GEOTECHNICAL INVESTIGATION REPORT

PROPOSED ATHLETIC COMPLEX

"CHESTER UPLAND SCHOOL DISTRICT"

1100 West 10th Street
City of Chester, Delaware County, Pennsylvania 19013

September 17, 2026

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1.0 INTRODUCTION

This Geotechnical Investigation Report was prepared by ACER Associates, LLC (ACER) at the request of MG Engineering Associates, LLC (Galante), and contains the results of a geotechnical engineering investigation conducted at the site of proposed renovation and construction for an athletic complex in the City of Chester, Delaware County, Pennsylvania. The purpose of this investigation was to define the stratification of subsurface soils and the engineering properties of these materials in the project area.

The scope of work for this project included a subsurface field investigation, laboratory testing program, and a geotechnical engineering evaluation. This report summarizes the results of the work performed and gives recommendations regarding foundation placement, soil strength conditions, and general site preparation criteria.

END OF SECTION

2.0 SITE AND PROJECT DESCRIPTION

The project site is located at the corner of Lamokin Street and Concord Avenue in the City of Chester, Delaware County, Pennsylvania. The site is situated within the Atlantic Coastal Plain Physiographic Province which is characterized by flat upper terrace surface cut by shallow valleys with very low relief and typically underlain by unconsolidated to poorly consolidated sediments and metamorphic rocks.

At the time of the investigation, the project site consisted of the existing Chester Upland School District athletic field, including a centrally located football and track field, grandstands along the eastern and western sides of the field, grass-covered areas, and asphalt-paved areas. Topography across the proposed construction area was relatively flat, sloping gently towards the south. The location of the site is presented on the *Site Location Map* found in Appendix A.

The proposed project will consist of improvements to the existing Chester Upland School District athletic field, including the construction of new home and visitor grandstands, a proposed two-story training facility with an approximate footprint of 10,802 square feet, a proposed single-story restroom building with an approximate footprint of 3,600 square feet, and a proposed single-story concessions structure with an approximate footprint of 1,200 square feet. It is assumed, that cuts and fills across the proposed construction areas will balance.

END OF SECTION

3.0 FIELD INVESTIGATION

ACER performed a field investigation, consisting of geotechnical sampling, at the project site on August 10 and August 11, 2026. Details regarding this task are presented below.

3.1 Geotechnical Sampling

The geotechnical investigation consisted of installing eight (8) standard earth borings, referenced as B-1 through B-8, across the site. B-1 through B-3 were installed within the footprint of the proposed two-story training facility, B-4 through B-6 were installed in the areas of the grandstands, B-7 was installed within the footprint of the proposed bathroom building, and B-8 was installed within the footprint of the proposed concessions structure. B-1 was installed to a termination depth of approximately 28.7 feet below ground surface (bgs), B-2 was installed to approximately 18.2 feet bgs, B-3 to approximately 28.8 feet bgs, B-4 and B-5 to approximately 30 feet bgs, B-6 to approximately 23.6 feet bgs, and B-7 and B-8 to approximately 20 feet bgs. The locations of borings have been depicted on the *Boring Location Plan* found in Appendix B.

The test borings were advanced using a Geoprobe 7822DT track-mounted drilling rig equipped with hollow stem augers and split spoon samplers. Subsurface soils were sampled in accordance with ASTM D1586/D1586M-18e1 procedures for the Standard Penetration Test (SPT). The SPT value, which is a measure of the soil density and consistency, consists of advancing a 2-inch outer-diameter split-barrel sampler, driven by a 140-pound hammer, free falling 30 inches. The number of blows required to advance the sampler over the 12-inch interval from 6 to 18 inches is considered the field "N" value, or SPT value. All samples were visually analyzed and classified in the field using the United Soil Classification System (USCS). Soil descriptions, depths to compositional changes, and SPT values encountered in the borings were recorded in the field, and are presented in the *Boring Logs* included in Appendix C.

END OF SECTION

4.0 SUBSURFACE CONDITIONS

4.1 Geology

According to the U.S.G.S., Geologic Map of Pennsylvania, two (2) separate geologic formations are mapped underlying the project site. These are the Wissahickon Formation (Xw) at the southern portion of the site and the Pennsauken and Bridgeton Formations (Tpb) at the northern portion of the site.

According to the Pennsylvania Geological Survey, Engineering Characteristics of the Rocks of Pennsylvania, Fourth Series, Revised 1982, the Wissahickon Formation is primarily composed of a gray to green albite-chlorite schist, oligoclase-mica schist, and the marburg schist, but also includes hornblende gneiss. Bedding within this portion of the Wissahickon formation is common and flaggy. Its joints have a blocky pattern, are irregular and are often steeply dipping.

According to the Pennsylvania Geological Survey, Engineering Characteristics of the Rocks of Pennsylvania, Fourth Series, Revised 1982, the Pennsauken and Bridgeton formation is primarily composed of a yellow to reddish-brown sand, with extensively crossbedded, interbedded, coarse gravel.

The observed subsurface conditions generally corresponded with the mapped geologic setting. The soil materials encountered in B-1 through B-6 appeared generally consistent with weathered materials associated with the Wissahickon Formation, while the materials encountered in B-6 through B-8 appeared generally consistent with the unconsolidated Pennsauken and Bridgeton Formations.

The location of the site in relation to the regional bedrock geology is presented on the *Geologic Map* found in Appendix D.

4.2 Soils

The surface at test borings B-1 through B-4, and B-7 through B-8 were covered be an approximate 3-inch-thick layer of topsoil. The surface at test borings B-5 and B-6 were covered by an approximate 6-inch-thick layer of asphalt.

Below the surficial layers, the subsurface profile underlying the project area was found to consist of four (4) soil strata, referenced herein as Stratum I through Stratum IV. Detailed descriptions of the subsurface conditions encountered, along with profiles of the test borings displaying subsurface conditions and other information obtained from the field investigation, are presented on the *Boring Logs* included in Appendix C. A general description of the soils encountered is as follows.

Stratum I – Yellowish brown to pale brown to grayish brown micaceous silty sand to sandy silt with varying amounts of clay (SM, ML, MH, SM-SC)

Stratum I was encountered within test borings B-1 through B-6 performed at the site, directly below the surficial layer within B-1 through B-5, and directly below Stratum IV in B-6. Stratum I extended to depths ranging from approximately 13 to 23 feet bgs across the borings. SPT N-values recorded while sampling Stratum I ranged from 2 blows per foot (bpf) to 36 bpf, and averaged approximately 11 bpf. Based on these values, the soils of Stratum I were found to be generally in a medium dense state, and ranged from very loose to dense. Laboratory results indicate these soils to be poorly graded, and range from non-plastic to low plasticity. Stratum I consisted predominantly of weathered mica schist soils derived from the underlying Wissahickon Formation.

Stratum II – White to grayish brown to reddish yellow micaceous silty sand to sandy silt with varying amount of clay (SM, ML, SM-SC)

Stratum II was encountered within test borings B-1 through B-6 performed at the site, directly below the soils of Stratum I. In borings B-2 through B-6, Stratum II extended to the termination depth within those borings. Within boring B-1, Stratum II extended to a depth of approximately depths ranging from 23 feet bgs. SPT N-values recorded while sampling Stratum II ranged from 21 bpf to in excess of 50 blows per 1 inch. Based on these values, the soils of Stratum II were found to exist in a medium dense to very dense state. Visual review of this soil shows it to be poorly graded, and range from non-plastic to low plasticity. Stratum I consisted predominantly of weathered mica schist soils derived from the underlying Wissahickon Formation.

Stratum III – Gray micaceous silty sand with decomposed weathered gneiss fragments (SM)

Stratum III was encountered only within test boring B-1, directly below the soils of Stratum II. Within B-1, Stratum III extended to the termination depth, approximately 28.7 feet bgs. SPT N-values recorded while sampling Stratum III ranged from 50 blows per 5 inches to 50 blows per 2 inches. Based on these values, the soils of Stratum III were found to exist in a very dense state. Visual review of Stratum III has shown it to be poorly graded, and non-plastic. Stratum III consisted predominantly of weathered micaceous gneiss derived from the underlying Wissahickon Formation.

Stratum IV – Strong brown sandy silt to silty sand with varying amounts of clay and gravel (ML, SM, SC, GW-GM)

Stratum IV was encountered only within test borings B-6 through B-8, directly below the surficial layer. Within B-6, Stratum IV extended to a depth of approxiamtely 6 feet bgs, and within B-7 and B-8 Stratum IV extended to the termination depth, approximately 20 feet bgs. SPT N-values recorded while sampling Stratum IV ranged from 7 to 36 bpf, and averaged approximately 15 bpf. Based on these values, the soils of Stratum IV were found to exist generally in a medium dense state and ranged from loos to dense. Visual review of Stratum IV has shown it to be poorly graded, and range from non-plastic to low

plasticity. Stratum IV is believed to be associated with the underlying Pennsauken and Bridgeton formations.

4.3 Bedrock

The bedrock surface was not encountered within any of the test borings performed at the site. Bedrock is defined as the depth at which auger refusal is encountered within a test boring.

4.4 Groundwater

Groundwater was encountered within each boring, ranging from approximately 11 feet bgs to 14 feet bgs It should be noted that these observations were made at the time of the drilling operation and that groundwater table elevations may fluctuate with daily, seasonal, and climatic variations.

END OF SECTION

5.0 LABORATORY ANALYSES

In order to supplement visual classifications, two (2) representative soil samples were obtained from the test borings and subjected to laboratory testing in accordance with ASTM C117, ASTM C136, ASTM D4318, ASTM D2216, and ASTM D2487. The results of the laboratory analyses are presented in Appendix E of this report and have been summarized in Table I below.

Table I
Summary of Laboratory Analyses of Soils

Sample Information				
Boring Number			B-1	B-5
Sample Number			S-5	S-4
Sample Depths (ft.)			8' – 10'	4' – 6'
Soil Type			Stratum I	Stratum I
Moisture Content Determination				
Moisture Content (%)			23.1	26.6
Particle Size Distribution				
Percent Passing Sieve	Gravel	1½"	100.0	100.0
		3/4"	100.0	100.0
		3/8"	100.0	100.0
		No. 4	100.0	100.0
	Sand	No. 10	99.7	99.6
		No. 40	83.6	91.2
		No. 100	53.0	69.4
	Silt & Clay	No. 200	40.0	56.8
Atterberg Limits				
Liquid Limit (LL)			NP	42
Plastic Limit (PL)			NP	32
Plasticity Index (PI)			NP	10
Classification				
USCS Group Name (Group Symbol)			Silty Sand (SM)	Sandy Silt (ML)

NP = Non-plastic

END OF SECTION

6.0 CONCLUSION AND RECOMMENDATIONS

Based on the subsurface conditions encountered and the results of the investigation, it is our opinion that the existing competent soils, as well as properly placed and compacted structural fill under engineering control, are capable of supporting the proposed building structures and grandstands on conventional shallow foundations. Alternatively, the proposed grandstands may be supported on deep foundations.

The recommendation to support the proposed building structures on shallow foundations and the grandstands on either shallow or deep foundations is provided under the premise that site preparations as described in this report are followed. Details regarding site development requirements are presented below.

6.1 Site Preparation

At the outset of the project, structural areas should be stripped of all existing asphalt pavements, vegetative cover, topsoil, roots, and other deleterious materials. Structural areas are defined as those areas to be covered by the proposed structures, extending a minimum of five (5) feet beyond the proposed building lines, where feasible, as well as any portions of the site to be covered by new asphalt or concrete pavements. Any weak, soft, unstable, non-native, deleterious materials, undocumented fill, and/or construction debris encountered below the surface should also be removed. Removal should continue until competent and stable bearing soils are encountered.

Where existing fill or other unsuitable materials are present within the zone of influence of proposed foundations, such materials should be removed and replaced with properly compacted structural fill. The zone of influence should extend downward and outward from the bottom outside edge of the proposed foundation at a minimum of 1 Horizontal to 1 Vertical (1H:1V) projection.

Following stripping and removal of unsuitable materials, exposed subgrades should be proof-rolled as desbribed in Section 6.2 below.

Care should be exercised during site preparation and construction activities to avoid disturbing, undermining, or otherwise damaging existing asphalt pavement subgrades and associated underground utilities at the site. Construction operations should maintain the stability of adjacent pavement areas that are to remain in service. Existing utility lines located within the zone of influence of proposed foundations should be relocated as part of the site preparation work. Utilities to be abandoned or removed should be rerouted to locations beyond the limits of proposed construction. Excavations resulting from utility removal should be over-excavated as necessary to provide sufficient working width for proper backfilling and compaction using appropriate construction equipment.

All backfill and structural fill should be placed and compacted in accordance with Section

6.3 of this report and performed under the direction of the Geotechnical Engineer or qualified geotechnical technician.

6.2 Proof-rolling

Having completed the site preparation as outlined above, all structural areas should first be densified using a smooth-drum vibratory roller having a maximum static weight of 10 tons, and then proof-rolled using a fully loaded tri-axle dump truck. Proof-rolling is necessary to verify the integrity of the upper zones of the soils. A qualified geotechnical representative should be present during proof-rolling operations to evaluate deflection, rutting, pumping, or other signs of instability. Areas exhibiting excessive deflection (typically greater than approximately 1 inch of rutting), pumping, weaving under load, or generally loose soils should be considered unsuitable and should be undercut and replaced with approved structural fill, or otherwise stabilized as directed by the geotechnical engineer. Removal and placement of existing soil with structural fill, if necessary, should follow Section 5.3 outlined below. In areas of the site where a cut or removal of soil is necessary to achieve the required soil subgrade elevation, proof-rolling of the surface should not be performed until the proposed subgrade elevation has been achieved.

6.3 Backfill & Compaction

Following the site preparation procedures discussed above, structural fill required to elevate the site to the planned subgrade elevations or replace any weak and unstable areas may be placed.

The following considerations should be given to the suitability of on-site soils to be utilized as structural fill:

Stratum I – The soils of Stratum I were found to consist of mostly of a micaceous silty sand to sandy silt with varying amounts of clay. Visual review of this soil stratum has shown it to consist of the group symbols: SM, ML, MH, SM-SC. Stratum I may be considered suitable for use as structural fill at the site. However, significant portions of Stratum I were found to contain mostly or significant amounts of fine-grained soils (i.e., silt and clay). Therefore, Stratum I will be moisture-sensitive and difficult to compact during wet conditions.

Stratum II – The soils of Stratum II were found to consist of mostly of a micaceous silty sand to sandy silt with varying amounts of clay. Visual review of this soil stratum has shown it to consist of the group symbols: SM, ML, SM-SC. Stratum II may be considered suitable for use as structural fill at the site. However, significant

portions of Stratum II were found to contain mostly or significant amounts of fine-grained soils (i.e., silt and clay). Therefore, Stratum II will be moisture-sensitive and difficult to compact during wet conditions.

Stratum IV – The soils of Stratum IV were found to consist mostly of a micaceous silty sand to sandy silt with varying amounts of clay and gravel. Visual review of this soil stratum has shown it to consist of the group symbols: ML, SM, SC, GW-GM. Stratum IV may be considered suitable for use as structural fill at the site. However, significant portions of Stratum IV were found to contain mostly or significant amounts of fine-grained soils (i.e., silt and clay). Therefore, Stratum IV will be moisture-sensitive and difficult to compact during wet conditions.

The recommendation for use of on-site soils as structural fill is based on analysis of soil samples retrieved from the test borings. Confirmation of any soil's suitability should be made during construction by a qualified Geotechnical Engineer.

Any imported structural or load-bearing soil that is required should meet the following criteria:

- Free of organic matter, ash, cinders, and demolition debris
- Particle size distribution that is well graded
- Plasticity index less than 10
- Less than 15 percent by weight rock fragments larger than 3", less than 30 percent by weight larger than 3/4" and less than 10 percent by weight smaller than the No. 200 sieve.

Structural fill should be placed in lifts not exceeding 8 inches in loose thickness and compacted with a smooth-drum vibratory roller having a minimum static weight of 10 tons. The optimum lift thickness and number of repetitive passes with compaction equipment necessary to achieve the required percentage compaction values should be determined in the field with test passes of the chosen compaction equipment. All fill should be placed at the optimum moisture content ± 3% as determined by ASTM D1557 (Modified Proctor) and compacted to a minimum percentage of the maximum dry density as indicated in Table 2.

Table 2
Compaction Criteria

Fill Area	Percent of Maximum Dry Density as per ASTM D1557 (Modified Proctor)
Foundation Areas	95
Slab-On-Grade, Paved Areas	95
Non-Structural	92

Structural fill utilized to backfill excavations for foundations, utilities, or any other new subsurface elements should also be placed and compacted in accordance with the guidelines set forth in this section.

6.4 Building Structure Foundations

As mentioned above, borings B-1 through B-3, B-7, and B-8 were installed within the proposed building structure footprints. After site preparation operations have been satisfactorily completed, the on-site soils and/or imported structural fill may be utilized for the support of the proposed buildings using shallow foundation systems. The calculations are based on a proposed foundation design consisting of 18-inch-wide continuous reinforced footings to be installed at a depth of 3 feet bgs. The soil bearing conditions at the site were evaluated based on the information derived from this investigation. The following conclusions and engineering recommendations are provided regarding the proposed foundation elements:

- Shallow foundations may be used to support the planned structures given the expected foundation loads.
- Foundations for the proposed structure may be designed for an allowable soil bearing pressure of **1,900 pounds per square foot (psf)** using 18-inch-wide continuous footings at a depth of 3 feet bgs.
- Exterior foundations and those in unheated areas should be placed a minimum of 3 feet below final exterior grade to minimize the potential for frost heave.
- All foundation bottoms should be completely cleaned of loose material or debris immediately prior to the placement of concrete or structural fill.
- The actual bearing conditions of the soil at the foundation subgrade elevation should be confirmed in the field during excavation, by inspection under the supervision of a Professional Engineer qualified in Geotechnical Engineering.

Given the above recommendations and design parameters, it is anticipated that total settlement of the structure will not exceed 1 inch with maximum differential settlement of foundation elements estimated to be less than 0.5 inches.

Prior to placement of concrete, all foundation bottoms should be densified and compacted using a walk behind vibratory roller, jumping jack, or similar equipment. Densification is required to provide uniform density of the foundation subgrade and allow for proper distribution of loads. Proper compaction and densification of the foundation soils should be verified by a qualified Geotechnical Engineer prior to placement of concrete. **If compaction is not performed on the foundation subgrade soils, the above referenced bearing capacity of 1,900 psf will not be achieved and the conclusions and recommendations found in this report will be invalid.**

It is emphasized that caution should be exercised in order to not disturb foundation subgrade soils. Should the foundation subgrade be disturbed during excavation, the soils should be compacted in place or removed and replaced with structural fill as outlined in this report. It is also recommended that footing excavations and placement of concrete be performed during fair weather conditions. Installation of the foundations should be carried out in accordance with applicable ACI guidelines, under the direction of a licensed Professional Engineer.

6.5 Grandstand Foundations

As mentioned above, borings B-4 through B-6 were installed at the approximate area of the proposed grandstands. Based on the Standard Penetration Test (SPT) data collected during this investigation, it is ACER's opinion that the subsurface underlying the site is considered capable of supporting the proposed grandstands on either a shallow foundation system consisting of "spread" footings or on drilled shaft foundations ("caissons"). These conclusions are provided under the premise that the recommendations regarding foundation design parameters presented below are followed.

6.5.1 Shallow Foundations

Should a shallow foundation system be used to support the proposed grandstand structures, it is ACER's opinion that spread footings consisting of a mat and pier for each column may be considered suitable.

Assuming a series of shallow spread footings measuring 4-feet square, bearing on soils situated at least 3 feet below grade, it is ACER's recommendation that a maximum allowable bearing capacity of **2,200 psf** may be used for design of a shallow foundation system.

The following conclusions and engineering recommendations are provided regarding shallow foundation elements:

- Foundations should be placed a minimum of 3 feet below final grade to minimize the potential for frost heave.
- All foundation bottoms should be completely cleaned of loose material or

debris immediately prior to the placement of concrete or structural fill.

- The actual bearing conditions of the soil at the foundation subgrade elevation should be confirmed in the field during excavations, by inspection under the supervision of a Professional Engineer qualified in Geotechnical Engineering.

Prior to placement of concrete, all shallow foundation bottoms should be densified and compacted using a walk behind vibratory roller, jumping jack, or similar equipment. Densification is required to provide uniform density of the foundation subgrade and allow for proper distribution of loads. Proper compaction and densification of the foundation soils should be verified by a qualified Geotechnical Engineer prior to placement of concrete. If compaction is not performed on the foundation subgrade soils, the above referenced bearing capacity of 1,800 psf will not be achieved and the conclusions and recommendations found in this report will be invalid.

It is emphasized that caution should be exercised in order to not disturb foundation subgrade soils. Should the foundation subgrade be disturbed during excavation, the soils should be compacted in place or removed and replaced with structural fill as outlined in this report. It is also recommended that footing excavation and placement of concrete be performed during fair weather conditions. Installation of the foundations should be carried out in accordance with applicable ACI guidelines, under the direction of a licensed Professional Engineer.

As previously stated, the sizing and other aspects of the design of the foundation members should be determined by the structural engineer for the project. The foundations should be placed at a sufficient depth for structural considerations, including requirements for handling uplift and overturning. The design to resist uplift and overturning should also include the dead weight of the foundations.

It should be noted that the foundation design parameters provided above are only recommendations, based on the subsurface conditions encountered within the test boring, and on ACER's experiences with similar projects, and that actual foundation design is beyond the scope of this evaluation.

6.5.2 Drilled Shafts ("Caissons")

Should a series of caisson foundations be used to support the proposed grandstands, it is ACER's opinion that the subsurface soils are suitable for support of the proposed structures.

ACER has calculated an allowable bearing capacity of **4,000 psf** for each caisson. This calculation is based on a 2-foot diameter drilled shaft to a depth of 8 feet bgs.

The earth pressure coefficients that can be used in the drilled caisson design are provided in the "Lateral Earth Pressures" section of this report.

The drilled shaft excavations should be temporarily cased during installation to avoid collapse and protect personnel. This can be achieved using "sonotubes". The excavations should also be kept as dry as possible and cleaned of loose material and/or debris immediately prior to inspection and concrete placement.

The sizing and other aspects of the design of the foundation members should be determined by the structural engineer for the project. The foundations should be placed at a sufficient depth for structural considerations, including requirements for handling uplift and overturning. The design to resist uplift and overturning should also include the dead weight of the foundations.

6.5.3 Lateral Earth Pressures

Design of a caisson foundation system will require the consideration of lateral earth pressures imposed on this element, such as in the case of skin frictional resistance as it is related to uplift capacity. ACER recommends using a friction factor of tan δ = 0.4, between the interface of the concrete and the soils. Table 3 provides a summary of the typical soil properties of the materials encountered. No strength testing was performed on any of the samples taken and the values reported in the table are based on results obtained from the field investigation and reported in literature.

Table 3
Earth Pressure Coefficients

Parameter	Stratum I	Stratum II	Stratum III	Stratum IV
Angle of Internal Friction (Φ)[1]	27°	32°	33°	33°
Unit Weight of Soil[1]	100.0 pcf	110.0 pcf	120.0 pcf	120.0 pcf
Submerged Unit Weight	37.6 pcf	47.6 pcf	57.6 pcf	57.6 pcf
Coefficient of Active Earth Pressure (K_A)[2]	0.38	0.31	0.29	0.29
Coefficient of Passive Earth Pressure (K_P)[3]	2.66	3.25	3.39	3.39
Coefficient of At-Rest Earth Pressure (K_O)[4]	0.55	0.47	0.46	0.46
Friction Angle (Soil to Concrete) (δ)	20.25°	24°	24.75°	24.75°
Cohesion	0 psf	0 psf	0 psf	0 psf

Notes:

1. The angle of internal friction and the unit weights reported are based on the field SPT results and values reported in literature (*Reference*: Bowles, J.E (1988). *Foundation Analysis and Design*,

4th Edition, 1988, McGraw-Hill, Inc. p. 141)

2. $K_A = \tan^2(45 - \Phi/2)$
3. $K_P = \tan^2(45 + \Phi/2)$
4. $K_O = 1 - \sin \Phi$ (assuming normally consolidated conditions)

6.6 Floor Slab Support

The floor for the proposed buildings, may be constructed as a conventional slab-on-grade and should be supported on firm and stable subgrade and compacted in accordance with Section 6.3 above. Once the finished subgrade elevations are reached, the entirety of the pads should be proof-rolled using a fully loaded, tri-axle dump truck under the review of a qualified Geotechnical Engineer. Following verification that the pad subgrades are firm and stable, efforts should be taken to protect the subgrade from adverse weather conditions, and minimize disturbance by construction vehicles, prior to concrete placement for the slab.

The floor slabs should be underlain by a bedding of clean stone to provide a capillary break. The stone bedding should have a minimum thickness of 6 inches and should be comprised of clean, crushed stone (such as AASHTO No. 57). A vapor/moisture barrier should be installed directly beneath the slab and above the stone subbase to reduce moisture migration into the slab.

Floor slabs designed and constructed in accordance with the recommendations provided herein are anticipated to experience total settlements of less than approximately one inch under anticipated service loading conditions.

6.7 Seismic Site Class

The American Society of Civil Engineers (ASCE) standard for *Minimum Design Loads for Buildings and Other Structures* (ASCE/SEI 7-16) provides a methodology for the interpretation of SPT N-values to determine a Site Class Definition; however, this method requires averaging the N-values over the top 100 feet of the subsurface profile, a depth well in excess of the depths of our exploration at this particular project site. Based on the information obtained from the geotechnical field investigation, and general guidelines provided in Chapter 20 of ASCE/SEI 7-16, we recommend that a Site Classification "E" can be used for seismic design considerations.

6.8 Excavations

Excavation during construction of the proposed structures is expected to take place within the soils of Stratum I and Stratum IV, and may extend into the soils of Stratum II. These soils may be removed using conventional excavation equipment.

Excavations greater than 5 feet will require temporary shoring of the excavation with trench boxes, or with sheeting and bracing, to obtain a safe working environment in accordance with local, state and federal regulations, including OSHA (CFR Part 1926) excavation trench safety standards. It is recommended that excavated soils be placed away from the edges of the excavation, at a distance equal to or exceeding the depth of the excavation. In addition, surface runoff should be diverted away from the crest of excavated slopes to prevent erosion and sloughing.

6.9 Dewatering

As previously discussed, groundwater was encountered as shallow as 11 feet bgs. It should be noted that these observations were made at the time of the field investigation and that groundwater table elevations will fluctuate with daily, seasonal, and climatic variations. Therefore, depending on the time of year, subsurface conditions at the time of construction, and if any undercutting of soils is required, dewatering during construction may be required.

Should it be deemed necessary to dewater during foundation construction due to elevated groundwater tables and/or perched water conditions, a series of well points or submersible pumps installed during the planned excavations should adequately dewater the construction area. The final selection of the dewatering system, and the exact placement of any well points, should be determined by the contractor and approved by the project engineer. Dewatering operations should be maintained during excavation and placement of the proposed foundations. A backup system should also be available in the event that the primary system fails. The water level should be maintained at a minimum of two (2) feet below the foundation subgrade elevation(s) prior to and during the placement of concrete. The dewatering system should be installed in such a manner that minimizes soil disturbance.

6.10 Construction Quality Control & Assurance

The proposed development at the site will include earthwork and concrete foundation construction. As the geotechnical engineering consultant of record, Acer Associates, LLC should be retained during the construction phase for the project to monitor these activities and provide materials testing services, in order to ensure that the recommendations presented within this report are followed, and that all relevant construction activities are performed in accordance with project specifications.

END OF SECTION

7.0 LIMITATIONS

The conclusions and recommendations contained in this report are based upon the subsurface data collected and on details stated in this report. Should conditions be encountered during construction that differ from those specifically stated herein, our office should be notified immediately so that our recommendations can be reviewed and revised, if necessary.

Our recommendations are also based on the assumption that a Professional Engineer, registered in the Commonwealth of Pennsylvania, and qualified in Geotechnical Engineering will be retained to oversee the installation of the proposed structure.

The boring logs are ACER's interpretation of the subsurface conditions found by collecting intermittent samples within each boring as it progressed downward. Detailed soil descriptions and interfaces between each stratum are interpretive, and actual changes are gradational.

The boring logs are descriptive only of the subsurface conditions in the specific location of each boring at the exact time it was installed. Subsurface conditions at other locations in the project area may differ from those in the location of the borings.

It is emphasized that this analysis was made for the proposed structures and grandstands to be constructed at the Chester Uplands Athletic School District at Lamokin Street and Concord Avenue in the City of Chester, Delaware County, Pennsylvania. ACER does not assume any responsibility in using this report to generate foundation design conclusions for any project other than that specifically described herein.

Prepared By:

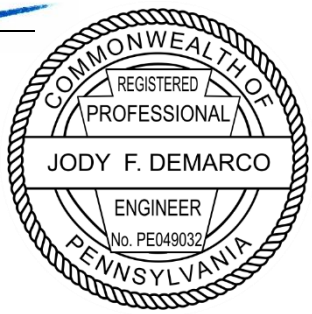
Stephen Kochenberger
Project Manager

Reviewed By:

J. Scott Horn, PG, CHMM
President

and

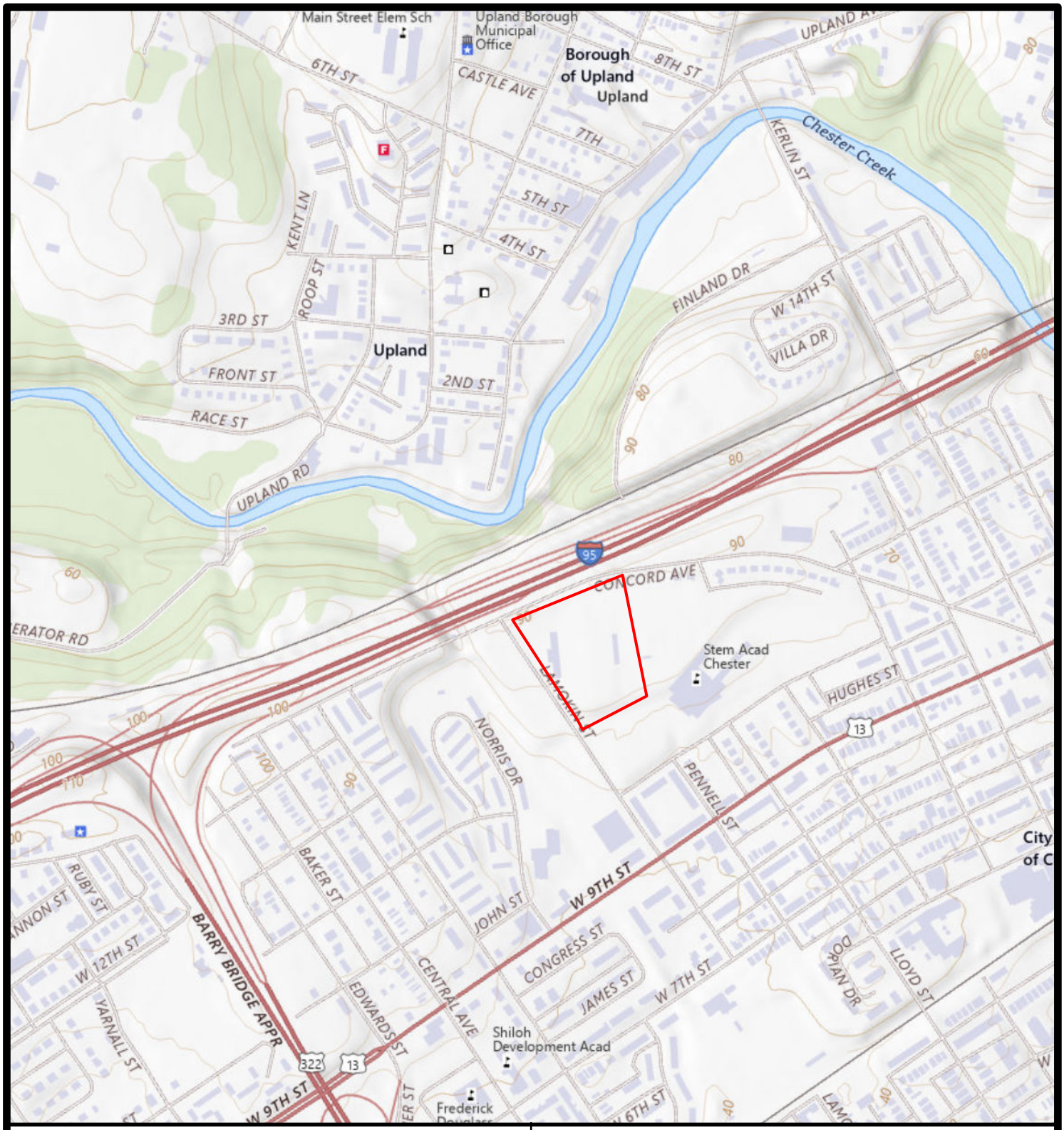
Jody F. DeMarco, P.E.
PA Professional Engineer
License # 49032



8.0 APPENDICES

Appendix A

Site Location Map



N

SITE LOCATION

0 500 1,000 2,000 Feet

SITE LOCATION MAP

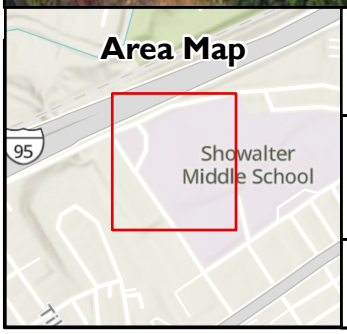
Proposed Athletic Field Improvements
Chester Upland School District Athletic Field
Lamokin Street & Concord Avenue
Chester, Delaware County, PA

ACER ASSOCIATES, LLC
1012 INDUSTRIAL DRIVE
WEST BERLIN, NEW JERSEY 08091
Tel (856) 809-1202 / Fax (856) 809-1203

Appendix B

Boring Location Plan

1012 Industrial Drive, West Berlin, New Jersey 08091
Tel. (856) 809-1202 Fax. (856) 809-1203



BORING LOCATION MAP

Proposed Athletic Field Improvements
Chester Upland School District Athletic Field
Lamokin Street & Concord Avenue
Chester, Delaware County, PA

B-# Indicates number and approximate location of test boring

ACER ASSOCIATES, LLC
1012 INDUSTRIAL DRIVE
WEST BERLIN, NEW JERSEY 08091
Tel (856) 809-1202 / Fax (856) 809-1203

N

0 37.5 75 150
Feet

Appendix C

Boring Logs

1012 Industrial Drive, West Berlin, New Jersey 08091
Tel. (856) 809-1202 Fax. (856) 809-1203

ACER ASSOCIATES, LLC

Environmental & Geotechnical Services

Project:	Project Number:	Client:	Date	Started:
Chester Upland Athletic Complex	20260552	MG Engineering Associates, LLC		8/10/2026
Location:		**Drilling Contractor:**		**Completed:**
1100 W 10th St., Chester, Delaware Co.,Pennsylvania		Pennington		8/10/2026
Sample Method:		**Drill Rig Type:**		**Hammer Weight:**
Standard Penetration Split Spoon Sampler (SPT)		Geoprobe 7822DT		140 lb.
Boring No.	**Logged By:**	**Surface Elevation (estimate)**		**Groundwater Depth:**
B-1	SK	±74' ASL		12'

Depth (feet)	Sample Depth (feet)	Sample Number	Blow Counts 0" - 6"	6" - 12"	12" - 18"	18" - 24"	N - Value	Graphic Log	Description	Remarks
	0 - 2	S - 1	1	1	2	2	3		3" Topsoil	
									Dark yellowish brown (10YR 4/4) micaceous silty sand (SM), highly weathered	
	2 - 4	S - 2	2	3	3	4	6		Dark yellowish brown (10YR 4/4) micaceous silty sand (SM), highly weathered	
	4 - 6	S - 3	3	5	7	8	12		Very pale brown (10YR 7/3) micaceous silty sand (SM), highly weathered soils	
	6 - 8	S - 4	5	7	8	10	15		Light brownish gray (10YR 6/2) micaceous silty sand (SM), highly weathered soils	
	8 - 10	S - 5	8	7	7	7	14		Pale brown (10YR 6/3) micaceous silty sand (SM), highly weathered soil	*moisture content = 23.1%*
10										
	13 - 14.3	S - 6	25	25	50/4"		50/4"		White (10YR 8/1) to grayish brown (10YR 5/2) micaceous silty sand (SM), trace decomposed rock fragments	
	18 - 19.3	S - 7	3	8	50/3"		50/3"		Reddish yellow (5YR 6/6) to grayish brown (10YR 5/2) micaceous silty sand (SM), highly weathered	
20										
	23 - 23.9	S - 8	14	50/5"			50/5"		Gray (10YR 5/1) micaceous silty sand (SM), with decomposed gneiss fragments	
	28 - 28.7	S - 9	10	50/2"			50/2"		Gray (10YR 5/1) micaceous silty sand (SM), with decomposed gneiss fragments	
30									END OF BORING AT 28.7 FEET (Spoon Refusal)	
40										
50										

LEGEND

- Topsoil
- Stratum I
- Stratum II
- Stratum III

▼ Stabilized Groundwater ▽ Groundwater At Time of Drilling

ACER ASSOCIATES, LLC

Environmental & Geotechnical Services

Project:	Project Number:	Client:	Date	Started:
Chester Upland Athletic Complex	20260552	MG Engineering Associates, LLC		8/10/2026
Location:		**Drilling Contractor:**		**Completed:**
1100 W 10th St., Chester, Delaware Co.,Pennsylvania		Pennington		8/10/2026
Sample Method:		**Drill Rig Type:**		**Hammer Weight:**
Standard Penetration Split Spoon Sampler (SPT)		Geoprobe 7822DT		140 lb.
Boring No.	**Logged By:**	**Surface Elevation (estimate)**		**Groundwater Depth:**
B-2	SK	±75' ASL		13'

Depth (feet)	Sample Depth (feet)	Sample Number	Blow Counts 0" - 6"	6" - 12"	12" - 18"	18" - 24"	N - Value	Graphic Log	Description	Remarks
	0 - 2	S - 1	0	2	2	3	4		3" Topsoil	
									Yellowish brown (10YR 5/4) micaceous sandy silt (ML), highly weathered	
	2 - 4	S - 2	2	3	5	6	8		Light brownish gray (10YR 6/2) micaceous silty sand (SM), highly weathered soils	
	4 - 6	S - 3	7	8	9	11	17		Light brownish gray (10YR 6/2) micaceous silty sand (SM), highly weathered soils	
	6 - 8	S - 4	7	8	11	12	19		Brownish yellow (10YR 6/6) micaceous silty sand (SM), highly weathered soils	
	8 - 10	S - 5	11	14	14	15	28		Light gray (10YR 7/2) micaceous silty sand (SM), highly weathered soil	
10										
	13 - 14.3	S - 6	18	20	19	20	39		Pale brown (10YR 6/3) micaceous silty sand (SM), highly weathered soil	
									Pale brown (10YR 6/3) micaceous sandy silt (ML), highly weathered soil	
	18 - 18.2	S - 7	50/2"				50/2"		END OF BORING AT 18.2 FEET (Auger Refusal)	
20										
30										
40										
50										

LEGEND

- Topsoil
- Stratum I
- Stratum II
- Stratum III

▼ Stabilized Groundwater ▽ Groundwater At Time of Drilling

ACER ASSOCIATES, LLC

Environmental & Geotechnical Services

Project:	Project Number:	Client:	Date	Started:
Chester Upland Athletic Complex	20260552	MG Engineering Associates, LLC		8/10/2026
Location:		**Drilling Contractor:**		**Completed:**
1100 W 10th St., Chester, Delaware Co.,Pennsylvania		Pennington		8/10/2026
Sample Method:		**Drill Rig Type:**		**Hammer Weight:**
Standard Penetration Split Spoon Sampler (SPT)		Geoprobe 7822DT		140 lb.
Boring No.	**Logged By:**	**Surface Elevation (estimate)**		**Groundwater Depth:**
B-3	SK	±80' ASL		12'

Depth (feet)	Sample Depth (feet)	Sample Number	Blow Counts 0" - 6"	6" - 12"	12" - 18"	18" - 24"	N - Value	Graphic Log	Description	Remarks
	0 - 2	S - 1	0	2	2	3	4		3" Topsoil	
									Brown (10YR 4/3) micaceous silty sand (SM)	
	2 - 4	S - 2	1	2	2	2	4		Brown (10YR 5/3) micaceous silty sand (SM)	
	4 - 6	S - 3	1	1	3	3	4		Dark brown (10YR 3/3) micaceous silty sand (SM)	
	6 - 8	S - 4	5	3	8	18	11		Light brownish gray (10YR 6/4) micaceous silty sand with gravel (SM)	
	8 - 10	S - 5	7	2	3	4	5		Yellow brown (10YR 5/4) micaceous silty sand (SM)	
10										
	13 - 15	S - 6	11	9	8	10	17		Grayish brown (10YR 5/2) micaceous silty sand (SM)	
	18 - 20	S - 7	9	8	13	14	21		Brown (10YR 5/3) micaceous silty sand (SM), highly weathered soil	
20										
	23 - 25	S - 8	20	11	19	19	30		Yellowish brown (10YR 5/4) micaceous silty sand (SM), highly weathered soil	
	28 - 28.8	S - 9	40	50/3"			50/3"		Grayish brown (10YR 5/2) micaceous silty sand (SM), highly weathered soil	
30									END OF BORING AT 28.8 FEET (Spoon Refusal)	
40										
50										

LEGEND

- Topsoil
- Stratum I
- Stratum II
- Stratum III

▼ Stabilized Groundwater ▽ Groundwater At Time of Drilling

ACER ASSOCIATES, LLC

Environmental & Geotechnical Services

Project:	Project Number:	Client:	Date	Started:
Chester Upland Athletic Complex	20260552	MG Engineering Associates, LLC		8/10/2026
Location:		**Drilling Contractor:**		**Completed:**
1100 W 10th St., Chester, Delaware Co.,Pennsylvania		Pennington		8/10/2026
Sample Method:		**Drill Rig Type:**		**Hammer Weight:**
Standard Penetration Split Spoon Sampler (SPT)		Geoprobe 7822DT		140 lb.
Boring No.	**Logged By:**	**Surface Elevation (estimate)**		**Groundwater Depth:**
B-4	SK	±84.5' ASL		13'

Depth (feet)	Sample Depth (feet)	Sample Number	Blow Counts 0" - 6"	6" - 12"	12" - 18"	18" - 24"	N - Value	Graphic Log	Description	Remarks
	0 - 2	S - 1	1	5	5	4	10		3" Topsoil	
									Light yellowish brown (10YR 6/4) micaceous sandy silt (ML)	
	2 - 4	S - 2	2	3	2	3	5		Light yellowish brown (10YR 6/4) micaceous elastic silt (MH)	
	4 - 6	S - 3	0	2	2	3	4		Yellowish brown (10YR 5/6) micaceous sandy silt (ML)	
	6 - 8	S - 4	3	4	4	5	8		Yellowish brown (10YR 5/6) micaceous silty sand (SM)	
	8 - 10	S - 5	4	4	4	6	8		Yellow brown (10YR 5/4) micaceous sandy silt (ML)	
10										
	13 - 15	S - 6	2	6	8	9	14		Pale brown (10YR 6/3) micaceous sandy silt (ML)	
	18 - 20	S - 7	11	10	12	17	22		Brown (10YR 6/3) micaceous micaceous sandy silt (ML)	
20										
	23 - 25	S - 8	9	11	11	14	22		Grayish brown (10YR 5/2) micaceous silty clayey sand (SM-SC)	
	28 - 28.8	S - 9	12	20	36	42	56		Dark yellowish brown (10YR 4/4) micaceous silty sand (SM)	
30									END OF BORING AT 30 FEET	
40										
50										

LEGEND

- Topsoil
- Stratum I
- Stratum II
- Stratum III

▼ Stabilized Groundwater ▽ Groundwater At Time of Drilling

ACER ASSOCIATES, LLC

Environmental & Geotechnical Services

Project:	Project Number:	Client:	Date	Started:
Chester Upland Athletic Complex	20260552	MG Engineering Associates, LLC		8/11/2026
Location:		**Drilling Contractor:**		**Completed:**
1100 W 10th St., Chester, Delaware Co.,Pennsylvania		Pennington		8/11/2026
Sample Method:		**Drill Rig Type:**		**Hammer Weight:**
Standard Penetration Split Spoon Sampler (SPT)		Geoprobe 7822DT		140 lb.
Boring No.	**Logged By:**	**Surface Elevation (estimate)**		**Groundwater Depth:**
B-5	SK	±85' ASL		11'

Depth (feet)	Sample Depth (feet)	Sample Number	Blow Counts 0" - 6"	6" - 12"	12" - 18"	18" - 24"	N - Value	Graphic Log	Description	Remarks
	0 - 2	S - 1	5	6	3	3	9		6" Asphalt	
									Yellowish brown (10YR 5/8) micaceous sandy silt (ML)	
	2 - 4	S - 2	2	0	3	1	3		Yellowish brown (10YR 5/6) micaceous sandy silt (ML)	
	4 - 6	S - 3	1	1	1	2	2		Dark yellowish brown (10YR 4/6) micaceous sandy silt (ML)	
	6 - 8	S - 4	3	5	5	6	10		Brown (7.5YR 4/4) micaceous sandy silt (ML)	*plasticity index = 10* *moisture content = 26.6%*
	8 - 10	S - 5	4	5	5	8	10		Dark yellowish brown (10YR 4/4) micaceous silty clayey sand (SM-SC)	
10										
	13 - 15	S - 6	9	11	14	14	25		Light brownish gray (10YR 6/2) micaceous sandy silt (ML)	
	18 - 20	S - 7	16	17	19	19	36		Brown (10YR 5/3) micaceous micaceous silty sand (SM)	
20										
	23 - 25	S - 8	25	30	30	40	60		Grayish brown (10YR 5/2) micaceous silty clayey sand (SM-SC), highly weathered soil	
	28 - 28.8	S - 9	18	27	33	30	60		Grayish brown (10YR 5/2) micaceous silty clayey sand (SM-SC), highly weathered soil	
30									END OF BORING AT 30 FEET	
40										
50										

LEGEND

- Asphalt
- Stratum I
- Stratum II
- Stratum III

▼ Stabilized Groundwater ▽ Groundwater At Time of Drilling

ACER ASSOCIATES, LLC

Environmental & Geotechnical Services

Project:	Project Number:	Client:	Date	Started:
Chester Upland Athletic Complex	20260552	MG Engineering Associates, LLC		8/11/2026
Location:		**Drilling Contractor:**		**Completed:**
1100 W 10th St., Chester, Delaware Co.,Pennsylvania		Pennington		8/11/2026
Sample Method:		**Drill Rig Type:**		**Hammer Weight:**
Standard Penetration Split Spoon Sampler (SPT)		Geoprobe 7822DT		140 lb.
Boring No.	**Logged By:**	**Surface Elevation (estimate)**		**Groundwater Depth:**
B-6	SK	±85' ASL		14'

Depth (feet)	Sample Depth (feet)	Sample Number	Blow Counts 0" - 6"	6" - 12"	12" - 18"	18" - 24"	N - Value	Graphic Log	Description	Remarks
	0 - 2	S - 1	0	8	5	5	13		6" Asphalt	
									Strong brown (7.5 YR 5/6) silty sand (SM)	
	2 - 4	S - 2	4	4	6	8	10		Strong brown (7.5 YR 5/8) silty sand with gravel (SM)	
	4 - 6	S - 3	9	7	6	9	13		Strong brown (7.5 YR 5/8) silty sand with gravel (SM)	
	6 - 8	S - 4	7	13	13	8	26		Dark yellowish brown (10YR 4/6) micaceous clayey sand with gravel (SC)	
	8 - 10	S - 5	14	5	4	4	9		Very pale brown (10YR 7/4) micaceous silty clayey sand (SM-SC)	
10										
	13 - 15	S - 6	9	8	11	11	19		Grayish brown (10YR 5/4) micaceous sandy silt (ML)	
	18 - 20	S - 7	14	15	14	16	29		Yellowish brown (10YR 5/4) micaceous micaceous silty sand with gravel (SM)	
20										
	23 - 23.6	S - 8	15	50/1"			50/1"		Brown (10YR 5/3) micaceous silty sand (SM), highly weathered soil	
									END OF BORING AT 23.6 FEET (Auger Refusal)	
30										
40										
50										

LEGEND

- Asphalt
- Stratum I
- Stratum II
- Stratum III
- Stratum IV

▼ Stabilized Groundwater ▽ Groundwater At Time of Drilling

ACER ASSOCIATES, LLC

Environmental & Geotechnical Services

Project:	Project Number:	Client:	Date	Started:
Chester Upland Athletic Complex	20260552	MG Engineering Associates, LLC		8/11/2026
Location:		**Drilling Contractor:**		**Completed:**
1100 W 10th St., Chester, Delaware Co.,Pennsylvania		Pennington		8/11/2026
Sample Method:		**Drill Rig Type:**		**Hammer Weight:**
Standard Penetration Split Spoon Sampler (SPT)		Geoprobe 7822DT		140 lb.
Boring No.	**Logged By:**	**Surface Elevation (estimate)**		**Groundwater Depth:**
B-7	SK	±85' ASL		14'

Depth (feet)	Sample Depth (feet)	Sample Number	Blow Counts 0" - 6"	6" - 12"	12" - 18"	18" - 24"	N - Value	Graphic Log	Description	Remarks
	0 - 2	S - 1	2	4	4	5	8		3" Topsoil	
									Strong brown (7.5YR 5/6) silty sand (SM)	
	2 - 4	S - 2	4	4	11	9	15		Strong brown (7.5YR 5/6) silty sand (SM)	
	4 - 6	S - 3	5	8	5	6	13		Brown (7.5YR 5/4) silty sand with gravel (SM)	
	6 - 8	S - 4	7	5	5	4	10		Light brownish gray (10YR 6/2) sandy silt with gravel (ML)	
	8 - 10	S - 5	1	1	3	2	4		Light brownish gray (10YR 6/2) sandy silt with gravel (ML)	
10										
	13 - 15	S - 6	4	3	4	7	7		Pale brown (10YR 6/3) clayey sand (SC)	
	18 - 20	S - 7	12	18	18	15	36		Pale brown (10YR 6/3) silty sand (SM)	
20									END OF BORING AT 20 FEET	
30										
40										
50										

LEGEND

- Topsoil
- Stratum I
- Stratum II
- Stratum III
- Stratum IV

▼ Stabilized Groundwater ▽ Groundwater At Time of Drilling

ACER ASSOCIATES, LLC

Environmental & Geotechnical Services

Project:	Project Number:	Client:	Date	Started:
Chester Upland Athletic Complex	20260552	MG Engineering Associates, LLC		8/11/2026
Location:		**Drilling Contractor:**		**Completed:**
1100 W 10th St., Chester, Delaware Co.,Pennsylvania		Pennington		8/11/2026
Sample Method:		**Drill Rig Type:**		**Hammer Weight:**
Standard Penetration Split Spoon Sampler (SPT)		Geoprobe 7822DT		140 lb.
Boring No.	**Logged By:**	**Surface Elevation (estimate)**		**Groundwater Depth:**
B-8	SK	±84' ASL		13'

Depth (feet)	Sample Depth (feet)	Sample Number	Blow Counts 0" - 6"	6" - 12"	12" - 18"	18" - 24"	N - Value	Graphic Log	Description	Remarks
	0 - 2	S - 1	4	5	3	3	8		3" Topsoil	
									Strong brown (7.5YR 5/6) sandy silt (ML)	
	2 - 4	S - 2	2	4	5	5	9		Strong brown (7.5YR 5/6) silty sand (SM)	
	4 - 6	S - 3	4	7	18	13	25		Reddish yellow (7.5YR 6/6) silty sand with gravel (SM)	
	6 - 8	S - 4	21	20	15	13	35		Light yellowish brown (10YR 6/4) well graded gravel with sand and silt (GW-GM)	
	8 - 10	S - 5	5	7	7	8	14		Brownish yellow (10YR 6/6) clayey sand with gravel (SC)	
10										
	13 - 15	S - 6	5	4	6	7	10		Strong brown (7.5YR 4/6) sandy silt (ML)	
	18 - 20	S - 7	11	11	15	15	26		Strong brown (7.5YR 4/6) sandy silt (ML)	
20									END OF BORING AT 20 FEET	
30										
40										
50										

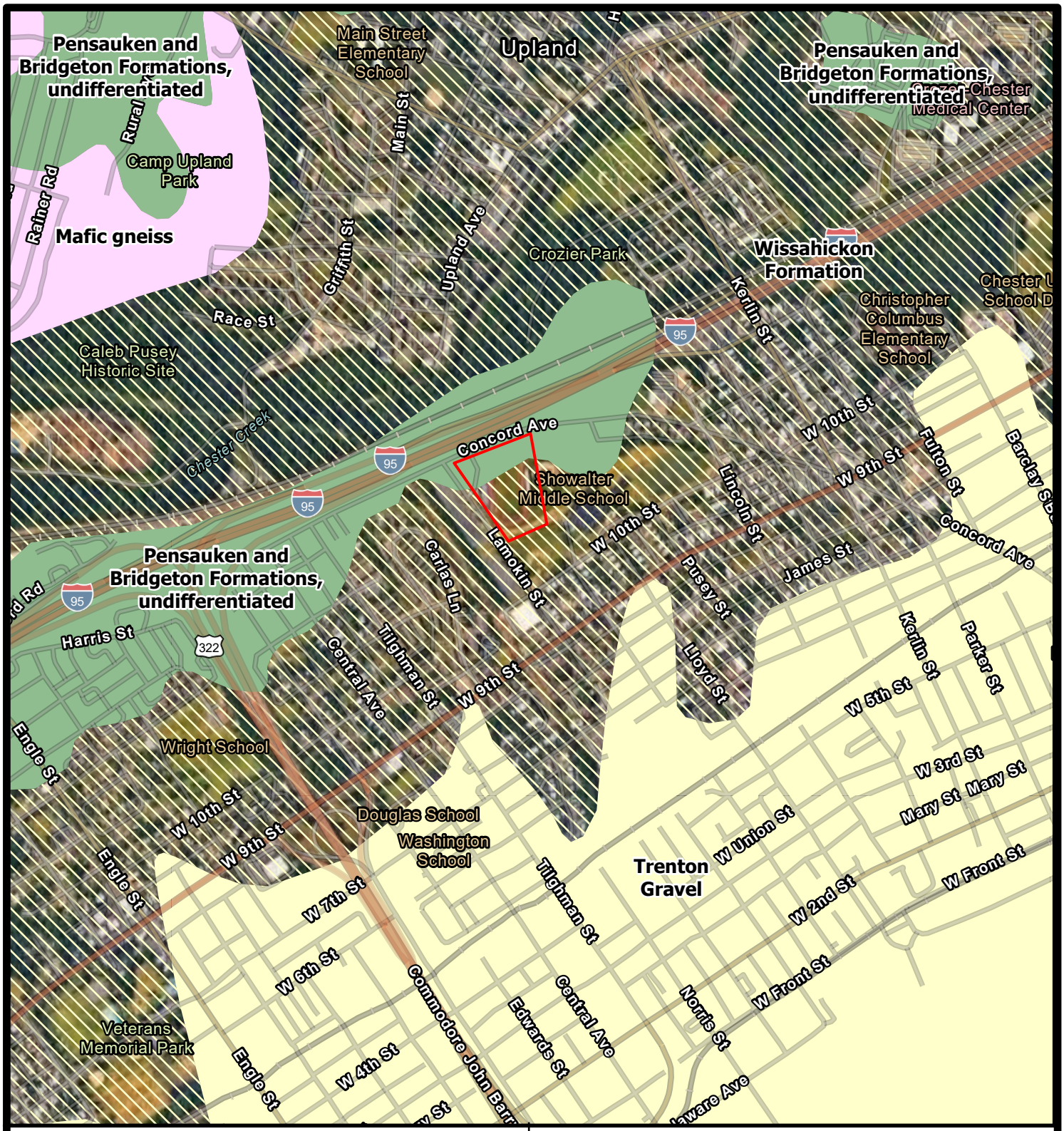
LEGEND

- Topsoil
- Stratum I
- Stratum II
- Stratum III
- Stratum IV

▼ Stabilized Groundwater ▽ Groundwater At Time of Drilling

Appendix D

Geologic Map



N

0 750 1,500 3,000 US Feet

APPROXIMATE SITE LOCATION

GEOLOGIC MAP

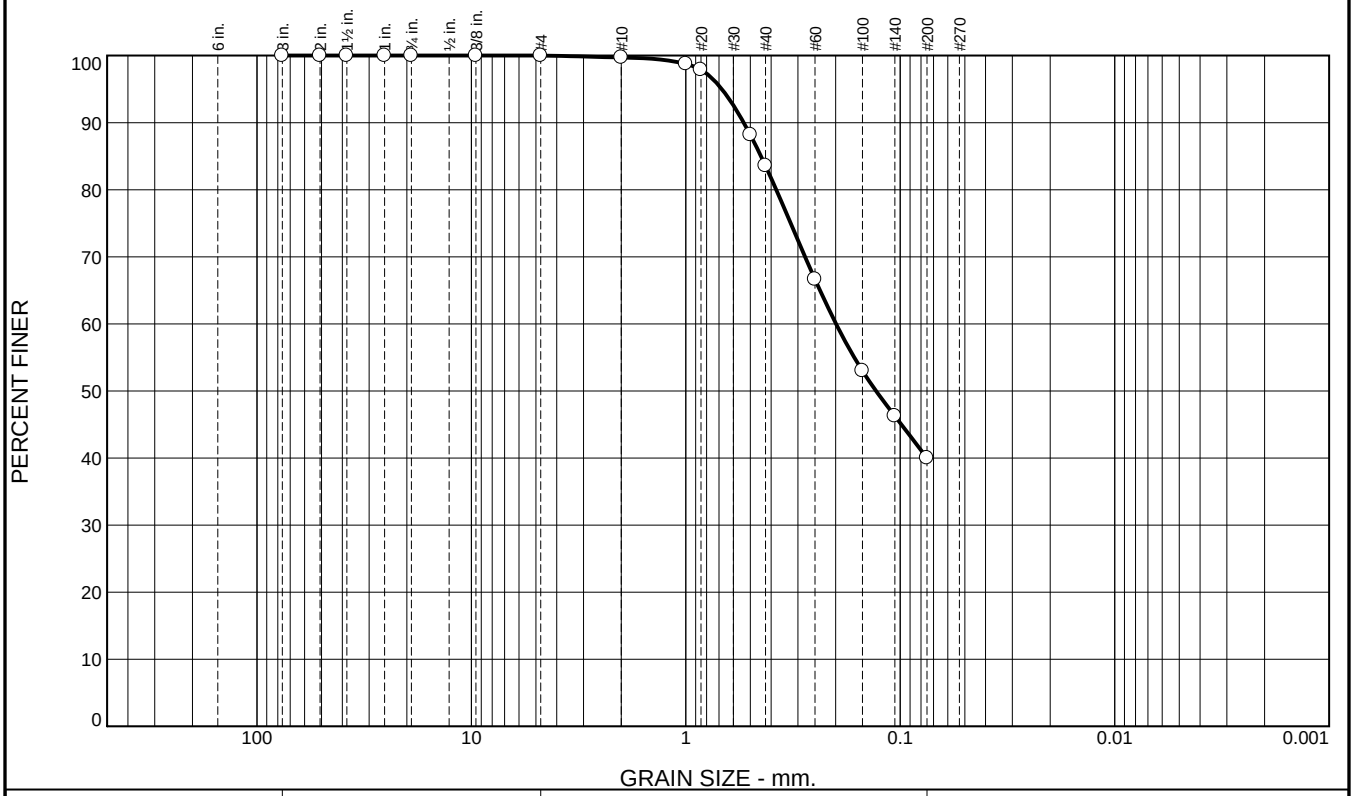
Proposed Athletic Field Improvements
Chester Upland School District Athletic Field
Lamokin Street & Concord Avenue
Chester, Delaware County, PA

ACER ASSOCIATES, LLC
1012 INDUSTRIAL DRIVE
WEST BERLIN, NEW JERSEY 08091
Tel (856) 809-1202 / Fax (856) 809-1203

Appendix E

Laboratory Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	16.1	43.6	40.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
0.75	100.0		
0.375	100.0		
#4	100.0		
#10	99.7		
#18	98.8		
#20	97.9		
#35	88.2		
#40	83.6		
#60	66.6		
#100	53.0		
#140	46.3		
#200	40.0		

* (no specification provided)

Material Description

USCS Classification: Silty Sand (SM)

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.5368 D_{85}= 0.4462 D_{60}= 0.1992
D_{50}= 0.1297 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Moisture Content (Oven-Dried): 23.1%
NP = Non-Plastic

Source of Sample: B-1 **Depth:** 8-10'
Sample Number: S-5

Date: 9/8/2026

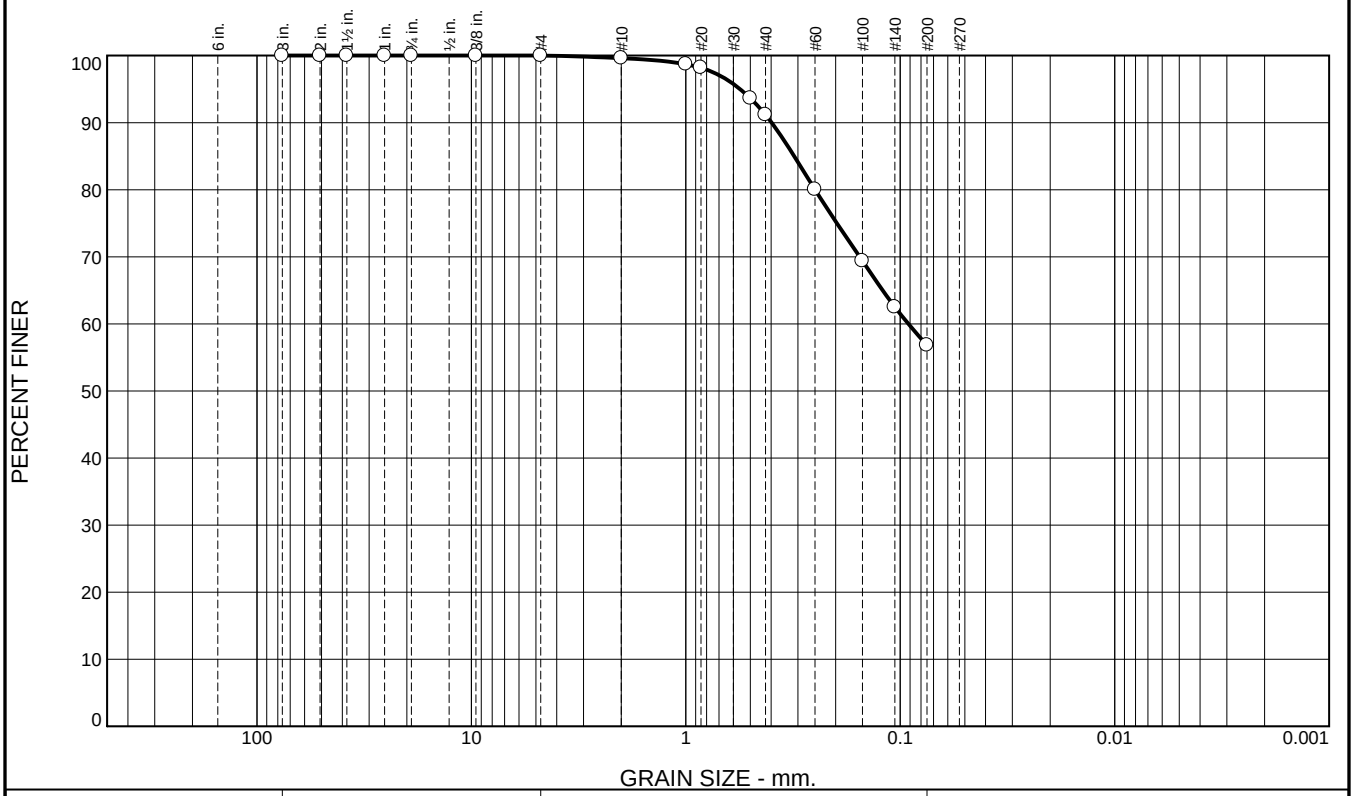
PRINCETON HYDRO
SCIENCE ENGINEERING DESIGN

Client: Acer Associates LLC
Project: Chester Uplands Athletic Fields (Acer# 20260552)

Project No: 1087.361 **Figure** 1

Tested By: R. Sheehan **Checked By:** M. Thomas (Laboratory Mgr.)

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	8.4	34.4	56.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
0.75	100.0		
0.375	100.0		
#4	100.0		
#10	99.6		
#18	98.7		
#20	98.2		
#35	93.6		
#40	91.2		
#60	80.0		
#100	69.4		
#140	62.5		
#200	56.8		

* (no specification provided)

Material Description

USCS Classification: Sandy Silt (ML)

Atterberg Limits

PL= 32 LL= 42 PI= 10

Coefficients

D_{90}= 0.3979 D_{85}= 0.3125 D_{60}= 0.0917
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-5(5)

Remarks

Moisture Content (Oven-Dried): 26.6%

Source of Sample: B-5 **Depth:** 4-6'
Sample Number: S-4

Date: 9/8/2026

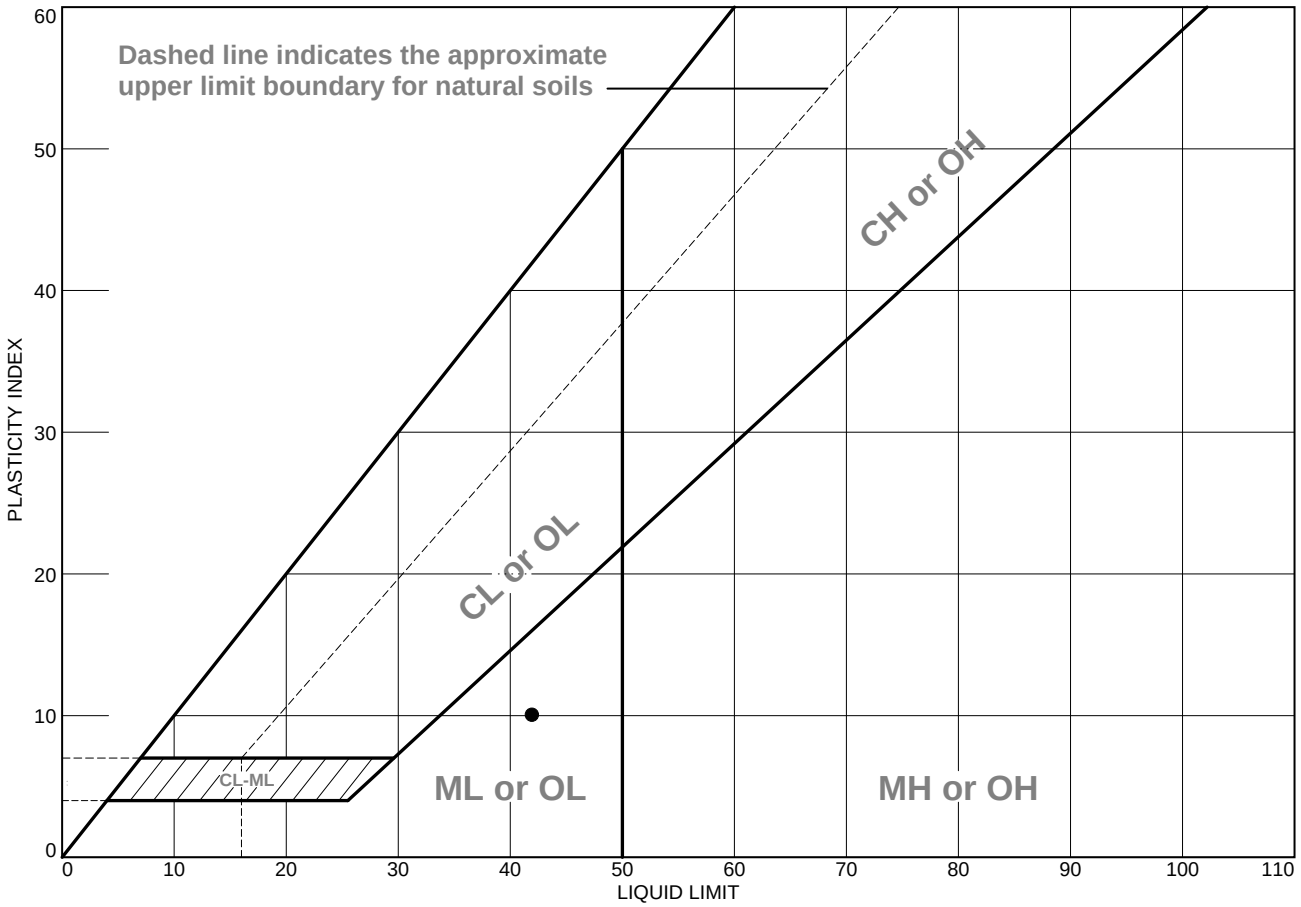
PRINCETON HYDRO
SCIENCE ENGINEERING DESIGN

Client: Acer Associates LLC
Project: Chester Uplands Athletic Fields (Acer# 20260552)

Project No: 1087.361 **Figure** 2

Tested By: R. Sheehan **Checked By:** M. Thomas (Laboratory Mgr.)

LIQUID AND PLASTIC LIMITS TEST REPORT



	Material Description	Sampled	Tested	Technician	LL	PL	PI	%<#40	USCS
●	USCS Classification: Sandy Silt (ML)	8/18/2026	9/9/2026	R. Sheehan	42	32	10	91.2	ML

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○**Source of Sample:** B-5 **Depth:** 4-6' **Sample Number:** S-4

PRINCETON HYDRO SCIENCE ENGINEERING DESIGN

Checked by: M. Thomas
Title: Labratory Manager

Figure

Tested By: R. Sheehan **Checked By:** M. Thomas

Appendix F

General Information for Geotechnical Reporting

1012 Industrial Drive, West Berlin, New Jersey 08091
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General Information for Geotechnical Reporting

This report is intended to provide the client with a site-specific interpretation of subsurface conditions at the project location at the time of the investigation. In order to avoid complications with the project, ACER has compiled the following information to assist in interpreting the data presented herein:

1. This geotechnical report has been specifically tailored to meet the needs of the client. This report is unique, and not intended for use in any other project, nor by any other engineer.
2. This report is intended to be read in its entirety. Reading only selected tables or paragraphs while omitting others could compromise the effectiveness of the report as a whole.
3. Geotechnical reporting is based on a number of factors that should remain invariable throughout the duration of the project. Any deviation from the initial project plan should always be conveyed to the geotechnical engineer to ensure the necessary changes in reporting can be made. Geotechnical engineers cannot be held liable or responsible for difficulties that occur due to a lack of information being provided to them.
4. The information contained in geotechnical reports is based on the subsurface conditions at the time the study is being performed. Geologic or man-made events can have major impact on the conditions at a site. Should a change in site condition occur or be suspected, the geotechnical engineer should always be consulted prior to application of any recommendations made within the report to determine if the report is still valid.
5. A geotechnical field study identifies only subsurface conditions at the specific locations where tests are conducted and samples are taken. Geotechnical reporting is based off of this data, and any subsequent recommendations are the professional opinion of the geotechnical engineer. Actual subsurface conditions at a site can sometimes notably differ from those indicated in a report. Retaining a geotechnical engineer to provide oversight of construction activities is the most effective way to manage risks associated with unexpected conditions. Moreover, the report's recommendations cannot be considered final until actual subsurface conditions are observed by the geotechnical engineer during site activities.
6. In order to mitigate risks associated with misinterpretation of the geotechnical report, the geotechnical engineer should be invited to consult with members of the design team as well as any contractors involved with the project.
7. Boring and testing logs are prepared by the geotechnical engineer based on their interpretations of field and laboratory data. These logs should never be reproduced for use in any other aspect of the design project. Logs may be copied electronically if

necessary; however, doing so can increase the risk of misinterpretation.

8. When soliciting contracting bids, contractors should be provided with a complete copy of this report. A letter of transmittal should be included with the report, indicating that the report's accuracy is limited without the consultation of the geotechnical engineer, and that the report was not provided for the purposes of developing a more competitive bid on the project. Prior to accepting bids, a conference is often the most effective way for information to be communicated amongst all parties involved in the project.

9. Geotechnical reporting is not an exact science. In order to avoid financial or legal disputes, the 'limitations' section included in this report should be read and fully understood prior to commencement of work at the site. Any questions should be directed to the geotechnical engineer who prepared the report.

SOIL CLASSIFICATION NOTES

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel, or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

The number of blows required to advance a standard two inch (2") O.D. split-spoon sampler the last twelve inches (12") of the total eighteen inch (18") penetration with a 140 pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value".

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-value (SS) Blows/Ft.	Consistency
< 500	0-1	Very Soft
500 – 1,000	2-3	Soft
1,001 – 2,000	4-6	Medium Stiff
2,001 – 4,000	7-12	Stiff
4,001 – 8,000	13-26	Very Stiff
8,000+	26+	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Ring Sampler (RS) Blows/Ft.	Relative Density
0 – 3	0-6	Very Loose
4 – 9	7-18	Loose
10 – 29	19-58	Medium Dense
30 – 49	59-98	Dense
50+	99+	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other Constituents	Percent of Dry Weight
Trace	< 15
With	15 – 30
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other Constituents	Percent of Dry Weight
Trace	< 5
With	5 – 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1-10
Medium	11-30
High	30+

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification	
					Group Symbol	Group Name[B]
Coarse Grained Soils	Gravels	Clean Gravels	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$		GW	Well-graded gravel[F]
More than 50% retained	More than 50% of coarse fraction retained on No. 4 sieve	Less than 5% fines[C]	$Cu < 4$ and/or $1 > Cc > 3^E$		GP	Poorly graded gravel[F]
on No. 200 sieve		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH		GM	Silty gravel[F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel[F,G,H]
	Sands	Clean Sands	$Cu \geq 6$ and $1 \leq Cc \leq 3^E$		SW	Well-graded sand[I]
	50% or more of coarse fraction passes No. 4 sieve	Less than 5% fines[D]	$Cu < 6$ and/or $1 > Cc > 3^E$		SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH		SM	Silty sand[G,H,I]
			Fines Classify as CL or CH		SC	Clayey sand[G,H,I]
Fine-Grained Soils	Silts and Clays	inorganic	PI > 7 and plots on or above "A" line[J]		CL	Lean clay[K,L,M]
50% or more passes the No. 200 sieve	Liquid limit less than 50		PI < 4 or plots below "A" line[J]		ML	Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay[K,L,M,N] / Organic silt[K,L,M,O]
	Silts and Clays	inorganic	PI plots on or above "A" line		CH	Fat clay[K,L,M]
	Liquid limit 50 or more		PI plots below "A" line		MH	Elastic Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay[K,L,M,P] / Organic silt[K,L,M,Q]
Highly organic soils	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.