GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Civil • Geotechnical
Structural • Architecture
Material Testing • Consulting

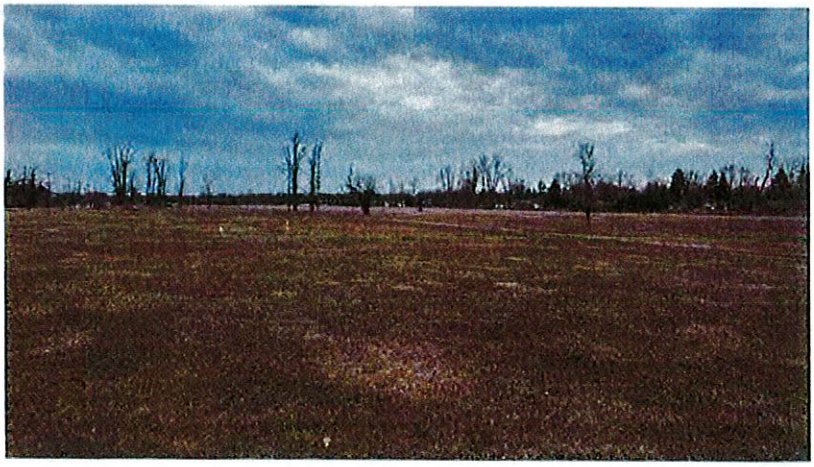
2190–2220 Wehrle Drive
Amherst, New York

Geotechnical Engineering Report

GGEA 21-1026

Prepared for:
Acquest Development Company, LLC
5554 Main Street
Williamsville, New York 14221

Prepared by
Glynn Group Engineering & Architecture, PLLC
415 South Transit Street
Lockport, New York 14094



December 16, 2021

GLYNN GROUP ENGINEERING & ARCHITECTURE, PLLC
415 South Transit Street, Lockport, New York 14094
voice 716.625.6933 / fax 716.625.6983
www.glynngroup.com

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 SCOPE

This report provides subsurface exploration data and geotechnical recommendations for the proposed development of the property located at 2190–2220 Wehrle Drive in the Town of Amherst, New York. Specifically, Glynn Group Engineering & Architecture, PLLC (GGEA) has provided the following scope of services:

1. Performed a site visit and established fourteen (14) soil borings in accordance with the plan provided by Aquest Development Company, LLC (Aquest).
2. Cleared underground utilities with Dig Safely New York.
3. Mobilized drilling subcontractor, Earth Dimensions, Inc. (EDI), with a track mounted ATV drill rig and crew.
4. Performed SPT sampling in accordance with ASTM D-1586 "Standard Method for Penetration Test and Split Barrel Sampling of Soils" to auger refusal at each boring location.
5. Provided soil boring logs, prepared by EDI, to include SPT data, N values, soil classification, refusal depth and groundwater conditions.
6. Prepared a geotechnical report to address suitability of construction, foundation recommendations and construction recommendations.

1.2 CONTRACT

GGEA performed this study in accordance with a written contract/proposal to Aquest dated March 4, 2021, for which GGEA received the notice to proceed via signed contract by Mr. Omar Abu-Sitta on the same day. All services provided by GGEA are subject to the Standard Terms and Conditions included in the contract.

1.3 EXCLUSIONS

The project efforts exercised by GGEA include geotechnical analysis, design recommendations and the preparation of this report. The scope of this report specifically excludes any review of former site use, in particular, environmental or pollution related concerns.

2.0 PROJECT BACKGROUND

2.1 SITE DESCRIPTION AND PROPOSED IMPROVEMENTS

The site encompasses two properties, specifically address 2190 (5.8 acres) and address 2220 (19.7 acres), providing for a total of 25.5 acres combined. The site is located in the north side of Wehrle Drive approximately 0.75 miles west of Transit Road (Route 78). The property is flat, open and covered by mowed grass with a few large deciduous trees located throughout and occasional pools of seasonal surface water. A Project Location Plan has been included in Appendix B.

The proposed site development plans were not provided to GGEA, however future development is presumed to consist of multiple buildings supported by shallow foundation systems with slab on grade first floors and associated roadways and parking areas.

2.2 GEOLOGIC SETTING

The underlying surficial geological conditions at the site are the result of the last glacial coverage of the Pleistocene Epoch, referred to as the Wisconsinan Glacial Stage, which ended approximately 12,000 years ago. As the glacier advanced across Western New York, the massive weight carved and crushed the underlying soil and rock to form glacial till, which typically consists of a dense matrix of silt, sand, rock and clay. Sediment was transported and deposited by the ice and meltwater, forming stratified soils commonly referred to as glacial drift. As the climate warmed and the glacier melted, vast quantities of meltwater were generated, which became impounded by the receding glacier and local topography to create proglacial pools throughout much of the area. The subsurface conditions encountered at the Wehrle Road site consist of slackwater deposits, glacial drift and glacial till overlying shallow limestone bedrock of the Middle Devonian Onondaga Formation. The bedrock typically has a high compressive strength and contains numerous chert nodules. Surficial geology maps identify bedrock at a depth of less than 10 feet from the ground surface in the vicinity of the Wehrle site. Soil borings revealed bedrock depth to vary from 3.0 to 10.6 feet below existing grade.

3.0 FIELD INVESTIGATION

3.1 METHODOLOGY

The subsurface exploration consisted of a total of fourteen (14) soil borings performed at locations selected by Aquest to provide a minimum of one boring per 3.5 acres of property. GGEA performed a site visit on March 11, 2021 to establish soil boring locations and assess drill rig access. Utility clearance was performed by EDI through Dig Safely New York.

EDI mobilized a tracked mounted ATV drill rig to the site on March 18, 2021 to perform the subsurface exploration on March 18 and 19, 2021. Soil boring and sampling operations were performed using hollow stem augers to advance through overburden materials in accordance with the Standard Penetration Test Method ASTM D-1586. Resistance values, or blow counts, were recorded for each six-inch advancement of a twenty-four inch long, two inch diameter split spoon sampler. The sum of the resistance values for the 6/12 and 12/18 inch intervals constitutes the N value, which provides an indication of the in-situ relative density and strength of encountered soils. All data recorded during drilling operations can be found on the soil boring logs included in Appendix A.

Retrieved soil samples were logged and visually classified by EDI in accordance with the ASEE System of Definition for Visual Identification of Soils (Burmister Classification System) and ASTM D-2488 "Standard Practice for Description and Identification of Soils (Visual – Manual Procedure)". Recovered soil samples were visually examined by GGEA to establish Unified Soil Classification System (USCS) classifications in accordance with ASTM D-2488 "Description and Identification of Soils (Visual-Manual Procedure)". Discrepancies observed between classifications noted on the EDI soil boring logs and those

identified in this report are due examination in the GGEA laboratory, which allows for the collection of specific gradation and index property data that was not discerned from visual classification in the field.

3.2 SUBSURFACE CONDITIONS

All soil borings were advanced to auger refusal, which was encountered on presumed limestone bedrock at depths ranging from a minimum of 3.0 feet at boring B-12 to a maximum of 10.6 feet at boring B-9. Overburden soils were found to be variable throughout the site, however subsurface conditions typically consisted of a thin layer of topsoil overlying firm to stiff slackwater sediment and stiff cohesive glacial till. Ground surface elevations were estimated at the soil boring locations from the topographic survey provided by Aquest. Soil boring locations are identified on the Subsurface Exploration Plan included in Appendix C and specific subsurface conditions can be found on the Subsurface Exploration Logs included in Appendix A. Subsurface conditions for each boring location have been summarized as follows:

B-1	Elevation 695.8
0.0 – 0.7 ft	Topsoil.
0.7 – 1.7 ft	Brown, extremely moist, soft, sandy silty clay (CL-ML), trace of gravel. N value of 5.
1.7 – 3.4 ft	Brown, faintly mottled, extremely moist, stiff, sandy silty clay with gravel (CL-ML). N value of > 10.
> 3.4 ft	Presumed limestone bedrock.
B-2	Elevation 698.5
0.0 – 0.4 ft	Topsoil.
0.4 – 4.4 ft	Brown, extremely moist, firm to very stiff, sandy silty clay with gravel (CL-ML). N values range from 9 to 22.
4.4 – 4.9 ft	Fractured limestone rock.
> 4.9 ft	Presumed limestone bedrock.
B-3	Elevation 698.0
0.0 – 0.9 ft	Topsoil.
0.9 – 1.8 ft	Brown, extremely moist, soft, sandy silty clay (CL-ML). N value of 4.
1.8 – 5.0 ft	Brown, extremely moist, very stiff, sandy silty clay with gravel (CL-ML). N value of 20.
5.0 – 6.6 ft	Brown to grayish brown, moist, hard, sandy silty clay with gravel (CL-ML). N value of 59.
> 6.6 ft	Presumed limestone bedrock.

B-4	Elevation 697.6
0.0 - 0.7 ft	Topsoil.
0.7 - 1.8 ft	Brown, faintly mottled, extremely moist, very soft, sandy silty clay (CL-ML). N value of 2.
1.8 - 6.3 ft	Brown, faintly mottled, moist, stiff to very stiff, lean clay (CL). N values range from 15 to 17.
6.3 - 6.8 ft	Gray, extremely moist to wet, very dense, sandy silty with gravel (ML).
> 6.8 ft	Presumed limestone bedrock.

B-5	Elevation 696.6
0.0 - 0.8 ft	Topsoil.
0.8 - 2.5 ft	Brown, faintly mottled, extremely moist, firm, sandy silty clay (CL-ML). N value of 8.
2.5 - 5.0 ft	Brown, extremely moist, very stiff, lean clay (CL). N value of 21.
5.0 - 7.1 ft	Brown to brownish gray, moist, very stiff, sandy silty clay with gravel (CL-ML). N value of 21.
> 7.1 ft	Presumed limestone bedrock.

B-6	Elevation 696.4
0.0 - 0.8 ft	Topsoil.
0.8 - 2.2 ft	Brown, faintly mottled, extremely moist, soft, lean clay (CL). N value of 4.
2.2 - 5.8 ft	Brown, moist, stiff to very stiff, lean clay (CL). N values range from 13 to 19.
5.8 - 6.6 ft	Brown, extremely moist, very stiff, sandy silty clay with gravel (CL-ML).
> 6.6 ft	Presumed limestone bedrock.

B-7	Elevation 695.9
0.0 - 0.8 ft	Topsoil.
0.8 - 2.0 ft	Brown, faintly mottled, extremely moist, soft, lean clay (CL). N value of 4.
2.0 - 4.9 ft	Brown, faintly mottled, extremely moist, stiff, sandy silty clay (CL-ML). N value of 12.
4.9 - 9.5 ft	Brown, extremely moist, very stiff to hard, sandy silty clay with gravel (CL-ML). N values range from 27 to 36.
9.5 - 10.2 ft	Gray, extremely moist, very dense, silty sand with gravel (SM).
10.2 - 10.4 ft	Fractured limestone rock.
> 10.4 ft	Presumed limestone bedrock.

B-8	Elevation 694.8
0.0 – 0.8 ft	Topsoil.
0.8 – 1.5 ft	Brown, extremely moist, very loose, sandy silt (ML). N value of 4.
1.5 – 7.2 ft	Brown, faintly mottled, moist, stiff to very stiff, lean clay (CL). N values range from 11 to 22.
7.2 – 8.5 ft	Grayish brown, moist, very stiff, lean clay (CL), trace of gravel. N value of 19.
8.5 – 9.3 ft	Light gray, extremely moist, very dense, sandy silt with gravel (ML).
> 9.3 ft	Presumed limestone bedrock.

B-9	Elevation 694.8
0.0 – 1.2 ft	Topsoil.
1.2 – 2.7 ft	Brown, faintly mottled, extremely moist, soft, lean clay (CL). N value of 4.
2.7 – 6.0 ft	Brown, extremely moist, stiff, lean clay (CL). N value of 10.
6.0 – 10.6 ft	Grayish brown, extremely moist, hard, sandy silty clay with gravel (CL-ML). N values range from 37 to 35.
> 10.6 ft	Presumed limestone bedrock.

B-10	Elevation 694.2
0.0 – 0.6 ft	Topsoil.
0.6 – 3.0 ft	Brownish gray, extremely moist, loose, sandy silt (ML). N value of 5.
3.0 – 7.0 ft	Grayish brown, moist, stiff to very stiff, lean clay (CL). N values range from 14 to 16.
7.0 – 9.7 ft	Grayish brown, extremely moist, very stiff to hard, sandy silty clay with gravel (CL-ML). N values range from 15 to 34.
9.7 – 9.9 ft	Gray, wet, fractured limestone.
> 9.9 ft	Presumed limestone bedrock.

B-11	Elevation 697.2
0.0 – 0.7 ft	Topsoil.
0.7 – 1.4 ft	Brown, extremely moist, stiff, lean clay (CL). N value of 11.
1.4 – 5.0 ft	Brown, extremely moist, very stiff, silty clay with gravel (CL-ML). N value of 21.
> 5.0 ft	Presumed limestone bedrock.

B-12	Elevation 695.6
0.0 – 0.7 ft	Topsoil.
0.7 – 3.0 ft	Brown, faintly mottled, extremely moist, firm, sandy silty clay with gravel (CL-ML). N value of 5.
> 3.0 ft	Presumed limestone bedrock.

B-13	Elevation 696.3
0.0 – 1.8 ft	Topsoil.
1.8 – 2.5 ft	Brown, faintly mottled, extremely moist, stiff, lean clay (CL).
2.5 – 4.3 ft	Grayish brown, moist, very stiff, sandy silty clay with gravel (CL-ML). N value of 18.
> 4.3 ft	Presumed limestone bedrock.

B-14	Elevation 694.7
0.0 – 0.6 ft	Topsoil.
0.6 – 1.7 ft	Brown, extremely moist, soft, lean clay (CL). N value of 4.
1.7 – 3.1 ft	Brown, extremely moist, hard, sandy silty clay with gravel (CL-ML). N value > 50.
> 3.1 ft	Presumed limestone bedrock.

It is GGEA's opinion the extent of this investigation was sufficient to accurately characterize the subsurface conditions and provide information necessary for the preparation of this report. The soil borings portray the subsurface conditions encountered at the soil boring locations at the time of investigation. The stratification lines shown on the soil boring logs are approximate, whereas in-situ the changes between strata may be more gradual. Ground surface elevations and corresponding bedrock elevations have been summarized in the following table:

Boring No.	Surface El. (ft)	Depth (ft)	Bedrock El. (ft)
B-1	695.8	3.4	692.4
B-2	698.5	4.9	693.6
B-3	698.0	6.6	691.4
B-4	697.6	6.8	690.8
B-5	696.6	7.1	689.5
B-6	696.4	6.6	689.8
B-7	695.9	10.4	685.5

B-8	694.8	9.3	685.5
B-9	694.8	10.6	684.2
B-10	694.2	9.9	684.3
B-11	697.2	5.0	692.2
B-12	695.6	3.0	692.6
B-13	696.3	4.3	692.0
B-14	694.7	3.1	691.6

3.3 GROUNDWATER

Groundwater was not encountered in the augers upon the completion of drilling efforts at the majority of the subsurface exploration locations. The augers did not remain in the ground for an extended period of time to allow for groundwater to migrate through the soils and stabilize within the augers, nor where groundwater monitoring wells or piezometers installed to obtain accurate groundwater elevation data. However, groundwater was measured at a depth of 9.6 feet in the augers upon the completion of drilling efforts at boring B-10. Rock was initially encountered at a depth of 9.7 feet at boring B-10 and auger refusal was encountered at 9.9 feet. Based on the moisture content of recovered soil samples, the stabilized groundwater elevation is estimated to be within the limestone bedrock below the exploration depth of this project. Notwithstanding, seasonal perched groundwater should be anticipated in areas where the bedrock surface is of lower elevation, specifically in areas where granular overburden soils are present. Seasonal perched groundwater depth is anticipated to vary depending upon precipitation, frost depth and soil percolation characteristics.

4.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

4.1 FOUNDATIONS

The subsurface conditions at this site are of good structural quality and will provide for the construction of shallow foundation systems consisting of strip footings with frost walls or spread footings with columns to support future buildings. Considering the depth to bedrock varies from a minimum of 3.0 feet to a maximum of 10.6 feet, subgrade composition at the design bearing elevation may vary from limestone bedrock to stiff lean clay (CL) native soil. GGEA provides design and construction recommendations as follows:

1. Where practical, foundations should be advanced through native soils to bear on bedrock. Limestone bedrock will provide for a net allowable bearing capacity of > 10,000 psf.
2. In areas where the design foundation bearing elevation is significantly above that of the bedrock elevation, foundations may be constructed over undisturbed native soil. Compacted in-situ native soil will provide for a net allowable bearing capacity of 3,000 psf.

3. Depending on the size and footprint of proposed buildings, the foundation subgrade may be composed partially of undisturbed native soil and partially of limestone bedrock in some areas. All soil subgrade soil should be thoroughly compacted with a reversible plate tamper (Bomag BPR 50/60 or equivalent) to maximize the relative density of the subgrade soil, minimize variable bearing capacity and minimize settlement potential.
4. Foundations should be constructed at a depth of greater than 3.5 feet below final grade to provide frost protection in accordance with regional frost depth regulations. However, this does not apply to foundations constructed directly over bedrock per section 1809.5 of the 2020 NYS Building Code.

4.2 SLAB ON GRADE

Building interior concrete slabs should be designed and constructed in accordance with the following recommendations:

1. All slabs should be designed using a recognized standard procedure, such as identified in the text "Designing Floor Slabs on Grade" by Ringo and Anderson (ISBN 0-924659-34-3). The floor slab should be designed to properly support the intended load, which may include fork truck traffic or rack posts.
2. Remove topsoil and expose competent, undisturbed native soil subgrade. Based on conditions encountered at the soil boring locations, excavation to a depth of 1.0 to 2.0 feet below existing grade is anticipated.
3. Compact the exposed soil thoroughly with a smooth drum vibratory roller to produce a uniform density throughout the subgrade.
4. Proof roll the exposed subgrade with a fully loaded 10-wheel dump truck weighing at least 30 tons or a smooth drum roller having an effective force of at least 600 pounds per linear inch of roller width. Any area exhibiting weaving, yielding, rutting or boiling should be reworked and compacted to produce an acceptable response or over excavated and replaced with Structural Fill. The depth of the undercut and type of Structural Fill will depend on the soil material encountered, weather conditions at the time of construction and the bearing conditions at the base of the undercut. The top surface of the subgrade should be pitched to drain to prevent ponding of stormwater.
5. Separation geotextile is not required for design, but is suggested to prevent contamination of the granular stone base from underlying soil subgrade as a result of repeated traffic during construction. Any granular stone base that becomes contaminated with soil during construction should be removed and replaced prior to pouring concrete. GGEA recommends US Fabrics US 250 or equivalent.
6. Place Select Structural Fill granular base. The thickness of the Select Structural Fill should be dependent upon the intended slab usage. At a minimum, GGEA recommends the granular base thickness be equivalent to that of the thickness of the slab. Heavily loaded slabs may require additional thickness.
7. Install subsurface utilities.

8. Install the concrete slab, the design of which should be based on a modulus of subgrade reaction of 150 pci. The installation of a vapor barrier and specification of the concrete finish technique is at the discretion of the architect.
9. Proper joint spacing and reinforcing steel spacing/placement will be critical to the long term performance of slab. The Portland Cement Association recommends joint spacing in feet should be two to three times the slab thickness in inches.

4.3 FLEXIBLE PAVEMENT

GGEA provides design and construction recommendations for flexible pavement as follows:

1. Remove existing topsoil to expose competent, undisturbed native subgrade soil. Based on conditions encountered at the soil boring locations, excavation to a depth of 1.0 to 2.0 feet below existing grade is anticipated.
2. Compact the exposed soil thoroughly with a smooth drum vibratory roller to produce a uniform density throughout the subgrade.
3. After the exposed subgrade is thoroughly densified, proof roll the subgrade with a fully loaded 10-wheel dump truck weighing at least 30 tons or a smooth drum roller having an effective force of at least 600 pounds per linear inch of roller width. Any area exhibiting weaving, yielding, rutting or boiling should be reworked and compacted to produce an acceptable response or over excavated and replaced with Structural Fill. The depth of the undercut and type of Structural Fill will depend on the soil material encountered, weather conditions at the time of construction and the bearing conditions at the base of the undercut. The top surface of the subgrade should be pitched to drain to prevent ponding of stormwater.
4. Install a granular base layer composed of properly placed and compacted Select Structural Fill. GGEA recommends a minimum granular base thickness of 10 inches for automobile traffic and 12 inches for bus or truck traffic.
5. If catch basins are installed, special attention should be directed at the compaction of stone around the catch basins and the pipes. Failure to properly compact the stone will result in pavement settlement around the catch basins and ponding of water.
6. If the design dictates, install ditches, lateral drains, weeps and storm drainage piping.
7. Construct a flexible pavement system consisting of asphalt binder followed by asphalt top. GGEA provides recommended pavement sections as follows:

Light Duty (primarily car traffic)
- 10 inches Select Structural Fill
- 2.5 inches of asphalt concrete binder (2008 NYSDOT item number 403.138902)
- 1.0 inch of asphalt concrete top (2008 NYSDOT item number 403.178902 or 403.198902)

Heavy Duty (mixed truck/bus and car traffic)
- 12 inches Select Structural Fill

3.0 inches of asphalt concrete binder (2008 NYSDOT item number 403.138902)
1.5 inch of asphalt concrete top (2008 NYSDOT item number 403.178902 or 403.198902)

The native slack water soils may become soft if exposed to moisture, which will contaminate the overlying Select Structural Fill over time through repeated loading. The installation of a woven separation geotextile will provide additional support and should be considered, especially if the granular base will be used as a working surface during construction. GGEA recommends US 200 (or equivalent) beneath light duty pavement and US 250 (or equivalent) beneath heavy duty pavement.

All site contractors should be notified that roadways and parking areas will not support repeated travel by construction loads. Pavement and subgrade failure can be anticipated in areas that receive a high volume of heavy construction traffic. To preclude the overstressing of the pavement system it is recommended that haul roads be located in non-critical areas. As an option, the base course of stone can be overbuilt to a total thickness of 20 inches to serve as a haul route. The additional thickness of stone should be removed prior to paving along with any areas of stone that have been contaminated with soil. Failure to remove fine-grained soils from the stone base may cause pavement distress in the form of heaving resulting from freeze thaw effects.

In the event the binder layer is used as a working surface during construction or there is a prolonged time period between binder and top placement such that daily activities occur over the binder surface, the surface must be power washed, not just swept, and a tack coat should be applied prior to installation of the top course. In addition, any yielding area of pavement binder should be removed and replaced prior to application of the top course.

Design and construction of the pavement system should take care to provide adequate drainage to prevent saturation of the subgrade soil, which may have a high silt content in some areas and provide a high potential for frost heave if exposed to water and freezing temperatures.

4.4 · EXCAVATION AND BACKFILL

Excavation through the overburden soil and fill materials is anticipated to require minimal effort from standard excavation equipment. Excavation into the limestone bedrock will require significant effort and the use of a heavy duty hydraulic breaker (rock hammer) with an impact energy of greater than 10,000 foot pounds.

Construction of stormwater detention ponds, associated piping and various underground utilities will likely require the removal of bedrock in some areas. Stormwater detention ponds should be lined with compacted low permeability cohesive soils or geosynthetic material if percolation of detained stormwater into the underlying bedrock is undesirable.

The soil encountered at this site should be classified by an OSHA competent person in accordance with 29 CFR, Part 1926, OSHA Subpart P, "Excavations and Trenches" prior to and during excavation. GGEA has classified the soils as Type C. However, this classification may change depending on other site

criteria and moisture conditions at the time of construction. An OSHA competent person should judge the potential need for excavation bracing and excavation geometry in the field.

Engineered Fill is defined as Structural Fill, Select Structural Fill or Flowable Fill (CLSM). Composition, placement and compaction specifications for Engineered Fill materials have been included in Appendix E.

The foundations should be backfilled once the frost wall concrete has achieved a nominal compressive strength. The initial lift of backfill placement should be on the outside of the wall, with subsequent lifts balanced along the interior and exterior of the wall perimeter. Foundations should be backfilled with properly placed and compacted Select Structural Fill in structurally loaded areas (pavement, sidewalk, interior backfill) and Common Fill in non-structural landscaped areas. In place density testing should be performed at a rate of one test per 50 feet of trench or 2500 square feet of area per lift with a minimum of one test per day of placement.

Engineering properties for compacted native soils and Select Structural Fill have been estimated as follows:

Native Silt (ML), compacted

moist unit weight = 125 pcf

friction angle = 31^0

Rankine theory

at rest pressure coefficient (Ko) = 0.48
active pressure coefficient (Ka) = 0.32
passive pressure coefficient (Kp) = 3.12

2015 IBC Table 1610.1 Lateral Soil Load

at rest pressure = 100 psf/ft of depth
active pressure = 45 psf/ft of depth

Native Lean Clay (CL), compacted

moist unit weight = 120 pcf

friction angle = 0^0 undrained, 25^0 drained

cohesion = 2000 psf undrained, 0 drained

Rankine theory (based on drained condition)

at rest pressure coefficient (Ko) = 0.57
active pressure coefficient (Ka) = 0.41
passive pressure coefficient (Kp) = 2.46

2015 IBC Table 1610.1 Lateral Soil Load

at rest pressure = 100 psf/ft of depth
active pressure = 60 psf/ft of depth

Select Structural Fill (GW)

moist unit weight = 145 pcf

friction angle = 40 degrees

Rankine theory

at rest pressure coefficient (Ko) = 0.36
active pressure coefficient (Ka) = 0.22
passive pressure coefficient (Kp) = 4.60

2015 IBC Table 1610.1 Lateral Soil Load

at rest pressure = 60 psf/ft of depth
active pressure = 30 psf/ft of depth

4.5 EXPANSIVE SOIL MITIGATION

Some cohesive soils undergo volumetric change (shrinkage and swelling) with changes in moisture content and degree of saturation, which are commonly referred to as expansive soils. This condition primarily occurs with fat clay (CH) soil, which is a cohesive soil that exhibits a liquid limit of 50 or greater. The liquid limit is the water content, in percent, of a soil that defines the boundary between the plastic and viscous fluid states.

Laboratory testing of recovered soil samples was not included in the scope of GGEA's services, however previous laboratory test results in the general area identified soils with a low potential for volumetric change.

4.6 LIQUEFACTION MITIGATION

Liquefaction is the process where saturated cohesionless (granular) soils, specifically, loose sands and silts, transform from a solid into a liquid as a result of an increase in the pore water pressure caused by repeated disturbance such as experienced during seismic events. Liquefaction results in an immediate loss of shear strength and bearing capacity, causing total and differential settling of the overlying structure.

The native soils encountered at this site exhibit a high in place density and do not provide concern for liquefaction.

4.7 SETTLEMENT

Foundations designed and constructed in accordance with the recommendations of this report will provide for estimated total settlement of less than 1.0 inch. Differential settlement is estimated to be less than 0.5 inches.

4.8 SEISMIC SITE CLASS AND DESIGN CATEGORY

In accordance with Section 1613 (Earthquake Loads) of the 2020 NYS Building Code, GGEA has classified the site as Seismic Site Class D. The site classification is based on the summation of N values for the upper 100 feet of boring B-9 in accordance with ASCE 7-16 Equation 20.4-2. The design spectral response accelerations have been calculated as 0.183 g for the short period design spectral response acceleration (S_{DS}) and 0.072 g for the one second design spectral response acceleration (S_{D1}). In accordance with tables 1613.2.5(1) and 1613.2.5(2), using Risk Category II, the site is classified as Seismic Design Category B (refer to Appendix D).

4.9 GENERAL CONSTRUCTION RECOMMENDATIONS

GGEA provides general construction recommendations as follows:

1. The exposed subgrade grade should not be allowed to become saturated or inundated with standing water. No fill material or concrete shall be placed in water, over saturated subgrade or over frozen subgrade. Soils may lose considerable strength and bearing capacity if subject to saturation. The foundation subgrade should be pitched to drain and provided with a temporary sump(s), located outside of the structure footprint, to prevent the accumulation of stormwater in the excavation and subsequent deterioration of the foundation subgrade during construction. Likewise, stormwater should not be permitted to remain in the excavation adjacent to foundations after construction and prior to backfill.
2. Backfill foundations prior to applying load.
3. Upon completion of the excavation for shallow foundations, the exposed foundation subgrade should be compacted to densify soil loosened by the excavation process. Proper subgrade preparation will assure the development of the anticipated bearing strength and reduce settlement potential.
4. If additional undercut is necessary, the excavation bottom should be graded to a uniform elevation and gradually sloped back to design elevation. Undercut "pockets" should be avoided.
5. Conformance to OSHA standards is mandatory during excavation and trench work.
6. Topsoil and organic soils should be removed from all load bearing areas.
7. Footing sizes should be proportioned to create nearly equal contact pressures under all foundations, which will serve to minimize differential settlement.
8. Foundation bearing grades should not be allowed to freeze prior to or after placement of concrete. Insulating blankets should be used to cover bearing grades plus a one foot perimeter outside of the forms or completed footings until backfill is placed.
9. The fill placed at grade elevation should be sloped to drain away from the foundation walls to eliminate the potential for standing water to accumulate along the foundation

10. During the excavation process, if encountered soils or moisture contents are found to be different than those identified on the soil boring logs and represented within this report, the allowable bearing capacity and associated design recommendations may need to be reevaluated by a qualified geotechnical engineer to account for varying bearing capacity.

4.10 CONCLUSION

This completes the geotechnical evaluation for the proposed development of the property at 2190 – 2220 Wehrle Drive in the Town of Amherst, New York. The subsurface conditions are of good structural quality and will provide for the construction of shallow foundation systems designed in accordance with the recommendations presented herein. This report has been prepared based on the encountered subsurface conditions at the soil boring locations and pertinent data supplied by Aquest. Supplemental geotechnical exploration and evaluation may be necessary once site development plans are finalized. Please contact GGEA if major project changes are made or if encountered soils differ from conditions identified in this report.

Sincerely,

G. Edward Lover, P.G.
Senior Geologist

Mark W. Glynn, P.E.
Consulting Engineer, Principal

/gel

Appendix A

Subsurface Exploration Logs

2190 – 2220 Wehrle Drive
Amherst, New York

Geotechnical Engineering Report

GGEA 21-1026

December 16, 2021

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-01-21 SURF. ELEVATION _

PROJECT 2190-2220 Wehrle Drive LOCATION _

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/18/21 COMPLETED 03/18/21

DEPTH IN FT	SN / REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1				5		Wet to extremely moist dark brown (SAND-SILT-CLAY) topsoil with 0 to 3% gravel, little sand, clay, and organic matter, very soft, granular soil structure, (ML-CL).	Silty topsoil with little sand, clay, and organic matter, trace gravel to 0.7 feet over clayey slackwater sediment with trace sand to 1.7 feet over silty glacial till with little sand and clay, trace to little gravel to end of boring.
	16		1					1.7	
				4				Extremely moist faintly mottled brown (CLAYEY-SILT) with some clay, trace sand, firm, blocky soil structure, (CL).	
					6			1.7	
	2	5						Extremely moist faintly mottled brown (SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, stiff, massive soil structure, (ML-CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 3.4 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
	13		9					3.4	
				50/1				Advanced augers to refusal at 3.4 feet.	No water at completion.
5									
10									
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-02-21 SURF. ELEVATION _

PROJECT 2190-2220 Wehrle Drive LOCATION _

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/19/21 COMPLETED 03/19/21

DEPTH IN FT	SN / REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1				9		Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace clay, very loose, granular soil structure, (ML).	Coarse silty topsoil with little sand and organic matter, trace clay to 0.4 feet over silty glacial till with little sand and clay, trace to little gravel to 4.4 feet over apparent limestone bedrock to end of boring.
	21		3					0.4	
				6					
					9				
	2	5				22		Extremely moist to moist brown (SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, stiff, very stiff below 2.0 feet, massive soil structure, (ML-CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 4.9 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
	24		10					4.4	
				12					
					14				
	3	13						Gray stone fragments, hard.	No water at completion.
5	6		50/1					4.9	
								Advanced augers to refusal at 4.9 feet.	
10									
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-03-21 SURF. ELEVATION _

PROJECT 2190-2220 Wehrle Drive LOCATION _

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/19/21 COMPLETED 03/19/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1							
	19		2			4		Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace clay, very loose, granular soil structure, (ML).	Coarse silty topsoil with little sand and organic matter, trace clay to 0.9 feet over silty slackwater sediment with little sand and clay to 1.8 feet over silty glacial till with little sand and clay, trace to little gravel with an occasional cobble to 5.0 feet over silty glacial till with little to some gravel, little sand and clay to end of boring.
				2				0.9	
					4			Extremely moist brown (SAND-SILT-CLAY) with little mostly fine size sand and clay, soft, blocky soil structure, (ML-CL).	
	2	6							
	24		8			20			
				12				1.8	
					16			Extremely moist to moist brown (SAND-SILT-CLAY) with 5 to 15% gravel, occasional cobble, little sand and clay, very stiff, massive soil structure, (ML-CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 6.6 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
	3	27							
5	3		35			59			
				24				5.0	
					49			Moist brown to grayish brown gravelly (SAND-SILT-CLAY) with 15 to 25% gravel, little sand and clay, hard, massive soil structure, (ML-CL).	No water at completion.
	4	50/3							
	3							6.6	
10								Advanced augers to refusal at 6.6 feet.	
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns) SHEET 1 OF 1

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-04-21 SURF. ELEVATION —

PROJECT 2190-2220 Wehrle Drive LOCATION —

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/19/21 COMPLETED 03/19/21

DEPTH IN FT	SN / REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1						Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, very loose, granular soil structure, (ML).	Coarse silty topsoil with little sand and organic matter to 0.7 feet over silty slackwater sediment with little sand and clay to 1.8 feet over clayey slackwater sediment to 6.3 feet over coarse silty glacial till with little sand, trace to little gravel to auger refusal.
	22		1			2		0.7	
				1				Extremely moist faintly mottled brown (SAND-SILT-CLAY) with little mostly fine size sand and clay, soft, blocky soil structure, (ML-CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 6.8 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
					2			1.8	
	2	4						Moist faintly mottled brown (CLAYEY-SILT) with some clay, stiff, very stiff below 3.0 feet, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).	No water at completion.
	24		6			15		6.3	
				9				Extremely moist to wet gray (SANDY-SILT) with 5 to 15% gravel, little sand, very dense, massive soil structure, (SM).	
					10			6.8	
	3	4						Advanced augers to refusal at 6.8 feet.	
5	24		7			17			
				10					
					10				
	4	50/5							
	5								
10									
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-05-21 SURF. ELEVATION _

PROJECT 2190-2220 Wehrle Drive LOCATION _

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/18/21 COMPLETED 03/18/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	2				8		Wet to extremely moist dark brown (SAND-SILT-CLAY) topsoil with little sand, clay, and organic matter, soft, granular soil structure, (ML).	Silty topsoil with little sand, clay, and organic matter to 0.8 feet over silty slackwater sediment with little sand and clay to 2.5 feet over clayey slackwater sediment with trace sand to 5.0 feet over silty glacial till with little sand and clay, trace to little gravel to end of boring.
	20		2						
				6					
					7				
	2	6						0.8	
	24		9			21		Extremely moist faintly mottled brown (SAND-SILT-CLAY) with little mostly fine size sand and clay, firm, blocky soil structure, (ML-CL).	
				12					
					16				
	3	3							
5	24		7			21		grades downward to 2.5	
				14				Extremely moist to moist brown (CLAYEY-SILT) with some clay, trace sand, very stiff and stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).	
					23				
	4	11						clear transition to 5.0	
	26		50/2					Moist brown to brownish gray (SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, very stiff, massive soil structure, (ML-CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 7.1 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
10								7.1	
								Advanced augers to refusal at 7.1 feet.	No water at completion.
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30" PER BLOW

LOGGED BY Brian Bartron, (cns) SHEET 1 OF 1

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-06-21 SURF. ELEVATION —

PROJECT 2190-2220 Wehrle Drive LOCATION —

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/19/21 COMPLETED 03/19/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1						Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace clay and wood fiber, very loose, granular soil structure, (ML).	Coarse silty topsoil with little sand and organic matter, trace clay to 0.8 feet over clayey slackwater sediment with trace sand to 5.8 feet over silty glacial till with little sand and clay, trace to little gravel to end of boring.
	16		2			4			
				2					
					5				
	2	4							
	24		6			13			
				7					
					10				
	3	5							
5	24		8			19			
				11					
					12				
	4	50/2							
	2								
								0.8	
								Extremely moist to moist faintly mottled brown (CLAYEY-SILT) with some clay, trace sand, firm, blocky soil structure, (CL).	
								grades downward to 2.2	
								Moist brown (CLAYEY-SILT) with some clay, trace sand, stiff, very stiff below 5.5 feet, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 6.6 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
								5.8	
								Extremely moist brown (SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, very stiff, massive soil structure, (ML-CL).	
10								6.6	
								Advanced augers to refusal at 6.6 feet.	No water at completion.
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-07-21 SURF. ELEVATION _

PROJECT 2190-2220 Wehrle Drive LOCATION _

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/18/21 COMPLETED 03/18/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1						Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace clay, very loose, granular soil structure, (ML).	Coarse silty topsoil with little sand and organic matter, trace clay to 0.8 feet over clayey slackwater sediment with trace gravel to 2.0 feet over silty slackwater sediment with little to some clay, little sand to 4.9 feet over silty glacial till with little sand and clay, trace to little gravel to 9.5 feet over sandy glacial till with some gravel, little silt to 10.2 feet over apparent limestone bedrock to end of boring.
	17		2			4			
				2					
					4				
	2	5						0.8	
	24		5			12		Extremely moist to moist faintly mottled brown (CLAYEY-SILT) with some clay, trace sand, firm, blocky soil structure, (CL).	
				7					
					10				
	3	6						grades downward to 2.0	
5	24		12			27		Extremely moist faintly mottled brown (SAND-SILT-CLAY) with little to some clay, little mostly fine size sand, stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (ML-CL).	
				15					
					17				
	4	7						clear transition to 4.9	
	24		11			26		Extremely moist to moist brown to grayish brown (SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, very stiff, hard below 9.0 feet, massive soil structure, (ML-CL).	
				15					
					18				
	5	8						9.5	
	24		15			36		Extremely moist gray gravelly (SILTY-SAND) with 20 to 40% mostly angular gravel, little silt, very dense, massive soil structure, (SM).	
				21					
10					40				
	6	25						10.2	
	5		50/5					Gray stone fragments, moderately hard to hard.	
								10.4	
								Boring completed at 10.4 feet.	
15									
20									

Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to split spoon refusal at 10.4 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns) SHEET 1 OF 1

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-08-21 SURF. ELEVATION —

PROJECT 2190-2220 Wehrle Drive LOCATION —

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/19/21 COMPLETED 03/19/21

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1						Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, very loose, granluar soil structure, (ML).	Coarse silty topsoil with little sand and organic matter to 0.8 feet over coarse silty slackwater sediment with little sand, trace clay to 1.5 feet over clayey slackwater sediment with trace sand to 7.2 feet over clayey glacial till with trace sand and gravel to 8.5 feet over coarse silty glacial till with little sand, trace to little gravel to end of boring.
	18		1			4		0.8	
				3				Extremely moist faintly mottled light grayish brown (SANDY-SILT) with little mostly fine size sand, trace clay, very loose, thinly bedded, (ML).	
					3			clear transition to 1.5	
	2	5						Moist faintly mottled brown (CLAYEY-SILT) with some clay, trace sand, stiff, very stiff below 5.0 feet, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 9.3 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
	24		6			11		clear transition to 7.2	
				5				Moist grayish brown (CLAYEY-SILT) with 3 to 7% gravel, some clay, trace sand, very stiff, massive soil structure, (CL).	No water at completion.
					8			8.5	
	3	4						Extremely moist light gray (SANDY-SILT) with 5 to 15% gravel, little sand, very stiff, massive soil structure, (ML).	
5	24		9			22		9.3	
				13				Advanced augers to refusal at 9.3 feet.	
					16				
	4	5							
	24		8			19			
				11					
					17				
	5	6							
	11		50/5						
10									
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30" PER BLOW

LOGGED BY Brian Bartron, (cns)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-09-21 SURF. ELEVATION _

PROJECT 2190-2220 Wehrle Drive LOCATION _

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/18/21 COMPLETED 03/18/21

DEPTH IN FT	SN / REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1						Wet to extremely moist dark brown (SANDY-SILT) topsoil with 0 to 3% gravel, little sand and organic matter, trace clay, very loose, granular soil structure, (ML).	Coarse silty topsoil with little sand and organic matter, trace gravel and clay to 1.2 feet over clayey slackwater sediment with trace sand to 6.0 feet over silty glacial till with little to some gravel, little sand and clay to end of boring.
	22		1			4			
				3					
					4				
	2	4							
	24		4			10			
				6					
					6				
	3	4							
5	24		4			10			
				6					
					8				
	4	49							
	6		16			37			
				21					
					20				
	5	14							
	18		18			35			
				17					
10					21				
	6	7							
	4		50/1						
15									
20									

1.2

Extremely moist faintly mottled brown (CLAYEY-SILT) with some clay, trace sand, firm, blocky soil structure, (CL).

clear transition to 2.7

Extremely moist brown (CLAYEY-SILT) with some clay, trace sand, stiff, weakly thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).

grades downward to 6.0

Extremely moist to moist grayish brown to brownish gray gravelly (SAND-SILT-CLAY) with 15 to 25% gravel, little sand and clay, hard, massive soil structure, (ML-CL).

10.6

Boring completed at 10.6 feet.

Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to split spoon refusal at 10.6 feet. Bore hole was backfilled with cuttings to ground surface upon completion.

No water at completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-10-21 SURF. ELEVATION —

PROJECT 2190-2220 Wehrle Drive LOCATION —

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/19/21 COMPLETED 03/19/21

DEPTH IN FT	SN / REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	WH						Wet to extremely moist (SANDY-SILT) topsoil with little sand and organic matter, very loose, granluar soil structure, (ML).	WH: Sampler penetration with weight of rods and hammer.
	20		2			5		0.6	Coarse silty topsoil with little sand and organic matter to 0.6 feet over coarse silty slackwater sediment with little sand, trace clay to 3.0 feet over clayey slackwater sediment with trace clay to 7.0 feet over silty glacial till with little to some clay, little sand, trace to little gravel to 9.5 feet over apparent limestone bedrock to end of boring.
				3					
					4				
	2	5							
	24		5			14		Extremely moist to moist light brownish gray (SANDY-SILT) with little mostly fine size sand, trace clay, loose, blocky soil structure becoming thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks below 1.7 feet, (ML).	
				9					
					9				
	3	4							
5	24		7			16			
				9					
					10				
	4	5							
	24		6			15			
				9					
					12				
	5	9							
	20		10			34			
				24					
10					50/5				
								grades downward to 3.0	
								Moist brown to grayish brown (CLAYEY-SILT) with some clay, trace sand, stiff and very stiff, thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL).	
								clear transition to 7.0	
								Extremely moist grayish brown (SAND-SILT-CLAY) with 5 to 15% gravel, little to some clay, trace to little sand, very stiff, (ML-CL) tending toward (CL).	▼ Water level at 9.6 feet below ground surface at completion.
								clear transition to 9.7	
								Wet gray stone fragments, hard.	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 9.9 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
15								9.9	
								Boring completed at 9.9 feet.	
20									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-11-21 SURF. ELEVATION _

PROJECT 2190-2220 Wehrle Drive LOCATION _

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/18/21 COMPLETED 03/18/21

DEPTH IN FT	SN / REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1						Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, very loose, granular soil structure, (ML).	Coarse silty topsoil with little sand and organic matter to 0.7 feet over clayey slackwater sediment with trace sand to 1.4 feet over silty glacial till with trace to little gravel, little clay, trace sand to end of boring.
	15		3			11		0.7	
				8				Extremely moist brown (CLAYEY-SILT) with some clay, trace sand, firm, blocky soil structure, (CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 5.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
					11			1.4	
	2	6						Extremely moist to moist brown (CLAYEY-SILT) with 5 to 15% gravel, little clay, trace sand, very stiff, massive soil structure, (ML-CL).	No water at completion.
	20		7			21		5.0	
				14				Advanced augers to refusal at 5.0 feet.	
					17				
	3	7							
5	6		50/2						
10									
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns) SHEET 1 OF 1

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-12-21 SURF. ELEVATION —

PROJECT 2190-2220 Wehrle Drive LOCATION —

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/18/21 COMPLETED 03/18/21

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1				5		Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, trace wood fiber, very loose, granluar soil structure, (ML).	Coarse silty topsoil with little sand and organic matter, trace wood fiber to 0.7 feet over silty glacial till with little to some gravel, little sand and clay to end of boring.
	18		2						
				3					
					6				
	2	2							
	6		50/3					0.7	
5								Extremely moist to moist faintly mottled brown gravelly (SAND-SILT-CLAY) with 15 to 25% gravel, little sand and clay, firm, massive soil structure, (ML-CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 3.0 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
								3.0	
								Advanced augers to refusal at 3.0 feet.	No water at completion.
10									
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-13-21 SURF. ELEVATION _

PROJECT 2190-2220 Wehrle Drive LOCATION _

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/18/21 COMPLETED 03/18/21

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1							
	13		2			5		Extremely moist dark brown (SANDY-SILT) topsoil fill with little sand, trace to little organic matter, very loose, weakly blocky soil structure, (ML).	Coarse silty topsoil with little sand, trace to little organic matter to 0.3 feet over silty topsoil with little sand, clay, and organic matter, trace to little wood fiber to 1.8 feet over clayey slackwater sediment with trace sand to 2.5 feet over silty glacial till with little to some gravel, little sand and clay to end of boring.
				3				0.3	
					5			Extremely moist dark brown (SAND-SILT-CLAY) topsoil with little sand, clay, and organic matter, trace to little wood fiber, firm, granular soil structure, (ML-CL).	
	2	5						1.8	
	22		7			18		Extremely moist to moist faintly mottled brown (CLAYEY-SILT) with some clay, trace sand, stiff, blocky soil structure becoming thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks below 2.0 feet, (CL).	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 4.3 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
				11				2.5	
					50/5			Moist brown to grayish brown gravelly (SAND-SILT-CLAY) with 15 to 25% gravel, little sand and clay, very stiff, massive soil structure, (ML-CL).	No water at completion.
5								4.3	
								Advanced augers to refusal at 4.3 feet.	
10									
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Brian Bartron, (cns) SHEET 1 OF 1

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

24K05g HOLE NO. BH-14-21 SURF. ELEVATION —

PROJECT 2190-2220 Wehrle Drive LOCATION —

Town of Amherst, Erie County, NY

CLIENT Glynn Group Engineering & Architecture, PLLC DATE STARTED 03/19/21 COMPLETED 03/19/21

DEPTH IN FT	SN REC	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	1				4		Extremely moist dark brown (SANDY-SILT) topsoil with little sand and organic matter, very loose, granular soil structure, (ML). 0.6	Coarse silty topsoil with little sand and organic matter to 0.6 feet over clayey slackwater sediment to 1.7 feet over silty glacial till with little to some clay, trace to little sand and gravel to end of boring.
	16		1						
				3					
					6				
	2	50/5						Extremely moist to moist brown (CLAYEY-SILT) with some clay, trace sand, firm, blocky soil structure, (CL). 1.7	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 3.1 feet. Bore hole was backfilled with cuttings to ground surface upon completion.
	4								
5								Extremely moist brown (SAND-SILT-CLAY) with 5 to 15% gravel, little to some clay, trace to little sand, stiff, massive soil structure, (ML-CL). 3.1	No water at completion.
								Advanced augers to refusal at 3.1 feet.	
10									
15									
20									

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30" PER BLOW

LOGGED BY Brian Bartron, (cns)

Appendix B

Project Location Plan

2190 – 2220 Wehrle Drive
Amherst, New York

Geotechnical Engineering Report

GGEA 21-1026

December 16, 2021

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

GGE ENGINEERING · DESIGN GLYNN GEOTECHNICAL ENGINEERING 415 S. TRANSIT STREET LOCKPORT, NEW YORK 14094 VOICE (716) 625 - 6933 / FAX (716) 625-6983 www.glynngroup.com	PROJECT: 2190-2220 WEHRLE DRIVE			SHEET NO.: S1
	SUBJECT: PROJECT LOCATION PLAN			
	CLIENT: AQUEST DEVELOPMENT			
	PROJ. NO.: 21-1026	SCALE: 1" = 1000'	DATE: 04.01.21	BY: GEL

Appendix C

Subsurface Exploration Plan

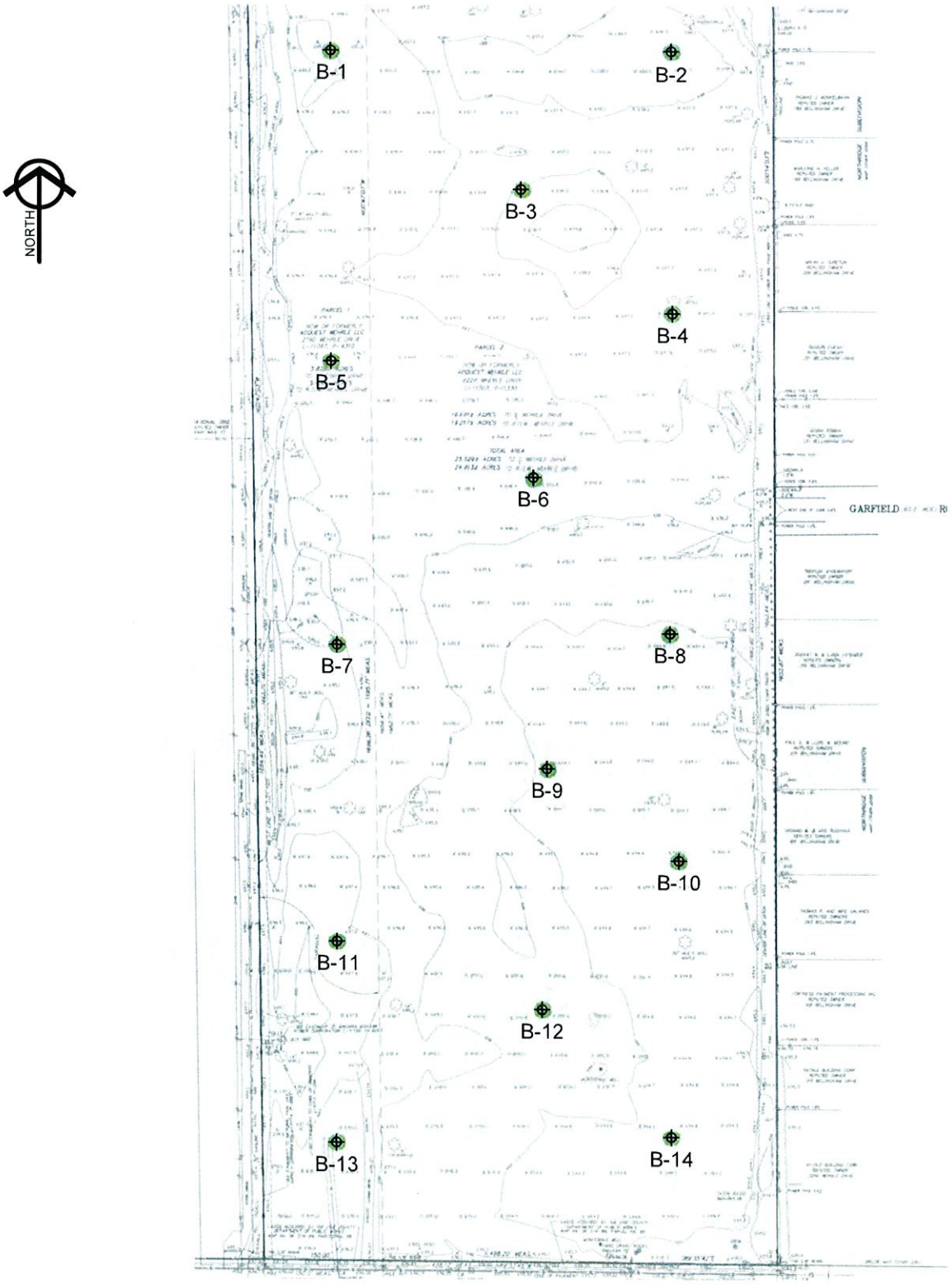
2190 – 2220 Wehrle Drive
Amherst, New York

Geotechnical Engineering Report

GGEA 21-1026

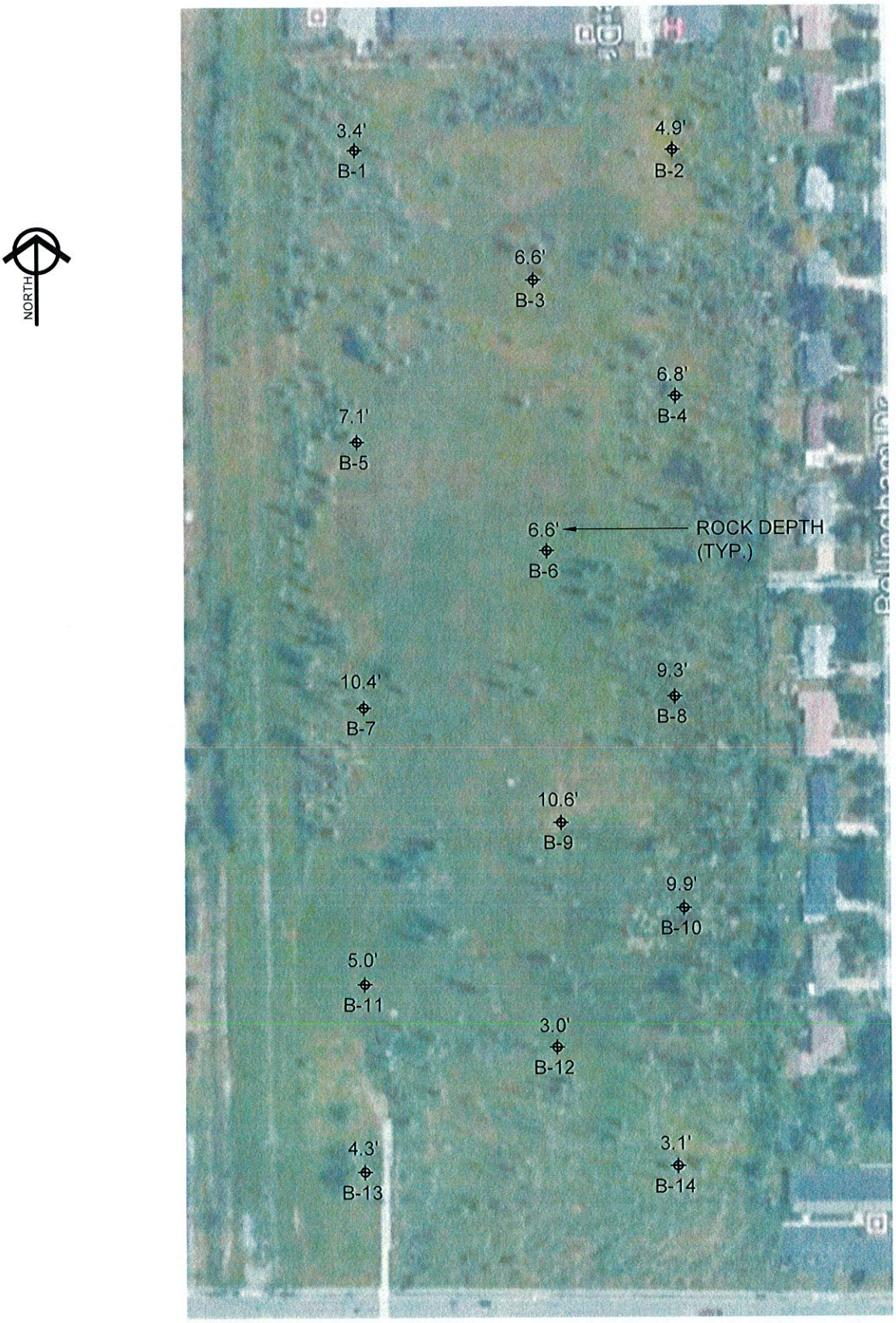
December 16, 2021

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC



GGE
ENGINEERING · DESIGN
GLYNN GEOTECHNICAL ENGINEERING
415 S. TRANSIT STREET
LOCKPORT, NEW YORK 14094
VOICE (716) 625 - 6933 / FAX (716) 625-6983
www.glynngroup.com

PROJECT: 2190 - 2220 WEHRLE DRIVE			SHEET NO.: S2A
SUBJECT: BORING LOCATION PLAN			
CLIENT: ACQUEST DEVELOPMENT			
PROJ. NO.: 21-1026	SCALE: 1"= 200'-0"	DATE: 03.16.21	BY: GEL



GGE
ENGINEERING · DESIGN
GLYNN GEOTECHNICAL ENGINEERING
415 S. TRANSIT STREET
LOCKPORT, NEW YORK 14094
VOICE (716) 625 - 6933 / FAX (716) 625-6983
www.glynngroup.com

PROJECT: 2190 - 2220 WEHRLE DRIVE			SHEET NO.: S2B
SUBJECT: BORING LOCATION PLAN			
CLIENT: ACQUEST DEVELOPMENT			
PROJ. NO.: 21-1026	SCALE: 1"= 200'-0"	DATE: 03.16.21	BY: GEL

Appendix D

Seismic Site Class and Design Category

2190 – 2220 Wehrle Drive
Amherst, New York

Geotechnical Engineering Report

GGEA 21-1026

December 16, 2021

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Project : 2190 - 2220 Wehrle Drive
Client: Aquest
GGEA # : 21-1026
Date: 04.06.21

B-9

Depth (di)	N Value (Ni)
2.7	4
3.3	10
4.6	36
89.4	100

ASCE 7-16
Equation 20.4-2

$$N = \frac{100}{\sum \frac{di}{Ni}} = 49.3$$

ASCE 7-16
Table 20.3-1

$15 < N < 50$ **SITE CLASS D**

2020 NYS Code Section 1613

F_a =	1.6	Site coefficient Table 1613.2.3(1)
F_v =	2.4	Site coefficient Table 1613.2.3(2)
S_s =	0.172	Mapped accelerations short periods Figure 1613.2.1(1)
S_1 =	0.045	Mapped accelerations 1 sec period Figure 1613.2.1(2)
S_{MS} =	0.275	Maximum spectral response short periods equation 16-36
S_{M1} =	0.108	Maximum spectral response 1 sec periods equation 16-37
S_{DS} =	0.183	Design spectral response short periods equation 16-38
S_{D1} =	0.072	Design spectral response 1 sec periods equation 16-39

Risk Category = II Table 1604.5

Seismic Design Category = B Table 1613.2.5(1)
Table 1613.2.5(2)

Appendix E

Engineered Fill Specifications

2190 - 2220 Wehrle Drive
Amherst, New York

Geotechnical Engineering Report

GGEA 21-1026

December 16, 2021

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Common Fill

All soil and/or crushed rock material with the exception
of those with USCS classifications of
CH, MH, OH, and OL.

Place material in 12 inch lifts (loose) and compact to 90 % of modified proctor (ASTM D-1557) maximum dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or a reversible vibratory plate tamper (for smaller applications) such as a Bomag BPR 35/60 or similar (weight > 400 lbs).

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Civil • Geotechnical
Structural • Architecture
Material Testing • Consulting

Structural Fill

All soil and/or crushed rock material with the exception
of those with USCS classifications of
CH, MH, OH, OL, ML and CL-ML.

Place material in 9 inch lifts (loose) and compact to 95 % of modified proctor (ASTM D-1557) maximum dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or a reversible vibratory plate tamper (for smaller applications) such as a Bomag BPR 35/60 or similar (weight > 400 lbs).

GLYNN GROUP ENGINEERING & ARCHITECTURE, PLLC
415 South Transit Street, Lockport, New York 14094
voice 716.625.6933 / fax 716.625.6983
www.glynngroup.com

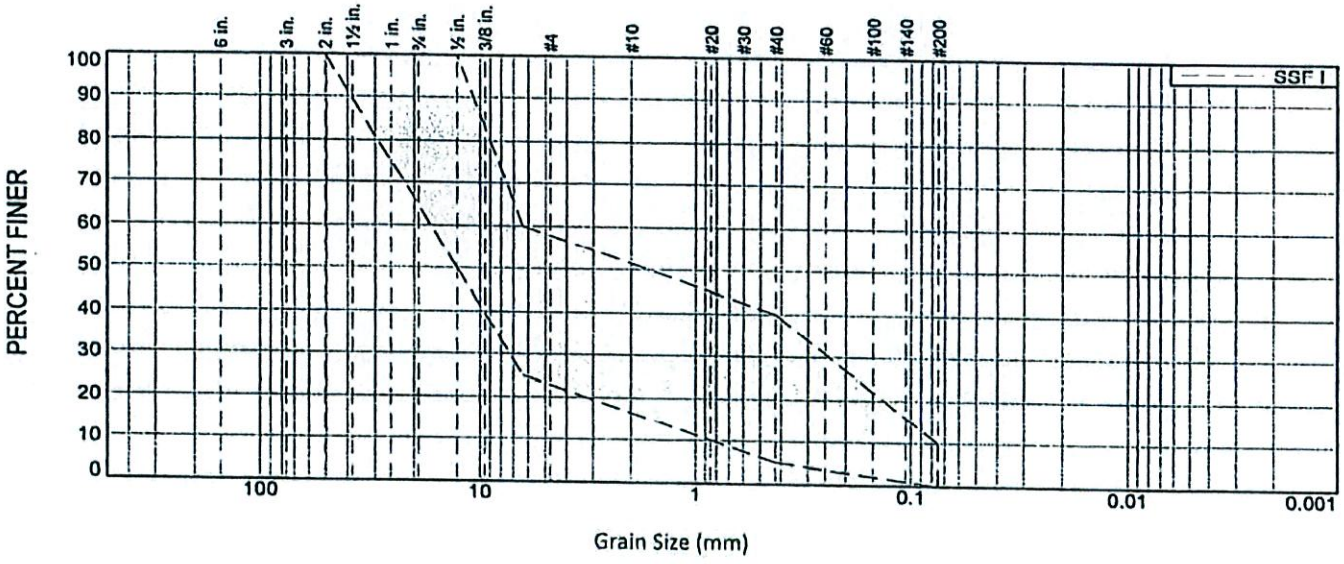
GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Civil • Geotechnical
Structural • Architecture
Material Testing • Consulting

Select Structural Fill

NYSDOT Item No. 304.12 Subbase Course, Type 2

Sieve Size	Required % Passing
2 inch	100
1/4 inch	25 - 60
No. 40	5 - 40
No. 200	0 - 10



In addition to the above specification, material shall also meet the well graded qualifications of ASTM D-2487, such that USCS classification = GW, GW-GM, SW or SW-SM.

Place material in 9 inch lifts (loose) and compact to 95 % of modified proctor (ASTM D-1557) maximum dry density within 2 % of optimum moisture content.

The material should be compacted using a smooth drum vibratory roller (for large applications) or a reversible vibratory plate tamper (for smaller applications) such as a Bomag BPR 35/60 or similar (weight > 400 lbs).

GLYNN GROUP ENGINEERING & ARCHITECTURE, PLLC
415 South Transit Street, Lockport, New York 14094
voice 716.625.6933 / fax 716.625.6983
www.glynngroup.com

GLYNN GROUP
ENGINEERING & ARCHITECTURE, PLLC

Civil • Geotechnical
Structural • Architecture
Material Testing • Consulting

Flowable Fill

Controlled Low Strength Material (CLSM).

Typically a fly ash based pozzolanic fill manufactured by local concrete plants.

Minimum 28 day compressive strength = 100 psi.

May include fine aggregate.

The material should be placed in separate lifts not to exceed 30 inches in depth and each lift should be allowed to fully cure (monitor for shrinkage and/or desiccation) prior to placing subsequent lifts or applying load.

CLSM should not be used within 42 inches of final grade due to potential freeze/thaw susceptibility and should not be used if the excavation contains standing water or is subject to groundwater infiltration.

GLYNN GROUP ENGINEERING & ARCHITECTURE, PLLC
415 South Transit Street, Lockport, New York 14094
voice 716.625.6933 / fax 716.625.6983
www.glynngroup.com