GEOTECHNICAL EVALUATION
NEW BUILDING SITE STUDY
ONEONTA, NEW YORK

Dente File No. FDE-14-207

Prepared For:

HOUSING VISIONS
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Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from alight industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ-sometimes significantly from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the express purpose of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in-this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechnical Engineer For Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

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GEOTECHNICAL EVALUATION
NEW BUILDING SITING STUDY
ONEONTA, NEW YORK

Dente File No. FDE-14-207

I. INTRODUCTION

Presented herein are the results of a geotechnical evaluation completed by Dente Engineering, P.C. for new housing developments planned for construction in Oneonta, New York. This evaluation was prepared in general accord with Dente proposal No. PFDE-14-167 and authorized by Housing Visions of Syracuse, New York. In general, the scope of services for the geotechnical evaluation consisted of the following:

- Layout and completion of eleven test borings at the Oneonta Heights project site and one test boring at the West and Columbia Street site,

- Laboratory testing of soil samples recovered from the test borings to determine their gradations and moisture contents,

- Preparation of this report which summarizes the results of the site explorations, and presents recommendations to assist in planning for earthwork and the design and construction of foundations, floor slabs, retaining walls and pavements.

This report and the recommendations contained within it were developed for specific application to the sites and construction planned, as we currently understand it. Corrections in our understanding, changes in the structure locations, their grades, loads, etc. should be brought to our attention so that we may evaluate their effect upon the recommendations offered in this report.

It should be understood that this report was prepared, in part, on the basis of a limited number of site explorations. The explorations were made at discrete locations and the overburden soils sampled at specific depths. Conditions are only known at the locations and through the depths investigated. Conditions at other locations and depths may be different, and these differences may impact upon the conclusions reached and the recommendations offered.

A sheet entitled *"Important Information about your Geotechnical Engineering Report"* prepared by the Association of Engineering Firms Practicing in the Geosciences is presented following the title page of this report. This sheet should never be separated from this report and be carefully reviewed as it sets the only context within which this report should be used.

This report was prepared for informational purposes only and should not be considered part of the contract documents. It should be made available to interested parties in its entirety only. Should the data contained in this report not be adequate for the contractor's purposes, the contractor may make their own investigations, tests and analyses for use in bid preparation.

The recommendations offered in this report concerning the control of surface and subsurface waters, moisture or vapor membranes address conventional Geotechnical Engineering aspects only and are not to be construed as recommendations for controlling or providing an environment that would prohibit or control infestations of the structure or its surroundings with mold or other biological agents.

II. SITE AND PROJECT DESCRIPTION

Two potential building sites were the focus of this study, including the Oneonta Heights site on Clinton Street and a smaller site at the intersection of West Street and Columbia Street. Both sites are shown on the USGS topographic map and aerial photographs presented in Appendix A. The map and photographs are provided to assist the reader in locating the sites and reviewing the general topography and land use in the areas.

Oneonta Heights Site

This is an undeveloped site located along the west side of Clinton Street between Monroe Street and Spruce Street Extension. The site is predominately wooded with some small open areas. The site slopes downward from about elevation 1260 to 1270 feet along the north side to between 1210 and 1225 feet in Silver Creek which borders the south and west sides.

Three buildings are planned to be constructed into the sloping grades at this site as described below. New entrance drives and parking lots are also planned along with several site retaining walls with heights ranging from less than 10 to as high as 21 feet. The Grading Plan prepared by Passero Associates for this site is presented in Appendix B. The approximate test boring locations are shown on this plan.

Building A will be a three story, 40 unit senior housing building. The ground floor will be a walk-out basement planned at elevation 1230 feet on the southerly side of the building. Entry to the second floor level will be at elevation 1240 feet on the northerly side of the building. Existing grades range between 1225 and 1247 feet

Buildings B and C will be two story, four unit, single family town homes with walk-out ground floors at about elevation 1250 feet in the south side and entry to the second floor at elevation 1262 feet on the north side. Existing grades are in the range of 1247 to 1254 feet in these building areas.

West and Columbia Street Site

This site is in an existing residential area at the intersection of West Street and Columbia Street. Several existing building will be removed from the site and replaced with two or three new four family residences. A grading plan was not provided to us for this site.

III. SITE INVESTIGATIONS

The subsurface conditions were investigated through the completion of eleven test borings at the Oneonta Heights site and one boring at the West/Columbia Street site. Infiltration test was also conducted at one location at the Oneonta Heights site. The approximate test boring locations are shown on the Subsurface Investigation Plans in Appendices B and C. The ground surface elevation for each boring at the Oneonta Heights site was estimated by us based on interpolation between topographic contours on the Grading Plan provided to us. These estimated elevations should be considered approximate.

The borings were made using a standard rotary drill rig equipped with hollow stem augers. As the augers were advanced, the soils were sampled and their relative density determined using split-spoon sampling techniques in general accord with ASTM D1586 procedures. Representative portions of the soil samples recovered from the borings were transported to our office for laboratory testing and visual classification by a Geotechnical Engineer. Individual subsurface logs, which were prepared based upon the visual classifications and test results, are presented in Appendices B and C together with a key that explains the terms used in their preparation. Laboratory test results are presented in Appendix D.

Oneonta Heights Site - Subsurface Profile

This project site was surfaced with nil to seven inches of topsoil and up to four feet of fill material in some locations. The fill was comprised of varying mixtures of loose to firm density sand, gravel and silt which also contained trace amounts of brick and wood in one location. The native soils beneath the topsoil and/or fill were also variable mixtures ranging from silt or clayey silt with trace to some sand and gravel to sand and gravel with little to some silt. The non-cohesive portions of the native soils were of a firm to very compact relative density and the soils which exhibited cohesion were of a stiff to hard consistency. Based on our visual classifications and laboratory gradation testing, the native soils can be categorized under the Unified Soil Classification System groups ML, CL, GM, SM and GP-GM.

Groundwater measurements were obtained at completion of drilling and sampling and the results are noted on the individual subsurface logs. It should be understood that these measurements may not accurately reflect the actual groundwater depths because adequate time did not pass after completion of drilling for water to enter and achieve a static level in the augers.

Measurable groundwater and/or wet soil samples were found in only four test boring locations, and on this basis it is estimated that groundwater was present at depths of about 20 feet below grade in boring B-4, 10 feet below grade in boring B-5, 4 feet below grade in boring B-9, and 5 feet below grade in boring B-11. It is noted that borings B-9 and B-11 were located in lower lying portions of the site where the ground surface elevations were about 1204 and 1215 feet, respectively. No measurable groundwater or wet soils were found in the remaining test boring locations.

Oneonta Heights Site - Infiltration Test Results

Infiltration testing was conducted in a test pipe installed at a depth of three feet below grade adjacent to test boring B-11. The testing was conducted in general accord with procedures outlined in the New York State Storm Water Management Design Manual. The test entailed installation of a four inch diameter PVC pipe at the test depth, filling the pipe with 24 inches of water and recording the drop in the water level over a one hour time period. This process was repeated for three trial runs.

The soils at the test depth consisted of gravel with some sand and little silt. As shown on the test results sheet in Appendix E, an infiltration rate of 1.0 inches per hour was measured for each of the three trial runs.

West and Columbia Street Site - Subsurface Profile

Test boring SB-1 at this site revealed six inches of topsoil and four feet of fill material consisting of relatively loose to firm sand and gravel with some silt and nil to some cinders. The underlying native soils consisted of relatively compact silt with little to trace sand and gravel. At a depth of about 11 feet the soils graded to very compact sand and gravel with some silt. The boring was ended in these soils when auger refusal was met at a depth of 16.5 feet.

No measurable groundwater was present in the augers at completion of drilling and the recovered soils were moist, not wet. On this basis it appears that groundwater was below the depth explored at the time of investigation.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. GENERAL SITE EVALUATION

In general the native soil deposits at the project sites are of adequate strength to support the proposed buildings using conventional shallow spread foundations with slab-on-grade design. Some localized fill areas exist at both project sites. For planning purposes it should be assumed that all existing fill must be removed and replaced beneath the proposed building areas. Consideration may be given to leaving existing fills in place beneath pavements provided that the surface is proof-rolled and stabilized and the Owner accepts some risk that settlement of the pavements may occur.

In general the site fills and native soils contain significant amounts of silt and clay size particles. These soil types can only be properly compacted when their moisture content is maintained within a relatively narrow range. This moisture control may be difficult or not possible during wet periods of the year. At the smaller West/Columbia Street site, it is recommended that all fills and backfills beneath new buildings and pavements be completed using an imported Structural Fill. At the larger Oneonta Heights site, where significant regrading will be required, consideration can be given to reusing the on-site materials in select locations, subject to the limitations detailed in the following report sections, provided that their as-compacted moisture contents can be properly controlled.

The high silt/clay content of the site soils will also render the subgrades sensitive to disturbance, and they may easily soften and lose strength under normal construction equipment traffic. This will be of greatest concern when the soils are wet. For this reason, the contractor should implement measures to maintain the subgrade in a dry and stable condition. Subgrade soils which become wet and soft will need to be undercut and the areas stabilized accordingly.

Groundwater may be encountered in site excavations where it is found perched in the existing fill materials and possibly trapped in layers in the underlying native soils. It should be possible to dewater excavations using standard sump and pump methods. The only permanent groundwater control should include the installation of perimeter foundation drains for the new buildings and site retaining walls.

It would be preferable to complete the site grading during a seasonal dry period, i.e., summer months, to facilitate reuse of the on-site materials and to assist in maintaining the subgrade surfaces in a relatively dry and stable condition. This would also minimize the potential for encountering perched groundwater in the site excavations.

The soils at both sites should generally have a relatively low permeability and it should be assumed that minimal if any infiltration of storm water into them will occur. We note that the test borings were widely spaced and it is possible that soils with higher permeability are present. Supplemental investigation would be required to determine the location and extent of these areas, if any exist.

The following report sections provide detailed recommendations to assist in planning for design and construction of foundations, floor slabs, retaining walls, and pavements. We should review final site grading and building plans and specifications prior to their release for bidding to confirm that our recommendations were properly interpreted and applied and to allow us to refine our recommendations if necessary based on the final design.

B. SEISMIC DESIGN CONSIDERATIONS

For seismic design purposes, we have evaluated the site conditions in accord with Section 1613 of the New York State Building Code (2010). On this basis, we have determined that Seismic Site Class “D - Stiff Profile” is applicable to this project. Liquefaction of the soils due to earthquake motions should not be a concern.

C. SITE PREPARATION & EARTHWORK

Site Preparation

If possible, site preparation should be planned during a seasonal dry period to assist in maintaining the subgrades in a dry and stable condition and to facilitate reuse of the on-site soils as fill. This is of greatest concern for the Oneonta Heights site were significant regrading is planned. If perched groundwater is present, the installation of drainage trenches and/or swales to intercept and divert the perched groundwater may be required.

The contractor should implement measures to maintain the subgrades in a relatively dry and stable condition. These measures may include, but not be limited to, installation of drainage swales to direct runoff away from the site, shaping the subgrade surface to promote runoff, and restricting construction equipment traffic from the subgrade surface when it is wet. The contractor should also construct temporary haul and construction roadways and routes about the site as appropriate for the specific weather conditions and equipment he intends to employ. At the end of each day, the subgrade surface should be "sealed" with the steel drum roller to promote runoff away from the site or to the drainage swales.

We caution that site grading must be performed and maintained so as not to allow waters to pond upon and saturate the subgrade soils. If this occurs, the soils may soften and become unsuitable for support of the building or pavements. Subgrade soils which are or become soft/wet should be removed and replaced with an imported Structural Fill.

Site preparation at the West/Columbia Street site should begin with demolition and removal of the existing buildings. The building slabs, foundations, and below grade walls should be removed in their entirety beneath the proposed building pads and to a depth of at least three feet below the surface of any new pavement areas.

At both project sites, site preparation outside the existing building areas should commence with clearing and stripping of asphalt, topsoil and surficial organic matter from proposed building and pavement areas. All existing fills should be removed in their entirety beneath the proposed building pads and extending at least five feet beyond their perimeters. Consideration may be given to leaving the existing fills in place beneath pavements provided that the Owner accepts some risk of settlement that may require periodic maintenance.

The prospective site contractors should make their own measurements of topsoil and existing fill thicknesses for their estimates and bidding and not rely solely on the measurements presented in this report. Our measurements were made for general geotechnical evaluation purposes in accord with our scope of services and they may not reflect the thickness of these materials in sufficient number and at all locations of the site required by the contractor for his purposes.

Prior to placing fills to raise site grades and/or after cuts are made to the plan subgrade elevations, the pavement and building subgrades should be proof-rolled using a steel drum roller with a static weight of at least ten tons. The roller should operate in its static mode, unless requested otherwise by the Geotechnical Engineer observing the work, and travel at a speed not exceeding three feet per second (two miles per hour). Soft areas which are identified by the proof-rolling should be investigated to ascertain the cause and, where determined to be necessary, undercut and replaced with Structural Fill.

Temporary and Permanent Slopes

In general, temporary side slopes for the site excavations should be made no steeper than one vertical on one horizontal as required by OSHA regulations for a Type B soil.

Any temporary excavations which are made along or into the toe of an existing slope should be reviewed on a case by case basis by a Geotechnical Engineer to confirm that the excavations will not adversely impact global stability. The excavations should be observed by a competent person to confirm acceptability of the temporary slopes.

Permanent cut and fill slopes should be no steeper than one vertical on three horizontal. The final slopes should be thickly vegetated to inhibit erosion.

All excavations should be completed so as not to undermine roads, utilities, and/or foundations of adjacent structures. In general, excavations should not encroach within a zone of influence defined by a line extending out and down from the existing structures at an inclination of one vertical on 1.5 horizontal. Excavations that encroach within this zone should be sheeted, shored and braced to support the soil and adjacent structure loads, or the structure should be underpinned to establish bearing at a deeper level.

Site Fill and Backfill

In general the site fills and native soils contain significant amounts of silt and clay size particles, and as such it is recommended that they be reused in landscape areas only at the West/Columbia Street site. At the larger Oneonta Heights site, it is also preferable to limit reuse of the on-site soils to landscape areas. However, at this site consideration may be given to reusing the on-site materials to complete general grade increases to within three feet of final pavement surfaces provided that the soil's as compacted moisture content can be properly controlled as stipulated below. This moisture control may be difficult or not possible during wet periods of the year, and in this case it will be necessary to use an imported Structural Fill to complete the grade increases. Reuse of the on-site soils is not recommended as fill and backfill beneath the building pads.

An imported Structural Fill should be used as backfill and to make grade increases beneath proposed building and pavement areas. The Structural Fill should consist of bank-run sand and gravel which conforms to the following limits of gradation and is free of recycled concrete, asphalt, bricks, glass and pyritic shale rock.

IMPORTED STRUCTURAL FILL

Sieve Size	Percent Finer
4"	100
1/4"	30 to 75
No. 40	5 to 40
No. 200	0 to 10

The imported Structural Fill and on-site materials should be placed in uniform loose layers no more than about one foot thick where heavy vibratory compaction equipment is used. Smaller lifts should be used where hand operated equipment is required for compaction. Each lift should be compacted to not less than 95 percent of the maximum dry density for the soil which is established by the Modified Proctor Compaction Test, ASTM D1557. The as-compacted moisture content of the fills should be maintained within two percent of the optimum moisture content determined by ASTM D1557. In

landscape areas, the compaction may be reduced to 90 percent of maximum dry density and the allowable as compacted moisture content increased to within three percent of optimum.

D. FOUNDATIONS

All building foundations should bear directly on undisturbed native soils or on compacted Structural Fill. If groundwater enters the excavations it should be removed together with any softened bearing grade soils. An approximate six inch thick layer of clean crushed stone (No. 1 and 2 size aggregate) should be placed to protect the bearing grades from disturbance and to assist in the dewatering if groundwater is encountered. A stabilization fabric, such as Mirafi 500X or equivalent, should be placed beneath the stone. All final bearing grades should be relatively firm, stable, and free of loose soil, mud, water and frost.

The building and site wall foundations may be proportioned for a maximum net allowable bearing pressure equal to 3,000 pounds per square foot. Continuous wall foundations should have a minimum width of 24-inches and isolated column foundations should be at least 36-inches wide. Exterior foundations should bear at least four feet beneath final adjacent exterior grades to afford frost penetration protection. Interior foundations may be seated a nominal two feet depth below the slab if allowed by local building codes.

Assuming standard care is used in preparing the foundation bearing grades, we estimate that total foundation settlements should be less than one inch. The settlements should occur within a few days after construction is completed and load increments are applied.

The installation of a perimeter foundation drain is recommended to intercept and divert surface infiltration which could otherwise become trapped in the backfill soils. The drains may consist of a nominal four-inch diameter perforated PVC pipe embedded at the base of a minimum 12-inch wide column of clean crushed stone (Blend of No. 1 and No. 2 size aggregate). The stone should be wrapped in a filter fabric (Mirafi 140N or equivalent).

E. FLOOR SLABS

The floor slabs should be provided with a minimum six inch thick base of clean crushed stone consisting of NYSDOT No. 1 and 2 size aggregate placed over a stabilization fabric such as Mirafi 500X. If zones of trapped or perched groundwater are encountered in the basement excavations, an increase in the thickness of the stone base, up to a maximum of 18 inches, may be required along with the installation of underdrain pipes connecting with the exterior perimeter foundation drains. The need for an increase in the stone thickness should be determined by a Geotechnical Engineer based upon the conditions revealed at the time of construction. A contingency should be carried in the project budget for this work if it is deemed necessary.

A vapor retarder (Stego Wrap 15 mil Class A or equivalent) should be installed if floor coverings or moisture sensitive coatings are to be placed on the slab. The vapor retarder should be positioned, i.e., above or below the stone base, in accord with the American

Concrete Institute (ACI) Manual of Concrete Practice Manual Section 302.1R. The floor slabs may be designed in accord with the recommended procedures of the ACI or Portland Cement Association using a vertical modulus of subgrade reaction equal to 200 pounds per cubic inch at the top of the recommended base layer.

F. RETAINING WALLS

Building or site walls that retain earth should be designed to resist lateral earth pressures together with any applicable surcharge loads. Active earth pressures may be assumed for walls that are free to deflect as the backfill is placed and surcharge loads applied. At-rest earth pressures should be assumed for walls that are braced prior to backfilling or applying surcharge loads.

The following design parameters are provided to assist in determining the lateral wall loads, whichever apply. The recommended lateral earth coefficients assume that the backfill behind and in front of the wall is level. Where slopes exist, the lateral earth pressure coefficients should be adjusted accordingly. The design parameters also assume that the walls are backfilled with imported Structural Fill.

Soil's Angle of Internal Friction	30 degrees
Coefficient of At-Rest Earth Pressure	0.50
Coefficient of Active Earth Pressure	0.33
Coefficient of Passive Earth Pressure	3.00
Total Unit Weight of Soil	120 pcf
Coefficient of Sliding Friction	0.30

If desired to reduce lateral pressures acting on the wall, clean crushed stone may be used as backfill. The crushed stone backfill material should entirely occupy the backfill zone wedge formed by a line extending up and away from a point two (2) feet beyond the interior edge of the wall at an angle of 45^0 off the vertical and the foundation wall itself. Where the wall extends beneath the exterior final grade and is backfilled on both its interior and exterior faces to that exterior grade with ordinary Structural Fill, the engineered fill materials to be placed within the backfill zone should be measured from a point two (2) feet beyond the interior edge of the wall at this grade and then up at an angle of 45^0 off the vertical. Assuming that the stone is installed in this manner, the design parameter tabulated below may be assumed.

Engineered Material	Total Unit Weight (pcf)	Coefficient of Lateral Earth Pressure	
		Active Condition	At-Rest Condition
50/50 Blend of NYSDOT #1&2 Crushed Aggregate	100	0.20	0.33

All retaining structures should be provided with drainage to prevent water from becoming trapped in the backfill soils and creating hydrostatic pressures on the walls. The drain may consist of a four-inch diameter perforated PVC pipe embedded at the base of a

minimum 12-inch wide column of clean crushed stone (No. 1 and No. 2 size aggregate). The stone should be wrapped in a filter fabric (Mirafi 140N or equivalent). Backfill soils behind the crushed stone drainage layer should consist of Structural Fill.

G. PAVEMENTS

Two pavement sections may be considered for use depending on the expected traffic loads; a Heavy Section should be used for entrance drives and a Light Section for areas subject primarily to automobile parking. Recommended flexible pavement section materials and thicknesses are tabulated below.

FLEXIBLE ASPHALTIC CONCRETE PAVEMENT SECTIONS			
Course	NYSDOT Reference	Layer Thickness	
		Heavy Section	Light Section
Asphalt Top	Section 403 - Type 6 or 7	1.5"	1.0"
Asphalt Binder	Section 403 - Type 3	3.0"	2.0"
Crusher-Run Stone Base	Section 304 - Type 2	18"	12"
Stabilization Fabric	Mirafi 500X or Equivalent	Single Ply	Single Ply

NOTE: The thickness of the Crusher-Run Stone base may be reduced to 12" for the Heavy Duty Section and 6" for the Light Duty Section where at least 12" of Imported Structural Fill is present below the pavement subgrade elevation.

All materials and construction should conform with the NYSDOT Standard Specifications for Construction and Materials. The base course materials should be compacted to 95 percent of the maximum dry density for the material established through the Modified Proctor Compaction Test, ASTM D1557.

The recommended pavement sections were designed primarily for automobile and occasional delivery truck traffic, and not to support heavy construction equipment loads or tractor trailer traffic which may require an augmented section. The contractor should construct temporary haul and construction roadways and routes about the site as appropriate for the specific weather conditions and equipment he intends to employ. Construction period traffic should not be routed across the recommended pavements.

All pavements require routine maintenance and occasional repairs. Failure to maintain the pavements or do repairs on a timely basis can materially shorten the pavement design life.

It should be understood that frost may penetrate beneath sidewalks and pavements and cause these pavement surfaces to heave and that the heave may be differential, particularly where sidewalks and pavements meet building doorways and along curbs. If these pavement conditions are planned and the potential heaving of them is to be minimized, a 16-inch thick base of No.1 and No. 2 size crushed stone should be placed

beneath the sidewalks or pavements with an under-drain to relieve any collected waters in order to limit the potential heave to generally tolerable magnitudes for most winters.

H. CONSTRUCTION MONITORING

The Geotechnical Engineer should be retained to monitor earthwork and bearing grade preparations for foundations, floor slabs, and pavements. It should be understood that the actual subsurface conditions that exist across this site will only be known when the site is excavated. The presence of the Geotechnical Engineer during the earthwork and foundation construction phases will allow validation of the subsurface conditions assumed to exist for this study and the design recommended in this report.

We believe this construction sequence observation and testing should be provided by the Geotechnical Engineer of record as a consultant to the Owner, Architect or Construction Manager. We do not believe these services should be provided through the general or earthwork contractor.

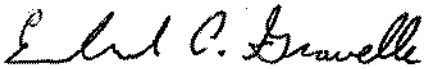
V. CLOSURE

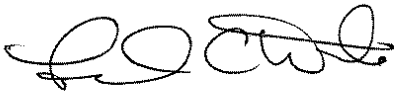
This report was prepared for specific application to the project sites and construction planned using methods and practices common to Geotechnical Engineering in the area and at the time of its preparation. No other warranties, expressed or implied, are made.

Dente Engineering should review plans and specifications related to foundations and earthwork prior to their release for bidding to confirm that the recommendations were properly interpreted and applied. Dente Engineering should also be retained during construction to validate that the actual site conditions are similar to those assumed for development of the recommendations contained in this report.

Should questions arise or if we may be of any other service, please contact us at your convenience.

Prepared By:
Dente Engineering, P.C.



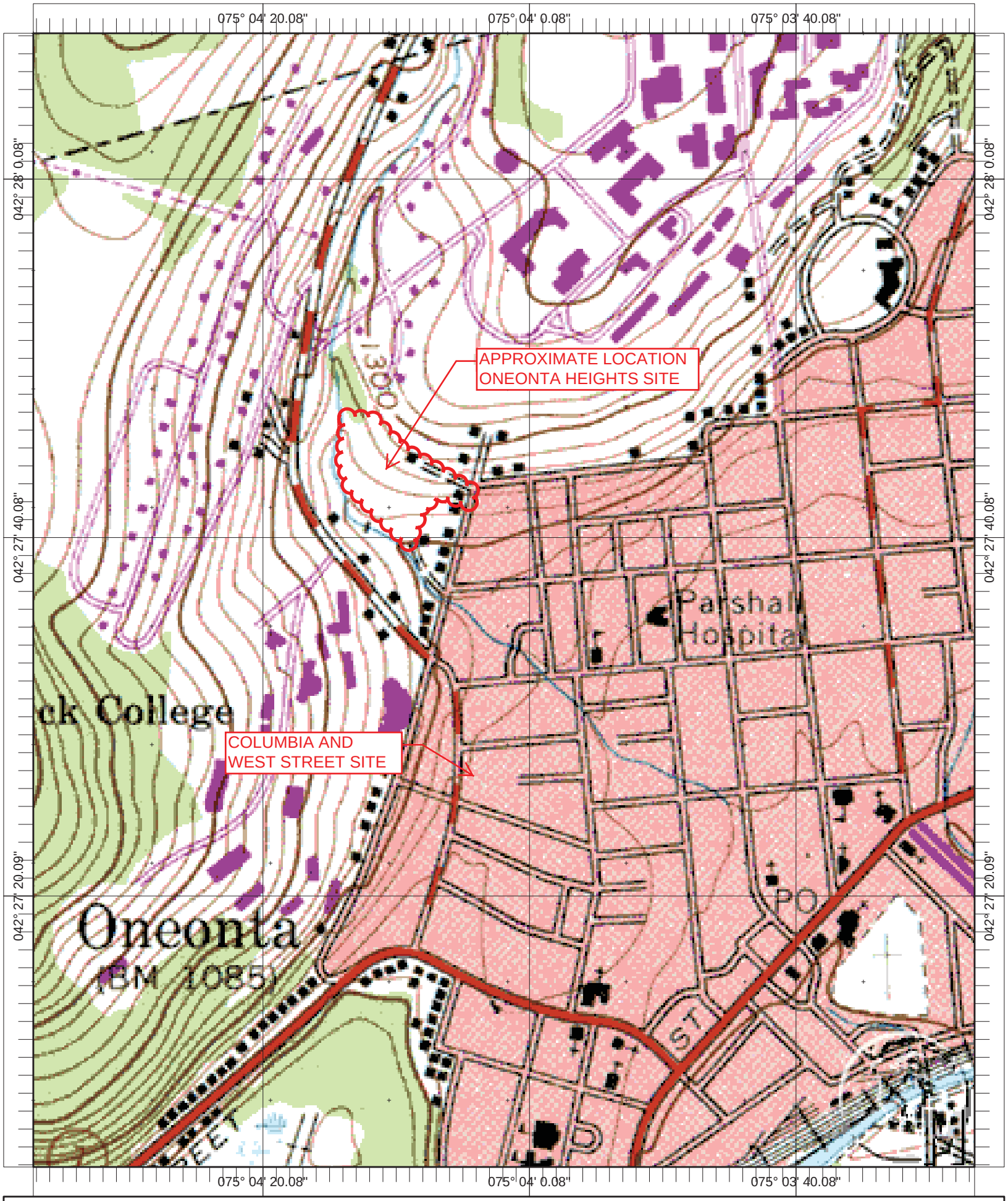


Edward C. Gravelle, P.E.
Vice President

Fred A. Dente, P.E.
President

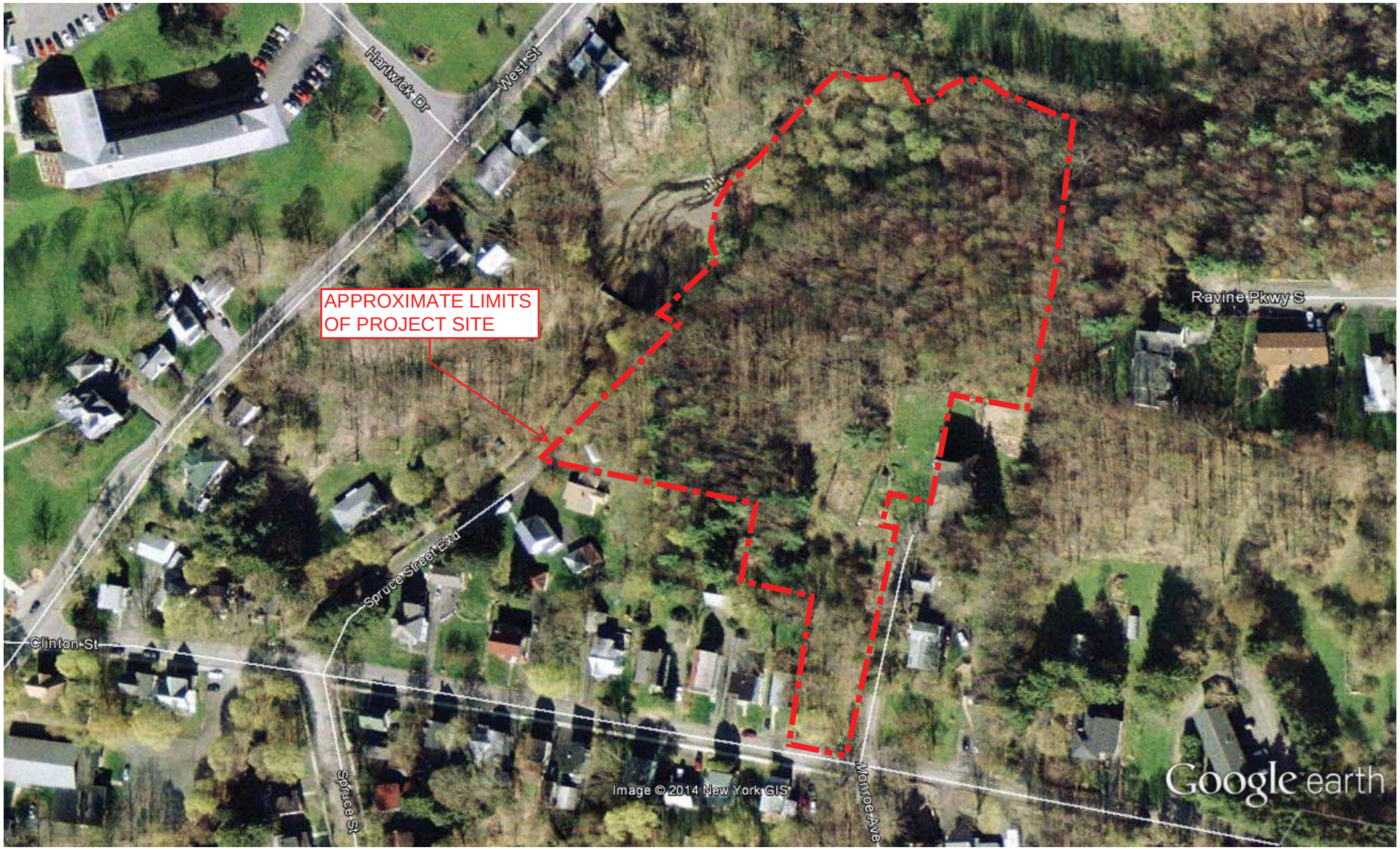
APPENDIX A
SITE LOCATION MAP
AND AERIAL PHOTOGRAPHS

New Building Siting Study
Oneonta, New York



Name: ONEONTA
Date: 11/3/114
Scale: 1 inch equals 666 feet

Location: 042° 27' 36.6" N 075° 04' 02.0" W
Caption: SITE LOCATION MAP
NEW BUILDING SITING STUDY
ONEONTA, NEW YORK



Google earth

feet 900
meters 300

ONEONTA HEIGHTS DEVELOPMENT
CLINTON STREET AT MONROE AVENUE
ONEONTA, NEW YORK

Google earth

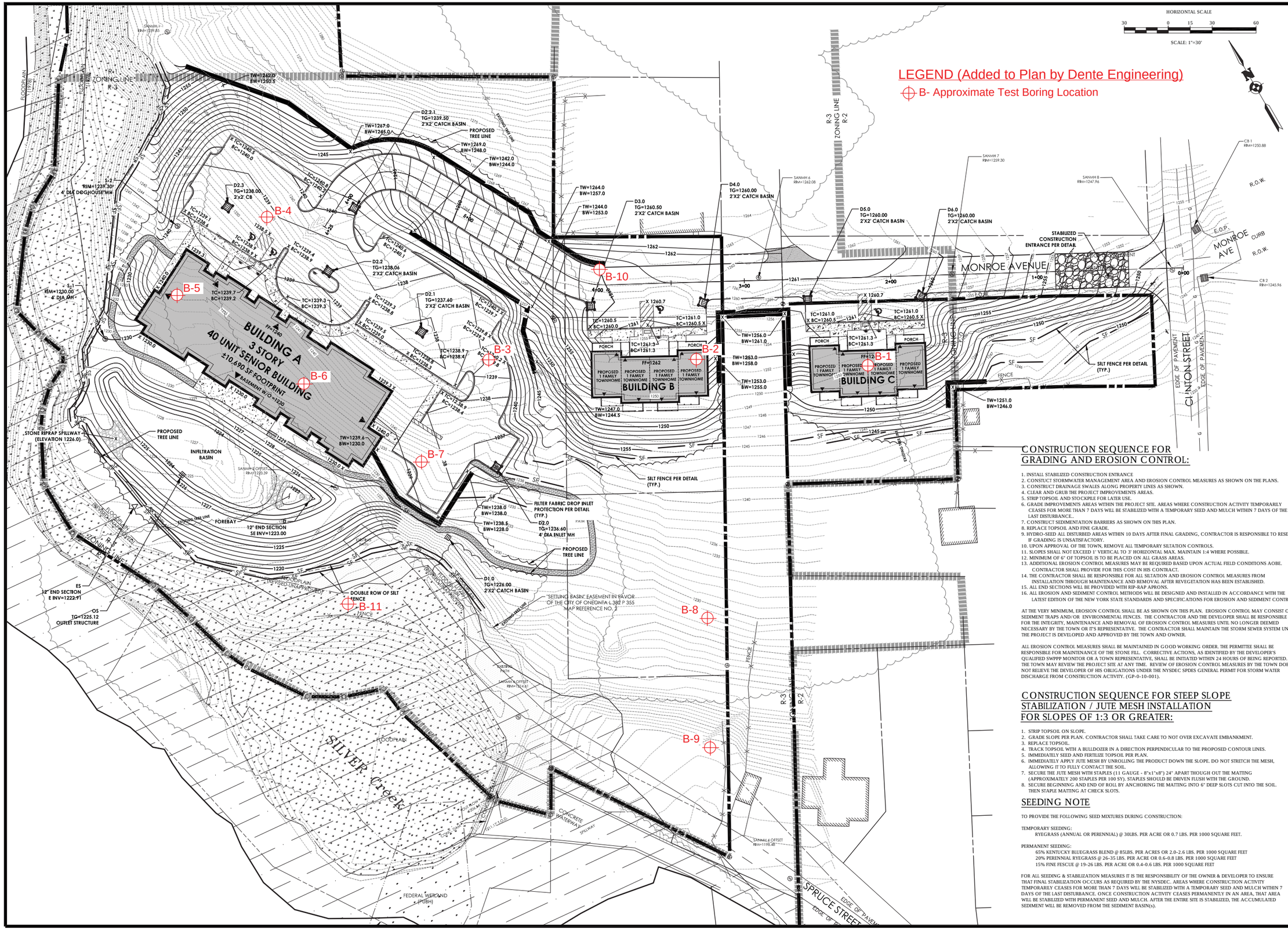
feet 500

meters 100

WEST STREET & COLUMBIA STREET DEVELOPMENT
ONEONTA, NEW YORK

APPENDIX B
SUBSURFACE INVESTIGATION PLAN AND TEST BORING LOGS

Oneonta Heights Development
Oneonta, New York



CONSTRUCTION SEQUENCE FOR GRADING AND EROSION CONTROL:

1. INSTALL STABILIZED CONSTRUCTION ENTRANCE
2. CONSTUCT STORMWATER MANAGEMENT AREA AND EROSION CONTROL MEASURES AS SHOWN ON THE PLANS.
3. CONSTRUCT DRAINAGE SWALES ALONG PROPERTY LINES AS SHOWN.
4. CLEAR AND GRUB THE PROJECT IMPROVEMENTS AREAS.
5. STRIP TOPSOIL AND STOCKPILE FOR LATER USE.
6. GRADE IMPROVEMENTS AREAS WITHIN THE PROJECT SITE. AREAS WHERE CONSTRUCTION ACTIVITY TEMPORARILY CEASES FOR MORE THAN 7 DAYS WILL BE STABILIZED WITH A TEMPORARY SEED AND MULCH WITHIN 7 DAYS OF THE LAST DISTURBANCE..
7. CONSTRUCT SEDIMENTATION BARRIERS AS SHOWN ON THIS PLAN.
8. REPLACE TOPSOIL AND FINE GRADE.
9. HYDRO-SEED ALL DISTURBED AREAS WITHIN 10 DAYS AFTER FINAL GRADING, CONTRACTOR IS RESPONSIBLE TO RESEED IF GRADING IS UNSATISFACTORY.
10. UPON APPROVAL OF THE TOWN, REMOVE ALL TEMPORARY SILTATION CONTROLS.
11. SLOPES SHALL NOT EXCEED 1' VERTICAL TO 3' HORIZONTAL MAX. MAINTAIN 1:4 WHERE POSSIBLE.
12. MINIMUM OF 6" OF TOPSOIL IS TO BE PLACED ON ALL GRASS AREAS.
13. ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED BASED UPON ACTUAL FIELD CONDITIONS AOBE. CONTRACTOR SHALL PROVIDE FOR THIS COST IN HIS CONTRACT.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SILTATION AND EROSION CONTROL MEASURES FROM INSTALLATION THROUGH MAINTENANCE AND REMOVAL AFTER REVEGETATION HAS BEEN ESTABLISHED.
15. ALL END SECTIONS WILL BE PROVIDED WITH RIP-RAP APRONS.
16. ALL EROSION AND SEDIMENT CONTROL METHODS WILL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE NEW YORK STATE STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL

AT THE VERY MINIMUM, EROSION CONTROL SHALL BE AS SHOWN ON THIS PLAN. EROSION CONTROL MAY CONSIST OF SEDIMENT TRAPS AND/OR ENVIRONMENTAL FENCES. THE CONTRACTOR AND THE DEVELOPER SHALL BE RESPONSIBLE FOR THE INTEGRITY, MAINTENANCE AND REMOVAL OF EROSION CONTROL MEASURES UNTIL NO LONGER DEEMED NECESSARY BY THE TOWN OR IT'S REPRESENTATIVE. THE CONTRACTOR SHALL MAINTAIN THE STORM SEWER SYSTEM UNTIL THE PROJECT IS DEVELOPED AND APPROVED BY THE TOWN AND OWNER.

ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED IN GOOD WORKING ORDER. THE PERMITTEE SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE STONE FILL. CORRECTIVE ACTIONS, AS IDENTIFIED BY THE DEVELOPER'S QUALIFIED SWPPP MONITOR OR A TOWN REPRESENTATIVE, SHALL BE INITIATED WITHIN 24 HOURS OF BEING REPORTED. THE TOWN MAY REVIEW THE PROJECT SITE AT ANY TIME. REVIEW OF EROSION CONTROL MEASURES BY THE TOWN DOES NOT RELIEVE THE DEVELOPER OF HIS OBLIGATIONS UNDER THE NYSDEC SPDES GENERAL PERMIT FOR STORM WATER DISCHARGE FROM CONSTRUCTION ACTIVITY. (GP-0-10-001).

CONSTRUCTION SEQUENCE FOR STEEP SLOPE STABILIZATION / JUTE MESH INSTALLATION FOR SLOPES OF 1:3 OR GREATER:

1. STRIP TOPSOIL ON SLOPE.
2. GRADE SLOPE PER PLAN. CONTRACTOR SHALL TAKE CARE TO NOT OVER EXCAVATE EMBANKMENT.
3. REPLACE TOPSOIL.
4. TRACK TOPSOIL WITH A BULLDOZER IN A DIRECTION PERPENDICULAR TO THE PROPOSED CONTOUR LINES.
5. IMMEDIATELY SEED AND FERTILIZE TOPSOIL PER PLAN.
6. IMMEDIATELY APPLY JUTE MESH BY UNROLLING THE PRODUCT DOWN THE SLOPE. DO NOT STRETCH THE MESH, ALLOWING IT TO FULLY CONTACT THE SOIL.
7. SECURE THE JUTE MESH WITH STAPLES (11 GAUGE - 8"x1"x8") 24" APART THOUGH OUT THE MATTING (APPROXIMATELY 200 STAPLES PER 100 SY). STAPLES SHOULD BE DRIVEN FLUSH WITH THE GROUND.
8. SECURE BEGINNING AND END OF ROLL BY ANCHORING THE MATTING INTO 6" DEEP SLOTS CUT INTO THE SOIL. THEN STAPLE MATTING AT CHECK SLOTS.

SEEDING NOTE

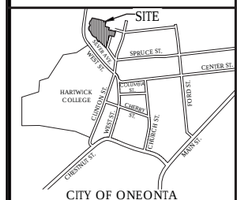
TO PROVIDE THE FOLLOWING SEED MIXTURES DURING CONSTRUCTION:

TEMPORARY SEEDING:
RYEGRASS (ANNUAL OR PERENNIAL) @ 30LBS. PER ACRE OR 0.7 LBS. PER 1000 SQUARE FEET.

PERMANENT SEEDING:
65% KENTUCKY BLUEGRASS BLEND @ 85LBS. PER ACRES OR 2.0-2.6 LBS. PER 1000 SQUARE FEET
20% PERENNIAL RYEGRASS @ 26-35 LBS. PER ACRE OR 0.6-0.8 LBS. PER 1000 SQUARE FEET
15% FINE FESCUE @ 19-26 LBS. PER ACRE OR 0.4-0.6 LBS. PER 1000 SQUARE FEET

FOR ALL SEEDING & STABILIZATION MEASURES IT IS THE RESPONSIBILITY OF THE OWNER & DEVELOPER TO ENSURE THAT FINAL STABILIZATION OCCURS AS REQUIRED BY THE NYSDEC. AREAS WHERE CONSTRUCTION ACTIVITY TEMPORARILY CEASES FOR MORE THAN 7 DAYS WILL BE STABILIZED WITH A TEMPORARY SEED AND MULCH WITHIN 7 DAYS OF THE LAST DISTURBANCE. ONCE CONSTRUCTION ACTIVITY CEASES PERMANENTLY IN AN AREA, THAT AREA WILL BE STABILIZED WITH PERMANENT SEED AND MULCH. AFTER THE ENTIRE SITE IS STABILIZED, THE ACCUMULATED SEDIMENT WILL BE REMOVED FROM THE SEDIMENT BASIN(s).

PASSERO ASSOCIATES
Engineering • Architecture
www.passero.com



CITY OF ONEONTA
LOCATION SKETCH
N.T.S.

Client:
HOUSING VISIONS CONSULTANTS, LLC
1201 E. FAYETTS STREET
SYRACUSE, NY 13210

Passero Associates
242 WEST MAIN STREET, SUITE 100 (585) 325-1000
Rochester, New York 14614 Fax: (585) 325-1691
Principal-in-Charge John F. Caruso, P.E.
Project Manager David L. Cox, P.E.
Designed by Matt Nissen, E.I.T.

STATE OF NEW YORK
JOHN F. CARUSO
LICENSED PROFESSIONAL ENGINEER
066631

Revisions

No.	Date	By	Description

GRADING PLAN

ONEONTA HEIGHTS

CLINTON STREET
ONEONTA, NY 13820

City of Oneonta, Ostego County, New York

Project No. 20141930.0001

Drawing No. C 103

Sheet No. 3

Scale: 1"=30'

Date OCTOBER 2014

INTERPRETATION OF SUBSURFACE LOGS

The Subsurface Logs present observations and the results of tests performed in the field by the Driller, Technicians, Geologists and Geotechnical Engineers as noted. Soil/Rock Classifications are made visually, unless otherwise noted, on a portion of the materials recovered through the sampling process and may not necessarily be representative of the materials between sampling intervals or locations.

The following defines some of the terms utilized in the preparation of the Subsurface Logs.

SOIL CLASSIFICATIONS

Soil Classifications are visual descriptions on the basis of the Unified Soil Classification ASTM D-2487 and USBR, 1973 with additional comments by weight of constituents by BUHRMASTER. The soil density or consistency is based on the penetration resistance determined by ASTM METHOD D1586. Soil Moisture of the recovered materials is described as DRY, MOIST, WET or SATURATED.

SIZE DESCRIPTION		RELATIVE DENSITY/CONSISTENCY (basis ASTM D1586)			
SOIL TYPE	PARTICLE SIZE	GRANULAR SOIL		COHESIVE SOIL	
BOULDER	> 12	DENSITY	BLOWS/FT.	CONSISTENCY	BLOWS/FT.
COBBLE	3" - 12"	LOOSE	< 10	VERY SOFT	< 3
GRAVEL-COARSE	3" - 3/4"	FIRM	11 - 30	SOFT	4 - 5
GRAVEL - FINE	3/4" - #4	COMPACT	31 - 50	MEDIUM	6 - 15
SAND - COARSE	#4 - #10	VERY COMPACT	50 +	STIFF	16 - 25
SAND - MEDIUM	#10 - #40			HARD	25 +
SAND - FINE	#40 - #200				
SILT/NONPLASTIC	< #200				
CLAY/PLASTIC	< #200				

SOIL STRUCTURE		RELATIVE PROPORTION OF SOIL TYPES	
STRUCTURE	DESCRIPTION	DESCRIPTION	% OF SAMPLE BY WEIGHT
LAYER	6" THICK OR GREATER	AND	35 - 50
SEAM	6" THICK OR LESS	SOME	20 - 35
PARTING	LESS THAN 1/4" THICK	LITTLE	10 - 20
VARVED	UNIFORM HORIZONTAL PARTINGS OR SEAMS	TRACE	LESS THAN 10

Note that the classification of soils or soil like materials is subject to the limitations imposed by the size of the sampler, the size of the sample and its degree of disturbance and moisture.

ROCK CLASSIFICATIONS

Rock Classifications are visual descriptions on the basis of the Driller's, Technician's, Geologist's or Geotechnical Engineer's observations of the coring activity and the recovered samples applying the following classifications.

CLASSIFICATION TERM	DESCRIPTION
VERY HARD	NOT SCRATCHED BY KNIFE
HARD	SCRATCHED WITH DIFFICULTY
MEDIUM HARD	SCRATCHED EASILY
SOFT	SCRATCHED WITH FINGERNAIL
VERY WEATHERED	DISINTEGRATED WITH NUMEROUS SOIL SEAM
WEATHERED	SLIGHT DISINTEGRATION, STAINING, NO SEAMS
SOUND	NO EVIDENCE OF ABOVE
MASSIVE	ROCK LAYER GREATER THAN 36" THICK
THICK BEDDED	ROCK LAYER 12" - 36"
BEDDED	ROCK LAYER 4" - 12"
THIN BEDDED	ROCK LAYER 1" - 4"
LAMINATED	ROCK LAYER LESS THAN 1"
FRACTURES	NATURAL BREAKS AT SOME ANGLE TO BEDS

Core sample recovery is expressed as percent recovered of total sampled. The ROCK QUALITY DESIGNATION (RQD) is the total length of core sample pieces exceeding 4" length divided by the total core sample length for N size cored.

GENERAL

- Soil and Rock classifications are made visually on samples recovered. The presence of Gravel, Cobbles and Boulders will influence sample recovery classification density/consistency determination.
- Groundwater, if encountered, was measured and its depth recorded at the time and under the conditions as noted.
- Topsoil or pavements, if present, were measured and recorded at the time and under the conditions as noted.
- Stratification Lines are approximate boundaries between soil types. These transitions may be gradual or distinct and are approximated.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-1**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/22/14	FINISH: 10/22/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1250' (approx.)
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
							+/- 6" Topsoil
	1	WH	2				Brown/Gray Mottled Clayey SILT, Some F-M
				10	19	12	Sand, Little Gravel, Moist
5'	2	20	36				Grades Brown Clayey SILT, Some F-C
				23		59	Sand and Gravel, Moist
10'	3	11	16				Grades Little Sand
				23		39	
15'	4	13	20				Grades Grayish Brown
				46		66	
20'	5	21	45				Grades SILT, SAND, and GRAVEL
				50/.2'		95/.7'	**(MOIST, FIRM TO VERY COMPACT)**
							Boring Ended at 21.2' with Spoon Refusal
25'							No measurable groundwater in augers at completion of drilling and sampling.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-2**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/22/14	FINISH: 10/22/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1253' (approx.)
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	1	2				+/- 3" Topsoil
				4	10	6	Brown SILT, Some F-C Sand and Gravel
							Moist
5'	2	17	16				Grades Little Gravel
				10		26	
10'	3	21	40				No Sample #3 Recovered
				34		74	
15'	4	10	15				Grades Grayish Brown Clayey SILT, Some
				22		37	F-C Sand, trace gravel
20'	5	8	12				Similar
				15		27	**(MOIST, LOOSE TO COMPACT)**
							Boring Ended at 21.5'
25'							No measurable groundwater in augers at completion of drilling and sampling.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-3**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/22/14	FINISH: 10/22/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1249' (approx.)
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	2	4				Brown F-C SAND and SILT, Some Gravel
				4	2	8	**(MOIST, LOOSE)**
	2	8	18				Brown SILT, Some F-C Sand, Little Gravel,
				13	36	31	Moist
5'							
	3	16	13				Grades Brown F-C SAND and SILT, Some
				13		26	Gravel
10'							
	4	8	13				Grades Brown Clayey SILT, Little F-C Sand
				18		31	and Gravel
15'							
	5	26	30				Grades SILT, Some F-C Sand and Gravel
				35		65	**(MOIST, FIRM TO VERY COMPACT)**
							Boring Ended at 16.5'
20'							No measurable groundwater in augers at completion of drilling and sampling.
25'							

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-4**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/21/14	FINISH: 10/21/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1254' (approx.)
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	1	4				**Possible Fill:** Brown F-C SAND and Gravel,
				10	12	14	Little Silt
							(MOIST, FIRM)
5'	2	19	26				Brown SILT, Some F-C Sand, Little Gravel,
				26		52	Moist
10'	3	19	23				Grades Brown Clayey SILT, Some F-C Sand
				27		50	Little Gravel
15'	4	32	40				Similar to above
				48		88	
20'	5	21	25				Similar, Becomes Wet
				33		58	**(MOIST TO WET, VERY COMPACT)**
							Boring Ended at 21.5'
25'							No measurable groundwater in augers at completion of drilling and sampling.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-5**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/21/14	FINISH: 10/21/14
LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers		
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods		
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1235'		
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.		

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	4	3				**FILL**: Dark Brown SILT, Some F-C Sand,
				2	3	5	Some Gravel, trace brick and wood
	2	6	5				**(MOIST, LOOSE)**
				18	13	23	Brown/Gray Mottled GRAVEL, Some F-C
							Sand and Silt, Moist
5'	3	12	15				Grades SILT, Some F-C Sand, Little Gravel
				15		30	
10'	4	20	19				Grades Brown F-C SAND, Some Gravel and
				13		32	Silt, Wet
							(MOIST TO WET, FIRM TO COMPACT)
15'	5	20	18				Red SILT, Little F-C Sand and Gravel, Moist
				24		42	
20'	6	21	34				Similar with Rock Fragments at End
				50/.4'		84/.9'	**(MOIST, COMPACT TO VERY COMPACT)**
							Boring Ended at 21.4' with Spoon Refusal
							Groundwater in augers at 10.3' below grade
25'							after sample #4 was obtained.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-6**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/20/14	FINISH: 10/20/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1234' (approx.)
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
							+/- 2" Wood Chips, +/- 2" Topsoil
	1	4	6				Brown F-C SAND and GRAVEL, Some Silt
				9	11	15	Moist
5'	2	20	17				Grades Brown F-C SAND, Some Silt, Little
				15		32	Gravel
10'	3	27	17				No Recovery in Sample #3
				15		32	
							(MOIST, FIRM TO COMPACT)
15'	4	16	19				Red SILT and F-C SAND, Little Gravel,
				25		44	Moist
20'	5	27	50				Similar
				50/.4'		100/.9	**(MOIST, COMPACT TO VERY COMPACT)**
							Boring Ended at 21.4' with Spoon Refusal
25'							No measurable groundwater in augers at completion of drilling and sampling.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-7**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/22/14	FINISH: 10/22/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1236' (approx.)
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	2	2				+/- 7" Topsoil
				5	10	7	Dark Brown to Brown/Gray Mottled F-C SAND and SILT, Some Gravel, Moist
5'	2	15	17				Grades Brown/Gray Mottled SILT, Some to
				23		40	Little F-C Sand and Gravel
10'	3	20	13				Grades Brown Clayey SILT, Little F-C Sand
				13		26	and Gravel
15'	4	9	10				Similar to above
				15		25	
20'	5	16	33				Grades Some Gravel
				39		72	**(MOIST, LOOSE TO VERY COMPACT)**
							Boring Ended at 21.5'
25'							No measurable groundwater in augers at completion of drilling and sampling.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-8**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/22/14	FINISH: 10/22/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1228' (approx.)
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	1	2				+/- 3" Topsoil
				3	5	5	Brown/Gray Mottled Clayey SILT, Some Gravel, Little F-C Sand, Moist
5'	2	12	15				Grades trace gravel
				17		32	
10'	3	12	16				Grades Brown F-C SAND and GRAVEL,
				16		32	Some Silt
							(MOIST, LOOSE TO FIRM & COMPACT)
15'							Boring Ended at 14.6' with Auger Refusal
							No measurable groundwater in augers at completion of drilling and sampling.
20'							
25'							

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-9**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/20/14	FINISH: 10/20/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1204' (approx.)
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	9	7				**FILL**: Brown F-C SAND and GRAVEL, Some
				4	4	11	Silt, Moist
	2	5	4				Similar with rootlets noted
				3	2	7	**(MOIST, FIRM TO LOOSE)**
	3	12	14				Gray SILT and CLAY, Little F-C Sand and
5'				7	10	21	Gravel, Wet
	4	13	15				Grades Grayish Brown, Some Gravel
				14	13	29	
10'	5	7	10				Grades Little Sand and Gravel
				12	18	22	
15'	6	4	10				Grades trace sand and gravel
				15	19	25	
							(WET, STIFF TO HARD)
20'							
	7	15	24				Brown F-C SAND and GRAVEL, Some Silt
				46	50/.4'	70	**(MOIST, VERY COMPACT)**
							Boring Ended at 21.9' with Spoon Refusal
							Groundwater in augers at 4.0' below grade
25'							after sample 4 was obtained.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-10**

PROJECT: Oneonta Heights Development	**DATE**	START: 10/21/14	FINISH: 10/21/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ±1262' (approx.)
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	5	9				Brown/Gray Mottled F-C SAND, SILT and
				28	25	37	GRAVEL, Cobbles noted, Moist
5'	2	7	10				Grades Brown Clayey SILT, Little F-C Sand
				12		22	and Gravel
10'	3	10	14				Grades Grayish Brown, trace gravel
				24		38	
15'	4	15	19				Similar to above
				27		46	
20'	5	13	17				Grades trace sand and gravel
				22		39	**(MOIST, FIRM TO COMPACT)**
							Boring Ended at 21.5'
25'							Groundwater in augers at 21.3' below grade one hour after completion of drilling.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-11**

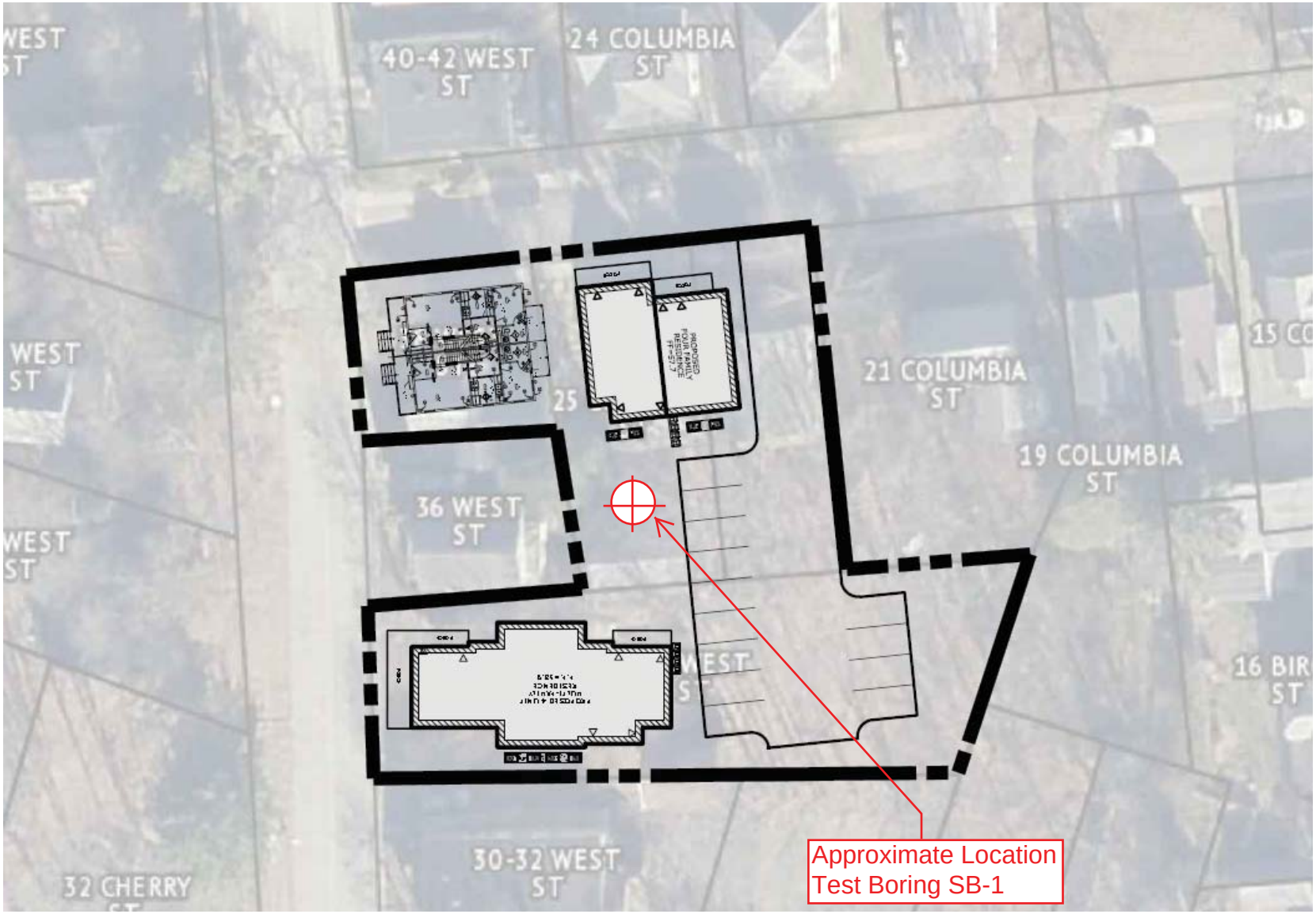
PROJECT: Oneonta Heights Development	**DATE**	START: 10/21/14	FINISH: 10/21/14

LOCATION: Clinton Street - Oneonta, NY	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:** ± 1215'
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	3	7				Dark Brown/Gray Mottled SILT, Little F-C
				5	6	12	Sand and Gravel, Moist
	2	11	11				Grades Brown GRAVEL, Some F-C Sand,
				10	13	21	Little Silt
	3	11	20				Grade SAND and GRAVEL, Some Silt
5'				13	8	33	**(MOIST, FIRM TO COMPACT)**
							Boring Ended at 6.0'
							Groundwater in augers at 5.3' below grade
							at completion of drilling and sampling.
10'							
15'							
20'							
25'							

APPENDIX C
SUBSURFACE INVESTIGATION PLAN AND TEST BORING LOGS

West Street & Columbia Street Development
Oneonta, New York



DENTE ENGINEERING, P. C.
594 Broadway - Watervliet, New York 12189
Voice 518-266-0310 Fax 518-266-9238

Scale: N.T.S.	**SUBSURFACE INVESTIGATION PLAN**	**Drawn By: NA**
Date: 11/07/2014	**West Street and Columbia Street Development** *Oneonta, New York*	**Drawing No. 1**

INTERPRETATION OF SUBSURFACE LOGS

The Subsurface Logs present observations and the results of tests performed in the field by the Driller, Technicians, Geologists and Geotechnical Engineers as noted. Soil/Rock Classifications are made visually, unless otherwise noted, on a portion of the materials recovered through the sampling process and may not necessarily be representative of the materials between sampling intervals or locations.

The following defines some of the terms utilized in the preparation of the Subsurface Logs.

SOIL CLASSIFICATIONS

Soil Classifications are visual descriptions on the basis of the Unified Soil Classification ASTM D-2487 and USBR, 1973 with additional comments by weight of constituents by BUHRMASTER. The soil density or consistency is based on the penetration resistance determined by ASTM METHOD D1586. Soil Moisture of the recovered materials is described as DRY, MOIST, WET or SATURATED.

SIZE DESCRIPTION		RELATIVE DENSITY/CONSISTENCY (basis ASTM D1586)			
SOIL TYPE	PARTICLE SIZE	GRANULAR SOIL		COHESIVE SOIL	
BOULDER	> 12	DENSITY	BLOWS/FT.	CONSISTENCY	BLOWS/FT.
COBBLE	3" - 12"	LOOSE	< 10	VERY SOFT	< 3
GRAVEL-COARSE	3" - 3/4"	FIRM	11 - 30	SOFT	4 - 5
GRAVEL - FINE	3/4" - #4	COMPACT	31 - 50	MEDIUM	6 - 15
SAND - COARSE	#4 - #10	VERY COMPACT	50 +	STIFF	16 - 25
SAND - MEDIUM	#10 - #40			HARD	25 +
SAND - FINE	#40 - #200				
SILT/NONPLASTIC	< #200				
CLAY/PLASTIC	< #200				

SOIL STRUCTURE		RELATIVE PROPORTION OF SOIL TYPES	
STRUCTURE	DESCRIPTION	DESCRIPTION	% OF SAMPLE BY WEIGHT
LAYER	6" THICK OR GREATER	AND	35 - 50
SEAM	6" THICK OR LESS	SOME	20 - 35
PARTING	LESS THAN 1/4" THICK	LITTLE	10 - 20
VARVED	UNIFORM HORIZONTAL PARTINGS OR SEAMS	TRACE	LESS THAN 10

Note that the classification of soils or soil like materials is subject to the limitations imposed by the size of the sampler, the size of the sample and its degree of disturbance and moisture.

ROCK CLASSIFICATIONS

Rock Classifications are visual descriptions on the basis of the Driller's, Technician's, Geologist's or Geotechnical Engineer's observations of the coring activity and the recovered samples applying the following classifications.

CLASSIFICATION TERM	DESCRIPTION
VERY HARD	NOT SCRATCHED BY KNIFE
HARD	SCRATCHED WITH DIFFICULTY
MEDIUM HARD	SCRATCHED EASILY
SOFT	SCRATCHED WITH FINGERNAIL
VERY WEATHERED	DISINTEGRATED WITH NUMEROUS SOIL SEAM
WEATHERED	SLIGHT DISINTEGRATION, STAINING, NO SEAMS
SOUND	NO EVIDENCE OF ABOVE
MASSIVE	ROCK LAYER GREATER THAN 36" THICK
THICK BEDDED	ROCK LAYER 12" - 36"
BEDDED	ROCK LAYER 4" - 12"
THIN BEDDED	ROCK LAYER 1" - 4"
LAMINATED	ROCK LAYER LESS THAN 1"
FRACTURES	NATURAL BREAKS AT SOME ANGLE TO BEDS

Core sample recovery is expressed as percent recovered of total sampled. The ROCK QUALITY DESIGNATION (RQD) is the total length of core sample pieces exceeding 4" length divided by the total core sample length for N size cored.

GENERAL

- Soil and Rock classifications are made visually on samples recovered. The presence of Gravel, Cobbles and Boulders will influence sample recovery classification density/consistency determination.
- Groundwater, if encountered, was measured and its depth recorded at the time and under the conditions as noted.
- Topsoil or pavements, if present, were measured and recorded at the time and under the conditions as noted.
- Stratification Lines are approximate boundaries between soil types. These transitions may be gradual or distinct and are approximated.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **SB-1**

PROJECT: West Street and Columbia Street	**DATE**	START: 10/21/14	FINISH: 10/21/14

LOCATION: Oneonta, New York	**METHODS:** 2-1/4" Hollow Stem Augers
CLIENT: Housing Visions	with ASTM D1586 Sampling Methods
JOB NUMBER: FDE-14-207	**SURFACE ELEVATION:**
DRILL TYPE: CME 55	**CLASSIFICATION:** E. Gravelle, P.E.

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	1	1	4				+/- 6" Topsoil
				6	5	10	**FILL**: Dark Brown to Brown F-C SAND and GRAVEL, Some Silt, Moist
	2	8	6				Grades Some Cinders
				6	8	12	**(MOIST, LOOSE TO FIRM)**
	3	10	14				Tan SILT, Little F-C Sand and Gravel
5'				24		38	**(MOIST, COMPACT)**
10'	4	15	19				Grades Brown SILT **(MOIST)**
				27		46	Brown F-C SAND and GRAVEL, Some Silt, Moist
15'	5	28	38	50/.4'		88/.9'	Similar, No Recovery in Sample #6
	6		50/.1'			REF	**(MOIST, VERY COMPACT)**
							Boring Ended at 16.5' with Spoon Refusal
20'							Auger refusal met at 16.4' and sample spoon refusal at 16.5'
							No measurable groundwater in augers at completion of drilling and sampling.
25'							

APPENDIX D
LABORATORY TEST RESULTS

Oneonta Heights Development
Oneonta, New York

Siting Study for New Buildings

Oneonta, NY

Moisture Content Results - ASTM D2216

Boring No.	B-2	B-2	B-5	B-5	B-11	
Sample No.	654/S2	655/S4	656/S2	657/S4	658/S2	
Sample Depth	5'-6.5'	15'-16.5'	2'-4'	10'-11.5'	2'-4'	
Tare Weight	403.20	413.60	405.30	403.20	411.10	
W_S + Tare	625.10	664.20	652.80	694.40	660.30	
W_D + Tare	598.30	638.20	631.20	667.60	647.90	
W_{WATER}	26.80	26.00	21.60	26.80	12.40	
$W_{DRY\ SOIL}$	195.10	224.60	225.90	264.40	236.80	
% Moisture (W_W / W_D)	13.7	11.6	9.6	10.1	5.2	

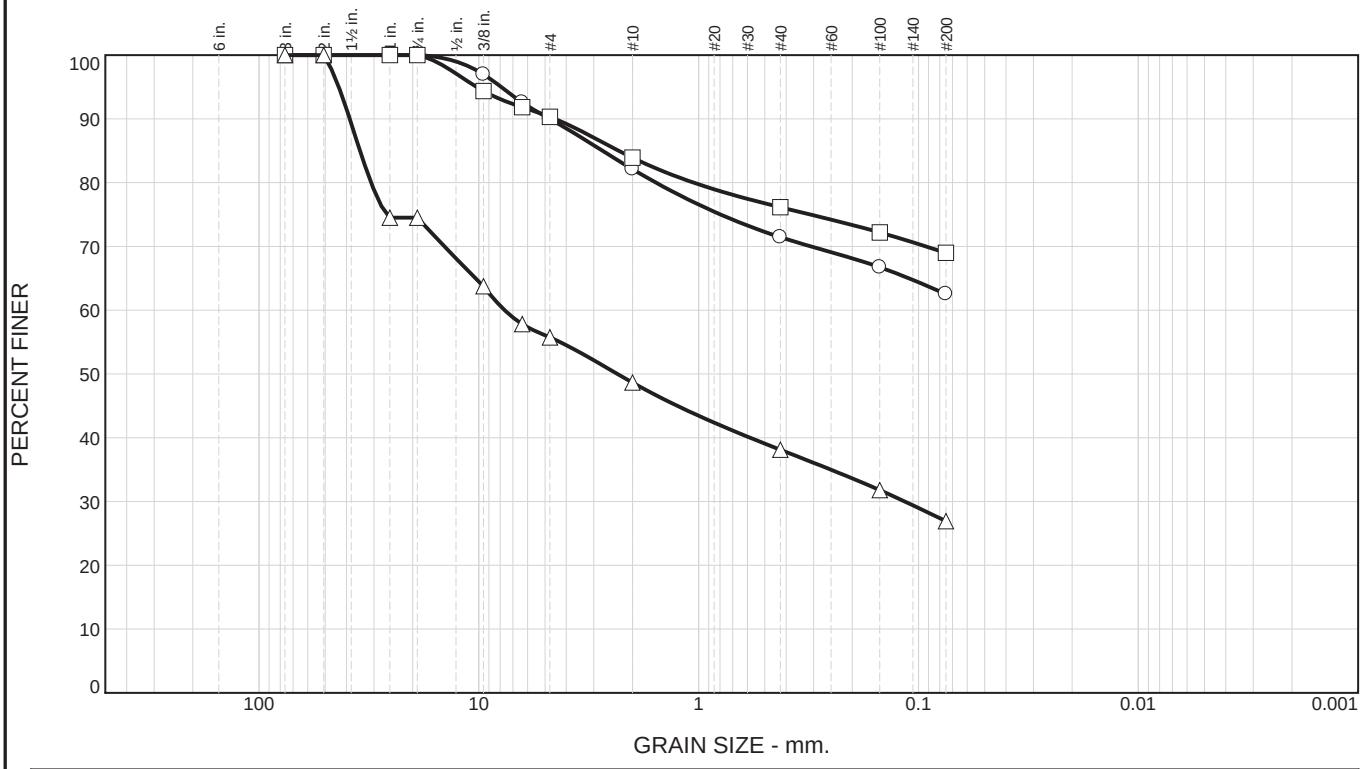
Boring No.						
Sample No.						
Sample Depth						
Tare Weight						
W_S + Tare						
W_D + Tare						
W_{WATER}						
$W_{DRY\ SOIL}$						
% Moisture (W_W / W_D)						

Boring No.						
Sample No.						
Sample Depth						
Tare Weight						
W_S + Tare						
W_D + Tare						
W_{WATER}						
$W_{DRY\ SOIL}$						
% Moisture (W_W / W_D)						

DENTE ENGINEERING
594 Broadway
Watervliet, NY 12189
Ph. 518-266-0310
Fax 518-266-9238

Client: Housing Visions
File No. FDE-14-207
Date: November 3, 2014

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	10.0	27.5	62.5		ML	A-4(0)	NP	NP
□	0.0	9.7	21.3	69.0		ML	A-4(0)	NP	NP
△	0.0	44.3	28.8	26.9		GM	A-2-4(0)	NP	NP

SIEVE inches size	PERCENT FINER ○	□	△
3	100.0	100.0	100.0
2	100.0	100.0	100.0
1	100.0	100.0	74.5
.75	100.0	100.0	74.5
.375	97.0	94.4	63.7
.25	92.6	91.8	57.8
GRAIN SIZE			
D_{60}			7.6370
D_{30}			0.1155
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	90.0	90.3	55.7
#10	82.1	83.9	48.6
#40	71.5	76.1	38.1
#100	66.7	72.2	31.8
#200	62.5	69.0	26.9

Material Description
○ SILT, some M-F-C Sand, little Gravel
□ SILT, some M-F-C Sand, trace Gravel
△ GRAVEL, some F-M-C Sand, some Silt

REMARKS:
○ Per ASTM D422
□ Per ASTM D422 Washed
△ Per ASTM D422 Washed

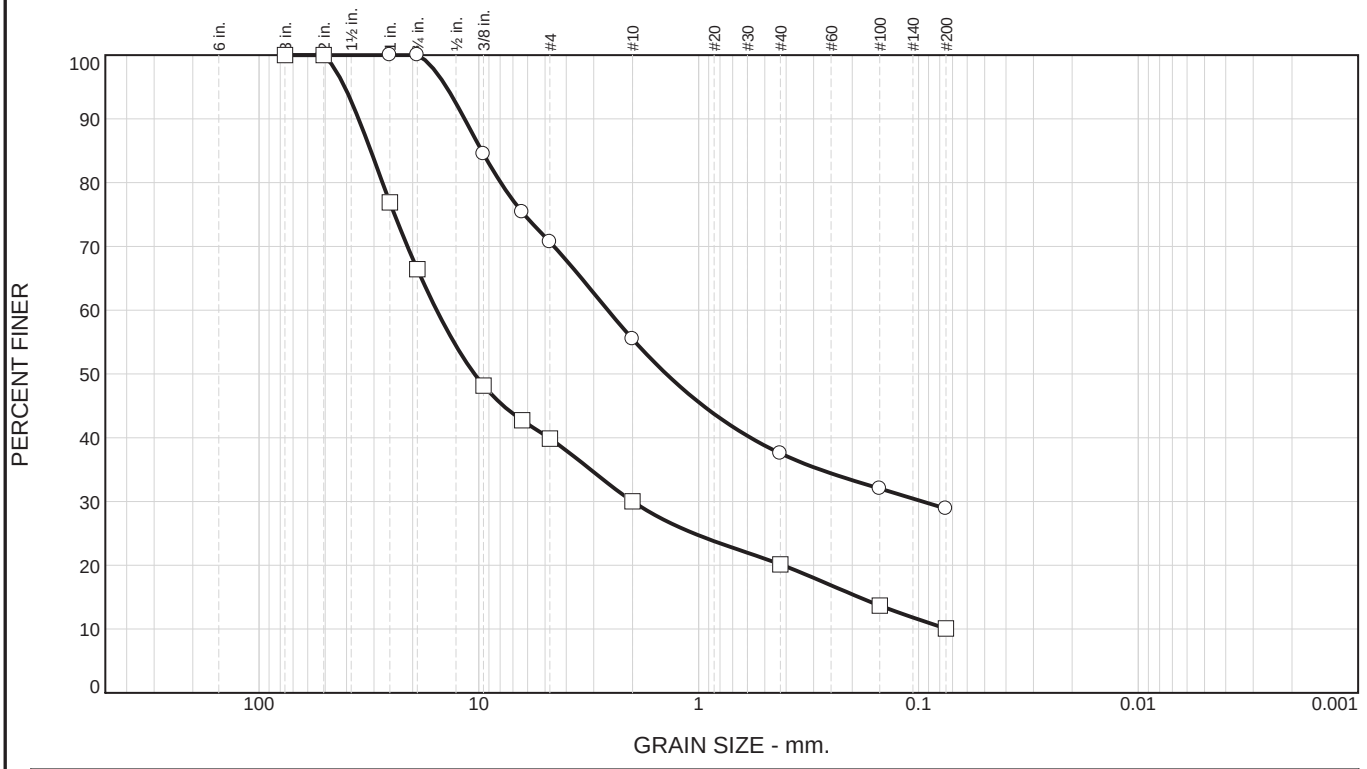
○ Source of Sample: Borings Depth: 5'-6.5' Sample Number: 654: B-2/S2
□ Source of Sample: Borings Depth: 15'-16.5' Sample Number: 655: B-2/S4
△ Source of Sample: Borings Depth: 2'-4' Sample Number: 656: B-5/S2

EVERGREEN TESTING, INC.
Watervliet, NY

Client: Housing Visions
Project: Siting Study for New Buildings
Oneonta, NY
Project No.: FDE-14-207 Figure 654-656

Tested By: ○ JC □ JC △ KM **Checked By:** EG

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○	0.0	29.3	41.8	28.9		SM	A-2-4(0)	NP	NP
□	0.0	60.1	29.8	10.1		GP-GM	A-1-a	NP	NP

SIEVE inches size	○ PERCENT FINER	□ PERCENT FINER
3	100.0	100.0
2	100.0	100.0
1	100.0	76.9
.75	100.0	66.4
.375	84.5	48.2
.25	75.4	42.7
GRAIN SIZE		
D_{60}	2.5879	15.5578
D_{30}	0.0956	1.9950
D_{10}		
COEFFICIENTS		
C_c		
C_u		

SIEVE number size	○ PERCENT FINER	□ PERCENT FINER
#4	70.7	39.9
#10	55.5	30.0
#40	37.6	20.1
#100	32.0	13.7
#200	28.9	10.1

Material Description

○ M-C-F SAND, some Gravel, some Silt

□ GRAVEL, some F-M-C Sand, little Silt

REMARKS:

○ Per ASTM D422 Washed

□ Per ASTM D422 Washed

○ Source of Sample: Borings Depth: 10'-11.5' Sample Number: 657: B-5/S4

□ Source of Sample: Borings Depth: 2'-4' Sample Number: 658: B-11/S2

EVERGREEN TESTING, INC.
Watervliet, NY

Client: Housing Visions

Project: Siting Study for New Buildings
Oneonta, NY

Project No.: FDE-14-207 Figure 657-658

Tested By: KM **Checked By:** EG

APPENDIX E
INFILTRATION TEST RESULTS

Oneonta Heights Development
Oneonta, New York

DENTE ENGINEERING

ALBANY AREA
594 Broadway
Watervliet, NY 12189
Voice 518-266-0310
Fax 518-266-9238

BUFFALO AREA
PO Box 482
Orchard Park, NY 14127
Voice 716-649-9474
Fax 716-648-3521

INFILTRATION TEST RESULTS

PROJECT: Oneonta Heights Development	**PROJECT NO.** FDE-14-207
PROJECT LOCATION: Oneonta, New York	**TEST DATE:** 10/22/14
WEATHER:	**TESTER:** J. Lamm

Test Location	Test Depth (feet)	Trial No.	Water Drop (inches)	Elapsed Time (hours)	Infiltration Rate (inches/hour)
B-11	3.0	1	1.0	1.00	1.0
		2	1.0	1.00	1.0
		3	1.0	1.00	1.0
		Average infiltration rate for three trials was 1.0 inch per hour. Infiltration rate of final trial was 1.0 inch per hour.			

Notes:

(1) Testing was conducted in general accord with the “Infiltration Testing Requirements” contained in Appendix D of the New York State Stormwater Management Design Manual.

(2) Test pipe was installed in a borehole made adjacent to test boring B-11.

SOIL CLASSIFICATION AT TEST DEPTH

Test Location B-11: Brown GRAVEL, Some F-C Sand, Little Silt
Groundwater at 5.3' depth on 10/21/2014