## DOCUMENT 00 31 19 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Existing drawings that include information on existing conditions including previous construction at Project site are available for viewing on Project Web site.

C. Related Requirements:

1. Document 00 21 13 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.

**END OF DOCUMENT 00 31 19**

## DOCUMENT 00 31 32 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.

B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.

C. Soil-boring data for Project, obtained by Earth Engineering Incorporated, dated September 06, 2023, is attached to this specification section.

D. A geotechnical investigation report for Project, prepared by Earth Engineering Incorporated, dated September 06, 2023, is attached to this specification section.

1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.

E. Related Requirements:

1. Document 00 21 13 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
2. Document 00 31 19 "Existing Condition Information" for information about existing conditions that is made available to bidders.

**END OF DOCUMENT 00 31 32**

EARTH ENGINEERING INCORPORATED

*Geotechnical Engineers & Geologists*

# REPORT OF GEOTECHNICAL INVESTIGATION

# CHICHESTER HIGH SCHOOL FIELDHOUSE AND TRACK

# 3333 CHICHESTER AVENUE

# UPPER CHICHESTER, PA

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**September 6, 2023**


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## APPENDIX

# I. INTRODUCTION AND BACKGROUND

## A. PROJECT OBJECTIVE AND SCOPE OF WORK

Earth Engineering Incorporated (EEI) has completed the geotechnical investigation for the proposed improvements and development to the existing athletics field located at 3333 Chichester Avenue in Upper Chichester, PA. The objective of this investigation was to evaluate the subsurface soil conditions within the proposed construction area. Based on the encountered conditions and the results of geotechnical and laboratory analyses performed for this project, EEI has developed geotechnical recommendations for the design and construction of a suitable foundation system. EEI also provides general construction guidelines for the development of the site.

The scope of work for this project included a test boring investigation, geologic analysis of site conditions, laboratory testing of soil samples, and a geotechnical engineering analysis of the data obtained. This investigation was performed in general accordance with EEI Proposal No. BB-21308, dated June 2, 2023. The following report sections present the results of the field and laboratory investigations and document recommendations regarding the geotechnical aspects of this project.

## B. EXISTING FEATURES AND PROJECT DESCRIPTION

The proposed development is located at 3333 Chichester Avenue, Upper Chichester, Pennsylvania. The site is bordered to the North by Chichester High School and baseball fields, to the East by Chichester High School, to the South by residential property, and to the West by Chichester Avenue. The grades at the site slope downward from West to East.

The proposed project consists of various improvements to the existing athletic field. Based on the provided plans and information, the proposed improvements include a new athletic field house, track, turf field, bleacher stands, stadium lights, asphalt driving and parking, and other general site improvements. It is EEI's understanding that only the proposed athletic field house and track will be developed at this time, and the other improvements will be conducted in the future. Therefore, the work performed, and recommendations detailed in this report pertain only to the proposed new athletic field house and track. The recommendations and findings made and explained in this report may not be considered for any other developments.

At the time of this report the proposed fieldhouse Finished Floor Elevation (FFE) and Bottom of Footing Elevation (BFE) were not provided. It is however, EEI's understanding is that

the proposed fieldhouse and field improvements to the athletic field will generally match the existing site elevations. From observation, the existing exterior grades across the site slope downward from West to East. Existing site elevations were not provided or known at the time of this report; therefore, elevations ranging from 108.00' to 102.00' was assumed for the purpose of this report; based off available topographical plans from the online resources at PAGEODE.

Figure 1 below, shows an aerial photograph of the approximate development area. A topographic map of the site, from the *Topographic Maps of Pennsylvania* series, Philadelphia Quadrangle, is shown in Plate 1 in the *Appendix* section of this report.


**Figure 1: Site location (Google 2021)**

According to the RFP, the proposed work will include various improvements to the existing athletic field. It is EEI's understanding the improvements that will be developed consist of a new athletic field house, and track. Other proposed improvements such as an athletic turf field, bleacher-stands, stadium lights, asphalt driving and parking, and other general site improvements are future planned projects; but were not considered or included in this report.

Finished Floor Elevation (FFE) of new athletic field house is assumed to be same as approximate grade. Structural loads for the proposed fieldhouse were not provided to EEI at the time of this report. Therefore, maximum column and wall loads of 50 kips and 1.0 kips/ft were assumed and used for analysis, respectively. Should the final structural loads vary from those stated, EEI should be contacted immediately to evaluate the impact on the subsequent recommendations. Should the project plans be further developed, EEI should be notified so that any changes may be evaluated.

## II. FIELD INVESTIGATION, OBSERVATIONS, AND DATA

### A. Field Activities and Procedures

#### 1. Test Borings

Twelve (12) test borings, denoted in this report as B-1 through B-12, were conducted for this investigation to obtain geotechnical data within the investigation area of the proposed development. The test borings were drilled on August 4 and August 5, 2023, by SANO Drilling Inc of Sewell, New Jersey, using an Acker Rebel truck-mounted drill rig. Supervision and monitoring of the test boring program was performed by a representative of EEI. The elevations of the test boring locations in the proposed development were assumed. The test borings are shown on the testing location plan, which is attached in the *Figures and Drawings* section at the end of the report.

The borings were advanced using 2-inch outer-diameter, split-barrel (spoon) samplers and 3-¼ inch inner-diameter hollow-stem augers. Split-barrel sampling was conducted with a automatic hammer. The borings were conducted in accordance with ASTM Standard D1586. Standard Penetration Test (SPT) values were recorded for each sample. The SPT values, which are a measure of soil density and consistency, are the number of blows required to drive the 2-inch outer diameter split-barrel sampler 1 foot using a 140-pound weight dropped 30 inches. The number of blows required to advance the sampler over the 12-inch interval from 6 to 18 inches is considered the "N" value, or the SPT value.

#### 2. Groundwater Observations

Groundwater measurements were taken in each borehole upon completion of the borings and up to 2.0 hours afterward. Groundwater was encountered within B-10 and B-11 at depths of 22.0 and 20.0 feet below the assumed existing ground surface elevations of 106.0 and 102.0 feet, respectively. These depths correlate to groundwater surface elevations of 84.0 and 82.0 feet. Table I below details the subsequent observation groundwater level readings at

the test locations. Groundwater level readings are also shown on the boring profiles and logs. It should be noted that due to logistics these observations were made just after the drilling operation and that groundwater table elevations may fluctuate with daily, seasonal, tidal, and climatic variations.

**TABLE I**
**GROUNDWATER DEPTHS AND ELEVATIONS**

| Test Location | 1.) Surface Elevation (ft.) | 2.) Depth to Groundwater (ft.) | Groundwater Elevation (ft.) |
|---|---|---|---|
| B-10 | 106.0 | 22.0 | 84.0 |
| B-11 | 102.0 | 20.0 | 82.0 |

1.) Ground surface elevations based on topographic estimates as shown on provided plans.
2.) Groundwater depths were measured from existing site grades at the time of the investigation.

## B. GEOTECHNICAL LABORATORY TESTING

Four (4) representative soil samples were recovered from the field investigation for laboratory testing. The laboratory testing was performed to verify visual classifications and to establish engineering parameters required for geotechnical engineering analysis. The tests performed included Particle Size Analysis (ASTM D2487) and Natural Moisture Content (ASTM D2216). Unified Soil Classification System (USCS) Group Symbols and ASTM Group Names were assigned to the samples based on the laboratory testing. The results of the laboratory testing are presented in the following table. Gradation curves, which graphically and numerically depict the results of the analyses, are included in the *Appendix* section.

**TABLE II**
**LABORATORY TEST RESULTS**

| **Boring Location** | B-5 & B-3 | B-2 & B-6 | B-10 & B-9 | B-12 |
|---|---|---|---|---|
| **Sample Location** | S-3 & S-4 | S-5 & S-5 | S-5 & S-6 | S-6 & S-7 |
| **Sample Depth** | 4.0’ – 6.0’ & 6.0’ – 8.0’ | 8.0’ – 10.0’ | 8.0’ – 10.0’ & 13.0’ – 15.0’ | 13.0’ – 15.0’ & 18.0’ – 20.0’ |
| **Stratum** | Stratum I | Stratum II | Stratum III | Stratum IV |
| **Atterberg Limits – Liquid Limit / Plastic Limit / Plasticity Index** | NP / NP / NP | NP / NP / NP | NP / NP / NP | NP / NP / NP |
| **Percent Passing No. 200 Sieve (%)** | 74.0 | 45.4 | 30.0 | 27.4 |
| **Natural Moisture Content (%)** | 19.2 | 18.0 | 14.7 | 16.7 |
| **Unified Soil Classification System (USCS) Group Symbol/ Name** | ML, Sandy Silt | SM, Silty Sand | SM, Silty Sand | SM, Silty Sand |

## C. PUBLISHED GEOLOGICAL INFORMATION

According to the Pennsylvania Geological Survey, Fourth Series, Open-File Report OFBM-05-05.0, *Map of the Bedrock Geology, Wagontown Quadrangle, Chester County, Pennsylvania* by L. Lynn Marquez, 2005, the site is underlain by a formation of anorthosite (denoted with geologic symbol *a*). Plate 2, which is included in the Appendix, shows the location of the site on a geologic map of the area.

According to the above referenced publication, the anorthosite formation consists of plagioclase with variable amounts of quartz, biotite, and hornblende. The anorthosite may contain 20% hornblende in some locations. Hornblende, when abundant, defines a gneissic foliation. The rock is generally difficult to excavate. This unit exhibits good cut-slope stability.

# III. INTERPRETATION OF INFORMATION AND DATA

## A. STRATIFICATION AND SUBSURFACE CONDITIONS

The samples of soil obtained during the field investigation were examined and visually classified by EEI, both in the field and in the laboratory. EEI has generalized the subsurface profile for the investigated area. One (1) material designated as Existing FILL and four (4) naturally occurring strata were characterized to exist at the investigated locations. The surficial layers, as reported in sequence from the surface asphalt, topsoil, and Existing FILL at all testing locations.

A *Subsurface Profile*, which depicts the strata, and other information obtained from the field investigations is included in the *Figures and Drawings* section. Detailed descriptions and data regarding the subsurface conditions are shown on the *Boring Logs,* found in the *Appendix* section. The following subsections provide general descriptions of the materials encountered.

### 1. Existing FILL

The Existing FILL materials consisting of Sandy Gravel and Clayey Sand with some gravel. The Existing FILL material was encountered within all twelve test borings below existing grade. As determined by visual observation, the USCS Group Symbol for representative samples of this soil is *SC and GP.* The assigned ASTM Group Name for the samples observed is *Clayey Sands and Sandy Gravel*

The SPT values recorded during the sampling of the Existing FILL ranged from 3 blows per foot to 33 blows per foot of penetration. Based on these values, the relative density of the

Existing FILL material ranged from Very Loose to Dense. These materials were encountered in a dry to moist state during the field investigation.

**2. Stratum I**

The soils designated as Stratum I are comprised of soils indicative of fine-grained alluvial soils. This stratum consists of Sandy Silt, with varying amounts of gravel. As determined by visual observation and laboratory analysis, the USCS Group Symbol for representative samples of this soil is *ML.* The assigned ASTM Group Name for the samples observed is *Sandy Silt*. This stratum was encountered beneath the Existing FILL within the test borings B-3, B-5, and B-6 locations and extended to depths ranging from 4.0-10.0feet below existing grade.

The SPT values recorded during the sampling of Stratum I soils were 5 blows per foot to 11 blows per foot of penetration. Based on these values, the relative density of Stratum I soils are Loose to Medium Dense. These materials were encountered in a dry to moist state during the field investigation.

**3. Stratum II**

The soils designated as Stratum II are comprised of soils indicative of coarse-grained alluvial soils. This stratum consists of Silty Sand, with varying amounts of gravel. As determined by visual observation and laboratory analysis, the USCS Group Symbol for representative samples of this soil is *SM.* The assigned ASTM Group Name for the samples observed is *Silty Sand*. This stratum was encountered beneath the Existing FILL and/or the Stratum I materials within 10 of the 12 test boring locations and extended to depths ranging from 8.0 to 13.0 feet below existing grade. Stratum II materials were not encountered within B-5 and B-8 boring locations.

The SPT values recorded during the sampling of the Stratum II ranged from 4 blows per foot to greater than 50 blows per foot of penetration. Based on these values, the relative density of the Existing FILL material ranged from Loose to Very Dense. These materials were encountered in a dry to moist state during the field investigation.

**4. Stratum III: Decomposed Schist**

The soils designated as Stratum III are comprised of soils indicative of the decomposition of the underlying bedrock formations. This stratum consists of Silty Sand with varying amounts of gravel, and frequent gneiss fragments. As determined by visual observation and laboratory analysis, the USCS Group Symbol for representative samples of this soil is *SM.*

The assigned ASTM Group Name for the samples observed is *Silty Sand*. This stratum was encountered beneath the Existing FILL materials in test boring location B-8, and beneath the Stratum II materials in test borings B-9, B-10, and B-11, extending to depths ranging from 10.0' to 25.0' below existing grade.

The SPT values recorded during the sampling of Stratum II ranged from 8 blows per foot of penetration to greater than 50 blows per foot of penetration. The relative density of Stratum III is loose to very dense. Stratum II was encountered in a dry to moist state during the field investigation.

**5. Stratum IV: Weathered Schist**

The soils designated as Stratum IV are comprised of soils indicative of the weathering of the underlying bedrock formations. This stratum consists of Sandy Silt with varying amounts of gravel, and frequent schist fragments. As determined by visual observation, the USCS Group Symbol for representative samples of this soil is *SM.* The assigned ASTM Group Name for the samples observed is *Sandy Silt*. This stratum was encountered beneath the Stratum II and III soils in test boings B-10 and B-12, extending to a depth of 25.0 feet below existing grade.

The SPT values recorded during the sampling of Stratum IV ranged from 19 blows per foot of penetration to greater than 50 blows per foot of penetration. The relative density of Stratum IV is Medium Dense to Very Dense. Stratum IV was encountered in a dry to moist state during the field investigation.

**6. Bedrock**

Bedrock is indicated by auger refusal, or when there is no significant advancement of the rotating auger drill bit for the type of drilling rig and drilling equipment used. Auger refusal was not encountered in the field investigation within any test boring.

## IV. GEOTECHNICAL RECOMMENDATIONS

### A. GEOTECHNICAL ANALYSES

EEI has completed geotechnical analyses in order to provide foundation design recommendations for the proposed athletic field house and track. The analyses are based on the conditions encountered in the field. EEI has evaluated the subsurface conditions and provides the following soil parameters utilized for foundation analyses in the following table.

As previously mentioned, the first level finished floor elevation (FFE) for the proposed new athletic field house was not provided to EEI and is assumed to match the existing FFE of

the existing athletic field. The bottom of footing elevation (BFE) is assumed to be 3.0 feet below FFE and adjacent exterior grade for frost protection. Column and wall loads were also not provided to EEI at the time of this report. Therefore, maximum column loads of 50 kips and the maximum wall load of 1.0 kips/lf were assumed and used for developing the following foundation recommendations. If these loads are developed and are significantly different, EEI should be contacted immediately to evaluate the impact on the subsequent recommendations. Other recommendations for field improvements will be made based on the findings of the test borings.

**TABLE III**
**GEOTECHNICAL SOIL PROPERTIES**

| **Stratum** | Existing FILL | Stratum I | Stratum II | Stratum III | Stratum IV |
|---|---|---|---|---|---|
| **Moist Unit Weight - $\gamma_m$ (pcf)** | 115 | 110 | 120 | 125 | 125 |
| **Effective Stress Angle of Internal Friction - $\phi'$** | 32 | 30 | 32 | 34 | 36 |
| **Cohesion – c (psf)** | 0 | 0 | 0 | 0 | 0 |

## B. FOUNDATION SUPPORT RECOMMENDATIONS

Based upon the proposed development concept, as well as the assumed structural loads, EEI has determined that the materials encountered in the vicinity for the proposed athletic field house and track are generally suitable for foundation and/or slab support. Following site preparation activities, the subgrade soils should be visually evaluated, probed, and/or proof rolled. Soft or unstable soils may be recompacted, scarified, dried in-place, or undercut/replaced and compacted.

Unstable, areas can be undercut to firm residual soils and/or stabilized. The extent of the undercutting/stabilization and confirmation of a stable subgrade should be determined in the field by a representative of the Geotechnical Engineer of Record. Following verification of suitable bearing material, the over-excavation may be backfilled and replaced with *structural fill*, as outlined in the FILL and COMPACTION section, or lean concrete up to the originally proposed foundation bottom elevation. Alternately, the foundations can bear on properly placed structural fill with the footing bottoms situated below frost depth, or the foundation base can be lowered to an approved soil bearing elevation.

Based upon the assumed loads and the subsurface conditions observed, EEI recommends supporting the proposed structure on a conventional strip and spread foundation system for the proposed athletic field house. The following foundation system and soil bearing capacity recommendations, in addition to those discussed above, are provided by EEI for use in foundation design assuming that the procedures stated in this report are followed.

1. The proposed new athletic track can bear on approved subgrade soils following the procedures spelled out in both the FILL & COMPACTION and SITE PREPERATION sections of this report.

2. A foundation system consisting of strip and spread footings is recommended for support of the proposed athletic field house.

2. EEI recommends the foundations for the fieldhouse be designed for an allowable bearing capacity of 3,000 pounds per square foot bearing on medium dense to very dense Stratum I, Stratum II, soils and/or properly placed structural fill. **Foundations shall not bear on or above existing soft/unstable materials.**

3. The total and differential settlements are expected to be less than 0.5 to 1.0 inches, respectively. These settlements were calculated utilizing a bearing pressure of 3,000 pounds per square foot, with assumed an maximum column load of 50 kips, and a maximum wall load of 1.0 kips per linear foot. In the event that foundation loads exceed or fall short of these values, EEI should be informed to review and revise these recommendations, as necessary.

4. Strip and spread foundations shall be a minimum of 18 inches and 36 inches wide, respectively, for shear considerations.

5. The bottom of exterior footings and footings in unheated areas should be placed at least thirty-six (36) inches below the final exterior grade for protection from frost heave. Foundations should match existing adjacent BFE or incorporate underpinning.

6. All footing bottoms should be dry and completely cleaned of loose material or debris immediately prior to the placement of concrete.

7. The actual bearing conditions of the soil at the footing bottom elevation should be confirmed in the field during excavation, by inspection under the supervision of a Professional Engineer qualified in Geotechnical Engineering.

## C. FLOOR SLAB SUPPORT

Floor slabs may be supported by approved subgrade soils and/or on structural fill placed and compacted over approved subgrade soils in accordance with the FILL AND COMPACTION section of this report. During SITE PREPARATION, localized areas may require removal of

unsuitable soils and replacement with compacted structural fill or excavation, drying, aeration and replacement in a controlled manner. The proposed building pad area should be probed, proof-rolled or otherwise observed to densify and verify the integrity of the subgrade soils. It is critical that the proof-rolling operation be performed in the presence of a representative of the Geotechnical Engineer of Record to ensure that the Fill, Stratum I, and Stratum II materials are suitable to provide adequate slab support. Topsoil, if encountered, should be removed and replaced with controlled, compacted lifts of structural fill as outlined in the FILL AND COMPACTION section of this report. Any unstable zones of FILL, Stratum I and or Stratum II soils identified during proof-rolling operations can be aerated and dried in-place, if feasible.

Alternately, EEI recommends localized over-excavation of any unstable materials to a firm and stable base and replacement with compacted structural fill as outlined in the FILL AND COMPACTION section of this report. Following these procedures, the resultant product should be a uniform bearing surface for slab support that will provide adequate structural support and limit settlement. The earthwork procedures described herein should be monitored and inspected by a representative of the Geotechnical Engineer of Record.

EEI recommends the floor slabs for the proposed structure are designed as a slab-on-grade system, and the subgrade should be prepared in accordance with the procedures described in this report. The floor slab shall be designed with a modulus of subgrade reaction value of 120 psi/in. EEI recommends the placement of a granular subbase beneath the floor slab to provide uniform support distribution between the subgrade soils and the base of the concrete slab. It is recommended that a minimum of four (4) inches of crushed stone aggregate, such as AASHTO #57 or equivalent, be placed and compacted beneath all floor slab areas. The floor slabs should be suitably reinforced to control shrinkage cracks. Proper joints should be provided at the junction of the slabs and foundation system so that a small amount of independent movement can occur without causing damage.

Furthermore, from a geotechnical perspective, a vapor retarder/barrier is not required to address any issues with moisture intrusion from shallow groundwater. The need for a vapor retarder/barrier from a non-geotechnical perspective depends on the floor covering and/or humidity control in the proposed building space. Refer to appropriate documentation from the Portland Cement Association for guidance on the need and location of a vapor retarder/barrier. If a moisture sensitive floor covering is used, or the building space is equipped with humidity control, then a vapor retarder/barrier is recommended. Additionally, the location of the vapor retarder/barrier would depend on when slab construction is completed with respect to placement of a watertight roofing system. There is some debate in the industry on the use and location of

vapor retarder/barrier. Regardless, these issues are not of a geotechnical nature. Therefore, EEI recommends that these issues be evaluated by the Architect and/or structural engineer accordingly to determine the need for and location of the vapor retarder/barrier.

## D. SITE PREPARATION

Initial site preparation measures should include the removal of all surficial materials including asphalt, and topsoil to expose the soils at the construction subgrade elevations within the development area. The subgrade should be proof-rolled, probed, or otherwise observed and compacted in order to densify and verify the integrity of the subgrade bearing materials. Observation by the geotechnical engineer is critical for both the new structure and proposed field improvements. EEI recommends that a smooth drum vibratory roller having a minimum static weight of 10 tons be utilized for this purpose. Areas that cannot be accessed by this sized equipment should be densified and compacted by use of walk-behind or hand operated equipment. The proof-rolling and compaction activities should be observed and evaluated during construction by the on-site representative of the Geotechnical Engineer of Record. Any soft or loose zones of soil encountered during proof-rolling should be scarified and moisture conditioned (dried) or removed and replaced with structural fill as described in the *FILL AND COMPACTION* subsection of this report.

The site should be graded during construction to convey surface runoff away from active work areas. Repeated construction traffic across the fine-grained native soils of Stratum I at the site will lead to instabilities and should therefore be minimized. The work areas should be sealed by rolling on a daily basis to promote runoff. Careful grading and management of surface water runoff will help minimize disturbance of the subgrade. EEI recommends that all construction areas, including those that will be excavated to achieve the planned subgrade elevation, be proof-rolled immediately before the placement of any structural fill and/or the placement of subbase stone, and again before the installation of concrete or asphalt. Such preparations will allow soft and weak areas to be observed and remediated before construction.

## E. LATERAL EARTH PRESSURES

The lateral earth pressures that may be used for designing below grade walls and for retaining walls, if necessary, are shown in the following table. Retaining walls that are restrained from deflection should be designed for the at-rest ($K_o$) condition. Retaining walls that are free to deflect, such as landscaped walls, should be designed for the active ($K_a$) condition. Considered somewhat conservative, the earth pressure data for the on-site material was

determined from the soil classification testing and visual classification of the soil samples and was compared to generally accepted and published values for the various properties.

EEI recommends that a drainage system be installed for walls constructed below grade. The presence of a drainage system will serve to minimize hydrostatic pressures caused by water trapped against the walls. If adequate drainage is not provided, the walls should be designed to resist hydrostatic loads. Additionally, consideration should be given to any surcharge loads at the top of walls.

**TABLE IV**
**SOIL PROPERTIES FOR COMPUTATION OF LATERAL LOADS**

| **Stratum** | Existing FILL | Stratum I | Stratum II | Stratum III | Stratum IV |
|---|---|---|---|---|---|
| **Effective Stress Angle of Internal Friction - $\phi'$** | 28° | 30° | 32° | 34° | 36 |
| **Moist Unit Weight - $\gamma_m$** | 115 pcf | 110 pcf | 120 pcf | 125 pcf | 125 pcf |
| **Rankine Coefficient of Active Earth Pressure - $K_a$** | 0.36 | 0.33 | 0.31 | 0.28 | 0.26 |
| **Rankine Coefficient of Passive Earth Pressure - $K_p$** | 2.77 | 3.00 | 3.25 | 3.54 | 3.85 |
| **Rankine Coefficient of At-Rest Earth Pressure - $K_o$** | 0.53 | 0.50 | 0.47 | 0.44 | 0.41 |
| **Coefficient of Sliding** | 0.37 | 0.40 | 0.44 | 0.47 | 0.51 |

## F. EXCAVATIONS

EEI expects that foundation excavations will occur within the Existing FILL, Stratum I Stratum II, and Stratum III at the site. EEI expects that the Stratum I and Stratum II soils should be capable of being excavated with conventional earth excavation equipment and techniques. Bedrock excavation is not anticipated at the site.

Excavations must be sloped, benched, or shored to prevent collapse during soil excavation and during construction. Sloping, benching, or shoring of all construction excavation should be conducted in accordance with 29 CFR 1926, Subpart P. A competent person as defined by the aforementioned regulation is required to confirm the stability of all excavations during construction. The actual excavation wall slopes, benching, or shoring should be determined in the field and should be based on the required depth of excavations and on the

soil types encountered. Care should be taken during construction to protect existing foundations and utilities from undermining.

## G. FILL AND COMPACTION

### 1. Onsite Fill Criteria

Fill material used to support and backfill foundations as well as fill for retaining walls is considered structural fill. Based on field observations it appears that the Existing FILL and Stratum II soils are generally suitable for reuse as a structural fill material in their current conditions. Stratum I material may be difficult to reuse due to the high fines, plasticity and elevated moisture. Organic material, or any material that may further decompose, should not be considered suitable as structural fill if it is encountered.

### 2. Imported Fill Criteria

If any structural fill is required to be **imported** to the site, it should meet the following criteria:

- it should be free of organic matter, ash, cinders, frozen materials, and demolition debris,
- the plasticity index should be less than 10
- it should be less than 15 percent by weight rock fragments larger than 3 inches, less than 30 percent by weight larger than ¾ inches, and less than 30 percent by weight smaller than the No. 200 sieve.
- meets the definition of clean fill according to PADEP Management of Fill Policy, Document Number 258-2182-773.

The above criteria are provided as a general guideline for soil materials imported to the site. Soil materials that become available for use as a structural fill should be submitted to the Geotechnical Engineer of Record for evaluation before they are imported to the site.

### 3. Compaction Criteria

Structural fills should be placed in horizontal lifts not exceeding 8 inches in loose thickness and compacted with a smooth drum vibratory roller with a minimum static weight of 10 tons. Structural fill should be placed in horizontal lifts of 6 inches loose thickness where compaction by hand-operated equipment is necessary. The optimum lift thickness and number of repetitions necessary to achieve the required percentage compaction values should be determined in the field with test passes of the chosen compaction equipment. The fill material should be placed at, or deviate nominally from, the optimum moisture content as determined in

accordance with ASTM D698 and compacted to a minimum percentage of the maximum dry density as indicated in Table 5.

**TABLE 5**
**COMPACTION CRITERIA**

| Fill Area | Percent (%) of Maximum Dry Density Per ASTM D698 |
|---|---|
| Foundation Support, and Wall | 98 |
| Utility Trenches and Walkways | 95 |
| Nonstructural | 92 |

## H. GROUNDWATER CONTROL

As previously mentioned, groundwater was encountered within the performed test borings. However, based upon the field observations and the proposed construction, the presence of groundwater is not anticipated and should not impact construction activities. It should be noted that groundwater elevations may fluctuate with daily, seasonal and climatic events. The contractor should be advised that they may conduct their own investigations to verify groundwater elevations prior to performing excavations on site.

## I. SITE SEISMIC CLASSIFICATION

According to the 2018 International Building Code IBC Section 1613.2.2 Site Classification for Seismic Design and the information obtained from the geotechnical field investigation, the average properties in the top 100 feet correspond to Site Class D (Table 20.3-1 *Site Classification*, in Chapter 20 of ASCE 7). Therefore, Site Class D conditions should be applied for the seismic design of the proposed structures.

## J. CONSTRUCTION QUALITY CONTROL

As documented within this report, the proposed construction will include earthwork procedures and foundation placement activities. The quality of these activities is an integral part of the development of this site and directly affects the validity of the recommendations presented in this report. Based on EEI's past experience, the most effective and economical earthwork inspection is obtained through the presence of a qualified representative of the Geotechnical Engineer of Record during site preparation, excavation of on-site materials, site development, proof-rolling, placement of structural fill, and installation of foundation elements. EEI recommends that these activities be examined, tested, and confirmed by the Geotechnical Engineer of Record.

## K. LIMITATIONS

The conclusions and recommendations presented in this report are based on the subsurface data collected, details stated in this report, and the assumption that the subsurface conditions do not deviate from those disclosed by the data acquisition activities performed. It is recommended that the final foundation plans be made available to EEI for review. Any substantial change in the proposed plans should be brought to the attention of EEI so that the impact of the change on the recommendations presented herein may be evaluated.

The procedures followed during the subsurface exploration, and the analyses and conclusions contained herein, have followed generally accepted practices of geotechnical engineering. EEI provides no other warranties, either expressed or implied, as to the professional advice provided under the terms of EEI's agreement and included in this report. The conclusions and recommendations presented in this report are based on the assumption that recognized, proper construction practices will be followed throughout construction and that a Professional Engineer qualified in Geotechnical Engineering will be retained to oversee the inspection of site preparation, proof-rolling, foundation construction, and other critical earthwork operations. If subsurface conditions substantially deviate during construction from those described in this report, EEI should be contacted promptly.

The recommendations provided herein are for the design of the foundations and associated structures related to the proposed development at the site. Should sheeting, shoring, underpinning, or bracing of existing and adjacent structures be required, EEI should be contacted so that proper design of such measures may be formulated.

EEI emphasizes that geotechnical analyses made in this report are for the proposed development of a field house and improvements to the existing athletic field at Chichester High School located at 3333 Chichester Avenue, Upper Chichester, Pennsylvania. EEI does not assume any responsibility for the use of this report in generating a foundation design for a site other than the one specifically addressed in this report.

Respectfully submitted,
***EARTH ENGINEERING INCORPORATED***


Benjamin Sibilla
Project Manager

Timothy B. Carlin, P.E.
Project Manager

## FIGURES AND DRAWINGS

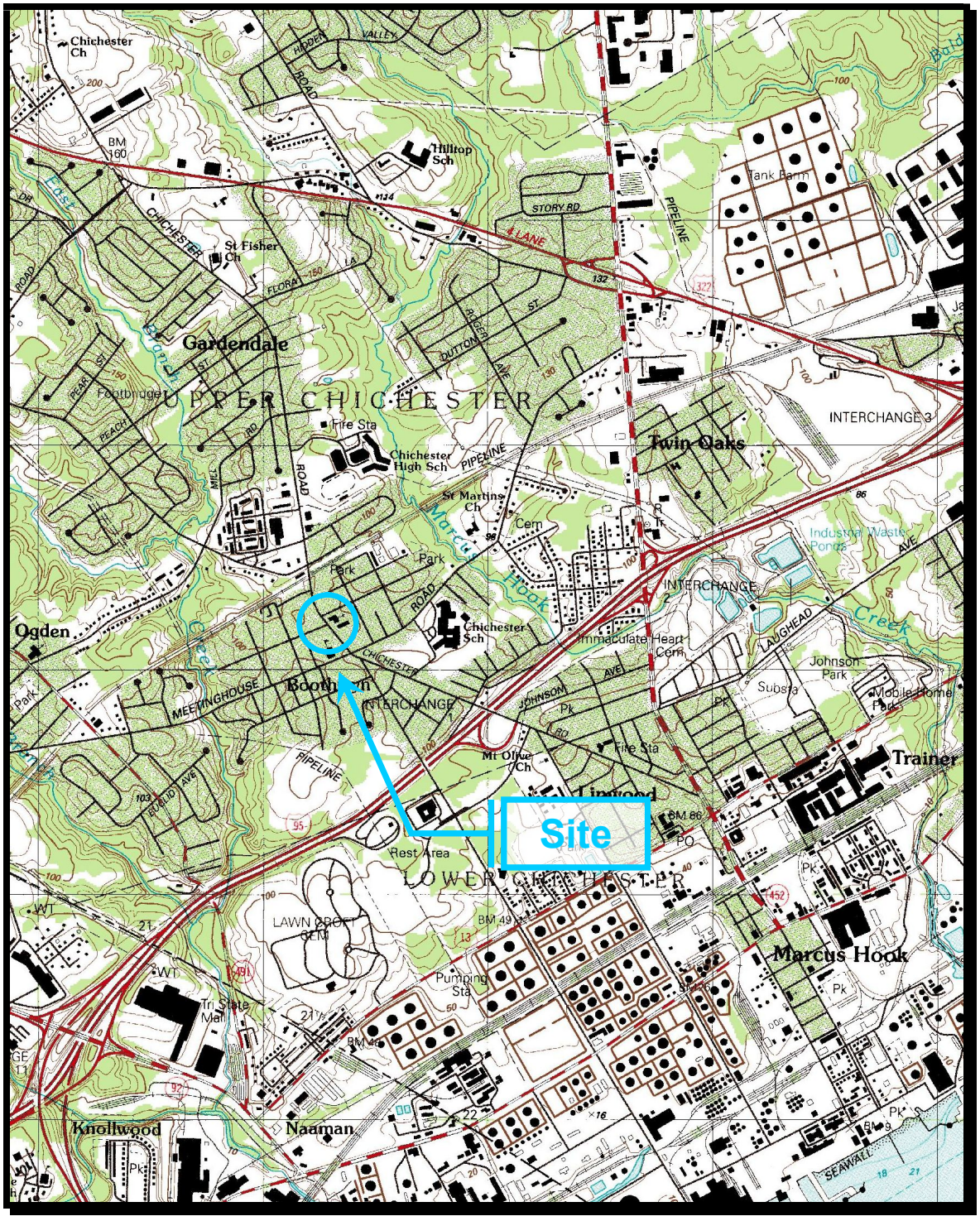



**PLATE 1 – TOPOGRAPHIC MAP OF SITE**

Reprinted from the United States Department of the Interior Geological Survey,
Topographic Maps of Pennsylvania, Marcus Hook, PA-NJ-DEL Quadrangle, Photorevised 1993.

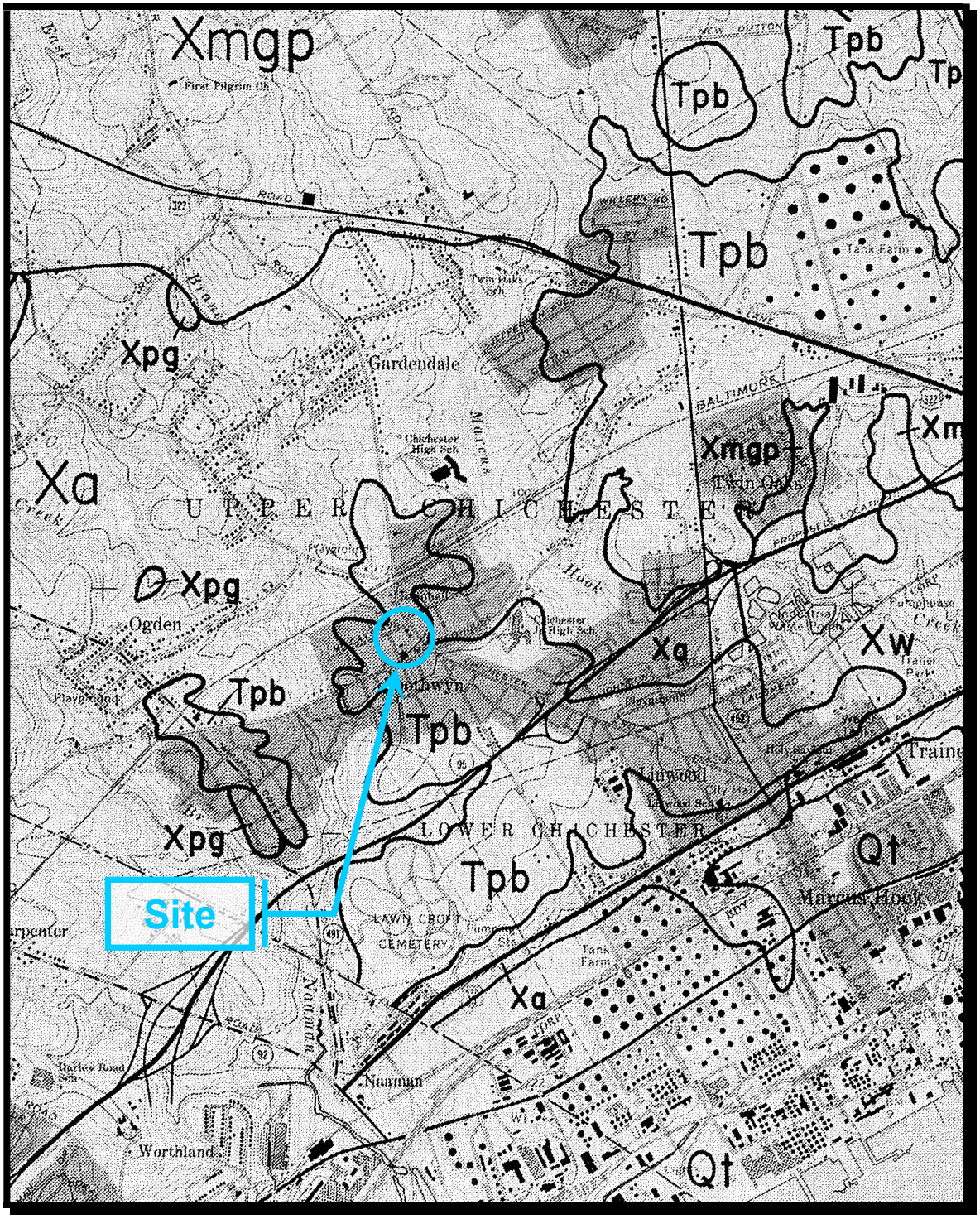
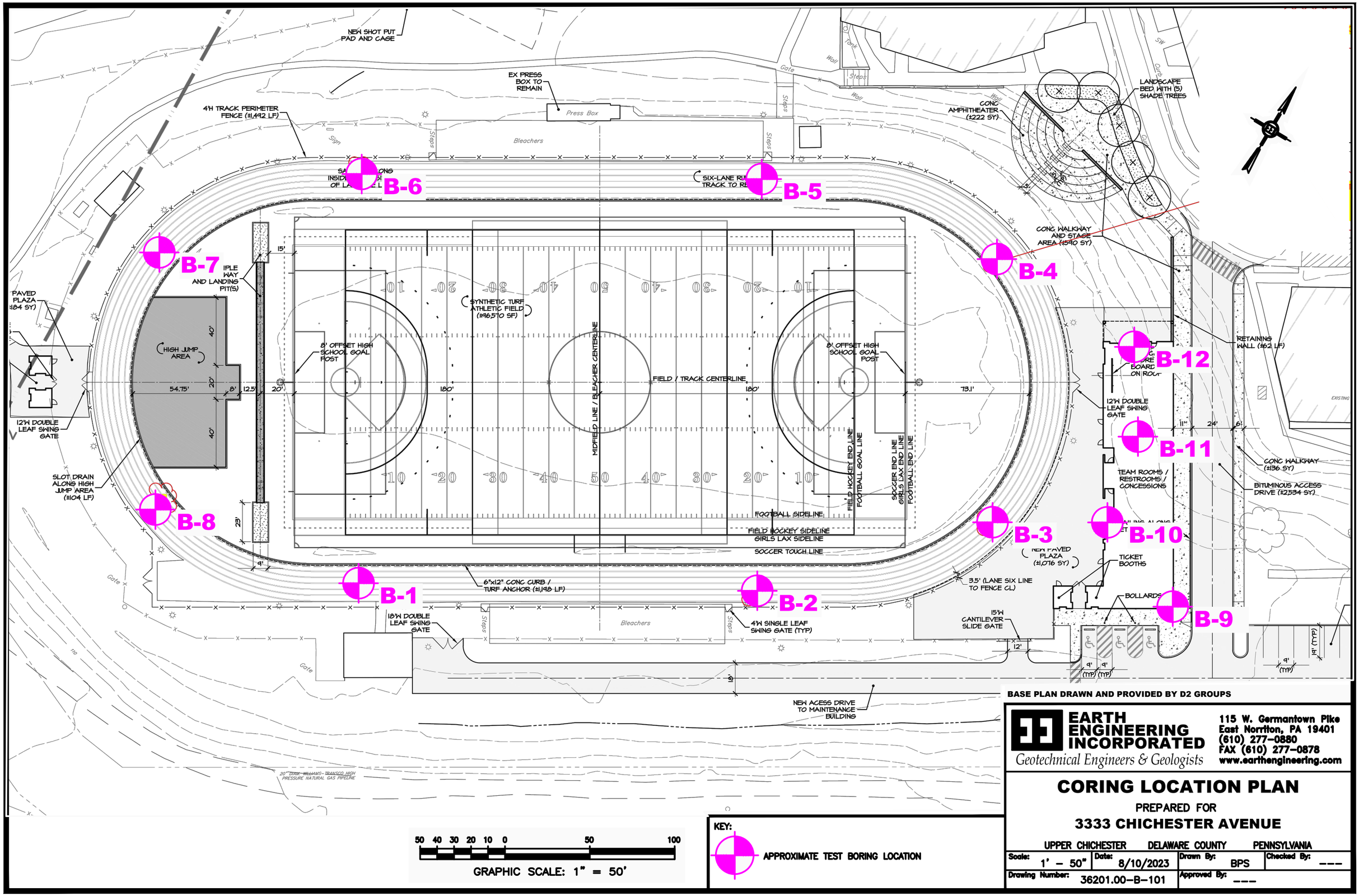



**PLATE 2 - GEOLOGIC MAP OF SITE**

Reprinted from the Pennsylvania Geological Survey, Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania, Marcus Hook, PA-NJ-DEL Quadrangle, 1978.




BASE PLAN DRAWN AND PROVIDED BY D2 GROUPS

GRAPHIC SCALE: 1" = 50'

KEY:

APPROXIMATE TEST BORING LOCATION


EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists
115 W. Germantown Pike
East Norrtion, PA 19401
(610) 277-0880
FAX (610) 277-0878
www.earthengineering.com


# CORING LOCATION PLAN

PREPARED FOR

## 3333 CHICHESTER AVENUE

UPPER CHICHESTER DELAWARE COUNTY PENNSYLVANIA

| Scale: | Date: | Drawn By: | Checked By: |
|---|---|---|---|
| 1' – 50" | 8/10/2023 | BPS | --- |
| Drawing Number: 36201.00-B-101 | | Approved By: --- | |

ELEVATION (feet)

110 105 100 95 90 85 80 75

**B-1**
**EL. 108.0'**
0.5 FILL
2.0
4.0 Stratum I
10.0
33 21 7 9 58/9"

**B-2**
**EL. 108.0'**
0.5 FILL
2.0
4.0 Stratum I
10.0
17 9 6 12 10

**B-3**
**EL. 108.0'**
0.5 FILL
2.0 Stratum I
8.0 Stratum II
10.0
25 10 5 7 10

**B-4**
**EL. 108.0'**
0.5 FILL
2.0
4.0 Stratum I
10.0
15 11 7 11 12

**B-5**
**EL. 108.0'**
0.5 FILL
2.0 Stratum I
4.0 Stratum II
10.0
20 12 11 11 10

**B-6**
**EL. 108.0'**
0.5 FILL
2.0 Stratum I
4.0 Stratum II
10.0
25 7 6 7 8

**B-7**
**EL. 108.0'**
0.5 FILL
2.0 Stratum I
10.0
13 5 4 8 7

**B-8**
**EL. 108.0'**
0.5 FILL
4.0 Stratum I
10.0
20 10 11 21 50/5"

**B-9**
**EL. 106.0'**
0.5 FILL
4.0 Stratum I
8.0 Stratum II
25.0
5 8 7 8 12 14 15 50/4"

**B-10**
**EL. 106.0'**
0.5 FILL
6.0 Stratum I
13.0 Stratum II
22.0 ▽
23.0 Stratum III
25.0
11 3 9 12 11 9 11 64/10"

**B-11**
**EL. 102.0'**
0.5 FILL
2.0 Stratum I
8.0 Stratum II
20.0 ▽
25.0
7 8 11 9 8 82/10" 80/11" 33

**B-12**
**EL. 102.0'**
0.5 FILL
6.0 Stratum I
13.0 Stratum II
25.0
8 8 11 10 12 23 19 50/4"

## Lithology Graphics

- Asphalt
- FILL
- Topsoil
- Stratum I
- Stratum II
- Stratum III
- Stratum IV - Weathered Schist

▽ Initial Groundwater Level

▼ Subsequent Groundwater Level

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*Geotechnical Engineers & Geologists*

# BORING PROFILES
PREPARED FOR
## 3333 CHICHESTER HIGHSCHOOL
UPPER CHICHESTER, PA

Project Number: 36201.00

# APPENDICES

**EARTH ENGINEERING INCORPORATED**
*Geotechnical Engineers & Geologists*

# *BORING LOG*

BORING NO. B-1
SHEET 1 OF 1
DATE: START 8/2/23
END 8/2/23
SURFACE ELEV. (FT) 108.0

PROJECT NAME 3333 Chichester Highschool
PROJECT LOCATION Upper Chichester, PA
PROJECT NUMBER 36201.00
INSPECTOR NAME B. Slbilla
EQUIPMENT USED Acker Rebel Truck Mounted Drill Rig
DRILLER NAME/COMPANY Nick P./SANO
DRILLING METHODS 2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals
AUGER: SIZE: 3.25" ID HSA ; AUGER DEPTH: 10.0' ; WATER: DEPTH: NE TIME: NA DATE: NA
CHECKED BY: B. Yildiz ; DATE: 8/7/2023 DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION (DEPTH / ELEVATION) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.5 | | | | | | | | 1" Rubber, 5" Asphalt<br>0.5 / 107.5 | |
| 2.0 | S-1 | 7<br>17<br>16 | 1.0' | - | GP | m/d | | Sandy Gravel, some sand; Grey Blue (FILL)<br>2.0 / 106.0 | Moderate to Easy Drilling 0.0' - 10.0' |
| 4.0 | S-2 | 11<br>12<br>9<br>9 | 1.0' | - | SC | m/d | | Clayey Sand, trace m-f gravel; Orange brown (FILL)<br>4.0 / 104.0 | |
| 6.0 | S-3 | 3<br>3<br>4<br>6 | 1.5' | - | SM | m/d | | Silty Sand, little fine gravel; Orange brown tan (Decomposed Schist) | |
| 8.0 | S-4 | 5<br>5<br>4<br>6 | 1.5' | - | SM | m/d | | | |
| 10.0 | S-5 | 7<br>8<br>50/3 | 1.0' | - | SM | m/d | | 10.0 / 98.0 | End of Test Boring @ 10.0' |

** D = DRY, M = MOIST, W = WET

**EARTH ENGINEERING INCORPORATED**
*Geotechnical Engineers & Geologists*

# *BORING LOG*

BORING NO. **B-10**
SHEET **1** OF **1**
DATE: START **8/3/23**
END **8/3/23**
SURFACE ELEV. (FT) **106.0**

PROJECT NAME **3333 Chichester Highschool**
PROJECT LOCATION **Upper Chichester, PA**
PROJECT NUMBER **36201.00**
INSPECTOR NAME **B. Slbilla**
EQUIPMENT USED **Acker Rebel Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **Nick P./SANO**
DRILLING METHODS **2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals**
AUGER: SIZE: **3.25" ID HSA** ; AUGER DEPTH: **25.0'** ; WATER: DEPTH: **22.0'** TIME: **0.5 Hr** DATE: **8/3/2023**
CHECKED BY: **B. Yildiz** ; DATE: **8/7/2023** DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | DEPTH / ELEVATION | |
| 0.0 | | | | | | | | 0.5 / 105.5 6" Topsoil | |
| | S-1 | 5 5 6 2 | 0.5' | - | SC | m | | Clayey Sand, little mf gravel; Orange brown (FILL) | Easy Drilling 0.0' - 20.0' |
| 2.0 | | | | | | | | | |
| | S-2 | 3 1 2 2 | 1.0' | - | SC | m | | | |
| 4.0 | | | | | | | | | |
| | S-3 | 4 4 5 5 | 1.0' | - | SC | m | | | |
| 6.0 | | | | | | | | 6.0 / 100.0 | |
| | S-4 | 9 6 6 6 | 1.0' | - | SM | m | | Silty Sand; Dark orange brown tan | |
| 8.0 | | | | | | | | | |
| | S-5 | 6 5 6 6 | 1.0' | - | SM | m | | | |
| 10.0 | | | | | | | | | |
| | | | | | | | | | |
| 13.0 | | | | | | | | 13.0 / 93.0 | |
| | S-6 | 4 4 5 5 | 1.0' | - | SM | m | | Silty Sand, little mf gravel, mica; Dark orange brown tan (Deocmposed Schist) | |
| 15.0 | | | | | | | | | |
| | | | | | | | | | |
| 18.0 | | | | | | | | | |
| | S-7 | 4 5 6 5 | 1.0' | - | SM | m/w | | | |
| 20.0 | | | | | | | | | Moderate Drilling 20.0' - 25.0' |
| | | | | | | | | | |
| | | | | | | | | | Groundwater @ 22.0' |
| 23.0 | | | | | | | | 23.0 / 83.0 | |
| | S-8 | 11 14 50/4 | 0.9' | - | SM | m/w | | Silty Sand and Gravel; White tan brown (Weathered Schist) | Spoon Refusal @ 24.5' |
| 24.5 | | | | | | | | 25.0 / 81.0 | End of Test Boring @ 25.0' |

** D = DRY, M = MOIST, W = WET

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*Geotechnical Engineers & Geologists*

# *BORING LOG*

BORING NO. **B-11**
SHEET **1** OF **1**
DATE: START **8/3/23**
END **8/3/23**
SURFACE ELEV. (FT) **102.0**

PROJECT NAME **3333 Chichester Highschool**
PROJECT LOCATION **Upper Chichester, PA**
PROJECT NUMBER **36201.00**
INSPECTOR NAME **B. Sibilla**
EQUIPMENT USED **Acker Rebel Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **Nick P./SANO**
DRILLING METHODS **2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals**
AUGER: SIZE: **3.25" ID HSA** ; AUGER DEPTH: **25.0'** ; WATER: DEPTH: **20.0'** TIME: **0.5 Hr** DATE: **8/3/2023**
CHECKED BY: **B. Yildiz** ; DATE: **8/7/2023** DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | DEPTH ELEVATION | |
| 0.0 | | | | | | | | 0.5 6" Topsoil 101.5 | |
| | S-1 | 3 2 5 6 | 1.0' | - | SM | m | | Clayey Sand to Silty Sand, little mf gravel; Dark Orange brown | Easy Drilling 0.0' - 15.0' |
| 2.0 | | | | | | | | 2.0 100.0 | |
| | S-2 | 3 4 4 5 | 1.0' | - | SM | m | | Silty Sand, little mf gravel; Orange brown | |
| 4.0 | | | | | | | | | |
| | S-3 | 4 5 6 9 | 1.0' | - | SM | m | | | |
| 6.0 | | | | | | | | | |
| | S-4 | 12 6 3 5 | 1.0' | - | SM | m | | | |
| 8.0 | | | | | | | | 8.0 94.0 | |
| | S-5 | 4 4 4 6 | 1.0' | - | SM | m | | Silty Sand, little mf gravel, mica; Tan orange brown (Decomposed Schist) | |
| 10.0 | | | | | | | | | |
| | | | | | | | | | |
| 13.0 | | | | | | | | | |
| | S-6 | 35 32 50/4 | 1.0' | - | SM | m | | | |
| 15.0 | | | | | | | | | Moderate Drilling 15.0' - 25.0' |
| | | | | | | | | | |
| 18.0 | | | | | | | | | |
| | S-7 | 25 30 50/5 | 1.0' | - | SM | m | | | |
| 20.0 | | | | | | | | | Groundwater @ 20.0' |
| | | | | | | | | | |
| 23.0 | | | | | | | | | |
| | S-8 | 11 15 18 25 | 1.0' | - | SM | m | | | End of Test Boring @ 25.0' |
| 25.0 | | | | | | | | 25.0 77.0 | |

** D = DRY, M = MOIST, W = WET

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# *BORING LOG*

BORING NO. **B-12**
SHEET **1** OF **1**
DATE: START **8/3/23**
END **8/3/23**
SURFACE ELEV. (FT) **102.0**

PROJECT NAME **3333 Chichester Highschool**
PROJECT LOCATION **Upper Chichester, PA**
PROJECT NUMBER **36201.00**
INSPECTOR NAME **B. Sibilla**
EQUIPMENT USED **Acker Rebel Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **Nick P./SANO**
DRILLING METHODS **2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals**
AUGER: SIZE: **3.25" ID HSA** ; AUGER DEPTH: **25.0'** ; WATER: DEPTH: **NE** TIME: **NA** DATE: **NA**
CHECKED BY: **B. Yildiz** ; DATE: **8/7/2023** DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | DEPTH ELEVATION | |
| 0.0 | S-1 | 2 4 4 5 | 1.0' | - | SC-SM | m | | 0.5 6" Topsoil 101.5<br>Clayey Sand to Silty Sand; Orange brown | Easy Drilling 0.0' - 20.0' |
| 2.0 | S-2 | 4 5 3 3 | 1.0' | - | SC-SM | m | | | |
| 4.0 | S-3 | 3 6 5 6 | 1.0' | - | SC-SM | m | | | |
| 6.0 | S-4 | 5 5 5 6 | 1.5' | - | SM | m | | 6.0 96.0<br>Silty Sand, little f gravel, mica; Orange brown (Decomposed Schist) | |
| 8.0 | S-5 | 5 6 6 6 | 1.5' | - | SM | m | | | |
| 10.0 | | | | | | | | | |
| 13.0 | S-6 | 4 8 15 19 | 1.0' | - | SM | m | | 13.0 89.0<br>Silty Sand, abundant mica, trace f gravel; Tan white orange brown (Weathered Schist) | |
| 15.0 | | | | | | | | | |
| 18.0 | S-7 | 6 6 13 45 | 1.0' | - | SM | m | | | Moderate Drilling 20.0' - 25.0' |
| 20.0 | S-8 | 35 50/4 | 0.5' | - | SM | m | | | Spoon Refusal @ 23.8' |
| 23.0 | | | | | | | | | |
| 23.8 | | | | | | | | 25.0 77.0 | End of Test Boring @ 25.0' |

** D = DRY, M = MOIST, W = WET

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# BORING LOG

BORING NO. B-2
SHEET 1 OF 1
DATE: START 8/2/23
END 8/2/23
SURFACE ELEV. (FT) 108.0

PROJECT NAME 3333 Chichester Highschool
PROJECT LOCATION Upper Chichester, PA
PROJECT NUMBER 36201.00
INSPECTOR NAME B. Sibilla
EQUIPMENT USED Acker Rebel Truck Mounted Drill Rig
DRILLER NAME/COMPANY Nick P./SANO
DRILLING METHODS 2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals
AUGER: SIZE: 3.25" ID HSA ; AUGER DEPTH: 10.0' ; WATER: DEPTH: NE TIME: NA DATE: NA
CHECKED BY: B. Yildiz ; DATE: 8/7/2023 DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION (DEPTH / ELEVATION) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.5 | | | | | | | | 1" Rubber, 5" Asphalt<br>0.5 / 107.5 | |
| 2.0 | S-1 | 20<br>10<br>7 | 1.0' | - | GP | m/d | | Sandy Gravel; Blue greyish (FILL)<br>2.0 / 106.0 | Moderate to Easy Drilling 0.0' - 10.0' |
| 4.0 | S-2 | 5<br>5<br>4<br>5 | 1.0' | - | SC | m/d | | Clayey Sand to Silty Sand; Orange Brown<br>4.0 / 104.0 | |
| 6.0 | S-3 | 2<br>3<br>3<br>5 | 1.5' | - | SM | m/d | | Silty Sand, mica; Orange Brown | |
| 8.0 | S-4 | 7<br>5<br>7<br>6 | 1.5' | - | SM | m/d | | | |
| 10.0 | S-5 | 8<br>5<br>5<br>4 | 1.0' | - | SM | m/d | | 10.0 / 98.0 | End of Test Boring @ 10.0' |

** D = DRY, M = MOIST, W = WET

**EARTH ENGINEERING INCORPORATED**
*Geotechnical Engineers & Geologists*

# *BORING LOG*

BORING NO. B-3
SHEET 1 OF 1
DATE: START 8/2/23
END 8/2/23
SURFACE ELEV. (FT) 108.0

PROJECT NAME 3333 Chichester Highschool
PROJECT LOCATION Upper Chichester, PA
PROJECT NUMBER 36201.00
INSPECTOR NAME B. Sibilla
EQUIPMENT USED Acker Rebel Truck Mounted Drill Rig
DRILLER NAME/COMPANY Nick P./SANO
DRILLING METHODS 2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals
AUGER: SIZE: 3.25" ID HSA ; AUGER DEPTH: 10.0' ; WATER: DEPTH: NE TIME: NA DATE: NA
CHECKED BY: B. Yildiz ; DATE: 8/7/2023 DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | DEPTH ELEVATION | |
| 0.5 | | | | | | | | 1" Rubber, 5" Asphalt<br>0.5 107.5 | |
| 2.0 | S-1 | 10<br>15<br>10 | 1.0' | - | GP | m/d | | Sandy Gravel; Blue grey (FILL)<br>2.0 106.0 | Easy to Moderate Drilling 0.0' - 10.0' |
| 4.0 | S-2 | 5<br>5<br>5<br>5 | 1.2' | - | ML | m/d | | Sandy Silt, trace fine gravel; Orange brown | |
| 6.0 | S-3 | 2<br>3<br>2<br>1 | 1.5' | - | ML | m/d | | | |
| 8.0 | S-4 | 4<br>3<br>4<br>3 | 1.9' | - | ML | m/d | | 8.0 100.0 | |
| 10.0 | S-5 | 8<br>5<br>5<br>5 | 2.0' | - | SM | m/d | | Silty Sand, abundant mica; Orange brown<br>10.0 98.0 | End of Test Boring @ 10.0' |

** D = DRY, M = MOIST, W = WET

**EARTH ENGINEERING INCORPORATED**
*Geotechnical Engineers & Geologists*

# *BORING LOG*

BORING NO. **B-4**
SHEET **1** OF **1**
DATE: START **8/2/23**
END **8/2/23**
SURFACE ELEV. (FT) **108.0**

PROJECT NAME **3333 Chichester Highschool**
PROJECT LOCATION **Upper Chichester, PA**
PROJECT NUMBER **36201.00**
INSPECTOR NAME **B. Slbilla**
EQUIPMENT USED **Acker Rebel Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **Nick P./SANO**
DRILLING METHODS **2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals**
AUGER: SIZE: **3.25" ID HSA** ; AUGER DEPTH: **10.0'** ; WATER: DEPTH: **NE** TIME: **NA** DATE: **NA**
CHECKED BY: **B. Yildiz** ; DATE: **8/7/2023** DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION (DEPTH / ELEVATION) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.5 | | | | | | | | 1" Rubber 5" Asphalt<br>0.5 / 107.5 | |
| 2.0 | S-1 | 9<br>9<br>6 | 1.0' | - | GP | m/d | | Sandy Gravel; Blue Grey (FILL)<br>2.0 / 106.0 | Easy Drilling 0.0' - 10.0' |
| 4.0 | S-2 | 12<br>6<br>5<br>6 | 1.5' | - | SC | m/d | | Clayey Sand; Dark grey brown (FILL)<br>4.0 / 104.0 | |
| 6.0 | S-3 | 2<br>3<br>4<br>5 | 1.5' | - | SM | m/d | | Silty Sand, little fine gravel; Orange grey brown | |
| 8.0 | S-4 | 4<br>6<br>5<br>6 | 1.0' | - | SM | m/d | | | |
| 10.0 | S-5 | 7<br>4<br>8<br>7 | 1.0' | - | SM | m/d | | 10.0 / 98.0 | End of Test Boring @ 9.0' |

** D = DRY, M = MOIST, W = WET

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# *BORING LOG*

BORING NO. **B-5**
SHEET **1** OF **1**
DATE: START **8/2/23**
END **8/2/23**
SURFACE ELEV. (FT) **108.0**

PROJECT NAME **3333 Chichester Highschool**
PROJECT LOCATION **Upper Chichester, PA**
PROJECT NUMBER **36201.00**
INSPECTOR NAME **B. Sibilla**
EQUIPMENT USED **Acker Rebel Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **Nick P./SANO**
DRILLING METHODS **2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals**
AUGER: SIZE: **3.25" ID HSA** ; AUGER DEPTH: **10.0'** ; WATER: DEPTH: **NE** TIME: **NA** DATE: **NA**
CHECKED BY: **B. Yildiz** ; DATE: **8/7/2023** DEPTH: _____ TIME: _____ DATE: _____
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | DEPTH ELEVATION | |
| 0.5 | | | | | | | | 1" Rubber, 5" Asphalt<br>0.5 107.5 | |
| | S-1 | 8<br>11<br>9 | 1.2' | - | GP | m/d | | Sandy Gravel; Blue grey (FILL) | Easy Drilling 0.0' - 10.0' |
| 2.0 | | | | | | | | | |
| | S-2 | 9<br>6<br>6<br>7 | 1.5' | - | ML | m/d | | | |
| 4.0 | | | | | | | | 4.0 104.0 | |
| | S-3 | 5<br>4<br>7<br>8 | 1.2' | - | ML | m/d | | Sandy Silt, trace fine gravel; Orange brown | |
| 6.0 | | | | | | | | | |
| | S-4 | 7<br>5<br>6<br>6 | 1.5' | - | ML | m/d | | | |
| 8.0 | | | | | | | | | |
| | S-5 | 8<br>5<br>5<br>5 | 1.5' | - | ML | m/d | | | End of Test Boring @ 10.0' |
| 10.0 | | | | | | | | 10.0 98.0 | |

** D = DRY, M = MOIST, W = WET

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# *BORING LOG*

BORING NO. **B-6**
SHEET **1** OF **1**
DATE: START **8/2/23**
END **8/2/23**
SURFACE ELEV. (FT) **108.0**

PROJECT NAME **3333 Chichester Highschool**
PROJECT LOCATION **Upper Chichester, PA**
PROJECT NUMBER **36201.00**
INSPECTOR NAME **B. Sibilla**
EQUIPMENT USED **Acker Rebel Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **Nick P./SANO**
DRILLING METHODS **2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals**
AUGER: SIZE: **3.25" ID HSA** ; AUGER DEPTH: **10.0'** ; WATER: DEPTH: **NE** TIME: **NA** DATE: **NA**
CHECKED BY: **B. Yildiz** ; DATE: **8/7/2023** DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION (DEPTH / ELEVATION) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.5 | | | | | | | | 1" Rubber, 5" Asphalt<br>0.5 / 107.5 | |
| 2.0 | S-1 | 3<br>11<br>14 | 1.5' | - | GP | m/d | | Sandy Gravel; Blue grey (FILL)<br>2.0 / 106.0 | Easy Drilling 0.0' - 10.0' |
| 4.0 | S-2 | 10<br>4<br>3<br>3 | 1.0' | - | ML | m/d | | Sandy Silt, trace fine gravel; Orange brown<br>4.0 / 104.0 | |
| 6.0 | S-3 | 2<br>3<br>3<br>2 | 1.5' | - | SM | m/d | | Silty Sand, trace f gravel; Orange brown tan | |
| 8.0 | S-4 | 4<br>3<br>4<br>5 | 1.5' | - | SM | m/d | | | |
| 10.0 | S-5 | 7<br>4<br>4<br>5 | 1.5' | - | SM | m/d | | 10.0 / 98.0 | End of Test Boring @ 10.0' |

** D = DRY, M = MOIST, W = WET

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# *BORING LOG*

BORING NO. B-7
SHEET 1 OF 1
DATE: START 8/2/23
END 8/2/23
SURFACE ELEV. (FT) 108.0

PROJECT NAME 3333 Chichester Highschool
PROJECT LOCATION Upper Chichester, PA
PROJECT NUMBER 36201.00
INSPECTOR NAME B. Slbilla
EQUIPMENT USED Acker Rebel Truck Mounted Drill Rig
DRILLER NAME/COMPANY Nick P./SANO
DRILLING METHODS 2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals
AUGER: SIZE: 3.25" ID HSA ; AUGER DEPTH: 10.0' ; WATER: DEPTH: NE TIME: NA DATE: NA
CHECKED BY: B. Yildiz ; DATE: 8/7/2023 DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | DEPTH ELEVATION | |
| 0.5 | | | | | | | | 1" Rubber, 5" Asphalt<br>0.5 107.5 | |
| | S-1 | 11<br>8<br>5 | 1.0' | - | GP | m/d | | Sandy Gravel; Blue grey (FILL)<br>2.0 106.0 | Easy Drilling 0.0' - 10.0' |
| 2.0 | | | | | | | | | |
| | S-2 | 4<br>2<br>3<br>3 | 1.0' | - | SM | m/d | | Silty Sand, trace clay; Orange brown | |
| 4.0 | | | | | | | | | |
| | S-3 | 2<br>2<br>2<br>3 | 1.0' | - | SM | m/d | | | |
| 6.0 | | | | | | | | | |
| | S-4 | 5<br>4<br>4<br>4 | 1.0' | - | SM | m/d | | | |
| 8.0 | | | | | | | | | |
| | S-5 | 5<br>3<br>4<br>3 | 1.0' | - | SM | m/d | | 10.0 98.0 | End of Test Boring @ 10.0' |
| 10.0 | | | | | | | | | |

** D = DRY, M = MOIST, W = WET

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# BORING LOG

BORING NO. B-8
SHEET 1 OF 1
DATE: START 8/2/23
END 8/2/23
SURFACE ELEV. (FT) 108.0

PROJECT NAME 3333 Chichester Highschool
PROJECT LOCATION Upper Chichester, PA
PROJECT NUMBER 36201.00
INSPECTOR NAME B. Sibilla
EQUIPMENT USED Acker Rebel Truck Mounted Drill Rig
DRILLER NAME/COMPANY Nick P./SANO
DRILLING METHODS 2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals
AUGER: SIZE: 3.25" ID HSA ; AUGER DEPTH: 10.0' ; WATER: DEPTH: NE TIME: NA DATE: NA
CHECKED BY: B. Yildiz ; DATE: 8/7/2023 DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | DEPTH ELEVATION | |
| 0.5 | | | | | | | | 1" Rubber, 5" Asphalt<br>0.5 107.5 | |
| | S-1 | 13<br>13<br>7 | 1.0' | - | GP | m/d | | Sandy Gravel; Blue grey (FILL) | Easy to Moderate Drilling 0.0' - 10.0' |
| 2.0 | | | | | | | | | |
| | S-2 | 8<br>6<br>4<br>11 | 0.5' | - | GP | m/d | | | |
| 4.0 | | | | | | | | 4.0 104.0 | |
| | S-3 | 4<br>5<br>6<br>21 | 1.0' | - | SM | m/d | | Silty Sand, little gravel; Tan yellow brown (Decomposed Schist) | |
| 6.0 | | | | | | | | | |
| | S-4 | 41<br>10<br>11<br>15 | 1.0' | - | SM | m/d | | | |
| 8.0 | | | | | | | | | |
| 8.4 | S-5 | 50/5 | 0.2' | - | SM | m/d | | | |
| | | | | | | | | | End of Test Boring @ 10.0' |
| | | | | | | | | 10.0 98.0 | |

** D = DRY, M = MOIST, W = WET

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# *BORING LOG*

BORING NO. **B-9**
SHEET **1** OF **1**
DATE: START **8/3/23**
END **8/3/23**
SURFACE ELEV. (FT) **106.0**

PROJECT NAME **3333 Chichester Highschool**
PROJECT LOCATION **Upper Chichester, PA**
PROJECT NUMBER **36201.00**
INSPECTOR NAME **B. Sibilla**
EQUIPMENT USED **Acker Rebel Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **Nick P./SANO**
DRILLING METHODS **2" Split Spoon Sampling Continuous to 10.0' Below Grade, Thereafter 5.0' Intervals**
AUGER: SIZE: **3.25" ID HSA** ; AUGER DEPTH: **25.0'** ; WATER: DEPTH: **NE** TIME: **NA** DATE: **NA**
CHECKED BY: **B. Yildiz** ; DATE: **8/7/2023** DEPTH: TIME: DATE:
NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./ TYPE/CORE RUN | BLOWS/0.5 FT. ON SAMPLER | RECOVERY (Ft.) | RECOVERY(%) / RQD (%) | USCS / AASHTO | $H_2O$ CONTENT | GRAPHIC LOG | DESCRIPTION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | DEPTH ELEVATION | |
| 0.0 | | | | | | | | 0.5 6" Topsoil 105.5 | |
| | S-1 | 3 2 3 4 | 1.0' | - | SC | m | | Clayey Sand, little mf gravel; Dark brown orange (FILL) | Easy Drilling 0.0' - 15.0' |
| 2.0 | | | | | | | | | |
| | S-2 | 5 4 4 6 | 1.0' | - | SC | m | | | |
| 4.0 | | | | | | | | 4.0 102.0 | |
| | S-3 | 3 3 4 6 | 1.0' | - | SM | m | | Silty Sand; Tan orange brown | |
| 6.0 | | | | | | | | | |
| | S-4 | 6 4 4 6 | 1.2' | - | SM | m | | | |
| 8.0 | | | | | | | | 8.0 98.0 | |
| | S-5 | 7 5 7 7 | 1.5' | - | SM | m | | Silty Sand, trace fine gravel, abundant mica; Tan orange brown dark grey (Decomposed Schist) | |
| 10.0 | | | | | | | | | |
| | | | | | | | | | |
| 13.0 | | | | | | | | | |
| | S-6 | 8 6 8 6 | 1.0' | - | SM | m | | | |
| 15.0 | | | | | | | | | Moderate Drilling 15.0' - 25.0' |
| | | | | | | | | | |
| 18.0 | | | | | | | | | |
| | S-7 | 7 5 10 27 | 1.2' | - | SM | m | | | |
| 20.0 | | | | | | | | | |
| | | | | | | | | | |
| 23.0 | | | | | | | | | |
| 23.5 | S-8 | 50/4 | 0.5' | - | SM | m | | | Spoon Refusal @ 23.5' |
| | | | | | | | | | End of Test Boring @ 25.0' |
| | | | | | | | | 25.0 81.0 | |

** D = DRY, M = MOIST, W = WET

# Particle Size Analysis of Soils


| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **As-rec'd water content:** 18.0 moist | | **Odor:** NR | | Particle Size | | | |
| **% Gravel:** 0.0 | **Coarse:** 0.0 | **Fine:** 0.0 | | US Standard Sieve Size | | Diameter, | % Finer |
| **% Sand:** 54.6 | **Coarse:** 0.9 | **Medium:** 14.0 | **Fine:** 39.7 | GRAVEL | Coarse | 3" | 75 | |
| **Gravel description:** | | | | | | 1½" | 38.1 | |
| | | | | | | ¾" | 19.0 | |
| **Sand description:** tan to brown, micaceous, subangular to subrounded | | | | | Fine | ⅜" | 9.5 | |
| | | | | | | № 4 | 4.75 | 100.0 |
| **Consistency:** firm | | **Hardness:** NR | | SAND | Coarse | № 10 | 2.00 | 99.1 |
| **Cementation:** NR | | **Dry Strength:** NR | | | Medium | № 40 | 0.425 | 85.1 |
| **Structure:** homogeneous | | **Dilatency:** NR | | | Fine | № 100 | 0.150 | 58.7 |
| **Reaction to HCl:** NR | | **Toughness:** NR | | | | № 200 | 0.075 | 45.4 |
| **USCS Classification:** SM, silty sand | | | | Hydrometer Analysis | | Clay Size | 0.005 | NR |
| **AASHTO Classification:** A-4 | | | | | | Colloids | 0.001 | NR |
| | | | | $G_s$: NR | $C_u$: N/A | $C_c$: N/A | | |
| **Project:** 36201.00 - 3333 Chichester Avenue - INV | | | | **LL:** NP | **PL:** NP | **PI:** NP | | |
| **Client:** Chichester School District | | | | | | | | |
| **Sample:** B-2, S-5 (8-5-5-4) & B-6. S-5 (7-4-4-5) | | | | | | | | |
| **Depth:** 8.0'- 10.0' | | | | | | | | |
| **Description:** Brown silty sand (Stratum II) | | | | | | | | |


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Lehigh Valley 610-967-4540


**Remarks:**

**Classification of Soils, ASTM D 2487-17 / D 2488-09a** ***August 29, 2023***

# Particle Size Analysis of Soils


| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **As-rec'd water content:** 19.2 moist | | **Odor:** NR | | Particle Size | | | |
| **% Gravel:** 0.6 | **Coarse:** 0.0 | **Fine:** 0.6 | | US Standard Sieve Size | | Diameter, | % Finer |
| **% Sand:** 25.4 | **Coarse:** 0.5 | **Medium:** 4.8 | **Fine:** 20.1 | GRAVEL | Coarse | 3" | 75 | |
| **Gravel description:** gray-brown, micaceous, subangular to subrounded | | | | | | 1½" | 38.1 | |
| | | | | | | ¾" | 19.0 | 100.0 |
| **Sand description:** multicolored to gray-brown, micaceous, subangular to subrounded | | | | | Fine | ⅜" | 9.5 | 99.8 |
| | | | | | | № 4 | 4.75 | 99.4 |
| **Consistency:** firm | | **Hardness:** NR | | SAND | Coarse | № 10 | 2.00 | 98.9 |
| **Cementation:** NR | | **Dry Strength:** NR | | | Medium | № 40 | 0.425 | 94.1 |
| **Structure:** homogeneous | | **Dilatency:** NR | | | Fine | № 100 | 0.150 | 82.2 |
| **Reaction to HCl:** NR | | **Toughness:** NR | | | | № 200 | 0.075 | 74.0 |
| **USCS Classification:** ML, silt with sand | | | | Hydrometer Analysis | | Clay Size | 0.005 | NR |
| **AASHTO Classification:** A-4 | | | | | | Colloids | 0.001 | NR |
| | | | | $G_s$: NR | $C_u$: N/A | $C_c$: N/A | | |
| **Project:** 36201.00 - 3333 Chichester Avenue - INV | | | | **LL:** NP | **PL:** NP | **PI:** NP | | |
| **Client:** Chichester School District | | | | | | | | |
| **Sample:** B-5, S-3 (5-4-7-8) & B-3, S-4 (4-3-4-3) | | | | | | | | |
| **Depth:** 4.0'- 6.0' & 6.0'- 8.0' | | | | | | | | |
| **Description:** Brown silt with sand (Stratum I) | | | | | | | | |


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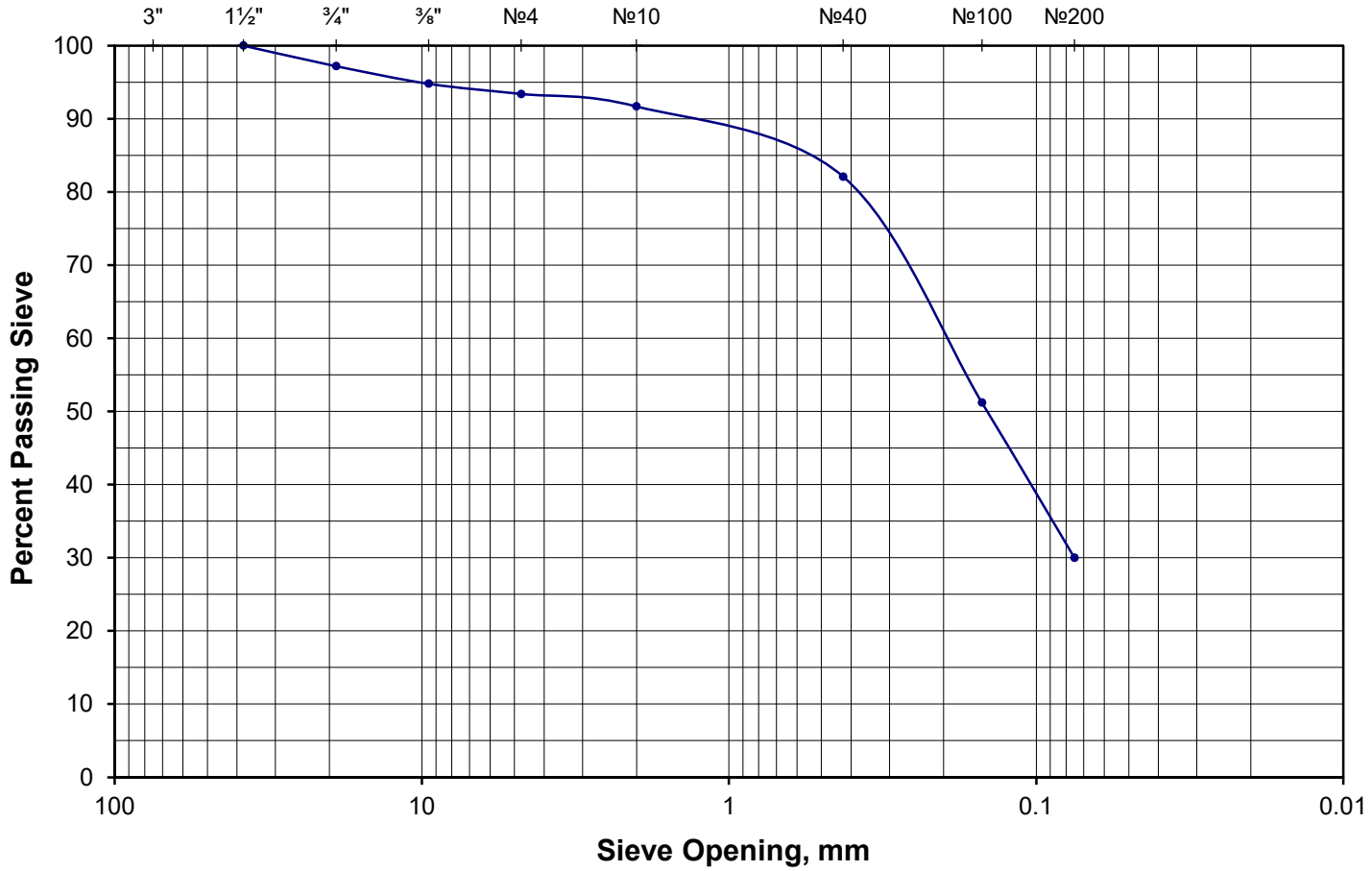
**Remarks:**

**Classification of Soils, ASTM D 2487-17 / D 2488-09a** ***August 29, 2023***

# Particle Size Analysis of Soils




**As-rec'd water content:** 14.7 moist **Odor:** NR

**% Gravel:** 6.6 **Coarse:** 2.8 **Fine:** 3.8

**% Sand:** 63.4 **Coarse:** 1.7 **Medium:** 9.6 **Fine:** 52.1

**Gravel description:** multicolor and light gray, subangular to subrounded

**Sand description:** brown and gray-brown, subangular to subrounded

**Consistency:** firm **Hardness:** NR

**Cementation:** NR **Dry Strength:** NR

**Structure:** homogeneous **Dilatency:** NR

**Reaction to HCl:** NR **Toughness:** NR

**USCS Classification:** SM, silty sand

**AASHTO Classification:** A-2-4

| Particle Size | | | | |
|---|---|---|---|---|
| US Standard Sieve Size | | | Diameter, | % Finer |
| GRAVEL | Coarse | 3" | 75 | |
| | | 1½" | 38.1 | 100.0 |
| | | ¾" | 19.0 | 97.2 |
| | Fine | ⅜" | 9.5 | 94.8 |
| | | № 4 | 4.75 | 93.4 |
| SAND | Coarse | № 10 | 2.00 | 91.7 |
| | Medium | № 40 | 0.425 | 82.1 |
| | Fine | № 100 | 0.150 | 51.2 |
| | | № 200 | 0.075 | 30.0 |
| Hydrometer Analysis | | Clay Size | 0.005 | NR |
| | | Colloids | 0.001 | NR |

$G_s$: NR $C_u$: N/A $C_c$: N/A

**LL:** NP **PL:** NP **PI:** NP

**Project:** 36201.00 - 3333 Chichester Avenue - INV

**Client:** Chichester School District

**Sample:** B-10, S-5 (6-5-5-5) & B-9. S-6 (8-6-8-6)

**Depth:** 8.0'- 10.0' & 13.0'- 15.0'

**Description:** Brown silty sand (Stratum III)

**Remarks:**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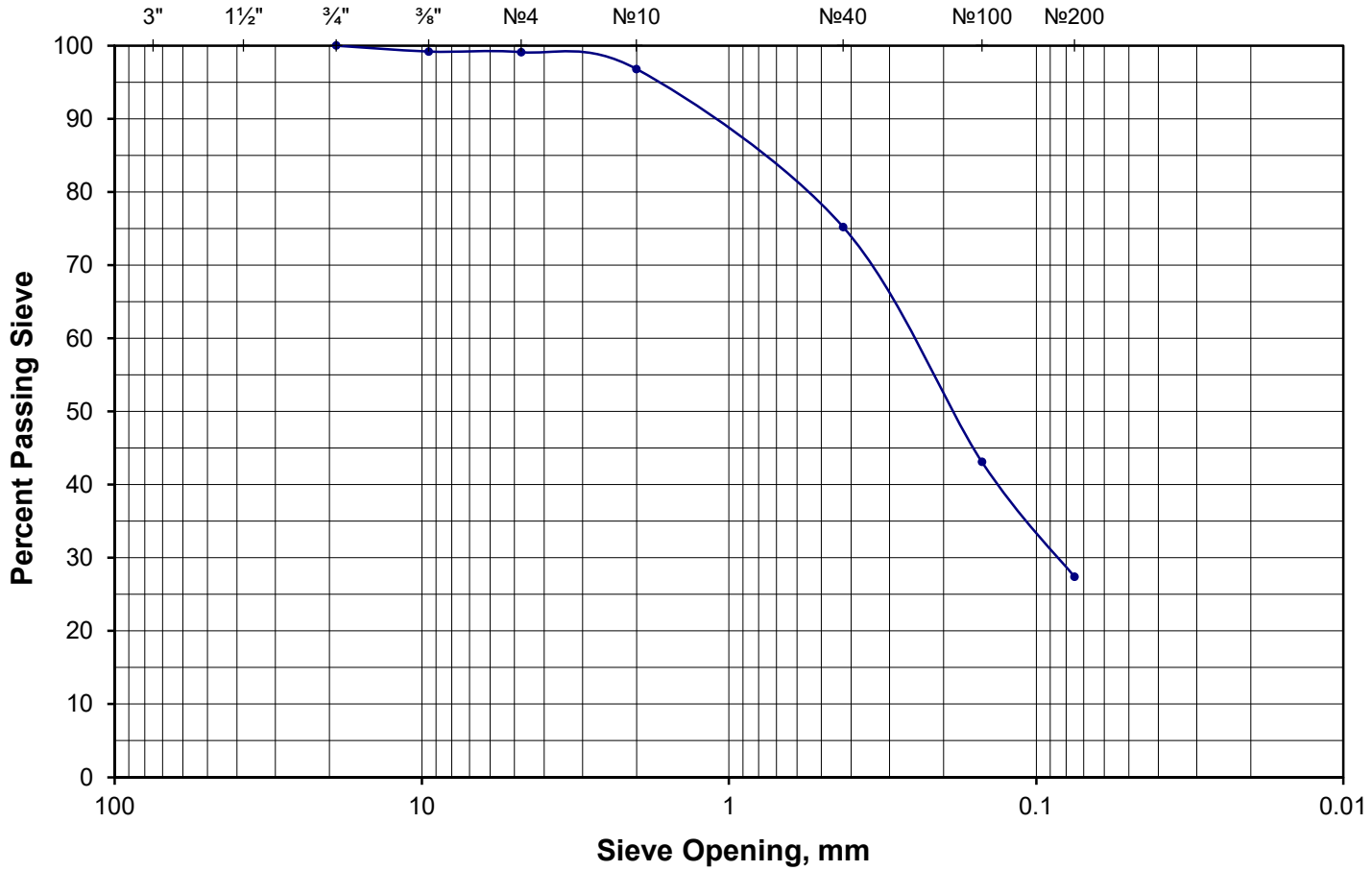
**Classification of Soils, ASTM D 2487-17 / D 2488-09a** ***August 29, 2023***

# Particle Size Analysis of Soils




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **As-rec'd water content:** 16.7 moist | | **Odor:** NR | | Particle Size | | | |
| **% Gravel:** 0.9 | **Coarse:** 0.0 | **Fine:** 0.9 | | US Standard Sieve Size | | Diameter, | % Finer |
| **% Sand:** 71.7 | **Coarse:** 2.3 | **Medium:** 21.6 | **Fine:** 47.8 | GRAVEL | Coarse | 3" | 75 | |
| **Gravel description:** gray-white with black, subangular to subrounded | | | | | | 1½" | 38.1 | |
| | | | | | | ¾" | 19.0 | 100.0 |
| **Sand description:** gray-brown, micaceous, subangular to subrounded | | | | | Fine | ⅜" | 9.5 | 99.2 |
| | | | | | | № 4 | 4.75 | 99.1 |
| **Consistency:** firm | | **Hardness:** NR | | SAND | Coarse | № 10 | 2.00 | 96.8 |
| **Cementation:** NR | | **Dry Strength:** NR | | | Medium | № 40 | 0.425 | 75.2 |
| **Structure:** homogeneous | | **Dilatency:** NR | | | Fine | № 100 | 0.150 | 43.1 |
| **Reaction to HCl:** NR | | **Toughness:** NR | | | | № 200 | 0.075 | 27.4 |
| **USCS Classification:** SM, silty sand | | | | Hydrometer Analysis | | Clay Size | 0.005 | NR |
| **AASHTO Classification:** A-2-4 | | | | | | Colloids | 0.001 | NR |
| | | | | $G_s$: NR | $C_u$: N/A | $C_c$: N/A | | |
| **Project:** 36201.00 - 3333 Chichester Avenue - INV | | | | **LL:** NP | **PL:** NP | **PI:** NP | | |
| **Client:** Chichester School District | | | | | | | | |
| **Sample:** B-12, S-6 (4-8-15-19) & S-7 (6-6-13-45) | | | | | | | | |
| **Depth:** 13.0'- 15.0' & 18.0'- 20.0' | | | | | | | | |
| **Description:** Brown to gray-brown silty sand (Stratum IV) | | | | | | | | |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**Remarks:**

**Classification of Soils, ASTM D 2487-17 / D 2488-09a** ***August 29, 2023***