Tectonic

PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

GEOTECHNICAL EVALUATION
PROPOSED PHASE 2 ATHLETIC FIELD IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

Submitted To:	Submitted By:
North Rockland Central School District	**Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C.**
106 Hammond Road Thiells, New York 10984	1279 Route 300, 2nd Floor Newburgh, NY 12550
March 22, 2024	(P) 845.567.6656 (F) 845.567.6248
W.O. 11584.01	

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

North Rockland Central School District
106 Hammond Road
Thiells, New York 10984

Attention: C/O: Mr. Joe Kral Jr., Landscape Architect/Project Manager– The LA Group
Via email: (jkral@thelagroup.com)

March 22, 2024

RE: W.O. 11584.01
GEOTECHNICAL EVALUATION
PROPOSED PHASE 2 ATHLETIC FIELD IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

Dear Mr. Kral:

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. is pleased to submit this subsurface investigation and geotechnical engineering evaluation for the proposed phase 2 site improvements within and around an existing practice athletic field at North Rockland High School. The purpose of the investigation was to evaluate the subsurface conditions within the planned area of improvements, to investigate a potential source area for fill material, and to provide geotechnical recommendations for the design and construction of the proposed structures and site improvements. This report presents detailed information about the investigation, our findings, and recommendations.

We appreciate this opportunity to assist you with this project. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

TECTONIC ENGINEERING CONSULTANTS, GEOLOGISTS & LAND SURVEYORS, D.P.C.

Christopher Burke, Ph.D, P.E., P.M.P.
Vice President, Geotechnical

STATE OF NEW YORK
CHRISTOPHER BURKE
078832
LICENSED PROFESSIONAL ENGINEER

"G:\Newburgh\Geotechnical\11500\11584.01 North Rockland High School\Phase 2\Report\TEC Cover Letter.docx"

Newburgh Office
1279 Route 300 I Newburgh, NY 12550
845.567.6656 Tel I 845.567.6248 Fax
tectonicengineering.com
Equal Opportunity Employer

GEOTECHNICAL EVALUATION
PROPOSED PHASE 2 ATHLETIC FIELD IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

TABLE OF CONTENTS

1.0 INTRODUCTION

In accordance with your request and authorization, Tectonic Engineering Consultants, Geologists, and Land Surveyors D.P.C. (Tectonic) has completed a subsurface investigation and geotechnical engineering evaluation for the proposed Phase 2 site improvements at North Rockland High School. The purpose of the investigation was to evaluate the subsurface conditions within the planned area of improvements, to investigate a potential source area for fill material, and to provide geotechnical recommendations for the design and construction of the proposed structures and site improvements. This report presents detailed information about the investigation, our findings, and recommendations.

2.0 SCOPE OF SERVICES

The geotechnical investigation was performed for North Rockland Central School District (hereafter referred to as the Client), and coordinated through The LA Group, herein referred to as Client Agent. The scope of the geotechnical investigation consisted of the following:

- Review of geological information publicly available through the United States Geological Survey (USGS), and site plans provided by the Client Agent.
- Drilling, sampling, and logging of test borings and performance of infiltration tests within the areas of the proposed new structures and site improvements. These included:
    - Thirteen (13) borings within and near the area of planned improvements, designated as borings B-1 through B-13.
    - One (1) boring within a potential source (borrow) area for fill material, designated as boring B-14.
    - Drilling and performance of ten (10) infiltration tests, designated as INF-1 through INF-10, for the proposed stormwater management design.
- Field inspection by a Tectonic representative, working under the supervision of a New York State licensed Professional Engineer, to locate the borings and infiltration tests; to log and classify all soil samples, and to perform the infiltration tests.
- Laboratory testing of soil samples selected to verify the field classifications of the soils, and to evaluate the engineering characteristics of the soil.
- Geotechnical engineering analyses of the subsurface conditions as they relate to the design and construction of the proposed structures and site improvements.
- Preparation of this report presenting the results of the subsurface investigation, engineering analyses, and our geotechnical recommendations for the design and construction for the geotechnical aspects of the proposed site improvements.

3.0 SITE AND PROJECT DESCRIPTIONS

The project site is located on the campus of North Rockland High School, located at 106 Hammond Road, in the Hamlet of Thiells, Town of Haverstraw, Rockland County, New York. The campus contains an existing three-story high school building within the southwestern portion of the campus, and existing athletic facilities within the northern and eastern portions of campus. There are existing asphalt-paved parking lots to the north, west, and south of the existing school building. The improvements are reported to be to an athletic field to the southeast of the school building and to the southwest of improvements made under Phase 1 of this project. The project site is bound by the school building and a parking lot to the west, tennis courts to the north, and a line of trees that separates the athletic field from residential properties to the east and south.

Partial topographic plans provided by the Client Agent and site observations show what appears to be a ditch to the east of the subject field, and a review of current USGS topographic maps show that a small tributary to Minisceongo Creek flows along the ditch, through the center of the high school campus in a north-south alignment. It is noted that portions of this small stream pass through a 6-foot-wide by 4-foot-tall corrugated metal pipe, north of the planned Phase 2 improvement.

Based on the partial topographic survey noted above, site grades within the existing field generally slope downwards from northwest to southeast, with surface elevations between approximately +271 and +266 feet. The bed of the above-noted stream slopes from approximately +265 feet, near the northeastern corner of the practice field, to approximately +259 feet, near the field’s southeastern corner. Site grading rises to the north and west of the field, with the tennis courts at approximately +280 feet, and the parking lot (near the southwest corner of the field) at approximately +273 feet. The partial topographic drawings do not indicate which datum was used; however, it is anticipated that all elevations given herein are referenced to the North American Vertical Datum of 1988 (NAVD88).

It is our understanding that this phase of the overall proposed project will consist of converting the existing field to a dedicated field hockey field, with expansion of the adjacent parking lot toward the east (by approximately one-half acre), and construction of a paved drive connecting the new parking lot expansion to walkways around the field. This will include raising the grade to create the new field and parking lot, installation of underground stormwater management features, and installation of lighting and associated athletic structures. It is also noted that other construction in this second phase of the project also reportedly includes improvements to the baseball and softball fields to the northeast of the planned field. These areas were included in our original geotechnical report for this project, and therefore, will not be discussed herein.

4.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of the drilling, sampling, and logging a total of fourteen (14) borings. Borings B-1 through B-13 were drilled in and near the proposed field; while boring B-14 was drilled at a proposed borrow area, at an existing obstacle course, northeast of the school building. Within the proposed field, borings B-1, B-2, B-4, B-5, B-6, B-10 and B-11 were "structural borings" drilled to a depth of 32 feet below existing grade. Borings B-3, B-7, B-8, B-12 and B-13 were "soil borings" drilled to a depth of 10 feet below existing grade. Borings B-1 and B-2 were drilled at the northeastern corner of the field, on either side of the stream and adjacent to a culvert. Boring B-8 was drilled near the center of the field, boring B-13 was drilled at the edge of the parking lot west of the building, and the remaining borings were drilled near the perimeter of the field. Boring B-14 was drilled near the center of the proposed borrow area and was terminated at a depth of 6.5 feet, on an apparent boulder.

In addition to the borings, the subsurface investigation included the drilling and performance of ten (10) infiltration tests, designated as INF-1 through INF-10, performed immediately adjacent to the corresponding borings. The test locations were generally performed at the Client Agent's requested locations and are shown on the attached Boring and Infiltration Test Location Plans, Figures 1 and 2.

The borings were drilled by Core Down Drilling, LLC., between February 15 and 21, 2024, using a track-mounted CME 55LC drill rig, equipped with an automatic hammer. The borings were advanced using 3¼-inch inside-diameter hollow-stem augers. Standard Penetration Testing (SPT) was conducted with a split-spoon sampler continuously to termination depth, or to 12 feet, whichever occurred first, and then at 5-foot maximum intervals, thereafter (in the "structural" borings). SPT sampling was performed in general accordance with the requirements of ASTM Standard D1586 *Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".* Field SPT N-values were recorded for each soil sample taken and recorded on the boring logs. Samples of the soil obtained during the investigation were retained in glass jars, and are currently stored at our material testing laboratory. Upon completion, the shallow "soil borings" were backfilled with drill cuttings, while the deeper "structural borings" were backfilled with grout (per Rockland County Department of Health requirements), to match the existing conditions.

The infiltration tests were performed within 4-inch diameter holes drilled within the existing athletic field. The locations of the infiltration tests are also shown on Figure 1. The infiltration test holes were typically drilled to and performed at a depth of approximately 3 feet, as requested. This included infiltration test INF-1 (performed beside boring B-3), which had been intended to be performed at a depth of 8 feet, but shallow groundwater prevented testing below a depth of 3 feet. Infiltration test INF-9 (performed beside boring B-12) was performed at a depth of 3.5 feet, which is 1.5 feet deeper than requested, and INF-10 (performed beside boring B-13) was performed at a depth of 8 feet, as requested. Each infiltration test was performed in accordance with the requirements dictated by the New York State Department of Environmental Conservation, including a pre-soak and measurement over four (4) one-hour intervals. Upon completion, the infiltration test holes were backfilled with drill cuttings.

A Tectonic representative observed the subsurface investigation, prepared logs of the subsurface conditions, and performed the infiltration tests under the purview of a Professional Engineer licensed in New York State. All soils encountered were classified in accordance with the Unified Soil Classification System (ASTM D2488), and the Modified Burmister Soil Classification System. Copies of the boring and infiltration test logs are included in Appendix I of this report.

5.0 LABORATORY TESTING

Laboratory testing was conducted on samples selected to assist in identifying the soils' engineering properties, and to verify field classifications. The laboratory testing is summarized in Table 5.0.1, below.

Table 5.0.1 – Laboratory Testing

Lab Test Description	ASTM Standard	Quantity
Gradation of Cohesionless Soils (gravels, sands & non-plastic silts)	D6913	6
Hydrometer Analysis (gradation of coarse- and fine-grained soils)	D422	1
Percent Finer than the No. 200 Sieve	D1140	2
Atterberg Limits Determination (plasticity of fine-grained soils)	D4318	1
Organic Content	D2974	1

The laboratory test results have been incorporated into the descriptions of the subsurface conditions presented below, in the boring logs included in Appendix I, and are included in Appendix II of this report.

6.0 OVERALL SUBSURFACE CONDITIONS

A review of USGS and New York State geologic maps indicate that the site is located near the intersection of a deposit of glacial outwash sands and gravels, and alluvial soils along the Minisceongo Creek valley. Based on the results of the subsurface investigation, the site is generally underlain by an upper layer of fill, underlain by native alluvial soils. The fill soils are likely a mixture of re-worked native soils and imported fill used to construct the athletic field (and adjacent parking lot). The following sub-sections provide generalized descriptions of the soil and groundwater conditions encountered in the borings. Detailed descriptions of the subsurface conditions are provided in the boring and infiltration test logs included in Appendix I.

As noted above, an automatic hammer was used in the SPT sampling of the borings. Given that an automatic hammer imparts more energy into the split spoon sampler than a safety hammer (N_{60}), the standard hammer used for most geotechnical engineering calculations, an energy correction factor of 1.3 is applied to the field N-values to obtain the N_{60}-values.

6.1 Proposed Field

Each of the borings initially encountered 2 to 4 inches of topsoil-like material, then encountered between 2 and 8 feet of fill. It is noted that the term “topsoil-like material” has been used to identify soil that resembles topsoil, but that has not been tested to determine if it meets the horticultural requirements for the project. The greatest thickness of fill was encountered in boring B-13, drilled at the top of the slope adjacent to the parking lot, west of the field, and the minimum fill thickness was encountered near the bottom of the slope adjacent to the parking lot, in borings B-10 and B-12, and at boring B-5 (near the center of the field). When the various fill depths are combined with the estimated ground surface elevations at each of the borings, we estimate that the bottom of fill elevations range from approximately +262 feet, in borings B-4 and B-6, to approximately +269 feet in borings B-10 and B-12 – indicating that the bottom of the fill (and likely, the original ground surface beneath the field) slopes downward from northwest to southeast.

The fill generally consists of brown coarse to fine sand, with 5 to 45 percent coarse to fine gravel, and between 10 and 30 percent silt. In some borings, the fill is coarser, and is described as brown coarse to fine gravel, with 20 to 45 percent coarse to fine sand, and 10 to 20 percent silt. The fill generally has USCS designations of SM and GM, and occasionally, SP and GP.

Field SPT N-values within the fill range from 3 to 49 blows per foot (bpf); which when corrected for the use of an automatic hammer, correspond to N_{60}-values between 4 and 64 bpf. On average the fill has a field SPT N-value of 20 bpf, and a corresponding corrected N_{60}-value of 26 bpf. These N-values indicate that the fill ranges from loose to very dense and is typically in a medium dense condition. It is also anticipated that the higher N-values generally occurred where the fill was found to have relatively high percentages of gravel.

Underlying the fill, native alluvial soils were encountered to the termination depths of the borings. The native alluvial soils are generally light brown to dark gray and their consistency typically ranges from fine sand, with 5 to 45 percent silt, to silt with up to 20 percent fine sand. Clayey silt and silt & clay were encountered, indicating various amounts of plasticity in the soil (see the Legend for Soil Description in Appendix I). Soils containing peat (one sample was measured in the lab to have approximately 15 percent organic matter) were also encountered in some relatively shallow samples of the native soils. It is also noted that a material that appeared to be buried topsoil was also observed immediately below the fill in some borings. When encountered, this material was also designated “topsoil-like material” on the boring logs.

Field SPT N-values within the native soils range from 1 to 88 bpf; however, the native soils have an average field N-value of 11 bpf. When corrected, SPT N_{60}-values range from approximately 1 to 114 bpf, with an average of 15 bpf, indicating that the soils range from very loose to very dense, but are typically in a medium dense condition. The native soils typically have USCS designations of SM and ML, and occasionally SP-SM, SC, SM-ML, CL-ML and OL (for buried topsoil-like material).

No groundwater observation wells were installed at the site; however, as indicated on the boring logs, saturated (wet) soil conditions were observed within most of the borings. It is generally assumed that the saturated soil conditions indicate the presence of groundwater, and consequently, groundwater depths are estimated to typically range from 6 to 8 feet. However, wet soil conditions were observed as deep as 10 feet, in boring B-1, and were not observed within boring B-13, which was terminated at a depth of 10 feet. When the various saturated soil depths are combined with the estimated ground surface elevations at each of the borings, we estimate that the groundwater elevations range from approximately +259 to +260 feet, in borings B-5 and B-6, to approximately +265 feet, in borings B-1, B-10 and B-12.

It is noted, however, that the groundwater elevation at most borings is approximately +262 feet. It should also be noted that groundwater levels fluctuate seasonally and with changing weather conditions.

6.2 Proposed Borrow Area Boring

Boring B-14 was advanced at a potential borrow area northeast of the school building and encountered approximately 3 inches of topsoil-like material, overlying approximately 4 feet of fill and undisturbed native soils. The fill generally consists of brown-gray coarse to fine gravel, with 35 to 40 percent coarse to fine sand, and less than 10 percent silt. Immediately beneath the fill, another approximately 9-inch thick, layer of topsoil-like material was encountered; which was, in turn, underlain by gray-brown granular soil with approximately equal percentages of sand and gravel, with less than 10 percent silt. The boring encountered split spoon and auger refusal on an apparent boulder at a depth of 6.5 feet bgs.

Field SPT N-values within the fill soils range from 28 to 29 bpf, and when corrected, the SPT N_{60}-values range from 36 to 37 bpf. The one SPT performed in the native soil had a field N-value of 77 bpf, corresponding to an N_{60}-value of 100 bpf. These N-values indicate that the fill at boring B-14 is in a dense condition, while the native soil is very dense. It is noted that the high measured N-values are likely caused by the high percentage of gravel in the soil. The fill at boring B-14 has USCS classifications of GW-GM, and the native soil has a classification of SW-SM. Neither groundwater nor saturated soils were observed within the limited depth of boring B-14.

7.0 INFILTRATION TESTS

Infiltration tests INF-1 through INF-10 were advanced adjacent to borings drilled in and around the existing field, for design of the proposed stormwater management system. SPT sampling was not performed within the infiltration test holes. Average infiltration rates were measured to range from 0 to 21 inches per hour (in/hr), indicating a wide variation in infiltration rates. It should be noted that due to standing water at the ground surface at infiltration test INF-8, there was no measured drop in the water level during the test. The results of the individual infiltration tests are provided on the attached Infiltration Test logs, included in Appendix I.

8.0 SEISMIC SITE COEFFICIENTS AND LIQUEFACTION POTENTIAL

Based on the results of the subsurface investigation and the criteria outlined in the current edition of the New York State Building Code (Code), the subsurface conditions underlying the site should be considered Class D, with maximum spectral response accelerations at short periods (S_{MS}) equal to 0.452g and at 1-second periods

(S_{M1}) equal to 0.146g. Based on the procedures outlined in the Code, the corresponding five-percent damped design spectral response acceleration at short periods, S_{DS}, is equal to 0.301g, and at 1-second, S_{D1}, is equal to 0.098g. It should be noted that the values given above are the same, whether the structures to be built are essential or non-essential (Risk Category I or II structure).

Liquefaction of soils can be caused by strong vibratory motion due to earthquakes. Both research and historical data indicate that loose, granular soils saturated by a shallow groundwater table are most susceptible to liquefaction. Liquefaction occurs when an earthquake and associated ground shaking of sufficient duration results in the loss of grain-to-grain contact due to a rapid increase in pore-water pressure, causing the soil to behave as a fluid for short periods.

A procedure recommended by Youd et al (2001) was used in evaluating the liquefaction potential at the site. This method estimates the stresses likely to be induced by an earthquake and the stresses likely to initiate liquefaction using the SPT blow counts, the effective overburden pressure, and the peak horizontal ground acceleration that would be caused by the design seismic event. For this site location, the USGS, using their 2014 dynamic model, anticipates an earthquake moment magnitude of 5.47, producing a rock surface Peak Ground Acceleration (PGA) of 0.176g. Combining the rock surface PGA with a PGA factor of 1.6, for a Class D site, results in a design PGA of 0.158g.

The factors of safety against liquefaction were computed by the ratio of cyclic shear strength of the soil to the cyclic shear stress induced by the seismic event. The liquefaction analysis indicates that the subsurface soils have a factor of safety against liquefaction greater than the generally accepted minimum of 1, indicating that liquefaction is unlikely.

9.0 DISCUSSION AND CONCLUSIONS

The proposed project primarily consists of regrading the existing field for construction of the planned field and a parking lot expansion. The results of the subsurface investigation indicate that the site is generally underlain by existing granular fill (silty coarse to fine sand and silty coarse to fine gravel), and native alluvial soils, primarily consisting of silty fine sand and sandy silt, with some pockets or layers of silt & clay or clayey silt. Both the fill and native soils were typically observed in a medium dense condition; however, both soil strata were also found to have zones or pockets that are very loose, and silt & clay and clayey silt deposits were found to be in a very soft condition.

Construction of the various site improvements is feasible from a geotechnical standpoint. The primary construction will consist of regrading and installation of lightly loaded structures, such as lighting and seating. As a consequence, the weak/loose soils that were encountered are not expected to have a significant effect on the planned construction.

Two forms of new field lighting structures are proposed to be constructed adjacent to the field: pedestrian lighting and athletic field lighting. The pedestrian lighting is expected to be similar to standard urban and suburban street lighting, which is limited in height and generally has relatively low lateral loading. The athletic field lighting is much higher, tends to have slightly higher compressive loads, and considerably higher lateral loading (typically due to wind load). Specifications regarding the pedestrian and athletic field lighting structures were not available as of the writing of this report. Our experience has shown that the preferred foundation for the small pedestrian light poles are typically precast concrete piers; while the athletic field lighting structures are often constructed on either drilled shaft foundations, or large isolated shallow footings – both of which can be designed to resist the relatively large overturning moments typical of those structures. However, weak soils exist near the anticipated bearing depths of shallow foundations on the eastern side of the field, and therefore, only deep foundations will be recommended for the athletic field lighting.

A comparison of Figure 1 with a provided Site Key Plan (Sheet C-100) indicates that the athletic field lighting is planned to be located approximately near borings B-4, B-6, B-10 and B-11. The soils at these four borings are generally suitable for supporting either form of lighting foundations, although an approximately 2-foot-thick layer of very soft silt and clay was encountered immediately below the fill (between 4 and 6 feet bgs) at boring B-6. This layer was also observed in boring B-5. Differential settlement of the very soft clayey soil could result in a non-plumb condition for the athletic lighting, if supported on shallow foundations. Consequently, it is expected that drilled shafts will be a better option for supporting the athletic lighting structures.

Although not clearly identified on the provided Site Key Plan, it appears that a small set of bleachers will be constructed on the new fill slope between the field and the parking lot expansion. Bleaches constructed within slopes are often built as stepped slab-on-grade structures. This type of structure can readily be constructed onto a new fill slope, provided that the subgrade is adequately prepared. Subgrade preparation recommendations for the bleachers will be provided in Section 11 of this report.

A site grading plan was not provided at the time this report was prepared. However, it is our understanding that some fill will be placed to grade the new field, and it is expected that the parking lot expansion will require approximately 4 to 8 feet of fill to be placed above the western side of the existing field. The existing fill and native soils can support the proposed fill, but depending upon the amount of fill that will be placed, it can be expected that the clayey soils encountered along the eastern side of the field will consolidate under the weight of the new fill. To estimate the relative effect of fill placement, we have estimated the degree of settlement produced by a uniform fill 4 feet thick. Four (4) feet of new fill would result in differential settlements of up to approximately 1 inch between locations where the field is primarily underlain by non-plastic silts and sands (e.g., borings B-2 and B-8), to where the deposits of silt & clay or clayey silt were encountered (at borings B-5 and B-6). This degree of differential settlement is not expected to significantly affect the athletic field.

It is our understanding that soils excavated for the reconstruction of the track and football field, and from the possible borrow area northeast of the school building would be used as fill at the field and parking lot expansion. Laboratory testing from Phase 1 and from current construction activities shows that the excavated material for that phase has fines contents (primarily silt) that range from approximately 5 to 35 percent. Laboratory testing also shows that the fill and native soils encountered in boring B-14 have approximately 8 to 9 percent fines (silt). These tests suggest that some of the potential fill soils have relatively low fines contents and would be acceptable. However, boring B-14 was terminated at a depth of 6.5 feet after encountering an anticipated boulder, and only a limited number of laboratory tests have been performed. Consequently, it can be expected that the fill material will be variable, with a relatively wide range of fines contents, as indicated above. These soils can be used as fill, but will become difficult to compact and are susceptible to pumping, rutting, et cetera if it is placed when wet. This may require that the fill soil be dried to allow it to be placed and compacted in a firm and stable condition. The relatively high fines contents of some of the potential fill soils also means that subgrade preparation and fill placement during typically wet periods (late fall through spring) should be avoided. Construction delays and cost overruns should be expected if fill placement is scheduled during wet periods.

Wet soils, likely indicating the presence of groundwater, were observed throughout the site between the depths of 4 and 8 feet bgs. More specifically, groundwater elevations are expected to range from approximately +260 feet near the field’s southeastern corner, to +265 feet near the northern side of the field. Consequently, the contractor should expect that any excavations that approach these elevations may require dewatering and subgrade protection (See Section 11).

The following are other general conclusions that can be made regarding the proposed construction:

- Excavation should be feasible with conventional construction equipment; however, it should be noted that cobbles and boulders may be encountered during excavation.

- Specifics about the planned paved areas were not provided; however, it is anticipated that the planned pavement types and loading will be similar to those for pavements investigated during our Phase 1 investigation. The parking lot expansion should have a pavement section designed in accordance with the recommendations given in our Phase 1 report.

- A relatively thin (3- to 6-inch) layer of topsoil-like material was observed immediately beneath the existing fill in some borings. It is anticipated that this indicates that the original ground beneath the existing field was not adequately stripped prior to fill placement. This soil is not expected to adversely affect fill placement or lightly loaded foundations bearing within the existing fill above them. However, it may be necessary to perform some remedial removal and replacement if these soils are encountered at foundation subgrades during construction.

- The grading of the planned slope between the field hockey field and the parking lot expansion has not been provided, and analysis of the slope stability was not included the scope of this project. However, we recommend that all fill slopes be limited to a maximum pitch of 3-horizontal to 1-vertical (3H:1V), unless slope stability analyses are performed on the specific slope.

- The results of our liquefaction analysis indicate that the soils underlying the site are unlikely to liquefy.

10.0 RECOMMENDATIONS

The following sections provide our geotechnical recommendations for design and construction of the proposed field lighting, bleachers, retaining walls, and associated lightly loaded structures. The recommendations are based on our understanding of the proposed construction, as described in Section 3, the results of our subsurface investigation, and our experience with other projects constructed in the general vicinity of the project site.

10.1 Concession and Press Box Building Foundations

Lightly loaded structures can be supported on conventional shallow spread footings or continuous wall footings that bear on medium dense to dense existing fill, newly placed fill, or native soils encountered in the northwestern half of the field. It should be noted that loose layers or pockets of existing fill and native soil were observed between 0 and 6 feet bgs within most of the borings. If encountered during excavation, it is recommended that any soft and unsuitable soils encountered within the zone of influence of the foundations be undercut, and replaced with properly compacted, structural fill. Shallow foundations should not be used to support structures in the southeastern half of existing field (if any are to be constructed).

Spread and continuous wall footings for new structures bearing on medium dense existing fill, native soils or newly placed and compacted fill can be designed for a maximum net allowable soil bearing pressure of 3,000 pounds per square foot (psf). Section 11 of this report provides the subgrade preparation procedures necessary to achieve the recommended bearing capacity. It is noted that the above recommendation is for lightly loaded structures (column loads less than 160 kips and wall loads less than 12 kips per linear foot) and that the Site Key Plan shows no other planned structures in the area of the planned field and parking lot expansion. If the design changes and a structure with relatively heavy column and/or wall loads is to be constructed, these foundation design recommendations should be revisited.

Using the above design criteria, total settlement of proposed lightly loaded structures is estimated to be up to 1 inch and differential settlements are estimated to be less than 0.5 inch. The differential settlement is estimated between columns and over a distance of about 30 feet along continuous footings. Continuous wall footings should have a minimum width of 2 feet and isolated spread footing should have a minimum width of 3 feet. All footings should bear at least 4 feet below the outside grade, for frost protection.

10.2 Slab-On-Grade Bleachers

The planned bleachers between the field and parking lot expansion may be constructed as a stepped slab-on-grade. The slab-on-grade should be supported on a minimum 12-inch-thick layer of compacted structural fill placed over existing fill, or a newly placed general fill subgrade. If encountered, any loose existing fill encountered near the bottom of the bleachers should be removed and replaced with compacted structural fill prior to placement of crushed stone. The steps for the bottom of the slab may be either formed or cut with a slope between each step that is no steeper than 1H to 1V. For concrete cast directly against newly placed structural fill, a coefficient of friction of 0.4 can be used.

A subgrade modulus of 200 pounds per cubic inch (pci) is recommended for design of slabs-on-grade bearing on newly placed structural fill, over existing or general fill. The design should be in accordance with the latest edition of the American Concrete Institute (ACI 360). The subgrade modulus is suitable for estimating distributions of bearing pressure beneath the slab and for estimating bending moments and shears within the slab. It is not intended for calculating total or differential settlements.

10.3 Design for Lateral Loading of Walls

Any foundation or retaining walls and temporary shoring should be designed in accordance with the following criteria:

Table 10.3.1 – Lateral Load Parameters

Soil Parameter	On-Site Soil	Structural Fill
Angle of Internal Friction	32°	34°
Active Earth Pressure Coefficient (K_a)[1]	0.31	0.28
Passive Earth Pressure Coefficient (K_p)[2]	3.25	3.54
At-Rest Earth Pressure Coefficient (K_o)[3]	0.47	0.44
Unit Weight of Soil (pounds per cubic foot)	130	135
Coefficient of Base Friction	0.4	0.4

1) Use for freestanding walls, such as retaining walls, where movement of up to 0.0015 X height of wall is both possible and tolerable. Otherwise, use at-rest coefficient.

2) Reduce passive pressure by half above a depth of 4 feet below exterior grade to account for disturbance caused by frost action.

3) Use for walls restrained against outward lateral movement, such as foundation walls.

Additional loading due to temporary and permanent surcharges should be added to the lateral loading exerted by the retained soil. Loads due to supported structures should be applied in appropriate combinations with the lateral loads. Walls should be backfilled in accordance with Section 11.3 of this report. Placement and compaction of backfill should be observed and tested by a geotechnical engineer to monitor that proper compaction is being achieved.

10.4 Lighting Foundations

The proposed lighting structures can be supported on precast concrete piers and/or drilled shafts. Walkway lighting can be supported on precast piers installed into drilled holes or open excavations that are subsequently backfilled. Precast piers should be sized to provide support through end bearing, based on the values given in Table 10.4.1, below.

Table 10.4.1 – Precast Pier Design Parameters for Axial Loading	
Depth Interval below Existing Grade (feet)	Allowable End Bearing Pressure (ksf)
0 – 4	N/A
4 – 6	3
6 – 10	2.5
10 – 15	2

Athletic field lighting should be designed to be supported on drilled shafts. Design for axial compressive loading can incorporate both side resistance and strain-compatible end bearing, while design for uplift load should only incorporate the side resistance and the shaft weight. Drilled shaft foundations installed west of the centerline of the field should bear at a minimum depth of 6 feet below finished grade, or 3 times the shaft diameter, whichever is greater. Drilled shaft foundations installed east of the centerline of the field should bear at a minimum depth of 8 feet below existing grade, to assure that the shafts bear below unsuitably weak soils located immediately below the existing fill (or 3 times the shaft diameter, whichever is greater). Design parameters for drilled shaft foundations are provided in Tables 10.4.2a and 10.4.2b for the western and eastern athletic lighting structures, respectively. A design groundwater depth of 4 feet bgs should be used for the lighting structures.

Table 10.4.2a – Drilled Shaft Design Parameters for Axial Loading (West)		
Depth Interval below Existing Grade (feet)	Drilled Pier Parameters	
	Allowable Skin Friction (psf)	Allowable End Bearing Pressure (psf)
0 – 4	0 – 200	N/A
4 – 6	250	N/A
6 – 15	300 – 400	600
15 – 25	400 – 475	600

Table 10.4.2b – Drilled Shaft Design Parameters for Axial Loading (East)

Depth Interval below Existing Grade (feet)	Drilled Pier Parameters	
	Allowable Skin Friction (psf)	Allowable End Bearing Pressure (psf)
0 – 4	0 – 75	N/A
4 – 10	75 – 375	N/A
8 – 10	400	600
10 – 25	400	600

Notes:

1. Where a range of skin friction or end bearing pressure is given, the strength varies linearly within the depth ranged given, and can be interpolated for drilled shafts that terminate within a given depth interval. Otherwise, use the single value given for the depth range.
2. Allowable side resistance should be reduced by half in the upper 4 feet below finished grade, to account for frost disturbance.
3. Allowable resistance based on a factor of safety of 2.
4. The allowable end bearing pressure corresponds to the average strain-compatible bearing capacity within the depth interval and reflects the relatively weak native soils encountered at the site.
5. Assume that any newly placed fill has the same characteristics as those given for the depth range of 0 to 4 feet.
6. The pile weight should be added to the allowable skin friction, when calculating the uplift capacity.

The soil parameters presented in Table 10.4.3a below are provided for design to resist lateral movement and for analyzing lateral deflection and lateral stability of piers and drilled shafts constructed west of the planned field's centerline, and at the expanded parking lot. The parameters presented in Table 10.4.3b are provided for design of shafts constructed east of the planned field's centerline. Lateral deflection at the top of the pier or shaft should be checked using a computer program such as LPILE.

Table 10.4.3a – Lateral Load Design Parameters for Drilled Shafts & Piers (West)

Depth Below Existing Ground (ft)		γ'	c	ϕ'	K static	K_p	e_{50}
From	To	(pcf)	(psf)	(deg)	(pci)		(in/in)
0	4	125	0	34	90	3.54	NA
4	10	63	0	32	60	3.25	NA
10	15	58	0	32	60	3.25	NA
15	25	58	0	32	20	3.25	NA

Table 10.4.3b – Lateral Load Design Parameters for Drilled Shafts & Piers (East)

Depth Below Existing Ground (ft)		γ'	c	ϕ'	K static	K_p	e_{50}
From	To	(pcf)	(psf)	(deg)	(pci)		(in/in)
0	4	125	0	34	90	3.54	NA
4	6	53	300	0	30	1.00	NA
6	8	63	0	34	60	3.54	NA
8	25	58	0	32	20	3.25	NA

Where

γ' = Effective unit weight
c = Cohesion
φ' = Effective friction angle
Kstatic = LPILE soil modulus parameter
K_p = Passive earth pressure coefficient
e_{50} = Strain at 50 percent
NA = Not Applicable

Notes:

1. The static passive resistances (Kp) within the top 4 feet of the piers or drilled shafts should be reduced by half above a depth of 4 feet below finished grade to account for disturbance caused by frost action.
2. Assume that any newly placed fill has the same characteristics as those given for the depth range of 0 to 4 feet.
3. The groundwater depth for the design of drilled shafts and piers has been assumed to be 4 feet below existing grade.

10.5 Groundwater and Foundation Drainage

Based on the results of our subsurface investigation, it is not anticipated that groundwater will affect the construction of foundations for small structures, pavement sections, and the bleachers, but it could affect the construction of the lighting foundations. In addition, rainwater and surface water may become trapped at the ground surface – particularly near the western side of the existing field – and in excavations. If necessary, dewatering can be performed with sump pumps and should be performed to allow work to be performed in the dry. Any dewatering should prevent loosening or migration of the subgrade soils. The dewatering system, if necessary, should be designed by a New York State licensed Professional Engineer.

All foundation and retaining walls should be designed and constructed with a foundation drain. The footing drain should consist of a minimum 12-inch-wide drainage layer of free draining crushed stone or clean gravel placed against the full height of the wall with a collector pipe at the footing bottom. Alternatively, a geocomposite drainage board could be used in lieu of the crushed stone drainage layer. The collector pipe at the bottom of the footing should consist of a 4-inch perforated PVC or corrugated HDPE pipe drain by gravity away from the structure to daylight, or to the site's stormwater management system. The gradation specification for the drainage material is provided in Section 11.3 of this report. The stone or gravel should be completely separated from the soil backfill by a permeable geotextile having an apparent opening size (AOS) equal to the #70 U.S. Sieve, such as Tencate's Mirafi 140N. Grading of the surface of the backfill and the surrounding topography and pavements should provide positive drainage away from the walls.

It is also recommended that a French drain be installed along the bottom of the bleachers to prevent build-up of groundwater below and behind the slab-on-grade. The French drain should extend to a depth of at least 2 feet below finished grade at the bottom of the bleaches (or to the deepest bearing elevation of the bleachers, whichever is deeper). The French drain should consist of at least 1 cubic foot of free draining crushed stone surrounding a 4-inch perforated PVC or corrugated HDPE pipe connected into the site storm sewer or piped to a positive outlet. As with footing drains, the crushed stone should be wrapped in non-woven filter fabric having an AOS no coarser than the No. 70 US sieve, such as Tencate's Mirafi 140N, or an approved equal.

Grading of the surface of the backfill and the surrounding topography and pavements should provide positive drainage away from any walls or other structures.

11.0 EARTHWORK CONSTRUCTION CRITERIA

The following sections present our recommendations regarding earthwork and construction monitoring.

11.1 General Site Preparation

Initially, the site should be cleared and grubbed (if necessary), then stripped of all pavement, topsoil and debris. The clearing, grubbing and stripping should extend at least 5 feet beyond the planned limits of construction. Debris and vegetation from the clearing operations should be removed from the site and disposed of at a legal disposal or recycling facility. All soft or unsuitable materials and subsurface obstructions should be removed from the footprints, and the zones of influence, of all slab-on-grade structures and foundations. The zone of influence is defined by 1:1 (horizontal to vertical) planes sloping downward and outward from the bottom edges of a slab or footing.

Any existing utilities within the project limits should be re-routed around planned foundations or removed. The resulting excavations should be backfilled with structural fill in accordance with the procedures outlined below. Any trench excavations should be properly benched to allow for adequate compaction.

11.2 Subgrade Preparation

It is our understanding that significant re-grading will be performed for the construction of the parking lot expansion, and fill may also be placed to raise the elevation of the field. Prior to the placement of fill, the ground surface should be cleared and grubbed, and the resulting subgrade should be proofrolled. Areas to receive structural fill should be proofrolled before placing any backfill materials, and all shallow foundation, slab-on-grade, and pavement subgrades should also be proofrolled. All proofrolling should be performed under the observation of the geotechnical engineer and should be accomplished by making a minimum of four (4) passes in perpendicular directions with a 10-ton roller in open areas, or a 1.5-ton trench roller, where access is confined.

Proofrolling should not be performed on saturated soils or in areas having freestanding surface water, until they are dewatered and allowed to dry. Proofrolling soils that exceed the optimum moisture content may disturb the soils, resulting in more unfavorable conditions. Any subgrade soils found to be soft and yielding during proofrolling, or otherwise deemed unsuitable by the geotechnical engineer during proofrolling, should be removed and replaced with properly compacted fill.

Prior to fill placement, the slope between the existing parking lot and field should be stepped to allow for proper compaction of the interface between existing fill and new fill. The steps should be no more than 2 feet horizontally and no taller than 2 feet vertically (and should be approximately vertical).

11.3 Fill and Backfill Materials

Structural fill should be well-graded granular soil that generally meets the gradation requirements for New York State Department of Transportation (NYSDOT) Type 2 Aggregate Subbase (Item 304.12), and as follows:

Sieve Size	Percent Finer by Weight
2 Inch	100
¼ Inch	25 to 60
No. 40	5 to 40
No. 200	0 to 10

Based on the results of our subsurface investigation and laboratory testing, most of the on-site soils available for use as fill are not suitable for use as structural fill, due to their relatively high fines content (up to 23 percent). However, some suitable soils were encountered in boring B-14, at the proposed borrow area northeast of the school building (but the sampling was limited). Any soils that are proposed to be used as structural fill should be tested and approved by the geotechnical engineer prior to use.

Select granular fill should be placed below the subbase material for the asphalt paving sections to provide frost protection. The Select granular fill should be a well-graded durable granular material that meets the gradation requirements for Select Granular Fill (Item 203.07) as specified in the NYSDOT Standard Specifications and as follows:

Sieve Size	Percent Finer by Weight
4 inch	100
No. 40	0 - 70
No. 200	0 – 15

On-site native soils that do not meet the above requirements for structural fill, or select granular fill, may be suitable for use as general fill in landscaped areas, beneath the field, and at depths greater than 1 foot beneath the parking lot expansion pavement subbase and slabs-on-grade. General fill should be predominantly granular soil (a mix of sand and gravel) free of particles larger than 8 inches in diameter (boulders), trash, debris, roots, vegetation, or other deleterious materials. It should be noted that use of soils containing moderately high silt contents (such as those encountered at the site) will likely cause construction delays during the winter months, following periods of wet weather, or if the material is wet when excavated. It is also noted that these soils can be susceptible to frost disturbance (heave, et cetera).

Crushed stone placed below slabs-on-grade and as drainage materials behind foundation and retaining walls should be Underdrain Filter Type I materials (Item No. 605.0901) as specified in the NYSDOT Standard Specifications and as follows:

Sieve Size	Percent Finer by Weight
1 inch	100
1/2 inch	30 - 100
1/4 inch	0 - 30
No. 10	0 - 10
No. 20	0 – 5

Material meeting the specifications for ASTM C33, No. 57 stone may also be used as free draining stone.

General fill placed for re-grading of the existing field should be compacted to at least 90 percent of the maximum dry density, at near optimum moisture contents, as determined by the modified Proctor test (ASTM D1557). All general fill to be placed beneath the parking lot expansion and in the slope between the parking lot and field, all select granular fill to be placed beneath pavement sections, and all structural fill should be compacted to at least 95 percent of the maximum dry density, at near optimum moisture contents, as determined by ASTM D1557. The degree of compaction should be tested and documented by a geotechnical engineer for each lift of fill.

The lift thickness for the fill soils will vary depending on the type of compaction equipment used. All fill should be placed in uniform horizontal lifts. The loose lift thickness for general fill and select granular fill should not exceeding 12 inches, while structural fill should be placed in lifts that do not exceeding 8 inches in loose thickness, when using a 10-ton roller. In confined areas, the loose lift thickness should be 4 inches or less and each lift should be compacted with sufficient passes of hand operated vibratory or impact compaction equipment. A geotechnical engineer with appropriate field and laboratory support should inspect all subgrades, approve materials for use as fill, and test backfill materials for compliance with the recommended compaction.

In some cases, it may be preferable to place flowable fill as backfill within utility trenches or as a substitute for compacted fill to restore the grade when undercutting unsuitable materials from beneath building or retaining wall foundations. In that case, the flowable fill should have a minimum 28-day unconfined compressive strength of 50 psi and should meet the requirements for Controlled Low Strength Material (CLSM), as specified in Section 733-01 – "Flowable Fill" of the NYSDOT Standard Specifications.

11.4 Protection of Subgrades and Construction Dewatering

Approved soil subgrades should be protected from the effects of frost, construction traffic, perched groundwater, surface water and precipitation. The necessary protection should be provided as soon after approval by the geotechnical engineer as is practicable and should be maintained until coverage with compacted fill or gravel. It is recommended that temporary surface drainage measures be installed to divert runoff away from the proposed construction limits.

Based on the conditions observed during the subsurface investigation, perched groundwater may be encountered during the construction phase. If necessary, dewatering should be performed in a manner that will prevent loosening or migration of the subgrade soils and performed to maintain the water level at least 1 foot below the deepest excavation. Given the relatively high fines content of the on-site soils, it is anticipated that sump pits and pumps may be suitable for dewatering. Sump pits should be placed at least 1 foot outside of excavations for every foot below the subgrade elevation that they are excavated. The dewatering system should be designed by a New York State Licensed Professional Engineer, and it should be designed to ensure that dewatering does not result in any loss of soil.

As has been previously noted, the on-site soils contain a high percentage of fines and they will soften and experience a reduction in load-carrying capacity when exposed to moisture and disturbed. They may also become unworkable if allowed to get wet. These soils are also frost susceptible and could become disturbed if allowed to freeze during construction. Additional excavation and material removal may be required if subgrades are allowed to be exposed for long durations without fill or concrete placement. Additionally, construction traffic could also disturb the native soils.

If maintaining subgrade stabilization during periods of wet weather is a concern, crushed stone may be placed on footing and/or slab subgrades after excavation and proofrolling. The crushed stone should be clean ½ to ¾ inch gravel, stone, or recycled concrete, and should not exceed 6 inches in thickness.

11.5 Excavations and Shoring

Temporary excavation slopes should conform to the latest OSHA standards, including slopes permitted for specified heights and soil conditions encountered. The presence of perched water, or other deleterious materials could require flatter slopes or temporary excavation support (e.g., shoring and bracing). Excavation support may also be necessary in areas where sufficient distance to provide adequate benching of slopes is not available.

Excavations into the existing fill and native soil should be feasible using standard construction equipment (i.e. hydraulic excavator). Cobbles and boulders should be expected within both the existing fill, and within the undisturbed native soils at the proposed borrow area.

Design of dewatering and excavation support should conform to the latest OSHA and other applicable agency requirements. Design of all excavation slopes greater than a 4-foot depth and design of sheeting, shoring, and bracing should be performed by a New York State licensed Professional Engineer. Adequate dewatering or surface-water runoff control should be provided to avoid instability and caving of soils.

11.6 Deep Foundation Construction Considerations

Drilled shaft foundations for the athletic field lights should be constructed in accordance with the most recent standards of the International Association of Foundation Drilling (ADSC), the Code, and ACI 336. Plans and specifications should clearly indicate that variable soil conditions are present, and obstructions, likely in the form of cobbles and boulders, may be present in the fill and native soils. This will allow the contractor to employ the appropriate equipment and construction methodologies. The foundations should also be constructed under the full-time observation of the geotechnical engineer.

Due to the variable nature of the subsurface soils, it is recommended that temporary steel casing be used to prevent collapse of the soils into the excavations and to maintain the sidewall stability below the groundwater level. At the time of the subsurface investigation, groundwater was observed at approximately 6 feet bgs at most locations around the existing field. Consequently, it is expected that groundwater will be encountered when installing the shafts. The temporary casing could be extended to the full depth of the shaft, in lieu of or along with drilling slurry, and the casing should be removed while concrete is placed. Removal of the casing should be performed so that the level of the concrete within the casing is always at least 1-foot above the bottom of the casing.

Concrete placement within the drilled shafts should be performed using tremie methods, to prevent segregation of the concrete. The concrete placement should also be done in a manner to prevent "necking" of the drilled shaft, as the casing is removed.

12.0 CONSTRUCTION MONITORING

A geotechnical engineer familiar with the existing subsurface conditions and having the appropriate laboratory and field-testing support should be engaged by the Client to observe that all earthwork is performed in accordance with the specifications, the Code, and the criteria provided in this report. As a minimum, the following work should be performed under the observation of the geotechnical engineer:

- Subgrade preparation
- Proofrolling
- Remedial removals of unsuitable soils
- Placement and compaction of fill and backfill materials
- Construction of drilled shafts for lighting structures
- Dewatering, if necessary

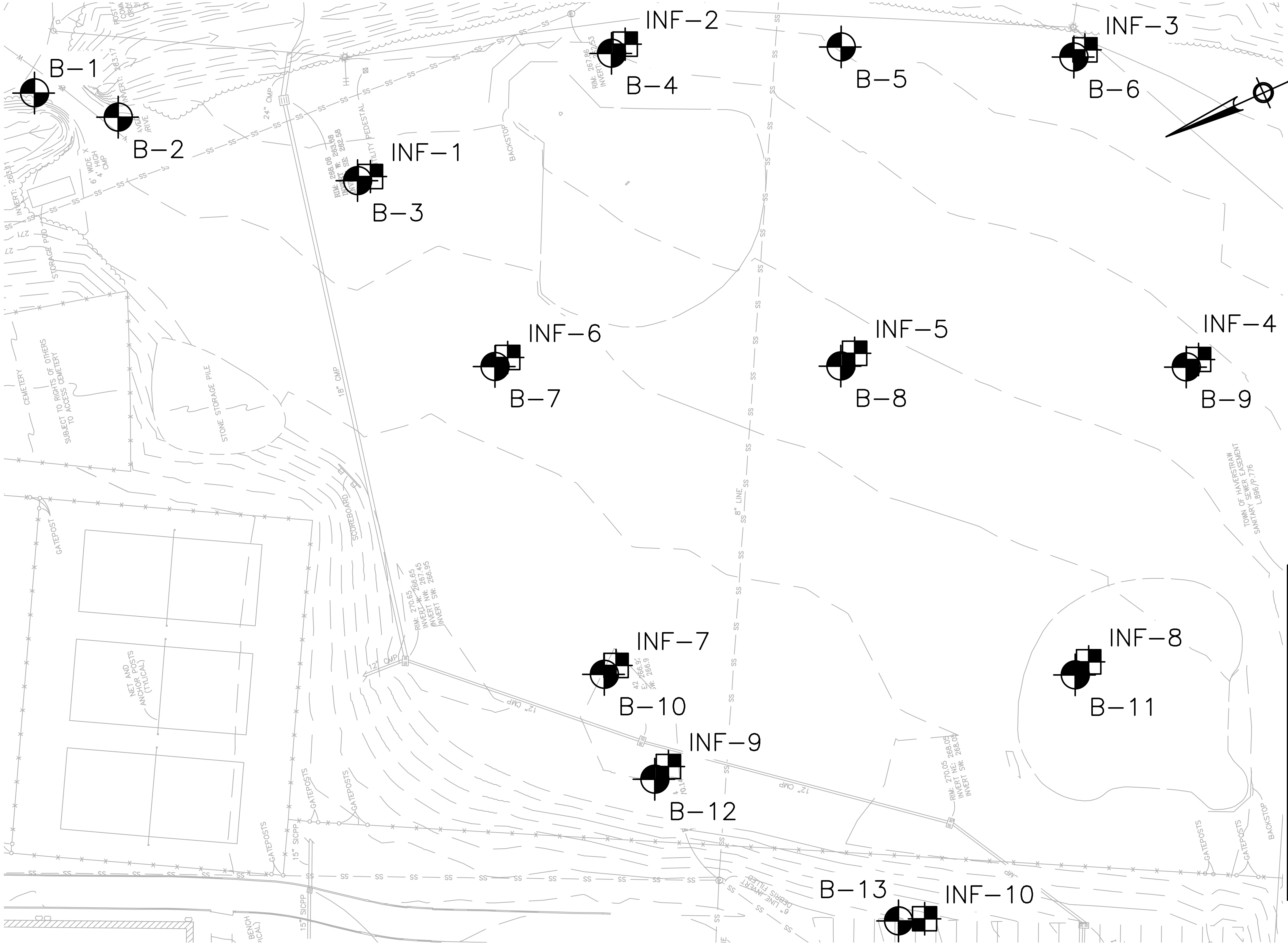
All materials proposed for use as soil fill should be tested and approved prior to delivery to the site. Additionally, all fill materials should be tested as they are being placed to verify that the required compaction is achieved. We further recommend that Tectonic be retained to review the project plans and specifications prior to completion of the bid documents.

13.0 LIMITATIONS

Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers and geologists practicing in this or similar situations. The interpretation of the field data is based on good judgment and experience. However, no matter how qualified the geotechnical engineer or detailed the investigation, subsurface conditions cannot always be predicted beyond the points of actual sampling and testing. No other warranty, expressed or implied, is made as to the professional advice included in this report. The recommendations contained in this report are intended for design purposes only. Contractors and others involved in the construction of this project are advised to make an independent assessment of the soil and groundwater conditions for the purpose of establishing quantities, schedules and construction techniques.

This report has been prepared for the exclusive use of Client, for the specific application to the proposed construction detailed in this report. We recommend that prior to construction; Tectonic Engineering Consultants, Geologists, and Land Surveyors D.P.C. reviews the project plans and specifications. It should be noted that upon review of those documents, some recommendations presented herein might be revised or modified. In the event that any changes in the design or location of the proposed structures are planned, Tectonic shall not consider the conclusions and recommendations contained in this report valid unless reviewed and verified in writing. It is further recommended that Tectonic be retained to provide construction monitoring and inspection services to ensure proper implementation of the recommendations contained herein, which would otherwise limit our professional liability.

FIGURE I



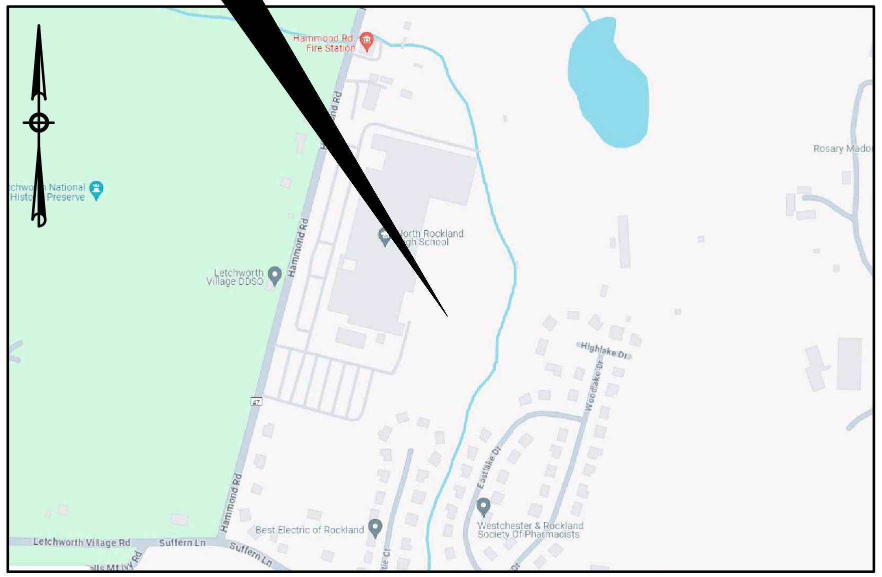
LEGEND

B–14	APPROXIMATE BORING LOCATION
INF–10	APPROXIMATE INFILTRATION TEST LOCATION

NOTES

1. PLAN BASED ON A DRAWING PROVIDED BY THE CLIENT ENTITLED "NORTH ROCKLAND HIGH SCHOOL FIELDS – PHASE 2 GEOTECHNICAL INVESTIGATION".
2. BORING AND INFILTRATION TEST LOCATIONS WERE FIELD LOCATED BY TECTONIC, AT CLIENT DESIGNATED LOCATIONS, AND SHOULD BE CONSIDERED APPROXIMATE.

SITE



0 1 2 3

ORIGINAL SIZE IN INCHES

Tectonic

PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

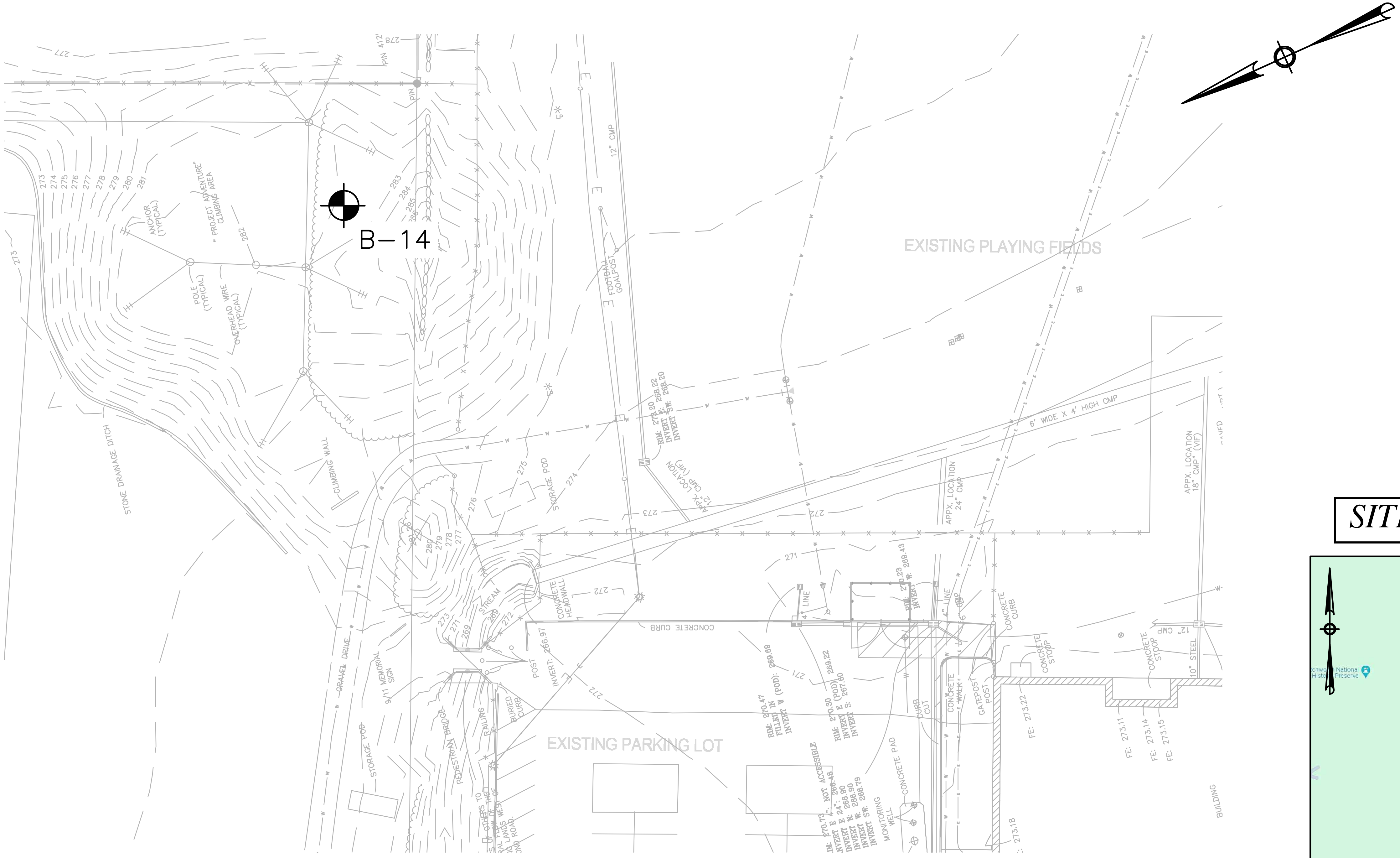
Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C.
70 Pleasant Hill Road
P.O. Box 37
Mountainville, NY 10953
Phone: (845) 534–5959
(800) 829–6531
www.tectonicengineering.com

Project Contact Info
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567–6656

BORING AND INFILTRATION TEST LOCATION PLAN

PROPOSED SITE IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW,
ROCKLAND COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
02/22/2024	11584.01	FIGURE 1	0
Scale 1" = 50'			



LEGEND

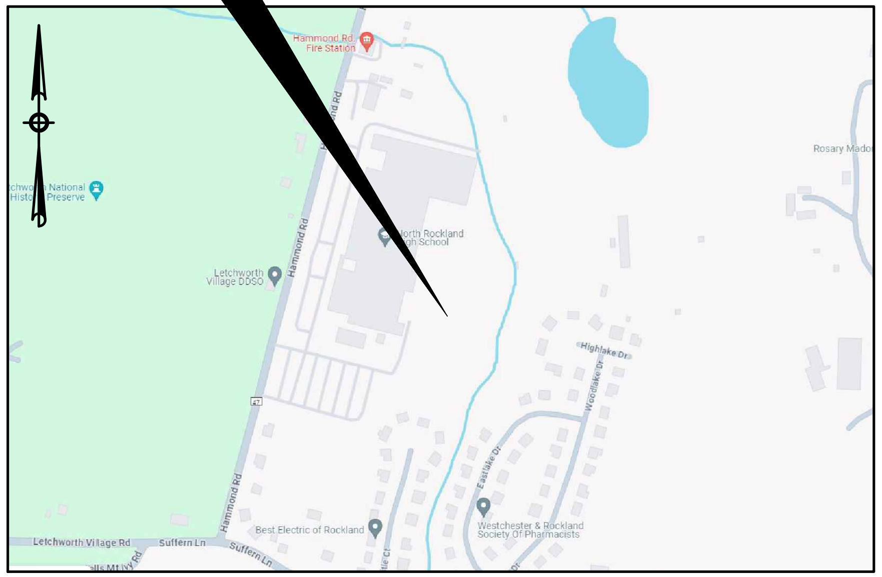
⊕ B-14 — APPROXIMATE BORING LOCATION

▣ INF-10 — APPROXIMATE INFILTRATION TEST LOCATION

NOTES

1. PLAN BASED ON A DRAWING PROVIDED BY THE CLIENT ENTITLED "NORTH ROCKLAND HIGH SCHOOL FIELDS – PHASE 2 GEOTECHNICAL INVESTIGATION".
2. BORING AND INFILTRATION TEST LOCATIONS WERE FIELD LOCATED BY TECTONIC, AT CLIENT DESIGNATED LOCATIONS, AND SHOULD BE CONSIDERED APPROXIMATE.

SITE



0 1 2 3

ORIGINAL SIZE IN INCHES

Tectonic

PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C.
70 Pleasant Hill Road
P.O. Box 37
Mountainville, NY 10953
Phone: (845) 534–5959
(800) 829–6531
www.tectonicengineering.com

Project Contact Info
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567–6656

BORING AND INFILTRATION TEST LOCATION PLAN

PROPOSED SITE IMPROVEMENTS
NORTH ROCKLAND HIGH SCHOOL
106 HAMMOND ROAD
HAMLET OF THIELLS, TOWN OF HAVERSTRAW,
ROCKLAND COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
02/22/2024	11584.01	FIGURE 2	0
Scale 1" = 50'			

APPENDIX I

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School Phase 2**
LOCATION: **Thiells, NY**

BORING No. B-1

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:	3 1/4"	0	TO	30'
ROT. DRILL:			TO	
CASING:			TO	
DIAMOND CORE:			TO	

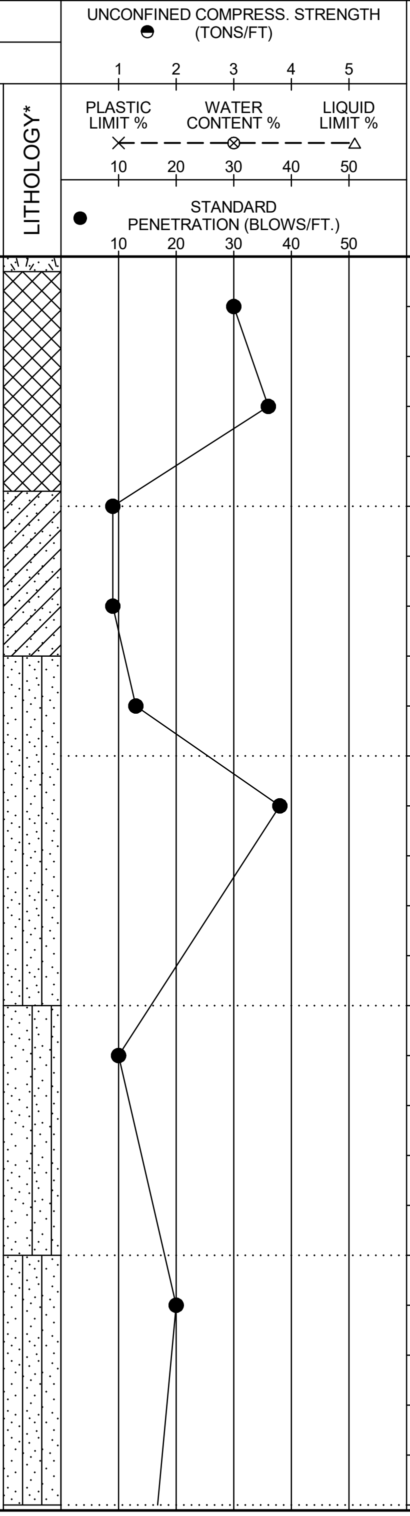
CME 55 ATV Rig with Automatic Hammer

GROUND WATER	DATE	TIME	DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **30° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Drew Bugna**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **270.0**
DATUM: **See Remarks**
DATE START: **2/15/24**
DATE FINISH: **2/15/24**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1 2	30	5 10 20 21	S-1	17		M	SM	2" Topsoil-like material Bwn c-f SAND, some c-f Gravel, little Silt (FILL)	
3 4	36	31 22 14 16	S-2	12		M	GM	Bwn-gy c-f GRAVEL, some c-f Sand, little Silt (FILL)	
5 6	9	9 7 2 1	S-3	12		W W	SM SC	Top 8" Bwn c-f SAND, some Silt, little c-f Gravel (FILL) Bottom 4" Gy-bwn f SAND, and Clay & Silt	265.0
7 8	9	1 1 8 9	S-4	0				No Recovery	
9 10	13	6 5 8 10	S-5	13		W	SM	Bwn-gy c-f SAND, some Silt, little c-f Gravel	260.0
11 12	38	17 19 19 14	S-6	10		W	SM	Bwn-or c-f SAND, and c-f Gravel, little Silt	
13									
14									
15									255.0
16 17	10	11 5 5 5	S-7	11		W	SP-SM	Lgt bwn m-f SAND, trace Silt	
18									
19									
20									250.0
21 22	20	3 11 9 8	S-8	24		W	SM	Bwn m-f SAND, some c-f Gravel, little Silt	
23									
24									
25									245.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

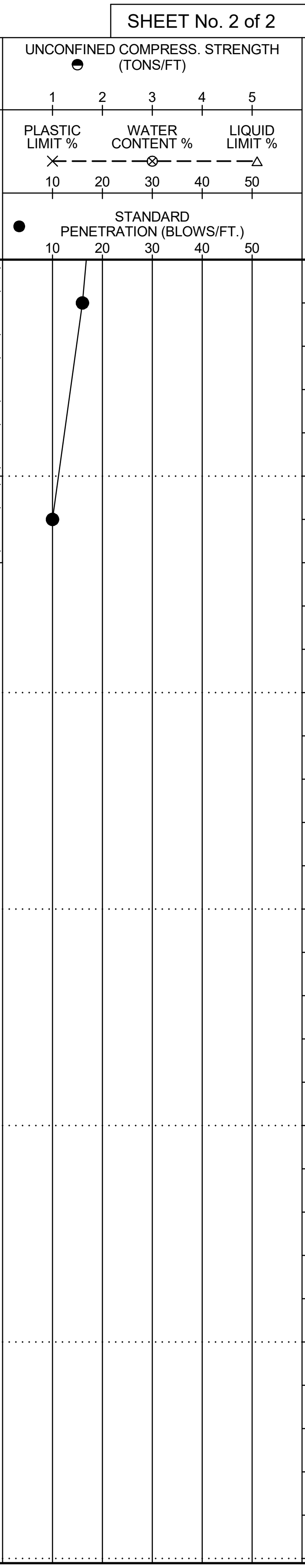
BORING No. B-1

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	16	6 9 7 6	S-9	12		W	SP-SM	Bwn m-f SAND, trace Silt		
27										
28										
29										
30										240.0
31	10	4 5 5 6	S-10	18		W	SM	Bwn c-f SAND, little Silt, trace c-f Gravel		
32										
33								End of Boring at 32'		
34										
35										235.0
36										
37										
38										
39										
40										230.0
41										
42										
43										
44										
45										225.0
46										
47										
48										
49										
50										220.0
51										
52										
53										
54										
55										215.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-2

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

INSPECTOR: **Drew Bugna**

DRILLER: **Andrew Bellucci**

SURFACE ELEVATION: **270.0**

METHOD OF ADVANCING BORING	DIA.	DEPTH	
POWER AUGER:	3 1/4"	0	TO 30'
ROT. DRILL:			TO
CASING:			TO
DIAMOND CORE:			TO

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **36° F**

DEPTH TO ROCK: **Not Encountered'**

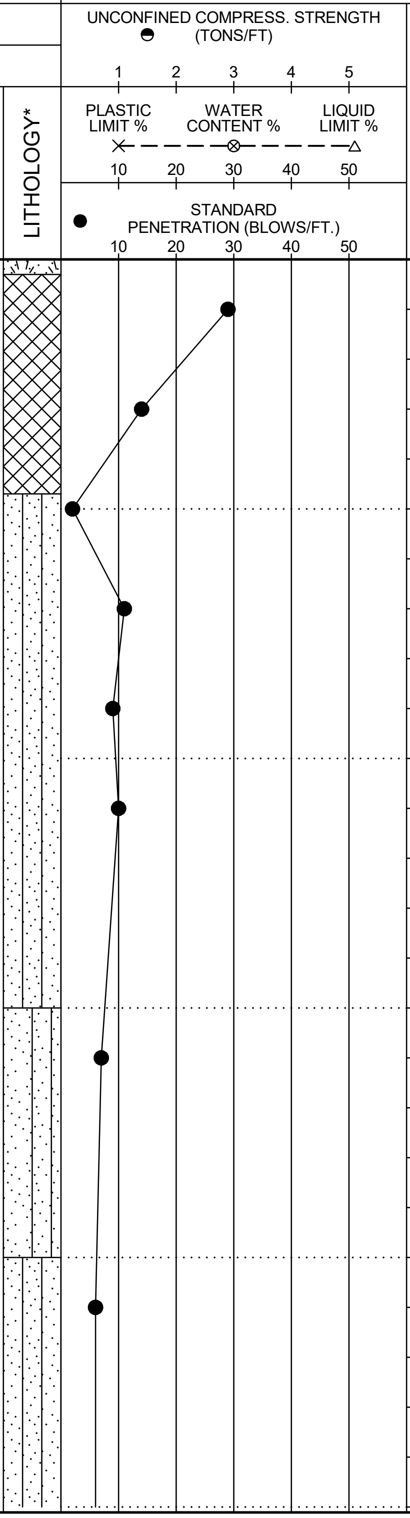
*CHANGES IN STRATA ARE INFERRED

DATUM: **See Remarks**

DATE START: **2/15/24**

DATE FINISH: **2/15/24**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1	29	4 13 16 15	S-1	10		M	GM	2" Topsoil-like material Bwn-gy c-f GRAVEL, some m-f Sand, little Silt (FILL)	
2									
3	14	12 8 6 3	S-2	8		M	GM	Bwn c-f GRAVEL, and c-f Sand, little Silt (FILL)	
4									
5	2	2 1 1 2	S-3	12		M M	SM SM	Top 8" Bwn m-f SAND, some Silt, little c-f Gravel (FILL) Bottom 4" Dk gy-bwn m-f SAND, and Silt	265.0
6									
7	11	2 3 8 8		0				No Recovery	
8									
9	9	4 5 4 4	S-4	14		W	SM	Bwn m-f SAND, little Silt	
10									260.0
11	10	2 4 6 5	S-5	18		W	SM	Same	
12									
13									
14									
15									255.0
16	7	4 4 3 4	S-6	14		W	SP-SM	Bwn-gy m-f SAND, trace Silt	
17									
18									
19									
20									250.0
21	6	2 3 3 3	S-7	12		W	SM	Bwn m-f SAND, little Silt	
22									
23									
24									
25									245.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

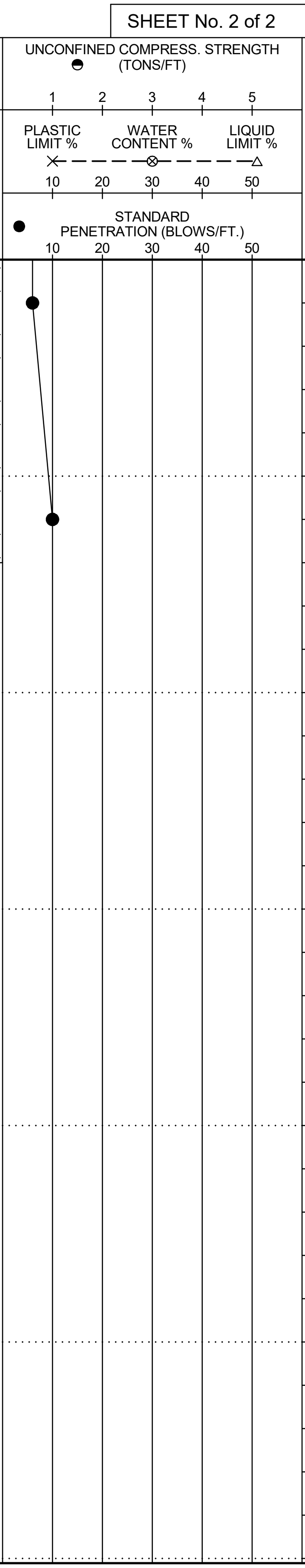
BORING No. B-2

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	6	3 3 3 4	S-8	24		W	SM	Bwn c-f SAND, little Silt, trace f Gravel		
27										
28										
29										
30										240.0
31	10	4 5 5 5	S-9	16		W	SM	Same		
32										
33								End of Boring at 32'		
34										
35										235.0
36										
37										
38										
39										
40										230.0
41										
42										
43										
44										
45										225.0
46										
47										
48										
49										
50										220.0
51										
52										
53										
54										
55										215.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

BORING No. B-3

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School Phase 2**
LOCATION: **Thiells, NY**

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

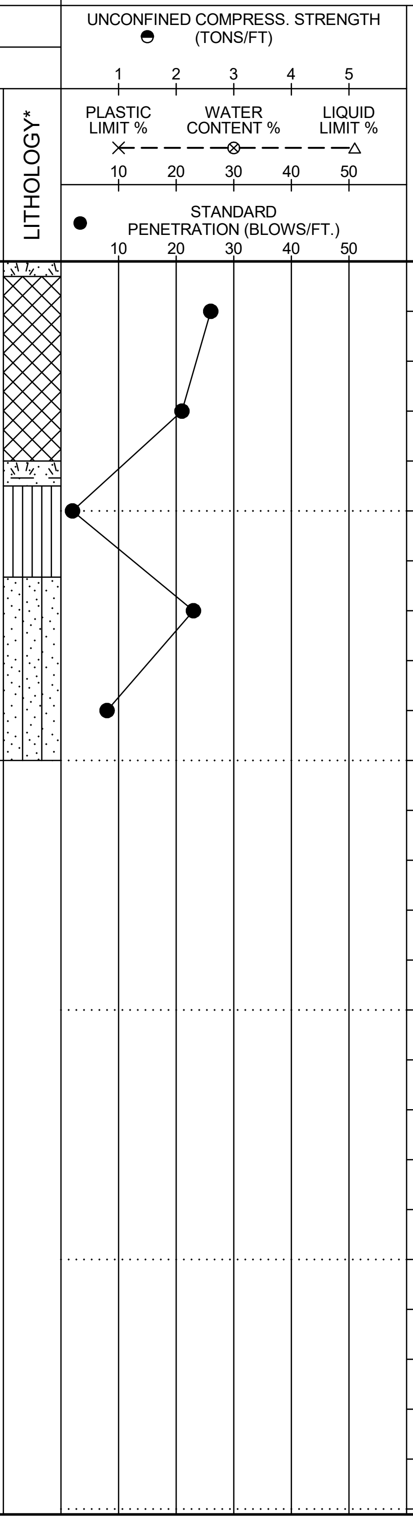
INSPECTOR: **Drew Bugna**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **269.5**
DATUM: **See Remarks**
DATE START: **2/16/24**
DATE FINISH: **2/16/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 8'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **29° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1 2	26	2 7 19 17	S-1	7		M	SM	2" Topsoil-like material Bwn m-f SAND, some Silt, trace c-f Gravel (FILL)	
3 4	21	17 13 8 4	S-2	3		M	SP	Bwn m-f SAND, and c-f Gravel, trace Silt (FILL)	
5 6	2	1 1 1 1	S-3	13		M M	OL ML	Top 6" Dk bwn Topsoil Like Material Bottom 7" Dk bwn SILT, some m-f Sand, little Peat, trace f Gravel, trace Roots.	264.5
7 8	23	2 9 14 10	S-4	12		M M	ML SM	Top 4" Same Bottom 8" Bwn-gy c-f SAND, and c-f Gravel, little Silt	
9 10	8	5 4 4 4	S-5	10		W	SM	Bwn m-f SAND, little Silt	259.5
11–25								End of Boring at 10'	254.5 (15) 249.5 (20) 244.5 (25)

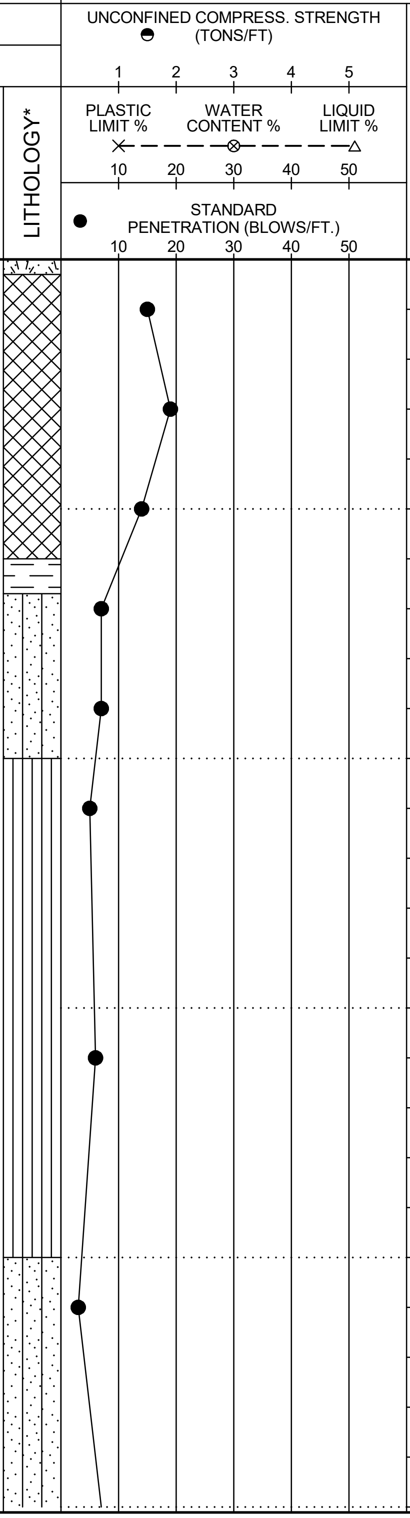


REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic	PROJECT No. **11584.01**	**BORING No. B-4**
	PROJECT: **North Rockland High School Phase 2**	
	LOCATION: **Thiells, NY**	SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**			GROUND WATER	DATE	TIME	DEPTH	INSPECTOR: **Drew Bugna**
CONTRACTOR: **Core Down Drilling LLC**							DRILLER: **Andrew Bellucci**
METHOD OF ADVANCING BORING	DIA.	DEPTH					SURFACE ELEVATION: **268.0**
POWER AUGER:	**3 1/4"**	**0** TO **30'**	MON. WELL ☐ YES ☒ NO				DATUM: **See Remarks**
ROT. DRILL:		TO	SCREEN DEPTH: **---** TO **---**				DATE START: **2/16/24**
CASING:		TO	WEATHER: **Clear** TEMP: **31° F**				DATE FINISH: **2/16/24**
DIAMOND CORE:		TO	DEPTH TO ROCK: **Not Encountered'**				
CME 55 ATV Rig with Automatic Hammer			*CHANGES IN STRATA ARE INFERRED				

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1	15	4 7 8 19	S-1	11		M	SM	2" Topsoil-like material Bwn m-f SAND, some c-f Gravel, little Silt (FILL)	
2									
3	19	10 12 7 8	S-2	11		M	SM	Bwn c-f SAND, little c-f Gravel, little Silt (FILL)	
4									
5	14	30 12 2 3	S-3	12		M	SM	Bwn m-f SAND, some Silt, little c-f Gravel (FILL)	263.0
6									
7	7	1 4 3 4	S-4	9		W	OL	Dk bwn-blk SILT, and c-f Sand, little Peat	
8									
9	7	13 4 3 3	S-5	6		W	SM	Dk gy m-f SAND, and Silt, trace c-f Gravel	
10									258.0
11	5	2 2 3 3	S-6	6		W	ML	Lgt bwn SILT, little f Sand (thinly layered)	
12									
13									
14									
15									253.0
16	6	2 4 2 3	S-7	10		W	ML	Same	
17									
18									
19									
20									248.0
21	3	1 1 2 2	S-8	14		W	SM	Lgt bwn f SAND, and Silt	
22									
23									
24									
25									243.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-4

SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

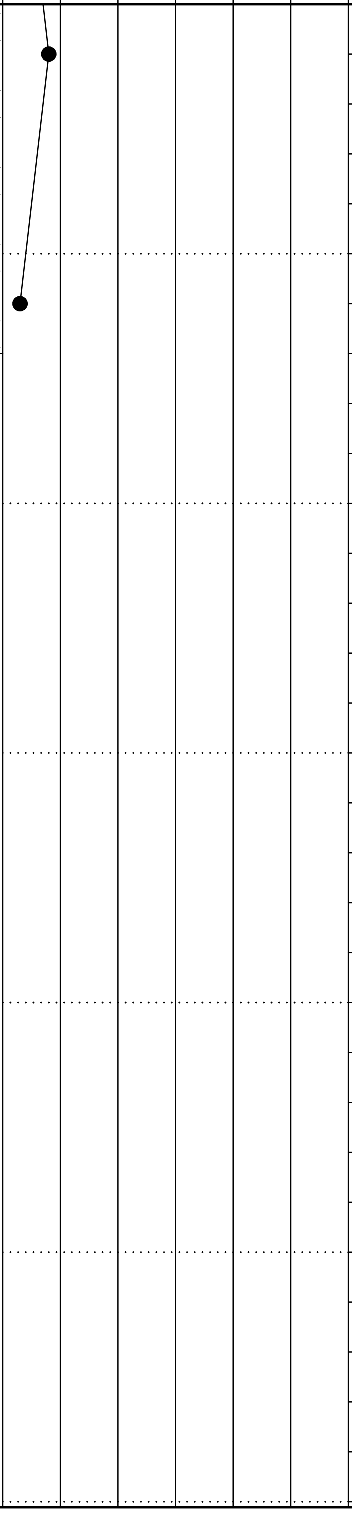
CONTRACTOR: **Core Down Drilling LLC**

UNCONFINED COMPRESS. STRENGTH ◓ (TONS/FT) 1 2 3 4 5

PLASTIC LIMIT % ✕ — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

● STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES			MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
			SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)					
26	8	3 4 4 4	S-9	10		W	SM	Same	⁘	
27									⁘	
28									⁘	
29									⁘	
30									⁘	238.0
31	3	4 2 1 1	S-10	18		W	SM	Same	⁘	
32										
33								End of Boring at 32'		
34										
35										233.0
36										
37										
38										
39										
40										228.0
41										
42										
43										
44										
45										223.0
46										
47										
48										
49										
50										218.0
51										
52										
53										
54										
55										213.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-5

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

INSPECTOR: **Drew Bugna**

DRILLER: **Andrew Bellucci**

SURFACE ELEVATION: **267.0**

DATUM: **See Remarks**

DATE START: **2/16/24**

DATE FINISH: **2/16/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:	**3 1/4"**	**0**	TO	**30'**
ROT. DRILL:			TO	
CASING:			TO	
DIAMOND CORE:			TO	

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO

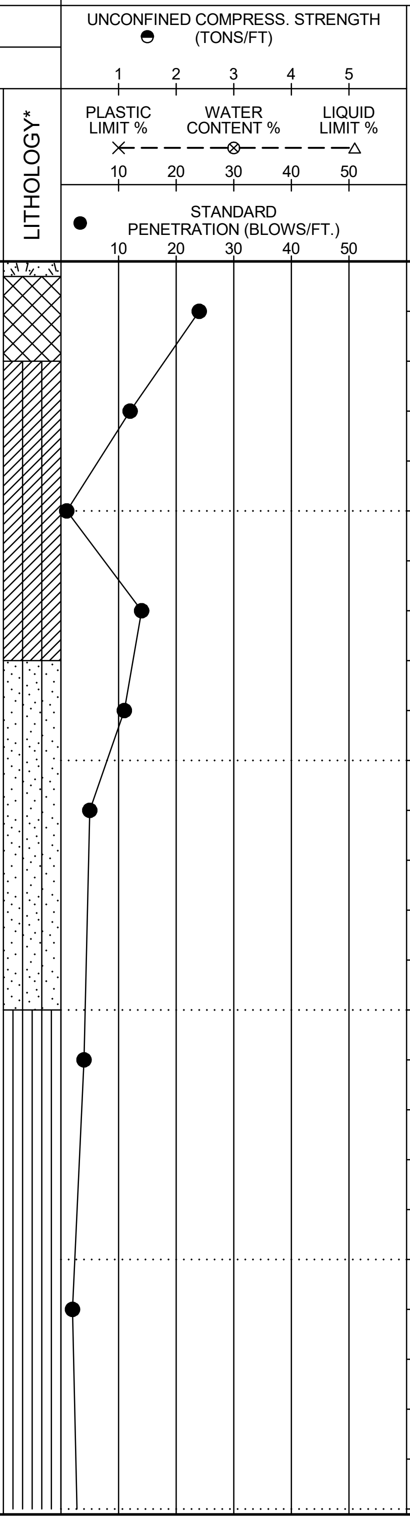
SCREEN DEPTH: **---** TO **---**

WEATHER: **Clear** TEMP: **37° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1 2	24	1 4 20 28	S-1	10		M	SM	4" Topsoil-like material Bwn m-f SAND, some Silt, trace c-f Gravel (FILL)	
3 4	12	22 10 2 1	S-2	8		M	CL-ML	Gy CLAYEY SILT, some m-f Sand, trace wood fibers	
5 6	1	1 0 1 WOH	S-3	5		M	CL-ML	Same	262.0
7 8	14	1 5 9 10		0				No Recovery	
9 10	11	9 6 5 5	S-4	6		W	SM	Dk bwn m-f SAND, some Silt, trace c-f Gravel (trace Organics)	257.0
11 12	5	1 2 3 4	S-5	15		W	SM	Bwn-gy m-f SAND, some Silt	
13 14 15									252.0
16 17	4	1 2 2 1	S-6	12		W	ML	Bwn SILT, some f Sand	
18 19 20									247.0
21 22	2	1 1 1 1	S-7	18		W	ML	Same	
23 24 25									242.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-5

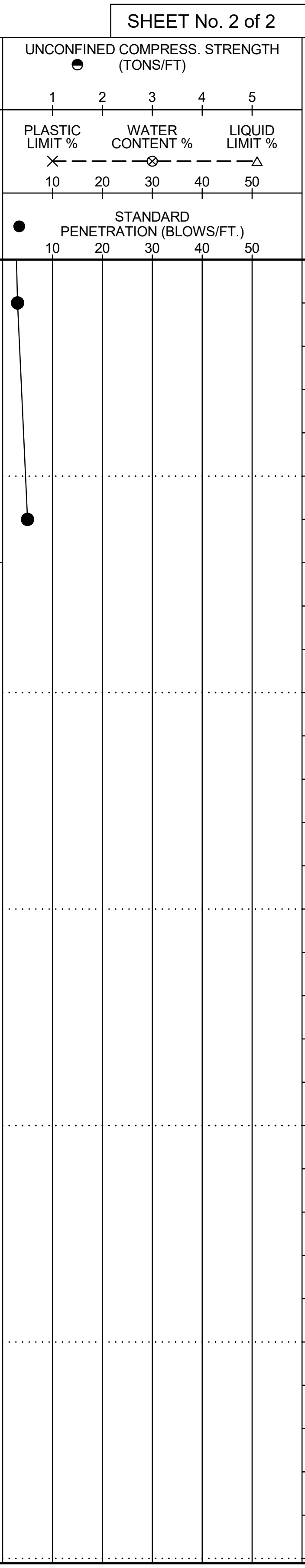
SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
26	3	1 1 2 3	S-8	12		W	ML	Same	
27									
28									
29									
30									237.0
31	5	1 2 3 3	S-9	15		W	ML	Same	
32									
33								End of Boring at 32'	
34									
35									232.0
36									
37									
38									
39									
40									227.0
41									
42									
43									
44									
45									222.0
46									
47									
48									
49									
50									217.0
51									
52									
53									
54									
55									212.0

LITHOLOGY*



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No.	**11584.01**	# BORING No. B-6
PROJECT:	**North Rockland High School Phase 2**	
LOCATION:	**Thiells, NY**	SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

INSPECTOR: **Drew Bugna**

DRILLER: **Andrew Bellucci**

SURFACE ELEVATION: **266.0**

DATUM: **See Remarks**

DATE START: **2/19/24**

DATE FINISH: **2/19/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:	3 1/4"	0	TO	30'
ROT. DRILL:			TO	
CASING:			TO	
DIAMOND CORE:			TO	

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO

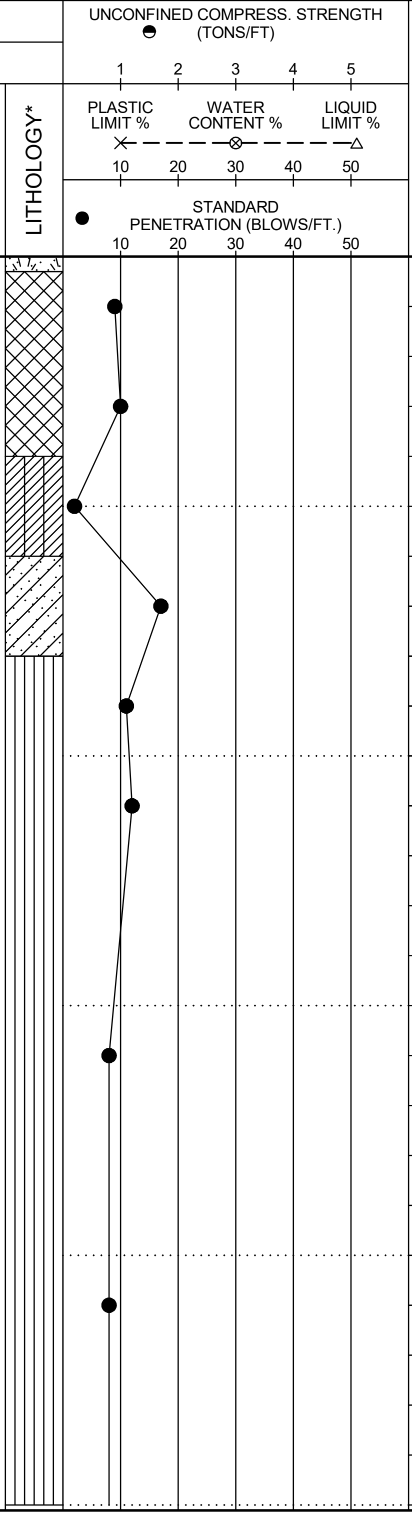
SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **27° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1 2	9	1 3 6 7	S-1	12		M	SM	4" Topsoil-like material Bwn m-f SAND, some Silt, trace c-f Gravel (FILL)	
3 4	10	9 6 4 1	S-2	7		M	GM	Bwn c-f GRAVEL, and c-f Sand, little Silt (FILL)	
5 6	2	WOH 1 1 WOH	S-3	9		M	CL-ML	Gy SILT & CLAY, little m-f Sand, trace wood fibers	261.0
7 8	17	5 2 15 12	S-4	9		W	SC	Gy & dk bwn m-f SAND, some Clayey Silt, trace Peat	
9 10	11	10 6 5 5	S-5	8		W	ML	Gy SILT, little m-f SAND	256.0
11 12	12	7 7 5 4	S-6	8		W	ML	Same	
13 14 15									251.0
16 17	8	3 4 4 4	S-7	12		W	ML	Bwn SILT, little m-f Sand	
18 19 20									246.0
21 22	8	3 3 5 4	S-8	12		W	ML	Same	
23 24 25									241.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-6

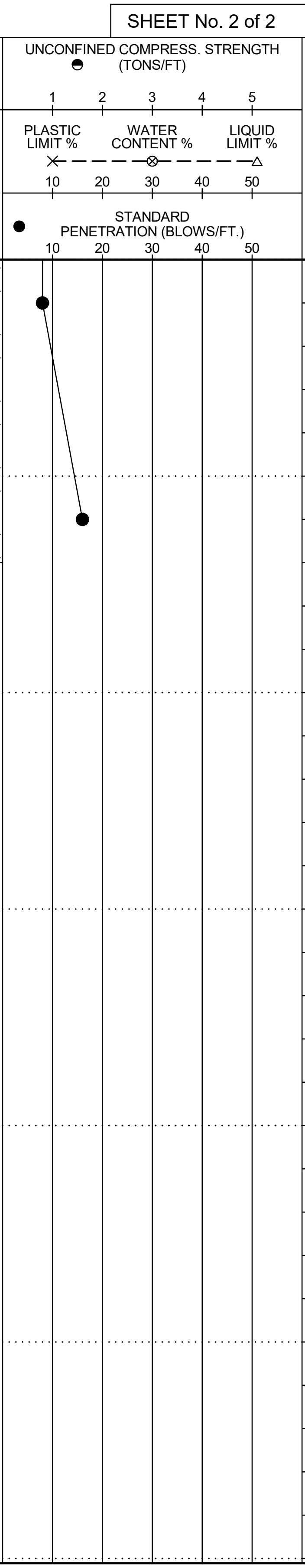
SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
26	8	4 4 4 5	S-9	10		W	SM	Bwn f SAND, and Silt	
27									
28									
29									
30									236.0
31	16	5 8 8 6	S-10	8		W	SM	Bwn c-f SAND, some Silt, little c-f Gravel	
32								End of Boring at 32'	
33									
34									
35									231.0
36									
37									
38									
39									
40									226.0
41									
42									
43									
44									
45									221.0
46									
47									
48									
49									
50									216.0
51									
52									
53									
54									
55									211.0

LITHOLOGY*



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School Phase 2**
LOCATION: **Thiells, NY**

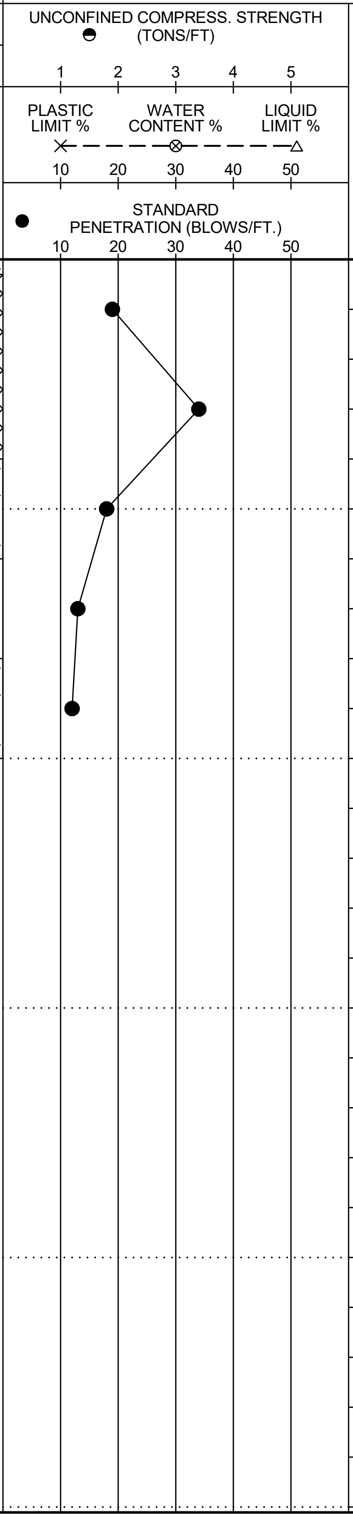
BORING No. B-7

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**			GROUND WATER	DATE	TIME	DEPTH
CONTRACTOR: **Core Down Drilling LLC**						
METHOD OF ADVANCING BORING	DIA.	DEPTH				
POWER AUGER:	3 1/4"	0 TO 8'	MON. WELL ☐ YES ☒ NO			
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---			
CASING:		TO	WEATHER: **Clear** TEMP: **22° F**			
DIAMOND CORE:		TO	DEPTH TO ROCK: **Not Encountered'**			
CME 55 ATV Rig with Automatic Hammer			*CHANGES IN STRATA ARE INFERRED			

INSPECTOR: **Drew Bugna**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **270.5**
DATUM: **See Remarks**
DATE START: **2/20/24**
DATE FINISH: **2/20/24**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1 2	19	1 3 16 21	S-1	15		M	GP	4" Topsoil-like material Bwn c-f GRAVEL, and c-f Sand, trace Silt, trace roots (FILL)		
3 4	34	30 21 13 12	S-2	18		M	SM	Bwn m-f SAND, some c-f Gravel, little Silt (FILL)		
5 6	18	12 8 10 8	S-3	8		M	SM-ML	Lgt bwn m-f SAND, and Silt (thinly layered, mottled)		265.5
7 8	13	7 7 6 4	S-4	13		W	ML	Lgt bwn SILT, little f Sand (thinly layered, mottled)		
9 10	12	5 6 6 7	S-5	11		W	SM-ML	Lgt bwn m-f SAND, and Silt		260.5
11 12 13 14 15								End of Boring at 10'		255.5
16 17 18 19 20										250.5
21 22 23 24 25										245.5



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

BORING No. B-8

SHEET No. 1 of 1

PROJECT No. **11584.01**
PROJECT: **North Rockland High School Phase 2**
LOCATION: **Thiells, NY**

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

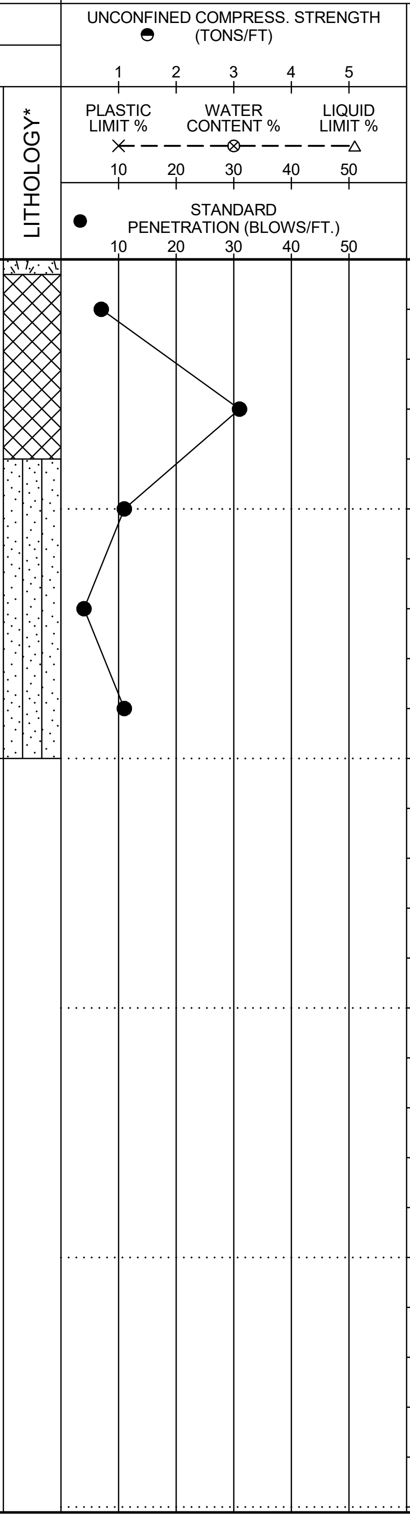
GROUND WATER	DATE	TIME	DEPTH

INSPECTOR: **Drew Bugna**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **269.5**
DATUM: **See Remarks**
DATE START: **2/19/24**
DATE FINISH: **2/19/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 8'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **35° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED



DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1	7	2 2 5 6	S-1	13		M	SM	4" Topsoil-like material Bwn c-f SAND, some Silt, little c-f Gravel (FILL)	
2									
3	31	17 14 17 19	S-2	11		M	SM	Bwn c-f SAND, some c-f Gravel, little Silt (FILL)	
4									
5	11	10 7 4 5	S-3	17		M	SM	Same	264.5
6									
7	4	1 1 3 7	S-4	15		W	SM	Gy m-f SAND, some Silt, trace c-f Gravel	
8									
9	11	6 6 5 6	S-5	13		W	SM	Bwn-gy m-f SAND, and Silt	
10									259.5
11								End of Boring at 10'	
12									
13									
14									
15									254.5
16									
17									
18									
19									
20									249.5
21									
22									
23									
24									
25									244.5

REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**
PROJECT: **North Rockland High School Phase 2**
LOCATION: **Thiells, NY**

BORING No. B-9

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**
CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

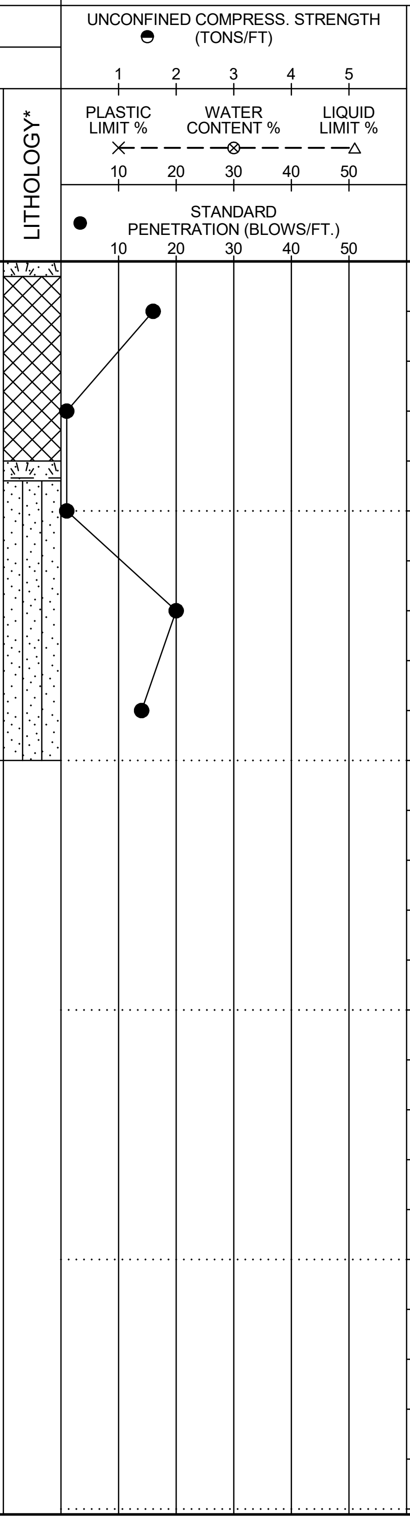
INSPECTOR: **Drew Bugna**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **268.0**
DATUM: **See Remarks**
DATE START: **2/19/24**
DATE FINISH: **2/19/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:	3 1/4"	0	TO	8'
ROT. DRILL:			TO	
CASING:			TO	
DIAMOND CORE:			TO	

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **33° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1 2	16	1 6 10 8	S-1	9		M	SM	4" Topsoil-like material Bwn c-f SAND, some c-f Gravel, some Silt (FILL)	
3 4	1	2 0 1 1	S-2	0		M		No Recovery	
5 6	1	WOH 0 1 4	S-3	12		M M	OL SM	Top 5" Dk bwn Topsoil-like materal, trace Roots Bottom 7" Bwn m-f SAND, some Silt, trace root fibers	263.0
7 8	20	10 10 10 9	S-4	5		W	SM	Same	
9 10	14	7 7 7 6	S-5	8		W	SM	Bwn-gy f SAND & Silt, some c-f Gravel	258.0
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25								End of Boring at 10'	253.0 248.0 243.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-10

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

INSPECTOR: **Drew Bugna**

DRILLER: **Andrew Bellucci**

SURFACE ELEVATION: **271.0**

DATUM: **See Remarks**

DATE START: **2/20/24**

DATE FINISH: **2/20/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 30'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO

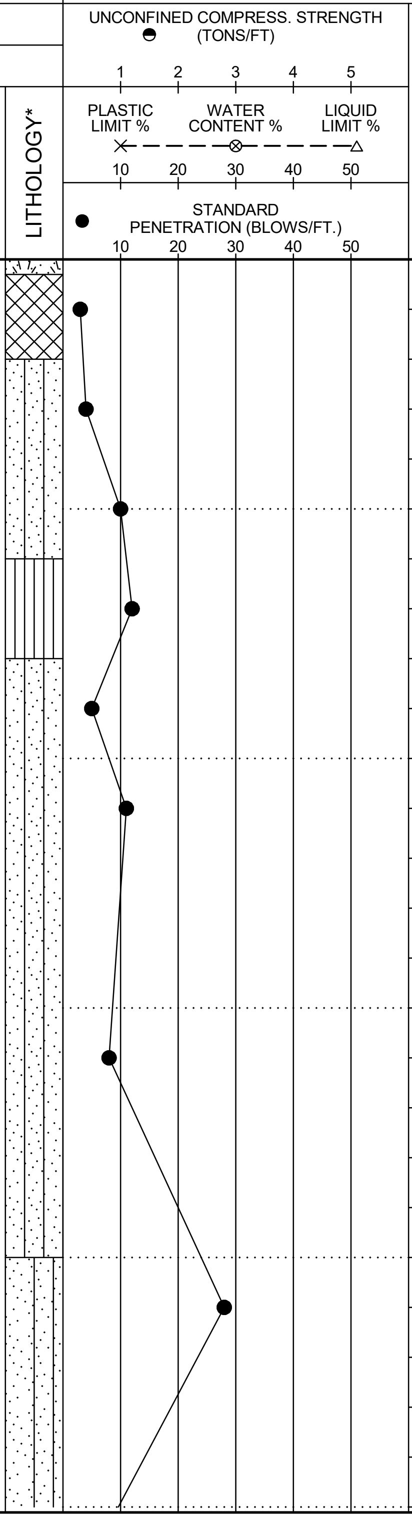
SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **24° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1	3	2 1 2 2	S-1	10		M	SM	4" Topsoil-like material Bwn m-f SAND, little Silt, trace c-f Gravel, trace Roots (FILL)	
2									
3	4	3 2 2 3	S-2	15		M	SM	Lgt bwn m-f SAND, some Silt	
4									
5	10	4 4 6 6	S-3	16		M	SM	Lgt bwn m-f SAND, and Silt	266.0
6									
7	12	6 6 6 5	S-4	13		W	ML	Lgt bwn SILT, little c-f Sand (thinly layered)	
8									
9	5	4 3 2 3	S-5	11		W	SM	Lgt bwn f SAND, some Silt	
10									261.0
11	11	4 6 5 3	S-6	20		W	SM	Same	
12									
13									
14									
15									256.0
16	8	5 4 4 3	S-7	4		W	SM	Bwn c-f SAND, little c Gravel, little Silt	
17									
18									
19									
20									251.0
21	28	2 13 15 2	S-8	4		W	GM	Bwn m-f SAND, little f Gravel, little Silt	
22									
23									
24									
25									246.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No.	**11584.01**
PROJECT:	**North Rockland High School Phase 2**
LOCATION:	**Thiells, NY**

BORING No. B-10

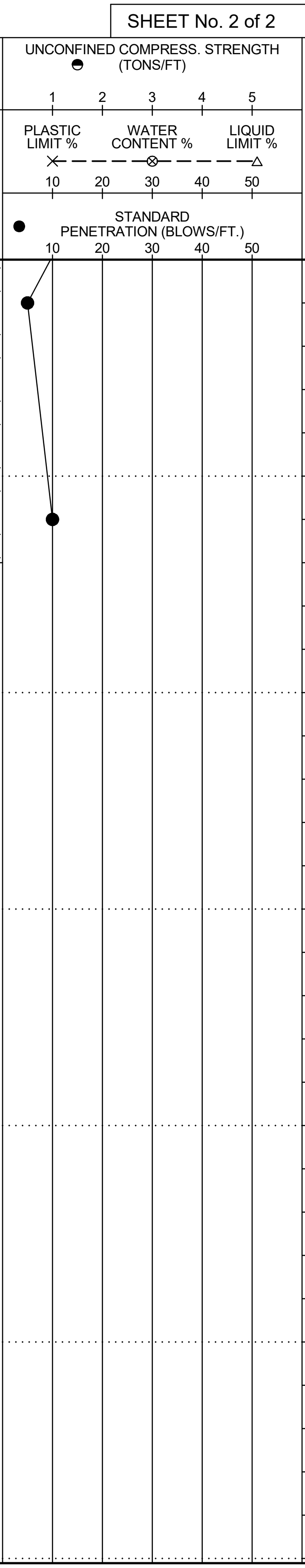
SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
26	5	2 2 3 2	S-9	8		W	SP-SM	Bwn m-f SAND, trace Silt	
27									
28									
29									
30									241.0
31	10	5 5 5 4	S-10	15		W	SP-SM	Same	
32									
33								End of Boring at 32'	
34									
35									236.0
36									
37									
38									
39									
40									231.0
41									
42									
43									
44									
45									226.0
46									
47									
48									
49									
50									221.0
51									
52									
53									
54									
55									216.0

LITHOLOGY*



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-11

SHEET No. 1 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

INSPECTOR: **Drew Bugna**

DRILLER: **Andrew Bellucci**

SURFACE ELEVATION: **270.5**

DATUM: **See Remarks**

DATE START: **2/21/24**

DATE FINISH: **2/21/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:	3 1/4"	0	TO	30'
ROT. DRILL:			TO	
CASING:			TO	
DIAMOND CORE:			TO	

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

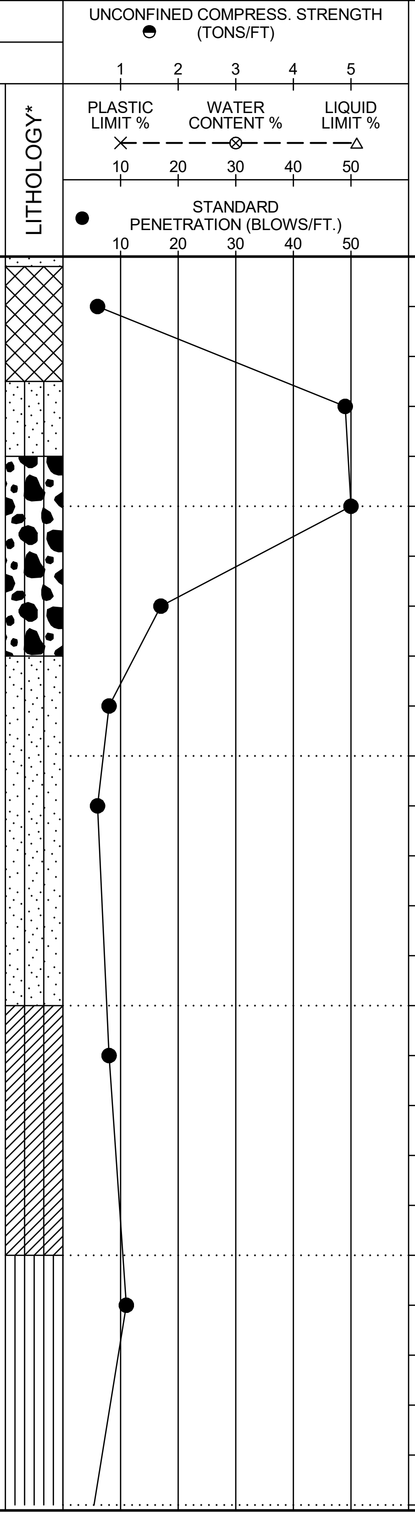
WEATHER: **Overcast** TEMP: **27° F**

DEPTH TO ROCK: **Not Encountered'**

CME 55 ATV Rig with Automatic Hammer

*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1 2	6	1 2 4 14	S-1	14		M	SM	2" Softball infield Sand Bwn c-f SAND, little c-f Gravel, little Silt (FILL)	
3 4	49	22 24 25 15	S-2	13		M M	SM SM	Top 6" Same (FILL) Bottom 7" Gy c-f SAND, and c-f Gravel, little Silt	
5 6	50	28 21 29 25	S-3	6		M	GM	Bwn-gy c-f GRAVEL, and c-f Sand, little Silt	265.5
7 8	17	17 10 7 7	S-4	7		M	GM	Gy c-f GRAVEL, and c-f Sand, little Silt	
9 10	8	1 3 5 7	S-5	7		W	SM	Gy m-f SAND, some c-f Gravel, little Silt	260.5
11 12	6	1 3 3 6	S-6	0		W	GP	No Recovery (Split spoon tip plugged with a piece of c Gravel)	
13 14 15									255.5
16 17	8	2 4 4 4	S-7	12		W	CL-ML	Gy CLAYEY SILT, trace f Sand, trace f Gravel	
18 19 20									250.5
21 22	11	3 5 6 3	S-8	12		W	ML	Lgt bwn SILT	
23 24 25									245.5



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-11

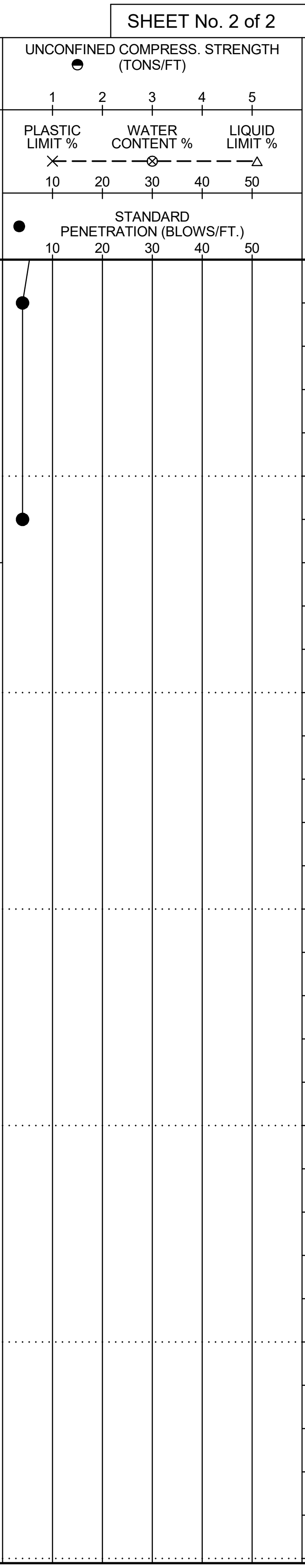
SHEET No. 2 of 2

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES SAMPLE NUMBER	SAMPLES RECOV. LENGTH (IN.)	SAMPLES RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
26	4	2 2 2 2	S-9	13		W	ML	Same	
27									
28									
29									
30									240.5
31	4	2 2 2 2	S-10	5		W	ML	Lgt bwn SILT, trace f Sand, trace c-f Gravel	
32									
33								End of Boring at 32'	
34									
35									235.5
36									
37									
38									
39									
40									230.5
41									
42									
43									
44									
45									225.5
46									
47									
48									
49									
50									220.5
51									
52									
53									
54									
55									215.5

LITHOLOGY*



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-12

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

INSPECTOR: **Drew Bugna**

DRILLER: **Andrew Bellucci**

SURFACE ELEVATION: **271.0**

DATUM: **See Remarks**

DATE START: **2/20/24**

DATE FINISH: **2/20/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	**3 1/4"**	**0** TO **8'**
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO

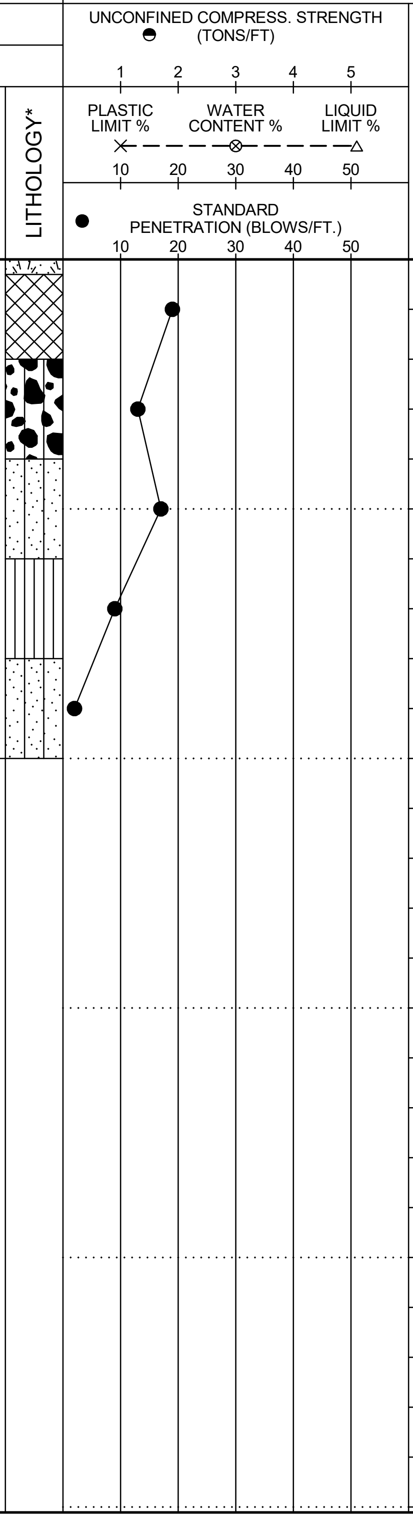
SCREEN DEPTH: **---** TO **---**

WEATHER: **Clear** TEMP: **34° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1 2	19	1 8 11 9	S-1	12		M	GM	4" Topsoil-like material Bwn c-f GRAVEL, and c-f Sand, little Silt (FILL)	
3 4	13	7 5 8 8	S-2	0				No Recovery	
5 6	17	10 10 7 4	S-3	8		M	SM	Bwn c-f SAND, little Silt	266.0
7 8	9	4 5 4 3	S-4	12		W	ML	Lgt bwn SILT, little f Sand (thinly layered)	
9 10	2	1 1 1 2	S-5	12		W	SM	Lgt bwn f SAND, some Silt	261.0
11								End of Boring at 10'	
12									
13									
14									
15									256.0
16									
17									
18									
19									
20									251.0
21									
22									
23									
24									
25									246.0



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-13

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

INSPECTOR: **Drew Bugna**

DRILLER: **Andrew Bellucci**

SURFACE ELEVATION: **276.0**

DATUM: **See Remarks**

DATE START: **2/21/24**

DATE FINISH: **2/21/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 8'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

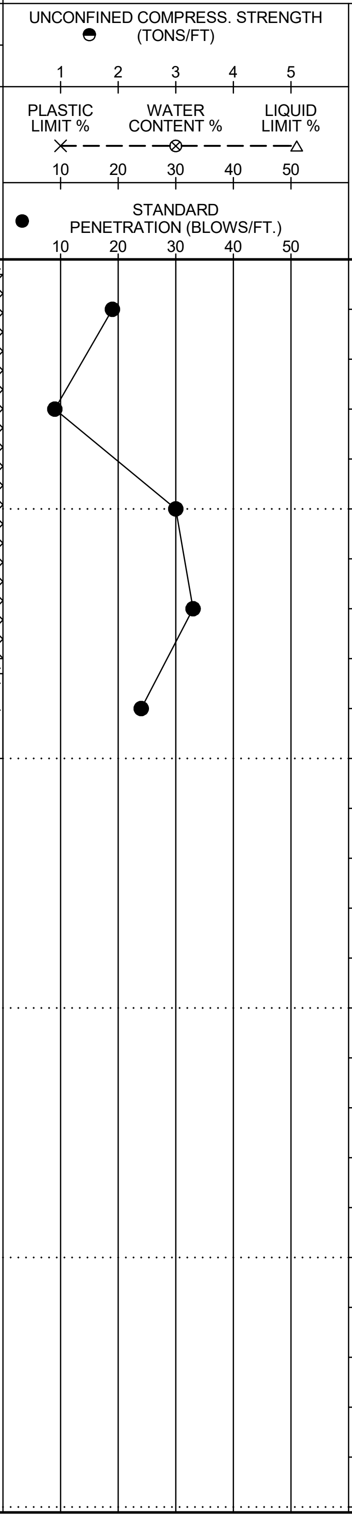
WEATHER: **Overcast** TEMP: **35° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1 2	19	1 3 16 11	S-1	7		M	SM	4" Topsoil-like material Bwn m-f SAND, some c-f Gravel, little Silt (FILL)	
3 4	9	7 6 3 4	S-2	5		M	SM	Same (FILL)	
5 6	30	15 18 12 10	S-3	12		M	GM	Bwn c-f GRAVEL, and m-f Sand, little Silt (FILL)	271.0
7 8	33	20 19 14 16	S-4	0				No Recovery	
9 10	24	9 13 11 14	S-5	4		M M	OL SM	Top 3" Dk bwn Topsoil-like material Bottom 1" Bwn m-f SAND, and c-f Gravel, little Silt	266.0
11								End of Boring at 10'	
12									
13									
14									
15									261.0
16									
17									
18									
19									
20									256.0
21									
22									
23									
24									
25									251.0

LITHOLOGY*



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

Tectonic

PROJECT No. **11584.01**

PROJECT: **North Rockland High School Phase 2**

LOCATION: **Thiells, NY**

BORING No. B-14

SHEET No. 1 of 1

CLIENT: **North Rockland Central School District**

CONTRACTOR: **Core Down Drilling LLC**

GROUND WATER	DATE	TIME	DEPTH

INSPECTOR: **Drew Bugna**

DRILLER: **Andrew Bellucci**

SURFACE ELEVATION: **282.0**

DATUM: **See Remarks**

DATE START: **2/15/24**

DATE FINISH: **2/15/24**

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:	3 1/4"	0	TO	6'
ROT. DRILL:			TO	
CASING:			TO	
DIAMOND CORE:			TO	

CME 55 ATV Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: **---** TO **---**

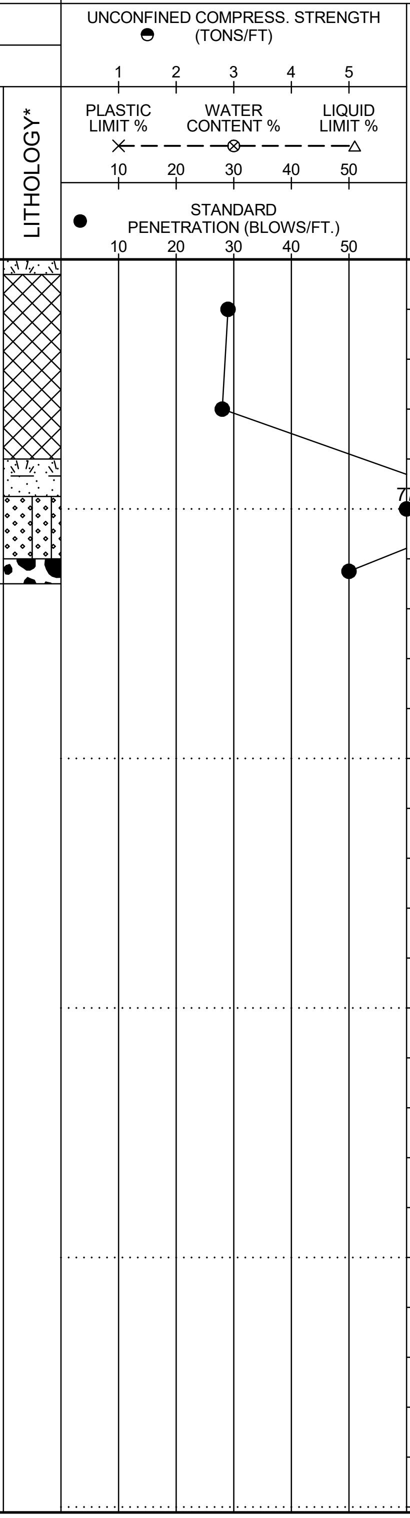
WEATHER: **Clear** TEMP: **25° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
0–2	29	1 13 16 15	S-1	9		M	GW-GM	3" Topsoil-like material Bwn-gy c-f GRAVEL, and c-f Sand, trace Silt (FILL)	
2–4	28	13 13 15 16	S-2	12		M	GW-GM	Same (FILL)	
4–6	77	36 26	S-3A	9		M	SM	Dk bwn c-f SAND, some Silt, trace c-f Gravel, trace Roots) (Topsoil-like material)	277.0
		51 50/5	S-3B	13		M	SW-SM	Gy-bwn c-f SAND, and c-f Gravel, trace Silt, trace Roots	
6	50+	97 50/0	S-4	1		M	GW	Gy c GRAVEL (in tip of spoon) (likely Boulder)	
10									272.0
15									267.0
20									262.0
25									257.0

End of Boring at 6.5'



REMARKS: Surface elevation was estimated to the nearest 0.5-foot by interpolating between the 1-foot contour lines shown on partial topographic plans provided by the Client Agent. Dotum is unknown.

LEGEND FOR SOIL DESCRIPTION

COARSE GRAINED SOIL (Coarser then No. 200 Sieve)

DESCRIPTIVE TERM & GRAIN SIZE

TERM	SAND	GRAVEL
coarse - c	No. 4 Sieve to No. 10 Sieve	3" to 3/4"
medium - m	No. 10 Sieve to No. 40 Sieve	3/4" to 3/16"
fine - f	No, 40 Sieve to No. 200 Sieve	

COBBLES 3" to 10"

BOULDERS 10" +

GRADATION DESIGNATIONS	PROPORTIONS OF COMPONENT
fine, f	Less than 10% coarse to medium
medium to fine, m-f	Less than 10% coarse
medium, m	Less than 10% coarse and fine
coarse to medium, c-m	Less than 10% fine
coarse, c	Less than 10% medium and fine
coarse to fine, c-f	All greater than 10%

FINE GRAINED SOIL (Finer than No. 200 Sieve)

DESCRIPTION	PLASTICITY INDEX	PLASTICITY
Silt	0 - 1	none
Clayey Silt	2 - 5	slight
Silt & Clay	6 - 10	low
Clay & Silt	11 - 20	medium
Silty Clay	21 - 40	high
Clay	greater than 40	very high

PROPORTION

DESCRIPTIVE TERM	PERCENT OF SAMPLE WEIGHT
trace	1 - 10
little	10 - 20
some	20 - 35
and	35 - 50

The primary component is fully capitalized if >50% of sample

COLOR

Blue - blue
Blk - black
Bwn - brown
Gn - green

Gy - gray
Or - orange
Rd - red
Tn - tan

Wh - white
Yl - yellow
Lgt - light
Dk - dark

SAMPLE NOTATION

S - Split Spoon Soil Sample
U - Undisturbed Tube Sample
C - Core Sample
B - Bulk Soil Sample
NR - No Recovery of Sample

WOC - Weight of Casing
WOR - Weight of Rods
WOH - Weight of Hammer
PPR - Compressive Strength based on Pocket Penetrometer
TV - Shear Strength (tsf) based on Torvane

ADDITIONAL CLASSIFICATIONS

New York City Building Code soil classifications are given in parentheses at the end of each description of material, if applicable. See sections 1804.2 of the 2008 Building Code for further details.

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 2/22/2024

Client: North Rockland Central School District

Project: North Rockland High School Phase 2

Project Engineer: Chris Ferri

Inspector: Drew Bugna

Infiltration Test Location: (See Figure 1) B-3. B-4

Weather Conditions: Mostly Cloudy Temperature: 26-44

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1-hour intervals						STABLE RATE (in/hr)
INF-1	3'	4"		Start NA	22	22	22	22		21.0
			CLOCK TIME	9:52	10:49	11:52	12:56	14:05		
			ELAPSED TIME	0	0.95	1.05	1.07	1.15		
COMMENTS: Water filled to 24" above the bottom of the casing (36" below the top of the casing) The infiltration test depth was raised from 8' to 3' because of shallow groundwater. The "Stable Rate" given above is the average of the four measurements.										
INF-2	3'	4"		Start NA	5	3	1	3		2.9
			CLOCK TIME	9:53	10:52	11:53	12:56	14:06		
			ELAPSED TIME	0	0.98	1.02	1.05	1.17		
COMMENTS: Water filled to 24" above the bottom of the casing (36" below the top of the casing) The "Stable Rate" given above is the average of the four measurements.										

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 2/22/2024

Client: North Rockland Central School District

Project: North Rockland High School Phase 2

Project Engineer: Chris Ferri

Inspector: Drew Bugna

Infiltration Test Location: (See Figure 1) B-6, B-9

Weather Conditions: Mostly Cloudy Temperature: 26-44

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1-hour intervals						STABLE RATE (in/hr)
INF-3	3'	4"		Start NA	20	20	19	20		18.7
			CLOCK TIME	9:49	10:46	11:47	12:51	14:04		
			ELAPSED TIME	0	0.95	1.02	1.07	1.22		

COMMENTS:
Water filled to 24" above the bottom of the casing (36" below the top of the casing)

The "Stable Rate" given above is the average of the four measurements.

INF-4	3'	4"		Start NA	11	9	7	8		8.4
			CLOCK TIME	9:47	10:43	11:45	12:47	14:01		
			ELAPSED TIME	0	0.93	1.03	1.03	1.23		

COMMENTS:
Water filled to 24" above the bottom of the casing (36" below the top of the casing)

The "Stable Rate" given above is the average of the four measurements.

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 2/22/2024

Client: North Rockland Central School District

Project: North Rockland High School Phase 2

Project Engineer: Chris Ferri

Inspector: Drew Bugna

Infiltration Test Location: (See Figure 1) B-8, B-7

Weather Conditions: Mostly Cloudy Temperature: 26-44

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1-hour intervals						STABLE RATE (in/hr)
INF-5	3'	4"		Start NA	3	1	0	0		1.0
			CLOCK TIME	9:45	10:41	11:43	12:47	14:00		
			ELAPSED TIME	0	0.93	1.03	1.07	1.22		

COMMENTS:
Water filled to 24" above the bottom of the casing (36" below the top of the casing)

The "Stable Rate" given above is the average of the four measurements.

INF-6	3'	4"		Start NA	5	5	4	4		4.4
			CLOCK TIME	9:03	10:04	11:06	12:08	13:10		
			ELAPSED TIME	0	1.02	1.03	1.03	1.03		

COMMENTS:
Water filled to 24" above the bottom of the casing (36" below the top of the casing)

The "Stable Rate" given above is the average of the four measurements.

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 2/23/2024

Client: North Rockland Central School District

Project: North Rockland High School Phase 2

Project Engineer: Chris Ferri

Inspector: Drew Bugna

Infiltration Test Location: (See Figure 1) B-10, B-11

Weather Conditions: Overcast/light rain Temperature: 33-47

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1-hour intervals						STABLE RATE (in/hr)
INF-7	3'	4"		Start NA	12	13	13	6		10.7
			CLOCK TIME	9:05	10:06	11:07	12:09	13:11		
			ELAPSED TIME	0	1.02	1.02	1.03	1.03		
COMMENTS: Water filled to 24" above the bottom of the casing (36" below the top of the casing) The "Stable Rate" given above is the average of the four measurements.										
INF-8	3'	4"		Start NA	0	0	0	0		0.0
			CLOCK TIME	9:07	10:08	11:09	12:11	13:15		
			ELAPSED TIME	0	1.02	1.02	1.03	1.07		
COMMENTS: Water filled to 24" above the bottom of the casing (36" below the top of the casing) The softball field was flooded and meddy at the time of the test. Consequently, the test should be considered invalid. The "Stable Rate" given above is the average of the four measurements.										

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

Tectonic

1279 Route 300
Newburgh, NY 12550
(845) 567-6656

INFILTRATION TEST DATA

W.O. No.: 11584.01 Lot No.: Date: 2/23/2024

Client: North Rockland Central School District

Project: North Rockland High School Phase 2

Project Engineer: Chris Ferri

Inspector: Drew Bugna

Infiltration Test Location: (See Figure 1) B-12, B-13

Weather Conditions: Overcast/light rain Temperature: 33-47

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		INFILTRATION TEST RUNS Drop in water levels (inches) at 1-hour intervals						STABLE RATE (in/hr)
INF-9	3.5'	4"		Start NA	7	15	15	11		11.7
			CLOCK TIME	9:06	10:07	11:08	12:10	13:13		
			ELAPSED TIME	0	1.02	1.02	1.03	1.05		
COMMENTS: Water filled to 24" above the bottom of the casing (18" below the top of the casing) The "Stable Rate" given above is the average of the four measurements.										
INF-10	8'	4"		Start NA	5	4	6	0		3.6
			CLOCK TIME	9:10	10:11	11:11	12:15	13:20		
			ELAPSED TIME	0	1.02	1.00	1.07	1.08		
COMMENTS: Water filled to 24" above the bottom of the casing (72" below the top of the casing) The "Stable Rate" given above is the average of the four measurements.										

Sketch Requirements

(To Be Completed On Back of Sheet)

Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

APPENDIX II

Boring #	Depth (Ft.)	Sample #	Specimen Description	% Gravel	% Sand	% Fines	USCS	Water Content	Liquid Limit	Plastic Limit	Plasticity Index	Penetro-meter (tsf)	Specific Gravity	Dry Density (pcf)	Organic Content (%)	pH
B-10	8.0	S-5	Lgt Bwn f SAND, some Silt	0.0	76.9	23.1		25								
B-11	6.0	S-4	Gy c-f Gravel, and c-f Sand, little Silt	42.7	41.8	15.5		8								
B-14	2.0	S-2	Bwn-Gy c-f GRAVEL, and c-f Sand, trace Silt	52.6	38.5	8.9		3								
B-14	4.0	S-3B	Gy-Bwn c-f Sand, and c-f Gravel, trace Silt	45.2	46.1	8.7		3								
B-2	2.0	S-2	Bwn c-f Gravel, and c-f Sand, little Silt	44.0	38.8	17.2		8								
B-4	6.0	S-4	Dk Bwn SILT, and c-f Sand, little Peat	0.0	41.1	58.9		61							13.5	
B-5	4.0	S-3	Gy CLAYEY SILT, some m-f Sand	0.0	26.7	73.3		44								
B-6	4.0	S-3	Gy SILT & CLAY					32	28	21	7					

Tectonic

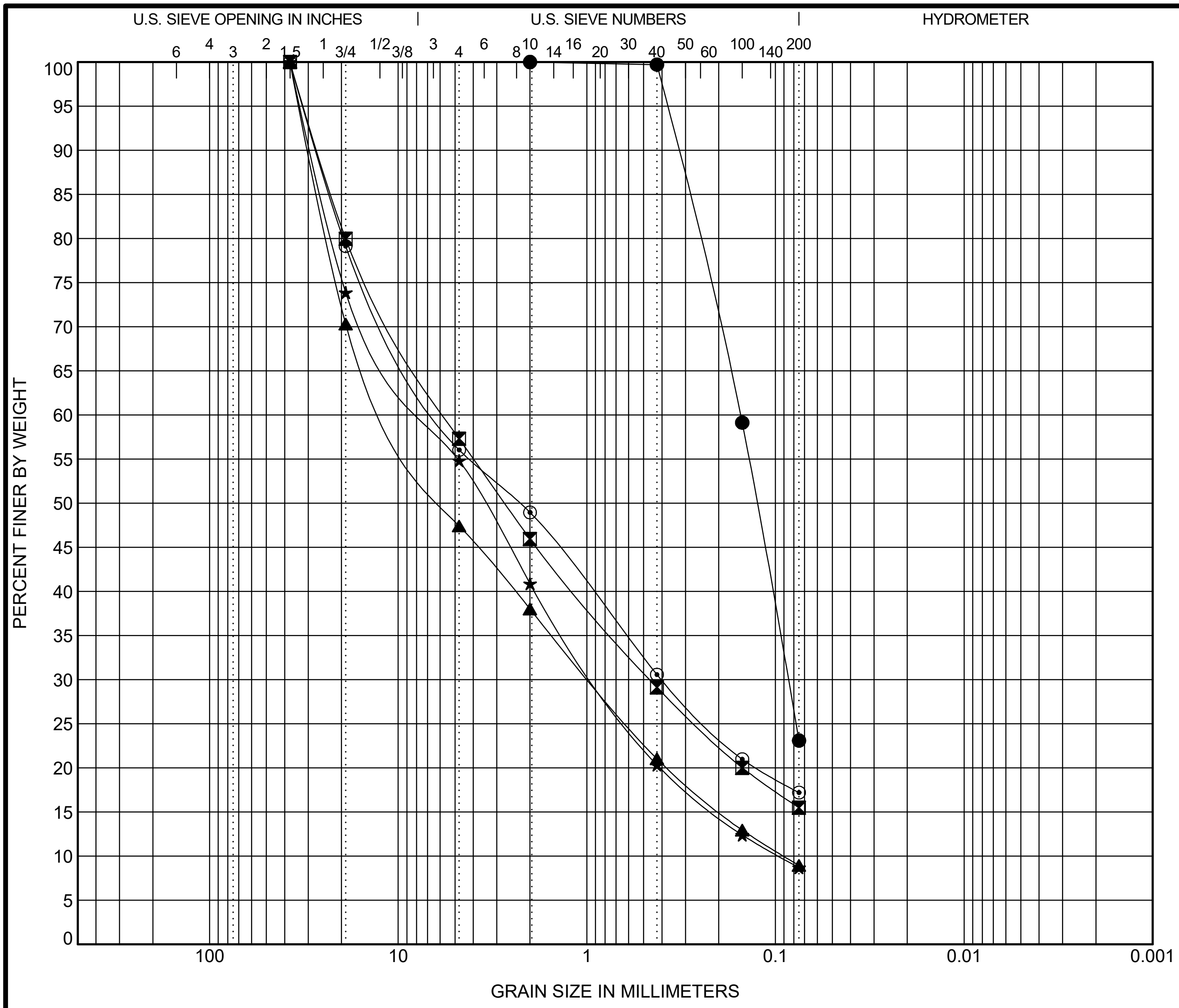
280 Little Britain Road, Bldg. 2
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

Summary of Laboratory Results

Project No: **11584.01** Date: **3/19/24**

Project: **North Rockland High School Phase 2**

Location: **Thiells, NY**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	**B-10**	**8.0**	**S-5**	**Lgt Bwn f SAND, some Silt**	**24.7**					
⧗	**B-11**	**6.0**	**S-4**	**Gy c-f Gravel, and c-f Sand, little Silt**	**8.4**					
▲	**B-14**	**2.0**	**S-2**	**Bwn-Gy c-f GRAVEL, and c-f Sand, trace Silt**	**3.1**				**1.01**	**112.98**
★	**B-14**	**4.0**	**S-3B**	**Gy-Bwn c-f Sand, and c-f Gravel, trace Silt**	**3.3**				**1.17**	**72.23**
⊙	**B-2**	**2.0**	**S-2**	**Bwn c-f Gravel, and c-f Sand, little Silt**	**7.6**					

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	**B-10**	**8.0**	**S-5**	**2**	**0.153**	**0.086**		**0.0**	**76.9**	**23.1**		**Boring**
⧗	**B-11**	**6.0**	**S-4**	**37.5**	**5.602**	**0.461**		**42.7**	**41.8**	**15.5**		**Boring**
▲	**B-14**	**2.0**	**S-2**	**37.5**	**10.183**	**0.964**	**0.09**	**52.6**	**38.5**	**8.9**		**Boring**
★	**B-14**	**4.0**	**S-3B**	**37.5**	**6.925**	**0.881**	**0.096**	**45.2**	**46.1**	**8.7**		**Boring**
⊙	**B-2**	**2.0**	**S-2**	**37.5**	**6.026**	**0.4**		**44.0**	**38.8**	**17.2**		**Boring**

Tectonic

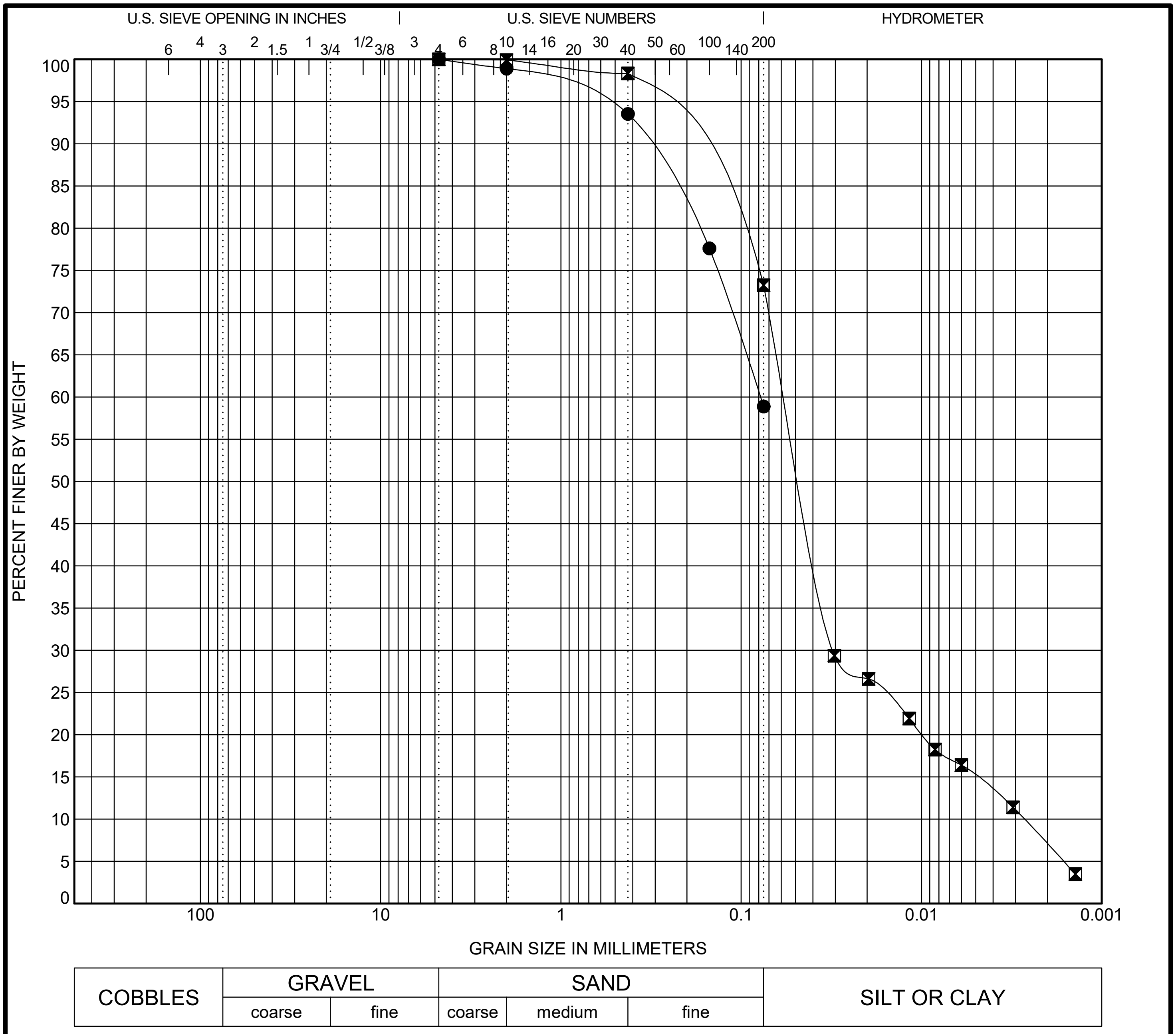
280 Little Britain Road, Bldg. 2
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

GRAIN SIZE DISTRIBUTION

Project No: **11584.01** Date: **3/19/24**

Project: **North Rockland High School Phase 2**

Location: **Thiells, NY**



	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	**B-4**	**6.0**	**S-4**	**Dk Bwn SILT, and c-f Sand, little Peat**	**61.1**					
⧗	**B-5**	**4.0**	**S-3**	**Gy CLAYEY SILT, some m-f Sand**	**44.3**				**6.17**	**21.20**

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	**B-4**	**6.0**	**S-4**	**4.75**	**0.078**			**0.0**	**41.1**	**58.9**		**Boring**
⧗	**B-5**	**4.0**	**S-3**	**4.75**	**0.057**	**0.031**	**0.003**	**0.0**	**26.7**	**58.2**	**15.0**	**Boring**

Tectonic

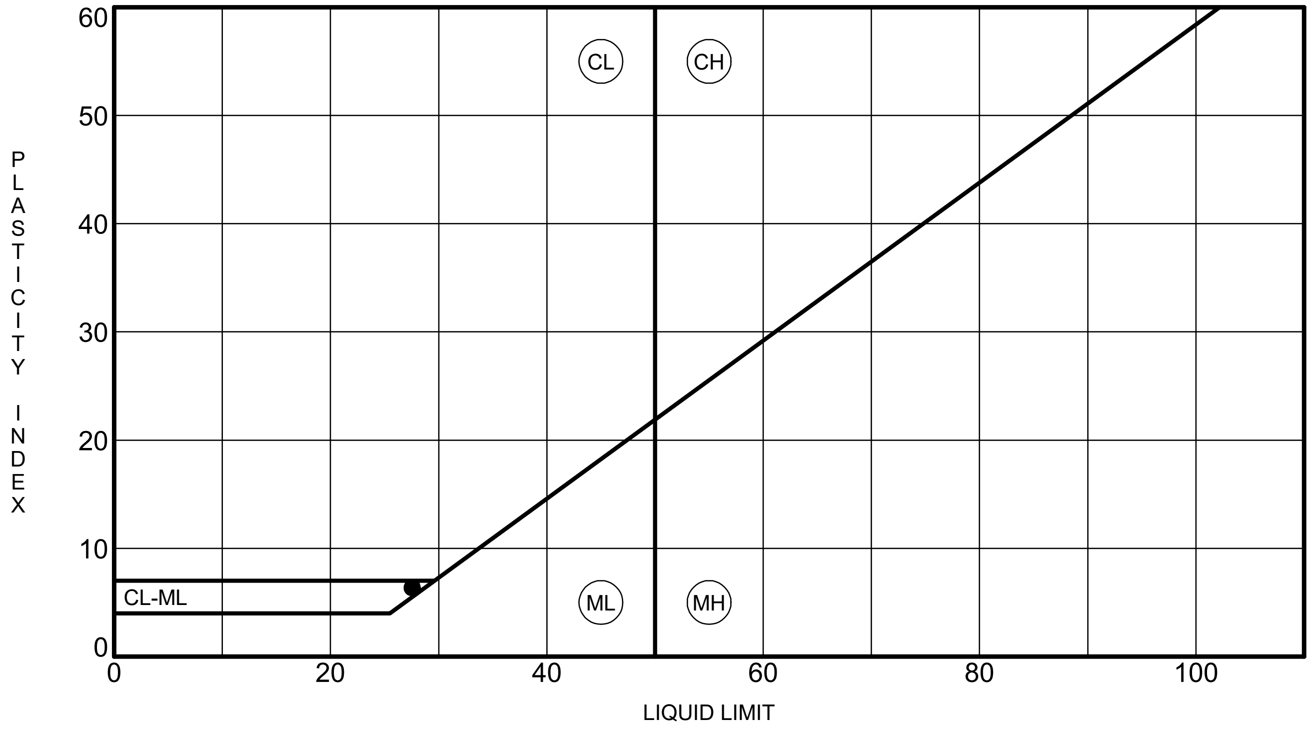
280 Little Britain Road, Bldg. 2
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

GRAIN SIZE DISTRIBUTION

Project No: **11584.01** Date: **3/19/24**

Project: **North Rockland High School Phase 2**

Location: **Thiells, NY**



	Sample Identification			LL	PL	PI	Fines %	WC %	Classification
●	**B-6**	**4.0**	**S-3**	**28**	**21**	**7**	**NA**	**32.5**	**Gy SILT & CLAY**

Tectonic
280 Little Britain Road, Bldg. 2
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

ATTERBERG LIMITS' RESULTS

Project No: **11584.01** Date: **3/18/24**

Project: **North Rockland High School Phase 2**

Location: **Thiells, NY**

Materials Finer than 75µm (No. 200 Sieve) by Washing

ASTM C 117; ASTM D 1140

TEC W.O.#: 11584.01

SAMPLE ID: B-5, S-7 (20 - 22)

PROJECT: N. Rockland HS Ph 2

DATE SAMPLED: 3/4/24

VISUAL DESCRIP: Bwn SILT, some f Sand

DATE TESTED: 3/14/24

TESTED BY: BMT

PROCEDURE A - WASHING WITH PLAIN WATER

Container ID	17	
Weight of Container	87.25	g
Weight of Container + Dry Sample Before Washing	419.78	g
Weight of Container + Dry Sample After Washing	179.55	g
Weight of Dry Sample Before Wash	332.53	g
Weight of Dry Sample After Wash	92.3	g
Weight of Washed Out <75µm Material	240.23	g
Percent of Sample Finer than the 75µm Sieve	**72.24**	%

Materials Finer than 75µm (No. 200 Sieve) by Washing

ASTM C 117; ASTM D 1140

TEC W.O.#: 11584.01

SAMPLE ID: B-9, S-1 (0 - 2)

PROJECT: N. Rockland HS Ph 2

DATE SAMPLED: 3/4/24

VISUAL DESCRIP: Bwn m-f SAND, some c-f Gravel, some Silt

DATE TESTED: 3/14/24

TESTED BY: BMT

PROCEDURE A - WASHING WITH PLAIN WATER

Container ID	14	
Weight of Container	86.72	g
Weight of Container + Dry Sample Before Washing	320.02	g
Weight of Container + Dry Sample After Washing	265.74	g
Weight of Dry Sample Before Wash	233.3	g
Weight of Dry Sample After Wash	179.02	g
Weight of Washed Out <75µm Material	54.28	g
Percent of Sample Finer than the 75µm Sieve	**23.27**	%

Our Story

For the past 30 years, Tectonic has delivered quality professional services in a timely and cost effective manner by pooling its talented staff into project teams that think, act, and perform as one integral unit. By carefully listening and collaborating with its clients, the firm is able to identify the key issues and assure stakeholder objectives are met in the final deliverables. Through innovating and adopting technological advances, the firm is able to generate unique solutions to improve our nation's deteriorating infrastructure and build safe sustainable communities.

As the world evolves, and its challenges grow more complex, Tectonic continues to innovate and provide the practical solutions and exceptional customer service its clients have trusted since its founding.

Tectonic

MOUNTAINVILLE, NY (CORPORATE OFFICE)
70 Pleasant Hill Road, PO Box 37
Mountainville, NY, 10953
Phone: 845-534-5959
Fax: 845-534-59993

www.TectonicEngineering.com