REPORT

19-1118.1S

October 21, 2019

Explorations and Geotechnical Engineering Services

Proposed Trademark FCU
340 Main Street (U.S. Route 1)
South Portland, Maine

Prepared For:
JD Design Associates, Inc.
Attention: Jim Durgin
29 Boulder Drive
Standish, ME 04084

Prepared By:
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Gray, ME 04039
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- Geotechnical Engineering
- Construction Materials Testing and Special Inspections
- GeoEnvironmental Services
- Test Boring Explorations

www.swcole.com
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1.0 INTRODUCTION

1.1 Scope and Purpose
The purpose of our services was to obtain subsurface information at the site in order to develop geotechnical recommendations relative to foundations and earthwork associated with the proposed construction. Our scope of services included test boring explorations, soils laboratory testing, a geotechnical analysis of the subsurface findings and preparation of this report.

1.2 Site and Proposed Construction
The site is located at 340 Main Street in South Portland, Maine and is designated by the City of South Portland, Maine as Tax Map 41 Lot 113B and is located on the corner of Main Street and Skillings Street in the Cash Corner neighborhood. The site is approximately 0.51 acres and is currently occupied by a 2,300 square foot, 1-story, multi-
tenant commercial/retail building and a 1,440 square foot 1-story, storage building on the northerly and easterly sides. Both buildings will be razed in favor of the new construction. The remainder of the site is mostly paved. The site is relatively flat and based on limited topographic information, appears to be at about elevation 30 feet (project datum).

We understand the project consists of a one-story, wood-framed bank structure with plan dimensions on the order of 40 by 80 feet. We understand the slab-on-grade floor will be at elevation 30.1 feet. Proposed site grading is not available at this time, however, we anticipate new site grades will be within about 12 inches of existing grades. We understand a 2 lane Drive-thru is planned on the northeast side of the structure. Paved access is planned from Skillings and Main Streets.

Proposed and existing site features are shown on the “Exploration Location Plan” attached in Appendix B.

2.0 EXPLORATION AND TESTING

2.1 Explorations
Six test borings (B-1 and B-3 through B-7) were made at the site on October 7, 2019, by S. W. Cole Explorations, LLC. Boring B-2 was not drilled due to overhead and subsurface utility conflicts. The exploration locations were selected and established in the field by S. W. Cole Engineering, Inc. (S.W.COLE) using measurements from existing site features and a plan provided by Walsh Engineering, Inc. The approximate exploration locations are shown on the “Exploration Location Plan” attached in Appendix B. Logs of the explorations and a key to the notes and symbols used on the logs are attached in Appendix C. The elevations shown on the logs were estimated based on topographic information shown on the “Exploration Location Plan”.

2.2 Field and Laboratory Testing
The test borings were drilled using a combination of solid stem auger, cased wash-boring and rod probe techniques. The soils were sampled at 2 to 5 foot intervals using a split spoon sampler and Standard Penetration Testing (SPT) methods. Pocket Penetrometer Tests (PPT) were performed where cohesive soils were encountered. SPT blow counts and PPT results are shown on the logs. Soil samples obtained from the explorations were returned to our laboratory for further classification and testing.
The results of soil moisture content testing are noted on the log sheets. The results of two soil gradation tests are attached in Appendix D.

3.0 SUBSURFACE CONDITIONS

3.1 Soil and Bedrock
Beneath the existing pavement, the explorations encountered a soil profile generally consisting of uncontrolled granular fill overlying native outwash sands, overlying layered glaciomarine sands and silty clay. The principal strata encountered are summarized below. Not all the strata were encountered at each exploration; refer to the attached logs for more detailed subsurface information.

Uncontrolled Fill: Each of the explorations encountered a surficial layer of uncontrolled granular fill extending to depths of about 2 to 4 feet below the existing ground surface. The fill generally consists of medium dense brown and black sand with varying amounts of silt and gravel. A thin layer of what appears to be ash was observed in the fill at boring B-6.

Outwash Sands: Underlying the fill soils, the explorations encountered a loose to medium dense rust brown sand with a trace to some silt. Occasional silt seams and clay layers were encountered within this deposit. Where penetrated, the rust brown sand deposit extends to depths varying from about 8 to 13 feet below the ground surface. Boring B-7, was terminated in this sand deposit at a depth of about 8 feet.

Glaciomarine Clays and Sands: Beneath the native outwash sands, borings B-1 and B-3 through B-6 encountered loose or soft gray silty clay with frequent gray clayey silty sand layers. These borings were terminated in this deposit at depths varying from about 14 to 19 feet below the ground surface. Boring B-5 was a cased, wash boring and was sampled to a depth of about 31 feet in the glaciomarine deposit and then advanced using a rod probe to a depth of about 48 feet. Based on the blow counts, it appears the layered glaciomarine soils extend to at least 48 feet below the ground surface.

Refusal Surfaces: Refusal surfaces were not met within the depths explored.
3.2 Groundwater
The test borings encountered groundwater at depths ranging from about 7.5 to 9 feet below the ground surface at the time of drilling. Long term groundwater information is not available. It should be anticipated that groundwater levels will fluctuate to higher levels, particularly in response to periods of snowmelt and precipitation, as well as changes in site use.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings
Based on the subsurface findings, the proposed construction appears feasible from a geotechnical standpoint. The principle geotechnical considerations include:

- We understand the existing structures and foundations, slabs, pavement and utilities will be removed. Depressions left by structure and utility removal should be backfilled with compacted Granular Fill. After grubbing and backfilling depressions, we recommend proof rolling the site with a 10 ton vibratory roller compactor to help densify the upper site soils. Areas that become soft or continue to yield after proofrolling must be removed and replaced with compacted Granular Borrow overlying geotextile fabric, where needed. S.W.COLE should be on site to observe the densification.

- All uncontrolled fill should be removed from beneath all foundations to expose the native sands. All foundations should be underlain with at least 12 inches of geotextile fabric-wrapped Crushed Stone. Foundation subgrades should be densified with a vibratory plate compactor weighing at least 500 ponds prior to placing the geotextile fabric and Crushed Stone.

- Based on the findings at boring B-6, there may be some ash encountered during construction which will need to be characterized and properly disposed of.

- The floor slab should be underlain with at least 12 inches of compacted Structural Fill overlying stable, densified subgrades.
Earthwork and foundation activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Excavation of bearing surfaces should be completed with a smooth-edged bucket to lessen subgrade disturbance.

4.2 Site and Subgrade Preparation
We recommend that site preparation begin with the construction of an erosion control system to protect adjacent drainage ways and areas outside the construction limits. We recommend site preparation include removal of existing structures, foundations, floor slabs, utilities, pavements, topsoil and disturbed soils form areas of construction. Depressions from demolition should be backfilled with compacted Granular Borrow overlying stable subgrades. We recommend the site soils be densified by proof-rolling with at least 3 passes of a vibratory roller compactor weighing about 10 tons. Soft or yielding soil should be removed and replaced with Granular Borrow underlain with geotextile fabric, where needed. As much vegetation as possible should remain outside the construction areas to lessen the potential for erosion and site disturbance.

Building Pad and Footings: We recommend the floor slab be underlain with at least 12 inches of compacted Structural Fill overlying densified, stable existing soils. We recommend all footings be underlain with at least 12 inches of compacted Crushed Stone fully wrapped with a non-woven geotextile fabric, such as Mirafi 180N, overlying densified subgrades.

Paved Areas and Utilities: Uncontrolled fills encountered beneath paved and hardscape areas should also be proof-rolled with at least 3 passes of a 10-ton vibratory roller compactor prior to placing new fills. Areas that become soft or continue to yield after densification should be removed and replaced with compacted Granular Borrow and geotextile fabric, where needed.

Beneath pipes and utility structures with soft trench bottoms, we recommend overexcavating with a smooth edged bucket and installing at least 1 foot of Underdrain Sand below customary bedding materials wrapped in non-woven geotextile filter fabric, such as Mirafi 180N. The depth of customary bedding materials for soft trench bottoms should be at least 12 inches of pipes and 24 inches of structures.
4.3 Excavation and Dewatering
The site is occupied by two structures and is in an area that has been developed for many years. As such, the contractor should anticipate excavation work will generally encounter existing and possibly relic foundation structures and utilities. Excavation will also encounter uncontrolled fills and the underlying native sand soils. Care must be exercised during construction to limit disturbance of the bearing soils. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Final cuts to subgrade should be performed with a smooth-edged bucket to help reduce strength loss from soil disturbance.

Sumping and pumping dewatering techniques should be adequate to control groundwater in excavations above the groundwater table. Controlling the water levels to at least one foot below planned excavation depths will help stabilize subgrades during construction. Excavations must be properly shored or sloped in accordance with OSHA Regulations to prevent sloughing and caving of the sidewalls during construction. Care must be taken to preclude undermining adjacent structures, utilities and roadways. The design and planning of excavations, excavation support systems, and dewatering is the responsibility of the contractor.

4.4 Foundations
We recommend the proposed building be supported on spread footings founded on at least 12-inches of geotextile fabric wrapped, compacted Crushed Stone overlying densified, stable, native sands. For foundations bearing on properly prepared subgrades, we recommend the following geotechnical parameters for design consideration:

<table>
<thead>
<tr>
<th>Geotechnical Parameters for Spread Footings on Improved Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Frost Depth (100 year AFI)</td>
</tr>
<tr>
<td>Net Allowable Soil Bearing Pressure</td>
</tr>
<tr>
<td>Base Friction Factor</td>
</tr>
<tr>
<td>Total Unit Weight of Backfill</td>
</tr>
<tr>
<td>At-Rest Lateral Earth Pressure Coefficient</td>
</tr>
<tr>
<td>Internal Friction Angle of Backfill</td>
</tr>
<tr>
<td>Seismic Soil Site Class (Shear Wave Velocity Method)</td>
</tr>
<tr>
<td>Estimated Total Settlement</td>
</tr>
<tr>
<td>Differential Settlement Across Building</td>
</tr>
</tbody>
</table>

We recommend all footings be at least 24 inches in their least dimension.
4.5 Foundation Drainage
We recommend an underdrain system be installed on the outside edge of the geotextile fabric-wrapped Crushed Stone beneath the perimeter spread footings. The underdrain pipe should consist of 4-inch diameter, perforated SDR-35 foundation drain pipe bedded in Crushed Stone and wrapped in non-woven geotextile fabric. The underdrain pipe must have a positive gravity outlet protected from freezing, clogging and backflow. Surface grades should be sloped away from the building for positive surface water drainage. General underdrain details are illustrated on the “Foundation Detail Sketch” attached in Appendix B.

4.6 Slab-On-Grade
On-grade floor slabs in heated areas may be designed using a subgrade reaction modulus of 100 pci (pounds per cubic inch) provided the slab is underlain by at least 12-inches of compacted Structural Fill placed over densified, stable subgrades. The structural engineer or concrete consultant must design steel reinforcing and joint spacing appropriate to slab thickness and function.

We recommend a sub-slab vapor retarder particularly in areas of the building where the concrete slab will be covered with an impermeable surface treatment or floor covering that may be sensitive to moisture vapors. The vapor retarder must have a permeance that is less than the floor cover or surface treatment that is applied to the slab. The vapor retarder must have sufficient durability to withstand direct contact with the sub-slab base material and construction activity. The vapor retarder material should be placed according to the manufacturer’s recommended method, including the taping and lapping of all joints and wall connections. The architect and/or flooring consultant should select the vapor retarder products compatible with flooring and adhesive materials.

The floor slab should be appropriately cured using moisture retention methods after casting. Typical floor slab curing methods should be used for at least 7 days. The architect or flooring consultant should assign curing methods consistent with current applicable American Concrete Institute (ACI) procedures with consideration of curing method compatibility to proposed surface treatments, flooring and adhesive materials.
4.7 Entrance Slabs and Sidewalks
Entrance slabs and sidewalks adjacent to the building must be designed to reduce the effects of differential frost action between adjacent pavement, doorways, and entrances. We recommend that non-frost susceptible Structural Fill be provided to a depth of at least 4.5 feet below the top of entrance slabs. This thickness of Structural Fill should extend the full width of the entrance slab and outward at least 4.5 feet, thereafter transitioning up to the bottom of the adjacent sidewalk or pavement gravels at a 3H:1V or flatter slope. General details of this frost transition zone are shown on the “Foundation Detail Sketch” attached in Appendix B.

For plaza slabs extending beyond immediate building entrances, we recommend extending the thickness of Structural Fill beneath the entire plaza slab thereafter transitioning up to the bottom of the adjacent sidewalk or pavement gravels at a 3H:1V or flatter slope. Alternatively, the entrance slab and plaza slab may be insulated for frost protection. General details of this frost transition zone are shown on the “Foundation Detail Sketch” attached in Appendix B.

4.8 Fill, Backfill and Compaction
We recommend the following fill and backfill materials: recycled products must also be tested in accordance with applicable environmental regulations and approved by a qualified environmental consultant.

**Common Borrow:** Fill to raise grades in landscape areas should be non-organic compactable earth meeting the requirements of 2014 MaineDOT Standard Specification 703.18 Common Borrow.

**Granular Borrow:** Fill to raise grades in building and paved areas, as well as to repair soft areas, should be sand or silty sand meeting the requirements of 2014 MaineDOT Standard Specification 703.19 Granular Borrow.

**Structural Fill:** Backfill for foundations, slab base material and material below exterior entrances slabs should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below:

<table>
<thead>
<tr>
<th>Structural Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sieve Size</strong></td>
</tr>
<tr>
<td>4 inch</td>
</tr>
<tr>
<td><strong>Percent Finer by Weight</strong></td>
</tr>
<tr>
<td>100</td>
</tr>
</tbody>
</table>
### Underdrain Sand
Sand used beneath bedding materials in soft trench bottoms should be clean, free-draining sand meeting the requirements of 2014 MaineDOT Standard Specification 703.22 Underdrain Backfill Material Type B.

### Crushed Stone
Crushed Stone, used beneath foundations and for underdrain aggregate should be washed ¾-inch crushed stone meeting the requirements of 2014 MaineDOT Standard Specification 703.22 Underdrain Backfill Material Type C.

### Reuse of Site Soils
The native sands are unsuitable for reuse in building areas, but may be suitable for reuse as Granular Borrow beneath paved areas, provided they are at a compactable moisture content at the time of reuse.

### Placement and Compaction
Fill should be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thicknesses for grading, fill and backfill activities should not exceed 12 inches. We recommend that fill and backfill in building and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Crushed Stone should be compacted with 3 to 5 passes of a vibratory plate compactor having a static weight of at least 500 pounds.

### 4.9 Weather Considerations
Construction activity should be limited during wet and freezing weather and the site soils may require drying or thawing before construction activities may continue. The contractor should anticipate the need for water to temper fills in order to facilitate compaction during dry weather. If construction takes place during cold weather, subgrades, foundations and floor slabs must be protected during freezing conditions. Concrete and fill must not be placed on frozen soil; and once placed, the concrete and soil beneath the structure must be protected from freezing.
4.10 Design Review and Construction Testing
S.W.COLE should be retained to review the construction documents prior to bidding to determine that our earthwork, foundation and pavement recommendations have been properly interpreted and implemented.

A soils and concrete testing program should be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE is available to observe earthwork activities, the preparation of foundation bearing surfaces and pavement subgrades, as well as to provide testing and IBC Special Inspection services for soils, concrete, steel, spray-applied fireproofing, structural masonry and asphalt construction materials.

5.0 CLOSURE
It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you during the construction phase of the project.

Sincerely,

S. W. Cole Engineering, Inc.

Paul F. Kohler, P.E.
Senior Geotechnical Engineer

PFK:ajh
APPENDIX A

Limitations

This report has been prepared for the exclusive use of JD Design Associates, Inc., for specific application to the proposed Trademark FCU Project at 340 U.S. Route 1 in South Portland, Maine. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE’s scope of services has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term “Biological Pollutants” includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE.
APPENDIX B

Figures
NOTE:

1. UNDERDRAIN INSTALLATION AND MATERIAL GRADATION RECOMMENDATIONS ARE CONTAINED WITHIN THIS REPORT.

2. DETAIL IS PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY, NOT FOR CONSTRUCTION.
APPENDIX C

Exploration Logs and Key
**BORING LOG**

**LOCATION:** See Exploration Location Plan  
**ELEVATION (FT):** 30' +/-  
**TOTAL DEPTH (FT):** 14.0  
**LOGGED BY:** Paul Kohler

**DRILLING CO.:** S. W. Cole Explorations, LLC  
**DRILLER:** Corey Culligan  
**DRILLING METHOD:** Hollow Stem Auger  
**AUGER ID/OD:** 2 1/4 in / 5 5/8 in  
**HAMMER TYPE:** Automatic  
**HAMMER WEIGHT (lbs):** 140 / 300  
**CASING ID/OD:** N/A / N/A  
**CORE BARREL:**

**WATER LEVEL DEPTHS (ft):**  
7.5 ft  
10/7/2019  
Soils Saturated

**GENERAL NOTES:**

**STRATIFICATION LINES:** Represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

**KEY TO NOTES AND SYMBOLS:**
- D = Split Spoon Sample
- U = Thin Walled Tube Sample
- R = Rock Core Sample
- V = Field Vane Shear
- q = Unconfined Compressive Strength, kips/sq.ft.
- S = Field Vane Shear Strength, kips/sq.ft.
- Ø = Friction Angle (Estimated)
- Pen. = Penetration Length
- Rec. = Recovery Length
- WOR = Weight of Rods
- WOH = Weight of Hammer
- bpf = Blows per Foot
- mpf = Minute per Foot
- q = Unconfined Compressive Strength, kips/sq.ft.
- RQD = Rock Quality Designation
- W = Water Level
- bpf = Blows per Foot
- Ø = Friction Angle (Estimated)
- N/A = Not Applicable

**BORING INFORMATION**

<table>
<thead>
<tr>
<th>Elev. (ft)</th>
<th>Depth (ft)</th>
<th>Casing Pen. (bpf)</th>
<th>Sample No.</th>
<th>Sample Description &amp; Classification</th>
<th>H2O Depth</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>0.5-2.5</td>
<td>24/18</td>
<td>1D</td>
<td>Asphalt Pavement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>2.0</td>
<td></td>
<td></td>
<td>Medium dense brown SAND and FINE GRAVEL, some silt (Fill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td>Medium dense brown SAND, some gravel, trace silt (Fill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.5</td>
<td>6-8</td>
<td></td>
<td>3D</td>
<td>Stiff brown-gray silty CLAY with sand layers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>9-11</td>
<td></td>
<td>4D</td>
<td>Loose rust brown SAND, trace silt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>11-</td>
<td></td>
<td></td>
<td>Loose/soft gray clayey silty SAND with some gray silty clay layers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sand blow-in in augers at 12 ft - no sampling  
Auger to 14 feet  
Bottom of Exploration at 14.0 feet
Boring not performed due to overhead power lines and a water line. Bottom of Exploration at 0.0 feet.

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.
### Drilling Information

**LOCATION:** See Exploration Location Plan  
**ELEVATION (FT):** 30 +/-  
**TOTAL DEPTH (FT):** 19.0  
**LOGGED BY:** Paul Kohler

**DRILLING CO.:** S. W. Cole Explorations, LLC  
**DRILLER:** Corey Culligan  
**DRILLING METHOD:** Hollow Stem Auger

**RIG TYPE:** Truck Mounted Diedrich D-50  
**AUGER ID/OD:** 2 1/4 in / 5 5/8 in

**HAMMER TYPE:** Automatic  
**HAMMER WEIGHT (lbs):** 140 / 300

**WATER LEVEL DEPTHS (ft):** 8 ft  
**LOGGED DATE:** 10/7/2019

**GENERAL NOTES:**
- Stratification lines represent approximate boundary between soil types. Transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.
- Soils saturated.

### Sample Information

<table>
<thead>
<tr>
<th>Elev. (ft)</th>
<th>Depth (ft)</th>
<th>Casing Pen. (bpf)</th>
<th>Sample No.</th>
<th>Depth (ft)</th>
<th>Pen./Rec. (in)</th>
<th>Blow Count or RQD</th>
<th>Field / Lab Test Data</th>
<th>Sample Description &amp; Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.5-2.5</td>
<td>24/12</td>
<td>1D</td>
<td>7-5-4-7</td>
<td>13.0</td>
<td>asphalt pavement</td>
<td>medium dense rust brown and dark brown SAND, some silt (Fill)</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>4-6</td>
<td>24/12</td>
<td>2D</td>
<td>1-1-2-3</td>
<td>19.0</td>
<td>loose rust brown SAND, trace silt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td>9-11</td>
<td>24/15</td>
<td>3D</td>
<td>1-2-3-5</td>
<td>14-16</td>
<td>loose/soft brown-gray silty CLAY with clayey silt and sand layers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>14-16</td>
<td>24/15</td>
<td>4D</td>
<td></td>
<td>0.5 ksf</td>
<td>sand blow-in in augers at 17.5 feet - no sampling Auger to 19 feet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bottom of Exploration at 19.0 feet**
**BORING LOG**

**CLIENT:** JD Design  
**PROJECT:** Proposed Trademark FCU  
**LOCATION:** 340 Main St, South Portland, ME  
**DATE START:** 10/7/2019  
**DATE FINISH:** 10/7/2019

**Drilling Information**
- **LOCATION:** See Exploration Location Plan  
- **ELEVATION (FT):** 30 +/-  
- **TOTAL DEPTH (FT):** 16.0  
- **LOGGED BY:** Paul Kohler

- **DRILLING CO.:** S. W. Cole Explorations, LLC  
- **DRILLER:** Corey Culligan  
- **DRILLING METHOD:** Hollow Stem Auger

- **RIG TYPE:** Truck Mounted Diedrich D-50  
- **AUGER ID/OD:** 2 1/4 in / 5 5/8 in

- **HAMMER TYPE:** Automatic  
- **HAMMER WEIGHT (lbs):** 140 / 300

- **HAMMER EFFICIENCY FACTOR:**  
- **HAMMER DROP (inch):** 30 / 18

- **WATER LEVEL DEPTHS (ft):** 9 ft  
- **WATER LEVEL:** 10/7/2019  
- **Soils saturated  
- **Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.**

**GENERAL NOTES:**  
- **KEY TO NOTES AND SYMBOLS:**  
  - D = Split Spoon Sample  
  - U = Thin Walled Tube Sample  
  - R = Rock Core Sample  
  - V = Field Vane Sample  
  - Pen. = Penetration Length  
  - Rec. = Recovery Length  
  - bpf = Blows per Foot  
  - mpf = Minute per Foot  
  - WOR = Weight of Rods  
  - WOH = Weight of Hammer  
  - S = Field Vane Shear Strength, kips/sq.ft.  
  - qu = Unconfined Compressive Strength, kips/sq.ft.  
  - RQD = Rock Quality Designation  
  - Ø = Friction Angle (Estimated)  
  - PID = Photoionization Detector  
  - N/A = Not Applicable

<table>
<thead>
<tr>
<th>Elev. (ft)</th>
<th>Depth (ft)</th>
<th>Casing Pen. (bpf)</th>
<th>Sample No.</th>
<th>Depth (ft)</th>
<th>Pen./Rec. (in)</th>
<th>Blow Count or RQD</th>
<th>Field / Lab Test Data</th>
<th>Graphic Log</th>
<th>Sample Description &amp; Classification</th>
<th>H2O Depth</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15</td>
<td></td>
<td>5D</td>
<td>14-16</td>
<td>24/16</td>
<td>WOH-WOH-WOH-1</td>
<td></td>
<td></td>
<td>Loosel/soft gray silty CLAY and silty sand layers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>10</td>
<td></td>
<td>4D</td>
<td>9-11</td>
<td>24/15</td>
<td>3-3-4-5</td>
<td></td>
<td></td>
<td>12.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td></td>
<td>3D</td>
<td>6-8</td>
<td>24/20</td>
<td>6-6-7-8</td>
<td></td>
<td></td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td></td>
<td>2D</td>
<td>4-6</td>
<td>24/20</td>
<td>3-5-6-7</td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>1D</td>
<td>0.5-2.5</td>
<td>24/17</td>
<td>7-5-4-2</td>
<td></td>
<td></td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bottom of Exploration at 16.0 feet**

**BORING NO.:** B-4  
**PROJECT NO.:** 19-1118.1  
**DATE:** 10/21/19  
**CLIENT:** JD Design  
**PROJECT:** Proposed Trademark FCU  
**LOCATION:** 340 Main St, South Portland, ME  
**DATE START:** 10/7/2019  
**DATE FINISH:** 10/7/2019  
**LOGGED BY:** Paul Kohler.
### Drilling Information

**LOCATION:** See Exploration Location Plan  
**ELEVATION (FT):** 30’ +/-  
**TOTAL DEPTH (FT):** 48.0  
**LOGGED BY:** Paul Kohler  
**DRILLING CO.:** S. W. Cole Explorations, LLC  
**DRILLER:** Corey Culligan  
**RIG TYPE:** Truck Mounted Diedrich D-50  
**AUGER ID/OD:** N/A / N/A  
**HAMMER TYPE:** Automatic  
**HAMMER WEIGHT (lbs):** 140 / 300  
**WATER LEVEL DEPTHS (ft):** 10/7/2019 Water used during drilling - no water level readings  
**GENERAL NOTES:**

- Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

### SAMPLE INFORMATION

<table>
<thead>
<tr>
<th>Elev. (ft)</th>
<th>Depth (ft)</th>
<th>Casing Pen. (bpf)</th>
<th>Sample No.</th>
<th>Depth (ft)</th>
<th>Pen. / Rec. (in)</th>
<th>Blown Count or RQD</th>
<th>Field / Lab Test Data</th>
<th>Sample Description &amp; Classification</th>
<th>H2O Depth</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>5</td>
<td>D = Split Spoon Sample</td>
<td>1D</td>
<td>0.5-2.5</td>
<td>24/15</td>
<td>8-15-13-8</td>
<td>Graphic Log</td>
<td>Asphalt Pavement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>25</td>
<td>U = Thin Walled Tube Sample</td>
<td>2D</td>
<td>4-6</td>
<td>24/14</td>
<td>1-3-4-6</td>
<td></td>
<td>Medium dense brown SAND, some gravel, some silt (Fill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>20</td>
<td>R = Rock Core Sample</td>
<td>3D</td>
<td>9-11</td>
<td>24/12</td>
<td>2-3-5-6</td>
<td>w =24.6 %</td>
<td>Medium dense brown SAND, some silt, cobble (Fill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td>0</td>
<td>V = Field Vane Shear</td>
<td>4D</td>
<td>14-16</td>
<td>24/20</td>
<td>WOH-WOH-WOH</td>
<td>w =35.7 %</td>
<td>Loose to medium dense rust brown SAND, trace silt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td></td>
<td>5D</td>
<td>19-21</td>
<td>24/21</td>
<td>WOH-WOH-WOH</td>
<td>q,=0.5 ksf</td>
<td>Loose/soft gray silty CLAY with frequent gray silty sand and clayey silt layers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6D</td>
<td>24-26</td>
<td></td>
<td></td>
<td>24/18</td>
<td>1- WOH</td>
<td></td>
<td></td>
<td>q,=0.5 ksf</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued Next Page)
# Boring Log

**CLIENT:** JD Design  
**PROJECT:** Proposed Trademark FCU  
**LOCATION:** 340 Main St, South Portland, ME  
**DATE START:** 10/7/2019  
**DATE FINISH:** 10/7/2019

<table>
<thead>
<tr>
<th>Sample Information</th>
<th>Sample Description &amp; Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elev. (ft)</td>
<td>Depth (ft)</td>
</tr>
<tr>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>-5</td>
<td>35</td>
</tr>
<tr>
<td>-10</td>
<td>40</td>
</tr>
<tr>
<td>-15</td>
<td>45</td>
</tr>
</tbody>
</table>

**Remarks:**  
Rod Probe 31’ to 48’ - no sampling  
Probable gray silty CLAY with frequent gray silty sand and clayey silt layers  
32’ to 33’ 19 blows  
33’ to 34’ 5 blows  
34’ to 35’ 8 blows  
35’ to 40’ 7 blows  
40’ to 48’ Hyd Push

**Bottom of Exploration at 48.0 feet**

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.
## Boring Log

### Drilling Information

- **Location:** See Exploration Location Plan
- **Elevation (ft):** 30 +/-
- **Total Depth (ft):** 14.0
- **Logged By:** Paul Kohler

### General Notes:

- **Key to Notes and Symbols:**
  - D = Split Spoon Sample
  - U = Thin Walled Tube Sample
  - R = Rock Core Sample
  - V = Field Vane Shear
  - bpf = Blows per Foot
  - mpf = Minute per Foot
  - WOH = Weight of Hammer
  - WOR = Weight of Rods
  - S, = Field Vane Shear Strength, kips/sq.ft.
  - Ø = Friction Angle (Estimated)
  - N/A = Not Applicable
  - q = Unconfined Compressive Strength, kips/sq.ft.

### Sample Information

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Depth (ft)</th>
<th>Depth (ft)</th>
<th>Pen./Rec. (in)</th>
<th>Blow Count or RQD</th>
<th>Field / Lab Test Data</th>
<th>Sample Description &amp; Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1D</td>
<td>0.5-2.5</td>
<td>24/15</td>
<td></td>
<td>4-6-4-3</td>
<td></td>
<td>Asphalt Pavement</td>
</tr>
<tr>
<td>2D</td>
<td>4-6</td>
<td>24/20</td>
<td></td>
<td>1-3-9-4</td>
<td></td>
<td>Medium dense brown gravelly SAND, some silt (Fill)</td>
</tr>
<tr>
<td>3D</td>
<td>6-8</td>
<td>24/20</td>
<td></td>
<td>6-6-6-7</td>
<td></td>
<td>Medium dense brown and black silty SAND, some gravel, possible ash (Fill)</td>
</tr>
<tr>
<td>4D</td>
<td>9-11</td>
<td>24/16</td>
<td></td>
<td>3-3-3-4</td>
<td></td>
<td>Loose/soft gray silty SAND with gray clayey silt layers</td>
</tr>
</tbody>
</table>

- **Sample Information:**
  - Asphalt Pavement
  - Medium dense brown gravelly SAND, some silt (Fill)
  - Medium dense brown and black silty SAND, some gravel, possible ash (Fill)
  - Loose gray SAND, trace silt
  - Loose/soft gray silty SAND with gray clayey silt layers

- **Remarks:**
  - Sand blow-in in augers at 11.5 feet - no sampling
  - Auger to 14 feet
  - Bottom of Exploration at 14.0 feet

---

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.
**BORING LOG**

**DATE START:** 10/7/2019  
**DATE FINISH:** 10/7/2019

**CLINT:** JD Design  
**PROJECT:** Proposed Trademark FCU  
**LOCATION:** 340 Main St, South Portland, ME

---

**Drilling Information**

- **LOCATION:** See Exploration Location Plan  
- **ELEVATION (FT):** 30' +/-  
- **TOTAL DEPTH (FT):** 8.0  
- **LOGGED BY:** Paul Kohler  
- **DRILLING CO.:** S.W. Cole Explorations, LLC  
- **DRILLER:** Corey Culligan  
- **RIG TYPE:** Truck Mounted Diedrich D-50  
- **AUGER ID/OD:** 2 1/4 in / 5 5/8 in  
- **HAMMER TYPE:** Automatic  
- **HAMMER WEIGHT (lbs):** 140 / 300  
- **WATER LEVEL DEPTHS (ft):** 10/7/2019 No free water observed

**GENERAL NOTES:**
- **WATER LEVEL DEPTHS (ft):** 10/7/2019 No free water observed
- **STRATIFICATION lines represent approximate boundary between soil types, transitions may be gradual.** Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

**SAMPLE INFORMATION**

<table>
<thead>
<tr>
<th>Elev. (ft)</th>
<th>Depth (ft)</th>
<th>Casing Pen. (bpf)</th>
<th>Sample No.</th>
<th>Pen./Rec. (in)</th>
<th>Blow Count or RQD</th>
<th>Field / Lab Test Data</th>
<th>Sample Description &amp; Classification</th>
<th>H2O Depth</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.5-2.5</td>
<td>24/14</td>
<td>1D</td>
<td></td>
<td>4-4-4-4</td>
<td>0.2</td>
<td>Asphalt Pavement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4-6</td>
<td>24/21</td>
<td>2D</td>
<td></td>
<td>3-5-7-7</td>
<td>4.0</td>
<td>Medium dense brown gravelly SAND, some silt (Fill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>6-8</td>
<td>24/22</td>
<td>3D</td>
<td></td>
<td>5-5-6-6</td>
<td></td>
<td>Medium dense brown SAND, trace silt</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bottom of Exploration at 8.0 feet**

---

**LOGGED BY:** Paul Kohler  
**CORE BARREL:**

---

**SHEET:** 1 of 1  
**PROJECT NO.:** 19-1118.1  
**BORING NO.:** B-7
KEY TO NOTES & SYMBOLS
Test Boring and Test Pit Explorations

Stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

- **w** - water content, percent (dry weight basis)
- **q_u** - unconfined compressive strength, kips/sq. ft. - laboratory test
- **S_v** - field vane shear strength, kips/sq. ft.
- **L_v** - lab vane shear strength, kips/sq. ft.
- **q_p** - unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
- **O** - organic content, percent (dry weight basis)
- **W_L** - liquid limit - Atterberg test
- **W_P** - plastic limit - Atterberg test
- **WOH** - advance by weight of hammer
- **WOM** - advance by weight of man
- **WOR** - advance by weight of rods
- **HYD** - advance by force of hydraulic piston on drill
- **RQD** - Rock Quality Designator - an index of the quality of a rock mass.
- **γ_T** - total soil weight
- **γ_B** - buoyant soil weight

Description of Proportions:

<table>
<thead>
<tr>
<th>Description of Proportions</th>
<th>Description of Stratified Soils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parting: 0 to 1/16” thickness</td>
<td>Trace: 0 to 5%</td>
</tr>
<tr>
<td>Seam: 1/16” to 1/2” thickness</td>
<td>Some: 5 to 12%</td>
</tr>
<tr>
<td>Layer: 1/2” to 12” thickness</td>
<td>“Y” 12 to 35%</td>
</tr>
<tr>
<td>Alternating seams or layers</td>
<td>And 35+%</td>
</tr>
<tr>
<td>Occasional: one or less per foot of thickness</td>
<td>With Undifferentiated</td>
</tr>
<tr>
<td>More than one per foot of thickness</td>
<td></td>
</tr>
</tbody>
</table>

**REFUSAL: Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

**REFUSAL: Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.
APPENDIX D

Laboratory Test Results
Report of Gradation
ASTM C-117 & C-136

Material Source: B5 2D 4-6

<table>
<thead>
<tr>
<th>STANDARD DESIGNATION (mm/µm)</th>
<th>AMOUNT PASSING (%)</th>
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</thead>
<tbody>
<tr>
<td>150 mm</td>
<td>100</td>
</tr>
<tr>
<td>125 mm</td>
<td>100</td>
</tr>
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<td>100 mm</td>
<td>100</td>
</tr>
<tr>
<td>75 mm</td>
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<td>50 mm</td>
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<tr>
<td>38.1 mm</td>
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<td>19.0 mm</td>
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<td>12.5 mm</td>
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</tr>
<tr>
<td>6.3 mm</td>
<td>100</td>
</tr>
<tr>
<td>4.75 mm</td>
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</tr>
<tr>
<td>No. 4</td>
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<tr>
<td>No. 10</td>
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<td>No. 20</td>
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<tr>
<td>No. 40</td>
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<td>No. 60</td>
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<tr>
<td>No. 100</td>
<td>5</td>
</tr>
<tr>
<td>No. 200</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Comments: w = 11.5%

Sheet
Report of Gradation
ASTM C-117 & C-136

Material Source: B5 3D 9-11

<table>
<thead>
<tr>
<th>STANDARD DESIGNATION (mm/µm)</th>
<th>SIEVE SIZE</th>
<th>AMOUNT PASSING (%)</th>
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</thead>
<tbody>
<tr>
<td>150 mm</td>
<td>6&quot;</td>
<td>100</td>
</tr>
<tr>
<td>125 mm</td>
<td>5&quot;</td>
<td>100</td>
</tr>
<tr>
<td>100 mm</td>
<td>4&quot;</td>
<td>100</td>
</tr>
<tr>
<td>75 mm</td>
<td>3&quot;</td>
<td>100</td>
</tr>
<tr>
<td>50 mm</td>
<td>2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>38.1 mm</td>
<td>1-1/2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>25.0 mm</td>
<td>1&quot;</td>
<td>100</td>
</tr>
<tr>
<td>19.0 mm</td>
<td>3/4&quot;</td>
<td>100</td>
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<tr>
<td>12.5 mm</td>
<td>1/2&quot;</td>
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<td>6.3 mm</td>
<td>1/4&quot;</td>
<td>100</td>
</tr>
<tr>
<td>4.75 mm</td>
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<td>12</td>
</tr>
<tr>
<td>75 µm</td>
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</tr>
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</table>

Comments: w = 24.6%