THE SCHOOL DISTRICT OF PHILADELPHIA

BOARD OF EDUCATION
Office of Capital Programs
440 North Broad Street, 3rd Floor – Suite 371
Philadelphia, PA 19130

TELEPHONE: (215) 400-4730

Addendum No. 4

Subject: **SDP Contracts No. B-011 C, B-012 C, B-013 C and B-014 C of 2017/18 Major Renovation and Addition**

Location: **Ethan Allen Elementary School**

This Addendum dated June 22, 2020 shall modify and become part of the Contract Documents. Any items not mentioned herein, or affected by, shall remain strictly in accordance with the original document.

NOTICE TO ALL BIDDERS:

BID OPENING POSTPONED UNTIL TUESDAY JUNE 30, 2020 AT 2:00 PM.

1. MODIFICATIONS TO GENERAL AND SUPPLEMENTARY CONDITIONS (DIVISION 00)

- See attached Engineering Soil and Foundation Engineering Report in response to Question #84.

2. MODIFICATIONS TO DIVISION 01 GENERAL REQUIREMENTS (DIVISION 01)

A. 01 10 00: Summary of work:

- Delete Paragraph 1.07.B.10. Contract No. B-111C of 2017/18 - General Construction (GC). The trailers will be removed by the School District.
- Delete Paragraph 1.10.G.3. Contract No. B-114C of 2017/18 – Electrical Construction (EC). All electrical, fire alarm, data and communication work for the trailers will be provided by the School District.

3. CHANGES TO TECHNICAL SPECIFICATIONS (DIVISIONS 02-36):

A. **Specification Section 04 20 00**: Revise Unit Masonry as follows:

Delete paragraph 2.02.A.1 and insert the following:
Brick Type I: Beldon - Claret Full Range Velour A
Brick Type II: Beldon - #8530

B. **Specification Section 08 06 71**: Revise Door Hardware Schedule as follows:

- The following hardware sets require (1) Interchangeable Core (CR8027 PYRAMID 626 finish): Sets 4.1, 4.2, 12.0, 13.0, 14.0, 15.0, 16.0, 17.0, 19.0, 20.0, 20.1, 21.0, 23.0, and 24.0

- The following hardware sets require (2) Interchangeable Cores (CR8027 PYRAMID 626 finish): Sets 5.0 and 22.0
- All exit devices require Core Housing CT6
- All cores to be Corbin Russwin 8027 PYRAMID

C. **Add Specification Section 07 81 23**: Intumescent Fire Protection; attached.

D. **Specification Section 08 51 13**: Aluminum Windows. Modify as follows:

2.01A. Aluminum Windows:
1. EFCO, a Pella Company**; 325X or PX32**: www.efcocorp.com.
2. Oldcastle Building Envelope**; Signature Lap**: www.oldcastlebe.com.
3. ~~*TRACO: www.traco.com.*~~ **Kawneer; AA4325 or NX-3000: www.kawneer.com.**
4. Wausau Window and Wall Systems**; 3250i-XLT**: www.wausauwindow.com.
5. YKK AP America Inc; ~~*YFW 400 TU*~~ **YOW 350 XT**: www.ykkap.com.

2.02A.1. Frame Depth: ~~*4*~~ **3-1/2** inches**, nominal**.

2.03G. Condensation Resistance Factor of Frame: ~~*75*~~ **45**, measured in accordance with AAMA 1503.

2.03H. Overall U-value, Including **Fixed** Glazing: 0.36 Btu/(hr sq ft deg F), maximum, measured on the
window size required for this project.

2.03**I. Overall U-value, Including Operable Glazing: 0.45 Btu/(hr sq ft deg F), maximum, measured on the**
window size required for this project.

2.04A. Frames: ~~*1-1/34*~~ **1.9 to 2.3** inch**es** wide by ~~*4*~~ **3.2 to 3.9** inch**es** deep profile, **of minimum 0.08 thick section;** thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.

Note: FINISHES (Superior Performing Organic Coatings System) remains unchanged.

E. **Specification Section 08 4313**: Aluminum-Framed Storefronts
   - Provide Class I natural anodized finish. Modify Paragraph 2.03A.4 accordingly and delete Paragraphs 2.06B, C, and D.

4. CLARIFICATIONS:

A. Phase 1 of the Construction Phasing Schedule (see A-016) shall read:
   - Notice to Proceed: September 2020
   - Substantial Completion: November 17, 2021
   - Final Completion: December 17, 2021

B. Drawing A-109 - First Floor Addition Plan - Area B: The door in the fire wall shall be identified as Door B101.
   1. The door shall be revised to provide a leaf swinging in each direction. See attached SK-02: Partial First Floor Plan
   2. Revised Hardware to include (2) Vertical Rods and Astragal.

C. Drawings A801 – A803 Furniture and Equipment Plans –
   - The existing chalk boards are to be removed. Provide Visual Display Boards as specified in Specification Section 10 1101: Visual Display Boards.

D. Correction to Addendum No. 1, Clarification #1: All electrical, data, communication and fire alarm work for the temporary classroom trailers to be provided by the School District.

5. QUESTIONS AND ANSWERS

Question 76: Specified Window - YKK YFW 400 TU is a fixed window system and cannot accept operable windows. This is a 4" deep system; YKK recommends that YOW 350 TU (3.5 deep system) be used instead because their 4" systems are fixed only. Please confirm if this is acceptable.
Answer: See Changes to Technical Specifications, Part B. above.

Question 77: The specifications for Aluminum Storefronts calls for both a clear anodized finish and a painted finish. Please confirm which finish is required.
Answer: See Changes to Technical Specifications, Part C. above.

Question 78: Most if not all the chalk and tack boards scheduled to be removed because of asbestos glue dots are on plastered walls. Other properties have unfinished wall surfaces behind the chalk/tack boards. Are we to price this project assuming the walls are finished?
Answer: No. Assume that an unfinished plaster scratch coat remains after the removal of the chalk boards and tack boards. In addition, all wood trim surrounding the chalk boards and tack boards is to remain.

Question 79: Many of the surfaces that need to be refinished or painted have art / schoolwork attached by staples, tape, picture hangers etc. Will these items be removed prior to construction by others?
Answer: Yes.

Answer 80: Please provide an "Intumescent Paint" spec for the exposed beams on the Gym ceilings shown on A205.
Answer: See attached Specification Section 07 8123 Intumescent Fire Protection.

Question 81: On the 700s plans, there are many rooms without "finish schedule" such as "coat room, J.C., vestibule, fire tower including stairs, storage and office" at the existing building A. The general note #10 on those plans calls that all closets within rooms shall receive same finish as adjacent room so, the coat room in the class room will be priced but, I am not sue if other rooms are required to be painted.
Answer: Stair A-1 and Stair A-2 at all floor levels, staff toilet rooms, offices

Question 82: The general finish note #19 on A700s plans calls out "paint condensate floor trench pipe cover and frame in all rooms" but, I don't see them on any plans. Please provide the locations.
Answer: See floor plan A-104. The existing condensate floor trench is denoted as a grey hatch with dashed lines and runs along the floor at the exterior wall. Rooms affected by this note include: Special Ed Room A004, Special Ed Room A003B, Classroom A-003A, Lockers A001C, Kitchen Office A-B-1, and Music Room A-B-2. This trench is also visible using the virtual walkthrough.

Question 83: The general finish note #14 calls "paint all door frames and window frames in addition trim paint PT-1" so, all the window frames are required to be painted in both the existing and new buildings?
Answer: General finish note #14 applies only to the Addition, not the Existing Building. Only interior vision panels (Windows H and J on A-610) shall be painted PT-1.

Question 84: IG-6 in the spec makes no sense. The only place we would use it per the spec is in the lower storefront type F3, and 1-1/4" glass (IG-6 spec) will not fit in a storefront glass pocket. We will plan to use IG-5 at this location per the next sentence. F1 and G1 are the other lower storefronts with doors, and they are called out as IG-5 with no laminate.
Answer: Agreed - delete IG-6 from the specifications and use IG-5 as described for F3, F1, and G1.

Question 85: Structural Drawing S-100 indicates to perform Ground Improvement - Soil Removal and Replacement per Underwood Engineering Soil and Foundation Engineering Report dated January 25, 2019.
Answer: See attached Engineering Soil and Foundation Engineering Report.

ATTACHMENTS:

- Revised Specification Section: Specification 07 8123 Intumescent Fire Protection
- SKA-02: Partial Floor Plan
- Engineering Soil and Foundation Engineering Report

End of Addendum 4

SECTION 07 8123 - INTUMESCENT FIRE PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thin-film intumescent fire protection.

1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018b.

B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2018c.

C. SSPC-PA 2 - Procedure For Determining Conformance To Dry Coating Thickness Requirements; 2015, with Editorial Revision (2018).

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittals procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Performance characteristics and test results.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Installation methods.

C. Certificates: Certify that intumescent fireproofing provided for this project meets or exceeds specified requirements in all respects.

D. Test Reports: Published fire resistive designs for structural elements of the types required for the project, indicating hourly ratings of each assembly.

E. Field Quality Control Submittals: Submit field test report.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company that specializes in manufacturing the type of products specified, with minimum of five years of experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer’s original, unopened containers with identification labels and testing agency markings intact and legible.

B. Store products in manufacturer's unopened packaging until ready for installation.
1. Store at temperatures not less than 50 degrees F in dry, protected area.
2. Protect from freezing, and do not store in direct sunlight.
3. Dispose of any materials that have come into contact with contaminants of any kind prior to application.

C. Dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

A. Protect areas of application from windblown dust and rain.

B. Maintain ambient field conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under ambient conditions outside manufacturer's absolute limits.
   1. Provide temporary enclosures as required to control ambient conditions.
   2. Do not apply intumescent fireproofing when ambient temperatures are below 50 degrees F without specific approval from manufacturer.
   3. Maintain relative humidity between 40 and 60 percent in areas of application.
   4. Maintain ventilation in enclosed spaces during application and for not less than 72 hours afterward.

PART 2 PRODUCTS

2.01 SYSTEM REQUIREMENTS

A. Fireproofing: Provide intumescent thin-film fire protection systems tested by an independent testing agency in accordance with ASTM E119 and acceptable to authorities having jurisdiction (AHJ).
   1. Provide assemblies listed by UL or FM and bearing listing agency label or mark.

2.02 MATERIALS

A. Fire Resistive Coating System: Thin-film intumescent fire protection system for structural steel.
   1. Surface Burning Characteristics: Tested in accordance with ASTM E84.
      a. Flame Spread Index (FSI): 25, maximum.
      b. Smoke Developed Index (SDI): 50, maximum.
   2. For Interior Use:
      a. Use only products without fiber content.

B. Sealers and Primer: As required by tested and listed assemblies, and recommended by fireproofing manufacturer to suit specific substrate conditions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates to determine if they are in satisfactory condition to receive intumescent fire protection; verify that substrates are clean and free of oil, grease, incompatible primers, or other foreign substances capable of impairing bond to fireproofing system.

B. Do not begin installation until substrates have been properly prepared.

C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Thoroughly clean surfaces to receive fireproofing.

B. Repair substrates to remove surface imperfections that could effect uniformity of texture and thickness of fireproofing system, and remove minor projections and fill voids that could telegraph through finished work.

C. Cover or otherwise protect other work that might be damaged by fallout or overspray of fireproofing system, and provide temporary enclosures as necessary to confine operations and maintain required ambient field conditions.

3.03 APPLICATION

A. Comply with manufacturer's instructions for each particular intumescent fire protection system installation application as indicated.

B. Apply manufacturer’s recommended primer to required coating thickness.

C. Apply fireproofing to full thickness over entire area of each substrate to be protected.

D. Apply coats at manufacturer’s recommended rate to achieve dry film thickness (DFT) as required for fire resistance ratings designated for each condition.

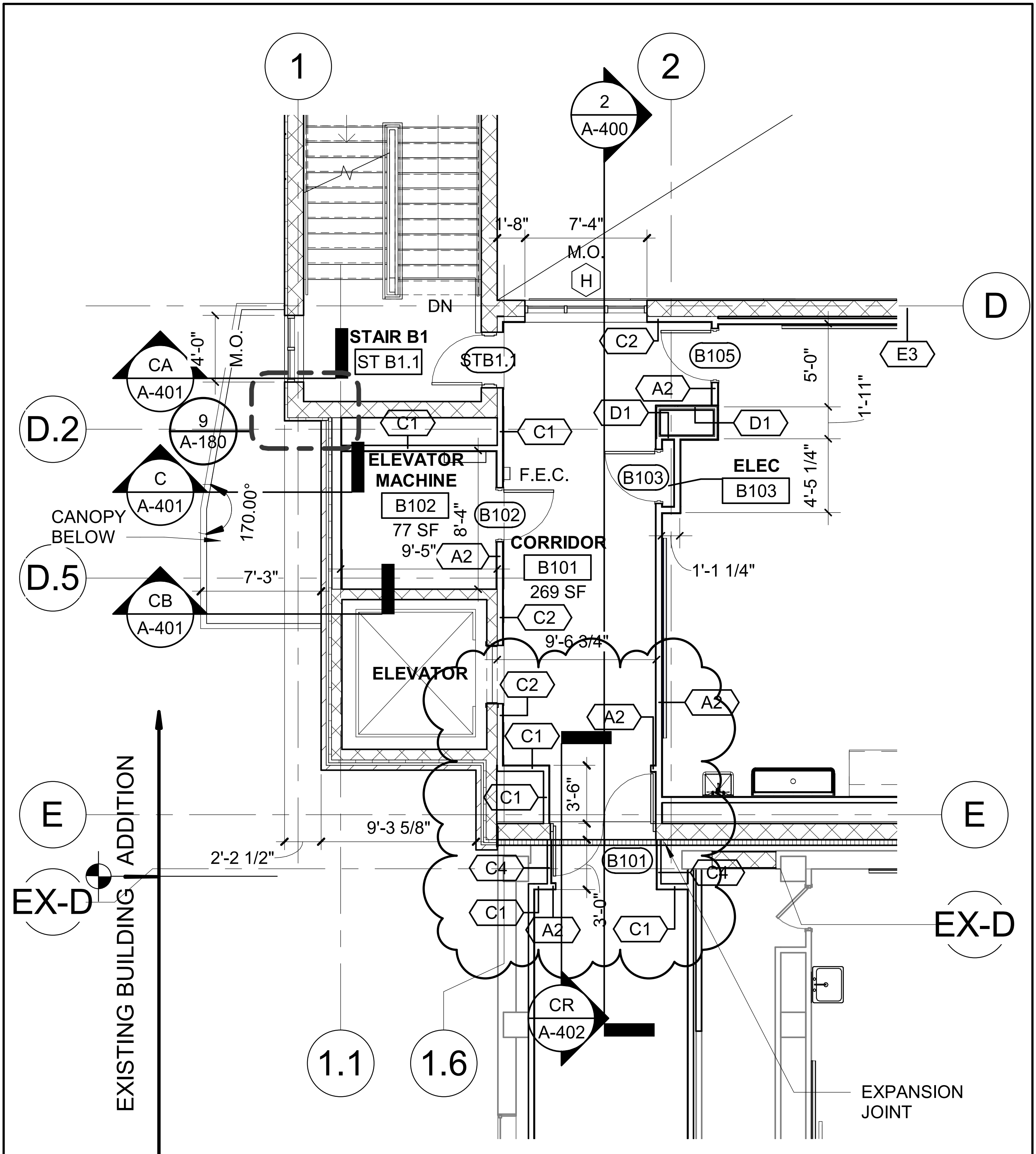
E. Apply intumescent fire protection by spraying to maximum extent possible, and as necessary complete coverage by roller application or other method acceptable to manufacturer.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000 - Quality Requirements.
   1. Arrange for testing of installed intumescent fire protection by an independent testing laboratory using magnetic pull-off dry film thickness gage in accordance with SSPC-PA 2, and ensure it meets requirements of authorities having jurisdiction (AHJ).
   2. Submit field test reports promptly to Contractor and Architect.

B. Repair or replace intumescent fire protection at locations where test results indicate fireproofing does not meet specified requirements.

END OF SECTION



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USA Architects

1550 Latimer Street, 3rd. Fl.
Philadelphia, PA18042
t 215.904.4597
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PROJECT TYPE

AT/FOR

MAJOR RENOVATION AND ADDITION

FOR/THE

ETHAN ALLEN ELEMENTARY SCHOOL

3001 ROBBINS STREET
PHILADELPHIA, PENNSYLVANIA 19149

Drawing Title: PARTIAL 1ST FLOOR PLAN	
Drawing No.: SKA-02	
Reference RFI:	Reference Drawing: A-105, A-109
USA Project No.: 2018-080	
Drawn By: MW	Checked By: RH
Date: 06/22/20	Page: 1 of 1

SOIL AND FOUNDATION ENGINEERING REPORT

PROPOSED ADDITION TO
ETHAN ALLEN ELEMENTARY SCHOOL
6329 BATTERSBY STREET
CITY OF PHILADELPHIA, PENNSYLVANIA

FOR

USA ARCHITECTS
100 West Oxford Street
Philadelphia, PA 19122

January 25, 2019
UNDERWOOD ENGINEERING COMPANY
U.E. Reference No: 4500-20009-1 (WO # 19-0777)

UNDERWOOD ENGINEERING COMPANY

SOIL & FOUNDATION ENGINEERING

143 Harding Ave. Bellmawr, NJ 08031

William R. Underwood, PE - President **Phone (856) 933-1818 Fax (856) 933-3121**

1/25/2019

USA Architects
100 West Oxford Street
Philadelphia, PA 19122

RE: Soil and Foundation Engineering Report
Proposed Addition to Ethan Allen Elementary School
6329 Battersby Street
City of Philadelphia, Pennsylvania

U.E. Reference No: 4500-20009-1 (WO # 19-0777)

Sir / Madame:

Underwood Engineering Company has been retained by USA Architects to perform a soil investigation, analysis and to make recommendations for the most suitable foundation system for the above referenced project. Presented herewith is the required information.

We appreciate the opportunity of working with you on this project. If we may be of further assistance, please do not hesitate to contact our office.

Respectfully submitted,
Underwood Engineering Company

William R. Underwood, P.E.
President

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I SITE DESCRIPTION

A. Location

The proposed addition site is located on the south side of the existing Ethan Allen Elementary School. The existing school is located at 6329 Battersby Street in the City of Philadelphia, Pennsylvania.

B. Surface Conditions

The proposed building addition is located along the south side of the existing four (4) story masonry elementary school building and is occupied by an existing asphalt covered school yard. In general, the proposed building addition area is flat with existing ground surface elevations ranging from approximate elevations 92.00 to 90.00.

C. General Site Geology

Philadelphia is situated in two physiographic provinces, the Atlantic Coastal Plain and the Piedmont Upland section. The bedrock positioned beneath the alluvium for this site is related to the Wissahickon formation. The Wissahickon formation is described as a pelitic schist and gneiss with interlayers of quartzite and is very micaceous. In general, the formation is highly weathered to moderate depths with a thin overlying mantle.

D. Project Plans

A site schematic plan (C102) showing the existing building location, proposed building addition location and stormwater areas was prepared by USA Architects dated 10/1/2018 last updated 1/11/2019 Entitled "Major Renovation and Addition, Schematic Site Plan. Ethan Allen Elementary School, 6239 Battersby Street Philadelphia, Pennsylvania".

Architectural Plans (Sheets S-100B, A-100, A103, A-106, A-109 & A-305) showing the proposed boring locations and building layout were prepared by USA Architects dated 10/1/2018, Entitled "The School District of Philadelphia, Ethan Allen Elementary School, 6329 Battersby Street, Philadelphia, Pennsylvania, Major Renovation and Addition, Geotechnical Investigation RFO October 18, 2018".

Proposal for Geotechnical Services document describing the project and providing structural loading data, prepared by USA Architects & Planners dated 10/18/2018.

II PROJECT DESCRIPTION

A. Type of Structure

The project is to consist of the proposed construction of a four (4) story addition onto the existing school and a "L" shaped 5,600 square foot underground stormwater management basin located in the asphalt paved school yard. The proposed addition measures approximately 117 feet long by 93 feet wide by 51 feet high. The ground floor of the addition will consist of a gymnasium / locker rooms with the upper floors consisting of class rooms. Framework for the proposed addition is anticipated to be structural steel, reinforced concrete and masonry, concrete slab on grade construction.

B. Structural Load Data:

Anticipated loading conditions for the proposed structures are as follows:

Typical Interior Column Loads: 180 Kips

Typical Exterior Column Loads: 200 Kips

Maximum Interior Column Load: 220 Kips, 40 Kips Lateral

Maximum Exterior Column Loads: 240 Kips, 40 Kips Lateral

C. Finished Floor Elevations

Based on site grading information provided, the proposed addition site will require cuts and fills of approximately one (1) to two (2) feet to achieve design finished floor elevations.

The proposed ground floor elevations are as follows: 91.97 to 89.95

III FIELD INVESTIGATION & SUBSURFACE CONDITIONS

A. Field Investigation

1) Field Infiltration Testing

The field investigation consisted of two (2) soil borings performed in the area of the proposed underground stormwater management areas. The soil borings were advanced to depths of approximately fourteen (14) feet below the existing ground surface elevations with standard penetration resistance per ASTM D-1586 on January 18, 2019. A total of four (4) cased bore hole infiltration tests were performed per ASTM D-6391. The cased bore hole tests were conducted at depths of five (5) and seven (7) feet below the existing ground surface elevations. The findings and locations are shown in Appendices A and B to include the Boring Location Plan and Soil Boring / Infiltration Test Logs.

The site soils encountered in the stormwater management areas consisted generally of the following profile:

Zone 1

Soft and stiff silts with trace to little amounts of clay were encountered in test borings P-1 and P-2 directly below the existing ground surface elevations to depths of approximately four (4) feet below the existing ground surface elevations.

Zone 2

Stiff to very stiff silts and clays were encountered in test borings P-1 and P-2 directly below the Zone 1 soils to depths of approximately six (6) feet below the existing ground surface elevations.

Zone 3

Stiff to very stiff silts with trace amounts of fine to coarse sands and trace to little amounts of fine to medium gravels were encountered in test borings P-1 and P-2 directly below the Zone 2 soils. Test borings P-1 and P-2 were terminated in the stiff to very stiff Zone 3 soils at depths of approximately fourteen (14) feet below the existing ground surface elevations.

See attached Soil Boring Logs (Appendix B) for more detailed soil descriptions and profiles.

The table below illustrates the field infiltration rates at the areas tested.

Test Boring Location	Depth of Test Below Existing Ground Surface Elevation	Soil Classification at Test Location	Infiltration Rate (in./hr.)
P-1	5 ft.	Clayey Silt	0.125
P-1	7 ft.	Sandy Silt	1.0
P-2	5 ft.	Clayey Silt	0.125
P-2	7 ft.	Sandy Silt	1.5

2) <u>Borings</u>

The field investigation consisted of six (6) soil borings advanced to depths of approximately twenty-six (26) feet, twenty-seven (27) feet, twenty-nine (29) feet and thirty-nine (39) feet below the existing ground surface elevations with standard penetration resistance per ASTM D-1586 on January 18, 2019. The findings and locations are shown in

Appendices A and B to include the Boring Location Plan and Soil Boring Logs.

The site soils encountered consisted generally of the following profile:

Zone 1

Soft, medium stiff, stiff and very stiff silts with trace to little amounts of clays and trace to little amounts of gravels and medium stiff to stiff silty clays were encountered in test borings TB-1 through TB-6 directly below the existing ground surface elevations to depths of approximately six (6) to eight (8) feet below the existing ground surface elevations. Based on Standard Penetration Test data recorded during the drilling operations test borings TB-1 through TB-6 are considered soft to depths of approximately two (2) to four (4) feet below the existing ground surface elevations.

Zone 2

Medium stiff, stiff to very stiff micaceous silts with trace / little / some / and fine sands and some / and amounts of weathered schist fragments and medium dense fine sands and silts were encountered in test borings TB-1, TB-2, TB-3, TB-4 and TB-5 directly below the Zone 1 soils to depths of approximately thirteen (13), eighteen (18), twenty-three (23) and thirty-eight (38) feet below the existing ground surface elevations.

Zone 3

Medium dense and dense fine to coarse sands with little / some amounts of silt / clay and little / some / and amounts of weathered schist were encountered in test borings TB-1 through TB-6 directly below the Zone 1 and Zone 2 soils. Test boring TB-5 was terminated in the dense Zone 3 materials due to auger refusal at a depth of approximately twenty-six (26) feet below the existing ground surface elevations. Test borings TB-1 and TB-3 were terminated in the dense Zone 3 soils due to auger refusal at depths of approximately twenty-seven (27) feet below the existing ground surface elevations. Test boring TB-6 was terminated in the dense Zone 3 materials due to auger refusal at a depth of approximately twenty-nine (29) feet below the existing ground surface elevations. Test borings TB-2 and TB-4 were terminated in the dense Zone 3 soils due to spilt spoon refusals at depths of approximately thirty-eight (38) feet ten (10) inches and thirty-nine (39) feet four (4) inches below the existing ground surface elevations.

See attached Soil Boring Logs (Appendix B) for more detailed soil descriptions and profiles.

3) Water Table

The ground water table was not encountered in the test borings at depths below the existing ground surface elevations as evidenced by direct observation and saturation of the soil samples.

It should be noted that the ground water data presented on the individual boring logs may not be representative of daily or seasonal variations in the ground water level.

IV RECOMMENDATIONS

A. Earthwork

1) Existing Soil Conditions

All asphalt paving, any vegetation / topsoil, demolition debris and all deleterious materials are to be removed from the proposed building and paved areas.

2) Construction Dewatering

Based on the test boring data, groundwater should not be encountered during the excavation for foundations / stormwater systems. Should perched water be encountered, the dewatering specifications should be of a type capable of maintaining the water table a minimum of two (2) feet below the prevailing excavation bottom during the excavations as well as during backfill operations. As stated above, groundwater and/or perched water levels encountered during construction may vary from those encountered during soil boring operations due to seasonal variations or other climatic conditions. Should perched water be encountered during foundation excavations and utility trenches, etc., temporary dewatering may be required i.e. installation of sump pits/pumps.

3) Proofrolling & Densification

The exposed subgrade for slabs on grade as well as any paved areas are to be proofrolled and densified with a vibratory compactor in the presence of the soil engineer to detect and repair any unsuitable soil conditions and to attain a uniform firm subgrade throughout. Any loose soils encountered are to be densified by proofrolling and further compaction by additional passes if necessary.

Prior to placement of structural fills, building pad subgrades are to be densified utilizing a 20-ton equivalent vibratory compactor. A minimum of six (6) passes over the building subgrade areas is recommended.

It is anticipated that once the site is stripped of the existing ground cover, that the prevailing subgrade soils will require scarification / aeration to allow the soils to dry to within optimum moisture content ranges so that proper compaction of the soils can be achieved. This will need to be performed only during dry weather conditions. Operation of heavy equipment on the site during wet conditions could result in excessive rutting and mixing of soils.

Over excavation / replacement and or stabilization of these soils may be required if the soils cannot be properly compacted in a suitable time frame.

4) Structural Fill Placement

Bring existing grade up to the desired elevation with a granular type soil that complies with the following specifications or soils which are reviewed and approved by the soil engineer and compact it to within the specifications listed under **Compaction**, unless approved by the Soils Engineer.

SIEVE SIZE	Percent by Weight Passing Square Mesh Sieve
2"	100
3/4"	70-100
#4	30-80
#50	10-35
#200	5-12

It is strongly recommended that bulk samples of material to be used as load bearing structural fill be taken and tested prior to the commencement of work so that moisture / density relationships (compaction) can be determined.

5) On Site Soils

On site silts and clays (Zone 1) are generally not suitable for use as structural fill due to the difficulty of achieving optimum moisture content ranges for compaction and are not suited for reuse during periods of wet weather without the use of moisture reducing agents.

On site (Zone 2 & 3) granular soils mixed with silts and having a maximum particle size of four (4) inches in diameter, as approved by the Soil Engineer, are suitable for use as load-bearing fill but will require strict moisture control due to the presence of fine grain materials (i.e. silt and clays). If the on-site soils are used as structural fill, they must be placed under favorable weather conditions and conditioned (i.e. aerated, moisture reducing applications) such that they are dried to within optimum moisture content ranges. This is extremely important to properly compact the soils as specified herein. If inclement weather is a factor, the onsite soils may be unsuitable, and provisions should be taken to import suitable structural materials and / or the use of moisture reducing applications.

6) Backfilling & Densification of Load-Bearing Fill

Building subgrades may be brought up to desired elevation with approved on-site soils or imported structural fill in lifts no greater than ten (10) to twelve (12) inches loose thickness and compacted to 95% of the material's maximum dry density per ASTM D-1557 as illustrated below. Materials compacted by hand operated equipment shall be placed in lifts no greater than four (4) inches loose thickness.

7) Compaction

All backfill, and fill materials should be compacted to the degree noted in the following table in accordance with ASTM D-1557 latest standard.

Building Area	% Maximum Dry Density (ASTM D-1557)
Supporting Foundations	95%
Supporting Floor Slabs	95%
Pavements	95%
Site (Non Load Bearing)	90%

8) Foundation Compaction

All exposed footing subgrades are to be compacted by two (2) passes with a jumping jack compactor immediately prior to the placement of the footing concrete.

B. Building Foundation

1) Type – Conventional Spread Footings

The proposed addition is to be placed on a spread footing foundation system. Prior to placement of design structural fills, Soils in the area of the proposed structure are to be improved as follows:

a) Ground Improvement - Soil Removal & Replacement

Remove approximately (4) feet of the soft / loose soils beneath the slab-on- grade subgrade foundation areas to a width of five (5) feet beyond the building lines to stable natural ground. Deeper excavations may be required where fill or loose soils are encountered in areas other than those identified during the initial subsurface investigation.

Scarify the exposed subgrade allowing the soils to dry to within optimum moisture content ranges.

Densify the exposed subgrade with a minimum of six (6) passes with a twenty (20) ton equivalent vibratory compactor to 95 % of the material's maximum dry density per ASTM D-1557.

Backfill and densify approved structural fill to 95 % the materials maximum dry density in accordance with recommendations listed under **Compaction. The granular materials may be separated out and re used as structural fill provided they can be dried to within optimum moisture contents ranges for compaction.**

Backfill materials are to be brought up to design subgrade in lifts no greater than ten (10) to twelve (12) inches loose thickness as detailed above.

Important Note: Excavations of soft soils must not extend below the foundations of the adjacent structures. If over excavations extend below the existing foundations, the foundations must be underpinned first to prevent possible damage and or collapse of the existing walls.

2) Elevation

The footings may be placed at any elevation provided the minimum depth criteria is met and the recommendations listed herein are performed.

The footing bottoms for the proposed building addition must bear at the same elevation of the existing structures.

If the new foundations must extend below the existing foundations for design purposes, then the existing foundations must be underpinned first to prevent possible damage and or collapse of the existing walls.

3) Minimum Depth of Foundation

All footing bottoms are to be founded at least three (3) feet beneath or away from atmospherically exposed final soil subgrade.

4) Allowable Bearing Values

The spread footing foundations may be designed for a maximum allowable bearing capacity of 3,000 Pounds per Square Foot provided that the requirements under Earthwork are adhered to strictly.

5) Settlements

Using the allowable bearing value and following the recommendations under Earthwork will keep total and differential settlements negligible.

C. Lateral Earth Pressures

The following values may be used for calculating lateral earth pressures utilizing the on-site silt - clay mixed soils.

Active Earth Pressure Coefficient, $K_A = 0.361$

At Rest Earth Pressure Coefficient, $K_R = 0.531$

Passive Earth Pressure Coefficient, $K_P = 2.77$

Angle of internal friction (phi) = 28.0

Unit Weight of Soil, $\gamma = 120$ lbs. / ft^3

The above values assume a level embankment.

Modulus of Subgrade Reaction = 150.0 psi/in.

D. Seismic Considerations

For Seismic Site Classification, use Site Class **D**[1].

E. Concrete Floor Slabs

Concrete floor slabs may be placed on grade provided they are underlain by a minimum of four (4) inches of porous material and all soft areas are to be removed and repaired as recommended under Earthwork.

F. Paved Areas

1) Subgrade Preparation

After the procedures as outlined under Proofrolling are completed, the subgrade should be compacted to 95% of the material's Maximum

Dry Density (ASTM D-1557). Prior to the installation of the bituminous base course the subgrade is to be proofrolled with a loaded ten-wheel dump truck in the presence of the soils engineer. This is extremely important and will be the primary criteria for subgrade acceptance. Any localized weak areas are to be repaired as required.

2) Design Criteria

In the design of pavements, a maximum CBR value of ten (10) should be used.

3) Stone Base Course

Pavement areas are to be provided with at least a four (4) inch thick crushed stone or coarse gravel base course.

V INSPECTION

It is recommended that all earthwork operations be inspected full time by a qualified representative of the Soil Engineer, especially the proofrolling operations and all footing subgrades immediately prior to placing the footing concrete. Foundation excavation evaluations should be performed to confirm that the design allowable bearing pressure is available. Footing subgrade evaluations should be performed through a combination of visual observation and hand rod probing in conjunction with comparison to the test borings. Concrete placement should be performed immediately after footing subgrade evaluations are made to prevent exposure and potential weakening of foundation subgrades.

[1] Data obtained from International Building Code

VI QUALIFICATIONS

Our recommendations are based on the subsurface conditions as revealed by the test borings, and on the assumptions outlined in the Project Description and Site Description sections of this report.

Our recommendations are also based on the assumption that the provisions for strict field inspection will be followed as outlined.

This report does not reflect any variations, which may be encountered during construction.

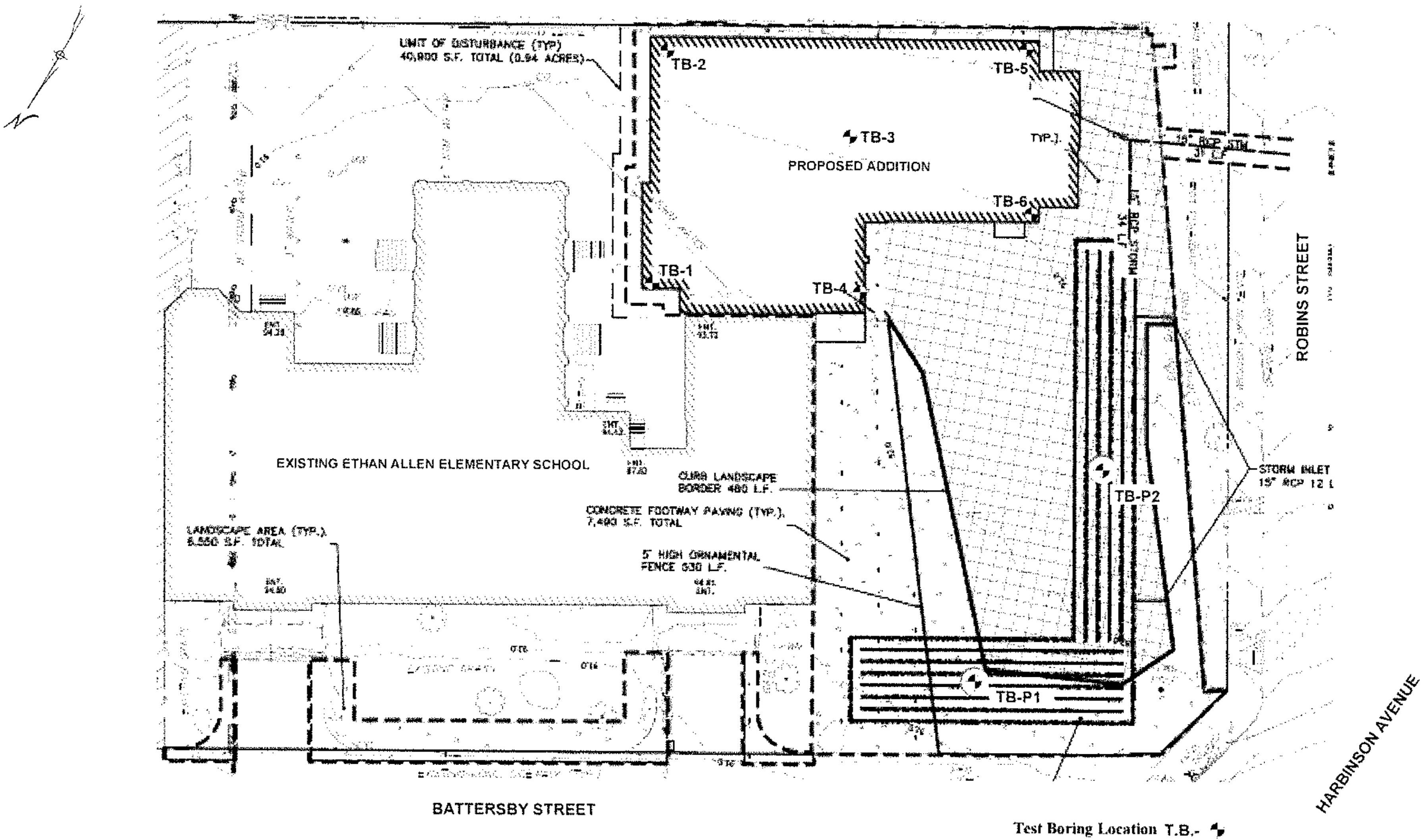
We should be informed immediately of such conditions so that we may modify our conclusions and recommendations, if necessary.

Underwood Engineering Company will not be responsible for variations in subsurface soils encountered in areas other than those tested.

Respectfully submitted,
Underwood Engineering Company

William R. Underwood, P.E.
President

Appendix A
Boring Location Plan



Test Boring Location T.B.-

USA ARCHITECTS	Boring Location Plan			Proposed Addition to Ethan Allen Elementary School 6329 Battersby Street City of Philadelphia, PA
Underwood Engineering Company	Scale: N.T.S.	Date: Jan. 25, 2019	UE Ref. No.: 4500-20009-1	

Appendix B
Boring / Infiltration Logs

CLIENT: USA Architects
PROJECT: Ethan Allen Elementary School
6329 Battersby Street
Philadelphia, Pennsylvania
DATE: 1/18/2019

UNDERWOOD ENGINEERING COMPANY
143 Harding Avenue, Bellmawr, NJ 08031
Ph.# 856.933.1818 Fx.# 856.933.3121
William R. Underwood, P.E., President

BORING No.: P-1

GROUND SURFACE ELEVATION: N/A

GROUNDWATER DATA	
DEPTH	Hours After Completion
DRY	N/A

METHOD OF ADVANCING BORING	DEPTH (FT.)
CONTINUOUS SPLIT SPOON SAMPLE	0' to 14'
AUGERS	
2" O.D. SPLIT SPOON	

Depth (ft)	Groundwater	Sampling Interval	Sample #	Blows	N-Values	Lithology	Soil Description*	Notes:
0							ASPHALT: 6"	
			S-1	3-3-4			SILT: Brown SILT (l) Clay	
			S-2	4-6-9-11			SILT: Light Brown SILT (l) Clay	
5			S-3	9-8-9-11			SILT: Red SILT (a) Clay	
			S-4	6-7-8-9			SILT: Red SILT (l) f. Gravel	
			S-5	6-8-10-11			SILT: Reddish Brown SILT (l) m.f. Gravel (tr) c.f. Sand	
10			S-6	9-8-11-11			SILT: Red SILT (s) c.f. Sand (l) m.f. Gravel	
			S-7	6-6-9-15			SILT: Brown SILT (l) f. Sand	

*FIELD CLASSIFICATION ONLY. SOIL CLASSIFICATION FOR PARTICULAR USES SHOULD BE ASCERTAINED BY LABORATORY TESTS.

N - STANDARD PENETRATION RESISTANCE PER 12" (140 lb. HAMMER, 30" DROP)

CLIENT: USA Architects

PROJECT: Ethan Allen Elementary School

6329 Battersby Street

Philadelphia, Pennsylvania

DATE: 1/18/2019

BORING No.: P-2

UNDERWOOD ENGINEERING COMPANY

143 Harding Avenue, Bellmawr, NJ 08031

Ph.# 856.933.1818 Fx.# 856.933.3121

William R. Underwood, P.E., President

GROUND SURFACE ELEVATION: N/A

GROUNDWATER DATA	
DEPTH	Hours After Completion
DRY	N/A

METHOD OF ADVANCING BORING	DEPTH (FT.)
CONTINUOUS SPLIT SPOON SAMPLE	0' to 14'
AUGERS	
2" O.D. SPLIT SPOON	

Depth (ft)	Groundwater	Sampling Interval	Sample #	Blows	N-Values	Lithology	Soil Description*	Notes:
0							ASPHALT: 4"	
							STONE: 3"	
			S-1	4-3-4			SILT: Brown SILT (tr) Clay	
			S-2	5-7-9-8			SILT: Reddish Yellow SILT (tr) Clay	
5			S-3	7-7-8-9			SILT: Red SILT (a) Clay	
			S-4	8-10-11-12			SILT: Red SILT (l) m.f. Gravel (tr) f. Sand	
			S-5	6-7-7-7				
10			S-6	7-8-9-11			SILT: Dark Reddish Brown SILT (l) c.f. Sand (l) m.f. Gravel	
			S-7	8-8-9-10				

*FIELD CLASSIFICATION ONLY. SOIL CLASSIFICATION FOR PARTICULAR USES SHOULD BE ASCERTAINED BY LABORATORY TESTS.

N - STANDARD PENETRATION RESISTANCE PER 12" (140 lb. HAMMER, 30" DROP)

CLIENT: USA Architects
PROJECT: Ethan Allen Elementary School
6329 Battersby Street
Philadelphia, Pennsylvania
DATE: 1/18/2019

BORING No.: TB-1

UNDERWOOD ENGINEERING COMPANY
143 Harding Avenue, Bellmawr, NJ 08031
Ph.# 856.933.1818 Fx.# 856.933.3121
William R. Underwood, P.E., President

GROUND SURFACE ELEVATION: N/A

GROUNDWATER DATA	
DEPTH	Hours After Completion
DRY	N/A

METHOD OF ADVANCING BORING	DEPTH (FT.)
CONTINUOUS SPLIT SPOON SAMPLE	0' to 10'
AUGERS	10' to 23'
2" O.D. SPLIT SPOON	23' to 25'

Depth (ft)	Groundwater	Sampling Interval	Sample #	Blows	N-Values	Lithology	Soil Description*	Notes:
0–2		0–2	S-1	2-2-3			ASPHALT: 6" SILT: Grayish Brown SILT (tr) Clay	
2–4		2–4	S-2	2-3-3-4			SILT: Brownish Gray SILT (tr) Clay	
4–6		4–6	S-3	3-3-3-4			SILT: Yellowish Brown SILT (l) Clay	
6–8		6–8	S-4	4-5-5-8			SILT: Red SILT (l) f. Gravel (tr) Clay	
8–10		8–10	S-5	8-9-11-13				
13–15		13–15	S-6	6-7-12-13			SILT: Yellow and Brown Micaceous SILT (s) Schist Fragments	
18–20		18–20	S-7	8-9-9-10				
23–25		23–25	S-8	15-50/5"			SAND: Brown m.f. SAND (s) Schist Fragments (l) Silt	Auger Refusal @

*FIELD CLASSIFICATION ONLY. SOIL CLASSIFICATION FOR PARTICULAR USES SHOULD BE ASCERTAINED BY LABORATORY TESTS.

N - STANDARD PENETRATION RESISTANCE PER 12" (140 lb. HAMMER, 30" DROP)

CLIENT: USA Architects

PROJECT: Ethan Allen Elementary School
6329 Battersby Street
Philadelphia, Pennsylvania

DATE: 1/18/2019

BORING No.: TB-2

UNDERWOOD ENGINEERING COMPANY
143 Harding Avenue, Bellmawr, NJ 08031
Ph.# 856.933.1818 Fx.# 856.933.3121
William R. Underwood, P.E., President

GROUND SURFACE ELEVATION: N/A

GROUNDWATER DATA	
DEPTH	Hours After Completion
DRY	N/A

METHOD OF ADVANCING BORING	DEPTH (FT.)
CONTINUOUS SPLIT SPOON SAMPLE	0' to 10'
AUGERS	10' to 38'
2" O.D. SPLIT SPOON	38' to 40'

Depth (ft)	Groundwater	Sampling Interval	Sample #	Blows	N-Values	Lithology	Soil Description*	Notes:
0							ASPHALT: 6"	
			S-1	1-2-2				
			S-2	2-3-3-3			SILT: Brownish Gray SILT (tr) Clay	
5			S-3	10-11-7-8			SILTY CLAY: Brownish Gray SILTY CLAY	
			S-4	7-8-9-10			SILT: Brownish Gray SILT	
10			S-5	6-18-7-10			SILT: Reddish Yellow SILT (tr) Clay	
15			S-6	6-5-8-9			SAND: Reddish Brown f. SAND (l) Silt (l) m.f. Gravel	
20			S-7	6-8-11-12			SILT: Yellow and Brown Micaceous SILT (a) f. Sand	
25			S-8	17-17-13-16			SAND: Yellow and Brown Micaceous c.f. SAND (s) Schist Fragments	
30			S-9	17-21-22-21			SCHIST: Gray and Yellow Micaceous c.f. SAND (s) Schist Fragments (l) Clay, Decomposed Schist	
35			S-10	23-38-41-50/ 3"				
40			S-11	33-50/4"				

*FIELD CLASSIFICATION ONLY. SOIL CLASSIFICATION FOR PARTICULAR USES SHOULD BE ASCERTAINED BY LABORATORY TESTS.

N - STANDARD PENETRATION RESISTANCE PER 12" (140 lb. HAMMER, 30" DROP)

CLIENT: USA Architects

PROJECT: Ethan Allen Elementary School
6329 Battersby Street
Philadelphia, Pennsylvania

DATE: 1/18/2019

BORING No.: TB-3

UNDERWOOD ENGINEERING COMPANY

143 Harding Avenue, Bellmawr, NJ 08031

Ph.# 856.933.1818 Fx.# 856.933.3121

William R. Underwood, P.E., President

GROUND SURFACE ELEVATION: N/A

GROUNDWATER DATA	
DEPTH	Hours After Completion
DRY	N/A

METHOD OF ADVANCING BORING	DEPTH (FT.)
CONTINUOUS SPLIT SPOON SAMPLE	0' to 10'
AUGERS	10' to 23'
2" O.D. SPLIT SPOON	23' to 25'

Depth (ft)	Groundwater	Sampling Interval	Sample #	Blows	N-Values	Lithology	Soil Description*	Notes:
0							ASPHALT: 6"	
			S-1	3-3-2			SILTY CLAY: Brown SILTY CLAY	
			S-2	2-1-3-4			SILTY CLAY: Brown SILTY CLAY (l) Stone	
5			S-3	3-3-3-4				
			S-4	3-4-4-6			SILT: Reddish Brown SILT (l) Clay	
			S-5	4-8-8-8			SILT: Dark Reddish Brown Micaceous SILT (tr) Clay	
10								
			S-6	5-11-11-15			SILT: Reddish Yellow Micaceous SILT (tr) f. Sand	
15								
			S-7	6-11-13-17			SAND: Dark Reddish Brown Micaceous m.f. SAND (l) Schist Fragments	
20								
25			S-8	20-33-50/5"				Auger Refusal @

*FIELD CLASSIFICATION ONLY. SOIL CLASSIFICATION FOR PARTICULAR USES SHOULD BE ASCERTAINED BY LABORATORY TESTS.

N - STANDARD PENETRATION RESISTANCE PER 12" (140 lb. HAMMER, 30" DROP)

CLIENT: USA Architects

PROJECT: Ethan Allen Elementary School
6329 Battersby Street
Philadelphia, Pennsylvania

DATE: 1/18/2019

BORING No.: TB-4

UNDERWOOD ENGINEERING COMPANY

143 Harding Avenue, Bellmawr, NJ 08031

Ph.# 856.933.1818 Fx.# 856.933.3121

William R. Underwood, P.E., President

GROUND SURFACE ELEVATION: N/A

GROUNDWATER DATA	
DEPTH	Hours After Completion
DRY	N/A

METHOD OF ADVANCING BORING	DEPTH (FT.)
CONTINUOUS SPLIT SPOON SAMPLE	0' to 10'
AUGERS	10' to 38'
2" O.D. SPLIT SPOON	38' to 40'

Depth (ft)	Groundwater	Sampling Interval	Sample #	Blows	N-Values	Lithology	Soil Description*	Notes:
0			S-1	3-5-3			ASPHALT: 6"	
			S-2	3-4-8-7			SILT: Reddish Brown SILT (tr) Clay	
5			S-3	4-5-5-5			SILTY CLAY: Brown SILTY CLAY	
			S-4	4-5-5-6			SILTY CLAY: Reddish Brown SILTY CLAY	
10			S-5	4-5-5-6			SILT: Reddish Brown Micaceous SILT - Highly Decomposed Schist	
15			S-6	4-5-5-6				
20			S-7	2-3-4-5				
25			S-8	2-2-3-5				
30			S-9	2-4-5-8			SILT: Brownish Gray Micaceous SILT - Highly Decomposed Schist	
35			S-10	3-6-7-11				
40			S-11	19-27-50/4"				

*FIELD CLASSIFICATION ONLY. SOIL CLASSIFICATION FOR PARTICULAR USES SHOULD BE ASCERTAINED BY LABORATORY TESTS.

N - STANDARD PENETRATION RESISTANCE PER 12" (140 lb. HAMMER, 30" DROP)

CLIENT: USA Architects

PROJECT: Ethan Allen Elementary School
6329 Battersby Street
Philadelphia, Pennsylvania

DATE: 1/18/2019

BORING No.: TB-5

UNDERWOOD ENGINEERING COMPANY
143 Harding Avenue, Bellmawr, NJ 08031
Ph.# 856.933.1818 Fx.# 856.933.3121
William R. Underwood, P.E., President

GROUND SURFACE ELEVATION: N/A

GROUNDWATER DATA	
DEPTH	Hours After Completion
DRY	N/A

METHOD OF ADVANCING BORING	DEPTH (FT.)
CONTINUOUS SPLIT SPOON SAMPLE	0' to 10'
AUGERS	10' to 23'
2" O.D. SPLIT SPOON	23' to 25'

Depth (ft)	Groundwater	Sampling Interval	Sample #	Blows	N-Values	Lithology	Soil Description*	Notes:
0 – 0.5		0 – 2	S-1	2-3-5			ASPHALT: 6"	
0.5 – 2							SILT: Brownish Gray SILT (tr) Clay	
2 – 4		2 – 4	S-2	6-6-7-5			SILTY CLAY: Grayish Brown SILTY CLAY	
4 – 6		4 – 6	S-3	8-7-7-5			SILTY CLAY: Reddish Brown SILTY CLAY (tr) c.f. Sand (tr) m.f. Gravel	
6 – 13		6 – 8	S-4	8-10-12-13			SAND: Reddish Brown f. SAND (a) Silt	
		8 – 10	S-5	12-10-15-14				
13 – 23		13 – 15	S-6	8-8-9-10			SAND: Gray Micaceous f. SAND (s) Silt	
		18 – 20	S-7	23-50/3"				
23 – 25		23 – 25	S-8	50/1"			No Recovery	Auger Refusal @

*FIELD CLASSIFICATION ONLY. SOIL CLASSIFICATION FOR PARTICULAR USES SHOULD BE ASCERTAINED BY LABORATORY TESTS.

N - STANDARD PENETRATION RESISTANCE PER 12" (140 lb. HAMMER, 30" DROP)

CLIENT: USA Architects

PROJECT: Ethan Allen Elementary School

6329 Battersby Street

Philadelphia, Pennsylvania

DATE: 1/18/2019

BORING No.: TB-6

UNDERWOOD ENGINEERING COMPANY

143 Harding Avenue, Bellmawr, NJ 08031

Ph.# 856.933.1818 Fx.# 856.933.3121

William R. Underwood, P.E., President

GROUND SURFACE ELEVATION: N/A

GROUNDWATER DATA	
DEPTH	Hours After Completion
DRY	N/A

METHOD OF ADVANCING BORING	DEPTH (FT.)
CONTINUOUS SPLIT SPOON SAMPLE	0' to 10'
AUGERS	10' to 28'
2" O.D. SPLIT SPOON	28' to 30'

Depth (ft)	Groundwater	Sampling Interval	Sample #	Blows	N-Values	Lithology	Soil Description*	Notes:
0							ASPHALT: 6"	
			S-1	1-1-2			SILTY CLAY: **Brownish Gray SILTY CLAY**	
			S-2	3-5-5-5			SILTY CLAY: Reddish Yellow SILTY CLAY	
5			S-3	5-6-7-7				
			S-4	5-7-20-10			Silty Clay: Reddish Yellow SILTY CLAY (tr) f. Gravel	
10			S-5	18-20-30-35			SAND: Olive Brown m.f. SAND (l) Silt (tr) m.f. Gravel	
							SCHIST: Light Brownish Gray Weathered SCHIST	
15			S-6	12-15-50/2"			SAND: Grayish Brown f. Micaceous SAND	
20			S-7	50/2"			SAND: Grayish Brown f. SAND (l) Schist Fragments	
25			S-8	31-50/3"				
30			S-9	50/0"			No Recovery	Auger Refusal @ 29'

*FIELD CLASSIFICATION ONLY. SOIL CLASSIFICATION FOR PARTICULAR USES SHOULD BE ASCERTAINED BY LABORATORY TESTS.

N - STANDARD PENETRATION RESISTANCE PER 12" (140 lb. HAMMER, 30" DROP)

PWD Stormwater Plan Review Infiltration Testing Log

Version 1 *7/1/2015*

Project Name: Ethan Allen School **Date:** 1/18/2019
Project Address: 6329 Battersby Street, Phila PA **Weather:** overcast
Testing Company: Underwood Engineering **Tester's Name:** Ted Crook
Phone Number: **Email Address:**

Test Number: **Test Pit/Boring Hole Number:** P-1 A **Test Method:** Cased Borehole Test
Test Depth (feet): 5ft **Surface Elevation (feet):** **Instrument Diameter (inches):**

Soil Characterization

Depth (feet):	Soil Texture:	Limiting Layers Type and Depth (feet):
0 - 0.5	asphalt and stone	
0.5 - 6	Clayey Silt	
6 -- 14	Sandy Silt	

Presoak

Time:	Time Interval:	Measurement, (feet):	Drop in water level, (feet):
9:30	0	-	-
10:00	30	-	0.0625
10:30	30	-	0.0625

Infiltration Testing

Time:	Time Interval (10 or 30 minutes):	Measurement, (feet):	Drop in water level, (feet):	Infiltration rate (inches per hour):	Remarks:
10:30	0	-	-	-	
11:00	30		0.0625	0.125	
11:30	30		0.0625	0.125	
12:00	30		0.0625	0.125	
12:30	30		0.0625	0.125	

Stabilized Infiltration Testing Rate (inches per hour): 0.125

PWD Stormwater Plan Review Infiltration Testing Log

Version 1 *7/1/2015*

Project Name: Ethan Allen School
Date: 1/18/2019
Project Address: 6329 Battersby Street, Phila PA
Weather: overcast
Testing Company: Underwood Engineering
Tester's Name: Ted Crook
Phone Number:
Email Address:

Test Number:
Test Pit/Boring Hole Number: P-1 B
Test Method: Cased Borehole Test
Test Depth (feet): 7ft
Surface Elevation (feet):
Instrument Diameter (inches):

Soil Characterization

Depth (feet):	Soil Texture:	Limiting Layers Type and Depth (feet):
0 - 0.5	asphalt and stone	
0.5 - 6	Clayey Silt	
6 -- 14	Sandy Silt	

Presoak

Time:	Time Interval:	Measurement, (feet):	Drop in water level, (feet):
9:32	0	-	-
10:02	30	-	1.5
10:32	30	-	0.5

Infiltration Testing

Time:	Time Interval (10 or 30 minutes):	Measurement, (feet):	Drop in water level, (feet):	Infiltration rate (inches per hour):	Remarks:
10:32	0	-	-	-	
11:02	30		0.5	1.0	
11:32	30		0.5	1.0	
12:02	30		0.5	1.0	
12:32	30		0.5	1.0	

Stabilized Infiltration Testing Rate (inches per hour): 1.0

PWD Stormwater Plan Review Infiltration Testing Log

Version 1 *7/1/2015*

Project Name: Ethan Allen School **Date:** 1/18/2019
Project Address: 6329 Battersby Street, Phila PA **Weather:** overcast
Testing Company: Underwood Engineering **Tester's Name:** Ted Crook
Phone Number: **Email Address:**

Test Number: **Test Pit/Boring Hole Number:** P-2 A **Test Method:** Cased Borehole Test
Test Depth (feet): 5ft **Surface Elevation (feet):** **Instrument Diameter (inches):**

Soil Characterization

Depth (feet):	Soil Texture:	Limiting Layers Type and Depth (feet):
0 - 0.6	asphalt and stone	
0.6 - 6	Clayey Silt	
6 -- 14	Sandy Silt	

Presoak

Time:	Time Interval:	Measurement, (feet):	Drop in water level, (feet):
9:50	0	-	-
10:20	30	-	0.0625
10:50	30	-	0.0625

Infiltration Testing

Time:	Time Interval (10 or 30 minutes):	Measurement, (feet):	Drop in water level, (feet):	Infiltration rate (inches per hour):	Remarks:
10:50	0	-	-	-	
11:20	30		0.0625	0.125	
11:50	30		0.0625	0.125	
12:20	30		0.0625	0.125	
12:50	30		0.0625	0.125	

Stabilized Infiltration Testing Rate (inches per hour): 0.125

PWD Stormwater Plan Review Infiltration Testing Log

Version 1 *7/1/2015*

Project Name: Ethan Allen School **Date:** 1/18/2019
Project Address: 6329 Battersby Street, Phila PA **Weather:** overcast
Testing Company: Underwood Engineering **Tester's Name:** Ted Crook
Phone Number: **Email Address:**

Test Number: **Test Pit/Boring Hole Number:** P-2 B **Test Method:** Cased Borehole Test
Test Depth (feet): 7ft **Surface Elevation (feet):** **Instrument Diameter (inches):**

Soil Characterization

Depth (feet):	Soil Texture:	Limiting Layers Type and Depth (feet):
0 - 0.6	asphalt and stone	
0.6 - 6	Clayey Silt	
6 -- 14	Sandy Silt	

Presoak

Time:	Time Interval:	Measurement, (feet):	Drop in water level, (feet):
9:51	0	-	-
10:21	30	-	1.25
10:51	30	-	0.75

Infiltration Testing

Time:	Time Interval (10 or 30 minutes):	Measurement, (feet):	Drop in water level, (feet):	Infiltration rate (inches per hour):	Remarks:
10:51	0	-	-	-	
11:21	30		0.75	1.5	
11:51	30		0.75	1.5	
12:21	30		0.75	1.5	
12:51	30		0.75	1.5	

Stabilized Infiltration Testing Rate (inches per hour): 1.5

Appendix C
Mechanical Sieve (Gradation) Analysis Results

Underwood Engineering, Inc.
143 Harding Avenue
Bellmawr, NJ 08031
856-933-1818 Phone
856-933-3121 Fax

Material Test Report

Report No: MAT:19-0934-S01

Issue No: 1

Client: USA Architects **CC:**

Project: Ethan Allen School
6329 Battersby St., Philadelphia, PA

AASHTO ACCREDITED

Submitted By: Bill Underwood
Date of Issue: 1/30/2019

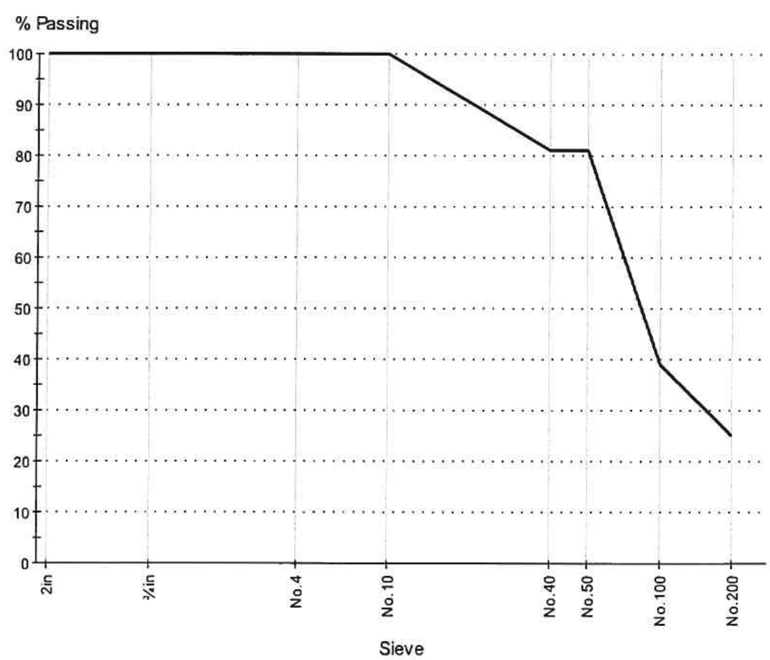
Sample Details

Sample ID	19-0934-S01
Date Sampled	1/25/2019
Material	NJ DOT I-5
Specification	I-5 plus No. 100 Sieve
Location	P1 12' to 14'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	13.3	
Method		B	
Tested By		Yahira Perez	
Date Tested		1/25/2019	

Particle Size Distribution



Method: ASTM C 136, ASTM C 117
Drying by: Oven
Date Tested: 1/25/2019
Tested By: Yahira Perez

Sieve Size	% Passing	Limits
2in	100	
¾in	100	
No.4	100	
No.10	100	
No.40	81	
No.50	81	
No.100	39	
No.200	25	

Comments

Brown m.f. SAND (s) Silt & Clay

Underwood Engineering, Inc.
143 Harding Avenue
Bellmawr, NJ 08031
856-933-1818 Phone
856-933-3121 Fax

Material Test Report

Report No: MAT:19-0934-S02

Issue No: 1

Client: USA Architects

CC:

Project: Ethan Allen School
6329 Battersby St., Philadelphia, PA

AASHTO ACCREDITED

Submitted By: Bill Underwood
Date of Issue: 1/30/2019

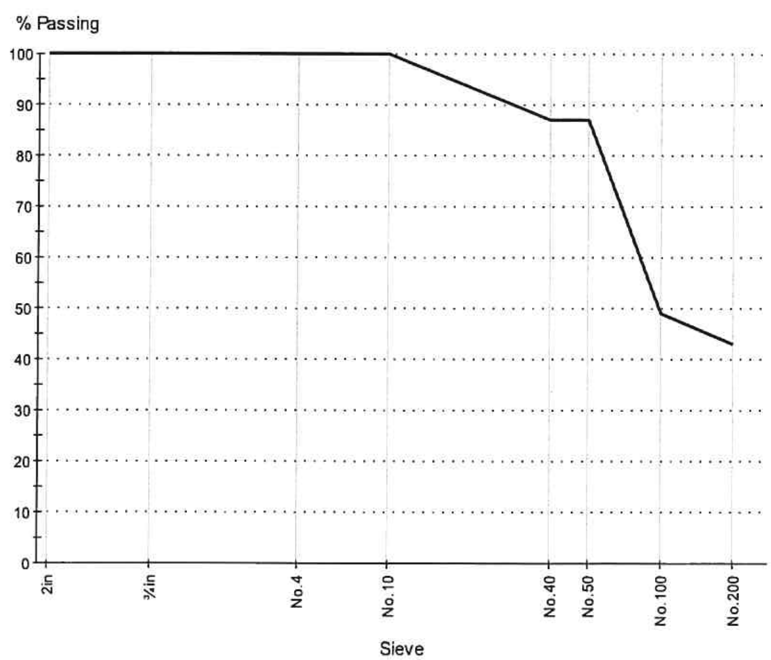
Sample Details

Sample ID	19-0934-S02
Date Sampled	1/25/2019
Material	NJ DOT I-5
Specification	I-5 plus No. 100 Sieve
Location	P2 4' to 6'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	23.3	
Method		B	
Tested By		Yahira Perez	
Date Tested		1/25/2019	

Particle Size Distribution



Method: ASTM C 136, ASTM C 117

Drying by: Oven
Date Tested: 1/25/2019
Tested By: Yahira Perez

Sieve Size	% Passing	Limits
2in	100	
¾in	100	
No.4	100	
No.10	100	
No.40	87	
No.50	87	
No.100	49	
No.200	43	

Comments

Red/Brown m.f. SAND (a) Silt & Clay

Underwood Engineering, Inc.
143 Harding Avenue
Bellmawr, NJ 08031
856-933-1818 Phone
856-933-3121 Fax

Material Test Report

Report No: MAT:19-0934-S03
Issue No: 1

Client: USA Architects **CC:**

Project: Ethan Allen School
6329 Battersby St., Philadelphia, PA

AASHTO ACCREDITED

Submitted By: Bill Underwood
Date of Issue: 1/30/2019

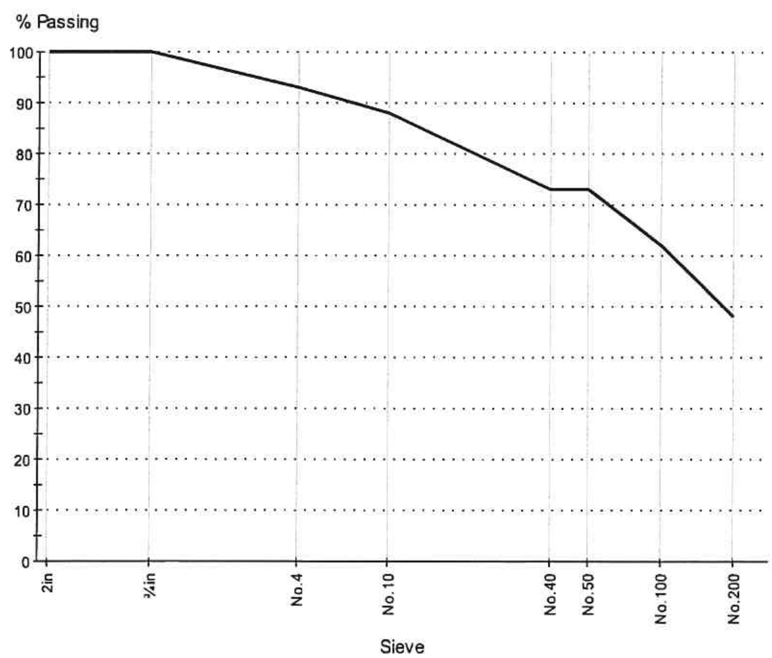
Sample Details

Sample ID	19-0934-S03
Date Sampled	1/25/2019
Material	NJ DOT I-5
Specification	I-5 plus No. 100 Sieve
Location	P1 6' to 8'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	16.0	
Method		B	
Tested By		Yahira Perez	
Date Tested		1/25/2019	

Particle Size Distribution



Method: ASTM C 136, ASTM C 117
Drying by: Oven
Date Tested: 1/25/2019
Tested By: Yahira Perez

Sieve Size	% Passing	Limits
2in	100	
¾in	100	
No.4	93	
No.10	88	
No.40	73	
No.50	73	
No.100	62	
No.200	48	

Comments

Red c.f. SAND (a) Silt & Clay (l) f. Gravel

Underwood Engineering, Inc.
143 Harding Avenue
Bellmawr, NJ 08031
856-933-1818 Phone
856-933-3121 Fax

Material Test Report

Report No: MAT:19-0935-S01
Issue No: 1

Client: USA Architects **CC:**

Project: Ethan Allen School
6329 Battersby St., Philadelphia, PA

AASHTO ACCREDITED

Submitted By: Bill Underwood
Date of Issue: 1/30/2019

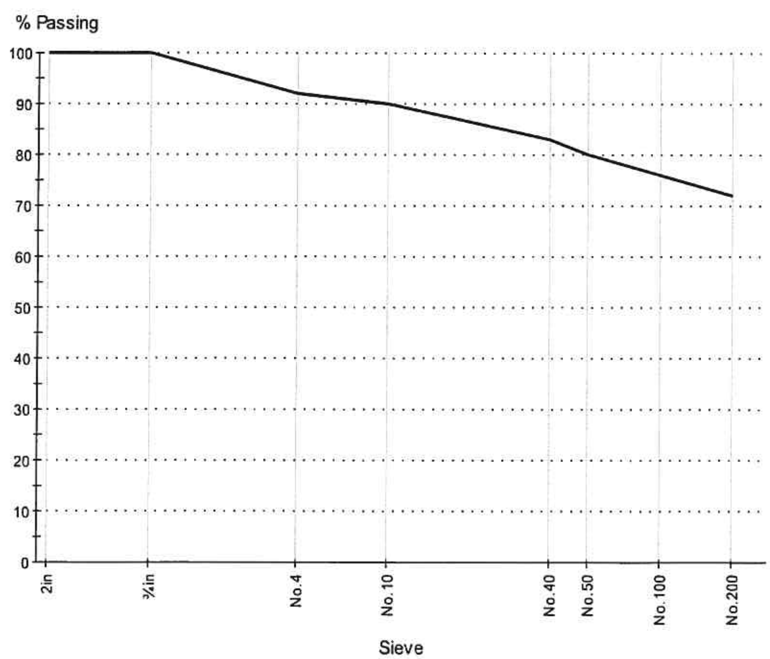
Sample Details

Sample ID	19-0935-S01
Date Sampled	1/25/2019
Source	Onsite
Material	NJ DOT I-5
Specification	I-5 plus No. 100 Sieve
Location	B1 2' to 4'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	20.4	
Method		B	
Tested By		Yahira Perez	
Date Tested		1/25/2019	

Particle Size Distribution



Method: ASTM C 136, ASTM C 117
Drying by: Oven
Date Tested: 1/25/2019
Tested By: Yahira Perez

Sieve Size	% Passing	Limits
2in	100	
¾in	100	
No.4	92	
No.10	90	
No.40	83	
No.50	80	
No.100	76	
No.200	72	

Comments

Brownish Gray SILT & CLAY (l) c.f. Sand (tr) f. Gravel

Underwood Engineering, Inc.
143 Harding Avenue
Bellmawr, NJ 08031
856-933-1818 Phone
856-933-3121 Fax

Material Test Report

Report No: MAT:19-0935-S02
Issue No: 1

Client: USA Architects **CC:**

Project: Ethan Allen School
6329 Battersby St., Philadelphia, PA

AASHTO ACCREDITED

Submitted By: Bill Underwood
Date of Issue: 1/30/2019

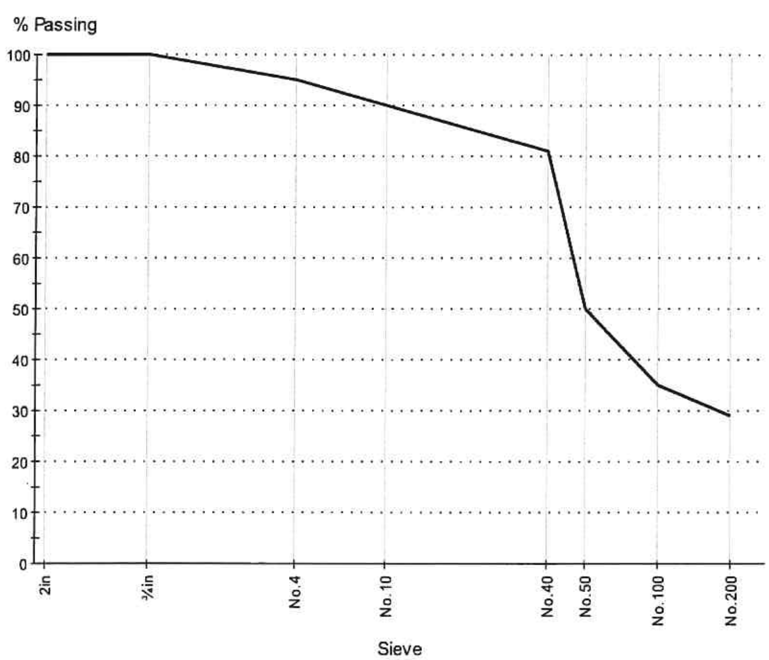
Sample Details

Sample ID	19-0935-S02
Date Sampled	1/25/2019
Source	Onsite
Material	NJ DOT I-5
Specification	I-5 plus No. 100 Sieve
Location	B2 18' to 20'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	16.3	
Method		B	
Tested By		Yahira Perez	
Date Tested		1/25/2019	

Particle Size Distribution



Method: ASTM C 136, ASTM C 117
Drying by: Oven
Date Tested: 1/25/2019
Tested By: Yahira Perez

Sieve Size	% Passing	Limits
2in	100	
¾in	100	
No.4	95	
No.10	90	
No.40	81	
No.50	50	
No.100	35	
No.200	29	

Comments

Brown c.f. SAND (s) Silt & Clay (tr) f. Gravel

Underwood Engineering, Inc.
143 Harding Avenue
Bellmawr, NJ 08031
856-933-1818 Phone
856-933-3121 Fax

Material Test Report

Report No: MAT:19-0935-S03
Issue No: 1

Client: USA Architects **CC:**

Project: Ethan Allen School
6329 Battersby St., Philadelphia, PA

AASHTO ACCREDITED

Submitted By: Bill Underwood
Date of Issue: 1/30/2019

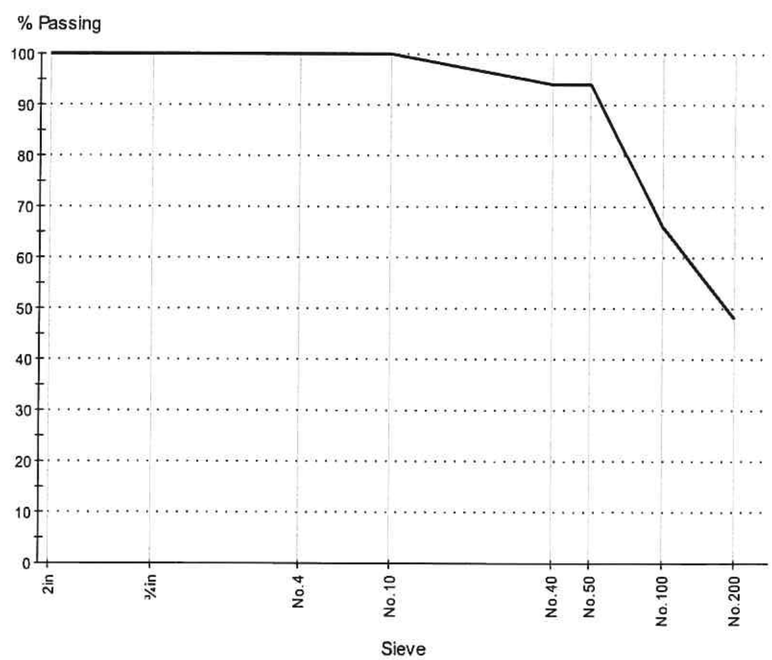
Sample Details

Sample ID	19-0935-S03
Date Sampled	1/25/2019
Source	Onsite
Material	NJ DOT I-5
Specification	I-5 plus No. 100 Sieve
Location	B3 13' to 15'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	30.6	
Method		B	
Tested By		Yahira Perez	
Date Tested		1/25/2019	

Particle Size Distribution



Method: ASTM C 136, ASTM C 117
Drying by: Oven
Date Tested: 1/25/2019
Tested By: Yahira Perez

Sieve Size	% Passing	Limits
2in	100	
¾in	100	
No.4	100	
No.10	100	
No.40	94	
No.50	94	
No.100	66	
No.200	48	

Comments

Reddish Yellow m.f. SAND (a) Silt & Clay

Underwood Engineering, Inc.
143 Harding Avenue
Bellmawr, NJ 08031
856-933-1818 Phone
856-933-3121 Fax

Material Test Report

Report No: MAT:19-0935-S04
Issue No: 1

Client: USA Architects **CC:**

Project: Ethan Allen School
6329 Battersby St., Philadelphia, PA

AASHTO ACCREDITED

Submitted By: Bill Underwood
Date of Issue: 1/30/2019

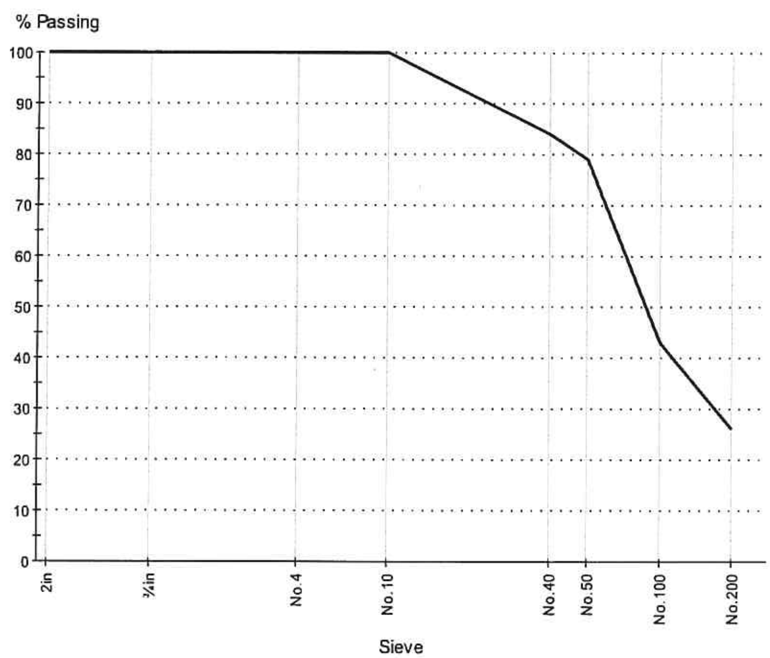
Sample Details

Sample ID	19-0935-S04
Date Sampled	1/25/2019
Source	Onsite
Material	NJ DOT I-5
Specification	I-5 plus No. 100 Sieve
Location	B4 33' to 35'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	30.0	
Method		B	
Tested By		Yahira Perez	
Date Tested		1/25/2019	

Particle Size Distribution



Method: ASTM C 136, ASTM C 117
Drying by: Oven
Date Tested: 1/25/2019
Tested By: Yahira Perez

Sieve Size	% Passing	Limits
2in	100	
¾in	100	
No.4	100	
No.10	100	
No.40	84	
No.50	79	
No.100	43	
No.200	26	

Comments

Brownish Gray m.f. SAND (s) Silt & Clay

Underwood Engineering, Inc.
143 Harding Avenue
Bellmawr, NJ 08031
856-933-1818 Phone
856-933-3121 Fax

Material Test Report

Report No: MAT:19-0935-S05
Issue No: 1

Client: USA Architects **CC:**

Project: Ethan Allen School
6329 Battersby St., Philadelphia, PA

AASHTO ACCREDITED

Submitted By: Bill Underwood
Date of Issue: 1/30/2019

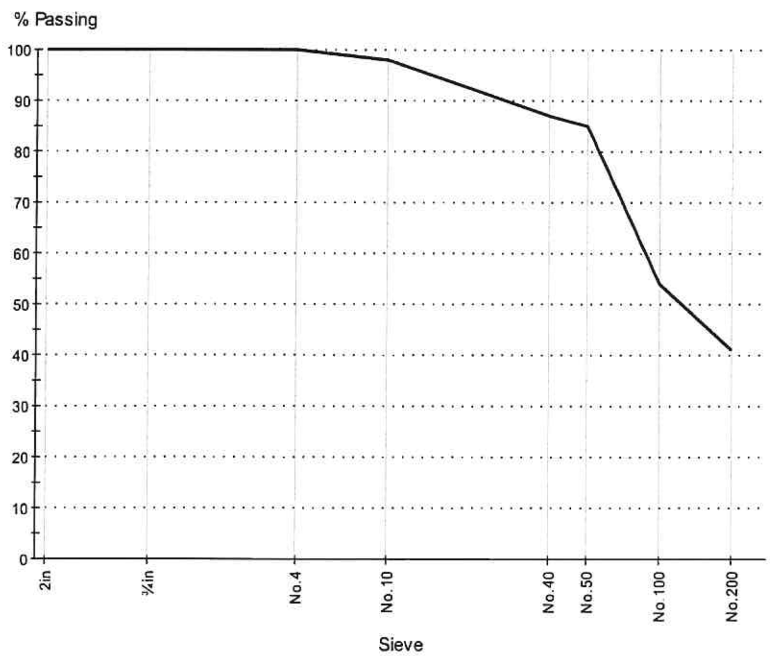
Sample Details

Sample ID	19-0935-S05
Date Sampled	1/25/2019
Source	Onsite
Material	NJ DOT I-5
Specification	I-5 plus No. 100 Sieve
Location	B5 6' to 8'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	30.7	
Method		B	
Tested By		Yahira Perez	
Date Tested		1/25/2019	

Particle Size Distribution



Method: ASTM C 136, ASTM C 117
Drying by: Oven
Date Tested: 1/25/2019
Tested By: Yahira Perez

Sieve Size	% Passing	Limits
2in	100	
¾in	100	
No.4	100	
No.10	98	
No.40	87	
No.50	85	
No.100	54	
No.200	41	

Comments

Reddish Brown c.f. SAND (a) Silt & Clay (tr) f. Gravel

Appendix D
General Soil Terms

General Soil Terms

Particle Sizes

Boulders	Greater than 2 inches (305mm)
Cobbles	3 inches (76.233) to 12 inches (305mm)
Gravel-coarse	3/4 inches (19.05mm) to 3 inches (76.2mm)
Gravel-fine	No. 4- 3/16 inches (4 75mm) to 3/4 inches (19.05mm)
Sand-coarse	No. 10 (2.00mm) to No. 4 (4 75mm)
Sand-medium	No. 40 (0.425mm) to No. 10 (2.00.)
Sand-fine	No. 200 (0.075mm) to No. 40 (0.425mm)
Silt	0.005mm to 0.074mm
Clay	Less than 0.005mm

Classifications

The major soil constituent is the principal noun, i.e. clay, silt, sand, gravel. The second major soil constituent and other minor constituents are reported as follows:

Second Major Constituent-Minor Constituents
(Percentage by weight)

Trace – 1 to 12%	Trace – 1 to 12%
Adjective – 12 to 35% (clayey, silty, etc.)	Little – 12 to 23
	Some – 23 to 33%
	And – Over 35%

Cohesive Soils

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with other major soil constituent as modifier: i.e. silty clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils: i.e. silty clay, trace of sand, little gravel

Consistency	Unconfined Compressive Strength (psi)	Approximate Range of (N)
Very Soft	Below 500	0-2
Soft	500-1000	3-4
Medium	1000-2000	5-8
Stiff	2000-4000	9-15
Very Stiff	4000-8000	16-30
Hard	8000-16000	31-50
Very Hard	Over 16000	Over 50

Consistency of cohesive soils is bases upon an evaluation of the observed resistance to deformation under load and not upon Standard Penetration Resistance (N)

Cohesionless Soils

Density Classification	Relative Density	Approximate Range of (N)
Very Loose	0-15	0-4
Loose	16-35	5-10
Medium Compact	36-65	11-30
Compact	66-85	31-50
Very Compact	86-100	Over 50

Relative Density of Cohesionless Soils is based upon the evaluation of the Standard Penetration Resistance (N), modified as required for depth effects, sampling effects, etc.

Standard Penetration Test (ASTM D 1586) – A 2.0" outside-diameter split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

Appendix E

Important Information about Your Geotechnical Engineering Report-ASFE

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS, AND PROJECTS

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely to the client. No one except you should rely on your geotechnical engineering report without first conferring with the GEOTECHNICAL engineer who prepared it. And no one-not even you should apply the report for any purpose or project except the one originally contemplated.

A GEOTECHNICAL ENGINEERING REPORT IS BASES ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences: the general nature of the structure involved, its size, and configuration: the location of the structure on the site: and the other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on geotechnical engineering report that was:
*not prepared for you,
*not prepared for your project,
*not prepared for the specific site explored, or
*completed before important project changes were made

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:
*the function of the proposed structure, as when its changed from a parking garage to an office
building, or from a light industrial plant to a refrigerated warehouse
*elevation, configuration, location, orientation, or weight off the proposed structure,
*composition of the design team, or
*project ownership

As general rule, always inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is bases on conditions that existed at the time the study was performed. Do not rely on a geotechnical engineering report whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods earthquakes, or groundwater fluctuations. Always contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINIONS

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render and opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over rely on the construction recommendations included in your report. Those recommendations are not final, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual conditions revealed during construction. The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

DO NOT REDRAW THE ENGINEERR'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

GIVE CONTRACTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer.

A prebid conference can also be valuable. Be sure contractors have sufficient time to perform additional studies. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and contractors do no recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations", many of these provisions indicate where geotechnical engineers responsibilities begin and end, to help others recognize their own responsibilities and risks. Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.

GEOENVIRONMENTAL CONCERNS ARE NOT CONVERED

The equipment, techniques and personnel used to perform a geoenvironmental study differ significantly from those used to perform a geotechnical study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated environmental problems have led to numerous project failures. If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. Do not rely on an environmental report prepared for someone else.