City of Bristol
Firehouse 3 Building
Committee

INFORMATION TO ACCESS
THIS MEETING

The regular Fire Station 3 Building Committee meeting will be held on Wednesday, April 24, 2024, at 6:00pm. in Meeting Room 1-4, 111 North Main Street Bristol, CT 06010

AGENDA

1. Call to Order
2. Public Participation
3. Approval of Minutes
    a. March 27, 2024 Meeting Minutes
4. Architect Update
    a. Revised Geotechnical Engineering Report
5. Old Business
    a. Encroachment Update
6. New Business
7. Adjournment

PER ORDER OF THE CHAIRPERSON

Fire House 3 Building Committee Regular Meeting
March 27, 2024

A Regular Meeting of the Board of Fire Commissioners was held on Wednesday, March 27, 2024 at 6:00 p.m., in Meeting Room 1-4 of City Hall, 111 N Main Street Bristol, CT

Present: Chairman Sean Moore, Committee Member Raymond Rogozinski, Committee Member David Maikowski, Fire Captain Craig Henderson, Fire Chief Hart, and Architect Christopher Nardi.
Present Via Zoom: Council Member Sebastian Panioto

Absent: Purchasing Agent Roger Rousseau, Committee Member John Lodovico

1. **CALL TO ORDER**
    a. The meeting was called to order by Chairman Moore at 6:00 p.m.

2. **PUBLIC PARTICIPATION**
    a. None.

3. **APPROVAL OF THE MEETING MINUTES**
    a. On motion of Chief Hart and seconded by Committee Member Rogozinski it was unanimously voted: To approve the February 28, 2024 Meeting Minutes. Following a voice vote in which there was no opposition, the Chairperson declared the motion carried.

4. **ARCHITECT UPDATE**
    a. Architect Christopher Nardi presented the board with updated plans and design renderings. A brief recap of Friday's special meeting was given. Discussion followed regarding the project timeline. The zoning application is being submitted on April 8th and design development should be completed mid-April. The discussion also included looking further into the cost savings on using heavy duty asphalt instead of concrete, the costs to have a hydrant and water storage tank on site, and the costs if space allows to add in an additional shower in the toilet only bathroom. HVAC systems were discussed and Committee member Rogozinski will interact with Downs on overseeing this.

5. **OLD BUSINESS**
    a. The encroachment on the property was discussed. Committee Member Rogozinski spoke with Corp Council and it was stated they would not be granting easement and need to remove the asphalted area. On motion of Committee

Member Rogozinski and seconded by Committee Member Maikowski the committee will direct the Public Works director to work with Corp Council to remove the asphalt that is encroaching on the property. Following a voice vote in which there was no opposition, the Chairperson declared the motion carried.

6. NEW BUSINESS

a. None.

7. ADJOURN

a. On motion of Committee Member Maikowski and seconded by Committee Member Chief Hart, was unanimously voted: To adjourn at 6:19 p.m.

Recording Secretary: Sara Bianchi

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

GEOTECHNICAL ENGINEERING REPORT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

Prepared for:

Silver Petrucelli & Associates
3190 Whitney Avenue
Hamden, Connecticut 06320

Prepared by:

Down To Earth Consulting, LLC
27 Siemon Company Drive #363W
Watertown, Connecticut 06795

File No. 0276-009.00
April 2024

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

January 11, 2024 (rev. April 16, 2024)
File No. 0276-009.00

Mr. Christopher Nardi
Silver Petrucelli & Associates
3190 Whitney Avenue
Hamden, Connecticut 06320

Via email: cnardi@silverpetrucelli.com

Re: Geotechnical Engineering Report
Proposed Fire Station No. 3
Church Avenue
Bristol, Connecticut

Down To Earth Consulting, LLC (DTE) is pleased to submit this revised geotechnical engineering report to Silver Petrucelli & Associates (Client) for the proposed Fire Station No. 3 building located on Church Avenue in Bristol, Connecticut (Site). We appreciate this opportunity to work with you. Please call if you have any questions.

Sincerely,

Down To Earth Consulting, LLC

Thomas J. Orszulak, P.E.
Project Manager

Raymond P. Janeiro, P.E.
Reviewer/Principal

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APPENDICES

1.0 INTRODUCTION

Down To Earth Consulting, LLC completed a subsurface exploration program and geotechnical engineering evaluation for the proposed Fire Station No. 3 building located on Church Avenue in Bristol, Connecticut (Site). Our geotechnical engineering services included: reviewing project plans, observing subsurface explorations, characterizing subsurface conditions within the project limits, performing geotechnical engineering analyses, and providing geotechnical design and construction recommendations for the project. Refer to Figure 1 (in Appendix 1) for the approximate site location.

Our services were performed in accordance with our September 13, 2023, proposal, and our project understanding is based on the drawing entitled, *Proposed Site Plan*, *City of Bristol: Fire Station #3, Church Avenue, Bristol, CT,* prepared by Silver Petrucelli + Associates, dated October 6, 2023. DTE was also provided with an updated drawing in preparation of this revised report entitled, *Grading and Drainage Plan, City of Bristol: Fire Station #3, Church Avenue, Bristol, CT*, prepared by Silver Petrucelli + Associates, revision dated March 7, 2024.

Elevations (El.) stated in this report are in feet and based on the topographic data provided in the referenced drawing. Our recommendations are based on allowable stress design methods and the 2021 International Building Code with 2022 Connecticut Supplements (Building Code).

2.0 BACKGROUND

The approximately 2.5-acre Site is located on Church Avenue and is generally bordered by residential properties to the south, west and north and by Church Avenue to the east. The Site consists of a vacant lot sloping from approximately El. 245 in the southwest portion of the Site to about El. 240 in the southeast portion of the Site. Based on review of historic aerial photos (CT State Library - https://cslib.contentdm.oclc.org/digital/collection/p4005coll10/id/12116), the Site was formerly developed with numerous buildings primarily towards the western Site limits.

The project consists of constructing an approximate 8,000-square-foot fire station building. It is our understanding that the proposed single-story building will have a first-floor elevation of about El. 245 with no basement level (i.e., slab-on-grade construction). Paved parking, access-ways, and utilities are proposed immediately surrounding the proposed building. Foundation and slab loads were not available at the time this report was prepared.

3.0 SUBSURFACE DATA

3.1 GENERAL SITE GEOLOGY

Published surficial and bedrock geological map data (*1:24,000 scale, Geologic Map of the Bristol Quadrangle, Connecticut, Simpson, H., 1961* and *Bedrock Geological Map of the Bristol Quadrangle, Simpson, H.E., 1990*) was reviewed. The surficial material within the Site area is mapped as alluvial deposits (sand and gravel deposits). Glacial Till deposits are also mapped adjacent to the Site. The underlying bedrock is classified as coarse- to fine-grained arkose (New Haven Arkose).

3.2 TEST BORINGS

DTE observed and logged six test borings (identified as B-1 through B-6) within the proposed building area and four infiltration test borings (designated I-1 through I-4) within proposed stormwater management areas. The borings were drilled by SITE, LLC between November 20 and 21, 2023 and March 14, 2023. Test boring locations are depicted on Figure 2 (Appendix 1) and the logs are included in Appendix 2. Borings were located in the field by taping/pacing from existing site features and should be considered approximate. Elevations at the boring locations were scaled from the referenced drawing and should also be considered approximate.

The borings were drilled to explore the soil, bedrock and groundwater conditions in the proposed building and stormwater management areas. Hollow-stem auger drilling methods were used to advance borings to depths of approximately 9 to 23 feet below existing grades (approximate El. 219+/- to 235+/-). Each boring was advanced until encountering natural soil deposits or drilling refusal on inferred bedrock.

Representative soil samples were obtained for soil classification by split barrel sampling procedures in general accordance with ASTM D-1586. The split-spoon sampling procedure utilizes a standard 2-inch O.D. split-barrel sampler that is driven into the bottom of the boring with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampler the middle 12-inches of a normal 24-inch penetration is recorded as the Standard Penetration Resistance Value (N). The blows (i.e., “N-Value”) are indicated on the boring logs at their depth of occurrence and provide an indication of the relative consistency of the material.

Groundwater levels were measured using a weighted tape in open drill holes and/or inferred from wet soil samples during drilling.

3.3 INFILTRATION TESTING

We performed four falling head permeability tests (at I-1 through I-4) to estimate the vertical hydraulic conductivity of the upper site soils. Tests were performed in 4-inch, nominal diameter, PVC pipe at depths of about 2 to 2.5 feet below existing grades. Test locations are depicted on Figure 2 (Appendix 1) and the field logs are included in Appendix 3.

4.0 SUBSURFACE CONDITIONS

4.1 SUBSURFACE PROFILE

Based on the subsurface explorations completed at the Site, the subsurface profile generally consists of Fill overlying natural Sand deposits and Glacial Till deposits. Each boring was terminated upon encountering inferred bedrock. The following is a more detailed description of the subsurface materials encountered at the Site:

4.1.1 Fill

Uncontrolled Fill was encountered at the ground surface of each boring and generally consisted of very loose to medium dense, brown to dark gray, fine to coarse sand with little to some

amounts of silt (10 to 35%) and trace to little amounts of fine to coarse gravel (0 to 20%). Trace amounts of ash, cinders, rubbish and root matter (0 to 10%) were also observed in the Fill. The Fill extended about 2 to 6 feet below existing grades (about El. 242 to 236). The thickness, character, and consistency of the Fill will vary between exploration locations.

4.1.2 Sand

Natural Sand deposits were encountered below the Fill and extended to depths typically ranging between 7 and 20 feet below existing grades. The natural Sand deposits generally consisted of medium dense to dense, brown to red-brown, fine to coarse sand with trace to some amounts of gravel (0 to 35%) and trace to little amounts of silt (0 to 20%). In many instances, the presence of cobbles and possibly boulders were inferred by observed “rig chatter” during drilling and split spoon sampler refusals.

4.1.3 Glacial Till

Glacial Till deposits were observed in many test borings (excluding Borings B-2 and B-6) beneath the natural Sand deposits. This stratum generally consisted of dense to very dense, red-brown to brown, fine to coarse sand with trace to little amounts of silt and fine to coarse gravel (0 to 20%). The Glacial Till deposits were inferred to contain cobbles and possibly boulders based on drilling behavior and sampling refusal.

4.1.4 Bedrock

Bedrock was inferred from split spoon sampler and auger refusals at each boring at about 18 to 23 feet below existing grades. Samples of weathered bedrock were collected within the split spoon sampler at Borings B-1, B-2, B-4 and B-5. In the logs, Weathered Rock refers to bedrock which the auger was able to advance through. Inferred Bedrock indicates auger refusal.

4.2 GROUNDWATER

Groundwater was encountered at about 3 to 6 feet below grade (El. 239+/- to 236+/-) during the exploratory program. Groundwater levels measured in the explorations may not have had sufficient time to stabilize and should be considered approximate. Groundwater levels will vary depending on factors such as temperature, season, precipitation, construction activity, and other conditions, which may be different from those at the time of these measurements.

5.0 GEOTECHNICAL RECOMMENDATIONS

We offer the following geotechnical engineering design recommendations based on the subsurface conditions encountered at the Site, available project information, and the proposed construction.

5.1 FOUNDATIONS

5.1.1 Foundation Type and Bearing Strata

We recommend supporting the proposed building on conventional, shallow spread footings. The footings should bear on undisturbed, natural Sand, or on Structural Fill (hereinafter specified as Compacted Granular Fill (CGF)) over undisturbed, natural Sand. Existing Fill and soils with appreciable organic content (e.g., Topsoil) are not considered suitable bearing materials and must be excavated from the structure areas during site preparation. Actual bottom of unsuitable bearing elevations will vary across the Site and must be verified during construction excavation by a DTE representative.

When CGF is used beneath the footings (e.g., in backfill areas), we recommend that it be placed one foot beyond the edge of the footings and at a one horizontal to one vertical slope away and down from the bottom outside edge of the footings. Crushed Stone can be used in place of CGF as it is easier to achieve compaction requirements.

5.1.2 Footing Levels and Sizes

Exterior footings (and footings in unheated areas) should be constructed at a minimum frost depth of 42-inches below proposed site grades. Interior footings, in heated areas, should be constructed at a minimum depth of 24-inches below proposed top of slab-on-grade level. We recommend a minimum footing width of column and strip footings of 3 feet and 2 feet, respectively.

5.1.3 Allowable Bearing Pressures and Estimated Settlement

We recommend a maximum allowable design bearing pressure of four kips per square foot (4 ksf) for footings bearing on the recommended bearing materials. Based on the recommended bearing strata and anticipated loads, we anticipate that footings will undergo less than 1 inch of total settlement and the maximum differential settlement should not exceed 0.5 inches. Settlements will occur as the loads are applied and are expected to be complete at the end of construction.

DTE should be provided the final foundation loads and geometries once they are available to confirm the above recommended bearing capacity and settlement estimates.

5.1.4 Drainage

We recommend installing an exterior perimeter footing drain at the proposed building. These drains will help prevent infiltrated surface water from building up behind foundation walls and facilitate surface drainage.

Drains should consist of 4-inch diameter perforated PVC pipe, surrounded by 4-inches of Crushed Stone, wrapped in non-woven filter fabric. Footing drain inverts should be set flush with or up to 6-inches above bottom of footing levels. Cleanouts should be installed in the direction of flow at the beginning of piping runs and consist of 45-degree elbows (90-degree

elbows should not be allowed). The drains should be gravity drained to a Site drainage system as recommended by the Client.

5.2 SLABS

We recommend placing concrete floor slabs (not subject to vehicular loading) over a minimum eight-inch-thick base course layer of compacted Sand and Gravel or six-inch layer of compacted Crushed Stone placed on the surface of undisturbed, suitable, natural soils, or on CGF over natural soils.

The base course layer may also be placed on inorganic Site soils that has been improved with surface densification under the observation of a qualified Geotechnical Engineer. This procedure consists of removing all surficial organic and debris materials and compacting the surface with a minimum of four passes with a vibratory drum roller having a minimum dynamic force of 5,000 lbs. per foot of drum width. Areas exhibiting instability shall receive additional compaction and/or be over-excavated and replaced with CGF, as recommended by the Geotechnical Engineer.

Existing Fill improvement will require careful observation by an experienced Geotechnical Engineer. Surface densification will improve loose zones and/or collapse potential of voids in the top 2 to 3 feet of Fill. It will not prevent organics or other deleterious materials from decaying and potentially causing slab settlements. Periodic slab resurfacing and repair may be required if there are slab settlements.

If project stakeholders are not willing to accept some risk associated with potential slab settlement and cracking, the proposed slabs should be constructed over CGF over prepared, natural soil deposits.

The design subgrade modulus for the recommended subgrade and base course is 200 pounds per cubic inch (pci).

5.3 RETAINING WALLS

5.3.1 Backfill and Drainage

We recommend backfilling earth retaining structures with compacted Sand and Gravel and installing footing drains. The drains should consist of 4-inch-diameter perforated PVC pipe, surrounded by 4-inches of Crushed Stone, wrapped in non-woven filter fabric. Footing drain inverts should be set flush with or up to 6-inches above bottom of footing level. The drains should be gravity drained to daylight or to the site drainage system.

5.3.2 Lateral Earth Pressures

Walls that are free to rotate at the top and are not braced should be designed to resist an equivalent active static horizontal fluid earth pressure equal to 35 pcf (based on $\varphi' = 34°$, $c = 0$, $K_a = 0.28$, $\delta = 17°$, and $\gamma = 125$ pcf). Braced retaining walls (e.g., loading docks) should be designed to resist an equivalent at-rest static horizontal fluid earth pressure equal to 56 pcf (based on $\varphi' = 34°$, $c = 0$, $K_o = 0.45$, and $\gamma = 125$ pcf). This assumes no unbalanced hydrostatic

pressures, seismic forces, or surcharges from traffic loads. We recommend using a minimum traffic surcharge load of 250 psf.

Due to the limited expected wall movement and depth of footings, we do not recommend the use of passive earth pressures against the base of walls. Based on an assumed Seismic Design Category "C" (or higher), no seismic design forces need be applied to retaining walls.

5.3.3 Coefficient of Friction

We recommend a maximum coefficient of friction of 0.45 between foundations and the recommending bearing strata.

5.4 PAVEMENT

According to FHWA design criterion (NCHRP 1-37A), soils are considered potentially frost susceptible if more than 3 percent of soil particles are smaller (by weight) than 0.02 millimeters in diameter. FHWA further categorizes the degree of frost susceptibility into four groups, F1 through F4, where F1 soils are less susceptible to frost and F4 soils are the most susceptible. The subgrade soils below the existing pavement generally fall within the F2 to F3 group described as sands containing greater than 3 percent finer than 0.075 mm by weight. Therefore, the existing base materials and subgrade soils would be considered *medium to highly* frost susceptible.

Based on available project information, a 20-year design life, and that subgrades are prepared in accordance with Section 7.1, we recommend the following minimum flexible pavement sections:

ITEM	MINIMUM THICKNESS (in.)	CTDOT SPECIFICATION (FORM 818)
Pavement Wearing Course	1.5	HMA S0.375 Superpave
Pavement Binder Course	1.5 (Standard Duty) 2.5 (Heavy Duty)	HMA S0.5 Superpave
Base Course	6 (Standard Duty) 8 (Heavy Duty)	Processed Aggregate Base (M.05.01)
Subbase Course	6	M.02.02 Subbase (M.02.06, Grading B)

A rigid concrete pavement should be used to provide suitable support in areas of heavy equipment, high traffic, or acute turns (i.e., ingress/egress locations). We recommend the following minimum rigid pavement sections:

ITEM	MINIMUM THICKNESS (in.)	CTDOT SPECIFICATION (FORM 818)
Surface Course	8	4,000 psi Air-Entrained Concrete
Base Course	8	Processed Aggregate Base (M.05.01)
Subbase Course	8	M.02.02 Subbase (M.02.06, Grading B)

Pavement maintenance (e.g., crack sealing) will be required throughout the design life of the pavement, and it should be assumed by project stakeholders that pavement performance will deteriorate over time resulting from frost heave. To mitigate risks associated with frost heave, a minimum pavement section thickness (i.e., combined thickness of asphalt and non-frost susceptible base and subbase) thickness of 42-inches would be required, which would result in significant costs.

5.5 SEISMIC DESIGN

Based on the standard penetration test results, location of the groundwater table, visual soil classification, and design peak ground acceleration at this locale, the site soils are not susceptible to liquefaction.

We recommend using the following design parameters as defined by the Building Code and, where applicable, the 2021 International Building Code (IBC):

- Site Class: C (Section 1613.5 of the IBC)
- MCE spectral response accelerations: S_s = 0.188g and S_1 = 0.054g (Building Code Appendix P)

6.0 MATERIALS RECOMMENDATIONS

6.1 COMPACTED GRANULAR FILL

Compacted Granular Fill (CGF) for use as structural fill shall consist of inorganic soil free of clay, loam, ice and snow, tree stumps, roots, and other organic matter; graded within the following limits:

Sieve Size	Percent finer by weight
4-inches	100%
No. 10	30 - 100
No. 40	10 - 90
No. 200	0 - 15

6.2 SAND AND GRAVEL

Sand and Gravel for use as slab and retaining wall backfill shall consist of hard, durable sand and gravel; free of ice, clay, shale, roots, sod, rubbish, and other organic matter; graded within the following limits:

Sieve Size	Percent finer by weight
2-inches	100%
1/2-inch	50 - 85
No. 4	40 - 75
No. 40	10 - 35
No. 200	0 - 5

6.3 CRUSHED STONE

Crushed Stone for use around drains or below foundations and slabs shall consist of sound, tough, durable, rock that is graded within the following:

Sieve Size	Percent finer by weight
5/8-inches	100%
1/2-inch	85 - 100
3/8 inch	15 - 45
No. 4	0 - 15
No. 8	0 - 5

6.4 COMMON FILL

Common Fill may be used for general site grading, and other areas as appropriate, or as directed by the Geotechnical Engineer or his/her representative. The material should not be used beneath sensitive structures. Common Fill should conform to the following gradation requirements:

Sieve Size	Percent finer by weight
6-inches	100%
No. 200	0 - 25

6.5 MATERIAL PLACEMENT AND COMPACTION

CGF and Sand and Gravel should be placed in loose lifts not exceeding 8 inches in depth and compacted to at least 95 percent of its maximum dry density, and within 2% of optimum moisture content, as determined by ASTM D1557, Method C (Modified Proctor).

Common Fill should also be placed in loose lifts not exceeding 8 inches in depth and compacted to at least 92 percent of its maximum dry density.

Crushed Stone is considered to be "self-compacting" and would negate the need to run laboratory proctor testing and have field density testing of in-place lifts. The Crushed Stone should be plate compacted to "chink up" the working surface in lifts. We recommend placing Crushed Stone in maximum 12-inch lifts and compacting the lifts with a minimum of four passes with a vibratory plate compactor weighing a minimum of 1,000 pounds and with a minimum centrifugal force of 10,000 pounds.

Extra care should be used when compacting adjacent to walls. Hand-operated rollers or plate compactors weighing not more than 250 pounds should be used within a lateral distance of 5 feet of walls. Where walls are buried on both sides, backfill and compaction should proceed on both sides of the wall so that the difference in top of fill on either side of the wall does not exceed 2 feet.

6.6 GEOTEXTILE FABRIC

Geotextile fabric placed around crushed stone pipe bedding or used as a separation fabric for crushed stone and soil material should meet the following criteria:

Property	Criteria	Test Method
Grab Strength	min. 120lbs	ASTM D4632
Static (CBR) Puncture	min. 310lbs	ASTM D6241
Trapezoid Tear	min. 50lbs	ASTM D4533
Apparent Opening Size	No. 70 (max.) U.S. Sieve Size	ASTM D4751

Fabric should be needle-punched non-woven material. Seams should be overlapped a minimum of six inches. During stone placement, the stone drop height should not exceed three feet and equipment traffic should be kept off the fabric until at least 6 to 12 inches of material is placed.

7.0 CONSTRUCTION RECOMMENDATIONS

7.1 SUBGRADE PREPARATION

Excavation to subgrade elevations for shallow foundation and slab construction should be performed using a smooth-edged bucket to minimize possible disturbance to the subgrade. Soil subgrades should be proof-compacted prior to CGF or concrete placement under the observation of a qualified Geotechnical Engineer with at least four (4) passes of a smooth-drum vibratory roller (minimum 8,000 pounds, minimum centrifugal force of 12,500 pounds) or, where approved by the Geotechnical Engineer, a vibratory plate compactor with a minimum of 2,500 pounds of centrifugal force. Any soft or loose zones identified during proof-rolling should be excavated and replaced with CGF, as necessary, and as recommended the Geotechnical Engineer.

Final excavations should not be made until the areas are ready for CGF or concrete placement. The base of footing and slab excavations should be free of water, frost, ice, organic material, and loose soils prior to placing CGF and concrete.

To help protect foundation subgrades in wet weather conditions, consideration should be given to placing either a 4-inch (minimum) Crushed Stone layer or a 2-inch-thick layer of lean concrete over building subgrades.

7.2 TEMPORARY EXCAVATIONS

The site soils are classified as OSHA Class "C" soil and can be cut at a maximum one vertical to one and a half horizontal (1V:1.5H) slope up to a maximum excavation depth of 20 feet. These maximum slope and excavation depths assume no surcharge load (i.e., stockpiles, construction equipment, etc.) at the top of the excavations or groundwater seepage.

If excavations cannot be sloped in accordance with OSHA requirements, a temporary excavation support system will be required. The system should be chosen and installed by the contractor and designed by a Professional Engineer registered in the State of Connecticut.

7.3 TEMPORARY GROUNDWATER CONTROL

We anticipate that the excavations for foundations will be above the groundwater table. Notwithstanding, we expect that temporary groundwater/stormwater control can be accomplished by means of shallow sumps with pumps and grading the excavation to low points. Dewatering should be performed as necessary to allow excavation and observation of the subgrades in the dry and to maintain a stable and dry bottom. In addition, constructing small temporary earth berms and grading to allow drainage away from the excavation is recommended to control surface water runoff. Discharge of accumulated water should be in accordance with all local, State, and Federal regulations.

8.0 REVIEW OF FINAL DESIGN, PLANS, AND SPECIFICATIONS

When project plans are finalized, and specifications are available, they should be provided to DTE for review of conformance with our geotechnical recommendations. If any changes are made to the proposed building location or our assumptions of finished floor elevations, the recommendations provided in this report will need to be verified by DTE for applicability.

9.0 CONSTRUCTION QUALITY CONTROL

We further recommend that DTE be retained during earthwork construction to observe excavation to footing subgrade, subgrade preparation, and fill placement and compaction in accordance with Connecticut Building Code requirements. The geotechnical engineer in the field should observe the work for compliance with the recommendations in this report, identify changes in subsurface conditions from those observed in the explorations should they become apparent, and assist in the development of design changes should subsurface conditions differ from those anticipated prior to the start of construction.

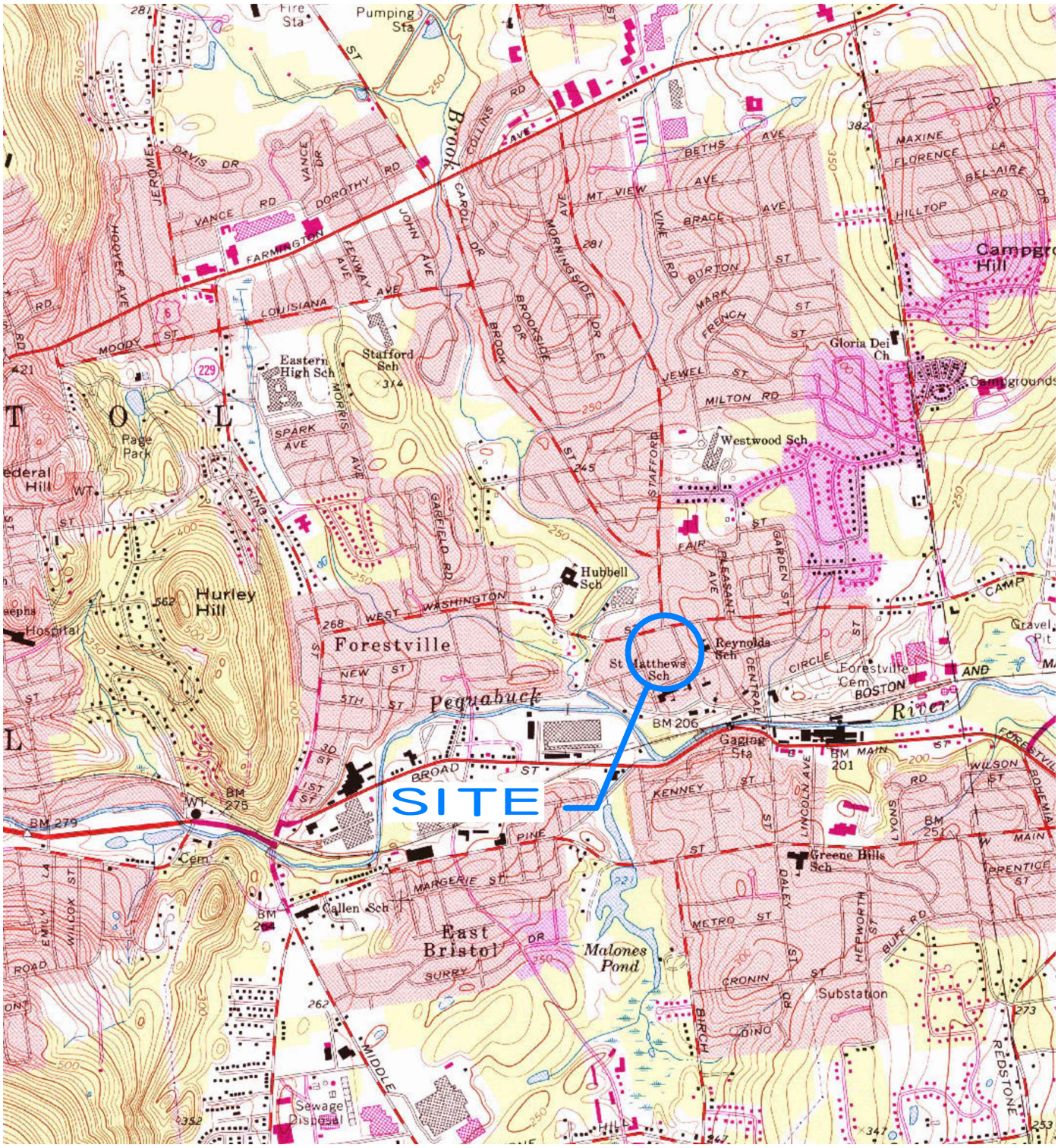
10.0 CLOSURE

We trust the information presented herein is sufficient for your use to progress design of the proposed building. We have enjoyed working with you on this project and look forward to our continued involvement. Please do not hesitate to call us if you have any questions.

This report is subject to the limitations included in Appendix 4.

APPENDIX 1 -

FIGURES



DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

27 SIEMON COMPANY DRIVE #363W
WATERTOWN, CONNECTICUT 06795

QUADRANGLE LOCATION

AREA PLAN
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

REFERENCE:
USGS TOPOGRAPHIC QUADRANGLE: BRISTOL, CT

SCALE 1"= 2,000'

2,000' 1,000' 0 2,000'

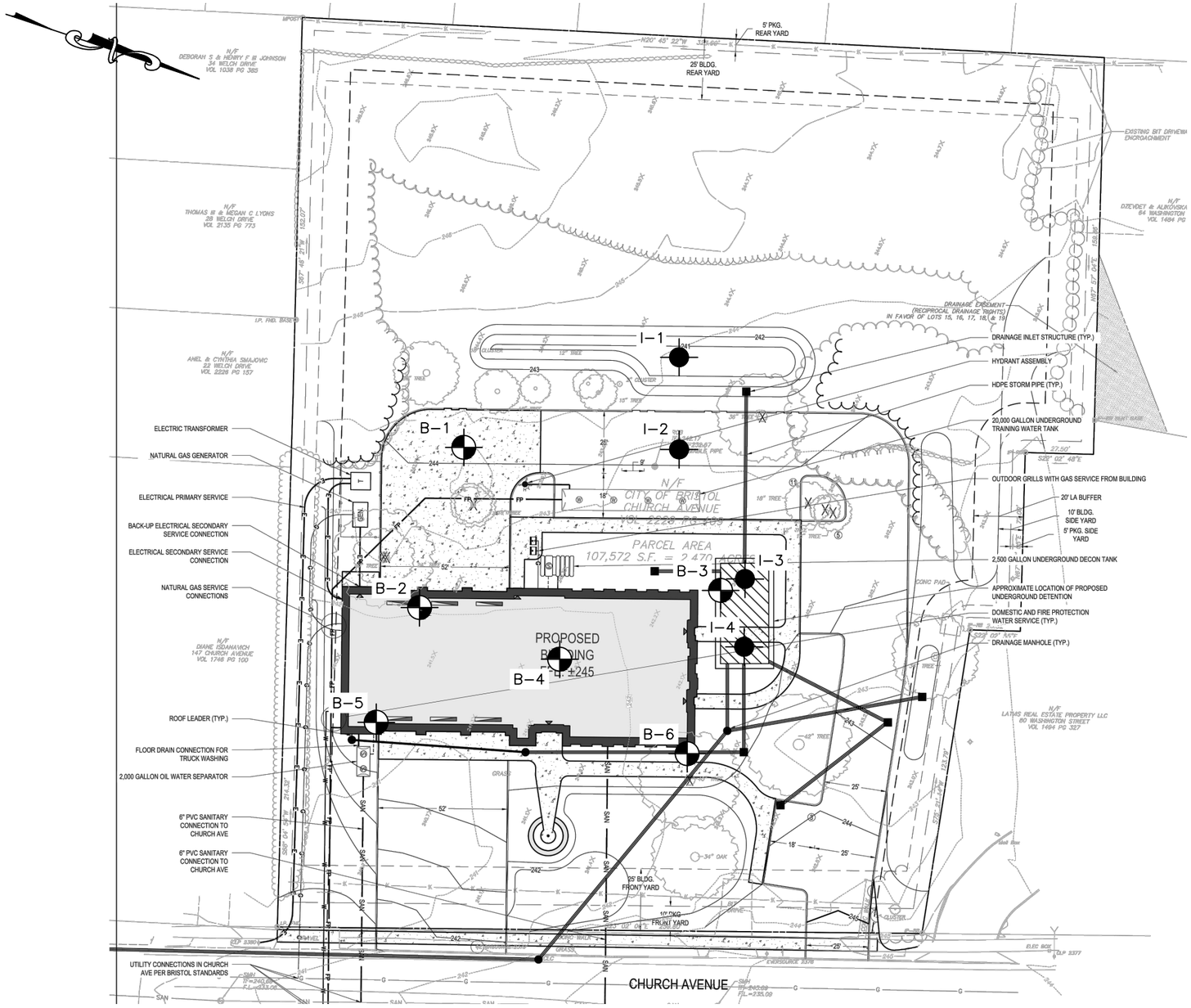
PROJECT NO. 0276-009.00

DATE: 12/15/2023

FIGURE NO. 1

DRAWN BY: TJO

REVIEWED BY: RPJ



LEGEND

B-1 — TEST BORING NO. AND LOCATION BY SILVER PETRUCELLI & ASSOCIATES

I-1 — INFILTRATION TEST BORING NO. AND LOCATION BY ALFRED BENESCH & COMPANY

NOTES:

1) BASE MAP DEVELOPED FROM AN ELECTRONIC FILE PREPARED BY SILVER PETRUCELLI + ASSOCIATES, ENTITLED "GRADING AND DRAINAGE PLAN, CITY OF BRISTOL: FIRE STATION #3", CHURCH AVENUE, BRISTOL, CONNECTICUT, DATED OCTOBER 6, 2023, ORIGINAL SCALE 1":20'.
2) BORINGS WERE COMPLETED BY SITE, LLC AND OBSERVED BY DOWN TO EARTH CONSULTING, LLC.
3) THE LOCATIONS OF THE BORINGS WERE DETERMINED BY TAPING AND VISUAL ESTIMATES FROM EXISTING SITE FEATURES. THIS DESIGN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

DESIGNED BY OTHERS						
DRAWN BY TJO						
CHECKED BY RPJ						
APPROVED BY RPJ	NO.	DATE	REVISIONS	DRWN.	CHKD	APPVD

SCALE 1" = 50'
50 25 0 50

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING
27 SIEMON COMPANY DRIVE #363W
WATERTOWN, CONNECTICUT 06795

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

DWG. TITLE.
SITE AND EXPLORATION LOCATION PLAN

FILE NO. 0276-009.00
SCALE AS NOTED
DATE 4/16/2024
FIGURE NO. 2

APPENDIX 2 -

TEST BORING LOGS

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. B-1
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	244+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	11/20/2023	Date End	11/20/2023

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/20/23	-	10	234+/-	Wet Sample
11/20/23	-	8.7	235.3+/-	End of Drilling

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	18/24	0 to 2	2-5-7-6		Medium dense, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Cinders	6"+/- Topsoil
2								FILL
3		S-2	12/24	2 to 4	9-10-7-7		Medium dense, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt	
4								
5								SAND
6		S-3	24/24	5 to 7	14-19-21-17		Dense, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt	
7								
8		S-4	13/24	7 to 9	14-17-17-17		Dense, brown , fine to coarse SAND, little fine to coarse Gravel, little Silt	
9								
10								
11		S-5	24/24	10 to 12	14-28-34-36		Very dense, red-brown, fine to coarse SAND, little Silt, trace fine Gravel	
12								
13								TILL
14								
15								
16		S-6	12/18	15 to 16.5	10-18-50/6"		Very dense, brown, fine to coarse SAND, little Silt, trace fine Gravel with arkose fragments	
17								WEATHERED ROCK
18								
19							END OF EXPLORATION AT 18 FEET BELOW GROUND SURFACE	INFERRED BEDROCK
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Auger refusal encountered at about 18 feet below grade on inferred bedrock.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. B-2
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	242+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	11/20/2023	Date End	11/20/2023

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/20/23	-	10	232+/-	Wet Sample

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	19/24	0 to 2	2-6-6-5		Medium dense, brown/dark gray, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Cinders, trace Rubbish fragments	3"+/- Topsoil
2								FILL
3		S-2	10/24	2 to 4	4-6-5-8		Medium dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	
4								
5								
6		S-3	20/24	5 to 7	5-19-26-22		Dense, brown, fine to coarse SAND, little Silt, little fine to coarse Gravel	
7								
8		S-4	19/24	7 to 9	19-23-25-30		Dense, red-brown , fine to coarse SAND, little Silt, trace fine to coarse Gravel	
9								
10								
11		S-5	20/24	10 to 12	17-27-35-43		Very dense, red-brown, fine to coarse SAND, little Silt, trace fine Gravel	SAND
12								
13								
14								
15								
16		S-6	9/9	15 to 15.8	25-50/3"		Very dense, red-brown, fine to coarse SAND, little Silt, with arkose fragments	
17								
18								
19								
20								
21		S-7	7/7	20 to 20.6	37-50/1"		Very dense, red-brown, decomposed ARKOSE fragments	WEATHERED ROCK
22								
23							END OF EXPLORATION AT 22 FEET BELOW GROUND SURFACE	INFERRED BEDROCK
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Auger refusal encountered at about 22 feet below grade on inferred bedrock.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. B-3
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	242+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	11/21/2023	Date End	11/21/2023

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/20/23	-	7	235+/-	Wet Sample
11/21/23	-	6	236+/-	18 hours

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	16/24	0 to 2	3-13-8-6		Medium dense, brown/dark gray, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Ash, trace Cinders	4"+/- Topsoil
2								
3		S-2	11/24	2 to 4	4-4-5-5		Loose, brown, fine SAND, some fine to coarse Gravel, little Silt	FILL
4								
5								
6		S-3	20/24	5 to 7	5-16-19-19		Dense, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt	
7								
8		S-4	24/24	7 to 9	25-31-28-25		Very dense, red-brown, fine to coarse SAND, little Silt, trace fine to coarse Gravel	
9								
10								SAND
11		S-5	20/24	10 to 12	9-26-28-27		Very dense, red-brown, Top 6": fine SAND, trace Silt; Bottom 14": fine to coarse SAND, some fine to coarse Gravel, trace Silt	
12								
13								
14								
15								
16		S-6	21/21	15 to 16.8	24-42-51-50/3"		Very dense, red-brown, fine to coarse SAND, little fine to coarse Gravel, little Silt	TILL
17								
18								
19								WEATH. ROCK
20							END OF EXPLORATION AT 19 FEET BELOW GROUND SURFACE	INFERRED BEDROCK
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Cobbles and/or boulders were inferred based on observed auger chatter from about 9 to 13 feet below grade.
4) Auger refusal encountered at about 13 feet below grade on inferred boulder. Boring relocated about 5 feet east and advanced to 10 feet below grade prior to resampling.
5) Auger refusal encountered at 19 feet below grade on inferred bedrock.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. B-4
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	242+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	11/20/2023	Date End	11/20/2023

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/20/23	-	10	232+/-	Wet Sample
11/21/23	-	5.8	236.2+/-	16 hours

DEPTH	Casing Blows (ft)	Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	16/24	0 to 2	1-2-2-2		Very loose, brown/dark gray, fine to coarse SAND, little fine to coarse Gravel, little Silt, trace Ceramic, trace Cinders	4"+/- Topsoil
2								
3		S-2	10/24	2 to 4	2-2-3-5		Loose, brown, fine SAND, some Silt, little fine to coarse Gravel	FILL
4								
5								
6		S-3	17/24	5 to 7	26-13-13-12		Medium dense, dark brown, fine to coarse SAND, little fine to coarse Gravel, little Silt	
7								
8		S-4	24/24	7 to 9	9-15-17-17		Dense, red-brown , fine to coarse SAND, little fine to coarse Gravel, little Silt	
9								
10								SAND
11		S-5	16/16	10 to 11.3	14-17-50/4"		Very dense, red-brown, fine to coarse SAND, little fine to coarse Gravel, little Silt	
12								
13								
14								
15								
16		S-6	10/10	15 to 15.8	29-50/4"		Very dense, brown, fine to coarse SAND, little Silt, trace fine Gravel	
17								TILL
18								
19								
20								WEATHERED ROCK
21		S-7	3/3	20 to 20.3	50/3"		Very dense, red-brown, decomposed ARKOSE fragments	
22							END OF EXPLORATION AT 20.3 FEET BELOW GROUND SURFACE	
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. B-5
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	242+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	11/20/2023	Date End	11/20/2023

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/20/23	-	10	232+/-	Wet Sample

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	19/24	0 to 2	2-7-4-2		Medium dense, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Cinders	FILL
2								
3		S-2	9/24	2 to 4	5-6-6-6		Medium dense, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Roots	SAND
4								
5								
6		S-3	17/24	5 to 7	11-20-24-20		Dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	
7								
8		S-4	24/24	7 to 9	17-26-21-17		Dense, red-brown, Top 8": fine SAND, some Silt; Bottom 16": fine to coarse SAND, little fine to coarse Gravel, little Silt	
9								TILL
10								
11		S-5	20/24	10 to 12	12-16-21-27		Dense, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt	
12								
13								
14								
15								
16		S-6	18/24	15 to 17	14-31-42-30		Very dense, red-brown, fine to coarse SAND, little Silt, trace fine Gravel with arkose fragments	
17								
18								
19								
20								
21		S-7	11/11	20 to 20.9	31-50/5"		Very dense, red-brown, decomposed ARKOSE fragments	WEATHERED ROCK
22								
23								
24							END OF EXPLORATION AT 23 FEET BELOW GROUND SURFACE	INFERRED BEDROCK
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Auger refusal encountered at about 23 feet below grade on inferred bedrock.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. B-6
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	242+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	11/21/2023	Date End	11/21/2023

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/21/23	-	7	235+/-	Wet Sample
11/21/23	-	6.5	235.5+/-	End of Drilling

DEPTH	Casing Blows (ft)	Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	18/24	0 to 2	1-2-2-2		Very loose, brown/dark gray, fine to coarse SAND, little fine to coarse Gravel, little Silt, trace Ash, trace Rubbish fragments	4"+/- Topsoil
2								
3		S-2	8/24	2 to 4	1-1-1-2		Very loose, brown, fine to medium SAND, some Silt, trace Roots	FILL
4								
5								
6		S-3	17/24	5 to 7	7-16-21-19		Dense, brown, fine to coarse SAND, little fine to coarse Gravel, little Silt	
7								
8		S-4	18/24	7 to 9	10-11-12-16		Medium dense, red-brown, fine to coarse SAND, some Silt, little fine to coarse Gravel	
9								
10								
11		S-5	12/15	10 to 11.3	21-26-50/3"		Very dense, red-brown, fine to coarse SAND, little fine to coarse Gravel, little Silt	SAND
12								
13								
14								
15								
16		S-6	10/10	15 to 15.8	21-50/4"		Very dense, brown, fine to coarse SAND, little Silt	
17								
18								WEATH. ROCK
19							END OF EXPLORATION AT 18.3 FEET BELOW GROUND SURFACE	INFERRED BEDROCK
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Auger refusal encountered at about 18.3 feet below grade on inferred bedrock.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. I-1
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	244+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	3/14/2024	Date End	3/14/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
3/14/24	-	7	237+/-	Wet Sample
3/14/24	-	5.3	238.7+/-	15 minutes

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	17/24	0 to 2	1-12-16-6		Medium dense, brown, fine to coarse SAND and fine to coarse fragmented GRAVEL, little Silt	6"+/- Topsoil
2								FILL
3		S-2	24/24	2 to 4	11-28-46-42		Very dense, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel	
4								
5								
6		S-3	24/24	5 to 7	20-25-24-16		Dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	TILL
7								
8		S-4	24/24	7 to 9	19-20-18-16		Dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	
9								
10							END OF EXPLORATION AT 9 FEET BELOW GROUND SURFACE	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. I-2
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	243+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	3/14/2024	Date End	3/14/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
3/14/24	-	4	239+/-	Wet Sample
3/14/24	-	4.5	238.5+/-	10 minutes

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	18/24	0 to 2	1-2-5-12		Loose, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Concrete fragments, trace Cinders	5"+/- Topsoil
2								FILL
3		S-2	16/24	2 to 4	13-14-14-17		Medium dense, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel	
4								
5								
6		S-3	20/24	5 to 7	8-11-10-11		Medium dense, red-brown, fine SAND, some Silt, trace fine Gravel	SAND
7								
8		S-4	24/24	7 to 9	7-13-24-28		Dense, red-brown, fine SAND, some Silt	
9								
10							END OF EXPLORATION AT 9 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. I-3
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	242+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	3/14/2024	Date End	3/14/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
3/14/24	-	5	237+/-	Wet Sample
3/14/24	-	4	238+/-	15 minutes

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	18/24	0 to 2	7-11-10-17		Medium dense, dark brown/gray, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Cinders	3"+/- Topsoil
2								
3		S-2	18/24	2 to 4	7-6-5-5		Medium dense, dark brown, fine to coarse SAND, some Silt, little fine Gravel, trace Concrete	FILL
4								
5								
6		S-3	19/24	5 to 7	3-12-25-34		Dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	
7								TILL
8		S-4	16/24	7 to 9	48-56-23-25		Very dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	
9								
10							END OF EXPLORATION AT 9 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED FIRE STATION NO. 3
CHURCH AVENUE
BRISTOL, CONNECTICUT

BORING NO. I-4
SHEET 1 of 1
FILE NO. 0276-009.00
CHKD. BY TJO

Boring Co.	Site, LLC	Boring Location	See Boring Location Plan		
Driller	John DeAngelis	Ground Surface El.	242+/-	Datum	NAVD88
Logged By	Mateusz Fekieta	Date Start	3/14/2024	Date End	3/14/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Track Mounted CME 55 LCX
Drilling Method:	2.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
3/14/24	-	3	239+/-	Wet Sample
3/14/24	-	3.5	238.5+/-	15 minutes

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	20/24	0 to 2	5-11-12-8		Medium dense, dark brown/gray, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace (-) Roots	3"+/- Topsoil
2								
3		S-2	12/24	2 to 4	5-10-5-4		Medium dense, dark brown, fine to coarse SAND, some Silt, trace fine Gravel	FILL
4								
5								
6		S-3	20/24	5 to 7	12-13-24-48		Dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	TILL
7								
8		S-4	18/21	7 to 8.8	24-21-22-50/3"		Very dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	
9								
10							END OF EXPLORATION AT 8.8 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

APPENDIX 3 -

INFILTRATION TEST RESULTS

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

Test Boring Falling Head Test
Proposed Stormwater Management Systems
Church Avenue
Bristol, CT
File No. 0276-009.01

Test Location: I-1
Test Type: Falling Head
Date: 3/14/2024

Driller: J. DeAngelis
Engineer: M. Fekieta
Weather: Sunny, 50s

Ground surface El.: 244± (ft.)
Top of Casing El.: 245.3± (ft.)
Bottom of Casing El.: 241.5± (ft.)

Total Casing Length: 3.8 (ft.)

Inside Casing Diameter: 3.875 (in.)

Hydraulic Conductivity (Kv) = π [D {Ln (h1/h2) }] / 11 (t2-t1)

Elapsed Time (min.)	t2 - t1 (min.)	DTW (in.)	h1 (in.)	h2 (in.)	ln(h1/h2)	Kv (in/min)	Kv (cm/sec)	Kv (in/hr)
5	5	0.19	45.6	45.4	0.0041	9.1E-04	3.9E-05	5.5E-02
11	6	0.63	45.4	45.0	0.0097	1.8E-03	7.6E-05	1.1E-01
20	9	1.13	45.0	44.5	0.0112	1.4E-03	5.8E-05	8.2E-02
30	10	1.75	44.5	43.9	0.0142	1.6E-03	6.6E-05	9.4E-02
45	15	2.75	43.9	42.9	0.0231	1.7E-03	7.2E-05	1.0E-01
60	15	3.63	42.9	42.0	0.0206	1.5E-03	6.4E-05	9.1E-02
90	30	5.5	42.0	40.1	0.0457	1.7E-03	7.1E-05	1.0E-01
120	30	9.13	40.1	36.5	0.0947	3.5E-03	1.5E-04	2.1E-01
150	30	13.5	36.5	32.1	0.1278	4.7E-03	2.0E-04	2.8E-01
180	30	17.25	32.1	28.4	0.1242	4.6E-03	1.9E-04	2.7E-01
210	30	20.75	28.4	24.9	0.1318	4.9E-03	2.1E-04	2.9E-01
240	30	24	24.9	21.6	0.1402	5.2E-03	2.2E-04	3.1E-01

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

Test Boring Falling Head Test
Proposed Stormwater Management Systems
Church Avenue
Bristol, CT
File No. 0276-009.01

Test Location: I-2
Test Type: Falling Head
Date: 3/14/2024

Driller: J. DeAngelis
Engineer: M. Fekieta
Weather: Sunny, 50s

Ground surface El.: 243± (ft.)
Top of Casing El.: 245± (ft.)
Bottom of Casing El.: 241± (ft.)

Total Casing Length: 4.0 (ft.)

Inside Casing Diameter: 3.875 (in.)

Hydraulic Conductivity (Kv) = π [D {Ln (h1/h2) }] / 11 (t2-t1)

Elapsed Time (min.)	t2 - t1 (min.)	DTW (in.)	h1 (in.)	h2 (in.)	ln(h1/h2)	Kv (in/min)	Kv (cm/sec)	Kv (in/hr)
5	5	0.25	48.0	47.8	0.0052	1.2E-03	4.9E-05	6.9E-02
10	5	0.63	47.8	47.4	0.0079	1.7E-03	7.4E-05	1.0E-01
20	10	1.25	47.4	46.8	0.0133	1.5E-03	6.2E-05	8.8E-02
30	10	1.88	46.8	46.1	0.0135	1.5E-03	6.3E-05	8.9E-02
45	15	2.88	46.1	45.1	0.0219	1.6E-03	6.8E-05	9.7E-02
60	15	3.75	45.1	44.3	0.0196	1.4E-03	6.1E-05	8.7E-02
90	30	5.5	44.3	42.5	0.0404	1.5E-03	6.3E-05	8.9E-02
120	30	7	42.5	41.0	0.0359	1.3E-03	5.6E-05	8.0E-02
150	30	8.5	41.0	39.5	0.0373	1.4E-03	5.8E-05	8.2E-02
180	30	9.88	39.5	38.1	0.0354	1.3E-03	5.5E-05	7.8E-02
210	30	11.13	38.1	36.9	0.0333	1.2E-03	5.2E-05	7.4E-02
240	30	12.5	36.9	35.5	0.0380	1.4E-03	5.9E-05	8.4E-02

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

Test Boring Falling Head Test
Proposed Stormwater Management Systems
Church Avenue
Bristol, CT
File No. 0276-009.01

Test Location: I-3
Test Type: Falling Head
Date: 3/15/2024

Driller: J. DeAngelis
Engineer: M. Fekieta
Weather: Sunny, 50s

Ground surface El.: 242± (ft.)
Top of Casing El.: 245± (ft.)
Bottom of Casing El.: 240± (ft.)

Total Casing Length: 5.0 (ft.)

Inside Casing Diameter: 3.875 (in.)

Hydraulic Conductivity (Kv) = π [D {Ln (h1/h2) }] / 11 (t2-t1)

Elapsed Time (min.)	t2 - t1 (min.)	DTW (in.)	h1 (in.)	h2 (in.)	ln(h1/h2)	Kv (in/min)	Kv (cm/sec)	Kv (in/hr)
10	10	0.13	60.0	59.9	0.0021	2.3E-04	9.8E-06	1.4E-02
30	20	0.75	59.9	59.3	0.0105	5.8E-04	2.5E-05	3.5E-02
60	30	1.63	59.3	58.4	0.0149	5.5E-04	2.3E-05	3.3E-02
90	30	2.63	58.4	57.4	0.0173	6.4E-04	2.7E-05	3.8E-02
120	30	4.25	57.4	55.8	0.0287	1.1E-03	4.5E-05	6.4E-02
150	30	5.88	55.8	54.1	0.0296	1.1E-03	4.6E-05	6.5E-02
180	30	7	54.1	53.0	0.0210	7.7E-04	3.3E-05	4.6E-02
210	30	8.25	53.0	51.8	0.0239	8.8E-04	3.7E-05	5.3E-02

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

Test Boring Falling Head Test
Proposed Stormwater Management Systems
Church Avenue
Bristol, CT
File No. 0276-009.01

Test Location: I-4
Test Type: Falling Head
Date: 3/15/2024

Driller: J. DeAngelis
Engineer: M. Fekieta
Weather: Sunny, 50s

Ground surface El.: 242± (ft.)
Top of Casing El.: 245± (ft.)
Bottom of Casing El.: 240± (ft.)

Total Casing Length: 5.0 (ft.)

Inside Casing Diameter: 3.875 (in.)

Hydraulic Conductivity (Kv) = π [D {Ln (h1/h2) }] / 11 (t2-t1)

Elapsed Time (min.)	t2 - t1 (min.)	DTW (in.)	h1 (in.)	h2 (in.)	ln(h1/h2)	Kv (in/min)	Kv (cm/sec)	Kv (in/hr)
10	10	0.25	60.0	59.8	0.0042	4.6E-04	2.0E-05	2.8E-02
30	20	1	59.8	59.0	0.0126	7.0E-04	3.0E-05	4.2E-02
60	30	2	59.0	58.0	0.0171	6.3E-04	2.7E-05	3.8E-02
90	30	3.25	58.0	56.8	0.0218	8.0E-04	3.4E-05	4.8E-02
120	30	4.25	56.8	55.8	0.0178	6.6E-04	2.8E-05	3.9E-02
150	30	5.38	55.8	54.6	0.0204	7.5E-04	3.2E-05	4.5E-02
180	30	6.38	54.6	53.6	0.0185	6.8E-04	2.9E-05	4.1E-02
210	30	7.38	53.6	52.6	0.0188	6.9E-04	2.9E-05	4.2E-02

APPENDIX 4 -

LIMITATIONS

LIMITATIONS

Explorations

1. The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations by Down To Earth Consulting, LLC (DTE) and others. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.

3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, tidal, temperature, and other factors occurring since the time measurements were made.

Review

4. In the event that any changes in the nature, design or location of the proposed building are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by DTE. It is recommended that this firm be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Construction

5. It is recommended that this firm be retained to provide soil engineering services during construction of the earthworks and foundation phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

Use of Report

6. This report has been prepared for the exclusive use of Silver Petrucelli & Associates for specific application to the project noted in this geotechnical report in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made.

7. This soil and foundation engineering report has been prepared for this project by DTE. This report is for design purposes only and is not sufficient to prepare an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to design considerations only.

8. This report may contain comparative cost estimates for the purpose of evaluating alternative foundation schemes. These estimates may also involve approximate quantity evaluations. It should be noted that quantity estimates may not be accurate enough for construction bids. Since DTE has no control over labor and materials cost and design, the estimates of construction costs have been made on the basis of experience. DTE does not guarantee the accuracy of cost estimates as compared to contractor's bids for construction costs.