REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

PROPOSED INDUSTRIAL PARK
Old Mill Road and Hemion Road (CR 93)
Section 55.22, Block 1, Lot 1; Village of Suffern
Rockland County, New York

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TABLE OF CONTENTS

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Rockland County, New York

TABLE OF CONTENTS
(continued)

APPENDICES

1.0 EXECUTIVE SUMMARY

Dynamic Earth, LLC (Dynamic Earth) has completed a preliminary geotechnical investigation at the subject site. The subsurface conditions encountered as part of this investigation included existing fill material underlain by natural glacial deposits that were encountered in a relatively loose/very loose condition at various depths throughout the soil profile. **The existing fill material and loose/very loose natural soils are not suitable for direct foundation support without the risk of excessive settlement.** While overexcavation and replacement of existing fill material and relatively deeper loose/very loose materials within the foundation influence zone may technically be feasible; shored/sloped excavations and/or excavations extending below the groundwater level would likely be required. As such, we preliminarily anticipate ground improvement (such as installation of aggregate piers) will be advantageous to minimize overexcavation and replacement of unsuitable soils.

Alternatively, depending on final structural loads, installation of a deep foundation system is also considered feasible to support the proposed structures. The appropriate foundation system should be selected by the project's structural engineer following a supplemental geotechnical investigation and evaluation of the final building configuration, structural loads, and grading plans. Preliminary recommendations for feasible foundation systems are included herein.

2.0 PROJECT DETAILS

The subject site is located Old Mill Road and Hemion Road (CR93) and is further identified as Section 55.22, Block 1, Lot 1 in the Village of Suffern, Rockland County, New York. The subject site is bound to the north by New York State Thruway Route I-87; to the east by Hemion Road; to the south by a wooded area and Lafayette Avenue beyond; and to the west by a wooded area, with Union Hill Quarry beyond.

At the time of our investigation, the site was developed with an existing industrial building (former Novartis Pharmaceuticals facility) and associated pavement, utilities, landscaped areas, and wooded areas. Based on a December 17, 2021 *Overall Site Plan* prepared by Dynamic Engineering Consultants, PC, the proposed site redevelopment will include demolition of the existing structures and construction of three warehouse buildings (identified as buildings 1 through 3) and associated improvements. Building #1 will be located within the central/northern portion of the site and will occupy a footprint area of approximately 963,100 square feet; Building #2 will be located within the southwestern portion of the site and will occupy a footprint area of approximately 170,500 square feet; and Building #3 will be located within the southern portion of the site and will occupy a footprint area of approximately 88,200 square feet. Additional site improvements are expected to include new pavements, utilities, landscaping, and potential stormwater management facilities.

Conceptual site grading plans were not finalized at the time of this report, however we preliminarily anticipate earth fills will be required to achieve proposed grades for the proposed buildings.

The final structural loads have not been developed this time. Based on our experience with similar facilities, we assume that the maximum loads will be less than the following:

- Axial column loads – 180 kips;
- Wall loads – 3.0 kips per liner foot
- Floor Slab – 600 pounds per square feet
- Pavement – 300,000 Equivalent Single Axle Loads (ESAL's)

3.0 SCOPE OF SERVICES

3.1 Field Investigation

Field exploration of the project site was conducted by means of 12 soil borings (identified as Borings B-1 through B-11 and offset boring B-8A. The borings were drilled with an ATV mounted drill rig using hollow stem auger drilling techniques. The test locations are shown on the accompanying *Boring Location Plan* in the Appendix of this report.

TEST LOCATION SUMMARY		
Number	**Proposed Location**	**Final Depth (feet)**
B-1	Building #1	50.0
B-2		37.0
B-3		50.0
B-4		50.0
B-5	Building #2	27.0
B-6		27.0
B-7	Building #3	42.0
B-8		22.0[1]
B-8A		37.0
B-9	Building #1	42.0
B-10		30.0
B-11		45.8

[1]Refusal

The soil borings were completed in the presence of a Dynamic Earth engineer who performed field tests, recorded visual classifications, and collected samples of the various strata encountered. The test locations were located in the field using conventional taping procedures with estimated right angles, and are presumed to be accurate within several feet of the locations plotted on the plans.

Soil borings and standard penetration tests (SPTs) were conducted in general accordance with ASTM D6151 (*Standard Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil*

Sampling) and ASTM D1586 (*Standard Test Method for Standard Penetration Test and Split Barrel Sampling of Soils)*. The SPT resistance values (N) can be used as an indicator of the consistency of fine-grained soils and relative density of coarse-grained soils. The N-value for various soil types can be correlated with engineering behavior of soils to develop foundation and earthwork recommendations.

Groundwater level observations were recorded during and at the completion of field operations prior to backfilling the borings. Seasonal variations, temperature, anthropogenic, seasonality, soil permeability, and precipitation will influence the actual and observed groundwater levels. Groundwater elevations derived from sources other than seasonally observed groundwater monitoring wells may not be representative of true groundwater levels.

3.2 Laboratory Testing

Physical/Textural Analysis: Each sample was visually classified in general accordance with the visual-manual method (ASTM D2488). In addition, representative samples of selected strata encountered were subjected to a laboratory testing program which included moisture content determinations (ASTM D2216), Atterberg limits (ASTM D4318), and washed gradation analyses (ASTM D422) in order to perform supplementary engineering soil classifications in general accordance with ASTM D2487. The soil strata tested were classified by the Unified Soil Classification System (USCS) and results of the laboratory testing are summarized in the following table.

LABORATORY TEST RESULTS							
Boring	**Sample No.**	**Depth (feet)**	**Moisture Content (%)**	**Liquid Limit**	**Plasticity Index**	**Percent Passing No. 200 (%)**	**USCS Classification**
B-1	S-7	15-17	20.8	Not Plastic		3.2	SP
B-2	S-4	6-8	24.5			35.3	SM
B-3	S-5	8-10	8.6			10.0	SW-SM
B-4	S-4	6-8	19.5			5.0	SP-SM
	S-8	20-22	16.5			4.0	SP
	S-13	45-47	17.8			50.3	ML
B-6	S-7	15-17	7.9			12.9	GM
B-7	S-8	20-22	16.3			3.9	SP
B-8A	S-2	30-32	14.1			19.1	SM
B-9	S-5	8-10	13.2			6.9	SW-SM
B-11	S-3	4-6	4.6			5.8	SP-SM

The engineering classifications are useful when considered in conjunction with the additional site data to estimate other properties of the soil types encountered and to predict the soil's behavior under construction and service loads.

4.0 SUMMARY OF SUBSURFACE CONDITIONS

4.1 Site Geology

The subject site is located in a region of the Piedmont Physiographic Province of New York known as the Newark Basin. The Newark Basin contains rocks of the Newark Super Group which is a stratigraphic series of Triassic to Jurassic age sedimentary rocks containing intrusive sills and dikes as well as extrusive volcanics. The formations mapped within the area of the site include the Hammer Formation which reportedly consists of conglomerate; and the Ladentown diabase and basaltic lava which reportedly consists of basalt.

The surficial deposits at the site reportedly include outwash sand and gravel (Og) consisting of coarse to fine stratified sand. Overlying materials also include manmade fill material.

4.2 Historic Aerial Imagery

Dynamic Earth perform a cursory review of available historic aerial imagery. Based on review of a historic aerial image from 1952, the subject site was apparently utilized as agricultural land. Based on a historic aerial image from 1965, Interstate I-87 had been constructed to the north of the site; and a building and parking lot had been constructed within the northern portion of the site. An historic aerial image from 1974 depicts a relatively smaller building within the western portion of the site and an apparent stormwater pond with the southern portion of the site. A historic aerial image from 1995 depicts an apparent building expansion within the central portion of the site and an access road within the southeastern portion of the site. Based on a 2002 aerial image, the structure within the western portion of the site was no longer present. The site appears relatively unchanged from 2002 to the time of our field investigation.

4.3 Subsurface Soil Profile

Details of the subsurface materials encountered are presented on the *Records of Subsurface Exploration* presented in the Appendix of this report. The subsurface soil conditions encountered in the soil borings consisted of the following generalized strata in order of increasing depth.

Surface Cover Material: Soil borings were performed within existing pavement and landscaped/undeveloped areas. Borings performed within the existing pavement encountered approximately four inches and six inches of asphaltic concrete at the surface with no apparent subbase material. Borings performed within existing landscaped/undeveloped areas encountered approximately four inches to seven inches of topsoil or three inches of gravel at the surface.

Existing Fill Material: Beneath the surface cover, existing fill material was encountered that generally consisted of sand, gravel, and silt with variable amounts of clay and debris. The debris

encountered included metal, asphalt millings, and roots. The existing fill material was encountered to depths ranging between approximately two feet to ten feet below the ground surface. Standard Penetration Tests (SPT) N-values within this stratum ranged between four blows per foot (bpf) and 56 bpf.

Natural Glacial Deposits: Beneath the existing fill material, natural coastal plain deposits were encountered that generally consisted of sand (USCS: SM, SP-SM, SW-SM, and SP), silt (USCS: ML) and gravel (USCS: GP) with variable amounts of clay. The natural glacial deposits were encountered to termination/refusal depths ranging between approximately 22 feet and 50 feet below the ground surface. Refusal on a suspected boulder was encountered at one test location (B-8) at a depth of approximately 22 feet below the ground surface. Portions of this stratum were encountered in a very loose/relatively loose condition at variable depths ranging between approximately eight feet and 45 feet below the ground surface. Except where refusal of the split spoon sampler was encountered or when the weight of hammer (W.O.H.) advanced the split spoon sampler, SPT N-values ranged between three bpf and 100 bpf, and averaged approximately 23 bpf, generally indicating a medium dense condition within the coarse-grained soils.

4.4 Groundwater

Groundwater was encountered at depths ranging between approximately six feet and 20 feet below the ground surface. In addition, apparent perched water was encountered within the existing fill layer at depths ranging between approximately two feet and three feet below the ground surface. Groundwater levels are expected to fluctuate seasonally, and following significant periods of precipitation.

5.0 PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

5.1 General

The following preliminary considerations are based on the soil conditions encountered during our limited subsurface investigation for the proposed site development and are intended to provide general characteristics of the subsurface conditions for preliminary planning purposes and should not be utilized for final design of structural foundations, floor slabs, or pavements. Final recommendations pertaining to the geotechnical aspects of the site development will need to be developed from a supplemental subsurface investigation and engineering analyses of the final site development plans.

The subsurface conditions encountered as part of this investigation included existing fill material and very loose/relatively loose natural glacial deposits at various depths throughout the soil profile. **The existing fill material and loose/very loose natural soils are not suitable for direct foundation support without the risk of excessive settlement.** Depending on final site plans and structural loading conditions, overexcavation and replacement of existing fill material and loose/very loose natural deposits from below foundation influence zones may be evaluated, however, overexcavation and replacement of relatively deeper unsuitable materials will likely require shored/sloped excavations and excavations extending below the groundwater level. As such, we preliminarily anticipate ground improvement with installation of aggregate piers will be advantageous to minimize overexcavation and replacement of unsuitable soils.

Following ground improvement and/or overexcavation and replacement, we preliminarily anticipate the proposed structures may be supported on a conventional shallow foundation bearing within approved subgrade soils.

Alternatively, depending on final design loads, installation of a deep foundation system may be considered to support relatively heavily loaded structures. Preliminary recommendations for feasible foundation systems are presented below.

5.2 Preliminary Shallow Foundation Design Recommendations

Anticipated Bearing Strata: Proposed foundations are preliminarily expected to bear within existing fill material and/or relatively loose/very loose natural glacial deposits. As detailed throughout this report, these materials are not suitable for direct foundation support and will need to be improved or overexcavated and replaced below proposed foundations.

Conventional Shallow Foundations: Following ground improvement and/or overexcavation and replacement, Dynamic Earth preliminarily recommends supporting the proposed structures on

conventional shallow foundations bearing within compacted structural fill material and/or approved subgrade soils. Foundations may preliminarily be designed to impart a maximum allowable bearing pressure of 3,000 pounds per square foot (psf), but a higher bearing capacity may be feasible if ground improvement with installation of aggregate piers is performed. Regardless of loading conditions, proposed foundations should be sized no less than a minimum of 24 inches for continuous wall footings and 36 inches for isolated column footings.

Ground Improvement (Aggregate Piers): As an alternative to overexcavation and replacement, ground improvement with installation of aggregate piers may be advantageous for this project. Ground improvement with aggregate pier elements is performed by driving a specialized displacement mandrel to the design bearing depth and using a rammer head to ram thin lifts of aggregate into the cavity created by the mandrel. Installation of aggregate piers allows for improvement of soils directly below proposed foundation and floor slab zones to a limited depth and the subsequent installation of a relatively standard conventional shallow foundation. While the risk of post-construction settlement for this option is higher than standard deep foundations, this option may contain a low risk of post-construction, total or differential settlement, and also would yield relatively fixed costs. A specialty contractor would be required for aggregate pier installation.

Inspection/Overexcavation Criteria: The suitability of the bearing soils along and below the footing bottoms must be verified by Dynamic Earth's geotechnical engineer prior to placing concrete, especially to confirm that unsuitable materials are removed and new fills are adequately placed and compacted. Any overexcavation to be restored with structural fill (on-site or imported) will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation to a depth of approximately twice the width of the footing. In areas where existing fill materials are encountered below foundation influence zones, the overexcavation may continue vertically to the bottom of the fill layer. Depending on supplemental evaluation, overexcavation and replacement may be limited to the influence zone of the proposed foundations. The bottom of overexcavations should be compacted with smooth drum rollers, walk-behind compactors, vibrating plates or plate tampers ("jumping jacks") to compact locally disturbed materials and densify underlying natural soil zones.

Unsuitable materials should be overexcavated prior to placing new fill material, where site grades are to be raised. The extent of overexcavation should be determined based on an evaluation of the final site grades, supplemental geotechnical investigation, and foundation layout plan. Furthermore, the proposed building footprint/interior column foundation locations should be located by a professional surveyor prior to performing overexcavation operations.

Settlement: Once design loading conditions have been determined, settlement associated with the proposed structures will be required as part of the final evaluation.

Frost Coverage Embedment Depth: Footings subject to frost action should be placed at least 40 inches below adjacent exterior grades or as required by the local building code to provide protection from frost penetration. Interior footings not subject to frost action (including during the period of construction) may be placed at a minimum depth of 18 inches below the slab subgrade.

5.3 Alternative Deep Foundation Considerations

Driven Pile Foundation: As an alternative to overexcavation or ground improvement, several deep foundation types are also preliminarily expected to be feasible, but common piles include driven timber or steel piles. A driven pile foundation should be designed to bear within the relatively dense underlying natural glacial deposits. Based on the relatively deep very loose/loose materials encountered, timber piles are not expected to be practical for the site due the typically limited installation depths. Driven steel piles typically provide higher axial capacity (on the order of approximately 50 tons) and allow some flexibility with installation of variable lengths, as splices may be designed for steel piles.

Due to the debris encountered, installation of driven piles may be complicated by the obstructions within the existing fill material. Therefore, pre-drilling and/or pre-excavation to remove obstructions within the existing fill material should be anticipated.

Drilled Pile Foundations: Often, drilled pile foundation systems may be a competitive alternative to driving steel pipes. These pile systems are generally installed using hydraulic powered rotary equipment and a high pressure grout is pumped into the pile during installation. Drilled piles may be advanced with a solid outer casing to prevent hole collapse (casing may be retracted following installation). Drilled piles may be designed as friction piles bearing within the relatively dense/stiff portions of the natural glacial deposits.

The feasibility and cost effectiveness of a deep pile foundation should be evaluated once the structural loads and proposed grading plans are available for this project. Dynamic Earth can provide detailed pile recommendations if required based on subsequent supplemental geotechnical investigation and development of structural loads.

5.4 Preliminary Floor Slab Recommendations

Dynamic Earth anticipates that on-site soils improved with aggregate piers and/or compacted structural fill material placed over approved natural subgrades will be suitable for support of the proposed floor slabs, provided these materials are properly evaluated, compacted and proofrolled in accordance with Sections 5.2 and 5.3 of this report. **Due to the potential variability of the existing fill material and moisture sensitive on-site soils encountered, at least partial**

overexcavation and replacement and/or subgrade stabilization should be anticipated below proposed floor slabs. Depending on construction phase evaluation, overexcavation may be limited (to a typical depth of approximately two feet) with the use of geogrid reinforcement. Any areas that become softened or disturbed as a result of wetting and/or repeated exposure to construction traffic should be removed and replaced with compacted structural fill. The properly prepared on-site soils are expected to yield a minimum subgrade modulus (k) of 125 psi/in.

If a deep foundation system is selected, a structurally reinforced floor slab should be designed to bear directly on the deep pile foundation system. Deep foundation supported slabs are achieved by either directly thickening and structurally reinforcing the slab at the deep foundation element location, or indirectly by a structurally reinforced slab on a network of deep foundation elements supported by grade beams.

A minimum four-inch layer of stone should be installed below the floor slabs to provide a capillary break. A vapor barrier beneath the floor slab is recommended. Total and post-construction settlements of floor slabs installed in accordance with the recommendations outlined in this report are preliminarily estimated to be less than one-quarter inch.

5.5 Preliminary Pavement Recommendations

The on-site soils are preliminarily expected to be suitable for support of proposed pavement provided that the risk of more frequent paving and/or increased maintenance is acceptable. If this risk is not acceptable, considerations for additional overexcavation and replacement or subgrade stabilization may be evaluated. **Due to the potential variability of the existing fill material and moisture sensitivity of the on-site soils, at least partial overexcavation and replacement and/or subgrade stabilization should be anticipated below proposed pavements.** Pavement life may benefit from using a geogrid (typically biaxial or triaxial) to provide additional subgrade reinforcement to minimize the amount of overexcavation and attempt to stabilize marginally suitable subgrade soils.

Preliminary Design Criteria: A preliminary design California Bearing Ratio (CBR) value of ten has been assigned to the anticipated properly prepared subgrade soils for pavement design purposes. Pavement section recommendations should be developed based on supplemental Geotechnical Investigation.

5.6 Preliminary Groundwater Considerations

Depending on final grading plans, groundwater levels are expected to be deeper than proposed foundation bearing depths. However, groundwater should be anticipated where overexcavation

and replacement of relatively deep unsuitable materials is proposed. As such, the contractor should anticipate the need for groundwater control during construction.

While groundwater control means and methods are the responsibility of the contractor, excavations extending to depths of approximately two feet below the static groundwater elevation typically may be controlled by sump pumps and strategically placed sump pits in and adjacent to excavations for relatively small areas. Larger excavations and excavations extending deeper than two feet below groundwater may require deeper well recovery points.

Surface water runoff must be controlled and diverted away from construction areas by grading and limiting the exposure of excavations to rainfall.

5.7 Preliminary Earthwork Considerations

Demolition/Surface Cover Stripping: Prior to the start of construction, all utilities should be identified and secured. If encountered, existing structural elements, such as concrete foundations, slabs, and remnant basement walls, should be removed entirely from below proposed foundations and slabs and excavated to at least two feet below pavement subgrades. Remnant structural elements may remain in-place below these depths below pavements provided they do not interfere with future construction. Any slabs left in-place should be thoroughly fractured to promote vertical drainage in the presence of a qualified Geotechnical Engineer and should be backfilled with structural fill in accordance with the recommendations included herein.

The surface cover materials, including pavement, gravel, vegetation, and topsoil, should be removed from within, and at least five feet beyond, the limits of the proposed buildings and new pavement areas as well as any other area which will require fill placement. Removal of trees should include root mats and tree stumps.

Surface Preparation/Proofrolling: Prior to placing any fill or subbase materials to raise or restore grades to the desired building pad or pavement subgrade elevations, the existing exposed soils should be compacted to a firm and unyielding surface with several passes in two perpendicular directions with a vibratory, smooth drum roller during favorable moisture conditions. The drum roller should be operated in the static mode or a kneading "sheepsfoot" roller should be used if fine-grained soils are encountered at the subgrade elevation. The surface should then be proofrolled with a loaded tandem axle truck in the presence of Dynamic Earth to help identify soft or loose pockets which may require removal and replacement or further investigation. Dynamic Earth anticipates at least partial overexcavation if the subgrade is wetted or subjected to repeated construction traffic. Any fill or backfill should be placed and compacted in accordance with the recommendations included herein.

Subgrade Protection and Inspection: Every effort should be made to minimize disturbance of the on-site soils by construction traffic and surface runoff. Occasional layers of sand with increased silt/clay content were encountered which are considered moisture sensitive. These materials could become increasingly difficult to reuse and compact if wetted beyond the optimum moisture content. In addition, the predominantly sandy soils can dry quickly and may require wetting during hot, dry periods to attain proper compaction. Therefore, the contractor should anticipate the need for moisture conditioning. On-site materials placed as fill should be sealed on a daily basis using a smooth drum roller to promote drainage and prevent ponding of stormwater. Alternatively, imported fill material or subgrade stabilization geogrids (biaxial or triaxial) may be required to attain the desired grades and expedite earthwork operations during wet weather periods. Dynamic Earth should be retained as the Geotechnical Engineer of Record to inspect soil conditions during construction and verify the suitability of prepared foundation, floor slab and pavement subgrades for support of design loads.

Import/On-site Structural Fill Material: Soils placed as structural fill material should consist of well graded sand or gravel with a maximum particle size of three inches in diameter and less than 15 percent of material passing the number 200 sieve. These materials should be free of objectionable debris (clay clumps, organic and/or deleterious material, etc.) and within moisture contents suitable for compaction. Alternative soil types with higher percentages of silt and clay may be considered, provided that the contractor is able to achieve proper compaction and maintain suitable subgrade once the material is placed. Fine-grained soils and/or granular soils with higher percentages of silt and clay are extremely moisture sensitive and will only be suitable for reuse as structural fill material under ideal weather conditions. Materials wetted beyond the optimum moisture content; that contain oversized material or debris; or with increased amounts of objectionable debris will not be suitable for reuse as structural fill material without special handling. As such, the contractor should be responsible for importing structural fill material and/or processing on-site soils as required so that these materials are suitable for structural fill placement.

If encountered, cobbles, boulders and/or oversized debris greater than three inches in diameter will need to be separated from material to be placed as structural fill. Approved material between three to 12 inches in diameter may be crushed or individually placed in fill layers deeper than two feet below proposed subgrade levels. Care must be taken to individually seat any large particles and to compact soil around large particles with hand operated equipment to minimize the risk of void formation. The larger material should not be placed near areas of the proposed utility or planned excavation. Boulders larger than approximately 12 inches are not expected to be adequate for use as fill or backfill and should be removed from the site or crushed to an adequate size.

The on-site soils include existing fill material and natural glacial deposits. The on-site soils (above the saturated zones) are preliminary anticipated to be suitable for reuse as structural fill material, provided moisture contents are within tolerable limits to achieve compaction and

oversized and deleterious debris is separated. Portions of the on-site soil are considered moisture sensitive and will likely require moisture conditioning during a period of favorable weather or become impractical for reuse if exposed to moisture. Reuse of these materials will be contingent upon further evaluation during construction.

Compaction and Placement Requirements: Structural fill and backfill should be placed in maximum 12 inch loose lifts and compacted to 95 percent of the maximum dry density within a targeted two percent of the optimum moisture content as determined by ASTM D 1557 (Modified Proctor). Variations in moisture content may be acceptable subject to Dynamic Earth's on-site geotechnical engineer's approval if the contractor is able to achieve the necessary compaction. Dynamic Earth recommends using a minimum 20-ton smooth drum roller to compact subgrade soils beneath pavements or slabs and hand operated vibratory jumping jacks and plate compactors within confined excavations for foundations or utilities. The drum roller should be operated in the static mode or a kneading "sheepsfoot" roller should be used to compact fine-grained soils. Fill material compacted with hand operated equipment, static drum roller and/or sheepsfoot roller, may need to be placed in thinner, loose lifts and an increased number of passes may be required to achieve proper compaction.

Structural Fill Testing: Before filling operations begin, representative samples of each proposed fill material (on-site and imported) should be collected. The samples should be tested to determine the maximum dry density, optimum moisture content, natural moisture content, gradation, and plasticity of the soil. These tests are needed for quality control during compaction and also to determine if the fill material is acceptable. The placement of all fill and backfill will need to be monitored by Dynamic Earth to ensure that the specified material and lift thicknesses are properly installed. A sufficient number of in-place density tests should be performed during fill placement to ensure that the specified compaction is achieved throughout the height of the fill or backfill.

5.8 Retaining Walls and Lateral Earth Pressure Recommendations

General: While proposed retaining walls have not been identified at this time, Dynamic Earth presents the following preliminary design recommendations for potential earth retaining structures for temporary excavation support and/or loading docks.

Soil Parameters and Design Considerations: Proposed retaining walls that are free to rotate generally can be designed to resist active earth pressures. Restrained walls and retaining wall corners need to be designed to resist at-rest earth pressures. Backfill soils adjacent to retaining structures should consist of freely draining materials composed primarily of sand and gravel. The soil parameters provided below apply to properly compacted granular fill and backfill placed in a well-drained, level condition and may be used for preliminary design of retaining structures.

SUMMARY OF LATERAL EARTH PRESSURE PARAMETERS						
Stratum	**Moist Density, γ_{moist}, (pcf)**	**Internal Friction Angle, Φ (degrees)**	**Coefficient of Active Earth Pressure (K_a)**	**Coefficient of Passive Earth Pressure (K_p)**	**Coefficient of At-Rest Earth Pressure (K_o)**	**Cohesion (psf)**
Existing Fill Material[1]	115	27	0.38	2.66	0.55	0
Natural Granular Deposits	120	30	0.33	3.0	0.50	0
Import/ Compacted Granular Soil	130	32	0.31	3.25	0.47	0

[1]Should be neglected for resistance

The effect of any surcharge loads including construction equipment, traffic, proposed/existing structures and temporary and permanent stockpiles also will need to be included in earth pressure calculations. Dynamic Earth would be pleased to assist with the calculation of lateral earth pressures based on the soil parameters presented herein during the structural design phase.

Retaining walls should be designed so that the combined effect of vertical and horizontal resultant loads and overturning moment does not exceed the maximum allowable soil bearing capacity recommended in this report.

Adequate drainage of water which may collect on the backfill side of the retaining walls should be incorporated into the design and/or hydrostatic pressures should be added to the pressure calculations. A system of perforated drain pipes should be used at the base of the backfill side of the wall structure to collect and remove the water and relieve hydrostatic pressure.

Dynamic Earth recommends that granular soils be used to backfill the proposed subgrade and retaining walls. Clays and silts or soils with a fine fraction with a liquid limit exceeding 40 or a plastic index exceeding 20 should not be used as backfill. Acceptable backfill should be placed in maximum nine-inch loose lifts and compacted to 95 percent of the maximum dry density, within two percent of the optimum moisture content, as determined by ASTM D 1557 (Modified Proctor). A maximum density of 130 pounds per cubic foot should not be exceeded in order to avoid creating excessive lateral pressure on the walls during compaction operations.

Dynamic Earth recommends that backfill directly behind the walls be compacted with light, hand-held compactors. Heavy compactors and grading equipment should not be allowed to operate within a zone measured at a 45-degree angle from the base of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

Resistance to sliding should be provided by friction resistance at the base of the retaining structure foundation. For mass concrete on the natural on-site soils, a coefficient of friction against sliding of 0.35 should be used in the design of the retaining structures. Passive earth pressures at the toe of the retaining structure should be neglected in the design.

5.9 Temporary Excavations

The granular soils encountered during the investigation are consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA) which require a maximum unbraced excavation angle of 1.5:1 (horizontal: vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA) to ensure that safe excavation methods and/or shoring and bracing requirements are implemented.

5.10 Supplemental Evaluation and Investigation

Final Design: Since these preliminary geotechnical investigation activities have been completed during the initial design phase, many critical assumptions or preliminarily details regarding assumed structural loads, existing and proposed elevations, etc. affect the geotechnical analysis. The preliminary considerations presented herein should be considered to help develop the optimum site design and grading, and Dynamic Earth should remain involved during final design. Supplemental investigation with soil test borings and standard penetration testing with specific geotechnical recommendations should be developed as the design progresses and/or to satisfy tenant specific geotechnical requirements. In addition, the subsurface conditions in presently inaccessible areas below the existing structure also should be evaluated following demolition to verify if the underlying soil conditions are consistent with the soil conditions encountered during this subsurface exploration.

Construction Monitoring and Testing: The recommendations presented herein are contingent on the owner retaining Dynamic Earth to perform inspection, testing and consultation during construction as described in previous sections of this report. **Construction phase evaluation by means of proofroll inspections, soil probes, and/or witnessing the installation of ground improvement/deep pile foundations will be needed to confirm adequate support for the proposed structures.** Monitoring and testing should also be performed to verify that suitable materials are used for controlled fill, and that they are properly placed and compacted over suitable subgrade soils. Testing of fill placement will also be critical to limiting differential settlement.

6.0 GENERAL COMMENTS AND LIMITATIONS

Supplemental recommendations will be required upon finalization of conceptual site plans or if significant changes are made in the characteristics or location of the proposed structures. Dynamic Earth should be included as a consultant to the design team and should be provided final plans for review to confirm these criteria apply or to modify recommendations as necessary.

The recommendations presented herein should be utilized by a qualified engineer in preparing preliminary design concepts and site grading. The engineer should consider these recommendations as minimum physical standards that may be superseded by local and regional building codes and structural considerations. These recommendations are prepared for the use of the client for the specific project detailed and should not be used by any third party. These recommendations are relevant to the preliminary design phase and should not be substituted for construction specifications.

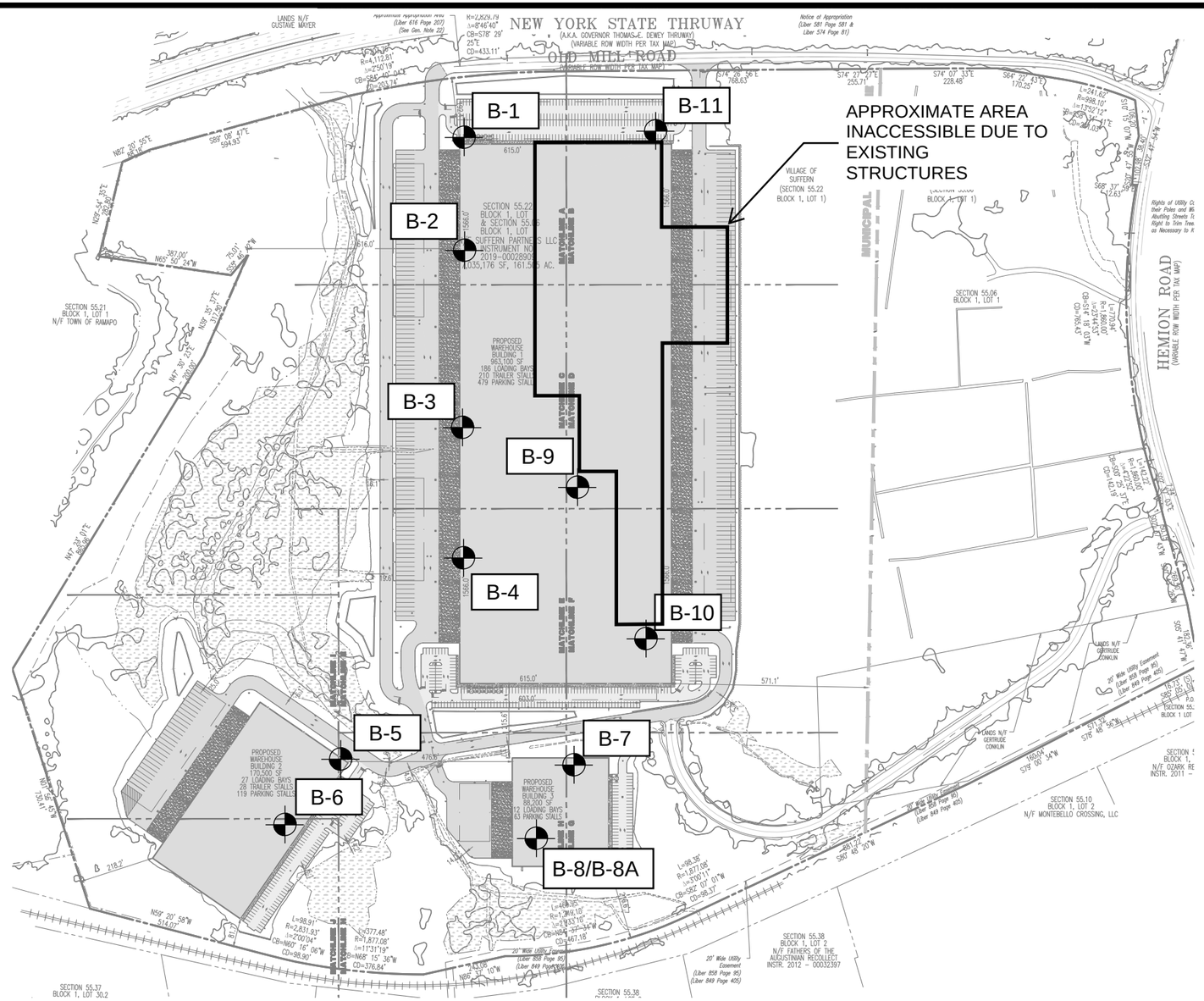
The possibility exists that conditions between test locations may differ from those at specific test pit locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, Dynamic Earth Geotechnical Engineers or their representatives should observe and document the final construction procedures used and the conditions encountered, as well as conduct testing and inspection to ensure the design criteria are met or recommendations to address deviations are implemented.

Dynamic Earth assumes that a qualified contractor will be employed to perform the construction work, and that the contractor will be required to exercise care to ensure all excavations are performed in accordance with applicable regulations and good practice. Particular attention should be paid to avoiding damaging or undermining adjacent properties and maintaining slope stability.

The exploration and analysis of the foundation conditions reported herein are presented to form a reasonable basis for preliminary site evaluation. The recommendations submitted for the proposed construction are based on the available soil information and the preliminary design details furnished or assumed. Deviations from the noted subsurface conditions encountered during construction should be brought to the attention of the geotechnical engineer.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

Boring Location Plan



SCALE: N.T.S.	JOB No: 2803-99-005E
SHEET No: 1 OF 1	DRAWN BY: GS DESIGNED BY: - CHECKED BY: FVC DATE: 12/06/22

TITLE:

BORING LOCATION PLAN

PROJECT: **TREETOP DEVELOPMENT, LLC**
Proposed Industrial Park
Old Mill Road and Hemion Road (CR 93)
Section 55.22 Block 1, Lot 1; Village of Suffern
Rockland County, New York

Rev. # 0 | DEC Client Code: 2803

LEGEND:

B-X
APPROXIMATE LOCATION OF SOIL BORING

NOTES:
1. THIS PLAN IS NOT FOR CONSTRUCTION AND WAS PREPARED TO ILLUSTRATE TEST LOCATIONS ONLY AND MAY NOT REFLECT THE MOST CURRENT REVISION OF THE BASE PLAN.
2. THIS PLAN HAS BEEN PREPARED BASED ON A DECEMBER 17, 2021 *OVERALL SITE PLAN* BY DYNAMIC ENGINEERING CONSULTANTS, PC.

DYNAMIC EARTH, LLC
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Chester, NJ 07930
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Records of Subsurface Exploration

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-01

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-12-2020						
Termination Depth:	50.0 feet	**Date Completed:**	08-12-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	7.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	7.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
0.0-2.0	S-1	SS	8	--	33 6 / 6 7	12		Surface Cover / FILL	4" Asphaltic concrete, with no apparent subbase material Brown to gray coarse to fine sand, little silt, trace coarse to fine gravel, wet (FILL)	Perched ground water at 2ft
2.0-4.0	S-2	SS	12	--	11 16 / 18 17	34			Brown coarse to fine sand, some coarse to fine gravel, little silt, moist, dense (SM)	
4.0-6.0	S-3	SS	16	--	10 12 / 12 15	24	5		Brown coarse to fine sand, little coarse to fine gravel, little silt, moist, medium dense (SM)	
6.0-8.0	S-4	SS	16	--	15 20 / 20 23	40	▼		As above, moist to wet, dense (SM)	
8.0-10.0	S-5	SS	16	--	16 17 / 15 16	32			Gray coarse to fine sand, some coarse to fine gravel, trace silt, wet, dense (SP-SM)	
10.0-12.0	S-6	SS	16	--	3 4 / 4 4	8	10		Brown coarse to fine sand, some coarse to fine gravel, little silt, wet, loose (SM)	
								Glacial Deposits		
15.0-17.0	S-7	SS	16	--	1 2 / 3 2	5	15		Brown coarse to fine sand, trace silt, trace fine gravel, wet, loose (SP)	
20.0-22.0	S-8	SS	18	--	2 4 / 6 6	10	20		Brown coarse to fine sand, little coarse to fine gravel, little silt, wet, medium dense (SM)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-01

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-12-2020						
Termination Depth:	50.0 feet	**Date Completed:**	08-12-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	7.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	7.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-9	SS	16	--	2 4 / 5 5	9			Brown fine sand, little silt, wet, loose (SM)	
							30			
30.0-32.0	S-10	SS	16	--	WOH 2 / 5 5	7			As above (SM)	
							35			
35.0-37.0	S-11	SS	14	--	6 5 / 6 8	11			Brown fine sand, little silt, wet, medium dense (SM)	
								Glacial Deposits		
							40			
40.0-42.0	S-12	SS	16	--	2 3 / 5 8	8			Brown fine sand, little silt, wet, loose (SM)	
							45			
45.0-47.0	S-13	SS	18	--	5 5 / 2 5	7			Brown fine sand, some silt, wet, loose (SM)	
48.0-50.0	S-14	SS	18	--	4 5 / 17 14	22			As above, medium dense (SM)	
									Boring B-01 was terminated at approximately 50.0 feet below the ground surface.	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-02

Project: Proposed Industrial Park — **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY — **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-12-2020						
Termination Depth:	37.0 feet	**Date Completed:**	08-12-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	9.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	9.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information								Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N					
0.0-2.0	S-1	SS	16	--	37 8 / 9 11	17			Surface Cover / FILL	6" Asphaltic concrete, with no apparent subbase material Brown to gray coarse to fine sand, some silt, little coarse to fine gravel, moist (FILL)	
2.0-4.0	S-2	SS	14	--	12 13 / 12 11	25				Reddish brown coarse to fine sand, some silt, trace coarse to fine gravel, moist, dense (SM)	
4.0-6.0	S-3	SS	16	--	35 12 / 12 13	24		5		Brown coarse to fine sand, little silt, moist, medium dense (SM)	
6.0-8.0	S-4	SS	18	--	11 13 / 14 12	27				Orange to brown coarse to fine sand, and silt, moist, medium dense (SM)	
8.0-10.0	S-5	SS	18	--	9 8 / 7 8	15	▼			Brown coarse to fine sand, little silt, moist to wet, medium dense (SM)	Possible mottling at 7.5 ft
10.0-12.0	S-6	SS	14	--	3 2 / 7 7	9		10		Brown coarse to fine sand, little silt, wet, loose (SM)	
									Glacial Deposits		
15.0-17.0	S-7	SS	19	--	3 3 / 6 8	9		15		As above (SM)	
20.0-22.0	S-8	SS	16	--	4 3 / 2 5	5		20		As above (SM)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-02

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-12-2020						
Termination Depth:	37.0 feet	**Date Completed:**	08-12-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	9.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	9.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-9	SS	18	--	2 4 / 6 10	10			Brown fine sand, little silt, wet, medium dense (SM)	
							30			
30.0-32.0	S-10	SS	18	--	3 5 / 11 9	16		Glacial Deposits	Brown coarse to fine sand, some silt, trace coarse to fine gravel, wet, medium dense (SM)	
							35			
35.0-37.0	S-11	SS	18	--	2 8 / 11 9	19			Brown coarse to fine sand, little coarse to fine gravel, little silt, wet, medium dense (SM)	
							40		Boring B-02 was terminated at approximately 37.0 feet below the ground surface.	
							45			

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-03

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-12-2020						
Termination Depth:	50.0 feet	**Date Completed:**	08-13-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	9.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	9.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information								Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N					
0.0-2.0	S-1	SS	14	--	7 12 / 12 12	24			Surface Cover	4" Topsoil Brown coarse to fine sand, some silt, little coarse to fine gravel, moist (FILL)	
2.0-4.0	S-2	SS	16	--	8 15 / 16 14	31				As above (FILL)	
4.0-6.0	S-3	SS	10	--	6 4 / 4 2	8		5	FILL	Brown coarse to fine sand, some silt, trace fine gravel, moist (FILL)	
6.0-8.0	S-4	SS	12	--	3 1 / 3 2	4				Brown coarse to fine sand, some silt, trace fine gravel, trace debris (concrete) moist (FILL)	
8.0-10.0	S-5	SS	14	--	2 2 / 4 6	6	▼			Reddish brown coarse to fine sand, little fine gravel, trace silt, moist to wet, loose (SW-SM)	
10.0-12.0	S-6	SS	8	--	6 7 / 9 11	16		10		Brown coarse to fine sand, little silt, little coarse to fine gravel, wet, medium dense (SM)	
15.0-17.0	S-7	SS	14	--	1 2 / 4 4	6		15	Glacial Deposits	Reddish brown coarse to fine sand, little coarse to fine gravel, little silt, wet, loose (SM)	
20.0-22.0	S-8	SS	18	--	4 7 / 10 9	17		20		Reddish brown coarse to fine sand, some coarse to fine gravel, little silt, wet, medium dense (SM)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-03

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-12-2020						
Termination Depth:	50.0 feet	**Date Completed:**	08-13-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	9.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	9.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-9	SS	16	--	2 3 / 4 4	7			Brown coarse to fine sand, little coarse to fine gravel, little silt, wet, loose (SM)	
							30			
30.0-32.0	S-10	SS	16	--	4 3 / 5 5	8			Reddish brown coarse to fine sand, little coarse to fine gravel, little silt, wet, loose (SM)	
							35			
35.0-37.0	S-11	SS	18	--	4 3 / 5 12	8			Brown coarse to fine sand, little silt, wet, loose (SM)	
								Glacial Deposits		
							40			
40.0-42.0	S-12	SS	14	--	2 1 / 2 7	3			As above, very loose (SM)	
							45			
45.0-47.0	S-13	SS	18	--	5 7 / 13 15	20			Brown medium to fine sand, little silt, wet, medium dense (SM)	
48.0-50.0	S-14	SS	16	--	13 9 / 3 11	12			Brown medium to fine sand, some silt, wet, medium dense (SM)	
									Boring B-03 was terminated at approximately 50.0 feet below the ground surface.	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-04

Project: Proposed Industrial Park — **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY — **Client:** Treetop Development, LLC

Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-13-2020	**Groundwater Data**	**Depth (ft)**	**El. (ft)**	**Additional Groundwater Data**	**Depth (ft)**	**El. (ft)**
Termination Depth:	50.0 feet	**Date Completed:**	08-13-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	6.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	6.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information								Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N					
0.0-2.0	S-1	SS	14	--	4 12 / 17 11	29			Surface Cover	5" Topsoil	
									FILL	Brown coarse to fine sand, and coarse to fine gravel, little silt, moist (FILL)	
2.0-4.0	S-2	SS	14	--	10 10 / 7 10	17				Light orangish brown coarse to fine sand, little silt, little coarse to fine gravel, moist (FILL)	
4.0-6.0	S-3	SS	12	--	11 7 / 7 12	14		5		Brown coarse to fine sand, little coarse to fine gravel, little silt, moist, medium dense (SM)	
6.0-8.0	S-4	SS	16	--	11 10 / 6 7	16	▼			Brown coarse to fine sand, little fine gravel, trace silt, wet, medium dense (SP-SM)	
8.0-10.0	S-5	SS	10	--	6 12 / 12 12	24		10		Brown coarse to fine gravel, trace coarse to fine sand, trace silt, wet, medium dense (GP)	
10.0-12.0	S-6	SS	10	--	6 4 / 2 4	6				Brown coarse to fine sand, some coarse to fine gravel, little silt, wet, loose (SM)	
									Glacial Deposits		
15.0-17.0	S-7	SS	14	--	1 1 / 5 8	6		15		Brown coarse to fine sand, some coarse to fine gravel, little silt, wet, loose (SM)	
20.0-22.0	S-8	SS	14	--	4 2 / 2 3	4		20		Brown coarse to fine sand, little fine gravel, trace silt , wet, loose (SP)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-04

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-13-2020						
Termination Depth:	50.0 feet	**Date Completed:**	08-13-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	6.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	6.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-9	SS	16	--	5 5 / 5 5	10			Brown coarse to fine sand, little fine gravel, little silt, wet,medium dense (SM)	
							30			
30.0-32.0	S-10	SS	16	--	3 4 / 3 4	7			Orangish brown coarse to fine sand, some coarse to fine gravel, little silt, wet, loose (SM)	
							35			
35.0-37.0	S-11	SS	14	--	8 5 / 5 6	10			Brown coarse to fine sand, little silt, wet, medium dense (SM)	
								Glacial Deposits		
							40			
40.0-42.0	S-12	SS	14	--	2 2 / 2 3	4			As above, very loose (SM)	
							45			
45.0-47.0	S-13	SS	16	--	5 8 / 8 9	16			Brown silt and coarse to fine sand, wet, stiff (ML)	
48.0-50.0	S-14	SS	18	--	6 4 / 7 7	11			Brown medium to fine sand, some silt, wet, medium dense (SM)	
									Boring B-04 was terminated at approximately 50.0 feet below the ground surface.	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-05

Project: Proposed Industrial Park — **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY — **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-13-2020						
Termination Depth:	27.0 feet	**Date Completed:**	08-14-2020						
Proposed Location:	Building #4	**Logged by:**	B. Hertzig	**While Drilling:** ▽	17.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	17.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information								Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N					
0.0-2.0	S-1	SS	16	--	6 24 / 23 30	47			Surface Cover	7" Topsoil	
									FILL	Gray to brown coarse to fine sand, some coarse to fine gravel, little silt, trace debris (asphalt millings), moist (FILL)	
2.0-4.0	S-2	SS	16	--	13 31 / 25 17	56				As above (FILL)	
4.0-6.0	S-3	SS	18	--	6 5 / 7 6	12		5		Dark reddish brown coarse to fine sand, some silt, trace fine gravel, moist, medium dense (SM)	
6.0-8.0	S-4	SS	18	--	9 15 / 15 19	30				As above, dense (SM)	
8.0-10.0	S-5	SS	18	--	34 37 / 26 25	63				As above, very dense (SM)	
10.0-12.0	S-6	SS	18	--	13 11 / 21 21	32		10		Brown and reddish brown coarse to fine sand, some silt, little coarse to fine gravel, moist, medium dense (SM)	
									Glacial Deposits		
15.0-17.0	S-7	SS	18	--	11 18 / 20 24	38	▼	15		Dark reddish brown coarse to fine sand, some silt, little coarse to fine gravel, moist to wet, dense (SM)	
								20			
20.0-22.0	S-8	SS	16	--	19 23 / 29 30	52				Brown coarse to fine sand, some silt, little coarse to fine gravel, wet, very dense (SM)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-05

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-13-2020						
Termination Depth:	27.0 feet	**Date Completed:**	08-14-2020						
Proposed Location:	Building #4	**Logged by:**	B. Hertzig	**While Drilling:** ▽	17.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	17.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-9	SS	16	--	20 45 45 49	90		Glacial Deposits	As above (SM)	
									Boring B-05 was terminated at approximately 27.0 feet below the ground surface.	

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DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-06

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-14-2020						
Termination Depth:	27.0 feet	**Date Completed:**	08-14-2020						
Proposed Location:	Building #4	**Logged by:**	B. Hertzig	**While Drilling:** ▽	20.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	20.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information								Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N					
0.0-2.0	S-1	SS	16	--	4 12 / 17 18	29			Surface Cover	4" Topsoil	
									FILL	Brown coarse to fine sand, some silt, little coarse to fine gravel, moist (FILL)	
2.0-4.0	S-2	SS	18	--	20 22 / 23 12	45				As above (FILL)	
4.0-6.0	S-3	SS	16	--	9 7 / 4 6	11		5		Gray coarse to fine sand, some silt, trace coarse to fine gravel, moist (FILL)	
6.0-8.0	S-4	SS	14	--	4 2 / 3 3	5				As above (FILL)	
8.0-10.0	S-5	SS	14	--	3 5 / 4 16	9				Grayish brown coarse to fine sand, some silt, trace coarse to fine gravel, moist (FILL)	
10.0-11.7	S-6	SS	18	--	27 40 / 60 50/2	100		10		Reddish brown coarse to fine gravel, some coarse to fine sand, little silt, moist, very dense (GM)	Boulder at 10.5ft
									Glacial Deposits		
15.0-17.0	S-7	SS	14	--	21 49 / 43 37	92		15		Brown coarse to fine gravel and coarse to fine sand, little silt, moist, very dense (GM)	
20.0-20.8	S-8	SS	8	--	47 50/3 / -- --	50/3		▼20		As above, wet (SM)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-06

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-14-2020						
Termination Depth:	27.0 feet	**Date Completed:**	08-14-2020						
Proposed Location:	Building #4	**Logged by:**	B. Hertzig	**While Drilling:** ▽	20.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	20.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-9	SS	8	--	60 / 45 / 45 / 49	90		Glacial Deposits	As above (SM)	
									Boring B-06 was terminaed at approximately 27.0 feet below the ground surface.	

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DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-07

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-14-2020						
Termination Depth:	42.0 feet	**Date Completed:**	08-14-2020						
Proposed Location:	Building #3	**Logged by:**	B. Hertzig	**While Drilling:** ▽	10.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	10.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information								Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N					
0.0-2.0	S-1	SS	14	--	9 6 / 17 11	23			Surface Cover	3" Gravel	
									FILL	Dark gray coarse to fine sand, some silt, some coarse to fine gravel, trace roots, moist (FILL)	
2.0-4.0	S-2	SS	8	--	5 13 / 5 6	18				As above (FILL)	
4.0-6.0	S-3	SS	16	--	13 18 / 14 15	32		5		As above (FILL)	
										Brown coarse to fine sand, little coarse to fine gravel, little silt, moist, dense (SM)	
6.0-8.0	S-4	SS	4	--	18 15 / 15 15	30				As above (SM)	
8.0-10.0	S-5	SS	8	--	14 8 / 8 9	16				Brown coarse to fine sand, some coarse to fine gravel, little silt, moist to wet, medium dense (SM)	
10.0-12.0	S-6	SS	6	--	8 6 / 9 6	15		▼10		Brown coarse to fine sand, some coarse to fine gravel, little silt, wet, medium dense (SM)	
									Glacial Deposits		
15.0-17.0	S-7	SS	18	--	3 7 / 8 16	15		15		Brown coarse to fine sand, some coarse to fine gravel, little silt, wet, medium dense (SM)	
20.0-22.0	S-8	SS	18	--	5 3 / 3 5	6		20		Brown coarse to fine sand, trace silt, wet, loose (SP)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-07

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-14-2020						
Termination Depth:	42.0 feet	**Date Completed:**	08-14-2020						
Proposed Location:	Building #3	**Logged by:**	B. Hertzig	**While Drilling:** ▽	10.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	10.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-9	SS	0	--	7 4 / 3 4	7			No recovery	
							30			
30.0-32.0	S-10	SS	18	--	33 12 / 14 12	26			Brown coarse to fine sand, some silt, wet, medium dense (SM)	
								Glacial Deposits		
							35			
35.0-37.0	S-11	SS	18	--	8 9 / 13 20	22			Brown coarse to fine sand, and silt, wet, medium dense (SM)	
							40			
40.0-42.0	S-12	SS	18	--	13 11 / 9 10	20			Brown coarse to fine sand, some silt, wet, medium dense (SM)	
							45		Boring B-07 encountered refusal at approximately 42 feet below the ground surface.	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-08

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-17-2020						
Termination Depth:	22.0 feet	**Date Completed:**	08-17-2020						
Proposed Location:	Building #3	**Logged by:**	B. Hertzig	**While Drilling:** ▽	8.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	8.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
0.0-2.0	S-1	SS	16	--	56 7 / 3 3	10		Surface Cover / FILL	5" Asphaltic concrete Brown coarse to fine sand, some silt, little coarse to fine gravel, moist (FILL) Dark gray coarse to fine sand, some silt, moist (FILL)	
2.0-4.0	S-2	SS	18	--	5 4 / 7 13	11			Light brown coarse to fine sand, little silt, moist, medium dense (SM)	
4.0-6.0	S-3	SS	18	--	11 14 / 13 19	27	5		Brown coarse to fine sand, some silt, little coarse to fine gravel, moist, medium dense (SM)	
6.0-8.0	S-4	SS	18	--	11 10 / 15 15	25			Brown coarse to fine sand, little coarse to fine gravel, little silt, moist, medium dense (SM)	
8.0-10.0	S-5	SS	14	--	10 13 / 35 21	48			Brown coarse to fine sand, some coarse to fine gravel, little silt, wet, dense (SM)	
10.0-12.0	S-6	SS	4	--	9 9 / 7 10	16	10	Glacial Deposits	Reddish brown coarse to fine sand, little silt, little coarse to fine gravel, wet, medium dense (SM)	
15.0-17.0	S-7	SS	0	--	16 11 / 9 7	20	15		No recovery	Gravel stuck in cone
20.0-22.0	S-8	SS	18	--	5 3 / 6 11	9	20		Brown coarse to fine gravel, little coarse to fine gravel, trace silt, wet, loose (GP)	Boring Boring B-08 encountered refusal due to suspected boulder causing augers to bend
									Boring B-08 encountered refusal at approximately 22.0 feet below the ground surface and was offset to B-08A	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-08A

Project:	Proposed Industrial Park	**Proj. No.:**	2803-99-005E
Location:	Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY	**Client:**	Treetop Development, LLC

Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-17-2020	**Groundwater Data**	**Depth**	**El.**	**Additional Groundwater Data**	**Depth**	**El.**
Termination Depth:	37.0 feet	**Date Completed:**	08-17-2020		**(ft)**	**(ft)**		**(ft)**	**(ft)**
Proposed Location:	Building #3	**Logged by:**	B. Hertzig	**While Drilling:** ▽	8.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	8.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
								Surface Cover	5" Asphaltic Concrete	
								FILL	Similar to B-8 from auger cuttings	
										Offset approximately 5 feet north of B-8 and augered directly to 25 feet
							5			
									Similar to B-8 from auger cuttings	
0 - 25	--	--	--	--	--	--	10			
								Glacial Deposits		
							15			
							20		Similar to B-8 from auger cuttings	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-08A

Project:	Proposed Industrial Park	**Proj. No.:**	2803-99-005E
Location:	Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY	**Client:**	Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-17-2020						
Termination Depth:	37.0 feet	**Date Completed:**	08-17-2020						
Proposed Location:	Building #3	**Logged by:**	B. Hertzig	**While Drilling:** ▽	8.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	8.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-1	SS	6	--	3 16 / 16 22	32			Brown coarse to fine sand, some silt, little fine gravel, wet, dense (SM)	
							30			
30.0-32.0	S-2	SS	18	--	6 10 / 13 23	23		Glacial Deposits	Brown coarse to fine sand, little silt, little fine gravel, wet, medium dense (SM)	
							35			
35.0-37.0	S-3	SS	18	--	6 9 / 16 26	25			Brown coarse to fine sand, little silt, trace fine gravel, wet, medium dense (SM)	
							40		Boring B-08 was terminated at approximately 37.0 feet below the ground surface.	
							45			

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-09

Project:	Proposed Industrial Park	**Proj. No.:**	2803-99-005E
Location:	Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY	**Client:**	Treetop Development, LLC

Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-14-2020	**Groundwater Data**	**Depth**	**El.**	**Additional Groundwater Data**	**Depth**	**El.**
Termination Depth:	42.0 feet	**Date Completed:**	08-14-2020		**(ft)**	**(ft)**		**(ft)**	**(ft)**
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	8.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	8.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information								Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)		N				
0.0-2.0	S-1	SS	16	--	33	13	27		Surface Cover	5" Asphaltic concrete, no apparent subbase	
					14	13				Gray coarse to fine gravel, and coarse to fine sand, trace silt, moist (FILL)	
2.0-4.0	S-2	SS	14	--	7	5	16		FILL	Gray silt, little coarse to fine sand, little coarse to fine gravel, trace silt, moist (FILL)	
					11	16					
4.0-6.0	S-3	SS	14	--	7	11	27	5		Brown coarse to fine sand, some silt, little coarse to fine gravel, moist (FILL)	
					16	24					
6.0-8.0	S-4	SS	10	--	14	10	18			Reddish brown coarse to fine sand, some silt, little coarse to fine gravel, moist, medium dense (SM)	
					8	50		▼			
8.0-10.0	S-5	SS	12	--	14	7	12			Light brown coarse to fine sand, some coarse to fine gravel, trace silt, wet, medium dense (SW-SM)	
					5	5		10			
10.0-12.0	S-6	SS	4	--	6	13	27			Light brown coarse to fine gravel, little coarse to fine gravel, trace silt, wet, medium dense (GP)	Gravel stuck in cone
					14	9					
								15	Glacial Deposits	Brown coarse to fine sand, little silt, wet, medium dense (SM)	
											Very easy drilling from 17-18 ft
20.0-22.0	S-8	SS	0	--	7	3	6	20		No recovery	
					3	11					

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-09

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-14-2020						
Termination Depth:	42.0 feet	**Date Completed:**	08-14-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	8.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	8.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-9	SS	8	--	5 4 / 3 6	7			Brown coarse to fine sand, some coarse to fine gravel, little silt, wet, loose (SM)	
							30			
30.0-32.0	S-10	SS	12	--	6 4 / 6 9	10			Brown coarse to fine sand, little coarse to fine gravel, little silt, wet, medium dense (SM)	
								Glacial Deposits		
							35			
35.0-37.0	S-11	SS	2	--	7 6 / 11 24	17			As above (SM)	
							40			
40.0-42.0	S-12	SS	8	--	7 5 / 5 6	10			Brown coarse to fine sand, some silt, wet, medium dense (SM)	
									Boring B-09 was terminated at approximately 42 feet below the ground surface.	
							45			

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-10

Project: Proposed Industrial Park — **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY — **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-18-2020						
Termination Depth:	30.0 feet	**Date Completed:**	08-18-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	10.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	10.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information									
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N	Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
0.0-2.0	S-1	SS	16	--	8, 6 / 8, 9	14		Surface Cover	5" Asphaltic concrete, no apparent subbase	
								FILL	Gray coarse to fine sand, little silt, trace coarse to fine gravel, moist (FILL)	
2.0-4.0	S-2	SS	10	--	7, 9 / 27, 14	36			Brown coarse to fine sand, little silt, trace coarse to fine gravel, wet (FILL)	Perched ground water at 3ft
4.0-6.0	S-3	SS	8	--	33, 19 / 10, 34	29	5	Glacial Deposits	Brown coarse to fine sand, little coarse to fine gravel, little silt, moist, medium dense (SM)	
6.0-8.0	S-4	SS	14	--	46, 17 / 22, 17	39			As above, dense (SM)	Hard drilling from 5-10 ft
8.0-10.0	S-5	SS	12	--	17, 36 / 43, 43	79			As above, very dense (SM)	
10.0-12.0	S-6	SS	10	--	26, 21 / 25, 24	56	10 ▼		Brown coarse to fine sand, some coarse to fine gravel, little silt, wet, very dense (SM)	Hard drilling from 10-15 ft
15.0-17.0	S-7	SS	16	--	13, 10 / 9, 12	19	15		Brown coarse to fine sand, little coarse to fine gravel, little silt, wet, medium dense (SM)	
20.0-22.0	S-8	SS	16	--	13, 7 / 7, 9	14	20		Brown coarse to fine sand, some coarse to fine gravel, little silt, wet, medium dense(SM)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-10

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-18-2020						
Termination Depth:	30.0 feet	**Date Completed:**	08-18-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	10.0	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	10.0	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0- 25.7	S-9	SS	6	--	13 50/2 -- --	50/2		Glacial Deposits	As above, very dense (SM)	Hard drilling from 26-28 ft
28.0-30.0	S-10	SS	10	--	21 20 23 25	43			As above (SM)	
							30		Boring B-10 was terminated at approximately 30.0 feet below the ground surface.	
							35			
							40			
							45			

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-11

Project: Proposed Industrial Park | **Proj. No.:** 2803-99-005E

Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY | **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-18-2020						
Termination Depth:	45.8 feet	**Date Completed:**	08-18-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	11.5	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	11.5	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
0.0-2.0	S-1	SS	12	--	4 4 / 12 7	16		Surface Cover	4" Topsoil Brown coarse to fine sand, little coarse to fine gravel, little silt, moist, medium dense (SM)	
2.0-4.0	S-2	SS	18	--	20 24 / 20 24	44			As above, dense (SM)	
4.0-6.0	S-3	SS	18	--	10 11 / 15 13	26	5		Brown coarse to fine sand, trace fine gravel, trace silt, moist, medium dense (SP-SM)	
6.0-8.0	S-4	SS	18	--	11 9 / 7 9	16			As above (SP-SM)	
8.0-10.0	S-5	SS	18	--	6 7 / 7 7	14			As above (SP-SM)	
10.0-12.0	S-6	SS	18	--	5 7 / 5 6	12	10 ▼		Brown coarse to fine sand, little fine gravel, little silt, moist to wet, medium dense (SM)	
								Glacial Deposits		
15.0-17.0	S-7	SS	18	--	3 3 / 2 4	5	15		Brown coarse to fine sand, little silt, wet, loose (SM)	
20.0-22.0	S-8	SS	16	--	5 5 / 6 8	11	20		Brown medium to fine sand, some silt, wet, medium dense (SM)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-11

Project: Proposed Industrial Park — **Proj. No.:** 2803-99-005E

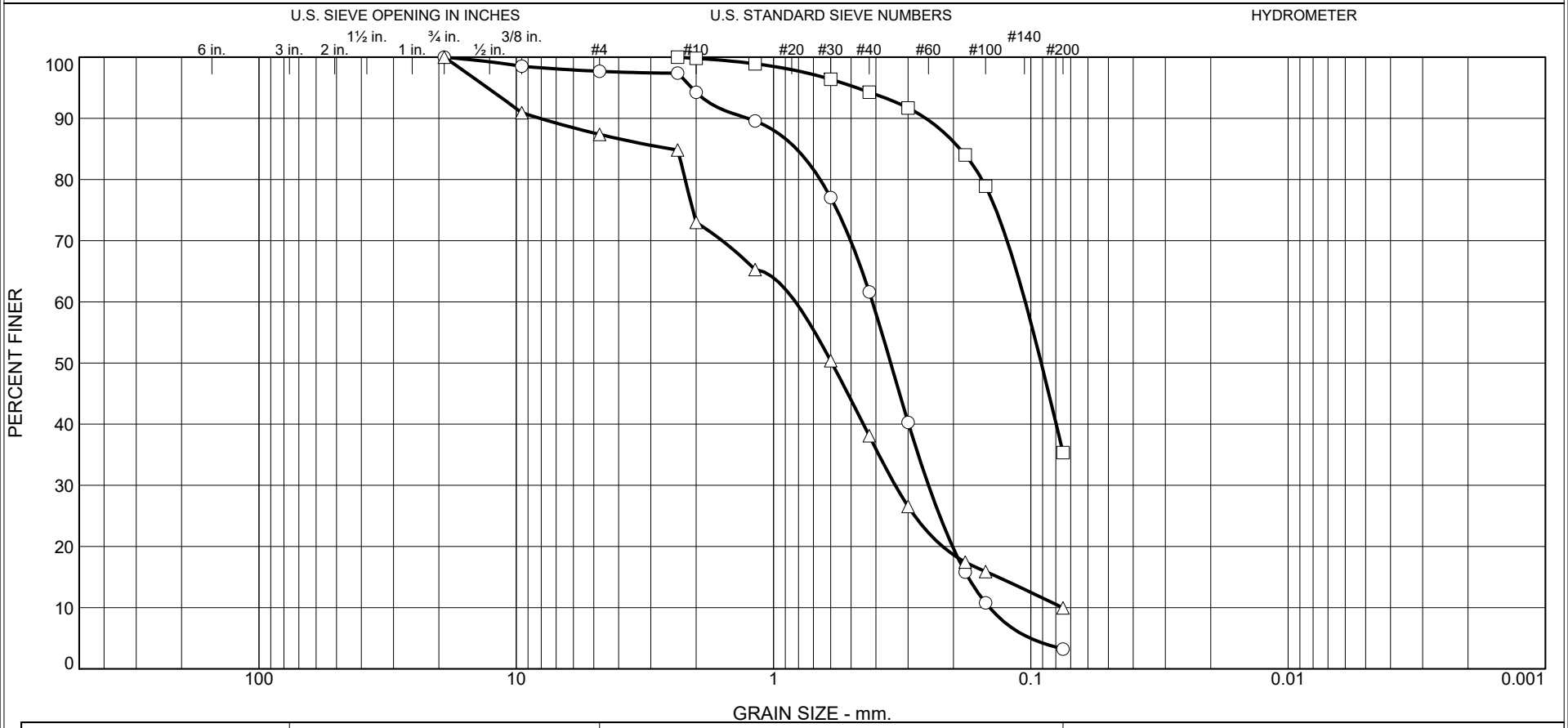
Location: Old Mill Road and Hemion Road (CR93), Village of Suffern, Rockland County, NY — **Client:** Treetop Development, LLC

				Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
Surface Elevation:	Not surveyed/Provided	**Date Started:**	08-18-2020						
Termination Depth:	45.8 feet	**Date Completed:**	08-18-2020						
Proposed Location:	Building #1	**Logged by:**	B. Hertzig	**While Drilling:** ▽	11.5	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	General Borings	**At Completion:** ▼	11.5	--			
Hammer Type:	Auto	**Rig Type:**	Diedrich D-50 Turbo						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
25.0-27.0	S-9	SS	18	--	7 9 / 11 12	20			As above (SM)	
							30			
30.0-32.0	S-10	SS	18	--	WOH WOH / WOH 5	WOH			Brown coarse to fine sand, little silt, trace fine gravel, wet, very loose (SM)	
							35	Glacial Deposits		
35.0-37.0	S-11	SS	16	--	6 12 / 7 17	19			Brown coarse to fine sand, and silt, trace coarse to fine gravel, wet, medium dense (SM)	
							40			
40.0-42.0	S-12	SS	14	--	21 25 / 36 32	61			Brown coarse to fine sand, some silt, little coarse to fine gravel, wet, very dense (SM)	
							45			
45.0-45.8	S-13	SS	8	--	55 50/3 / -- --	50/3			Brown coarse to fine sand, little coarse to fine gravel, little silt, wet, very dense (SM)	
									Boring B-11 was terminated at approximately 45.8 feet below the ground surface.	

Laboratory Test Results

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	2.3	3.4	32.7	58.4	3.2
□	0.0	0.0	0.0	0.2	5.5	59.0	35.3
△	0.0	0.0	12.6	14.4	34.9	28.1	10.0

	Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
○	B-1	S-7	15'-17'	8/12/2020	SP	Brown coarse to fine sand, trace silt, trace fine gravel	20.8	NV	NP
□	B-2	S-4	6'-8'	8/12/2020	SM	Orange to brown coarse to fine sand and silt	24.5	NV	NP
△	B-3	S-5	8'-10'	8/12/2020	SW-SM	Orangish brown coarse to fine sand, little fine gravel, trace silt	8.6	NV	NP

Client Treetop Development, LLC

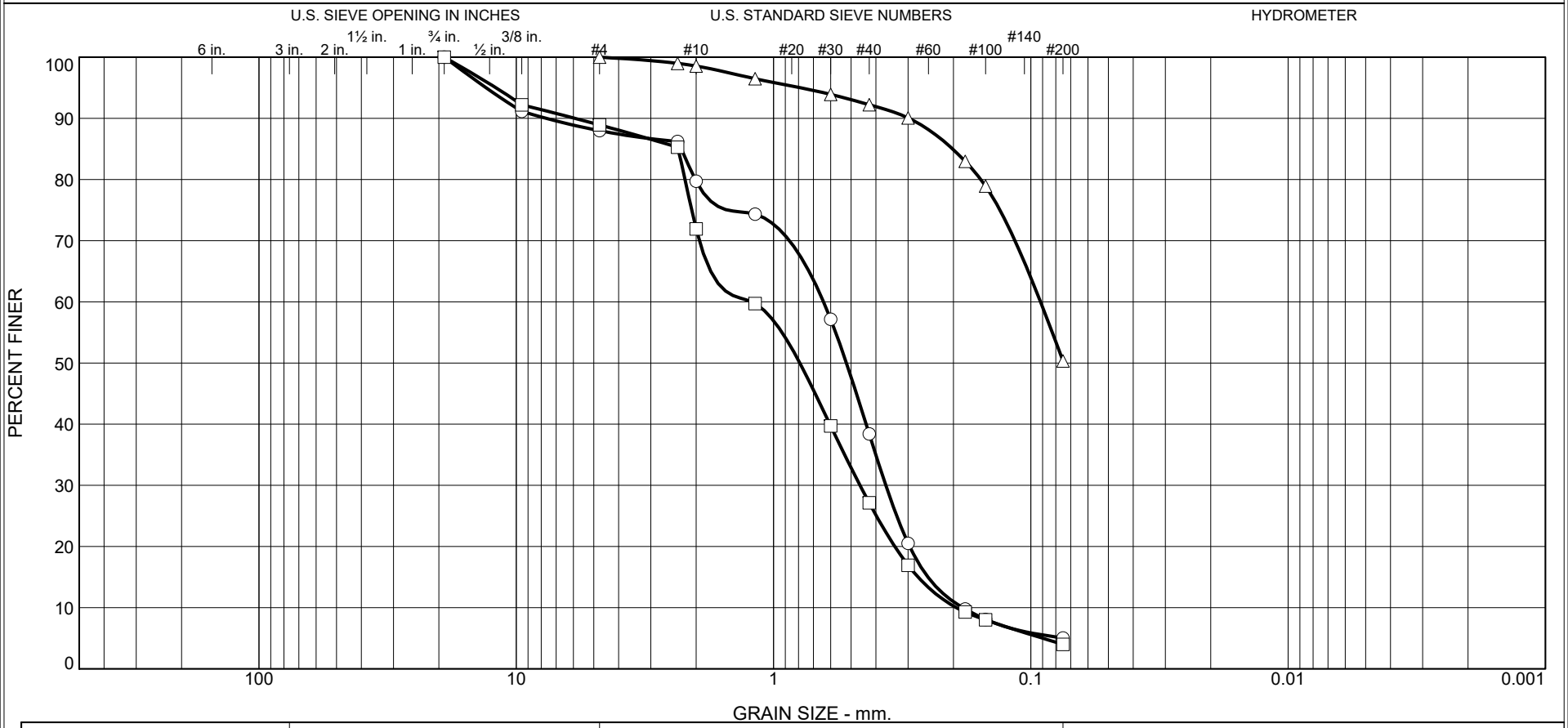
Project Proposed Warehouse

Road and Hemion Road (CR93), Suffern, NY

Project No. 2803-99-005E Figure 1

DYNAMIC EARTH

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	12.0	8.3	41.3	33.4	5.0
□	0.0	0.0	11.1	17.0	44.8	23.1	4.0
△	0.0	0.0	0.0	1.4	6.4	41.9	50.3

	Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
○	B-4	S-4	6'-8'	8/13/2020	SP-SM	Brown coarse to fine sand, little fine gravel, trace silt	19.5	NV	NP
□	B-4	S-8	20'-22'	8/13/2020	SP	Brown coarse to fine sand, little fine gravel, trace silt	16.5	NV	NP
△	B-4	S-13	45'-47'	8/13/2020	ML	Brown silt and coarse to fine sand	17.8	NV	NP

Client Treetop Development, LLC

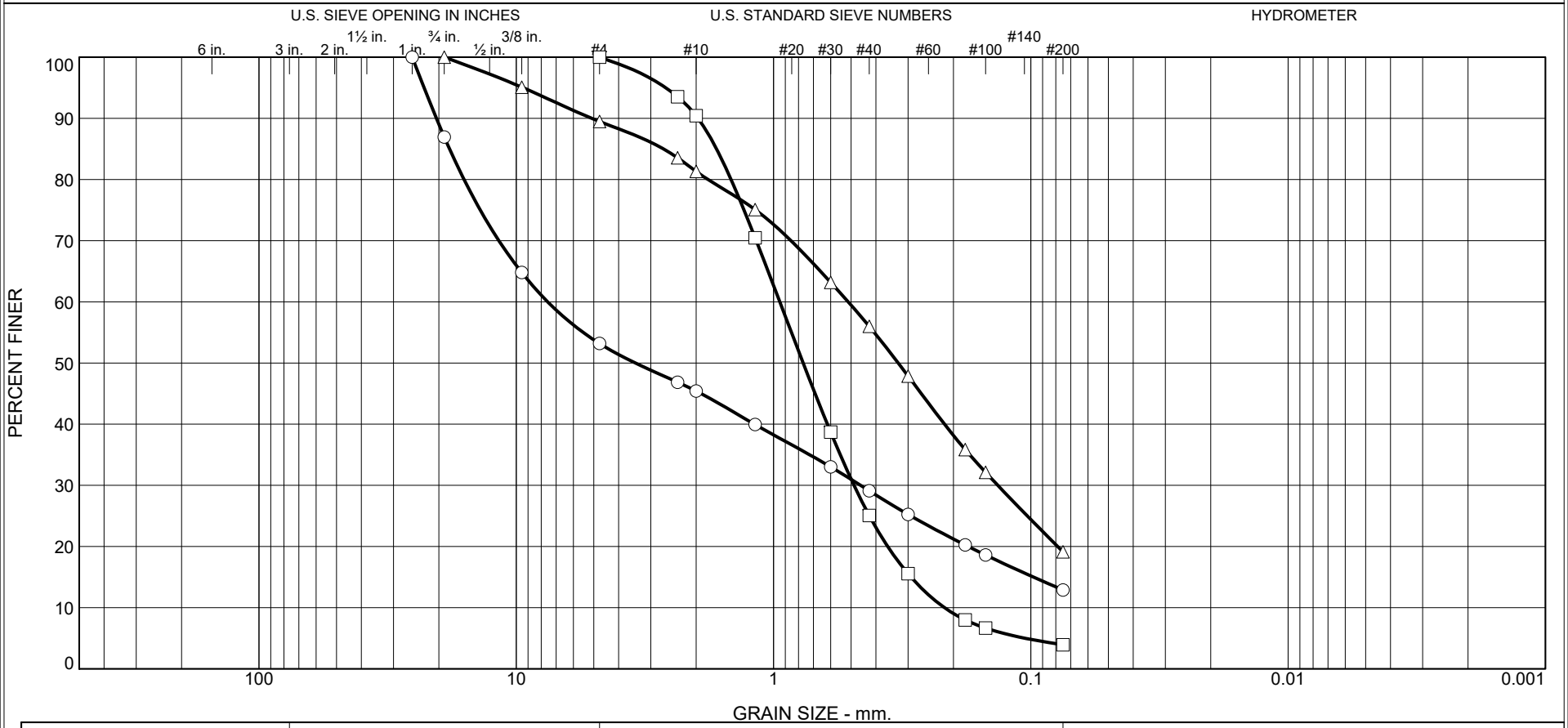
Project Proposed Warehouse

Road and Hemion Road (CR93), Suffern, NY

Project No. 2803-99-005E Figure 2

DYNAMIC EARTH

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	13.1	33.7	7.8	16.3	16.2	12.9
□	0.0	0.0	0.0	9.6	65.3	21.2	3.9
△	0.0	0.0	10.5	8.2	25.3	36.9	19.1

	Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
○	B-6	S-7	15'-17'	8/14/2020	GM	Brown coarse to fine gravel and coarse to fine sand, little silt	7.9	NV	NP
□	B-7	S-8	20'-22'	8/14/2020	SP	Brown coarse to fine sand, trace silt	16.3	NV	NP
△	B-8A	S-2	30'-32'	8/17/2020	SM	Brown coarse to fine sand, litte silt, little fine gravel	14.1	NV	NP

Client Treetop Development, LLC

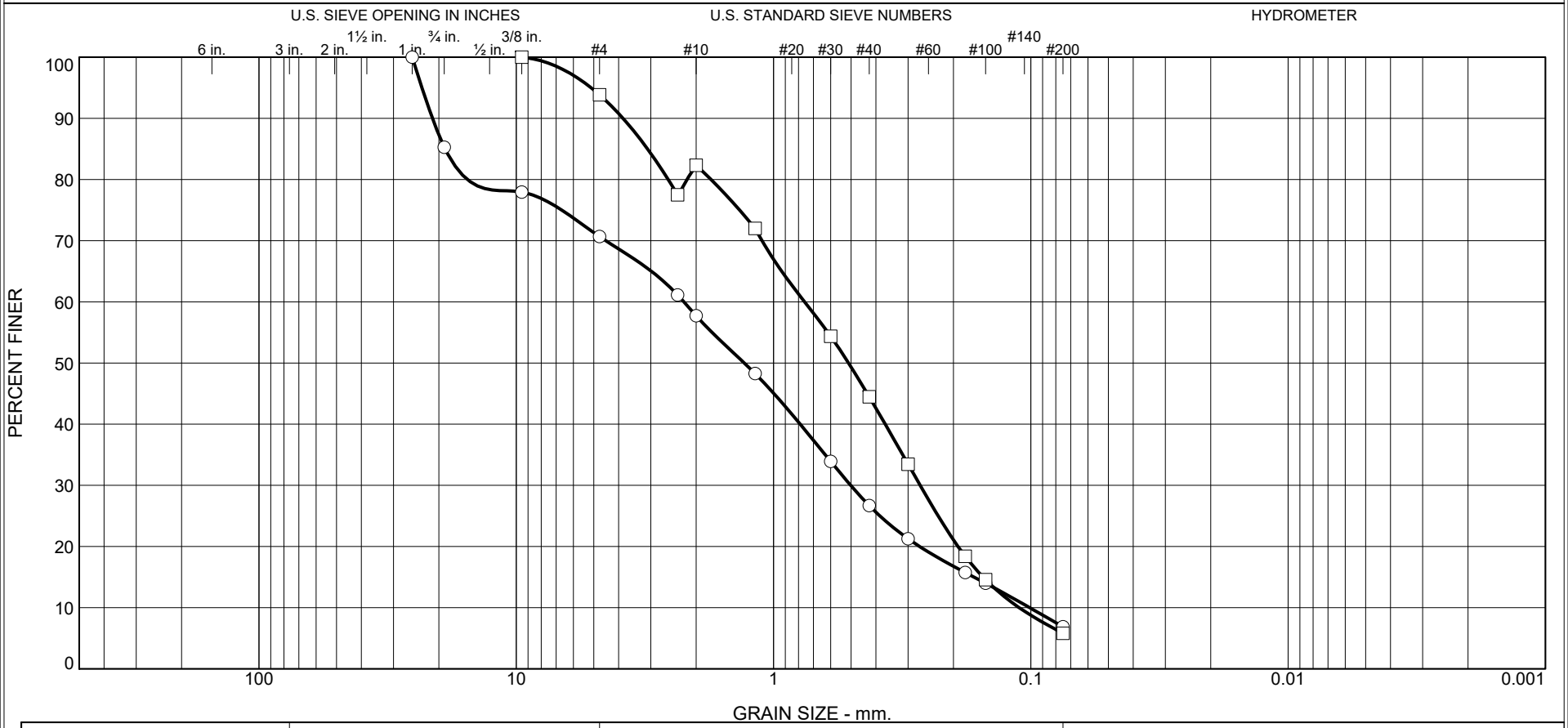
Project Proposed Warehouse

Road and Hemion Road (CR93), Suffern, NY

Project No. 2803-99-005E Figure 3

DYNAMIC EARTH

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	14.7	14.6	13.0	31.0	19.8	6.9
□	0.0	0.0	6.1	11.6	37.8	38.7	5.8

	Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
○	B-9	S-5	8'-10'	8/14/2020	SW-SM	Light brown c-f sand, some c-f gravel, trace silt	13.2	NV	NP
□	B-11	S-3	4'-6'	8/18/2020	SP-SM	Brown coarse to fine sand, trace fine gravel, trace silt	4.6	NV	NP

Client Treetop Development, LLC

Project Proposed Warehouse

Road and Hemion Road (CR93), Suffern, NY

Project No. 2803-99-005E

Figure 4

DYNAMIC EARTH

Geotechnical Terms and Symbols

DYNAMIC EARTH

245 Main Street; Suite 110
Chester, NJ 07930
908-879-7095: Fax 908-879-0222

GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N:	Standard Penetration Value: Blows per ft. or a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu:	Unconfined compressive strength, TSF.
Qp:	Penetrometer value, unconfined compressive strength, TSF.
Mc:	Moisture content, %
LL:	Liquid limit, %
PI:	Plasiticity index, %
δd:	Natural dry density, PCF.
▼:	Apparent groundwater level at time noted after completion of boring.
=	

DRILLING AND SAMPLING SYMBOLS

NE:	Not Encountered (Groundwater was not encountered)
SS:	Split-Spoon – 1⅜" I.D., 2" O.D., except where noted
ST:	Shelby Tube – 3" O.D., except where noted
AU:	Auger Sample
OB:	Diamond Bit
CB:	Carbide Bit
WS:	Washed Sample

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

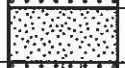
Term (Cohesive Soils)	Qu (TSF)
Very Soft	0-0.25
Soft	0.25-0.50
Firm (Medium)	0.50-1.00
Stiff	1.00-2.00
Very Stiff	2.00-4.00
Hard	4.00 +

PARTICLE SIZE

Boulders	8 in. +	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in. – 3 in.	Medium Sand	0.6mm-0.2mm	Clay	- 0.005mm
Gravel	3 in. – 5mm	Fine Sand	0.2mm – 0.074mm		

USCS Standard Classification System

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D2488

MAJOR DIVISION			GROUP SYMBOL	LETTER SYMBOL	GROUP NAME
COARSE GRAINED SOILS CONTAINS MORE THAN 50% FINES	**GRAVEL AND GRAVELLY SOILS** MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVEL WITH * 5% FINES		GW	Well-graded GRAVEL
				GP	Poorly graded GRAVEL
		GRAVEL WITH BETWEEN 5% AND 15% FINES		GW-GM	Well-graded GRAVEL with silt
				GW-GC	Well-graded GRAVEL with clay
				GP-GM	Poorly graded GRAVEL with silt
				GP-GC	Poorly graded GRAVEL with clay
		GRAVEL WITH ≥ 15% FINES		GM	Silty GRAVEL
				GC	Clayey GRAVEL
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SAND WITH * 5% FINES		SW	Well-graded SAND
				SP	Poorly graded SAND
		SAND WITH BETWEEN 5% AND 15% FINES		SW-SM	Well-graded SAND with silt
				SW-SC	Well-graded SAND with clay
				SP-SM	Poorly graded SAND with silt
				SP-SC	Poorly graded SAND with clay
		SAND WITH ≥ 15% FINES		SM	Silty SAND
				SC	Clayey SAND
FINE GRAINED SOILS CONTAINS MORE THAN 50% FINES	SILT AND CLAY	LIQUID LIMIT LESS THAN 50		ML	Inorganic SILT with low plasticity
				CL	Lean inorganic CLAY with low plasticity
				OL	Organic SILT with low plasticity
		LIQUID LIMIT GREATER THAN 50		MH	Elastic inorganic SILT with moderate to high plasticity
				CH	Fat inorganic CLAY with moderate to high plasticity
				OH	Organic SILT or CLAY with moderate to high plasticity
HIGHLY ORGANIC SOILS				PT	PEAT soils with high organic contents

NOTES:

1) Sample descriptions are based on visual field and laboratory observations using classification methods of ASTM D2488. Where laboratory data are available, classifications are in accordance with ASTM D2487.

2) Solid lines between soil descriptions indicate change in interpreted geologic unit. Dashed lines indicate stratigraphic change within the unit.

3) Fines are material passing the U.S. Std. #200 Sieve.