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May 22, 2025

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Attn: Patrick M. Hludzenski, P.E., Principal Engineer
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Re: Hudson Valley Regional Airport – Airport Support Buildings
Wappingers Falls, New York
CME Project No.: 28256-05

Gentlepeople:

Attached you will find....

<u>Number of Copies</u>	<u>Report Number</u>	<u>Description</u>
1	188E-02-0525	Soils Investigation and Foundation Recommendation Report

The above report was emailed to Patrick M. Hludzenski at phludzenski@cscos.com on 05/22/2025.

Respectfully submitted,
CME Associates, Inc.

A handwritten signature in black ink, appearing to read "Seamans", written over a light blue circular stamp.

Jerry Seamans
Administrative Assistant

Soils Investigation and Foundation Recommendation Report

Hudson Valley Regional Airport Project Wappinger, New York

Prepared For:

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CEG Report No.: 188E-02-0525
May 22, 2025

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Attachments:

Project Drawings (3 of 3)
 ASCE 7 Hazard Report (3 of 3)
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Soils Investigation and Foundation Recommendation Report
Hudson Valley Regional Airport Project
Wappinger, New York

1.0 INTRODUCTION

CME Engineering Group, D.P.C. (CEG) is pleased to submit this Soils Investigation and Foundation Recommendation Report to C&S Engineers, Inc. (Client). CEG has prepared this report in its capacity as a subconsultant to CME Associates, Inc. (CME), in accordance with the Geotechnical Services Agreement between the Client and CME, dated January 16, 2025, referring to the CME Proposal/Agreement No. 05.7716.

A limited subsurface exploration was conducted at the project site by CME in March 2025. The findings from this field investigation are documented in the attached *Geotechnical Data Report* (GDR), designated CME Report No. 28256B-01-0425, which was submitted by CME to the Client on April 10, 2025.

This report presents geotechnical recommendations for the design of foundations for the proposed cold storage building and the salt/urea storage building. Recommendations for other site improvements that may be part of the overall project scope are not included herein, as they fall outside the scope of basic services outlined in the referenced agreement and are therefore expressly excluded from this report.

2.0 PROPOSED CONSTRUCTION OVERVIEW

The proposed development consists of two structures: a cold storage building and a salt/urea storage building. Please refer to the attached *Project Drawings*¹ for the locations, grading details, and foundation layouts associated with the proposed buildings. It is important to note that the existing grading behind (west of) the proposed cold storage building is subject to revision by the Client, with the intent to reduce fill placement and avoid adverse impacts on the stability of the existing slope.

Based on information provided by the Client, both buildings will be single-story structures with no basements. The planned finished floor elevation for both buildings is 145 feet.

Cold Storage Building: The cold storage facility will be a pre-engineered metal building, with a reinforced concrete floor slab. Structural loads from walls and columns are anticipated to be carried

¹ Grading Plan, labeled CG-101, dated August 2024.
Cold Storage Foundation and Slab Plan, labeled S-101, dated August 2024.
Salt Storage Foundation and Slab Plan, labeled S-102, dated August 2024.

by reinforced concrete foundation walls and piers founded on conventional reinforced concrete footings.

Salt/Urea Storage Building: The salt/urea storage building will also be a pre-engineered structure, incorporating both reinforced concrete and wood framing elements. The salt storage section will include a reinforced concrete floor slab and reinforced concrete walls on three sides, with timber framing above. These walls are expected to bear on continuous strip footings.

The urea storage section will be constructed as a pole barn-type structure. It will include a reinforced concrete floor slab, perimeter wood-framed walls, and wood columns. These wood columns will be supported on Sonatube-formed concrete pier foundations. The concrete slab will be haunched along the perimeter to support the wall loads. Frost walls are not planned around the perimeter of the urea storage space.

Structural Load Summary: According to the Client, the following design loads are anticipated:

- Maximum column load: 30 kips
- Maximum wall load: 3,000 pounds per linear foot
- Cold storage floor live load: Up to 250 pounds per square foot (psf)
- Salt/Urea storage floor live load: Up to 960 psf

Please review the above project information and notify us in writing if any details are inaccurate or have changed since the time of this report.

3.0 SUBSURFACE CONDITIONS

The subsurface conditions described in this section have been generalized for clarity and brevity by CEG, based on data presented in the Test Boring Logs included in the attached *GDR*. These logs provide detailed information regarding the materials encountered at each boring location, including specific depths and elevations. Subsurface conditions may vary between exploration locations and between sampling intervals.

3.1 Surface Conditions and Subsurface Profile

The general subsurface profile encountered during the exploration program consists of surface materials (Surfacings), underlain by Existing Fill (man-placed), underlain by Silt and Clay, underlain by Silty Sand and Gravel, underlain by probable Bedrock. A summary description of each stratum, in the order encountered, is provided below.

Surfacings: All borings, except for Borings B-3 and B-6, encountered approximately 2 to 6 inches of topsoil and organic material at the surface. Borings B-3 and B-6 encountered Existing Fill at grade.

Existing Fill: Man-placed fill (Existing Fill) was encountered in all borings except Boring B-5, extending to depths ranging from approximately 4 to 8 feet below existing grade. The fill consists of a heterogeneous mixture of soil types—including sand, gravel, clay, and silt—with varying amounts of miscellaneous debris such as asphalt and wood. This material is considered Unprepared Fill as defined by the Building Code and is assigned a zero bearing capacity due to its uncontrolled placement and

variable composition. The Existing Fill is unreliable to bear foundations and slabs due to settlement and bearing capacity concerns of the elements placed above it.

Silt and Clay: Below Existing Fill, a Silty and Clay stratum was penetration in Boring B-6, only. This stratum was penetrated to about 18 feet below grade. Based on Standard Penetration Testing (SPT) blow counts, this stratum is medium stiff in consistency.

Silty Sand and Gravel: Beneath the Surfacing, Existing Fill, or Silt and Clay, a stratum of Silty Sand and Gravel was encountered in all borings. This stratum generally consists of Silty Sand and Gravel with occasional and trace amounts of Clay. Based on Standard Penetration Test (SPT) blow counts, this stratum has a compactness rating ranging from loose to very compact. This material was observed to extend to auger/sampler refusal depth, where probable bedrock was encountered.

Bedrock: Auger/sampler refusal on probable bedrock was encountered in all test borings or probes at depths ranging from 8.5 to 31.1 feet below existing grade, corresponding to approximate elevations of 135 to 96 feet. No rock core drilling was performed as part of this investigation, and thus the bedrock composition and quality were not evaluated.

3.2 Groundwater Observations

Groundwater observations are made by the CME field crew during the advancement of each test boring. CME notes water levels when groundwater accumulation occurs within the borehole, both during drilling and immediately following auger or casing removal. In addition, the moisture condition of retrieved soil samples are visually assessed and recorded. The timing and conditions of groundwater observations are specific to each boring and are documented on the individual Test Boring Logs.

During the short-term field exploration, no groundwater was observed in any of the boreholes. It is important to note that the silty soils encountered at this site exhibit low permeability, which can significantly slow the groundwater movement. As such, groundwater may not accumulate readily in open boreholes during short observation periods.

However, perched groundwater conditions may be present within the Existing Fill layer, particularly during wetter seasons. Perched water can occur when relatively permeable materials (such as Existing Fill), are underlain by low-permeability layers (silty soils), and the upper layer receives water from precipitation or other sources.

The groundwater level at this site is expected to fluctuate seasonally and in response to climatic variations, storm events, and surrounding construction activities. As such, groundwater conditions at the time of construction may differ from those observed during this investigation.

3.3 Site Class

Based on the results of the subsurface exploration and interpretation of Chapter 20 of ASCE 7, the subsurface profile at the project site is characterized as a "Stiff Soil" profile, corresponding to Site Class D.

This classification is supported by a computational analysis of the soil properties observed in the attached Test Boring Logs. The borings did not encounter soils considered susceptible to liquefaction, sudden collapse, or other seismic failure mechanisms under anticipated seismic loading conditions.

For additional seismic design parameters, including the Design Response Spectrum and Seismic Design Category applicable to Risk Category II structures, please refer to the attached *ASCE 7 Hazards Report*.

3.4 Expansive Soil

Based on the visual classification of recovered soil samples performed by the undersigned engineer, no soils exhibiting characteristics indicative of potentially expansive behavior were encountered in the Borings B-1 to B-5, advanced within and around the proposed structures. The materials from these borings did not display the high plasticity or clay content typically associated with expansive soils.

The Silt and Clay soils sampled in Boring B-6, advanced near the toe of the existing slope, may be potentially expansive. However, this Silt and Clay layer was not encountered in the borings advanced within the building areas.

3.5 OSHA Soil Type

The subsurface strata identified in the Test Borings are described in Report Section 3.1, in the approximate order of encounter. According to OSHA 29 CFR Part 1926 Occupational Safety and Health Standards; Final Rule, these soils, to 20 feet depth (above groundwater), are designated OSHA Soil Types, as given below. Contemporaneous Field evaluation of all excavations and materials must be performed by an OSHA *Competent Person*². See Report Section 4.5 for additional requirements.

<u>Subsurface Stratum</u>	<u>OSHA Soil Type</u>
Existing Fill	Type C
Silty Sand and Gravel	Type C
Silt and Clay	Type B

4.0 GEOTECHNICAL RECOMMENDATIONS

4.1 Engineering Evaluation

Based on the subsurface conditions presented in Section 3.0 and the project details described in Section 2.0 of this report, the proposed structures may be supported using the shallow foundation systems currently under consideration. However, the following geotechnical considerations must be satisfactorily addressed by the Registered Design Professional (RDP) as part of the design process:

1. **Existing Fill:** As noted in Section 3.1, Existing Fill was encountered in the test borings to depths of approximately 4 to 8 feet below existing grade. This fill consists of heterogeneous materials including soil and miscellaneous debris, and is classified as "Unprepared Fill" per the Building

² An OSHA "Competent Person" is defined as "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them" [OSHA 29 CFR 1926.32(f)]. The preliminary OSHA Soil Type Designations given in this Report are for planning purposes only and are not to supersede contemporaneous excavation evaluation and soil classification promulgated by OSHA and NYCRR to be the responsibility of the Contractor's Competent Person.

Code. Accordingly, it is assigned to have zero bearing capacity and should not be relied upon to support structural foundations and slabs without further investigation.

A Test Pit exploration is recommended to assess the composition, thickness, and engineering behavior of the fill material and to evaluate its suitability for ground improvement. Appropriate ground improvement measures may include:

- Complete removal and replacement (i.e., mass excavation and replacement)
- Partial removal and replacement
- In-place densification

This recommendation was communicated to the Client. However, according to the Client, a Test Pit program is not feasible at this time. CEG was therefore directed to proceed with ground improvement recommendations based on a worst-case scenario.

To that end, mass excavation and replacement of all Existing Fill is recommended in order to support a conventional shallow foundation system and slab-on-grade construction for the proposed buildings. This approach is considered appropriate given the uncertain quality and variable nature of the fill.

2. **Existing Slope:** As shown on the current Grading Plan (subject to modification), the proposed cold storage building is located in proximity to the top of an existing slope. Additionally, new fill is proposed to be placed over this slope to reach the planned finish floor and finish grade elevations. This configuration raises slope stability concerns due to potential adverse impacts from added loads and changes in grade.

CEG performed a slope stability analysis based on the current grading configuration. The initial analysis yielded a Factor of Safety (FOS) that was unsatisfactory for global slope stability given the proposed building placement. The analysis was repeated with lowered finish grades and footing elevations along the west side of the proposed building, which resulted in an acceptable FOS.

The slope stability analysis, along with the modeling assumptions and results, is provided under separate cover. Refer to Section 4.3 of this report for further discussion on recommended grading and footing bearing elevation along the west side of the cold storage building.

4.2 Building Pad Preparation

As noted in Section 4.1.1, CEG was directed to proceed with ground improvement recommendations based on a worst-case scenario. The recommendations given herein may be modified if a Test Pit exploration is performed in the presence of a CEG Professional Geotechnical Engineer.

In the absence of the above referenced Test Pit exploration, we recommend that the building design incorporate the following building pad preparation procedures to establish a suitable foundation and slabs subgrade. These recommendations are based on the findings of the limited Test Boring exploration, as described in Section 3.1.

Mass-Excavation: All Surfacing, Existing Fill, and other deleterious or unsuitable soils shall be completely removed from within the building pads to expose firm, inorganic, virgin soils. Based on available test boring data, up to approximately 8 feet of material removal may be required to reach competent native soils. The actual depth of removal should be verified in the field and may be adjusted if a Test Pit exploration is performed in the presence of a CEG Professional Geotechnical Engineer.

For purposes of this report, the building pad is defined as the building footprint plus a 5-foot buffer, all around.

Subgrade Verification and Proofrolling: Following the excavation and removal of unsuitable materials, the exposed undercut grade shall be visually inspected and proofrolled under the observation of the Inspecting Professional Geotechnical Engineer (IPGE). Proofrolling should be conducted under dry weather conditions to allow proper evaluation of the undercut grade response.

The proofrolling process shall utilize a 10-ton vibratory steel drum roller, making a minimum of five overlapping passes in each of two perpendicular directions on vibratory mode. Alternatively, the IPGE may elect to perform subgrade probing in lieu of proofrolling based on actual field conditions (e.g., wet soils, space constraints, etc.).

The IPGE will delineate any unstable, non-uniform, or yielding areas and will provide guidance on remedial measures, which may include additional excavation, re-compaction, or replacement with engineered fill.

Structural Fill Placement: Upon satisfactory approval of the exposed undercut grade, placement of Structural Fill may begin to raise the grade to the design floor slab subgrade elevation. Detailed requirements for acceptable fill materials, placement procedures, and compaction testing are provided in Section 4.7 of this report.

4.3 Foundation Recommendations

Following satisfactory building pad preparation as outlined in Section 4.2, the proposed buildings may be supported using conventional shallow spread footings and pier foundations, provided the following geotechnical recommendations are implemented.

Slope Stability Consideration: To address the slope stability concern discussed in Section 4.1, the finished grade along the west side of the proposed cold storage building shall be limited to a maximum elevation of 142 feet. Additionally, the footings along the west wall of the cold storage building shall be constructed to bear at or below elevation 137.5 feet. These modifications are essential to maintain acceptable global slope stability conditions for the planned structure.

In addition to these grading and foundation elevation requirements, appropriate surface water management and slope protection measures must be implemented to prevent shallow surficial failures (e.g., erosion, shallow sloughing), which—if left unaddressed—could progress over time and compromise the integrity of the slope and the structure. It is the responsibility of the project Civil Engineer to evaluate and design suitable surface stabilization systems. Such systems may include, but are not limited to, properly graded drainage swales, erosion control blankets, turf reinforcement mats,

permanent vegetation, riprap armoring, or other slope stabilization treatments as appropriate for the site conditions. The timely incorporation of these measures is critical to the long-term performance and stability of the slope.

Foundation Bearing Conditions: Shallow foundations shall bear on either:

- Firm, undisturbed native Silty Sand and Gravel soils, or
- Properly installed, compacted, and tested Structural Fill that has been verified and approved by the IPGE.

A Presumptive Soil Bearing Pressure of 3,000 pounds per square foot (psf) may be used for foundation design, subject to confirmation in the field by the IPGE prior to footing/pier construction.

Frost Protection Requirements: To mitigate frost heave, CEG recommends the following minimum footing embedment depths, measured from the bottom of the footing to the adjacent exterior finished grade:

- Exterior footings for heated spaces: minimum 4 feet (4'-0")
- Interior footings within heated spaces: may bear as high as practical beneath the slab-on-grade, provided they are fully frost protected
- All footings for unheated spaces: minimum 4 feet 6 inches (4'-6")

Estimated Foundation Settlements: Foundations designed and constructed in accordance with the recommendations provided herein and using standard construction practices are expected to experience:

- Total settlements of less than 1 inch, and
- Differential settlements between adjacent footings/piers of less than ¾ inch

4.4 Lateral Earth Pressure

Lateral earth pressure design parameters are provided herein for the design of below-grade walls, assuming they will be backfilled with Select Granular Fill, as defined in Section 4.7 of this report. Table 1 presents the recommended soil parameters for use in static lateral earth pressure calculations.

Table 1: Recommended Lateral Earth Pressure Parameters for Controlled Backfill							
Material	Effective Friction Angle (deg.)	Cohesion (psf)	Wet Unit Weight (pcf)	Submerged Unit Weight (pcf)	k_a	k_p	k_o
Select Granular Fill (Horizontal Backfill)	30	0	135	75	0.30	3.0	0.50
k_a - Active Earth Pressure Coefficient, k_o - At Rest Earth Pressure Coefficient				k_p - Passive Earth Pressure Coefficient			

Surcharge Loads: Where permanent surface surcharge loads (e.g., vehicular traffic, storage loads, or adjacent footings) are present near retaining structures, their effects must be included in the lateral pressure calculations. A conversion factor of 0.5 (50%) may be applied to convert vertical surcharge pressure to lateral pressure. The resulting load may be assumed to act over a depth equal to the width of the surcharge area, measured perpendicular to the wall.

Passive Resistance and Sliding: When evaluating lateral sliding resistance, passive earth pressure may be considered only from soils located deeper than 2 feet below finished grade. Soils in the upper 2 feet are subject to disturbance and should not be relied upon for passive resistance in design.

A friction factor of 0.55 (with no factor of safety applied) may be used between the concrete footing and the approved bearing surface to compute sliding resistance.

4.5 Frost Heave

Reinforced concrete floor slabs planned for this project in unheated space will be exposed to freezing conditions and may be subject to vertical displacement due to frost heave of underlying subgrade soils. If mitigation of frost heave is a design objective, appropriate frost protection measures shall be incorporated into the project design.

One standard mitigation approach involves removal of frost-susceptible soils within the influence zone of freezing and replacement with Non-Frost Susceptible Fill (NFSF). Specifically, the subgrade beneath the floor slab and other exterior slabs should be excavated to the local frost cover depth and replaced with NFSF, properly compacted in controlled lifts. At this site, the recommended minimum frost cover depth is 4.5 feet, measured vertically from finished exterior grade.

Alternatively, where full subgrade replacement is not feasible, a layer of rigid extruded polystyrene (XPS) insulation may be designed and installed beneath the slab to limit frost penetration and minimize heave potential. Insulation thickness and configuration should be designed by the Structural Engineer in accordance with local building code and geotechnical recommendations.

CEG recommends that floor slabs exposed to freezing be either thermally protected or isolated structurally to allow for potential differential movement caused by frost heave, especially at interfaces with foundation elements.

4.6 Modulus of Subgrade Reaction

The proposed reinforced concrete floor slabs-on-grade for the two planned buildings are anticipated to be supported on a compacted Subbase Course underlain by several feet of Structural Fill placed during building pad preparation.

Based on the anticipated subgrade, satisfactorily proofrolled in the presence of the IPGE, a Modulus of Subgrade Reaction, k_s , of 200 pounds per cubic inch (pci) may be assumed for design purposes. This value is applicable for Structural Fill placed and compacted in accordance with Report Section 4.7 and approved in-place by the IPGE.

A minimum 12-inch-thick Subbase Course is recommended beneath the floor slabs to provide a uniform and stable support platform. The subbase material should conform to NYSDOT Standard Specifications, Section 304, Item 304.12 – Type 2 Subbase, which consists of well-graded crushed gravel or crushed stone with appropriate fines to promote compaction and load distribution.

Design of the concrete slabs-on-grade should follow guidance provided in ACI 360R, *Guide to Design of Slabs-on-Ground*, and construction should conform to the recommendations in ACI 302.1R, *Guide for Concrete Floor and Slab Construction*. It is recommended that slabs-on-grade be installed by ACI-certified Flatwork Technicians and Finishers to ensure quality workmanship and surface performance.

4.7 Fill & Backfill

4.7.1 Material

On-site Borrow: CEG recommends that on-site excavated material not be reused as fill or backfill within the Influence Area³ of structural components of this project.

Select Granular Fill / Non-Frost Susceptible Fill: All fill and backfill within the building pad shall consist of Select Granular Fill/Non-Frost Susceptible Fill.

All fill and backfill materials shall be pre-qualified via a submittal process. The submittals shall include all required test reports that are not older than 60 days.

The minimum requirements for a prequalification submittal shall include the following test results which are not more than 2 months old:

- ✓ Sieve Analysis – ASTM D422
- ✓ Moisture-Density Relationship – ASTM D1557
- ✓ Plasticity Index – ASTM D4318
- ✓ Soundness Test – ASTM C88

Structural Fill Material consisting of Select Granular Fill/Non-Frost Susceptible Fill is recommended for all fill and backfill within the building pad areas, below plan subgrade elevation. These Fill materials shall be well-graded sand and gravel, approved recycled product or crushed rock product which is capable of being compacted to the required density at the proper moisture content and which is free of deleterious materials, trash, roots, debris, frozen material and organic or other foreign matter. Fill materials to be used under slabs and to backfill walls for this project shall be free of Recycled Asphalt Pavement (RAP) products.

All Fill materials shall be accepted based on gradation, soundness, plasticity index and a well-defined Moisture-Density Relationship Curve. Fill to be placed within 2'-0" of final exterior grade shall be subjected to Soundness requirements. Soundness shall be less than 30% loss based on a four-cycle magnesium sulfate soundness test. Plasticity Index of that portion of fill material passing the No. 40 mesh sieve shall not exceed 5.0. Gradation requirements for the above referenced fill materials are as provided below.

Table 2: Select Granular Fill	
Standard Sieve Size	% Passing by Dry Weight
2-inch	100
1/4-inch	25 to 65
No. 40	5 to 40
No. 200	0 to 10

³ The Zone of Influence or Influence Area is defined as the area within planes sloped downward and outward at a 45-degree angle from horizontal measured from:

1. 1-foot outside outermost edge at the base of foundations, slabs, and rigid pavements.
2. 1-foot outside outermost edge at the surface of parking lots, roadways, and shoulders.
3. 0.5 foot outside exterior at springline of pipes and culverts.

Table 3: Non-Frost Susceptible Fill	
Standard Sieve Size	% Passing by Dry Weight
2-inch	100
1/4-inch	25 to 65
No. 40	5 to 40
No. 200	0 to 6

4.7.2 Execution

CEG recommends that all filling and backfilling that will occur on this project be accomplished in a workmanlike manner according to good industry practice. All filling and backfilling shall be installed in a quality-controlled manner with pre-qualified materials, with quality assurance structural tests and inspections conducted at regular intervals according to the Building Code Chapters 17 and 18, and consistent with the following methodology:

1. The grade to receive fill shall be dry and stable, and free of mud, water, and loose or frozen material. The grade shall be proofrolled, inspected, and deemed satisfactory by the IPGE prior to placement of fill.
2. Fill material shall be placed on satisfactory grade, in a manner to minimize segregation. The fill shall be placed in nearly horizontal lifts commencing at the lowest fill area elevation and proceeding with each lift upward and outward from the lower lift.
3. The moisture content of the material shall be adjusted prior to application of compaction such that it is within 3% of the Optimum Moisture Content. This procedure may involve adding water when the fill material is too dry or discing and aerating to reduce moisture when the fill material is too wet.
4. The loose lift thickness and minimum in-place field density shall conform to the recommendations provided in Table 4.

Table 4: Structural Fill Compaction and Lift Thickness Recommendations		
Minimum In-Place Density¹	Maximum Loose Lift Thickness² (inch)	Fill Area Description
95%	12	Mass fill areas and subbase course.
95%	8	Confined areas such as utility trenches and foundation backfill.
1. As determined using ASTM D1557, Modified Effort Proctor. 2. Or compactor manufacturer's recommended thickness, whichever is less.		

5. When the test results indicate that insufficient compaction has been obtained in any layer, the Contractor shall take action to modify or alter the moisture content of the soil and provide additional compaction or make other adjustments to increase the in-place soil density. If the Contractor cannot obtain satisfactory compaction due to material properties, the Contractor shall remove the unsatisfactory material and replace it with new material.
6. Materials which are frozen, or which include mud, debris, organics, or other deleterious materials, shall be removed and replaced with clean specified material.
7. No fill shall be placed over an area or lift of fill that has not been tested and achieved satisfactory results.

5.0 SOIL SPECIAL INSPECTION

The Building Code requires Construction and Materials Inspection and tests for all Structural Fill, backfill, concrete, and reinforcement of the geotechnical constructions proposed for this project. Client must incorporate the Construction and Materials Inspection requirements into the Project Program and Construction Contract Documents.

5.1 Accredited Testing Agency Required

CEG recommends that the Testing Agency providing special inspections and structural tests be Accredited by a Nationally Recognized Authority (such as: AASHTO resource, A2LA or NVLAP) to demonstrate compliance with ASTM E329 to conduct soil, aggregate, and concrete materials testing. All testing and inspection staff must possess current credentials and nationally recognized certification or licensure which are applicable to the specific material and construction element that they are inspecting and/or testing.

5.2 Soil and Foundation Inspections and Tests

CEG recommends that the Soil and Foundation special inspections and tests be accomplished in full conformance with Table 5 given herein.

Table 5: Statement of Required Soil Special Inspections	
Type	Frequency of Special Inspections & Tests
1. Prior to placement of compacted fill, inspect subgrade and verify that the site has been prepared properly.	Periodically prior to placement of compacted fill. These observations should be accomplished by the Inspecting Professional Geotechnical Engineer (IPGE)
2. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	Continuously during fill installation and per Earthwork Specifications. Perform 1 In-Place Field Density (IPFD) test per 400 square feet per lift and 1 IPFD per 20 lineal feet of trench or wall per lift per side by IPGE.
3. Perform classification and testing of compacted fill materials.	Periodically per the Earthwork Specification by IPGE.
4. Inspect and approve footing/pier bearing grade.	Continuously during excavation by IPGE.

6.0 OTHER IMPORTANT CONSIDERATIONS

CEG provides the information in this section for those using our reports, so they may acquire a better understanding of the geotechnical engineering profession being practiced and the limitations associated with its application to this and other projects.

6.1 Changes to the Project

CEG has described in Report Section 2.0 our understanding of the proposed development at the time this report is published. It is anticipated that the preliminary plans may change during design phase. Substantial changes consist of many items such as, but not limited to; bearing elevation, planned depth of cuts or fills, decrease or increase in design loads, structure footprint growth or shrinkage, structure location movement, and time period of construction (compression or relaxation), among others.

Please advise CEG of substantial changes so we can evaluate the continued applicability of the analyses and recommendations given in this Report. It will help reduce project risks, could save you time and money, and result in a higher quality construction project.

6.2 Review of Plans & Specs

CEG recommends that it be afforded the opportunity to review the Plans and Specifications prepared pursuant to this Report, prior to Bidding. This review will help to verify that a correct interpretation of CEG's recommendations and design intent given in this Report are implemented and incorporated into the Construction Documents. Since CEG is not aware of the project schedule, it is the responsibility of the Client to forward the applicable construction contract documents to CEG for review. Please allow at least 5 business days for CEG to complete the review and issue a report of comments and findings.

6.3 Construction Phase Geotechnical Services

The analysis and recommendations contained in this report are preliminary and are based on the specific data obtained from the limited subsurface explorations referenced in this report. The explorations indicate subsurface conditions only at the specific locations and times, and only to the depths penetrated. The validity of the recommendations is based in part on CEG's assumptions about the stratigraphy, as well as information about the proposed development provided by others. CEG's assumptions may be confirmed only during earthwork and foundation construction operations.

The recommendations made in this report are based on the "Observational Method". The Observational Method ensures continuity from the design to the construction and has been at the heart of many successful construction projects. It relies upon extensive use of monitoring and observational procedures during the construction. Construction monitoring allows CEG to take advantage of conditions more favorable than those anticipated based on the subsurface exploration program. It often provides for timely warning when conditions are less favorable, allowing for changes or alterations to be made before a problem shows itself in newly completed construction. Therefore, it is recommended that CEG be retained to provide Construction Phase Observation and the Soil and Foundation Special Inspections.

It is very important to point out that CEG's engineering recommendations given in this Report are premised upon CEG being retained to provide Construction Phase Geotechnical Engineering Observation as they relate to earthwork, filling and backfilling, and foundation installations. If others are retained to provide construction phase observation, a complete understanding, interpretation or execution of CEG's reported recommendations may not occur. CEG will not assume responsibility for the performance of the structures, slabs and pavements when CEG is not providing the construction phase observation

6.4 Standard of Care and Warranty

CEG has endeavored to conduct the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the geotechnical engineering profession currently practicing in the same locality and under similar conditions as this project. No warranty, either express or implied, is made or intended by the proposal, contract, and written and oral reports, all of which warranties are hereby expressly disclaimed. CEG shall not be responsible for the acts or omissions of Client, its contractors, agents and consultants. CEG has relied upon information supplied by Client, its

contractors, agents and consultants, and/or information available from generally accepted reputable sources, without independent verification, and CEG assumes no responsibility for the accuracy thereof.

6.5 Closing Comments

Please do not hesitate to contact our office if you have any questions regarding this report, its conclusions, its recommendations, or its application to actual field conditions revealed during construction.

Respectfully Submitted,
CME ENGINEERING GROUP, D.P.C.

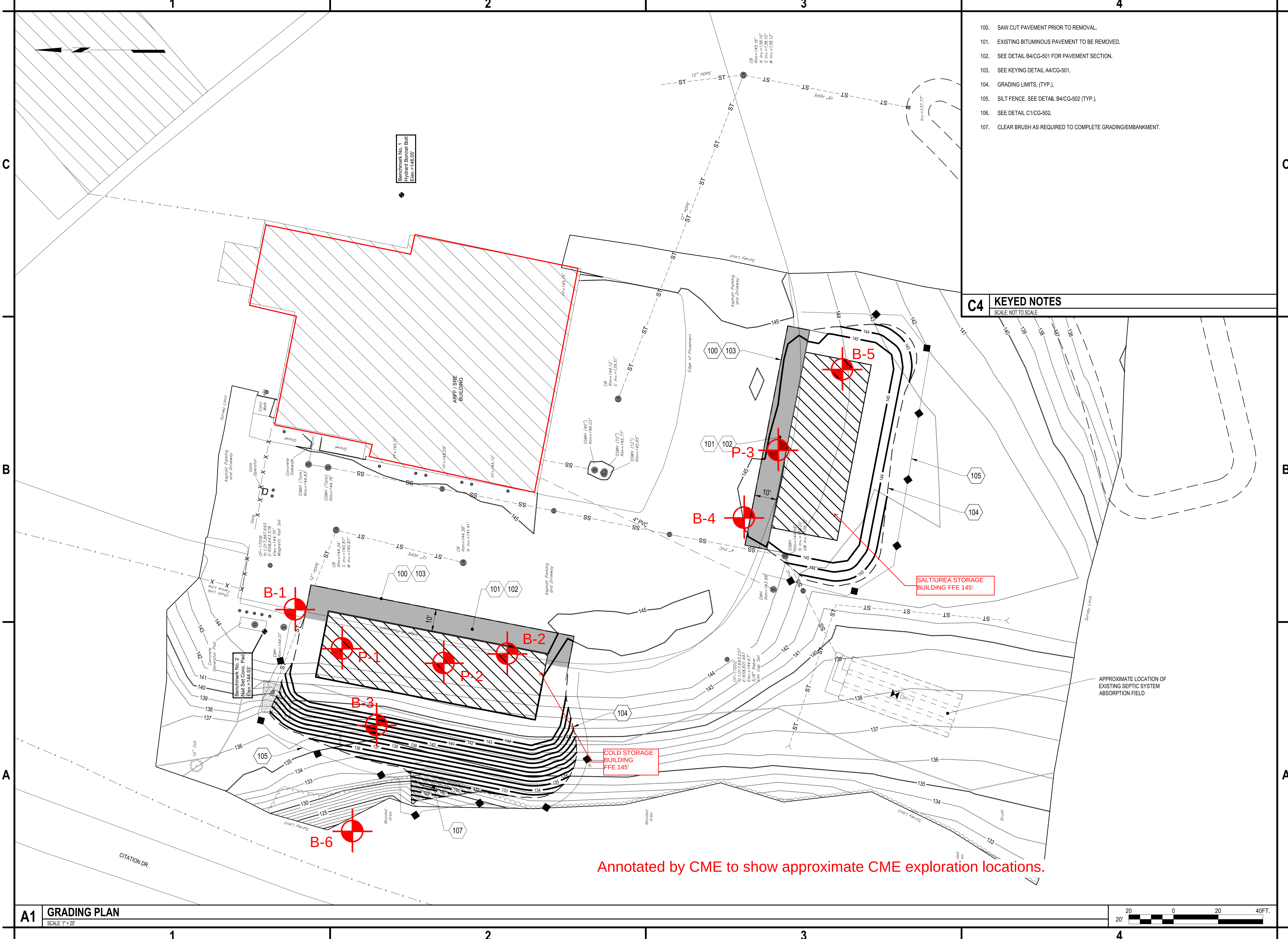


Anas N. Anasthas, P.E.
President

Reviewed By,
CME ENGINEERING GROUP, D.P.C.



Christopher R. Paolini, P.E., MPS, EXWSM
Vice President



- 100. SAW CUT PAVEMENT PRIOR TO REMOVAL.
- 101. EXISTING BITUMINOUS PAVEMENT TO BE REMOVED.
- 102. SEE DETAIL B4/CG-501 FOR PAVEMENT SECTION.
- 103. SEE KEYING DETAIL A4/CG-501.
- 104. GRADING LIMITS, (TYP.).
- 105. SILT FENCE, SEE DETAIL B4/CG-502 (TYP.).
- 106. SEE DETAIL C1/CG-502.
- 107. CLEAR BRUSH AS REQUIRED TO COMPLETE GRADING/EMBANKMENT.

C4 KEYED NOTES

SCALE: NOT TO SCALE



C&S Engineers, Inc.
21 Arkansas Street
Plattsburgh, New York 12901
Phone: 315-455-2000
www.cscos.com

CERTIFICATE OF AUTHORIZATION # 0021365

PRELIMINARY
NOT FOR
CONSTRUCTION



AIRPORT SUPPORT BUILDINGS
HUDSON VALLEY REGIONAL AIRPORT
263 NEW HACKENSACK ROAD
WAPPINGERS FALLS, NY 12590

MARK	DATE	DESCRIPTION
REVISIONS		
PROJECT NO: 128.056.001		
DATE: AUGUST 2024		
DRAWN BY: JWP		
DESIGNED BY: JWP		
CHECKED BY: PMH		
NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK EDUCATION LAW		

GRADING PLAN

CG-101



C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
Syracuse, New York 13212
Phone: 315-455-2000
Fax: 315-455-9667
www.cscos.com

PRELIMINARY
NOT FOR CONSTRUCTION

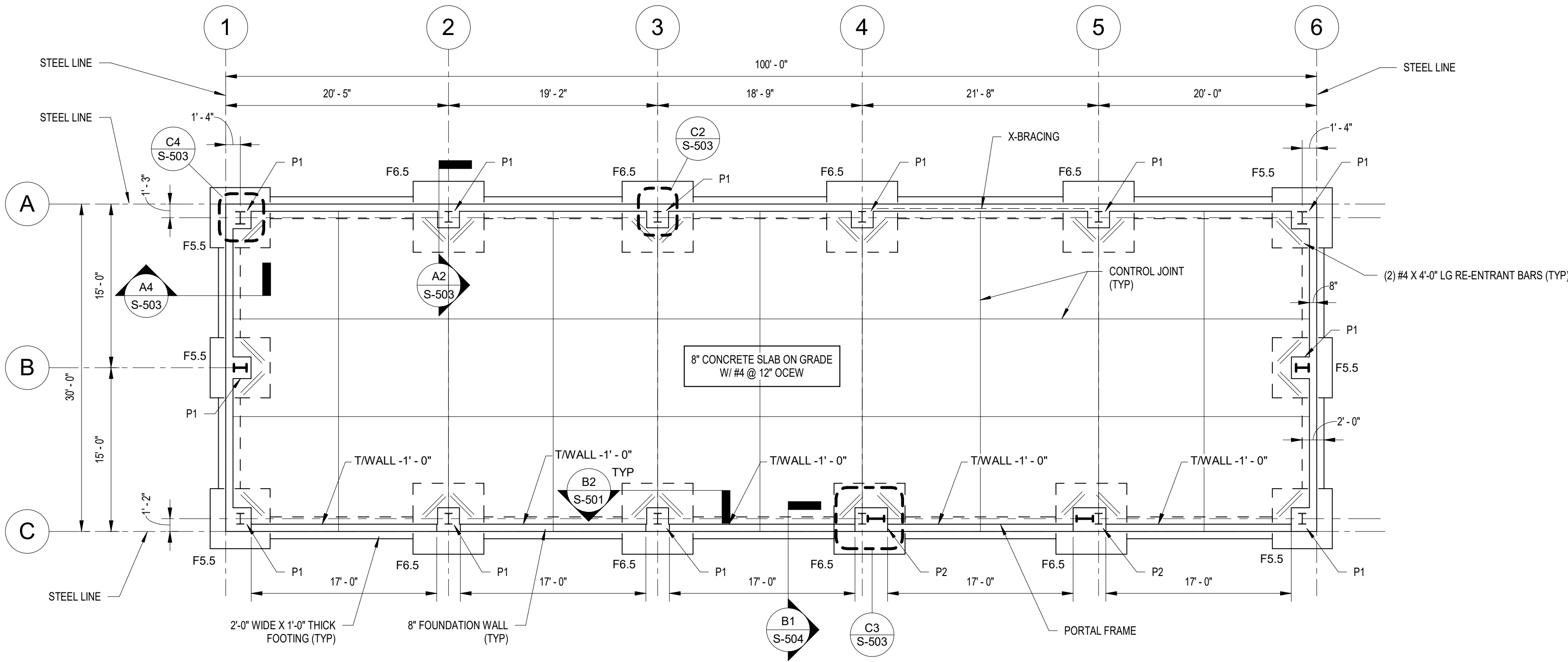


AIRPORT SUPPORT BUILDINGS
HUDSON VALLEY REGIONAL AIRPORT
263 NEW HACKENSACK ROAD
WAPPINGERS FALLS, NY 12590

MARK	DATE	DESCRIPTION
REVISIONS		
PROJECT NO: 128.065.001		
DATE: AUGUST 2024		
DRAWN BY: B. ZUHRIC		
DESIGNED BY: B. ZUHRIC		
CHECKED BY: K. SPYTKO, PE		
NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK EDUCATION LAW		

COLD STORAGE
FOUNDATION AND
SLAB PLAN

S-101

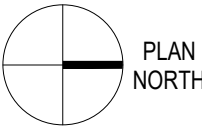


FOUNDATION AND SLAB PLAN GENERAL NOTES:

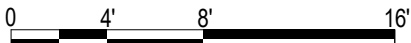
- ELEVATIONS REFERENCED FROM LEVEL 1 T/CONC = 0'-0"
- REFER TO SHEETS S-001, S-501 AND S-502 FOR GENERAL FOUNDATION NOTES AND STANDARD DETAILS
- COORDINATE ACTUAL SIZE AND LOCATION OF WALL OPENINGS WITH ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS INCLUDING THEIR APPROVED SHOP DRAWINGS TO ENSURE COORDINATION OF ALL TRADES
- REFER TO CIVIL DRAWINGS FOR LOCATIONS OF UNDERGROUND UTILITIES
- T/FOOTING = 4'-0" UNLESS NOTED OTHERWISE
- T/WALL = 1'-0" UNLESS NOTED OTHERWISE
- T/PIER = 1'-0" UNLESS NOTES OTHERWISE
- ALL FOUNDATION FOOTINGS SHALL BE PLACED ON AT LEAST 1'-0" OF COMPACTED SELECT STRUCTURAL FILL PER THE GEOTECHNICAL REPORT
- PROVIDE (2) - #4 x 4'-0" LONG SLAB REINFORCEMENT AT ALL RE-ENTRANT CORNERS OF SLABS
- PROVIDE VAPOR RETARDER BELOW ALL INTERIOR SLABS ON GRADE
- ALL SLABS ON GRADE SHALL BE PLACED ON AT LEAST 0'-6" OF COMPACTED SELECT STRUCTURAL FILL

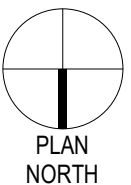
NOTE: FOUNDATION PLAN IS FOR BIDDING PURPOSES ONLY.
FINAL FOUNDATION DESIGN WILL BE PROVIDED ONCE
APPROVED PRE-ENGINEERED METAL BUILDING SHOP
DRAWINGS HAVE BEEN RECEIVED

T/CONC = 0'-0" UNO
REFER TO CIVIL DRAWINGS FOR FINISHED FLOOR ELEVATION



A1 FOUNDATION PLAN - COLD STORAGE BUILDING
SCALE: 1/8" = 1'-0"





S-102

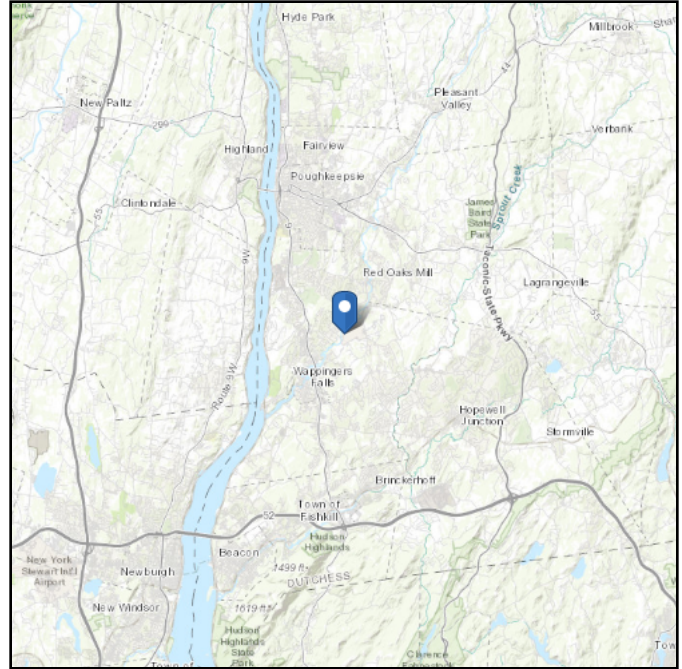
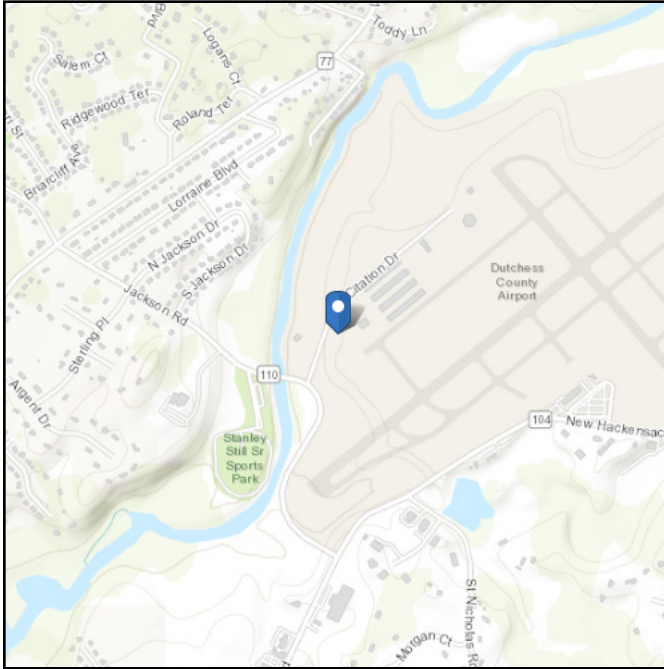


ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 41.626027
Longitude: -73.890983
Elevation: 144.9863725529496 ft
(NAVD 88)

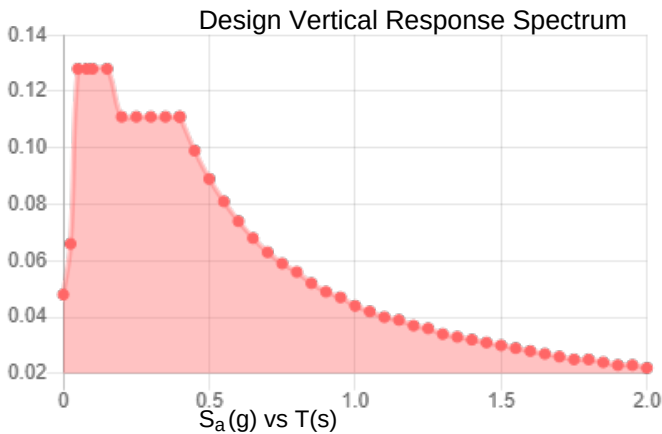
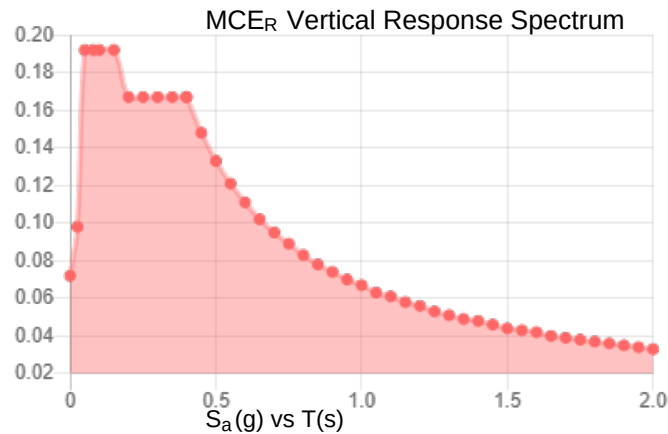
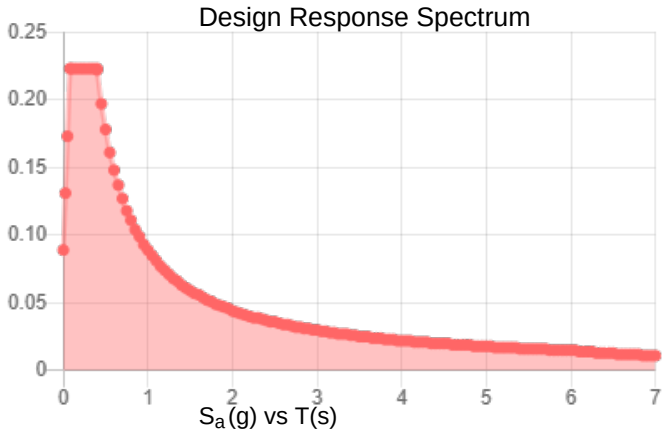
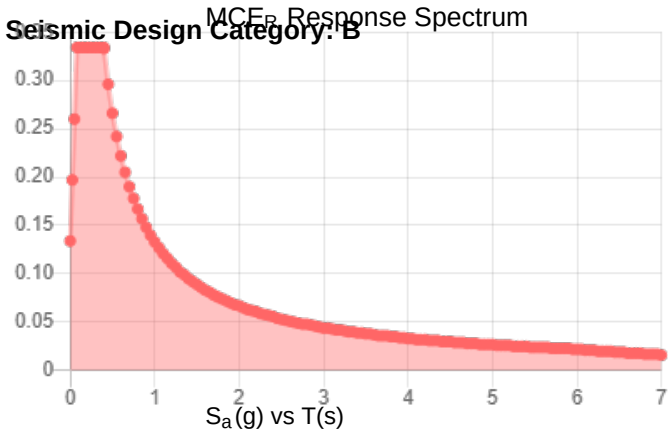




Site Soil Class: D - Stiff Soil

Results:

S_S :	0.209	S_{D1} :	0.089
S_1 :	0.056	T_L :	6
F_a :	1.6	PGA :	0.118
F_v :	2.4	PGA _M :	0.184
S_{MS} :	0.334	F_{PGA} :	1.564
S_{M1} :	0.133	I_e :	1
S_{DS} :	0.223	C_v :	0.718



Data Accessed: Wed Apr 30 2025

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.



The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.



6035 Corporate Drive
East Syracuse, New York 13057
(315) 701-0522
(315) 701-0526 (Fax)

www.cmeassociates.com

Transmittal

April 10, 2025

C&S Engineers, Inc. (Client)
499 Col. Eileen Collins Blvd.
Syracuse, NY 13212
Phone: 315.703.4145

Attn: Patrick M. Hludzenski, P.E., Principal Engineer
phludzenski@cscos.com

Re: Hudson Valley Regional Airport – Airport Support Buildings
Wappingers Falls, New York
CME Project No.: 28256-05

Gentlepeople:

Attached you will find....

<u>Number of Copies</u>	<u>Report Number</u>	<u>Description</u>
1	28256B-01-0425	Geotechnical Data Report

The above report was emailed to Patrick M. Hludzenski at phludzenski@cscos.com on 04/10/2025.

Respectfully submitted,
CME Associates, Inc.

A handwritten signature in blue ink, appearing to read "Niru Paransothy".

Niru Paransothy, E.I.T.
Staff Geotechnical Engineer



6035 Corporate Drive
East Syracuse, New York 13057
(315) 701-0522
(315) 701-0526 (Fax)

www.cmeassociates.com

April 10, 2025

C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
Syracuse, NY 13212
Phone: 315.703.4145

Attn: Patrick M. Hludzenski, P.E., Principal Engineer
phludzenski@cscos.com

Re: Geotechnical Data Report
Hudson Valley Regional Airport – Airport Support Buildings
Wappingers Falls, New York
CME Report No.: 28256B-01-0425
Page 1 of 3

1.0 INTRODUCTION

CME Associates, Inc. (CME) was retained by C&S Engineers, Inc. (Client) to provide subsurface exploration and geotechnical services for the subject project. CME conducted a subsurface exploration, consisting of advancing 6 Test Borings and 3 Auger Probes, for the subject project on 03/11/2025 and 03/12/2025.

The Scope of Basic Services and this report have been provided pursuant to a Geotechnical Services Agreement between Client and CME, dated and executed on 01/16/2025, which references CME Proposal/Agreement No.: 05.7716. This report provides a summary of exploration activities conducted at the subject project site. Foundation recommendations for the proposed structures and other geotechnical items contracted in the agreement will follow under separate cover.

2.0 EXPLORATION METHODOLOGY

2.1 Exploration Layout and Utility Clearance

The exploration locations were selected by Client and staked in the field by CME. Prior to performing the fieldwork, CME contacted UDig New York to clear public utilities at the exploration locations. Private utilities at the exploration locations were cleared by CME using Ground Penetration Radar equipment and Radio Detection equipment. The attached *CME Exploration Location Plan*, labeled ELP-1, depicts the approximate exploration locations.

GPS coordinates and elevation at grade at each exploration location were determined using hand-held GPS Survey equipment. Please refer to the attached *GPS Coordinates and Elevations Table* for GPS coordinates and elevation at grade at each exploration location.

CME Report No.: 28256B-01-0425**Page 2 of 3**

2.2 Test Borings

The Test Borings were advanced using a Central Mine Equipment Model 550X ATV-mounted rotary drill rig, equipped with 3-1/4" I.D. hollow stem augers. Soil sampling was conducted using a 140-pound automatic hammer dropping through a distance of 30-inches to drive a 2" O.D. split barrel sampler in general conformance with ASTM D1586 Standard Practice. The boreholes were backfilled with auger cuttings to closely match existing grade. The *CME Subsurface Exploration – Test Boring Logs*, labeled B-1 to B-6, are attached.

The soil samples were logged and visually classified in the field by the CME drillers, and a portion of each soil sample was placed and sealed in a glass jar. The soil classifications were later reviewed by a CME Geologist and the undersigned Engineer in CME's AASHTO re:source¹ accredited East Syracuse Laboratory. The visual soil classifications were made using a modified Burmister Classification System, as practiced by CME and as generally described in the attached document, entitled "*General Information & Key to the Test Boring Logs*".

2.3 Auger Probes

The Auger Probes were advanced using a Central Mine Equipment Model 550X, ATV-mounted, rotary exploration drill rig, equipped with 3-1/4" I.D. hollow stem augers. The Auger Probes were advanced to depths where auger refusal was encountered on probable bedrock. *The CME Subsurface Exploration - Auger Probe Logs*, labeled P-1 to P-3, are attached.

3.0 STANDARD OF CARE

CME endeavored to conduct services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the industry currently practicing in the same locality and under similar conditions as this project. No warranty, either expressed or implied, is made or intended by CME's proposal, contract, and written and oral reports, all of which warranties are hereby expressly disclaimed. CME shall not be responsible for the acts or omissions of Client, its contractors, agents and consultants. CME may rely upon information supplied by Client, its contractors, agents and consultants or information available from generally accepted reputable sources, without independent verification, and CME assumes no responsibility for the accuracy thereof.

4.0 CLOSING

This report is intended to satisfy specific service scope outlined by the referenced Agreement. No other representations, expressed or implied, are intended or made with respect to the information provided herein, and including but not limited to, its suitability for use by others.

Respectfully Submitted,
CME Associates, Inc.

A handwritten signature in blue ink, appearing to read "Paransothy Niru", written over a light blue grid background.

Niru Paransothy, E.I.T.
Staff Geotechnical Engineer

Reviewed by,
CME Associates, Inc.

A handwritten signature in blue ink, appearing to read "Chen Liu", written over a light blue grid background.

Chen Liu, Ph.D., E.I.T.
Geotechnical Engineer

¹AASHTO re:source – American Association of State Highway & Transportation Officials (AASHTO) Materials Reference Laboratory, a Federal Agency having jurisdiction to assess laboratory competency according to the Standards of the United States of America. CME East Syracuse accreditation includes testing of Portland Cement Concrete, Aggregate and Soil Materials. www.AASHTOresource.org.

CME Report No.: 28256B-01-0425

Page 3 of 3



Attachment Listing:

- CME Exploration Location Plan (1 of 1)
- GPS Coordinates and Elevations Table (1 of 1)
- CME Subsurface Exploration – Test Boring Logs (10 of 10)
- CME Subsurface Exploration – Auger Probe Logs (5 of 5)
- General Information & Key to Test Boring Logs (4 of 4)

CME EXPLORATION LOCATION PLAN - ELP-1

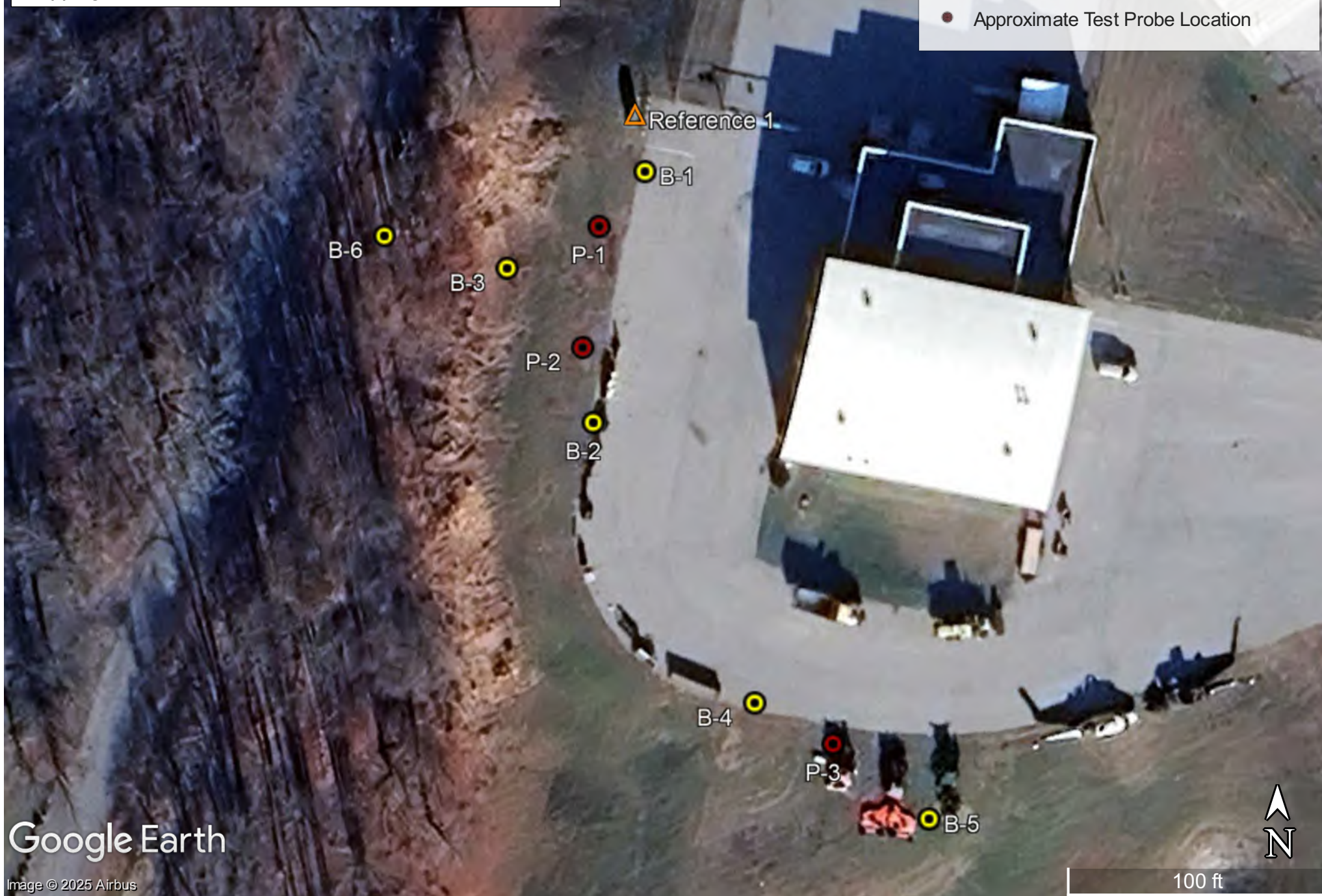
CME Project No. 28256-05

Hudson Valley Regional Airport - Airport Support Buildings

Wappingers Falls, New York

Legend

- △ Approximate Reference Point Location
- Approximate Test Boring Location
- Approximate Test Probe Location



Google Earth

Image © 2025 Airbus

100 ft

CME Project No.: 28256-05**GPS Coordinates and Elevations Table****Hudson Valley Regional Airport - Airport Support Buildings****Wappingers Falls, New York**

TABLE 1			
Boring ID	Latitude	Longitude	Elevation (FT.)
B-1	41.62602658	-73.89098319	144.8
B-2	41.62575736	-73.89105726	144.5
B-3	41.62592296	-73.89118108	135.3
B-4	41.62545876	-73.89082657	144.8
B-5	41.62533701	-73.89057956	143.5
B-6	41.62596068	-73.89136427	117.9
P-1	41.62596769	-73.89104894	144.1
P-2	41.62583780	-73.89107244	144.4
P-3	41.62541592	-73.89071529	144.4
Reference 1	41.62608664	-73.89099915	144.6

Notes:

AMSL: Above Mean Sea Level

1. GPS coordinates and elevations were obtained utilizing GPS equipment.
2. NYSDOT CORS positions are based on North American Datum of 1983 (NAD 83).
3. Elevations are based on the North American Vertical Datum of 1988 (NAVD 88).
4. Reference 1 refers to a survey nail located to the northwest of Test Boring B-1 and shown on Client-provided Grading Plan CG-101 as Benchmark No. 2 with an elevation of 144.53'.

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522		SUBSURFACE EXPLORATION TEST BORING LOG				Boring No.		B-1					
						Page No.		1 of 2					
						Project No.		28256-05					
Project Name:		Hudson Valley Regional Airport - Airport Support Buildings, Wappinger Falls, New York						Date Started		03/11/25			
Client:		C&S Engineers, Inc.						Date Finished		03/11/25			
Location:		See Exploration Location Plan ELP-1						Surf. Elev. (ft)		144.8			
METHODS OF INVESTIGATION							GROUNDWATER OBSERVATIONS						
Driller: Beau Fletcher		Casing: 3 ¼" ID H.S.A.				Date		Time		Depth (ft)		Casing At (ft)	
Driller: Chris O'Hara		Casing Hammer:				03/11/25		While Drilling		None Noted		13.5	
Inspector:		Other:				03/11/25		Before Casing Removed		None Noted		27.2	
Drill Rig: CME 550X		Soil Sampler: 2" OD Split Barrel				03/11/25		After Casing Removed		None Noted		out	
Type: ATV		Hammer Wt: 140 lbs.				03/11/25		After Casing Removed		caved @ 20.5		out	
Rod Size: AWJ		Hammer Fall: 30 in.											
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL							
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine		and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%		SPT "N" or RQD %		
0	1A	0.0	0.5	SS/13	3-6-5-9		Topsoil and Organic Material (moist)				11		
1	1B	0.5	2.0				FILL; Brown cmf sand, mf gravel, silt, clay (moist)						
2	2	2.0	4.0	SS/17	16-13-14-15		FILL; Brown cmf sand, mf gravel, silt, clay (moist)				27		
3													
4	3	4.0	6.0	SS/24	11-13-17-17		Possible FILL; Brown mf gravel, cmf sand, silt, clay (moist)				30		
5													
6	4	6.0	8.0	SS/18	14-9-11-14		Possible FILL; Brown cmf sand, mf gravel, silt, clay (moist)				20		
7													
8	5	8.0	10.0	SS/17	35-20-15-14		Grey/Brown cmf SAND, some SILT, some fine GRAVEL, trace CLAY (moist, compact)				35		
9													
10													
11													
12													
13													
14	6	13.5	15.0	SS/10	9-4-4		Brown/Grey cmf GRAVEL and cmf SAND, little SILT (moist, loose)				8		
15													
16													
17													
18													
19	7	18.5	20.0	SS/16	4-3-8		Brown mf GRAVEL and cmf SAND, some SILT, trace CLAY (moist, medium compact)				11		
20							Continued on Page 2						

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522						SUBSURFACE EXPLORATION TEST BORING LOG			Boring No.	B-1
						Page No.	2 of 2			
						Project No.	28256-05			
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL				
Depth Scale (ft)	Sample No.	Sample Depth (ft) FromTo		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine	and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %	
20	8	23.5	25.0	SS/18	4-7-7		Continued from Page 1		14	
21										
22										
23										
24							Brown SILT and mf GRAVEL, some cmf SAND (wet, stiff)			
25	9	27.2	27.2	SS/0	50@0"		Augers like weathered ROCK beginning @ 26.4'		50+	
26										
27							No Recovery - Spoon and Auger Refusal @ 27.2' on possible top of Bedrock			
28							Bottom of Boring @ 27.2'			
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522		SUBSURFACE EXPLORATION TEST BORING LOG				Boring No.		B-2					
						Page No.		1 of 2					
						Project No.		28256-05					
Project Name:		Hudson Valley Regional Airport - Airport Support Buildings, Wappinger Falls, New York						Date Started		03/12/25			
Client:		C&S Engineers, Inc.						Date Finished		03/12/25			
Location:		See Exploration Location Plan ELP-1						Surf. Elev. (ft)		144.5			
METHODS OF INVESTIGATION							GROUNDWATER OBSERVATIONS						
Driller: Beau Fletcher		Casing: 3 ¼" ID H.S.A.				Date		Time		Depth (ft)		Casing At (ft)	
Driller: Chris O'Hara		Casing Hammer:				03/12/25		While Drilling		None Noted		25.0	
Inspector:		Other:				03/12/25		Before Casing Removed		None Noted		24.8	
Drill Rig: CME 550X		Soil Sampler: 2" OD Split Barrel				03/12/25		After Casing Removed		None Noted		out	
Type: ATV		Hammer Wt: 140 lbs.				03/12/25		After Casing Removed		caved @ 12.7		out	
Rod Size: AWJ		Hammer Fall: 30 in.											
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL							
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine		and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%		SPT "N" or RQD %		
0	1A	0.0	0.5	SS/14	3-8-8-10		Topsoil and Organic Material (moist)				16		
1	1B	0.5	2.0				Miscellaneous FILL; Brown cmf sand, mf gravel, asphalt (moist)						
2	2	2.0	3.9	SS/12	15-11-11-50@4"		Possible FILL; Brown silt, mf gravel, cmf sand (moist)				22		
3													
4	3	4.0	6.0	SS/8	12-16-19-15		Grey/Brown cmf SAND and mf GRAVEL, little SILT, trace CLAY (moist, compact)				35		
5													
6	4	6.0	8.0	SS/6	8-8-15-19		Brown/Grey cmf SAND, some SILT, little mf GRAVEL, trace CLAY (moist, medium compact)				23		
7													
8	5	8.0	10.0	SS/20	11-12-11-12		Similar as above (moist, medium compact)				23		
9													
10													
11													
12													
13													
14	6	13.5	15.0	SS/7	4-6-10		Brown cmf SAND and cmf GRAVEL, little SILT (moist, medium compact)				16		
15													
16													
17													
18													
19	7	18.5	20.0	SS/16	4-8-17		Brown cmf SAND and SILT, some mf GRAVEL (moist, medium compact)				25		
20							Continued on Page 2						

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522						SUBSURFACE EXPLORATION TEST BORING LOG			Boring No.	B-2
									Page No.	2 of 2
									Project No.	28256-05
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL				
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine	and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %	
20	8	23.5	24.8	SS/13	15-16-50@3"		Continued from Page 1		50+	
21										
22										
23										
24							Brown cmf GRAVEL, some cmf SAND, little SILT, trace CLAY (moist, very compact) <i>Spoon Refusal @ 24.8'</i> <i>Auger Refusal @ 25.0' on possible top of Bedrock</i>			
25							Bottom of Boring @ 25.0'			
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522		SUBSURFACE EXPLORATION TEST BORING LOG		Boring No.		B-3									
				Page No.		1 of 2									
				Project No.		28256-05									
Project Name:		Hudson Valley Regional Airport - Airport Support Buildings, Wappinger Falls, New York				Date Started		03/11/25							
Client:		C&S Engineers, Inc.				Date Finished		03/11/25							
Location:		See Exploration Location Plan ELP-1				Surf. Elev. (ft)		135.3							
METHODS OF INVESTIGATION						GROUNDWATER OBSERVATIONS									
Driller:		Beau Fletcher		Casing:		3 ¼" ID H.S.A.		Date		Time		Depth (ft)		Casing At (ft)	
Driller:		Chris O'Hara		Casing Hammer:				03/11/25		While Drilling		None Noted		20.0	
Inspector:				Other:				03/11/25		Before Casing Removed		None Noted		31.1	
Drill Rig:		CME 550X		Soil Sampler:		2" OD Split Barrel		03/11/25		After Casing Removed		None Noted		out	
Type:		ATV		Hammer Wt:		140 lbs.		03/11/25		After Casing Removed		caved @ 14.7		out	
Rod Size:		AWJ		Hammer Fall:		30 in.									
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL									
Depth Scale (ft)	Sample No.	Sample Depth (ft)		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine		and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%		SPT "N" or RQD %				
		From	To												
0	1	0.0	2.0	SS/8	2-2-3-12		FILL; Brown cmf sand, mf gravel, silt, clay, roots (moist)				5				
1															
2	2	2.0	4.0	SS/5	4-35-14-25		FILL; Grey rock fragments (moist) <i>Possible rip-rap stone fill</i>				49				
3															
4	3	4.0	5.8	SS/9	15-17-37-50@4"		FILL; Similar as above (moist) <i>Spoon refusal at 5.8' on possible rip-rap stone fill</i>				54				
5															
6	4	6.0	6.6	SS/4	43-50@1"		FILL; Similar as above (moist) <i>Spoon refusal at 6.6' on possible rap-rap stone fill</i>				50+				
7															
8	5	8.0	10.0	SS/7	6-4-6-5		Brown cmf SAND and mf GRAVEL, some SILT (moist, medium compact)				10				
9															
10	6	10.0	12.0	SS/9	5-6-4-4		Brown/Grey cmf SAND and mf GRAVEL, trace SILT (moist, medium compact)				10				
11															
12	7	12.0	14.0	SS/13	4-5-3-3		Brown/Grey cmf SAND, some mf GRAVEL, trace SILT (moist, loose)				8				
13															
14	8	14.0	16.0	SS/10	4-4-4-4		Brown/Grey cmf SAND and mf GRAVEL, trace SILT (moist, loose)				8				
15															
16	9	16.0	18.0	SS/14	4-4-4-5		Similar as above (moist, loose)				8				
17															
18	10	18.0	20.0	SS/11	6-5-7-7		Brown cmf SAND and mf GRAVEL, trace SILT, trace CLAY (wet, medium compact)				12				
19															
20							Continued on Page 2								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522						SUBSURFACE EXPLORATION TEST BORING LOG			Boring No.	B-3
									Page No.	2 of 2
									Project No.	28256-05
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL				
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine	and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %	
20	11	23.5	25.0	SS/15	8-10-16		Continued from Page 1		26	
21										
22										
23										
24							Grey cmf SAND and SILT, little mf GRAVEL (moist, medium compact)			
25	12	28.5	28.5	SS/0	50@0"		Augers very hard beginning @ 28.3' No Recovery - Spoon Refusal @ 28.5'		50+	
26										
27										
28							Augers like possible bedrock			
29							Auger Refusal @ 31.1' on possible top of Bedrock			
30	Bottom of Boring @ 31.1'									
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522		SUBSURFACE EXPLORATION TEST BORING LOG				Boring No.		B-4					
						Page No.		1 of 1					
						Project No.		28256-05					
Project Name:		Hudson Valley Regional Airport - Airport Support Buildings, Wappinger Falls, New York						Date Started		03/12/25			
Client:		C&S Engineers, Inc.						Date Finished		03/12/25			
Location:		See Exploration Location Plan ELP-1						Surf. Elev. (ft)		144.8			
METHODS OF INVESTIGATION							GROUNDWATER OBSERVATIONS						
Driller: Beau Fletcher		Casing: 3 ¼" ID H.S.A.				Date		Time		Depth (ft)		Casing At (ft)	
Driller: Chris O'Hara		Casing Hammer:				03/12/25		While Drilling		None Noted		8.0	
Inspector:		Other:				03/12/25		Before Casing Removed		None Noted		12.8	
Drill Rig: CME 550X		Soil Sampler: 2" OD Split Barrel				03/12/25		After Casing Removed		None Noted		out	
Type: ATV		Hammer Wt: 140 lbs.				03/12/25		After Casing Removed		caved @ 9.7		out	
Rod Size: AWJ		Hammer Fall: 30 in.											
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL							
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine		and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%		SPT "N" or RQD %		
0	1A	0.0	0.1	SS/6	4-5-9-14		Topsoil and Organic Material (moist)				14		
1	1B	0.1	2.0				FILL; Brown/Grey mf gravel, cmf sand, silt, roots, asphalt (moist)						
2	2	2.0	4.0	SS/23	14-14-14-17		FILL; Grey/Brown cmf sand, silt, mf gravel, roots (moist)				28		
3													
4	3	4.0	6.0	SS/14	15-17-16-13		Brown cmf SAND, some cmf GRAVEL, trace SILT (moist, compact)				33		
5													
6	4	6.0	8.0	SS/10	10-9-8-6		Brown cmf SAND and cmf GRAVEL, trace SILT (moist, medium compact)				17		
7													
8	5	8.0	10.0	SS/22	12-8-9-12		Brown cmf SAND and cmf GRAVEL, some SILT (moist, medium compact)				17		
9													
10													
11													
12													
13	6	12.8	12.8	SS/0	50@0"		Grey ROCK Fragments in tip of spoon. Spoon and Auger Refusal @ 12.8' on possible top of Bedrock				50+		
14							Bottom of Boring @ 12.8'						
15													
16													
17													
18													
19													
20													

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522		SUBSURFACE EXPLORATION TEST BORING LOG				Boring No.		B-5					
						Page No.		1 of 1					
						Project No.		28256-05					
Project Name:		Hudson Valley Regional Airport - Airport Support Buildings, Wappinger Falls, New York						Date Started		03/12/25			
Client:		C&S Engineers, Inc.						Date Finished		03/12/25			
Location:		See Exploration Location Plan ELP-1						Surf. Elev. (ft)		143.5			
METHODS OF INVESTIGATION							GROUNDWATER OBSERVATIONS						
Driller: Beau Fletcher		Casing: 3 ¼" ID H.S.A.				Date		Time		Depth (ft)		Casing At (ft)	
Driller: Chris O'Hara		Casing Hammer:				03/12/25		While Drilling		None Noted		6.0	
Inspector:		Other:				03/12/25		Before Casing Removed		None Noted		8.5	
Drill Rig: CME 550X		Soil Sampler: 2" OD Split Barrel				03/12/25		After Casing Removed		None Noted		out	
Type: ATV		Hammer Wt: 140 lbs.				03/12/25		After Casing Removed		caved @ 5.0		out	
Rod Size: AWJ		Hammer Fall: 30 in.											
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL							
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine		and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%		SPT "N" or RQD %		
0	1A	0.0	0.5	SS/15	2-9-7-7		Topsoil and Organic Material (moist)				16		
1	1B	0.5	2.0				Brown cmf SAND and mf GRAVEL, little SILT (moist, medium compact)						
2	2	2.0	4.0	SS/19	10-11-16-28		Brown cmf SAND and mf GRAVEL, little SILT, trace CLAY (moist, medium compact)				27		
3													
4	3	4.0	4.9	SS/11	25-50@5"		Brown cmf SAND and mf GRAVEL, little SILT (moist, very compact)				50+		
5													
6	4	6.0	6.3	SS/4	50@4"		Similar as above (moist, very compact)				50+		
7													
8	5	8.0	8.4	SS/2	50@5"		Brown/Grey mf GRAVEL, trace cmf SAND, trace SILT (moist, very compact)				50+		
9							<i>Auger Refusal @ 8.5' on possible Cobble or Boulder</i>						
10							Bottom of Boring @ 8.5'						
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522		SUBSURFACE EXPLORATION TEST BORING LOG				Boring No.		B-6					
						Page No.		1 of 2					
						Project No.		28256-05					
Project Name:		Hudson Valley Regional Airport - Airport Support Buildings, Wappinger Falls, New York						Date Started		03/11/25			
Client:		C&S Engineers, Inc.						Date Finished		03/11/25			
Location:		See Exploration Location Plan ELP-1						Surf. Elev. (ft)		117.9			
METHODS OF INVESTIGATION							GROUNDWATER OBSERVATIONS						
Driller: Beau Fletcher		Casing: 3 ¼" ID H.S.A.				Date		Time		Depth (ft)		Casing At (ft)	
Driller: Chris O'Hara		Casing Hammer:				03/11/25		While Drilling		None Noted		13.5	
Inspector:		Other:				03/11/25		Before Casing Removed		None Noted		22.0	
Drill Rig: CME 550X		Soil Sampler: 2" OD Split Barrel				03/11/25		After Casing Removed		None Noted		out	
Type: ATV		Hammer Wt: 140 lbs.				03/11/25		After Casing Removed		caved @ 4.6		out	
Rod Size: AWJ		Hammer Fall: 30 in.											
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL							
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine		and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%		SPT "N" or RQD %		
0	1	0.0	2.0	SS/8	2-4-3-4		FILL; Brown cmf sand, silt, fine gravel, roots, wood (moist)				7		
1													
2	2	2.0	4.0	SS/11	4-4-3-3		Possible FILL; Brown cmf sand, mf gravel, silt, roots (moist)				7		
3													
4	3	4.0	6.0	SS/12	4-5-5-4		Possible FILL; Brown/Grey cmf sand, mf gravel, silt (moist)				10		
5													
6	4A	6.0	7.0	SS/16	5-4-4-3		Possible FILL; Brown cmf sand, mf gravel, silt (wet)				8		
7	4B	7.0	8.0				Brown SILT, some CLAY, trace fine SAND (wet, medium stiff)						
8	5	8.0	10.0	SS/17	5-3-3-4		Brown SILT and CLAY (wet, medium stiff)				6		
9													
10													
11													
12													
13													
14	6	13.5	15.0	SS/16	4-2-2		Grey, Similar as above (moist, medium stiff)				4		
15													
16													
17													
18													
19	7	18.5	20.0	SS/15	9-12-22		Grey cmf SAND and SILT, some fine GRAVEL, little CLAY (moist, compact)				34		
20							Continued on Page 2						

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522						SUBSURFACE EXPLORATION TEST BORING LOG			Boring No.	B-6
									Page No.	2 of 2
									Project No.	28256-05
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL				
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine	and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %	
20	8	22.0	22.0	SS/0	50@0"		Continued from Page 1		50+	
21										
22							Grey ROCK Fragments in tip of spoon. Spoon and Auger Refusal @ 22.0' on possible top of Bedrock			
23							Bottom of Boring @ 22.0'			
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522 SUBSURFACE EXPLORATION AUGER PROBE LOG					Boring No.	P-1		
					Page No.	1 of 2		
					Project No.	28256-05		
Project Name:					Hudson Valley Regional Airport - Airport Support Buildings, Wappinger Falls, New York	Date Started	03/12/25	
Client:					C&S Engineers, Inc.	Date Finished	03/12/25	
Location:					See Exploration Location Plan ELP-1	Surf. Elev. (ft)	144.1	
METHODS OF INVESTIGATION					GROUNDWATER OBSERVATIONS			
Driller:		Beau Fletcher		Casing:	3 ¼" ID H.S.A.			
Driller:		Chris O'Hara		Casing Hammer:				
Inspector:				Other:				
Drill Rig:		CME 550X		Soil Sampler:				
Type:		ATV		Hammer Wt:	140 lbs.			
Rod Size:		AWJ		Hammer Fall:	30 in.			
LOG OF BORING SAMPLES					VISUAL CLASSIFICATION OF MATERIAL			
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0							Auger advanced to refusal depth without SPT and Sampling	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522						SUBSURFACE EXPLORATION AUGER PROBE LOG			Boring No.	P-1
									Page No.	2 of 2
									Project No.	28256-05
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL				
Depth Scale (ft)	Sample No.	Sample Depth (ft) FromTo		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine	and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %	
20							Continued from Page 1			
21										
22										
23										
24										
25							Auger Refusal @ 25.2'			
26							Bottom of Boring @ 25.2'			
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522 SUBSURFACE EXPLORATION AUGER PROBE LOG					Boring No.	P-2		
					Page No.	1 of 2		
					Project No.	28256-05		
Project Name:					Hudson Valley Regional Airport - Airport Support Buildings, Wappinger Falls, New York	Date Started	03/12/25	
Client:					C&S Engineers, Inc.	Date Finished	03/12/25	
Location:					See Exploration Location Plan ELP-1	Surf. Elev. (ft)	144.4	
METHODS OF INVESTIGATION					GROUNDWATER OBSERVATIONS			
Driller:		Beau Fletcher		Casing:	3 ¼" ID H.S.A.			
Driller:		Chris O'Hara		Casing Hammer:				
Inspector:				Other:				
Drill Rig:		CME 550X		Soil Sampler:				
Type:		ATV		Hammer Wt:	140 lbs.			
Rod Size:		AWJ		Hammer Fall:	30 in.			
LOG OF BORING SAMPLES					VISUAL CLASSIFICATION OF MATERIAL			
Depth Scale (ft)	Sample No.	Sample Depth (ft) From To		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0							Auger advanced to refusal depth without SPT and Sampling	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522						SUBSURFACE EXPLORATION AUGER PROBE LOG			Boring No.	P-2
									Page No.	2 of 2
									Project No.	28256-05
LOG OF BORING SAMPLES						VISUAL CLASSIFICATION OF MATERIAL				
Depth Scale (ft)	Sample No.	Sample Depth (ft) FromTo		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine	and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %	
20							Continued from Page 1			
21										
22										
23										
24										
25							Auger Refusal @ 24.5'			
26							Bottom of Boring @ 24.5'			
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522 SUBSURFACE EXPLORATION AUGER PROBE LOG					Boring No.	P-3		
					Page No.	1 of 1		
					Project No.	28256-05		
Project Name:					Hudson Valley Regional Airport - Airport Support Buildings, Wappinger Falls, New York	Date Started	03/12/25	
Client:					C&S Engineers, Inc.	Date Finished	03/12/25	
Location:					See Exploration Location Plan ELP-1	Surf. Elev. (ft)	144.4	
METHODS OF INVESTIGATION					GROUNDWATER OBSERVATIONS			
Driller:		Beau Fletcher		Casing:	3 ¼" ID H.S.A.			
Driller:		Chris O'Hara		Casing Hammer:				
Inspector:				Other:				
Drill Rig:		CME 550X		Soil Sampler:				
Type:		ATV		Hammer Wt:	140 lbs.			
Rod Size:		AWJ		Hammer Fall:	30 in.			
LOG OF BORING SAMPLES					VISUAL CLASSIFICATION OF MATERIAL			
Depth Scale (ft)	Sample No.	Sample Depth (ft) FromTo		Type / Sample Rec. (in)	Blows on Sampler Per 6 Inches	Depth of Change (ft)	c - coarse m - medium f - fine and - 35 to 50% / some - 20 to 35% little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0							Auger advanced to refusal depth without SPT and Sampling	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10							Augers like weathered ROCK @ 6.0'	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20	Auger Refusal @ 9.0' Bottom of Boring @ 9.0'							

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:



GENERAL INFORMATION & KEY TO TEST BORING LOGS

The **Subsurface Exploration – Test Boring Logs** produced by **CME Associates, Inc.** (CME) present observations and mechanical data collected by the CME Drill Crew while at the site, supplemented, at times, by classification of the materials removed from the borings determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between the sampled intervals. The data presented on the Exploration Logs together with the recovered samples will provide a basis for evaluating the character of the subsurface conditions relative to the proposed construction. The evaluation must consider all the recorded details and their significance relative to each other. Often, analyses of standard boring data indicate the need for additional testing and sampling procedures to more accurately evaluate the subsurface conditions. Any evaluations of the contents of CME's report and the recovered samples must be performed by Licensed Professionals having experience in Soil Mechanics, Geological Sciences and Geotechnical Engineering. The information presented in this Key defines some of the methods, procedures and terms used on the CME Exploration Logs to describe the conditions encountered. Refer to the Log on page 4 for key number.

Key No.

Description

1. The figures in the **DEPTH SCALE** column define the vertical scale of the Boring Log.
2. The **SAMPLE NO.** is used for identification on the sample containers and in the Laboratory Test Report or Summary.
3. The **SAMPLE DEPTH** column gives the depth range from which a sample was recovered.
4. The **TYPE / SAMPLE RECOVERY** column is used to signify the various types of samples. "SS is Split Spoon, "U" is Undisturbed Tube, and "C" is Rock Core. For soil and rock samples, the recovered length of the sample is recorded in inches.
5. **BLOWS ON SAMPLER** – This column shows the results of the "Standard Penetration Test (SPT) ASTM D1586", recording the number of blows required to drive a 2-inch outside diameter (O.D.) split spoon sampler into the ground beneath the casing. The number of blows required for each six inches of penetration is recorded. The total number of blows required for the 6-inch to 18-inch interval is summarized in the **SPT "N"** column and represents the "Standard Penetration Number". The outside diameter of the sampler, the hammer weight and the length of drop are noted in the **Methods of Investigation** portion of the log. A "WH" or "WR" in this column indicates that the sample spoon advanced a 6-inch interval under the **Weight of Hammer + Rod** or **Weight of Rod**, respectively. If a rock core sample is taken, the core bit size designation is given here.
6. The **DEPTH OF CHANGE** column designates the depth (in feet) that the driller noted a compactness or stratum change. In soft materials or soil strata exhibiting a consistent relative density, it is difficult for the driller to determine the exact change from one stratum to the next. In addition, a grading or gradual change may exist. In such cases the depth noted is approximate or estimated only and may be represented by a dashed line. When continuous split spoon sampling is not employed, or an interval of several feet exists between samplings, the Depth of Change may not be indicated at all.
7. **VISUAL CLASSIFICATION OF MATERIAL** – Soil materials sampled and recovered are described by the Driller or Geotechnical Representative on the original field log. Notes of the Drillers observations are also placed in this column. Recovered samples may also be visually classified by a Geologist, Engineer, or Soil Technician. Visual soil classifications are made using a modified **Burmister System** as practiced by CME and as generally described in this Key and abbreviated on the Test Boring Log. This modified **Burmister System** is a type of visual-manual textural classification estimated by the Driller, Geologist, Engineer, or Technician on the basis of weight-fraction of the recovered material and estimated plasticity, among other characteristics. See Table 1 "**Classification of Materials**". The description of the relative compactness or consistency is based upon the standard penetration number as defined in Table 2. The description of the recovered sample moisture condition is described as dry, moist, wet, or saturated. Water used to advance the boring may affect the moisture content of the recovered sample. Special terms may be used to describe recovered materials in greater detail, such terms are listed in ASTM D653. When sampling gravelly soils with a standard two-inch O.D. Split Spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders, cobbles, and large gravel is sometimes, but not necessarily, detected by observation of the casing advancement and sampler blows and/or through the "action" of the drill rig, sampler and/or casing as reported by the Driller.

The description of **Rock** is based upon the recovered rock core. Terms frequently used in the description are included in Tables 3, 4 and 5. The length of core run is defined as length of penetration between retrievals of the core barrel from the bore hole, expressed in inches. The core recovery expresses the length of core recovered from the core barrel per core run, in percent. The size core barrel used is noted in Column 5. An "N" size core, being larger in diameter than "A" size core, often produces better recovery, and is frequently utilized where accurate information regarding the geologic conditions and engineering properties is needed. An estimate of in-situ rock quality is provided by a modified core recovery ratio known as the "**Rock Quality Designation**" (**RQD**). This ratio is determined by considering only pieces of core that are at least 4 inches long and are hard and sound. Breaks obviously caused by drilling are ignored. The percentage ratio between the total length of such core recovered and the length of core drilled on a given run is the **RQD**. Table 4 indicates in-situ rock quality as related to the **RQD**.



8. The SPT "N" or RQD is given in this column as applicable to the specific sample taken. In Very Compact coarse-grained soils and in Hard fine-grained soils the N-value may be indicated as 50+ or 100+. This typically means that the blow count was achieved prior to driving the sampler the entire 6-inch interval or the sampler refused further penetration. For an "N" size rock core, the RQD is reported here, expressed in percent (%).
9. **GROUNDWATER OBSERVATIONS** and timing noted by the Drill Crew are shown in this section. It is important to realize that the reliability of the water level observations depend upon the soil type (e.g. water does not readily stabilize in a hole through fine grained soils), and that drill water used to advance the boring may have influenced the observations. Groundwater levels typically fluctuate seasonally so those noted on the log are only representative of that exhibited during the period of time noted on the log. One or more perched or trapped water levels may exist in the ground seasonally. All the available resources and data should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or through groundwater observation well installations.
10. **METHODS of INVESTIGATION** provides pertinent information regarding the identity of the Drill Crew members, inspector (if any), drill rig make and model, drill rig mount vehicle, casing and type of advancement, soil and rock sampling tools and appurtenances used in the installation of the Test Boring.

TABLE 1 - CLASSIFICATION OF MATERIALS	
GROUP	COARSE GRAINED SOILS TEXTURAL SIZES
BOULDERS	larger than 12" diameter
COBBLES	12" diameter to 3" sieve
GRAVEL	3" - coarse - 1" - medium - 1/2" - fine - #4 sieve
SAND	#4 - coarse - #10 - medium - #40 - fine - #200 sieve
GROUP	FINE GRAINED SOILS SIZE (PLASTICITY*)
SILT	#200 sieve (0.074mm) to 0.005mm size (see below *)
CLAY	0.005mm size to 0.001 mm size (see below *)
GROUP	ORGANIC SOILS, PEAT, MUCK, MARL
ORGANIC	Based on smell, visual-manual and laboratory testing

ABBREVIATIONS	TERM	ESTIMATED PERCENT OF TOTAL SAMPLE BY WEIGHT
f - fine	and	35 to 50%
m - medium	some	20 to 35%
c - coarse	little	10 to 20%
	trace	0 to 10%

*PLASTICITY DESCRIPTIONS and INDICATOR FIELD TESTS			
TERM	PLASTICITY INDEX	DRY STRENGTH TEST	
		INDICATION	FIELD TEST RESULT
non-plastic	0 - 3	Very low	falls apart easily
slightly plastic	4 - 15	Slight	easily crushed by fingers
plastic	15 - 30	Medium	difficult to crush
highly plastic	31 or more	High	impossible to crush with fingers
Other Field Tests include: Dilatancy, Thread and Shine Testing			

**TABLE 2 - DESCRIPTION OF SOIL COMPACTNESS OR CONSISTENCY based on SPT "N"***

Primary Soil Type	Descriptive Term of Compactness	Range of Standard Penetration Resistance (N)
COARSE GRAINED SOILS	Very Loose	less than 4 blows per foot
(More than half of Material is larger than No. 200 sieve size)	Loose	4 to 10
	Medium Compact	10 to 30
	Compact	30 to 50
	Very Compact	Greater than 50
FINE GRAINED SOILS	Descriptive Term of Consistency	Range of Standard Penetration Resistance (N)
(More than half of material is smaller than No. 200 sieve size)	Very Soft	less than 2 blows per foot
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	Greater than 30
*The number of blows of 140-pound weight falling 30 inches to drive a 2-inch O.D., 1-3/8 inch I.D. sampler 12 inches is defined as the Standard Penetration Resistance, designated "N".		

TABLE 3 - ROCK CLASSIFICATION TERMS

Rock Classification Terms		Field Test or Meaning of Term
Hardness	Soft	Scratched by fingernail. Crumbles under firm blows with a geologic pick.
	Medium Soft	Shallow indentations (1 to 3 mm) can be made by firm blows of a geologic pick. Can be peeled with a pocketknife with difficulty.
	Medium Hard	Scratched distinctly by penknife or steel nail. Can't be peeled or scraped with knife.
	Hard	Scratched with difficulty by penknife or steel nail. Requires more than one blow with a geologic hammer to break it
	Very Hard	Cannot be scratched by penknife or steel nail. Breaks only by repeated heavy blows with a geologic hammer.
Bedding (Divisional planes and/or surfaces separating it from layers above and below)	Thinly Laminated Laminated Thinly Bedded Medium Bedded Thickly Bedded Massive	less than 1/8 th inch 1/8 th to 1 inch 1 inch to 4 inches 4 inches to 12 inches 12 inches to 48 inches greater than 48 inches

**TABLE 4
Relation of Rock Quality Designation (RQD) and in-situ Rock Quality**

RQD %	Rock Quality Term Used
90 to 100	Excellent
75 to 90	Good
50 to 75	Fair
25 to 50	Poor
0 to 25	Very Poor

**TABLE 5 – BEDROCK WEATHERING CLASSIFICATION**

Classification	Diagnostic Features
Fresh	No visible sign of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	Slight discoloration inwards from open fractures, otherwise similar to Fresh.
Moderately Weathered	Discoloration throughout. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped with knife. Texture observed.
Highly Weathered	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	Minerals decomposed to soil, but fabric and structure preserved (e.g. Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

 6035 Corporate Drive East Syracuse, NY 13057 Phone: 315-701-0522		SUBSURFACE EXPLORATION TEST BORING LOG		Boring No.	B-2
				Page No.	1 of 1
				Report No.	
				Date Started	
Project Name:		Date Finished		Surface Elev.	
Client:					
Location:					
METHODS OF INVESTIGATION			GROUNDWATER OBSERVATIONS		
Driller:	10	Casing:	10	Date	Time
Driller:		Casing Hammer:			
Inspector:		Other:			
Drill Rig:		Soil Sampler:			
Type:		Hammer Wt:			
Rod Size:		Hammer Fall:			
LOG OF BORING SAMPLES			VISUAL CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)
1	2	3 3	4	5	6
					7
					8

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks: