

EMPIRE **GEO** SERVICES, INC.

A SUBSIDIARY OF SJB SERVICES, INC.



**CORPORATE/
BUFFALO OFFICE**

5167 South Park Avenue
Hamburg, NY 14075
Phone: (716) 649-8110
Fax: (716) 649-8051



ALBANY OFFICE

PO Box 2199
Ballston Spa, NY 12020

5 Knabner Road
Mechanicville, NY 12118
Phone: (518) 899-7491
Fax: (518) 899-7496



CORTLAND OFFICE

60 Miller Street
Cortland, NY 13045
Phone: (607) 758-7182
Fax: (607) 758-7188



ROCHESTER OFFICE

535 Summit Point Drive
Henrietta, NY 14467
Phone: (585) 359-2730
Fax: (585) 359-9668

October 8, 2015
Project No. BE-15-179

Southern Tier Senior Living, LLC

c/o: Mr. Thomas Dobrydney
Fagan Engineers & Land Surveyors, P.C.
113 East Chemung Place
Elmira, New York 14904

Re: Geotechnical Evaluation Report for
Proposed Southern Tier Senior Living Facility
Biltmore Road and Gardner Road
Town of Horseheads
Chemung County, New York

Dear Mr. Dobrydney:

Empire Geo-Services, Inc. is pleased to submit two (2) copies of the enclosed Geotechnical Evaluation Report to Fagan Engineers & Land Surveyors, P.C., on behalf of Southern Tier Senior Living, LLC, for the above referenced project. We have also e-mailed you an electronic copy (pdf file format) of this report for your use and for distribution on behalf of Southern Tier Senior Living, LLC, as appropriate.

Please contact me should you have any questions or wish to discuss this report. Thank you for considering Empire for this work and we look forward to working with you through completion of this project.

Sincerely,

EMPIRE GEO-SERVICES, INC.

John J. Danzer, P.E.
Senior Geotechnical Engineer

Enc.: Geotechnical Evaluation Report (2 copies)

MEMBER

ACEC *New York*

American Council of Engineering Companies of New York

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**Geotechnical Evaluation Report for
Proposed Southern Tier Senior Living Facility
Biltmore Road and Gardner Road
Town of Horseheads
Chemung County, New York**

Prepared For:

Southern Tier Senior Living, LLC

**c/o: Fagan Engineers & Land Surveyors, P.C.
113 East Chemung Place
Elmira, New York 14904**

Prepared By:

**Empire Geo-Services, Inc.
5167 South Park Avenue
Hamburg, New York 14075**



**Project No.: BE-15-179
October 2015**

MEMBER

ACEC New York
American Council of Engineering Companies of New York

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1.00 INTRODUCTION

1.10 GENERAL

This report presents the results of a subsurface exploration and geotechnical engineering evaluation completed by Empire Geo-Services, Inc. (Empire), for the proposed Southern Tier Senior Living Facility development planned at the northeast corner of Biltmore Road and Gardner Road in the Town of Horseheads, Chemung County, New York. The approximate location of the project site is shown on Figure 1.

Southern Tier Senior Living, LLC, at the request and recommendation of Fagan Engineers (Fagan) authorized Empire to complete the geotechnical evaluation, which was done in accordance with our proposal dated July 24th, 2015. SJB Services, Inc. (SJB), our affiliated drilling company, performed the subsurface exploration, which consisted of four (4) test borings drilled at the project site.

On this basis, Empire prepared this report, which summarizes the subsurface conditions encountered by the test borings and presents geotechnical recommendations for design and construction of the foundations and slab-on-grade for the proposed building complex, along with associated pavement construction and site preparation work.

1.20 PROJECT DESCRIPTION

The proposed Southern Tier Senior Living Facility development is planned on a currently undeveloped 7 acre parcel located on the northeast corner of Biltmore Road and Gardner Road, in the Town of Horseheads. The project is expected to consist of the following.

- The Senior Living Facility building is planned as three main wings connected to a common core building area, and is expected to consist of a 2-story structure, which will be supported on a shallow spread foundation system;
- No basement or depressed pit structures are planned;
- The at grade floor construction is planned as slab-on-grade;
- The building will be designed for seismic loads per the Building Code of New York State (December 2010).

The Senior Living Facility development will also include construction of asphalt pavement access drives and parking lot areas. Traffic accessing the facility is expected to consist predominately of automobiles/SUVs, with occasional delivery trucks. Accordingly, it is expected the pavement design will include both heavy duty and light duty asphalt pavement for the access drives and parking lot areas, respectively.

The development parcel currently consists of dense brush, with occasional intermixed medium size trees. The site appears to slope down in elevation from northwest to southeast, with ground surface elevations (El.) obtained at the test boring locations ranging from El. 979.1 feet to El. 967.7 feet,. The driller did note that remnants of some previous structures were apparent at surface within the site, suggesting that the site historically was previously developed.

Figure 2 illustrates the proposed building areas, access drives and parking lot areas, as well as the approximate test boring locations.

2.00 SUBSURFACE EXPLORATION

The subsurface exploration program consisted of four (4) test borings drilled by SJB on September 30th, 2015. The borings are designated as borings B-1 through B-4, and their approximate locations are shown on Figure 2.

The test boring locations (coordinates) were initially established by Fagan on a site plan provided to Empire. SJB then staked the boring locations in the field using a hand held GPS device. Survey level measurements were utilized by SJB to determine the relative existing ground surface elevation at the test boring locations. The ground surface elevations were referenced to the top of the west bonnet nut on the fire hydrant located at the southwest corner of the site, as shown on Figure 2. The bonnet bolt has a reported elevation (El.) of 967.30 feet, based on the site plan prepared by Fagan.

The test borings were each drilled through the overburden to sample spoon and auger refusal, which was encountered in apparent sandstone and siltstone bedrock at depths ranging between 24.1 feet and 24.4 feet below the existing ground surface (bgs), where the borings were then terminated.

The test borings were made using a Diedrich, model D-50 rubber track, all-terrain (ATV) vehicle drill rig. The borings were advanced through the overburden using hollow stem auger and split spoon sampling techniques. Split spoon samples and

Standard Penetration Tests (SPTs) were taken continuously from the ground surface to a depth of 12 feet and then at standard intervals of 5 feet or less until the borings were terminated. The split spoon sampling and SPT's were completed in general accordance with *ASTM D 1586 - "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils"*.

A geologist prepared the test boring logs based on visual observation of the recovered soil samples, along with review of the driller's field notes. The soil samples were described based on a visual/manual estimation of the grain size distribution, along with characteristics such as color, relative density, consistency, moisture, etc. The test boring logs are presented in Appendix A, along with general information and a key of terms and symbols used to prepare the logs.

3.00 SUBSURFACE CONDITIONS

The general stratigraphy encountered by the test borings consisted of surface topsoil at borings B-1, B-3 and B-4, followed by indigenous silty clay soil deposits containing varying amounts of intermixed sand and gravel. Within test borings B-1, B-2 and B-4, the indigenous soils were found to overlie apparent Sandstone and Siltstone bedrock, beginning at depths of about 19 feet, 24 feet and 24 feet respectively. The soil stratigraphy encountered and the groundwater conditions observed are described in more detail below and on the boring logs in Appendix A.

Neither a distinct topsoil layer thickness or man-placed fill were apparent to the driller at the surface of the test boring locations. This may be due in part to the upper surface soils being disturbed by site clearing activity, necessary to access the boring locations. The driller did note that remnants of some previous structures were apparent at surface within the site.

Accordingly, we recommend the Contractor, and/or others, make their own detailed observations and measurements regarding the presence of topsoil, prior to bidding and construction, to determine the quantities, costs and efforts that may be required for topsoil and organic surface soil material removal and associated replacement with appropriate suitable fill materials.

The indigenous soils encountered generally consisted of brown and gray silty clay soil deposits containing varying amounts of intermixed sand and gravel. The indigenous soils are classified as CL group soils using the Unified Soil Classification System (ASTM D2488).

Standard Penetration Test (SPT) “N” values obtained in the indigenous soils ranged from 4 to to “REF – sample spoon refusal” (i.e. 50 blows to advance the split spoon with 6-inches or less of penetration). The SPT “N” values indicate the consistency of the fine grained silty clay soils vary from medium to very hard.

Apparent Sandstone and Siltstone bedrock was encountered in borings B-1, B-2 and B-4, beginning at depths of about 19 feet, 24 feet and 24 feet respectively. Auger refusal (suggesting the apparent presence of more competent bedrock) was encountered at depths ranging between 24.1 feet and 24.4 feet bgs at the boring locations. Bedrock coring, however, was not performed to confirm the characteristics and quality of the apparent bedrock. Geologic maps indicate the uppermost bedrock formation in this area includes Upper Devonian Period Sandstone and Siltstone, part of the West Falls geologic group.

Water level measurements were made in the test borings following the completion of auger drilling and split spoon soil sampling. In all cases, no freestanding water was present at the completion of drilling and sampling. It is possible however, given the fine grain, low permeability nature of the soils encountered, that groundwater, if present, might not have had sufficient time to accumulate in these borings within the time period that had elapsed from the completion of soil drilling and sampling operations and the time of these observations / measurements.

The installation of a groundwater observation well would help to better define the potential groundwater levels present on the site, as well as their potential fluctuations. It should be expected that groundwater conditions could vary with location and with changes in soil and bedrock conditions, precipitation and seasonal conditions.

4.00 GEOTECHNICAL CONSIDERATIONS AND RECOMMENDATIONS

4.10 GENERAL

Based on the soil conditions encountered at the test boring locations, it is Empire’s opinion that the subsurface conditions are generally suitable for construction of the planned Senior Living Facility buildings using a conventional spread foundation system and at grade slab-on-grade floor construction, as currently planned.

The geotechnical issues, which should be addressed, include the removal of any existing fill soils if present beneath the proposed foundation bearing grades, along with the proper preparation of the foundation bearing grades and the subgrades for the slab-on-grade floor construction.

Based on the depth to apparent bedrock, the subsurface conditions within the upper 100 feet of the proposed site can be classified as Seismic Site Class “C” in accordance with Table 1613.5.2 of the Building Code of New York State - December 2010 (NYS Building Code). Therefore, seismic design may be based on this site classification.

4.20 FOUNDATION DESIGN

The building foundations should bear on suitable, relatively undisturbed “stiff” to “very stiff” silty clay soil bearing grades or they may bear on Engineered Fill (i.e. compacted Structural Fill or suitable flowable backfill) placed over the suitable indigenous soil bearing subgrades, following removal of surface vegetation / topsoil, any fill soils, and any other unsuitable soils, which extend below the proposed footings.

Suitable indigenous soil bearing subgrades should be free of any existing fill, organics, soft, loose, wet, “mucky” or otherwise deleterious material. Suitable bearing subgrade depths encountered at the building test boring locations are presented on the following table.

Recommended Suitable Subgrade Depth and Elevation for Spread Foundation or Engineered Fill		
Boring No.	Ground Surface Elevation (Feet)	Suitable Subgrade Depth/Elevation (Feet)
B-1	979.1	3.0 / 976.1
B-2	975.8	3.0 / 972.8
B-3	972.3	2.5 / 969.8
B-4	967.7	2.5 / 965.2

In general the foundations should bear at or below these grades or on Engineered Fill, which is placed following excavation to these grades. Subsurface conditions may vary between and away from the exploration locations and therefore could require adjustments in the suitable subgrade elevation based on actual conditions encountered at the time of construction. Accordingly, close full time inspection of

the foundation bearing subgrades, by qualified geotechnical personnel, is recommended as the excavations are made at the time of construction.

If it is necessary to place Structural Fill beneath the foundations, it should be placed beyond the foundation limits a horizontal distance equal to at least 0.5 times the thickness of the Structural Fill layer beneath the foundation. Excavations, therefore, will need to be planned and sized accordingly. Recommendations for Structural Fill material along with its placement and/or compaction are presented in Appendix B.

Flowable backfill material, if used, should be a non-swelling type material and should have a minimum 28-day compressive strength (f'_c) of 250 pounds per square inch (psi). The flowable backfill should extend at least 12 inches horizontally beyond the foundation limits for its entire depth.

Foundations constructed on suitable indigenous soil bearing grades or on Engineered Fill, which is properly placed over the suitable bearing grades can be sized based on a maximum net allowable bearing pressure of 3,000 pounds per square foot (psf).

Continuous wall footings should be at least 2.0 feet in width and column/individual footings should be at least 3.0 feet in width. Exterior foundations should be embedded a minimum of 4.0 feet below finished exterior grades for frost protection. Interior foundations should be embedded a minimum of 2.0 feet below the finished floor elevation in order to develop adequate bearing capacity. All foundations, however, should bear on suitable bearing subgrades in accordance with the recommendations presented above.

It is estimated that spread foundations sized and properly constructed in accordance with our recommendations will undergo total settlement of less than 1-inch.

4.30 FLOOR SLABS

The at grade building floors can be constructed as slab-on-grade following proper subgrade preparation. All trees, stumps, large root matter, vegetation, topsoil, organics present beneath the proposed building area floors should be removed. Stripping of the site beyond the surface topsoil layer may be necessary in some areas to remove the organic soils around tree areas. Any resulting undercut excavations should be backfilled with Structural Fill or Suitable Granular Fill as described in Appendix B. Following excavation to the slab-on-grade subgrade, the

exposed subgrades should be proof-rolled and evaluated in accordance with our recommendations presented in Section 4.60.3.

A minimum of 6 inches of Subbase Stone, as described in Appendix B, is recommended beneath lightly loaded floor slabs. A minimum of 12-inches of Subbase Stone is recommended beneath more heavily loaded floor slabs such as storage areas and mechanical rooms, etc. A suitable stabilization/separation geotextile, such as Mirafi 500X, should be placed over the existing soil subgrades prior to placement of the Subbase Stone layer.

We note that the above Subbase Stone thicknesses are not designed for carrying construction vehicle loads. Therefore, it may be desirable for the Contractor to temporarily increase the Subbase Stone thickness within the building pad area to provide a suitable working surface to stage the construction, carry construction vehicle loads and protect the underlying subgrades. This will be particularly important if construction proceeds during seasonally wet periods. The additional subbase stone material could then be removed and regraded in preparation for the actual floor construction and re-used as foundation backfill, pavement subbase, or as otherwise determined appropriate.

The floor slabs can be designed in accordance with procedures recommended by the Portland Cement Association or the American Concrete Institute, using a modulus of subgrade reaction of 150 pounds per cubic inch at the top of the subbase layer.

A moisture barrier does not appear warranted provided the floor slabs are constructed above the final site grades, unless otherwise recommended by the finished flooring manufacturer. It is recommended that the slab-on-grade be constructed such that it is not structurally connected to, or resting upon, perimeter walls or column footings in order to limit potential differential settlement effects, unless the slab / wall or column interface is designed with sufficient reinforcement to bridge potential differential settlement effects at these interfaces.

4.40 SEISMIC DESIGN CONSIDERATIONS

Based on the subsurface conditions encountered at test boring locations, the upper 100 feet of the project site can be classified as Seismic Site Class “C” in accordance with Table 1613.5.2 of the Building Code of New York State - December 2010 (NYS Building Code). The soil conditions encountered are not considered to be susceptible to potential liquefaction in the case of a seismic event. Therefore, seismic design can be based on this seismic site information.

The spectral response accelerations in the area of the project site, off Biltmore Road and Gardner Road in the Town of Horseheads, New York, were obtained by Empire using the United States Geological Survey (USGS) web site application (<https://geohazards.usgs.gov/secure/designmaps/us/>). The accelerations are based on the 2009 NEHRP Recommended Seismic Provisions, which makes use of the 2008 USGS seismic hazard data. The uniform hazard acceleration values obtained from this application were then adjusted, as recommended by the USGS, to obtain the 2% probability in 50 years mapped geometric mean accelerations, as presented in the NYS Building Code.

The calculated spectral response geometric accelerations for Site Class “B” soils are 0.121g for the short period (0.2 second) response (S_S) and 0.046g for the one second response (S_1). For design purposes, these spectral response accelerations were then adjusted for the Seismic Site Class “C” soil profile determined for the project site.

Accordingly, the adjusted spectral response accelerations (S_{MS} and S_{M1}) for Site Class “C” are as follows:

- * Short Period Response (S_{MS}) - 0.145g
- * 1 Second Period Response (S_{M1}) - 0.078g

The corresponding five percent damped design spectral response accelerations (S_{DS} and S_{D1}) are as follows:

- * S_{DS} - 0.097g
- * S_{D1} - 0.052g

4.50 PAVEMENT DESIGN

4.50.1 General

Pavement design recommendations are provided for construction of the new asphaltic concrete parking areas and access drives for the proposed senior living facility.

The pavement recommendations are based on the assumption that the subgrades will be prepared as discussed in Section 4.60.3 below and that a stabilization/separation geotextile is placed beneath the subbase course of the pavement sections.

The installation of underdrains and/or edge drains is recommended to drain the pavement subbase course and subgrades in order to limit the potential for frost action and improve pavement structure performance and design life. Alternatively, the pavement subbase course can also be allowed to daylight/drain to an adjacent perimeter drainage swale.

Proper grading of the pavement structure subgrades is also recommended to help limit potential frost action and improve pavement structure life and performance. Accumulation of water on pavement subgrades should be avoided by grading the subgrade to a slope of at least 2 percent to allow drainage to the underdrains and/or edge drains or drainage swale.

4.50.2 Flexible Pavement Design

Flexible pavement design recommendations are provided for both a Heavy Duty Asphalt Concrete Pavement (i.e. for use in the entrances, access drives, and areas used by delivery trucks) and for a Light Duty Asphalt Concrete Pavement (i.e. for use in automobile only parking areas),

Heavy Duty Asphalt Concrete Pavement:

- 1.5 inches – Top Course
- 3.0 inches – Binder Course
- 15 inches – Subbase Course*
- Geotextile

Light Duty Asphalt Concrete Pavement:

- 1.5 inches – Top Course
- 2.0 inches – Binder Course
- 12 inches – Subbase Course*
- Geotextile

* It may be necessary to increase the subbase course thickness in some areas to improve subgrade conditions and to promote drainage to underdrains or drainage swales, etc. as discussed below.

Materials for the above pavement structure components should consist of the following:

- A. Asphalt Concrete Top Course - NYSDOT Standard Specifications - Hot Mix Asphalt, Type 7 F2 Top Course.
- B. Asphalt Concrete Binder Course - NYSDOT Standard Specifications - Hot Mix Asphalt, Type 3 Binder Course.
- C. Subbase Course – Should comply with NYSDOT Standard Specifications, Item No. 304.12 - Type 2 Subbase.
- D. Geotextile - Woven polypropylene stabilization/separation geotextile (i.e., Mirafi 600X or approved suitable equivalent).

4.60 SITE PREPARATION AND CONSTRUCTION

4.60.1 Construction Dewatering

Construction dewatering for surface water control and for any excavations, which encounter groundwater seepage should be implemented in conjunction with the excavation work such that the work generally proceeds in the dry. Groundwater, if encountered, should be intercepted and maintained at least 1 to 2 feet below the proposed excavation bottom. It is anticipated that the use of diversion berms, proper site grading, cut-off trenches, drainage stone layers, underdrains, in conjunction with conventional sump and pump methods of dewatering, should generally be sufficient to control surface water and localized groundwater conditions, should they be encountered.

It is recommended that the Contractor excavate some test pits in advance of the excavation work, particularly where deeper excavations are required, to ascertain potential groundwater conditions and plan the dewatering that will be necessary. Groundwater dewatering plans should include implementation of measures to control erosion, sedimentation and the migration of soil fines.

4.60.2 Excavation and Foundation Construction

Excavation to the proposed bearing grades for the foundation construction should be performed using a method, which reduces disturbance to the bearing grade soils, such as an excavator / backhoe equipped with a smooth blade bucket. Any existing fill, organic soils, or otherwise deleterious soil material, which is present beneath the proposed foundation bearing grades, should be removed. Any resulting over-excavations should be backfilled with Engineer Fill.

The indigenous soil bearing grades should be observed and evaluated by a representative of Empire, prior to placement of Engineered Fill and/or the foundation structure. Placement and compaction of Structural Fill beneath foundations should also be observed and tested by a representative of Empire.

All soil bearing grades for foundation construction should be protected from precipitation and surface water. The indigenous soils will be sensitive to disturbance and strength degradation when in the presence of excess moisture. Where spread foundations are constructed directly on the indigenous soil bearing grades, and where construction of the foundations proceeds during seasonal wet periods and/or the foundations will not be constructed on the same day of the excavation, it may be desirable to place a 2 to 3-inch thick lean concrete mud mat in the excavation bottom to help protect the exposed subgrades and provide a suitable working surface for the foundation construction.

After completion of the foundation construction, the excavations should be backfilled as soon as possible and prior to construction of the superstructure. It is recommended that the foundation excavations be backfilled with a Structural Fill or Suitable Granular Fill material as described in Appendix B.

4.60.3 Subgrade Preparation for Slab-on-Grade and Pavement Construction

The site preparation work to establish the building pad and pavement areas should be performed during seasonal dry periods to minimize potential degradation of the subgrade soils and undercuts which may be required to establish a stable base for construction. It should be understood that the subgrade soils that will be exposed are sensitive and may degrade and lose strength when they are wet and disturbed by construction equipment traffic.

Accordingly, efforts should be made to maintain the subgrades in a dry and stable condition, and minimize construction traffic directly over these soils. These efforts should include installation of drainage swales to divert surface runoff and standing water away from the construction areas, sloping of the subgrade and “sealing” of the surface, at the end of each day or when rain is anticipated, with a smooth drum roller to promote runoff, and restricting construction equipment traffic from traveling directly over the subgrade surfaces, especially when they are wet.

All trees, stumps, tree root matter, vegetation, topsoil, and any other deleterious materials within the proposed slab-on-grade and pavement areas should be removed. Stripping of the site beyond the surface topsoil layer may be necessary in some

areas to remove these organics, as well as tree stumps, root matter and any organic indigenous soils. Any resulting undercut excavations should be backfilled with Structural Fill as described in Appendix B.

Following removal of the surface materials and excavation to the proposed subgrades, the exposed existing soil subgrades should be evaluated and then proof-rolled. Any deleterious materials, such as organics, soft or wet soils, debris, etc., which are present at the bottom of the subgrade excavation, should be further undercut, removed, and replaced with suitable engineered fill material.

The subgrade proof-rolling should be performed using a smooth drum roller weighing at least 10 tons. The roller should be operated in the static mode for proof rolling. The roller should complete at least two (2) passes over the exposed subgrades for the proof rolling evaluation.

The subgrade proof-rolling should be done under the guidance of, and observed by, a representative of Empire. In some cases, it may be necessary to waive the proof-rolling requirement which will be dependent on the type of subgrade conditions exposed and/or if any wet subgrades are present. This should be determined by Empire. Any undercuts, which may be required as the result of the inspection and proof-rolling, should be performed based on guidance and evaluation of the conditions by Empire.

Resulting undercuts/over-excavations should generally be backfilled with Structural Fill material. The placement of an initial lift of oversized stone fill material (i.e. "surge stone", "6-inch minus crusher run stone", No.3 & No.4 Stone/Crushed Gravel, etc.), encased in stabilization geotextile (i.e. Mirafi 600X or suitable equivalent) top and bottom, can also be used to help stabilize subgrades prior to the subgrade fill or subbase placement, if any of the existing subgrades are found to be in a soft/wet condition.

Subgrade fill placement, as necessary to raise the site grades, may proceed following preparation and acceptance of the existing soil subgrades. Subgrade fill placed beneath proposed foundations should consist of Structural Fill, and should be placed over suitable bearing subgrades as described above under Section 4.20 "Foundation Design".

The subgrade fill should be placed to a stable condition and should not "pump" or show signs of movement or significant deflection (i.e. unstable conditions) as it is being constructed. Any unsuitable conditions should be undercut and removed. The fill subgrades should also be properly graded, drained and protected from moisture

and frost. Placement of fill over wet, soft, snow covered or frozen subgrades is not acceptable.

Suitable Granular Fill or Structural Fill as described in Appendix B, can be used as subgrade fill to raise the existing site grades for the building slab-on-grade construction. Empire, however, should be consulted regarding the acceptability of any materials, which do not meet the requirements stated in Appendix B for Suitable Granular Fill or Structural Fill. All fill placement and compaction should be closely monitored and tested on a “full-time” basis by a representative of Empire.

4.60.4 Pavement Construction

Placement of the pavement subbase stone can proceed, following proper subgrade preparation, compaction, proof-rolling and subgrade filling as described in Section 4.60.3. Installation of adjacent geotextile panels should have minimum overlap of 12 to 18 inches. The subbase stone should be placed and compacted in accordance with the recommendations presented in Appendix B for Structural Fill. Construction of the asphalt concrete courses (i.e., binder and top) should be performed in accordance with NYSDOT Standard Specification Section 400. In addition, placement of asphalt concrete courses should not be permitted on wet or snow covered surfaces or when the subgrade surface is less than 40° F.

5.00 CONCLUDING REMARKS

This report was prepared to assist in the design and construction of the proposed Southern Tier Senior Living Facility planned at the northeast corner of Biltmore Road and Gardner Road in the Town of Horseheads, New York. The report has been prepared for the exclusive use of Southern Tier Senior Living, LLC; Fagan Engineers; and other members of the design team, for specific application to this site and this project only.

The recommendations were prepared based on Empire Geo-Services, Inc.’s understanding of the proposed project, as described herein, and through the application of generally accepted soils and foundation engineering practices. No warranties, expressed or implied are made by the conclusions, opinions, recommendations or services provided.

Empire Geo-Services, Inc. should be informed of any changes to the planned construction so that it may be determined if any modifications to the recommendations presented in this report are warranted. Empire Geo-Services, Inc. should also be retained to review final plans and specifications and to monitor

the foundation and site preparation construction to verify that the recommendations were properly interpreted and implemented.

Additional information regarding the use and interpretation of this report is presented in Appendix C.

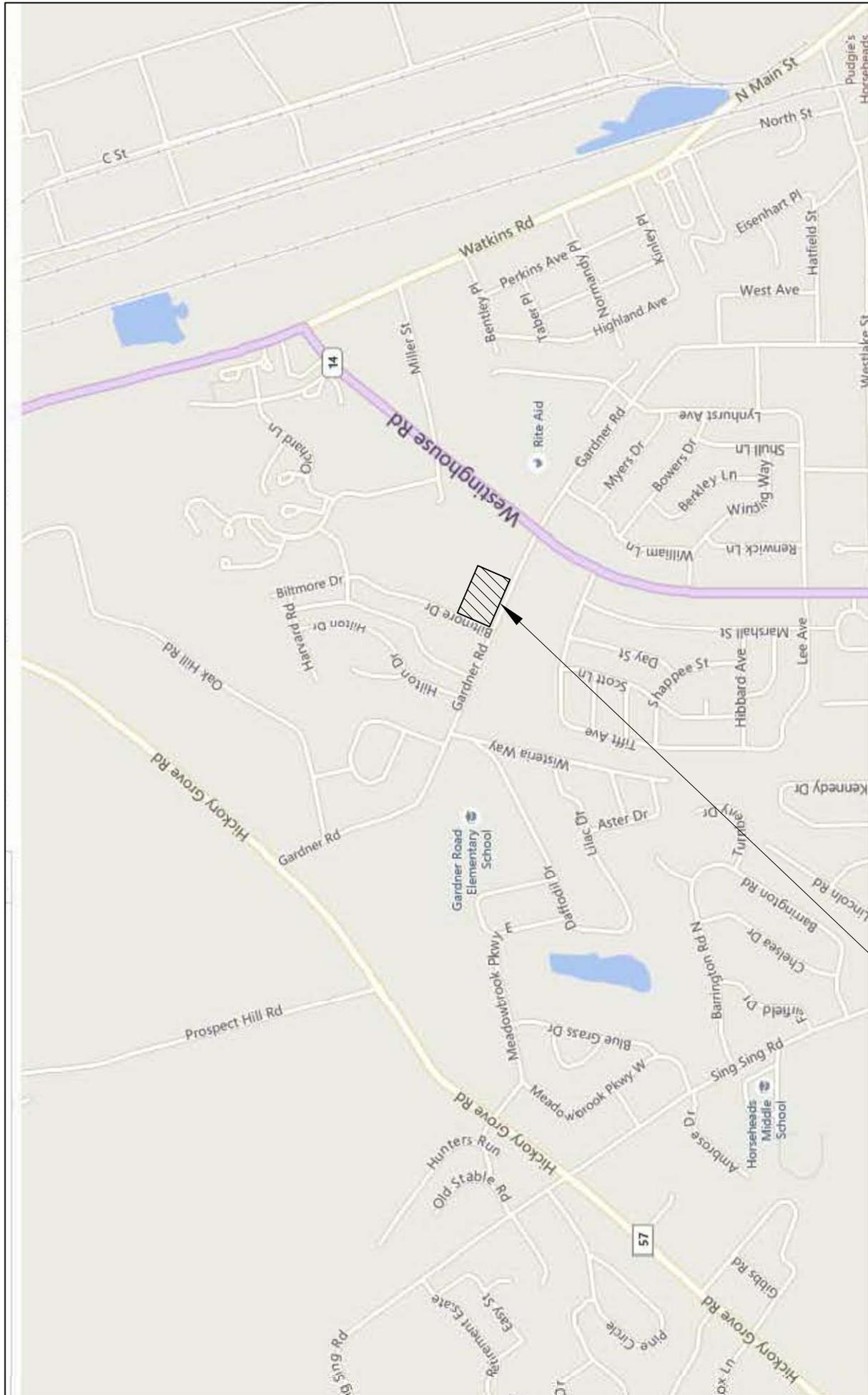
Respectfully Submitted:

EMPIRE GEO-SERVICES, INC.

A handwritten signature in blue ink, appearing to read 'J. Danzer', with a long horizontal flourish extending to the right.

John J. Danzer, P.E.
Senior Geotechnical Engineer

FIGURES



PROPOSED SOUTHERN TIER SENIOR LIVING FACILITY
 BILTMORE ROAD AND GARDNER ROAD
 TOWN OF HORSEHEADS
 CHEMUNG COUNTY, NEW YORK

EMPIRE GEO SERVICES INC
 a subsidiary of SJB Services, Inc.

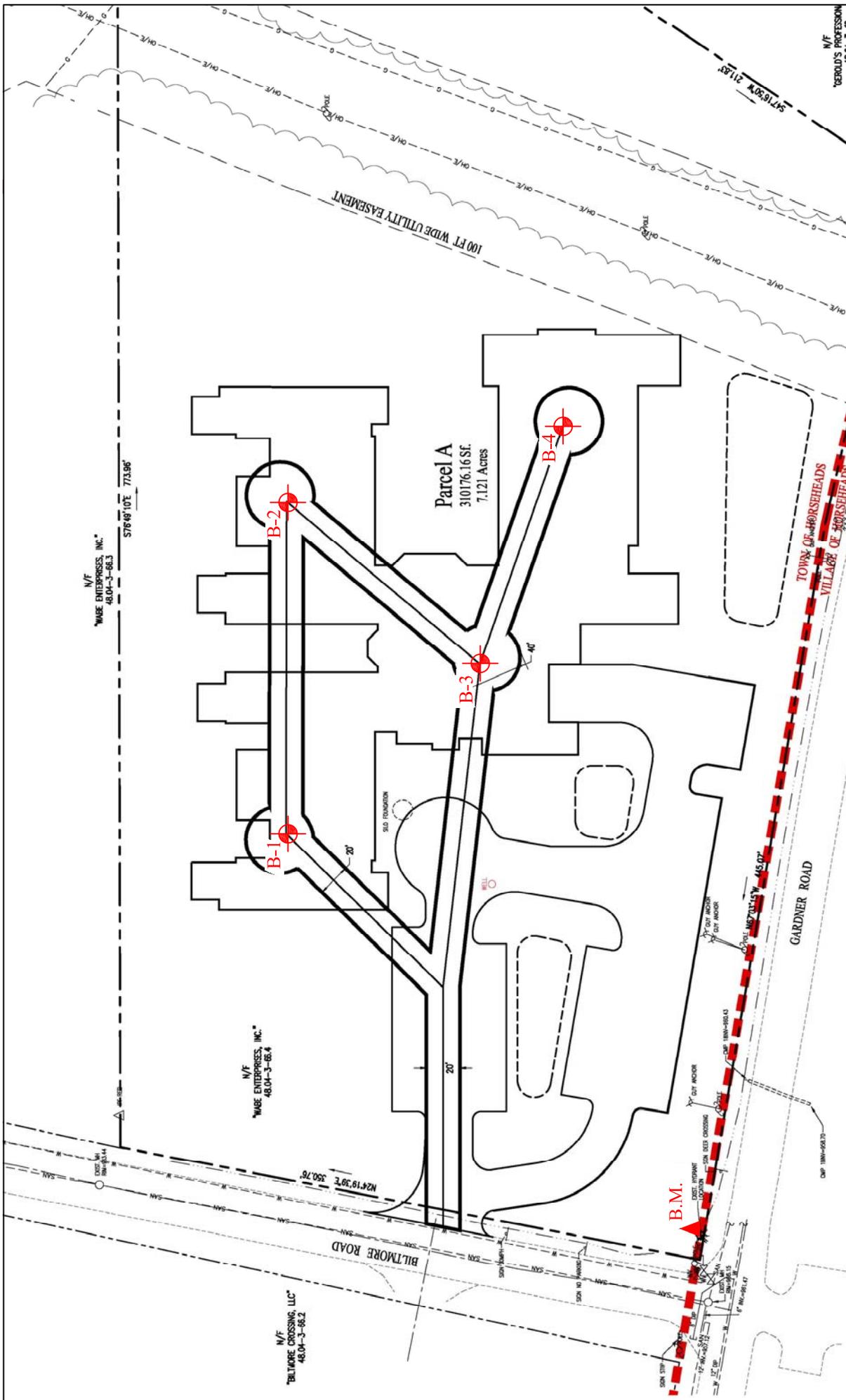
APPROXIMATE LOCATION OF PROJECT SITE

NOTE:
 SITE LOCATION PLAN DEVELOPED FROM BING
 MAPS - MICROSOFT CORPORATION © 2015

DR BY: WMA	SCALE: NTS	PROJECT NO.: BE-15-179
CHKD BY: JJD	DATE: 10/08/15	FIGURE NO.: 1

SITE LOCATION PLAN

North Arrow



LEGEND:

B-1  INDICATES APPROXIMATE LOCATION AND DESIGNATION OF TEST BORING.

B.M.  BENCHMARK: TOP OF WEST BONNET BOLT OF EXISTING FIRE HYDRANT. ELEVATION = 967.30 FEET AS ESTABLISHED BY OTHERS.

NOTE:
FIGURE DEVELOPED FROM "BORING ACCESS DRIVE", DATED 12/29/2014, PREPARED BY FAGAN ENGINEERS.



SUBSURFACE EXPLORATION PLAN

PROPOSED SOUTHERN TIER SENIOR LIVING FACILITY
 BILTMORE ROAD AND GARDNER ROAD
 TOWN OF HORSEHEADS
 CHEMUNG COUNTY, NEW YORK

DR BY: WMA	SCALE: NTS	PROJECT NO.: BE-15-179
CHKD BY: JJD	DATE: 10/08/15	FIGURE NO: 2

APPENDIX A
SUBSURFACE EXPLORATION LOGS

GENERAL INFORMATION & KEY TO SUBSURFACE LOGS

The Subsurface Logs attached to this report present the observations and mechanical data collected by the driller at the site, supplemented by classification of the material removed from the borings as determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface condition between adjacent borings or between the sampled intervals. The data presented of the Subsurface Logs together with the recovered samples provide a basis for evaluating the character of the subsurface conditions relative to the project. The evaluation must consider all the recorded details and their procedures to more accurately evaluate the subsurface conditions. Any evaluation of the contents of this report and recovered samples must be performed by qualified professionals. The following information defines some of the procedures and terms used of the Subsurface Logs to describe the conditions encountered, consistent with the numbered identifiers shown on the Key opposite this page.

1. The figures in the Depth column define the scale of the Subsurface Log.
2. The Samples column shows, graphically, the depth range from which a sample was recovered. See Table I for descriptions of the symbols used to represent the various types of samples.
3. The Sample No. is used for identification on sample containers and/or Laboratory Test Reports.
4. Blows on Sampler – shows the results of the “Penetration Test”, recording the number of blows required to drive a split spoon sampler into the soil. The number of blows required for each six inches is recorded. The first 6 inches of penetration is considered a seating drive. The number of blows required for the second and third 6 inches of penetration is termed the penetration resistance, N.
5. Blows on Casing – Shows the number of blows required to advance the casing a distance of 12 inches. The casing size, hammer weight, and length of drop are noted at the bottom of the Subsurface Log. If the casing is advanced by means other than driving, the method of advancement will be indicated in the Notes column or under the Method of Investigation at the bottom of the Subsurface Log. Alternatively, sample recovery may be shown in this column or other data consistent with the column heading.
6. All recovered soil samples are reviewed in the laboratory by an engineering technician, geologist, or geotechnical engineer, unless noted otherwise. Visual descriptions are made on the basis of a combination of the driller’s field descriptions and noted observations together with the sample as received in the laboratory. The method of visual classification is based primarily on the Unified Soil Classification System (ASTM D 2487) with regard to the particle size and plasticity (See Table No. II), and the Unified Soil Classification System group symbols for the soil types are sometimes included with the soil classification. Additionally, the relative portion, by weight, of two or more soil types is described for granular soils in accordance with “Suggested Methods of Test for Identification of Soils” by D.M. Burmister, ASTM Special Technical Publication 479, June 1970. (See Table No. III). Description of the relative soil density or consistency is based upon the penetration records as defined in Table No. IV. The description of the soil moisture is based upon the relative wetness of the soil as recovered and is described as dry, moist, wet, and saturated. Water introduced into the boring either naturally or during drilling may have affected the moisture condition of the recovered sample. Special terms are used as required to describe soil deposition in greater detail; several such terms are listed in Table V. When sampling gravelly soils with a standard two inch diameter split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the “action” of the drill rig as reported by the driller.
7. Rock description is based on review of the recovered rock core and the driller’s notes. Frequently used rock classification terms are included in Table VI.
8. The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Solid stratification lines delineate apparent changes in soil type, based upon review of recovered soil samples and the driller’s notes. Dashed lines convey a lesser degree of certainty with respect to either a change in soil type or where such change may occur.
9. Miscellaneous observations and procedures noted by the driller are shown in this column, including water level observations. It is important to realize the reliability of the water level observations depends upon the soil type (water does not readily stabilize in a hole through fine grained soils), and that any drill water used to advance the boring may have influenced the observations. The ground water level will fluctuate seasonally, typically. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or groundwater observation wells.
10. The length of core run is defined as the length of penetration of the core barrel. Core recovery is the length of core recovered divided by the core run. The RQD (Rock Quality Designation) is the total length of pieces of NX core exceeding 4 inches divided by the core run. The size core barrel used is also noted in the Method of Investigation at the bottom of the Subsurface Log.

DATE _____
 STARTED _____
 FINISHED _____
 SHEET _____ OF _____



SJB SERVICES, INC. SUBSURFACE LOG

PROJ. No. _____
 HOLE No. _____
 SURF. ELEV. _____
 G.W. DEPTH _____

PROJECT _____ LOCATION _____

DEPTH (ft)	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER					BLOWS ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
			0-6	6-12	12-18	18-24	N			
0								3" TOPSOIL	Groundwater at 10' upon completion, and 5' 24 hrs. after completion	
1	1	3	3	4	8	7	10	Brown SILT, some Sand, trace clay, ML (Moist-Loose)		
5							15 50/.5	Gray SHALE, medium hard, weathered, thin bedded, some fractures		
	①	②	③	④	⑤	⑥		⑦ (numbered features explained on reverse)	⑧	
									⑨ Run#1, 2.5'-5.0' 95% Recovery 50% RQD ⑩	

TABLE I

	Split Spoon Sample
	Shelby Tube Sample
	Geoprobe Macro-Core
	Auger or Test Pit Sample
	Rock Core

TABLE II

Identification of soil type is made on basis of an estimate of particle sizes, and in the case of fine grained soils also on basis of plasticity.

Soil Type	Soil Particle Size	
Boulder	>12"	
Cobble	3" - 12"	
Gravel - Coarse	3" - 3/4"	Coarse Grained (Granular)
- Fine	3/4" - #4	
Sand - Coarse	#4 - #10	Fine Grained
- Medium	#10 - #40	
- Fine	#40 - #200	
Silt - Non Plastic (Granular)	<#200	
Clay - Plastic (Cohesive)		

TABLE III

The following terms are used in classifying soils consisting of mixtures of two or more soil types. The estimate is based on weight of total sample.

Term	Percent of Total Sample
"and"	35 - 50
"some"	20 - 35
"little"	10 - 20
"trace"	less than 10

(When sampling gravelly soils with a standard split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter.)

TABLE IV

The relative compactness or consistency is described in accordance with the following terms:

Granular Soils		Cohesive Soils	
Term	Blows per Foot, N	Term	Blows per Foot, N
Loose	0 - 4	Very Soft	0 - 2
Loose	4 - 10	Soft	2 - 4
Firm	10 - 30	Medium	4 - 8
Compact	30 - 50	Stiff	8 - 15
Very Compact	>50	Very Stiff	15 - 30
		Hard	>30

(Large particles in the soils will often significantly influence the blows per foot recorded during the penetration test)

TABLE V

Varved	Horizontal uniform layers or seams of soil(s).
Layer	Soil deposit more than 6" thick.
Seam	Soil deposit less than 6" thick.
Parting	Soil deposit less than 1/8" thick.
Laminated	Irregular, horizontal and angled seams and partings of soil(s).

TABLE VI

Rock Classification Term	Meaning	Rock Classification Term	Meaning
Hardness	- Soft	Bedding	- Laminated (<1")
	- Medium Hard		- Thin Bedded (1" - 4")
	- Hard		- Bedded (4" - 12")
	- Very Hard		- Thick Bedded (12" - 36")
Weathering	- Very Weathered	- Massive (>36")	
	- Weathered		
	- Sound		

(Fracturing refers to natural breaks in the rock oriented at some angle to the rock layers)

DATE
 START 9/30/2015
 FINISH 9/30/2015
 SHEET 1 OF 1

SJB SERVICES, INC.
SUBSURFACE LOG



HOLE NO. B-1
 SURF. ELEV 979.1' +/-
 G.W. DEPTH See Notes

PROJECT: SOUTHERN TIER SENIOR LIVING FACILITY LOCATION: BILTMORE RD. & GARDNER RD.
 PROJ. NO.: BE-15-179 HORSEHEADS, NY

DEPTH FT.	SMPL NO.	BLOWS ON SAMPLER				SOIL OR ROCK CLASSIFICATION	NOTES	
		0/6	6/12	12/18	N			
5	1	WOH	1			TOPSOIL	Driller notes Topsoil at surface WOH = Weight of Hammer and Rods Possible Fill Samples #1 - #4	
		3	8		4	Brown Silty CLAY, tr.gravel (moist, medium, CL)		
		2	4	7		(stiff)		
			8	8		15		Becomes Brown-Gray
		3	4	9				Contains tr.organics
			6	6		15		
10	4	11	7			Gray-Brown Silty CLAY, tr.sand, tr.gravel	Poor Recovery Sample #6	
		6	9		13	(moist, v.stiff, CL)		
	5	5	6					
		11	22		17			
15	6	22	30			Contains Gray Limestone fragments		
		34	42		64			
20	7	15	23			Gray Silty CLAY, little f-c Gravel, tr.sand	REF = Sample Spoon Refusal	
		21	20		44	(moist, hard, CL)		
25	8	50/0.2			REF	Gray SANDSTONE fragments	Driller noted hard augering around 22' No Recovery Sample #9	
30	9	50/0.1			REF		Boring Complete with Sample Spoon and Auger Refusal at 24.1'	
35							No Free Standing Water encountered at Boring Completion	
40								

N = NO. BLOWS TO DRIVE 2-INCH SPOON 12-INCHES WITH A 140 LB. PIN WT. FALLING 30-INCHES PER BLOW CLASSIFIED BY: Geologist
 DRILLER: B. DELUDE DRILL RIG TYPE: DIEDRICH D-50
 METHOD OF INVESTIGATION ASTM D-1586 USING HOLLOW STEM AUGERS

DATE
 START 9/30/2015
 FINISH 9/30/2015
 SHEET 1 OF 1

SJB SERVICES, INC.
SUBSURFACE LOG



HOLE NO. B-2
 SURF. ELEV 975.8' +/-
 G.W. DEPTH See Notes

PROJECT: SOUTHERN TIER SENIOR LIVING FACILITY LOCATION: BILTMORE RD. & GARDNER RD.
 PROJ. NO.: BE-15-179 HORSEHEADS, NY

DEPTH FT.	SMPL NO.	BLOWS ON SAMPLER				SOIL OR ROCK CLASSIFICATION	NOTES
		0/6	6/12	12/18	N		
5	1	WOH	4			Brown Silty CLAY, tr.gravel (moist, stiff, CL)	WOH = Weight of Hammer and Rods
		6	4		10		
5	2	6	5			Light Brown Silty CLAY and f-c Sand, tr.gravel (moist, stiff, CL)	WOH = Weight of Hammer and Rods
		9	7		14		
5	3	5	7			Gray-Brown Silty CLAY, tr.gravel (moist, v.stiff, CL)	WOH = Weight of Hammer and Rods
		10	8		17		
10	4	9	7			Contains little f-c Gravel	
		9	9		16		
10	5	10	14				
		14	20		28		
15	6	21	23				
		10	26		33		
20	7	12	21			Gray Silty CLAY, little f-c Gravel, tr.sand (moist, hard, CL)	REF = Sample Spoon Refusal
		28	25		49		
25	8	50/0.3			REF	Gray SILTSTONE fragments	No Recovery Sample #8
25	9	50/0.2			REF	Boring Complete with Sample Spoon and Auger Refusal at 24.2'	No Free Standing Water encountered at Boring Completion
30							
35							
40							

N = NO. BLOWS TO DRIVE 2-INCH SPOON 12-INCHES WITH A 140 LB. PIN WT. FALLING 30-INCHES PER BLOW CLASSIFIED BY: Geologist
 DRILLER: B. DELUDE DRILL RIG TYPE: DIEDRICH D-50
 METHOD OF INVESTIGATION ASTM D-1586 USING HOLLOW STEM AUGERS

APPENDIX B

**FILL MATERIAL AND
EARTHWORK RECOMMENDATIONS**

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FILL MATERIAL AND EARTHWORK RECOMMENDATIONS

I. Material Recommendations

Structural Fill should consist of a crusher run stone or crushed gravel and sand, free of clay, organics and friable or deleterious particles. As a minimum, the crusher run stone or crushed gravel should meet the requirements of New York State Department of Transportation, Standard Specifications, Item 304.12 – Type 2 Subbase or Item 304.14 – Type 4 Subbase. If a gravel and sand product is used (vs. a crusher run stone), the gravel should be a crushed gravel material with at least 50% of the particles greater than ¼ inch, having a minimum of one crushed face. The Structural Fill should have the following gradation requirements.

Item 304.12 – Type 2 Subbase (Crusher Run Stone)		Item 304.14 – Type 4 Subbase (Crushed Gravel and Sand)	
<u>Sieve Size Distribution</u>	<u>Percent Finer by Weight</u>	<u>Sieve Size Distribution</u>	<u>Percent Finer by Weight</u>
2 inch	100	2 inch	100
¼ inch	25 to 60	¼ inch	30 to 65
No. 40	5 to 40	No. 40	5 to 40
No. 200	0 to 10	No. 200	0 to 10

B. Subbase Stone

The subbase stone course placed as the aggregate course beneath slab-on-grade and pavement construction should conform to the same material requirements as Structural Fill as stated above.

C. Suitable Granular Fill

Suitable soil material, well graded from coarse to fine and classified as GW, GP, GM, SW, SP or SM type soil using the Unified Soil Classification System (ASTM D-2487) and having no more than 85 percent by weight material passing the No. 4 sieve, no more than 20 percent by weight material passing the No. 200 sieve and which is generally free of particles greater than 6 inches, will be acceptable as Suitable Granular Fill. It should also be free of topsoil, asphalt, concrete rubble, wood, debris, clay and other deleterious materials. Suitable Granular Fill can be used as foundation backfill and as subgrade fill to raise site grades beneath slab-on-grade and pavement construction.

II. Placement and Compaction Requirements

All controlled fill placed beneath foundations, slab-on-grade construction and pavement construction should be compacted to a minimum of 95 percent of the maximum dry density as measured by the modified Proctor test (ASTM D1557). Fill placed in non-loaded grass areas can be compacted to a minimum of 90 percent of the maximum dry density (ASTM D1557).

Placement of fill should not exceed a maximum loose lift thickness of 6 to 9 inches with the exception of subbase courses beneath slab on grade and pavement construction, which can be placed in a single lift not exceeding 12 inches. The loose lift thickness should be reduced in conjunction with the compaction equipment used so that the required density is attained.

Fill should have a moisture content within two percent of the optimum moisture content at the time of compaction. Subgrades should be properly drained and protected from moisture and frost. Placement of fill on frozen subgrades is not acceptable. It is recommended that all fill placement and compaction be monitored and tested on a full-time basis by a representative of Empire Geo-Services, Inc.

III. Quality Assurance Testing

The following minimum laboratory and field quality assurance testing frequencies are recommended to confirm fill material quality and post placement and compaction conditions. These minimum frequencies are based on generally uniform material properties and placement conditions. Should material properties vary or conditions at the time of placement vary (i.e. moisture content, placement and compaction, procedures or equipment, etc.) Then additional testing is recommended. Additional testing, which may be necessary, should be determined by qualified geotechnical personnel, based on evaluation of the actual fill material and construction conditions.

A. Laboratory Testing of Material Properties

- Moisture content (ASTM D-2216) - 1 test per 4,000 cubic yards or no less than 2 tests per each material type.
- Grain Size Analysis (ASTM D-422) - 1 test per 4,000 cubic yards or no less than 2 tests per each material type.

- Liquid and Plastic Limits (ASTM D-4318) 1 test per 4,000 cubic yards or no less than 2 tests per each material type. Liquid and Plastic Limit testing is necessary only if appropriate, based on material composition (i.e. clayey or silty soils).
- Modified Proctor Moisture Density Relationship (ASTM D-1557) 1 test per 4,000 cubic yards or no less than 1 test per each material type. A maximum/minimum density relationship (ASTM D-4253 and ASTM D-4254) may be an appropriate substitute for ASTM D-1557 depending on material gradation.

B. Field In-Place Moisture/Density Testing (ASTM D-3017 and ASTM D-2922)

- Backfilling along trenches and foundation walls - 1 test per 50 lineal feet per lift.
- Backfilling Isolated Excavations (i.e. column foundations, manholes, etc.) 1 test per lift.
- Filling in open areas for slab-on-grade construction - 1 test per 2,500 square feet per lift.

APPENDIX C

GEOTECHNICAL REPORT LIMITATIONS

GEOTECHNICAL REPORT LIMITATIONS

Empire Geo-Services, Inc. (Empire) has endeavored to meet the generally accepted standard of care for the services completed, and in doing so is obliged to advise the geotechnical report user of our report limitations. Empire believes that providing information about the report preparation and limitations is essential to help the user reduce geotechnical-related delays, cost over-runs, and other problems that can develop during the design and construction process. Empire would be pleased to answer any questions regarding the following limitations and use of our report to assist the user in assessing risks and planning for site development and construction.

PROJECT SPECIFIC FACTORS: The conclusions and recommendations provided in our geotechnical report were prepared based on project specific factors described in the report, such as size, loading, and intended use of structures; general configuration of structures, roadways, and parking lots; existing and proposed site grading; and any other pertinent project information. Changes to the project details may alter the factors considered in development of the report conclusions and recommendations. *Accordingly, Empire cannot accept responsibility for problems which may develop if we are not consulted regarding any changes to the project specific factors that were assumed during the report preparation.*

SUBSURFACE CONDITIONS: The site exploration investigated subsurface conditions only at discrete test locations. Empire has used judgement to infer subsurface conditions between the discrete test locations, and on this basis the conclusions and recommendations in our geotechnical report were developed. It should be understood that the overall subsurface conditions inferred by Empire may vary from those revealed during construction, and these variations may impact on the assumptions made in developing the report conclusions and recommendations. *For this reason, Empire should be retained during construction to confirm that conditions are as expected, and to refine our conclusions and recommendations in the event that conditions are encountered that were not disclosed during the site exploration program.*

USE OF GEOTECHNICAL REPORT: Unless indicated otherwise, our geotechnical report has been prepared for the use of our client for specific application to the site and project conditions described in the report. *Without consulting with Empire, our geotechnical report should not be applied by any party to other sites or for any uses other than those originally intended.*

CHANGES IN SITE CONDITIONS: Surface and subsurface conditions are subject to change at a project site subsequent to preparation of the geotechnical report. Changes may include, but are not limited to, floods, earthquakes, groundwater fluctuations, and construction activities at the site and/or adjoining properties. *Empire should be informed of any such changes to determine if additional investigative and/or evaluation work is warranted.*

MISINTERPRETATION OF REPORT: The conclusions and recommendations contained in our geotechnical report are subject to misinterpretation. *To limit this possibility, Empire should review project plans and specifications relative to geotechnical issues to confirm that the recommendations contained in our report have been properly interpreted and applied.*

Subsurface exploration logs and other report data are also subject to misinterpretation by others if they are separated from the geotechnical report. This often occurs when copies of logs are given to contractors during the bid preparation process. *To minimize the potential for misinterpretation, the subsurface logs should not be separated from our geotechnical report and the use of excerpted or incomplete portions of the report should be avoided.*

OTHER LIMITATIONS: Geotechnical engineering is less exact than other design disciplines, as it is based partly on judgement and opinion. For this reason, our geotechnical report may include clauses that identify the limits of Empire's responsibility, or that may describe other limitations specific to a project. These clauses are intended to help all parties recognize their responsibilities and to assist them in assessing risks and decision making. Empire would be pleased to discuss these clauses and to answer any questions that may arise.