Preliminary Geotechnical Evaluation Report

Rome Business Park
Ellsworth Road
Rome, New York

Christopher M. Kenney, P.E.
2-27-2020
INTRODUCTION
This report presents the results of the preliminary geotechnical investigation performed for the Rome Business Park in Rome, New York. This geotechnical report presents the data developed during the subsurface investigation and provides analysis and recommendations for the proposed construction.

No environmental services are included in this study. No conclusions have been drawn regarding environmental conditions of the site, potential contaminants, potential special treatment or disposal of site materials, or other environmental considerations.

AUTHORIZATION
Our services for this project was authorized by Terry Horst, President of Terry Horst Landscape Architecture on February 10th, 2020.

PROJECT DESCRIPTION
The purpose of this investigation is to provide a preliminary understanding of the subsurface conditions at the site. This study is not specific to any building or structure and additional borings may be necessary in the future.
DESIGN CRITERIA

No design specifications were given at the time of this report.

The following ASTM Standards were utilized during this study:

- ASTM D1586 “Penetration Test and Split-Barrel Sampling of Soils”
- ASTM D2487 “Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)”

Local geotechnical practice was followed in the performance of this study. We assumed a tolerable foundation settlement of one inch in our analysis. Frost depth was assumed to be 48 inches for this analysis.

SITE CONDITIONS

The project site is a 16.6-acre open field to the southeast of Griffiss International Airport in Rome, New York. The site slopes to the east with surface elevations ranging from approximately 476 feet to 472 feet.

The site is located within the Mohawk River Valley physiographic province. Major topographic and geologic features in this area were formed during the last glacial advance and retreat, which ended approximately 12,000 years ago. Regional surficial geologic mapping suggests that natural soils in the site vicinity generally consist of lacustrine sand. Bedrock mapping suggests that Utica Shale underlies soil in the areas.

FIELD STUDY

The subsurface investigation performed at the site included four soil borings (B-1 to B-4, respectively) and two infiltration tests (IT-1 and IT-2). The site investigation was performed on February 24th, 2020. The boring locations were selected and field located by Kenney Geotechnical Engineering Services personnel. Test borings were performed with a track-mounted Geoprobe 7822DT. Hollow stem augers were utilized to advance the borehole. Standard penetration testing (SPT) (ASTM D1586) was performed with an automatic hammer to obtain soil samples. Test borings were advanced to depths of 20 feet or practical refusal. Practical refusal occurs when augers cannot be advanced or consecutive standard penetration test “N” values exceed 50 blows per foot.
Infiltration testing was performed by installing a temporary four-inch diameter PVC casing into a cleaned borehole to the depth of five feet below the ground surface. After sealing the borehole annulus, the test locations were pre-soaked for twenty-four hours. Testing was performed the day following presoaking. Stabilized infiltration readings are summarized in the attached tables at the end of this report.

Soil samples obtained during the subsurface investigation were classified by a Geotechnical Engineer using the Unified Soil Classification System. Boring logs documenting the subsurface conditions encountered are attached. The boring logs and related information depict subsurface conditions only at the specific locations and times indicated. Subsurface conditions and water levels at other locations may differ from conditions at the locations where sampling was conducted. The passage of time also may result in changes in the conditions interpreted to exist at the locations where sampling was performed.

**LABORATORY TESTING**

Laboratory testing performed for this project included Natural Moisture Content Testing (ASTM D-2216) and Particle Size Analysis (ASTM D-422). Testing was performed in Kenney Geotechnical Services laboratory. Test results are attached to this report and are summarized below.

<table>
<thead>
<tr>
<th>Boring</th>
<th>Depth</th>
<th>Natural Moisture Content (%</th>
<th>Grain Size Distribution</th>
<th>Classification (USCS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gravel* (%</td>
<td>Sand** (%)</td>
</tr>
<tr>
<td>B-1</td>
<td>2-4</td>
<td>14.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-1</td>
<td>4-6</td>
<td>15.0</td>
<td>1.8</td>
<td>81.6</td>
</tr>
<tr>
<td>B-1</td>
<td>6-8</td>
<td>16.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-1</td>
<td>13-15</td>
<td>33.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-1</td>
<td>18-20</td>
<td>33.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-2</td>
<td>2-4</td>
<td>20.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-2</td>
<td>6-8</td>
<td>9.6</td>
<td>1.9</td>
<td>65.9</td>
</tr>
<tr>
<td>B-2</td>
<td>8-10</td>
<td>15.9</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-3</td>
<td>2-4</td>
<td>12.7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-3</td>
<td>4-6</td>
<td>15.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-3</td>
<td>6-8</td>
<td>16.9</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-3</td>
<td>8-10</td>
<td>22.1</td>
<td>0</td>
<td>6.1</td>
</tr>
<tr>
<td>B-3</td>
<td>13-15</td>
<td>37.8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B-3</td>
<td>18-20</td>
<td>12.4</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
**SUBSURFACE CONDITIONS ENCOUNTERED**

The following presents our interpretation of the subsurface conditions encountered during exploration and is based on our review of the recovered samples, the boring logs, drilling observations, and our professional experience.

In general, the subsurface conditions encountered consisted of lacustrine sand with silt or gravel. The following table summarizes the results of Standard Penetration Testing performed during the advancement of the test borings.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>From (BGS Feet)</th>
<th>To (BGS Feet)</th>
<th>USCS Classifications</th>
<th>&quot;N&quot; Values (Uncorrected)</th>
<th>Condition</th>
<th>Plasticity</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>0.2</td>
<td>Topsoil</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Topsoil</td>
</tr>
<tr>
<td>B</td>
<td>0.2</td>
<td>20</td>
<td>SW, SWG, and SM</td>
<td>5</td>
<td>100</td>
<td>25</td>
<td>Lacustrine Sand</td>
</tr>
</tbody>
</table>

Borings were advanced to the planned exploration depth (20 feet bgs) without encountering refusal conditions.

**GROUNDWATER CONDITIONS ENCOUNTERED**

Water levels were measured within the augers during advancement and from the open borehole after the augers were removed. The following table summarizes the water levels measured at the time of the subsurface investigation.

<table>
<thead>
<tr>
<th>Boring Location</th>
<th>Depth of Water While Drilling (ft)</th>
<th>Depth of Water Within the Augers (ft)</th>
<th>Depth of Water in Open Borehole (ft)</th>
<th>Depth of Cave in Open Borehole (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>14.0</td>
<td>14.5</td>
<td>Dry</td>
<td>Caved to 9.90</td>
</tr>
<tr>
<td>B-2</td>
<td>14.0</td>
<td>Dry</td>
<td>9.50</td>
<td>Caved to 9.70</td>
</tr>
<tr>
<td>B-3</td>
<td>14.0</td>
<td>19.0</td>
<td>8.5</td>
<td>Caved to 9.00</td>
</tr>
<tr>
<td>B-4</td>
<td>14.0</td>
<td>11.5</td>
<td>Dry</td>
<td>Caved to 9.00</td>
</tr>
</tbody>
</table>
Groundwater depths and seepage rates will vary with the seasons and changes in precipitation patterns and may be higher during the wetter seasons. No long-term groundwater data was generated during this study and the range of possible groundwater elevation is unknown.

**RECOMMENDATIONS AND CONCLUSIONS**

**A. Geotechnical Analysis**

In general the site appears to have acceptable geotechnical aspects for development. The sand encountered to a depth of 20 feet below the ground surface layer is capable of supporting a shallow foundation system for buildings up to three stories in height. The sand layer should provide good infiltration for stormwater management features. Groundwater was encountered at a depth of 14 feet, beyond typical excavation depths. Additional preliminary recommendations are presented below.

**B. Site Preparation and Earthwork**

Earthwork must be performed using methods that will result in a stable excavations and fills. Typical temporary earthwork measures such as temporary drainage swales, stabilized haul roads, and the use of protective layers of crushed stone can be employed at this site. It is recommended that earthwork is observed by geotechnical personnel.

We anticipate earthwork will be performed as follows:

- Divert stormwater from the work area;
- Dewater as necessary to work in the dry; Install subsurface drainage as necessary to prevent water from ponding in subsurface structures.
- Strip existing pavement, fill, topsoil, stumps, roots and organics from all areas that will receive new construction to establish subgrade.
- Create stable level benches for the placement of fill on sideslopes. Provide drainage at each bench level.
- Temporary slopes (less than one week duration) should not be steeper than 1.5H:1V unless approved by geotechnical personnel. Final slopes should not be steeper than 3H:1V unless a slope stability analysis is performed to confirm acceptability.
• Proof-roll subgrade with a fully loaded dump truck, or accepted alternative equipment, under the observation of geotechnical personnel. Areas that rut, weave, or deflect should be over-excavated and replaced with compacted structural fill (see below for structural fill characteristic requirements).

• Utilize structural fill to raise site grades to the desired elevation. Structural fill should consist of imported granular material conforming to NYSDOT Subbase Course (2” minus) or approved equal. Existing on-site soil can be re-utilized as structural fill pending field review by geotechnical personnel.

• Field moisture contents for structural fill should be maintained within 2 percentage points of the optimum moisture content established by laboratory testing to provide adequate compaction. All fill should be placed in level lifts having a loose thickness no greater than 12 inches and should be compacted to at least the following minimum percentages of the Modified Proctor (ASTM D-1557) maximum dry density:

  - Below footings: 95%
  - Beneath slab-on-grade or pavements: 95%
  - Utility trench backfill: 95%
  - Beneath landscape areas: 90%
  - Beneath sidewalks and exterior slabs: 95%

Bulk samples of proposed structural fill materials should be delivered to our testing laboratory at least two weeks prior to the initiation of earthwork. In-place density testing should be performed at a frequency of one test per 500 square feet per lift in open areas and one test per 25 feet per lift in trenches.

• If the structure is to be constructed during the winter months or if the building interiors will be subjected to freezing temperatures after footer construction, adequate frost cover and protection must be provided. Earthwork cannot be performed with frozen material.

• Permanent slopes should be graded no steeper than 3 horizontal: 1 vertical unless they are reinforced or otherwise stabilized.

In utility trenches, or other confined areas, small compaction equipment may be necessary such as a vibratory plate, jumping jack or walk-behind vibratory roller.
In-place density testing should be performed at a frequency of one test per 25 feet per lift in trenches. Utility trench fill should be placed in level lifts no greater than 8 inches in thickness and should be compacted to at least 95% the Modified Proctor (ASTM D-1557) maximum dry density. Structural fill should consist of imported granular material such as NYSDOT Subbase (2” minus) or approved equal. Adequate frost cover and protection must be provided during winter weather construction. Earthwork cannot be performed with frozen material.

C. Excavation and Earth Support

We anticipate conventional earthmoving equipment will be capable of performing the site excavation. Temporary excavation slopes must be evaluated by the Contractor’s on-site Responsible Person. We anticipate on-site soil will be classified as Type C soil. Type C materials must be graded to slopes no greater than 1.5:1 (horizontal to vertical) unless shoring is utilized. The Contractor’s on-site Responsible Person should periodically review excavations for signs of movement or distress. Excavation sidewalls should be periodically raked to remove loose particles.

Site grading and shoring must consider the loads imposed by existing structures. The design of shoring and underpinning elements is beyond the scope of this report.

Design of subsurface walls subjected to lateral earth pressure must consider the type of wall, degree of restraint against wall rotation, and other factors. We suggest the following lateral earth pressure parameters:

- $K_a = 0.33$
- $K_p = 3.00$
- $K_o = 0.5$
- Coefficient of friction = 0.4

Any water pressure or surcharges from equipment, material stockpiles, or adjacent structures must be added to the suggested lateral pressure.

It is recommended that drainage is provided for all walls to reduce hydrostatic wall loading and possible frost action. Backfill against any walls should consist of a relatively well-graded free-draining granular material having no more than 10% passing the No. 200 sieve. The granular backfill zone behind walls should be at least one foot wide as measured horizontally from the face of the wall. Backfill against
walls should be placed in loose lifts no greater than 6 inches in thickness. A nonwoven geotextile filter should be placed between the granular backfill and insitu soil to prevent the migration of fine-grained soil.

**D. Construction Dewatering**

Groundwater was generally encountered below a depth of 14 feet during the subsurface investigation. Dewatering may be necessary for excavations that extend beyond this depth. Surface water must be diverted from the construction area. Ponding water should not be permitted above slopes or on earth surfaces that will support foundations, compacted fill, or earth retention structures. All fill surfaces should be sloped or crowned to prevent water ponding and sealed with a smooth-drum roller at the end of each shift to reduce infiltration. Smooth rolled surfaces must be scarified before placing subsequent lifts of fill.

Storm events and other factors can affect groundwater and seepage during construction. All dewatering discharge should be transported to a temporary dewatering basin constructed consistent with NYDEC construction stormwater and/or dewatering treatment Best Management Practices (BMPs).

**E. Foundations**

An allowable bearing pressure of 3,000 pounds per square foot (psf) is recommended for the design of shallow foundations bearing on medium dense sand. Foundation bearing grade must be reviewed by geotechnical personnel to verify the strength of the soil. Any disturbed or saturated soil must be removed from below foundation bearing grade. Proper management of the soil will be critical during foundation construction and earthwork.

Geotechnical personnel must review the bearing grade to ensure that the assumptions made based upon the findings of the subsurface conditions are consistent with the ground conditions exposed during foundation excavation. Additional undercutting may be necessary where the bearing material is considered unacceptable by on-site geotechnical personnel. All exterior footings should bear at least 48 inches below finished exterior grade for frost protection unless an insulated frost protection system is installed.

We estimate that foundations designed as recommended herein and properly managed during construction will undergo total settlements of less than one inch.
**F. Interior Concrete Slabs on Grade**

All topsoil, pavement, organic matter, building debris, etc. must be removed from beneath the concrete slab on grade subgrade. All subgrade areas should be proof-rolled as discussed in the Earthwork recommendations. A preliminary subgrade modulus of 250 pci is suggested for design; however, this modulus value assumes subgrade is protected from disturbance by over-excavation or saturation during construction. If necessary for grading, place structural fill over stripped ground in order to achieve new floor slab elevations. Structural fill placed to establish floor slab subgrade should conform to the recommendations for materials and compaction presented in the Earthwork recommendations.

The subbase for the slab-on-grade should consist of a minimum of 6 inches of gravel or crushed stone conforming to NYSDOT specifications for Item 304-2.02 Type 2 or 4. Follow compaction requirements presented for earthwork.

**G. Exterior Concrete Slabs on Grade (Sidewalks, Curbs, Gutters, Misc.)**

Earthwork for exterior slabs should be performed as discussed in Section D. Type I/II cement is sufficient for use in the concrete for the sidewalks.

**H. Seismic Hazard Concerns, Liquefaction, Seismicity, and Faulting**

The subsurface conditions encountered and “N” values recorded during the subsurface investigation suggest that seismic **Site Class D** is appropriate for this site. The estimated design spectral response acceleration parameters are $S_{DS} = 0.184g$ and $S_{D1} = 0.111g$. Liquefaction, surface rupture from faulting or lateral spreading is estimated to have a low probability of occurrence given the soil conditions encountered and typical regional seismicity.

**LIMITATIONS**

This report was prepared for the Rome Business Park should not construed as instruction to the Contractor. Detailed design information was not available at the time of preparing this report. Kenney Geotechnical Engineering Services shall be afforded the opportunity to complete a thorough review of the final facility design as it relates to foundations and earthworks to verify our assumptions, and to confirm that our recommendations are appropriate. If not given this opportunity, Kenney Geotechnical Engineering services cannot assume liability for omissions, misinterpretations, or deficiencies.
The recommendations presented in this report are predicated on the performance of construction observation and testing by qualified geotechnical personnel. We request continued involvement with this project so that we may assess subsurface conditions exposed during construction to determine if modifications to our recommendations are necessary.

REFERENCES


25,000± SF
30± SPACES
30± FUTURE SPACES
25,000± SF
4.89± acres

NEW STORMWATER PONDS WITH OVERFLOW TO EXISTING STORMSEWER
LOADING DOCK AND PARKING LOT
NEW PUBLIC ACCESS ROAD
WETLAND RECLAMATION
PROPOSED BUILDING UTILITY CONNECTIONS TO TIE INTO EXISTING AND NEW UTILITIES IN R.O.W.

NEW BUILDING EXPANSION
POTENTIAL BUILDING EXPANSION

LEGEND

EXISTING CONTOUR
PROPERTY LINE
NEW GAS LINE
EXISTING WATER LINE
NEW WATER LINE

EXISTING ELECTRICAL LINE
NEW ELECTRICAL LINE
EXISTING SANITARY LINE
NEW SANITARY LINE
EXISTING STORM DRAIN
NEW STORM DRAIN

Ug/Elect.

GRAPHIC SCALE:

ENTERPRISE WAY LOT LAYOUT SCHEMATIC PLAN

DATE: 02/19/2020
SCALE: 1" = 200'
DRAWN BY: AR

Terry Horst
LANDSCAPE
ARCHITECTURE, PC

PHONE: 315-472-2461
WWW.THORSTLANDSCAPEARCH.COM
200 HAMILTON AVENUE, SYRACUSE, NEW YORK
### TERMS DESCRIBING CONSISTENCY OR CONDITION

**COARSE-GRAINED** soils (major portions retained on No. 200 sieve): includes (1) clean gravel and sands and (2) silty or clayey gravels and sands. Condition is rated according to relative density as determined by laboratory tests or standard penetration resistance tests.

<table>
<thead>
<tr>
<th>Descriptive Terms</th>
<th>Relative Density</th>
<th>SPT Blow Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very loose</td>
<td>0 to 15 %</td>
<td>&lt; 4</td>
</tr>
<tr>
<td>Loose</td>
<td>15 to 35 %</td>
<td>4 to 10</td>
</tr>
<tr>
<td>Medium dense</td>
<td>35 to 65 %</td>
<td>10 to 30</td>
</tr>
<tr>
<td>Dense</td>
<td>65 to 85 %</td>
<td>30 to 50</td>
</tr>
<tr>
<td>Very dense</td>
<td>85 to 100 %</td>
<td>&gt; 50</td>
</tr>
</tbody>
</table>

**FINE-GRAINED** soils (major portions passing on No. 200 sieve): includes (1) inorganic and organic silts and (2) gravely, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings, SPT blow count, or unconfined compression tests.

### GENERAL NOTES

1. Classifications are based on the United Soil Classification System and include consistency, moisture, and color. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate.
2. Surface elevations are based on topographic maps and estimated locations.
3. Descriptions on these boring logs apply only at the specific boring locations and at the time the borings were made. They are not guaranteed to be representative of subsurface conditions at other locations or times.

#### Key to Soil Symbols and Terms

- **GW**: Well-graded gravels, gravel-sand mixtures, little or no fines
- **GP**: Poorly-graded gravels, gravel-sand mixtures, little or no fines
- **GM**
  - **d**: Silty gravels, gravel-sand-silt mixtures
  - **u**: Clayey gravels, gravel-sand-silt mixtures
- **GC**: Clayey gravels, gravel-sand-silt mixtures
- **SW**: Well-graded sands, gravelly sands, little or no fines
- **SP**: Poorly-graded sands, gravelly sands, little or no fines
- **SM**
  - **d**: Silty sands, sand-silt mixtures
  - **u**: Clayey sands, sand-clay mixtures
- **SC**: Clayey sands, sand-clay mixtures
- **ML**: Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey clays with slight plasticity
- **CL**: Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
- **OL**: Organic silts and organic silt clays of low plasticity
- **MH**: Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts
- **CH**: Inorganic clays of high plasticity, fat clays
- **OH**: Organic clays of medium to high plasticity, organic silts
- **Pt**: Peat and other highly organic soils

#### Laboratory Classification Criteria

- **C** = \( \frac{D_40}{D_20} \)
- **C** = \( \frac{(D_{60})^2}{D_{60} \times D_{10}} \)

- **ML**: Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey clays with slight plasticity
- **CL**: Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
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- **Pt**: Peat and other highly organic soils

#### Plasticity Chart

- **PLASTICITY INDEX (PI)**
  - **30**: 10 to 20
  - **40**: 20 to 40
  - **60**: 25 to 50
  - **70**: 30 to 50
  - **80**: 35 to 65
  - **90**: 40 to 70
  - **100**: 45 to 85

- **LIQUID LIMIT (LL)**
  - **4**: Less than 5 percent
  - **7**: More than 5 percent
  - **10**: More than 10 percent
  - **20**: More than 20 percent
  - **30**: More than 30 percent
  - **40**: More than 40 percent
  - **50**: More than 50 percent
  - **60**: More than 60 percent
  - **70**: More than 70 percent
  - **80**: More than 80 percent
  - **90**: More than 90 percent
  - **100**: More than 100 percent

#### Typical Names

- **Less than 5 percent**: GW, GP, SW, SP
- **More than 12 percent**: GM, GC, SM, SC
- **6 to 12 percent**: Borderline cases requiring dual symbols**

#### Unconfined Compressive Stress

<table>
<thead>
<tr>
<th>Descriptive Terms</th>
<th>Strength kPa</th>
<th>SPT Blow Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very soft</td>
<td>&lt; 25</td>
<td>&lt; 2</td>
</tr>
<tr>
<td>Soft</td>
<td>25 to 50</td>
<td>2 to 4</td>
</tr>
<tr>
<td>Medium stiff</td>
<td>50 to 100</td>
<td>4 to 8</td>
</tr>
<tr>
<td>Stiff</td>
<td>100 to 200</td>
<td>8 to 15</td>
</tr>
<tr>
<td>Very stiff</td>
<td>200 to 400</td>
<td>15 to 30</td>
</tr>
<tr>
<td>Hard</td>
<td>&gt; 400</td>
<td>&gt; 30</td>
</tr>
</tbody>
</table>

#### Relative Density

<table>
<thead>
<tr>
<th>Typical Names</th>
<th>Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>GW, GP, SW, SP</td>
<td>0 to 15%</td>
</tr>
<tr>
<td>GM, GC, SM, SC</td>
<td>15 to 35%</td>
</tr>
<tr>
<td>GW, GP, SW, SP</td>
<td>35 to 65%</td>
</tr>
<tr>
<td>GW, GP, SW, SP</td>
<td>65 to 85%</td>
</tr>
<tr>
<td>GW, GP, SW, SP</td>
<td>85 to 100%</td>
</tr>
</tbody>
</table>

#### Soil Classification

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#### Atterberg Limits

- **LL** = Liquid limit
- **PL** = Plastic limit
- **PL** = Plasticity index

#### Particle Size Distribution

<table>
<thead>
<tr>
<th>Particle Size</th>
<th>Particle Size Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&lt; 0.04 mm</strong></td>
<td>0.074 to 0.42</td>
</tr>
<tr>
<td><strong>0.074 to 0.42</strong></td>
<td>2 to 4.76</td>
</tr>
<tr>
<td><strong>2 to 4.76</strong></td>
<td>0.04 to 0.28</td>
</tr>
<tr>
<td><strong>0.04 to 0.28</strong></td>
<td>0.02 to 0.12</td>
</tr>
<tr>
<td><strong>0.02 to 0.12</strong></td>
<td>0.01 to 0.05</td>
</tr>
<tr>
<td><strong>0.01 to 0.05</strong></td>
<td>0.0075 to 0.0016</td>
</tr>
</tbody>
</table>

#### Soil Types

- **Gravel**: 
  - **Fines**: Silt or clay
  - **Grain Size**: Coarse fraction
- **Sand**: 
  - **Fines**: Silty or clayey gravels
  - **Grain Size**: Medium fraction
- **Silt**: 
  - **Fines**: Clayey silts
  - **Grain Size**: Fine fraction
- **Clay**: 
  - **Fines**: Organic silts
  - **Grain Size**: Very fine fraction

#### Laboratory Classification Criteria

- **C** = \( \frac{D_{40}}{D_{20}} \)
- **C** = \( \frac{(D_{60})^2}{D_{60} \times D_{10}} \)

#### Unconfined Compressive Stress

<table>
<thead>
<tr>
<th>Descriptive Terms</th>
<th>Strength kPa</th>
<th>SPT Blow Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very soft</td>
<td>&lt; 25</td>
<td>&lt; 2</td>
</tr>
<tr>
<td>Soft</td>
<td>25 to 50</td>
<td>2 to 4</td>
</tr>
<tr>
<td>Medium stiff</td>
<td>50 to 100</td>
<td>4 to 8</td>
</tr>
<tr>
<td>Stiff</td>
<td>100 to 200</td>
<td>8 to 15</td>
</tr>
<tr>
<td>Very stiff</td>
<td>200 to 400</td>
<td>15 to 30</td>
</tr>
<tr>
<td>Hard</td>
<td>&gt; 400</td>
<td>&gt; 30</td>
</tr>
</tbody>
</table>
LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

- ML: USCS Silt
- SM: USCS Silty Sand
- SW: USCS Well-graded Sand
- SWG: USCS Well-graded Gravelly Sand
- TOPSOIL: Topsoil

Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

- Water Level at Time
- Water Level After 24 Hours
- Water Level at End of Drilling, or as Shown
- Water Level at Time of Drilling, or as Shown

ABBREVIATIONS

- LL: LIQUID LIMIT (%)
- PI: PLASTIC INDEX (%)
- W: MOISTURE CONTENT (%)
- DD: DRY DENSITY (PCF)
- NP: NON PLASTIC
- -200: PERCENT PASSING NO. 200 SIEVE
- PP: POCKET PENETROMETER (TSF)
- TV: TORVANE
- PID: PHOTOIONIZATION DETECTOR
- UC: UNCONFINED COMPRESSION
- ppm: PARTS PER MILLION
- \(\n\) Water Level at Time
- \(\n\) Water Level After 24 Hours
- \(\n\) Water Level at End of Drilling, or as Shown
- \(\n\) Water Level at Time of Drilling, or as Shown
Client: Terry Horst Landscape Architecture

Project Name: Rome Business Park

Project Location: Rome, New York

Date Started: 2/24/20

Completed: 2/24/20

Drilling Contractor: Kenney Geotechnical Services

Logged By: RS

Checked By: CMK

NOTES

Ground Elevation: 473 ft

Logged By: RS

Drilling Method: 3.25" HSA

Hole Size: 8"

Ground Water Levels:
- At Time of Drilling: 14.00 ft / Elev 459.00 ft
- At End of Drilling: 14.50 ft / Elev 458.50 ft
- After Drilling: --- Dry: Caved to 9.90 feet

Graphic Log Material Description:
- Topsoil, Moist
  - SW Brown Medium Dense Silty Sand, Moist

Sample Type: Pocket Pen

Sample Recovery %: 75

SPT N Value:
- 1 - 3-6-7-4 (13)
- 2 - 6-12-18-18 (30)
- 3 - 8-12-12-24 (24)
- 4 - 19-19-21-25 (40)
- 5 - 30-21-19-18 (40)
- 6 - 7-7-9-8 (16)
- 7 - 12-12-8-9 (20)

Pocket Pen (tsf): 0

VOC (ppm):

After Drilling: --- Dry: Caved to 9.90 feet
**TOPSOIL, MOIST**
(SW) BROWN MEDIUM DENSE TO DENSE WELL-GRADED SAND WITH GRAVEL, MOIST

**SPT 1**
75
7-10-20-22
(30)

**SPT 2**
90
14-14-12-17
(26)

**SPT 3**
63
50-24-25-26
(49)

**SPT 4**
71
49-50/2'

**SPT 5**
90
20-22-24-25
(46)

**SPT 6**
75
9-3-2-2
(5)

**SPT 7**
75
2-3-3-5
(6)

**BOTTOM OF BOREHOLE AT 20.0 FEET.**

---

**NOTES**

**GROUND ELEVATION**
474 ft

**LOGGED BY**
RS

**CHECKED BY**
CMK

---

**GROUND WATER LEVELS:**

\[\text{AT TIME OF DRILLING: 14.00 ft / Elev 460.00 ft} \]

\[\text{AT END OF DRILLING: DRY} \]

\[\text{AFTER DRILLING: 9.50 ft / Elev 464.50 ft: CAVED TO 9.70 FEET} \]

---

**CLIENT**
TERRY HORST LANDSCAPE ARCHITECTURE

**PROJECT NUMBER**
2020-033

**DATE STARTED**
2/24/20

**DATE COMPLETED**
2/24/20

**DRILLING CONTRACTOR**
KENNEY GEOTECHNICAL SERVICES

---

**GROUND WATER LEVELS:**

\[\text{AT TIME OF DRILLING: 14.00 ft / Elev 460.00 ft} \]

\[\text{AT END OF DRILLING: DRY} \]

\[\text{AFTER DRILLING: 9.50 ft / Elev 464.50 ft: CAVED TO 9.70 FEET} \]

---

**REPORTING:**

Kenney Geotechnical Engineering Services, PLLC
6901 Herman Road
Syracuse, NY 13209
315-638-2706

---

**GEOTECH BORING REPORT**

---

**GROUND WATER LEVELS:**

\[\text{AT TIME OF DRILLING: 14.00 ft / Elev 460.00 ft} \]

\[\text{AT END OF DRILLING: DRY} \]

\[\text{AFTER DRILLING: 9.50 ft / Elev 464.50 ft: CAVED TO 9.70 FEET} \]
Topsoil, moist

(SW) Brown loose well-graded sand, moist

(SW) Brown medium dense well-graded sand, moist

(SW) Brown dense well-graded sand, moist

(ML) Brown medium dense silt, moist

(SM) Brown loose silty sand, wet

(SM) Brown medium dense silty sand with gravel, wet

Bottom of borehole at 20.0 feet.
### BORING NUMBER B-4

**CLIENT** TERRY HORST LANDSCAPE ARCHITECTURE  
**PROJECT NUMBER** 2020-033  
**DATE STARTED** 2/24/20  
**DATE COMPLETED** 2/24/20  
**DRILLING CONTRACTOR** KENNEY GEOTECHNICAL SERVICES  
**LOGGED BY** RS  
**CHECKED BY** CMK  
**NOTES**

**GROUND ELEVATION** 473 ft  
**HOLE SIZE** 8"  
**GROUND WATER LEVELS:**
- **AT TIME OF DRILLING** 14.00 ft / Elev 459.00 ft  
- **AT END OF DRILLING** 11.50 ft / Elev 461.50 ft  
- **AFTER DRILLING** --- DRY: CAVED TO 9.00 FEET  

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>GRAPHIC LOG</th>
<th>MATERIAL DESCRIPTION</th>
<th>SAMPLE TYPE</th>
<th>RECOVERY % (RQD)</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>POCKET PEN (tsf)</th>
<th>VOC (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>TOPSOIL, MOIST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(SM) BROWN LOOSE SILTY SAND, MOIST</td>
<td>SPT 1</td>
<td>75</td>
<td>2-2-5-10 (7)</td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td></td>
<td>(SM) BROWN MEDIUM DENSE SILTY SAND, MOIST</td>
<td>SPT 2</td>
<td>80</td>
<td>7-9-9-8 (18)</td>
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<tr>
<td>10</td>
<td></td>
<td>(SM) BROWN LOOSE SILTY SAND, MOIST</td>
<td>SPT 3</td>
<td>75</td>
<td>2-4-4-3 (8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>(SM) BROWN MEDIUM DENSE SILTY SAND, MOIST TO WET</td>
<td>SPT 4</td>
<td>100</td>
<td>5-7-8-10 (15)</td>
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<td>20</td>
<td></td>
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<td>SPT 5</td>
<td>100</td>
<td>6-8-8-11 (16)</td>
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<td>25</td>
<td></td>
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<td>SPT 6</td>
<td>100</td>
<td>10-11-11-15 (22)</td>
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<td>30</td>
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<td></td>
<td>SPT 7</td>
<td>100</td>
<td>7-8-7-17 (15)</td>
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**BOTTOM OF BOREHOLE AT 20.0 FEET.**
### Specimen Identification

<table>
<thead>
<tr>
<th>Specimen Identification</th>
<th>Classification</th>
<th>LL</th>
<th>PL</th>
<th>PI</th>
<th>Cc</th>
<th>Cu</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Grain Size Distribution

<table>
<thead>
<tr>
<th>COBBLES</th>
<th>GRAVEL</th>
<th>SAND</th>
<th>SILT OR CLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>coarse</td>
<td>fine</td>
<td>coarse</td>
<td>medium</td>
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</tbody>
</table>

### Per Cent Finer by Weight

<table>
<thead>
<tr>
<th>Specimen Identification</th>
<th>D100</th>
<th>D60</th>
<th>D30</th>
<th>D10</th>
<th>%Gravel</th>
<th>%Sand</th>
<th>%Silt</th>
<th>%Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>5.0</td>
<td>12.7</td>
<td>0.219</td>
<td>0.111</td>
<td>1.8</td>
<td>81.6</td>
<td>16.6</td>
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</tbody>
</table>
**GRAIN SIZE DISTRIBUTION**

**CLIENT**: TERRY HORST LANDSCAPE ARCHITECTURE  
**PROJECT NAME**: ROME BUSINESS PARK  
**PROJECT NUMBER**: 2020-033  
**PROJECT LOCATION**: ROME, NEW YORK

---

**Specimen Identification**

<table>
<thead>
<tr>
<th>Classification</th>
<th>LL</th>
<th>PI</th>
<th>Cc</th>
<th>Cu</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-2</td>
<td>7.0</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Nominal Classification**

- **COBBLES**: coarse
- **GRAVEL**: coarse
- **SAND**: medium
- **SILT OR CLAY**: fine

<table>
<thead>
<tr>
<th>Specimen Identification</th>
<th>D100</th>
<th>D60</th>
<th>D30</th>
<th>D10</th>
<th>%Gravel</th>
<th>%Sand</th>
<th>%Silt</th>
<th>%Clay</th>
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</thead>
<tbody>
<tr>
<td>B-2</td>
<td>6.35</td>
<td>0.148</td>
<td></td>
<td>1.9</td>
<td>65.9</td>
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<td>32.2</td>
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</table>
### GRAIN SIZE DISTRIBUTION

#### Specimen Identification

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<thead>
<tr>
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<th>Classification</th>
<th>LL</th>
<th>PL</th>
<th>PI</th>
<th>Cc</th>
<th>Cu</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-3</td>
<td>9.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

#### Specimen Identification

<table>
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<tr>
<th>Specimen Identification</th>
<th>D100</th>
<th>D60</th>
<th>D30</th>
<th>D10</th>
<th>%Gravel</th>
<th>%Sand</th>
<th>%Silt</th>
<th>%Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-3</td>
<td>9.0</td>
<td>4.75</td>
<td>2</td>
<td>1</td>
<td>0.0</td>
<td>6.1</td>
<td>93.9</td>
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### INFILTRATION TESTING LOG

<table>
<thead>
<tr>
<th>PROJECT:</th>
<th>Rome Business Park</th>
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<tbody>
<tr>
<td>PRESOAK:</td>
<td>2/24/2020 Clear</td>
</tr>
<tr>
<td>TEST:</td>
<td>2/27/2020 Snow</td>
</tr>
<tr>
<td>PERSONNEL:</td>
<td>MM IT-1</td>
</tr>
<tr>
<td>TEST TYPE:</td>
<td>4” PVC AT 5’</td>
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<tr>
<td>SOIL CONDITIONS:</td>
<td>Silty Sand</td>
</tr>
<tr>
<td>RUN #</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>RATE (INCH/HOUR)</td>
<td>24 24 24</td>
</tr>
<tr>
<td>STABILIZED (INCH/HR)</td>
<td>24</td>
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</tbody>
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**NOTES:**

### INFILTRATION TESTING LOG

<table>
<thead>
<tr>
<th>PROJECT:</th>
<th>Rome Business Park</th>
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</thead>
<tbody>
<tr>
<td>PRESOAK:</td>
<td>2/24/2020 Clear</td>
</tr>
<tr>
<td>TEST:</td>
<td>2/27/2020 Snow</td>
</tr>
<tr>
<td>PERSONNEL:</td>
<td>MM IT-2</td>
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<td>TEST TYPE:</td>
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<td>SOIL CONDITIONS:</td>
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<tr>
<td>RUN #</td>
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<tr>
<td>RATE (INCH/HOUR)</td>
<td>24 24 24</td>
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**NOTES:**