APPENDIX C
GEOTECHNICAL INVESTICATION REPORT

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20 January 2017

Glenco Group LLC
670 White Plains Road, Suite 201
Scarsdale, NY 10583

Attn: Glen Vetromile, Principal

Re: Report On Subsurface Soil and Foundation Investigation
Proposed Development
River Knoll
40 Croton Dam Road
Ossining, NY (CSA Job # 16-207)

Dear Mr. Vetromile:

In accordance with our proposal dated 7 November 2016 and your subsequent authorization, we have completed a Subsurface Soil and Foundation Investigation for the referenced site. The purpose of this study was to determine the nature and engineering properties of the subsurface soil and the groundwater conditions for the new construction, to recommend a practical foundation scheme, to determine the allowable bearing capacity of the site soils, and make recommendations for the proposed stormwater management areas.

We understand that the planned construction will consist of a new three-story building with two garage levels, new soil/rock slopes, site retaining walls, and three stormwater management areas. The proposed construction will also include underground utilities, and asphalt paved driveways. To guide us in our study, you have provided us with site plans that indicate the location of the proposed construction.

Our scope of work for this project included the following:

1. Reviewed the proposed layout, the existing site conditions, the expected soil conditions, and planned this study.

2. Retained General Borings, Inc. to advance 17 test borings in the area of the proposed building (borings B-1 through B-5, and B-7 through B-18) as well as 13 borings (borings PT-1 through PT-12) in the stormwater management areas.

3. Performed 9 borehole permeability tests in the proposed stormwater management areas.

4. Laid out the boring locations in the field, provided full time inspection of the explorations, obtained soil samples, and prepared detailed logs and a Boring Location Plan.

5. Performed soil identification tests on selected soil samples in our laboratory.

6. Analyzed the field and laboratory test data and prepared this report containing the results of this study.

SITE DESCRIPTION

The project site is located on the campus of the former Stony Lodge Hospital. The site is occupied by several existing buildings throughout the property. Portions of the existing site are developed with asphalt and concrete parking lots and driveways. The majority of the site is occupied by landscape areas that consist of grass and wooded areas. Several rock outcrops were also noted. Site grades vary significantly from elevation +320.0 to +415.0 at the hill in the center of the property.

SUBSURFACE CONDITIONS

To determine the subsurface soil and groundwater conditions at the site, we advanced 17 test borings in the area of the proposed building, and 13 borings were advanced in the proposed stormwater management areas. The boring locations are shown on the enclosed Boring Location Plan. Detailed logs have been prepared and are included in this report. Our field representative visually identified all soil samples and selected soil samples were tested in our laboratory. The results of these tests are included in this report.

Soil and Rock

The soil descriptions shown on the boring logs are based on the Burmister Classification System. In this system, the soil is divided into three components: Sand (S), Silt ($) and Gravel (G). The major component is indicated in all capital letters, the lesser in lower case letters. The following modifiers indicate the quantity of each lesser component:

Modifier	Quantity
trace (t)	0 -10%
little (l)	10% - 20%
some (s)	20% - 35%
and (a)	35% - 50%

The subsurface soil and rock conditions observed in the borings can be summarized as follows:

Stratum 1A Asphalt — The surface layer in 15 of the borings consists of asphalt that ranges from approximately 0'2" to 0'5" in thickness.

Stratum 1B Topsoil — The surface layer in 14 of the borings consists of topsoil that varies from approximately 0'5" to 1'6" in thickness.

Stratum 1C Concrete — The surface layer in boring B-15 consists of concrete that is approximately 0'4" in thickness.

Stratum 2 Existing Fill — Beneath the surface layers in borings B-1 through B-5, B-8 through B-11, B-13, and PT-4 through PT-8 is existing fill that consists of brown coarse to fine Sand, some (to and) Silt, trace (to little) coarse to fine Gravel or brown SILT and, coarse to fine Sand, little medium to fine Gravel that extends to depths ranging from 0'6" to 9'0" below the existing ground surface.

Stratum 3 Silty Sand or Sandy Silt — Below the surface layers or existing fill in 5 of the borings in the building area and 8 of the borings in the stormwater management areas is loose brown coarse to fine Sand, and Silt, trace (to little) coarse to fine Gravel or soft brown Clayey SILT little (+), coarse to fine Sand that extends to depths ranging from 2'0" to 17'0" below the existing ground surface.

Stratum 4 Silty Sand with Gravel — Below the existing fill or Silty Sand in 9 of the borings in the building area and 9 of the borings in the stormwater management area is medium dense to dense brown coarse to fine SAND, trace (to little) Silt, little (to some) coarse to fine Gravel. This stratum extends to depths ranging from 4'6" to 11'0" below the existing ground surface.

Stratum 5 Weathered Gneiss — Underlying the existing fill, Silty Sand, or Silty Sand with Gravel in 8 borings in the building area and 2 borings in the stormwater management areas is completely weathered gneiss. This layer is soil like in state, however, there could be denser pockets that cannot be conventionally excavated. The weathered Gneiss extends to depths ranging from 3'0" to 10'6" below the existing ground surface.

Stratum 6 Gneiss Bedrock — Gneiss bedrock or auger refusal on the probable bedrock surface was encountered in throughout the site at depths ranging from 0'6" to 17'0" below the existing ground surface.

In the building area, the upper 3'0" to 26'0" of the bedrock was cored at 12 of the boring locations. The rock core recoveries ranged from 33% to 100% and the rock quality designation (RQD) of the recovered cores ranged from 0% to 100%. This indicates that the upper portion of the bedrock ranges from very poor quality in a crushed condition to excellent quality or intact rock.

Groundwater

During the subsurface investigation, groundwater was not encountered above the bedrock surface in any of the 17 test borings. Groundwater was encountered in 8 of the borings performed in the stormwater management areas at depths ranging from 3’0” to 14’0” (elevations +338.0 to +294.5) below the existing ground surface. A summary of the groundwater conditions in the stormwater management areas can be found in Table 4.

Several existing groundwater observation wells were found throughout the site. The locations of the existing groundwater observation wells is included in the boring location plan. Measurements were taken at 2 observation wells (MW-1 and MW-2) and groundwater was found at depths of 7’6” and 5’0” (elevations +356.5 and +338.0) below the existing ground surface, respectively. A summary of the groundwater conditions in the existing groundwater monitoring wells can be found in Table 5.

Groundwater on the subject site will be controlled by the topography and the underlying bedrock surface. As surface water infiltrates the ground, the water will travel along the soil/rock interface and through fractures in the bedrock. During construction, we expect that perched or trapped water may be encountered within the existing fill, in the silty site soils, and/or along the soil/rock interface, especially during wet periods. Proper groundwater control measures will be required in the event that water is encountered in the site excavations. Variations in the location of the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not immediately apparent at the time of this exploration.

EVALUATION

We understand that the planned construction will consist of a new three-story apartment building with one underground garage level and one partial underground garage level. Site development will also include new retaining walls, slopes, asphalt paved parking areas, new underground utilities, and stormwater management areas.

The geotechnical recommendations provided in this report are based on the Preliminary Site Grading Plan dated 2017-01-05 and Site Sections dated 05/20/2016. At the time this report was prepared, the site plans had not been finalized. The following evaluation is based on information that has been provided to our office as of the date of this report. Once the planned construction has been further developed, a copy of the site grading plan should be forwarded to our office so that we can review it along with the recommendations in this report. At that time, any changes or additional recommendations can be provided, if required.

The planned finished floor elevations for the new building vary with the existing topography. We understand that the first floor level will be at elevation +408.0. The underground garages will step down in elevation to the east. Garage level 1 will have a finished floor elevation of +396.0. Garage level 2 will have a finished floor elevation of +384.0. The existing grades in the area vary from approximately elevation +415.0 to +360.0. Therefore cuts up to up to approximately 7’0” and a fill up to approximately 20’0”

will be required to achieve the planned grades in the area of the proposed buildings. A cross-section (prepared by others) through the proposed building is attached in the appendix of this report.

The boring data indicates that the surface layers (Strata 1) are underlain by existing fill (Stratum 2) in portions of the site. The surface layers and existing fill are underlain by loose to dense Silty Sand or Silty Sand with Gravel (Strata 3 and 4). Below the existing site soils is Gneiss bedrock (Strata 5 and 6). The existing fill, groundwater, and bedrock observations for the borings performed in the area of the proposed building are summarized in Table 1 below.

Table 1 – Summary of Boring Observations in Building Area

Boring No.	Approximate Ground Surface Elevation	Depth to Bottom of Existing Fill (Elevation)	Observed Depth to Bedrock (Elevation)
B-1	+409.0	1’6” (+407.5)	6’0” (+403.0)
B-2	+407.0	3’0” (+404.0)	3’0” (+404.0)
B-3	+410.0	2’6” (+407.5)	2’6” (+407.5)
B-4	+410.0	2’6” (+407.5)	2’6” (+407.5)
B-5	+412.0	0’6” (+411.5)	0’6” (+411.5)
B-7	+411.0	NE	2’6” (+408.5)
B-8	+390.0	9’0” (+381.0)	13’0” (+377.0)**
B-9	+383.0	3’0” (+380.0)	6’0” (+377.0) **
B-10	+388.0	1’0” (+387.0)	1’0” (+387.0) **
B-11	+400.0	3’6” (+396.5)	13’0” (+387.0)
B-12	+401.0	NE	11’0” (+390.0)
B-13	+395.0	1’6” (+393.5)	10’6” (+384.5) **
B-14	+370.0	NE	5’0” (+365.0)
B-15	+352.0	NE	10’6” (+341.5)
B-16	+356.0	NE	6’0” (+350.0)
B-17	+364.0	NE	4’6” (+358.0)
B-18	+383.0	NE	5’0” (+378.0)

NE – Not Encountered
** - Auger refusal on Probable Bedrock

Implications of Existing Fill

The boring data indicates that existing fill (Stratum 2) is present within portions of the planned building area. Where the fill was encountered in the borings, it extended to depths ranging from 0’6” to 9’0” (elevation + 411.5 to +387.0) below the existing ground surface. With finished floor elevations of +408.0, +396.0, and +384.0, the majority of the existing fill will be removed from below the proposed building during excavation to the planned subgrade. However, the depth of the existing fill is expected to be variable and may be deeper in unexplored areas of the site, especially adjacent to the existing buildings.

The existing fill is not an acceptable bearing material for the new building foundations and floor slab. The consistency and density of the fill material are not predictable. Certain areas may contain clean dense soils while other areas may contain loose material, topsoil, and/or debris, as shown by the boring data. The existing fill creates the possibility of intolerable differential settlements under loading. To eliminate the potential for damaging differential settlements, we recommend that the existing fill be completely removed from the new building area and replaced with new compacted fill.

We recommend that a series of supplemental test pits be performed at the time of construction to further evaluate the existing fill conditions in and around the planned building area. The test pits should be conducted under the full time observation of a Carlin-Simpson & Associates representative. These test pits will be used to confirm the consistency of the fill and to establish the vertical and horizontal extents of the existing fill within the planned building area.

Provided that the existing fill and any other unsuitable materials encountered during construction are removed, it is our opinion that the new structural fill, virgin soils, and weathered or intact bedrock can adequately support the new building foundations and floor slabs.

Removal of Existing Structures from New Building and Pavement Areas

Building Area

As part of the site development, the existing buildings and structures will be removed. All debris resulting from the demolition of these structures must be completely removed from the new building area, extending at least ten (10) feet beyond the new building limits, where practical. This shall include the complete removal of all foundations, walls, floor slabs, utilities, pavement, and miscellaneous debris. Where the removal of existing structures or associated materials extends below the planned building, the resulting excavations shall be backfilled with new compacted fill as described below.

Existing utilities, where they are encountered within the planned building area, should be either abandoned or rerouted around the new structure. Once the utility has been rerouted or abandoned, the section of pipe and any associated structure within the building area should be completely removed. The removal of the pipe and structure must also include any loose fill around the pipe or structure. After the pipe, associated structure, and associated loose backfill have been removed, the resulting excavation shall be backfilled with new controlled fill as described below.

New compacted fill shall consist of either suitable on-site soil or imported sand and gravel. Imported sand and gravel fill shall contain less than 20% by weight passing a No. 200 sieve. The fill shall be placed in layers not exceeding one (1) foot in loose thickness. In the proposed building area, new fill shall be compacted to at least 95% of its Maximum Modified Dry Density (ASTM D-1557). Each layer shall be compacted, tested, and approved prior to placing subsequent layers.

Pavement Areas

In the proposed pavement areas, the existing structures and debris resulting from the demolition of these structures must be completely removed from the new pavement area, extending at least five (5) feet beyond the new paving limits, where practical. The excavations resulting from the removal of existing structures shall be backfilled using controlled compacted fill. New fill shall consist of either suitable on-site soil or imported sand and gravel placed in one (1) foot loose layers and compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557).

Preparation of Building Area and Removal of Existing Fill

In order to prepare the new building areas for construction, all surface materials, such as topsoil, surface vegetation, concrete, asphalt, etc. shall be removed from the planned building areas, extending at least ten (10) feet beyond the new construction limits, where feasible.

After the surface materials are removed, the existing fill, where present, shall be excavated from the new building areas. The removal of the existing fill from the new building areas shall extend through the existing fill, down to the virgin soil. At the bottom of the excavation, the removal of the unsuitable material shall extend horizontally beyond the building lines a minimum distance of three (3) feet plus a distance equal to the depth of the excavation below the planned foundation bearing elevation. For example, if the removal of the existing fill extends vertically four (4) feet below the planned foundation bearing elevation, the excavation must extend horizontally a minimum of seven (7) feet (3 feet plus 4 feet) beyond the new building line at that location.

The removal of the existing fill from the planned building areas shall be performed under the full time inspection of Carlin-Simpson & Associates or a qualified geotechnical engineering firm. The geotechnical engineer or their representative shall direct the contractor during this operation to ensure that all of the unsuitable material has been removed from the proposed building areas.

During the removal of the existing fill from the building areas the contractor should segregate the potentially re-usable existing fill material from the non-reusable fill (i.e. debris and topsoil). Based on the boring observations, we anticipate that most of the existing fill material may not be suitable for re-use as new compacted fill. The geotechnical engineering firm shall evaluate the suitability of the excavated materials for use as compacted fill during the excavation and prior to its re-use. Potentially usable fill should be stockpiled and covered with tarps or plastic sheeting for protection from excess moisture. Any fill material that is or becomes wet must be dried prior to its re-use.

Once the required depth and horizontal limits of the excavation have been achieved and prior to placement of new fill, the exposed subgrade at the bottom of the excavation shall be graded level and proofrolled by several passes of a large vibratory drum roller (i.e. Dynapac CA 250 or equivalent). The proofrolling is necessary to densify the underlying soil. Carlin-Simpson & Associates or a qualified geotechnical engineering firm shall

witness the proofrolling operations. If any soft or otherwise unsuitable soils are noted, the unsuitable material shall be removed and replaced with new compacted fill. The geotechnical engineer or their representative shall be responsible for determining what material, if any, is to be removed and will direct the contractor during this operation.

Rock Removal - Blasting Issues

As discussed above, bedrock was encountered in each of the test borings during this study at depths ranging from 0'6" to 13'0" beneath the ground surface. These depths correspond to bedrock elevations ranging between approximately elevation +411.5 and elevation +341.0. Rock outcropping was also observed at the site. The observed depth to bedrock at each boring location is summarized in Table 1 above.

At 12 boring locations, the upper 3'0" to 26'0" of the Gneiss bedrock was cored. In general, the quality of the bedrock varies and generally improves with depth. The rock quality ranges from very poor quality in a crushed condition to excellent quality or intact rock condition.

The bedrock encountered in the borings consists of Gneiss. Based on our experience, the in-situ bedrock will range from highly weathered, fractured rock to massive, intact rock. To excavate the rock, the upper 1'0" to 3'0" of rock may be "rippable" by using large construction equipment. The use of hydraulic hammers and/or blasting will be required in order to achieve deeper excavations. Zones of weathered rock may exist deeper than 3'0" but conditions are expected to be highly variable. Hard rock will be encountered during construction.

In order to develop the site, rock removal will be required in areas to achieve the proposed grades. Rock removal may also be required for the new pavement and utilities in portions of the site. Rock blasting will likely be required to achieve the proposed grades in areas. Nearby buildings and existing underground utilities could be affected by the blasting.

The blasting operation shall be monitored by a seismologist using a seismograph. The maximum peak particle velocity on any one component of an instrument measuring three-component motion shall not exceed the limits indicated in Table 2 below.

Table 2 – Distance Versus Peak Particle Velocity Method

Distance in Feet To Nearest Building	Peak Particle Velocity of any One Component (Inches per Second)
0 to 100	1.50
100 to 200	1.25
200 to 500	1.00
500 to 1,000	0.50
Over 1,000	0.25

Each blast will be monitored independently to insure that this criterion is not exceeded. The monitoring results shall be provided to the blasting contractor as soon as possible so that the blasting program can be modified if necessary.

We recommend that a minimum of four (4) monitoring points be established, to the north, east, south and west of the planned blast area. The seismograph sensors should be placed near the closest structure and at any structures identified during the pre-blast survey that are considered to be susceptible to vibration damage. Where possible, the seismograph sensors should be placed on the bedrock surface. This will require shallow excavations through the overburden soils in the monitoring areas.

Prior to the start of any construction, a Blasting Management Plan shall be prepared by the blasting contractor for this project. This plan shall be in accordance with State regulations and the Explosive Materials Code, NFPA No. 495, National Fire Prevention Association. Additionally, all blasting should adhere to the provisions of 29 CFR Ch. XVII Section 1910.109 for explosives and blasting agents and to all local requirements.

Prior to any blasting work being done, a licensed professional engineer shall be retained to perform a detailed pre-blast survey of existing structures located within 300 feet of the planned blast area. The pre-blast survey shall be conducted in accordance with the requirements of local authorities. A copy of all reports prepared by the licensed engineer shall be submitted to the Town Engineer and the owner's representative in a timely manner.

Prior to the beginning of blasting, a notice will be sent to all residential and commercial property owners within a 300-foot radius of the blast area. This notification will be given at least 48 hours before blasting takes place. A contact person will be established and named in this notice to respond to all concerns raised by nearby residents during the blasting phase of the project. The contact person will respond to any inquiries within 24 hours.

New Building Foundations

After the building areas have been prepared as outlined above, the foundations may be constructed. Based on the site plans and the boring data, as well as the proposed construction, the building footings will bear on either the virgin site soils, new compacted fill, or bedrock. The excavations for the new foundations shall be performed under the full time inspection of Carlin-Simpson & Associates or a qualified geotechnical engineer.

Where rock is encountered in the foundation excavations, "Special Construction Procedures" must be employed. When continuous wall footings or closely spaced column footings (20 feet or less) bear on dissimilar material (i.e. rock and soil) the potential for differential movement exists. A footing bearing in rock will not move, whereas a footing bearing on soil will settle slightly due to the compressive nature of all soils when subjected to new loads. The area between movement and non-movement will develop a (shear) stress point. Cracks in foundations and walls will be the result from such movement. Therefore, continuous wall footings must bear either entirely on rock or entirely on soil for any

individual structure. Alternatively, for larger structures, transition zones can be constructed to create a gradual transition from a soil to a rock bearing subgrade.

Where rock and soil both exist at the bearing elevation in a foundation excavation, the footings must either be lowered to bear entirely on rock, or a minimum of 18 inches of rock must be removed from below planned footing bottom. The over-excavated 18 inches must then be filled with a granular material having a maximum particle size of 1/2-inch and containing at least 10% but not more than 30% material by weight passing a No. 200 sieve. The fill shall be placed in six (6) inch layers and each layer shall be compacted to at least 95% of its Maximum Modified Dry Density (ASTM D-1557). This procedure will create a "cushion" atop the rock and reduce the potential for differential movement. For soft, rippable rock, this procedure will not be required.

Adjacent column footings greater than 20 feet apart may bear on dissimilar material (i.e. soil and rock). Any individual column footing must bear entirely on the same type bearing material (i.e. all soil or all rock). In addition, new footings constructed on sloping bedrock must be keyed into the bedrock surface.

If during the excavation for continuous foundations, the transition from soil to rock is gradual (i.e. from medium dense soil to dense weathered rock to very dense rock) over a distance of 20 feet or more, the "Special Construction Procedures" may not be required. This would have to be evaluated in the field on a case-by-case basis by the representative from Carlin-Simpson & Associates or a qualified geotechnical engineer at the time of construction.

Where the transition from rock to soil is abrupt within the excavation for continuous wall foundations, transition zones can be constructed by over-excavating the rock in steps and increasing the "soil cushion" thickness over a distance of 24 feet or more. To construct the transition zone, the bedrock is over-excavated in a series of steps, each step being six (6) inches in depth and at least eight (8) feet in length. The first step is six (6) inches deep, the second step is 12 inches deep, and the final step is 18 inches deep. The over-excavation is then backfilled with the soil cushion material described above. A detail showing a typical transition zone (FIG-3) is attached in the appendix of this report.

Prior to the placement of formwork, reinforcement steel, and concrete, the bearing subgrade soil shall be cleaned of all loose soil and where soil is encountered at the subgrade elevation, it shall be compacted with several passes of a small vibratory drum trench compactor (i.e. Wacker Model RT560), a heavy vibratory plate tamper (i.e. Wacker BPU 3545A or equivalent), or "jumping jack" style tamper (i.e. Wacker Model BS 600). This must be performed under the observation of Carlin-Simpson & Associates or a qualified geotechnical engineer. If instability is observed during the compaction of the bearing subgrade, the soft soil shall be removed and replaced with new compacted fill.

The new foundations may be designed as a shallow spread footings bearing on the virgin soil, bedrock, or new approved compacted fill. The following net allowable bearing pressures are recommended:

2 TSF	Virgin Soil or New Compacted Fill
5 TSF	Weathered or Intact Gneiss

All of the exterior footings shall bear at least 42 inches below the finished outside grade for protection from frost. Footings on rock may bear at shallower depths since rock is not frost susceptible. Interior footings may bear just below the floor slabs, provided that the buildings are heated during winter. The wall footings shall have a minimum width of 18 inches and column footings shall have a minimum dimension of 30 inches.

Foundation Walls

Where foundation walls are required, the soil adjacent to the building walls will exert a horizontal pressure against the wall. This pressure is based on the soil density and Coefficient of Earth Pressure at Rest (k_o), which is applicable to non-yielding building walls. We estimate that the backfill material will have an in-place (moist) density of about 130 pcf and a k_o of 0.5. Based on these properties, the soil will produce an Equivalent Fluid Pressure of 65 psf/ft against the building walls. For sliding, the coefficient of friction between concrete and the virgin site soils or new structural fill is 0.45. For clean sound rock, a friction coefficient of 0.55 can be used.

Where foundation walls are required, we recommend that a footing drain be placed around the exterior of the new structure to prevent water from accumulating against the foundation wall. This drain may consist of a minimum four (4) inch diameter, rigid wall perforated PVC pipe surrounded by at least 12 inches of 3/4-inch clean crushed stone. The stone shall be wrapped in a geotextile fabric, such as Mirafi 140N or equivalent. The foundation drainpipe should be extended to daylight or to the stormwater collection system. The outside face of the foundation wall, where it extends below grade, must be damp proofed or waterproofed.

Outside the structure, the backfill placed adjacent to the foundation walls and above the footing drain shall consist of either clean crushed stone or an imported sand and gravel mixture containing less than 10% by weight passing a No. 200 sieve and placed in layers not exceeding one (1) foot in thickness. This clean sand and gravel or crushed stone backfill shall extend a minimum of one (1) foot horizontally from the back face of the foundation walls, and shall extend vertically up the wall face to two (2) feet below the finished ground surface elevation. Where retained soils are not covered by concrete or pavement and are exposed to weather, the top two (2) feet of backfill should consist of low permeable soil. This will help to minimize water infiltration behind the wall. Surface grades should be sloped away from the building to prevent water from accumulating adjacent to the wall.

Beyond this point, the foundation walls should be backfilled with suitable soil placed in layers up to one (1) foot in thickness. The suitability of the on-site soil for reuse as compacted fill is discussed in a separate section below. The new fill should be compacted with a vibratory drum trench compactor (i.e. Wacker Model RT560), a heavy vibratory plate tamper (i.e. Wacker BPU 3545A or equivalent), or “jumping jack” style tamper (i.e. Wacker Model BS 600) to at least 92% of its Maximum Modified Dry Density

(ASTM D-1557). Heavy equipment should not be operated near the building walls as damage to the walls could occur.

Floor Slabs

After the footings and foundation walls are installed, fill will be required to backfill the excavations and to raise grades in the building area to the slab subgrade elevations. New fill for the floor slabs shall consist of either suitable on-site soil or imported sand and gravel. Imported sand and gravel shall contain less than 20% by weight passing a No. 200 sieve. The fill shall be placed in layers not exceeding one (1) foot in loose thickness and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557). Fill layers shall be compacted, tested, and approved before placing subsequent layers.

The floor may be designed as a slab on grade, bearing on virgin soil, bedrock, or new compacted fill. We recommend a Modulus of Subgrade Reaction (k) of 200 pounds per cubic inch (pci) be used for design. A minimum six (6) inch layer of 3/4-inch crushed stone is recommended beneath the concrete slabs for additional support and drainage. Where the floor slabs are constructed directly on bedrock, a minimum of 12 inches of crushed stone or DGA should be provided beneath the floor slabs for drainage and to act as a cushion on the rock.

Provisions for sump pits and pumps are recommended for the garage levels constructed at elevation +396.0 and +384.0. Sump pits and pumps are also recommended for the first floor areas at elevation +408.0 where excavation into bedrock is required.

Settlement

Settlement of individual footings, designed in accordance with recommendations presented in this report, is expected to be within tolerable limits for the proposed structure. For footings placed on natural soils, weathered rock, or new compacted fill approved by Carlin-Simpson & Associates and constructed in accordance with the requirements outlined in this report, maximum total settlement is expected to be on the order of 1/2-inch or less. Maximum differential settlement between adjacent columns or load bearing walls is expected to be half the total settlement.

The above settlement values are based on our engineering experience with similar soil conditions and the anticipated structural loading, and are to guide the structural engineer with his design. To minimize difficulties during the foundation installation phase, it is critical that Carlin-Simpson & Associates be retained to observe the foundation bearing surfaces and to confirm the recommended bearing pressures and that the existing fill and unsuitable materials have been removed from beneath the new foundations.

Seismic Design Considerations

From site-specific test boring data, the Site Class was determined from Table 1613.5.2 of the New York State Building Code. The site-specific data used to determine

the Site Class typically includes soil test borings to determine Standard Penetration resistances (N-values). Based on estimated average N-values in the upper 100 feet of soil profile, the site can be classified as Site Class C – Very Dense Soil and Soft Rock Profile.

New structures should be designed to resist stress produced by lateral forces computed in accordance with Section 1613 of the New York State Building Code. The values in Table 3 shall be used for this project.

Table 3– Seismic Design Values

Mapped Spectral Response Acceleration for Short Periods, [Fig 1613.5 (1)]	S_S=0.28g
Mapped Spectral Response Acceleration at 1-Second Period, [Fig 1613.5 (2)]	S_1=0.08g
Site Coefficient [Table 1613.5.3 (1)]	F_a=1.2
Site Coefficient [Table 1613.5.3 (2)]	F_v=1.7
Max Considered Earthquake Spectral Response for Short Periods [Eq 16-37]	S_{MS}=0.336g
Max Considered Earthquake Spectral Response at 1-Second Period [Eq 16-38]	S_{M1}=0.136g
Design Spectral Response Acceleration for Short Periods [Eq 16-39]	S_{DS}=0.224g
Design Spectral Response Acceleration for 1-Second Period [Eq 16-40]	S_{D1}=0.091g

Proposed Cut Slopes

Soil and rock excavation will be required to construct the new building. Cuts ranging up to approximately 7’0” are anticipated to achieve the planned subgrade elevation in the area of the building. Additional cuts on the order of 8’0” will be required in the area of the proposed driveway west of the proposed building. We understand that permanent rock slopes will also be constructed below the proposed building as shown on the attached cross-section. The general soil and rock conditions encountered at the boring locations consist of 0’6” to 13’0” of overburden soil followed by Gneiss bedrock.

The rock surface on the subject site is covered with overburden soil. The amount of soil coverage varies from approximately 0’10” to 13’0” throughout the building area. A rock out crop was noted to the west of the proposed building near the proposed driveway. Above the rock cut, the overburden soil must be graded to a stable slope, typically on a 3 horizontal to 1 vertical (3H:1V) or flatter angle.

Preliminarily for this site, we anticipate that rock slopes of approximately 4 vertical to 1 horizontal (76 degrees) may be achievable with proper landing zones and/or rock slope anchoring and stabilization methods. Slopes of 6.0 vertical to 1.0 horizontal may be achieved with proper anchoring and stabilization methods. In rock, the stability of a slope is dependent upon the quality of the rock, the jointing and shear zones in the rock, the strike and dip of the rock, and groundwater seepage.

Portions of the exposed rock face may consist of weathered, fractured Gneiss. The nature of the rock is such that loose spalling rock or slope raveling will occur throughout the life of the slope. Slope raveling is a condition described when small pieces of rock become detached from a rock mass and fall as individual pieces to the toe of the slope. The principal cause of this condition is due to the cyclic expansion and contraction associated

with the freezing and thawing of water in the cracks and fissures of the rock mass. A secondary cause is related to the gradual deterioration (weathering) of the minerals within the rock matrix.

As a result of this process and depending upon the location of the rock slope, the rock slope face may need to be covered with wire mesh netting or have a landing zone at the toe of the slope with a chain link rock impact fence. The landing zone should be pitched slightly towards the toe of the slope.

The width of the landing zone should be increased with the slope height. Listed below are our recommendations for the landing zone widths. Wire mesh netting should be used where an adequate landing zone width cannot be provided.

Slope Height	**Width of Landing Zone**
0 – 5’	1’ – 2’
5’ – 10’	3’
10’ – 20’	8’

Water may seep out of the joints and fracture zones on the new rock face. The water seepage will need to be evaluated by Carlin-Simpson & Associates during construction. Horizontal rock drains may be required to facilitate drainage and to prevent the buildup of water pressure behind the rock slope that could destabilize the slope. Swales and drainage inlets should be provided along the base of the slope to collect the water seepage.

Site Retaining Walls

We understand that several retaining walls will be required in portions of the site. Based on the provided grading plan, the majority of the new walls will be less than 10’0” in height or less. However, the proposed wall on the east side of the proposed building will range up to approximately 19’6” in height. The planned toe slope and back slope conditions around the proposed walls vary with the site grades. The site retaining walls may be designed as either cast-in-place steel reinforced concrete walls or mechanically stabilized earth (MSE) walls. The MSE walls consist of segmental concrete block units with geogrid reinforcement. Foundations for the proposed garage level 2 will be within about 15’0” of the proposed wall. The horizontal increase in stress caused by the footings on the proposed wall must be accounted for in design.

The foundations for the new retaining wall may be placed on the virgin soil, weathered bedrock, or on new compacted fill approved by Carlin-Simpson & Associates. New compacted fill shall consist of either suitable on-site soil or imported sand and gravel. Imported fill shall contain less than 20% by weight passing the No. 200 sieve. The fill shall be placed in one (1) foot thick loose layers and compacted to at least 95% of its Maximum Modified Dry Density (ASTM D-1557). The footings or base of the wall can be designed using a net design bearing pressure of 4,000 psf (2.0 TSF).

For MSE walls, the wall base or foundation must be adequately embedded for internal and global stability and will depend on the proposed toe slope and back slope conditions. The embedment depth will be determined by the Wall Design Engineer. For reinforced concrete walls, the footing or base of the wall shall bear at least 42 inches below finished grade of the outside face of the wall for protection from frost.

Drains must be provided behind the retaining walls to prevent the buildup of hydrostatic pressure against the walls. The drain should consist of a 4-inch diameter perforated PVC pipe, surrounded with 3/4-inch clean crushed stone and wrapped in a geotextile fabric, Mirafi 140N or equivalent. The drain should be installed behind the base or foundation of the retaining wall to collect the water behind the wall and be connected into the site stormwater collection system or extended to daylight beyond the wall area.

Behind the wall, the backfill placed adjacent to the wall and above the footing drain shall consist of freely draining aggregate containing less than 10% material by weight passing a No. 4 sieve. This drainage fill shall extend a horizontally a minimum of 12 inches from the back of the wall and shall extend vertically to at least two (2) feet below final grade behind the wall.

The retaining walls shall be backfilled with suitable soil placed in layers up to one (1) foot in loose thickness. For MSE walls, fill material used to construct the reinforced soil zone shall consist of one of the following soil types according to their USCS designations (GP, GW, SW, SP, SM) with less than 30% by weight passing the No. 200 sieve. The material passing the No. 200 sieve must be either non-plastic or of low plasticity. The maximum particle size shall be limited to 1½ inches.

Beyond the reinforced zone, approved material excavated from the site cut areas may be used as compacted fill provided that it conforms to the wall design gradation requirements, is relatively dry enough to be adequately compacted to the required density and does not contain any debris or organic material (i.e. topsoil and roots).

The new fill shall be compacted with small hand guided vibratory compactors to a minimum density of 92% Maximum Modified Dry Density (ASTM D-1557). Excessive compaction adjacent to the retaining wall must be avoided. Layers shall be tested and approved before placing subsequent layers. Large compaction equipment must not be used within ten (10) feet of the new wall to prevent potential damage to the wall.

The soil adjacent to the site retaining walls will exert a horizontal pressure against the walls. This pressure is based on the soil density and the Coefficient of Active Earth Pressure (k_a). We estimate that the backfill material will have an in-place (moist) density of about 130 pcf and an angle of internal friction (ϕ) of 30^o. For design, soil cohesion is assumed to be zero. The active earth pressure coefficient (k_a) is 0.33 provided the grade behind the wall is level. Based on these properties, the retained soil will produce an Equivalent Fluid Pressure of 43.3 pcf against the retaining wall. If a sloping grade exists behind the new wall, the k_a and the Equivalent Fluid Pressure must be adjusted accordingly. In addition, any surcharge loads from structures, vehicles, construction equipment, stored materials, or other retaining walls (i.e. tiered walls) must be considered

in the wall design. For sliding, the friction coefficient between mass concrete and the virgin site soils or new compacted fill is 0.45. For clean sound rock, a friction coefficient of 0.55 can be used.

The Wall Design Engineer shall prepare a complete wall design (i.e. drawings, specifications, and calculations), which shall be designed and sealed by a Professional Engineer registered in the State of New York and submitted to Carlin-Simpson & Associates for review and approval. MSE retaining walls shall be designed in accordance with the recommendations of the NCMA Design Manual for Segmental Retaining Walls (Current Edition). Carlin-Simpson & Associates can prepare an MSE wall design upon request.

The MSE wall design shall consider the internal stability of the reinforced soil mass and shall be in completed accordance with acceptable engineering practice. In addition, external stability, including sliding, overturning, and bearing, as well as global slope stability shall be evaluated in accordance with acceptable engineering practice.

The MSE Wall Designer Engineer shall be responsible for determining the required geogrid reinforcement lengths and elevations based on his stability analysis (including global stability) and the properties of the geogrid reinforcement used in the design. We anticipate that in the critical areas of the wall, global stability will be the controlling design criteria for the design of the geogrid reinforcement.

The contractor shall be responsible for providing soil samples and completing all necessary laboratory testing, as required by the Carlin-Simpson & Associates, to determine soil design parameters for any imported fill used in the construction of the wall. The Wall Design Engineer must approve the fill to be utilized in the reinforced zone. It is anticipated that most of the on-site soils will be suitable for use in construction of the retaining walls.

Stormwater Management System

We understand that the planned construction will also include 3 stormwater management areas. At the time this report was prepared, the proposed stormwater management system design has not been completed, and the location, grades, and invert elevations of the system had not been finalized. Thirteen soil borings were performed in the proposed stormwater management areas, as well as 2 soil probes.

Groundwater was encountered in 8 of the borings performed in the stormwater management areas at depths ranging from 3’0” to 14’0” (elevations +338.0 to +294.5) below the existing ground surface. A summary of the soil, bedrock, groundwater, and seasonal high groundwater conditions encountered in the stormwater management areas can be found in Table 4 below.

Table 4 - Stormwater Boring and Probe Observations

Boring or Probe No.	Approximate Ground Surface Elevation	Observed Depth to Groundwater (Elevation)	Seasonal High Groundwater Elevation	Depth to Bottom of Existing Fill (Elevation)	Observed Depth to Bedrock (Elevation)
Stormwater Management Area 1A, Basin Bottom El. +360.0					
PT-1	+364.0	NE to 11'0"	+355.5	NE	9'0" (+355.0)
PT-2	+364.0	NE to 9'6"	+355.5	NE	8'6" (+355.0)
PT-2A	+364.0	NE to 9'6"	+355.5	NE	8'6" (+355.0)
PT-9	+365.0	NE to 12'0"	+355.0	NE	NE to 12'0"
PT-10	+364.0	NE to 10'0"	+353.0	NE	10'0" (+354.0)
Stormwater Management Area 1B, Basin Bottom El. +344.0					
PT-3	+339.5	3'0" (+336.5)	+337.5	2'0" (+337.5)	NE to 9'0"
PT-4	+339.0	3'0" (+336.0)	+337.5	2'0" (+337.5)	10'6" (+328.5)
PT-11	+345.0	7'0" (+338.0)	+340.0	NE	8'6" (+336.5)
PT-12	+348.0	NE to 11'0"	+339.5	NE	11'0" (+337.0)
Stormwater Management Area 2B, Basin Bottom El. +300.0					
PT-7	+308.0	4'6" (+303.5)	--	2'6" (+305.5)	NE to 5'0"
PT-7A	+306.0	8'6" (+297.5)	+300.5	3'0" (+303.0)	NE to 9'0"
PT-8	+305.0	10'0" (+295.0)	+298.0	4'0" (+301.0)	NE to 17'0"
P-1	+307.0	12'6" (+294.5)	+298.0	NR	NE to 15'0"
P-2	+311.0	14'0" (+297.0)	+298.0	NR	NE to 15'0"

NE- Not Encountered
NR – Not Recorded

Several existing groundwater observation wells were found throughout the site. The locations of the existing groundwater observation wells is included in the boring location plan. Measurements were taken at 2 observation wells (MW-1 and MW-2) and groundwater was found at depths of 7'6" and 5'0" (elevations +356.5 and +338.0) below the existing ground surface, respectively. A summary of the groundwater conditions in the existing groundwater monitoring wells can be found in Table 5 below.

Table 5 - Monitoring Well Observations

Monitoring Well No.	Approximate Ground Surface Elevation	Depth to Groundwater (Elevation)	Depth to Bottom of Well (Elevation)
MW-1	+364.0	7'6" (+356.5)	7'6" (+356.5)
MW-2	+343.0	5'0" (+338.0)	6'2" (+336.8)

During this study, 9 borehole permeability tests were performed in the proposed stormwater management areas. The borehole permeability test were performed at the boring locations listed in Table 6 below.

Table 6 - Borehole Permeability Test Results

Boring No.	Test Depth (Elevation)	Permeability Rate (in/hr)
Stormwater Management Area 1A,	*Basin Bottom El. +360.0*	
PT-1	5'6" (+358.5)	2.4
PT-2	5'6" (+358.5)	12.2
PT-2A	3'6" (+360.5)	3.6
PT-9	5'0" (+361.5)	2.5
PT-10	4'0" (+360.0)	4.3
Stormwater Management Area 1B,	*Basin Bottom El. +344.0*	
PT-3	2'0" (+337.5)	0.0
PT-11	3'0" (+342.0)	4.1
Stormwater Management Area 2B,	*Basin Bottom El. +300.0*	
PT-7A	4'6" (+300.5)	0.0
PT-8	4'0" (+301.0)	0.0

Stormwater management areas should be a minimum of two (2) feet above confining layers, seasonal high groundwater, or the existing groundwater table. Should stormwater management areas be planned in other portions of the site, they should be evaluated on a case-by-case basis. The stormwater management systems must be designed in accordance with the applicable New York State Department of Environmental Conservation (NYSDEC) regulations and the New York State Stormwater Management Design Manual (August 2010). The testing requirements are outlined in Appendix D of the manual.

Pavement

We understand that the proposed construction will also include new asphalt paved parking areas. We expect that varying cuts and fills will be required to achieve the planned subgrade elevations in the new pavement areas. The existing site soils, weathered Gneiss bedrock, and new compacted fill may be used to support the pavement. To prepare the new pavement areas, the existing surface materials (i.e. topsoil, vegetation, etc.) must be removed from the planned pavement areas.

After all surface materials have been removed, the area can be excavated to the planned subgrade elevation. Where soil is encountered at the subgrade elevation, the subgrade shall be proofrolled with a large vibratory drum roller (i.e. Dynapac 250 or equivalent) to densify the underlying soils. The on-site representative from Carlin-Simpson & Associates shall witness the proofrolling operation. If any excessive movement is noted during the proofrolling, the soft or unsuitable soil shall be removed and replaced with new compacted fill.

Areas where existing fill is encountered shall be compacted in place. Carlin-Simpson & Associates must evaluate these areas for the presence of soft or unsuitable material within the existing fill matrix. Portions of this fill may have to be removed and

replaced with new compacted fill. Carlin-Simpson & Associates will determine this during construction.

Where new fill is required to achieve final grades, it shall consist of either suitable on-site soil or imported sand and gravel. Imported sand and gravel shall contain less than 20% by weight passing a No. 200 sieve. New fill shall be placed in layers not exceeding one (1) foot in loose thickness and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557). After the planned subgrade has been proofrolled and new compacted fill has been placed as required, the new pavement subbase may be placed on the existing site soils, bedrock, and new compacted fill.

We recommend that the rock be processed through a crusher to make it more suitable for use in the fill areas. The maximum particle size shall be limited to six (6) inches in the pavement areas. Within two (2) feet of the final subgrade elevation, the maximum particle size shall be limited to three (3) inches. All rock fill must be well blended with smaller rock fragments and/or soil. Open voids within the rock matrix must be avoided.

A minimum of six (6) inches of dense graded aggregate (DGA) or crushed stone is recommended for sub-pavement drainage and additional pavement support. Where bedrock is encountered at the pavement subgrade elevation, the subbase stone should be increased to a thickness of 12 inches. We recommend that the following pavement section be used for the parking lots. This pavement section is subject to local government approval.

Parking Lots (Light Duty)

1 ½”	Asphalt Wearing Surface Course	NYSDOT, Type 6F
2”	Asphalt Base Course	NYSDOT, Type 1
6”	Stone Subbase (DGA)	NYSDOT, Type 4
	Approved Compacted Subgrade (Minimum CBR = 10)	

Based on the boring data and laboratory test results, we anticipate that the existing site soils, bedrock, and new compacted fill will provide a CBR value that is equal to or greater than 10, which can adequately support the above pavement section.

Utilities

New utilities may bear in the existing site soils, weathered bedrock, or new compacted fill. The bottom of all trenches should be excavated clean and shaped so a hard bottom is provided for the pipe support. If any soft or unsuitable soil conditions are encountered during construction, the unsuitable materials must be removed and replaced with new compacted fill.

Trench blasting may be required to install the new utilities in portions of the site where rock is encountered above the planned utility invert elevation. Where rock is encountered in the utility excavations, it must be removed to at least six (6) inches below planned pipe invert. The over-excavated six (6) inches shall then be filled with new sandy

fill and compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557) to act as a cushion on the rock.

In the event that the trench bottom becomes soft due to the inflow of surface or trapped water, the soft soil shall be removed and the excavation filled with a minimum of six (6) inches of 3/4-inch clean crushed stone to provide a firm base for support of the pipe. Sump pits and pumps should be adequate to keep the excavations dry.

After the utility is installed, the trench must be backfilled with compacted fill. The fill shall consist of suitable on-site soil or imported sand and gravel. Imported fill shall contain less than 20% by weight passing a No. 200 sieve. Large rock fragments and boulders must not be placed directly against the pipe. Controlled compacted fill shall be placed in one (1) foot loose layers and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557). The backfill must be free of topsoil, debris, and large boulders or rock fragments.

Temporary Construction Excavations

Temporary construction excavations should be conducted in accordance with the most recent OSHA guidelines or applicable federal, state or local codes. Based on the boring data, we believe the site soils and rock would have the following classifications as defined by the OSHA guidelines.

Soil/Rock Type	Possible Classification
Virgin Soil & Existing Fill	Type “B” or “C”
Intact Bedrock	Type “A” or Stable Rock

Further evaluation of the site soil deposits and bedrock will be required in the field by a qualified person at the time of the excavation to determine which OSHA soil classification should be used. Trapped water encountered during the excavation could destabilize the sides of the excavation. An evaluation of the excavation stability must be performed if water is encountered. Temporary support (i.e. sheeting and shoring) should be used for any excavation that cannot be sloped or benched in accordance with the applicable regulations. In addition, rock anchors and/or steel wire mesh may be required for stabilization of temporary excavations in bedrock.

Suitability of the In-Situ Soils for Use as Compacted Fill

Topsoil (Stratum 1) is not suitable for use as compacted fill. During the stripping operation it may be stockpiled for use in the landscape areas or removed from the site.

The existing fill (Stratum 2) that was encountered in portions of the site generally consists of Silty Sand. Due to the high fines content of the existing fill, the existing fill will likely not meet the gradation requirements for structural fill provided above. In addition, the high silt content of the existing fill will make the existing fill very moisture sensitive and difficult to compact properly.

The virgin site soils that may be excavated during construction generally consist of Silty Sand or Clayey Silt or Silty Sand with Gravel. The Silty Sand or Clayey Silt site soils likely do not meet the gradation requirements for structural fill provided above. The Silty Sand with Gravel may be suitable for reuse as compacted fill provided that it remains relatively dry for optimum compaction. Large cobbles and boulders shall not be used as new structural fill in the proposed building areas or in utility trenches.

Excavated rock may be used as fill material provided that the material conforms to the required gradation, is well graded, and has been approved prior to use by Carlin-Simpson & Associates. All rock fill must be well blended with smaller rock fragments and/or soil. The maximum particle size for rock placed as fill in the building area shall be three (3) inches in diameter. In other areas of the site, the maximum particle size shall be six (6) inches in diameter. Most of the excavated rock will be too large for use as compacted fill in structural areas. The excavated rock must therefore be processed through a crusher to provide suitable fill material. Rock fill should not be used where it will interfere with the installation of foundations or utilities. Also, it shall not be used as backfill directly against concrete walls or utilities.

When new fill is placed on a sloped subgrade, each fill layer must be benched a minimum of three (3) feet into the existing embankment. Fill layers shall be placed in horizontal layers, beginning at the base of the slope. End dumping over the top of a slope is not permitted.

Proper moisture conditioning of the soil will be required. New compacted fill should be within 2% (+/-) of its optimum moisture content at the time of placement. In the event that the on-site material is too wet at the time of placement and cannot be adequately compacted, the soil should be aerated and allowed to dry or the material removed and a drier cleaner fill material used. In the event that the on-site material is too dry at the time of placement and cannot be adequately compacted, water may be needed to increase the soil moisture content for proper compaction.

The in-situ soils which exist throughout the site may become soft and weave if exposed to excessive moisture and construction traffic. The instability will occur quickly when exposed to these elements and it will be difficult to stabilize the subgrade. We recommend that adequate site drainage be implemented early in the construction schedule and if the subgrade becomes wet, the contractor should limit construction activity until the soil has dried.

GENERAL

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the study and our past experience. If additional information becomes available that might

impact our geotechnical opinions, it will be necessary for Carlin-Simpson & Associates to review the information, reassess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between borings and test pits will differ from those encountered at specific boring or test pit locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process have altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

The professional opinions presented in this geotechnical report are not final. Field observations and foundation installation monitoring by the geotechnical engineer, as well as soil density testing and other quality assurance functions associated with site earthwork and foundation construction, are an extension of this report. Therefore, Carlin-Simpson & Associates should be retained by the Owner to observe all earthwork and foundation construction, to document that the conditions anticipated in this study actually exist, and to finalize or amend our conclusions and recommendations Carlin-Simpson & Associates is not responsible or liable for the conclusions and recommendations presented in this report if Carlin-Simpson & Associates does not perform the observation and testing services.

Therefore, in order to preserve continuity in this project, the Owner must retain the services of Carlin-Simpson & Associates to provide full time geotechnical related monitoring and testing during construction. At a minimum, this shall include the observation and testing of the following: 1) the removal of existing fill and unsuitable soil, where required; 2) the proofrolling of the subgrade soil prior to the placement of new compacted fill; 3) the placement and compaction of controlled fill; 4) the excavation for the building foundations; 5) the preparation of the subgrade for the floor slabs; 6) the construction of retaining walls, rock slopes, and soil slopes; and 7) the preparation of the subgrade for the new pavement areas.

This report has been prepared in accordance with generally accepted geotechnical engineering practice. No other warranty is expressed or implied. The evaluations and recommendations presented in this report are based on the available project information, as well as on the results of the exploration. Carlin-Simpson & Associates should be given the opportunity to review the final drawings and site plans for this project to determine if changes to the recommendations outlined in this report are needed. Should the nature of the project change, these recommendations should be re-evaluated.

This report is provided for the exclusive use of Glenco Group LLC and the project specific design team and may not be used or relied upon in connection with other projects or by other third parties. Carlin-Simpson & Associates disclaims liability for any such third party use or reliance without express written permission. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. Carlin-Simpson & Associates is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

If the conditions encountered during construction vary significantly from those stated in this report, this office should be notified immediately so that additional recommendations can be made.

Thank you for allowing us to assist you with this project. Should you have any questions or comments, please contact this office.

Very truly yours,

CARLIN-SIMPSON & ASSOCIATES

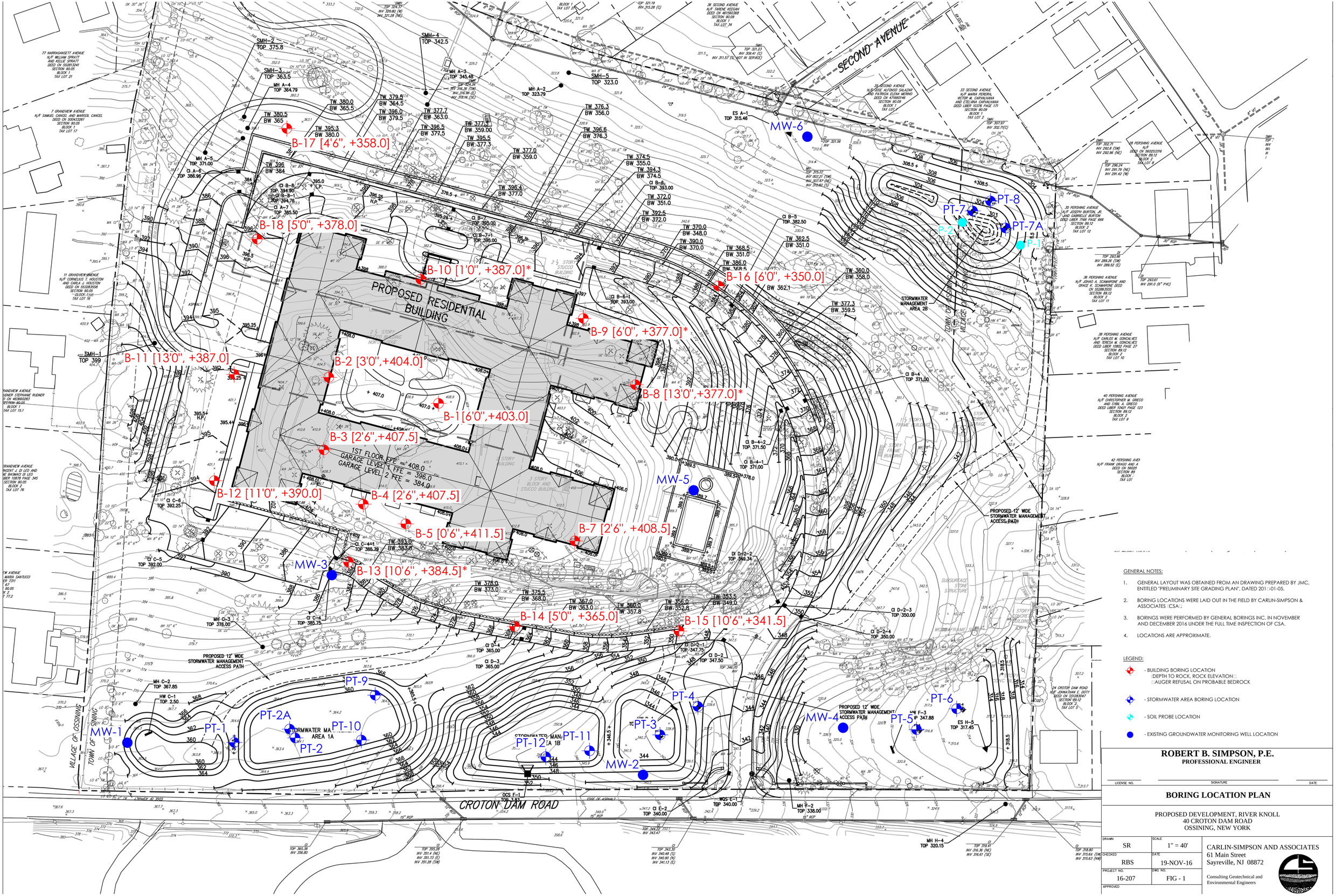
Stephen Rossi

STEPHEN ROSSI, E.I.T.
Project Manager

Robert Simpson

ROBERT B. SIMPSON, P.E.

File No. 16-207



GENERAL NOTES:

1. GENERAL LAYOUT WAS OBTAINED FROM AN DRAWING PREPARED BY JMC, ENTITILED "PRELIMINARY SITE GRADING PLAN", DATED 201□-01-05.
2. BORING LOCATIONS WERE LAID OUT IN THE FIELD BY CARLIN-SIMPSON & ASSOCIATES □CSA□
3. BORINGS WERE PERFORMED BY GENERAL BORINGS INC. IN NOVEMBER AND DECEMBER 2016 UNDER THE FULL TIME INSPECTION OF CSA.
4. LOCATIONS ARE APPROXIMATE.

LEGEND:

- BUILDING BORING LOCATION □DEPTH TO ROCK, ROCK ELEVATION□ □AUGER REFUSAL ON PROBABLE BEDROCK
- STORMWATER AREA BORING LOCATION
- SOIL PROBE LOCATION
- EXISTING GROUNDWATER MONITORING WELL LOCATION

ROBERT B. SIMPSON, P.E.
PROFESSIONAL ENGINEER

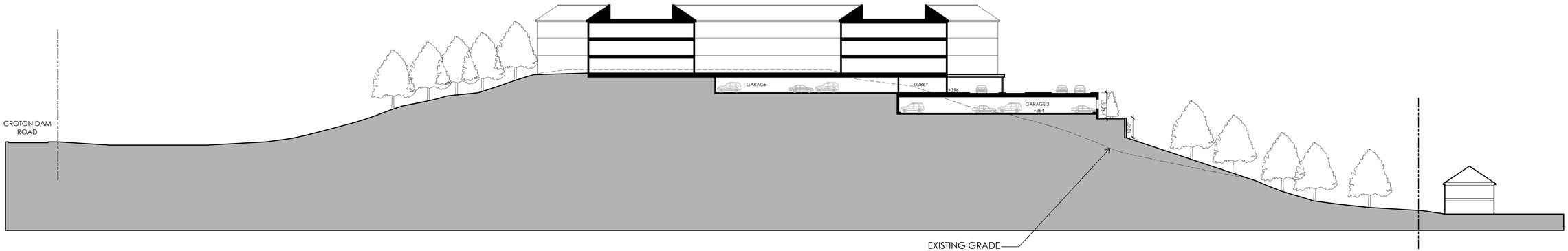
LICENSE NO. | SIGNATURE | DATE

BORING LOCATION PLAN

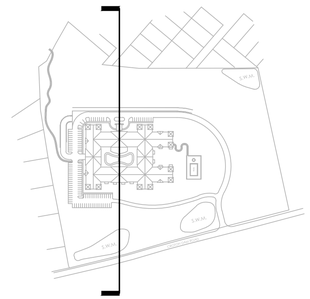
PROPOSED DEVELOPMENT, RIVER KNOLL
40 CROTON DAM ROAD
OSSINING, NEW YORK

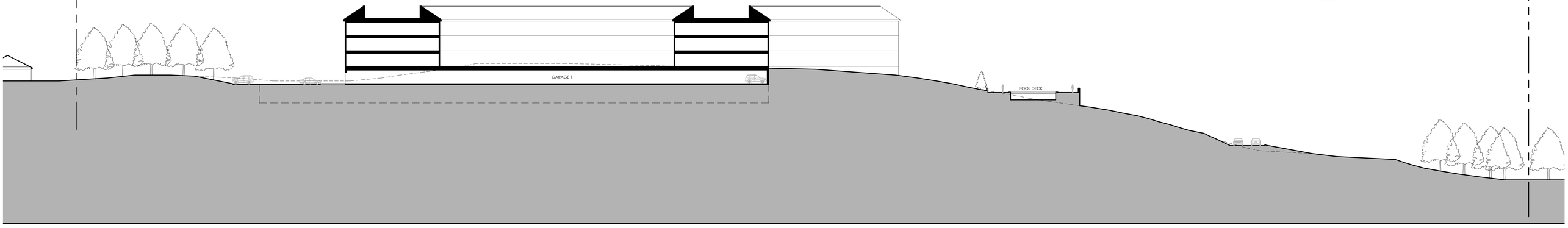
DRAWN: SR	SCALE: 1" = 40'
CHECKED: RBS	DATE: 19-NOV-16
PROJECT NO.: 16-207	DWG NO.: FIG - 1
APPROVED	

CARLIN-SIMPSON AND ASSOCIATES
61 Main Street
Sayreville, NJ 08872
Consulting Geotechnical and Environmental Engineers

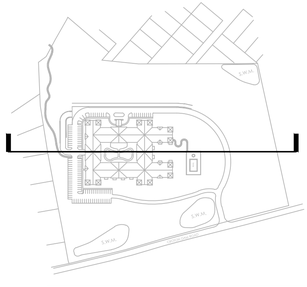


NORTH - SOUTH SECTION





EAST - WEST SECTION



SCALE: 1"=30'-0"

SITE SECTIONS

DATE: 05/20/2016

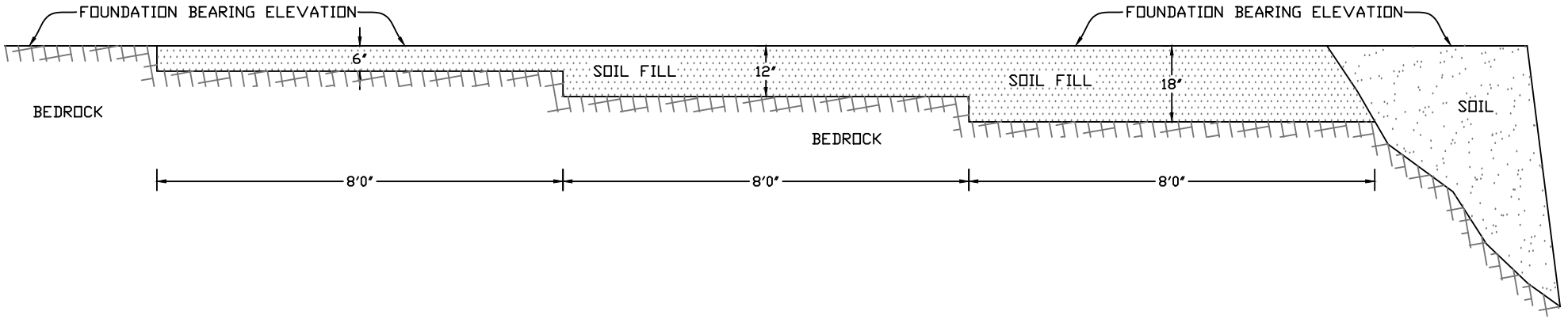
MINNO WASKO
ARCHITECTS AND PLANNERS
80 LAMBERT LANE, SUITE 105, LAMBERTVILLE, NEW JERSEY 08530 MINNOWASKO.COM

GLENCO

RIVER KNOLL

TOWN OF OSSINING, WESTCHESTER COUNTY, NEW YORK

XX-XXXX-XX



NOTES:

1. EXCAVATE ROCK IN A SERIES OF STEPS. EACH STEP SHALL BE 6-INCHES DEEP AND A MINIMUM OF 8-FEET IN LENGTH, FOR A TOTAL DISTANCE OF 24-FEET FROM EDGE OF SOIL/ROCK INTERFACE.

2. BACKFILL OVER-EXCAVATION WITH SOIL FILL. SOIL FILL SHALL BE PLACED IN MAXIMUM 6-INCH LAYERS AND EACH LAYER SHALL BE COMPACTED TO AT LEAST 95% OF ITS MAXIMUM MODIFIED DRY DENSITY (ASTM D1557).

3. SOIL FILL SHALL HAVE A MAXIMUM PARTICLE SIZE OF 1/2-INCH AND CONTAIN AT LEAST 15% BUT LESS THAN 30% BY WEIGHT PASSING A NO. 200 SIEVE.

ROBERT B. SIMPSON, P.E.
PROFESSIONAL ENGINEER

LICENSE NO. _____ SIGNATURE _____ DATE _____

TRANSITION ZONE DETAIL (ROCK TO SOIL)

PROPOSED DEVELOPMENT, RIVER KNOLL
40 CROTON DAM ROAD
OSSINING, NEW YORK

DRAWN: SR	SCALE: 1" = 3'
CHECKED: RBS	DATE: 20-JAN-16
PROJECT NO.: 16-207	DWG NO.: FIG-3
APPROVED	

CARLIN-SIMPSON AND ASSOCIATES
61 Main Street
Sayreville, NJ 08872

Consulting Geotechnical and Environmental Engineers

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-1
Project: Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY		**SHEET NO.:** 1 of 2
Client: Glenco Group LLC		**JOB NUMBER:** 16-207
Drilling Contractor: General Boring Inc.		**ELEVATION:** +409.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	Qx		START DATE: 30-Nov-16
No Water Encountered				DIA.	3 1/4"	1 3/8"	2 7/8"		FINISH DATE: 30-Nov-16
				WGHT		140 #			DRILLER: T. McGovern
				FALL		30"			INSPECTOR: CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	SYM	IDENTIFICATION	REMARKS
					Asphalt 0'4"	
1						
			9		FILL (Br cf S, a (+) $, l (-) cf G)	Rec = 9 "
2		S-1	4		**FILL (Brown coarse to fine Sand, and (+) Silt, little (-) coarse to fine Gravel)** 1'6"	moist
			2			
3			2		Br Cy $, l (+), cf S	
			2		same **Brown Clayey SILT, little (+),**	Rec = 11"
4		S-2	3		**coarse to fine Sand** 4'0"	moist
			17		Br cf S, t (+) $, l (+) cf G, w/ completely weathered Schist	
5			17		**Brown coarse to fine SAND, trace (+) Silt,**	
		S-3	52		same **little coarse to fine Gravel, with**	Rec = 4"
6			50/1"		**completely weathered Schist** 6'0"	moist
						Auger refusal @ 6'0"
7						
						Run #1
8		Run #1			**Gray Gneiss with Mica and Quartz,**	6'0"-11'0"
					blocky and seamy, moderately to	Run = 60"
9					**slightly weathered**	Rec = 58", 97%
						RQD = 55%
10						
11						
						Run #2
12						11'0"-16'0"
						Run = 60"
13		Run #2			same	Rec = 57", 95%
						RQD = 50%
14						
15						
16					16'0"	
17					**Gray Gneiss, massive moderately,**	
					slightly weathered	Run #3
18		Run #3				16'0"-21'0"
						Run = 60"
19						Rec = 58", 97%
						RQD = 84%
20						
21					21'0"	
					Gray Gneiss, intact, fresh	
22		Run #4				

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-1
Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**	**SHEET NO.:** 2 of 2
Client:	**Glenco Group LLC**	**JOB NUMBER:** 16-207

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
23		Run #4 cont'd			**Gray Gneiss, intact, fresh**	Run #4 21'0"-26'0" Run = 60" Rec = 58", 97% RQD = 97%
24						
25						
26					26'0"	
					End of Boring @ 26'0"	
27						
28						
29						
30						
31						
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CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-2
Project: Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY		**SHEET NO.:** 1 of 2
Client: Glenco Group LLC		**JOB NUMBER:** 16-207
Drilling Contractor: General Boring Inc.		**ELEVATION:** +407.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	Qx		START DATE: 30-Nov-16
No water encountered				DIA.	3 1/4"	1 5/8"	2 3/8"		FINISH DATE: 1-Dec-16
				WGHT		140 #			DRILLER: T. McGovern
				FALL		30"			INSPECTOR: CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	SYM	IDENTIFICATION	REMARKS
					Asphalt 0'4"	
1						
		S-1	10		FILL (Br cf S, a (-) $, l (-) cf G)	Rec = 10"
2			5		**FILL (Brown coarse to fine Sand, and (-) Silt, little (-) coarse to fine Gravel)**	moist
			5			
3			50/3"		3'0"	
						Auger refusal @ 3'0"
4					**Gray Gneiss with Mica and Quartz, blocky and seamy, moderately to slightly weathered**	
						Run #1
5		**Run #1**				3'0" - 8'0"
						Run = 60"
6						Rec = 50", 83%
						RQD = 67%
7						
8						
9						
						Run #2
10		**Run #2**			same	8'0" - 13'0"
						Run = 60"
11						Rec = 60", 100%
						RQD = 67%
12						
13					13'0"	
14						
					Gray Gneiss with Mica and Quartz, massive moderately jointed, moderately to slightly weathered	Run #3
15		**Run #3**				13'0" - 18'0"
						Run = 60"
16						Rec = 58", 97%
						RQD = 75%
17						
18					18'0"	
19					**Gray Gneiss with Mica and Quartz, intact, fresh**	Run #4
						18'0" - 23'0"
20		**Run #4**				Run = 60"
						Rec = 60", 100%
21						RQD = 100%
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-2
Project: Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY		**SHEET NO.:** 2 of 2
Client: Glenco Group LLC		**JOB NUMBER:** 16-207

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
23		Run #4 cont'd				
24					**Gray Gneiss with Mica and Quartz, intact, fresh**	Run #5 23'0" - 28'0" Run = 60" Rec = 60", 100% RQD = 100%
25		Run #5				
26						
27						
28					28'0"	
29					**End of Boring @ 28'0"**	
30						
31						
32						
33						
34						
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36						
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CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-3

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1	
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207	
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+410.0	
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo	
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**	**Qx**		**START DATE:**	1-Dec-16	
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**	**2 3/8"**		**FINISH DATE:**	1-Dec-16	
				WGHT		**140#**			**DRILLER:**	T. McGovern	
				FALL		**30"**			**INSPECTOR:**	CKS	

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	SYM	IDENTIFICATION		REMARKS
					Asphalt	0'2"	
1							Rec = 12"
			15		FILL (Br cf S, a $, t mf G)		moist
2			4		**FILL (Brown coarse to fine Sand,**		
			50/5"		**and Silt, trace medium to fine Gravel)**	2'6"	
3							Auger refusal @ 2'6"
4					**Gray Gneiss, shattered, very blocky**		Run #1
		Run #1			**and seamy, moderately weathered**		2'6" - 7'6"
5							Run = 60"
							Rec = 50", 83%
6							RQD = 42%
7							
						7'6"	
8					**End of Boring @ 7'6"**		
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-4

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1	
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207	
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+410.0	
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo	
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**	**Qx**		**START DATE:**	1-Dec-16	
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**	**2 3/8"**		**FINISH DATE:**	1-Dec-16	
				WGHT		**140#**			**DRILLER:**	T. McGovern	
				FALL		**30"**			**INSPECTOR:**	CKS	

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION		REMARKS
					Asphalt	0'2"	
1							
			5		FILL (Br cf S, a $, t (+) mf G)		Rec = 10"
2			27		**FILL (Brown coarse to fine Sand, and**		moist
			50/3"		**Silt, trace (+) medium to fine Gravel)**	2'6"	
3					**Gneiss, completely weathered**	3'0"	Auger refusal @ 3'0"
4							
							Run #1
5		**Run #1**			**Gray Gneiss, blocky and seamy,**		3'0" - 8'0"
6					**moderately weathered**		Run = 60"
							Rec = 67", 83%
7							RQD = 55%
8							
9							
							Run #2
10		**Run # 2**			same		8'0" - 13'0"
11							Run = 60"
							Rec = 93%
12							RQD = 73%
13						13'0"	
14							
							Run #3
15		**Run # 3**			**Gneiss, intact, slightly weathered**		13'0" - 18'0"
16							Run = 60"
							Rec = 58", 97%
17							RQD = 93%
18						18'0"	
					End of Boring @ 18'0"		
19							
20							
21							
22							

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-5

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**	**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**	**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**	**ELEVATION:**	+412.0
GROUNDWATER		**DATUM:**	Topo
START DATE:	2-Dec-16		
FINISH DATE:	2-Dec-16		
DRILLER:	T. McGovern		
INSPECTOR:	CKS		

DATE	TIME	DEPTH	CASING
No water encountered			

	CASING	SAMPLE	CORE	TUBE
TYPE	HSA	SS	Qx	
DIA.	3 1/4"	1 3/8"	2 3/8"	
WGHT		140#		
FALL		30"		

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION	REMARKS
					Asphalt 0'2"	
1			50/1"		**FILL (Brown, black coarse to fine Sand, and Silt, little (-) coarse to fine Gravel)** 0'6"	Rec = 1"
2						moist
						Auger refusal @ 0'6"
3		**Run #1**			**Gray Gneiss, blocky and seamy moderately weathered**	Run #1
4						0'6" - 5'6"
						Run = 60"
5						Rec = 56", 93%
						RQD = 75%
6					5'6" **End of Boring @ 5'6"**	
7						
8						
9						
10						
11						
12						
13						
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20						
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22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-7
Project: Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY		**SHEET NO.:** 1 of 2
Client: Glenco Group LLC		**JOB NUMBER:** 16-207
Drilling Contractor: General Boring Inc.		**ELEVATION:** +411.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	Qx		START DATE: 2-Dec-16
No water encountered				DIA.	3 1/4"	1 3/8"	2 3/8"		FINISH DATE: 2-Dec-16
				WGHT		140#			DRILLER: T. McGovern
				FALL		30"			INSPECTOR: CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	SYM	IDENTIFICATION	REMARKS
1		S-1	2 4 4		**Topsoil** 1'6"	Rec = 15" moist
2			6		Br cf S, a $, l mf G	Rec = 1"
3		S-2	2 50/5"		**Brown coarse to fine Sand, and Silt little medium to fine Gravel** 2'6"	moist
4					**Gneiss, completely weathered** 4'0"	Auger refusal @ 4'0"
5						
6		Run # 1			**Gray Gneiss with Mica and Quartz, shattered, very blocky and seamy. moderately to slightly weathered**	Run #1 4'0" - 9'0" Run = 60" Rec = 52", 87% RQD = 48%
7						
8						
9					9'0"	
10						
11		Run #2			**Gray Gneiss with Mica and Quartz, blocky and seamy, moderatly to slightly weathered**	Run #2 9'0" - 14'0" Run = 60" Rec = 54", 90% RQD = 73%
12						
13						
14					14'0"	
15						
16		Run #3			**Gray Gneiss with Mica and Quartz, massive, moderately jointed, slightly weathered**	Run #3 14'0" - 19'0" Run = 60" Rec = 60", 100% RQD = 83%
17						
18						
19					19'0"	
20						
21		Run #4			**Gray Gneiss with Mica and Quartz, intact, fresh**	Run #4 19'0" - 24'0" Run = 60" Rec = 60", 100% RQD = 100%
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-7
Project: Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY		**SHEET NO.:** 2 of 2
Client: Glenco Group LLC		**JOB NUMBER:** 16-207

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
23		Run #4 cont'd			**Gray Gneiss with Mica and Quartz, intact, fresh**	
24						
25						
26		Run #5			same	Run #5 24'0" - 29'0" Run = 60" Rec = 60", 100% RQD = 100%
27						
28						
29						
30		Run #6			same 30'0"	Run #6 29'0" - 30'0" Run = 12" Rec = 12", 100% RQD = 100%
31					**End of Boring @ 30'0"**	
32						
33						
34						
35						
36						
37						
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39						
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CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-8

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1	
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207	
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+390.0	
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo	
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	5-Dec-16	
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	5-Dec-16	
				WGHT		**140#**			**DRILLER:**	T. McGovern	
				FALL		**30"**			**INSPECTOR:**	CKS	

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	SYM	IDENTIFICATION	REMARKS
					Asphalt 0'2"	
1						
			9		FILL (Br cf S, a (+) $, t cf G)	Rec = 8"
2		**S-1**	8		**FILL (Brown coarse to fine Sand, and**	moist
			11		**(+) Silt, trace coarse to fine Gravel)** 2'0"	
3			9		FILL (Br cf S, l (+) $, a cf G)	
			4		**FILL (Brown coarse to fine SAND, some**	Rec = 6"
4		**S-2**	6		**Silt, some (+) coarse to fine Gravel)**	moist
			14			
5			9		FILL (same, l $)	
			8			Rec = 3"
6		**S-3**	41		FILL (same)	moist
			13			
7			9			
			5		FILL (same)	Rec = 2"
8		**S-4**	4			moist
			3			
9			4		9'0"	
10			23		Br cf S, t (+) $, s cf G	Rec = 14"
			30		**Brown coarse to fine SAND, trace (+) Silt,**	moist
11		**S-5**	44		**some coarse to fine Gravel**	occasional cobbles
			50/4"			
12						
13					13'0"	Auger refusal @ 13'0"
					End of Boring @ 13'0"	On Probable Bedrock
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-9

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+383.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	5-Dec-16
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	5-Dec-16
				WGHT		**140#**			**DRILLER:**	T. McGovern
				FALL		**30"**			**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION	REMARKS
					Asphalt 0'2"	
1						
			4		FILL (Br, bk cf S, s $, l cf G, w/ asphalt, brick)	Rec = 10"
2		**S-1**	9		**FILL (Brown, black coarse to fine SAND,**	moist
			9		**some Silt, little coarse to fine Gravel, with**	
3			11		**asphalt, brick)** 3'0"	
			17		Br cf S, l (+) $, t cf G	Rec = 3"
4		**S-2**	17		**Brown coarse to fine SAND, little (+) Silt,**	moist
			38		**trace coarse to fine Gravel**	
5			40			
		S-3	26		same	Rec = 2"
6			50/3"		6'0"	moist
					End of Boring @ 6'0"	Auger refusal @ 6'0"
7						On Probable Bedrock
8						
9						
10						
11						
12						
13						
14						
15						
16						
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22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-10

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+388.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	5-Dec-16
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	5-Dec-16
				WGHT		**140#**			**DRILLER:**	T. McGovern
				FALL		**30"**			**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	SYM	IDENTIFICATION		REMARKS
					Asphalt	0'2"	
1					FILL (Br cf S, s $, l cf G)		
					FILL (Brown coarse to fine SAND,		
2					**some Silt, little coarse to fine Gravel)**	1'0"	Auger refusal @ 1'0"
					End of Boring @ 1'0"		On Probable Bedrock
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-11
Project: Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY		**SHEET NO.:** 1 of 1
Client: Glenco Group LLC		**JOB NUMBER:** 16-207
Drilling Contractor: General Boring Inc.		**ELEVATION:** +400.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	Qx		START DATE: 5-Dec-16
No water encountered				DIA.	3 1/4"	1 3/8"	2 3/8"		FINISH DATE: 5-Dec-16
				WGHT		140#			DRILLER: T. McGovern
				FALL		30"			INSPECTOR: CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	SYM	IDENTIFICATION	REMARKS
					Asphalt 0'2"	
1			2		FILL (Br cf S, a $, t f G)	Rec = 12"
			1		**FILL (Brown coarse to fine Sand,**	moist
2		**S-1**	2		**and Silt, trace fine Gravel)**	
			2			
3			3		FILL (same)	Rec = 14"
		S-2	4		3'6"	moist
4			16		Br cf S, l $, l cf G	
			23			
5						
			4			Rec = 14"
6		**S-3**	7		Br cf S, a $, l (+) mf G	moist
			27			
7			50/5"		**Brown coarse to fine SAND, some (+) Silt,**	
					little coarse to fine Gravel	
8						
						Boulder 8'0"-9'0"
9						
10						
			12		same, s $	Rec = 15"
11			17			moist
		S-4	12			
12			12			
						Auger Refusal @ 13'0"
13					13'0"	
						Run #1
14					**Gray Gneiss, highly weathered,**	13'0" - 16'0"
		Run 1			**many vertical seams**	Run = 36"
15						Rec = 12", 33%
						RQD = 0%
16					16'0"	
					End of Boring @ 16'0"	Many vertical seams in rock
17						kept jamming core barrel
						Abandonded hole
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-12

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**									**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**									**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**									**ELEVATION:**	+401.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**		**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**	**Qx**			**START DATE:**	5-Dec-16
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**	**2 3/8"**			**FINISH DATE:**	5-Dec-16
				WGHT		**140 #**				**DRILLER:**	T. McGovern
				FALL		**30"**				**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION	REMARKS
					Concrete 0'4"	
1						
			5		Br cf S, a $, t cf G	Rec = 12"
2		**S-1**	2			moist
			2			
3			2		**Brown coarse to fine Sand, and Silt,**	
			2		same **trace coarse to fine Gravel**	Rec = 13"
4		**S-2**	2			moist to wet
			4			
5			10			
			5		same, slightly mottled	Rec = 14"
6		**S-3**	9		6'0"	wet
			11		Br cf S, t (+) $, l cf G, slightly mottled	slight mottling 5'0" - 6'0"
7			24			
			21		same	Rec = 15"
8		**S-4**	21			moist
			46		**Brown coarse to fine SAND, trace (+)**	
9			26		**Silt, little coarse to fine Gravel**	
10						
		S-5	50/5"		same	Rec = 4"
11					11'0"	moist
						Auger refusal @ 11'0"
12						
					Gray Gneiss, massive, moderately	
13		**Run #1**			**jointed, slightly weathered**	Run #1
						11'0" - 16'0"
14						Run = 60"
						Rec = 60", 100%
15						RQD = 83%
16					16'0"	
					End of Boring @ 16'0"	
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-13

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**									**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**									**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**									**ELEVATION:**	+395.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**		**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**	**Qx**			**START DATE:**	6-Dec-16
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**	**2 3/8"**			**FINISH DATE:**	6-Dec-16
				WGHT		**140#**				**DRILLER:**	T. McGovern
				FALL		**30"**				**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION	REMARKS
					Asphalt 0'3"	
1						
			15		FILL (Br cf S, a $, l cf G)	Rec = 15"
2		**S-1**	5		**FILL (Brown coarse to fine Sand,**	moist
			10		**some silt, little coarse to fine Gravel)** 1'6"	
3			22		Br cf S, s $, l cf G with weathered rock	
					Brown coarse to fine SAND, some Silt,	
4					**little coarse to fine Gravel**	
					with weathered rock	
5					5'0"	
		S-2	50/4"		Gneiss, completely weathered	Rec = 3"
6						moist
					Gneiss, completely weathered	
7						
8						
9						
10						Rec = 1"
		S-3	50/1"		same 10'6"	moist
11					**End of Boring 10'6"**	Auger Refusal @ 10'6"
						On Probable Bedrock
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-14

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**	**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**	**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**	**ELEVATION:**	+370.0
GROUNDWATER		**DATUM:**	Topo
START DATE:	6-Dec-16		
FINISH DATE:	6-Dec-16		
DRILLER:	T. McGovern		
INSPECTOR:	CKS		

DATE	TIME	DEPTH	CASING		CASING	SAMPLE	CORE	TUBE
				TYPE	HSA	SS		
				DIA.	3 1/4"	1 3/8"		
				WGHT		140#		
				FALL		30"		

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION		REMARKS
					Asphalt	0'5"	
1							
			6		FILL (Br bk cf S, a $, l cf G)		Rec = 1"
2		S-1	8		**FILL (Brown black coarse to fine Sand,**		moist
			7		**and Silt, little coarse to fine Gravel)**	2'6"	
3			13		Br cf S, s $, l cf G, with weathered rock		
			15		**Brown coarse to fine SAND, some Silt**		Rec = 9"
4		S-2	40		**little coarse to fine Gravel, with**		moist
			50/3"		**weathered rock**		
5						5'0"	
		S-3	50/3"		Gneiss, completely weathered		
6					**Gneiss, completely weathered**	6'0"	Auger refusal @ 6'0"
7							
					Gray Gneiss with Mica, highly weathered		Run #1
8		Run #1					6'0" - 11'0"
9							Run = 60"
							Rec = 30", 50%
10							RQD = 0%
11						11'0"	
					End of Boring @ 11'0"		
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-15

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**									**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**									**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**									**ELEVATION:**	+352.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**		**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**				**START DATE:**	6-Dec-16
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**				**FINISH DATE:**	6-Dec-16
				WGHT		**140#**				**DRILLER:**	T. McGovern
				FALL		**30"**				**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION	REMARKS
					Asphalt 0'2"	
1						
			5		FILL (Br cf S, a (+) $, l cf G)	Rec = 12"
2		**S-1**	8		**FILL (Brown SILT and (-), coarse to**	moist
			6		**fine Sand, little medium to fine Gravel)**	
3			5			
			5		FILL (same)	Rec = 13"
4		**S-2**	2		4'0"	moist
			10		Br cf S, s $, s (-) cf G	
5			20			
			10		same	Rec = 15"
6		**S-3**	28		**Brown coarse to fine SAND, little Silt,**	moist
			35		**and (-) coarse to fine Gravel**	
7			36			
			16		Br cf G a (-), cf S, t (+) $	Rec = 6"
8		**S-4**	16			moist
			19			
9			50/5"			
10						
					10'6"	Auger refusal @ 10'6"
11					**End of Boring @ 10'6"**	On Probable Bedrock
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-16

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**	**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**	**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**	**ELEVATION:**	+356.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE		
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	Qx		DATUM:	Topo
No water encountered				DIA.	3 1/4"	1 3/8"	2 3/8"		START DATE:	6-Dec-16
				WGHT		140#			FINISH DATE:	6-Dec-16
				FALL		30"			DRILLER:	R. Poynton
									INSPECTOR:	CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION	REMARKS
			2		**Topsoil** 0'5"	
1			3		Br cf S, a (+) $, l (-) cf G	Rec = 14"
		S-1	4		**Brown coarse to fine Sand, and (+) Silt,**	moist
2			5		**little (-) coarse to fine Gravel** 2'0"	
			6		Br cf S, t (+) $, s cf G	Rec = 16"
3		S-2	10		**Brown coarse to fine SAND, trace (+) Silt,**	moist
			12		**some coarse to fine Gravel**	
4			17			
5						
		S-3	50/5"		same	No Recovery
6					6'0"	
					Gneiss, completely weathered	Auger refusal @ 7'0"
7					7'0"	
8						
						Run #1
9		Run #1			**Gray Gneiss, shattered, very blocky**	7'0" - 12'0"
					and seamy, moderately weathered	Run = 60"
10						Rec = 60", 100%
						RQD = 47%
11						
12					12'0"	
					End of Boring @ 12'0"	
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-17

Project:	**Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+364.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**	**Qx**		**START DATE:**	9-Dec-16
No water encoutnered				**DIA.**	**3 1/4"**	**1 3/8"**	**2 3/8"**		**FINISH DATE:**	9-Dec-16
				WGHT		**140#**			**DRILLER:**	R. Poynton
				FALL		**30"**			**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION	REMARKS
			2		**Topsoil** 0'5"	
1		**S-1**	2		Br cf S, a (+) $, t f G	Rec = 14"
			2		**Brown coarse to fine Sand, and (+) Silt,**	moist
2			3		**trace fine Gravel**	
			11		same	Rec = 12"
3		**S-2**	7		3'0"	
			9		Br cf S, l $, l cf G	
4			7		**Brown coarse to fine SAND, little Silt,**	
					little coarse to fine Gravel 4'6"	
5						
		S-3	50/0"		**Gneiss, completely weathered**	No Recovery
6					6'0"	Auger refusal @ 6'0"
7						
					Gray Gneiss with Mica and Quartz,	Run #1
8					**blocky and seamy, moderately**	6'0" - 11'0"
		Run #1			**weathered**	Run = 60"
9						Rec = 50", 83%
						RQD = 58%
10						
					11'0"	
11					**End of Boring @ 11'0"**	
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.				TEST BORING LOG					BORING NUMBER B-18
Project:	Prop. Development, River Knoll, 40 Croton Dam Rd., Ossining, NY								**SHEET NO.:** 1 of 1
Client:	Glenco Group LLC								**JOB NUMBER:** 16-207
Drilling Contractor:	General Boring Inc.								**ELEVATION:** +383.0
GROUNDWATER					CASING	SAMPLE	CORE	TUBE	**DATUM:** Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	HSA	SS			**START DATE:** 9-Dec-16
No water encountered				**DIA.**	3 1/4"	1 3/8"			**FINISH DATE:** 9-Dec-16
				WGHT		140#			**DRILLER:** R. Poynton
				FALL		30"			**INSPECTOR:** CKS

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	S Y M	IDENTIFICATION	REMARKS
					Topsoil 0'5"	
1			5		Br cf S, a (+) $, l cf G	Rec = 4"
		S-1	4		**Brown coarse to fine Sand, and (+) Silt,**	moist
2			4		**little coarse to fine Gravel**	
			5		same 2'6"	Rec = 7"
3			7		Br cf S, t (+) $, s cf G	moist
		S-2	12		**Brown coarse to fine SAND, trace (+)**	
4			50/4"		**Silt, some coarse to fine Gravel**	
5					5'0"	
		S-3	50/1"		Gneiss, completely weathered	No Recovery
6						
					Gneiss, completely weathered	
7						
8						
					8'6"	Auger refusal @ 8'6"
9						
						Run #1
10					**Gray Gneiss with Mica and Quartz,**	8'6" - 13'6"
		Run #1			**blocky and seamy, moderately**	Run = 60"
11					**weathered**	Rec = 52", 87%
						RQD = 60%
12						
13						
					13'6"	
14					**End of Boring @ 13'6"**	
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-1

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**	**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**	**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**	**ELEVATION:**	+364.0
GROUNDWATER		**DATUM:**	Topo
START DATE:	6-Dec-16		
FINISH DATE:	6-Dec-16		
DRILLER:	R. Poynton		
INSPECTOR:	CKS		

DATE	TIME	DEPTH	CASING	TYPE	CASING	SAMPLE	CORE	TUBE
No water encountered				DIA.	3 1/4"	1 3/8"		
				WGHT		140#		
				FALL		30"		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			2		**Topsoil** 0'6"	
1			3		Br cf S, a (+) $, t cf G	Rec = 18"
		S-1	3		**Brown coarse to fine Sand, and (+) Silt,**	moist
2			4		**trace coarse to fine Gravel**	
			5		same	Rec = 16"
3		S-2	8		3'0"	moist
			12		Mottled br, gr, orbr cf S, a $, l (-) cf G	
4			10		**Mottled brown, gray, orange brown coarse**	
					to fine Sand, and Silt, little (-) 5'0"	
5					**coarse to fine Gravel**	
			36		Br cf S, s $, a cf G	Rec = 19"
6		S-3	29		**Brown coarse to fine SAND, some Silt,**	moist
			40		**and coarse to fine Gravel**	
7			40			
8						
					9'0"	
9						
10					**Gneiss, completely weathered**	
		S-4	50/1"		Gneiss, completely weathered	Rec = 1"
11					11'0"	moist
					End of Boring @ 11'0"	
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-2

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**	**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**	**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**	**ELEVATION:**	+364.0
GROUNDWATER		**DATUM:**	Topo
START DATE:	6-Dec-16		
FINISH DATE:	6-Dec-16		
DRILLER:	R. Poynton		
INSPECTOR:	CKS		

DATE	TIME	DEPTH	CASING
No water encountered			

	CASING	SAMPLE	CORE	TUBE
TYPE	HSA	SS		
DIA.	3 1/4"	1 3/8"		
WGHT		140#		
FALL		30"		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			1		**Topsoil** 0'6"	Rec = 14"
1			2		Br cf S, a $, l mf G	moist
		S-1	4		**Brown coarse to fine Sand, and Silt,**	
2			4		**little medium to fine Gravel**	
			8		2'6"	
3		S-2	26		Br cf S, l (+) $, s cf G	Rec = 12"
			25		**Brown coarse to fine Sand, little (+)**	moist
4			29		**Silt, some coarse to fine Gravel**	
5						
			43		same	Rec = 14"
6		S-3	46			moist
			36			
7			44			
8						
					8'6"	
9					Gneiss, completely weathered	No Recovery
		S-4	50/1"		**Gneiss, completely weathered** 9'6"	Auger refusal @ 9'6"
10					**End of Boring @ 9'6"**	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-3

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+339.5
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	8-Dec-16
8-Dec-16	**0900**	**3'0"**	**None**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	8-Dec-16
				WGHT		**140#**			**DRILLER:**	R Poynton
				FALL		**30"**			**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			1		**Topsoil** 0'6"	
1			2		FILL (Dk br cf S, a $, t cf G)	Rec = 18"
		S-1	2		**FILL (Dark brown coarse to fine Sand,**	moist
2			2		**and Silt, trace coarse to fine Gravel)** 2'0"	
			2		Br cf S, a (+) $, t mf G	Rec = 17"
3		**S-2**	3			moist to wet
			6			
4			6		**Brown coarse to fine Sand, and (+) Silt,**	
					trace medium fine Gravel	
5						
			4		same	Rec = 14"
6		**S-3**	8			wet
			14			
7			24			
		S-4	26		same	Rec = 6"
8			50/2"			wet
9					9'0"	
					End of Boring @ 9'0"	
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-4

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+339.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	7-Dec-16
8-Dec-16	**0800**	**3'0"**	**None**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	7-Dec-16
				WGHT		**140#**			**DRILLER:**	R. Poynton
				FALL		**30"**			**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			1		**Topsoil** 0'5"	
1			2		FILL (Dk br, br cf S, s (+) $, l cf G)	Rec = 14"
		S-1	3		**FILL (Dark brown, brown coarse to fine**	moist
2			3		**SAND, some (+) Silt, little coarse** 2'0"	
			3		**to fine Gravel)**	Rec = 15"
3		**S-2**	6			moist to wet
			9		Br cf S, s (-) $, t mf G	slightly mottled
4			15			
5						
			7		same **Brown coarse to fine SAND, some (-) Silt**	Rec - 19"
6		**S-3**	10		**trace medium to fine Gravel**	wet
			15			
7			16			
		S-4	50/3"		same	Rec = 1"
8						wet
9						
10						
					10'6"	Auger refusal @ 10'6"
11					**End of Boring @ 10'6"**	
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-5

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**	**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**	**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**	**ELEVATION:**	+317.0
GROUNDWATER		**DATUM:**	Topo
		START DATE:	7-Dec-16
		FINISH DATE:	7-Dec-16
		DRILLER:	R. Poynton
		INSPECTOR:	CKS

DATE	TIME	DEPTH	CASING	TYPE	CASING	SAMPLE	CORE	TUBE
7-Dec-16	1030	13'6"	HSA	DIA.	3 1/4"	1 3/8"		
7-Dec-16	1100	11'0"	None	WGHT		140#		
7-Dec-16	1400	5'6"	None	FALL		30"		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			1		**Topsoil** 0'5"	
1			2		FILL(Br, gr, orbr cf S, a (+) $, t f G)	Rec = 12"
		S-1	3		**FILL (Brown, gray, orange brown coarse**	wet to moist
2			3		**to fine Sand, and (+) Silt, trace fine Gravel)**	
			3		FILL (same)	Rec = 15"
3			4			moist
		S-2	5			
4			10		4'0"	
5						
			7		Gr cf S, a (-) $, l cf G	Rec = 19"
6		S-3	7		**Gray coarse to fine Sand, and (-) Silt,**	moist
			8		**little coarse to fine Gravel**	
7			9			
			10		same	Rec = 14"
8		S-4	8			moist to wet
			7			
9			11			
10					10'0"	
			6		Br cf S, t (+) $, l (+) cf G	Rec = 11"
11			11		**Brown coarse to fine SAND, trace (+) Silt,**	wet
		S-5	15		**little (+) coarse to fine Gravel**	
12			15			
13					13'0"	
14						
15						
			6		Br cf S, s $, l (+) cf G	Rec = 15"
16		S-6	7		**Brown coarse to fine SAND, some Silt,**	wet
			11		**little (+) coarse to fine Gravel**	
17			19		17'0"	
18					**End of Boring @ 17'0"**	
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-6

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+315.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	7-Dec-16
7-Dec-16	**12:45**	**5'6"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	7-Dec-16
				WGHT		**140#**			**DRILLER:**	R. Poynton
				FALL		**30"**			**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			2		**Topsoil** 0'4"	
1		**S-1**	4		FILL (Br cf S, a (+) $, l cf G)	Rec =18"
			4		**FILL (Brown coarse to fine Sand,**	moist
2			5		**and (+) Silt, little coarse to fine Gravel)**	slightly mottled
			3			
3			2			Rec = 15"
		S-2	15			moist
4			14			
5					5'0"	
			3		Br cf S, s $, l cf G	Rec =18"
6		**S-3**	4			wet
			13		**Brown coarse to fine SAND, some Silt,**	
7			9		**little coarse to fine Gravel**	
			6		same	Rec = 17"
8			9			moist to wet
		S-4	10			
9			10			
10						
			13		same, br	Rec = 8"
11			15			wet
		S-5	10			
12			13		12'0"	
					End of Boring @ 12'0"	
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-7

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+308.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	1-Dec-16
1-Dec-16	**1400**	**4'6"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	1-Dec-16
				WGHT		**140#**			**DRILLER:**	T. McGovern
				FALL		**30"**			**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
					Asphalt 0'2"	
1						
			8		FILL (Br cf S, a $, l cf G)	Rec =14"
2		**S-1**	5		**FILL (Brown coarse to fine Sand, and Silt,**	moist
			8		**little coarse to fine Gravel)** 2'6"	
3			5		Br cf S, a (+) $, s cf G	
			5		**Brown coarse to fine Sand, and (+) Silt,**	Rec =12"
4		**S-2**	7		**some coarse to fine Gravel**	moist to wet
			9		same	
5			50/5"			Auger refusal @ 5'0"
					End of Boring @ 5'0"	Probable Boulders
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-7A

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+306.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	1-Dec-16
1-Dec-16	**1430**	**8'6"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	1-Dec-16
				WGHT		**140#**			**DRILLER:**	T. McGovern
				FALL		**30"**			**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION		REMARKS
					Asphalt	0'2"	
1							
			4		FILL (Br bk cf S, a $, l cf G w/ bricks)		Rec = 10"
2		**S-1**	8		**FILL (Brown black coarse to fine Sand,**		moist
			15		**and Silt, little coarse to fine Gravel**		
3			8		**with Bricks**	3'0"	
			6		Gr cf S, a $, t mf G		Rec = 18"
4		**S-2**	15		**Gray coarse to fine Sand, and Silt,**		moist
			18		**trace medium to fine Gravel**		
5			9				
			7		same	5'6"	Rec = 18"
6		**S-3**	8		Mottled Br, orbr, gr cf S, a (+) $, l cf G		moist
			9		**Mottled Brown, orange brown, gray**		
7			13		**coarse to fine Sand, and (+) Silt,**		
			14		**little coarse to fine Gravel**		Rec = 17"
8		**S-4**	16		same w/ weathered rock		moist to wet
			18				
9			50/1"			9'0"	
					End of Boring @ 9'0"		
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-8
Project: Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY		**SHEET NO.:** 1 of 1
Client: Glenco Group LLC		**JOB NUMBER:** 16-207
Drilling Contractor: General Boring Inc.		**ELEVATION:** +305.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	**DATUM:** Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:** 6-Dec-16
6-Dec-16	**1000**	**10'0"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:** 6-Dec-16
				WGHT		**140#**			**DRILLER:** T. McGovern
				FALL		**30"**			**INSPECTOR:** CKS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
					Asphalt 0'2"	
1						
			6		FILL (Br bk cf S, s (+) $, s cf G, w/ topsoil)	Rec = 10"
2		**S-1**	8		**FILL (Brown black coarse to fine SAND, some (+) Silt, some coarse to fine Gravel, with topsoil)**	moist
			5			
3			7			
			8		FILL (same)	Rec = 10"
4		**S-2**	2		4'0"	wet to moist
			9		Br cf S, l (+) $, l cf G	
5			16		**Brown coarse to fine Sand, little (+) Silt, little coarse to fine Gravel** 5'0"	
			2			Rec = 14"
6		**S-3**	16		Br cf S, a (+) $, s cf G	moist
			17		**Brown coarse to fine Sand, and (+) Silt, some coarse to fine Gravel** 7'0"	
7			10			
			11		Mottled br, orbr, gr, dkbr cf S, a (+) $, l (+) cf G	Rec = 17"
8		**S-4**	32		**Mottled Brown, orange brown, gray, dark brown coarse to fine Sand, and (+) Silt, some coarse to fine Gravel**	moist
			17			
9			16			
10					10'0"	
			16		Rd br cf S, l (-) $, l cf G	
11		**S-5**	13			Rec = 10"
			17			moist-wet
12			16			
13					**Red brown coarse to fine SAND, little (-) Silt, little coarse to fine Gravel**	
14						
15						
			5		same, s (-) $	Rec = 15"
16			13			wet
		S-6	25			
17			35		17'0"	
					End of Boring @ 17'0"	
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-9

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**	**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**	**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**	**ELEVATION:**	+364.0
GROUNDWATER		**DATUM:**	Topo
DATE / **TIME** / **DEPTH** / **CASING**		**START DATE:**	9-Dec-16
No water encoutnered		**FINISH DATE:**	9-Dec-16
		DRILLER:	R. Poynton
		INSPECTOR:	CKS

	CASING	SAMPLE	CORE	TUBE
TYPE	**HSA**	**SS**		
DIA.	**3 1/4"**	**1 3/8"**		
WGHT		**140#**		
FALL		**30"**		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1			2		**Topsoil**	
			3		0'8"	Rec = 9"
		S-1	5		Br cf S, s (+) $, t f G	moist
2			3			
			2		same **Brown coarse to fine SAND, some (+)**	Rec = 14"
3			3		**Silt, trace fine Gravel**	moist
		S-2	5			
4			4			
5					5'0"	
			21		Br cf S, l (-) $, l (+) cf G	Rec = 20"
6		S-3	31			moist
			36		**Brown coarse to fine SAND, little (-)**	
7			29		**Silt, little (+) coarse to fine Gravel**	
		S-4	50/5"		same	Rec = 1"
8						moist
9						
10						
			18		same	Rec = 5"
11		S-5	23			moist
			36			
12			49		12'0"	
13					**End of Boring @ 12'0"**	
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-10

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**	**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**	**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**	**ELEVATION:**	+364.0
GROUNDWATER		**DATUM:**	Topo
START DATE:	9-Dec-16		
FINISH DATE:	9-Dec-16		
DRILLER:	R. Poynton		
INSPECTOR:	CKS		

DATE	TIME	DEPTH	CASING
No water encountered			

	CASING	SAMPLE	CORE	TUBE
TYPE	HSA	SS		
DIA.	3 1/4"	1 3/8"		
WGHT		140#		
FALL		30"		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			1		**Topsoil** 0'6"	
1			2		Br cf S, l (-) $, t cf G	Rec = 15"
		S-1	2			moist
2			3			
			3		same	Rec = 10"
3			7			moist
		S-2	17			
4			20		**Brown coarse to fine SAND, little (-) Silt, trace coarse to fine Gravel**	
5						
			8		same	Rec = 16"
6		S-3	12			moist
			19			
7			20			
			20		same	
8		S-4	22			No Recovery
			50/3"			moist
9						
10					10'0"	Auger refusal @ 10'0"
					End of Boring 10'0"	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-11

Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**								**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**								**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**								**ELEVATION:**	+348.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	9-Dec-16
9-Dec-16	**1330**	**7'0"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	9-Dec-16
				WGHT		**140#**			**DRILLER:**	R. Poynton
				FALL		**30"**			**INSPECTOR:**	CKS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION		REMARKS
			2		**Topsoil**	0'6"	
1		**S-1**	2				Rec = 6"
			2		Br cf S, a (+) $, t f G		moist
2			3		**Brown coarse to fine Sand, and (+) Silt,**		
			6		**trace fine Gravel**		Rec = 8"
3		**S-2**	8		same	3'0"	moist
			11		Br cf S, t (+) $, t f G		
4			15				
			15		same		Rec = 12"
5		**S-3**	39		**Brown coarse to fine SAND, trace (+) Silt,**		moist
			39		**trace fine Gravel**		
6			44				
			30		same		Rec = 10"
7		**S-4**	62				moist to wet
			60				
8			50/1"			7'7"	
					End of Boring @ 7'7"		Spoon refusal @ 7'7"
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER PT-12

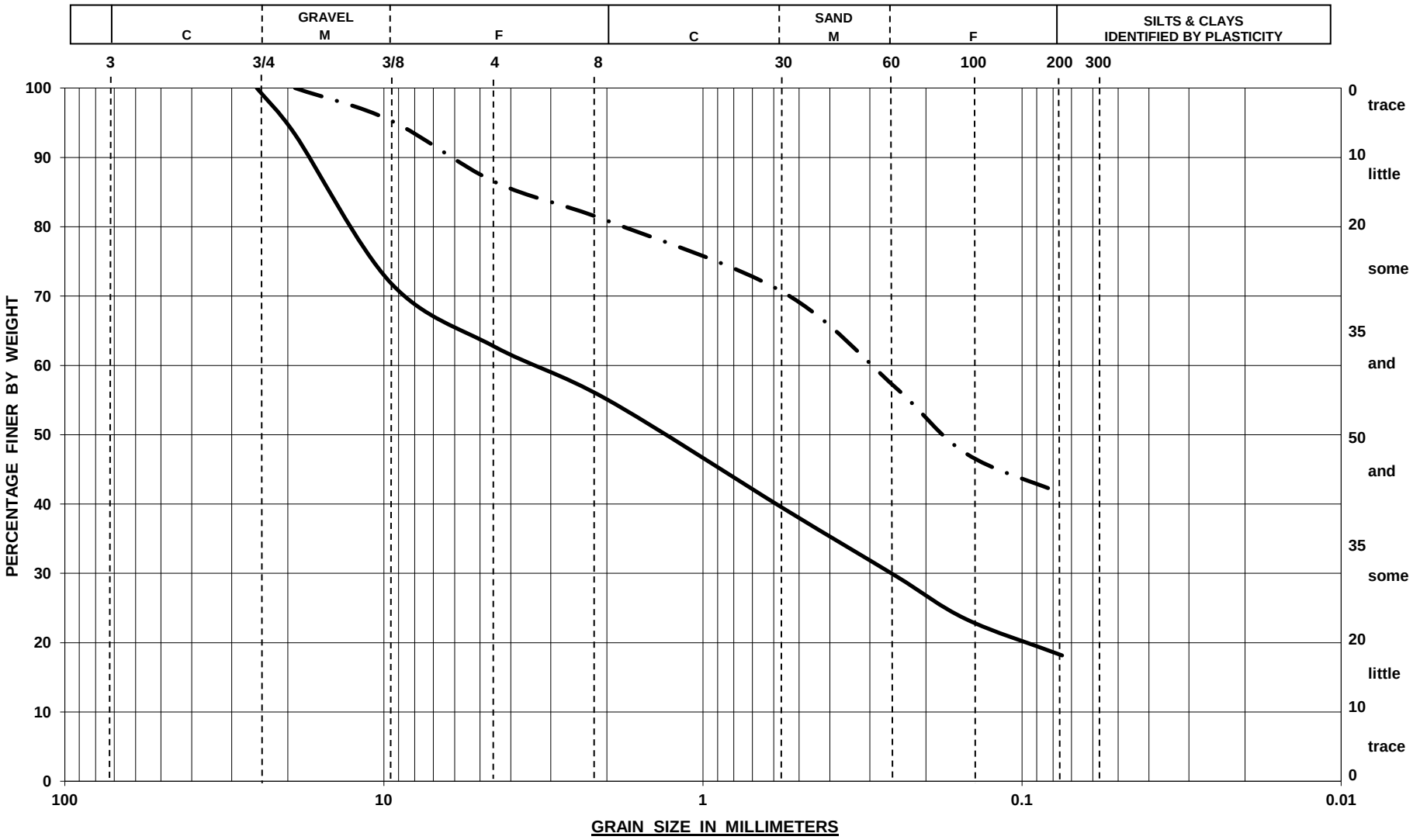
Project:	**Prop. Development, River Knoll, 40 Corton Dam Rd., Ossining, NY**	**SHEET NO.:**	1 of 1
Client:	**Glenco Group LLC**	**JOB NUMBER:**	16-207
Drilling Contractor:	**General Boring Inc.**	**ELEVATION:**	+348.0
GROUNDWATER		**DATUM:**	Topo
DATE / **TIME** / **DEPTH** / **CASING**	**No water encountered**	**START DATE:**	9-Dec-16
		FINISH DATE:	9-Dec-16
		DRILLER:	R. Poynton
		INSPECTOR:	CKS

	CASING	SAMPLE	CORE	TUBE
TYPE	**HSA**	**SS**		
DIA.	**3 1/4"**	**1 3/8"**		
WGHT		**140#**		
FALL		**30"**		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1			1		**Topsoil**	Rec = 12"
			2		0'8"	moist
2		**S-1**	5		Br $ s (-), cf S, t f G	
			11			
3			4		**Brown Silt some (-), coarse to fine**	Rec = 14"
		S-2	11		same **SAND, trace fine Gravel**	moist
4			8			
			7			
5					5'6"	
6			5		Br cf S, l (+) $, l (+) cf G	Rec = 17"
		S-3	11			moist
7			27			occasional cobbles
			50/5"			
8					**Brown coarse to fine SAND, little (+)**	
					Silt, little (+) coarse to fine Gravel	
9						
10						
11			21		same l (-) $, weathered rock	Rec = 3"
		S-4	50/1"		11'0"	moist
12					**End of Boring @ 11'0"**	Auger refusal @ 11'0"
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES
SAYREVILLE, NJ 08872

SIEVE ANALYSIS



SYMBOL	BORING	SAMPLE	DEPTH	DESCRIPTION	NAT MC
———	B-8	S-2	3'0" - 5'0"	FILL (Brown coarse to fine Sand, little (+) Silt, and coarse to fine Gravel)	7.4%
— ·	B-11	S-3	5'0" - 7'0"	Brown coarse to fine Sand, and Silt, little (+) medium to fine Gravel	13.3%

PROJECT Proposed Development, River Knoll, 40 Croton Dam Rd, Ossining, NY **BY** M.B. **DATE** 3-Jan-17 **JOB NO** 16-207

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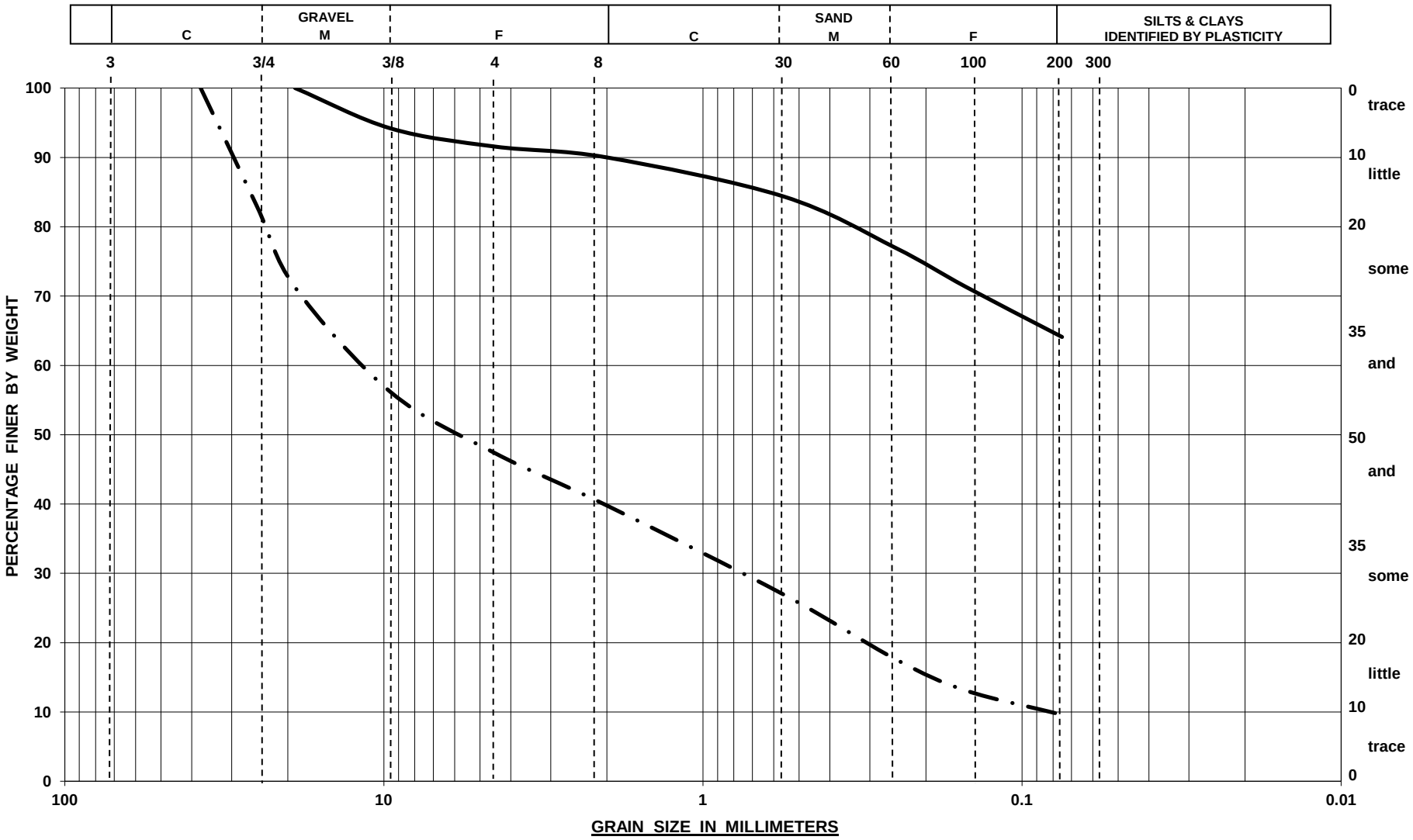
SAYREVILLE, NJ 08872

SIEVE ANALYSIS



SYMBOL	BORING	SAMPLE	DEPTH	DESCRIPTION	NAT MC
———	B-15	S-1	1'0" - 3'0"	FILL (Brown SILT and (-), coarse to fine Sand, little (-) medium to fine Gravel)	20.2%
— · —	B-15	S-4	7'0" - 9'0"	Brown coarse to fine GRAVEL and (-), coarse to fine Sand, trace (+) Silt	2.8%

PROJECT Proposed Development, River Knoll, 40 Croton Dam Rd, Ossining, NY **BY** M.B. **DATE** 3-Jan-17 **JOB NO** 16-207