EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists

REPORT OF GEOTECHNICAL INVESTIGATION

PROPOSED COMMUNITY CENTER AND ADMINISTRATION & POLICE DEPARTMENT BUILDNGS

FOLCROFT MUNICIPAL COMPLEX

AHSLAND AVENUE AND DELMAR DRIVE

FOLCROFT BOROUGH

DELAWARE COUNTY, PENNSYLVANIA

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EEI Project No. 32554.00

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APPENDIX

I. PROJECT OBJECTIVE AND SCOPE OF WORK

Earth Engineering Incorporated (EEI) has completed the Geotechnical Investigation for the proposed Community Center and Administration & Police Department buildings to be located at the Folcroft Municipal Complex on Ashland Avenue in Folcroft Borough, Delaware County, Pennsylvania. The objective of this project has been to investigate, document, and analyze the subsurface conditions present at the site. Based upon these conditions and the proposed construction, recommendations regarding the earthwork stages of construction and the design and construction of suitable foundation systems have been developed.

This study was performed in general accordance with EEI's Proposal No. BB-18741, dated February 24, 2020. The scope of work for this project included a field investigation, a geologic analysis of site conditions, laboratory testing of the soil samples obtained, and a geotechnical engineering analysis. This report presents the results of our field and laboratory investigations and documents our recommendations regarding the geotechnical engineering aspects of this project.

II. EXISTING FEATURES AND PROJECT DESCRIPTION

The project site investigated is located on Ashland Avenue in Folcroft Borough, Delaware County, Pennsylvania. Ashland Avenue borders the site to the east. The Folcroft Library and Fire Co. No. 1 border the site to the north. Delmar Drive is located beyond these buildings to the north. Commercial properties border the site to the south and east. The general location of the project site is presented on the Site Topographic Map included in the Appendix of this report.

The proposed buildings are planned to be constructed in the area of existing playing fields. In general, the areas of proposed building construction slopes from the west gently

downward to the east. Maximum relief across the area investigated measures approximately 4 feet.

According to information provided by Linn Architects, the project will include construction of two one-story structures with slab-on-grade construction. The Community Center building will have a footprint measuring approximately 11,970 square feet and be constructed at a finished floor elevation of 43.85'. The Administration & Police Department building will have a footprint measuring approximately 10,222 square feet and be constructed at a finished floor elevation of 46.6'. The locations of the proposed buildings, relative to the existing roadways, are shown on the Boring Location Plan, EEI Drawing No. 32554.00-B-101, included within the Appendix.

For the purposes of our analyses, it has been assumed that the proposed buildings will be built using conventional steel and masonry construction methods. The structural loads were not provided for EEI's consideration. However, EEI has estimated that the maximum column loads will be on the order of 75 kips, and the maximum wall loads to be on the order of 3 kips per lineal foot for each building.

III. FIELD INVESTIGATION

A series of eight (8) standard earth borings were completed for this investigation on March 5 and 6, 2020 by Corcoran Drilling Company of Havertown, Pennsylvania. Test borings B-1 through B-4 were conducted for the proposed Community Center building and borings B-5 through B-8 were performed for the Administration & Police Department building. EEI field located the borings by scaling and measuring distances from existing site features. Supervision and monitoring of the test boring program were provided by a representative of Earth Engineering Incorporated. The relative location and corresponding number of each boring relative to the existing roadways and proposed site features, is shown on the Boring Location Plan.

The test borings were advanced using a truck mounted drill rig equipped with 6" diameter solid augers and split spoon samplers. Split-spoon samples, conducted in accordance with ASTM standard D1586, were taken at regular intervals throughout the depth of the borings. 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 a 2-inch (outer diameter) split-barrel sampler one 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 which is recorded on the boring profiles, Sheets 1 and 2, included in the Appendix. Boring logs containing sample depths and descriptions of the materials encountered are also included in the Appendix.

IV. LABORATORY TESTING

Four (4) representative samples of the soils recovered from the field investigation were tested in the laboratory. The laboratory testing conducted on these samples consisted of classification tests, conducted in accordance with ASTM standard D2487, to verify visual classifications and to establish engineering parameters required for analysis. The tests performed included Particle Size Analysis (ASTM D422), Atterberg Limits Determination (ASTM D4318), and Natural Moisture Content (ASTM D2216). A Unified Soil Classification System (USCS) Group Symbol and ASTM Group Name have been assigned to the samples based upon the laboratory testing.

The results of the laboratory testing conducted are presented in Table I. Gradation curves, graphically depicting the results of the particle size analyses, are included in the Appendix.

TABLE I LABORATORY RESULTS					
Boring Location		B-2	B-6	B-3	B-5
Sample Number		S-3, S-4	S-2, S-3	S-6, S-8	S-6, S-7
Sample Depths		4.0’ – 8.0’	2.0’ – 6.0’	13.0’ – 19.0’	13.0’ – 18.3’
Stratum		Stratum I	Stratum I	Stratum II	Stratum III
Particle Size Distribution					
Percent Passing Sieve	1.5"	100	100	100	100
	3/4"	100	100	100	100
	3/8"	100	100	99.7	100
	No. 4	100	100	99.1	98.9
	No. 10	100	99.9	97.5	95.5
	No. 40	98.9	99.2	57.7	59.8
	No. 100	94.7	98.5	23.2	22.4
	No. 200	90.6	97.2	14.5	12.3
Atterberg Limits					
Liquid Limit		Non-Plastic	Non-Plastic	Non-Plastic	Non-Plastic
Plastic Limit		Non-Plastic	Non-Plastic	Non-Plastic	Non-Plastic
Plasticity Index		Non-Plastic	Non-Plastic	Non-Plastic	Non-Plastic
Natural Moisture Content (percent)		17.2	19.5	15.1	15.6
Unified Soil Classification System (USCS) Group Symbol		ML	ML	SM	SM
ASTM Group Name		Silt	Silt	Silty Sand	Silty Sand

V. SUBSURFACE CONDITIONS

A. Geology

According to the Pennsylvania Geologic Survey, *Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania*, Lansdowne PA Quadrangle, 1978, the project site is underlain by the Wissahickon Formation (geologic symbol - Xw) near contacts with the Pensauken and Bridgeton Formations undifferentiated (geologic symbol - Tpb) to the north and

the Trenton Gravel Formation (geologic symbol - Qt) to the south. Based upon the material observed during the field investigation, the natural soil conditions appeared typical of the alluvial soils of either the Pensauken and Bridgeton and/or Trenton Gravel Formations situated above the residual soil/weathered rock of the Wissahickon Formation. Plate 2, included in the Appendix, shows the approximate location of the site on a geologic map of the area.

As noted in the Pennsylvania Geological Survey, *Engineering Characteristics of The Rocks of Pennsylvania*, Fourth Series, Revised 1982, the Pensauken and Bridgeton Formations are composed of cross-bedded clayey sand typically stained reddish brown. The Trenton Gravel Formation consists primarily of gray to pale reddish brown very gravelly sand interstratified with cross-bedded sand and clay-silt beds.

Also noted in this publication, the Wissahickon Formation (Geologic Symbol: Xw) is typically composed of a mica schist. This rock is characterized by its distinct foliation which is caused by the preferential orientation of muscovite, feldspar and quartz. The foliation within this formation is typically well developed, fissile to thin. This rock type is moderately resistant to weathering and the overlying soil mantle is typically thin.

B. Soils

Each of the soil samples recovered from the test boring operation was examined and visually classified by EEI. Based upon the visual classifications and laboratory testing, it was determined that the subsurface soil conditions are generally consistent within the borings conducted. One (1) FILL material and three (3) natural soil strata were characterized by EEI to exist at this site. Surface layers of topsoil, infield sand, asphalt millings, and crushed stone were observed at each boring location.

Cross-sections of the borings displaying the various strata and other information obtained from the field investigation are included on the boring profiles. The test boring

information is further detailed on the boring logs. A general description of each stratum is as follows:

FILL

The material designated as FILL is visually described as brown, orange brown, and dark brown sandy silt to silty sand with no to trace gravel. Trace amounts of glass, roots and organics were observed in this soil in boings B-6, B-7, and B-8. The FILL was observed in borings B-5 through B-8 and extends downward to a contact with the Stratum I soil at depths ranging from 0.6 to 2.5 feet below the existing ground surface.

SPT values of 3 and 7 blows on the sampling barrel per foot of penetration were recorded while sampling the FILL. Based on the SPT values, this soil exists in a very loose to loose state.

STRATUM I – Alluvial Soil

The material designated as Stratum I is visually described as a multi-colored (gray, greenish gray, brown, reddish brown, and yellow brown) silt to sandy silt. As determined by laboratory testing, the USCS Group Symbol for representative samples of this soil is ML. The assigned ASTM Group Name for the samples tested is Silt. Stratum I was encountered in each boring below the surficial materials or FILL and extends downward to the Stratum II or Stratum III soils. This soil is typical of the alluvial deposition associated with the Pensauken and Bridgeton Formation or the Trenton Gravel Formation.

SPT values ranging from of 3 to 32 blows on the sampling barrel per foot of penetration. Based on the SPT values, this soil exists in a very loose to dense state.

STRATUM II – Completely Weathered Rock

The soil designated as Stratum II is visually described as completely weathered rock in the form of an orange brown, reddish brown and brown micaceous silty sand. As determined by laboratory testing, the USCS Group Symbol for a representative sample of this soil is SM. The assigned ASTM Group Name for the sample tested is Silty Sand. Stratum II was observed below the Stratum I soil in most boring locations. Where found, Stratum II extends downward to the conclusion depth of the boring or to the Stratum III weathered rock. This completely weathered rock stratum was encountered in a saprolitic state. A saprolite is soil which has undergone significant weathering but still maintains its remnant foliation and mineral integrity.

SPT values recorded while sampling this soil ranged from 5 to 31 blows on the sampling barrel per foot of penetration. Based on the SPT values, this soil exists in a loose to dense state.

STRATUM III – Highly Weathered Rock

The soil designated as Stratum II is visually described as a highly weathered rock in the form of an orange brown, reddish brown, and grayish brown silty sand with friable rock fragments. As determined by laboratory testing, the USCS Group Symbol for a representative sample of this soil is SM. The assigned ASTM Group Name for the sample tested is Silty Sand. Stratum III was observed below the Stratum I and/or Stratum II soil in each boring except boring B-2. Where found, Stratum III extended downward to the conclusion depths of the borings or to the bedrock surface as defined by auger refusal.

SPT values recorded while sampling this soil ranged from 58 blows on the sampling barrel per foot of penetration to 50 blows per three inches of penetration. Based on the SPT values, this soil exists in a very dense state.

C. Bedrock

The bedrock surface as defined by auger refusal was observed in borings B-5 through B-8. The recorded depths to bedrock range from 16.2 to 19.8 feet below the existing ground surface. These depths correlate to bedrock surface elevations ranging from 20.7 to 27.2 feet.

Based on the proposed building construction elevations, bedrock excavation is not anticipated for the proposed site improvements.

D. Groundwater

Groundwater was encountered in each of the eight (8) test borings. The initial and subsequent recorded depths to groundwater at the boring locations range from approximately 4.6 to 7.5 feet below the existing ground surface. The recorded groundwater depths correspond to high groundwater elevations ranging from 34.4 to 36.7 feet. Table II below details the groundwater level readings at the testing locations. 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.

The initial and subsequent groundwater level readings relative to the anticipated building construction elevations are shown on the boring profiles. Groundwater level readings are also shown on the boring logs. As displayed on the profiles, excavation to achieve the anticipated footing bottom elevation is not expected to extend below the recorded groundwater level. However, new utility construction may approach or extend below the recorded groundwater elevations. Therefore, localized utility excavation may extend below the recorded groundwater levels. Consequently, groundwater control measures may be required during site construction activities. Measures to minimize the impact of groundwater during construction are discussed in the Groundwater Control section of this report.

TABLE II – GROUNDWATER READINGS				
Test Location	[1.)] Approx. Ground Surface Elevation (ft.)	Depth to Groundwater		High Groundwater Elevation (ft.)
		Initial Reading	Subsequent Reading	
B-1	41.1	6.6’ @ 0.25 hr.	4.7’ @ 6.5 hours	36.4
B-2	40.5	5.7’ @ 0.25 hr.	4.6’ @ 6.0 hours	35.9
B-3	40.6	7.4’ @ 0.25 hr.	5.2’ @ 4.0 hours	35.4
B-4	40.3	5.4’ @ 0.25 hr.	4.8’ @ 4.5 hours	35.5
B-5	40.5	6.4’ @ 0.25 hr.	5.8’ @ 6.0 hours	34.7
B-6	40.1	5.8’ @ 0.25 hr.	5.7’ @ 2.0 hour	34.4
B-7	43.4	7.5’ @ 0.25 hr.	6.7’ @ 0.5 hr.	36.7
B-8	40.7	5.8 @ 0.25 hr.	5.8’ @ 0.5 hr.	34.9

Note: 1) The ground surface elevations at the testing locations were field surveyed by EEI using a manhole rim elevation of 45.89’ shown on the Site Plan, prepared by Catania Consulting Engineer, dated 12/08/17 as a reference.

VI. SITE PREPARATION

In addition to removal of any existing utility(s), initial site preparation measures should include the complete removal of the asphalt millings, infield sand, crushed stone and all organics, including topsoil, trees, and root mass extending a minimum distance of 5 feet beyond the proposed construction areas. Minimal cuts and fill placement of up to approximately 4’ is expected to be required to achieve the corresponding slab subgrade elevations. Following excavation to achieve proposed grades and prior to the placement of structural fill, the proposed construction areas should be proof-rolled and compacted. It is recommended that a steel drum roller having a minimum static weight of ten (10) tons be utilized for this purpose.

Proof-rolling and compaction procedures are necessary to compact and verify the integrity of the upper zones of the soils. Soft/loose zones of soil attributed to excessive soil moisture, if any, can be aerated and dried in-place. Aeration and drying of excessively moist soil are best accomplished in warm dry summer months. Following adequate drying time, the

soils can be densified in-place. Alternately, any soft/loose zones of soil can be removed and replaced with structural fill, as outlined in the *Fill and Compaction* section of this report.

EEI recommends all FILL material encountered during building pad preparation be thoroughly evaluated for the occurrence of significant non-soil debris. Portions of the FILL containing significant organics and/or deleterious materials, if any, should be removed and replaced with controlled, compacted lifts of structural fill. Proof-rolling and subsequent fill placement to achieve the proposed building pad subgrade elevation should be field inspected by a qualified representative of the Geotechnical Engineer of Record.

The site should be graded during construction to direct surface runoff away from the construction areas. Proper grading and management of surface runoff will help minimize disturbance of the subgrade. Additionally, work areas should be sealed on a daily basis. Furthermore, EEI recommends that all construction areas, including those which are excavated to achieve the planned subgrade elevation, be proof-rolled immediately prior to the placement of subbase stone and again prior to the concrete floor and asphalt pavement section. This will allow for loose and weak areas to be observed and remediated.

VII. CONCLUSIONS AND RECOMMENDATIONS

A. Community Center Building

The results of the field study, supported by laboratory testing, revealed that the general geotechnical cross-section within this building area consists of loose to dense silt to sandy silt (Stratum I); and loose to dense micaceous silty sand with trace rock fragments (Stratum II); situated above very dense silty sand with friable rock fragments (Stratum III). Based on the planned Community Center building finished floor elevation of 43.85’ and frost protection requirements, the footing bottom elevation will be situated at an elevation of approximately

40.85'. Construction at these elevations will situate the standard strip and spread foundations on and above the natural soils and/or properly placed structural fill. Engineering analysis performed by EEI indicates that the suitably dense natural soils, and/or properly placed structural fill will be capable of supporting the proposed building utilizing a shallow foundation system

The following foundation system and soil bearing capacity recommendations are provided by EEI. These recommendations assume that the site preparation procedures stated within and specifications presented below are followed.

1. A foundation system consisting of strip and/or spread footings is recommended for support of the proposed Community Center building.

2. The base of the foundations should be situated within the suitably dense natural soils and/or structural fill placed and compacted as detailed in the *Compaction Criteria* section. The base of all footings should be compacted with a jumping jack type tamper to densify soils loosened during excavation. Excessively moist soil that cannot be densified in place should be undercut and replaced with compacted lifts of structural fill. **New foundations shall not bear on or above existing utilities.**

3. Supported on the suitably dense natural soil, and/or properly placed structural fill, the foundation elements should be designed for a maximum allowable bearing capacity of 3000 pounds per square foot. Regardless of the load criteria, a minimum 18 inch wide strip footing and 36 inch spread footing should be utilized.

4. Total foundation settlement is estimated not to exceed 1.0 inch. Differential settlement is estimated not to exceed 0.50 inch. These settlements were calculated using a bearing pressure of 3000 pounds per square foot and anticipated maximum column loads of 75 kips and maximum wall loads of 3.0 kips/ft. Should the anticipated loads be different, EEI should be notified so that our recommendations can be reviewed and revised, if necessary.

5. The bottom of exterior footings and footings in unheated areas should be placed at least 3 feet below the final exterior grade for protection from frost heave.

6. All footing bottoms should be 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.

B. Administration & Police Department Building

The results of the field study, supported by laboratory testing, revealed that the general geotechnical cross-section within this building area consists of very loose to loose sandy silt to silt sand with no to trace gravel and trace glass, roots, and organics (FILL): loose to dense silt to sandy silt (Stratum I); loose to dense micaceous silty sand with trace rock fragments (Stratum II); and very dense silty sand with friable rock fragments (Stratum III); situated above schist bedrock. Based on the planned Community Center building finished floor elevation of 46.6' and frost protection requirements, the footing bottom elevation will be situated at an elevation of approximately 40.6'. Construction at these elevations will situate the standard strip and spread foundations on and above the FILL, natural soils and/or properly placed structural fill. Engineering analysis performed by EEI indicates that the FILL, natural soils, and/or properly placed structural fill will be capable of supporting the proposed building utilizing a shallow foundation system. This recommendation assumes the FILL is free of significant organics and the loose zones of the FILL material are densified during the site preparation measures.

The following foundation system and soil bearing capacity recommendations are provided by EEI.

1. A foundation system consisting of strip and/or spread footings is recommended for support of the proposed Community Center building.

2. The base of the foundations should be situated within the suitably dense FILL, natural soils and/or structural fill placed and compacted as detailed in the *Compaction Criteria* section. The base of all footings should be compacted with a jumping jack type tamper to densify soils loosened during excavation. Excessively moist soil that cannot be densified in place should be undercut and replaced with compacted lifts of structural fill. **New foundations shall not bear on or above existing utilities.**

3. Supported on the suitably dense FILL, natural soil, and/or properly placed structural fill, the foundation elements should be designed for a maximum allowable bearing capacity of 3000 pounds per square foot. Regardless of the load criteria, a minimum 18 inch wide strip footing and 36 inch spread footing should be utilized.

4. Total foundation settlement is estimated not to exceed 1.0 inch. Differential settlement is estimated not to exceed 0.50 inch. These settlements were calculated using a bearing pressure of 3000 pounds per square foot and anticipated maximum column loads of 75 kips and maximum wall loads of 3.0 kips/ft. Should the anticipated loads be different, EEI should be notified so that our recommendations can be reviewed and revised, if necessary.

5. The bottom of exterior footings and footings in unheated areas should be placed at least 3 feet below the final exterior grade for protection from frost heave.

6. All footing bottoms should be 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.

VIII. FLOOR SLAB SUPPORT

The slab elements can be supported on the FILL material, natural soils and newly placed structural fill assuming the building pad is thoroughly proof-rolled and compacted. EEI recommends all existing FILL material encountered during building pad preparation be thoroughly evaluated for the occurrence of non-soil debris. Portions of the FILL, if any, containing significant organics and/or deleterious materials should be removed and replaced with controlled, compacted lifts of structural fill. Proof-rolling and subsequent fill placement to achieve the proposed building pad subgrade elevation should be field inspected by a qualified representative of the Geotechnical Engineer of Record.

EEI recommends a minimum four (4) inches of granular sub-base be placed beneath the slab to provide uniform support distribution between the subgrade soils and the base of the concrete slab. Floor slabs supported on a minimum 4-inch thick layer of a clean stone, AASHTO #57 or equivalent can be designed using a modulus of subgrade reaction of approximately 150 psi/inch. This recommendation is provided that the soils are compacted to a

minimum of 95% of the soils maximum dry density as determined by ASTM D1557 (modified) in fill areas and assume that adequate slab reinforcing and joints to control cracking will be provided. EEI also recommends the use of a vapor barrier in conjunction with the clean stone capillary break.

IX. EXCAVATION METHODS

Excavation required to achieve the proposed subgrade elevations and for installation of the foundation elements will occur within the FILL material and natural soil referenced as Stratum I. Based on the proposed building finished floor elevations, rock excavation will not be required for the proposed site construction.

In general, the FILL material and natural Stratum I soil should provide minimal excavation difficulties using conventional equipment and techniques. Excavations must be sloped, benched or shored to prevent collapse during soil excavation and provide a safe working environment. 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 field determined and should be based on the required depth of excavations and on the soil types encountered.

X. TEMPORARY GROUNDWATER CONTROL

As previously discussed, utility installation is expected to approach recorded groundwater elevations and localized groundwater seepage may occur. Localized groundwater

seepage encountered during construction can be diverted to sump pit(s) and removed with submersible pumps positioned within the sump pit(s). The final number and positioning of pumps required to dewater the excavation should be made by the contractor, subject to review by the Engineer.

The contractor should also be prepared to immediately place clean aggregate at the base of excavations where infiltrating water is encountered. A base layer of clean aggregate (AASHTO #57 or equivalent) will serve to provide a stable material on which the foundations may be placed and from which groundwater can be readily removed from the excavation.

Construction during warm and dry summer months may reduce the scope of temporary groundwater control measures. The appropriate measures to be taken for groundwater control during construction should be determined prior to and at the time of excavation and are the responsibilities of the contractor. Water produced during the dewatering operation should be handled in accordance with applicable statutes and regulations.

XI. FILL AND COMPACTION

A. Fill Criteria

Fill material which supports foundations, floor slabs, and pavements, in addition to material used for retaining wall backfill is considered structural fill. Following the performance of the site preparation measures as discussed in *Section VI* of this report, structural fill required to elevate the building pads and parking/driveway areas may be placed. Excavation necessary for site construction is expected to make limited quantities of the FILL and natural Stratum I soil available for re-use as structural fill.

Visual classification of the FILL indicates this material consists of sandy silt to silty sand and is non-plastic. Samples of this soil also contained trace glass, roots, and organics. In

general, the soil portion of the FILL is generally suitable for reuse as structural fill. FILL material containing significant organics or other deleterious material, if any, should be stockpiled separately and used in non-structural areas of the site or disposed of properly.

As determined by laboratory testing and visual observation, the Stratum I soil is non-plastic and consists of silt. Typical optimum moisture content values for this soil type range from 12 to 16 percent. The Stratum I samples tested possessed moisture contents of 17.2 and 19.5 percent. Therefore, the Stratum I soil exists in a slightly elevated to elevated moisture content. Based on its fine grained content and elevated moisture content, the Stratum I soil is not considered ideal for use as structural fill material within building and parking lot areas.

Excessively moist soil that is suitable for reuse will require aeration and drying time to achieve the required densities and percentage compaction values if re-used as structural fill. Aeration and drying of excessively moist soil are best accomplished in warm dry summer months.

Soils excavated from below the groundwater level, if any, should be stockpiled separately from the overlying soils. If used as structural fill, the saturated soils will require significant aeration and drying time prior to achieving the required densities and percentage compaction values.

The on-site soils will require careful moisture control as portions are fine-grained and sensitive to moisture changes. Caution should be exercised during construction to not stockpile and/or expose these soils to weather conditions for long periods of time. Materials stockpiled for use as structural fill should be graded to shed water and rolled to maintain the soils. During periods of wet site conditions, travel upon the building pad and construction areas should be limited to minimize disturbance of the subgrade which will lead to instabilities.

Any structural or load-bearing soil for use in the building area, which is required to be **imported** to the site, should meet the following criteria:

- Granular soils such as GW, GP, GM SW, SP or SM as classified by ASTM D2487 are preferred, however soils having soil classifications GC, SC, ML or CL may be acceptable provided the Geotechnical Engineer of Record approves the soil;
- the largest particles within the fill should be no greater than 3 inches in diameter;
- not include deleterious materials such as construction debris, wood, glass, ash, trash, refuse, roots and other organic matter or contain frozen clumps of soil, snow or ice and
- have moisture contents within 3 percent of the soil's optimum moisture content and
- 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 to be imported to the site. Soil materials available for use as a structural fill should be submitted to the Geotechnical Engineer of Record for evaluation and subsequent consideration prior to its importation to the site.

B. Compaction Criteria

Structural fill should generally be placed in horizontal lifts not exceeding eight (8) inches in loose thickness and compacted with a minimum ten (10) ton steel-drum, smooth-barrel vibratory roller. Fill material should generally be placed in horizontal lifts not exceeding six (6) inches in 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 structural fill material should be placed at, or deviate nominally from, the optimum moisture content as determined in accordance with ASTM D1557 and compacted to a minimum percentage of the maximum dry density as indicated in Table III.

TABLE III - COMPACTION CRITERIA	
Fill Area	**Percent of Maximum Dry Density as per ASTM D1557**
Foundation Bearing and Slab-On-Grade Areas	95
Pavements	95
Non-Structural	92

XII. GENERAL SOIL PROPERTIES

A. Lateral Earth Pressures

The lateral earth pressures that may be used for design purposes of retaining walls, shoring, or walls constructed below grade are shown in Table IV. Retaining walls which are restrained from deflection such as loading dock, basement, or other structure walls, should be designed for the at rest (Ko) condition. Retaining walls which are free to deflect such as landscaped walls should be designed for the active (Ka) condition. The data for the FILL and natural soils was determined based upon visual classification and laboratory testing of the site soil samples compared to generally accepted published values for the various properties.

It is recommended 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.

TABLE IV - Soil Properties For Computation of Lateral Loads			
Soil Property	**FILL & Stratum I**	**Stratum II**	**Stratum III**
Angle of Internal Friction	28.0°	30.0°	34.0°
Coefficient of Active Earth Pressure - K_a	0.36	0.33	0.28
Coefficient of Passive Earth Pressure - K_p	2.77	3.00	3.54
Coefficient of At Rest Earth Pressure - K_o	0.53	0.50	0.44
Coefficient of Sliding, Soil to Mass Concrete - μ	0.35	0.38	0.45
Moist Unit Weight (pcf)	115.0	120.0	125.0
Submerged Unit Weight (pcf)	52.6	57.6	62.6

These values assume horizontal backfill, do not consider any surcharge on top of the wall, and do not include a design safety factor. This information should only be used by design professionals with experience in this type of design as certain soil parameters can vary depending on anticipated loading conditions.

B. Site Seismic Conditions

According to the 2009 International Building Code IBC Section 1613.5.5 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. Therefore, Site Class D conditions should be applied for the seismic design of the proposed structures.

XIII. CONSTRUCTION QUALITY CONTROL

The development of this site will involve significant earthwork and foundation construction activities, the quality of which directly impacts the validity of the recommendations presented in this report. Based upon past experience, the most effective and economical construction and earthwork inspection is obtained through the presence of a qualified representative of the Geotechnical Engineer of Record. Therefore, it is recommended that the proof-rolling, site preparation, foundation construction, and other critical earthwork operations be observed, tested, and documented in the field by EEI.

XIV. 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 arise which

differ from those specifically stated herein, or if design criteria are modified, our office should be notified immediately so that our recommendations can be reviewed and revised, if necessary.

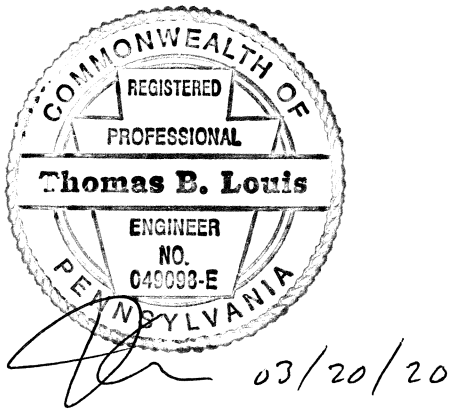
Unless specifically indicated to the contrary in this report, the scope of this report is limited to only investigations and evaluations of the geotechnical aspects of the site conditions and does not include any considerations of potential site pollution, contamination or other environmental issues. This report offers no facts or opinions related to potential pollution or contamination on the site.

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 assume 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.

It is emphasized that this analysis was made for the Community Center and Administration & Police Department buildings to be located at the Folcroft Municipal Complex on Ashland Avenue in Folcroft Borough, Delaware County, Pennsylvania. Earth Engineering Incorporated does not assume any responsibility in using this report to generate earthwork criteria or foundation design other than at the specific site addressed.

Respectfully submitted,
Earth Engineering Incorporated

Jim Ward, P.G.
Assistant Director - New Jersey Division



Thomas B. Louis, P.E.
Director - New Jersey Division
Pennsylvania Professional Engineer
License Number GE-049098E

APPENDIX

PLATE 1 – SITE TOPOGRAPHIC MAP
PLATE 2 – SITE GEOLOGIC MAP
BORING LOCATION PLAN
BORING PROFILES
BORING LOGS
LABORATORY TEST RESULTS

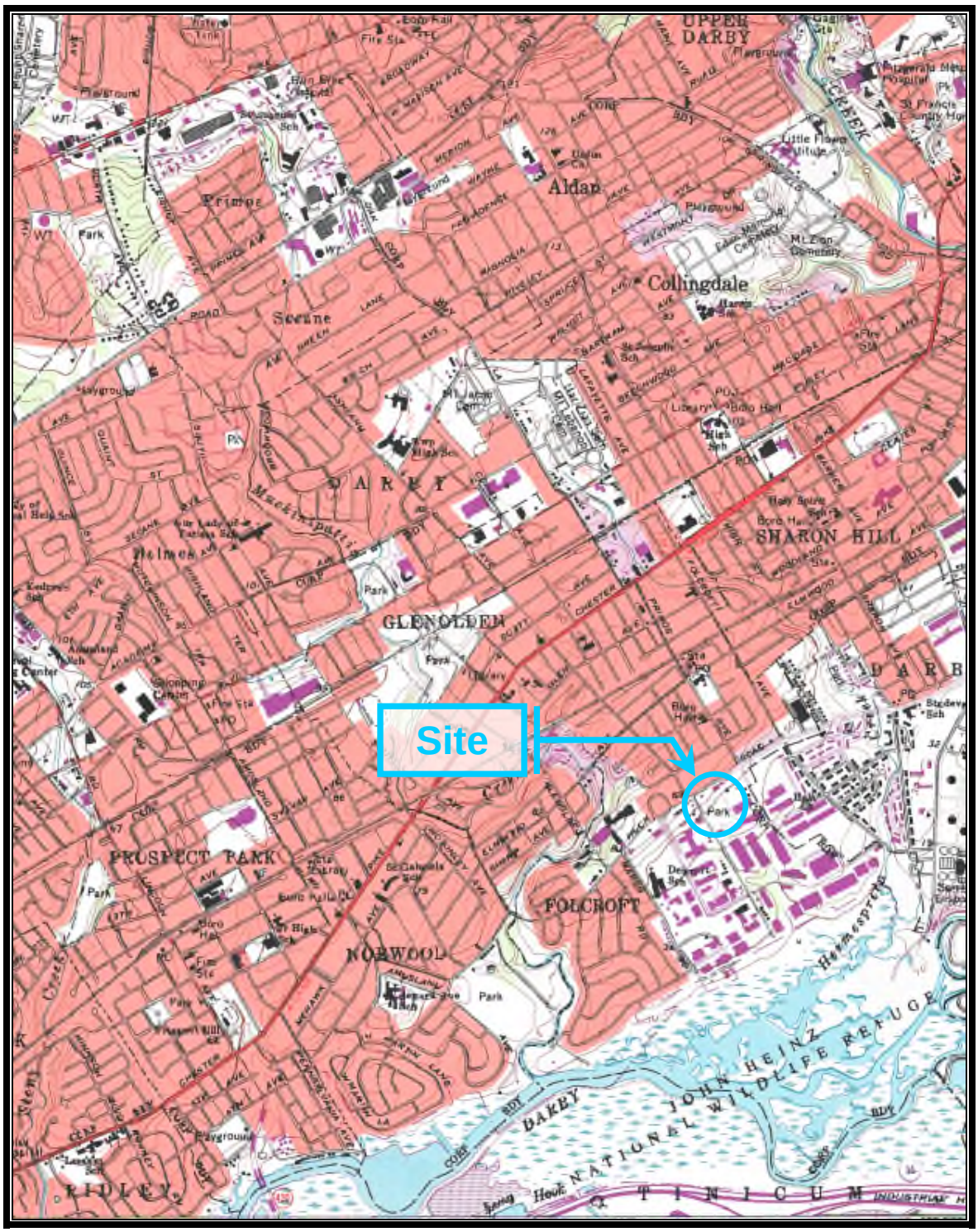


PLATE 1 – SITE TOPOGRAPHIC MAP

Reprinted from the United States Department of the Interior Geological Survey, *Topographic Maps of Pennsylvania*, Lansdowne, PA Quadrangle, Revised 1994.

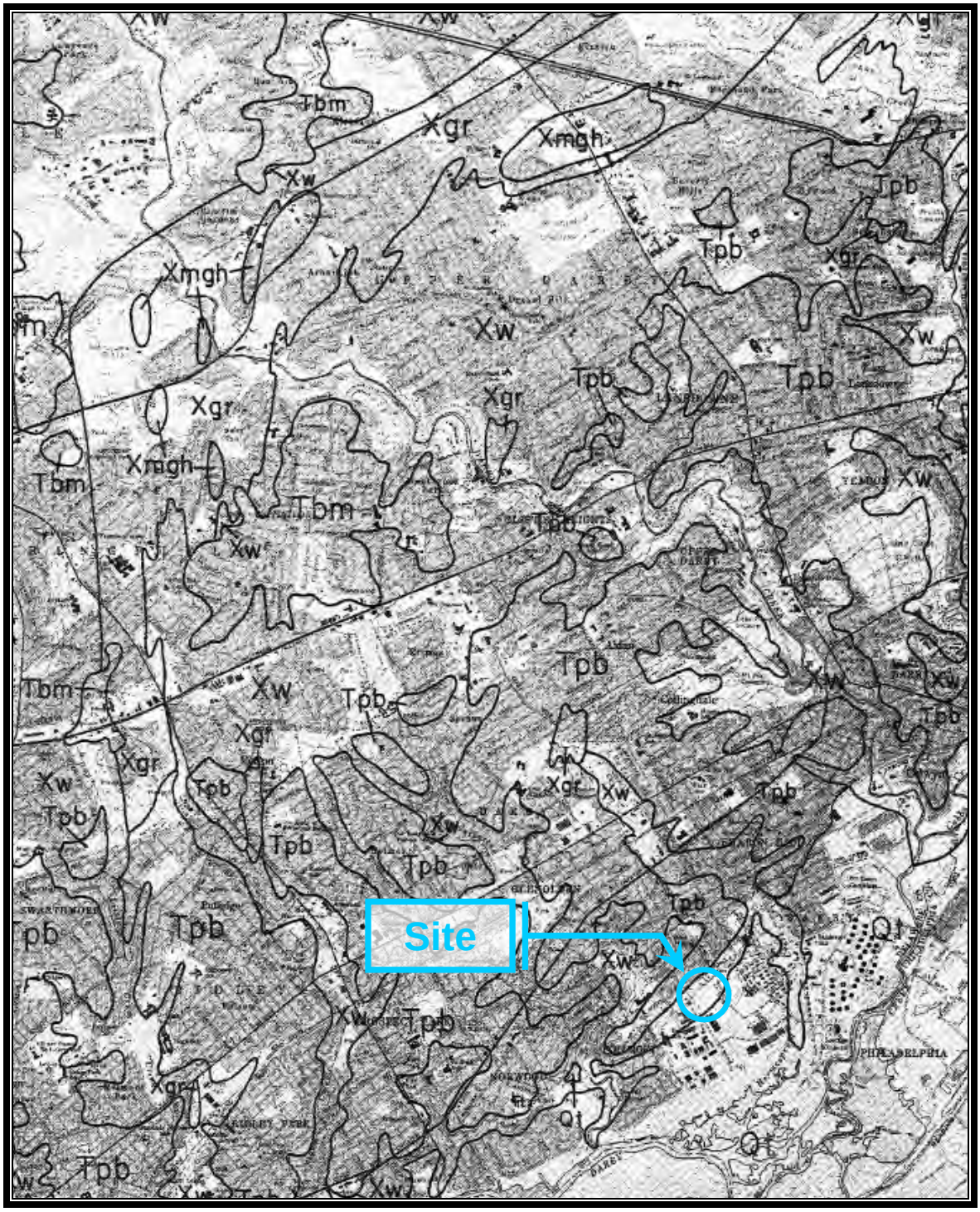
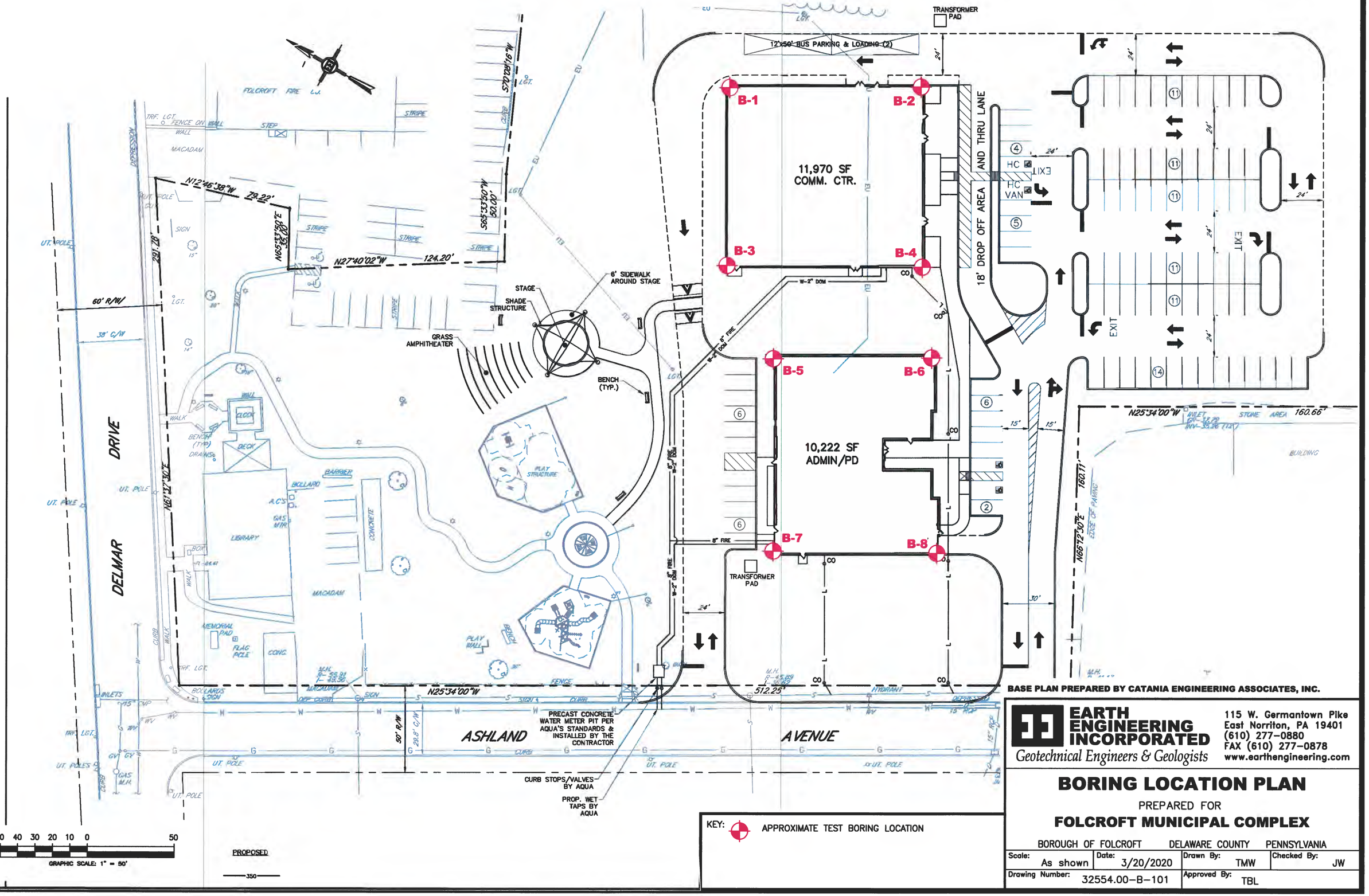


PLATE 2 – SITE GEOLOGIC MAP

Reprinted from the Pennsylvania Geological Survey, *Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania*, Lansdowne, PA Quadrangle, 1978.



KEY: APPROXIMATE TEST BORING LOCATION

BASE PLAN PREPARED BY CATANIA ENGINEERING ASSOCIATES, INC.

EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists
115 W. Germantown Pike
East Norriton, PA 19401
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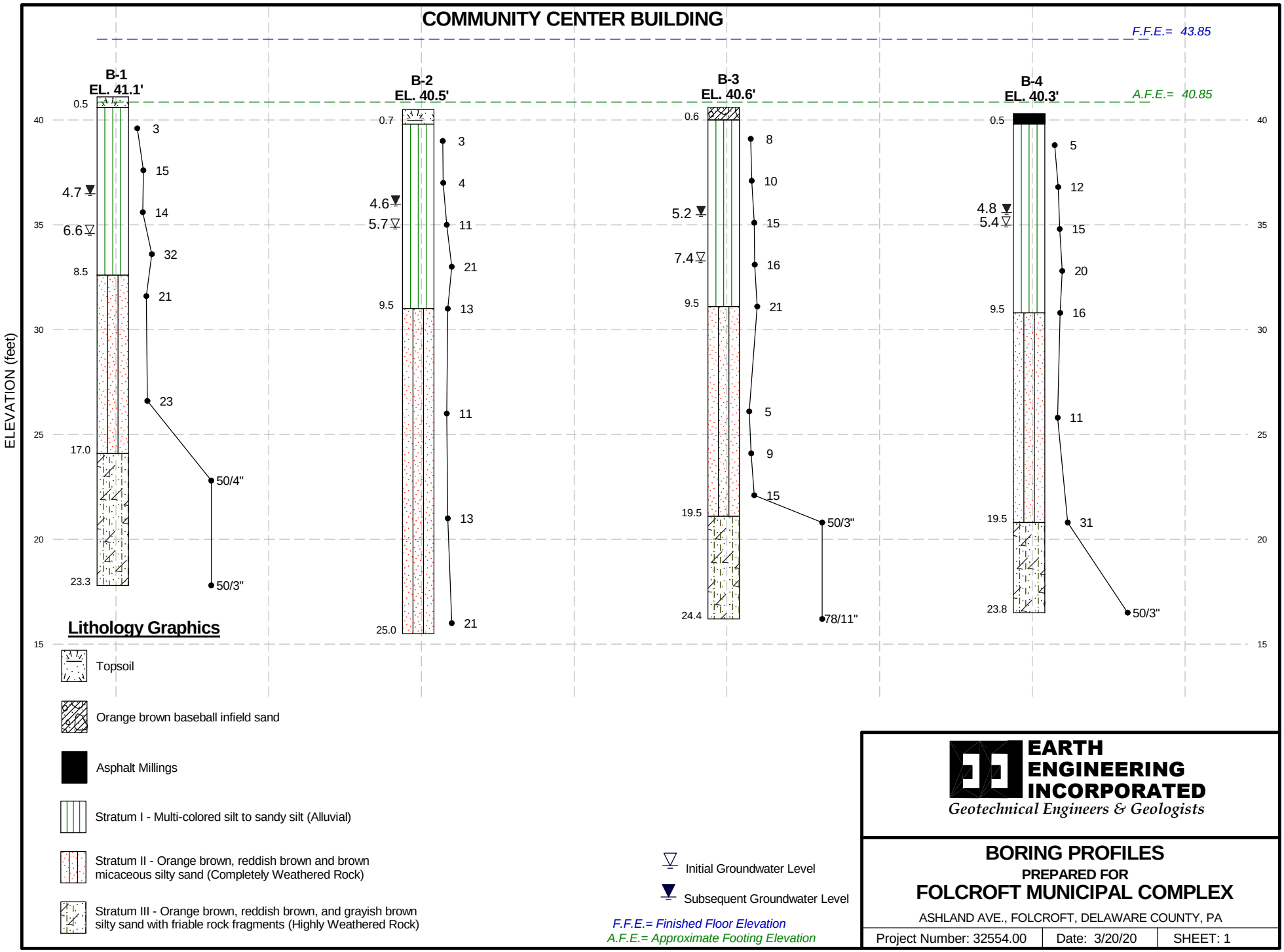
BORING LOCATION PLAN

PREPARED FOR

FOLCROFT MUNICIPAL COMPLEX

BOROUGH OF FOLCROFT DELAWARE COUNTY PENNSYLVANIA

Scale:	Date:	Drawn By:	Checked By:
As shown	3/20/2020	TMW	JW
Drawing Number: 32554.00-B-101		Approved By: TBL	



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BORING PROFILES

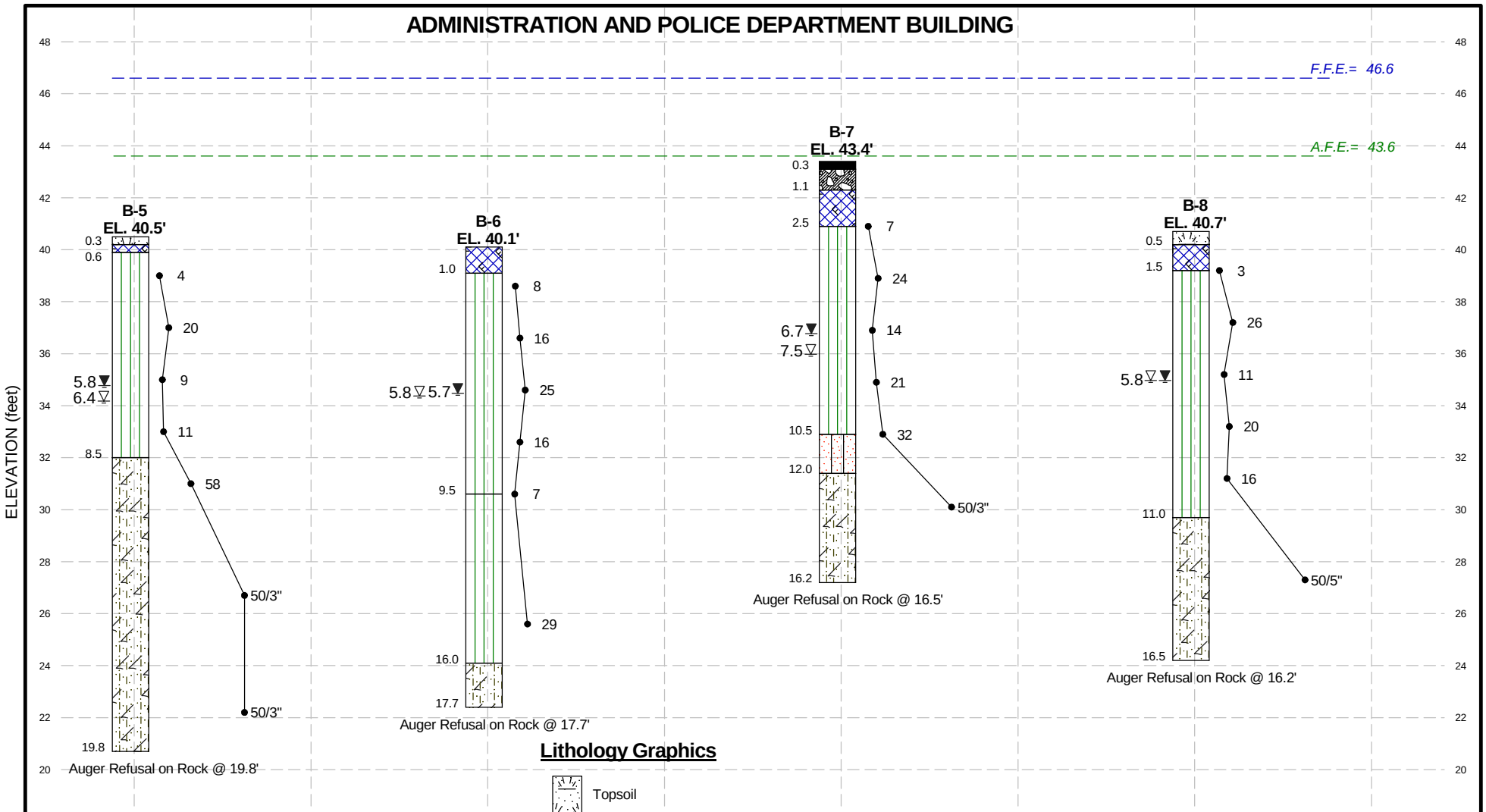
PREPARED FOR

FOLCROFT MUNICIPAL COMPLEX

ASHLAND AVE., FOLCROFT, DELAWARE COUNTY, PA

Project Number: 32554.00	Date: 3/20/20	SHEET: 1

ADMINISTRATION AND POLICE DEPARTMENT BUILDING



Lithology Graphics

- Topsoil
- Asphalt Millings
- Crushed Stone
- FILL - Reddish brown, brown, and dark brown sandy silt to silty sand with no to trace gravel. Trace glass, roots & organics in boings B-6, B-7, & B-8
- Stratum I - Multi-colored silt to sandy silt (Alluvial)
- Stratum II - Orange brown, reddish brown and brown micaceous silty sand (Completely Weathered Rock)
- Stratum III - Orange brown, reddish brown, and grayish brown silty sand with friable rock fragments (Highly Weathered Rock)

▽ Initial Groundwater Level

▼ Subsequent Groundwater Level

F.F.E.= Finished Floor Elevation

A.F.E.= Approximate Footing Elevation

EARTH ENGINEERING INCORPORATED

Geotechnical Engineers & Geologists

BORING PROFILES

PREPARED FOR

FOLCROFT MUNICIPAL COMPLEX

ASHLAND AVE., FOLCROFT, DELAWARE COUNTY, PA

Project Number: 32554.00	Date: 3/17/20	SHEET: 2

EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists

BORING LOG

BORING NO. **B-1**
SHEET **1** OF **1**
DATE: START **3/5/20**
END **3/5/20**
SURFACE ELEV. (FT) **41.1**

PROJECT NAME **Folcroft Municipal Complex Buildings**
PROJECT LOCATION **Ashland Ave., Folcroft, Delaware County, PA**
PROJECT NUMBER **32554.00**
INSPECTOR NAME **M. Friedrichsen**
EQUIPMENT USED **Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **B. Corcoran/Corcoran Drilling Company**
DRILLING METHODS **Solid Stem Augers and Split Spoon Samplers**
AUGER: SIZE: **6.0"** ; AUGER DEPTH: **23.0'** ; WATER: DEPTH: **6.6'** TIME: **1/4 Hr.** DATE: **3/5/2020**
CHECKED BY: **J. Ward** ; DATE: **3/10/2020** DEPTH: **4.7'** TIME: **6 1/2 Hrs.** DATE: **3/5/2020**
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 Topsoil (6.0") 40.6	
	S-1	1 1 2 3	1.6'	-		NA		Stratum I - Gray and orange brown silt to sandy silt	
2.0									
	S-2	4 5 10 12	1.4'	-		NA			
4.0									
	S-3	4 5 9 11	1.5'	-		NA			Wet @ 4.7' @ 6 1/2 Hours
6.0									
	S-4	10 16 16 15	1.4'	-		NA			Wet @ 6.6' @ 1/4 Hour
8.0								8.5 32.6	
	S-5	6 9 12 14	1.2'	-		NA		Stratum II - Grayish brown, orange brown, and reddish brown micaceous silty sand	Moderate Drilling @ 8.5' - 17.0'
10.0									
13.0									
	S-6	10 11 12 13	1.2'	-		NA			
15.0									
								17.0 24.1	
18.0				-				Stratum III - Grayish brown and orange brown silty sand with friable rock fragments (Weathered Rock)	
18.3	S-7	50/4	0.3'			NA			Hard Drilling @ 18.5' - 23.0'
23.0				-					
23.3	S-8	50/3	0.3'			NA		23.3 17.8	End of Boring (EOB) @ 23.3'

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

EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists

BORING LOG

BORING NO. **B-2**
SHEET **1** OF **1**
DATE: START **3/6/20**
END **3/6/20**
SURFACE ELEV. (FT) **40.5**

PROJECT NAME **Folcroft Municipal Complex Buildings**
PROJECT LOCATION **Ashland Ave., Folcroft, Delaware County, PA**
PROJECT NUMBER **32554.00**
INSPECTOR NAME **M. Friedrichsen**
EQUIPMENT USED **Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **B. Corcoran/Corcoran Drilling Company**
DRILLING METHODS **Solid Stem Augers and Split Spoon Samplers**
AUGER: SIZE: **6.0"** ; AUGER DEPTH: **25.0'** ; WATER: DEPTH: **5.7'** TIME: **1/4 Hr.** DATE: **3/6/2020**
CHECKED BY: **J. Ward** ; DATE: **3/10/2020** DEPTH: **4.6'** TIME: **6 Hrs.** DATE: **3/6/2020**
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								Topsoil (8.0") 0.7 39.8	
	S-1	1 1 2 3	1.5'	-		NA		Stratum I - Gray and brown SILT (ML)	
2.0									
	S-2	2 2 2 4	1.1'	-		NA			
4.0									
	S-3	2 5 6 8	1.8'	-		NA			Wet @ 4.6' @ 6 Hours
6.0									Wet @ 5.7' @ 1/4 Hour
	S-4	8 10 11 12	1.7'	-		NA			
8.0									
	S-5	5 6 7 12	1.3'	-		NA		9.5 31.0	
10.0								Stratum II - Grayish brown and orange brown micaceous silty sand	
13.0									
	S-6	7 6 5 5	1.0'	-		NA			
15.0									
18.0									
	S-7	5 5 8 13	0.8'	-		NA			
20.0									Moderate Drilling @ 20.0' - 25.0'
23.0									
	S-8	5 7 14 29	1.4'	-		NA			
25.0								25.0 15.5	
									EOB @ 25.0'

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

EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists

BORING LOG

BORING NO. **B-3**
SHEET **1** OF **1**
DATE: START **3/5/20**
END **3/5/20**
SURFACE ELEV. (FT) **40.6**

PROJECT NAME **Folcroft Municipal Complex Buildings**
PROJECT LOCATION **Ashland Ave., Folcroft, Delaware County, PA**
PROJECT NUMBER **32554.00**
INSPECTOR NAME **M. Friedrichsen**
EQUIPMENT USED **Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **B. Corcoran/Corcoran Drilling Company**
DRILLING METHODS **Solid Stem Augers and Split Spoon Samplers**
AUGER: SIZE: **6.0"** ; AUGER DEPTH: **23.0'** ; WATER: DEPTH: **7.4'** TIME: **1/4 Hr.** DATE: **3/5/2020**
CHECKED BY: **J. Ward** ; DATE: **3/10/2020** DEPTH: **5.2'** TIME: **4 Hrs.** DATE: **3/5/2020**
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								0.6 Orange brown Infield baseball sand (7.0") 40.0	
	S-1	3 4 4 4	1.6'	-		NA		Stratum I - Gray and grayish brown silt to sandy silt	
2.0									
	S-2	2 3 7 8	1.3'	-		NA			
4.0									
	S-3	4 6 9 13	1.7'	-		NA			Wet @ 5.2' @ 4 Hours
6.0									
	S-4	6 7 9 9	1.4'	-		NA			Wet @ 7.4' @ 1/4 Hour
8.0									
	S-5	7 10 11 10	1.2'	-		NA		9.5 31.1	
10.0								Stratum II - Gray and orange brown micaceous SILTY SAND (SM)	
13.0									
	S-6	4 3 2 3	1.1'	-		NA			
15.0									
	S-7	3 4 5 5	0.0'	-		NA			
17.0									
	S-8	6 7 8 15	0.9'	-		NA			Moderate Drilling @ 18.5' - 19.5'
19.0									
19.8	S-9	23 50/3	0.8'	-		NA		19.5 21.1	Hard Drilling @ 19.5' - 24.4'
								Stratum III - Grayish brown and reddish brown silty sand with friable rock fragments (Weathered Rock)	
23.0									
	S-10	19 28 50/5	1.0'	-		NA		24.4 16.2	
24.4									EOB @ 24.4'

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

EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists

BORING LOG

BORING NO. **B-4**
SHEET **1** OF **1**
DATE: START **3/6/20**
END **3/6/20**
SURFACE ELEV. (FT) **40.3**

PROJECT NAME **Folcroft Municipal Complex Buildings**
PROJECT LOCATION **Ashland Ave., Folcroft, Delaware County, PA**
PROJECT NUMBER **32554.00**
INSPECTOR NAME **M. Friedrichsen**
EQUIPMENT USED **Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **B. Corcoran/Corcoran Drilling Company**
DRILLING METHODS **Solid Stem Augers and Split Spoon Samplers**
AUGER: SIZE: **6.0"** ; AUGER DEPTH: **23.0'** ; WATER: DEPTH: **5.4'** TIME: **1/4 Hr.** DATE: **3/6/2020**
CHECKED BY: **J. Ward** ; DATE: **3/10/2020** DEPTH: **4.8'** TIME: **4 1/2 Hrs.** DATE: **3/6/2020**
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 0.5 — Asphalt Millings with trace silty sand (6.0") — ELEVATION 39.8	
0.0	S-1	2 3 2 3	1.7'	-		NA		Stratum I - Grayish brown and brown silt to sandy silt	
2.0	S-2	4 5 7 9	1.4'	-		NA			
4.0	S-3	8 7 8 11	0.8'	-		NA			Wet @ 4.8' @ 4 1/2 Hours
6.0	S-4	9 10 10 12	1.7'	-		NA			Wet @ 5.4' @ 1/4 Hour
8.0	S-5	6 8 8 11	1.3'	-		NA		9.5 — 30.8	
10.0								Stratum II - Grayish brown and orange brown micaceous silty sand	
13.0									
15.0	S-6	3 4 7 8	0.5'	-		NA			
18.0									
20.0	S-7	7 13 18 30	1.3'	-		NA		19.5 — 20.8	
23.0								Stratum III - Grayish brown and orange brown silty sand with friable rock fragments (Weathered Rock)	Moderate to Hard Drilling @ 19.5' - 23.8'
23.8	S-8	38 50/3	0.7'	-		NA		23.8 — 16.5	
									EOB @ 23.8'

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

EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists

BORING LOG

BORING NO. **B-5**
SHEET **1** OF **1**
DATE: START **3/5/20**
END **3/5/20**
SURFACE ELEV. (FT) **40.5**

PROJECT NAME **Folcroft Municipal Complex Buildings**
PROJECT LOCATION **Ashland Ave., Folcroft, Delaware County, PA**
PROJECT NUMBER **32554.00**
INSPECTOR NAME **M. Friedrichsen**
EQUIPMENT USED **Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **B. Corcoran/Corcoran Drilling Company**
DRILLING METHODS **Solid Stem Augers and Split Spoon Samplers**
AUGER: SIZE: **6.0"** ; AUGER DEPTH: **19.8'** ; WATER: DEPTH: **6.4'** TIME: **1/4 Hr.** DATE: **3/5/2020**
CHECKED BY: **J. Ward** ; DATE: **3/10/2020** DEPTH: **5.8'** TIME: **6 Hrs.** DATE: **3/5/2020**
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	1 2 2 3	1.7'	-		NA		0.3 Topsoil (4.0") 40.2	
								0.6 FILL - Brown and orange brown sandy silt 39.9	
2.0								Stratum I - Gray, grayish brown, and orange brown sandy silt to silty sand, trace clay and gravel	
	S-2	5 9 11 16	1.5'	-		NA			
4.0	S-3	3 4 5 6	1.6'	-		NA			
6.0	S-4	4 5 6 6	1.4'	-		NA			Wet @ 5.8' @ 6 Hours Wet @ 6.4' @ 1/4 Hour
8.0								8.5 32.0	
	S-5	6 20 38 53	1.9'	-		NA		Stratum III - Grayish brown and orange brown SILT SAND (SM) with friable rock fragments (Weathered Rock)	Moderate Drilling @ 8.5' - 10.5
10.0									Hard Drilling @ 10.5' - 19.8'
13.0									
13.8	S-6	41 50/3	0.8'	-		NA			
18.0				-					
18.3	S-7	50/3	0.3'			NA			
								19.8 20.7	
									EOB @ 19.8', Due to Auger Refusal

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

EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists

BORING LOG

BORING NO. **B-6**
SHEET **1** OF **1**
DATE: START **3/6/20**
END **3/6/20**
SURFACE ELEV. (FT) **40.1**

PROJECT NAME **Folcroft Municipal Complex Buildings**
PROJECT LOCATION **Ashland Ave., Folcroft, Delaware County, PA**
PROJECT NUMBER **32554.00**
INSPECTOR NAME **M. Friedrichsen**
EQUIPMENT USED **Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **B. Corcoran/Corcoran Drilling Company**
DRILLING METHODS **Solid Stem Augers and Split Spoon Samplers**
AUGER: SIZE: **6.0"** ; AUGER DEPTH: **17.7'** ; WATER: DEPTH: **5.8'** TIME: **1/4 Hr.** DATE: **3/6/2020**
CHECKED BY: **J. Ward** ; DATE: **3/10/2020** DEPTH: **5.7'** TIME: **2 Hrs.** DATE: **3/6/2020**
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	4 3 5 3	1.6'	-		NA		FILL - Dark brown silty sand with trace gravel and glass fragments 1.0 39.1	
2.0	S-2	3 5 11 16	1.3'	-		NA		Stratum I - Gray SILT (ML)	
4.0	S-3	9 12 13 15	1.8'	-		NA			
6.0	S-4	6 8 8 10	1.1'	-		NA			Wet @ 5.7' @ 2 Hours Wet @ 5.8' @ 1/4 Hour
8.0	S-5	2 3 4 11	1.6'	-		NA		9.5 30.6	
10.0								Stratum I - Orange brown sandy silt	Moderate Drilling @ 9.5' - 16.0'
13.0	S-6	8 12 17 36	1.3'	-		NA			
15.0								16.0 24.1	
								Stratum III - Grayish brown and orange brown silty sand with some friable rock fragments (Weathered Rock) 17.7 22.4	Hard Drilling @ 16.0' - 17.7'
									EOB @ 17.7', Due to Auger Refusal

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

EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists

BORING LOG

BORING NO. **B-7**
SHEET **1** OF **1**
DATE: START **3/5/20**
END **3/5/20**
SURFACE ELEV. (FT) **43.4**

PROJECT NAME **Folcroft Municipal Complex Buildings**
PROJECT LOCATION **Ashland Ave., Folcroft, Delaware County, PA**
PROJECT NUMBER **32554.00**
INSPECTOR NAME **M. Friedrichsen**
EQUIPMENT USED **Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **B. Corcoran/Corcoran Drilling Company**
DRILLING METHODS **Solid Stem Augers and Split Spoon Samplers**
AUGER: SIZE: **6.0"** ; AUGER DEPTH: **16.2'** ; WATER: DEPTH: **7.5'** TIME: **1/4 Hr.** DATE: **3/5/2020**
CHECKED BY: **J. Ward** ; DATE: **3/10/2020** DEPTH: **6.7'** TIME: **1/2 Hr.** DATE: **3/5/2020**
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
								0.3 / 43.1 Asphalt (4.0")	
1.0								1.1 / 42.3 Crushed Stone (9.0")	
	S-1	2 3 4 8	1.4'	-		NA		FILL - Dark brown silty sand with trace organics	
3.0								2.5 / 40.9	
	S-2	8 11 13 15	1.5'	-		NA		Stratum I - Gray and orange brown silt to sandy silt	
5.0									
	S-3	4 6 8 9	1.7'	-		NA			
7.0									Wet @ 6.7' @ 1/2 Hour
	S-4	8 10 11 13	1.5'	-		NA			Wet @ 7.5' @ 1/4 Hour
9.0									
	S-5	5 10 22 48	1.6'	-		NA		10.5 / 32.9	
11.0								Stratum II - Gray, grayish brown, and orange brown micaceous silty sand	Moderate Drilling @ 10.5' - 12.0'
								12.0 / 31.4	
13.0				-				Stratum III - Orange brown silty sand with some rock fragments (Weathered Rock)	Hard Drilling @ 12.0' - 16.2'
13.3	S-6	50/3	0.3'			NA			
								16.2 / 27.2	
									EOB @ 16.2', Due to Auger Refusal

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

EARTH ENGINEERING INCORPORATED
Geotechnical Engineers & Geologists

BORING LOG

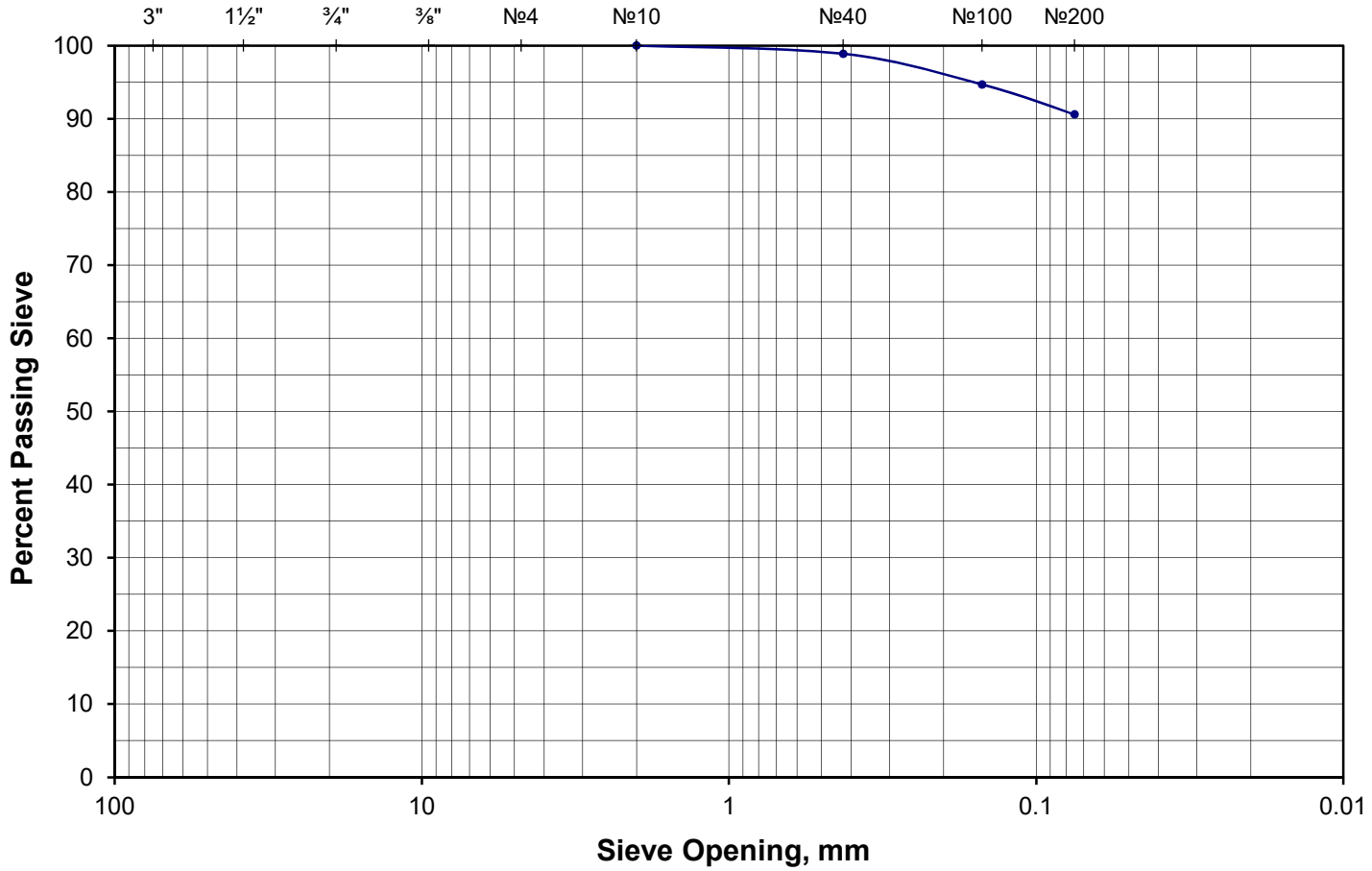
BORING NO. **B-8**
SHEET **1** OF **1**
DATE: START **3/6/20**
END **3/6/20**
SURFACE ELEV. (FT) **40.7**

PROJECT NAME **Folcroft Municipal Complex Buildings**
PROJECT LOCATION **Ashland Ave., Folcroft, Delaware County, PA**
PROJECT NUMBER **32554.00**
INSPECTOR NAME **M. Friedrichsen**
EQUIPMENT USED **Truck Mounted Drill Rig**
DRILLER NAME/COMPANY **B. Corcoran/Corcoran Drilling Company**
DRILLING METHODS **Solid Stem Augers and Split Spoon Samplers**
AUGER: SIZE: **6.0"** ; AUGER DEPTH: **16.5'** ; WATER: DEPTH: **5.8'** TIME: **1/4 Hr.** DATE: **3/6/2020**
CHECKED BY: **J. Ward** ; DATE: **3/10/2020** DEPTH: **5.8'** TIME: **1/2 Hr.** DATE: **3/6/2020**
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, 2, 1, 2	1.7'	-		NA		0.5 / 40.2 Topsoil with gravel (6.0")	
								1.5 / 39.2 FILL - Dark brown and brown silt, trace roots	
2.0	S-2	7, 13, 13, 15	1.6'	-		NA		Stratum I - Gray and orange brown silt to sandy silt	
4.0	S-3	4, 5, 6, 7	1.5'	-		NA			
6.0	S-4	7, 9, 11, 12	1.3'	-		NA			Wet @ 5.8' @ 1/4 Hour Wet @ 5.8' @ 1/2 Hour
8.0	S-5	6, 7, 9, 10	1.0'	-		NA			
10.0								11.0 / 29.7	
13.0				-				Stratum III - Grayish brown and orange brown silty sand with friable rock fragments (Weathered Rock)	Hard to Very Hard Drilling @ 11.0' - 16.5'
13.4	S-6	50/5	0.4'			NA		16.5 / 24.2	
									EOB @ 16.5', Due to Auger Refusal

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

Particle Size Analysis of Soils



As-rec'd water content: 17.2 moist		**Odor:** NR		Particle Size			
% Gravel: 0.0	**Coarse:** 0.0	**Fine:** 0.0		US Standard Sieve Size		Diameter,	% Finer
% Sand: 9.4	**Coarse:** 0.0	**Medium:** 1.1	**Fine:** 8.3	GRAVEL	Coarse	3"	75	
Gravel description:						1½"	38.1	
						¾"	19.0	
Sand description: light brown, micaceous, subangular to subrounded					Fine	⅜"	9.5	
						№ 4	4.75	
Consistency: firm		**Hardness:** NR		SAND	Coarse	№ 10	2.00	100.0
Cementation: NR		**Dry Strength:** NR			Medium	№ 40	0.425	98.9
Structure: homogeneous		**Dilatency:** NR			Fine	№ 100	0.150	94.7
Reaction to HCl: NR		**Toughness:** NR				№ 200	0.075	90.6
USCS Classification: ML, silt				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: 32554.00 - Ashland Ave. Folcroft - Investigation				**LL:** NP	**PL:** NP	**PI:** NP		
Client: Linn Architects								
Sample: B-2, S-3 (2-5-6-8) & S-4 (8-10-11-12)								
Depth: 4.0'- 6.0' & 6.0'- 8.0'								
Description: Gray with brown silt								

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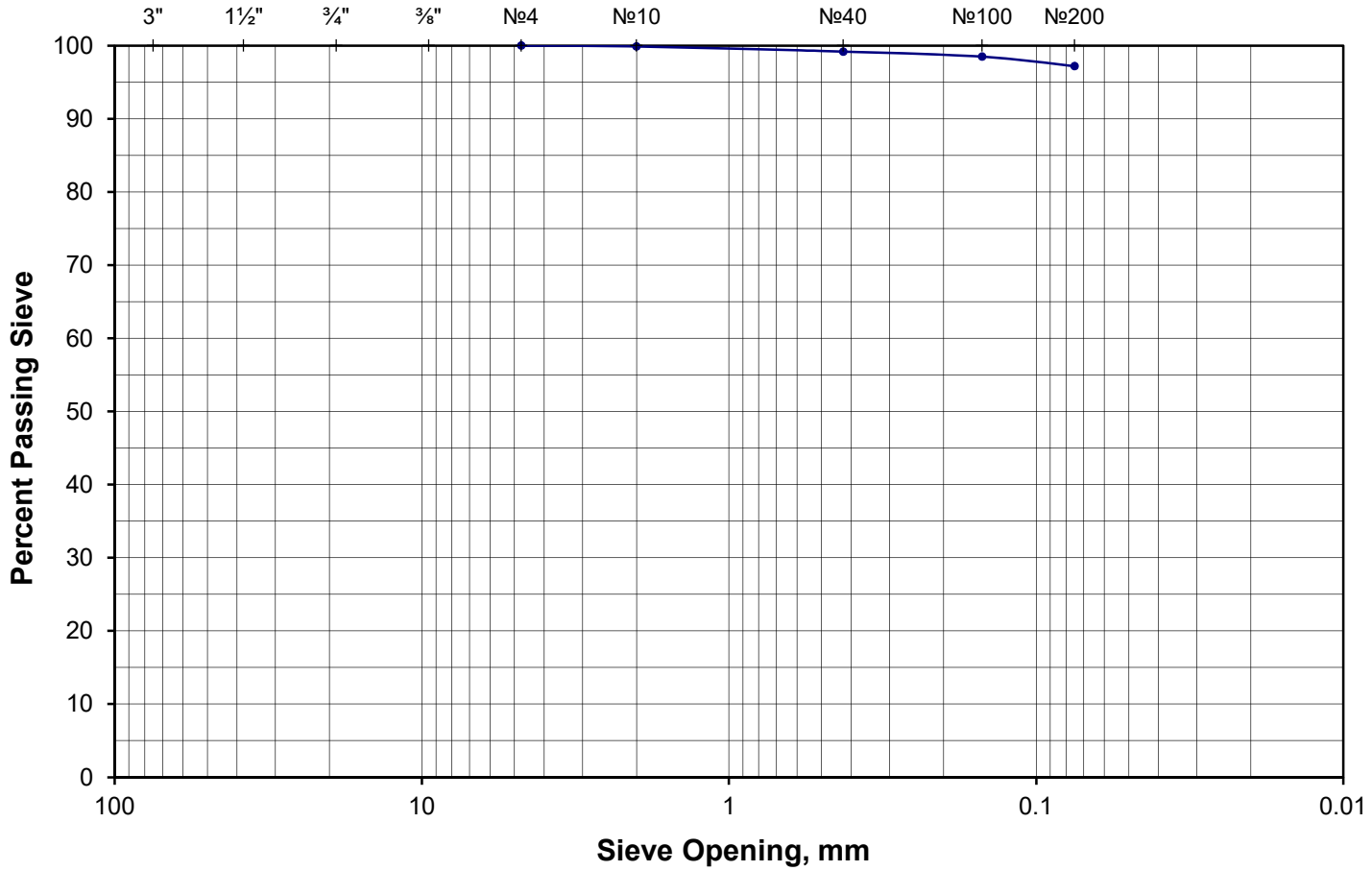
Remarks:

Classification of Soils, ASTM D 2487-17 / D 2488-09a ***March 16, 2020***

Particle Size Analysis of Soils



As-rec'd water content: 19.5 moist		**Odor:** NR		Particle Size			
% Gravel: 0.0	**Coarse:** 0.0	**Fine:** 0.0		US Standard Sieve Size		Diameter,	% Finer
% Sand: 2.8	**Coarse:** 0.1	**Medium:** 0.7	**Fine:** 2.0	GRAVEL	Coarse	3"	75	
Gravel description:						1½"	38.1	
						¾"	19.0	
Sand description: orange-brown, subangular to subrounded					Fine	⅜"	9.5	
						№ 4	4.75	100.0
Consistency: firm	**Hardness:** NR			SAND	Coarse	№ 10	2.00	99.9
Cementation: NR	**Dry Strength:** NR				Medium	№ 40	0.425	99.2
Structure: homogeneous	**Dilatency:** NR				Fine	№ 100	0.150	98.5
Reaction to HCl: NR	**Toughness:** NR					№ 200	0.075	97.2
USCS Classification: ML, silt				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: 32554.00 - Ashland Ave. Folcroft - Investigation				**LL:** NP	**PL:** NP	**PI:** NP		
Client: Linn Architects								
Sample: B-6, S-2 (3-5-11-16) & S-3 (9-12-13-15)								
Depth: 2.0'- 4.0' & 4.0'- 6.0'								
Description: Gray silt								

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Remarks:

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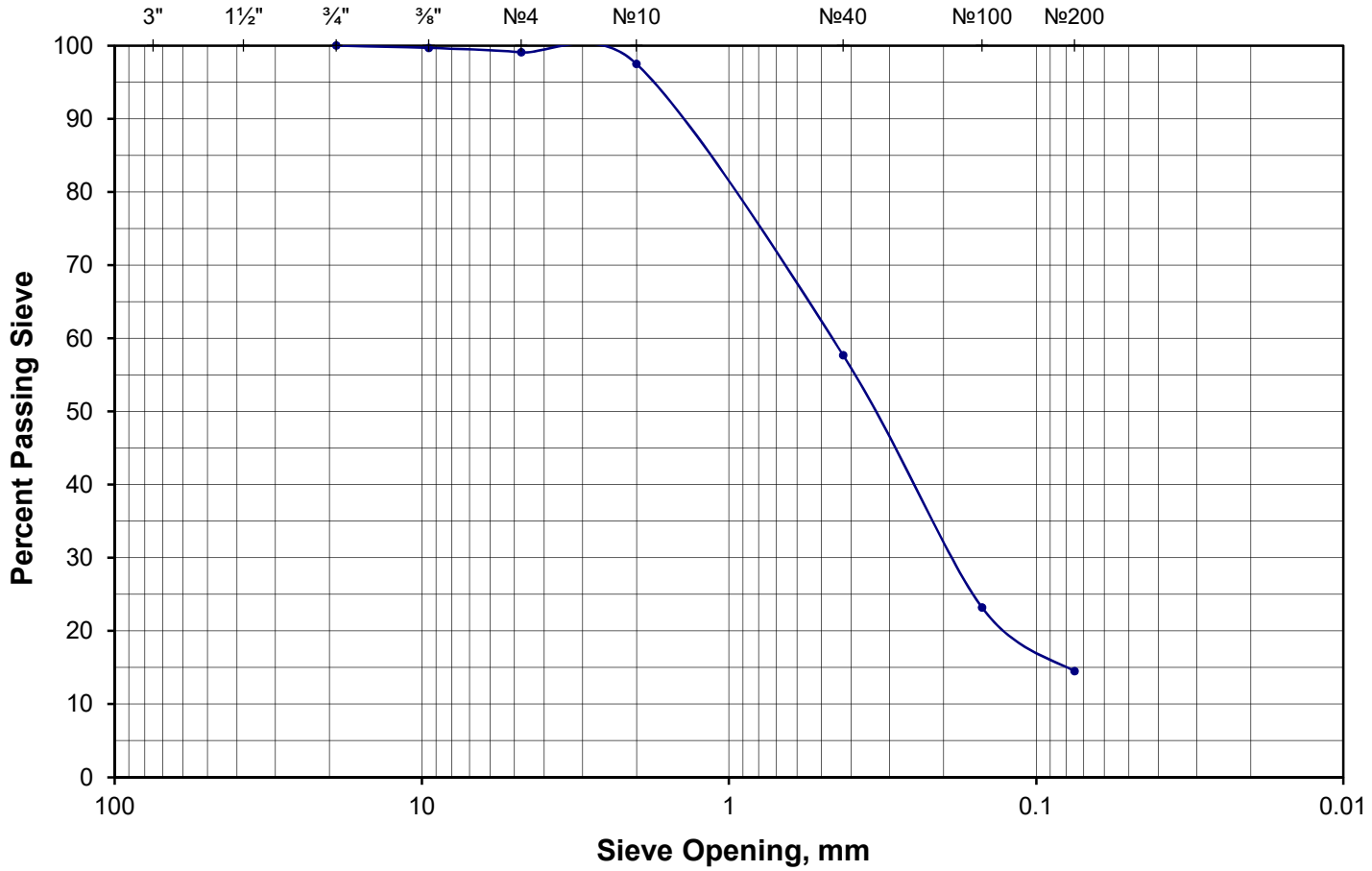
Particle Size Analysis of Soils



As-rec'd water content: 15.1 moist **Odor:** NR

% Gravel: 0.9 **Coarse:** 0.0 **Fine:** 0.9

% Sand: 84.6 **Coarse:** 1.6 **Medium:** 39.8 **Fine:** 43.2

Gravel description: brown to black, micaceous

Sand description: brown to black, micaceous, 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	
		¾"	19.0	100.0
	Fine	⅜"	9.5	99.7
		№ 4	4.75	99.1
SAND	Coarse	№ 10	2.00	97.5
	Medium	№ 40	0.425	57.7
	Fine	№ 100	0.150	23.2
		№ 200	0.075	14.5
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: 32554.00 - Ashland Ave. Folcroft - Investigation

Client: Linn Architects

Sample: B-3, S-6 (4-3-2-3) & S-8 (6-7-8-15)

Depth: 13.0'- 15.0' & 17.0'- 19.0'

Description: Gray-brown and light brown, micaceous silty sand

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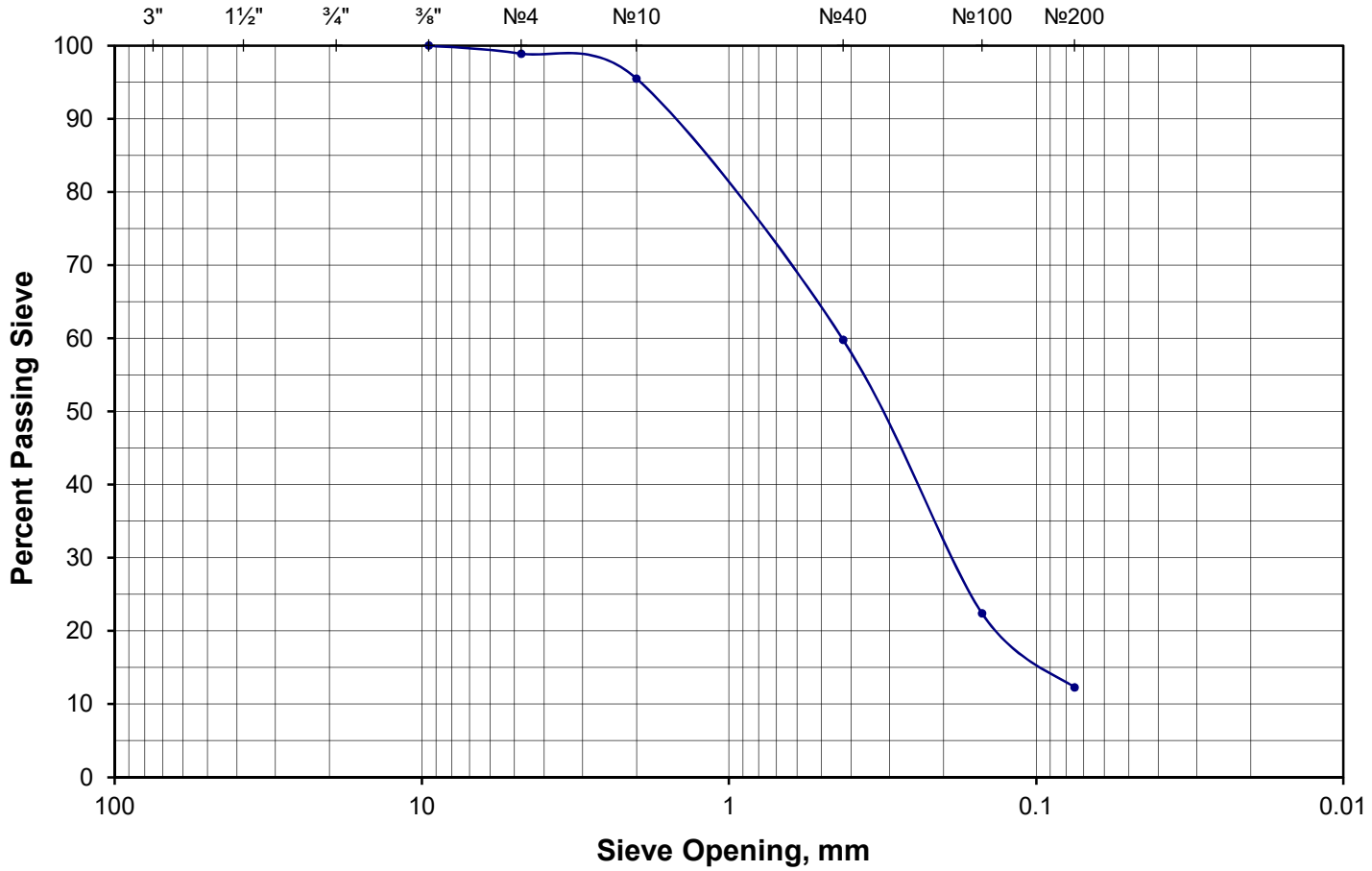
Remarks:

Classification of Soils, ASTM D 2487-17 / D 2488-09a ***March 16, 2020***

Particle Size Analysis of Soils



As-rec'd water content: 15.6 moist **Odor:** NR

% Gravel: 1.1 **Coarse:** 0.0 **Fine:** 1.1

% Sand: 86.6 **Coarse:** 3.4 **Medium:** 35.7 **Fine:** 47.5

Gravel description: brown to black, micaceous

Sand description: brown to black, micaceous, 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	
		¾"	19.0	
	Fine	⅜"	9.5	100.0
		№ 4	4.75	98.9
SAND	Coarse	№ 10	2.00	95.5
	Medium	№ 40	0.425	59.8
	Fine	№ 100	0.150	22.4
		№ 200	0.075	12.3
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: 32554.00 - Ashland Ave. Folcroft - Investigation

Client: Linn Architects

Sample: B-5, S-6 (41-50/3") & S-7 (50/3")

Depth: 13.0'- 13.8' & 18.0'- 18.3'

Description: Gray-brown, micaceous silty sand

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