Geotechnical Recommendations Report

Proposed Scituate Police Station

1315 Chopmist Hill Road
Scituate, Rhode Island
AP 35, Lot 10

Prepared for:
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Scituate Town Council President
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195 Danielson Pike
Scituate, RI 02857

Submission Date:
February 2018

Submitted by:
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<td></td>
</tr>
</tbody>
</table>
1 INTRODUCTION

This report presents our geotechnical recommendations for the proposed construction of one-story municipal building, the Town of Scituate Police Station, located on Tax Assessor’s Plat Map (AP) 35, Lot 10, in the Town of Scituate, Rhode Island. The overall scope of the project includes construction of an approximately 8,000 square-foot (footprint), one-story building with associated parking areas, stormwater management areas, on-site wastewater treatment system and landscaping improvements.

2 PROJECT AND SITE DESCRIPTION

The subject property has a physical address of 1315 Chopmist Hill Road in the Town of Scituate, Rhode Island. The subject property, also identified as AP 35, Lot 10, consists of approximately 40 acres of land; see Figure 1 for general site Locus Map. The parcel is owned by the Town of Scituate and is home to the Scituate Senior Center. Based on our review of existing data, including orthophotography obtained from the Rhode Island Geographic Information System (RIGIS), included in Appendix A, it appears that the site has been a vacant field or farm land since prior to 1939.

2.1 USDA Soil Classification

According to the Soil Survey of Rhode Island, prepared by the US Department of Agriculture, Soil Conservation Service, the soils on the site consist of Paxton Fine Sandy Loam, 0 to 8 percent slopes very stony (PhB), Ridgebury, Leicester, and Whitman Soils, 0 to 8 percent slopes, extremely stony (Rf) and Woodbridge Fine Sandy Loam, 0 to 8 percent slopes, very stony (WoB).

3 SUBSURFACE EXPLORATIONS

3.1 Borings

JCE engaged Northern Drill Service, Inc. (NDS) of Northborough, Massachusetts to drill the borings for the proposed Scituate Police Station. All borings were performed on February 7, 2018 using rotary wash drilling techniques. A JCE engineer was on-site full time to coordinate and document the explorations and to collect soil samples. NDS drilled two (2) borings within the proposed building footprint (B-101 and B-102). Exploration locations are shown on Figure 2 and were located by taping from existing site features.

A Rhode Island Registered Professional Engineer later checked field classifications at JCE’s office. Standard Penetration Tests (SPTs) were performed at standard 5-foot intervals for all borings until the proposed termination depth or refusal was encountered, whichever was shallower. Boring logs are included in Appendix B. A summary of the exploration program performed by JCE for the site is provided in Table 1.

All soil samples collected as a result of our explorations are being stored at our office in Warwick, Rhode Island. The soil samples will be held for six (6) months after the issuance of this report. We will discard the samples after the six (6) months has elapsed unless other arrangements are made.

3.2 Test Pits
JCE observed and documented the excavation of four (4) soil evaluation test pits on August 21, 2017 for use in stormwater management design, and to assess suitable areas for an OWTS system for the proposed Scituate Police Station. The test pit locations are summarized in Table 1 and are shown in plan on Figure 2. Test pit logs are included in Appendix B. The groundwater elevations observed during the test pit excavations are defined as the Seasonal High Groundwater Table (SHGWT), as determined in accordance with Rhode Island Department of Environmental Management Regulations. These SHGWT elevations are defined on the test pit logs and have been incorporated into our design recommendations.

3.3 Generalized Subsurface Conditions
Subsurface conditions were generally consistent between all borings and test pits performed. The subsurface conditions are only known at the boring locations; conditions elsewhere may vary significantly. A description of the major soil layers encountered in the borings is presented below.

Topsoil – A layer of topsoil was encountered at all explorations locations. The topsoil layer averaged approximately 1-foot in thickness throughout the site.

Glacial Till – A layer of glacial till was encountered in all explorations below the topsoil. All borings were terminated in the glacial till layer. Generally, the glacial till consisted of about 55 percent fine to medium sand, 30 percent non-plastic fines and about 15 percent fine to coarse gravel. SPT N-values taken in the glacial outwash deposits layer ranged from 27 to 80 bpf, with a median value of 50 bpf, indicating a dense to very dense soil.
3.4 Groundwater

Based on the presence of gleyed soils observed during the test pit excavations and during drilling of the borings, the groundwater table is estimated to be approximately 24 to 36-inches below the existing ground surface. For design purposes, we recommend using a groundwater table of 30-inches below the existing ground surface.

4 GEOTECHNICAL RECOMMENDATIONS

4.1 Foundation Design

Shallow spread footings bearing on undisturbed glacial till or properly placed and compacted Structural Fill are recommended to support the proposed Scituate Police Station building. Site survey is currently in progress, so a finish floor elevation has not yet been established, however we understand that the proposed bearing elevation of the footings will be at, or above, the existing groundwater table.

During construction, if saturated soils are observed at or above the proposed bearing elevation, a minimum of 6-inches of over-excavation will be required. A layer of filter fabric (Mirafi FW700 or approved equal) should be placed over the exposed subgrade and a minimum of 6-inches of Filter Stone should be placed. The Filter Stone may be placed in one uniform 6-inch-thick lift compacted with 1 to 2 passes of a vibratory drum roller or compacted with 5 to 6 passes of a vibratory plate compactor.

A net allowable bearing pressure of 5,000 pounds per square foot (psf) should be used for design of footings bearing on undisturbed glacial till. For footings less than 3-feet wide, the allowable bearing pressure should be reduced proportionately; it is recommended that continuous footings be no less than 18-inches wide. Exterior footings should extend at least 4-feet below final exterior grade for frost protection. Any interior footings should extend at least 18-inches below the bottom of the floor slab.

We estimate that total spread or strip footing settlements will be about ¾-inch, and differential settlements between adjacent footings will be about ¼-inch. Most of the settlement is expected to occur during or immediately after construction. These estimates assume that the foundation and subgrades are designed and constructed according to the recommendations in this report.

Any boulders encountered within excavations for foundations should be removed to a depth of at least 12-inches below the bottom of footings. Voids from these excavations
should be filled with compacted Structural Fill, or crushed stone if below the water table or if subgrade is wet.

4.2 Floor Slab Design

The floor slab of the proposed building may be designed as a slab-on-grade that bears on compacted Structural Fill or compacted \(\frac{3}{4}\)-inch crushed stone. All topsoil and unsuitable material should be removed and replaced with compacted Structural Fill. The floor slab should not rest directly on bedrock or boulders. Any sharp protrusions of boulders or cobbles should be excavated as needed to allow for a minimum 6-inch-thick layer compacted Structural Fill or compacted \(\frac{3}{4}\)-inch crushed stone to be placed below the slab.

We recommend that contraction joints be incorporated between the slab-on-grade and the columns and perimeter walls of the proposed building. To design slabs on soil subgrades described above, we recommend using Westergaard’s modulus of subgrade reaction \(k = 100\) pounds per cubic inch (pci) where the Structural Fill or crushed stone thickness is less than or equal to 12 inches or \(k = 150\) pci where structural fill or crushed stone thickness is greater than 12 inches. These recommendations are based on design criteria provided in “Slab Thickness Design for Industrial Concrete Floors on Grade” by the Portland Cement Association.

4.3 Seismic Design

We recommend using Site Class D for seismic design of foundation elements in accordance with Section 1613 of the International Building Code (IBC 2012) (adopted as Rhode Island State Building Code, Effective July 1, 2013). Foundation elements should be designed to resist earthquake lateral forces as described in Section 1613 of IBC 2012.

According to Table 1608.1 in the Rhode Island Amendments to the IBC 2012 (SBC-1 State Building Code), the following seismic coefficients should be used for seismic design:

- \(S_s = 0.173g\)
- \(S_1 = 0.061g\)
- \(S_{DS} = 0.185g\)
- \(S_{D1} = 0.098g\)
- \(PGA_M = 0.144g\)

Peak ground acceleration (\(PGA_M\)) corresponds to the PGA value corrected for site effects (as indicated in ASCE 7-10). The soils below the foundation level are not susceptible to liquefaction.
4.4 Foundation Drain and Underdrain System

Groundwater levels are generally within 24- to 36-inches of the existing ground surface. Therefore, a perimeter foundation drain is recommended. Groundwater collected by the foundation drain system will likely be able to discharge via gravity to the site’s stormwater management system or towards the wetlands at the rear of the site. The perimeter foundation drain should consist of a perforated 6-inch diameter PVC pipe (placed holes down) in a 9 to 12-inch-thick layer of filter stone wrapped in a non-woven geotextile filter fabric. The foundation drainage system should have clean-outs installed at the end of each branch or at changes in direction.

If a permanent underdrain system is not designed and constructed, foundations and slabs should be waterproofed and designed to resist hydrostatic pressures as necessary.

5 CONSTRUCTION RECOMMENDATIONS

5.1 Earthwork

Any fill placed within the proposed building footprint and within a 5-foot radius of the proposed building footprint should meet the gradation and compaction requirements for Structural Fill shown in Table 2. We recommend that any fill placed within 5 feet of foundation walls be compacted with a hand-operated compactor. Backfill placed outside of the area described above should meet the gradation and compaction requirements for Common Borrow shown in Table 3.

The ground immediately adjacent to the proposed building footprint and foundation should be sloped away from the building at a slope not less than 5 percent for a minimum distance of 10 feet. Impervious surfaces adjacent to the proposed building footprint and foundation may be sloped a minimum of 2 percent for a minimum distance of 10 feet. All excavations should be made in accordance with OSHA regulations.

5.2 Dewatering

Groundwater may be encountered during excavation for footings, specifically if construction commences during the wet season. Filtered sumps that discharge into onsite recharge pits should be adequate to control groundwater. Footing excavations should be sloped slightly towards the sump. Sumps should be located outside of the limits of the footings and should extend at least 2 feet below the bottom of the subgrade. Construction specifications should require the contractor to maintain a groundwater level of at least 2 feet below the bottom of the excavation.
5.3 **Freezing Conditions**
Soils at the site are susceptible to frost. All subgrades should be free of frost before placement of concrete. If construction is performed during freezing weather, special precautions to protect the subgrade from freezing may be required. Any frozen soil should be removed and replaced with compacted Structural Fill.

5.4 **Reuse of On-Site Soils**
Based on the results of the subsurface exploration program, the majority of excavated soils will consist of silty sand with fines content ranging from 25 to 45 percent. As a result, on-site soils are not recommended for re-use as Structural Fill, Gravel Borrow, and/or Common Borrow.

6 **LIMITATIONS**
This report was prepared for the use of the Town of Scituate, exclusively. The recommendations presented in this report are based on project information provided to us at the time of this report. These recommendations may require modification if there are any changes in the design or location of proposed structures. We will not accept responsibility for design based on our recommendations unless we are engaged to review final plans and specifications to determine whether our recommendations have been properly implemented in the design.

The recommendations in this report are based on the data obtained from the subsurface explorations. If variations in the subsurface conditions exist, they will likely not become evident until construction. Variations in subsurface conditions may require revisions to our recommendations.

The data and recommendations presented in this report were collected and analyzed using generally accepted industry methods and practices. No other warranty, express or implied is made.
Tables
# Table 1. Subsurface Exploration Data

Proposed Scituate Police Station
1315 Chopmist Hill Rd., Scituate, Rhode Island

<table>
<thead>
<tr>
<th>Exploration ID</th>
<th>Latitude (1), (degrees)</th>
<th>Longitude (1), (degrees)</th>
<th>Termination Depth (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-101</td>
<td>41°49’7.78”N</td>
<td>71°39’57.05”W</td>
<td>21.1</td>
</tr>
<tr>
<td>B-102</td>
<td>41°49’8.14”N</td>
<td>71°39’57.87”W</td>
<td>16.0</td>
</tr>
<tr>
<td>TH-1</td>
<td>41°49’6.45”N</td>
<td>71°39’56.04”W</td>
<td>8.0</td>
</tr>
<tr>
<td>TH-2</td>
<td>41°49’7.77”N</td>
<td>71°39’57.75”W</td>
<td>9.0</td>
</tr>
<tr>
<td>TH-3</td>
<td>41°49’7.20”N</td>
<td>71°39’59.03”W</td>
<td>8.0</td>
</tr>
<tr>
<td>TH-4</td>
<td>41°49’7.88”N</td>
<td>71°39’58.53”W</td>
<td>9.0</td>
</tr>
</tbody>
</table>

**Notes:**
1. Horizontal datum is NAD83, Geographic Coordinate System.
Table 2. Requirements for Structural Fill
Proposed Scituate Police Station
1315 Chopmist Hill Rd., Scituate, Rhode Island

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 inches</td>
<td>100</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>50 - 100</td>
</tr>
<tr>
<td>No. 4</td>
<td>30 - 85</td>
</tr>
<tr>
<td>No. 16</td>
<td>15 - 65</td>
</tr>
<tr>
<td>No. 50</td>
<td>5 - 40</td>
</tr>
<tr>
<td>No. 200</td>
<td>0 - 8</td>
</tr>
</tbody>
</table>

Notes:
1. Structural fill shall consist of well-graded, natural sand and gravel free of excessive clay, silt, organic matter, and other deleterious materials.
2. Material passing the No. 200 sieve should be non-plastic.
3. Structural fill shall be compacted in loose lifts no more than 9-inches-thick. Compaction shall be to 95 percent of the maximum dry density in accordance with ASTM D1557.
Table 3. Requirements for Common Borrow
Proposed Scituate Police Station
1315 Chopmist Hill Rd., Scituate, Rhode Island

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 inches</td>
<td>100</td>
</tr>
<tr>
<td>3 inches</td>
<td>80 - 100</td>
</tr>
<tr>
<td>1 inch</td>
<td>60 - 100</td>
</tr>
<tr>
<td>No. 4</td>
<td>20 - 85</td>
</tr>
<tr>
<td>No. 200</td>
<td>0 - 17</td>
</tr>
</tbody>
</table>

Notes:
1. Common borrow shall be in accordance with Section M.01 of the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, 2004 Edition with latest addenda and shall consist of well-graded, natural sand and gravel free of excessive clay, silt, organic matter, and other deleterious materials.
2. Material passing the No. 200 sieve should be non-plastic.
3. Common Borrow shall be compacted in loose lifts no more than 12-inches-thick. Compaction shall be to 92 percent of the maximum dry density in accordance with ASTM D1557.
### Table 4. Filter Stone

Proposed Scituate Police Station
1315 Chopmist Hill Rd., Scituate, Rhode Island

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
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<tbody>
<tr>
<td>1 inch</td>
<td>100</td>
</tr>
<tr>
<td>3/4 inch</td>
<td>70 - 85</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>10 - 40</td>
</tr>
<tr>
<td>3/8 inch</td>
<td>0 - 20</td>
</tr>
<tr>
<td>No. 4</td>
<td>0 - 5</td>
</tr>
</tbody>
</table>

**Notes:**
1. Filter stone shall consist of durable, washed crushed rock or gravel and shall conform to the requirements of the State of Rhode Island Department of Transportation Standard Specifications, Section M.01.09, for Type V Filter Stone.
Figures
PROPOSED SITUATE POLICE STATION
1315 CHOPMIST HILL ROAD
SITUATE, RHODE ISLAND
MAP 35, LOT 10

SCALE (FEET)
0 20 40 80 160
1 INCH = 40 FT

LEGEND

BORING LOCATION
TEST HOLE LOCATION

FIGURE 2

DESIGNED BY: NBH
DRAWN BY: NBH
CHECKED BY: DD
DATE: FEB. 2018
PROJECT NO: 07-109c
REVISIONS: NO.

Preliminary, not for construction

SUBSURFACE EXPLORATION PLAN

SITUATE SENIOR CENTER
1315 CHOPMIST HILL ROAD

TH-1
TH-2
TH-3
TH-4

B-101
B-102

APPROXIMATE BUILDING FOOTPRINT

CHOPMIST HILL ROAD (ROUT 102)
Appendix A

Historical Orthophotography
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10

1952 AERIAL PHOTOGRAPH
NOT TO SCALE
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

1962 AERIAL PHOTOGRAPH
NOT TO SCALE

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

1972 AERIAL PHOTOGRAPH
NOT TO SCALE

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10
NOTE:
AERIAL IMAGERY OBTAINED FROM RHODE ISLAND GEOGRAPHIC INFORMATION SYSTEM (RIGIS).

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10

1976 AERIAL PHOTOGRAPH
NOT TO SCALE
NOTE:
AERIAL IMAGERY OBTAINED FROM RHODE ISLAND GEOGRAPHIC INFORMATION SYSTEM (RIGIS).

1981 AERIAL PHOTOGRAPH
NOT TO SCALE

APPROXIMATE SITE LOCATION

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

1988 AERIAL PHOTOGRAPH
NOT TO SCALE

APPROXIMATE SITE LOCATION

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

1997 AERIAL PHOTOGRAPH
NOT TO SCALE

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10

2003 AERIAL PHOTOGRAPH
NOT TO SCALE
NOTE:
AERIAL IMAGERY OBTAINED FROM RHODE ISLAND GEOGRAPHIC INFORMATION SYSTEM (RIGIS).

APPROXIMATE SITE LOCATION

2004 AERIAL PHOTOGRAPH
NOT TO SCALE
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

2008 AERIAL PHOTOGRAPH
NOT TO SCALE

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

2011 AERIAL PHOTOGRAPH
NOT TO SCALE
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

2014 AERIAL PHOTOGRAPH
NOT TO SCALE

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10
NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

2016 AERIAL PHOTOGRAPH
NOT TO SCALE

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10

NOTE:
AERIAL IMAGERY OBTAINED
FROM RHODE ISLAND
GEOGRAPHIC INFORMATION
SYSTEM (RIGIS).

2016 AERIAL PHOTOGRAPH
NOT TO SCALE

PROPOSED POLICE STATION
1315 CHOPMIST HILL ROAD
SCITUATE, RHODE ISLAND
AP 35 LOT 10
Appendix B

Subsurface Exploration Logs
Boring Information

Location: See Figure 2

Ground Surface El. (ft): NA
Vertical Datum: NA
Drilling Company: Northern Drill Service, Inc.
Total Depth (ft): 21.0
Logged By: Nicholas Hilbern
Rig Type: Mobile Drill B-57

Drilling Information

Hammer Type: Automatic
Casing I.D./O.D.: 4.5" OD Flush Mounted
Auger I.D./O.D.: NA
Drill Rod O.D.: 3.25" OD
Core Barrel Type: NA
Core Barrel I.D./O.D.: NA
Drilling Method: Rotary Wash with Casing; Standard Sampling

Abbreviations:
- Pen. = Penetration Length
- Rec. = Recovery Length
- RQD = Rock Quality Designation
- WOR = Weight of Rods
- WOH = Weight of Hammer
- S = Split Spoon Sample
- C = Core Sample
- SC = Sonic Core
- SD = Direct Push Sample
- DP = Direct Push Sample
- PID = Photoelasticity Detector
- HSA = Hollow Stem Auger
- I.D./O.D. = Inside Diameter/Outside Diameter

Drilling Remarks/Field Test Data

<table>
<thead>
<tr>
<th>Elev. (ft)</th>
<th>Depth (ft)</th>
<th>Sample No.</th>
<th>Pen./Rec. (in)</th>
<th>Blows per 6 in. or RQD</th>
<th>Soil and Rock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.0 to 2.0</td>
<td>S1</td>
<td>24&quot;/17&quot;*</td>
<td>1-1-1-2</td>
<td>S1 (0-8&quot;): SILTY SAND (SM); Dark brown, moist, 80% fine to medium sand, 15% non-plastic fines, 5% fine gravel, TOPSOIL.</td>
</tr>
<tr>
<td>-4</td>
<td>4.0 to 6.0</td>
<td>S2</td>
<td>24&quot;/16&quot;*</td>
<td>18-15-12-8</td>
<td>S2: SILTY SAND (SM); Gray, moist, 60% fine to coarse sand, 30% non-plastic fines, 10% fine to coarse gravel.</td>
</tr>
<tr>
<td>-8</td>
<td>9.0 to 11.0</td>
<td>S3</td>
<td>24&quot;/15&quot;*</td>
<td>19-24-36-39</td>
<td>S3 (0-5&quot;): WELL GRADED SAND WITH SILT (SW-SM); Dark gray, 90% fine to coarse sand, 10% non-plastic fines.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S3 (5-15&quot;): SILTY SAND WITH GRAVEL (SM); Gray, moist, 50% fine to coarse sand, 35% non-plastic fines, 15% fine to coarse gravel.</td>
</tr>
<tr>
<td>-12</td>
<td>14.0 to 16.0</td>
<td>S4</td>
<td>24&quot;/18&quot;*</td>
<td>30-30-32-36</td>
<td>S4: SILTY SAND WITH GRAVEL (SM); Gray, moist, 55% fine to coarse sand, 30% non-plastic fines, 15% fine to coarse gravel.</td>
</tr>
<tr>
<td>-20</td>
<td>19.0 to 21.0</td>
<td>S5</td>
<td>24&quot;/20&quot;*</td>
<td>33-40-40-33</td>
<td>S5: SILTY SAND WITH GRAVEL (SM); Gray, moist, 55% fine to coarse sand, 30% non-plastic fines, 15% fine to coarse gravel.</td>
</tr>
<tr>
<td>-24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bottom of boring at 21.0'. Backfilled with cuttings upon completion.</td>
</tr>
</tbody>
</table>

Project Name: Proposed Scituate Police Station
City/State: Scituate, RI
Project Number: 07-109c
Notes:
### Soil and Rock Description

**S1 (0'-8')**: SILTY SAND (SM); Dark brown, moist, 80% fine to medium sand, 15% non-plastic fines, 5% fine gravel, TOPSOIL.

**S1 (8'-18')**: SILTY SAND (SM); Light brown, moist, 75% fine to medium sand, 20% non-plastic fines, 5% fine gravel.

**S2**: SILTY SAND (SM); Gray, moist, 60% fine to coarse sand, 30% non-plastic fines, 10% fine to coarse gravel.

**S3**: SILTY SAND (SM); Gray, moist, 55% fine to coarse sand, 35% non-plastic fines, 10% fine to coarse gravel.

**S4**: SILTY SAND WITH GRAVEL (SW); Gray, moist, 50% fine to coarse sand, 35% non-plastic fines, 15% fine to coarse gravel.

Bottom of boring at 16.0’. Backfilled with cuttings upon completion.
## Soil and Rock Description

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Type/No.</th>
<th>Layer</th>
<th>Remarks</th>
<th>Soil and Rock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 10&quot;</td>
<td>TS</td>
<td>ABALATION/LODGEMENT TILL</td>
<td>Excavation difficulty 'easy' above 48-inches.</td>
<td>(0 - 10&quot;): SILTY SAND (SM); ~70% fine to medium sand, ~25% nonplastic fines, ~5% fine gravel, dark brown, moist, TOPSOIL. (sandy loam).</td>
</tr>
<tr>
<td>10 - 26&quot;</td>
<td></td>
<td></td>
<td></td>
<td>(10 - 26&quot;) : SILTY SAND (SM); ~70% fine to medium sand, ~25% nonplastic fines, ~5% fine gravel, brown, moist. (sandy loam).</td>
</tr>
<tr>
<td>26 - 48&quot;</td>
<td></td>
<td></td>
<td></td>
<td>(26 - 48&quot;) : SILTY SAND (SM); ~60% fine to medium sand, ~35% nonplastic fines, ~5% fine to coarse gravel, gleyed bluish gray, moist. (sandy loam).</td>
</tr>
<tr>
<td>48 - 96&quot;</td>
<td></td>
<td></td>
<td></td>
<td>(48 - 96&quot;) : SILTY SAND WITH GRAVEL (SM); ~50% fine to medium sand, ~35% nonplastic fines, ~15% fine to coarse gravel, bluish gray, moist. (gravelly sandy loam).</td>
</tr>
<tr>
<td>Bottom of test hole at 96&quot;. Backfilled with previously excavated material upon completion.</td>
<td>HSG C (1.02 in/hr)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Test hole left open for approximately 1-hour; no groundwater infiltration observed after 15-minutes or after 1-hour.

**SHWT:** 26-inches

**Impervious/Limiting Layer Depth:** >96-inches
**Test Pit Location:** See Figure 2  
**Date Start / Finish:** August 21, 2017

**Ground Surface El. / Datum:** NA  
**Conditions:** Clear, 80 deg. F

**Excavator Type:** JD 410E Backhoe  
**Excavator Reach:** Approx. 12-feet

**Operator:** Town of Scituate Department of Public Works  
**JCE Rep.:** Daniel R. Decesaris (RI P.E. No. 10162)

---

### Soil and Rock Description

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Type/No.</th>
<th>Layer</th>
<th>Remarks</th>
<th>Estimated Hydraulic Conductivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 9&quot;</td>
<td>TS</td>
<td></td>
<td>(0-9'': SILTY SAND (SM); ~70% fine to medium sand, ~25% nonplastic fines, ~5% fine to coarse gravel, dark brown, moist, TOPSOIL. (loamy sand).</td>
<td>HSG C (1.02 in/hr)</td>
</tr>
<tr>
<td>9 - 30&quot;</td>
<td></td>
<td></td>
<td>(9 - 30'': SILTY SAND (SM); ~70% fine to medium sand, ~25% nonplastic fines, ~5% fine to coarse gravel, brown, moist. (loamy sand).</td>
<td></td>
</tr>
<tr>
<td>30 - 60&quot;</td>
<td></td>
<td></td>
<td>(30 - 60'': SILTY SAND (SM); ~55% fine to medium sand, ~35% nonplastic fines, ~10% fine gravel, gleyed bluish gray. (sandy loam).</td>
<td></td>
</tr>
<tr>
<td>60 - 108&quot;</td>
<td></td>
<td></td>
<td>(60 - 108&quot;: SILTY SAND WITH GRAVEL (SM); ~45% fine to medium sand, ~35% nonplastic fines, ~20% fine to coarse gravel, bluish gray. (gravelly sandy loam).</td>
<td></td>
</tr>
<tr>
<td>108&quot;</td>
<td></td>
<td>Bottom of test hole at 108&quot;. Backfilled with previously excavated material upon completion.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**SHWT:** 30-inches  
**Impervious/Limiting Layer Depth:** >108-inches

---

**Project Name:** Scituate Police Station  
**Project Number:** 07-109c

**JOE CASALI ENGINEERING, INC.**
## Test Pit Location: See Figure 2

### Date Start / Finish: August 21, 2017

### Ground Surface El. / Datum: NA

### Excavator Type: JD 410E Backhoe

### Excavator Reach: Approx. 12-feet

### Operator: Town of Scituate Department of Public Works

### JCE Rep.: Daniel R. Decesaris (RI P.E. No. 10162)

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### Depth (ft) | Sample Type/No. | Layer | Remarks | Soil and Rock Description | Estimated Hydraulic Conductivity
---|---|---|---|---|---
1 | TS | | Excavation difficulty 'easy' above 50-inches. | (0 - 10"): SILTY SAND (SM); ~70% fine to medium sand, ~25% nonplastic fines, ~5% fine gravel, dark brown, moist, TOPSOIL. (*loamy sand*). | |
1 | | | | (10 - 28") : SILTY SAND (SM); ~65% fine to medium sand, ~25% nonplastic fines, ~10% fine to coarse gravel, brown, moist. (*loamy sand*). | |
2 | | | Excavation difficulty 'hard' below 50-inches. | (28 - 50") : SILTY SAND WITH GRAVEL (SM); ~50% fine to medium sand, ~35% nonplastic fines, ~15% fine to coarse gravel, gleyed bluish gray, moist. (*gravelly sandy loam*). | |
2 | | | Numerous cobbles/boulders below 50-inches; max size = 24". | Bottom of test hole at 96", refusal on possible bedrock. Backfilled with previously excavated material upon completion. | |
3 | | | | | |
4 | | | | | |
5 | | | | | |
6 | | | | | |
7 | | | | | |
8 | | | | | |
9 | | | | | |
10 | | | | | |
11 | | | | | |
12 | | | | | |

### Notes:

### SHWT: 28-inches

### Impervious/Limiting Layer Depth: 96-inches

### Project Name: Scituate Police Station

### Project Number: 07-109c

### Joe Casali Engineering, Inc.
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Type/No.</th>
<th>Layer</th>
<th>Remarks</th>
<th>Soil and Rock Description</th>
<th>Estimated Hydraulic Conductivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 10&quot;</td>
<td>TS</td>
<td></td>
<td>(0 - 10&quot;) / SILTY SAND (SM) / ~75% fine to medium sand, ~20% nonplastic fines, ~5% fine gravel, dark brown, moist, TOPSOIL. <em>(loamy sand).</em></td>
<td>HSG C (1.02 in/hr)</td>
<td></td>
</tr>
<tr>
<td>10 - 25&quot;</td>
<td></td>
<td></td>
<td>(10 - 25&quot;) / SILTY SAND (SM) / ~70% fine to medium sand, ~20% nonplastic fines, ~10% fine gravel, brown, moist. <em>(loamy sand).</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 - 70&quot;</td>
<td></td>
<td></td>
<td>(25-70&quot;) / SILTY SAND (SM) / ~55% fine to medium sand, ~35% nonplastic fines, ~10% fine to coarse gravel, gleyed bluish gray, moist. <em>(sandy loam).</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70 - 108&quot;</td>
<td></td>
<td></td>
<td>(70 - 108&quot;) / SILTY SAND WITH GRAVEL (SM) / ~50% fine to medium sand, ~35% nonplastic fines, ~15% fine to coarse gravel, bluish gray, moist. <em>(gravely sandy loam)</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Bottom of test hole at 108". Backfilled with previously excavated material upon completion.

SHWT: 25-inches
Impervious/Limiting Layer Depth: >108-inches

Project Name: Scituate Police
Project Number: 07-109c

Joe Casali Engineering, Inc.