minimum, CEC recommends the following section for new pavement areas:

Course Layer	Light-Duty (in.)	Heavy-Duty (in.)
Asphalt Wearing Course	2	2
Asphalt Binder Course	3	4
Crushed Aggregate Subbase	6	8

Light-duty sections should be used in areas subject to personal vehicle traffic and heavy-duty sections should be used in areas subject to heavier traffic loads (i.e. bus travel routes).

If concrete pavements are opted for use in dumpster pads, aprons, or loading areas, CEC recommends a minimum 6-inch Portland cement concrete section over 8 inches of aggregate base material placed in accordance with the recommendations herein. At a minimum, steel reinforcement should be provided at rigid pavement joints or within areas of concrete pavement.

CEC recommends construction equipment be prevented from traversing the pavement areas after the binder and/or wearing courses have been placed. Construction traffic can severely weaken

and fatigue pavement after it has been placed. Most pavements are not designed to account for heavy construction equipment traffic.

CEC emphasizes the importance of establishing and utilizing a continuous pavement maintenance program. Proper maintenance and repairs (as necessary) of the pavement and adjacent stormwater controls are critical to the performance and longevity of asphalt surfaces. Crack repairs, seal coats, and overlays are typically required over the course of an asphalt pavement's design life. In particular, numerous modes of pavement-related failures and damages are caused by water/moisture. Sample/guideline maintenance programs are available from the Federal Aviation Administration, state DOTs, etc.

4.6 WEATHER CONSIDERATIONS

Fill may be difficult to compact if the moisture content is greater than the OMC. In addition, inclement weather will cause additional difficulties for drying and working the material. To reduce the effects of precipitation, stockpiles of fine-grained fill should be covered with plastic sheeting or sealed with a smooth-drum roller if inclement weather is expected. During inclement weather or winter and spring construction, it may not be possible to reduce the moisture content of fine-grained soil, in particular the high plasticity clays encountered in various borings. If earthwork is performed during winter months or inclement weather, the contractor should expect a reduction in productivity. Therefore, CEC recommends performing construction during summer or early fall to reduce the impact of weather on the contractor's productivity. The moisture content of soil can change depending on the season and other climatic factors. If earthwork construction is performed during winter or spring months, the contractor should anticipate the need to import select borrow material and waste wet and unsuitable soil off site. Lime or cement may need to be blended with wet soils to facilitate earthwork construction during inclement weather conditions.

4.7 TREATMENT OF ACID PRODUCING ROCK

CEC recommends APR, as identified visually by dark gray shale, and/or by sulfur testing performed during construction, be handled in accordance with this section, if encountered. APR should be segregated and mixed with a sufficient amount of neutralizing materials, such as limestone if encountered during earthwork operations.

If carbonaceous shale is identified during construction, one (1) 5-gallon bucket full of material should be collected for every 2,000 tons of potential pyritic or APR materials. Per PADEP guidance, the amount of limestone (LS) needed to neutralize pyritic materials/APR should be calculated utilizing the equation that follows:

$$(\text{Acres of APR}) * (\text{Thickness in ft}) * \frac{\text{Tons APR}}{\text{Acre} - \text{Ft}} * \%\text{S} * \frac{62.5 \text{ Tons}}{1{,}000 \text{ Tons}} = \text{Tons of LS}$$

Neutralized APR to remain on-site should be encapsulated in capping soil that are at least 20 percent fine-grained (i.e., passing the No. 200 sieve), a plasticity index of greater than 3, and compacted in accordance with the recommendations presented herein. The materials should be placed at the bottom of the deepest areas of fill and outside of the building footprint, if encountered with a minimum 4-foot-thick cap.

4.8 SETTLEMENT MONITORING

The recommendations in Sections 4.2 and 4.3 include backfilling overexcavations with imported aggregate as a potential approved alternative. However, the use of imported aggregate to backfill the building footprint may induce excess settlement. As such, CEC recommends supporting structures in areas of thickest fill placement (e.g., the western portion of the building as shown on Figure 2) only after settlement resultant from fill placement has dissipated.

Based on the anticipated thickness of the proposed fill materials beneath the structures (i.e., estimated at a maximum of about 6 feet), settlement due to fill loads is preliminarily

anticipated to dissipate over a period of several [i.e., one (1) to three (3)] weeks to several months. As such, CEC recommends settlement monitoring be performed until settlement of the existing soils and fill beneath its self-weight tapers to less than approximately 0.1-inch over four (4) consecutive readings.

Settlement monitoring should be performed at a minimum of three (3) locations within structural footprints at the site in areas of maximum fills in the western portion of the proposed building. Surveyed readings should be performed on an approximate weekly basis for a minimum of four (4) weeks prior to foundation construction. CEC should review and analyze the survey information to assess if settlement resultant from fill placement is generally complete.

4.9 CONSTRUCTION PHASE SERVICES

4.9.1 Geotechnical Monitoring

Geotechnical engineering is a two (2)-phase process. Phase 1 includes a subsurface exploration, analysis, and preparation of a report presenting final conclusions and recommendations. This report represents the results of Phase 1. Phase 2 of the geotechnical engineering process involves developing construction drawings and technical specifications, observing the conditions encountered in the field during construction, assessing the appropriateness of the recommendations, observing that the actual subsurface conditions do not differ, and confirming CEC's recommendations are being correctly implemented.

The recommendations presented in this report are contingent on CEC preparing/reviewing/observing/testing:

- Foundation plans;
- Stripping of site topsoil material;
- Laboratory testing on proposed fill materials;
- The suitability of excavated materials for reuse as structural fill;
- Proofrolling and new fill subgrade conditions;

- Fill placement and compaction, including performing nuclear density testing on the fill materials;
- Overexcavations and backfill (where necessary) beneath the proposed building foundations and for toe-key locations;
- Installation of ground improvements;
- Shallow foundation subgrades and construction;
- Slab-on-grade overexcavations, subgrades, and construction; and
- Installation of stormwater and drainage features.

4.9.2 Special Inspections

Chapter 17 of the IBC states that "the owner or the registered design professional in responsible charge acting as the owner's agent should employ one (1) or more Special Inspectors to provide inspections…" during building construction. During the design phase, the architect or other design professional is required to submit a Statement of Special Inspections for Building Official approval. The Statement of Special Inspections lists the items that are to be inspected. CEC recommends that the following geotechnical items from the IBC, which are associated with building construction and indicated frequencies of inspection, be included on the Statement of Special Inspections:

Inspection Task	Frequency
Observe shallow foundation construction and overexcavations/ground improvements and maintain complete and accurate records.	Continuous during installation.
Verify materials below floor slabs are adequate to achieve the recommended bearing capacity.	Periodically, as necessary, to observe all subgrades.
Verify excavations are extended to proper depth and have reached proper bearing material.	Periodically, as necessary, to observe all floor slab/pavement/ subgrade excavations.
Verify use of proper materials, densities, and lift thickness during placement and compaction of controlled fill.	Continuous during fill placement.
Prior to placement of controlled fill, observe subgrade and verify that site has been properly prepared.	Periodically, as necessary, to observe all subgrade areas.

Additional special inspections and field testing in accordance with Chapter 17 are required for reinforcing steel, concrete, etc., and should be specified by the structural engineer or other design professionals.

CEC recommends that field inspectors assigned to the project are qualified and certified to perform the specified inspections. The International Code Council (ICC) provides training and certification for Special Inspectors. CEC recommends that the project specifications require ICC certificates for special inspectors.

In order to receive an occupancy permit at the end of the project, a final report may be required stating that all of the construction items listed on the Statement of Special Inspections were constructed and completed in compliance with project documents.

4.10 MOLD PREVENTION

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, such strategies should be devised for the express purpose of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight. A number of mold prevention strategies focus on keeping building surfaces dry since just tiny amounts of water or moisture can lead to the development of severe mold infestations. While groundwater and drainage issues have been addressed as part of this report, CEC is not a mold prevention consultant. None of the services performed as part of our services were designed or conducted for the purpose of mold prevention. Properly implementing the recommendations conveyed in this report may not be sufficient to prevent mold from growing in or on the structures involved. CEC recommends an experienced mold prevention consultant be retained to prevent or minimize mold problems.

5.0 REPORT LIMITATIONS

The scope of this report is limited to the specific project and location described, and our descriptions of the project represent our understanding of the significant aspects relevant to soil, rock, and foundation construction. In preparing this report, CEC's professional services have been performed, findings obtained, and opinions presented in accordance with generally accepted engineering principles and practices. Appendix A contains a document entitled, "Important Information About This Geotechnical-Engineering Report." This document further explains the realities of geotechnical engineering and limitations that exist in evaluating geotechnical issues. No warranty, express or implied, is made or intended by rendition of these services or by furnishing oral or written reports of findings made. This report was prepared for the exclusive use of SFSD.

The analyses and recommendations presented in this report are based upon the data obtained from the borings at the location indicated in the plan (Figure 2) and from any other information discussed in the report. Information presented regarding conditions at the boring locations is based on the engineering judgment of CEC and could be interpreted differently by others. In the performance of the subsurface exploration, specific information is obtained at specific locations at specific times. However, it should be recognized, variations in soil, rock, and groundwater conditions exist on most sites and may vary adjacent to the boring locations. The nature and extent of the variations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the opinions presented after performing on-site observations during the construction period and noting the characteristics of any variations.

TABLES

Table 1
Subsurface Investigation Summary

Notes:

-- Not Obtained / Not Encountered.

(1) All thicknesses, depths, and elevations recorded are approximate.

(2) Water level readings were recorded at the completion of soil sampling and coring.

(3) Bedrock sampling occurred via NQ-Core.

BORING INFORMATION [1]			SOIL THICKNESS [1]				BEDROCK [1]				WATER LEVELS [1][2]		
Test Boring	Existing Ground Elevation (ft)	Boring Depth (ft bgs)	Topsoil (ft)	Alluvium (ft)	Residuum (ft)	Soil Total (ft)	Weathered Rock/Bedrock Thickness (ft)	Top of Weathered Rock/Bedrock Elevation (ft)	Bedrock Thickness [3] (ft)	Top of Bedrock Elevation (ft)	After Soil Sampling (ft bgs)	At End of Coring (ft bgs)	≥ 24 Hours Elevation (ft)
B-1	1156	27.2	0.3	17.7	4.0	22.0	0.2	1134.0	5.0	1133.8	Dry	25.2	Backfilled Immediately
B-2	1143	18.8	0.3	6.7	8.3	15.3	3.5	1127.7	--	1124.2	Dry	N/A	Backfilled Immediately
B-3	1172	13.4	0.5	--	8.5	9.0	4.4	1163.0	--	1158.6	Dry	N/A	Backfilled Immediately
B-4	1115	10.3	0.6	5.4	3.0	9.0	1.3	1106.0	--	1104.7	Dry	N/A	Backfilled Immediately
B-5	1162	12.1	0.5	--	8.5	9.0	3.1	1153.0	--	1149.9	Dry	N/A	Backfilled Immediately
B-6	1137	24.0	0.5	--	15.3	15.8	3.0	1121.2	5.2	1118.2	Dry	Dry	Backfilled Immediately
B-7	1176	7.5	0.5	--	2.5	3.0	4.5	1173.0	--	1168.5	Dry	N/A	Backfilled Immediately
B-8	1200	30.0	0.4	--	17.6	18.0	1.0	1182.0	11.0	1181.0	Dry	23.8	Backfilled Immediately
B-9	1210	20.0	0.4	--	8.6	9.0	0.2	1201.0	10.8	1200.8	Dry	8.8	Backfilled Immediately
B-10	1234	40.0	0.5	--	8.5	9.0	1.0	1225.0	30.0	1224.0	Dry	25.4	Backfilled Immediately
B-11	1220	20.0	0.5	--	9.3	9.8	5.5	1210.2	4.7	1204.7	Dry	8.5	Backfilled Immediately

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Subsurface Investigation Summary

Notes:

-- Not Obtained / Not Encountered.

(1) All thicknesses, depths, and elevations recorded are approximate.

(2) Water level readings were recorded at the completion of soil sampling and coring.

(3) Bedrock sampling occurred via NQ-Core.

BORING INFORMATION [1]			SOIL THICKNESS [1]				BEDROCK [1]				WATER LEVELS [1][2]		
Test Boring	Existing Ground Elevation (ft)	Boring Depth (ft bgs)	Topsoil (ft)	Alluvium (ft)	Residuum (ft)	Soil Total (ft)	Weathered Rock/Bedrock Thickness (ft)	Top of Weathered Rock/Bedrock Elevation (ft)	Bedrock Thickness [3] (ft)	Top of Bedrock Elevation (ft)	After Soil Sampling (ft bgs)	At End of Coring (ft bgs)	≥ 24 Hours Elevation (ft)
B-12	1187	14.2	0.3	--	11.7	12.0	2.2	1175.0	--	1172.8	11.8	N/A	Backfilled Immediately
B-13	1194	25.1	0.4	--	8.6	9.0	6.1	1185.0	10.0	1178.9	Dry	Dry	Backfilled Immediately
B-14	1194	20.1	0.5	--	5.5	6.0	9.1	1188.0	5.0	1178.9	Dry	12.7	Backfilled Immediately
B-15	1198	15.2	0.5	--	14.5	15.0	0.2	1183.0	--	1182.8	Dry	N/A	Backfilled Immediately
B-16	1216	16.2	0.5	--	14.5	15.0	1.2	1201.0	--	1199.8	Dry	N/A	Backfilled Immediately
IT-1	1126	6.0	0.5	5.5	--	6.0	--	--	--	--	4.5	N/A	4.5
IT-2	1127	6.0	0.4	5.6	--	6.0	--	--	--	--	Dry	N/A	Backfilled Immediately
IT-3	1135	5.0	0.6	4.4	--	5.0	--	--	--	--	Dry	N/A	Backfilled Immediately
IT-4	1119	6.0	0.5	2.0	--	2.5	3.5	1116.5	--	--	5.3	N/A	5.3
IT-5	1143	6.0	0.2	--	5.8	6.0	--	--	--	--	Dry	N/A	Backfilled Immediately
IT-6	1182	6.0	0.3	--	5.7	6.0	--	--	--	--	Dry	N/A	Backfilled Immediately

Table 1
Subsurface Investigation Summary

Notes:

-- Not Obtained / Not Encountered.

(1) All thicknesses, depths, and elevations recorded are approximate.

(2) Water level readings were recorded at the completion of soil sampling and coring.

(3) Bedrock sampling occurred via NQ-Core.

BORING INFORMATION [1]			**SOIL THICKNESS** [1]				**BEDROCK** [1]				**WATER LEVELS** [1][2]		
Test Boring	Existing Ground Elevation (ft)	Boring Depth (ft bgs)	Topsoil (ft)	Alluvium (ft)	Residuum (ft)	Soil Total (ft)	Weathered Rock/Bedrock Thickness (ft)	Top of Weathered Rock/Bedrock Elevation (ft)	Bedrock Thickness [3] (ft)	Top of Bedrock Elevation (ft)	After Soil Sampling (ft bgs)	At End of Coring (ft bgs)	≥ 24 Hours Elevation (ft)
IT-7	1170	2.0	0.5	--	1.5	2.0	--	--	--	--	Dry	N/A	Backfilled Immediately
IT-8	1164	4.0	0.5	--	3.5	4.0	--	--	--	--	Dry	N/A	Backfilled Immediately
IT-9	1162	4.0	0.5	--	3.5	4.0	--	--	--	--	Dry	N/A	Backfilled Immediately
IT-10	1170	5.0	0.5	--	4.5	5.0	--	--	--	--	Dry	N/A	Backfilled Immediately
Total		**364.1**				**232.4**	**50.0**		**81.7**				

Table 2
Laboratory Testing Summary

Notes:

-- Test was not performed / Not Applicable.

(1) Atterberg Limits performed on portion of sample passing #40 sieve.

(2) Optimum moisture content and maximum dry density based on standard Proctor ASTM D698.

(3) Direct shear testing was performed on an undisturbed sample with confining pressures of 0.5, 1.0, and 2.0 tsf.

BORING INFORMATION				SOIL CLASSIFICATION							SOIL DENSITY		DIRECT SHEAR		ROCK TESTING	
Test Boring	Sample Depth (ft bgs)	Sample Type	Sample Origin	USCS Classification	USCS Group Symbol	Moisture Content (%)	% Passing No. 200 Sieve (%)	Liquid Limit(1)	Plastic Limit(1)	Plasticity Index(1)	Optimum Moisture Content(2) (%)	Maximum Dry Density(2) (pcf)	Cohesion(3) (psf)	Friction Angle(3) (degrees)	Unconfined Compressive Strength (psi)	Total Sulfur (% weight)
B-1	12.0 - 13.5	Jar	Alluvium	Lean Clay	CL	25.8	86.2	42	20	22	--	--	--	--	--	--
B-1	15.0-16.5	Jar	Alluvium			18.8					--	--	--	--	--	--
B-2	4.5-6.0	Shelby Tube	Alluvium	Lean Clay with Sand	CL	20.0	76.8	36	19	17	--	--	389	25.5	--	--
B-2	6.0-7.5	Jar	Alluvium			28.7					--	--	--	--	--	--
B-2	9.0-10.5	Jar	Residuum			26.9					--	--	--	--	--	--
B-3	3.0 - 4.5	Jar	Residuum	--	--	17.2	--	--	--	--	--	--	--	--	--	--
B-3	6.0 - 7.5	Jar	Residuum	--	--	13.2	--	--	--	--	--	--	--	--	--	--
B-6	9.0-10.5	Jar	Residuum	Lean Clay with Sand	CL	22.1	82.0	29	19	10	--	--	--	--	--	--
B-6	12.0-13.5	Jar	Residuum			19.3					--	--	--	--	--	--
B-8	19.5 - 20.0	Rock Core	Bedrock	--	--	--	--	--	--	--	--	--	--	--	1,920	--
B-8	21.0-22.0	Rock Core	Bedrock	--	--	--	--	--	--	--	--	--	--	--	--	0.18
B-8	25.4 - 26.1	Rock Core	Bedrock	--	--	--	--	--	--	--	--	--	--	--	24,150	--
B-8	27.0-28.0	Rock Core	Bedrock	--	--	--	--	--	--	--	--	--	--	--	--	1.33
B-9	0.0 - 10.0	Bag	Residuum	Lean Clay with Sand	CL	23.1	73.9	43	21	22	18.9	106.0	--	--	--	--
B-9	9.2 - 10.0	Rock Core	Bedrock	--	--	--	--	--	--	--	--	--	--	--	17,060	--
B-10	0.0 - 10.0	Bag	Residuum	Fat Clay	CH	18.7	86.7	50	25	25	19.0	101.1	--	--	--	--

Table 2
Laboratory Testing Summary

Notes:

-- Test was not performed / Not Applicable.

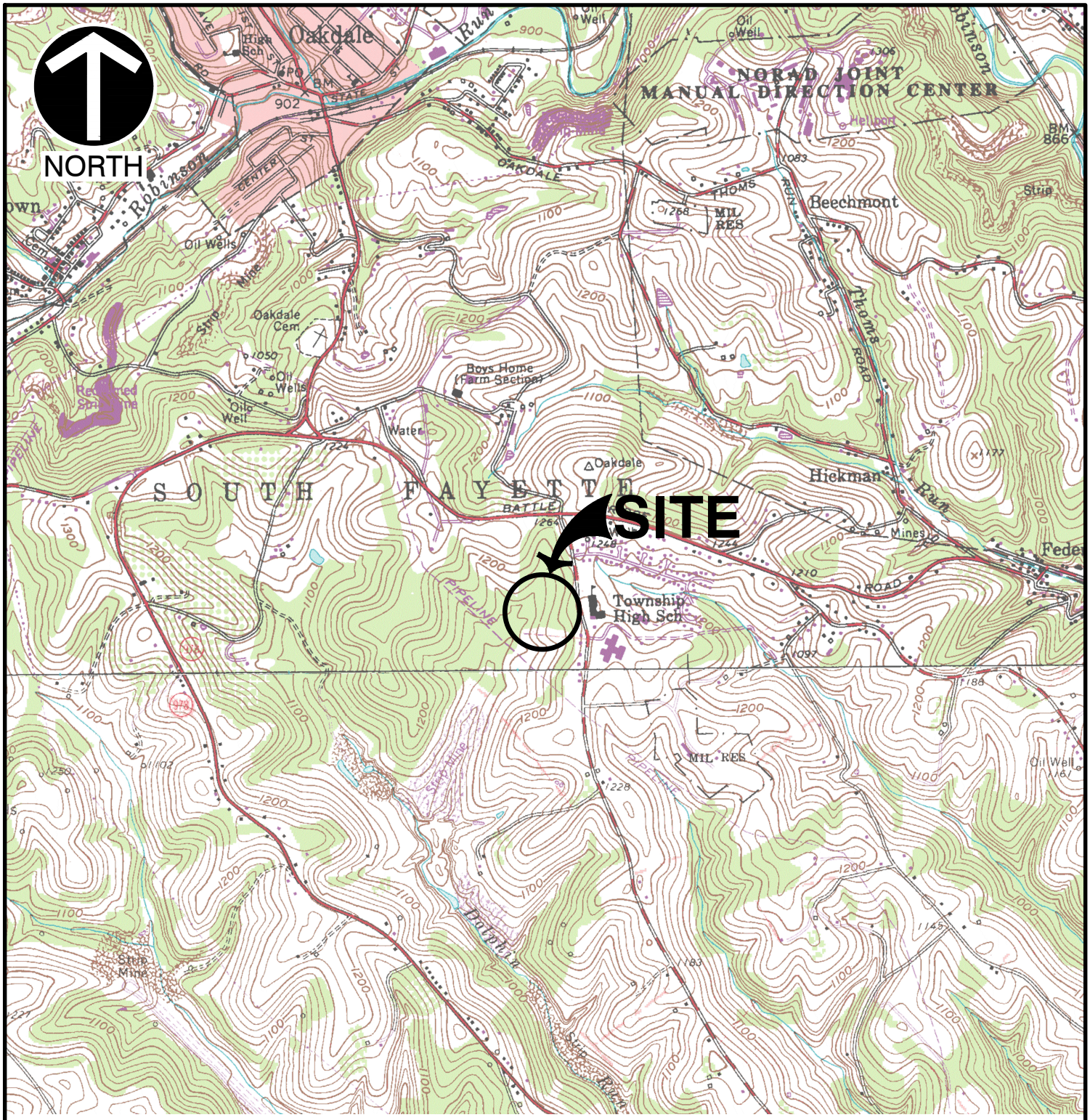
(1) Atterberg Limits performed on portion of sample passing #40 sieve.

(2) Optimum moisture content and maximum dry density based on standard Proctor ASTM D698.

(3) Direct shear testing was performed on an undisturbed sample with confining pressures of 0.5, 1.0, and 2.0 tsf.

BORING INFORMATION				SOIL CLASSIFICATION							SOIL DENSITY		DIRECT SHEAR		ROCK TESTING	
Test Boring	Sample Depth (ft bgs)	Sample Type	Sample Origin	USCS Classification	USCS Group Symbol	Moisture Content (%)	% Passing No. 200 Sieve (%)	Liquid Limit(1)	Plastic Limit(1)	Plasticity Index(1)	Optimum Moisture Content(2) (%)	Maximum Dry Density(2) (pcf)	Cohesion(3) (psf)	Friction Angle(3) (degrees)	Unconfined Compressive Strength (psi)	Total Sulfur (% weight)
B-10	23.4 - 23.8	Rock Core	Bedrock	--	--	--	--	--	--	--	--	--	--	--	11,680	--
B-12	3.0-4.5	Jar	Residuum	Sandy Lean Clay	CL	26.6	63.5	49	25	24	--	--	--	--	--	--
B-12	6.0-7.5	Jar	Residuum			29.8					--	--	--	--	--	--
B-12	9.0-10.5	Jar	Residuum			32.5					--	--	--	--	--	--
B-14	0.0 - 10.0	Bag	Residuum	Lean Clay with Sand	CL	20.8	78.1	44	21	23	19.7	104.3	--	--	--	--

FIGURES



REFERENCE

1. U.S.G.S. 7.5' TOPOGRAPHIC QUADRANGLE OAKDALE, PA, DATED: 1960, PHOTOREVISED: 1990 AND CANNONSBURG, PA, DATED: 1960, PHOTOREVISED: 1979.

SCALE IN FEET

0 2000 4000

*HAND SIGNATURE ON FILE

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SOUTH FAYETTE TOWNSHIP SCHOOL DISTRICT
BUS DEPOT
SOUTH FAYETTE TOWNSHIP
ALLEGHENY COUNTY, PENNSYLVANIA

SITE LOCATION MAP

DRAWN BY:	SCC	CHECKED BY:	TJR	APPROVED BY:	AWL	FIGURE NO.:
DATE:	JUNE 2025	DWG SCALE:	1"=2,000'	PROJECT NO:	336-102	1

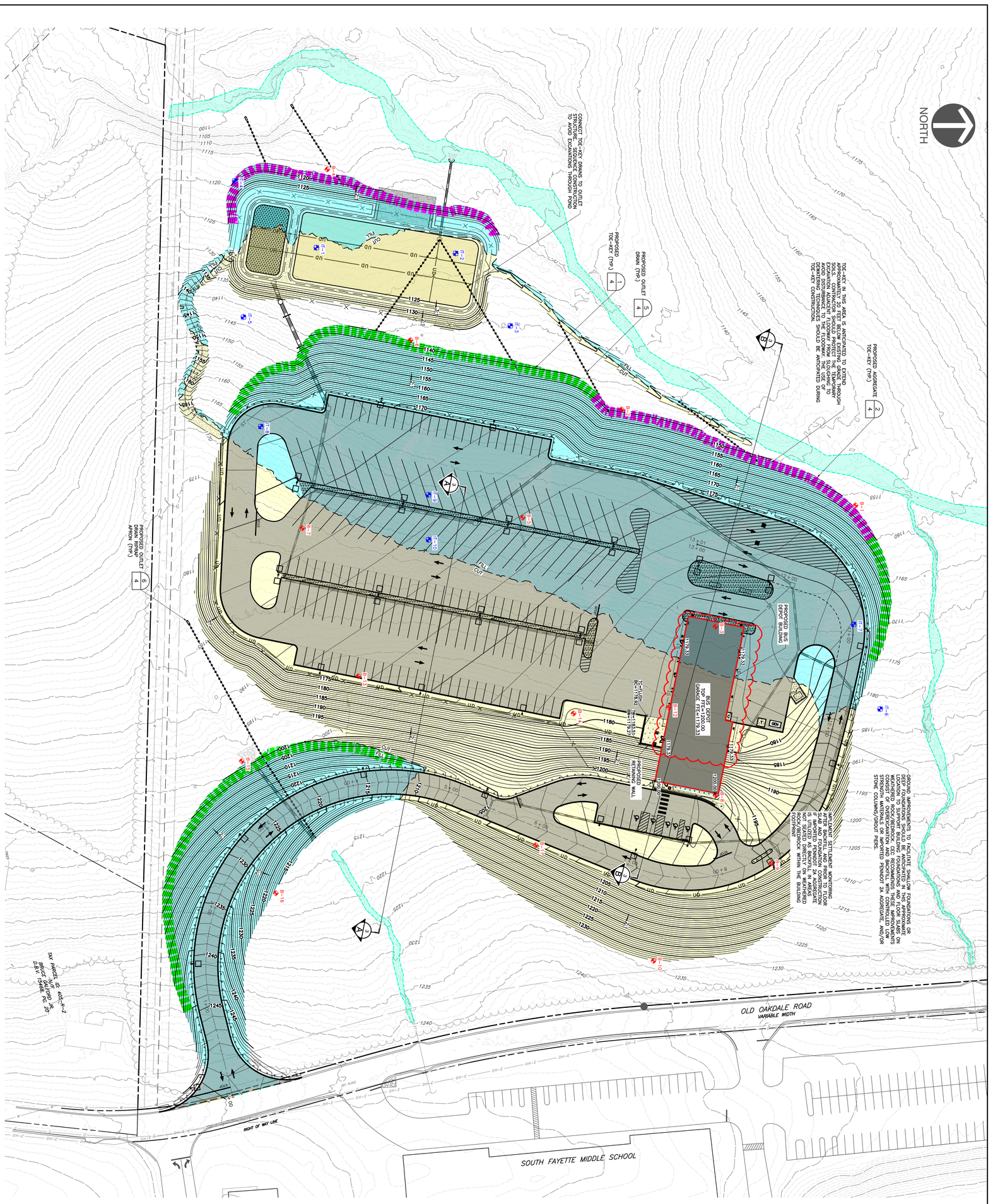
P:\330-000\336-102\-CADD\Dwg\GT02\336102-GT02-SITE LOCATION MAP.dwg{1} LS:(6/6/2025 - lkljucaric) - LP: 6/9/2025 4:44 PM

REFERENCE

1. TOPOGRAPHIC SURVEY FOR SOUTH FAYETTE TOWNSHIP SCHOOL DISTRICT, PREPARED BY: CIVIL & ENVIRONMENTAL CONSULTANTS, INC., DATED: JANUARY 2024.
2. PROPERTY BOUNDARY FROM DRAWING TITLED: SOUTH FAYETTE TOWNSHIP SCHOOL DISTRICT PLAN OF PROPERTY/PLAN OF TOPOGRAPHIC, DRAWING NO. 1 OF 1, PREPARED BY: CIVIL & ENVIRONMENTAL CONSULTANTS, INC., DATED: 05/29/2020

NOTES

1. BORING LOCATIONS SHOWN ARE APPROXIMATE AND WERE MARKED IN THE FIELD USING A HAND OPERATED GLOBAL POSITIONING SYSTEM (GPS) UNIT.
2. BORING LOGS ARE PRESENTED IN APPENDIX B OF GEOTECHNICAL REPORT.
3. SURFACE INFORMATION IN THE BORING LOGS EXIST ONLY AT THE LOCATIONS AND TIMES OF DRILLING. SUBSURFACE CONDITIONS WILL VARY BETWEEN BORINGS.
4. SITE GRADING AND CUT/CUT SHOWN ON THIS PLAN MAY NOT BE FINAL.



LEGEND

EXISTING PROPERTY LINE
EXISTING EASEMENT
EXISTING RIGHT-OF-WAY
EXISTING INDEX CONTOUR
EXISTING INTERMEDIATE CONTOUR
EXISTING FENCE LINE
EXISTING DITCH FLOW LINE
EXISTING STORM PIPE
EXISTING GAS LINE
EXISTING OVERHEAD WIRE
EXISTING TREELINE
100 YEAR FLOODWAY
EXISTING PERENNIAL STREAM
PROPOSED CONCRETE
PROPOSED CURB
PROPOSED SIDEWALK
PROPOSED BUILDING
PROPOSED ASPHALT
PROPOSED FENCE
PROPOSED INDEX CONTOUR
PROPOSED INTERMEDIATE CONTOUR
PROPOSED SLOPE LABEL
PROPOSED SPOT ELEVATION
PROPOSED STORM PIPE
PROPOSED INLET TYPES
PROPOSED UNDERDRAIN
PROPOSED ENDWALL W/ RIPRAP
PROPOSED SINGLE LINE STORM PIPE
INFILTRATION TEST LOCATION
BORING LOCATION
GEOLOGIC CROSS-SECTION LOCATION
CUT/FILL LINE
PROPOSED TOE-KEY
PROPOSED AGGREGATE TOE-KEY
PROPOSED OUTLET DRAIN
AREA OF CUT
AREA OF FILL

SCALE IN FEET
0 40 80

Proj No. 24-S49-01B
Issue Date 06/06/2025

2

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NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY

3600 OLD OAKDALE RD MCDONALD, PA, 15057
SOUTH FAYETTE TOWNSHIP SCHOOL DISTRICT 3680 OLD OAKDALE RD
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BORING AND INFILTRATION TEST LOCATION PLAN

REVISIONS
1 8/15/2025 REVISED GEOTECH REPORT

GEOTECHNICAL REPORT - JUNE 9, 2025

DATE 06/06/2025 DRAWN BY SCC
SCALE AS SHOWN CHECKED BY TJR
PROJECT NO. 24S-1001 APPROVED BY AWL
*AWAITING SIGNATURE ON FILE

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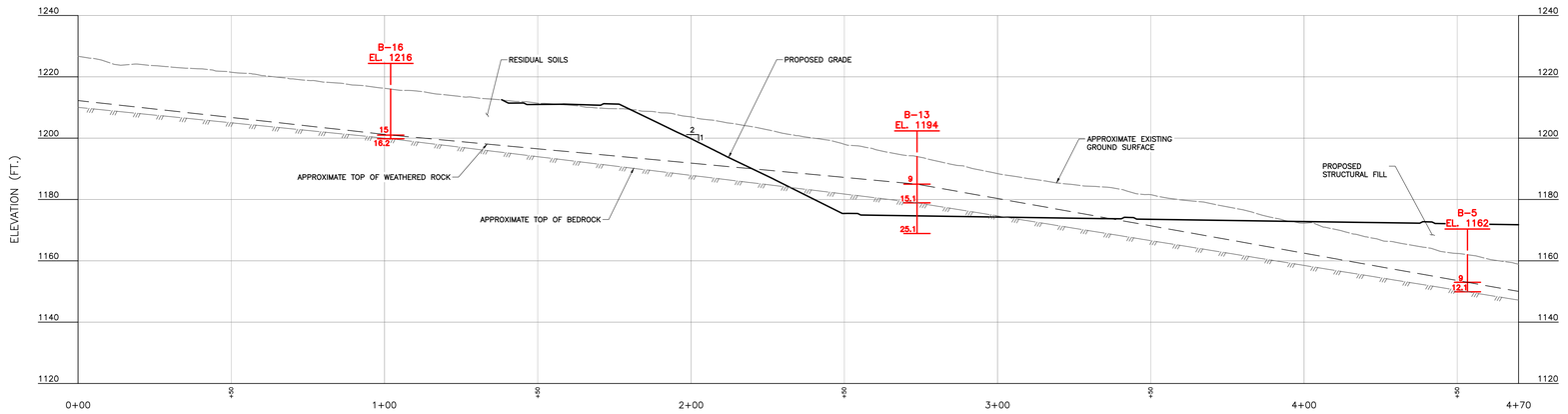


CROSS-SECTION A-A

SCALE H:1"=20'; V:1"=20'

SCALE IN FEET (HORIZONTAL)

0 20 40

SCALE IN FEET (VERTICAL)

0 20 40

CROSS-SECTION LEGEND

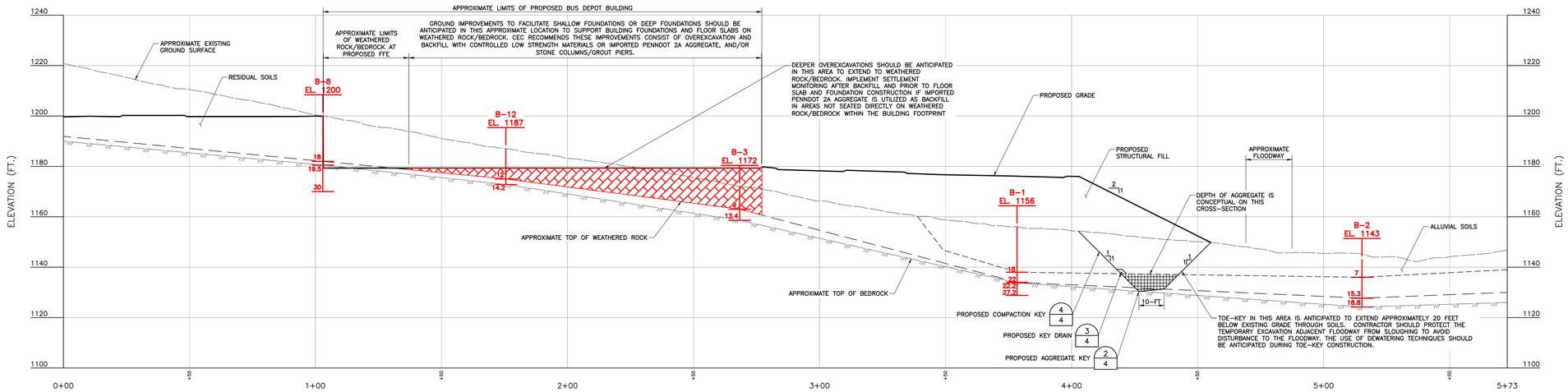
- EXISTING GROUND SURFACE (APPROX.)
- PROPOSED FINISHED GRADE
- APPROXIMATE SUBSURFACE STRATA INTERFACE
- APPROXIMATE TOP OF WEATHERED ROCK
- APPROXIMATE TOP OF BEDROCK

B-1 — BORING NUMBER

10 FT — APPROXIMATE DEPTH BELOW GROUND SURFACE OF STRATA INTERFACE

NOTES

1. CEC BORING LOGS ARE PRESENTED IN APPENDIX B OF THE GEOTECHNICAL REPORT. NOT EVERY STRATUM IS DEFINED/SHOWN ON THE CROSS-SECTION DUE TO THE SCALE OF THE CROSS-SECTION. MORE DETAILED BORING INFORMATION IS PRESENTED ON THE BORING LOGS.
2. BORING LOCATIONS SHOWN ON THE CROSS-SECTION ARE APPROXIMATE AND PROJECTED AS NECESSARY.
3. THE SUBSURFACE INFORMATION PRESENTED HEREIN DEPICTS SUBSURFACE CONDITIONS AT THE TEST BORING LOCATIONS AND AT THE TIME OF DRILLING. SOIL CONDITIONS AT OTHER LOCATIONS MAY DIFFER.
4. THE DEPTHS AND THICKNESSES OF THE SUBSURFACE STRATA INDICATED ON THE PROFILE WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE EXPLORATION BORINGS AND/OR APPARENT SITE FEATURES. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATIONS OF THE EXPLORATION BORINGS AND IT IS POSSIBLE THAT SUBSURFACE CONDITIONS BETWEEN THE EXPLORATION BORINGS MAY VARY FROM THOSE INDICATED.
5. GRADING SHOWN HEREON IS PRELIMINARY AND SUBJECT TO CHANGE.



CROSS-SECTION B-B

SCALE H:1"=20'; V:1"=20'

SCALE IN FEET (HORIZONTAL)

0 20 40

SCALE IN FEET (VERTICAL)

0 20 40

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DATE:	06/06/2025	DRAWN BY:	SCC
SCALE:	AS SHOWN	CHECKED BY:	TJR
CEC PROJECT NO.	24-S49-01B	APPROVED BY:	AWL

*HAND SIGNATURE ON FILE

REVISIONS
1 6/13/2025 REVISED GEOTECH REPORT

GEOTECHNICAL REPORT - JUNE 9, 2025

NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY

3600 OLD OAKDALE RD MCDONALD, PA. 15057
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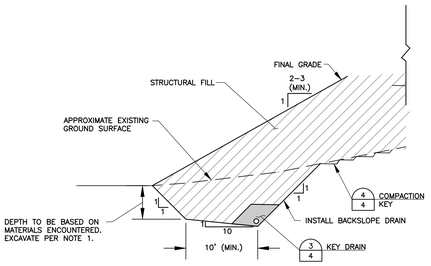
CROSS-SECTIONS A-A AND B-B

Proj No. 24-S49-01B
Issue Date 06/06/2025

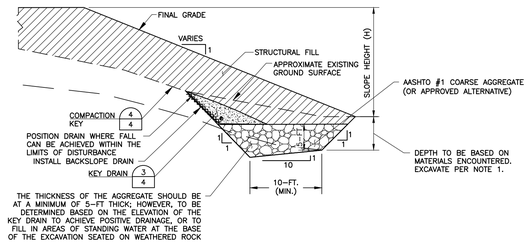
3



NOTES:

1. THE FRONT OF THE PROPOSED TOE-KEYS SHALL BE EXTENDED INTO WEATHERED ROCK AND/OR BEDROCK.
2. REFER TO AVAILABLE BORING INFORMATION TO ESTIMATE APPROXIMATE TOE-KEY DEPTHS. ACTUAL TOE-KEY DEPTH SHALL BE DETERMINED IN THE FIELD BY A QUALIFIED DESIGNATED REPRESENTATIVE.
3. DEEPER TOE-KEYS SHALL TRANSITION GRADUALLY INTO SHALLOWER TOE KEYS.
4. INSTALL KEY DRAIN AT THE HEEL (BOTTOM BACK) OF TOE KEY IN ACCORDANCE WITH DETAIL 3. IF APPROVED BY THE GEOTECHNICAL ENGINEER, THE BASE OF KEY DRAINS MAY BE RAISED IN ELEVATION TO ALLOW FOR OUTLETTING WITHIN THE PROPOSED LOD.
5. OUTLET TOE KEY DRAINS AT THE DIRECTION OF THE GEOTECHNICAL ENGINEER. CONSTRUCT OUTLETS IN ACCORDANCE WITH OUTLET DRAIN DETAIL 5.

DETAIL 1
FILL TOE-KEY
N.T.S.



NOTES:

1. THE FRONT OF THE PROPOSED TOE-KEYS SHALL BE EXTENDED INTO WEATHERED ROCK AND/OR BEDROCK.
2. REFER TO AVAILABLE BORING INFORMATION TO ESTIMATE APPROXIMATE TOE-KEY DEPTHS. ACTUAL TOE-KEY DEPTH SHALL BE DETERMINED IN THE FIELD BY A QUALIFIED DESIGNATED REPRESENTATIVE.
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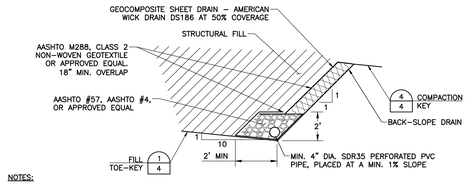
4. INSTALL KEY DRAIN AT THE HEEL (BOTTOM BACK) OF TOE KEY IN ACCORDANCE WITH DETAIL 3. IF APPROVED BY THE GEOTECHNICAL ENGINEER, THE BASE OF KEY DRAINS MAY BE RAISED IN ELEVATION TO ALLOW FOR OUTLETTING WITHIN THE PROPOSED LOD.
5. OUTLET TOE KEY DRAINS AT THE DIRECTION OF THE GEOTECHNICAL ENGINEER. CONSTRUCT OUTLETS IN ACCORDANCE WITH OUTLET DRAIN DETAIL 5.

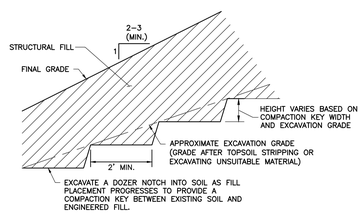
DETAIL 2
FILL AGGREGATE KEY
N.T.S.



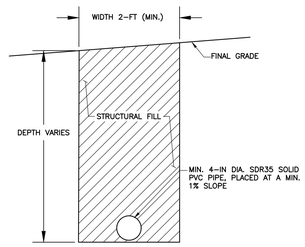
NOTES:

1. SLOPE PIPES AT 1% MIN. TOWARDS THE OUTLET DRAIN LOCATION AND IN THE DIRECTION INDICATED ON THE PLAN.
2. BACK-SLOPE DRAINS CONSIST OF GEOCOMPOSITE SHEET DRAIN (50% COVERAGE) AND SHALL BE INSTALLED IF SEEPS, GROUNDWATER, OR EVIDENCE OF GROUNDWATER IS ENCOUNTERED DURING CONSTRUCTION. TERMINATE BACK-SLOPE DRAIN AT THE OBSERVED SEEP/GROUNDWATER LOCATION OR A MAXIMUM OF 3-FT BELOW FINISHED GRADE.

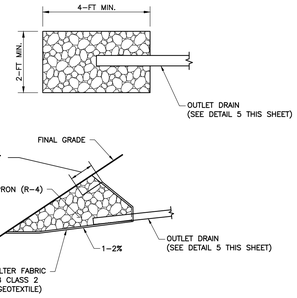
DETAIL 3
KEY DRAIN
N.T.S.



DETAIL 4
COMPACTION KEY
N.T.S.



DETAIL 5
OUTLET DRAIN
N.T.S.



DETAIL 6
OUTLET DRAIN RIPRAP APRON
N.T.S.

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REVISIONS

GEOTECHNICAL REPORT - JUNE 9, 2025

NEW DISTRICT MAINTENANCE & BUS DEPOT FACILITY

3600 OLD OAKDALE RD MCDONALD, PA. 15057
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GEOTECHNICAL DETAILS

Proj No. 24-S49-01B
Issue Date 06/06/2025

4

APPENDIX A

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX B

BORING AND INFILTRATION TEST LOGS

Rock Types

Rock Name	Characteristics	Symbol
Claystone	Clay sized particles that are consolidated, lacking fissility.	
Coal	Black and shiny, can break into cubes or conchoidally.	
Conglomerate	Gravel sized grains and larger held together by finer material, called a breccia if clasts are angular.	
Limestone	Effervesses w/ diluted HCl, can be composed of clay up to gravel particles (fossils).	
Sandstone	Primarily sand sized particles modified w/ the descriptor fine, medium, or coarse.	
Shale	Clay sized particles, shale has fissility which is a horizontal sheet-like or laminated feature.	
Siltstone	Composed of silt, normally breaks as irregular chunks.	

Rock Quality Descriptions

Weathering

Completely Weathered: All rock material is decomposed and/or disintegrated. The original rock structure may still be intact.

Highly Weathered: More than half of the rock material is decomposed. Fresh rock is present only as a discontinuous framework or as corestones.

Moderately Weathered: Less than half of the rock material is decomposed. Fresh rock is present at a discontinuous framework or as corestones.

Slightly Weathered: Discoloration or staining indicates weathering of rock material on discontinuity surfaces. Rock may be discolored and softened.

Fresh: No visible signs of rock material weathering.

RQD

Descriptor	%
Very Poor	<25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	>90

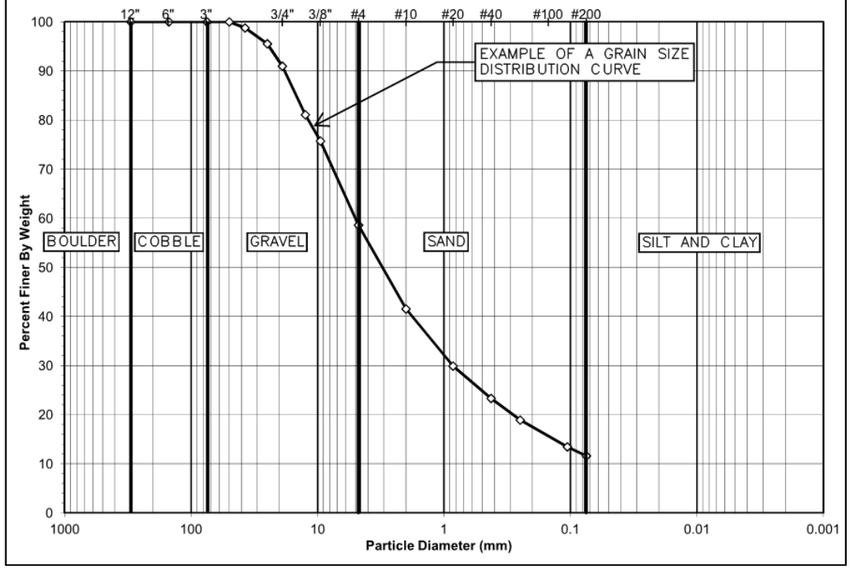
Brokenness

Descriptor	Fracture Spacing (in & ft)
Very Broken	<1 (<0.08)
Broken	1-3 (0.08-0.25)
Moderately Broken	3-6 (0.25-0.5)
Slightly Broken	>6 (>0.5)

Rock Hardness

Descriptor	Field Criterion	Relative Unconfined Compressive Strength
Very Hard	Difficult to break w/ Hammer	> 30,000 psi
Hard	Hand-held sample breaks w/ Hammer	8,000 to 30,000 psi
Medium Hard	Cannot scrape surface w/ knife	2,000 to 8,000 psi
Soft	Cutting or scraping w/ knife difficult	500 to 2,000 psi
Very Soft	Can be cut w/ knife	< 500 psi

Grain Size Distribution Curve



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

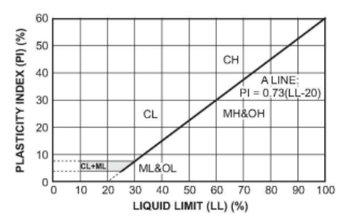
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ..... GW, GP, SW, SP
More than 12 percent ..... GM, GC, SM, SC
5 to 12 percent ..... Borderline cases requiring dual symbols

PLASTICITY CHART



Glossary

Alluvial Soil or Alluvium: Soil deposited by water in a river, stream, floodplain, or delta.

Bedrock: Materials underlying soil or other unconsolidated surficial materials in which refusal is consistently encountered on lithified, undisturbed, natural bedrock.

Colluvial Soil or Colluvium: Incoherent soil on or at the base of a slope deposited by gravity or slope movement.

Fill: Soil derived from natural soil, rock, or processed materials that was placed by artificial methods, such as construction, waste disposal, or dumping.

Glacial Outwash: Soil, typically sand and gravel, deposited by glacial streams or meltwater in a preexisting valley or over a plain.

Glacial Till: Soil deposited by and underneath a glacier, generally consisting of a heterogeneous, unstratified mixture of clay, sand, gravel, and boulders.

N-Value: The blow count representation of the penetration resistance of the soil determined by the Standard Penetration Test (SPT). It is the sum of the number of blows required to drive the sampler the second and third 6-inch increments (sample depth interval of 6 to 18 inches) and is recorded in blows per foot (bpf). The N-value is considered to be an indication of the relative density of coarse-grained soils (sand and gravel) or consistency of fine-grained soils (silt and clay).

Pocket Pen (PP): Field penetration test performed using a hand-held penetrometer that estimates unconfined compressive strength of cohesive soil in tons per square foot (tsf).

Recovery %: Total length of rock core or soil sample retrieved divided by the total length of the core run or sample interval, expressed as a percentage.

Refusal: The depth at which greater than 50 SPT hammer blows are required to drive the sampling spoon 6 inches or less.

Residual Soil or Residuum: Soil derived from the physical or chemical weathering of the underlying parent bedrock, generally with N-values less than 30 and 50 bpf in cohesive and cohesionless materials, respectively.

Rock Quality Designation (RQD): The sum of the length of intact rock core pieces longer than 4 inches (excluding mechanical breaks) divided by the total length of the core run, expressed as a percentage.

Shelby Tube: A 2" to 3" diameter, thin walled sampling tube that is pushed into the soil to obtain a relatively undisturbed soil sample for geotechnical laboratory tests.

Split Spoon Sampler: A soil sampling tube which is driven, retrieved, and split-open lengthwise for removal and visual inspection, and testing of the soil obtained.

Standard Penetration Test (SPT) ASTM D1586 : Field penetration test consisting of driving a 2-inch outside diameter split-spoon sampler 18 inches using a 140-pound hammer free falling a distance of 30 inches. The number of blows required to advance the spoon through successive 6-inch increments is recorded to determine the N-value.

Weathered Rock: Materials derived from lithified, undisturbed, natural bedrock which are able to be sampled with a split-spoon. Cohesive and cohesionless materials generally have N-values greater than 30 and 50 bpf, respectively.

N-Value Rating

Fine-Grained Soils (Silt and Clay)

Consistency	Blows/ft	PP (tsf)
Very Soft	0-2	<0.25
Soft	3-4	0.25-0.5
Medium Stiff	5-8	0.5-1
Stiff	9-15	1-2
Very Stiff	16-32	2-4
Hard	>32	>4

Coarse-Grained Soils (Sand and Gravel)

Relative Density	Blows/ft
Very Loose	0-4
Loose	5-10
Medium Dense	11-30
Dense	31-50
Very Dense	>50

Unconsolidated Material

Term	Grain Size in mm (in)	Approximate Example Size
Clay and Silt	<.075	can't see grains to barely visible
Fine Sand	0.075 – 0.4	table salt to sugar
Med. Sand	0.4-2.0 (~<1/16)	openings in a window screen
Coarse Sand	2.0 - 4.75 (~1/16 – 1/8)	sidewalk salt
Gravel	4.75 – 75 (~1/8 – 3)	pea to tennis ball
Cobble	75 – 300 (3 – 12)	tennis ball to basketball
Boulder	>300 (>12)	larger than a basketball

Other Features – Used to describe other identifiable, pertinent features (e.g., angularity of coarse-grained soils, organics, construction debris, etc.)

Term	%
Trace	< 5
Few	5-15
Some	15-45

Moisture Content
Dry: Sample is dusty or obviously dry.
Moist: Anything that does not fit the definition of dry or wet.
Wet: Sample contains free water.

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Definitions of Standard Terms and Symbols

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BORING NUMBER B-1

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/15/25 **COMPLETED** 4/16/25
GROUND ELEVATION 1156 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA, SPT, and NQ-Core
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING 25.2 ft / Elev 1130.8 ft
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
	0	Topsoil - 0.3 ft				
1155		Orange-Brown to Brown, Sandy Lean Clay, CL, Moist, Soft to Stiff **(ALLUVIUM)**	SS 1	40	1-1-3 (4)	0.5
			SS 2	67	4-4-4 (8)	2.5
	5					
1150			SS 3	67	3-4-3 (7)	1.5
	10		SS 4	100	3-4-5 (9)	
1145		Gray, LEAN CLAY, CL, Moist, Stiff to Medium Stiff **(ALLUVIUM)** *Trace Organics*	SS 5	100	3-4-5 (9)	1.25
	15		SS 6	80	2-5-3 (8)	1.0
1140						
		Olive to Gray, Sandy Lean Clay, CL, Dry, Very Stiff **(RESIDUUM)**	SS 7	100	12-13-15 (28)	
	20					
1135			SS 8	100	12-24-50/0.2	50/0.2
		Olive Shale, Completely to Highly Weathered, Very Soft **(WEATHERED ROCK)**				
		Dark Gray to Gray Shaley Sandstone, Moderately Weathered to Slightly Weathered, Soft to Medium Hard, Very Broken to Slightly Broken **(BEDROCK)**				
	25		NQ 1	88 (36)		
1130						
		Bottom of boring at 27.2 feet.				

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

CEC CUSTOM LOG 336-102 DRAFT BUS DEPOT BORING LOGS.GPJ CEC.GDT 6/6/25

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BORING NUMBER B-2

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/16/25 **COMPLETED** 4/16/25
GROUND ELEVATION 1143 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
	Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
	Topsoil - 0.3 ft					
	Orange-Brown, LEAN CLAY WITH SAND, CL, Moist, Soft to Medium Stiff **(ALLUVIUM)**		SS 1	67	1-1-3 (4)	1.0
1140			SS 2	67	3-3-2 (5)	1.0
	Shelby Tube obtained from approximately 4.5 to 6.0 ft. Rig down pressure 100 to 200 psi. Recovery = 1.1 ft. **Friction Angle = 25.5 degrees; Cohesion = 389 psf**	5	ST 1	73		
			SS 3	53	14-6-3 (9)	
1135	Brown to Tan, LEAN CLAY WITH SAND, CL, Moist, Stiff to Medium Stiff **(RESIDUUM)**					
		10	SS 4	80	2-2-3 (5)	1.0
1130	Tan, Clayey Gravel, GC, Dry, Medium Dense **(RESIDUUM)**		SS 5	100	15-11-13 (24)	
		15				
	Tan Sandstone, Completely to Highly Weathered, Very Soft **(WEATHERED ROCK)**		SS 6	80	10-14-15 (29)	
1125			SS 7	100	34-50/0.3	
	Bottom of boring at 18.8 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

50/0.3

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BORING NUMBER B-3

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/18/25 **COMPLETED** 4/18/25
GROUND ELEVATION 1172 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
		Topsoil - 0.5 ft		SS 1	87	2-2-3 (5)	1.25
1170		Brown, Sandy Lean Clay, CL, Moist, Stiff to Medium Stiff **(RESIDUUM)**					
				SS 2	100	3-4-8 (12)	2.25
			5				
1165		Olive to Gray, Clayey Gravel with Sand, GC, Dry, Medium Dense **(RESIDUUM)**		SS 3	67	4-5-8 (13)	
		Olive to Gray Sandstone, Completely to Highly Weathered, Very Soft **(WEATHERED ROCK)**	10	SS 4	100	39-16-12 (28)	
1160				SS 5	100	11-13-50/0.4	
		Bottom of boring at 13.4 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

50/0.4

CEC CUSTOM LOG 336-102 DRAFT BUS DEPOT BORING LOGS.GPJ CEC.GDT 6/6/25

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BORING NUMBER B-4

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/16/25 **COMPLETED** 4/16/25
GROUND ELEVATION 1115 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
1115		Topsoil - 0.6 ft	0				
		Brown, Lean Clay, CL, Moist, Very Soft to Stiff **(ALLUVIUM)**		SS 1	53	0-1-1 (2)	0.25
				SS 2	73	4-4-6 (10)	2.5
1110			5				
		Olive to Brown, Silty Sand, SM, Dry, Loose **(RESIDUUM)**		SS 3	100	5-4-6 (10)	
1105		Dark Gray Shale, Completely to Highly Weathered, Very Soft **(WEATHERED ROCK)**	10	SS 4	100	21-40-50/0.3	
		Bottom of boring at 10.3 feet.					

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80
50/0.3

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BORING NUMBER B-5

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/17/25 **COMPLETED** 4/17/25
GROUND ELEVATION 1162 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
	0	Topsoil - 0.5 ft				
1160		Orange-Brown, Sandy Lean Clay, CL, Moist, Soft to Stiff **(RESIDUUM)**	SS 1	67	1-2-2 (4)	1.0
	5		SS 2	100	5-6-6 (12)	1.75
1155			SS 3	53	5-6-6 (12)	
	10	Olive Shale, Completely to Highly Weathered, Very Soft **(WEATHERED ROCK)**	SS 4	67	8-9-8 (17)	
1150		Bottom of boring at 12.1 feet.	SS 5	100	50/0.1	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

50/0.1

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BORING NUMBER B-6

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/16/25 **COMPLETED** 4/16/25
GROUND ELEVATION 1137 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA, SPT, and NQ-Core
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- Dry
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
	Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
	Topsoil - 0.5 ft					
1135	Orange-Brown to Brown, Sandy Lean Clay, CL, Moist to Dry, Soft to Stiff **(RESIDUUM)**		SS 1	53	1-2-2 (4)	1.25
			SS 2	67	4-4-5 (9)	1.0
		5				
1130			SS 3	40	3-3-3 (6)	1.0
	Tan, LEAN CLAY WITH SAND, CL, Moist to Dry, Stiff to Very Stiff **(RESIDUUM)**	10	SS 4	100	4-7-7 (14)	1.25
1125			SS 5	100	11-15-11 (26)	
		15				
	Olive to Gray Shale, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**		SS 6	80	8-9-19 (28)	
1120			SS 7	100	33-50/0.3	
	Brown to Gray Shale, Highly Weathered, Soft to Medium Hard, Very Broken to Broken **(BEDROCK)**	20				
1115			NQ 1	44 (0)		
	Bottom of boring at 24.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

50/0.3

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BORING NUMBER B-7

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/17/25 **COMPLETED** 4/17/25
GROUND ELEVATION 1176 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	SPT N VALUE / PL MC LL / FINES CONTENT (%)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0					▲ SPT N VALUE ▲ 20 40 60 80
1175		Topsoil - 0.5 ft Orange-Brown, Sandy Lean Clay, CL, Moist, Soft **(RESIDUUM)**		SS 1	67	1-2-2 (4)	1.0	PL MC LL 20 40 60 80
		Olive to Gray Shale, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**		SS 2	100	9-50/0.3		☐ FINES CONTENT (%) ☐ 20 40 60 80
			5					50/0.3
1170				SS 3	100	16-18-21 (39)		
		Auger refusal encountered at approximately 7.5 ft Bottom of boring at 7.5 feet.						

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BORING NUMBER B-8

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/15/25 **COMPLETED** 4/15/25
GROUND ELEVATION 1200 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA, SPT, and NQ-Core
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING 23.8 ft / Elev 1176.2 ft
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
1200	0	Topsoil - 0.4 ft Brown, Sandy Lean Clay, CL, Moist, Soft to Stiff **(RESIDUUM)**	SS 1	67	1-2-2 (4)	0.5
			SS 2	80	4-4-5 (9)	1.75
1195	5		SS 3	100	4-4-7 (11)	
1190	10		SS 4	80	2-1-3 (4)	
		Reddish Brown, Sandy Lean Clay, CL, Dry, Hard **(RESIDUUM)**	SS 5	100	12-19-30 (49)	
1185	15		SS 6	100	22-24-22 (46)	
		Gray Shale, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**	SS 7	0	50/0.1	
		Auger refusal encountered at approximately 19.0 ft	NQ 1	80 (40)		
1180	20	Gray Shale, Moderately Weathered, Soft, Broken **(BEDROCK)**				
		Light Gray to Tan Siltstone, Slightly Weathered to Fresh, Soft to Medium Hard, Broken to Slightly Broken **(BEDROCK)** **Unconfined Compressive Strength = 1,920 psi** *Clay seam observed from approximately 20.0 to 20.2 ft*	NQ 2	100 (68)		
1175	25	Gray Shaley Sandstone, Slightly Weathered, Medium Hard to Hard, Broken to Moderately Broken **(BEDROCK)** **Unconfined Compressive Strength = 24,150 psi**				
		Dark Gray to Reddish Gray Clayey Shale, Completely Weathered to Moderately Weathered, Very Soft to Soft, Very Broken to Moderately Broken **(BEDROCK)**	NQ 3	100 (12)		
1170	30					

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
FINES CONTENT (%): 20 40 60 80

50/0.1

Bottom of boring at 30.0 feet.

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BORING NUMBER B-9

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/15/25 **COMPLETED** 4/15/25
GROUND ELEVATION 1210 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA, SPT, and NQ-Core
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING 8.8 ft / Elev 1201.2 ft
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
1210	0	Topsoil - 0.4 ft Orange-Brown to Brown, LEAN CLAY WITH SAND, CL, Moist, Soft to Stiff **(RESIDUUM)**	SS 1	67	1-2-2 (4)	0.75
		Bag sample collected from auger cuttings between approximately 0.0 to 10.0 ft. **Maximum Dry Density = 106.0 pcf; Optimum Moisture Content = 18.9%**	SS 2	87	3-3-7 (10)	1.75
1205	5		SS 3	80	6-6-6 (12)	
1200	10	Tan to Olive Sandstone, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**	SS 4	100	50/0.2	
		Gray Sandstone, Slightly Weathered to Fresh, Hard, Moderately Broken to Slightly Broken **(BEDROCK)** **Unconfined Compressive Strength = 17,060 psi**	NQ 1	75 (75)		
1195	15	Olive to Gray Shale, Completely Weathered to Highly Weathered, Very Soft, Very Broken to Broken **(BEDROCK)**	NQ 2	80 (38)		
		Dark Gray Claystone, Highly Weathered to Moderately Weathered, Very Soft, Broken to Very Broken **(BEDROCK)**	NQ 3	84 (0)		
1190	20	Gray Shale, Highly Weathered, Soft, Broken **(BEDROCK)**				
		Bottom of boring at 20.0 feet.				

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

50/0.2

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BORING NUMBER B-10

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/14/25 **COMPLETED** 4/14/25
GROUND ELEVATION 1234 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA, SPT, and NQ-Core
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING 25.4 ft / Elev 1208.6 ft
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
	0	Topsoil - 0.5 ft Light Brown to Olive, FAT CLAY, CH, Moist, Very Soft to Very Stiff **(RESIDUUM)** *Trace Organics*	SS 1	100	1-1-1 (2)	0.5
1230		*Bag sample collected from auger cuttings between approximately 0.0 to 10.0 ft.* **Maximum Dry Density = 101.1 pcf; Optimum Moisture Content = 19.0%**	SS 2	100	12-9-11 (20)	1.0
	5		SS 3	100	9-10-13 (23)	
1225		Gray Sandstone, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**	SS 4	100	34-50/0.3	
	10	Gray Sandstone, Slightly Weathered, Hard, Moderately Broken **(BEDROCK)** *Completely weathered soil zone from approximately 11.3 to 11.6 ft*	NQ 1	88 (10)		
1220		Olive Shale, Completely Weathered to Moderately Weathered, Very Soft to Soft, Very Broken to Broken **(BEDROCK)**				
	15	*Clay seam observed from approximately 15.3 to 15.8 ft*	NQ 2	100 (0)		
1215						
	20		NQ 3	100 (20)		
1210		Gray Clayey Sandstone, Highly Weathered to Fresh, Soft to Hard, Very Broken to Moderately Broken **(BEDROCK)** **Unconfined Compressive Strength = 11,680 psi** *Shale seam observed between approximately 24.2 and 24.6 ft*				
	25	*90 degree fracture observed between approximately 26.8 and 27.5 ft*	NQ 4	100 (10)		
1205		Gray Shale, Completely Weathered to Moderately Weathered, Very Soft to Medium Hard, Very Broken to Broken **(BEDROCK)**				
	30					

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

50/0.3

(Continued Next Page)

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BORING NUMBER B-10

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	30					
		Gray Shale, Completely Weathered to Moderately Weathered, Very Soft to Medium Hard, Very Broken to Broken **(BEDROCK)** ***(continued)***						
		Clay seam observed between approximately 30.9 and 31.1 ft						
		Clay seam observed between approximately 31.3 and 31.5 ft		NQ 5	100 (24)			
1200		Gray Sandstone, Moderately Weathered to Slightly Weathered, Hard, Slightly Broken to Broken **(BEDROCK)**	35					
		Gray Shale, Completely Weathered to Moderately Weathered, Very Soft to Soft, Very Broken to Broken **(BEDROCK)**		NQ 6	94 (30)			
1195		*Clay seam observed from approximately 37.0 to 37.4 ft*	40					
		Bottom of boring at 40.0 feet.						

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BORING NUMBER B-11

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/14/25 **COMPLETED** 4/14/25
GROUND ELEVATION 1220 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA, SPT, and NQ-Core
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING 8.5 ft / Elev 1211.5 ft
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
1220	0	Topsoil - 0.5 ft Tan, Sandy Lean Clay, CL, Moist, Soft to Stiff **(RESIDUUM)**	SS 1	100	1-2-2 (4)	1.0
		Bag sample collected from auger cuttings between approximately 0.0 to 5.0 ft.	SS 2	100	4-4-5 (9)	1.0
1215	5		SS 3	100	4-6-7 (13)	
1210	10	Tan to Olive, Silty Gravel with Sand, GM, Moist, Medium Dense **(RESIDUUM)**	SS 4	100	16-19-20 (39)	
		Tan to Olive Shale, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**	SS 5	100	10-20-18 (38)	
1205	15		SS 6	100	50/0.3	
		Light Brown to Gray Clayey Shale, Highly Weathered to Moderately Weathered, Very Soft to Soft, Very Broken to Moderately Broken **(BEDROCK)**	NQ 1	60 (16)		
1200	20	Bottom of boring at 20.0 feet.				

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

50/0.3

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BORING NUMBER B-12

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/18/25 **COMPLETED** 4/18/25
GROUND ELEVATION 1187 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
▽ **AT END OF SOIL SAMPLING** 11.8 ft / Elev 1175.2 ft
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
		Topsoil - 0.3 ft		SS 1	53	1-2-2 (4)	1.0
1185		Orange-Brown to Olive, SANDY LEAN CLAY, CL, Moist to Wet, Soft to Stiff **(RESIDUUM)**					
				SS 2	100	5-6-6 (12)	2.5
			5				
1180				SS 3	100	3-2-2 (4)	
			10	SS 4	87	4-4-3 (7)	
1175		▽ *Hard layer, tough auger advancement between approximately 11.8 and 12.4 ft.*		SS 5	100	50/0.1	
		Brown Shale, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**		SS 6	100	29-50/0.2	
		Bottom of boring at 14.2 feet.					

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

50/0.1
50/0.2

CEC CUSTOM LOG 336-102 DRAFT BUS DEPOT BORING LOGS.GPJ CEC.GDT 6/6/25

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BORING NUMBER B-13

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/18/25 **COMPLETED** 4/18/25
GROUND ELEVATION 1194 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA, SPT, and NQ-Core
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- Dry
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
	Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
	Topsoil - 0.4 ft					
	Reddish-Brown, Sandy Lean Clay, CL, Moist, Soft to Stiff **(RESIDUUM)**		SS 1	73	1-1-3 (4)	1.5
1190			SS 2	100	5-7-7 (14)	
		5	SS 3	100	4-4-7 (11)	
1185						
	Brown to Tan Limestone, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**	10	SS 4	100	5-13-13 (26)	
			SS 5	100	38-50/0.1	
1180		15				
	Brown Claystone, Highly Weathered to Moderately Weathered, Very Soft, Very Broken to Moderately Broken **(BEDROCK)**		SS 6	100	50/0.1	
	Tan to Gray Limestone, Moderately Weathered to Slightly Weathered, Medium Hard, Very Broken to Broken **(BEDROCK)**		NQ 1	86 (12)		
1175		20				
	Gray Claystone, Highly Weathered to Moderately Weathered, Very Soft, Broken **(BEDROCK)**		NQ 2	100 (10)		
1170						
	Gray Sandstone, Slightly Weathered to Fresh, Medium Hard to Hard, Broken to Moderately Broken **(BEDROCK)**	25				
	Bottom of boring at 25.1 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

50/0.1
50/0.1

CEC CUSTOM LOG 336-102 DRAFT BUS DEPOT BORING LOGS.GPJ CEC.GDT 6/6/25

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BORING NUMBER B-14

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/18/25 **COMPLETED** 4/18/25
GROUND ELEVATION 1194 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA, SPT, and NQ-Core
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING 12.7 ft / Elev 1181.3 ft
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
	0	Topsoil - 0.5 ft Orange-Brown, LEAN CLAY WITH SAND, CL, Moist, Medium Stiff to Very Stiff **(RESIDUUM)**	SS 1	80	1-2-4 (6)	1.75
1190		*Bag sample collected from auger cuttings between approximately 0.0 to 10.0 ft.* **Maximum Dry Density = 104.3 pcf; Optimum Moisture Content = 19.7%**	SS 2	100	5-8-8 (16)	
	5		SS 3	100	4-9-11 (20)	
1185		Gray to Brown Sandstone, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**				
	10		SS 4	0	10-8-4 (12)	
			SS 5	100	5-28-50/0.2	
1180	15	Gray to Brown Clayey Sandstone, Completely Weathered to Moderately Weathered, Soft to Medium Hard, Very Broken to Slightly Broken **(BEDROCK)**	SS 6	100	50/0.1	
			NQ 1	84 (30)		
1175	20	Brown Claystone, Completely Weathered to Highly Weathered, Very Soft, Very Broken **(BEDROCK)**				
		Bottom of boring at 20.1 feet.				

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
FINES CONTENT (%): 20 40 60 80

50/0.2
50/0.1

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BORING NUMBER B-15

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/18/25 **COMPLETED** 4/18/25
GROUND ELEVATION 1198 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0			
		Topsoil - 0.5 ft				
		Orange-Brown, Clayey Sand, SC, Moist, Loose **(RESIDUUM)**		SS 1	40	5-2-5 (7)
1195				SS 2	80	6-3-6 (9)
			5			
		Olive to Gray, Clayey Gravel, GC, Dry, Medium Dense **(RESIDUUM)**		SS 3	67	5-6-6 (12)
1190						
		Olive to Gray, Sandy Lean Clay, CL, Dry, Medium Stiff to Very Stiff **(RESIDUUM)**	10	SS 4	73	4-3-4 (7)
1185				SS 5	100	9-8-12 (20)
			15			
		Olive to Gray Shale, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**		SS 6	100	50/0.2
		Bottom of boring at 15.2 feet.				

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

50/0.2

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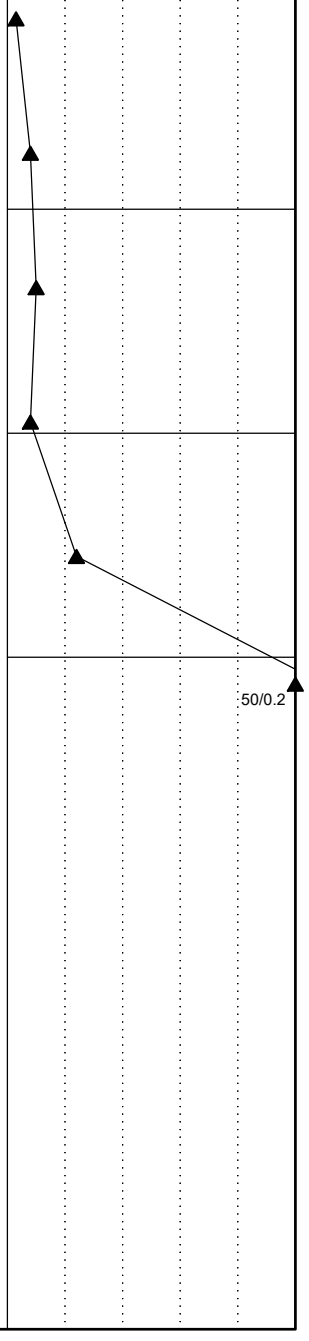
BORING NUMBER B-16

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/18/25 **COMPLETED** 4/18/25
GROUND ELEVATION 1216 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
1215		Topsoil - 0.5 ft Brown to Olive, Sandy Lean Clay, CL, Moist, Soft to Stiff **(RESIDUUM)**		SS 1	53	1-1-2 (3)	0.5
				SS 2	87	4-4-4 (8)	2.0
			5				
1210				SS 3	100	4-4-6 (10)	2.25
				SS 4	100	3-4-4 (8)	1.75
			10				
1205				SS 5	100	5-4-20 (24)	
		Olive to Brown, Clayey Sand, SC, Dry, Medium Dense **(RESIDUUM)**					
			15				
1200		Olive Shale, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**		SS 6	100	14-16-50/0.2	
		Bottom of boring at 16.2 feet.					



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BORING NUMBER IT-1

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/16/25 **COMPLETED** 4/16/25
GROUND ELEVATION 1126 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
▽ **AT END OF SOIL SAMPLING** 4.5 ft / Elev 1121.5 ft
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
▼ **24hrs AFTER DRILLING** 4.5 ft / Elev 1121.5 ft

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
1125		Topsoil - 0.5 ft Orange-Brown to Olive, Sandy Lean Clay, CL, Moist to Wet, Soft to Stiff **(ALLUVIUM)**		SS 1	53	1-1-2 (3)	1.0
				SS 2	53	3-3-4 (7)	1.25
		▼		SS 3	67	6-7-8 (15)	
			5	SS 4	80	6-5-8 (13)	
1120		*Infiltration test not performed due to 0hr water level of 4.5 ft* Bottom of boring at 6.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER IT-2

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/16/25 **COMPLETED** 4/16/25
GROUND ELEVATION 1127 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
		Topsoil - 0.4 ft					
1125		Orange-Brown to Olive, Sandy Lean Clay, CL, Moist to Dry, Soft to Stiff **(ALLUVIUM)**		SS 1	53	1-1-2 (3)	1.0
				SS 2	53	3-3-3 (6)	1.75
				SS 3	100	3-4-3 (7)	
			5	SS 4	87	5-5-7 (12)	
		Bottom of boring at 6.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER IT-3

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/16/25 **COMPLETED** 4/16/25
GROUND ELEVATION 1135 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
1135		Topsoil - 0.6 ft	0				
		Orange-Brown, Sandy Lean Clay, CL, Moist, Soft to Stiff **(ALLUVIUM)**		SS 1	67	0-1-2 (3)	0.75
				SS 2	67	2-4-4 (8)	1.5
				SS 3	53	4-5-4 (9)	
1130			5				
		Bottom of boring at 5.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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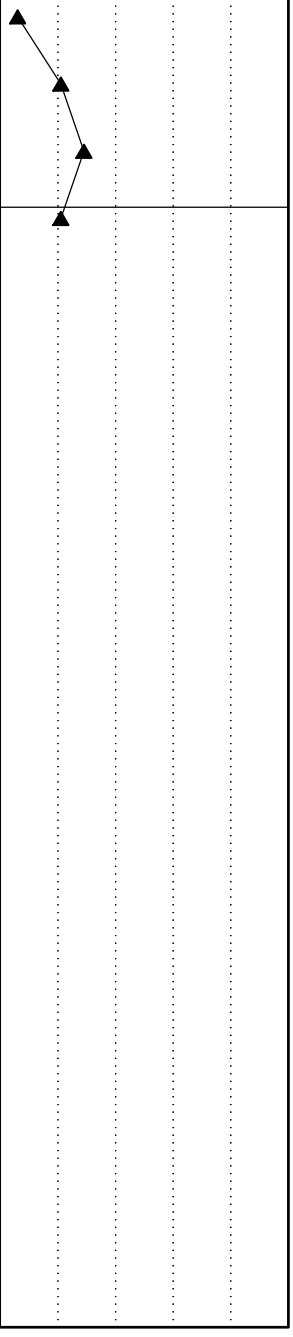
BORING NUMBER IT-4

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/16/25 **COMPLETED** 4/16/25
GROUND ELEVATION 1119 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
▽ **AT END OF SOIL SAMPLING** 5.3 ft / Elev 1113.7 ft
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
▼ **24hrs AFTER DRILLING** 5.3 ft / Elev 1113.7 ft

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Topsoil - 0.5 ft	0				
		Orange-Brown, Sandy Lean Clay, CL, Moist, Medium Stiff to Very Stiff **(ALLUVIUM)**		SS 1	53	1-3-3 (6)	1.5
				SS 2	67	3-12-9 (21)	
1115		Dark Gray Sandy Shale, Completely Weathered to Highly Weathered, Very Soft **(WEATHERED ROCK)**		SS 3	80	12-13-16 (29)	
			5	SS 4	87	10-12-9 (21)	
		Infiltration test not performed due to 0hr water level of 5.3 ft Bottom of boring at 6.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



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BORING NUMBER IT-5

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/16/25 **COMPLETED** 4/16/25
GROUND ELEVATION 1143 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
		Topsoil - 0.2 ft					
		Olive to Orange-Brown, Sandy Lean Clay, CL, Moist, Very Soft to Stiff **(RESIDUUM)**		SS 1	67	2-1-1 (2)	1.0
1140				SS 2	67	3-3-4 (7)	
				SS 3	53	3-3-3 (6)	
			5	SS 4	40	5-5-6 (11)	
		Bottom of boring at 6.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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Monroeville, PA 15146

BORING NUMBER IT-6

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/15/25 **COMPLETED** 4/15/25
GROUND ELEVATION 1182 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
1180		Topsoil - 0.3 ft Orange-Brown to Olive, Sandy Lean Clay, CL, Moist to Dry, Very Soft to Stiff **(RESIDUUM)**		SS 1	53	1-1-1 (2)	1.0
				SS 2	67	4-4-7 (11)	0.75
			5				
		Bottom of boring at 6.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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Monroeville, PA 15146

BORING NUMBER IT-7

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/15/25 **COMPLETED** 4/15/25
GROUND ELEVATION 1170 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
1170		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0					
		Topsoil - 0.5 ft Orange-Brown, Sandy Lean Clay, CL, Moist, Soft **(RESIDUUM)**		SS 1	100	2-1-2-3 (3)	1.5	▲
		Bottom of boring at 2.0 feet.						

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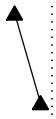
Monroeville, PA 15146

BORING NUMBER IT-8

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/17/25 **COMPLETED** 4/17/25
GROUND ELEVATION 1164 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Topsoil - 0.5 ft	0				
		Olive to Brown, Gravelly Lean Clay, CL, Dry, Medium Stiff to Very Stiff **(RESIDUUM)**		SS 1	75	2-3-4-5 (7)	1.0
1160				SS 2	90	4-6-10-6 (16)	1.5
		Bottom of boring at 4.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487

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Monroeville, PA 15146

BORING NUMBER IT-9

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/17/25 **COMPLETED** 4/17/25
GROUND ELEVATION 1162 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)
		Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487	0				
		Topsoil - 0.5 ft					
1160		Orange-Brown, Sandy Lean Clay, CL, Moist, Soft to Stiff **(RESIDUUM)**		SS 1	60	3-2-2-2 (4)	1.0
				SS 2	50	5-5-4-6 (9)	1.5
		Bottom of boring at 4.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Civil & Environmental Consultants, Inc.
4350 Northern Pike, Suite 141
Monroeville, PA 15146

BORING NUMBER IT-10

CLIENT South Fayette Township School District
PROJECT NAME South Fayette Township School District - Bus Depot
PROJECT NUMBER 336-102
PROJECT LOCATION South Fayette Township, Allegheny County, PA
DATE STARTED 4/17/25 **COMPLETED** 4/17/25
GROUND ELEVATION 1170 ft **BACKFILL** Auger Cuttings
SOIL SAMPLING CONTRACTOR Test Boring Services, Inc.
WATER LEVELS:
SOIL SAMPLING METHOD HSA & SPT
AT END OF SOIL SAMPLING --- Dry
CEC REP SRM **CHECKED BY** TJR
AT END OF CORING --- N/A
NOTES
24hrs AFTER DRILLING --- N/A - Immediately Backfilled

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	SPT N VALUE / PL MC LL / FINES CONTENT (%)
1170		Topsoil - 0.5 ft Brown, Lean Clay, CL, Moist, Soft **(RESIDUUM)**	0	SS 1	53	1-2-2 (4)	1.5	
		Olive to Brown, Gravelly Lean Clay, CL, Dry, Stiff **(RESIDUUM)**		SS 2	67	4-6-5 (11)		
1165			5	SS 3	80	6-6-5 (11)		
		Bottom of boring at 5.0 feet.						

Soil classifications were derived using the general methodologies presented in ASTM D2488, except where capitalized USCS group names are indicated hereon, if any. Capitalized USCS group names denote the classifications were derived using the general methodologies presented in ASTM D2487

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
FINES CONTENT (%): 20 40 60 80

APPENDIX C

CORE BOX PHOTOS

APPENDIX C- CORE BOX PHOTOGRAPHS

Boring B-1 - Box 1 of 1

Boring B-6 - Box 1 of 1

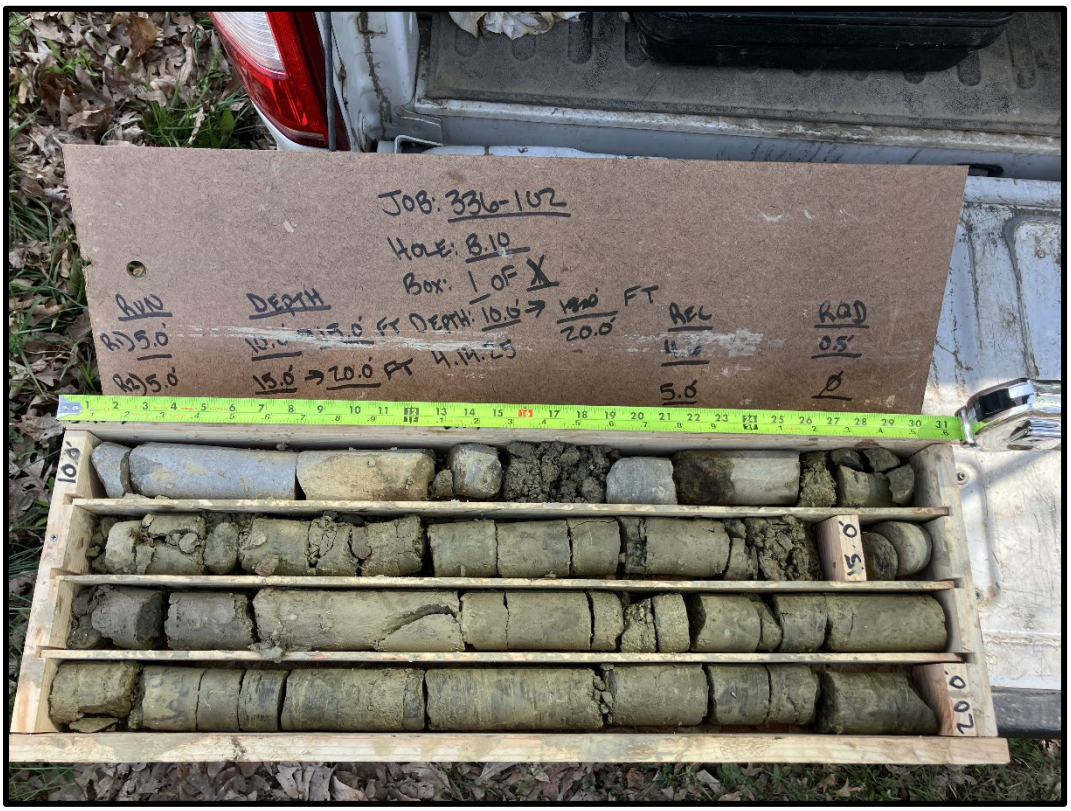
APPENDIX C- CORE BOX PHOTOGRAPHS

Boring B-8 - Box 1 of 2

Boring B-8 - Box 2 of 2

APPENDIX C- CORE BOX PHOTOGRAPHS

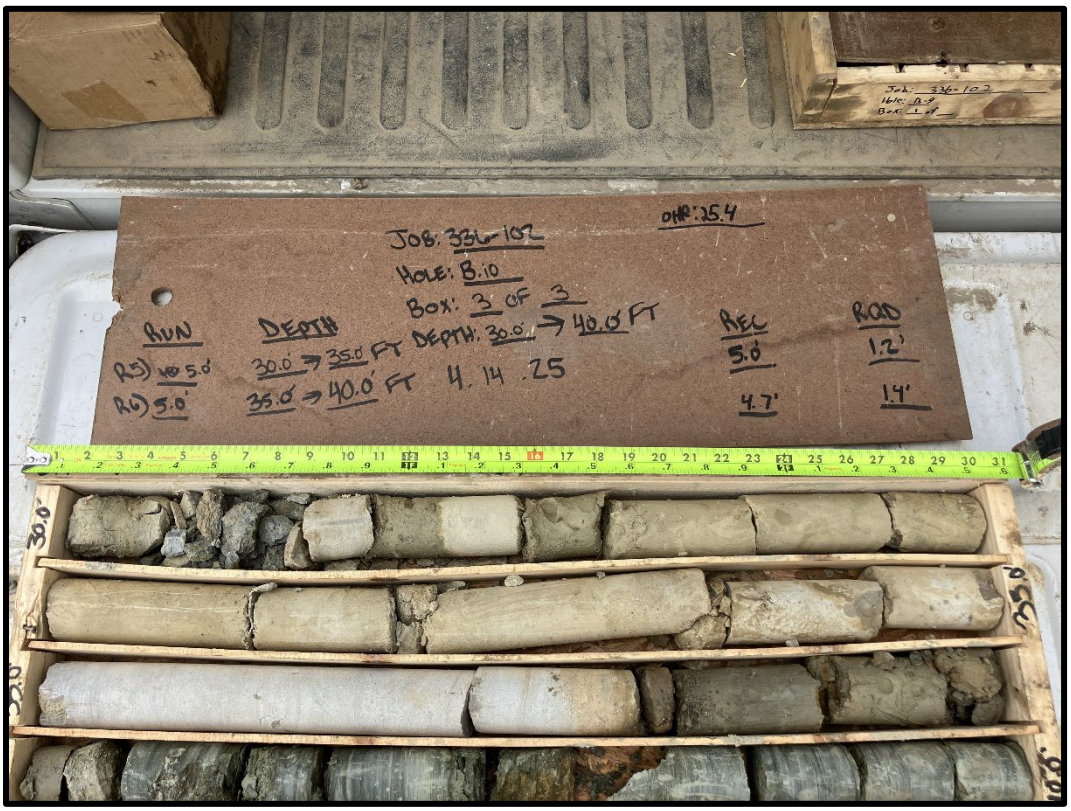
Boring B-9 - Box 1 of 1



Boring B-10 - Box 1 of 3

APPENDIX C- CORE BOX PHOTOGRAPHS

Boring B-10 - Box 2 of 3



Boring B-10 - Box 3 of 3

APPENDIX C- CORE BOX PHOTOGRAPHS

Boring B-11 - Box 1 of 1

Boring B-13 - Box 1 of 1

APPENDIX C- CORE BOX PHOTOGRAPHS

Boring B-14 - Box 1 of 1

APPENDIX D

LABORATORY TEST DATA

May 19, 2025

Project No. 2025-275-001

Tyler Reynolds
Civil & Environmental Consultants
4350 Northern Pike, Suite 141
Monroeville, PA 15146

Transmittal
Laboratory Test Results
336-102

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was transmitted to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens that were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectfully submitted,
Geotechnics, Inc.

Nathan Melaro
Director of Operations

We understand that you have a choice in your laboratory services and we thank you for choosing Geotechnics.

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MOISTURE CONTENT

ASTM D 2216-19

Client: Civil & Environmental Consultants
Client Reference: 336-102
Project No.: 2025-275-001

Lab ID:	001	002	004	005	006	008
Boring No.:	B-1	B-1	B-2	B-2	B-2	B-3
Depth (ft):	12.0-13.5'	15.0-16.5'	4.5-6.0'	6.0-7.5'	9.0-10.5'	3.0-4.5'
Sample No.:	SS-5	SS-6	ST-1	SS-3	SS-4	SS-2
Tare Number	70	27	3103	10	59	46
Wt. of Tare & Wet Sample (g)	22.31	23.62	175.69	23.44	34.41	130.75
Wt. of Tare & Dry Sample (g)	18.40	20.40	147.81	18.93	27.79	112.04
Weight of Tare (g)	3.24	3.24	8.17	3.21	3.22	3.16
Weight of Water (g)	3.91	3.22	27.88	4.51	6.62	18.71
Weight of Dry Sample (g)	15.16	17.16	139.64	15.72	24.57	108.88
Water Content (%)	**25.8**	**18.8**	**20.0**	**28.7**	**26.9**	**17.2**

Lab ID	009	010	011	019	020	021
Boring No.	B-3	B-6	B-6	B-12	B-12	B-12
Depth (ft)	6.0-7.5'	9.0-10.5'	12.0-13.5'	3.0-4.5'	6.0-7.5'	9.0-10.5'
Sample No.	SS-3	SS-4	SS-5	SS-2	SS-3	SS-4
Tare Number	19	22	1	2	30	93
Wt. of Tare & Wet Sample (g)	156.66	31.25	26.41	30.57	29.01	28.94
Wt. of Tare & Dry Sample (g)	138.74	26.16	22.67	24.82	23.08	22.65
Weight of Tare (g)	3.25	3.17	3.30	3.24	3.18	3.32
Weight of Water (g)	17.92	5.09	3.74	5.75	5.93	6.29
Weight of Dry Sample (g)	135.49	22.99	19.37	21.58	19.90	19.33
Water Content (%)	**13.2**	**22.1**	**19.3**	**26.6**	**29.8**	**32.5**

Notes :

Tested By *JW* *Date* *5/1/25* *Checked By* *EG* *Date* *5/2/25*

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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Civil & Environmental Consultants	Boring No.:	B-1
Client Reference:	336-102	Depth (ft):	12.0-16.5'
Project No.:	2025-275-001	Sample No.:	SS-5 & SS-6
Lab ID:	2025-275-001-003	Soil Color:	Gray

Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**0.82**
#4 to #200	***Sand***	**13.00**
Finer than #200	***Silt & Clay***	**86.19**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By DF Date 5/13/25 Checked By EG Date 5/15/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Civil & Environmental Consultants	Boring No.:	B-1
Client Reference:	336-102	Depth (ft):	12.0-16.5'
Project No.:	2025-275-001	Sample No.:	SS-5 & SS-6
Lab ID:	2025-275-001-003	Soil Color:	Gray

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1498	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	441.91	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	441.91	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	148.80	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	293.11	Weight of Dry Soil (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**0.0**
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	293.11
Tare No. (Sub-Specimen)	1498	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	441.91	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	148.80	Dry Weight of - 3/4" Sample (g):	293.11
Sub-Specimen Wet Weight (g):	293.11	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	293.11
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100.0**
6"	150	0.00		0.00	0.00	100.00	**100.0**
3"	75	0.00		0.00	0.00	100.00	**100.0**
2"	50	0.00	(*)	0.00	0.00	100.00	**100.0**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100.0**
1"	25	0.00		0.00	0.00	100.00	**100.0**
3/4"	19	0.00		0.00	0.00	100.00	**100.0**
1/2"	12.5	0.00	(**)	0.00	0.00	100.00	**100.0**
3/8"	9.5	0.00		0.00	0.00	100.00	**100.0**
#4	4.75	2.40		0.82	0.82	99.18	**99.2**
#10	2	4.98		1.70	2.52	97.48	**97.5**
#20	0.85	4.26	(**)	1.45	3.97	96.03	**96.0**
#40	0.425	3.69		1.26	5.23	94.77	**94.8**
#60	0.25	5.25		1.79	7.02	92.98	**93.0**
#100	0.15	8.40		2.87	9.89	90.11	**90.1**
#140	0.106	5.81		1.98	11.87	88.13	**88.1**
#200	0.075	5.70		1.94	13.81	86.19	**86.2**
Pan	-	252.62		86.19	100.00	-	**-**

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen*

Tested By DF Date 5/13/25 Checked By EG Date 5/15/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Civil & Environmental Consultants	Boring No.:	B-1
Client Reference:	336-102	Depth (ft):	12.0-16.5'
Project No.:	2025-275-001	Sample No.:	SS-5 & SS-6
Lab ID:	2025-275-001-003	Soil Description:	GRAY LEAN CLAY

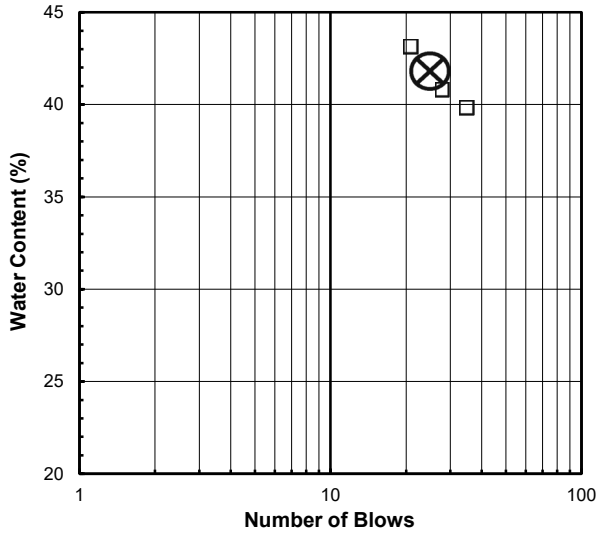
Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content ASTM D2216-19		**Liquid Limit Test**			
		1	**2**	**3**	**M**
Tare Number:	44	193	502	601	**U**
Wt. of Tare & Wet Sample (g):	23.64	40.37	43.13	41.80	**L**
Wt. of Tare & Dry Sample (g):	19.88	33.70	36.25	34.88	**T**
Weight of Tare (g):	3.25	16.94	19.37	18.82	**I**
Weight of Water (g):	3.8	6.7	6.9	6.9	**P**
Weight of Dry Sample (g):	16.6	16.8	16.9	16.1	**O**
Was As Received MC Preserved:	**Yes**				**I**
Moisture Content (%):	**22.6**	**39.8**	**40.8**	**43.1**	**N**
Number of Blows:		**35**	**28**	**21**	**T**

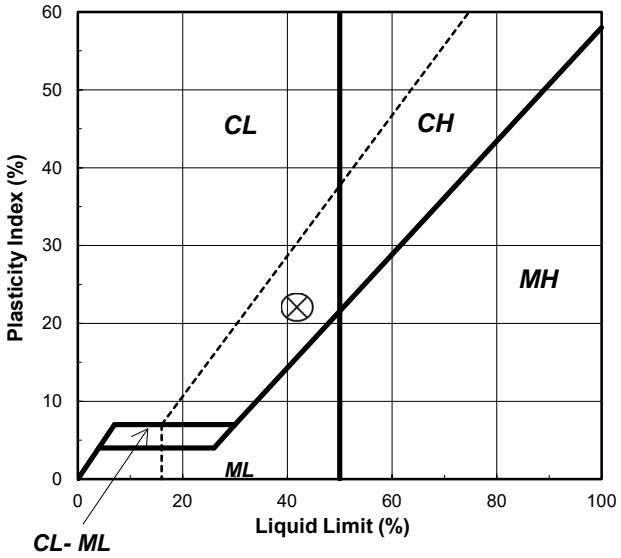
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	610	631	
Wt. of Tare & Wet Sample (g):	24.93	25.01	
Wt. of Tare & Dry Sample (g):	23.87	23.99	
Weight of Tare (g):	18.59	18.84	
Weight of Water (g):	1.1	1.0	
Weight of Dry Sample (g):	5.3	5.2	
Moisture Content (%):	**20.1**	**19.8**	**0.3**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**42**
Plastic Limit (%):	**20**
Plasticity Index (%):	**22**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By BS *Date* 5/9/25 *Checked By* EG *Date* 5/12/25

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DIRECT SHEAR

ASTM D 3080-11

Client:	Civil & Environmental Consultants	Boring No.:	B-2
Client Reference:	336-102	Depth (ft):	5.5-5.8
Project No.:	2025-275-001	Sample No.:	ST-1
Lab ID:	2025-275-001-004	Visual Description:	Brown Clay with Rock

Sample Conditions: Undisturbed, Inundated and Double Drained

Maximum Shear Stress (psi)		Normal Stress (psi)
6.01	(1)	**6.94**
9.72	(2)	**13.89**
15.97	(3)	**27.78**

Overall Regression Analysis

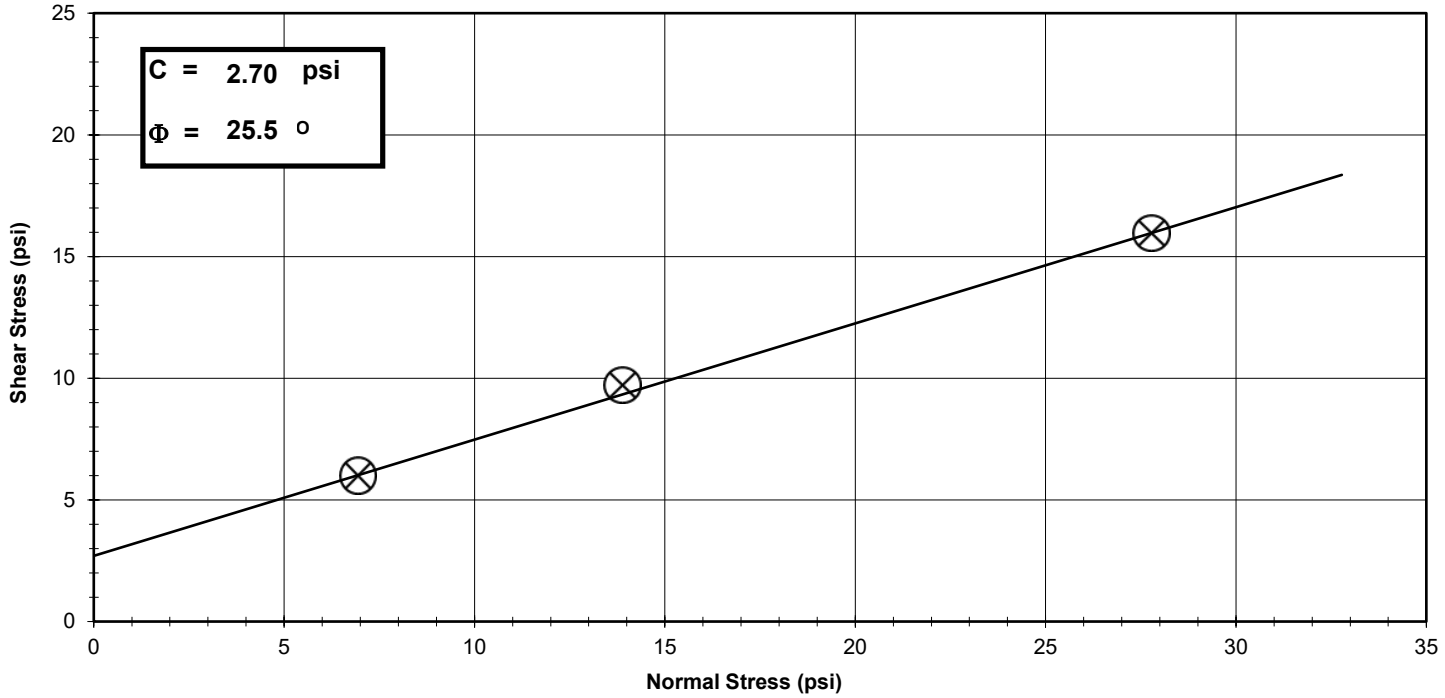
Slope =	0.47	
C =	**2.89**	**psi**
Φ =	**25.3**	**degrees**

Selected Points	Shear Stress (psi)	Normal Stress (psi)
1	6.01	6.94
3	15.97	27.78

Selected Points Regression

Slope =	0.48	
C =	**2.70**	**psi**
Φ =	**25.5**	**degrees**

SHEAR STRESS vs. NORMAL STRESS



Note: Graph not to scale

Tested By RPE *Date* 5/16/25 *Approved By* NJM *Date* 5/16/25

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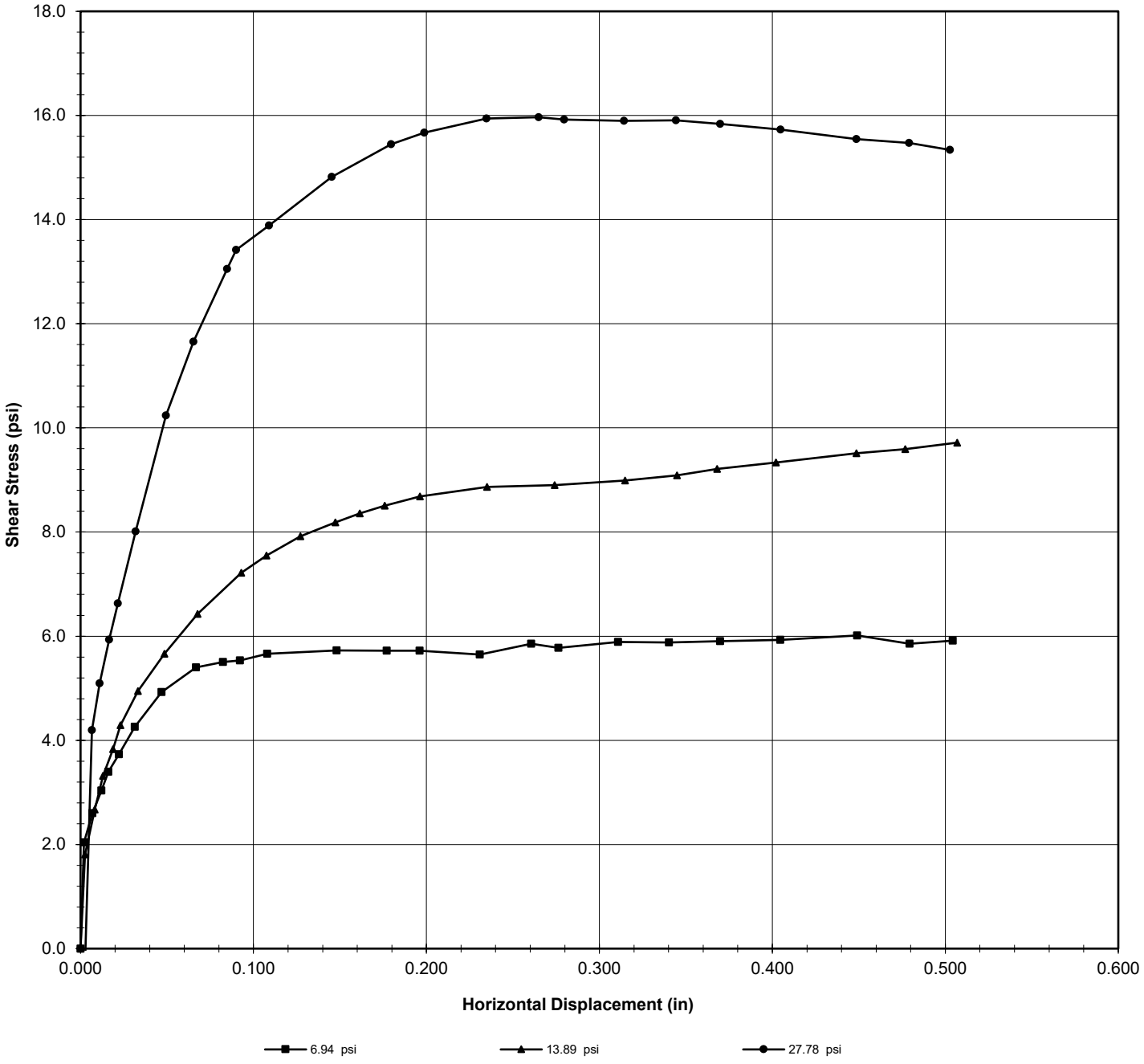
DIRECT SHEAR

ASTM D 3080-11

Client:	Civil & Environmental Consultants	Boring No.:	B-2
Client Reference:	336-102	Depth (ft):	5.5-5.8
Project No.:	2025-275-001	Sample No.:	ST-1
Lab ID:	2025-275-001-004	Visual Description:	Brown Clay with Rock

Sample Conditions: Undisturbed, Inundated and Double Drained

SHEAR STRESS vs. HORIZONTAL DISPLACEMENT



Tested By RPE *Date* 5/16/25 *Approved By* NJM *Date* 5/16/25

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DIRECT SHEAR

ASTM D 3080-11

Client:	Civil & Environmental Consultants	Boring No.:	B-2
Client Reference:	336-102	Depth (ft):	5.7-5.8
Project No.:	2025-275-001	Sample No.:	ST-1
Lab ID:	2025-275-001-004	Visual Description:	Brown Clay with Rock

Sample Conditions: Undisturbed, Inundated and Double Drained

Machine ID # **G3156**

SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	385.73	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	216.72	Volume of Solids (cm^3)	52.2
Weight of Wet Specimen (g)	169.01	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0152
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0110
Wet Density (pcf)	131.2	Void Ratio Before Consolidation	0.542
Dry Density (pcf)	**109.3**	**Void Ratio After Consolidation**	0.525

Moisture Content	*Before Test*	*After Test*	*Testing Parameters*	
Tare ID	3103	4007		
Weight of Wet Soil & Tare (g)	175.69	178.77	Normal Stress (psi)	**6.94**
Weight of Dry Soil & Tare (g)	147.81	149.97		
Weight of Tare (g)	8.17	8.14	Strain Rate (in/min)	0.00144
Weight of Water (g)	27.88	28.8		
Weight of Dry Soil (g)	139.64	141.83	Machine Deflection (in)	0.0042
Moisture Content (%)	**20.0**	**20.3**		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr,(-)decr (in)	Shear To Normal Ratio
0.000	0.0	**0.00**	0.0000	0.0000	0.00
0.002	10.0	**2.04**	0.0007	-0.0007	0.29
0.007	12.8	**2.60**	0.0010	-0.0010	0.38
0.012	14.9	**3.04**	0.0014	-0.0014	0.44
0.016	16.7	**3.39**	0.0015	-0.0015	0.49
0.022	18.3	**3.73**	0.0015	-0.0015	0.54
0.031	20.9	**4.26**	0.0016	-0.0016	0.61
0.047	24.2	**4.92**	0.0016	-0.0016	0.71
0.067	26.5	**5.40**	0.0009	-0.0009	0.78
0.082	27.0	**5.51**	0.0000	0.0000	0.79
0.092	27.2	**5.54**	-0.0005	0.0005	0.80
0.108	27.8	**5.66**	-0.0011	0.0011	0.82
0.148	28.1	**5.73**	-0.0027	0.0027	0.83
0.177	28.1	**5.72**	-0.0041	0.0041	0.82
0.196	28.1	**5.72**	-0.0047	0.0047	0.82
0.231	27.7	**5.65**	-0.0055	0.0055	0.81
0.261	28.7	**5.85**	-0.0062	0.0062	0.84
0.276	28.4	**5.78**	-0.0070	0.0070	0.83
0.311	28.9	**5.89**	-0.0077	0.0077	0.85
0.340	28.9	**5.88**	-0.0090	0.0090	0.85
0.370	29.0	**5.90**	-0.0100	0.0100	0.85
0.405	29.1	**5.93**	-0.0112	0.0112	0.85
0.449	29.5	**6.01**	-0.0125	0.0125	0.87
0.479	28.7	**5.85**	-0.0125	0.0125	0.84
0.504	29.0	**5.92**	-0.0127	0.0127	0.85

Tested By RPE *Date* 5/14/25 *Input Checked By* NJM *Date* 5/16/25

DCN: CT-S21C DATE: 06/10/13 REV: 1

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DIRECT SHEAR

ASTM D 3080-11

Client:	Civil & Environmental Consultants	Boring No.:	B-2
Client Reference:	336-102	Depth (ft):	5.6-5.7
Project No.:	2025-275-001	Sample No.:	ST-1
Lab ID:	2025-275-001-004	Visual Description:	Brown Clay with Rock

Sample Conditions: Undisturbed, Inundated and Double Drained

Machine ID # **G1645**

SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	378.13	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	214.69	Volume of Solids (cm^3)	50.5
Weight of Wet Specimen (g)	163.44	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0306
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0256
Wet Density (pcf)	126.8	Void Ratio Before Consolidation	0.594
Dry Density (pcf)	**105.7**	**Void Ratio After Consolidation**	0.553

Moisture Content	*Before Test*	*After Test*	*Testing Parameters*	
Tare ID	3103	3387		
Weight of Wet Soil & Tare (g)	175.69	173.30	Normal Stress (psi)	**13.89**
Weight of Dry Soil & Tare (g)	147.81	146.24		
Weight of Tare (g)	8.17	8.20	Strain Rate (in/min)	0.00144
Weight of Water (g)	27.88	27.06		
Weight of Dry Soil (g)	139.64	138.04	Machine Deflection (in)	0.0050
Moisture Content (%)	**20.0**	**19.6**		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr,(-)decr (in)	Shear To Normal Ratio
0.000	0.0	**0.00**	0.0000	0.0000	0.00
0.003	8.9	**1.81**	0.0007	-0.0007	0.13
0.008	13.1	**2.67**	0.0014	-0.0014	0.19
0.013	16.3	**3.32**	0.0018	-0.0018	0.24
0.019	18.8	**3.83**	0.0023	-0.0023	0.28
0.023	21.1	**4.29**	0.0028	-0.0028	0.31
0.033	24.3	**4.95**	0.0039	-0.0039	0.36
0.049	27.8	**5.66**	0.0053	-0.0053	0.41
0.068	31.5	**6.43**	0.0064	-0.0064	0.46
0.093	35.4	**7.22**	0.0074	-0.0074	0.52
0.108	37.1	**7.55**	0.0078	-0.0078	0.54
0.127	38.9	**7.92**	0.0083	-0.0083	0.57
0.147	40.2	**8.19**	0.0088	-0.0088	0.59
0.161	41.0	**8.36**	0.0089	-0.0089	0.60
0.176	41.7	**8.51**	0.0089	-0.0089	0.61
0.196	42.6	**8.68**	0.0090	-0.0090	0.63
0.235	43.5	**8.87**	0.0090	-0.0090	0.64
0.274	43.7	**8.90**	0.0089	-0.0089	0.64
0.315	44.1	**8.99**	0.0089	-0.0089	0.65
0.345	44.6	**9.09**	0.0086	-0.0086	0.65
0.368	45.2	**9.21**	0.0084	-0.0084	0.66
0.402	45.8	**9.33**	0.0082	-0.0082	0.67
0.449	46.7	**9.51**	0.0078	-0.0078	0.68
0.477	47.1	**9.59**	0.0073	-0.0073	0.69
0.507	47.7	**9.72**	0.0070	-0.0070	0.70

Tested By RPE *Date* 5/14/25 *Input Checked By* NJM *Date* 5/16/25

DCN: CT-S21C DATE: 06/10/13 REV: 1

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DIRECT SHEAR

ASTM D 3080-11

Client:	Civil & Environmental Consultants	Boring No.:	B-2
Client Reference:	336-102	Depth (ft):	5.5-5.6
Project No.:	2025-275-001	Sample No.:	ST-1
Lab ID:	2025-275-001-004	Visual Description:	Brown Clay with Rock

Sample Conditions: Undisturbed, Inundated and Double Drained

Machine ID # **G1285**

SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	374.77	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	214.02	Volume of Solids (cm^3)	49.6
Weight of Wet Specimen (g)	160.75	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0627
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0405
Wet Density (pcf)	124.8	Void Ratio Before Consolidation	0.621
Dry Density (pcf)	**104.0**	**Void Ratio After Consolidation**	0.555

Moisture Content	*Before Test*	*After Test*	*Testing Parameters*	
Tare ID	3103	3023		
Weight of Wet Soil & Tare (g)	175.69	168.85	Normal Stress (psi)	**27.78**
Weight of Dry Soil & Tare (g)	147.81	140.66		
Weight of Tare (g)	8.17	8.03	Strain Rate (in/min)	0.00144
Weight of Water (g)	27.88	28.19		
Weight of Dry Soil (g)	139.64	132.63	Machine Deflection (in)	0.0223
Moisture Content (%)	**20.0**	**21.3**		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr,(-)decr (in)	Shear To Normal Ratio
0.000	0.0	**0.00**	0.0000	0.0000	0.00
0.003	-0.7	**-0.14**	0.0000	0.0000	-0.01
0.007	20.6	**4.19**	0.0011	-0.0011	0.15
0.011	25.0	**5.09**	0.0019	-0.0019	0.18
0.017	29.1	**5.93**	0.0034	-0.0034	0.21
0.022	32.5	**6.63**	0.0045	-0.0045	0.24
0.032	39.3	**8.01**	0.0064	-0.0064	0.29
0.049	50.3	**10.24**	0.0083	-0.0083	0.37
0.065	57.2	**11.66**	0.0103	-0.0103	0.42
0.085	64.1	**13.05**	0.0122	-0.0122	0.47
0.090	65.9	**13.42**	0.0125	-0.0125	0.48
0.109	68.2	**13.89**	0.0141	-0.0141	0.50
0.145	72.8	**14.82**	0.0149	-0.0149	0.53
0.180	75.8	**15.45**	0.0157	-0.0157	0.56
0.199	76.9	**15.67**	0.0160	-0.0160	0.56
0.235	78.3	**15.94**	0.0167	-0.0167	0.57
0.265	78.4	**15.97**	0.0172	-0.0172	0.57
0.280	78.2	**15.92**	0.0173	-0.0173	0.57
0.314	78.0	**15.90**	0.0174	-0.0174	0.57
0.344	78.1	**15.91**	0.0176	-0.0176	0.57
0.370	77.7	**15.84**	0.0177	-0.0177	0.57
0.405	77.2	**15.73**	0.0181	-0.0181	0.57
0.449	76.3	**15.55**	0.0183	-0.0183	0.56
0.479	75.9	**15.47**	0.0185	-0.0185	0.56
0.503	75.3	**15.34**	0.0186	-0.0186	0.55

Tested By RPE *Date* 5/14/25 *Input Checked By* NJM *Date* 5/16/25

DCN: CT-S21C DATE: 06/10/13 REV: 1

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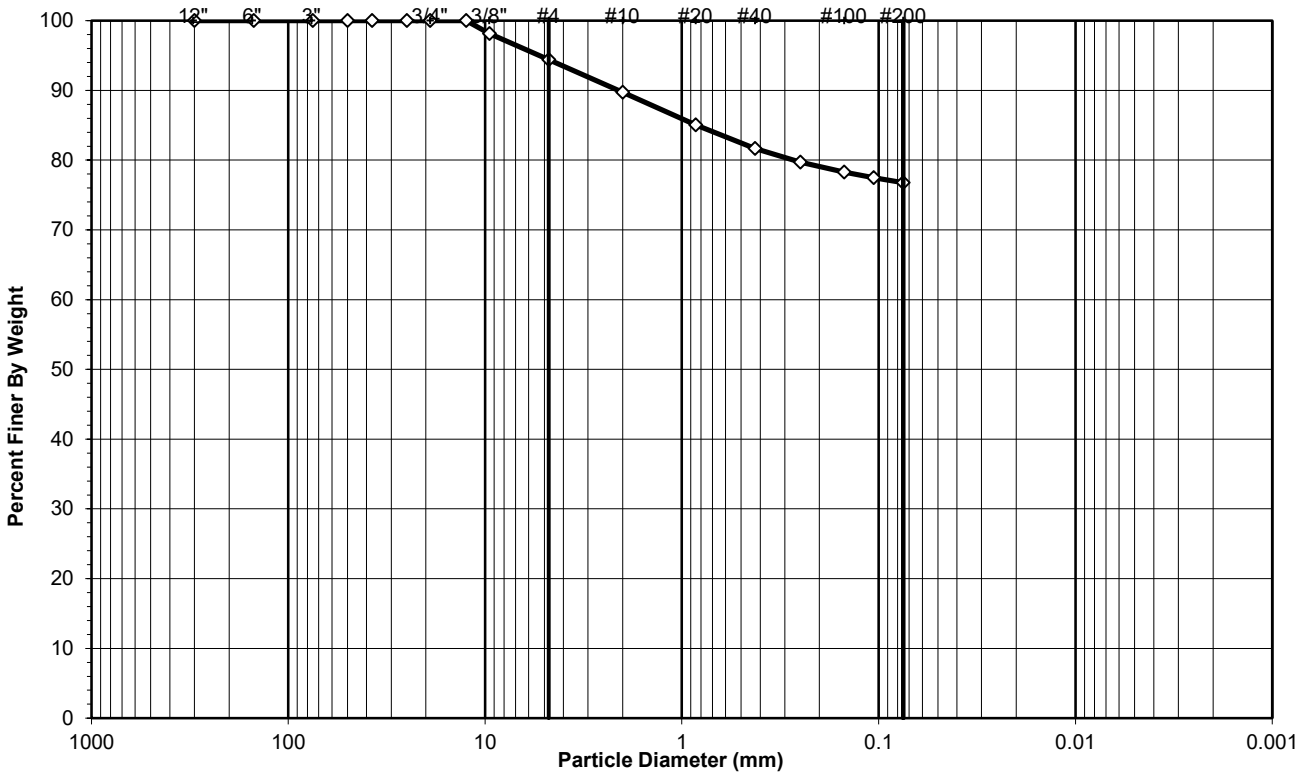
SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Civil & Environmental Consultants	Boring No.:	B-2
Client Reference:	336-102	Depth (ft):	4.5-10.5'
Project No.:	2025-275-001	Sample No.:	ST-1, SS-3 & SS-4
Lab ID:	2025-275-001-007	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**5.58**
#4 to #200	***Sand***	**17.65**
Finer than #200	***Silt & Clay***	**76.77**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By DF Date 5/16/25 Checked By JLK Date 5/16/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Civil & Environmental Consultants	Boring No.:	B-2
Client Reference:	336-102	Depth (ft):	4.5-10.5'
Project No.:	2025-275-001	Sample No.:	ST-1, SS-3 & SS-4
Lab ID:	2025-275-001-007	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1421	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	471.78	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	471.78	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	142.74	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	329.04	Weight of Dry Soil (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	329.04
Tare No. (Sub-Specimen)	1421	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	471.78	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	142.74	Dry Weight of - 3/4" Sample (g):	329.04
Sub-Specimen Wet Weight (g):	329.04	Dry Weight -3/4" +3/8" Sample (g):	6.06
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	322.98
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100**
6"	150	0.00		0.00	0.00	100.00	**100**
3"	75	0.00		0.00	0.00	100.00	**100**
2"	50	0.00	(*)	0.00	0.00	100.00	**100**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100**
1"	25	0.00		0.00	0.00	100.00	**100**
3/4"	19	0.00		0.00	0.00	100.00	**100**
1/2"	12.5	0.00	(**)	0.00	0.00	100.00	**100**
3/8"	9.5	6.06		1.84	1.84	98.16	**98**
#4	4.75	12.30		3.74	5.58	94.42	**94**
#10	2	15.47		4.70	10.28	89.72	**90**
#20	0.85	15.39	(**)	4.68	14.96	85.04	**85**
#40	0.425	11.05		3.36	18.32	81.68	**82**
#60	0.25	6.45		1.96	20.28	79.72	**80**
#100	0.15	4.71		1.43	21.71	78.29	**78**
#140	0.106	2.67		0.81	22.52	77.48	**77**
#200	0.075	2.34		0.71	23.23	76.77	**77**
Pan	-	252.60		76.77	100.00	-	**-**

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen*

Tested By	DF	Date	5/16/25	Checked By	JLK	Date	5/16/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Civil & Environmental Consultants	Boring No.:	B-2
Client Reference:	336-102	Depth (ft):	4.5-10.5'
Project No.:	2025-275-001	Sample No.:	ST-1, SS-3 & SS-4
Lab ID:	2025-275-001-007	Soil Description:	BROWN LEAN CLAY

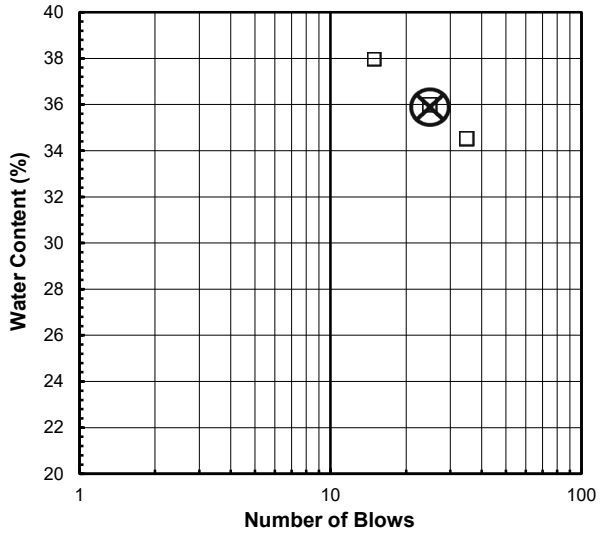
Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content ASTM D2216-19		**Liquid Limit Test**			
		1	**2**	**3**	**M**
Tare Number:	97	173	539	123	**U**
Wt. of Tare & Wet Sample (g):	23.69	41.72	41.38	40.60	**L**
Wt. of Tare & Dry Sample (g):	19.18	36.05	35.84	34.81	**T**
Weight of Tare (g):	3.34	19.61	20.44	19.55	**I**
Weight of Water (g):	4.5	5.7	5.5	5.8	**P**
Weight of Dry Sample (g):	15.8	16.4	15.4	15.3	**O**
Was As Received MC Preserved:	**Yes**				**I**
Moisture Content (%):	**28.5**	**34.5**	**36.0**	**37.9**	**N**
Number of Blows:		**35**	**25**	**15**	**T**

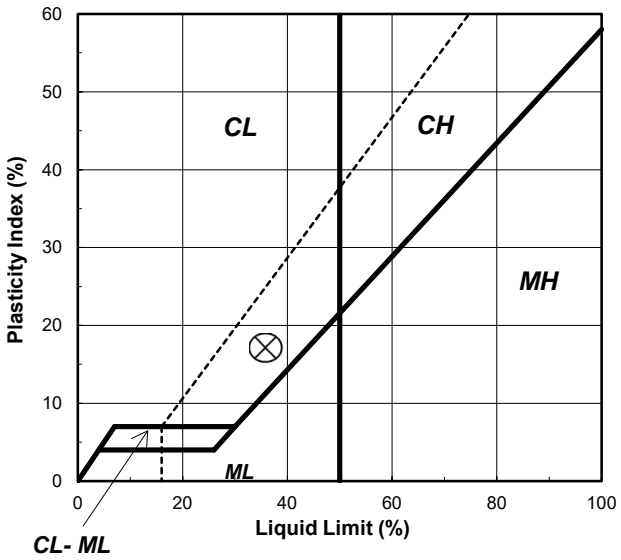
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	203	476	
Wt. of Tare & Wet Sample (g):	25.86	23.61	
Wt. of Tare & Dry Sample (g):	24.83	22.61	
Weight of Tare (g):	19.32	17.23	
Weight of Water (g):	1.0	1.0	
Weight of Dry Sample (g):	5.5	5.4	
Moisture Content (%):	**18.7**	**18.6**	**0.1**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**36**
Plastic Limit (%):	**19**
Plasticity Index (%):	**17**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By DDA *Date* 5/14/25 *Checked By* EG *Date* 5/15/25

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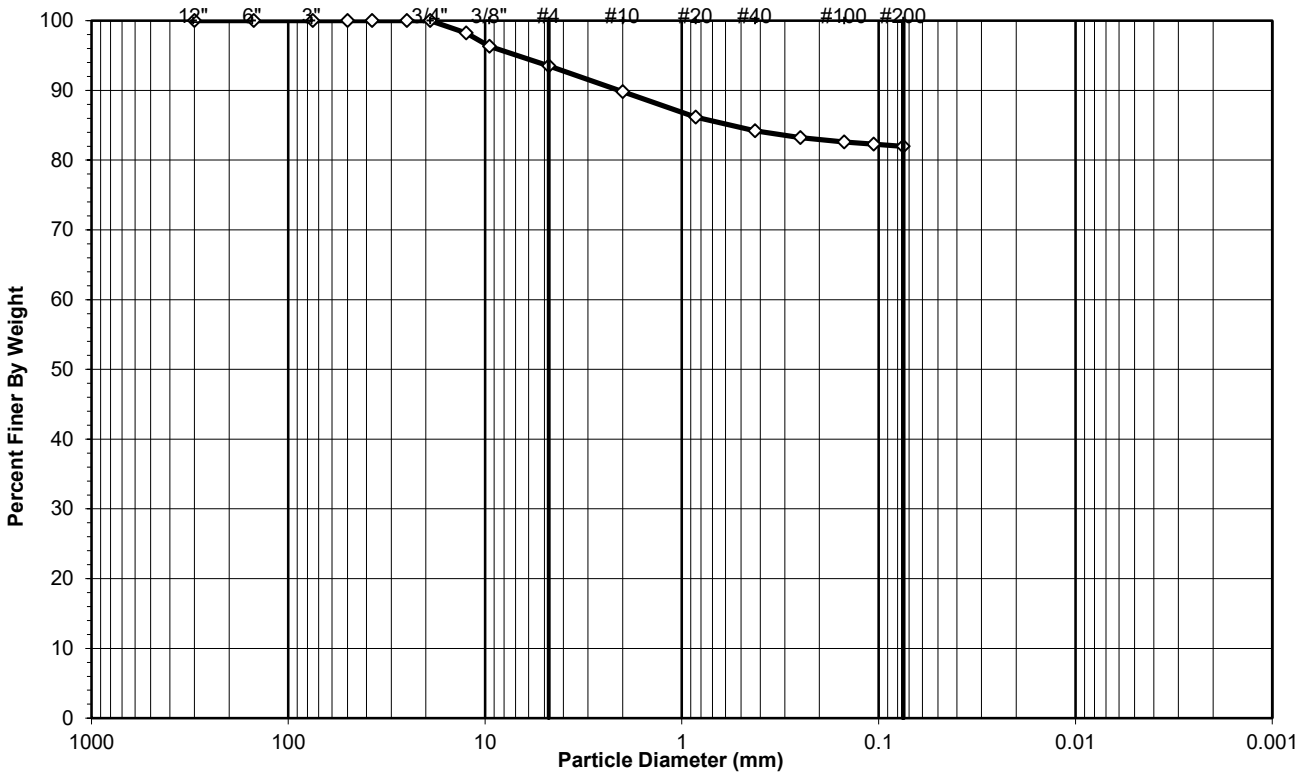
SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Civil & Environmental Consultants	Boring No.:	B-6
Client Reference:	336-102	Depth (ft):	9.0-13.5'
Project No.:	2025-275-001	Sample No.:	SS-4 & SS-5
Lab ID:	2025-275-001-012	Soil Color:	Tan

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**6.47**
#4 to #200	***Sand***	**11.56**
Finer than #200	***Silt & Clay***	**81.97**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By DF Date 5/6/25 Checked By EG Date 5/9/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Civil & Environmental Consultants	Boring No.:	B-6
Client Reference:	336-102	Depth (ft):	9.0-13.5'
Project No.:	2025-275-001	Sample No.:	SS-4 & SS-5
Lab ID:	2025-275-001-012	Soil Color:	Tan

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1446	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	481.52	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	423.62	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	143.82	Weight of Tare (g):	NA
Weight of Water (g):	57.90	Weight of Water (g):	NA
Weight of Dry Soil (g):	279.80	Weight of Dry Soil (g):	NA
Moisture Content (%):	**20.7**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	279.80
Tare No. (Sub-Specimen)	1446	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	481.52	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	143.82	Dry Weight of - 3/4" Sample (g):	279.80
Sub-Specimen Wet Weight (g):	337.70	Dry Weight -3/4" +3/8" Sample (g):	10.35
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	269.45
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100**
6"	150	0.00		0.00	0.00	100.00	**100**
3"	75	0.00		0.00	0.00	100.00	**100**
2"	50	0.00	(*)	0.00	0.00	100.00	**100**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100**
1"	25	0.00		0.00	0.00	100.00	**100**
3/4"	19	0.00		0.00	0.00	100.00	**100**
1/2"	12.5	4.92	(**)	1.76	1.76	98.24	**98**
3/8"	9.5	5.43		1.94	3.70	96.30	**96**
#4	4.75	7.75		2.77	6.47	93.53	**94**
#10	2	10.45		3.73	10.20	89.80	**90**
#20	0.85	10.13	(**)	3.62	13.82	86.18	**86**
#40	0.425	5.55		1.98	15.81	84.19	**84**
#60	0.25	2.73		0.98	16.78	83.22	**83**
#100	0.15	1.72		0.61	17.40	82.60	**83**
#140	0.106	0.88		0.31	17.71	82.29	**82**
#200	0.075	0.88		0.31	18.03	81.97	**82**
Pan	-	229.36		81.97	100.00	-	**-**

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen*

Tested By	DF	Date	5/6/25	Checked By	EG	Date	5/9/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Civil & Environmental Consultants	Boring No.:	B-6
Client Reference:	336-102	Depth (ft):	9.0-13.5'
Project No.:	2025-275-001	Sample No.:	SS-4 & SS-5
Lab ID:	2025-275-001-012	Soil Description:	TAN LEAN CLAY

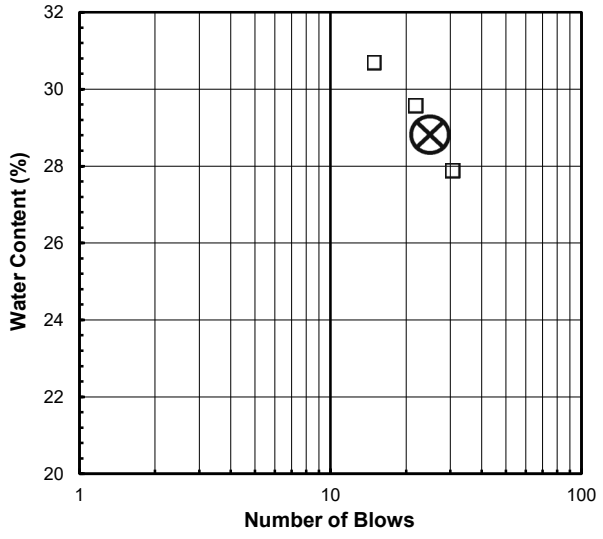
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content ASTM D2216-19		**Liquid Limit Test** 1	2	3	M
Tare Number:	65	504	53	687	U
Wt. of Tare & Wet Sample (g):	30.17	44.95	40.37	41.65	L
Wt. of Tare & Dry Sample (g):	25.24	39.37	35.45	36.68	T
Weight of Tare (g):	3.19	19.34	18.80	20.48	I
Weight of Water (g):	4.9	5.6	4.9	5.0	P
Weight of Dry Sample (g):	22.1	20.0	16.7	16.2	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**22.4**	**27.9**	**29.5**	**30.7**	N
Number of Blows:		**31**	**22**	**15**	T

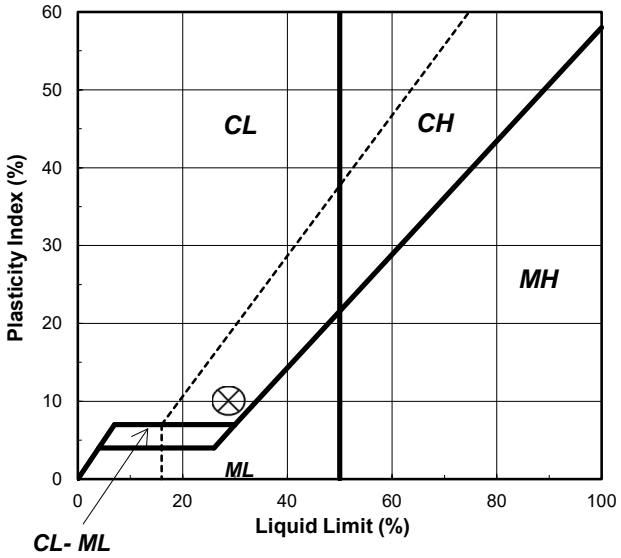
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	539	182	
Wt. of Tare & Wet Sample (g):	28.98	28.85	
Wt. of Tare & Dry Sample (g):	27.61	27.31	
Weight of Tare (g):	20.44	19.38	
Weight of Water (g):	1.4	1.5	
Weight of Dry Sample (g):	7.2	7.9	
Moisture Content (%):	**19.1**	**19.4**	**-0.3**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**29**
Plastic Limit (%):	**19**
Plasticity Index (%):	**10**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By MLF *Date* 5/8/25 *Checked By* EG *Date* 5/9/25

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UNCONFINED COMPRESSION STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C
This method does not report strain rate or deformation.
Sample Prep and Conformance Verification: ASTM D 4543-08

Client:	Civil & Environmental Consultants	Boring No.:	B-8
Client Project:	336-102	Depth (ft):	19.5-20.0
Project No.:	2025-275-001	Sample ID:	NQ-1
Lab ID No.:	2025-275-001-013	Moisture Condition:	As Received-Unpreserved

Specimen Weight (g): 458.45

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	4.00	Reading 1:	1.98
Reading 2:	4.00	Reading 2:	1.98
Reading 3:	4.00	Average:	**1.98**
Average:	**4.00**	Area (in^2):	3.08
		L/D:	2.02

MOISTURE CONTENT			
Tare Number:	3224	Total Load (lb):	5,920
Wt. of Tare & Wet Sample (g):	466.38	**Uniaxial Compressive Strength (psi):**	**1,920**
Wt. of Tare & Dry Sample (g):	460.13		
Weight of Tare (g):	8.59	Fracture Type:	**Cone & Split**
Weight of Wet Sample (g):	457.79		
Sample Volume (cm^3):	201.83	Rate of Loading (lb/sec):	79
Moisture Content (%):	1.38	Time to Break (min:sec):	1:15.21
Unit Wet Weight (g/cm^3):	2.271	Deviation From Straightness[3]:	
Unit Wet Weight (pcf):	141.7		
Unit Dry Weight (g/cm^3):	2.240	AXIAL: *Pass*	TOP: *Pass* BOTTOM: *Pass*
Unit Dry Weight (pcf):	139.8		

Physical Description: Rock Core

Notes:
1) Moisture conditions at time of the test are: As Received-Unpreserved
2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
3) Deviation from straightness, Procedure A of ASTM D 4543-08
   Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
4) Temperature is laboratory room temperature.
5) D4543 Prep and D7012 Testing Equipment Used:
6) Tool / Machine List:
   G788 Compression Machine
   G1661 Digital Calipers, G1380 Dial Gauge
   G1616 Straight Edge, G1571 Feeler Gauge
   G1633 V-Block, G1634 Rock Saw, G1635 Grinder

Tested By: JAC Date: 5/12/25 *Checked By:* NJM *Date:* 5/13/25

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UNCONFINED COMPRESSION STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C
This method does not report strain rate or deformation.
Sample Prep and Conformance Verification: ASTM D 4543-08

Client:	Civil & Environmental Consultants	Boring No.:	B-8
Client Project:	336-102	Depth (ft):	25.4-26.1
Project No.:	2025-275-001	Sample ID:	NQ-3
Lab ID No.:	2025-275-001-014	Moisture Condition:	As Received-Unpreserved

Specimen Weight (g): 544.69

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	3.99	Reading 1:	1.98
Reading 2:	3.99	Reading 2:	1.98
Reading 3:	3.99	Average:	**1.98**
Average:	**3.99**	Area (in^2):	3.09
		L/D:	2.01

MOISTURE CONTENT			
Tare Number:	3034	Total Load (lb):	74,600
Wt. of Tare & Wet Sample (g):	541.24	**Uniaxial Compressive Strength (psi):**	**24,150**
Wt. of Tare & Dry Sample (g):	539.74		
Weight of Tare (g):	8.08	Fracture Type:	**Cone & Split**
Weight of Wet Sample (g):	533.16		
Sample Volume (cm^3):	202.14	Rate of Loading (lb/sec):	235
Moisture Content (%):	0.28	Time to Break (min:sec):	5:17.38
Unit Wet Weight (g/cm^3):	2.695	Deviation From Straightness[3]:	
Unit Wet Weight (pcf):	168.1		
Unit Dry Weight (g/cm^3):	2.687	AXIAL: *Pass*	TOP: *Pass* BOTTOM: *Pass*
Unit Dry Weight (pcf):	167.7		

Physical Description: Rock Core

Notes:
1) Moisture conditions at time of the test are: As Received-Unpreserved
2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
3) Deviation from straightness, Procedure A of ASTM D 4543-08
   Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
4) Temperature is laboratory room temperature.
5) D4543 Prep and D7012 Testing Equipment Used:
6) Tool / Machine List:
   G788 Compression Machine
   G1661 Digital Calipers, G1380 Dial Gauge
   G1616 Straight Edge, G1571 Feeler Gauge
   G1633 V-Block, G1634 Rock Saw, G1635 Grinder

Tested By: JAC Date: 5/12/25 *Checked By:* NJM *Date:* 5/13/25

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UNCONFINED COMPRESSION STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C
This method does not report strain rate or deformation.
Sample Prep and Conformance Verification: ASTM D 4543-08

Client:	Civil & Environmental Consultants	Boring No.:	B-9
Client Project:	336-102	Depth (ft):	9.2-10.0
Project No.:	2025-275-001	Sample ID:	NQ-1
Lab ID No.:	2025-275-001-015	Moisture Condition:	As Received-Unpreserved

Specimen Weight (g): 530.90

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	4.00	Reading 1:	1.98
Reading 2:	4.00	Reading 2:	1.98
Reading 3:	4.00	Average:	**1.98**
Average:	**4.00**	Area (in^2):	3.09
		L/D:	2.02

MOISTURE CONTENT			
Tare Number:	3222	Total Load (lb):	52,685
Wt. of Tare & Wet Sample (g):	537.90	**Uniaxial Compressive Strength (psi):**	**17,060**
Wt. of Tare & Dry Sample (g):	534.72		
Weight of Tare (g):	8.16	Fracture Type:	**Cone & Split**
Weight of Wet Sample (g):	529.74		
Sample Volume (cm^3):	202.44	Rate of Loading (lb/sec):	210
Moisture Content (%):	0.60	Time to Break (min:sec):	4:11.34
Unit Wet Weight (g/cm^3):	2.623	Deviation From Straightness[3]:	
Unit Wet Weight (pcf):	163.6		
Unit Dry Weight (g/cm^3):	2.607	AXIAL: *Pass*	TOP: *Pass* BOTTOM: *Pass*
Unit Dry Weight (pcf):	162.7		

Physical Description: Rock Core

Notes:
1) Moisture conditions at time of the test are: As Received-Unpreserved
2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
3) Deviation from straightness, Procedure A of ASTM D 4543-08
   Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
4) Temperature is laboratory room temperature.
5) D4543 Prep and D7012 Testing Equipment Used:
6) Tool / Machine List:
   G788 Compression Machine
   G1661 Digital Calipers, G1380 Dial Gauge
   G1616 Straight Edge, G1571 Feeler Gauge
   G1633 V-Block, G1634 Rock Saw, G1635 Grinder

Tested By: JAC Date: 5/12/25 *Checked By:* NJM *Date:* 5/13/25

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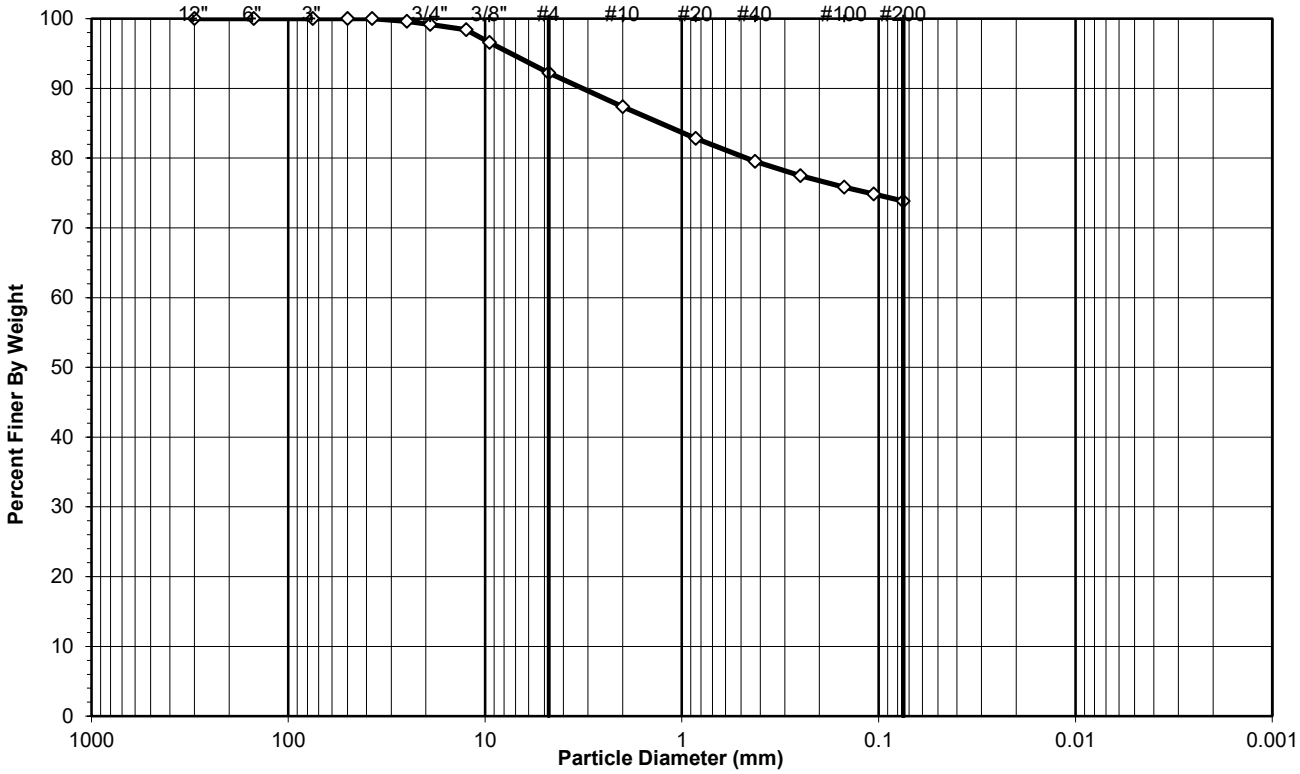
SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Civil & Environmental Consultants	Boring No.:	B-9
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-016	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**7.79**
#4 to #200	***Sand***	**18.36**
Finer than #200	***Silt & Clay***	**73.85**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By DF Date 5/6/25 Checked By DF Date 5/12/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Civil & Environmental Consultants	Boring No.:	B-9
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-016	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	3167	Tare No.:	3185
Wt. of Tare & Wet Sample (g):	294.08	Weight of Tare & Wet Sample (g):	106.07
Wt. of Tare & Dry Sample (g):	267.74	Weight of Tare & Dry Sample (g):	102.31
Weight of Tare (g):	7.57	Weight of Tare (g):	8.16
Weight of Water (g):	26.34	Weight of Water (g):	3.76
Weight of Dry Soil (g):	260.17	Weight of Dry Soil (g):	94.15
Moisture Content (%):	**10.1**	**Moisture Content (%):**	**4.0**

Wet Weight of -3/4" Sample (g):	12557.00	Total Dry Weight of Sample (g):	11495.86
Tare No. -3/4" Sub-Specimen (g):	1408	Wet Weight of +3/4" Sample (g):	97.00
Wt. of Tare & Wet -3/4" Sub-Specimen (g):	1389.05	Dry Weight of + 3/4" Sample (g):	93.27
Weight of Tare (g):	174.90	Dry Weight of - 3/4" Sample (g):	11402.59
Sub-Specimen 3/4" Wet Weight (g):	1214.15	Dry Weight -3/4" +3/8" Sample (g):	300.54
Tare No. (-3/8" Sub-Specimen):	452	Dry Weight of -3/8" Sample (g):	11102.04
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	391.98	J - Factor (% Finer than 3/4"):	99.2%
Weight of Tare (g):	89.18	J - Factor (% Finer than 3/8"):	96.6%
Sub-Specimen -3/8" Wet Weight (g):	302.80		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100**
6"	150	0.00		0.00	0.00	100.00	**100**
3"	75	0.00		0.00	0.00	100.00	**100**
2"	50	0.00	(*)	0.00	0.00	100.00	**100**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100**
1"	25	46.00		0.38	0.38	99.62	**100**
3/4"	19	51.00		0.43	0.81	99.19	**99**
1/2"	12.5	8.75	(**)	0.79	0.79	99.21	**98**
3/8"	9.5	20.31		1.84	2.64	97.36	**97**
#4	4.75	12.42		4.52	4.52	95.48	**92**
#10	2	13.78		5.01	9.53	90.47	**87**
#20	0.85	13.00	(**)	4.73	14.26	85.74	**83**
#40	0.425	9.32		3.39	17.65	82.35	**80**
#60	0.25	5.86		2.13	19.78	80.22	**77**
#100	0.15	4.67		1.70	21.48	78.52	**76**
#140	0.106	2.80		1.02	22.49	77.51	**75**
#200	0.075	2.84		1.03	23.53	76.47	**74**
Pan	-	210.27		76.47	100.00	-	**-**

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen*

Tested By DF Date 5/6/25 Checked By DF Date 5/12/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Civil & Environmental Consultants	Boring No.:	B-9
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-016	Soil Description:	BROWN LEAN CLAY

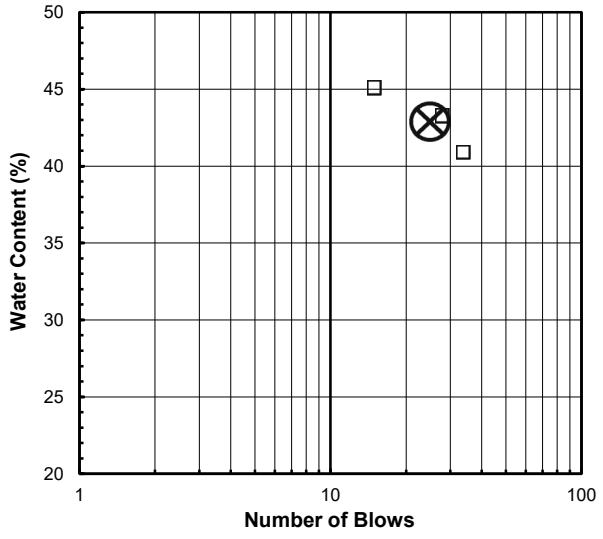
Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	4004	647	716	162	U
Wt. of Tare & Wet Sample (g):	257.47	42.62	40.80	40.14	L
Wt. of Tare & Dry Sample (g):	210.53	36.03	34.09	33.10	T
Weight of Tare (g):	7.28	19.90	18.57	17.47	I
Weight of Water (g):	46.9	6.6	6.7	7.0	P
Weight of Dry Sample (g):	203.3	16.1	15.5	15.6	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**23.1**	**40.9**	**43.2**	**45.0**	N
Number of Blows:		**34**	**28**	**15**	T

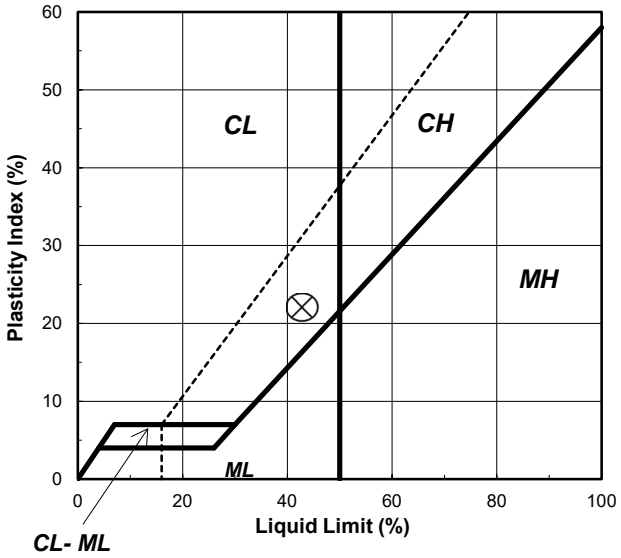
Plastic Limit Test	1	2	Range
Tare Number:	704	682	
Wt. of Tare & Wet Sample (g):	33.96	31.84	
Wt. of Tare & Dry Sample (g):	32.38	30.40	
Weight of Tare (g):	24.99	23.63	
Weight of Water (g):	1.6	1.4	
Weight of Dry Sample (g):	7.4	6.8	
Moisture Content (%):	**21.4**	**21.3**	**0.1**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**43**
Plastic Limit (%):	**21**
Plasticity Index (%):	**22**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By MLF *Date* 5/9/25 *Checked By* EG *Date* 5/12/25

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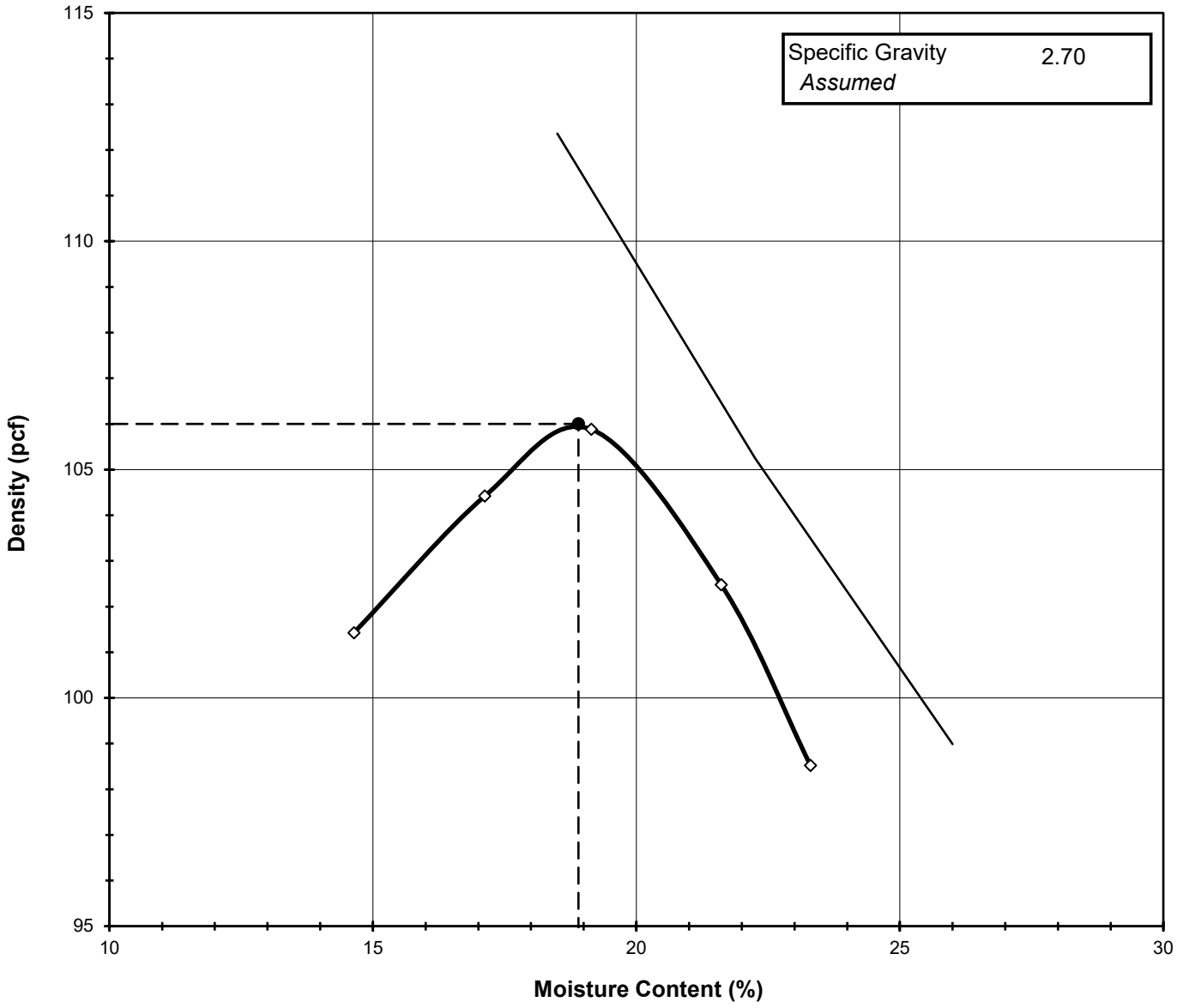
MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	Civil & Environmental Consultants	Boring No.:	B-9
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-016	Test Method	**STANDARD**

Visual Description: Brown Clay with Rock

Optimum Moisture Content (%): 18.9
Maximum Dry Density (pcf): 106.0



Tested By AB *Date* 5/2/2025 *Checked By* JLK *Date* 5/5/25

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	Civil & Environmental Consultants	Boring No.:	B-9
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-016		

Visual Description: Brown Clay with Rock

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	C

Test Type:	**STANDARD**
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G3349
Mold ID:	G3347
Mold diameter:	6"
Weight of the Mold (g):	5714
Volume of the Mold (cm^3):	2123

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Weight of Mold & Wet Sample (g):	9670	9875	10006	9954	9847
Weight of Mold (g):	5714	5714	5714	5714	5714
Weight of Wet Sample (g):	3956	4161	4292	4240	4133
Mold Volume (cm^3):	2123	2123	2123	2123	2123

Moisture Content / Density

Tare Number:	419	424	428	446	494
Weight of Tare & Wet Sample (g):	492.01	491.96	486.79	491.44	492.01
Weight of Tare & Dry Sample (g):	440.87	433.38	422.46	420.32	416.24
Weight of Tare (g):	91.54	91.29	86.44	91.23	91.10
Weight of Water (g):	51.14	58.58	64.33	71.12	75.77
Weight of Dry Sample (g):	349.33	342.09	336.02	329.09	325.14

Wet Density (g/cm^3):	1.86	1.96	2.02	2.00	1.95
Wet Density (pcf):	116.3	122.3	126.2	124.6	121.5
Moisture Content (%):	**14.6**	**17.1**	**19.1**	**21.6**	**23.3**
Dry Density (pcf):	**101.4**	**104.4**	**105.9**	**102.5**	**98.5**

Zero Air Voids

Moisture Content (%):	18.5	22.3	26.0
Dry Unit Weight (pcf):	112.4	105.3	99.0

Tested By AB *Date* 5/2/25 *Checked By* JLK *Date* 5/5/25

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UNCONFINED COMPRESSION STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C
This method does not report strain rate or deformation.
Sample Prep and Conformance Verification: ASTM D 4543-08

Client:	Civil & Environmental Consultants	Boring No.:	B-10
Client Project:	336-102	Depth (ft):	23.4-23.8
Project No.:	2025-275-001	Sample ID:	NQ-3
Lab ID No.:	2025-275-001-017	Moisture Condition:	As Received-Unpreserved

Specimen Weight (g): 527.61

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	3.95	Reading 1:	1.99
Reading 2:	3.95	Reading 2:	1.99
Reading 3:	3.95	Average:	**1.99**
Average:	**3.95**	Area (in^2):	3.10
		L/D:	1.99

MOISTURE CONTENT			
Tare Number:	3329	Total Load (lb):	36,245
Wt. of Tare & Wet Sample (g):	529.27	**Uniaxial Compressive Strength (psi):**	**11,680**
Wt. of Tare & Dry Sample (g):	525.29		
Weight of Tare (g):	8.27	Fracture Type:	**Cone & Split**
Weight of Wet Sample (g):	521.00		
Sample Volume (cm^3):	200.83	Rate of Loading (lb/sec):	179
Moisture Content (%):	0.77	Time to Break (min:sec):	3:22.41
Unit Wet Weight (g/cm^3):	2.627	Deviation From Straightness[3]:	
Unit Wet Weight (pcf):	163.9		
Unit Dry Weight (g/cm^3):	2.607	AXIAL: *Pass*	TOP: *Pass* BOTTOM: *Pass*
Unit Dry Weight (pcf):	162.7		

Physical Description: Rock Core

Notes:
1) Moisture conditions at time of the test are: As Received-Unpreserved
2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
3) Deviation from straightness, Procedure A of ASTM D 4543-08
   Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
4) Temperature is laboratory room temperature.
5) D4543 Prep and D7012 Testing Equipment Used:
6) Tool / Machine List:
   G788 Compression Machine
   G1661 Digital Calipers, G1380 Dial Gauge
   G1616 Straight Edge, G1571 Feeler Gauge
   G1633 V-Block, G1634 Rock Saw, G1635 Grinder

Tested By: JAC Date: 5/12/25 *Checked By:* NJM *Date:* 5/13/25

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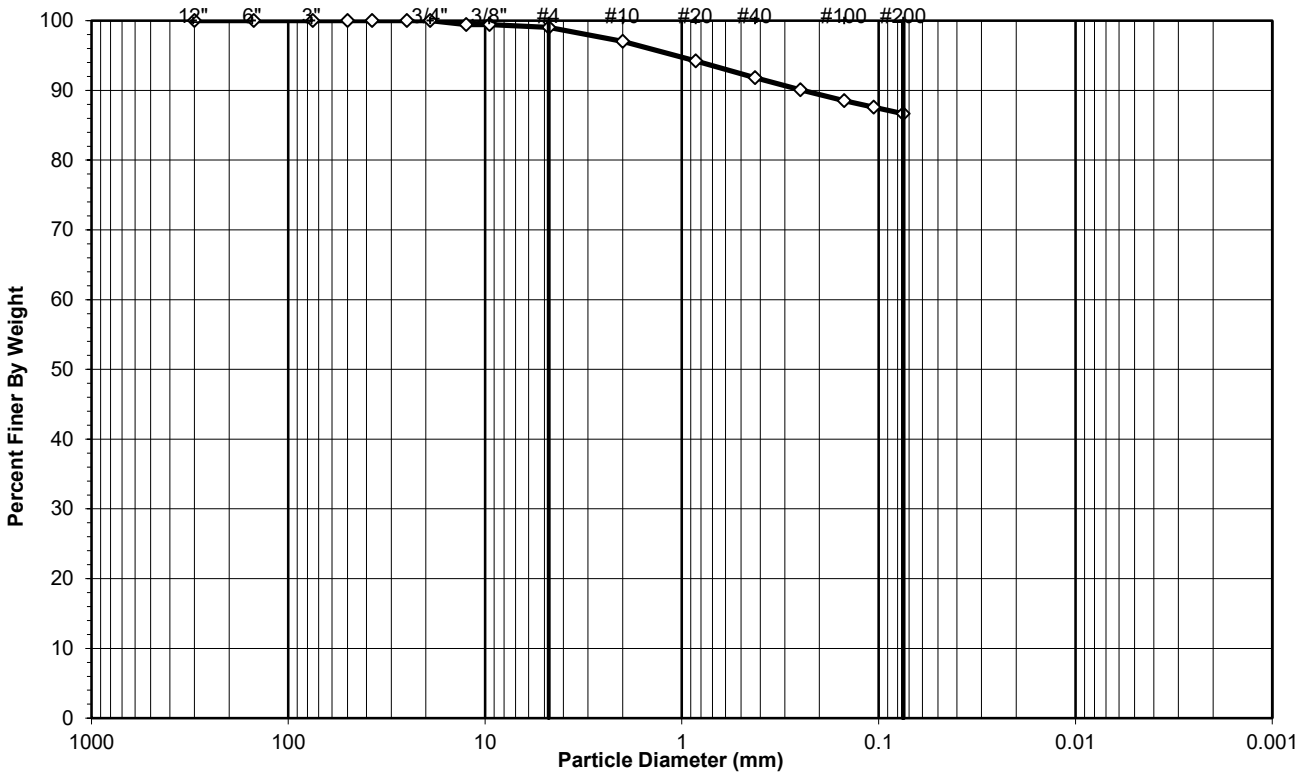
SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Civil & Environmental Consultants	Boring No.:	B-10
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-018	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**0.98**
#4 to #200	***Sand***	**12.36**
Finer than #200	***Silt & Clay***	**86.66**

USCS Symbol:
CH, TESTED

USCS Classification:
FAT CLAY

Tested By DF Date 5/6/25 Checked By EG Date 5/12/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Civil & Environmental Consultants	Boring No.:	B-10
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-018	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1429	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	889.40	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	771.86	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	142.56	Weight of Tare (g):	NA
Weight of Water (g):	117.54	Weight of Water (g):	NA
Weight of Dry Soil (g):	629.30	Weight of Dry Soil (g):	NA
Moisture Content (%):	**18.7**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	629.30
Tare No. (Sub-Specimen)	1429	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	889.40	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	142.56	Dry Weight of - 3/4" Sample (g):	629.30
Sub-Specimen Wet Weight (g):	746.84	Dry Weight -3/4" +3/8" Sample (g):	3.54
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	625.76
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100.0**
6"	150	0.00		0.00	0.00	100.00	**100.0**
3"	75	0.00		0.00	0.00	100.00	**100.0**
2"	50	0.00	(*)	0.00	0.00	100.00	**100.0**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100.0**
1"	25	0.00		0.00	0.00	100.00	**100.0**
3/4"	19	0.00		0.00	0.00	100.00	**100.0**
1/2"	12.5	3.54	(**)	0.56	0.56	99.44	**99.4**
3/8"	9.5	0.00		0.00	0.56	99.44	**99.4**
#4	4.75	2.65		0.42	0.98	99.02	**99.0**
#10	2	12.50		1.99	2.97	97.03	**97.0**
#20	0.85	17.64	(**)	2.80	5.77	94.23	**94.2**
#40	0.425	15.13		2.40	8.18	91.82	**91.8**
#60	0.25	11.08		1.76	9.94	90.06	**90.1**
#100	0.15	9.76		1.55	11.49	88.51	**88.5**
#140	0.106	5.87		0.93	12.42	87.58	**87.6**
#200	0.075	5.80		0.92	13.34	86.66	**86.7**
Pan	-	545.33		86.66	100.00	-	**-**

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen*

Tested By	DF	Date	5/6/25	Checked By	EG	Date	5/12/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Civil & Environmental Consultants	Boring No.:	B-10
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-018	Soil Description:	BROWN FAT CLAY

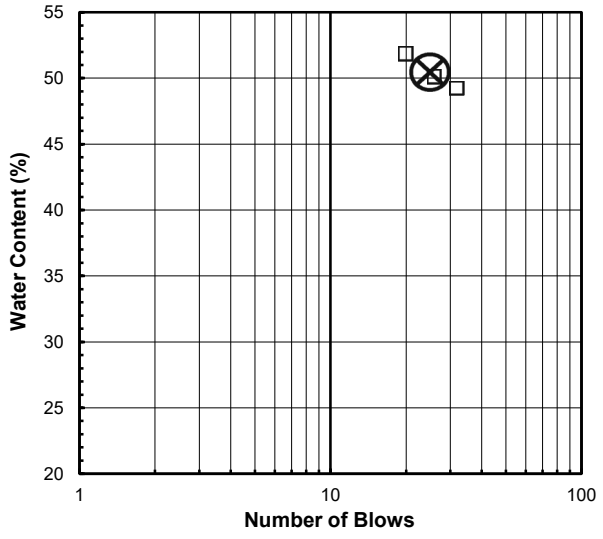
Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content ASTM D2216-19		**Liquid Limit Test** 1	2	3	M
Tare Number:	18	191	500	517	U
Wt. of Tare & Wet Sample (g):	186.56	37.91	42.64	43.68	L
Wt. of Tare & Dry Sample (g):	157.70	31.20	34.89	35.37	T
Weight of Tare (g):	3.30	17.56	19.41	19.33	I
Weight of Water (g):	28.9	6.7	7.8	8.3	P
Weight of Dry Sample (g):	154.4	13.6	15.5	16.0	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**18.7**	**49.2**	**50.1**	**51.8**	N
Number of Blows:		**32**	**26**	**20**	T

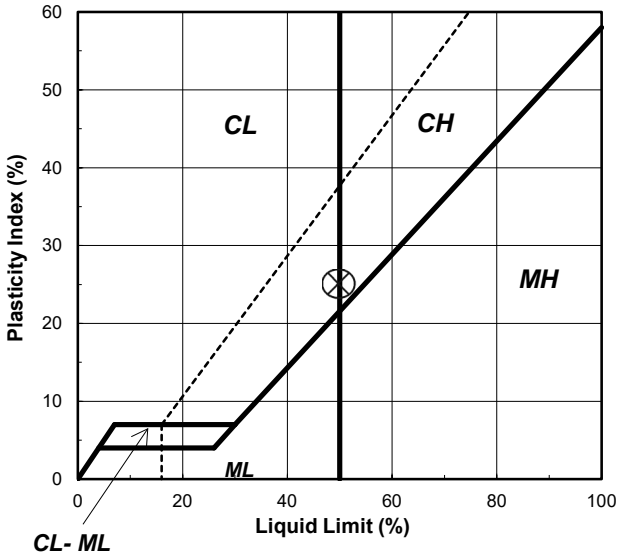
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	573	603	
Wt. of Tare & Wet Sample (g):	26.10	24.99	
Wt. of Tare & Dry Sample (g):	24.75	23.77	
Weight of Tare (g):	19.33	18.81	
Weight of Water (g):	1.4	1.2	
Weight of Dry Sample (g):	5.4	5.0	
Moisture Content (%):	**24.9**	**24.6**	**0.3**
Note: The acceptable range of the two Moisture Contents is ±			1.4

Test Results	
Liquid Limit (%):	**50**
Plastic Limit (%):	**25**
Plasticity Index (%):	**25**
USCS Symbol:	**CH**

Flow Curve



Plasticity Chart



Tested By BS *Date* 5/9/25 *Checked By* EG *Date* 5/12/25

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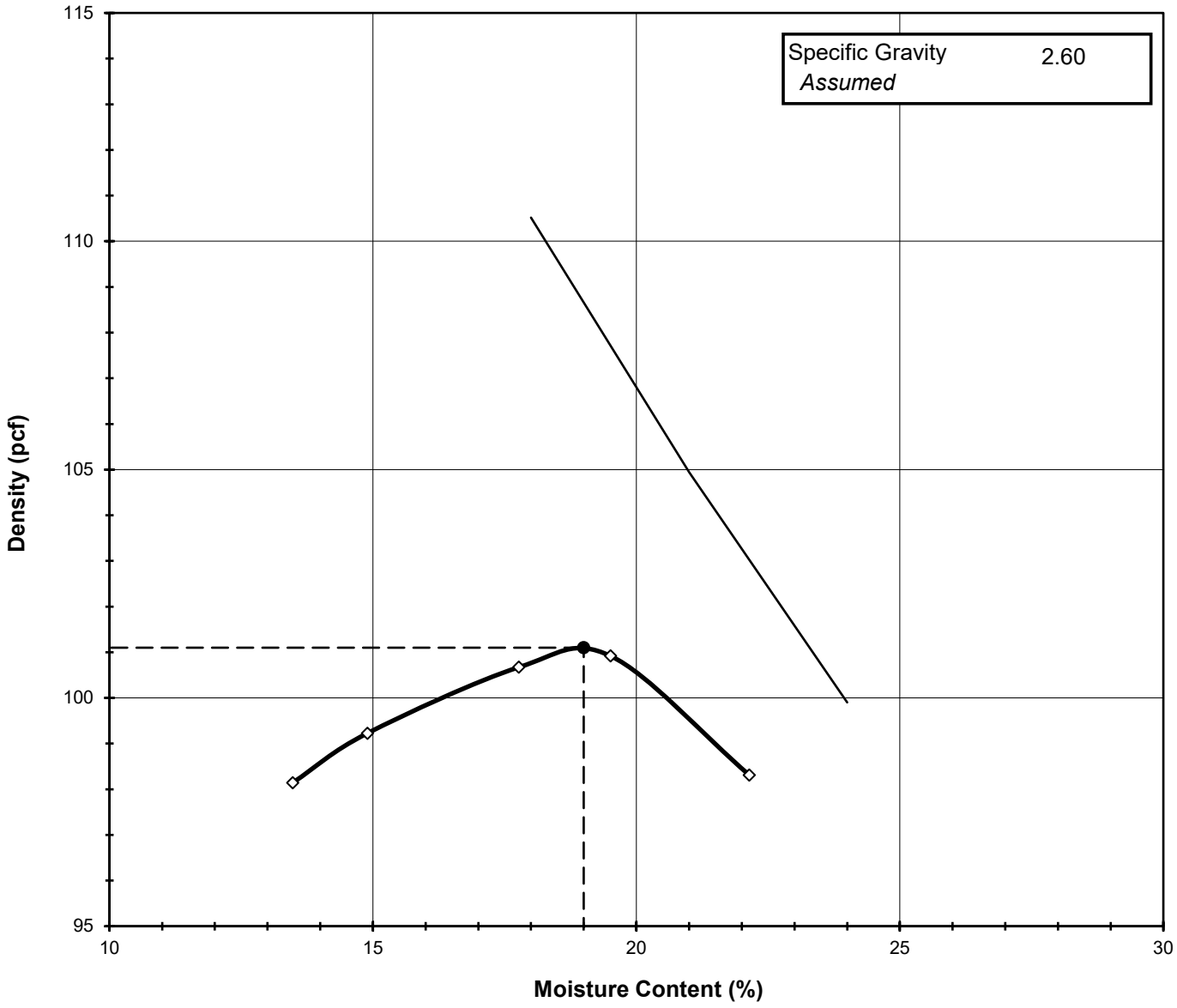
MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	Civil & Environmental Consultants	Boring No.:	B-10
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-018	Test Method	**STANDARD**

Visual Description: Brown Clay

Optimum Moisture Content (%): 19.0
Maximum Dry Density (pcf): 101.1



Tested By AB *Date* 5/5/2025 *Checked By* JLK *Date* 5/6/25

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	Civil & Environmental Consultants	Boring No.:	B-10
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-018		

Visual Description: Brown Clay

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.60
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	C

Test Type:	**STANDARD**
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G3349
Mold ID:	G3291
Mold diameter:	4"
Weight of the Mold (g):	4104
Volume of the Mold (cm^3):	946

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Weight of Mold & Wet Sample (g):	5792	5832	5901	5932	5924
Weight of Mold (g):	4104	4104	4104	4104	4104
Weight of Wet Sample (g):	1688	1728	1797	1828	1820
Mold Volume (cm^3):	946	946	946	946	946

Moisture Content / Density

Tare Number:	400	436	459	475	477
Weight of Tare & Wet Sample (g):	497.06	492.53	498.96	498.83	498.43
Weight of Tare & Dry Sample (g):	449.52	440.62	438.56	433.47	425.89
Weight of Tare (g):	96.78	92.15	98.66	98.43	98.28
Weight of Water (g):	47.54	51.91	60.40	65.36	72.54
Weight of Dry Sample (g):	352.74	348.47	339.90	335.04	327.61

Wet Density (g/cm^3):	1.78	1.83	1.90	1.93	1.92
Wet Density (pcf):	111.4	114.0	118.6	120.6	120.1
Moisture Content (%):	**13.5**	**14.9**	**17.8**	**19.5**	**22.1**
Dry Density (pcf):	**98.1**	**99.2**	**100.7**	**100.9**	**98.3**

Zero Air Voids

Moisture Content (%):	18.0	21.0	24.0
Dry Unit Weight (pcf):	110.5	104.9	99.9

Tested By AB *Date* 5/5/25 *Checked By* JLK *Date* 5/6/25

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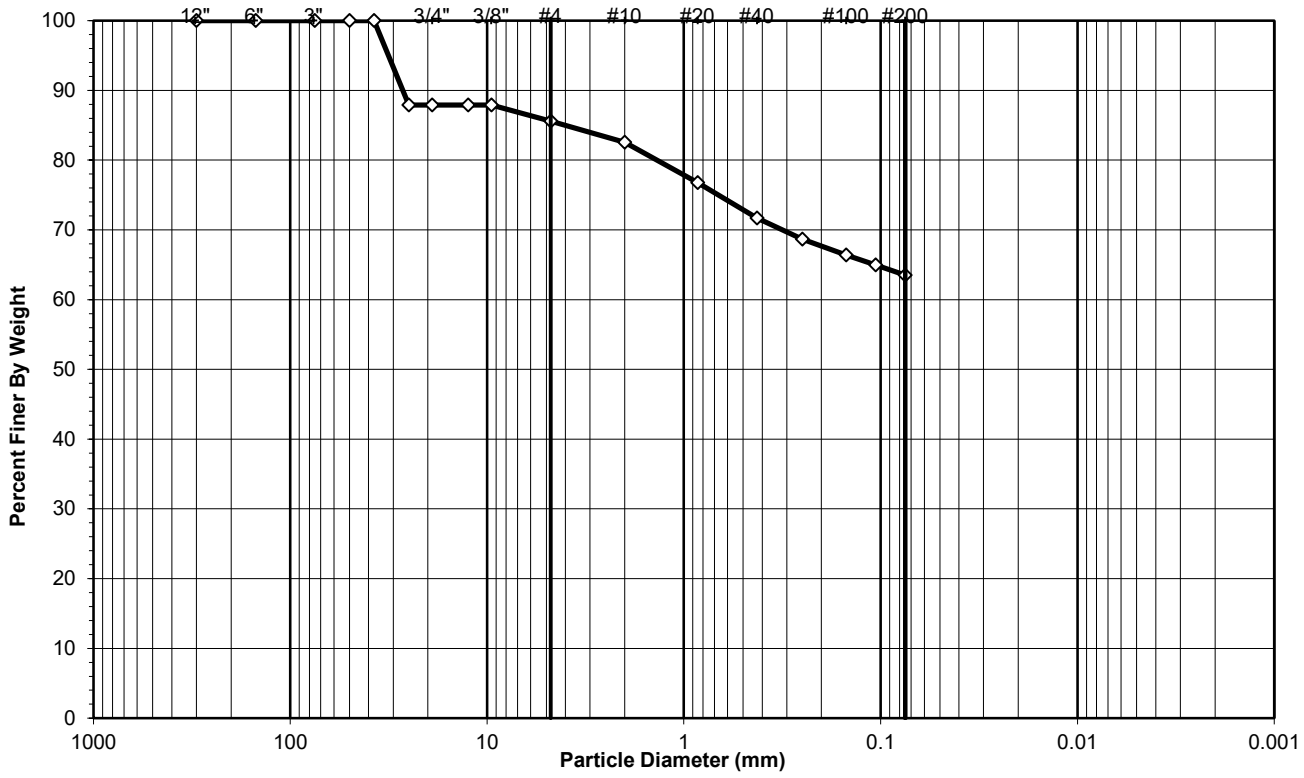
SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Civil & Environmental Consultants	Boring No.:	B-12
Client Reference:	336-102	Depth (ft):	3.0-10.5'
Project No.:	2025-275-001	Sample No.:	SS-2 to SS-4
Lab ID:	2025-275-001-022	Soil Color:	Brown/Gray

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**14.43**
#4 to #200	***Sand***	**22.05**
Finer than #200	***Silt & Clay***	**63.52**

USCS Symbol:
CL, TESTED

USCS Classification:
SANDY LEAN CLAY

Tested By DF Date 5/6/25 Checked By EG Date 5/12/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Civil & Environmental Consultants	Boring No.:	B-12
Client Reference:	336-102	Depth (ft):	3.0-10.5'
Project No.:	2025-275-001	Sample No.:	SS-2 to SS-4
Lab ID:	2025-275-001-022	Soil Color:	Brown/Gray

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1553	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	469.01	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	401.48	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.02	Weight of Tare (g):	NA
Weight of Water (g):	67.53	Weight of Water (g):	NA
Weight of Dry Soil (g):	257.46	Weight of Dry Soil (g):	NA
Moisture Content (%):	**26.2**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	257.46
Tare No. (Sub-Specimen)	1553	Wet Weight of +3/4" Sample (g):	39.27
Wt. of Tare & Wet Sub-Specimen (g):	469.01	Dry Weight of + 3/4" Sample (g):	31.11
Weight of Tare (g):	144.02	Dry Weight of - 3/4" Sample (g):	226.35
Sub-Specimen Wet Weight (g):	324.99	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	226.35
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100**
6"	150	0.00		0.00	0.00	100.00	**100**
3"	75	0.00		0.00	0.00	100.00	**100**
2"	50	0.00	(*)	0.00	0.00	100.00	**100**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100**
1"	25	31.11		12.08	12.08	87.92	**88**
3/4"	19	0.00		0.00	12.08	87.92	**88**
1/2"	12.5	0.00	(**)	0.00	12.08	87.92	**88**
3/8"	9.5	0.00		0.00	12.08	87.92	**88**
#4	4.75	6.04		2.35	14.43	85.57	**86**
#10	2	7.81		3.03	17.46	82.54	**83**
#20	0.85	14.79	(**)	5.74	23.21	76.79	**77**
#40	0.425	13.08		5.08	28.29	71.71	**72**
#60	0.25	7.86		3.05	31.34	68.66	**69**
#100	0.15	5.87		2.28	33.62	66.38	**66**
#140	0.106	3.57		1.39	35.01	64.99	**65**
#200	0.075	3.80		1.48	36.48	63.52	**64**
Pan	-	163.53		63.52	100.00	-	**-**

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen*

Tested By	DF	Date	5/6/25	Checked By	EG	Date	5/12/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Civil & Environmental Consultants	Boring No.:	B-12
Client Reference:	336-102	Depth (ft):	3.0-10.5'
Project No.:	2025-275-001	Sample No.:	SS-2 to SS-4
Lab ID:	2025-275-001-022	Soil Description:	BROWN/GRAY LEAN CLAY

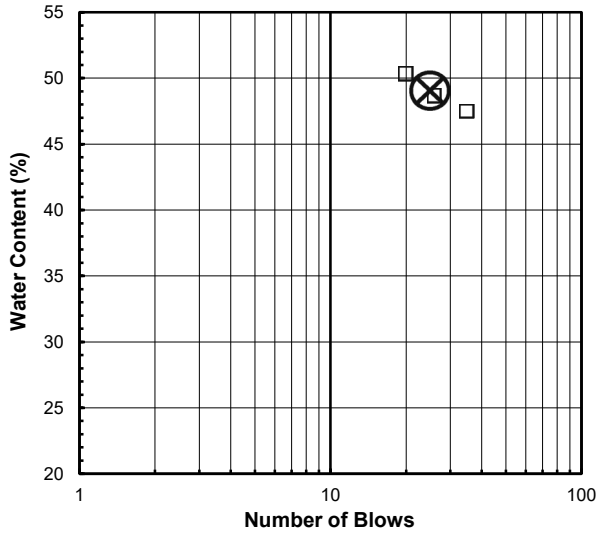
Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content ASTM D2216-19		**Liquid Limit Test**			
		1	**2**	**3**	**M**
Tare Number:	66	313	519	531	**U**
Wt. of Tare & Wet Sample (g):	40.36	39.94	41.05	44.41	**L**
Wt. of Tare & Dry Sample (g):	32.00	33.01	33.98	36.06	**T**
Weight of Tare (g):	3.20	18.40	19.44	19.46	**I**
Weight of Water (g):	8.4	6.9	7.1	8.3	**P**
Weight of Dry Sample (g):	28.8	14.6	14.5	16.6	**O**
Was As Received MC Preserved:	**Yes**				**I**
Moisture Content (%):	**29.0**	**47.4**	**48.6**	**50.3**	**N**
Number of Blows:		**35**	**26**	**20**	**T**

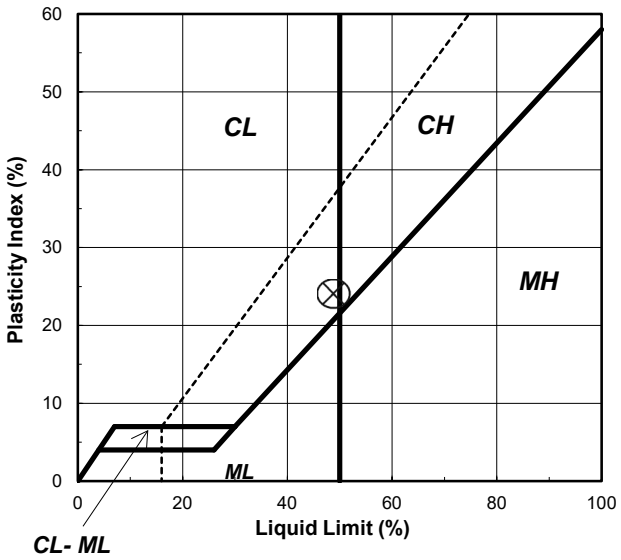
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	628	687	
Wt. of Tare & Wet Sample (g):	24.83	24.71	
Wt. of Tare & Dry Sample (g):	23.64	23.46	
Weight of Tare (g):	18.81	18.38	
Weight of Water (g):	1.2	1.3	
Weight of Dry Sample (g):	4.8	5.1	
Moisture Content (%):	**24.6**	**24.6**	**0.0**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**49**
Plastic Limit (%):	**25**
Plasticity Index (%):	**24**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By BS *Date* 5/9/25 *Checked By* EG *Date* 5/12/25

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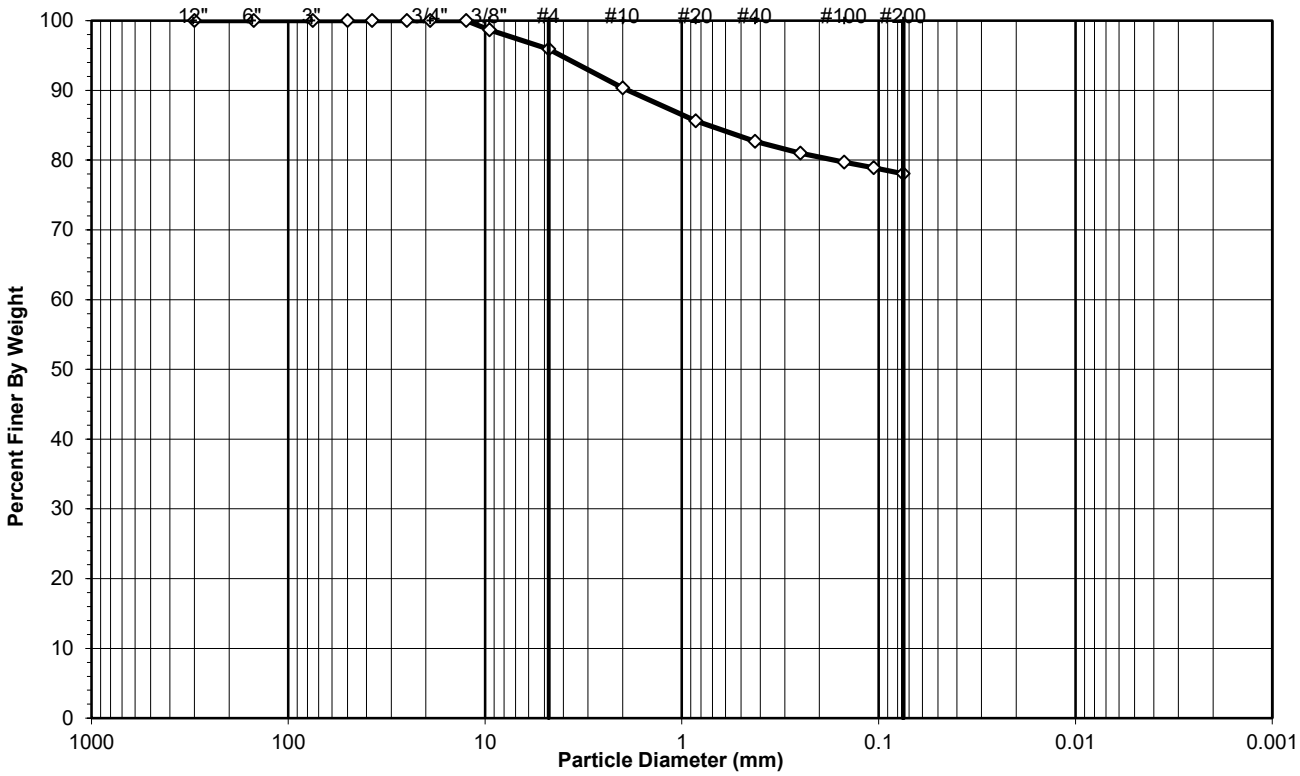
SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Civil & Environmental Consultants	Boring No.:	B-14
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-023	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**4.10**
#4 to #200	***Sand***	**17.85**
Finer than #200	***Silt & Clay***	**78.05**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By DF Date 5/6/25 Checked By EG Date 5/9/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Civil & Environmental Consultants	Boring No.:	B-14
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-023	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1543	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	850.61	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	722.80	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	142.90	Weight of Tare (g):	NA
Weight of Water (g):	127.81	Weight of Water (g):	NA
Weight of Dry Soil (g):	579.90	Weight of Dry Soil (g):	NA
Moisture Content (%):	**22.0**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	579.90
Tare No. (Sub-Specimen)	1543	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	850.61	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	142.90	Dry Weight of - 3/4" Sample (g):	579.90
Sub-Specimen Wet Weight (g):	707.71	Dry Weight -3/4" +3/8" Sample (g):	7.59
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	572.31
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100**
6"	150	0.00		0.00	0.00	100.00	**100**
3"	75	0.00		0.00	0.00	100.00	**100**
2"	50	0.00	(*)	0.00	0.00	100.00	**100**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100**
1"	25	0.00		0.00	0.00	100.00	**100**
3/4"	19	0.00		0.00	0.00	100.00	**100**
1/2"	12.5	0.00	(**)	0.00	0.00	100.00	**100**
3/8"	9.5	7.59		1.31	1.31	98.69	**99**
#4	4.75	16.17		2.79	4.10	95.90	**96**
#10	2	32.29		5.57	9.67	90.33	**90**
#20	0.85	27.27	(**)	4.70	14.37	85.63	**86**
#40	0.425	17.01		2.93	17.30	82.70	**83**
#60	0.25	9.90		1.71	19.01	80.99	**81**
#100	0.15	7.55		1.30	20.31	79.69	**80**
#140	0.106	4.54		0.78	21.09	78.91	**79**
#200	0.075	4.98		0.86	21.95	78.05	**78**
Pan	-	452.60		78.05	100.00	-	**-**

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen*

Tested By	DF	Date	5/6/25	Checked By	EG	Date	5/9/25

DCN: CT-S73T, DATE 2/25/22, REV. 1

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Civil & Environmental Consultants	Boring No.:	B-14
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-023	Soil Description:	BROWN LEAN CLAY

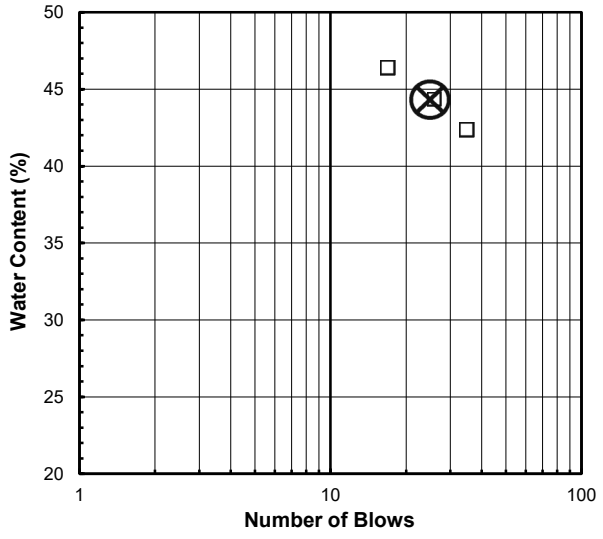
Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content ASTM D2216-19		**Liquid Limit Test**			
		1	**2**	**3**	**M**
Tare Number:	74	5	620	617	**U**
Wt. of Tare & Wet Sample (g):	187.68	38.16	41.34	43.67	**L**
Wt. of Tare & Dry Sample (g):	155.91	31.91	34.79	36.03	**T**
Weight of Tare (g):	3.19	17.14	20.01	19.55	**I**
Weight of Water (g):	31.8	6.3	6.6	7.6	**P**
Weight of Dry Sample (g):	152.7	14.8	14.8	16.5	**O**
Was As Received MC Preserved:	**Yes**				**I**
Moisture Content (%):	**20.8**	**42.3**	**44.3**	**46.4**	**N**
Number of Blows:		**35**	**26**	**17**	**T**

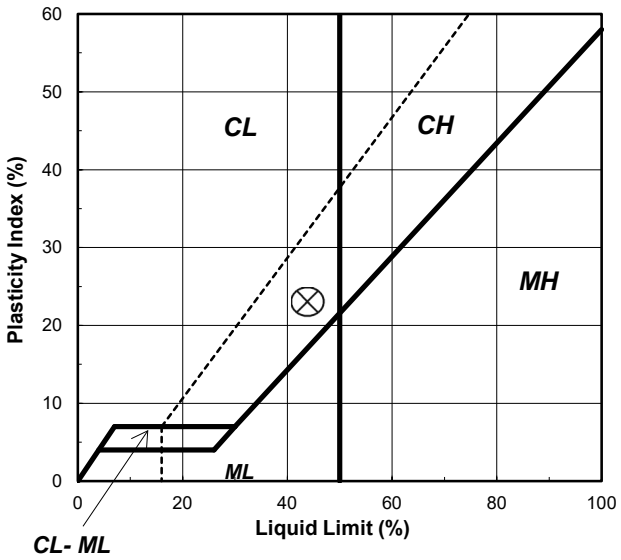
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	221	761	
Wt. of Tare & Wet Sample (g):	26.96	28.77	
Wt. of Tare & Dry Sample (g):	25.79	27.41	
Weight of Tare (g):	20.18	20.95	
Weight of Water (g):	1.2	1.4	
Weight of Dry Sample (g):	5.6	6.5	
Moisture Content (%):	**20.9**	**21.1**	**-0.2**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**44**
Plastic Limit (%):	**21**
Plasticity Index (%):	**23**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By MLF *Date* 5/8/25 *Checked By* EG *Date* 5/9/25

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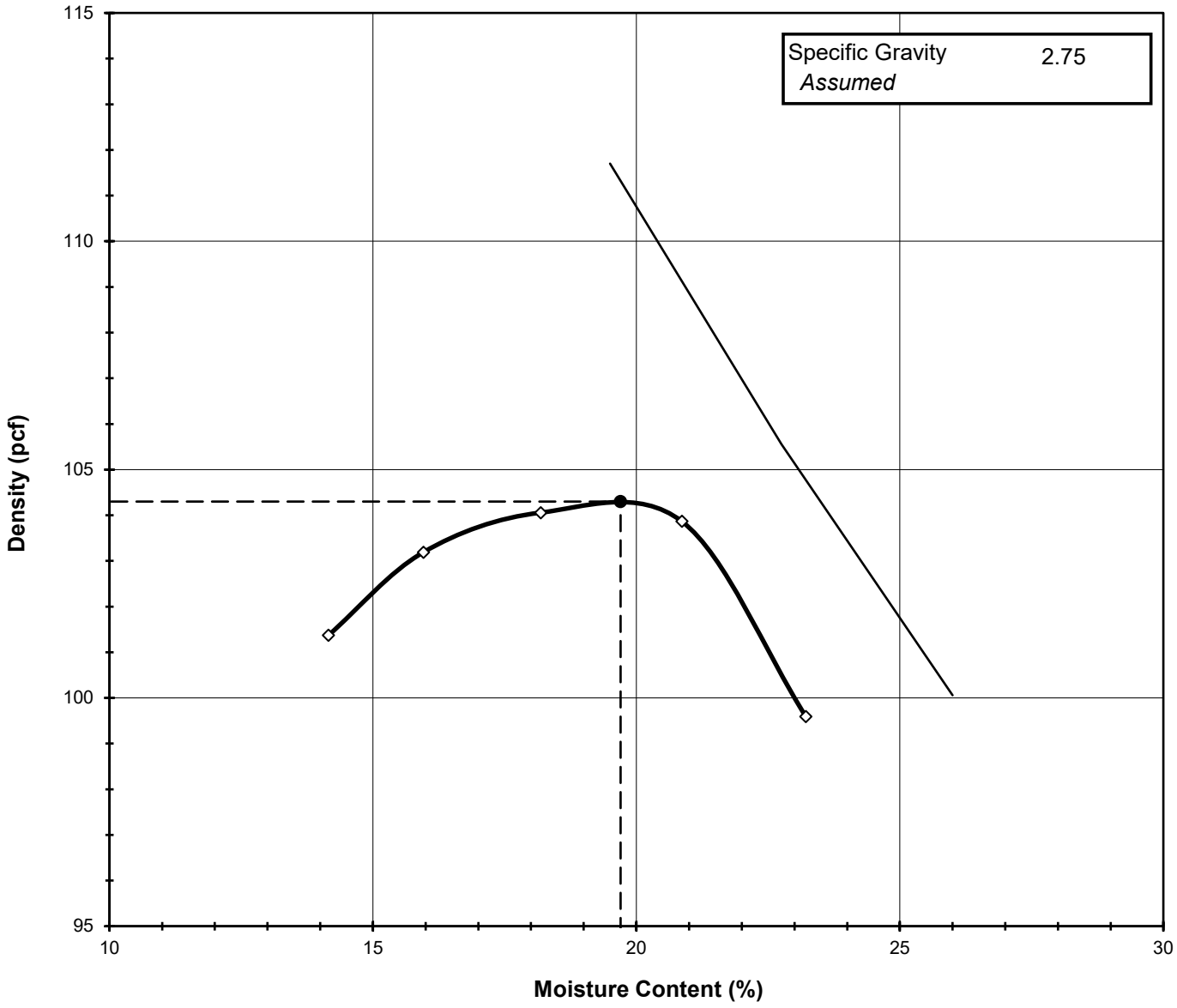
MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	Civil & Environmental Consultants	Boring No.:	B-14
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-023	Test Method	**STANDARD**

Visual Description: Brown Clay with Rock

Optimum Moisture Content (%): 19.7
Maximum Dry Density (pcf): 104.3



Tested By AB *Date* 5/6/2025 *Checked By* JLK *Date* 5/8/25

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	Civil & Environmental Consultants	Boring No.:	B-14
Client Reference:	336-102	Depth (ft):	0.0-10.0'
Project No.:	2025-275-001	Sample No.:	Bulk
Lab ID:	2025-275-001-023		

Visual Description: Brown Clay with Rock

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	C

Test Type:	**STANDARD**
Rammer Weight (lb):	5.5
Rammer Drop (in):	12
Rammer Type:	MECHANICAL
Machine ID:	G3349
Mold ID:	G3347
Mold diameter:	6"
Weight of the Mold (g):	5714
Volume of the Mold (cm^3):	2123

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Weight of Mold & Wet Sample (g):	9651	9785	9898	9985	9889
Weight of Mold (g):	5714	5714	5714	5714	5714
Weight of Wet Sample (g):	3937	4071	4184	4271	4175
Mold Volume (cm^3):	2123	2123	2123	2123	2123

Moisture Content / Density

Tare Number:	434	435	453	461	475
Weight of Tare & Wet Sample (g):	491.45	491.62	490.90	498.49	498.88
Weight of Tare & Dry Sample (g):	441.81	436.55	429.33	429.36	423.41
Weight of Tare (g):	91.10	91.44	90.71	98.01	98.33
Weight of Water (g):	49.64	55.07	61.57	69.13	75.47
Weight of Dry Sample (g):	350.71	345.11	338.62	331.35	325.08

Wet Density (g/cm^3):	1.85	1.92	1.97	2.01	1.97
Wet Density (pcf):	115.7	119.7	123.0	125.5	122.7
Moisture Content (%):	**14.2**	**16.0**	**18.2**	**20.9**	**23.2**
Dry Density (pcf):	**101.4**	**103.2**	**104.1**	**103.9**	**99.6**

Zero Air Voids

Moisture Content (%):	19.5	22.8	26.0
Dry Unit Weight (pcf):	111.7	105.6	100.1

Tested By AB *Date* 5/6/25 *Checked By* JLK *Date* 5/8/25

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Civil & Environmental Consultants, Inc.

Mr. Tyler Reynolds

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treynolds@cecinc.com
AccountsPayable@cecinc.com

Received: 6/10/2025
Sampled by: client

Project 336-102

wt. lbs received	CTL ID	SAMPLE ID	DRY Total Sulfur (wt%)	Forms of Sulfur Pyritic (wt%)	Organic (wt%)	Sulfate (wt%)
2.4	353187	B-8, 21'-22' 6/10/2025	0.117	0.10	0.00	0.02
3.3	353188	B-8, 27'-28' 6/10/2025	1.334	1.31	0.00	0.03

Dry Basis

Total Sulfur	D 4239
Pyrtic Sulfur	D 8214

Approved by: P.Conti Otroba
Chemist