Issued for Bid: November 1, 2023

PROJECT MANUAL

VOLUME 04 OF 04 : APPENDIX

Pawling Central School District

2020 Capital Project - Phase 3

Pawling Elementary School: SED No. 13-12-01-04-0-001-024

CSArch Project No. 208-2101.03

The design of this project conforms to applicable provisions of the New York State Uniform Fire Prevention and Building Code, the New York State Energy Conservation Construction Code, and the Manual of Planning Standards of the New York State Education Department

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Tectonic

PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

GEOTECHNICAL EVALUATION
PAWLING CSD SITE IMPROVEMENTS
30 WAGNER ROAD
PAWLING, DUTCHESS COUNTY, NEW YORK

Submitted To:

Pawling CSD
C/O CSArch

19 Front Street
Newburgh, New York 12550

September 8, 2021

W.O. 11033.01

Submitted By:

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C.

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CSArch
19 Front Street
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Attention: Mr. Greg Klokiw, AIA - Managing Principal
Via email: (gklokiw@csarchpc.com)

September 8, 2021

RE: W.O. 11033.01
GEOTECHNICAL EVALUATION
PROPOSED BUILDING AND SITE IMPROVEMENTS
PAWLING CENTRAL SCHOOL DISTRICT
30 WAGNER ROAD
PAWLING, NEW YORK

Dear Mr. Klokiw:

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. is pleased to submit this subsurface investigation and geotechnical engineering evaluation for the proposed additions and site improvements to the Pawling Central School District campus, in the Town of Pawling, New York. The purpose of the investigation was to evaluate the subsurface conditions within the areas of proposed building expansions on the elementary, and middle school/high school campuses, proposed parking lot construction, and proposed track and field facilities, and to provide geotechnical recommendations for design and construction of the proposed structures and improvements. This report presents detailed information about the investigations, 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.

STATE OF NEW YORK
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GEOTECHNICAL EVALUATION
PROPOSED BUILDING AND SITE IMPROVEMENTS
PAWLING CENTRAL SCHOOL DISTRICT
30 WAGNER ROAD
PAWLING, NEW YORK

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Tectonic

PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

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 structures and site improvements to two school campuses within the Pawling Central School District system, in the Town of Pawling, New York. The purpose of the investigation was to evaluate the subsurface conditions within the areas of improvements, and to provide geotechnical recommendations for design and construction of the proposed structures and improvements. This report presents detailed information about the investigations, our findings and recommendations.

2.0 SCOPE OF SERVICES

The geotechnical investigation was performed for the Pawling Central School District (hereafter referred to as the Client), and coordinated through CSArch PC, 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 the National Resources Conservation Service (NRCS).
- On the campus of Pawling Middle School/High School, services included the drilling, sampling, and logging of test borings, test pits, and infiltration tests within the areas of the proposed additions. These included:
    - Eight (8) structural borings, designated as borings SB-1 through SB-8, for the proposed expansion of existing buildings, and construction of the new track and field facility and storage building.
    - Drilling and performance of eight (8) infiltration tests within the existing athletic fields, and adjacent to existing school buildings, designated as PT-1 through PT-8.
    - Six (6) pavement borings, designated as borings PB-1 through PB-6, for improvements to the existing drive aisles and construction of new parking lots.
    - Excavation of six (6) test pits, designated as TP-1 through TP-6, advanced adjacent to existing buildings, and within the footprint of the proposed storage building.
- On the campus of Pawling Elementary School, services included drilling, sampling, and logging of one (1) structural boring, designated as SB-1E, and one (1) pavement boring, designated as PB-1E.
- Field inspection of the borings and test pits by a geotechnical engineer, working under the supervision of a New York State licensed Professional Engineer.
- Performance of laboratory testing of soil samples selected to assist in the field classifications and help evaluate the engineering characteristics of the soils underlying the site.

- Geotechnical engineering analyses of the subsurface conditions as they relate to the design and construction of the proposed structures, pavement sections, 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 of foundations for the proposed additions.

3.0 SITE AND PROJECT DESCRIPTIONS

The project site encompasses the campuses of Pawling Middle/High School, located at 30 Wagner Drive, and the campus of Pawling Elementary School, located at 7 Haight Street, in the Town of Pawling, Dutchess County, New York. The middle/high school campus contains the two (2) existing school buildings, athletic fields, parking lots, and asphalt paved drive aisles. The campus of the elementary school contains one (1) existing school building, parking lots, bus loops, asphalt paved drive aisles, and athletic fields.

The proposed project will be completed in four phases; the first phase will include improvements to the middle and high school, including new asphalt pavement within the existing parking lots and drive aisles, a new track and field facility, new bleachers, press box, and field lighting, re-location of the retention pond, a new 600 square foot (sf) single story storage building adjacent to the new, outdoor track facility, new retaining walls, and interior renovations to the school buildings; the second phase will consist of the expansion of the parking lot and roadways at the high school, construction of an exterior courtyard with a new retaining wall, a 3,000 sf one-story classroom addition to the high school building, and interior renovations; the third phase will consist of interior renovations of the elementary school, and a 400 sf one story, vestibule addition; the fourth, and final phase will consist of interior renovations of the middle school, a 500 sf second floor addition to the middle school building, and replacement of the sidewalks and pavement. As of the writing of this report, the size and type of retaining walls are not known.

Improvements to the existing athletic field to the west of the middle school will consist of the construction of a new outdoor track and field facility. Minor grade changes are expected to construct the track around the existing athletic field. The bleachers are expected to be constructed into the existing slope between the athletic field and the parking lot. The track and field facility will receive new bleachers on the eastern side of the track, a new press box, and field lighting poles. The field lighting will consist of approximately 80-foot tall light poles. The poles are proposed to be supported on 3.5-foot diameter shaft foundations bearing at a depth of approximately 25 feet below ground surface (bgs). Due to the preliminary nature of this project, details on the bleachers and press box were not available as of the writing of this report.

Based on conversations with the project structural engineer, HHA Structural Engineering, the proposed new storage building will be a lightly loaded, one-story structure, located southwest of the existing retention pond. Column loads for the proposed middle and high school additions are expected to be between approximately 25 and 50 kips, with most columns experiencing less than 25 kips of loading. The vertical expansion at the middle and high school will be imparting an additional 10 to 15 kips on the columns. Due to the preliminary nature of this project, exact locations of the additions are not known.

Based on a topographic survey provided by CSArch, site grades at the middle/high school campus generally slope downwards from southeast to northwest. Surface elevations of the existing middle school building and adjacent parking areas slope from approximately +600 feet from the southeast corner of the school building to +578 feet in the bus loop. The existing athletic field is at approximate elevations of between +565 and +566 feet. Surface elevations in the footprint of the proposed storage building are relatively flat, with elevations between approximately +565 and +566 feet. Surface elevations adjacent to the existing high school building slope downwards from approximately +614 feet to the southeast of the high school building, to approximately +591 feet in the parking lot to the northwest of the high school building. Within the footprint of the proposed bleachers, site elevations slope downwards from east to west, with surface elevations ranging from between +582 to +566 feet.

At the elementary school campus, surface elevations generally slope downwards from west to east. Based on the CSArch topographic survey, the FFE of the elementary school is between approximately +481 and +484 feet. In the area of proposed expansion at the elementary school, the surface elevation is approximately +476 feet. Surface elevations throughout the parking areas range from between approximately +485 to +469 feet. All elevations referenced herein are per the North American Vertical Datum of 1988 (NAVD88).

4.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of the drilling, sampling, and logging of four (14) test borings at the middle/high school campus, designated as borings SB-1 through SB-8 (structural borings), PB-1 through PB-6 (pavement borings); two (2) test borings at the elementary school campus, designated as SB-1E and PB-1E; the excavation of six (6) test pits at the middle/high school campus, designated as TP-1 through TP-6; and the drilling and performance of eight (8) infiltration tests, designated as PT-1 through PT-8. The test locations were generally performed at the Client Agent requested locations. The boring, test pit and infiltration test locations on the middle/high school campus are shown on the attached Boring, Test Pit, and Infiltration Test Location Plan, Figure 1, and the boring locations at the elementary school campus are shown on Boring Location Plan, Figure 2.

The borings were drilled by Core Down Drilling, LLC. between July 12 and July 15, 2021, using a track-mounted CME 55LC drill rig, equipped with an automatic hammer. The borings were advanced using 4-inch inside-diameter hollow-stem augers. Within the structural borings, Standard Penetration Testing (SPT) was conducted with a split-spoon sampler continuously to depths of up to 18 feet, and then 5-foot maximum intervals thereafter. Within the pavement borings, SPT sampling was performed continuously to a depth of 8 feet. SPT sampling was performed in accordance with the requirements of ASTM Standard D1586 *Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".* SPT N-values were recorded for each soil sample taken. Samples of the soil obtained during the investigation were retained in glass jars, and are currently stored at our material testing laboratory. The boreholes were backfilled with drill cuttings to match the existing conditions. Boreholes within existing roadways were cold patched with asphalt, as required.

The test pits were excavated by Core Down Drilling, LLC on July 16, 2021, using a Kubota KX057-4 mini-excavator. The test pits were excavated to depths of between 6.0 and 7.5 feet bgs. Upon completion, the test pits were backfilled with the excavated soils.

The infiltration tests (identified as PT-1 through PT-8) were performed within 4-inch diameter holes drilled in select areas throughout the site. Infiltration test PT-1 was advanced within the footprint of the proposed storage building; infiltration tests PT-2 and PT-3 were advanced within the existing athletic field; infiltration test PT-4 through PT-6 were advanced within existing and proposed parking lots; infiltration test PT-7 was advanced to the east of the middle school building; and infiltration test PT-8 was advanced to the north of the high school building. The locations of the infiltration tests are also shown on Figure 1. The infiltration test holes were drilled to depths ranging from 59 to 63 inches. Each infiltration test was performed in accordance with the requirements dictated by New York State, including a pre-soak and measurement over four (4) one-hour intervals. Upon completion, the infiltration test holes were backfilled with drill cuttings.

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

5.0 LABORATORY TESTING

Laboratory testing was performed on soil samples selected to assist in evaluating the engineering properties of the encountered soils and to help in field identifications of the soils. Testing included the performance of nine (9) grain-size distribution tests, performed in general accordance with ASTM Standard D6913, and three (3) Atterberg limits determinations, performed in general accordance with D4318. The results of the laboratory testing are included in Appendix II.

6.0 OVERALL SUBSURFACE CONDITIONS

A review of USGS and New York State geologic maps indicates that the site is underlain by gravelly, fine sand loam. The following sections provide generalized descriptions of the soils and groundwater conditions encountered in the borings and test pits, and the infiltration test results. Detailed descriptions of the subsurface conditions are provided in the boring, test pit, and infiltration test logs included in Appendix I. The encountered subsurface conditions are described in the following sections for defined areas of the project site.

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 High School Improvements

Borings SB-7 and SB-8 were advanced adjacent to the southern and western faces of the existing high school building, respectively; infiltration tests PT-6, PT-8 were advanced adjacent to the southern and western faces of the high school, respectively; test pits TP-5 and TP-6 were advanced adjacent to the southern and western faces of the high school building, respectively.

In general, the subsurface conditions consist of native till. The following subsection provides generalized descriptions of the soil and groundwater conditions. More detailed descriptions are provided in the attached boring logs.

Native soils were encountered to the termination depth of the borings, which extended to 22 feet bgs. The native soils generally consisted of brown silt, with varying amounts of medium-to-fine sand, and fine gravel. Field SPT N-values within the native silt soils ranged from 6 to 46 bpf. When corrected, the

SPT N_{60}-values range from between approximately 8 and 60 bpf, indicating a stiff to hard consistency. In general, the native silt soils were encountered with a hard consistency. Laboratory results of soil samples tested indicate the native silt soils have a liquid limit of 22, and a plasticity index of 7. The native silt soils have USCS classifications of ML and CL-ML.

Within infiltration tests PT-6 and PT-8, brown medium-to-fine sand with varying amounts of fines and fine gravel were observed to the termination depths of approximately 5 feet. SPT sampling was not performed within the infiltration test holes.

Within test pits TP-5 and TP-6, underlying approximately 6 inches of topsoil-like material, native soils were observed to the termination depth of the test pits of approximately 7.0 feet bgs. Within the test pits, the native soils consisted of brown silt, with coarse-to-fine sand and coarse-to-fine gravel. Seepage or groundwater were not observed within the test pits.

As indicated on the boring logs, saturated soil conditions were observed within the native soils adjacent to the high school building at a depth of approximately 19.5 feet in boring SB-8. It should also be noted that groundwater levels fluctuate seasonally and with changing weather conditions.

6.2 Proposed Middle School Improvements

Test pit TP-4, and infiltration test PT-7 were advanced adjacent to the eastern side of the middle school building. In general, the subsurface conditions consist of native till soils. The following subsection provides generalized descriptions of the soil and groundwater conditions. More detailed descriptions are provided in the attached boring logs.

Within test pit TP-4, underlying approximately 6 inches of topsoil-like material, native soils were observed to the termination depth of the test pit at approximately 6.0 feet bgs. Within the test pit, the native soils consisted of brown silt, with coarse-to-fine sand and coarse-to-fine gravel. Seepage was observed at a depth of approximately 3.0 feet bgs, and free groundwater was observed at a depth of 5.33 feet bgs.

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PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

Within infiltration test PT-7, brown medium-to-fine sand with varying amounts of fines and fine gravel were observed to the termination depths of approximately 5 feet. SPT sampling was not performed within the infiltration test hole.

6.3 Athletic Field, Track and Field Facility, and Storage Building

In general, the subsurface conditions within the footprint of the existing athletic field consists of, in turn, a thin veneer of topsoil-like material, uncontrolled fill, and native till. Borings SB-1 through SB-5, were advanced around the perimeter of the existing athletic field. Boring SB-6 was advanced adjacent to the existing retention pond to the north of the athletic fields for the proposed one-story storage building. Infiltrations tests PT-1 and test pit TP-1 was advanced to the southwest of the existing retention pond, in the approximate footprint of the storage building. Infiltration tests PT-2 and PT-3 were advanced near the center of the existing athletic field. The following subsection provides generalized descriptions of the soil and groundwater conditions. More detailed descriptions are provided in the attached boring logs.

Underlying approximately 6-inches of topsoil-like material, fill soils were encountered between approximately 6 to 10 feet below ground surface (bgs). The fill soils typically consist of brown silt, with varying amounts of coarse-to-fine sand and gravel, or brown coarse-to-fine sand, with varying amounts of coarse-to-fine gravel, and fines. A thin layer of coarse-to-fine gravel with medium-to-fine sand and fines with asphalt debris was encountered within boring SB-2 between 6 and 8 feet bgs. Fragments of wood were also observed within the fill. Based on the composition of the fill observed, it is likely re-worked native fill. Laboratory results of soil samples tested indicate the fill soils are comprised of between 5 to 16 percent coarse to fine gravel, 32 to 54 percent coarse to fine sand, and 41 to 52 percent passing the #200 sieve.

Field SPT N-values within the uncontrolled fill range between 4 and 17 blows per foot (bpf). When corrected, the SPT N_{60}-values range from approximately 5 to 22 bpf, indicating a loose to medium dense condition. In general, the fill within the athletic field was observed in a medium dense condition. The fill soils have USCS designations of SM, ML, and GP.

Underlying the uncontrolled fill, layers of native silt and sand soils were generally encountered to the termination depth of the borings, which extended to up to 27 feet bgs. The native soils generally consisted of brown silt, with varying amounts of medium-to-fine sand, and fine gravel, or medium-to-fine sand, with varying amounts of fine gravel and fines. A thin layer of coarse-to-fine gravel, with silt and fine sand was encountered in boring SB-5 between 20 and 22 feet bgs.

Field SPT N-values within the native silt soils range from 4 to 76 bpf. When corrected, the SPT N_{60}-values range from between approximately 5 and 99 bpf, indicating a medium stiff to hard consistency. In general, the native silt soils were encountered with a stiff to very stiff consistency. Laboratory results of a soil sample tested indicate the native silt soils have a liquid limit of 26, and a plasticity index of 8.

Native sand and gravel soils were encountered in borings SB-4 through SB-6 between 10 and 27 feet bgs. SPT N-values in the native sand and gravel soils range from 10 to 93 bpf. When corrected, SPT N_{60}-values range from between 13 to 121 bpf, indicating a medium dense to very dense condition. The native soils have USCS classifications of CL, ML and SM.

Within test pit TP-1, advanced in the southwest corner of the existing retention pond, underlying approximately 6 inches of topsoil-like material, native soils were observed to the termination depth of the test pit of approximately 7.5 feet bgs. Within the test pit, the native soils consisted of brown silt, with medium-to-fine sand and coarse-to-fine gravel. Seepage or groundwater were not observed within the test pit.

Within infiltration tests PT-1 through PT-3, brown medium-to-fine sand with varying amounts of fines and fine gravel were observed to the termination depths of approximately 5 feet. SPT sampling was not performed within the infiltration test holes.

As indicated on the boring logs, free groundwater or saturated soil conditions were encountered within each borings, at varying depths. Groundwater in the form of saturated soil conditions were observed at a depth of 4 feet bgs in borings SB-3 and SB-5, and between 8 and 15 feet bgs in the remaining borings. After the completion of boring SB-6, a groundwater measurement was taken within the hollow-stem auger; free groundwater was observed at a depth of approximately 11 feet bgs. Based on the varying depths of groundwater within the athletic fields, it is likely that shallow groundwater was observed in a perched condition within the fine-grained soils. It should also be noted that groundwater levels fluctuate seasonally and with changing weather conditions.

6.4 Middle/High School Pavement Borings

Borings PB-1 through PB-6 were advanced along the existing drive aisles, and parking areas throughout the middle and high school campus. Test pits TP-2 and TP-3, and infiltration tests PT-4 and PT-5 were advanced within the proposed parking lot expansion areas. In general, the subsurface conditions consist of, in turn, 4 to 6 inches of asphalt pavement, fill soils, and native till. The following subsection provides generalized descriptions of the soil and groundwater conditions. More detailed descriptions are provided in the attached boring logs.

Underlying between approximately 4 to 6-inches of asphalt pavement, fill soils were encountered between approximately 2 to 6 feet bgs in borings PB-1 through PB-3, and PB-6. The fill soils typically consist of variable-colored medium-to-fine sand, with varying amounts of coarse-to-fine gravel and fines, or gray-brown silt, with fine sand and coarse-to-fine gravel. Fragments of wood were also observed within the fill in boring PB-3. Laboratory results of soil samples tested indicate the fill soils are comprised of between 15 to 29 percent coarse to fine gravel, 37 to 47 percent coarse to fine sand, and 33 to 38 percent passing the #200 sieve. Field SPT N-values within the fill range between 12 and 23 blows per foot (bpf). When corrected, the SPT N_{60}-values range from approximately 16 to 30 bpf, indicating a medium dense condition. The fill soils have USCS designations of SM, GM, and ML.

Underlying a relatively thin veneer of topsoil-like material in borings PB-4 and PB-5, or fill soils in the remaining borings, native soils were encountered to the termination depth of the borings, which extended up to 8 feet bgs. The native soils generally consisted of brown silt, with varying amounts of fine sand, and fine gravel. A layer of gray fine sand and silt, with trace amounts of fine gravel was observed in boring PB-1 between 6 and 8 feet bgs. Field SPT N-values within the native soils range from 6 to 40 bpf. When corrected, the SPT N_{60}-values range from between approximately 8 and 52 bpf, indicating a stiff to hard condition. In general, the native soils were encountered in a very stiff condition.

Laboratory results of a soil sample tested indicate the native soils in the proposed drive aisle are comprised of 3 percent coarse to fine gravel, 25 percent fine sand, and 72 percent passing the #200 sieve. The native soils have USCS classifications of SM and ML.

Within test pits TP-2 and TP-3, advanced within the area of proposed roadway expansion, underlying approximately 6 inches of topsoil-like material, native soils were observed to the termination depth of the test pits of approximately 7.0 feet bgs. Within the test pits, the native soils consisted of brown silt, with coarse-to-fine sand and coarse-to-fine gravel. Seepage or groundwater were not observed within the test pits.

Within infiltration tests PT-4 and PT-5, brown medium-to-fine sand with varying amounts of fines and fine gravel were observed to the termination depths of approximately 5 feet. SPT sampling was not performed within the infiltration test hole.

As indicated on the boring logs, free groundwater or saturated soil conditions were not encountered within any of the pavement borings. It should also be noted that groundwater levels fluctuate seasonally and with changing weather conditions.

6.5 Elementary School Improvements

Borings SB-1 and PB-1 were advanced to the northeast of the existing elementary school building (see Figure 2). In general, the subsurface conditions consist of, in turn, 2 inches of topsoil-like material or 6 inches of asphalt pavement, fill soils, and native soils. The following subsection provides generalized descriptions of the soil and groundwater conditions. More detailed descriptions are provided in the attached boring logs.

Underlying between approximately 6 inches of asphalt pavement, or 2 inches of topsoil-like material, fill soils were encountered between approximately 4 to 12 feet bgs in borings PB-1 and SB-1, respectively. The fill soils typically consist of variable-colored medium-to-fine sand, with varying amounts of coarse-to-fine gravel and fines. Laboratory testing performed on a sample of the fill indicate the fill soils are comprised of approximately 25 percent coarse-to-fine gravel, 58 percent coarse-to-fine sand, and 17 percent passing the #200 sieve. Based on the composition of the fill observed, it was likely re-worked native fill.

Field SPT N-values within the fill range between 2 and 17 blows per foot (bpf). When corrected, the SPT N_{60}-values range from approximately 3 to 21 bpf, indicating a very loose to medium dense condition. The fill soils have USCS designations of SM.

Underlying the fill soils, native soils were encountered to the termination depth of the borings, which extended up to 23.5 feet bgs. The native soils generally consisted of brown medium-to-fine sand, with varying amounts of fine gravel, and fines, or silt, with varying amounts of fine sand and gravel. Field SPT N-values within the native soils range from 8 to 27 bpf. When corrected, the SPT N_{60}-values range from between approximately 10 and 35 bpf, indicating a medium dense to dense condition. In general, the native soils were encountered in a medium dense condition. Auger and split-spoon sampler refusal was encountered at a depth of 23.5 feet on either a boulder or bedrock. The native soils have USCS classifications of SM and ML.

As indicated on the boring logs, free groundwater or saturated soil conditions were encountered within each borings, at varying depths. Groundwater in the form of saturated soil conditions were observed at a depth of 2 feet bgs in boring PB-1, and at 15 feet bgs in boring SB-1. Based on the varying depths of groundwater, it is likely that shallow groundwater was observed in a perched condition within the fine-grained soils. It should also be noted that groundwater levels fluctuate seasonally and with changing weather conditions.

7.0 INFILTRATION TESTS

Eight (8) infiltration tests, designated as PT-1 through PT-8 were performed throughout the project site. In general, these tests found that the site soils have a relatively low infiltration rate, with measured rates ranging from 0 to 2 inches per hour, except for infiltration test PT-4, within the footprint of the proposed drive aisle expansion. The subsurface conditions within the infiltration test holes indicate that the upper 5 feet of soil consist of medium-to-fine sand with relatively high fines contents. The stable infiltration rates are presented in Table 7.1. Infiltration test logs are attached to Appendix I.

Table 7.1 – Infiltration Test Results

Test ID	Stable Infiltration Rate (inches per hour)
PT-1	1.5
PT-2	2.0
PT-3	0.25
PT-4	7.0
PT-5	1.0
PT-6	1.0
PT-7	0.0
PT-8	0.0

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 0.333g and at 1-second periods (S_{M1}) equal to 0.133g. 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 0.222g, and at 1-second, S_{D1}, is equal to 0.089g. It should be noted that the values given above are the same, whether the structures to be built are essential or non-essential facilities.

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.

An analysis was performed to evaluate the liquefaction potential at the site, in accordance with the Code, using a procedure recommended by Youd et. al. (2001). This method estimates the stresses likely to be induced by an earthquake and the stresses likely to initiate liquefaction using the SPT N-values, the effective overburden pressure, and the peak horizontal ground acceleration caused by the design seismic event. 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. Using a design earthquake magnitude of 5.57 and the peak horizontal ground acceleration of 0.117g, specified by the Code and reported by the USGS, the liquefaction analysis indicates that the subsurface soils have a factor of safety against liquefaction greater than the generally accepted minimum of 1.1. Subsequently, the soils underlying the site are unlikely to liquefy during the design earthquake.

9.0 DISCUSSION AND CONCLUSIONS

The proposed project consists of many site improvements throughout the two campuses, including the expansion of existing roadways, construction of new parking lots, the construction of a new outdoor track and field facility, new field lighting, new bleachers, the construction of a new storage building, new retaining walls, interior renovations, and expansion of the existing school buildings. New retaining walls are proposed to be constructed adjacent to the new parking areas near the middle school campus, at the proposed track and field facility, and at the proposed exterior courtyard near the high school. Construction of the various site improvements are feasible from a geotechnical standpoint. The results of the subsurface investigations indicate that the two sites are generally underlain by re-worked native fill, and native till, consisting of silt with varying amounts of coarse-to-fine sand and gravel, or medium-to-fine sands with a relatively high percentage of fines. The fill soils were generally observed in a loose to medium dense condition, and the native soils were generally observed with a stiff to hard consistency, or in a medium dense to very dense condition.

The proposed 600 sf structure to be constructed to the northwest of the new track and field facility will be a single-story structure used for storage. Based on conversations with the structural engineer, it is expected that the structure will impart relatively light loads, therefore, the proposed building can be supported by traditional, shallow foundations. Significant re-grading in the footprint of the building is not anticipated; therefore, the proposed building is assumed to have an FFE of approximately +566 feet. The assumed bearing elevation of the foundations will be at approximately +562 feet; based on this assumed elevation, the in-place soil at the proposed bearing elevation is hard silt. The existing, in-place soils should be excavated to a depth of 4 feet, and the resulting subgrades should be compacted prior to the placement of any structural fill or concrete. If encountered, it is recommended that any soft and unsuitable soils encountered within the zone of influence of the building foundations are undercut, and replaced with properly compacted, granular fill soils.

Improvements to the high school will consist of the construction of a 3,000 sf one-story addition, expansion of the existing parking lot and roadways, and construction of a new retaining wall. At the high school, the proposed addition will reportedly be constructed to the north and west of the existing building. From a geotechnical aspect, the soils adjacent to the high school building consist of stiff to hard silt soils, which are suitable for support of the building additions and retaining walls.

Improvements to the middle school will include a vertical expansion, consisting of a 500 sf second floor addition. Based on conversations with the project team, the proposed additions will add approximately 10 to 15 kips to the existing column loads. It should be noted that no borings were advanced in the vicinity of the proposed addition. Additionally, the size and depth of the existing middle school building foundations are not known. The structural engineer should evaluate whether the existing foundations can support the additional structural loading based on the provided bearing capacity.

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Improvements to the elementary school will consist of interior renovations, and construction of a 400 sf, one-story vestibule addition adjacent to the existing building. The subsurface conditions in the footprint of the vestibule addition consist of approximately 12 feet of re-worked fill soils. The fill was observed in a very loose to loose condition to a depth of 8 feet bgs, and transition to a medium dense condition below. The loose fill soils are not suitable for building support. All loose fill soils within the footprint of the addition footprint should be undercut (to a depth of approximately 12 feet), and replaced with properly compacted granular fill. Due to the proximity of the existing elementary school building, it is likely that the building will need to be underpinned to protect the existing building foundations while removing unsuitable soils in the footprint of the addition, and the surrounding area will need to be properly shored. Support of the elementary school addition on deep foundations was considered; it is not known whether the existing building is supported by shallow or deep foundations. If the existing building is shallow supported, supporting the addition on deep foundations may result the two structures settling at different rates, which may cause undesired differential settlement. It is expected that the existing building is shallow supported, so it is recommended that the addition is supported by shallow foundations bearing on compacted structural fill, after removal and replacement of all loose unsuitable soils, and that the addition foundations match the elevation of the existing building.

New bleachers, field lighting, and a press box are proposed to be constructed at the existing athletic field located west of the middle school building. The subsurface conditions on the athletic field consist of between 6 and 10 feet of re-worked native fill soils, and native till to the exploration depth of 27 feet bgs. Based on project documents, the field lighting structures will be supported by 3.5-foot diameter shaft foundations, bearing at a depth of approximately 25 feet bgs. Due to the stiff to hard nature of the soils at the bearing depth of the lighting structures, shaft foundations are suitable for support. The bleachers and press box are expected to be supported by shallow foundations; the in-place fill soils should be removed to a depth of 4 feet bgs, so that the bleachers and press box foundations are bearing below frost depth.

Within the area of the proposed parking lot expansion adjacent to the high school, soils consist of medium stiff to stiff silt soils, which are suitable for support of new asphalt pavement sections. Within the areas that are proposed to have the drive aisles widened, the soils generally consist of medium stiff to very stiff silts. Significant re-grading of the site is not expected for construction of the parking lot and widened drive aisles. If clay soils are encountered at the proposed subgrade elevation, the subgrade should be cut an additional 1-foot, and a separation fabric (Mirafi® 180N or similar) should be placed between the silt soils and a 1-foot layer of non-expansive granular structural fill. In any proposed fill areas, the exposed subgrade should be proofrolled, and accepted prior to the placement of any fill soils. Any cut native sand or silt soils may be used to raise site grades, but compacted granular aggregate material should be placed at least 1 foot below the subgrade elevation for frost heave protection.

Groundwater was observed at varying depths throughout the site. Within the middle/high school campus, free groundwater was not encountered below existing asphalt pavement; adjacent to the high school groundwater was encountered at a depth of approximately 20 feet bgs; in the athletic field groundwater was encountered between 4 and 15 feet bgs; adjacent to the middle school groundwater was encountered at 5.33 feet; adjacent to the existing elementary school building groundwater was encountered at 15 feet; in the existing bus loop at the elementary school groundwater was encountered at 2 feet. It should be noted that the shallow groundwater observed throughout the site is likely in a perched condition within the fine-grained soils. It is not expected that groundwater will affect construction of the proposed structures and additions, but perched groundwater will likely be encountered during construction throughout the sites.

Due to relatively high fines content of the on-site soils, they should be considered to be sensitive to disturbance during excavation and/or compaction, when exposed to water. Therefore, it is critical that care be taken during construction of foundations and pavement subgrade preparation to prevent undue wetting of the soils. Due to the density and generally high fines content of the native till, it is expected to have relatively low permeability, and to be difficult to dewater. It should be noted that shallow perched groundwater was observed throughout the site and may be encountered during the construction phase. Grading of pavement subgrades to shed water and to prevent ponding will also be critical to prevent disturbance of the existing soils. Both of these conditions may require subgrade remediation during the construction of new structures and pavement sections, if adequate protection cannot be maintained. Subgrade disturbance can be minimized by using proper subgrade preparation techniques, as described in Section 11 of this report.

It is Tectonic's understanding that the existing asphalt paved drive aisles will be widened, and new parking lots will be constructed. The proposed new asphalt paving sections should be designed as discussed in Section 10.9. The recommendations are based upon a California Bearing Ratio of 5, a design life of 20 years and 500 vehicles per day, with 5 percent heavy trucks. Additionally, due to the relatively high fines content of the native soils, frost heave susceptibility should be considered with regard to longevity of the pavement.

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, boulders, and oversized materials may be encountered during excavation.

- The soils found on-site are typically not suitable for use as structural fill, because of their high fines content. The existing fill and native soils should not be used as backfill behind foundation or retaining walls, because their high fines content will impede the proper drainage of the backfill. If used for general fill, these soils are moisture sensitive, and should be at or below optimum moisture content when placed and compacted, to achieve the specific degree of compaction and to provide a stable pavement subgrade. Construction delays should be expected, if the on-site soils are used.

- It is not anticipated that groundwater will be encountered during excavation activities on the site; however, shallow perched groundwater was encountered at a depth of 2 feet bgs in boring PB-1E, adjacent to the elementary school and could be encountered elsewhere depending on season and weather.

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

- It is Tectonic's understanding that the retention pond is proposed to be re-located as part of the site improvements. As of the writing of this report, the location of the proposed retention pond is not known.

- Monitoring should be performed to document that the construction of the proposed additions does not adversely affect the existing structures. Monitoring should include performance of preconstruction conditions surveys of the portions of the elementary, middle and high school buildings adjacent to the proposed additions. Monitoring should also include measuring vibration levels during construction to document that they are within acceptable limits.

10.0 RECOMMENDATIONS

The following sections provide our geotechnical recommendations for design and construction of the proposed building, building additions, field lighting, and asphalt paving. 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 in the general vicinity of the project site.

10.1 Storage Building and High School Addition Foundations

The proposed storage building and high school additions can be supported on shallow spread footings and continuous wall footings that bear on the native stiff silt, or structural fill. Within borings SB-7 and SB-8, performed adjacent to the high school building, clayey silts were encountered in a stiff to very stiff condition, which is suitable for bearing. In boring SB-6, performed in the area of the existing retention pond that is to be re-located, hard silt was encountered at the proposed bearing elevation of the storage building. If any soft or unsuitable soils are encountered within the footprint of the storage building foundations, they should be removed from the zone of influence of the foundations, and replaced with compacted, granular fill. Spread and continuous wall footings for the new buildings and building additions bearing on stiff clayey silts or compacted structural fill can be designed for a maximum net allowable soil bearing pressure of 4,000 pounds per square foot (psf). Section 11 of this report provides the subgrade preparation procedures necessary to achieve the recommended bearing capacity.

Using the above design criteria, total settlement of the proposed building 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 2.0 feet and isolated spread footing should have a minimum width of 3.0 feet. Otherwise, all footings should bear at least 4 feet below the outside grade, for frost protection.

10.2 Elementary School Addition Foundations

The proposed elementary school additions can be supported on shallow spread footings and continuous wall footings that bear on structural fill. Within boring SB-1E, very loose to loose fill was encountered up to 8 feet bgs. The total depth of fill within boring SB-1E was between 12 and 15 feet. All loose fill should be removed from the zone of influence of the building addition foundations, and replaced with compacted, structural fill. Spread and continuous wall footings bearing on structural fill can be designed for a maximum net allowable bearing pressure of 4,000 psf. Section 11 of this report provides the subgrade preparation necessary to achieve the recommended bearing capacity.

Using the above design criteria, total settlement of the proposed building 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 2.0 feet and isolated spread footing should have a minimum width of 3.0 feet. Otherwise, all footings should bear at least 4 feet below the outside grade, for frost protection.

10.3 Slab-On-Grade Floors

Slab-on-grade floors should be supported on a minimum 6-inch-thick layer of free draining ½ to ¾ inch crushed stone placed over the undisturbed native soil, or structural fill subgrades. If encountered, any loose fill that is encountered below the slab-on-grades should be removed and replaced with compacted structural fill prior to placement of crushed stone. All moisture-sensitive floor slabs should be constructed above a vapor barrier, consisting of a polyethylene membrane with a minimum thickness of fifteen (15) mils. A coefficient of friction of 0.3 should be used between the slab and the vapor barrier. If concrete is cast directly against competent native soils, structural fill or existing fill, a coefficient of friction of 0.40 can be used.

A subgrade modulus of 150 pounds per cubic inch (pci) is recommended for design of slab-on-grade floors bearing on 6 inches of crushed stone base placed above the existing 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.

10.4 Underpinning

Based on the results of the boring adjacent to the elementary school, underpinning may be necessary, as significant remedial removals of the loose existing fill is expected. If necessary, underpinning should consist of a continuous concrete wall cast in alternating pits with dimensions and spacing selected to maintain stability of the existing foundations and minimize the disturbance of soils adjacent to each underpinning pit. Given that the fill at the site is generally loose, particular care should be taken to minimize raveling and collapse of excavation sidewalls.

10.5 Design for Lateral Loading of Walls

Foundation walls, temporary shoring, and retaining walls should be designed in accordance with the following criteria:

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Table 10.5.1 – Lateral Load Parameters		
Soil Parameter	On-Site Soil	Imported Fill
Angle of Internal Friction	30°	34°
Active Earth Pressure Coefficient (K_a) [1]	0.33	0.28
Passive Earth Pressure Coefficient (K_p) [2]	3.00	3.54
At-Rest Earth Pressure Coefficient (K_o) [3]	0.50	0.44
Unit Weight of Soil (pounds per cubic foot)	120	130

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 3.5 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. As of the writing of this report, the size and type of retaining wall proposed to be constructed is not known. Retaining wall foundations constructed adjacent to the existing high school building, and within the proposed new parking lots can be designed for an allowable bearing capacity of 4,000 psf if bearing on the native medium stiff silt soils, or compacted structural fill.

10.6 Groundwater and Foundation Drainage

Based on the results of our subsurface investigation, it is not anticipated that groundwater will affect the construction of the foundations of the building additions, or the proposed track and field facility. However, perched groundwater may be encountered during the construction phase. Rainwater and surface water may become trapped 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.

Dampproofing should be provided for all foundation walls where the outside grade is higher than the slab elevation. All retaining walls and any foundation walls where the slab resides at a lower elevation than the outside grade should include foundation drainage consisting of a minimum 12-inch-wide drainage layer of crushed stone or clean gravel placed against the full-height of the wall with a collector pipe at the footing bottom draining by gravity to a suitable outlet. The gradation specification for the drainage material is provided in Section 11.4 as "free draining crushed stone." The stone or gravel should be completely separated from the soil backfill by a permeable geotextile having an apparent opening size (AOS) of U.S. Sieve Nos. 70 to 100, 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. Roof drains should be positively drained to areas away from the building.

10.7 Bleacher and Press Box Foundations

Bleachers and a press box are proposed to be constructed on the existing athletic field to the west of the middle school building. The upper soils within the athletic field generally consist of medium dense sand and/or medium stiff to stiff silt soils. If encountered, soft soils in the zone of influence of the bleacher and press box foundations should be removed, and replaced with compacted, granular fill. The proposed bleachers and press box may be supported on shallow foundations that bear on the existing in-place soils at a depth of approximately 4 feet. Loading on the bleachers are expected to be relatively light, so total settlements of foundations bearing on compacted fill are expected to be negligible.

The press box foundations may be designed for an allowable bearing capacity of 3,000 psf if bearing on the in-place, compacted fill soils. Using the above design criteria, total settlement of the proposed press box is estimated to be up to 1-inch and differential settlements are estimated to be less than 0.5 inch. Continuous wall footings should have a minimum width of 2.0 feet and isolated spread footing should have a minimum width of 3.0 feet. Otherwise, all footings should bear at least 4 feet below the outside grade, for frost protection. Section 11 of this report provides the subgrade preparation procedures necessary for foundation construction.

10.8 Light Pole Foundations

At the proposed bearing elevation of the field lighting structures, the site soils consist of stiff to hard silt soils. Based on project drawings, the proposed field lighting structures will be supported by 3.5-foot diameter shaft foundations bearing at a depth of approximately 25 feet. The following allowable end bearing pressures and side resistance values are provided for design of the shaft foundation.

Table 10.8.1: Drilled Shaft Parameters		
Depth Below Existing Grade (Feet)	Allowable Net End Bearing Pressure, q_b [(2)] (kips per sq. ft.)	Allowable Side Resistance [(1)] (pounds per Sq. Ft.)
0 to 6	NA	NA
6 to 15	4.5	275
15 to 27	9.0	550

(1) Allowable resistance based on a Factor of Safety = 2.0.

The following soil parameters are provided for designing to resist lateral movement and tilting, and for analyzing lateral deflection and lateral stability. Lateral deflection at the top of the drilled shaft should be checked using a computer program such as LPILE. Maximum deflection should not exceed that recommended by the manufacturer of the structure.

Table 10.8.2: Drilled Shaft Lateral Parameters						
Depth Below Existing Grade (Feet)	γ (pcf)	ϕ (degrees)	C (psf)	K_l (pci)	ε_{50}	K_p
0 to 6	105	32	NA	25	NA	3.25
6 to 15 [(1)]	120/58	30	1000	500	0.007	3.00
15 to 27	73	30	2000	1000	0.005	3.00

(1) The lower and higher values correspond to the above or below the groundwater table.

γ = design unit weight of soil (pounds per cubic foot)

ϕ = angle of internal friction (degrees)

C = cohesion (pounds per square foot)

K_l = coefficient of lateral subgrade reaction (pounds per cubic inch) required for p-y curve methods of analysis

ε_{50} = axial strain at 50% of the maximum principal stress difference

K_p = coefficient of passive earth pressure

A design groundwater depth of 10 feet below existing grade should be used for the drilled shaft foundation. Tectonic recommends that any existing asphalt paved surface be removed, and the site then be graded to the design subgrade elevations. Significant grade changes are not expected as part of the widening of existing drive aisles, or expansion of the high school parking lot. Subgrades consisting of existing soil should be proofrolled under the observation of the project geotechnical engineer, and observed to be firm, stable and unyielding. In areas where the native silt soils are encountered at the subgrade elevation, the subgrade should be cut 1-foot, and a separation fabric should be placed between the silt soils and a 1-foot layer of non-expansive granular structural fill. Due to the relatively high fines content of the site soils, frost susceptibility should also be considered with regard to longevity of the pavement. Full protection against frost heave would require placement of granular soil to the estimated depth of frost protection. Full protection against frost is not typically designed for and is costly. To provide partial frost heave protection, we recommend that a layer of granular structural fill at least 12 inches in thickness be placed between the native soils and the pavement subbase.

10.9 Pavements

It is our understanding that the proposed site improvements include the construction of new asphalt paving sections for the proposed parking lots, new drive aisles, and the re-construction of existing

Subgrade preparation and proofrolling should be performed in accordance with the recommendations provided in Section 11.2 of this report. For this report, the pavement design parameters were estimated by Tectonic, for standard duty traffic. The standard duty section was based upon a daily traffic of 500 vehicles, with 25 percent heavy trucks. An assumed twenty (20) year design life was used for each pavement section.

A design California Bearing Ratio (CBR) value of 5 was selected for the design of the asphalt pavement section. This CBR was selected based on the soils encountered on the site, and the compacted native soils that will underlie the pavement. We recommend that the pavement section consist of the following:

Table 10.9.1 - Asphalt Pavements	
Pavement Section Type	Recommended Section
Standard Duty	2 inches Top Course HMA (Items 402.095102 or 402.125102) 3 inches Binder Course HMA (Item 402.195102 or 402.255902) 4 inches Type 2 Aggregate Subbase (Item 304.12)
Heavy-Duty Flexible Pavement	2 inches Top Course HMA (Items 402.095102 or 402.125102) 3 inches Binder Course HMA (Item 402.195102 or 402.255902) 6 inches Type 2 Aggregate Subbase (Item 304.12)

Note:

1) All Item Numbers are indicated in New York State Department of Transportation Standard Specifications.

2) Heavy-Duty pavement should be placed where busses, delivery trucks or tractor trailer trucks will travel.

3) Light-Duty pavement should only be placed in areas that will primarily be used by passenger vehicles, such as school district personal parking areas.

11.0 EARTHWORK CONSTRUCTION CRITERIA

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

11.1 General Site Preparation

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

Any existing utilities within the project limits should be re-routed around the foundations, or removed. The resulting excavations should be backfilled with structural fill in accordance with the procedures outlined in Section 11.3. Trench excavations should be properly benched to allow for adequate compaction.

11.2 Subgrade Preparation

All foundation, slab-on-grade, and pavement subgrades should be inspected by the geotechnical engineer prior to the placement of structural fill, concrete, or pavement subbase material. Based on the composition of the existing loose fill, remedial removals of the in-place soil in the elementary school building footprints will likely be required. Existing fill was encountered to depths of up to 15 feet in the boring, which should be removed from the zone of influence of the building foundations.

For the proposed drive aisles or parking lots, any cut areas of the site should be lowered to the planned subgrade depth, and the exposed native soils should be proofrolled to observe for potentially yielding soils. In any proposed fill areas, the surface should be cleared and grubbed, and the resulting subgrade prior to fill placement should also be proofrolled. Areas to receive structural fill should also be proofrolled before placing any backfill materials.

The foundation and pavement subgrades, and any surfaces to receive structural fill or concrete should be proofrolled under the observation of the geotechnical engineer. Proofrolling 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. Unsuitable materials or areas identified to be soft by the geotechnical engineer, based on visual inspection and observation of proofrolling operations should be removed and replaced with compacted structural fill. Any subgrade soils found to be soft and yielding during proofrolling, or otherwise deemed unsuitable by the geotechnical engineer, should be removed and replaced with properly compacted select granular fill. If deemed necessary during excavation, reinforcing geostabilization fabric or geogrid (Tensar Biaxial Geogrid BX1100, or similar) may be used to augment the stability of the over-excavated area, as recommended during proofrolling by the geotechnical engineer.

11.3 Fill and Backfill Materials

Imported structural fill should consist of clean sand, gravel, crushed stone, crushed gravel, or a mixture of these, and should contain no organic matter. Imported structural fill materials should meet the gradation for Select Granular Fill (Item No. 733.1101), as specified in the New York State Department of Transportation (NYSDOT) Standard Specifications, and as recommended below.

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

Based on the results of our subsurface investigation and laboratory testing the native soils are not suitable for use as structural fill, due to the high fines content (up to 72 percent). If required, any native soils that are cut may be used to raise site grades in the parking lot, but granular structural fill should be used to achieve the proposed subgrade elevation. Any soils that are to be used as structural fill should be tested, and approved by the geotechnical engineer prior to use.

Non-conforming native soils may be suitable for use as general fill in landscaped areas, provided they are free of 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.

All general fill and structural fill should be compacted to at least 95 percent of the maximum dry density, at near optimum moisture contents, as determined by the modified Proctor test (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 structural fill soils will vary depending on the type of compaction equipment used. Structural fill should generally be placed in uniform horizontal lifts 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. Backfill in landscape area should be compacted to at least 90 percent of the maximum dry density, at near optimum moisture contents, as determined by the ASTM D1557. 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.

Free draining crushed stone placed below floor slabs and as drainage materials behind foundation and retaining walls should be Underdrain Filter Type I materials (Item No. 733.2001) 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. 4	0 - 10
No. 8	0 – 5

Type 2 Aggregate Subbase (Item 304.12), to be placed immediately below the asphalt pavement, or as fill or backfill, should be a well-graded durable granular material that meets the gradation requirements for NYSDOT Type 2 Subbase (Item No. 733.0402), as follows:

Sieve Size	Percent Finer by Weight
2 inch	100
¼ inch	25 – 60
No. 40	5 – 40
No. 200	0 - 10

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 dense nature and 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 (silt and clay) 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 floor 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, such as adjacent to existing structures adjacent to the proposed additions. It is expected that the use of shoring will be required to remove the very loose in-place fill adjacent to the elementary school for the vestibule addition.

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 glacial till. 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.

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
- Underpinning, if necessary
- Settlement and vibration monitoring of the existing building
- Placement and compaction of fill and backfill materials
- 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.

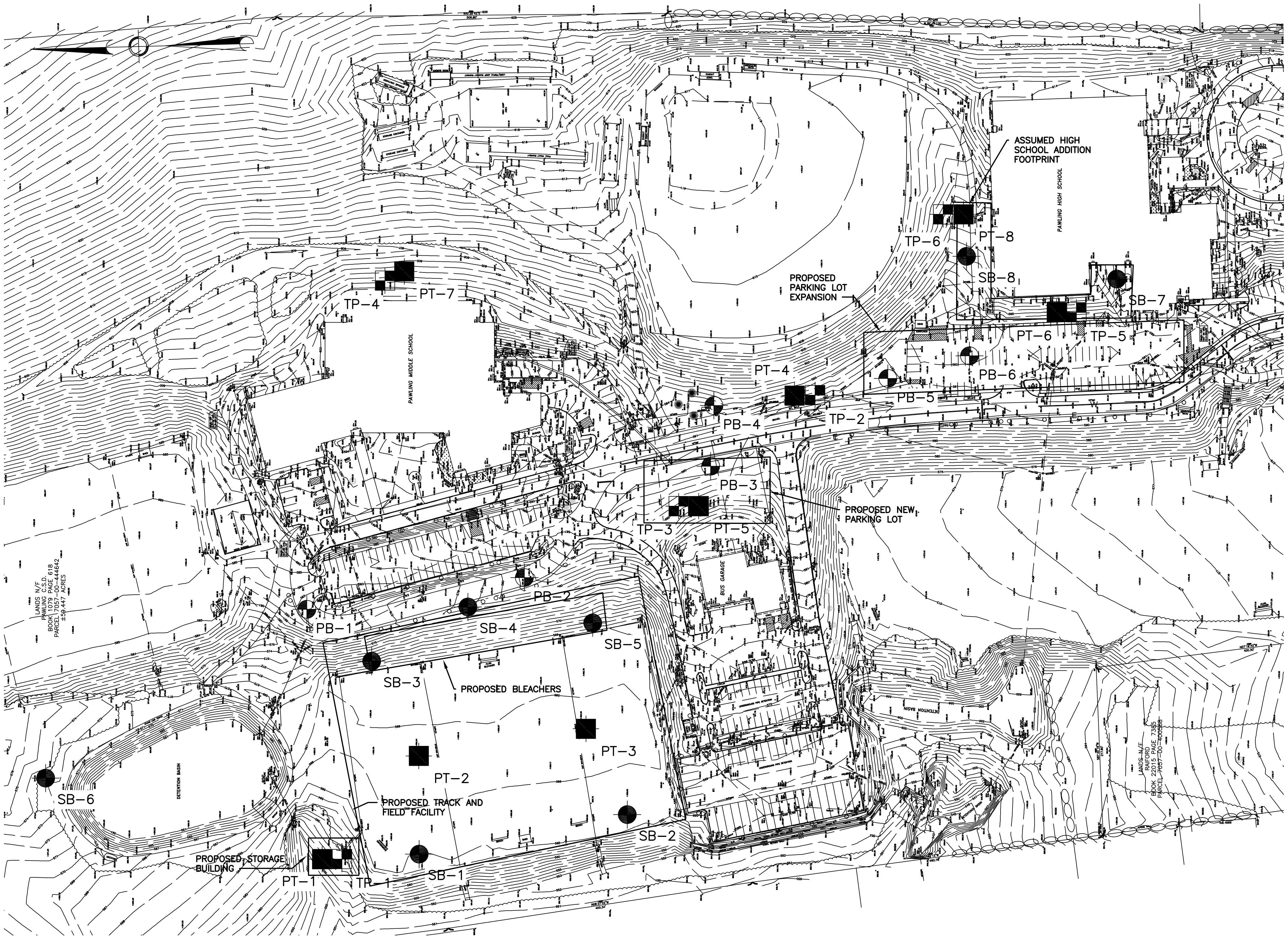
13.0 LIMITATIONS

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 Pawling Central School District, 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.

SC/MAS: G:\Newburgh\Geotechnical\11000\11033.01 Pawling CSD\Report\11033.01 Pawling CSD Improvements geoinv.docx

FIGURES



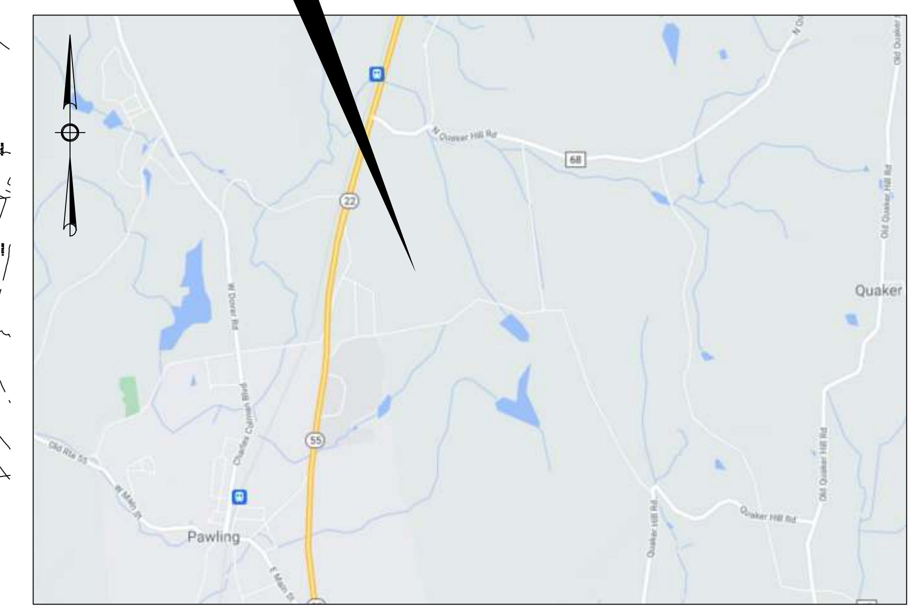
LEGEND

Symbol	Description
SB-1	APPROXIMATE STRUCTURAL BORING LOCATION
PB-1	APPROXIMATE PAVEMENT BORING LOCATION
TP-1	APPROXIMATE TEST PIT LOCATION
PT-1	APPROXIMATE INFILTRATION TEST LOCATION

NOTES

1. PLAN BASED ON A SURVEY PROVIDED BY THE CLIENT.
2. BORING, TEST PIT, AND INFILTRATION TEST LOCATIONS WERE FIELD LOCATED BY TECTONIC 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, TEST PIT, AND INFILTRATION TEST LOCATION PLAN

PAWLING MIDDLE SCHOOL AND HIGH SCHOOL
30 WAGNER DRIVE
PAWLING, DUTCHESS COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
08/12/2021	11033.01	FIGURE 1	0
Scale: 1" = 150'			

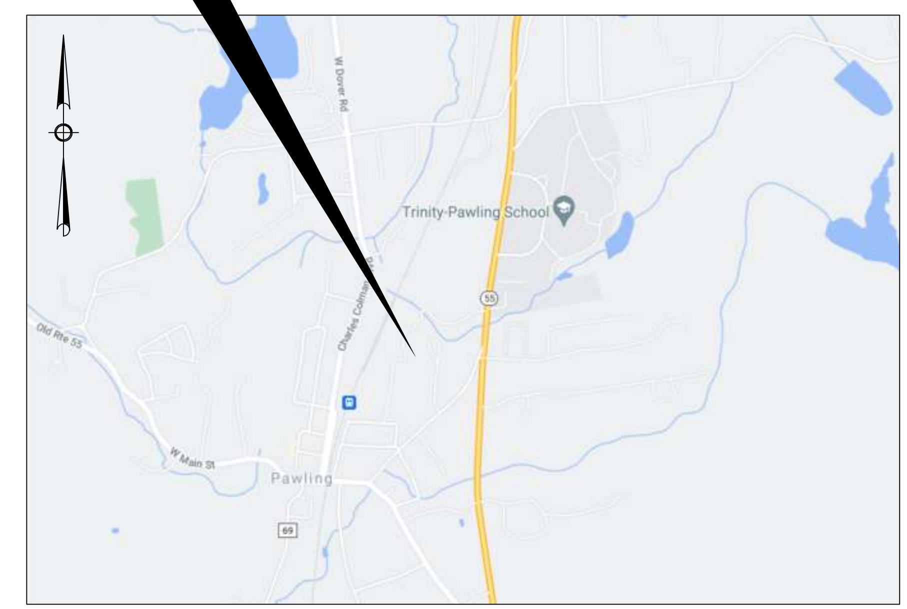
LEGEND

- SB-1E — APPROXIMATE STRUCTURAL BORING LOCATION
- PB-1E — APPROXIMATE PAVEMENT BORING LOCATION

NOTES

1. PLAN BASED ON A SURVEY PROVIDED BY THE CLIENT.
2. BORING LOCATIONS WERE FIELD LOCATED BY TECTONIC AND SHOULD BE CONSIDERED APPROXIMATE.

SITE



0 1 2 3
ORIGINAL SIZE IN INCHES

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BORING LOCATION PLAN

PAWLING ELEMENTARY SCHOOL
7 HAIGHT STREET
PAWLING, DUTCHESS COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
08/12/2021	11033.01	FIGURE 2	0
Scale: 1" = 100'			

APPENDIX I

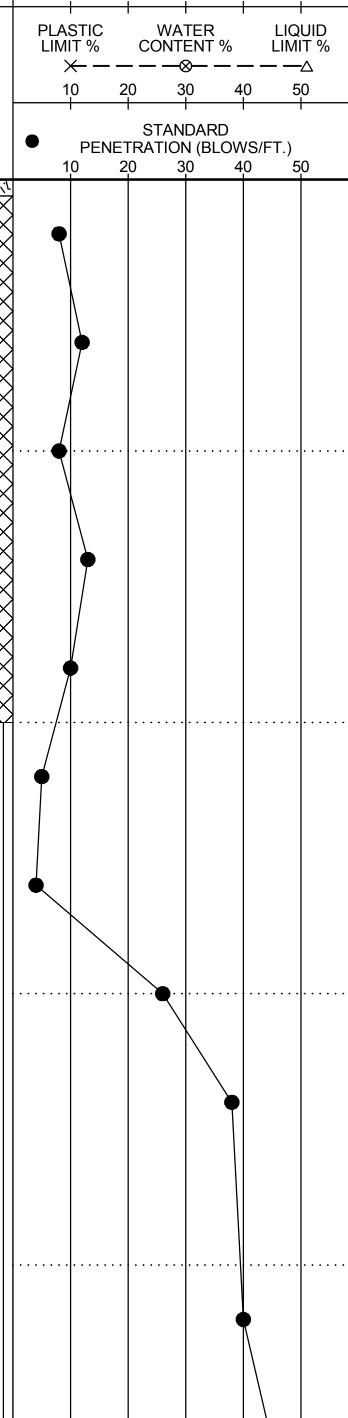
Tectonic

PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Middle / High School**
LOCATION:	**Pawling, NY**

BORING No. SB-1

CLIENT: **CSArch**				GROUND WATER: DATE	TIME	DEPTH	INSPECTOR: **Paul Gregory**
CONTRACTOR: **Core Down Drilling LLC**							DRILLER: **Andrew Bellucci**
METHOD OF ADVANCING BORING	DIA.	DEPTH					SURFACE ELEVATION: **565.0**
POWER AUGER:	**3 1/4"**	**0** TO **25'**		MON. WELL ☐ YES ☒ NO			DATUM: **See Remarks**
ROT. DRILL:		TO		SCREEN DEPTH: **---** TO **---**			DATE START: **7/13/21**
CASING:		TO		WEATHER: **Overcast**	TEMP: **70° F**		DATE FINISH: **7/13/21**
DIAMOND CORE:		TO		DEPTH TO ROCK: **Not Encountered'**			UNCONFINED COMPRESS. STRENGTH (TONS/FT)
CME 55 Track 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.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
0–2	8	2, 3, 5, 6	S-1	16		M	GP	0.5' Topsoil-like material Bwn f GRAVEL, and c-f Sand, trace Silt (FILL)	Topsoil / Fill	
2–4	12	7, 7, 5, 6	S-2	22		M	SM	Bwn f SAND, and Silt, trace f Gravel (FILL)	Fill	
4–6	8	8, 4, 4, 3	S-3	18		M	ML	Bwn-gy SILT, and f Sand, trace f Gravel (FILL)	Fill	560.0
6–8	13	4, 6, 7, 7	S-4	16		M	SM	Bwn c-f SAND, some Silt (FILL)	Fill	
8–10	10	5, 5, 5, 4	S-5	12		M	SM	Bwn-gy m-f SAND, and Silt, trace f Gravel (FILL)	Fill	555.0
10–12	5	2, 2, 3, 3	S-6	18		M	ML	Gy-bwn SILT and f Sand, trace f Gravel	Silt	
12–14	4	2, 2, 2, 6	S-7	20		W	ML	Gy-bwn SILT, and f Sand, trace f Gravel (perched water in sample)	Silt	
14–16	26	8, 12, 14, 15	S-8	21		W	ML	Gy-bwn SILT, some m-f Sand, trace f Gravel	Silt	550.0
16–18	38	14, 16, 22, 25	S-9	24		M	ML	Same	Silt	
18–20									Silt	545.0
20–22	40	12, 16, 24, 26	S-10	24		M	ML	Same	Silt	
22–23									Silt	



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Middle / High School**
LOCATION:	**Pawling, NY**

BORING No. SB-1

CLIENT: **CSArch**

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

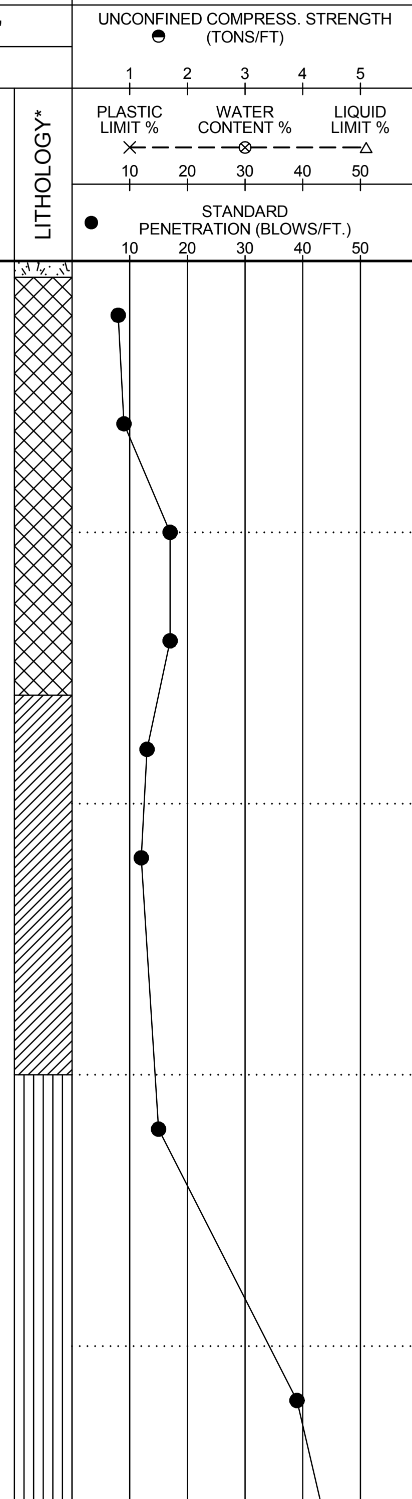
DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
24										
25		16								540.0
26	51	24 27	S-11	24		M	ML	Bwn SILT, some c-f Gravel, some c-f Sand		
27		36								
28								End of Boring at 27'		
29										
30										535.0
31										
32										
33										
34										
35										530.0
36										
37										
38										
39										
40										525.0
41										
42										
43										
44										
45										520.0
46										
47										
48										
49										
50										515.0

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic	PROJECT No. **11033.01**	**BORING No. SB-2**
	PROJECT: **Pawling Central School District Middle / High School**	
	LOCATION: **Pawling, NY**	SHEET No. 1 of 2

CLIENT: **CSArch**		GROUND WATER	DATE	TIME	DEPTH	INSPECTOR: **Paul Gregory**
CONTRACTOR: **Core Down Drilling LLC**						DRILLER: **Andrew Bellucci**
METHOD OF ADVANCING BORING	DIA.	DEPTH				SURFACE ELEVATION: **565.0**
POWER AUGER:	3 1/4"	0 TO 25'	MON. WELL ☐ YES ☒ NO			DATUM: **See Remarks**
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---			DATE START: **7/13/21**
CASING:		TO	WEATHER: **Overcast** TEMP: **70° F**			DATE FINISH: **7/13/21**
DIAMOND CORE:		TO	DEPTH TO ROCK: **Not Encountered'**			
CME 55 Track 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.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1–2	8	1, 3, 5, 8	S-1	20		M	ML	0.5' Topsoil-like material Bwn SILT, some f Gravel, some m-f Sand (FILL)	
2–4	9	5, 5, 4, 5	S-2	18		M	ML	Gy-bwn SILT, and m-f Sand, trace f Gravel (FILL)	
4–6	17	8, 9, 8, 10	S-3	21		M	ML	Gy-bwn SILT, some c-f Gravel, some m-f Sand, trace wood pieces (FILL)	560.0
6–8	17	7, 9, 8, 5	S-4	11		M	GM	Gy c-f GRAVEL, some Silt, little m-f Sand, asphalt debris (FILL)	
8–10	13	5, 6, 7, 7	S-5	18		M	CL	Gy-bwn SILT & CLAY, some m-f Sand, trace f Gravel	555.0
10–12	12	4, 5, 7, 7	S-6	20		M	CL	Same	
12–15									550.0
15–17	15	1, 4, 11, 14	S-7	22		W	ML	Gy-bwn SILT, some f Gravel, little f Sand	
17–20									545.0
20–22	39	12, 16, 23, 36	S-8	21		M	ML	Same	
22–23									



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Middle / High School**
LOCATION:	**Pawling, NY**

BORING No. SB-2

SHEET No. 2 of 2

CLIENT: **CSArch**

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: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
24										
25										540.0
26	50	17 27 23 30	S-9	20		M	ML	Gy-bwn SILT, some f Sand, little f Gravel		
27										
28								End of Boring at 27'		
29										
30										535.0
31										
32										
33										
34										
35										530.0
36										
37										
38										
39										
40										525.0
41										
42										
43										
44										
45										520.0
46										
47										
48										
49										
50										515.0

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Middle / High School**
LOCATION:	**Pawling, NY**

BORING No. SB-3

SHEET No. 1 of 1

CLIENT: **CSArch**					INSPECTOR: **Paul Gregory**
CONTRACTOR: **Core Down Drilling LLC**					DRILLER: **Andrew Bellucci**

GROUND WATER	DATE	TIME	DEPTH

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

CME 55 Track Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Overcast** TEMP: **70° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

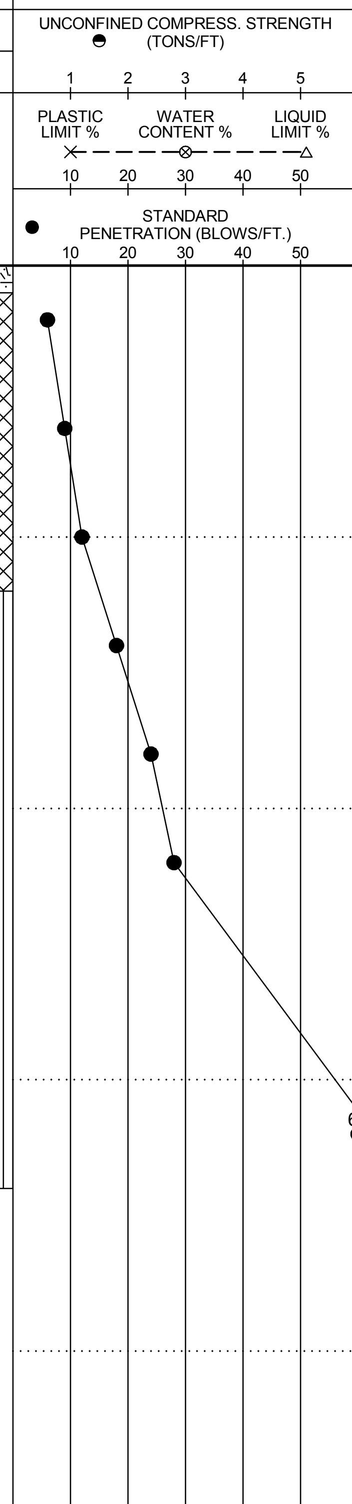
SURFACE ELEVATION: **565.0**

DATUM: **See Remarks**

DATE START: **7/12/21**

DATE FINISH: **7/12/21**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
0–2	6	2, 2, 4, 4	S-1	16		M	SM	0.5 Topsoil-like material Bwn f SAND, and Silt, trace f Gravel (FILL)	
2–4	9	4, 5, 4, 4	S-2	19		M	SM	Same (FILL)	
4–6	12	5, 5, 7, 8	S-3	16		W	SM	Bwn m-f SAND, some Silt, little f Gravel (FILL)	560.0
6–8	18	7, 7, 11, 13	S-4	16		W	ML	Gy-bwn SILT, and f Sand, trace f Gravel	
8–10	24	8, 11, 13, 16	S-5	16		W	ML	Same	555.0
10–12	28	7, 11, 17, 26	S-6	21		W	ML	Gy SILT, some f Sand, trace f Gravel	
15–17	63	13, 26, 37, 41	S-7	24		W	ML	Gy SILT, some f Sand, little c-f Gravel	550.0
17								End of Boring at 17'	
20									545.0



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

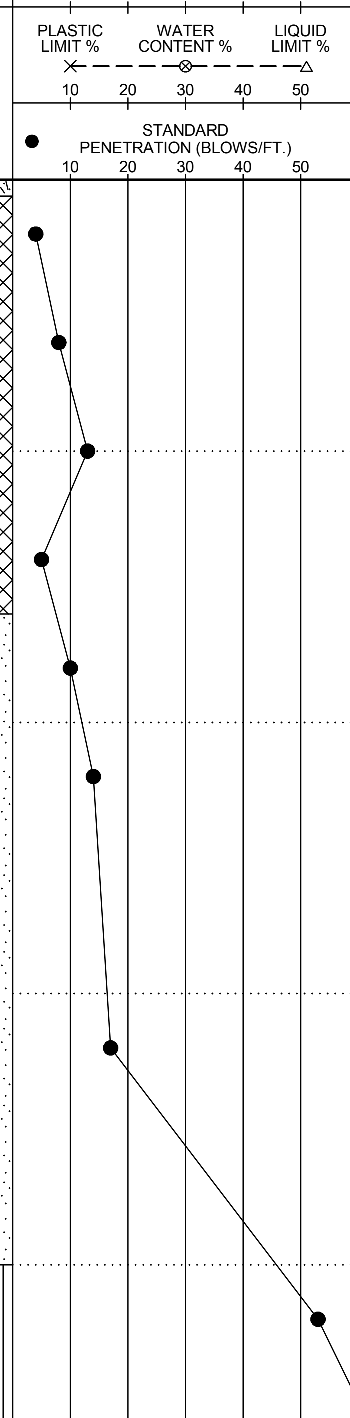
PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Middle / High School**
LOCATION:	**Pawling, NY**

BORING No. SB-4

SHEET No. 1 of 2

CLIENT: **CSArch**		GROUND WATER: DATE	TIME	DEPTH	INSPECTOR: **Paul Gregory**
CONTRACTOR: **Core Down Drilling LLC**					DRILLER: **Andrew Bellucci**
METHOD OF ADVANCING BORING	DIA. / DEPTH				SURFACE ELEVATION: **578.0**
POWER AUGER:	3 1/4" / 0 TO 25'	MON. WELL ☐ YES ☒ NO			DATUM: **See Remarks**
ROT. DRILL:	TO	SCREEN DEPTH: --- TO ---			DATE START: **7/14/21**
CASING:	TO	WEATHER: **Overcast**	TEMP: **70° F**		DATE FINISH: **7/14/21**
DIAMOND CORE:	TO	DEPTH TO ROCK: **Not Encountered'**			UNCONFINED COMPRESS. STRENGTH (TONS/FT)
CME 55 Track 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.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
0-2	4	1, 2, 2, 2	S-1	13		M	SM	0.5' Topsoil-like material Bwn m-f SAND, and Silt, little c-f Gravel (FILL)	
2-4	8	1, 2, 6, 7	S-2	14		M	ML	Bwn SILT, some f Sand, little c-f Gravel (FILL)	
4-6	13	5, 7, 6, 3	S-3	20		M	ML	Gy-bwn SILT, some f Sand, trace f Gravel (FILL)	573.0
6-8	5	2, 2, 3, 4	S-4	19		M	ML	Gy-bwn SILT, little f Sand, trace f Gravel (FILL)	
8-10	10	6, 5, 5, 5	S-5	21		M	SM	Gy-bwn f SAND, and Silt, trace f Gravel	568.0
10-12	14	3, 3, 11, 8	S-6	15		M	SM	Gy m-f SAND, and Silt, trace f Gravel, limestone vein in spoon	
15-17	17	6, 7, 10, 7	S-7	17		W	SM	Bwn m-f SAND, some f Gravel, some Silt (wet at bottom of spoon)	563.0
20-22	53	16, 23, 30, 45	S-8	22		W	ML	Bwn-gy SILT, little f Sand, trace f Gravel	558.0



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

BORING LOG 11033.01 MIDDLE HIGH SCHOOL.GPJ TECTONIC ENG.GDT 8/27/21

Tectonic	PROJECT No. **11033.01**	**BORING No. SB-4**
	PROJECT: **Pawling Central School District Middle / High School**	
	LOCATION: **Pawling, NY**	SHEET No. 2 of 2

CLIENT: **CSArch**

CONTRACTOR: **Core Down Drilling LLC**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	UNCONFINED COMPRESS. STRENGTH (TONS/FT) / PLASTIC LIMIT % – WATER CONTENT % – LIQUID LIMIT % / STANDARD PENETRATION (BLOWS/FT.)	ELEVATION (FT.)
24											
25											553.0
26	76	28 31 45 47	S-9	22		W	ML	Bwn-gy SILT, some m-f Sand, trace f Gravel		76	
27											
28								End of Boring at 27'			
30											548.0
35											543.0
40											538.0
45											533.0
50											528.0

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Middle / High School**
LOCATION:	**Pawling, NY**

BORING No. SB-5

CLIENT: **CSArch**	GROUND WATER	DATE	TIME	DEPTH
CONTRACTOR: **Core Down Drilling LLC**				

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:	3 1/4"	0	TO	25'
ROT. DRILL:			TO	
CASING:			TO	
DIAMOND CORE:			TO	
CME 55 Track Rig with Automatic Hammer				

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Overcast** TEMP: **70° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Paul Gregory**

DRILLER: **Andrew Bellucci**

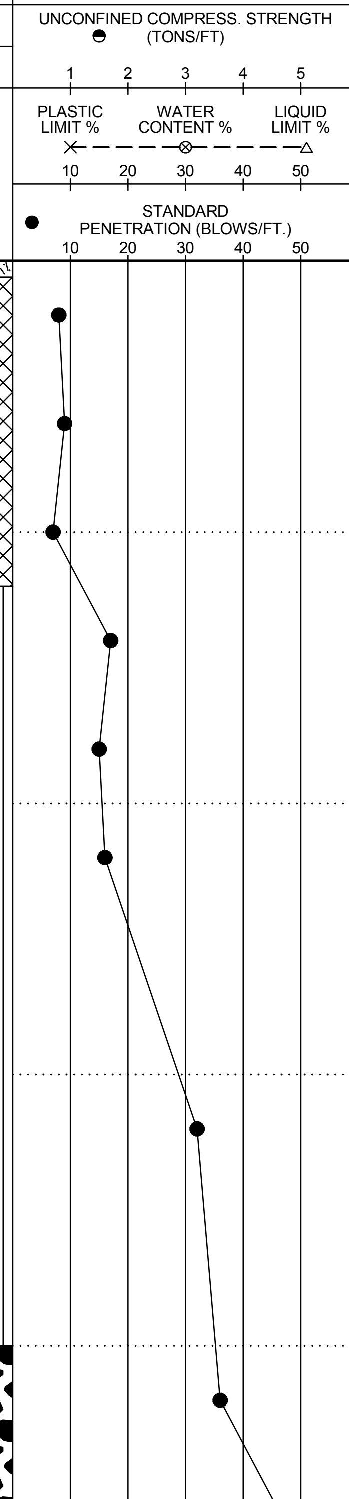
SURFACE ELEVATION: **566.0**

DATUM: **See Remarks**

DATE START: **7/13/21**

DATE FINISH: **7/13/21**

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	LITHOLOGY*	ELEVATION (FT.)
1	8	1, 3, 5, 5	S-1	12		M	SM	0.5' Topsoil-like material Bwn f SAND, and Silt, trace f Gravel (FILL)		
2										
3	9	3, 5, 4, 4	S-2	15		M	SM	Same (FILL)		
4										
5	7	2, 3, 4, 6	S-3	16		W	SM	Same (perched water in sample) (FILL)		561.0
6										
7	17	6, 7, 10, 11	S-4	9		W	ML	Gy-bwn SILT, little f Sand, trace f Gravel		
8										
9	15	4, 7, 8, 11	S-5	19		W	ML	Gy-bwn SILT, and f Sand, trace f Gravel		
10										556.0
11	16	6, 8, 8, 10	S-6	22		M	ML	Gy-bwn SILT, little f Sand, trace f Gravel		
12										
13										
14										
15										551.0
16	32	10, 13, 19, 20	S-7	20		M	ML	Gy SILT, some f Gravel, little f Sand		
17										
18										
19										
20										546.0
21	36	14, 16, 20, 25	S-8	10		M	GM	Gy-wh c-f GRAVEL, some Silt, little f Sand		
22										
23										



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

Tectonic

BORING No. SB-5

CLIENT: **CSArch**

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*	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	ELEVATION (FT.)
24											
25											541.0
26	61	15 30 31 41	S-9	22		M	SM	Gy c-f SAND, some f Gravel, some Silt		61	
27											
28								End of Boring at 27'			
29											
30											536.0
31											
32											
33											
34											
35											531.0
36											
37											
38											
39											
40											526.0
41											
42											
43											
44											
45											521.0
46											
47											
48											
49											
50											516.0

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

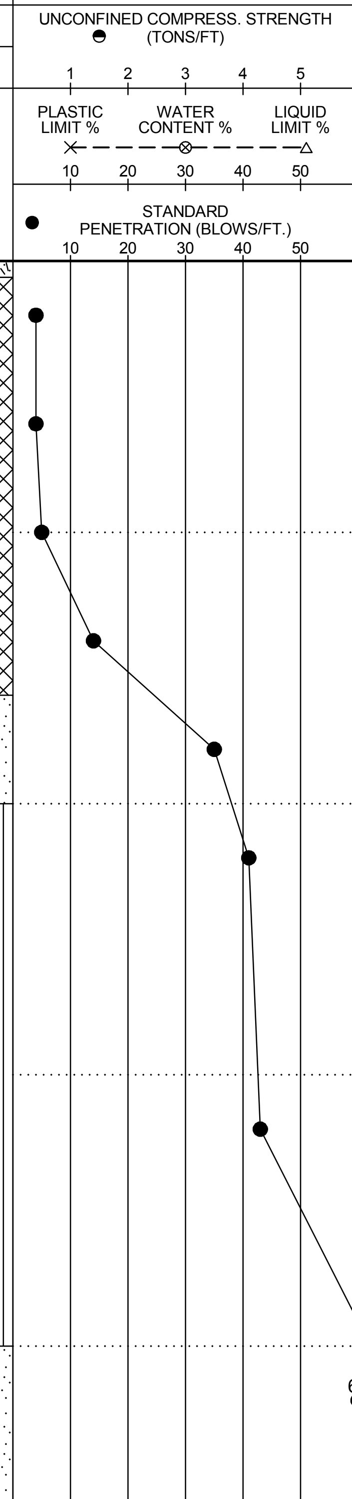
Tectonic

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

BORING No. SB-6

CLIENT: CSArch			GROUND WATER	DATE	TIME	DEPTH	INSPECTOR: Paul Gregory
CONTRACTOR: Core Down Drilling LLC				7/12/2021	10:00 AM	11'	DRILLER: Andrew Bellucci
METHOD OF ADVANCING BORING	DIA.	DEPTH					SURFACE ELEVATION: 574.0
POWER AUGER:	3 1/4"	0 TO 25'	MON. WELL ☐ YES ☒ NO				DATUM: See Remarks
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---				DATE START: 7/12/21
CASING:		TO	WEATHER: Overcast TEMP: 70° F				DATE FINISH: 7/12/21
DIAMOND CORE:		TO	DEPTH TO ROCK: Not Encountered'				
CME 55 Track 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.)
0–2	4	1, 2, 2, 3	S-1	19		M	SM	0.5' Topsoil-like material Bwn f SAND, and Silt, trace f Gravel (FILL)	
2–4	4	2, 2, 2, 3	S-2	20		M	SM	Bwn m-f SAND, and Silt, trace f Gravel (FILL)	
4–6	5	3, 2, 3, 4	S-3	18		M	ML	Bwn SILT, and m-f Sand, trace f Gravel (FILL)	569.0 (at 5)
6–8	14	4, 6, 8, 10	S-4	24		M	ML	Same (FILL)	
8–10	35	12, 14, 21, 30	S-5	20		M	SM	Bwn c-f SAND, and Silt, trace f Gravel	564.0 (at 10)
10–12	41	10, 17, 24, 21	S-6	20		W	ML	Bwn SILT, some f Sand, trace f Gravel ▼	
15–17	43	13, 20, 23, 28	S-7	20		W	ML	Gy SILT, little f Sand, trace f Gravel	559.0 (at 15)
20–22	67	27, 30, 37, 40	S-8	19		W	SM	Gy f SAND, and Silt, trace f Gravel	554.0 (at 20)



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No. **11033.01**

PROJECT: **Pawling Central School District Middle / High School**

LOCATION: **Pawling, NY**

BORING No. SB-6

CLIENT: **CSArch**

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: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
24										
25										549.0
26	93	14, 41, 52, 50/4	S-9	22		W	SM	Same		
27								End of Boring at 27'		
28										
29										
30										544.0
31										
32										
33										
34										
35										539.0
36										
37										
38										
39										
40										534.0
41										
42										
43										
44										
45										529.0
46										
47										
48										
49										
50										524.0

Standard penetration plot: 93 (at 26 ft)

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

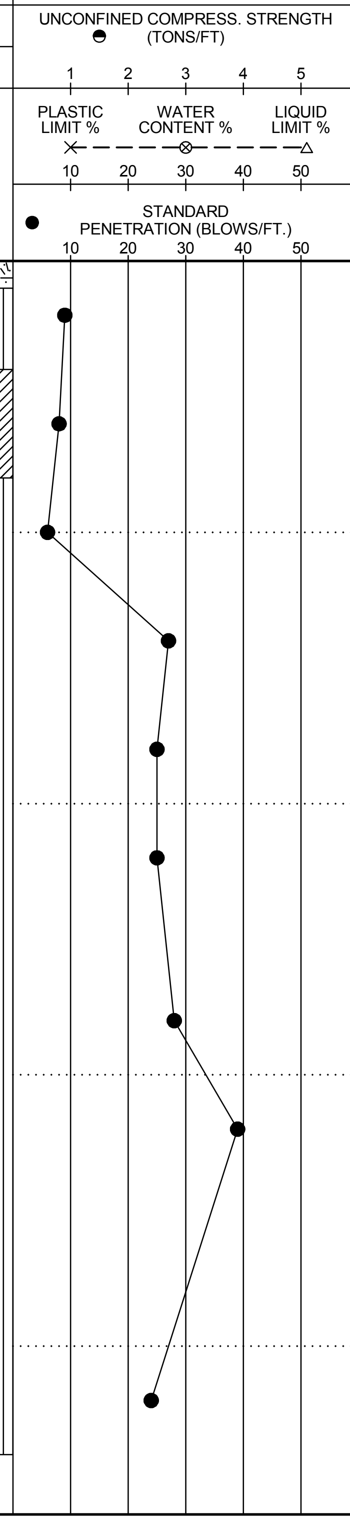
PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

BORING No. SB-7

SHEET No. 1 of 1

CLIENT: **CSArch**				GROUND WATER	DATE	TIME	DEPTH	INSPECTOR: **Nicolas Watson**
CONTRACTOR: **Core Down Drilling LLC**								DRILLER: **Andrew Bellucci**
METHOD OF ADVANCING BORING	DIA.	DEPTH						SURFACE ELEVATION: **598.0**
POWER AUGER:	3 1/4"	0 TO 25'		MON. WELL ☐ YES ☒ NO				DATUM: **See Remarks**
ROT. DRILL:		TO		SCREEN DEPTH: --- TO ---				DATE START: **7/15/21**
CASING:		TO		WEATHER: **Overcast** TEMP: **70° F**				DATE FINISH: **7/15/21**
DIAMOND CORE:		TO		DEPTH TO ROCK: **Not Encountered'**				
CME 55 Track 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.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
0–2	9	4, 5, 4, 6	S-1	8		M	ML	0.5' Topsoil-like material Dk bwn SILT, trace f Gravel	
2–4	8	7, 4, 4, 3	S-2	9		M	CL-ML	Lgt bwn SILT & CLAY, some f Sand, trace f Gravel	
4–6	6	3, 3, 3, 4	S-3	20		M	ML	Lgt bwn CLAYEY SILT, little f Sand, trace f Gravel	593.0
6–8	27	7, 10, 17, 17	S-4	23		M	ML	Bwn SILT, little f Sand, trace f Gravel	
8–10	25	9, 12, 13, 21	S-5	18		M	ML	Bwn SILT, trace f Sand, trace f Gravel	588.0
10–12	25	10, 13, 12, 16	S-6	22		M	ML	Bwn SILT, little f Gravel, trace f Sand	
13–15	28	10, 14, 14, 15	S-7	22		M	ML	Gy-bwn SILT, trace f Gravel, trace f Sand	583.0
15–17	39	15, 18, 21, 23	S-8	22		M	ML	Same	
20–22	24	8, 11, 13, 19	S-9	22		M	ML	Same	578.0
22								End of Boring at 22'	

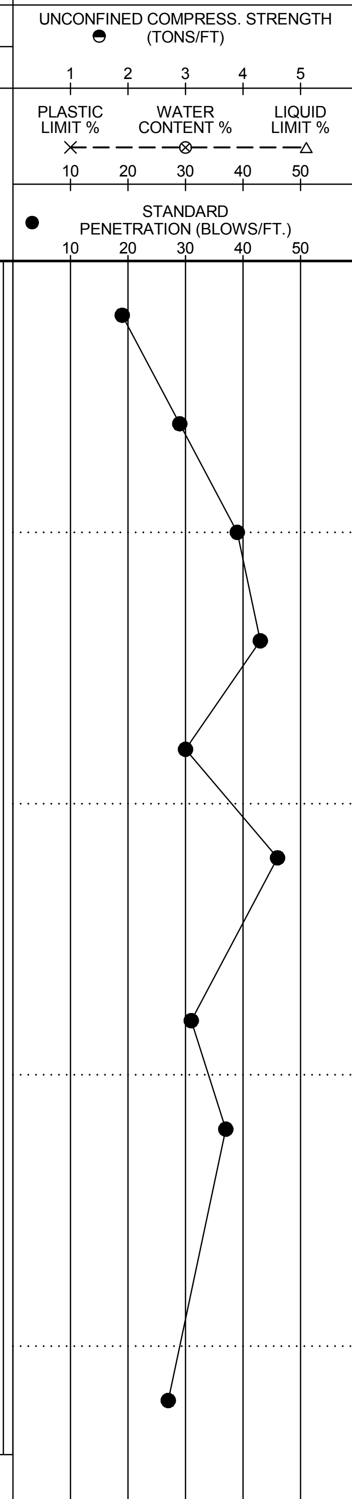


REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic	PROJECT No. 11033.01	BORING No. SB-8
	PROJECT: Pawling Central School District Middle / High School	
	LOCATION: Pawling, NY	SHEET No. 1 of 1

CLIENT: CSArch		GROUND WATER	DATE	TIME	DEPTH	INSPECTOR: Nicolas Watson
CONTRACTOR: Core Down Drilling LLC			7/16/2021	2:00 PM	19.5'	DRILLER: Andrew Bellucci
METHOD OF ADVANCING BORING	DIA. / DEPTH					SURFACE ELEVATION: 598.0
POWER AUGER:	3 1/4" / 0 TO 25'	MON. WELL ☐ YES ☒ NO				DATUM: See Remarks
ROT. DRILL:	TO	SCREEN DEPTH: --- TO ---				DATE START: 7/15/21
CASING:	TO	WEATHER: Overcast TEMP: 70° F				DATE FINISH: 7/15/21
DIAMOND CORE:	TO	DEPTH TO ROCK: Not Encountered'				
CME 55 Track 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.)
0–2	19	6, 9, 10, 10	S-1	23		M	ML	0.5' Topsoil-like material Lgt bwn SILT, trace f Gravel	
2–4	29	13, 13, 16, 18	S-2	24		M	ML	Lgt bwn SILT, little f Gravel	
4–6	39	18, 18, 21, 23	S-3	23		M	ML	Dk & lgt bwn SILT, little f Gravel	593.0
6–8	43	20, 20, 23, 27	S-4	24		M	ML	Dk & lgt bwn SILT, some f Gravel	
8–10	30	10, 14, 16, 24	S-5	23		M	ML	Dk bwn SILT, little f Gravel	588.0
10–12	46	16, 21, 25, 25	S-6	21		M	ML	Dk bwn SILT, some f Gravel, little Silt	
13–15	31	9, 15, 16, 19	S-7	23		M	ML	Dk bwn SILT, little f Gravel	583.0
15–17	37	19, 16, 21, 25	S-8	23		M	ML	Same	
19.5								▼ (groundwater)	578.0
20–22	27	7, 11, 16, 17	S-9	23		W	ML	Dk bwn SILT, trace f Gravel	
22								End of Boring at 22'	



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Middle / High School**
LOCATION:	**Pawling, NY**

BORING No. PT-1

SHEET No. 1 of 1

CLIENT: **CSArch**		GROUND WATER: DATE	TIME	DEPTH	INSPECTOR: **Paul Gregory**
CONTRACTOR: **Core Down Drilling LLC**					DRILLER: **Andrew Bellucci**
METHOD OF ADVANCING BORING	DIA. / DEPTH				SURFACE ELEVATION: **565.0**
POWER AUGER:	**3 1/4"** **0** TO **5'**	MON. WELL ☐ YES ☒ NO			DATUM: **See Remarks**
ROT. DRILL:	TO	SCREEN DEPTH: **---** TO **---**			DATE START: **7/12/21**
CASING:	TO	WEATHER: **Rain**	TEMP: **70° F**		DATE FINISH: **7/12/21**
DIAMOND CORE:	TO	DEPTH TO ROCK: **Not Encountered'**			UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
CME 55 Track 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	LITHOLOGY*	PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50); STANDARD PENETRATION (BLOWS/FT.) (10 20 30 40 50)	ELEVATION (FT.)
0–5						M	SM	Advanced hollow stem auger to 5', No Sampling Bwn f SAND, and Silt, trace f Gravel Installed 4" PVC casing			560.0
5								End of Boring at 5'			
10											555.0
15											550.0
20											545.0
23											

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

BORING LOG 11033.01 MIDDLE HIGH SCHOOL.GPJ TECTONIC ENG.GDT 8/27/21

Tectonic

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

BORING No. PT-2

SHEET No. 1 of 1

CLIENT: CSArch	GROUND WATER	DATE	TIME	DEPTH
CONTRACTOR: Core Down Drilling LLC				

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 5'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO
CME 55 Track Rig with Automatic Hammer		

MON. WELL	☐ YES ☒ NO
SCREEN DEPTH:	--- TO ---
WEATHER: Rain	TEMP: 70° F
DEPTH TO ROCK:	Not Encountered'
*CHANGES IN STRATA ARE INFERRED	

INSPECTOR:	Paul Gregory
DRILLER:	Andrew Bellucci
SURFACE ELEVATION:	566.0
DATUM:	See Remarks
DATE START:	7/12/21
DATE FINISH:	7/12/21

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.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
0–1								Advanced hollow stem auger to 5', No Sampling		
3						M	SM	Bwn f SAND, and Silt, trace f Gravel		
5								Installed 4" PVC casing		561.0
6								End of Boring at 5'		
10										556.0
15										551.0
20										546.0
23										

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

BORING No. PT-3

SHEET No. 1 of 1

CLIENT: CSArch						INSPECTOR: Paul Gregory
CONTRACTOR: Core Down Drilling LLC						DRILLER: Andrew Bellucci
METHOD OF ADVANCING BORING	DIA.	DEPTH	GROUND WATER: DATE	TIME	DEPTH	SURFACE ELEVATION: 566.0
POWER AUGER:	3 1/4"	0 TO 5'	MON. WELL ☐ YES ☒ NO			DATUM: See Remarks
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---			DATE START: 7/13/21
CASING:		TO	WEATHER: Overcast TEMP: 70° F			DATE FINISH: 7/13/21
DIAMOND CORE:		TO	DEPTH TO ROCK: Not Encountered'			UNCONFINED COMPRESS. STRENGTH (TONS/FT)
CME 55 Track 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.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT %; STANDARD PENETRATION (BLOWS/FT.)	ELEVATION (FT.)
0–5						M	SM	Advanced hollow stem auger to 5', No Sampling Bwn f SAND, and Silt, trace f Gravel Installed 4" PVC casing			
5								End of Boring at 5'			561.0
10											556.0
15											551.0
20											546.0

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

BORING No. PT-4

SHEET No. 1 of 1

CLIENT: CSArch	GROUND WATER	DATE	TIME	DEPTH
CONTRACTOR: Core Down Drilling LLC				

INSPECTOR: Paul Gregory
DRILLER: Andrew Bellucci
SURFACE ELEVATION: 592.0
DATUM: See Remarks
DATE START: 7/14/21
DATE FINISH: 7/14/21

METHOD OF ADVANCING BORING	DIA.	DEPTH		
POWER AUGER:	3 1/4"	0	TO	5'
ROT. DRILL:			TO	
CASING:			TO	
DIAMOND CORE:			TO	

CME 55 Track Rig with Automatic Hammer

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: Clear TEMP: 75° F
DEPTH TO ROCK: Not Encountered'
*CHANGES IN STRATA ARE INFERRED

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.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
0–5						M	SM	Auger to 5', No Sampling Bwn m-f SAND, and Silt, trace f Gravel (drill cuttings) Installed 4" PVC casing		
5								End of Boring at 5'		587.0
10										582.0
15										577.0
20										572.0

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

BORING No. PT-5

SHEET No. 1 of 1

CLIENT: CSArch			INSPECTOR: Paul Gregory
CONTRACTOR: Core Down Drilling LLC			DRILLER: Andrew Bellucci
			SURFACE ELEVATION: 584.0

GROUND WATER

DATE	TIME	DEPTH

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 5'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO
CME 55 Track Rig with Automatic Hammer		

MON. WELL	☐ YES ☒ NO
SCREEN DEPTH:	--- TO ---
WEATHER:	Clear TEMP: 75° F
DEPTH TO ROCK:	Not Encountered'
*CHANGES IN STRATA ARE INFERRED	

DATUM:	See Remarks
DATE START:	7/14/21
DATE FINISH:	7/14/21

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.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1								Auger to 5', No Sampling		
2										
3						M	SM	Bwn m-f SAND, and Silt, trace f Gravel (drill cuttings)		
4										
5								Installed 4" PVC casing		579.0
6								End of Boring at 5'		
7										
8										
9										
10										574.0
11										
12										
13										
14										
15										569.0
16										
17										
18										
19										
20										564.0
21										
22										
23										

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

BORING No. PT-6

SHEET No. 1 of 1

				GROUND WATER	DATE	TIME	DEPTH		
CLIENT: CSArch								INSPECTOR:	Nicolas Watson
CONTRACTOR: Core Down Drilling LLC								DRILLER:	Andrew Bellucci
METHOD OF ADVANCING BORING	DIA.	DEPTH						SURFACE ELEVATION:	595.0
POWER AUGER:	3 1/4"	0 TO 5'		MON. WELL	☐ YES	☒ NO		DATUM:	See Remarks
ROT. DRILL:		TO		SCREEN DEPTH:	--- TO ---			DATE START:	7/15/21
CASING:		TO		WEATHER:	Overcast	TEMP:	70° F	DATE FINISH:	7/15/21
DIAMOND CORE:		TO		DEPTH TO ROCK:	Not Encountered'				
CME 55 Track Rig with Automatic Hammer				*CHANGES IN STRATA ARE INFERRED					

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: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
0–1								Auger to 5', No Sampling		
2–3						M	SM	Bwn m-f SAND, and Silt, trace f Gravel (drill cuttings)		
4–5								Installed 4" PVC casing		590.0
5								End of Boring at 5'		
10										585.0
15										580.0
20										575.0
23										

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

BORING No. PT-7

SHEET No. 1 of 1

CLIENT: CSArch			GROUND WATER: DATE	TIME	DEPTH	INSPECTOR: Paul Gregory
CONTRACTOR: Core Down Drilling LLC						DRILLER: Andrew Bellucci
METHOD OF ADVANCING BORING	DIA.	DEPTH				SURFACE ELEVATION: 605.0
POWER AUGER:	3 1/4"	0 TO 5'	MON. WELL ☐ YES ☒ NO			DATUM: See Remarks
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---			DATE START: 7/14/21
CASING:		TO	WEATHER: Clear	TEMP: 75° F		DATE FINISH: 7/14/21
DIAMOND CORE:		TO	DEPTH TO ROCK: Not Encountered'			UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
CME 55 Track Rig with Automatic Hammer			*CHANGES IN STRATA ARE INFERRED			

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.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
0–5								Auger to 5', No Sampling		
3						M	SM	Bwn m-f SAND, and Silt, trace f Gravel (drill cuttings)		
								Installed 4" PVC casing		
5								End of Boring at 5'		600.0
10										595.0
15										590.0
20										585.0

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

BORING No. PT-8

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

CLIENT: CSArch	GROUND WATER	DATE	TIME	DEPTH
CONTRACTOR: Core Down Drilling LLC				

INSPECTOR: **Nicolas Watson**
DRILLER: **Andrew Bellucci**
SURFACE ELEVATION: **603.0**
DATUM: **See Remarks**
DATE START: **7/15/21**
DATE FINISH: **7/15/21**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:		TO
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **70° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

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.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1								Auger to 4', No Sampling		
2										
3						M	SM	Bwn m-f SAND, and Silt, trace f Gravel (drill cuttings)		
4								Installed 4" PVC casing. Obstruction encountered at 4'		
5								End of Boring at 4'		598.0
6										
7										
8										
9										
10										593.0
11										
12										
13										
14										
15										588.0
16										
17										
18										
19										
20										583.0
21										
22										
23										

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

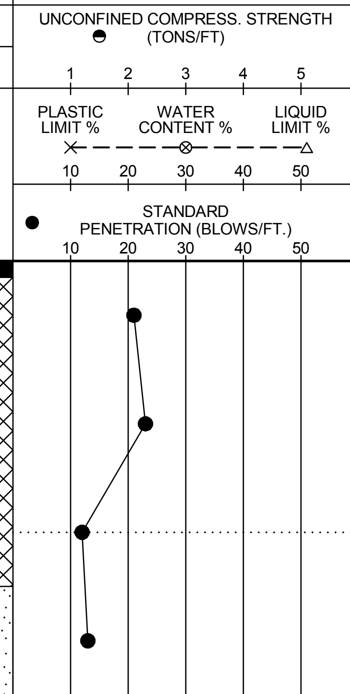
PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Middle / High School**
LOCATION:	**Pawling, NY**

BORING No. PB-1

SHEET No. 1 of 1

CLIENT: **CSArch**	GROUND WATER: DATE / TIME / DEPTH		INSPECTOR: **Paul Gregory**
CONTRACTOR: **Core Down Drilling LLC**			DRILLER: **Andrew Bellucci**
METHOD OF ADVANCING BORING / DIA. / DEPTH			SURFACE ELEVATION: **583.0**
POWER AUGER: TO	MON. WELL ☐ YES ☒ NO		DATUM: **See Remarks**
ROT. DRILL: TO	SCREEN DEPTH: --- TO ---		DATE START: **7/12/21**
CASING: TO	WEATHER: **Overcast**	TEMP: **70° F**	DATE FINISH: **7/12/21**
DIAMOND CORE: TO	DEPTH TO ROCK: **Not Encountered'**		
CME 55 Track 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.)
0–2	21	34, 12, 9, 10	S-1	21		M	SM	0.5' Asphalt Bwn m-f SAND, and Silt, little f Gravel (FILL)	
2–4	23	12, 12, 11, 12	S-2	22		M	SM	Gy-bwn f SAND, some Silt, trace f Gravel (FILL)	
4–6	12	7, 7, 5, 7	S-3	22		M	SM	Gy-bwn f SAND, and Silt, trace f Gravel, wood pieces (FILL)	578.0 (at 5)
6–8	13	5, 6, 7, 9	S-4	9		M	SM	Gy f SAND, and Silt, trace f Gravel	
8								End of Boring at 8'	
10									573.0
15									568.0
20									563.0
23									



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic	PROJECT No. 11033.01 PROJECT: Pawling Central School District Middle / High School LOCATION: Pawling, NY	BORING No. PB-2 SHEET No. 1 of 1

CLIENT: **CSArch**		INSPECTOR: **Paul Gregory**
CONTRACTOR: **Core Down Drilling LLC**		DRILLER: **Andrew Bellucci**

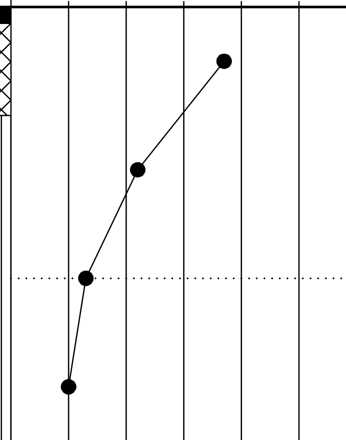
METHOD OF ADVANCING BORING	DIA.	DEPTH	GROUND WATER: DATE	TIME	DEPTH

POWER AUGER:	TO	MON. WELL ☐ YES ☒ NO
ROT. DRILL:	TO	SCREEN DEPTH: --- TO ---
CASING:	TO	WEATHER: **Overcast** TEMP: **70° F**
DIAMOND CORE:	TO	DEPTH TO ROCK: **Not Encountered'**
CME 55 Track Rig with Automatic Hammer		*CHANGES IN STRATA ARE INFERRED

SURFACE ELEVATION: **581.0**
DATUM: **See Remarks**
DATE START: **7/14/21**
DATE FINISH: **7/14/21**

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.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	37	33, 18, 19, 15	S-1			M	GM	0.33' Asphalt Lgt bwn-tn c-f GRAVEL, and c-f Sand, some Silt (FILL)		
3–4	22	12, 12, 10, 6	S-2			M	ML	Bwn SILT, and m-f Sand, trace f Gravel		
5–6	13	5, 6, 7, 6	S-3			M	ML	Gy-bwn SILT, some f Sand, trace f Gravel, roots, wood		576.0
7–8	10	3, 5, 5, 5	S-4			M	ML	Gy-bwn SILT, some f Sand, trace f Gravel		
9								End of Boring at 8'		
10										571.0
11										
12										
13										
14										
15										566.0
16										
17										
18										
19										
20										561.0
21										
22										
23										



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic

BORING No. PB-3

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Middle / High School
LOCATION:	Pawling, NY

SHEET No. 1 of 1

CLIENT: **CSArch**			GROUND WATER	DATE	TIME	DEPTH
CONTRACTOR: **Core Down Drilling LLC**						
METHOD OF ADVANCING BORING	DIA.	DEPTH				
POWER AUGER:		TO	MON. WELL ☐ YES ☒ NO			
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---			
CASING:		TO	WEATHER: **Overcast** TEMP: **70° F**			
DIAMOND CORE:		TO	DEPTH TO ROCK: **Not Encountered'**			
CME 55 Track Rig with Automatic Hammer			*CHANGES IN STRATA ARE INFERRED			

INSPECTOR:	**Paul Gregory**
DRILLER:	**Andrew Bellucci**
SURFACE ELEVATION:	**589.0**
DATUM:	**See Remarks**
DATE START:	**7/14/21**
DATE FINISH:	**7/14/21**

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

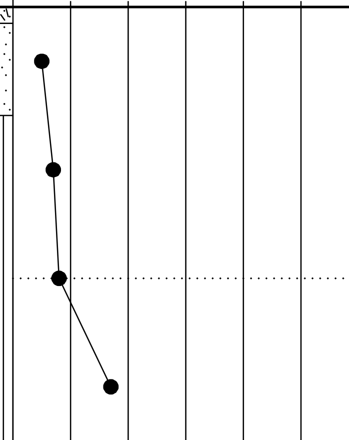
DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1–2	18	40 10 8 7	S-1	19		M	ML	0.5' Asphalt 0.33' Subbase Gy-bwn SILT, some f Sand, little c-f Gravel, trace wood (FILL)	
2–4	12	6 6 6 6	S-2	21		M	ML	GY-bwn SILT, some f Sand, little c-f GRavel	
4–6	7	4 3 4 3	S-3	19		M	ML	Gy-bwn SILT, little f Sand, trace f Gravel	584.0
6–8	9	2 3 6 8	S-4	20		M	ML	Same	
8								End of Boring at 8'	
10									579.0
15									574.0
20									569.0
23									

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic	PROJECT No. 11033.01	BORING No. PB-4
	PROJECT: Pawling Central School District Middle / High School	
	LOCATION: Pawling, NY	SHEET No. 1 of 1

CLIENT: **CSArch**	GROUND WATER	DATE / TIME / DEPTH		INSPECTOR: **Paul Gregory**
CONTRACTOR: **Core Down Drilling LLC**				DRILLER: **Andrew Bellucci**
METHOD OF ADVANCING BORING / DIA. / DEPTH				SURFACE ELEVATION: **593.0**
POWER AUGER: TO	MON. WELL ☐ YES ☒ NO			DATUM: **See Remarks**
ROT. DRILL: TO	SCREEN DEPTH: --- TO ---			DATE START: **7/14/21**
CASING: TO	WEATHER: **Overcast** TEMP: **76° F**			DATE FINISH: **7/14/21**
DIAMOND CORE: TO	DEPTH TO ROCK: **Not Encountered'**			UNCONFINED COMPRESS. STRENGTH (TONS/FT)
CME 55 Track 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.)
0-2	5	1, 2, 3, 3	S-1	21		M	SM	0.5' Topsoil-like material Bwn f SAND, and Silt	
2-4	7	3, 3, 4, 5	S-2	22		M	ML	Bwn SILT, some f Sand, trace f Gravel	
4-6	8	3, 4, 4, 3	S-3	16		M	ML	Same	588.0 (at 5 ft)
6-8	17	3, 6, 11, 17	S-4	20		M	ML	Same	
8								End of Boring at 8'	583.0 (at 10 ft)
15									578.0
20									573.0



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

Tectonic	PROJECT No. 11033.01	BORING No. PB-5
	PROJECT: Pawling Central School District Middle / High School	
	LOCATION: Pawling, NY	SHEET No. 1 of 1

			GROUND WATER				
CLIENT: CSArch			DATE	TIME	DEPTH	INSPECTOR: Paul Gregory	
CONTRACTOR: Core Down Drilling LLC						DRILLER: Andrew Bellucci	
METHOD OF ADVANCING BORING	DIA.	DEPTH				SURFACE ELEVATION:	591.0
POWER AUGER:		TO	MON. WELL ☐ YES ☒ NO			DATUM:	See Remarks
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---			DATE START:	7/14/21
CASING:		TO	WEATHER: Overcast TEMP: 75° F			DATE FINISH:	7/14/21
DIAMOND CORE:		TO	DEPTH TO ROCK: Not Encountered'			UNCONFINED COMPRESS. STRENGTH (TONS/FT)	
CME 55 Track 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.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	STANDARD PENETRATION (BLOWS/FT.)	ELEVATION (FT.)
0–2	7	1, 2, 5, 7	S-1	19		M	ML	0.5' Topsoil-like material Bwn SILT, some f Sand, trace f Gravel		7	
2–4	12	7, 7, 5, 5	S-2	20		M	ML	Same		12	
4–6	6	3, 3, 3, 3	S-3	17		M	ML	Bwn SILT, some f Sand, little c-f Gravel		6	586.0
6–8	10	4, 5, 5, 5	S-4	17		M	ML	Bwn SILT, little f Sand, trace f Gravel		10	
8								End of Boring at 8'			
10											581.0
15											576.0
20											571.0

REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

BORING LOG 11033.01 MIDDLE HIGH SCHOOL.GPJ TECTONIC ENG.GDT 8/27/21

Tectonic

PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Middle / High School**
LOCATION:	**Pawling, NY**

BORING No. PB-6

SHEET No. 1 of 1

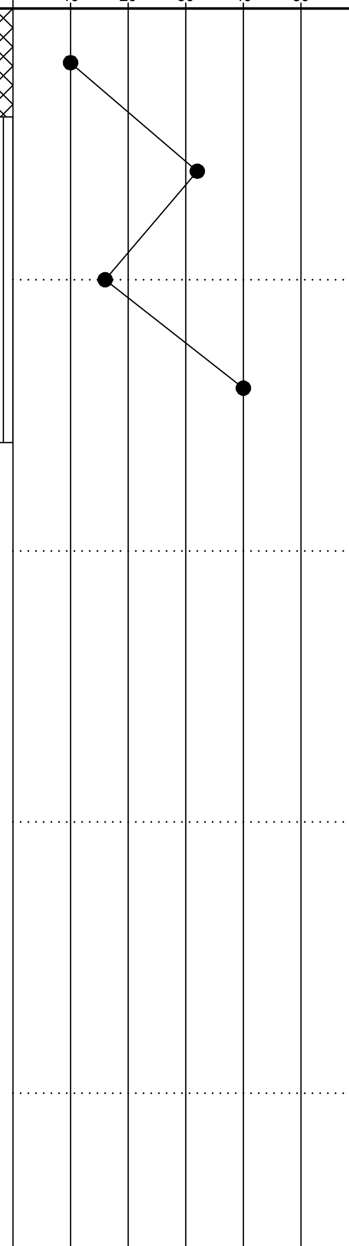
CLIENT: **CSArch**			GROUND WATER: DATE	TIME	DEPTH
CONTRACTOR: **Core Down Drilling LLC**					
METHOD OF ADVANCING BORING	DIA.	DEPTH			
POWER AUGER:		TO	MON. WELL ☐ YES ☒ NO		
ROT. DRILL:		TO	SCREEN DEPTH: --- TO ---		
CASING:		TO	WEATHER: **Overcast** TEMP: **70° F**		
DIAMOND CORE:		TO	DEPTH TO ROCK: **Not Encountered'**		
CME 55 Track Rig with Automatic Hammer			*CHANGES IN STRATA ARE INFERRED		

INSPECTOR:	**Nicolas Watson**
DRILLER:	**Andrew Bellucci**
SURFACE ELEVATION:	**592.0**
DATUM:	**See Remarks**
DATE START:	**7/15/21**
DATE FINISH:	**7/15/21**

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	10	26, 6, 4, 8	S-1	16		M	SM	6" Asphalt Bwn m-f SAND, some Silt, some c-f Gravel (FILL)	
2–4	32	16, 15, 17, 14	S-2	23		M	ML	Dk bwn SILT, trace f Gravel	
4–6	16	9, 7, 9, 14	S-3	20		M	ML	Dk bwn SILT, trace f Gravel, trace f Sand	587.0 (at 5)
6–8	40	23, 20, 20, 21	S-4	20		M	ML	Dk bwn SILT, trace f Gravel	
8								End of Boring at 8'	

Elevations: 587.0 (5 ft), 582.0 (10 ft), 577.0 (15 ft), 572.0 (20 ft)

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



REMARKS: Surface elevations are estimated based on topographic survey provided by CSArch.

BORING LOG 11033.01 MIDDLE HIGH SCHOOL.GPJ TECTONIC ENG.GDT 8/27/21

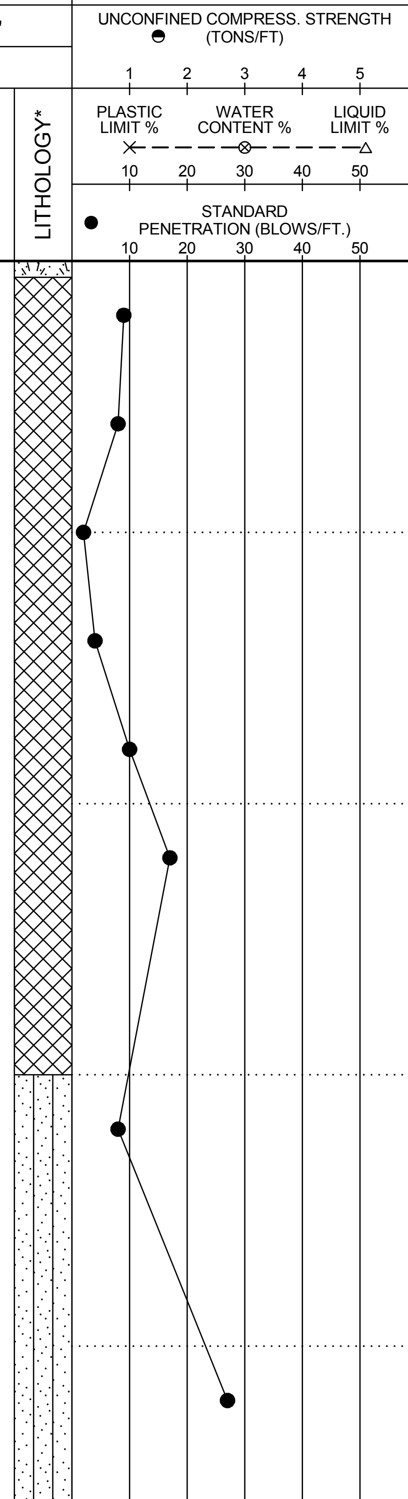
Tectonic

PROJECT No.	11033.01
PROJECT:	Pawling Central School District Elementary School
LOCATION:	Pawling, NY

BORING No. SB-1E

CLIENT: CSArch			GROUND WATER	DATE	TIME	DEPTH	INSPECTOR:	Ryan Villa
CONTRACTOR: Core Down Drilling LLC							DRILLER:	Andrew Bellucci
METHOD OF ADVANCING BORING	DIA.	DEPTH					SURFACE ELEVATION:	476.0
POWER AUGER:	4"	0 TO 23.5'	MON. WELL	☐ YES	☒ NO		DATUM:	See Remarks
ROT. DRILL:		TO	SCREEN DEPTH:	---	TO	---	DATE START:	7/16/21
CASING:		TO	WEATHER:	Clear	TEMP:	85° F	DATE FINISH:	7/16/21
DIAMOND CORE:		TO	DEPTH TO ROCK:	Not Encountered'				
CME 55 Track 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.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
0–2	9	1, 4, 5, 7	S-1	16		M	SM	0.2' Topsoil-like material Bwn m-f SAND, and Silt, trace f Gravel (FILL)	
2–4	8	3, 4, 4, 5	S-2	8		M	SM	Same	
4–6	2	2, 1, 1, 2	S-3	12		M	SM	Bwn c-f SAND, some c-f Gravel, little Silt, trace organics (FILL)	471.0 (at 5)
6–8	4	2, 2, 2, 2	S-4	6		M	SM	Bwn m-f SAND, some Silt, trace c-f Gravel (FILL)	
8–10	10	3, 4, 6, 5	S-5	12		M	SM	Same (FILL)	466.0 (at 10)
10–12	17	5, 11, 6, 5	S-6	12		M	SM	Bwn c-f SAND, and c-f Gravel, some Silt (FILL)	
12–15									461.0 (at 15)
15–17	8	4, 4, 4, 4	S-7	14		W	SM	Bwn m-f SAND, and Silt, trace f Gravel	
17–20									456.0 (at 20)
20–22	27	9, 13, 14, 20	S-8	20		W	SM	Tn m-f SAND, and Silt, trace f Gravel	
22–23									



REMARKS: Surface elevations are estimated using USGS topographic survey, provided by CSArch.

Tectonic	PROJECT No. **11033.01**	**BORING No. SB-1E**	
	PROJECT: **Pawling Central School District Elementary School**		
	LOCATION: **Pawling, NY**	SHEET No. 2 of 2	

CLIENT: **CSArch**

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	LITHOLOGY*	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	ELEVATION (FT.)
								Spoon / Auger refusal @ 23.5'			
24											
								End of Boring at 23.5'			
25											451.0
26											
27											
28											
29											
30											446.0
31											
32											
33											
34											
35											441.0
36											
37											
38											
39											
40											436.0
41											
42											
43											
44											
45											431.0
46											
47											
48											
49											
50											426.0

REMARKS: Surface elevations are estimated using USGS topographic survey, provided by CSArch.

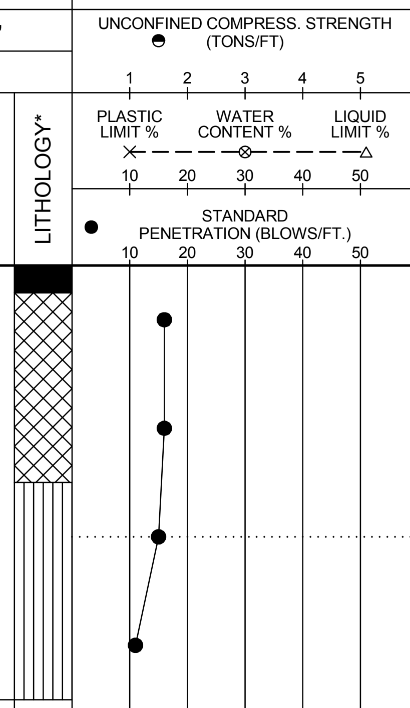
BORING No. PB-1E

Tectonic

PROJECT No.	**11033.01**
PROJECT:	**Pawling Central School District Elementary School**
LOCATION:	**Pawling, NY**
SHEET No. 1 of 1	

CLIENT: **CSArch**		GROUND WATER: DATE	TIME	DEPTH	INSPECTOR: **Ryan Villa**
CONTRACTOR: **Core Down Drilling LLC**					DRILLER: **Andrew Bellucci**
METHOD OF ADVANCING BORING	DIA. / DEPTH				SURFACE ELEVATION: **480.0**
POWER AUGER:	TO	MON. WELL ☐ YES ☒ NO			DATUM: **See Remarks**
ROT. DRILL:	TO	SCREEN DEPTH: **---** TO **---**			DATE START: **7/16/21**
CASING:	TO	WEATHER: **Clear**	TEMP: **85° F**		DATE FINISH: **7/16/21**
DIAMOND CORE:	TO	DEPTH TO ROCK: **Not Encountered'**			UNCONFINED COMPRESS. STRENGTH (TONS/FT)
CME 55 Track 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.)
0–2	16	31, 8, 8, 11	S-1	8		M	SP	6" Asphalt 2" Tn m-f SAND, trace c-f Gravel, trace Silt (FILL)	
2–4	16	12, 10, 6, 8	S-2	0		W		No Recovery (wet spoon)	
4–6	15	11, 9, 6, 8	S-3	14		W	ML	Bwn SILT, little f Sand, trace f Gravel	475.0
6–8	11	7, 6, 5, 9	S-4	0		W	ML	Same	
8								End of Boring at 8'	
10									470.0
15									465.0
20									460.0



REMARKS: Surface elevations are estimated using USGS topographic survey, provided by CSArch.

BORING LOG 11033.01 ELEMENTARY SCHOOL.GPJ TECTONIC ENG.GDT 8/25/21

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

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

COLOR

Blue - blue	Gy - gray	Wh - white
Blk - black	Or - orange	Yl - yellow
Bwn - brown	Rd - red	Lgt - light
Gn - green	Tn - tan	Dk - dark

SAMPLE NOTATION

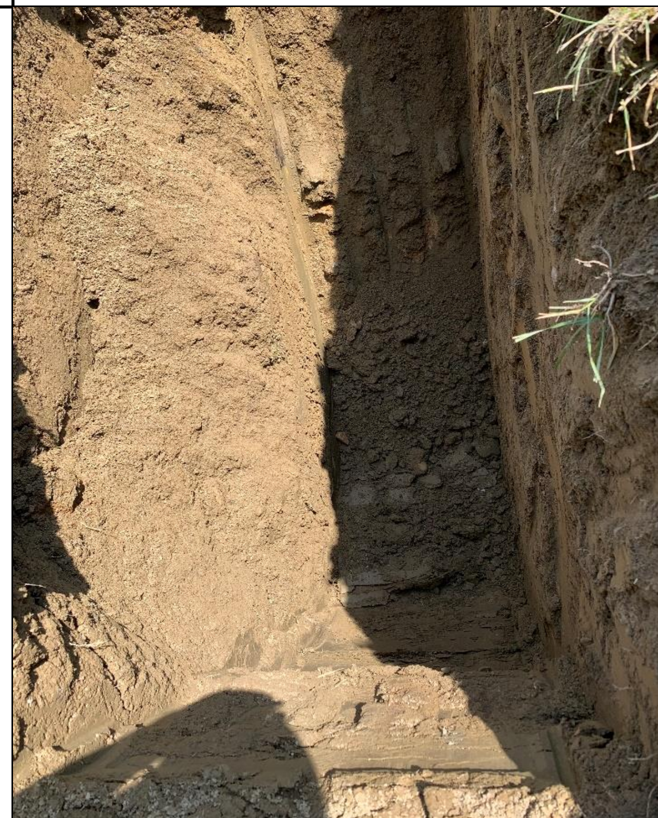
S - Split Spoon Soil Sample	WOC - Weight of Casing
U - Undisturbed Tube Sample	WOR - Weight of Rods
C - Core Sample	WOH - Weight of Hammer
B - Bulk Soil Sample	PPR - Compressive Strength based on Pocket Penetrometer
NR - No Recovery of Sample	TV - Shear Strength (tsf) based on Torvane

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	W.O. No. 11033.01	Date: 7/16/2021	TEST PIT
	Project: Pawling Central School District		TP-1
	Location: Pawling, New York		
(800) 829-6531			

Client:	CS Arch, PC	Depth to Seepage:	N.E.	Inspector:	Ryan Villa
Contractor:	Core Down Drilling, LLC	Depth to Groundwater:	N.E.	Surface Elevation:	+562.0
Equipment:	Kubota KX057-4 mini excavator	Depth to Bedrock:	N.E.	Datum:	See Remarks

SAMPLES: Sample No.	SAMPLES: Moisture	Unified Soil Classification	Soil Profile	Strata Change (ft.)	Foundation Profile	REMARKS
			6" topsoil-like material	-0.5		Test pit excavated approximately 9 feet east of PT-1. Test pit dimensions: 7' L x 2' W No seepage or groundwater observed in test pit. Surface elevations estimated using USGS topographic survey.
	M	ML	Bwn SILT, little m-f Sand, trace c-f Gravel, trace organics	-7.5		
			End of test pit at 7.5'			

PARTICLE SIZE		PROPORTION (exclusive of boulders & cobbles)	PROPORTION (boulders & cobbles)		MOISTURE
Boulder: 10"(+)	Sand: No.200 Sieve-3/16"	trace: 0-10%	sparse:	0-10%	D: dry
Cobble: 3-10"	Silt/Clay: No.200 Sieve (-)	little: 10-20%	few:	10-35%	M: moist
Gravel: 3/16"-3"		some: 20-35%	many:	35-65%	W: wet
		and: 35-50%			

Tectonic

(800) 829-6531

W.O. No.	11033.01
Date:	7/16/2021
Project:	Pawling Central School District
Location:	Pawling, New York

TEST PIT TP-2

Client:	CS Arch, PC	Depth to Seepage:	N.E.	Inspector:	Ryan Villa
Contractor:	Core Down Drilling, LLC	Depth to Groundwater:	N.E.	Surface Elevation:	+590.0
Equipment:	Kubota KX057-4 mini excavator	Depth to Bedrock:	N.E.	Datum:	See Remarks

SAMPLES: Sample No.	SAMPLES: Moisture	Unified Soil Classification	Soil Profile	Strata Change (ft.)	Foundation Profile	REMARKS
			6" topsoil-like material	-0.5		Test pit excavated approximately 8 feet east of PT-4. Test pit dimensions: 6' L x 2' W No seepage or groundwater observed in test pit. Surface elevations estimated using USGS topographic survey.
	M	ML	Bwn SILT, little c-f Sand, trace c-f Gravel, trace organics	-7.0		
			End of test pit at 7.0'			

PARTICLE SIZE		PROPORTION (exclusive of boulders & cobbles)	PROPORTION (boulders & cobbles)		MOISTURE
Boulder: 10"(+)	Sand: No.200 Sieve-3/16"	trace: 0-10%	sparse:	0-10%	D: dry
Cobble: 3-10"	Silt/Clay: No.200 Sieve (-)	little: 10-20%	few:	10-35%	M: moist
Gravel: 3/16"-3"		some: 20-35%	many:	35-65%	W: wet
		and: 35-50%			

Tectonic	W.O. No. 11033.01	Date: 7/16/2021	TEST PIT TP-3
	Project: Pawling Central School District		
	Location: Pawling, New York		
(800) 829-6531			

Client: CS Arch, PC	Depth to Seepage: N.E.	Inspector: Ryan Villa	
Contractor: Core Down Drilling, LLC	Depth to Groundwater: N.E.	Surface Elevation: +584.0	
Equipment: Kubota KX057-4 mini excavator	Depth to Bedrock: N.E.	Datum: See Remarks	

SAMPLES Sample No.	SAMPLES Moisture	Unified Soil Classification	Soil Profile	Strata Change (ft.)	Foundation Profile	REMARKS
			6" topsoil-like material	-0.5		Test pit excavated approximately 8 feet west of PT-5. Test pit dimensions: 7' L x 2' W
	M	ML	Bwn SILT, little c-f Sand, trace c-f Gravel, trace organics	-7.0		No seepage or groundwater observed in test pit. Surface elevations estimated using USGS topographic survey.
			End of test pit at 7.0'			

PARTICLE SIZE		PROPORTION (exclusive of boulders & cobbles)	PROPORTION (boulders & cobbles)		MOISTURE
Boulder: 10"(+)	Sand: No.200 Sieve-3/16"	trace: 0-10%	sparse:	0-10%	D: dry
Cobble: 3-10"	Silt/Clay: No.200 Sieve (-)	little: 10-20%	few:	10-35%	M: moist
Gravel: 3/16"-3"		some: 20-35%	many:	35-65%	W: wet
		and: 35-50%			

Tectonic	W.O. No. 11033.01	Date: 7/16/2021	TEST PIT TP-4
	Project: Pawling Central School District		
	Location: Pawling, New York		
(800) 829-6531			

Client: CS Arch, PC	Depth to Seepage: 3.0 ft	Inspector: Ryan Villa	
Contractor: Core Down Drilling, LLC	Depth to Groundwater: 5.33 ft	Surface Elevation: +604.0	
Equipment: Kubota KX057-4 mini excavator	Depth to Bedrock: N.E.	Datum: See Remarks	

SAMPLES: Sample No.	SAMPLES: Moisture	Unified Soil Classification	Soil Profile	Strata Change (ft.)	Foundation Profile	REMARKS
			6" topsoil-like material	-0.5		Test pit excavated approximately 6 feet west of PT-7. Test pit dimensions: 6' L x 2' W
	M	ML	Bwn SILT, little c-f Sand, trace c-f Gravel, trace organics ∇	-5.33 -6.0		Seepage at 3.0 ft, groundwater table at 5.33 ft. Surface elevations estimated using USGS topographic survey.
			End of test pit at 6.0'			

PARTICLE SIZE		PROPORTION (exclusive of boulders & cobbles)	PROPORTION (boulders & cobbles)		MOISTURE
Boulder: 10"(+)	Sand: No.200 Sieve-3/16"	trace: 0-10%	sparse:	0-10%	D: dry
Cobble: 3-10"	Silt/Clay: No.200 Sieve (-)	little: 10-20%	few:	10-35%	M: moist
Gravel: 3/16"-3"		some: 20-35%	many:	35-65%	W: wet
		and: 35-50%			

Tectonic	W.O. No. 11033.01	Date: 7/16/2021	TEST PIT TP-5
(800) 829-6531	Project: Pawling Central School District		
	Location: Pawling, New York		

Client: CS Arch, PC	Depth to Seepage: N.E.	Inspector: Ryan Villa
Contractor: Core Down Drilling, LLC	Depth to Groundwater: N.E.	Surface Elevation: +595.0
Equipment: Kubota KX057-4 mini excavator	Depth to Bedrock: N.E.	Datum: See Remarks

SAMPLES: Sample No.	SAMPLES: Moisture	Unified Soil Classification	Soil Profile	Strata Change (ft.)	Foundation Profile	REMARKS
			6" topsoil-like material	-0.5		Test pit excavated approximately 6 feet east of PT-6. Test pit dimensions: 7' L x 2' W No seepage or groundwater observed in test pit. Surface elevations estimated using USGS topographic survey.
	M	ML	Bwn SILT, some c-f Sand, trace c-f Gravel	-7.0		
			End of test pit at 7.0'			

PARTICLE SIZE		PROPORTION (exclusive of boulders & cobbles)	PROPORTION (boulders & cobbles)		MOISTURE
Boulder: 10"(+)	Sand: No.200 Sieve-3/16"	trace: 0-10%	sparse:	0-10%	D: dry
Cobble: 3-10"	Silt/Clay: No.200 Sieve (-)	little: 10-20%	few:	10-35%	M: moist
Gravel: 3/16"-3"		some: 20-35%	many:	35-65%	W: wet
		and: 35-50%			

Tectonic	W.O. No. 11033.01	Date: 7/16/2021	TEST PIT TP-6
(800) 829-6531	Project: Pawling Central School District		
	Location: Pawling, New York		

Client: CS Arch, PC	Depth to Seepage: N.E.	Inspector: Ryan Villa	
Contractor: Core Down Drilling, LLC	Depth to Groundwater: N.E.	Surface Elevation: +605.0	
Equipment: Kubota KX057-4 mini excavator	Depth to Bedrock: N.E.	Datum: See Remarks	

SAMPLES: Sample No.	SAMPLES: Moisture	Unified Soil Classification	Soil Profile	Strata Change (ft.)	Foundation Profile	REMARKS
			6" topsoil-like material	-0.5		Test pit excavated approximately 5 feet west of PT-8. Test pit dimensions: 8' L x 2' W No seepage or groundwater observed in test pit. Surface elevations estimated using USGS topographic survey.
	M	ML	Bwn SILT, some c-f Sand, trace c-f Gravel	-7.0		
			End of test pit at 7.0'			

PARTICLE SIZE		PROPORTION (exclusive of boulders & cobbles)	PROPORTION (boulders & cobbles)		MOISTURE
Boulder: 10"(+)	Sand: No.200 Sieve-3/16"	trace: 0-10%	sparse:	0-10%	D: dry
Cobble: 3-10"	Silt/Clay: No.200 Sieve (-)	little: 10-20%	few:	10-35%	M: moist
Gravel: 3/16"-3"		some: 20-35%	many:	35-65%	W: wet
		and: 35-50%			

Tectonic

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

INFILTRATION TEST DATA

W.O. No.: 11033.01 Lot No.: ______ Date: 7/16/2021

Client: CSArch

Project: Pawling Central School District

Project Engineer: Christopher Ferri

Inspector: Ryan Villa / Michael O'Leary

Infiltration Test Location: (see reverse) PT-1/PT-2

Weather Conditions: Sunny, Clear Temperature: 80-85 degrees

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		PERCOLATION TEST RUNS Drop in water levels (inches) at 1 hour intervals						STABLE RATE (in/hr)
PT-1	4' 11"	4"	8:42 AM		2"	2"	2"	1.5"		1.5
			TIME	0:00:00	1 hour	2 hours	3 hours	4 hours		
COMMENTS:										
PT-2	5'	4"	8:47 AM		2"	2"	1.5"	2"		2
			TIME	0:00:00	1 hour	2 hours	3 hours	4 hours		
COMMENTS:										

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.: 11033.01 Lot No.: ______ Date: 7/16/2021

Client: CSArch

Project: Pawling Central School District

Project Engineer: Christopher Ferri

Inspector: Ryan Villa / Michael O'Leary

Infiltration Test Location: (see reverse) PT-3, PT-4

Weather Conditions: Sunny, Clear Temperature: 80-85 degrees

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		PERCOLATION TEST RUNS Drop in water levels (inches) at 1 hour intervals						STABLE RATE (in/hr)
PT-3	4' 11"	4"	8:50 AM		0"	1"	1"	0.25"		0.25
			TIME	0:00:00	1 hour	2 hours	3 hours	4 hours		
COMMENTS:										
PT-4	5'	4"	9:16 AM		6"	9"	8.5"	7"		7
			TIME	0:00:00	1 hour	2 hours	3 hours	4 hours		
COMMENTS:										

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.: 11033.01 Lot No.: Date: 7/16/2021

Client: CSArch

Project: Pawling Central School District

Project Engineer: Christopher Ferri

Inspector: Ryan Villa / Michael O'Leary

Infiltration Test Location: (see reverse) PT-5, PT-6

Weather Conditions: Sunny, Clear Temperature: 80-85 degrees

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		PERCOLATION TEST RUNS Drop in water levels (inches) at 1 hour intervals						STABLE RATE (in/hr)
PT-5	5' 3"	4"	9:06 AM		2"	1.5"	2"	1"		1
			TIME	0:00:00	1 hour	2 hours	3 hours	4 hours		
COMMENTS:										
PT-6	5'	4"	9:20 AM		2"	2"	1.5"	1"		1
			TIME	0:00:00	1 hour	2 hours	3 hours	4 hours		
COMMENTS:										

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.: 11033.01 Lot No.: ______ Date: 7/16/2021

Client: CSArch

Project: Pawling Central School District

Project Engineer: Christopher Ferri

Inspector: Ryan Villa / Michael O'Leary

Infiltration Test Location: (see reverse) PT-7, PT-8

Weather Conditions: Sunny, Clear Temperature: 80-85 degrees

TEST HOLE No.	TEST HOLE DEPTH	TEST HOLE DIA.		PERCOLATION TEST RUNS Drop in water levels (inches) at 1 hour intervals						STABLE RATE (in/hr)
PT-7	5' 1"	4"	8:57 AM		0"	0"	0"	0"		0
			TIME	0:00:00	1 hour	2 hours	3 hours	4 hours		
COMMENTS:										
PT-8	5'	4"	9:24 AM		0"	0"	0"	0"		0
			TIME	0:00:00	1 hour	2 hours	3 hours	4 hours		
COMMENTS:										

Sketch Requirements

(To Be Completed On Back of Sheet)

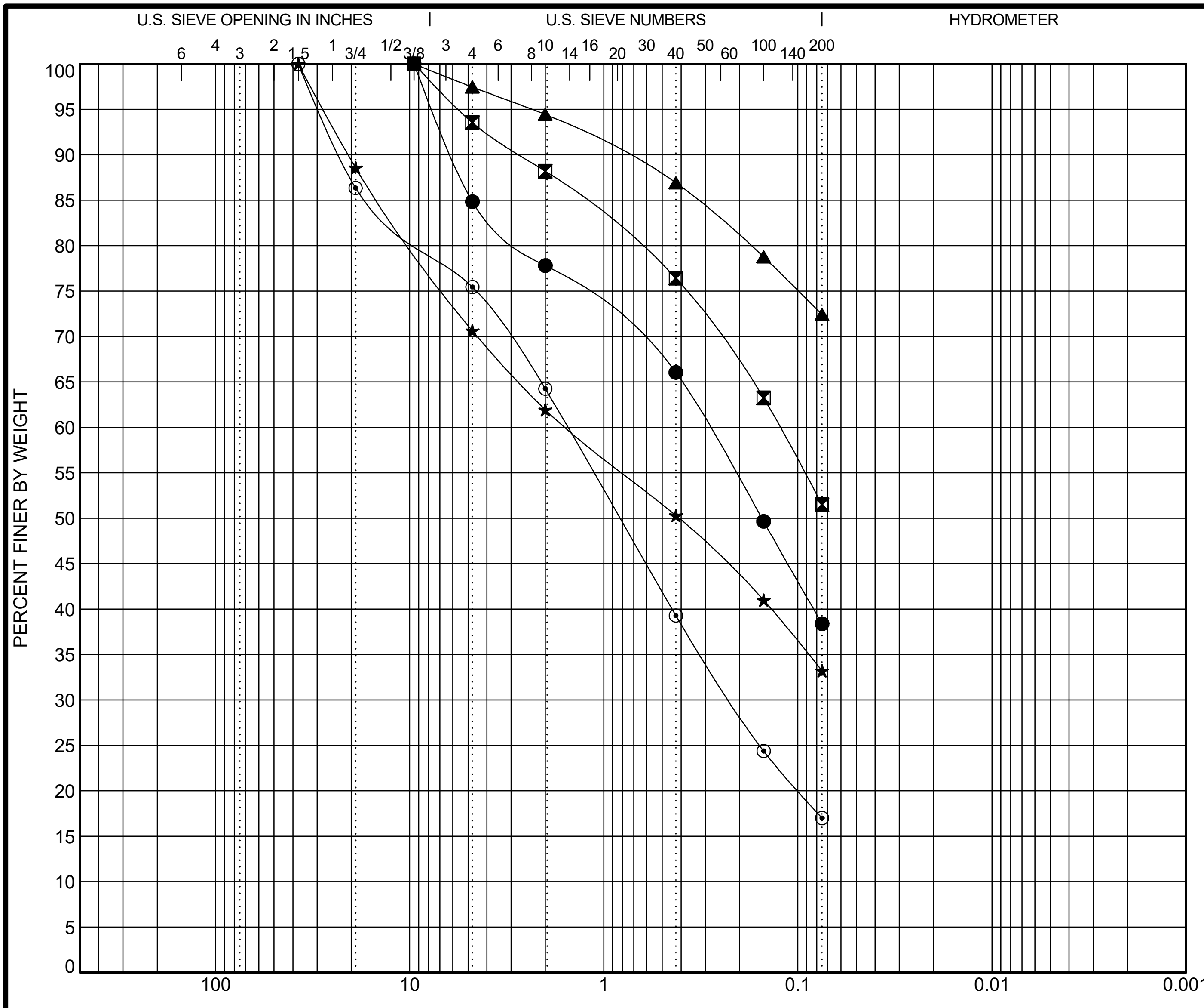
Indicate North

Indicate Nearest Roadway

Indicate Property Lines

Indicate Off-Sets from 2 Adjacent Property Lines

APPENDIX II



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	**PB-1**	**0.0**	**S-1**	**Bwn m-f Sand, and Silt, little f Gravel**	**8.1**					
⧗	**PB-2**	**2.0**	**S-2**	**Bwn SILT, and m-f Sand, trace f Gravel**	**10.0**					
▲	**PB-4**	**2.0**	**S-2**	**Bwn SILT, some f Sand, trace f Gravel**	**18.4**					
★	**PB-6**	**0.0**	**S-1**	**Bwn m-f Sand, some Silt, some c-f Gravel**	**9.9**					
⊙	**SB-1E**	**4.0**	**S-3**	**Bwn c-f SAND, some c-f Gravel, little Silt**	**7.2**					

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	**PB-1**	**0.0**	**S-1**	**9.5**	**0.29**			**15.2**	**46.5**	**38.4**		**Boring**
⧗	**PB-2**	**2.0**	**S-2**	**9.5**	**0.124**			**6.5**	**42.1**	**51.5**		**Boring**
▲	**PB-4**	**2.0**	**S-2**	**9.5**				**2.6**	**25.0**	**72.4**		**Boring**
★	**PB-6**	**0.0**	**S-1**	**37.5**	**1.547**			**29.4**	**37.4**	**33.2**		**Boring**
⊙	**SB-1E**	**4.0**	**S-3**	**37.5**	**1.537**	**0.222**		**24.6**	**58.4**	**17.0**		**Boring: Elementary School**

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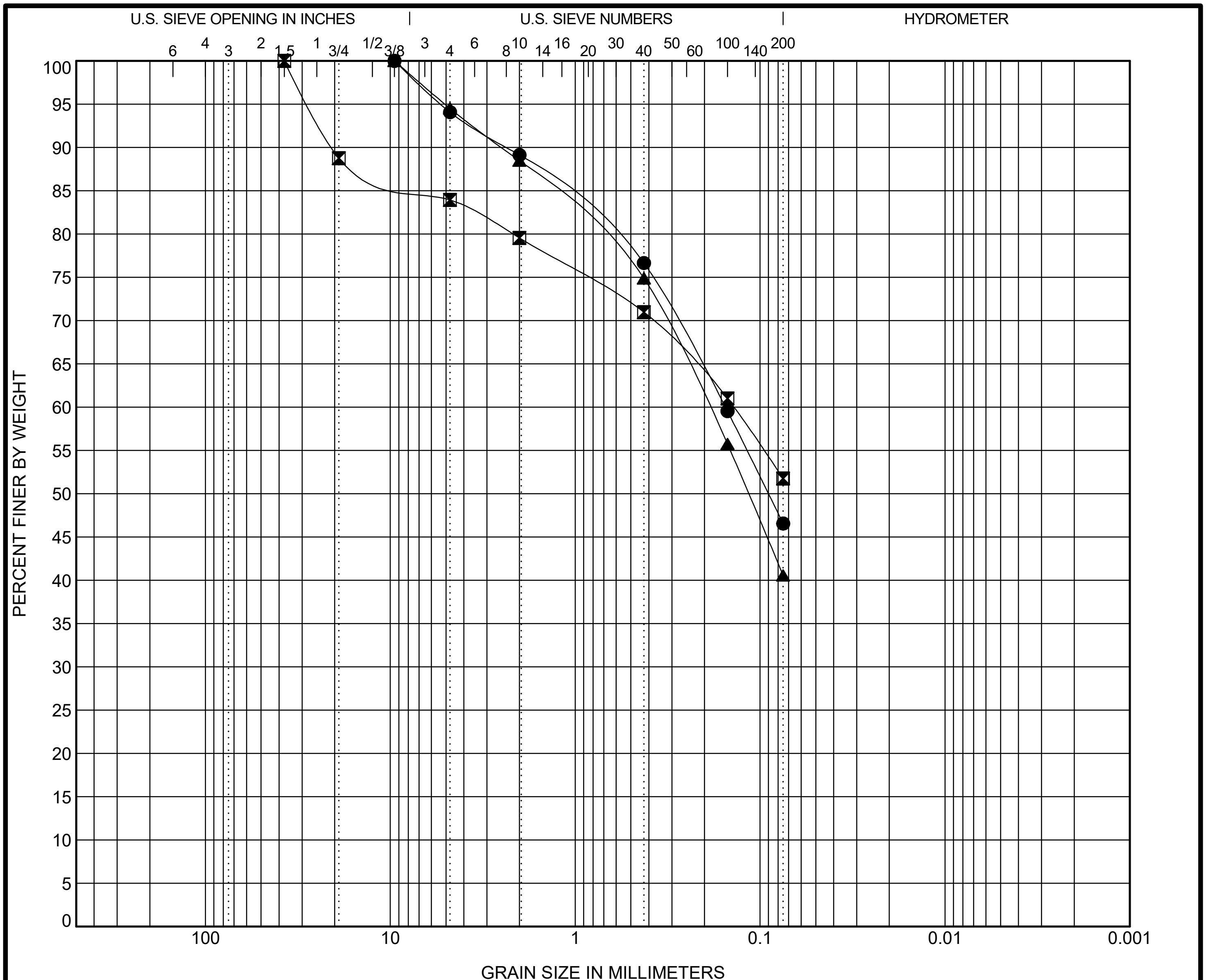
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

GRAIN SIZE DISTRIBUTION

Project No: **11033.01** Date: **8/20/21**

Project: **Pawling CSD**

Location: **Pawling, NY**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	**SB-3**	**4.0**	**S-3**	**Gy-Bwn m-f Sand, and Silt, trace f Gravel**	**13.4**					
⧗	**SB-4**	**2.0**	**S-2**	**Bwn SILT, some f Sand, little c Gravel**	**12.3**					
▲	**SB-6**	**2.0**	**S-2**	**Bwn m-f SAND, and Silt, trace f Gravel**	**16.7**					

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	**SB-3**	**4.0**	**S-3**	**9.5**	**0.154**			**5.9**	**47.5**	**46.6**		**Boring**
⧗	**SB-4**	**2.0**	**S-2**	**37.5**	**0.139**			**16.1**	**32.2**	**51.8**		**Boring**
▲	**SB-6**	**2.0**	**S-2**	**9.5**	**0.189**			**5.5**	**53.9**	**40.6**		**Boring**

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Newburgh, NY 12550
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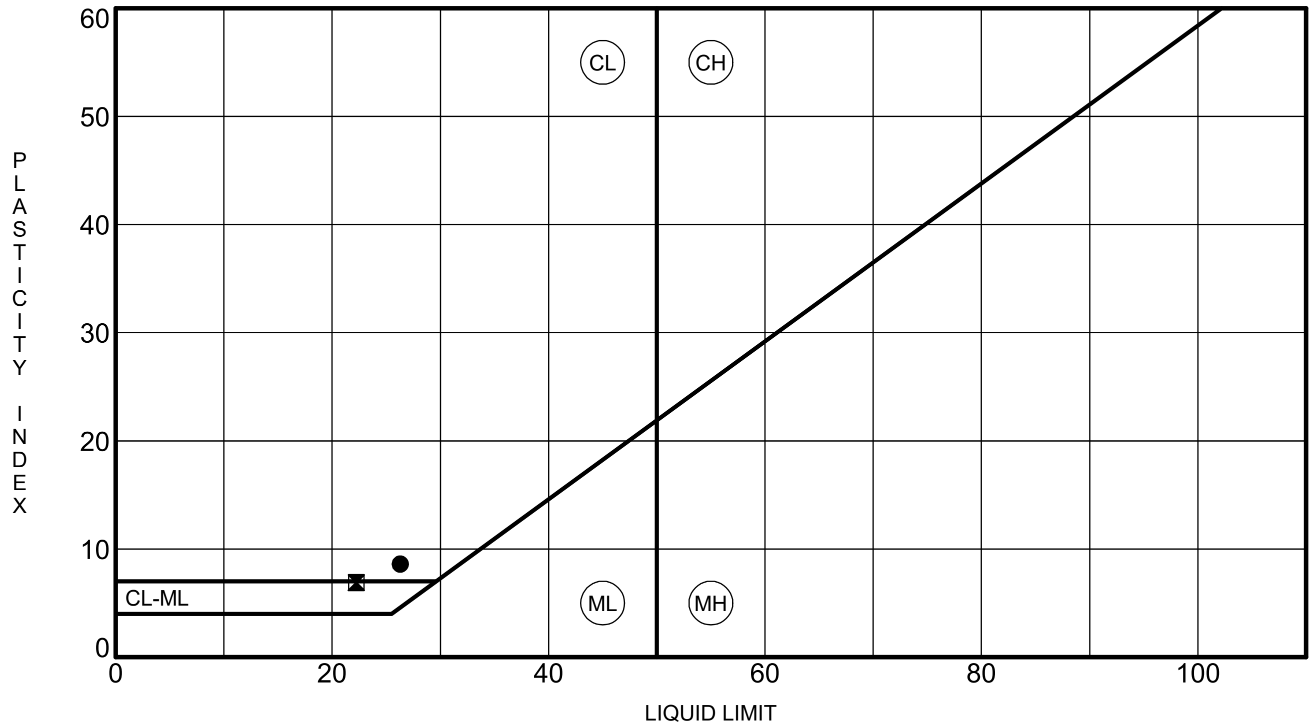
GRAIN SIZE DISTRIBUTION

Project No: **11033.01** Date: **8/20/21**

Project: **Pawling CSD**

Location: **Pawling, NY**



	Sample Identification			LL	PL	PI	Fines %	WC %	Classification
●	**SB-2**	**8.0**	**S-5**	**26**	**18**	**8**	**NA**	**16.6**	**Gy-Bwn SILT & CLAY**
⧗	**SB-7**	**2.0**	**S-2**	**22**	**15**	**7**	**NA**	**14.1**	**Lgt Bwn SILT & CLAY**

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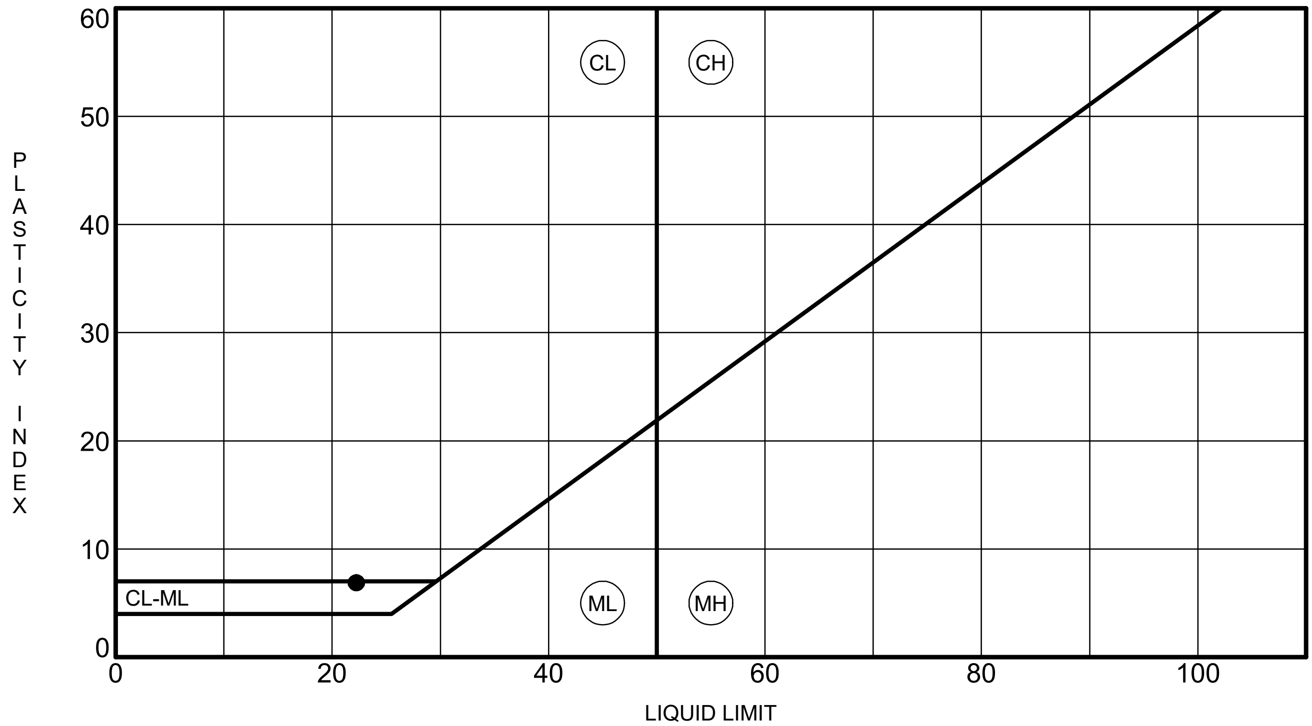
ATTERBERG LIMITS' RESULTS

Project No: **11033.01** Date: **8/27/21**

Project: **Pawling CSD**

Location: **Pawling, NY**



	Sample Identification			LL	PL	PI	Fines %	WC %	Classification
●	SB-7	2.0	S-2	22	15	7	NA	14.1	Lgt Bwn SILT & CLAY

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ATTERBERG LIMITS' RESULTS

Project No: **11033.01** Date: **8/25/21**

Project: **Pawling CSD**

Location: **Pawling, NY**

Boring #	Depth (Ft.)	Sample #	Specimen Description	% Gravel	% Sand	% Fines	USCS	Water Content	Liquid Limit	Plastic Limit	Plasticity Index	Penetrometer (tsf)	Specific Gravity	Dry Density (pcf)	Organic Content (%)	pH
PB-1	0.0	S-1	Bwn m-f Sand, and Silt, little f Gravel	15.2	46.5	38.4		8								
PB-1E	0.0	S-1	Tn m-f Sand, trace c-f Gravel, trace Silt					4								
PB-2	2.0	S-2	Bwn SILT, and m-f Sand, trace f Gravel	6.5	42.1	51.5		10								
PB-4	2.0	S-2	Bwn SILT, some f Sand, trace f Gravel	2.6	25.0	72.4		18								
PB-6	0.0	S-1	Bwn m-f Sand, some Silt, some c-f Gravel	29.4	37.4	33.2		10								
SB-1	10.0	S-6	Gy-Bwn Silt, and f Sand, trace f Gravel					6								
SB-1E	4.0	S-3	Bwn c-f SAND, some c-f Gravel, little Silt	24.6	58.4	17.0		7								
SB-2	8.0	S-5	Gy-Bwn SILT & CLAY					17	26	18	8					
SB-3	4.0	S-3	Gy-Bwn m-f Sand, and Silt, trace f Gravel	5.9	47.5	46.6		13								
SB-4	2.0	S-2	Bwn SILT, some f Sand, little c Gravel	16.1	32.2	51.8		12								
SB-6	2.0	S-2	Bwn m-f SAND, and Silt, trace f Gravel	5.5	53.9	40.6		17								
SB-7	2.0	S-2	Lgt Bwn SILT & CLAY					14	22	15	7					

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Summary of Laboratory Results

Project No: **11033.01** Date: **8/27/21**

Project: **Pawling CSD**

Location: **Pawling, NY**

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

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