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CONSULTING GEOTECHNICAL,
FORENSIC & ENVIRONMENTAL
ENGINEERS

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT I FOUNDATION DESIGN AND BUILDING PAD PREPARATION

PROPOSED QUAKER VALLEY HIGH SCHOOL BUILDING
ALLEGHENY COUNTY, PENNSYLVANIA

For:

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May 24, 2024
GBBE 16123A

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May 24, 2024

Mr. Geoff Phillips, P.E.
Phillips & Associates, Inc.
1122 Mosside Boulevard
Wall, PA 15148

Subject: Geotechnical Exploration and Engineering Report – Part I
Foundation Design & Building Pad Preparation
Proposed Quaker Valley High School Building
Leet Township, Allegheny County, Pennsylvania
Garvin Boward Beitko Project 16123A

Dear Mr. Phillips:

We are pleased to present Part I of our geotechnical report outlining the geotechnical exploration we completed for the proposed school. This report is provided in general accordance with our revised proposal, 16123A-2, dated June 7, 2023. Part I addresses foundation design and building pad preparation. Part I of the report includes a brief review of the project background, a description of our field procedures along with the subsurface conditions encountered, and our evaluation of those conditions with respect to the proposed building. Part II addresses the site grading issues and has been provided to Leet Township as part of the preliminary/final approval as defined by Leet Township.

EXECUTIVE SUMMARY

We completed a geotechnical exploration at the site to provide foundation design parameters and building pad preparation recommendations to the design team. The exploration revealed that:

- The new building can be supported on shallow spread footings bearing at normal frost protection depths.

- The building floor slabs can be designed and constructed as soil-supported slabs-on-grade.

- It appears that an approximate 10-foot undercut and replacement of the soil/bedrock beneath the entire footprint of the new school will be needed and appropriate for several reasons including:

    1. Promoting uniform settlement across the different areas of the school thereby reducing the potential for differential settlement.

    2. Generating a significant volume of granular fill (sand and sandstone fragments) that will be needed to construct the reinforced slopes needed to develop the site.

    3. Facilitating subfloor utility construction as excavating trenches in intact, in-situ, hard sandstone bedrock can be problematic and expensive.

    4. Reducing the risks associated with potentially expansive minerals (PEMs). The upper sandstone topping this ridge has a proclivity for containing random, intermittent seams of PEMs. PEMs typically do not cause issues if they are located at least 10 feet below structures. The recommended undercut and replacement will eliminate PEMs from the upper 10 feet.

    5. Providing a suitable use for the landslide prone redbed-derived soils that will be undercut from the planned embankment areas as this redbed-derived soil material, when compacted, is suitable for building support and utility trench construction.

BACKGROUND INFORMATION

Project background information was provided by: Mr. John Orsini of BSHM Architects, Inc. (BSHM), the project architect; Mr. Geoff Phillips, PE of Phillips & Associates (PHILLIPS), the site/civil engineer; and by Mr. Tyler J. McGrady, PE of Barber & Hoffman, Inc. (B&H), the structural engineer. We understand that Quaker Valley School District (QVSD or District) retained BSHM to design a new school on the former Tull property and other properties that have been combined to form the new QVSD HS campus. The new school will have an irregularly-shaped footprint as shown on the appended Figure 2 - Field Exploration Plan. As shown on the plan, the school will have three different levels, and each level will have at-grade

access. The northern-most wing will have a finished floor elevation (FFE) of approximately 1096 FT (project datum). The southern-most wing will have a FFE of approximately 1082 FT. The attached storm shelter, generally located at the eastern edge of the southern wing, will have a FFE on the order of 1070 FT.

The structure will be framed with load bearing masonry and steel columns. We understand that wall and column loads will not exceed 24 kips per lineal foot and 250 kips, respectively. There will be an internal retaining wall between the upper and lower levels and another internal retaining wall between the main lower level and the storm shelter level. There will also be external retaining walls placed strategically around the exterior of the new school to facilitate the necessary grade changes in the courtyard and pavement areas.

The information outlined in this section reflects our understanding of the project and was instrumental in our evaluation. If our understanding is inaccurate, or if additional information becomes available, we should be given the opportunity to review our evaluation and recommendations in light of the new or revised information.

PURPOSE AND SCOPE OF EXPLORATION

This geotechnical exploration helped to characterize the general soil and bedrock conditions within the planned construction area, so those conditions could be evaluated with respect to the new school building that is planned at this site. Test Boring Services, Inc. (TBS), drilled approximately 136 widely spaced test borings at locations we suggested, throughout the planned campus and improvement areas to facilitate our evaluation. Of those, approximately 35 were drilled in and around the proposed building area.

Test Boring Records (TBRs) were prepared based on visual classification of the samples, the driller's field logs, and laboratory test results in some cases. We then evaluated the results of the field testing using generally accepted empirical relationships pertaining to soil strength/compressibility characteristics. Field and laboratory testing was completed in general accordance with applicable standards. The assessment of site environmental conditions for the presence of recognized environmental conditions in the soil, rock, and groundwater was beyond our scope of services for this project.

SITE CONDITIONS

A geologist or engineer from our office visited the site to observe test drilling operations and document surface conditions that could affect our evaluation and recommendations. The appended Figure 1 - Site Location Plan, shows the approximate site location and the approximate limits of the property. Figure 1 also shows the approximate location of the proposed school relative to the large property itself. The site encompasses approximately 159 acres. A brief review of the United States Geological Survey (USGS) Ambridge, PA, Quadrangle topographic map reveals the ground surface elevation in the project area is on the order of 1122 to 760 feet above Mean Sea Level. This interval generally matches the elevation intervals shown on the appended Figure 2, that was surveyed by the project team. Hence, the project datum appears to coincide with the USGS datum.

The site of the proposed high school campus occupies a generally east-west running ridge with moderately steep to gentle slopes that span the border between Leet Township, Leetsdale Borough and Edgeworth Borough. Camp Meeting Road borders the property on the west. The proposed school will be located at the top of the ridge near its eastern border with Edgeworth Borough. The appended Figure 2 – Field Exploration Plan, shows the proposed building, and building area, with more detail. That area is mostly flat-lying along the ridge top with gentle slopes on the north and south side of the ridge, with a partially paved roadway and two unoccupied houses. The ridge and the slopes are heavily wooded except for the area near the easternmost abandoned house in the vicinity of the proposed school, where there already exists a large clearing.

GEOLOGIC SETTING

Available published references indicate the proposed school campus site lies with the Allegheny Plateaus Physiographic Province. The bedrock at the site is within the Lower Casselman to Upper Glenshaw Formations in the Conemaugh Group of the Pennsylvanian System. The rocks in these formations include thick sandstone and claystone units and thin shale and limestone units, most of which were encountered during drilling. The site lies on the eastern flank of the north-south trending Crows Run Anticline. The bedrock dips gently at 10 feet/mile toward the southeast. Based upon our in-house references, the Ames Limestone daylights below the ridgetop. The Ames was not encountered during this phase of drilling because the borings were either terminated before the Ames was reached, or started below the elevation of the Ames. However, the Ames Limestone was encountered in multiple test borings during earlier phases of

drilling. The Ames Limestone is a well-known marker bed that typically defines the top of the Pittsburgh Redbeds, a well-known claystone unit that is associated with many landslides in this area. This unit was encountered during all drilling phases, but will likely have the most effect primarily on the western half of the site where the lower access road is proposed, and will be a major consideration during site design but should not have much effect on the building foundation design. The reference also shows the historical landslide activity at this site. In many borings that were drilled in the vicinity of the proposed lower access road, colluvial deposits were encountered. Colluvial deposits are soil deposit created from the downslope movement of soil and rock. The colluvium encountered during drilling ranged in thickness of 6 feet to 54 feet. The existence of these thick landslide deposits will be a major consideration in site design, but should not affect the building design.

MINING CONDITONS

According to "Coal Resources of Allegheny County," Clifford Dodge, 1985, The Pittsburgh Coal is eroded at this site. The next mineable coal seam, the Upper Freeport, lies at an elevation of approximately 690 feet above MSL. According to the published information, the Upper Freeport Coal is not mined beneath the site.

SUBSURFACE CONDITIONS

Procedures

Over time, and under the direction of GBBE, TBS has drilled approximately 136 test borings in the proposed construction areas to help predict the general subsurface soil, rock, and groundwater conditions at the site. Of those, approximately 35 were drilled in the vicinity of the planned building and are shown on Figure 2 – Field Exploration Plan in the Appendix. The test boring locations/surface elevations were surveyed by PHILLIPS. Although not specifically related to the building, additional test borings will be drilled along and below Camp Meeting Road after the County provides guidance and input relative to their roadway.

The test borings were drilled in general accordance with the procedures outlined in American Society of Testing Materials (ASTM) Test Designation D 420. Standard Penetration Tests (SPTs) were performed at three-foot vertical intervals in the soil mantle in general accordance with the procedures outlined in ASTM D 1586. When properly interpreted, the SPT resistances

provide an indication of the in-place consistency of cohesive soil or relative density of predominately granular soil. They also provide soil samples for laboratory evaluation.

The subsurface conditions encountered are summarized on the test boring records in the Appendix. The test boring records represent our interpretation of subsurface conditions at the time of drilling based on the driller's field logs and visual classification of the field samples by an engineer or geologist in general accordance with ASTM D 2488. In some cases, the classification was supplemented by limited laboratory testing. The lines designating the interfaces between various strata on the test boring records represent the approximate interface locations and the actual transitions between strata may be gradual. Groundwater levels shown on the test boring records represent the conditions only at the time of our exploration.

Soil Conditions

The site elevations drop significantly from the ridge top to the south and the north. However, the proposed school building area is underlain by decomposed sandstone and sandstone. As such, the individual test boring records should be reviewed for the soil and rock conditions at specific locations. In general, there are pockets of fill in some areas that are likely associated with previous construction at the site. The fill soils appear to be a mixture of reworked, on-site residual soil. The fill soils overlie residual soils that were formed in place by the decomposition of the parent bedrock. The residual soils gradually become more competent with depth as they gradually transition into bedrock. The underlying sedimentary bedrock intercepted in the planned building area borings generally consists of sandstone with occasional shaly seams. Some of the isolated shaly seams contain PEMs that should be addressed during construction (select removal and stockpiling). In general, the soil and bedrock conditions indicated by the test borings appear consistent with those predicted by published references.

Groundwater Conditions

The borings did not intercept the groundwater table (as defined by 100 percent saturation below the phreatic surface). However, the borings did intercept wet zones that are likely the result of perched water. In addition, there may be other pockets of perched water (not intercepted by the borings) within fill zones, and atop less permeable soil/bedrock layers. Such perched water could be encountered during construction operations. It should be understood that groundwater levels can vary with seasonal climatic changes, variations in surface runoff patterns, and construction activity. Potential groundwater below the bedrock surface could not be clearly delineated as the drill water used for rock coring operations obscured groundwater below the bedrock surface.

GEOTECHICAL EVALUATION

The proposed building may be supported on shallow spread footings. However, some undercutting of bedrock, and soil, will be required for many reasons as discussed previously.

Building Undercut & Replacement

The soil and bedrock, mostly bedrock, should be undercut to at least 10 feet below each respective finished floor elevation as shown on Figures 4 and 5 in the Appendix. This equates to an undercut elevation of 1086 FT in the upper level with a finished floor elevation of 1096 FT. It also equates to an undercut elevation of 1072 FT in the lower level that has a FFE of 1082 FT, and an undercut elevation of 1060 FT in the storm shelter footprint as the FFE in that portion of the school is 1070 FT. The lateral extent of the undercut and replacement (for the building only) should be determined by a superimposed line drawn down and away from the outside edge of the footings, at a 45-degree angle to the horizonal, until the appropriate undercut elevation for each building section is intersected by that line.

Assuming the building pad is prepared in accordance with our recommendations, the entire structure can be supported on shallow spread footings. The floor slabs in each of those areas may be designed and constructed as soil-supported slabs-on-grade.

BUILDING PAD PREPARATION

All topsoil and organic matter should be stripped from the building construction area and stockpiled separately for future use in landscaped areas. Excavation should continue to the different undercut elevations and lateral limits as shown on Figures 4 and 5 in the Appendix. As evidenced on Figure 2 - Field Exploration Plan, there are existing buildings, partially constructed concrete foundations, and likely several existing utilities that cross beneath the proposed school. All remnants of previous construction and utilities should be abandoned and completely removed from beneath the new school. All foundations, floor slabs, or other remnants of previous construction should also be removed from the new school footprint. Excavation should continue until all previously placed fill (associated with abandoned utilities or foundation construction/earthwork related to previous structures) has been removed from the footprint of the new school.

Selective Stockpiling of Undercut Materials

As inferred above, excavation will be required to reach the recommended undercut elevations/depths. The undercut material should generally consist of sand and sandstone fragments, and large sandstone boulders. However, there are pockets of finer grained soils, PEMs, and potentially other soil types not conducive to engineering purposes.

Proofrolling

Proofrolling will be needed beneath all planned pavement and hard stands. It may also be needed if there is an extended period of time between placement of the building area fill and construction of the floor slabs/foundations for the school building. Once natural undisturbed soils are exposed (after initial stripping and cutting to the bottom of old fill layer), they should be thoroughly proofrolled with overlapping passes of a fully-loaded tandem axle dump truck or approved equivalent. The proofrolling is needed to help delineate soils that may not be suitable for building or floor slab support.

The proofrolling will also help to identify remnants of previous construction, pockets of previously placed fill, and abandoned utilities that may have been missed during initial stripping operations. Any "pumping," soft, wet, or otherwise unsuitable soils should be removed and replaced with engineered fill as described later in this report. Proofrolling should be performed after a suitable period of dry weather to avoid degrading a previously acceptable subgrade and should be observed and documented by a geotechnical engineer or a field representative working under the direction of a geotechnical engineer.

The actual amount of undercutting and replacement can only be determined by the geotechnical engineer during construction. As such, the construction contract should be set up to account for the inherent variability. This can be accomplished by establishing a baseline amount of undercutting/replacement along with a unit rate to adjust accordingly for either more or less undercutting/replacement.

Engineered Fill

The proofrolled and approved excavation can be backfilled to final subgrade elevations with engineered fill. Engineered fill is defined as a soil with adequate material properties that has been placed and compacted with engineering control such that the end-result properties of the in-place material are conducive to structural support. Extensive grading (cut areas as potential fill

source) is planned for this project. Therefore, we anticipate that some suitable fill soil will be available on site. However, we did encounter pockets of soil that will not be suitable. Therefore, the contractor will have to selectively stockpile suitable cut soils and haul unsuitable cut soils from the site. It is possible that some importing of suitable soil will be required. The geotechnical engineer should be afforded the opportunity to evaluate all proposed fill soils, whether obtained from on-site or off-site borrow sources. In general, engineered fill material should consist of inorganic, low-plasticity soil with a liquid limit (LL) less than 30 and a plasticity index (PI) of less than 10. Engineered fill material should be free of topsoil, carbonaceous shale, pyritic/marcasitic minerals, organic matter, slag, "red-dog," other deleterious material, and rock fragments larger than 3 inches in diameter. Inert (non-pyritic/marcasitic) decomposed shale and sandstone are commonly used as engineered fill in this area. If the contractor elects to utilize this type of material, it is likely that some effort will be required to break down the rock fragments into a well-graded mixture suitable for re-use. We anticipate that the contractor will have to spread such material in thin layers and pulverize it with large, track-mounted equipment, sheep-foot rollers, and large vibratory compactors.

As indicated previously, an abandoned concrete foundation at the site will be demolished. We understand that the demolition contract will require the contractor to crush/process acceptable demolition debris such as bricks and concrete into small sizes meeting PennDOT 2A gradation. This material will not be acceptable for use beneath the new building but should be suitable for reuse beneath pavement. This issue will be addressed in Part II of the geotechnical report.

Before filling operations begin, representative samples of each proposed fill material should be collected and submitted to our geotechnical engineer for his review. The geotechnical engineer will require that laboratory testing be completed by an approved testing laboratory prior to final approval. The laboratory testing will include laboratory compaction tests (ASTM D 1557) or relative density tests (ASTM D 4253 and D 4254) as appropriate, and tests to determine the gradation and plasticity of the soil. These tests are needed for quality control during compaction operation and to determine if the fill material is acceptable.

Frozen soils should not be used for engineered fill. The owners and contractors/subcontractors of this project are cautioned to recognize that some local soils may be difficult to compact during prolonged periods of cold or wet weather. It may be necessary to import granular fill if the construction schedule mandates earthwork during inclement weather.

We generally recommend that engineered fill be constructed by spreading acceptable soil in loose layers not more than eight inches thick. However, some of the engineered fill on this project will be constructed in small, confined utility trenches where large compaction equipment

cannot be used. As such, it may be necessary to limit the loose layer thickness to four to six inches in order to achieve the recommended degree of compaction. All fill beneath future buildings or parking areas should be compacted to at least 95 percent of its maximum dry density as determined by the modified Proctor test (ASTM D 1557). The moisture content of the fill soils should be maintained near the optimum moisture as determined by ASTM D 1557. This may require the contractor to dry the soils during periods of wet weather, or wet the soils during the hot summer months. Laboratory compaction testing (Proctor) is not applicable to some types/gradations of granular fill material (crushed limestone meeting AASHTO No. 57 gradation, etc.). These material types should be compacted to at least 70 percent of the maximum relative density as determined in accordance with ASTM D 4253 and D 4254.

The fill surface should be adequately maintained during construction in order to achieve an acceptable engineered fill. Areas on which fill is to be placed should by scarified prior to fill placement. We recommend that the fill surface be sloped to achieve adequate drainage and to prevent water from ponding on the fill. If precipitation is expected, engineered fill construction should be temporarily halted and the surface should be rolled with rubber-tired or steel-drummed equipment to improve surface run-off. If the surface soils become excessively wet or frozen, they should be removed prior to additional fill placement.

Fill construction should be observed and tested by a geotechnical engineer or a field representative working under the direction of a geotechnical engineer. The geotechnical engineer should observe and document the contractor's procedures, and should perform periodic field density tests. At least one field density test should be performed for every 2000 square feet (or fraction thereof) of area in each lift of fill. Tests should be completed every 50 feet (or fraction thereof) and in each lift of fill when backfilling narrow trenches or behind retaining walls. Significant deviations, either from the specifications or good practice, should be brought to the attention of the owner.

SPREAD FOOTINGS

Design Considerations – Condition 1 – 3000 PSF/3 KSF

A brief review of the test boring records indicates that once the upper portions of the site are cut to planned undercut elevations and then backfilled with engineered fill, the new spread footings will bear directly on the engineered fill with up to 10 feet of engineered fill beneath any given footing. The engineered fill will be underlain by essentially incompressible (relative to the loads applied) bedrock. Those spread footings bearing on up to 10 feet of engineered fill may be designed using an allowable bearing pressure of 3 kips per square foot (KSF). Given the

maximum column load of 250 kips, and a maximum wall load of 16 KLF, provided by the structural engineer, calculations indicate total settlement should be an inch or less with differential settlements approximately half that amount. Calculations indicate the settlement will be due to the compression of the engineered fill between the footing bottoms and the top of bedrock.

Design Considerations – Condition 2 – 4000 PSF/4 KSF

Discussions with the structural engineer indicated a substantial savings in footing size could be realized if some of the heavier loaded footings could be designed for 4 KSF, as opposed to the previously mentioned 3 KSF. Those footing locations are shown graphically on Figure 3 in the Appendix. Given the heavier wall load of 24 KLF provided by the structural engineer, calculations indicate total settlement should be an inch or less with differential settlements approximately half that amount, if the engineered fill thickness beneath these footings can be limited to 7 feet, as opposed to the 10-foot limit allowed for the 3 KSF bearing pressure.

Undercutting Requirements

The need for the previously mentioned 10-foot undercut and replacement, below the floor elevation in any section of the building, is driven by several issues, not just the foundation performance. Therefore, the planned undercut bottom elevation cannot be changed to reduce the engineered fill thickness between the foundation bottoms and the top of bedrock. Instead, the foundation itself must be designed to bear lower in the profile.

Additional Foundation Design Considerations

Foundations along exterior walls or unheated space should be maintained at least 3.5 feet below final adjacent grade to reduce the potential for frost penetration into the supporting soils/bedrock. Interior footings may bear at nominal depths. We recommend minimum footing widths of 18 and 24 inches for strip footings and column footings, respectively, in order to reduce the potential for localized shear failures.

Spread footings may be stepped down no steeper than 1H:1V or 45 degrees to lower the bearing surfaces when approaching internal retaining walls. Further, and as shown on Figures 4 and 5, no foundations should bear above a 45-degree line sloped up and away from retaining wall foundations unless those walls have been specifically designed to resist the additional lateral pressures generated by nearby spread footings.

Foundation Construction Considerations

Footing and or mud-wall excavations (see retaining wall foundations) should be observed and evaluated by a geotechnical engineer or his representative to determine if the intended bearing strata has been reached. In general, the footing excavation should be free of loose material, water, mud, and debris. Water should not be permitted to stand at the bottom of footing excavations. The contractor should be prepared to remove water from any source to avoid degrading previously acceptable bearing surfaces. Concrete for foundations should be placed the same day the excavation is prepared. If foundation concrete cannot be placed, and precipitation appears imminent, the excavation bottoms should be protected with lean concrete.

Seismic Site Class

The site may be considered Site Class C.

SLAB-ON-GRADE DESIGN AND CONSTRUCTION CONSIDERATIONS

Assuming the subgrade soils are prepared as described in the previous section of this report, the slabs may be designed using a modulus of subgrade reaction of 150 lb/cu inch. Any soil-supported slabs should be jointed around column and continuous wall foundations (and any other load-bearing members) to reduce the potential for damage from differential movement. A minimum six-inch-thick layer of free-draining granular material (such as crushed limestone meeting AASHTO No. 57 gradation requirements and PennDOT requirements for Type C coarse aggregate) should be placed beneath the slab to provide uniform support and to permit lateral drainage. A vapor retarder may be placed assuming it is placed in accordance with ACI recommendations. A geotechnical engineer or a field representative working under the direction of a geotechnical engineer should observe and document the condition of the floor slab subgrade immediately prior to aggregate and concrete placement.

RETAINING WALL DESIGN CONSIDERATIONS

Restrained Internal Walls

We understand there will be internal transition walls that will function as retaining walls. The transition/basement walls should be designed as retaining walls that are not free to rotate or deflect. Given the engineered fill soil planned to backfill the over-excavation and replacement,

the compacted in-place density should be assumed as 135 pounds per cubic foot (PCF). The basement walls should be designed using an at-rest pressure coefficient Ko of 0.56 and a passive pressure coefficient, Kp, of 2.5. The designer may assume a frictional coefficient of 0.3 for sliding resistance. Any surcharges and floor loads should also be considered when designing the walls.

External Walls – Free to Rotate

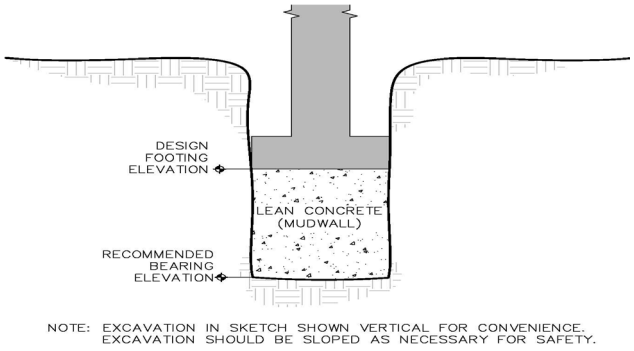
Given the plethora of different soil types on the site that might be used as engineered fill soil to backfill the exterior walls, the compacted in-place density should be assumed as 135 pounds per cubic foot (PCF). An active pressure coefficient, Ka, of 0.4 may be used for exterior retaining walls that are free to rotate. Any surcharges and floor loads should also be considered when designing the walls. The designer may assume a frictional coefficient of 0.3 for sliding resistance.

The recommended soil density and pressure coefficients assume the walls will be properly drained. Proper drainage would consist of a minimum 1-foot thick (perpendicular to wall) layer of free-draining aggregate that extends at least ¾ of the wall height. The free-draining layer should be tied into a slotted drain pipe at the wall base that is designed to withstand the overburden pressures and sloped to provide positive drainage to an appropriate outlet. The free-draining layer should be wrapped in a monofilament woven geotextile such as Mirafi FW402 to reduce the potential for migration of fine-grained soil into the free-draining matrix.

Exterior Retaining Walls AA and BB Foundation Design Considerations

Exterior retaining walls AA and BB, as shown on Figure 2, Field Exploration Plan will abut the existing building on either side of the planned loading dock. The building system retaining walls, and the abutting site retaining walls should be constructed separately with joint details that allow independent movement of the two different retaining wall types. If constructed at normal frost protection depths, the bottom of the footings for both AA and BB will be constructed near elevation 1075 FT, which is about 4 feet below the footings for the immediately adjacent building foundation that is located near elevation 1079 FT. That operation will likely entail underpinning of the building foundation in that area, assuming the building walls are constructed first. In addition, that would place AA and BB foundations directly over about 3 feet of engineered fill that will be placed above the underlying bedrock as part of the previously described building undercuts (1072 ft). However, those, essentially linear strip footings will begin to bear directly on bedrock as the building undercutting only extends a short distance beyond the exterior building walls. Those extremely different bearing conditions could lead to

differential settlement over short distances which can be problematic. As such, we recommend that the exterior retaining wall foundations be extended to bear directly on bedrock via lean concrete "mud-walls" as shown schematically below and with additional detail on Figure 13 in the Appendix. The "mud-wall" work should only be required for a short distance away from the building walls; however, it appears that additional "mud-wall" work will be needed near the eastern end of retaining wall AA, down to about elevation 1069 FT.



Because these site retaining walls will be bearing on bedrock, directly or indirectly via mud-walls, the allowable bearing capacity design may be increased to 10 KSF.

Exterior Retaining Wall CC Foundation Design Considerations

As shown on Figure 2, exterior retaining wall CC directly abuts the storm shelter portion of the building that has a finished floor elevation near 1070 FT. The building wall in that area is also acting as a retaining wall and should bear at approximate elevation 1067 FT. As indicated previously for site walls AA and BB, the building system retaining walls, and the abutting site retaining walls should be constructed separately with joint details that allow independent movement of the two different retaining wall types. Retaining wall CC has a top elevation on the order of 1081 FT. If the retaining wall CC is set at normal frost protection depth of 3.5 feet, it appears that it will bear near elevation 1070.5 FT, which is well above the immediately subjacent building foundation of 1067 FT and would place additional pressure on that basement wall. As such, the foundation for exterior wall CC should be lowered to at least an elevation that matches the building wall of about 1067 FT. At that elevation, the retaining wall foundation would still be bearing on about 7 feet of engineered fill placed atop bedrock, while a short distance away it will bear on directly on incompressible bedrock (relative to the range of loads from this structure). That could lead to excessive differential settlement. As such, we

recommend that the exterior retaining wall CC foundations be extended to bear directly on bedrock via lean concrete "mud-walls" as shown schematically above and with additional detail on Figure 13 in the Appendix. The "mud-wall" work will likely be required for most of retaining wall CC.

MUD-WALLS

As discussed above, a brief review of the test boring records indicates that very dense residual soil/bedrock will be located below the "as-designed" foundation levels of the site retaining walls, AA, BB, and CC in some areas. When this occurs, the foundation loads should be transferred to the more competent strata via mud-walls as described above. The actual elevation of suitable bearing material should be judged by the geotechnical engineer during construction. The resulting over-excavations (excavations down to very dense residual soil/bedrock) should then be backfilled with lean concrete "mud-walls" up to the initially planned bearing elevations. We have included a Typical Mud-Wall Construction Detail as Figure 13 in the Appendix of this report. Because the actual amount of "mud-wall" construction cannot be determined until construction, we recommend setting up the contract to account for the inherent variability. This can be accomplished by establishing a baseline bid amount of mud-wall construction (the baseline bid amount should be determined by estimating the distance to the top of bedrock along the foundation alignment and considering the design footing widths + 6 inches in any direction). The final payment amount could then be adjusted based on the same unit rate used to calculate cost for the baseline bid amount. The same unit rate should be applied regardless of whether the actual amount of mud-walls is more or less than the baseline amount. We recommend that the unit be defined as the volume between and directly beneath the footing (plus 6 inches from each footing edge) and the surface of the very dense residual soil/bedrock as judged by the geotechnical engineer.

POTENTIALLY EXPANSIVE MINERAL CONSIDERATIONS

As mentioned above, there were seams of PEMs in some of the test borings in and around the planned building area. The PEMs are generally identifiable as dark gray, coaly, shales. However, even light gray sedimentary bedrock, such as the rock we have at this site, can contain PEMs. PEM-laden layers can heave sufficiently to lift floor slabs and lightly loaded foundations when exposed to oxygen and moisture (humid air). Given the current state of the profession, and considering the proclivity of PEM concentrations to vary significantly over extremely short distances, it is not possible to accurately estimate the potential for future heaving. As such, the

layer should be removed when possible or otherwise accounted for in the design and construction of the new project. Because of the planned 10-foot undercut beneath the entire school, these PEMs should not present much of an issue relative to actual school construction. However, these PEMs will have to be stockpiled separately during the undercut and replacement operations for the building. In addition, the PEMs will have to be managed relative to the site retaining walls and buried site utilities. We noted heavy concentrations of PEM bedrock in test borings SB-16 and SB-17. We have included some generalized subsurface profiles on Figures 6, 7, and 8 in the Appendix of this report that identify other potential PEM-laden seams we observed during drilling.

There are mitigation techniques that can be implemented to reduce the risk of future problems in the new school campus. In general, the heaving is caused by a reaction between the PEMs (iron disulfide or pyrite), oxygen, and water. The newly formed minerals occupy many times the original volume and can heave or lift floor slabs, lightly loaded foundations, pavement, etc. Most preventive measures focus on reducing the potential exposure of PEMs to the known triggering mechanisms of oxygen and water (humid air).

We have included typical mitigation (risk-reducing) details in the Appendix of this report. These mitigation techniques generally focus on limiting the exposure time of PEMs to oxygen and water (humid air) to 48 hours or less. The sealing will reduce the risk of triggering expansion in PEM layers that either extend back beneath the new construction at the site such as pavement, sidewalks, or hard stands (equipment pads). The seals should extend at least 6 inches beyond the edge of PEM-containing layers.

PEM CONSIDERATIONS ALONG BURIED UTILITY ROUTES

As indicated previously, portions of this site are underlain by a near surface layer of PEM containing bedrock. The construction of buried utilities will likely expose the layered PEMs along utility trench sidewalls and trench bottoms. These layers should be sealed with sulfate-resistant concrete to reduce the potential for causing damage to the newly installed lines or to the pavement structure in the vicinity of the trench. We have included details for such seals in the Appendix of this report. As an alternate to the labor-intensive details, and if acceptable to the owner, it would also be possible to backfill the trenches with sulfate-resistant controlled low strength material (CLSM). CLSM is high slump, low strength, cementitious mixture typically batched by concrete suppliers. The compressive strength can typically be set low enough to allow excavation with traditional backhoes/trackhoes if the lines must be accessed in the future. We suggest a minimum compressive strength requirement of 100 psi and a maximum

compressive strength of 200 psi if considering this option. The extent of needed sealing can be estimated by reviewing utility line locations, invert elevations, the location of the PEM layer, and the anticipated trench widths. As such, the estimating work cannot be completed until the subsurface utility alignments and profiles are finalized.

EXCAVATION CONSIDERATIONS

This project will require excavations during removal of previously placed fill soils and to construct the foundations and utilities. The majority of the soils and upper bedrock we encountered should be readily excavatable by traditional means such as backhoes and trackhoes. Some harder seams, and relatively confined excavations (i.e. utility trenches in bedrock), may require hoe-ramming, jack-hammering, or controlled blasting. All temporary excavations should be designed and protected in accordance with Occupational Safety and Health Administration (OSHA) standards. Nobody should enter mud-wall excavations for any reason unless the excavations are properly shored. The mud-walls should be constructed entirely from ground surface. The soils at this site should generally be considered OSHA Type C. The contractor typically assumes responsibility for excavation protection.

GROUNDWATER CONSIDERATIONS

Groundwater control does not appear to be a major issue for this project; however, it is likely that some perched groundwater will be encountered. The contractor should be prepared to protect exposed soils from surface runoff, water tables, perched water, or other sources of water. Dewatering system design and installation is typically the responsibility of the general contractor. However, if dewatering is needed, it can sometimes be accomplished by trenching around the construction area and pumping groundwater from sump pits.

BASIS FOR EVALUATION AND FIELD DOCUMENTATION

This report has been prepared using field and laboratory techniques and analysis methods conforming to commonly accepted geotechnical engineering practices. All recommendations and/or conclusions herein pertain only to this specific project and should not be used or interpreted by others for modifications to this project, or for other projects or sites. Even within the project context, subsurface conditions depicted herein are representative only at the boring locations; actual conditions between/beyond the borings will vary. Due in part to such

variability in subsurface conditions, the implementation of recommended measures must be inspected by qualified personnel under the direction of a professional (licensed) geotechnical engineer to confirm that the subsurface conditions encountered during construction are consistent with the test borings and our engineering analysis, and verify that the subgrades and all other geo-materials used are behaving as anticipated. Some conditions or material/subgrade behavior and/or performance may require modifications to our recommendations, which can typically only be determined "on-the-spot" by one of our engineers. Therefore, we will assume no responsibility or professional liability for the performance and/or suitability of any foundations, structures, slabs, slopes, appurtenances, or related project areas affected by geotechnical elements inspected by others. The selected construction-phase field evaluation/ testing agency must take full responsibility for proper selection, implementation, and performance of the project geotechnical recommendations implemented on the site.

CLOSURE

We enjoyed assisting you on this project and trust this report will satisfy your immediate needs. If you have any questions or comments concerning this report, please feel free to contact us.

Sincerely,

GARVIN BOWARD BEITKO ENGINEERING, INC.

Miles A. Walker, E.I.T.
Engineering Associate

Douglas A. Beitko, P.E.
Principal Engineer

DAB:MAW/db

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
Professional
Douglas A. Beitko
ENGINEER
050545-E
7/12/24

APPENDIX

Figure 1 - Site Location Plan
Figure 2 – Field Exploration Plan
Definition of Soil and Rock Classification Terms
Test Boring Records (Building Area)
Figure 3 – Foundations Designed Using 4 KSF Allowable Bearing Pressure

Figure 4 – Conceptual Building Undercut/Replacement at Cross-Section A-A
Figure 5 – Conceptual Building Undercut/Replacement at Cross-Section B-B
Figure 6 – Generalized Subsurface Profile – Building Area - Showing Zones of PEMS
Figure 7 – Generalized Subsurface Profile – Building Area - Showing Zones of PEMS
Figure 8 – Generalized Subsurface Profile – Building Area - Showing Zones of PEMS
Figure 9 - Typical Carbonaceous/Pyritic/PEM Strata Seal with Mudmat
Figure 10 - Typical PEM/Carbonaceous/Pyritic Strata Excavation Sidewall Seals
Figure 11 - Typical PEM/Carbonaceous/Pyritic Utility Trench Seals
Figure 12 - Typical Footing Trench Seals
Figure 13 - Typical Mud-Wall Construction Detail

APPENDIX

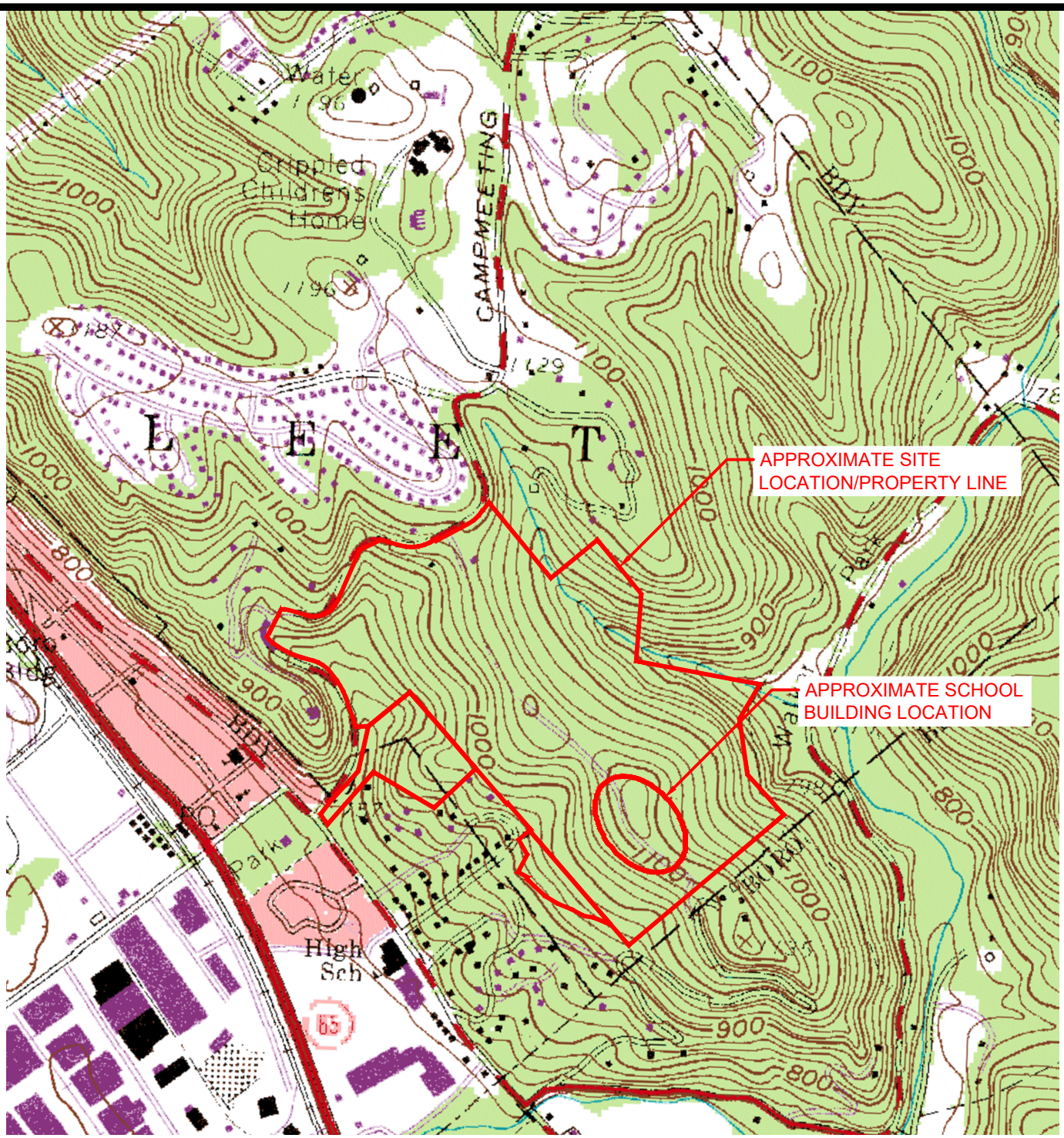


FIGURE 1 - SITE LOCATION PLAN

0 1000 2000 3000

APPROX. SCALE: 1" = 1000'

REFERENCE:
EXCERPT FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS) AMBRIDGE, PA, TOPOGRAPHIC QUADRANGLE MAP (1960); PHOTOREVISED 1990.

GARVIN BOWARD BEITKO

GARVIN BOWARD BEITKO ENGINEERING, INC.
PITTSBURGH, PA

GEOTECHNICAL EXPLORATION & ENGINEERING REPORT PART 1

FOUNDATION DESIGN & BUILDING PAD PREPARATION PROPOSED QUAKER VALLEY HIGH SCHOOL BUILDING

GBBE PROJECT: 16123A

PROPOSED SCHOOL BUILDING

EXISTING BUILDING TO BE DEMOLISHED BUILDING

TWO-STORY NORTHERN WING LOWEST FFL 1096 FT

TWO-STORY SOUTHERN WING LOWEST FFL 108

ONE-STORY SOUTHERN WING LOWEST FFL 1082 FT

STORM SHELTER AREA LOWEST FFL 1070 FT

AUX GYM ALTERNATE

DISTRICT ADMIN ALTERNATE

COURTYARD

ELEVATOR

TOP OF SLOPED SEATING

8" SLAB-ON-GRADE

SLAB ON GEOFOAM TIERED SEATING

4" SLAB-ON-GRADE SLOPED SEATING

LOWEST FFL 1079.33 FT

8" REINFORCED MASONRY WALL

LOADING DOCK RETAINING WALL AB

SITE RETAINING WALL AA

SITE RETAINING WALL BB

SITE RETAINING WALL CC

TW 1099.50
BW 1078.40

TW 1098.98
BW 1080.01

TW 1083.00
BW 1079.62

TW 1083.00
BW 1083.00

TW 1089.00
BW 1085.41

Emergency Generator

Utility Transformer

ACH-1

ACH-2

1:1 REINFORCED F-SLOPE

TOP OF SLOPE

PROPOSED GRADING IN THIS AREA WAS PROVIDED BY PHILLIPS & ASSOCIATES, INC. FROM A PLAN COMPLETED BY CIVIL AND ENVIRONMENTAL CONSULTANTS DATED MAY 3, 2024

B-84 B-85 B-86 B-87 B-88 B-89 B-94 B-95 B-96 B-97 B-98

SB-1 SB-2 SB-3 SB-4 SB-5 SB-6 SB-7 SB-8 SB-9 SB-10 SB-11 SB-12 SB-13 SB-14 SB-15 SB-16 SB-17 SB-18 SB-19 SB-20 SB-21 SB-22 SB-23 SB-24 SB-25 SB-26 SB-27

LEGEND

B–XX GBBE BORING NUMBER DRILLED JULY 19, 2023 TO AUGUST 4, 2023

SB–XX GBBE BORING NUMBER DRILLED JULY 13-19, 2023

APPROXIMATE GBBE TEST BORING LOCATION

APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS

1090 EXISTING MAJOR GROUND SURFACE CONTOUR (FT-MSL)

EXISTING MINOR GROUND SURFACE CONTOUR (FT-MSL)

1090 PROPOSED MAJOR GROUND SURFACE CONTOUR (FT-MSL)

PROPOSED MINOR GROUND SURFACE CONTOUR (FT-MSL)

APPROXIMATE CROSS-SECTION LOCATION

0+00 0+70

REFERENCE:
BASE DRAWING PROVIDED BY PHILLIPS AND ASSOCIATES, INC.

FIGURE 2 - FIELD EXPLORATION PLAN - SCHOOL

0 20 40 60
APPROX. SCALE: 1" = 20'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	05/23/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION & ENGINEERING REPORT - PART 1
FOUNDATION DESIGN & BUILDING PAD PREPARATION - PROPOSED QUAKER VALLEY HIGH SCHOOL BUILDING

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A

GARVIN
BOWARD BEITKO

DEFINITION OF SOIL AND ROCK CLASSIFICATION TERMS

SOIL

Consistency and Relative Density of soils, based on the Standard Penetration Test[1] (SPT) blow counts over the last foot of penetration, N, are generally determined as follows:

Consistency of Cohesive Soils

CONSISTENCY	N (blows/foot)	UNCONFINED COMPRESSIVE STRENGTH, Q_u(tsf)
Very soft	0 – 2	<0.25
Soft	3 – 4	0.25 – 0.5
Medium	5 – 7	0.5 – 1.0
Stiff	8 – 15	1.0 – 2.0
Very stiff	16 – 30	2.0 – 4.0
Extremely stiff	>30	>4.0
Hard (if friable or brittle)	>30	>4.0

Relative Density of Granular Soils

RELATIVE DENSITY	N (blows/foot)
Very loose	0 – 4
Loose	5 – 10
Firm	11 – 14
Medium dense	15 – 30
Dense	31 – 50
Very dense	>50

The percents by weight of constituents present in soil are as follows:

Trace:	indicates particles are present, but estimated to be less than 5%
Few:	indicates 5 to 10%
Little:	indicates 15 to 25%
Some:	indicates 30 to 45%
Mostly (and):	indicates 50 to 100%

Criteria for describing moisture content:

MOISTURE CONDITION	CRITERIA
Dry (Humid)	Absence of moisture, dusty, dry to touch
Damp	Apparent moisture in soil
Moist	Moist to touch, but no visible water
Wet	Visible free water

ROCK

Hardness of rock is based on the following:

Very soft – crushes under finger pressure
Soft – crushes easily under one hammer blow
Medium hard – breaks under one hammer blow
Hard – resistant to breaking under hammer blow
Very hard – resisting to breaking under several hammer blows

	SPACING OF FRACTURES AND/OR DISCONTINUITES
Extremely or very broken	<1”
Moderately broken	1” – 3”
Occasionally broken or blocky	3” – 6”
Massive	>6”

[1] STANDARD PENETRATION TEST (SPT) – defined as the number of blows (N) required to drive a two-inch outside diameter split-barrel sampling tube a depth of one foot with a 140-pound hammer falling 30 in. in accordance with American Society of Testing and Materials (ASTM) Test Designation: D1586.

GARVIN BOWARD BEITKO

Test Boring Record

B-84

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partyle sunny, 74 Degrees
Water Level Upon Completion: 13.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1092'	Brown and gray SANDSTONE FRAGMENTS (GP), some sand, very loose, moist		S-1	27	1-1-2 (3)				
	(COLLUVIAL) 3.0								
1087	Brown-orange DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, dense to very dense, dry	5	S-2	100	19-19-13 (32)				
	(RESIDUAL) 6.6		S-3	100	34-50/0.1'				
	Orange-brown medium to coarse-grained SANDSTONE, moderately weathered, medium bedded, moderately broken to massive, hard, few vugs		R-1	100 (0)					
1082	-lost water at 9.5'	10	R-2	92 (50)					
	-MOHs 8.5 at 10'								
	14.0		R-3	75 (0)					
1077	Boring Terminated at 14.0 feet Boring collapsed at 2.2' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	15							
1072		20							
1067		25							
1062		30							
1057		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-85

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 69 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1102'		TOPSOIL 0.3								
		Brown randomly oriented SANDSTONE FRAGMENTS (GP), few silt, very loose to medium dense, moist		S-1	67	1-1-1 (2)				
				S-2	100	20-16-17 (33)				
1097		**(COLLUVIAL)** 5.0	5							
		Brown and gray DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, dense, moist		S-3	100	16-23-17 (40)				
		(RESIDUAL) 9.0								
1092		Brown-gray DECOMPOSED SHALE sampled as shale fragments, few silt, trace clay, medium dense, dry 10.1	10	S-4	100	20-12-27 (39)				
		(RESIDUAL)								
		Orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, dense to very dense, dry		S-5	100	30-28-22 (50)				
1087		**(RESIDUAL)** 15.1	15							
		Boring Terminated at 15.1 feet		S-6	100	50/0.1'				
		Boring collapsed at 13.2' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1082			20							
1077			25							
1072			30							
1067			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-86

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 69 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1086'	TOPSOIL 0.4								
	Brown sandy SILT (ML), few clay, very soft, moist		S-1	100	1-1-1 (2)				
	(COLLUVIAL) 3.0								
	Brown and gray randomly oriented SANDSTONE FRAGMENTS (GP), some sand, medium dense, moist		S-2	100	18-19-17 (36)				
1081		5							
	(COLLUVIAL) 6.0								
	Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, medium to very dense, dry to moist		S-3	100	12-11-11 (22)				
	-moist from 6.0' to 7.5'								
1076	**(RESIDUAL)** 9.9	10	S-4	100	41-50/0.4'				
	Boring Terminated at 9.9 feet Boring collapsed at 12.8' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1071		15							
1066		20							
1061		25							
1056		30							
1051		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-87

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 68 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1081'	TOPSOIL 0.3								
	Brown clayey SILT (ML), some sand, very soft, moist **(COLLUVIAL)** 2.0		S-1	67	1-1-1 (2)				
	Yellow-brown SANDSTONE FRAGMENTS (GP), some sand, trace silt, medium dense, moist		S-2	100	14-11-10 (21)				
1076	**(COLLUVIAL)** 6.0	5							
	Orange-brown and gray DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, medium dense to dense, dry		S-3	100	9-14-19 (33)				
1071		10	S-4	100	24-20-23 (43)				
	(RESIDUAL) 13.2		S-5	100	6-3-12 (15)				
	Black DECOMPOSED carbonaceous SHALE sampled as carbonaceous shale fragments, loose, dry 13.4								
1066	**(RESIDUAL)**	15							
	Brown and orange-brown DECOMPOSED medium to coarse-grained SANDSTONE sampled as sandstone fragments, few sand, medium to very dense, dry, some carbonaceous inclusions		S-6	100	36-16-9 (25)				
	(RESIDUAL) 18.2		S-7	100	50/0.2'				
	Boring Terminated at 18.2 feet								
1061	Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	20							
1056		25							
1051		30							
1046		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-88

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 76 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1089'		TOPSOIL 0.3								
		Brown SANDSTONE FRAGMENTS (GP), few sand, trace clay, very loose, moist		S-1	67	1-1-1 (2)				
		(COLLUVIAL) 3.0								
		Brown SANDSTONE FRAGMENTS (GP), few to little sand, medium dense, dry		S-2	100	8-15-11 (26)				
1084			5							
				S-3	100	6-6-9 (15)				
		(RESIDUAL) 9.0								
		Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry 9.3		S-4	100	50/0.3'				
1079		**(RESIDUAL)**	10							
		Boring Terminated at 9.3 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1074			15							
1069			20							
1064			25							
1059			30							
1054			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-89

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 70's, Cloudy
Water Level Upon Completion: 3.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1116'	Brown and gray ROCK FRAGMENTS (GP) (sandstone), little sand, few silt, medium dense, dry		S-1	80	7-9-12 (21)				
	(RESIDUAL) 3.0								
	Brown clayey SILT (ML), trace sand, stiff, dry		S-2	80	16-7-6 (13)				
1111	**(RESIDUAL)** 6.0	5							
	Brown to orange-brown SAND (SM), some silt, few rock fragments, dense, dry		S-3	100	30-14-19 (33)				
	(RESIDUAL) 9.0								
1106	Gray-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little to few sand, few to trace silt, very dense, dry	10	S-4	100	20-37-50/0.3'				
			S-5	100	17-50/0.3'				
1101	**(RESIDUAL)** 15.2	15	S-6	100	50/0.2'				
	Gray and brown medium- to coarse-grained SANDSTONE, moderately to highly weathered, very broken to massive (generally very broken to moderately broken), medium hard to hard, few carbonaceous laminations, some water staining, vuggy -MOHs 6.5 at 16.5'		R-1	90 (0)					
1096	-clay seam from 20.3' to 20.4'	20							
	-MOHs 7.5 at 22'		R-2	100 (16)					
1091	26.0	25							
	Dark gray and brown-gray CARBONACEOUS SHALE, highly weathered, very broken and fractured, very soft to soft -MOHs 3.5 at 27'		R-3	100 (0)					
1086	29.9	30							
	Gray fine-grained SANDSTONE, slightly weathered, very broken to massive, medium hard to hard, many carbonaceous laminations -MOHs 7.5 at 32'		R-4	167 (53)					
	33.2								
	Boring Terminated at 33.2 feet								
1081		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-94

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours: 16.4'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1047'	Brown and gray rock fragments, some sand, little silt, loose, dry		S-1	53	1-2-4 (6)		12.3		
	(COLLUVIAL) 3.0								
1042	Brown SAND (SM), some silt, few rock fragments (generally small and coarse sand-sized sandstone and shale), loose, moist	5	S-2	80	2-3-4 (7)		7.1		
	(COLLUVIAL) 6.0								
	Brown-gray and brown SANDSTONE FRAGMENTS, little to some sand, few silt, medium dense to dense, dry		S-3	47	9-9-16 (25)		5.2		
1037		10	S-4	100	8-8-13 (21)		6.7		
			S-5	100	40-31-12 (43)		9.7		
1032	**(COLLUVIAL)** 15.0	15							
	Gray and orange-brown mottled CLAY to silty CLAY (CL/ML), very stiff, moist, (completely decomposed claystone)		S-6	100	5-7-11 (18)		21.4		
			S-7	100	13-16-15 (31)		19.9		
1027		20							
			S-8	80	7-12-17 (29)		18.1		
	(RESIDUAL) 24.0								
1022	Gray and light brown DECOMPOSED shaley CLAYSTONE, sampled as clay, little to some sand, trace gravel (claystone fragments), extremely stiff, dry	25	S-9	100	49-50/0.4'	73.17	11.5	36	22
	(RESIDUAL) 27.6		S-10	100	37-50/0.1'		8.5		
1017	Boring Terminated at 27.6 feet Bench was cut into slope for rig. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	30							
1012		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-95

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1066'	Light brown clayey SILT (ML), few rock fragments (shale, pink shale, orange-brown sandsotne), stiff, moist		S-1	67	1-4-5 (9)				
	(COLLUVIAL) 3.0								
1061	Orange-brown and light brown SANDSTONE FRAGMENTS (GP), little sand, few silt, loose, moist, micaceous	5	S-2	100	7-4-5 (9)				
	(POSSIBLE COLLUVIAL/RESIDUAL) 6.0								
	Orange-brown and light brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few to little sand, few silt, very dense, moist, micaceous		S-3	100	5-20-50/0.4'				
	(RESIDUAL) 9.2								
1056	Boring Terminated at 9.2 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project. Boring collapsed at 3.8' after 24 Hours	10	S-4	100	50/0.2'				
1051		15							
1046		20							
1041		25							
1036		30							
1031		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-96

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1067'		Brown SAND (SM), some silt, little rock fragments (shale, orange sandstone, red sandstone), loose to medium dense, moist		S-1	53	1-4-5 (9)				
				S-2	67	9-11-9 (20)				
1062			5							
				S-3	100	26-8-9 (17)				
		(COLLUVIAL) 9.0								
1057		Reddish-brown and brown to gray-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, few silt, very dense, dry	10	S-4	100	50/0.3'				
		(RESIDUAL) 12.2		S-5	100	50/0.2'				
1052		Boring Terminated at 12.2 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project. Boring collapsed at 4.2' after 24 Hours	15							
1047			20							
1042			25							
1037			30							
1032			35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-97

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours: 11.7'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1067.3'	Light brown SILT (ML), little sand, trace small rock fragments (orange sandstone, shale), medium, dry		S-1	80	1-2-3 (5)				
	(COLLUVIAL) 3.0								
1062	Orange-brown and brown SANDSTONE FRAGMENTS (GP), little to some sand, few silt, micaceous, loose to very dense, dry	5	S-2	100	13-12-8 (20)				
			S-3	100	11-7-7 (14)				
	(COLLUVIAL) 9.0								
1057	Orange-brown and brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little to some sand, few silt, micaceous, loose to very dense, dry	10	S-4	100	16-50/0.4'				
			S-5	53	33-18-22 (40)				
1052		15	S-6	100	11-13-15 (28)				
			S-7	100	9-7-3 (10)				
1047		20							
	(COLLUVIAL) 22.0		S-8	100	8-20-20 (40)				
	Orange-brown and brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little to some sand, few silt, micaceous, dense to very dense, dry								
	(RESIDUAL) 24.3		S-9	100	50/0.3'				
1042	Boring Terminated at 24.3 feet	25							
1037		30							
1032		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-98

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 80's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1064'	Light brown SILT (ML), some sand, few small rock fragments (orange-brown shale, shale, sandstone), very soft, moist		S-1	40	1-1-1 (2)		11.6		
	(COLLUVIAL) 3.0								
	Light orange-brown SAND (SM), little silt, little rock fragments (sandstone), medium dense, moist		S-2	100	19-10-9 (19)		7.8		
1059		5				20.1			
			S-3	100	16-9-9 (18)		6.9		
	(POSSIBLE COLLUVIAL/RESIDUAL) 9.0								
1054	Brown and orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, medium dense to very dense, dry	10	S-4	100	13-13-17 (30)				
			S-5	80	9-13-20 (33)				
1049		15							
	(RESIDUAL) 15.9		S-6	100	37-50/0.4'				
	Boring Terminated at 15.9 feet Boring collapsed at 4.5' after 24 Hours								
1044		20							
1039		25							
1034		30							
1029		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-1

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1084.1'	TOPSOIL 0.3								
	Brown-yellow SILT (ML), some sand, trace rock fragments, medium, dry		S-1	67	1-1-5 (6)		10.3		
	(RESIDUAL) 3.5								
	Yellow-brown SAND (SM), some silt, little gravel, iron staining, relic bedding, medium dense, dry		S-2	100	4-14-17 (31)		9.0		
1079		5				32.42			
	(RESIDUAL) 7.5		S-3	100	13-12-8 (20)		7.2		
	Brown-gray DECOMPOSED SANDSTONE; sampled as sandstone fragments, some sand, very dense, dry to moist								
	(RESIDUAL) 9.4		S-4	100	50/0.4'				
1074	Brown-gray medium-grained SANDSTONE, moderately weathered, extensive iron staining, medium bedded, moderately broken, medium hard	10							
	-MOHs 7.5 at 11'		R-1	58 (0)					
	-lost water return at 12.0'								
1069		15							
			R-2	80 (14)					
	-few O.5" to 1.0" vugs from 18.0' to 22.0'								
1064		20							
			R-3	84 (32)					
	-MOHs 7.5 at 23.5'								
	24.4								
1059	Boring Terminated at 24.4 feet Boring collapsed at 4.9' after 24 Hours	25							
1054		30							
1049		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-2

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 70's, Hazy
Water Level Upon Completion: 9.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 5.2'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1095.1'	FILL: sampled as brown silty sand, little rock and brick fragments, loose, moist		S-1	80	1-2-4 (6)				
	(FILL) 3.0								
1090	Brown DECOMPOSED SHALE; sampled as shale fragments (GP), few silt, few clay, medium dense, moist	5	S-2	100	10-10-9 (19)				
	(RESIDUAL) 6.0								
	Brown DECOMPOSED sandy SHALE; sampled as shale fragments (GP), medium to very dense, dry		S-3	80	7-7-8 (15)				
1085	**(RESIDUAL)** 10.1	10	S-4	100	16-32-50/0.1'				
	Brown fine- to medium-grained micaceous SANDSTONE, moderately weathered, medium bedded, very broken to massive, medium hard to hard		R-1	100 (46)					
1080	-vugs from 12.4' to 13.4'	15							
	-MOHs 8.5 at 16'		R-2	98 (66)					
1075		20							
	21.0								
	Brown and gray medium- to coarse-grained SANDSTONE, moderately weathered, medium to thickly bedded, broken to massive, hard		R-3	96 (46)					
1070	-MOHs 8.5 at 24' 25.1	25							
	Boring Terminated at 25.1 feet								
1065		30							
1060		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-3

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly sunny, 77 Degrees
Water Level Upon Completion: 4.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G./L. Barnes, E.I.T.
Water Level After 24 Hours: 7.5'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1100'	FILL: sampled as brown silty sand, few yellow-brown rock fragments (sandstone, shale), dry		S-1	53	1-2-2 (4)				
	-trace organics from 0.0' to 1.5'								
			S-2	100	5-7-11 (18)				
1095	**(FILL)**	5							
	Light gray and orange-brown DECOMPOSED medium to coarse-grained SANDSTONE; sampled as sandstone fragments, little sand, medium dense, dry	6.0	S-3	100	11-18-21 (39)				
	(RESIDUAL)	7.0							
1090	Dark gray DECOMPOSED SANDSTONE; sampled as sandstone fragments, little sand, medium dense, dry	9.0	S-4	100	20-32-38 (70)				
	(RESIDUAL)	10							
	Brown-gray DECOMPOSED SHALE; sampled as shale fragments, very dense, dry		S-5	100	50/0.4'				
	(RESIDUAL)	12.0							
1085	Brown DECOMPOSED fine-grained SANDSTONE; sampled as sandstone fragments, trace sand, very dense, dry	15	S-6	100	50/0.2'				
	(RESIDUAL)	15.2							
	Brown medium to coarse-grained SANDSTONE, moderately weathered, very broken to massive (generally massive), medium to hard (generally hard)		R-1	100 (68)					
	-MOHs 6.5 at 16'								
1080		20							
			R-2	100 (88)					
1075		25							
	-MOHs 7.5 at 26'		R-3	82 (26)					
	-vertical fracture from 26.8' to 26.9'								
	-high angle fracture from 28.5' to 28.7'								
1070	-very broken to blocky from 26.6' to 30.2' with water stained fractures	30							
		30.2							
	Boring Terminated at 30.2 feet Offset Appox. 7' downslope. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project.								
1065		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-4

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Hazy, 74 to 78 Degrees
Water Level Upon Completion: 44.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1115'	FILL: sampled as brown and gray rock fragments (sandstone, shale), few sand, few silt, very loose, moist		S-1	53	3-2-2 (4)				
	(FILL)	3.0							
	FILL: sampled as brown rock fragments (sandstone, red shale), little to some sand, loose to firm, dry to wet		S-2	80	4-6-7 (13)				
1110		5	S-3	100	11-6-5 (11)				
1105		10	S-4	100	9-7-5 (12)				
			S-5	100	3-4-7 (11)				
1100		15	S-6	100	10-4-5 (9)				
			S-7	100	6-3-2 (5)				
1095		20							
	-wet from 21.0' to 22.0'		S-8	80	3-3-5 (8)				
	(FILL)	22.0							
	Brown coarse-grained SANDSTONE FRAGMENTS (GP), some sand, firm, dry								
	(RESIDUAL)	24.7							
1090	Brown-gray clayey SILT (ML), trace shale fragments, stiff, moist	25	S-9	100	11-8-8 (16)				
	(RESIDUAL)	27.0							
	Gray-brown DECOMPOSED SHALE; sampled as soft shale fragments, little silt, few clay, medium dense, moist		S-10	100	11-12-17 (29)				
	(RESIDUAL)	28.3							
1085	Gray and brown-orange DECOMPOSED SANDSTONE; sampled as sandstone fragments, some sand, very dense, dry	30							
	(RESIDUAL)	30.4	S-11	100	50/0.4'				
	Brown fine to medium-grained SANDSTONE, highly weathered, thickly laminated, very broken, soft -MOHs <2 at 31' -no drill water return from 30.4' to 45.4'	33.0	R-1	54 (0)					
	Brown INTERBEDDED fine-grained SANDSTONE and SHALE, moderately weathered, thinly to thickly laminated, very broken to	34.5							
1080		35							

(Continued Next Page)

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GARVIN BOWARD BEITKO

Test Boring Record

SB-4

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Hazy, 74 to 78 Degrees
Water Level Upon Completion: 44.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		moderately broken, medium hard -MOHs 3.5 at 33.5'								
		Brown fine to medium-grained SANDSTONE, moderately weathered, medium bedded, moderately broken to massive, hard *(continued)* -MOHs 8.5 at 37.5'		R-2	82 (40)					
1075			40							
		-soft, highly weathered shale 40.4' to 40.7'		R-3	100 (50)					
1070		-MOHs >9 at 45'	45							
		45.4 Boring Terminated at 45.4 feet Offset 15' Uphill. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project. Boring collapsed at 4.2' after 24 Hours								
1065			50							
1060			55							
1055			60							
1050			65							
1045			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-5

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 70's
Water Level Upon Completion: 28'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1079.1'	Light brown SILT (ML), little to some sand, few to little gravel, trace roots, medium, moist		S-1	100	1-2-3 (5)	58.05	12.8		
	(COLLUVIAL)	3.0							
	Orange-brown SAND (SM), little silt, some gravel, firm to medium dense, moist		S-2	100	14-17-13 (30)		9.4		
1074		5							
			S-3	100	9-8-6 (14)	16.06	12.5		
1069		10	S-4	100	10-8-7 (15)		12.7		
	(POSSIBLE COLLUVIAL/RESIDUAL)	12.0							
	Orange-brown and gray-brown mottled silty CLAY (CL/ML), relic bedding, hard, dry		S-5	100	15-23-48 (71)				
1064	**(RESIDUAL)**	15.0	15						
	Orange-brown SAND (SM), some silt, little rock fragments, moist	15.8	S-6	100	17-50/0.3'				
	(RESIDUAL)								
	Orange-brown medium to coarse-grained SANDSTONE, moderately to highly weathered, very broken to massive, soft to hard, vuggy in places, micaceous -MOHs 2.5 at 16' -vertical fracture from 17.0' to 17.7'		R-1	88 (26)					
1059		20							
	-very soft silty sand seam from 20.0' to 20.2' -grading to brown at 20.0'								
	-MOHs 6.5 at 22'		R-2	94 (26)					
1054		25							
	-vertical fracture from 24.7' to 25.5'								
	-grading to gray and brown at 26.4', water stained, few low angle fractures -MOHs 7.5 at 26'		R-3	100 (56)					
1049		30							
		30.8							
	Boring Terminated at 30.8 feet Boring collapsed at 15.2' after 24 Hours								
1044		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-6

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Overcast, 80's
Water Level Upon Completion: 31.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1103.1'	TOPSOIL 0.4								
	Orange brown SAND (SP), medium-grained, loose, moist		S-1	80	1-1-2 (3)				
	(RESIDUAL) 3.5								
1098	Brown-gray DECOMPOSED SANDSTONE; sampled as sandstone fragments (GP), some gray sand, dense to very dense, moist	5	S-2	93	6-12-10 (22)				
			S-3	100	12-11-11 (22)				
1093	**(RESIDUAL)** 9.8	10	S-4	100	34-50/0.3'				
	Brown gray SANDSTONE, slightly weathered to moderately weathered, medium to coarse-grained, moderately broken, medium hard, extensive iron staining, micaceous, medium bedded to massive		R-1	46 (26)					
1088	-MOHs >9 at 11'	15							
			R-2	72 (10)					
1083		20							
	-MOHs 7.5 at 22'		R-3	100 (56)					
1078		25							
			R-4	100 (46)					
1073	-vertical fracture from 29.7' to 30.5'	30							
	-MOHs 8.5 at 31'		R-5	100 (47)					
	32.8								
	Boring Terminated at 32.8 feet								
1068		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-7

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 85 Degrees
Water Level Upon Completion: 36.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 42.1'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1115.7'	Brown micaceous SANDSTONE FRAGMENTS (GP), few to little sand, loose, dry		S-1	67	2-3-5 (8)				
			S-2	87	7-6-4 (10)				
1111	**(RESIDUAL)** 6.0	5							
	Brown DECOMPOSED SANDSTONE; sampled as micaceous sandstone fragments, few sand, trace silt, medium dense to very dense, dry		S-3	100	5-6-12 (18)				
1106	**(RESIDUAL)** 10.0	10	S-4	100	50/0.2'				
	Brown fine to medium-grained micaceous SANDSTONE, moderately weathered, thinly bedded, moderately broken to blocky, hard -no drill water return from 10.0' to 44.0' -medium to coarse-grained from 11.6' to 15.0' -MOHs 8.5 at 12'		R-1	76 (30)					
1101		15							
	17.0								
	Brown SHALE, completely weathered, very broken, very soft -MOHs <2 at 17.5' 18.0		R-2	76 (0)					
	Black CARBONACEOUS SHALE, highly weathered, thinly lamianted, very broken, very soft -MOHs 2.5 at 18.2'								
1096	20.0	20							
	Gray DECOMPOSED SHALE, highly weathered, thinly laminated, very soft -MOHs <2 at 22' 22.4		R-3	100 (32)					
	Brown fine to medium-grained SANDSTONE, highly to moderately weathered, thinly to medium bedded, very broken to massive, medium hard to hard -MOHs 4.5 at 22.6' -MOHs 6.5 at 24' 24.8								
1091		25							
	Brown medium to coarse-grained SANDSTONE, moderately weathered, moderately broken to blocky, hard -heavily water stained, high angle fracture from 25.4' to 26.0' -MOHs 7.5 at 29'		R-4	92 (22)					
1086		30							
	-few vugs from 32.0' to 35.0' -MOHs 8.5 at 34'		R-5	68 (18)					
1081	35.0	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-7

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 85 Degrees
Water Level Upon Completion: 36.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 42.1'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1076		Brown fine to medium-grained SANDSTONE, moderately weathered, thinly to medium bedded, moderately broken to massive, hard	40	R-6	94 (52)					
		-MOHs 7.5 at 37'		R-7	80 (100)					
		44.0								
1071		Boring Terminated at 44.0 feet	45							
1066			50							
1061			55							
1056			60							
1051			65							
1046			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-8

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion: 17.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1115'	TOPSOIL 0.4		S-1	80	1-3-5 (8)				
	Orange-brown medium-grained SAND (SP), trace silt, loose, moist								
	(RESIDUAL) 3.0								
	Orange-brown SAND (SM), little silt, few gravel gravel (sandstone fragments), firm to medium dense, moist		S-2	100	8-8-8 (16)		9.4		
1110		5				21.08			
			S-3	80	8-6-6 (12)		9.5		
	(RESIDUAL) 8.0								
	Gray DECOMPOSED SANDSTONE; sampled as sandstone fragments (GP), some sand, medium dense to very dense, moist								
1105		10	S-4	100	9-11-12 (23)				
			S-5	100	8-50/0.4'				
1100	**(RESIDUAL)** 15.3	15	S-6	100	50/0.3'				
	Brown-gray medium-grained SANDSTONE, moderately weathered, micaceous, medium bedded, soft to medium hard 15.8								
	Gray CLAYSTONE, slightly weathered, micaceous, medium bedded, very soft		R-1	50 (0)					
1095	-MOHs <2 at 17'	20							
	-lost water return at 21.0'		R-2	86 (0)					
	Medium-gray clayey SHALE, slightly weathered, micaceous, thinly to medium bedded, soft 21.8								
1090	-MOHs 3.5 at 24' 24.7	25							
	Gray SANDSTONE, slightly weathered, thinly to medium bedded, carbonaceous laminations, some iron staining, slightly broken, medium hard		R-3	100 (0)					
1085	-MOHs 7.5 at 27'	30							
	-moderately weathered, broken, and extensive iron staining from 30.5' to 32.8'		R-4	80 (22)					
1080	-MOHs 8.5 at 34'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-8

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion: 17.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray SANDSTONE, slightly weathered, thinly to medium bedded, carbonaceous laminations, some iron staining, slightly broken, medium hard *(continued)*								
1075			40	R-5	100 (56)					
		-MOHs 8.5 at 41'								
		43.3		R-6	58 (8)					
1070		Boring Terminated at 43.3 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	45							
1065			50							
1060			55							
1055			60							
1050			65							
1045			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-9

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Hazy
Water Level Upon Completion: 45.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1117.5'	Fill: sampled as brown rock fragments, (sandstone, shale), little to some sand, loose, moist		S-1	27	3-5-4 (9)				
			S-2	80	4-4-4 (8)				
1113		5							
			S-3	80	9-6-5 (11)				
1108		10	S-4	40	4-4-3 (7)				
	(FILL)	12.0							
	Brown SANDSTONE FRAGMENTS (GP), little sand, loose to firm, moist		S-5	100	5-7-11 (18)				
1103	**(RESIDUAL)**	15.0	15						
	Brown and gray DECOMPOSED SANDSTONE; sampled as sandstone fragments (GP), little sand, medium dense to very dense, moist		S-6	100	12-10-11 (21)				
			S-7	100	7-9-11 (20)				
1098		20							
			S-8	100	23-50/0.4'				
	(RESIDUAL)								
1093		24.8	25	S-9	100	35-50/0.3'			
	Brown SANDSTONE, completely weathered, very soft	25.0							
	Brown-gray SHALE, completely to highly weathered, thinly laminated, very broken to broken, very soft to soft -completely weathered, very soft from 25.0' to 27.3' -MOHs 2.5 at 26'		R-1	100 (0)					
1088		30							
		31.0							
	Brown and gray interbedded fine-grained SANDSTONE and SHALE, slightly to moderately weathered, thinly to thickly laminated, very broken to blocky, few carbonaceous laminations, medium hard to hard -MOHs 4.5 at 31.5' -MOHs 7.5 at 34'		R-2	100 (8)					
1083		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-9

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Hazy
Water Level Upon Completion: 45.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown and gray interbedded fine-grained SANDSTONE and SHALE, slightly to moderately weathered, thinly to thickly laminated, very broken to blocky, few carbonaceous laminations, medium hard to hard *(continued)*								
		-vertical fracture and soft from 37.5' to 41.0'		R-3	50 (20)					
		-lost drill water return at 37'								
		39.5								
1078		Brown fine- to medium-grained SANDSTONE, moderately weathered, medium bedded, broken to massive, soft to medium hard, few coarse-grained zones	40							
		-few carbonaceous laminations		R-4	84 (46)					
		-MOHs >9 at 41'								
1073			45							
		-soft from 45.5' to 45.7'		R-5	100 (58)					
		46.0								
		Boring Terminated at 46.0 feet Boring collapsed at 21.9' after 24 Hours								
1068			50							
1063			55							
1058			60							
1053			65							
1048			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-10

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 70's
Water Level Upon Completion: 24.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1096'	TOPSOIL 0.3								
	Light brown SAND (SM), some silt, trace fine roots, loose to firm, moist		S-1	87	2-2-3 (5)				
			S-2	100	9-7-7 (14)				
1091		5							
	(COLLUVIAL) 6.0								
	Light brown and gray silty CLAY (CL/ML), few rock fragments (sandstone, shale), trace roots, very stiff, moist		S-3	100	8-9-16 (25)				
	(RESIDUAL) 9.0								
1086	Brown and orange-brown silty CLAY (CL/ML), trace fine sand, relic bedding, hard, dry	10	S-4	100	13-18-19 (37)				
	(RESIDUAL) 12.1								
	Gray-brown shaley SANDSTONE, moderately weathered, very broken to moderately broken, medium hard to hard		S-5	100	50/0.1'				
	-MOHs 7,5 at 14'		R-1	97 (0)					
1081	14.6	15							
	Brown medium to coarse-grained SANDSTONE, moderately to highly weathered, very broken to blocky, vuggy, medium hard to hard		R-2	100 (34)					
	-MOHs 8.5 at 18.5'								
1076	-several 0.5"-1.0"-diameter vugs from 18.0' to 22.0'	20							
	-very broken and fractured from 22.0' to 24.0'		R-3	72 (0)					
1071	25.1	25							
	Boring Terminated at 25.1 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project. Boring collapsed at 7.2' after 24 Hours								
1066		30							
1061		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-11

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 75 to 77 Degrees
Water Level Upon Completion: 22.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1105.2'		ASPHALTIC CONCRETE 0.2'		S-1	53	1-4-9 (13)				
		Orange-brown SANDSTONE FRAGMENTS (GP), few sand, firm, dry								
		(RESIDUAL) 3.0								
		Brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, medium dense to very dense, dry		S-2	80	21-9-7 (16)				
1100			5							
				S-3	100	26-15-23 (38)				
		(RESIDUAL) 9.9	10	S-4	100	36-50/0.4'				
1095		Orange-brown medium to coarse-grained SANDSTONE, moderately weathered, thinly bedded, very broken to moderately broken, soft to medium hard		R-1	42 (0)					
		-MOHs 8.5 at 10.2'								
1090		15.0	15							
		Gray and orange-brown fine to medium-grained micaceous SANDSTONE, highly to moderately weathered, thickly laminated to thinly bedded, moderately broken to blocky, soft to hard		R-2	56 (10)					
		-highly weathered, soft from 15.0' to 17.6'								
		-MOHs 5.5 at 17' 17.6								
		Brown medium to coarse-grained SANDSTONE, moderately weathered, medium bedded, very broken to massive, hard								
1085			20							
		-MOHs >9 at 20.5'		R-3	82 (14)					
		-lost drill water return at 21'								
1080			25							
		-MOHs >9 at 25'		R-4	100 (26)					
		-vuggy zones from 31' to 33'								
1075			30							
		-MOHs >9 at 32'		R-5	94 (16)					
		33.0								
		Boring Terminated at 33.0 feet								
1070			35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-12

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 78°-84°, Partly Sunny
Water Level Upon Completion: 29.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1114'	TOPSOIL 0.5		S-1	67	2-2-3 (5)				
	Orange-brown micaceous SANDSTONE FRAGMENTS (GP), few sand, trace silt, loose, dry								
	(RESIDUAL) 3.0								
	Orange-brown SAND (SM), little silt, few gravel (sandstone fragments), medium dense, dry		S-2	100	12-12-12 (24)		5.4		
1109		5				24.47			
			S-3	100	14-11-10 (21)		5.3		
	(RESIDUAL) 9.0								
1104	Orange-brown micaceous DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, trace silt, medium dense to very dense, dry	10	S-4	100	50/0.4'				
	(RESIDUAL) 12.2		S-5	100	50/0.2'				
	Brown and gray medium- to coarse-grained SANDSTONE, moderately to completely weathered, thinly to medium bedded, very broken to broken, very soft to medium hard		R-1	71 (0)					
1099	-vertical fracture from 13.0' to 13.5'	15							
	-MOHs 5.5 at 13.6'								
	-no drill water return from 12.2' to 42.0'		R-2	80 (0)					
	-very soft, completely weathered from 16.0' to16.5' 16.5								
	Brown interbedded fine-grained SANDSTONE and SHALE, highly weathered, thinly to thickly laminated, very broken, soft								
1094	-MOHs <2 at 17'	20							
	21.0		R-3	84 (0)					
	Brown medium- to coarse-grained SANDSTONE, moderately weathered, thinly to medium bedded, very broken to massive, hard, some cross bedding								
	-highly weathered from 21.0' to 30.0'								
	-vugs from 22.0' to 23.0'								
1089	-MOHs >9 at 24'	25							
	-vugs from 27.0' to 27.3'		R-4	100 (60)					
	-MOHs 8.5 at 28'								
1084		30							
			R-5	100 (64)					
1079	-vugs from 34.0' to 34.7'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-12

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 78°-84°, Partly Sunny
Water Level Upon Completion: 29.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown medium- to coarse-grained SANDSTONE, moderately weathered, thinly to medium bedded, very broken to massive, hard, some cross bedding *(continued)*								
				R-6	100 (56)					
1074		-MOHs 8.5 at 38'	40							
				R-7	30 (25)					
			42.0							
		Boring Terminated at 42.0 feet Offset Approx. 11.5' North. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project. Boring collapsed at 32.9' after 24 Hours								
1069			45							
1064			50							
1059			55							
1054			60							
1049			65							
1044			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-13

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 70 to 74 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1113.1'	Brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, medium to very dense, dry		S-1	67	1-7-20 (27)				
			S-2	100	17-50/0.1'				
1108		5							
	(RESIDUAL) 6.2		S-3	100	50/0.2'				
	Brown fine to medium-grained micaceous SANDSTONE, highly to moderately weathered, thinly bedded, very broken to blocky, soft to hard		R-1	80 (10)					
	-lost water return at 7.0'								
1103	-soft from 8.0' to 8.7'	10							
	-MOHs 6.5 at 10'								
	11.3								
	Brown medium to coarse-grained micaceous SANDSTONE, moderately weathered, very broken to blocky, hard		R-2	92 (16)					
	-few fractured zones								
1098		15							
	-MOHS 6.5 at 14'								
	17.4								
	Brown fine to medium-grained SANDSTONE, highly to moderately weathered, thinly bedded, very broken to moderately broken, soft to medium hard		R-3	90 (0)					
	-soft, highly weathered from 19.4' to 19.9'								
1093		20							
	20.8								
	Black CARBONACEOUS SHALE, highly weathered, thinly laminated, very broken, soft, possible pyrite 21.5								
	-MOHs 2.5 at 21'								
	Gray-brown SHALE, highly to completely weathered, thinly laminated, very broken to moderately broken, soft 24.0		R-4	100 (0)					
	-MOHs <2 at 22'								
1088		25							
	Brown fine to medium-grained SANDSTONE, moderately weathered, moderately broken, medium hard to hard 26.2								
	-MOHs 8.5 at 25'								
	-vuggy from 25.5' to 26.0' 27.0								
	Dark gray SHALE, moderately weathered, thinly laminated, very broken, soft		R-5	100 (12)					
	Brown medium to coarse-grained SANDSTONE, moderately weathered, medium bedded, moderately broken to massive, hard, few vertical fractures								
1083		30							
	-many vugs and carbonaceous inclusions from 31.3' to 34.5'								
	-MOHs >9 at 31.5'		R-6	100 (16)					
1078		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-13

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 70 to 74 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown medium to coarse-grained SANDSTONE, moderately weathered, medium bedded, moderately broken to massive, hard, few vertical fractures *(continued)*								
1073		-MOHs 8.5 at 38'	40	R-7	96 (0)					
		41.0								
		Boring Terminated at 41.0 feet Boring collapsed at 15' after 24 Hours								
1068			45							
1063			50							
1058			55							
1053			60							
1048			65							
1043			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

SB-14

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 67 to 70 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1113.4'	Brown DECOMPOSED micaceous SANDSTONE; sampled as sandstone fragments, few sand, medium dense to very dense, dry		S-1	80	1-4-17 (21)				
			S-2	100	16-40-50/0.3'				
1108		5							
	(RESIDUAL)		S-3	100	50/0.3'				
		6.3							
	Brown fine to medium-grained micaceous SANDSTONE, moderately weathered, thinly bedded, very broken to blocky, medium hard		R-1	82 (8)					
	-MOHs 4.5 at 8.5'								
1103		10							
		11.1							
	Brown SHALE, completely to highly weathered, thinly laminated, very broken, very soft		R-2	74 (0)					
		13.0							
	Brown fine to medium-grained SANDSTONE, moderately weathered, thinly bedded, very broken to blocky, hard								
1098		15							
	-few vugs, medium to coarse-grained from 14.0' to 15.0'								
	-MOHs 7.5 at 19'		R-3	100 (0)					
1093		20							
		20.4							
	Brown to dark gray SHALE, highly weathered, thinly laminated, very broken, soft								
	-MOHs <2 at 21.2'	21.5							
	Brown INTERBEDDED fine-grained SANDSTONE and SHALE, moderately weathered, thinly to thickly laminated, very broken to massive, medium hard , some carbonaceous laminations		R-4	100 (10)					
	-MOHs 2.5 at 22.3'								
1088		25							
	-few vertically fractured zones								
	-MOHs 6.5 at 24'								
		27.0							
	Brown medium to coarse-grained SANDSTONE, moderately weathered, moderately broken to massive, hard, few carbonaceous laminations		R-5	92 (28)					
1083		30							
	-MOHs 8.5 at 31'								
			R-6	100 (32)					
1078		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-14

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 67 to 70 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown medium to coarse-grained SANDSTONE, moderately weathered, moderately broken to massive, hard, few carbonaceous laminations *(continued)*								
1073			40	R-7	74 (46)					
		-MOHs 8.5 at 41'								
		41.3								
		Boring Terminated at 41.3 feet Boring collapsed at 4.2' after 24 Hours								
1068			45							
1063			50							
1058			55							
1053			60							
1048			65							
1043			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-15

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1114.3'	TOPSOIL 0.4		S-1	67	1-2-6 (8)				
	Orange-brown medium-grained SAND (SP), loose, moist								
	(RESIDUAL) 3.0								
	Gray DECOMPOSED SANDSTONE; sampled as sandstone fragments, some sand, medium dense to very dense, iron stained, moist		S-2	100	3-11-13 (24)				
1109		5							
			S-3	100	11-17-14 (31)				
1104		10	S-4	100	34-44-33 (77)				
			S-5	100	50/0.4'				
1099	**(RESIDUAL)** 15.4	15	S-6	100	50/0.4'				
	Brown-gray medium- to coarse-grained SANDSTONE, moderately weathered, medium bedded, micaceous, iron stained, slightly broken, medium hard		R-1	80 (30)					
	-MOHs 5.5 at 16'								
1094		20							
	22.3								
	Medium gray CLAYSTONE, fresh, medium bedded, very soft 23.2		R-2	100 (14)					
	Medium gray SILTSTONE, slightly weathered to fresh, medium bedded, slightly broken, medium hard								
1089	-shaley zone from 24.3' to 24.4'	25							
	-MOHs 6.5 at 25'		R-3	100 (36)					
	27.6								
	Gray fine- to medium-grained SANDSTONE, moderately weathered to fresh, iron stained, highly broken and weathered, hard								
1084		30							
	-MOHs 8.5 at 29'		R-4	100 (0)					
	-iron stained, vertical fracture, microlaminated from 34.8' to 35.9'								
1079		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-15

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray fine- to medium-grained SANDSTONE, moderately weathered to fresh, iron stained, highly broken and weathered, hard *(continued)*								
		-coarse-grained, highly broken, vuggy, and fractured from 35.0' to 37.0'		R-5	46 (0)					
1074		-MOHs >9 at 36'	40							
		-vertical fracture from 41.9' to 42.5'		R-6	100 (0)					
		43.4								
1069		Boring Terminated at 43.4 feet	45							
1064			50							
1059			55							
1054			60							
1049			65							
1044			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-16

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's, Hazy
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1109'	Brown and orange-brown SAND (SM), some silt, little rock fragments (sandstone), loose, dry		S-1	67	2-3-4 (7)				
	(RESIDUAL) 3.0								
	Gray-brown DECOMPOSED SANDSTONE; sampled as medium- to course-grained sandstone fragments, little to some sand, little to few silt, dense to very dense, dry		S-2	100	11-21-36 (57)				
1104		5							
			S-3	100	28-23-15 (38)				
	(RESIDUAL) 9.4								
1099	Orange-brown coarse-grained SANDSTONE, highly weathered, very broken to moderately broken, medium hard to hard, vuggy 10.4	10	S-4	100	50/0.4'				
	-MOHs >9 at 10'		R-1	68 (0)					
	Gray and brown CARBONACEOUS fine sandy SHALE, moderately to highly weathered, very broken to moderately broken, very soft to medium hard								
	-clay seam from 10.6' to 10.8'								
1094	-MOHs 7.5 at 14.5'	15	R-2	100 (0)					
	18.8								
1089	Medium gray CARBONACEOUS fine- to medium-grained shaley SANDSTONE, moderately weathered, very broken to blocky, medium hard to hard	20	R-3	82 (0)					
	-MOHs >9 at 20' 21.9								
	Gray and brown fine- to medium-grained SANDSTONE, few to many carbonaceous laminations, moderately to highly weathered, very broken to moderately broken, soft to hard (generally medium hard), shaley in zones								
1084	-MOHs 3.5 at 22.2'	25	R-4	94 (38)					
	-MOHs 7.5 at 25'								
1079		30							
	30.6								
	Orange-brown medium- to coarse-grained SANDSTONE, highly weathered, very broken to massive, medium hard to hard		R-5	80 (36)					
	-MOHs >9 at 31'								
	-highly weathered, driller noted soft zones while coring R-5								
1074	-vuggy from 31.0' to 34.0'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-16

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's, Hazy
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Orange-brown medium- to coarse-grained SANDSTONE, highly weathered, very broken to massive, medium hard to hard *(continued)*		R-6	67 (43)					
		-MOHs >9 at 37' 37.4								
		Boring Terminated at 37.4 feet Offset 5' South. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project; no water return								
1069			40							
1064			45							
1059			50							
1054			55							
1049			60							
1044			65							
1039			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-17

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's, Hazy
Water Level Upon Completion: 31.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1102.6'	TOPSOIL 0.4		S-1	67	1-2-3 (5)				
	Gray-brown SAND (SM), some silt, few rock fragments (brown and red sandstone, coal), loose, dry **(COLLUVIAL)** 3.0								
1098	Light brown to orange-brown SAND (SM), some silt, few rock fragments (sandstone), firm, dry **(RESIDUAL)** 6.0	5	S-2	100	10-7-7 (14)				
	Gray and rust-brown decomposed CARBONACEOUS SHALE; sampled as very thinly laminated shale fragments, little silt, few sand, micaceous, medium dense to very dense, dry to moist		S-3	87	12-11-10 (21)				
1093		10	S-4	100	22-43-50/0.4'				
	(RESIDUAL) 12.4		S-5	100	50/0.4'				
	Gray-brown CARBONACEOUS SHALE, moderately to highly weathered, very broken, soft to medium hard, fine sandy		R-1	96 (0)					
1088	-MOHs 2.5 at 13.5'	15							
	-MOHs 2.5 at 19'		R-2	100 (8)					
1083	20.6	20							
	Gray fine- to medium-grained SANDSTONE, moderately weathered, very broken to moderately broken, medium hard to hard, few to many carbonaceous laminations		R-3	100 (0)					
	-MOHs 6.5 at 22'								
1078	25.3	25							
	Brown medium-grained SANDSTONE, moderately to slightly weathered, very broken to massive, medium hard to hard, trace carbonaceous laminations, some water staining -high angle water stained fracture from 25.5' to 25.8' -lost water ~26.0' -MOHs 5.5 at 26' -clay seam at 30.4'		R-4	92 (18)					
1073	30.5	30							
	Brown medium- to coarse-grained SANDSTONE, moderately weathered, very broken to massive, medium hard to hard, vuggy -MOHs 7.5 at 31' 32.5		R-5	50 (26)					
	Boring Terminated at 32.5 feet Boring collapsed at 28.8' after 24 Hours								
1068		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-18

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 70's
Water Level Upon Completion: 31.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours: 28'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1078'	Light brown SAND (SM), some silt, trace rock fragments (red sandstone, brown sandstone), loose, moist		S-1	100	1-5-5 (10)				
	(COLLUVIAL)	3.0							
	Brown, grayish-brown, and orange-brown silty CLAY (CL/ML), trace fine sand, relic bedding, stiff, dry		S-2	100	11-7-7 (14)				
1073	**(RESIDUAL)**	5							
		6.0							
	Reddish-brown and orange-brown SANDSTONE FRAGMENTS (GP), little sand, trace silt, loose, dry		S-3	100	6-4-4 (8)				
	(RESIDUAL)	9.0							
1068	Orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, very dense, dry	9.3 10	S-4	100	50/0.3'				
	(RESIDUAL)		R-1	80 (0)					
	Brown and orange-brown medium to coarse-grained SANDSTONE, moderately to highly weathered, very broken to moderately broken, medium hard to hard, vuggy -no water return -MOHs 7.5 at 11' -vertical fracture from 15.3' to 15.5' -completely weathered from 15.7' to 16.0' -black clay seam at 16.0'		R-2	98 (0)					
1063		15							
		16.3							
	Gray and brown medium-grained SANDSTONE, moderately weathered, very broken to massive, medium hard to hard, some water staining, micaceous, few low angle fractures		R-3	98 (50)					
1058	-MOHs 7.5 at 21'	20							
	-clay seam at 23.0' -clay seam at 24.0'		R-4	96 (0)					
		24.5							
1053	Gray fine- to medium-grained SANDSTONE, moderately to slightly weathered, very broken to massive, medium hard to hard, some water staining, micaceous, few carbonaceous laminations	25	R-5	100 (58)					
1048	-MOHs 8.5 at 28'	30							
			R-6	100 (58)					
1043		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-18

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 70's
Water Level Upon Completion: 31.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours: 28'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray fine- to medium-grained SANDSTONE, moderately to slightly weathered, very broken to massive, medium hard to hard, some water staining, micaceous, few carbonaceous laminations *(continued)*		R-7	100 (86)					
1038		-MOHs 8.5 at 40'	40							
			41.4	R-8	100 (77)					
		Medium gray fine sandy SILTSTONE, slightly weathered to fresh, very broken to blocky, medium hard to hard	42.8							
		-clay seam at 41.5' -MOHs 6.5 at 41.6'								
1033		Boring Terminated at 42.8 feet Offset Approximately 5' South (downslope). Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project.	45							
1028			50							
1023			55							
1018			60							
1013			65							
1008			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-19

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's. Partly Sunny
Water Level Upon Completion: 25.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1122'	TOPSOIL 0.3		S-1	73	2-5-4 (9)				
	FILL: sampled as orange-brown rock fragments (shale, sandstone), few gravel, trace clay, loose, moist **(FILL)** 3.0								
	Brown SAND (SM), little silt, little gravel (sandstone fragments), medium dense, moist		S-2	100	16-15-14 (29)		8.6		
1117	-moist from 3.0' to 7.5'	5				21.53			
			S-3	100	10-8-8 (16)		9.1		
	(RESIDUAL) 9.0								
1112	Brown micaceous DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, trace silt, medium to very dense, dry	10	S-4	100	50/0.3'				
	(RESIDUAL) 12.4		S-5	100	50/0.4'				
1107	Brown fine- to medium-grained micaceous SANDSTONE, moderately weathered, thickly laminated to medium bedded, very broken to massive, medium hard to hard, few soft seams	15	R-1	81 (0)					
	-MOHs 7.5 at 16.5'		R-2	100 (0)					
1102	-very water stained, medium to coarse-grained, thinly bedded, massive, hard from 20.0' to 30.8'	20							
			R-3	96 (54)					
1097	-MOHs 7.5 at 25'	25							
			R-4	92 (38)					
1092	-MOHs 6.5 at 32'	30							
	32.7		R-5	94 (12)					
1087	-MOHs 5.5 at 35'	35							

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BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

SB-19

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's. Partly Sunny
Water Level Upon Completion: 25.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown and gray fine- to medium-grained SANDSTONE and SHALE, moderately weathered, thinly laminated to thinly bedded,very broken to moderately broken, medium hard, some carbonaceous laminations, possible pyrite *(continued)*	36.0	R-6	100 (0)					
		Boring Terminated at 36.0 feet Boring Collapsed at 22.7' after 24 Hours								
1082			40							
1077			45							
1072			50							
1067			55							
1062			60							
1057			65							
1052			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

SB-20

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1116.8'	TOPSOIL 0.4								
	Yellow-brown SAND (SP), little angular sandstone fragments, very loose to firm, moist		S-1	67	1-1-2 (3)				
			S-2	100	8-5-6 (11)				
1112		5							
	(RESIDUAL) 7.0		S-3	100	6-7-8 (15)				
	Brown-orange-gray DECOMPOSED SANDSTONE (GP); sampled as sandstone fragments, little sand, loose to very dense, moist								
1107		10	S-4	100	15-27-50/0.4'				
	(RESIDUAL) 12.1		S-5	100	50/0.1'				
	Gray medium-grained SANDSTONE, moderately weathered, thinly bedded, moderately broken, medium hard to hard, iron stained		R-1	76 (0)					
	-MOHs 7.5 at 13'								
1102	15.0	15							
	Light gray CLAYSTONE, slightly weathered, medium bedded, very soft								
	-MOHs <2 at 16'								
	-lost water return at 17.0' 17.5		R-2	66 (0)					
	Brown-gray SANDSTONE, medium-grained, micaceous, moderately broken, iron stained, carbonaceous streaks, hard								
1097		20							
	-MOHs 7.5 at 19'								
	22.3		R-3	100 (26)					
	Dark gray sandy CLAYSTONE, moderately weathered, thinly bedded, very soft 22.7								
	Gray medium-grained SANDSTONE, slightly weathered, iron stained, slightly broken, soft to hard								
1092		25							
	-MOHs 2.5 at 23'								
	-MOHs 7.5 at 24' 25.2								
	26.4		R-4	100 (8)					
	Gray sandy SHALE, slightly weathered, thinly bedded, iron stained, slightly broken, soft								
	-MOHs <2 at 25.5'								
	28.4								
	Gray medium-grained SANDSTONE, slightly weathered, thinly bedded, slightly broken, soft to medium hard								
1087	-MOHs 5.5 at 27'	30							
	-iron stained vertical fracture from 28.3' to 28.5' 30.0		R-5	(20)					
	Medium gray SILTSTONE, slightly to moderately weathered, iron stained, vertically fractured, slightly broken, medium hard								
	-MOHs 4.5 at 29' 32.0								
	Gray medium-grained SANDSTONE, slightly weathered to fresh, micaeous, carbonaceous laminations, sub-vertical fracture, moderately broken, hard								
1082	-MOHs 8.5 at 31'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-20

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Boring Terminated at 32.0 feet Boring collapsed at 7' after 24 Hours								
1077			40							
1072			45							
1067			50							
1062			55							
1057			60							
1052			65							
1047			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-21

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion: 3.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours: 2.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1107.1'	TOPSOIL 0.4		S-1	67	1-1-1 (2)				
	Brown-orange medium-grained SAND (SM), little silt, trace sandstone fragments, very loose, moist **(RESIDUAL)** 3.0								
	Yellow-brown SAND (SP), some sandstone fragments, loose, moist		S-2	100	4-3-5 (8)				
1102	**(RESIDUAL)** 6.0	5							
	Gray DECOMPOSED SANDSTONE; sampled as sandstone fragments, little sand, medium dense to very dense, moist		S-3	100	18-12-9 (21)				
1097		10	S-4	100	20-35-50/0.4'				
	(RESIDUAL) 12.4		S-5	100	50/0.4'				
	Gray medium-grained SANDSTONE, moderately weathered, thinly to medium bedded, micaceous, moderately broken, medium hard		R-1	100 (0)					
1092	-MOHs 4.5 at 13.3'	15							
	16.4		R-2	100 (0)					
	Gray CLAYSTONE, slightly weathered to fresh, medium bedded, very soft -MOHs <2 at 17.5' 18.0								
	Gray sandy SHALE, slightly weathered, iron stained, thinly bedded, slightly broken, very soft to soft 19.4								
1087	Gray with dark gray streaked shaley SANDSTONE, slightly weathered, microlaminated, thinly to medium bedded, moderately broken, medium hard 21.0	20	R-3	100 (25)					
	-MOHs 5.5 at 20'								
	Boring Terminated at 21.0 feet								
1082		25							
1077		30							
1072		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-22

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 74 to 77 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1113.6'	Brown DECOMPOSED micaceous SANDSTONE; sampled as sandstone fragments, few sand, medium to very dense, dry		S-1	100	3-6-10 (16)				
			S-2	100	17-29-38 (67)				
1109		5							
			S-3	100	33-20-19 (39)				
	(RESIDUAL) 9.1								
1104	Brown to light gray fine to medium-grained SANDSTONE, moderately weathered, thinly bedded, very broken to blocky, hard	10	S-4	100	50/0.1'				
			R-1	44 (0)					
	-MOHs >9 at 12'		R-2	90 (8)					
1099		15							
	-light gray/brown, soft vertical fracture from 16.0' to 17.0'		R-3	96 (0)					
	-MOHs 8.5 at 20.6'								
1094		20							
	-vertical fracture from 20.0' to 20.5'								
	-few vertical fractures from 21.4' to 24.7' 22.0		R-4	98 (16)					
	Brown and gray INTERBEDDED fine-grained SANDSTONE and SHALE, moderately weathered, thinly laminated, very broken to moderately broken, medium hard, numerous carbonaceous laminations								
1089		25							
	-MOHs 6.5 at 26'		R-5	93 (0)					
	28.0								
	Boring Terminated at 28.0 feet								
1084		30							
1079		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-23

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 70's, Cloudy
Water Level Upon Completion: 15.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1103.3'	Brown clayey SILT (ML), trace fine sand, medium, moist		S-1	67	1-1-4 (5)				
	(RESIDUAL) 3.0								
1098	Gray and brown SANDSTONE FRAGMENTS (GP), some sand, little silt, medium dense, moist, micaceous	5	S-2	80	5-7-8 (15)				
	(RESIDUAL) 6.5								
	Gray and brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, some sand, little silt, dense to very dense, moist, micaceous		S-3	80	7-30-10 (40)				
	(RESIDUAL) 9.4		S-4	100	50/0.4'				
1093	Brown medium- to coarse-grained micaceous SANDSTONE, moderately to highly weathered, very broken to moderately broken, medium hard	10	R-1	60 (0)					
	-vertical fracture from 10.6' to 11.6'								
	-MOHs 6.5 at 11'								
	14.2								
1088	Gray and orange-brown SHALE, highly weathered, very soft	15	R-2	100 (10)					
	-MOHs <2 at 15.5'								
	17.7								
	Gray and brown shaley fine- to medium-grained SANDSTONE, highly weathered, very broken to massive (generally very broken to moderately broken), very soft to hard (generally medium hard) 19.4								
1083	-MOHs 6.5 at 18'	20							
	Boring Terminated at 19.4 feet								
1078		25							
1073		30							
1068		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-24

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 80's, Hazy
Water Level Upon Completion: 25.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1113.7'	Brown CLAY (CL) with gray mottling, stiff, dry		S-1	87	9-5-9 (14)				
	(RESIDUAL) 3.0								
	Gray and brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, little sand, few silt, very dense, dry		S-2	100	50/0.4'				
1109	**(RESIDUAL)** 6.1	5							
	Gray and brown medium- to coarse-grained SANDSTONE, moderately to highly weathered, very broken to moderately broken, medium hard to hard, some water staining, few low angle fractures, vuggy in places		S-3	100	50/0.1'				
	-MOHs 5.5 at 8'		R-1	94 (0)					
1104		10							
			R-2	100 (0)					
1099		15							
	-MOHs 8.5 at 16.8'								
	-clay seam at 17.3'								
	-gray and brown claystone and clayshale interbeds from 17.7' to 21.1'		R-3	72 (0)					
1094		20							
	21.4								
	Medium gray and brown CARBONACEOUS fine sandy SHALE, moderately to highly weathered, very broken and fractured, very soft to medium hard		R-4	88 (0)					
	-MOHs 5.5 at 24.5'								
1089	25.5	25							
	Gray fine- to medium-grained SANDSTONE, slightly weathered, very broken to massive (generally moderately broken to blocky), medium hard to hard, vuggy, many carbonaceous laminations		R-5	100 (30)					
	-MOHs 8.5 at 27'								
	-water stained from 29.6' to 29.8'								
1084	30.1	30							
	Boring Terminated at 30.1 feet								
1079		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-25

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly cloudy, 71 Degrees
Water Level Upon Completion: 16.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1103'	TOPSOIL 0.3		S-1	87	1-3-4 (7)				
	Tan sandy SILT (ML), medium, dry								
	(RESIDUAL) 3.0								
	Brown SANDSTONE FRAGMENTS (GP), some sand, loose to very dense, dry		S-2	100	9-9-5 (14)				
1098		5							
			S-3	100	6-5-4 (9)				
	(RESIDUAL) 9.3		S-4	100	50/0.3'				
1093	Brown fine to medium-grained micaceous SANDSTONE, moderately weathered, thinly bedded, very broken to massive, hard, few carbonaceous laminations	10	R-1	98 (40)					
	-MOHs 8.5 at 10.5 13.3								
1088	Gray INTERBEDDED fine-grained micaceous SANDSTONE and SHALE, slightly weathered, moderately broken to hard, some carbonaceous laminations	15	R-2	100 (0)					
	-lost drill water at 14'								
	-MOHs 8.5 at 17.5' 18.0								
	Boring Terminated at 18.0 feet								
1083	Offset Approx. 9' NE. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project.	20							
1078		25							
1073		30							
1068		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-26

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 69 Degrees
Water Level Upon Completion: 19.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry/L. Barnes
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1110'	Light brown SILT (ML), little sand, few rock fragments, trace roots, stiff, dry		S-1	87	1-4-8 (12)		4.4		
	(POSSIBLE COLLUVIAL/RESIDUAL) 3.0								
	Gray and brown SAND (SM), little silt, little to some gravel (sandstone fragments), medium dense, dry		S-2	100	13-12-13 (25)		4.4		
1105		5				21.88			
			S-3	100	10-9-7 (16)		5.2		
	(RESIDUAL) 9.0								
1100	Gray to gray and brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, few silt, very dense, dry 9.8	10	S-4	38	32-50/0.3'				
	(RESIDUAL)								
	Brown and gray medium to coarse-grained SANDSTONE, slightly to moderately weathered, medium bedded, very broken to massive, hard		R-1	94 (48)					
1095	-MOHs >9 at 15'	15							
	16.5								
	Brown and gray fine to medium-grained micaceous SANDSTONE, slightly weathered, thinly laminated to very thinly bedded, very broken to massive, hard		R-2	96 (44)					
1090	-MOHs >9 at 21'	20							
	22.0								
	Gray INTERBEDDED fine-grained SANDSTONE and SHALE, slightly weathered, thinly to thickly laminated, moderately broken to massive, hard, few carbonaceous laminations		R-3	100 (60)					
1085	-MOHs 8.5 at 24' 24.8	25							
	Boring Terminated at 24.8 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1080		30							
1075		35							

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GARVIN BOWARD BEITKO

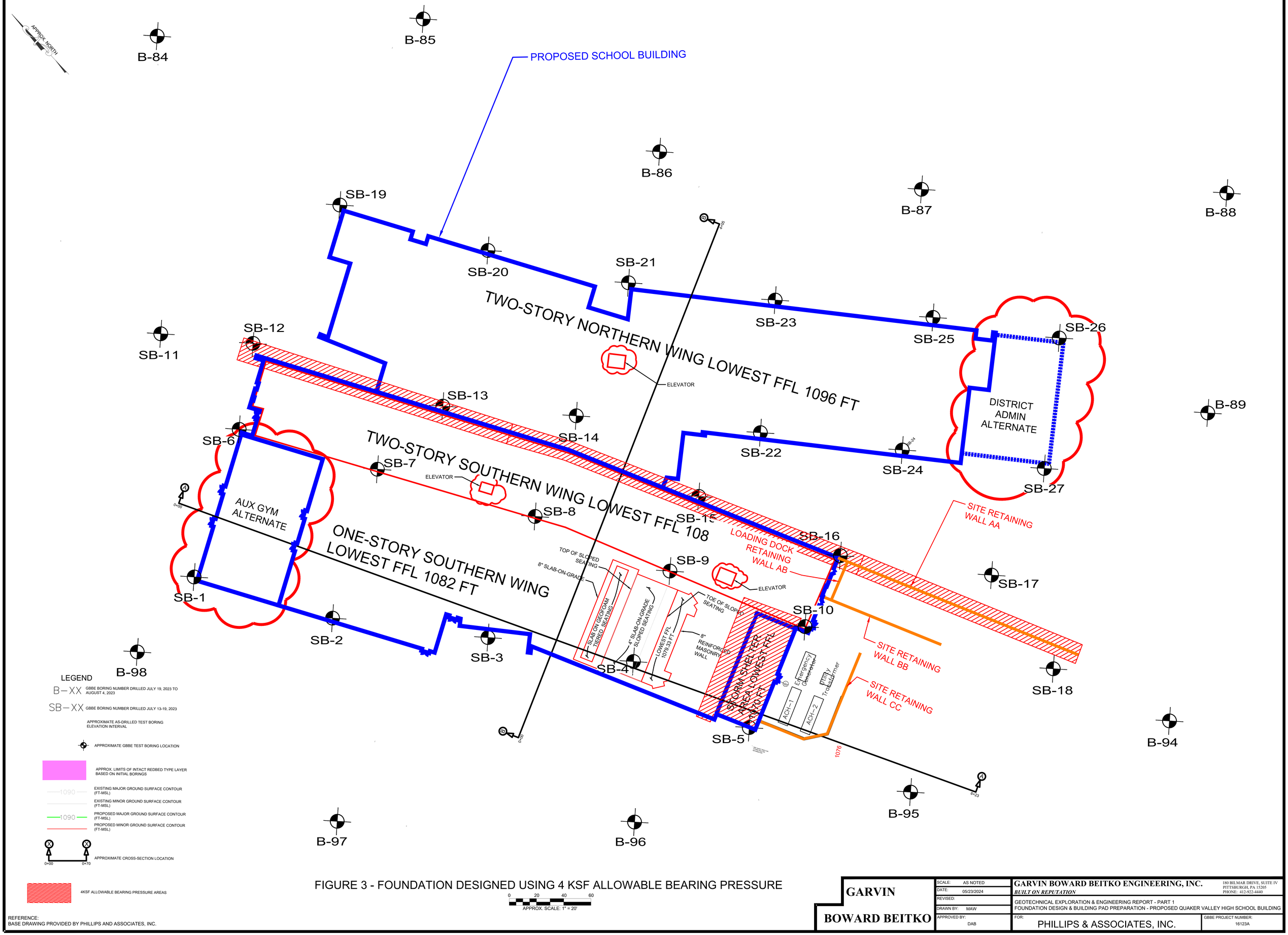
Test Boring Record

SB-27

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 78 to 80 Degrees
Water Level Upon Completion: 27.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 19.8'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1115'	Brown micaceous SANDSTONE FRAGMENTS (GP), few sand, trace silt, firm, dry		S-1	27	3-7-5 (12)				
	(RESIDUAL) 2.0								
	Brown DECOMPOSED SANDSTONE sampled as fine- to medium-grained sandstone fragments, few sand, trace silt, dense to very dense, dry		S-2	100	18-22-21 (43)				
1110		5							
			S-3	100	20-41-44 (85)				
1105	**(RESIDUAL)** 10.1	10	S-4	136	38-40-50/0.1'				
	Brown fine to medium-grained micaceous SANDSTONE, highly to moderately weathered, thinly laminated, very broken to moderately broken, soft to medium hard -soft, highly weathered from 10.2' to 10.4' -MOHs 5.5 at 12'		R-1	90 (0)					
1100	14.9	15							
	Brown and orange-brown medium to coarse-grained SANDSTONE, moderately weathered, thinly bedded, moderately broken to blocky, medium hard to hard, few carbonaceous laminations, vertical fractures throughout -MOHs 6.5 at 16'		R-2	94 (12)					
1095	19.8	20							
	Brown to gray INTERBEDDED fine-grained SANDSTONE and SILTSTONE, highly to slightly weathered, thinly to thickly laminated, very broken to massive, medium hard -soft, highly weathered from 21.0' to 22.0'		R-3	100 (20)					
1090	=MOHs 6.5 at 23'	25							
	-gray to dark gray from 22.0' to 27.0' -light gray from 27.0' to 30.1'		R-4	100 (0)					
1085	-MOHs 7.5 at 29' 30.1	30							
	Boring Terminated at 30.1 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1080		35							

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LEGEND

- B–XX GBBE BORING NUMBER DRILLED JULY 19, 2023 TO AUGUST 4, 2023
- SB–XX GBBE BORING NUMBER DRILLED JULY 13-19, 2023
- APPROXIMATE AS-DRILLED TEST BORING ELEVATION INTERVAL
- APPROXIMATE GBBE TEST BORING LOCATION
- APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS
- 1090 EXISTING MAJOR GROUND SURFACE CONTOUR (FT-MSL)
- EXISTING MINOR GROUND SURFACE CONTOUR (FT-MSL)
- 1090 PROPOSED MAJOR GROUND SURFACE CONTOUR (FT-MSL)
- PROPOSED MINOR GROUND SURFACE CONTOUR (FT-MSL)
- APPROXIMATE CROSS-SECTION LOCATION (0+00 to 0+70)
- 4KSF ALLOWABLE BEARING PRESSURE AREAS

REFERENCE:
BASE DRAWING PROVIDED BY PHILLIPS AND ASSOCIATES, INC.

FIGURE 3 - FOUNDATION DESIGNED USING 4 KSF ALLOWABLE BEARING PRESSURE

0 20 40 60
APPROX. SCALE: 1" = 20'

GARVIN BOWARD BEITKO

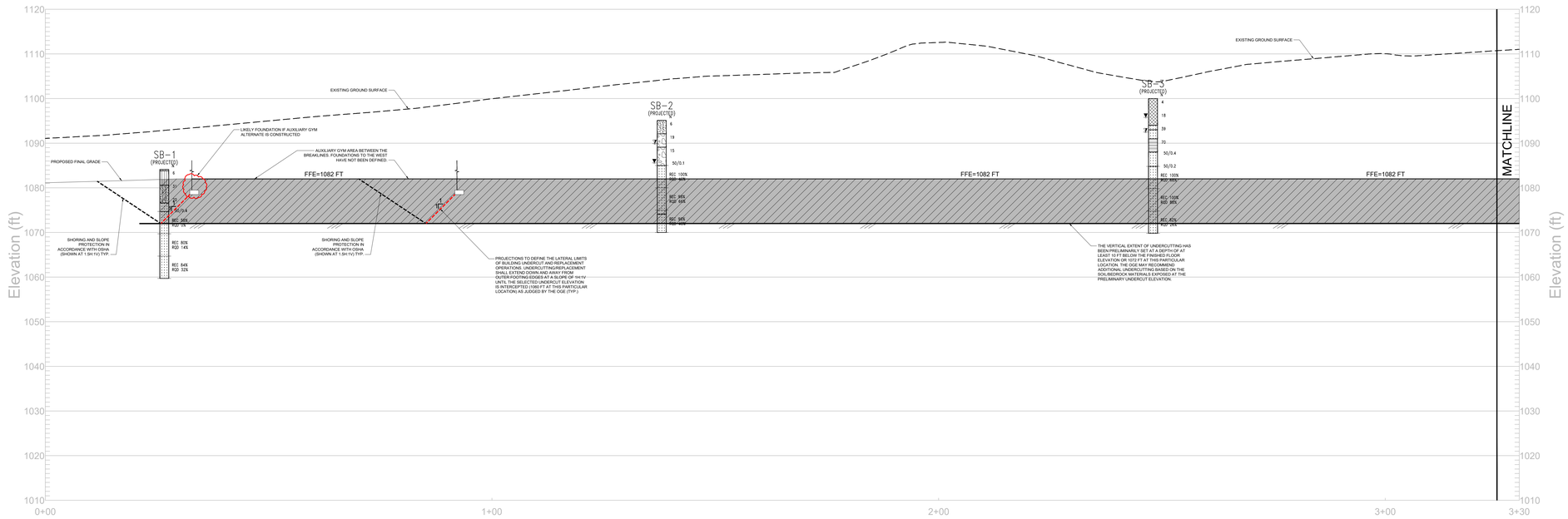
SCALE:	AS NOTED
DATE:	05/23/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

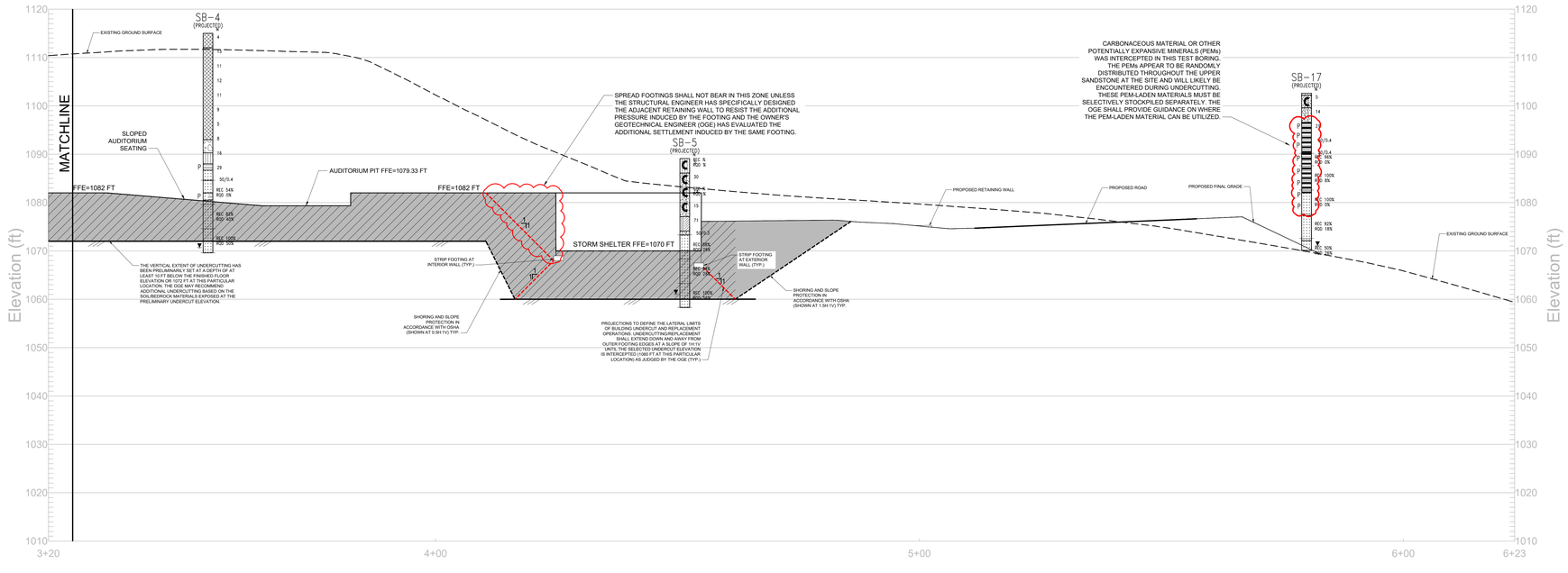
GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION & ENGINEERING REPORT - PART 1
FOUNDATION DESIGN & BUILDING PAD PREPARATION - PROPOSED QUAKER VALLEY HIGH SCHOOL BUILDING

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A





LEGEND

LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE

- WATER LEVEL AT END OF DRILLING
- WATER LEVEL DURING DRILLING
- WATER LEVEL AFTER 24 HR
- DENOTES COLLUVIAL SOIL
- GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK
- GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE

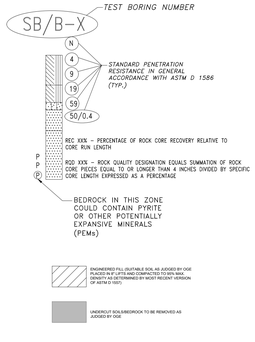


FIGURE 4 - CONCEPTUAL BUILDING UNDERCUT/REPLACEMENT AT CROSS-SECTION A-A

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	05/23/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.
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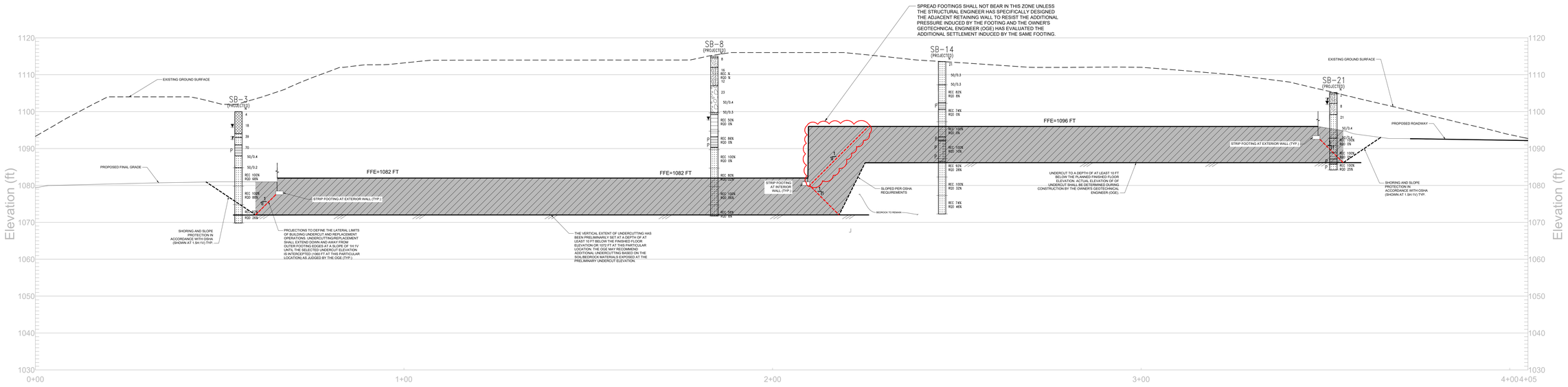


FIGURE 5 - CONCEPTUAL BUILDING UNDERCUT/REPLACEMENT AT CROSS-SECTION B-B

0 10 20 30

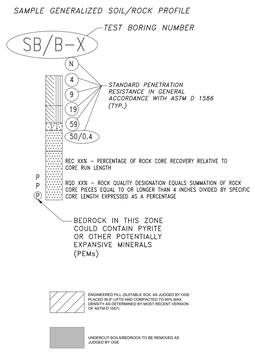
APPROX. HORZ. & VERT. SCALE: 1" = 10'

LEGEND

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- WATER LEVEL AFTER 24 HR
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- GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE



GARVIN BOWARD BEITKO	SCALE: AS NOTED	GARVIN BOWARD BEITKO ENGINEERING, INC. *BUILT ON REPUTATION*	180 BILMAR DRIVE, SUITE IV PITTSBURGH, PA 15205 PHONE: 412-922-4440
	DATE: 05/23/2024	GEOTECHNICAL EXPLORATION & ENGINEERING REPORT - PART 1 FOUNDATION DESIGN & BUILDING PAD PREPARATION - PROPOSED QUAKER VALLEY HIGH SCHOOL BUILDING	
	REVISED:		
	DRAWN BY: MAW		
	APPROVED BY: DAB	FOR: PHILLIPS & ASSOCIATES, INC.	GBBE PROJECT NUMBER: 16123A

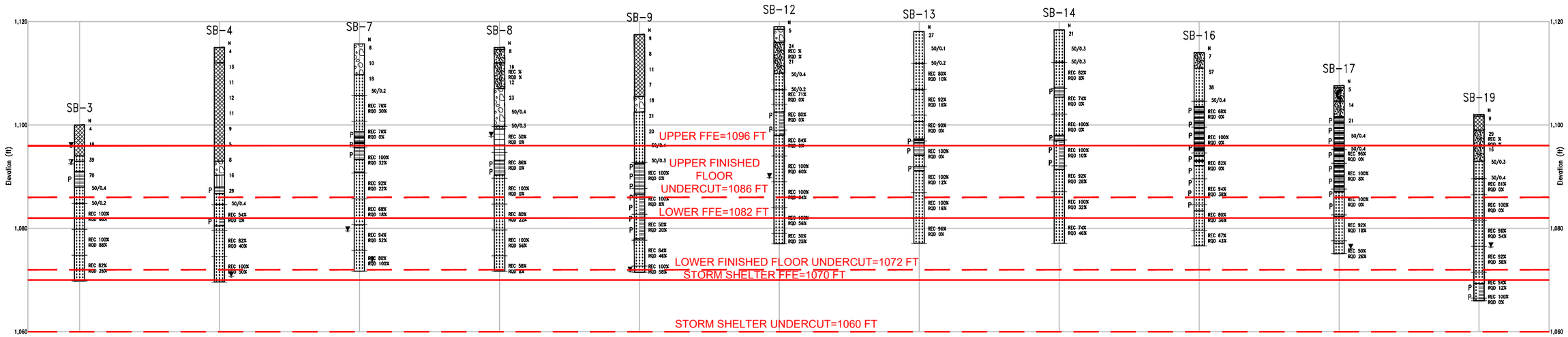


FIGURE 6 - GENERALIZED SUBSURFACE PROFILE - BUILDING AREA - SHOWING ZONES OF POTENTIALLY EXPANSIVE MINERALS (PEMs)

0 20 40 60

APPROX. VERT. SCALE: 1" = 20'

NOTES:
1. SOLID RED LINE INDICATES FINISHED FLOOR ELEVATION.
2. DASHED LINE INDICATES UNDERCUT ELEVATION.

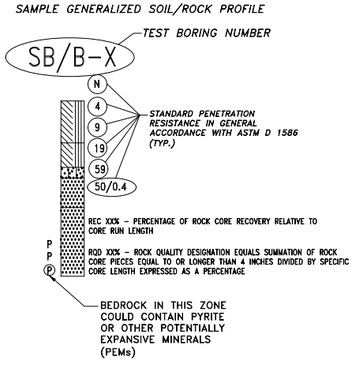
LEGEND

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SAMPLE GENERALIZED SOIL/ROCK PROFILE



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PROPOSED QUAKER VALLEY HIGH SCHOOL BUILDING

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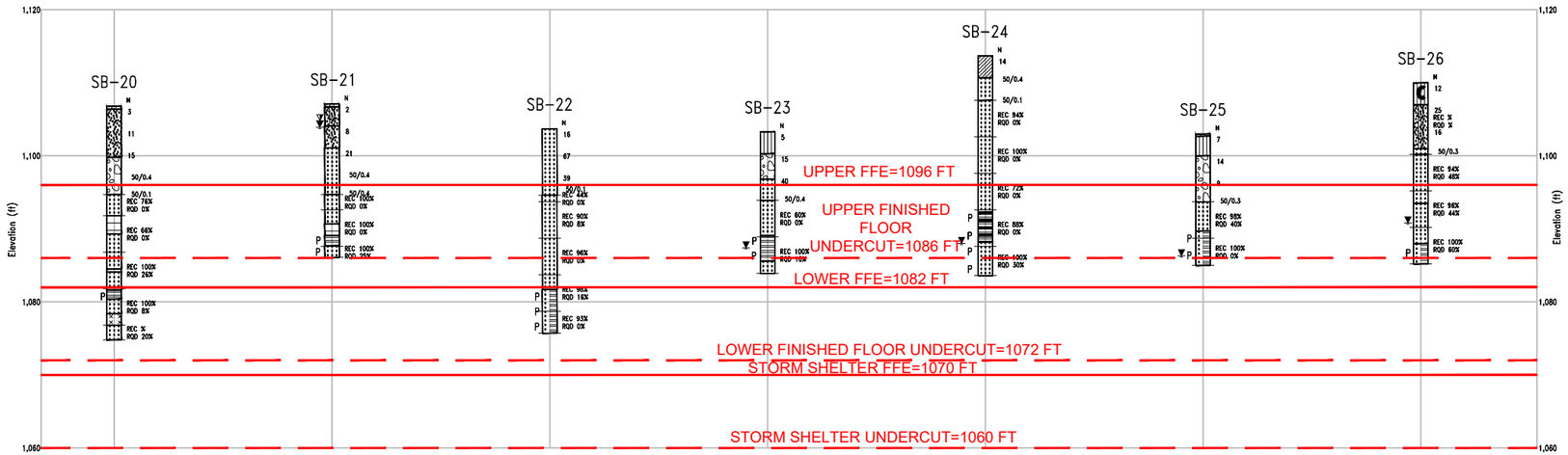


FIGURE 7 - GENERALIZED SUBSURFACE PROFILE - BUILDING AREA - SHOWING ZONES OF POTENTIALLY EXPANSIVE MINERALS (PEMs)

0 20 40 60

APPROX. VERT. SCALE: 1" = 20'

NOTES:
1. SOLID RED LINE INDICATES FINISHED FLOOR ELEVATION.
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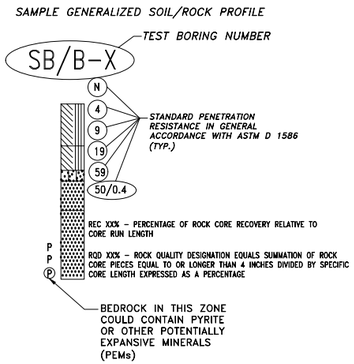
LEGEND

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SAMPLE GENERALIZED SOIL/ROCK PROFILE



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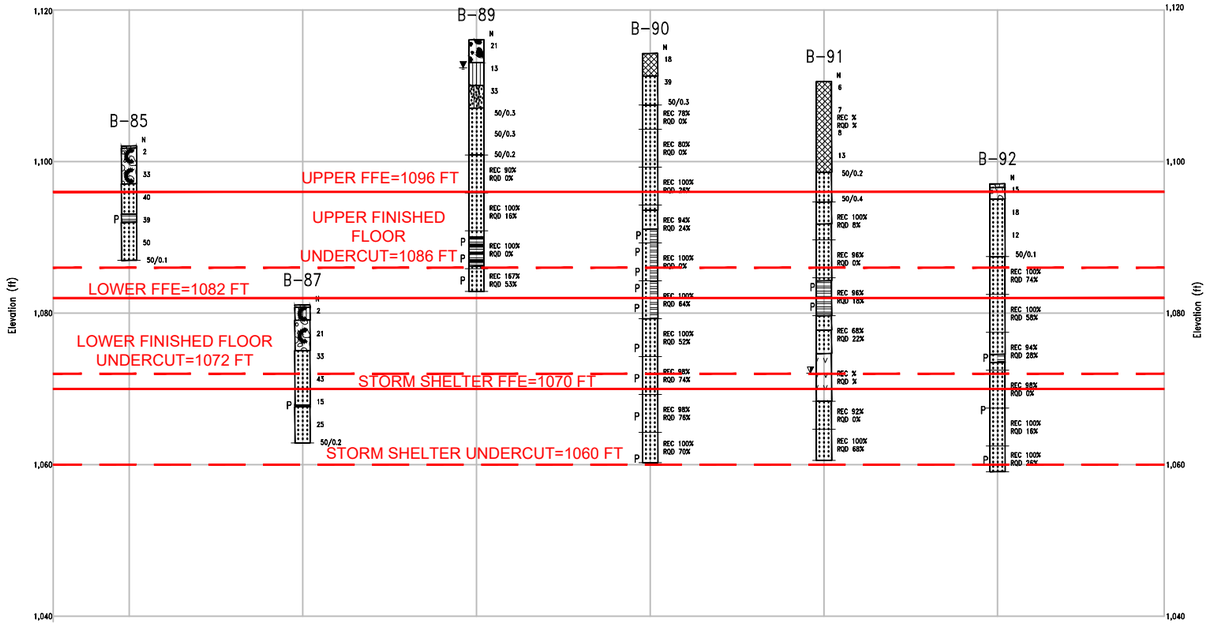


FIGURE 8 - GENERALIZED SUBSURFACE PROFILE - BUILDING AREA - SHOWING ZONES OF POTENTIALLY EXPANSIVE MINERALS (PEMs)

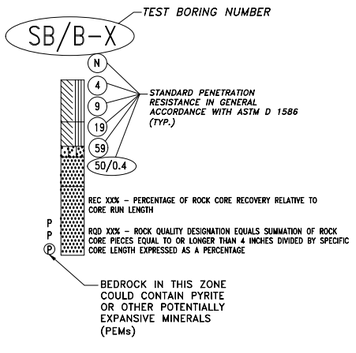
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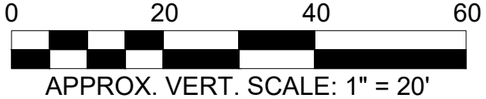
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SAMPLE GENERALIZED SOIL/ROCK PROFILE





APPROX. VERT. SCALE: 1" = 20'

NOTES:

1. SOLID RED LINE INDICATES FINISHED FLOOR ELEVATION.
2. DASHED LINE INDICATES UNDERCUT ELEVATION.

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PROPOSED QUAKER VALLEY HIGH SCHOOL BUILDING

GBBE PROJECT: 16123A

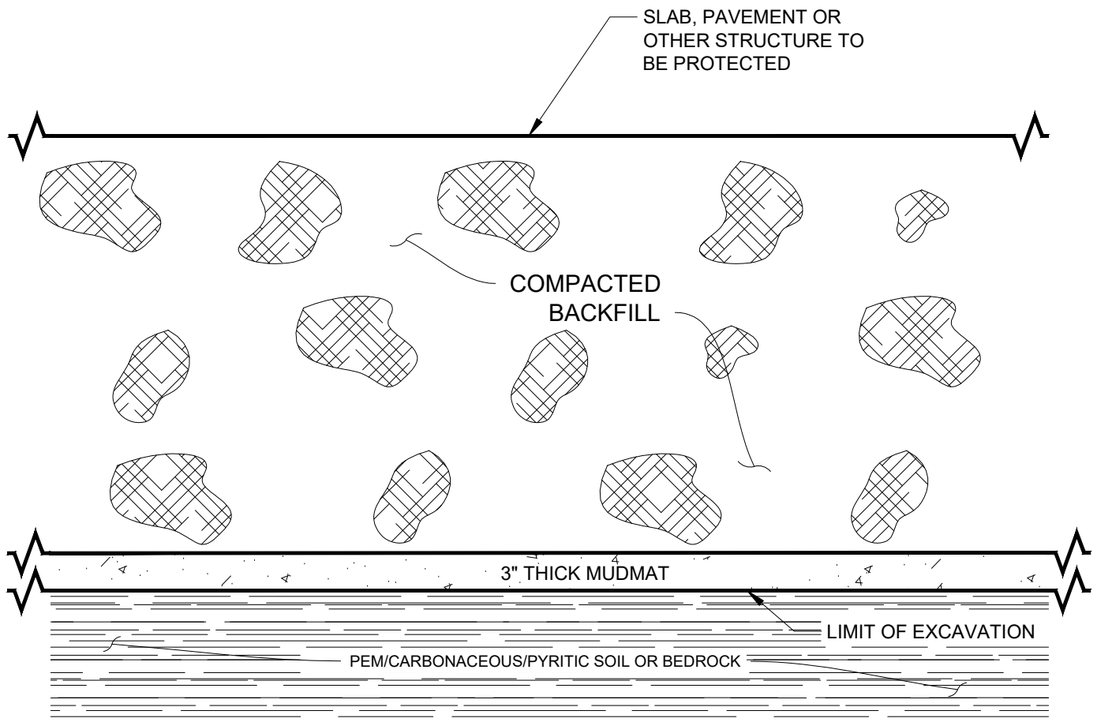
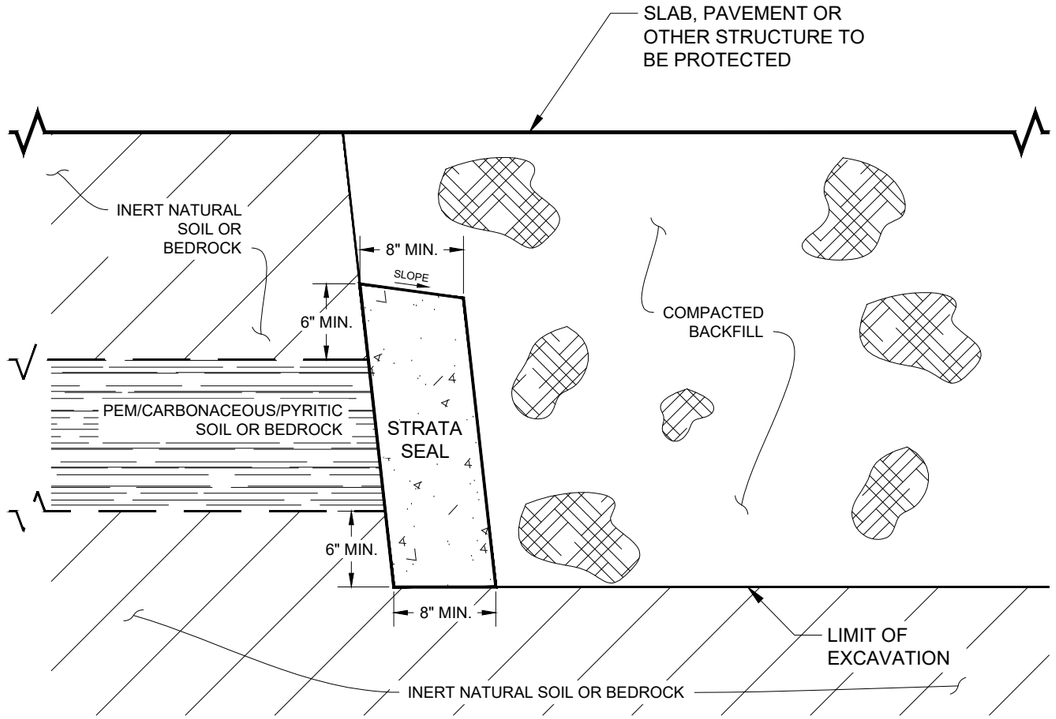


FIGURE 9 - TYPICAL CARBONACEOUS/PYRITIC/PEM STRATA SEAL WITH MUDMAT

(NOT TO SCALE)

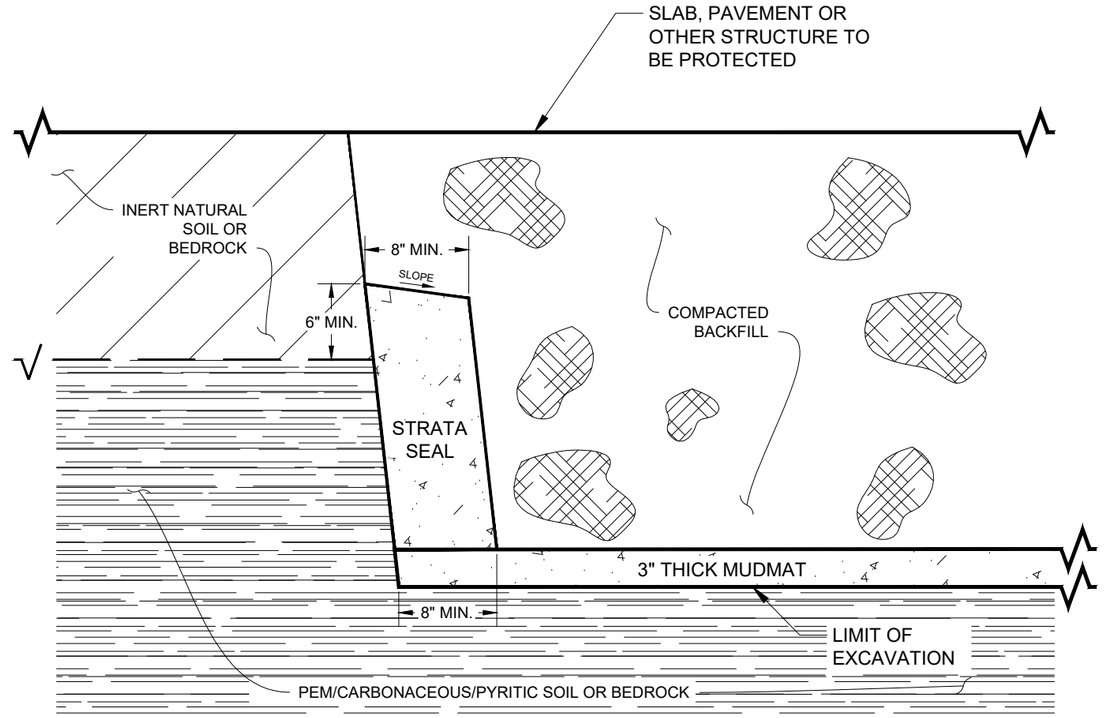
NOTES:

1. HORIZONTAL SURFACES EXPOSING PEM/PYRITIC/CARBONACEOUS MATERIAL SHOULD BE CUT TO A FLAT PLANE.
2. ALL LOOSE MATERIAL AND WATER MUST BE REMOVED AND THE SURFACES THOROUGHLY CLEANED WITH AIR COMPRESSORS AND/OR BROOMS PRIOR TO SEALING.
3. MUDMAT MUST CONSIST OF SULFATE-RESISTANT CONCRETE.
4. A MINIMUM OF 3 INCH THICK MUDMAT SHOULD BE INSTALLED ON ALL HORIZONTAL PEM/PYRITIC/CARBONACEOUS SURFACES.
5. PEM/PYRITIC/CARBONACEOUS STRATA MUST BE SEALED WITHIN 48 HOURS OF INITIAL EXPOSURE.
6. IF 48 HOUR EXPOSURE TIME LIMIT IS EXCEEDED, 8 IN. OF PEM/PYRITIC/CARBONACEOUS STRATA MUST BE REMOVED TO EXPOSE A "FRESH" FACE.



DETAIL "A"

(PEM/CARBONACEOUS/PYRITIC MATERIAL
EXPOSED ONLY IN VERTICAL SURFACES)



DETAIL "B"

(PEM/CARBONACEOUS/PYRITIC MATERIAL EXPOSED
IN VERTICAL & HORIZONTAL SURFACES)

NOTES:

1. HORIZONTAL SURFACES EXPOSING PEM/PYRITIC/CARBONACEOUS MATERIAL SHOULD BE CUT TO A FLAT PLANE.
2. ALL LOOSE MATERIAL AND WATER MUST BE REMOVED AND THE SURFACES THOROUGHLY CLEANED WITH AIR COMPRESSORS AND/OR BROOMS PRIOR TO SEALING.
3. STRATA SEAL AND MUDMAT MUST CONSIST OF SULFATE-RESISTANT CONCRETE.
4. STRATA SEAL MUST EXTEND A MINIMUM OF 6 INCHES ABOVE AND BELOW THE PEM/PYRITIC/CARBONACEOUS MATERIAL.
5. A MINIMUM OF 3 INCH THICK MUDMAT SHOULD BE INSTALLED ON ALL HORIZONTAL PEM/PYRITIC/CARBONACEOUS SURFACES.
6. PEM/PYRITIC/CARBONACEOUS STRATA MUST BE SEALED WITHIN 48 HOURS OF INITIAL EXPOSURE.
7. IF 48 HOUR EXPOSURE TIME LIMIT IS EXCEEDED, 8 IN. OF PEM/PYRITIC/CARBONACEOUS STRATA MUST BE REMOVED TO EXPOSE A "FRESH" FACE.

FIGURE 10 - TYPICAL PEM/CARBONACEOUS/PYRITIC STRATA EXCAVATION SIDEWALL SEALS

(NOT TO SCALE)

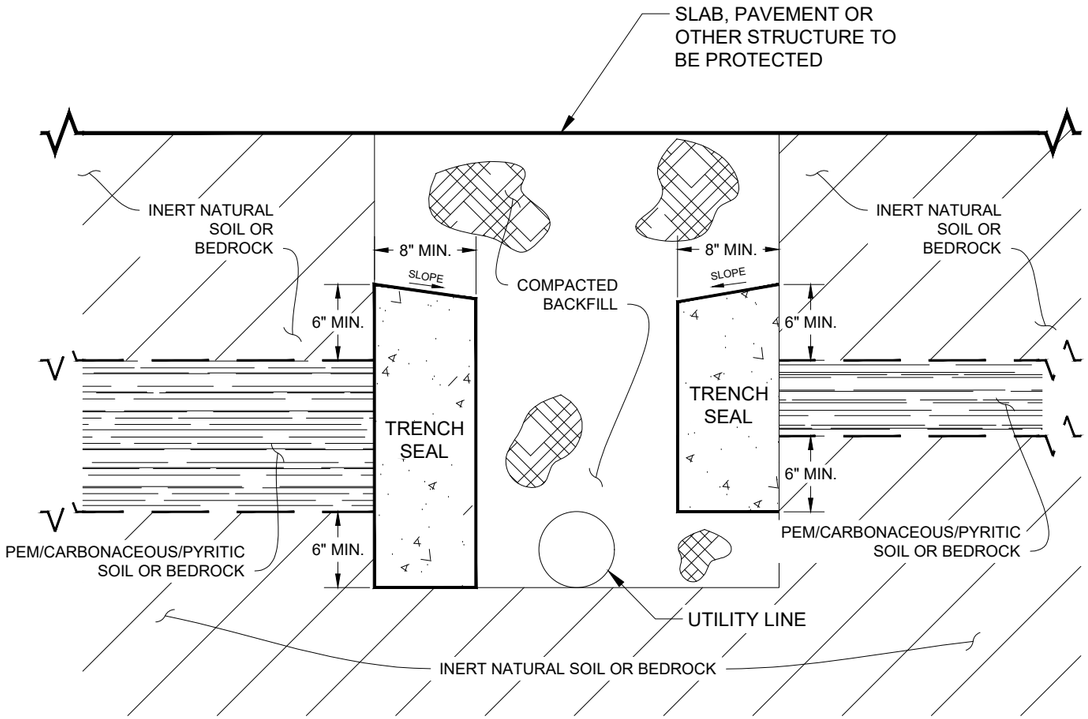
GARVIN BOWARD BEITKO

GARVIN BOWARD BEITKO ENGINEERING, INC.
PITTSBURGH, PA

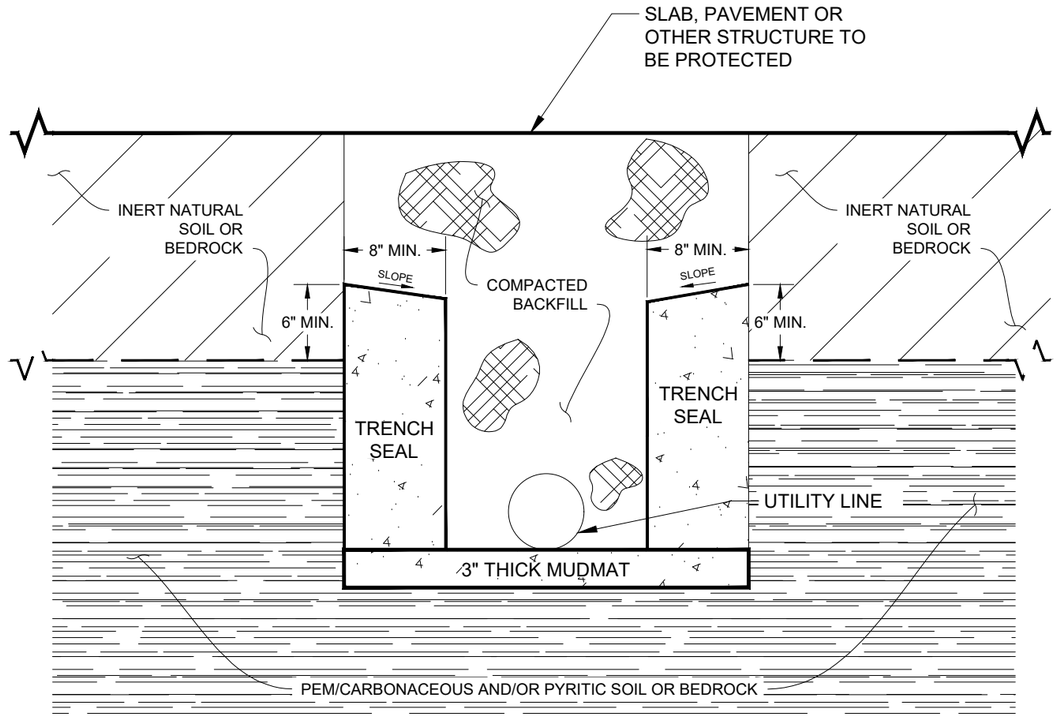
GEOTECHNICAL
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FOUNDATION DESIGN &
BUILDING PAD PREPARATION
PROPOSED QUAKER VALLEY
HIGH SCHOOL BUILDING

GBBE PROJECT: 16123A



DETAIL "A"
(PEM/CARBONACEOUS/PYRITIC MATERIAL
EXPOSED ONLY IN VERTICAL SURFACES)



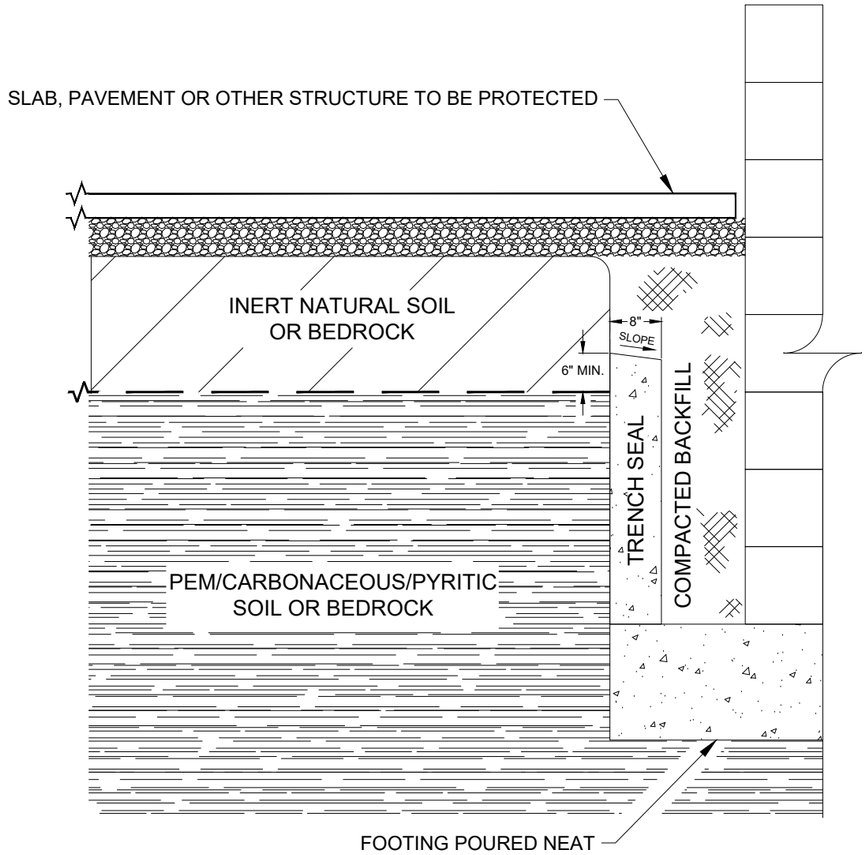
DETAIL "B"
(PEM/CARBONACEOUS/PYRITIC MATERIAL
EXPOSED IN VERTICAL & HORIZONTAL SURFACES)

NOTES:

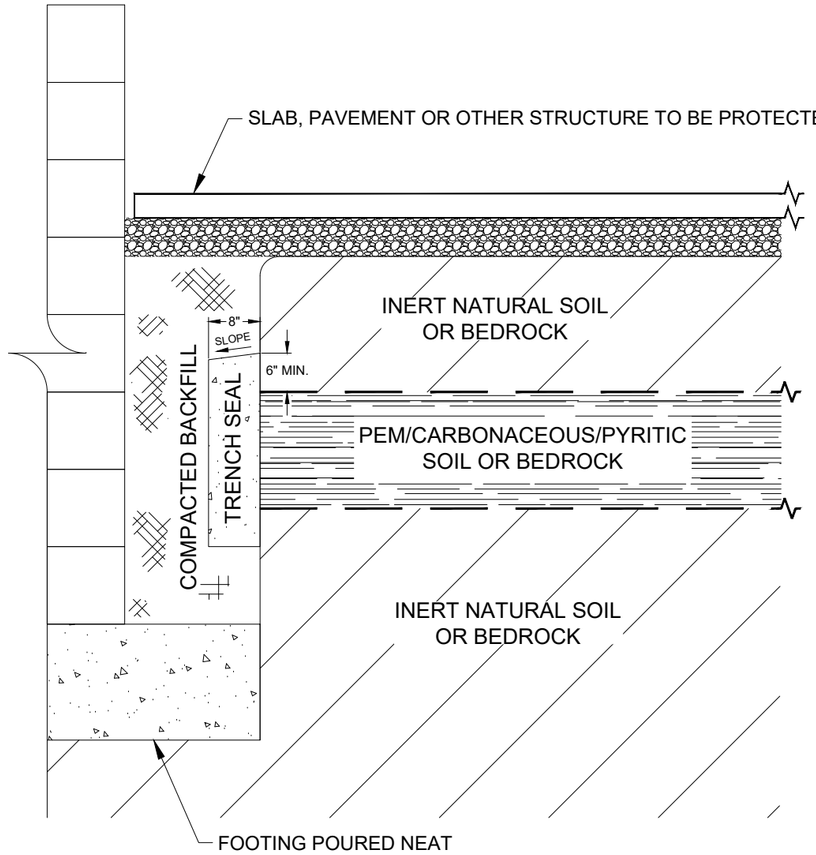
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2. ALL LOOSE MATERIAL AND WATER MUST BE REMOVED AND THE SURFACES THOROUGHLY CLEANED WITH AIR COMPRESSORS AND/OR BROOMS PRIOR TO SEALING.
3. TRENCH SEALS MUST CONSIST OF SULFATE-RESISTANT CONCRETE.
4. TRENCH SEAL MUST EXTEND A MINIMUM OF 6 INCHES ABOVE AND BELOW THE PEM/PYRITIC/CARBONACEOUS MATERIAL.
5. A MINIMUM OF 3 INCH THICK MUDMAT SHOULD BE INSTALLED ON ALL HORIZONTAL PEM/PYRITIC/CARBONACEOUS SURFACES.
6. AS AN ALTERNATIVE TO APPLYING CONCRETE SEALS AS SHOWN ON DETAIL "B", THE ENTIRE TRENCH COULD BE BACKFILLED WITH CONCRETE, IF PERMISSIBLE BY THE OWNER.
7. PEM/PYRITIC/CARBONACEOUS STRATA MUST BE SEALED WITHIN 48 HOURS OF INITIAL EXPOSURE.
8. IF 48 HOUR EXPOSURE TIME LIMIT IS EXCEEDED, 8 IN. OF PEM/PYRITIC/CARBONACEOUS STRATA MUST BE REMOVED TO EXPOSE A "FRESH" FACE.

FIGURE 11 - TYPICAL PEM/CARBONACEOUS/PYRITIC UTILITY TRENCH SEALS

(NOT TO SCALE)



DETAIL "A"



DETAIL "B"

NOTES:

1. HORIZONTAL SURFACES EXPOSING PEM/PYRITIC/CARBONACEOUS MATERIAL SHOULD BE CUT TO A FLAT PLANE.
2. ALL LOOSE MATERIAL AND WATER MUST BE REMOVED AND THE SURFACES THOROUGHLY CLEANED WITH AIR COMPRESSORS AND/OR BROOMS PRIOR TO PLACING CONCRETE FOOTING AND TRENCH SEAL.
3. STRATA SEAL AND MUDMAT MUST CONSIST OF SULFATE-RESISTANT CONCRETE.
4. STRATA SEAL MUST EXTEND A MINIMUM OF 6 INCHES ABOVE AND BELOW THE PEM/PYRITIC/CARBONACEOUS MATERIAL, IF APPLICABLE.
5. PEM/PYRITIC/CARBONACEOUS STRATA MUST BE SEALED WITHIN 48 HOURS OF INITIAL EXPOSURE.
6. IF 48 HOUR EXPOSURE TIME LIMIT IS EXCEEDED, 8 IN. OF PEM/PYRITIC/CARBONACEOUS STRATA MUST BE REMOVED TO EXPOSE A "FRESH" FACE.

FIGURE 12 - TYPICAL FOOTING TRENCH SEALS

(NOT TO SCALE)

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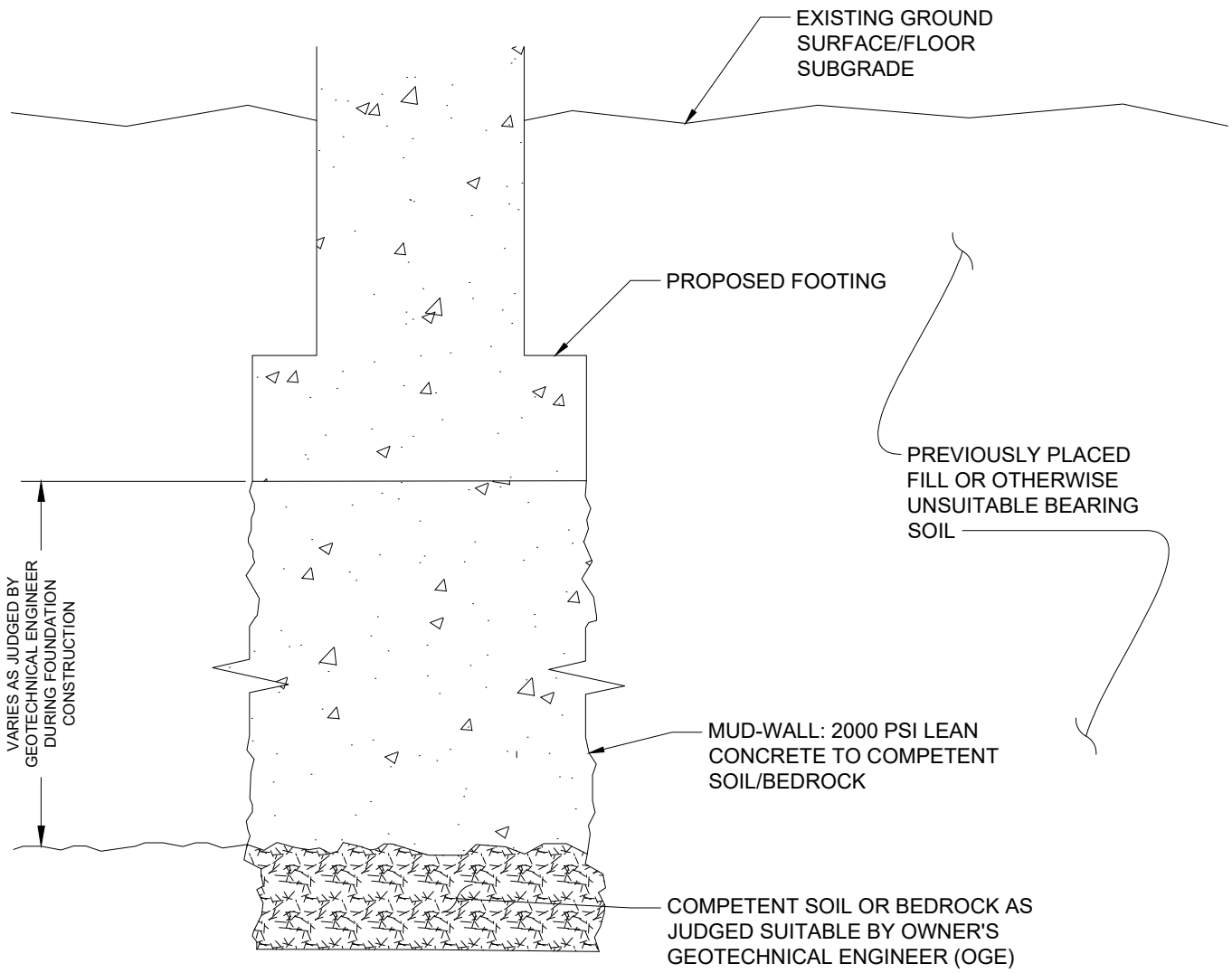


FIGURE 13 - TYPICAL MUD-WALL CONSTRUCTION DETAIL

(NOT TO SCALE)

GARVIN

BOWARD BEITKO

BUILT ON REPUTATION

CONSULTING GEOTECHNICAL, FORENSIC & ENVIRONMENTAL ENGINEERS

REVISED GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT II MASS GRADING EVALUATION

PROPOSED QUAKER VALLEY HIGH SCHOOL ALLEGHENY COUNTY, PENNSYLVANIA

For:

PHILLIPS & ASSOCIATES, INC.
122 MOSSIDE BOULEVARD
WALL, PENNSYLVANIA 15148

Garvin Boward Beitko Engineering, Inc.
180 Bilmar Drive
Suite IV
Pittsburgh, PA 15205

Phone: (412) 922-4440
Fax: (412) 922-3223

November 14, 2023
Revised March 8, 2024
GBBE 16123A

GARVIN
BOWARD BEITKO

BUILT ON REPUTATION

CONSULTING
GEOTECHNICAL / FORENSIC / ENVIRONMENTAL
ENGINEERS

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Mr. Geoff Phillips, P.E.
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1122 Mosside Boulevard
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Subject: Revised Geotechnical Exploration and Engineering Report – Part II
Mass Grading Recommendations
Proposed Quaker Valley High School Campus
Leet Township, Allegheny County, Pennsylvania
Garvin Boward Beitko Project 16123A

Dear Mr. Phillips:

We are pleased to present Part II of our revised geotechnical report outlining the subsurface exploration we completed for planned grading to facilitate the new high school (HS) campus. The Part I report, for support of the proposed school building, will be provided under separate cover as the building design progresses. This Part II report is provided in general accordance with our revised proposal, 16123A-2, dated June 7, 2023. This revised report includes a brief review of the project background, a description of our field procedures along with the subsurface conditions encountered, our evaluation, and our approach to managing those conditions with respect to the mass grading planned at this time. This revised report also includes our responses to some interim questions raised by Ackenheil Engineers, Inc. who is reviewing this report on behalf of Leet Township.

EXECUTIVE SUMMARY

We performed a geotechnical engineering exploration at the site to address mass grading requirements and provide foundation design parameters and building pad preparation recommendations to the design team. Our exploration revealed that:

- The presence of the Pittsburgh Redbed geologic unit at the site. Our engineering analysis of mass grading took this unit into account. We developed measures to maintain slope stability throughout the areas of proposed grading.

- While not specifically addressed in this report, the proposed building will be constructed atop the site ridge. The building will immediately overlie a competent sandstone layer that caps the ridgetop. As such, the new building can be safely supported on shallow spread footings bearing at normal frost protection depths. There will be a 10-ft deep undercut of sandstone bedrock and replacement with engineered fill beneath each section of the new school.

BACKGROUND INFORMATION

Project background information was provided by: Mr. John Orsini of BSHM Architects, Inc. (BSHM), the project architect; Mr. Geoff Phillips, PE, of Phillips & Associates (PHILLIPS), the site/civil engineer; and by Mr. Tyler J. McGrady, PE, of Barber & Hoffman, Inc. (B&H), the structural engineer. We understand that Quaker Valley School District (QVSD or District) retained BSHM to design a proposed school on the former Tull property. The Tull property along with some other adjacent properties have been combined to form the new QVSD HS campus.

The information outlined in this section reflects our understanding of the project and was instrumental in our evaluation. If our understanding is inaccurate, or if additional information becomes available, we should be given the opportunity to review our evaluation and recommendations in light of new or revised information.

Grading

Figure 2 - Field Exploration Plan West (FEP West) and Figure 3 - Field Exploration Plan East (FEP East) show grading that is currently planned at the site. As shown on FEP West, the upper entrance to the site is planned at its western end, at the top of the ridge, where that portion of the site abuts Camp Meeting Road. A second, topographically lower entrance will also be required along a lower stretch of Camp Meeting Road near elevation 855 FT (project datum). The second entrance road winds its way up, at an approximate 10% grade, to the building pad area near elevation 1075 FT and will require cut and fill slopes along the approximate 2,020-foot alignment. The fill slopes, both below and above the new roadway, have been preliminarily

designed at one horizontal to one vertical (1H:1V) with proposed fill slopes as high as 115 feet total, including both below and above the roadway level. These slopes will be designed as reinforced slopes with basket facing and layered geosynthetic reinforcement extending back from the basket facing into the slope.

As shown on FEP West, grading will be required along Camp Meeting Road, as well, which will be affected by County requirements that are not available at this time. Nonetheless, we anticipate that the geotechnical engineering requirements to provide for stable slope construction at that area should be similar to our analysis and recommendations in general for the project.

As shown on FEP East, there are several smaller fill slopes that will be required in the eastern portions of the site. Some of these slopes will be designed as 1H:1V fill slopes; however, these slopes will bear on the decomposed sandstone/sandstone unit capping the east-west-aligned ridge.

As also shown on FEP West, two stormwater management ponds are currently planned in the lower reaches of the site. The grading shown is somewhat conceptual as this grading may be affected by County requirements for roadway work.

Building

The new school building will have an approximate "footprint" as shown on the appended FEP East (Figure 3). As shown on that plan, the school building will include three floor levels, and each level will have at-grade access. The northern-most wing will have a finished floor elevation (FFE) of approximately 1096 FT (project datum). The southern-most wing will have a FFE of approximately 1082 FT. The attached storm shelter, generally located at the eastern edge of the southern wing, will have a FFE on the order of 1070 FT.

The structure will be framed with load bearing masonry and steel columns. We understand that wall and column loads will not exceed 16 kips per linear foot and 250 kips, respectively. An internal retaining wall is required between the upper and lower building floor levels, and another internal retaining wall between the main lower level and the storm shelter level. External retaining walls are strategically planned around the exterior of the proposed school to facilitate the necessary grade changes in the courtyard and pavement areas.

PURPOSE AND SCOPE OF EXPLORATION

Our geotechnical exploration characterized general soil and bedrock conditions within the planned construction area. With that data, we evaluated the currently planned mass site grading. Test Boring Services, Inc. (TBS), drilled 136 test borings at locations we suggested throughout the planned campus and improvement areas to facilitate our evaluation.

We prepared Test Boring Records (TBRs) based on visual classification of the samples, the driller's field logs, and some laboratory testing. We then evaluated the results of the field testing using generally accepted empirical relationships pertaining to soil strength/compressibility characteristics. It is anticipated that some on-going lab test program may allow the use of higher shear strength values during final design but should not affect the overall direction of the design process. Field testing was completed in general accordance with applicable standards. The assessment of site environmental conditions for the presence of recognized environmental conditions in the soil, rock, and groundwater was beyond our scope of services for this project.

SITE CONDITIONS

A geologist or engineer from our office visited the site to observe test boring operations and document surface conditions that could affect our evaluation and recommendations. The appended Figure 1 - Site Location Plan, shows the approximate site location, as well as the approximate property limits. The site encompasses approximately 159 acres. A brief review of the United States Geological Survey (USGS) Ambridge, PA, Quadrangle topographic map reveals the ground surface elevation in the project area is on the order of 1122 to 760 feet above Mean Sea Level. This interval generally coincides with the elevation intervals shown on appended Figures 2 and 3, which are based on surveys by the project team. Hence, the project datum appears to coincide with USGS datum.

As previously mentioned, the proposed high school campus site occupies a generally east-west-aligned ridge with moderately steep to gentle slopes that span the border between Leet Township, Leetsdale Borough, and Edgeworth Borough. Camp Meeting Road borders the property on the west. The proposed school building will be located at the top of the ridge. Appended Figures 2 and 3 – Field Exploration Plans West and East, respectively, show more detail across the site. The site is mostly flat-lying along the ridge top with gentle slopes on the north and south side of the ridge, with a partially paved roadway and two unoccupied houses. The ridge and the slopes are heavily wooded, except for the area near the easternmost abandoned house in the vicinity of the proposed school, where there exists a large clearing. A proposed access road will traverse the wooded, moderately steep slopes to the south of the ridge.

GEOLOGIC SETTING

Available published references indicate that the proposed school campus site lies within the Allegheny Plateaus Physiographic Province. The bedrock at the site is within the Lower Casselman to Upper Glenshaw Formations in the Conemaugh Group of the Pennsylvanian System. The rock strata in these formations include thick sandstone and claystone units and thin shale and limestone units, most of which were encountered during drilling. The site lies on the eastern flank of the north-south trending Crows Run Anticline. The bedrock dips gently at 10 feet/mile toward the southeast. As shown on appended Figure 4 – Landslide Map, the Ames Limestone daylights below the ridgetop. The Ames was not encountered during this most recent phase of drilling, because the borings were either terminated before the Ames was reached, or started below the elevation of the Ames. However, the Ames Limestone was encountered in multiple test borings during earlier phases of drilling. The Ames Limestone is a well-known marker bed that typically defines the top of the Pittsburgh Redbeds, a well-known claystone unit that must be addressed to provide for stable slope conditions. Of course, our engineering analysis addressed it. It appears that this redbed unit will likely have the most effect in the western half of the site where the lower access road is proposed. This map also shows the historical landslide activity at this site. In many borings that were drilled in the vicinity of the proposed lower access road, colluvial deposits were encountered. Colluvial deposits are derived from soil and decomposed rock that migrated downslope due to gravity. The colluvium encountered during drilling ranged in thickness from 6 feet to 54 feet. Our geotechnical engineering analysis accounted for the colluvium, as needed to provide for stable proposed grading.

MINING CONDITIONS

According to "Coal Resources of Allegheny County," Clifford Dodge, 1985, the Pittsburgh Coal is eroded at this site. The next mineable coal seam, the Upper Freeport, lies at an elevation of approximately 690 feet above MSL. According to the published information, The Upper Freeport Coal is not mined beneath the site, so, therefore, it is probably not of economically mineable thickness in the vicinity.

SUBSURFACE CONDITIONS

Procedures

Over time, and under the direction of GBBE, TBS drilled 136 test borings in the proposed construction areas to delineate general subsurface soil, rock, and groundwater conditions at the

site. Additional test borings are planned and will be drilled upon approval from the County. The test boring locations/surface elevations were surveyed by PHILLIPS and are shown on Figures 2 and 3, Field Exploration Plans West and East, respectively, in the Appendix. Additional test borings will be drilled along and below County-owned Camp Meeting Road after the County provides guidance and input relative to their roadway.

The test borings were drilled in general accordance with the procedures outlined in American Society of Testing Materials (ASTM) Test Designation D 420. Standard Penetration Tests (SPTs) were performed at three-foot vertical intervals in the soil mantle in general accordance with the procedures outlined in ASTM D 1586. When properly interpreted, the SPT resistances provide an indication of the in-place consistency of cohesive soil or the relative density of predominately granular soil. They also provide soil samples for laboratory evaluation.

The subsurface conditions encountered are summarized on the test boring records in the Appendix. The test boring records represent our interpretation of subsurface conditions at the time of drilling based on the driller's field logs and visual classification of the field samples by an engineer or geologist in general accordance with ASTM D 2488. In some cases, the classification was supplemented by limited laboratory testing. The lines designating the interfaces between various strata on the test boring records represent the approximate interface locations; the actual transitions between strata may be gradual. Groundwater levels shown on the test boring records represent the conditions only at the time of our exploration.

Soil Conditions

The test boring records should be reviewed for specific soil and bedrock conditions across the site. In general, and where not affected by previous grading activity, the ridgetop is capped by a layer of competent sandstone with a thin layer of residual sandy soil that has weathered from its parent sandstone. The sandstone layer extends to around elevation 1043 FT at the west end of the site, and to as low as elevation 1032 FT at its eastern limit. The upper sandstone is underlain by an unnamed redbed unit, the Ames Limestone, and the Pittsburgh Redbed unit that appears to extend as low as elevation 950 FT at the west end of the site, and as low as elevation 935 FT at the east end of the site. The approximate top and bottom elevations of the redbed units are shown on the two Field Exploration Plans as a pink shaded band. The bedrock below the redbed unit consisted of cyclic sequences of sandstone, siltstone, claystone, and shale to the lowest termination elevations across the site. We also encountered pockets of colluvium in many test borings, generally located at or below the elevation of the redbed unit. The colluvium thicknesses are plotted directly on the two Field Exploration Plans in the Appendix. In general,

the soil and bedrock conditions indicated by the test borings appear consistent with those predicted by published references.

Groundwater Conditions

The borings did not intercept the groundwater table (as defined by 100 percent saturation below the phreatic surface). However, the borings did intercept wet zones that are likely the result of perched water. In addition, there may be other pockets of perched water (not intercepted by the borings) within fill zones, and atop less permeable soil/bedrock layers. Such perched water could be encountered during construction operations. It should be understood that groundwater levels can vary with seasonal and climatic changes, variations in surface runoff patterns, and construction activity. Potential groundwater below the bedrock surface could not be clearly delineated as the drill water used for rock coring operations obscured groundwater below the bedrock surface.

GEOTECHICAL ENGINEERING EVALUATION

The Leet Township Subdivision and Land Development Ordinance (SALDO) indicates that a professional engineer shall determine whether or not proposed slopes, that exceed a slope severity of 2H:1V, will result in injury to persons or damage to adjacent property OR document that all such slopes are protected by a retaining wall or walls designed to support the face of the slope. The reinforced slopes planned on this project are actually considered mass-gravity retaining walls, with a sloped face, in the geotechnical and retaining wall design professions. It is questionable whether the SALDO actually has any jurisdiction over these mass-gravity retaining walls, other than those mass-gravity retaining walls on this project must be designed by a professional engineer. However, and in any case, as professional engineers, we are bound to protect the health, welfare, and safety of the public above all else, and that is inherent to our design work. The design work related to slopes, walls, and combinations of the two will be completed in accordance with the generally-accepted geotechnical engineering standard of care in this area, including the appropriate factors of safety for each geotechnically salient aspect of the design. Our engineering analysis shows stable and safe mass-gravity-retaining walls/slopes relative to the standard of care established in the profession, assuming that the proposed retaining walls and slopes are constructed in accordance with our stamped drawings, reports, etc. The retaining walls and slopes will be designed to be safe in accordance with the standard of care.

REINFORCED SLOPES ALONG LOWER ENTRANCE ROADWAY

Based on our engineering evaluation, it appears that the reinforced slopes shown on the current grading plan can be constructed with factors of safety (FS) consistent with the normal standard of care for designing such slopes. Our evaluation of the reinforced slopes was completed using MiraSlope Pro. Our evaluation assumes that all colluvial deposits found in areas beneath planned fill embankments are removed to the extent necessary to promote long term stability. This will essentially require removing unstable soil deposits down to competent bedrock. The analyses shown is not necessarily the most efficient design, and assumes relatively conservative shear strength values for each of the respective layers. Additional laboratory testing may justify adjustments to the relatively conservative shear strength values. We will issue an addendum to this report if that turns out to be the case.

Reinforced Slope Near Section B-B

We selected the highest planned reinforced slope and evaluated that slope with respect to the deep colluvial deposits currently at the planned toe of that slope at Section B-B, the location of which is shown on FEP West. As shown on Figure 5, the test borings in the vicinity of B-B indicate that potential old landslide deposits (colluvium and noted with "C" on the stick logs) approach 34 feet thick in that area. Calculations indicate that if all of that colluvium is removed, and the new reinforced slope is founded on bedrock below the colluvial deposit, and reinforced with geosynthetics, the new slope will have a 1.7 global factor of safety (FS) with respect to rotational failure, and a FS of 1.5 with respect to translational failure. The analyses shown is not necessarily the most efficient design, and assumes relatively conservative shear strength values for each of the respective layers. The pending laboratory testing may indicate that higher shear strength values may be allowable, which may allow for more cost-effective design and construction. Where the redbed-type claystone is exposed during benching, the weathering of the redbed layer upon exposure should be monitored and addressed as outlined in the following paragraph. We appended the output of the design program for the new reinforced slope near B-B.

Reinforced Slope Near Section Q-Q

We also selected a section of reinforced slope near Section Q-Q. While this section is not as high as B-B, it appears to be the highest section of the reinforced slope that will require founding directly on the redbed claystone and, as such, appears to be another critical location. As shown on Figure 7, the test borings in the vicinity of Q-Q, potential old landslide deposits (colluvium and noted with "C" on the stick logs) approach 21 feet thick in that area. Calculations indicate that if all of that colluvium is removed, and the new reinforced slope is founded directly on the

intact claystone bedrock below the colluvial deposit, and reinforced with geosynthetics, the new slope will have a FS of at least 1.5 for both global and translational failure. In addition to the excavation of intact claystone implied on Figures 7 and 8, the redbed-type claystone at this site tends to weather very quickly upon exposure. As such, the timeframe between initial exposure and covering the layer should be limited as much as practical. This judgement will be left to the geotechnical engineer during construction who will evaluate the newly exposed bedrock just prior to construction of the new reinforced slope. If the newly exposed bedrock degrades too quickly, additional undercutting will be required. Our experience indicates that degradation can occur as quickly as a day assuming wet weather, and up to a few days assuming dry weather. We also appended the output of the design program for the reinforced slope near Q-Q.

Reinforced Slope Near Section R-R

Based on our preliminary discussions with Ackenheil Engineers, Inc. (geotechnical consultant reviewing on behalf of Leet Township), we selected the highest planned reinforced slope and evaluated that slope with respect to the deep colluvial deposits currently at the planned toe of that slope at Section R-R, the location of which is shown on FEP West. As shown on Figure 10, the test borings in the vicinity of R-R indicate that potential old landslide deposits (colluvium and noted with "C" on the stick logs) approach 35 feet thick in that area. Calculations indicate that if all of that colluvium is removed, and the new reinforced slope is founded on bedrock below the colluvial deposit, and reinforced with geosynthetics, the new slope will have a 1.6 global factor of safety (FS) with respect to rotational failure, and a FS of about 1.5 with respect to translational failure. Where the redbed-type claystone is exposed during benching, the weathering of the redbed layer upon exposure should be monitored and addressed as outlined in the later in this report. We appended the output of the design program for the new reinforced slope near R-R.

Cut Slope Near Section G-G

Current plans indicate that the lower entrance roadway will require cutting of soils that support nearby Camp Meeting Road. We cannot perform test borings on Camp Meeting Road until the County approves our drilling plan and approach, but our review of conditions indicate that the lower entrance roadway will require a cut into old landslide deposits. It is likely that some type of stabilization of the new face will be required. Based on our experience, it appears that some combination of soil nailing and a reinforced face will be required. The final facing may consist of high strength steel mesh intended for use on slope faces, or possibly reinforced shotcrete. These systems are typically completed as a design-build specialty. In addition to the cut in colluvium discussed here, there may be other cuts in colluvium that may need to be addressed

similarly once the County provides insight relative to the roadway improvements, as these comments may drive changes that affect the stormwater pond design.

Grading Plan Yields a Higher Factor of Safety Than Current Conditions

We analyzed current slope conditions near Cross-Section B-B and Cross-Section Q-Q using the typical approach and standard of care for such geotechnical engineering evaluations. The approach is based on the premise that gravity is the driving force constantly pulling down on a given soil/rock slope. The gravitational forces are resisted by the internal shear strength of the soil. That internal shear strength is broken into two parts for engineering analyses. The first is the angle of internal friction, which describes the interlocking action between soil or rock particles. The second shear strength factor is the cohesion or "stickiness" between soil particles. The slope stability factor of safety is determined by dividing the total sum of resisting forces by the driving forces imposed on a slope. Hence, when the resisting forces, which resist slope failure, are twice as great as the driving forces, tending to cause slope failure, the slope FS is 2. It follows that if the resisting force was half of the driving force, the FS would be 0.5 and the slope would have already failed. When a slope begins to fail, the movement or failure continues until the soil particles adequately rearrange, and the slope flattens enough, so the resisting force equals the driving forces. Then the movement stops leaving a meta-stable or borderline stable state of equilibrium condition. The meta-stable condition obviously yields a FS of 1. So when old landslides, like we have here, are evaluated, the standard protocol is to assume a FS of 1 and then to back-calculate the actual shear strength parameters that yield a FS of 1. Of course, the shear strength parameters are sometimes adjusted based on soil laboratory testing.

In these two particular slope cross-section cases, the back-calculations reveal that the actual soil shear strengths must be greater than the shear strengths we assumed and used in our proposed slope design analyses. In fact, if our assumed values are plugged into the global stability analyses, the FS for each of the two current slope configurations would be on the order of 0.85, indicating that slope failure is currently in progress, which it is not. Thus, the strength parameters we assumed for preliminary design purposes were conservative, and yet, they still yield a final FS of at least 1.5 for slopes constructed in accordance with our engineering requirements.

REINFORCED SLOPES IN UPPER CAMPUS

The current site plan also calls for approximately five new 1H:1V mass-gravity walls/reinforced slopes in the upper campus area. These are identified on the Field Exploration Plans as S-S, T-T, U-U, V-V, and P-P. Based on the test borings, it appears that all but two of those slopes will be

constructed atop sandstone or decomposed sandstone and, as such, easily yield acceptable factors of safety for global stability. Two of those reinforced slopes, shown at Cross-Section P-P and Cross-Section S-S, may encroach slightly into the reddish-brown claystone below the sandstone layer. However, each of the slopes were evaluated for global stability revealing they each have a FS of at least 1.5 to meet the typical standard of care for such mass-gravity retaining walls/ slopes.

TEMPORARY STABILITY DURING BENCHING PROCESS

As shown on each of the cross-sections previously discussed, toe benching and intermediate benching will be required to remove colluvial deposits down to relatively sound bedrock/decomposed bedrock. The backside cuts required at each bench are shown at temporary slopes of 1H:1V. The benches in the shale/sandstone units below the Pittsburgh Redbeds and the benches in the sandstone above the Pittsburgh Redbeds should easily meet the standard of care for global stability on a temporary basis (FS 1.2 to 1.3). We calculated the FS in the redbed unit assuming a friction angle of 20 degrees and a cohesion of 250 psf which are easily supported on a temporary basis when exposure to weather is limited. If the contractor delays work due to weather or other factors and the exposed surface detrimentally weathers as judged by our field personnel, the contractor may be required to trim the backside of the bench to a less steep slope.

ENGINEERED FILL CONSTRUCTION

The recommendations outlined in this section are general in nature and should be incorporated into a specification type format attached to and made part of the grading plans for the project.

Stripping

All topsoil, rootballs, and any other organic matter should be stripped from areas that will receive engineered fill and stockpiled separately for future use in landscaped areas. All abandoned foundations, floor slabs, or other remnants of previous construction should also be removed from the construction footprint. Excavation should continue until all previously-placed fill or old landslide deposits have been removed from proposed fill areas. Excavation of toe benches (aka, keyways) and intermediate benches should also be excavated, as indicated by the Owner's Geotechnical Engineer (OGE), on the project documents and as adjusted in the field based on the conditions exposed during earthwork. The OGE should observe and document the need for undercutting for any of the aforementioned reasons. Although not shown on the conceptual cross-sections prepared for this report, all benches will require drainage systems with appropriate outlets to provide positive drainage.

Once natural undisturbed soils are exposed (after initial stripping and cutting to the bottom of old fill/landslide deposits), they should be thoroughly proofrolled with overlapping passes of a fully-loaded tandem-axle dump truck or approved equivalent. Proofrolling is performed to delineate soils that may not be suitable for engineered fill support. The proofrolling also identifies remnants of previous construction, pockets of previously placed fill, and abandoned utilities that may have been missed during initial stripping operations. Any "pumping," soft, wet, or otherwise unsuitable soils should be removed and replaced with engineered fill as described later in this report. Proofrolling should be performed after a suitable period of dry weather to avoid degrading a previously acceptable subgrade and should be observed and documented by the OGE or a field representative working under the direction of the OGE.

The actual amount of undercutting and replacement can only be determined by the geotechnical engineer during construction. As such, the construction contract should be set up to account for inherent variability. This can be accomplished by establishing a baseline amount of undercutting/replacement along with a unit rate to adjust accordingly for either more or less undercutting/replacement.

Engineered Fill

The proofrolled and approved excavation subgrade can be backfilled to final subgrade elevations with engineered fill. Engineered fill is defined as a soil with adequate material properties that has been placed and compacted with engineering control such that the end-result properties of the in-place material are conducive to structural support. Extensive grading (cut areas as potential fill source) is planned for this project. Therefore, we anticipate that some suitable fill soil will be available on site. However, the test borings revealed pockets of soil that will not be suitable. Therefore, the contractor should selectively stockpile suitable cut soils at the site. It is possible that some mixing of suitable soil will be required. The geotechnical engineer should be afforded the opportunity to evaluate all proposed fill soils, whether obtained from on-site or off-site borrow sources.

<u>Fill Type for Reinforced Slopes/Gravity-Retaining Wall Systems</u>

All fill to be used within the reinforced zone of the mass-gravity walls/reinforced slopes should consist of sand or sand/sandstone mixtures with a maximum particle size of 3 inches and with less than 10 percent silt or clay content. This material should be available along the ridgetop based on the cutting needed to reach final grades. It is likely that some preparation of the cut material will be required in some areas. This will probably include crushing of larger sandstone

fragments until all such fragments are less than 3 inches in the largest dimension, and washing until less than 10 percent of fines (percent passing the U.S. No. 200 sieve size) is contained in the reinforced slope fill mixture.

Fill Type Beneath Building, Pavement or in Retained Zone of Reinforced Slopes

In general, engineered fill material for these purposes should consist of inorganic, low-plasticity soil with a liquid limit (LL) less than 30 and a plasticity index (PI) of less than 10. Engineered fill material should be free of mud, frozen materials, trash, topsoil, carbonaceous materials, pyritic/marcasitic minerals, organic matter, slag, "red-dog," other deleterious material, and rock fragments larger than three inches in diameter. Inert (non-pyritic/marcasitic) decomposed shale and sandstone are commonly used as engineered fill in this area. If the contractor elects to utilize this type of material, it is likely that some effort will be required to break down the rock fragments into a well-graded mixture suitable for re-use. We anticipate that the contractor will have to spread such material in thin layers and pulverize it with large, track-mounted equipment, sheep-foot rollers, and large vibratory compactors.

General Fill Procedures

Before filling operations begin, representative samples of each proposed fill material should be collected and submitted to the geotechnical engineer for his review. The geotechnical engineer will require that laboratory testing be completed by an approved testing laboratory prior to final approval. The laboratory testing will include laboratory compaction tests (ASTM D 1557) or relative density tests (ASTM D 4253 and D 4254) as appropriate, and tests to determine the gradation and plasticity of the soil. These tests are needed for quality control during compaction operation and to determine if the fill material is acceptable.

Frozen soils should not be used for engineered fill. The owners and contractors/subcontractors of this project are cautioned to recognize that some local soils may be difficult to compact during prolonged periods of cold or wet weather. It may be necessary to import granular fill if the construction schedule mandates earthwork during inclement weather.

We generally recommend that engineered fill be constructed by spreading acceptable soil in loose layers not more than eight inches thick. However, some of the engineered fill on this project will be constructed in small, confined utility trenches where large compaction equipment cannot be used. As such, it may be necessary to limit the loose layer thickness to four to six inches to achieve the recommended degree of compaction. All fill beneath future buildings or parking areas should be compacted to at least 95 percent of its maximum dry density as

determined by the modified Proctor test (ASTM D 1557) and within three percent (±3%) of its optimum water content. This may require that the contractor dry the soils during periods of wet weather, or wet the soils during hot summer months. Laboratory compaction testing (Proctor) is not applicable to some types/gradations of granular fill material (crushed limestone meeting AASHTO No. 57 gradation, etc.). These material types should be compacted to at least 70 percent of relative density as determined in accordance with ASTM D 4253 and D 4254.

The fill surface should be adequately maintained during construction in order to achieve an acceptable engineered fill. Areas on which fill is to be placed should by scarified prior to fill placement. We recommend that the fill surface be sloped to achieve adequate drainage and to prevent water from ponding on the fill. If precipitation is expected, engineered fill construction should be temporarily halted and the surface should be rolled with rubber-tired or steel-drummed equipment to improve surface run-off. If the surface soils become excessively wet or frozen, they should be removed prior to additional fill placement.

Fill construction should be observed and tested by a geotechnical engineer or a field representative working under the direction of a geotechnical engineer. The geotechnical engineer should observe and document the contractor's procedures, and should perform periodic field density tests. At least one field density test should be performed for every 2000 square feet (or fraction thereof) of area in each lift of fill. Tests should be completed every 50 feet (or fraction thereof) and in each lift of fill when backfilling narrow trenches or behind retaining walls. Significant deviations, either from the specifications or good practice, should be brought to the attention of the owner.

EXCAVATION CONSIDERATIONS

This project will require excavations to lower the ridge top and to construct the building. In addition, excavations will be required to remove colluvial deposits from beneath the new fill embankments that will support the proposed access roadway. Bulldozers, equipped with rippers, track-hoes equipped with hoe-rams/jackhammers, or blasting could be considered to remove the upper reaches of the hard sandstone capping the ridgetop. It is also likely that some processing will be required to break down the rock fragments excavated at the ridgetop into a usable fill material. Other than the hard sandstone, the majority of the soils and upper bedrock encountered in the borings should be readily excavatable by traditional means, such as backhoes and trackhoes. Some harder seams, and relatively confined excavations (i.e., utility trenches in bedrock), may require hoe-ramming or jack-hammering. All temporary excavations should be designed and protected in accordance with Occupational Safety and Health Administration (OSHA) standards. The soils at this site should generally be considered OSHA Type C.

However, in some excavations, particularly in colluvial deposits it will likely be necessary to slope excavation sides at relatively shallow 4H:1V slopes, or to shore the excavations and to coordinate removal activities to reduce the likelihood of inducing slope movement. The contractor typically assumes responsibility for excavation protection. These areas should be identified on the construction documents.

GROUNDWATER CONSIDERATIONS

Groundwater control does not appear to be a major issue for this project; however, some perched groundwater will likely be encountered. The contractor should be prepared to protect exposed soils from surface runoff, water tables, perched water, or other sources of water. Dewatering system design and installation is typically the responsibility of the general contractor. However, if dewatering is needed, it can sometimes be accomplished by trenching around the construction area and pumping groundwater from sump pits.

BASIS FOR EVALUATION AND FIELD DOCUMENTATION

This report has been prepared using field and laboratory techniques and analysis methods conforming to commonly accepted geotechnical engineering practices. All recommendations and/or conclusions herein pertain only to this specific project and should not be used or interpreted by others for modifications to this project, or for other projects or sites. Even within the project context, subsurface conditions depicted herein are representative only at the boring locations; actual conditions between/beyond the borings will vary. Due in part to such variability in subsurface conditions, the implementation of recommended measures must be inspected by qualified personnel under the direction of a professional (licensed) geotechnical engineer to confirm that the subsurface conditions encountered during construction are consistent with the test borings and our engineering analysis, and verify that the subgrades and all other geo-materials used are behaving as anticipated. Some conditions or material/subgrade behavior and/or performance may require modifications to our recommendations, which can typically only be determined “on-the-spot” by one of our engineers. Garvin Boward Beitko Engineering, Inc., intends to be the geotechnical engineer of record on site; however, if QVSD hires another geotechnical engineer, that engineer will then assume responsibility and professional liability for the performance and/or suitability of any foundations, structures, slabs, slopes, appurtenances, or related project areas affected by geotechnical elements inspected by others. The selected construction-phase field evaluation/testing agency must take responsibility for proper selection, implementation, and performance of the project geotechnical recommendations implemented on the site.

CLOSURE

We enjoyed assisting you on this project and trust this report will satisfy your immediate needs. If you have any questions or comments concerning this report, please feel free to contact us.

Sincerely,

GARVIN BOWARD BEITKO ENGINEERING, INC.

Miles A. Walker, E.I.T.
Engineering Associate

Douglas A. Beitko, P.E.
Principal Engineer

Joseph F. Boward, P.E.
Principal Engineer

DAB:JFB:MAW/db

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
Professional
Douglas A. Beitko
ENGINEER
050545-E

7/12/24

APPENDIX

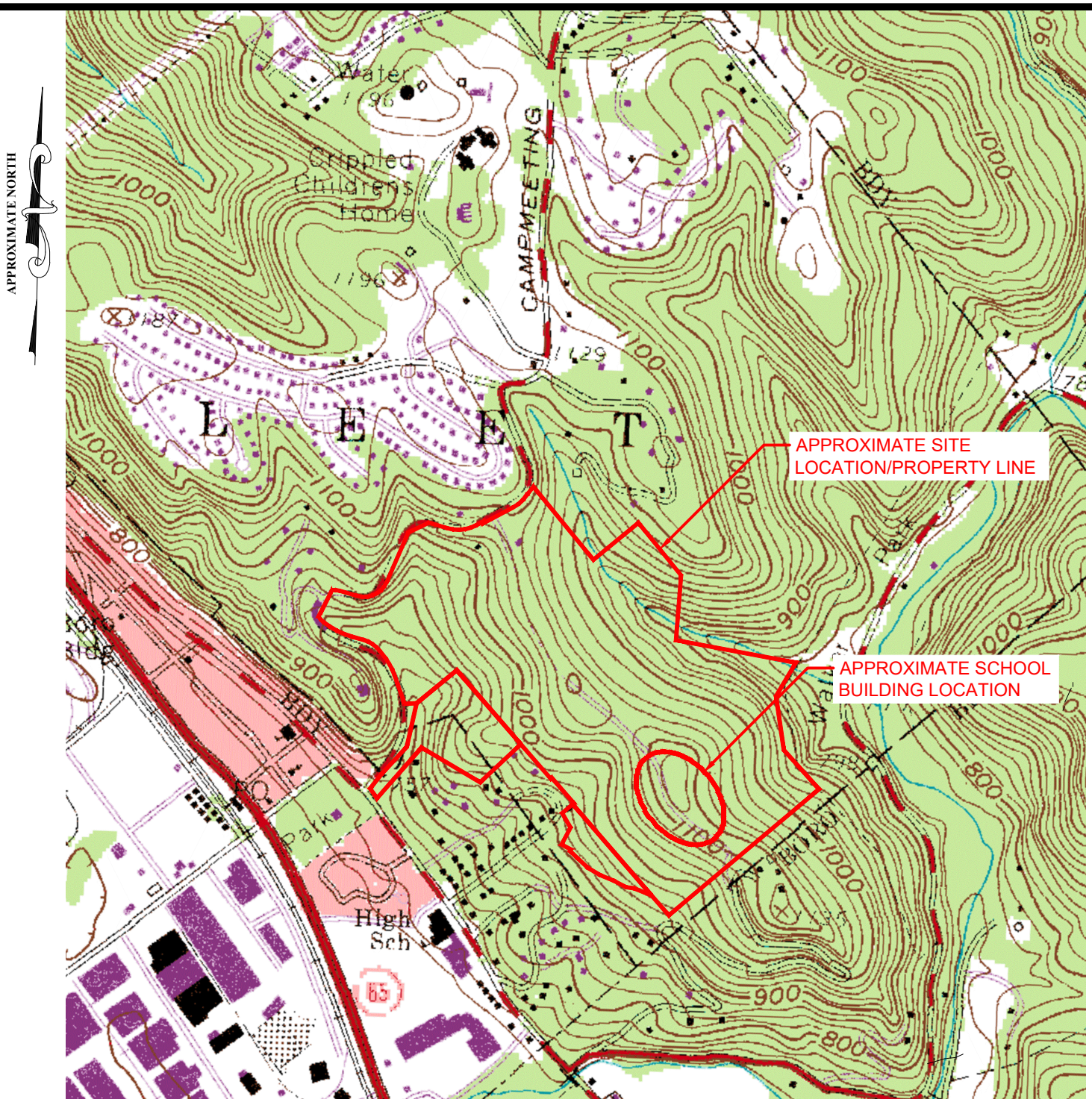
Figure 1 - Site Location Plan
Figure 2 - Field Exploration Plan West
Figure 3 – Field Exploration Plan East
Figure 4 – Landslide Map
Definition of Soil and Rock Classification Terms
Test Boring Records from Original Exploration (GBB-1 through GBB-37)
Laboratory Results for GBB Series Test Borings
Test Boring Records from Dohar Exploration (D-1 through D-8)
Test Boring Records from Most Recent Exploration (Mixed Series B-x and SB-x)
Laboratory Results from Most Recent Series Test Borings (Mixed Series B-x and SB-x)
Figure 5 - Cross-Section B-B
Current Global Stability – Cross-Section B-B
Figure 6 - Cross-Section B-B Subsurface Model
Cross-Section B-B Initial Analysis of Reinforced Slope
Figure 7 - Cross-Section Q-Q

CONTINUED

CONTINUED

Current Global Stability – Cross-Section Q-Q
Figure 8 - Cross-Section Q-Q Subsurface Model
Cross-Section Q-Q Initial Analysis of Reinforced Slope
Figure 9 - Cross-Section G-G Potential Soil Nail Support of Cut Face
Figure 10 Cross-Section R-R
Figure 11 - Cross-Section R-R Subsurface Model
Cross-Section R-R Initial Analysis of Reinforced Slope
Figure 12 Cross-Section P-P
Figure 13 - Cross-Section P-P Subsurface Model
Cross-Section P-P Initial Analysis of Reinforced Slope
Figure 14 - Cross-Section S-S
Figure 15 - Cross-Section S-S Subsurface Model
Cross-Section S-S Initial Analysis of Reinforced Slope
Figure 16 - Cross-Section T-T
Figure 17 - Cross-Section T-T Subsurface Model
Cross-Section T-T Initial Analysis of Reinforced Slope
Figure 18 - Cross-Section U-U
Figure 19 - Cross-Section U-U Subsurface Model
Cross-Section U-U Initial Analysis of Reinforced Slope
Figure 20 - Cross-Section V-V
Figure 21 - Cross-Section V-V Subsurface Model
Cross-Section V-V Initial Analysis of Reinforced Slope
Bench - Temporary Stability @ IH:1V

APPENDIX



SITE LOCATION PLAN

0 1000 2000 3000

APPROX. SCALE: 1" = 1000'

REFERENCE:
EXCERPT FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS) AMBRIDGE, PA, TOPOGRAPHIC QUADRANGLE MAP (1960); PHOTOREVISED 1990.

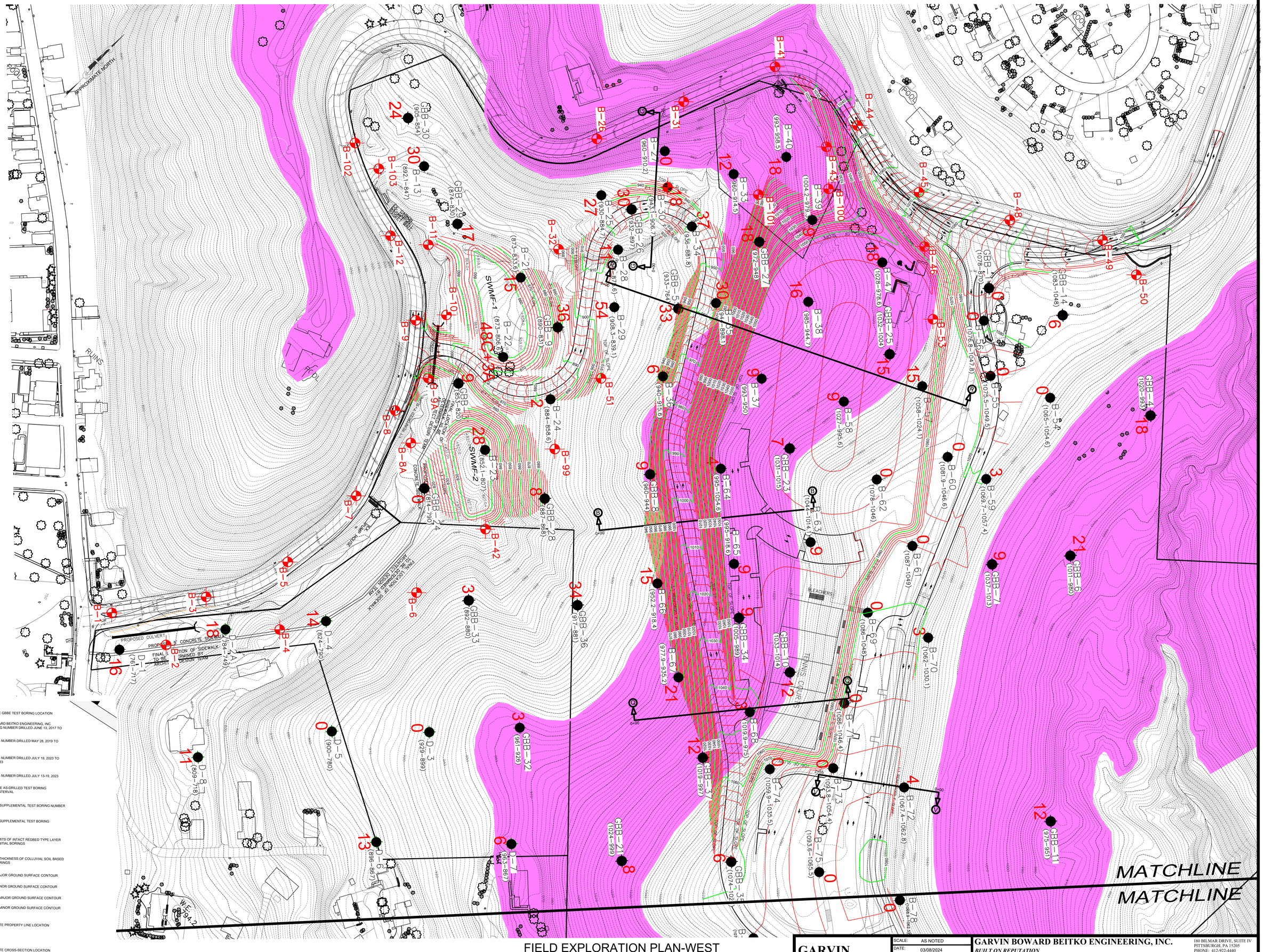
GARVIN BOWARD BEITKO

GARVIN BOWARD BEITKO ENGINEERING, INC.
PITTSBURGH, PA

MASS GRADING RECOMMENDATIONS

PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FIGURE 1
GBBE PROJECT: 16123A



LEGEND

- APPROXIMATE GBBE TEST BORING LOCATION
- GBB–XX — GARVIN BOWARD BEITKO ENGINEERING, INC. (GBBE) BORING NUMBER DRILLED JUNE 13, 2017 TO JUNE 23, 2017
- D–X — GBBE BORING NUMBER DRILLED MAY 28, 2019 TO JUNE 3, 2019
- B–XX — GBBE BORING NUMBER DRILLED JULY 19, 2023 TO AUGUST 4, 2023
- SB–XX — GBBE BORING NUMBER DRILLED JULY 13-19, 2023
- (XXXX–XXXX) — APPROXIMATE AS-DRILLED TEST BORING ELEVATION INTERVAL
- B–XX — PROPOSED SUPPLEMENTAL TEST BORING NUMBER
- PROPOSED SUPPLEMENTAL TEST BORING LOCATION
- APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS
- XX — ESTIMATED THICKNESS OF COLLUVIAL SOIL BASED ON TEST BORINGS
- 1090 — EXISTING MAJOR GROUND SURFACE CONTOUR (FT-MSL)
- EXISTING MINOR GROUND SURFACE CONTOUR (FT-MSL)
- 1090 — PROPOSED MAJOR GROUND SURFACE CONTOUR (FT-MSL)
- PROPOSED MINOR GROUND SURFACE CONTOUR (FT-MSL)
- APPROXIMATE PROPERTY LINE LOCATION
- X 0+00 — X 0+70 — APPROXIMATE CROSS-SECTION LOCATION

FIELD EXPLORATION PLAN-WEST

0 60 120 180

APPROXIMATE SCALE: 1" = 60'

REFERENCE:
BASE DRAWING PROVIDED BY PHILLIPS AND ASSOCIATES, INC.

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	03/08/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 2

MASS GRADING RECOMMENDATION - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A

MATCHLINE

MATCHLINE

APPROXIMATE NORTH

GBB–15 (968–954) 6

GBB–18 (936–912) 16

GBB–12 (983–959) 7

B–84 (1092–1078) 3

B–85 (1102–1087) 5

B–81 (1073–1057.3) 7

B–79 (1071–1061.7) 0

B–78 (1068.9–1062.5) 0

PROPOSED SCHOOL BUILDING

B–86 (1086–1076) 6

B–87 (1081–1062.8) 6

B–88 (1089–1079.7) 3

SB–19 (1122–1086) 0

SB–20 (1116.8–1086) 0

SB–21 (1107.1–1086) 0

SB–23 (1103.3–1083.7) 0

SB–25 (1103–1088) 0

SB–26 (1111–1085) 3

EXISTING BUILDING TO BE DEMOLISHED BUILDING

GBB–2 (1085–785) 0

B–83 (1093.1–1073.7) 2F

SB–2 (1114–1072) 0

SB–11 (1105.2–1072) 0

SB–14 (1113.4–1071.8) 0

SB–22 (1113.6–1086) 0

SB–24 (1113.7–1084) 0

SB–27 (1115–1085) 0

SB–13 (1113.1–1072) 0

SB–15 (1114.3–1070.9) 0

B–89 (1116–1081.8) 0

B–91 (1110.5–1061) 0

TO REMAIN AS GREEN SPACE

B–90 (1114.2–1060) 0

SB–6 (1103.1–1070.3) 0

SB–7 (1115.7–1072) 0

SB–8 (1115–1070) 0

SB–16 (1109–1071.6) 0

SB–17 (1102.6–1071.1) 3

B–93 (1080–1067.2) 9

GBB–3 (1113–813) 0

B–92 (1097–1059) 0

B–77 (1076–1063.2) 6

B–80 (1063–1053.8) 6

B–82 (1068.4–1058) 3

SB–1 (1084.1–1059) 0

SB–9 (1117.5–1072) 0

SB–10 (1096–1071) 6

SB–18 (1078–1035) 3

B–52 15

B–76 (1076–1061) 6

SB–2 (1095.1–1070) 0

SB–3 (1100–1070) 0

SB–4 (1115–1069.6) 0

SB–5 (1079.1–1048) 12

B–74 (1047–1014.4) 9

B–98 (1064–1048) 9

B–97 (1067.3–1043) 22

B–96 (1067–1054.8) 9

B–95 (1066–1056.8) 6

GBB–13 (996–974) 9

GBB–16 (1023–1004) 9

GBB–19 (1014–998) 5

GBB–22 (1001–988) 4

GBB–17 (937–925) 8

GBB–20 (953–935) 11

LEGEND

GBB–XX	GARVIN BOWARD BEITKO ENGINEERING, INC. (GBBE) BORING NUMBER DRILLED JUNE 13, 2017 TO JUNE 23, 2017
D–X	GBBE BORING NUMBER DRILLED MAY 28, 2019 TO JUNE 3, 2019
B–XX	GBBE BORING NUMBER DRILLED JULY 19, 2023 TO AUGUST 4, 2023
SB–XX	GBBE BORING NUMBER DRILLED JULY 13-19, 2023
(XXXX–XXXX)	APPROXIMATE AS-DRILLED TEST BORING ELEVATION INTERVAL
B–XX	PROPOSED SUPPLEMENTAL TEST BORING NUMBER
	PROPOSED SUPPLEMENTAL TEST BORING LOCATION
	APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS
XX	ESTIMATED THICKNESS OF COLLUVIAL SOIL BASED ON TEST BORINGS
1090	EXISTING MAJOR GROUND SURFACE CONTOUR (FT-MSL)
1090	EXISTING MINOR GROUND SURFACE CONTOUR (FT-MSL)
1090	PROPOSED MAJOR GROUND SURFACE CONTOUR (FT-MSL)
	PROPOSED MINOR GROUND SURFACE CONTOUR (FT-MSL)
	APPROXIMATE PROPERTY LINE LOCATION

REFERENCE:
BASE DRAWING PROVIDED BY PHILLIPS AND ASSOCIATES, INC.

FIELD EXPLORATION PLAN-EAST

0 60 120 180

APPROXIMATE SCALE: 1" = 60'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	03/08/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

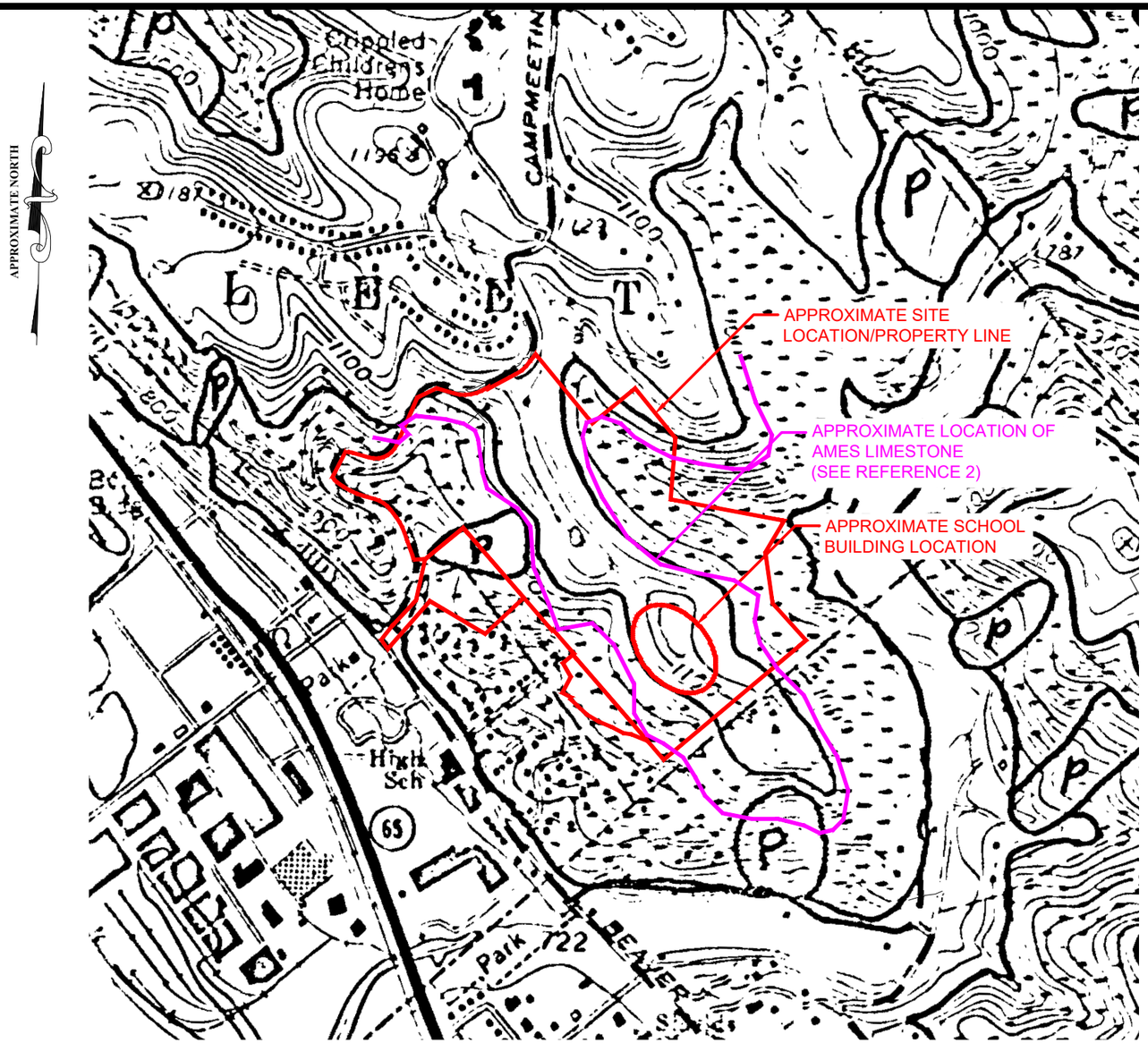
GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 3

MASS GRADING RECOMMENDATION - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A



LANDSLIDE MAP

0 1000 2000 3000

APPROX. SCALE: 1" = 1000'

LEGEND

ACTIVE OR RECENTLY ACTIVE LANDSLIDE
Complex landslide composed of earthflow, debris slide, earth and rock slump. Identified fron historical records, and from scars, debris and other field evidence. Ground extremely unstable; sliding accelerated by excavation, loading and changes in drainage conditions. May include areas with several active slides too small to be shown separately. Questioned where doubtful.

LANDSLIDE
Area of extensive hummocky ground caused by earthflow and earth and rock slump. Lacks clear evidence of active sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sited in areas away from the edge of the toe; can be reactivated by extensive, rapid excavation, loading, and changes in ground water and surface water conditions. Area of old landslide probably includes recent ones not identified from field evidence or otherwide documented. Upslope boundary of landslide generally defined by modified scarp, but downslope (toe) may be gradational and not well defined. Questioned where doubtful.

COLLUVIAL SLOPE
Valley wall along major streams with slope as steep as 40° (85%); stony, clayey silt soil up to 50 ft. (15 m) thick; commonly buttressed by a terrace or bench at the toe of the slope; very susceptible to sliding by cutting of toe area, removal of terrace or bench, and overloading; landslide commonly activated without apparent cause.

AREAS SUSCEPTIBLE TO DEBRIS FLOWS AND DEBRIS AVALANCHES
Primarily shallow, narrow ravines and chutes with accumulation of stony colluvium generally 10 ft. (3 m) or less in thickness; susceptible to rapid movement during intense rainfall. Most ravines designated show evidence of former debris flows and avalanches. Symbol - a - designates historical debris flow or debris avalanche.

AREAS SUSCEPTIBLE TO ROCKFALL
Steep, locally vertical, natural and man-made slopes and cliffs, 15 ft. (4.5 m) or higher. formed dominantly of sandstone, limestone, sandy shale, mudstone and claystone. Interbedded mudstone, claystone and shale weather rapidly leaving sandstone and limestone rock faces unsupported.

COVE UNDERLAIN BY CLAY LAYER
Rounded or U-shaped valley with steep concave slope of valley floor (coves) and valley heads underlain by clayey soils forming a coherent layer generally 8 ft. (2.5 m) or less in thickness. Zone of water commonly at the base of the clay layer is under 2 to 8 ft. (0.6 - 2.5 m) artesian head. Clay soil is underlain by claystone and shale. Clay slab moves as a coherent mass up to 1 ft. (0.3 m) per year; very susceptible to more rapid sliding when overloaded by fill or structure and by excavations that break the continuity of slope. Recent soil slips (earth flows) as much as 40,000 square feet (3,700 square meters) in size are common.

SOIL AND ROCK SUSCEPTIBLE TO LANDSLIDING
Soil and rock similar to that involved in landslides elsewhere in map area; primarily areas underlain by claystone, mudstone and shale associated with other rock types. Rock weathers rapidly on exposure forming clayey soil highly susceptible to sliding.

AREAS LEAST PRONE TO LANDSLIDES
Map areas in which no patterns or symbols are shown; primarily valley floors, ridge tops and broad benches; modification by excavation and fill may lead to local landslides.

The first five digits of the open file number designate the specific 1:250,000 scale map sheet of which this quadrangle is a part. The last two digits designate the position of the quadrangle in a subdivision of the 1:250,000 scale map based on rows and tiers shown in the diagram to the right. The location of this quadrangle is shown by the black square.

REFERENCES:

1. EXCERPT FROM LANDSLIDES AND RELATED FEATURES OF THE AMBRIDGE, PA QAUDRANGLE BY JOHM S. POMROY, 1978, U.S. GEOLOGICAL SURVEY, OPEN FILE MAP 78-1057 (E-15)
2. LINE REPRESENTING THE APPROXIMATE AMES LIMESTONE LOCATION WAS SUPERIMPOSED USING BEST-FIT METHODOLOGY FROM THE GREATER PITTSBURGH REGION GEOLOGIC MAP COMPILED BY W.R. WAGNER, J.L. CRAFT, L. HEYMAN, AND J.A. HARPER, 1975.

GARVIN BOWARD BEITKO

GARVIN BOWARD BEITKO ENGINEERING, INC.
PITTSBURGH, PA

MASS GRADING RECOMMENDATIONS

PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FIGURE 4
GBBE PROJECT: 16123A

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BOWARD BEITKO

DEFINITION OF SOIL AND ROCK CLASSIFICATION TERMS

SOIL

Consistency and Relative Density of soils, based on the Standard Penetration Test[1] (SPT) blow counts over the last foot of penetration, N, are generally determined as follows:

Consistency of Cohesive Soils

CONSISTENCY	N (blows/foot)	UNCONFINED COMPRESSIVE STRENGTH, Q_u(tsf)
Very soft	0 – 2	<0.25
Soft	3 – 4	0.25 – 0.5
Medium	5 – 7	0.5 – 1.0
Stiff	8 – 15	1.0 – 2.0
Very stiff	16 – 30	2.0 – 4.0
Extremely stiff	>30	>4.0
Hard (if friable or brittle)	>30	>4.0

Relative Density of Granular Soils

RELATIVE DENSITY	N (blows/foot)
Very loose	0 – 4
Loose	5 – 10
Firm	11 – 14
Medium dense	15 – 30
Dense	31 – 50
Very dense	>50

The percents by weight of constituents present in soil are as follows:

Trace:	indicates particles are present, but estimated to be less than 5%
Few:	indicates 5 to 10%
Little:	indicates 15 to 25%
Some:	indicates 30 to 45%
Mostly (and):	indicates 50 to 100%

Criteria for describing moisture content:

MOISTURE CONDITION	CRITERIA
Dry (Humid)	Absence of moisture, dusty, dry to touch
Damp	Apparent moisture in soil
Moist	Moist to touch, but no visible water
Wet	Visible free water

ROCK

Hardness of rock is based on the following:

Very soft – crushes under finger pressure
Soft – crushes easily under one hammer blow
Medium hard – breaks under one hammer blow
Hard – resistant to breaking under hammer blow
Very hard – resisting to breaking under several hammer blows

	SPACING OF FRACTURES AND/OR DISCONTINUITES
Extremely or very broken	<1”
Moderately broken	1” – 3”
Occasionally broken or blocky	3” – 6”
Massive	>6”

[1] STANDARD PENETRATION TEST (SPT) – defined as the number of blows (N) required to drive a two-inch outside diameter split-barrel sampling tube a depth of one foot with a 140-pound hammer falling 30 in. in accordance with American Society of Testing and Materials (ASTM) Test Designation: D1586.

GARVIN BOWARD BEITKO

Test Boring Record

GBB-1

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 6

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/13/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/13/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny to overcast, 74 to 90 ° | **Water Level Upon Completion:** 48.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1078'	FILL sampled as brown sandy silt, some rock/brick fragments, medium dense, moist		S-1	80	3-3-4 (7)				
	(FILL) 3.0								
	Brown-orange SANDSTONE FRAGMENTS (GP), little sand, medium dense, moist		S-2	80	7-9-12 (21)				
1073	**(RESIDUAL)** 5.0	5							
	Orange-brown and gray SANDSTONE FRAGMENTS (GP), few sand, moist		S-3	100	10-12-12 (24)				
	(RESIDUAL) 9.0								
1068	Gray and orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragaments, trace sand, medium dense to very dense, dry	10	S-4	100	8-9-11 (20)				
			S-5	100	32-50/0.4'				
1063	**(RESIDUAL)** 15.3	15	S-6	100	50/0.3'				
	Brown to light gray fine to medium-grained micaceous SANDSTONE, highly to slightly weathered, thinly laminated to very thinly bedded, very broken to blocky, medium hard		R-1	100 (0)					
	-highly weathered from 17.3' to 17.5' MOHS 3.5 at 17.7' -vertically fractured from 15.3' to 28.3'								
1058	MOHS 5.5 at 20.0'	20							
			R-2	10 (0)					
1053		25							
	-slightly weathered from 28.2' to 31.0' -vertical fracture from 28.6' to 28.7'								
1048		30							
	-vertical fracture from 30.6' to 30.8' 31.0								
	Light gray very fine-grained SANDSTONE, slightly weathered, thinly bedded, moderately broken to massive, hard		R-3	96 (49)					
1043		35							

(Continued Next Page)

BORING LOG - GARVIN - GARVIN.GDT - 08/14/19 08:55 - \\SERVER\SHARED DOCUMENTS\GINT\PROJECTS\16123 TULL PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

GBB-1

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 6

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/13/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/13/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny to overcast, 74 to 90 ° | **Water Level Upon Completion:** 48.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		MOHS 5.5 at 35.0'	35.3							
		Light gray to gray silty CLAYSTONE, slightly weathered, medium bedded, moderately broken to massive, soft to medium, hard MOHS 1.5 at 36.0' MOHS 2.5 at 38.3'								
1038			40.0							
		Light gray to red-gray CLAYSTONE, moderately weathered, medium bedded, very broken, very soft to soft MOHS 0.5 at 41.0'	40							
				R-4	100 (0)					
1033			45							
		-calcareous and nodular from 48.0' to 52.0'								
1028			50							
		MOHS 4.5 at 51.0'	52.0							
		Light gray to purple clayey SILTSTONE, thinly to thickly laminated, moderately to slightly weathered, very broken to blocky, soft to hard MOHS 5.5 at 54.0'		R-5	100 (55)					
1023			55							
			59.0							
1018		Gray to dark gray nodular LIMESTONE, slightly weathered, thinly bedded, moderately broken to blocky, hard -calcareous and nodular from 59.3' to 61.0'	60							
		MOHS 7.5 at 60.5'	61.0							
		Red-purple and gray calcareous CLAYSTONE, slightly weathered, medium bedded, very broken to blocky, soft MOHS 0.5 at 61.5'		R-6	100 (5)					
1013			65							
		MOHS 3.5 at 66.5'								
1008			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-1

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 3 of 6

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/13/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/13/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny to overcast, 74 to 90 ° | **Water Level Upon Completion:** 48.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Red-purple and gray calcareous CLAYSTONE, slightly weathered, medium bedded, very broken to blocky, soft *(continued)*								
1003			75	R-7	100 (0)					
			75.5							
		Purple CLAYSTONE, slightly weathered, medium bedded, moderately broken to massive, soft, few calcareous clasts and veins								
998			80							
		-some medium hard clayey siltstone interbeds from 83.0' to 90.7'		R-8	100 (28)					
993			85							
988			90							
			90.7							
		Light gray SILTSTONE, highly weathered to fresh, thinly laminated to very thinly bedded, very broken to massive, soft to hard								
		MOHS 5.5 at 91.0'								
		-Soft from 91.0' to 91.3'								
		-clayey, calcareous veins from 90.7' to 97.5'								
983		-very broken from 93.5' to 93.7'	95	R-9	97 (43)					
		-very broken from 95.2' to 95.4'								
		-slickensides from 95.7' to 96.3'								
		-high angle fracture from 97.8' to 98.6'								
978		MOHS 7.5 at 99.0'	100							
		-soft from 103.3' to 103.6'		R-10	100 (65)					
973			105							

(Continued Next Page)

BORING LOG - GARVIN - GARVIN.GDT - 08/14/19 08:55 - \\SERVER\SHARED DOCUMENTS\GINT\PROJECTS\16123 TULL PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

GBB-1

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 4 of 6

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/13/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/13/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny to overcast, 74 to 90 ° | **Water Level Upon Completion:** 48.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Light gray SILTSTONE, highly weathered to fresh, thinly laminated to very thinly bedded, very broken to massive, soft to hard *(continued)*								
		-some medium gray laminations from 108.2'to 113.0'								
968			110							
			113.0	R-11	100 (35)					
		Brown to gray and brown-red CLAYSTONE, slightly weathered, medium bedded, very broken to massive, soft								
963			115							
		MOHS 2.5 at 116.0'								
958			120.0							
		Red-brown clayey SILTSTONE, slightly weathered, medium bedded, very broken to blocky, medium hard	120							
		MOHS 4.5								
			123.4	R-12	100 (28)					
953		Purple to gray fine-grained SANDSTONE, slightly weathered, medium bedded, moderately broken to massive, hard	125							
		MOHS 7.5 at 124.0'								
			129.0							
948		Gray SHALE, fresh, very thinly laminated to thinly laminated, moderately broken to massive, hard	130							
		-slightly calcareous from 129.0' to 133.0'								
		MOHS 8.5 at 131.0'								
			133.0	R-13	100 (59)					
943		Gray clayey SILTSTONE with calcareous veins, slightly to moderately weathered, very thinly bedded, moderately broken, medium hard	135							
		MOHS 5.5 at 134.5'	135.2							
		Gray SHALE, fresh, thinly laminated, moderately broken to massive, hard								
		MOHS 8.5 at 139.0'								
938			140							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-1

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 5 of 6

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/13/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/13/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny to overcast, 74 to 90 ° | **Water Level Upon Completion:** 48.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray SHALE, fresh, thinly laminated, moderately broken to massive, hard *(continued)*								
933			145	R-14	100 (95)					
		-some fine-grained sandstone laminations from 146.0' to 169.5'								
928			150							
		MOHS 6.5 at 150.0'		R-15	100 (100)					
923			155							
918			160							
				R-16	100 (100)					
913			165							
			169.5							
908		Medium gray SHALE, fresh, thinly laminated, very broken to massive, hard -visible pyrite lenses from 169.5' to 173.0'	170							
				R-17	100 (98)					
903			175							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-1

Project Number: 16123
Project Name: Tull Property
Sheet: 6 of 6
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/13/17
Water Level During Drilling:
Drilled By: T. Zilka (Test Boring Services, Inc.)
Completion Date: 06/13/17
Water Level Before Coring:
Drilling Rig: CME 850 Buggy Rig
Weather: Sunny to overcast, 74 to 90 °
Water Level Upon Completion: 48.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Medium gray SHALE, fresh, thinly laminated, very broken to massive, hard *(continued)*								
898		180							
	-black carbonaceous shale from 179.9' to 180.7'	180.7							
	Gray CLAYSTONE, fresh, thinly bedded, moderately broken to blocky, soft		R-18	100 (60)					
893		184.7							
	Light gray LIMESTONE, fresh, moderately broken, soft	185.0							
	Light gray and medium gray INTERBEDDED fine-grained SANDSTONE and SHALE, fresh, moderately broken to massive, hard MOHS 9.5 at 187.0'								
888		190							
			R-19	100 (67)					
883		195							
		197.4							
	Gray to red-brown and red-gray INTERBEDDED silty CLAYSTONE and clayey SILTSTONE, fresh, medium bedded, moderately broken to massive, soft to hard								
878		200							
	MOHS 2.5 at 202.0'		R-20	100 (64)					
873		205							
		208.2							
	Boring Terminated at 208.2 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
868		210							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-2

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/17/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Partly Sunny, Thunderstorms, 70 to 80° | **Water Level Upon Completion:** 50.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G./L. Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1085'		TOPSOIL 0.6 Brown-orange SAND (SP), few to some sandstone fragments, loose to medium dense, moist		S-1	100	1-2-3 (5)				
				S-2	100	5-7-10 (17)				
1080		**(RESIDUAL)** 6.0	5							
		Brown-orange to gray DECOMPOSED SANDSTONE (GW) sampled as sandstone fragments, few to little sand, dense to very dense, moist to dry		S-3	100	8-18-13 (31)				
1075			10	S-4	100	15-14-21 (35)				
				S-5	100	50/0.4'				
1070			15	S-6	100	47-42-50/0.4'				
		(RESIDUAL) 18.3		S-7	100	50/0.3'				
1065		Brown fine to medium-grained micaceous SANDSTONE, moderately weathered, thinly laminated to thinly bedded, very broken, soft to medium hard MOHS 5.5 at 20.0'	20	R-1	90 (58)					
1060		-vertically fracture, soft from 25.0' to 28.0'	25	R-2	52 (12)					
1055		30.1	30	R-3	100 (40)					
1050		Gray fine-grained micaceous SANDSTONE, highly to slightly weathered, thinly laminated to very thinly bedded, very broken to blocky, very soft to medium hard -carbonaceous shale interbed from 30.1' to 30.3' -many carbonaceous laminations from 30.3' to 33.0' MOHS 2.5 at 31.5' -some high angle bedding planes and vertical fractures from 32.2' to 33.4'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-2

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/17/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Partly Sunny, Thunderstorms, 70 to 80° | **Water Level Upon Completion:** 50.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G./L. Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-some high angle bedding planes and vertical fractures from 33.9' to 35.0'		R-4	100 (52)					
		Gray fine-grained micaceous SANDSTONE, highly to slightly weathered, thinly laminated to very thinly bedded, very broken to blocky, very soft to medium hard *(continued)*	37.7							
		MOHS 5.5 at 35.5'								
1045		Brown to light gray fine to medium-grained micaceous SANDSTONE, moderately weathered to slightly weathered, thinly laminated to medium bedded, very broken to massive, hard, some interstitial carbon and a few carbonaceous laminations	40							
		-lost water at 38.0'								
		-carbonaceous sandstone seam from 37.7' to 38.9'		R-5	95 (87)					
1040		-vertically fracture from 44.2' to 45.3'	45							
		MOHS 8.5 at 45.0'								
			46.3							
		Medium gray to black silty very fine-grained SANDSTONE, slightly weathered, thinly laminated to thinly bedded, very broken to blocky, medium hard								
		-black, carbonaceous sandstone from 48.4' to 51.7'								
1035		MOHS 4.5 at 49.0'	50							
		-vertical fracture from 49.2' to 51.1'								
			51.7							
		Gray to purple clayey SILTSTONE, highly weathered to slightly weathered, thinly laminated to very thinly bedded, very broken to massive, soft to medium hard		R-6	100 (9)					
		-soft, highly weathered from 51.7' to 58.5'								
1030		-silty claystone interbeds from 51.7' to 54.0'	55							
		MOHS 0.5 at 54.0'								
		-fine-grained sandstone laminations from 59.0' to 63.0'								
1025		MOHS 2.5 at 59.5'	60							
				R-7	100 (49)					
1020			65							
		MOHS 1.5 at 67.0'								
			69.3							
1015			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-2

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 3 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/17/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Partly Sunny, Thunderstorms, 70 to 80° | **Water Level Upon Completion:** 50.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G./L. Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		MOHS 9.8 at 69.4'								
		Light and medium gray nodular fossiliferous LIMESTONE, slightly weathered, very thinly bedded, very broken to moderately broken, medium hard to hard *(continued)*	71.2							
		-pyrite visible from 69.3' to 70.0'								
		MOHS 4.5 at 70.0'		R-8	89 (0)					
1010		Gray to brown-red calcareous CLAYSTONE with calcareous inclusions, slightly weathered, medium bedded, very broken to massive, soft to medium hard	75							
		MOHS 4.5 at 74.0'								
1005			80							
				R-9	100 (17)					
1000			85							
			88.0							
		Brown-red and purple CLAYSTONE, slightly weathered, thinly bedded, moderately broken to blocky, soft, some gray mottling								
995			90							
		NOTE: UNCONFINED COMPRESSIVE STRENGTH PER ASTM D 7012 METHOD C 40 PSI AT 90'								
		MOHS 1.5 at 91.0'								
				R-10	100 (0)					
990			95							
			98.8							
985		Gray SILTSTONE, moderately weathered to fresh, thickly laminated to thinly bedded, very broken to massive, medium hard, some calcareous veins	100							
		MOHS 3.5 at 99.0'								
		MOHS 8.5 at 101.0'								
				R-11	100 (50)					
980			105							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-2

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 4 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/17/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Partly Sunny, Thunderstorms, 70 to 80° | **Water Level Upon Completion:** 50.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G./L. Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray SILTSTONE, moderately weathered to fresh, thickly laminated to thinly bedded, very broken to massive, medium hard, some calcareous veins *(continued)*								
		-vertical and high angle fractures from 108.5' to 108.7'	109.0							
975		Orange clayey SILTSTONE, slightly weathered to fresh, very thinly laminated, moderately broken to massive, medium hard	110							
		-vertical and high angle fractures from 109.6' to 109.7'								
		MOHS 2.5 at 112.0'		R-12	100 (54)					
970			115							
		-few carbonaceous laminations from 116.5' to 117.0'								
		-vertical and high angle fractures from 117.3' to 117.5'								
965			120							
			120.4							
		Light gray to purple to brown-red CLAYSTONE, slightly weathered, thinly bedded, very broken to blocky, soft								
				R-13	100 (4)					
960			125							
		MOHS 0.5 at 127.0'								
			129.7							
955		Gray fine-grained SANDSTONE, highly to slightly weathered, thinly bedded, very broken to massive, hard	130							
		-vertical fracture from 130.0' to 131.0'								
				R-14	100 (40)					
950			135							
			135.0							
		Gray SILTSTONE, highly weathered to slightly weathered, thinly laminated to thinly bedded, very broken to massive, hard								
		MOHS 2.5 at 135.5'								
		-some clayey siltstone interbeds from 135.0' to 149.0'								
		-vertically fractured from 137.9' to 138.5'								
		MOHS 7.5 at 138.3'								
945			140							

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GARVIN BOWARD BEITKO

Test Boring Record

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 5 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/17/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Partly Sunny, Thunderstorms, 70 to 80° | **Water Level Upon Completion:** 50.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G./L. Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-vertically fractured from 139.5' to 139.7'								
		Gray SILTSTONE, highly weathered to slightly weathered, thinly laminated to thinly bedded, very broken to massive, hard *(continued)*								
		-very soft from 140.4' to 140.7'								
		-vertically fractured from 142.0' to 143.6'		R-15	100 (40)					
940			145							
		-vertical fracture from 145.0' to 145.6'								
		-vertical fracture from 146.2' to 146.5'								
935			150							
		151.0								
		Gray INTERBEDDED SHALE and very fine-grained SANDSTONE, fresh, thinly laminated, massive, hard		R-16	100 (100)					
930			155							
925		MOHS 8.5 at 160.0'	160							
				R-17	100 (100)					
920			165							
		166.0								
		INTERBEDDED medium gray SHALE and light gray fine-grained SANDSTONE, fresh, thinly laminated, massive, hard, some dark gray siltstone laminations								
915			170							
		MOHS 8.5 at 170.0'								
				R-18	100 (100)					
910			175							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-2

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 6 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/17/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Partly Sunny, Thunderstorms, 70 to 80° | **Water Level Upon Completion:** 50.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G./L. Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		INTERBEDDED medium gray SHALE and light gray fine-grained SANDSTONE, fresh, thinly laminated, massive, hard, some dark gray siltstone laminations *(continued)*								
905		-possible pyrite from 179.9' to 188.0'	180							
		MOHS 8.5 at 180.0'								
				R-19	100 (100)					
900			185							
895			190							
			190.7							
		Gray CLAYSTONE with calcareous clasts, slightly weathered, thinly bedded, very broken to moderately broken, soft		R-20	100 (57)					
890			195							
			196.0							
		Gray INTERBEDDED SHALE and light gray SANDSTONE, slightly weathered to fresh, thinly laminated, very broken to massive, hard								
885			200							
		MOHS 9.5 at 200.0'								
				R-21	100 (56)					
880			205							
			208.8							
875		Gray CLAYSTONE with clay seams, slightly weathered, moderately broken, soft to medium hard	210.0	210						

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-2

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 7 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/17/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Partly Sunny, Thunderstorms, 70 to 80° | **Water Level Upon Completion:** 50.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G./L. Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray and red CLAYSTONE, soft seams, slightly weathered, moderately broken to blocky, medium hard								
870		MOHS 4.5 at 214.5'	215	R-22	100 (30)					
		219.5								
865		Gray INTERBEDDED SHALE and light gray SANDSTONE, slightly weathered, thinly bedded, blocky to massive, hard	220							
				R-23	98 (75)					
860			225							
		MOHS 9.5 at 228.5'								
855			230							
				R-24	100 (100)					
850			235							
845			240							
				R-25	100 (100)					
840			245							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-2

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 8 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/17/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Partly Sunny, Thunderstorms, 70 to 80° | **Water Level Upon Completion:** 50.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G./L. Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray INTERBEDDED SHALE and light gray SANDSTONE, slightly weathered, thinly bedded, blocky to massive, hard *(continued)*								
		MOHS 9.5 at 248.3'								
835			250							
		MOHS 9.0 at 253.5'		R-26	100 (100)					
830			255							
825			260							
			261.0							
		Gray LIMESTONE, slightly weathered, thinly bedded, massive, hard								
		MOHS 9.0 at 263.5'		R-27	100 (100)					
820			265							
			266.0							
		Light gray SANDSTONE and INTERBEDDED gray SHALE, possible pyrite, fine-grained, micaceous, fresh, massive, hard, thinly bedded								
815			270							
		MOHS 9.5 at 273.5'		R-28	100 (100)					
810			275							
805			280							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-2

Project Number: 16123
Project Name: Tull Property
Sheet: 9 of 9
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/16/17
Water Level During Drilling:
Drilled By: T. Zilka (Test Boring Services, Inc.)
Completion Date: 06/17/17
Water Level Before Coring:
Drilling Rig: CME 850 Buggy Rig
Weather: Partly Sunny, Thunderstorms, 70 to 80°
Water Level Upon Completion: 50.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G./L. Phillips, P.E.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
800		Light gray SANDSTONE and INTERBEDDED gray SHALE, possible pyrite, fine-grained, micaceous, fresh, massive, hard, thinly bedded *(continued)*	285	R-29	100 (100)					
795			290							
790			295	R-30	100 (100)					
785		MOHS 9.5 at 298.5'	300	R-31	93 (93)					
		300.0 Boring Terminated at 300.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
780			305							
775			310							
770			315							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-3

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 72.1'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 57.6'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1113'	TOPSOIL 0.4		S-1	100	2-5-7 (12)				
	Brown SAND and SANDSTONE FRAGMENTS (GP). loose, moist								
	(RESIDUAL) 3.5		S-2	100	6-8-23 (31)				
1108	Orange-brown and gray DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, dense to very dense, dry	5							
			S-3	100	18-20-26 (46)				
	(RESIDUAL) 9.3		S-4	100	50/0.3'				
1103	Brown to light gray fine to medium-grained micaceous SANDSTONE, moderately to slightly weathered, thinly laminated to thinly bedded, moderately broken to massive, very soft to hard	10	R-1	98 (28)					
	-few carbonaceous laminations from 9.3' to 48.0'								
	-no drill water return from 11.0' to end of boring at 300.0'								
	MOHS 7.5 at 11.5'								
	-soft from 12.0' to 12.5'								
1098	MOHS 7.5 at 14.5'	15	R-2	98 (30)					
	-vertically fractured from 18.6' to 18.9'								
1093		20	R-3	100 (46)					
	-vertically fractured from 20.4' to 20.7'								
	-vertically fractured from 21.7' to 24.0'								
	-massive from 24.0' to 28.0'								
1088	MOHS 7.5 at 25.0'	25	R-4	100 (54)					
	-vugs from 25.0' to 28.0'								
1083		30							
	MOHS 7.5 at 31.0'		R-5	90 (56)					
1078		35							

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GARVIN BOWARD BEITKO

Test Boring Record

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 72.1'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 57.6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown to light gray fine to medium-grained micaceous SANDSTONE, moderately to slightly weathered, thinly laminated to thinly bedded, moderately broken to massive, very soft to hard *(continued)*								
		-dark grayish-brown shale, very soft to soft from 37.3' to 39.3'								
		-soft from 37.3' to 39.3'								
1073		-vertically fractured from 39.6' to 40.6'	40							
		MOHS 7.5 at 40.0'		R-6	90 (68)					
1068			45							
		MOHS 8.5 at 48.0'								
		-dark grayish-brown shale, very soft to soft from 48.5' to 49.6'								
1063		MOHS 0.5 at 48.7'	50							
		-dark grayish-brown shale, very soft to soft from 51.3' to 53.0'		R-7	78 (18)					
1058			55							
		-vugs from 55.8' to 56.3'								
		-fine-grained carbonaceous sandstone, possible visible pyrite from 56.3' to 58.0'								
		MOHS 2.5 at 56.8'								
		-vugs from 57.5' to 58.0'								
		MOHS 9.5 at 57.6'								
1053		-fine-grained carbonaceous sandstone, possible visible pyrite from 58.3' to 58.7'	60							
		-vertical fracture from 58.7' to 61.5'								
		MOHS 7.5 at 60.0'								
		-many clasts, vugs, and carbonaceous inclusions from 61.7' to 63.2'								
		MOHS 7.5 at 62.2'		R-8	90 (30)					
		-vertical fracture from 63.4' to 64.2'								
1048			65							
		-many clasts, vugs, and carbonaceous inclusions from 66.0' to 67.2'								
		-vertical fracture from 68.6' to 69.7'								
1043			70							

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Test Boring Record

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 3 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 72.1'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 57.6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown to light gray fine to medium-grained micaceous SANDSTONE, moderately to slightly weathered, thinly laminated to thinly bedded, moderately broken to massive, very soft to hard *(continued)*								
		-moderate carbonaceous laminations from 68.0' to 84.0'								
		MOHS 8.5 at 72.0'		R-9	95 (68)					
1038			75							
1033		MOHS 8.5 at 80.0'	80							
		-very soft from 80.5' to 90.0'		R-10	73 (29)					
1028		-many clasts, vugs, and carbonaceous inclusions from 84.0' to 90.0'	85							
1023			90.0 90							
		Gray silty fine-grained SANDSTONE, highly to slightly weathered, thinly laminated, very broken to moderately broken, very soft to medium hard	91.0							
		MOHS 4.5 at 90.6'		R-11	57 (0)					
		Gray and purple clayey SILTSTONE, highly to slightly weathered, thinly laminated to thinly bedded, very broken to massive, very soft to medium hard								
1018		-vugs and clasts, visible pyrite from 94.8' to 95.2'	95							
		-highly weathered, very soft from 95.2' to 101.5', MOHS 0.5		R-12	100 (0)					
1013			100							
		MOHS 3.5 at 102.5'								
		-vertical fracture from 103.0' to 104.1'		R-13	79 (27)					
1008			105							

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 4 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 72.1'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 57.6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray and purple clayey SILTSTONE, highly to slightly weathered, thinly laminated to thinly bedded, very broken to massive, very soft to medium hard *(continued)*								
		-soft granular calcareous sandstone from 108.3' to 108.8'								
1003		-purple from 110.0' to 116.0'	110							
		MOHS 4.5 at 111.0'		R-14	66 (20)					
998			115							
		116.0								
		Gray fossiliferous LIMESTONE, highly to slightly weathered and fractured, thinly bedded, very broken, medium hard to hard								
		118.3								
		Purple to gray calcareous CLAYSTONE, slightly weathered, medium bedded, moderately broken to massive, very soft to soft								
993		-high angle fracture from 119.3' to 120.6'	120							
		MOHS 1.5 at 122.0'		R-15	90 (0)					
988			125							
983		-very soft from 130.0' to 130.8'	130							
		133.0								
		Purple and gray CLAYSTONE, highly to slightly weathered, medium bedded, very broken to massive, very soft to soft		R-16	80 (0)					
978		MOHS 0.5' at 134.0'	135							
973			140							

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 5 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 72.1'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 57.6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Purple and gray CLAYSTONE, highly to slightly weathered, medium bedded, very broken to massive, very soft to soft *(continued)*								
		MOHS 3.5 at 143.0'	144.0	R-17	50 (41)					
968		Gray SILTSTONE, slightly weathered, thinly laminated to thinly bedded, moderately broken to massive, hard -some calcareous veins from 144.0' to 149.0'	145							
		MOHS 4.5 at 146.0'								
963		-some clayey siltstone interbeds from 149.0' to 165.0'	150							
				R-18	100 (46)					
958		MOHS 5.5 at 155.0'	155							
		-vertical fracture from 155.8' to 157.0'								
953			160							
				R-19	100 (50)					
948			165							
			165.8							
		Gray to purple CLAYSTONE, highly weathered, thinly bedded, very broken, very soft to soft -very soft, highly weathered from 165.8' to 166.3'								
943			170							
		MOHS 0.5 at 171.0'								
				R-20	100 (34)					
938		-very soft, highly weathered from 174.0' to 174.5'	175.0	175						

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 6 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 72.1'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 57.6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Light gray fine-grained SANDSTONE, slightly weathered to fresh, thinly laminated, moderately broken to massive, hard, some carbonaceous lenses MOHS 8.5 at 177.0'								
933			180							
		181.0								
		Gray and purple SILTSTONE, slightly weathered to fresh, thinly laminated to thinly bedded, very broken to massive, hard, some clayey siltstone interbeds, some calcareous clasts MOHS 4.5 at 182.0'		R-21	100 (72)					
928		-vertical fracture from 184.7' to 187.0'	185							
		-vertical fracture from 188.3' to 188.8'								
923		MOHS 5.5 at 190.0' -vertical fracture from 190.3' to 194.3'	190							
918		MOHS 7.5 at 196.0'	195	R-22	100 (39)					
		198.0								
913		Gray INTERBEDDED SHALE and very fine-grained SANDSTONE, fresh, thinly laminated, very massive, hard	200							
		200.5								
		Medium gray SHALE, fresh, thinly laminated, moderately broken to massive, hard								
908		MOHS 7.5 at 204.0'	205	R-23	100 (100)					
903			210							

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Test Boring Record

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 7 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 72.1'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 57.6'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Medium gray SHALE, fresh, thinly laminated, moderately broken to massive, hard *(continued)*								
			R-24	100 (87)					
898		215							
	MOHS 7.5 at 216.0'								
		218.2							
	INTERBEDDED medium gray SHALE and light gray fine-grained SANDSTONE, fresh, thinly laminated, moderately broken to massive, hard								
893	-some dark gray laminations, possibly pyrite from 218.3' to 219.2'	220							
	MOHS 6.5 at 222.0'		R-25	99 (87)					
	-carbonaceous laminations, visible pyrite from 223.5' to 223.9'								
888		225							
		226.3							
	Light gray fossiliferous LIMESTONE with a few shale interbeds and silt inclusions, fresh, thinly bedded, moderately broken to massive, hard, some pyrite visible	227.7							
	MOHS 9.5 at 227.5'								
883	INTERBEDDED medium gray SHALE and light gray fine-grained SANDSTONE, fresh, thinly laminated, massive, hard	230							
	MOHS 7.5 at 232.0'		R-26	100 (100)					
878		235							
873	-few carbonaceous laminations, calcareous and pyritic nodules from 239.0' to 240.0'	240.0 240							
		240.4							
	Gray fossiliferous LIMESTONE, slightly weathered, thinly bedded, very broken, hard								
	MOHS 9.5 at 240.3'								
	Gray calcareous CLAYSTONE with calcareous nodules, slightly weathered, very broken to moderately broken, medium hard		R-27	89 (85)					
868	MOHS 2.5 at 242.6'	245							

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Test Boring Record

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 8 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 72.1'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 57.6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		245.6 INTERBEDDED medium gray SHALE and light gray fine-grained SANDSTONE, fresh, thinly laminated, moderately broken to massive, hard 247.6 MOHS 8.5 at 247.0'								
863		Light gray fine-grained SANDSTONE, fresh, medium bedded, massive, hard 249.6 -calcareous from 247.6' to 248.2' MOHS 8.5 at 249.0'	250							
858		Gray SILTSTONE, fresh, thinly laminated to thinly bedded, very broken to massive, hard MOHS 5.5 at 250.0'	255	R-28	100 (60)					
853		-calcareous from 258.3' to 259.6' 259.9 -carbonaceous lenses and visible pyrite from 259.6' to 259.7'	260							
848		Medium gray to brown-red CLAYSTONE, slightly weathered, thinly bedded, very broken to moderately broken, very soft to soft MOHS 2.5 at 264.0'	265	R-29	100 (5)					
843			270							
838		272.3 Light gray fine-grained micaceous SANDSTONE, fresh, thinly laminated to thinly bedded, massive, hard -calcareous veins and clasts from 272.3' to 276.0' MOHS 9.5 at 274.0'	275	R-30	100 (63)					
833			280							

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GARVIN BOWARD BEITKO

Test Boring Record

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 9 of 9

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 72.1'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 57.6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Light gray fine-grained micaceous SANDSTONE, fresh, thinly laminated to thinly bedded, massive, hard *(continued)*								
				R-31	100 (100)					
828			285							
		MOHS 9.5 at 285.0'								
823			290							
				R-32	100 (100)					
818			295							
		MOHS 9.5 at 295.0'								
813		300.0	300	R-33	88 (71)					
		Boring Terminated at 300.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc								
808			305							
803			310							
798			315							

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Test Boring Record

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Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/21/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/21/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Partly sunny, 78° | **Water Level Upon Completion:** 16.9'

Drilling Method: 3 1/4-inch HSA | **Logged By:** Lynn Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1020'	TOPSOIL 0.5								
	Brown and gray mottled silty CLAY (CL), little sand, trace gravel, medium to stiff, moist		S-1	47	1-2-2 (4)				
			S-2	100	3-5-5 (10)				
1015		5							
			S-3	100	2-3-3 (6)				
1010	-small sandstone fragments at 9.5' -trace black carbonaceous fragments and wood fragments at 10.0'	10	S-4	67	3-5-4 (9)				
	(COLLUVIAL) 13.0		S-5	100	6-9-15 (24)				
	Red-brown silty CLAY (CL), trace gravel, very stiff, moist								
1005	**(COLLUVIAL)** 15.0	15							
	Brown silty CLAY (CL), little gravel/rock fragments, trace sand, very stiff, moist		S-6	67	10-6-10 (16)				
	(COLLUVIAL) 18.0								
	Red and gray mottled silty CLAY (CL), trace gravel, very stiff, moist		S-7	100	10-16-19 (35)				
1000		20							
	-soft, wet at 22.0'		S-8	100	10-8-3 (11)				
	(RESIDUAL) 24.0								
995	Red DECOMPOSED CLAYSTONE sampled as claystone fragments, very dense, dry	25	S-9	100	15-32-50/0.4'				
	(RESIDUAL) 27.4		S-10	100	50/0.4'				
	Boring Terminated at 27.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
990		30							
985		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-5

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 5

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 39.4'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** M. Walker, E.I.T. | **Water Level After 24 Hours:** 4.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
933'	Light brown sandy CLAY (CL), few sandstone fragments, trace organics, medium, dry		S-1	73	2-3-3 (6)		13.7		
	(COLLUVIAL) 3.0								
	Light brown sandy CLAY (CL), few gray sandstone fragments, very stiff, dry		S-2	100	7-10-11 (21)	62.45	16.7	24	15
928	-sample S-2 trace red clay	5							
			S-3	100	6-12-9 (21)	62.45	12.7	24	15
923		10	S-4	100	9-12-14 (26)		12.4		
	(COLLUVIAL) 12.0								
	Light brown and light gray sandy CLAY (CL), few light gray and orange sandstone fragments, very stiff, dry		S-5	100	8-8-13 (21)		17.5		
918	**(COLLUVIAL)** 15.0	15							
	Medium gray to dark gray CLAY (CL), few sandstone and claystone fragments, very stiff, dry		S-6	100	5-7-9 (16)		15.8		
	(COLLUVIAL) 18.0								
	Light gray and red CLAY (CL), few sandstone, siltstone, and claystone fragments, very stiff, dry		S-7	100	4-7-13 (20)		22.1		
913	**(COLLUVIAL)** 21.0	20							
	Gray, brown, red, and orange CLAY (CL), few sandstone and shale fragments, very stiff to stiff, dry to moist		S-8	100	6-9-8 (17)		13.3		
908	-Sample S-9 spoon had moist sample above jar material -Sample S-9 possible sandstone boulder	25	S-9	67	6-8-5 (13)		11.1		
	(COLLUVIAL) 27.0								
	Gray and red CLAY (CL), few sandstone and claystone fragments, very stiff, dry		S-10	100	6-10-13 (23)		19.8		
903		30							
			S-11	100	13-8-12 (20)		12.8		
	(COLLUVIAL) 33.0								
	Light gray and brown sandy DECOMPOSED CLAYSTONE sampled as claystone fragments, extremely stiff, dry 34.4		S-12	100	7-17-50/0.4'		6.0		
898	**(RESIDUAL)**	35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-5

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 5

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 39.4'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** M. Walker, E.I.T. | **Water Level After 24 Hours:** 4.3'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Light gray to medium gray medium to fine-grained SANDSTONE, slightly weathered to fresh, moderately broken to blocky, hard to medium hard *(continued)*		R-1	100 (28)					
893			40							
		MOHS 4.5 at 42.0'		R-2	94 (60)					
			43.4							
888		Dark gray CARBONACEOUS silty fine-grained SANDSTONE, fresh to slightly weathered, moderately broken, hard	44.8 45							
		Gray and red CLAYSTONE, fresh, moderately broken, soft to very soft		R-3	100 (6)					
		MOHS 0 at 47.0'								
		MOHS 0.5 at 48.0'								
883			50							
			50.7							
		Medium gray to dark gray CARBONACEOUS SILTSTONE, fresh, blocky to massive, hard		R-4	100 (56)					
		MOHS 0.5 at 52.0'								
			53.6							
878		CARBONACEOUS LIMESTONE, fresh, blocky, hard 54.2 MOHS 2.5 at 54.0'	55							
		Medium gray CARBONACEOUS fine-grained SANDSTONE, fresh, moderately broken to massive, hard		R-5	80 (24)					
		MOHS 5.5 at 55.0'								
		-gray-purple claystone seam from 56.4' to 57.1'								
873			60							
		MOHS 8.5 at 60.5'		R-6	100 (82)					
868			65							
				R-7	100 (100)					
		MOHS 4.5 at 68.0'								
863			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-5

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 3 of 5

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 39.4'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** M. Walker, E.I.T. | **Water Level After 24 Hours:** 4.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Medium gray CARBONACEOUS fine-grained SANDSTONE, fresh, moderately broken to massive, hard *(continued)*		R-8	100 (100)					
858		75							
	MOHS 3.5 at 76.0'	76.7	R-9	100 (98)					
	Medium gray to dark gray INTERBEDDED silty fine-grained SANDSTONE and sandy SILTSTONE, fresh, massive, medium hard to hard								
853		80							
			R-10	100 (100)					
	MOHS 3.5 at 84.0'	84.2							
848	Dark gray CARBONACEOUS silty fine-grained SANDSTONE, fresh, massive, medium hard with shale interbeds	85	R-11	100 (98)					
843		90							
	MOHS 4.5 at 92.0'		R-12	100 (98)					
838		95							
			R-13	100 (100)					
		97.8							
	Light gray medium-grained SANDSTONE, fresh, carbonaceous laminations, massive, medium hard to hard, limy inclusions								
833		100							
	MOHS 9.5 at 101.0'		R-14	100 (100)					
	MOHS 9.5 at 104.0'								
828		105							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-5

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 4 of 5

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 39.4'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** M. Walker, E.I.T. | **Water Level After 24 Hours:** 4.3'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Light gray medium-grained SANDSTONE, fresh, carbonaceous laminations, massive, medium hard to hard, limy inclusions *(continued)*								
		MOHS 6.5 at 107.0'		R-15	100 (90)					
823			110							
			111.9	R-16	100 (100)					
		Light to medium gray medium-grained SANDSTONE, slightly weathered to fresh, blocky to massive (generally massive), hard, micaceous								
		-few carbonaceous laminations from 111.9' to 114.1'								
818		MOHS 6.5 at 114.0'	115							
				R-17	100 (100)					
		-few carbonaceous laminations from 118.8' to 119.4'								
813			120							
				R-18	100 (100)					
808			125							
		MOHS 8.5 at 126.0'								
		-few carbonaceous laminations from 126.8' to 127.3'		R-19	100 (100)					
		MOHS 9.5 at 128.0'								
803			130							
				R-20	100 (100)					
		-few carbonaceous laminations from 132.9' to 133.5'								
798			135							
				R-21	100 (100)					
793			140							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-5

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 5 of 5

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/14/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 39.4'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** M. Walker, E.I.T. | **Water Level After 24 Hours:** 4.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Light to medium gray medium-grained SANDSTONE, slightly weathered to fresh, blocky to massive (generally massive), hard, micaceous *(continued)*		R-22	100 (100)					
788	MOHS 8.5 at 144.5'	145							
	145.3								
	Light and medium gray fine to medium-grained SANDSTONE, slightly weathered to fresh, massive, hard, micaceous, many carbonaceous laminations		R-23	100 (100)					
783		150							
	150.6								
	Medium to very dark gray CARBONACEOUS very fine-grained silty SANDSTONE, slightly weathered to fresh, massive, hard		R-24	100 (100)					
778	MOHS 3.5 at 155.0'	155							
	-black coal veins and interbeds from 157.8' to 159.2'		R-25	100 (74)					
	159.2								
773	INTERBEDDED dark gray very fine-grained sandy CARBONACEOUS SILTSTONE and light gray fine-grained SANDSTONE with carbonaceous laminations, slightly weathered to fresh, moderately broken to massive (generally massive), hard, micaceous, few fossiliferous zones	160	R-26	96 (96)					
768		165	R-27	100 (96)					
	169.4								
763	Boring Terminated at 169.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-2 AND S-3**	170							
758		175							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-6

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/20/17
Water Level During Drilling:
Drilled By: K. Erickson (Test Boring Services, Inc.)
Completion Date: 06/20/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Sunny, 72°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Phillips, P.E.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1011'		TOPSOIL 0.4								
		Brown and gray silty CLAY (CL), some sand, little micaceous sandstone fragments, medium to very stiff, moist		S-1	27	1-1-1 (2)				
				S-2	53	2-2-3 (5)				
1006			5							
				S-3	20	2-3-5 (8)				
1001			10	S-4	100	5-7-11 (18)				
		(POSSIBLE COLLUVIAL) 12.0								
		Red-brown silty CLAY (CL), trace gravel, very stiff to hard, moist		S-5	100	10-13-18 (31)				
996			15							
				S-6	100	15-16-21 (37)				
				S-7	100	21-19-22 (41)				
991			20							
		(POSSIBLE COLLUVIAL) 21.0								
		Brown DECOMPOSED CLAYSTONE sampled as claystone fragments, dense, dry		S-8	100	17-22-18 (40)				
986			25	S-9	100	23-27-34 (61)				
		(RESIDUAL) 27.0								
		Light brown DECOMPOSED SHALE sampled as shale fragments, very dense, dry		S-10	100	50/0.4'				
981			30							
		(RESIDUAL) 31.2		S-11	100	34-47-50/0.2'				
		Boring Terminated at 31.2 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
976			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-7

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/20/17
Water Level During Drilling:
Drilled By: K. Erickson (Test Boring Services, Inc.)
Completion Date: 06/20/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Sunny, 72°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Phillips, P.E.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1037'		TOPSOIL 0.5								
		Brown and gray silty CLAY (CL), little sand, trace gravel, stiff, moist		S-1	73	1-2-6 (8)				
				S-2	67	2-4-8 (12)				
1032		**(COLLUVIAL)** 6.0	5							
		Brown and orange silty CLAY (CL), trace shale fragments, very stiff, moist		S-3	100	4-10-10 (20)				
		(POSSIBLE RESIDUAL) 9.0								
1027		Red-brown silty CLAY (CL), little sand, trace decomposed rock fragments, extremely stiff, moist	10	S-4	100	15-25-24 (49)				
		(RESIDUAL) 12.5								
		Light brown and gray DECOMPOSED CLAYSTONE sampled as claystone fragments, dense, dry		S-5	100	13-14-17 (31)				
1022			15	S-6	100	27-21-30 (51)				
		(RESIDUAL) 18.0								
		Light gray to purple DECOMPOSED clayey SILTSTONE sampled as clayey siltstone fragments, very dense, dry		S-7	100	36-50/0.4'				
1017			20	S-8	100	50/0.4'				
		(RESIDUAL) 24.4		S-9	100	50/0.4'				
1012		Boring Terminated at 24.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.	25							
1007			30							
1002			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-8

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/19/17
Water Level During Drilling:
Drilled By: K. Erickson (Test Boring Services, Inc.)
Completion Date: 06/19/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Cloudy, 70's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
960'		TOPSOIL 0.2								
		Orange-brown clayey SAND (SC), few to little rock fragments, soft to stiff, moist		S-1	80	1-1-3 (4)	48.10	8.9	33	22
				S-2	100	8-7-8 (15)	48.10	20.7	33	22
955			5							
		(COLLUVIAL) 6.0								
		Red-brown and tan silty CLAY (CL), little small soft claystone fragments, very stiff, moist		S-3	87	5-7-13 (20)		10.6		
		(POSSIBLE COLLUVIAL/RESIDUAL) 9.0								
950		Red DECOMPOSED CLAYSTONE sampled as claystone fragments, dry	10	S-4	100	24-23-32 (55)		8.7		
		(RESIDUAL) 12.0								
		Tan DECOMPOSED clayey SHALE sampled as clayey shale fragments, few sand, dry		S-5	0	50/0.3'		4.4		
945		**(RESIDUAL)** 15.4	15	S-6	100	50/0.4'		6.4		
		Boring Terminated at 15.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-1 AND S-2**								
940			20							
935			25							
930			30							
925			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-9

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/13/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/13/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 80's | **Water Level Upon Completion:** 6.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** M. Walker, E.I.T. | **Water Level After 24 Hours:** 12.9'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
890'		Brown SANDSTONE FRAGMENTS (GC), some gray clay, trace organics, loose, dry		S-1	73	1-2-3 (5)		14.5		
		(COLLUVIAL) 3.0								
		Brown SANDSTONE FRAGMENTS (GC), little red clay, few sand, medium dense, dry		S-2	100	6-12-12 (24)		11.3		
885		**(COLLUVIAL)** 6.0	5							
		Gray and brown mottled sandy CLAY (CL), little sandstone fragments, trace coal fragments, stiff to very stiff, dry -Sample S-3 trace red clay		S-3	80	5-6-8 (14)		16.1		
880			10	S-4	100	6-11-12 (23)		11.5		
		(COLLUVIAL) 12.0								
		Dark brown and orange SANDSTONE FRAGMENTS (GW), few coal fragments, very dense, dry		S-5	100	18-21-25 (46)		10.8		
875		**(COLLUVIAL)** 15.0	15							
		Light brown and orange CLAY (CL), trace red clay, few sandstone fragments, few coal fragments, very stiff, dry		S-6	100	11-9-10 (19)		15.5		
		(COLLUVIAL) 18.0								
		Brown SANDSTONE FRAGMENTS (GC), some clay, trace coal fragments, medium dense, dry		S-7	73	9-8-10 (18)		12.1		
870		**(COLLUVIAL)** 21.0	20							
		Gray and light brown mottled CLAY (CL), few sandstone fragments, trace coal fragments, stiff to very stiff, dry		S-8	67	5-6-9 (15)		18.0		
865		-FAT CLAY (CH) seam ~25'	25	S-9	67	4-6-11 (17)		15.8		
		(COLLUVIAL) 27.0								
		Light gray, light brown, red, and purple CLAY (CL), trace claystsone fragments, trace sandstone fragments, very stiff, moist		S-10	100	4-8-10 (18)	88.74	22.9	47	17
860			30	S-11	80	7-9-12 (21)	88.74	18.0	47	17
		(COLLUVIAL) 33.0								
		Red, gray, and brown mottled CLAY (CL), some sandstone fragments, extremely stiff, dry		S-12	100	9-13-17 (30)		15.3		
855			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-9

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/13/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/13/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 80's | **Water Level Upon Completion:** 6.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** M. Walker, E.I.T. | **Water Level After 24 Hours:** 12.9'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	(COLLUVIAL) 36.0								
	Light brown and orange DECOMPOSED SHALEY SANDSTONE sampled as sandstone fragments, dense to very dense, dry -Sample S-13 wet spoon		S-13	100	9-18-19 (37)		6.3		
	(RESIDUAL) 39.8		S-14	100	40-50/0.3'		5.9		
850	Brown to gray SHALE, moderately weathered to slightly weathered, thinly laminated, very broken to blocky, soft to hard MOHS 0.5 at 40.2' -moderately weathered, soft from 40.2' to 40.6' MOHS 4.5 at 40.8' -moderately weathered from 41.5' to 41.7'	40	R-1	93 (0)					
845	MOHS 4.5 at 43.7' -moderately weathered, soft from 43.7' to 44.0'	45	R-2	64 (12)					
840	MOHS 4.5 at 46.0' -vertical fracture from 48.0' to 49.0' -moderately weathered, soft from 49.0' to 50.3'	50	R-3	94 (58)					
835	-some fine sandstone laminations from 52.0' to 56.0' -limy at 52.5' -hard from 52.6' to 57.0' -dark gray from 52.0' to 57.0'	55	R-4	100 (98)					
	-black carbonaceous shale, some visible pyrite at 57.0' 57.5								
830	Gray fine-grained SANDSTONE, fresh, thinly to thickly laminated, massive, hard, some carbonaceous laminations, limestone inclusions 59.0 MOHS 9.5 at 58.0'	60							
	Boring Terminated at 59.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-10 AND S-11**								
825		65							
820		70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-10

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/20/17 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/20/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 60's | **Water Level Upon Completion:**

Drilling Method: 3 1/4-inch HSA | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1033'	TOPSOIL 0.3								
	Tan ROCK FRAGMENTS (GW), some sand, few silt, loose, dry		S-1	80	1-2-3 (5)		10.5		
			S-2	67	6-4-4 (8)		23.8		
1028	**(COLLUVIAL)** 5.0	5							
	Brown and gray mottled CLAY (CL), trace claystone fragments, firm, moist		S-3	100	8-6-8 (14)	97.68	11.9	43	22
1023	-purple ~9'	10	S-4	100	12-11-12 (23)	97.68	9.6	43	22
	(COLLUVIAL) 12.0								
	Tan DECOMPOSED SHALE sampled as shale fragments, medium dense, dry		S-5	100	7-10-16 (26)		13.1		
1018	**(RESIDUAL)** 15.0	15							
	Tan to purple DECOMPOSED CLAYSTONE sampled as claystone fragments, very dense, dry		S-6	100	28-41-50/0.3'		8.5		
	(RESIDUAL) 18.4		S-7	100	50/0.4'		8.2		
	Boring Terminated at 18.4 feet								
1013	Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-3 AND S-4**	20							
1008		25							
1003		30							
998		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-11

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/22/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/22/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Mostly sunny, 72 °
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
975'	TOPSOIL 0.3								
	Red-brown and yellow-brown ROCK FRAGMENTS (GW) (sandtsone, shale, claystone), few sand, few to little clay, very loose to medium dense, moist		S-1	47	1-1-3 (4)				
			S-2	100	14-7-6 (13)				
970		5							
			S-3	100	8-12-13 (25)				
965		10	S-4	100	11-10-9 (19)				
	(COLLUVIAL) 12.0								
	Brown-red to purple and brown-yellow mottled DECOMPOSED CLAYSTONE sampled as claystone fragments, trace to few clay, medium dense to dense, moist		S-5	100	7-10-12 (22)				
960		15	S-6	100	11-12-11 (23)				
			S-7	100	12-17-23 (40)				
955	**(RESIDUAL)** 20.0	20							
	Brown and brown-red DECOMPOSED SHALE sampled as shale fragments, few clay, very dense, moist		S-8	100	50/0.2'				
	(RESIDUAL) 24.0								
950	Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, very dense, moist 24.4	25	S-9	100	50/0.4'				
	(RESIDUAL)								
	Boring Terminated at 24.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
945		30							
940		35							

BORING LOG - GARVIN - GARVIN.GDT - 08/14/19 08:56 - \\SERVER\SHARED DOCUMENTS\GINT\PROJECTS\16123 TULL PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

GBB-12

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/22/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/22/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Mostly sunny, 70°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
983'		TOPSOIL 0.4								
		Brown-red and tan CLAY (CL), trace to some rock fragments (shale, claystone), soft to stiff, moist		S-1	80	1-1-2 (3)				
				S-2	100	8-6-6 (12)				
978			5							
		(COLLUVIAL) 7.0		S-3	100	4-7-10 (17)				
		Brown and brown-red DECOMPOSED SHALE (GW) sampled as shale fragments, few silt, few clay, medium dense to dense, moist, some clayey shale interbeds								
973			10	S-4	100	13-12-14 (26)				
				S-5	100	18-16-17 (33)				
968		**(RESIDUAL)** 15.0	15							
		Purple and yellow-brown mottled to tan DECOMPOSED CLAYSTONE sampled as claystone fragments, few clay, medium dense to very dense, moist to dry		S-6	100	16-16-20 (36)				
				S-7	100	16-17-16 (33)				
963			20							
				S-8	100	19-30-50/0.4'				
		(RESIDUAL) 24.4								
958			25	S-9	100	50/0.4'				
		Boring Terminated at 24.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
953			30							
948			35							

BORING LOG - GARVIN - GARVIN.GDT - 08/14/19 08:56 - \\SERVER\SHARED DOCUMENTS\GINT\PROJECTS\16123 TULL PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

GBB-13

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/20/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/20/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Sunny, 65°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
996'		TOPSOIL 0.3								
		Brown SANDSTONE FRAGMENTS (GW), trace to few sand, few clay, very loose to firm, moist		S-1	60	1-1-1 (2)		13.8		
				S-2	67	6-6-5 (11)		10.9		
991			5							
		(COLLUVIAL) 6.5		S-3	100	6-10-15 (25)		9.8		
		Brown and gray ROCK FRAGMENTS (GC) (sandstone, shale), some brown-red clay, medium dense, moist								
		(COLLUVIAL) 9.0								
986		Purple to gray and orange-brown mottled DECOMPOSED CLAYSTONE sampled as claystone fragments, dense, moist	10	S-4	100	18-21-14 (35)		10.0		
		(RESIDUAL) 11.0								
		Gray-brown DECOMPOSED SHALE sampled as shale fragments, very dense, dry		S-5	100	41-44-43 (87)		6.2		
981			15							
				S-6	100	32-31-37 (68)		7.9		
				S-7	100	33-50/0.4'		6.0		
976			20							
		(RESIDUAL) 22.4		S-8	100	40-34-50/0.4'		8.0		
		Boring Terminated at 22.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
971			25							
966			30							
961			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-14

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/20/17 | **Water Level During Drilling:**

Drilled By: T. Zilka (Test Boring Services, Inc.) | **Completion Date:** 06/20/17 | **Water Level Before Coring:**

Drilling Rig: CME 850 Buggy Rig | **Weather:** Sunny, 72° | **Water Level Upon Completion:** 23.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** L. Phillips, P.E. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1083'	TOPSOIL 0.4		S-1	100	1-3-2 (5)				
	Brown silty CLAY (CL/ML), little gravel, trace sand, medium, moist								
	(COLLUVIAL) 3.0								
	Orange-brown SANDSTONE FRAGMENTS (SW), very dense, moist		S-2	100	33-32-50/0.4'				
1078	**(COLLUVIAL)** 6.0	5							
	Orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, some sand, very dense, moist		S-3	100	39-50/0.4'				
	(RESIDUAL) 9.3								
1073	Brown to light gray medium to fine-grained SANDSTONE, slightly weathered, thinly bedded, medium hard, dark stained fractures	10	S-4 / R-1	100 / 86 (0)	50/0.3'				
	-vertical fracture from 13.5' to 13.7' -soft seam from 14.0' to 14.1'	15	R-2	100 (14)					
1068									
	-vertical fracture from 17.5' to 18.0' MOHS 8.5 at 18.0'		R-3	100 (12)					
1063		20							
	-vertical fracture from 20.3' to 20.6'		R-4	92 (0)					
	-micaceous seam at 24.0'								
1058		25							
	27.5		R-5	100 (0)					
	Gray completely weathered CLAYSTONE, very soft								
1053	30.0	30							
	Light gray fine-grained SANDSTONE, slightly weathered, moderately broken to blocky, hard		R-6	98 (76)					
1048	MOHS 5.5 at 34.0' 35.0	35							

(Continued Next Page)

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-14

Project Number: 16123
Project Name: Tull Property
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/20/17
Water Level During Drilling:
Drilled By: T. Zilka (Test Boring Services, Inc.)
Completion Date: 06/20/17
Water Level Before Coring:
Drilling Rig: CME 850 Buggy Rig
Weather: Sunny, 72°
Water Level Upon Completion: 23.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Phillips, P.E.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Boring Terminated at 35.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
1043			40							
1038			45							
1033			50							
1028			55							
1023			60							
1018			65							
1013			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-15

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/20/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/20/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Mostly sunny, 78°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
968'	TOPSOIL 0.4								
	Brown-red CLAY (CL), soft, moist		S-1	80	1-1-2 (3)				
	(COLLUVIAL) 3.0								
	Purple CLAY (CL), little to some rock fragments (yellow-brown sandstone, red claystone), stiff, moist		S-2	100	3-4-5 (9)				
963		5							
	(COLLUVIAL) 6.0								
	Brown-red CLAY (CL), few claystone fragments, very stiff, moist		S-3	100	10-10-13 (23)				
	(RESIDUAL) 9.0								
958	Gray and red-yellow mottled CLAY (CL), few gray claystone fragments, very stiff, moist	10	S-4	100	13-12-14 (26)				
	(RESIDUAL) 12.0								
	Brown DECOMPOSED SHALE and SANDSTONE sampled as shale and sandstone fragments, few sand, few silt, very dense, dry 13.5		S-5	100	50/0.3'				
	(RESIDUAL) 13.8		S-6	100	50/0.3'				
953	Gray-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, trace sand, very dense, dry	15							
	(RESIDUAL)								
	Boring Terminated at 13.8 feet								
	Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
948		20							
943		25							
938		30							
933		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-16

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/20/17 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/20/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 68° | **Water Level Upon Completion:**

Drilling Method: 3 1/4-inch HSA | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1023'	Tan SANDSTONE FRAGMENTS (GW), few sand, very loose, dry		S-1	47	1-1-1 (2)		11.2		
	(COLLUVIAL) 3.0								
	Brown-red CLAY (CL), trace rock fragments (claystone, shale), firm to medium dense, moist		S-2	100	5-4-5 (9)	98.55	15.8	39	21
1018		5							
			S-3	100	5-6-10 (16)	98.55	14.9	39	21
	(COLLUVIAL) 9.0								
1013	Tan CLAY (CL), some rock fragments (claystone), hard, dry	10	S-4	100	16-19-20 (39)		17.1		
	(RESIDUAL) 11.0								
	Brown-red and gray mottled DECOMPOSED CLAYSTONE sampled as claystone fragments, trace clay, very dense, dry		S-5	100	14-35-40 (75)	77.69	10.3	35	18
1008		15	S-6	100	30-31-50/0.4'	77.69	10.8	35	18
	(RESIDUAL) 19.3		S-7	100	33-46-50/0.3'		10.9		
1003	Boring Terminated at 19.3 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLES COMPOSED S-2 & S-3 AND S-5 &S-6**	20							
998		25							
993		30							
988		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-17

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/20/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/20/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Mostly sunny, 75°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
937'		TOPSOIL 0.4								
		Tan ROCK FRAGMENTS (GW) (sandstone, shale), little silt, loose, damp		S-1	100	1-3-3 (6)		11.6		
		(COLLUVIAL) 3.0								
		Orange-red CLAY (CL), some gray and brown rock fragments (sandstone), stiff, moist		S-2	100	7-6-9 (15)		16.8		
932			5							
		(COLLUVIAL) 6.0								
		Brown-red and gray mottled CLAY (CL), little rock fragments (claystone, shale, sandstone), stiff, moist		S-3	100	7-7-8 (15)		13.3		
		(COLLUVIAL) 8.0								
		Tan and red-brown INTERBEDDED DECOMPOSED SANDSTONE and SHALE sampeld as sandstone and shale fragments, trace to few sand, trace to few silt, very dense, dry		S-4	100	50/0.4'		6.1		
927			10							
		(RESIDUAL) 12.4		S-5	100	50/0.4'		5.3		
		Boring Terminated at 12.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
922			15							
917			20							
912			25							
907			30							
902			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-18

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/20/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/20/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: mostly sunny, 75°
Water Level Upon Completion: 17'
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 12.2'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
936'	TOPSOIL 0.5								
	Brown-red CLAY (CL), some rock fragments (yellow-brown sandstone, shale, claystone), very soft to very stiff, moist to wet		S-1	33	1-1-1 (2)				
			S-2	100	7-9-8 (17)				
931		5							
			S-3	100	4-6-7 (13)				
			S-4	100	7-5-5 (10)				
926		10							
	-wet from 12.0' to 16.5'		S-5	100	5-5-5 (10)				
921	**(COLLUVIAL)**	15							
	Gray, brown, and brown-gray SHALE FRAGMENTS (GM), few silt, firm, wet 15.5		S-6	100	5-7-5 (12)				
	(RESIDUAL) 18.0								
	Brown-gray DECOMPOSED SHALE sampled as shale fragments, medium dense to very dense, moist to dry		S-7	100	9-8-7 (15)				
916		20							
			S-8	100	26-30-50/0.4'				
	(RESIDUAL) 24.4								
911		25	S-9	100	50/0.4'				
	Boring Terminated at 24.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
906		30							
901		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-19

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/12/17 | **Water Level During Drilling:**

Drilled By: D. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/12/17 | **Water Level Before Coring:**

Drilling Rig: CME 55 Track Mounted | **Weather:** Sunny, 87° | **Water Level Upon Completion:**

Drilling Method: 3 1/4-inch HSA | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1014'		TOPSOIL 0.4								
		Brown silty SAND (SM), few clay, trace organics (roots), loose, moist 2.0		S-1	60	1-3-2 (5)				
		(COLLUVIAL)								
		Brown CLAY (CL), some rock fragments (shale, sandstone, carbonaceous shale), stiff, moist		S-2	100	4-4-7 (11)				
1009		**(COLLUVIAL)** 5.0	5							
		Brown-red and gray mottled DECOMPOSED CLAYSTONE with calcareous nodules/clasts sampled as clay, some rock fragments, dense, dry		S-3	100	7-13-28 (41)				
		(RESIDUAL) 9.0								
1004		Brown-red and gray mottled DECOMPOSED calcareous CLAYSTONE sampled as claystone fragments, very dense, dry	10	S-4	100	21-28-50/0.4'				
		-limestone fragments at 12.5'		S-5	100	30-35-18 (53)				
999			15							
		(RESIDUAL) 15.9		S-6	100	41-50/0.4'				
		Boring Terminated at 15.9 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
994			20							
989			25							
984			30							
979			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-20

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/21/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/21/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Overcast, 65°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
953'		TOPSOIL 0.3								
		Brown-red CLAY (CL), some brown-yellow sandstone fragments, very soft, moist 2.0		S-1	67	1-1-1 (2)				
		(COLLUVIAL)								
		Red-yellow and brown-orange mottled CLAY (CL), little rock fragments (sandstone, shale), stiff to very stiff, moist		S-2	53	3-4-7 (11)				
948			5							
				S-3	100	6-8-9 (17)				
943			10	S-4	100	9-6-7 (13)				
		(COLLUVIAL) 11.0								
		Brown-red DECOMPOSED SHALE sampled as shale fragments, few silt, trace clay, very dense, moist, few claystone interbeds		S-5	100	22-28-43 (71)				
938			15	S-6	100	21-28-32 (60)				
		(RESIDUAL) 18.3								
		Auger Refusal at 18.3 feet		S-7		50/0.0'				
933		Boring Terminated at 18.3 feet	20							
		Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
928			25							
923			30							
918			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-21

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/21/17 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/21/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Overcast, 65° | **Water Level Upon Completion:**

Drilling Method: 3 1/4-inch HSA | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1024'	TOPSOIL 0.2								
	Orange-red CLAY (CL), few rock fragments (shale, sandstone), few sand, very soft, moist **(COLLUVIAL)** 2.5		S-1	100	1-1-1 (2)		15.0		
1019	Red-yellow and gray mottled CLAY (CL), few rock fragments (micaceous sandstone, shale), stiff, moist **(COLLUVIAL)** 6.0	5	S-2	100	5-6-8 (14)		11.9		
	Purple and gray mottled CLAY (CL), some rock fragments (claystone, shale), stiff, moist **(COLLUVIAL)** 8.0		S-3	100	6-6-9 (15)		12.2		
1014	Purple and gray mottled DECOMPOSED CLAYSTONE sampled as claystone fragments, trace clay, dense, moist to dry	10	S-4	100	14-13-11 (24)	97.66	11.4	38	21
	-tested as (CL)								
	-calcareous from 12.0' to 13.5'		S-5	100	13-15-18 (33)	97.66	10.9	38	21
1009	**(RESIDUAL)** 15.0	15							
	Red-brown, orange-yellow and gray-brown DECOMPOSED LIMESTONE sampled as limestone fragments, dense, dry **(RESIDUAL)** 18.0		S-6	100	14-22-27 (49)		10.8		
1004	Brown-red DECOMPOSED CLAYSTONE sampled as claystone fragments, very dense, dry	20	S-7	100	17-29-39 (68)		10.5		
			S-8	100	24-27-50/0.4'		11.0		
999	**(RESIDUAL)** 24.9	25	S-9	100	43-50/0.4'		10.3		
	Boring Terminated at 24.9 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-4 AND S-5**								
994		30							
989		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-22

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/12/17
Water Level During Drilling:
Drilled By: D. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/12/17
Water Level Before Coring:
Drilling Rig: CME 55 Track Mounted
Weather: Sunny, 84°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1001'	TOPSOIL 0.4								
	Red-orange CLAY (CL), trace rock fragments, trace organics (roots), soft, moist		S-1	67	2-2-2 (4)				
	(COLLUVIAL) 4.0		S-2	80	4-5-9 (14)				
996	Brown-red CLAY (CL), trace organics (roots), stiff, moist	5							
	(RESIDUAL) 6.0		S-3	87	8-14-16 (30)				
	Brown-red and gray mottled DECOMPOSED CLAYSTONE, extremely stiff, moist								
991	-calcareous zones 9.0' from 13.0'	10	S-4	100	16-21-25 (46)				
	(RESIDUAL) 13.0		S-5	100	33-32-50/0.3'				
	Brown-gray DECOMPOSED LIMESTONE sampled as clay, few limestone fragments, very dense, moist 13.3								
986	**(RESIDUAL)**	15							
	Boring Terminated at 13.3 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
981		20							
976		25							
971		30							
966		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-23

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/22/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/22/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Mostly sunny, 74°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1031'	TOPSOIL 0.5								
	Brown and brown-gray ROCK FRAGMENTS (GW) (sandstone, shale), some clay, very loose to firm, moist		S-1	53	1-1-1 (2)		28.2		
			S-2	100	6-5-7 (12)		12.5		
1026	**(COLLUVIAL)** 5.0	5							
	Gray SHALE FRAGMENTS (GW), firm, dense								
	(RESIDUAL) 6.8		S-3	100	6-4-5 (9)		32.8		
	Dark brownish-purple clayey SILT (CL/ML), trace limestone fragments, stiff, wet 7.3								
	(RESIDUAL)								
1021	Brown-gray DECOMPOSED SHALE FRAGMENTS sampled as shale fragaments, loose to dense, moist 10.0	10	S-4	100	14-22-22 (44)		13.0		
	(RESIDUAL)								
	Tan to brown-red and gray mottled DECOMPOSED CLAYSTONE with calcareous nodues sampled as claystone fragments, trace clay, dense to very dense, dry		S-5	100	35-41-50/0.4'		10.6		
1016	**(RESIDUAL)** 15.4	15	S-6	100	50/0.4'		11.6		
	Boring Terminated at 15.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
1011		20							
1006		25							
1001		30							
996		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-24

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/15/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Partly sunny, 70's | **Water Level Upon Completion:** 20'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** L. Barnes, E.I.T. | **Water Level After 24 Hours:** 19.7'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
814'		Brown sandy SILT (ML), some sandstone fragments, soft, moist		S-1	67	1-1-2 (3)				
		(RESIDUAL) 1.5								
		Yellow-brown DECOMPOSED SANDSTONE (GW) sampled as sandstone fragments, few sand, very dense, moist		S-2	100	11-12-47 (59)				
809		**(RESIDUAL)** 5.5	5							
		Brown water-stained medium-grained SANDSTONE, moderately to highly weathered, very broken to massive (generally blocky to massive), medium hard to hard		S-3		50/0.0'				
		-vertical fracture from 7.3' to 7.8'		R-1	100 (71)					
804			10							
		MOHS 8.5 at 10.5'		R-2	100 (74)					
		-very broken/fractured from 11.9' to 12.3'								
799			15							
				R-3	100 (100)					
		17.8								
		Gray medium-grained SANDSTONE, moderately to slightly weathered, very broken to massive (generally blocky), medium hard to hard, micaceous, few water stained zones								
794		MOHS 8.5 at 18.0'	20	R-4	100 (92)					
		24.0								
789		Boring Terminated at 24.0 feet	25							
		Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
784			30							
779			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-25

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/19/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/19/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rain, 70's | **Water Level Upon Completion:**

Drilling Method: 3 1/4-inch HSA | **Logged By:** L. Barnes, E.I.T. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1032'		FILL sampled as dark brown clayey silt, little rock fragments/slag, trace organics, very soft, moist		S-1	33	1-1-1 (2)		17.3		
		(FILL) 3.0								
		Orange-brown and gray mottled CLAY (CL), medium, moist		S-2	100	2-3-3 (6)		29.0		
1027		**(COLLUVIAL)** 6.0	5							
		Red-brown and yellow-brown CLAY (CL), few claystone fragments, very stiff, moist		S-3	100	4-7-10 (17)	85.82	14.8	41	22
		(COLLUVIAL) 9.0								
1022		Tan and black CLAY (CL), few claystone fragments, very stiff, moist	10	S-4	100	11-12-16 (28)	85.82	23.4	41	22
		(COLLUVIAL) 12.0								
		Red-brown and yellow-brown CLAY (CL), few claystone fragments, extremely stiff, moist		S-5	100	7-15-23 (38)	85.82	16.9	41	22
1017		**(POSSIBLE COLLUVIAL/RESIDUAL)** 15.0	15							
		Tan and orange-brown silty CLAY (CL), few limestone nodules/clasts, limy, dry		S-6	100	22-35-50/0.4'		11.2		
		(RESIDUAL) 18.0								
		Red-brown DECOMPOSED CLAYSTONE sampled as silty clay, little claystone fragments, dry		S-7	100	44-50/0.4'		9.6		
1012		**(RESIDUAL)** 21.0	20							
		Red-brown to red-gray to purplish-red and gray mottled DECOMPOSED CLAYSTONE samped as claystone fragments, little clay, few calcareous clasts, dry		S-8	100	26-25-18 (43)		12.2		
1007			25	S-9	100	33-38-50/0.3'		9.6		
		(RESIDUAL) 28.3		S-10	100	33-48-50/0.3'		9.3		
1002		Boring Terminated at 28.3 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-3, S-4, AND S-5**	30							
997			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-26

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/19/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/19/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rain, 70's | **Water Level Upon Completion:**

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** L. Barnes, E.I.T. | **Water Level After 24 Hours:** 24.7'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	% < #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
932'	TOPSOIL 0.2		S-1	80	1-3-4 (7)		26.4		
	Red-brown to red and tan FAT CLAY (CH), few to little rock fragments (including sandstone, shale, claystone), soft to stiff, moist		S-2	80	2-2-3 (5)	78.55	16.7	50	17
927		5	S-3	47	2-2-2 (4)	78.55	19.8	50	17
922		10	S-4	67	3-5-6 (11)		17.7		
			S-5	100	4-9-5 (14)		20.7		
917		15	S-6	53	3-3-3 (6)		16.1		
			S-7	100	3-4-5 (9)		15.0		
912	**(COLLUVIAL)** 21.0	20							
	Brown and red mottled sitly CLAY (CL), little rock fragments (including sandstone, shale), stiff, moist		S-8	100	6-7-8 (15)		15.3		
	(COLLUVIAL) 24.0								
907	Gray and brown CLAY (CL), little rock fragments, few sand, stiff, moist	25	S-9	100	7-7-7 (14)		14.6		
	(COLLUVIAL) 27.0								
	Tan, brown, and red silty CLAY (CL), little rock fragments, very stiff, moist		S-10	100	9-10-12 (22)		14.7		
902	**(COLLUVIAL)** 30.0	30							
	Tan silty CLAY (CL), few claystone fragments, extremely stiff, dry		S-11	100	8-15-22 (37)		11.3		
	(RESIDUAL) 33.0								
	Tan and yellow-brown silty CLAY (CL), few limestone nodules and clasts, dry		S-12	100	50/0.1'		6.5		
897	**(RESIDUAL)**	35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-26

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/19/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/19/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rain, 70's | **Water Level Upon Completion:**

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** L. Barnes, E.I.T. | **Water Level After 24 Hours:** 24.7'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Light gray DECOMPOSED LIMESTONE sampled as limestone fragments, trace sandy, dry **(RESIDUAL)**	35.2 / 35.4	S-13	50	50/0.2'		2.0		
892		Auger Refusal at 35.2 feet Boring Terminated at 35.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-2 AND S-3**	40							
887			45							
882			50							
877			55							
872			60							
867			65							
862			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-27

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/19/17
Water Level During Drilling:
Drilled By: K. Erickson (Test Boring Services, Inc.)
Completion Date: 06/19/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Mostly sunny, 80's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
972'	TOPSOIL 0.2								
	Brown clayey SILT (ML), few rock fragments (including red shale, carbonaceous shale, sandstone), trace organics, medium, moist		S-1	67	1-3-3 (6)		14.2		
	(COLLUVIAL) 3.0								
	Red-brown and brown CLAY (CL), few rock fragments, stiff, moist		S-2	100	6-7-7 (14)		19.0		
967		5							
	(COLLUVIAL) 6.0								
	Brown and light brown silty CLAY (CL), some rock fragments (mostly sandstone, including small red shale and coal), few sand, very stiff, moist		S-3	100	12-14-15 (29)		7.0		
962		10	S-4	87	16-14-15 (29)		8.4		
	(COLLUVIAL) 12.0								
	Red and yellow-brown CLAY (CL), little shaley claystone fragments, very stiff, dry		S-5	100	9-11-14 (25)		8.1		
957	**(POSSIBLE COLLUVIAL/RESIDUAL)** 15.0	15							
	Tan silty CLAY (CL), few claystone fragments, very stiff, dry		S-6	100	11-9-9 (18)		11.2		
	(POSSIBLE COLLUVIAL/RESIDUAL) 18.0								
	Orange-brown and light brown CLAY (CL), few clayey shale fragments, very stiff, dry		S-7	100	11-13-11 (24)		8.1		
952	**(RESIDUAL)** 21.0	20							
	Orange-brown and light brown DECOMPOSED CLAYEY SHALE samped as clayey shale fragments, trace sand, dry		S-8	100	14-44-50/0.2'		5.4		
	(RESIDUAL) 24.0								
947	Light brown DECOMPOSED SHALE sampeld as shale fragments, few silt, dry 24.3	25	S-9	67	50/0.3'		4.5		
	(RESIDUAL)								
	Boring Terminated at 24.3 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
942		30							
937		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-28

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/15/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/15/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Partly sunny, 70's | **Water Level Upon Completion:**

Drilling Method: 3 1/4-inch HSA | **Logged By:** L. Barnes, E.I.T. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
887'	Brown and tan clayey SAND (SC), some gravel (claystone, shale, sandstone), very stiff, dry		S-1	67	2-7-12 (19)	33.66	10.0	30	19
			S-2	100	7-9-8 (17)	33.66	8.0	30	19
882		5							
	(COLLUVIAL)		S-3	100	6-9-11 (20)		7.7		
	7.5								
	Brown, yellow, orange and red-brown DECOMPOSED SANDSTONE sampled as sandstone fragmentss, some sand, very dense, dry								
877		10	S-4	100	15-33-38 (71)		8.2		
	(RESIDUAL)								
	12.0		S-5	100	50/0.4'		4.9		
	Brown DECOMPOSED sandy SHALE sampled as sandy shale fragments, little sand, few silt, few clay, dry to moist								
872		15							
	-Sample S-6 sampeld as sandy shale fragments, little clay, few sand		S-6	100	30-42-43 (85)		4.7		
	(RESIDUAL)								
	18.0								
	Tan DECOMPOSED clayey SHALE sampled as clayey shale fragments, few sand, few clay, dry		S-7	100	30-50/0.4'		5.1		
	18.9								
867	**(RESIDUAL)**	20							
	Boring Terminated at 18.9 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-1 AND S-2**								
862		25							
857		30							
852		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-29

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/16/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Mostly sunny, 70's | **Water Level Upon Completion:**

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** L. Barnes, E.I.T. | **Water Level After 24 Hours:** 14.8'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
874'	Brown and red-brown clayey GRAVEL (GC) (sandstone and shale fragments, little sand, stiff to very stiff, moist		S-1	73	1-4-4 (8)		13.8		
			S-2	60	5-4-4 (8)	35.96	22.5	34	19
869		5							
			S-3	87	3-7-7 (14)	35.96	14.1	34	19
	(COLLUVIAL)	9.0							
864	Brown and red-brown CLAY (CL), few to some rock fragments (sandstone, shale), trace to few sand, stiff to very stiff, moist	10	S-4	87	6-7-10 (17)		15.5		
			S-5	100	11-13-18 (31)		12.7		
859	▼	15							
	(COLLUVIAL)	16.5	S-6	100	10-11-18 (29)		13.2		
	Brown DECOMPOSED SHALE sampled as shale fragments, trace to few silt, moist		S-7	100	12-15-19 (34)		10.0		
854		20							
			S-8	100	23-23-42 (65)		8.8		
	(RESIDUAL)	24.3							
849	Medium and dark gray SHALE, moderately to highly weathered, very broken to moderately broken, very soft to medium hard, few carboanceous zones, micaceous	25	S-9	100	50/0.3'				
	-high angle fracture from 26.0' to 26.1'		R-1	100 (0)					
	MOHS 3.5 at 27.0'								
	-hard gray limestone from 27.4' to 27.8'		R-2	90 (20)					
844		30							
	-very soft from 30.8' to 31.2'								
	-very soft from 31.4' to 31.6'								
	-very soft from 32.4' to 32.6'		R-3	100 (40)					
839		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-29

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/16/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Mostly sunny, 70's | **Water Level Upon Completion:**

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** L. Barnes, E.I.T. | **Water Level After 24 Hours:** 14.8'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-calcareous veins from 34.5' to 35.2' -slickensided from 34.7' to 34.9' Medium and dark gray SHALE, moderately to highly weathered, very broken to moderately broken, very soft to medium hard, few carboanceous zones, micaceous *(continued)* -calcareous veins from 37.4' to 37.6'		R-4	100 (80)					
834			40							
		40.8 Gray and medium gray SANDSTONE, moderately to slightly weathered, very broken to massive, medium hard to hard, miaceous, few calcareous clasts and inclusions, many medium gray laminations -brown, water-stained from 41.2' to 41.5' -brown, water-stained at 42.5'		R-5	100 (51)					
829		44.3 MOHS 9.5 at 43.0'	45							
		Boring Terminated at 44.3 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-2 AND S-3**								
824			50							
819			55							
814			60							
809			65							
804			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-30

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/16/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Mostly sunny, 70's | **Water Level Upon Completion:**

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** L. Barnes, E.I.T. | **Water Level After 24 Hours:** 11.2'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
905'		FILL sampled as brown silty clay, few to little rock fragaments, few sand, trace wood fragments, soft to very stiff, moist		S-1	47	1-1-3 (4)		16.9		
				S-2	100	5-7-13 (20)		13.5		
900			5							
		(POSSIBLE FILL/COLLUVIAL) 6.0								
		Brown and light brown clayey SAND (SC), trace rock fragments (including red sandstone, sandstone, sandy shale), stiff to very stiff, moist		S-3	100	7-15-13 (28)		9.4		
		-Sample S-4 rock fragments include clayey shale								
895			10	S-4	100	7-8-9 (17)		15.5		
				S-5	100	7-7-9 (16)	40.63	12.4	28	17
890			15							
				S-6	100	6-7-7 (14)	40.63	11.7	28	17
		(COLLUVIAL) 18.0								
		Brown and tan CLAY (CL), little rock fragments (including small shale and clayey shale), few silt, very stiff, moist		S-7	100	7-11-13 (24)		13.2		
885			20							
				S-8	100	7-9-10 (19)		13.2		
		(COLLUVIAL) 24.0								
880		Brown DECOMPOSED SHALE sampled as shale fragments, few silt, trace clay, medium dense to very dense, moist	25	S-9	100	33-18-12 (30)		8.6		
				S-10	100	24-41-50/0.4'		6.9		
875			30							
		(RESIDUAL) 31.3		S-11	100	13-39-50/0.3'		7.3		
		Brown and gray shaley CLAYSTONE, highly weathered, very broken, very soft to soft		R-1	100 (21)					
		MOHS 0 at 33.0' 33.2								
870		-few thin clay seams from 34.4' to 36.1'	35							

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BORING LOG - GARVIN - GARVIN.GDT - 08/14/19 08:56 - \\SERVER\SHARED DOCUMENTS\GINT\PROJECTS\16123 TULL PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

GBB-30

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/16/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/16/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Mostly sunny, 70's | **Water Level Upon Completion:**

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** L. Barnes, E.I.T. | **Water Level After 24 Hours:** 11.2'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Medium gray very fine to fine-grained SANDSTONE, slightly weathered, very broken to massive (generally blocky to massive), medium hard to hard, micaceous *(continued)*		R-2	100 (64)					
865		MOHS 9.5 at 37.0'	40							
				R-3	100 (100)					
860			45							
		46.0								
		Grading into medium gray very fine-grained sandy SILTSTONE, slightly weathered to fresh, massive, hard		R-4	100 (100)					
855			50							
		MOHS 4.5 at 50.0'		R-5	100 (100)					
		51.3								
		Boring Terminated at 51.3 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-5 AND S-6**								
850			55							
845			60							
840			65							
835			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-31

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/13/17 | **Water Level During Drilling:**

Drilled By: K. Erickson (Test Boring Services, Inc.) | **Completion Date:** 06/13/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 75° | **Water Level Upon Completion:** 17.9'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** M. Walker, E.I.T. | **Water Level After 24 Hours:** 8.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
853'	Brown silty CLAY (CL), some sandstone fragaments, trace sand, soft, dry		S-1	67	1-2-1 (3)		16.9		
	(COLLUVIAL) 3.0								
	Light brown DECOMPOSED SANDSTONE (GW) (possible boulder) sampled as SANDSTONE FRAGMENTS, few clay, loose, dry		S-2	33	4-5-4 (9)		10.6		
848		5							
	(COLLUVIAL) 6.0								
	Brown sandy CLAY (CL), few light gray sandstone and shale fragments, stiff, dry		S-3	100	4-5-6 (11)		14.8		
	(COLLUVIAL) 9.0								
843	Light gray to medium gray DECOMPOSED sandy SILTSTONE sampled as siltstone fragments, trace red clay in spoon, dense to very dense, dry	10	S-4	53	12-15-21 (36)		4.4		
	(RESIDUAL) 12.9		S-5	100	36-50/0.4'		3.7		
838	Medium gray CARBONACEOUS fine to very fine coarse-grained SANDSTONE to SILTSTONE, slightly weathered to fresh, very broken to moderately broken, medium hard	15	R-1	81 (0)					
	MOHS 2.5 at 15.7'		R-2	100 (0)					
833		20							
	22.0								
	Light gray and brown medium-grained SANDSTONE, few carbonaceous laminations in light gray portion of rock core, slightly weathered, blocky to massive, medium hard to hard, limy inclusions		R-3	100 (58)					
828	MOHS 7.5 at 23.0'	25							
			R-4	100 (84)					
823		30							
			R-5	100 (80)					
	33.0								
818	Boring Terminated at 33.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.	35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-32

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/23/17 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/23/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rainy, 70° | **Water Level Upon Completion:** 6.8'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
961'	TOPSOIL 0.4		S-1	73	1-1-1 (2)		15.5		
	Red-brown and gray ROCK FRAGMENTS (GW) (sandstone, clay, shale), little brown-red clay, very loose, moist **(COLLUVIAL)** 3.0								
	Orange-brown, gray, and brown SANDSTONE FRAGMENTS (GP), little to some sand, loose, moist		S-2	100	9-10-10 (20)		13.0		
956		5							
			S-3	100	3-3-5 (8)		15.4		
	(RESIDUAL) 9.0								
951	Gray-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, medium dense, dry	10	S-4	100	6-7-9 (16)		15.3		
	(RESIDUAL) 12.1								
	Tan DECOMPOSED SHALE sampled as shale fragments, few silt, very dense, dry		S-5	100	50/0.4'		10.6		
946	**(RESIDUAL)** 15.3	15	S-6	100	50/0.3'				
	Brown to gray SILTSTONE, moderately weathered, thinly to thickly bedded, very broken to massive, soft to hard, few clayey siltstone interbeds -vertical fracture from 15.3' to 17.5' -soft from 15.3' to 16.5' -medium hard from 16.5' to 23.0'		R-1	90 (0)					
941		20	R-2	100 (0)					
	-vertical fracture from 21.3' to 21.6' MOHS 3.5 at 22.0' -vertical fracture from 22.3' to 30.6'								
936		25	R-3	100 (38)					
	MOHS 5.5 at 27.0'								
931		30	R-4	100 (48)					
	-dark gray interbeds at 31.0' -few fine-grained sandstone interbeds from 32.3' to 35.3'								
926		35	R-5	90 (40)					

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-32

Project Number: 16123
Project Name: Tull Property
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/23/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/23/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Rainy, 70°
Water Level Upon Completion: 6.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Boring Terminated at 35.3 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.	35.3							
921			40							
916			45							
911			50							
906			55							
901			60							
896			65							
891			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-33

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 1

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/23/17 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/23/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rainy, 70° | **Water Level Upon Completion:**

Drilling Method: 3 1/4-inch HSA | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
892'		TOPSOIL 0.2								
		Brown SILT (ML), few clay, soft, moist		S-1	80	1-2-1 (3)		15.3		
		(COLLUVIAL) 3.0								
		Yellow-brown SHALE FRAGMENTS (GM), little silt, medium dense, moist		S-2	100	13-9-8 (17)		11.8		
887		**(RESIDUAL)** 5.0	5							
		Pink and gray-green to tan DECOMPOSED CLAYSTONE sampled as claystone fragments, trace clay, medium dense to very dense, moist to dry		S-3	100	11-14-15 (29)	93.31	10.6	45	20
		-tested as (CL)								
882			10	S-4	100	16-18-12 (30)	93.31	13.4	45	20
		(RESIDUAL) 12.0								
		Boring Terminated at 12.0 feet		S-5		50/0.0'				
877		Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-3 AND S-4**	15							
872			20							
867			25							
862			30							
857			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-34

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/21/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/21/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Partly sunny, 67°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1005'		TOPSOIL 0.3								
		Brown-red CLAY (CL), trace rock fragments, soft, moist		S-1	33	1-1-2 (3)		26.2		
		(COLLUVIAL) 3.0								
		Yellow-brown clayey SAND (SC), little yellow-brown and red-brown rock fragments (claystone and sandstone) (prioir to soaking during test), stiff to very stiff, moist		S-2	100	3-5-8 (13)	44.87	10.9	35	18
1000			5							
				S-3	100	10-7-10 (17)	44.87	10.4	35	18
		(COLLUVIAL) 9.0								
995		Orange-brown and red-yellow DECOMPOSED SANDSTONE sampled as sandstone fragments (GW), little sand, firm, moist	10	S-4	100	3-4-9 (13)		8.9		
		(RESIDUAL) 12.0								
		Brown-yellow DECOMPOSED SHALE sampled as shale fragments, very dense, dry		S-5	100	22-24-50/0.4'		7.1		
990			15							
		(RESIDUAL) 15.8		S-6	163	30-50/0.3'		6.0		
		Boring Terminated at 15.8 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. **NOTE: GRAIN SIZE ANALYSIS (ASTM D 422) AND ATTERBERG LIMITS (ASTM D 4318) COMPLETED ON COMPOSITE SAMPLE INCLUDING S-2 AND S-3**								
985			20							
980			25							
975			30							
970			35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-35

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/21/17 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/21/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Cloudy, rainy, 65° | **Water Level Upon Completion:** 41.2'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1074'	TOPSOIL 0.6								
	Red-brown SANDSTONE FRAGMENTS (GW), little sand, few silt, very loose, moist		S-1	60	1-1-1 (2)				
	(COLLUVIAL) 3.0								
	Gray and brown SANDSTONE FRAGMENTS (GW), little sand, medium dense, moist		S-2	100	8-9-8 (17)				
1069		5							
	(COLLUVIAL) 6.0								
	Gray and red-yellow DECOMPOSED micaceous SANDSTONE (GW) sampled as sandstone fragments, few sand, very dense, dry		S-3	100	7-8-10 (18)				
1064		10	S-4	100	43-30-24 (54)				
			S-5	100	24-36-27 (63)				
1059	**(RESIDUAL)** 15.0	15							
	Brown to gray fine to medium-grained SANDSTONE with interstitial carbon, slightly to moderately weathered, thinly bedded, very broken, very soft to hard, some carbonaceous laminations		S-6 R-1	93 (0)	50/0.0'				
	MOHS 8.5 at 16.0'								
1054	-very soft carbonaceous sandstone from 19.5' to 20.0'	20	R-2	100 (46)					
1049	-very soft to soft carbonaceous sandstone from 24.3' to 24.9'	25	R-3	78 (8)					
	-vertical fracture from 27.3' to 28.8'								
1044	MOHS 8.5 at 30.0'	30	R-4	100 (28)					
	-gray, slightly weathered from 32.0' to 35.8'								
1039		35	R-5	94 (46)					

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-35

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/21/17 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/21/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Cloudy, rainy, 65° | **Water Level Upon Completion:** 41.2'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown to gray fine to medium-grained SANDSTONE with interstitial carbon, slightly to moderately weathered, thinly bedded, very broken, very soft to hard, some carbonaceous laminations *(continued)*								
1034		-gray, slightly weathered from 39.0' to 41.3'	40	R-6	100 (12)					
		-very soft from 43.0' to 43.3'	43.3							
1029		Light gray clayey SILTSTONE, highly weathered, thinly bedded, very broken to moderately broken, soft MOHS 0.5 at 45.0'	45	R-7	74 (16)					
			46.5							
		Boring Terminated at 46.5 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
1024			50							
1019			55							
1014			60							
1009			65							
1004			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-36

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 1 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/23/17 | **Water Level During Drilling:** 32'

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/23/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rainy, 72° | **Water Level Upon Completion:** 36'

Drilling Method: 3 1/4-inch HSA | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
917'	TOPSOIL 0.4								
	Brown to red-brown CLAY (CL), some to and rock fragments (sandstone, shale), few sand, very loose to medium dense, moist		S-1	80	1-1-3 (4)				
			S-2	80	5-9-7 (16)		13.0		
912	**(COLLUVIAL)** 6.0	5							
	Brown clayey SAND (SC), some rock fragments (sandstone, shale), loose to medium dense, moist to wet		S-3	100	8-8-8 (16)		11.8		
907		10	S-4	100	6-8-15 (23)		12.1		
			S-5	100	9-8-7 (15)		11.5		
902	-very moist from 15.0' to 16.5'	15	S-6	100	5-3-4 (7)		14.8		
			S-7	100	3-2-3 (5)		12.8		
897		20							
	-wet from 21.5' to 22.0'		S-8	100	3-2-7 (9)		12.6		
	(COLLUVIAL) 24.0								
892	Brown and red-brown silty SAND (SM), trace sandstone fragments, few clay, very loose to very dense, wet	25	S-9	100	0-0-0 (0)		22.8		
	-light gray coarse-grained sandstone boulder from 27.0' to 27.3'		S-10	100	50/0.3'		9.8		
887		30							
			S-11	100	7-6-9 (15)		16.8		
	(COLLUVIAL) 33.7								
	Dark and light gray mottled DECOMPOSED CLAYSTONE sampled as claystone fragments, dense, dry		S-12	67	11-15-18 (33)		10.7		
882		35							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-36

Project Number: 16123 | **Project Name:** Tull Property | **Sheet:** 2 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA | **Start Date:** 06/23/17 | **Water Level During Drilling:** 32'

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 06/23/17 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rainy, 72° | **Water Level Upon Completion:** 36'

Drilling Method: 3 1/4-inch HSA | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		(RESIDUAL)	36.0							
		Gray and red-yellow DECOMPOSED INTERBEDDED SHALE and SANDSTONE sampled as shale and sandstone fragments, very dense, dry	36.7	S-13	100	44-50/0.2'		7.5		
		(RESIDUAL)								
		Boring Terminated at 36.7 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
877			40							
872			45							
867			50							
862			55							
857			60							
852			65							
847			70							

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GARVIN BOWARD BEITKO

Test Boring Record

GBB-37

Project Number: 16123
Project Name: Tull Property
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 06/23/17
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 06/23/17
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Overcast, 70°
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1019'	TOPSOIL 0.4								
	Brown-red and gray-green mottled CLAY (CL), few rock fragments, very soft, moist		S-1	27	1-1-1 (2)		25.8		
	(COLLUVIAL) 3.0								
	Purple and green-gray mottled FAT CLAY (CH), few rock fragments (shale, sandstone, limestone), firm to dense, moist		S-2	87	6-7-7 (14)		21.0		
1014	**NOTE: COMPOSITE AUGER CUTTING BAG SAMPLE FROM 0 TO 9 FT NATURAL MOISTURE CONTENT EQUAL TO 14.0%. PERCENT PASSING #200 SIEVE 95.3%. LIQUID LIMIT 53%, PLASTIC LIMIT 15%**	5							
			S-3	100	6-6-11 (17)		15.0		
1009		10	S-4	100	15-15-19 (34)		13.2		
	(COLLUVIAL) 12.0								
	Purple and green-gray mottled CLAY (CL), trace claystone fragments, extremely stiff, dry		S-5	100	15-14-19 (33)		11.7		
1004		15							
			S-6	100	13-19-29 (48)		11.8		
			S-7	100	29-34-50/0.4'		11.8		
999		20							
	(RESIDUAL) 21.7		S-8	100	33-50/0.2'		9.4		
	Boring Terminated at 21.7 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
994		25							
989		30							
984		35							

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July 26, 2017

Project No. 2017-372-001

Mr. Doug Beitko
Garvin Boward Beitko Engineering, Inc.
180 Bilmar Drive, Suite IV
Pittsburgh, PA 15205

Transmittal
Laboratory Test Results
Tull Property 16123

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.

Respectively submitted,
Geotechnics, Inc.



David R. Backstrom
Laboratory Director

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

MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	004	005	006	007	009
Boring No.:	GBB-37	GBB-5	GBB-5	GBB-5	GBB-5
Depth (ft):	0-9	0.0-1.5	3.0-4.5	6.0-7.5	9.0-10.5
Sample No.:	NA	S-1	S-2	S-3	S-4
Tare Number	2972	24	35	50	28
Wt. of Tare & Wet Sample (g)	184.86	65.08	58.29	41.18	71.13
Wt. of Tare & Dry Sample (g)	162.93	58.06	50.93	37.30	64.03
Weight of Tare (g)	6.75	6.90	6.97	6.82	6.92
Weight of Water (g)	21.93	7.02	7.36	3.88	7.10
Weight of Dry Sample (g)	156.18	51.16	43.96	30.48	57.11
Water Content (%)	**14.0**	**13.7**	**16.7**	**12.7**	**12.4**

Lab ID	010	011	012	013	014
Boring No.	GBB-5	GBB-5	GBB-5	GBB-5	GBB-5
Depth (ft)	12.0-13.5	15.0-16.5	18.0-19.5	21.0-22.5	24.0-25.5
Sample No.	S-5	S-6	S-7	S-8	S-9
Tare Number	4	6	31	40	17
Wt. of Tare & Wet Sample (g)	82.89	64.33	92.27	74.04	88.14
Wt. of Tare & Dry Sample (g)	71.56	56.51	76.83	66.15	80.02
Weight of Tare (g)	6.89	6.93	6.90	6.92	7.05
Weight of Water (g)	11.33	7.82	15.44	7.89	8.12
Weight of Dry Sample (g)	64.67	49.58	69.93	59.23	72.97
Water Content (%)	**17.5**	**15.8**	**22.1**	**13.3**	**11.1**

Notes :

Tested By PC *Date* 7/11/17 *Checked By* TMP *Date* 7/12/17

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	015	016	017	018	019
Boring No.:	GBB-5	GBB-5	GBB-5	GBB-8	GBB-8
Depth (ft):	27.0-28.5	30.0-31.5	33.0-34.4	0.0-1.5	3.0-4.5
Sample No.:	S-10	S-11	S-12	S-1	S-2
Tare Number	49	8	22	48	16
Wt. of Tare & Wet Sample (g)	81.75	68.31	82.04	55.42	38.52
Wt. of Tare & Dry Sample (g)	69.35	61.33	77.77	51.44	33.11
Weight of Tare (g)	6.77	6.98	7.00	6.78	6.96
Weight of Water (g)	12.40	6.98	4.27	3.98	5.41
Weight of Dry Sample (g)	62.58	54.35	70.77	44.66	26.15
Water Content (%)	**19.8**	**12.8**	**6.0**	**8.9**	**20.7**

Lab ID	021	022	023	024	025
Boring No.	GBB-8	GBB-8	GBB-8	GBB-8	GBB-9
Depth (ft)	6.0-7.5	9.0-10.5	12.0-12.3	15.0-15.4	0.0-1.5
Sample No.	S-3	S-4	S-5	S-6	S-1
Tare Number	39	14	45	2	44
Wt. of Tare & Wet Sample (g)	69.41	64.47	59.91	68.10	91.09
Wt. of Tare & Dry Sample (g)	63.41	59.88	57.70	64.43	80.42
Weight of Tare (g)	6.84	6.96	7.04	6.96	6.99
Weight of Water (g)	6.00	4.59	2.21	3.67	10.67
Weight of Dry Sample (g)	56.57	52.92	50.66	57.47	73.43
Water Content (%)	**10.6**	**8.7**	**4.4**	**6.4**	**14.5**

Notes :

Tested By PC *Date* 7/11/17 *Checked By* TMP *Date* 7/12/17

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	026	027	028	029	030
Boring No.:	GBB-9	GBB-9	GBB-9	GBB-9	GBB-9
Depth (ft):	3.0-4.5	6.0-7.5	9.0-10.5	12.0-13.5	15.0-16.5
Sample No.:	S-2	S-3	S-4	S-5	S-6
Tare Number	34	7	32	19	46
Wt. of Tare & Wet Sample (g)	81.16	55.74	107.21	89.05	77.10
Wt. of Tare & Dry Sample (g)	73.62	48.96	96.89	81.05	67.71
Weight of Tare (g)	6.95	6.88	6.82	6.99	7.05
Weight of Water (g)	7.54	6.78	10.32	8.00	9.39
Weight of Dry Sample (g)	66.67	42.08	90.07	74.06	60.66
Water Content (%)	**11.3**	**16.1**	**11.5**	**10.8**	**15.5**

Lab ID	031	032	033	034	035
Boring No.	GBB-9	GBB-9	GBB-9	GBB-9	GBB-9
Depth (ft)	18.0-19.5	21.0-22.5	24.0-25.5	27.0-28.5	30.0-31.5
Sample No.	S-7	S-8	S-9	S-10	S-11
Tare Number	15	37	47	42	26
Wt. of Tare & Wet Sample (g)	73.17	65.60	65.13	62.52	53.51
Wt. of Tare & Dry Sample (g)	66.02	56.67	57.16	52.17	46.40
Weight of Tare (g)	7.02	6.99	6.63	6.89	6.91
Weight of Water (g)	7.15	8.93	7.97	10.35	7.11
Weight of Dry Sample (g)	59.00	49.68	50.53	45.28	39.49
Water Content (%)	**12.1**	**18.0**	**15.8**	**22.9**	**18.0**

Notes :

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ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	037	038	039	040	041
Boring No.:	GBB-9	GBB-9	GBB-9	GBB-10	GBB-10
Depth (ft):	33.0-34.5	36.0-37.5	39.0-39.8	0.0-1.5	3.0-4.5
Sample No.:	S-12	S-13	S-14	S-1	S-2
Tare Number	29	21	27	9	36
Wt. of Tare & Wet Sample (g)	84.03	76.22	82.04	61.85	82.40
Wt. of Tare & Dry Sample (g)	73.76	72.14	77.82	56.63	67.87
Weight of Tare (g)	6.81	6.99	6.89	6.93	6.85
Weight of Water (g)	10.27	4.08	4.22	5.22	14.53
Weight of Dry Sample (g)	66.95	65.15	70.93	49.70	61.02
Water Content (%)	**15.3**	**6.3**	**5.9**	**10.5**	**23.8**

Lab ID	042	043	045	046	047
Boring No.	GBB-10	GBB-10	GBB-10	GBB-10	GBB-10
Depth (ft)	6.0-7.5	9.0-10.5	12.0-13.5	15.0-16.3	18.0-18.4
Sample No.	S-3	S-4	S-5	S-6	S-7
Tare Number	1	5	11	13	23
Wt. of Tare & Wet Sample (g)	51.96	66.07	76.69	74.57	75.41
Wt. of Tare & Dry Sample (g)	47.15	60.89	68.60	69.25	70.19
Weight of Tare (g)	6.88	6.86	6.90	6.95	6.87
Weight of Water (g)	4.81	5.18	8.09	5.32	5.22
Weight of Dry Sample (g)	40.27	54.03	61.70	62.30	63.32
Water Content (%)	**11.9**	**9.6**	**13.1**	**8.5**	**8.2**

Notes :

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ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	048	049	050	051	052
Boring No.:	GBB-13	GBB-13	GBB-13	GBB-13	GBB-13
Depth (ft):	0.0-1.5	3.0-4.5	6.0-7.5	9.0-10.5	12.0-13.5
Sample No.:	S-1	S-2	S-3	S-4	S-5
Tare Number	4	6	31	40	17
Wt. of Tare & Wet Sample (g)	104.93	102.44	71.53	72.53	81.64
Wt. of Tare & Dry Sample (g)	93.06	93.03	65.74	66.55	77.27
Weight of Tare (g)	6.86	6.91	6.87	6.91	7.04
Weight of Water (g)	11.87	9.41	5.79	5.98	4.37
Weight of Dry Sample (g)	86.20	86.12	58.87	59.64	70.23
Water Content (%)	**13.8**	**10.9**	**9.8**	**10.0**	**6.2**

Lab ID	053	054	055	056	057
Boring No.	GBB-13	GBB-13	GBB-13	GBB-16	GBB-16
Depth (ft)	15.0-16.5	18.0-18.9	21.0-22.4	0.0-1.5	3.0-4.5
Sample No.	S-6	S-7	S-8	S-1	S-2
Tare Number	36	20	18	41	33
Wt. of Tare & Wet Sample (g)	81.65	80.34	80.85	94.71	45.23
Wt. of Tare & Dry Sample (g)	76.19	76.18	75.37	85.88	39.99
Weight of Tare (g)	6.81	7.01	6.99	6.94	6.79
Weight of Water (g)	5.46	4.16	5.48	8.83	5.24
Weight of Dry Sample (g)	69.38	69.17	68.38	78.94	33.20
Water Content (%)	**7.9**	**6.0**	**8.0**	**11.2**	**15.8**

Notes :

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	058	060	061	062	064
Boring No.:	GBB-16	GBB-16	GBB-16	GBB-16	GBB-16
Depth (ft):	6.0-7.5	9.0-10.5	12.0-13.5	15.0-16.4	18.0-19.3
Sample No.:	S-3	S-4	S-5	S-6	S-7
Tare Number	27	47	9	12	7
Wt. of Tare & Wet Sample (g)	47.14	62.43	43.88	46.61	61.98
Wt. of Tare & Dry Sample (g)	41.91	54.27	40.43	42.74	56.55
Weight of Tare (g)	6.92	6.68	6.89	6.92	6.90
Weight of Water (g)	5.23	8.16	3.45	3.87	5.43
Weight of Dry Sample (g)	34.99	47.59	33.54	35.82	49.65
Water Content (%)	**14.9**	**17.1**	**10.3**	**10.8**	**10.9**

Lab ID	065	066	067	068	069
Boring No.	GBB-17	GBB-17	GBB-17	GBB-17	GBB-17
Depth (ft)	0.0-1.5	3.0-4.5	6.0-7.5	9.0-9.4	12.0-12.4
Sample No.	S-1	S-2	S-3	S-4	S-5
Tare Number	39	37	30	9	26
Wt. of Tare & Wet Sample (g)	82.66	87.19	80.27	82.90	93.74
Wt. of Tare & Dry Sample (g)	74.79	75.64	71.63	78.50	89.34
Weight of Tare (g)	6.85	6.98	6.85	6.91	6.99
Weight of Water (g)	7.87	11.55	8.64	4.40	4.40
Weight of Dry Sample (g)	67.94	68.66	64.78	71.59	82.35
Water Content (%)	**11.6**	**16.8**	**13.3**	**6.1**	**5.3**

Notes :

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	070	071	072	073	074
Boring No.:	GBB-21	GBB-21	GBB-21	GBB-21	GBB-21
Depth (ft):	0.0-1.5	3.0-4.5	6.0-7.5	9.0-10.5	12.0-13.5
Sample No.:	S-1	S-2	S-3	S-4	S-5
Tare Number	45	14	44	26	15
Wt. of Tare & Wet Sample (g)	86.12	91.98	104.41	44.57	34.32
Wt. of Tare & Dry Sample (g)	75.81	82.96	93.82	40.71	31.64
Weight of Tare (g)	7.05	6.97	6.98	6.88	7.03
Weight of Water (g)	10.31	9.02	10.59	3.86	2.68
Weight of Dry Sample (g)	68.76	75.99	86.84	33.83	24.61
Water Content (%)	**15.0**	**11.9**	**12.2**	**11.4**	**10.9**

Lab ID	076	077	078	079	080
Boring No.	GBB-21	GBB-21	GBB-21	GBB-21	GBB-23
Depth (ft)	15.0-16.5	18.0-19.5	21.0-22.4	24.0-24.9	0.0-1.5
Sample No.	S-6	S-7	S-8	S-9	S-1
Tare Number	41	29	46	20	21
Wt. of Tare & Wet Sample (g)	105.71	97.56	102.97	84.62	74.45
Wt. of Tare & Dry Sample (g)	96.10	88.93	93.45	77.36	59.61
Weight of Tare (g)	6.91	6.83	7.01	7.01	6.97
Weight of Water (g)	9.61	8.63	9.52	7.26	14.84
Weight of Dry Sample (g)	89.19	82.10	86.44	70.35	52.64
Water Content (%)	**10.8**	**10.5**	**11.0**	**10.3**	**28.2**

Notes :

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ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	081	082	083	084	085
Boring No.:	GBB-23	GBB-23	GBB-23	GBB-23	GBB-23
Depth (ft):	3.0-4.5	6.0-7.5	9.0-10.5	12.0-13.4	15.0-15.4
Sample No.:	S-2	S-3	S-4	S-5	S-6
Tare Number	4	8	22	48	1
Wt. of Tare & Wet Sample (g)	103.66	78.18	98.08	92.67	81.94
Wt. of Tare & Dry Sample (g)	92.88	60.60	87.59	84.46	74.16
Weight of Tare (g)	6.80	6.97	6.97	6.80	6.87
Weight of Water (g)	10.78	17.58	10.49	8.21	7.78
Weight of Dry Sample (g)	86.08	53.63	80.62	77.66	67.29
Water Content (%)	**12.5**	**32.8**	**13.0**	**10.6**	**11.6**

Lab ID	086	087	088	089	090
Boring No.	GBB-25	GBB-25	GBB-25	GBB-25	GBB-25
Depth (ft)	0.0-1.5	3.0-4.5	6.0-7.5	9.0-10.5	12.0-13.5
Sample No.	S-1	S-2	S-3	S-4	S-5
Tare Number	24	35	47	42	34
Wt. of Tare & Wet Sample (g)	88.73	69.85	34.61	42.71	48.53
Wt. of Tare & Dry Sample (g)	76.65	55.71	31.00	35.91	42.52
Weight of Tare (g)	6.90	6.98	6.64	6.89	6.98
Weight of Water (g)	12.08	14.14	3.61	6.80	6.01
Weight of Dry Sample (g)	69.75	48.73	24.36	29.02	35.54
Water Content (%)	**17.3**	**29.0**	**14.8**	**23.4**	**16.9**

Notes :

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	092	093	094	095	096
Boring No.:	GBB-25	GBB-25	GBB-25	GBB-25	GBB-25
Depth (ft):	15.0-16.4	18.0-18.9	21.0-22.5	24.0-25.3	27.0-28.3
Sample No.:	S-6	S-7	S-8	S-9	S-10
Tare Number	50	28	16	23	5
Wt. of Tare & Wet Sample (g)	89.43	90.05	95.49	93.46	100.81
Wt. of Tare & Dry Sample (g)	81.10	82.77	85.85	85.91	92.80
Weight of Tare (g)	6.80	6.90	6.95	6.86	6.86
Weight of Water (g)	8.33	7.28	9.64	7.55	8.01
Weight of Dry Sample (g)	74.30	75.87	78.90	79.05	85.94
Water Content (%)	**11.2**	**9.6**	**12.2**	**9.6**	**9.3**

Lab ID	097	098	099	101	102
Boring No.	GBB-26	GBB-26	GBB-26	GBB-26	GBB-26
Depth (ft)	0.0-1.5	3.0-4.5	6.0-7.5	9.0-10.5	12.0-13.5
Sample No.	S-1	S-2	S-3	S-4	S-5
Tare Number	11	32	6	13	4
Wt. of Tare & Wet Sample (g)	55.54	44.28	31.89	74.62	87.99
Wt. of Tare & Dry Sample (g)	45.39	38.92	27.77	64.47	74.10
Weight of Tare (g)	6.90	6.82	6.92	6.97	6.87
Weight of Water (g)	10.15	5.36	4.12	10.15	13.89
Weight of Dry Sample (g)	38.49	32.10	20.85	57.50	67.23
Water Content (%)	**26.4**	**16.7**	**19.8**	**17.7**	**20.7**

Notes :

Tested By SG *Date* 7/14/17 *Checked By* TMP *Date* 7/17/17

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	103	104	105	106	107
Boring No.:	GBB-26	GBB-26	GBB-26	GBB-26	GBB-26
Depth (ft):	15.0-16.5	18.0-19.5	21.0-22.5	24.0-25.5	27.0-28.5
Sample No.:	S-6	S-7	S-8	S-9	S-10
Tare Number	31	17	36	33	42
Wt. of Tare & Wet Sample (g)	77.22	73.43	72.72	84.56	84.73
Wt. of Tare & Dry Sample (g)	67.45	64.79	63.99	74.66	74.73
Weight of Tare (g)	6.87	7.02	6.80	6.79	6.89
Weight of Water (g)	9.77	8.64	8.73	9.90	10.00
Weight of Dry Sample (g)	60.58	57.77	57.19	67.87	67.84
Water Content (%)	**16.1**	**15.0**	**15.3**	**14.6**	**14.7**

Lab ID	108	109	110	111	112
Boring No.	GBB-26	GBB-26	GBB-26	GBB-27	GBB-27
Depth (ft)	30.0-31.5	33.0-33.1	35.2-35.7	0.0-1.5	3.0-4.5
Sample No.	S-11	S-12	S-13	S-1	S-2
Tare Number	34	32	6	27	18
Wt. of Tare & Wet Sample (g)	69.39	36.75	65.30	71.98	65.63
Wt. of Tare & Dry Sample (g)	63.05	34.92	64.17	63.88	56.25
Weight of Tare (g)	6.94	6.82	6.91	6.88	6.98
Weight of Water (g)	6.34	1.83	1.13	8.10	9.38
Weight of Dry Sample (g)	56.11	28.10	57.26	57.00	49.27
Water Content (%)	**11.3**	**6.5**	**2.0**	**14.2**	**19.0**

Notes :

Tested By SG *Date* 7/14/17 *Checked By* TMP *Date* 7/17/17

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	113	114	115	116	117
Boring No.:	GBB-27	GBB-27	GBB-27	GBB-27	GBB-27
Depth (ft):	6.0-7.5	9.0-10.5	12.0-13.5	15.0-16.5	18.0-19.5
Sample No.:	S-3	S-4	S-5	S-6	S-7
Tare Number	19	2	40	12	15
Wt. of Tare & Wet Sample (g)	76.73	68.03	68.66	88.32	91.80
Wt. of Tare & Dry Sample (g)	72.18	63.32	64.02	80.15	85.43
Weight of Tare (g)	6.97	6.94	6.91	6.93	7.02
Weight of Water (g)	4.55	4.71	4.64	8.17	6.37
Weight of Dry Sample (g)	65.21	56.38	57.11	73.22	78.41
Water Content (%)	**7.0**	**8.4**	**8.1**	**11.2**	**8.1**

Lab ID	118	119	120	121	123
Boring No.	GBB-27	GBB-27	GBB-28	GBB-28	GBB-28
Depth (ft)	21.0-22.2	24.0-24.3	0.0-1.5	3.0-4.5	6.0-7.5
Sample No.	S-8	S-9	S-1	S-2	S-3
Tare Number	2672	3012	14	45	3247
Wt. of Tare & Wet Sample (g)	107.40	54.53	47.27	37.05	114.84
Wt. of Tare & Dry Sample (g)	102.28	52.54	43.60	34.84	107.16
Weight of Tare (g)	6.70	8.14	7.01	7.06	6.85
Weight of Water (g)	5.12	1.99	3.67	2.21	7.68
Weight of Dry Sample (g)	95.58	44.40	36.59	27.78	100.31
Water Content (%)	**5.4**	**4.5**	**10.0**	**8.0**	**7.7**

Notes :

Tested By SG *Date* 7/14/17 *Checked By* TMP *Date* 7/17/17

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	124	125	126	127	128
Boring No.:	GBB-28	GBB-28	GBB-28	GBB-28	GBB-29
Depth (ft):	9.0-10.5	12.0-12.4	15.0-16.5	18.0-18.9	0.0-1.5
Sample No.:	S-4	S-5	S-6	S-7	S-1
Tare Number	3177	3034	3230	3203	AE
Wt. of Tare & Wet Sample (g)	91.77	92.19	87.65	93.60	103.18
Wt. of Tare & Dry Sample (g)	85.43	88.18	84.03	89.40	91.68
Weight of Tare (g)	8.09	6.86	6.86	6.92	8.14
Weight of Water (g)	6.34	4.01	3.62	4.20	11.50
Weight of Dry Sample (g)	77.34	81.32	77.17	82.48	83.54
Water Content (%)	**8.2**	**4.9**	**4.7**	**5.1**	**13.8**

Lab ID	129	130	132	133	134
Boring No.	GBB-29	GBB-29	GBB-29	GBB-29	GBB-29
Depth (ft)	3.0-4.5	6.0-7.5	9.0-10.5	12.0-13.5	15.0-16.5
Sample No.	S-2	S-3	S-4	S-5	S-6
Tare Number	44	29	3084	3164	3141
Wt. of Tare & Wet Sample (g)	45.93	36.00	108.74	121.48	86.17
Wt. of Tare & Dry Sample (g)	38.79	32.39	95.27	108.52	76.91
Weight of Tare (g)	7.00	6.82	8.11	6.83	6.78
Weight of Water (g)	7.14	3.61	13.47	12.96	9.26
Weight of Dry Sample (g)	31.79	25.57	87.16	101.69	70.13
Water Content (%)	**22.5**	**14.1**	**15.5**	**12.7**	**13.2**

Notes :

Tested By SG *Date* 7/14/17 *Checked By* TMP *Date* 7/17/17

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	135	136	137	138	139
Boring No.:	GBB-29	GBB-29	GBB-30	GBB-30	GBB-30
Depth (ft):	18.0-19.5	21.0-22.5	0.0-1.5	3.0-4.5	6.0-7.5
Sample No.:	S-7	S-8	S-1	S-2	S-3
Tare Number	2898	3142	3145	3045	3071
Wt. of Tare & Wet Sample (g)	104.16	108.15	87.10	101.55	96.70
Wt. of Tare & Dry Sample (g)	95.43	100.10	75.69	90.25	89.07
Weight of Tare (g)	8.15	8.15	8.08	6.81	8.06
Weight of Water (g)	8.73	8.05	11.41	11.30	7.63
Weight of Dry Sample (g)	87.28	91.95	67.61	83.44	81.01
Water Content (%)	**10.0**	**8.8**	**16.9**	**13.5**	**9.4**

Lab ID	140	141	142	144	145
Boring No.	GBB-30	GBB-30	GBB-30	GBB-30	GBB-30
Depth (ft)	9.0-10.5	12.0-13.5	15.0-16.5	18.0-19.5	21.0-22.5
Sample No.	S-4	S-5	S-6	S-7	S-8
Tare Number	3155	4	31	3229	3014
Wt. of Tare & Wet Sample (g)	110.28	49.66	39.10	94.16	112.40
Wt. of Tare & Dry Sample (g)	96.58	44.95	35.73	84.11	100.23
Weight of Tare (g)	8.10	6.86	6.88	8.07	8.08
Weight of Water (g)	13.70	4.71	3.37	10.05	12.17
Weight of Dry Sample (g)	88.48	38.09	28.85	76.04	92.15
Water Content (%)	**15.5**	**12.4**	**11.7**	**13.2**	**13.2**

Notes :

Tested By SG *Date* 7/14/17 *Checked By* TMP *Date* 7/17/17

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	146	147	148	149	150
Boring No.:	GBB-30	GBB-30	GBB-30	GBB-31	GBB-31
Depth (ft):	24.0-25.5	27.0-28.4	30.0-31.3	0.0-1.5	3.0-4.5
Sample No.:	S-9	S-10	S-11	S-1	S-2
Tare Number	40	12	47	7	39
Wt. of Tare & Wet Sample (g)	83.89	78.89	79.22	86.31	68.91
Wt. of Tare & Dry Sample (g)	77.78	74.25	74.28	74.85	62.96
Weight of Tare (g)	6.90	6.95	6.65	6.88	6.86
Weight of Water (g)	6.11	4.64	4.94	11.46	5.95
Weight of Dry Sample (g)	70.88	67.30	67.63	67.97	56.10
Water Content (%)	**8.6**	**6.9**	**7.3**	**16.9**	**10.6**

Lab ID	151	152	153	154	155
Boring No.	GBB-31	GBB-31	GBB-31	GBB-32	GBB-32
Depth (ft)	6.0-7.5	9.0-1.5	12.0-12.9	0.0-1.5	3.0-4.5
Sample No.	S-3	S-4	S-5	S-1	S-2
Tare Number	37	19	2	15	45
Wt. of Tare & Wet Sample (g)	82.83	82.05	83.92	76.12	77.76
Wt. of Tare & Dry Sample (g)	73.03	78.86	81.17	66.84	69.61
Weight of Tare (g)	6.98	6.98	6.95	7.00	7.06
Weight of Water (g)	9.80	3.19	2.75	9.28	8.15
Weight of Dry Sample (g)	66.05	71.88	74.22	59.84	62.55
Water Content (%)	**14.8**	**4.4**	**3.7**	**15.5**	**13.0**

Notes :

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	156	157	158	159	160
Boring No.:	GBB-32	GBB-32	GBB-32	GBB-33	GBB-33
Depth (ft):	6.0-7.5	9.0-10.5	12.0-12.4	0.0-1.5	3.0-4.5
Sample No.:	S-3	S-4	S-5	S-1	S-2
Tare Number	14	13	27	30	6
Wt. of Tare & Wet Sample (g)	87.58	68.60	74.97	74.71	77.16
Wt. of Tare & Dry Sample (g)	76.80	60.43	68.47	65.72	69.74
Weight of Tare (g)	6.97	6.99	6.91	6.88	6.99
Weight of Water (g)	10.78	8.17	6.50	8.99	7.42
Weight of Dry Sample (g)	69.83	53.44	61.56	58.84	62.75
Water Content (%)	**15.4**	**15.3**	**10.6**	**15.3**	**11.8**

Lab ID	161	162	164	165	166
Boring No.	GBB-33	GBB-33	GBB-34	GBB-34	GBB-34
Depth (ft)	6.0-7.5	9.0-10.5	0.0-1.5	3.0-4.5	6.0-7.5
Sample No.	S-3	S-4	S-1	S-2	S-3
Tare Number	17	36	33	41	33
Wt. of Tare & Wet Sample (g)	35.52	38.81	76.77	35.29	41.79
Wt. of Tare & Dry Sample (g)	32.80	35.02	62.26	32.50	38.50
Weight of Tare (g)	7.05	6.80	6.83	6.93	6.80
Weight of Water (g)	2.72	3.79	14.51	2.79	3.29
Weight of Dry Sample (g)	25.75	28.22	55.43	25.57	31.70
Water Content (%)	**10.6**	**13.4**	**26.2**	**10.9**	**10.4**

Notes :

Tested By PC *Date* 7/17/17 *Checked By* TMP *Date* 7/18/17

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	168	169	170	171	172
Boring No.:	GBB-34	GBB-34	GBB-34	GBB-36	GBB-36
Depth (ft):	9.0-10.5	12.0-13.4	15.0-15.8	3.0-4.5	6.0-7.5
Sample No.:	S-4	S-5	S-6	S-2	S-3
Tare Number	32	8	22	48	9
Wt. of Tare & Wet Sample (g)	81.50	86.38	84.09	72.12	90.61
Wt. of Tare & Dry Sample (g)	75.37	81.10	79.72	64.60	81.75
Weight of Tare (g)	6.87	6.98	7.04	6.82	6.95
Weight of Water (g)	6.13	5.28	4.37	7.52	8.86
Weight of Dry Sample (g)	68.50	74.12	72.68	57.78	74.80
Water Content (%)	**8.9**	**7.1**	**6.0**	**13.0**	**11.8**

Lab ID	173	174	175	176	177
Boring No.	GBB-36	GBB-36	GBB-36	GBB-36	GBB-36
Depth (ft)	9.0-10.5	12.0-13.5	15.0-16.5	18.0-19.5	21.0-22.5
Sample No.	S-4	S-5	S-6	S-7	S-8
Tare Number	26	41	44	4	18
Wt. of Tare & Wet Sample (g)	95.89	111.83	106.72	130.46	109.99
Wt. of Tare & Dry Sample (g)	86.33	101.01	93.90	116.41	98.47
Weight of Tare (g)	7.05	6.99	7.10	6.92	7.00
Weight of Water (g)	9.56	10.82	12.82	14.05	11.52
Weight of Dry Sample (g)	79.28	94.02	86.80	109.49	91.47
Water Content (%)	**12.1**	**11.5**	**14.8**	**12.8**	**12.6**

Notes :

Tested By PC *Date* 7/17/17 *Checked By* TMP *Date* 7/18/17

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	178	179	180	181	182
Boring No.:	GBB-36	GBB-36	GBB-36	GBB-36	GBB-36
Depth (ft):	24.0-25.5	27.0-27.3	30.0-31.5	33.0-34.5	36.0-36.7
Sample No.:	S-9	S-10	S-11	S-12	S-13
Tare Number	29	46	20	21	49
Wt. of Tare & Wet Sample (g)	109.79	85.90	77.58	77.69	91.31
Wt. of Tare & Dry Sample (g)	90.70	78.85	67.42	70.85	85.45
Weight of Tare (g)	6.89	7.07	7.02	7.00	6.81
Weight of Water (g)	19.09	7.05	10.16	6.84	5.86
Weight of Dry Sample (g)	83.81	71.78	60.40	63.85	78.64
Water Content (%)	**22.8**	**9.8**	**16.8**	**10.7**	**7.5**

Lab ID	183	184	185	186	187
Boring No.	GBB-37	GBB-37	GBB-37	GBB-37	GBB-37
Depth (ft)	0.0-1.5	3.0-4.5	6.0-7.5	9.0-10.5	12.0-13.5
Sample No.	S-1	S-2	S-3	S-4	S-5
Tare Number	11	34	1	24	35
Wt. of Tare & Wet Sample (g)	127.21	65.51	81.25	85.79	83.22
Wt. of Tare & Dry Sample (g)	102.52	55.34	71.54	76.60	75.21
Weight of Tare (g)	6.92	6.96	6.86	6.92	6.98
Weight of Water (g)	24.69	10.17	9.71	9.19	8.01
Weight of Dry Sample (g)	95.60	48.38	64.68	69.68	68.23
Water Content (%)	**25.8**	**21.0**	**15.0**	**13.2**	**11.7**

Notes :

Tested By PC *Date* 7/17/17 *Checked By* TMP *Date* 7/18/17

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MOISTURE CONTENT

ASTM D 2216-10

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: Tull Property 16123
Project No.: 2017-372-001

Lab ID:	188	189	190
Boring No.:	GBB-37	GBB-37	GBB-37
Depth (ft):	15.0-16.5	18.0-19.4	21.0-21.7
Sample No.:	S-6	S-7	S-8
Tare Number	50	28	16
Wt. of Tare & Wet Sample (g)	80.50	94.89	83.86
Wt. of Tare & Dry Sample (g)	72.70	85.62	77.26
Weight of Tare (g)	6.85	6.98	7.01
Weight of Water (g)	7.80	9.27	6.60
Weight of Dry Sample (g)	65.85	78.64	70.25
Water Content (%)	**11.8**	**11.8**	**9.4**

Notes :

Tested By PC *Date* 7/17/17 *Checked By* TMP *Date* 7/18/17

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-2
Client Project:	Tull Property 16123	Depth (ft):	90.3-91.7
Project No.:	2017-372-001	Sample ID:	NA
Lab ID No.:	2017-372-001-001	Moisture Condition:	As Received-Preserved

Specimen Weight (g): 436.17

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	3.58	Reading 1:	2.00
Reading 2:	3.58	Reading 2:	2.00
Reading 3:	3.58	Average:	**2.00**
Average:	**3.58**	Area (in^2):	3.14
		L/D:	1.79

MOISTURE CONTENT			
Tare Number:	3122	Total Load (lb):	140
Wt. of Tare & Wet Sample (g):	442.38	**Uniaxial Compressive Strength (psi):**	**40**
Wt. of Tare & Dry Sample (g):	405.92		
Weight of Tare (g):	6.79	Fracture Type:	**Shear**
Weight of Wet Sample (g):	435.59		
Sample Volume (cm^3):	184.42	Rate of Loading (lb/sec):	6
Moisture Content (%):	9.13	Time to Break (min:sec):	0:25.00
Unit Wet Weight (g/cm^3):	2.365	Deviation From Straightness[2]:	
Unit Wet Weight (pcf):	147.6		
Unit Dry Weight (g/cm^3):	2.167	AXIAL: *Fail*	TOP: *Pass* BOTTOM: *Pass*
Unit Dry Weight (pcf):	135.2		

Physical Description: Rock Core



Notes:

1) Moisture conditions at time of the test are: As Received-Preserved
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:
   G788 Compression Machine,
   G1661 Digital Calipers, G1380 Dial Gauge,
   G1616 Straight Edge, G1571 Feeler Gauge,
   G1633 V-Block, G1634 Rock Saw, G1635 Grinder.
6) Sample short of L/D parameters.

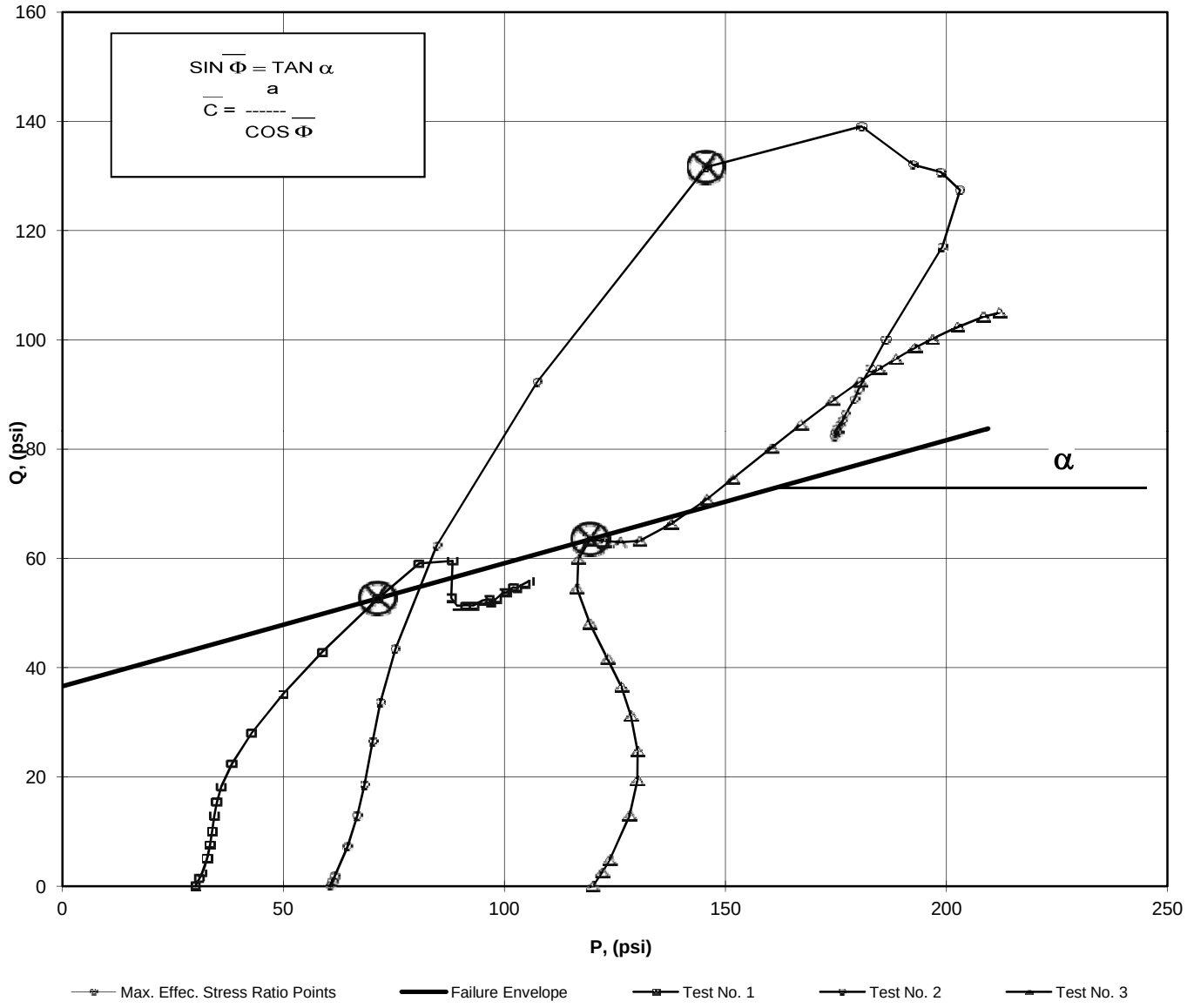
Tested By: JAC Date: 6/10/17 *Checked By:* JAM *Date:* 7/10/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1&2
Client Reference:	Tull Property 16123	Depth (ft):	79.2-91.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-002		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**36.60**	$\bar{C}$	=	**37.56**
α	=	**12.7**	$\bar{\Phi}$	=	**13.01**

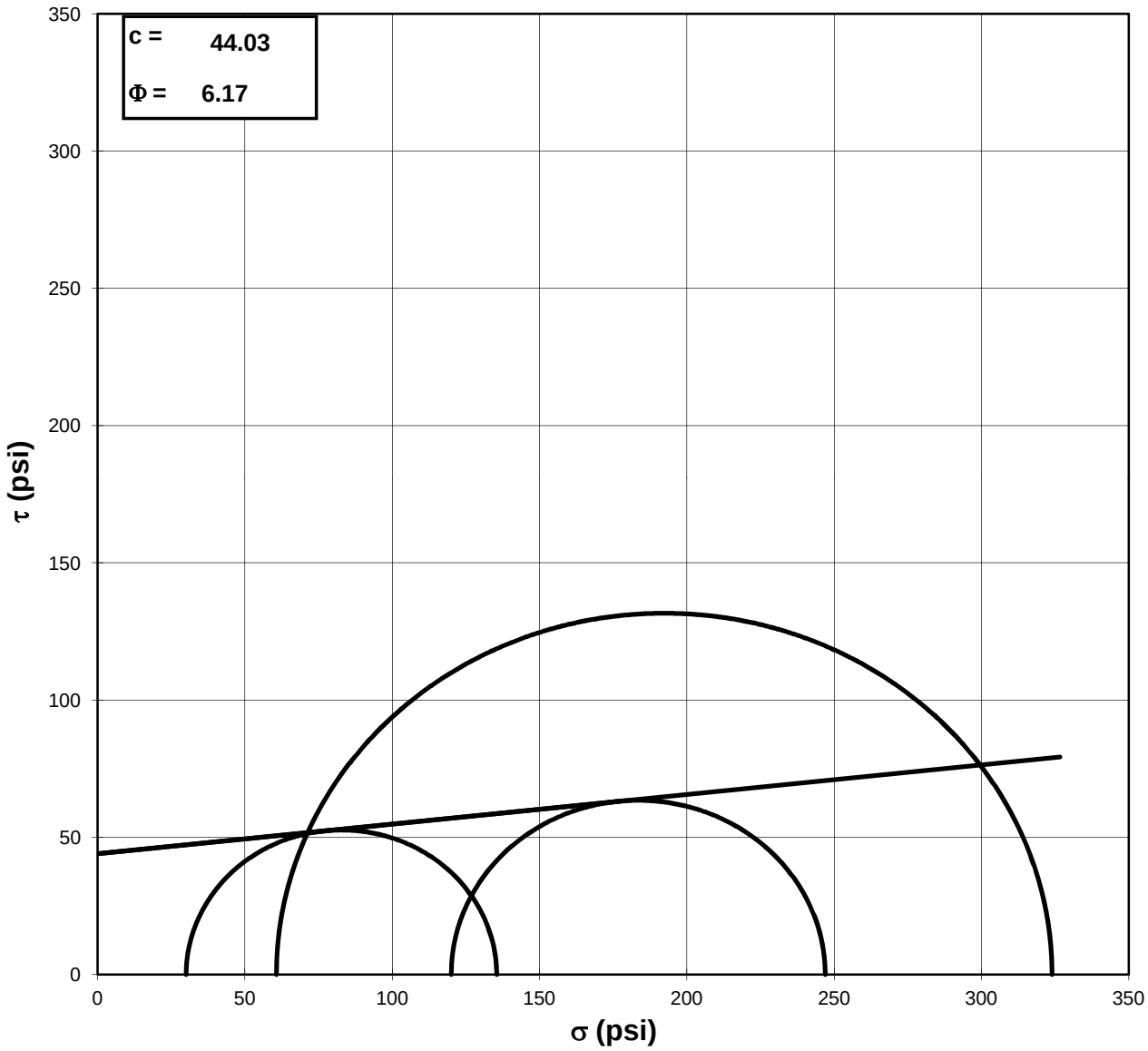
Tested By: JAB Date: 7/11/17 Approved By: DB Date: 7/17/17

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MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1&2
Client Reference:	Tull Property 16123	Depth (ft):	79.2-91.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-002		
Visual Description:	Reddish Brown Sandstone (UNDISTURBED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: JAB *Date:* 7/11/17 *Approved By:* DB *Date:* 7/17/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1&2
Client Reference:	Tull Property 16123	Depth (ft):	79.2-91.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-002		

Visual Description: Reddish Brown Sandstone (UNDISTURBED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	61.8
Back Pressure (psi)	31.7
Eff. Conf. Pressure (psi)	30.1
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	71.39
Q	=	52.67

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	3.920	Diameter 1:	2.066
Length 2:	3.908	Diameter 2:	2.001
Length 3:	3.947	Diameter 3:	2.036
Avg. Length:	3.925	*Avg. Diam.:*	2.034

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	20.8
Final Change (ml)	3.2
Initial Dial Reading (mil)	28
Dial Reading After Saturation (mil)	29
Dial Reading After Consolidation (mil)	59

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
18.8	0.000	31.7
27.4	0.001	32.2
34.3	0.002	32.6
51.8	0.004	34.2
68.2	0.007	36.0
83.4	0.011	37.9
102.8	0.017	40.4
119.5	0.022	42.3
137.5	0.030	44.1
165.4	0.043	45.9
202.7	0.062	47.0
250.7	0.084	47.0
303.4	0.107	45.9
370.4	0.133	43.1
415.2	0.152	40.2
421.4	0.180	33.1
379.3	0.218	26.6
373.2	0.258	23.8
376.9	0.288	22.1
380.6	0.327	20.3
390.0	0.356	19.0
394.4	0.386	17.9
393.8	0.416	16.9
400.8	0.435	16.3
411.3	0.455	15.7
413.3	0.474	15.1
422.8	0.494	14.5
425.4	0.523	13.6
434.7	0.552	12.6
440.6	0.572	12.1
443.2	0.592	11.5

Tested By: JAB Date: 7/11/17 Input Checked By: KC Date: 7/17/17

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WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1&2
Client Reference:	Tull Property 16123	Depth (ft):	79.2-91.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-002		

Visual Description: Reddish Brown Sandstone (UNDISTURBED)

Effective Confining Pressure (psi)	30.1	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	3.93
Initial Sample Diameter (in)	2.03
Initial Sample Area (in^2)	3.25
Initial Sample Volume (in^3)	12.76

VOLUME CHANGE

Volume After Consolidation (in^3)	12.55
Length After Consolidation (in)	3.89
Area After Consolidation (in^2)	3.224

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	2.66	0.45	32.31	29.6	1.090	0.18	30.98	1.33
0.04	4.81	0.90	34.01	29.2	1.165	0.19	31.61	2.41
0.11	10.23	2.48	37.86	27.6	1.370	0.25	32.74	5.12
0.19	15.30	4.32	41.08	25.8	1.593	0.29	33.43	7.65
0.28	19.99	6.23	43.86	23.9	1.837	0.32	33.87	9.99
0.43	25.94	8.66	47.38	21.4	2.210	0.34	34.41	12.97
0.58	31.05	10.62	50.53	19.5	2.594	0.35	35.00	15.52
0.77	36.54	12.40	54.25	17.7	3.064	0.35	35.97	18.27
1.11	44.98	14.20	60.88	15.9	3.828	0.33	38.39	22.49
1.59	56.13	15.33	70.90	14.8	4.800	0.28	42.84	28.07
2.17	70.38	15.32	85.16	14.8	5.762	0.22	49.97	35.19
2.74	85.87	14.19	101.78	15.9	6.399	0.17	58.84	42.93
3.42	105.33	11.37	124.06	18.7	6.625	0.11	71.39	52.67
3.91	118.17	8.49	139.78	21.6	6.468	0.07	80.70	59.08
4.63	119.12	1.37	147.85	28.7	5.146	0.01	88.29	59.56
5.60	105.56	-5.10	140.76	35.2	3.999	-0.05	87.98	52.78
6.64	102.64	-7.89	140.63	38.0	3.702	-0.08	89.31	51.32
7.40	102.87	-9.62	142.58	39.7	3.590	-0.10	91.15	51.43
8.40	102.80	-11.42	144.32	41.5	3.476	-0.11	92.92	51.40
9.15	104.63	-12.67	147.39	42.8	3.447	-0.12	95.08	52.31
9.90	104.99	-13.84	148.93	43.9	3.389	-0.14	96.44	52.49
10.67	103.93	-14.79	148.82	44.9	3.315	-0.15	96.86	51.96
11.18	105.25	-15.38	150.73	45.5	3.314	-0.15	98.10	52.62
11.68	107.55	-15.97	153.62	46.1	3.334	-0.15	99.84	53.77
12.18	107.49	-16.60	154.19	46.7	3.302	-0.16	100.45	53.74
12.68	109.45	-17.15	156.70	47.3	3.316	-0.16	101.98	54.72
13.43	109.20	-18.11	157.40	48.2	3.265	-0.17	102.81	54.60
14.19	110.72	-19.05	159.87	49.2	3.252	-0.18	104.51	55.36
14.70	111.63	-19.62	161.35	49.7	3.245	-0.18	105.53	55.82
15.20	111.65	-20.22	161.97	50.3	3.219	-0.19	106.14	55.83

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1&2
Client Reference:	Tull Property 16123	Depth (ft):	79.2-91.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-002		

Visual Description: Reddish Brown Sandstone (UNDISTURBED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	91.3
Back Pressure (psi)	30.6
Eff. Conf. Pressure (psi)	60.7
Pore Pressure Response (%)	100

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	145.70
Q	=	131.63

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	3.784	Diameter 1:	2.009
Length 2:	3.791	Diameter 2:	2.017
Length 3:	3.787	Diameter 3:	2.006
Avg. Length	3.787	*Avg. Diam.:*	2.011

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	21.6
Final Change (ml)	2.4
Initial Dial Reading (mil)	29
Dial Reading After Saturation (mil)	29
Dial Reading After Consolidation (mil)	42

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
20.7	0.000	30.6
26.3	0.001	31.1
32.2	0.002	31.5
66.3	0.003	34.0
102.0	0.007	37.5
138.1	0.011	41.5
188.3	0.015	47.6
234.0	0.021	53.0
296.1	0.028	59.4
417.4	0.039	69.0
610.8	0.057	76.2
866.5	0.077	77.2
919.7	0.098	49.6
880.3	0.125	30.9
875.8	0.143	23.3
860.1	0.169	15.6
799.5	0.205	9.3
694.2	0.246	5.1
664.4	0.276	3.4
645.4	0.316	2.1
638.5	0.344	1.3
625.3	0.373	0.6
620.9	0.401	0.0
619.2	0.419	-0.2
616.9	0.438	-0.1
615.9	0.457	-0.4
617.9	0.477	-0.7
624.8	0.506	-0.9
624.2	0.535	-1.2
634.2	0.555	-1.2
646.1	0.574	-1.1

Tested By: JAB Date: 7/11/17 Input Checked By: KC Date: 7/17/17

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1&2
Client Reference:	Tull Property 16123	Depth (ft):	79.2-91.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-002		

Visual Description: Reddish Brown Sandstone (UNDISTURBED)

Effective Confining Pressure (psi)	60.7	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	3.79
Initial Sample Diameter (in)	2.01
Initial Sample Area (in^2)	3.18
Initial Sample Volume (in^3)	12.03

VOLUME CHANGE

Volume After Consolidation (in^3)	11.88
Length After Consolidation (in)	3.77
Area After Consolidation (in^2)	3.147

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.03	1.77	0.48	61.99	60.2	1.029	0.27	61.10	0.88
0.04	3.67	0.91	63.46	59.8	1.061	0.25	61.63	1.83
0.09	14.48	3.41	71.78	57.3	1.253	0.24	64.54	7.24
0.18	25.78	6.85	79.63	53.8	1.479	0.27	66.74	12.89
0.28	37.20	10.92	86.98	49.8	1.747	0.29	68.38	18.60
0.41	53.04	17.00	96.74	43.7	2.213	0.32	70.22	26.52
0.55	67.40	22.42	105.68	38.3	2.761	0.33	71.98	33.70
0.74	86.87	28.79	118.77	31.9	3.723	0.33	75.34	43.43
1.04	124.72	38.37	147.05	22.3	6.585	0.31	84.69	62.36
1.51	184.66	45.59	199.77	15.1	13.219	0.25	107.44	92.33
2.05	263.22	46.62	277.30	14.1	19.702	0.18	145.69	131.61
2.61	278.18	19.00	319.88	41.7	7.672	0.07	180.79	139.09
3.30	264.12	0.31	324.52	60.4	5.373	0.00	192.45	132.06
3.80	261.39	-7.33	329.42	68.0	4.842	-0.03	198.73	130.70
4.48	254.76	-15.01	330.47	75.7	4.365	-0.06	203.09	127.38
5.44	233.98	-21.34	316.02	82.0	3.852	-0.09	199.03	116.99
6.51	200.08	-25.53	286.30	86.2	3.320	-0.13	186.26	100.04
7.32	189.55	-27.24	277.48	87.9	3.155	-0.14	182.71	94.77
8.36	181.90	-28.50	271.10	89.2	3.039	-0.16	180.15	90.95
9.12	178.38	-29.33	268.40	90.0	2.981	-0.16	179.21	89.19
9.88	173.13	-30.03	263.86	90.7	2.908	-0.17	177.29	86.56
10.62	170.45	-30.59	261.73	91.3	2.867	-0.18	176.51	85.22
11.11	169.04	-30.81	260.55	91.5	2.847	-0.18	176.03	84.52
11.61	167.46	-30.73	258.89	91.4	2.831	-0.18	175.16	83.73
12.11	166.21	-31.02	257.94	91.7	2.812	-0.19	174.83	83.11
12.63	165.79	-31.30	257.79	92.0	2.802	-0.19	174.90	82.89
13.40	166.23	-31.54	258.46	92.2	2.802	-0.19	175.35	83.11
14.18	164.55	-31.79	257.04	92.5	2.779	-0.19	174.77	82.28
14.70	166.28	-31.82	258.81	92.5	2.797	-0.19	175.67	83.14
15.20	168.51	-31.70	260.91	92.4	2.824	-0.19	176.65	84.25

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1&2
Client Reference:	Tull Property 16123	Depth (ft):	79.2-91.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-002		

Visual Description: Reddish Brown Sandstone (UNDISTURBED)

Stage No.	1
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	152
Back Pressure (psi)	32
Eff. Conf. Pressure (psi)	120.0
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	119.45
Q	=	63.48

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	4.062	Diameter 1:	2.001
Length 2:	4.071	Diameter 2:	1.979
Length 3:	4.053	Diameter 3:	2.010
Avg. Length:	4.062	*Avg. Diam.:*	1.997

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	15.4
Final Change (ml)	8.6
Initial Dial Reading (mil)	45
Dial Reading After Saturation (mil)	51
Dial Reading After Consolidation (mil)	124

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
31.0	0.000	32.0
46.9	0.002	32.4
60.7	0.002	33.0
109.9	0.004	36.6
149.3	0.007	41.3
181.8	0.010	46.5
221.6	0.016	54.5
254.5	0.021	62.0
286.5	0.029	70.3
326.9	0.042	80.7
367.7	0.062	89.9
403.5	0.086	95.1
428.5	0.111	96.0
430.5	0.141	92.7
431.1	0.162	88.8
435.6	0.190	84.6
459.5	0.229	80.6
493.8	0.269	77.0
522.3	0.299	74.9
565.5	0.340	71.8
598.8	0.370	69.3
633.5	0.400	66.7
662.2	0.430	64.0
681.0	0.450	61.9
697.7	0.470	59.9
716.1	0.490	57.7
731.4	0.510	55.4
752.7	0.541	51.8
772.5	0.571	47.9
782.5	0.592	45.1
788.0	0.612	42.2

Tested By: JAB Date: 7/11/17 Input Checked By: KC Date: 7/17/17

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1&2
Client Reference:	Tull Property 16123	Depth (ft):	79.2-91.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-002		

Visual Description: Reddish Brown Sandstone (UNDISTURBED)

Effective Confining Pressure (psi)	120.0	*Stage No.*	1
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	4.06
Initial Sample Diameter (in)	2.00
Initial Sample Area (in^2)	3.13
Initial Sample Volume (in^3)	12.72

VOLUME CHANGE

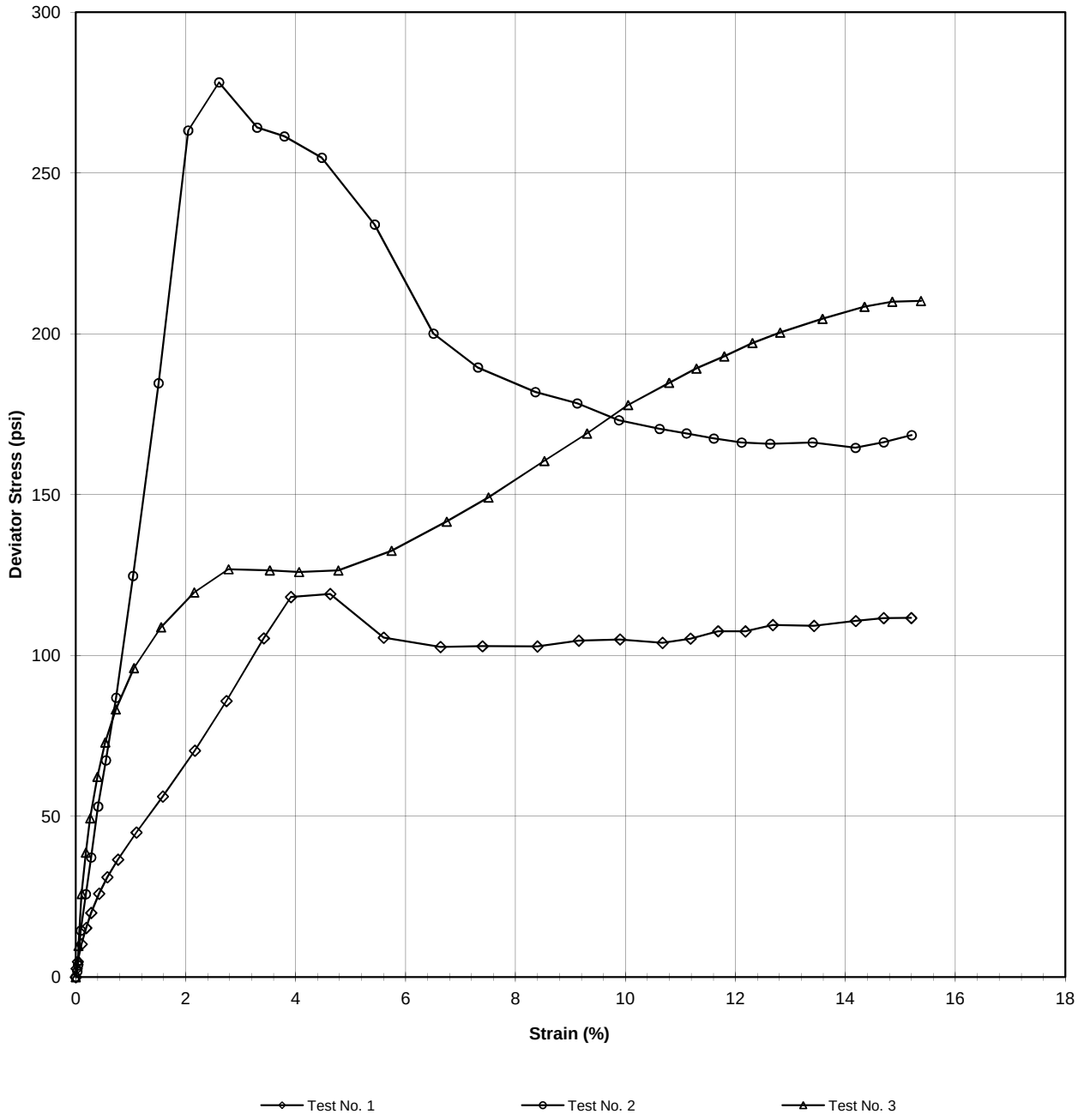
Volume After Consolidation (in^3)	12.14
Length After Consolidation (in)	3.98
Area After Consolidation (in^2)	3.047

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.05	5.21	0.41	124.80	119.6	1.044	0.08	122.20	2.61
0.05	9.73	1.01	128.71	119.0	1.082	0.11	123.85	4.86
0.11	25.88	4.60	141.28	115.4	1.224	0.18	128.34	12.94
0.19	38.74	9.29	149.45	110.7	1.350	0.25	130.08	19.37
0.26	49.36	14.53	154.83	105.5	1.468	0.30	130.15	24.68
0.39	62.30	22.49	159.81	97.5	1.639	0.37	128.66	31.15
0.54	72.96	30.00	162.95	90.0	1.811	0.42	126.47	36.48
0.73	83.22	38.25	164.97	81.7	2.018	0.47	123.36	41.61
1.06	96.07	48.71	167.37	71.3	2.348	0.52	119.33	48.04
1.55	108.77	57.95	170.82	62.1	2.753	0.55	116.44	54.38
2.16	119.60	63.09	176.51	56.9	3.102	0.54	116.71	59.80
2.78	126.82	64.03	182.79	56.0	3.266	0.52	119.38	63.41
3.53	126.48	60.65	185.82	59.3	3.131	0.49	122.58	63.24
4.06	125.96	56.81	189.15	63.2	2.994	0.46	126.17	62.98
4.78	126.44	52.57	193.87	67.4	2.875	0.43	130.65	63.22
5.74	132.54	48.58	203.96	71.4	2.856	0.38	137.69	66.27
6.75	141.61	45.04	216.58	75.0	2.889	0.33	145.77	70.81
7.51	149.13	42.90	226.23	77.1	2.934	0.30	151.66	74.56
8.52	160.45	39.79	240.66	80.2	3.000	0.26	160.44	80.23
9.30	169.01	37.33	251.68	82.7	3.044	0.23	167.18	84.50
10.05	177.86	34.69	263.17	85.3	3.085	0.20	174.24	88.93
10.79	184.76	31.97	272.79	88.0	3.099	0.18	180.41	92.38
11.29	189.21	29.90	279.31	90.1	3.100	0.16	184.71	94.60
11.80	192.99	27.93	285.06	92.1	3.096	0.15	188.56	96.49
12.31	197.14	25.74	291.40	94.3	3.091	0.13	192.83	98.57
12.81	200.39	23.36	297.03	96.6	3.074	0.12	196.83	100.19
13.58	204.66	19.81	304.84	100.2	3.043	0.10	202.51	102.33
14.35	208.40	15.87	312.54	104.1	3.001	0.08	208.33	104.20
14.85	209.99	13.05	316.94	106.9	2.964	0.06	211.94	104.99
15.37	210.23	10.21	320.02	109.8	2.915	0.05	214.90	105.12

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, In	Boring No.:	GBB-1&2
Client Reference:	Tull Property 16123	Depth (ft):	79.2-91.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-002		
Visual Description:	Reddish Brown Sandstone (UNDISTURBED)		



Tested By: JAB Date: 7/11/17 Approved By: DB Date: 7/17/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.		
Client Reference:	Tull Property 16123		
Project No.:	2017-372-001		
Lab ID:	2017-372-001-002	Specific Gravity (assumed)	2.7
Visual Description:	Reddish Brown Sandstone (UNDISTURBED)		

SAMPLE CONDITION SUMMARY

Boring No.:	GBB-1&2	GBB-1&2	GBB-1&2
Depth (ft):	79.2-91.7	79.2-91.7	79.2-91.7
Sample No.:	NA	NA	NA
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.0003	0.0003	0.0018
Back Pressure (psi)	31.7	30.6	32
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	7.8	6.6	10.2
Total Unit Weight (pcf)	145.9	149.8	144.0
Dry Unit Weight (pcf)	135.3	140.5	130.7
Moisture Content (%) (FINAL)	10.0	8.3	8.8
Initial State Void Ratio,e	0.245	0.199	0.290
Void Ratio at Shear, e	0.226	0.185	0.231



Tested By: JAB Date: 7/11/17 Input Checked By: KC Date: 7/17/17

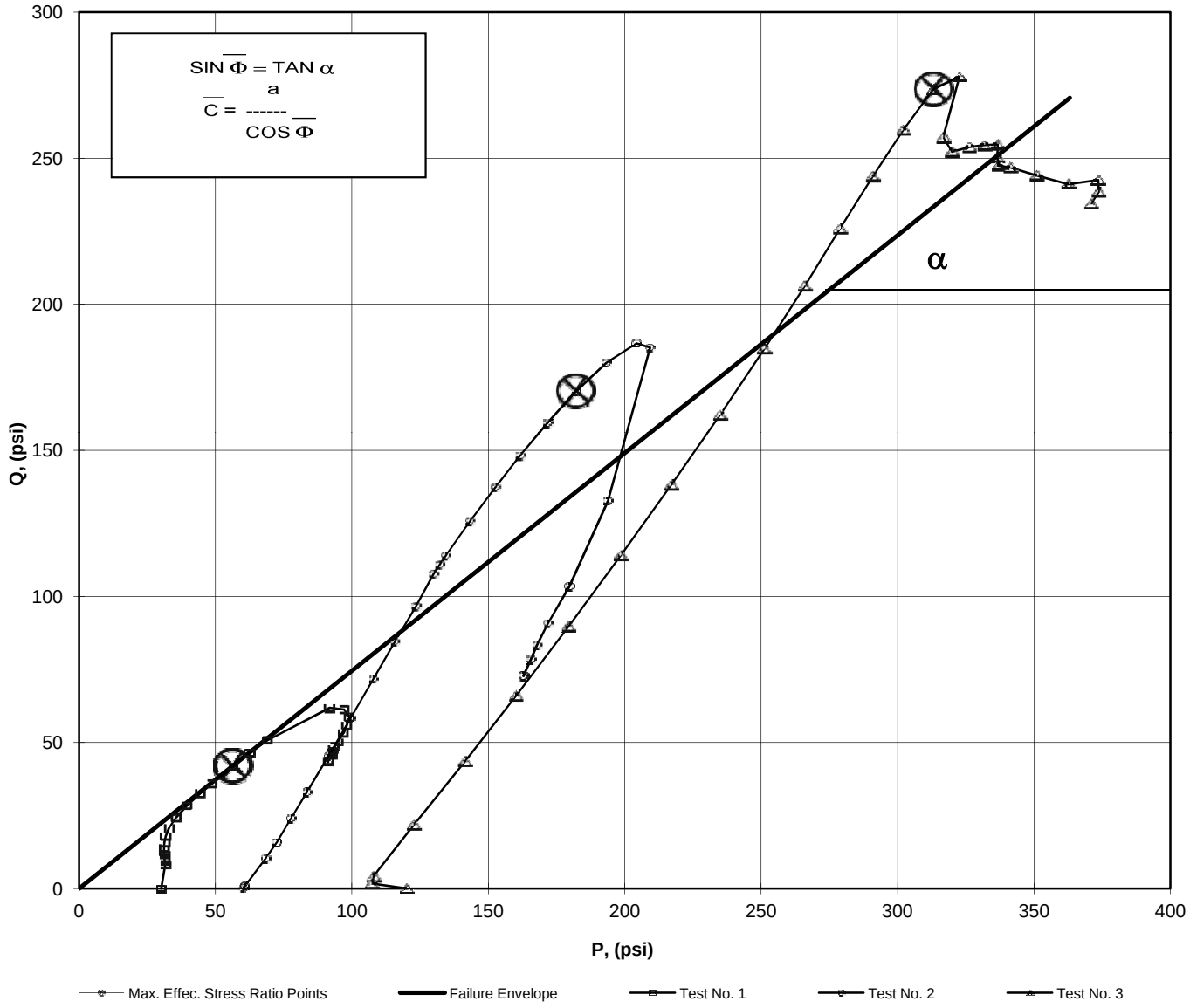
DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1,2 & 3
Client Reference:	Tull Property 16123	Depth (ft):	70.8-126.5
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-003		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**0.00**	$\overline{C}$	=	**0.00**
α	=	**36.7**	$\overline{\Phi}$	=	**48.17**

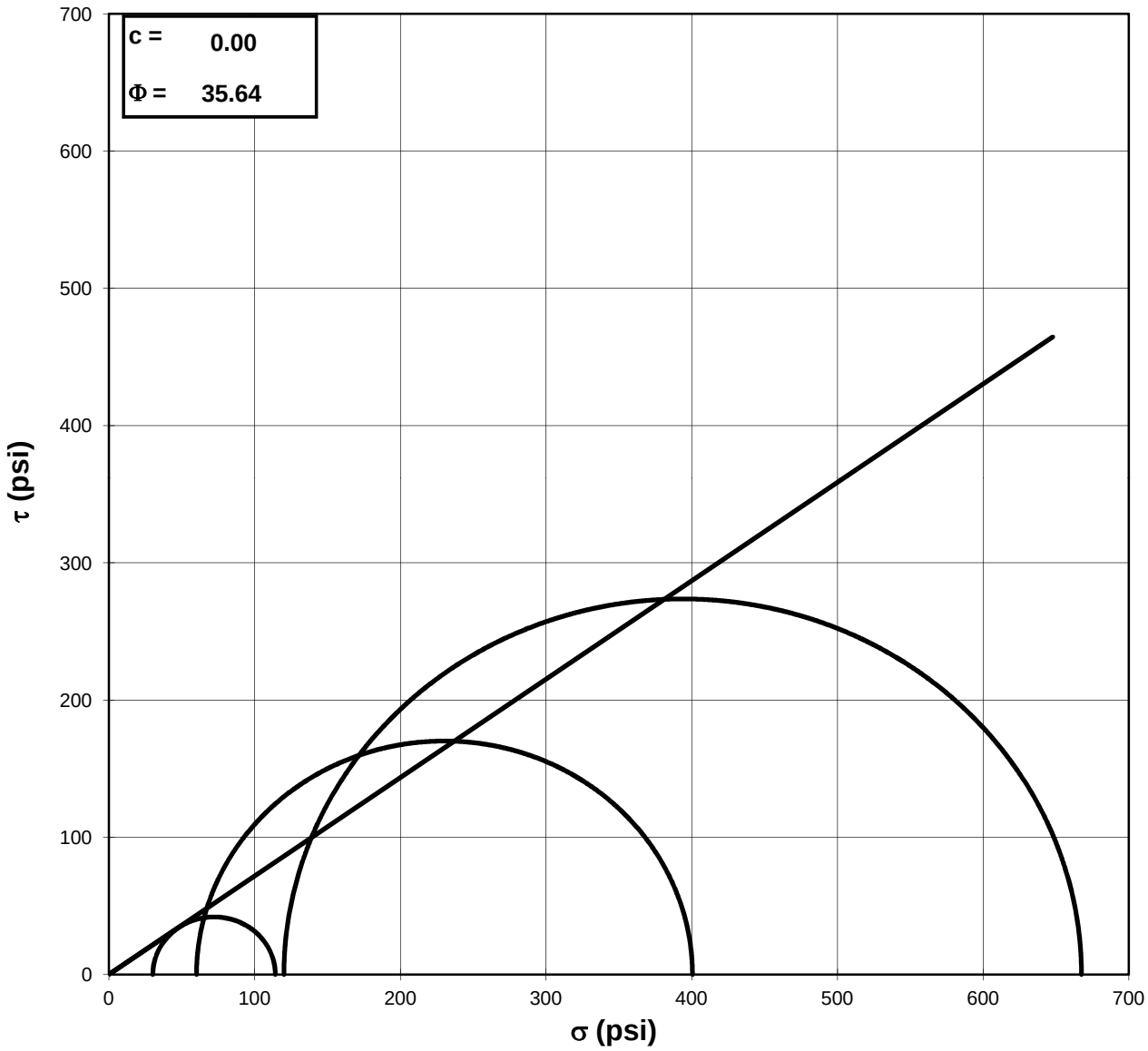
Tested By: JAB Date: 7/14/17 Approved By: DB Date: 7/21/17

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MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1,2 & 3
Client Reference:	Tull Property 16123	Depth (ft):	70.8-126.5
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-003		
Visual Description:	Brown Claystone (UNDISTURBED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: JAB *Date:* 7/14/17 *Approved By:* DB *Date:* 7/21/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1,2 & 3
Client Reference:	Tull Property 16123	Depth (ft):	84.9-85.6
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-003		

Visual Description: Brown Claystone (UNDISTURBED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	61.1
Back Pressure (psi)	31.0
Eff. Conf. Pressure (psi)	30.1
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	56.41
Q	=	42.04

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	4.105	Diameter 1:	2.017
Length 2:	4.097	Diameter 2:	2.036
Length 3:	4.099	Diameter 3:	2.033
Avg. Length:	4.100	*Avg. Diam.:*	2.029

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	18.0
Final Change (ml)	6.0
Initial Dial Reading (mil)	23
Dial Reading After Saturation (mil)	32
Dial Reading After Consolidation (mil)	73

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
11.8	0.000	31.0
62.5	0.001	37.6
70.7	0.002	39.0
77.7	0.004	40.2
84.1	0.005	41.3
89.8	0.007	42.3
99.7	0.010	43.8
111.5	0.015	45.6
125.4	0.023	47.2
143.8	0.035	48.8
167.4	0.056	49.8
194.5	0.078	49.9
223.7	0.102	49.2
246.0	0.117	48.5
287.3	0.144	46.7
317.3	0.164	45.0
348.1	0.184	42.8
428.8	0.255	31.1
428.4	0.284	25.2
414.2	0.325	20.6
397.8	0.354	18.7
383.8	0.384	17.4
365.2	0.415	16.4
356.2	0.435	15.9
351.8	0.455	15.4
349.1	0.475	15.1
345.2	0.496	14.7
345.1	0.526	14.0
332.1	0.556	13.4
330.2	0.576	13.0
330.4	0.596	12.7

Tested By: JAB Date: 7/14/17 Input Checked By: KC Date: 7/21/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1,2 & 3
Client Reference:	Tull Property 16123	Depth (ft):	84.9-85.6
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-003		

Visual Description: Brown Claystone (UNDISTURBED)

Effective Confining Pressure (psi)	30.1	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	4.10
Initial Sample Diameter (in)	2.03
Initial Sample Area (in^2)	3.23
Initial Sample Volume (in^3)	13.25

VOLUME CHANGE

Volume After Consolidation (in^3)	12.80
Length After Consolidation (in)	4.05
Area After Consolidation (in^2)	3.160

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	16.04	6.59	39.54	23.5	1.682	0.42	31.53	8.02
0.06	18.62	7.99	40.72	22.1	1.842	0.44	31.41	9.31
0.09	20.82	9.20	41.72	20.9	1.996	0.46	31.31	10.41
0.13	22.85	10.31	42.64	19.8	2.155	0.47	31.22	11.43
0.17	24.64	11.27	43.47	18.8	2.308	0.47	31.15	12.32
0.25	27.72	12.83	45.00	17.3	2.605	0.48	31.13	13.86
0.38	31.43	14.55	46.97	15.5	3.021	0.48	31.26	15.71
0.57	35.72	16.17	49.65	13.9	3.564	0.47	31.79	17.86
0.88	41.40	17.76	53.75	12.3	4.355	0.44	33.04	20.70
1.38	48.56	18.80	59.86	11.3	5.295	0.40	35.58	24.28
1.93	56.70	18.89	67.91	11.2	6.059	0.34	39.56	28.35
2.52	65.34	18.24	77.21	11.9	6.508	0.29	44.54	32.67
2.89	71.96	17.51	84.55	12.6	6.717	0.25	48.57	35.98
3.54	84.07	15.73	98.45	14.4	6.849	0.19	56.41	42.04
4.04	92.75	13.97	108.88	16.1	6.751	0.16	62.50	46.37
4.53	101.58	11.79	119.90	18.3	6.547	0.12	69.11	50.79
6.29	123.64	0.09	153.65	30.0	5.119	0.00	91.83	61.82
7.02	122.55	-5.77	158.42	35.9	4.416	-0.05	97.15	61.27
8.02	117.10	-10.37	157.57	40.5	3.894	-0.09	99.02	58.55
8.75	111.45	-12.27	153.82	42.4	3.631	-0.11	98.09	55.73
9.49	106.53	-13.64	150.27	43.7	3.435	-0.13	97.01	53.26
10.25	100.37	-14.63	145.10	44.7	3.244	-0.15	94.91	50.18
10.74	97.28	-15.12	142.50	45.2	3.151	-0.16	93.86	48.64
11.24	95.49	-15.59	141.19	45.7	3.090	-0.17	93.44	47.75
11.73	94.20	-15.92	140.22	46.0	3.047	-0.17	93.12	47.10
12.24	92.58	-16.31	138.99	46.4	2.995	-0.18	92.70	46.29
12.99	91.77	-16.95	138.83	47.1	2.950	-0.19	92.94	45.89
13.73	87.42	-17.60	135.12	47.7	2.833	-0.21	91.41	43.71
14.22	86.40	-17.96	134.46	48.1	2.798	-0.21	91.26	43.20
14.70	85.97	-18.27	134.34	48.4	2.777	-0.22	91.35	42.98

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1,2 & 3
Client Reference:	Tull Property 16123	Depth (ft):	70.8-71.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-003		

Visual Description: Brown Claystone (UNDISTURBED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	92.4
Back Pressure (psi)	32.3
Eff. Conf. Pressure (psi)	60.1
Pore Pressure Response (%)	99

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	182.10
Q	=	170.17

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	4.078	Diameter 1:	1.994
Length 2:	4.074	Diameter 2:	1.995
Length 3:	4.083	Diameter 3:	2.002
Avg. Length	4.078	*Avg. Diam.:*	1.997

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	21.1
Final Change (ml)	2.9
Initial Dial Reading (mil)	39
Dial Reading After Saturation (mil)	34
Dial Reading After Consolidation (mil)	42

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
15.5	0.000	32.3
19.5	0.001	32.4
20.5	0.002	32.5
78.8	0.005	34.2
114.0	0.007	35.8
164.6	0.010	38.8
219.9	0.012	41.8
298.0	0.015	46.3
378.4	0.018	51.2
462.6	0.021	56.3
542.6	0.024	61.1
619.1	0.028	65.5
688.8	0.031	70.2
708.4	0.032	71.1
727.8	0.033	71.9
803.3	0.036	74.8
876.7	0.039	77.2
945.4	0.043	79.0
1015.9	0.046	80.1
1084.4	0.050	80.5
1147.3	0.053	79.1
1189.8	0.057	74.8
1181.7	0.061	68.2
857.6	0.091	31.3
678.7	0.133	16.0
603.4	0.175	11.2
565.9	0.246	7.9
547.5	0.350	5.2
541.0	0.573	2.4
544.7	0.593	2.2
540.8	0.614	2.1

Tested By: JAB Date: 7/14/17 Input Checked By: KC Date: 7/21/17

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1,2 & 3
Client Reference:	Tull Property 16123	Depth (ft):	70.8-71.7
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-003		

Visual Description: Brown Claystone (UNDISTURBED)

Effective Confining Pressure (psi)	60.1	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	4.08
Initial Sample Diameter (in)	2.00
Initial Sample Area (in^2)	3.13
Initial Sample Volume (in^3)	12.77

VOLUME CHANGE

Volume After Consolidation (in^3)	12.64
Length After Consolidation (in)	4.08
Area After Consolidation (in^2)	3.103

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	1.29	0.12	61.27	60.0	1.022	0.09	60.63	0.65
0.04	1.61	0.17	61.54	59.9	1.027	0.11	60.73	0.81
0.13	20.38	1.94	78.55	58.2	1.350	0.10	68.36	10.19
0.17	31.69	3.47	88.33	56.6	1.560	0.11	72.48	15.85
0.24	47.96	6.49	101.57	53.6	1.894	0.14	77.59	23.98
0.29	65.70	9.48	116.32	50.6	2.298	0.15	83.47	32.85
0.37	90.74	14.03	136.81	46.1	2.970	0.16	91.44	45.37
0.45	116.45	18.91	157.64	41.2	3.827	0.16	99.42	58.23
0.52	143.35	23.97	179.49	36.1	4.967	0.17	107.81	71.68
0.60	168.88	28.80	200.18	31.3	6.396	0.17	115.74	84.44
0.68	193.24	33.19	220.15	26.9	8.181	0.17	123.53	96.62
0.76	215.37	37.86	237.61	22.2	10.682	0.18	129.93	107.68
0.78	221.61	38.78	242.93	21.3	11.393	0.18	132.13	110.81
0.80	227.77	39.59	248.28	20.5	12.107	0.18	134.39	113.89
0.88	251.69	42.55	269.24	17.6	15.340	0.17	143.40	125.84
0.96	274.91	44.89	290.12	15.2	19.072	0.16	152.66	137.45
1.05	296.58	46.67	310.00	13.4	23.088	0.16	161.72	148.29
1.13	318.81	47.80	331.12	12.3	26.916	0.15	171.71	159.41
1.22	340.34	48.17	352.26	11.9	29.539	0.14	182.10	170.17
1.30	360.06	46.78	373.38	13.3	28.038	0.13	193.35	180.03
1.39	373.25	42.46	390.89	17.6	22.158	0.11	204.26	186.62
1.49	370.29	35.94	394.46	24.2	16.326	0.10	209.31	185.15
2.24	265.33	-1.04	326.47	61.1	5.340	0.00	193.80	132.66
3.27	206.78	-16.27	283.15	76.4	3.708	-0.08	179.76	103.39
4.29	181.36	-21.08	262.55	81.2	3.234	-0.12	171.87	90.68
6.04	166.68	-24.44	251.22	84.5	2.972	-0.15	167.88	83.34
8.58	156.77	-27.07	243.94	87.2	2.798	-0.17	165.55	78.38
14.06	145.56	-29.94	235.60	90.0	2.617	-0.21	162.82	72.78
14.56	145.75	-30.08	235.93	90.2	2.616	-0.21	163.05	72.88
15.06	143.82	-30.23	234.15	90.3	2.592	-0.21	162.24	71.91

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS

ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1,2 & 3
Client Reference:	Tull Property 16123	Depth (ft):	125.8-126.5
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-003		

Visual Description: Brown Claystone (UNDISTURBED)

Stage No.	1
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	152.4
Back Pressure (psi)	32.3
Eff. Conf. Pressure (psi)	120.1
Pore Pressure Response (%)	100

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	313.15
Q	=	273.68

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	4.084	Diameter 1:	1.999
Length 2:	4.081	Diameter 2:	1.987
Length 3:	4.079	Diameter 3:	1.989
Avg. Length:	4.081	*Avg. Diam.:*	1.992

VOLUME CHANGE

Initial Burette Reading (ml)	144.0
Final Burette Reading (ml)	43.8
Final Change (ml)	100.2

Initial Dial Reading (mil)	54
Dial Reading After Saturation (mil)	49
Dial Reading After Consolidation (mil)	66

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
49.8	0.000	44.9
55.4	0.008	46.8
63.5	0.017	48.6
121.1	0.024	51.4
192.3	0.027	54.4
266.8	0.030	58.2
345.0	0.033	62.7
425.8	0.036	67.9
505.7	0.039	73.5
585.3	0.041	79.6
660.4	0.045	86.0
731.9	0.048	92.7
797.4	0.051	99.4
856.8	0.054	105.2
910.2	0.057	109.9
957.7	0.061	112.9
972.2	0.064	107.6
904.6	0.069	92.8
888.9	0.074	84.6
895.0	0.077	79.9
898.0	0.081	75.1
899.6	0.085	70.4
885.3	0.089	65.9
877.1	0.093	62.8
876.8	0.101	58.0
873.1	0.129	45.4
879.2	0.205	31.0
906.7	0.306	21.4
915.4	0.408	17.1
925.9	0.511	15.9
986.5	0.591	16.1

Tested By: JAB Date: 7/14/17 Input Checked By: KC Date: 7/21/17

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1,2 & 3
Client Reference:	Tull Property 16123	Depth (ft):	125.8-126.5
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-003		

Visual Description: Brown Claystone (UNDISTURBED)

Effective Confining Pressure (psi)	120.1	*Stage No.*	1
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	4.08
Initial Sample Diameter (in)	1.99
Initial Sample Area (in^2)	3.12
Initial Sample Volume (in^3)	12.72

VOLUME CHANGE

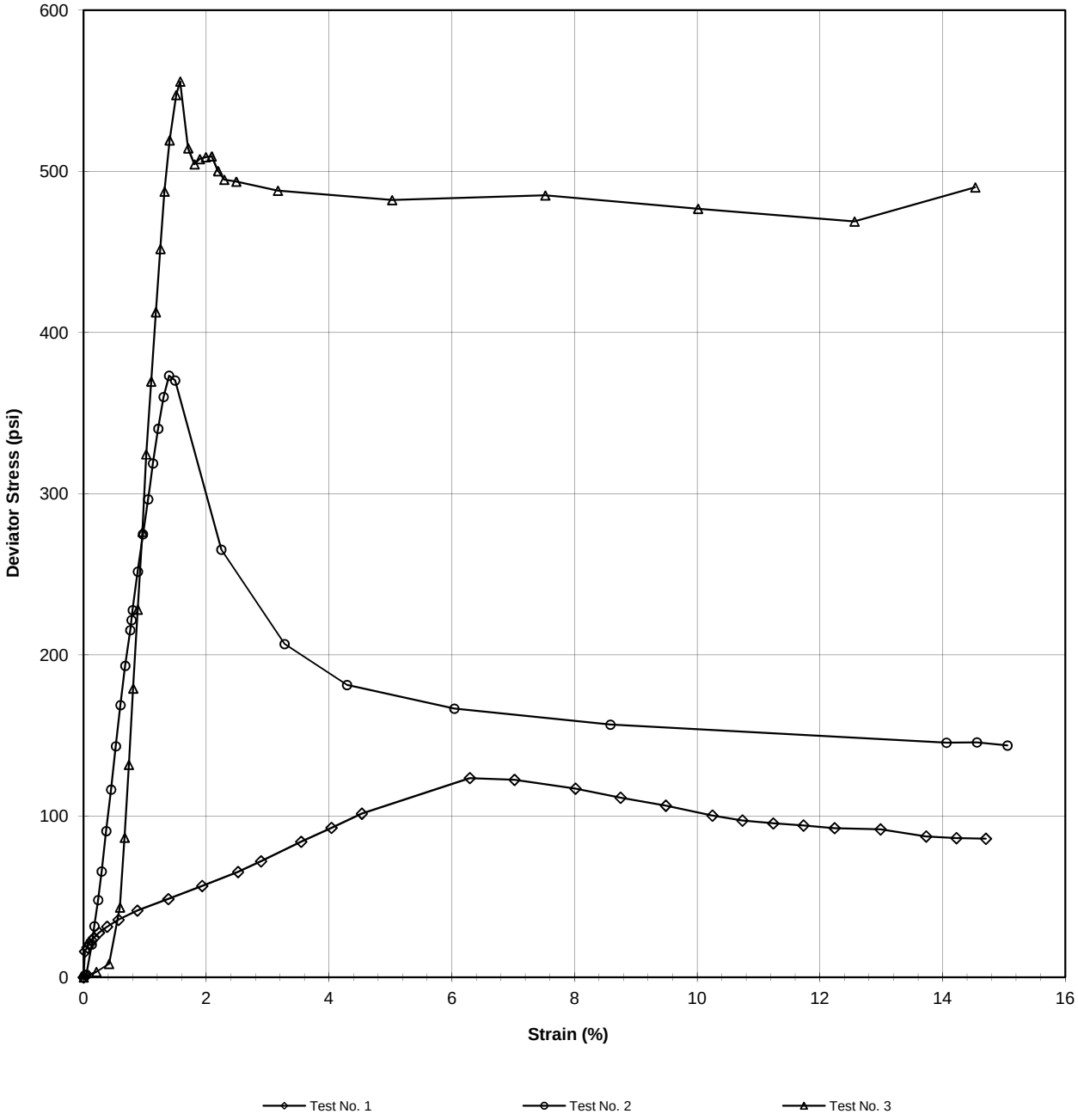
Volume After Consolidation (in^3)	6.65
Length After Consolidation (in)	4.07
Area After Consolidation (in^2)	1.634

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.21	3.37	14.45	109.02	105.6	1.032	4.29	107.33	1.68
0.41	8.34	16.28	112.16	103.8	1.080	1.95	107.99	4.17
0.59	43.37	19.11	144.36	101.0	1.429	0.44	122.67	21.68
0.67	86.63	22.06	184.67	98.0	1.884	0.25	141.35	43.31
0.74	131.85	25.87	226.07	94.2	2.399	0.20	160.15	65.92
0.81	179.22	30.40	268.92	89.7	2.998	0.17	179.31	89.61
0.88	228.11	35.57	312.65	84.5	3.699	0.16	198.59	114.06
0.96	276.38	41.17	355.31	78.9	4.502	0.15	217.12	138.19
1.02	324.46	47.30	397.26	72.8	5.457	0.15	235.03	162.23
1.10	369.66	53.67	436.09	66.4	6.565	0.15	251.26	184.83
1.18	412.63	60.39	472.34	59.7	7.910	0.15	266.03	206.32
1.25	451.90	67.10	504.90	53.0	9.527	0.15	278.95	225.95
1.32	487.49	72.95	534.64	47.2	11.339	0.15	290.90	243.74
1.40	519.32	77.63	561.79	42.5	13.228	0.15	302.13	259.66
1.51	547.36	80.63	586.83	39.5	14.868	0.15	313.15	273.68
1.57	555.75	75.34	600.50	44.8	13.417	0.14	322.63	277.87
1.70	514.37	60.52	573.95	59.6	9.633	0.12	316.77	257.19
1.81	504.37	52.34	572.13	67.8	8.444	0.10	319.94	252.19
1.89	507.61	47.57	580.14	72.5	7.999	0.09	326.33	253.80
1.99	508.88	42.80	586.18	77.3	7.583	0.08	331.74	254.44
2.09	509.32	38.11	591.31	82.0	7.212	0.07	336.65	254.66
2.19	500.21	33.62	586.69	86.5	6.784	0.07	336.59	250.10
2.29	494.81	30.50	584.41	89.6	6.523	0.06	337.01	247.41
2.49	493.62	25.66	588.06	94.4	6.227	0.05	341.25	246.81
3.16	488.02	13.13	594.99	107.0	5.562	0.03	350.98	244.01
5.03	482.19	-1.29	603.58	121.4	4.972	0.00	362.48	241.09
7.52	485.08	-10.89	616.07	131.0	4.703	-0.02	373.53	242.54
10.01	476.82	-15.20	612.11	135.3	4.524	-0.03	373.71	238.41
12.56	468.91	-16.40	605.41	136.5	4.435	-0.03	370.96	234.46
14.53	490.07	-16.20	626.36	136.3	4.596	-0.03	381.33	245.03

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-1,2 & 3
Client Reference:	Tull Property 16123	Depth (ft):	70.8-126.5
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-003		
Visual Description:	Brown Claystone (UNDISTURBED)		



Tested By: JAB Date: 7/14/17 Approved By: DB Date: 7/21/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.		
Client Reference:	Tull Property 16123		
Project No.:	2017-372-001		
Lab ID:	2017-372-001-003	Specific Gravity (assumed)	2.7
Visual Description:	Brown Claystone (UNDISTURBED)		

SAMPLE CONDITION SUMMARY

Boring No.:	GBB-1,2 & 3	GBB-1,2 & 3	GBB-1,2 & 3
Depth (ft):	84.9-85.6	70.8-71.7	125.8-126.5
Sample No.:	NA	NA	NA
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.0005	0.0005	0.0005
Back Pressure (psi)	31.0	32.3	32.3
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	10.3	6.0	7.1
Total Unit Weight (pcf)	142.4	152.2	150.9
Dry Unit Weight (pcf)	129.1	143.5	140.9
Moisture Content (%) (FINAL)	10.8	8.5	9.1
Initial State Void Ratio,e	0.305	0.175	0.196
Void Ratio at Shear, e	0.261	0.163	-0.374





Tested By: JAB Date: 7/14/17 Input Checked By: KC Date: 7/21/17

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

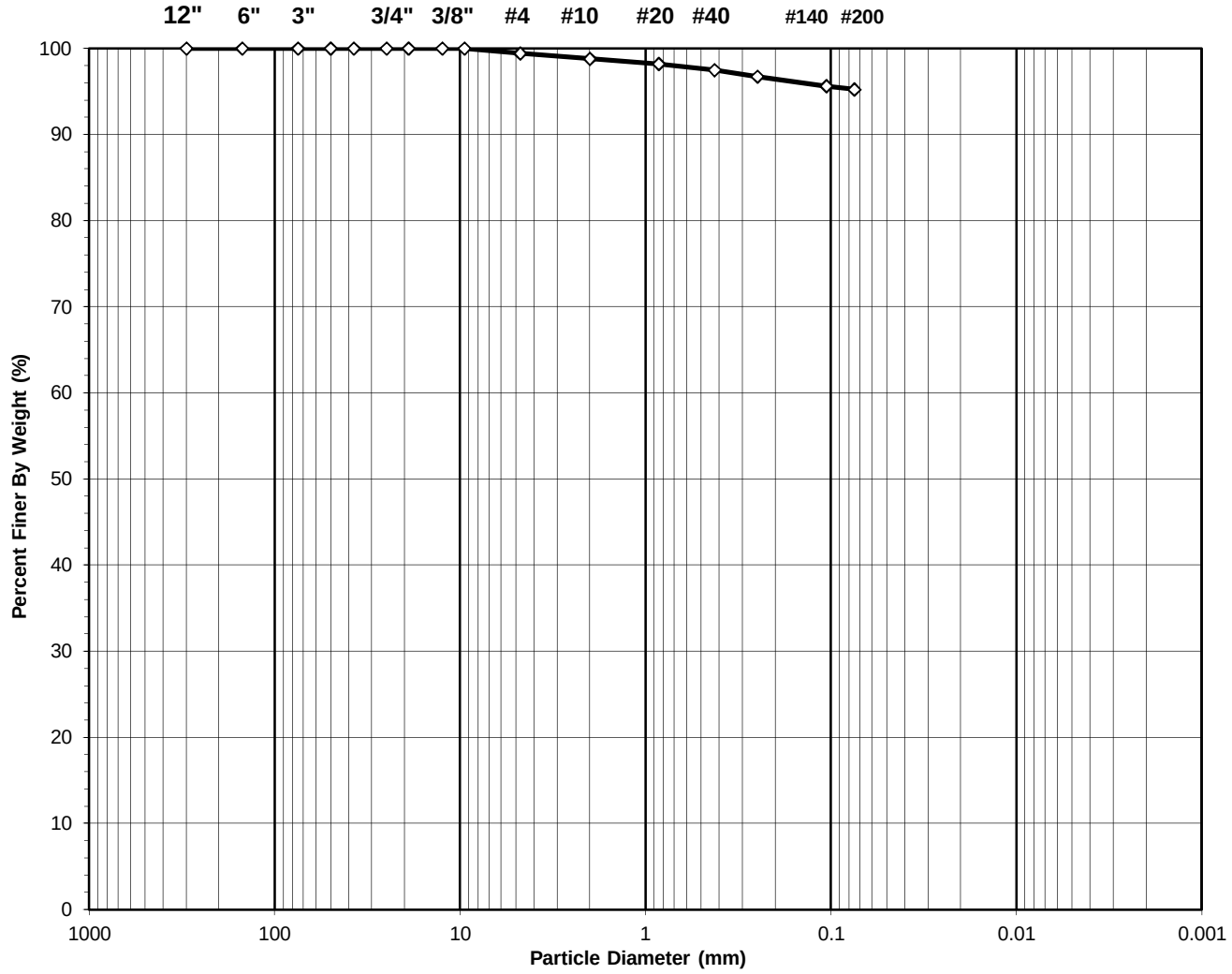
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004	Soil Color:	Reddish Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CH, TESTED

USCS Classification:
FAT CLAY

Tested By	HL	Date	7/17/17	Checked By	TMP	Date	7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004	Soil Color:	Reddish Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1532	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	863.25	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	758.67	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	147.30	Weight of Tare (g):	NA
Weight of Water (g):	104.58	Weight of Water (g):	NA
Weight of Dry Sample (g):	611.37	Weight of Dry Sample (g):	NA
Moisture Content (%):	**17.1**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	611.37
Dry Weight of - 3/4" Sample (g):	611.4	Weight of - #200 Material (g):	582.31
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	29.06
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	3.44	0.56	0.56	99.44	**99.44**
#10	2.00	3.91	0.64	1.20	98.80	**98.80**
#20	0.850	3.57	0.58	1.79	98.21	**98.21**
#40	0.425	4.43	0.72	2.51	97.49	**97.49**
#60	0.250	4.55	0.74	3.25	96.75	**96.75**
#140	0.106	6.78	1.11	4.36	95.64	**95.64**
#200	0.075	2.38	0.39	4.75	95.25	**95.25**
Pan	-	582.31	95.25	100.00	-	**-**

Note: Sample was collected from material following completion of the modified proctor per client request.

Tested By HL Date 7/17/17 Checked By TMP Date 7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004	Soil Description:	REDDISH BROWN FAT CLAY

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

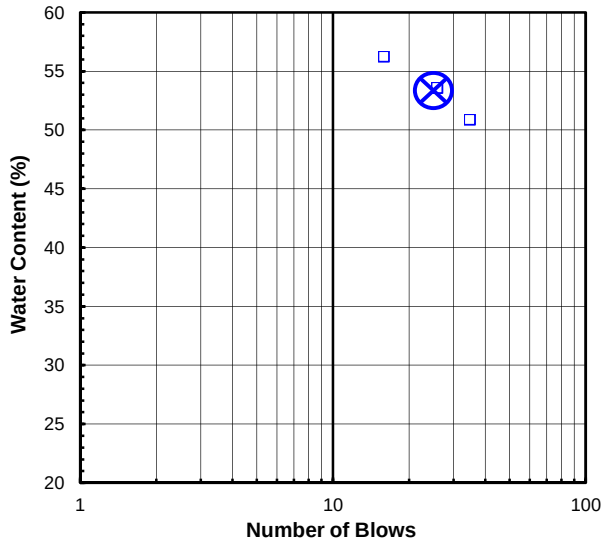
As Received Moisture Content		Liquid Limit Test			
ASTM D2216-10		1	2	3	M
Tare Number:	2972	246	15	156	U
Wt. of Tare & Wet Sample (g):	184.86	37.63	37.58	39.03	L
Wt. of Tare & Dry Sample (g):	162.93	30.39	30.60	32.24	T
Weight of Tare (g):	6.75	17.50	17.56	18.88	I
Weight of Water (g):	21.9	7.2	7.0	6.8	P
Weight of Dry Sample (g):	156.2	12.9	13.0	13.4	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**14.0**	**56.2**	**53.5**	**50.8**	N
Number of Blows:		**16**	**26**	**35**	T

Plastic Limit Test	1	2	Range
Tare Number:	14	139	
Wt. of Tare & Wet Sample (g):	25.64	25.88	
Wt. of Tare & Dry Sample (g):	24.82	25.06	
Weight of Tare (g):	19.37	19.67	
Weight of Water (g):	0.8	0.8	
Weight of Dry Sample (g):	5.5	5.4	
Moisture Content (%):	**15.0**	**15.2**	**-0.2**

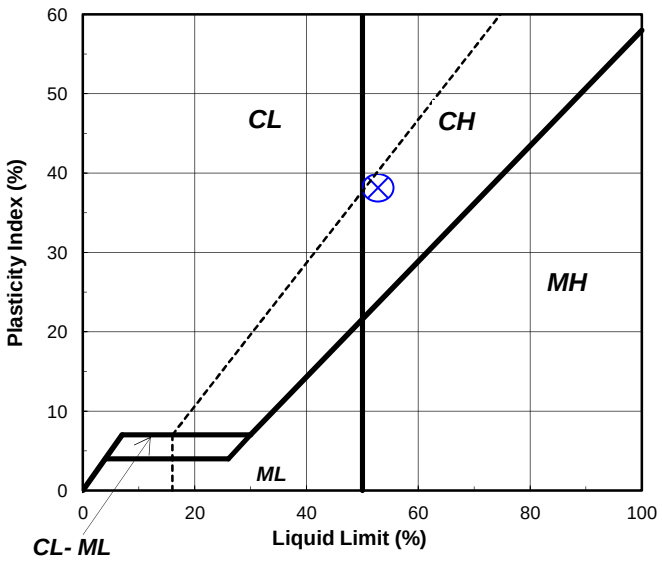
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**53**
Plastic Limit (%):	**15**
Plasticity Index (%):	**38**
USCS Symbol:	**CH**

Flow Curve



Plasticity Chart



Note: Sample was collected from material following completion of the modified proctor per client request.

Tested By RAL *Date* 7/17/17 *Checked By* TMP *Date* 7/18/17

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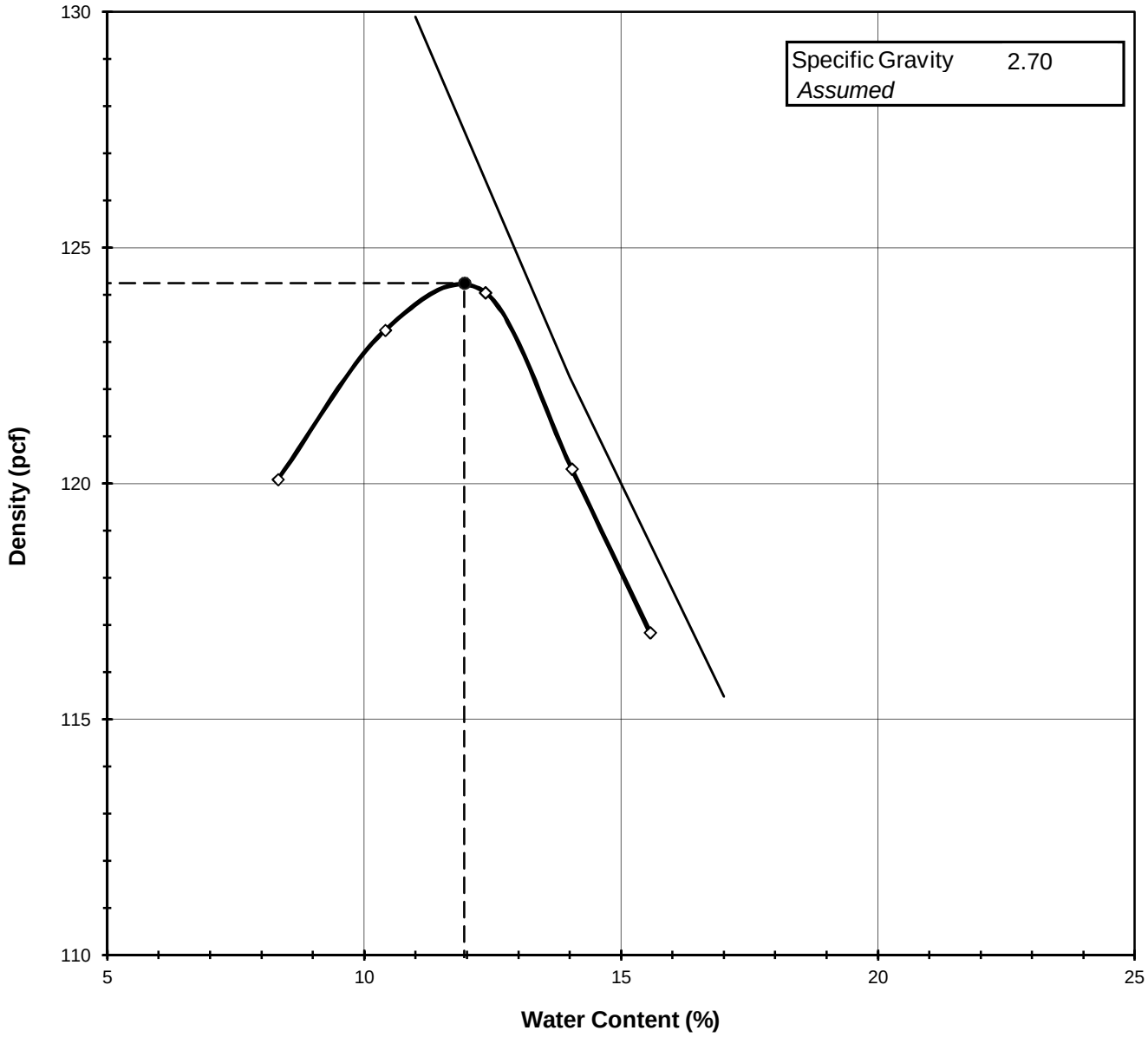
MOISTURE DENSITY RELATIONSHIP

ASTM D1557-12

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004	Test Method	**MODIFIED**

Visual Description: Reddish Brown Clay

Optimum Water Content **12.0**
Maximum Dry Density **124.3**



Tested By *TV* *Date* *7/13/17* *Checked By* *KC* *Date* 7/14/17

 DCN:CT-S12 DATE:5/1/13 REVISION: 14

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MOISTURE - DENSITY RELATIONSHIP

ASTM D1557-12

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		

Visual Description: Reddish Brown Clay

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:	B

Test Type:	**MODIFIED**
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G 441
Mold ID:	G 1701
Mold diameter:	4""
Weight of the Mold (g):	4367
Volume of the Mold (cm^3):	946

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Weight of Mold & Wet Sample (g):	6339	6430	6480	6447	6414
Weight of Mold (g):	4367	4367	4367	4367	4367
Weight of Wet Sample (g):	1972	2063	2113	2080	2047
Mold Volume (cm^3):	946	946	946	946	946

Moisture Content / Density

Tare Number:	673	565	901	729	1128
Weight of Tare & Wet Sample (g):	369.32	487.94	575.74	593.34	513.37
Weight of Tare & Dry Sample (g):	346.51	449.71	524.55	530.89	455.65
Weight of Tare (g):	72.39	82.44	110.30	86.14	84.83
Weight of Water (g):	22.81	38.23	51.19	62.45	57.72
Weight of Dry Sample (g):	274.12	367.27	414.25	444.75	370.82

Wet Density (g/cm^3):	2.08	2.18	2.23	2.20	2.16
Wet Density (pcf):	130.1	136.1	139.4	137.2	135.0
Moisture Content (%):	**8.3**	**10.4**	**12.4**	**14.0**	**15.6**
Dry Density (pcf):	**120.1**	**123.3**	**124.0**	**120.3**	**116.8**

Zero Air Voids

Moisture Content (%):	11.0	14.0	17.0	
Dry Unit Weight (pcf):	129.9	122.3	115.5	

Tested By TV *Date* 7/13/17 *Checked By* KC *Date* 7/14/17

DCN:CT-S12 DATE:5/1/13 REVISION: 14

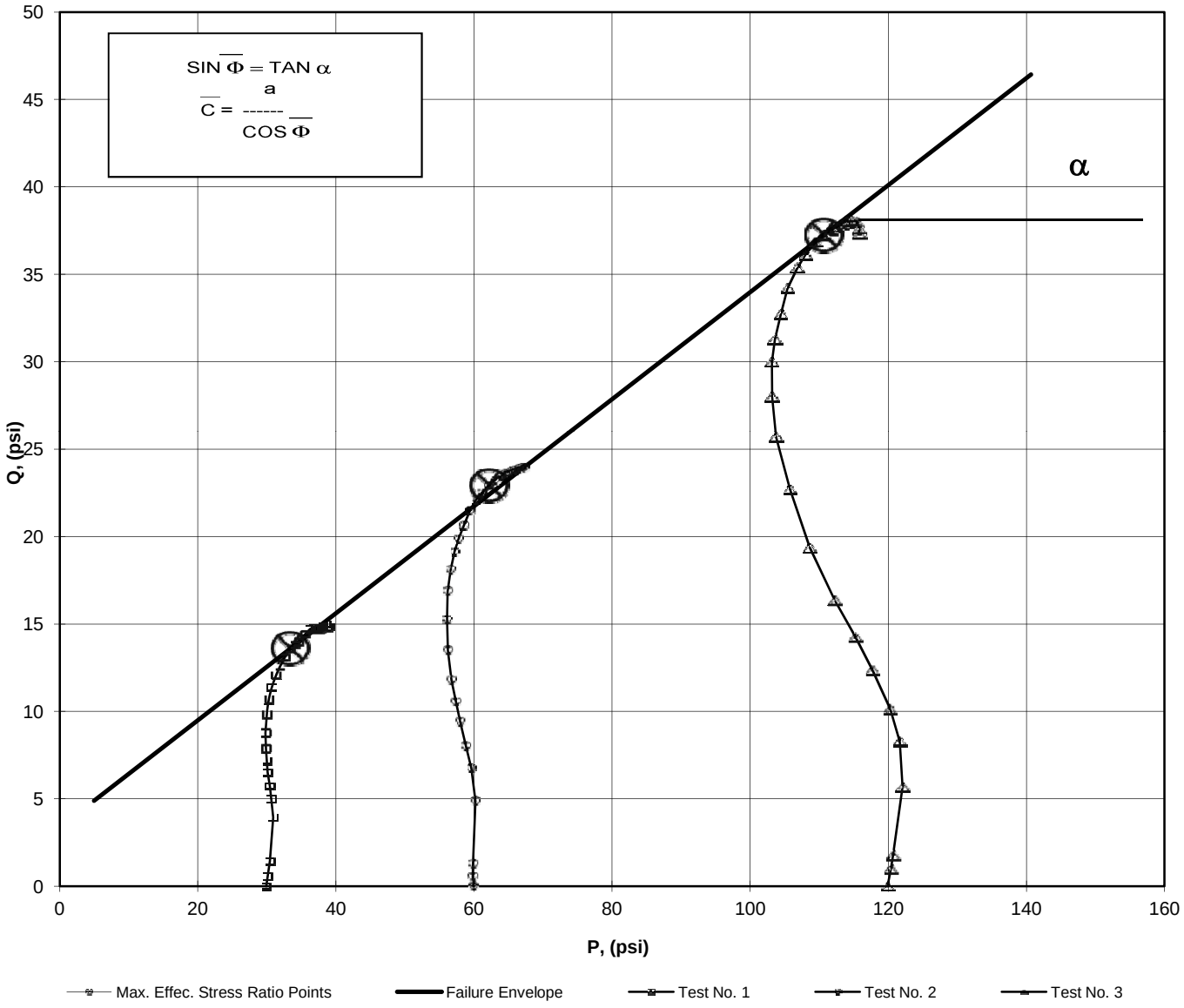
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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**0.00**	$\bar{C}$	=	**0.00**
α	=	**17.0**	$\bar{\Phi}$	=	**17.83**

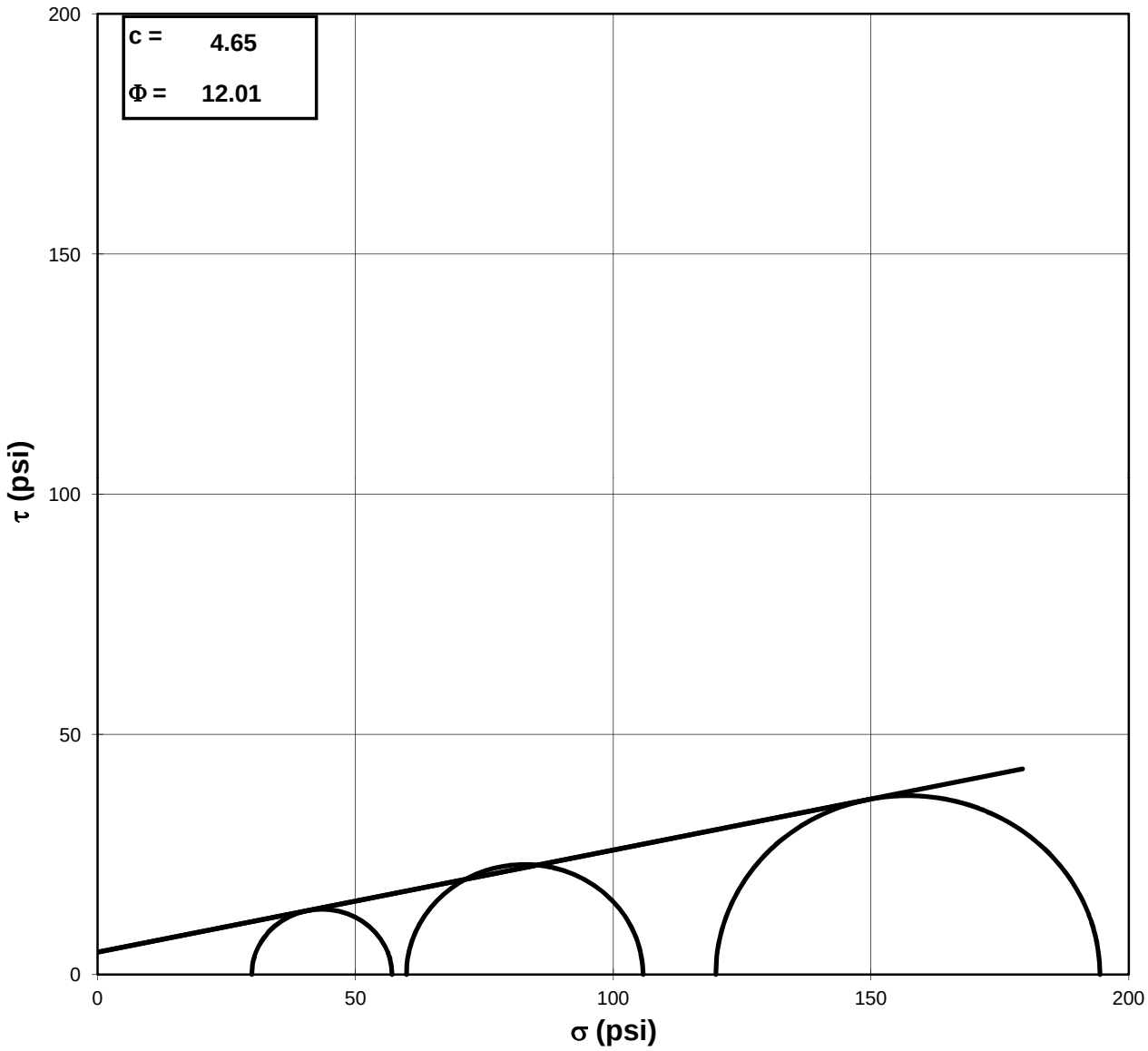
Tested By: JAB Date: 7/17/17 Approved By: DB Date: 7/26/17

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MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		
Visual Description:	Reddish Brown Clay (REMOLDED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: JAB *Date:* 7/17/17 *Approved By:* DB *Date:* 7/26/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		

Visual Description: Reddish Brown Clay (REMOLDED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	61.1
Back Pressure (psi)	31.2
Eff. Conf. Pressure (psi)	29.9
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	33.45
Q	=	13.60

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.011	Diameter 1:	2.867
Length 2:	6.011	Diameter 2:	2.867
Length 3:	6.011	Diameter 3:	2.867
Avg. Length:	6.011	*Avg. Diam.:*	2.867

VOLUME CHANGE

Initial Burette Reading (ml)	72.0
Final Burette Reading (ml)	41.1
Final Change (ml)	30.9
Initial Dial Reading (mil)	24
Dial Reading After Saturation (mil)	28
Dial Reading After Consolidation (mil)	95

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
13.6	0.000	31.2
20.5	0.000	31.6
31.5	0.002	32.1
62.4	0.007	34.1
75.6	0.013	35.4
84.7	0.018	36.4
94.6	0.027	37.5
103.2	0.036	38.3
111.8	0.048	39.1
123.5	0.068	40.1
137.1	0.098	40.9
148.8	0.134	41.5
158.9	0.170	41.7
169.0	0.211	41.8
176.3	0.242	41.7
184.4	0.284	41.6
192.5	0.340	41.3
197.4	0.401	40.8
201.3	0.446	40.5
209.2	0.506	40.0
214.9	0.552	39.5
217.2	0.597	39.1
218.9	0.641	38.7
219.8	0.671	38.5
220.5	0.702	38.2
222.5	0.732	38.0
225.2	0.763	37.8
228.4	0.808	37.5
228.3	0.852	37.1
229.7	0.883	36.9
229.4	0.913	36.7

Tested By: JAB Date: 7/17/17 Input Checked By: KC Date: 7/26/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		

Visual Description: Reddish Brown Clay (REMOLDED)

Effective Confining Pressure (psi)	29.9	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.01
Initial Sample Diameter (in)	2.87
Initial Sample Area (in^2)	6.46
Initial Sample Volume (in^3)	38.81

VOLUME CHANGE

Volume After Consolidation (in^3)	36.84
Length After Consolidation (in)	5.94
Area After Consolidation (in^2)	6.202

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.01	1.11	0.35	30.66	29.5	1.038	0.33	30.11	0.56
0.03	2.88	0.91	31.87	29.0	1.099	0.32	30.43	1.44
0.11	7.86	2.92	34.84	27.0	1.291	0.38	30.91	3.93
0.22	9.98	4.23	35.65	25.7	1.389	0.44	30.66	4.99
0.31	11.43	5.19	36.14	24.7	1.463	0.47	30.43	5.72
0.45	13.00	6.28	36.62	23.6	1.550	0.50	30.12	6.50
0.61	14.36	7.08	37.18	22.8	1.629	0.51	30.00	7.18
0.81	15.70	7.89	37.71	22.0	1.713	0.52	29.86	7.85
1.15	17.52	8.89	38.53	21.0	1.834	0.52	29.77	8.76
1.65	19.58	9.71	39.77	20.2	1.970	0.51	29.98	9.79
2.25	21.31	10.28	40.92	19.6	2.086	0.50	30.27	10.65
2.86	22.75	10.54	42.11	19.4	2.175	0.48	30.74	11.38
3.56	24.17	10.61	43.46	19.3	2.253	0.45	31.37	12.09
4.07	25.16	10.53	44.53	19.4	2.299	0.43	31.95	12.58
4.78	26.23	10.36	45.76	19.5	2.342	0.41	32.65	13.11
5.73	27.20	10.05	47.04	19.8	2.370	0.38	33.45	13.60
6.75	27.64	9.61	47.92	20.3	2.362	0.36	34.10	13.82
7.50	27.99	9.26	48.63	20.6	2.356	0.34	34.64	13.99
8.51	28.85	8.76	49.99	21.1	2.365	0.31	35.57	14.43
9.29	29.44	8.34	51.00	21.6	2.365	0.29	36.28	14.72
10.05	29.53	7.94	51.49	22.0	2.344	0.28	36.73	14.77
10.80	29.53	7.54	51.89	22.4	2.321	0.26	37.12	14.76
11.30	29.49	7.30	52.09	22.6	2.305	0.26	37.35	14.74
11.81	29.42	7.03	52.29	22.9	2.287	0.25	37.58	14.71
12.32	29.53	6.81	52.62	23.1	2.279	0.24	37.86	14.77
12.84	29.73	6.59	53.04	23.3	2.275	0.23	38.18	14.87
13.60	29.93	6.28	53.55	23.6	2.267	0.22	38.59	14.96
14.35	29.65	5.94	53.61	24.0	2.237	0.21	38.78	14.82
14.86	29.66	5.73	53.84	24.2	2.227	0.20	39.00	14.83
15.36	29.45	5.48	53.87	24.4	2.206	0.19	39.15	14.72

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		

Visual Description: Reddish Brown Clay (REMOLDED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	90.9
Back Pressure (psi)	31.0
Eff. Conf. Pressure (psi)	59.9
Pore Pressure Response (%)	98

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	62.19
Q	=	22.93

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.011	Diameter 1:	2.867
Length 2:	6.011	Diameter 2:	2.867
Length 3:	6.011	Diameter 3:	2.867
Avg. Length	6.011	*Avg. Diam.:*	2.867

VOLUME CHANGE

Initial Burette Reading (ml)	72.0
Final Burette Reading (ml)	31.4
Final Change (ml)	40.7

Initial Dial Reading (mil)	26
Dial Reading After Saturation (mil)	2
Dial Reading After Consolidation (mil)	46

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
16.6	0.000	31.0
23.5	0.002	31.7
32.1	0.003	32.3
76.5	0.008	35.6
99.7	0.014	38.0
115.1	0.019	40.1
132.8	0.028	42.3
147.0	0.037	44.1
162.4	0.048	46.0
184.1	0.070	48.1
207.5	0.101	50.1
228.5	0.138	51.6
245.4	0.173	52.4
260.5	0.215	52.9
270.8	0.244	53.0
282.4	0.286	53.0
296.6	0.345	53.0
308.3	0.404	52.7
315.3	0.449	52.3
324.4	0.508	51.6
331.2	0.554	51.1
337.1	0.600	50.3
342.0	0.646	50.0
344.3	0.675	49.7
347.1	0.705	49.4
349.9	0.735	49.1
352.3	0.765	48.8
356.4	0.811	48.3
359.8	0.858	47.9
362.3	0.888	47.5
364.6	0.917	47.2

Tested By: JAB Date: 7/17/17 Input Checked By: KC Date: 7/26/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		

Visual Description: Reddish Brown Clay (REMOLDED)

Effective Confining Pressure (psi)	59.9	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	6.01
Initial Sample Diameter (in)	2.87
Initial Sample Area (in^2)	6.46
Initial Sample Volume (in^3)	38.81

VOLUME CHANGE

Volume After Consolidation (in^3)	36.79
Length After Consolidation (in)	5.99
Area After Consolidation (in^2)	6.141

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.03	1.12	0.66	60.36	59.2	1.019	0.60	59.80	0.56
0.05	2.53	1.32	61.11	58.6	1.043	0.53	59.84	1.26
0.13	9.74	4.57	65.07	55.3	1.176	0.48	60.20	4.87
0.23	13.50	7.05	66.35	52.9	1.255	0.53	59.60	6.75
0.32	15.99	9.07	66.82	50.8	1.315	0.58	58.83	8.00
0.47	18.84	11.34	67.40	48.6	1.388	0.61	57.98	9.42
0.61	21.10	13.07	67.94	46.8	1.451	0.63	57.39	10.55
0.80	23.56	14.96	68.50	44.9	1.524	0.65	56.72	11.78
1.17	26.95	17.15	69.71	42.8	1.630	0.65	56.23	13.48
1.68	30.56	19.08	71.38	40.8	1.749	0.64	56.10	15.28
2.30	33.72	20.58	73.04	39.3	1.858	0.62	56.18	16.86
2.88	36.18	21.37	74.72	38.5	1.939	0.60	56.62	18.09
3.58	38.30	21.87	76.33	38.0	2.007	0.58	57.18	19.15
4.08	39.70	21.98	77.62	37.9	2.047	0.56	57.77	19.85
4.77	41.22	21.97	79.15	37.9	2.087	0.54	58.54	20.61
5.75	42.97	21.97	80.90	37.9	2.133	0.52	59.42	21.48
6.75	44.30	21.69	82.52	38.2	2.159	0.50	60.37	22.15
7.50	45.00	21.27	83.63	38.6	2.165	0.48	61.13	22.50
8.48	45.87	20.65	85.12	39.3	2.168	0.46	62.19	22.93
9.25	46.48	20.06	86.33	39.8	2.167	0.44	63.08	23.24
10.02	46.96	19.34	87.52	40.6	2.158	0.42	64.04	23.48
10.78	47.28	18.98	88.20	40.9	2.156	0.41	64.56	23.64
11.26	47.36	18.67	88.59	41.2	2.149	0.40	64.91	23.68
11.77	47.48	18.36	89.02	41.5	2.143	0.39	65.28	23.74
12.27	47.62	18.07	89.44	41.8	2.138	0.39	65.64	23.81
12.77	47.68	17.80	89.77	42.1	2.133	0.38	65.94	23.84
13.54	47.84	17.33	90.40	42.6	2.124	0.37	66.48	23.92
14.32	47.89	16.85	90.94	43.0	2.112	0.36	66.99	23.94
14.81	47.96	16.53	91.33	43.4	2.106	0.35	67.35	23.98
15.31	47.99	16.21	91.68	43.7	2.099	0.34	67.68	24.00

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		

Visual Description: Reddish Brown Clay (REMOLDED)

Stage No.	1
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	152.8
Back Pressure (psi)	32.9
Eff. Conf. Pressure (psi)	119.9
Pore Pressure Response (%)	99

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	110.65
Q	=	37.24

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.011	Diameter 1:	2.867
Length 2:	6.011	Diameter 2:	2.867
Length 3:	6.011	Diameter 3:	2.867
Avg. Length:	6.011	*Avg. Diam.:*	2.867

VOLUME CHANGE

Initial Burette Reading (ml)	96.0
Final Burette Reading (ml)	59.2
Final Change (ml)	36.8

Initial Dial Reading (mil)	37
Dial Reading After Saturation (mil)	45
Dial Reading After Consolidation (mil)	265

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
33.1	0.000	32.9
45.4	0.001	33.4
55.5	0.002	33.9
104.8	0.007	36.4
137.6	0.013	39.4
161.1	0.019	42.6
189.5	0.028	47.5
213.8	0.037	51.8
240.9	0.049	56.9
279.9	0.070	63.5
324.0	0.099	69.7
364.3	0.135	74.7
396.0	0.171	77.6
424.9	0.213	79.7
444.4	0.243	80.5
466.3	0.286	81.1
490.7	0.343	81.6
511.6	0.402	81.4
525.9	0.448	80.9
541.6	0.507	80.1
551.5	0.552	79.4
560.4	0.597	78.6
567.0	0.641	77.9
572.5	0.670	77.4
578.1	0.700	76.9
580.7	0.731	76.4
584.9	0.762	76.0
589.1	0.806	75.3
588.0	0.852	74.5
587.7	0.882	74.2
585.5	0.912	73.8

Tested By: JAB Date: 7/17/17 Input Checked By: KC Date: 7/26/17

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		

Visual Description: Reddish Brown Clay (REMOLDED)

Effective Confining Pressure (psi)	119.9	*Stage No.*	1
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	6.01
Initial Sample Diameter (in)	2.87
Initial Sample Area (in^2)	6.46
Initial Sample Volume (in^3)	38.81

VOLUME CHANGE

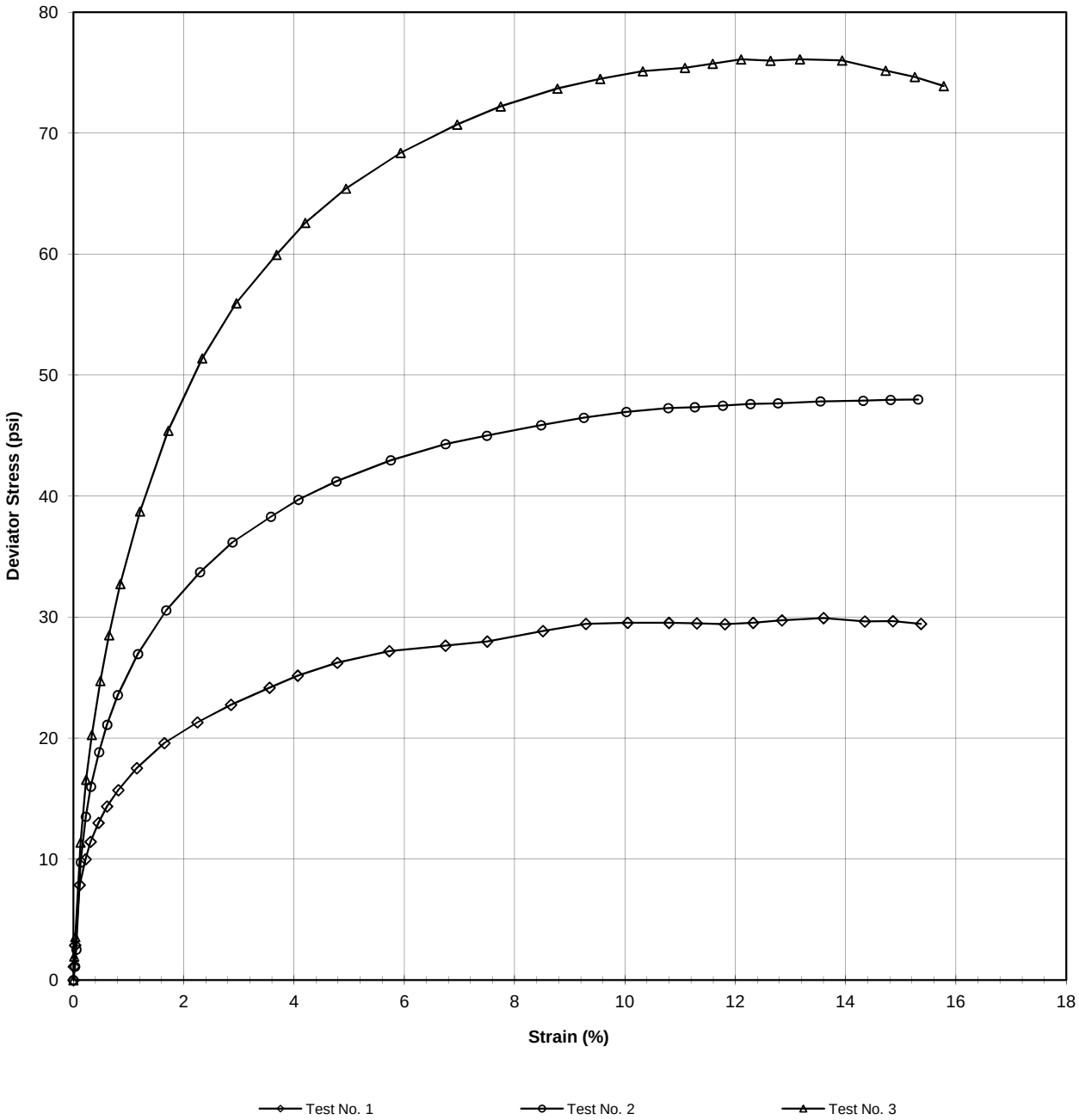
Volume After Consolidation (in^3)	36.40
Length After Consolidation (in)	5.78
Area After Consolidation (in^2)	6.295

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	1.95	0.51	121.35	119.4	1.016	0.26	120.37	0.98
0.04	3.56	1.01	122.45	118.9	1.030	0.29	120.67	1.78
0.13	11.37	3.51	127.75	116.4	1.098	0.31	122.07	5.68
0.23	16.55	6.51	129.95	113.4	1.146	0.40	121.67	8.28
0.33	20.26	9.74	130.42	110.2	1.184	0.49	120.29	10.13
0.49	24.73	14.55	130.07	105.3	1.235	0.59	117.71	12.36
0.65	28.52	18.90	129.51	101.0	1.282	0.67	115.25	14.26
0.85	32.74	24.01	128.63	95.9	1.341	0.74	112.26	16.37
1.21	38.74	30.64	128.00	89.3	1.434	0.80	108.63	19.37
1.72	45.42	36.83	128.48	83.1	1.547	0.82	105.78	22.71
2.34	51.39	41.83	129.46	78.1	1.658	0.82	103.76	25.69
2.95	55.95	44.71	131.14	75.2	1.744	0.81	103.16	27.98
3.68	59.95	46.76	133.10	73.1	1.820	0.79	103.12	29.98
4.20	62.59	47.59	134.90	72.3	1.866	0.77	103.60	31.29
4.94	65.42	48.19	137.13	71.7	1.912	0.74	104.42	32.71
5.93	68.38	48.68	139.60	71.2	1.960	0.72	105.41	34.19
6.96	70.72	48.47	142.15	71.4	1.990	0.69	106.79	35.36
7.74	72.22	48.00	144.12	71.9	2.004	0.67	108.01	36.11
8.77	73.69	47.24	146.35	72.7	2.014	0.65	109.50	36.84
9.55	74.49	46.49	147.90	73.4	2.015	0.63	110.65	37.24
10.32	75.12	45.71	149.31	74.2	2.013	0.61	111.75	37.56
11.09	75.41	44.98	150.33	74.9	2.007	0.60	112.62	37.70
11.59	75.75	44.50	151.15	75.4	2.005	0.59	113.28	37.88
12.11	76.10	44.00	152.01	75.9	2.003	0.58	113.95	38.05
12.64	75.99	43.52	152.37	76.4	1.995	0.58	114.38	38.00
13.17	76.11	43.06	152.95	76.8	1.991	0.57	114.90	38.06
13.93	76.01	42.42	153.49	77.5	1.981	0.56	115.48	38.01
14.72	75.17	41.59	153.48	78.3	1.960	0.56	115.89	37.59
15.25	74.66	41.31	153.25	78.6	1.950	0.56	115.92	37.33
15.78	73.90	40.93	152.87	79.0	1.936	0.56	115.92	36.95

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-37
Client Reference:	Tull Property 16123	Depth (ft):	0-9'
Project No.:	2017-372-001	Sample No.:	NA
Lab ID:	2017-372-001-004		
Visual Description:	Reddish Brown Clay (REMOLDED)		



Tested By: JAB Date: 7/17/17 Approved By: DB Date: 7/26/17

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Garvin Boward Beitko Engineering, Inc.		
Client Reference:	Tull Property 16123		
Project No.:	2017-372-001		
Lab ID:	2017-372-001-004	Specific Gravity (assumed)	2.7
Visual Description:	Reddish Brown Clay (REMOLDED)		

SAMPLE CONDITION SUMMARY

Boring No.:	GBB-37	GBB-37	GBB-37
Depth (ft):	0-9'	0-9'	0-9'
Sample No.:	NA	NA	NA
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.0002	0.0002	0.0002
Back Pressure (psi)	31.2	31.0	32.9
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	11.5	11.5	11.5
Total Unit Weight (pcf)	131.7	131.6	131.5
Dry Unit Weight (pcf)	118.1	118.1	117.9
Moisture Content (%) (FINAL)	20.1	18.3	16.8
Initial State Void Ratio,e	0.427	0.428	0.429
Void Ratio at Shear, e	0.355	0.354	0.341



Tested By: JAB Date: 7/17/17 Input Checked By: KC Date: 7/26/17

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

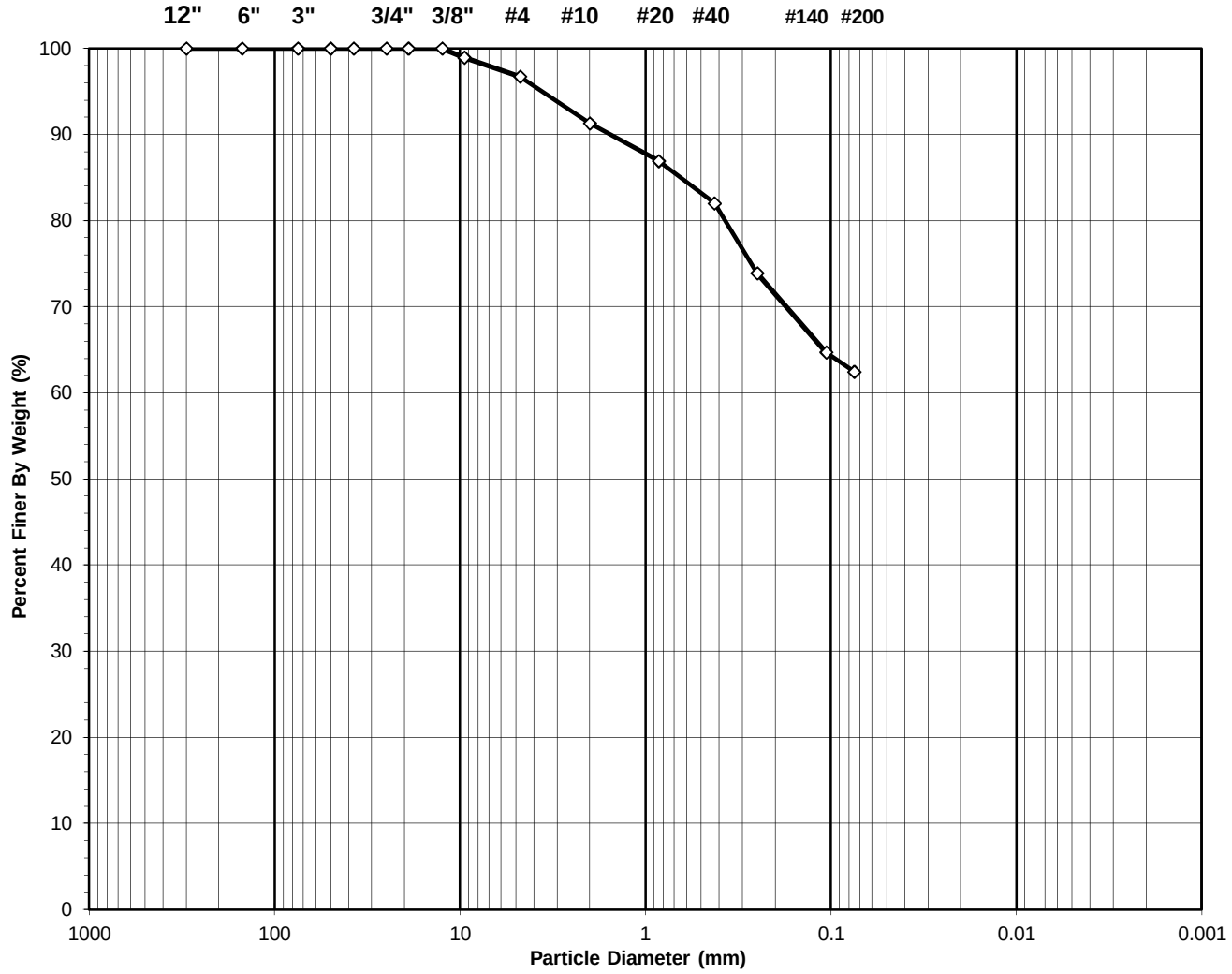
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-5
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-008	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CL, TESTED

USCS Classification:
SANDY LEAN CLAY

Tested By	HL	Date	7/17/17	Checked By	TMP	Date	7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-5
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-008	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1450	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	433.48	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	433.48	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.93	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	288.55	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	288.55
Dry Weight of - 3/4" Sample (g):	288.6	Weight of - #200 Material (g):	180.20
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	108.35
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	3.04	1.05	1.05	98.95	**98.95**
#4	4.75	6.38	2.21	3.26	96.74	**96.74**
#10	2.00	15.69	5.44	8.70	91.30	**91.30**
#20	0.850	12.62	4.37	13.08	86.92	**86.92**
#40	0.425	14.18	4.91	17.99	82.01	**82.01**
#60	0.250	23.38	8.10	26.09	73.91	**73.91**
#140	0.106	26.53	9.19	35.29	64.71	**64.71**
#200	0.075	6.53	2.26	37.55	62.45	**62.45**
Pan	-	180.20	62.45	100.00	-	**-**

Tested By HL Date 7/17/17 Checked By TMP Date 7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-5
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-008	Soil Description:	BROWN LEAN CLAY

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

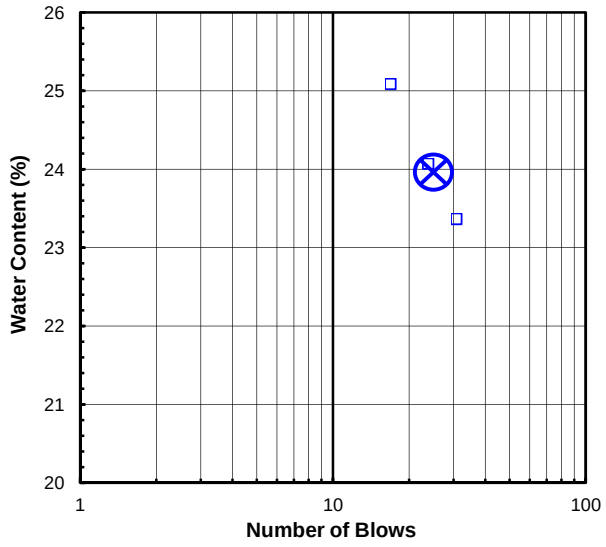
As Received Moisture Content		Liquid Limit Test			
ASTM D2216-10		1	2	3	M
Tare Number:	41	162	167	1253	U
Wt. of Tare & Wet Sample (g):	57.71	37.93	39.45	41.41	L
Wt. of Tare & Dry Sample (g):	52.10	33.83	35.30	37.54	T
Weight of Tare (g):	6.92	17.48	18.05	20.97	I
Weight of Water (g):	5.6	4.1	4.2	3.9	P
Weight of Dry Sample (g):	45.2	16.4	17.3	16.6	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**12.4**	**25.1**	**24.1**	**23.4**	N
Number of Blows:		**17**	**24**	**31**	T

Plastic Limit Test	1	2	Range
Tare Number:	88	121	
Wt. of Tare & Wet Sample (g):	29.89	29.74	
Wt. of Tare & Dry Sample (g):	28.49	28.41	
Weight of Tare (g):	18.97	19.41	
Weight of Water (g):	1.4	1.3	
Weight of Dry Sample (g):	9.5	9.0	
Moisture Content (%):	**14.7**	**14.8**	**-0.1**

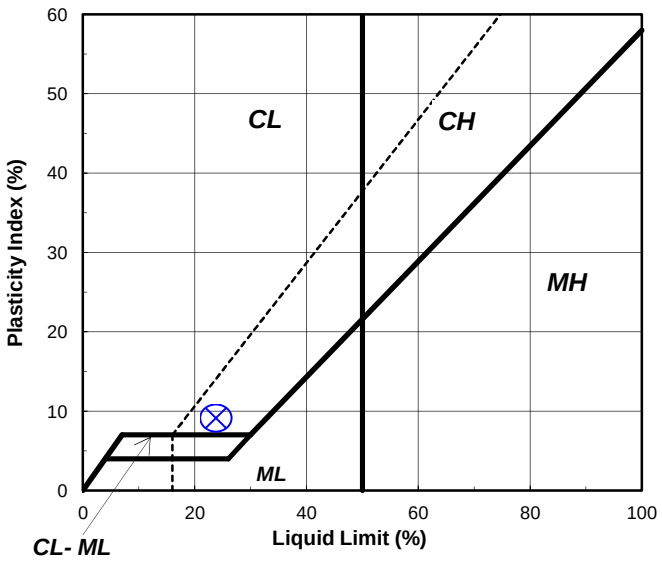
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**24**
Plastic Limit (%):	**15**
Plasticity Index (%):	**9**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/13/17 *Checked By* TMP *Date* 7/14/17

S:\Excel\Excel QA\Spreadsheets\Limit 3Pt.xls

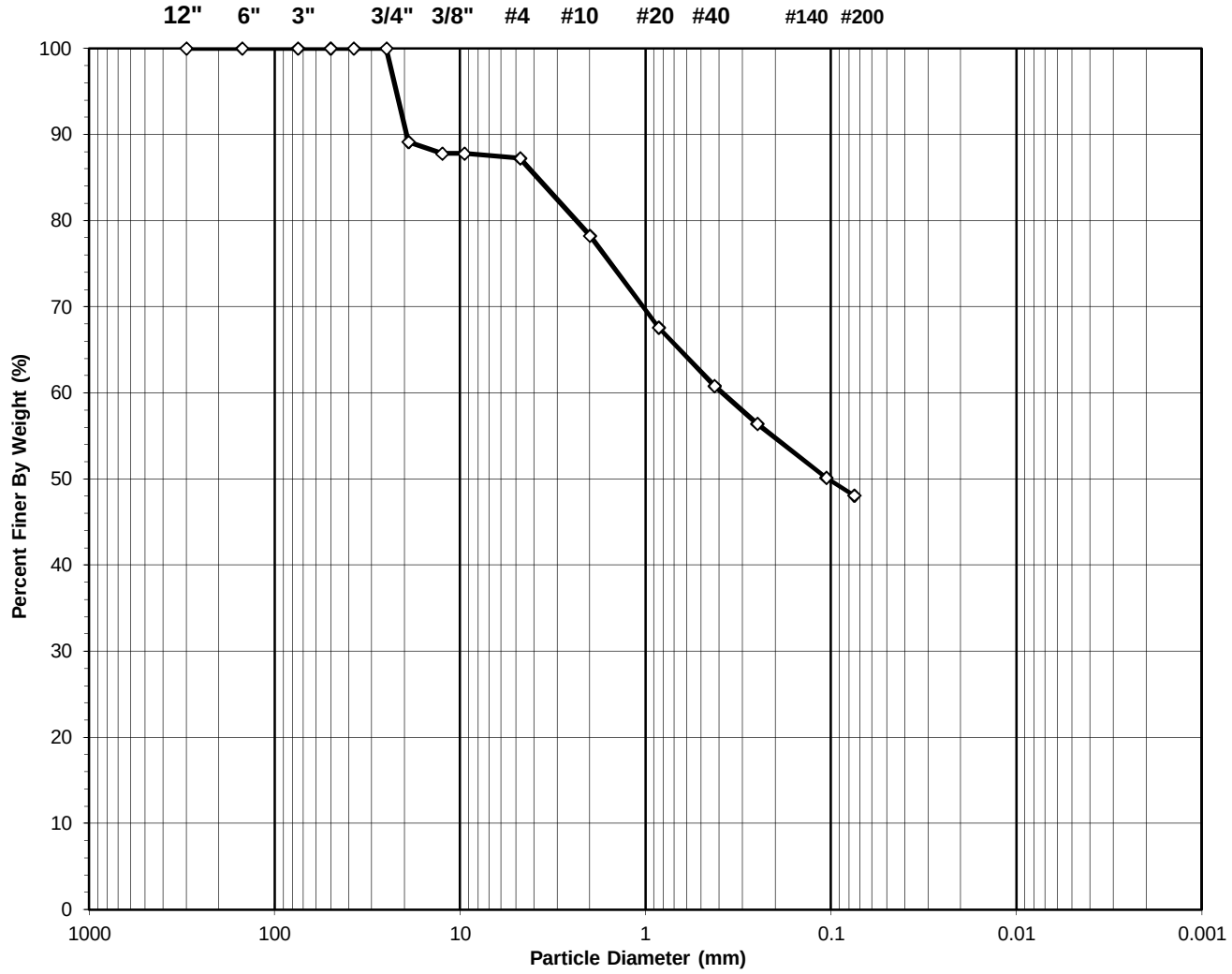
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-8
Client Reference:	Tull Property 16123	Depth (ft):	0.0-4.5
Project No.:	2017-372-001	Sample No.:	S-1 & S-2
Lab ID:	2017-372-001-020	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
SC, TESTED

USCS Classification:
CLAYEY SAND

Tested By HL Date 7/17/17 Checked By TMP Date 7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-8
Client Reference:	Tull Property 16123	Depth (ft):	0.0-4.5
Project No.:	2017-372-001	Sample No.:	S-1 & S-2
Lab ID:	2017-372-001-020	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1421	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	383.97	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	383.97	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.72	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	239.25	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	239.25
Dry Weight of - 3/4" Sample (g):	213.3	Weight of - #200 Material (g):	115.07
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	124.18
Dry Weight of + 3/4" Sample (g):	25.97		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	25.97	10.85	10.85	89.15	**89.15**
1/2"	12.50	3.24	1.35	12.21	87.79	**87.79**
3/8"	9.50	0.00	0.00	12.21	87.79	**87.79**
#4	4.75	1.28	0.54	12.74	87.26	**87.26**
#10	2.00	21.55	9.01	21.75	78.25	**78.25**
#20	0.850	25.51	10.66	32.41	67.59	**67.59**
#40	0.425	16.22	6.78	39.19	60.81	**60.81**
#60	0.250	10.50	4.39	43.58	56.42	**56.42**
#140	0.106	15.01	6.27	49.86	50.14	**50.14**
#200	0.075	4.90	2.05	51.90	48.10	**48.10**
Pan	-	115.07	48.10	100.00	-	**-**

Tested By HL Date 7/17/17 Checked By TMP Date 7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-8
Client Reference:	Tull Property 16123	Depth (ft):	0.0-4.5
Project No.:	2017-372-001	Sample No.:	S-1 & S-2
Lab ID:	2017-372-001-020	Soil Description:	BROWN LEAN CLAY

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

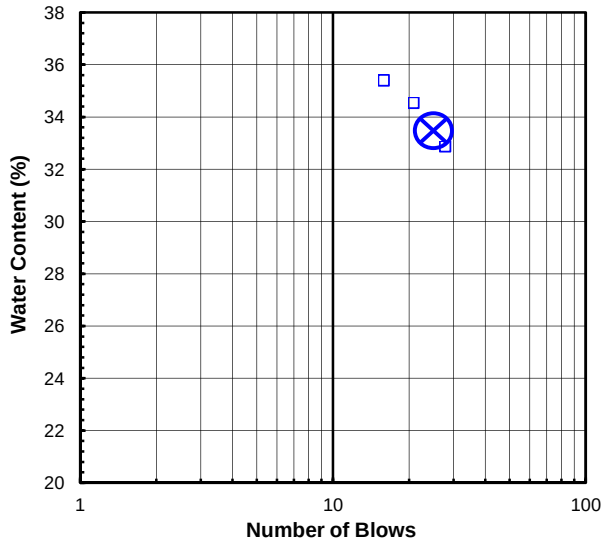
As Received Moisture Content		Liquid Limit Test			
ASTM D2216-10		1	2	3	M
Tare Number:	18	53	281	286	U
Wt. of Tare & Wet Sample (g):	41.66	41.96	46.41	38.45	L
Wt. of Tare & Dry Sample (g):	36.75	36.24	40.93	32.48	T
Weight of Tare (g):	6.97	18.82	25.05	15.60	I
Weight of Water (g):	4.9	5.7	5.5	6.0	P
Weight of Dry Sample (g):	29.8	17.4	15.9	16.9	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**16.5**	**32.8**	**34.5**	**35.4**	N
Number of Blows:		**28**	**21**	**16**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	113	143	
Wt. of Tare & Wet Sample (g):	25.12	26.12	
Wt. of Tare & Dry Sample (g):	23.97	25.00	
Weight of Tare (g):	18.81	19.97	
Weight of Water (g):	1.2	1.1	
Weight of Dry Sample (g):	5.2	5.0	
Moisture Content (%):	**22.3**	**22.3**	**0.0**

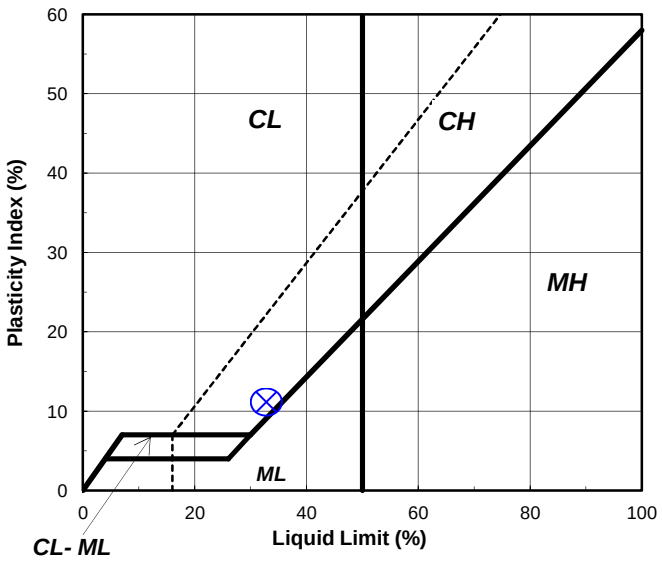
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**33**
Plastic Limit (%):	**22**
Plasticity Index (%):	**11**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 7/13/17 *Checked By* TMP *Date* 7/14/17

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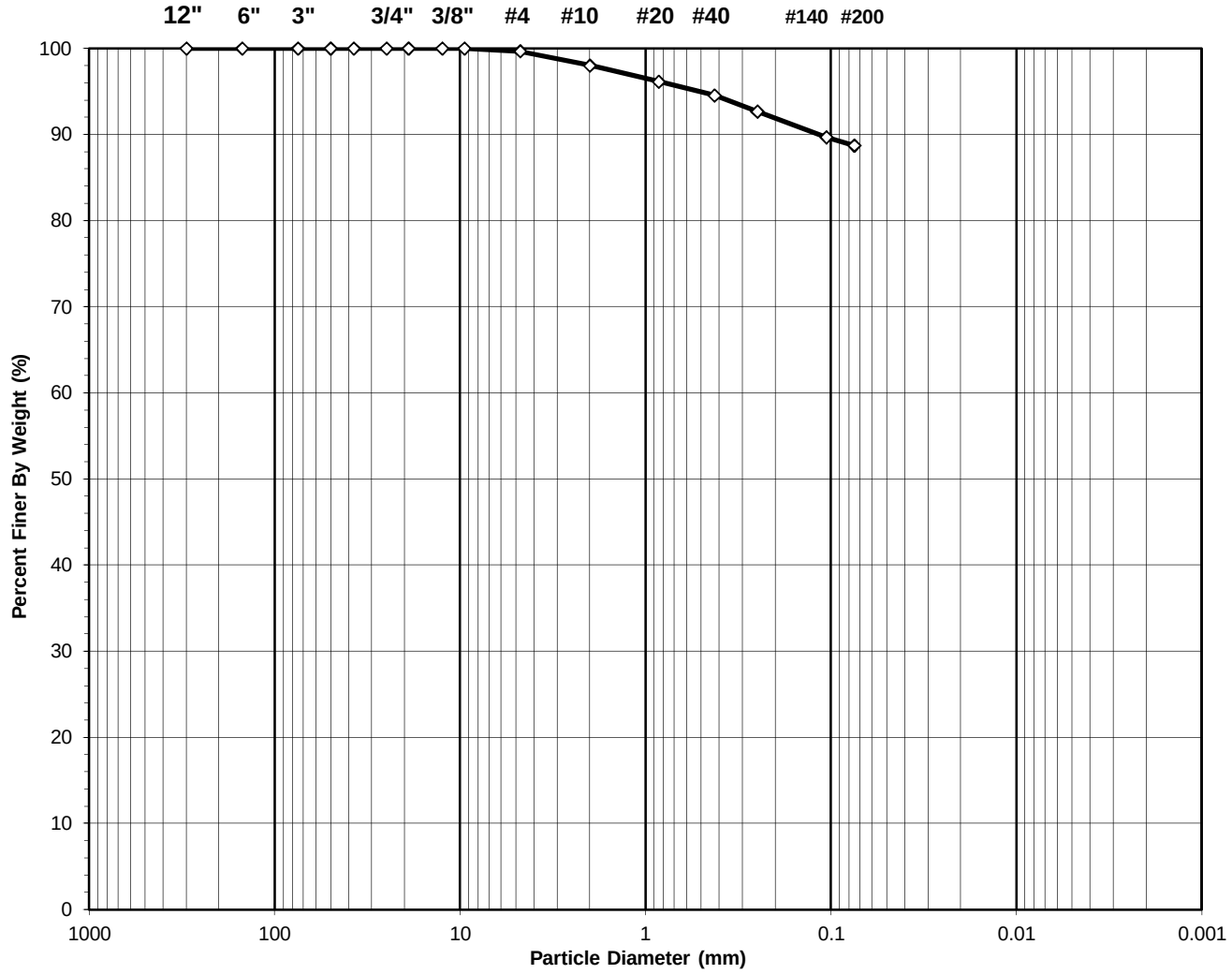
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-9
Client Reference:	Tull Property 16123	Depth (ft):	27.0-31.5
Project No.:	2017-372-001	Sample No.:	S-10 & S-11
Lab ID:	2017-372-001-036	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By	SG	Date	7/18/17	Checked By	KC	Date	7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-9
Client Reference:	Tull Property 16123	Depth (ft):	27.0-31.5
Project No.:	2017-372-001	Sample No.:	S-10 & S-11
Lab ID:	2017-372-001-036	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1455	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	354.99	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	354.99	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	145.19	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	209.80	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	209.80
Dry Weight of - 3/4" Sample (g):	209.8	Weight of - #200 Material (g):	186.18
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	23.62
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.68	0.32	0.32	99.68	**99.68**
#10	2.00	3.50	1.67	1.99	98.01	**98.01**
#20	0.850	3.92	1.87	3.86	96.14	**96.14**
#40	0.425	3.35	1.60	5.46	94.54	**94.54**
#60	0.250	3.92	1.87	7.33	92.67	**92.67**
#140	0.106	6.25	2.98	10.31	89.69	**89.69**
#200	0.075	2.00	0.95	11.26	88.74	**88.74**
Pan	-	186.18	88.74	100.00	-	**-**

Tested By SG Date 7/18/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-9
Client Reference:	Tull Property 16123	Depth (ft):	27.0-31.5
Project No.:	2017-372-001	Sample No.:	S-10 & S-11
Lab ID:	2017-372-001-036	Soil Description:	BROWN LEAN CLAY

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

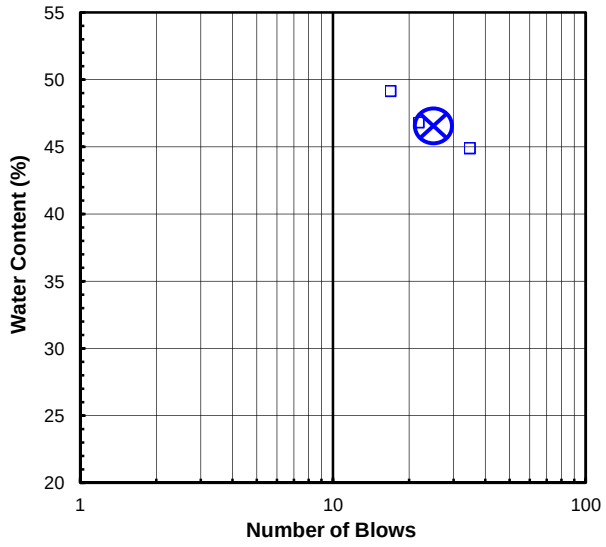
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	20	1254	278	1265	U
Wt. of Tare & Wet Sample (g):	67.00	37.93	39.17	41.26	L
Wt. of Tare & Dry Sample (g):	56.88	31.21	32.21	33.51	T
Weight of Tare (g):	7.03	16.22	17.32	17.72	I
Weight of Water (g):	10.1	6.7	7.0	7.8	P
Weight of Dry Sample (g):	49.9	15.0	14.9	15.8	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**20.3**	**44.8**	**46.7**	**49.1**	N
Number of Blows:		**35**	**22**	**17**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	1255	36	
Wt. of Tare & Wet Sample (g):	19.45	25.06	
Wt. of Tare & Dry Sample (g):	18.54	24.13	
Weight of Tare (g):	13.26	18.73	
Weight of Water (g):	0.9	0.9	
Weight of Dry Sample (g):	5.3	5.4	
Moisture Content (%):	**17.2**	**17.2**	**0.0**

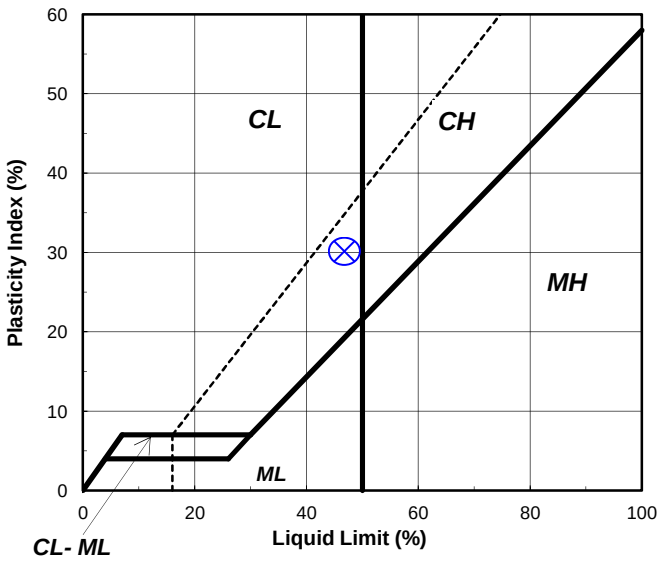
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**47**
Plastic Limit (%):	**17**
Plasticity Index (%):	**30**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 7/13/17 *Checked By* TMP *Date* 7/17/17

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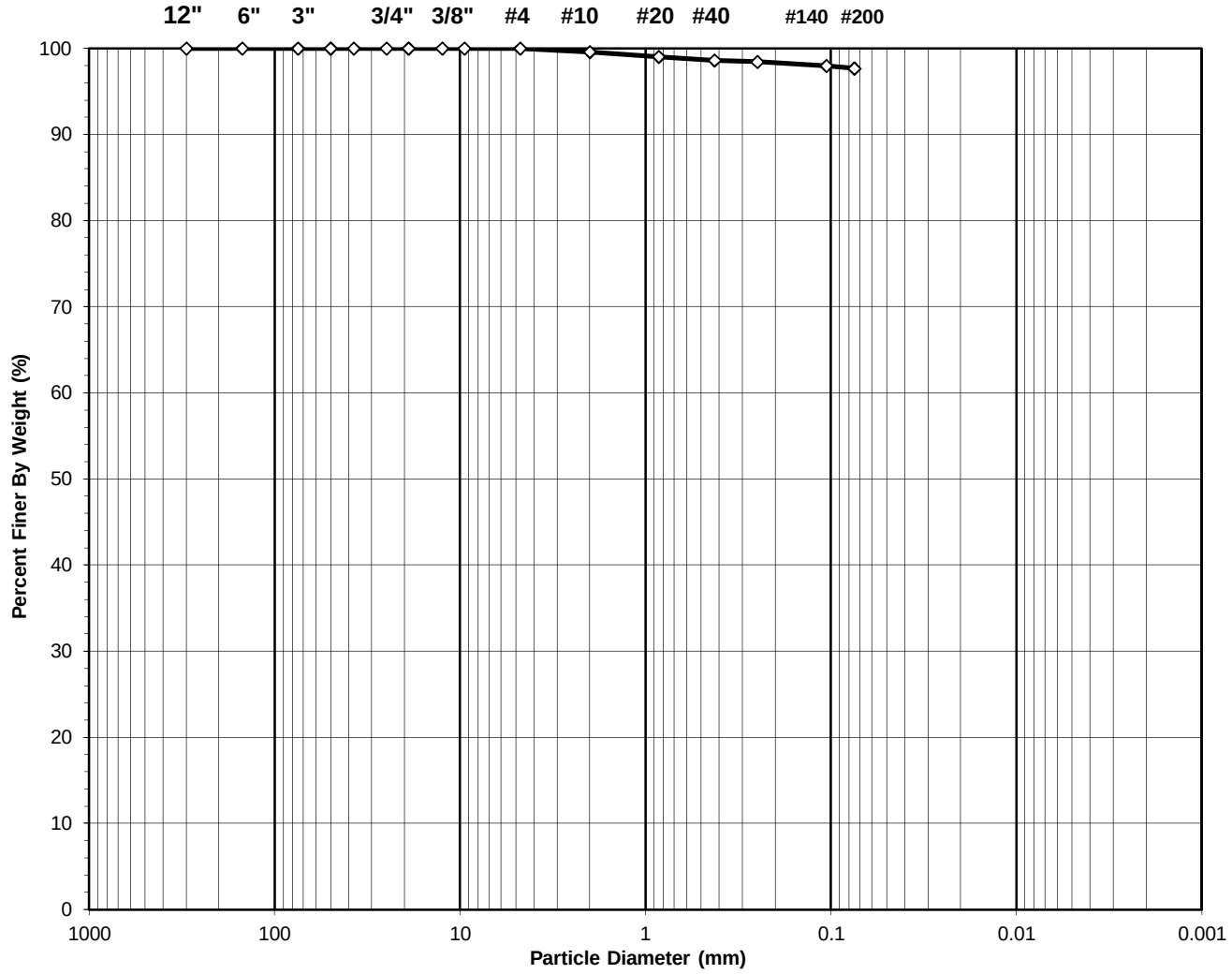
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-10
Client Reference:	Tull Property 16123	Depth (ft):	6.0-10.5
Project No.:	2017-372-001	Sample No.:	S-3 & S-4
Lab ID:	2017-372-001-044	Soil Color:	Reddish Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By	HL	Date	7/17/17	Checked By	TMP	Date	7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-10
Client Reference:	Tull Property 16123	Depth (ft):	6.0-10.5
Project No.:	2017-372-001	Sample No.:	S-3 & S-4
Lab ID:	2017-372-001-044	Soil Color:	Reddish Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1478	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	465.62	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	465.62	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	147.40	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	318.22	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	318.22
Dry Weight of - 3/4" Sample (g):	318.2	Weight of - #200 Material (g):	310.83
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	7.39
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	1.28	0.40	0.40	99.60	**99.60**
#20	0.850	1.76	0.55	0.96	99.04	**99.04**
#40	0.425	1.35	0.42	1.38	98.62	**98.62**
#60	0.250	0.58	0.18	1.56	98.44	**98.44**
#140	0.106	1.44	0.45	2.01	97.99	**97.99**
#200	0.075	0.98	0.31	2.32	97.68	**97.68**
Pan	-	310.83	97.68	100.00	-	**-**

Tested By HL Date 7/17/17 Checked By TMP Date 7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-10
Client Reference:	Tull Property 16123	Depth (ft):	6.0-10.5
Project No.:	2017-372-001	Sample No.:	S-3 & S-4
Lab ID:	2017-372-001-044	Soil Description:	REDDISH BROWN LEAN CLAY

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

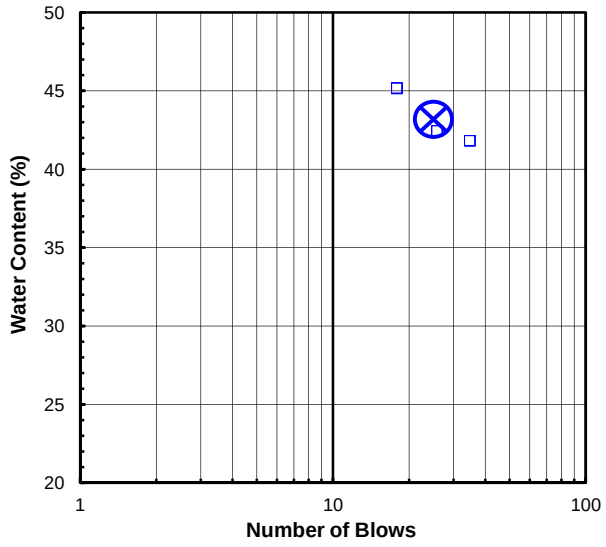
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	33	195	110	150	U
Wt. of Tare & Wet Sample (g):	52.82	37.46	39.76	39.89	L
Wt. of Tare & Dry Sample (g):	48.26	31.18	33.76	33.96	T
Weight of Tare (g):	6.79	17.26	19.61	19.76	I
Weight of Water (g):	4.6	6.3	6.0	5.9	P
Weight of Dry Sample (g):	41.5	13.9	14.2	14.2	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**11.0**	**45.1**	**42.4**	**41.8**	N
Number of Blows:		**18**	**26**	**35**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	183	4	
Wt. of Tare & Wet Sample (g):	25.36	25.22	
Wt. of Tare & Dry Sample (g):	24.25	24.08	
Weight of Tare (g):	19.29	18.92	
Weight of Water (g):	1.1	1.1	
Weight of Dry Sample (g):	5.0	5.2	
Moisture Content (%):	**22.4**	**22.1**	**0.3**

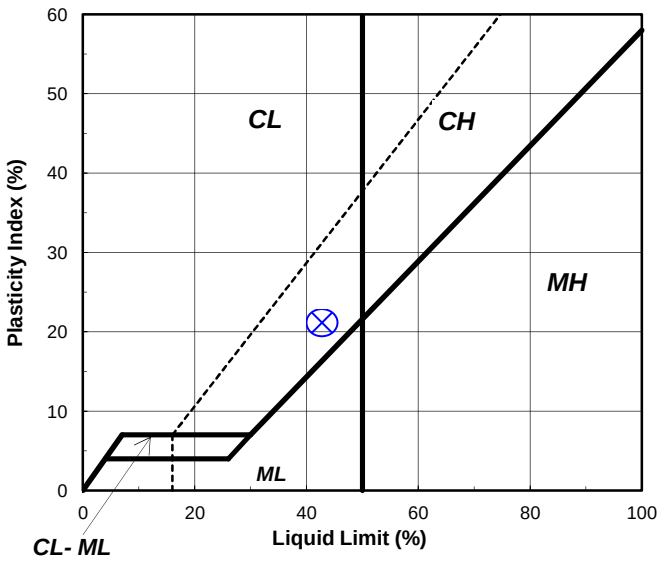
Note: The acceptable range of the two Moisture contents is ± 1.4

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

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/13/17 *Checked By* TMP *Date* 7/14/17

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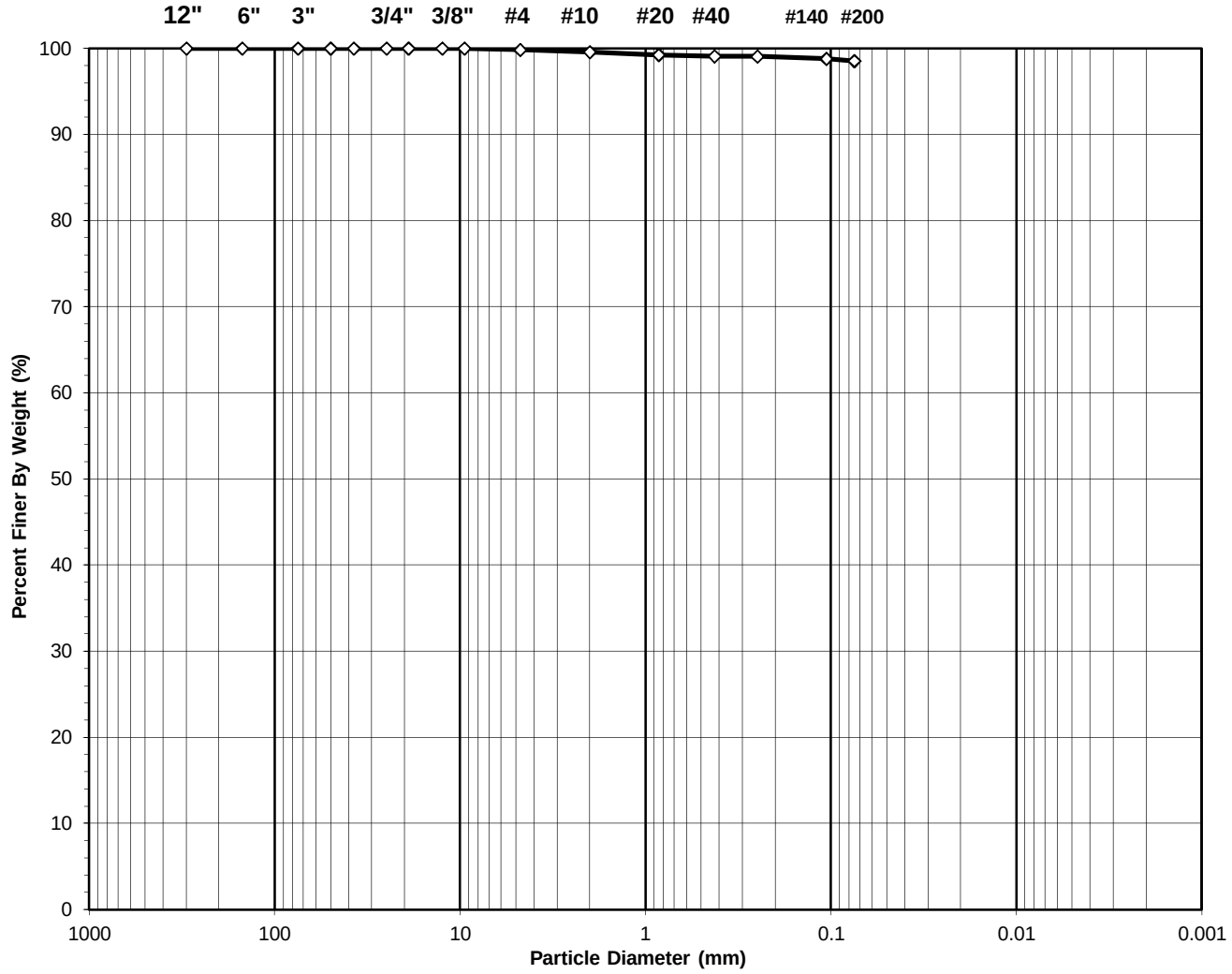
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-16
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-059	Soil Color:	Brown/Reddish Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By	HL	Date	7/17/17	Checked By	TMP	Date	7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-16
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-059	Soil Color:	Brown/Reddish Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1518	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	430.15	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	430.15	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	148.66	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	281.49	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	281.49
Dry Weight of - 3/4" Sample (g):	281.5	Weight of - #200 Material (g):	277.41
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	4.08
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.47	0.17	0.17	99.83	**99.83**
#10	2.00	0.71	0.25	0.42	99.58	**99.58**
#20	0.850	0.91	0.32	0.74	99.26	**99.26**
#40	0.425	0.47	0.17	0.91	99.09	**99.09**
#60	0.250	0.06	0.02	0.93	99.07	**99.07**
#140	0.106	0.76	0.27	1.20	98.80	**98.80**
#200	0.075	0.70	0.25	1.45	98.55	**98.55**
Pan	-	277.41	98.55	100.00	-	**-**

Tested By HL Date 7/17/17 Checked By TMP Date 7/18/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-16
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-059	Soil Description:	BROWN/REDDISH BROWN LEAN CLAY

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

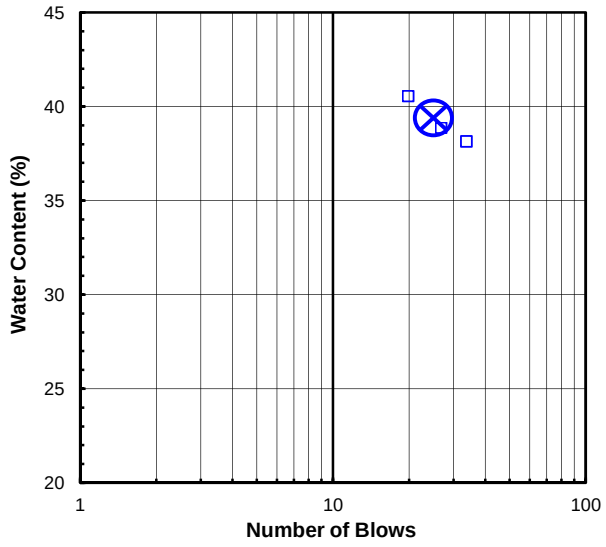
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	30	2	14	171	U
Wt. of Tare & Wet Sample (g):	51.23	41.21	41.84	41.00	L
Wt. of Tare & Dry Sample (g):	45.43	35.21	35.56	34.69	T
Weight of Tare (g):	6.83	19.46	19.38	19.11	I
Weight of Water (g):	5.8	6.0	6.3	6.3	P
Weight of Dry Sample (g):	38.6	15.8	16.2	15.6	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**15.0**	**38.1**	**38.8**	**40.5**	N
Number of Blows:		**34**	**27**	**20**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	227	175	
Wt. of Tare & Wet Sample (g):	25.55	25.96	
Wt. of Tare & Dry Sample (g):	24.23	24.85	
Weight of Tare (g):	18.09	19.68	
Weight of Water (g):	1.3	1.1	
Weight of Dry Sample (g):	6.1	5.2	
Moisture Content (%):	**21.5**	**21.5**	**0.0**

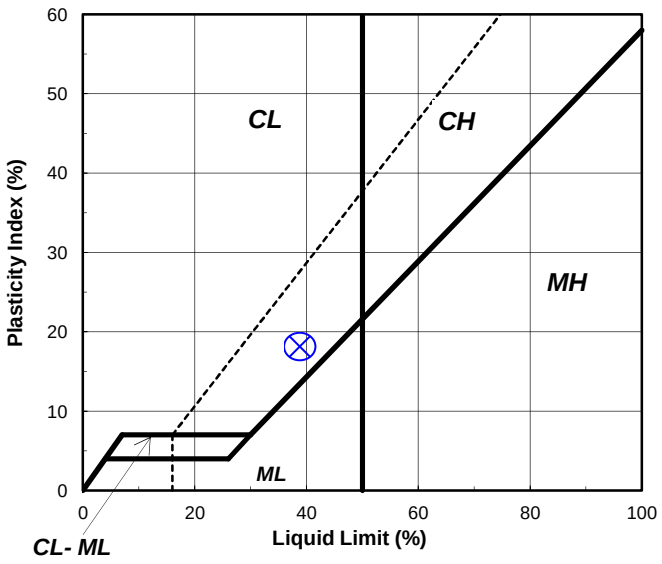
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**39**
Plastic Limit (%):	**21**
Plasticity Index (%):	**18**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/13/17 *Checked By* TMP *Date* 7/14/17

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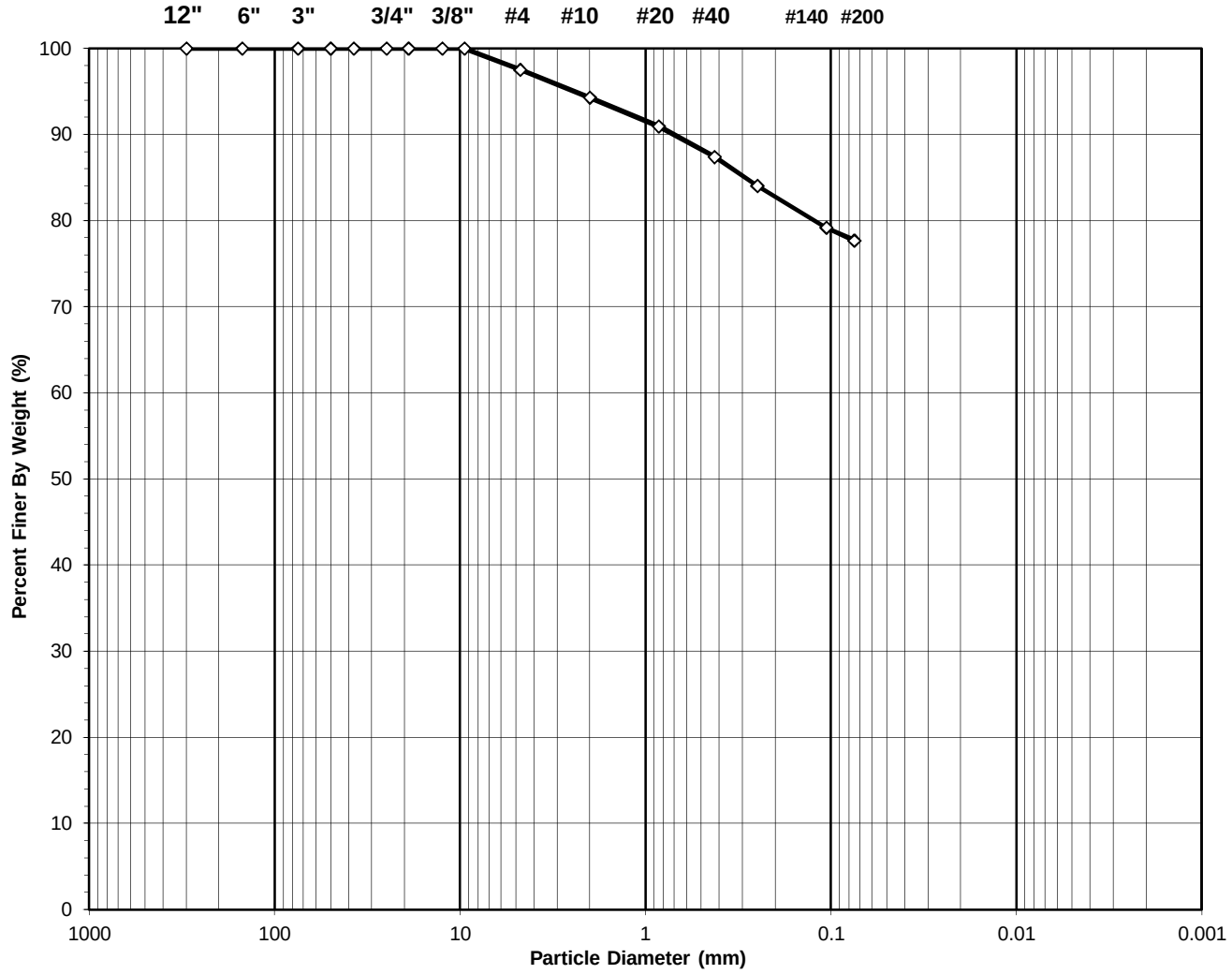
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-16
Client Reference:	Tull Property 16123	Depth (ft):	12.0-16.4
Project No.:	2017-372-001	Sample No.:	S-5 & S-6
Lab ID:	2017-372-001-063	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By	SG	Date	7/18/17	Checked By	KC	Date	7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-16
Client Reference:	Tull Property 16123	Depth (ft):	12.0-16.4
Project No.:	2017-372-001	Sample No.:	S-5 & S-6
Lab ID:	2017-372-001-063	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1549	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	487.70	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	487.70	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	142.95	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	344.75	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	344.75
Dry Weight of - 3/4" Sample (g):	344.8	Weight of - #200 Material (g):	267.84
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	76.91
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	8.53	2.47	2.47	97.53	**97.53**
#10	2.00	11.09	3.22	5.69	94.31	**94.31**
#20	0.850	11.58	3.36	9.05	90.95	**90.95**
#40	0.425	12.25	3.55	12.60	87.40	**87.40**
#60	0.250	11.53	3.34	15.95	84.05	**84.05**
#140	0.106	16.73	4.85	20.80	79.20	**79.20**
#200	0.075	5.20	1.51	22.31	77.69	**77.69**
Pan	-	267.84	77.69	100.00	-	**-**

Tested By SG Date 7/18/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-16
Client Reference:	Tull Property 16123	Depth (ft):	12.0-16.4
Project No.:	2017-372-001	Sample No.:	S-5 & S-6
Lab ID:	2017-372-001-063	Soil Description:	BROWN LEAN CLAY

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

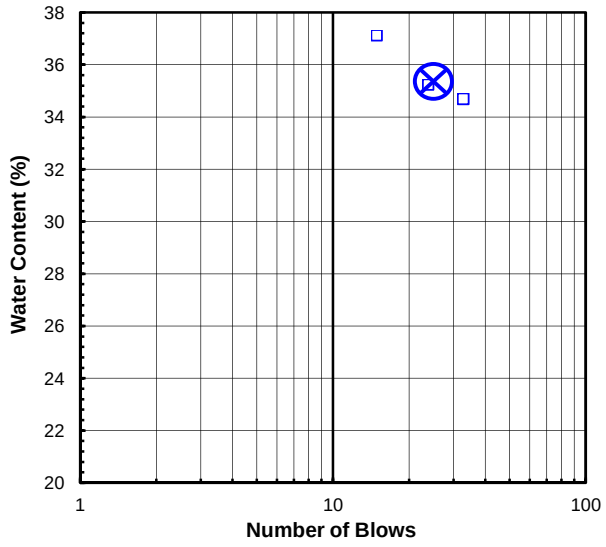
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	30	162	167	197	U
Wt. of Tare & Wet Sample (g):	45.74	41.86	39.07	40.17	L
Wt. of Tare & Dry Sample (g):	42.03	35.27	33.60	34.32	T
Weight of Tare (g):	6.84	17.50	18.06	17.44	I
Weight of Water (g):	3.7	6.6	5.5	5.9	P
Weight of Dry Sample (g):	35.2	17.8	15.5	16.9	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**10.5**	**37.1**	**35.2**	**34.7**	N
Number of Blows:		**15**	**24**	**33**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	2	14	
Wt. of Tare & Wet Sample (g):	28.94	28.32	
Wt. of Tare & Dry Sample (g):	27.49	26.94	
Weight of Tare (g):	19.47	19.38	
Weight of Water (g):	1.5	1.4	
Weight of Dry Sample (g):	8.0	7.6	
Moisture Content (%):	**18.1**	**18.3**	**-0.2**

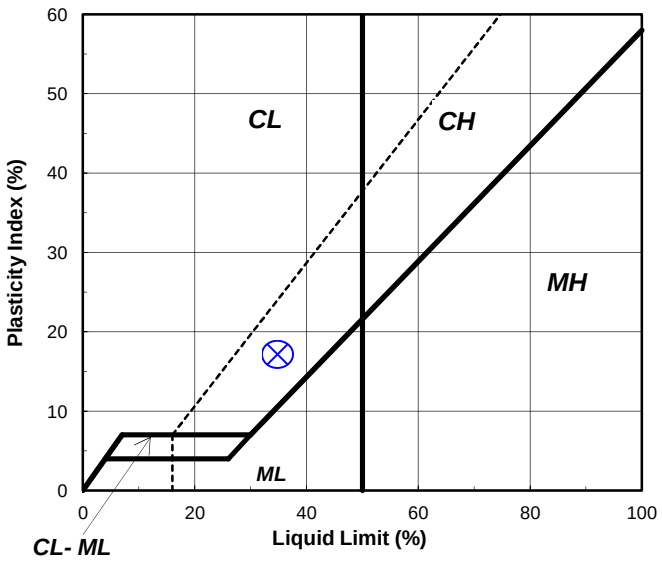
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**35**
Plastic Limit (%):	**18**
Plasticity Index (%):	**17**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By MLF *Date* 7/14/17 *Checked By* TMP *Date* 7/17/17

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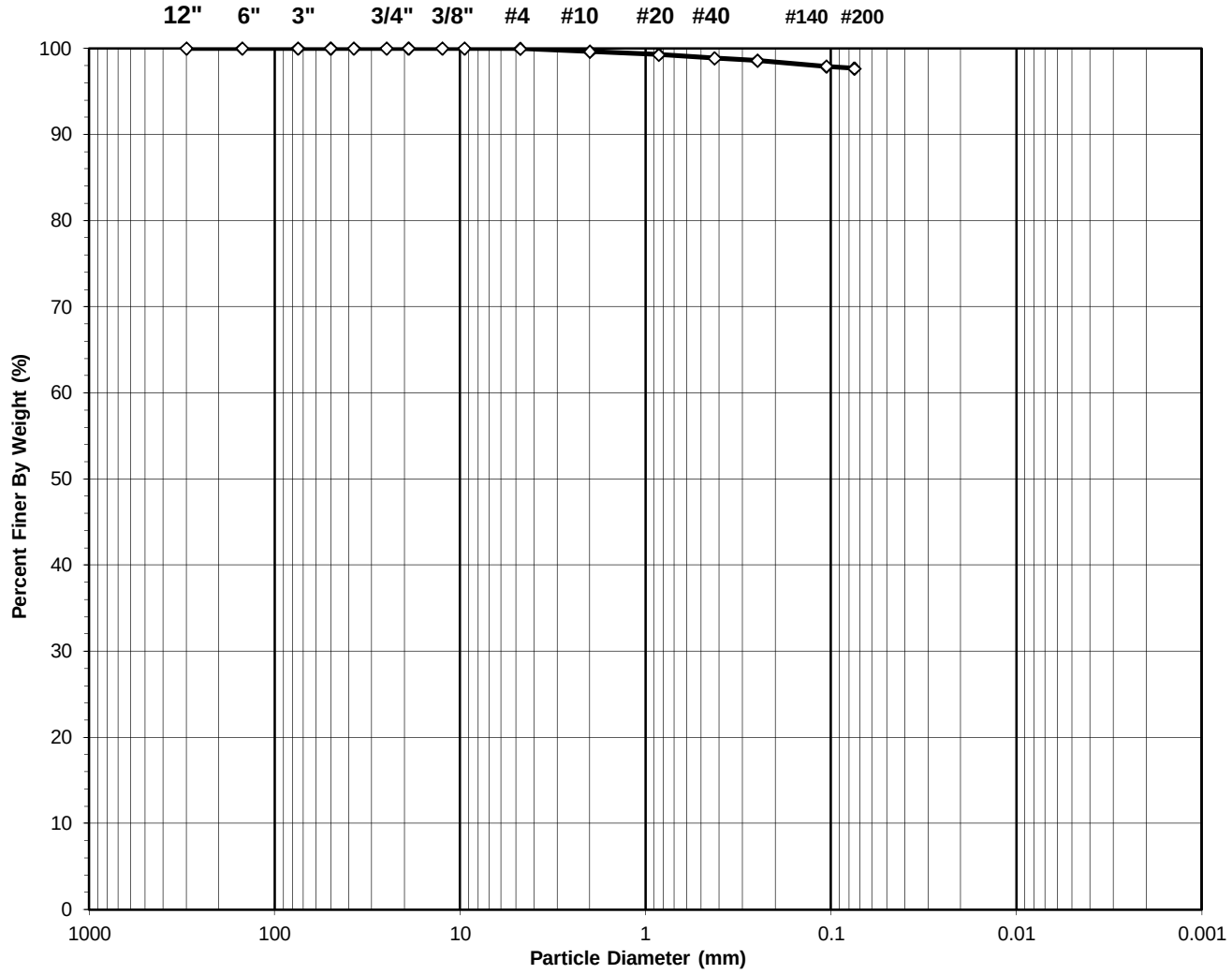
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-21
Client Reference:	Tull Property 16123	Depth (ft):	9.0-13.5
Project No.:	2017-372-001	Sample No.:	S-4 & S-5
Lab ID:	2017-372-001-075	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By	HL	Date	7/19/17	Checked By	KC	Date	7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-21
Client Reference:	Tull Property 16123	Depth (ft):	9.0-13.5
Project No.:	2017-372-001	Sample No.:	S-4 & S-5
Lab ID:	2017-372-001-075	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1525	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	473.19	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	473.19	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.49	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	326.70	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	326.70
Dry Weight of - 3/4" Sample (g):	326.7	Weight of - #200 Material (g):	319.06
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	7.64
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.14	0.04	0.04	99.96	**99.96**
#10	2.00	1.03	0.32	0.36	99.64	**99.64**
#20	0.850	1.25	0.38	0.74	99.26	**99.26**
#40	0.425	1.33	0.41	1.15	98.85	**98.85**
#60	0.250	0.83	0.25	1.40	98.60	**98.60**
#140	0.106	2.21	0.68	2.08	97.92	**97.92**
#200	0.075	0.85	0.26	2.34	97.66	**97.66**
Pan	-	319.06	97.66	100.00	-	**-**

Tested By HL Date 7/19/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-21
Client Reference:	Tull Property 16123	Depth (ft):	9.0-13.5
Project No.:	2017-372-001	Sample No.:	S-4 & S-5
Lab ID:	2017-372-001-075	Soil Description:	BROWN LEAN CLAY

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

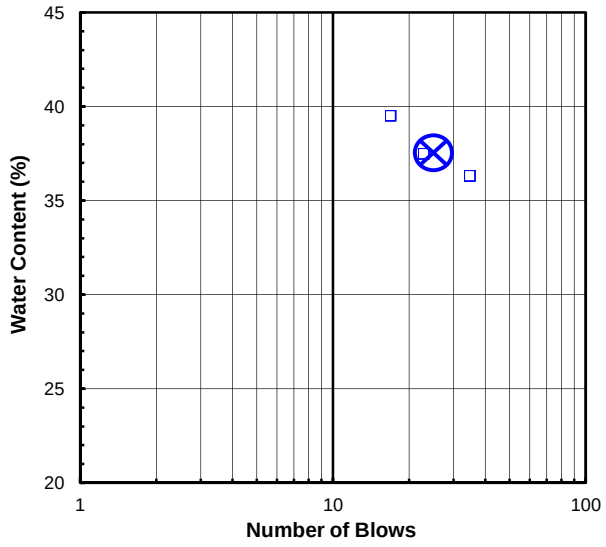
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	37	247	17	146	U
Wt. of Tare & Wet Sample (g):	51.59	39.40	38.47	39.36	L
Wt. of Tare & Dry Sample (g):	47.20	33.67	32.83	33.93	T
Weight of Tare (g):	6.99	19.15	17.77	18.96	I
Weight of Water (g):	4.4	5.7	5.6	5.4	P
Weight of Dry Sample (g):	40.2	14.5	15.1	15.0	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**10.9**	**39.5**	**37.5**	**36.3**	N
Number of Blows:		**17**	**23**	**35**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	126	176	
Wt. of Tare & Wet Sample (g):	25.71	25.84	
Wt. of Tare & Dry Sample (g):	24.63	24.72	
Weight of Tare (g):	19.47	19.41	
Weight of Water (g):	1.1	1.1	
Weight of Dry Sample (g):	5.2	5.3	
Moisture Content (%):	**20.9**	**21.1**	**-0.2**

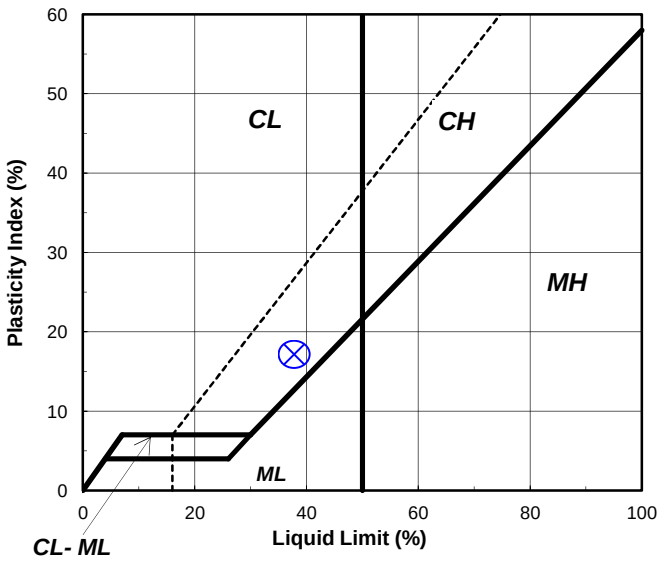
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**38**
Plastic Limit (%):	**21**
Plasticity Index (%):	**17**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/17/17 *Checked By* TMP *Date* 7/18/17

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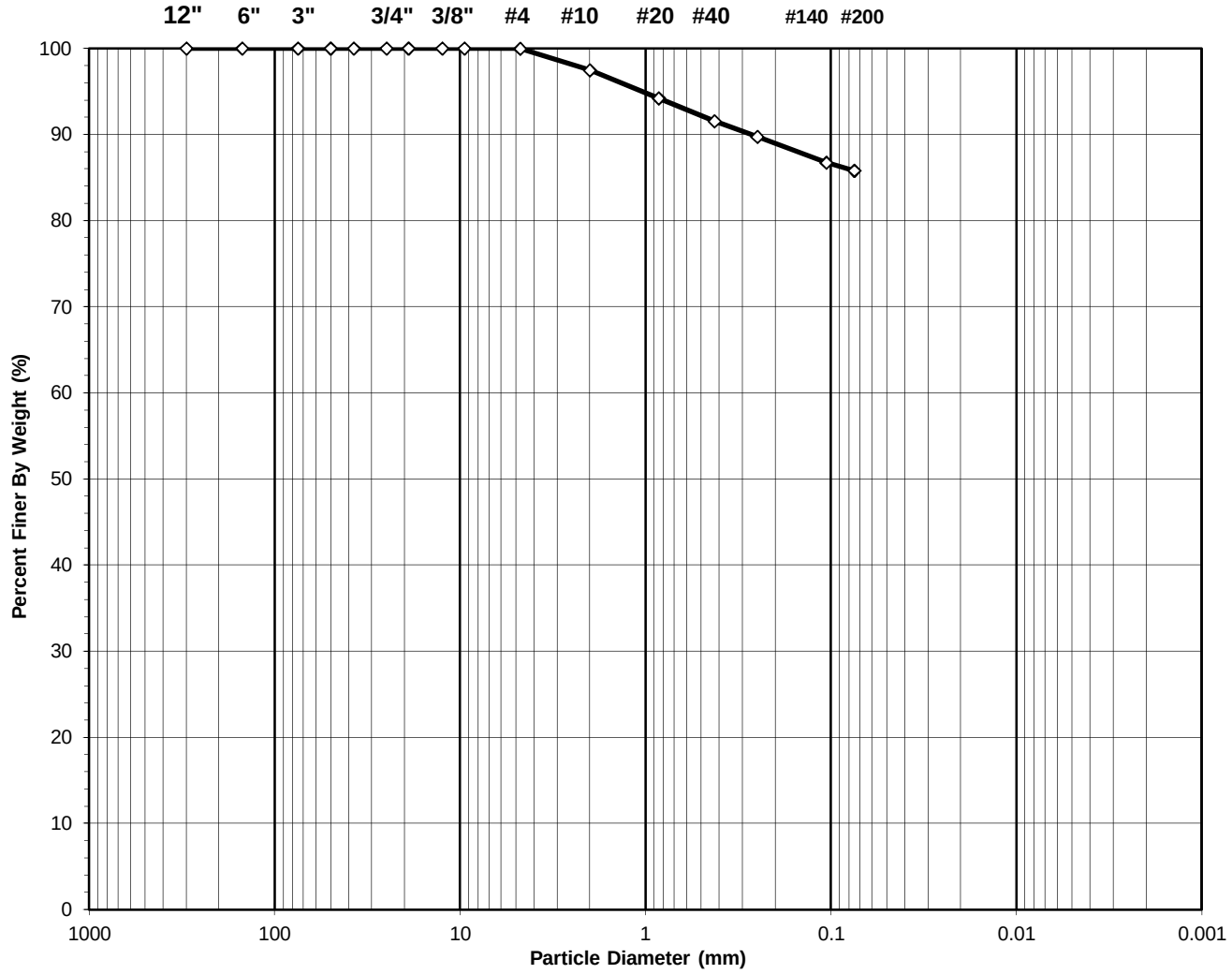
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-25
Client Reference:	Tull Property 16123	Depth (ft):	6.0-13.5
Project No.:	2017-372-001	Sample No.:	S-3,4 & 5
Lab ID:	2017-372-001-091	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By	SG	Date	7/18/17	Checked By	KC	Date	7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-25
Client Reference:	Tull Property 16123	Depth (ft):	6.0-13.5
Project No.:	2017-372-001	Sample No.:	S-3,4 & 5
Lab ID:	2017-372-001-091	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1517	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	585.47	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	585.47	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	143.10	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	442.37	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	442.37
Dry Weight of - 3/4" Sample (g):	442.4	Weight of - #200 Material (g):	379.64
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	62.73
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.15	0.03	0.03	99.97	**99.97**
#10	2.00	11.05	2.50	2.53	97.47	**97.47**
#20	0.850	14.39	3.25	5.78	94.22	**94.22**
#40	0.425	11.81	2.67	8.45	91.55	**91.55**
#60	0.250	8.00	1.81	10.26	89.74	**89.74**
#140	0.106	13.29	3.00	13.27	86.73	**86.73**
#200	0.075	4.04	0.91	14.18	85.82	**85.82**
Pan	-	379.64	85.82	100.00	-	**-**

Tested By SG Date 7/18/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-25
Client Reference:	Tull Property 16123	Depth (ft):	6.0-13.5
Project No.:	2017-372-001	Sample No.:	S-3, 4 & 5
Lab ID:	2017-372-001-091	Soil Description:	BROWN LEAN CLAY

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

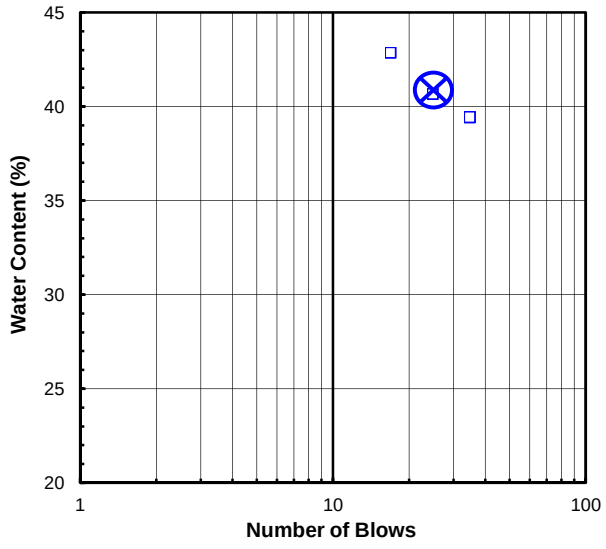
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	7	313	201	394	U
Wt. of Tare & Wet Sample (g):	57.91	38.68	37.66	34.56	L
Wt. of Tare & Dry Sample (g):	50.13	32.60	31.77	28.77	T
Weight of Tare (g):	6.87	18.40	17.27	14.07	I
Weight of Water (g):	7.8	6.1	5.9	5.8	P
Weight of Dry Sample (g):	43.3	14.2	14.5	14.7	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**18.0**	**42.8**	**40.6**	**39.4**	N
Number of Blows:		**17**	**25**	**35**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	183	12	
Wt. of Tare & Wet Sample (g):	25.69	26.02	
Wt. of Tare & Dry Sample (g):	24.56	24.90	
Weight of Tare (g):	19.30	19.73	
Weight of Water (g):	1.1	1.1	
Weight of Dry Sample (g):	5.3	5.2	
Moisture Content (%):	**21.5**	**21.7**	**-0.2**

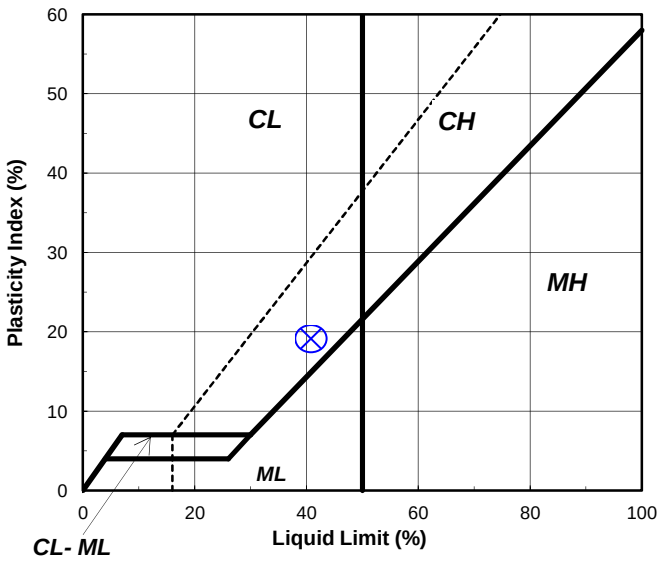
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**41**
Plastic Limit (%):	**22**
Plasticity Index (%):	**19**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/15/17 *Checked By* TMP *Date* 7/17/17

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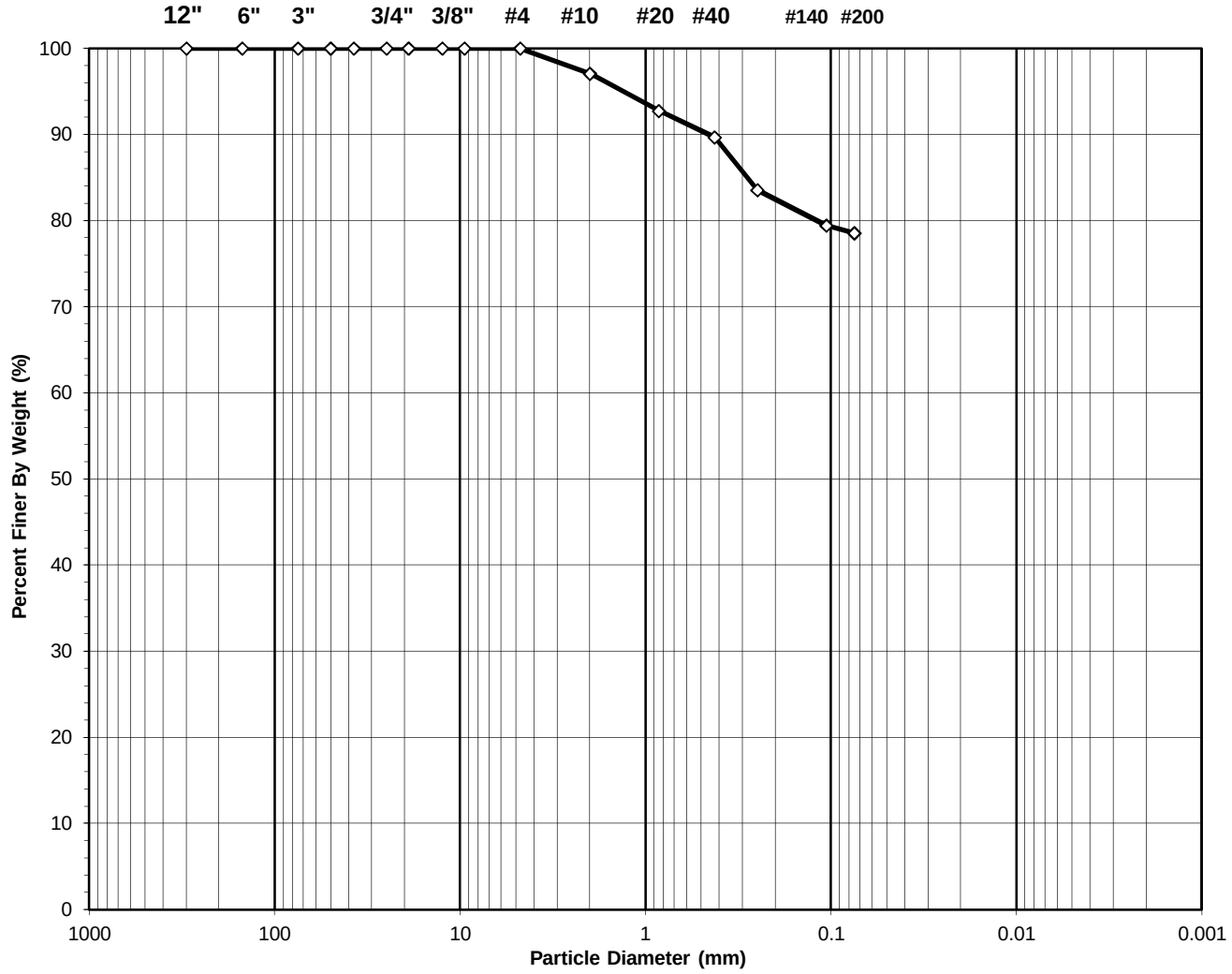
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-26
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-100	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CH, TESTED

USCS Classification:
FAT CLAY WITH SAND

Tested By	HL	Date	7/19/17	Checked By	KC	Date	7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-26
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-100	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1479	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	384.35	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	384.35	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	145.79	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	238.56	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	238.56
Dry Weight of - 3/4" Sample (g):	238.6	Weight of - #200 Material (g):	187.38
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	51.18
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	6.99	2.93	2.93	97.07	**97.07**
#20	0.850	10.34	4.33	7.26	92.74	**92.74**
#40	0.425	7.31	3.06	10.33	89.67	**89.67**
#60	0.250	14.60	6.12	16.45	83.55	**83.55**
#140	0.106	9.83	4.12	20.57	79.43	**79.43**
#200	0.075	2.11	0.88	21.45	78.55	**78.55**
Pan	-	187.38	78.55	100.00	-	**-**

Tested By HL Date 7/19/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-26
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-100	Soil Description:	BROWN FAT CLAY

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

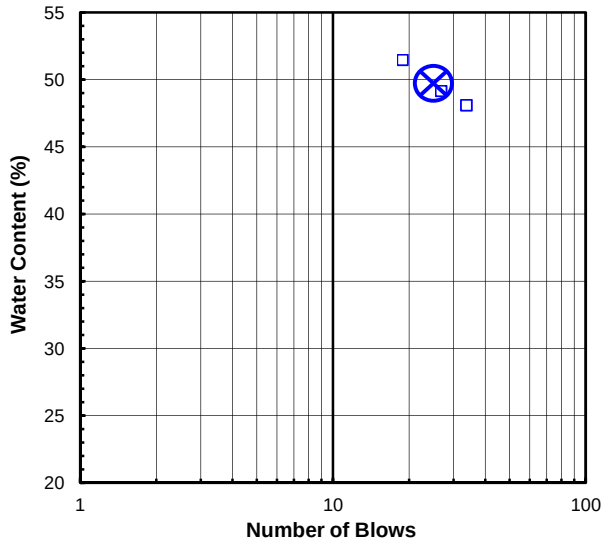
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	38	161	195	203	U
Wt. of Tare & Wet Sample (g):	42.71	38.04	37.66	39.54	L
Wt. of Tare & Dry Sample (g):	37.22	31.18	30.94	32.98	T
Weight of Tare (g):	6.84	17.83	17.25	19.32	I
Weight of Water (g):	5.5	6.9	6.7	6.6	P
Weight of Dry Sample (g):	30.4	13.4	13.7	13.7	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**18.1**	**51.4**	**49.1**	**48.0**	N
Number of Blows:		**19**	**27**	**34**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	236	2	
Wt. of Tare & Wet Sample (g):	24.63	25.65	
Wt. of Tare & Dry Sample (g):	23.76	24.77	
Weight of Tare (g):	18.49	19.45	
Weight of Water (g):	0.9	0.9	
Weight of Dry Sample (g):	5.3	5.3	
Moisture Content (%):	**16.5**	**16.5**	**0.0**

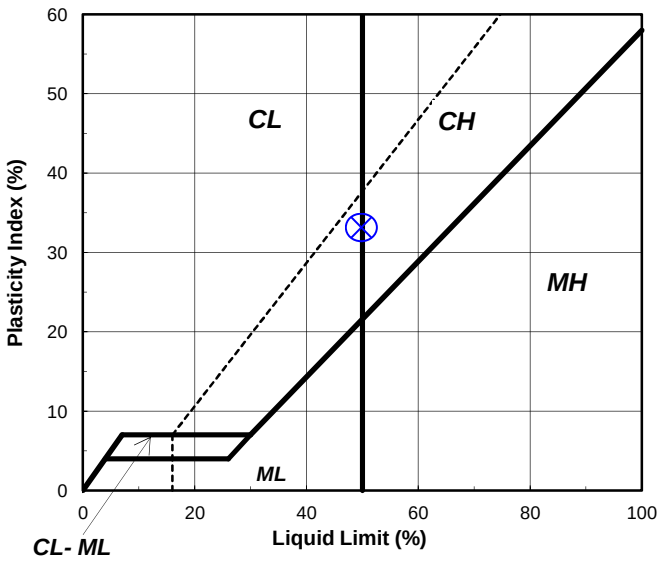
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**50**
Plastic Limit (%):	**17**
Plasticity Index (%):	**33**
USCS Symbol:	**CH**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/17/17 *Checked By* TMP *Date* 7/18/17

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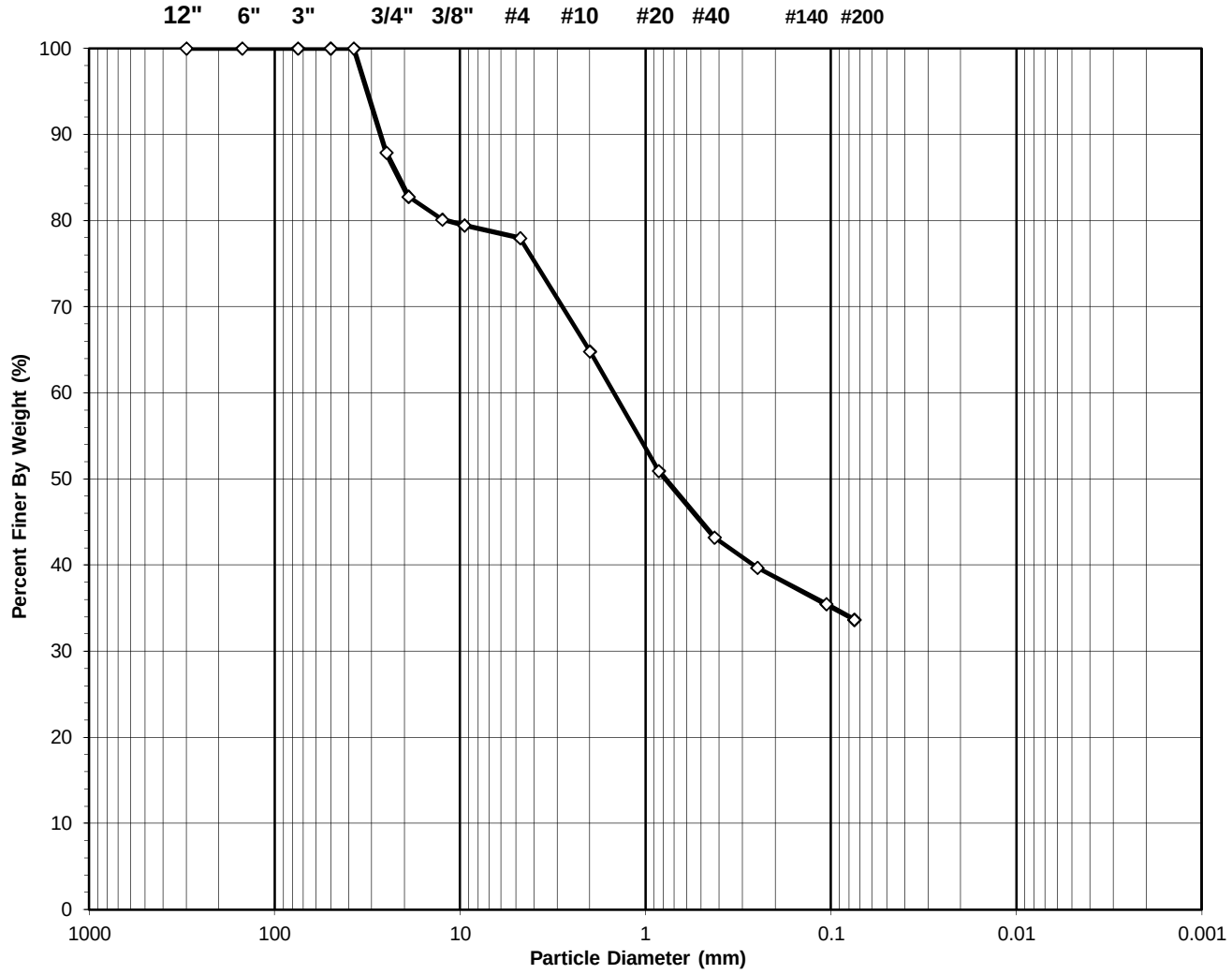
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-28
Client Reference:	Tull Property 16123	Depth (ft):	0.0-4.5
Project No.:	2017-372-001	Sample No.:	S-1 & S-2
Lab ID:	2017-372-001-122	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
SC, TESTED

USCS Classification:
CLAYEY SAND WITH GRAVEL

Tested By	SG	Date	7/18/17	Checked By	KC	Date	7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-28
Client Reference:	Tull Property 16123	Depth (ft):	0.0-4.5
Project No.:	2017-372-001	Sample No.:	S-1 & S-2
Lab ID:	2017-372-001-122	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	14936	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	416.62	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	416.62	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	148.04	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	268.58	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	268.58
Dry Weight of - 3/4" Sample (g):	222.4	Weight of - #200 Material (g):	90.41
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	178.17
Dry Weight of + 3/4" Sample (g):	46.23		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	32.52	12.11	12.11	87.89	**87.89**
3/4"	19.0	13.71	5.10	17.21	82.79	**82.79**
1/2"	12.50	7.15	2.66	19.87	80.13	**80.13**
3/8"	9.50	1.82	0.68	20.55	79.45	**79.45**
#4	4.75	3.96	1.47	22.03	77.97	**77.97**
#10	2.00	35.36	13.17	35.19	64.81	**64.81**
#20	0.850	37.28	13.88	49.07	50.93	**50.93**
#40	0.425	20.74	7.72	56.79	43.21	**43.21**
#60	0.250	9.41	3.50	60.30	39.70	**39.70**
#140	0.106	11.34	4.22	64.52	35.48	**35.48**
#200	0.075	4.88	1.82	66.34	33.66	**33.66**
Pan	-	90.41	33.66	100.00	-	**-**

Tested By SG Date 7/18/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-28
Client Reference:	Tull Property 16123	Depth (ft):	0.0-4.5
Project No.:	2017-372-001	Sample No.:	S-1 & S-2
Lab ID:	2017-372-001-122	Soil Description:	BROWN LEAN CLAY

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

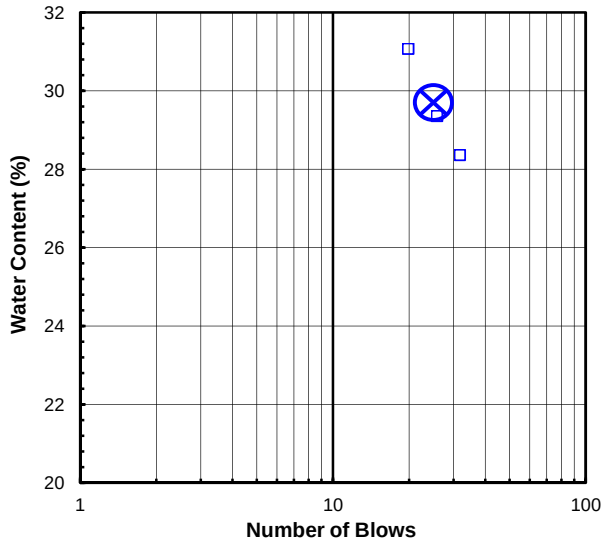
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	907	355	257	243	U
Wt. of Tare & Wet Sample (g):	56.78	38.43	39.58	39.18	L
Wt. of Tare & Dry Sample (g):	53.02	33.63	35.03	34.70	T
Weight of Tare (g):	6.98	18.17	19.52	18.89	I
Weight of Water (g):	3.8	4.8	4.6	4.5	P
Weight of Dry Sample (g):	46.0	15.5	15.5	15.8	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**8.2**	**31.0**	**29.3**	**28.3**	N
Number of Blows:		**20**	**26**	**32**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	182	236	
Wt. of Tare & Wet Sample (g):	25.41	24.74	
Wt. of Tare & Dry Sample (g):	24.46	23.77	
Weight of Tare (g):	19.39	18.50	
Weight of Water (g):	0.9	1.0	
Weight of Dry Sample (g):	5.1	5.3	
Moisture Content (%):	**18.7**	**18.4**	**0.3**

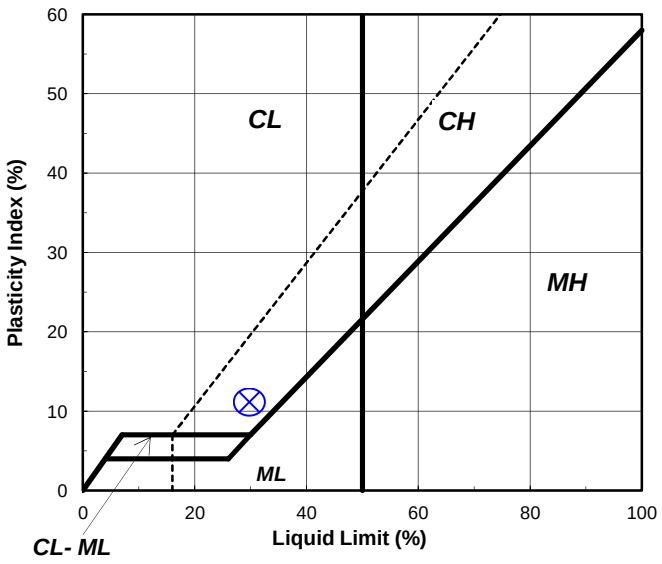
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**30**
Plastic Limit (%):	**19**
Plasticity Index (%):	**11**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/15/17 *Checked By* KC *Date* 7/19/17

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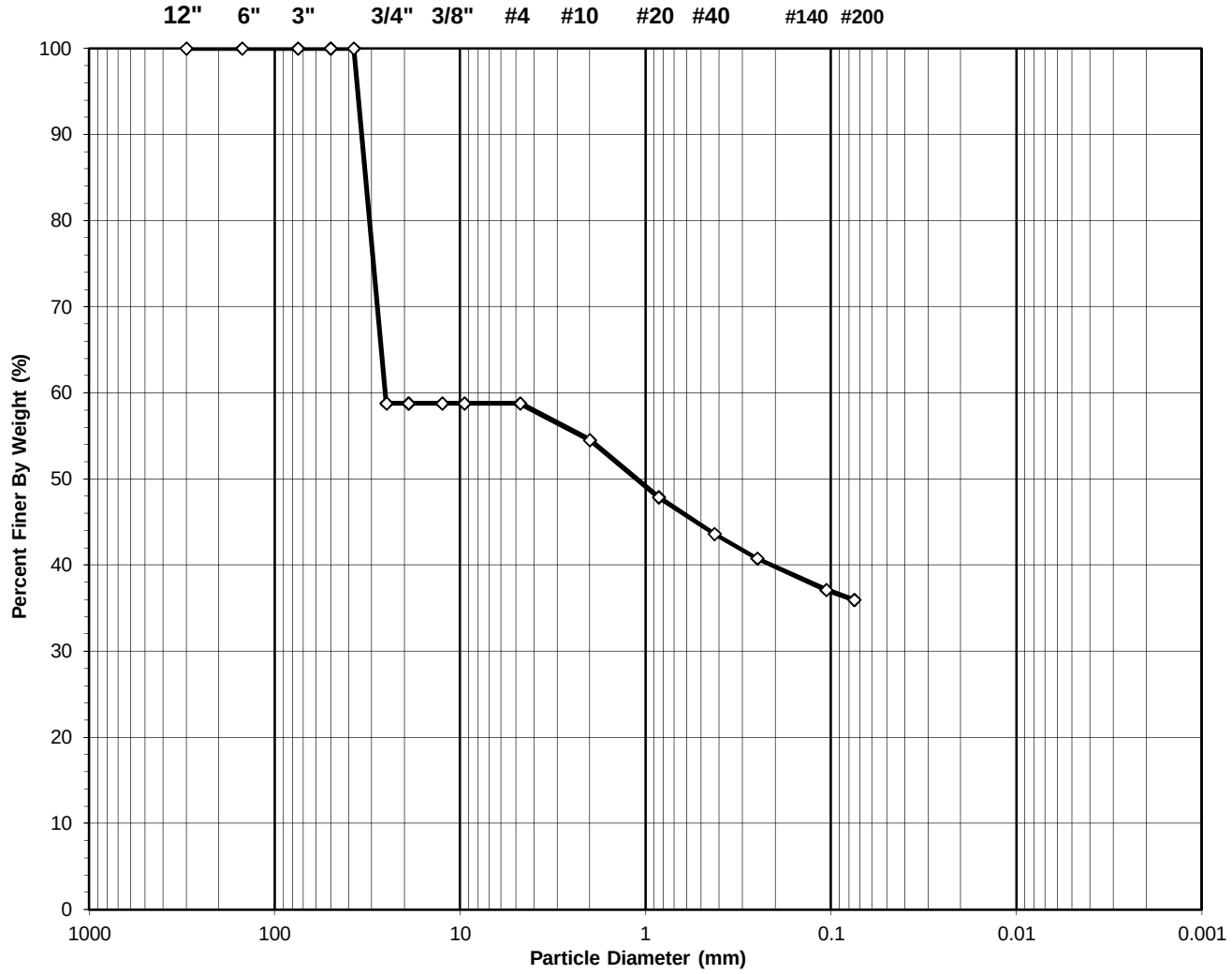
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-29
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-131	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
GC, TESTED

USCS Classification:
CLAYEY GRAVEL WITH SAND

Tested By SG Date 7/18/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-29
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-131	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1451	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	416.53	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	416.53	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.72	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	271.81	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	271.81
Dry Weight of - 3/4" Sample (g):	159.8	Weight of - #200 Material (g):	97.75
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	174.06
Dry Weight of + 3/4" Sample (g):	112.04		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	112.04	41.22	41.22	58.78	**58.78**
3/4"	19.0	0.00	0.00	41.22	58.78	**58.78**
1/2"	12.50	0.00	0.00	41.22	58.78	**58.78**
3/8"	9.50	0.00	0.00	41.22	58.78	**58.78**
#4	4.75	0.00	0.00	41.22	58.78	**58.78**
#10	2.00	11.57	4.26	45.48	54.52	**54.52**
#20	0.850	18.03	6.63	52.11	47.89	**47.89**
#40	0.425	11.61	4.27	56.38	43.62	**43.62**
#60	0.250	7.71	2.84	59.22	40.78	**40.78**
#140	0.106	9.94	3.66	62.87	37.13	**37.13**
#200	0.075	3.16	1.16	64.04	35.96	**35.96**
Pan	-	97.75	35.96	100.00	-	**-**

Tested By SG Date 7/18/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-29
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-131	Soil Description:	BROWN LEAN CLAY

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

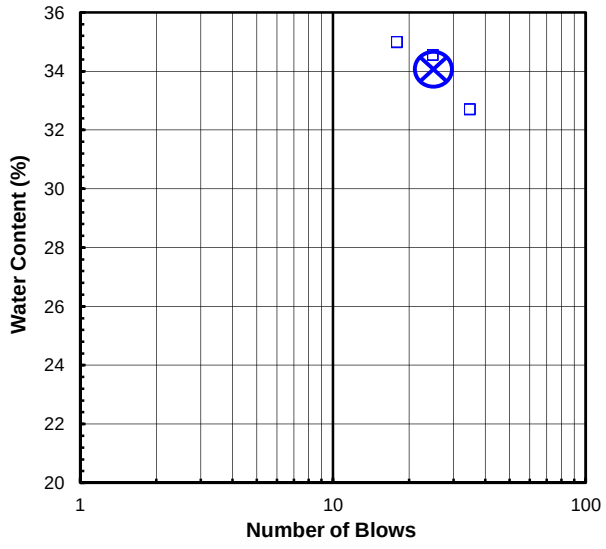
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	19	115	250	164	U
Wt. of Tare & Wet Sample (g):	54.16	39.28	38.15	37.46	L
Wt. of Tare & Dry Sample (g):	47.72	33.92	32.85	32.52	T
Weight of Tare (g):	6.95	18.59	17.50	17.40	I
Weight of Water (g):	6.4	5.4	5.3	4.9	P
Weight of Dry Sample (g):	40.8	15.3	15.4	15.1	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**15.8**	**35.0**	**34.5**	**32.7**	N
Number of Blows:		**18**	**25**	**35**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	234	135	
Wt. of Tare & Wet Sample (g):	26.47	25.64	
Wt. of Tare & Dry Sample (g):	25.42	24.66	
Weight of Tare (g):	19.89	19.41	
Weight of Water (g):	1.1	1.0	
Weight of Dry Sample (g):	5.5	5.3	
Moisture Content (%):	**19.0**	**18.7**	**0.3**

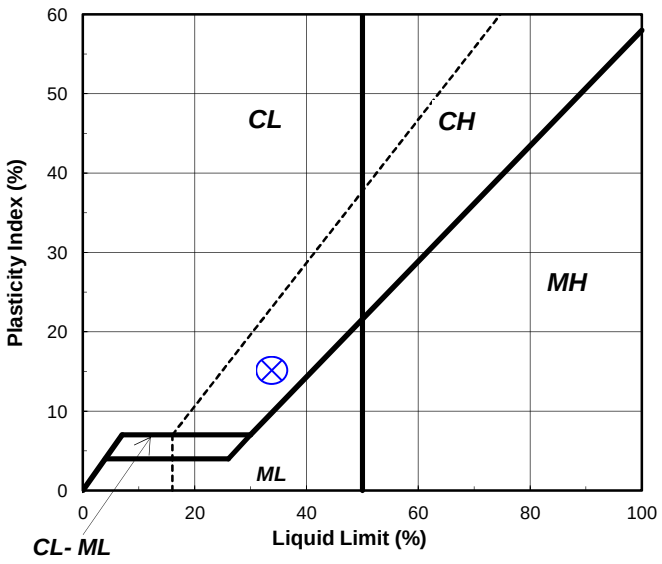
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**34**
Plastic Limit (%):	**19**
Plasticity Index (%):	**15**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/15/17 *Checked By* TMP *Date* 7/17/17

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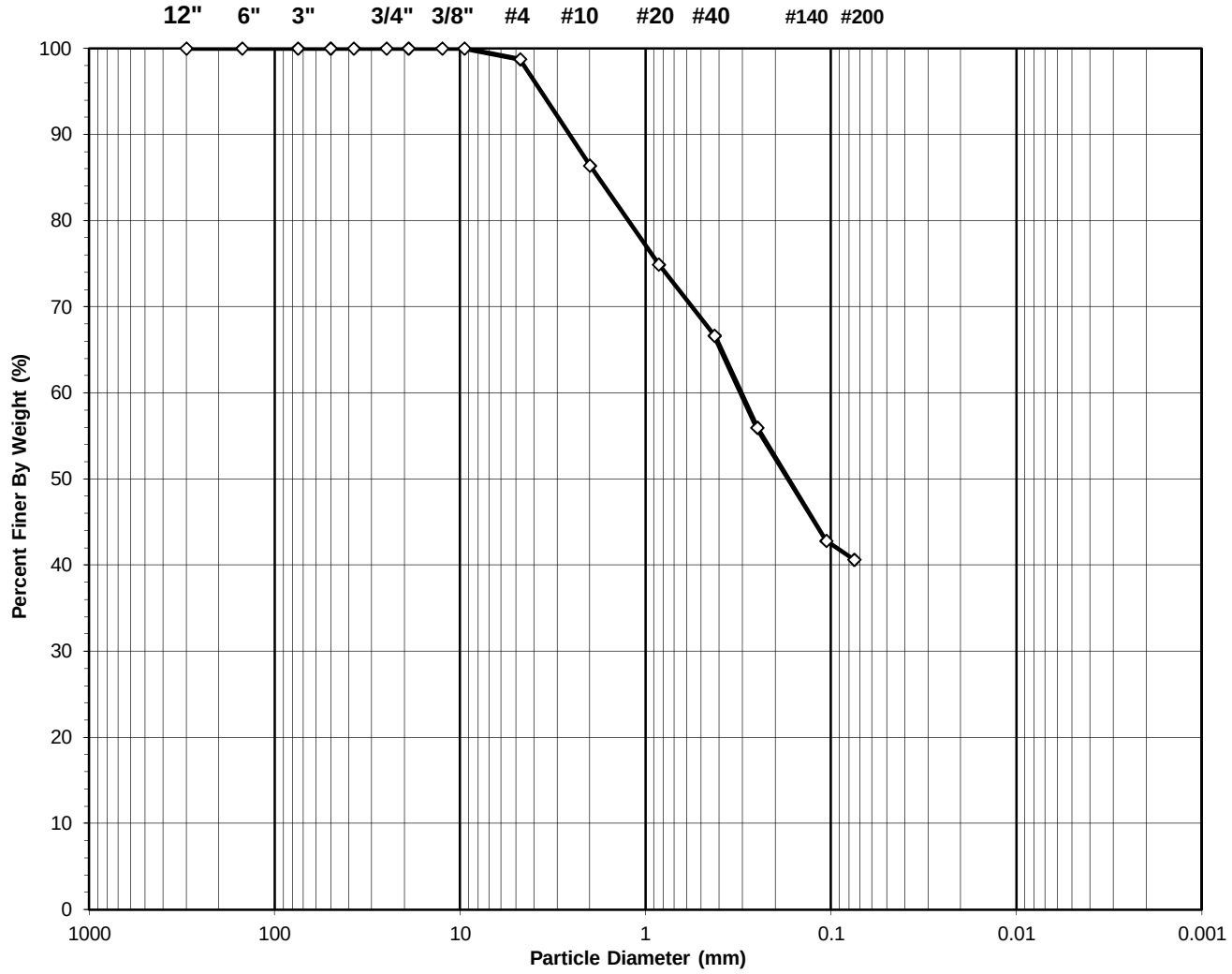
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-30
Client Reference:	Tull Property 16123	Depth (ft):	12.0-16.5
Project No.:	2017-372-001	Sample No.:	S-5 & S-6
Lab ID:	2017-372-001-143	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
SC, TESTED

USCS Classification:
CLAYEY SAND

Tested By	SG	Date	7/18/17	Checked By	KC	Date	7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-30
Client Reference:	Tull Property 16123	Depth (ft):	12.0-16.5
Project No.:	2017-372-001	Sample No.:	S-5 & S-6
Lab ID:	2017-372-001-143	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1467	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	479.75	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	479.75	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.35	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	333.40	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	333.40
Dry Weight of - 3/4" Sample (g):	333.4	Weight of - #200 Material (g):	135.47
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	197.93
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	4.11	1.23	1.23	98.77	**98.77**
#10	2.00	41.21	12.36	13.59	86.41	**86.41**
#20	0.850	38.32	11.49	25.09	74.91	**74.91**
#40	0.425	27.58	8.27	33.36	66.64	**66.64**
#60	0.250	35.60	10.68	44.04	55.96	**55.96**
#140	0.106	43.81	13.14	57.18	42.82	**42.82**
#200	0.075	7.30	2.19	59.37	40.63	**40.63**
Pan	-	135.47	40.63	100.00	-	**-**

Tested By SG Date 7/18/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-30
Client Reference:	Tull Property 16123	Depth (ft):	12.0-16.5
Project No.:	2017-372-001	Sample No.:	S-5 & S-6
Lab ID:	2017-372-001-143	Soil Description:	BROWN LEAN CLAY

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

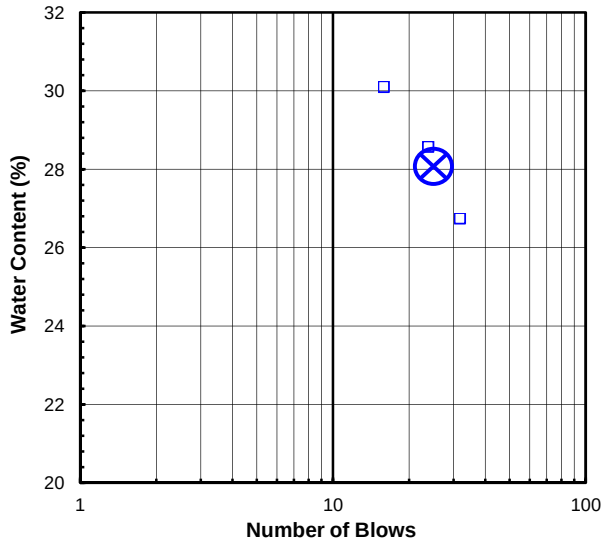
As Received Moisture Content		Liquid Limit Test			
ASTM D2216-10		1	2	3	M
Tare Number:	40	191	1253	279	U
Wt. of Tare & Wet Sample (g):	42.76	38.23	41.33	42.41	L
Wt. of Tare & Dry Sample (g):	38.79	33.45	36.81	38.06	T
Weight of Tare (g):	6.90	17.56	20.98	21.78	I
Weight of Water (g):	4.0	4.8	4.5	4.3	P
Weight of Dry Sample (g):	31.9	15.9	15.8	16.3	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**12.4**	**30.1**	**28.6**	**26.7**	N
Number of Blows:		**16**	**24**	**32**	T

Plastic Limit Test	1	2	Range
Tare Number:	186	178	
Wt. of Tare & Wet Sample (g):	24.77	24.54	
Wt. of Tare & Dry Sample (g):	23.85	23.63	
Weight of Tare (g):	18.50	18.41	
Weight of Water (g):	0.9	0.9	
Weight of Dry Sample (g):	5.4	5.2	
Moisture Content (%):	**17.2**	**17.4**	**-0.2**

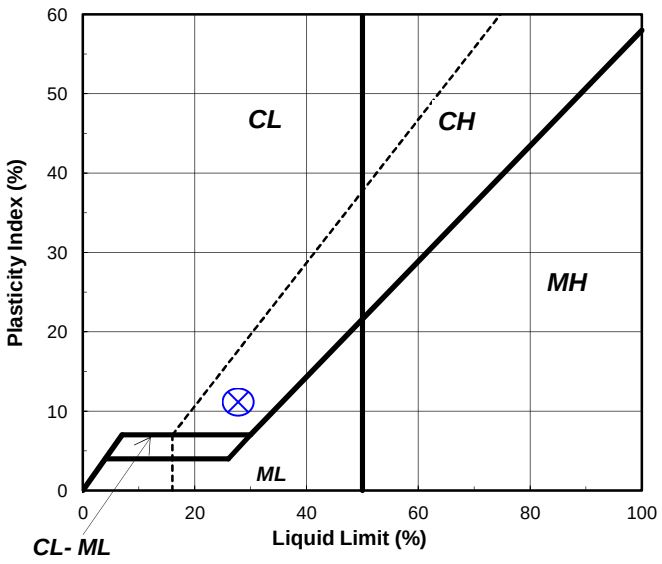
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**28**
Plastic Limit (%):	**17**
Plasticity Index (%):	**11**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/15/17 *Checked By* TMP *Date* 7/17/17

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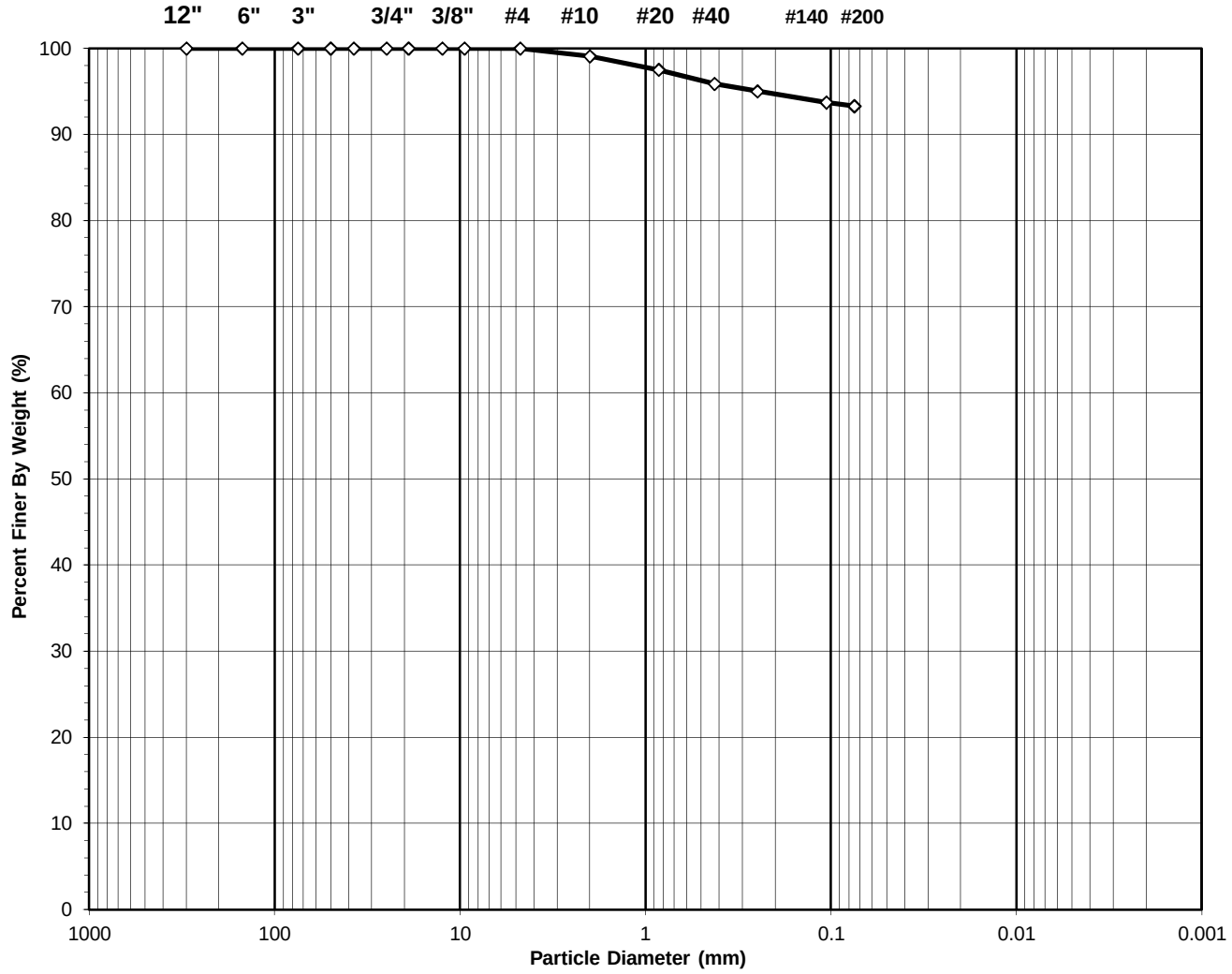
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-33
Client Reference:	Tull Property 16123	Depth (ft):	6.0-10.5
Project No.:	2017-372-001	Sample No.:	S-3 & S-4
Lab ID:	2017-372-001-163	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By	SG	Date	7/18/17	Checked By	KC	Date	7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-33
Client Reference:	Tull Property 16123	Depth (ft):	6.0-10.5
Project No.:	2017-372-001	Sample No.:	S-3 & S-4
Lab ID:	2017-372-001-163	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1499	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	458.41	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	458.41	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	148.13	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	310.28	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	310.28
Dry Weight of - 3/4" Sample (g):	310.3	Weight of - #200 Material (g):	289.53
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	20.75
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.00	0.00	0.00	100.00	**100.00**
#10	2.00	2.78	0.90	0.90	99.10	**99.10**
#20	0.850	4.92	1.59	2.48	97.52	**97.52**
#40	0.425	5.02	1.62	4.10	95.90	**95.90**
#60	0.250	2.73	0.88	4.98	95.02	**95.02**
#140	0.106	4.00	1.29	6.27	93.73	**93.73**
#200	0.075	1.30	0.42	6.69	93.31	**93.31**
Pan	-	289.53	93.31	100.00	-	**-**

Tested By SG Date 7/18/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-33
Client Reference:	Tull Property 16123	Depth (ft):	6.0-10.5
Project No.:	2017-372-001	Sample No.:	S-3 & S-4
Lab ID:	2017-372-001-163	Soil Description:	BROWN LEAN CLAY

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

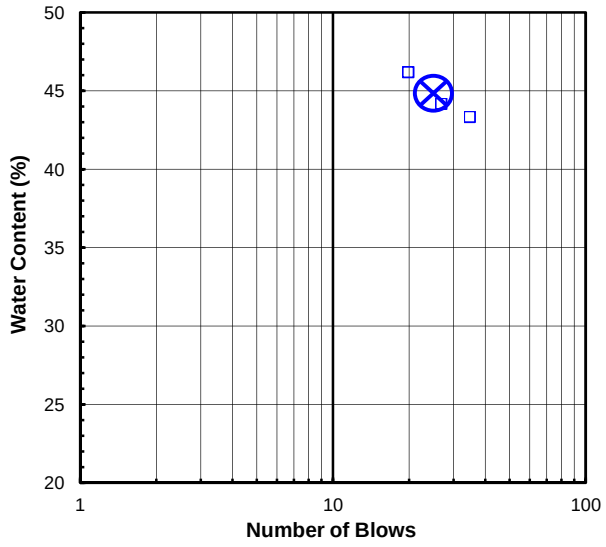
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	18	454	1101	158	U
Wt. of Tare & Wet Sample (g):	40.36	35.50	39.05	37.77	L
Wt. of Tare & Dry Sample (g):	37.33	28.99	32.67	31.65	T
Weight of Tare (g):	6.96	14.88	18.21	17.51	I
Weight of Water (g):	3.0	6.5	6.4	6.1	P
Weight of Dry Sample (g):	30.4	14.1	14.5	14.1	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**10.0**	**46.1**	**44.1**	**43.3**	N
Number of Blows:		**20**	**27**	**35**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	237	4	
Wt. of Tare & Wet Sample (g):	25.05	25.29	
Wt. of Tare & Dry Sample (g):	24.02	24.25	
Weight of Tare (g):	18.80	18.94	
Weight of Water (g):	1.0	1.0	
Weight of Dry Sample (g):	5.2	5.3	
Moisture Content (%):	**19.7**	**19.6**	**0.1**

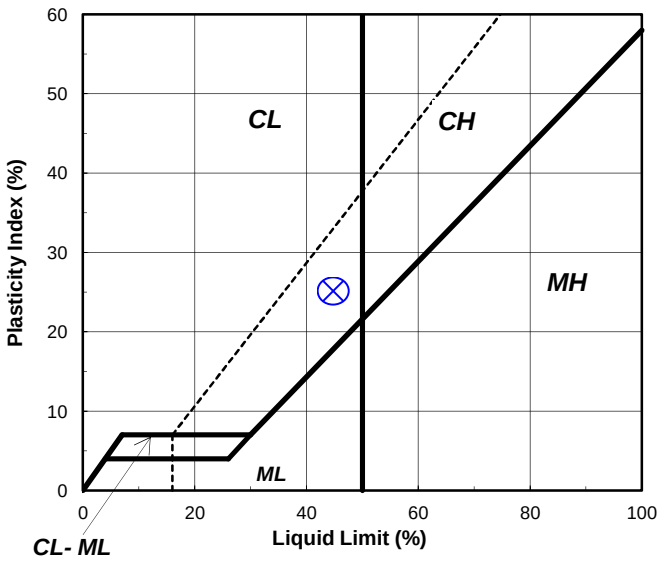
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**45**
Plastic Limit (%):	**20**
Plasticity Index (%):	**25**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/15/17 *Checked By* TMP *Date* 7/17/17

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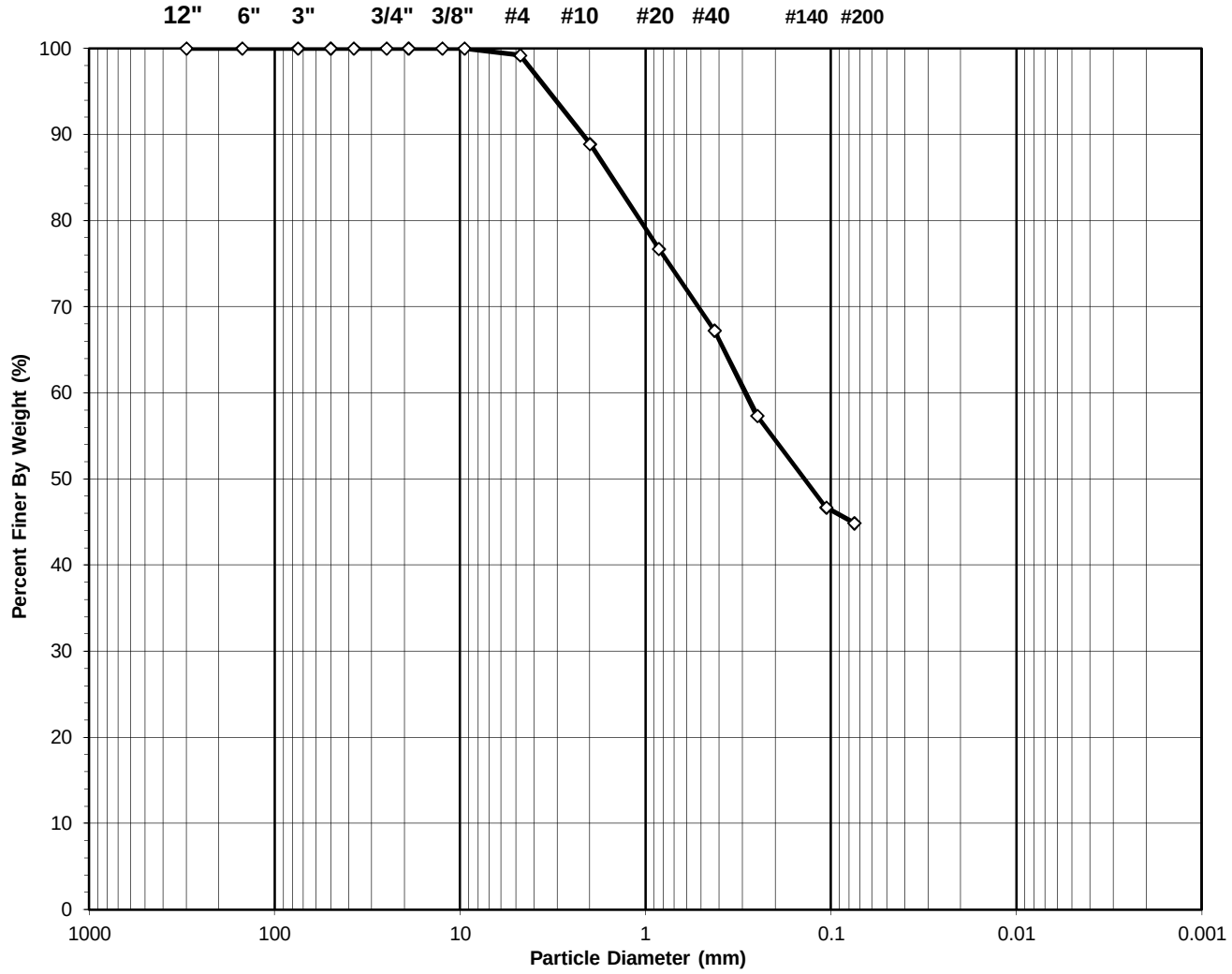
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SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-34
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-167	Soil Color:	Brown

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol:
SC, TESTED

USCS Classification:
CLAYEY SAND

Tested By	SG	Date	7/18/17	Checked By	KC	Date	7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-34
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-167	Soil Color:	Brown

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.:	1443	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	512.57	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	512.57	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	145.01	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Sample (g):	367.56	Weight of Dry Sample (g):	NA
Moisture Content (%):	**0.0**	**Moisture Content (%):**	**NA**

Wet Weight of -3/4" Sample (g):	NA	Weight of the Dry Sample (g):	367.56
Dry Weight of - 3/4" Sample (g):	367.6	Weight of - #200 Material (g):	164.92
Wet Weight of +3/4" Sample (g):	NA	Weight of + #200 Material (g):	202.64
Dry Weight of + 3/4" Sample (g):	0.00		
Total Dry Weight of Sample (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	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	2.89	0.79	0.79	99.21	**99.21**
#10	2.00	37.95	10.32	11.11	88.89	**88.89**
#20	0.850	44.71	12.16	23.28	76.72	**76.72**
#40	0.425	34.87	9.49	32.76	67.24	**67.24**
#60	0.250	36.38	9.90	42.66	57.34	**57.34**
#140	0.106	39.12	10.64	53.30	46.70	**46.70**
#200	0.075	6.72	1.83	55.13	44.87	**44.87**
Pan	-	164.92	44.87	100.00	-	**-**

Tested By SG Date 7/18/17 Checked By KC Date 7/19/17

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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ATTERBERG LIMITS

ASTM D 4318-10

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	GBB-34
Client Reference:	Tull Property 16123	Depth (ft):	3.0-7.5
Project No.:	2017-372-001	Sample No.:	S-2 & S-3
Lab ID:	2017-372-001-167	Soil Description:	BROWN LEAN CLAY

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

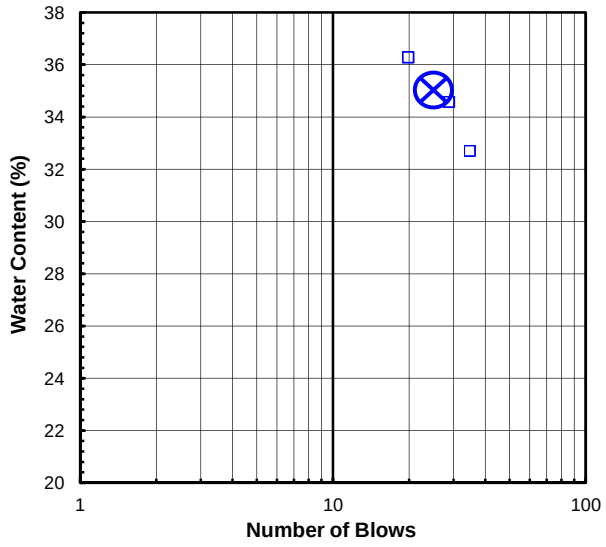
As Received Moisture Content ASTM D2216-10		**Liquid Limit Test** 1	2	3	M
Tare Number:	27	202	101	208	U
Wt. of Tare & Wet Sample (g):	38.80	37.83	37.35	39.68	L
Wt. of Tare & Dry Sample (g):	35.79	32.36	32.11	34.61	T
Weight of Tare (g):	6.89	17.27	16.94	19.09	I
Weight of Water (g):	3.0	5.5	5.2	5.1	P
Weight of Dry Sample (g):	28.9	15.1	15.2	15.5	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**10.4**	**36.2**	**34.5**	**32.7**	N
Number of Blows:		**20**	**29**	**35**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	139	88	
Wt. of Tare & Wet Sample (g):	25.91	25.09	
Wt. of Tare & Dry Sample (g):	24.97	24.18	
Weight of Tare (g):	19.67	18.98	
Weight of Water (g):	0.9	0.9	
Weight of Dry Sample (g):	5.3	5.2	
Moisture Content (%):	**17.7**	**17.5**	**0.2**

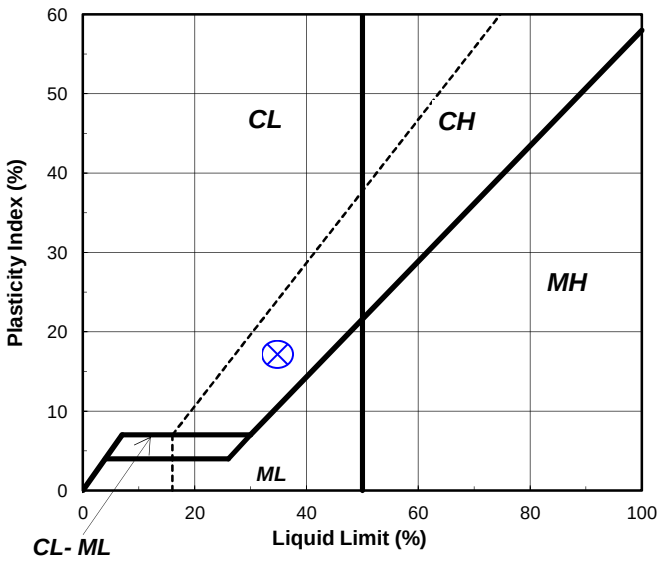
Note: The acceptable range of the two Moisture contents is ± 1.4

Test Results	
Liquid Limit (%):	**35**
Plastic Limit (%):	**18**
Plasticity Index (%):	**17**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By RAL *Date* 7/15/17 *Checked By* TMP *Date* 7/17/17

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GARVIN BOWARD BEITKO

Test Boring Record

D-1

Project Number: 16123-1 | **Project Name:** Dohar Property | **Sheet:** 1 of 2

Project Location: Leetsdale Boro, Allegheny Co., PA | **Start Date:** 5/28/19 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 5/28/19 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Mostly cloudy, 68 Degrees | **Water Level Upon Completion:** 17.9'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 4.5'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
761.2'	TOPSOIL 0.4								
	FILL sampled as brown silty clay, some rock fragments, soft to stiff, moist		S-1	67	1-1-2 (3)				
			S-2	100	7-5-4 (9)				
756	**(FILL)** 5.0	5							
	Red-brown and brown CLAY (CL), some dark gray, light brown, and brown rock fragments (sandstone, shale), medium to stiff, moist		S-3	100	4-3-4 (7)				
751		10	S-4	100	6-10-12 (22)				
	(COLLUVIAL) 12.0								
	Red-brown and dark greenish gray CLAY (CL), little rock fragments, very stiff, moist		S-5	100	5-7-9 (16)				
746		15	S-6	100	8-12-14 (26)				
	(COLLUVIAL) 18.0								
	Dark gray and red-yellow CLAY (CL), few light gray and brown rock fragments (sandstone, shale), very stiff, moist		S-7	100	8-9-14 (23)				
741	**(COLLUVIAL)** 21.0	20							
	Light gray and orange-brown DECOMPOSED shaley SANDSTONE sampled as sandstone fragments, dense to very dense, dry		S-8	100	9-13-24 (37)				
	-encountered water at 21.0'								
	(RESIDUAL) 24.4		S-9	100	50/0.4'				
736	Light gray fine to medium-grained micaceous SANDSTONE, slightly to moderately weathered, thinly to thickly laminated, moderately broken to massive, hard, few carbonaceous laminations	25	R-1	96 (60)					
	MOH of 8.5 at 25.0'								
731		30	R-2	100 (60)					
726		35	R-3	100 (88)					

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GARVIN BOWARD BEITKO

Test Boring Record

D-1

Project Number: 16123-1
Project Name: Dohar Property
Sheet: 2 of 2
Project Location: Leetsdale Boro, Allegheny Co., PA
Start Date: 5/28/19
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 5/28/19
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Mostly cloudy, 68 Degrees
Water Level Upon Completion: 17.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 4.5'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Light gray fine to medium-grained micaceous SANDSTONE, slightly to moderately weathered, thinly to thickly laminated, moderately broken to massive, hard, few carbonaceous laminations *(continued)*								
721		-MOH of 8.5 at 39.0'	40	R-4	100 (86)					
				R-5	100 (72)					
			44.4							
716		Boring Terminated at 44.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.	45							
711			50							
706			55							
701			60							
696			65							
691			70							

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GARVIN BOWARD BEITKO

Test Boring Record

D-2

Project Number: 16123-1 | **Project Name:** Dohar Property | **Sheet:** 1 of 2

Project Location: Leetsdale Boro, Allegheny Co., PA | **Start Date:** 6/3/19 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 6/3/19 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Sunny, 65 Degrees | **Water Level Upon Completion:** 9.9'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 19'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
784.4'	TOPSOIL 0.4								
	FILL sampled as brown clay, few to some rock fragments (sandstone, shale, claystone), soft to very stiff, moist		S-1	67	1-1-2 (3)				
			S-2	53	12-12-9 (21)				
779	**(FILL)** 6.0	5							
	Brown and gray SANDSTONE FRAGMENTS (GP), few red-brown clay, medium dense, moist		S-3	80	7-7-9 (16)				
774	▼	10	S-4	100	18-23-19 (42)				
	(COLLUVIAL) 12.0								
	Dark brown and red-brown silty CLAY (CL), some to and rock fragments (yellow-brown sandstone, carbonaceous shale, brown shale), stiff to very stiff, moist		S-5	100	14-12-14 (26)				
769		15	S-6	100	6-6-7 (13)				
	(COLLUVIAL) 18.0								
	▼ Gray DECOMPOSED thinly laminated SANDSTONE with carbonaceous laminations sampled as sandstone fragments, very dense, moist to dry -moist from 18.0' to 19.5' -encountered water at 19.5'		S-7	100	7-39-16 (55)				
764		20	S-8	100	47-34-19 (53)				
759	**(RESIDUAL)** 25.4	25	S-9	100	23-23-50/0.4'				
	Brown SANDSTONE with carbonaceous laminations, highly weathered, thinly laminated, very broken to moderately broken, soft -MOH of 0.5 at 27.0' 28.0		R-1	90 (0)					
	Brown clayey SILTSTONE, completely to slightly weathered, very thinly bedded, very broken, soft to medium hard		R-2	100 (0)					
754		30							
	-MOH of 2.5 at 32.0'		R-3	100 (13)					
749	-medium hard from 34.5' to 35.4'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

D-2

Project Number: 16123-1
Project Name: Dohar Property
Sheet: 2 of 2
Project Location: Leetsdale Boro, Allegheny Co., PA
Start Date: 6/3/19
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 6/3/19
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Sunny, 65 Degrees
Water Level Upon Completion: 9.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 19'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-MOH of 4.5 at 35.0' 35.4								
		Boring Terminated at 35.4 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
744			40							
739			45							
734			50							
729			55							
724			60							
719			65							
714			70							

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GARVIN BOWARD BEITKO

Test Boring Record

D-3

Project Number: 16123-1
Project Name: Dohar Property
Sheet: 1 of 1
Project Location: Leetsdale Boro, Allegheny Co., PA
Start Date: 6/3/19
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 6/3/19
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Sunny, 50's
Water Level Upon Completion: 21'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 6'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
928.7'	TOPSOIL 0.4								
	Brown clayey SILT (ML), trace rock fragments, soft, moist **(RESIDUAL)** 2.0		S-1	100	1-1-3 (4)				
	Brown DECOMPOSED shaley SANDSTONE sampled as sandstone fragments, very dense, dry		S-2	100	11-20-30 (50)				
924	**(RESIDUAL)** 6.0	5							
	Brown DECOMPOSED SHALE sampled as shale fragments, very dense, dry		S-3	100	15-25-44 (69)				
	(RESIDUAL) 9.0								
919	Brown INTERBEDDED SHALE and SANDSTONE sampled as shale fragments, some sand, very dense, dry 10.0	10	S-4	100	30-50/0.3'				
	(RESIDUAL)		R-1	80 (0)					
	Brown SHALE, moderately weathered, thinly to thickly laminated, very broken to moderately broken, soft to medium hard -soft, very broken and fractured from 10.0' to 13.0' -vertical fracture from 13.5' to 14.5' -MOH of 4.5 at 13.5'		R-2	100 (0)					
914		15							
	-vertical fracture from 16.0' to 16.5' 16.5								
	Brown to gray INTERBEDDED SHALE and light gray fine-grained SANDSTONE, moderately to slightly weathered, thinly to thickly laminated, very broken to blocky, medium hard to hard -vertical fracture from 16.5' to 17.0' -vertical fracture from 17.5' to 18.0' -vertical fracture from 18.5' to 20.2'		R-3	100 (0)					
909		20							
	-MOH of 8.5 at 20.5' 21.0								
	Brown SILTSTONE, moderately weathered, very thinly bedded, very broken to moderately broken, medium hard 23.3		R-4	100 (0)					
	Gray LIMESTONE with calcareous clasts, slightly weathered, hard, MOH of 8.5 23.8								
904	Gray CLAYSTONE, few calcareous clasts, moderately weathered, very broken to blocky, soft -MOH of 1.5 at 24.0'	25							
	Red-brown to brown very fine-grained SANDSTONE, highly to moderately weathered, very broken to moderately broken, medium hard -vertical fracture from 26.5' to 28.2' -soft, highly weathered from 282.' to 29.0'		R-5	100 (0)					
899	-MOH of 7.5 at 29.8' 30.0	30							
	Boring Terminated at 30.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
894		35							

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GARVIN BOWARD BEITKO

Test Boring Record

D-4

Project Number: 16123-1 | **Project Name:** Dohar Property | **Sheet:** 1 of 1

Project Location: Leetsdale Boro, Allegheny Co., PA | **Start Date:** 5/29/19 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 5/29/19 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Partly sunny, 75 Degrees | **Water Level Upon Completion:**

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
824.1'	TOPSOIL 0.2		S-1	67	1-1-1 (2)				
	FILL sampled as red-brown rock fragments, some clay, very loose, moist								
	(FILL) 3.0								
	Red-brown CLAY (CL), little to some rock fragments (shale, carbonaceous shale), stiff, moist		S-2	100	4-4-8 (12)				
819		5							
			S-3	100	12-8-8 (16)				
	(COLLUVIAL) 9.7								
814	Brown and gray SANDSTONE FRAGMENTS (GP), few sand, few red-brown clay, loose to very dense, dry	10	S-4	100	16-15-50/0.2'				
			S-5	80	8-3-2 (5)				
809		15							
	(COLLUVIAL) 16.5		S-6	73	10-9-6 (15)				
	Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, trace sand, dense, dry								
			S-7	100	14-22-15 (37)				
804		20							
	-boulder from 21.5' to 23.0'		S-8	67	48-50/0.4'				
	(RESIDUAL) 24.1								
799	Brown fine to medium-grained micaceous SANDSTONE, slightly to moderately weathered, thickly laminated to very thinly bedded, moderately broken to massive, hard	25	S-9	0	50/0.1'				
			R-1	90 (43)					
794		30	R-2	60 (78)					
	-MOH of 8.5 at 30.0'								
	-no drill water return from 24.1' to 34.1'		R-3	100 (85)					
	34.1								
789	Boring Terminated at 34.1 feet	35							

Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.

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GARVIN BOWARD BEITKO

Test Boring Record

D-5

Project Number: 16123-1 | **Project Name:** Dohar Property | **Sheet:** 1 of 4

Project Location: Leetsdale Boro, Allegheny Co., PA | **Start Date:** 5/29/19 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 5/30/19 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rainy, 70's | **Water Level Upon Completion:** 59.7'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
900.4'	TOPSOIL 0.5		S-1	87	1-1-2 (3)				
	Orange-yellow silty SAND (SM), few clay, trace sandstone fragments, very loose, moist **(RESIDUAL)** 3.0								
	Gray-brown SANDSTONE FRAGMENTS (GP), few sand, medium dense, dry **(RESIDUAL)** 5.0		S-2	100	17-14-11 (25)				
895	Brown-yellow DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry	5	S-3	100	14-33-50 (83)				
	(RESIDUAL) 9.0								
890	Gray-brown DECOMPOSED SHALE sampled as shale fragments, very dense, dry	10	S-4	100	15-17-16 (33)				
			S-5	100	24-26-34 (60)				
885	**(RESIDUAL)** 15.0	15							
	Brown-gray and brown-orange DECOMPOSED SILTSTONE sampled as siltstone fragments, very dense, dry		S-6	100	19-22-26 (48)				
			S-7	100	14-27-30 (57)				
880	**(RESIDUAL)** 21.0	20							
	Red-yellow to gray DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, very dense, dry 22.0		S-8	100	31-50/0.4'				
	(RESIDUAL)								
	Red-yellow silty CLAYSTONE, completely to slightly weathered, thinly bedded, very broken to blocky, soft								
875	-MOH of 2.5 at 23.0'	25	R-1	100 (0)					
	-soft from 24.2' to 26.0' 25.5								
	Red-yellow and gray INTERBEDDED fine-grained SANDSTONE and SHALE, completely to slightly weathered, thinly laminated to very thinly bedded, very broken, soft to hard								
	-vertical fracture from 28.0' to 28.5'								
870	-vertical fracture from 29.5' to 30.0'	30	R-2	100 (8)					
	-MOH of 8.5 at 31.0'								
865	-vertical fracture from 34.0' to 35.6'	35	R-3	100 (8)					

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GARVIN BOWARD BEITKO

Test Boring Record

D-5

Project Number: 16123-1 | **Project Name:** Dohar Property | **Sheet:** 2 of 4

Project Location: Leetsdale Boro, Allegheny Co., PA | **Start Date:** 5/29/19 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 5/30/19 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rainy, 70's | **Water Level Upon Completion:** 59.7'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Red-yellow and gray INTERBEDDED fine-grained SANDSTONE and SHALE, completely to slightly weathered, thinly laminated to very thinly bedded, very broken, soft to hard *(continued)*								
860		-vertical fracture from 40.0' to 41.0'	40	R-4	100 (0)					
855		-MOH of 5.5 at 45.0' -soft from 46.5' to 47.0'	45	R-5	100 (8)					
			49.5							
850		Gray SHALE, slightly weathered, thinly laminated, very broken to blocky, soft to hard -soft from 52.2' to 52.6' -MOH of 3.5 at 53.0'	50	R-6	100 (0)					
845		-soft from 54.5' to 55.0'	55	R-7	100 (20)					
			57.2							
840		Black CARBONACEOUS SHALE, moderately to slightly weathered, thinly laminated, very broken to blocky, soft to hard -MOH of 5.5 at 58.0' -vertically fracture, soft from 58.5' to 59.3' -many pyrite lenses and laminations	60	R-8	100 (48)					
835		-some gray siltstone laminations -soft, highly weathered from 62.0' to 66.0' -MOH of 2.5 at 63.0'	65	R-9	100 (10)					
			65.0							
		Gray SHALE, moderately weathered to fresh, medium bedded, moderately broken to massive, soft to hard								
830		-MOH of 6.5 at 69.0'	70	R-10	100 (80)					

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GARVIN BOWARD BEITKO

Test Boring Record

D-5

Project Number: 16123-1 | **Project Name:** Dohar Property | **Sheet:** 3 of 4

Project Location: Leetsdale Boro, Allegheny Co., PA | **Start Date:** 5/29/19 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 5/30/19 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Rainy, 70's | **Water Level Upon Completion:** 59.7'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Gray SHALE, moderately weathered to fresh, medium bedded, moderately broken to massive, soft to hard *(continued)*								
	-carbonaceous shale and coal interbed from 73.4' to 73.8'								
825	-vertical fracture from 73.5' to 75.2'	75	R-11	100 (34)					
	-MOH of 6.5 at 76.0'								
820	-soft from 80.0' to 80.5'	80	R-12	100 (70)					
	-carbonaceous shale and coal interbed from 82.8' to 83.1'								
	83.1								
815	Gray to light gray fine to medium-grained micaceous SANDSTONE, moderately to slightly weathered, moderately broken to massive, hard	85	R-13	50 (84)					
	-MOH of 8.5 at 88.0'								
810		90	R-14	100 (100)					
805		95	R-15	100 (100)					
	-moderately weathered from 97.5' to 103.0'								
800	-vertical fracture from 99.0' to 99.5'	100	R-16	100 (54)					
	-lost water return at 101.0'								
	-MOH of 8.5 at 101.5'								
	-vertical fracture from 101.5' to 102.0'								
795		105	R-17	100 (58)					

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GARVIN BOWARD BEITKO

Test Boring Record

D-5

Project Number: 16123-1
Project Name: Dohar Property
Sheet: 4 of 4
Project Location: Leetsdale Boro, Allegheny Co., PA
Start Date: 5/29/19
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 5/30/19
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Rainy, 70's
Water Level Upon Completion: 59.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray to light gray fine to medium-grained micaceous SANDSTONE, moderately to slightly weathered, moderately broken to massive, hard *(continued)*								
		107.3								
790		Red-brown to gray INTERBEDDED SHALE and light gray fine-grained SANDSTONE, slightly to moderately weathered, thinly laminated, very broken to blocky, hard -dark gray from 107.3' to 109.0'	110	R-18	100 (44)					
		-MOH of 6.5 at 109.5'								
785			115	R-19	100 (52)					
		-MOH of 8.5 at 118.0'								
780		-fresh from 117.5' to 120.0'	120	R-20	93 (27)					
		120.0								
		Boring Terminated at 120.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. Borehole collapsed at 12' after 24 hours								
775			125							
770			130							
765			135							
760			140							

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GARVIN BOWARD BEITKO

Test Boring Record

D-6

Project Number: 16123-1
Project Name: Dohar Property
Sheet: 1 of 1
Project Location: Leetsdale Boro, Allegheny Co., PA
Start Date: 6/3/19
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 6/3/19
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Sunny, 55 Degrees
Water Level Upon Completion: 6.4'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
896.4'	TOPSOIL 0.4		S-1	80	1-1-1 (2)				
	Orange-brown sandy SILT (ML), some sandstone fragments, very loose, moist 2.0								
	(COLLUVIAL)								
	Yellow-brown SANDSTONE FRAGMENTS (GP), few sand, few red-yellow clay, medium dense, moist		S-2	100	13-10-7 (17)				
891	**(COLLUVIAL)** 5.0	5							
	Yellow-brown SANDSTONE FRAGMENTS (GP), few sand, medium dense, dry		S-3	100	12-17-10 (27)				
	(COLLUVIAL) 9.0								
886	Brown silty CLAY (CL), trace rock fragments (red sandstone, black shale), very stiff, dry	10	S-4	100	8-11-14 (25)				
	(COLLUVIAL) 12.5		S-5	100	15-17-19 (36)				
	Brown-gray and red-brown mottled DECOMPOSED silty CLAYSTONE sampled as claystone fragments, medium to very dense, dry								
881		15	S-6	100	12-13-17 (30)				
	(RESIDUAL) 19.0		S-7	100	28-50/0.3'				
876	Brown-red and green-gray mottled silty CLAYSTONE, highly weathered, very thinly bedded, very broken to blocky, soft -MOH of 0.5 at 20.0'	20	R-1	88 (0)					
	23.0								
	Red-brown to tan fine-grained SANDSTONE, completely weathered, thinly bedded, very broken to moderately broken, very soft		R-2	100 (0)					
871	26.0	25							
	Brown SHALE, highly weathered, thinly laminated, very broken and fractured, very soft to soft -MOH of 3.5 at 27.0'		R-3	100 (0)					
	29.0								
866	Boring Terminated at 29.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. Borehole coallapsed at 2' after 24 hours	30							
861		35							

BORING LOG - GARVIN - GARVIN.GDT - 3/10/23 14:25 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123-1 DOHAR PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

D-7

Project Number: 16123-1
Project Name: Dohar Property
Sheet: 1 of 3
Project Location: Leetsdale Boro, Allegheny Co., PA
Start Date: 5/30/19
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 5/31/19
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Overcast, 60 to 70 Degrees
Water Level Upon Completion: 32.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
963'	TOPSOIL 0.1 FILL sampled as brown-red and yellow-brown clay, some rock fragments/gravel, few sand, medium, moist		S-1	80	2-3-3 (6)				
			S-2	87	4-4-4 (8)				
958	**(FILL)** 5.0 Brown-yellow to brown-red silty CLAY (CL), some red-brown and yellow-brown rock fragments (sandstone, shale), stiff to very stiff, moist	5	S-3	60	5-10-12 (22)				
953	**(COLLUVIAL)** 11.0 Brown DECOMPOSED SHALE sampled as shale fragments, very dense, dry	10	S-4	100	6-7-5 (12)				
			S-5	100	31-46-50 (96)				
948		15	S-6	100	19-27-34 (61)				
	(RESIDUAL) 18.0 Gray-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry 19.0		S-7	100	50/0.2'				
943	**(RESIDUAL)** Orange-brown SANDSTONE, completely weathered to highly weathered, thickly laminated, very broken, very soft to soft 21.2	20	R-1	65 (0)					
	Brown to gray INTERBEDDED SHALE and fine-grained SANDSTONE, highly to slightly weathered, thinly laminated to very thinly bedded, very broken, very soft to hard -very soft to soft from 21.2' to 24.0'		R-2	100 (0)					
938	-MOH of 5.5 at 25.5'	25							
933	-moderately weathered, vertical fracture from 30.3' to 31.0'	30	R-3	100 (18)					
	-moderately weathered, vertical fracture from 32.3' to 33.0'		R-4	100 (14)					
928	34.0	35							

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BORING LOG - GARVIN - GARVIN.GDT - 3/10/23 14:25 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123-1 DOHAR PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

D-7

Project Number: 16123-1 | **Project Name:** Dohar Property | **Sheet:** 2 of 3

Project Location: Leetsdale Boro, Allegheny Co., PA | **Start Date:** 5/30/19 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 5/31/19 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Overcast, 60 to 70 Degrees | **Water Level Upon Completion:** 32.5'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:**

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray to brown SILTSTONE, moderately weathered to slightly weathered, thinly laminated to very thinly bedded, very broken to blocky, hard *(continued)*								
		-very soft from 36.0' to 36.4'		R-5	100 (24)					
923			40.0							
		Medium gray SILTSTONE INTERBEDDED with light gray fine-grained SANDSTONE, slightly to moderately weathered, very broken to blocky, hard	40							
		-moderately weathered, waterstained vertical fracture from 41.0' to 43.5'								
		-MOH of 7.5 at 42.5'		R-6	100 (14)					
918			45							
		-moderately weathered, waterstained vertical fracture from 44.2' to 46.0'								
				R-7	100 (44)					
913			50							
		-MOH of 8.5 at 53.0'		R-8	100 (56)					
908			55							
			55.8							
		Gray SILTSTONE, slightly weathered to fresh, moderately broken to blocky, hard								
		-45 Degree fractures								
		-MOH of 7.5 at 57.0'	58.4	R-9	94 (10)					
		Gray fossiliferous LIMESTONE, highly weathered to slightly weathered, moderately broken, soft to hard	59.8							
903		-hard from 58.4' to 58.7'	60							
		Light gray CLAYSTONE with calcareous clasts, slightly weathered, thinly bedded, very broken to blocky, soft, MOH of 2.5	60.8							
		Light gray fine-grained SANDSTONE, slightly weathered, medium bedded, very broken to massive, hard								
		-waterstained vertical fracture from 64.0' to 65.3'		R-10	100 (58)					
898			65							
			65.8							
		Gray to brown SHALE, slightly to moderately weathered, thinly laminated to thickly laminated, very broken to massive, hard								
		-MOH of 7.5 at 67.0'		R-11	100 (30)					
893			70							

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BORING LOG - GARVIN - GARVIN.GDT - 3/10/23 14:25 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123-1 DOHAR PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

D-7

Project Number: 16123-1
Project Name: Dohar Property
Sheet: 3 of 3
Project Location: Leetsdale Boro, Allegheny Co., PA
Start Date: 5/30/19
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 5/31/19
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Overcast, 60 to 70 Degrees
Water Level Upon Completion: 32.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray to brown SHALE, slightly to moderately weathered, thinly laminated to thickly laminated, very broken to massive, hard *(continued)*								
		-moderately weathered, waterstained vertical fracture from 71.8' to 72.6'								
		-MOH of 7.5 at 73.0'								
888		-moderately weathered, waterstained vertical fracture from 73.4' to 73.9'	75	R-12	100 (16)					
		76.2								
		Gray to brown-red CLAYSTONE, slightly weathered, very thinly bedded, very broken to blocky, soft								
		-MOH of 5.5 at 89.0'								
883			80	R-13	100 (0)					
878			85	R-14	100 (0)					
		88.5								
		Brown-red INTERBEDDED SHALE and CLAYSTONE, moderately weathered, thickly laminated, very broken to moderately broken, soft to medium hard								
873		-MOH of 3.5 at 89.0'	90	R-15	96 (18)					
		92.0								
		Gray SILTSTONE with some light gray sandstone laminations, slightly weathered, very broken to massive, hard								
		-MOH of 8.5 at 93.0'								
868			95	R-16	100 (74)					
		96.0								
		Boring Terminated at 96.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc. Borehole collapsed at 3' after 24 hours								
863			100							
858			105							

BORING LOG - GARVIN - GARVIN.GDT - 3/10/23 14:25 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123-1 DOHAR PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

D-8

Project Number: 16123-1 | **Project Name:** Dohar Property | **Sheet:** 1 of 3

Project Location: Leetsdale Boro, Allegheny Co., PA | **Start Date:** 5/28/19 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 5/29/19 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Mostly cloudy, 80 Degrees | **Water Level Upon Completion:** 42.7'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 1'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
809.2'	Cinders and gravel **(FILL)** 0.4 FILL sampled as brown and gray rock fragments, loose, dry **(FILL)** 3.0		S-1	67	10-6-4 (10)				
804	Brown CLAY (CL), few to little rock fragments (shale, carbonaceous shale), medium to stiff, moist	5	S-2	100	6-8-10 (18)				
			S-3	100	4-6-6 (12)				
799		10	S-4	100	6-7-9 (16)				
	(COLLUVIAL) 12.0 Brown and red-brown CLAY (CL), some rock fragments sandstone, shale), stiff, moist **(COLLUVIAL)** 14.0		S-5	67	5-3-7 (10)				
794	Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry **(RESIDUAL)** 16.0	15	S-6	100	29-50/0.3'				
789	Brown fine to medium-grained micaceous SANDSTONE, moderately weathered, thinly to thickly laminated, very broken to moderately broken, soft to hard -water stained and vertically fractured from 16.7' to 17.4' -soft seams at 17.4', 17.6', and 17.8' -water stained vertical fracture from 18.1' to 18.6' -medium hard from 16.0' to 20.0' -MOH of 8.5 at 21.0'	20	R-1	94 (0)					
	-water stained vertical fracture at 21.0' -water stained vertical fracture from 23.0' to 23.5' 24.5		R-2	100 (34)					
784	Gray SILTSTONE, slightly weathered, thinly laminated to very thinly bedded, very broken to blocky, medium hard -MOH of 8.5 at 25.5'	25							
	-soft seam from 27.7' to 27.8'		R-3	100 (32)					
779	-water stained vertical fracture from 28.8' to 29.1'	30							
	-few light gray sandstone laminations 30.8 Light gray fine to medium-grained micaceous SANDSTONE with shale and carbonaceous shale laminations, slightly weathered, thinly laminated, very broken to blocky, medium hard								
774	-MOH of 8.5 at 35.5'	35	R-4	100 (26)					

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BORING LOG - GARVIN - GARVIN.GDT - 3/10/23 14:25 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123-1 DOHAR PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

D-8

Project Number: 16123-1 | **Project Name:** Dohar Property | **Sheet:** 2 of 3

Project Location: Leetsdale Boro, Allegheny Co., PA | **Start Date:** 5/28/19 | **Water Level During Drilling:**

Drilled By: C. Selvoski (Test Boring Services, Inc.) | **Completion Date:** 5/29/19 | **Water Level Before Coring:**

Drilling Rig: CME 45C Track Mounted | **Weather:** Mostly cloudy, 80 Degrees | **Water Level Upon Completion:** 42.7'

Drilling Method: 3 1/4 HSA & NQ2 Core | **Logged By:** K. Thiry, P.G. | **Water Level After 24 Hours:** 1'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Light gray fine to medium-grained micaceous SANDSTONE with shale and carbonaceous shale laminations, slightly weathered, thinly laminated, very broken to blocky, medium hard *(continued)*								
769		40	R-5	100 (34)					
		42.3							
	Gray to black SHALE, slightly weathered, thinly laminated, very broken to moderately broken, medium hard -MOH of 6.5 at 42.5' -carbonaceous from 44.1' to 44.5'		R-6	100 (42)					
764		44.5 45							
	Gray CLAYSTONE, slightly weathered, medium bedded, very broken to massive, very soft to soft -calcareous from 46.0' to 47.0' -MOH of 3.5 at 46.5'		R-7	100 (8)					
759		50							
	-MOH of 3.5 at 52.5'		R-8	100 (0)					
754		55							
			R-9	100 (54)					
749		60							
	-carbonaceous from 61.8' to 62.4'		R-10	100 (52)					
		64.3							
744	Brown fine to medium-grained micaceous SANDSTONE, moderately to slightly weathered, medium bedded, very broken to massive, soft to hard -soft from 65.0' to 65.2' -MOH of 8.5 at 65.5' -high angle fracture from 68.0' to 68.5'	65							
			R-11	100 (90)					
739		70							

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BORING LOG - GARVIN - GARVIN.GDT - 3/10/23 14:25 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123-1 DOHAR PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

D-8

Project Number: 16123-1
Project Name: Dohar Property
Sheet: 3 of 3
Project Location: Leetsdale Boro, Allegheny Co., PA
Start Date: 5/28/19
Water Level During Drilling:
Drilled By: C. Selvoski (Test Boring Services, Inc.)
Completion Date: 5/29/19
Water Level Before Coring:
Drilling Rig: CME 45C Track Mounted
Weather: Mostly cloudy, 80 Degrees
Water Level Upon Completion: 42.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 1'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown fine to medium-grained micaceous SANDSTONE, moderately to slightly weathered, medium bedded, very broken to massive, soft to hard *(continued)* -soft from 71.0' to 71.3' -fine-grained sandstone interbed from 71.6' to 73.5'								
734			75	R-12	100 (74)					
729			80	R-13	100 (94)					
		-MOH of 8.5 at 82.0'								
724			85	R-14	100 (88)					
719			90	R-15	96 (90)					
			91.0							
		Boring Terminated at 91.0 feet Ground Surface Elevations and Coordinates Surveyed and Provided By Phillips & Associates, Inc.								
714			95							
709			100							
704			105							

BORING LOG - GARVIN - GARVIN.GDT - 3/10/23 14:25 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123-1 DOHAR PROPERTY.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-13

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-31-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-31-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 63-69°, Sunny
Water Level Upon Completion: 8.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 11.9'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
892.1'		TOPSOIL 0.2								
		Brown and gray ROCK FRAGMENTS (sandstone, shale) (GP), few sand, few clay, loose to medium dense, moist		S-1	40	1-3-4 (7)		16.1		
				S-2	80	7-8-9 (17)		12.4		
887			5							
		(COLLUVIAL) 6.0								
		Orange-brown and gray faintly mottled clayey SILT (ML/CL), trace rock fragments (sandstone, shale), very stiff, moist		S-3	100	10-11-15 (26)		12.4		
		(COLLUVIAL) 9.0								
882		Brown and gray sand to gravel-sized ROCK FRAGMENTS (SC), some brown-red clay, medium dense, moist	10	S-4	100	7-12-15 (27)		14.6		
				S-5	100	7-9-9 (18)		13.9		
877			15							
				S-6	100	8-9-11 (20)	41.82	15.1		
				S-7	100	4-9-7 (16)		16.2		
872			20							
		(COLLUVIAL) 21.0								
		Yellow-brown and gray-green ROCK FRAGMENTS (sandstone, shale, claystone) (GC), some brown-red clay, medium dense, moist		S-8	100	10-10-16 (26)		14.4		
		(COLLUVIAL) 24.0								
867		Brown-red and gray mottled CLAY (CL), little sand/rock fragments (sandstone, shale, claystone), very stiff to extremely stiff, moist	25	S-9	100	7-15-17 (32)		18.4		
							81.09		34	20
				S-10	100	5-7-10 (17)		22.9		
862		**(COLLUVIAL)** 30.0	30							
		Gray DECOMPOSED SHALE sampled as shale fragments, very dense, dry 30.3		S-11	100	50/0.3'		4.1		
		(RESIDUAL)								
		Gray SILTSTONE, slightly weathered to fresh, thinly laminated to thinly bedded, very broken to massive, hard		R-1	74 (28)					
857			35							

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BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:42 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-13

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-31-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-31-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 63-69°, Sunny
Water Level Upon Completion: 8.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 11.9'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
852		Gray SILTSTONE, slightly weathered to fresh, thinly laminated to thinly bedded, very broken to massive, hard *(continued)* -MOHS 6.5 at 38.5'	40	R-2	100 (60)					
847			45	R-3	100 (94)					
		45.3 Boring Terminated at 45.3 feet								
842			50							
837			55							
832			60							
827			65							
822			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:42 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-21

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-27-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80-84°, Partly Sunny
Water Level Upon Completion: 39.4'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 9.5'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
873'	Brown ROCK FRAGMENTS (GP), little tan sand, few silt, firm to medium dense, dry		S-1	53	1-4-9 (13)		7.9		
			S-2	100	18-13-11 (24)		10.8		
868	**(COLLUVIAL)**	5							
	Brown and black ROCK FRAGMENTS (sandstone, shale, carbonaceous shale) (GP), little sand, few brown clay, medium dense, moist	6.0	S-3	100	12-11-14 (25)		12.7		
	(COLLUVIAL)	9.0							
863	Brown and yellow-brown SANDSTONE FRAGMENTS (GP), few sand, few brown-red clay, medium dense, moist	10	S-4	100	9-10-13 (23)		11.2		
			S-5	100	6-8-12 (20)		12.0		
858	**(COLLUVIAL)**	15.0	15						
	Brown to gray DECOMPOSED SHALE sampled as shale fragments, few silt, medium dense to very dense, dry		S-6	100	11-20-21 (41)		6.1		
			S-7	100	16-20-34 (54)		9.0		
853		20							
	-fractured and wet from 21.0' to 22.5'		S-8	100	6-11-13 (24)		7.3		
	(RESIDUAL)								
	-light gray at 24.0'	24.4	S-9	100	50/0.4'		5.4		
848	Gray SHALE, slightly weathered to fresh, thinly laminated, very broken to massive, hard	25	R-1	100 (0)					
	-MOHS 6.5 at 28.0'								
843		30							
	-vertical fracture from 29.7' to 30.5'		R-2	100 (8)					
838		35							

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BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:42 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-21

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2

Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:

Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-27-23
Water Level Before Coring:

Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80-84°, Partly Sunny
Water Level Upon Completion: 39.4'

Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 9.5'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray SHALE, slightly weathered to fresh, thinly laminated, very broken to massive, hard *(continued)*		R-3	100 (62)					
		-MOHS 6.5 at 39.0'	39.4							
833		Boring Terminated at 39.4 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	40							
828			45							
823			50							
818			55							
813			60							
808			65							
803			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:42 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-22

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-27-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 76-82°, Cloudy
Water Level Upon Completion: 14.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 6.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
873'	TOPSOIL 0.3		S-1	53	1-2-3 (5)		14.8		
	Brown and black ROCK FRAGMENTS (sandstone, shale) (GP), little sand, few clay, loose, moist								
	(COLLUVIAL) 4.0		S-2	100	7-4-3 (7)		24.9		
868	Orange-brown and light gray mottled SAND (SC), little gravel, some clay, very soft to very stiff, moist	5							
	-sandstone boulder from 6.0' to 7.0'		S-3	100	50/0.3'		5.3		
863		10	S-4	100	10-8-11 (19)		9.9		
	(COLLUVIAL) 12.0								
	Brown-yellow SAND (SC), little to some gravel, some clay, stiff to very stiff, moist		S-5	40	4-4-6 (10)		11.6		
858		15	S-6	100	9-12-14 (26)		15.0		
	-some clay from 18.5' to 19.0'		S-7	100	6-11-17 (28)		13.1		
853		20							
	-wet at 22.5'		S-8	100	8-11-11 (22)	41.86	16.1		
848	-coal fragments, from 24.5' to 25.0'	25	S-9	100	12-9-15 (24)		12.1		
	(COLLUVIAL) 27.0								
	Gray-brown and rust-orange mottled CLAY (CL), trace sandstone fragments, stiff, moist 28.0		S-10	100	7-9-14 (23)		16.2		
	(COLLUVIAL)								
843	Brown, black, and gray SANDSTONE FRAGMENTS (GP), little sand, few clay, medium dense to dense, moist	30	S-11	100	8-17-19 (36)		10.4		
	(COLLUVIAL) 33.0								
	Gray-brown SANDSTONE FRAGMENTS (GP), some red clay, very stiff, moist		S-12	100	5-8-12 (20)		12.7		
838		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-22

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-27-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 76-82°, Cloudy
Water Level Upon Completion: 14.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 6.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Gray-brown SANDSTONE FRAGMENTS (GP), some red clay, very stiff, moist *(continued)*								
			S-13	100	10-15-13 (28)		15.8		
833		40	S-14	100	10-16-13 (29)		12.5		
			S-15	100	12-13-13 (26)		13.9		
828	-gray-green and gray mottled clay from 45.0' to 45.7'	45	S-16	100	19-13-15 (28)		17.7		
	(COLLUVIAL)	48.0							
	Dark gray-red clayey SILT (CL/ML), trace gray-blue rock fragments (sandstone, shale), stiff, moist		S-17	100	2-4-5 (9)		24.4		
823	-trace wood at 49.0'	50							
	(ALLUVIAL)	51.0							
	Blue-gray DECOMPOSED micaceous SANDSTONE sampled as sandstone fragments, trace sand, very dense, dry	51.4	S-18	100	50/0.4'		17.6		
	(RESIDUAL)								
	Light gray fine-grained SANDSTONE, thickly laminated to very thinly bedded, very broken to massive, very hard, some siltstone laminations		R-1	82 (20)					
818	-MOHS +9.5 at 55.0'	55							
	-MOHS +9.5 at 58.0'		R-2	100 (46)					
813		60							
	-soft silty interbed from 61.4' to 62.0'		R-3	94 (78)					
808		65							
		66.4							
	Boring Terminated at 66.4 feet								
803		70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-23

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-26-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-27-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 84°, Sunny
Water Level Upon Completion: 8.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 16.2'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
852.1'	FILL sampled as brown and red-brown silty clay, few rock fragments (shale, sandstone), medium to stiff, moist		S-1	100	1-2-5 (7)		12.9		
			S-2	100	5-7-7 (14)		11.5		
847	**(FILL)** 5.0	5							
	Brown-red SAND (SC), some clay, trace gravel (claystone, shale), very stiff, moist		S-3	100	5-8-8 (16)		11.7		
	-few yellow-brown sandstone fragments from 9' to 13'								
842		10	S-4	100	6-9-12 (21)	42.89	10.2	24	14
			S-5	100	8-10-12 (22)		6.6		
837	**(COLLUVIAL)** 15.0	15							
	Brown SAND (SC), some gravel, some brown to brown-red clay, firm to medium dense, moist		S-6	100	6-6-7 (13)		11.8		
			S-7	100	6-6-7 (13)		13.0		
832		20							
			S-8	100	6-6-8 (14)	35.5	12.3		
827		25	S-9	100	4-7-7 (14)		13.1		
	-wet at 25.5'								
	(COLLUVIAL) 28.0		S-10	100	5-16-26 (42)		6.5		
	Brown DECOMPOSED shaley SANDSTONE sampled as sandstone fragments, few sand, few silt, medium dense, dry								
822	**(RESIDUAL)** 30.0	30							
	Brown DECOMPOSED SHALE sampled as shale fragments, very dense, dry 30.1		S-11	100	50/0.1'		8.0		
	(RESIDUAL)								
	Gray fine- to medium-grained SANDSTONE, micaceous, slightly weathered to fresh, thickly laminated to medium bedded, massive, hard		R-1	90 (64)					
817	-soft from 34.3' to 34.6'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-23

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-26-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-27-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 84°, Sunny
Water Level Upon Completion: 8.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 16.2'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray fine- to medium-grained SANDSTONE, micaceous, slightly weathered to fresh, thickly laminated to medium bedded, massive, hard *(continued)*								
		-MOHS >9 at 38.0'		R-2	100 (76)					
812			40							
		-MOHS >9 at 41.5'		R-3	100 (100)					
		-carbonaceous laminations from 43.0' to 45.1'								
807		45.1	45							
		Boring Terminated at 45.1 feet								
802			50							
797			55							
792			60							
787			65							
782			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-24

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-26-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-26-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 79-81°, Sunny
Water Level Upon Completion: 8.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
884'	Brown clayey SILT (ML), stiff, moist **(COLLUVIAL)** 2.0		S-1	40	2-6-6 (12)				
	Brown-gray and light gray mottled CLAY (CL), few shale fragments, very stiff, moist		S-2	80	9-9-14 (23)				
879	**(RESIDUAL)** 6.0	5							
	Brown-orange and gray mottled DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, medium dense to very dense, moist to wet -wet from 7.2' to 7.5'		S-3	100	4-14-12 (26)				
874	**(RESIDUAL)** 10.4	10	S-4	100	15-31-50/0.4'				
	Brown fine-grained SANDSTONE, thinly to thickly laminated, highly to moderately weathered, very broken to broken, very soft to medium hard -many soft zones from 10.4' to 12.8' -MOHS 6.5 at 10.8' 13.3		R-1	86 (0)					
869	Brown to green-gray SHALE, moderately weathered, thinly to thickly laminated, very broken, medium hard to hard -MOHS 4.5 at 14.6' -mostly vertically fractured from 15.4' to 20.4'	15							
			R-2	100 (8)					
864		20							
			R-3	100 (0)					
859	-vertical fracture from 24.1' to 25.4' -MOHS 4.5 at 24.7' 25.4	25							
	Boring Terminated at 25.4 feet shifted 3.5' downhill, 210° SW. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
854		30							
849		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-25

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-1-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-1-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 76-79°, Sunny
Water Level Upon Completion: 4.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
930'	TOPSOIL 0.3		S-1	33	1-1-1 (2)		23.7		
	Brown-red and gray mottled CLAY (CL), little to some sand, few to little gravel-sized rock fragments (shale, yellow sandstone, claystone), very soft to stiff, moist								
			S-2	100	4-6-3 (9)		15.7		
925		5							
	-high-plasticity clay from 6.0' to 7.0'		S-3	100	3-4-3 (7)	62.46	30.2	40	20
920		10	S-4	100	2-4-5 (9)		23.6		
	-some rock fragments from 12.0' to 13.0		S-5	100	2-2-4 (6)		17.9		
915	**(COLLUVIAL)** 15.0	15							
	Brown and gray-green ROCK FRAGMENTS (GC), some brown-red clay, loose, moist		S-6	100	3-4-5 (9)		15.0		
	(COLLUVIAL) 19.0		S-7	100	2-6-9 (15)		13.8		
910	Brown-red and gray mottled CLAY (CL), little rock fragments (sandstone, shale, claystone), few sand, stiff to very stiff, moist	20							
			S-8	100	6-8-10 (18)		14.8		
905	-wet from 24.5' to 25.0'	25	S-9	100	6-7-9 (16)		12.7		
	(COLLUVIAL) 27.0								
	Brown-gray DECOMPOSED SHALE sampled as shale fragments, few silt, very dense, dry		S-10	100	50/0.4'		11.0		
900	**(RESIDUAL)** 30.0	30							
	Light gray DECOMPOSED LIMESTONE sampled as limestone fragments, very dense, dry 30.3		S-11	100	50/0.3'				
	(RESIDUAL)								
	Brown to gray SHALE, slightly to moderately weathered, thinly to thickly laminated, very broken to broken, medium hard, few sandstone interbeds and laminations		R-1	100 (0)					
	-very broken and fractured from 30.3' to 39.6'								
895	-MOHS 3.5 at 32.0'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-25

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-1-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-1-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 76-79°, Sunny
Water Level Upon Completion: 4.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
890		Brown to gray SHALE, slightly to moderately weathered, thinly to thickly laminated, very broken to broken, medium hard, few sandstone interbeds and laminations *(continued)*	40	R-2	40 (0)					
		-MOHS 5.5 at 40.0'	40.5							
		Red-brown and gray-green mottled CLAYSTONE, moderately weathered, thinly bedded, very broken to broken, soft								
		-MOHS 2.5 at 43.0'		R-3	100 (0)					
885			45							
			45.3							
		Boring Terminated at 45.3 feet Boring caved in at 5' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
880			50							
875			55							
870			60							
865			65							
860			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-27

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-31-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-31-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 72°, Sunny
Water Level Upon Completion: 6.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 3.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
960'	TOPSOIL 0.3		S-1	80	1-1-8 (9)		5.6		
	FILL sampled as brown and gray rock fragments (sandstone, shale), few clay, loose, moist 2.0								
	(FILL)								
	Brown to gray-brown DECOMPOSED SHALE sampled as shale fragments, few silt, very dense, dry		S-2	100	9-22-29 (51)		6.0		
955		5							
	-brown-red clayey shale from 6.0' to 6.8'		S-3	100	20-28-50/0.4'		7.5		
	(RESIDUAL)		S-4	100	29-50/0.3'		4.9		
950	9.8	10							
	Brown-gray SHALE, highly to moderately weathered, thinly to thickly laminated, very broken to broken, medium hard, some vertical fractures and soft zones -MOHS 6.5 at 10.5'		R-1	100 (18)					
	13.0								
	Gray SHALE, some fine-grained sandstone laminations, thinly to thickly laminated, very broken to massive, hard								
945		15							
	-moderately weathered from 14.8' to 15.5' -MOHS 7.5 at 15.7' -moderately weathered from 16.1' to 16.4'		R-2	100 (42)					
940		20							
	-moderately weathered from 20.0' to 20.4'		R-3	100 (62)					
935		25							
			R-4	100 (82)					
	-MOHS 7.5 at 28.5'								
930		30							
	-MOHS 7.5 at 32.5'		R-5	100 (76)					
925		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-27

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-31-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-31-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 72°, Sunny
Water Level Upon Completion: 6.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 3.3'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-soft, vertical fracture from 34.8' to 35.2' Gray SHALE, some fine-grained sandstone laminations, thinly to thickly laminated, very broken to massive, hard *(continued)*		R-6	100 (48)					
920			40							
				R-7	100 (58)					
915			45							
		-high angle fracture from 47.2' to 48.5'		R-8	92 (78)					
910		-MOHS 7.5 at 49.0' 49.8	50							
		Boring Terminated at 49.8 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
905			55							
900			60							
895			65							
890			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-28

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-1-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-1-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 68-70°, Partly Sunny
Water Level Upon Completion: 3.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 7'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
907'	TOPSOIL 0.4								
	Brown SANDSTONE FRAGMENTS (GP), trace to few sand, trace to few clay, loose to firm, moist		S-1	67	4-2-3 (5)				
			S-2	100	3-2-3 (5)				
902		5							
			S-3	53	6-5-9 (14)				
	-cobble from 8.0' to 8.5'								
	(COLLUVIAL) 9.0								
897	Brown-red CLAY (CL), few rock fragments (brown-yellow sandstone, shale, claystone), very stiff, moist	10	S-4	100	10-10-16 (26)				
	(COLLUVIAL) 11.0								
	Brown and gray DECOMPOSED LIMESTONE sampled as limestone fragments, few silt, few clay, firm, moist 12.3		S-5	100	15-31-35 (66)				
	(RESIDUAL)								
892	Brown-gray DECOMPOSED SHALE sampled as shale fragments, few silt, very dense, dry	15							
	(RESIDUAL)		S-6	100	32-46-50/0.4'				
	16.4								
	Brown INTERBEDDED fine-grained SANDSTONE and SHALE, highly to moderately weathered, thinly laminated to very thinly bedded, very broken to broken, very soft to soft, (almost completely fractured, highly weathered and soft)		R-1	38 (0)					
887		20							
	-MOHS <2 at 21.6'		R-2	50 (0)					
882		25							
	26.2								
	Purple to light gray CLAYSTONE, highly to slightly weathered, thinly bedded, very broken to broken, very soft to soft highly weathered, very soft from 26.2' to 27.0'		R-3	100 (0)					
877		30							
	-MOHS 2.5 at 30.4'								
	31.4								
	Boring Terminated at 31.4 feet Boring Shifted 8' 355°N. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
872		35							

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GARVIN BOWARD BEITKO

Test Boring Record

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Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-28-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 86-89°, Partly Sunny
Water Level Upon Completion: 39.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 3.1'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
908'	TOPSOIL 0.3								
	Brown-red and gray CLAY (CL), little to some sand-sized and little gravel-sized rock fragments (shale, sandstone), medium dense, moist		S-1	40	1-7-10 (17)		9.5		
			S-2	100	20-12-11 (23)		13.9		
903		5							
			S-3	100	15-12-8 (20)	54.26	16.4		
898		10	S-4	100	7-8-12 (20)		17.4		
			S-5	100	5-7-10 (17)		16.1		
893	**(COLLUVIAL)** 15.0	15							
	Green, gray, brown, and brown-red CLAY (CL), little sand-sized and little gravel-sized rock fragments (sandstone, shale, claystone), medium dense to dense, moist		S-6	100	6-10-12 (22)		18.2		
			S-7	100	13-13-13 (26)		10.5		
888		20							
			S-8	100	5-10-11 (21)		15.7		
883		25	S-9	100	6-11-12 (23)	68.67	18.4		
			S-10	100	5-10-16 (26)		16.8		
878		30							
			S-11	100	11-12-12 (24)		20.9		
	-encountered perched water at 33.0'		S-12	100	5-9-17 (26)		16.4		
873		35							

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BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:42 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-29

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-28-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 86-89°, Partly Sunny
Water Level Upon Completion: 39.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 3.1'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Green, gray, brown, and brown-red CLAY (CL), little sand-sized and little gravel-sized rock fragments (sandstone, shale, claystone), medium dense to dense, moist *(continued)*								
			S-13	100	6-8-12 (20)		13.0		
868		40	S-14	100	5-12-15 (27)		13.5		
			S-15	100	5-9-15 (24)		17.3		
863		45	S-16	100	7-12-23 (35)		16.2		
	(COLLUVIAL)	48.0							
	Blue-gray SANDSTONE FRAGMENTS (GC), some red clay, dense, moist		S-17	100	6-14-19 (33)		12.6		
858		50							
			S-18	100	7-13-27 (40)		12.0		
	(COLLUVIAL)	54.0							
853	Light gray decomposed SHALE sampled as shale fragments, very dense, dry	54.2	S-19	100	50/0.2'				
	(RESIDUAL)	55							
	Gray SHALE, moderately weathered to fresh, thinly laminated, very broken to massive, soft to hard, few sandstone laminations -moderately weathered, soft from 54.2' to 55.0' -MOHS 6.5 at 57.7'		R-1	98 (64)					
848		60	R-2	100 (64)					
843		65	R-3	100 (40)					
	-lost water return at 67.0' -soft from 67.4' to 67.7' -MOHS 6.5 at 68.0'								
		69.2							
838	Boring Terminated at 69.2 feet	70							

Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:42 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-30

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-1-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-1-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 70-74°, Sunny
Water Level Upon Completion: 5.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 6.5'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
943.1'	TOPSOIL 0.3								
	Brown clayey SILT (ML), trace organics, very soft, moist		S-1	80	1-1-1 (2)				
	3.0								
	Brown ROCK FRAGMENTS (shale) (GP), little brown clay, loose to firm, moist		S-2	100	2-2-4 (6)				
938		5							
			S-3	100	3-4-4 (8)				
	-water around rock fragments from 9.0' to 10.5'								
933		10	S-4	100	3-4-5 (9)				
			S-5	100	2-5-7 (12)				
	(COLLUVIAL)								
928	15.0	15							
	Gray and brown ROCK FRAGMENTS (GC), little brown-red clay, medium dense, moist		S-6	100	5-7-9 (16)				
	(COLLUVIAL) 18.0								
	Brown DECOMPOSED SHALE sampled as shale fragments, very dense, dry		S-7	100	3-16-50/0.4'				
923	-MOHS 4.5 at 20.0'	20							
	(RESIDUAL) 21.4		S-8	100	50/0.4'				
	Brown to brown-gray SHALE, slightly to moderately weathered, thinly to thickly laminated, very broken to blocky, soft to hard								
	-very broken and fractured from 21.4' to 24.4'		R-1	100 (0)					
918	-many fractured zones from 24.4' to 31.0'	25							
			R-2	100 (0)					
913	-MOHS 5.5 at 30.0	30							
			R-3	100 (0)					
908	-MOHS 6.5 at 34.0'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-30

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-1-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-1-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 70-74°, Sunny
Water Level Upon Completion: 5.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 6.5'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown to brown-gray SHALE, slightly to moderately weathered, thinly to thickly laminated, very broken to blocky, soft to hard *(continued)*	36.4							
		Boring Terminated at 36.4 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
903			40							
898			45							
893			50							
888			55							
883			60							
878			65							
873			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:42 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-33

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-1-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-1-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 74 to 76 Degrees
Water Level Upon Completion: 13.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 9.6'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
960'	TOPSOIL 0.4								
	Yellow CLAY (CH), very soft, moist		S-1	27	1-1-1 (2)		23.7		
			S-2	100	2-3-3 (6)		25.6	59	22
955	**(COLLUVIAL)** 6.0	5							
	Reddish brown and grayish brown CLAY (CL), soft to stiff, moist		S-3	67	3-5-7 (12)		14.4	29	15
	(COLLUVIAL) 9.0								
950	Yellowish gray completely weathered SHALE, iron stained on remnant bedding, very stiff, moist	10	S-4	100	13-15-15 (30)		12.2		
	(POSSIBLE COLLUVIAL) 11.9								
	Reddish brown SHALE, completely weathered, very stiff, friable, moist 12.5		S-5	100	27-42-33 (75)		7.6		
	(RESIDUAL)								
945	Light yellow-gray SHALE, completely weathered, iron stained on remnant bedding, hard, friable, moist	15	S-6		25-31-38 (69)		7.4		
	(RESIDUAL) 18.0								
	Light yellow-gray weathered fine-grained SANDSTONE, very dense, moist 18.3		S-7	100	50/0.3'		3.5		
940	Light yellowish gray SILTSTONE and silty SHALE, slightly weathered, iron stained on bedding, very broken to blocky, hard	20	R-1	100 (0)					
	-MOHs 7.5 at 19'								
	-some iron concretions from 19.7' to 19.9'								
	-dark gray to yellow-gray shale, hard, slickensided, soft from 21.5' to 22.4' 22.4		R-2	100 (0)					
	Yellow-gray SILTSTONE and silty SHALE, moderately weathered, fractured and very broken, hard 24.2								
935	-MOHs 7.5 at 23.8'	25							
	Light gray and greenish silty SHALE and SILTSTONE, fresh, slightly broken to broken, very hard								
	-iron stained areas/concretions from 24.2' to 27.1'								
	-MOHs 8.5 at 27'		R-3	100 (0)					
930	-high angle open iron stained fracture from 29.9' to 30.2'	30							
			R-4	100 (52)					
925		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-33

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-1-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-1-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 74 to 76 Degrees
Water Level Upon Completion: 13.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 9.6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		35.5								
		Gray SILTSTONE, fresh, massive, very hard		R-5	100 (54)					
920			40							
		-MOHs 8.5 at 41'								
		-low angle open iron stained fractures from 41.9' to 43.0'		R-6	100 (76)					
		44.3								
915		Gray SILTSTONE with sandstone laminations, massive, very hard	45							
		-MOHs >9 at 44'								
		45.5								
		Boring Terminated at 45.5 feet Boring shifted approximately 6' downslope of original location; approximately 1' lower in elevation. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
910			50							
905			55							
900			60							
895			65							
890			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-34

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-2-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-2-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 66-72°, Partly Sunny
Water Level Upon Completion: 9.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
936'	Red-brown and brown CLAY (CL), some sand-sized and trace gravel-sized shale fragments, very soft, moist to wet		S-1	27	1-1-1 (2)		24.6		
	-wet from 0.0' to 1.5'					59.11		32	20
			S-2	27	1-1-1 (2)		25.1		
931	**(COLLUVIAL)** 6.0	5							
	Brown-red and gray-green mottled CLAY (CL), some sand-sized and few gravel-sized rock fragments (sandstone, shale, claystone), loose to firm, moist to wet		S-3	67	1-3-8 (11)		18.8		
	-wet at 6.5' to 7.5'					53.8		26	13
926	-some rock fragments from 9.0' to 10.0'	10	S-4	80	3-3-7 (10)		16.0		
	(COLLUVIAL) 12.0								
	Yellow-brown, gray and black ROCK FRAGMENTS (yellow sandstone, shale, carbonaceous shale) (GP), trace to few brown-red clay, firm to very dense, moist		S-5	80	5-5-6 (11)		12.0		
921		15							
			S-6	100	5-7-6 (13)		11.9		
			S-7	80	3-6-7 (13)		14.9		
916		20							
			S-8	100	9-10-11 (21)		12.1		
911	-sandstone cobbles 24.5' to 27.5'	25	S-9	100	9-47-21 (68)		7.2		
			S-10	53	49-11-11 (22)		11.2		
906		30							
	-wood fragments from 31.3' to 31.5'		S-11	100	8-9-7 (16)		11.8		
	-wood fragments from 33.0' to 33.5'								
	-perched water at 33'		S-12	100	3-6-9 (15)		14.4		
901		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-34

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-2-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-2-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 66-72°, Partly Sunny
Water Level Upon Completion: 9.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Yellow-brown, gray and black ROCK FRAGMENTS (yellow sandstone, shale, carbonaceous shale) (GP), trace to few brown-red clay, firm to very dense, moist *(continued)*								
	(COLLUVIAL) 37.0		S-13	100	6-9-34 (43)		12.8		
	Purple and green-gray mottled DECOMPOSED CLAYSTONE; sampled as claystone fragments, very denes, dry								
	(RESIDUAL) 39.0								
896	39.2 Light gray calcareous DECOMPOSED SHALE; sampled as shale fragments, trace silt, very dense, dry	40	S-14	100	50/0.2'				
	(RESIDUAL)								
	Gray interbedded fine-grained SANDSTONE and SHALE, thickly laminated to very thinly bedded, slightly weathered, very broken to blocky, hard		R-1	100 (20)					
	-MOHS 6.5 at 40.0'								
891		45	R-2	100 (44)					
	-MOHS 6.5 at 48.7'								
886		50							
	50.5 Pink and gray mottled CLAYSTONE, slightly weathered, thinly bedded, very broken to broken, soft		R-3	100 (12)					
	-MOHS <2 at 53.5 54.2								
881	Boring Terminated at 54.2 feet	55							
	Moved boring 9' 105°E. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
	Boring collapsed at 7' after 24 Hours								
876		60							
871		65							
866		70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-35

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-2-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-3-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 81-85°, Partly Sunny
Water Level Upon Completion: 5.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 9'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
944'	Brown clayey SILT (CL/ML), few rock fragments (claystone, sandstone), soft, moist		S-1	100	1-1-2 (3)				
	(COLLUVIAL) 3.0								
	Brown and gray ROCK FRAGMENTS (GP), little brown sand, trace clay, very stiff, moist		S-2	100	7-10-11 (21)				
939		5							
			S-3	100	10-11-12 (23)				
	(COLLUVIAL) 9.0								
934	Brown and gray mottled clayey SAND (SC), few rock fragments (sandstone, shale), loose to medium dense, moist	10	S-4	100	8-6-9 (15)				
			S-5	100	1-3-5 (8)				
929	**(COLLUVIAL)** 15.0	15							
	Brown and gray ROCK FRAGMENTS (sandstone, shale) (GP), little sand, few clay, firm to medium dense, moist		S-6	100	8-6-8 (14)				
	-micaceous sandstone boulders from 17.0' to 19.5'		S-7	100	22-10-10 (20)				
924	**(COLLUVIAL)** 21.0	20							
	Brown and dark gray-green faintly mottled CLAY (CL), few rock fragments (yellow-brown sandstone, gray shale), stiff, moist		S-8	100	6-6-6 (12)				
	(COLLUVIAL) 24.0								
919	Gray, green, and brown ROCK FRAGMENTS (gray-green sandstone, shale, claystone) (GC), little to some brown-red clay, medium dense, moist	25	S-9	100	9-10-9 (19)				
	-some clay from 27.0' to 28.5'		S-10	100	5-8-11 (19)				
914	**(COLLUVIAL)** 30.0	30							
	Brown DECOMPOSED SHALE; sampled as shale fragments, trace silt, very dense, dry 30.9		S-11	100	16-50/0.4'				
	(RESIDUAL)								
	Brown to gray interbedded fine-grained SANDSTONE and SHALE, thinly to thickly laminated, very broken, soft to hard -MOHS 2.5 at 32.3'		R-1	80 (0)					
909		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-35

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-2-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-3-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 81-85°, Partly Sunny
Water Level Upon Completion: 5.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 9'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown to gray interbedded fine-grained SANDSTONE and SHALE, thinly to thickly laminated, very broken, soft to hard *(continued)*								
904			40	R-2	100 (62)					
		-many vertical fractures from 30.9' to 34.4' -MOHS 7.5 at 40.0'								
		43.0								
		Light gray CLAYSTONE, slightly weathered, thinly bedded, very broken to broken, soft		R-3	80 (0)					
899			45							
		-MOHS <2 at 45.0'								
		45.9								
		Boring Terminated at 45.9 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
894			50							
889			55							
884			60							
879			65							
874			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-36

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-26-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-26-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 70-74°, Sunny
Water Level Upon Completion: 24.4'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 6.6'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
940'	Tan clayey SILT (CL/ML), trace rock fragments (red and brown sandstone and shale), soft, moist		S-1	67	1-1-3 (4)		14.7		
	(COLLUVIAL) 3.0								
	Brown ROCK FRAGMENTS (sandstone, shale) (GP), few sand, few silt, medium dense, dry		S-2	100	9-9-18 (27)		5.9		
935		5							
	(COLLUVIAL) 6.0								
	Brown DECOMPOSED SHALE sampled as shale fragments, few silt, very dense, dry		S-3	100	16-13-38 (51)		6.0		
	(RESIDUAL) 9.4		S-4	100	50/0.4'		4.9		
930	Brown to gray SHALE, highly to moderately weathered, thinly to thickly laminated, very broken to broken, very soft to medium hard	10							
	-very soft, almost completely weathered from 9.4' to 15.4'		R-1	100 (0)					
925		15							
			R-2	98 (0)					
	-MOHS 4.5 at 18.7'								
920	-MOHS 3.5 at 20.0'	20							
			R-3	60 (0)					
	24.4								
915	Boring Terminated at 24.4 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	25							
910		30							
905		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-37

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-2-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-2-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 66 to 72 Degrees
Water Level Upon Completion: 27.1'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 20.4'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
993'	Reddish brown silty CLAY (CL/ML), few sandstone gravel, medium, moist		S-1	67	1-2-3 (5)		24.1		
	(POSSIBLE COLLUVIAL) 3.0								
	Yellow-brown SAND (SC), some clay, trace gravel (shale fragments), medium dense, moist		S-2	100	8-8-7 (15)		12.0		
988		5				43.41		40	23
			S-3	67	9-8-9 (17)		9.8		
	(POSSIBLE COLLUVIAL) 9.0								
983	Yellowish brown DECOMPOSED SHALE, iron stained on relic bedding, hard, dry	10	S-4	100	12-22-26 (48)		8.0		
	-moist at 9.1'								
			S-5	87	25-22-21 (43)		9.0		
	-coarse gravel-sized shale fragments at, 13.1' -short iron stained fracture and slickensided at ~13.1'-13.2'								
978		15							
	-high angle iron stained fractures from 15.0' to 16.5'		S-6	100	20-29-39 (68)		9.2		
			S-7	100	23-27-37 (64)				
973	-highly weathered iron concretion, moist at 18.5'	20							
	-trace of iron stained high angle fractures, moist from 21.0' to 22.5'		S-8	100	24-28-24 (52)				
	(RESIDUAL) 24.0								
968	Reddish brown and light yellowish brown mottled completely weathered CLAYSTONE, slickensides, hard	25	S-9	100	14-19-29 (48)				
	(RESIDUAL) 27.0								
	Reddish brown completely weathered CLAYSTONE, gray mottles, slickensides, hard, moist 27.9		S-10	100	35-50/0.4'				
	(RESIDUAL)		R-1	48 (0)					
963	Reddish brown CLAYSTONE, highly weathered, slickensides, massive, very soft	30							
	-yellowish gray claystone from 28.4' to 28.7' -MOHs <2 at 30.5' -yellow gray claystone from 31.1' to 31.4' 31.6		R-2	100 (0)					
	Grayish-green to yellow gray SILTSTONE, highly weathered, broken to very broken, hard to medium hard -open high angle iron stained fracture from 33.1' to 33.8' -MOHs 6.5 at 32'								
958		35							

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BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-37

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-2-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-2-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 66 to 72 Degrees
Water Level Upon Completion: 27.1'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 20.4'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	-open 45° angle iron stained fracture from 34.6' to 34.8'								
	Grayish-green to yellow gray SILTSTONE, highly weathered, broken to very broken, hard to medium hard *(continued)*	36.6							
	-soft with high angle iron stained fracture from 36.2' to 36.6'	37.5	R-3	100 (32)					
	Reddish brown CLAYSTONE, highly weathered, very soft								
953	Reddish brown and grayish SHALE, moderately weathered, slickensides, massive, medium hard	40							
	-MOHs 8.5 at 40'								
		41.3							
	Light grayish green LIMESTONE, brecciated, massive, hard	41.7	R-4	97 (73)					
	-MOHs >9 at 41.5'								
	Light grayish-green silty SHALE, slickensided, massive, medium hard	43.0							
948	-arcuate, open iron stained fracture from 42.3' to 42.7'	45							
	-MOHs 7.5 at 42.9'								
	Boring Terminated at 43.0 feet								
	Boring shifted 4' down road (east), 0.5' in elevation. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
943		50							
938		55							
933		60							
928		65							
923		70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-38

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-1-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-1-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 70 to 73'
Water Level Upon Completion: 18.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 5.7'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
985'	Yellow-brown CLAY with SAND (SC), soft, moist		S-1	67	0-1-2 (3)		18.2		
	(COLLUVIAL) 3.0								
	Dark yellow brown silty CLAY (CL/ML), stiff, wet		S-2	40	4-6-7 (13)		20.0		
980	**(COLLUVIAL)** 6.0	5							
	Dark yellow brown CLAY with GRAVEL (GC), highly weathered sandstone gravel, wet around sandstone gravel, stiff to very stiff, moist		S-3	80	7-6-9 (15)		15.3		
	-heavy dark iron staining from 9.0' to 10.5'		S-4	100	8-9-12 (21)		15.1		
975	**(COLLUVIAL)** 12.0	10							
	Reddish brown silty CLAY (CL/ML), trace fine-grained sandstone gravel, very stiff, moist 13.1		S-5	100	7-9-11 (20)		18.5		
	(COLLUVIAL)								
	Reddish brown silty CLAY (CL/ML), light gray reduction zones around blackened tree roots, some bright yellow clay films, stiff, moist		S-6	100	7-10-13 (23)		16.6		
970	15.9 **(COLLUVIAL)**	15							
	Light yellow gray SHALE, completely weathered, very stiff, moist **(RESIDUAL)** 18.0								
	Yellowish gray and red mottled SHALE, completely weathered, little bright yellow clay film, very stiff, moist		S-7	100	9-11-12 (23)		20.2		
965	**(RESIDUAL)** 21.0	20							
	Pale yellow brown silty CLAY (CL/ML), few reddish brown and light gray mottles, very stiff, moist		S-8	100	8-11-13 (24)		20.4		
	(RESIDUAL) 24.0								
	Reddish brown silty CLAY (CL/ML), hard, moist 24.3		S-9	100	16-48-50/0.3'		5.4		
960	**(RESIDUAL)** 25.3	25							
	Light gray SHALE, completely weathered, fiable, hard, moist 25.6								
	Reddish brown and light gray CLAYSTONE, very soft 26.1								
	Light gray CLAYSTONE, few red mottles, very soft		R-1	96 (32)					
	Light gray-green SILTSTONE, slightly weathered, very broken to moderately broken, medium hard 28.3								
	-soft from 26.7' to 27.1'								
955	-MOHs 5.5 at 27.3' 30.5	30							
	Reddish brown CLAYSTONE, few gray green mottles, very broken, soft								
	-MOHs <2 at 29.4' 31.7								
	Light greenish gray SILTSTONE, slickensided, very broken to moderately broken, medium hard		R-2	96 (24)					
	-MOHs 6.5 at 31'								
950	-soft red shale layer from 31.1' to 31.4'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-38

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-1-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-1-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 70 to 73'
Water Level Upon Completion: 18.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 5.7'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-MOHs 2.5 at 34'	35.3							
		Light gray green and reddish brown mottled CLAYSTONE, slickensided, some limestone nodules, broken to massive, medium hard to soft *(continued)*	36.7	R-3	96 (34)					
		Gray SILTSTONE, slickensides, few red mottles, broken, medium hard	38.6							
		-MOHs 7.5 at 36.2'								
945		Reddish brown and greenish gary mottled CLAYSTONE, slickensides, very broken, soft to medium hard	40.3							
		-MOHs 4.5 at 37.5								
		-light gray-green LIMESTONE, brecciated, massive, hard								
		Grayish green SILTSTONE, massive, hard								
		-MOHs 6.5 at 40'								
		Boring Terminated at 40.3 feet								
		Boring shifted 5' downslope. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
940										
935										
930										
925										
920										
915										

40 45 50 55 60 65 70

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GARVIN BOWARD BEITKO

Test Boring Record

B-39

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-31-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-31-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 65 Degrees
Water Level Upon Completion: 19.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1004.2'	TOPSOIL 0.2								
	Red-brown and gray CLAY (CL), some gravel, stiff, moist		S-1	67	2-5-4 (9)		21.7		
	(COLLUVIAL) 3.0								
	Red-brown CLAY (CL), trace sand, homogeneous color and texture, very stiff to extremely stiff, moist		S-2	100	8-13-17 (30)		13.2		
999		5				96.76		39	18
			S-3	87	13-16-15 (31)		10.7		
	(COLLUVIAL) 9.0								
994	Light yellow brown DECOMPOSED SHALE, iron stained on remnant bed, friable, faint slickenside, moist 9.9	10	S-4	100	36-50/0.4'		7.0		
	(RESIDUAL)								
	Yellowish gray SHALE, moderately to highly weathered, large slickenside, iron stained, soft to very soft -iron stained fracture, very broken, core loss from 9.9' to 10.6' -core loss from 11.1' to 15.2' -MOHs <2 at 12'		R-1	76 (0)					
989		15							
	-core loss, very broken, iron stained from 17.4' to 18.0'		R-2	100 (0)					
984	-core loss, very broken, iron stained from 19.0' to 19.9'	20							
	-MOHs 2.5 at 20.2'		R-3	90 (0)					
	-core loss, very broken, iron stained from 20.5' to 23.7'								
979	24.9	25							
	Boring Terminated at 24.9 feet Boring collapsed at 8' after 24 Hours								
974		30							
969		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-40

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-31-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-31-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 72 Degrees
Water Level Upon Completion: 11.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 9.6'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
993'	Light yellow-brown SAND (SC), some clay, trace gravel, very loose to medium dense, moist		S-1	40	1-1-2 (3)		12.6		
						49.95		28	16
			S-2	87	8-7-9 (16)		16.8		
988		5							
	(POSSIBLE COLLUVIAL)	6.0							
	Red-brown, orange-brown, and gray SAND (SC), some clay, litle gravel, firm to medium dense, moist		S-3	100	8-11-13 (24)		13.5		
	-Sample S-3 slickensided								
983		10	S-4	100	10-10-8 (18)		12.9		
	-Sample S-4 fine, flat, angular gravel								
	-Sample S-5 wet zones throughout. Visible water and iron stained around gravel		S-5	100	6-8-6 (14)	43.92	13.5	37	19
978		15							
	Sample S-6 visible water around highly weathered shale gravel, redclay films on gew gravel surfaces		S-6	100	11-11-12 (23)		10.8		
	(POSSIBLE COLLUVIAL)	18.0							
	Brown-gray completely weathered SHALE, iron stained on remnant bedding, few red clay films, very dense, moist to wet (possible base of colluvium)	18.9	S-7	100	39-50/0.4'		11.5		
973	**(RESIDUAL)**	20	R-1	55 (0)					
	-spoon wet in sample S-7								
	Gray SHALE, iron stained on bedding, very broken and fractured, hard	21.7							
	-iron stained from 18.9' to 21.7'		R-2	78 (0)					
	-MOHs 7.5 at 21.5'	22.9							
	Yellowish gray SHALE, completely weathered, very soft	24.6							
968	-faint high angle iron stained fissures from 22.8' to 23.3'	25.0 25							
	Red and gray mottled CLAYSTONE, slickensided, few coaly plant roots, very soft								
	-MOHs <2 at 24'								
	Light brownish yellow SHALE, very soft		R-3	100 (0)					
	Reddish brown CLAYSTONE, few green-gray mottles with yellow clay films, slickensided, very broken to moderately broken, soft								
963	-MOHs <2 at 27'	30.0 30							
	Reddish brown CLAYSTONE, few green-gray mottles, slickensided, very soft								
	-MOHs 2.5 at 31'		R-4	100 (0)					
		34.0							
958	Boring Terminated at 34.0 feet	35							

~~Boring shifted approximately 8' east. Ground surface estimated~~ based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.

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GARVIN BOWARD BEITKO

Test Boring Record

B-47

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-28-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly sunny, 80 to 84 Degrees
Water Level Upon Completion: 16.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1028'	Slag	0.5	S-1	100	6-1-3 (4)		21.9		
	(FILL)								
	Light gray silty CLAY (CL/ML), faint orange mottles, soft to medium, moist								
			S-2	0	2-3-3 (6)				
1023		5							
	(COLLUVIAL)	6.0							
	Dark gray-green SAND (SM), some silt, trace gravel (sandstone), loose, wet		S-3	87	2-4-4 (8)	42.31	25.7	21	18
	(COLLUVIAL)	9.0							
1018	Yellow-brown CLAY (CL), few to little sand, trace gravel, iron stained on bedding planes, stiff to very stiff, moist	10	S-4	87	3-6-8 (14)		14.5		
	-vertical light gray clay-filled fissure from 9.0' to 9.5'								
	-few red mottles from 10.0' to 10.5'								
			S-5	100	3-9-9 (18)	88.21	16.3	39	21
	-red-brown with faint gray fine mottles and slickensided from 13' to 18'								
1013		15							
			S-6	100	2-6-8 (14)		14.7		
	(COLLUVIAL)	18.0							
	Red-brown silty CLAY (CL/ML), faint light gray mottles, slickensided, hard, moist		S-7	100	9-17-23 (40)		15.0		
1008		20							
			S-8	100	14-18-24 (42)		13.2		
	(RESIDUAL)	24.0							
1003	Reddish brown/light gray-green CLAYSTONE, slightly weathered, hard, moist	25	S-9	100	11-23-29 (52)		13.1		
			S-10	100	12-24-26 (50)		12.1		
998		30							
	(RESIDUAL)	30.5							
	Light gray-brown highly weathered SHALE, some red-brown mottles, hard, moist		S-11	100	22-17-30 (47)		12.3		
	(RESIDUAL)	33.8	S-12	100	38-50/0.3'		8.1		
	Red-brown SHALE, slickensided, soft	34.6	R-1	100 (0)					
993		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-47

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-28-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly sunny, 80 to 84 Degrees
Water Level Upon Completion: 16.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Red-brown CLAYSTONE, slickensided, very soft *(continued)* 35.7								
	Light yellow-brown CLAYSTONE, slickensides, very soft to soft -MOHs <2 at 36.5'		R-2	100 (0)					
	37.5								
	Light gray and green SHALE, slickensided, soft 38.1								
	Gray-green LIMESTONE, very hard 38.3 -MOHs 8.5 at 38.2'								
988	Yellowish-gray CLAYSHALE, moderately weathered, soft, slickensides 40.2 -MOHs 3.5 at 39'	40	R-3	90 (0)					
	Light gray SHALE, fresh to moderately weathered, slickensided, soft -soft and very broken from 40.6' to 41.1' -yellowish-gray from 41.4' to 41.7' 43.6 -MOHs 7.5 at 42.2' -yellowish-gray from 42.6' to 43.2' -high angle, open, iron stained fracture from 43.2' to 43.5'								
983		45							
	Light gray SHALE, fresh, slickensided, very broken to moderately broken, medium hard -yellow-gray from 44.2' to 44.5' -iron stained from 44.9' to 45.4' -MOHs 7.5 at 48.8'		R-4	100 (0)					
	49.2								
978	Boring Terminated at 49.2 feet Boring shifted 7' north towards driveway. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	50							
973		55							
968		60							
963		65							
958		70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-54

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-25-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 68 Degrees
Water Level Upon Completion: 10.4'
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1065'		Brown SAND (SM), some silt, trace sandstone fragments, loose, dry		S-1	73	2-2-5 (7)				
		(RESIDUAL) 3.0								
1060		Brown and gray DECOMPOSED micaceous SANDSTONE sampled as sandstone fragments, few sand, firm to very dense, dry	5	S-2	100	10-7-8 (15)				
				S-3	100	7-5-9 (14)				
1055		-some silty and calcareous inclusions from 9.0' to 10.4' **(RESIDUAL)** 10.4	10	S-4	100	30-39-50/0.4'				
		Boring Terminated at 10.4 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1050			15							
1045			20							
1040			25							
1035			30							
1030			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-55

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 85 Degrees
Water Level Upon Completion: 25.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1075.5'	FILL sampled as brown silt, little to some sand, few gravel (sandstone, shale), stiff to very stiff, dry		S-1	60	1-3-5 (8)	63.99	18.1		
			S-2	100	10-10-11 (21)		11.8		
1071	**(FILL)**	5							
		6.0							
	FILL sampled as dark brown sand, little rock fragments (brown and gray sandstone), very dense, dry	6.7	S-3	100	31-50/0.2'		3.1		
	(FILL)								
	Light gray to brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry								
1066	**(RESIDUAL)**	9.8	S-4	100	47-50/0.3'		8.0		
	Brown to brown-gray medium-grained SANDSTONE, micaceous, moderately weathered, thickly laminated to thinly bedded, very broken to massive, soft to medium hard	10							
	-MOHs 4.5 at 11.0'		R-1	64 (0)					
	-many vertical fractures from 9.8' to 17.2'								
1061	-lost drill water at 12.5'	15							
			R-2	74 (22)					
1056	-MOHs 5.5 at 19.0'	20							
	-vuggy from 19.0' to 20.2'								
			R-3	80 (34)					
	-some vertical fractures with heavy water staining from 22.0' to 24.4'								
1051		25							
		26.0	R-4	100 (58)					
	Boring Terminated at 26.0 feet Boring collapsed at 22.7' after 24 Hours								
1046		30							
1041		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-56

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-25-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly cloudy, 70 to 74 Degrees
Water Level Upon Completion: 28.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 21.4'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1076.8'	GRAVEL (subbase) 0.4		S-1	47	2-4-6 (10)		9.3		
	Dark brown sandy SILT (SM), trace organics, very loose, moist **(TOPSOIL)** 0.7								
	Brown SANDSTONE FRAGMENTS (GP), few sand, very loose, dry **(RESIDUAL)** 1.2		S-2	100	10-10-22 (32)		7.7		
1072	Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, firm to very dense, dry **(RESIDUAL)** 6.4	5							
	Brown fine to medium-grained SANDSTONE, highly to moderately weathered, thickly laminated to very thinly bedded, very broken to moderately broken, very soft to hard		S-3	100	50/0.4'		5.3		
	-many very soft zones from 6.4' to 19.0'		R-1	50 (0)					
	-very broken and vertically fractured from 8.0' to 19.0'								
1067		10	R-2	36 (0)					
	-lost water return from 10.0' to 13.5'								
	-MOHs 5.5 at 11.0'								
1062		15	R-3	22 (0)					
	-lost water at 17.0'								
1057	-hard from 19.0' to 29.0'	20	R-4	88 (0)					
	-MOHs 6.5 at 21.3'								
1052	-MOHs 7.5 at 23.5'	25	R-5	94 (0)					
	-some vertical fractures from 23.7' to 28.0'								
	29.0		R-6	95 (0)					
1047	Boring Terminated at 29.0 feet	30							
1042		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-57

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-27-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 76 to 78 Degrees
Water Level Upon Completion: 21.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 21.9'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1058'	TOPSOIL	0.3							
	Orange-brown silty CLAY (CL/ML), some sand and gravel, soft to medium, moist		S-1	47	1-1-3 (4)		8.8		
			S-2	100	4-4-3 (7)		5.3		
1053	**(COLLUVIAL)**	5							
	Coarse iron stained GRAVEL (GP-GM), some sand, few to little silt, firm to medium dense, moist	6.0	S-3	100	6-8-6 (14)	10.84	5.9		
1048		10	S-4	100	22-10-10 (20)		4.9		
	(COLLUVIAL)	12.0							
	Light gray fine-grained sandstone GRAVEL (GP), few fines, medium dense, moist, relic bedding and fractures		S-5	100	8-7-12 (19)		5.2		
1043	**(COLLUVIAL)**	15.0	15						
	Tan to light gray silty CLAY (CL/ML), orange mottles on remnant bedding planes, thin sandstone layers, very stiff, moist		S-6	100	7-11-11 (22)		9.5		
	(POSSIBLE COLLUVIAL)	18.0							
	Light gray-brown completely weathered SHALE, iron stained on remnant bedding planes, hard, moist	18.9	S-7	100	28-50/0.4'		6.8		
1038	**(RESIDUAL)** -lost water return at 18.9'	20	R-1	45 (0)					
	Gray-brown SILTSTONE, very broken, medium hard -MOHs 5.5 at 20'	20.8							
	Gray SHALE, fractured, iron stained, very soft -MOHs <2 at 23' -iron stained and very broken from 24.1' to 25.0'		R-2	100 (0)					
1033		25.0	25						
	Light gray-green CLAYSTONE, iron stained, slightly weathered, slickensides, very soft	26.0							
	Light gray-green to dark gray SHALE, slightly weathered, soft -MOHs <2 at 26.5'	26.8							
	Dark gray CLAYSTONE, slightly weathered, slickensides, very soft, ~0.1' of coal at top	27.1	R-3	100 (0)					
1028	Light gray-green CLAYSTONE, slightly weathered, few red mottles, slickensides, very soft -iron stained fractures from 19.5' to 20.5' -MOHs <2 at 30'	30							
			R-4	79 (0)					
		33.9							
1023	Boring Terminated at 33.9 feet	35							

Boring shifted within 5' of stake, 1.5' lower in elevation. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.

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GARVIN BOWARD BEITKO

Test Boring Record

B-58

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-28-23
Water Level During Drilling:
Drilled By: J. Powell/C. Crum (Test Boring Services, Inc.)
Completion Date: 7-28-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 82 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 1.8'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1027'	Yellow-brown silty CLAY (CL/ML), some gravel, moist **(COLLUVIAL)** 0.3		S-1	100	1-2-4 (6)		20.0		
	Tan and reddish brown silty CLAY (CL/ML), medium, moist **(COLLUVIAL)** 3.0								
	Light gray and pale yellow CLAY (CL), few red mottles, trace sand, stiff to hard, moist		S-2	100	4-5-5 (10)		27.6		
1022		5				98.39		47	24
			S-3	100	5-6-11 (17)		21.5		
	(COLLUVIAL) 9.0								
1017	Light gray and pale yellow CLAY (CL), few red mottles, little sand, trace gravel, hard, moist	10	S-4	100	7-21-24 (45)		10.6		
						77.33		37	21
	-Sample S-5 fine gray and green mottles		S-5	87	15-14-21 (35)		16.1		
1012	**(RESIDUAL)** 15.0	15							
	Reddish brown silty CLAY (CL/ML), fine gray-green mottles, hard, moist 16.4		S-6	100	23-41-50/0.4'		11.3		
	(RESIDUAL)								
	Reddish gray CLAYSTONE, fresh, slickensided, few gray/green mottles, very soft		R-1	84 (0)					
1007	-MOHs <2 at 19.5'	20							
	22.1								
	Reddish brown SHALE, slickensides, very soft		R-2	100 (0)					
1002	-light gray claystone, slickesided, very soft from 25.1' to 26.4'	25							
	-MOHs <2 at 26'								
	27.1								
	Red-brown CLAYSTONE, slickensided, very soft		R-3	100 (0)					
	-light gray claystone, slickesided, very soft from 29.9' to 30.3'								
997	-light gray claystone, slickesided, very soft from 30.7' to 31.1'	30							
	-MOHs <2 at 29.8'								
	31.4								
	Boring Terminated at 31.4 feet Boring shifted 7' upslope, ~1' higher in elevation. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
992		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-59

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 83 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1069.7'		Gray and brown SANDSTONE FRAGMENTS (GP), few sand, few silt, loose, dry		S-1	67	1-3-5 (8)				
		(COLLUVIAL) 3.0								
		Brown DECOMPOSED micaceous SANDSTONE sampled as sandstone fragments, few sand, medium to very dense, dry		S-2	100	11-13-16 (29)				
1065			5	S-3	100	12-15-29 (44)				
1060			10	S-4	100	42-41-33 (74)				
		(RESIDUAL) 12.3								
		Boring Terminated at 12.3 feet Boring collapsed at 10.3' after 24 Hours		S-5	100	50/0.3'				
1055			15							
1050			20							
1045			25							
1040			30							
1035			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-60

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-25-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Mostly sunny, 78 Degrees
Water Level Upon Completion: 34.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 15.2'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1081.9'	TOPSOIL 0.4		S-1	53	2-4-7 (11)		11.7		
	FILL sampled as brown and gray rock fragments (sandstone, shale), few sand, few silt, loose to medium dense, moist **(FILL)** 3.0								
1077	Brown micaceous SAND (SM), some gravel (sandstone fragments), little silt, medium dense, dry	5	S-2	100	19-10-16 (26)		5.6		
			S-3	100	16-13-11 (24)	16.94	7.5		
1072		10	S-4	67	17-10-11 (21)		7.8		
	(RESIDUAL) 12.0								
	Brown-orange medium to coarse-grained DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry		S-5	100	50/0.2'		7.4		
1067	**(RESIDUAL)** 15.3	15	S-6	100	50/0.3'		6.4		
	Brown and light gray fine to medium-grained micaceous SANDSTONE, moderately weathered, thickly laminated to thinly bedded, very broken to massive, very soft to medium hard -MOHs 5.5 at 17.0' -few soft and vertically fractured zones from 18.0' to 20.7'		R-1	96 (14)					
1062		20							
	-some slightly weathered and massive zones from 22.0' to 25.0'		R-2	94 (50)					
1057		25							
	-MOHs 7.5 at 24.8' -very soft, completely weathered from 25.3' to 27.3'		R-3	76 (8)					
1052		30							
	31.5								
	Brown and gray INTERBEDDED fine-grained micaceous SANDSTONE and SHALE, completely weathered to slightly weathered, thickly laminated, very broken and fractured to moderately broken, very soft to medium hard -MOHs <2 at 32.0'		R-4	100 (0)					
1047		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-60

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-25-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Mostly sunny, 78 Degrees
Water Level Upon Completion: 34.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 15.2'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-completely weathered, very soft from 32.4' to 34.3' -MOHs 5.5 at 35.0'	35.3							
		Boring Terminated at 35.3 feet								
1042			40							
1037			45							
1032			50							
1027			55							
1022			60							
1017			65							
1012			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-61

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-25-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-26-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Mostly sunny, 79 Degrees
Water Level Upon Completion: 37.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G./J. Hawk, P.G.
Water Level After 24 Hours: 34.9'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1087'	TOPSOIL 0.5		S-1	53	1-5-9 (14)		8.6		
	Brown SANDSTONE FRAGMENTS (GP), few sand, firm, dry **(RESIDUAL)** 2.0								
	Brown and light gray SAND (SM) sampled as sand, few to little gravel (decomposed sandstone), little silt, medium dense to very dense, dry		S-2	100	32-44-18 (62)		8.8		
1082		5							
			S-3	100	13-13-10 (23)	19.25	10.1		
1077		10	S-4	100	7-9-36 (45)		8.0		
	(RESIDUAL) 12.0								
	Brown-orange medium to coarse-grained DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, medium dense to dense, moist		S-5	80	19-22-16 (38)		0.7		
	-some carbonaceous inclusions from 12.0' to 13.5'								
1072	**(RESIDUAL)** 15.5	15							
	Brown-gray DECOMPOSED clayey SHALE sampled as shale fragments, few silt, few clay, dense, dry		S-6	100	18-22-21 (43)		12.1		
	(RESIDUAL) 18.0								
	Brown-gray DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry 18.2		S-7	100	50/0.2'				
1067	**(RESIDUAL)** 19.9	20	R-1	95 (60)					
	Orange-brown medium- to fine-grained SANDSTONE, moderately weathered, iron stained, broken to massive, hard 21.1								
	-lost water return at start of coring -iron stained open fractures from 18.4' to 18.9' -MOHs 8.5 at 19'		R-2	94 (70)					
	Light gray fine-grained SANDSTONE, fresh, micaceous, massive, hard								
1062	-MOHs 8.5 at 20.3' -iron stained on bedding at 20.5'	25							
	Light brown and gray fine- to medium-grained SANDSTONE, moderately weathered, micaceous, massive, hard		R-3	98 (88)					
	-iron concretion at 23.1' -iron stained on bedding at 24.0' -high angle, iron stained open fracture from 26.3' to 27.0'								
1057	-MOHs 8.5 at 29'	30							
	-low angle, iron stained open fracture at 30.2' 30.7		R-4	72 (16)					
	Brown coarse-grained SANDSTONE with coal laminations, moderately to highly weathered, iron stained, parallel vertical fracture, very soft								
	-gray shale, very soft from 31.1' to 31.4' -very soft before parallel, vertical, op, iron-stained fractures from 31.6' to 34.4' (core loss)								
1052		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-61

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-25-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-26-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Mostly sunny, 79 Degrees
Water Level Upon Completion: 37.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G./J. Hawk, P.G.
Water Level After 24 Hours: 34.9'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-MOHs 7.5 at 35'	35.2							
		Light gray SANDSTONE, iron stained on bedding, very broken, hard	36.1	R-5	96 (0)					
		-MOHs 8.5 at 35.4'								
		-soft shale band at 35.6'								
		-core loss, very broken from 35.8' to 40.1'								
		-approx. 45° iron stained open fracture from 35.8' to 40.1'	38.0							
1047		Brown-gray fine- to medium-grained SANDSTONE, micaceous, moderately weathered, very broken, hard	40							
		-fractured, iron stained, very broken from 37.1' to 37.3'								
		-yellow completely weathered shale, very soft, little coal, vertical, open, iron-stained fracture from 37.6' to 38'								
		-MOHS 7.5 at 37.4'								
		-vertical iron stained open fracture from 37.6' to 38.0'								
1042		Boring Terminated at 38.0 feet	45							
1037			50							
1032			55							
1027			60							
1022			65							
1017			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-62

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-27-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-27-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly sunny, 80 to 82 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1078'	Light yellow-brown silty CLAY (CL/ML), moist **(RESIDUAL)**	0.5	S-1	67	5-8-10 (18)		6.2		
	Light yellow-brown clayey GRAVEL (GC), some sand, medium dense, moist **(RESIDUAL)**	3.0							
1073	Light yellow-brown GRAVEL (GP-GM), some sand, few to little silt, firm to medium dense, moist	5	S-2	80	5-7-6 (13)	10.64	4.4		
			s-3	100	8-9-6 (15)		5.6		
	(RESIDUAL)	9.0							
1068	Light yellow-gray highly weathered SANDSTONE, medium-grained, moist **(RESIDUAL)**	9.4	S-4	100	50/0.4'				
		10	R-1	100 (0)					
	Gray and brown medium-grained SANDSTONE, weathered, micaceous, iron stained, very broken to broken, medium hard -open high angle iron stained fracture from 11.4' to 11.9' -MOHs 5.5 at 11' -open high angle fracture from 12.9' to 13.2'		R-2	94 (0)					
1063	-open, high angle fracture from 14.2' to 15.0' (core loss)	15.0 15							
	Light gray and green medium-grained SANDSTONE, micaceous, broken to blocky, medium hard to hard -MOHs 6.5 at 17'		R-3	84 (0)					
1058	-iron stained from 19.6' to 20.5' -open, 45-degree angle, iron stained fracture at 19.8' -open high angle iron stained fracture at 19.8' to 20.7'	20							
	-open, iron-stained fracture from 22.4' to 24.6 (core loss)		R-4	70 (8)					
1053	-MOHs 6.5 at 22'	25.0 25							
	Light gray and orange-brown SANDSTONE with coal laminations, highly to completely weathered, micaceous, iron stained, very broken, soft to very soft -coal band at 25.2' and 25.5'	26.6	R-5	82 (0)					
1048	Brownish gray and yellow-brown INTERBEDDED SANDSTONE and SHALE, moderately to completely weathered, some iron staining, some coal and carbonaceous laminations, very broken to moderately broken, very soft to hard -coal from 27.8' to 27.9' -claystone from 27.9' to 28.0' -MOHs 7.5 at 29'	30	R-6	85 (5)					
	-heavy iron staining from 30.0' to 30.4'	32.0							
1043	Boring Terminated at 32.0 feet Boring shifted 7.6' north. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project. Boring collapsed at 8' after 24 Hours	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-63

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-3-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-4-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 82°, Sunny
Water Level Upon Completion: 15.1'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 8.6'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1044'	TOPSOIL 0.2		S-1	67	1-1-3 (4)				
	Pale yellowish brown silty CLAY (CL/ML), trace weathred sandstone fragments, homogeneous color and texture, soft, moist **(COLLUVIAL)** 3.0								
1039	Yellowish brown sandstone GRAVEL with SAND, few fines, medium dense, moist	5	S-2	100	12-7-9 (16)				
	(COLLUVIAL) 6.0								
	Yellowish brown to grayish brown sandstone GRAVEL with fines, medium dense, moist		S-3	100	8-9-14 (23)				
	(COLLUVIAL) 9.0								
1034	Grayish brown CLAY (CL), iron stained throughout, hard, moist	10	S-4	100	11-18-20 (38)				
	(RESIDUAL) 12.0								
	Light grayish brown SHALE, completely weathered, hard, moist **(RESIDUAL)** 12.9		S-5	100	27-50/0.4'				
	-heavy iron staining from 12.2' to 12.4'		R-1	85 (0)					
1029	Yellowish brown SHALE, completely to highly weathered, broken to very broken, very soft	15							
	-MOHs 2.5 at 14'		R-2	52 (0)					
	-fractured and iron stained, very broken, some core loss from 14.7' to 18.1' 18.5								
	Light yellow brown SHALE, completely weathered, very broken, very soft 19.3 19.9								
1024	Red/green SHALE, completely weathered, very broken (ground up), very soft	20							
	-MOHs <2 at 19.5'		R-3	56 (0)					
	Red and green SHALE, moderately weathered, very broken, iron stained fractures, soft								
	-MOHs 2.5 at 23'								
1019	24.9	25							
	Light grayish green SHALE, completely weathered, some iron staining on relict bedding, very soft		R-4	56 (0)					
	-MOHs <2 at 28'								
	28.5								
1014	Reddish brown CLAYSTONE with limestone nodules, highly to completely weathered, iron stained on relict bedding, slickensides, soft 29.9	30							
	-MOHs <2 at 29'								
	Boring Terminated at 29.9 feet								
	Boring shifted ~5' downslope, ~1.5' lower in elevation. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1009		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-64

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-3-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-3-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 75-85°, Partly Sunny
Water Level Upon Completion: 6.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 11.7'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
995'	Brown-red CLAY (CL), trace brown-yellow sandstone fragments, stiff, moist		S-1	80	2-4-5 (9)		22.6		
	(COLLUVIAL) 3.7								
990	Yellow-brown decomposed CLAYSTONE (GP); sampled as claystoe fragments, few clay, medium dense, dry	5	S-2	100	4-11-8 (19)		10.4		
	(RESIDUAL) 6.0								
	Red-brown and yellow-brown decomposed SHALE; sampled as shale fragments, dense to very dense, dry		S-3	100	5-15-24 (39)		8.3		
985		10	S-4	100	20-26-27 (53)		9.5		
			S-5	100	15-27-27 (54)		8.2		
980		15	S-6	100	17-19-19 (38)		9.6		
	(RESIDUAL) 19.3		S-7	100	22-47-50/0.3'		7.7		
975	Brown SHALE, highly weathered, thinly to thicky laminated, very broken, very soft to soft -vertical fractures from 19.3' to 21.0'	20	R-1	80 (0)					
	-MOHS 2.5 at 23.5' 24.5								
970	Tan to gray-green and pink mottled CLAYSTONE, slightly weathered, very broken to broken, soft	25	R-2	100 (0)					
	-MOHS <2 at 27.0'								
965	-driller reported soft zone from 29.3' to 31.0' and from 32.0' to 34.3'	30	R-3	14 (0)					
960		35							

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BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-64

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-3-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 8-3-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 75-85°, Partly Sunny
Water Level Upon Completion: 6.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 11.7'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-inner barrel didn't latch for R-4 Tan to gray-green and pink mottled CLAYSTONE, slightly weathered, very broken to broken, soft *(continued)*		R-4	20 (0)					
955			40							
			41.0							
		Gray to brown-red mottled SILTSTONE, highly to slightly weathered, thinly laminated to thickly bedded, very broken to massive, very soft to hard -MOHS 7.5 at 42.0'		R-5	100 (18)					
950			45							
		-slickensides at 45.4'		R-6	100 (44)					
945			50							
		-few fine-grained sandstone interbeds and laminations from 50.0' to 59.3'		R-7	100 (68)					
940		-MOHS 7.5 at 54.0'	55							
				R-8	100 (86)					
			59.3							
935		Boring Terminated at 59.3 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	60							
930			65							
925			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-65

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 3
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-2-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-2-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 75°, Sunny
Water Level Upon Completion: 39.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 33.3'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
995'		TOPSOIL 0.1								
		Yellowish brown silty CLAY (CL/ML), homogeneous color and texture, soft, moist **(COLLUVIAL)** 3.0		S-1	100	0-1-3 (4)		12.3		
		Reddish brown silty CLAY (CL/ML), homogeneous color and texture, very stiff, moist 4.1		S-2	100	9-12-15 (27)		10.3		
990		**(COLLUVIAL)**	5							
		Yellowish brown silty CLAY (CL/ML), faint red mottles, very stiff, moist 6.0		S-3	100	10-11-8 (19)		12.2		
		(COLLUVIAL)								
		Yellowish brown SHALE, completely weathered, very stiff to extremely stiff, fisslie, friable, moist **(COLLUVIAL)** 9.0								
985		Yellowish-brown SHALE, completely weathered, hard, moist	10	S-4	100	19-22-30 (52)		9.2		
		-coarse gravel-sized siltstone fragments from 12.0' to 13.5'		S-5	100	24-31-38 (69)		9.5		
980			15							
		-high angle vertical iron stained fissures from 15.0' to 16.4' **(RESIDUAL)** 16.4		S-6	100	23-32-50/0.4'		7.9		
		Greenish gray SHALE, moderately weathered, broken to very broken, hard, iron stained on bedding -high angle parallel fractures, very broken and iron stained (some core loss) from 17.7' to 22.6'		R-1	64 (0)					
975		-MOHs 7.5 at 18'	20							
		-iron stained fractures, very broken from 22.3' to 23.9'		R-2	100 (0)					
970			25							
		-iron stained fractures, very broken from 25.8' to 27.4'								
		27.5		R-3	68 (0)					
		Light brownish yellow CLAYSTONE, completely weathered, very soft, iron stain on irregular surfaces								
965		-MOHs <2 at 30'	30							
		31.4								
		Reddish brown CLAYSTONE, completely to highly weathered, very soft, slickensides, fine green mottles								
		-MOHs <2 at 34'		R-4	64 (0)					
960			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-65

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 3
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-2-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-2-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 75°, Sunny
Water Level Upon Completion: 39.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 33.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
	Reddish brown CLAYSTONE, completely to highly weathered, very soft, slickensides, fine green mottles *(continued)*								
		37.9							
	Light grayish green CLAYSTONE, highly weathered, very soft, slickensides		R-5	100 (0)					
955	-MOHs <2 at 39'	39.6							
		40.2							
	Yellowish gray SILTSTONE, highly weathered, broken, soft to medium hard	40							
	-high angle open iron stained fractures, broken from 39.8' to 40.2'								
	-MOHs 5.5 at 40'								
		43.1							
	Light grayish green SILTSTONE, moderately weathered, broken to slightly broken, medium hard, iron concretions and banding	43.6	R-6	94 (22)					
950	-MOHs 7.5 at 41.5'	44.9							
	Light gray SILTSTONE, slightly weathered, broken, hard	45							
	Reddish brown SHALE, iron stained on bedding, broken to very broken, medium hard								
	-MOHs 6.5 at 44.3'								
	Light grayish green SILTSTONE, massive, hard	48.7							
	-about 1" red shale layers from 45.5' to 45.8'	49.2	R-7	98 (0)					
	-MOHs 6.5 at 46.5'								
945	-0.2' red and brown shale layre with 45° angle fracture from 48.1' to 48.3'	50							
	-irregular reddish brown slickensided shale from 48.3' to 48.7'	50.9							
		51.6							
	Light gray and green silty CLAYSTONE with limestone nodules, slickensides, little brown reddish mottling, slightly broken, medium hard	52.1							
		52.9							
	-high angle to near vertical open iron stained fractures from 48.8' to 50.7'		R-8	100 (70)					
940	-MOHs 4.5 at 49'	55							
	Light grayish green SILTSTONE, broken, hard								
	-MOHs 7.5 at 49.5'								
	-limestone nodule at 50.4'								
	Reddish brown and light grayish green SHALE with limestone nodules, broken to very broken, hard								
	Red and green shaley LIMESTONE, broken, very hard		R-9	100 (82)					
	-MOHs >9 at 51.7'								
935		60							
	Reddish brown and grayish green CLAYSTONE, slickensides, broken, very soft								
	-MOHs 2.5 at 52.7'								
	Light grayish green SILTSTONE, fresh, massive, very hard								
	-high angle open iron stained fractures from 56.8' to 57.1								
	-MOHs >9 at 55'		R-10	100 (100)					
930		65							
	-MOHs 8.5 at 67'								
	-low angle open iron stained fracture at 67.8		R-11	98 (98)					
925		70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-65

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 3 of 3
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 8-2-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 8-2-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 75°, Sunny
Water Level Upon Completion: 39.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 33.3'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
920		Light grayish green SILTSTONE, fresh, massive, very hard *(continued)*	75	R-12	96 (96)					
		-MOHs 8.5 at 76'								
		76.4								
915		Boring Terminated at 76.4 feet Boring shifted ~6' east. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	80							
910			85							
905			90							
900			95							
895			100							
890			105							

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GARVIN BOWARD BEITKO

Test Boring Record

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Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-25-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70 Degrees
Water Level Upon Completion: 6.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
952.2'	Light yellow brown clayey SILT (ML), homogeneous in structure, medium, moist		S-1	100	2-2-3 (5)		12.5		
	(COLLUVIAL) 3.0								
	Yellow brown silty SAND (SM), with gravel (weathered coarse sandstone), medium dense, moist		S-2	100	6-8-11 (19)		11.4		
947	**(COLLUVIAL)** 6.0	5							
	Red and yellowish gray silty CLAY (CL/ML), occassional weathered sandstone gravel, very stiff, moist		S-3	100	8-10-11 (21)		11.8		
	(COLLUVIAL) 9.0								
942	Yellowish brown and red sandy CLAY (CL), few coarse sandstone gravel, stiff, moist wet, dark iron stain at 10.1'	10	S-4	100	6-7-7 (14)		13.3		
	(COLLUVIAL) 12.0								
	Yellowish brown GRAVEL with CLAY (GC), iron stain on gravel, medium dense, moist		S-5	67	7-9-7 (16)		5.5		
937	**(COLLUVIAL)** 15.0	15							
	Yellowish gray to light and dark reddish brown and orange completely weathered silty SHALE, iron stained on relict bedding, dense to very dense, moist		S-6	100	14-32-4 (36)		5.7		
	(RESIDUAL) 18.8		S-7	100	44-50/0.3'		6.0		
932	Brownish gray silty SHALE, moderately weathered, iron stained on bedding, closely spaced iron stained open fractures, broken to very broken, medium hard -MOHs 4.5 at 21'	20	R-1	100 (0)					
	23.8								
927	Gray silty SHALE, closely to medium spaced fractures, iron stained on bedding, very broken, medium hard -MOHs 6.5 at 27'	25	R-2	100 (0)					
922	-iron stained and broken from 23.8' to 28.8' -MOHs 7.5 at 33'	30	R-3	100 (0)					
	-broken from 32.8' to 38.8' 33.8								
917	Boring Terminated at 33.8 feet Boring collapsed at 9' after 24 Hours	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-67

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-25-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70 Degrees
Water Level Upon Completion: 6.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 6'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
978'	TOPSOIL 0.2		S-1	100	1-2-4 (6)		14.2		
	Completely weathered shale with sandstone layers, yellowish gray, moist								
	(COLLUVIAL) 3.0								
	Completely weathered shale with sandstone layers (GP), yellowish gray, moist, iron stain on remnant bedding		S-2	100	5-10-12 (22)		10.0		
973	**(COLLUVIAL)** 6.0	5							
	Silty clay (CL/ML), light gray, coarse orange mottles, heavy iron stained from 6.0' to 6.1', little reddish brown		S-3	100	5-6-7 (13)		13.3		
	(COLLUVIAL) 9.0								
968	Yellow-brown, gray-green, and grayish-brown SAND (SM), some silt, trace gravel, medium dense to dense, moist	10	S-4	100	8-7-12 (19)		17.3		
			S-5	100	6-11-13 (24)	36.21	10.8	17	15
963		15	S-6	100	6-14-22 (36)		7.1		
	-interlayered yellow brown silt, highly weathered sandstone gravel, small vertical rock clasts, yellowish brown and reddish brown clay mixed, wet around sandstone gravel from 18.0' to 19.0'								
	(COLLUVIAL) 19.0		S-7	100	6-6-7 (13)		18.6		
958	Reddish brown and grayish brown mottled silty clay, moist	20							
	(POSSIBLE COLLUVIAL/RESIDUAL) 21.0		S-8	100	12-10-13 (23)		6.4		
	Highly weathered silty SHALE, grayish brown, iron stained, moist, very stiff								
	(RESIDUAL) 24.0								
953	Highly weathered silty CLAYSTONE, reddish-brown and gray-green, hard, moist	25	S-9	100	12-19-23 (42)		7.2		
	(RESIDUAL) 27.0								
	Grayish-green silty SHALE, highly weathered, iron stained, dry 27.7		S-10	100	30-50/0.2'		6.4		
	(RESIDUAL)								
	Grayish-green silty SHALE, hard, slightly weathered, grades into reddish brown shale at 28.4' , very soft and broken from 28.4' to 28.6' 28.9								
948	-MOHs 4.5 at 28.8' 29.8	30	R-1	94 (0)					
	Red and grayish-green mottled SHALE, slightly broken to massive, very soft								
	Light gray SILTSTONE, hard, slightly weathered, very broken to moderately broken								
	-high angle, iron-stained fracture from 30.2' to 32.4'								
943	-open, iron-stained fractures from 32.4' to 33.7'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-67

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-25-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70 Degrees
Water Level Upon Completion: 6.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		-MOHs 7.5 at 34' Light gray SILTSTONE, hard, slightly weathered, very broken to moderately broken *(continued)*		R-2	98 (8)					
			38.0							
938		Light gray SILTSTONE, hard, fresh, moderately broken to massive -MOHs >9 at 40' -very broken with slickensided fractures from 40.9' to 41.6' -very broken with slickensided fractures from 42.3' to 42.7'	40	R-3	100 (36)					
		-slickensided fracture from 41.7' to 41.9'	42.7							
933		Boring Terminated at 42.7 feet	45							
928			50							
923			55							
918			60							
913			65							
908			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-68

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 76 Degrees
Water Level Upon Completion: 6.7'
Drilling Method: 3 1/4-inch HSA
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 16'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1019.9'		Completely weathered gray-brown SANDSTONE with shale layers, medium dense		S-1		1-5-8 (13)		6.4		
		(COLLUVIAL)								
			3.0							
		Yellowish-brown silty CLAY (CL/ML) with red mottles, slickensides, very stiff, moist	3.4	S-2	100	11-10-10 (20)		12.2		
1015		**(RESIDUAL)**	5							
		Light reddish-brown silty CLAY (CL/ML), moist, grades into yellow-brown at 5.8', slickensides, very stiff	6.0							
		(RESIDUAL)		S-3	80	13-12-10 (22)		17.5		
		Light yellowish-gray silty CLAY (CL/ML), moist, stiff								
		(RESIDUAL)	9.0							
1010		Reddish-brown silty CLAY (CL), abundant grayish-brown mottles, moist, hard	10	S-4	100	9-10-20 (30)		9.9		
		(RESIDUAL)	12.0							
		Reddish-gray CLAY (CL), little to some sand, trace gravel, hard, moist		S-5	100	13-38-49 (87)		8.9		
1005			15				73.76		37	20
		-Sample S-6 abundant gray-brown mottles, layered		S-6	100	10-22-24 (46)		12.1		
		(RESIDUAL)	18.0							
		Reddish-brown silty CLAY (CL/ML), some grayish-green mottles, hard, moist		S-7	100	22-48-50/0.4'		11.1		
1000			20							
		-relict iron stained fractures from 21.0' to 22.5'		S-8	100	14-19-45 (64)		9.1		
		(RESIDUAL)	22.5							
		Completely weathered silty SHALE, reddish-brown, relict bedding, hard (soil), very soft (rock)								
		(RESIDUAL)		S-9	100	21-50/0.4'		9.5		
995			25							
		CLAYSTONE, reddish-brown, very soft, slickensides -MOHs <2 at 25'		R-1	100 (0)					
			27.2							
		CLAYSTONE, light gray-green, slickensides, very soft, calcareous	28.2							
		-MOHs <2 at 28'								
990		CLAYSTONE, reddish-brown, slickensides, very soft -light gray-green mottles and calcareous from 28.2' to 29.9' -limestone nodules at 29.9'	30							
		-MOHs <2 at 30'	30.3 30.8							
		CLAYSTONE, light gray-green, very soft, slickensides		R-2	100 (0)					
		CLAYSTONE, reddish-brown, very soft, slickensides -MOHs <2 at 32' -light gray-green mottles from 34.5' to 35.4' -gractured and broken from 34.5' to 34.9'								
985		-fractured and broken from 35.1' to 35.4'	35							

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BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-68

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-25-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 76 Degrees
Water Level Upon Completion: 6.7'
Drilling Method: 3 1/4-inch HSA
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 16'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		35.4 CLAYSTONE, yellowish-gray, very soft, slickensides 37.4								
980		SHALE, greenish-gray, very soft, very broken and iron stained, slickensides on horizontal bedding planes, iron stained on bedding -MOHs <2 at 38' -very broken and iron stained from 39.9' to 40.2'	40	R-3	100 (0)					
		40.3 SHALE, medium gray, soft, broken to very broken -MOHs 2.5 at 41' 41.3 42.0 SHALE, yellowish-gray, soft to very soft SHALE, dark gray to light gray, very soft, fractured, and iron stained -intersecting low angle, iron stained fractures from 43.0' to 43.4'		R-4	100 (0)					
975		44.9 Boring Terminated at 44.9 feet	45							
970			50							
965			55							
960			60							
955			65							
950			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-69

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-26-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-26-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 72 Degrees
Water Level Upon Completion: 37.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1086'	Orangish-brown silty SAND (SM), few weathered sandstone gravel, loose, moist		S-1	67	1-2-2 (4)				
	(RESIDUAL) 3.0								
1081	Orangish-brown clayey GRAVEL (GC), coarse weathered sandstone gravel, firm to medium dense, moist	5	S-2	100	4-6-7 (13)				
	-iron stain on gravel at 6.0'		S-3	87	7-10-9 (19)				
	(RESIDUAL) 9.0								
1076	Orangish-brown silty GRAVEL (GM), some sand, iron stained, firm to very dense, moist	10	S-4	100	15-8-5 (13)				
	-iron stain on gravel at 13.0'		S-5	100	28-33-50 (83)				
1071	**(RESIDUAL)** 15.0	15							
	Yellowish-brown slightly weathered medium-grained SANDSTONE, iron stain on bedding 15.1		S-6	100	50/0.1'				
			R-1	100 (0)					
	Light gray and brown medium- to coarse-grained SANDSTONE, iron stain on breaks, broken to very broken, very hard -lost water at top of rock -MOHS 8.5 at 16' -coal laminations from 17.1' to 17.4' -very broken, short open iron stained fractures from 18.0' to 18.1' 19.8		R-2	94 (0)					
1066		20							
	Brownish-gray fine- to medium-grained SANDSTONE, micaceous, slightly weathered, very broken to moderately broken, very hard -large coal fragments at 20.5' -shale laminations from 20.6' to 22.5' -iron stained fractures and very broken from 21.5' to 22.5' -iron nodules from 23.1' to 23.5' -vugs at 23.2' 23.5		R-3	88 (42)					
1061		25							
	Light gray SANDSTONE, micaceous, some iron staining, broken to massive, very hard -MOHs >9 at 24'		R-4	98 (58)					
	27.6								
1056	Brownish-gray fine- to medium-grained SANDSTONE, slightly weathered, massive to very broken, soft to hard -micaceous, coal laminations from 28.9' to 30.1'	30							
			R-5	96 (40)					
1051	-MOHs 7.5 at 35'	35							

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BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-69

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-26-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-26-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 72 Degrees
Water Level Upon Completion: 37.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brownish-gray fine- to medium-grained SANDSTONE, slightly weathered, massive to very broken, soft to hard *(continued)*								
		-cross-bedded at 35.0'		R-6	100 (0)					
		-closely spaced, open low angle iron stained fractures, broken to very broken from 35.6' to 37.7'								
		-shale and coal lamination from 35.6' to 36.1'								
		-soft, very broken and fractured, vuggy from 36.8' to 37.1'								
		-MOHs 7.5 at 37.7'								
1046		Boring Terminated at 38.0 feet	38.0							
			40							
1041			45							
1036			50							
1031			55							
1026			60							
1021			65							
1016			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-70

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 76 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 24.8'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1062'	Orange-brown SANDSTONE FRAGMENTS (GP), few sand, firm, moist -trace roots from 0.0' to 1.0'		S-1	67	1-5-6 (11)				
	(COLLUVIAL) 3.0								
	Brown SANDSTONE FRAGMENTS (GP), few sand, firm to medium dense, moist to dry -moist from 3.0' to 4.5'		S-2	100	8-8-10 (18)				
1057		5	S-3	100	8-7-6 (13)				
	(RESIDUAL) 8.0								
	Brown-gray DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, medium dense, dry		S-4	100	25-10-11 (21)				
1052		10	S-5	67	29-17-6 (23)				
1047	-dark brown from 15.0' to 15.4'	15	S-6	80	14-9-12 (21)				
	(RESIDUAL) 18.5								
	Brown-orange and gray mottled DECOMPOSED SHALE sampled as shale fragments, few silt, few clay, dense, dry		S-7	80	17-21-23 (44)				
1042	**(RESIDUAL)** 21.0	20							
	Brown DECOMPOSED fine-grained SANDSTONE sampled as sandstone fragments, medium to very dense, dry		S-8	67	15-11-12 (23)				
1037		25	S-9	100	14-16-36 (52)				
	(RESIDUAL) 27.0								
	Light gray DECOMPOSED shaley CLAYSTONE sampled as claystone fragments, little clay, dense, dry		S-10	100	14-18-31 (49)				
1032	**(RESIDUAL)** 30.0	30							
	Light gray and brown-red mottled DECOMPOSED CLAYSTONE sampled as claystone fragments, very dense, dry 31.3		S-11	100	39-49-50/0.3'				
	(RESIDUAL)								
	Boring Terminated at 31.3 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1027		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-71

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-26-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-26-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 79 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1086'	TOPSOIL 0.4								
	Light brown, yellow-brown, and gray SAND (SM), little to some gravel, little silt, firm to medium, moist to dry		S-1	53	2-4-7 (11)		8.3		
			S-2	67	7-6-6 (12)	20.5	3.2		
1081		5	S-3	100	8-6-15 (21)		4.2		
	(RESIDUAL) 9.1								
1076	Brownish gray medium-grained SANDSTONE, iron staining on bedding, cross bedded, slightly to moderately weathered, broken to massive, hard	10	S-4	100	50/0.1'				
			R-1	100 (0)					
	-thin iron bands from 11.5' to 11.8'		R-2	92 (36)					
	-MOHs 8.5 at 11'								
1071	14.6	15							
	-high angle open fracture from 14.4' to 14.6'								
	Yellow-gray medium- to coarse-grained SANDSTONE, occassional iron staining on coal laminations, slightly weathered, micaceous, massive, hard		R-3	54 (44)					
	-MOHs 8.5 at 15'								
	-very broken and iron stained from 16.9' to 19.2' (core loss)								
	-lost water return at 17.3'								
1066	-breaks along iron bands, fractured, very broken, iron stained from 19.6' to 21.9'	20							
	21.9		R-4	88 (32)					
	Light yellow-gray fine- to medium-grained SANDSTONE, very broken to massive, hard								
	-fine-grained from 22.2' to 22.5'								
	-very broken and iron stained from 23.0' to 23.4'								
1061	-heavy horizontal concentration of iron from 24.1' to 24.5'	25							
	-arcuate iron banding from 24.6' to 25.8'		R-5	96 (34)					
	-open vertical iron stained fracture from 25.6' to 28.1'								
1056	-large 0.5-0.7' diameter iron concentrations from 29.4' to 31.0'	30							
	-triangular iron concretion/nodule at 31.4'		R-6	100 (54)					
	-MOHs >9 at 31.5'								
	-high angle open fracture from 32.0' to 32.7'								
	-abundant coal laminations, very soft and broken from 32.8' to 33.1'								
1051	-closely spaced iron stained fractures from 33.6' to 34.6'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-71

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-26-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-26-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 79 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Light yellow-gray fine- to medium-grained SANDSTONE, very broken to massive, hard *(continued)* -coal lamination from 35.3' to 35.7' -high angle open iron stained fracture from 35.9' to 36.5' -MOHs 8.5 at 36.5' -low angle open iron stained fracture at 37.0'		R-7	100 (24)					
1046		-vertical open iron stained fracture from 37.2' to 39.6' 39.6	40							
		Boring Terminated at 39.6 feet Boring shifted 10.5' downslope. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1041			45							
1036			50							
1031			55							
1026			60							
1021			65							
1016			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-72

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 75 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1067.4'	Brown and black ROCK FRAGMENTS (GP), few sand, loose, moist		S-1	53	1-4-4 (8)				
	(COLLUVIAL)		S-2	100	10-50/0.3'				
	3.8								
1062	Gray DECOMPOSED SANDSTONE sampled as sandstone fragments, very dense, dry	5	S-3	100	50/0.1'				
	4.6								
	(RESIDUAL)								
	Auger Refusal at 4.5 feet Boring Terminated at 4.6 feet Boring collapsed at 3.5' after 24 Hours								
1057		10							
1052		15							
1047		20							
1042		25							
1037		30							
1032		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-73

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 73 Degrees
Water Level Upon Completion: 6.4'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 9.6'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1093.8'	TOPSOIL 0.3		S-1	80	1-3-15 (18)		6.6		
	Pale yellow SILT (ML), few plant roots, very stiff to hard, moist								
	(RESIDUAL) 3.5		S-2	100	9-35-50/0.3'		2.4		
1089	Light gray medium-grained DECOMPOSED SANDSTONE sampled as sandstone fragments with silty clay, highly weathered, soft, moist, heavy ironstain from 3.5' to 6.5', very dense to medium dense	5							
	(RESIDUAL) 7.5		S-3	100	11-11-8 (19)		6.0		
	Completely weathered silty shale with sandstone layers, very soft, moist, hard, faint iron staining, CL-ML with gravel **(RESIDUAL)** 9.4		S-4	100	50/0.4'		6.9		
1084	Light gray SANDSTONE with coal laminations, medium-grained, completely weathered shale layers 9.6' to 9.7', very broken to moderately broken, iron staining along laminations, hard	10							
	-soft clay layer from 9.6' to 9.8'		R-1	84 (0)					
	-very broken and soft at 10.0'								
	-MOHs 5.5 at 11.5' 11.6								
	Yellow-brown SANDSTONE with clay layers, hard, moderately weathered, fine-grained 14.4								
1079	-MOHs 4.5 at 13.5'	15							
	Yellowish-brown SANDSTONE, moderately weathered, thickly bedded, slightly broken to massive, hard		R-2	100 (46)					
	-broken to very broken from 14.4' to 15.0'								
	-MOHs 7.5 at 16'								
	-broken to very broken from 18.5' to 19.4'								
1074	-MOHs >9 at 19.8'	20							
	-high angle, iron-stained healed fracture from 20.0' to 20.6'		R-3	100 (50)					
	-MOHs 8.5 at 20.6'								
	-thin iron bands- common 20.1' to 21.4'								
	-large iron concretion from 22.4' to 22.8'								
	-heavy iron stain 23.2' to 24.2' 24.2								
1069	Brownish-gray SANDSTONE, medium to coarse-grained, slightly weathered, little iron-stain on bedding, massive, hard	25							
	-heavy iron stain 24.8' to 25.2'		R-4	98 (82)					
	29.7								
1064	Light gray medium-grained SANDSTONE, fresh, massive, very hard	30							
	-MOHs >9 at 30'		R-5	100 (100)					
1059	34.8	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-73

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 73 Degrees
Water Level Upon Completion: 6.4'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours: 9.6'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Light yellowish-gray medium-grained SANDSTONE, slightly weathered, massive, hard *(continued)* -soft clay layer at 35.2' -very broken from 34.6' to 36.6' -closely spaced, high angle, healed fractures from 36.6' to 39.4' -1" to 2" iron concretions at 36.3', 37.2', and 38.4'		R-6	100 (62)					
1054		Boring Terminated at 39.4 feet 39.4	40							
1049			45							
1044			50							
1039			55							
1034			60							
1029			65							
1024			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-74

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 74 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1059.9'	Yellowish-brown SILT with fine sand (ML), few weathered sandstone gravel, loose, moist		S-1	80	1-3-5 (8)				
	(RESIDUAL)								
	3.5								
	GRAVEL with fine sand and silt (GP-GM), coarse gravel, buff, iron-stained, medium dense, moist		S-2	100	15-6-5 (11)				
	4.3								
1055	**(RESIDUAL)**	5							
	Orange-brown coarse-grained GRAVEL (GP-GM), micaceous, iron stain on remnant bedding planes, medium dense, moist		S-3	100	6-6-6 (12)				
	(RESIDUAL)								
	9.0								
	Very fine SAND (SP), yellow-brown, few sandstone gravel, very dense, moist		S-4	100	50/0.4'				
1050	9.4	10							
	(RESIDUAL)								
	SANDSTONE, medium-grained, brownish-gray, hard, moderately weathered, very broken to blocky, micaceous, iron stained open fractures -MOHs >9 at 10' -fine to medium-grained from 11.9' to 12.7' -thin clay layer at 12.4'		R-1	84 (8)					
1045	-iron stained open fractures, very broken from 12.7' to 13.9' (core loss)	15							
	15.1								
	Yellowish-gray fine to medium-grained SANDSTONE, moderately weathered, hard -high angle, iron stained open fracture from 16.7' to 18.2' -few coaly laminations at 17.4'		R-2	82 (10)					
	very broken and iron-stained from 19.1' to 19.6'								
1040	19.6	20							
	Grayish-brown silty SHALE, completely weathered, very soft, iron-stained								
	20.3								
	-very soft, highly weathered from 19.4' to 20.3'								
	21.0								
	Yellowish-gray SANDSTONE, hard, micaceous, broken to very broken 20.3' to 21' (some core loss)		R-3	64 (24)					
	Yellowish-gray SANDSTONE, slightly weathered, micaceous, hard -MOHs >9 at 22'								
	24.4								
1035	Boring Terminated at 24.4 feet	25							
1030		30							
1025		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-75

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70's
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1093.6'	Light brown SANDSTONE FRAGMENTS (GP), little sand, few silt, medium dense, moist		S-1	53	2-7-8 (15)				
	(RESIDUAL) 3.0								
	Orange-brown and gray silty CLAY (CL/ML), stiff, moist		S-2	100	7-6-6 (12)				
1089		5							
	(RESIDUAL) 6.0								
	Gray-brown silty CLAY (CL/ML), relic bedding, hard, dry		S-3	100	10-17-29 (46)				
	(RESIDUAL) 9.0								
1084	Gray and orange-brown DECOMPOSED shaley SANDSTONE sampled as sandstone fragments, little sand, few silt, dry 10.1	10	S-4	100	27-37-50/0.1'				
	(RESIDUAL) 11.2								
	Brown and gray SANDSTONE, highly weathered, very broken to blocky, soft to hard -MOHs 5.5 at 10.5' 13.1		R-1	88 (14)					
	Gray CLAYSHALE, highly weathered, very soft -MOHs 4.5 at 12.5'								
1079	Brown and gray fine to medium-grained SANDSTONE, moderately to highly weathered, very broken to massive, medium hard to hard, water stained throughout, micaceous, vuggy in places	15							
	-MOHs 6.5 at 17'		R-2	92 (28)					
1074		20							
	-MOHs 8.5 at 23'		R-3	90 (66)					
1069		25							
	-vertical fracture from 26.6' to 27.6' -MOHs 7.5 at 27' 28.1		R-4	100 (0)					
	Boring Terminated at 28.1 feet								
1064		30							
1059		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-76

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70's
Water Level Upon Completion: 14'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1076'	Tan SILT (ML), few small rock fragments (shale, sandy shale, clayshale), medium, moist		S-1	80	1-1-4 (5)		11.5	33	24
	(COLLUVIAL) 3.0								
1071	Brown and orange-brown SAND (SM), little silt, little gravel (mostly sandstone), medium dense, moist	5	S-2	100	6-8-7 (15)	24.61	7.4		
	(COLLUVIAL) 6.0								
	Orange-brown DECOMPOSED SANDSTONE sampled as sand, little gravel (sandstone), little silt, dense, moist		S-3	100	8-17-24 (41)		7.0		
	(RESIDUAL) 9.2								
1066		10	S-4	100	50/0.2'				
	Brown and gray-brown fine to medium-grained SANDSTONE, moderately weathered, very broken to massive (generally moderately broken to massive), medium hard to hard, micaceous								
	-MOHs 6.5 at 10.5'		R-1	96 (40)					
	-MOHs 8.5 at 14.5'								
1061	15.0	15							
	Boring Terminated at 15.0 feet Offset approximately 7' east. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project. Boring collapsed at 5.2' after 24 Hours								
1056		20							
1051		25							
1046		30							
1041		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-77

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1076'	Brown SILT (ML), few clay, trace small rock fragments (shale, carbonaceous shale), very soft, moist		S-1	80	0-0-1 (1)				
	(COLLUVIAL) 3.0								
	Brown clayey SILT (ML), few rock fragments (shale, sandy shale), very stiff, moist		S-2	100	5-9-8 (17)				
1071	**(COLLUVIAL)** 6.0	5							
	Brown SANDSTONE FRAGMENTS (GP), little sand, loose, moist		S-3	100	5-6-4 (10)				
	(RESIDUAL) 9.0								
1066	Brown and orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, trace silt, very dense, moist	10	S-4	100	50/0.3'				
	(RESIDUAL) 12.8		S-5	38	17-50/0.3'				
	Boring Terminated at 12.8 feet Boring collapsed at 3.7' after 24 Hours								
1061		15							
1056		20							
1051		25							
1046		30							
1041		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-78

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: unny, 74 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1068.9'		TOPSOIL 0.2								
		Dark orange-brown SAND (SM), some silt, loose, dry		S-1	100	1-3-4 (7)				
		(RESIDUAL) 3.0								
		Brown-orange DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry		S-2	100	10-24-25 (49)				
1064			5							
		(RESIDUAL) 6.4		S-3	100	50/0.4'				
		Boring Terminated at 6.4 feet								
1059			10							
1054			15							
1049			20							
1044			25							
1039			30							
1034			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-79

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 73 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1071'		Orange-brown SANDSTONE FRAGMENTS (GP), few to little sand, loose, dry		S-1	73	1-3-3 (6)				
				S-2	100	8-5-4 (9)				
1066		**(RESIDUAL)**	5							
			6.0							
		Orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, medium to very dense, dry		S-3	100	7-6-10 (16)				
		(RESIDUAL)								
			9.3	S-4	100	50/0.3'				
1061		Boring Terminated at 9.3 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	10							
1056			15							
1051			20							
1046			25							
1041			30							
1036			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-80

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 60's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1063'	Brown SANDSTONE FRAGMENTS (GP), little sand, few silt, loose, moist		S-1	67	1-4-3 (7)				
	-Sample S-2 little clay		S-2	80	2-3-5 (8)				
1058	**(COLLUVIAL)**	5							
		6.0							
	Brown and gray-brown SANDSTONE FRAGMENTS (GP), little sand, few silt, firm, moist		S-3	100	7-7-7 (14)				
	(RESIDUAL)								
		9.0							
1053	Brown-gray DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, few silt, dry	9.2 10	S-4	100	50/0.2'				
	(RESIDUAL)								
	Boring Terminated at 9.2 feet Offset approximately 10' north. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project. Boring collapsed at 3.8' after 24 Hours								
1048		15							
1043		20							
1038		25							
1033		30							
1028		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-81

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Sunny, 72 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 13.2'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1073'		Orange-brown SANDSTONE FRAGMENTS (GP), little sand, very loose to loose, moist		S-1	27	1-1-2 (3)				
				S-2	100	8-4-5 (9)				
1068			5							
		(COLLUVIAL) 7.0		S-3	100	8-6-10 (16)				
		Brown DECOMPOSED micaceous SANDSTONE sampled as sandstone fragments, few sand, loose to very dense, dry		S-4	100	7-10-10 (20)				
1063			10							
				S-5	100	26-42-29 (71)				
1058		**(RESIDUAL)** 15.7	15	S-6	100	48-50/0.2'				
		Boring Terminated at 15.7 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1053			20							
1048			25							
1043			30							
1038			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-82

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 60's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1068.4'	Light brown clayey SILT (ML), trace sand, medium, moist		S-1	67	1-2-4 (6)				
	(COLLUVIAL) 3.0								
	Brown SAND (SM), some silt, few to little rock fragments (sandstone), medium dense, moist		S-2	100	11-11-11 (22)				
1063		5							
			S-3	100	10-11-15 (26)				
	(RESIDUAL) 9.0								
1058	Brown and orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, few silt, dry 9.9	10	S-4	100	30-50/0.4'				
	(RESIDUAL)								
	Boring Terminated at 9.9 feet Boring collapsed at 1.8' after 24 Hours								
1053		15							
1048		20							
1043		25							
1038		30							
1033		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-83

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-24-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-24-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Sunny, 79 Degrees
Water Level Upon Completion: 3.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: J. Hawk, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1093.1'	FILL sampled as fine gravel with some sand, moist **(FILL)**		S-1	47	11-4-3 (7)		7.7		
	1.4 Completely weathered shale layers with trace angular fragments sampled as yellow-brown fine SAND (SM), little silt, few gravel, moist, trace thin clay, faint orange-brown mottles		S-2	87	7-8-8 (16)		8.9		
1088		5				22.62			
	(RESIDUAL) 6.9		S-3	100	13-5-11 (16)		12.3		
	CLAY (CL), coarse orange mottles, moist, stiff, little dark iron staining 7.1 **(RESIDUAL)**								
1083	9.4 Completely weathered, fine-grained sandstone, orange-brown, faint mottles, moist, very dense **(RESIDUAL)**	10	S-4	100	50/0.4'				
	SANDSTONE, graysih-brown, medium to coarse-grained, hard, moderately weathered -moderately broken to slightly broken from 9.4' to 10.5' -massive from 10.5' to 13.1' -MOHs 8.5 at 11' -high angle fracture from 13.1' to 13.4' - soft, very broken 14.4		R-1	90 (50)					
1078	Gray brown SANDSTONE, coarse-grained, hard, moderately weathered, broken to very broken -approximate 60 Degree angle fracture from 15.4' to 15.6', open 17.0 -MOHs 8.7 at 16.2' -heavy iron staining from 15.9' to 16.3' -high angle fracture from 15.9' to 16.3', open	15	R-2	92					
1073	SANDSTONE, medium gray, yellow brown, thin 2-3 mm iron bands 17.7' to 18', hard, moderately weathered 19.4 -MOHs 8.5 at 17.5' -iron bands common from 17.4' to 18.6'	20							
	Boring Terminated at 19.4 feet								
1068		25							
1063		30							
1058		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-84

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partyle sunny, 74 Degrees
Water Level Upon Completion: 13.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1092'	Brown and gray SANDSTONE FRAGMENTS (GP), some sand, very loose, moist		S-1	27	1-1-2 (3)				
	(COLLUVIAL) 3.0								
1087	Brown-orange DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, dense to very dense, dry	5	S-2	100	19-19-13 (32)				
	(RESIDUAL) 6.6		S-3	100	34-50/0.1'				
	Orange-brown medium to coarse-grained SANDSTONE, moderately weathered, medium bedded, moderately broken to massive, hard, few vugs		R-1	100 (0)					
1082	-lost water at 9.5'	10	R-2	92 (50)					
	-MOHs 8.5 at 10'								
	14.0		R-3	75 (0)					
1077	Boring Terminated at 14.0 feet Boring collapsed at 2.2' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	15							
1072		20							
1067		25							
1062		30							
1057		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-85

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 69 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1102'		TOPSOIL 0.3								
		Brown randomly oriented SANDSTONE FRAGMENTS (GP), few silt, very loose to medium dense, moist		S-1	67	1-1-1 (2)				
				S-2	100	20-16-17 (33)				
1097		**(COLLUVIAL)** 5.0	5							
		Brown and gray DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, dense, moist		S-3	100	16-23-17 (40)				
		(RESIDUAL) 9.0								
1092		Brown-gray DECOMPOSED SHALE sampled as shale fragments, few silt, trace clay, medium dense, dry 10.1	10	S-4	100	20-12-27 (39)				
		(RESIDUAL)								
		Orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, dense to very dense, dry		S-5	100	30-28-22 (50)				
1087		**(RESIDUAL)** 15.1	15							
		Boring Terminated at 15.1 feet		S-6	100	50/0.1'				
		Boring collapsed at 13.2' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1082			20							
1077			25							
1072			30							
1067			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-86

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 69 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1086'	TOPSOIL 0.4								
	Brown sandy SILT (ML), few clay, very soft, moist		S-1	100	1-1-1 (2)				
	(COLLUVIAL) 3.0								
	Brown and gray randomly oriented SANDSTONE FRAGMENTS (GP), some sand, medium dense, moist		S-2	100	18-19-17 (36)				
1081		5							
	(COLLUVIAL) 6.0								
	Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, medium to very dense, dry to moist		S-3	100	12-11-11 (22)				
	-moist from 6.0' to 7.5'								
1076	**(RESIDUAL)** 9.9	10	S-4	100	41-50/0.4'				
	Boring Terminated at 9.9 feet Boring collapsed at 12.8' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1071		15							
1066		20							
1061		25							
1056		30							
1051		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-87

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 68 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1081'	TOPSOIL 0.3								
	Brown clayey SILT (ML), some sand, very soft, moist **(COLLUVIAL)** 2.0		S-1	67	1-1-1 (2)				
	Yellow-brown SANDSTONE FRAGMENTS (GP), some sand, trace silt, medium dense, moist		S-2	100	14-11-10 (21)				
1076	**(COLLUVIAL)** 6.0	5							
	Orange-brown and gray DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, medium dense to dense, dry		S-3	100	9-14-19 (33)				
1071		10	S-4	100	24-20-23 (43)				
	(RESIDUAL) 13.2		S-5	100	6-3-12 (15)				
	Black DECOMPOSED carbonaceous SHALE sampled as carbonaceous shale fragments, loose, dry 13.4								
1066	**(RESIDUAL)**	15							
	Brown and orange-brown DECOMPOSED medium to coarse-grained SANDSTONE sampled as sandstone fragments, few sand, medium to very dense, dry, some carbonaceous inclusions		S-6	100	36-16-9 (25)				
	(RESIDUAL) 18.2		S-7	100	50/0.2'				
	Boring Terminated at 18.2 feet								
1061	Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	20							
1056		25							
1051		30							
1046		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-88

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-21-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-21-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 76 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1089'		TOPSOIL 0.3								
		Brown SANDSTONE FRAGMENTS (GP), few sand, trace clay, very loose, moist		S-1	67	1-1-1 (2)				
		(COLLUVIAL) 3.0								
		Brown SANDSTONE FRAGMENTS (GP), few to little sand, medium dense, dry		S-2	100	8-15-11 (26)				
1084			5							
				S-3	100	6-6-9 (15)				
		(RESIDUAL) 9.0								
		Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, very dense, dry 9.3		S-4	100	50/0.3'				
1079		**(RESIDUAL)**	10							
		Boring Terminated at 9.3 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1074			15							
1069			20							
1064			25							
1059			30							
1054			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-89

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 70's, Cloudy
Water Level Upon Completion: 3.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1116'	Brown and gray ROCK FRAGMENTS (GP) (sandstone), little sand, few silt, medium dense, dry		S-1	80	7-9-12 (21)				
	(RESIDUAL) 3.0								
	Brown clayey SILT (ML), trace sand, stiff, dry		S-2	80	16-7-6 (13)				
1111	**(RESIDUAL)** 6.0	5							
	Brown to orange-brown SAND (SM), some silt, few rock fragments, dense, dry		S-3	100	30-14-19 (33)				
	(RESIDUAL) 9.0								
1106	Gray-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little to few sand, few to trace silt, very dense, dry	10	S-4	100	20-37-50/0.3'				
			S-5	100	17-50/0.3'				
1101	**(RESIDUAL)** 15.2	15	S-6	100	50/0.2'				
	Gray and brown medium- to coarse-grained SANDSTONE, moderately to highly weathered, very broken to massive (generally very broken to moderately broken), medium hard to hard, few carbonaceous laminations, some water staining, vuggy -MOHs 6.5 at 16.5'		R-1	90 (0)					
1096	-clay seam from 20.3' to 20.4'	20							
	-MOHs 7.5 at 22'		R-2	100 (16)					
1091	26.0	25							
	Dark gray and brown-gray CARBONACEOUS SHALE, highly weathered, very broken and fractured, very soft to soft -MOHs 3.5 at 27'		R-3	100 (0)					
1086	29.9	30							
	Gray fine-grained SANDSTONE, slightly weathered, very broken to massive, medium hard to hard, many carbonaceous laminations -MOHs 7.5 at 32'		R-4	167 (53)					
	33.2								
	Boring Terminated at 33.2 feet								
1081		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-90

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly cloudy, 75 to 80 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1114.2'	FILL sampled as brown sandstone fragments, few sand, medium dense, dry		S-1	93	7-9-9 (18)				
	(FILL) 3.0								
	Brown DECOMPOSED micaceous SANDSTONE sampled as sandstone fragments, trace sand, dense to very dense, dry		S-2	100	5-19-20 (39)				
1109		5							
	(RESIDUAL) 6.8		S-3	100	34-50/0.3'				
	Brown to gray fine to medium-grained micaceous SANDSTONE, moderately to slightly weathered, thickly laminated to thinly bedded, very broken to blocky, hard -few shaley zones from 6.8' to 15.0'		R-1	78 (0)					
1104		10							
	-MOHs 7.5 at 8'		R-2	80 (0)					
1099	-lost water return at 14.0'	15							
	-highly weathered, soft from 15.5' to 16.3'		R-3	100 (26)					
	-MOHs 8.5 at 18'								
1094		20							
	20.7 Orange-brown medium to coarse-grained SANDSTONE, moderately weathered, medium bedded, moderately broken to blocky, hard, few carbonaceous laminations and inclusions		R-4	94 (24)					
	-MOHs 8.5 at 23' 23.2								
1089	Brown to gray INTERBEDDED fine-grained SANDSTONE and SHALE, slightly to moderately weathered, thinly to thickly laminated, very broken to massive, medium hard to hard, few carbonaceous laminations, few vugs	25							
			R-5	100 (0)					
1084	-MOHs 8.5 at 29'	30							
	-MOHs 7.5 at 32'		R-6	100 (64)					
1079	35.0	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-90

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly cloudy, 75 to 80 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown and gray fine to medium-grained micaceous SANDSTONE, fresh to moderately weathered, thickly laminated to medium bedded, moderately broken to massive, hard								
		-MOHs 7.5 at 37'		R-7	100 (52)					
1074		-few shale and carbonaceous laminations from 39.0' to 40.0'	40							
		-MOHs 8.5 at 42'		R-8	98 (74)					
		-few shale and carbonaceous laminations from 42.0' to 43.5'								
1069			45							
				R-9	98 (76)					
		-few shale and carbonaceous laminations from 47.5' to 49.5'								
1064			50							
		-few vugs from 52.0' to 52.5'								
		-0.1" thick coal lamination at 52.3'		R-10	100 (70)					
		-MOHs 8.5 at 53'								
		-few shale and carbonaceous laminations from 51.5' to 54.0' 54.0								
1059		Boring Terminated at 54.0 feet Boring collapsed at 15.6' after 24 Hours	55							
1054			60							
1049			65							
1044			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-91

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly cloudy, 80 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 38.5'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1110.5'	FILL sampled as brown sand, some gravel (sandstone fragments), little to some silt, loose to firm, moist		S-1	80	2-3-3 (6)		8.2		
			S-2	100	2-4-3 (7)		10.4		
1106		5				28.61			
			S-3	100	3-4-4 (8)		18.1		
1101		10	S-4	100	7-6-7 (13)		7.8		
	(FILL) 12.0		S-5	100	50/0.2'				
	Brown decomposed SANDSTONE sampled as sandstone fragments, few sand, very dense, dry								
1096		15							
	(RESIDUAL) 15.9		S-6	100	33-50/0.4'				
	Brown fine to medium-grained SANDSTONE, micaceous, moderately weathered, thickly laminated to thinly bedded, broken to blocky, hard -lost drill water return at 16.0' -MOHs 7.5 at 17' 18.8		R-1	100 (8)					
1091	Orange-brown to brown medium to coarse-grained SANDSTONE, moderately weathered, thickly to medium bedded, very broken to broken, hard -MOHs 7.5 at 20' -dark gray shale interbed from 21.3' to 22.6'	20							
	-vuggy from 22.6' to 26.4'		R-2	96 (0)					
1086	-MOHs 8.5 at 25'	25							
	26.3								
	Dark gray SHALE, slightly weathered, thinly laminated, broken to blocky, medium hard -MOHs 5.5 at 28'		R-3	96 (18)					
1081		30							
	-carbonaceous from 30.6' to 30.9' 30.9								
	Brown to gray fine to medium-grained SANDSTONE, few shale laminations, moderately weathered, broken, medium hard 32.8 -MOHs 7.5 at 31.5'		R-4	68 (22)					
1076	Brown-gray medium to coarse-grained SANDSTONE, completely to moderately weathered, very broken to blocky, very soft to hard	35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-91

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly cloudy, 80 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 38.5'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		35.9								
		VOID -MOHs >9 at 34'								
1071			40							
		42.2								
		Brown to gray fine- to medium-grained SANDSTONE, micaceous, thickly laminated to thinly beddded, very broken to massive, very soft to hard -very soft, vertical fracture from 43.0' to 44.7'		R-5	92 (0)					
1066			45							
		-MOHs 6.5 at 42.5'								
		-carbonaceous laminations and inclusions from 47.5' to 50.0'		R-6	100 (68)					
		-MOHs 8.5 at 49'								
1061		50.0	50							
		Boring Terminated at 50.0 feet								
1056			55							
1051			60							
1046			65							
1041			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-92

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 75-80°, Partly Cloudy
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1097'	TOPSOIL 0.5								
	Brown SANDSTONE FRAGMENTS (GP), little sand, medium dense, dry 2.0		S-1	67	2-6-9 (15)				
	(RESIDUAL)								
	Brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, firm to very dense, dry		S-2	87	14-10-8 (18)				
1092		5							
			S-3	87	10-6-6 (12)				
	(RESIDUAL) 9.6		S-4	100	32-50/0.1'				
1087	Brown and orange-brown medium- to coarse-grained SANDSTONE, moderately weathered, thinly to medium bedded, few vugs, broken to massive, very hard	10	R-1	100 (74)					
	-MOHs 8.5 at 10.5'								
1082		15	R-2	100 (58)					
	-MOHs 8.5 at 19'								
1077		20	R-3	94 (28)					
	22.5								
	Dark gray to gray INTERBEDDED fine-grained SANDSTONE and SHALE, highly to slightly weathered, thinly to thickly laminated, very broken, very soft to medium hard 23.6								
1072	-MOHs 2.5 at 23.5'	25	R-4	98 (0)					
	Brown and gray fine to medium-grained micaceous SANDSTONE, micaceous, slightly to moderately weathered, thickly laminated to thinly bedded, very broken to massive, medium hard to hard, siltstone and carbonaceous inclusions								
	-some vugs from 27.0' to 29.2'								
1067		30							
	-MOHs 4.5 at 30.8'		R-5	100 (16)					
	-MOHs 5..5 at 33'								
1062		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-92

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 75-80°, Partly Cloudy
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown and gray fine to medium-grained micaceous SANDSTONE, micaceous, slightly to moderately weathered, thickly laminated to thinly bedded, very broken to massive, medium hard to hard, siltstone and carbonaceous inclusions *(continued)*		R-6	100 (26)					
		-vertical fracture from 35.0' to 37.0'								
		-MOHs 6.5 at 37'	38.0							
1057		Boring Terminated at 38.0 feet Collapsed at 13.6' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	40							
1052			45							
1047			50							
1042			55							
1037			60							
1032			65							
1027			70							

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GARVIN BOWARD BEITKO

Test Boring Record

B-93

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 82°, Partly Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1080'		Brown and gray randomly oriented SANDSTONE FRAGMENTS (GP), few to little sand, few silt, loose to medium dense, dry		S-1	67	1-2-5 (7)				
				S-2	100	12-11-8 (19)				
1075			5							
				S-3	100	9-7-6 (13)				
		(COLLUVIAL) 9.0								
1070		Brown DECOMPOSED micaceous SANDSTONE sampled as sandstone fragments, trace sand, very dense, dry	10	S-4	100	50/0.3'				
		(RESIDUAL) 12.8		S-5	100	49-50/0.3'				
1065		Boring Terminated at 12.8 feet Boring Collapsed at 10.3' after 24 Hours. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	15							
1060			20							
1055			25							
1050			30							
1045			35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-94

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours: 16.4'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1047'	Brown and gray rock fragments, some sand, little silt, loose, dry		S-1	53	1-2-4 (6)		12.3		
	(COLLUVIAL) 3.0								
1042	Brown SAND (SM), some silt, few rock fragments (generally small and coarse sand-sized sandstone and shale), loose, moist	5	S-2	80	2-3-4 (7)		7.1		
	(COLLUVIAL) 6.0								
	Brown-gray and brown SANDSTONE FRAGMENTS, little to some sand, few silt, medium dense to dense, dry		S-3	47	9-9-16 (25)		5.2		
1037		10	S-4	100	8-8-13 (21)		6.7		
			S-5	100	40-31-12 (43)		9.7		
1032	**(COLLUVIAL)** 15.0	15							
	Gray and orange-brown mottled CLAY to silty CLAY (CL/ML), very stiff, moist, (completely decomposed claystone)		S-6	100	5-7-11 (18)		21.4		
			S-7	100	13-16-15 (31)		19.9		
1027		20							
			S-8	80	7-12-17 (29)		18.1		
	(RESIDUAL) 24.0								
1022	Gray and light brown DECOMPOSED shaley CLAYSTONE, sampled as clay, little to some sand, trace gravel (claystone fragments), extremely stiff, dry	25	S-9	100	49-50/0.4'	73.17	11.5	36	22
	(RESIDUAL) 27.6		S-10	100	37-50/0.1'		8.5		
1017	Boring Terminated at 27.6 feet Bench was cut into slope for rig. Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	30							
1012		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-95

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1066'	Light brown clayey SILT (ML), few rock fragments (shale, pink shale, orange-brown sandsotne), stiff, moist		S-1	67	1-4-5 (9)				
	(COLLUVIAL) 3.0								
1061	Orange-brown and light brown SANDSTONE FRAGMENTS (GP), little sand, few silt, loose, moist, micaceous	5	S-2	100	7-4-5 (9)				
	(POSSIBLE COLLUVIAL/RESIDUAL) 6.0								
	Orange-brown and light brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few to little sand, few silt, very dense, moist, micaceous		S-3	100	5-20-50/0.4'				
	(RESIDUAL) 9.2								
1056	Boring Terminated at 9.2 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project. Boring collapsed at 3.8' after 24 Hours	10	S-4	100	50/0.2'				
1051		15							
1046		20							
1041		25							
1036		30							
1031		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-96

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1067'		Brown SAND (SM), some silt, little rock fragments (shale, orange sandstone, red sandstone), loose to medium dense, moist		S-1	53	1-4-5 (9)				
				S-2	67	9-11-9 (20)				
1062			5							
				S-3	100	26-8-9 (17)				
		(COLLUVIAL) 9.0								
1057		Reddish-brown and brown to gray-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, few sand, few silt, very dense, dry	10	S-4	100	50/0.3'				
		(RESIDUAL) 12.2		S-5	100	50/0.2'				
1052		Boring Terminated at 12.2 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project. Boring collapsed at 4.2' after 24 Hours	15							
1047			20							
1042			25							
1037			30							
1032			35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

B-97

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 70's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours: 11.7'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1067.3'	Light brown SILT (ML), little sand, trace small rock fragments (orange sandstone, shale), medium, dry		S-1	80	1-2-3 (5)				
	(COLLUVIAL) 3.0								
1062	Orange-brown and brown SANDSTONE FRAGMENTS (GP), little to some sand, few silt, micaceous, loose to very dense, dry	5	S-2	100	13-12-8 (20)				
			S-3	100	11-7-7 (14)				
	(COLLUVIAL) 9.0								
1057	Orange-brown and brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little to some sand, few silt, micaceous, loose to very dense, dry	10	S-4	100	16-50/0.4'				
			S-5	53	33-18-22 (40)				
1052		15	S-6	100	11-13-15 (28)				
			S-7	100	9-7-3 (10)				
1047		20							
	(COLLUVIAL) 22.0		S-8	100	8-20-20 (40)				
	Orange-brown and brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little to some sand, few silt, micaceous, dense to very dense, dry								
	(RESIDUAL) 24.3		S-9	100	50/0.3'				
1042	Boring Terminated at 24.3 feet	25							
1037		30							
1032		35							

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GARVIN BOWARD BEITKO

Test Boring Record

B-98

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-20-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-20-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Cloudy, 80's
Water Level Upon Completion:
Drilling Method: 3 1/4-inch HSA
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1064'	Light brown SILT (ML), some sand, few small rock fragments (orange-brown shale, shale, sandstone), very soft, moist		S-1	40	1-1-1 (2)		11.6		
	(COLLUVIAL) 3.0								
	Light orange-brown SAND (SM), little silt, little rock fragments (sandstone), medium dense, moist		S-2	100	19-10-9 (19)		7.8		
1059		5				20.1			
			S-3	100	16-9-9 (18)		6.9		
	(POSSIBLE COLLUVIAL/RESIDUAL) 9.0								
1054	Brown and orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, medium dense to very dense, dry	10	S-4	100	13-13-17 (30)				
			S-5	80	9-13-20 (33)				
1049		15							
	(RESIDUAL) 15.9		S-6	100	37-50/0.4'				
	Boring Terminated at 15.9 feet Boring collapsed at 4.5' after 24 Hours								
1044		20							
1039		25							
1034		30							
1029		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-1

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1084.1'	TOPSOIL 0.3								
	Brown-yellow SILT (ML), some sand, trace rock fragments, medium, dry		S-1	67	1-1-5 (6)		10.3		
	(RESIDUAL) 3.5								
	Yellow-brown SAND (SM), some silt, little gravel, iron staining, relic bedding, medium dense, dry		S-2	100	4-14-17 (31)		9.0		
1079		5				32.42			
	(RESIDUAL) 7.5		S-3	100	13-12-8 (20)		7.2		
	Brown-gray DECOMPOSED SANDSTONE; sampled as sandstone fragments, some sand, very dense, dry to moist								
	(RESIDUAL) 9.4		S-4	100	50/0.4'				
1074	Brown-gray medium-grained SANDSTONE, moderately weathered, extensive iron staining, medium bedded, moderately broken, medium hard	10							
	-MOHs 7.5 at 11'		R-1	58 (0)					
	-lost water return at 12.0'								
1069		15							
			R-2	80 (14)					
	-few O.5" to 1.0" vugs from 18.0' to 22.0'								
1064		20							
			R-3	84 (32)					
	-MOHs 7.5 at 23.5'								
	24.4								
1059	Boring Terminated at 24.4 feet Boring collapsed at 4.9' after 24 Hours	25							
1054		30							
1049		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-2

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 70's, Hazy
Water Level Upon Completion: 9.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 5.2'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1095.1'	FILL: sampled as brown silty sand, little rock and brick fragments, loose, moist		S-1	80	1-2-4 (6)				
	(FILL) 3.0								
1090	Brown DECOMPOSED SHALE; sampled as shale fragments (GP), few silt, few clay, medium dense, moist	5	S-2	100	10-10-9 (19)				
	(RESIDUAL) 6.0								
	Brown DECOMPOSED sandy SHALE; sampled as shale fragments (GP), medium to very dense, dry		S-3	80	7-7-8 (15)				
1085	**(RESIDUAL)** 10.1	10	S-4	100	16-32-50/0.1'				
	Brown fine- to medium-grained micaceous SANDSTONE, moderately weathered, medium bedded, very broken to massive, medium hard to hard		R-1	100 (46)					
1080	-vugs from 12.4' to 13.4'	15							
	-MOHs 8.5 at 16'		R-2	98 (66)					
1075		20							
	21.0								
	Brown and gray medium- to coarse-grained SANDSTONE, moderately weathered, medium to thickly bedded, broken to massive, hard		R-3	96 (46)					
1070	-MOHs 8.5 at 24' 25.1	25							
	Boring Terminated at 25.1 feet								
1065		30							
1060		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-3

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly sunny, 77 Degrees
Water Level Upon Completion: 4.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G./L. Barnes, E.I.T.
Water Level After 24 Hours: 7.5'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1100'	FILL: sampled as brown silty sand, few yellow-brown rock fragments (sandstone, shale), dry		S-1	53	1-2-2 (4)				
	-trace organics from 0.0' to 1.5'								
			S-2	100	5-7-11 (18)				
1095	**(FILL)**	5							
	Light gray and orange-brown DECOMPOSED medium to coarse-grained SANDSTONE; sampled as sandstone fragments, little sand, medium dense, dry	6.0	S-3	100	11-18-21 (39)				
	(RESIDUAL)	7.0							
1090	Dark gray DECOMPOSED SANDSTONE; sampled as sandstone fragments, little sand, medium dense, dry	9.0	S-4	100	20-32-38 (70)				
	(RESIDUAL)	10							
	Brown-gray DECOMPOSED SHALE; sampled as shale fragments, very dense, dry		S-5	100	50/0.4'				
	(RESIDUAL)	12.0							
1085	Brown DECOMPOSED fine-grained SANDSTONE; sampled as sandstone fragments, trace sand, very dense, dry	15	S-6	100	50/0.2'				
	(RESIDUAL)	15.2							
	Brown medium to coarse-grained SANDSTONE, moderately weathered, very broken to massive (generally massive), medium to hard (generally hard)		R-1	100 (68)					
	-MOHs 6.5 at 16'								
1080		20							
			R-2	100 (88)					
1075		25							
	-MOHs 7.5 at 26'		R-3	82 (26)					
	-vertical fracture from 26.8' to 26.9'								
	-high angle fracture from 28.5' to 28.7'								
1070	-very broken to blocky from 26.6' to 30.2' with water stained fractures	30							
		30.2							
	Boring Terminated at 30.2 feet Offset Appox. 7' downslope. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project.								
1065		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-4

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Hazy, 74 to 78 Degrees
Water Level Upon Completion: 44.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1115'	FILL: sampled as brown and gray rock fragments (sandstone, shale), few sand, few silt, very loose, moist		S-1	53	3-2-2 (4)				
	(FILL)	3.0							
	FILL: sampled as brown rock fragments (sandstone, red shale), little to some sand, loose to firm, dry to wet		S-2	80	4-6-7 (13)				
1110		5	S-3	100	11-6-5 (11)				
1105		10	S-4	100	9-7-5 (12)				
			S-5	100	3-4-7 (11)				
1100		15	S-6	100	10-4-5 (9)				
			S-7	100	6-3-2 (5)				
1095		20							
	-wet from 21.0' to 22.0'		S-8	80	3-3-5 (8)				
	(FILL)	22.0							
	Brown coarse-grained SANDSTONE FRAGMENTS (GP), some sand, firm, dry								
	(RESIDUAL)	24.7							
1090	Brown-gray clayey SILT (ML), trace shale fragments, stiff, moist	25	S-9	100	11-8-8 (16)				
	(RESIDUAL)	27.0							
	Gray-brown DECOMPOSED SHALE; sampled as soft shale fragments, little silt, few clay, medium dense, moist		S-10	100	11-12-17 (29)				
	(RESIDUAL)	28.3							
1085	Gray and brown-orange DECOMPOSED SANDSTONE; sampled as sandstone fragments, some sand, very dense, dry	30							
	(RESIDUAL)	30.4	S-11	100	50/0.4'				
	Brown fine to medium-grained SANDSTONE, highly weathered, thickly laminated, very broken, soft -MOHs <2 at 31' -no drill water return from 30.4' to 45.4'	33.0	R-1	54 (0)					
	Brown INTERBEDDED fine-grained SANDSTONE and SHALE, moderately weathered, thinly to thickly laminated, very broken to	34.5							
1080		35							

(Continued Next Page)

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GARVIN BOWARD BEITKO

Test Boring Record

SB-4

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Hazy, 74 to 78 Degrees
Water Level Upon Completion: 44.3'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		moderately broken, medium hard -MOHs 3.5 at 33.5'								
		Brown fine to medium-grained SANDSTONE, moderately weathered, medium bedded, moderately broken to massive, hard *(continued)* -MOHs 8.5 at 37.5'		R-2	82 (40)					
1075			40							
		-soft, highly weathered shale 40.4' to 40.7'		R-3	100 (50)					
1070		-MOHs >9 at 45'	45							
		45.4 Boring Terminated at 45.4 feet Offset 15' Uphill. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project. Boring collapsed at 4.2' after 24 Hours								
1065			50							
1060			55							
1055			60							
1050			65							
1045			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-5

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 70's
Water Level Upon Completion: 28'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1079.1'	Light brown SILT (ML), little to some sand, few to little gravel, trace roots, medium, moist		S-1	100	1-2-3 (5)	58.05	12.8		
	(COLLUVIAL)	3.0							
	Orange-brown SAND (SM), little silt, some gravel, firm to medium dense, moist		S-2	100	14-17-13 (30)		9.4		
1074		5							
			S-3	100	9-8-6 (14)	16.06	12.5		
1069		10	S-4	100	10-8-7 (15)		12.7		
	(POSSIBLE COLLUVIAL/RESIDUAL)	12.0							
	Orange-brown and gray-brown mottled silty CLAY (CL/ML), relic bedding, hard, dry		S-5	100	15-23-48 (71)				
1064	**(RESIDUAL)**	15.0	15						
	Orange-brown SAND (SM), some silt, little rock fragments, moist	15.8	S-6	100	17-50/0.3'				
	(RESIDUAL)								
	Orange-brown medium to coarse-grained SANDSTONE, moderately to highly weathered, very broken to massive, soft to hard, vuggy in places, micaceous -MOHs 2.5 at 16' -vertical fracture from 17.0' to 17.7'		R-1	88 (26)					
1059		20							
	-very soft silty sand seam from 20.0' to 20.2' -grading to brown at 20.0'								
	-MOHs 6.5 at 22'		R-2	94 (26)					
1054		25							
	-vertical fracture from 24.7' to 25.5'								
	-grading to gray and brown at 26.4', water stained, few low angle fractures -MOHs 7.5 at 26'		R-3	100 (56)					
1049		30							
		30.8							
	Boring Terminated at 30.8 feet Boring collapsed at 15.2' after 24 Hours								
1044		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-6

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Overcast, 80's
Water Level Upon Completion: 31.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1103.1'	TOPSOIL 0.4								
	Orange brown SAND (SP), medium-grained, loose, moist		S-1	80	1-1-2 (3)				
	(RESIDUAL) 3.5								
1098	Brown-gray DECOMPOSED SANDSTONE; sampled as sandstone fragments (GP), some gray sand, dense to very dense, moist	5	S-2	93	6-12-10 (22)				
			S-3	100	12-11-11 (22)				
1093	**(RESIDUAL)** 9.8	10	S-4	100	34-50/0.3'				
	Brown gray SANDSTONE, slightly weathered to moderately weathered, medium to coarse-grained, moderately broken, medium hard, extensive iron staining, micaceous, medium bedded to massive		R-1	46 (26)					
1088	-MOHs >9 at 11'	15							
			R-2	72 (10)					
1083		20							
	-MOHs 7.5 at 22'		R-3	100 (56)					
1078		25							
			R-4	100 (46)					
1073	-vertical fracture from 29.7' to 30.5'	30							
	-MOHs 8.5 at 31'		R-5	100 (47)					
	32.8								
	Boring Terminated at 32.8 feet								
1068		35							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

SB-7

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 85 Degrees
Water Level Upon Completion: 36.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 42.1'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1115.7'	Brown micaceous SANDSTONE FRAGMENTS (GP), few to little sand, loose, dry		S-1	67	2-3-5 (8)				
			S-2	87	7-6-4 (10)				
1111	**(RESIDUAL)** 6.0	5							
	Brown DECOMPOSED SANDSTONE; sampled as micaceous sandstone fragments, few sand, trace silt, medium dense to very dense, dry		S-3	100	5-6-12 (18)				
1106	**(RESIDUAL)** 10.0	10	S-4	100	50/0.2'				
	Brown fine to medium-grained micaceous SANDSTONE, moderately weathered, thinly bedded, moderately broken to blocky, hard -no drill water return from 10.0' to 44.0' -medium to coarse-grained from 11.6' to 15.0' -MOHs 8.5 at 12'		R-1	76 (30)					
1101		15							
	17.0								
	Brown SHALE, completely weathered, very broken, very soft -MOHs <2 at 17.5' 18.0		R-2	76 (0)					
	Black CARBONACEOUS SHALE, highly weathered, thinly lamianted, very broken, very soft -MOHs 2.5 at 18.2'								
1096	20.0	20							
	Gray DECOMPOSED SHALE, highly weathered, thinly laminated, very soft -MOHs <2 at 22' 22.4		R-3	100 (32)					
	Brown fine to medium-grained SANDSTONE, highly to moderately weathered, thinly to medium bedded, very broken to massive, medium hard to hard -MOHs 4.5 at 22.6' -MOHs 6.5 at 24' 24.8								
1091		25							
	Brown medium to coarse-grained SANDSTONE, moderately weathered, moderately broken to blocky, hard -heavily water stained, high angle fracture from 25.4' to 26.0' -MOHs 7.5 at 29'		R-4	92 (22)					
1086		30							
	-few vugs from 32.0' to 35.0' -MOHs 8.5 at 34'		R-5	68 (18)					
1081	35.0	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-7

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 85 Degrees
Water Level Upon Completion: 36.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 42.1'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1076		Brown fine to medium-grained SANDSTONE, moderately weathered, thinly to medium bedded, moderately broken to massive, hard	40	R-6	94 (52)					
		-MOHs 7.5 at 37'		R-7	80 (100)					
		44.0								
1071		Boring Terminated at 44.0 feet	45							
1066			50							
1061			55							
1056			60							
1051			65							
1046			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-8

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion: 17.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1115'	TOPSOIL 0.4		S-1	80	1-3-5 (8)				
	Orange-brown medium-grained SAND (SP), trace silt, loose, moist								
	(RESIDUAL) 3.0								
	Orange-brown SAND (SM), little silt, few gravel gravel (sandstone fragments), firm to medium dense, moist		S-2	100	8-8-8 (16)		9.4		
1110		5				21.08			
			S-3	80	8-6-6 (12)		9.5		
	(RESIDUAL) 8.0								
	Gray DECOMPOSED SANDSTONE; sampled as sandstone fragments (GP), some sand, medium dense to very dense, moist								
1105		10	S-4	100	9-11-12 (23)				
			S-5	100	8-50/0.4'				
1100	**(RESIDUAL)** 15.3	15	S-6	100	50/0.3'				
	Brown-gray medium-grained SANDSTONE, moderately weathered, micaceous, medium bedded, soft to medium hard 15.8								
	Gray CLAYSTONE, slightly weathered, micaceous, medium bedded, very soft		R-1	50 (0)					
1095	-MOHs <2 at 17'	20							
	-lost water return at 21.0'		R-2	86 (0)					
	Medium-gray clayey SHALE, slightly weathered, micaceous, thinly to medium bedded, soft 21.8								
1090	-MOHs 3.5 at 24' 24.7	25							
	Gray SANDSTONE, slightly weathered, thinly to medium bedded, carbonaceous laminations, some iron staining, slightly broken, medium hard		R-3	100 (0)					
1085	-MOHs 7.5 at 27'	30							
	-moderately weathered, broken, and extensive iron staining from 30.5' to 32.8'		R-4	80 (22)					
1080	-MOHs 8.5 at 34'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-8

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion: 17.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray SANDSTONE, slightly weathered, thinly to medium bedded, carbonaceous laminations, some iron staining, slightly broken, medium hard *(continued)*								
1075			40	R-5	100 (56)					
		-MOHs 8.5 at 41'								
		43.3		R-6	58 (8)					
1070		Boring Terminated at 43.3 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.	45							
1065			50							
1060			55							
1055			60							
1050			65							
1045			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-9

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Hazy
Water Level Upon Completion: 45.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1117.5'	Fill: sampled as brown rock fragments, (sandstone, shale), little to some sand, loose, moist		S-1	27	3-5-4 (9)				
			S-2	80	4-4-4 (8)				
1113		5							
			S-3	80	9-6-5 (11)				
1108		10	S-4	40	4-4-3 (7)				
	(FILL)	12.0							
	Brown SANDSTONE FRAGMENTS (GP), little sand, loose to firm, moist		S-5	100	5-7-11 (18)				
1103	**(RESIDUAL)**	15.0	15						
	Brown and gray DECOMPOSED SANDSTONE; sampled as sandstone fragments (GP), little sand, medium dense to very dense, moist		S-6	100	12-10-11 (21)				
			S-7	100	7-9-11 (20)				
1098		20							
			S-8	100	23-50/0.4'				
	(RESIDUAL)								
1093		24.8	25	S-9	100	35-50/0.3'			
	Brown SANDSTONE, completely weathered, very soft	25.0							
	Brown-gray SHALE, completely to highly weathered, thinly laminated, very broken to broken, very soft to soft -completely weathered, very soft from 25.0' to 27.3' -MOHs 2.5 at 26'		R-1	100 (0)					
1088		30							
		31.0							
	Brown and gray interbedded fine-grained SANDSTONE and SHALE, slightly to moderately weathered, thinly to thickly laminated, very broken to blocky, few carbonaceous laminations, medium hard to hard -MOHs 4.5 at 31.5' -MOHs 7.5 at 34'		R-2	100 (8)					
1083		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-9

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Hazy
Water Level Upon Completion: 45.8'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown and gray interbedded fine-grained SANDSTONE and SHALE, slightly to moderately weathered, thinly to thickly laminated, very broken to blocky, few carbonaceous laminations, medium hard to hard *(continued)*								
		-vertical fracture and soft from 37.5' to 41.0'		R-3	50 (20)					
		-lost drill water return at 37'								
		39.5								
1078		Brown fine- to medium-grained SANDSTONE, moderately weathered, medium bedded, broken to massive, soft to medium hard, few coarse-grained zones	40							
		-few carbonaceous laminations		R-4	84 (46)					
		-MOHs >9 at 41'								
1073			45							
		-soft from 45.5' to 45.7'		R-5	100 (58)					
		46.0								
		Boring Terminated at 46.0 feet Boring collapsed at 21.9' after 24 Hours								
1068			50							
1063			55							
1058			60							
1053			65							
1048			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-10

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 70's
Water Level Upon Completion: 24.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1096'	TOPSOIL 0.3								
	Light brown SAND (SM), some silt, trace fine roots, loose to firm, moist		S-1	87	2-2-3 (5)				
			S-2	100	9-7-7 (14)				
1091		5							
	(COLLUVIAL) 6.0								
	Light brown and gray silty CLAY (CL/ML), few rock fragments (sandstone, shale), trace roots, very stiff, moist		S-3	100	8-9-16 (25)				
	(RESIDUAL) 9.0								
1086	Brown and orange-brown silty CLAY (CL/ML), trace fine sand, relic bedding, hard, dry	10	S-4	100	13-18-19 (37)				
	(RESIDUAL) 12.1								
	Gray-brown shaley SANDSTONE, moderately weathered, very broken to moderately broken, medium hard to hard		S-5	100	50/0.1'				
	-MOHs 7,5 at 14'		R-1	97 (0)					
1081	14.6	15							
	Brown medium to coarse-grained SANDSTONE, moderately to highly weathered, very broken to blocky, vuggy, medium hard to hard		R-2	100 (34)					
	-MOHs 8.5 at 18.5'								
1076	-several 0.5"-1.0"-diameter vugs from 18.0' to 22.0'	20							
	-very broken and fractured from 22.0' to 24.0'		R-3	72 (0)					
1071	25.1	25							
	Boring Terminated at 25.1 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project. Boring collapsed at 7.2' after 24 Hours								
1066		30							
1061		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-11

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 75 to 77 Degrees
Water Level Upon Completion: 22.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1105.2'		ASPHALTIC CONCRETE 0.2'		S-1	53	1-4-9 (13)				
		Orange-brown SANDSTONE FRAGMENTS (GP), few sand, firm, dry								
		(RESIDUAL) 3.0								
		Brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, medium dense to very dense, dry		S-2	80	21-9-7 (16)				
1100			5							
				S-3	100	26-15-23 (38)				
		(RESIDUAL) 9.9	10	S-4	100	36-50/0.4'				
1095		Orange-brown medium to coarse-grained SANDSTONE, moderately weathered, thinly bedded, very broken to moderately broken, soft to medium hard		R-1	42 (0)					
		-MOHs 8.5 at 10.2'								
1090		15.0	15							
		Gray and orange-brown fine to medium-grained micaceous SANDSTONE, highly to moderately weathered, thickly laminated to thinly bedded, moderately broken to blocky, soft to hard		R-2	56 (10)					
		-highly weathered, soft from 15.0' to 17.6'								
		-MOHs 5.5 at 17' 17.6								
		Brown medium to coarse-grained SANDSTONE, moderately weathered, medium bedded, very broken to massive, hard								
1085			20							
		-MOHs >9 at 20.5'		R-3	82 (14)					
		-lost drill water return at 21'								
1080			25							
		-MOHs >9 at 25'		R-4	100 (26)					
		-vuggy zones from 31' to 33'								
1075			30							
		-MOHs >9 at 32'		R-5	94 (16)					
		33.0								
		Boring Terminated at 33.0 feet								
1070			35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-12

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 78°-84°, Partly Sunny
Water Level Upon Completion: 29.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1114'	TOPSOIL 0.5		S-1	67	2-2-3 (5)				
	Orange-brown micaceous SANDSTONE FRAGMENTS (GP), few sand, trace silt, loose, dry								
	(RESIDUAL) 3.0								
	Orange-brown SAND (SM), little silt, few gravel (sandstone fragments), medium dense, dry		S-2	100	12-12-12 (24)		5.4		
1109		5				24.47			
			S-3	100	14-11-10 (21)		5.3		
	(RESIDUAL) 9.0								
1104	Orange-brown micaceous DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, trace silt, medium dense to very dense, dry	10	S-4	100	50/0.4'				
	(RESIDUAL) 12.2		S-5	100	50/0.2'				
	Brown and gray medium- to coarse-grained SANDSTONE, moderately to completely weathered, thinly to medium bedded, very broken to broken, very soft to medium hard		R-1	71 (0)					
1099	-vertical fracture from 13.0' to 13.5'	15							
	-MOHs 5.5 at 13.6'								
	-no drill water return from 12.2' to 42.0'		R-2	80 (0)					
	-very soft, completely weathered from 16.0' to16.5' 16.5								
	Brown interbedded fine-grained SANDSTONE and SHALE, highly weathered, thinly to thickly laminated, very broken, soft								
1094	-MOHs <2 at 17'	20							
	21.0		R-3	84 (0)					
	Brown medium- to coarse-grained SANDSTONE, moderately weathered, thinly to medium bedded, very broken to massive, hard, some cross bedding								
	-highly weathered from 21.0' to 30.0'								
	-vugs from 22.0' to 23.0'								
1089	-MOHs >9 at 24'	25							
	-vugs from 27.0' to 27.3'		R-4	100 (60)					
	-MOHs 8.5 at 28'								
1084		30							
			R-5	100 (64)					
1079	-vugs from 34.0' to 34.7'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-12

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 78°-84°, Partly Sunny
Water Level Upon Completion: 29.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown medium- to coarse-grained SANDSTONE, moderately weathered, thinly to medium bedded, very broken to massive, hard, some cross bedding *(continued)*								
				R-6	100 (56)					
1074		-MOHs 8.5 at 38'	40							
				R-7	30 (25)					
			42.0							
		Boring Terminated at 42.0 feet Offset Approx. 11.5' North. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project. Boring collapsed at 32.9' after 24 Hours								
1069			45							
1064			50							
1059			55							
1054			60							
1049			65							
1044			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-13

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 70 to 74 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1113.1'	Brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, medium to very dense, dry		S-1	67	1-7-20 (27)				
			S-2	100	17-50/0.1'				
1108		5							
	(RESIDUAL) 6.2		S-3	100	50/0.2'				
	Brown fine to medium-grained micaceous SANDSTONE, highly to moderately weathered, thinly bedded, very broken to blocky, soft to hard		R-1	80 (10)					
	-lost water return at 7.0'								
1103	-soft from 8.0' to 8.7'	10							
	-MOHs 6.5 at 10'								
	11.3								
	Brown medium to coarse-grained micaceous SANDSTONE, moderately weathered, very broken to blocky, hard		R-2	92 (16)					
	-few fractured zones								
1098		15							
	-MOHS 6.5 at 14'								
	17.4								
	Brown fine to medium-grained SANDSTONE, highly to moderately weathered, thinly bedded, very broken to moderately broken, soft to medium hard		R-3	90 (0)					
	-soft, highly weathered from 19.4' to 19.9'								
1093		20							
	20.8								
	Black CARBONACEOUS SHALE, highly weathered, thinly laminated, very broken, soft, possible pyrite 21.5								
	-MOHs 2.5 at 21'								
	Gray-brown SHALE, highly to completely weathered, thinly laminated, very broken to moderately broken, soft 24.0		R-4	100 (0)					
	-MOHs <2 at 22'								
1088		25							
	Brown fine to medium-grained SANDSTONE, moderately weathered, moderately broken, medium hard to hard 26.2								
	-MOHs 8.5 at 25'								
	-vuggy from 25.5' to 26.0' 27.0								
	Dark gray SHALE, moderately weathered, thinly laminated, very broken, soft		R-5	100 (12)					
	Brown medium to coarse-grained SANDSTONE, moderately weathered, medium bedded, moderately broken to massive, hard, few vertical fractures								
1083		30							
	-many vugs and carbonaceous inclusions from 31.3' to 34.5'								
	-MOHs >9 at 31.5'		R-6	100 (16)					
1078		35							

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BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

SB-13

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 70 to 74 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown medium to coarse-grained SANDSTONE, moderately weathered, medium bedded, moderately broken to massive, hard, few vertical fractures *(continued)*								
1073		-MOHs 8.5 at 38'	40	R-7	96 (0)					
		41.0								
		Boring Terminated at 41.0 feet Boring collapsed at 15' after 24 Hours								
1068			45							
1063			50							
1058			55							
1053			60							
1048			65							
1043			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

SB-14

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 67 to 70 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1113.4'	Brown DECOMPOSED micaceous SANDSTONE; sampled as sandstone fragments, few sand, medium dense to very dense, dry		S-1	80	1-4-17 (21)				
			S-2	100	16-40-50/0.3'				
1108		5							
	(RESIDUAL)		S-3	100	50/0.3'				
		6.3							
	Brown fine to medium-grained micaceous SANDSTONE, moderately weathered, thinly bedded, very broken to blocky, medium hard		R-1	82 (8)					
	-MOHs 4.5 at 8.5'								
1103		10							
		11.1							
	Brown SHALE, completely to highly weathered, thinly laminated, very broken, very soft		R-2	74 (0)					
		13.0							
	Brown fine to medium-grained SANDSTONE, moderately weathered, thinly bedded, very broken to blocky, hard								
1098		15							
	-few vugs, medium to coarse-grained from 14.0' to 15.0'								
	-MOHs 7.5 at 19'		R-3	100 (0)					
1093		20							
		20.4							
	Brown to dark gray SHALE, highly weathered, thinly laminated, very broken, soft								
	-MOHs <2 at 21.2'	21.5							
	Brown INTERBEDDED fine-grained SANDSTONE and SHALE, moderately weathered, thinly to thickly laminated, very broken to massive, medium hard , some carbonaceous laminations		R-4	100 (10)					
	-MOHs 2.5 at 22.3'								
1088		25							
	-few vertically fractured zones								
	-MOHs 6.5 at 24'								
		27.0							
	Brown medium to coarse-grained SANDSTONE, moderately weathered, moderately broken to massive, hard, few carbonaceous laminations		R-5	92 (28)					
1083		30							
	-MOHs 8.5 at 31'								
			R-6	100 (32)					
1078		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-14

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: Partly cloudy, 67 to 70 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown medium to coarse-grained SANDSTONE, moderately weathered, moderately broken to massive, hard, few carbonaceous laminations *(continued)*								
1073			40	R-7	74 (46)					
		-MOHs 8.5 at 41'								
		41.3								
		Boring Terminated at 41.3 feet Boring collapsed at 4.2' after 24 Hours								
1068			45							
1063			50							
1058			55							
1053			60							
1048			65							
1043			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-15

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1114.3'	TOPSOIL 0.4		S-1	67	1-2-6 (8)				
	Orange-brown medium-grained SAND (SP), loose, moist								
	(RESIDUAL) 3.0								
	Gray DECOMPOSED SANDSTONE; sampled as sandstone fragments, some sand, medium dense to very dense, iron stained, moist		S-2	100	3-11-13 (24)				
1109		5							
			S-3	100	11-17-14 (31)				
1104		10	S-4	100	34-44-33 (77)				
			S-5	100	50/0.4'				
1099	**(RESIDUAL)** 15.4	15	S-6	100	50/0.4'				
	Brown-gray medium- to coarse-grained SANDSTONE, moderately weathered, medium bedded, micaceous, iron stained, slightly broken, medium hard		R-1	80 (30)					
	-MOHs 5.5 at 16'								
1094		20							
	22.3								
	Medium gray CLAYSTONE, fresh, medium bedded, very soft 23.2		R-2	100 (14)					
	Medium gray SILTSTONE, slightly weathered to fresh, medium bedded, slightly broken, medium hard								
1089	-shaley zone from 24.3' to 24.4'	25							
	-MOHs 6.5 at 25'		R-3	100 (36)					
	27.6								
	Gray fine- to medium-grained SANDSTONE, moderately weathered to fresh, iron stained, highly broken and weathered, hard								
1084		30							
	-MOHs 8.5 at 29'		R-4	100 (0)					
	-iron stained, vertical fracture, microlaminated from 34.8' to 35.9'								
1079		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-15

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray fine- to medium-grained SANDSTONE, moderately weathered to fresh, iron stained, highly broken and weathered, hard *(continued)*								
		-coarse-grained, highly broken, vuggy, and fractured from 35.0' to 37.0'		R-5	46 (0)					
1074		-MOHs >9 at 36'	40							
		-vertical fracture from 41.9' to 42.5'		R-6	100 (0)					
		43.4								
1069		Boring Terminated at 43.4 feet	45							
1064			50							
1059			55							
1054			60							
1049			65							
1044			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-16

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's, Hazy
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1109'	Brown and orange-brown SAND (SM), some silt, little rock fragments (sandstone), loose, dry		S-1	67	2-3-4 (7)				
	(RESIDUAL) 3.0								
	Gray-brown DECOMPOSED SANDSTONE; sampled as medium- to course-grained sandstone fragments, little to some sand, little to few silt, dense to very dense, dry		S-2	100	11-21-36 (57)				
1104		5							
			S-3	100	28-23-15 (38)				
	(RESIDUAL) 9.4								
1099	Orange-brown coarse-grained SANDSTONE, highly weathered, very broken to moderately broken, medium hard to hard, vuggy 10.4	10	S-4	100	50/0.4'				
	-MOHs >9 at 10'		R-1	68 (0)					
	Gray and brown CARBONACEOUS fine sandy SHALE, moderately to highly weathered, very broken to moderately broken, very soft to medium hard								
	-clay seam from 10.6' to 10.8'								
1094	-MOHs 7.5 at 14.5'	15	R-2	100 (0)					
	18.8								
1089	Medium gray CARBONACEOUS fine- to medium-grained shaley SANDSTONE, moderately weathered, very broken to blocky, medium hard to hard	20	R-3	82 (0)					
	-MOHs >9 at 20' 21.9								
	Gray and brown fine- to medium-grained SANDSTONE, few to many carbonaceous laminations, moderately to highly weathered, very broken to moderately broken, soft to hard (generally medium hard), shaley in zones								
1084	-MOHs 3.5 at 22.2'	25	R-4	94 (38)					
	-MOHs 7.5 at 25'								
1079		30							
	30.6								
	Orange-brown medium- to coarse-grained SANDSTONE, highly weathered, very broken to massive, medium hard to hard		R-5	80 (36)					
	-MOHs >9 at 31'								
	-highly weathered, driller noted soft zones while coring R-5								
1074	-vuggy from 31.0' to 34.0'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-16

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's, Hazy
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Orange-brown medium- to coarse-grained SANDSTONE, highly weathered, very broken to massive, medium hard to hard *(continued)*		R-6	67 (43)					
		-MOHs >9 at 37' 37.4								
		Boring Terminated at 37.4 feet Offset 5' South. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project; no water return								
1069			40							
1064			45							
1059			50							
1054			55							
1049			60							
1044			65							
1039			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-17

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's, Hazy
Water Level Upon Completion: 31.5'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1102.6'	TOPSOIL 0.4		S-1	67	1-2-3 (5)				
	Gray-brown SAND (SM), some silt, few rock fragments (brown and red sandstone, coal), loose, dry **(COLLUVIAL)** 3.0								
1098	Light brown to orange-brown SAND (SM), some silt, few rock fragments (sandstone), firm, dry **(RESIDUAL)** 6.0	5	S-2	100	10-7-7 (14)				
	Gray and rust-brown decomposed CARBONACEOUS SHALE; sampled as very thinly laminated shale fragments, little silt, few sand, micaceous, medium dense to very dense, dry to moist		S-3	87	12-11-10 (21)				
1093		10	S-4	100	22-43-50/0.4'				
	(RESIDUAL) 12.4		S-5	100	50/0.4'				
	Gray-brown CARBONACEOUS SHALE, moderately to highly weathered, very broken, soft to medium hard, fine sandy		R-1	96 (0)					
1088	-MOHs 2.5 at 13.5'	15							
	-MOHs 2.5 at 19'		R-2	100 (8)					
1083	20.6	20							
	Gray fine- to medium-grained SANDSTONE, moderately weathered, very broken to moderately broken, medium hard to hard, few to many carbonaceous laminations		R-3	100 (0)					
	-MOHs 6.5 at 22'								
1078	25.3	25							
	Brown medium-grained SANDSTONE, moderately to slightly weathered, very broken to massive, medium hard to hard, trace carbonaceous laminations, some water staining -high angle water stained fracture from 25.5' to 25.8' -lost water ~26.0' -MOHs 5.5 at 26' -clay seam at 30.4'		R-4	92 (18)					
1073	30.5	30							
	Brown medium- to coarse-grained SANDSTONE, moderately weathered, very broken to massive, medium hard to hard, vuggy -MOHs 7.5 at 31' 32.5		R-5	50 (26)					
	Boring Terminated at 32.5 feet Boring collapsed at 28.8' after 24 Hours								
1068		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-18

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 70's
Water Level Upon Completion: 31.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours: 28'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1078'	Light brown SAND (SM), some silt, trace rock fragments (red sandstone, brown sandstone), loose, moist		S-1	100	1-5-5 (10)				
	(COLLUVIAL)	3.0							
	Brown, grayish-brown, and orange-brown silty CLAY (CL/ML), trace fine sand, relic bedding, stiff, dry		S-2	100	11-7-7 (14)				
1073	**(RESIDUAL)**	5							
		6.0							
	Reddish-brown and orange-brown SANDSTONE FRAGMENTS (GP), little sand, trace silt, loose, dry		S-3	100	6-4-4 (8)				
	(RESIDUAL)	9.0							
1068	Orange-brown DECOMPOSED SANDSTONE sampled as sandstone fragments, little sand, very dense, dry	9.3 10	S-4	100	50/0.3'				
	(RESIDUAL)		R-1	80 (0)					
	Brown and orange-brown medium to coarse-grained SANDSTONE, moderately to highly weathered, very broken to moderately broken, medium hard to hard, vuggy -no water return -MOHs 7.5 at 11' -vertical fracture from 15.3' to 15.5' -completely weathered from 15.7' to 16.0' -black clay seam at 16.0'		R-2	98 (0)					
1063		15							
		16.3							
	Gray and brown medium-grained SANDSTONE, moderately weathered, very broken to massive, medium hard to hard, some water staining, micaceous, few low angle fractures		R-3	98 (50)					
1058	-MOHs 7.5 at 21'	20							
	-clay seam at 23.0' -clay seam at 24.0'		R-4	96 (0)					
		24.5							
1053	Gray fine- to medium-grained SANDSTONE, moderately to slightly weathered, very broken to massive, medium hard to hard, some water staining, micaceous, few carbonaceous laminations	25	R-5	100 (58)					
1048	-MOHs 8.5 at 28'	30							
			R-6	100 (58)					
1043		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-18

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-18-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 70's
Water Level Upon Completion: 31.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours: 28'

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Gray fine- to medium-grained SANDSTONE, moderately to slightly weathered, very broken to massive, medium hard to hard, some water staining, micaceous, few carbonaceous laminations *(continued)*		R-7	100 (86)					
1038		-MOHs 8.5 at 40'	40							
			41.4	R-8	100 (77)					
		Medium gray fine sandy SILTSTONE, slightly weathered to fresh, very broken to blocky, medium hard to hard	42.8							
		-clay seam at 41.5' -MOHs 6.5 at 41.6'								
1033		Boring Terminated at 42.8 feet Offset Approximately 5' South (downslope). Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project.	45							
1028			50							
1023			55							
1018			60							
1013			65							
1008			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-19

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's. Partly Sunny
Water Level Upon Completion: 25.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1122'	TOPSOIL 0.3		S-1	73	2-5-4 (9)				
	FILL: sampled as orange-brown rock fragments (shale, sandstone), few gravel, trace clay, loose, moist **(FILL)** 3.0								
	Brown SAND (SM), little silt, little gravel (sandstone fragments), medium dense, moist		S-2	100	16-15-14 (29)		8.6		
1117	-moist from 3.0' to 7.5'	5				21.53			
			S-3	100	10-8-8 (16)		9.1		
	(RESIDUAL) 9.0								
1112	Brown micaceous DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, trace silt, medium to very dense, dry	10	S-4	100	50/0.3'				
	(RESIDUAL) 12.4		S-5	100	50/0.4'				
1107	Brown fine- to medium-grained micaceous SANDSTONE, moderately weathered, thickly laminated to medium bedded, very broken to massive, medium hard to hard, few soft seams	15	R-1	81 (0)					
	-MOHs 7.5 at 16.5'		R-2	100 (0)					
1102	-very water stained, medium to coarse-grained, thinly bedded, massive, hard from 20.0' to 30.8'	20							
			R-3	96 (54)					
1097	-MOHs 7.5 at 25'	25							
			R-4	92 (38)					
1092	-MOHs 6.5 at 32'	30							
	32.7		R-5	94 (12)					
1087	-MOHs 5.5 at 35'	35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-19

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 70's. Partly Sunny
Water Level Upon Completion: 25.6'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Brown and gray fine- to medium-grained SANDSTONE and SHALE, moderately weathered, thinly laminated to thinly bedded,very broken to moderately broken, medium hard, some carbonaceous laminations, possible pyrite *(continued)*	36.0	R-6	100 (0)					
		Boring Terminated at 36.0 feet Boring Collapsed at 22.7' after 24 Hours								
1082			40							
1077			45							
1072			50							
1067			55							
1062			60							
1057			65							
1052			70							

BORING LOG - GARVIN - GARVIN.GDT - 2-14-24 07:43 - \\10.87.1.5\SHARED DOCUMENTS\GINT (NEW)\PROJECTS\2016\16123A QVSD.GPJ

GARVIN BOWARD BEITKO

Test Boring Record

SB-20

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1116.8'	TOPSOIL 0.4								
	Yellow-brown SAND (SP), little angular sandstone fragments, very loose to firm, moist		S-1	67	1-1-2 (3)				
			S-2	100	8-5-6 (11)				
1112		5							
	(RESIDUAL) 7.0		S-3	100	6-7-8 (15)				
	Brown-orange-gray DECOMPOSED SANDSTONE (GP); sampled as sandstone fragments, little sand, loose to very dense, moist								
1107		10	S-4	100	15-27-50/0.4'				
	(RESIDUAL) 12.1		S-5	100	50/0.1'				
	Gray medium-grained SANDSTONE, moderately weathered, thinly bedded, moderately broken, medium hard to hard, iron stained		R-1	76 (0)					
	-MOHs 7.5 at 13'								
1102	15.0	15							
	Light gray CLAYSTONE, slightly weathered, medium bedded, very soft								
	-MOHs <2 at 16'								
	-lost water return at 17.0' 17.5		R-2	66 (0)					
	Brown-gray SANDSTONE, medium-grained, micaceous, moderately broken, iron stained, carbonaceous streaks, hard								
1097		20							
	-MOHs 7.5 at 19'								
	22.3		R-3	100 (26)					
	Dark gray sandy CLAYSTONE, moderately weathered, thinly bedded, very soft 22.7								
	Gray medium-grained SANDSTONE, slightly weathered, iron stained, slightly broken, soft to hard								
1092		25							
	-MOHs 2.5 at 23'								
	-MOHs 7.5 at 24' 25.2								
	26.4		R-4	100 (8)					
	Gray sandy SHALE, slightly weathered, thinly bedded, iron stained, slightly broken, soft								
	-MOHs <2 at 25.5'								
	28.4								
	Gray medium-grained SANDSTONE, slightly weathered, thinly bedded, slightly broken, soft to medium hard								
1087	-MOHs 5.5 at 27'	30							
	-iron stained vertical fracture from 28.3' to 28.5' 30.0		R-5	(20)					
	Medium gray SILTSTONE, slightly to moderately weathered, iron stained, vertically fractured, slightly broken, medium hard								
	-MOHs 4.5 at 29' 32.0								
	Gray medium-grained SANDSTONE, slightly weathered to fresh, micaeous, carbonaceous laminations, sub-vertical fracture, moderately broken, hard								
1082	-MOHs 8.5 at 31'	35							

(Continued Next Page)

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GARVIN BOWARD BEITKO

Test Boring Record

SB-20

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 2 of 2
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours:

Ground Elevation (ft)	Graphic Log	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
		Boring Terminated at 32.0 feet Boring collapsed at 7' after 24 Hours								
1077			40							
1072			45							
1067			50							
1062			55							
1057			60							
1052			65							
1047			70							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-21

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-13-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-13-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 80's, Sunny
Water Level Upon Completion: 3.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: C. Ledney
Water Level After 24 Hours: 2.3'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1107.1'	TOPSOIL 0.4		S-1	67	1-1-1 (2)				
	Brown-orange medium-grained SAND (SM), little silt, trace sandstone fragments, very loose, moist **(RESIDUAL)** 3.0								
	Yellow-brown SAND (SP), some sandstone fragments, loose, moist		S-2	100	4-3-5 (8)				
1102	**(RESIDUAL)** 6.0	5							
	Gray DECOMPOSED SANDSTONE; sampled as sandstone fragments, little sand, medium dense to very dense, moist		S-3	100	18-12-9 (21)				
1097		10	S-4	100	20-35-50/0.4'				
	(RESIDUAL) 12.4		S-5	100	50/0.4'				
	Gray medium-grained SANDSTONE, moderately weathered, thinly to medium bedded, micaceous, moderately broken, medium hard		R-1	100 (0)					
1092	-MOHs 4.5 at 13.3'	15							
	16.4		R-2	100 (0)					
	Gray CLAYSTONE, slightly weathered to fresh, medium bedded, very soft -MOHs <2 at 17.5' 18.0								
	Gray sandy SHALE, slightly weathered, iron stained, thinly bedded, slightly broken, very soft to soft 19.4								
1087	Gray with dark gray streaked shaley SANDSTONE, slightly weathered, microlaminated, thinly to medium bedded, moderately broken, medium hard 21.0	20	R-3	100 (25)					
	-MOHs 5.5 at 20'								
	Boring Terminated at 21.0 feet								
1082		25							
1077		30							
1072		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-22

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 74 to 77 Degrees
Water Level Upon Completion:
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1113.6'	Brown DECOMPOSED micaceous SANDSTONE; sampled as sandstone fragments, few sand, medium to very dense, dry		S-1	100	3-6-10 (16)				
			S-2	100	17-29-38 (67)				
1109		5							
			S-3	100	33-20-19 (39)				
	(RESIDUAL) 9.1								
1104	Brown to light gray fine to medium-grained SANDSTONE, moderately weathered, thinly bedded, very broken to blocky, hard	10	S-4	100	50/0.1'				
			R-1	44 (0)					
	-MOHs >9 at 12'		R-2	90 (8)					
1099		15							
	-light gray/brown, soft vertical fracture from 16.0' to 17.0'		R-3	96 (0)					
	-MOHs 8.5 at 20.6'								
1094		20							
	-vertical fracture from 20.0' to 20.5'								
	-few vertical fractures from 21.4' to 24.7' 22.0		R-4	98 (16)					
	Brown and gray INTERBEDDED fine-grained SANDSTONE and SHALE, moderately weathered, thinly laminated, very broken to moderately broken, medium hard, numerous carbonaceous laminations								
1089		25							
	-MOHs 6.5 at 26'		R-5	93 (0)					
	28.0								
	Boring Terminated at 28.0 feet								
1084		30							
1079		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-23

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: W. Ewing (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Acker Rebel Track Mounted Rig
Weather: 70's, Cloudy
Water Level Upon Completion: 15.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1103.3'	Brown clayey SILT (ML), trace fine sand, medium, moist		S-1	67	1-1-4 (5)				
	(RESIDUAL) 3.0								
1098	Gray and brown SANDSTONE FRAGMENTS (GP), some sand, little silt, medium dense, moist, micaceous	5	S-2	80	5-7-8 (15)				
	(RESIDUAL) 6.5								
	Gray and brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, some sand, little silt, dense to very dense, moist, micaceous		S-3	80	7-30-10 (40)				
	(RESIDUAL) 9.4		S-4	100	50/0.4'				
1093	Brown medium- to coarse-grained micaceous SANDSTONE, moderately to highly weathered, very broken to moderately broken, medium hard	10	R-1	60 (0)					
	-vertical fracture from 10.6' to 11.6'								
	-MOHs 6.5 at 11'								
	14.2								
1088	Gray and orange-brown SHALE, highly weathered, very soft	15	R-2	100 (10)					
	-MOHs <2 at 15.5'								
	17.7								
	Gray and brown shaley fine- to medium-grained SANDSTONE, highly weathered, very broken to massive (generally very broken to moderately broken), very soft to hard (generally medium hard) 19.4								
1083	-MOHs 6.5 at 18'	20							
	Boring Terminated at 19.4 feet								
1078		25							
1073		30							
1068		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-24

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-17-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-17-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: 80's, Hazy
Water Level Upon Completion: 25.7'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: L. Barnes, E.I.T.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1113.7'	Brown CLAY (CL) with gray mottling, stiff, dry		S-1	87	9-5-9 (14)				
	(RESIDUAL) 3.0								
	Gray and brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, little sand, few silt, very dense, dry		S-2	100	50/0.4'				
1109	**(RESIDUAL)** 6.1	5							
	Gray and brown medium- to coarse-grained SANDSTONE, moderately to highly weathered, very broken to moderately broken, medium hard to hard, some water staining, few low angle fractures, vuggy in places		S-3	100	50/0.1'				
	-MOHs 5.5 at 8'		R-1	94 (0)					
1104		10							
			R-2	100 (0)					
1099		15							
	-MOHs 8.5 at 16.8'								
	-clay seam at 17.3'								
	-gray and brown claystone and clayshale interbeds from 17.7' to 21.1'		R-3	72 (0)					
1094		20							
	21.4								
	Medium gray and brown CARBONACEOUS fine sandy SHALE, moderately to highly weathered, very broken and fractured, very soft to medium hard		R-4	88 (0)					
	-MOHs 5.5 at 24.5'								
1089	25.5	25							
	Gray fine- to medium-grained SANDSTONE, slightly weathered, very broken to massive (generally moderately broken to blocky), medium hard to hard, vuggy, many carbonaceous laminations		R-5	100 (30)					
	-MOHs 8.5 at 27'								
	-water stained from 29.6' to 29.8'								
1084	30.1	30							
	Boring Terminated at 30.1 feet								
1079		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-25

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-19-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly cloudy, 71 Degrees
Water Level Upon Completion: 16.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1103'	TOPSOIL 0.3		S-1	87	1-3-4 (7)				
	Tan sandy SILT (ML), medium, dry								
	(RESIDUAL) 3.0								
	Brown SANDSTONE FRAGMENTS (GP), some sand, loose to very dense, dry		S-2	100	9-9-5 (14)				
1098		5							
			S-3	100	6-5-4 (9)				
	(RESIDUAL) 9.3		S-4	100	50/0.3'				
1093	Brown fine to medium-grained micaceous SANDSTONE, moderately weathered, thinly bedded, very broken to massive, hard, few carbonaceous laminations	10	R-1	98 (40)					
	-MOHs 8.5 at 10.5 13.3								
1088	Gray INTERBEDDED fine-grained micaceous SANDSTONE and SHALE, slightly weathered, moderately broken to hard, some carbonaceous laminations	15	R-2	100 (0)					
	-lost drill water at 14'								
	-MOHs 8.5 at 17.5' 18.0								
	Boring Terminated at 18.0 feet								
1083	Offset Approx. 9' NE. Ground Surface Elevation Estimated Based On Ground Surface Elevation At Originally-Staked Location & The Topographic Mapping Provided For Project.	20							
1078		25							
1073		30							
1068		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-26

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-18-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-19-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Cloudy, 69 Degrees
Water Level Upon Completion: 19.2'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry/L. Barnes
Water Level After 24 Hours:

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1110'	Light brown SILT (ML), little sand, few rock fragments, trace roots, stiff, dry		S-1	87	1-4-8 (12)		4.4		
	(POSSIBLE COLLUVIAL/RESIDUAL) 3.0								
	Gray and brown SAND (SM), little silt, little to some gravel (sandstone fragments), medium dense, dry		S-2	100	13-12-13 (25)		4.4		
1105		5				21.88			
			S-3	100	10-9-7 (16)		5.2		
	(RESIDUAL) 9.0								
1100	Gray to gray and brown DECOMPOSED SANDSTONE; sampled as sandstone fragments, few sand, few silt, very dense, dry 9.8	10	S-4	38	32-50/0.3'				
	(RESIDUAL)								
	Brown and gray medium to coarse-grained SANDSTONE, slightly to moderately weathered, medium bedded, very broken to massive, hard		R-1	94 (48)					
1095	-MOHs >9 at 15'	15							
	16.5								
	Brown and gray fine to medium-grained micaceous SANDSTONE, slightly weathered, thinly laminated to very thinly bedded, very broken to massive, hard		R-2	96 (44)					
1090	-MOHs >9 at 21'	20							
	22.0								
	Gray INTERBEDDED fine-grained SANDSTONE and SHALE, slightly weathered, thinly to thickly laminated, moderately broken to massive, hard, few carbonaceous laminations		R-3	100 (60)					
1085	-MOHs 8.5 at 24' 24.8	25							
	Boring Terminated at 24.8 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1080		30							
1075		35							

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GARVIN BOWARD BEITKO

Test Boring Record

SB-27

Project Number: 16123A
Project Name: Proposed QVSD High School
Sheet: 1 of 1
Project Location: Edgeworth, Leet Twp., Leetsdale, PA
Start Date: 7-14-23
Water Level During Drilling:
Drilled By: J. Powell (Test Boring Services, Inc.)
Completion Date: 7-14-23
Water Level Before Coring:
Drilling Rig: Diedrich D-50 Track Mount
Weather: Partly sunny, 78 to 80 Degrees
Water Level Upon Completion: 27.9'
Drilling Method: 3 1/4 HSA & NQ2 Core
Logged By: K. Thiry, P.G.
Water Level After 24 Hours: 19.8'

Ground Elevation (ft)	Material Description	Depth (ft)	Sample Type Number	Recovery % (RQD)	Blow Counts (N Value)	%< #200 Sieve	Water Content (%)	Liquid Limit	Plastic Limit
1115'	Brown micaceous SANDSTONE FRAGMENTS (GP), few sand, trace silt, firm, dry		S-1	27	3-7-5 (12)				
	(RESIDUAL) 2.0								
	Brown DECOMPOSED SANDSTONE sampled as fine- to medium-grained sandstone fragments, few sand, trace silt, dense to very dense, dry		S-2	100	18-22-21 (43)				
1110		5							
			S-3	100	20-41-44 (85)				
1105	**(RESIDUAL)** 10.1	10	S-4	136	38-40-50/0.1'				
	Brown fine to medium-grained micaceous SANDSTONE, highly to moderately weathered, thinly laminated, very broken to moderately broken, soft to medium hard -soft, highly weathered from 10.2' to 10.4' -MOHs 5.5 at 12'		R-1	90 (0)					
1100	14.9	15							
	Brown and orange-brown medium to coarse-grained SANDSTONE, moderately weathered, thinly bedded, moderately broken to blocky, medium hard to hard, few carbonaceous laminations, vertical fractures throughout -MOHs 6.5 at 16'		R-2	94 (12)					
1095	19.8	20							
	Brown to gray INTERBEDDED fine-grained SANDSTONE and SILTSTONE, highly to slightly weathered, thinly to thickly laminated, very broken to massive, medium hard -soft, highly weathered from 21.0' to 22.0'		R-3	100 (20)					
1090	=MOHs 6.5 at 23'	25							
	-gray to dark gray from 22.0' to 27.0' -light gray from 27.0' to 30.1'		R-4	100 (0)					
1085	-MOHs 7.5 at 29' 30.1	30							
	Boring Terminated at 30.1 feet Ground surface estimated based on ground surface elevation at originally-staked location and the topographic mapping provided for the project.								
1080		35							

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December 7, 2023

Project No. 2023-680-002

Doug Beitko
Garvin Boward Beitko Engineering, Inc.
180 Bilmar Drive, Suite IV
Pittsburgh, PA 15205

Transmittal
Laboratory Test Results
QVSD HS GBB 16123A

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: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	001	002	003	005	006
Boring No.:	SB-1	SB-1	SB-1	SB-5	SB-5
Depth (ft):	0.0-1.5'	3.0-4.5'	6.0-7.5'	0.0-1.5'	3.0-4.5'
Sample No.:	1	2	3	1	2
Tare Number	3082	3332	3526	3092	3029
Wt. of Tare & Wet Sample (g)	76.02	45.40	63.78	25.90	41.16
Wt. of Tare & Dry Sample (g)	69.71	42.30	60.03	23.89	38.31
Weight of Tare (g)	8.27	8.03	8.03	8.17	8.15
Weight of Water (g)	6.31	3.10	3.75	2.01	2.85
Weight of Dry Sample (g)	61.44	34.27	52.00	15.72	30.16
Water Content (%)	**10.3**	**9.0**	**7.2**	**12.8**	**9.4**

Lab ID	007	008	010	011	013
Boring No.	SB-5	SB-5	SB-8	SB-8	SB-12
Depth (ft)	6.0-7.5'	9.0-10.5'	3.0-4.5'	6.0-7.5'	3.0-4.5'
Sample No.	3	4	2	3	2
Tare Number	3081	3520	3012	3278	4025
Wt. of Tare & Wet Sample (g)	40.06	40.58	42.52	36.39	47.53
Wt. of Tare & Dry Sample (g)	36.52	36.93	39.58	33.95	45.50
Weight of Tare (g)	8.28	8.18	8.45	8.19	8.10
Weight of Water (g)	3.54	3.65	2.94	2.44	2.03
Weight of Dry Sample (g)	28.24	28.75	31.13	25.76	37.40
Water Content (%)	**12.5**	**12.7**	**9.4**	**9.5**	**5.4**

Notes :

Tested By JW *Date* 11/14/23 *Checked By* KC *Date* 11/15/23

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	014	016	017	019	020
Boring No.:	SB-12	SB-19	SB-19	SB-26	SB-26
Depth (ft):	6.0-7.5'	3.0-4.5'	6.0-7.5'	0.0-1.5'	3.0-4.5'
Sample No.:	3	2	3	1	2
Tare Number	3188	3521	3230	3236	3527
Wt. of Tare & Wet Sample (g)	37.13	42.59	34.60	94.99	46.10
Wt. of Tare & Dry Sample (g)	35.69	39.87	32.39	91.33	44.49
Weight of Tare (g)	8.35	8.16	8.19	8.26	8.18
Weight of Water (g)	1.44	2.72	2.21	3.66	1.61
Weight of Dry Sample (g)	27.34	31.71	24.20	83.07	36.31
Water Content (%)	**5.3**	**8.6**	**9.1**	**4.4**	**4.4**

Lab ID	021	023	024	025	026
Boring No.	S-26	B-13	B-13	B-13	B-13
Depth (ft)	6.0-7.5'	0.0-1.5'	3.0-4.5'	6.0-7.5'	9.0-10.5'
Sample No.	3	1	2	3	4
Tare Number	4011	2995	4039	3146	2965
Wt. of Tare & Wet Sample (g)	39.52	43.74	60.44	56.77	52.71
Wt. of Tare & Dry Sample (g)	37.96	38.80	54.67	51.41	47.03
Weight of Tare (g)	8.02	8.10	8.15	8.08	8.19
Weight of Water (g)	1.56	4.94	5.77	5.36	5.68
Weight of Dry Sample (g)	29.94	30.70	46.52	43.33	38.84
Water Content (%)	**5.2**	**16.1**	**12.4**	**12.4**	**14.6**

Notes :

Tested By *JW* *Date* *11/14/23* *Checked By* *KC* *Date* *11/15/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	027	028	029	031	032
Boring No.:	B-13	B-13	B-13	B-13	B-13
Depth (ft):	12.0-13.5'	15.0-16.5'	18.0-19.5'	21.0-22.5'	24.0-25.5'
Sample No.:	5	6	7	8	9
Tare Number	3327	3184	4007	3383	3294
Wt. of Tare & Wet Sample (g)	39.05	48.90	40.78	50.75	55.27
Wt. of Tare & Dry Sample (g)	35.29	43.54	36.21	45.40	47.94
Weight of Tare (g)	8.26	8.15	8.06	8.14	8.14
Weight of Water (g)	3.76	5.36	4.57	5.35	7.33
Weight of Dry Sample (g)	27.03	35.39	28.15	37.26	39.80
Water Content (%)	**13.9**	**15.1**	**16.2**	**14.4**	**18.4**

Lab ID	033	035	036	037	038
Boring No.	B-13	B-13	B-21	B-21	B-21
Depth (ft)	27.0-28.5'	30.0-30.3'	0.0-1.5'	3.0-4.5'	6.0-7.5'
Sample No.	10	11	1	2	3
Tare Number	2899	3043	3031	4015	3169
Wt. of Tare & Wet Sample (g)	38.16	63.14	77.75	86.85	81.83
Wt. of Tare & Dry Sample (g)	32.55	60.97	72.66	79.22	73.52
Weight of Tare (g)	8.08	8.15	8.06	8.26	8.08
Weight of Water (g)	5.61	2.17	5.09	7.63	8.31
Weight of Dry Sample (g)	24.47	52.82	64.60	70.96	65.44
Water Content (%)	**22.9**	**4.1**	**7.9**	**10.8**	**12.7**

Notes :

Tested By *JW* *Date* *11/14/23* *Checked By* *KC* *Date* *11/15/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	039	040	041	042	043
Boring No.:	B-21	B-21	B-21	B-21	B-21
Depth (ft):	9.0-10.5'	12.0-13.5'	15.0-16.5'	18.0-19.5'	21.0-22.5'
Sample No.:	4	5	6	7	8
Tare Number	3103	3306	3523	3222	2947
Wt. of Tare & Wet Sample (g)	62.40	91.67	84.30	94.30	76.79
Wt. of Tare & Dry Sample (g)	56.92	82.70	79.91	87.20	72.11
Weight of Tare (g)	8.01	8.06	8.06	8.10	8.04
Weight of Water (g)	5.48	8.97	4.39	7.10	4.68
Weight of Dry Sample (g)	48.91	74.64	71.85	79.10	64.07
Water Content (%)	**11.2**	**12.0**	**6.1**	**9.0**	**7.3**

Lab ID	044	045	046	047	048
Boring No.	B-21	B-22	B-22	B-22	B-22
Depth (ft)	24.0-24.4'	0.0-1.5'	3.0-4.5'	6.0-6.3'	9.0-10.5'
Sample No.	9	1	2	3	4
Tare Number	3382	3533	3274	3155	3031
Wt. of Tare & Wet Sample (g)	87.14	74.82	97.25	75.16	125.15
Wt. of Tare & Dry Sample (g)	83.11	66.21	79.47	71.82	114.61
Weight of Tare (g)	8.16	8.17	8.19	8.22	8.06
Weight of Water (g)	4.03	8.61	17.78	3.34	10.54
Weight of Dry Sample (g)	74.95	58.04	71.28	63.60	106.55
Water Content (%)	**5.4**	**14.8**	**24.9**	**5.3**	**9.9**

Notes :

Tested By *JW* *Date* *11/14/23* *Checked By* *KC* *Date* *11/15/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
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Project No.: 2023-680-002

Lab ID:	049	050	051	052	053
Boring No.:	B-22	B-22	B-22	B-22	B-22
Depth (ft):	12.0-13.5'	15.0-16.5'	18.0-19.5'	21.0-22.5'	24.0-25.5'
Sample No.:	5	6	7	8	9
Tare Number	2949	3233	3351	2672	2987
Wt. of Tare & Wet Sample (g)	78.96	36.76	43.62	36.62	35.51
Wt. of Tare & Dry Sample (g)	71.60	33.02	39.51	32.69	32.54
Weight of Tare (g)	8.28	8.03	8.05	8.25	8.08
Weight of Water (g)	7.36	3.74	4.11	3.93	2.97
Weight of Dry Sample (g)	63.32	24.99	31.46	24.44	24.46
Water Content (%)	**11.6**	**15.0**	**13.1**	**16.1**	**12.1**

Lab ID	054	056	057	058	059
Boring No.	B-22	B-22	B-22	B-22	B-22
Depth (ft)	27.0-28.5'	30.0-31.5'	33.0-34.5'	36.0-37.5'	39.0-40.5'
Sample No.	10	11	12	13	14
Tare Number	3509	3229	3387	3530	14
Wt. of Tare & Wet Sample (g)	36.07	100.80	111.15	67.49	73.09
Wt. of Tare & Dry Sample (g)	32.18	92.11	99.51	59.40	65.87
Weight of Tare (g)	8.14	8.27	8.05	8.08	8.08
Weight of Water (g)	3.89	8.69	11.64	8.09	7.22
Weight of Dry Sample (g)	24.04	83.84	91.46	51.32	57.79
Water Content (%)	**16.2**	**10.4**	**12.7**	**15.8**	**12.5**

Notes :

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Client: Garvin Boward Beitko Engineering, Inc.
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Project No.: 2023-680-002

Lab ID:	060	061	062	063	064
Boring No.:	B-22	B-22	B-22	B-22	B-23
Depth (ft):	42.0-43.5'	45.0-46.5'	48.0-49.5'	51.0-51.4'	0.0-1.5'
Sample No.:	15	16	17	18	1
Tare Number	13	19	29	36	8
Wt. of Tare & Wet Sample (g)	67.61	62.36	59.72	54.32	47.20
Wt. of Tare & Dry Sample (g)	60.42	54.32	49.74	47.52	42.78
Weight of Tare (g)	8.76	8.77	8.78	8.98	8.61
Weight of Water (g)	7.19	8.04	9.98	6.80	4.42
Weight of Dry Sample (g)	51.66	45.55	40.96	38.54	34.17
Water Content (%)	**13.9**	**17.7**	**24.4**	**17.6**	**12.9**

Lab ID	065	066	067	068	070
Boring No.	B-23	B-23	B-23	B-23	B-23
Depth (ft)	3.0-4.5'	6.0-7.5'	9.0-10.5'	12.0-13.5'	15.0-16.5'
Sample No.	2	3	4	5	6
Tare Number	7	11	35	39	28
Wt. of Tare & Wet Sample (g)	46.67	37.28	57.58	69.04	51.06
Wt. of Tare & Dry Sample (g)	42.80	34.27	53.05	65.30	46.57
Weight of Tare (g)	9.10	8.46	8.84	8.66	8.43
Weight of Water (g)	3.87	3.01	4.53	3.74	4.49
Weight of Dry Sample (g)	33.70	25.81	44.21	56.64	38.14
Water Content (%)	**11.5**	**11.7**	**10.2**	**6.6**	**11.8**

Notes :

Tested By *JW* *Date* *11/15/23* *Checked By* *KC* *Date* *11/16/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	071	072	073	075	076
Boring No.:	B-23	B-23	B-23	B-23	B-23
Depth (ft):	18.0-19.5'	21.0-22.5'	24.0-25.5'	27.0-28.5'	30.0-30.1'
Sample No.:	7	8	9	10	11
Tare Number	1	40	27	9	21
Wt. of Tare & Wet Sample (g)	51.62	45.80	43.36	41.50	27.96
Wt. of Tare & Dry Sample (g)	46.68	41.75	39.35	39.50	26.54
Weight of Tare (g)	8.63	8.79	8.73	8.59	8.76
Weight of Water (g)	4.94	4.05	4.01	2.00	1.42
Weight of Dry Sample (g)	38.05	32.96	30.62	30.91	17.78
Water Content (%)	**13.0**	**12.3**	**13.1**	**6.5**	**8.0**

Lab ID	077	078	079	080	081
Boring No.	B-25	B-25	B-25	B-25	B-25
Depth (ft)	0.0-1.5'	3.0-4.5'	6.0-7.5'	9.0-10.5'	12.0-13.5'
Sample No.	1	2	3	4	5
Tare Number	23	39	28	35	11
Wt. of Tare & Wet Sample (g)	39.66	32.31	43.30	44.72	49.72
Wt. of Tare & Dry Sample (g)	33.76	29.10	35.22	37.86	43.47
Weight of Tare (g)	8.84	8.61	8.43	8.79	8.47
Weight of Water (g)	5.90	3.21	8.08	6.86	6.25
Weight of Dry Sample (g)	24.92	20.49	26.79	29.07	35.00
Water Content (%)	**23.7**	**15.7**	**30.2**	**23.6**	**17.9**

Notes :

Tested By *JW* *Date* *11/16/23* *Checked By* *KC* *Date* *11/17/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	083	084	085	086	087
Boring No.:	B-25	B-25	B-25	B-25	B-25
Depth (ft):	15.0-16.5'	18.0-19.5'	21.0-22.5'	24.0-25.5	27.0-27.4
Sample No.:	6	7	8	9	10
Tare Number	8	29	36	19	13
Wt. of Tare & Wet Sample (g)	48.56	55.13	41.38	71.03	72.00
Wt. of Tare & Dry Sample (g)	43.35	49.52	37.21	64.01	65.73
Weight of Tare (g)	8.67	8.78	8.98	8.76	8.78
Weight of Water (g)	5.21	5.61	4.17	7.02	6.27
Weight of Dry Sample (g)	34.68	40.74	28.23	55.25	56.95
Water Content (%)	**15.0**	**13.8**	**14.8**	**12.7**	**11.0**

Lab ID	088	089	090	091	092
Boring No.	B-27	B-27	B-27	B-27	B-29
Depth (ft)	0.0-1.5'	3.0-4.5'	6.0-7.4'	9.0-9.8'	0.0-1.5'
Sample No.	1	2	3	4	1
Tare Number	12	43	3	5	34
Wt. of Tare & Wet Sample (g)	45.08	62.83	48.23	41.49	41.18
Wt. of Tare & Dry Sample (g)	43.19	59.78	45.45	39.96	38.37
Weight of Tare (g)	9.21	8.59	8.56	8.51	8.67
Weight of Water (g)	1.89	3.05	2.78	1.53	2.81
Weight of Dry Sample (g)	33.98	51.19	36.89	31.45	29.70
Water Content (%)	**5.6**	**6.0**	**7.5**	**4.9**	**9.5**

Notes :

Tested By *JW* *Date* *11/16/23* *Checked By* *KC* *Date* *11/17/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	093	094	095	096	098
Boring No.:	B-29	B-29	B-29	B-29	B-29
Depth (ft):	3.0-4.5'	6.0-7.5'	9.0-10.5'	12.0-13.5'	15.0-16.5'
Sample No.:	2	3	4	5	6
Tare Number	38	24	20	30	46
Wt. of Tare & Wet Sample (g)	44.93	42.05	47.44	58.19	44.19
Wt. of Tare & Dry Sample (g)	40.50	37.34	41.67	51.33	38.71
Weight of Tare (g)	8.70	8.66	8.59	8.77	8.63
Weight of Water (g)	4.43	4.71	5.77	6.86	5.48
Weight of Dry Sample (g)	31.80	28.68	33.08	42.56	30.08
Water Content (%)	**13.9**	**16.4**	**17.4**	**16.1**	**18.2**

Lab ID	099	100	101	102	103
Boring No.	B-29	B-29	B-29	B-29	B-29
Depth (ft)	18.0-19.5'	21.0-22.5'	24.0-25.5'	27.0-28.5'	30.0-31.5'
Sample No.	7	8	9	10	11
Tare Number	2	42	33	15	14
Wt. of Tare & Wet Sample (g)	40.52	42.98	48.45	43.33	36.85
Wt. of Tare & Dry Sample (g)	37.48	38.31	42.28	38.28	31.99
Weight of Tare (g)	8.49	8.60	8.69	8.30	8.76
Weight of Water (g)	3.04	4.67	6.17	5.05	4.86
Weight of Dry Sample (g)	28.99	29.71	33.59	29.98	23.23
Water Content (%)	**10.5**	**15.7**	**18.4**	**16.8**	**20.9**

Notes :

Tested By *JW* *Date* *11/16/23* *Checked By* *KC* *Date* *11/17/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	104	106	107	108	109
Boring No.:	B-29	B-29	B-29	B-29	B-29
Depth (ft):	33.0-34.5'	36.30-37.5'	39.0-40.5'	42.0-43.5'	45.0-46.5'
Sample No.:	12	13	14	15	16
Tare Number	4	32	49	22	31
Wt. of Tare & Wet Sample (g)	40.52	42.06	33.12	40.44	40.02
Wt. of Tare & Dry Sample (g)	36.03	38.21	30.21	35.73	35.62
Weight of Tare (g)	8.57	8.61	8.73	8.43	8.44
Weight of Water (g)	4.49	3.85	2.91	4.71	4.40
Weight of Dry Sample (g)	27.46	29.60	21.48	27.30	27.18
Water Content (%)	**16.4**	**13.0**	**13.5**	**17.3**	**16.2**

Lab ID	110	111	112	113	114
Boring No.	B-29	B-29	B-33	B-33	B-33
Depth (ft)	48.0-19.5'	51.0-52.5'	0.0-1.5'	3.0-4.5'	6.0-7.5'
Sample No.	17	18	1	2	3
Tare Number	37	50	16	45	3348
Wt. of Tare & Wet Sample (g)	47.86	70.70	43.33	26.52	28.71
Wt. of Tare & Dry Sample (g)	43.43	64.07	36.66	22.86	26.12
Weight of Tare (g)	8.39	8.77	8.47	8.55	8.15
Weight of Water (g)	4.43	6.63	6.67	3.66	2.59
Weight of Dry Sample (g)	35.04	55.30	28.19	14.31	17.97
Water Content (%)	**12.6**	**12.0**	**23.7**	**25.6**	**14.4**

Notes :

Tested By *JW* *Date* *11/16/23* *Checked By* *KC* *Date* *11/17/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	115	116	117	118	119
Boring No.:	B-33	B-33	B-33	B-33	B-34
Depth (ft):	9.0-10.5'	12.0-13.5'	15.0-16.5'	18.0-18.3'	0.0-1.5'
Sample No.:	4	5	6	7	1
Tare Number	16	45	50	37	31
Wt. of Tare & Wet Sample (g)	44.53	58.01	58.26	33.10	35.61
Wt. of Tare & Dry Sample (g)	40.61	54.54	54.84	32.26	30.25
Weight of Tare (g)	8.48	8.58	8.80	8.44	8.46
Weight of Water (g)	3.92	3.47	3.42	0.84	5.36
Weight of Dry Sample (g)	32.13	45.96	46.04	23.82	21.79
Water Content (%)	**12.2**	**7.6**	**7.4**	**3.5**	**24.6**

Lab ID	120	122	123	125	126
Boring No.	B-34	B-34	B-34	B-34	B-34
Depth (ft)	3.0-4.5'	6.0-7.5'	9.0-10.5'	12.0-13.5'	15.0-16.5'
Sample No.	2	3	4	5	6
Tare Number	35	28	39	34	3
Wt. of Tare & Wet Sample (g)	32.13	39.44	31.73	63.37	48.66
Wt. of Tare & Dry Sample (g)	27.44	34.53	28.54	57.50	44.41
Weight of Tare (g)	8.76	8.41	8.57	8.73	8.60
Weight of Water (g)	4.69	4.91	3.19	5.87	4.25
Weight of Dry Sample (g)	18.68	26.12	19.97	48.77	35.81
Water Content (%)	**25.1**	**18.8**	**16.0**	**12.0**	**11.9**

Notes :

Tested By *JW* *Date* *11/17/23* *Checked By* *JLK* *Date* *11/20/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	127	128	129	130	131
Boring No.:	B-34	B-34	B-34	B-34	B-34
Depth (ft):	18.0-19.5'	21.0-22.5'	24.0-25.5'	27.0-28.5'	30.0-31.5'
Sample No.:	7	8	9	10	11
Tare Number	43	12	13	19	1
Wt. of Tare & Wet Sample (g)	59.40	61.00	59.14	52.70	48.11
Wt. of Tare & Dry Sample (g)	52.81	55.42	55.77	48.27	43.95
Weight of Tare (g)	8.62	9.22	8.70	8.77	8.60
Weight of Water (g)	6.59	5.58	3.37	4.43	4.16
Weight of Dry Sample (g)	44.19	46.20	47.07	39.50	35.35
Water Content (%)	**14.9**	**12.1**	**7.2**	**11.2**	**11.8**

Lab ID	132	133	134	135	136
Boring No.	B-34	B-34	B-36	B-36	B-36
Depth (ft)	33.0-34.5'	36.0-37.5'	0.0-1.5'	3.0-4.5'	6.0-7.5'
Sample No.	12	13	1	2	3
Tare Number	40	49	22	32	4
Wt. of Tare & Wet Sample (g)	63.50	49.88	50.42	59.85	74.69
Wt. of Tare & Dry Sample (g)	56.60	45.20	45.05	57.01	70.92
Weight of Tare (g)	8.71	8.72	8.44	8.64	8.60
Weight of Water (g)	6.90	4.68	5.37	2.84	3.77
Weight of Dry Sample (g)	47.89	36.48	36.61	48.37	62.32
Water Content (%)	**14.4**	**12.8**	**14.7**	**5.9**	**6.0**

Notes :

Tested By *JW* *Date* *11/17/23* *Checked By* *JLK* *Date* *11/20/23*

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ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	137	138	139	140	142
Boring No.:	B-36	B-37	B-37	B-37	B-37
Depth (ft):	9.0-9.4'	0.0-1.5'	3.0-4.5'	6.0-7.5'	9.0-10.5'
Sample No.:	4	1	2	3	4
Tare Number	14	15	29	36	8
Wt. of Tare & Wet Sample (g)	57.18	39.95	29.01	36.94	56.66
Wt. of Tare & Dry Sample (g)	54.94	33.81	26.84	34.45	53.10
Weight of Tare (g)	8.76	8.32	8.74	8.93	8.55
Weight of Water (g)	2.24	6.14	2.17	2.49	3.56
Weight of Dry Sample (g)	46.18	25.49	18.10	25.52	44.55
Water Content (%)	**4.9**	**24.1**	**12.0**	**9.8**	**8.0**

Lab ID	143	144	145	146	147
Boring No.	B-37	B-37	B-38	B-38	B-38
Depth (ft)	12.0-13.5'	15.0-16.5'	0.0-1.5'	3.0-4.5'	6.0-7.5'
Sample No.	5	6	1	2	3
Tare Number	23	21	9	27	42
Wt. of Tare & Wet Sample (g)	58.37	48.22	35.49	60.95	49.35
Wt. of Tare & Dry Sample (g)	54.26	44.91	31.33	52.25	43.94
Weight of Tare (g)	8.81	8.88	8.51	8.69	8.58
Weight of Water (g)	4.11	3.31	4.16	8.70	5.41
Weight of Dry Sample (g)	45.45	36.03	22.82	43.56	35.36
Water Content (%)	**9.0**	**9.2**	**18.2**	**20.0**	**15.3**

Notes :

Tested By *JW* *Date* *11/17/23* *Checked By* *JLK* *Date* *11/20/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	148	149	150	151	152
Boring No.:	B-38	B-38	B-38	B-38	B-38
Depth (ft):	9.0-10.5'	12.0-13.5'	15.0-16.5'	18.0-19.5'	21.0-22.5'
Sample No.:	4	5	6	7	8
Tare Number	33	2	46	30	20
Wt. of Tare & Wet Sample (g)	49.02	50.64	52.69	44.90	49.94
Wt. of Tare & Dry Sample (g)	43.74	44.07	46.42	38.83	42.92
Weight of Tare (g)	8.69	8.49	8.61	8.74	8.58
Weight of Water (g)	5.28	6.57	6.27	6.07	7.02
Weight of Dry Sample (g)	35.05	35.58	37.81	30.09	34.34
Water Content (%)	**15.1**	**18.5**	**16.6**	**20.2**	**20.4**

Lab ID	153	154	155	156	158
Boring No.	B-38	B-39	B-39	B-39	B-39
Depth (ft)	24.0-25.3'	0.0-1.5'	3.0-4.5'	6.0-7.5'	9.0-9.9'
Sample No.	9	1	2	3	4
Tare Number	24	38	3188	4025	3012
Wt. of Tare & Wet Sample (g)	53.78	34.58	46.51	37.18	58.06
Wt. of Tare & Dry Sample (g)	51.48	29.97	42.05	34.37	54.81
Weight of Tare (g)	8.66	8.72	8.35	8.09	8.44
Weight of Water (g)	2.30	4.61	4.46	2.81	3.25
Weight of Dry Sample (g)	42.82	21.25	33.70	26.28	46.37
Water Content (%)	**5.4**	**21.7**	**13.2**	**10.7**	**7.0**

Notes :

Tested By *JW* *Date* *11/17/23* *Checked By* *JLK* *Date* *11/20/23*

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Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	159	160	162	163	164
Boring No.:	B-40	B-40	B-40	B-40	B-40
Depth (ft):	0.0-1.5'	3.0-4.5'	6.0-7.5'	9.0-10.5'	12.0-13.5'
Sample No.:	1	2	3	4	5
Tare Number	27	9	21	23	8
Wt. of Tare & Wet Sample (g)	36.41	28.29	32.66	34.85	32.75
Wt. of Tare & Dry Sample (g)	33.30	25.44	29.82	31.88	29.89
Weight of Tare (g)	8.70	8.50	8.78	8.82	8.73
Weight of Water (g)	3.11	2.85	2.84	2.97	2.86
Weight of Dry Sample (g)	24.60	16.94	21.04	23.06	21.16
Water Content (%)	**12.6**	**16.8**	**13.5**	**12.9**	**13.5**

Lab ID	165	166	168	169	170
Boring No.	B-40	B-40	B-47	B-47	B-47
Depth (ft)	15.0-16.5'	18.0-18.9'	.0.0-1.5'	6.0-7.5'	9.0-10.5'
Sample No.	6	7	1	3	4
Tare Number	36	22	49	40	1
Wt. of Tare & Wet Sample (g)	37.13	36.02	51.79	25.06	34.40
Wt. of Tare & Dry Sample (g)	34.39	33.18	44.05	21.71	31.12
Weight of Tare (g)	9.00	8.43	8.72	8.70	8.56
Weight of Water (g)	2.74	2.84	7.74	3.35	3.28
Weight of Dry Sample (g)	25.39	24.75	35.33	13.01	22.56
Water Content (%)	**10.8**	**11.5**	**21.9**	**25.7**	**14.5**

Notes :

Tested By *JW* *Date* *11/21/23* *Checked By* *JLK* *Date* *11/22/23*

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ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	171	172	174	175	176
Boring No.:	B-47	B-47	B-47	B-47	B-47
Depth (ft):	12.0-13.5'	15.0-16.5'	18.0-19.5'	21.0-22.5'	24.0-25.5'
Sample No.:	5	6	7	8	9
Tare Number	19	15	29	7	4
Wt. of Tare & Wet Sample (g)	37.83	39.55	61.52	43.77	38.53
Wt. of Tare & Dry Sample (g)	33.76	35.55	54.65	39.68	35.06
Weight of Tare (g)	8.74	8.30	8.77	8.81	8.56
Weight of Water (g)	4.07	4.00	6.87	4.09	3.47
Weight of Dry Sample (g)	25.02	27.25	45.88	30.87	26.50
Water Content (%)	**16.3**	**14.7**	**15.0**	**13.2**	**13.1**

Lab ID	177	178	179	180	181
Boring No.	B-47	B-47	B-47	B-55	B-55
Depth (ft)	27.0-28.5'	30.0-31.5'	33.0-33.8'	0.0-1.5'	3.0-4.5'
Sample No.	10	11	12	1	2
Tare Number	24	38	20	30	46
Wt. of Tare & Wet Sample (g)	54.24	41.53	53.76	39.12	42.84
Wt. of Tare & Dry Sample (g)	49.31	37.94	50.37	34.46	39.24
Weight of Tare (g)	8.69	8.70	8.60	8.74	8.64
Weight of Water (g)	4.93	3.59	3.39	4.66	3.60
Weight of Dry Sample (g)	40.62	29.24	41.77	25.72	30.60
Water Content (%)	**12.1**	**12.3**	**8.1**	**18.1**	**11.8**

Notes :

Tested By *JW* *Date* *11/21/23* *Checked By* *JLK* *Date* *11/22/23*

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Client: Garvin Boward Beitko Engineering, Inc.
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Project No.: 2023-680-002

Lab ID:	183	184	185	186	187
Boring No.:	B-55	B-55	B-56	B-56	B-56
Depth (ft):	6.0-6.7'	9.0-9.8'	0.0-1.5'	3.0-4.5'	6.0-6.4'
Sample No.:	3	4	1	2	3
Tare Number	35	28	31	37	50
Wt. of Tare & Wet Sample (g)	57.21	55.14	51.17	50.15	64.92
Wt. of Tare & Dry Sample (g)	55.75	51.66	47.55	47.17	62.11
Weight of Tare (g)	8.81	8.43	8.48	8.43	8.78
Weight of Water (g)	1.46	3.48	3.62	2.98	2.81
Weight of Dry Sample (g)	46.94	43.23	39.07	38.74	53.33
Water Content (%)	**3.1**	**8.0**	**9.3**	**7.7**	**5.3**

Lab ID	188	189	191	192	194
Boring No.	B-57	B-57	B-57	B-57	B-57
Depth (ft)	0.0-1.5'	3.0-4.5'	6.0-7.5'	9.0-10.5'	12.0-13.5'
Sample No.	1	2	3	4	5
Tare Number	45	16	13	11	43
Wt. of Tare & Wet Sample (g)	33.58	51.35	41.44	52.35	57.06
Wt. of Tare & Dry Sample (g)	31.56	49.18	39.61	50.31	54.67
Weight of Tare (g)	8.61	8.49	8.66	8.45	8.61
Weight of Water (g)	2.02	2.17	1.83	2.04	2.39
Weight of Dry Sample (g)	22.95	40.69	30.95	41.86	46.06
Water Content (%)	**8.8**	**5.3**	**5.9**	**4.9**	**5.2**

Notes :

Tested By JW *Date* 11/21/23 *Checked By* JLK *Date* 11/22/23

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	195	196	197	198	199
Boring No.:	B-57	B-57	B-58	B-58	B-58
Depth (ft):	15.0-16.5'	18.0-18.9'	0.0-1.5'	3.0-4.5'	6.0-7.5'
Sample No.:	6	7	1	2	3
Tare Number	42	32	27	49	36
Wt. of Tare & Wet Sample (g)	46.89	58.90	59.40	35.20	40.11
Wt. of Tare & Dry Sample (g)	43.56	55.71	50.95	29.47	34.58
Weight of Tare (g)	8.59	8.65	8.69	8.69	8.91
Weight of Water (g)	3.33	3.19	8.45	5.73	5.53
Weight of Dry Sample (g)	34.97	47.06	42.26	20.78	25.67
Water Content (%)	**9.5**	**6.8**	**20.0**	**27.6**	**21.5**

Lab ID	201	202	204	205	206
Boring No.	B-58	B-58	B-58	B-60	B-60
Depth (ft)	9.0-10.5'	12.0-13.5'	15.0-16.4'	0.0-1.5'	3.0-4.5'
Sample No.	4	5	6	1	2
Tare Number	8	23	9	28	31
Wt. of Tare & Wet Sample (g)	35.06	31.83	52.83	41.58	45.15
Wt. of Tare & Dry Sample (g)	32.53	28.63	48.32	38.12	43.22
Weight of Tare (g)	8.63	8.78	8.48	8.46	8.47
Weight of Water (g)	2.53	3.20	4.51	3.46	1.93
Weight of Dry Sample (g)	23.90	19.85	39.84	29.66	34.75
Water Content (%)	**10.6**	**16.1**	**11.3**	**11.7**	**5.6**

Notes :

Tested By JW *Date* 11/27/23 *Checked By* BRB *Date* 11/29/23

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	207	208	210	211	212
Boring No.:	B-60	B-60	B-60	B-60	B-61
Depth (ft):	6.0-7.5'	9.0-10.5'	12.0-12.2'	15.0-15.3'	0.0-1.5'
Sample No.:	3	4	5	6	1
Tare Number	35	12	46	30	20
Wt. of Tare & Wet Sample (g)	37.34	34.00	65.80	34.16	42.70
Wt. of Tare & Dry Sample (g)	35.34	32.20	61.84	32.63	40.00
Weight of Tare (g)	8.84	9.05	8.65	8.80	8.62
Weight of Water (g)	2.00	1.80	3.96	1.53	2.70
Weight of Dry Sample (g)	26.50	23.15	53.19	23.83	31.38
Water Content (%)	**7.5**	**7.8**	**7.4**	**6.4**	**8.6**

Lab ID	213	214	215	216	218
Boring No.	B-61	B-61	B-61	B-61	B-61
Depth (ft)	3.0-4.5'	6.0-7.5'	9.0-10.5'	12.0-13.5'	15.0-16.5'
Sample No.	2	3	4	5	6
Tare Number	38	24	11	43	13
Wt. of Tare & Wet Sample (g)	34.19	29.30	44.44	43.22	45.83
Wt. of Tare & Dry Sample (g)	32.13	27.42	41.78	42.97	41.81
Weight of Tare (g)	8.76	8.78	8.49	8.68	8.70
Weight of Water (g)	2.06	1.88	2.66	0.25	4.02
Weight of Dry Sample (g)	23.37	18.64	33.29	34.29	33.11
Water Content (%)	**8.8**	**10.1**	**8.0**	**0.7**	**12.1**

Notes :

Tested By *JW* *Date* *11/27/23* *Checked By* *BRB* *Date* *11/29/23*

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ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	219	220	221	223	224
Boring No.:	B-62	B-62	B-62	B-64	B-64
Depth (ft):	0.0-1.5'	3.0-4.5'	6.0-7.5'	0.0-1.5'	3.0-4.5'
Sample No.:	1	2	3	1	2
Tare Number	16	45	50	37	7
Wt. of Tare & Wet Sample (g)	47.82	41.08	48.25	48.55	62.00
Wt. of Tare & Dry Sample (g)	45.53	39.71	46.17	41.15	57.00
Weight of Tare (g)	8.49	8.56	8.81	8.40	8.77
Weight of Water (g)	2.29	1.37	2.08	7.40	5.00
Weight of Dry Sample (g)	37.04	31.15	37.36	32.75	48.23
Water Content (%)	**6.2**	**4.4**	**5.6**	**22.6**	**10.4**

Lab ID	225	226	227	228	229
Boring No.	B-64	B-64	B-64	B-64	B-64
Depth (ft)	6.0-7.5'	9.0-10.5'	12.0-13.5'	15.0-16.5'	18.0-19.3'
Sample No.	3	4	5	6	7
Tare Number	4	29	15	19	14
Wt. of Tare & Wet Sample (g)	61.67	63.04	35.62	52.67	55.64
Wt. of Tare & Dry Sample (g)	57.59	58.34	33.54	48.84	52.27
Weight of Tare (g)	8.55	8.77	8.27	8.79	8.75
Weight of Water (g)	4.08	4.70	2.08	3.83	3.37
Weight of Dry Sample (g)	49.04	49.57	25.27	40.05	43.52
Water Content (%)	**8.3**	**9.5**	**8.2**	**9.6**	**7.7**

Notes :

Tested By JW *Date* 11/27/23 *Checked By* BRB *Date* 11/29/23

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QUSP-HS-16123A
Project No.: 2023-680-002

Lab ID:	230	231	232	233	234
Boring No.:	B-65	B-65	B-65	B-65	B-65
Depth (ft):	0.0-1.5'	3.0-4.5'	6.0-7.5'	9.0-10.5'	12.0-13.5'
Sample No.:	1	2	3	4	5
Tare Number	1	40	34	3	39
Wt. of Tare & Wet Sample (g)	56.16	70.84	54.82	67.74	50.04
Wt. of Tare & Dry Sample (g)	50.95	65.02	49.80	62.75	46.44
Weight of Tare (g)	8.56	8.68	8.69	8.56	8.55
Weight of Water (g)	5.21	5.82	5.02	4.99	3.60
Weight of Dry Sample (g)	42.39	56.34	41.11	54.19	37.89
Water Content (%)	**12.3**	**10.3**	**12.2**	**9.2**	**9.5**

Lab ID	235	236	237	238	239	240
Boring No.	B-65	B-66	B-66	B-66	B-66	B-66
Depth (ft)	15.0-16.4'	0.0-1.5'	3.0-4.5'	6.0-7.5'	9.0-10.5'	12.0-13.5'
Sample No.	6	1	2	3	4	5
Tare Number	2999	3383	2945	3046	2936	3000
Wt. of Tare & Wet Sample (g)	93.40	80.90	57.61	54.31	78.45	85.77
Wt. of Tare & Dry Sample (g)	87.15	72.81	52.53	49.44	70.18	81.72
Weight of Tare (g)	8.11	8.14	8.09	8.10	8.08	8.09
Weight of Water (g)	6.25	8.09	5.08	4.87	8.27	4.05
Weight of Dry Sample (g)	79.04	64.67	44.44	41.34	62.10	73.63
Water Content (%)	**7.9**	**12.5**	**11.4**	**11.8**	**13.3**	**5.5**

Notes :

Tested By JW *Date* 11/30/23 *Checked By* BRB *Date* 12/4/23

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	241	242	243	244	245
Boring No.:	B-66	B-66	B-67	B-67	B-67
Depth (ft):	15.0-16.5'	18.0-18.8'	0.0-1.5'	3.0-4.5'	6.0-7.5'
Sample No.:	6	7	1	2	3
Tare Number	2945	3171	2992	3385	2947
Wt. of Tare & Wet Sample (g)	80.34	63.25	67.14	63.03	48.21
Wt. of Tare & Dry Sample (g)	76.45	60.13	59.80	58.06	43.51
Weight of Tare (g)	8.16	8.25	8.21	8.13	8.07
Weight of Water (g)	3.89	3.12	7.34	4.97	4.70
Weight of Dry Sample (g)	68.29	51.88	51.59	49.93	35.44
Water Content (%)	**5.7**	**6.0**	**14.2**	**10.0**	**13.3**

Lab ID	246	247	248	250	251
Boring No.	B-67	B-67	B-67	B-67	B-67
Depth (ft)	9.0-10.5'	12.0-13.5'	15.0-16.5'	18.0-19.5'	21.0-22.5'
Sample No.	4	5	6	7	8
Tare Number	3382	3380	3306	3222	3517
Wt. of Tare & Wet Sample (g)	50.46	45.92	52.27	70.14	56.62
Wt. of Tare & Dry Sample (g)	44.22	42.25	49.40	60.41	53.70
Weight of Tare (g)	8.09	8.12	8.90	8.13	8.14
Weight of Water (g)	6.24	3.67	2.87	9.73	2.92
Weight of Dry Sample (g)	36.13	34.13	40.50	52.28	45.56
Water Content (%)	**17.3**	**10.8**	**7.1**	**18.6**	**6.4**

Notes :

Tested By *JW* *Date* *11/27/23* *Checked By* *BRB* *Date* *11/29/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	252	253	254	255	256
Boring No.:	B-67	B-67	B-68	B-68	B-68
Depth (ft):	24.0-25.5'	27.0-27.7'	0.0-1.5'	3.0-4.5'	6.0-7.5'
Sample No.:	9	10	1	2	3
Tare Number	3023	3150	3521	3383	3234
Wt. of Tare & Wet Sample (g)	60.21	70.54	61.74	50.35	74.18
Wt. of Tare & Dry Sample (g)	56.72	66.81	58.50	45.76	64.37
Weight of Tare (g)	8.05	8.10	8.14	8.15	8.22
Weight of Water (g)	3.49	3.73	3.24	4.59	9.81
Weight of Dry Sample (g)	48.67	58.71	50.36	37.61	56.15
Water Content (%)	**7.2**	**6.4**	**6.4**	**12.2**	**17.5**

Lab ID	257	258	259	261	262
Boring No.	B-68	B-68	B-68	B-68	B-68
Depth (ft)	9.0-10.5'	12.0-13.5'	15.0-16.5'	18.0-19.5'	21.0-22.5'
Sample No.	4	5	6	7	8
Tare Number	3230	3301	3082	3268	3229
Wt. of Tare & Wet Sample (g)	75.79	46.41	60.71	59.39	57.35
Wt. of Tare & Dry Sample (g)	69.67	43.28	55.05	54.27	53.26
Weight of Tare (g)	8.16	8.13	8.25	8.15	8.25
Weight of Water (g)	6.12	3.13	5.66	5.12	4.09
Weight of Dry Sample (g)	61.51	35.15	46.80	46.12	45.01
Water Content (%)	**9.9**	**8.9**	**12.1**	**11.1**	**9.1**

Notes :

Tested By *JW* *Date* *11/27/23* *Checked By* *BRB* *Date* *11/29/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	263	264	265	266	268
Boring No.:	B-68	B-71	B-71	B-71	B-73
Depth (ft):	24.0-24.9'	0.0-1.5'	3.0-4.5'	6.0-7.5'	0.0-1.5'
Sample No.:	9	1	2	3	1
Tare Number	2854	3356	2982	3148	3146
Wt. of Tare & Wet Sample (g)	49.27	42.59	40.66	49.79	48.94
Wt. of Tare & Dry Sample (g)	45.69	39.94	39.65	48.10	46.40
Weight of Tare (g)	8.09	8.08	8.17	8.23	8.02
Weight of Water (g)	3.58	2.65	1.01	1.69	2.54
Weight of Dry Sample (g)	37.60	31.86	31.48	39.87	38.38
Water Content (%)	**9.5**	**8.3**	**3.2**	**4.2**	**6.6**

Lab ID	269	270	271	272	273
Boring No.	B-73	B-73	B-73	B-76	B-76
Depth (ft)	3.0-4.3'	6.0-7.5'	9.0-9.4'	0.0-1.5'	3.0-4.5'
Sample No.	2	3	4	1	2
Tare Number	3396	2936	2933	3169	2949
Wt. of Tare & Wet Sample (g)	63.03	56.31	52.10	43.91	42.20
Wt. of Tare & Dry Sample (g)	61.73	53.58	49.28	40.20	39.86
Weight of Tare (g)	8.17	8.12	8.14	8.03	8.28
Weight of Water (g)	1.30	2.73	2.82	3.71	2.34
Weight of Dry Sample (g)	53.56	45.46	41.14	32.17	31.58
Water Content (%)	**2.4**	**6.0**	**6.9**	**11.5**	**7.4**

Notes :

Tested By JW *Date* 11/27/23 *Checked By* BRB *Date* 11/29/23

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	274	276	277	278	280
Boring No.:	B-76	B-83	B-83	B-83	B-91
Depth (ft):	6.0-7.5'	0.0-1.5'	3.0-4.5'	6.0-7.5'	0.0-1.5'
Sample No.:	3	1	2	3	1
Tare Number	2898	3020	3368	2900	3133
Wt. of Tare & Wet Sample (g)	41.76	57.23	35.13	33.80	44.12
Wt. of Tare & Dry Sample (g)	39.56	53.71	32.92	31.00	41.39
Weight of Tare (g)	8.10	8.18	8.13	8.32	8.09
Weight of Water (g)	2.20	3.52	2.21	2.80	2.73
Weight of Dry Sample (g)	31.46	45.53	24.79	22.68	33.30
Water Content (%)	**7.0**	**7.7**	**8.9**	**12.3**	**8.2**

Lab ID	281	282	283	285	286
Boring No.	B-91	B-91	B-91	B-94	B-94
Depth (ft)	3.0-4.3'	6.0-7.5'	9.0-9.4'	0.0-1.5'	3.0-4.5'
Sample No.	2	3	4	1	2
Tare Number	3009	3141	4028	3534	3529
Wt. of Tare & Wet Sample (g)	41.18	49.29	39.70	54.09	56.16
Wt. of Tare & Dry Sample (g)	38.08	43.00	37.42	49.07	52.95
Weight of Tare (g)	8.18	8.28	8.20	8.13	7.98
Weight of Water (g)	3.10	6.29	2.28	5.02	3.21
Weight of Dry Sample (g)	29.90	34.72	29.22	40.94	44.97
Water Content (%)	**10.4**	**18.1**	**7.8**	**12.3**	**7.1**

Notes :

Tested By JW *Date* 11/27/23 *Checked By* BRB *Date* 11/29/23

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MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBB 16123A
Project No.: 2023-680-002

Lab ID:	287	288	289	290	291
Boring No.:	B-94	B-94	B-94	B-94	B-94
Depth (ft):	6.0-7.5'	9.0-10.5'	12.0-13.5'	15.0-16.5'	18.0-19.5'
Sample No.:	3	4	5	6	7
Tare Number	4030	3513	3167	4038	3094
Wt. of Tare & Wet Sample (g)	57.31	57.06	75.24	54.50	40.98
Wt. of Tare & Dry Sample (g)	54.89	54.01	69.35	46.31	35.53
Weight of Tare (g)	8.20	8.20	8.38	8.08	8.18
Weight of Water (g)	2.42	3.05	5.89	8.19	5.45
Weight of Dry Sample (g)	46.69	45.81	60.97	38.23	27.35
Water Content (%)	**5.2**	**6.7**	**9.7**	**21.4**	**19.9**

Lab ID	292	293	294	296	297
Boring No.	B-94	B-94	B-94	B-98	B-98
Depth (ft)	21.0-22.5'	24.0-24.9'	27.0-27.6'	0.0-1.5'	3.0-4.5'
Sample No.	8	9	10	1	2
Tare Number	3312	4017	3032	2903	3391
Wt. of Tare & Wet Sample (g)	54.59	44.54	43.16	44.12	49.08
Wt. of Tare & Dry Sample (g)	47.45	40.78	40.42	40.38	46.12
Weight of Tare (g)	8.10	7.98	8.08	8.12	8.38
Weight of Water (g)	7.14	3.76	2.74	3.74	2.96
Weight of Dry Sample (g)	39.35	32.80	32.34	32.26	37.74
Water Content (%)	**18.1**	**11.5**	**8.5**	**11.6**	**7.8**

Notes :

Tested By *JW* *Date* *11/27/23* *Checked By* *BRB* *Date* *11/29/23*

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MOISTURE CONTENT

ASTM D 2216-19

Client:	Garvin Boward Beitko Engineering, Inc.
Client Reference:	QVSD HS GBB 16123A
Project No.:	2023-680-002

Lab ID:	298
Boring No.:	B-98
Depth (ft):	6.0-7.5'
Sample No.:	3
Tare Number	3154
Wt. of Tare & Wet Sample (g)	61.54
Wt. of Tare & Dry Sample (g)	58.09
Weight of Tare (g)	8.23
Weight of Water (g)	3.45
Weight of Dry Sample (g)	49.86
Water Content (%)	**6.9**

Notes :

Tested By *JW* *Date* *11/27/23* *Checked By* *BRB* *Date* *11/29/23*

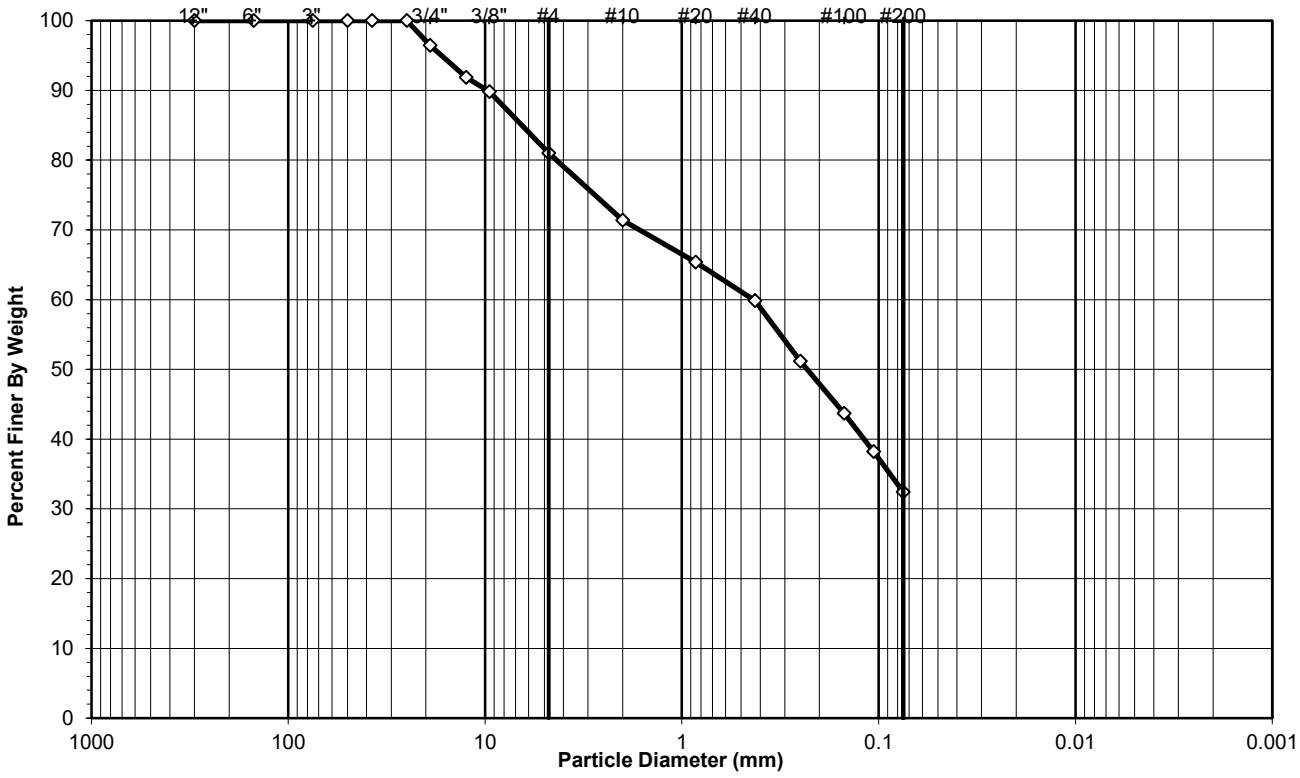
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-1
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-004	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**18.98**
#4 to #200	***Sand***	**48.59**
Finer than #200	***Silt & Clay***	**32.42**

USCS Symbol:
sm, ASSUMED

D50 = 0.23

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By DF Date 11/16/23 Checked By KC Date 11/16/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-1
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-004	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1455	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	509.32	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	480.29	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	143.40	Weight of Tare (g):	NA
Weight of Water (g):	29.03	Weight of Water (g):	NA
Weight of Dry Soil (g):	336.89	Weight of Dry Soil (g):	NA
Moisture Content (%):	**8.6**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	336.89
Tare No. (Sub-Specimen)	1455	Wet Weight of +3/4" Sample (g):	12.98
Wt. of Tare & Wet Sub-Specimen (g):	509.32	Dry Weight of + 3/4" Sample (g):	11.95
Weight of Tare (g):	143.40	Dry Weight of - 3/4" Sample (g):	324.94
Sub-Specimen Wet Weight (g):	365.92	Dry Weight -3/4" +3/8" Sample (g):	22.38
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	302.56
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	11.95		3.55	3.55	96.45	**96**
1/2"	12.5	15.40	(**)	4.57	8.12	91.88	**92**
3/8"	9.5	6.98		2.07	10.19	89.81	**90**
#4	4.75	29.62		8.79	18.98	81.02	**81**
#10	2	32.52		9.65	28.64	71.36	**71**
#20	0.85	20.25	(**)	6.01	34.65	65.35	**65**
#40	0.425	18.54		5.50	40.15	59.85	**60**
#60	0.25	29.30		8.70	48.85	51.15	**51**
#100	0.15	25.08		7.44	56.29	43.71	**44**
#140	0.106	18.44		5.47	61.76	38.24	**38**
#200	0.075	19.58		5.81	67.58	32.42	**32**
Pan	-	109.23		32.42	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	11/16/23	Checked By	KC	Date	11/16/23

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

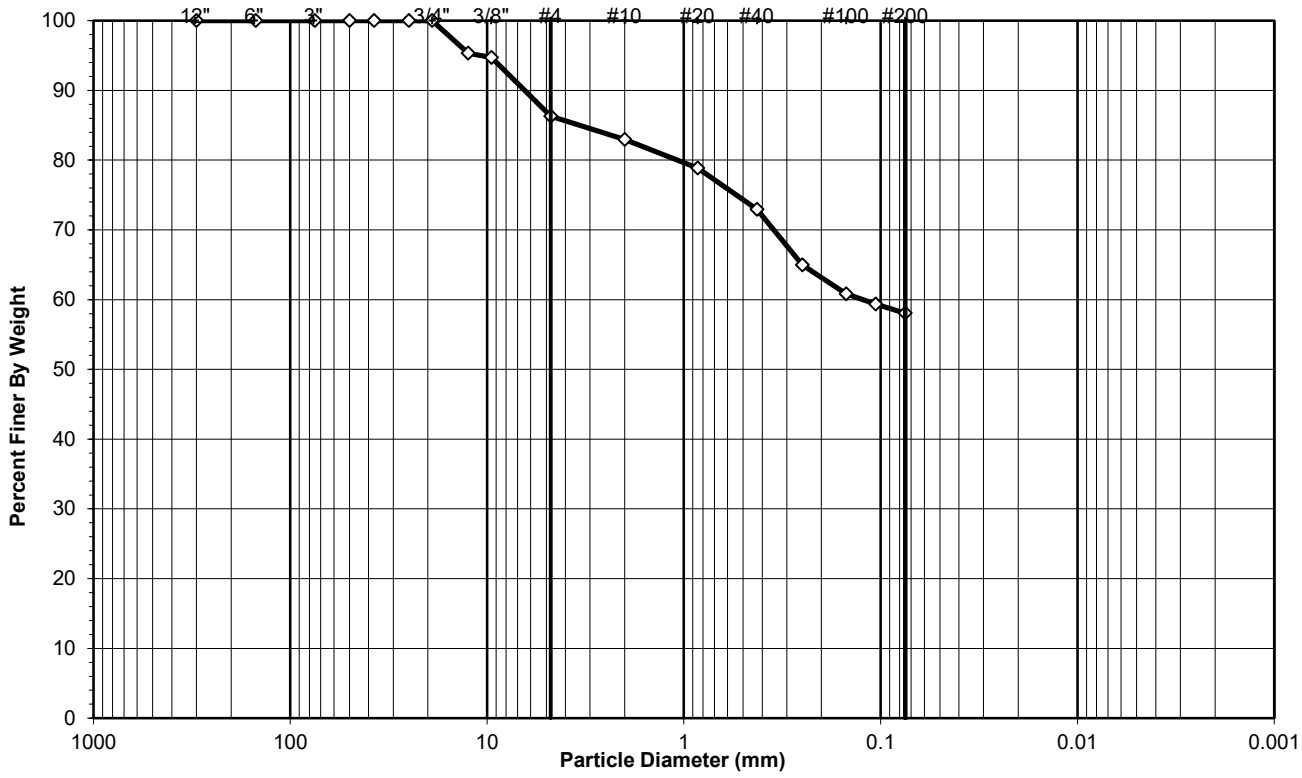
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-5
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-1.5'
Project No.:	2023-680-002	Sample No.:	1
Lab ID:	2023-680-002-005	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**13.70**
#4 to #200	***Sand***	**28.25**
Finer than #200	***Silt & Clay***	**58.05**

USCS Symbol:
ml, ASSUMED

USCS Classification:
SANDY SILT

Tested By DF Date 11/16/23 Checked By KC Date 11/16/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-5
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-1.5'
Project No.:	2023-680-002	Sample No.:	1
Lab ID:	2023-680-002-005	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2034	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	307.02	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	288.10	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.33	Weight of Tare (g):	NA
Weight of Water (g):	18.92	Weight of Water (g):	NA
Weight of Dry Soil (g):	141.77	Weight of Dry Soil (g):	NA
Moisture Content (%):	**13.3**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	141.77
Tare No. (Sub-Specimen)	2034	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	307.02	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	146.33	Dry Weight of - 3/4" Sample (g):	141.77
Sub-Specimen Wet Weight (g):	160.69	Dry Weight -3/4" +3/8" Sample (g):	7.50
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	134.27
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	6.64	(**)	4.68	4.68	95.32	**95**
3/8"	9.5	0.86		0.61	5.29	94.71	**95**
#4	4.75	11.92		8.41	13.70	86.30	**86**
#10	2	4.74		3.34	17.04	82.96	**83**
#20	0.85	5.79	(**)	4.08	21.13	78.87	**79**
#40	0.425	8.40		5.93	27.05	72.95	**73**
#60	0.25	11.33		7.99	35.04	64.96	**65**
#100	0.15	5.83		4.11	39.15	60.85	**61**
#140	0.106	2.13		1.50	40.66	59.34	**59**
#200	0.075	1.83		1.29	41.95	58.05	**58**
Pan	-	82.30		58.05	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 11/16/23 Checked By KC Date 11/16/23

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

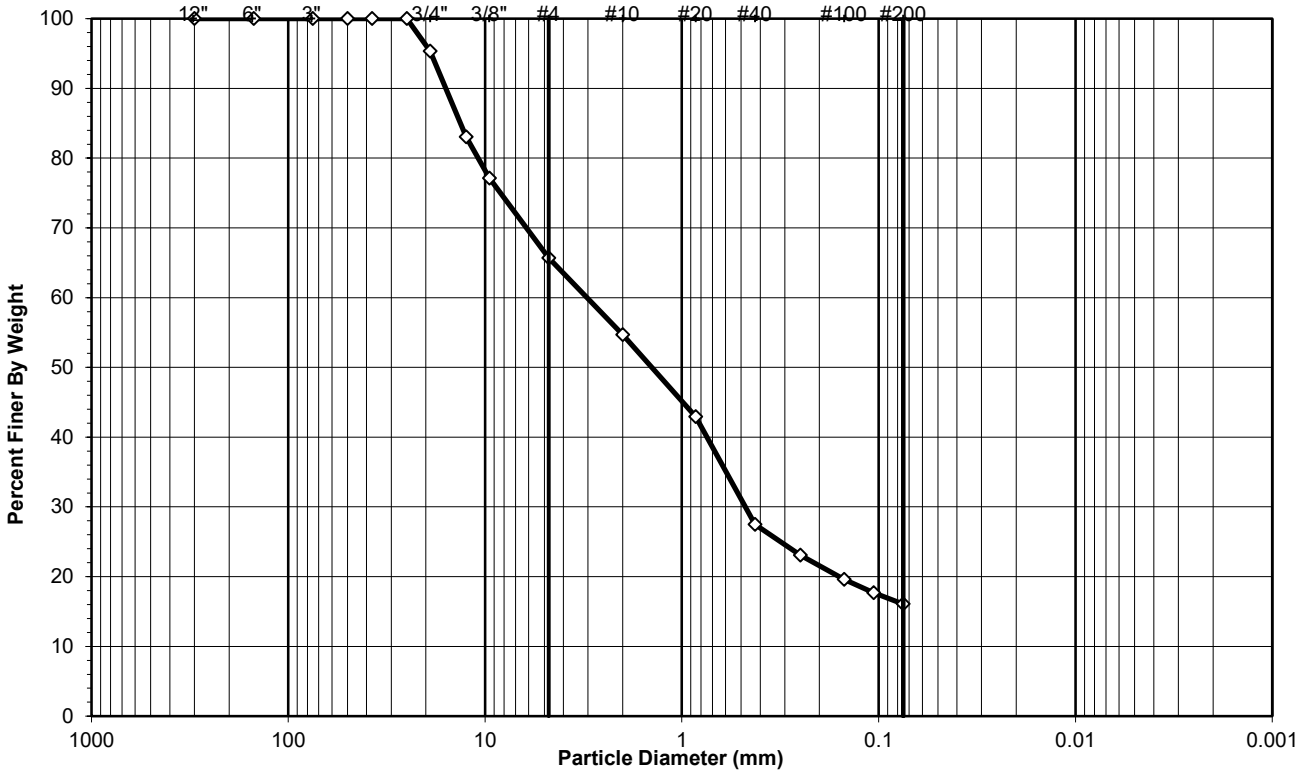
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-5
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-10.5'
Project No.:	2023-680-002	Sample No.:	2 to 4
Lab ID:	2023-680-002-009	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**34.30**
#4 to #200	***Sand***	**49.64**
Finer than #200	***Silt & Clay***	**16.06**

USCS Symbol:
sm, ASSUMED

D50 = 1.42

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By DF Date 11/16/23 Checked By KC Date 11/16/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-5
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-10.5'
Project No.:	2023-680-002	Sample No.:	2 to 4
Lab ID:	2023-680-002-009	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1487	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	752.57	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	698.33	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.63	Weight of Tare (g):	NA
Weight of Water (g):	54.24	Weight of Water (g):	NA
Weight of Dry Soil (g):	551.70	Weight of Dry Soil (g):	NA
Moisture Content (%):	**9.8**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	551.70
Tare No. (Sub-Specimen)	1487	Wet Weight of +3/4" Sample (g):	28.23
Wt. of Tare & Wet Sub-Specimen (g):	752.57	Dry Weight of + 3/4" Sample (g):	25.70
Weight of Tare (g):	146.63	Dry Weight of - 3/4" Sample (g):	526.00
Sub-Specimen Wet Weight (g):	605.94	Dry Weight -3/4" +3/8" Sample (g):	100.61
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	425.39
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	25.70		4.66	4.66	95.34	**95**
1/2"	12.5	67.74	(**)	12.28	16.94	83.06	**83**
3/8"	9.5	32.87		5.96	22.89	77.11	**77**
#4	4.75	62.92		11.40	34.30	65.70	**66**
#10	2	60.70		11.00	45.30	54.70	**55**
#20	0.85	65.00	(**)	11.78	57.08	42.92	**43**
#40	0.425	85.25		15.45	72.54	27.46	**27**
#60	0.25	24.26		4.40	76.93	23.07	**23**
#100	0.15	19.13		3.47	80.40	19.60	**20**
#140	0.106	10.55		1.91	82.31	17.69	**18**
#200	0.075	8.95		1.62	83.94	16.06	**16**
Pan	-	88.63		16.06	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 11/16/23 Checked By KC Date 11/16/23

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

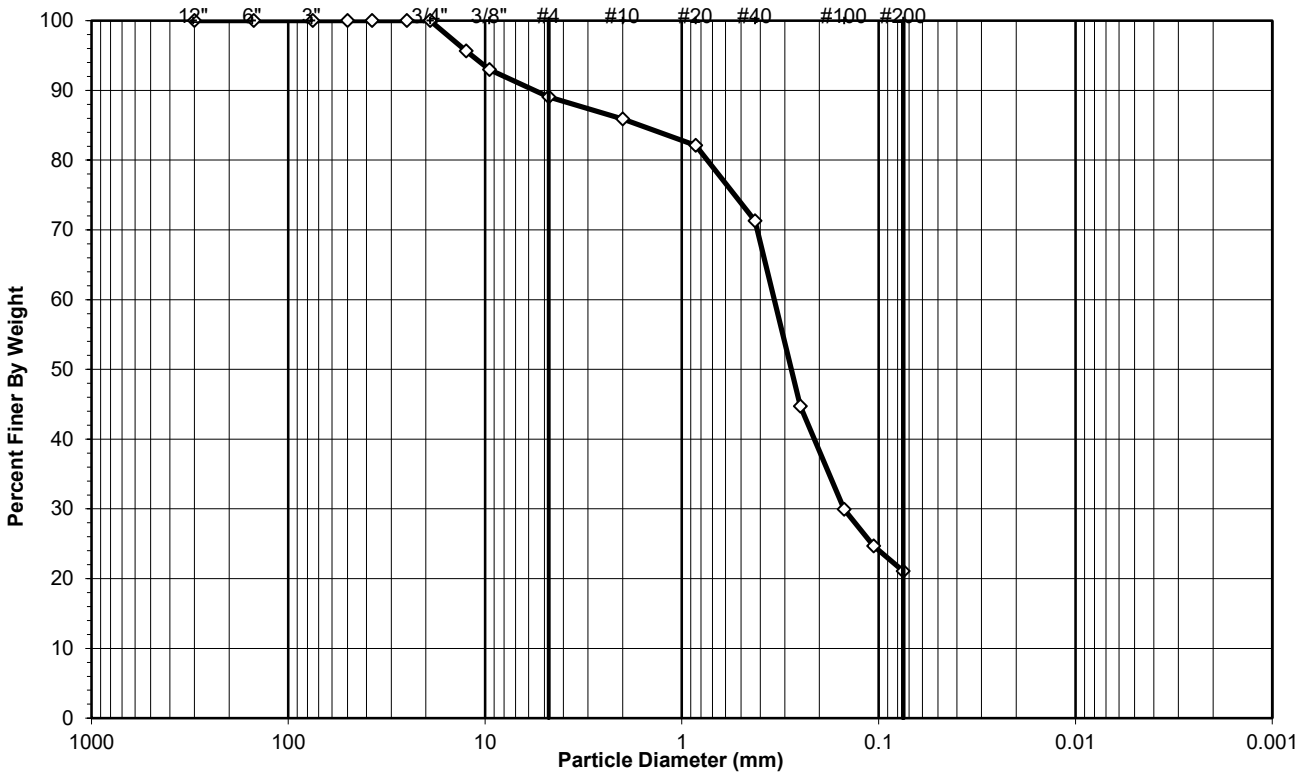
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-8
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-012	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**10.93**
#4 to #200	***Sand***	**67.99**
Finer than #200	***Silt & Clay***	**21.08**

USCS Symbol:
sm, ASSUMED

D50 = 0.28

USCS Classification:
SILTY SAND

Tested By DF Date 11/16/23 Checked By KC Date 11/16/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-8
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-012	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1544	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	517.55	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	485.82	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	149.11	Weight of Tare (g):	NA
Weight of Water (g):	31.73	Weight of Water (g):	NA
Weight of Dry Soil (g):	336.71	Weight of Dry Soil (g):	NA
Moisture Content (%):	**9.4**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	336.71
Tare No. (Sub-Specimen)	1544	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	517.55	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	149.11	Dry Weight of - 3/4" Sample (g):	336.71
Sub-Specimen Wet Weight (g):	368.44	Dry Weight -3/4" +3/8" Sample (g):	23.60
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	313.11
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**
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	14.60	(**)	4.34	4.34	95.66	**96**
3/8"	9.5	9.00		2.67	7.01	92.99	**93**
#4	4.75	13.20		3.92	10.93	89.07	**89**
#10	2	10.74		3.19	14.12	85.88	**86**
#20	0.85	12.69	(**)	3.77	17.89	82.11	**82**
#40	0.425	36.38		10.80	28.69	71.31	**71**
#60	0.25	89.50		26.58	55.27	44.73	**45**
#100	0.15	49.77		14.78	70.05	29.95	**30**
#140	0.106	17.80		5.29	75.34	24.66	**25**
#200	0.075	12.06		3.58	78.92	21.08	**21**
Pan	-	70.97		21.08	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 11/16/23 Checked By KC Date 11/16/23

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

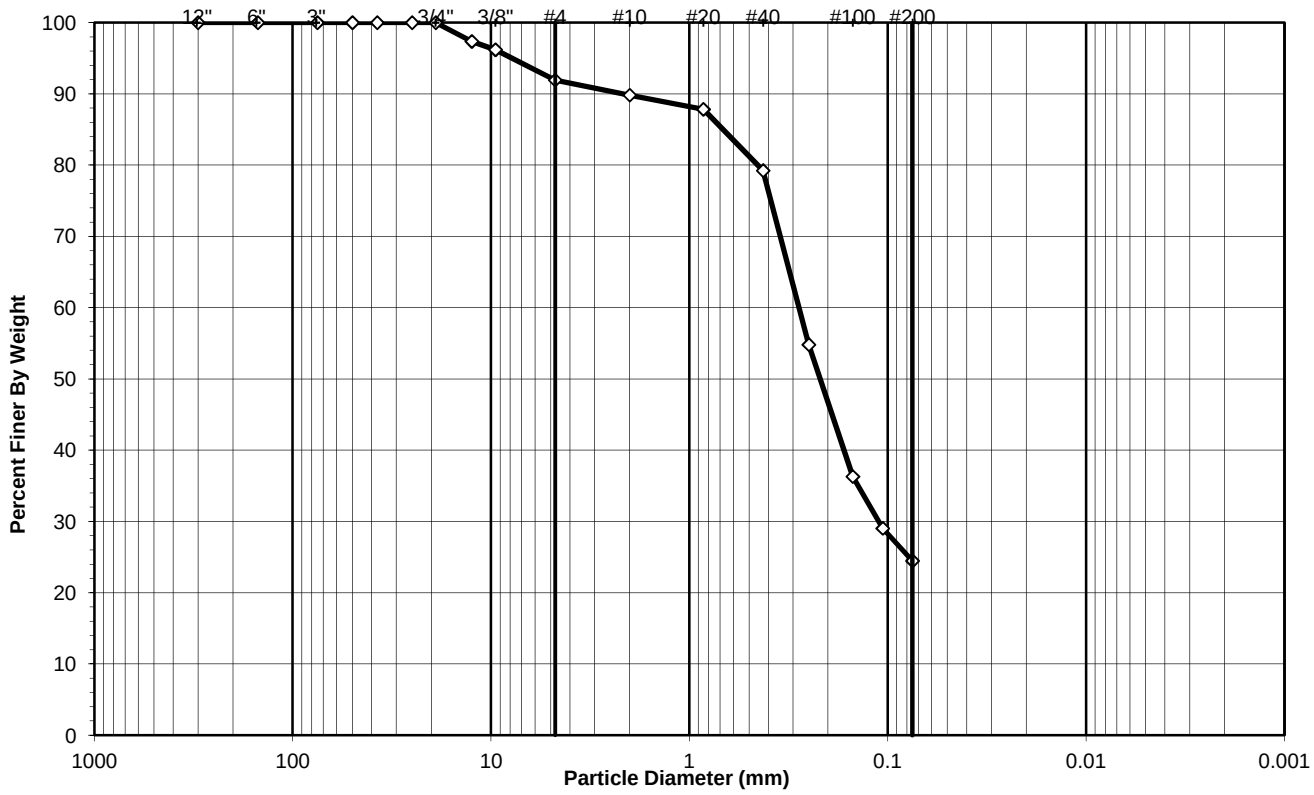
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-12
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-015	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**8.06**
#4 to #200	***Sand***	**67.47**
Finer than #200	***Silt & Clay***	**24.47**

USCS Symbol:
sm, ASSUMED

D50 = 0.22

USCS Classification:
SILTY SAND

Tested By DF Date 11/16/23 Checked By KC Date 11/16/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-12
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-015	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1434	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	504.45	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	484.04	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.93	Weight of Tare (g):	NA
Weight of Water (g):	20.41	Weight of Water (g):	NA
Weight of Dry Soil (g):	339.11	Weight of Dry Soil (g):	NA
Moisture Content (%):	**6.0**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	339.11
Tare No. (Sub-Specimen)	1434	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	504.45	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.93	Dry Weight of - 3/4" Sample (g):	339.11
Sub-Specimen Wet Weight (g):	359.52	Dry Weight -3/4" +3/8" Sample (g):	12.89
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	326.22
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	8.93	(**)	2.63	2.63	97.37	**97**
3/8"	9.5	3.96		1.17	3.80	96.20	**96**
#4	4.75	14.44		4.26	8.06	91.94	**92**
#10	2	7.17		2.11	10.17	89.83	**90**
#20	0.85	6.75	(**)	1.99	12.16	87.84	**88**
#40	0.425	29.12		8.59	20.75	79.25	**79**
#60	0.25	82.85		24.43	45.18	54.82	**55**
#100	0.15	62.80		18.52	63.70	36.30	**36**
#140	0.106	24.60		7.25	70.96	29.04	**29**
#200	0.075	15.50		4.57	75.53	24.47	**24**
Pan	-	82.99		24.47	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 11/16/23 Checked By KC Date 11/16/23

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

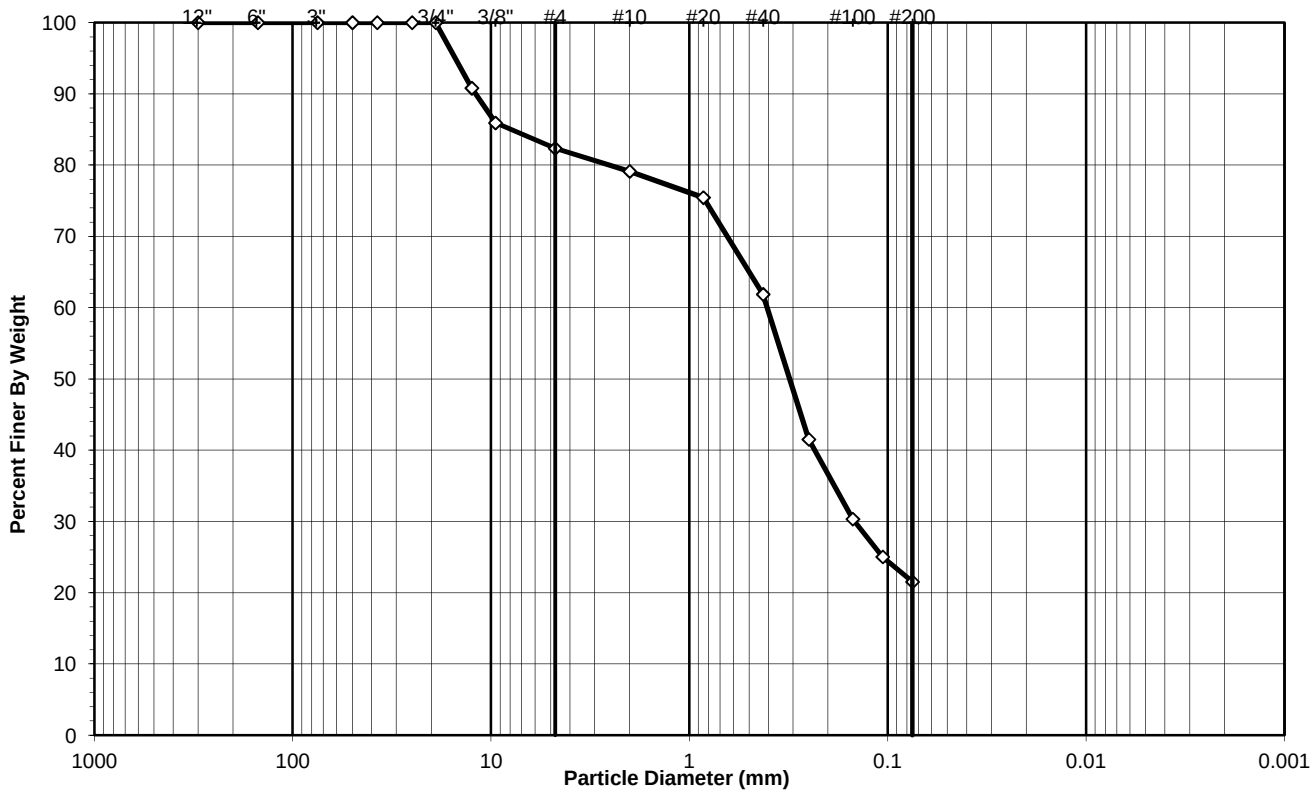
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-19
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-018	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**17.65**
#4 to #200	***Sand***	**60.82**
Finer than #200	***Silt & Clay***	**21.53**

USCS Symbol:
sm, ASSUMED

D50 = 0.31

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By DF Date 11/16/23 Checked By KC Date 11/16/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-19
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-018	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1431	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	578.42	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	544.97	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.16	Weight of Tare (g):	NA
Weight of Water (g):	33.45	Weight of Water (g):	NA
Weight of Dry Soil (g):	400.81	Weight of Dry Soil (g):	NA
Moisture Content (%):	**8.3**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	400.81
Tare No. (Sub-Specimen)	1431	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	578.42	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.16	Dry Weight of - 3/4" Sample (g):	400.81
Sub-Specimen Wet Weight (g):	434.26	Dry Weight -3/4" +3/8" Sample (g):	56.40
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	344.41
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	36.85	(**)	9.19	9.19	90.81	**91**
3/8"	9.5	19.55		4.88	14.07	85.93	**86**
#4	4.75	14.33		3.58	17.65	82.35	**82**
#10	2	12.94		3.23	20.88	79.12	**79**
#20	0.85	14.74	(**)	3.68	24.55	75.45	**75**
#40	0.425	54.41		13.58	38.13	61.87	**62**
#60	0.25	81.60		20.36	58.49	41.51	**42**
#100	0.15	44.84		11.19	69.67	30.33	**30**
#140	0.106	21.24		5.30	74.97	25.03	**25**
#200	0.075	14.00		3.49	78.47	21.53	**22**
Pan	-	86.31		21.53	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	11/16/23	Checked By	KC	Date	11/16/23

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

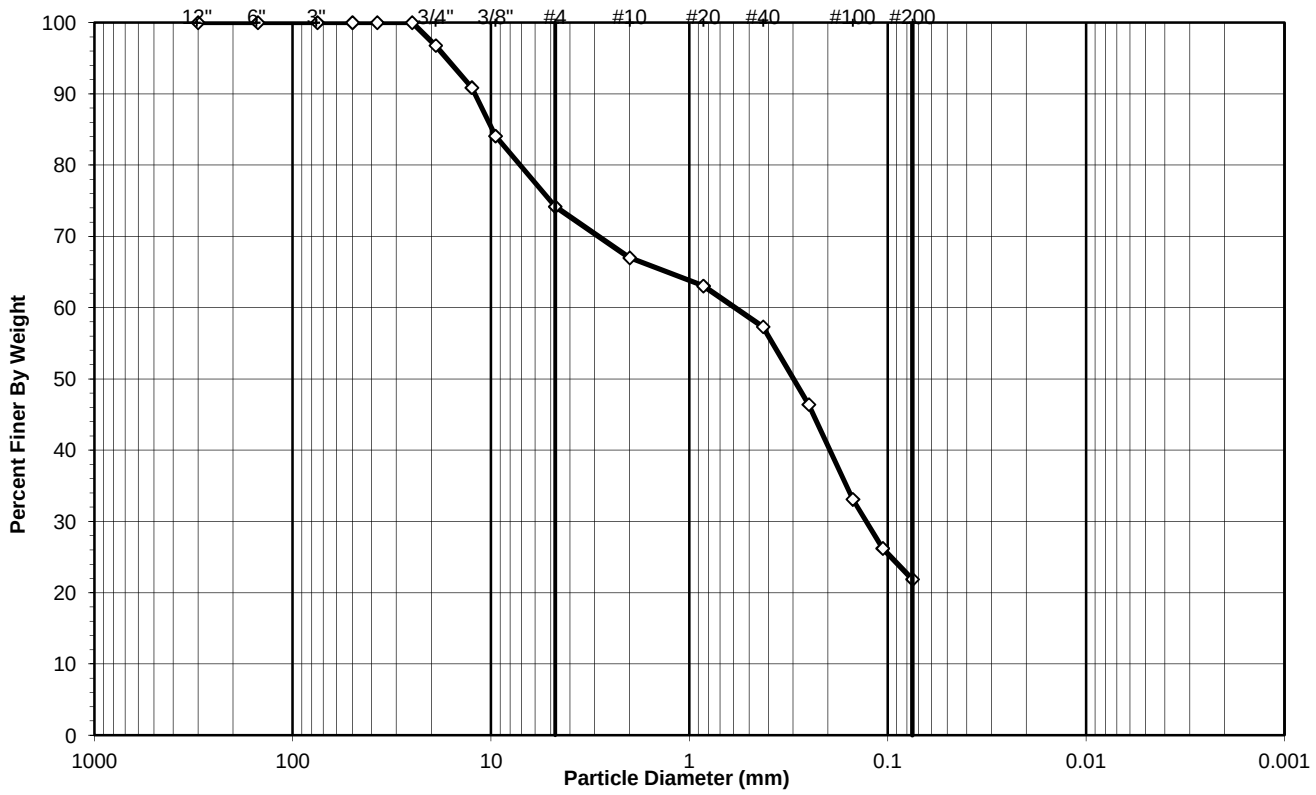
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-26
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-022	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**25.81**
#4 to #200	***Sand***	**52.31**
Finer than #200	***Silt & Clay***	**21.88**

USCS Symbol:
sm, ASSUMED

D50 = 0.30

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By DF Date 11/16/23 Checked By KC Date 11/16/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	SB-26
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-022	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1453	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	536.42	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	517.89	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	137.19	Weight of Tare (g):	NA
Weight of Water (g):	18.53	Weight of Water (g):	NA
Weight of Dry Soil (g):	380.70	Weight of Dry Soil (g):	NA
Moisture Content (%):	**4.9**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	380.70
Tare No. (Sub-Specimen)	1453	Wet Weight of +3/4" Sample (g):	12.83
Wt. of Tare & Wet Sub-Specimen (g):	536.42	Dry Weight of + 3/4" Sample (g):	12.23
Weight of Tare (g):	137.19	Dry Weight of - 3/4" Sample (g):	368.47
Sub-Specimen Wet Weight (g):	399.23	Dry Weight -3/4" +3/8" Sample (g):	48.35
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	320.12
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	12.23		3.21	3.21	96.79	**97**
1/2"	12.5	22.50	(**)	5.91	9.12	90.88	**91**
3/8"	9.5	25.85		6.79	15.91	84.09	**84**
#4	4.75	37.69		9.90	25.81	74.19	**74**
#10	2	27.37		7.19	33.00	67.00	**67**
#20	0.85	15.06	(**)	3.96	36.96	63.04	**63**
#40	0.425	21.81		5.73	42.69	57.31	**57**
#60	0.25	41.52		10.91	53.59	46.41	**46**
#100	0.15	50.64		13.30	66.90	33.10	**33**
#140	0.106	26.20		6.88	73.78	26.22	**26**
#200	0.075	16.55		4.35	78.12	21.88	**22**
Pan	-	83.28		21.88	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	11/16/23	Checked By	KC	Date	11/16/23

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

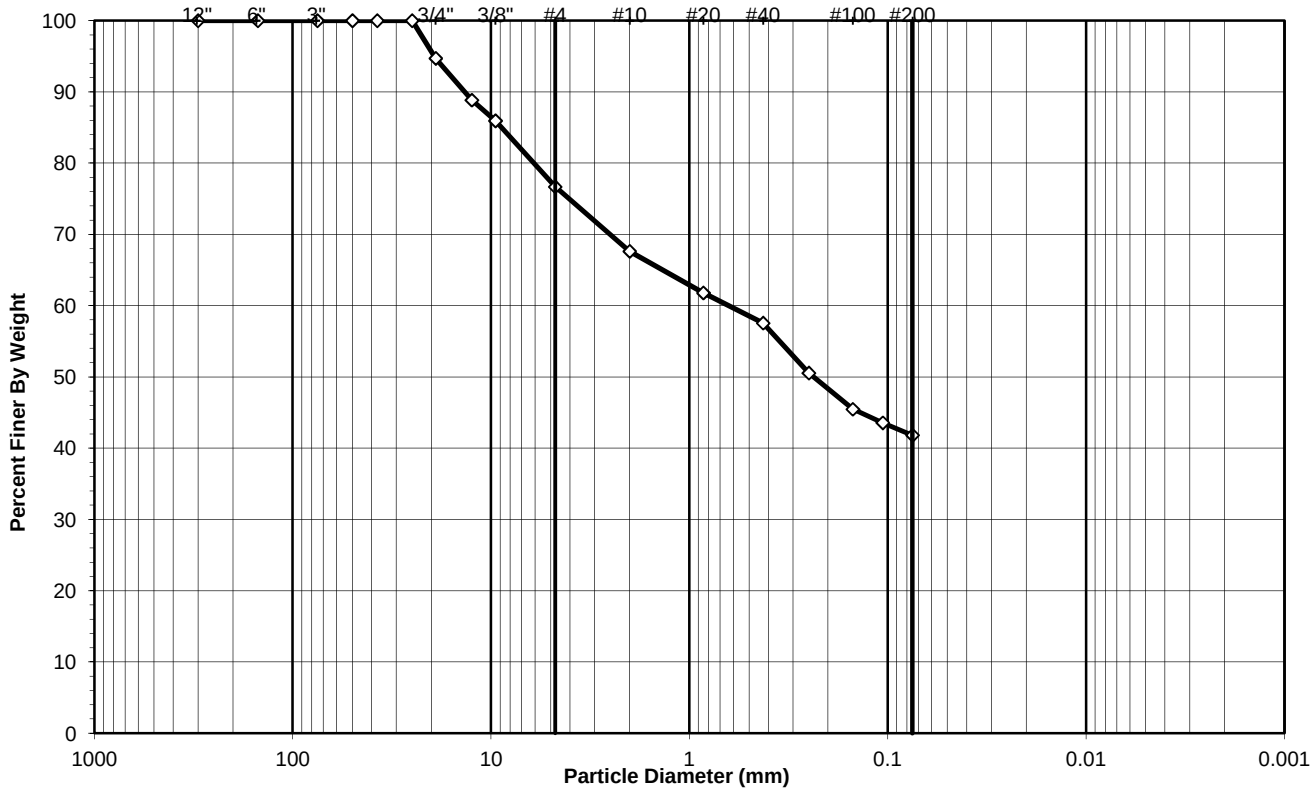
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-13
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	12.0-19.5'
Project No.:	2023-680-002	Sample No.:	5 to 7
Lab ID:	2023-680-002-030	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**23.31**
#4 to #200	***Sand***	**34.87**
Finer than #200	***Silt & Clay***	**41.82**

USCS Symbol:
sc, ASSUMED

D50 = 0.24

USCS Classification:
CLAYEY SAND WITH GRAVEL

Tested By DF Date 11/16/23 Checked By KC Date 11/16/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-13
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	12.0-19.5'
Project No.:	2023-680-002	Sample No.:	5 to 7
Lab ID:	2023-680-002-030	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2022	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	705.54	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	634.04	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	145.47	Weight of Tare (g):	NA
Weight of Water (g):	71.50	Weight of Water (g):	NA
Weight of Dry Soil (g):	488.57	Weight of Dry Soil (g):	NA
Moisture Content (%):	**14.6**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	488.57
Tare No. (Sub-Specimen)	2022	Wet Weight of +3/4" Sample (g):	29.64
Wt. of Tare & Wet Sub-Specimen (g):	705.54	Dry Weight of + 3/4" Sample (g):	25.86
Weight of Tare (g):	145.47	Dry Weight of - 3/4" Sample (g):	462.71
Sub-Specimen Wet Weight (g):	560.07	Dry Weight -3/4" +3/8" Sample (g):	42.81
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	419.90
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	25.86		5.29	5.29	94.71	**95**
1/2"	12.5	28.64	(**)	5.86	11.16	88.84	**89**
3/8"	9.5	14.17		2.90	14.06	85.94	**86**
#4	4.75	45.22		9.26	23.31	76.69	**77**
#10	2	44.27		9.06	32.37	67.63	**68**
#20	0.85	28.52	(**)	5.84	38.21	61.79	**62**
#40	0.425	20.68		4.23	42.44	57.56	**58**
#60	0.25	34.24		7.01	49.45	50.55	**51**
#100	0.15	24.83		5.08	54.53	45.47	**45**
#140	0.106	9.30		1.90	56.44	43.56	**44**
#200	0.075	8.53		1.75	58.18	41.82	**42**
Pan	-	204.31		41.82	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	11/16/23	Checked By	KC	Date	11/16/23

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

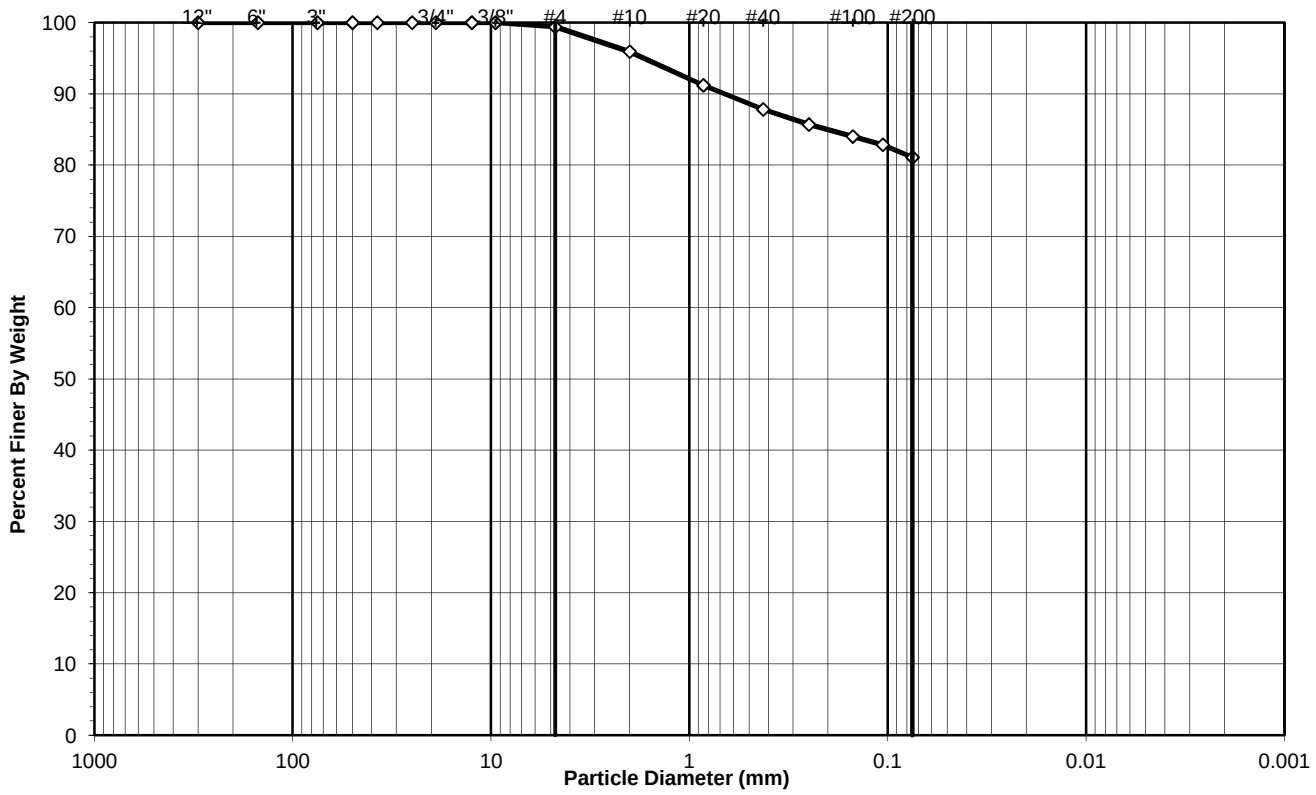
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-13
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	24.0-28.5'
Project No.:	2023-680-002	Sample No.:	9 & 10
Lab ID:	2023-680-002-034	Soil Color:	Gray

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**0.60**
#4 to #200	***Sand***	**18.31**
Finer than #200	***Silt & Clay***	**81.09**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By DF Date 11/27/23 Checked By BRB Date 11/27/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-13
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	24.0-28.5'
Project No.:	2023-680-002	Sample No.:	9 & 10
Lab ID:	2023-680-002-034	Soil Color:	Gray

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1444	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	440.42	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	440.42	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.53	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	295.89	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):	295.89
Tare No. (Sub-Specimen)	1444	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	440.42	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.53	Dry Weight of - 3/4" Sample (g):	295.89
Sub-Specimen Wet Weight (g):	295.89	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	295.89
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	1.78		0.60	0.60	99.40	**99.4**
#10	2	10.25		3.46	4.07	95.93	**95.9**
#20	0.85	14.00	(**)	4.73	8.80	91.20	**91.2**
#40	0.425	9.98		3.37	12.17	87.83	**87.8**
#60	0.25	6.26		2.12	14.29	85.71	**85.7**
#100	0.15	5.00		1.69	15.98	84.02	**84.0**
#140	0.106	3.42		1.16	17.13	82.87	**82.9**
#200	0.075	5.26		1.78	18.91	81.09	**81.1**
Pan	-	239.94		81.09	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 11/27/23 Checked By BRB Date 11/27/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-13
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	24.0-28.5'
Project No.:	2023-680-002	Sample No.:	9 & 10
Lab ID:	2023-680-002-034	Soil Description:	GRAY LEAN CLAY

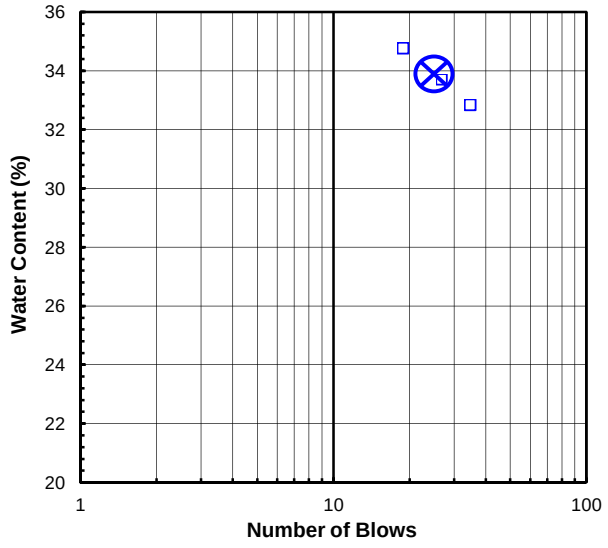
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	3375	308	601	162	U
Wt. of Tare & Wet Sample (g):	35.42	41.14	40.74	37.94	L
Wt. of Tare & Dry Sample (g):	30.90	35.72	35.22	32.66	T
Weight of Tare (g):	8.12	19.20	18.83	17.46	I
Weight of Water (g):	4.5	5.4	5.5	5.3	P
Weight of Dry Sample (g):	22.8	16.5	16.4	15.2	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**19.8**	**32.8**	**33.7**	**34.7**	N
Number of Blows:		**35**	**27**	**19**	T

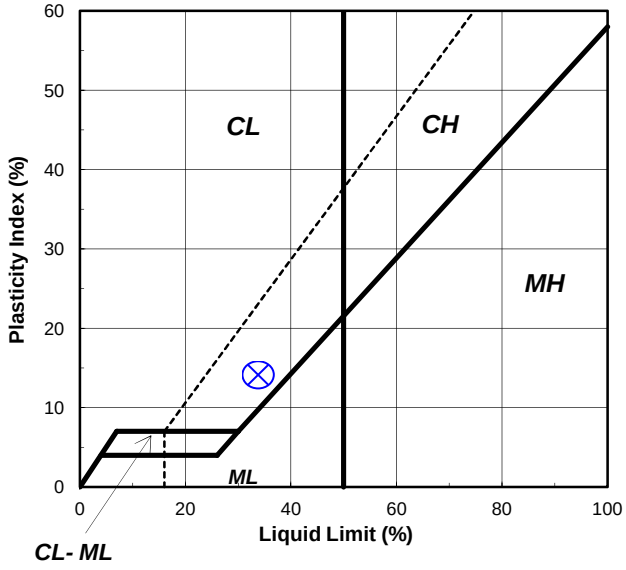
Plastic Limit Test	1	2	Range
Tare Number:	327	513	
Wt. of Tare & Wet Sample (g):	26.01	25.98	
Wt. of Tare & Dry Sample (g):	24.89	24.87	
Weight of Tare (g):	19.40	19.33	
Weight of Water (g):	1.1	1.1	
Weight of Dry Sample (g):	5.5	5.5	
Moisture Content (%):	**20.4**	**20.0**	**0.4**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**34**
Plastic Limit (%):	**20**
Plasticity Index (%):	**14**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 11/21/23 *Checked By* JLK *Date* 11/22/23

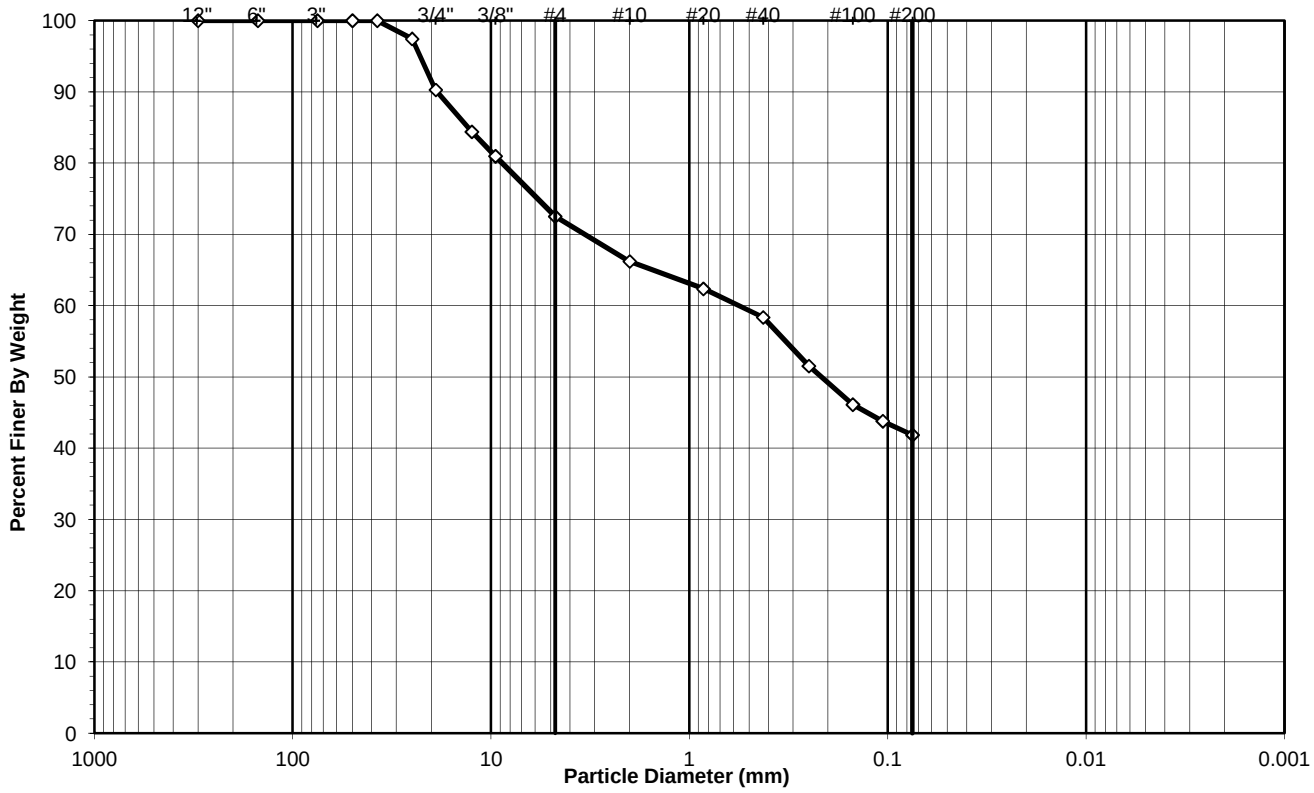
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-22
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	15.0-28.5'
Project No.:	2023-680-002	Sample No.:	6 to 10
Lab ID:	2023-680-002-055	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**27.48**
#4 to #200	***Sand***	**30.66**
Finer than #200	***Silt & Clay***	**41.86**

USCS Symbol:
sc, ASSUMED

D50 = 0.22

USCS Classification:
CLAYEY SAND WITH GRAVEL

Tested By DF Date 11/16/23 Checked By KC Date 11/16/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-22
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	15.0-28.5'
Project No.:	2023-680-002	Sample No.:	6 to 10
Lab ID:	2023-680-002-055	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2028	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	1237.53	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	1108.29	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	147.99	Weight of Tare (g):	NA
Weight of Water (g):	129.24	Weight of Water (g):	NA
Weight of Dry Soil (g):	960.30	Weight of Dry Soil (g):	NA
Moisture Content (%):	**13.5**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	960.30
Tare No. (Sub-Specimen)	2028	Wet Weight of +3/4" Sample (g):	105.96
Wt. of Tare & Wet Sub-Specimen (g):	1237.53	Dry Weight of + 3/4" Sample (g):	93.39
Weight of Tare (g):	147.99	Dry Weight of - 3/4" Sample (g):	866.91
Sub-Specimen Wet Weight (g):	1089.54	Dry Weight -3/4" +3/8" Sample (g):	89.34
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	777.57
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	24.64		2.57	2.57	97.43	**97**
3/4"	19	68.75		7.16	9.73	90.27	**90**
1/2"	12.5	56.44	(**)	5.88	15.60	84.40	**84**
3/8"	9.5	32.90		3.43	19.03	80.97	**81**
#4	4.75	81.20		8.46	27.48	72.52	**73**
#10	2	60.57		6.31	33.79	66.21	**66**
#20	0.85	37.00	(**)	3.85	37.64	62.36	**62**
#40	0.425	38.43		4.00	41.65	58.35	**58**
#60	0.25	65.50		6.82	48.47	51.53	**52**
#100	0.15	52.02		5.42	53.88	46.12	**46**
#140	0.106	22.33		2.33	56.21	43.79	**44**
#200	0.075	18.58		1.93	58.14	41.86	**42**
Pan	-	401.94		41.86	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	11/16/23	Checked By	KC	Date	11/16/23

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

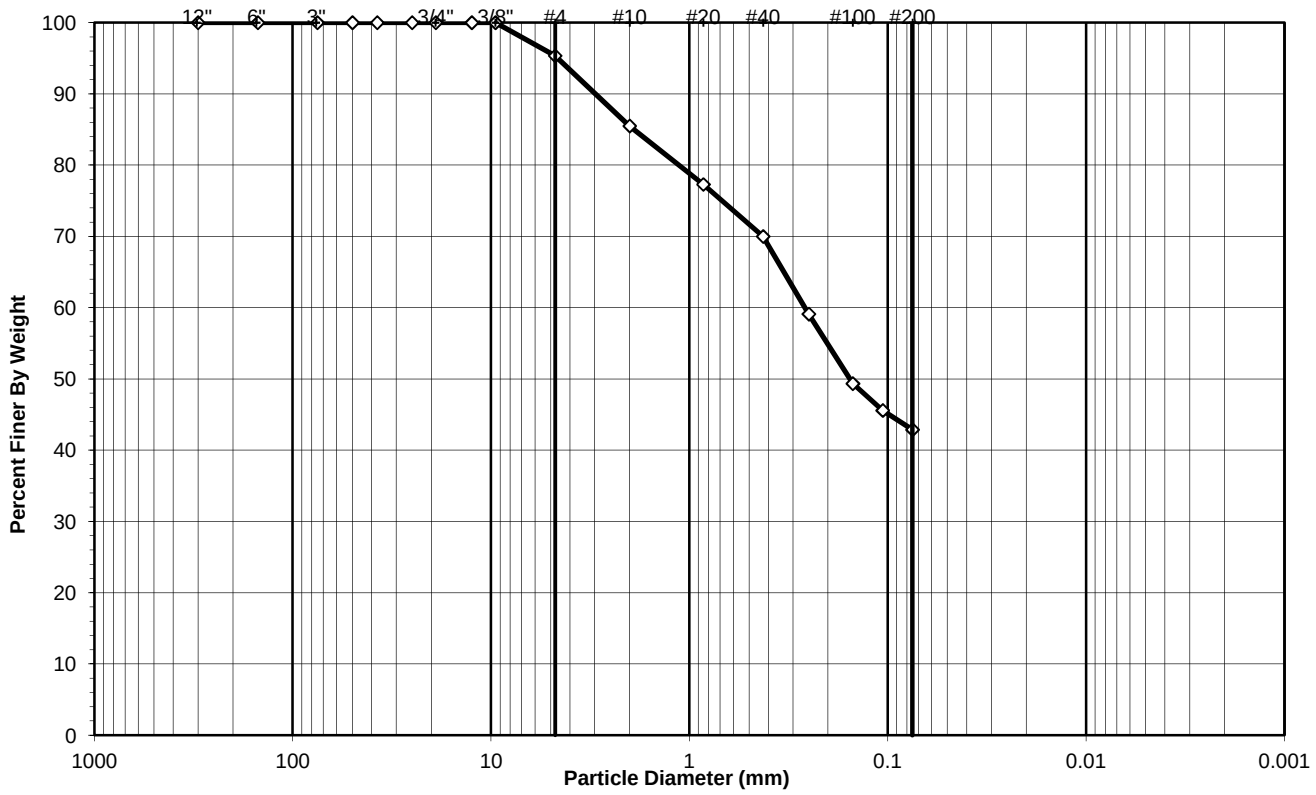
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-23
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-13.5'
Project No.:	2023-680-002	Sample No.:	3 to 5
Lab ID:	2023-680-002-069	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**4.66**
#4 to #200	***Sand***	**52.45**
Finer than #200	***Silt & Clay***	**42.89**

USCS Symbol:
SC, TESTED

D50 = 0.16

USCS Classification:
CLAYEY SAND

Tested By DF Date 11/27/23 Checked By BRB Date 11/27/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-23
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-13.5'
Project No.:	2023-680-002	Sample No.:	3 to 5
Lab ID:	2023-680-002-069	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1456	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	554.17	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	554.17	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	130.79	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	423.38	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):	423.38
Tare No. (Sub-Specimen)	1456	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	554.17	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	130.79	Dry Weight of - 3/4" Sample (g):	423.38
Sub-Specimen Wet Weight (g):	423.38	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	423.38
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	0.00		0.00	0.00	100.00	**100**
#4	4.75	19.74		4.66	4.66	95.34	**95**
#10	2	41.64		9.84	14.50	85.50	**86**
#20	0.85	34.73	(**)	8.20	22.70	77.30	**77**
#40	0.425	30.90		7.30	30.00	70.00	**70**
#60	0.25	46.14		10.90	40.90	59.10	**59**
#100	0.15	41.30		9.75	50.65	49.35	**49**
#140	0.106	15.95		3.77	54.42	45.58	**46**
#200	0.075	11.41		2.69	57.11	42.89	**43**
Pan	-	181.57		42.89	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 11/27/23 Checked By BRB Date 11/27/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-23
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-13.5'
Project No.:	2023-680-002	Sample No.:	3 to 5
Lab ID:	2023-680-002-069	Soil Description:	BROWN LEAN CLAY

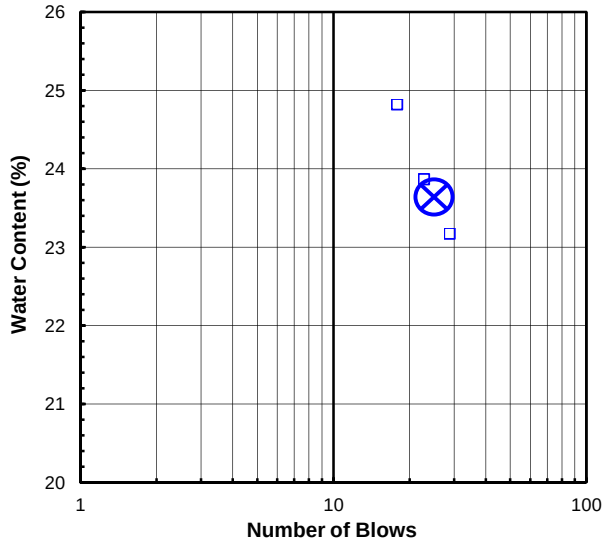
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	12	293	5	310	U
Wt. of Tare & Wet Sample (g):	59.68	42.32	42.27	45.58	L
Wt. of Tare & Dry Sample (g):	54.81	37.81	37.43	40.37	T
Weight of Tare (g):	9.16	18.34	17.14	19.37	I
Weight of Water (g):	4.9	4.5	4.8	5.2	P
Weight of Dry Sample (g):	45.7	19.5	20.3	21.0	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**10.7**	**23.2**	**23.9**	**24.8**	N
Number of Blows:		**29**	**23**	**18**	T

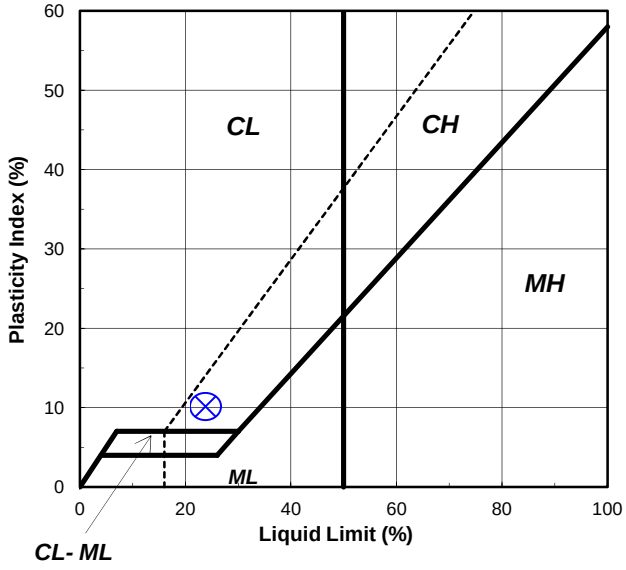
Plastic Limit Test	1	2	Range
Tare Number:	335	349	
Wt. of Tare & Wet Sample (g):	25.74	24.62	
Wt. of Tare & Dry Sample (g):	24.95	23.85	
Weight of Tare (g):	19.32	18.37	
Weight of Water (g):	0.8	0.8	
Weight of Dry Sample (g):	5.6	5.5	
Moisture Content (%):	**14.0**	**14.1**	**0.0**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**24**
Plastic Limit (%):	**14**
Plasticity Index (%):	**10**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 11/21/23 *Checked By* JLK *Date* 11/22/23

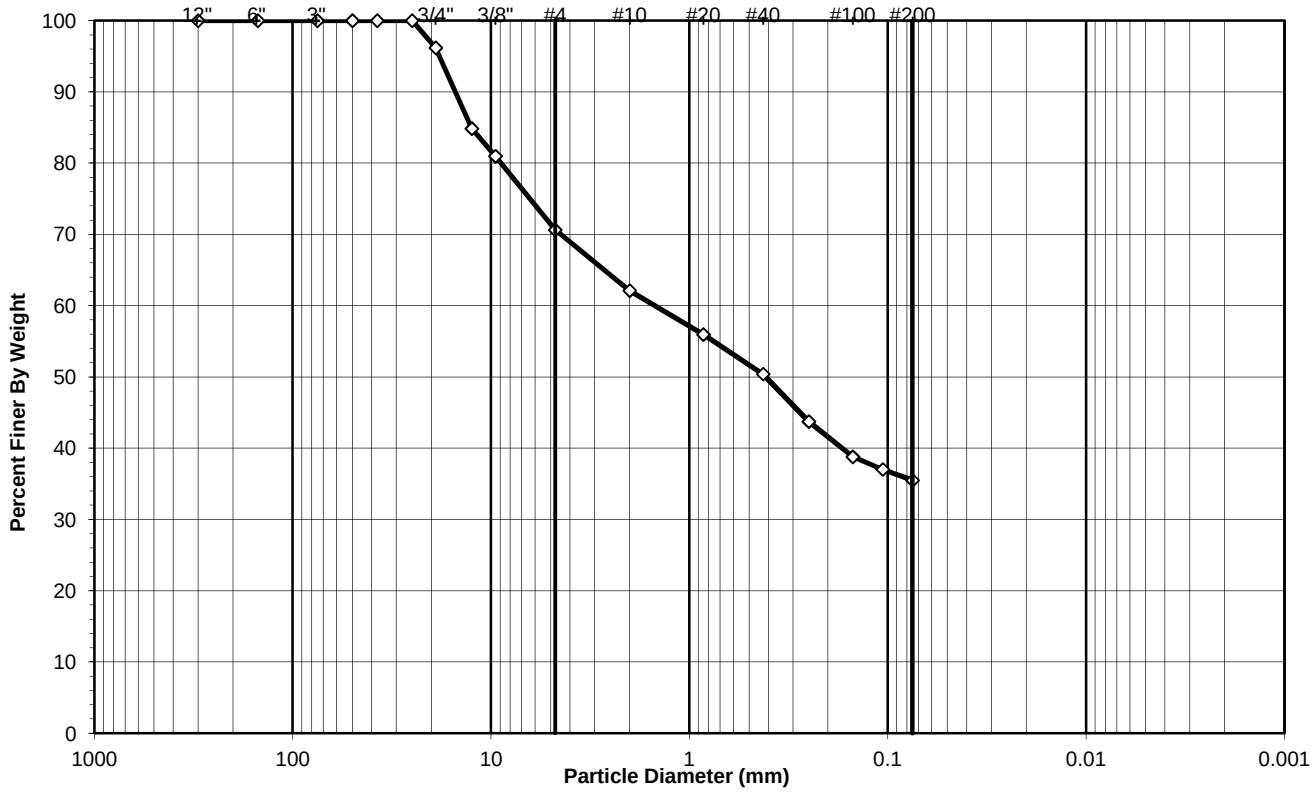
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-23
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	18.0-25.5'
Project No.:	2023-680-002	Sample No.:	7 to 9
Lab ID:	2023-680-002-074	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**29.36**
#4 to #200	***Sand***	**35.13**
Finer than #200	***Silt & Clay***	**35.50**

USCS Symbol:
sc, ASSUMED

D50 = 0.41

USCS Classification:
CLAYEY SAND WITH GRAVEL

Tested By DF Date 11/20/23 Checked By KC Date 11/21/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-23
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	18.0-25.5'
Project No.:	2023-680-002	Sample No.:	7 to 9
Lab ID:	2023-680-002-074	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2038	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	718.65	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	654.23	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.38	Weight of Tare (g):	NA
Weight of Water (g):	64.42	Weight of Water (g):	NA
Weight of Dry Soil (g):	507.85	Weight of Dry Soil (g):	NA
Moisture Content (%):	**12.7**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	507.85
Tare No. (Sub-Specimen)	2038	Wet Weight of +3/4" Sample (g):	21.84
Wt. of Tare & Wet Sub-Specimen (g):	718.65	Dry Weight of + 3/4" Sample (g):	19.38
Weight of Tare (g):	146.38	Dry Weight of - 3/4" Sample (g):	488.47
Sub-Specimen Wet Weight (g):	572.27	Dry Weight -3/4" +3/8" Sample (g):	77.26
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	411.21
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	19.38		3.82	3.82	96.18	**96**
1/2"	12.5	57.50	(**)	11.32	15.14	84.86	**85**
3/8"	9.5	19.76		3.89	19.03	80.97	**81**
#4	4.75	52.49		10.34	29.36	70.64	**71**
#10	2	43.30		8.53	37.89	62.11	**62**
#20	0.85	31.26	(**)	6.16	44.05	55.95	**56**
#40	0.425	28.20		5.55	49.60	50.40	**50**
#60	0.25	33.83		6.66	56.26	43.74	**44**
#100	0.15	25.13		4.95	61.21	38.79	**39**
#140	0.106	8.98		1.77	62.98	37.02	**37**
#200	0.075	7.73		1.52	64.50	35.50	**36**
Pan	-	180.29		35.50	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	11/20/23	Checked By	KC	Date	11/21/23

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

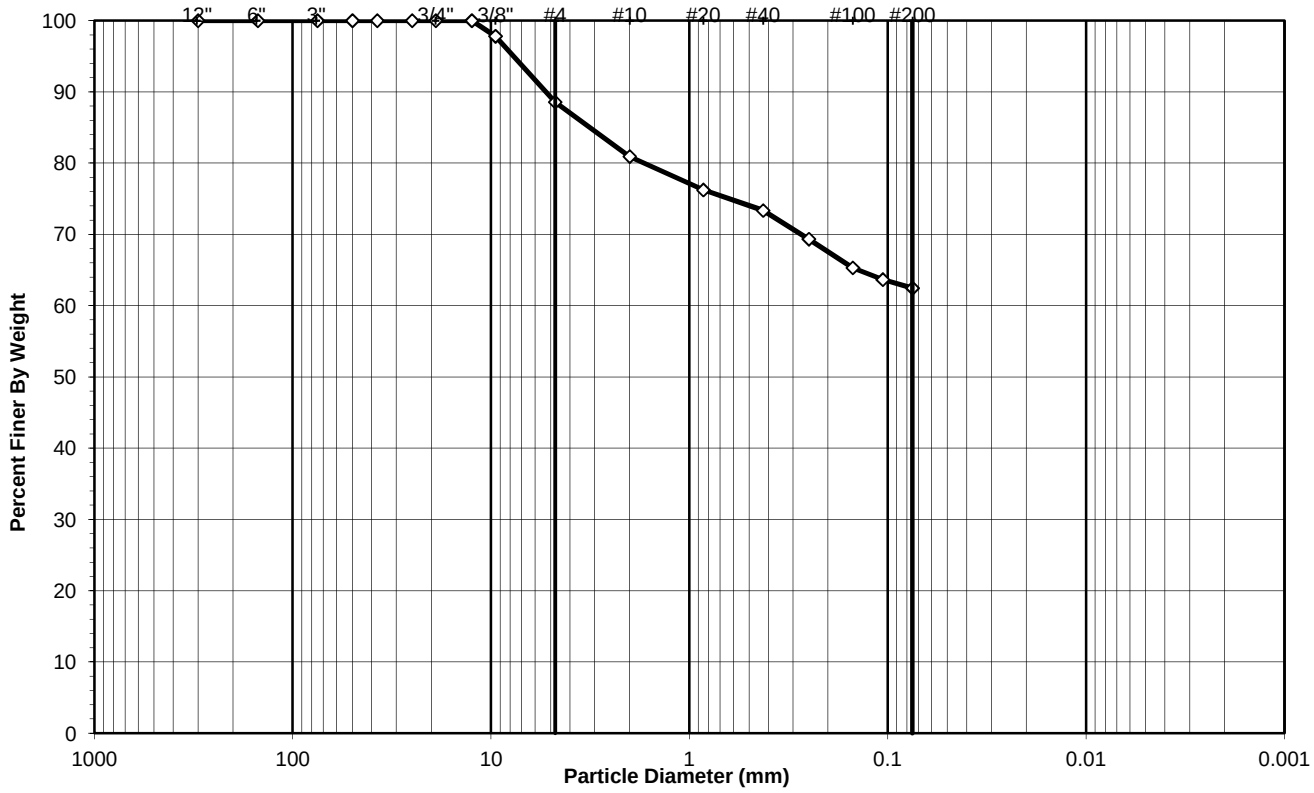
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-25
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-13.5'
Project No.:	2023-680-002	Sample No.:	1 to 5
Lab ID:	2023-680-002-082	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**11.43**
#4 to #200	***Sand***	**26.10**
Finer than #200	***Silt & Clay***	**62.46**

USCS Symbol:
CL, TESTED

USCS Classification:
SANDY LEAN CLAY

Tested By DF Date 11/27/23 Checked By BRB Date 11/27/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-25
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-13.5'
Project No.:	2023-680-002	Sample No.:	1 to 5
Lab ID:	2023-680-002-082	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1613	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	794.20	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	794.20	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	148.58	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	645.62	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):	645.62
Tare No. (Sub-Specimen)	1613	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	794.20	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	148.58	Dry Weight of - 3/4" Sample (g):	645.62
Sub-Specimen Wet Weight (g):	645.62	Dry Weight -3/4" +3/8" Sample (g):	14.12
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	631.50
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	14.12		2.19	2.19	97.81	**98**
#4	4.75	59.69		9.25	11.43	88.57	**89**
#10	2	49.30		7.64	19.07	80.93	**81**
#20	0.85	30.30	(**)	4.69	23.76	76.24	**76**
#40	0.425	18.62		2.88	26.65	73.35	**73**
#60	0.25	25.93		4.02	30.66	69.34	**69**
#100	0.15	26.00		4.03	34.69	65.31	**65**
#140	0.106	10.64		1.65	36.34	63.66	**64**
#200	0.075	7.74		1.20	37.54	62.46	**62**
Pan	-	403.28		62.46	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 11/27/23 Checked By BRB Date 11/27/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-25
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-13.5'
Project No.:	2023-680-002	Sample No.:	1 to 5
Lab ID:	2023-680-002-082	Soil Description:	BROWN LEAN CLAY

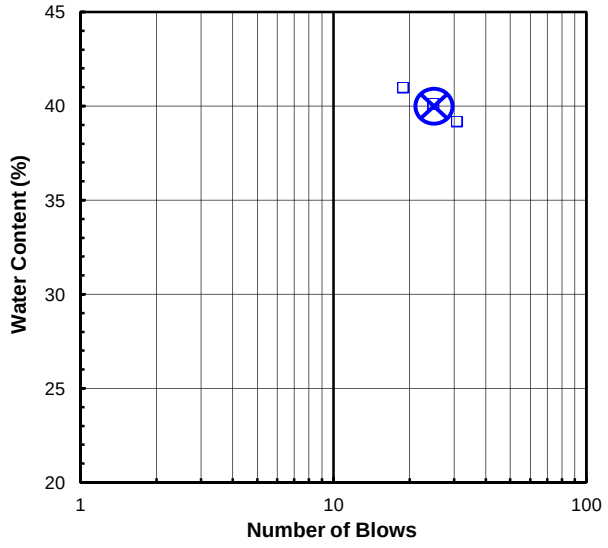
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content ASTM D2216-19		**Liquid Limit Test** 1	2	3	M
Tare Number:	7	3002	647	147	U
Wt. of Tare & Wet Sample (g):	71.60	37.76	40.53	40.50	L
Wt. of Tare & Dry Sample (g):	60.09	31.94	34.63	34.58	T
Weight of Tare (g):	8.92	17.07	19.91	20.12	I
Weight of Water (g):	11.5	5.8	5.9	5.9	P
Weight of Dry Sample (g):	51.2	14.9	14.7	14.5	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**22.5**	**39.1**	**40.1**	**40.9**	N
Number of Blows:		**31**	**25**	**19**	T

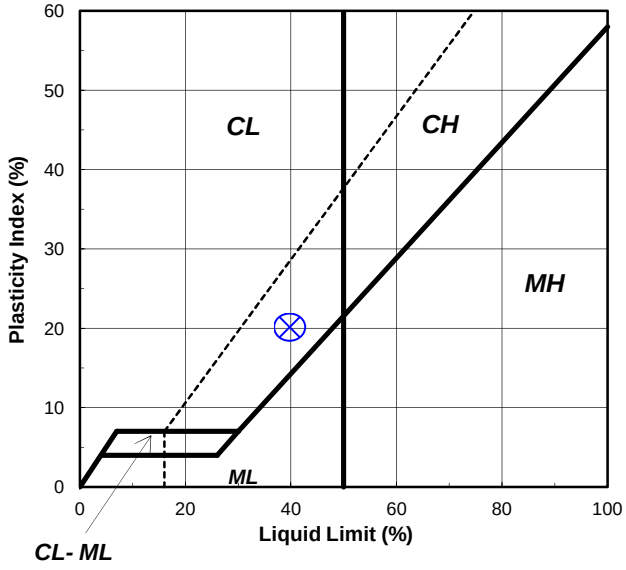
Plastic Limit Test	**1**	**2**	**Range**	
Tare Number:	156	508		
Wt. of Tare & Wet Sample (g):	25.18	25.53		
Wt. of Tare & Dry Sample (g):	24.12	24.48		
Weight of Tare (g):	18.88	19.32		
Weight of Water (g):	1.1	1.1		
Weight of Dry Sample (g):	5.2	5.2		
Moisture Content (%):	**20.2**	**20.3**	**-0.1**	
Note: The acceptable range of the two Moisture Contents is ±				1.12

Test Results	
Liquid Limit (%):	**40**
Plastic Limit (%):	**20**
Plasticity Index (%):	**20**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By FS *Date* 11/21/23 *Checked By* JLK *Date* 11/22/23

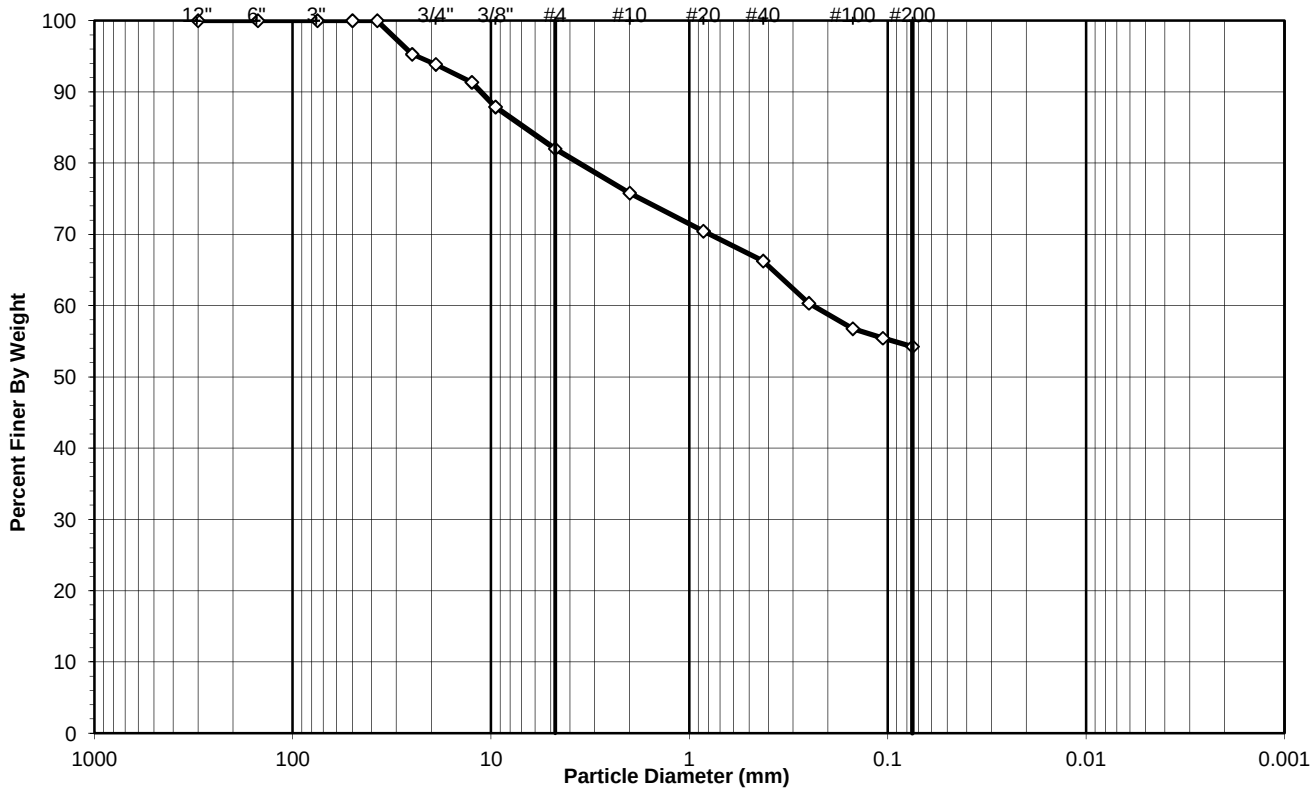
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-29
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-13.5'
Project No.:	2023-680-002	Sample No.:	1 to 5
Lab ID:	2023-680-002-097	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**17.99**
#4 to #200	***Sand***	**27.75**
Finer than #200	***Silt & Clay***	**54.26**

USCS Symbol:
cl, ASSUMED

USCS Classification:
SANDY LEAN CLAY WITH GRAVEL

Tested By DF Date 11/20/23 Checked By KC Date 11/21/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-29
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-13.5'
Project No.:	2023-680-002	Sample No.:	1 to 5
Lab ID:	2023-680-002-097	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1557	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	1062.97	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	952.57	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	147.59	Weight of Tare (g):	NA
Weight of Water (g):	110.40	Weight of Water (g):	NA
Weight of Dry Soil (g):	804.98	Weight of Dry Soil (g):	NA
Moisture Content (%):	**13.7**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	804.98
Tare No. (Sub-Specimen)	1557	Wet Weight of +3/4" Sample (g):	56.19
Wt. of Tare & Wet Sub-Specimen (g):	1062.97	Dry Weight of + 3/4" Sample (g):	49.41
Weight of Tare (g):	147.59	Dry Weight of - 3/4" Sample (g):	755.57
Sub-Specimen Wet Weight (g):	915.38	Dry Weight -3/4" +3/8" Sample (g):	48.09
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	707.48
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	37.97		4.72	4.72	95.28	**95**
3/4"	19	11.44		1.42	6.14	93.86	**94**
1/2"	12.5	20.22	(**)	2.51	8.65	91.35	**91**
3/8"	9.5	27.87		3.46	12.11	87.89	**88**
#4	4.75	47.30		5.88	17.99	82.01	**82**
#10	2	50.02		6.21	24.20	75.80	**76**
#20	0.85	43.02	(**)	5.34	29.55	70.45	**70**
#40	0.425	33.66		4.18	33.73	66.27	**66**
#60	0.25	47.73		5.93	39.66	60.34	**60**
#100	0.15	28.78		3.58	43.23	56.77	**57**
#140	0.106	10.72		1.33	44.56	55.44	**55**
#200	0.075	9.43		1.17	45.74	54.26	**54**
Pan	-	436.82		54.26	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	11/20/23	Checked By	KC	Date	11/21/23

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

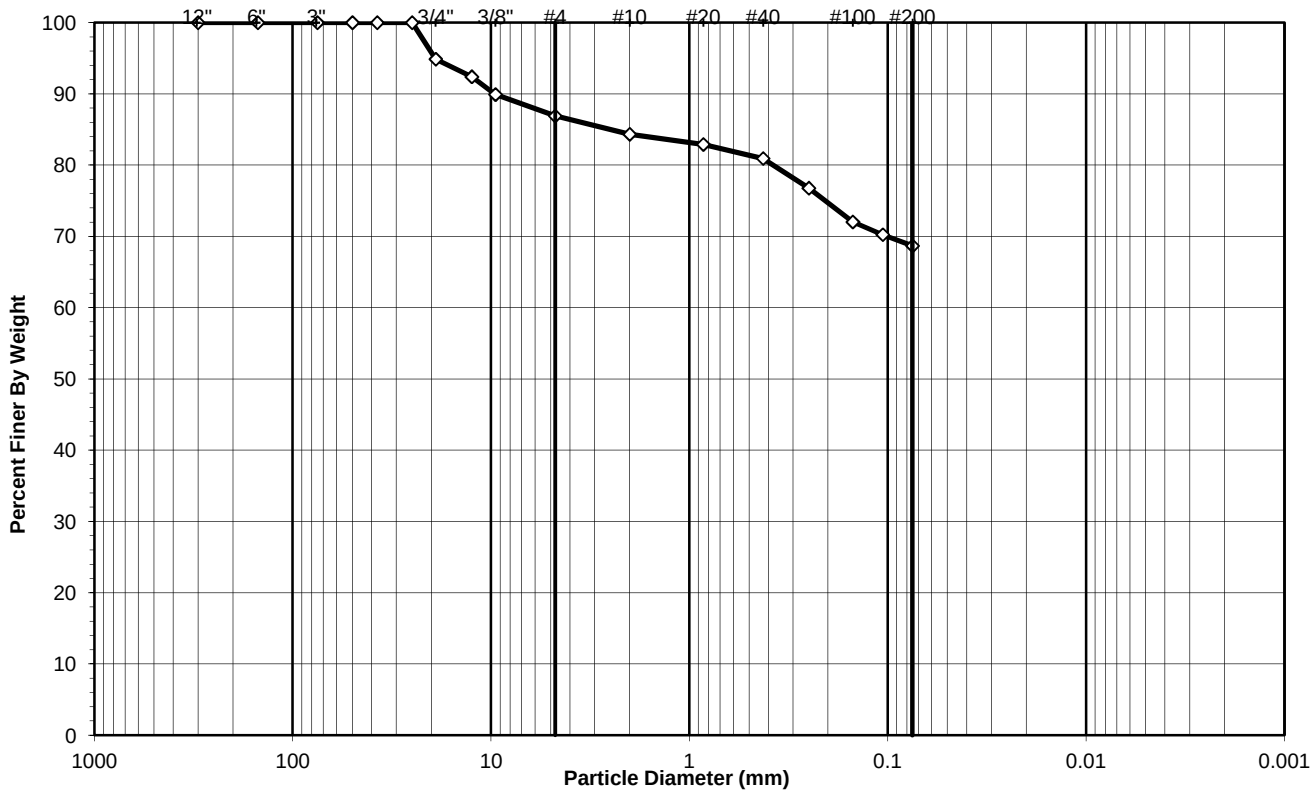
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-29
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	15.0-34.5'
Project No.:	2023-680-002	Sample No.:	6 to 12
Lab ID:	2023-680-002-105	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**13.10**
#4 to #200	***Sand***	**18.23**
Finer than #200	***Silt & Clay***	**68.67**

USCS Symbol:
cl, ASSUMED

USCS Classification:
SANDY LEAN CLAY

Tested By DF Date 11/20/23 Checked By KC Date 11/21/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-29
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	15.0-34.5'
Project No.:	2023-680-002	Sample No.:	6 to 12
Lab ID:	2023-680-002-105	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	21	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	1477.45	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	1300.22	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	197.21	Weight of Tare (g):	NA
Weight of Water (g):	177.23	Weight of Water (g):	NA
Weight of Dry Soil (g):	1103.01	Weight of Dry Soil (g):	NA
Moisture Content (%):	**16.1**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	1103.01
Tare No. (Sub-Specimen)	21	Wet Weight of +3/4" Sample (g):	65.58
Wt. of Tare & Wet Sub-Specimen (g):	1477.45	Dry Weight of + 3/4" Sample (g):	56.50
Weight of Tare (g):	197.21	Dry Weight of - 3/4" Sample (g):	1046.51
Sub-Specimen Wet Weight (g):	1280.24	Dry Weight -3/4" +3/8" Sample (g):	54.78
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	991.73
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	56.50		5.12	5.12	94.88	**95**
1/2"	12.5	27.28	(**)	2.47	7.60	92.40	**92**
3/8"	9.5	27.50		2.49	10.09	89.91	**90**
#4	4.75	33.18		3.01	13.10	86.90	**87**
#10	2	28.33		2.57	15.67	84.33	**84**
#20	0.85	15.75	(**)	1.43	17.09	82.91	**83**
#40	0.425	21.76		1.97	19.07	80.93	**81**
#60	0.25	45.90		4.16	23.23	76.77	**77**
#100	0.15	52.32		4.74	27.97	72.03	**72**
#140	0.106	19.63		1.78	29.75	70.25	**70**
#200	0.075	17.43		1.58	31.33	68.67	**69**
Pan	-	757.43		68.67	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	11/20/23	Checked By	KC	Date	11/21/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-33
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-4.5'
Project No.:	2023-680-002	Sample No.:	2
Lab ID:	2023-680-002-113	Soil Description:	BROWN FAT CLAY

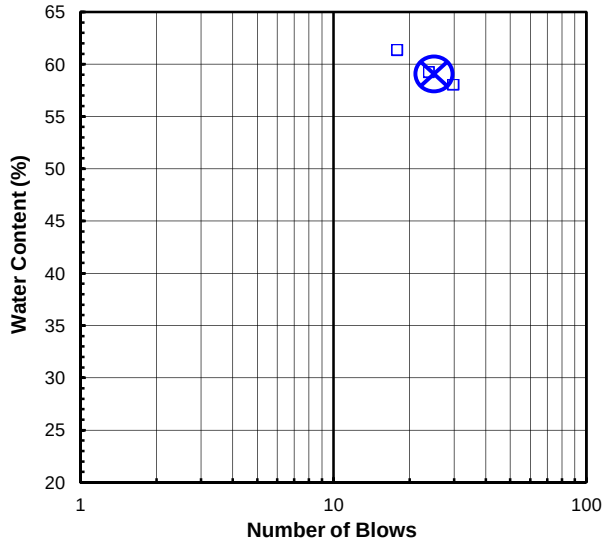
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	45	231	237	297	U
Wt. of Tare & Wet Sample (g):	26.52	39.96	38.92	45.19	L
Wt. of Tare & Dry Sample (g):	22.86	32.51	31.43	36.97	T
Weight of Tare (g):	8.55	19.66	18.77	23.56	I
Weight of Water (g):	3.7	7.5	7.5	8.2	P
Weight of Dry Sample (g):	14.3	12.9	12.7	13.4	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**25.6**	**58.0**	**59.2**	**61.3**	N
Number of Blows:		**30**	**24**	**18**	T

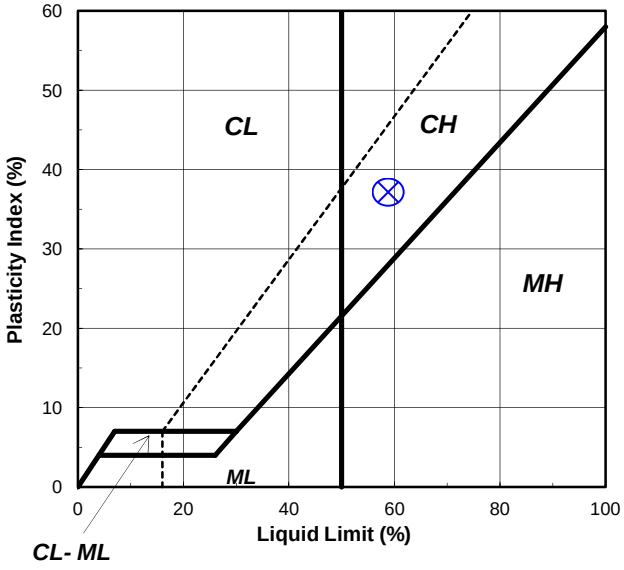
Plastic Limit Test	1	2	Range
Tare Number:	531	334	
Wt. of Tare & Wet Sample (g):	25.75	25.61	
Wt. of Tare & Dry Sample (g):	24.62	24.47	
Weight of Tare (g):	19.46	19.36	
Weight of Water (g):	1.1	1.1	
Weight of Dry Sample (g):	5.2	5.1	
Moisture Content (%):	**21.9**	**22.3**	**-0.4**
Note: The acceptable range of the two Moisture Contents is ±			1.4

Test Results	
Liquid Limit (%):	**59**
Plastic Limit (%):	**22**
Plasticity Index (%):	**37**
USCS Symbol:	**CH**

Flow Curve



Plasticity Chart



Tested By FS *Date* 11/22/23 *Checked By* BRB *Date* 11/29/23

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-33
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-7.5'
Project No.:	2023-680-002	Sample No.:	3
Lab ID:	2023-680-002-114	Soil Description:	BROWN LEAN CLAY

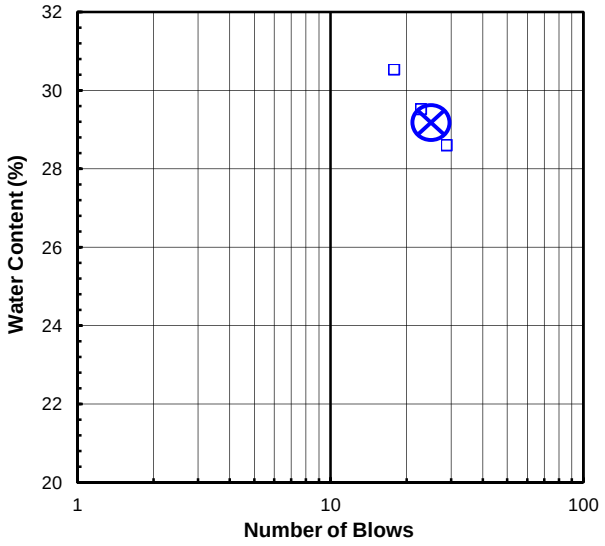
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	3348	1528	539	4327	U
Wt. of Tare & Wet Sample (g):	28.71	44.56	44.64	46.39	L
Wt. of Tare & Dry Sample (g):	26.12	39.23	39.13	40.23	T
Weight of Tare (g):	8.15	20.58	20.45	20.04	I
Weight of Water (g):	2.6	5.3	5.5	6.2	P
Weight of Dry Sample (g):	18.0	18.7	18.7	20.2	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**14.4**	**28.6**	**29.5**	**30.5**	N
Number of Blows:		**29**	**23**	**18**	T

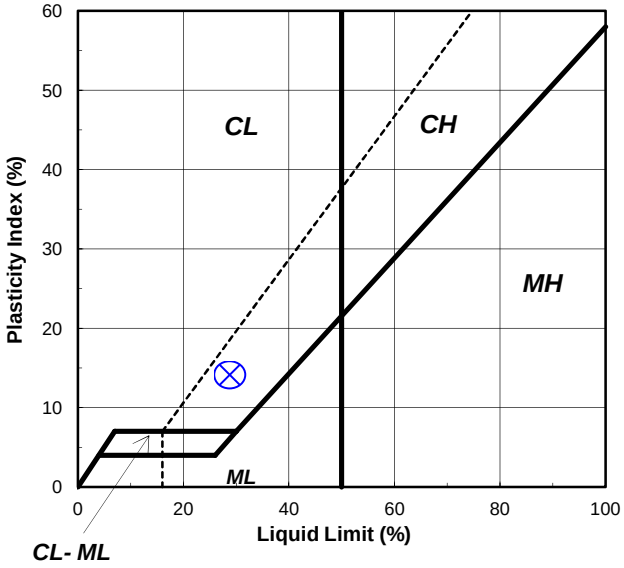
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	544	525	
Wt. of Tare & Wet Sample (g):	26.38	26.79	
Wt. of Tare & Dry Sample (g):	25.61	25.96	
Weight of Tare (g):	20.31	20.35	
Weight of Water (g):	0.8	0.8	
Weight of Dry Sample (g):	5.3	5.6	
Moisture Content (%):	**14.5**	**14.8**	**-0.3**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**29**
Plastic Limit (%):	**15**
Plasticity Index (%):	**14**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 11/21/23 *Checked By* JLK *Date* 11/22/23

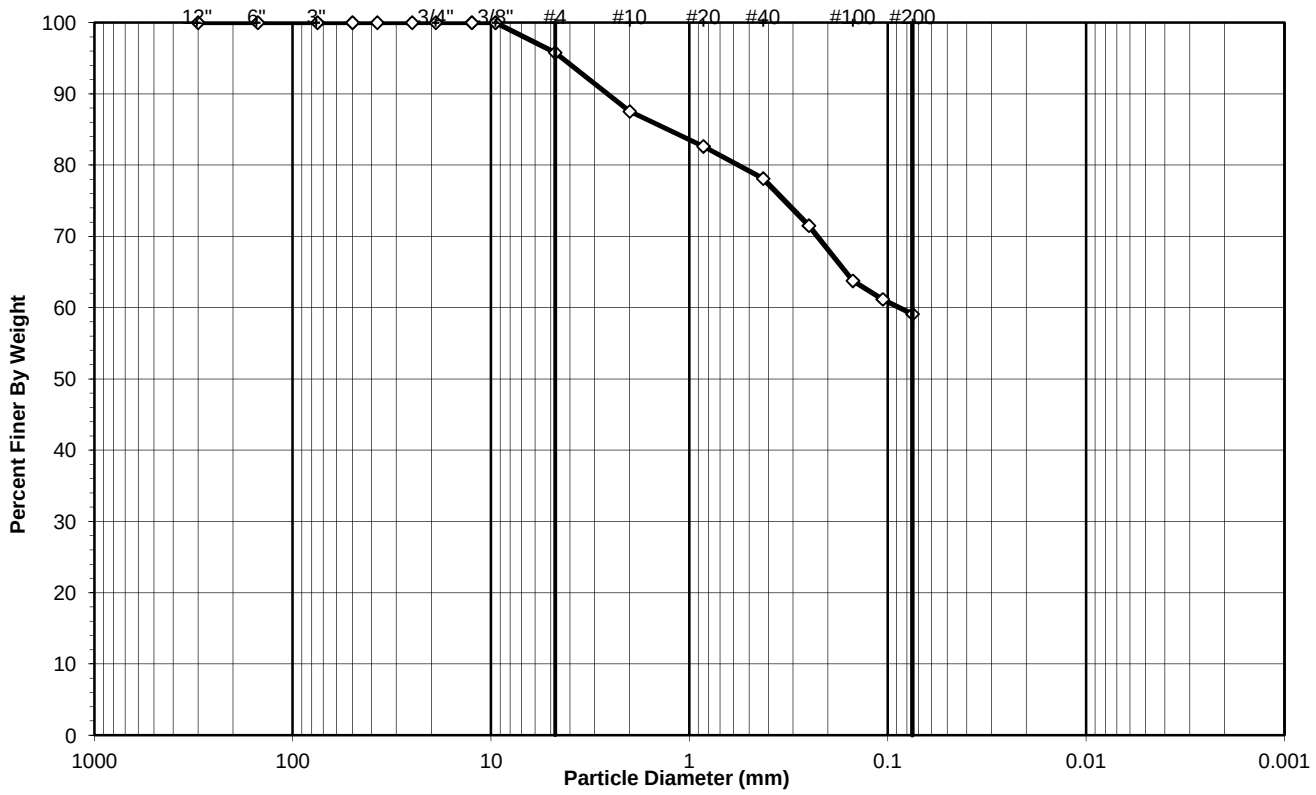
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-34
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-4.5'
Project No.:	2023-680-002	Sample No.:	1 & 2
Lab ID:	2023-680-002-121	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**4.21**
#4 to #200	***Sand***	**36.68**
Finer than #200	***Silt & Clay***	**59.11**

USCS Symbol:
CL, TESTED

USCS Classification:
SANDY LEAN CLAY

Tested By DF Date 11/30/23 Checked By BRB Date 12/4/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-34
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-4.5'
Project No.:	2023-680-002	Sample No.:	1 & 2
Lab ID:	2023-680-002-121	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1491	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	398.48	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	398.48	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	142.16	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	256.32	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):	256.32
Tare No. (Sub-Specimen)	1491	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	398.48	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	142.16	Dry Weight of - 3/4" Sample (g):	256.32
Sub-Specimen Wet Weight (g):	256.32	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	256.32
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	0.00		0.00	0.00	100.00	**100**
#4	4.75	10.80		4.21	4.21	95.79	**96**
#10	2	21.13		8.24	12.46	87.54	**88**
#20	0.85	12.58	(**)	4.91	17.37	82.63	**83**
#40	0.425	11.58		4.52	21.88	78.12	**78**
#60	0.25	16.92		6.60	28.48	71.52	**72**
#100	0.15	19.85		7.74	36.23	63.77	**64**
#140	0.106	6.65		2.59	38.82	61.18	**61**
#200	0.075	5.30		2.07	40.89	59.11	**59**
Pan	-	151.51		59.11	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 11/30/23 Checked By BRB Date 12/4/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-34
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-4.5'
Project No.:	2023-680-002	Sample No.:	1 & 2
Lab ID:	2023-680-002-121	Soil Description:	BROWN LEAN CLAY

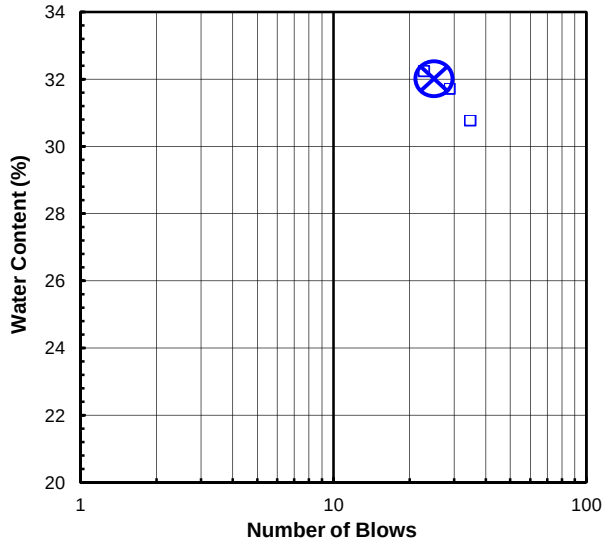
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	11	1280	649	1350	U
Wt. of Tare & Wet Sample (g):	28.36	41.66	40.23	39.81	L
Wt. of Tare & Dry Sample (g):	24.18	36.59	35.26	34.83	T
Weight of Tare (g):	8.46	20.10	19.58	19.37	I
Weight of Water (g):	4.2	5.1	5.0	5.0	P
Weight of Dry Sample (g):	15.7	16.5	15.7	15.5	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**26.6**	**30.7**	**31.7**	**32.2**	N
Number of Blows:		**35**	**29**	**23**	T

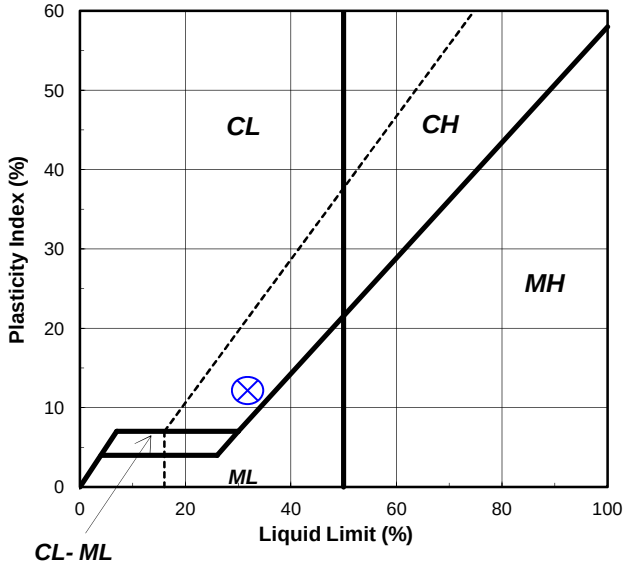
Plastic Limit Test	1	2	Range
Tare Number:	268	301	
Wt. of Tare & Wet Sample (g):	24.08	24.98	
Wt. of Tare & Dry Sample (g):	23.04	23.96	
Weight of Tare (g):	17.75	18.71	
Weight of Water (g):	1.0	1.0	
Weight of Dry Sample (g):	5.3	5.3	
Moisture Content (%):	**19.7**	**19.4**	**0.2**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**32**
Plastic Limit (%):	**20**
Plasticity Index (%):	**12**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By FS *Date* 11/28/23 *Checked By* BRB *Date* 11/30/23

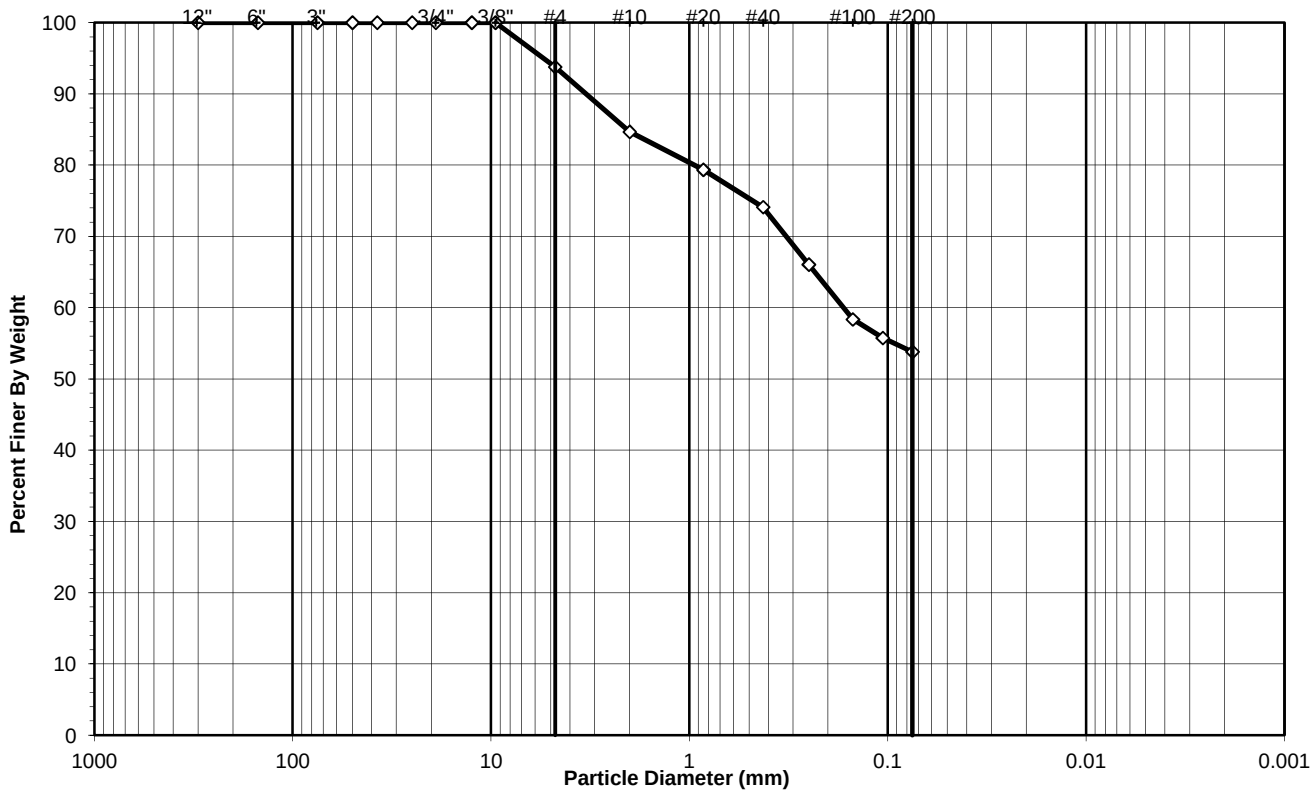
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-34
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-10.5'
Project No.:	2023-680-002	Sample No.:	3 & 4
Lab ID:	2023-680-002-124	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**6.23**
#4 to #200	***Sand***	**39.97**
Finer than #200	***Silt & Clay***	**53.80**

USCS Symbol:
CL, TESTED

USCS Classification:
SANDY LEAN CLAY

Tested By DF Date 11/30/23 Checked By BRB Date 12/4/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-34
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-10.5'
Project No.:	2023-680-002	Sample No.:	3 & 4
Lab ID:	2023-680-002-124	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2036	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	514.33	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	514.33	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.66	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	367.67	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):	367.67
Tare No. (Sub-Specimen)	2036	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	514.33	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	146.66	Dry Weight of - 3/4" Sample (g):	367.67
Sub-Specimen Wet Weight (g):	367.67	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	367.67
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	0.00		0.00	0.00	100.00	**100**
#4	4.75	22.90		6.23	6.23	93.77	**94**
#10	2	33.43		9.09	15.32	84.68	**85**
#20	0.85	19.60	(**)	5.33	20.65	79.35	**79**
#40	0.425	19.26		5.24	25.89	74.11	**74**
#60	0.25	29.62		8.06	33.95	66.05	**66**
#100	0.15	28.31		7.70	41.65	58.35	**58**
#140	0.106	9.58		2.61	44.25	55.75	**56**
#200	0.075	7.15		1.94	46.20	53.80	**54**
Pan	-	197.82		53.80	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 11/30/23 Checked By BRB Date 12/4/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-34
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-10.5'
Project No.:	2023-680-002	Sample No.:	3 & 4
Lab ID:	2023-680-002-124	Soil Description:	BROWN LEAN CLAY

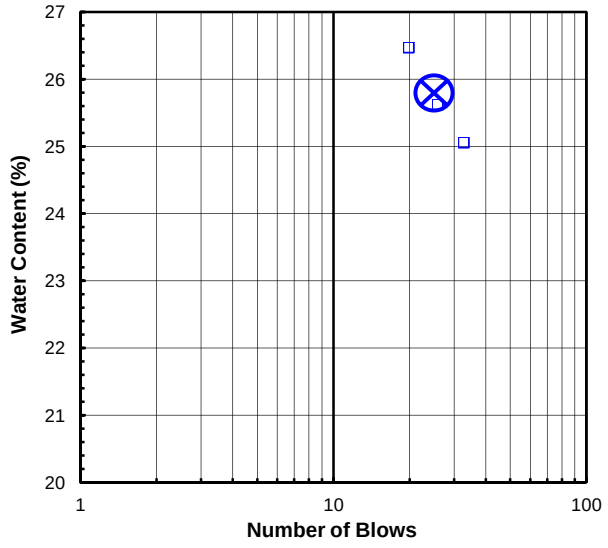
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	5	180	171	647	U
Wt. of Tare & Wet Sample (g):	39.23	39.91	40.19	40.50	L
Wt. of Tare & Dry Sample (g):	34.68	35.85	35.89	36.19	T
Weight of Tare (g):	8.53	19.64	19.10	19.90	I
Weight of Water (g):	4.6	4.1	4.3	4.3	P
Weight of Dry Sample (g):	26.2	16.2	16.8	16.3	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**17.4**	**25.0**	**25.6**	**26.5**	N
Number of Blows:		**33**	**26**	**20**	T

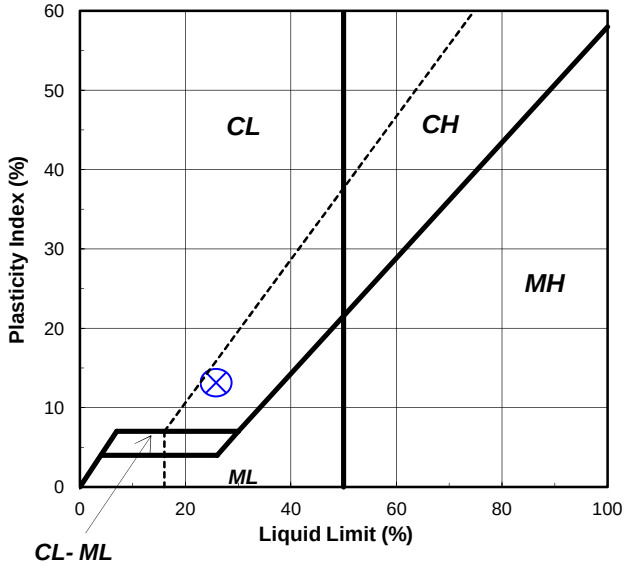
Plastic Limit Test	1	2	Range
Tare Number:	603	161	
Wt. of Tare & Wet Sample (g):	25.40	24.16	
Wt. of Tare & Dry Sample (g):	24.64	23.48	
Weight of Tare (g):	18.81	17.84	
Weight of Water (g):	0.8	0.7	
Weight of Dry Sample (g):	5.8	5.6	
Moisture Content (%):	**13.0**	**12.1**	**1.0**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**26**
Plastic Limit (%):	**13**
Plasticity Index (%):	**13**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By FS *Date* 11/28/23 *Checked By* BRB *Date* 11/30/23

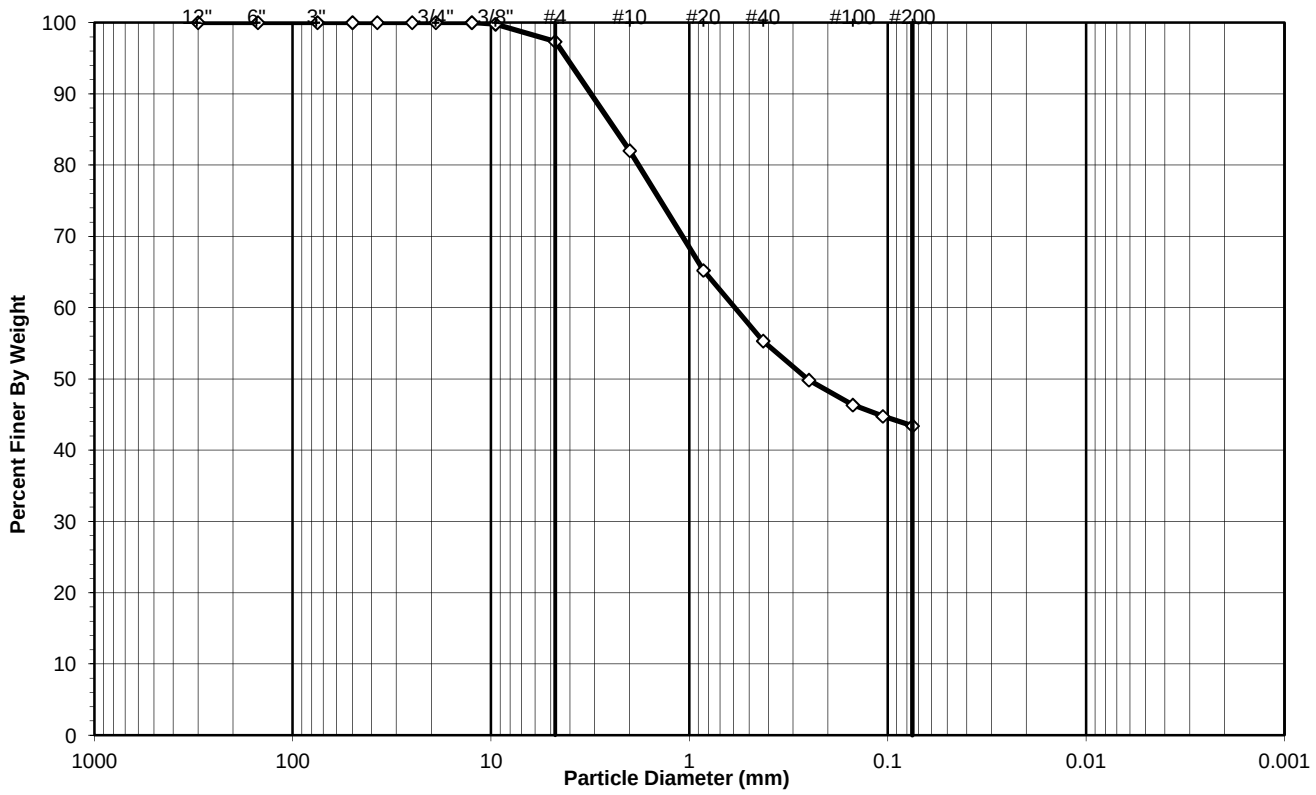
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-37
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-141	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**2.66**
#4 to #200	***Sand***	**53.93**
Finer than #200	***Silt & Clay***	**43.41**

USCS Symbol:
SC, TESTED

D50 = 0.25

USCS Classification:
CLAYEY SAND

Tested By DF Date 11/30/23 Checked By BRB Date 12/4/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-37
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-141	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1418	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	482.38	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	482.38	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	142.83	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	339.55	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):	339.55
Tare No. (Sub-Specimen)	1418	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	482.38	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	142.83	Dry Weight of - 3/4" Sample (g):	339.55
Sub-Specimen Wet Weight (g):	339.55	Dry Weight -3/4" +3/8" Sample (g):	0.73
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	338.82
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	0.73		0.21	0.21	99.79	**100**
#4	4.75	8.30		2.44	2.66	97.34	**97**
#10	2	51.99		15.31	17.97	82.03	**82**
#20	0.85	57.06	(**)	16.80	34.78	65.22	**65**
#40	0.425	33.63		9.90	44.68	55.32	**55**
#60	0.25	18.63		5.49	50.17	49.83	**50**
#100	0.15	11.89		3.50	53.67	46.33	**46**
#140	0.106	5.37		1.58	55.25	44.75	**45**
#200	0.075	4.56		1.34	56.59	43.41	**43**
Pan	-	147.39		43.41	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	11/30/23	Checked By	BRB	Date	12/4/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-37
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-141	Soil Description:	BROWN LEAN CLAY

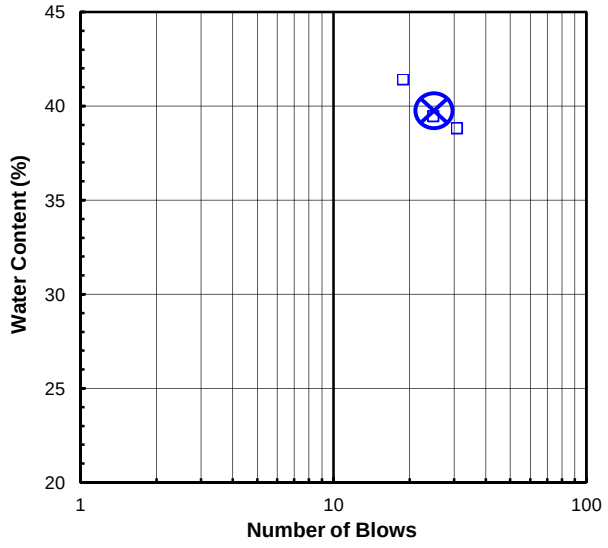
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	7	532	177	217	U
Wt. of Tare & Wet Sample (g):	52.03	40.59	40.60	39.05	L
Wt. of Tare & Dry Sample (g):	47.77	34.96	34.83	33.08	T
Weight of Tare (g):	8.87	20.44	20.19	18.65	I
Weight of Water (g):	4.3	5.6	5.8	6.0	P
Weight of Dry Sample (g):	38.9	14.5	14.6	14.4	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**11.0**	**38.8**	**39.4**	**41.4**	N
Number of Blows:		**31**	**25**	**19**	T

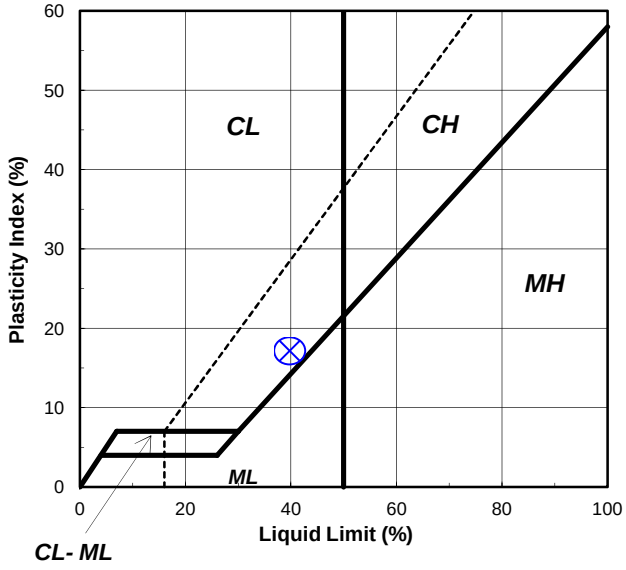
Plastic Limit Test	1	2	Range
Tare Number:	500	324	
Wt. of Tare & Wet Sample (g):	25.59	25.37	
Wt. of Tare & Dry Sample (g):	24.43	24.22	
Weight of Tare (g):	19.42	19.24	
Weight of Water (g):	1.2	1.2	
Weight of Dry Sample (g):	5.0	5.0	
Moisture Content (%):	**23.2**	**23.1**	**0.1**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**40**
Plastic Limit (%):	**23**
Plasticity Index (%):	**17**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By FS *Date* 11/28/23 *Checked By* BRB *Date* 11/30/23

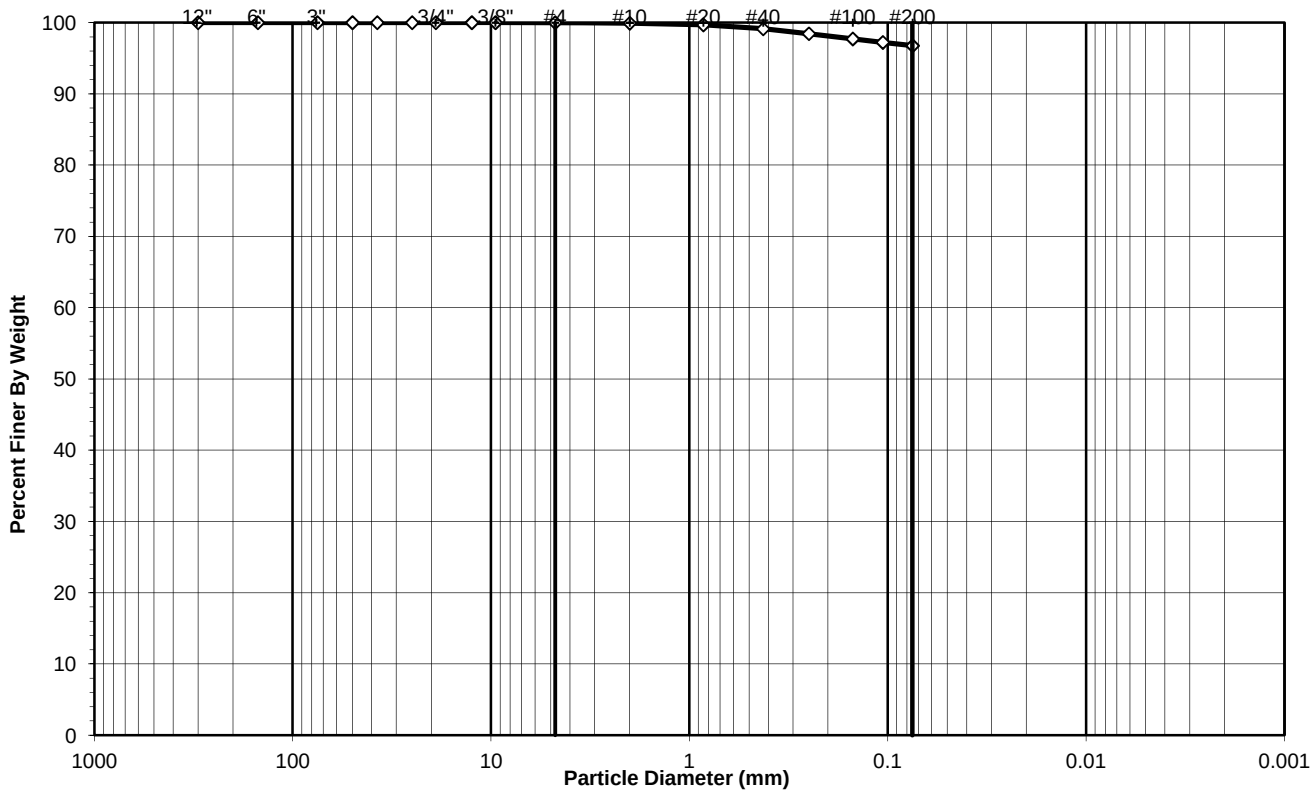
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-39
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-157	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**0.00**
#4 to #200	***Sand***	**3.24**
Finer than #200	***Silt & Clay***	**96.76**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By DF Date 11/30/23 Checked By BRB Date 12/4/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-39
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-157	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1415	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	430.80	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	430.80	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.32	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	286.48	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):	286.48
Tare No. (Sub-Specimen)	1415	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	430.80	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.32	Dry Weight of - 3/4" Sample (g):	286.48
Sub-Specimen Wet Weight (g):	286.48	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	286.48
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	0.00		0.00	0.00	100.00	**100.0**
#10	2	0.22		0.08	0.08	99.92	**99.9**
#20	0.85	0.68	(**)	0.24	0.31	99.69	**99.7**
#40	0.425	1.59		0.56	0.87	99.13	**99.1**
#60	0.25	1.95		0.68	1.55	98.45	**98.5**
#100	0.15	2.10		0.73	2.28	97.72	**97.7**
#140	0.106	1.40		0.49	2.77	97.23	**97.2**
#200	0.075	1.33		0.46	3.24	96.76	**96.8**
Pan	-	277.21		96.76	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 11/30/23 Checked By BRB Date 12/4/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-39
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-157	Soil Description:	RED & BROWN LEAN CLAY

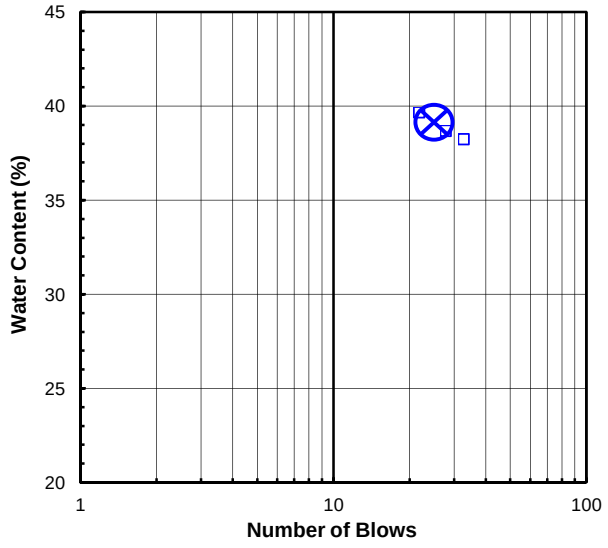
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	3278	357	129	1274	U
Wt. of Tare & Wet Sample (g):	44.76	41.01	39.16	43.76	L
Wt. of Tare & Dry Sample (g):	40.60	35.32	33.48	37.94	T
Weight of Tare (g):	8.19	20.42	18.78	23.25	I
Weight of Water (g):	4.2	5.7	5.7	5.8	P
Weight of Dry Sample (g):	32.4	14.9	14.7	14.7	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**12.8**	**38.2**	**38.6**	**39.6**	N
Number of Blows:		**33**	**28**	**22**	T

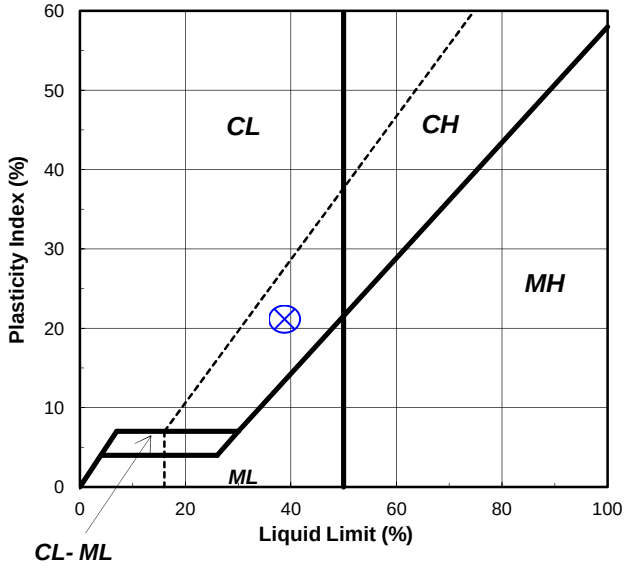
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	319	305	
Wt. of Tare & Wet Sample (g):	24.59	25.38	
Wt. of Tare & Dry Sample (g):	23.61	24.38	
Weight of Tare (g):	18.26	19.02	
Weight of Water (g):	1.0	1.0	
Weight of Dry Sample (g):	5.4	5.4	
Moisture Content (%):	**18.3**	**18.7**	**-0.3**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**39**
Plastic Limit (%):	**18**
Plasticity Index (%):	**21**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By FS *Date* 11/28/23 *Checked By* BRB *Date* 11/30/23

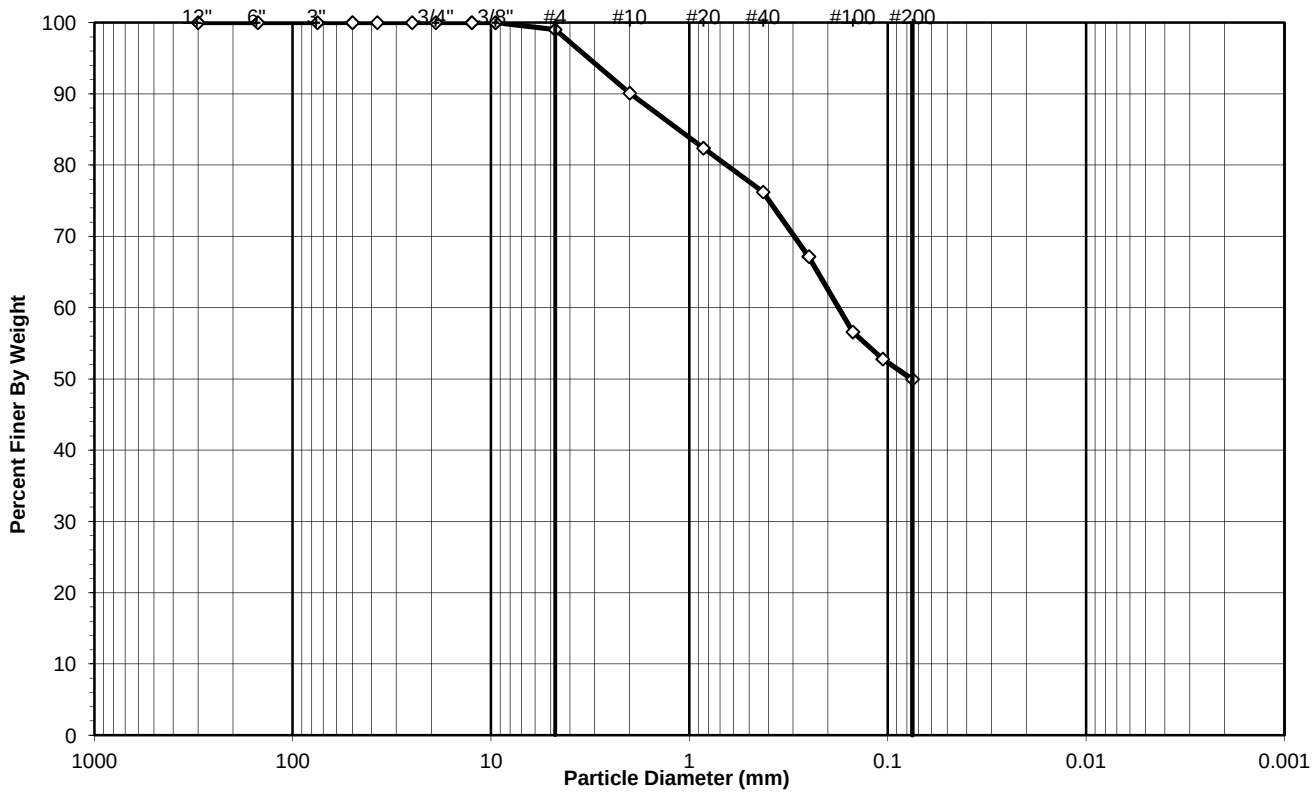
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-40
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-4.5'
Project No.:	2023-680-002	Sample No.:	1 & 2
Lab ID:	2023-680-002-161	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***	**49.07**
Finer than #200	***Silt & Clay***	**49.95**

USCS Symbol:
SC, TESTED

D50 = 0.08

USCS Classification:
CLAYEY SAND

Tested By DF Date 12/6/23 Checked By KC Date 12/6/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-40
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-4.5'
Project No.:	2023-680-002	Sample No.:	1 & 2
Lab ID:	2023-680-002-161	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1426	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	434.93	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	434.93	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.32	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	290.61	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):	290.61
Tare No. (Sub-Specimen)	1426	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	434.93	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.32	Dry Weight of - 3/4" Sample (g):	290.61
Sub-Specimen Wet Weight (g):	290.61	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	290.61
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	2.85		0.98	0.98	99.02	**99.0**
#10	2	25.88		8.91	9.89	90.11	**90.1**
#20	0.85	22.46	(**)	7.73	17.61	82.39	**82.4**
#40	0.425	17.90		6.16	23.77	76.23	**76.2**
#60	0.25	26.30		9.05	32.82	67.18	**67.2**
#100	0.15	30.77		10.59	43.41	56.59	**56.6**
#140	0.106	11.03		3.80	47.21	52.79	**52.8**
#200	0.075	8.26		2.84	50.05	49.95	**50.0**
Pan	-	145.16		49.95	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	12/6/23	Checked By	KC	Date	12/6/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-40
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-4.5'
Project No.:	2023-680-002	Sample No.:	1 & 2
Lab ID:	2023-680-002-161	Soil Description:	BROWN LEAN CLAY

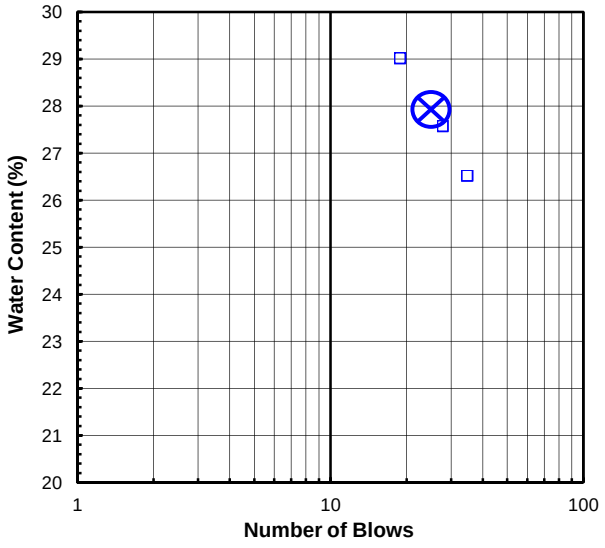
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	42	701	712	743	U
Wt. of Tare & Wet Sample (g):	28.94	51.66	49.11	47.35	L
Wt. of Tare & Dry Sample (g):	25.96	45.14	43.37	41.37	T
Weight of Tare (g):	8.57	20.54	22.54	20.75	I
Weight of Water (g):	3.0	6.5	5.7	6.0	P
Weight of Dry Sample (g):	17.4	24.6	20.8	20.6	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**17.1**	**26.5**	**27.6**	**29.0**	N
Number of Blows:		**35**	**28**	**19**	T

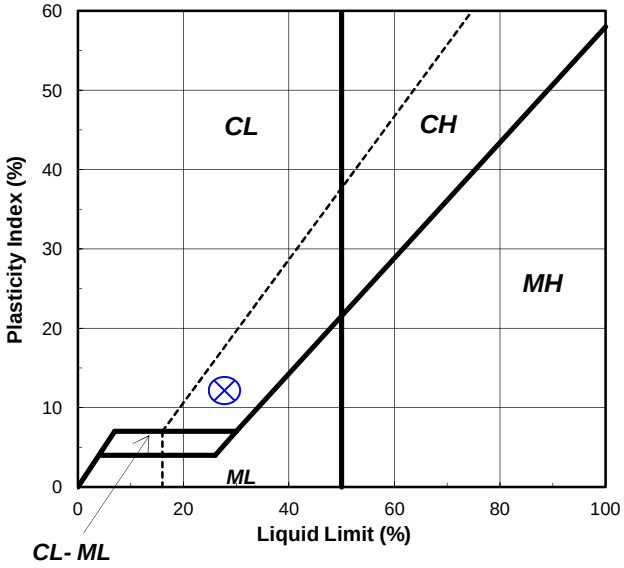
Plastic Limit Test	1	2	Range
Tare Number:	753	765	
Wt. of Tare & Wet Sample (g):	26.69	30.00	
Wt. of Tare & Dry Sample (g):	25.86	29.12	
Weight of Tare (g):	20.57	23.55	
Weight of Water (g):	0.8	0.9	
Weight of Dry Sample (g):	5.3	5.6	
Moisture Content (%):	**15.7**	**15.8**	**-0.1**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**28**
Plastic Limit (%):	**16**
Plasticity Index (%):	**12**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By BS *Date* 12/4/23 *Checked By* JLK *Date* 12/5/23

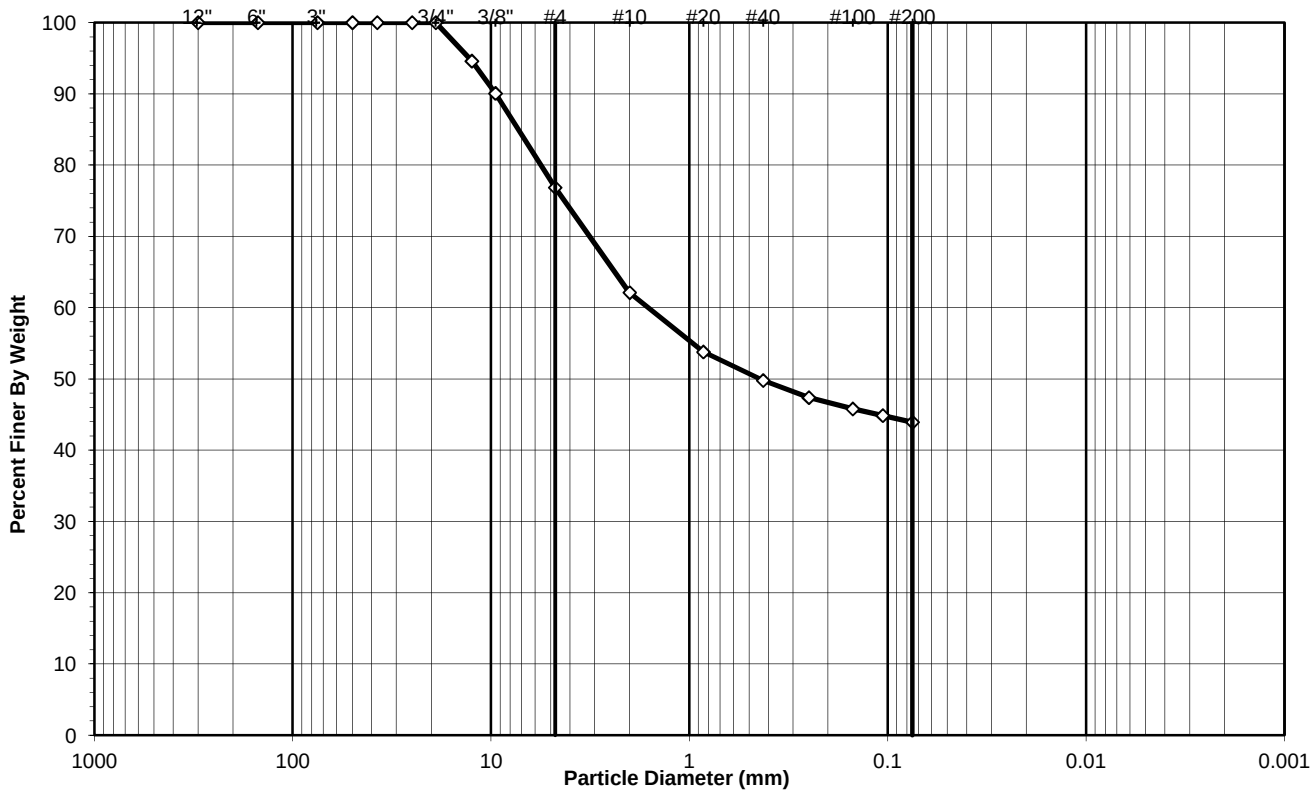
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-40
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-18.9'
Project No.:	2023-680-002	Sample No.:	3 to 7
Lab ID:	2023-680-002-167	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**23.15**
#4 to #200	***Sand***	**32.93**
Finer than #200	***Silt & Clay***	**43.92**

USCS Symbol:
SC, TESTED

D50 = 0.44

USCS Classification:
CLAYEY SAND WITH GRAVEL

Tested By DF Date 11/27/23 Checked By JLK Date 12/5/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-40
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-18.9'
Project No.:	2023-680-002	Sample No.:	3 to 7
Lab ID:	2023-680-002-167	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1520	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	769.17	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	696.72	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	148.49	Weight of Tare (g):	NA
Weight of Water (g):	72.45	Weight of Water (g):	NA
Weight of Dry Soil (g):	548.23	Weight of Dry Soil (g):	NA
Moisture Content (%):	**13.2**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	548.23
Tare No. (Sub-Specimen)	1520	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	769.17	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	148.49	Dry Weight of - 3/4" Sample (g):	548.23
Sub-Specimen Wet Weight (g):	620.68	Dry Weight -3/4" +3/8" Sample (g):	54.45
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	493.78
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	29.59	(**)	5.40	5.40	94.60	**95**
3/8"	9.5	24.86		4.53	9.93	90.07	**90**
#4	4.75	72.46		13.22	23.15	76.85	**77**
#10	2	80.82		14.74	37.89	62.11	**62**
#20	0.85	45.63	(**)	8.32	46.21	53.79	**54**
#40	0.425	21.94		4.00	50.22	49.78	**50**
#60	0.25	13.20		2.41	52.62	47.38	**47**
#100	0.15	8.67		1.58	54.21	45.79	**46**
#140	0.106	5.12		0.93	55.14	44.86	**45**
#200	0.075	5.14		0.94	56.08	43.92	**44**
Pan	-	240.80		43.92	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	11/27/23	Checked By	JLK	Date	12/5/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-40
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-18.9'
Project No.:	2023-680-002	Sample No.:	3 to 7
Lab ID:	2023-680-002-167	Soil Description:	BROWN LEAN CLAY

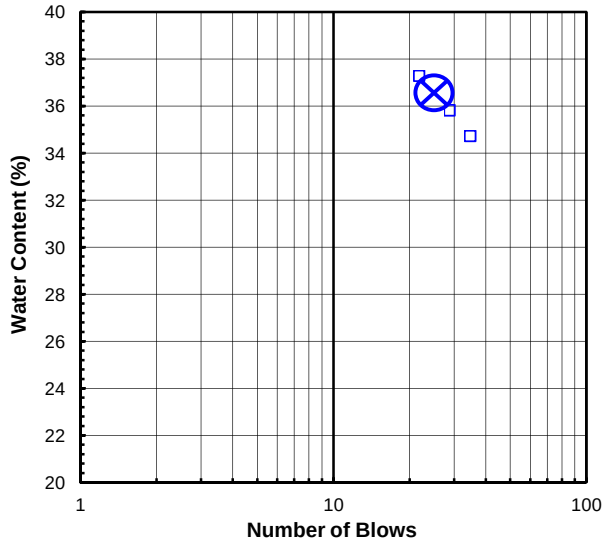
Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus #40 sieve material, Air dried)
sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

As Received Moisture Content		**Liquid Limit Test**			
ASTM D2216-19		**1**	**2**	**3**	**M**
Tare Number:	32	1431	617	613	**U**
Wt. of Tare & Wet Sample (g):	42.05	38.81	39.71	39.93	**L**
Wt. of Tare & Dry Sample (g):	38.51	33.60	34.40	34.44	**T**
Weight of Tare (g):	8.66	18.58	19.56	19.70	**I**
Weight of Water (g):	3.5	5.2	5.3	5.5	**P**
Weight of Dry Sample (g):	29.9	15.0	14.8	14.7	**O**
Was As Received MC Preserved:	**Yes**				**I**
Moisture Content (%):	**11.9**	**34.7**	**35.8**	**37.2**	**N**
Number of Blows:		**35**	**29**	**22**	**T**

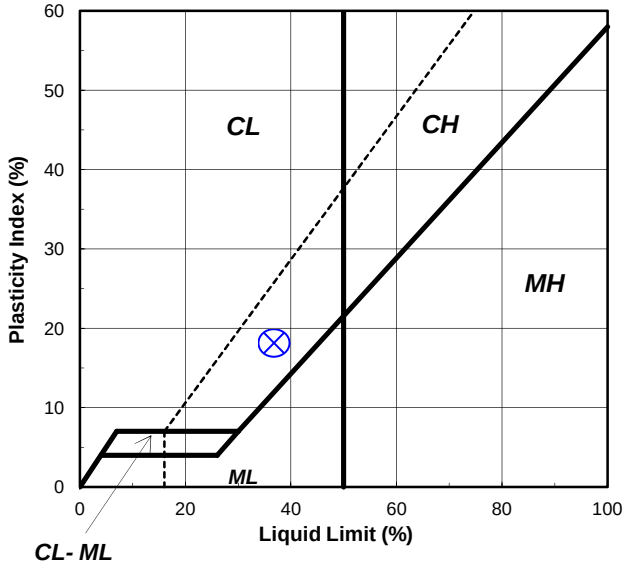
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	166	242	
Wt. of Tare & Wet Sample (g):	24.06	25.33	
Wt. of Tare & Dry Sample (g):	23.05	24.32	
Weight of Tare (g):	17.71	19.14	
Weight of Water (g):	1.0	1.0	
Weight of Dry Sample (g):	5.3	5.2	
Moisture Content (%):	**18.9**	**19.5**	**-0.6**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**37**
Plastic Limit (%):	**19**
Plasticity Index (%):	**18**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By FS *Date* 12/4/23 *Checked By* JLK *Date* 12/5/23

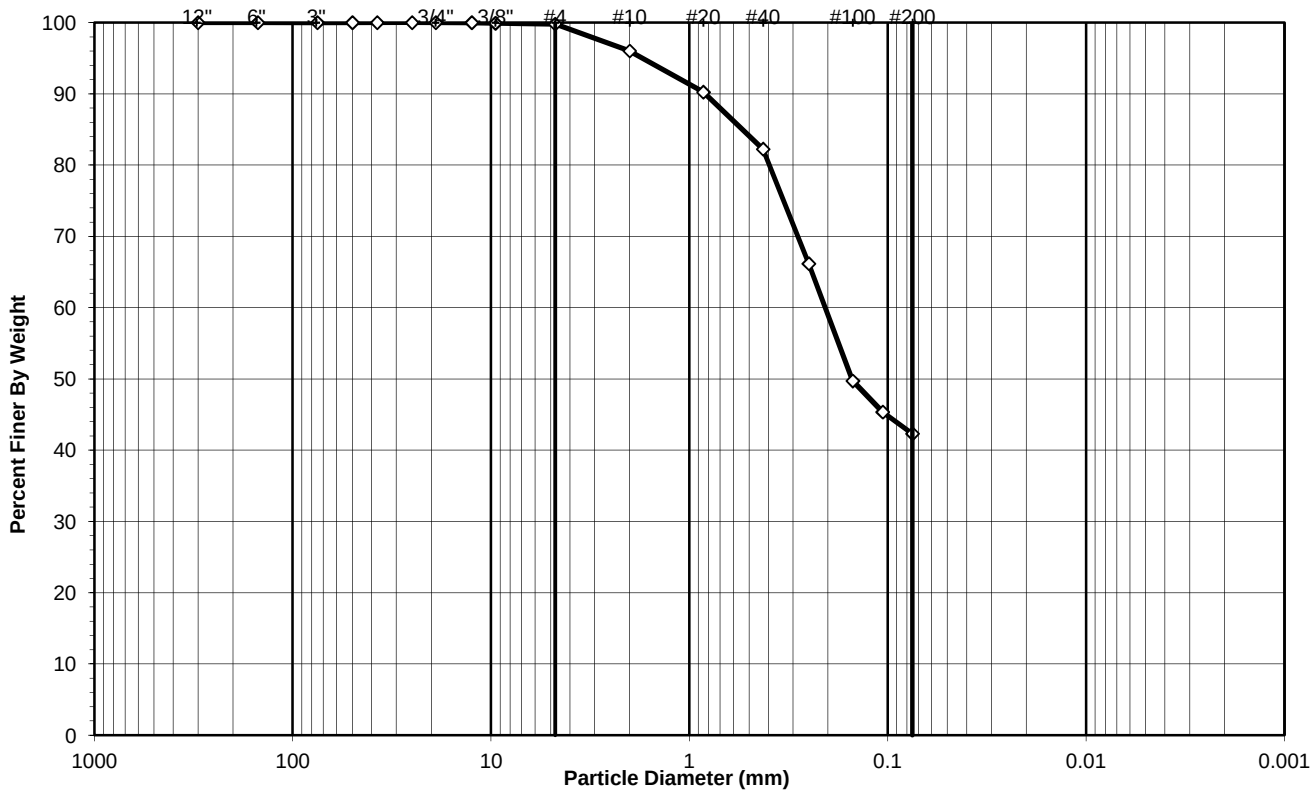
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-47
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-7.5'
Project No.:	2023-680-002	Sample No.:	3
Lab ID:	2023-680-002-169	Soil Color:	Gray

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**0.21**
#4 to #200	***Sand***	**57.48**
Finer than #200	***Silt & Clay***	**42.31**

USCS Symbol:
SM, TESTED

D50 = 0.15

USCS Classification:
SILTY SAND

Tested By DF Date 12/4/23 Checked By KC Date 12/6/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-47
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-7.5'
Project No.:	2023-680-002	Sample No.:	3
Lab ID:	2023-680-002-169	Soil Color:	Gray

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2023	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	346.76	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	346.76	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.31	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	202.45	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):	202.45
Tare No. (Sub-Specimen)	2023	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	346.76	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.31	Dry Weight of - 3/4" Sample (g):	202.45
Sub-Specimen Wet Weight (g):	202.45	Dry Weight -3/4" +3/8" Sample (g):	0.17
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	202.28
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	0.17		0.08	0.08	99.92	**99.9**
#4	4.75	0.25		0.12	0.21	99.79	**99.8**
#10	2	7.63		3.77	3.98	96.02	**96.0**
#20	0.85	11.70	(**)	5.78	9.76	90.24	**90.2**
#40	0.425	16.17		7.99	17.74	82.26	**82.3**
#60	0.25	32.56		16.08	33.83	66.17	**66.2**
#100	0.15	33.32		16.46	50.28	49.72	**49.7**
#140	0.106	8.83		4.36	54.65	45.35	**45.4**
#200	0.075	6.16		3.04	57.69	42.31	**42.3**
Pan	-	85.66		42.31	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	12/4/23	Checked By	KC	Date	12/6/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-47
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-7.5'
Project No.:	2023-680-002	Sample No.:	3
Lab ID:	2023-680-002-169	Soil Description:	GRAY SILT

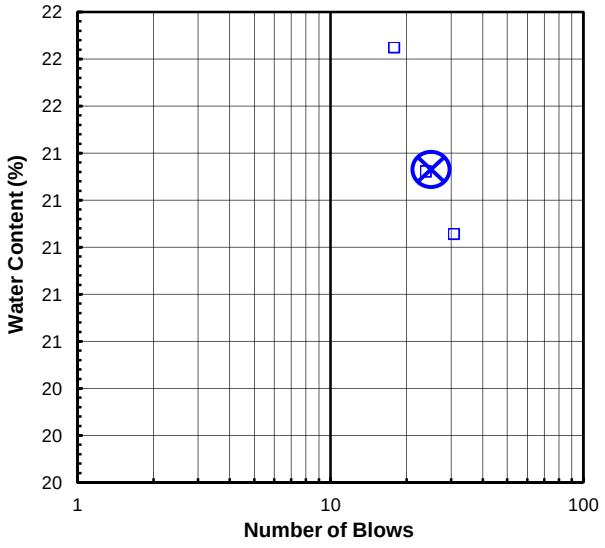
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	40	1431	613	649	U
Wt. of Tare & Wet Sample (g):	25.06	39.05	40.12	40.04	L
Wt. of Tare & Dry Sample (g):	21.71	35.49	36.53	36.37	T
Weight of Tare (g):	8.70	18.58	19.69	19.57	I
Weight of Water (g):	3.4	3.6	3.6	3.7	P
Weight of Dry Sample (g):	13.0	16.9	16.8	16.8	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**25.7**	**21.1**	**21.3**	**21.8**	N
Number of Blows:		**31**	**24**	**18**	T

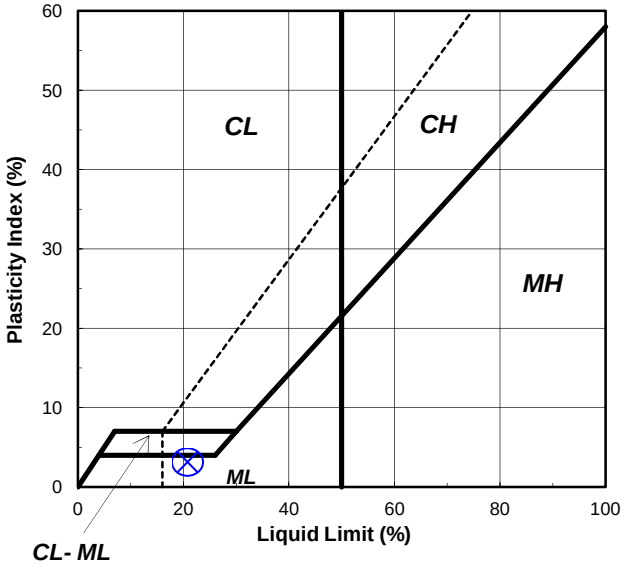
Plastic Limit Test	1	2	Range
Tare Number:	257	242	
Wt. of Tare & Wet Sample (g):	25.85	25.28	
Wt. of Tare & Dry Sample (g):	24.89	24.35	
Weight of Tare (g):	19.51	19.13	
Weight of Water (g):	1.0	0.9	
Weight of Dry Sample (g):	5.4	5.2	
Moisture Content (%):	**17.8**	**17.8**	**0.0**
Note: The acceptable range of the two Moisture Contents is ±			0.84

Test Results	
Liquid Limit (%):	**21**
Plastic Limit (%):	**18**
Plasticity Index (%):	**3**
USCS Symbol:	**ML**

Flow Curve



Plasticity Chart



Tested By FS *Date* 11/30/23 *Checked By* BRB *Date* 12/4/23

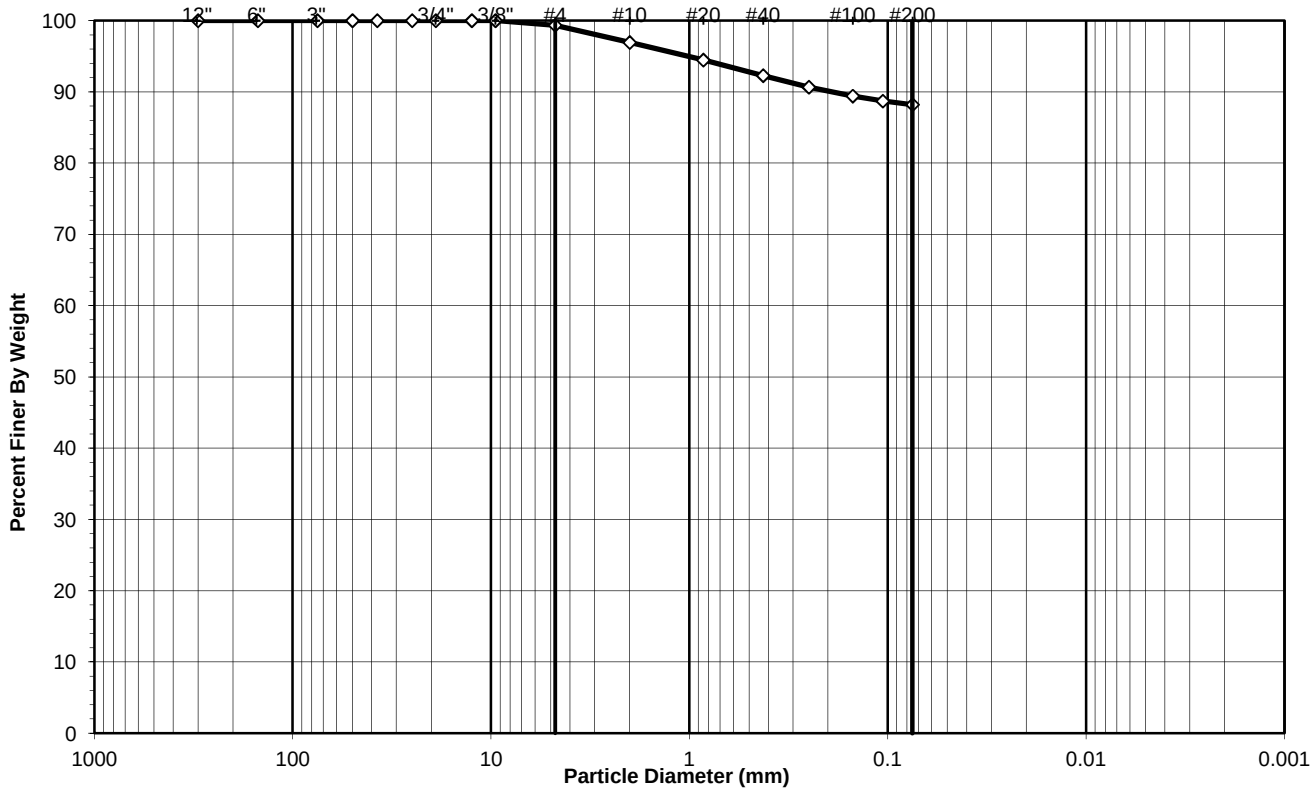
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-47
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	9.0-16.5'
Project No.:	2023-680-002	Sample No.:	4 to 6
Lab ID:	2023-680-002-173	Soil Color:	Reddish Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**0.65**
#4 to #200	***Sand***	**11.13**
Finer than #200	***Silt & Clay***	**88.21**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By DF Date 12/6/23 Checked By KC Date 12/6/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-47
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	9.0-16.5'
Project No.:	2023-680-002	Sample No.:	4 to 6
Lab ID:	2023-680-002-173	Soil Color:	Reddish Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1529	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	558.35	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	558.35	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.11	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	412.24	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):	412.24
Tare No. (Sub-Specimen)	1529	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	558.35	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	146.11	Dry Weight of - 3/4" Sample (g):	412.24
Sub-Specimen Wet Weight (g):	412.24	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	412.24
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	2.70		0.65	0.65	99.35	**99.3**
#10	2	9.93		2.41	3.06	96.94	**96.9**
#20	0.85	10.18	(**)	2.47	5.53	94.47	**94.5**
#40	0.425	9.00		2.18	7.72	92.28	**92.3**
#60	0.25	6.68		1.62	9.34	90.66	**90.7**
#100	0.15	5.16		1.25	10.59	89.41	**89.4**
#140	0.106	2.90		0.70	11.29	88.71	**88.7**
#200	0.075	2.04		0.49	11.79	88.21	**88.2**
Pan	-	363.65		88.21	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	12/6/23	Checked By	KC	Date	12/6/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-47
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	9.0-16.5'
Project No.:	2023-680-002	Sample No.:	4 to 6
Lab ID:	2023-680-002-173	Soil Description:	REDDISH BROWN LEAN CLAY

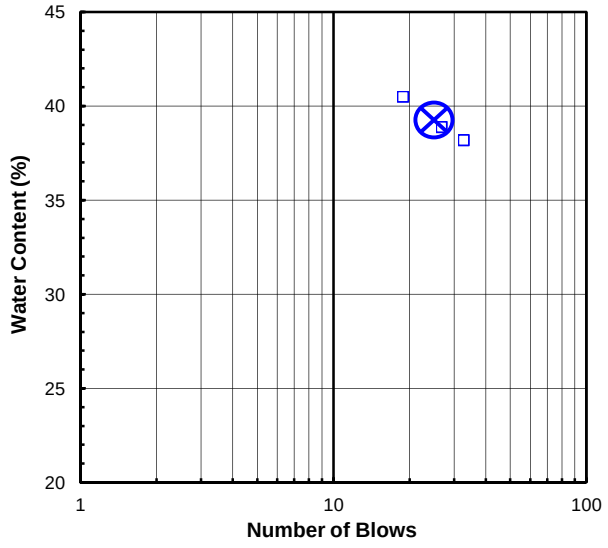
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	14	704	713	718	U
Wt. of Tare & Wet Sample (g):	46.56	44.07	42.51	44.38	L
Wt. of Tare & Dry Sample (g):	41.46	37.51	36.32	37.01	T
Weight of Tare (g):	8.79	20.31	20.38	18.79	I
Weight of Water (g):	5.1	6.6	6.2	7.4	P
Weight of Dry Sample (g):	32.7	17.2	15.9	18.2	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**15.6**	**38.1**	**38.8**	**40.5**	N
Number of Blows:		**33**	**27**	**19**	T

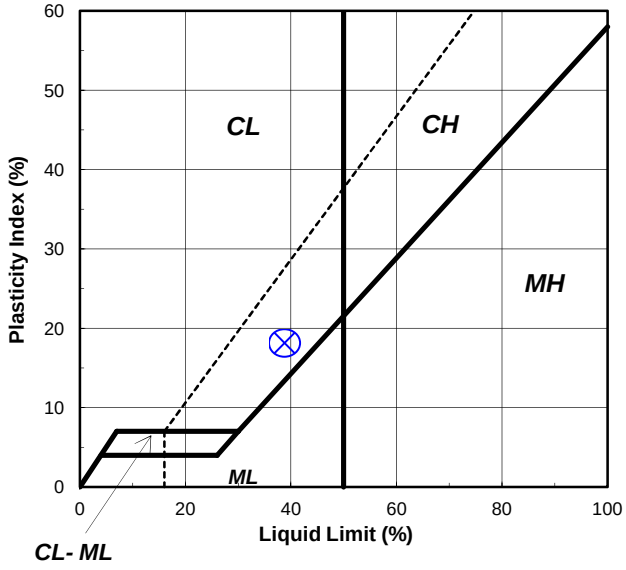
Plastic Limit Test	1	2	Range
Tare Number:	728	737	
Wt. of Tare & Wet Sample (g):	25.48	25.89	
Wt. of Tare & Dry Sample (g):	24.36	24.78	
Weight of Tare (g):	19.02	19.52	
Weight of Water (g):	1.1	1.1	
Weight of Dry Sample (g):	5.3	5.3	
Moisture Content (%):	**21.0**	**21.1**	**-0.1**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**39**
Plastic Limit (%):	**21**
Plasticity Index (%):	**18**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By BS *Date* 12/4/23 *Checked By* JLK *Date* 12/5/23

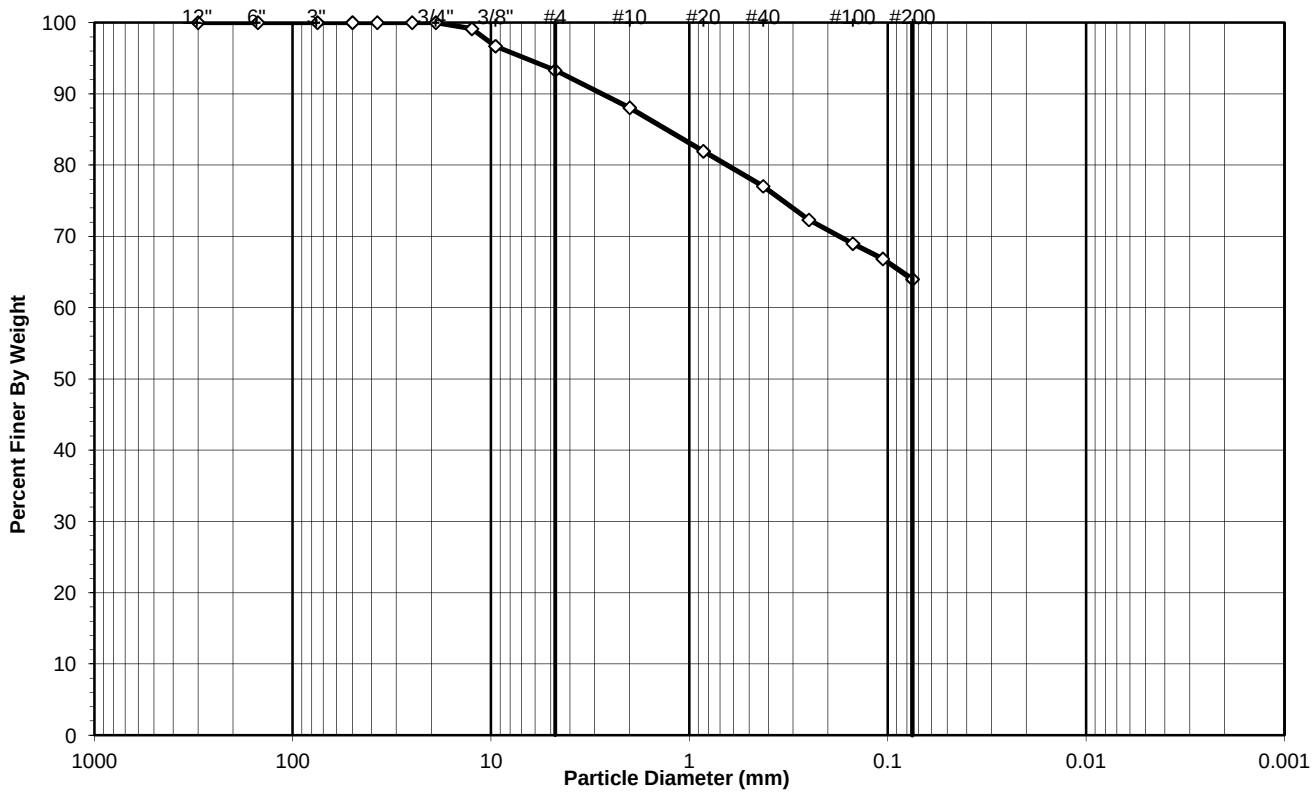
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-55
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-4.5'
Project No.:	2023-680-002	Sample No.:	1 & 2
Lab ID:	2023-680-002-182	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**6.70**
#4 to #200	***Sand***	**29.31**
Finer than #200	***Silt & Clay***	**63.99**

USCS Symbol:
cl, ASSUMED

USCS Classification:
SANDY LEAN CLAY

Tested By DF Date 11/27/23 Checked By KC Date 12/4/23

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

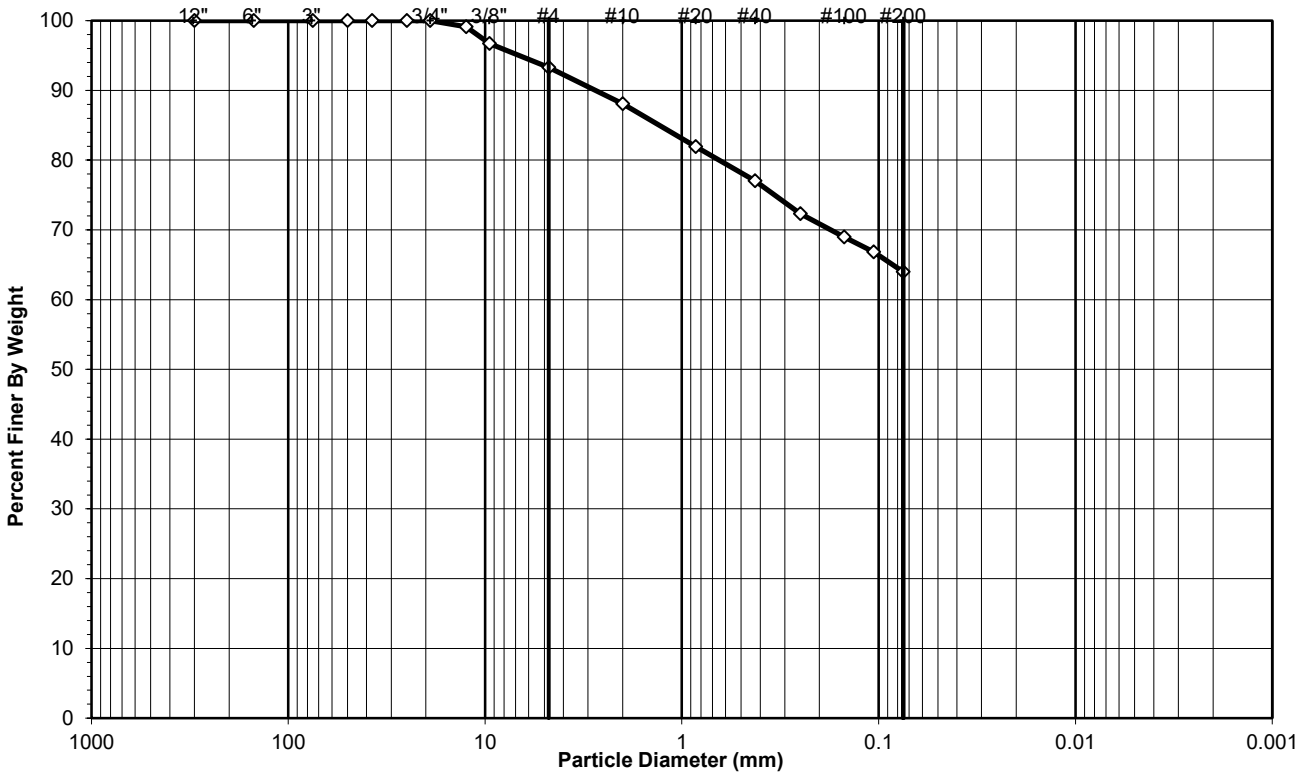
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-55
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-4.5'
Project No.:	2023-680-002	Sample No.:	1 & 2
Lab ID:	2023-680-002-182	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**6.70**
#4 to #200	***Sand***	**29.31**
Finer than #200	***Silt & Clay***	**63.99**

USCS Symbol:
ml, ASSUMED

USCS Classification:
SANDY SILT

Tested By DF Date 11/27/23 Checked By KC Date 12/4/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-55
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-4.5'
Project No.:	2023-680-002	Sample No.:	1 & 2
Lab ID:	2023-680-002-182	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1479	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	468.90	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	428.04	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	145.65	Weight of Tare (g):	NA
Weight of Water (g):	40.86	Weight of Water (g):	NA
Weight of Dry Soil (g):	282.39	Weight of Dry Soil (g):	NA
Moisture Content (%):	**14.5**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	282.39
Tare No. (Sub-Specimen)	1479	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	468.90	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	145.65	Dry Weight of - 3/4" Sample (g):	282.39
Sub-Specimen Wet Weight (g):	323.25	Dry Weight -3/4" +3/8" Sample (g):	9.33
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	273.06
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	2.45	(**)	0.87	0.87	99.13	**99**
3/8"	9.5	6.88		2.44	3.30	96.70	**97**
#4	4.75	9.59		3.40	6.70	93.30	**93**
#10	2	14.80		5.24	11.94	88.06	**88**
#20	0.85	17.25	(**)	6.11	18.05	81.95	**82**
#40	0.425	13.88		4.92	22.96	77.04	**77**
#60	0.25	13.31		4.71	27.68	72.32	**72**
#100	0.15	9.42		3.34	31.01	68.99	**69**
#140	0.106	6.04		2.14	33.15	66.85	**67**
#200	0.075	8.08		2.86	36.01	63.99	**64**
Pan	-	180.69		63.99	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 11/27/23 Checked By KC Date 12/4/23

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

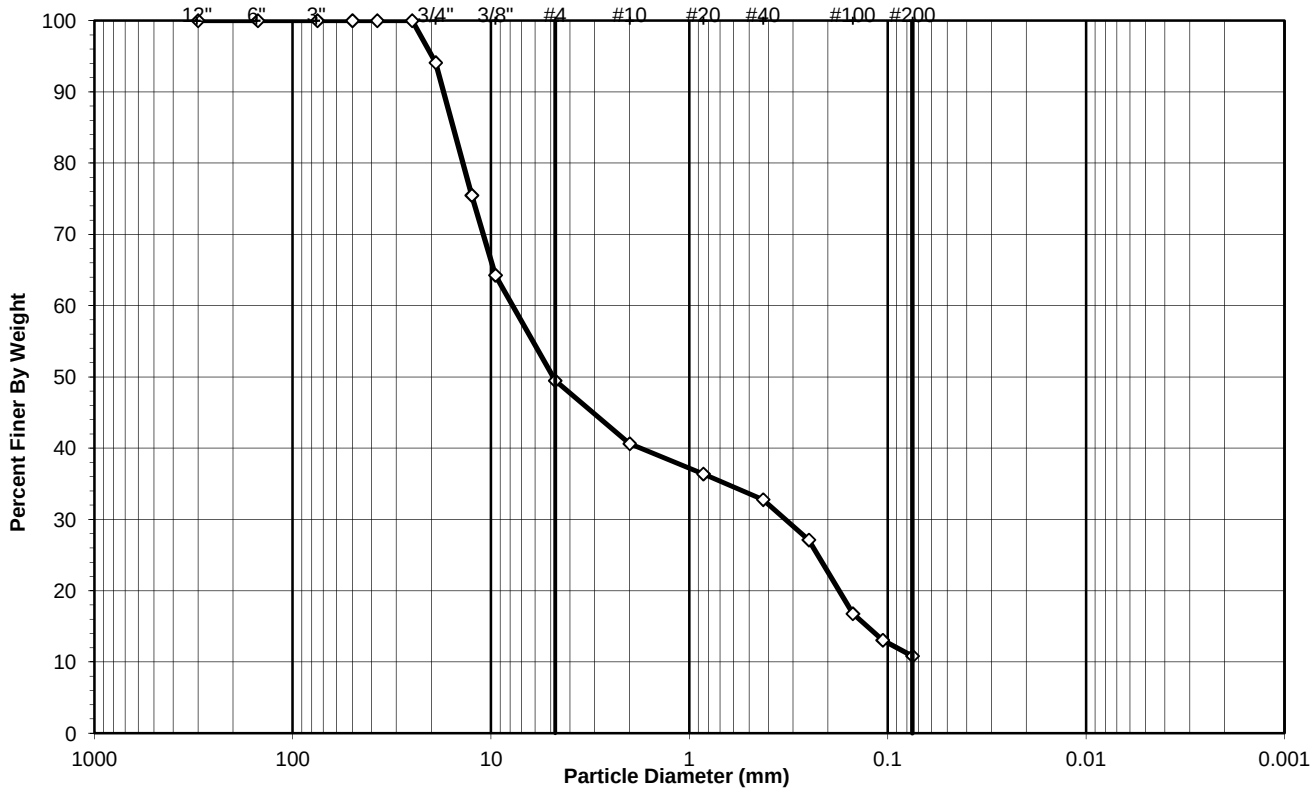
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-57
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-10.5'
Project No.:	2023-680-002	Sample No.:	3 & 4
Lab ID:	2023-680-002-193	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**50.52**
#4 to #200	***Sand***	**38.65**
Finer than #200	***Silt & Clay***	**10.84**

USCS Symbol:
gp-gm, ASSUMED

D50 = 4.87

USCS Classification:
POORLY GRADED GRAVEL WITH SILT AND SAND

Tested By DF Date 11/27/23 Checked By KC Date 12/4/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-57
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	6.0-10.5'
Project No.:	2023-680-002	Sample No.:	3 & 4
Lab ID:	2023-680-002-193	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):	588.66	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	566.19	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	143.18	Weight of Tare (g):	NA
Weight of Water (g):	22.47	Weight of Water (g):	NA
Weight of Dry Soil (g):	423.01	Weight of Dry Soil (g):	NA
Moisture Content (%):	**5.3**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	423.01
Tare No. (Sub-Specimen)	1543	Wet Weight of +3/4" Sample (g):	26.24
Wt. of Tare & Wet Sub-Specimen (g):	588.66	Dry Weight of + 3/4" Sample (g):	24.92
Weight of Tare (g):	143.18	Dry Weight of - 3/4" Sample (g):	398.09
Sub-Specimen Wet Weight (g):	445.48	Dry Weight -3/4" +3/8" Sample (g):	126.21
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	271.88
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	24.92		5.89	5.89	94.11	**94**
1/2"	12.5	78.78	(**)	18.62	24.51	75.49	**75**
3/8"	9.5	47.43		11.21	35.73	64.27	**64**
#4	4.75	62.56		14.79	50.52	49.48	**49**
#10	2	37.43		8.85	59.37	40.63	**41**
#20	0.85	17.98	(**)	4.25	63.62	36.38	**36**
#40	0.425	15.22		3.60	67.21	32.79	**33**
#60	0.25	23.93		5.66	72.87	27.13	**27**
#100	0.15	43.79		10.35	83.22	16.78	**17**
#140	0.106	15.71		3.71	86.94	13.06	**13**
#200	0.075	9.42		2.23	89.16	10.84	**11**
Pan	-	45.84		10.84	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 11/27/23 Checked By KC Date 12/4/23

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

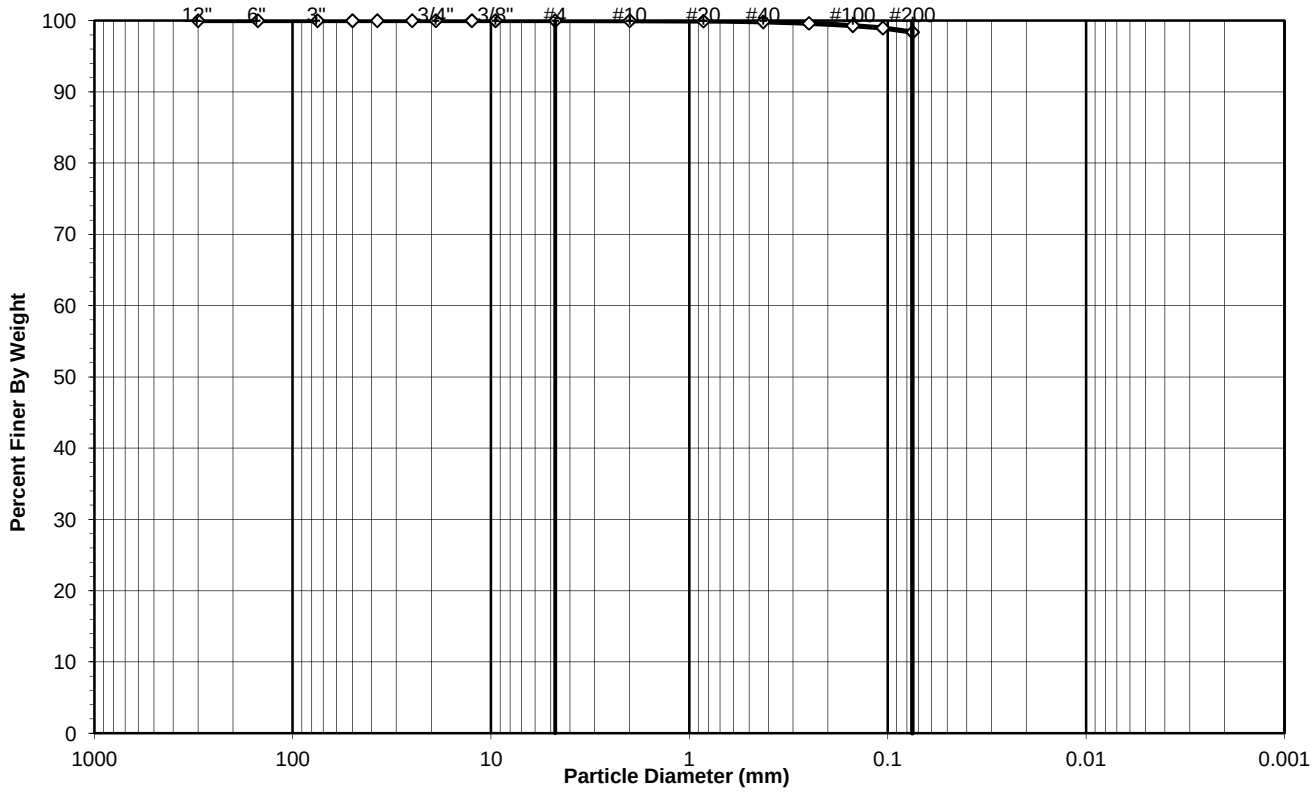
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-58
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-200	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**0.00**
#4 to #200	***Sand***	**1.61**
Finer than #200	***Silt & Clay***	**98.39**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY

Tested By DF Date 12/7/23 Checked By KC Date 12/7/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-58
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-200	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1544	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	385.67	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	385.67	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	149.02	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	236.65	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):	236.65
Tare No. (Sub-Specimen)	1544	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	385.67	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	149.02	Dry Weight of - 3/4" Sample (g):	236.65
Sub-Specimen Wet Weight (g):	236.65	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	236.65
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	0.00		0.00	0.00	100.00	**100.0**
#10	2	0.00		0.00	0.00	100.00	**100.0**
#20	0.85	0.16	(**)	0.07	0.07	99.93	**99.9**
#40	0.425	0.24		0.10	0.17	99.83	**99.8**
#60	0.25	0.49		0.21	0.38	99.62	**99.6**
#100	0.15	0.78		0.33	0.71	99.29	**99.3**
#140	0.106	0.77		0.33	1.03	98.97	**99.0**
#200	0.075	1.37		0.58	1.61	98.39	**98.4**
Pan	-	232.84		98.39	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	12/7/23	Checked By	KC	Date	12/7/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-58
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-200	Soil Description:	BROWN LEAN CLAY

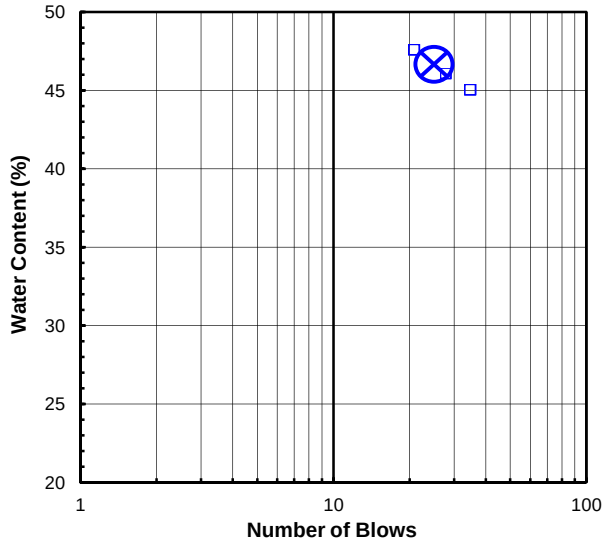
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	22	345	337	546	U
Wt. of Tare & Wet Sample (g):	48.88	40.85	40.73	40.61	L
Wt. of Tare & Dry Sample (g):	41.01	34.52	34.40	34.12	T
Weight of Tare (g):	8.55	20.45	20.65	20.47	I
Weight of Water (g):	7.9	6.3	6.3	6.5	P
Weight of Dry Sample (g):	32.5	14.1	13.8	13.7	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**24.2**	**45.0**	**46.0**	**47.5**	N
Number of Blows:		**35**	**28**	**21**	T

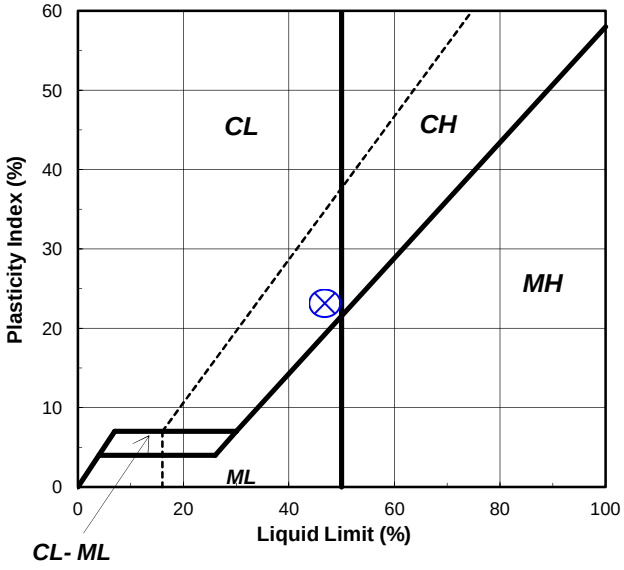
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	634	600	
Wt. of Tare & Wet Sample (g):	24.87	25.02	
Wt. of Tare & Dry Sample (g):	23.66	23.85	
Weight of Tare (g):	18.69	18.88	
Weight of Water (g):	1.2	1.2	
Weight of Dry Sample (g):	5.0	5.0	
Moisture Content (%):	**24.3**	**23.5**	**0.8**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**47**
Plastic Limit (%):	**24**
Plasticity Index (%):	**23**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By FS *Date* 12/5/23 *Checked By* KC *Date* 12/6/23

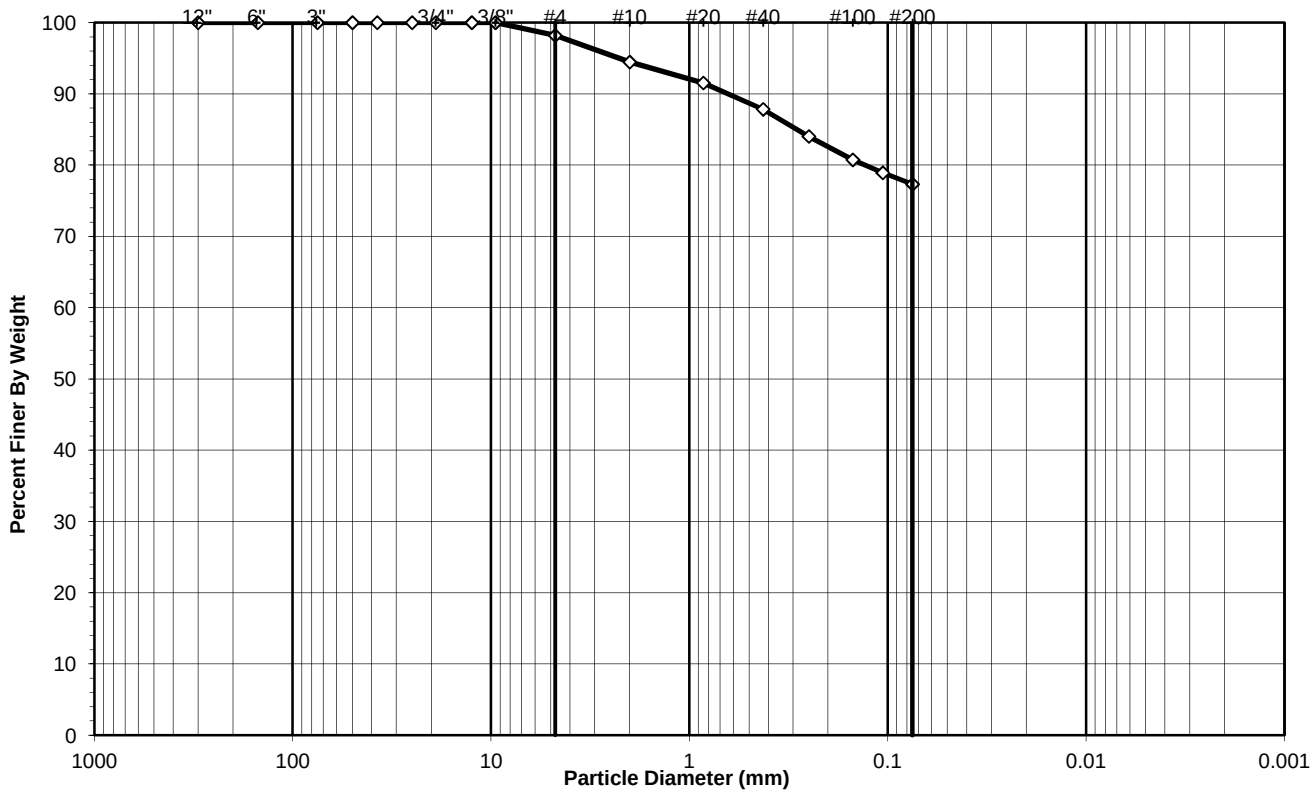
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-58
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	9.0-13.5'
Project No.:	2023-680-002	Sample No.:	4 & 5
Lab ID:	2023-680-002-203	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**1.80**
#4 to #200	***Sand***	**20.87**
Finer than #200	***Silt & Clay***	**77.33**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By DF Date 12/7/23 Checked By KC Date 12/7/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-58
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	9.0-13.5'
Project No.:	2023-680-002	Sample No.:	4 & 5
Lab ID:	2023-680-002-203	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1453	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	438.95	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	438.95	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	137.12	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	301.83	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):	301.83
Tare No. (Sub-Specimen)	1453	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	438.95	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	137.12	Dry Weight of - 3/4" Sample (g):	301.83
Sub-Specimen Wet Weight (g):	301.83	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	301.83
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	0.00		0.00	0.00	100.00	**100**
#4	4.75	5.43		1.80	1.80	98.20	**98**
#10	2	11.25		3.73	5.53	94.47	**94**
#20	0.85	8.88	(**)	2.94	8.47	91.53	**92**
#40	0.425	11.14		3.69	12.16	87.84	**88**
#60	0.25	11.48		3.80	15.96	84.04	**84**
#100	0.15	9.92		3.29	19.25	80.75	**81**
#140	0.106	5.50		1.82	21.07	78.93	**79**
#200	0.075	4.83		1.60	22.67	77.33	**77**
Pan	-	233.40		77.33	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	12/7/23	Checked By	KC	Date	12/7/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-58
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	9.0-13.5'
Project No.:	2023-680-002	Sample No.:	4 & 5
Lab ID:	2023-680-002-203	Soil Description:	BROWN LEAN CLAY

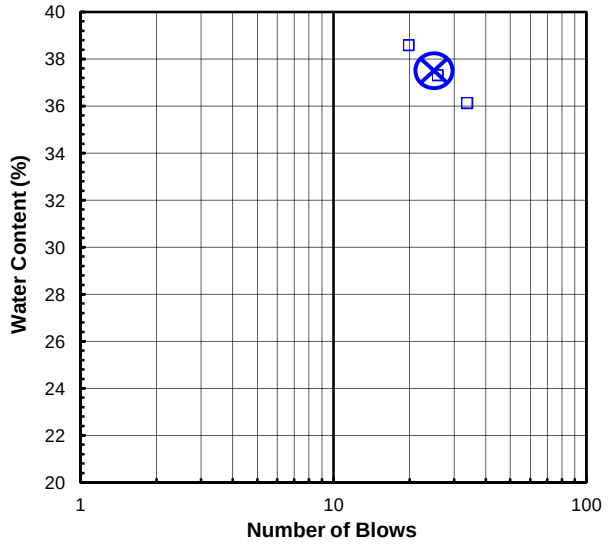
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	21	305	503	515	U
Wt. of Tare & Wet Sample (g):	38.26	46.00	41.37	44.53	L
Wt. of Tare & Dry Sample (g):	34.40	38.85	35.31	37.56	T
Weight of Tare (g):	8.76	19.04	19.05	19.48	I
Weight of Water (g):	3.9	7.2	6.1	7.0	P
Weight of Dry Sample (g):	25.6	19.8	16.3	18.1	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**15.1**	**36.1**	**37.3**	**38.6**	N
Number of Blows:		**34**	**26**	**20**	T

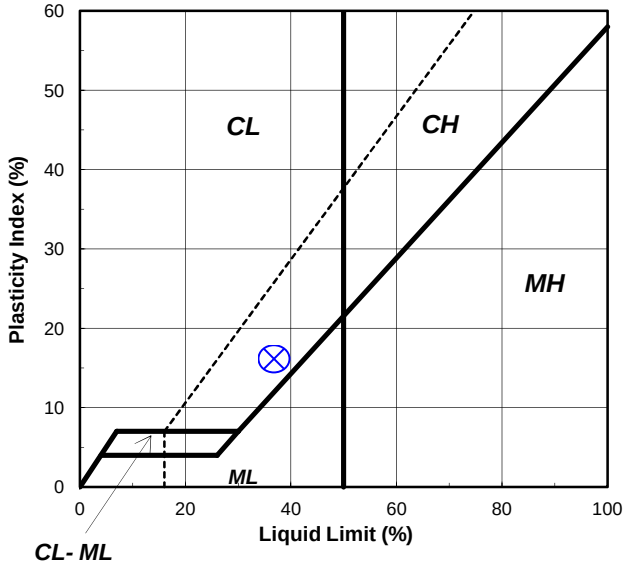
Plastic Limit Test	1	2	Range
Tare Number:	517	2101	
Wt. of Tare & Wet Sample (g):	25.66	24.91	
Wt. of Tare & Dry Sample (g):	24.57	23.80	
Weight of Tare (g):	19.33	18.47	
Weight of Water (g):	1.1	1.1	
Weight of Dry Sample (g):	5.2	5.3	
Moisture Content (%):	**20.8**	**20.8**	**0.0**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**37**
Plastic Limit (%):	**21**
Plasticity Index (%):	**16**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By BS *Date* 12/5/23 *Checked By* KC *Date* 12/6/23

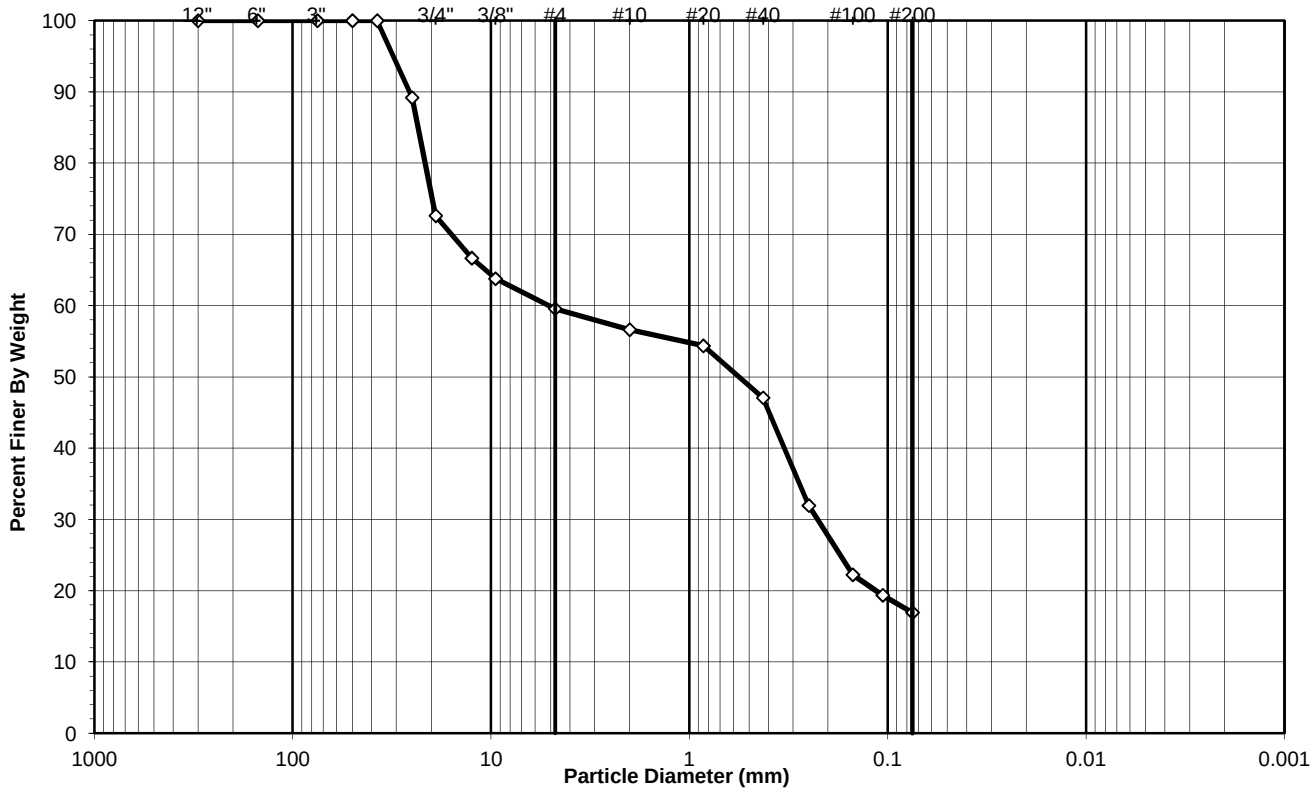
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-60
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-10.5'
Project No.:	2023-680-002	Sample No.:	2 to 4
Lab ID:	2023-680-002-209	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**40.44**
#4 to #200	***Sand***	**42.63**
Finer than #200	***Silt & Clay***	**16.94**

USCS Symbol:
sm, ASSUMED

D50 = 0.56

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By DF Date 11/29/23 Checked By BRB Date 11/30/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-60
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-10.5'
Project No.:	2023-680-002	Sample No.:	2 to 4
Lab ID:	2023-680-002-209	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2012	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	731.21	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	691.13	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.67	Weight of Tare (g):	NA
Weight of Water (g):	40.08	Weight of Water (g):	NA
Weight of Dry Soil (g):	546.46	Weight of Dry Soil (g):	NA
Moisture Content (%):	**7.3**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	546.46
Tare No. (Sub-Specimen)	2012	Wet Weight of +3/4" Sample (g):	160.59
Wt. of Tare & Wet Sub-Specimen (g):	731.21	Dry Weight of + 3/4" Sample (g):	149.62
Weight of Tare (g):	144.67	Dry Weight of - 3/4" Sample (g):	396.84
Sub-Specimen Wet Weight (g):	586.54	Dry Weight -3/4" +3/8" Sample (g):	48.27
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	348.57
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	59.05		10.81	10.81	89.19	**89**
3/4"	19	90.57		16.57	27.38	72.62	**73**
1/2"	12.5	32.52	(**)	5.95	33.33	66.67	**67**
3/8"	9.5	15.75		2.88	36.21	63.79	**64**
#4	4.75	23.08		4.22	40.44	59.56	**60**
#10	2	15.99		2.93	43.36	56.64	**57**
#20	0.85	12.40	(**)	2.27	45.63	54.37	**54**
#40	0.425	39.84		7.29	52.92	47.08	**47**
#60	0.25	82.63		15.12	68.04	31.96	**32**
#100	0.15	53.09		9.72	77.76	22.24	**22**
#140	0.106	15.71		2.87	80.63	19.37	**19**
#200	0.075	13.28		2.43	83.06	16.94	**17**
Pan	-	92.55		16.94	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 11/29/23 Checked By BRB Date 11/30/23

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

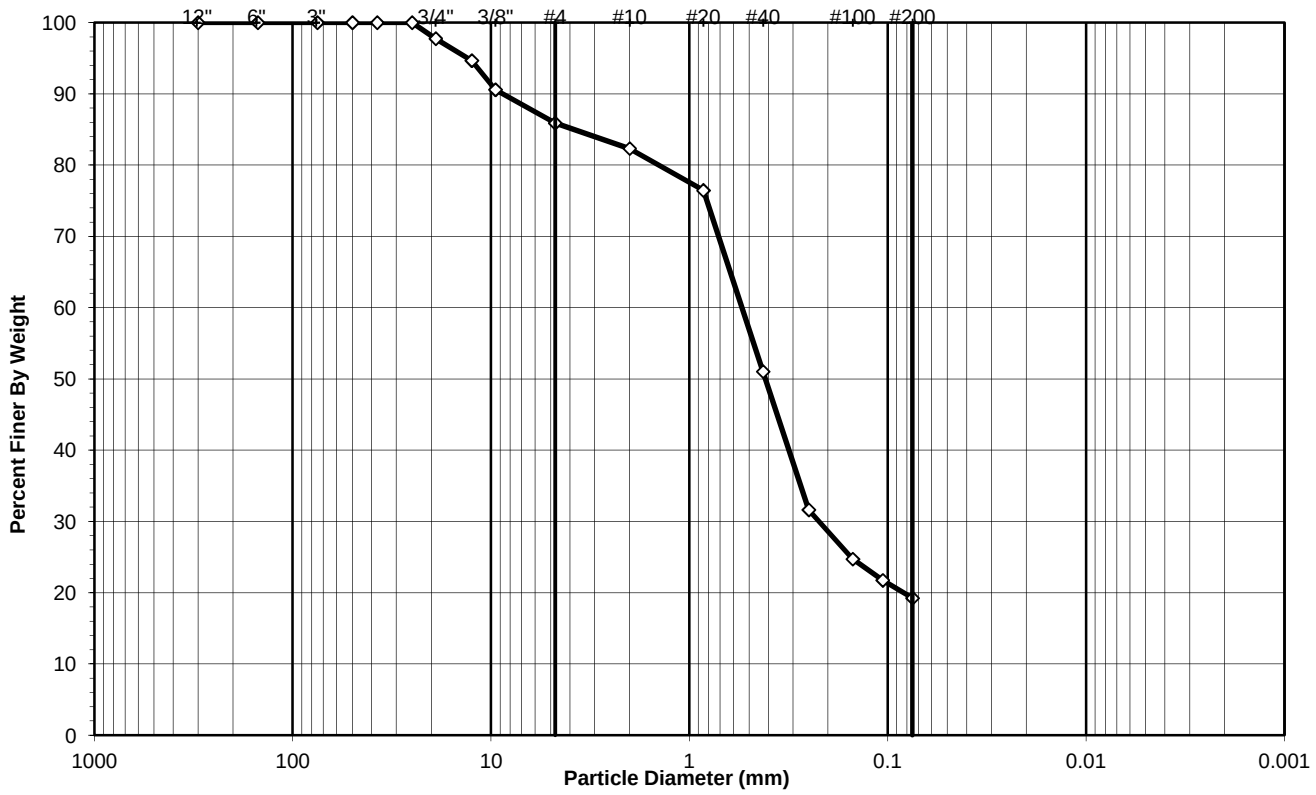
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-61
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-10.5'
Project No.:	2023-680-002	Sample No.:	2 to 4
Lab ID:	2023-680-002-217	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**14.10**
#4 to #200	***Sand***	**66.65**
Finer than #200	***Silt & Clay***	**19.25**

USCS Symbol:
sm, ASSUMED

D50 = 0.41

USCS Classification:
SILTY SAND

Tested By DF Date 11/29/23 Checked By BRB Date 11/30/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-61
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-10.5'
Project No.:	2023-680-002	Sample No.:	2 to 4
Lab ID:	2023-680-002-217	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1617	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	725.40	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	682.98	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	148.08	Weight of Tare (g):	NA
Weight of Water (g):	42.42	Weight of Water (g):	NA
Weight of Dry Soil (g):	534.90	Weight of Dry Soil (g):	NA
Moisture Content (%):	**7.9**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	534.90
Tare No. (Sub-Specimen)	1617	Wet Weight of +3/4" Sample (g):	12.95
Wt. of Tare & Wet Sub-Specimen (g):	725.40	Dry Weight of + 3/4" Sample (g):	12.00
Weight of Tare (g):	148.08	Dry Weight of - 3/4" Sample (g):	522.90
Sub-Specimen Wet Weight (g):	577.32	Dry Weight -3/4" +3/8" Sample (g):	38.36
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	484.54
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	12.00		2.24	2.24	97.76	**98**
1/2"	12.5	16.50	(**)	3.08	5.33	94.67	**95**
3/8"	9.5	21.86		4.09	9.41	90.59	**91**
#4	4.75	25.05		4.68	14.10	85.90	**86**
#10	2	19.13		3.58	17.67	82.33	**82**
#20	0.85	31.37	(**)	5.86	23.54	76.46	**76**
#40	0.425	136.02		25.43	48.97	51.03	**51**
#60	0.25	103.80		19.41	68.37	31.63	**32**
#100	0.15	36.95		6.91	75.28	24.72	**25**
#140	0.106	15.93		2.98	78.26	21.74	**22**
#200	0.075	13.33		2.49	80.75	19.25	**19**
Pan	-	102.96		19.25	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 11/29/23 Checked By BRB Date 11/30/23

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

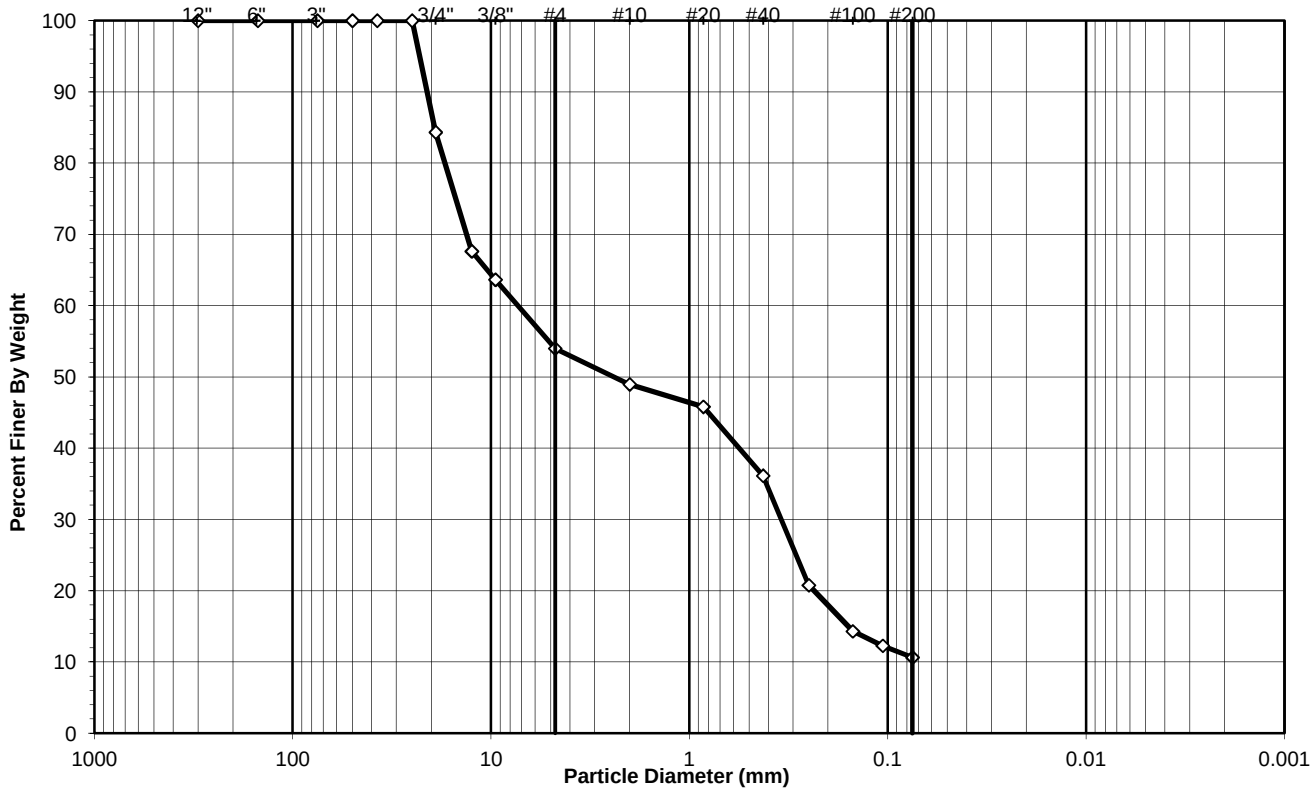
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-62
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-222	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**46.02**
#4 to #200	***Sand***	**43.35**
Finer than #200	***Silt & Clay***	**10.64**

USCS Symbol:
gp-gm, ASSUMED

D50 = 2.39

USCS Classification:
POORLY GRADED GRAVEL WITH SILT AND SAND

Tested By DF Date 11/29/23 Checked By BRB Date 11/30/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-62
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-222	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1442	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	633.28	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	611.57	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	145.13	Weight of Tare (g):	NA
Weight of Water (g):	21.71	Weight of Water (g):	NA
Weight of Dry Soil (g):	466.44	Weight of Dry Soil (g):	NA
Moisture Content (%):	**4.7**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	466.44
Tare No. (Sub-Specimen)	1442	Wet Weight of +3/4" Sample (g):	76.49
Wt. of Tare & Wet Sub-Specimen (g):	633.28	Dry Weight of + 3/4" Sample (g):	73.09
Weight of Tare (g):	145.13	Dry Weight of - 3/4" Sample (g):	393.35
Sub-Specimen Wet Weight (g):	488.15	Dry Weight -3/4" +3/8" Sample (g):	96.50
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	296.85
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	73.09		15.67	15.67	84.33	**84**
1/2"	12.5	77.90	(**)	16.70	32.37	67.63	**68**
3/8"	9.5	18.60		3.99	36.36	63.64	**64**
#4	4.75	45.05		9.66	46.02	53.98	**54**
#10	2	23.44		5.03	51.04	48.96	**49**
#20	0.85	14.69	(**)	3.15	54.19	45.81	**46**
#40	0.425	45.11		9.67	63.86	36.14	**36**
#60	0.25	71.67		15.37	79.23	20.77	**21**
#100	0.15	30.17		6.47	85.70	14.30	**14**
#140	0.106	9.45		2.03	87.72	12.28	**12**
#200	0.075	7.65		1.64	89.36	10.64	**11**
Pan	-	49.62		10.64	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 11/29/23 Checked By BRB Date 11/30/23

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

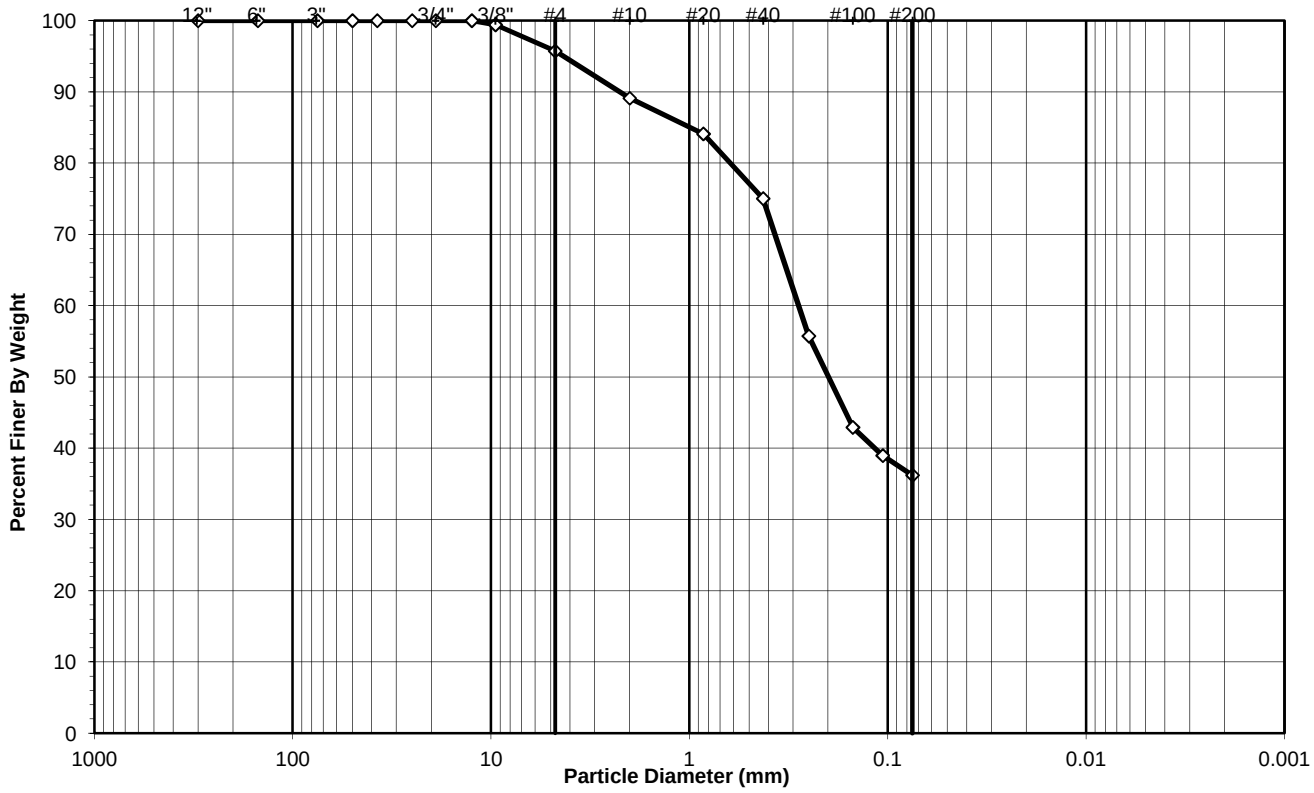
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-67
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	9.0-16.5'
Project No.:	2023-680-002	Sample No.:	4 to 6
Lab ID:	2023-680-002-249	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**4.26**
#4 to #200	***Sand***	**59.53**
Finer than #200	***Silt & Clay***	**36.21**

USCS Symbol:
SM, TESTED

D50 = 0.20

USCS Classification:
SILTY SAND

Tested By DF Date 12/7/23 Checked By KC Date 12/7/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-67
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	9.0-16.5'
Project No.:	2023-680-002	Sample No.:	4 to 6
Lab ID:	2023-680-002-249	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2029	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	702.17	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	702.17	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	145.12	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	557.05	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):	557.05
Tare No. (Sub-Specimen)	2029	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	702.17	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	145.12	Dry Weight of - 3/4" Sample (g):	557.05
Sub-Specimen Wet Weight (g):	557.05	Dry Weight -3/4" +3/8" Sample (g):	3.25
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	553.80
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	3.25		0.58	0.58	99.42	**99**
#4	4.75	20.50		3.68	4.26	95.74	**96**
#10	2	36.88		6.62	10.88	89.12	**89**
#20	0.85	27.89	(**)	5.01	15.89	84.11	**84**
#40	0.425	50.55		9.07	24.97	75.03	**75**
#60	0.25	107.50		19.30	44.26	55.74	**56**
#100	0.15	71.35		12.81	57.07	42.93	**43**
#140	0.106	22.05		3.96	61.03	38.97	**39**
#200	0.075	15.40		2.76	63.79	36.21	**36**
Pan	-	201.68		36.21	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	12/7/23	Checked By	KC	Date	12/7/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-67
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	9.0-16.5'
Project No.:	2023-680-002	Sample No.:	4 to 6
Lab ID:	2023-680-002-249	Soil Description:	BROWN SILT

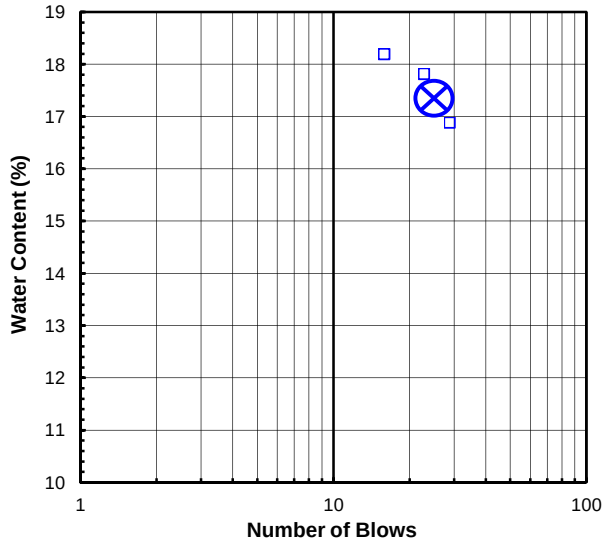
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	3348	449	231	543	U
Wt. of Tare & Wet Sample (g):	72.90	43.78	41.31	39.52	L
Wt. of Tare & Dry Sample (g):	66.48	40.82	38.04	36.41	T
Weight of Tare (g):	8.15	23.27	19.67	19.30	I
Weight of Water (g):	6.4	3.0	3.3	3.1	P
Weight of Dry Sample (g):	58.3	17.6	18.4	17.1	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**11.0**	**16.9**	**17.8**	**18.2**	N
Number of Blows:		**29**	**23**	**16**	T

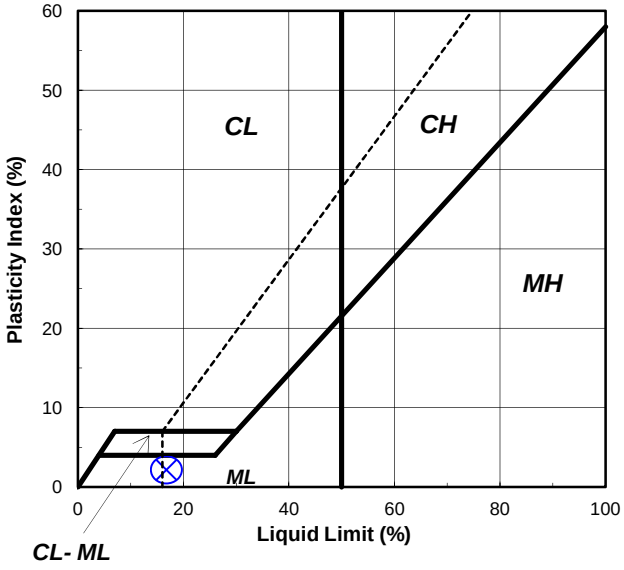
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	1113	306	
Wt. of Tare & Wet Sample (g):	25.12	25.59	
Wt. of Tare & Dry Sample (g):	24.32	24.79	
Weight of Tare (g):	18.95	19.45	
Weight of Water (g):	0.8	0.8	
Weight of Dry Sample (g):	5.4	5.3	
Moisture Content (%):	**14.9**	**15.0**	**-0.1**
Note: The acceptable range of the two Moisture Contents is ±			0.84

Test Results	
Liquid Limit (%):	**17**
Plastic Limit (%):	**15**
Plasticity Index (%):	**2**
USCS Symbol:	**ML**

Flow Curve



Plasticity Chart



Tested By FS *Date* 12/5/23 *Checked By* KC *Date* 12/6/23

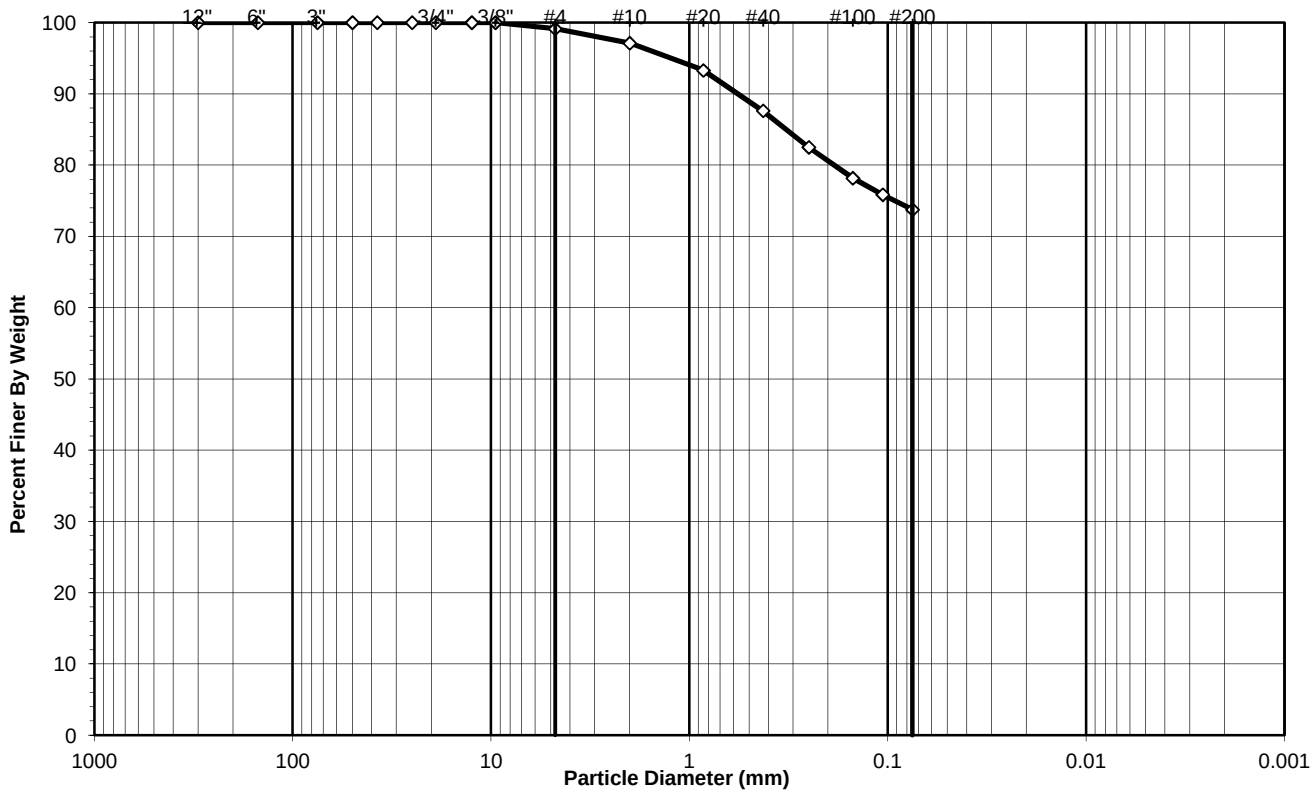
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-68
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	12.0-16.5'
Project No.:	2023-680-002	Sample No.:	5 & 6
Lab ID:	2023-680-002-260	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**0.87**
#4 to #200	***Sand***	**25.37**
Finer than #200	***Silt & Clay***	**73.76**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By DF Date 12/7/23 Checked By KC Date 12/7/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-68
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	12.0-16.5'
Project No.:	2023-680-002	Sample No.:	5 & 6
Lab ID:	2023-680-002-260	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2015	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	400.92	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	400.92	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.98	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	255.94	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):	255.94
Tare No. (Sub-Specimen)	2015	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	400.92	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.98	Dry Weight of - 3/4" Sample (g):	255.94
Sub-Specimen Wet Weight (g):	255.94	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	255.94
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	2.22		0.87	0.87	99.13	**99.1**
#10	2	5.15		2.01	2.88	97.12	**97.1**
#20	0.85	9.80	(**)	3.83	6.71	93.29	**93.3**
#40	0.425	14.49		5.66	12.37	87.63	**87.6**
#60	0.25	13.12		5.13	17.50	82.50	**82.5**
#100	0.15	11.10		4.34	21.83	78.17	**78.2**
#140	0.106	5.93		2.32	24.15	75.85	**75.8**
#200	0.075	5.35		2.09	26.24	73.76	**73.8**
Pan	-	188.78		73.76	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	12/7/23	Checked By	KC	Date	12/7/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-68
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	12.0-16.5'
Project No.:	2023-680-002	Sample No.:	5 & 6
Lab ID:	2023-680-002-260	Soil Description:	BROWN LEAN CLAY

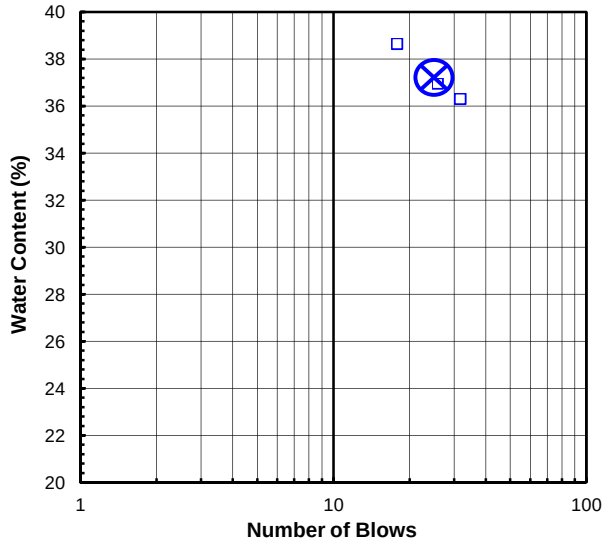
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	3046	714	728	737	U
Wt. of Tare & Wet Sample (g):	55.08	42.59	41.06	43.87	L
Wt. of Tare & Dry Sample (g):	50.56	36.61	35.12	37.09	T
Weight of Tare (g):	8.14	20.12	19.03	19.53	I
Weight of Water (g):	4.5	6.0	5.9	6.8	P
Weight of Dry Sample (g):	42.4	16.5	16.1	17.6	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**10.7**	**36.3**	**36.9**	**38.6**	N
Number of Blows:		**32**	**26**	**18**	T

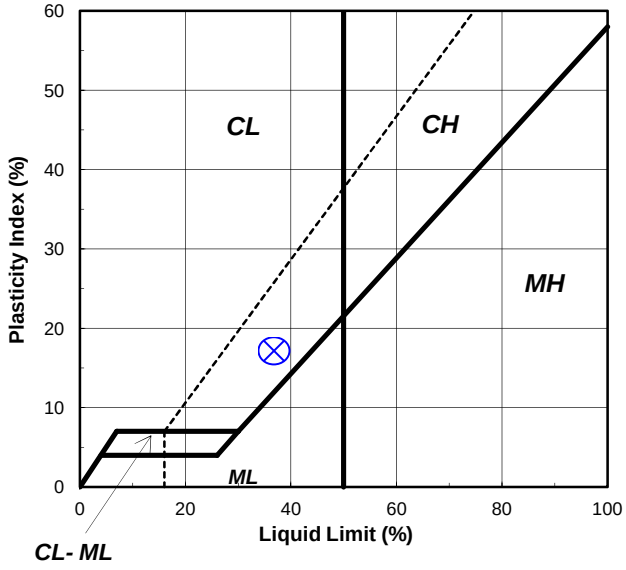
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	742	748	
Wt. of Tare & Wet Sample (g):	26.48	25.17	
Wt. of Tare & Dry Sample (g):	25.21	24.02	
Weight of Tare (g):	18.94	18.24	
Weight of Water (g):	1.3	1.2	
Weight of Dry Sample (g):	6.3	5.8	
Moisture Content (%):	**20.3**	**19.9**	**0.4**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**37**
Plastic Limit (%):	**20**
Plasticity Index (%):	**17**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By BS *Date* 12/5/23 *Checked By* KC *Date* 12/6/23

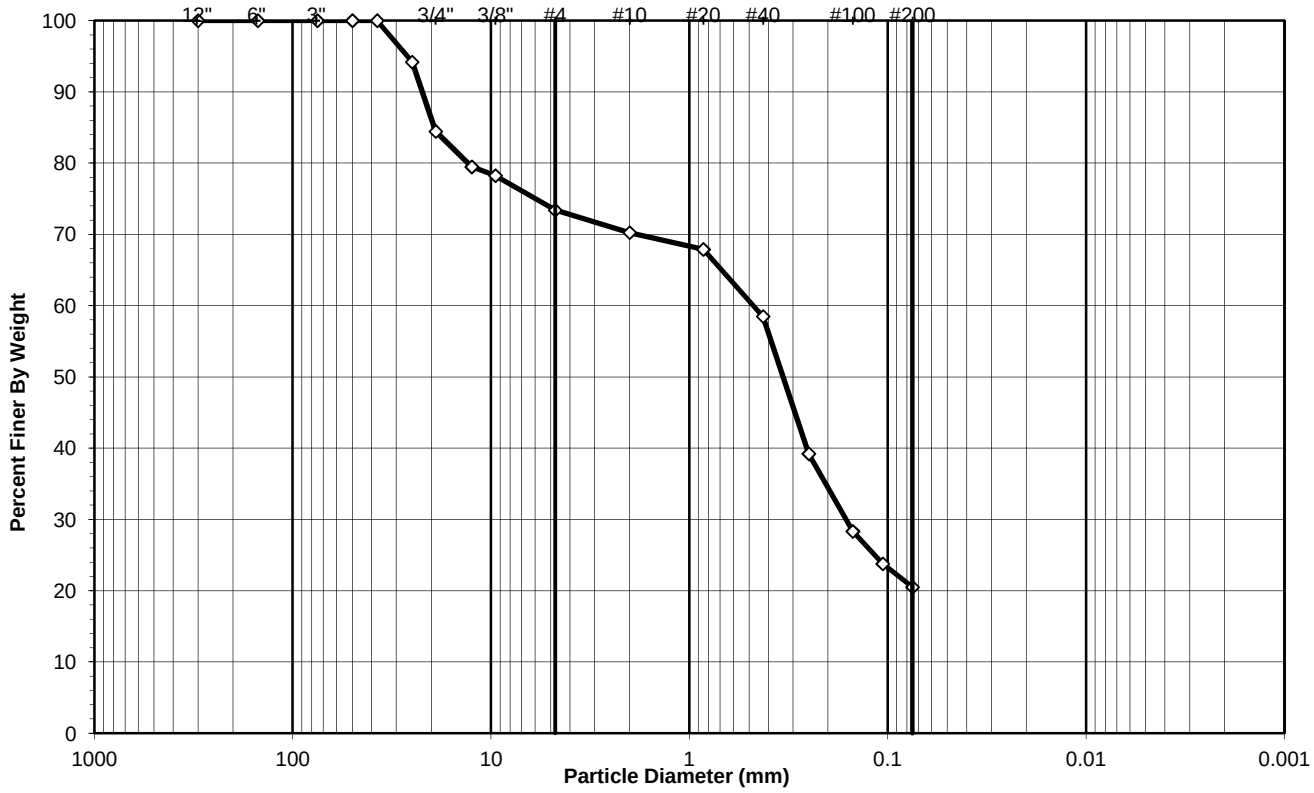
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-71
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-7.5'
Project No.:	2023-680-002	Sample No.:	1 to 3
Lab ID:	2023-680-002-267	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**26.60**
#4 to #200	***Sand***	**52.90**
Finer than #200	***Silt & Clay***	**20.50**

USCS Symbol:
sm, ASSUMED

D50 = 0.34

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By DF Date 11/29/23 Checked By BRB Date 11/30/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

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Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-71
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-7.5'
Project No.:	2023-680-002	Sample No.:	1 to 3
Lab ID:	2023-680-002-267	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	2035	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	675.17	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	650.16	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	147.04	Weight of Tare (g):	NA
Weight of Water (g):	25.01	Weight of Water (g):	NA
Weight of Dry Soil (g):	503.12	Weight of Dry Soil (g):	NA
Moisture Content (%):	**5.0**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	503.12
Tare No. (Sub-Specimen)	2035	Wet Weight of +3/4" Sample (g):	82.09
Wt. of Tare & Wet Sub-Specimen (g):	675.17	Dry Weight of + 3/4" Sample (g):	78.20
Weight of Tare (g):	147.04	Dry Weight of - 3/4" Sample (g):	424.92
Sub-Specimen Wet Weight (g):	528.13	Dry Weight -3/4" +3/8" Sample (g):	31.28
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	393.64
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	29.22		5.81	5.81	94.19	**94**
3/4"	19	48.98		9.74	15.54	84.46	**84**
1/2"	12.5	25.05	(**)	4.98	20.52	79.48	**79**
3/8"	9.5	6.23		1.24	21.76	78.24	**78**
#4	4.75	24.34		4.84	26.60	73.40	**73**
#10	2	15.85		3.15	29.75	70.25	**70**
#20	0.85	11.85	(**)	2.36	32.10	67.90	**68**
#40	0.425	47.37		9.42	41.52	58.48	**58**
#60	0.25	96.96		19.27	60.79	39.21	**39**
#100	0.15	54.74		10.88	71.67	28.33	**28**
#140	0.106	22.88		4.55	76.22	23.78	**24**
#200	0.075	16.52		3.28	79.50	20.50	**20**
Pan	-	103.13		20.50	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	11/29/23	Checked By	BRB	Date	11/30/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-73
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-1.5'
Project No.:	2023-680-002	Sample No.:	1
Lab ID:	2023-680-002-268	Color:	Brown
			(MInus No. 40 sieve material)

As Received
Water Content

Tare Number	3146
Wt. of Tare & Wet Sample (g)	48.94
Wt. of Tare & Dry Sample (g)	46.40
Weight of Tare (g)	8.02
Weight of Water (g)	2.54
Weight of Dry Sample (g)	38.38
Water Content (%)	**6.6**

NON - PLASTIC MATERIAL

Tested By BS *Date* 12/5/23 *Checked By* KC *Date* 12/6/23

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-76
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-1.5'
Project No.:	2023-680-002	Sample No.:	1
Lab ID:	2023-680-002-272	Soil Description:	BROWN SILT

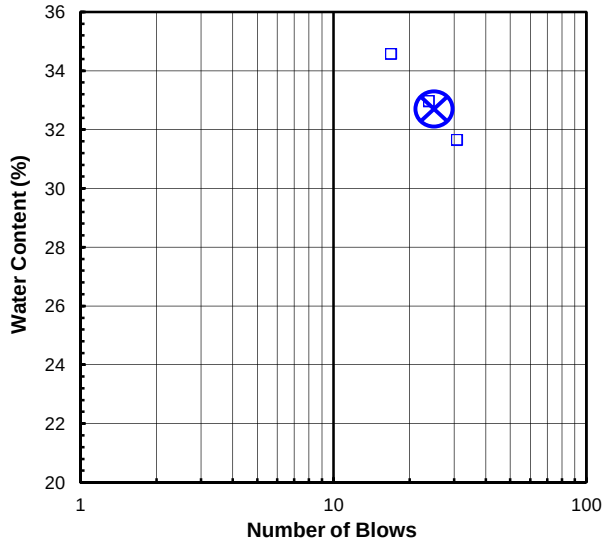
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content		Liquid Limit Test			
ASTM D2216-19		1	2	3	M
Tare Number:	3169	297	288	316	U
Wt. of Tare & Wet Sample (g):	43.91	43.84	43.40	40.64	L
Wt. of Tare & Dry Sample (g):	40.20	38.97	38.38	35.43	T
Weight of Tare (g):	8.03	23.57	23.14	20.35	I
Weight of Water (g):	3.7	4.9	5.0	5.2	P
Weight of Dry Sample (g):	32.2	15.4	15.2	15.1	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**11.5**	**31.6**	**32.9**	**34.5**	N
Number of Blows:		**31**	**24**	**17**	T

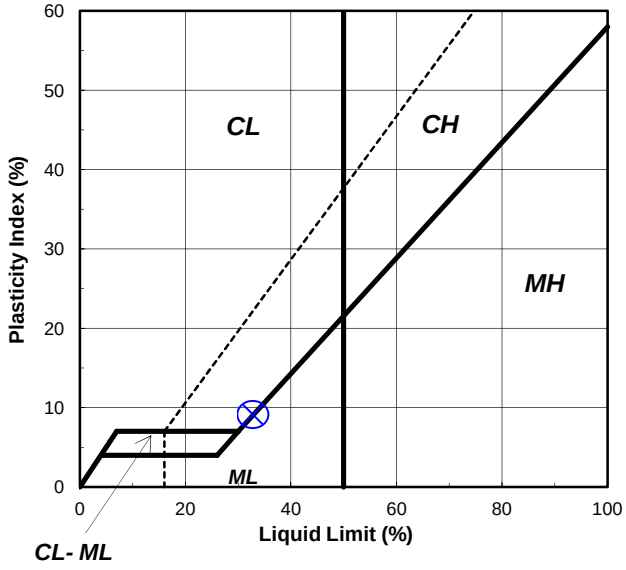
Plastic Limit Test	1	2	Range
Tare Number:	334	531	
Wt. of Tare & Wet Sample (g):	25.57	25.72	
Wt. of Tare & Dry Sample (g):	24.35	24.50	
Weight of Tare (g):	19.37	19.46	
Weight of Water (g):	1.2	1.2	
Weight of Dry Sample (g):	5.0	5.0	
Moisture Content (%):	**24.5**	**24.2**	**0.3**
Note: The acceptable range of the two Moisture Contents is ±			0.84

Test Results	
Liquid Limit (%):	**33**
Plastic Limit (%):	**24**
Plasticity Index (%):	**9**
USCS Symbol:	**ML**

Flow Curve



Plasticity Chart



Tested By FS *Date* 12/4/23 *Checked By* JLK *Date* 12/5/23

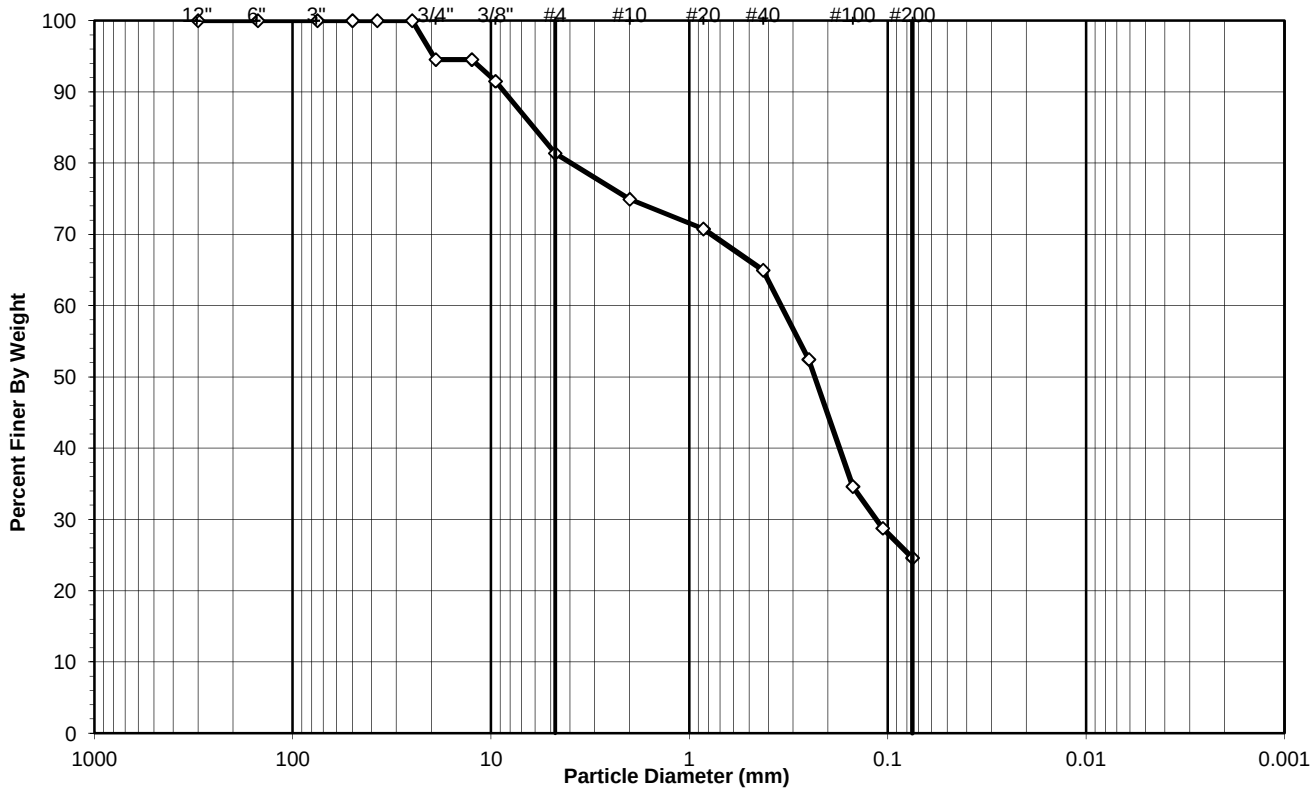
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-76
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-275	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**18.62**
#4 to #200	***Sand***	**56.77**
Finer than #200	***Silt & Clay***	**24.61**

USCS Symbol:
sm, ASSUMED

D50 = 0.23

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By DF Date 11/29/23 Checked By BRB Date 11/30/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-76
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-275	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1518	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	499.48	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	475.33	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	147.46	Weight of Tare (g):	NA
Weight of Water (g):	24.15	Weight of Water (g):	NA
Weight of Dry Soil (g):	327.87	Weight of Dry Soil (g):	NA
Moisture Content (%):	**7.4**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	327.87
Tare No. (Sub-Specimen)	1518	Wet Weight of +3/4" Sample (g):	19.23
Wt. of Tare & Wet Sub-Specimen (g):	499.48	Dry Weight of + 3/4" Sample (g):	17.91
Weight of Tare (g):	147.46	Dry Weight of - 3/4" Sample (g):	309.96
Sub-Specimen Wet Weight (g):	352.02	Dry Weight -3/4" +3/8" Sample (g):	9.98
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	299.98
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	17.91		5.46	5.46	94.54	**95**
1/2"	12.5	0.00	(**)	0.00	5.46	94.54	**95**
3/8"	9.5	9.98		3.04	8.51	91.49	**91**
#4	4.75	33.16		10.11	18.62	81.38	**81**
#10	2	21.13		6.44	25.06	74.94	**75**
#20	0.85	13.66	(**)	4.17	29.23	70.77	**71**
#40	0.425	18.99		5.79	35.02	64.98	**65**
#60	0.25	41.07		12.53	47.55	52.45	**52**
#100	0.15	58.46		17.83	65.38	34.62	**35**
#140	0.106	19.20		5.86	71.24	28.76	**29**
#200	0.075	13.63		4.16	75.39	24.61	**25**
Pan	-	80.68		24.61	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 11/29/23 Checked By BRB Date 11/30/23

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

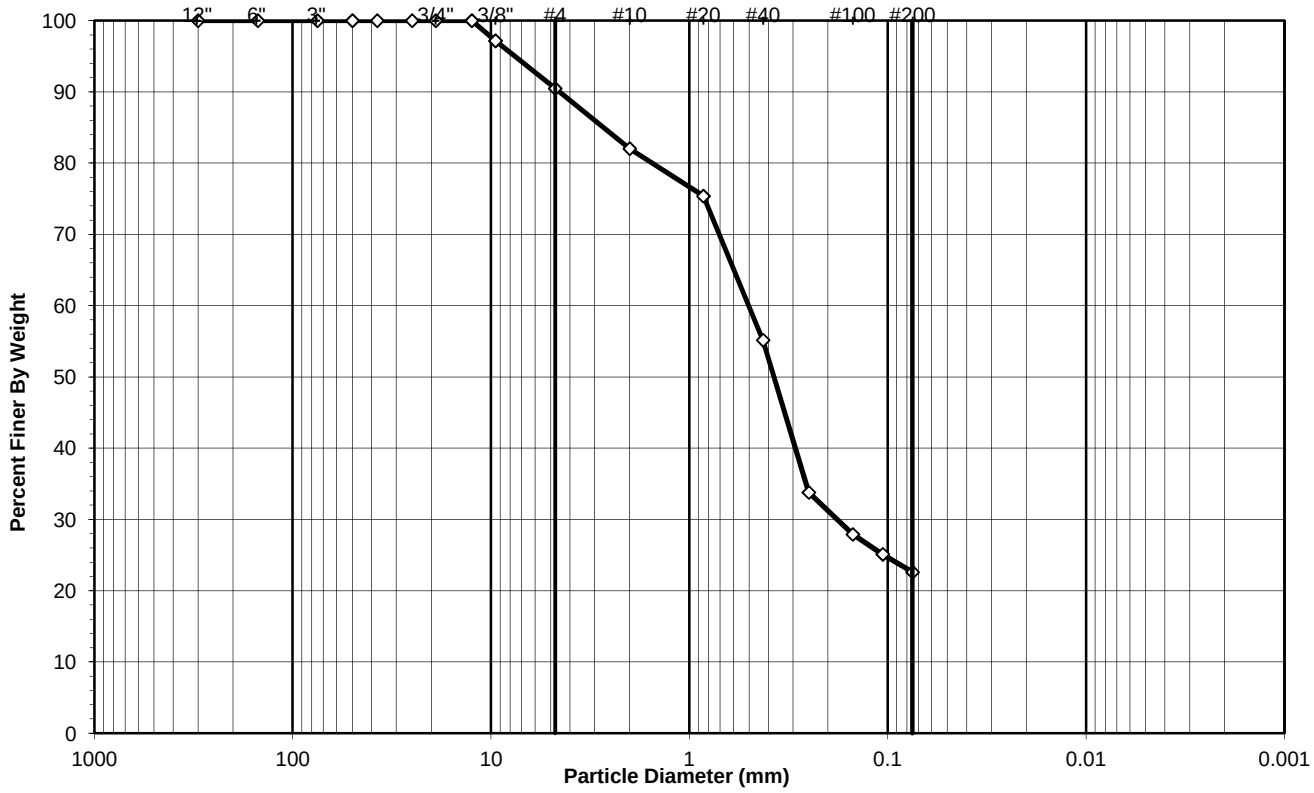
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-83
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-279	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**9.52**
#4 to #200	***Sand***	**67.86**
Finer than #200	***Silt & Clay***	**22.62**

USCS Symbol:
sm, ASSUMED

D50 = 0.37

USCS Classification:
SILTY SAND

Tested By DF Date 11/29/23 Checked By BRB Date 11/30/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-83
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-279	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):	503.10	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	468.89	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	143.56	Weight of Tare (g):	NA
Weight of Water (g):	34.21	Weight of Water (g):	NA
Weight of Dry Soil (g):	325.33	Weight of Dry Soil (g):	NA
Moisture Content (%):	**10.5**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	325.33
Tare No. (Sub-Specimen)	1429	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	503.10	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	143.56	Dry Weight of - 3/4" Sample (g):	325.33
Sub-Specimen Wet Weight (g):	359.54	Dry Weight -3/4" +3/8" Sample (g):	9.20
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	316.13
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	9.20		2.83	2.83	97.17	**97**
#4	4.75	21.77		6.69	9.52	90.48	**90**
#10	2	27.47		8.44	17.96	82.04	**82**
#20	0.85	21.66	(**)	6.66	24.62	75.38	**75**
#40	0.425	65.81		20.23	44.85	55.15	**55**
#60	0.25	69.49		21.36	66.21	33.79	**34**
#100	0.15	19.12		5.88	72.09	27.91	**28**
#140	0.106	9.12		2.80	74.89	25.11	**25**
#200	0.075	8.10		2.49	77.38	22.62	**23**
Pan	-	73.59		22.62	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 11/29/23 Checked By BRB Date 11/30/23

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

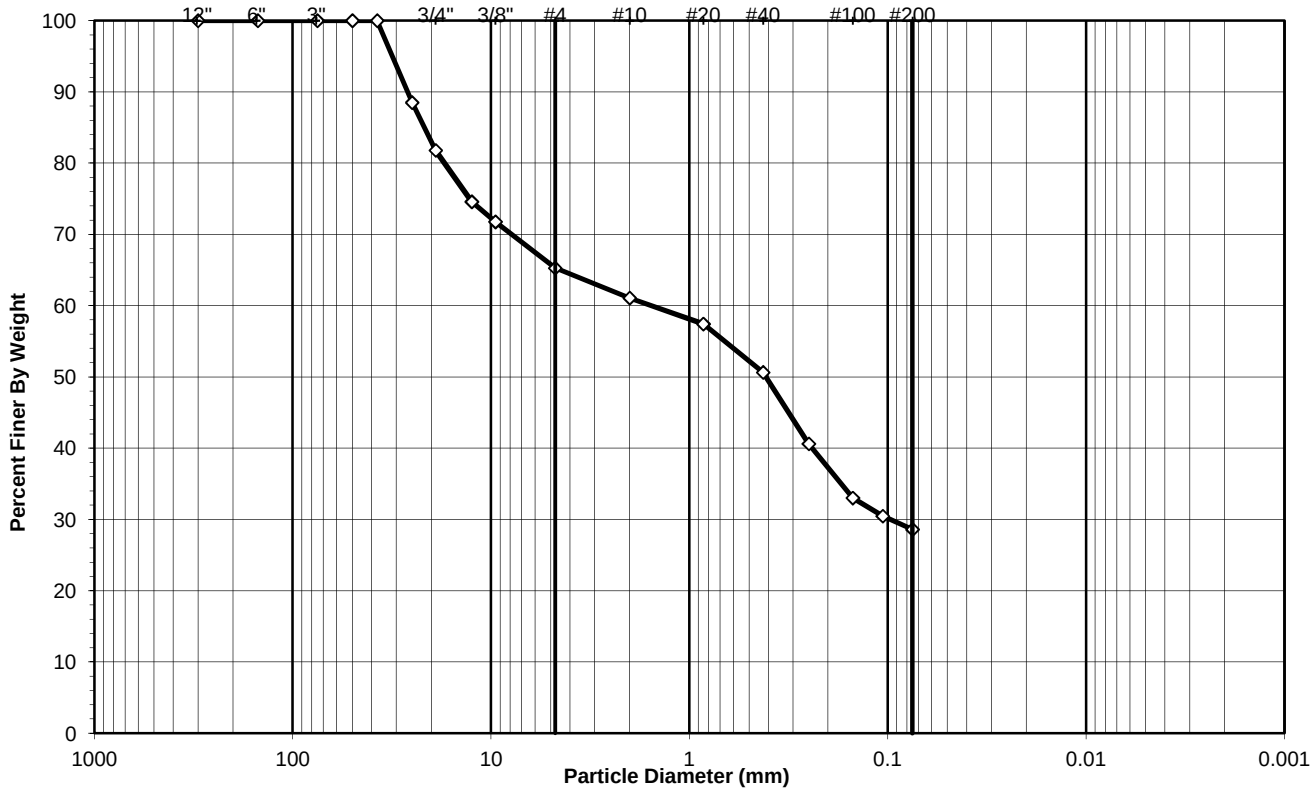
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-91
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-10.5'
Project No.:	2023-680-002	Sample No.:	1 to 4
Lab ID:	2023-680-002-284	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**34.72**
#4 to #200	***Sand***	**36.67**
Finer than #200	***Silt & Clay***	**28.61**

USCS Symbol:
sm, ASSUMED

D50 = 0.41

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By DF Date 11/29/23 Checked By BRB Date 11/30/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-91
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	0.0-10.5'
Project No.:	2023-680-002	Sample No.:	1 to 4
Lab ID:	2023-680-002-284	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1462	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	965.05	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	887.33	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.92	Weight of Tare (g):	NA
Weight of Water (g):	77.72	Weight of Water (g):	NA
Weight of Dry Soil (g):	742.41	Weight of Dry Soil (g):	NA
Moisture Content (%):	**10.5**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	742.41
Tare No. (Sub-Specimen)	1462	Wet Weight of +3/4" Sample (g):	149.33
Wt. of Tare & Wet Sub-Specimen (g):	965.05	Dry Weight of + 3/4" Sample (g):	135.18
Weight of Tare (g):	144.92	Dry Weight of - 3/4" Sample (g):	607.23
Sub-Specimen Wet Weight (g):	820.13	Dry Weight -3/4" +3/8" Sample (g):	74.42
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	532.81
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	85.38		11.50	11.50	88.50	**88**
3/4"	19	49.80		6.71	18.21	81.79	**82**
1/2"	12.5	53.55	(**)	7.21	25.42	74.58	**75**
3/8"	9.5	20.87		2.81	28.23	71.77	**72**
#4	4.75	48.18		6.49	34.72	65.28	**65**
#10	2	31.22		4.21	38.93	61.07	**61**
#20	0.85	27.05	(**)	3.64	42.57	57.43	**57**
#40	0.425	50.40		6.79	49.36	50.64	**51**
#60	0.25	74.47		10.03	59.39	40.61	**41**
#100	0.15	56.40		7.60	66.99	33.01	**33**
#140	0.106	18.86		2.54	69.53	30.47	**30**
#200	0.075	13.86		1.87	71.39	28.61	**29**
Pan	-	212.37		28.61	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 11/29/23 Checked By BRB Date 11/30/23

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

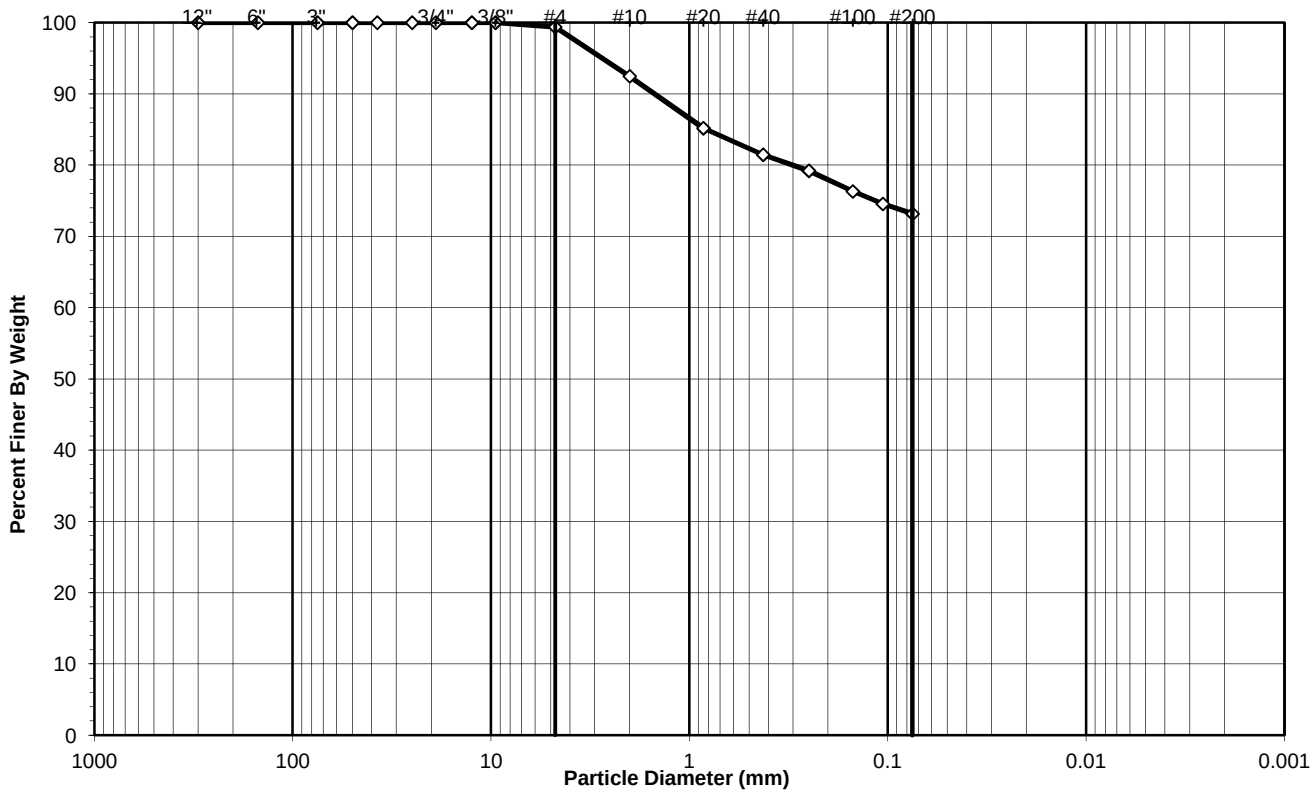
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-94
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	24.0-27.6'
Project No.:	2023-680-002	Sample No.:	9 & 10
Lab ID:	2023-680-002-295	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**0.62**
#4 to #200	***Sand***	**26.21**
Finer than #200	***Silt & Clay***	**73.17**

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By DF Date 12/7/23 Checked By KC Date 12/7/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-94
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	24.0-27.6'
Project No.:	2023-680-002	Sample No.:	9 & 10
Lab ID:	2023-680-002-295	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1525	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	495.11	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	495.11	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	146.35	Weight of Tare (g):	NA
Weight of Water (g):	0.00	Weight of Water (g):	NA
Weight of Dry Soil (g):	348.76	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):	348.76
Tare No. (Sub-Specimen)	1525	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	495.11	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	146.35	Dry Weight of - 3/4" Sample (g):	348.76
Sub-Specimen Wet Weight (g):	348.76	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	348.76
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	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	2.15		0.62	0.62	99.38	**99.4**
#10	2	24.08		6.90	7.52	92.48	**92.5**
#20	0.85	25.43	(**)	7.29	14.81	85.19	**85.2**
#40	0.425	13.00		3.73	18.54	81.46	**81.5**
#60	0.25	7.83		2.25	20.79	79.21	**79.2**
#100	0.15	10.10		2.90	23.68	76.32	**76.3**
#140	0.106	6.12		1.75	25.44	74.56	**74.6**
#200	0.075	4.85		1.39	26.83	73.17	**73.2**
Pan	-	255.20		73.17	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	12/7/23	Checked By	KC	Date	12/7/23

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

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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-94
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	24.0-27.6'
Project No.:	2023-680-002	Sample No.:	9 & 10
Lab ID:	2023-680-002-295	Soil Description:	BROWN LEAN CLAY

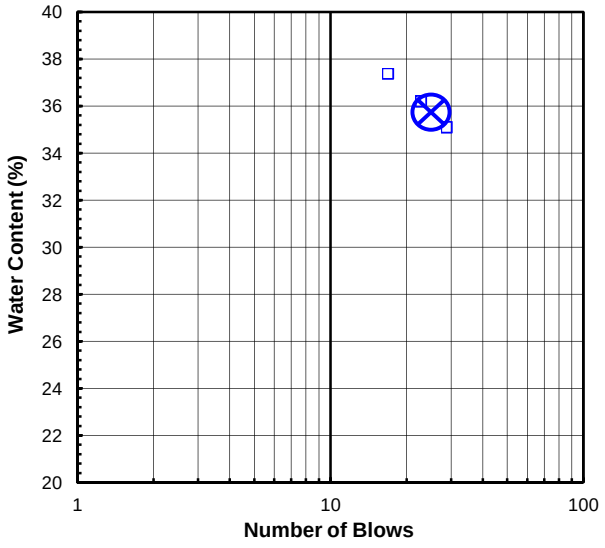
Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus #40 sieve material, Air dried)

As Received Moisture Content ASTM D2216-19		**Liquid Limit Test** 1	2	3	M
Tare Number:	4023	1274	147	126	U
Wt. of Tare & Wet Sample (g):	43.90	45.42	41.61	40.63	L
Wt. of Tare & Dry Sample (g):	40.92	39.67	35.90	34.88	T
Weight of Tare (g):	8.08	23.27	20.11	19.48	I
Weight of Water (g):	3.0	5.8	5.7	5.8	P
Weight of Dry Sample (g):	32.8	16.4	15.8	15.4	O
Was As Received MC Preserved:	**Yes**				I
Moisture Content (%):	**9.1**	**35.1**	**36.2**	**37.3**	N
Number of Blows:		**29**	**23**	**17**	T

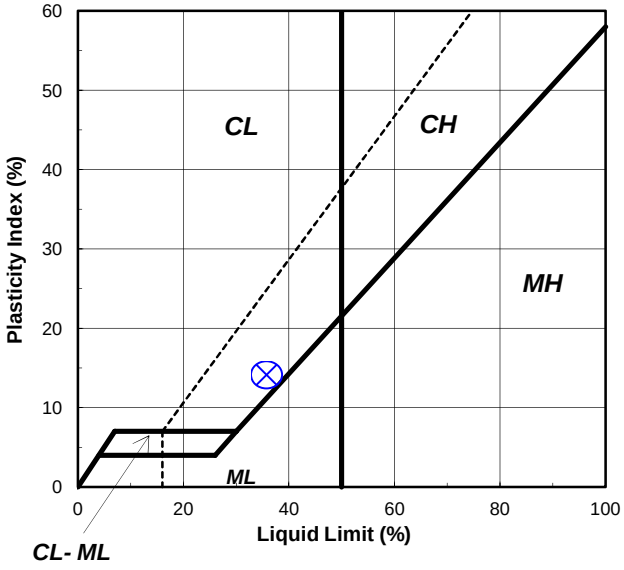
Plastic Limit Test	**1**	**2**	**Range**
Tare Number:	609	504	
Wt. of Tare & Wet Sample (g):	25.37	25.89	
Wt. of Tare & Dry Sample (g):	24.21	24.72	
Weight of Tare (g):	18.80	19.36	
Weight of Water (g):	1.2	1.2	
Weight of Dry Sample (g):	5.4	5.4	
Moisture Content (%):	**21.4**	**21.8**	**-0.4**
Note: The acceptable range of the two Moisture Contents is ±			1.12

Test Results	
Liquid Limit (%):	**36**
Plastic Limit (%):	**22**
Plasticity Index (%):	**14**
USCS Symbol:	**CL**

Flow Curve



Plasticity Chart



Tested By BS *Date* 12/5/23 *Checked By* KC *Date* 12/6/23

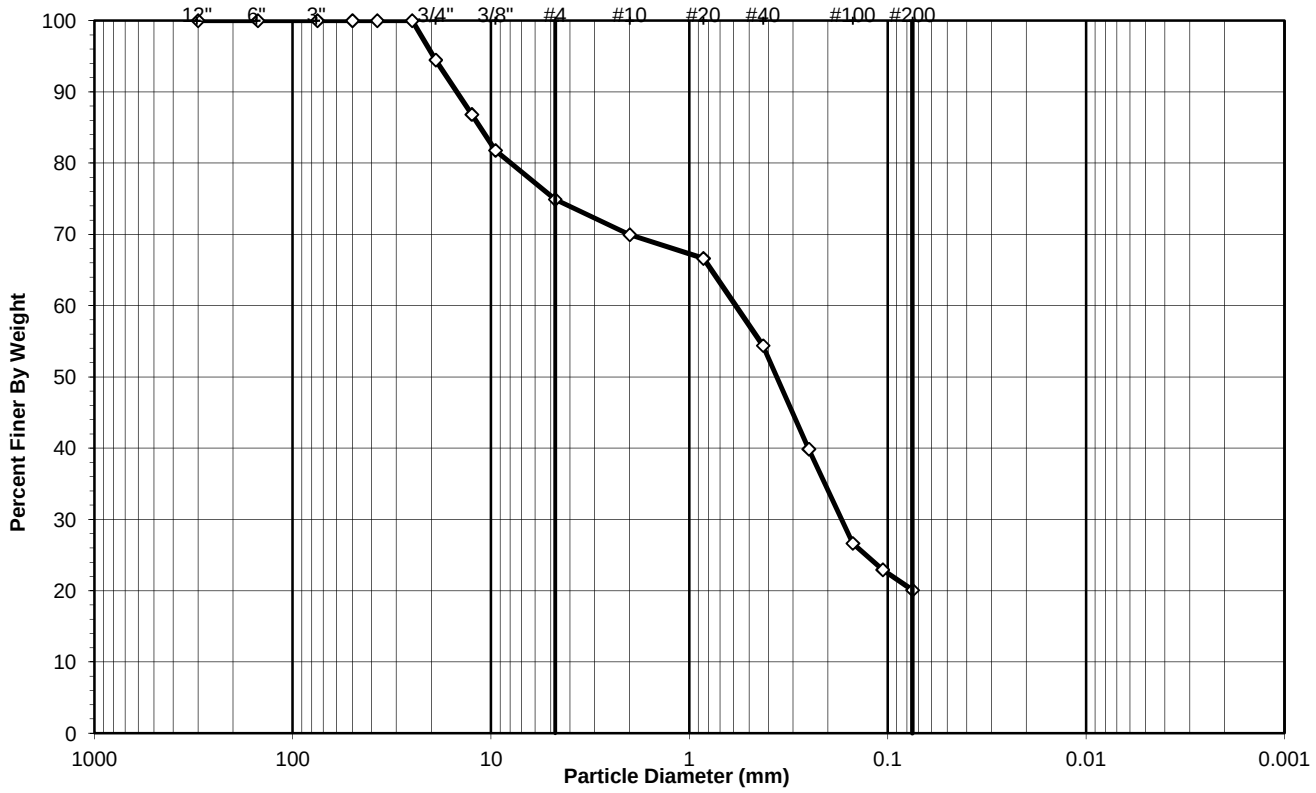
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-98
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-299	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	***Gravel***	**25.09**
#4 to #200	***Sand***	**54.82**
Finer than #200	***Silt & Clay***	**20.10**

USCS Symbol:
sm, ASSUMED

D50 = 0.36

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By DF Date 11/29/23 Checked By BRB Date 11/30/23

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

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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	B-98
Client Reference:	QVSD HS GBB 16123A	Depth (ft):	3.0-7.5'
Project No.:	2023-680-002	Sample No.:	2 & 3
Lab ID:	2023-680-002-299	Soil Color:	Brown

Moisture Content of Passing 3/4" Material		Moisture Content of Retained 3/4" Material	
Tare No.:	1459	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	604.66	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	573.94	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	139.82	Weight of Tare (g):	NA
Weight of Water (g):	30.72	Weight of Water (g):	NA
Weight of Dry Soil (g):	434.12	Weight of Dry Soil (g):	NA
Moisture Content (%):	**7.1**	**Moisture Content (%):**	**0.0**

Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	434.12
Tare No. (Sub-Specimen)	1459	Wet Weight of +3/4" Sample (g):	25.68
Wt. of Tare & Wet Sub-Specimen (g):	604.66	Dry Weight of + 3/4" Sample (g):	23.98
Weight of Tare (g):	139.82	Dry Weight of - 3/4" Sample (g):	410.14
Sub-Specimen Wet Weight (g):	464.84	Dry Weight -3/4" +3/8" Sample (g):	55.07
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	355.07
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		

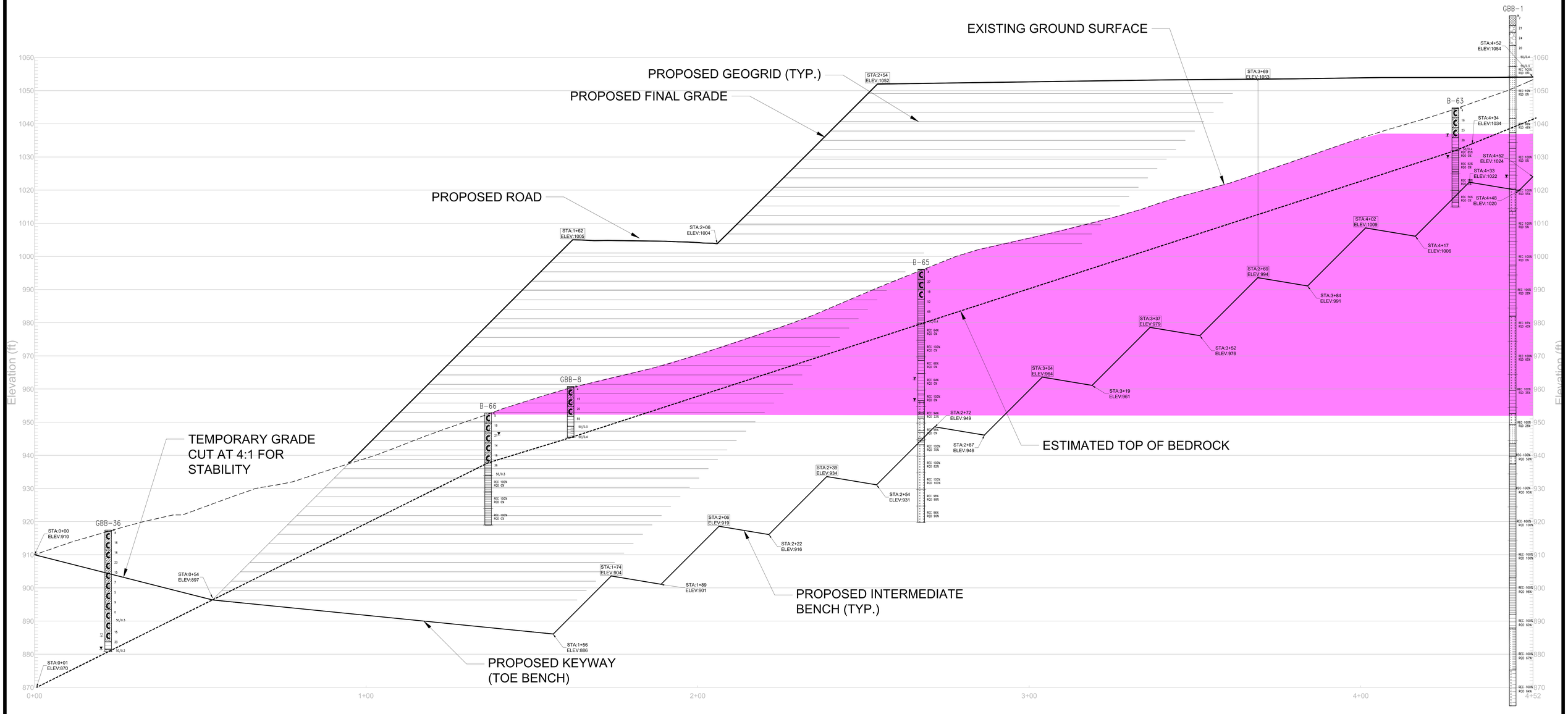
Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100**
6"	150	0.00		0.00	0.00	100.00	**100**
3"	75	0.00		0.00	0.00	100.00	**100**
2"	50	0.00	(*)	0.00	0.00	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	23.98		5.52	5.52	94.48	**94**
1/2"	12.5	33.17	(**)	7.64	13.16	86.84	**87**
3/8"	9.5	21.90		5.04	18.21	81.79	**82**
#4	4.75	29.85		6.88	25.09	74.91	**75**
#10	2	21.50		4.95	30.04	69.96	**70**
#20	0.85	14.46	(**)	3.33	33.37	66.63	**67**
#40	0.425	53.11		12.23	45.60	54.40	**54**
#60	0.25	63.06		14.53	60.13	39.87	**40**
#100	0.15	57.40		13.22	73.35	26.65	**27**
#140	0.106	16.08		3.70	77.05	22.95	**23**
#200	0.075	12.36		2.85	79.90	20.10	**20**
Pan	-	87.25		20.10	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 11/29/23 Checked By BRB Date 11/30/23

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

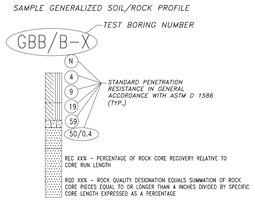
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LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE
- WATER LEVEL AT END OF DRILLING
- WATER LEVEL DURING DRILLING
- WATER LEVEL AFTER 24 HR
- DENOTES COLLUVIAL SOIL
- GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK
- GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE



APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS

CROSS-SECTION B-B

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	10/25/2023
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 5

MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

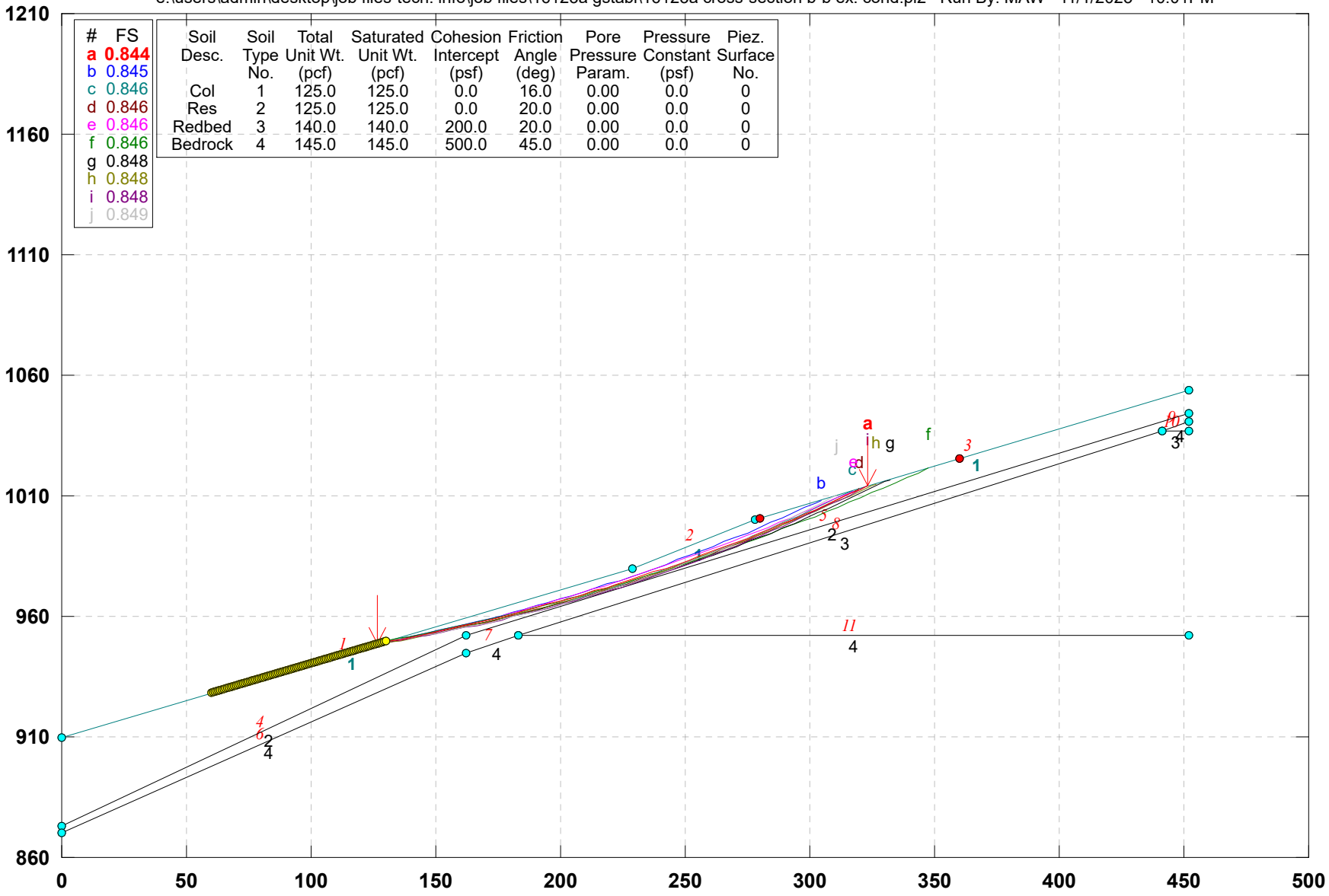
GBBE PROJECT NUMBER: 16123A

16123A QVSD Cross-Section B-B Ex. Conditions

e:\users\admin\desktop\job files-tech. info\job files\16123a gstabl\16123a cross-section b-b ex. cond.pl2 Run By: MAW 11/1/2023 10:01PM

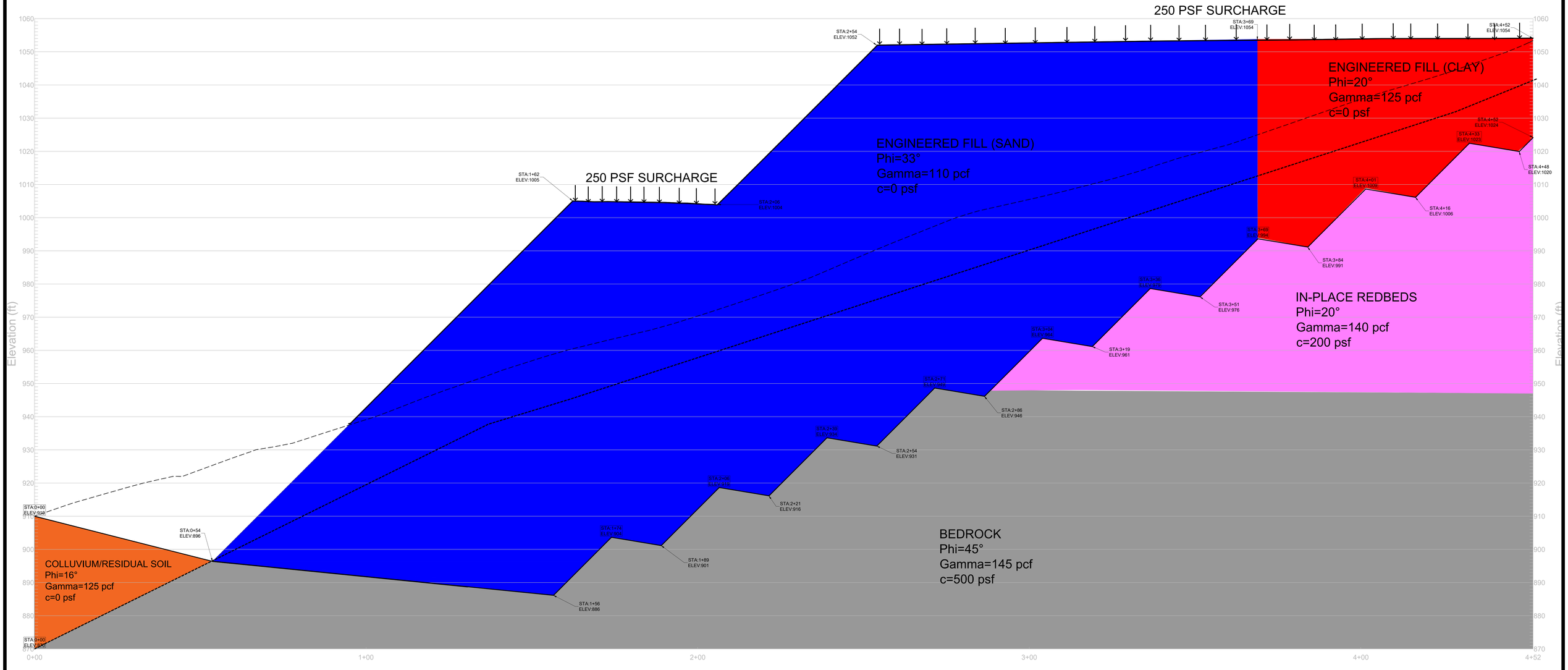
#	FS
a	0.844
b	0.845
c	0.846
d	0.846
e	0.846
f	0.846
g	0.848
h	0.848
i	0.848
j	0.849

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Col	1	125.0	125.0	0.0	16.0	0.00	0.0	0
Res	2	125.0	125.0	0.0	20.0	0.00	0.0	0
Redbed	3	140.0	140.0	200.0	20.0	0.00	0.0	0
Bedrock	4	145.0	145.0	500.0	45.0	0.00	0.0	0



GSTABL7 v.2 FSmin=0.844

Safety Factors Are Calculated By The Modified Bishop Method



CROSS-SECTION B-B

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	10/26/2023
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 6

MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A

SOLMAX

MiraSlope® Pro

Cross-Section B-B

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PROJECT IDENTIFICATION

Title: Cross-Section B-B
Project Number: 16123A -
Client: QVSD
Designer: MAW

Description:

Company's information:

Name: GBBE
Street: 180 Bilmar Drive Suite 4
Pittsburgh, PA 15205
Telephone #: 412-922-4440
E-Mail:

Original file path and name: E:\Users\A ..... les\16123A MiraSlope\Cross-Section B-B - Copy.MIRp
Original date and time of creating this file: Tue Oct 17 15:53:07 2023

PROGRAM MODE: Analysis of a General Slope using GEOSYNTHETIC as reinforcing material.

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INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ^{3}]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ^{2}]
1.....Eng Fill (Sand).....	110.0	33.0	0.0
2.....Ex Soil/Colluvium.....	125.0	16.0	0.0
3.....Eng Fill (Clay).....	125.0	20.0	0.0
4.....In-Place Redbeds.....	140.0	20.0	200.0
5.....Bedrock.....	145.0	45.0	500.0

REINFORCEMENT

Reinforcement Type #	Geosynthetic Designated Name	Ultimate Strength, Tult [lb/ft]	Reduction Factor for Installation Damage, RFid	Reduction Factor for Durability, RFd	Reduction Factor for Creep, RFc	Coverage Ratio, Rc
1	20XT	16000	1.10	1.10	1.44	1.00

Interaction Parameters Type #	Geosynthetic Designated Name	== Direct Sliding == Cds-phi	Cds-c	==== Pullout ==== Ci	Alpha
1	20XT	0.80	0.00	0.80	0.80

Relative Orientation of Reinforcement Force, ROR = 0.00. Assigned Factor of Safety to resist pullout, Fs-po = 1.50
Design method for Global Stability: Comprehensive Bishop.

WATER

Water is not present

SEISMICITY

Not Applicable

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DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

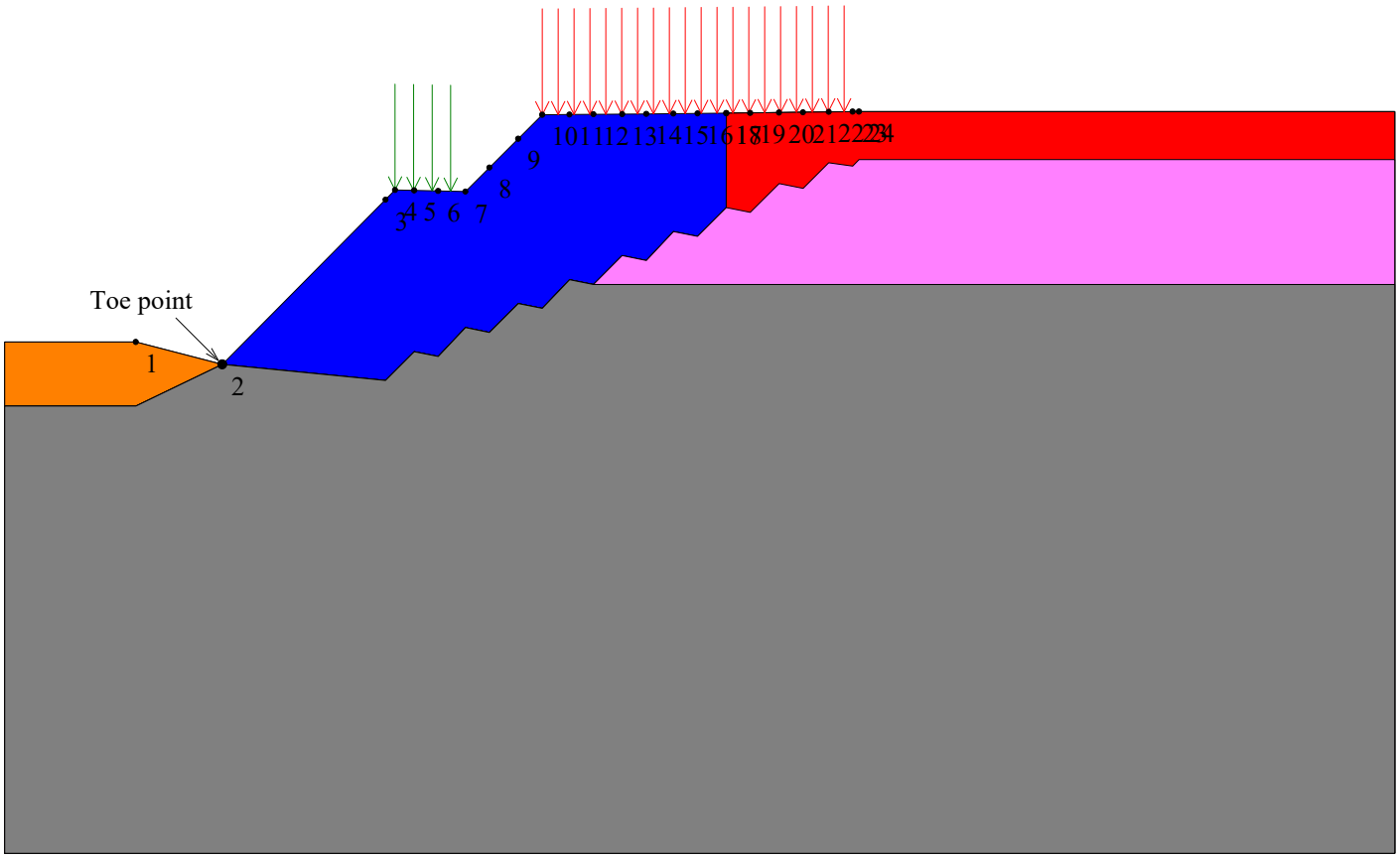
Soil profile contains 5 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 162.00 and ends at X1e = 206.00 [ft].
Load Q2 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X2s = 254.00 and ends at X2e = 452.00 [ft].
Surcharge load, Q3.....None

STRIP LOAD

.....None.....



SCALE:

0 5 11 22 33 [ft]

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TABULATED DETAILS OF GEMERAL SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

	#	Xi	Yi
Top of Layer 1	1	0.00	910.00
	2	54.00	896.00
	3	162.00	1005.00
	4	206.00	1004.00
	5	254.00	1052.00
	6	369.10	1053.00
	7	452.00	1054.00
Top of Layer 2	8	0.00	910.00
	9	54.00	896.00
	10	156.00	886.00
	11	174.00	904.00
	12	189.00	901.00
	13	206.00	919.00
	14	221.00	916.00
	15	239.00	934.00
	16	254.00	931.00
	17	271.00	949.00
	18	286.00	946.00
	19	304.00	964.00
	20	319.00	961.00
	21	336.00	979.00
	22	351.00	976.00
	23	369.00	994.00
	24	369.10	1053.00
	25	452.00	1054.00
Top of Layer 3	26	0.00	870.00
	27	54.00	896.00
	28	156.00	886.00
	29	174.00	904.00
	30	189.00	901.00
	31	206.00	919.00
	32	221.00	916.00
	33	239.00	934.00
	34	254.00	931.00
	35	271.00	949.00
	36	286.00	946.00
	37	304.00	964.00
	38	319.00	961.00
	39	336.00	979.00
	40	351.00	976.00
	41	369.00	994.00
	42	369.10	1053.00
	43	452.00	1054.00
Top of Layer 4	44	0.00	870.00
	45	54.00	896.00
	46	156.00	886.00
	47	174.00	904.00
	48	189.00	901.00
	49	206.00	919.00
	50	221.00	916.00

	#	Xi	Yi
	51	239.00	934.00
	52	254.00	931.00
	53	271.00	949.00
	54	286.00	946.00
	55	304.00	964.00
	56	319.00	961.00
	57	336.00	979.00
	58	351.00	976.00
	59	369.00	994.00
	60	384.00	991.00
	61	402.00	1009.00
	62	417.00	1006.00
	63	433.00	1022.00
	64	448.00	1020.00
	65	452.00	1024.00
Top of Layer 5	66	0.00	870.00
	67	54.00	896.00
	68	156.00	886.00
	69	174.00	904.00
	70	189.00	901.00
	71	206.00	919.00
	72	221.00	916.00
	73	239.00	934.00
	74	254.00	931.00
	75	271.00	949.00
	76	286.00	946.00

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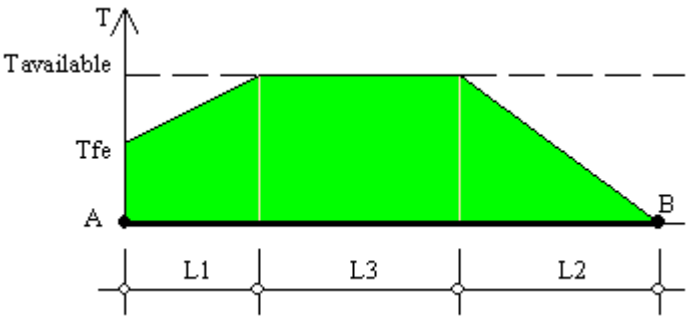
TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3	Y4	Y5
1	0.00	910.00	910.00	870.00	870.00	870.00
2	54.00	896.00	896.00	896.00	896.00	896.00
3	156.00	998.94	886.00	886.00	886.00	886.00
4	162.00	1005.00	892.00	892.00	892.00	892.00
5	174.00	1004.73	904.00	904.00	904.00	904.00
6	189.00	1004.39	901.00	901.00	901.00	901.00
7	206.00	1004.00	919.00	919.00	919.00	919.00
8	221.00	1019.00	916.00	916.00	916.00	916.00
9	239.00	1037.00	934.00	934.00	934.00	934.00
10	254.00	1052.00	931.00	931.00	931.00	931.00
11	271.00	1052.15	949.00	949.00	949.00	949.00
12	286.00	1052.28	946.00	946.00	946.00	946.00
13	304.00	1052.43	964.00	964.00	964.00	946.00
14	319.00	1052.56	961.00	961.00	961.00	946.00
15	336.00	1052.71	979.00	979.00	979.00	946.00
16	351.00	1052.84	976.00	976.00	976.00	946.00
17	369.00	1053.00	994.00	994.00	994.00	946.00
18	369.10	1053.00	1053.00	1053.00	993.98	946.00
19	384.00	1053.18	1053.18	1053.18	991.00	946.00
20	402.00	1053.40	1053.40	1053.40	1009.00	946.00
21	417.00	1053.58	1053.58	1053.58	1006.00	946.00
22	433.00	1053.77	1053.77	1053.77	1022.00	946.00
23	448.00	1053.95	1053.95	1053.95	1020.00	946.00
24	452.00	1054.00	1054.00	1054.00	1024.00	946.00

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER



A = Front-end of reinforcement (at face of slope)
B = Rear-end of reinforcement
AB = L1 + L2 + L3 = Embedded length of reinforcement

Tavailable = Long-term strength of reinforcement
Tfe = Available front-end strength (e.g., connection to facing)

L1 = Front-end 'pullout' length
L2 = Rear-end pullout length
Tavailable prevails along L3

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
1	20XT	0.10	110.00	0.00	1.41	108.59	9182.74	9182.74
2	20XT	2.93	110.00	0.00	1.44	108.56	9182.74	9182.74
3	20XT	5.76	110.00	0.00	1.48	108.52	9182.74	9182.74
4	20XT	8.59	110.00	0.00	1.51	108.49	9182.74	9182.74
5	20XT	11.42	110.00	0.00	1.57	108.43	9182.74	9182.74
6	20XT	14.25	110.00	0.00	1.61	108.39	9182.74	9182.74
7	20XT	17.08	110.00	0.00	1.67	108.33	9182.74	9182.74
8	20XT	19.91	110.00	0.00	1.71	108.29	9182.74	9182.74
9	20XT	22.74	110.00	0.00	1.77	108.23	9182.74	9182.74
10	20XT	25.57	110.00	0.00	1.84	108.16	9182.74	9182.74
11	20XT	28.40	110.00	0.00	1.90	108.10	9182.74	9182.74
12	20XT	31.23	110.00	0.00	1.97	108.03	9182.74	9182.74
13	20XT	34.06	110.00	0.00	2.03	107.97	9182.74	9182.74
14	20XT	36.89	110.00	0.00	2.13	107.87	9182.74	9182.74
15	20XT	39.72	110.00	0.00	2.23	107.77	9182.74	9182.74
16	20XT	42.55	110.00	0.00	2.33	107.67	9182.74	9182.74
17	20XT	45.38	110.00	0.00	2.36	107.64	9182.74	9182.74
18	20XT	48.21	110.00	0.00	2.36	107.64	9182.74	9182.74
19	20XT	51.04	110.00	0.00	2.36	107.64	9182.74	9182.74
20	20XT	53.87	110.00	0.00	2.36	107.64	9182.74	9182.74
21	20XT	56.70	110.00	0.00	2.36	107.64	9182.74	9182.74
22	20XT	59.53	110.00	0.00	2.36	107.64	9182.74	9182.74
23	20XT	62.36	110.00	0.00	2.36	107.64	9182.74	9182.74
24	20XT	65.19	110.00	0.00	2.36	107.64	9182.74	9182.74
25	20XT	68.02	110.00	0.00	2.36	107.64	9182.74	9182.74
26	20XT	70.85	110.00	0.00	2.36	107.64	9182.74	9182.74
27	20XT	73.68	110.00	0.00	2.36	107.64	9182.74	9182.74
28	20XT	76.51	110.00	0.00	2.36	107.64	9182.74	9182.74
29	20XT	79.34	110.00	0.00	2.36	107.64	9182.74	9182.74
30	20XT	82.17	110.00	0.00	2.36	107.64	9182.74	9182.74
31	20XT	85.00	110.00	0.00	2.36	107.64	9182.74	9182.74
32	20XT	87.83	110.00	0.00	2.36	107.64	9182.74	9182.74
33	20XT	90.66	110.00	0.00	2.36	107.64	9182.74	9182.74
34	20XT	93.49	110.00	0.00	2.43	107.57	9182.74	9182.74
35	20XT	96.32	110.00	0.00	2.53	107.47	9182.74	9182.74

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER (continues)

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
36	20XT	99.15	110.00	0.00	2.66	107.34	9182.74	9182.74
37	20XT	101.98	110.00	0.00	2.79	107.21	9182.74	9182.74
38	20XT	104.81	110.00	0.00	2.95	107.05	9182.74	9182.74
39	20XT	107.64	110.00	0.00	3.12	106.88	9182.74	9182.74
40	20XT	110.47	110.00	0.00	3.28	106.72	9182.74	9182.74
41	20XT	113.30	110.00	0.00	3.51	106.49	9182.74	9182.74
42	20XT	116.13	110.00	0.00	3.74	106.26	9182.74	9182.74
43	20XT	118.96	110.00	0.00	4.00	106.00	9182.74	9182.74
44	20XT	121.79	110.00	0.00	4.33	105.67	9182.74	9182.74
45	20XT	124.62	110.00	0.00	4.72	105.28	9182.74	9182.74
46	20XT	127.45	110.00	0.00	5.18	104.82	9182.74	9182.74
47	20XT	130.28	110.00	0.00	5.71	104.29	9182.74	9182.74
48	20XT	133.11	110.00	0.00	6.40	103.60	9182.74	9182.74
49	20XT	135.94	110.00	0.00	7.25	102.75	9182.74	9182.74
50	20XT	138.77	110.00	0.00	8.40	101.60	9182.74	9182.74
51	20XT	141.60	110.00	0.00	9.94	100.06	9182.74	9182.74
52	20XT	144.43	110.00	0.00	12.20	97.80	9182.74	9182.74
53	20XT	147.26	110.00	0.00	15.78	94.22	9182.74	9182.74
54	20XT	150.09	110.00	0.00	22.44	87.56	9182.74	9182.74
55	20XT	152.92	110.00	0.00	39.27	70.73	9182.74	9182.74

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RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	240.00	1038.00	48.58	897.41	89.97	1041.67	150.08	3.15	
2	261.00	1052.06	31.97	901.78	96.63	1052.91	164.38	2.13	
3	282.00	1052.24	63.75	907.23	114.11	1068.18	168.65	1.81	
4	303.00	1052.43	14.97	906.25	91.42	1112.47	219.94	1.76	
5	324.00	1052.61	-0.37	910.14	90.09	1144.69	251.38	1.77	
6	345.00	1052.79	64.32	906.99	113.21	1155.95	253.71	1.83	
. 7	366.00	1052.97	63.58	906.99	88.24	1242.14	336.06	1.68 .	OK
8	387.00	1053.22	63.88	906.98	96.19	1265.69	360.16	1.75	
9	408.00	1053.47	64.66	906.90	72.77	1363.34	456.51	1.80	
10	429.00	1053.72	63.24	906.90	64.80	1432.02	525.12	1.84	
11	450.00	1053.98	64.20	906.91	74.45	1459.60	552.79	1.86	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

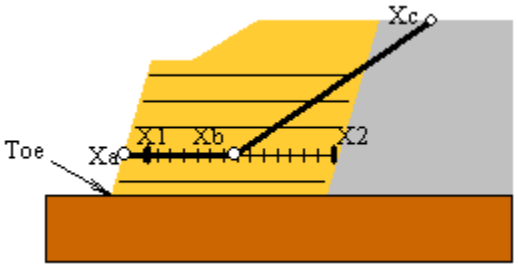
Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	-1.26	910.51	303.00	1052.43	85.50	1121.62	228.24	1.77	
2	14.97	906.25	303.00	1052.43	91.42	1112.47	219.94	1.76	
3	31.81	901.79	303.00	1052.43	97.71	1102.59	211.34	1.80	
4	48.58	897.41	240.00	1038.00	89.97	1041.67	150.08	3.15	
. 5	63.58	906.99	366.00	1052.97	88.24	1242.14	336.06	1.68 .	OK
6	80.21	923.32	366.00	1052.97	108.73	1240.25	318.21	1.81	
7	97.02	939.63	366.00	1052.97	140.42	1212.47	276.27	1.95	
8	111.97	956.26	366.00	1052.97	165.03	1198.86	248.34	2.13	
9	129.37	972.36	366.00	1052.97	187.64	1188.92	224.26	2.39	
10	145.32	988.86	366.00	1052.97	217.96	1150.71	177.40	2.65	
11	160.60	1005.57	387.00	1053.22	238.89	1195.30	205.25	2.94	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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RESULTS OF TRANSLATIONAL ANALYSIS



Results in the table below represent critical two-part wedges identified between specified starting (X1) and ending (X2) search points. Wedges along all reinforcement layers and at elevation zero are reported. The critical two-part wedge, one for each predetermined elevation, is defined by Xa, Xb and Xc where Xa is the front end of the passive wedge (slope face), Xb is where the passive wedge ends and the active one starts, and Xc is the X-ordinate at which the active wedge starts.

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
At toe elevation	0.00	54.00	896.00	163.80	896.00	388.35	1053.23	1.60	Minimum on Edge
Reinf. Layer #1	0.10	54.10	896.10	164.29	896.10	388.70	1053.24	1.47	Minimum on Edge
Reinf. Layer #2	2.93	56.90	898.93	167.09	898.93	387.44	1053.22	1.48	Minimum on Edge
Reinf. Layer #3	5.76	59.71	901.76	169.89	901.76	386.18	1053.21	1.50	Minimum on Edge
Reinf. Layer #4	8.59	62.51	904.59	172.69	904.59	384.91	1053.19	1.54	Minimum on Edge
Reinf. Layer #5	11.42	65.32	907.42	175.49	907.42	383.65	1053.18	1.56	Minimum on Edge
Reinf. Layer #6	14.25	68.12	910.25	178.29	910.25	390.30	1053.26	1.58	Minimum on Edge
Reinf. Layer #7	17.08	70.92	913.08	181.19	913.08	388.99	1053.24	1.62	Minimum on Edge
Reinf. Layer #8	19.91	73.73	915.91	183.99	915.91	387.56	1053.22	1.64	Minimum on Edge
Reinf. Layer #9	22.74	76.53	918.74	186.79	918.74	386.14	1053.21	1.67	Minimum on Edge
Reinf. Layer #10	25.57	79.34	921.57	189.59	921.57	392.41	1053.28	1.70	Minimum on Edge
Reinf. Layer #11	28.40	82.14	924.40	192.39	924.40	390.82	1053.26	1.71	Minimum on Edge
Reinf. Layer #12	31.23	84.94	927.23	195.19	927.23	397.00	1053.34	1.75	Minimum on Edge
Reinf. Layer #13	34.06	87.75	930.06	197.99	930.06	387.65	1053.22	1.77	Minimum on Edge
Reinf. Layer #14	36.89	90.55	932.89	200.79	932.89	393.48	1053.29	1.78	Minimum on Edge
Reinf. Layer #15	39.72	93.36	935.72	203.59	935.72	391.71	1053.27	1.82	Minimum on Edge
Reinf. Layer #16	42.55	96.16	938.55	206.39	938.55	397.44	1053.34	1.83	Minimum on Edge
Reinf. Layer #17	45.38	98.96	941.38	209.19	941.38	395.49	1053.32	1.86	Minimum on Edge
Reinf. Layer #18	48.21	101.77	944.21	211.99	944.21	393.54	1053.29	1.88	Minimum on Edge
Reinf. Layer #19	51.04	104.57	947.04	214.79	947.04	398.94	1053.36	1.90	Minimum on Edge
Reinf. Layer #20	53.87	107.38	949.87	217.59	949.87	396.80	1053.33	1.94	Minimum on Edge
Reinf. Layer #21	56.70	110.18	952.70	220.39	952.70	394.65	1053.31	1.97	Minimum on Edge
Reinf. Layer #22	59.53	112.98	955.53	223.19	955.53	392.50	1053.28	2.01	Minimum on Edge
Reinf. Layer #23	62.36	115.79	958.36	225.99	958.36	390.36	1053.26	2.06	Minimum on Edge
Reinf. Layer #24	65.19	118.59	961.19	228.79	961.19	388.21	1053.23	2.10	Minimum on Edge
Reinf. Layer #25	68.02	121.40	964.02	231.59	964.02	386.06	1053.20	2.15	Minimum on Edge
Reinf. Layer #26	70.85	124.20	966.85	234.39	966.85	383.92	1053.18	2.20	Minimum on Edge
Reinf. Layer #27	73.68	127.00	969.68	237.19	969.68	381.77	1053.15	2.25	Minimum on Edge
Reinf. Layer #28	76.51	129.81	972.51	239.99	972.51	379.62	1053.13	2.32	Minimum on Edge
Reinf. Layer #29	79.34	132.61	975.34	242.79	975.34	325.67	1052.62	2.37	Minimum on Edge
Reinf. Layer #30	82.17	135.42	978.17	245.59	978.17	322.66	1052.60	2.44	Minimum on Edge
Reinf. Layer #31	85.00	138.22	981.00	248.39	981.00	322.53	1052.60	2.49	Minimum on Edge
Reinf. Layer #32	87.83	141.02	983.83	251.29	983.83	322.50	1052.60	2.57	Minimum on Edge
Reinf. Layer #33	90.66	143.83	986.66	254.09	986.66	322.37	1052.59	2.66	Minimum on Edge
Reinf. Layer #34	93.49	146.63	989.49	256.89	989.49	322.23	1052.59	2.76	Minimum on Edge
Reinf. Layer #35	96.32	149.44	992.32	259.69	992.32	324.34	1052.61	2.89	Minimum on Edge
Reinf. Layer #36	99.15	152.24	995.15	262.49	995.15	326.33	1052.63	3.02	Minimum on Edge
Reinf. Layer #37	101.98	155.04	997.98	265.29	997.98	330.46	1052.66	3.15	Minimum on Edge
Reinf. Layer #38	104.81	157.85	1000.81	268.09	1000.81	329.88	1052.66	3.31	Minimum on Edge

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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RESULTS OF TRANSLATIONAL ANALYSIS (continues)

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
Reinf. Layer #39	107.64	160.65	1003.64	270.89	1003.64	331.44	1052.67	3.49	Minimum on Edge
Reinf. Layer #40	110.47	208.47	1006.47	318.69	1006.47	396.68	1053.33	3.78	Minimum on Edge
Reinf. Layer #41	113.30	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #42	116.13	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #43	118.96	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #44	121.79	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #45	124.62	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #46	127.45	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #47	130.28	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #48	133.11	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #49	135.94	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #50	138.77	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #51	141.60	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #52	144.43	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #53	147.26	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #54	150.09	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence
Reinf. Layer #55	152.92	54.00	896.00	54.00	896.00	54.00	89(1000033.30		No convergence

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.68
Critical Circle: Xc = 88.24[ft], Yc = 1242.14[ft], R = 336.06[ft]. (Number of slices used = 57)

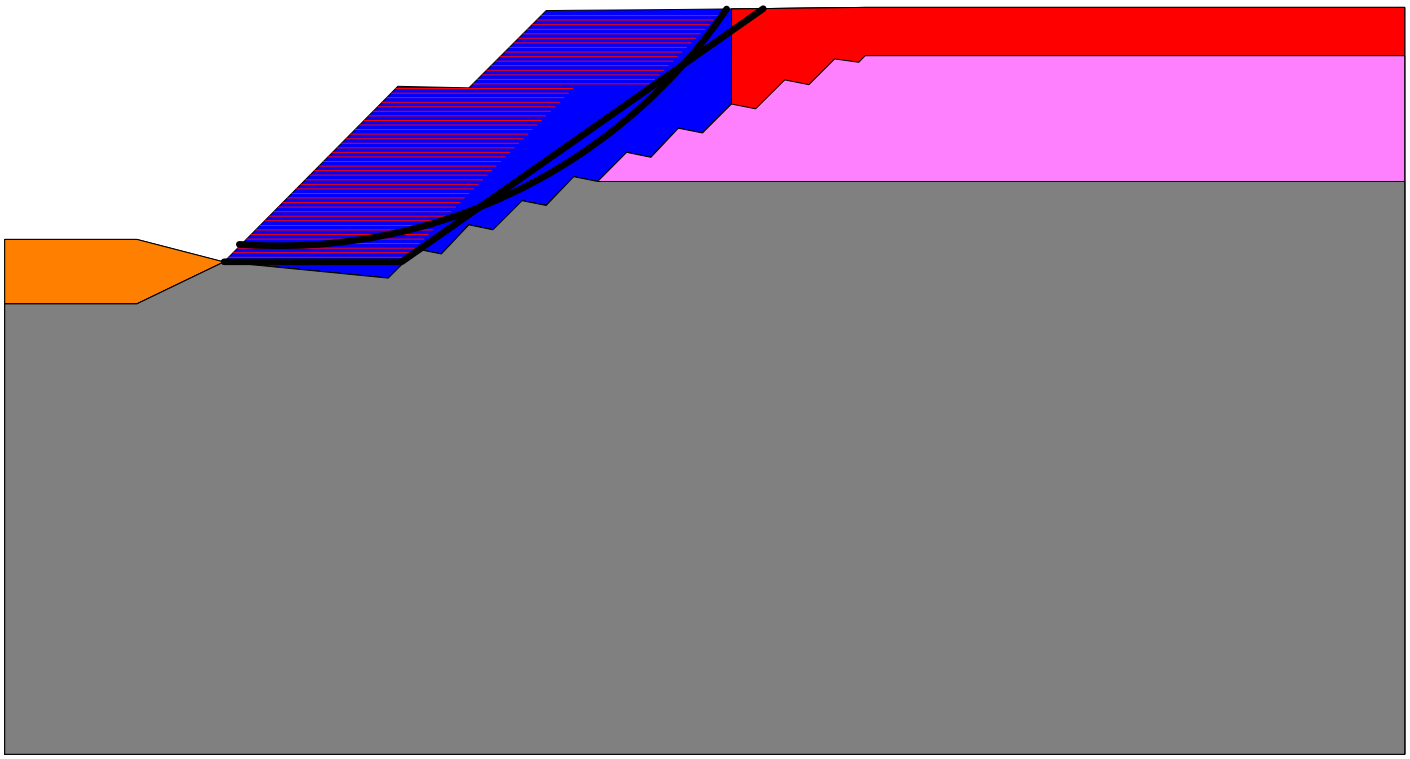
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

Minimum Factor of Safety = 1.47
Critical Two-Part Wedge: (Xa = 54.10, Ya = 896.10) [ft]
(Xb = 164.29, Yb = 896.10) [ft]
(Xc = 388.70, Yc = 1053.24) [ft]
(Number of slices used = 30)
Interslice resultant force inclination = 26.27 [degrees]

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

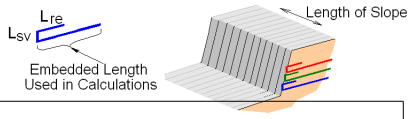
REINFORCEMENT LAYOUT: DRAWING



SCALE:

(51223([ft]

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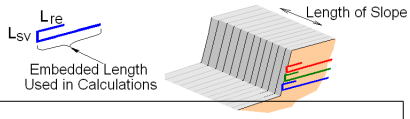


REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
1	1	20XT	0.10	110.00	1.00	54.10	896.10	164.10	896.10	0.00	0.00
2	1	20XT	2.93	110.00	1.00	56.90	898.93	166.90	898.93	0.00	0.00
3	1	20XT	5.76	110.00	1.00	59.71	901.76	169.71	901.76	0.00	0.00
4	1	20XT	8.59	110.00	1.00	62.51	904.59	172.51	904.59	0.00	0.00
5	1	20XT	11.42	110.00	1.00	65.32	907.42	175.32	907.42	0.00	0.00
6	1	20XT	14.25	110.00	1.00	68.12	910.25	178.12	910.25	0.00	0.00
7	1	20XT	17.08	110.00	1.00	70.92	913.08	180.92	913.08	0.00	0.00
8	1	20XT	19.91	110.00	1.00	73.73	915.91	183.73	915.91	0.00	0.00
9	1	20XT	22.74	110.00	1.00	76.53	918.74	186.53	918.74	0.00	0.00
10	1	20XT	25.57	110.00	1.00	79.34	921.57	189.34	921.57	0.00	0.00
11	1	20XT	28.40	110.00	1.00	82.14	924.40	192.14	924.40	0.00	0.00
12	1	20XT	31.23	110.00	1.00	84.94	927.23	194.94	927.23	0.00	0.00
13	1	20XT	34.06	110.00	1.00	87.75	930.06	197.75	930.06	0.00	0.00
14	1	20XT	36.89	110.00	1.00	90.55	932.89	200.55	932.89	0.00	0.00
15	1	20XT	39.72	110.00	1.00	93.36	935.72	203.36	935.72	0.00	0.00
16	1	20XT	42.55	110.00	1.00	96.16	938.55	206.16	938.55	0.00	0.00
17	1	20XT	45.38	110.00	1.00	98.96	941.38	208.96	941.38	0.00	0.00
18	1	20XT	48.21	110.00	1.00	101.77	944.21	211.77	944.21	0.00	0.00
19	1	20XT	51.04	110.00	1.00	104.57	947.04	214.57	947.04	0.00	0.00
20	1	20XT	53.87	110.00	1.00	107.38	949.87	217.38	949.87	0.00	0.00
21	1	20XT	56.70	110.00	1.00	110.18	952.70	220.18	952.70	0.00	0.00
22	1	20XT	59.53	110.00	1.00	112.98	955.53	222.98	955.53	0.00	0.00
23	1	20XT	62.36	110.00	1.00	115.79	958.36	225.79	958.36	0.00	0.00
24	1	20XT	65.19	110.00	1.00	118.59	961.19	228.59	961.19	0.00	0.00
25	1	20XT	68.02	110.00	1.00	121.40	964.02	231.40	964.02	0.00	0.00
26	1	20XT	70.85	110.00	1.00	124.20	966.85	234.20	966.85	0.00	0.00
27	1	20XT	73.68	110.00	1.00	127.00	969.68	237.00	969.68	0.00	0.00
28	1	20XT	76.51	110.00	1.00	129.81	972.51	239.81	972.51	0.00	0.00
29	1	20XT	79.34	110.00	1.00	132.61	975.34	242.61	975.34	0.00	0.00
30	1	20XT	82.17	110.00	1.00	135.42	978.17	245.42	978.17	0.00	0.00
31	1	20XT	85.00	110.00	1.00	138.22	981.00	248.22	981.00	0.00	0.00
32	1	20XT	87.83	110.00	1.00	141.02	983.83	251.02	983.83	0.00	0.00
33	1	20XT	90.66	110.00	1.00	143.83	986.66	253.83	986.66	0.00	0.00
34	1	20XT	93.49	110.00	1.00	146.63	989.49	256.63	989.49	0.00	0.00
35	1	20XT	96.32	110.00	1.00	149.44	992.32	259.44	992.32	0.00	0.00
36	1	20XT	99.15	110.00	1.00	152.24	995.15	262.24	995.15	0.00	0.00
37	1	20XT	101.98	110.00	1.00	155.04	997.98	265.04	997.98	0.00	0.00
38	1	20XT	104.81	110.00	1.00	157.85	1000.81	267.85	1000.81	0.00	0.00
39	1	20XT	107.64	110.00	1.00	160.65	1003.64	270.65	1003.64	0.00	0.00
40	1	20XT	110.47	110.00	1.00	208.47	1006.47	318.47	1006.47	0.00	0.00
41	1	20XT	113.30	110.00	1.00	211.30	1009.30	321.30	1009.30	0.00	0.00
42	1	20XT	116.13	110.00	1.00	214.13	1012.13	324.13	1012.13	0.00	0.00
43	1	20XT	118.96	110.00	1.00	216.96	1014.96	326.96	1014.96	0.00	0.00
44	1	20XT	121.79	110.00	1.00	219.79	1017.79	329.79	1017.79	0.00	0.00
45	1	20XT	124.62	110.00	1.00	222.62	1020.62	332.62	1020.62	0.00	0.00
46	1	20XT	127.45	110.00	1.00	225.45	1023.45	335.45	1023.45	0.00	0.00
47	1	20XT	130.28	110.00	1.00	228.28	1026.28	338.28	1026.28	0.00	0.00
48	1	20XT	133.11	110.00	1.00	231.11	1029.11	341.11	1029.11	0.00	0.00
49	1	20XT	135.94	110.00	1.00	233.94	1031.94	343.94	1031.94	0.00	0.00
50	1	20XT	138.77	110.00	1.00	236.77	1034.77	346.77	1034.77	0.00	0.00

* Vertical distance between layers.

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REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
51	1	20XT	141.60	110.00	1.00	239.60	1037.60	349.60	1037.60	0.00	0.00
52	1	20XT	144.43	110.00	1.00	242.43	1040.43	352.43	1040.43	0.00	0.00
53	1	20XT	147.26	110.00	1.00	245.26	1043.26	355.26	1043.26	0.00	0.00
54	1	20XT	150.09	110.00	1.00	248.09	1046.09	358.09	1046.09	0.00	0.00
55	1	20XT	152.92	110.00	1.00	250.92	1048.92	360.92	1048.92	0.00	0.00

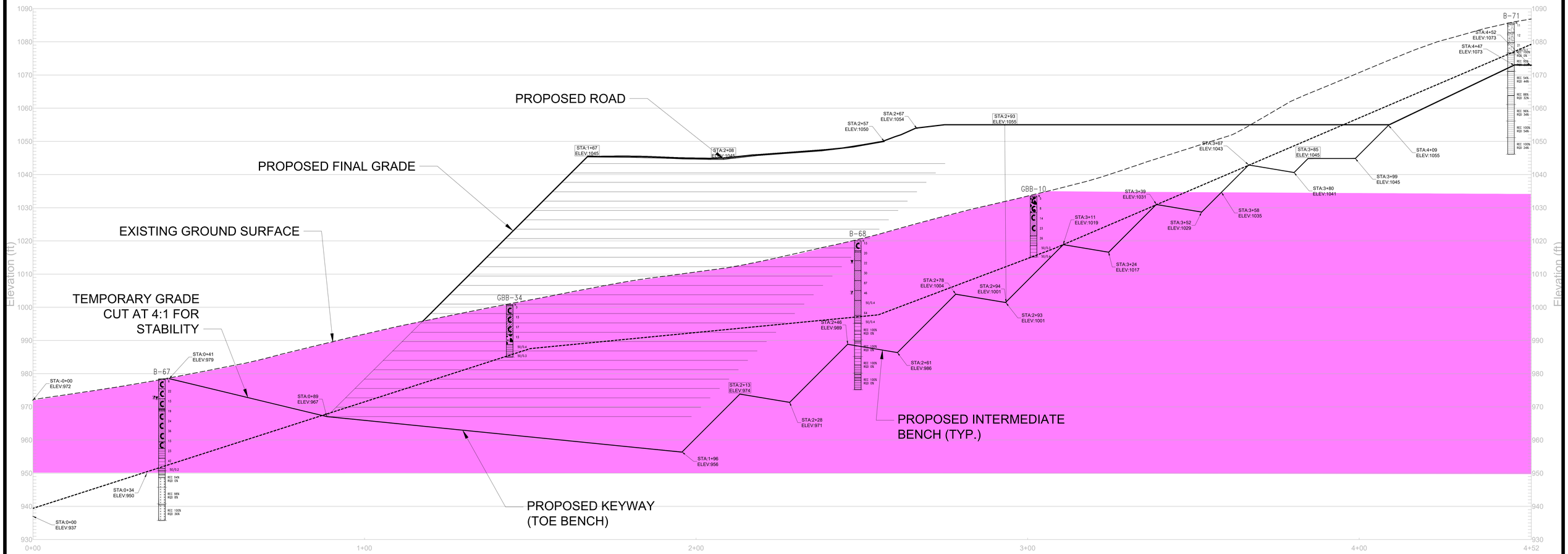
* Vertical distance between layers.

QUANTITIES

Reinf. Type #	Designated Name	Coverage Ratio	Area of reinforcemnt [ft²] / length of slope [ft]
1	20XT	1.00	6050.00

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CROSS-SECTION Q-Q

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE

WATER LEVEL AT END OF DRILLING

WATER LEVEL DURING DRILLING

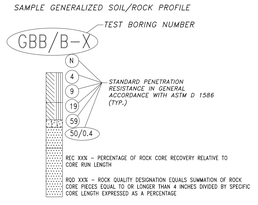
WATER LEVEL AFTER 24 HR

C DENOTES COLLUVIAL SOIL

GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK

GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE



APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS

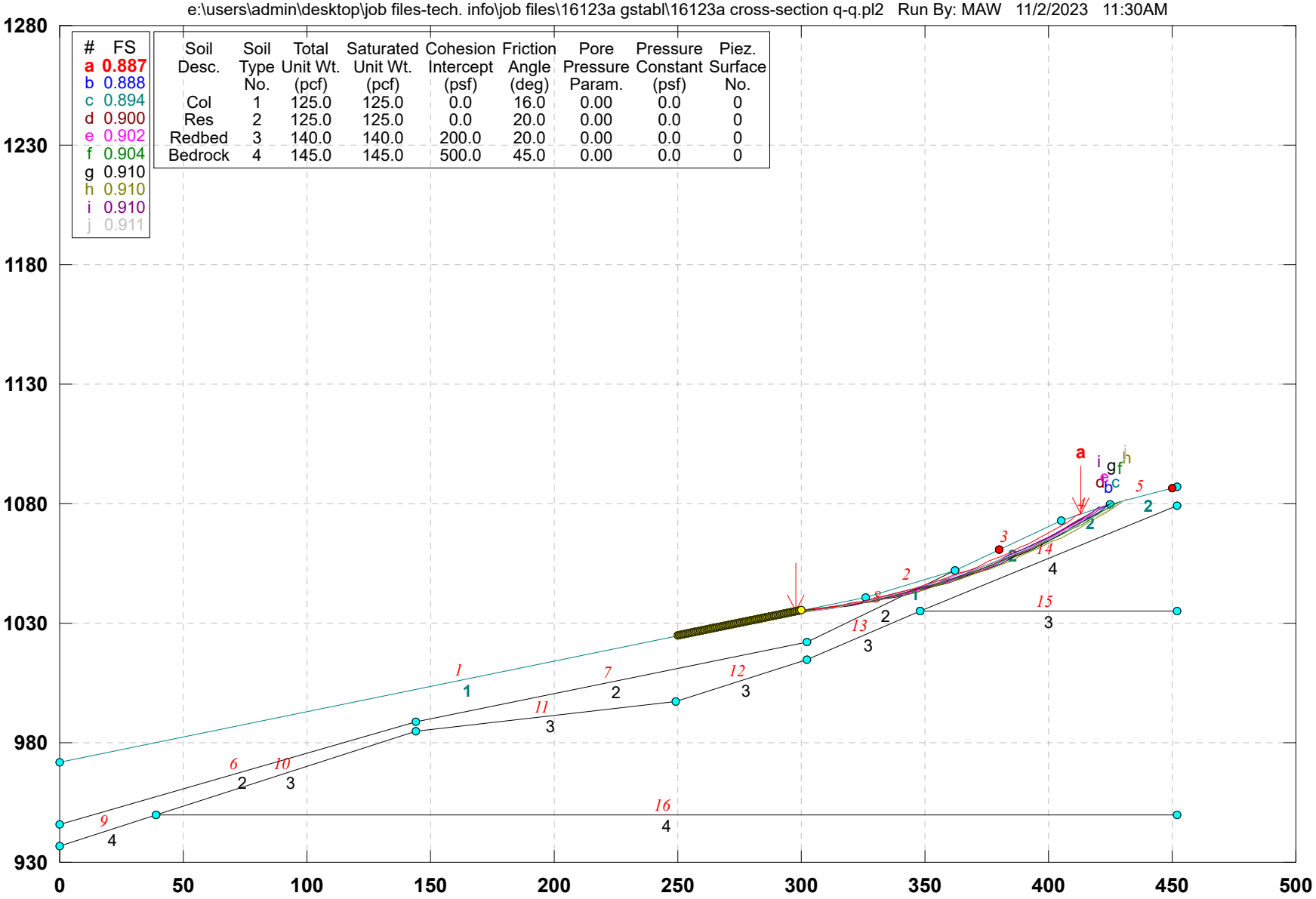
GARVIN BOWARD BEITKO	SCALE: AS NOTED	GARVIN BOWARD BEITKO ENGINEERING, INC. *BUILT ON REPUTATION*	180 BILMAR DRIVE, SUITE IV PITTSBURGH, PA 15205 PHONE: 412-922-4440
	DATE: 10/26/2023	GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II	FIGURE 7
	REVISED:	MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS	
	DRAWN BY: MAW		
	APPROVED BY: DAB	FOR: PHILLIPS & ASSOCIATES, INC.	GBBE PROJECT NUMBER: 16123A

16123A QVSD Cross-Section Q-Q

e:\users\admin\desktop\job files-tech. info\job files\16123a gstabl\16123a cross-section q-q.pl2 Run By: MAW 11/2/2023 11:30AM

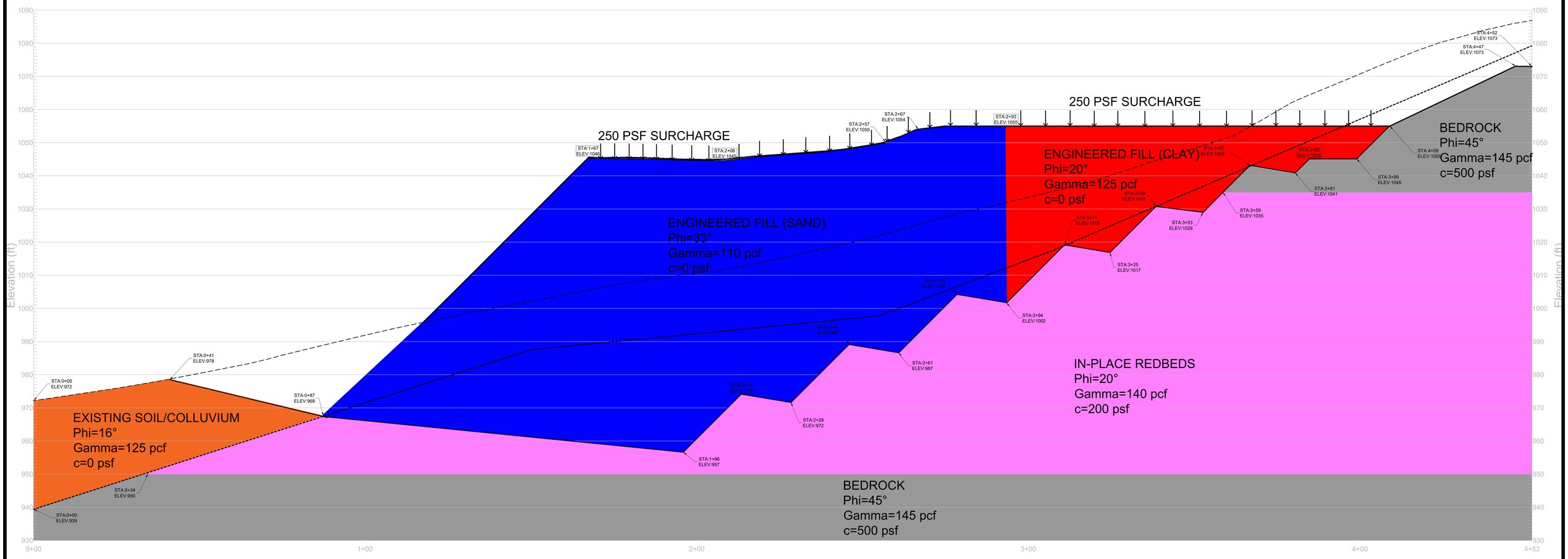
#	FS
a	0.887
b	0.888
c	0.894
d	0.900
e	0.902
f	0.904
g	0.910
h	0.910
i	0.910
j	0.911

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Col	1	125.0	125.0	0.0	16.0	0.00	0.0	0
Res	2	125.0	125.0	0.0	20.0	0.00	0.0	0
Redbed	3	140.0	140.0	200.0	20.0	0.00	0.0	0
Bedrock	4	145.0	145.0	500.0	45.0	0.00	0.0	0



GSTABL7 v.2 FSmin=0.887

Safety Factors Are Calculated By The Modified Bishop Method



CROSS-SECTION Q-Q

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	10/26/2023
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 8

MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A

SOLMAX

MiraSlope® Pro

Cross-Section Q-Q 10-26-23

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PROJECT IDENTIFICATION

Title: Cross-Section Q-Q 10-26-23
Project Number: 16123A -
Client: PAI
Designer: MAW

Description:

Company's information:

Name: GBBE
Street: 180 Bilmar Drive Suite 4
Pittsburgh, PA 15205
Telephone #: 412-922-4440
E-Mail:

Original file path and name: E:\Users\A ..... s\16123A MiraSlope\Cross-Section Q-Q 10-26-23.MIRp
Original date and time of creating this file: Thu Oct 26 11:52:59 2023

PROGRAM MODE: Analysis of a General Slope using GEOSYNTHETIC as reinforcing material.

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INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ^{3}]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ^{2}]
1.....Eng Fill (Sand).....	110.0	33.0	0.0
2.....Ex. Soil/Colluvium.....	125.0	16.0	0.0
3.....Eng Fill (Clay).....	125.0	20.0	0.0
4.....Bedrock.....	145.0	45.0	500.0
5.....In-Place Redbeds.....	140.0	20.0	200.0
6.....Bedrock.....	145.0	45.0	500.0

REINFORCEMENT

Reinforcement Type #	Geosynthetic Designated Name	Ultimate Strength, Tult [lb/ft]	Reduction Factor for Installation Damage, RFid	Reduction Factor for Durability, RFd	Reduction Factor for Creep, RFc	Coverage Ratio, Rc
1	20XT	16000	1.10	1.10	1.44	1.00

Interaction Parameters Type #	Geosynthetic Designated Name	== Direct Sliding == Cds-phi	Cds-c	==== Pullout ==== Ci	Alpha
1	20XT	0.80	0.00	0.80	0.80

Relative Orientation of Reinforcement Force, ROR = 0.00. Assigned Factor of Safety to resist pullout, Fs-po = 1.50
Design method for Global Stability: Comprehensive Bishop.

WATER

Water is not present

SEISMICITY

Not Applicable

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DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

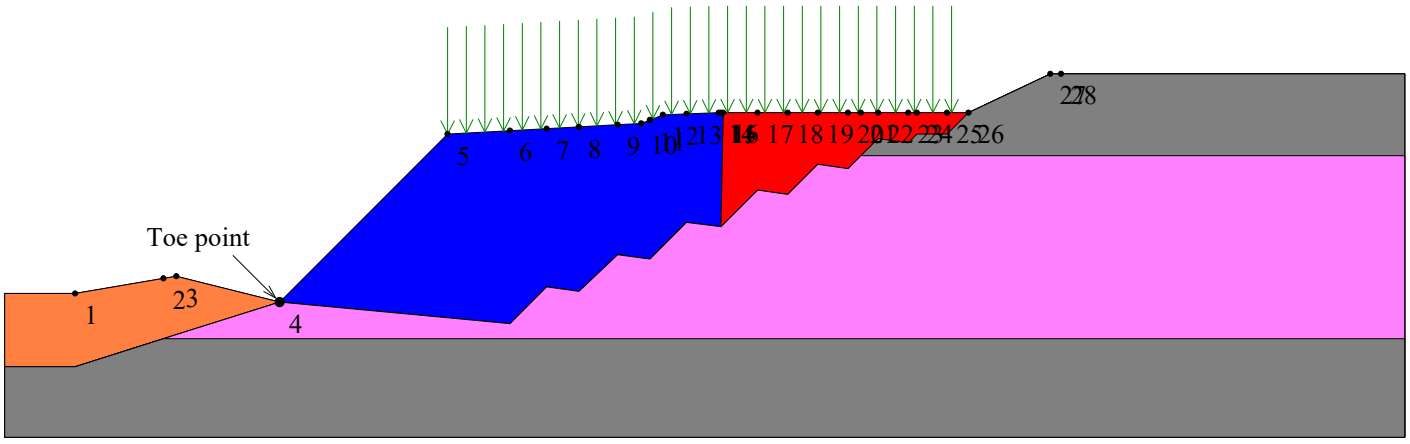
Soil profile contains 6 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 173.00 and ends at X1e = 415.00 [ft].
Surcharge load, Q2.....None
Surcharge load, Q3.....None

STRIP LOAD

.....None.....



SCALE:

0511223([ft]

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TABULATED DETAILS OF GEMERAL SPECIFIED GEOMETRY

Soil profile contains 6 layers. Coordinates in [ft.]

	#	Xi	Yi
Top of Layer 1	1	0.00	971.00
	2	47.00	979.00
	3	95.00	967.00
	4	173.00	1045.00
	5	263.00	1050.00
	6	273.00	1054.00
	7	299.00	1055.00
	8	415.00	1055.00
	9	453.00	1073.00
	10	458.00	1073.00
Top of Layer 2	11	0.00	971.00
	12	47.00	979.00
	13	95.00	967.00
	14	202.00	957.00
	15	219.00	974.00
	16	234.00	972.00
	17	252.00	989.00
	18	267.00	987.00
	19	284.00	1004.00
	20	300.00	1002.00
	21	301.00	1055.00
	22	415.00	1055.00
	23	453.00	1073.00
	24	458.00	1073.00
Top of Layer 3	25	0.00	937.00
	26	41.00	950.00
	27	95.00	967.00
	28	202.00	957.00
	29	219.00	974.00
	30	234.00	972.00
	31	252.00	989.00
	32	267.00	987.00
	33	284.00	1004.00
	34	300.00	1002.00
	35	301.00	1055.00
	36	415.00	1055.00
	37	453.00	1073.00
	38	458.00	1073.00
Top of Layer 4	39	0.00	937.00
	40	41.00	950.00
	41	95.00	967.00
	42	202.00	957.00
	43	219.00	974.00
	44	234.00	972.00
	45	252.00	989.00
	46	267.00	987.00
	47	284.00	1004.00
	48	300.00	1002.00
	49	317.00	1019.00
	50	331.00	1017.00
	51	345.00	1031.00
	52	359.00	1029.00
	53	365.00	1035.00
	54	373.00	1043.00
	55	387.00	1041.00
	56	391.00	1045.00
	57	405.00	1045.00
	58	415.00	1055.00
	59	453.00	1073.00
	60	458.00	1073.00
Top of Layer 5	61	0.00	937.00
	62	41.00	950.00
	63	95.00	967.00
	64	202.00	957.00
	65	219.00	974.00
	66	234.00	972.00
	67	252.00	989.00
	68	267.00	987.00
	69	284.00	1004.00
	70	300.00	1002.00
	71	317.00	1019.00
	72	331.00	1017.00
	73	345.00	1031.00
	74	359.00	1029.00
	75	365.00	1035.00
	76	458.00	1035.00
Top of Layer 6	77	0.00	937.00
	78	41.00	950.00
	79	458.00	950.00

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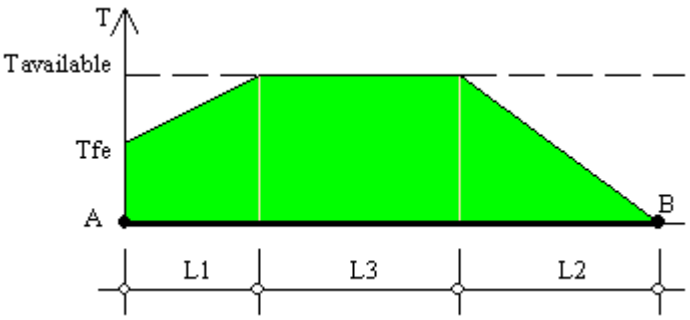
TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 6 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3	Y4	Y5	Y6
1	0.00	971.00	971.00	937.00	937.00	937.00	937.00
2	41.00	977.98	977.98	950.00	950.00	950.00	950.00
3	47.00	979.00	979.00	951.89	951.89	951.89	950.00
4	95.00	967.00	967.00	967.00	967.00	967.00	950.00
5	173.00	1045.00	959.71	959.71	959.71	959.71	950.00
6	202.00	1046.61	957.00	957.00	957.00	957.00	950.00
7	219.00	1047.56	974.00	974.00	974.00	974.00	950.00
8	234.00	1048.39	972.00	972.00	972.00	972.00	950.00
9	252.00	1049.39	989.00	989.00	989.00	989.00	950.00
10	263.00	1050.00	987.53	987.53	987.53	987.53	950.00
11	267.00	1051.60	987.00	987.00	987.00	987.00	950.00
12	273.00	1054.00	993.00	993.00	993.00	993.00	950.00
13	284.00	1054.42	1004.00	1004.00	1004.00	1004.00	950.00
14	299.00	1055.00	1002.13	1002.13	1002.13	1002.13	950.00
15	300.00	1055.00	1002.00	1002.00	1002.00	1002.00	950.00
16	301.00	1055.00	1055.00	1055.00	1003.00	1003.00	950.00
17	317.00	1055.00	1055.00	1055.00	1019.00	1019.00	950.00
18	331.00	1055.00	1055.00	1055.00	1017.00	1017.00	950.00
19	345.00	1055.00	1055.00	1055.00	1031.00	1031.00	950.00
20	359.00	1055.00	1055.00	1055.00	1029.00	1029.00	950.00
21	365.00	1055.00	1055.00	1055.00	1035.00	1035.00	950.00
22	373.00	1055.00	1055.00	1055.00	1043.00	1035.00	950.00
23	387.00	1055.00	1055.00	1055.00	1041.00	1035.00	950.00
24	391.00	1055.00	1055.00	1055.00	1045.00	1035.00	950.00
25	405.00	1055.00	1055.00	1055.00	1045.00	1035.00	950.00
26	415.00	1055.00	1055.00	1055.00	1055.00	1035.00	950.00
27	453.00	1073.00	1073.00	1073.00	1073.00	1035.00	950.00
28	458.00	1073.00	1073.00	1073.00	1073.00	1035.00	950.00

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER



A = Front-end of reinforcement (at face of slope)
B = Rear-end of reinforcement
AB = L1 + L2 + L3 = Embedded length of reinforcement

Tavailable = Long-term strength of reinforcement
Tfe = Available front-end strength (e.g., connection to facing)

L1 = Front-end 'pullout' length
L2 = Rear-end pullout length
Tavailable prevails along L3

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
1	20XT	0.10	110.00	0.00	1.90	108.10	9182.74	9182.74
2	20XT	2.93	110.00	0.00	1.97	108.03	9182.74	9182.74
3	20XT	5.76	110.00	0.00	2.03	107.97	9182.74	9182.74
4	20XT	8.59	110.00	0.00	2.13	107.87	9182.74	9182.74
5	20XT	11.42	110.00	0.00	2.20	107.80	9182.74	9182.74
6	20XT	14.25	110.00	0.00	2.30	107.70	9182.74	9182.74
7	20XT	17.08	110.00	0.00	2.40	107.60	9182.74	9182.74
8	20XT	19.91	110.00	0.00	2.49	107.51	9182.74	9182.74
9	20XT	22.74	110.00	0.00	2.59	107.41	9182.74	9182.74
10	20XT	25.57	110.00	0.00	2.72	107.28	9182.74	9182.74
11	20XT	28.40	110.00	0.00	2.85	107.15	9182.74	9182.74
12	20XT	31.23	110.00	0.00	3.02	106.98	9182.74	9182.74
13	20XT	34.06	110.00	0.00	3.18	106.82	9182.74	9182.74
14	20XT	36.89	110.00	0.00	3.38	106.62	9182.74	9182.74
15	20XT	39.72	110.00	0.00	3.58	106.42	9182.74	9182.74
16	20XT	42.55	110.00	0.00	3.84	106.16	9182.74	9182.74
17	20XT	45.38	110.00	0.00	4.10	105.90	9182.74	9182.74
18	20XT	48.21	110.00	0.00	4.43	105.57	9182.74	9182.74
19	20XT	51.04	110.00	0.00	4.82	105.18	9182.74	9182.74
20	20XT	53.87	110.00	0.00	5.25	104.75	9182.74	9182.74
21	20XT	56.70	110.00	0.00	5.81	104.19	9182.74	9182.74
22	20XT	59.53	110.00	0.00	6.43	103.57	9182.74	9182.74
23	20XT	62.36	110.00	0.00	7.15	102.85	9182.74	9182.74
24	20XT	65.19	110.00	0.00	7.91	102.09	9182.74	9182.74
25	20XT	68.02	110.00	0.00	8.76	101.24	9182.74	9182.74
26	20XT	70.85	110.00	0.00	9.97	100.03	9182.74	9182.74
27	20XT	73.68	110.00	0.00	11.84	98.16	9182.74	9182.74
28	20XT	76.51	110.00	0.00	15.06	94.94	9182.74	9182.74

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RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	173.00	1045.00	18.49	975.70	79.87	1045.75	93.14	19.79	
2	197.20	1046.34	39.50	978.26	103.02	1047.80	94.19	3.38	
3	221.40	1047.69	59.21	976.45	123.95	1049.31	97.47	2.63	
4	245.60	1049.03	88.57	969.27	146.72	1049.25	98.88	2.57	
5	269.80	1052.72	88.46	969.23	152.64	1068.50	118.22	1.80	
6	294.00	1054.81	79.76	970.90	154.69	1095.05	145.01	1.62	
7	318.20	1055.00	79.83	970.84	160.47	1122.09	171.41	1.56	
. 8	342.40	1055.00	39.50	978.08	148.81	1182.46	231.78	1.50 .	OK
9	366.60	1055.00	39.50	978.04	154.43	1223.20	270.75	1.56	
10	390.80	1055.00	39.50	978.02	161.11	1263.13	309.96	1.68	
11	415.00	1055.00	28.41	976.69	158.33	1328.69	375.22	1.77	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

****

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

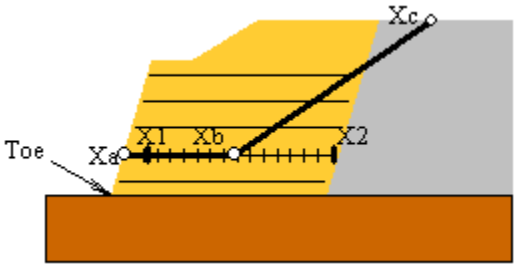
Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	19.49	974.63	342.40	1055.00	129.69	1220.77	269.68	1.59	
2	28.41	976.69	415.00	1055.00	158.33	1328.69	375.22	1.77	
. 3	39.50	978.08	342.40	1055.00	148.81	1182.46	231.78	1.50 .	OK
4	48.63	979.01	342.40	1055.00	156.05	1169.58	218.75	1.51	
5	58.57	976.48	342.40	1055.00	158.22	1168.52	216.35	1.51	
6	68.89	973.77	342.40	1055.00	160.33	1166.97	213.74	1.52	
7	79.73	970.87	342.40	1055.00	164.09	1159.61	206.74	1.53	
8	88.46	969.23	269.80	1052.72	152.64	1068.50	118.22	1.80	
9	98.45	972.70	342.40	1055.00	176.54	1143.92	188.19	1.71	
10	108.81	982.78	342.40	1055.00	196.05	1114.50	157.99	2.21	
11	119.75	992.13	366.60	1055.00	208.72	1158.86	188.98	2.85	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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RESULTS OF TRANSLATIONAL ANALYSIS



Results in the table below represent critical two-part wedges identified between specified starting (X1) and ending (X2) search points. Wedges along all reinforcement layers and at elevation zero are reported. The critical two-part wedge, one for each predetermined elevation, is defined by Xa, Xb and Xc where Xa is the front end of the passive wedge (slope face), Xb is where the passive wedge ends and the active one starts, and Xc is the X-ordinate at which the active wedge starts.

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
At toe elevation	0.00	95.00	967.00	204.80	967.00	351.26	1055.00	2.32	Minimum on Edge
Reinf. Layer #1	0.10	95.10	967.10	205.29	967.10	335.61	1055.00	2.06	Minimum on Edge
Reinf. Layer #2	2.93	97.93	969.93	208.19	969.93	325.28	1055.00	2.12	Minimum on Edge
Reinf. Layer #3	5.76	100.76	972.76	210.99	972.76	347.86	1055.00	2.17	Minimum on Edge
Reinf. Layer #4	8.59	103.59	975.59	213.79	975.59	345.95	1055.00	2.25	Minimum on Edge
Reinf. Layer #5	11.42	106.42	978.42	216.59	978.42	344.04	1055.00	2.31	Minimum on Edge
Reinf. Layer #6	14.25	109.25	981.25	219.49	981.25	342.23	1055.00	2.37	Minimum on Edge
Reinf. Layer #7	17.08	112.08	984.08	222.29	984.08	340.32	1055.00	2.47	Minimum on Edge
Reinf. Layer #8	19.91	114.91	986.91	225.09	986.91	329.94	1055.00	2.55	Minimum on Edge
Reinf. Layer #9	22.74	117.74	989.74	227.99	989.74	341.02	1055.00	2.66	Minimum on Edge
Reinf. Layer #10	25.57	120.57	992.57	230.79	992.57	338.92	1055.00	2.74	Minimum on Edge
Reinf. Layer #11	28.40	123.40	995.40	233.59	995.40	336.82	1055.00	2.82	Minimum on Edge
Reinf. Layer #12	31.23	126.23	998.23	236.49	998.23	334.82	1055.00	2.95	Minimum on Edge
Reinf. Layer #13	34.06	129.06	1001.06	239.29	1001.06	332.72	1055.00	3.04	Minimum on Edge
Reinf. Layer #14	36.89	131.89	1003.89	242.09	1003.89	330.62	1055.00	3.19	Minimum on Edge
Reinf. Layer #15	39.72	134.72	1006.72	244.89	1006.72	322.15	1055.00	3.32	Minimum on Edge
Reinf. Layer #16	42.55	137.55	1009.55	247.79	1009.55	320.53	1055.00	3.45	Minimum on Edge
Reinf. Layer #17	45.38	140.38	1012.38	250.59	1012.38	321.52	1055.00	3.64	Minimum on Edge
Reinf. Layer #18	48.21	143.21	1015.21	253.39	1015.21	319.61	1055.00	3.79	Minimum on Edge
Reinf. Layer #19	51.04	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence
Reinf. Layer #20	53.87	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence
Reinf. Layer #21	56.70	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence
Reinf. Layer #22	59.53	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence
Reinf. Layer #23	62.36	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence
Reinf. Layer #24	65.19	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence
Reinf. Layer #25	68.02	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence
Reinf. Layer #26	70.85	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence
Reinf. Layer #27	73.68	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence
Reinf. Layer #28	76.51	95.00	967.00	95.00	967.00	95.00	96´1000033.30		No convergence

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.50
Critical Circle: Xc = 148.81[ft], Yc = 1182.46[ft], R = 231.78[ft]. (Number of slices used = 61)

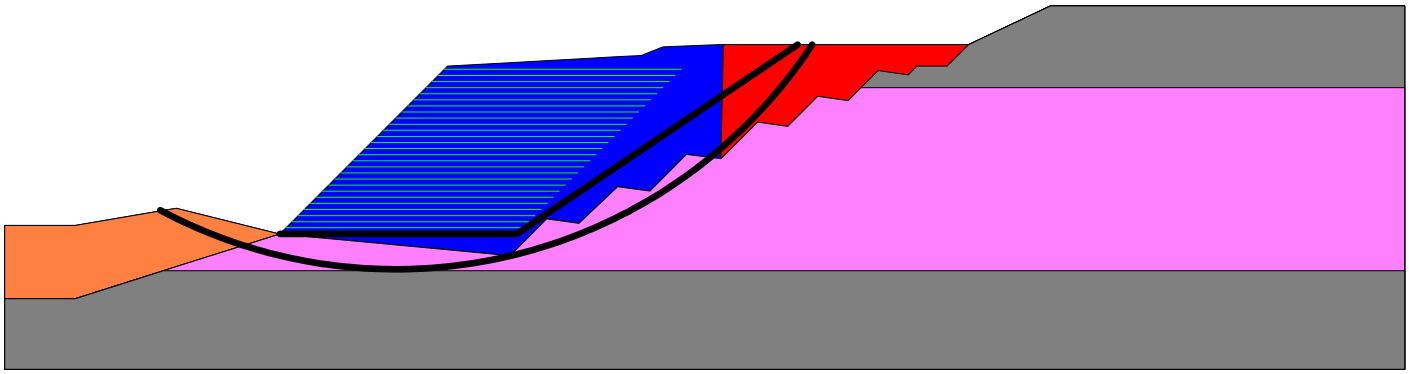
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

Minimum Factor of Safety = 2.06
Critical Two-Part Wedge: (Xa = 95.10, Ya = 967.10) [ft]
(Xb = 205.29, Yb = 967.10) [ft]
(Xc = 335.61, Yc = 1055.00) [ft]
(Number of slices used = 30)
Interslice resultant force inclination = 20.78 [degrees]

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

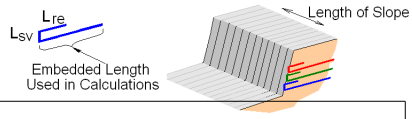
REINFORCEMENT LAYOUT: DRAWING



SCALE:

0511223([ft]

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REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

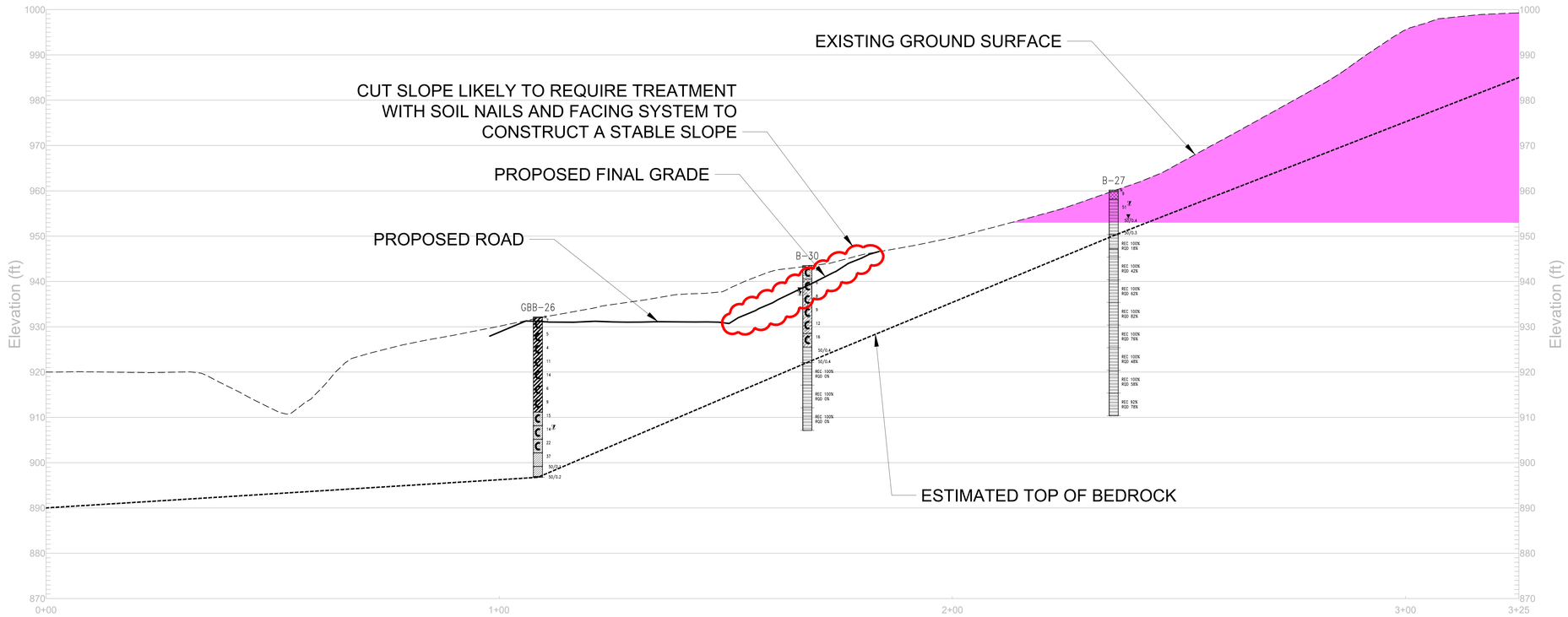
Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
1	1	20XT	0.10	110.00	1.00	95.10	967.10	205.10	967.10	0.00	0.00
2	1	20XT	2.93	110.00	1.00	97.93	969.93	207.93	969.93	0.00	0.00
3	1	20XT	5.76	110.00	1.00	100.76	972.76	210.76	972.76	0.00	0.00
4	1	20XT	8.59	110.00	1.00	103.59	975.59	213.59	975.59	0.00	0.00
5	1	20XT	11.42	110.00	1.00	106.42	978.42	216.42	978.42	0.00	0.00
6	1	20XT	14.25	110.00	1.00	109.25	981.25	219.25	981.25	0.00	0.00
7	1	20XT	17.08	110.00	1.00	112.08	984.08	222.08	984.08	0.00	0.00
8	1	20XT	19.91	110.00	1.00	114.91	986.91	224.91	986.91	0.00	0.00
9	1	20XT	22.74	110.00	1.00	117.74	989.74	227.74	989.74	0.00	0.00
10	1	20XT	25.57	110.00	1.00	120.57	992.57	230.57	992.57	0.00	0.00
11	1	20XT	28.40	110.00	1.00	123.40	995.40	233.40	995.40	0.00	0.00
12	1	20XT	31.23	110.00	1.00	126.23	998.23	236.23	998.23	0.00	0.00
13	1	20XT	34.06	110.00	1.00	129.06	1001.06	239.06	1001.06	0.00	0.00
14	1	20XT	36.89	110.00	1.00	131.89	1003.89	241.89	1003.89	0.00	0.00
15	1	20XT	39.72	110.00	1.00	134.72	1006.72	244.72	1006.72	0.00	0.00
16	1	20XT	42.55	110.00	1.00	137.55	1009.55	247.55	1009.55	0.00	0.00
17	1	20XT	45.38	110.00	1.00	140.38	1012.38	250.38	1012.38	0.00	0.00
18	1	20XT	48.21	110.00	1.00	143.21	1015.21	253.21	1015.21	0.00	0.00
19	1	20XT	51.04	110.00	1.00	146.04	1018.04	256.04	1018.04	0.00	0.00
20	1	20XT	53.87	110.00	1.00	148.87	1020.87	258.87	1020.87	0.00	0.00
21	1	20XT	56.70	110.00	1.00	151.70	1023.70	261.70	1023.70	0.00	0.00
22	1	20XT	59.53	110.00	1.00	154.53	1026.53	264.53	1026.53	0.00	0.00
23	1	20XT	62.36	110.00	1.00	157.36	1029.36	267.36	1029.36	0.00	0.00
24	1	20XT	65.19	110.00	1.00	160.19	1032.19	270.19	1032.19	0.00	0.00
25	1	20XT	68.02	110.00	1.00	163.02	1035.02	273.02	1035.02	0.00	0.00
26	1	20XT	70.85	110.00	1.00	165.85	1037.85	275.85	1037.85	0.00	0.00
27	1	20XT	73.68	110.00	1.00	168.68	1040.68	278.68	1040.68	0.00	0.00
28	1	20XT	76.51	110.00	1.00	171.51	1043.51	281.51	1043.51	0.00	0.00

* Vertical distance between layers.

QUANTITIES

Reinf. Type #	Designated Name	Coverage Ratio	Area of reinforcemnt [ft²] / length of slope [ft]
1	20XT	1.00	3080.00

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CROSS-SECTION G-G

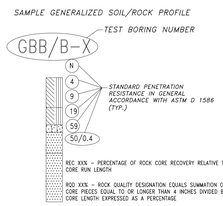
0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE
- WATER LEVEL AT END OF DRILLING
- WATER LEVEL DURING DRILLING
- WATER LEVEL AFTER 24 HR
- DENOTES COLLUVIAL SOIL
- GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK
- GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE

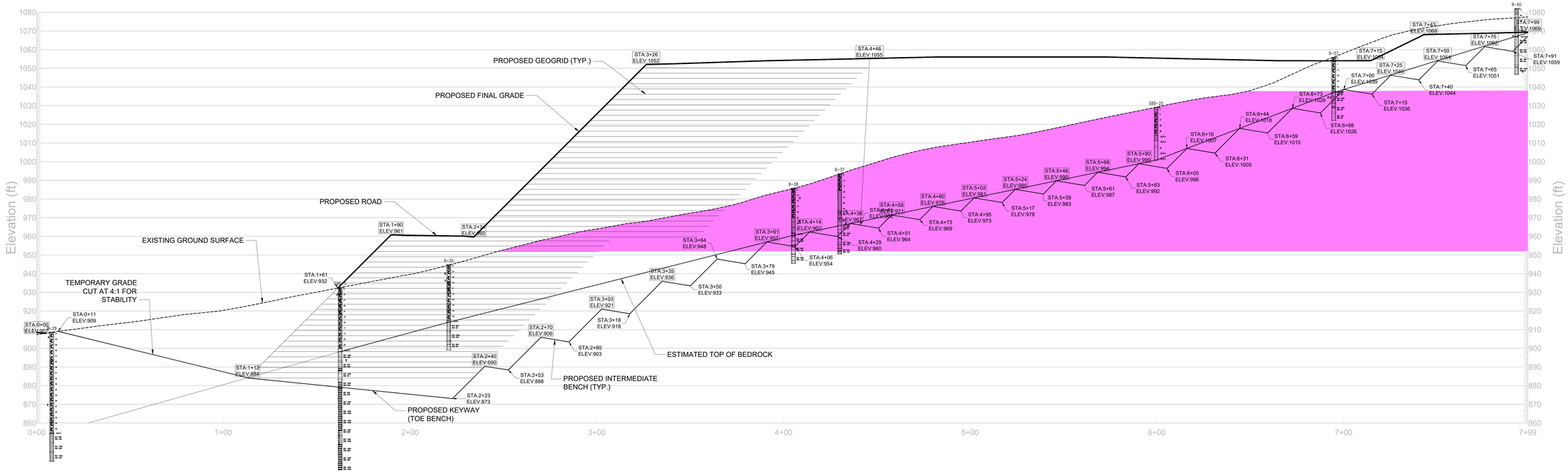


APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS

GARVIN BOWARD BEITKO

SCALE: AS NOTED	GARVIN BOWARD BEITKO ENGINEERING, INC.
DATE: 10/25/2023	*BUILT ON REPUTATION*
REVISED:	GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 9
DRAWN BY: MAW	MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS
APPROVED BY: DAB	FOR: PHILLIPS & ASSOCIATES, INC. — GBBE PROJECT NUMBER: 16123A

180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440



CROSS-SECTION R-R

0 20 40 60

APPROX. HORZ. & VERT. SCALE: 1" = 20'

LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE

WATER LEVEL AT END OF DRILLING

WATER LEVEL DURING DRILLING

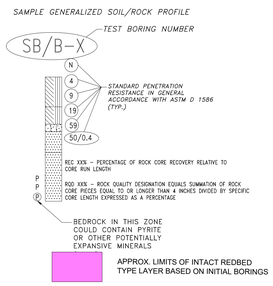
WATER LEVEL AFTER 24 HR

DENOTES COLLUVIAL SOIL

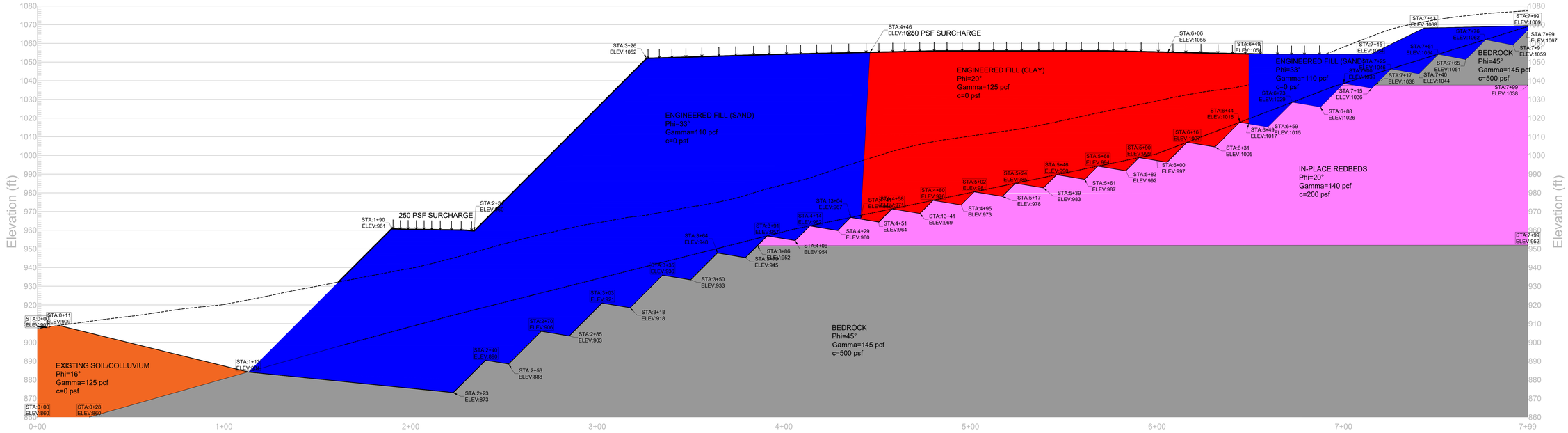
GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK

GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE



GARVIN BOWARD BEITKO	SCALE: AS NOTED	GARVIN BOWARD BEITKO ENGINEERING, INC. *BUILT ON REPUTATION*	180 BILMAR DRIVE, SUITE IV PITTSBURGH, PA 15205 PHONE: 412-922-4440
	DATE: 03/08/2024	GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II	FIGURE 10
	REVISED:	MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS	
	DRAWN BY: MAW		
	APPROVED BY: DAB	FOR: PHILLIPS & ASSOCIATES, INC.	GBBE PROJECT NUMBER: 16123A



CROSS-SECTION R-R

0 20 40 60

APPROX. HORZ. & VERT. SCALE: 1" = 20'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	03/08/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.

BUILT ON REPUTATION

180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 11

MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A

SOLMAX

MiraSlope® Pro

Cross-Section R-R

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PROJECT IDENTIFICATION

Title: Cross-Section R-R
Project Number: 16123A -
Client: QVSD
Designer: MAW

Description:

Company's information:

Name: GBBE
Street: 180 Bilmar Drive Suite 4
Pittsburgh, PA 15205
Telephone #: 412-922-4440
E-Mail:

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Original date and time of creating this file: Wed Mar 06 10:10:52 2024

PROGRAM MODE: Analysis of a General Slope using GEOSYNTHETIC as reinforcing material.

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INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ^{3}]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ^{2}]
1.....Eng. Fill (Sand).....	110.0	33.0	0.0
2.....Colluvium.....	125.0	16.0	0.0
3.....Eng. Fill (Redbed).....	125.0	20.0	0.0
4.....In-Place Redbeds.....	140.0	20.0	200.0
5.....Bedrock.....	145.0	45.0	500.0

REINFORCEMENT

Reinforcement Type #	Geosynthetic Designated Name	Ultimate Strength, Tult [lb/ft]	Reduction Factor for Installation Damage, RFid	Reduction Factor for Durability, RFd	Reduction Factor for Creep, RFc	Coverage Ratio, Rc
1	20XT	16000	1.10	1.10	1.44	1.00

Interaction Parameters Type #	Geosynthetic Designated Name	== Direct Sliding == Cds-phi	Cds-c	==== Pullout ==== Ci	Alpha
1	20XT	0.80	0.00	0.80	0.80

Relative Orientation of Reinforcement Force, ROR = 0.00. Assigned Factor of Safety to resist pullout, Fs-po = 1.50
Design method for Global Stability: Comprehensive Bishop.

WATER

Water is not present

SEISMICITY

Not Applicable

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DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

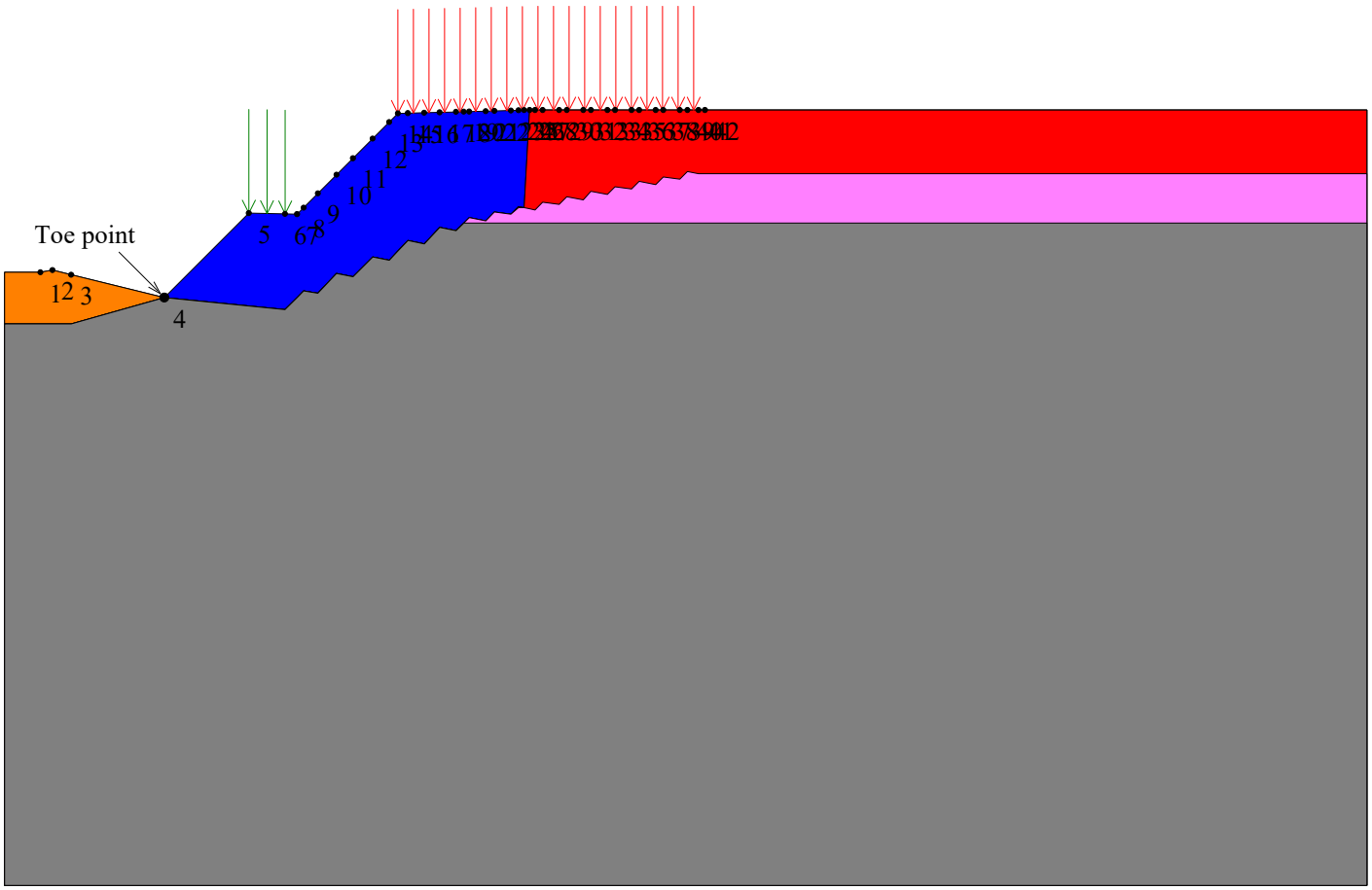
Soil profile contains 5 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 190.00 and ends at X1e = 234.00 [ft].
Load Q2 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X2s = 326.00 and ends at X2e = 606.00 [ft].
Surcharge load, Q3.....None

STRIP LOAD

.....None.....



SCALE:

(0 123([ft]

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TABULATED DETAILS OF GEMERAL SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

	#	Xi	Yi
Top of Layer 1	1	0.00	907.00
	2	11.00	909.00
	3	113.00	884.00
	4	190.00	961.00
	5	234.00	960.00
	6	326.00	1052.00
	7	446.00	1055.00
	8	606.00	1055.00
Top of Layer 2	9	0.00	907.00
	10	11.00	909.00
	11	113.00	884.00
	12	223.00	873.00
	13	240.00	890.00
	14	253.00	888.00
	15	270.00	906.00
	16	285.00	903.00
	17	303.00	921.00
	18	318.00	918.00
	19	335.00	936.00
	20	350.00	933.00
	21	364.00	948.00
	22	379.00	945.00
	23	386.00	952.00
	24	391.00	957.00
	25	406.00	954.00
	26	414.00	962.00
	27	429.00	960.00
	28	436.00	967.00
	29	441.00	966.00
	30	446.00	1055.00
	31	606.00	1055.00
Top of Layer 3	32	0.00	860.00
	33	28.00	860.00
	34	113.00	884.00
	35	223.00	873.00
	36	240.00	890.00
	37	253.00	888.00
	38	270.00	906.00
	39	285.00	903.00
	40	303.00	921.00
	41	318.00	918.00
	42	335.00	936.00
	43	350.00	933.00
	44	364.00	948.00
	45	379.00	945.00
	46	386.00	952.00
	47	391.00	957.00
	48	406.00	954.00
	49	414.00	962.00
	50	429.00	960.00
	51	436.00	967.00
	52	441.00	966.00
	53	446.00	1055.00
	54	606.00	1055.00
Top of Layer 4	55	0.00	860.00
	56	28.00	860.00
	57	113.00	884.00
	58	223.00	873.00
	59	240.00	890.00
	60	253.00	888.00
	61	270.00	906.00
	62	285.00	903.00
	63	303.00	921.00
	64	318.00	918.00
	65	335.00	936.00
	66	350.00	933.00
	67	364.00	948.00
	68	379.00	945.00
	69	386.00	952.00
	70	391.00	957.00
	71	406.00	954.00
	72	414.00	962.00
	73	429.00	960.00
	74	436.00	966.00
	75	441.00	966.00
	76	451.00	964.00
	77	458.00	971.00
	78	473.00	969.00
	79	480.00	976.00
	80	495.00	973.00
	81	502.00	981.00
	82	517.00	978.00
	83	524.00	985.00
	84	539.00	983.00
	85	546.00	990.00
	86	561.00	987.00
	87	568.00	994.00
	88	583.00	992.00
	89	590.00	999.00
	90	600.00	997.00
Top of Layer 5	91	0.00	860.00
	92	28.00	860.00
	93	113.00	884.00
	94	223.00	873.00
	95	240.00	890.00
	96	253.00	888.00
	97	270.00	906.00
	98	285.00	903.00
	99	303.00	921.00
	100	318.00	918.00
	101	335.00	936.00
	102	350.00	933.00
	103	364.00	948.00
	104	379.00	945.00
	105	386.00	952.00
	106	606.00	952.00

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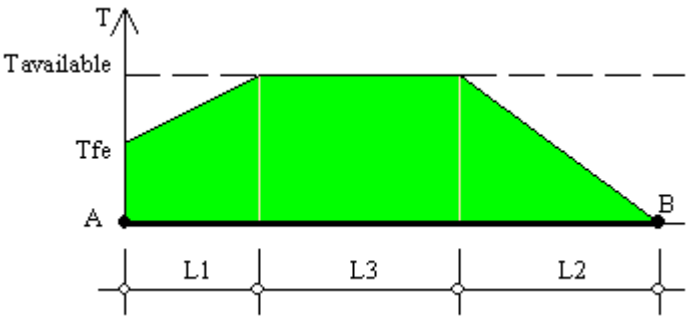
TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3	Y4	Y5
1	0.00	907.00	907.00	860.00	860.00	860.00
2	11.00	909.00	909.00	860.00	860.00	860.00
3	28.00	904.83	904.83	860.00	860.00	860.00
4	113.00	884.00	884.00	884.00	884.00	884.00
5	190.00	961.00	876.30	876.30	876.30	876.30
6	223.00	960.25	873.00	873.00	873.00	873.00
7	234.00	960.00	884.00	884.00	884.00	884.00
8	240.00	966.00	890.00	890.00	890.00	890.00
9	253.00	979.00	888.00	888.00	888.00	888.00
10	270.00	996.00	906.00	906.00	906.00	906.00
11	285.00	1011.00	903.00	903.00	903.00	903.00
12	303.00	1029.00	921.00	921.00	921.00	921.00
13	318.00	1044.00	918.00	918.00	918.00	918.00
14	326.00	1052.00	926.47	926.47	926.47	926.47
15	335.00	1052.22	936.00	936.00	936.00	936.00
16	350.00	1052.60	933.00	933.00	933.00	933.00
17	364.00	1052.95	948.00	948.00	948.00	948.00
18	379.00	1053.33	945.00	945.00	945.00	945.00
19	386.00	1053.50	952.00	952.00	952.00	952.00
20	391.00	1053.63	957.00	957.00	957.00	952.00
21	406.00	1054.00	954.00	954.00	954.00	952.00
22	414.00	1054.20	962.00	962.00	962.00	952.00
23	429.00	1054.58	960.00	960.00	960.00	952.00
24	436.00	1054.75	967.00	967.00	966.00	952.00
25	441.00	1054.88	966.00	966.00	966.00	952.00
26	446.00	1055.00	1055.00	1055.00	965.00	952.00
27	451.00	1055.00	1055.00	1055.00	964.00	952.00
28	458.00	1055.00	1055.00	1055.00	971.00	952.00
29	473.00	1055.00	1055.00	1055.00	969.00	952.00
30	480.00	1055.00	1055.00	1055.00	976.00	952.00
31	495.00	1055.00	1055.00	1055.00	973.00	952.00
32	502.00	1055.00	1055.00	1055.00	981.00	952.00
33	517.00	1055.00	1055.00	1055.00	978.00	952.00
34	524.00	1055.00	1055.00	1055.00	985.00	952.00
35	539.00	1055.00	1055.00	1055.00	983.00	952.00
36	546.00	1055.00	1055.00	1055.00	990.00	952.00
37	561.00	1055.00	1055.00	1055.00	987.00	952.00
38	568.00	1055.00	1055.00	1055.00	994.00	952.00
39	583.00	1055.00	1055.00	1055.00	992.00	952.00
40	590.00	1055.00	1055.00	1055.00	999.00	952.00
41	600.00	1055.00	1055.00	1055.00	997.00	952.00
42	606.00	1055.00	1055.00	1055.00	997.00	952.00

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER



A = Front-end of reinforcement (at face of slope)
B = Rear-end of reinforcement
AB = L1 + L2 + L3 = Embedded length of reinforcement

Tavailable = Long-term strength of reinforcement
Tfe = Available front-end strength (e.g., connection to facing)

L1 = Front-end 'pullout' length
L2 = Rear-end pullout length
Tavailable prevails along L3

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
1	20XT	0.00	120.00	0.00	2.00	118.00	9182.74	9182.74
2	20XT	2.82	120.00	0.00	2.07	117.93	9182.74	9182.74
3	20XT	5.64	120.00	0.00	2.07	117.93	9182.74	9182.74
4	20XT	8.46	120.00	0.00	2.07	117.93	9182.74	9182.74
5	20XT	11.28	120.00	0.00	2.07	117.93	9182.74	9182.74
6	20XT	14.10	120.00	0.00	2.07	117.93	9182.74	9182.74
7	20XT	16.92	120.00	0.00	2.07	117.93	9182.74	9182.74
8	20XT	19.75	120.00	0.00	2.07	117.93	9182.74	9182.74
9	20XT	22.59	120.00	0.00	2.07	117.93	9182.74	9182.74
10	20XT	25.42	120.00	0.00	2.07	117.93	9182.74	9182.74
11	20XT	28.25	120.00	0.00	2.07	117.93	9182.74	9182.74
12	20XT	31.09	120.00	0.00	2.07	117.93	9182.74	9182.74
13	20XT	33.92	120.00	0.00	2.07	117.93	9182.74	9182.74
14	20XT	36.75	120.00	0.00	2.07	117.93	9182.74	9182.74
15	20XT	39.59	120.00	0.00	2.07	117.93	9182.74	9182.74
16	20XT	42.42	120.00	0.00	2.07	117.93	9182.74	9182.74
17	20XT	45.25	120.00	0.00	2.07	117.93	9182.74	9182.74
18	20XT	48.09	120.00	0.00	2.07	117.93	9182.74	9182.74
19	20XT	50.92	120.00	0.00	2.07	117.93	9182.74	9182.74
20	20XT	53.75	120.00	0.00	2.07	117.93	9182.74	9182.74
21	20XT	56.59	120.00	0.00	2.07	117.93	9182.74	9182.74
22	20XT	59.42	120.00	0.00	2.07	117.93	9182.74	9182.74
23	20XT	62.25	120.00	0.00	2.07	117.93	9182.74	9182.74
24	20XT	65.09	120.00	0.00	2.07	117.93	9182.74	9182.74
25	20XT	67.92	120.00	0.00	2.07	117.93	9182.74	9182.74
26	20XT	70.75	120.00	0.00	2.07	117.93	9182.74	9182.74
27	20XT	73.59	120.00	0.00	2.07	117.93	9182.74	9182.74
28	20XT	75.00	120.00	0.00	2.07	117.93	9182.74	9182.74
29	20XT	79.25	120.00	0.00	1.71	118.29	9182.74	9182.74
30	20XT	82.09	120.00	0.00	1.74	118.26	9182.74	9182.74
31	20XT	84.92	120.00	0.00	1.80	118.20	9182.74	9182.74
32	20XT	87.75	120.00	0.00	1.87	118.13	9182.74	9182.74
33	20XT	90.59	120.00	0.00	1.94	118.06	9182.74	9182.74
34	20XT	93.42	120.00	0.00	2.00	118.00	9182.74	9182.74
35	20XT	97.00	120.00	0.00	2.10	117.90	9182.74	9182.74

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER (continues)

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
36	20XT	99.09	120.00	0.00	2.17	117.83	9182.74	9182.74
37	20XT	101.92	120.00	0.00	2.26	117.74	9182.74	9182.74
38	20XT	104.75	120.00	0.00	2.36	117.64	9182.74	9182.74
39	20XT	107.59	120.00	0.00	2.46	117.54	9182.74	9182.74
40	20XT	110.42	120.00	0.00	2.56	117.44	9182.74	9182.74
41	20XT	113.25	120.00	0.00	2.69	117.31	9182.74	9182.74
42	20XT	116.09	120.00	0.00	2.82	117.18	9182.74	9182.74
43	20XT	118.92	120.00	0.00	2.99	117.01	9182.74	9182.74
44	20XT	121.75	120.00	0.00	3.15	116.85	9182.74	9182.74
45	20XT	124.59	120.00	0.00	3.35	116.65	9182.74	9182.74
46	20XT	127.42	120.00	0.00	3.54	116.46	9182.74	9182.74
47	20XT	130.25	120.00	0.00	3.81	116.19	9182.74	9182.74
48	20XT	133.09	120.00	0.00	4.10	115.90	9182.74	9182.74
49	20XT	135.92	120.00	0.00	4.43	115.57	9182.74	9182.74
50	20XT	138.75	120.00	0.00	4.79	115.21	9182.74	9182.74
51	20XT	141.59	120.00	0.00	5.28	114.72	9182.74	9182.74
52	20XT	144.42	120.00	0.00	5.84	114.16	9182.74	9182.74
53	20XT	147.25	120.00	0.00	6.53	113.47	9182.74	9182.74
54	20XT	150.09	120.00	0.00	7.41	112.59	9182.74	9182.74
55	20XT	152.92	120.00	0.00	8.56	111.44	9182.74	9182.74
56	20XT	155.75	120.00	0.00	10.17	109.83	9182.74	9182.74
57	20XT	158.59	120.00	0.00	12.57	107.43	9182.74	9182.74
58	20XT	161.42	120.00	0.00	16.37	103.63	9182.74	9182.74
59	20XT	164.25	120.00	0.00	23.69	96.31	9182.74	9182.74
60	20XT	167.00	120.00	0.00	44.00	76.00	9182.74	9182.74

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RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	315.00	1041.00	104.17	886.22	152.51	1041.36	162.49	3.56	
2	343.50	1052.44	117.92	890.35	172.00	1053.11	171.51	1.99	
3	372.00	1053.15	114.02	886.88	166.08	1089.37	209.08	1.85	
4	400.50	1053.86	114.85	886.62	159.76	1137.48	254.86	1.89	
5	429.00	1054.58	118.68	890.05	164.66	1178.26	291.85	1.69	
. 6	457.50	1055.00	114.27	886.59	141.91	1264.22	378.64	1.59 .	OK
7	486.00	1055.00	115.45	886.50	86.38	1442.11	556.37	1.65	
8	514.50	1055.00	118.48	889.99	108.86	1470.80	580.89	1.69	
9	543.00	1055.00	115.18	886.47	45.04	1691.81	808.38	1.76	
10	571.50	1055.00	122.26	893.48	41.01	1824.97	935.03	1.85	
11	600.00	1055.00	118.94	889.99	-30.85	2110.43	1229.59	1.90	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

****

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

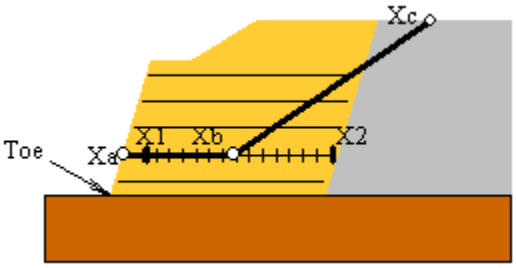
Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	104.45	886.11	372.00	1053.15	160.69	1093.81	215.19	1.99	
2	113.00	884.00	113.00	884.00	113.00	884.00	0.00	N/A	#10 - Overhanging Cliff
3	111.50	884.37	372.00	1053.15	163.27	1089.89	211.94	2.00	
. 4	114.27	886.59	457.50	1055.00	141.91	1264.22	378.64	1.59 .	OK
5	118.42	890.00	457.50	1055.00	119.00	1319.72	429.72	1.60	
6	121.09	893.60	457.50	1055.00	148.65	1267.46	374.87	1.60	
7	124.50	897.11	457.50	1055.00	152.02	1269.16	373.07	1.62	
8	128.98	900.55	457.50	1055.00	160.89	1259.28	360.15	1.64	
9	132.35	904.06	457.50	1055.00	164.24	1261.05	358.41	1.66	
10	136.06	907.56	457.50	1055.00	182.03	1231.46	327.14	1.68	
11	139.08	911.08	457.50	1055.00	170.95	1264.78	355.13	1.69	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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RESULTS OF TRANSLATIONAL ANALYSIS



Results in the table below represent critical two-part wedges identified between specified starting (X1) and ending (X2) search points. Wedges along all reinforcement layers and at elevation zero are reported. The critical two-part wedge, one for each predetermined elevation, is defined by Xa, Xb and Xc where Xa is the front end of the passive wedge (slope face), Xb is where the passive wedge ends and the active one starts, and Xc is the X-ordinate at which the active wedge starts.

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
At toe elevation	0.00	113.00	884.00	232.80	884.00	506.46	1055.00	1.57	Minimum on Edge
Reinf. Layer #1	0.00	113.00	884.00	233.19	884.00	506.85	1055.00	1.45	Minimum on Edge
Reinf. Layer #2	2.82	115.82	886.82	235.99	886.82	505.13	1055.00	1.46	Minimum on Edge
Reinf. Layer #3	5.64	118.64	889.64	238.89	889.64	503.52	1055.00	1.46	Minimum on Edge
Reinf. Layer #4	8.46	121.46	892.46	241.69	892.46	501.81	1055.00	1.48	Minimum on Edge
Reinf. Layer #5	11.28	124.28	895.28	244.49	895.28	500.10	1055.00	1.50	Minimum on Edge
Reinf. Layer #6	14.10	127.10	898.10	247.29	898.10	519.05	1055.00	1.50	Minimum on Edge
Reinf. Layer #7	16.92	129.92	900.92	250.09	900.92	516.96	1055.00	1.52	Minimum on Edge
Reinf. Layer #8	19.75	132.75	903.75	252.99	903.75	514.96	1055.00	1.53	Minimum on Edge
Reinf. Layer #9	22.59	135.59	906.59	255.79	906.59	512.84	1055.00	1.55	Minimum on Edge
Reinf. Layer #10	25.42	138.42	909.42	258.59	909.42	510.74	1055.00	1.58	Minimum on Edge
Reinf. Layer #11	28.25	141.25	912.25	261.49	912.25	499.07	1055.00	1.60	Minimum on Edge
Reinf. Layer #12	31.09	144.09	915.09	264.29	915.09	497.14	1055.00	1.62	Minimum on Edge
Reinf. Layer #13	33.92	146.92	917.92	267.09	917.92	495.23	1055.00	1.65	Minimum on Edge
Reinf. Layer #14	36.75	149.75	920.75	269.99	920.75	502.52	1055.00	1.67	Minimum on Edge
Reinf. Layer #15	39.59	152.59	923.59	272.79	923.59	491.49	1055.00	1.69	Minimum on Edge
Reinf. Layer #16	42.42	155.42	926.42	275.59	926.42	489.58	1055.00	1.72	Minimum on Edge
Reinf. Layer #17	45.25	158.25	929.25	278.49	929.25	496.30	1055.00	1.74	Minimum on Edge
Reinf. Layer #18	48.09	161.09	932.09	281.29	932.09	494.18	1055.00	1.77	Minimum on Edge
Reinf. Layer #19	50.92	163.92	934.92	284.09	934.92	492.07	1055.00	1.79	Minimum on Edge
Reinf. Layer #20	53.75	166.75	937.75	286.99	937.75	490.07	1055.00	1.82	Minimum on Edge
Reinf. Layer #21	56.59	169.59	940.59	289.79	940.59	487.95	1055.00	1.86	Minimum on Edge
Reinf. Layer #22	59.42	172.42	943.42	292.59	943.42	485.85	1055.00	1.89	Minimum on Edge
Reinf. Layer #23	62.25	175.25	946.25	295.49	946.25	483.85	1055.00	1.92	Minimum on Edge
Reinf. Layer #24	65.09	178.09	949.09	298.29	949.09	481.73	1055.00	1.97	Minimum on Edge
Reinf. Layer #25	67.92	180.92	951.92	301.09	951.92	479.63	1055.00	2.02	Minimum on Edge
Reinf. Layer #26	70.75	183.75	954.75	303.99	954.75	477.63	1055.00	2.06	Minimum on Edge
Reinf. Layer #27	73.59	186.59	957.59	306.79	957.59	475.51	1055.00	2.11	Minimum on Edge
Reinf. Layer #28	75.00	188.00	959.00	308.19	959.00	474.47	1055.00	2.14	Minimum on Edge
Reinf. Layer #29	79.25	237.25	963.25	357.49	963.25	504.32	1055.00	2.35	Minimum on Edge
Reinf. Layer #30	82.09	240.09	966.09	360.29	966.09	502.58	1055.00	2.41	Minimum on Edge
Reinf. Layer #31	84.92	242.92	968.92	363.09	968.92	500.85	1055.00	2.47	Minimum on Edge
Reinf. Layer #32	87.75	245.75	971.75	365.99	971.75	499.22	1055.00	2.54	Minimum on Edge
Reinf. Layer #33	90.59	248.59	974.59	368.79	974.59	497.47	1055.00	2.60	Minimum on Edge
Reinf. Layer #34	93.42	251.42	977.42	371.59	977.42	495.74	1055.00	2.68	Minimum on Edge
Reinf. Layer #35	97.00	255.00	981.00	375.19	981.00	493.61	1055.00	2.78	Minimum on Edge
Reinf. Layer #36	99.09	257.09	983.09	377.29	983.09	492.37	1055.00	2.84	Minimum on Edge
Reinf. Layer #37	101.92	259.92	985.92	380.09	985.92	490.64	1055.00	2.93	Minimum on Edge
Reinf. Layer #38	104.75	262.75	988.75	382.99	988.75	489.01	1055.00	3.03	Minimum on Edge

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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RESULTS OF TRANSLATIONAL ANALYSIS (continues)

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
Reinf. Layer #39	107.59	265.59	991.59	385.79	991.59	487.27	1055.00	3.13	Minimum on Edge
Reinf. Layer #40	110.42	268.42	994.42	388.59	994.42	493.52	1055.00	3.24	Minimum on Edge
Reinf. Layer #41	113.25	271.25	997.25	391.49	997.25	491.52	1055.00	3.36	Minimum on Edge
Reinf. Layer #42	116.09	274.09	1000.09	394.29	1000.09	489.40	1055.00	3.48	Minimum on Edge
Reinf. Layer #43	118.92	276.92	1002.92	397.09	1002.92	471.47	1055.00	3.67	Minimum on Edge
Reinf. Layer #44	121.75	279.75	1005.75	399.99	1005.75	478.81	1055.00	3.80	Minimum on Edge
Reinf. Layer #45	124.59	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #46	127.42	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #47	130.25	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #48	133.09	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #49	135.92	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #50	138.75	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #51	141.59	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #52	144.42	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #53	147.25	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #54	150.09	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #55	152.92	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #56	155.75	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #57	158.59	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #58	161.42	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #59	164.25	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence
Reinf. Layer #60	167.00	113.00	884.00	113.00	884.00	113.00	88‹1000033.30		No convergence

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.59
Critical Circle: Xc = 141.91[ft], Yc = 1264.22[ft], R = 378.64[ft]. (Number of slices used = 67)

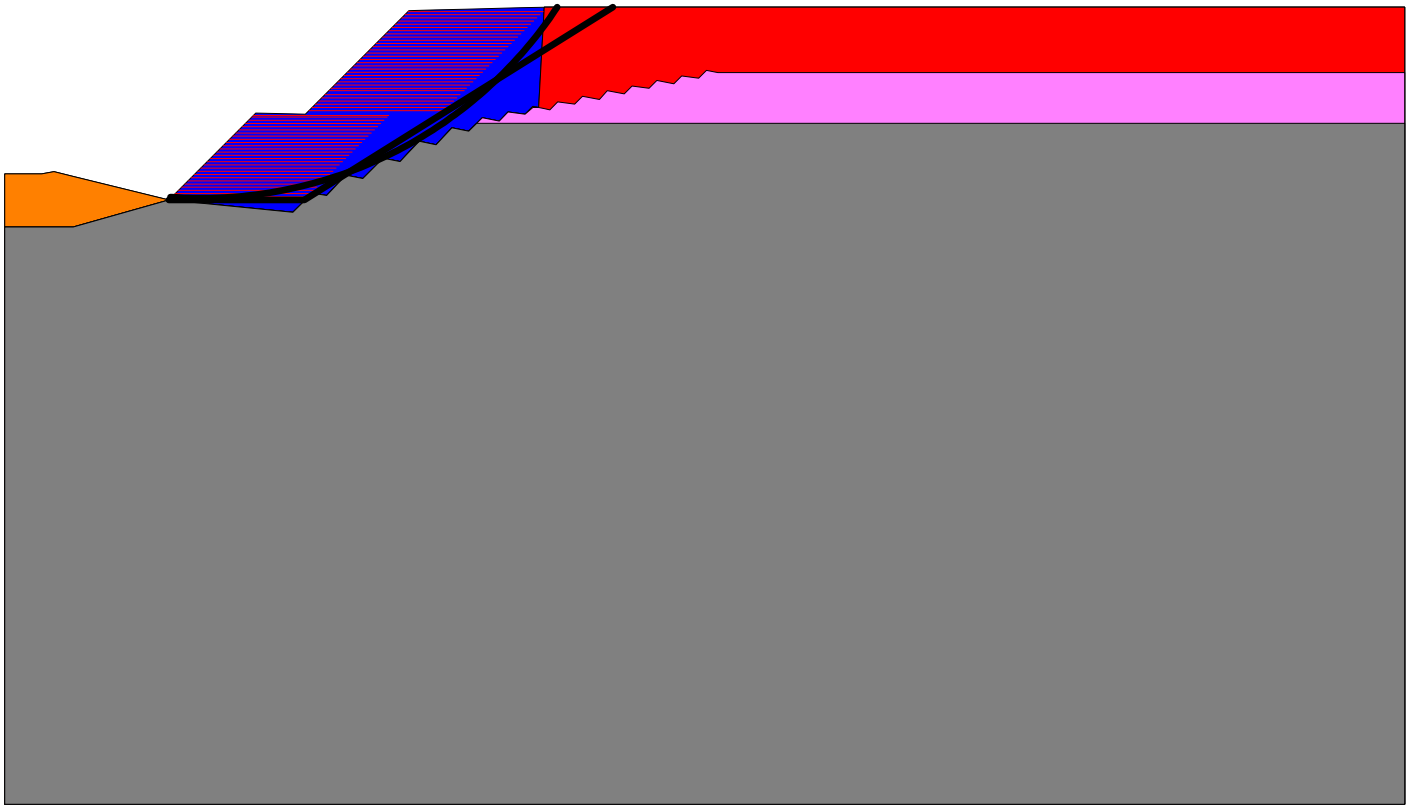
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

Minimum Factor of Safety = 1.45
Critical Two-Part Wedge: (Xa = 113.00, Ya = 884.00) [ft]
(Xb = 233.19, Yb = 884.00) [ft]
(Xc = 506.85, Yc = 1055.00) [ft]
(Number of slices used = 30)
Interslice resultant force inclination = 24.66 [degrees]

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

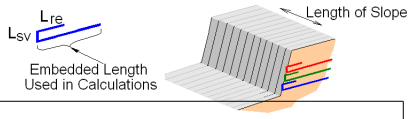
REINFORCEMENT LAYOUT: DRAWING



SCALE:

(1 inch = 123([ft]

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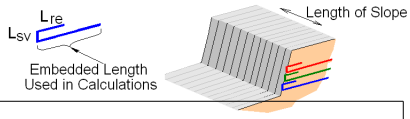


REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
1	1	20XT	0.00	120.00	1.00	113.00	884.00	233.00	884.00	0.00	0.00
2	1	20XT	2.82	120.00	1.00	115.82	886.82	235.82	886.82	0.00	0.00
3	1	20XT	5.64	120.00	1.00	118.64	889.64	238.64	889.64	0.00	0.00
4	1	20XT	8.46	120.00	1.00	121.46	892.46	241.46	892.46	0.00	0.00
5	1	20XT	11.28	120.00	1.00	124.28	895.28	244.28	895.28	0.00	0.00
6	1	20XT	14.10	120.00	1.00	127.10	898.10	247.10	898.10	0.00	0.00
7	1	20XT	16.92	120.00	1.00	129.92	900.92	249.92	900.92	0.00	0.00
8	1	20XT	19.75	120.00	1.00	132.75	903.75	252.75	903.75	0.00	0.00
9	1	20XT	22.59	120.00	1.00	135.59	906.59	255.59	906.59	0.00	0.00
10	1	20XT	25.42	120.00	1.00	138.42	909.42	258.42	909.42	0.00	0.00
11	1	20XT	28.25	120.00	1.00	141.25	912.25	261.25	912.25	0.00	0.00
12	1	20XT	31.09	120.00	1.00	144.09	915.09	264.09	915.09	0.00	0.00
13	1	20XT	33.92	120.00	1.00	146.92	917.92	266.92	917.92	0.00	0.00
14	1	20XT	36.75	120.00	1.00	149.75	920.75	269.75	920.75	0.00	0.00
15	1	20XT	39.59	120.00	1.00	152.59	923.59	272.59	923.59	0.00	0.00
16	1	20XT	42.42	120.00	1.00	155.42	926.42	275.42	926.42	0.00	0.00
17	1	20XT	45.25	120.00	1.00	158.25	929.25	278.25	929.25	0.00	0.00
18	1	20XT	48.09	120.00	1.00	161.09	932.09	281.09	932.09	0.00	0.00
19	1	20XT	50.92	120.00	1.00	163.92	934.92	283.92	934.92	0.00	0.00
20	1	20XT	53.75	120.00	1.00	166.75	937.75	286.75	937.75	0.00	0.00
21	1	20XT	56.59	120.00	1.00	169.59	940.59	289.59	940.59	0.00	0.00
22	1	20XT	59.42	120.00	1.00	172.42	943.42	292.42	943.42	0.00	0.00
23	1	20XT	62.25	120.00	1.00	175.25	946.25	295.25	946.25	0.00	0.00
24	1	20XT	65.09	120.00	1.00	178.09	949.09	298.09	949.09	0.00	0.00
25	1	20XT	67.92	120.00	1.00	180.92	951.92	300.92	951.92	0.00	0.00
26	1	20XT	70.75	120.00	1.00	183.75	954.75	303.75	954.75	0.00	0.00
27	1	20XT	73.59	120.00	1.00	186.59	957.59	306.59	957.59	0.00	0.00
28	1	20XT	75.00	120.00	1.00	188.00	959.00	308.00	959.00	0.00	0.00
29	1	20XT	79.25	120.00	1.00	237.25	963.25	357.25	963.25	0.00	0.00
30	1	20XT	82.09	120.00	1.00	240.09	966.09	360.09	966.09	0.00	0.00
31	1	20XT	84.92	120.00	1.00	242.92	968.92	362.92	968.92	0.00	0.00
32	1	20XT	87.75	120.00	1.00	245.75	971.75	365.75	971.75	0.00	0.00
33	1	20XT	90.59	120.00	1.00	248.59	974.59	368.59	974.59	0.00	0.00
34	1	20XT	93.42	120.00	1.00	251.42	977.42	371.42	977.42	0.00	0.00
35	1	20XT	97.00	120.00	1.00	255.00	981.00	375.00	981.00	0.00	0.00
36	1	20XT	99.09	120.00	1.00	257.09	983.09	377.09	983.09	0.00	0.00
37	1	20XT	101.92	120.00	1.00	259.92	985.92	379.92	985.92	0.00	0.00
38	1	20XT	104.75	120.00	1.00	262.75	988.75	382.75	988.75	0.00	0.00
39	1	20XT	107.59	120.00	1.00	265.59	991.59	385.59	991.59	0.00	0.00
40	1	20XT	110.42	120.00	1.00	268.42	994.42	388.42	994.42	0.00	0.00
41	1	20XT	113.25	120.00	1.00	271.25	997.25	391.25	997.25	0.00	0.00
42	1	20XT	116.09	120.00	1.00	274.09	1000.09	394.09	1000.09	0.00	0.00
43	1	20XT	118.92	120.00	1.00	276.92	1002.92	396.92	1002.92	0.00	0.00
44	1	20XT	121.75	120.00	1.00	279.75	1005.75	399.75	1005.75	0.00	0.00
45	1	20XT	124.59	120.00	1.00	282.59	1008.59	402.59	1008.59	0.00	0.00
46	1	20XT	127.42	120.00	1.00	285.42	1011.42	405.42	1011.42	0.00	0.00
47	1	20XT	130.25	120.00	1.00	288.25	1014.25	408.25	1014.25	0.00	0.00
48	1	20XT	133.09	120.00	1.00	291.09	1017.09	411.09	1017.09	0.00	0.00
49	1	20XT	135.92	120.00	1.00	293.92	1019.92	413.92	1019.92	0.00	0.00
50	1	20XT	138.75	120.00	1.00	296.75	1022.75	416.75	1022.75	0.00	0.00

* Vertical distance between layers.

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REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

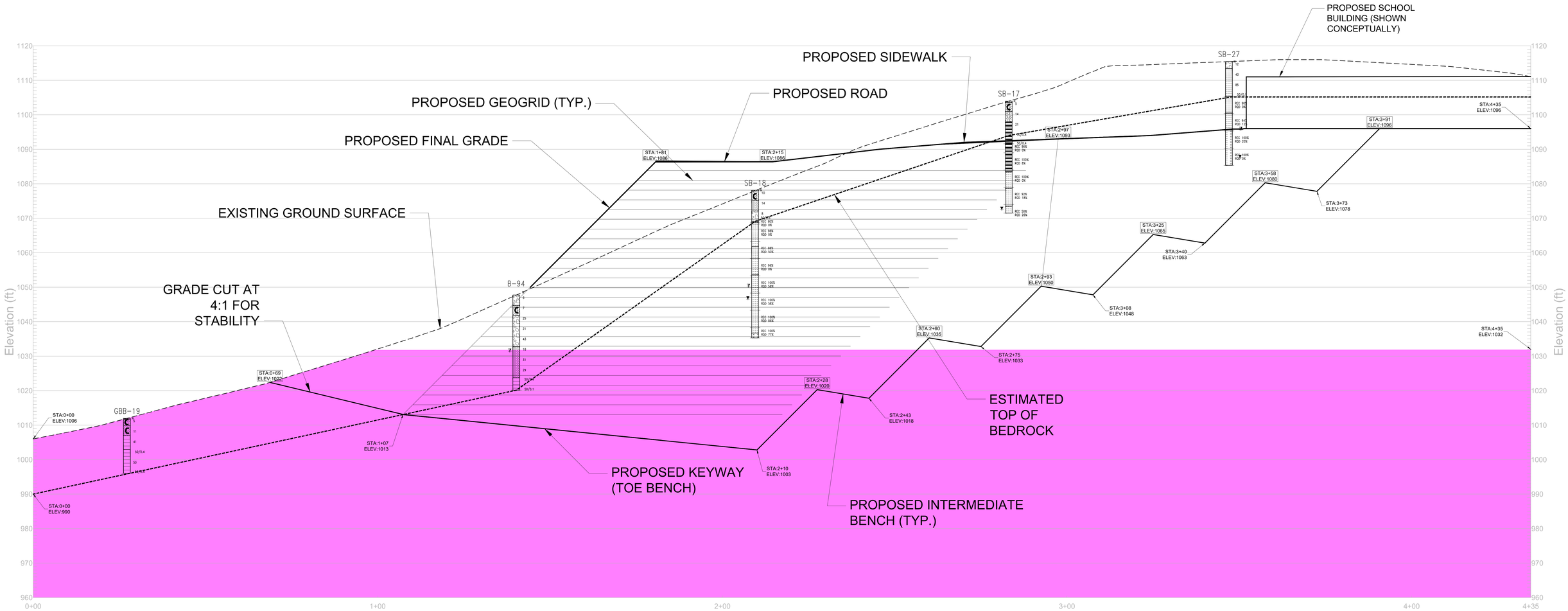
Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
51	1	20XT	141.59	120.00	1.00	299.59	1025.59	419.59	1025.59	0.00	0.00
52	1	20XT	144.42	120.00	1.00	302.42	1028.42	422.42	1028.42	0.00	0.00
53	1	20XT	147.25	120.00	1.00	305.25	1031.25	425.25	1031.25	0.00	0.00
54	1	20XT	150.09	120.00	1.00	308.09	1034.09	428.09	1034.09	0.00	0.00
55	1	20XT	152.92	120.00	1.00	310.92	1036.92	430.92	1036.92	0.00	0.00
56	1	20XT	155.75	120.00	1.00	313.75	1039.75	433.75	1039.75	0.00	0.00
57	1	20XT	158.59	120.00	1.00	316.59	1042.59	436.59	1042.59	0.00	0.00
58	1	20XT	161.42	120.00	1.00	319.42	1045.42	439.42	1045.42	0.00	0.00
59	1	20XT	164.25	120.00	1.00	322.25	1048.25	442.25	1048.25	0.00	0.00
60	1	20XT	167.00	120.00	1.00	325.00	1051.00	445.00	1051.00	0.00	0.00

* Vertical distance between layers.

QUANTITIES

Reinf. Type #	Designated Name	Coverage Ratio	Area of reinforcemnt [ft²] / length of slope [ft]
1	20XT	1.00	7200.00

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CROSS-SECTION P-P

0 10 20 30

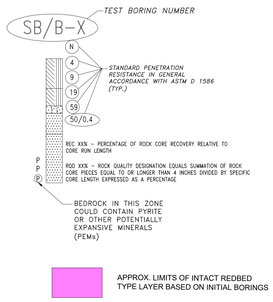
APPROX. HORZ. & VERT. SCALE: 1" = 10'

LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE

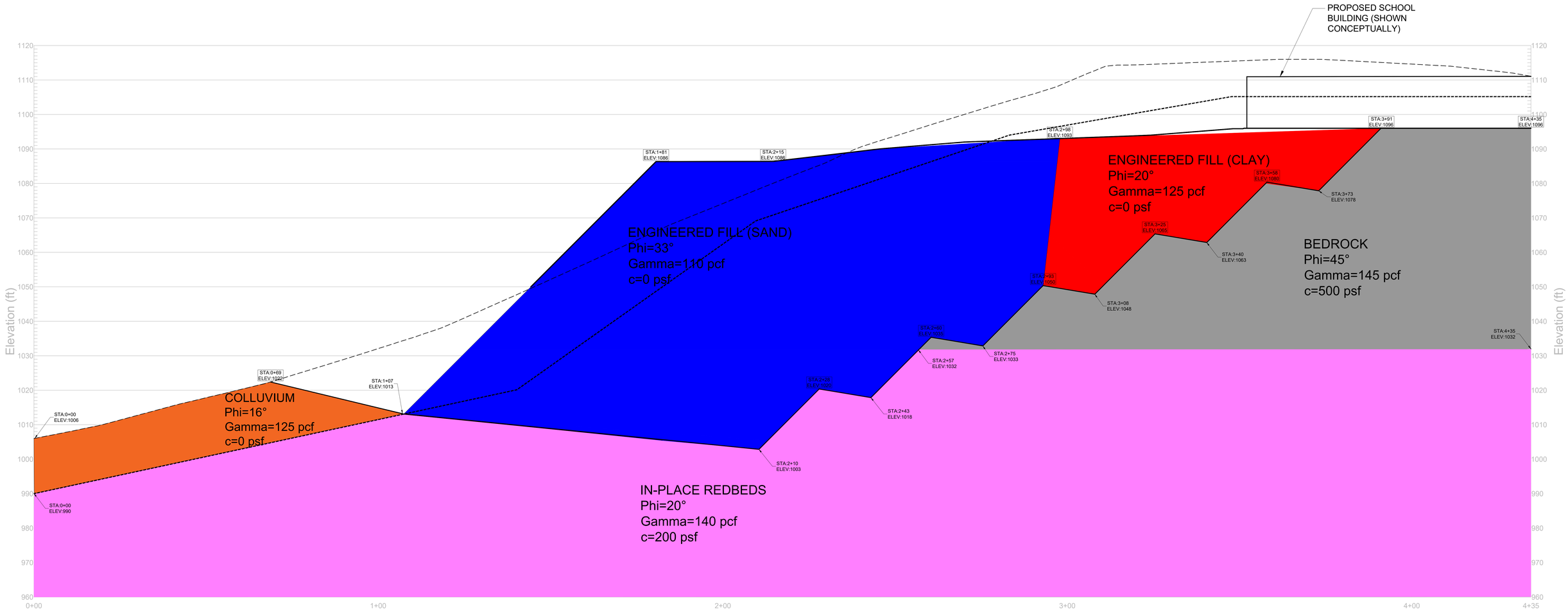
- WATER LEVEL AT END OF DRILLING
- WATER LEVEL DURING DRILLING
- WATER LEVEL AFTER 24 HR
- DENOTES COLLUVIAL SOIL
- GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK
- GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE



APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS

GARVIN BOWARD BEITKO	SCALE: AS NOTED	GARVIN BOWARD BEITKO ENGINEERING, INC. *BUILT ON REPUTATION*	180 BILMAR DRIVE, SUITE IV PITTSBURGH, PA 15205 PHONE: 412-922-4440
	DATE: 03/08/2024	GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II	FIGURE 12
	REVISED:	MASS GRADING RECOMMENDATION - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS	
	DRAWN BY: MAW		
	APPROVED BY: DAB	FOR: PHILLIPS & ASSOCIATES, INC.	GBBE PROJECT NUMBER: 16123A



CROSS-SECTION P-P

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	03/08/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 13

MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A

SOLMAX

MiraSlope® Pro

Cross-Section P-P

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PROJECT IDENTIFICATION

Title: Cross-Section P-P
Project Number: 16123A -
Client: QVSD
Designer: MAW

Description:

Company's information:

Name: GBBE
Street: 180 Bilmar Drive Suite 4
Pittsburgh, PA 15205
Telephone #: 412-922-4440
E-Mail:

Original file path and name: E:\Users\A ..... \Job Files\16123A MiraSlope\Cross-Section P-P.MIRp
Original date and time of creating this file: Wed Mar 06 10:10:52 2024

PROGRAM MODE: Analysis of a General Slope using GEOSYNTHETIC as reinforcing material.

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INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ^{3}]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ^{2}]
1.....Eng. Fill (Sand).....	110.0	33.0	0.0
2.....Colluvium.....	125.0	16.0	0.0
3.....Eng. Fill (Redbed).....	125.0	20.0	0.0
4.....Bedrock.....	145.0	45.0	500.0
5.....In-Place Redbeds.....	140.0	20.0	200.0

REINFORCEMENT

Reinforcement Type #	Geosynthetic Designated Name	Ultimate Strength, Tult [lb/ft]	Reduction Factor for Installation Damage, RFid	Reduction Factor for Durability, RFd	Reduction Factor for Creep, RFc	Coverage Ratio, Rc
1	20XT	16000	1.10	1.10	1.44	1.00

Interaction Parameters Type #	Geosynthetic Designated Name	== Direct Sliding == Cds-phi	Cds-c	==== Pullout ==== Ci	Alpha
1	20XT	0.80	0.00	0.80	0.80

Relative Orientation of Reinforcement Force, ROR = 0.00. Assigned Factor of Safety to resist pullout, Fs-po = 1.50
Design method for Global Stability: Comprehensive Bishop.

WATER

Water is not present

SEISMICITY

Not Applicable

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DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

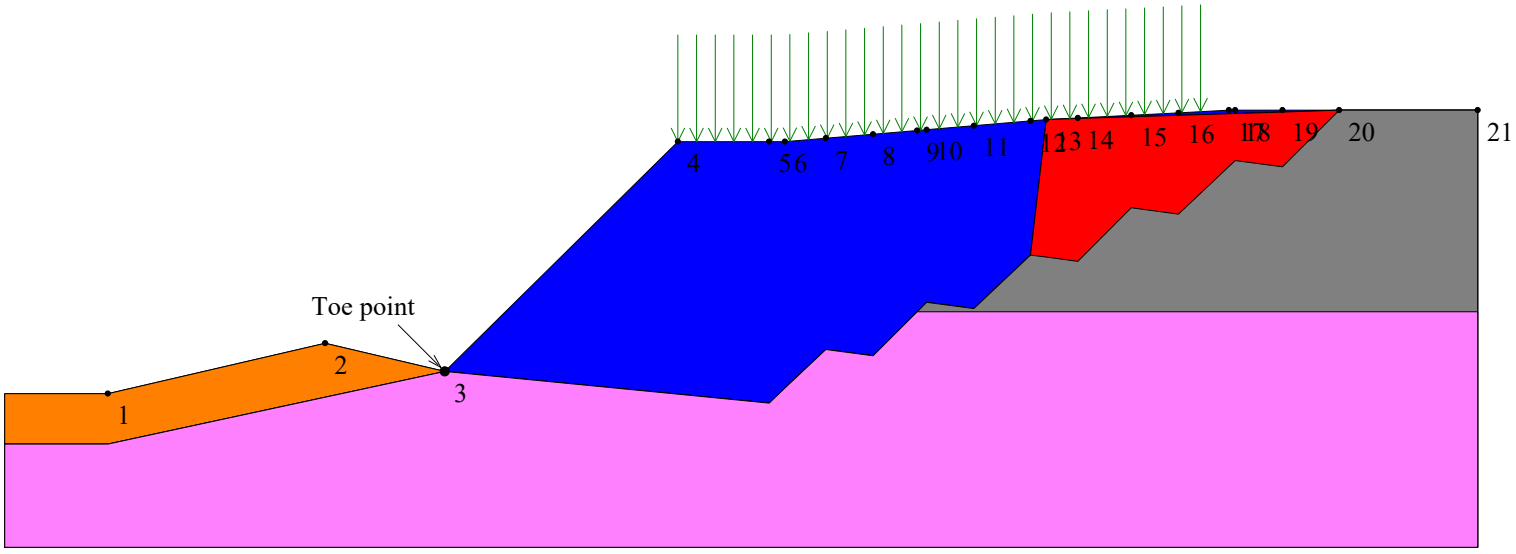
Soil profile contains 5 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 181.00 and ends at X1e = 350.00 [ft].
Surcharge load, Q2.....None
Surcharge load, Q3.....None

STRIP LOAD

.....None.....



SCALE:

0 5 10 15 20 30[ft]

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TABULATED DETAILS OF GEMERAL SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

	#	Xi	Yi	#	Xi	Yi
Top of Layer 1	1	0.00	1006.00	51	107.00	1013.00
	2	69.00	1022.00	52	210.00	1003.00
	3	107.00	1013.00	53	228.00	1020.00
	4	181.00	1086.00	54	243.00	1018.00
	5	215.00	1086.00	55	257.00	1032.00
	6	298.00	1093.00	56	435.00	1032.00
	7	356.00	1096.00			
	8	435.00	1096.00			
Top of Layer 2	9	0.00	1006.00			
	10	69.00	1022.00			
	11	107.00	1013.00			
	12	210.00	1003.00			
	13	228.00	1020.00			
	14	243.00	1018.00			
	15	257.00	1032.00			
	16	260.00	1035.00			
	17	275.00	1033.00			
	18	293.00	1050.00			
	19	298.00	1093.00			
	20	391.00	1096.00			
	21	435.00	1096.00			
Top of Layer 3	22	0.00	990.00			
	23	107.00	1013.00			
	24	210.00	1003.00			
	25	228.00	1020.00			
	26	243.00	1018.00			
	27	257.00	1032.00			
	28	260.00	1035.00			
	29	275.00	1033.00			
	30	293.00	1050.00			
	31	298.00	1093.00			
	32	391.00	1096.00			
	33	435.00	1096.00			
Top of Layer 4	34	0.00	990.00			
	35	107.00	1013.00			
	36	210.00	1003.00			
	37	228.00	1020.00			
	38	243.00	1018.00			
	39	257.00	1032.00			
	40	260.00	1035.00			
	41	275.00	1033.00			
	42	293.00	1050.00			
	43	308.00	1048.00			
	44	325.00	1065.00			
	45	340.00	1063.00			
	46	358.00	1080.00			
	47	373.00	1078.00			
	48	391.00	1096.00			
	49	435.00	1096.00			
Top of Layer 5	50	0.00	990.00			

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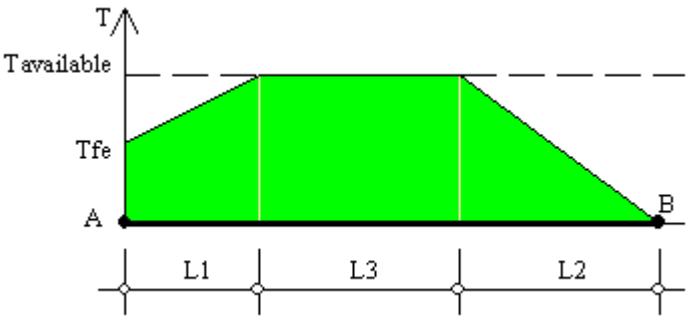
TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3	Y4	Y5
1	0.00	1006.00	1006.00	990.00	990.00	990.00
2	69.00	1022.00	1022.00	1004.83	1004.83	1004.83
3	107.00	1013.00	1013.00	1013.00	1013.00	1013.00
4	181.00	1086.00	1005.82	1005.82	1005.82	1005.82
5	210.00	1086.00	1003.00	1003.00	1003.00	1003.00
6	215.00	1086.00	1007.72	1007.72	1007.72	1007.72
7	228.00	1087.10	1020.00	1020.00	1020.00	1020.00
8	243.00	1088.36	1018.00	1018.00	1018.00	1018.00
9	257.00	1089.54	1032.00	1032.00	1032.00	1032.00
10	260.00	1089.80	1035.00	1035.00	1035.00	1032.00
11	275.00	1091.06	1033.00	1033.00	1033.00	1032.00
12	293.00	1092.58	1050.00	1050.00	1050.00	1032.00
13	298.00	1093.00	1093.00	1093.00	1049.33	1032.00
14	308.00	1093.52	1093.32	1093.32	1048.00	1032.00
15	325.00	1094.40	1093.87	1093.87	1065.00	1032.00
16	340.00	1095.17	1094.35	1094.35	1063.00	1032.00
17	356.00	1096.00	1094.87	1094.87	1078.11	1032.00
18	358.00	1096.00	1094.94	1094.94	1080.00	1032.00
19	373.00	1096.00	1095.42	1095.42	1078.00	1032.00
20	391.00	1096.00	1096.00	1096.00	1096.00	1032.00
21	435.00	1096.00	1096.00	1096.00	1096.00	1032.00

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER



A = Front-end of reinforcement (at face of slope)
B = Rear-end of reinforcement
AB = L1 + L2 + L3 = Embedded length of reinforcement

Tavailable = Long-term strength of reinforcement
Tfe = Available front-end strength (e.g., connection to facing)

L1 = Front-end 'pullout' length
L2 = Rear-end pullout length
Tavailable prevails along L3

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
1	20XT	0.10	110.00	0.00	2.07	107.93	9182.74	9182.74
2	20XT	2.92	110.00	0.00	2.17	107.83	9182.74	9182.74
3	20XT	5.74	110.00	0.00	2.23	107.77	9182.74	9182.74
4	20XT	8.56	110.00	0.00	2.33	107.67	9182.74	9182.74
5	20XT	11.38	110.00	0.00	2.43	107.57	9182.74	9182.74
6	20XT	14.20	110.00	0.00	2.53	107.47	9182.74	9182.74
7	20XT	17.02	110.00	0.00	2.62	107.38	9182.74	9182.74
8	20XT	19.84	110.00	0.00	2.76	107.24	9182.74	9182.74
9	20XT	22.66	110.00	0.00	2.89	107.11	9182.74	9182.74
10	20XT	25.48	110.00	0.00	3.05	106.95	9182.74	9182.74
11	20XT	28.30	110.00	0.00	3.22	106.78	9182.74	9182.74
12	20XT	31.12	110.00	0.00	3.41	106.59	9182.74	9182.74
13	20XT	33.94	110.00	0.00	3.61	106.39	9182.74	9182.74
14	20XT	36.76	110.00	0.00	3.84	106.16	9182.74	9182.74
15	20XT	39.58	110.00	0.00	4.10	105.90	9182.74	9182.74
16	20XT	42.40	110.00	0.00	4.43	105.57	9182.74	9182.74
17	20XT	45.22	110.00	0.00	4.79	105.21	9182.74	9182.74
18	20XT	48.04	110.00	0.00	5.22	104.78	9182.74	9182.74
19	20XT	50.86	110.00	0.00	5.71	104.29	9182.74	9182.74
20	20XT	53.68	110.00	0.00	6.33	103.67	9182.74	9182.74
21	20XT	56.50	110.00	0.00	7.12	102.88	9182.74	9182.74
22	20XT	59.32	110.00	0.00	8.14	101.86	9182.74	9182.74
23	20XT	62.14	110.00	0.00	9.48	100.52	9182.74	9182.74
24	20XT	64.96	110.00	0.00	11.35	98.65	9182.74	9182.74
25	20XT	67.78	110.00	0.00	14.24	95.76	9182.74	9182.74
26	20XT	70.60	110.00	0.00	19.36	90.64	9182.74	9182.74

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RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	170.00	1075.15	39.11	1016.04	90.87	1075.90	79.14	39.15	
2	196.50	1086.00	39.59	1015.63	102.00	1086.60	94.50	3.59	
3	223.00	1086.68	39.96	1015.32	117.30	1087.36	105.70	2.61	
4	249.50	1088.91	55.21	1019.94	139.93	1089.42	109.57	2.27	
5	276.00	1091.14	79.68	1019.66	157.38	1111.61	120.38	1.73	
6	302.50	1093.23	71.81	1021.42	159.48	1146.23	152.52	1.63	
. 7	329.00	1094.60	55.13	1019.45	152.63	1200.73	205.83	1.58 .	OK
8	355.50	1095.97	38.72	1015.80	142.92	1270.00	274.73	1.77	
9	382.00	1096.00	38.58	1016.07	166.61	1243.69	261.16	2.03	
10	408.50	1096.00	39.04	1015.79	176.75	1272.47	291.29	2.17	
11	435.00	1096.00	39.48	1015.54	186.85	1303.48	323.46	2.29	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

****

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

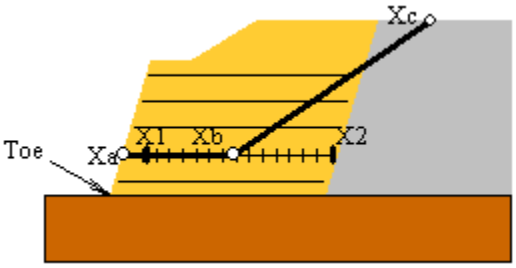
Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	39.20	1015.68	329.00	1094.60	140.99	1213.47	222.44	1.58	
2	46.55	1018.32	302.50	1093.23	149.24	1142.16	160.88	1.72	
. 3	55.13	1019.45	329.00	1094.60	152.63	1200.73	205.83	1.58 .	OK
4	63.87	1020.94	302.50	1093.23	155.86	1147.28	156.28	1.63	
5	71.81	1021.42	302.50	1093.23	159.48	1146.23	152.52	1.63	
6	79.44	1019.78	302.50	1093.23	162.78	1142.12	148.03	1.63	
7	87.07	1018.09	302.50	1093.23	165.07	1140.84	145.44	1.64	
8	94.95	1016.22	302.50	1093.23	167.37	1139.22	142.74	1.66	
9	102.50	1014.52	302.50	1093.23	169.69	1137.25	139.92	1.70	
10	111.99	1017.94	302.50	1093.23	178.43	1128.49	128.98	1.89	
11	119.01	1026.60	302.50	1093.23	190.41	1115.95	114.37	2.34	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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RESULTS OF TRANSLATIONAL ANALYSIS



Results in the table below represent critical two-part wedges identified between specified starting (X1) and ending (X2) search points. Wedges along all reinforcement layers and at elevation zero are reported. The critical two-part wedge, one for each predetermined elevation, is defined by Xa, Xb and Xc where Xa is the front end of the passive wedge (slope face), Xb is where the passive wedge ends and the active one starts, and Xc is the X-ordinate at which the active wedge starts.

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
At toe elevation	0.00	107.00	1013.00	216.80	1013.00	354.83	1095.94	2.42	Minimum on Edge
Reinf. Layer #1	0.10	107.10	1013.10	217.29	1013.10	349.41	1095.66	2.14	Minimum on Edge
Reinf. Layer #2	2.92	109.96	1015.92	220.19	1015.92	347.65	1095.57	2.20	Minimum on Edge
Reinf. Layer #3	5.74	112.82	1018.74	222.99	1018.74	345.79	1095.47	2.26	Minimum on Edge
Reinf. Layer #4	8.56	115.68	1021.56	225.89	1021.56	344.03	1095.38	2.35	Minimum on Edge
Reinf. Layer #5	11.38	118.54	1024.38	228.79	1024.38	352.53	1095.82	2.42	Minimum on Edge
Reinf. Layer #6	14.20	121.39	1027.20	231.59	1027.20	350.24	1095.70	2.49	Minimum on Edge
Reinf. Layer #7	17.02	124.25	1030.02	234.49	1030.02	348.06	1095.59	2.59	Minimum on Edge
Reinf. Layer #8	19.84	127.11	1032.84	237.29	1032.84	345.77	1095.47	2.67	Minimum on Edge
Reinf. Layer #9	22.66	129.97	1035.66	240.19	1035.66	343.59	1095.36	2.80	Minimum on Edge
Reinf. Layer #10	25.48	132.83	1038.48	243.09	1038.48	341.41	1095.25	2.89	Minimum on Edge
Reinf. Layer #11	28.30	135.69	1041.30	245.89	1041.30	339.12	1095.13	2.99	Minimum on Edge
Reinf. Layer #12	31.12	138.55	1044.12	248.79	1044.12	336.94	1095.01	3.15	Minimum on Edge
Reinf. Layer #13	33.94	141.40	1046.94	251.59	1046.94	334.65	1094.90	3.27	Minimum on Edge
Reinf. Layer #14	36.76	144.26	1049.76	254.49	1049.76	332.47	1094.78	3.46	Minimum on Edge
Reinf. Layer #15	39.58	147.12	1052.58	257.39	1052.58	330.29	1094.67	3.61	Minimum on Edge
Reinf. Layer #16	42.40	149.98	1055.40	260.19	1055.40	328.00	1094.55	3.78	Minimum on Edge
Reinf. Layer #17	45.22	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence
Reinf. Layer #18	48.04	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence
Reinf. Layer #19	50.86	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence
Reinf. Layer #20	53.68	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence
Reinf. Layer #21	56.50	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence
Reinf. Layer #22	59.32	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence
Reinf. Layer #23	62.14	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence
Reinf. Layer #24	64.96	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence
Reinf. Layer #25	67.78	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence
Reinf. Layer #26	70.60	107.00	1013.00	107.00	1013.00	107.00	101[1000033.30		No convergence

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.58
Critical Circle: Xc = 152.63[ft], Yc = 1200.73[ft], R = 205.83[ft]. (Number of slices used = 65)

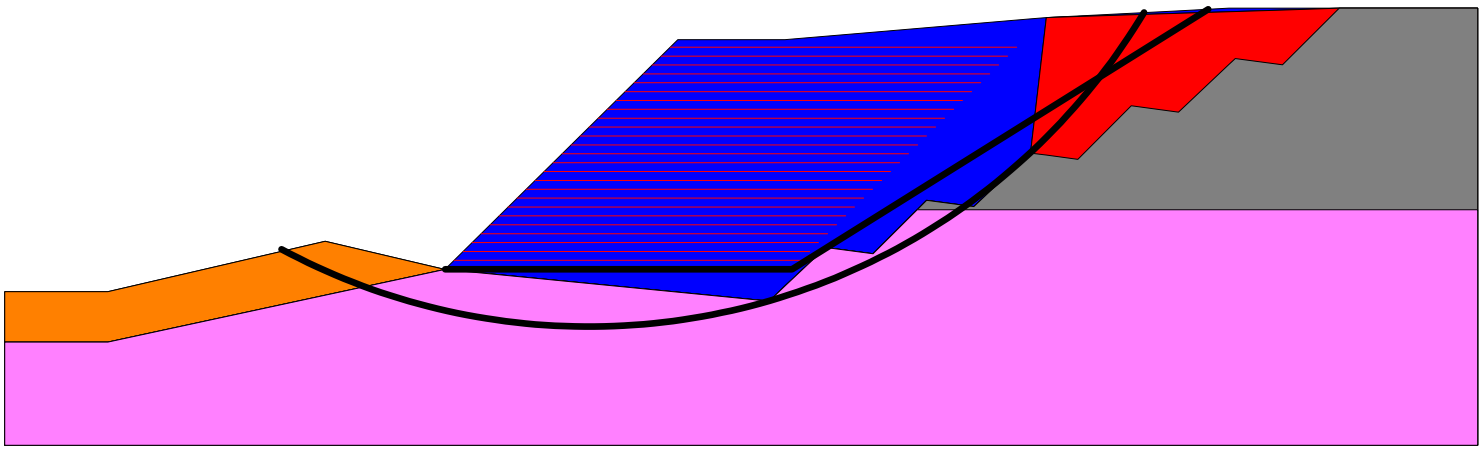
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

Minimum Factor of Safety = 2.14
Critical Two-Part Wedge: (Xa = 107.10, Ya = 1013.10) [ft]
(Xb = 217.29, Yb = 1013.10) [ft]
(Xc = 349.41, Yc = 1095.66) [ft]
(Number of slices used = 30)
Interslice resultant force inclination = 19.56 [degrees]

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

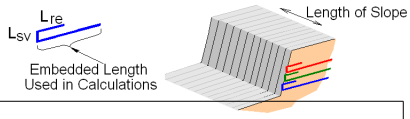
REINFORCEMENT LAYOUT: DRAWING



SCALE:

0 5 11 2 2 3 0[ft]

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REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

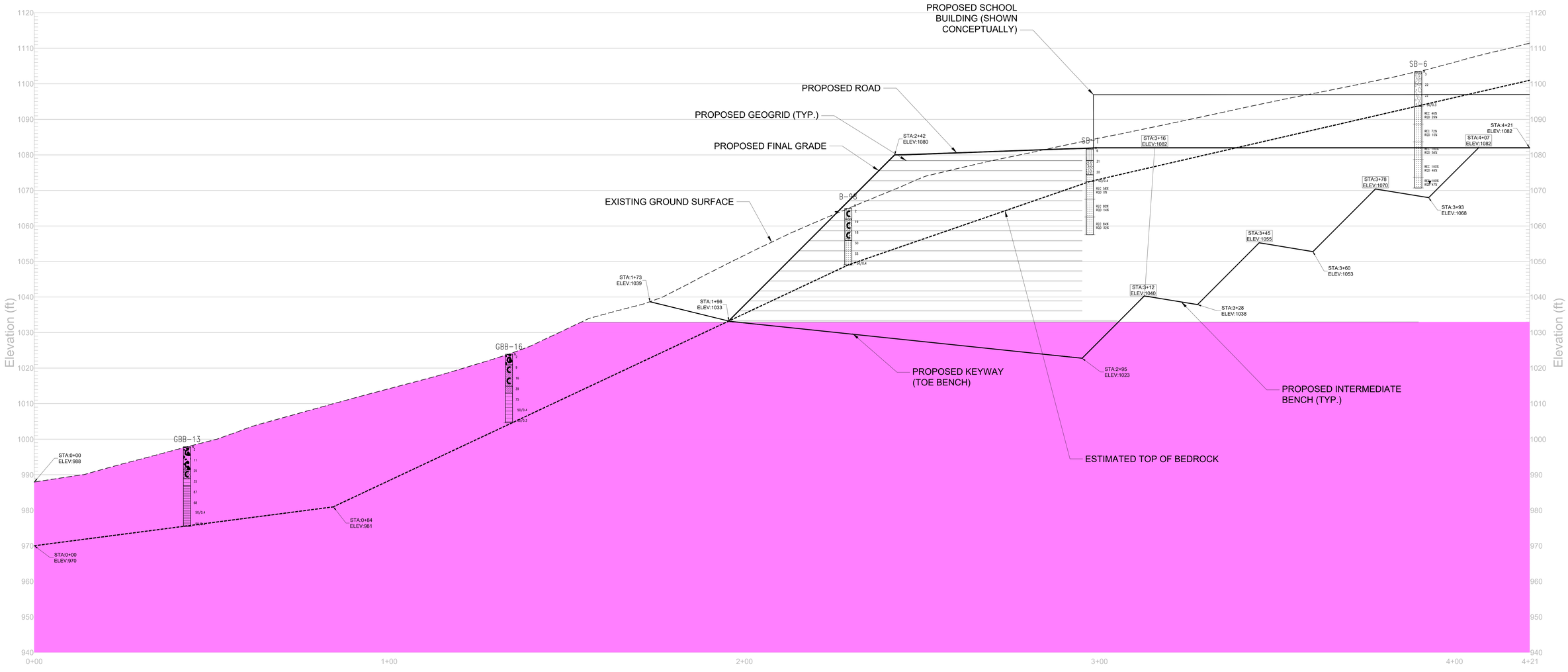
Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
1	1	20XT	0.10	110.00	1.00	107.10	1013.10	217.10	1013.10	0.00	0.00
2	1	20XT	2.92	110.00	1.00	109.96	1015.92	219.96	1015.92	0.00	0.00
3	1	20XT	5.74	110.00	1.00	112.82	1018.74	222.82	1018.74	0.00	0.00
4	1	20XT	8.56	110.00	1.00	115.68	1021.56	225.68	1021.56	0.00	0.00
5	1	20XT	11.38	110.00	1.00	118.54	1024.38	228.54	1024.38	0.00	0.00
6	1	20XT	14.20	110.00	1.00	121.39	1027.20	231.39	1027.20	0.00	0.00
7	1	20XT	17.02	110.00	1.00	124.25	1030.02	234.25	1030.02	0.00	0.00
8	1	20XT	19.84	110.00	1.00	127.11	1032.84	237.11	1032.84	0.00	0.00
9	1	20XT	22.66	110.00	1.00	129.97	1035.66	239.97	1035.66	0.00	0.00
10	1	20XT	25.48	110.00	1.00	132.83	1038.48	242.83	1038.48	0.00	0.00
11	1	20XT	28.30	110.00	1.00	135.69	1041.30	245.69	1041.30	0.00	0.00
12	1	20XT	31.12	110.00	1.00	138.55	1044.12	248.55	1044.12	0.00	0.00
13	1	20XT	33.94	110.00	1.00	141.40	1046.94	251.40	1046.94	0.00	0.00
14	1	20XT	36.76	110.00	1.00	144.26	1049.76	254.26	1049.76	0.00	0.00
15	1	20XT	39.58	110.00	1.00	147.12	1052.58	257.12	1052.58	0.00	0.00
16	1	20XT	42.40	110.00	1.00	149.98	1055.40	259.98	1055.40	0.00	0.00
17	1	20XT	45.22	110.00	1.00	152.84	1058.22	262.84	1058.22	0.00	0.00
18	1	20XT	48.04	110.00	1.00	155.70	1061.04	265.70	1061.04	0.00	0.00
19	1	20XT	50.86	110.00	1.00	158.56	1063.86	268.56	1063.86	0.00	0.00
20	1	20XT	53.68	110.00	1.00	161.42	1066.68	271.42	1066.68	0.00	0.00
21	1	20XT	56.50	110.00	1.00	164.27	1069.50	274.27	1069.50	0.00	0.00
22	1	20XT	59.32	110.00	1.00	167.13	1072.32	277.13	1072.32	0.00	0.00
23	1	20XT	62.14	110.00	1.00	169.99	1075.14	279.99	1075.14	0.00	0.00
24	1	20XT	64.96	110.00	1.00	172.85	1077.96	282.85	1077.96	0.00	0.00
25	1	20XT	67.78	110.00	1.00	175.71	1080.78	285.71	1080.78	0.00	0.00
26	1	20XT	70.60	110.00	1.00	178.57	1083.60	288.57	1083.60	0.00	0.00

* Vertical distance between layers.

QUANTITIES

Reinf. Type #	Designated Name	Coverage Ratio	Area of reinforcemnt [ft²] / length of slope [ft]
1	20XT	1.00	2860.00

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CROSS-SECTION S-S

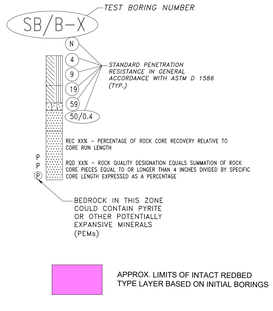
0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE
- WATER LEVEL AT END OF DRILLING
- WATER LEVEL DURING DRILLING
- WATER LEVEL AFTER 24 HR
- C DENOTES COLLUVIAL SOIL
- GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK
- GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE



APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	03/08/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

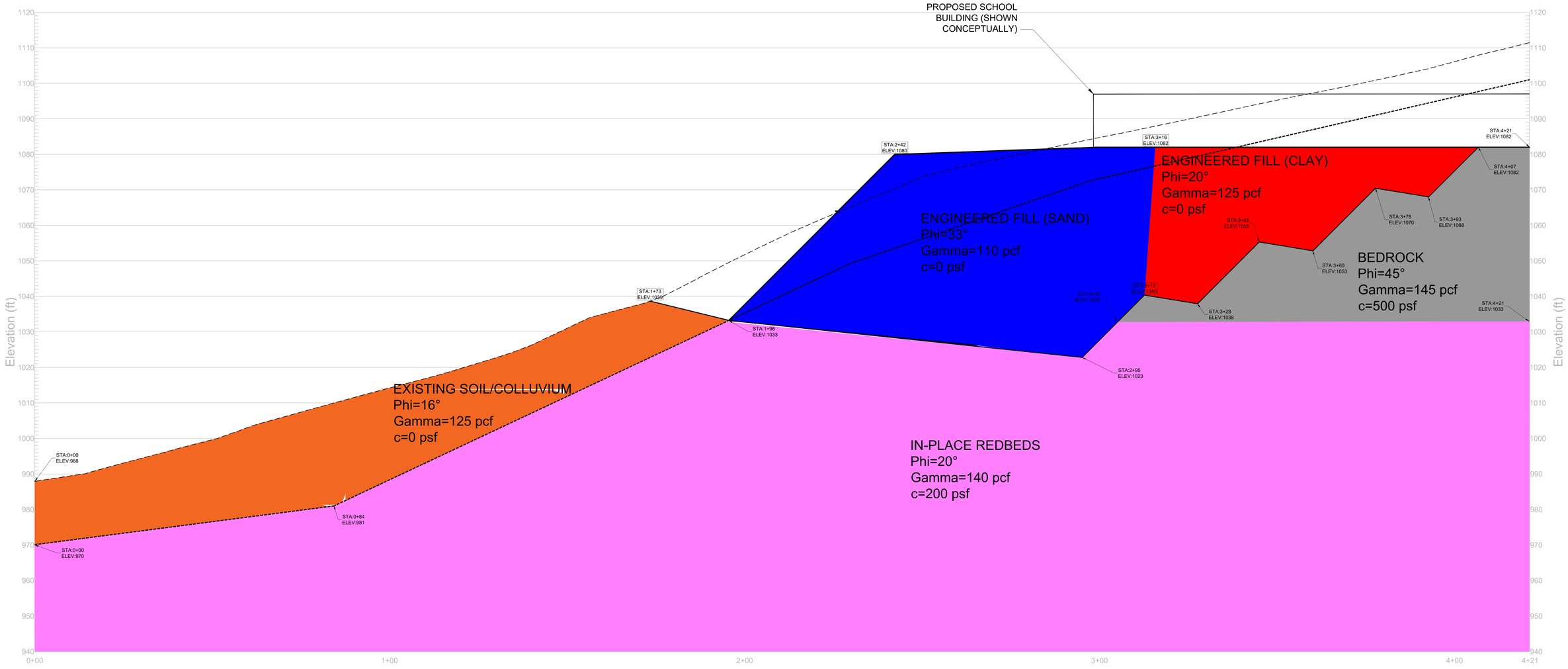
GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 14

MASS GRADING RECOMMENDATION - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A



CROSS-SECTION S-S

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	03/08/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.
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PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II
FIGURE 15
MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A

SOLMAX

MiraSlope® Pro

Cross-Section S-S

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PROJECT IDENTIFICATION

Title: Cross-Section S-S
Project Number: 16123A -
Client: QVSD
Designer: MAW

Description:

Company's information:

Name: GBBE
Street: 180 Bilmar Drive Suite 4
Pittsburgh, PA 15205
Telephone #: 412-922-4440
E-Mail:

Original file path and name: E:\Users\A ..... \Job Files\16123A MiraSlope\Cross-Section S-S.MIRp
Original date and time of creating this file: Wed Mar 06 10:10:52 2024

PROGRAM MODE: Analysis of a General Slope using GEOSYNTHETIC as reinforcing material.

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INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ³]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ²]
1.....Eng. Fill (Sand).....	110.0	33.0	0.0
2.....Colluvium.....	125.0	16.0	0.0
3.....Eng. Fill (Redbed).....	125.0	20.0	0.0
4.....Bedrock.....	145.0	45.0	500.0
5.....In-Place Redbeds.....	140.0	20.0	200.0

REINFORCEMENT

Reinforcement Type #	Geosynthetic Designated Name	Ultimate Strength, Tult [lb/ft]	Reduction Factor for Installation Damage, RFid	Reduction Factor for Durability, RFd	Reduction Factor for Creep, RFc	Coverage Ratio, Rc
1	20XT	16000	1.10	1.10	1.44	1.00

Interaction Parameters Type #	Geosynthetic Designated Name	== Direct Sliding == Cds-phi	Cds-c	==== Pullout ==== Ci	Alpha
1	20XT	0.80	0.00	0.80	0.80

Relative Orientation of Reinforcement Force, ROR = 0.00. Assigned Factor of Safety to resist pullout, Fs-po = 1.50
Design method for Global Stability: Comprehensive Bishop.

WATER

Water is not present

SEISMICITY

Not Applicable

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DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

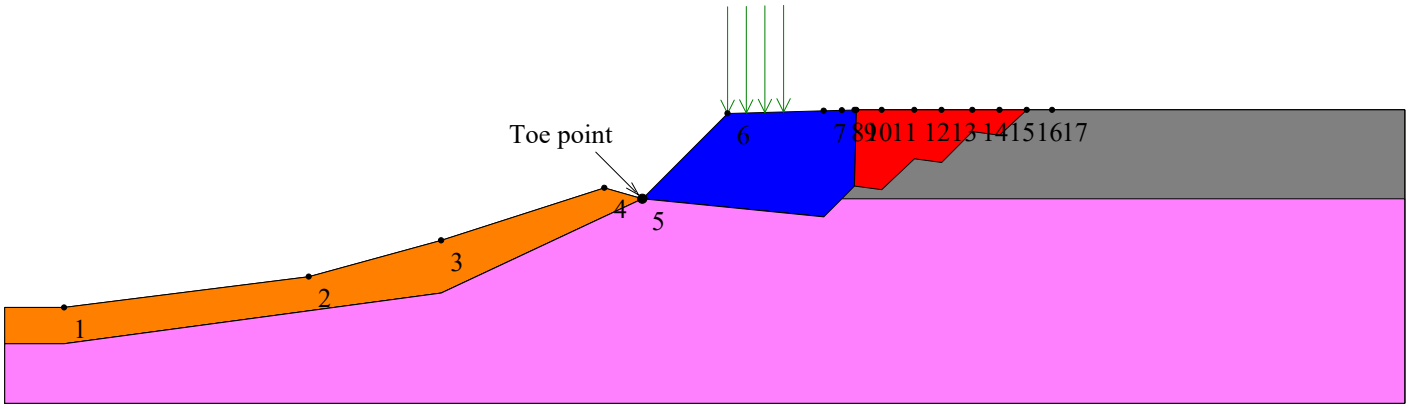
Soil profile contains 5 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 158.00 and ends at X1e = 193.00 [ft].
Surcharge load, Q2.....None
Surcharge load, Q3.....None

STRIP LOAD

.....None.....



SCALE:

0 5 11 22 33 [ft]

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TABULATED DETAILS OF GEMERAL SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

	#	Xi	Yi
Top of Layer 1	1	-208.00	973.00
	2	-73.00	990.00
	3	0.00	1010.00
	4	90.00	1039.00
	5	111.00	1033.00
	6	158.00	1080.00
	7	229.00	1082.00
	8	323.00	1082.00
	9	337.00	1082.00
Top of Layer 2	10	-208.00	973.00
	11	-73.00	990.00
	12	0.00	1010.00
	13	90.00	1039.00
	14	111.00	1033.00
	15	211.00	1023.00
	16	228.00	1040.00
	17	229.00	1082.00
	18	323.00	1082.00
	19	337.00	1082.00
Top of Layer 3	20	-208.00	953.00
	21	0.00	981.00
	22	111.00	1033.00
	23	211.00	1023.00
	24	228.00	1040.00
	25	229.00	1082.00
	26	323.00	1082.00
	27	337.00	1082.00
Top of Layer 4	28	-208.00	953.00
	29	0.00	981.00
	30	111.00	1033.00
	31	211.00	1023.00
	32	228.00	1040.00
	33	243.00	1038.00
	34	261.00	1055.00
	35	276.00	1053.00
	36	293.00	1070.00
	37	308.00	1068.00
	38	323.00	1082.00
	39	337.00	1082.00
Top of Layer 5	40	-208.00	953.00
	41	0.00	981.00
	42	111.00	1033.00
	43	211.00	1023.00
	44	221.00	1033.00
	45	337.00	1033.00

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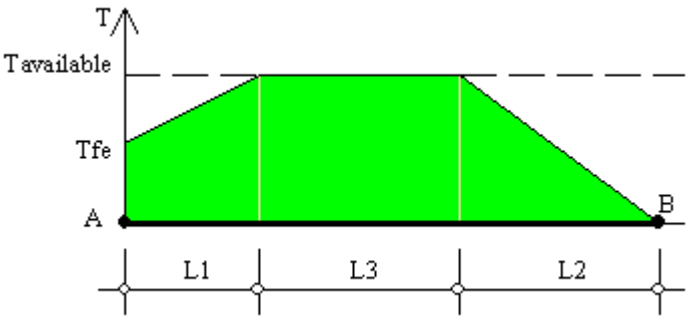
TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3	Y4	Y5
1	-208.00	973.00	973.00	953.00	953.00	953.00
2	-73.00	990.00	990.00	971.17	971.17	971.17
3	0.00	1010.00	1010.00	981.00	981.00	981.00
4	90.00	1039.00	1039.00	1023.16	1023.16	1023.16
5	111.00	1033.00	1033.00	1033.00	1033.00	1033.00
6	158.00	1080.00	1028.30	1028.30	1028.30	1028.30
7	211.00	1081.49	1023.00	1023.00	1023.00	1023.00
8	221.00	1081.77	1033.00	1033.00	1033.00	1033.00
9	228.00	1081.97	1040.00	1040.00	1040.00	1033.00
10	229.00	1082.00	1082.00	1082.00	1039.87	1033.00
11	243.00	1082.00	1082.00	1082.00	1038.00	1033.00
12	261.00	1082.00	1082.00	1082.00	1055.00	1033.00
13	276.00	1082.00	1082.00	1082.00	1053.00	1033.00
14	293.00	1082.00	1082.00	1082.00	1070.00	1033.00
15	308.00	1082.00	1082.00	1082.00	1068.00	1033.00
16	323.00	1082.00	1082.00	1082.00	1082.00	1033.00
17	337.00	1082.00	1082.00	1082.00	1082.00	1033.00

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER



A = Front-end of reinforcement (at face of slope)
B = Rear-end of reinforcement
AB = L1 + L2 + L3 = Embedded length of reinforcement

Tavailable = Long-term strength of reinforcement
Tfe = Available front-end strength (e.g., connection to facing)

L1 = Front-end 'pullout' length
L2 = Rear-end pullout length
Tavailable prevails along L3

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
1	20XT	0.00	100.00	0.00	3.12	96.88	9182.74	9182.74
2	20XT	2.82	97.00	0.00	3.31	93.69	9182.74	9182.74
3	20XT	5.64	94.00	0.00	3.54	90.46	9182.74	9182.74
4	20XT	8.46	91.00	0.00	3.77	87.23	9182.74	9182.74
5	20XT	11.28	88.00	0.00	4.07	83.93	9182.74	9182.74
6	20XT	14.10	85.00	0.00	4.40	80.60	9182.74	9182.74
7	20XT	16.92	82.00	0.00	4.79	77.21	9182.74	9182.74
8	20XT	19.75	80.00	0.00	5.28	74.72	9182.74	9182.74
9	20XT	22.59	77.00	0.00	5.84	71.16	9182.74	9182.74
10	20XT	25.42	74.00	0.00	6.56	67.44	9182.74	9182.74
11	20XT	28.25	71.00	0.00	7.51	63.49	9182.74	9182.74
12	20XT	31.09	68.00	0.00	8.76	59.24	9182.74	9182.74
13	20XT	33.92	66.00	0.00	10.47	55.53	9182.74	9182.74
14	20XT	36.75	63.00	0.00	13.06	49.94	9182.74	9182.74
15	20XT	39.59	60.00	0.00	17.45	42.55	9182.74	9182.74
16	20XT	42.42	57.00	0.00	26.51	30.49	9182.74	9182.74
17	20XT	45.25	55.00	0.00	55.00	0.00	8205.11	8205.11 (*)

(*) This Tavailable is dictated by the pullout resistance capacity, which is smaller than the long-term strength of the reinforcement that is related to its specified ultimate strength.

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RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	155.00	1077.00	-103.44	987.05	-1.65	1110.83	160.26	2.35	
2	173.00	1080.42	-104.07	987.40	0.88	1133.93	180.24	2.17	
3	191.00	1080.93	-103.75	987.14	7.11	1148.79	196.01	2.04	
4	209.00	1081.44	-104.02	987.14	7.29	1184.34	226.45	1.94	
5	227.00	1081.94	-103.33	986.69	9.48	1215.88	255.45	1.79	
6	245.00	1082.00	-71.49	991.43	29.45	1236.97	265.48	1.66	
7	263.00	1082.00	-71.29	991.25	27.13	1289.76	314.32	1.58	
. 8	281.00	1082.00	-71.44	991.13	14.31	1387.46	405.50	1.55 .	OK
9	299.00	1082.00	-71.47	991.00	-5.01	1520.09	533.24	1.60	
10	317.00	1082.00	-168.55	978.17	-105.19	1869.15	893.22	1.67	
11	335.00	1082.00	-168.88	978.61	-0.42	1437.14	488.50	1.91	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

****

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

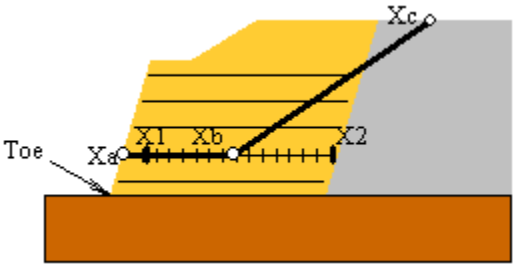
Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	-200.61	974.16	281.00	1082.00	-67.07	1507.14	549.46	1.66	
2	-168.34	978.33	281.00	1082.00	-40.78	1451.04	489.62	1.62	
3	-135.38	982.28	281.00	1082.00	-27.13	1449.44	479.53	1.58	
4	-102.60	986.33	245.00	1082.00	8.65	1261.40	296.72	1.67	
. 5	-71.44	991.13	281.00	1082.00	14.31	1387.46	405.50	1.55 .	OK
6	-38.59	999.88	299.00	1082.00	27.58	1462.82	467.64	1.66	
7	-5.01	1008.63	245.00	1082.00	89.60	1148.89	169.18	1.80	
8	27.15	1019.02	263.00	1082.00	106.28	1195.80	193.68	1.77	
9	59.37	1029.67	263.00	1082.00	132.81	1166.26	155.08	1.93	
10	92.50	1038.29	263.00	1082.00	156.92	1141.38	121.57	2.16	
11	124.78	1047.07	299.00	1082.00	179.60	1225.58	186.74	3.93	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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RESULTS OF TRANSLATIONAL ANALYSIS



Results in the table below represent critical two-part wedges identified between specified starting (X1) and ending (X2) search points. Wedges along all reinforcement layers and at elevation zero are reported. The critical two-part wedge, one for each predetermined elevation, is defined by Xa, Xb and Xc where Xa is the front end of the passive wedge (slope face), Xb is where the passive wedge ends and the active one starts, and Xc is the X-ordinate at which the active wedge starts.

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
At toe elevation	0.00	111.00	1033.00	210.80	1033.00	286.25	1082.00	3.10	Minimum on Edge
Reinf. Layer #1	0.00	111.00	1033.00	211.19	1033.00	296.06	1082.00	2.65	Minimum on Edge
Reinf. Layer #2	2.82	113.82	1035.82	210.99	1035.82	279.45	1082.00	2.73	Minimum on Edge
Reinf. Layer #3	5.64	116.64	1038.64	210.89	1038.64	280.28	1082.00	2.81	Minimum on Edge
Reinf. Layer #4	8.46	119.46	1041.46	210.69	1041.46	280.91	1082.00	2.92	Minimum on Edge
Reinf. Layer #5	11.28	122.28	1044.28	210.49	1044.28	266.41	1082.00	3.07	Minimum on Edge
Reinf. Layer #6	14.10	125.10	1047.10	210.29	1047.10	266.14	1082.00	3.20	Minimum on Edge
Reinf. Layer #7	16.92	127.92	1049.92	210.09	1049.92	265.65	1082.00	3.38	Minimum on Edge
Reinf. Layer #8	19.75	130.75	1052.75	210.99	1052.75	256.03	1082.00	3.59	Minimum on Edge
Reinf. Layer #9	22.59	133.59	1055.59	210.79	1055.59	256.53	1082.00	3.82	Minimum on Edge
Reinf. Layer #10	25.42	111.00	1033.00	111.00	1033.00	111.00	1031000	33.30	No convergence
Reinf. Layer #11	28.25	111.00	1033.00	111.00	1033.00	111.00	1031000	33.30	No convergence
Reinf. Layer #12	31.09	111.00	1033.00	111.00	1033.00	111.00	1031000	33.30	No convergence
Reinf. Layer #13	33.92	111.00	1033.00	111.00	1033.00	111.00	1031000	33.30	No convergence
Reinf. Layer #14	36.75	111.00	1033.00	111.00	1033.00	111.00	1031000	33.30	No convergence
Reinf. Layer #15	39.59	111.00	1033.00	111.00	1033.00	111.00	1031000	33.30	No convergence
Reinf. Layer #16	42.42	111.00	1033.00	111.00	1033.00	111.00	1031000	33.30	No convergence
Reinf. Layer #17	45.25	111.00	1033.00	111.00	1033.00	111.00	1031000	33.30	No convergence

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.55
Critical Circle: Xc = 14.31[ft], Yc = 1387.46[ft], R = 405.50[ft]. (Number of slices used = 60)

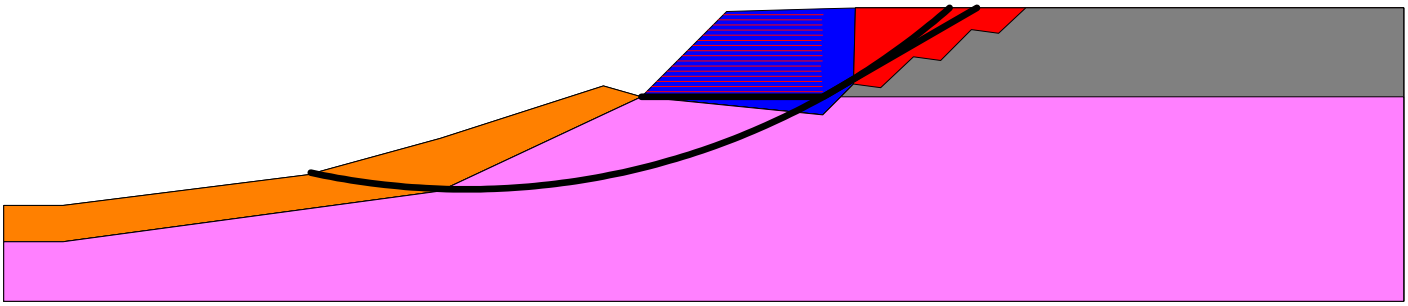
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

Minimum Factor of Safety = 2.65
Critical Two-Part Wedge: (Xa = 111.00, Ya = 1033.00) [ft]
(Xb = 211.19, Yb = 1033.00) [ft]
(Xc = 296.06, Yc = 1082.00) [ft]
(Number of slices used = 30)
Interslice resultant force inclination = 14.36 [degrees]

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

REINFORCEMENT LAYOUT: DRAWING

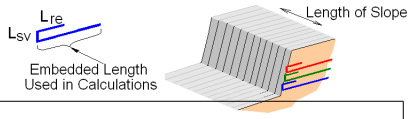


SCALE:

(511223([ft]

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REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

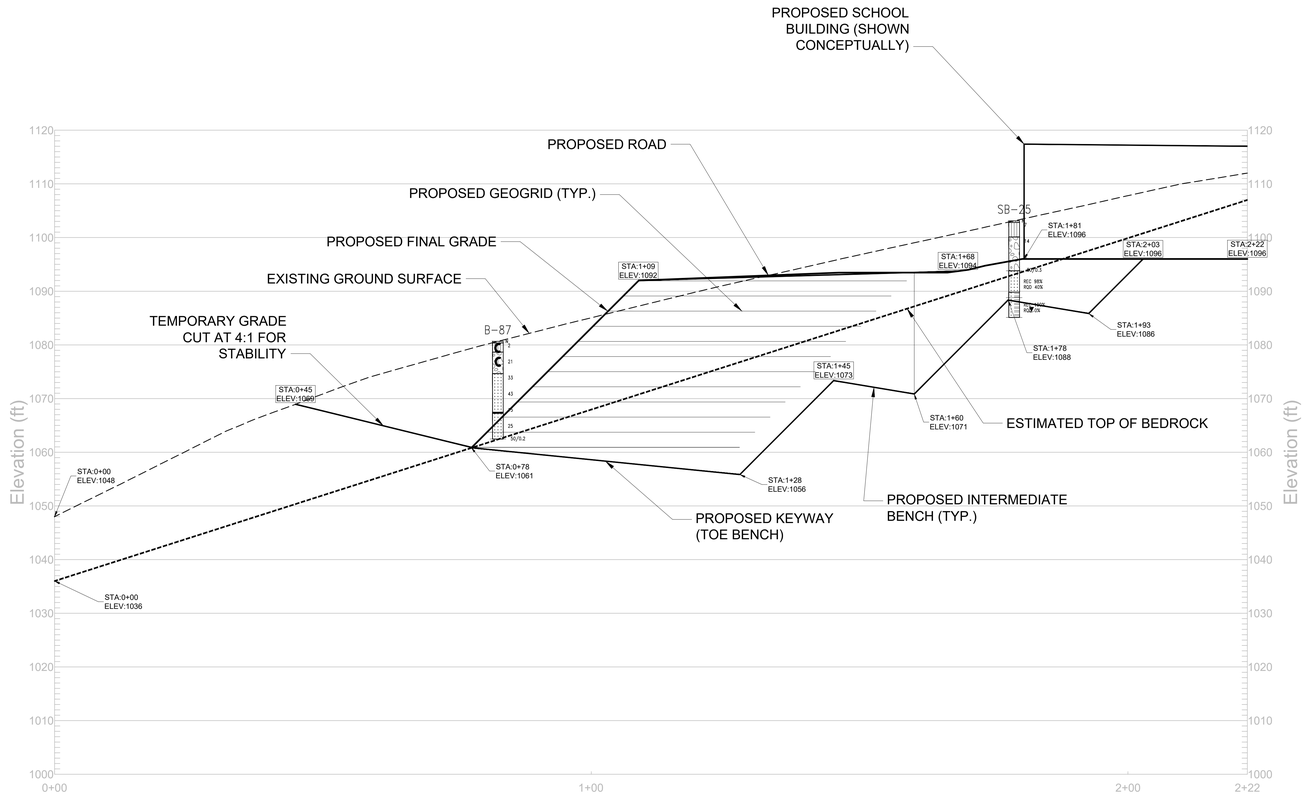
Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
1	1	20XT	0.00	100.00	1.00	111.00	1033.00	211.00	1033.00	0.00	0.00
2	1	20XT	2.82	97.00	1.00	113.82	1035.82	210.82	1035.82	0.00	0.00
3	1	20XT	5.64	94.00	1.00	116.64	1038.64	210.64	1038.64	0.00	0.00
4	1	20XT	8.46	91.00	1.00	119.46	1041.46	210.46	1041.46	0.00	0.00
5	1	20XT	11.28	88.00	1.00	122.28	1044.28	210.28	1044.28	0.00	0.00
6	1	20XT	14.10	85.00	1.00	125.10	1047.10	210.10	1047.10	0.00	0.00
7	1	20XT	16.92	82.00	1.00	127.92	1049.92	209.92	1049.92	0.00	0.00
8	1	20XT	19.75	80.00	1.00	130.75	1052.75	210.75	1052.75	0.00	0.00
9	1	20XT	22.59	77.00	1.00	133.59	1055.59	210.59	1055.59	0.00	0.00
10	1	20XT	25.42	74.00	1.00	136.42	1058.42	210.42	1058.42	0.00	0.00
11	1	20XT	28.25	71.00	1.00	139.25	1061.25	210.25	1061.25	0.00	0.00
12	1	20XT	31.09	68.00	1.00	142.09	1064.09	210.09	1064.09	0.00	0.00
13	1	20XT	33.92	66.00	1.00	144.92	1066.92	210.92	1066.92	0.00	0.00
14	1	20XT	36.75	63.00	1.00	147.75	1069.75	210.75	1069.75	0.00	0.00
15	1	20XT	39.59	60.00	1.00	150.59	1072.59	210.59	1072.59	0.00	0.00
16	1	20XT	42.42	57.00	1.00	153.42	1075.42	210.42	1075.42	0.00	0.00
17	1	20XT	45.25	55.00	1.00	156.25	1078.25	211.25	1078.25	0.00	0.00

* Vertical distance between layers.

QUANTITIES

Reinf. Type #	Designated Name	Coverage Ratio	Area of reinforcemnt [ft²] / length of slope [ft]
1	20XT	1.00	1308.00

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CROSS-SECTION T-T

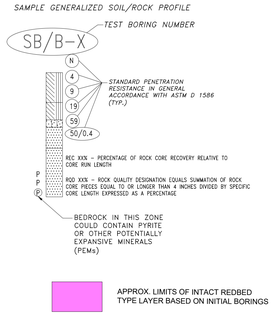
0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE
- WATER LEVEL AT END OF DRILLING
- WATER LEVEL DURING DRILLING
- WATER LEVEL AFTER 24 HR
- DENOTES COLLUVIAL SOIL
- GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK
- GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE



APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS

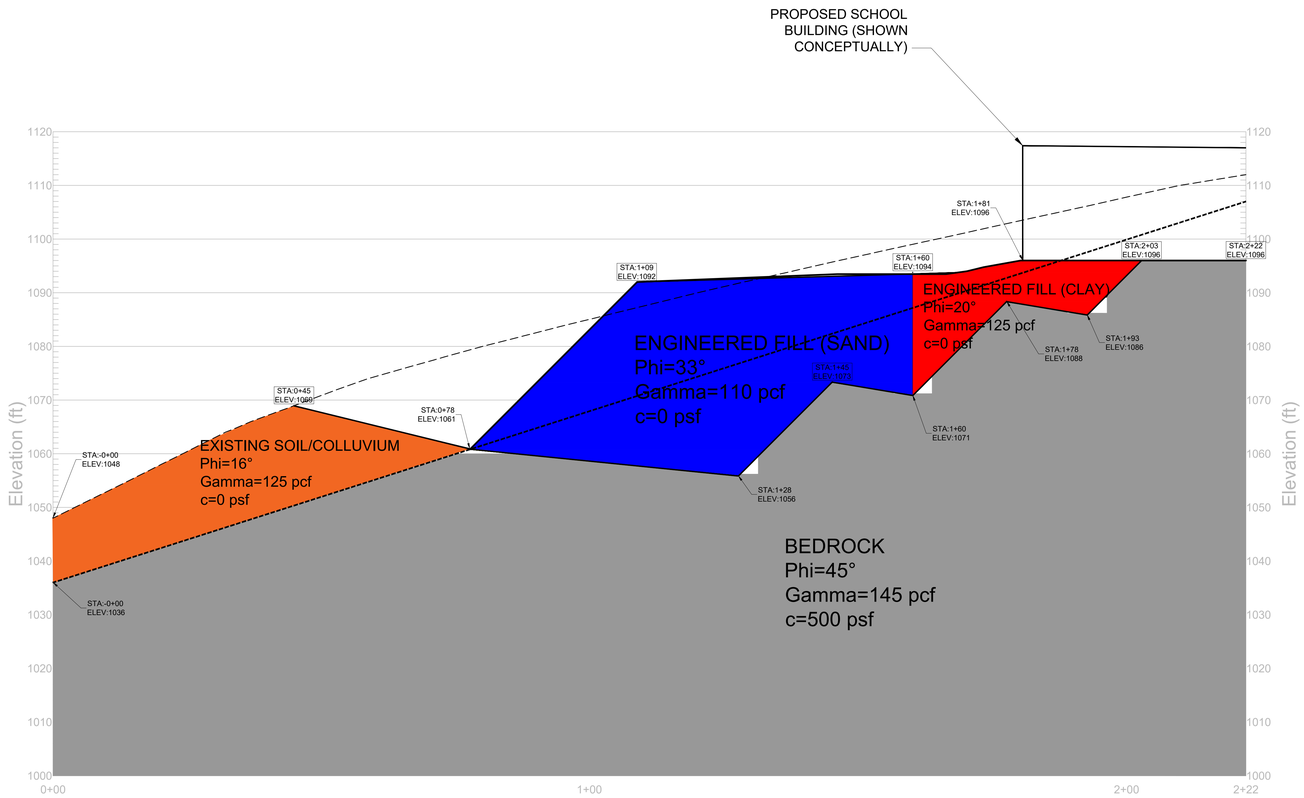
GARVIN BOWARD BEITKO

SCALE: AS NOTED	GARVIN BOWARD BEITKO ENGINEERING, INC.
DATE: 03/08/2024	*BUILT ON REPUTATION*
REVISED:	GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II
DRAWN BY: MAW	MASS GRADING RECOMMENDATION - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS
APPROVED BY: DAB	FOR: PHILLIPS & ASSOCIATES, INC.

180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

FIGURE 16

GBBE PROJECT NUMBER: 16123A



CROSS-SECTION T-T

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

GARVIN BOWARD BEITKO

SCALE: AS NOTED	GARVIN BOWARD BEITKO ENGINEERING, INC.
DATE: 03/08/2024	*BUILT ON REPUTATION*
REVISED:	GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II
DRAWN BY: MAW	MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS
APPROVED BY: DAB	FOR: PHILLIPS & ASSOCIATES, INC.

180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

FIGURE 17

GBBE PROJECT NUMBER: 16123A

SOLMAX

MiraSlope® Pro

Cross-Section T-T

Report created by MiraSlope® Pro: Update #1.01: Copyright (c) 2021-2023, ADAMA Engineering, Inc.

PROJECT IDENTIFICATION

Title: Cross-Section T-T
Project Number: 16123A -
Client: QVSD
Designer: MAW

Description:

Company's information:

Name: GBBE
Street: 180 Bilmar Drive Suite 4
Pittsburgh, PA 15205
Telephone #: 412-922-4440
E-Mail:

Original file path and name: E:\Users\A ..... \Job Files\16123A MiraSlope\Cross-Section T-T.MIRp
Original date and time of creating this file: Wed Mar 06 10:10:52 2024

PROGRAM MODE: Analysis of a General Slope using GEOSYNTHETIC as reinforcing material.

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INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ³]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ²]
1.....Eng. Fill (Sand).....	110.0	33.0	0.0
2.....Colluvium.....	125.0	16.0	0.0
3.....Eng. Fill (Redbed).....	125.0	20.0	0.0
4.....In-Place Redbeds.....	140.0	20.0	200.0

REINFORCEMENT

Reinforcement Type #	Geosynthetic Designated Name	Ultimate Strength, Tult [lb/ft]	Reduction Factor for Installation Damage, RFid	Reduction Factor for Durability, RFd	Reduction Factor for Creep, RFc	Coverage Ratio, Rc
1	20XT	16000	1.10	1.10	1.44	1.00

Interaction Parameters Type #	Geosynthetic Designated Name	== Direct Sliding == Cds-phi	Cds-c	==== Pullout ==== Ci	Alpha
1	20XT	0.80	0.00	0.80	0.80

Relative Orientation of Reinforcement Force, ROR = 0.00. Assigned Factor of Safety to resist pullout, Fs-po = 1.50
Design method for Global Stability: Comprehensive Bishop.

WATER

Water is not present

SEISMICITY

Not Applicable

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DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

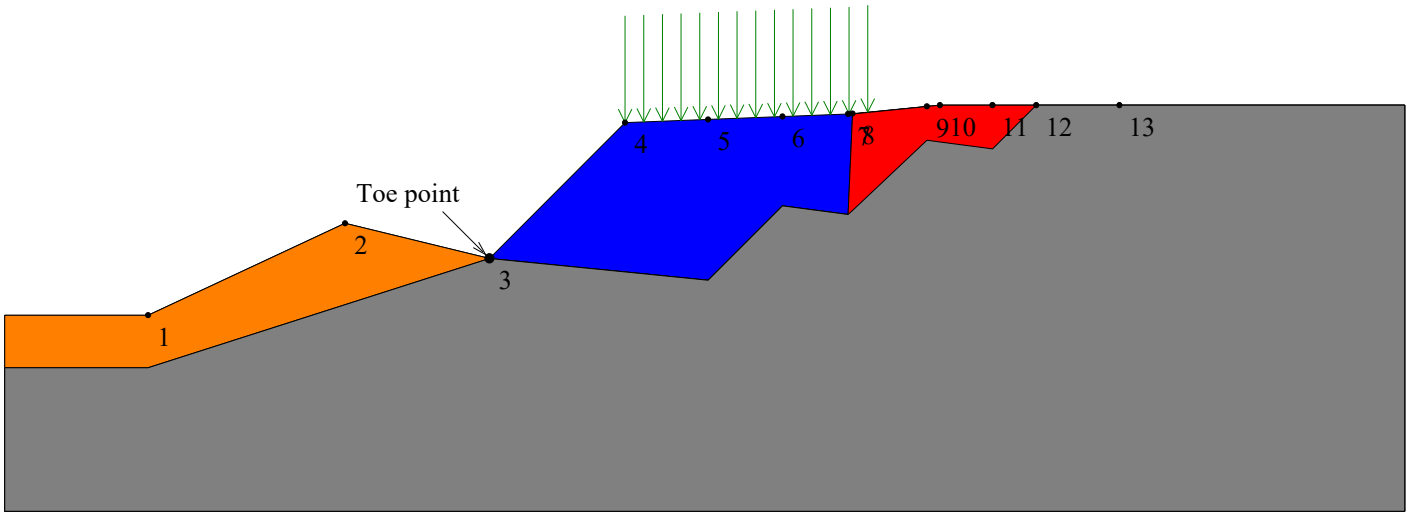
Soil profile contains 4 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 109.00 and ends at X1e = 168.00 [ft].
Surcharge load, Q2.....None
Surcharge load, Q3.....None

STRIP LOAD

.....None.....



SCALE:

0 5 10 15 20 25 30 [ft]

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TABULATED DETAILS OF GEMERAL SPECIFIED GEOMETRY

Soil profile contains 4 layers. Coordinates in [ft.]

	#	Xi	Yi
Top of Layer 1	1	0.00	1048.00
	2	45.00	1069.00
	3	78.00	1061.00
	4	109.00	1092.00
	5	160.00	1094.00
	6	181.00	1096.00
	7	203.00	1096.00
	8	222.00	1096.00
Top of Layer 2	9	0.00	1048.00
	10	45.00	1069.00
	11	78.00	1061.00
	12	128.00	1056.00
	13	145.00	1073.00
	14	160.00	1071.00
	15	161.00	1094.00
	16	181.00	1096.00
	17	203.00	1096.00
	18	222.00	1096.00
Top of Layer 3	19	0.00	1036.00
	20	78.00	1061.00
	21	128.00	1056.00
	22	145.00	1073.00
	23	160.00	1071.00
	24	161.00	1094.00
	25	181.00	1096.00
	26	203.00	1096.00
	27	222.00	1096.00
Top of Layer 4	28	0.00	1036.00
	29	78.00	1061.00
	30	128.00	1056.00
	31	145.00	1073.00
	32	160.00	1071.00
	33	178.00	1088.00
	34	193.00	1086.00
	35	203.00	1096.00
	36	222.00	1096.00

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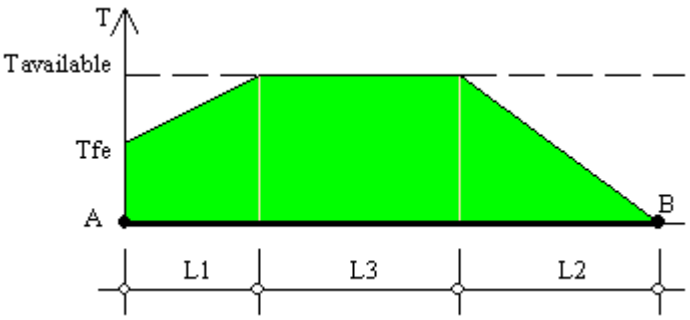
TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 4 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3	Y4
1	0.00	1048.00	1048.00	1036.00	1036.00
2	45.00	1069.00	1069.00	1050.42	1050.42
3	78.00	1061.00	1061.00	1061.00	1061.00
4	109.00	1092.00	1057.90	1057.90	1057.90
5	128.00	1092.75	1056.00	1056.00	1056.00
6	145.00	1093.41	1073.00	1073.00	1073.00
7	160.00	1094.00	1071.00	1071.00	1071.00
8	161.00	1094.10	1094.00	1094.00	1071.94
9	178.00	1095.71	1095.70	1095.70	1088.00
10	181.00	1096.00	1096.00	1096.00	1087.60
11	193.00	1096.00	1096.00	1096.00	1086.00
12	203.00	1096.00	1096.00	1096.00	1096.00
13	222.00	1096.00	1096.00	1096.00	1096.00

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER



A = Front-end of reinforcement (at face of slope)
B = Rear-end of reinforcement
AB = L1 + L2 + L3 = Embedded length of reinforcement

Tavailable = Long-term strength of reinforcement
Tfe = Available front-end strength (e.g., connection to facing)

L1 = Front-end 'pullout' length
L2 = Rear-end pullout length
Tavailable prevails along L3

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
1	20XT	0.10	50.00	0.00	4.79	45.21	9182.74	9182.74
2	20XT	2.92	50.00	0.00	5.25	44.75	9182.74	9182.74
3	20XT	5.74	50.00	0.00	5.77	44.23	9182.74	9182.74
4	20XT	8.56	50.00	0.00	6.46	43.54	9182.74	9182.74
5	20XT	11.38	50.00	0.00	7.32	42.68	9182.74	9182.74
6	20XT	14.20	50.00	0.00	8.40	41.60	9182.74	9182.74
7	20XT	17.02	50.00	0.00	9.94	40.06	9182.74	9182.74
8	20XT	19.84	50.00	0.00	12.11	37.89	9182.74	9182.74
9	20XT	22.66	50.00	0.00	15.58	34.42	9182.74	9182.74
10	20XT	25.48	50.00	0.00	22.08	27.92	9182.74	9182.74
11	20XT	28.30	50.00	0.00	39.96	10.04	9182.74	9182.74
12	20XT	31.12	50.00	0.00	50.00	0.00	2942.62	2942.62 (*)

(*) This Tavailable is dictated by the pullout resistance capacity, which is smaller than the long-term strength of the reinforcement that is related to its specified ultimate strength.

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RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	78.00	1061.00	78.00	1061.00	78.00	1061.00	0.00	N/A	#10 - Overhanging Cliff
2	78.00	1061.00	78.00	1061.00	78.00	1061.00	0.00	N/A	#10 - Overhanging Cliff
3	124.00	1092.59	34.46	1064.99	73.68	1096.79	50.50	29.38	
4	136.00	1093.06	56.81	1066.81	91.56	1094.55	44.47	7.40	
5	148.00	1093.53	66.42	1063.88	101.56	1094.26	46.45	1.99	
6	160.00	1094.00	61.65	1065.18	101.74	1110.60	60.58	1.80	
. 7	172.00	1095.14	61.45	1065.25	104.02	1127.18	75.15	1.77 .	OK
8	184.00	1096.00	56.70	1066.44	104.85	1147.98	94.69	1.83	
9	196.00	1096.00	52.27	1067.45	106.91	1168.45	114.83	1.92	
10	208.00	1096.00	52.32	1067.38	110.27	1189.88	135.51	2.07	
11	220.00	1096.00	47.92	1068.40	112.16	1218.12	162.92	2.21	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

****

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

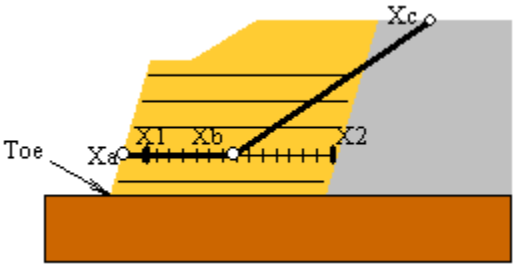
Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	34.48	1064.62	184.00	1096.00	91.29	1165.87	116.10	1.89	
2	38.18	1067.21	184.00	1096.00	95.08	1162.70	111.16	1.88	
3	43.50	1068.93	172.00	1095.14	96.73	1136.03	85.66	1.84	
4	48.10	1068.47	172.00	1095.14	99.06	1132.86	82.12	1.79	
5	52.50	1067.44	172.00	1095.14	100.83	1130.54	79.48	1.78	
6	56.85	1066.43	172.00	1095.14	102.20	1129.81	77.93	1.77	
. 7	61.45	1065.25	172.00	1095.14	104.02	1127.18	75.15	1.77 .	OK
8	66.06	1064.07	172.00	1095.14	105.41	1126.05	73.42	1.78	
9	70.80	1062.81	172.00	1095.14	106.80	1124.70	71.59	1.82	
10	74.66	1062.06	172.00	1095.14	108.20	1123.11	69.66	1.85	
11	79.34	1063.39	172.00	1095.14	112.16	1118.70	64.31	2.02	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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RESULTS OF TRANSLATIONAL ANALYSIS



Results in the table below represent critical two-part wedges identified between specified starting (X1) and ending (X2) search points. Wedges along all reinforcement layers and at elevation zero are reported. The critical two-part wedge, one for each predetermined elevation, is defined by Xa, Xb and Xc where Xa is the front end of the passive wedge (slope face), Xb is where the passive wedge ends and the active one starts, and Xc is the X-ordinate at which the active wedge starts.

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
At toe elevation	0.00	78.00	1061.00	127.80	1061.00	188.42	1096.00	2.52	Minimum on Edge
Reinf. Layer #1	0.10	78.10	1061.10	128.29	1061.10	188.74	1096.00	2.21	Minimum on Edge
Reinf. Layer #2	2.92	80.92	1063.92	131.09	1063.92	186.65	1096.00	2.39	Minimum on Edge
Reinf. Layer #3	5.74	83.74	1066.74	133.99	1066.74	184.67	1096.00	2.62	Minimum on Edge
Reinf. Layer #4	8.56	86.56	1069.56	136.79	1069.56	182.59	1096.00	2.87	Minimum on Edge
Reinf. Layer #5	11.38	89.38	1072.38	139.59	1072.38	180.40	1095.94	3.16	Minimum on Edge
Reinf. Layer #6	14.20	92.20	1075.20	142.39	1075.20	177.91	1095.71	3.53	Minimum on Edge
Reinf. Layer #7	17.02	78.00	1061.00	78.00	1061.00	78.00	106 1000033.30		No convergence
Reinf. Layer #8	19.84	78.00	1061.00	78.00	1061.00	78.00	106 1000033.30		No convergence
Reinf. Layer #9	22.66	78.00	1061.00	78.00	1061.00	78.00	106 1000033.30		No convergence
Reinf. Layer #10	25.48	78.00	1061.00	78.00	1061.00	78.00	106 1000033.30		No convergence
Reinf. Layer #11	28.30	78.00	1061.00	78.00	1061.00	78.00	106 1000033.30		No convergence
Reinf. Layer #12	31.12	78.00	1061.00	78.00	1061.00	78.00	106 1000033.30		No convergence

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.77
Critical Circle: Xc = 104.02[ft], Yc = 1127.18[ft], R = 75.15[ft]. (Number of slices used = 56)

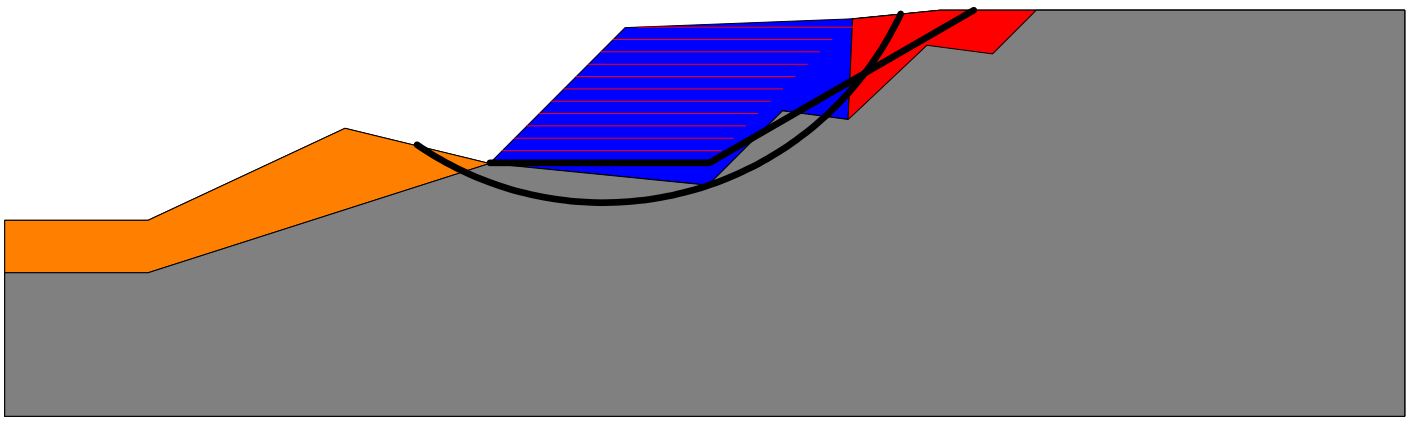
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

Minimum Factor of Safety = 2.21
Critical Two-Part Wedge: (Xa = 78.10, Ya = 1061.10) [ft]
(Xb = 128.29, Yb = 1061.10) [ft]
(Xc = 188.74, Yc = 1096.00) [ft]
(Number of slices used = 30)
Interslice resultant force inclination = 17.87 [degrees]

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

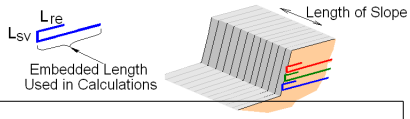
REINFORCEMENT LAYOUT: DRAWING



SCALE:

0 5 10 15 20 25 30 [ft]

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REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

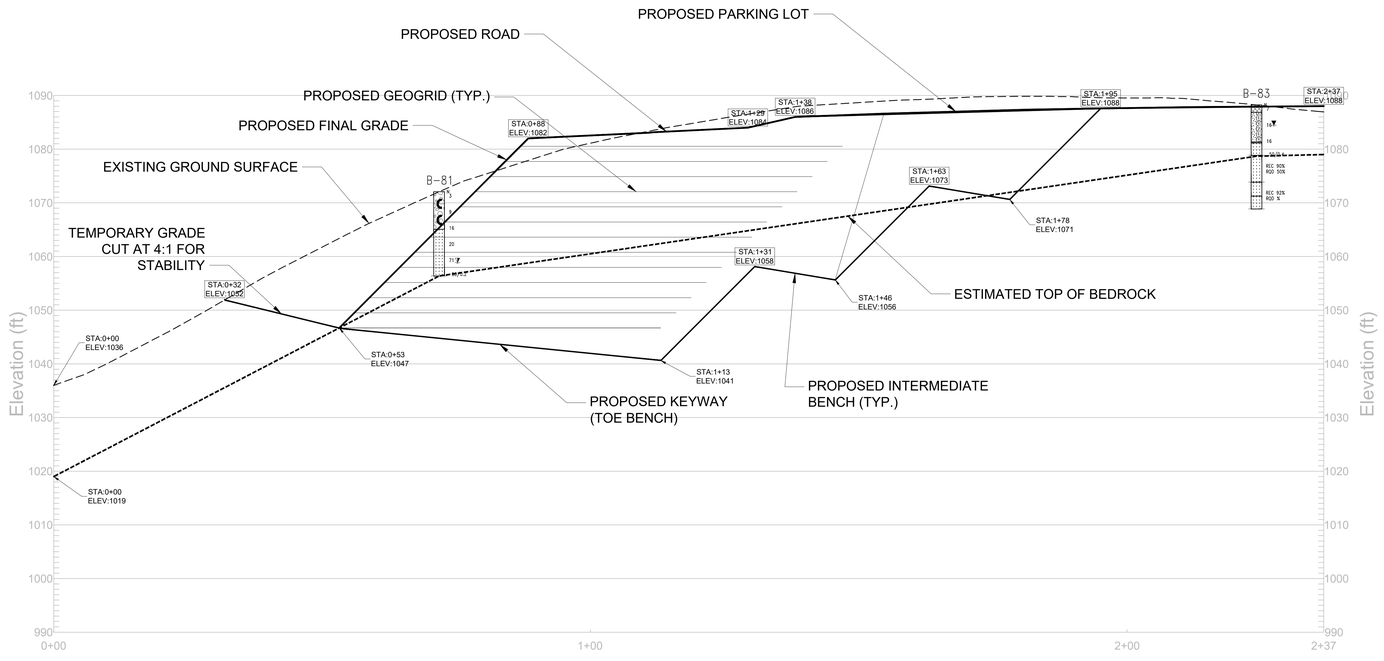
Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
1	1	20XT	0.10	50.00	1.00	78.10	1061.10	128.10	1061.10	0.00	0.00
2	1	20XT	2.92	50.00	1.00	80.92	1063.92	130.92	1063.92	0.00	0.00
3	1	20XT	5.74	50.00	1.00	83.74	1066.74	133.74	1066.74	0.00	0.00
4	1	20XT	8.56	50.00	1.00	86.56	1069.56	136.56	1069.56	0.00	0.00
5	1	20XT	11.38	50.00	1.00	89.38	1072.38	139.38	1072.38	0.00	0.00
6	1	20XT	14.20	50.00	1.00	92.20	1075.20	142.20	1075.20	0.00	0.00
7	1	20XT	17.02	50.00	1.00	95.02	1078.02	145.02	1078.02	0.00	0.00
8	1	20XT	19.84	50.00	1.00	97.84	1080.84	147.84	1080.84	0.00	0.00
9	1	20XT	22.66	50.00	1.00	100.66	1083.66	150.66	1083.66	0.00	0.00
10	1	20XT	25.48	50.00	1.00	103.48	1086.48	153.48	1086.48	0.00	0.00
11	1	20XT	28.30	50.00	1.00	106.30	1089.30	156.30	1089.30	0.00	0.00
12	1	20XT	31.12	50.00	1.00	112.06	1092.12	162.06	1092.12	0.00	0.00

* Vertical distance between layers.

QUANTITIES

Reinf. Type #	Designated Name	Coverage Ratio	Area of reinforcemnt [ft²] / length of slope [ft]
1	20XT	1.00	600.00

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CROSS-SECTION U-U

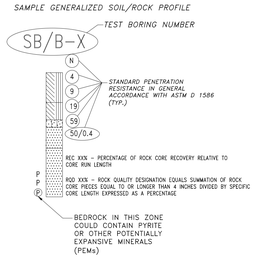
0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE
- WATER LEVEL AT END OF DRILLING
- WATER LEVEL DURING DRILLING
- WATER LEVEL AFTER 24 HR
- DENOTES COLLUVIAL SOIL
- GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK
- GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE



APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	03/08/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

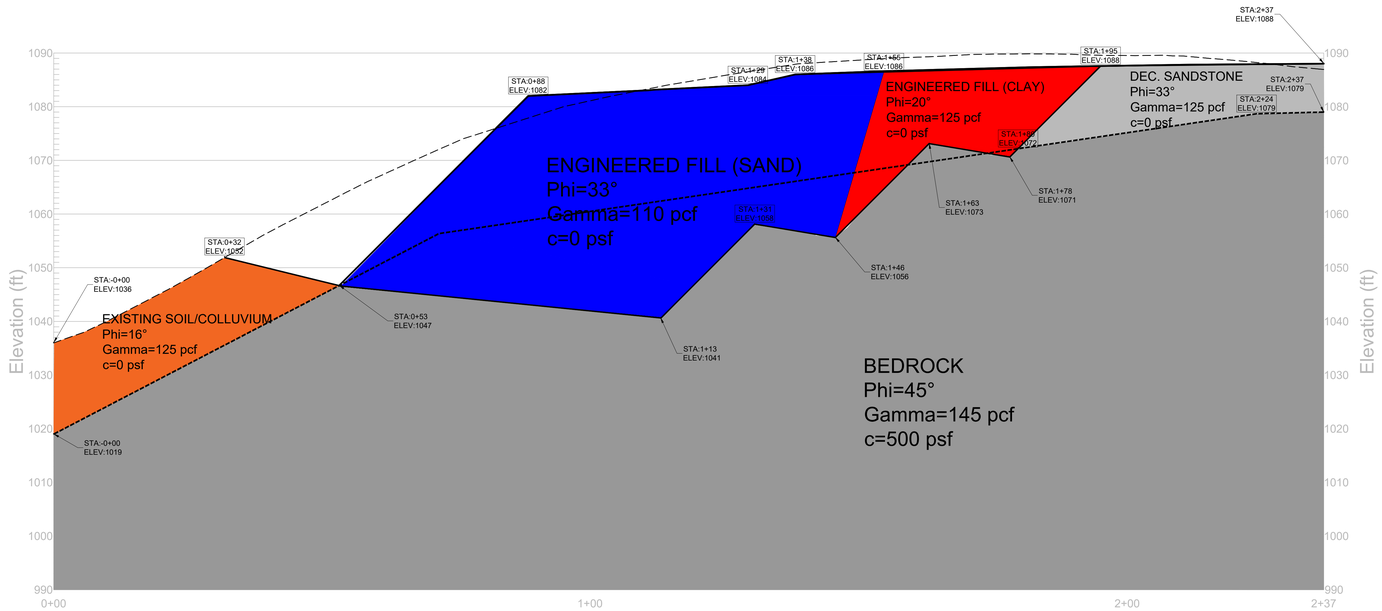
GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION
180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 18

MASS GRADING RECOMMENDATION - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A



CROSS-SECTION U-U

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

GARVIN BOWARD BEITKO	SCALE: AS NOTED	GARVIN BOWARD BEITKO ENGINEERING, INC. *BUILT ON REPUTATION*	180 BILMAR DRIVE, SUITE IV PITTSBURGH, PA 15205 PHONE: 412-922-4440
	DATE: 03/08/2024	GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II	FIGURE 19
	REVISED:	MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS	
	DRAWN BY: MAW		
	APPROVED BY: DAB	FOR: PHILLIPS & ASSOCIATES, INC.	GBBE PROJECT NUMBER: 16123A

SOLMAX

MiraSlope® Pro

Cross-Section U-U

Report created by MiraSlope® Pro: Update #1.01: Copyright (c) 2021-2023, ADAMA Engineering, Inc.

PROJECT IDENTIFICATION

Title: Cross-Section U-U
Project Number: 16123A -
Client: QVSD
Designer: MAW

Description:

Company's information:

Name: GBBE
Street: 180 Bilmar Drive Suite 4
Pittsburgh, PA 15205
Telephone #: 412-922-4440
E-Mail:

Original file path and name: E:\Users\A ..... \Job Files\16123A MiraSlope\Cross-Section U-U.MIRp
Original date and time of creating this file: Wed Mar 06 10:10:52 2024

PROGRAM MODE: Analysis of a General Slope using GEOSYNTHETIC as reinforcing material.

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INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ^{3}]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ^{2}]
1.....Eng. Fill (Sand).....	110.0	33.0	0.0
2.....Colluvium.....	125.0	16.0	0.0
3.....Eng. Fill (Redbed).....	125.0	20.0	0.0
4.....Decomposed Sandstone.....	125.0	33.0	0.0
5.....Bedrock.....	145.0	45.0	500.0

REINFORCEMENT

Reinforcement Type #	Geosynthetic Designated Name	Ultimate Strength, Tult [lb/ft]	Reduction Factor for Installation Damage, RFid	Reduction Factor for Durability, RFd	Reduction Factor for Creep, RFc	Coverage Ratio, Rc
1	20XT	16000	1.10	1.10	1.44	1.00

Interaction Parameters Type #	Geosynthetic Designated Name	== Direct Sliding == Cds-phi	Cds-c	==== Pullout ==== Ci	Alpha
1	20XT	0.80	0.00	0.80	0.80

Relative Orientation of Reinforcement Force, ROR = 0.00. Assigned Factor of Safety to resist pullout, Fs-po = 1.50
Design method for Global Stability: Comprehensive Bishop.

WATER

Water is not present

SEISMICITY

Not Applicable

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DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

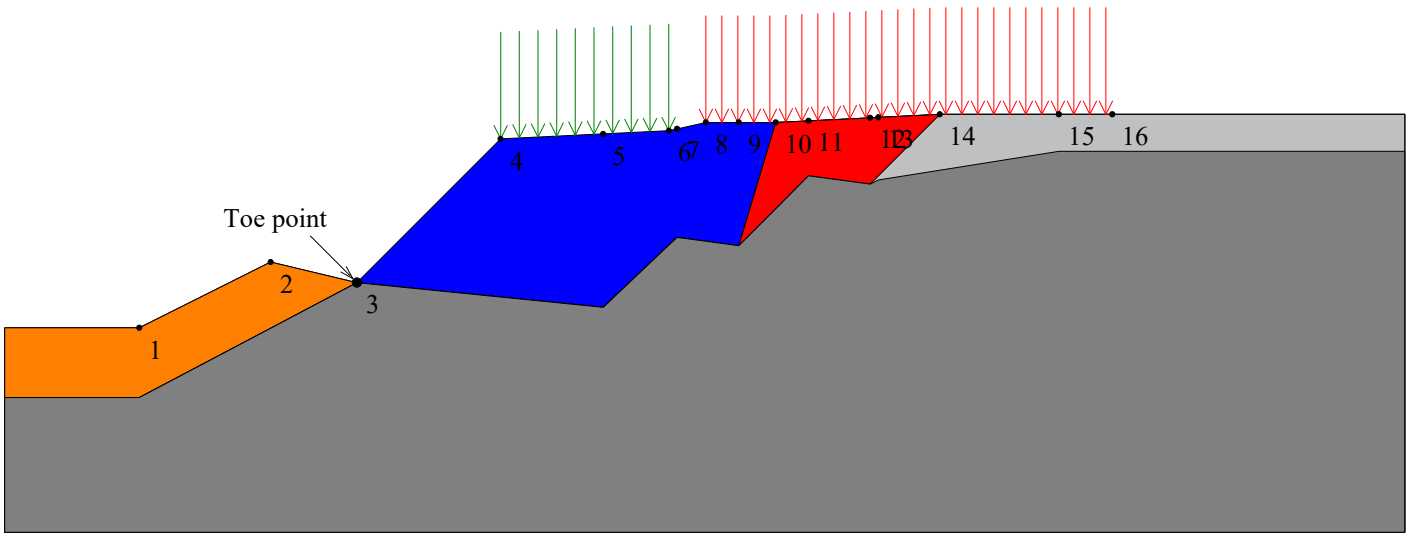
Soil profile contains 5 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 88.00 and ends at X1e = 129.00 [ft].
Load Q2 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X2s = 138.00 and ends at X2e = 237.00 [ft].
Surcharge load, Q3.....None

STRIP LOAD

.....None.....



SCALE:

0 5 10 15 20 25 30 [ft]

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TABULATED DETAILS OF GEMERAL SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

	#	Xi	Yi
Top of Layer 1	1	0.00	1036.00
	2	32.00	1052.00
	3	53.00	1047.00
	4	88.00	1082.00
	5	129.00	1084.00
	6	138.00	1086.00
	7	155.00	1086.00
	8	195.00	1088.00
	9	237.00	1088.00
Top of Layer 2	10	0.00	1036.00
	11	32.00	1052.00
	12	53.00	1047.00
	13	113.00	1041.00
	14	131.00	1058.00
	15	146.00	1056.00
	16	155.00	1086.00
	17	195.00	1088.00
	18	237.00	1088.00
Top of Layer 3	19	0.00	1019.00
	20	53.00	1047.00
	21	113.00	1041.00
	22	131.00	1058.00
	23	146.00	1056.00
	24	155.00	1086.00
	25	195.00	1088.00
	26	237.00	1088.00
Top of Layer 4	27	0.00	1019.00
	28	53.00	1047.00
	29	113.00	1041.00
	30	131.00	1058.00
	31	146.00	1056.00
	32	163.00	1073.00
	33	178.00	1071.00
	34	195.00	1088.00
	35	237.00	1088.00
Top of Layer 5	36	0.00	1019.00
	37	53.00	1047.00
	38	113.00	1041.00
	39	131.00	1058.00
	40	146.00	1056.00
	41	163.00	1073.00
	42	178.00	1071.00
	43	180.00	1072.00
	44	224.00	1079.00
	45	237.00	1079.00

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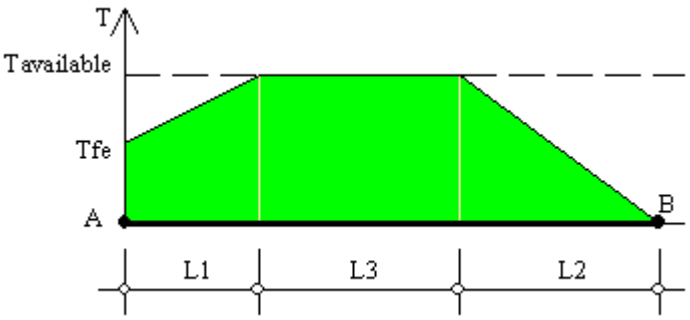
TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3	Y4	Y5
1	0.00	1036.00	1036.00	1019.00	1019.00	1019.00
2	32.00	1052.00	1052.00	1035.91	1035.91	1035.91
3	53.00	1047.00	1047.00	1047.00	1047.00	1047.00
4	88.00	1082.00	1043.50	1043.50	1043.50	1043.50
5	113.00	1083.22	1041.00	1041.00	1041.00	1041.00
6	129.00	1084.00	1056.11	1056.11	1056.11	1056.11
7	131.00	1084.44	1058.00	1058.00	1058.00	1058.00
8	138.00	1086.00	1057.07	1057.07	1057.07	1057.07
9	146.00	1086.00	1056.00	1056.00	1056.00	1056.00
10	155.00	1086.00	1086.00	1086.00	1065.00	1065.00
11	163.00	1086.40	1086.40	1086.40	1073.00	1073.00
12	178.00	1087.15	1087.15	1087.15	1071.00	1071.00
13	180.00	1087.25	1087.25	1087.25	1073.00	1072.00
14	195.00	1088.00	1088.00	1088.00	1088.00	1074.39
15	224.00	1088.00	1088.00	1088.00	1088.00	1079.00
16	237.00	1088.00	1088.00	1088.00	1088.00	1079.00

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER



A = Front-end of reinforcement (at face of slope)
B = Rear-end of reinforcement
AB = L1 + L2 + L3 = Embedded length of reinforcement

Tavailable = Long-term strength of reinforcement
Tfe = Available front-end strength (e.g., connection to facing)

L1 = Front-end 'pullout' length
L2 = Rear-end pullout length
Tavailable prevails along L3

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
1	20XT	0.10	60.00	0.00	4.20	55.80	9182.74	9182.74
2	20XT	2.92	60.00	0.00	4.53	55.47	9182.74	9182.74
3	20XT	5.74	60.00	0.00	4.92	55.08	9182.74	9182.74
4	20XT	8.56	60.00	0.00	5.41	54.59	9182.74	9182.74
5	20XT	11.38	60.00	0.00	5.97	54.03	9182.74	9182.74
6	20XT	14.20	60.00	0.00	6.69	53.31	9182.74	9182.74
7	20XT	17.02	60.00	0.00	7.61	52.39	9182.74	9182.74
8	20XT	19.84	60.00	0.00	8.73	51.27	9182.74	9182.74
9	20XT	22.66	60.00	0.00	10.20	49.80	9182.74	9182.74
10	20XT	25.48	60.00	0.00	12.24	47.76	9182.74	9182.74
11	20XT	28.30	60.00	0.00	15.58	44.42	9182.74	9182.74
12	20XT	31.12	60.00	0.00	22.24	37.76	9182.74	9182.74
13	20XT	33.94	60.00	0.00	47.38	12.62	9182.74	9182.74

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RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	53.00	1047.00	53.00	1047.00	53.00	1047.00	0.00	N/A	#10 - Overhanging Cliff
2	53.00	1047.00	53.00	1047.00	53.00	1047.00	0.00	N/A	#10 - Overhanging Cliff
3	115.00	1083.32	29.81	1051.21	66.24	1083.63	48.76	10.75	
4	130.00	1084.22	38.16	1051.32	78.14	1084.36	51.86	5.18	
5	145.00	1086.00	59.96	1054.03	91.96	1097.99	54.38	3.53	
6	160.00	1086.25	56.62	1051.17	89.53	1124.06	79.98	3.15	
. 7	175.00	1087.00	53.31	1048.16	81.87	1168.73	123.91	2.93 .	OK
8	190.00	1087.75	55.60	1051.15	76.72	1238.66	188.70	3.09	
9	205.00	1088.00	53.68	1048.02	67.34	1302.64	254.99	3.67	
10	220.00	1088.00	56.95	1051.00	80.84	1323.51	273.55	4.36	
11	235.00	1088.00	53.86	1048.01	76.82	1374.27	327.07	4.83	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

****

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

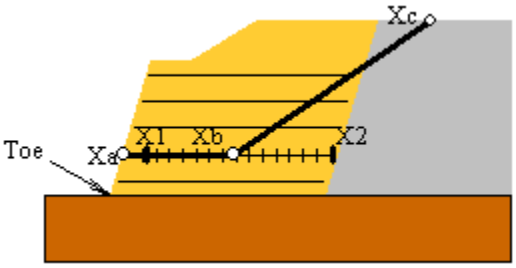
Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	29.00	1051.29	175.00	1087.00	71.25	1194.86	149.66	3.24	
2	32.30	1052.01	175.00	1087.00	76.80	1178.98	134.55	3.21	
3	35.04	1051.36	175.00	1087.00	77.29	1178.11	133.60	3.19	
4	37.87	1050.69	175.00	1087.00	77.76	1177.12	132.58	3.18	
5	40.77	1049.98	175.00	1087.00	78.24	1175.99	131.46	3.17	
6	44.02	1049.23	175.00	1087.00	82.11	1163.12	120.10	3.27	
7	47.00	1048.50	175.00	1087.00	82.72	1161.77	118.77	3.30	
8	50.00	1047.75	175.00	1087.00	82.19	1163.89	120.52	3.30	
. 9	53.31	1048.16	175.00	1087.00	81.87	1168.73	123.91	2.93 .	OK
10	55.93	1051.25	175.00	1087.00	84.78	1171.33	123.50	3.02	
11	59.66	1054.09	175.00	1087.00	90.05	1166.16	116.11	3.16	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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RESULTS OF TRANSLATIONAL ANALYSIS



Results in the table below represent critical two-part wedges identified between specified starting (X1) and ending (X2) search points. Wedges along all reinforcement layers and at elevation zero are reported. The critical two-part wedge, one for each predetermined elevation, is defined by Xa, Xb and Xc where Xa is the front end of the passive wedge (slope face), Xb is where the passive wedge ends and the active one starts, and Xc is the X-ordinate at which the active wedge starts.

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
At toe elevation	0.00	53.00	1047.00	112.80	1047.00	179.77	1087.24	2.60	Minimum on Edge
Reinf. Layer #1	0.10	53.10	1047.10	113.29	1047.10	183.10	1087.40	2.30	Minimum on Edge
Reinf. Layer #2	2.92	55.92	1049.92	116.09	1049.92	180.82	1087.29	2.42	Minimum on Edge
Reinf. Layer #3	5.74	58.74	1052.74	118.99	1052.74	178.65	1087.18	2.59	Minimum on Edge
Reinf. Layer #4	8.56	61.56	1055.56	121.79	1055.56	176.36	1087.07	2.79	Minimum on Edge
Reinf. Layer #5	11.38	64.38	1058.38	124.59	1058.38	174.08	1086.95	2.98	Minimum on Edge
Reinf. Layer #6	14.20	67.20	1061.20	127.39	1061.20	171.80	1086.84	3.25	Minimum on Edge
Reinf. Layer #7	17.02	70.02	1064.02	130.19	1064.02	169.52	1086.73	3.56	Minimum on Edge
Reinf. Layer #8	19.84	72.84	1066.84	133.09	1066.84	167.35	1086.62	3.84	Minimum on Edge
Reinf. Layer #9	22.66	53.00	1047.00	53.00	1047.00	53.00	104′1000033.30		No convergence
Reinf. Layer #10	25.48	53.00	1047.00	53.00	1047.00	53.00	104′1000033.30		No convergence
Reinf. Layer #11	28.30	53.00	1047.00	53.00	1047.00	53.00	104′1000033.30		No convergence
Reinf. Layer #12	31.12	53.00	1047.00	53.00	1047.00	53.00	104′1000033.30		No convergence
Reinf. Layer #13	33.94	53.00	1047.00	53.00	1047.00	53.00	104′1000033.30		No convergence

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 2.93
Critical Circle: Xc = 81.87[ft], Yc = 1168.73[ft], R = 123.91[ft]. (Number of slices used = 56)

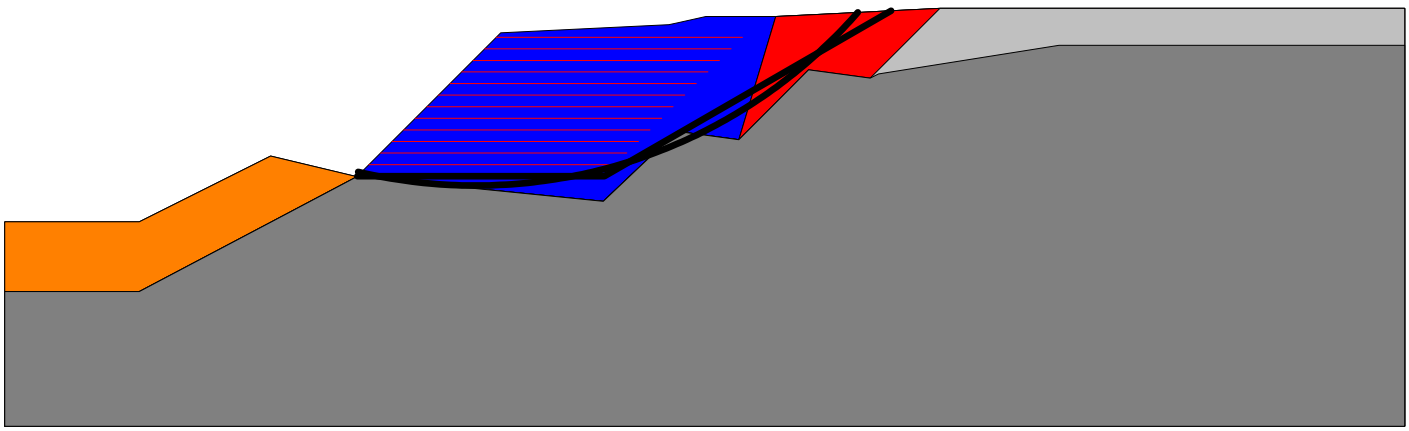
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

Minimum Factor of Safety = 2.30
Critical Two-Part Wedge: (Xa = 53.10, Ya = 1047.10) [ft]
(Xb = 113.29, Yb = 1047.10) [ft]
(Xc = 183.10, Yc = 1087.40) [ft]
(Number of slices used = 30)
Interslice resultant force inclination = 18.01 [degrees]

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

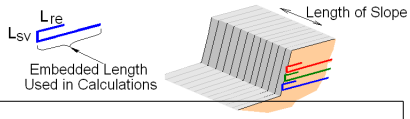
REINFORCEMENT LAYOUT: DRAWING



SCALE:

0 5 10 15 20 25 30 [ft]

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REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

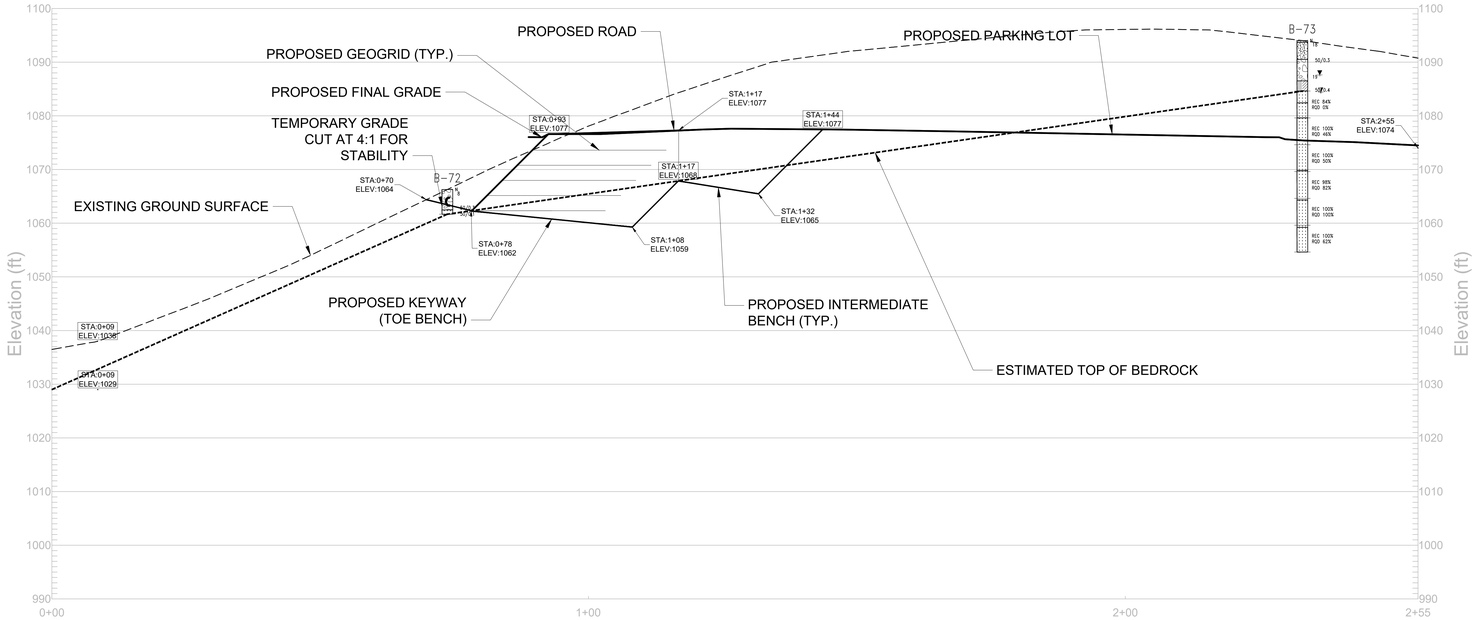
Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
1	1	20XT	0.10	60.00	1.00	53.10	1047.10	113.10	1047.10	0.00	0.00
2	1	20XT	2.92	60.00	1.00	55.92	1049.92	115.92	1049.92	0.00	0.00
3	1	20XT	5.74	60.00	1.00	58.74	1052.74	118.74	1052.74	0.00	0.00
4	1	20XT	8.56	60.00	1.00	61.56	1055.56	121.56	1055.56	0.00	0.00
5	1	20XT	11.38	60.00	1.00	64.38	1058.38	124.38	1058.38	0.00	0.00
6	1	20XT	14.20	60.00	1.00	67.20	1061.20	127.20	1061.20	0.00	0.00
7	1	20XT	17.02	60.00	1.00	70.02	1064.02	130.02	1064.02	0.00	0.00
8	1	20XT	19.84	60.00	1.00	72.84	1066.84	132.84	1066.84	0.00	0.00
9	1	20XT	22.66	60.00	1.00	75.66	1069.66	135.66	1069.66	0.00	0.00
10	1	20XT	25.48	60.00	1.00	78.48	1072.48	138.48	1072.48	0.00	0.00
11	1	20XT	28.30	60.00	1.00	81.30	1075.30	141.30	1075.30	0.00	0.00
12	1	20XT	31.12	60.00	1.00	84.12	1078.12	144.12	1078.12	0.00	0.00
13	1	20XT	33.94	60.00	1.00	86.94	1080.94	146.94	1080.94	0.00	0.00

* Vertical distance between layers.

QUANTITIES

Reinf. Type #	Designated Name	Coverage Ratio	Area of reinforcemnt [ft²] / length of slope [ft]
1	20XT	1.00	780.00

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CROSS-SECTION V-V

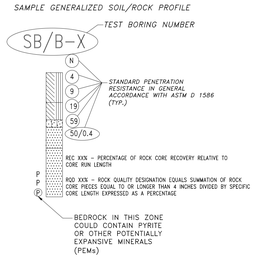
0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

LITHOLOGIC SYMBOLS (UNIFIED SOIL CLASSIFICATION SYSTEM)

- ASPHALT
- TOPSOIL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- FILL
- LOW PLASTICITY CLAY
- CLAYEY SILT TO SILTY CLAY
- CLAYEY GRAVEL
- SILTY SAND
- SILT
- CLAYEY SAND
- HIGH PLASTICITY CLAY
- WELL-GRADED GRAVEL
- POORLY-GRADED SAND
- ORGANIC SILT
- VOID
- CLAYSTONE
- COAL
- SILTSTONE
- SHALE
- SANDSTONE
- LIMESTONE
- WATER LEVEL AT END OF DRILLING
- WATER LEVEL DURING DRILLING
- WATER LEVEL AFTER 24 HR
- DENOTES COLLUVIAL SOIL
- GRAPHIC WITH THICK, BOLD LINE(S) REPRESENTS CARBONACEOUS SOIL/ROCK
- GRAPHIC WITH DUAL SYMBOL REPRESENTS SOIL/ROCK THAT IS INTERBEDDED

SAMPLE GENERALIZED SOIL/ROCK PROFILE



APPROX. LIMITS OF INTACT REDBED TYPE LAYER BASED ON INITIAL BORINGS

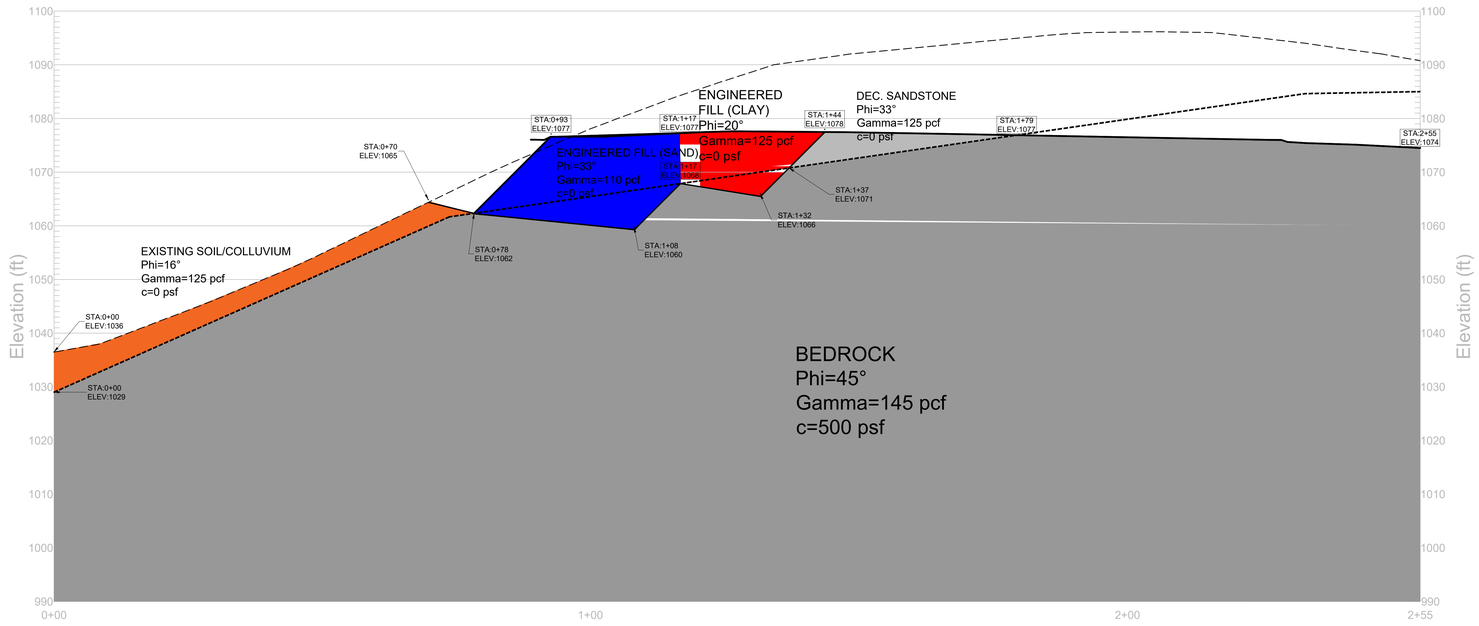
GARVIN BOWARD BEITKO

SCALE: AS NOTED	GARVIN BOWARD BEITKO ENGINEERING, INC.
DATE: 03/08/2024	*BUILT ON REPUTATION*
REVISED:	GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II
DRAWN BY: MAW	MASS GRADING RECOMMENDATION - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS
APPROVED BY: DAB	FOR: PHILLIPS & ASSOCIATES, INC.

180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

FIGURE 20

GBBE PROJECT NUMBER: 16123A



CROSS-SECTION V-V

0 10 20 30

APPROX. HORZ. & VERT. SCALE: 1" = 10'

GARVIN BOWARD BEITKO

SCALE:	AS NOTED
DATE:	03/08/2024
REVISED:	
DRAWN BY:	MAW
APPROVED BY:	DAB

GARVIN BOWARD BEITKO ENGINEERING, INC.
BUILT ON REPUTATION

180 BILMAR DRIVE, SUITE IV
PITTSBURGH, PA 15205
PHONE: 412-922-4440

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT - PART II — FIGURE 21

MASS GRADING RECOMMENDATIONS - PROPOSED QUAKER VALLEY HIGH SCHOOL CAMPUS

FOR: PHILLIPS & ASSOCIATES, INC.

GBBE PROJECT NUMBER: 16123A

SOLMAX

MiraSlope® Pro

Cross-Section V-V

Report created by MiraSlope® Pro: Update #1.01: Copyright (c) 2021-2023, ADAMA Engineering, Inc.

PROJECT IDENTIFICATION

Title: Cross-Section V-V
Project Number: 16123A -
Client: QVSD
Designer: MAW

Description:

Company's information:

Name: GBBE
Street: 180 Bilmar Drive Suite 4
Pittsburgh, PA 15205
Telephone #: 412-922-4440
E-Mail:

Original file path and name: E:\Users\A ..... \Job Files\16123A MiraSlope\Cross-Section V-V.MIRp
Original date and time of creating this file: Wed Mar 06 10:10:52 2024

PROGRAM MODE: Analysis of a General Slope using GEOSYNTHETIC as reinforcing material.

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INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ^{3}]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ^{2}]
1.....Eng. Fill (Sand).....	110.0	33.0	0.0
2.....Colluvium.....	125.0	16.0	0.0
3.....Eng. Fill (Redbed).....	125.0	20.0	0.0
4.....Decomposed Sandstone.....	125.0	33.0	0.0
5.....Bedrock.....	145.0	45.0	500.0

REINFORCEMENT

Reinforcement Type #	Geosynthetic Designated Name	Ultimate Strength, Tult [lb/ft]	Reduction Factor for Installation Damage, RFid	Reduction Factor for Durability, RFd	Reduction Factor for Creep, RFc	Coverage Ratio, Rc
1	20XT	16000	1.10	1.10	1.44	1.00

Interaction Parameters Type #	Geosynthetic Designated Name	== Direct Sliding == Cds-phi	Cds-c	==== Pullout ==== Ci	Alpha
1	20XT	0.80	0.00	0.80	0.80

Relative Orientation of Reinforcement Force, ROR = 0.00. Assigned Factor of Safety to resist pullout, Fs-po = 1.50
Design method for Global Stability: Comprehensive Bishop.

WATER

Water is not present

SEISMICITY

Not Applicable

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DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

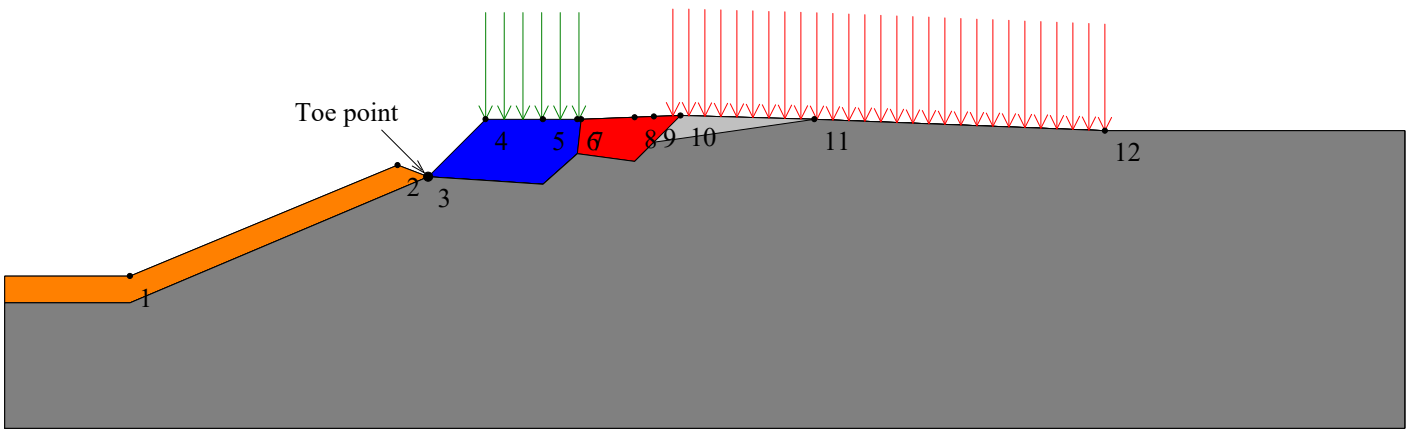
Soil profile contains 5 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 93.00 and ends at X1e = 122.00 [ft].
Load Q2 = 250.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X2s = 142.00 and ends at X2e = 255.00 [ft].
Surcharge load, Q3.....None

STRIP LOAD

.....None.....



SCALE:

0 5 10 15 20 25 30 [ft]

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TABULATED DETAILS OF GEMERAL SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

	#	Xi	Yi
Top of Layer 1	1	0.00	1036.00
	2	70.00	1065.00
	3	78.00	1062.00
	4	93.00	1077.00
	5	118.00	1077.00
	6	144.00	1078.00
	7	179.00	1077.00
	8	255.00	1074.00
Top of Layer 2	9	0.00	1036.00
	10	70.00	1065.00
	11	78.00	1062.00
	12	108.00	1060.00
	13	117.00	1068.00
	14	118.00	1077.00
	15	144.00	1078.00
	16	179.00	1077.00
	17	255.00	1074.00
Top of Layer 3	18	0.00	1029.00
	19	78.00	1062.00
	20	108.00	1060.00
	21	117.00	1068.00
	22	118.00	1077.00
	23	144.00	1078.00
	24	179.00	1077.00
	25	255.00	1074.00
Top of Layer 4	26	0.00	1029.00
	27	78.00	1062.00
	28	108.00	1060.00
	29	117.00	1068.00
	30	132.00	1066.00
	31	137.00	1071.00
	32	144.00	1078.00
	33	179.00	1077.00
	34	255.00	1074.00
Top of Layer 5	35	0.00	1029.00
	36	78.00	1062.00
	37	108.00	1060.00
	38	117.00	1068.00
	39	132.00	1066.00
	40	137.00	1071.00
	41	179.00	1077.00
	42	255.00	1074.00

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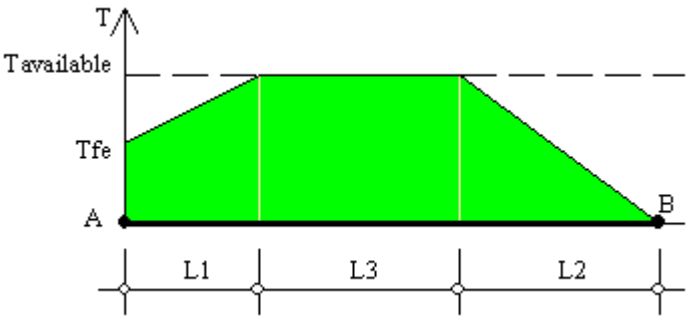
TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 5 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3	Y4	Y5
1	0.00	1036.00	1036.00	1029.00	1029.00	1029.00
2	70.00	1065.00	1065.00	1058.62	1058.62	1058.62
3	78.00	1062.00	1062.00	1062.00	1062.00	1062.00
4	93.00	1077.00	1061.00	1061.00	1061.00	1061.00
5	108.00	1077.00	1060.00	1060.00	1060.00	1060.00
6	117.00	1077.00	1068.00	1068.00	1068.00	1068.00
7	118.00	1077.00	1077.00	1077.00	1067.87	1067.87
8	132.00	1077.54	1077.54	1077.54	1066.00	1066.00
9	137.00	1077.73	1077.73	1077.73	1071.00	1071.00
10	144.00	1078.00	1078.00	1078.00	1078.00	1072.00
11	179.00	1077.00	1077.00	1077.00	1077.00	1077.00
12	255.00	1074.00	1074.00	1074.00	1074.00	1074.00

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DISTRIBUTION OF AVAILABLE STRENGTH ALONG EACH REINFORCEMENT LAYER



A = Front-end of reinforcement (at face of slope)
B = Rear-end of reinforcement
AB = L1 + L2 + L3 = Embedded length of reinforcement

Tavailable = Long-term strength of reinforcement
Tfe = Available front-end strength (e.g., connection to facing)

L1 = Front-end 'pullout' length
L2 = Rear-end pullout length
Tavailable prevails along L3

Factor of safety on resistance to pullout on either end of reinforcement, Fs-po = 1.50

Reinforcement Layer #	Designated Name	Height Relative to Toe [ft]	L [ft]	L1 [ft]	L2 [ft]	L3 [ft]	Tfe [lb/ft]	Tavailable [lb/ft]
1	20XT	0.10	25.00	0.00	10.14	14.86	9182.74	9182.74
2	20XT	2.92	25.00	0.00	12.50	12.50	9182.74	9182.74
3	20XT	5.74	25.00	0.00	16.31	8.69	9182.74	9182.74
4	20XT	8.56	25.00	0.00	25.00	0.00	8543.67	8543.67 (*)
5	20XT	11.38	25.00	0.00	25.00	0.00	5113.64	5113.64 (*)

(*) This Tavailable is dictated by the pullout resistance capacity, which is smaller than the long-term strength of the reinforcement that is related to its specified ultimate strength.

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RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	78.00	1062.00	78.00	1062.00	78.00	1062.00	0.00	N/A	#10 - Overhanging Cliff
2	106.50	1077.00	59.94	1060.93	80.18	1077.79	26.34	6.77	
3	123.00	1077.19	79.78	1064.07	91.74	1102.41	40.16	2.60	OK
4	139.50	1077.83	79.47	1064.06	89.77	1156.92	93.43	3.27	
5	156.00	1077.66	79.92	1064.00	86.38	1246.78	182.90	4.38	
6	172.50	1077.19	77.82	1062.01	89.92	1289.46	227.77	7.68	
7	189.00	1076.61	59.82	1060.86	68.19	1530.01	469.23	9.46	
8	205.50	1075.95	59.40	1060.87	70.59	1667.51	606.74	11.51	
9	222.00	1075.30	60.00	1060.86	60.00	1976.47	915.61	13.64	
10	238.50	1074.65	60.00	1060.86	60.00	2222.68	1161.82	16.13	
11	255.00	1074.00	58.91	1060.84	25.77	3021.90	1961.35	18.68	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

****

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

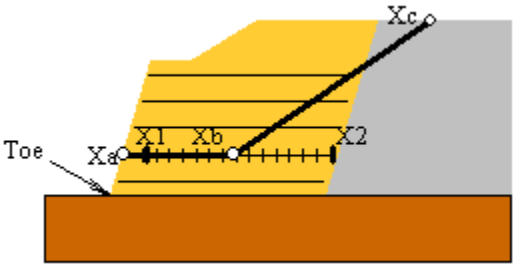
Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	59.47	1061.06	123.00	1077.19	80.07	1113.13	55.99	3.85	
2	61.85	1061.74	123.00	1077.19	81.93	1111.02	53.21	3.84	
3	63.47	1062.76	123.00	1077.19	84.10	1107.65	49.41	3.82	
4	65.76	1063.45	123.00	1077.19	85.84	1105.90	46.96	3.79	
5	67.56	1064.40	123.00	1077.19	87.83	1103.09	43.68	3.75	
6	69.55	1065.25	123.00	1077.19	89.72	1100.58	40.68	3.70	
7	71.80	1064.35	123.00	1077.19	90.12	1099.81	39.91	3.70	
8	73.57	1063.69	123.00	1077.19	90.23	1099.95	39.90	3.73	
9	75.52	1062.96	123.00	1077.19	90.92	1097.90	38.18	3.88	
10	77.87	1062.04	123.00	1077.19	90.29	1099.83	39.78	3.72	
11	79.78	1064.07	123.00	1077.19	91.74	1102.41	40.16	2.60	On extreme X-exit

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

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RESULTS OF TRANSLATIONAL ANALYSIS



Results in the table below represent critical two-part wedges identified between specified starting (X1) and ending (X2) search points. Wedges along all reinforcement layers and at elevation zero are reported. The critical two-part wedge, one for each predetermined elevation, is defined by Xa, Xb and Xc where Xa is the front end of the passive wedge (slope face), Xb is where the passive wedge ends and the active one starts, and Xc is the X-ordinate at which the active wedge starts.

Critical two-part wedge along each interface:

Interface	Height Relative to Toe [ft]	(Xa, Ya) [ft]		(Xb, Yb) [ft]		(Xc, Yc) [ft]		Fs	STATUS
At toe elevation	0.00	78.00	1062.00	102.80	1062.00	122.21	1077.16	2.67	Minimum on Edge
Reinf. Layer #1	0.10	78.10	1062.10	103.29	1062.10	121.87	1077.15	2.35	Minimum on Edge
Reinf. Layer #2	2.92	80.92	1064.92	106.09	1064.92	122.34	1077.17	2.76	Minimum on Edge
Reinf. Layer #3	5.74	83.74	1067.74	108.99	1067.74	121.94	1077.15	3.40	Minimum on Edge
Reinf. Layer #4	8.56	78.00	1062.00	78.00	1062.00	78.00	1061000	33.30	No convergence
Reinf. Layer #5	11.38	78.00	1062.00	78.00	1062.00	78.00	1061000	33.30	No convergence

Note: In the 'Status' column, OK means the critical two part-wedge was identified within the specified search domain. 'Minimum on Edge' means the critical result corresponds to a minimum on the edge of the search domain; i.e., either on X1 or X2 or the internally preset limits on Xc.

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CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 2.60
Critical Circle: Xc = 91.74[ft], Yc = 1102.41[ft], R = 40.16[ft]. (Number of slices used = 55)

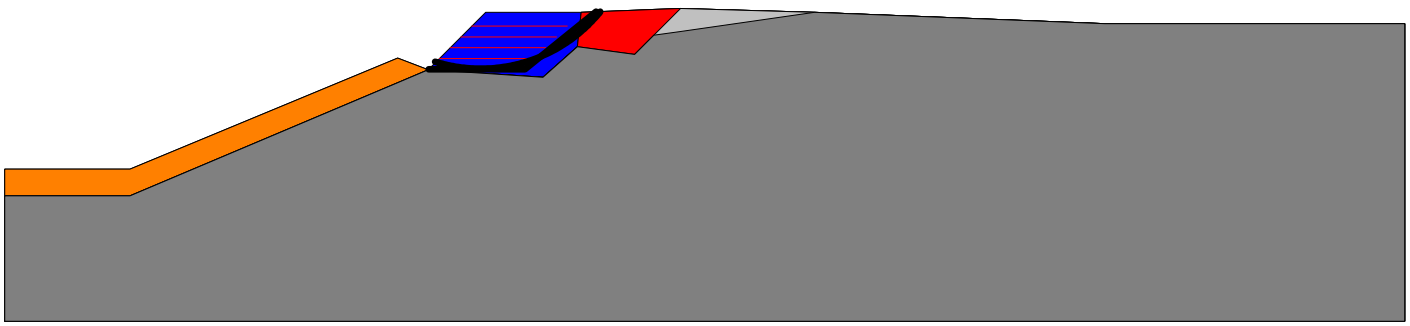
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

Minimum Factor of Safety = 2.35
Critical Two-Part Wedge: (Xa = 78.10, Ya = 1062.10) [ft]
(Xb = 103.29, Yb = 1062.10) [ft]
(Xc = 121.87, Yc = 1077.15) [ft]
(Number of slices used = 30)
Interslice resultant force inclination = 19.85 [degrees]

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

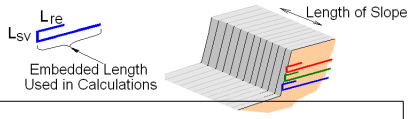
REINFORCEMENT LAYOUT: DRAWING



SCALE:

0 5 10 20 30[ft]

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REINFORCEMENT LAYOUT: TABULATED DATA & QUANTITIES

Layer #	Reinf. Type #	Geosynthetic Designated Name	Height Relative to Toe [ft]	Embedded Length [ft]	Covergae Ratio, Rc	(X, Y) front [ft]		(X, Y) rear [ft]		Lsv * [ft]	Lre [ft]
1	1	20XT	0.10	25.00	1.00	78.10	1062.10	103.10	1062.10	0.00	0.00
2	1	20XT	2.92	25.00	1.00	80.92	1064.92	105.92	1064.92	0.00	0.00
3	1	20XT	5.74	25.00	1.00	83.74	1067.74	108.74	1067.74	0.00	0.00
4	1	20XT	8.56	25.00	1.00	86.56	1070.56	111.56	1070.56	0.00	0.00
5	1	20XT	11.38	25.00	1.00	89.38	1073.38	114.38	1073.38	0.00	0.00

* Vertical distance between layers.

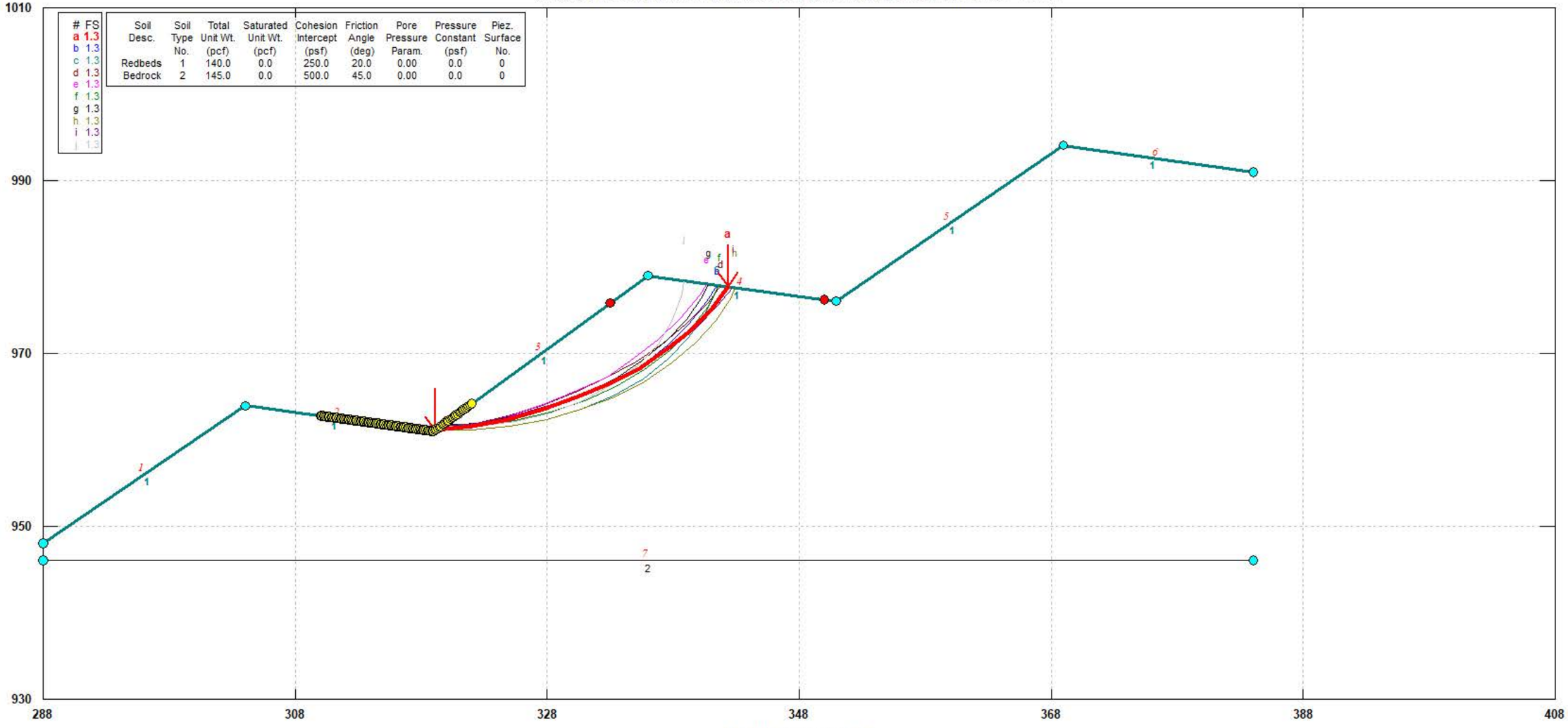
QUANTITIES

Reinf. Type #	Designated Name	Coverage Ratio	Area of reinforcemnt [ft²] / length of slope [ft]
1	20XT	1.00	125.00

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16123A QVSD Bench Temporary Stability @ 1H:1V

e:\users\admin\desktop\job files-tech. info\job files\16123a gstabl\temp cut.pl2 Run By: MAW 3/8/2024 09:18AM



GSTABL7 v.2 FSmin=1.3

Safety Factors Are Calculated By The Modified Bishop Method