GEOTECHNICAL EVALUATION
STRATTON VA MEDICAL CENTER
EMERGENCY DEPARTMENT ADDITION
CITY OF ALBANY, NEW YORK

Dente File No. FDE-11-104

Prepared For:

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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 a light 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 Geotechncial 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 you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

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GEOTECHNICAL EVALUATION
STRATTON VA MEDICAL CENTER
EMERGENCY DEPARTMENT ADDITION
CITY OF ALBANY, NEW YORK

I. INTRODUCTION

This report presents the results of a geotechnical evaluation completed by Dente Engineering, P.C. (Dente) for the Emergency Department (ED) addition proposed for construction at the Stratton VA Medical Center in the City of Albany, New York. The evaluation was completed in general accord with Dente proposal number PFDE-11-56 and authorized by Hyman Hayes Associates of Albany, New York.

In general, the scope of services for this evaluation consisted of the following:

- Field location and completion of eight test borings and two temporary groundwater monitoring wells.
- Site reconnaissance by a Geotechnical Engineer.
- 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, and retaining walls.

This report and the recommendations contained within it were developed for specific application to the site 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 test borings. The borings were advanced 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.

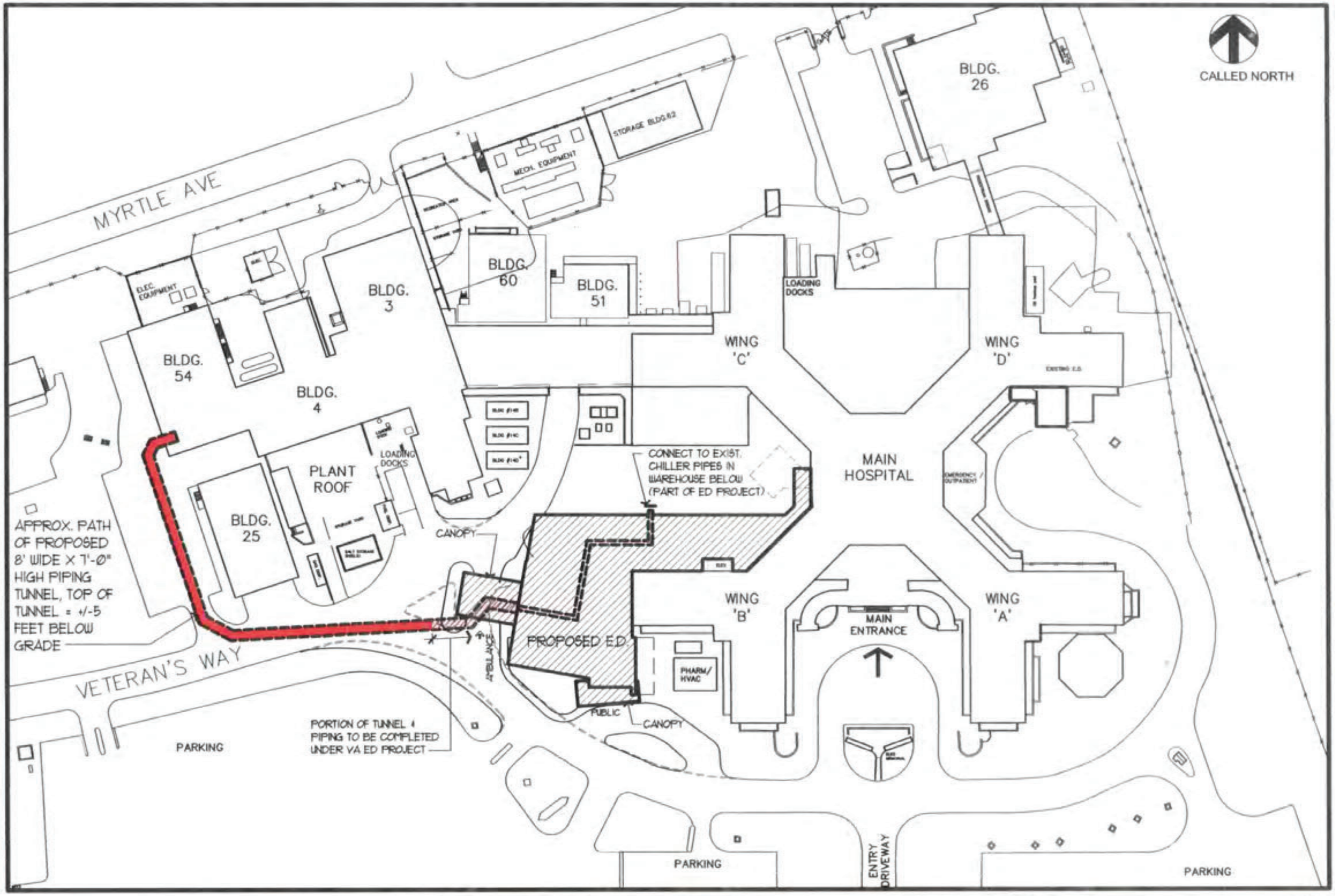
II. SITE AND PROJECT DESCRIPTION

The project will entail construction of a new Emergency Department (ED) addition and utility tunnel at the VA Medical Center complex in Albany, New York. The project site is located south of Myrtle Avenue as depicted on a portion of the current USGS Topographic Map for the area presented in Appendix A. The map is provided to assist the reader in locating the site and reviewing the general topography and land use in the area within which it exists. A portion of the USGS map dated 1893 is also presented to illustrate the changes in land use and topography over time in the general project area.

The ED addition will be a single-story structure with basement level, designed to accommodate one future floor. Based on information provided to us by the project engineer, Ryan-Biggs Associates, maximum column loads for the new addition will range between 13 and 220 kips. This includes the future second-floor level construction. A new utility tunnel for chiller piping will extend from the ED addition to the west side of Building 54. The tunnel will be about 8 feet wide and 6.5 feet high, with the top of the tunnel about 5 feet below existing grade. The proposed layout of the new addition and utility tunnel is shown on the Proposed Site Plan and Conceptual Section which follow this page.

The basement floor for the ED addition will match the existing basement floors for the adjoining structures at elevation ±190.5 feet. This is about 9 to 13 feet below the existing ground surface elevations in the proposed building area. All the existing adjoining buildings are reportedly supported on pipe pile foundations. The top of the pile caps is near elevation ±186.0 feet and the bottom of the pile caps at elevation ±183.0 feet. A sub-basement level (crawl space) is present in the existing Wing C building where it will adjoin the called north side of the new addition.

The existing adjoining buildings were originally constructed circa 1950. In 2008 new areaways were built adjacent to the called north side of Wing B. When these were



V.A. Repair Hot Water Lines Phase 2
Conceptual Site Plan (with proposed ED) **SK-A**

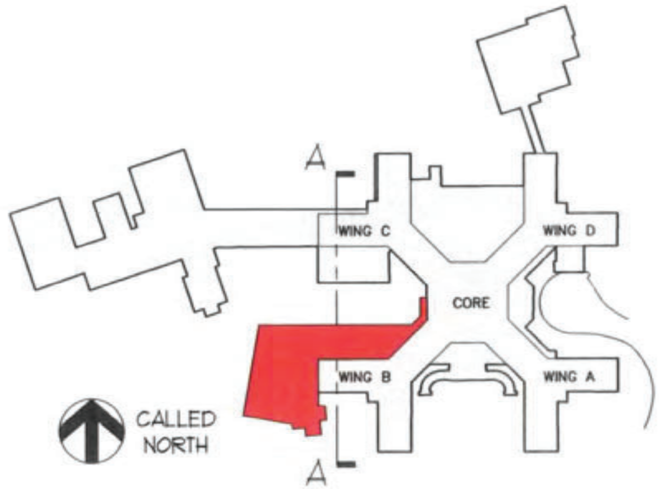
Department of Veterans Affairs

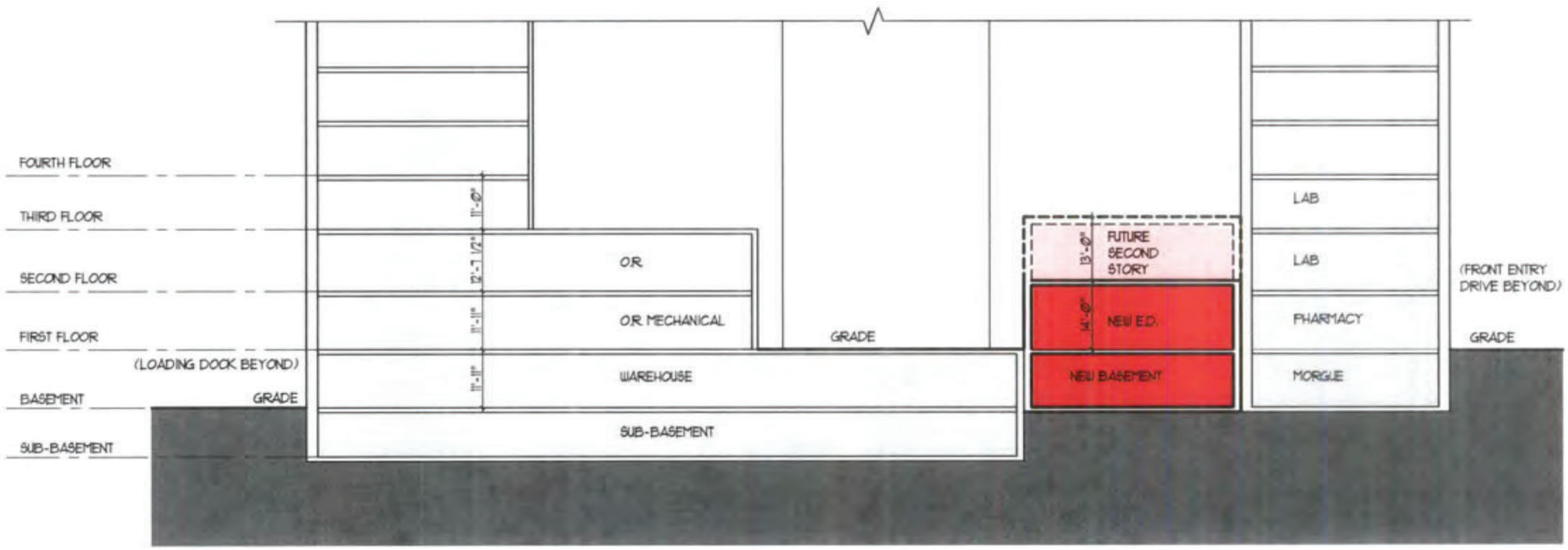
Hyman Hayes

SCALE: 1:100"=1'-0" 0 20 40 60 80 100 200 FEET

JOB # 11029

DATE: 6-8-11





SECTION A-A

V.A. Emergency Department Conceptual Section

SCALE: 1/32"=1'-0"

0 20 40 60 80 100 200 FEET

SK-1e

Department of Veterans Affairs

Hyman Hayes

JOB # 10046 DATE: REVISED 3-14-11

constructed, the space between the Wing B and Wing C basement levels was excavated what appears from photographs to be about 15 to 20 feet below the existing ground surface elevations. This is consistent with the finding of our test borings which disclosed 18 to 20 feet of fill in this general area.

The proposed building and pavement areas are currently relatively level and gently sloping. The areas are predominately open lawns with concrete sidewalks and asphalt surfaced roads. Photographs of the general site conditions taken at the time of our exploration are provided in Appendix B.

III. SUBSURFACE CONDITIONS

The subsurface conditions at the site were investigated through the completion of eight test borings at the approximate locations shown on the Subsurface Investigation Plan in Appendix C. Ground surface elevations for the borings were estimated by us based on interpolation between topographic contour intervals shown on the site plans.

The borings were completed using a standard rotary drill rig equipped with hollow stem augers. As the augers were advanced, the overburden soils were sampled and their relative density determined using split-spoon sampling techniques in general accord with ASTM D1586 procedures. Upon completion of the borings, groundwater monitoring wells were installed in B-3 and B-8. Water levels were measured in the wells about two weeks after they were installed.

Representative portions of the soil samples recovered from the test borings were transported to our office for visual classification by a Geotechnical Specialist. Individual subsurface logs, which were prepared based upon the visual classifications, are presented in Appendix D together with a key that explains the terms used in their preparation.

The individual subsurface logs should be reviewed for a description of the conditions encountered at the specific test boring locations. It should be understood that conditions are only known at the depths and locations sampled. Conditions at other depths and locations may be different. A general summary of the conditions encountered is provided below.

Subsurface Profile

The site was found to be mantled with variable depths of fill material overlying deep lacustrine silt and clay deposits. The deepest test boring was ended in the silt and clay at a depth of 52 feet below grade. From past investigations at the project site it is known that the silt and clay layer extends some 130 feet below grade where glacial till is found overlying shale bedrock.

Fill Material: Fill materials were found to a depth of about 12 feet below grade in boring B-1 where the proposed utility tunnel passes along the side of Building 25. On the west side of the proposed ED addition, borings B-2 through B-6 disclosed about 4 feet of fill materials. The fill material in these borings, B-1 through B-6, was comprised of variable silt, clay, sand, and gravel mixtures with trace amounts of brick and coal.

Along the north side of the proposed ED addition, borings B-7 and B-8 revealed 18 to 20 feet of fill material. As previously discussed, this area was excavated in 2008 during construction of new areaways for the existing Wing B. The deep fills in this area consisted of relatively firm to compact sand and gravel that changed to crushed stone or gravel in the bottom few feet.

Lacustrine Silt and Clay: Glacio-lacustrine deposits of silt and clay were found beneath the fill materials and extending to the maximum 17 to 52 feet depths explored. The silt and clay soil was initially brown in color, moist, and of a medium to stiff consistency and with increasing depth below grade the soil graded gray, wet, and medium to very soft consistency. Based on past site investigations, it is known that the silt and clay extends to glacial till and shale bedrock some 130 feet below grade.

Laboratory testing of the silt and clay completed for several projects in the general site area has established that the silt and clay soils are pre-consolidated to pressures that exceed the current overburden stress. The magnitude of the pre-consolidation pressures above the existing stresses should exceed 4000 pounds per square foot (psf) in the upper medium consistency portions of the clay and 1500 to 2000 psf in the lower very soft consistency soils.

Groundwater Conditions

As noted on the subsurface logs, no measurable groundwater was present in the augers upon completion of drilling. It should be understood, however, that adequate time did not pass after completion of drilling for groundwater to drain into the augers from the slowly permeable silt and clay soil. Similarly, groundwater levels may not yet have achieved a static level in the monitoring wells. Two weeks after the wells were installed, groundwater was measured 10.4 feet below grade in B-3 and 19.7 feet below grade in B-8.

In general, it is expected that groundwater was actually present at or near the depths where the soils became wet and/or changed in color from brown to gray as noted on the subsurface logs. In the proposed building area, this transition typically occurred at depths of about 4 feet below grade in borings B-2 through B-5 and 10 feet below grade in boring B-6. This corresponds to groundwater elevations in the range of 194 to 198 feet in the native silt and clay soils. Where the deep fills were present on the north side of the proposed ED addition, groundwater appeared to be about 18 feet below grade in boring B-7 and 15 below grade in B-8. This corresponds to groundwater elevations in the deep fills in the range of 185.5 to 188.5 feet.

Along the alignment of the proposed utility tunnel near Building 25, no wet or gray soil was encountered within the 17 feet depths explored in boring B-1.

IV. GEOTECHNICAL RECOMMENDATIONS

A. GENERAL

Based on our evaluation of the subsurface conditions as they relate to the planned construction, it is our opinion that the new ED addition may be supported on conventional non-pile supported spread foundations with slab-on-grade construction. This assumes that provisions are made to adequately address the presence of existing fill materials, groundwater, and sensitive subgrade soils beneath the proposed addition and interaction of the new structure with the adjoining pile supported building. The utility tunnel, seated some 12 feet below grade may also bear on the native silt and clay soils.

On the called west side of the proposed building, it appears that excavation to the plan basement floor level will extend through the existing fills ending in wet, soft, gray silt and clay soils. The basement floor will be up to several feet below groundwater levels. Here it will be necessary to undercut the subgrade so at least two feet of clean crushed stone can be placed to establish a more stable working surface and serve as a permanent underdrain system for the floor slabs.

Where the deep fills are present on the called north side of the ED addition, borings indicate that up to 7 feet of sand/gravel and crushed stone/gravel may be present below the plan floor slab subgrade elevation. For preliminary planning purposes, it should be assumed that these fills must be removed and replaced with a combination of structural fill material and crushed stone. This assumption may be refined based on evaluation of supplemental investigations and/or conditions exposed during construction. That is, it may be possible to consider leaving the existing fills in place if they are satisfactorily proof-compacted and stabilized as needed. However, a minimum two-feet thick base of crushed stone is recommended for placement directly beneath the foundations and the slab at all locations.

Underdrain pipes should be placed in the stone base beneath the slabs, and the pipes should outlet by gravity flow to site stormwater systems or to sumps equipped with backup pumps and power sources. The amount of groundwater collected in the stone should be relatively small. A perimeter foundation drain should be provided and the floor slabs and basement walls should be damp-proofed.

The new spread foundations should also be provided with a minimum two feet thick base layer of crushed stone. Again, the stone will establish a more stable working surface for construction, serve as a medium for dewatering, and allow the use of a somewhat higher design bearing pressure for the foundations. Similar to the floor slabs, it is expected that the foundation bearing grades will consist of undisturbed native silt and clay soils on the called west side of the ED addition. Several feet of sand/gravel and crushed stone/gravel fill material may be present beneath the plan foundation bearing grades on the called north side of the addition. It should be assumed that the existing fills must be removed and replaced in a controlled manner beneath the foundations.

In general, it appears that the utility tunnel bottom will be in undisturbed, wet, medium to soft, silt and clay soils. A minimum 18-inch thick base of crushed stone should be planned for the tunnel construction. If permanent drainage outlets for the stone are not provided, the tunnel walls, floor and roof should be designed to resist unbalanced hydrostatic pressures. The hydrostatic pressures can be eliminated if underdrain pipes are installed in the stone base and outlet by gravity flow to the site's stormwater system. Whether or not drainage is provided, it is our opinion that waterproofing of the tunnel roof, walls and floor should be installed.

B. SEISMIC DESIGN CONSIDERATIONS

For seismic design purposes, we have evaluated the site conditions in accord with Sections 1613 of the New York State Building Code (2010). On this basis, we have determined that Seismic Site Class "D - Stiff Soil Profile" is applicable to this project. The Class D designation is based on the results of shear wave velocity testing completing at several nearby sites in similar subsurface profiles.

Using the general building code procedures and applying the Site Class "D" designation, we obtained the following spectral response parameters.

Short Period Spectral Response Acceleration: $S_S = 0.190$
1-Second Period Spectral Response Acceleration: $S_1 = 0.061$

Short Period Site Coefficient: $F_a = 1.6$
1-Second Period Site Coefficient:: $F_v = 2.4$

Short Period Design Spectral Response Parameter: $S_{DS} = 0.203$
1-Second Period Design Spectral Response Parameter: $S_{D1} = 0.100$

Using the above design parameters, Building Code Tables 1613.5.6 (1) and (2) define the project as Seismic Design Category "B" for Occupancy Categories I-III and Design Category "C" for Occupancy Category IV. A determination of lateral pressures on basement and retaining walls due to earthquake motions is not required for Design Categories B and C. For Design Category C, evaluation must be made of potential hazards resulting from earthquake motions including slope instability, liquefaction, and surface rupture due to faulting or lateral spreading.

Liquefaction: Based on the composition of the site soils, the potential for liquefaction to occur during a seismic event is low and is not a factor in planning for design.

Surface Rupture Potential: On the Geologic Map of New York there are no faults mapped within at least one mile from the project site. In addition, the soils at the site are generally not susceptible to lateral spreading due to earthquake motions. Accordingly, the risk of surface rupture beneath the building due to faulting or lateral spreading is considered to be low at this time.

Slope Instability: Considering the plan basement floor elevation for the new structure and topography of the general site area, slope instability caused by earthquake motions is not a concern for the building.

C. SITE PREPARATION & EARTHWORK

Site preparation should preferably be done during a seasonal dry period to limit the impacts of soft/wet subgrade conditions on construction. Regardless of the construction season, site preparation should be sequenced such that construction equipment traffic does not travel directly over the silt and clay soils at the plan subgrade elevations.

Building Subgrade Preparation

Excavation for the basement level should proceed incrementally across the site, with the subgrade established at least two-feet below the bottom of the floor slab. The final subgrade surfaces in native soils should be trimmed to grade using a backhoe equipped with a smooth-edged bucket to limit disturbance of the silt and clay soils. The exposed subgrade surface should be covered with a geotextile stabilization fabric (Mirafi 500X or eq.) followed by crushed stone to the plan subgrade elevation. The stone should be an ASTM C33 Blend 57 material. It should be chinked together using a vibratory roller. Underdrain pipes of nominal four-inch diameter should be placed at the bottom of the stone at maximum spacings of 25 feet.

For preliminary planning purposes, it should be assumed that all existing fills must be removed and replaced beneath the floor slab on the called north side of the ED addition. Suitable portions of the excavated fills may be stock-piled for reuse in backfilling the undercuts. Based on evaluation of supplemental investigations and observations made during construction, it may be possible to consider leaving the existing fills in place if they are satisfactorily proof-compacted and stabilized as needed. In any case, a minimum two-feet thick base of crushed stone is recommended for placement directly beneath the slab.

Utility Tunnel Subgrade Preparation

The subgrade for the utility tunnel construction may be prepared in a manner similar to the new building addition subgrades. The plan subgrade should be undercut at least 18-inches to allow for the placement of a geotextile stabilization fabric (Mirafi 500X or eq.) and based of crushed stone (ASTM C33 Blend 57 material). The final subgrade surfaces in native soils should be trimmed to grade using a backhoe equipped with a smooth-edged bucket to limit disturbance of the silt and clay soils. The stone base should be chinked together using a vibratory roller. Underdrain pipes should be embedded at the base of the stone if permanent relief of unbalanced hydrostatic pressures on the structure floors and walls is planned.

Temporary Excavations Slopes

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 above groundwater levels. Below groundwater levels, the side slopes should be flattened to at least one vertical on 1.5 horizontal as required for an OSHA Type C soil. All excavations should be observed by a competent person to confirm acceptability of the temporary slopes.

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 two 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.

Fill and Backfill Requirements
Structural Fill should be used as fill/backfill within the proposed building pad and pavement areas. The fill should consist of imported sand and gravel or suitable existing on-site fills. Suitable on-site fills may be found along the north side of Wing B. Elsewhere on the site, the fills were highly variable and generally not suitable for reuse as Structural Fill. The imported or on-site fills should meet the limits of gradation tabulated below and be free of recycled concrete, asphalt, bricks, glass and pyritic shale rock.

STRUCTURAL FILL

Sieve Size	Percent Finer
3"	100
1/4"	30 to 75
No. 40	5 to 40
No. 200	0 to 10

The Structural Fill 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. In landscape areas, the compaction may be reduced to 90 percent of maximum dry density.

D. FOUNDATIONS

New building foundations should be provided with a minium two-feet thick base of clean crushed stone which is placed over undisturbed native silt and clay soils, or where found satisfactory, the existing fill soils. The stone base should extend at least two feet beyond each side of the foundation. The silt and clay bearing grades should be trimmed to final grade using a backhoe equipped with a steel plate welded across the bucket's teeth. A geotextile stabilization fabric (Mirafi 500X or eq.) should be placed over the subgrade followed by the crushed stone (ASTM C33 Blend 57). The stone should be chinked together using a large vibratory plate or mechanical tamper.

Foundations bearing on the stone base may be proportioned for a maximum net allowable bearing pressure equal to 3,000 pounds per square foot. The foundations should have a minimum width of 24-inches even of this results in a bearing pressure which is less than the maximum allowable. Exterior foundations should bear at least four feet beneath final adjacent exterior grades to afford frost penetration protection. Interior foundations may bear at a nominal two feet depth beneath the interior floor slabs if permitted 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 to weeks after construction is complete and each load increment is applied. A portion of the total predicted settlement will occur in response to the initial construction of the single story structure and remaining settlement will occur when the future second floor loads are added.

The magnitude of the settlements will be a factor of the applied load. Approximately one inch total settlement is predicted for the maximum column load of 220 kips. At lesser column loads the predicted maximum settlements are 0.75 inch for a 100 kip load, 0.50 inch for a 50 kip load, and 0.25 inch for a 25 kip load.

E. BASEMENT AND TUNNEL WALLS

Building and utility tunnel 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 the tunnel walls and building 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 parameters do not include a safety factor.

	Structural Fill	Silt & Clay
• Coefficient of At-Rest Earth Pressure	0.50	0.80
• Coefficient of Active Earth Pressure	0.33	0.40
• Coefficient of Passive Earth Pressure	3.00	2.00
• Total Unit Weight of Soil	120 pcf	116 pcf
• Coefficient of Sliding Friction	0.45	0.30

A foundation drain should be installed to prevent water from becoming trapped in the backfill soils and creating hydrostatic pressures on the walls. The drain 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 (ASTM C33 Blend 57). The stone should be wrapped in a filter fabric (Mirafi 140N or equivalent) to inhibit siltation. The backfill soils behind the crushed stone drainage layer should consist of Structural Fill. Where pavements do not abut the building or tunnel, the upper two feet of backfill may consist of silt and clay soils excavated on-site to form a more slowly permeable cap.

The foundation drain for the building addition should outlet by gravity flow to the site's stormwater system or to sumps equipped with backup pumps and power sources. The basement walls for the building addition should be damp-proofed.

The foundation drain for the tunnel should outlet by gravity flow to the site's stormwater system. If this is not possible, the walls should be designed to resist unbalanced hydrostatic forces assuming groundwater levels may rise to at least four feet below the ground surface. Whether or not gravity drainage is provided, waterproofing is recommended for the walls, floors and roof of the tunnel.

F. FLOOR SLABS

The building floor slabs may be designed in accord with the recommended procedures of the American Concrete Institute or Portland Cement Association. The floor slabs should be damp-proofed and cast upon a vapor retarder such as Stego Wrap Class A with a minimum 15 mil thickness. The slabs may be designed using a Modulus of Subgrade Reaction equal to 150 pounds per cubic inch (pci) at the top of the 24-inch thick crushed stone base layers previously recommended. Underdrain pipes that outlet by gravity flow or to sumps should be installed in the stone base at maximum 25 feet spacings beneath the floor slabs. The sumps should be equipped with backup pumps and power sources.

G. CONSTRUCTION MONITORING

The Geotechnical Engineer should be retained to monitor earthwork and bearing grade preparations for foundations and floor slabs. 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. Dente Engineering should be retained to monitor earthwork and bearing grade preparations for foundations and floor slabs.

H. SUPPLEMENTAL INVESTIGATION

Supplemental site investigation may be considered to further investigate the composition and extent of the existing deep fills placed between the called north side of Wing B and the Wing C basement and sub-basement levels. Results of the investigation can be used to further evaluate the potential to leave the existing fills in place beneath the new ED addition floor slabs. A search for possible documentation for the 2008 placement of these fills should also be conducted.

V. CLOSURE

This report was prepared for specific application to the project site and construction planned based on a limited number of explorations at discrete locations. Dente Engineering should 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. Dente Engineering should also 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.

This report was prepared using methods and practices common to Geotechnical Engineering, no other warranties expressed or implied are made. Should questions arise or if we may be of any other service, please contact us at your convenience.

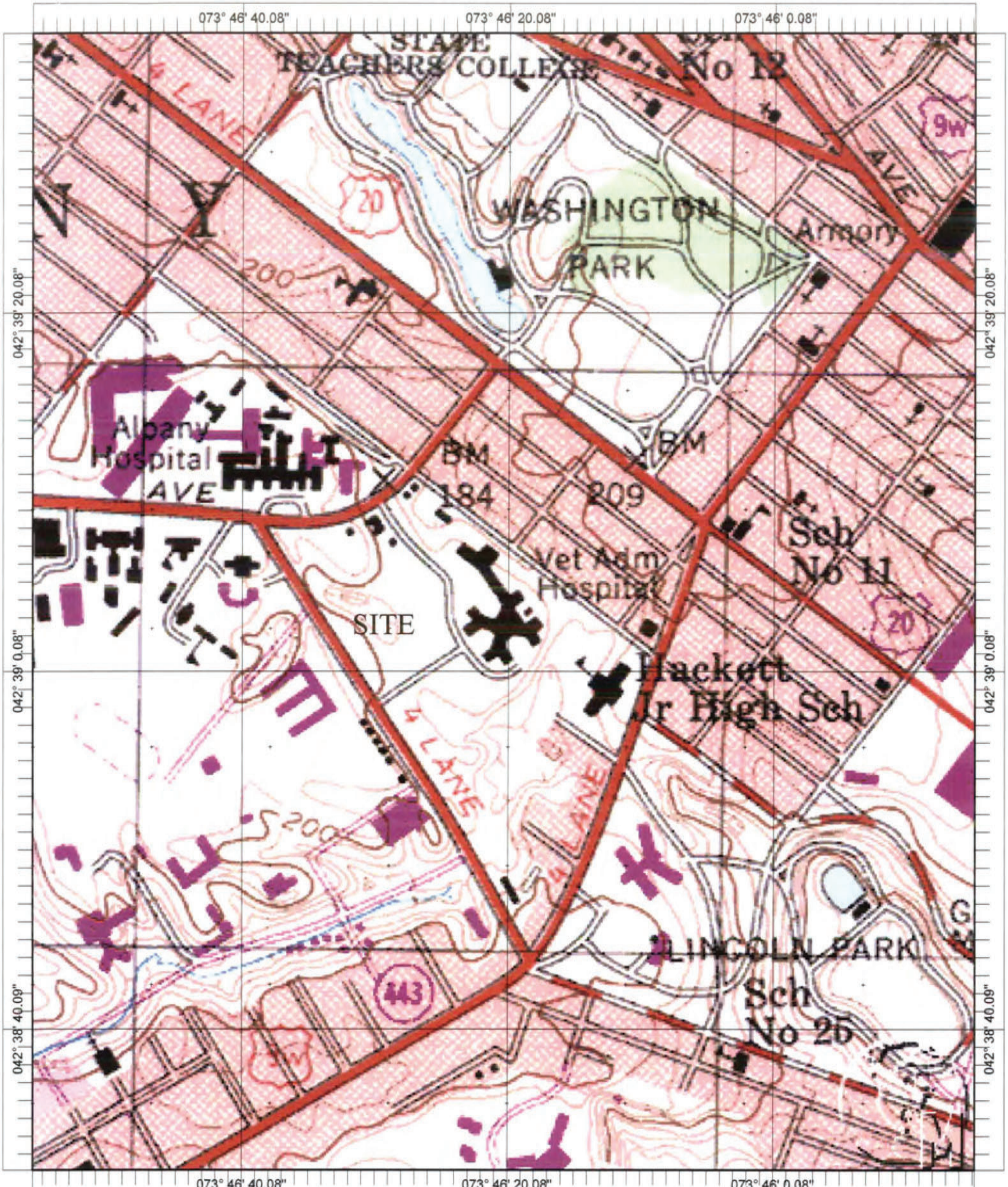
Prepared By,
Dente Engineering, P.C.

Edward C. Gravelle, P.E.
Vice President

Fred A. Dente, P.E.
President

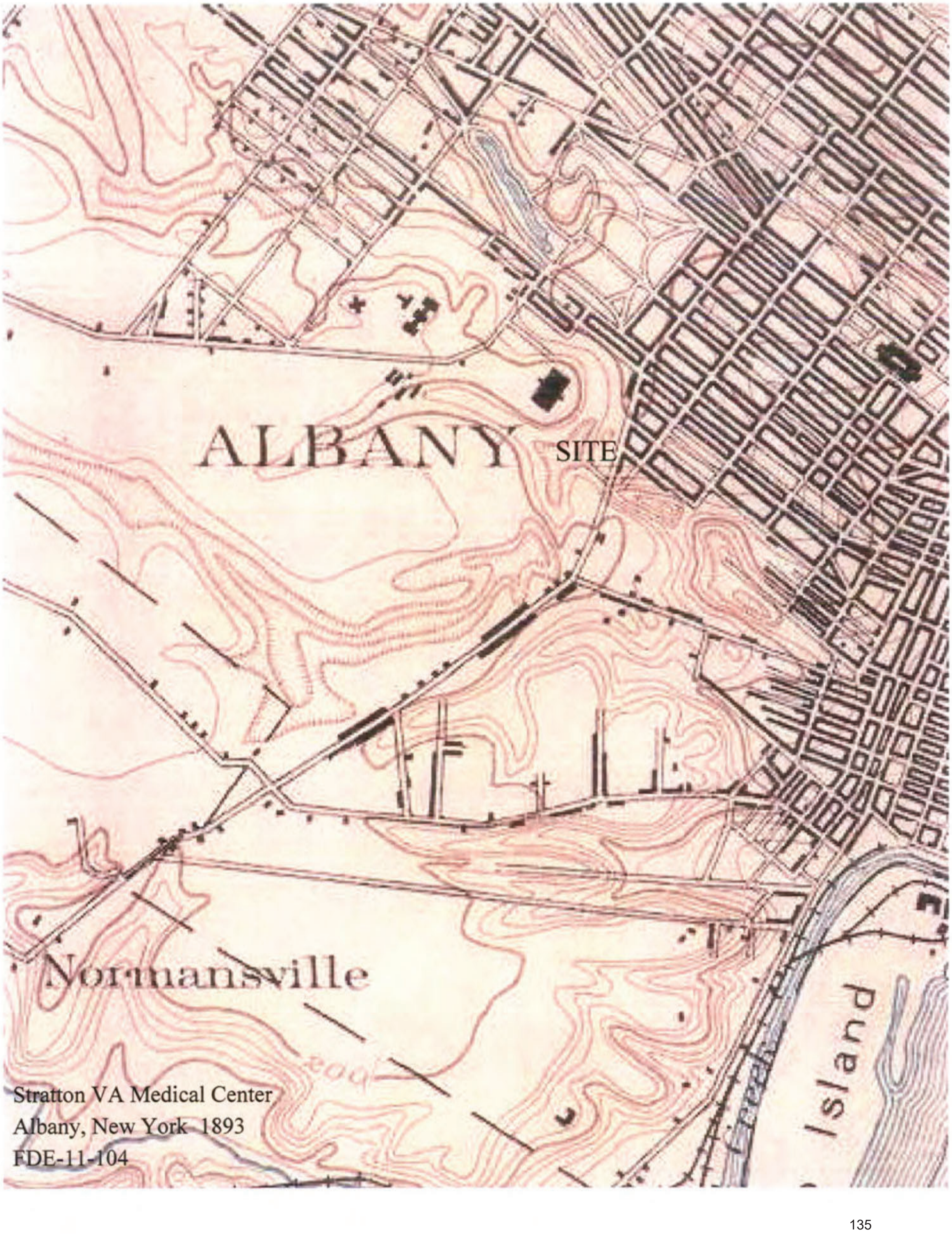
APPENDIX A
SITE LOCATION MAPS

VA Hospital Emergency Department
Albany, New York



Name: ALBANY
Date: 7/12/111
Scale: 1 inch equals 666 feet

Location: 042° 39' 03.9" N 073° 46' 20.4" W
Caption: STRATTON VA HOSPITAL
ALBANY, NEW YORK
FDE-11-104



Stratton VA Medical Center
Albany, New York 1893
FDE-11-104

APPENDIX B
SITE PHOTOGRAPHS

VA Hospital Emergency Department
Albany, New York

View north toward area of B-3 (was moved to the other side of the sidewalk)

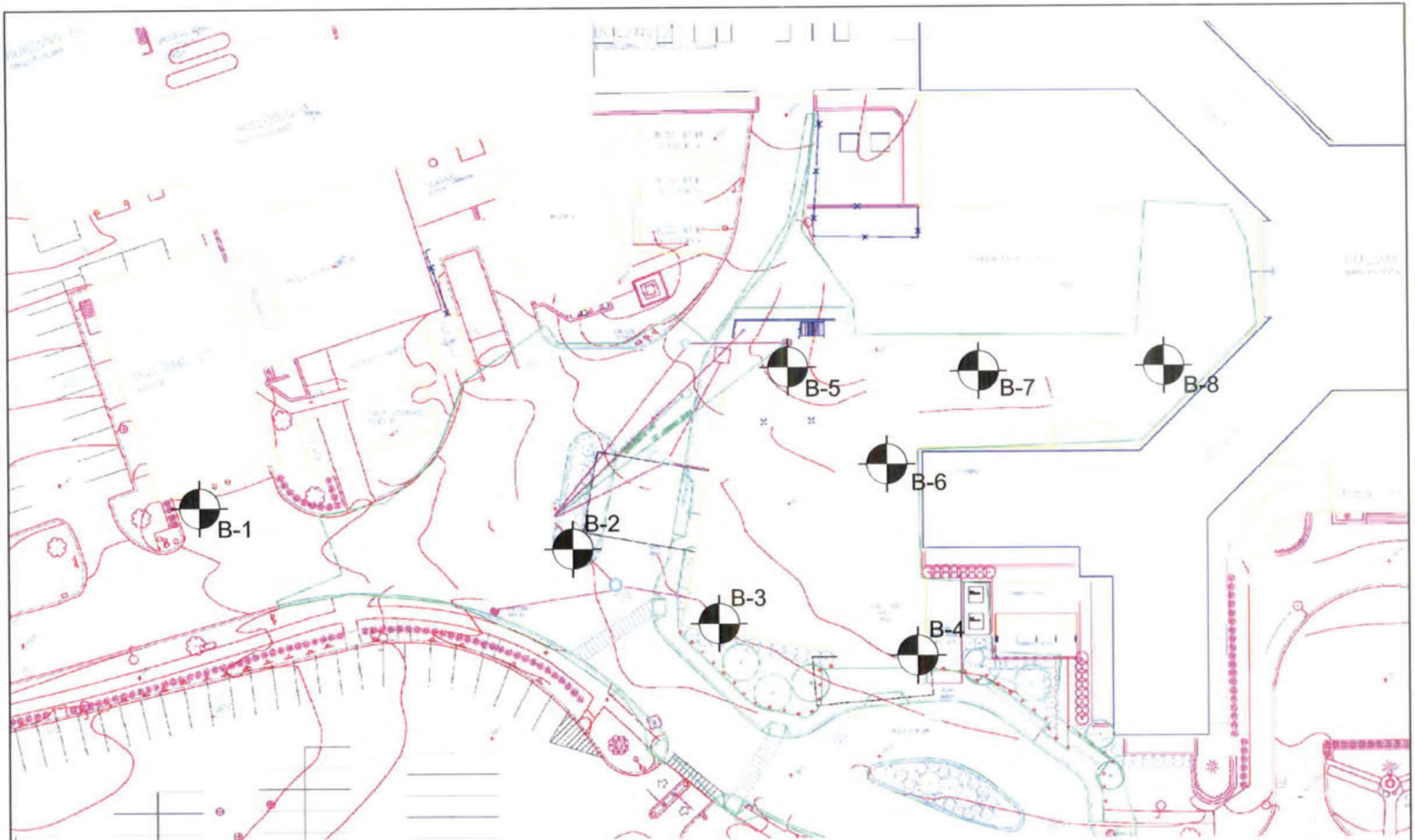
View northeast toward area of B-1

View southeast toward B-7 and B-8

View northeast from B-4

APPENDIX C
SUBSURFACE INVESTIGATION PLAN

VA Hospital Emergency Department
Albany, New York



STRATTON VA MEDICAL CENTER
ALBANY, NEW YORK
SUBSURFACE INVESTIGATION PLAN
DRAWN BY: N/A
SCALE: N/A
DATE: JULY 13, 2011

LEGEND

⊕ APPROXIMATE SOIL BORING LOCATION

DENTE ENGINEERING

594 BROADWAY
WATERVLIET, NY 12189
PH. 518-266-0310
FAX 518-266-9238
www.dente-engineering.com

APPENDIX D
SUBSURFACE LOGS & KEY

VA Hospital Emergency Department
Albany, New York

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: Stratton VA Medical Center	**DATE** START: 7/8/11	FINISH: 7/8/11

LOCATION: Albany, New York	**METHODS:** 3 1/4" Hollow Stem Augers with
CLIENT: Hyman Hayes Associates	ASTM D1586 Sampling Methods
JOB NUMBER: FDE-11-104	**SURFACE ELEVATION:** +/- 196.5'
DRILL TYPE: CME 55 ATV Mounted Rig	**CLASSIFICATION:** O.Burns

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
							+/- 2" Asphalt, +/- 6" Bankrun Gravel
	1	5	4				FILL: Brown SILT and CLAY, trace brick
				7	10	11	and coal (MOIST)
	2	14	11				
				11	14	22	
5'	3	7	7				
				10	13	17	
	4	16	12				Grades Little Dark Brown F-C Sand
				9	9	21	
10'	5	2	4				Similar with rootlets noted
				6		10	**(MOIST, FIRM TO LOOSE)**
15'	6	6	7				Brown SILT and CLAY
				9	8	16	**(MOIST, STIFF)**
							End of Boring at 17.0' Depth
20'							No measurable groundwater in augers at completion of drilling and sampling.
25'							

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-2**
PROJECT: Stratton VA Medical Center	**DATE** START: 7/8/11 FINISH: 7/8/11
LOCATION: Albany, New York	**METHODS:** 2 1/4" Hollow Stem Augers with
CLIENT: Hyman Hayes Associates	ASTM D1586 Sampling Methods
JOB NUMBER: FDE-11-104	**SURFACE ELEVATION:** +/- 199.5'
DRILL TYPE: CME 55 ATV Mounted Rig	**CLASSIFICATION:** O.Burns

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	+/- 5" Topsoil
	1	2	3				**FILL**: Dark Brown F-C SAND, Some Silt and
				5	7	8	Gravel (MOIST)
	2	5	6				Grades to Some Brown Silt and Clay
				4	3	10	**(MOIST, LOOSE)**
	3	2	2				Brown Banded SILT and CLAY (WET)
5'				3	3	5	
	4	5	4				
				3	4	7	
10'	5	1	1				Grades Gray
				2	3	3	
15'	6	3	2				
				3	3	5	
20'	7	1	2				
				3	3	5	**(WET, MEDIUM AND SOFT)**
							End of Boring at 22.0' Depth
							No measurable groundwater in augers at
25'							completion of drilling and sampling. Soil
							samples became Wet beginning about 4'
							below ground surface.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-3**
PROJECT: Stratton VA Medical Center	**DATE** START: 7/8/11 FINISH: 7/8/11
LOCATION: Albany, New York	**METHODS:** 4 1/4" Hollow Stem Augers with
CLIENT: Hyman Hayes Associates	ASTM D1586 Drilling Methods
JOB NUMBER: FDE-11-104	**SURFACE ELEVATION:** +/- 200.0'
DRILL TYPE: CME 55 ATV Mounted Rig	**CLASSIFICATION:** O.Burns

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	+/- 6" Topsoil
	1	2	4				**FILL**: Brown SILT, trace brick (MOIST)
				7	10	11	
	2	11	13				
				11	10	24	**(MOIST, FIRM)**
	3	1	1				Brown/Gray Banded SILT and CLAY (WET)
5'				1	3	2	
	4	3	2				
				2	1	4	
10'	5	WH/18	-				
				-	1	WH	
15'	6	WH/18	-				Similar with Silt Seams
				-	1	WH	
20'	7	WH/18	-				Grades Gray
				-		WH	
25'	8	WH	1				
				2	3	3	**(WET, SOFT)**
							End of Boring at 27.0' Depth
							Monitoring well in at 25' depth. Groundwater
							at 10.4' below grade in well on 7/21/11.

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

PROJECT: Stratton VA Medical Center	**DATE**	START: 7/7/11	FINISH: 7/7/11

LOCATION: Albany, New York	**METHODS:** 2 1/4" Hollow Stem Augers with
CLIENT: Hyman Hayes Associates	ASTM D1586 Sampling Methods
JOB NUMBER: FDE-11-104	**SURFACE ELEVATION:** +/- 201.0'
DRILL TYPE: CME 55 ATV Mounted Rig	**CLASSIFICATION:** O.Burns

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	+/- 3" Topsoil, +/- 3" Crushed Stone
	1	8	10				**FILL**: Dark Brown SILT, Little Gravel
				13	12	23	(MOIST)
	2	8	10				Grades Brown Mottled
				17	15	27	**(MOIST, FIRM)**
	3	4	4				Gray Banded SILT and CLAY (WET)
5'				3	4	7	
	4	2	2				
				2	2	4	
10'	5	WH	1				
				2		3	
15'	6	WH/12	-				
				1		1	
20'	7	WH	2				**(WET, MEDIUM TO SOFT)**
				2		4	
							End of Boring at 21.5' Depth
25'							No measurable groundwater in augers at completion of drilling and sampling. Soil samples became Wet beginning about 4' below ground surface.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-5.1**

PROJECT: Stratton VA Medical Center	**DATE**	START: 7/8/11	FINISH: 7/8/11

LOCATION: Albany, New York	**METHODS:** 2 1/4" Hollow Stem Augers with
CLIENT: Hyman Hayes Associates	ASTM D1586 Sampling Methods
JOB NUMBER: FDE-11-104	**SURFACE ELEVATION:** +/- 202.5'
DRILL TYPE: CME 55 ATV Mounted Rig	**CLASSIFICATION:** O.Burns

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	+/- 4" Topsoil
	1	3	6				**FILL**: Brown F-C SAND and SILT, Little
				8	9	14	Brick (MOIST)
	2	11	17				Grades Reworked SILT and CLAY (WET)
				15	6	32	**(MOIST TO WET, FIRM TO COMPACT)**
	3	4	3				Brown Banded SILT and CLAY (WET)
5'				4	4	7	
	4	3	2				Grades Gray
				2	5	4	
10'	5	2	2				
				2		4	
15'	6	2	1				
				2		3	
20'	7	2	2				
				3		5	
25'	8	2	4				
				5		9	
							(WET, MEDIUM TO SOFT)

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-5.2**

PROJECT: Stratton VA Medical Center	**DATE**	START: 7/8/11	FINISH: 7/8/11

LOCATION: Albany, New York	**METHODS:** 2 1/4" Hollow Stem Augers with
CLIENT: Hyman Hayes Associates	ASTM D1586 Sampling Methods
JOB NUMBER: FDE-11-104	**SURFACE ELEVATION:** +/- 202.5'
DRILL TYPE: CME 55 ATV Mounted Rig	**CLASSIFICATION:** O.Burns

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	
	9	2	3				Gray Banded SILT and CLAY (WET)
				3		6	
35'	10	2	1				
				3		4	
40'	11	WH	2				
				3		5	
45'	12	2	3				
				3		6	
50'	13	2	3				**(WET, SOFT AND MEDIUM)**
				5		8	
							End of Boring at 51.5' Depth
							No measurable groundwater in augers at completion of drilling and sampling. Soil samples became Wet beginning about 2' to 4' below ground surface.
55'							

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-6**	
PROJECT: Stratton VA Medical Center	**DATE** START: 7/7/11	FINISH: 7/7/11
LOCATION: Albany, New York	**METHODS:** 2 1/4" Hollow Stem Augers with	
CLIENT: Hyman Hayes Associates	ASTM D1586 Sampling Methods	
JOB NUMBER: FDE-11-104	**SURFACE ELEVATION:** +/- 201.0'	
DRILL TYPE: CME 55 ATV Mounted Rig	**CLASSIFICATION:** O.Burns	

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	+/- 4" Topsoil
	1	2	4				**FILL**: Brown SILT, Little F-C Sand and
				7	6	11	Gravel, trace brick (MOIST)
	2	10	8				
				4	4	12	**(MOIST, FIRM)**
	3	3	3				Brown SILT, Little Fine Sand, trace gravel
5'				3	4	6	
	4	4	3				Grades Clay Partings
				4	4	7	
							(MOIST, LOOSE)
10'	5	2	2				Gray Banded SILT and CLAY (WET)
				2		4	
15'	6	1	2				
				2		4	
							Similar with F-M Sand Partings
20'	7	1	2				**(WET, SOFT)**
				3		5	
							End of Boring at 21.5' Depth
							No measurable groundwater in augers at completion of drilling and sampling. Soil samples became Wet beginning about 10' below ground surface.
25'							

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-7**		
PROJECT: Stratton VA Medical Center	**DATE**	START: 7/7/11	FINISH: 7/7/11

LOCATION: Albany, New York	**METHODS:** 2 1/4" Hollow Stem Augers with
CLIENT: Hyman Hayes Associates	ASTM D1586 Sampling Methods
JOB NUMBER: FDE-11-104	**SURFACE ELEVATION:** +/- 203.5'
DRILL TYPE: CME 55 ATV Mounted Rig	**CLASSIFICATION:** O.Burns

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	+/- 4" Topsoil
	1	2	5				**FILL**: Brown F-C SAND and GRAVEL, trace
				15	16	20	silt (MOIST)
	2	17	17				Grades Little Gravel
				20	18	37	
5'	3	40	18				Grades Some Gravel and Silt
				25	17	43	
10'	4	50	25				
				22		47	
15'	5	12	8				POOR RECOVERY: Gray GRAVEL
				10		18	
							(MOIST, FIRM AND COMPACT)
20'	6	2	2				Brown to Gray SILT and CLAY
				3		5	**(WET, SOFT)**
							End of Boring at 21.5' Depth
							No measurable groundwater in augers at
25'							completion of drilling and sampling. Soil
							samples became Wet beginning about 18'
							below ground surface.

DENTE ENGINEERING, P.C.	SUBSURFACE LOG **B-8**		
PROJECT: Stratton VA Medical Center	**DATE**	START: 7/6/11	FINISH: 7/7/11

LOCATION: Albany, New York	**METHODS:** 4 1/4" Hollow Stem Augers with
CLIENT: Hyman Hayes Associates	ASTM D1586 Sampling Methods
JOB NUMBER: FDE-11-104	**SURFACE ELEVATION:** +/- 203.5'
DRILL TYPE: CME 55 ATV Mounted Rig	**CLASSIFICATION:** O.Burns

SAMPLE		BLOWS ON SAMPLER					CLASSIFICATION / OBSERVATIONS
DEPTH	#	6"	12"	18"	24"	N	+/- 2" Topsoil
	1	5	6				**FILL**: Brown F-M SAND, Little Gravel
				7	8	13	(MOIST)
	2	9	12				Grades Brown F-C SAND and GRAVEL
				13	11	25	
	3	6	8				
5'				9	8	17	
	4	14	8				
				7	15	15	
	5	10	19				Grades Little Silt
				16	15	35	
10'	6	5	10				
				11	11	21	
	7	11	12				
				12	12	24	
	8	5	6				Grades (WET)
15'				7	8	13	Grades Gray CRUSHED STONE
	9	5	4				
				8	11	12	
	10	2	6				
				5	4	11	**(MOIST TO WET, FIRM AND COMPACT)**
20'	11	WH/18	-				Gray Banded SILT and CLAY
				-	2	WH	
25'	12	WH	1				**(WET, VERY SOFT)**
				1		2	
							End of Boring at 26.5' Depth
							Monitoring well in at 25' depth. Groundwater
							in well at 19.7' below grade on 7/21/11.