# ConTest Consultants, Inc

**Providing Inspection/Testing & Consulting Services**

January 3, 2020

Ms. Patricia Shogren
Town of Danville
210 Main Street
Danville, NH 03819

**Re: Geotechnical Recommendations**
**Danville Police Station**
**67 Hersey Road**
**Danville, New Hampshire**
**CTC Project No. 219252**

Dear Ms. Shogren:

As per your request and our proposal # 170-19, ConTest Consultants, Inc. is pleased to submit the Geotechnical Recommendations for the proposed Police Station at 67 Hersey Road in Danville, New Hampshire by our Geotechnical Consultant – Civil Connection. The investigation included performing test boring at the site, site visit and an evaluation of the conditions as they relate to foundation design and earthwork construction for the project.

We trust the contents of this report are satisfactory to your needs at this time. Should have any questions or require further assistance, please do not hesitate to contact our office or Mr. Richard Bushnell, P.E. at Civil Connection. Thank you for this opportunity to assist you and your design team on this phase of the project.

Best Regards,

**CONTEST CONSULTANTS, INC.**

Donald C. Walden
*President*

18 Cote Avenue, Unit 11, Goffstown, NH 03045
Phone (603) 626-4422 • Fax (603) 782-0064
www.contestconsultantsinc.com

**Civil Connection, LLC**
38 Edwards Drive
Gilmanton IW, New Hampshire 03837
Tel: 603-393-9842

December 31, 2019

ConTest Consultants, Inc.
Attn: Mr. Don Walden
18 Cote Avenue
Goffstown, New Hampshire 03045

**RE: Geotechnical Recommendations**
**Danville Police Station**
**67 Hersey Road**
**Danville, New Hampshire**
**Project: No. 19-294**

Dear Mr. Walden:

As requested, Civil Connection, LLC (CC) has conducted a geotechnical investigation for the above-referenced project. This report presents the findings of a subsurface exploration program and an evaluation of the conditions encountered as they relate to foundation design and earthwork construction for the project. The work was performed in general accordance with our proposal. The contents of this report are subject to the attached ***Limitations***.

## PROJECT & SITE DESCRIPTION

The proposed site development and focus of this geotechnical investigation is located at a vacant parcel of land located at 67 Hersey Road in Danville, New Hampshire. The project site abuts the existing Danville Highway Department property. The proposed project consists of developing the parcel for use as the Danville Police Department. The proposed building will be a single-story structure with a Mechanical attic over part of it. At this time no below-grade space is proposed. Proposed site development includes the construction of access roads and parking lots. The existing area has been used as storage by others with pile of debris, concrete pipe, manholes, asphalt, brush, timber, scattered throughout the upper area. The remaining is lightly wooded with underlying brush, and exposed boulders/bedrock outcrops observed.

## SUBSURFACE EXPLORATION PROGRAM

The subsurface exploration program consisted of the advancement of soil borings within the proposed building footprint. The soil borings were advanced at six locations with additional attempts at two of them due to shallow refusals. Borings were advanced on December 23, 2019 by SoilX Corporation, utilizing a CME75 ATV Mounted drilling rig, under the observation of a representative from CC. Borings were advanced to refusal with depths ranging from 7.5 to 11.0 feet depth utilizing 4-1/2 inch inside diameter (I.D.) hollow-stem augers. Soil samples were typically taken at five foot intervals or strata changes with a 2 inch standard split-spoon sampler in accordance with ASTM D1586. Standard penetration resistance was measured in six inch increments for two feet, using a 140 pound hammer falling 30 inches as part of the sampling procedure.

The borings were located in the field by CC by referencing staked locations by others. Boring locations are shown on the attached Boring Location Plan. Materials encountered during the exploration program were sampled and visually classified in the field by a Geotechnical Engineer from our office. Field descriptions of the soils encountered, the observed groundwater conditions upon completion of each test boring, as well as other pertinent observations are contained on the subsurface exploration logs attached to this report.

## SUBSURFACE CONDITIONS

In general, the test borings were advanced through either 2 to 5 feet of existing fill or 4 to 9-inches of Forest Mat/Subsoil. The fill was comprised of a brown/grey, fine to medium SAND, little to some Gravel, trace to little Silt and contained pieces of asphalt. The fill appears to have been placed during prior use as a storage yard and the fill would be expected to potentially contain other debris not recovered within the split-spoon sampler. The underlying native material consisted of a brown, dense to very dense, fine to medium SAND, little Gravel, little Silt (Glacial Till) overlying apparent bedrock or large boulders.

Refusal conditions were encountered in all the subsurface explorations advanced at the site. Based on the salient conditions observed at the site and observations made during the test borings the refusals are probably a result of bedrock.

**Groundwater—** Groundwater was encountered during the subsurface exploration program at depths ranging from 5 to 9 feet below existing grade. Additionally, perched water was encountered atop the glacial till due to the fine-nature of the material. Groundwater conditions were observed during the advancement of explorations, while sampling and immediately upon completion and should be anticipated to vary in response to equilibration time, rainfall, snowmelt, seasonal fluctuations, site development and other factors not present during the time that the explorations were performed. Additionally, perched water may be encountered due to the undulating bedrock/glacial till surface, which may potentially trap run-off.

## FOUNDATION DESIGN RECOMMENDATIONS

**Foundation Design -** The subsurface conditions are suitable for supporting the proposed building atop shallow spread footings with a concrete slab-on-grade. Prior to construction, the surficial material and other unsuitable material should be removed from beneath the entire building footprint and from within the perimeter footings' zone of influence. The footing zone of influence is defined as that area encompassed by a 1V:1H splay originating from 1 foot beyond the edge of the footing and projecting downward and outward. If required the removed material may be replaced with compacted structural fill.

The potential exists for bedrock to be encountered during construction depending upon final development grade. Should the bedrock to be located higher than proposed finish floor elevations, CC has included detailed rock excavation recommendations hereon below. It is expected that footings will bear on either the native material or compacted structural fill, it is recommended that the bedrock be removed to a depth of 1 foot below proposed subgrade and replaced with structural fill to allow for proper uniform drainage.

**Bearing Capacity & Settlement Evaluation** - Based on our explorations and foundation design recommendations the footings will bear atop the native glacial deposit. Provided the subgrade is prepared as outlined hereon below it is recommended the footings be proportioned for a net allowable bearing capacity of 2**.0 tsf**. The foregoing allowable bearing pressure for soil is predicated by footing geometry and depth below grade. With regards to footing geometry, the minimum footing width of column and strip footings should be 4 ft and 2 ft respectively.

Based on the net allowable bearing pressure for footings placed on prepared subgrades, total footing settlement is not expected to exceed 1 inch with differential settlement between adjacent columns being less than 3/4 inch. The majority of the settlement is expected to occur during construction and long term settlements are anticipated to be negligible.

**Frost Protection**—Exterior footings should be protected from frost at a minimum depth for the locality in which the structure is located. Based on local code and building practice, the exterior footing should be protected with at least 4 ft of earthen embedment. Interior footings should be placed at least 18 inches below finish floor grade provided the interior area is to be heated, otherwise a minimum 4 ft of earthen cover is required. If foundation construction is to occur during cold weather, the foundation elements should be protected against frost.

**Seismic Design Considerations** – Based upon a review of the observed site conditions in general accordance with IBC, the project site does not contain soil strata and groundwater conditions susceptible to earthquake-induced liquefaction. Based on the subsurface conditions the Site Class for the project would be C. For Site Coefficient, which reflects the potential site amplification of the traveling seismic waves, it is recommended that S = 1.2 be considered in design of the proposed building.

**Slab-On-Grade**— A concrete slab-on-grade is deemed suitable for the proposed building. Our recommendations are based on the provisions for floor slab design outlined in ACI 302.1. Based on the observed material from the subsurface exploration programs, the subgrades have been classified as a medium support soil. CC recommends that a minimum 8-inch layer of structural fill, meeting the gradation requirements outlined hereon below, be utilized above a properly prepared subgrade. The structural fill provides uniform support for the slab and improved drainage of water from beneath the slab.

The structural fill should be compacted to at least 95 percent relative compaction as determined by the Modified Proctor Test (ASTM D1557). Based upon the foregoing floor slab base preparation, a modulus of subbase reaction ($K_s$) of 200 pounds per cubic inch (pci) may be used for design.

**Foundation Waterproofing/Damproofing Recommendations**— Based on the encountered depth to groundwater and the proposed finish grades, underslab and perimeter foundation drains will not be required. However, CC recommends that a subslab vapor retarder be placed beneath the proposed slab-on-grade. The recommended retarder should be a 8-mil polyethylene with joints lapped a minimum of 12 inches across joints. As recommended in ACI 360R-92, *Design of Slabs on Grade,* paragraph 9.8, the vapor retarder should not be placed in direct contact with slabs on grade. The retarder should be placed atop a properly prepared subgrade beneath the floor slab base course material. This will allow excess bleed water to pass out the bottom of the slab, allowing faster finishing and prevent slab curling.

## CONSTRUCTION CONSIDERATIONS

**Foundation and Floor Slab Subgrade Preparation** - Prior to foundation construction, all traces of surficial material and other unsuitable materials should be removed from the entire building footprint and within the footing zone of influence as previously discussed. Footings should bear directly upon a competent subgrade comprised of the natural deposit or compacted structural fill.

After removing the unsuitable soils, the exposed foundation and floor slab subgrade soils should be proofrolled prior to foundation construction to densify disturbed soils resulting from the excavation and to preload the subgrade. Recommended proofrolling should include 4 coverages with a 2-ton double-drum vibratory roller or 8 coverages with a ¼ ton vibratory plate compactor. During the proofrolling process the subgrade should be observed by a qualified engineer to identify areas exhibiting weaving or excessive reaction. It may be necessary to remove such loose and unstable soils and replace with a free draining granular fill or crushed stone, at the direction of the Engineer.

Proofrolling upon soils that become saturated due to precipitation or within 1 foot of the groundwater table may be detrimental to the competency of the foundation subgrade. Under these circumstances, proofrolling is not recommended. However, the final excavation should be monitored to assess disturbance to prepared subgrades.

**Rock Excavation** - Based on the proposed plan and the subsurface exploration program, the building and potential site work improvements are within the vicinity of explorations which encountered shallow refusal depths. Based on our observations and study of the bedrock in the area and the condition of the bedrock encountered during the exploration program it is expected that the uppermost portions of the bedrock surface are slightly weathered and therefore may be rippable with a large excavator or bulldozer equipped with ripping tooth. Should fresh zones of bedrock be encountered, that are not rippable, they may require excavation by a backhoe-mounted ram or controlled drilling and blasting.

It is recommended that the contractor familiarize himself with the expected bedrock excavation prior to construction. Additionally, project specifications should clearly outline bedrock excavation particularly as it pertains to the contractor's means and methods. Lastly, the blasting specifications should account for Town of Danville requirements.

**Preparation of Bedrock Surface** – CC recommends that the bedrock surface be removed to a minimum of 1 foot below footing subgrade. The bedrock surface should be level and free from loose soil or rock. Minor irregularities in the level of the rock surface may be filled with crushed stone or concrete to provide a level working surface. Following preparation of the surface a 1 foot lift of structural should be placed and compacted to 95% of the maximum dry density determined in accordance with ASTM D1557.

**Construction Dewatering** - Based on the subsurface explorations, construction dewatering may be required during foundation construction to account for surficial run-off, perched water, or encountered groundwater. It is anticipated that construction dewatering may be accomplished using filtered sumps and pumps. In addition the contractor should be prepared to remove any ponded surface water or run-off by means of localized sumps and pumps. A lift of crushed stone at excavation grade may be desired to facilitate dewatering during construction and provide a dry/stable subgrade during construction.

The Contractor should select whichever dewatering method is most familiar and cost-effective to him while, at the same time, meeting the performance criteria of maintaining dry, stable excavation bottoms at all times. The responsibility for a properly designed and executed dewatering program must remain with the Contractor.

**Excavation Support** - Deep excavations (greater than 5 ft) are not anticipated for foundation construction. They may be required for utility installation. It is envisioned that such excavations may be accomplished with slope laybacks. For stable excavation designs, the on-site soil deposits should be considered Type C soils in accordance with Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926). This preliminary soil classification should be verified in the field by a competent person as defined by OSHA.

The maximum temporary slopes for Soil Type C soils is 1.5H:1V provided the groundwater is lowered below the bottom of the excavation and the height of the cut is a maximum 20 feet. The foregoing slope requirement does not consider surcharge loads (stockpiled soils, equipment, materials) which may be situated at the crest of the slope and vibration loads (blasting, soil compaction). It should be noted that these slope requirements are minimums required by OSHA regulations and that any excavation which exceeds the minimum requirements must be designed by a registered professional engineer. Furthermore, it must be stressed the contractor is ultimately responsible for stability of temporary slopes associated with construction activities.

**Structural Fill/Use of On-Site Soil for Backfill**—Structural fill to be used below the building for foundation support should conform to the following gradation requirements. The specified gradation is based on consideration of the recommended allowable bearing pressure and estimated settlement of a spread footing foundation as presented in the **Foundation Considerations Section.**

| Sieve Size | Percent Finer by Weight |
|---|---|
| 3" | 100% |
| #4 | 45-85 |
| #40 | 10-50 |
| #200 | 0-8 |

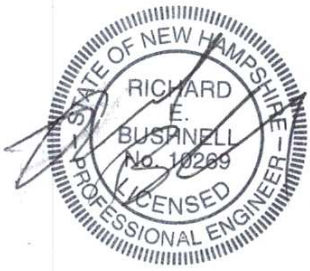
Structural fill should be placed in maximum loose lifts of 12-inches and be compacted to 95 percent of maximum dry density as determined by the modified proctor test (ASTM-D1557). The adequacy of the compaction efforts should be verified by field density testing.

**Construction Monitoring**— It is recommended that the construction activity be monitored by your office in conjunction with engineering oversight by CC to ensure conformance with contract requirements, documents and design concepts. Prior to construction, CC would be pleased to provide a review of the earthwork specifications and structural design as they relate to geotechnical issues.

**Closure** - It has been a pleasure to assist you on this project, and I look forward to its successful completion. In the meantime, if you have any questions on the content of this report, please do not hesitate to contact me.

Very truly yours,

**CIVIL CONNECTION, LLC**




Richard E. Bushnell, P.E.
Principal Engineer

Enclosures

c:\Danville Police Station.geotechnical

## LIMITATIONS

Explorations

1. The analyses, recommendations and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. 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 re-evaluate 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 interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.

3. Water level readings have been made in the test pits and/or test borings under conditions stated on the 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, temperature, and other factors differing from the time the measurements were made.

Review

4. It is recommended that this firm be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.

5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by Civil Connection, LLC.

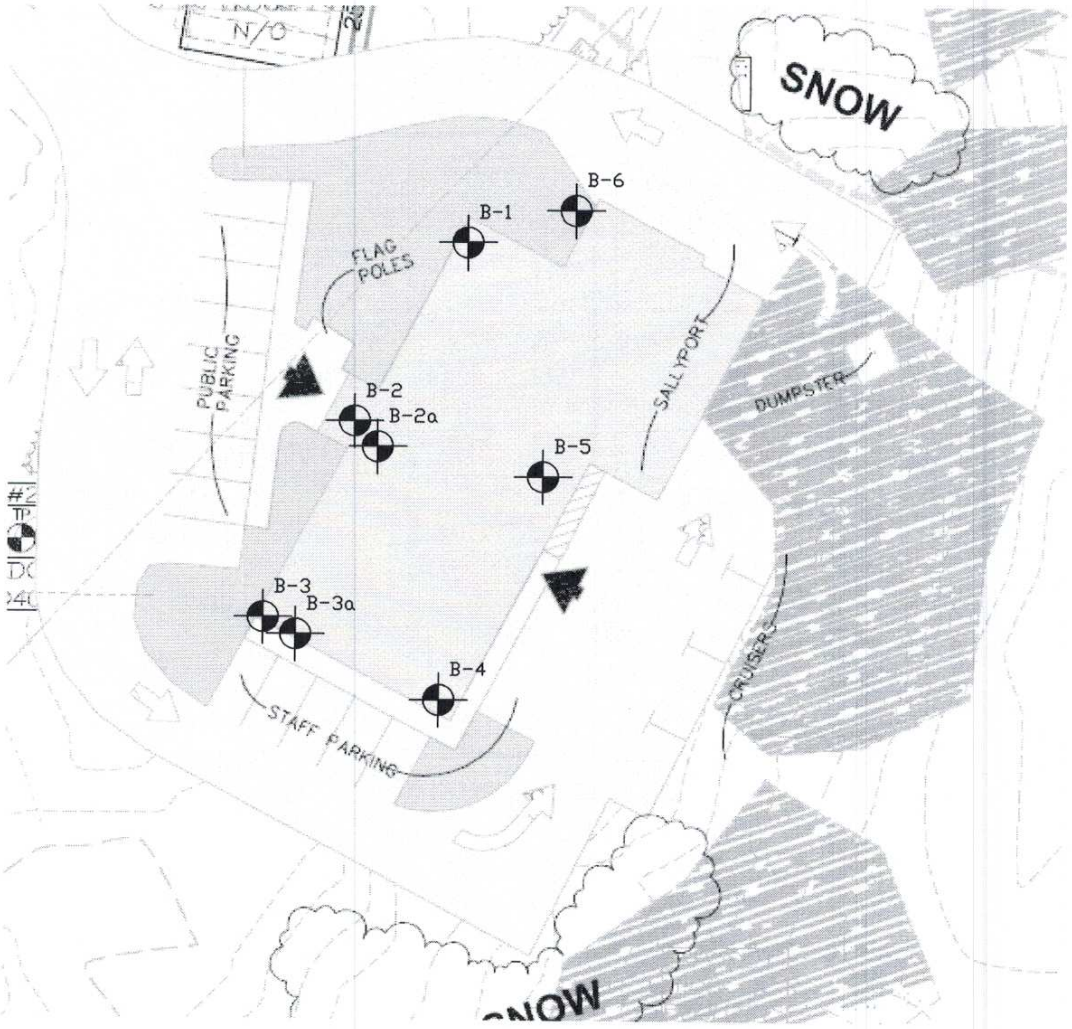
Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during the earthwork 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 the start of construction.

Use of Report

7. This report has been prepared for the exclusive use of ConTest Consultants, Inc. and their assigned in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

8. This report has been prepared for this project by Civil Connection, LLC. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to evaluation considerations only.




B-1 Test Boring Number & Location (TYP)

NOTES:

Test Borings were advanced on December 23, 2019 by Soil X Corporation under the direction of Civil Connection, LLC. Test borings were located based on staked locations in the field by others and should be considered accurate to the degree implied by the survey method.

| | | | |
|---|---|---|---|
| TEST BORING LOCATION PLAN | CIVIL CONNECTION, LLC<br>38 EDWARDS DRIVE GILMANTON IW, NEW HAMPSHIRE 03837<br>TEL. (603) 393-9842 | | |
| DANVILLE POLICE STATION<br><br>DANVILLE, NEW HAMPSHIRE | Drawn By: reb | Date: 12/31/19 | Figure No. SK1 |
| | Checked By: reb | Scale: NTS | |
| | File Name: c:richard danville | Project No.: 19-294 | |

Civil Connection

# TEST BORING LOG

Boring No. B - 1

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Project | Danville Police Station | Project No. | 19-294 | Elevation | |
| Location | Danville, New Hampshire | Project Mgr. | Richard Bushnell | Datum | |
| Client | ConTest Consultants, Inc. | Inspector | Richard Bushnell | Date Started | 12-23-19 |
| Contractor | Soil X Corp | Checked By | Richard Bushnell | Date Finished | 12-23-19 |
| Driller | Pat Goodale | Rig Make & Model | CME 75 | | |

| Item: | Auger | Casing | Sampler | Core Barrel | | Truck | | Skid | Hammer Type: | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type | HSA | | Split Spoon | | | Track | | ATV | X | Safety Hammer |
| Inside Diameter (in). | 4.5 | | | | | Bomb | | Geoprobe | | Doughnut |
| Hammer Weight (lb) | 140 | | | | | Tripod | | Other | X | Automatic |
| Hammer Fall (in.) | 30 | | | | | Winch | | Cat Head | Roller Bit | Cutting Head |

| Depth (ft) | Casing (Blows/ft) | Sample Data No. | Depth (ft) | Rec (in.) | SPT (Blows/ 6-in.) | Rock RQD (%) | PID Rdg. (ppm) | SOIL AND ROCK CLASSIFICATION-DESCRIPTION<br>BURMISTER SYSTEM (SOIL)<br>U.S. CORPS OF ENGINEERS SYSTEM (ROCK) |
|---|---|---|---|---|---|---|---|---|
| 0 | | S-1 | 0-2 | 11 | 3-2 | | | 4" – Forest Mat/Subsoil |
| 1 | | | | | 4-9 | | | Brown/grey, loose, f-m SAND, little Silt, trace Gravel |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | S-2 | 5-7 | 14 | 23-35 | | | Brown/grey, very dense, f-m SAND, some Gravel, little Silt. |
| 6 | | | | | 22 | | | |
| 7 | | | | | 50/2" | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | Auger Refusal – 9'-6" - |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
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| 30 | | | | | | | | |

Water Level Data

| Date | Time | Depth (ft) to: Bott. of Casing | Bott. of Hole | Water |
|---|---|---|---|---|
| 12-23 | UC | | 9'-6" | 5' |
| | | | | |
| | | | | |

**Sample Identification**
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

**Cohesive Soils N-Value**
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30: Very Stiff
Over 30: Hard

**Granular Soils N-Value**
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%) Little (10 to 20%) Some (20 to 35%) And (35 to 50%)

Standard Penetration Test (SPT) = 140# hammer falling 30", Blows are per 6" taken with an 18" long x 1.5" I.D. split spoon sampler in accordance with ASTM D 1586, unless otherwise noted.

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test borings at times and under conditions stated on the test boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

Notes:

CIVIL CONNECTION, LLC • 38 Edwards Drive, Gilmanton IW, NH 03837 • (603) 393-9842 •

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# TEST BORING LOG

Boring No. B - 2

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Project | Danville Police Station | Project No. | 19-294 | Elevation | |
| Location | Danville, New Hampshire | Project Mgr. | Richard Bushnell | Datum | |
| Client | ConTest Consultants, Inc. | Inspector | Richard Bushnell | Date Started | 12-23-19 |
| Contractor | Soil X Corp | Checked By | Richard Bushnell | Date Finished | 12-23-19 |
| Driller | Pat Goodale | Rig Make & Model | CME 75 | | |

| Item: | Auger | Casing | Sampler | Core Barrel | | Truck | | Skid | Hammer Type: | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type | HSA | | Split Spoon | | | Track | | ATV | X | Safety Hammer |
| Inside Diameter (in). | 4.5 | | | | | Bomb | | Geoprobe | | Doughnut |
| Hammer Weight (lb) | 140 | | | | | Tripod | | Other | X | Automatic |
| Hammer Fall (in.) | 30 | | | | | Winch | | Cat Head | Roller Bit | Cutting Head |

| Depth (ft) | Casing (Blows/ft) | Sample Data No. | Depth (ft) | Rec (in.) | SPT (Blows/ 6-in.) | Rock RQD (%) | PID Rdg. (ppm) | SOIL AND ROCK CLASSIFICATION-DESCRIPTION<br>BURMISTER SYSTEM (SOIL)<br>U.S. CORPS OF ENGINEERS SYSTEM (ROCK) |
|---|---|---|---|---|---|---|---|---|
| 0 | | S-1 | 0-2 | 15 | 9-7 | | | Dark brown, medium-dense, f-m SAND, little Gravel, trace Silt – piece of Asphalt – (FILL) |
| 1 | | | | | 8-6 | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | S-2 | 5-7 | 11 | 32-42 | | | Brown/grey, very dense, f-m SAND, some Gravel, little Silt. |
| 6 | | | | | 62/4" | | | |
| 7 | | | | | | | | Auger Refusal – 7'-11" |
| 8 | | | | | | | | Reset 5' to assess depth of refusal |
| 9 | | | | | | | | |
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Water Level Data

| Date | Time | Depth (ft) to: Bott. of Casing | Bott. of Hole | Water |
|---|---|---|---|---|
| 12-23 | UC | | 7'-11" | 7' |
| | | | | |
| | | | | |

**Sample Identification**
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

**Cohesive Soils N-Value**
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30: Very Stiff
Over 30: Hard

**Granular Soils N-Value**
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%) Little (10 to 20%) Some (20 to 35%) And (35 to 50%)

Standard Penetration Test (SPT) = 140# hammer falling 30", Blows are per 6" taken with an 18" long x 1.5" I.D. split spoon sampler in accordance with ASTM D 1586, unless otherwise noted.

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test borings at times and under conditions stated on the test boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

Notes:

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Civil Connection

# TEST BORING LOG

Boring No. B - 2a

Page 1 of 1

| | | | |
|---|---|---|---|
| Project | Danville Police Station | Project No. | 19-294 |
| Location | Danville, New Hampshire | Project Mgr. | Richard Bushnell |
| Client | ConTest Consultants, Inc. | Inspector | Richard Bushnell |
| Contractor | Soil X Corp | Checked By | Richard Bushnell |
| Driller | Pat Goodale | Rig Make & Model | CME 75 |
| Elevation | | | |
| Datum | | | |
| Date Started | 12-23-19 | | |
| Date Finished | 12-23-19 | | |

| Item: | Auger | Casing | Sampler | Core Barrel | | Truck | | Skid | Hammer Type: | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type | HSA | | Split Spoon | | | Track | | ATV | X | Safety Hammer |
| Inside Diameter (in). | 4.5 | | | | | Bomb | | Geoprobe | | Doughnut |
| Hammer Weight (lb) | 140 | | | | | Tripod | | Other | X | Automatic |
| Hammer Fall (in.) | 30 | | | | | Winch | | Cat Head | Roller Bit | Cutting Head |

| Depth (ft) | Casing (Blows/ft) | Sample Data No. | Depth (ft) | Rec (in.) | SPT (Blows/ 6-in.) | Rock RQD (%) | PID Rdg. (ppm) |
|---|---|---|---|---|---|---|---|
| 0 | | | | | | | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
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| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | | | | | | | |

**SOIL AND ROCK CLASSIFICATION-DESCRIPTION**
BURMISTER SYSTEM (SOIL)
U.S. CORPS OF ENGINEERS SYSTEM (ROCK)

Drill Rig – Reset 5 feet from B-2 to assess Depth of Refusal

Auger Refusal – 9'-2" -

Water Level Data

| Date | Time | Depth (ft) to: Bott. of Casing | Bott. of Hole | Water |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

**Sample Identification**
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

**Cohesive Soils N-Value**
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30: Very Stiff
Over 30: Hard

**Granular Soils N-Value**
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%) Little (10 to 20%) Some (20 to 35%) And (35 to 50%)

Standard Penetration Test (SPT) = 140# hammer falling 30", Blows are per 6" taken with an 18" long x 1.5" I.D. split spoon sampler in accordance with ASTM D 1586, unless otherwise noted.

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test borings at times and under conditions stated on the test boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

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# TEST BORING LOG

Boring No. B - 3

Page 1 of 1

| | | | |
|---|---|---|---|
| Project | Danville Police Station | Project No. | 19-294 |
| Location | Danville, New Hampshire | Project Mgr. | Richard Bushnell |
| Client | ConTest Consultants, Inc. | Inspector | Richard Bushnell |
| Contractor | Soil X Corp | Checked By | Richard Bushnell |
| Driller | Pat Goodale | Rig Make & Model | CME 75 |

| Item: | Auger | Casing | Sampler | Core Barrel |
|---|---|---|---|---|
| Type | HSA | | Split Spoon | |
| Inside Diameter (in). | 4.5 | | | |
| Hammer Weight (lb) | 140 | | | |
| Hammer Fall (in.) | 30 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Truck | | Skid | | Hammer Type: | |
| | Track | | ATV | X | Safety Hammer | |
| | Bomb | | Geoprobe | | Doughnut | |
| | Tripod | | Other | X | Automatic | |
| | Winch | | Cat Head | | Roller Bit | | Cutting Head |

| Depth (ft) | Casing (Blows/ft) | Sample Data No. | Depth (ft) | Rec (in.) | SPT (Blows/ 6-in.) | Rock RQD (%) | PID Rdg. (ppm) | SOIL AND ROCK CLASSIFICATION-DESCRIPTION<br>BURMISTER SYSTEM (SOIL)<br>U.S. CORPS OF ENGINEERS SYSTEM (ROCK) |
|---|---|---|---|---|---|---|---|---|
| 0 | | S-1 | 0-2 | 13 | 5-9 | | | Brown, medium-dense to dense, f-m SAND, some Gravel, little Silt, (FILL) |
| 1 | | | | | 36-31 | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | S-2 | 5-7 | 19 | 39-24 | | | Brown/grey, very dense, f-m SAND, some Gravel, little Silt. |
| 6 | | | | | 60 | | | Approximate 2" layer of f-m SAND, little Silt embedded in sample |
| 7 | | | | | 50/4" | | | |
| 8 | | | | | | | | Auger Refusal – 7'-11" |
| 9 | | | | | | | | Reset Drill Rig 5' to assess depth of refusal. |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
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| 28 | | | | | | | | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |

Water Level Data

| Date | Time | Depth (ft) to: Bott. of Casing | Bott. of Hole | Water |
|---|---|---|---|---|
| 12-23 | UC | | 7'-11" | 7'-6" |
| | | | | |
| | | | | |

**Sample Identification**
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

**Cohesive Soils N-Value**
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30: Very Stiff
Over 30: Hard

**Granular Soils N-Value**
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%) Little (10 to 20%) Some (20 to 35%) And (35 to 50%)

Standard Penetration Test (SPT) = 140# hammer falling 30", Blows are per 6" taken with an 18" long x 1.5" I.D. split spoon sampler in accordance with ASTM D 1586, unless otherwise noted.

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test borings at times and under conditions stated on the test boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

Notes:

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# TEST BORING LOG

Boring No. B - 3a

Page 1 of 1

| | | | |
|---|---|---|---|
| Project | Danville Police Station | Project No. | 19-294 |
| Location | Danville, New Hampshire | Project Mgr. | Richard Bushnell |
| Client | ConTest Consultants, Inc. | Inspector | Richard Bushnell |
| Contractor | Soil X Corp | Checked By | Richard Bushnell |
| Driller | Pat Goodale | Rig Make & Model | CME 75 |
| Elevation | | | |
| Datum | | | |
| Date Started | 12-23-19 | | |
| Date Finished | 12-23-19 | | |

| Item: | Auger | Casing | Sampler | Core Barrel | | Truck | | Skid | Hammer Type: | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type | HSA | | Split Spoon | | | Track | | ATV | X | Safety Hammer |
| Inside Diameter (in). | 4.5 | | | | | Bomb | | Geoprobe | | Doughnut |
| Hammer Weight (lb) | 140 | | | | | Tripod | | Other | X | Automatic |
| Hammer Fall (in.) | 30 | | | | | Winch | | Cat Head | Roller Bit | Cutting Head |

| Depth (ft) | Casing (Blows/ft) | Sample Data No. | Depth (ft) | Rec (in.) | SPT (Blows/ 6-in.) | Rock RQD (%) | PID Rdg. (ppm) |
|---|---|---|---|---|---|---|---|
| 0 | | | | | | | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
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| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |
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| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | | | | | | | |

**SOIL AND ROCK CLASSIFICATION-DESCRIPTION**
BURMISTER SYSTEM (SOIL)
U.S. CORPS OF ENGINEERS SYSTEM (ROCK)

Drill Rig Reset 5' from B-3 to Assess Depth of Refusal

Auger Refusal – 7'-6"

Water Level Data

| Date | Time | Depth (ft) to: Bott. of Casing | Bott. of Hole | Water |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

**Sample Identification**
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

**Cohesive Soils N-Value**
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30: Very Stiff
Over 30: Hard

**Granular Soils N-Value**
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%) Little (10 to 20%) Some (20 to 35%) And (35 to 50%)

Standard Penetration Test (SPT) = 140# hammer falling 30", Blows are per 6" taken with an 18" long x 1.5" I.D. split spoon sampler in accordance with ASTM D 1586, unless otherwise noted.

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test borings at times and under conditions stated on the test boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

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# TEST BORING LOG

Boring No. B - 4

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Project | Danville Police Station | Project No. | 19-294 | Elevation | |
| Location | Danville, New Hampshire | Project Mgr. | Richard Bushnell | Datum | |
| Client | ConTest Consultants, Inc. | Inspector | Richard Bushnell | Date Started | 12-23-19 |
| Contractor | Soil X Corp | Checked By | Richard Bushnell | Date Finished | 12-23-19 |
| Driller | Pat Goodale | Rig Make & Model | CME 75 | | |

| Item: | Auger | Casing | Sampler | Core Barrel | | Truck | | Skid | Hammer Type: | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type | HSA | | Split Spoon | | | Track | | ATV | X | Safety Hammer |
| Inside Diameter (in). | 4.5 | | | | | Bomb | | Geoprobe | | Doughnut |
| Hammer Weight (lb) | 140 | | | | | Tripod | | Other | X | Automatic |
| Hammer Fall (in.) | 30 | | | | | Winch | | Cat Head | Roller Bit | Cutting Head |

| Depth (ft) | Casing (Blows/ft) | Sample Data No. | Depth (ft) | Rec (in.) | SPT (Blows/ 6-in.) | Rock RQD (%) | PID Rdg. (ppm) | SOIL AND ROCK CLASSIFICATION-DESCRIPTION<br>BURMISTER SYSTEM (SOIL)<br>U.S. CORPS OF ENGINEERS SYSTEM (ROCK) |
|---|---|---|---|---|---|---|---|---|
| 0 | | S-1 | 0-2 | 3 | 6-8 | | | Brown, medium-dense, f-m SAND, some Gravel, little Silt (FILL) |
| 1 | | | | | 6-4 | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | S-2 | 5-7 | 16 | 20-26 | | | Brown/grey, very dense, f-m SAND, some Gravel, little Silt. |
| 6 | | | | | 25-36 | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | S-3 | 10-12 | 2 | 50/3" | | | Brown, very dense, f-m SAND, some Gravel, little Silt, piece of rock<br>In tip of Spoon<br>Refusal – 10'-3" |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
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| 28 | | | | | | | | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |

Water Level Data

| Date | Time | Depth (ft) to: Bott. of Casing | Bott. of Hole | Water |
|---|---|---|---|---|
| 12-23 | UC | | 10'-3" | 9' |
| | | | | |
| | | | | |

**Sample Identification**
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

**Cohesive Soils N-Value**
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30: Very Stiff
Over 30: Hard

**Granular Soils N-Value**
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%) Little (10 to 20%) Some (20 to 35%) And (35 to 50%)

Standard Penetration Test (SPT) = 140# hammer falling 30", Blows are per 6" taken with an 18" long x 1.5" I.D. split spoon sampler in accordance with ASTM D 1586, unless otherwise noted.

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test borings at times and under conditions stated on the test boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

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# TEST BORING LOG

Boring No. B - 5

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Project | Danville Police Station | Project No. | 19-294 | Elevation | |
| Location | Danville, New Hampshire | Project Mgr. | Richard Bushnell | Datum | |
| Client | ConTest Consultants, Inc. | Inspector | Richard Bushnell | Date Started | 12-23-19 |
| Contractor | Soil X Corp | Checked By | Richard Bushnell | Date Finished | 12-23-19 |
| Driller | Pat Goodale | Rig Make & Model | CME 75 | | |

| Item: | Auger | Casing | Sampler | Core Barrel | | Truck | | Skid | Hammer Type: | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type | HSA | | Split Spoon | | | Track | | ATV | X | Safety Hammer |
| Inside Diameter (in). | 4.5 | | | | | Bomb | | Geoprobe | | Doughnut |
| Hammer Weight (lb) | 140 | | | | | Tripod | | Other | X | Automatic |
| Hammer Fall (in.) | 30 | | | | | Winch | | Cat Head | Roller Bit | Cutting Head |

| Depth (ft) | Casing (Blows/ft) | Sample Data No. | Depth (ft) | Rec (in.) | SPT (Blows/ 6-in.) | Rock RQD (%) | PID Rdg. (ppm) | SOIL AND ROCK CLASSIFICATION-DESCRIPTION<br>BURMISTER SYSTEM (SOIL)<br>U.S. CORPS OF ENGINEERS SYSTEM (ROCK) |
|---|---|---|---|---|---|---|---|---|
| 0 | | S-1 | 0-2 | 17 | 4-8 | | | Brown/Grey, medium-dense, f-m SAND, little-some Gravel, trace-little Silt (FILL) |
| 1 | | | | | 23-13 | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | S-2 | 5-7 | 19 | 12-30 | | | Brown/grey, very dense, f-m SAND, some Gravel, little Silt. |
| 6 | | | | | 38-43 | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | S-3 | 10-12 | 1 | 50/4" | | | Wet Rock Fragments recovered – minimal soil |
| 11 | | | | | | | | |
| 12 | | | | | | | | Refusal – 11'-0" |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
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| 26 | | | | | | | | |
| 27 | | | | | | | | |
| 28 | | | | | | | | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |

Water Level Data

| Date | Time | Depth (ft) to: Bott. of Casing | Bott. of Hole | Water |
|---|---|---|---|---|
| 12-23 | UC | | 11'-0" | 8'-6" |
| | | | | |
| | | | | |

**Sample Identification**
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

**Cohesive Soils N-Value**
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30: Very Stiff
Over 30: Hard

**Granular Soils N-Value**
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%) Little (10 to 20%) Some (20 to 35%) And (35 to 50%)

Standard Penetration Test (SPT) = 140# hammer falling 30", Blows are per 6" taken with an 18" long x 1.5" I.D. split spoon sampler in accordance with ASTM D 1586, unless otherwise noted.

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test borings at times and under conditions stated on the test boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

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# TEST BORING LOG

Boring No. B - 6

Page 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Project | Danville Police Station | Project No. | 19-294 | Elevation | |
| Location | Danville, New Hampshire | Project Mgr. | Richard Bushnell | Datum | |
| Client | ConTest Consultants, Inc. | Inspector | Richard Bushnell | Date Started | 12-23-19 |
| Contractor | Soil X Corp | Checked By | Richard Bushnell | Date Finished | 12-23-19 |
| Driller | Pat Goodale | Rig Make & Model | CME 75 | | |

| Item: | Auger | Casing | Sampler | Core Barrel |
|---|---|---|---|---|
| Type | HSA | | Split Spoon | |
| Inside Diameter (in). | 4.5 | | | |
| Hammer Weight (lb) | 140 | | | |
| Hammer Fall (in.) | 30 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Truck | | Skid | Hammer Type: | | | | |
| | Track | | ATV | X | Safety Hammer | | | |
| | Bomb | | Geoprobe | | Doughnut | | | |
| | Tripod | | Other | X | Automatic | | | |
| | Winch | | Cat Head | | Roller Bit | | Cutting Head | |

| Depth (ft) | Casing (Blows/ft) | Sample Data No. | Depth (ft) | Rec (in.) | SPT (Blows/ 6-in.) | Rock RQD (%) | PID Rdg. (ppm) | SOIL AND ROCK CLASSIFICATION-DESCRIPTION<br>BURMISTER SYSTEM (SOIL)<br>U.S. CORPS OF ENGINEERS SYSTEM (ROCK) |
|---|---|---|---|---|---|---|---|---|
| 0 | | S-1 | 0-2 | 15 | 1-8 | | | 9" – Forest Mat/Subsoil |
| 1 | | | | | 7-9 | | | Brown/grey, loose, f-m SAND, little Silt, trace Gravel |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | S-2 | 5-7 | 16 | 15-53 | | | Brown/grey, very dense, f-m SAND, some Gravel, little Silt. |
| 6 | | | | | 49-57 | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | Auger Refusal – 9' |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
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| 27 | | | | | | | | |
| 28 | | | | | | | | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |

Water Level Data

| Date | Time | Depth (ft) to: Bott. of Casing | Bott. of Hole | Water |
|---|---|---|---|---|
| 12-23 | UC | | 9'-0" | 6'-6" |
| | | | | |
| | | | | |

**Sample Identification**
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

**Cohesive Soils N-Value**
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30: Very Stiff
Over 30: Hard

**Granular Soils N-Value**
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%) Little (10 to 20%) Some (20 to 35%) And (35 to 50%)

Standard Penetration Test (SPT) = 140# hammer falling 30", Blows are per 6" taken with an 18" long x 1.5" I.D. split spoon sampler in accordance with ASTM D 1586, unless otherwise noted.

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test borings at times and under conditions stated on the test boring logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

Notes: