



# **BARRON & ASSOCIATES, P.C.**

## **Geotechnical Consulting and Special Inspections**

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April 8, 2024

Job No: 23-610

Uniland Construction Corporation  
University Corporate Centre  
100 Corporate Parkway, Suite 500  
Amherst, New York 14226

ATTN: Mr. David J. Reilly

RE: Geotechnical Engineering Report  
Proposed Industrial Complex  
2 Bailey Avenue  
City of Buffalo, Erie Co., New York 14206

Mr. Reilly:

This report presents the findings of the subsurface investigation program and geotechnical engineering recommendations for the above referenced project. The geographic orientation of the project site is illustrated on the U.S. Geologic Survey (USGS) site location map in Figure No. 1. The project site is illustrated in Figure No. 2, entitled "Test Boring and Monitoring Well Location Plan", which includes: the approximate location of 30 test borings and three monitoring wells that were drilled by Buffalo Drilling Company, Inc. (BDC); relative ground surface elevations; and additional site details.

### **EXPLORATION METHODS**

Sampling Method: An ATV-mounted CME-550 rotary drill rig was used to drill 30 borings each to auger refusal using 2-1/4 inch inside diameter (ID), continuous flight hollow stem augers. Samples were recovered by driving a standard split-spoon sampler (2-foot long by 1-3/8 inch inside diameter) 24 inches with a 140-pound hammer falling 30 inches per blow per the American Society of Testing and Materials (ASTM) Standard D1586. The number of blows from six to 18 inches of penetration is defined as the Standard Penetration Test (SPT) N-value. Auger refusal, which may infer the top of bedrock, was encountered at each boring, from approximately nine to 21 feet below ground surface.

Three groundwater observation wells were installed at test borings B-1, B-25, and B-30 in general accordance with ASTM Method D5092. The observation wells were constructed with two-inch inside diameter, flush joint threaded schedule 40 PVC screen and riser pipe. The well screen was a number 10 slot (i.e., 0.010-inch-wide) and backfilled with a uniformly graded silicon sand (i.e., Ricci No. 00N) that was placed to approximately one foot above the top of the screen. The well was sealed with a two-foot minimum thickness of bentonite chips. The remaining borehole annulus was sealed to ground surface with auger cuttings. A locking J-plug was installed at the top of each well. For convenience, the boring/well combination will be referred to as boring or well B/MW-1, B/MW-25, and B/MW-30.

Classification: The retrieved soil and fill samples were initially logged in the field by the driller, and a portion of each sample was placed and sealed in a glass jar. The boring logs and monitoring well schematics, which are included in Appendix A, were based upon the field logs and a second visual classification of recovered samples in the laboratory by a geologist. Classification/identification of samples, as noted on the boring logs, is based on the Unified Soil Classification System (USCS) in ASTM D2487/D2488. Refer to Appendix B entitled, "Geotechnical Reference Standards", for an explanation of the terminology that is used for soil and rock descriptions.

Laboratory Testing: Laboratory soil testing was undertaken on several retrieved split spoon samples. The overall laboratory testing program consisted of the following test methods:

- |                                                              |            |
|--------------------------------------------------------------|------------|
| • Particle Size Analysis                                     | ASTM D421  |
| • Water (Moisture) Content of Soil                           | ASTM D2216 |
| • Liquid Limit, Plastic Limit, and Plasticity Index of Soils | ASTM D4318 |

Table No. 1 is a summary of subsurface exploration and Table No. 2 presents the tabulated results of the physical/soil index properties. The associated graphical illustration of the data is included in Appendix C.

## **SITE AND SUBSURFACE CONDITIONS**

General: The proposed site for development is a 53.7 ± acre former railroad yard, addressed as 2 Bailey Avenue, in the City of Buffalo, Erie County, New York. The project will include two large footprint garage-type structures, 120,000 and 180,000 ± square-foot respectively, auto impound building, salt barn, solar farm, several laydown/storage yard areas, and associated asphalt pavement parking and roadway areas. The site topography is generally slopes to the southeast with ground surface elevations varying by about nine feet across the boring locations. A mounded area exists at the south-central portion of the site and will likely require leveling for the Broadway Streets & Sanitation Garage building pad.

Subsurface Soil Conditions: In general, subsurface conditions, underlying a very thin, indistinguishable topsoil layer, consists of three to eight feet of fill material atop naturally deposited, lacustrine silty clay which mantles cohesive glacial till that extends to auger refusal.

Beneath the topsoil, primarily granular fill material was encountered and extends three eight feet below ground surface. This fill consists of fine to coarse-grained sand and gravel with little to trace amounts of silt, clay, slag, concrete, brick, construction lumber, and roots/organic matter. Relative density of the fill is generally medium dense with pockets of both loose and dense material. Moisture contents of retrieved samples are in a moist to wet state. This material appears to be locally imported or site-derived soil that was reworked and placed during the operation of the railway. In general, fill materials are typically placed in uncontrolled and uncompacted manners. As such, the variable strengths and erratic material

characteristics, both vertically and laterally at and below the proposed foundation bearing grades, make them unsuitable in providing reliable direct supporting media for footings/shallow foundations.

Beneath the fill, a naturally deposited silty clay exists and extends eight to 14 feet below ground surface. This soil consists of moderately plastic silty clay with trace amounts of sand and gravel. Consistency of the silty clay is primarily very stiff with moisture contents of retrieved samples in a moist state.

Beneath the lacustrine silty clay, a naturally deposited cohesive/fine-grained glacial till exists and extends to auger refusal. The till generally consists of silt and clay with lesser amounts of fine-sized to coarse-sized sand and gravel. Plasticity is noted as slightly plastic with consistency of this soil primarily being very stiff to hard. Moisture contents of retrieved samples are noted to be moist to wet.

Bedrock: Auger refusal, which is generally inferred to be the top of the apparent bedrock surface, was encountered at each boring approximately nine to 21 feet below ground surface. Based upon the regional geology, the bedrock type beneath the site would be the Onondaga Limestone.

Groundwater: No appreciable amounts of groundwater were encountered during or at the completion of drilling efforts at the test borings. Note that groundwater readings were taken at completion of drilling efforts and, therefore, an adequate amount of time for the groundwater level to recharge to static conditions was probably not allowed. Ground water levels were recorded after installation of the three monitoring wells, February 6, 14, and 15, 2024, and ranged from approximately 12 to 18 feet below ground surface. Development of the monitoring wells took place on March 26, 2024 and the static groundwater depths recorded approximately two to 12 feet below the ground surface. Refer to Table No. 1, "Summary of Subsurface Exploration" for actual elevations. This data suggests a south-easterly groundwater flow direction and two main groundwater tables. Firstly, the presence of the upper granular fill layer atop the less permeable silty clay creates localized, seasonal perched water table conditions and is represented at monitoring wells B/MW-1 and B/MW-25. At monitoring well B/MW-30, a second deeper water table with minor artesian flow exists near the till/bedrock interface. This groundwater condition was not apparent until fully penetrating the dense/hard glacial till. Fluctuations in the groundwater level may occur due to other factors than those present during field operations.

## **EARTHQUAKE/SEISMIC CONSIDERATIONS**

Site Class Definition: For the given site conditions, the most applicable site definition is Site Class D, in accordance with Section 1613.2.2 of Building Code of New York State © 2020 and listed in Table 20.3-1 of Chapter 20 of American Society of Civil Engineers (ASCE) Standard 7-16.

**Liquefaction Potential:** For the Site Class D, the design spectral response acceleration parameters  $S_{DS}$ , at 0.2 seconds, and  $S_{D1}$ , at one second, are 0.174g and 0.071g ( $g = 32.2 \text{ feet/sec}^2$ ), respectively, for this part of Erie County, New York (see Appendix D). These values have a two percent probability of being exceeded in 50 years. Based upon the above conditions and an approximate magnitude 6.0 earthquake on the Richter Scale, the potential for liquefaction or settlement of Site Class D soil is considered low.

## **FOUNDATION DESIGN AND CONSTRUCTION RECOMMENDATIONS**

**General:** This section will present and discuss recommendations on foundation design and construction and placement of controlled fills, and subgrade and base layer requirements for concrete floor slabs, paved parking and roadway areas.

As shown in Figure No. 2, the proposed development will include two large footprint garage-type structures, 120,000 and 180,000  $\pm$  square-foot respectively, auto impound building, salt barn, solar farm, several laydown/storage yard areas, and associated asphalt pavement parking and roadway areas. The existing ground surface generally slopes to the southeast with ground surface elevations varying by about nine feet across the boring locations. Finish floor elevations for the buildings and grading plans have yet to be finalized. For the purpose of this report, those elevations are assumed close to 603.5  $\pm$  feet to minimize potential earthwork. The final exterior grades are generally assumed about one-half foot below finished floor at elevation, 603.0  $\pm$  feet. Based upon the conceptual understanding of buildings planned to be constructed maximum design bearing wall and column loads are not expected to exceed 15 kips per lineal foot and 200 kips, respectively. The maximum live floor load is taken as 150 pounds per square foot (psf).

**Site Preparation and Earthwork:** General site preparation will include the demolition and complete removal of any encountered foundations and floor slabs, and removing all unsuitable surficial material (i.e., asphalt pavement, concrete, brick, expansive slag, organic or topsoil layer, and construction and demolition-like fill) to a depth where firm, granular or cohesive fills or naturally occurring soils are encountered. It is recommended, particularly in the location of the proposed structure, that any slag and/or cinder/ash containing material, if encountered, should be tested to determine the expansion and corrosion characteristics (where applicable for direct or potential contact with foundation elements and buried utilities) of these materials prior to their use on-site. Any rubble-like and brick fill, boulders, or wood fill in particular, if encountered, will require undercutting. The proposed building pads and any paved areas are to be proof rolled with a fully loaded ten-wheel dump truck. All encountered soft and disturbed zones should be undercut and stabilized with granular fill that is placed in compacted lifts prior to placement of additional fill materials above.

Refer to Appendix E entitled "General Earthwork Specification" for definition of the fill types and gradations, recommended minimum compaction requirements for various site developments, and placement and compaction methods. The NYS Department of Transportation (NYSDOT) specification numbers for typical aggregate subbase/base course components that are included in the select granular fill category as are as follows: Item No. 304.12 (Metric) Subbase Course, Type 2 (< 2-inch maximum size), which is preferred; or Item No. 304.14 (Metric) Subbase Course, Type 4 (< 2-inch maximum size).

It is unknown if any former residential/commercial structures existed at the project site or if any former footings and foundation walls may be buried. Septic tank and system locations and the abandonment conditions or practices are normally unknown. If encountered during site development, it is recommended that any tanks and systems should be properly removed/treated/remediated relative to the proposed development and under the applicable local and state regulations. The remaining cavities, from the aforementioned items, should be backfilled with select/approved granular fill that is placed in thin lifts and compacted to the minimum recommendation, as presented in this report, for the proposed development at that cavity location.

Shallow Foundation: The recommended foundation type is shallow footings. Continuous strip and spread exterior footings and interior spread footings would bear at an elevation of four feet or lower below final grade, at relative elevation  $599.00 \pm$  feet. A four-foot minimum footing depth (as required by local or New York State code) is needed to provide adequate protection from frost for exterior footings.

The exterior and interior footings are recommended to bear at the same relative elevation on stable, naturally deposited very stiff (Nvalues 15 blows or greater) silty clay or on thin layers of thoroughly compacted (minimum of 95 percent of the maximum dry density by ASTM D 1557) select/approved granular fill that is placed on an approved subgrade. If needed, a geotextile strength and filter fabric (such as, Mirafi 600X) may be used to line the excavation bottom for the purpose of stabilizing the excavation and placement of the select/approved granular fill.

Minimum one to four foot undercuts will be necessary within portions of all building footprints to remove random fill material and/or softer natural soils that is unsuitable for direct foundation bearing. The unsuitable fills/soils vary in both vertical and lateral distribution. See Appendix D, "Profile of Borings" for schematic and additional details. Undercut areas beneath proposed foundations must extend laterally beyond each vertically projected edge of the foundation by a minimum distance equal to one-half the total depth of the undercut or equating to a slope of two vertical to one horizontal from the bottom foundation corner. The undercuts and placement of compacted select/approved granular fill are required to ensure a suitable and more uniform bearing media for the footings, and to prevent unacceptable differential settlements.

Wall footings should have a minimum two-foot width and column footings should have a minimum three-foot width. Based on the above described conditions, the recommended maximum net allowable foundation bearing pressure is 3,000 pounds per square foot (psf) of bearing area. All footings for the proposed expansion are recommended to be designed near the same contact pressure. The recommended maximum net allowable foundation bearing pressure is based on generally accepted design methods for cohesive soil conditions. Based on the provisions of the above recommendations and estimated design requirements and utilization of proper construction procedures and experienced field supervision and testing personnel, total and differential settlements are estimated to be less than one inch and 3/4's inch, respectively. Refer to Appendix D for additional foundation design and construction details.

Additional Foundation Considerations: In addition to the above, the following recommendations will provide additional assurances with regard to proper foundation construction.

- a) All fill placed beneath, adjacent, or above foundations must comply with the "General Earthwork Specification", included as Appendix E.
- b) Backfill of foundations with approved select granular fill must be completed prior to placement of substantial superstructure loads, except for basement walls or substructure areas that may additionally require superstructure loads and possibly internal bracing.
- c) The upper silty materials may rut and "pump" if exposed to excessive surface water and repeated construction traffic. Proper site management and fill placement operations are needed to minimize costly undercuts and subgrade repairs prior to placement of concrete slabs and asphalt pavement. It is noted that construction during wet/rainy and/or Fall and Spring conditions may require added precautions and possibly a thicker base layer to maintain a stable subgrade condition.
- d) Step footings, if utilized, should have a rise to run ratio of 1:2, with a two-foot maximum rise and a four-foot minimum run between steps or as recommended by the design structural engineer.
- e) The recommended at rest (rigid wall), active, and passive static earth pressure coefficients for unsaturated, select granular sandy gravel fill against an earth retaining structure/wall are 0.76, 0.24, and 2.8 (with an ultimate value of 4.2), respectively. The respective equivalent static lateral fluid pressures are recommended to be 90, 30 and 330 (with an ultimate value of 500) pounds per square foot (psf) per foot depth which are based upon a moist, compacted unit backfill weight of 120 pounds per cubic foot (pcf). The at rest value would account for the average expected compaction induced stresses and/or the potential influences of hydrostatic pressure. The static lateral fluid pressures can be directly proportioned for other unit weights.

Stabilization of Excavations: The trench/excavation sidewall stability concerns can be addressed with the Occupational Safety and Health Act (OSHA) requirements as set forth in Subpart P of 29 CFR Part 1926, Sections 1926.650 to 1926.652. In lieu of a properly designed shoring system, side slopes of the trench excavation should be one on one (vertical to horizontal distance) or flatter in cohesive soils or one on one and one-half or flatter in the granular materials, as required by OSHA.

Water must not be allowed to accumulate or pond on exposed foundation bearing grades. Surface water and groundwater from within the excavation must be either pumped, diverted or channelized by gravity flow to effectuate the construction of the proposed foundation. Pockets of localized perched groundwater may seasonally be expected to be encountered at footing and/or footing undercut bearing grades. At these locations, dewatering with surface sumps may be required to maintain stable side slopes and excavation bottom.

Concrete Interior Floor Slab(s)/Pad: For the most part and based on test results for similar soils/fills, moderately plastic cohesive natural soils/fills may be difficult to compact in a controlled manner considering the varying soil plasticity and natural moisture contents that are estimated to be wet of optimum, at the time of this investigation. Excavated and approvable cohesive soil/fill types are not expected to be available in any reasonable quantities for placement within the building pad or beneath foundation elements due to their compressibility and sensitivity to poor weather conditions during the bulk of the construction season. These soils/fills may be expected to be suitable only for re-use as general fill or beneath lightly loaded pavement areas with the implementation of a very stringent and uniformly applied soil conditioning (i.e., drying and blending) and compaction methods, and “full time” inspection and testing by qualified geotechnical personnel.

Excavated and approvable granular (i.e., sand or gravel and non-plastic silt and sand) soil/fill are expected to be available in limited quantity. However, substantial efforts will be required to dry, blend, and screen/remove of deleterious material from the fill prior to use beneath load bearing portions of the site. For the most part, granular (i.e., sand or gravel) soil/fill is expected to be acceptable for on-site re-use, as general/ordinary fill without substantial reworking and/or modification, while silty fine-sized sand may first require drying and blending.

Dissimilar excavated materials should not be commingled prior to their use elsewhere on-site, unless designated for a green/vegetation area. General fill material is also recommended to be placed on prepared and approved subgrade and in accordance with previous recommendations.

A geotextile fabric (such as, Mirafi 600X or equal) that separates the subgrade and the approved/select granular base layer is particularly recommended for sensitive cohesive/fine-grained/silty clay subgrade soil/fills. This approach will stabilize and provide a workable building pad condition with minimal required repairs.

The approved subgrades will most likely consist of medium dense or better/thoroughly compacted (i.e., minimum 92 percent of the maximum dry density by ASTM D 1557) granular fill and/or a thoroughly compacted imported select/approved granular fill. Above the approved subgrades, a minimum 12-inch thick select granular fill (i.e., number two crusher run stone or equal) layer is recommended as the base course for the proposed concrete floor slabs (heavy duty). The NYSDOT specification numbers for typical aggregate subbase/base course components are Item No. 304.12 (Metric) Subbase Course, Type 2 (< 2-inch maximum), which is preferred, or Item No. 304.14 (Metric) Subbase Course, Type 4 (< 2-inch maximum). This select granular base layer would be compacted to a minimum 95 percent of the maximum dry density by ASTM D 1557. The floor slabs for the proposed buildings are recommended to be a six-inch minimum thickness (heavy duty) or is as determined by the design structural engineer. The floor slab reinforcement should be provided through placement of wire mesh or plastic fibers and is also as determined by the design structural engineer.

At the discretion of the design architect, a vapor barrier may be considered for use in the proposed structures. The use of a thin gravel cushion, as a capillary break, or a thin sand cushion over a vapor barrier that is placed beneath the concrete slab(s) are at the discretion of the design architect/engineer or as required by local code. Gradations of gravels that are satisfactory capillary breaks include 1 ¼-inch or ¾-inch crushed stone or aggregate per the ASTM D2321 Types IA, IB and II with less than 5 % fines. A number two crusher run stone may also be applicable, but the gradation and material property specifications must qualify.

At the assumed final site grade and based upon the thickness and character of the underlying fill and natural soils, the subgrade modulus is recommended not to exceed 150 pounds per cubic inch (pci). A Poisson Ratio of 0.4 is recommended for design purposes. Isolation of the floor slabs from the footings-piers-columns and walls do appear to be warranted. Based upon the subgrade modulus and slab mechanical properties and thickness, the design structural engineer may accordingly adjust the granular aggregate base thickness.



Exterior Concrete Slabs-On-Grade/Pad/Parking and Roadway Facilities: The characteristics of the fill and natural soils and the known frost penetration in Western New York require that specific attention is provided to the design and construction of paved roadway and parking areas. For new pavement sections, isolated pockets of surficial silty/cohesive/fine-grained soil/fill may be encountered and may be too soft and wet in the proposed parking and roadway areas. These types of soil/fill may be adequately conditioned (i.e., dried and blended) and compacted (i.e., minimum 90 percent compaction) to support necessary construction equipment and normal pavement section. Otherwise, the removal/undercutting of the silty/cohesive/fine-grained soil/fill to a firm, approved subgrade and subsequent placement and compaction of select or approved granular fill will be required in order to accommodate the recommended pavement sections.

For new pavement sections, it is recommended that the subgrade surface is adequately graded and/or underdrains are installed to prevent water accumulation. Above the approved subgrade surface (i.e., minimum 90 percent compaction), a minimum eight-inch thick select granular layer is recommended as the base course for lightly traveled roadway and parking areas (standard duty section). A geotextile filter and strength fabric (such as, Mirafi 600X or equal) and minimum 12-inch thick base course are recommended for all truck routes and heavily traveled roadways (heavy duty section). If “pumping” of the silty/cohesive/fine-grained soil subgrade occurs or is difficult to stabilize during construction, an increase in the base thickness to that of the heavy-duty section and/or a geotextile filter and strength fabric is recommended to be placed on the prepared and approved subgrade for the standard duty section. The NYS Department of Transportation (NYSDOT) specification numbers for typical aggregate subbase/base course components are Item No. 304.12 (Metric) Subbase Course, Type 2 (< 2-inch maximum size), which is preferred, or Item No. 304.14 (Metric) Subbase Course, Type 4 (< 2-inch maximum size). The granular aggregate base layer is recommended to be compacted to at least 95 percent of maximum dry density by ASTM D1557.

The thickness of top and binder course layers should be determined in accordance with AASHTO methods. In summary, the minimum recommended asphalt thicknesses for the heavy-duty section and standard duty section are four inches and three inches, respectively. The top and binder course layers are recommended to be designed and constructed in accordance with New York State Department of Transportation Standard Specification.

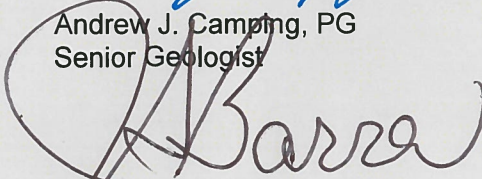
Limitations, Field Inspections and Monitoring: This report is based on the preliminary information that is provided by project representatives and the subsurface conditions that were encountered at the test boring locations. Due to the nature of the investigation method, test pit excavation will provide a greater level of delineation of the subsurface soil/fill/rock conditions than can be defined by the test boring data alone. As detailed in Appendix F "Limitations", modification regarding proposed building/structure locations and other site developments can result in changes to provided recommendations. It is recommended that the geotechnical engineer be provided the opportunity to generally review the final detailed design and contract specifications. Required earthwork and foundation construction should be done under the supervision of experienced construction personnel and in a manner consistent with proven methods. All site work should be carefully monitored and tested by experienced geotechnical personnel to assure compliance with earthwork and foundation construction specifications.

Thank you for the opportunity to assist on this project. If questions should arise, please call the undersigned at your earliest convenience.

Very truly yours,  
**BARRON & ASSOCIATES, INC.**  
and  
**BUFFALO DRILLING COMPANY, INC.**



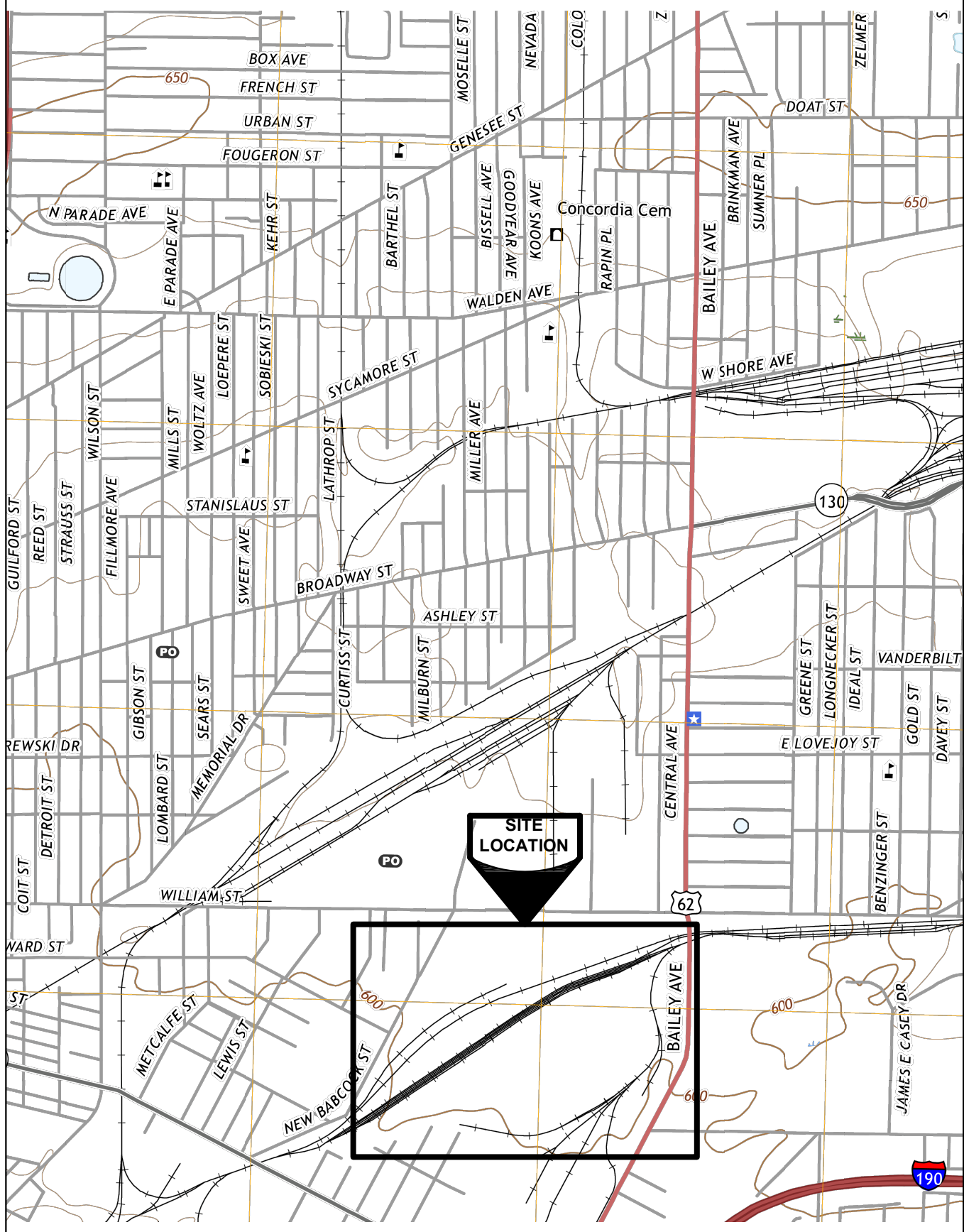
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409.24



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 PROJECT: PROPOSED INDUSTRIAL COMPLEX  
 2 BAILEY AVENUE  
 CITY OF BUFFALO, ERIE CO., NEW YORK 14206

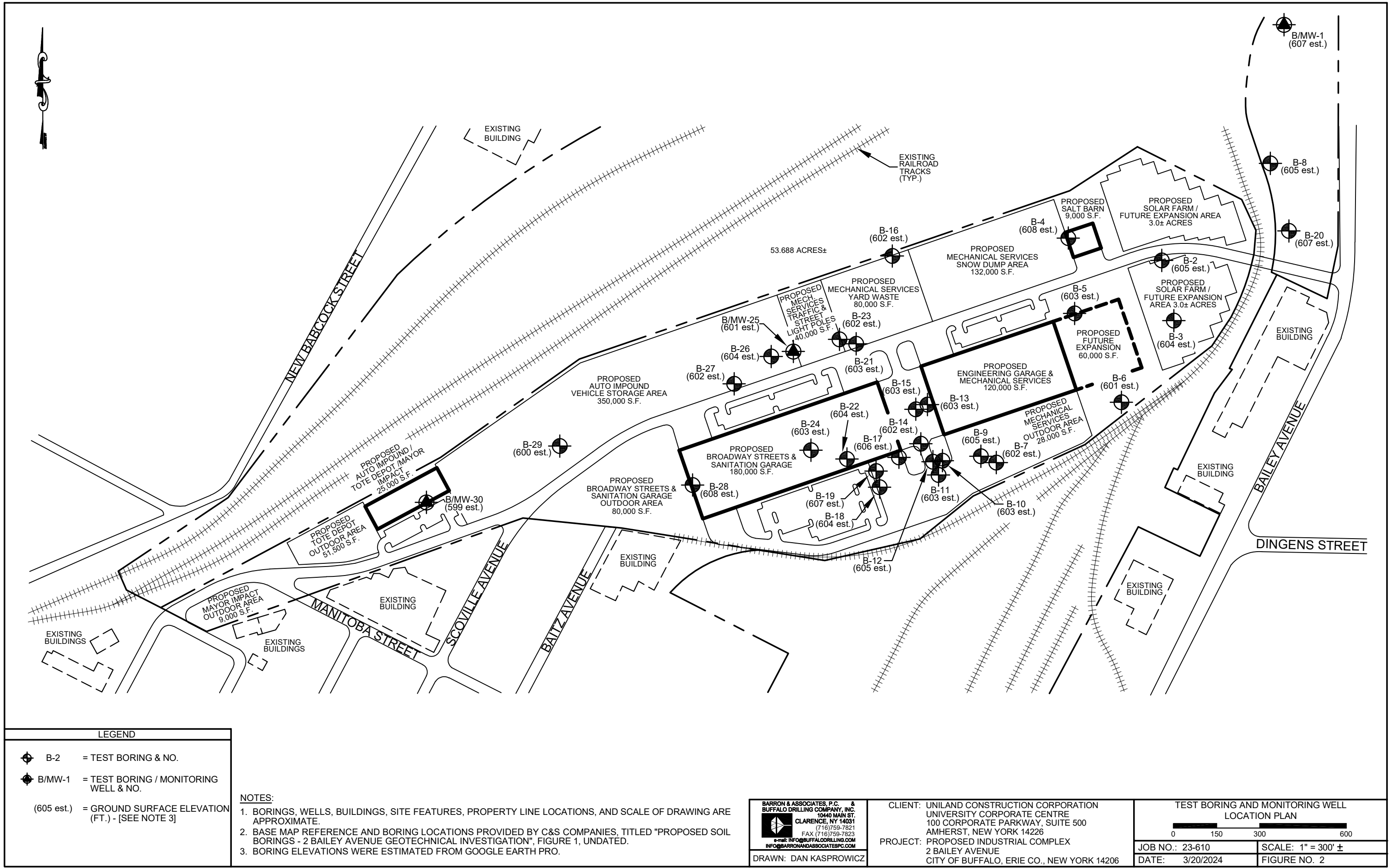
NEW YORK STATE  
 SITE LOCATION



USGS SITE LOCATION PLAN  
 BUFFALO NE  
 2019

|                 |               |
|-----------------|---------------|
| JOB NO.: 23-610 | SCALE: N.T.S. |
| DATE: 2/14/2024 | FIGURE NO. 1  |





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B&amp;A JOB NO: 23-610

CLIENT: Uniland Construction Corporation

PROJECT: Proposed Industrial Complex

2 Bailey Avenue

City of Buffalo, Erie Co., New York 14206

TABLE NO. 1  
 SUMMARY OF SUBSURFACE EXPLORATION

| Boring No. | Ground Elevation (est.) (ft.) | Topsoil <sup>1</sup> |                | Fill <sup>2</sup> |             | Groundwater <sup>3</sup> |             | Apparent Top Rock <sup>4</sup> |             | Total Depth Drilled (ft.) |
|------------|-------------------------------|----------------------|----------------|-------------------|-------------|--------------------------|-------------|--------------------------------|-------------|---------------------------|
|            |                               | Thickness (in.)      | To Elev. (ft.) | Depth (ft.)       | Elev. (ft.) | Depth (ft.)              | Elev. (ft.) | Depth (ft.)                    | Elev. (ft.) |                           |
| B/MW-1     | 607.0                         | -                    | -              | 6.0               | 601.0       | 4.8                      | 602.2       | 15.0                           | 592.0       | 15.0                      |
| B-2        | 605.0                         | -                    | -              | 7.0               | 598.0       | -                        | -           | 15.6                           | 589.4       | 15.6                      |
| B-3        | 604.0                         | -                    | -              | 6.0               | 598.0       | -                        | -           | 16.5                           | 587.5       | 16.5                      |
| B-4        | 608.0                         | -                    | -              | 6.0               | 602.0       | -                        | -           | 17.0                           | 591.0       | 17.0                      |
| B-5        | 603.0                         | -                    | -              | 4.0               | 599.0       | -                        | -           | 15.0                           | 588.0       | 15.0                      |
| B-6        | 601.0                         | -                    | -              | 5.0               | 596.0       | -                        | -           | 19.5                           | 581.5       | 19.5                      |
| B-7        | 602.0                         | -                    | -              | 3.0               | 599.0       | -                        | -           | 20.0                           | 582.0       | 20.0                      |
| B-8        | 605.0                         | -                    | -              | 5.0               | 600.0       | -                        | -           | 15.5                           | 589.5       | 15.5                      |
| B-9        | 605.0                         | -                    | -              | 6.0               | 599.0       | -                        | -           | 20.0                           | 585.0       | 20.0                      |
| B-10       | 603.0                         | -                    | -              | 6.0               | 597.0       | -                        | -           | 19.0                           | 584.0       | 19.0                      |
| B-11       | 603.0                         | -                    | -              | 4.0               | 599.0       | -                        | -           | 17.0                           | 586.0       | 17.0                      |
| B-12       | 605.0                         | -                    | -              | 6.0               | 599.0       | -                        | -           | 17.0                           | 588.0       | 17.0                      |
| B-13       | 603.0                         | -                    | -              | 4.0               | 599.0       | -                        | -           | 21.0                           | 582.0       | 21.0                      |
| B-14       | 602.0                         | -                    | -              | 6.0               | 596.0       | -                        | -           | 20.5                           | 581.5       | 20.5                      |
| B-15       | 603.0                         | -                    | -              | 5.0               | 598.0       | -                        | -           | 21.0                           | 582.0       | 21.0                      |
| B-16       | 602.0                         | -                    | -              | 4.0               | 598.0       | -                        | -           | 15.0                           | 587.0       | 15.0                      |
| B-17       | 606.0                         | -                    | -              | 4.0               | 602.0       | -                        | -           | 19.5                           | 586.5       | 19.5                      |
| B-18       | 604.0                         | -                    | -              | 5.0               | 599.0       | -                        | -           | 10.0                           | 594.0       | 10.0                      |
| B-19       | 607.0                         | -                    | -              | 4.0               | 603.0       | -                        | -           | 9.1                            | 597.9       | 9.1                       |
| B-20       | 607.0                         | -                    | -              | 8.0               | 599.0       | -                        | -           | 20.5                           | 586.5       | 20.5                      |
| B-21       | 603.0                         | -                    | -              | 5.0               | 598.0       | -                        | -           | 17.0                           | 586.0       | 17.0                      |
| B-22       | 604.0                         | -                    | -              | 6.0               | 598.0       | -                        | -           | 13.0                           | 591.0       | 13.0                      |
| B-23       | 602.0                         | -                    | -              | 5.0               | 597.0       | -                        | -           | 14.5                           | 587.5       | 14.5                      |
| B-24       | 603.0                         | -                    | -              | 6.0               | 597.0       | -                        | -           | 14.0                           | 589.0       | 14.0                      |
| B/MW-25    | 601.0                         | -                    | -              | 3.0               | 598.0       | 2.0                      | 599.0       | 12.1                           | 588.9       | 12.1                      |
| B-26       | 604.0                         | -                    | -              | 4.0               | 600.0       | -                        | -           | 13.5                           | 590.5       | 13.5                      |
| B-27       | 602.0                         | -                    | -              | 4.0               | 598.0       | -                        | -           | 16.5                           | 585.5       | 16.5                      |
| B-28       | 608.0                         | -                    | -              | 4.0               | 604.0       | -                        | -           | 11.7                           | 596.3       | 11.7                      |
| B-29       | 600.0                         | -                    | -              | 4.0               | 596.0       | -                        | -           | 10.0                           | 590.0       | 10.0                      |
| B/MW-30    | 599.0                         | -                    | -              | 6.0               | 593.0       | 12.3                     | 586.7       | 18.0                           | 581.0       | 18.0                      |

1. All measurements are approximate and taken in the field during drilling or sampling efforts. Topsoil very thin and not visually distinguishable from fill material below.

2. In many cases, fill material is comprised of indigenous soil and is visually indistinguishable from naturally deposited material. Fill depths, in most cases have been approximated.

3. At the boring locations, groundwater readings were taken at the completion of drilling efforts and therefore adequate time for groundwater elevations to stabilize to static conditions was probably not allowed. B/MW-1, B/MW-25, and B/MW-30 are monitoring wells with stabilized groundwater readings.

4. Auger refusal depth identified during subsurface exploration efforts and is inferred as top of bedrock.



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B&A JOB NO: 23-610

CLIENT: Uniland Construction Corporation

PROJECT: Proposed Industrial Complex

2 Bailey Avenue

City of Buffalo, Erie Co., New York 14206

TABLE NO. 2  
LABORATORY PHYSICAL SOIL TEST RESULTS

| Boring No. | Sample No. | Depth | Moisture Content | Organic Matter Content | Unconfined Compressive Strength | Grain Size Analysis |       |      |     | Atterberg Limits |     |    | USCS Soil Classification<br>ASTM D2487 / ASTM D2488 * |
|------------|------------|-------|------------------|------------------------|---------------------------------|---------------------|-------|------|-----|------------------|-----|----|-------------------------------------------------------|
|            |            |       | ASTM D2216       | ASTM D2974             |                                 | ASTM C136           |       |      |     | ASTM D4318       |     |    |                                                       |
|            |            |       | (ft.)            | (%)                    |                                 | (%)                 | (psf) | (%)  | (%) | (%)              | (%) | LL |                                                       |
| B-4        | S-1        | 0-2   | 12.8             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | SM-Fill                                               |
|            | S-2        | 2-4   | 11.6             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | SM-Fill                                               |
|            | S-3        | 4-6   | 25.8             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | SM-Fill                                               |
|            | S-4        | 6-8   | 27.0             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-5        | 8-10  | 20.9             | -                      | -                               | -                   | -     | -    | -   | 32               | 20  | 12 | CL                                                    |
|            | S-6        | 10-12 | 25.1             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-7        | 14-16 | 12.9             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL/ML-Till                                            |
| B-8        | S-1        | 0-2   | 17.8             | -                      | -                               | 26.9                | 58.1  | 15.0 |     | -                | -   | -  | SM-Fill                                               |
|            | S-2        | 2-4   | 17.6             | -                      | -                               |                     |       |      |     | -                | -   | -  | SM-Fill                                               |
|            | S-3        | 4-6   | -                | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | NO SAMPLE                                             |
|            | S-4        | 6-8   | 22.8             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-5        | 8-10  | 26.3             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-6        | 10-12 | 23.0             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-7        | 14-16 | 11.8             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL/ML-Till                                            |
| B-10       | S-1        | 0-2   | 12.7             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | SM-Fill                                               |
|            | S-2        | 2-4   | 20.0             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | SM-Fill                                               |
|            | S-3        | 4-6   | 19.6             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | SM-Fill                                               |
|            | S-4        | 6-8   | 24.0             | -                      | -                               | -                   | -     | -    | -   | 32               | 18  | 14 | CL                                                    |
|            | S-5        | 8-10  | 20.5             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-6        | 10-12 | 21.0             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-7        | 14-16 | 23.8             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL/ML-Till                                            |
| B-15       | S-1        | 0-2   | 15.1             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | SM-Fill                                               |
|            | S-2        | 2-4   | 23.6             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | SM-Fill                                               |
|            | S-3        | 4-5   | 20.7             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | SM-Fill                                               |
|            |            | 5-6   | 30.3             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-4        | 6-8   | 25.2             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-5        | 8-10  | 19.7             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-6        | 10-12 | 18.3             | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL                                                    |
|            | S-7        | 14-16 | 17.0             | -                      | -                               | -                   | -     | -    | -   | 27               | 16  | 11 | CL                                                    |
|            | S-8        | 19-21 | 8.5              | -                      | -                               | -                   | -     | -    | -   | -                | -   | -  | CL/ML-Till                                            |

\* Soil classification based on visual identification and soil classification of adjacent samples (as applicable).



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B&A JOB NO: 23-610

CLIENT: Uniland Construction Corporation

PROJECT: Proposed Industrial Complex

2 Bailey Avenue

City of Buffalo, Erie Co., New York 14206

TABLE NO. 2 (cont'd)  
LABORATORY PHYSICAL SOIL TEST RESULTS

| Boring No. | Sample No. | Depth | Moisture Content | Organic Matter Content | Unconfined Compressive Strength | Grain Size Analysis |      |      |      | Atterberg Limits |     |            | USCS Soil Classification<br>ASTM D2487 / ASTM D2488 * |
|------------|------------|-------|------------------|------------------------|---------------------------------|---------------------|------|------|------|------------------|-----|------------|-------------------------------------------------------|
|            |            |       | ASTM D2216       | ASTM D2974             | ASTM D2166                      | ASTM C136           |      |      |      | ASTM D4318       |     |            |                                                       |
|            |            |       |                  |                        |                                 | Gravel              | Sand | Silt | Clay | LL               | PL  | PI         |                                                       |
|            |            | (ft.) | (%)              | (%)                    | (psf)                           | (%)                 | (%)  | (%)  | (%)  | (%)              | (%) | (%)        | ( - )                                                 |
| B-24       | S-1        | 0-2   | 18.5             | -                      | -                               | 13.5                | 65.1 | 21.4 |      | -                | -   | -          | SM-Fill                                               |
|            | S-2        | 2-4   | 21.8             | -                      | -                               |                     |      |      |      | -                | -   | -          | SM-Fill                                               |
|            | S-3        | 4-6   | 35.4             | -                      | -                               |                     |      |      |      | -                | -   | -          | SM-Fill                                               |
|            | S-4        | 6-8   | 23.3             | -                      | -                               | -                   | -    | -    | -    | -                | -   | CL         |                                                       |
|            | S-5        | 8-10  | 20.5             | -                      | -                               | -                   | -    | -    | -    | -                | -   | CL         |                                                       |
|            | S-6        | 10-12 | 20.9             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL                                                    |
| B/MW-25    | S-1        | 0-2   | 41.4             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | SM-Fill                                               |
|            | S-2        | 2-3   | 21.3             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | SM-Fill                                               |
|            |            | 3-4   | 24.4             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL                                                    |
|            | S-3        | 4-6   | 27.2             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL                                                    |
|            | S-4        | 6-8   | 26.1             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL                                                    |
|            | S-5        | 8-10  | 10.5             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL/ML-Till                                            |
| S-6        | 10-12      | 11.5  | -                | -                      | -                               | -                   | -    | -    | 18   | 11               | 7   | CL/ML-Till |                                                       |
| B-28       | S-1        | 0-2   | 19.7             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | SM-Fill                                               |
|            | S-2        | 2-4   | 36.1             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | SM-Fill                                               |
|            | S-3        | 4-6   | 21.3             | -                      | -                               | -                   | -    | -    | -    | 44               | 20  | 24         | CL                                                    |
|            | S-4        | 6-8   | 22.7             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL                                                    |
|            | S-5        | 8-10  | 14.4             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL/ML-Till                                            |
|            | S-6        | 10-12 | 10.8             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL/ML-Till                                            |
| B/MW-30    | S-1        | 0-2   | 21.7             | -                      | -                               | 12.4                | 61.6 | 26.0 |      | -                | -   | -          | SM-Fill                                               |
|            | S-2        | 2-4   | 12.9             | -                      | -                               |                     |      |      |      | -                | -   | -          | SM-Fill                                               |
|            | S-3        | 4-6   | 19.9             | -                      | -                               |                     |      |      |      | -                | -   | -          | SM-Fill                                               |
|            | S-4        | 6-8   | 18.4             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL                                                    |
|            | S-5        | 8-10  | 21.7             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL                                                    |
|            | S-6        | 10-12 | 22.9             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL                                                    |
|            | S-7        | 14-16 | 24.1             | -                      | -                               | -                   | -    | -    | -    | -                | -   | -          | CL                                                    |

\* Soil classification based on visual identification and soil classification of adjacent samples (as applicable).



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## **APPENDIX A**

### **TEST BORING LOGS/MONITORING WELL SCHEMATICS**



**BARRON & ASSOCIATES, P.C. &  
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**MONITORING WELL SCHEMATIC**

**JOB No.:** 23-610

**BORING No.:** B/MW-1

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/6/24  
**DATE COMPLETED:** 2/6/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 4 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (FT):** 607 est.  
**GROUNDWATER DEPTH (FT):** 4.8 (See Notes)  
(measured at completion unless indicated below)

| Monitoring Well Installation Details                     | Elevation/Depth | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample No. | N-Value | % REC (RQD) | Soil and Rock Description / Remarks                                                                                                   |
|----------------------------------------------------------|-----------------|----------------------------------------------------|------------|---------|-------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 2" I.D. Sch. 40 PVC Riser and Locking J-Plug             | 0               |                                                    |            |         |             |                                                                                                                                       |
| Auger Cutting Backfill                                   |                 |                                                    |            |         |             |                                                                                                                                       |
| Bentonite Seal                                           | 605             |                                                    | S-1        | 24      | 25          | Dk. brown, m. dense f/c Sand, some Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                                                          |                 |                                                    | S-2        | 13      | 0           | Same as S-1 (No Recovery)                                                                                                             |
| Sand Pack (#00N)                                         | 5               |                                                    | S-3        | 12      | 0           | Same as S-1 (No Recovery)                                                                                                             |
| 2" I.D. Sch. 40, 0.010" Slotted PVC Screen and Sand Pack | 600             |                                                    | S-4        | 10      | 75          | Brown, stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                      |
|                                                          | 10              |                                                    | S-5        | 21      | 75          | ...grade: v. stiff                                                                                                                    |
|                                                          | 595             |                                                    | S-6        | 19      | 75          | Same as S-5                                                                                                                           |
|                                                          | 15              |                                                    | S-7        | 50+     | 50          | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, wet (CL/ML-Till)                                              |
|                                                          | 590             | REFUSAL                                            |            |         |             | Depth to Bottom of Hole: 15.0 feet                                                                                                    |
|                                                          | 20              |                                                    |            |         |             |                                                                                                                                       |
|                                                          | 585             |                                                    |            |         |             |                                                                                                                                       |
|                                                          | 25              |                                                    |            |         |             |                                                                                                                                       |
|                                                          | 580             |                                                    |            |         |             |                                                                                                                                       |
|                                                          | 30              |                                                    |            |         |             |                                                                                                                                       |
|                                                          | 575             |                                                    |            |         |             |                                                                                                                                       |

1. Groundwater level at 13.0 feet below ground surface (BGS) after installation on 2/6/24.
2. Well developed and groundwater levels recorded again on 3/26/24.
3. Groundwater level at 4.8 feet BGS (elevation 602.2 +/- feet) on 3/26/24.
4. Groundwater recharging approximately 12 inches per five minutes.

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-2

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/7/24  
**DATE COMPLETED:** 2/7/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 605 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 605 0                         |                                                    | S-1 : 0.0'- 2.0'      | 10          | 50             | Dk. brown, m. dense f/c Sand, some Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 12          | 65             | ...grade: Brown, little Gravel                                                                                                        |
| 600 5                         |                                                    | S-3 : 4.0'- 6.0'      | 18          | 50             | ...grade: Dk. brown, some Gravel, wet                                                                                                 |
|                               |                                                    | S-4 : 6.0'- 8.0'      | 13          | 65             | ...grade: little Gravel                                                                                                               |
| 595 10                        |                                                    | S-5 : 8.0'- 10.0'     | 24          | 65             | Brown, stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)<br>...grade: v. stiff                                |
|                               |                                                    | S-6 : 10.0'- 12.0'    | 20          | 90             | Same as S-5                                                                                                                           |
| 590 15                        |                                                    | S-7 : 14.0'- 15.3'    | 50+         | 50             | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, wet (CL/ML-Till)                                              |
|                               | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 15.6 feet                                                                                                    |
| 585 20                        |                                                    |                       |             |                |                                                                                                                                       |
| 580 25                        |                                                    |                       |             |                |                                                                                                                                       |
| 575 30                        |                                                    |                       |             |                |                                                                                                                                       |
| 570 35                        |                                                    |                       |             |                |                                                                                                                                       |

Logged by: E. Zinni

Logged by: E. Zinni

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-4

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/8/24  
**DATE COMPLETED:** 2/8/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 608 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                     |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                         |
| 605                           |                                                    | S-1 : 0.0'- 2.0'      | 10          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 12          | 50             | Same as S-1                                                                                                                             |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 25          | 50             | ...grade: wet                                                                                                                           |
| 600                           |                                                    | S-4 : 6.0'- 8.0'      | 11          | 50             | Gray, stiff CLAY, some Silt, little f/c Sand, tr. Gravel, mod. plastic, moist (CL)                                                      |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 18          | 65             | ...grade: Brown, v. stiff, tr. f/c Sand                                                                                                 |
| 10                            |                                                    | S-6 : 10.0'- 12.0'    | 26          | 100            | Same as S-5                                                                                                                             |
| 595                           |                                                    | S-7 : 14.0'- 16.0'    | 24          | 100            | Gray, v. stiff CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                          |
| 15                            |                                                    |                       |             |                |                                                                                                                                         |
| 590                           |                                                    |                       |             |                | Depth to Bottom of Hole: 17.0 feet                                                                                                      |
| 20                            |                                                    |                       |             |                |                                                                                                                                         |
| 585                           |                                                    |                       |             |                |                                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                         |
| 580                           |                                                    |                       |             |                |                                                                                                                                         |
| 30                            |                                                    |                       |             |                |                                                                                                                                         |
| 575                           |                                                    |                       |             |                |                                                                                                                                         |
| 35                            |                                                    |                       |             |                |                                                                                                                                         |

Logged by: E. Zinni

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-5

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/8/24  
**DATE COMPLETED:** 2/8/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 603 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                     |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    | S-1 : 0.0'- 2.0'      | 23          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
| 600                           |                                                    | S-2 : 2.0'- 4.0'      | 44          | 70             | ...grade: dense, little Slag, little Brick                                                                                              |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 14          | 75             | Gray, stiff CLAY, some Silt, little f/c Sand, tr. Gravel, mod. plastic, moist (CL)                                                      |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 43          | 75             | ...grade: Brown, hard, tr. f/c Sand,                                                                                                    |
| 10                            |                                                    | S-5 : 8.0'- 10.0'     | 20          | 70             | ...grade: v. stiff                                                                                                                      |
| 590                           |                                                    | S-6 : 10.0'- 12.0'    | 31          | 75             | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, wet (CL/ML-Till)                                                |
| 15                            |                                                    | S-7 : 14.0'- 14.9'    | 50+         | 20             | Same as S-6                                                                                                                             |
| 585                           | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 15.0 feet                                                                                                      |
| 20                            |                                                    |                       |             |                |                                                                                                                                         |
| 580                           |                                                    |                       |             |                |                                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                         |
| 575                           |                                                    |                       |             |                |                                                                                                                                         |
| 30                            |                                                    |                       |             |                |                                                                                                                                         |
| 570                           |                                                    |                       |             |                |                                                                                                                                         |
| 35                            |                                                    |                       |             |                |                                                                                                                                         |

Logged by: E. Zinni

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**TEST BORING LOG**

**JOB No.:** 23-610

**BORING No.:** B-6

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/8/24  
**DATE COMPLETED:** 2/8/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 601 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                       |
| 600                           |                                                    | S-1 : 0.0'- 2.0'      | 15          | 50             | Dk. brown, m. dense f/c Sand, some Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 9           | 50             | ...grade: loose                                                                                                                       |
|                               |                                                    | S-3 : 4.0'- 6.0'      | 6           | 50             | Same as S-2                                                                                                                           |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 30          | 90             | Brown, m. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)<br>...grade: v. stiff                             |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 33          | 90             | ...grade: hard                                                                                                                        |
| 590                           |                                                    | S-6 : 10.0'- 12.0'    | 27          | 90             | ...grade: v. stiff                                                                                                                    |
|                               |                                                    | S-7 : 14.0'- 16.0'    | 7           | 100            | Gray, m. stiff CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, wet (CL/ML-Till)                                          |
| 585                           |                                                    | S-8 : 19.0'- 19.5'    | 50+         | 100            | ...grade: hard                                                                                                                        |
| 20                            | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 19.5 feet                                                                                                    |
| 580                           |                                                    |                       |             |                |                                                                                                                                       |
| 25                            |                                                    |                       |             |                |                                                                                                                                       |
| 575                           |                                                    |                       |             |                |                                                                                                                                       |
| 30                            |                                                    |                       |             |                |                                                                                                                                       |
| 570                           |                                                    |                       |             |                |                                                                                                                                       |
| 35                            |                                                    |                       |             |                |                                                                                                                                       |
| 565                           |                                                    |                       |             |                |                                                                                                                                       |

Logged by: E. Zinni

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-7

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/9/24  
**DATE COMPLETED:** 2/9/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 602 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                                        |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                                            |
| 600                           |                                                    | S-1 : 0.0'- 2.0'      | 11          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill)<br>...grade: loose |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 8           | 50             | Dk. brown, stiff CLAY, some Silt, little f/c Sand, tr. Gravel, mod. plastic, moist (CL)<br>...grade: Brown, v. stiff, tr. f/c Sand                         |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 15          | 50             | ...grade: hard                                                                                                                                             |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 33          | 75             | ...grade: v. stiff                                                                                                                                         |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 22          | 75             | Same as S-5                                                                                                                                                |
| 590                           |                                                    | S-6 : 10.0'- 12.0'    | 29          | 100            |                                                                                                                                                            |
| 15                            |                                                    | S-7 : 14.0'- 16.0'    | 10          | 100            | Gray, stiff CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, wet (CL/ML-Till)                                                                  |
| 585                           |                                                    | S-8 : 19.0'- 19.8'    | 50+         | 50             | ...grade: hard                                                                                                                                             |
| 20                            |                                                    |                       |             |                |                                                                                                                                                            |
| 580                           |                                                    |                       |             |                | Depth to Bottom of Hole: 20.0 feet                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                                            |
| 575                           |                                                    |                       |             |                |                                                                                                                                                            |
| 30                            |                                                    |                       |             |                |                                                                                                                                                            |
| 570                           |                                                    |                       |             |                |                                                                                                                                                            |
| 35                            |                                                    |                       |             |                |                                                                                                                                                            |

Logged by: E. Zinni



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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-8

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/7/24  
**DATE COMPLETED:** 2/7/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 605 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 605 0                         |                                                    | S-1 : 0.0'- 2.0'      | 12          | 50             | Dk. brown, m. dense f/c Sand, some Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 22          | 50             | ...grade: m. dense                                                                                                                    |
| 600 5                         |                                                    | S-3 : 4.0'- 6.0'      | 10          | 0              | Same as S-2 (No Recovery)                                                                                                             |
|                               |                                                    | S-4 : 6.0'- 8.0'      | 25          | 25             | Dk. brown, v. stiff CLAY, some Silt, little f/c Sand, tr. Gravel, mod. plastic, moist (CL)                                            |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 18          | 90             | ...grade: Brown, tr. f/c Sand                                                                                                         |
| 595 10                        |                                                    | S-6 : 10.0'- 12.0'    | 18          | 25             | Same as S-5                                                                                                                           |
| 590 15                        |                                                    | S-7 : 14.0'- 15.3'    | 59+         | 25             | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, wet (CL/ML-Till)                                              |
|                               |                                                    |                       |             |                | Depth to Bottom of Hole: 15.5 feet                                                                                                    |

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-9

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/9/24  
**DATE COMPLETED:** 2/9/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 605 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 605 0                         |                                                    |                       |             |                |                                                                                                                                       |
|                               |                                                    | S-1 : 0.0'- 2.0'      | 20          | 50             | Dk. brown, m. dense f/c Sand, some Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 13          | 50             | ...grade: Brown, little Gravel                                                                                                        |
|                               |                                                    | S-3 : 4.0'- 6.0'      | 8           | 50             | ...grade: Dk. brown, loose, wet                                                                                                       |
| 600 5                         |                                                    | S-4 : 6.0'- 8.0'      | 19          | 75             | Brown, v. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                   |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 25          | 75             | Same as S-4                                                                                                                           |
| 595 10                        |                                                    | S-6 : 10.0'- 12.0'    | 25          | 75             | Same as S-4                                                                                                                           |
|                               |                                                    | S-7 : 14.0'- 16.0'    | 18          | 100            | Gray, v. stiff CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                        |
| 590 15                        |                                                    | S-8 : 19.0'- 19.8'    | 50+         | 20             | ...grade: hard, wet                                                                                                                   |
| 585 20                        | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 20.0 feet                                                                                                    |
| 580 25                        |                                                    |                       |             |                |                                                                                                                                       |
| 575 30                        |                                                    |                       |             |                |                                                                                                                                       |
| 570 35                        |                                                    |                       |             |                |                                                                                                                                       |

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-10

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/9/24  
**DATE COMPLETED:** 2/9/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 603 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                     |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                         |
| 600                           |                                                    | S-1 : 0.0'- 2.0'      | 13          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 5           | 50             | ...grade: loose, wet                                                                                                                    |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 8           | 50             | ...grade: Brown                                                                                                                         |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 23          | 100            | Brown, v. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                     |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 18          | 75             | Same as S-4                                                                                                                             |
| 10                            |                                                    | S-6 : 10.0'- 12.0'    | 24          | 75             | Same as S-4                                                                                                                             |
| 590                           |                                                    | S-7 : 14.0'- 16.0'    | 20          | 100            | Gray, v. stiff CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                          |
| 15                            |                                                    |                       |             |                |                                                                                                                                         |
| 585                           |                                                    |                       |             |                |                                                                                                                                         |
| 20                            | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 19.0 feet                                                                                                      |
| 580                           |                                                    |                       |             |                |                                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                         |
| 575                           |                                                    |                       |             |                |                                                                                                                                         |
| 30                            |                                                    |                       |             |                |                                                                                                                                         |
| 570                           |                                                    |                       |             |                |                                                                                                                                         |
| 35                            |                                                    |                       |             |                |                                                                                                                                         |

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-11

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/12/24  
**DATE COMPLETED:** 2/12/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 603 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                       |
| 600                           |                                                    | S-1 : 0.0'- 2.0'      | 10          | 10             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, wet (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 10          | 0              | Same as S-1 (No Recovery)                                                                                                             |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 17          | 50             | Brown, v. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                   |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 19          | 50             | Same as S-3                                                                                                                           |
| 10                            |                                                    | S-5 : 8.0'- 10.0'     | 32          | 75             | Brown, hard CLAY, some Silt, little Gravel, little f/c Sand, mod. plastic, moist (CL-Till)                                            |
| 590                           |                                                    | S-6 : 10.0'- 12.0'    | 30          | 75             | ...grade: v. stiff                                                                                                                    |
| 15                            |                                                    | S-7 : 14.0'- 16.0'    | 33          | 75             | ...grade: Gray, hard, and SILT, sl. plastic (CL/ML-Till)                                                                              |
| 585                           | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 17.0 feet                                                                                                    |
| 20                            |                                                    |                       |             |                |                                                                                                                                       |
| 580                           |                                                    |                       |             |                |                                                                                                                                       |
| 25                            |                                                    |                       |             |                |                                                                                                                                       |
| 575                           |                                                    |                       |             |                |                                                                                                                                       |
| 30                            |                                                    |                       |             |                |                                                                                                                                       |
| 570                           |                                                    |                       |             |                |                                                                                                                                       |
| 35                            |                                                    |                       |             |                |                                                                                                                                       |

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-12

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/9/24  
**DATE COMPLETED:** 2/9/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 605 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 605 0                         |                                                    | S-1 : 0.0'- 2.0'      | 16          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, wet (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 6           | 65             | ...grade: Brown, loose                                                                                                                |
| 600 5                         |                                                    | S-3 : 4.0'- 6.0'      | 8           | 75             | Dk. brown, stiff Clay, some Silt, little f/c Sand, tr. Gravel, tr. Slag, mod. plastic, moist (CL-Fill)                                |
|                               |                                                    | S-4 : 6.0'- 8.0'      | 16          | 75             | Brown, v. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                   |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 21          | 75             | Same as S-4                                                                                                                           |
| 595 10                        |                                                    | S-6 : 10.0'- 12.0'    | 30          | 75             | Same as S-4                                                                                                                           |
| 590 15                        |                                                    | S-7 : 14.0'- 15.9'    | 17          | 95             | Gray, v. stiff CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, wet (CL/ML-Till)                                          |
|                               | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 17.0 feet                                                                                                    |
| 585 20                        |                                                    |                       |             |                |                                                                                                                                       |
| 580 25                        |                                                    |                       |             |                |                                                                                                                                       |
| 575 30                        |                                                    |                       |             |                |                                                                                                                                       |
| 570 35                        |                                                    |                       |             |                |                                                                                                                                       |

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**TEST BORING LOG**

**JOB No.:** 23-610

**BORING No.:** B-14

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/12/24  
**DATE COMPLETED:** 2/12/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 602 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                       |
| 600                           |                                                    | S-1 : 0.0'- 1.3'      | 53+         | 20             | Dk. brown, v. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, wet (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 2.3'      | 50+         | 10             | ...grade: and Construction lumber                                                                                                     |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 14          | 50             | Dk. brown, stiff Clay, some Silt, little f/c Sand, tr. Gravel, tr. Slag, tr. Brick, mod. plastic, moist (CL-Fill)                     |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 29          | 75             | Brown, v. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                   |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 21          | 75             | Same as S-4                                                                                                                           |
| 10                            |                                                    | S-6 : 10.0'- 12.0'    | 22          | 75             | Same as S-4                                                                                                                           |
| 590                           |                                                    |                       |             |                |                                                                                                                                       |
| 15                            |                                                    | S-7 : 14.0'- 16.0'    | 22          | 100            | Gray, v. stiff CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                        |
| 585                           |                                                    |                       |             |                |                                                                                                                                       |
| 20                            |                                                    | S-8 : 19.0'- 19.9'    | 50+         | 75             | ...grade: hard                                                                                                                        |
| 580                           | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 20.5 feet                                                                                                    |
| 25                            |                                                    |                       |             |                |                                                                                                                                       |
| 575                           |                                                    |                       |             |                |                                                                                                                                       |
| 30                            |                                                    |                       |             |                |                                                                                                                                       |
| 570                           |                                                    |                       |             |                |                                                                                                                                       |
| 35                            |                                                    |                       |             |                |                                                                                                                                       |

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# TEST BORING LOG

**BORING No.:** B-15

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/12/24  
**DATE COMPLETED:** 2/12/24

|                                                                                    |                    |
|------------------------------------------------------------------------------------|--------------------|
| <b>TYPE OF DRILL RIG:</b>                                                          | CME-550 (ATV)      |
| <b>SIZE AND TYPE OF BIT:</b>                                                       | 2 1/4" I.D. H.S.A. |
| <b>SURFACE ELEVATION (ft.):</b>                                                    | 603 est.           |
| <b>GROUNDWATER DEPTH (ft.):</b><br>(measured at completion unless indicated below) | None               |

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                     |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                         |
| 600                           |                                                    | S-1 : 0.0'- 2.0'      | 24          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 28          | 65             | ...grade: wet                                                                                                                           |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 18          | 75             | ...grade: Brown                                                                                                                         |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 15          | 75             | Gray, v. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, wet (CL)<br>...grade: Brown, moist                              |
| 10                            |                                                    | S-5 : 8.0'- 10.0'     | 30          | 100            | ...grade: hard                                                                                                                          |
| 590                           |                                                    | S-6 : 10.0'- 12.0'    | 30          | 100            | Same as S-5                                                                                                                             |
| 15                            |                                                    | S-7 : 14.0'- 16.0'    | 38          | 100            | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                              |
| 585                           |                                                    | S-8 : 19.0'- 20.8'    | 20          | 100            | ...grade: v. stiff                                                                                                                      |
| 20                            | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 21.0 feet                                                                                                      |
| 580                           |                                                    |                       |             |                |                                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                         |
| 575                           |                                                    |                       |             |                |                                                                                                                                         |
| 30                            |                                                    |                       |             |                |                                                                                                                                         |
| 570                           |                                                    |                       |             |                |                                                                                                                                         |
| 35                            |                                                    |                       |             |                |                                                                                                                                         |

Logged by: E. Zinni



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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-16

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/8/24  
**DATE COMPLETED:** 2/8/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 602 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    | S-1 : 0.0'- 2.0'      | 15          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, wet (SM-Fill) |
| 600                           |                                                    | S-2 : 2.0'- 4.0'      | 21          | 50             | Same as S-1                                                                                                                           |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 15          | 75             | Brown, v. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                   |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 34          | 75             | ...grade: hard                                                                                                                        |
| 10                            |                                                    | S-5 : 8.0'- 10.0'     | 38          | 75             | Same as S-4                                                                                                                           |
| 590                           |                                                    | S-6 : 10.0'- 12.0'    | 31          | 10             | Same as S-5                                                                                                                           |
| 15                            |                                                    | S-7 : 14.0'- 14.7'    | 50+         | 50             | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                            |
| 585                           | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 15.0 feet                                                                                                    |
| 20                            |                                                    |                       |             |                |                                                                                                                                       |
| 580                           |                                                    |                       |             |                |                                                                                                                                       |
| 25                            |                                                    |                       |             |                |                                                                                                                                       |
| 575                           |                                                    |                       |             |                |                                                                                                                                       |
| 30                            |                                                    |                       |             |                |                                                                                                                                       |
| 570                           |                                                    |                       |             |                |                                                                                                                                       |
| 35                            |                                                    |                       |             |                |                                                                                                                                       |

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# TEST BORING LOG

**JOB No.:** 23-610

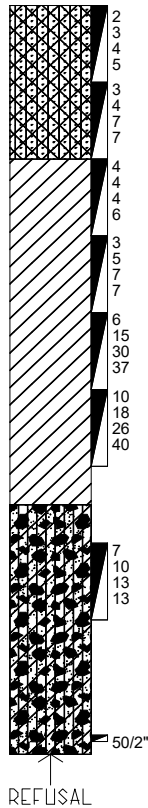
**BORING No.:** B-17

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/12/24  
**DATE COMPLETED:** 2/12/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 606 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                    |
| 605                           |                                                    | S-1 : 0.0'- 2.0'      | 7           | 50             | Dk. brown, loose f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, wet (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 11          | 50             | ...grade: m. dense                                                                                                                 |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 8           | 75             | Brown, stiff CLAY, some Silt, little f/c Sand, tr. Gravel, mod. plastic, moist (CL)                                                |
| 600                           |                                                    | S-4 : 6.0'- 8.0'      | 12          | 75             | ...grade: tr. f/c Sand                                                                                                             |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 45          | 75             | ...grade: hard                                                                                                                     |
| 10                            |                                                    | S-6 : 10.0'- 12.0'    | 44          | 100            | Same as S-5                                                                                                                        |
| 595                           |                                                    | S-7 : 14.0'- 16.0'    | 23          | 100            | Gray, v. stiff CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                     |
| 15                            |                                                    | S-8 : 19.0'- 19.2'    | 50+         | 0              | ...grade: hard (No Recovery)                                                                                                       |
| 590                           |                                                    |                       |             |                |                                                                                                                                    |
| 20                            |                                                    |                       |             |                |                                                                                                                                    |
| 585                           |                                                    |                       |             |                |                                                                                                                                    |
| 25                            |                                                    |                       |             |                |                                                                                                                                    |
| 580                           |                                                    |                       |             |                |                                                                                                                                    |
| 30                            |                                                    |                       |             |                |                                                                                                                                    |
| 575                           |                                                    |                       |             |                |                                                                                                                                    |
| 35                            |                                                    |                       |             |                |                                                                                                                                    |
| 570                           |                                                    |                       |             |                |                                                                                                                                    |



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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-18

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/13/24  
**DATE COMPLETED:** 2/13/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 604 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                     |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    | S-1 : 0.0'- 2.0'      | 17          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 6           | 50             | ...grade: loose, wet                                                                                                                    |
| 600                           |                                                    | S-3 : 4.0'- 6.0'      | 6           | 50             | Same as S-2                                                                                                                             |
| 5                             |                                                    | S-4 : 6.0'- 8.0'      | 23          | 75             | Brown, m. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)<br>...grade: v. stiff                               |
| 595                           |                                                    | S-5 : 8.0'- 9.6'      | 18          | 75             | Same as S-4                                                                                                                             |
| 10                            |                                                    |                       |             |                |                                                                                                                                         |
|                               | REFUSAL                                            |                       |             |                |                                                                                                                                         |
| 590                           |                                                    |                       |             |                |                                                                                                                                         |
| 15                            |                                                    |                       |             |                |                                                                                                                                         |
| 585                           |                                                    |                       |             |                |                                                                                                                                         |
| 20                            |                                                    |                       |             |                |                                                                                                                                         |
| 580                           |                                                    |                       |             |                |                                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                         |
| 575                           |                                                    |                       |             |                |                                                                                                                                         |
| 30                            |                                                    |                       |             |                |                                                                                                                                         |
| 570                           |                                                    |                       |             |                |                                                                                                                                         |
| 35                            |                                                    |                       |             |                |                                                                                                                                         |
|                               |                                                    |                       |             |                | Depth to Bottom of Hole: 10.0 feet                                                                                                      |

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-19

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/13/24  
**DATE COMPLETED:** 2/13/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 607 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                  |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                      |
| 605                           |                                                    | S-1 : 0.0'- 2.0'      | 6           | 50             | Dk. brown, loose f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 12          | 50             | ...grade: m. dense, some Slag                                                                                                        |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 5           | 50             | Brown, m. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                  |
| 600                           |                                                    | S-4 : 6.0'- 8.0'      | 22          | 65             | ...grade: v. stiff                                                                                                                   |
|                               |                                                    | S-5 : 8.0'- 9.1'      | 56+         | 50             | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, wet (CL/ML-Till)                                             |
| 10                            |                                                    |                       |             |                | Depth to Bottom of Hole: 9.1 feet                                                                                                    |
| 595                           |                                                    |                       |             |                |                                                                                                                                      |
| 15                            |                                                    |                       |             |                |                                                                                                                                      |
| 590                           |                                                    |                       |             |                |                                                                                                                                      |
| 20                            |                                                    |                       |             |                |                                                                                                                                      |
| 585                           |                                                    |                       |             |                |                                                                                                                                      |
| 25                            |                                                    |                       |             |                |                                                                                                                                      |
| 580                           |                                                    |                       |             |                |                                                                                                                                      |
| 30                            |                                                    |                       |             |                |                                                                                                                                      |
| 575                           |                                                    |                       |             |                |                                                                                                                                      |
| 35                            |                                                    |                       |             |                |                                                                                                                                      |

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-20

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/7/24  
**DATE COMPLETED:** 2/7/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 607 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                       |
| 605                           |                                                    | S-1 : 0.0'- 2.0'      | 14          | 75             | Dk. brown, m. dense f/c Sand, some Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 35          | 75             | ...grade: dense, little Gravel                                                                                                        |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 32          | 70             | Same as S-2                                                                                                                           |
| 600                           |                                                    | S-4 : 6.0'- 8.0'      | 13          | 50             | ...grade: m. dense, some Gravel, wet                                                                                                  |
| 10                            |                                                    | S-5 : 8.0'- 10.0'     | 10          | 10             | Brown, stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                      |
| 595                           |                                                    | S-6 : 10.0'- 12.0'    | 24          | 50             | ...grade: v. stiff                                                                                                                    |
| 15                            |                                                    | S-7 : 14.0'- 16.0'    | 10          | 100            | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                            |
| 590                           |                                                    | S-8 : 19.0'- 20.4'    | 57+         | 50             | ...grade: hard                                                                                                                        |
| 20                            |                                                    |                       |             |                |                                                                                                                                       |
| 585                           | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 20.5 feet                                                                                                    |
| 25                            |                                                    |                       |             |                |                                                                                                                                       |
| 580                           |                                                    |                       |             |                |                                                                                                                                       |
| 30                            |                                                    |                       |             |                |                                                                                                                                       |
| 575                           |                                                    |                       |             |                |                                                                                                                                       |
| 35                            |                                                    |                       |             |                |                                                                                                                                       |

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**TEST BORING LOG**

**JOB No.:** 23-610

**BORING No.:** B-21

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/14/24  
**DATE COMPLETED:** 2/14/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 603 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                     |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                         |
| 600                           |                                                    | S-1 : 0.0'- 2.0'      | 18          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 22          | 50             | Same as S-1                                                                                                                             |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 14          | 70             | ...grade: Gray, some Silt, tr. Gravel                                                                                                   |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 18          | 75             | Brown, stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)<br>...grade: v. stiff                                  |
| 10                            |                                                    | S-5 : 8.0'- 10.0'     | 31          | 100            | ...grade: hard                                                                                                                          |
| 590                           |                                                    | S-6 : 10.0'- 12.0'    | 29          | 100            | ...grade: v. stiff                                                                                                                      |
| 15                            |                                                    | S-7 : 14.0'- 16.0'    | 34          | 0              | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till) (No Recovery)                                |
| 585                           | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 17.0 feet                                                                                                      |
| 20                            |                                                    |                       |             |                |                                                                                                                                         |
| 580                           |                                                    |                       |             |                |                                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                         |
| 575                           |                                                    |                       |             |                |                                                                                                                                         |
| 30                            |                                                    |                       |             |                |                                                                                                                                         |
| 570                           |                                                    |                       |             |                |                                                                                                                                         |
| 35                            |                                                    |                       |             |                |                                                                                                                                         |

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-22

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/13/24  
**DATE COMPLETED:** 2/13/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 604 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                     |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    | S-1 : 0.0'- 2.0'      | 12          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 16          | 50             | ...grade: wet                                                                                                                           |
| 600                           |                                                    | S-3 : 4.0'- 6.0'      | 8           | 0              | ...grade: loose (No Recovery)                                                                                                           |
| 5                             |                                                    | S-4 : 6.0'- 8.0'      | 11          | 25             | Dk. brown, stiff CLAY, some Silt, little f/c Sand, tr. Gravel, mod. plastic, moist (CL)                                                 |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 9           | 100            | ...grade: Brown, some f/c Sand, wet                                                                                                     |
| 595                           |                                                    | S-6 : 10.0'- 12.0'    | 12          | 100            | Gray, v. stiff CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                          |
| 10                            |                                                    |                       |             |                |                                                                                                                                         |
| 590                           |                                                    |                       |             |                | Depth to Bottom of Hole: 13.0 feet                                                                                                      |
| 15                            |                                                    |                       |             |                |                                                                                                                                         |
| 585                           |                                                    |                       |             |                |                                                                                                                                         |
| 20                            |                                                    |                       |             |                |                                                                                                                                         |
| 580                           |                                                    |                       |             |                |                                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                         |
| 575                           |                                                    |                       |             |                |                                                                                                                                         |
| 30                            |                                                    |                       |             |                |                                                                                                                                         |
| 570                           |                                                    |                       |             |                |                                                                                                                                         |
| 35                            |                                                    |                       |             |                |                                                                                                                                         |

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-23

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/14/24  
**DATE COMPLETED:** 2/14/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 602 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                     |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    | S-1 : 0.0'- 2.0'      | 24          | 50             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
| 600                           |                                                    | S-2 : 2.0'- 4.0'      | 20          | 50             | Same as S-1                                                                                                                             |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 31          | 50             | ...grade: dense                                                                                                                         |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 24          | 75             | Gray, v. stiff CLAY, some Silt, little f/c Sand, tr. Gravel, mod. plastic, moist (CL)<br>...grade: Brown, v. stiff, tr. f/c Sand        |
| 10                            |                                                    | S-5 : 8.0'- 10.0'     | 31          | 100            | ...grade: hard                                                                                                                          |
| 590                           |                                                    | S-6 : 10.0'- 12.0'    | 38          | 100            | Same as S-5                                                                                                                             |
| 15                            |                                                    | S-7 : 14.0'- 14.1'    | 50+         | 0              | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, wet (CL/ML-Till) (No Recovery)                                  |
| 585                           |                                                    |                       |             |                | Depth to Bottom of Hole: 14.5 feet                                                                                                      |
| 20                            |                                                    |                       |             |                |                                                                                                                                         |
| 580                           |                                                    |                       |             |                |                                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                         |
| 575                           |                                                    |                       |             |                |                                                                                                                                         |
| 30                            |                                                    |                       |             |                |                                                                                                                                         |
| 570                           |                                                    |                       |             |                |                                                                                                                                         |
| 35                            |                                                    |                       |             |                |                                                                                                                                         |

Logged by: E. Zinni



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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-24

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/12/24  
**DATE COMPLETED:** 2/12/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 603 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                   |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    | S-1 : 0.0'- 2.0'      | 23          | 65             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, wet (SM-Fill) |
| 600                           |                                                    | S-2 : 2.0'- 4.0'      | 16          | 50             | Same as S-1                                                                                                                           |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 5           | 50             | ...grade: loose, little Clay, little Silt, saturated                                                                                  |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 11          | 50             | Brown, stiff CLAY, some Silt, some f/c Sand, tr. Gravel, mod. plastic, wet (CL)                                                       |
| 10                            |                                                    | S-5 : 8.0'- 10.0'     | 34          | 100            | ...grade: hard, tr. f/c Sand, moist                                                                                                   |
| 590                           |                                                    | S-6 : 10.0'- 12.0'    | 31          | 100            | Same as S-5                                                                                                                           |
| 15                            | REFUSAL                                            |                       |             |                | (Depth of glacial till based upon adjacent borings.)                                                                                  |
| 585                           |                                                    |                       |             |                | Depth to Bottom of Hole: 14.0 feet                                                                                                    |
| 20                            |                                                    |                       |             |                |                                                                                                                                       |
| 580                           |                                                    |                       |             |                |                                                                                                                                       |
| 25                            |                                                    |                       |             |                |                                                                                                                                       |
| 575                           |                                                    |                       |             |                |                                                                                                                                       |
| 30                            |                                                    |                       |             |                |                                                                                                                                       |
| 570                           |                                                    |                       |             |                |                                                                                                                                       |
| 35                            |                                                    |                       |             |                |                                                                                                                                       |

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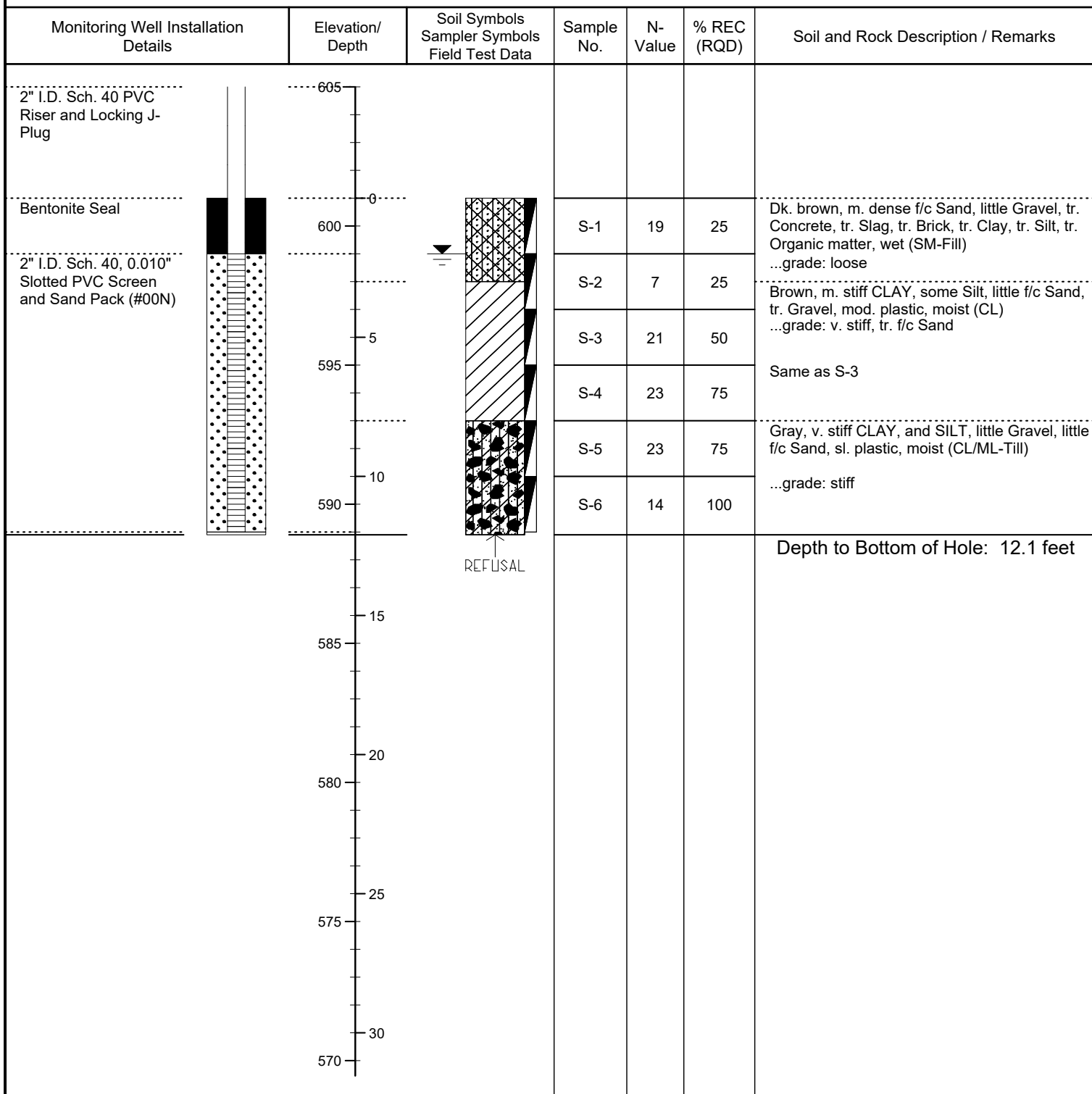
**MONITORING WELL SCHEMATIC**
**JOB No.:** 23-610

**BORING No.:** B/MW-25

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/14/24  
**DATE COMPLETED:** 2/14/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 4 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (FT):** 601 est.  
**GROUNDWATER DEPTH (FT):** 2.0 (See Notes)  
(measured at completion unless indicated below)



1. Groundwater level at 11.8 feet below ground surface (BGS) after installation on 2/14/24.
2. Well to be developed and groundwater levels recorded again on 3/26/24.
3. Groundwater level at 2.0 feet BGS (elevation 599.0 +/- feet) on 3/26/24.
4. Groundwater recharging approximately 6 inches per five minutes.

Logged by: E. Zinni

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-27

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/15/24  
**DATE COMPLETED:** 2/15/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 602 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                     |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    |                       |             |                |                                                                                                                                         |
| 600                           |                                                    | S-1 : 0.0'- 2.0'      | 10          | 25             | Dk. brown, m. dense f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 2.9'      | 50+         | 25             | ...grade: v. dense                                                                                                                      |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 22          | 25             | Dk. brown, v. stiff CLAY, some Silt, little f/c Sand, tr. Gravel, mod. plastic, moist (CL)                                              |
| 595                           |                                                    | S-4 : 6.0'- 8.0'      | 18          | 25             | ...grade: Brown, tr. f/c Sand, wet                                                                                                      |
|                               |                                                    | S-5 : 8.0'- 10.0'     | 8           | 75             | ...grade: stiff                                                                                                                         |
| 10                            |                                                    | S-6 : 10.0'- 12.0'    | 9           | 75             | Same as S-5                                                                                                                             |
| 590                           |                                                    | S-7 : 14.0'- 15.9'    | 48          | 10             | Gray, hard CLAY, and SILT, some Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                                |
| 15                            |                                                    |                       |             |                |                                                                                                                                         |
| 585                           |                                                    |                       |             |                |                                                                                                                                         |
|                               |                                                    |                       |             |                |                                                                                                                                         |
| 20                            |                                                    |                       |             |                |                                                                                                                                         |
| 580                           |                                                    |                       |             |                |                                                                                                                                         |
| 25                            |                                                    |                       |             |                |                                                                                                                                         |
| 575                           |                                                    |                       |             |                |                                                                                                                                         |
| 30                            |                                                    |                       |             |                |                                                                                                                                         |
| 570                           |                                                    |                       |             |                |                                                                                                                                         |
| 35                            |                                                    |                       |             |                |                                                                                                                                         |

REFUSAL

Depth to Bottom of Hole: 16.5 feet

Logged by: E. Zinni

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# TEST BORING LOG

**JOB No.:** 23-610

**BORING No.:** B-28

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/13/24  
**DATE COMPLETED:** 2/13/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 608 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                  |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 0                             |                                                    | S-1 : 0.0'- 2.0'      | 7           | 30             | Dk. brown, loose f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
| 605                           |                                                    | S-2 : 2.0'- 4.0'      | 9           | 50             | ...grade: saturated                                                                                                                  |
| 5                             |                                                    | S-3 : 4.0'- 6.0'      | 22          | 75             | Brown, v. stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                  |
|                               |                                                    | S-4 : 6.0'- 8.0'      | 28          | 75             | Same as S-3                                                                                                                          |
| 600                           |                                                    | S-5 : 8.0'- 10.0'     | 34          | 75             | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                           |
| 10                            |                                                    | S-6 : 10.0'- 11.6'    | 15          | 75             | ...grade: v. stiff                                                                                                                   |
| 595                           | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 11.7 feet                                                                                                   |
| 15                            |                                                    |                       |             |                |                                                                                                                                      |
| 590                           |                                                    |                       |             |                |                                                                                                                                      |
| 20                            |                                                    |                       |             |                |                                                                                                                                      |
| 585                           |                                                    |                       |             |                |                                                                                                                                      |
| 25                            |                                                    |                       |             |                |                                                                                                                                      |
| 580                           |                                                    |                       |             |                |                                                                                                                                      |
| 30                            |                                                    |                       |             |                |                                                                                                                                      |
| 575                           |                                                    |                       |             |                |                                                                                                                                      |
| 35                            |                                                    |                       |             |                |                                                                                                                                      |

Logged by: E. Zinni

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**TEST BORING LOG**

**JOB No.:** 23-610

**BORING No.:** B-29

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/15/24  
**DATE COMPLETED:** 2/15/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 2 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (ft.):** 600 est.  
**GROUNDWATER DEPTH (ft.):** None  
(measured at completion unless indicated below)

| Elevation/<br>Depth<br>(feet) | Soil Symbols<br>Sampler Symbols<br>Field Test Data | Sample<br>No. : Range | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                                  |
|-------------------------------|----------------------------------------------------|-----------------------|-------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 600 0                         |                                                    | S-1 : 0.0'- 2.0'      | 7           | 50             | Dk. brown, loose f/c Sand, little Gravel, tr. Concrete, tr. Slag, tr. Brick, tr. Clay, tr. Silt, tr. Organic matter, moist (SM-Fill) |
|                               |                                                    | S-2 : 2.0'- 4.0'      | 13          | 50             | Dk. brown, stiff Clay, some Silt, little f/c Sand, tr. Gravel, tr. Slag, mod. plastic, moist (CL-Fill)                               |
| 595 5                         |                                                    | S-3 : 4.0'- 6.0'      | 14          | 75             | Brown, stiff CLAY, some Silt, tr. Gravel, tr. f/c Sand, mod. plastic, moist (CL)                                                     |
|                               |                                                    | S-4 : 6.0'- 8.0'      | 48          | 75             | ...grade: hard                                                                                                                       |
| 590 10                        |                                                    | S-5 : 8.0'- 9.7'      | 32          | 75             | Gray, hard CLAY, and SILT, little Gravel, little f/c Sand, sl. plastic, moist (CL/ML-Till)                                           |
|                               | REFUSAL                                            |                       |             |                | Depth to Bottom of Hole: 10.0 feet                                                                                                   |
| 585 15                        |                                                    |                       |             |                |                                                                                                                                      |
| 580 20                        |                                                    |                       |             |                |                                                                                                                                      |
| 575 25                        |                                                    |                       |             |                |                                                                                                                                      |
| 570 30                        |                                                    |                       |             |                |                                                                                                                                      |
| 565 35                        |                                                    |                       |             |                |                                                                                                                                      |

Logged by: E. Zinni

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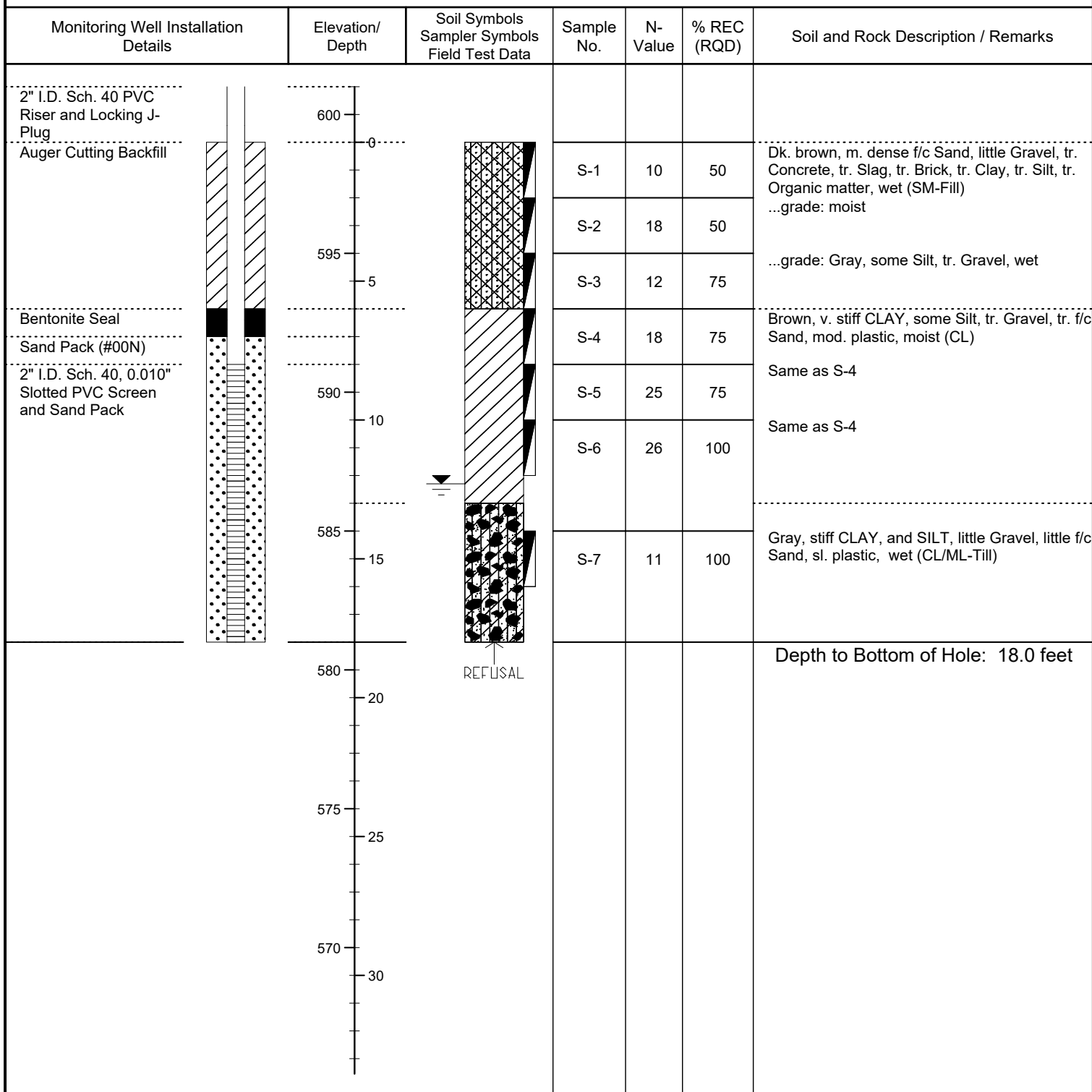
**MONITORING WELL SCHEMATIC**
**JOB No.:** 23-610

**BORING No.:** B/MW-30

**PROJECT:** Proposed Industrial Complex  
2 Bailey Avenue, City of Buffalo, New York 14220

**DRILLER:** D. Rimbeck  
**SAMPLING METHODS:** ASTM D1586  
**DATE STARTED:** 2/15/24  
**DATE COMPLETED:** 2/15/24

**TYPE OF DRILL RIG:** CME-550 (ATV)  
**SIZE AND TYPE OF BIT:** 4 1/4" I.D. H.S.A.  
**SURFACE ELEVATION (FT):** 599 est.  
**GROUNDWATER DEPTH (FT):** 12.3 (See Notes)  
(measured at completion unless indicated below)



1. Groundwater level at 17.8 feet below ground surface (BGS) after installation on 2/15/24.
2. Well developed and groundwater levels recorded again on 3/26/24.
3. Groundwater level at 12.3 feet BGS (elevation 586.7 +/- feet) on 3/26/24.
4. Groundwater recharging approximately two inches per five minutes.



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## **APPENDIX B**

### **GEOTECHNICAL REFERENCE STANDARDS**





# BARRON & ASSOCIATES, P.C.

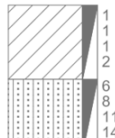
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PAGE: 1 of 3

### Column Header Descriptions

| <b>BARRON &amp; ASSOCIATES, P.C. &amp; BUFFALO DRILLING COMPANY, INC.</b>                                                                                             |                                                                                    | <b>TEST BORING LOG</b>                                                                     |             |                |                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------|
|  10440 MAIN STREET<br>CLARENCE, NEW YORK 14031<br>(716) 759-7821 FAX: (716) 759-7823 |                                                                                    | JOB No.:                                                                                   |             | BORING No.:    |                                                                                                                     |
| PROJECT:                                                                                                                                                              |                                                                                    | <b>EXAMPLE</b>                                                                             |             |                |                                                                                                                     |
| DRILLER:                                                                                                                                                              |                                                                                    | TYPE OF DRILL RIG:                                                                         |             |                |                                                                                                                     |
| SAMPLING METHODS:                                                                                                                                                     |                                                                                    | SIZE AND TYPE OF BIT:                                                                      |             |                |                                                                                                                     |
| DATE STARTED:                                                                                                                                                         |                                                                                    | SURFACE ELEVATION (ft.):                                                                   |             |                |                                                                                                                     |
| DATE COMPLETED:                                                                                                                                                       |                                                                                    | GROUNDWATER DEPTH (ft.):<br><small>(measured at completion unless indicated below)</small> |             |                |                                                                                                                     |
| Elevation/<br>Depth<br>(feet)                                                                                                                                         | Soil Symbols<br>Sampler Symbols<br>Field Test Data                                 | Sample<br>No. : Range                                                                      | N-<br>Value | % REC<br>(RQD) | Soil and Rock Description / Remarks                                                                                 |
| 100<br>0                                                                                                                                                              |  | S-1 : 0.0'- 2.0'                                                                           | 2           | 50             | Dk. brown, soft, CLAY, some Silt, little f. Sand, tr. Gravel, tr. Roots, tr. Organic matter, mod. plastic, wet (CL) |
|                                                                                                                                                                       |                                                                                    | S-2 : 2.0'- 4.0'                                                                           | 19          | 50             | Brown, m. dense f. SAND, some Silt, tr. Gravel, tr. Clay, tr. Roots, non-plastic, moist (SM)                        |

Elevation/Depth: The depth column provides the vertical scale of the boring log in feet below ground surface.

Sample No. : Range: Disturbed samples are identified with "S" preceding the sample number. Undisturbed (Shelby-tube) samples are identified with "U" preceding the sample number. Rock core samples identified with "C" preceding the core run. The range of elevation/depth where the sample was taken is identified in one-tenth foot increments.

N-value: The Standard Penetration Test N-value, as specified by ASTM D1586, is defined as the number of blows required by a 140-pound hammer falling 30 inches, each blow, to drive a 2-in outside diameter split-spoon sampler 12 inches.

% REC (RQD): "Percent Recovery" is the length of samples recovered divided by the total length sampled. The result is numerically expressed as a percent. The Rock Quality Designation (RQD) is the total length of places >4 inches divided by the total length of core run.

Soil and Rock Description / Remarks: This column denotes the exact depth of recovery and general documentation of drilling efforts. Description and classification are based on visual inspection of samples and boring operations. The stratum lines shown on the boring logs are based upon interpretation and may not represent precise subsurface conditions. Water-level readings have been made in the drill holes at time under conditions stated on the boring logs. Fluctuations in the water level may occur due to other factors than those present the time measurement was taken. See attached sheet.



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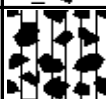
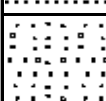
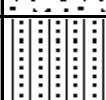
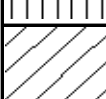
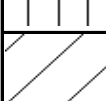
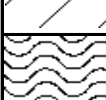
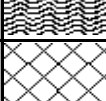
PAGE: 2 of 3

### Soil and Rock Description / Remarks: Terminology Used for Soil Description

| Density Description of Granular Soil               |                                                                                                              | Abbreviations Used in Soil Sample Classification |                                  |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------|
| Number of Blows per ft., N                         | Relative Density                                                                                             | f - fine                                         | v - very                         |
| 0 - 4                                              | Very Loose                                                                                                   | m - medium                                       | gr - gray                        |
| 4 - 10                                             | Loose                                                                                                        | c - coarse                                       | bn - brown                       |
| 10 - 30                                            | Medium                                                                                                       | f/m - fine to medium                             | yel - yellow                     |
| 30 - 50                                            | Dense                                                                                                        | f/c - fine to coarse                             | sl - slight                      |
| Over 50                                            | Very Dense                                                                                                   | tr - trace                                       | dk - dark                        |
| Consistency Description of Cohesive Soil           |                                                                                                              | Bedding                                          |                                  |
| Number of Blows per ft., N                         | Consistency                                                                                                  | Parting                                          | Less than 0.02 ft.               |
| Below 2                                            | Very Soft                                                                                                    | Band                                             | 0.02 - 0.2 ft.                   |
| 2 - 4                                              | Soft                                                                                                         | Thin bed                                         | 0.2 - 0.5 ft.                    |
| 4 - 8                                              | Medium                                                                                                       | Medium bed                                       | 0.5 - 1.0 ft.                    |
| 8 - 15                                             | Stiff                                                                                                        | Thick bed                                        | 1.0 - 2.0 ft.                    |
| 15 - 30                                            | Very Stiff                                                                                                   | Massive                                          | Over 2.0 ft.                     |
| Over 30                                            | Hard                                                                                                         |                                                  |                                  |
| Grain Size                                         |                                                                                                              | Hardness                                         |                                  |
|                                                    | Passing / Retained on                                                                                        | Very Soft or Plastic                             | Can be indented with thumb       |
| Boulder                                            | LARGE / 12-in sieve                                                                                          | Soft                                             | Can be scratched with fingernail |
| Cobble                                             | 12-in / 3-in sieve                                                                                           | Moderately Hard                                  | Can be scratched with knife      |
| Gravel                                             | 3-in sieve / No. 4 sieve                                                                                     | Hard                                             | Difficulty to scratch with knife |
|                                                    | No. 4 sieve / No. 10 sieve                                                                                   | Very hard                                        | Cannot be scratched with knife   |
| Sand                                               | No. 10 sieve / No. 40 sieve                                                                                  |                                                  |                                  |
|                                                    | No. 40 sieve / No. 200 sieve                                                                                 |                                                  |                                  |
| Silt                                               | No. 200 sieve / 0.005 mm sieve                                                                               |                                                  |                                  |
| Clay                                               | Smaller than 0.005 mm                                                                                        |                                                  |                                  |
| Percentage Terminology Used in Soil Classification |                                                                                                              |                                                  |                                  |
| Trace                                              | 0 - 10 %                                                                                                     | Some                                             | 20 - 35 %                        |
| Little                                             | 10 - 20 %                                                                                                    | And                                              | 35 - 50 %                        |
| Moisture                                           |                                                                                                              |                                                  |                                  |
| Dry                                                | Absence of moisture, dusty, dry to the touch.                                                                |                                                  |                                  |
| Moisture                                           | Small quantity of moisture. Soil usually above groundwater level.                                            |                                                  |                                  |
| Wet                                                | Moisture noticeable to the touch. Soil may be below groundwater level.                                       |                                                  |                                  |
| Saturated                                          | Visible free water, usually soil is below groundwater level.                                                 |                                                  |                                  |
| Plasticity                                         |                                                                                                              |                                                  |                                  |
| Non-plastic                                        | An 1/8-in thread cannot be rolled at any water content.                                                      |                                                  |                                  |
| Slight plasticity                                  | Thread can be barley rolled.                                                                                 |                                                  |                                  |
| Moderate plasticity                                | Thread is easy to roll and little time is required to reach the plastic limit (PL).                          |                                                  |                                  |
| Plasticity                                         | Considerable time is required to reach PL. Thread can be re-rolled several times after reaching the PL.      |                                                  |                                  |
| Crystallinity or Texture                           |                                                                                                              |                                                  |                                  |
| Dense                                              | Crystals are to small they cannot be distinguished with the naked eye.                                       |                                                  |                                  |
| Very Fine Crystalline                              | Crystals barely discernable with the naked eye.                                                              |                                                  |                                  |
| Crystalline                                        | Crystals are medium size, up to 1/8-in diameter.                                                             |                                                  |                                  |
| Very Coarsely Crystalline                          | Crystals larger than 1/8-in diameter.                                                                        |                                                  |                                  |
| Voids                                              |                                                                                                              |                                                  |                                  |
| Porous                                             | Smaller than pinhead. Their presence is indicated by the degree of absorbcency.                              |                                                  |                                  |
| Pitted                                             | Pinhead size to 1/4 in. If thin walls separate the individuals pits, the core may be described as honeycomb. |                                                  |                                  |
| Vug                                                | 1/4 inch to the diameter of the core. The upper limit will vary with core size.                              |                                                  |                                  |
| Cavity                                             | Larger than the diameter of the core.                                                                        |                                                  |                                  |



## Soil Classification Chart: Unified Soil Classification System (USCS)

| Major Divisions                                                                  |                                                                          |                                                                                     | Pattern                                                                             | USCS ID                                                                                                            | Typical Descriptions                                            |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| <b>Coarse-Grained Soils:</b> More than 50% of material larger than No. 200 sieve | <b>Gravels:</b> More than 50% of coarse fraction larger than No. 4 sieve | Clean Gravels (little or no fines)                                                  |    | GW                                                                                                                 | Well-graded gravels, gravel-sand mixtures, little or no fines   |
|                                                                                  |                                                                          |                                                                                     |    | GP                                                                                                                 | Poorly-graded gravels, gravel-sand mixtures, little or no fines |
|                                                                                  |                                                                          | Gravels with appreciable amounts of fines                                           |    | GM                                                                                                                 | Silty gravels, gravel-sand-silt mixtures                        |
|                                                                                  |                                                                          |                                                                                     |    | GC                                                                                                                 | Clayey gravels, gravel-sand-silt mixtures                       |
|                                                                                  | <b>Sands:</b> Less than 50% of coarse fraction larger than No. 4 sieve   | Clean sands (little or no fines)                                                    |    | SW                                                                                                                 | Well-graded sands, gravelly sands, little or no fines           |
|                                                                                  |                                                                          |                                                                                     |    | SP                                                                                                                 | Poorly-graded sands, gravelly sands, little or no fines         |
|                                                                                  |                                                                          | Sand with appreciable amount of fines                                               |   | SM                                                                                                                 | Silty sands, silt-sand mixtures                                 |
|                                                                                  |                                                                          |                                                                                     |  | SC                                                                                                                 | Clayey sands, sand-clay mixtures                                |
| <b>Fine-Grained Soils:</b> Less than 50% of material larger than No. 200 sieve   | <b>Silts and Clays, Low plasticity:</b><br>Liquid Limit < 50%            |  | ML                                                                                  | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity |                                                                 |
|                                                                                  |                                                                          |  | CL                                                                                  | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays                  |                                                                 |
|                                                                                  |                                                                          |  | OL                                                                                  | Organic silts and organic silty clays of low plasticity                                                            |                                                                 |
|                                                                                  | <b>Silts and Clays, High plasticity:</b><br>Liquid Limit > 50%           |  | MH                                                                                  | Inorganic silts, micaceous or diatomaceous fine sand or silty soils                                                |                                                                 |
|                                                                                  |                                                                          |  | CH                                                                                  | Inorganic clays of high plasticity, fat clays                                                                      |                                                                 |
|                                                                                  |                                                                          |  | OH                                                                                  | Organic clays of medium to high plasticity, organic silts                                                          |                                                                 |
| Highly Organic Soils                                                             |                                                                          |  | Pt                                                                                  | Peat, humus, swamp soils with organic contents                                                                     |                                                                 |
| Miscellaneous Fill                                                               |                                                                          |  | FILL                                                                                | Miscellaneous fill may belong in any division but is identified as FILL                                            |                                                                 |



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## **APPENDIX C**

### **LABORATORY SOIL TEST RESULTS**



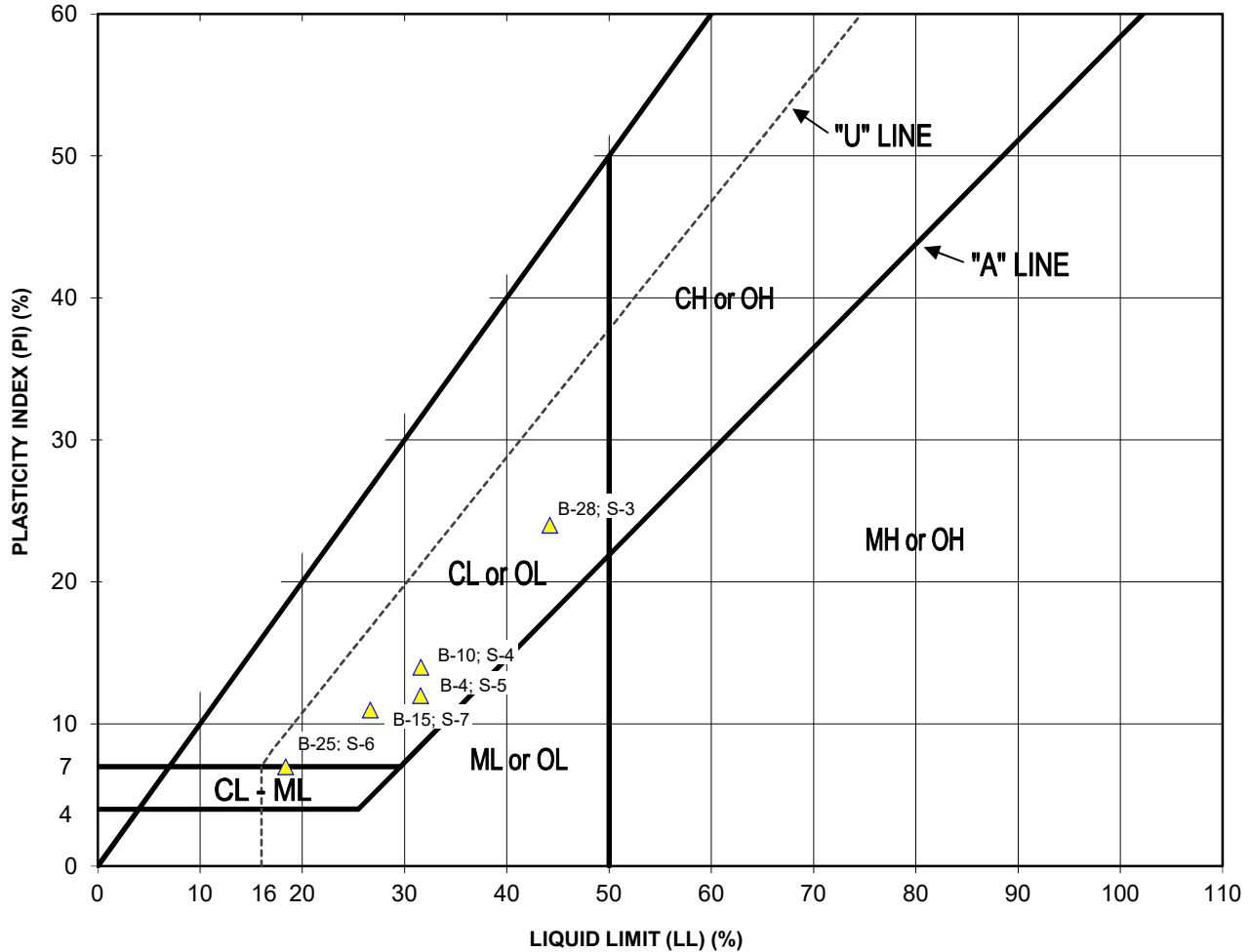
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Job No: 23-610

Project: Proposed Industrial Complex  
2 Bailey Avenue  
City of Buffalo, Erie Co., New York 14206

## Plasticity Chart ASTM D4318 & D2487



| Boring No. | Sample No. | Depth (ft.) | LL (%) | PL (%) | PI (%) |
|------------|------------|-------------|--------|--------|--------|
| B-4        | S-5        | 8-10        | 32     | 20     | 12     |
| B-10       | S-4        | 6-8         | 32     | 18     | 14     |
| B-15       | S-7        | 14-16       | 27     | 16     | 11     |
| B-25       | S-6        | 10-12       | 18     | 11     | 7      |
| B-28       | S-3        | 4-6         | 44     | 20     | 24     |



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Job No: 23-610  
Project: Proposed Industrial Complex  
2 Bailey Avenue  
City of Buffalo, Erie Co., NY 14206

## GRAIN SIZE ANALYSIS ASTM C136

C<sub>c</sub>= NA

C<sub>u</sub>= NA

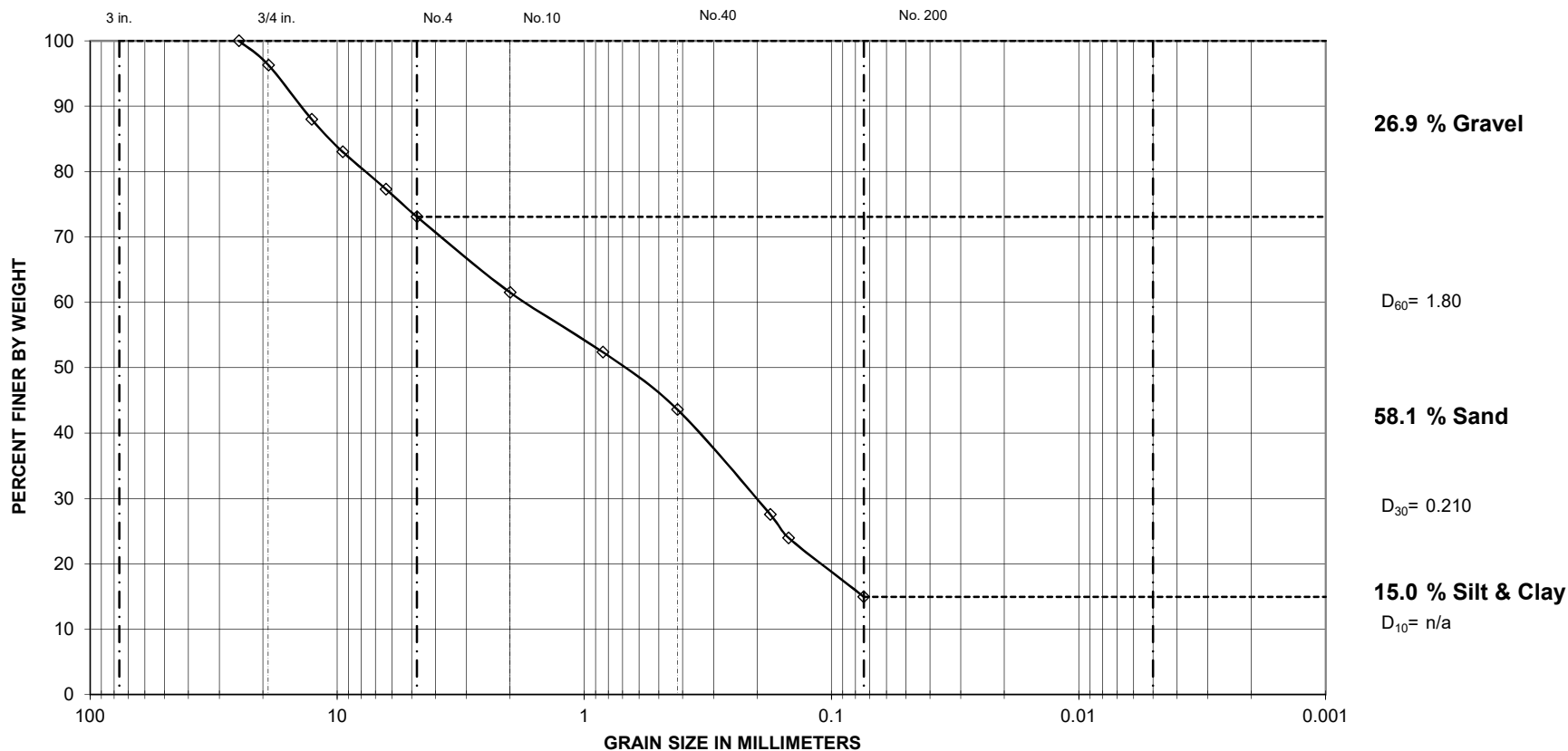
LL= NA

PL= NA

PI= NA

USCS= SM-Fill

### U.S. STANDARD SIEVE SIZE



| COBBLES | GRAVEL |      | SAND   |        |      | SILT | CLAY |
|---------|--------|------|--------|--------|------|------|------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |      |      |

Date Tested: March 15, 2024

Boring No.: B-8

Sample No.: S-1 to S-3

Depth: 0 to 6 ft.



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Job No: 23-610  
Project: Proposed Industrial Complex  
2 Bailey Avenue  
City of Buffalo, Erie Co., NY 14206

## GRAIN SIZE ANALYSIS ASTM C136

$C_c$  = NA

$C_u$  = NA

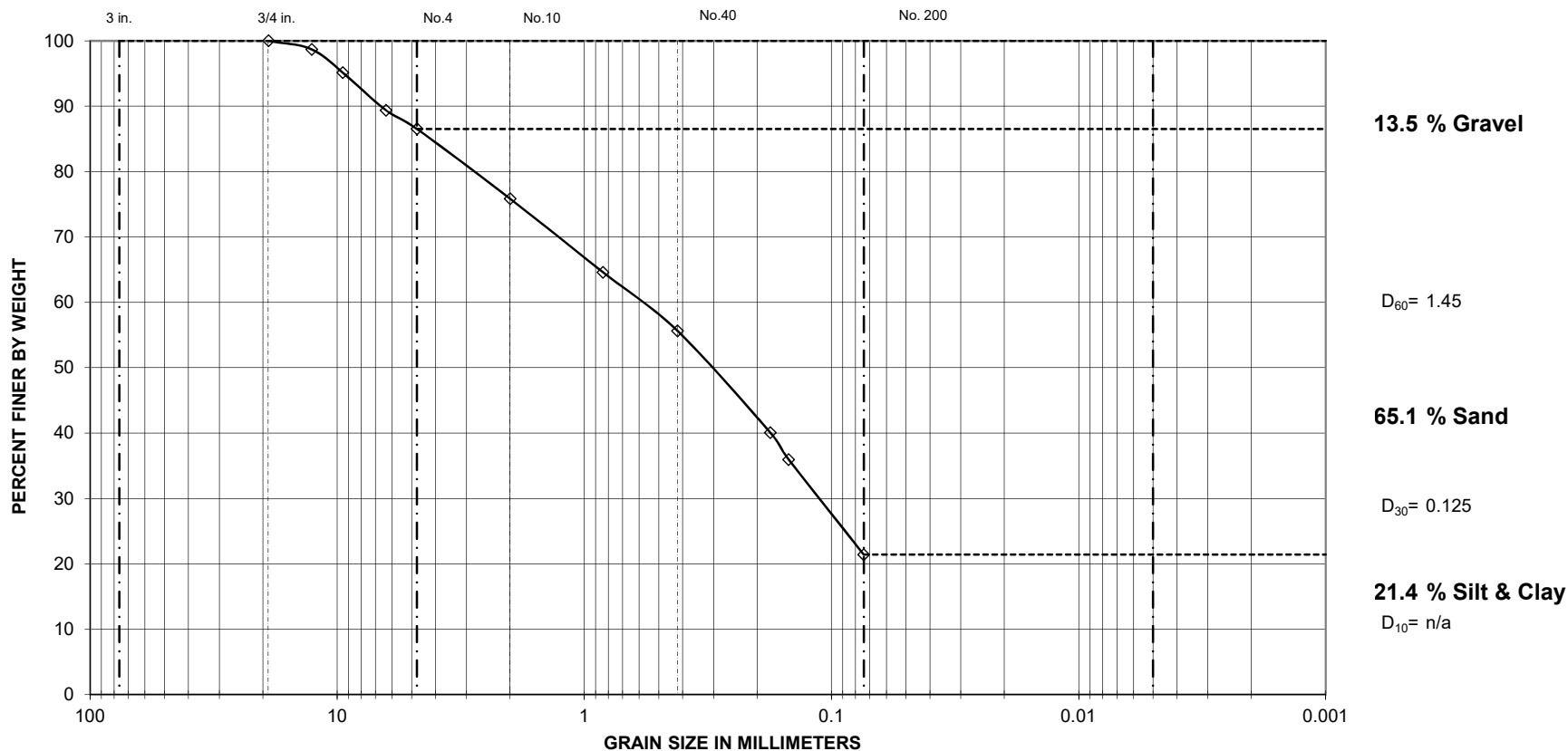
LL = NA

PL = NA

PI = NA

USCS = SM-Fill

### U.S. STANDARD SIEVE SIZE



| COBBLES | GRAVEL |      | SAND   |        |      | SILT | CLAY |
|---------|--------|------|--------|--------|------|------|------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |      |      |

Date Tested: March 15, 2024

Boring No.: B-24

Sample No.: S-1 to S-3

Depth: 0 to 6 ft.



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2 Bailey Avenue  
City of Buffalo, Erie Co., NY 14206

## GRAIN SIZE ANALYSIS ASTM C136

C<sub>c</sub>= NA

C<sub>u</sub>= NA

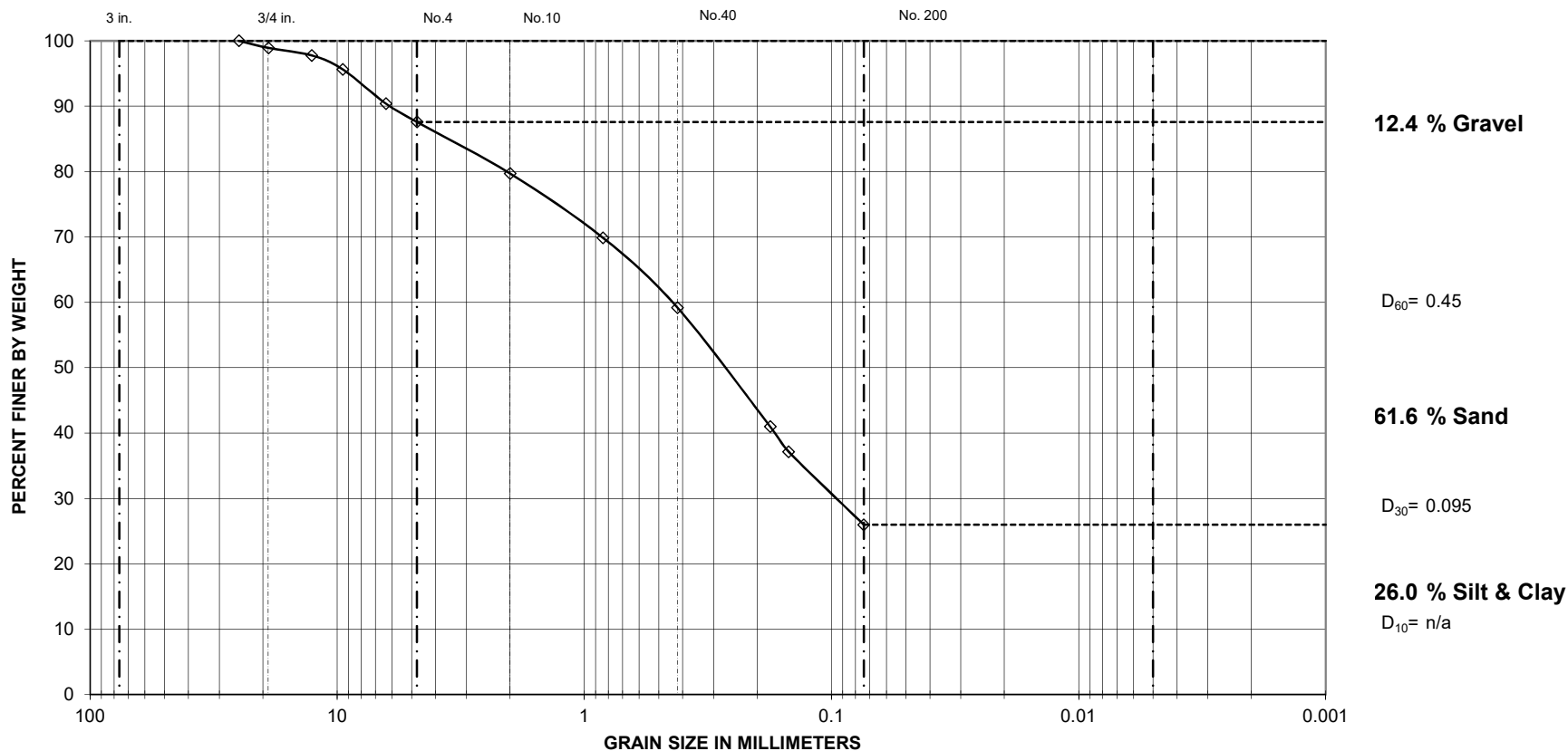
LL= NA

PL= NA

PI= NA

USCS= SM-Fill

### U.S. STANDARD SIEVE SIZE



| COBBLES | GRAVEL |      | SAND   |        |      | SILT | CLAY |
|---------|--------|------|--------|--------|------|------|------|
|         | COARSE | FINE | COARSE | MEDIUM | FINE |      |      |

Date Tested: March 15, 2024

Boring No.: B-30

Sample No.: S-1 to S-3

Depth: 0 to 6 ft.





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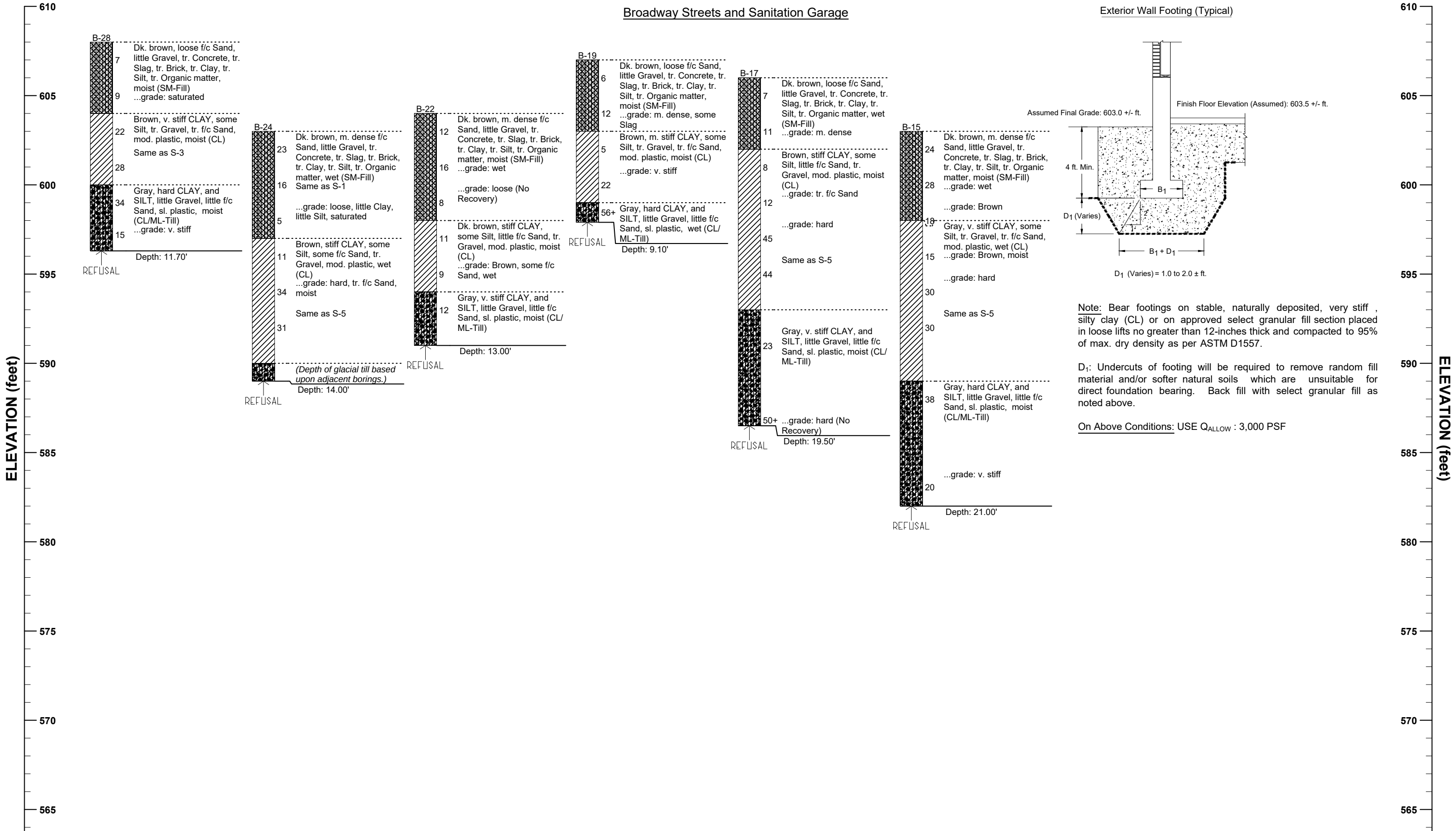
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## **APPENDIX D**

### **ENGINEERING COMPUTATIONS AND SCHEMATICS**

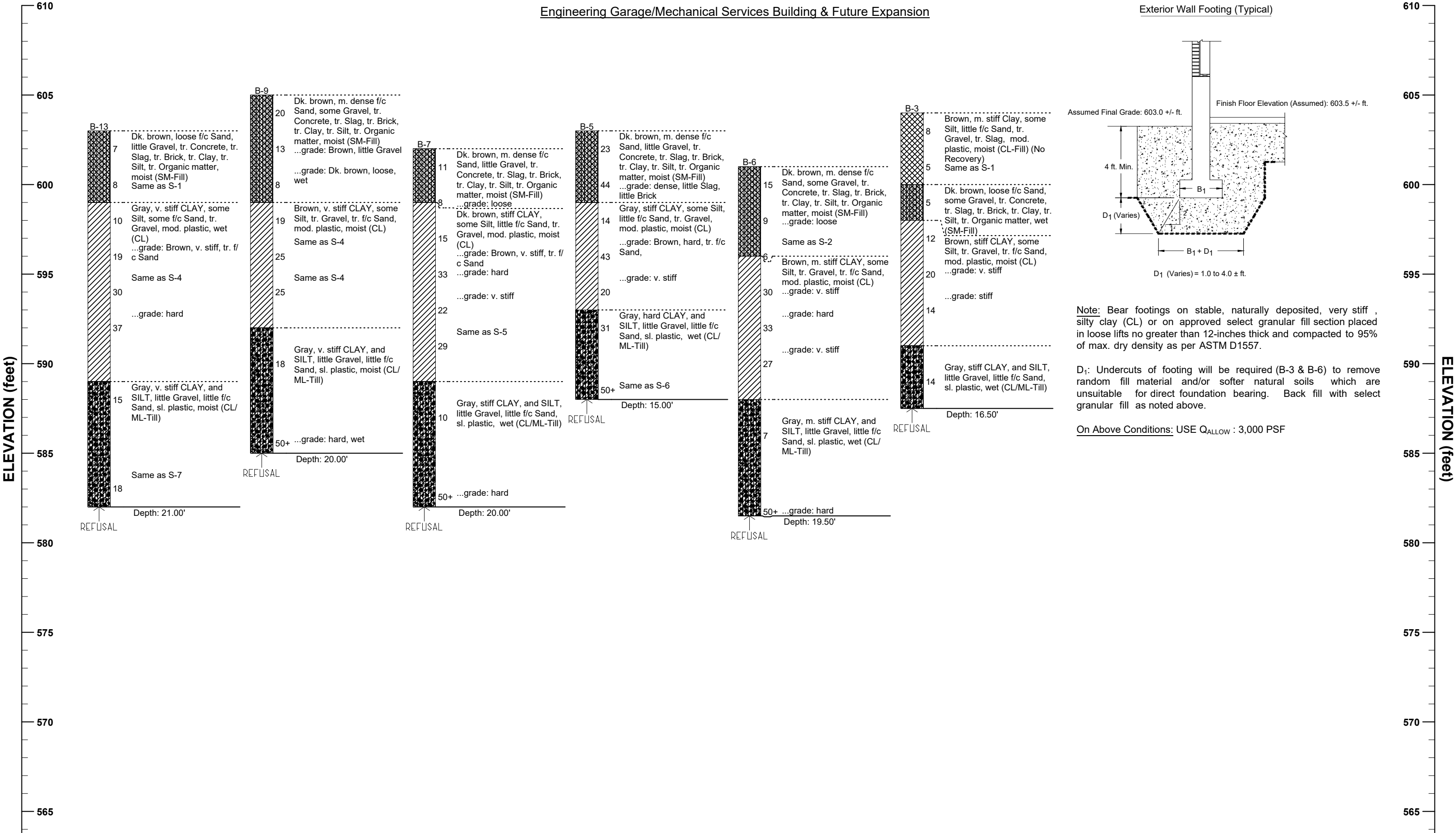
"PROFILE" OF BORINGS

Broadway Streets and Sanitation Garage



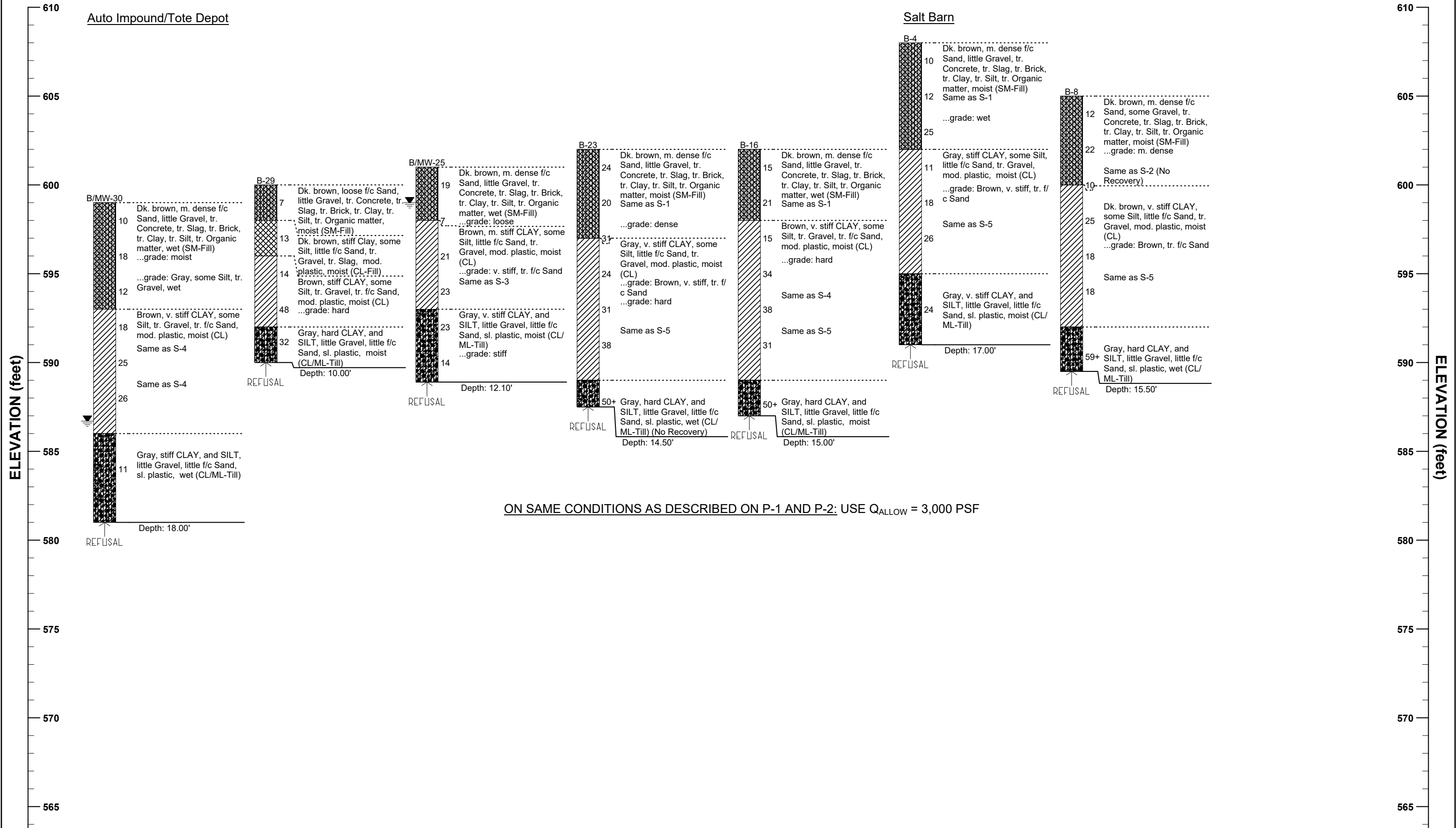
"PROFILE" OF BORINGS

Engineering Garage/Mechanical Services Building & Future Expansion



Sand Fill  
 Low plasticity clay  
 Cohesive Glacial Till  
 Fill  
 Drill rejection

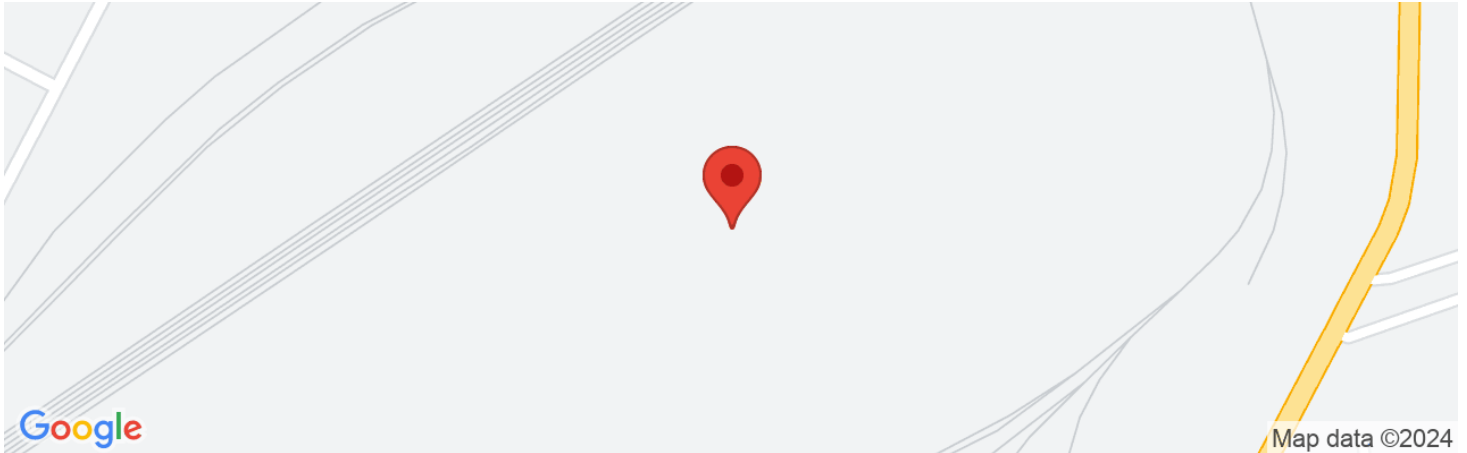
"PROFILE" OF BORINGS





## Proposed Industrial Complex, Bailey Ave., Buffalo, NY 14206

Latitude, Longitude: 42.8800, -78.8205



|                                |                       |
|--------------------------------|-----------------------|
| Date                           | 3/26/2024, 3:59:52 PM |
| Design Code Reference Document | ASCE7-16              |
| Risk Category                  | II                    |
| Site Class                     | D - Stiff Soil        |

| Type     | Value | Description                                    |
|----------|-------|------------------------------------------------|
| $S_S$    | 0.163 | $MCE_R$ ground motion. (for 0.2 second period) |
| $S_1$    | 0.044 | $MCE_R$ ground motion. (for 1.0s period)       |
| $S_{MS}$ | 0.261 | Site-modified spectral acceleration value      |
| $S_{M1}$ | 0.107 | Site-modified spectral acceleration value      |
| $S_{DS}$ | 0.174 | Numeric seismic design value at 0.2 second SA  |
| $S_{D1}$ | 0.071 | Numeric seismic design value at 1.0 second SA  |

| Type       | Value | Description                                                                               |
|------------|-------|-------------------------------------------------------------------------------------------|
| SDC        | B     | Seismic design category                                                                   |
| $F_a$      | 1.6   | Site amplification factor at 0.2 second                                                   |
| $F_v$      | 2.4   | Site amplification factor at 1.0 second                                                   |
| PGA        | 0.091 | $MCE_G$ peak ground acceleration                                                          |
| $F_{PGA}$  | 1.6   | Site amplification factor at PGA                                                          |
| $PGA_M$    | 0.145 | Site modified peak ground acceleration                                                    |
| $T_L$      | 6     | Long-period transition period in seconds                                                  |
| $S_{sRT}$  | 0.163 | Probabilistic risk-targeted ground motion. (0.2 second)                                   |
| $S_{sUH}$  | 0.171 | Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration  |
| $S_{sD}$   | 1.5   | Factored deterministic acceleration value. (0.2 second)                                   |
| $S_{1RT}$  | 0.044 | Probabilistic risk-targeted ground motion. (1.0 second)                                   |
| $S_{1UH}$  | 0.048 | Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration. |
| $S_{1D}$   | 0.6   | Factored deterministic acceleration value. (1.0 second)                                   |
| $PGA_d$    | 0.5   | Factored deterministic acceleration value. (Peak Ground Acceleration)                     |
| $PGA_{UH}$ | 0.091 | Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration        |
| $C_{RS}$   | 0.957 | Mapped value of the risk coefficient at short periods                                     |
| $C_{R1}$   | 0.934 | Mapped value of the risk coefficient at a period of 1 s                                   |
| $C_v$      | 0.7   | Vertical coefficient                                                                      |



**LATERAL EARTH PRESSURE ON GENERIC BLOCK FOUNDATIONS FOR SIGNS, FREE-STANDING RETAINING WALLS, OR BELOW GRADE/BASEMENT/TANK/POOL RETAINING WALLS (Less Than 20 Feet High)**

- a) Porous filter media, in contact with the basement/below grade foundation wall or retaining walls, protects and is in contact with a minimum 4 inch diameter perforated drainage pipes at the footing/base of the foundation/structural wall (exterior backfill side and interior basement side) and/or weep pipes through the wall, as needed and as applicable.
- b) Where recommended, a geotextile filter fabric will protect the gravel filter media from the earth backfill. Overlap unsewn seams as per the manufacturer's recommendations.
- c) Waterproof earth side of wall, as is customarily provided in practice.
- d) Drainage pipes are connected to an appropriately designed collector pipe, conveyance, and/or sump pump system as is applicable for the intended purpose of the wall and as customarily provided/installed in practice.
- e) For potential groundwater table conditions above the top of the basement slab-on-grade condition, install continuous waterstops (with no joints in stop) at wall and floor construction joints, as is customarily provided in practice. Interior intermediate drainage pipes beneath the slab, that are spaced on-center and in both directions, do appear to be needed.
- f) Assume a uniformly graded, clean coarse sand or sandy gravel backfills:
- \* equivalent N-value in a dense state:  $(N_1)_{60} = 40$  blows/foot
  - \* friction angle:  $\phi' = 38$  degrees {Teng, pg. 12}
  - \* average in-place densities: moist -  $\gamma_m = 120$  pcf
  - saturated -  $\gamma_{sat} = 132$  pcf
  - submerged -  $\gamma' = (\gamma_{sat} - \gamma_w) = 70$  pcf
- g) Assume at base of wall/footing, coefficient of friction against sliding ( $f_s$ ) at base of wall (Refer to Teng, pg. 320-1):
- $$f_s = \tan(0.58 \times \phi') = 0.40 \quad (\text{AREA silty soil to silty coarse-grained soil})$$
- h) Use equivalent fluid pressure design approach {Hough, pg. 249 and NAVFAC pg. 7-10-9}:
- \* at rest pressure coefficient -  $K_0 = 1 - \sin(\phi') = 0.38$
  - \* effective lateral pressure of soil -  $\gamma'_l = K_0 \times \gamma' = 26.6$  pcf
  - \* hydrostatic pressure -  $\gamma_w = 62.4$  pcf
  - \* equivalent fluid pressure with water level -  $\gamma_{eo} = \gamma'_l + \gamma_w = 89$  pcf (say 90 pcf)
  - at the top of the grade at the wall
  - \* equivalent fluid pressure with compaction induced lateral stress increase (W&F, pg 409)  $\gamma_{eo} = 2 \times K_0 \times \gamma_m = 91$  pcf (say 90 pcf)
  - \* active pressure case -  $K_a = [1 - \sin(\phi')] / [1 + \sin(\phi')] = 0.24$
  - $\gamma_{ea} = K_a \times \gamma_m = 29$  pcf (say 30 pcf)
  - \* passive pressure case -  $K_p = [1 + \sin(\phi')] / [1 - \sin(\phi')] = 4.2$
  - $\gamma_{ep} = K_p \times \gamma_m = 504$  pcf (say 330 pcf with a F.S. = 1.5)

|                                                                                                                                                                                                  |                                                                                                     | Thoroughly Compacted $\Rightarrow \Rightarrow$ | Uniformly Graded & Clean<br>Coarse Sand or Sandy Gravel Fill | Non-Plastic Silty Sand<br>or Sandy Silt Fill |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------|----------------------------------------------|
| USE: Earth Pressure Coefficient                                                                                                                                                                  | Static Active                                                                                       | =                                              | 0.24                                                         | 0.33                                         |
|                                                                                                                                                                                                  | Static At-Rest                                                                                      | =                                              | 0.76                                                         | 1.00                                         |
|                                                                                                                                                                                                  | Static Passive                                                                                      | =                                              | 2.80                                                         | 2.00 (with F.S. = 1.5)                       |
|                                                                                                                                                                                                  | Static Passive                                                                                      | =                                              | 4.20                                                         | 3.00 (with F.S. = 1.0)                       |
| USE: Equivalent Fluid Pressure                                                                                                                                                                   | Static Active                                                                                       | =                                              | 30 pcf                                                       |                                              |
|                                                                                                                                                                                                  | Static At-Rest                                                                                      | =                                              | 90 pcf (for rigid walls)                                     |                                              |
|                                                                                                                                                                                                  | Static Passive                                                                                      | =                                              | 330 pcf (with F.S. = 1.5)                                    | [ 500 pcf with (with F.S. = 1.0)]            |
|                                                                                                                                                                                                  |                                                                                                     |                                                |                                                              |                                              |
| <i>[For earthquakes, structural engineer may elect to use the above Static Passive case instead of the below Earthquake Lateral Load for Non-Yielding Wall movement into the soil backfill.]</i> |                                                                                                     |                                                |                                                              |                                              |
| USE: Simplified Model for Earthquake Lateral Load/Ft. Wall Length<br>@ 0.6 $H_{bw}$ above base. Loads for Non-Yielding Wall.                                                                     | Reduce load by 33% for Yielding Wall (active case)                                                  | =                                              | ( 6.8 psf / foot ) x $H_{bw}^2$                              | (NYS, $S_{ds} = 0.25$ g)                     |
|                                                                                                                                                                                                  | ( $\gamma_m = 120$ pcf for $S_{ds}$ value. Add to Static At Rest/                                   | =                                              | (13.5 psf / foot ) x $H_{bw}^2$                              | (NYS, $S_{ds} = 0.50$ g)                     |
|                                                                                                                                                                                                  | Active Pressure/Load for unsaturated backfill case )                                                | =                                              | (17.5 psf / foot ) x $H_{bw}^2$                              | (NEern NYS, $S_{ds} \leq 0.65$ g)            |
|                                                                                                                                                                                                  | [Above for Site Class C to E soils. Interpolate for other $S_{ds}$ values.]                         |                                                |                                                              |                                              |
|                                                                                                                                                                                                  | Use 1.75 x values for walls on Class B/A rock or on rigid foundation base. (FEMA NEHRP Guidelines)] |                                                |                                                              |                                              |
|                                                                                                                                                                                                  | Saturated/Liquified Soil During Earthquake                                                          | =                                              | 132 pcf                                                      |                                              |
| <i>(Equivalent Fluid Pressure. Add to inertial hydrodynamic pressure, not presented here.)</i>                                                                                                   |                                                                                                     |                                                |                                                              |                                              |
| <i>[For looser/denser backfills, adjust above pressures by the ratio = new density / 120 pcf or / 132 pcf (for saturated case)]</i>                                                              |                                                                                                     |                                                |                                                              |                                              |
| USE: Coefficient of Friction Against Sliding ( $f_s$ )                                                                                                                                           |                                                                                                     | =                                              | 0.45 (on compacted NYSDOT Item #304.12 or #304.14 gravels)   |                                              |
|                                                                                                                                                                                                  | (use lowest $f_s$ with no underlying weaker layers)                                                 | =                                              | 0.35 (on compacted granular soil & non-plastic silt)         |                                              |
|                                                                                                                                                                                                  |                                                                                                     | =                                              | 0.20 (slab-on-grade on polyethylene on granular fill)        |                                              |
|                                                                                                                                                                                                  | [with a F.S. = 1.0]                                                                                 | =                                              | 0.60/0.50 (on clean, rough, & sound bedrock/smooth bedrock)  |                                              |
| Min. Factor of Safety Against Sliding                                                                                                                                                            |                                                                                                     | =                                              | 1.5                                                          | [Rev.9-30-09]                                |



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## **APPENDIX E**

### **GENERAL EARTHWORK SPECIFICATION**



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### **GENERAL EARTHWORK SPECIFICATIONS**

#### **1. GENERAL**

##### **1.1. SITE AND SUBSURFACE CONDITIONS**

###### **1.1.1. Overview**

This specification is included as a courtesy to the clients of *Barron & Associates, PC* and addresses earthwork site preparation. Additions and modifications are necessary to create a job-specific specification. This specification may serve as a basis for the development for a technical specification under Division 31 (Earthwork) and Division 32 (Exterior Improvements).

###### **1.1.2. Site Conditions**

The site-specific conditions are described under separate cover or may be available from the OWNER.

###### **1.1.3. Subsurface Conditions**

The site-specific subsurface conditions are described under separate cover or may be available from the OWNER.

##### **1.2. REFERENCES**

###### **1.2.1. American Standard for Testing and Measurement (ASTM)**

- ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- ASTM D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- ASTM D7928 Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than 75- $\mu$ m (No. 200) Sieve in Soils by Washing
- ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>))
- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)



- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D1883 Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils

#### 1.2.2. Other

- 2018 International Building Code (IBC)
- 2020 Building Code of New York State
- 2020 Residential Code of New York State
- 2021 MasterSpec

### 1.3. DEFINITIONS

#### 1.3.1. Unacceptable Material

Soil material containing debris, wood, scrap material, vegetation, refuse, soft unsound particles, and other organic, frozen, deleterious, or objectionable materials. Contaminated soils shall be properly documented and removed or remediated on site. If necessary, remediation procedure will be defined by the OWNER.

#### 1.3.2. Unsuitable Material

Brown, organic topsoil and underlying soft pockets of organic silt or wet, reworked silty clay.

#### 1.3.3. Ordinary Fill

Friable soil containing no stone greater than two-thirds loose lift thickness and no unacceptable or unsuitable materials. In general, existing random fill is expected to be acceptable for reuse as ordinary fill given proper sorting, blending, drying, and controlled placement methods.

#### 1.3.4. Granular Fill

Ordinary fill meeting the designation of ASTM D2487 classification of GW with a maximum of 10 percent by weight passing ASTM D1140, No. 200 sieve.

#### 1.3.5. Select Granular Fill

Clean, uncoated soil which contains no unacceptable materials and conforms to the gradation requirements defined in Table A: Select Granular Fill.

| <b>Table A: Select Granular Fill</b>      |                                |
|-------------------------------------------|--------------------------------|
| <u>Sieve Size</u>                         | <u>Percent Finer by Weight</u> |
| $\frac{2}{3}$ of the loose lift thickness | 100                            |
| No. 10                                    | 30 - 95                        |
| No. 40                                    | 10 - 70                        |
| No. 200                                   | 0 - 15                         |

#### 1.3.6. Sand and Gravel

Clean, hard, durable, uncoated particle of sand and gravel, free from lumps of clay, containing no unacceptable matter, and conforming to gradation requirements of Table B: Sand and Gravel.

| Table B: Sand and Gravel |                                |
|--------------------------|--------------------------------|
| <u>Sieve Size</u>        | <u>Percent Finer by Weight</u> |
| *                        | 100                            |
| No. 4                    | 50 - 85                        |
| No. 10                   |                                |
| No. 40                   | 10 - 35                        |
| No. 100                  |                                |
| No. 200                  | 0 - 8                          |

\* Job-Specific. To be determined by the ENGINEER

#### 1.3.7. Crushed Stone

Clean, durable, sharp-angled fragments of rock or crushed gravel stone of uniform quality, containing no unacceptable matter, free from coatings, and conforming to gradation requirements of Table C: Crushed Stone.

| Table C: Crushed Stone |                                |                       |
|------------------------|--------------------------------|-----------------------|
| <u>Sieve Size</u>      | <u>Percent Finer by Weight</u> |                       |
|                        | <u>¾-inch Stone</u>            | <u>1 ¼-inch Stone</u> |
| 1 ½-inch               |                                | 100                   |
| 1 ¼-inch               |                                | 85 - 100              |
| 1-inch                 | 100                            |                       |
| ¾-inch                 | 90 - 100                       | 10 - 40               |
| ⅝-inch                 |                                |                       |
| ½-inch                 | 10 - 50                        | 0 - 8                 |
| ⅜-inch                 | 0 - 20                         |                       |
| No. 4                  | 0 - 5                          |                       |

#### 1.3.8. Flowable Fill

Also known as Controlled Low Strength Material – Controlled Density Fill (CLSM-CDF), this material is available under a variety of producer names (e.g., K-Krete®, M-Crete, Flash Fill®, Flowable Mortar, Unshrinkable Fill, etc.). This non-settling backfill mixture is most commonly used for its flowable characteristics, its support strength under traffic loads, and its removability at a later date. The material may be produced on-site or off-site. In either case, the producer

of such materials and the product must meet certain certification criteria. Such information is beyond the scope of this specification and will be considered on a site-specific basis.

Flowable fill may be acceptable for use as a backfill for utility trenches of other low-lying areas which require a compacted granular fill. Its use and warranty of performance is left to the CONTRACTOR in such applications.

The use of flowable fill under load-bearing structural components in place of properly placed and compacted granular fill is NOT common and is questionable. The localized use of such material may have profound effects on the performance of a foundation system. Site-specific conditions and the extent of anticipated use of flowable fill must be examined by geotechnical engineer. Cost of such consultation shall be borne by the CONTRACTOR unless specifically directed by the OWNER to seek such consultation. Without such consultation, warranty of performance for such use is left to the CONTRACTOR.

#### 1.4. SUBMITTALS

The following submittals shall be provided in accordance with approved submittals procedures.

- (1) Fill Source: Provide name and source locations of fill material.
- (2) Field Test Reports: Field tests will be performed by OWNER's Representative as needed. CONTRACTOR may be required to perform such tests on proposed off-site fill materials.
  - (a) Fill material grain size analyses per ASTM C136, D7928, D1140, D2487
  - (b) Moisture/Density test results per ASTM D2216
  - (c) Liquid limit, plastic limit, and plasticity index per ASTM D4318
  - (d) Compaction/Density test results per ASTM D6938 and D1557
- (3) Sample: Geotextile fabric

#### 2. PRODUCTS

Geotextile Fabric: Mirafi 600X or equal. (Also referred to as synthetic fabric).

#### 3. EXECUTION

##### 3.1. PROTECTION

###### 3.1.1. General

Manner of excavation shall minimize disturbance of underlying natural ground. If deemed necessary by the Engineer, alter construction procedures to reduce subgrade disturbance.

Excavate areas which have been excessively disturbed to firm ground and backfill with properly compacted granular fill.

#### 3.1.2. Roads and Walks

Keep roads and walks free of dirt and debris at all times.

#### 3.1.3. Trees, Shrubs, and Existing Facilities

Protect from any damage all vegetation and facilities identified to remain.

#### 3.1.4. Utility Lines

Locate all utilities within the area of disturbance prior to the start of work. Show locations on initial plans. Protect utility lines from damage. Notify the ENGINEER immediately of damage to or an encounter with an unknown utility. Damage to utility lines are to be repaired by the CONTRACTOR at no additional cost. The CONTRACTOR shall have underground utility owners stake out utility locations prior to the start of clearing and excavation operations.

### 3.2. VERIFICATION OF CONDITIONS / PROOF-ROLLING

Prior to placement of the initial layer of fill over the natural ground, proof-roll the exposed natural ground above the groundwater table elevation by making two passes with a fully-loaded ten-wheel truck. Excavate unstable areas detected by this process and replace with compacted granular fill.

### 3.3. PREPARATION

#### 3.3.1. Surface Preparation

Within the site limits indicated on the drawings, excavate all unsuitable material to firm natural ground in the manner specified herein. Follow a construction procedure which permits visual identification of firm natural ground. In the event that groundwater is encountered, the ENGINEER may require that the size of the open excavation be limited to that which can be handled by open pumping to allow visual inspection of the excavation bottom and the performance of backfill operations to be conducted in a dry state.

Excavation of unsuitable material shall be limited to the greater of the following:

- A distance of 5 feet beyond building lines or
- The area defined by a one-horizontal to one-vertical line sloping down from the outside bottom edge of exterior footings to firm natural ground.

### 3.4. PLACEMENT AND COMPACTION

#### 3.4.1. General

Place fill in accordance with Table D: Compaction Alternatives. These alternatives are provided as minimum compaction standards only and in no way relieve the CONTRACTOR of his obligation to achieve any specified degree of compaction by whatever means may be necessary.

Grade to provide positive drainage and a smooth surface which will readily shed water. To the extent practicable, compact each layer to the specified density on the same day placed. Place fill in horizontal layers. Where horizontal layers meet a natural slope, key layer into slope by cutting a bench.

Fill that is too wet for proper compaction: Disc, harrow, or otherwise dry to proper moisture content for compaction to the required density.

Fill that is too dry for proper compaction: Uniformly apply water over the surface of the loose layer in sufficient quantity to allow compaction to the required density.

| <b>Table D: Compaction Alternatives</b>                                                  |                           |                                              |                     |                                 |                     |
|------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------|---------------------|---------------------------------|---------------------|
| <u>Compaction Method</u>                                                                 | <u>Maximum Stone Size</u> | <u>Maximum Loose Lift Thickness (inches)</u> |                     | <u>Maximum Number of Passes</u> |                     |
|                                                                                          |                           | Below Structure and Pavements                | Less-Critical Areas | Below Structure and Pavements   | Less-Critical Areas |
| Hand operated vibratory plate of light roller in confined areas.                         | 3                         | 4                                            | 4                   | 4                               | 4                   |
| Hand operated vibratory drum rollers weighing at least 1,000 pounds in confined areas.   | 4                         | 6                                            | 8                   | 4                               | 4                   |
| Loaded 10-wheel truck or D-8 crawler.                                                    | 6                         | 10                                           | 12                  | 4                               | 2                   |
| Light vibratory drum roller; Min. weight at drum 8,000lbs; Min. dynamic force 10,000lbs. | 8                         | 12                                           | 12                  | 6                               | 2                   |
| Minimum vibratory drum; Min. weight at drum 10,000lbs; Min. dynamic force 20,000lbs.     | 8                         | 18                                           | 18                  | 6                               | 4                   |

### 3.4.2. Dewatering

Provide adequate pumping and drainage facilities to keep excavated areas sufficiently dry of groundwater and surface run-off. Dewatering shall avoid adversely affecting construction procedures or causing excessive disturbance of underlying natural ground. Drain all pumped water in such a manner as to avoid damage to adjacent property.

If requested by the ENGINEER, place a 6-inch to 12-inch layer of sand and gravel or crushed stone over the natural underlying soil to stabilize areas which have been disturbed due to groundwater seepage pressures and to expedite dewatering operations. Particular attention shall be given to areas under proposed foundations.

## 3.5. FIELD QUALITY CONTROL

### 3.5.1. Compaction Requirements

Allow the ENGINEER sufficient time to make necessary observations and tests. Base the degree of compaction on maximum dry density as determined by ASTM D1557. The minimum degree of compaction for placed fill shall be as indicated in Table E: Compaction Requirements.

| Table E: Compaction Requirements                                |                                              |
|-----------------------------------------------------------------|----------------------------------------------|
| <u>Area</u>                                                     | <u>Minimum Degree of Compaction (%)</u>      |
| Below foundation.                                               | 95                                           |
| Pavement and building subbase and base courses.                 | 95                                           |
| Below building slab base course and above bottom of foundation. | 92                                           |
| Below pavement subbase and base courses.                        | 90                                           |
| Trench backfill outside of building.                            | 90                                           |
| Trench backfill inside of building.                             | Refer to one of the above- listed categories |
| Ordinary fill within 5 feet of grade.                           | 90                                           |
| Vegetated areas below 5 feet of grade.                          | 85                                           |

### 3.5.2. Testing

Site work should be monitored and tested by geotechnical ENGINEER or his representative and in accordance with requirements of the design team to assure compliance with earthwork and foundation construction specifications.

The owner will retain a geotechnical ENGINEER or his representative to perform on-site observations and testing during this phase of construction operations. The geotechnical ENGINEER or his representative will:

- Observe excavation and dewatering of building and controlled fill areas;
- Observe backfill and compaction within building and controlled fill areas;
- Laboratory test and analyze fill material; and
- Observe construction – and performing water content, gradation, and compaction tests.

On a timely basis, the CONTRACTOR will receive copies of test results submitted to the OWNER. In addition, during construction the geotechnical ENGINEER will advise the OWNER and CONTRACTOR in writing of conditions which fail to conform to the Contract Documents. The CONTRACTOR shall take immediate action to remedy indicated deficiencies.

The geotechnical ENGINEER or his representative will not supervise or direct the actual work of the CONTRACTOR or employees and representatives of the CONTRACTOR. The presence of, observations by, and testing performed by the geotechnical ENGINEER or his representatives shall not excuse the CONTRACTOR from defects discovered in the work.



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## **APPENDIX F**

### **LIMITATIONS**



## **LIMITATIONS**

1. This report is based on the data that was obtained from the subsurface explorations and on the design of the proposed industrial complex as submitted to the geotechnical engineer. A geotechnical engineer, who is experienced in foundation construction and earthwork, should be engaged to review the final design and specifications in order to determine whether any change in concept may have any effect on the validity of the conclusions presented herein, and whether these conclusions have, in fact, been implemented in the design and specifications.
2. The subsurface conditions, including thickness, between the exploration locations are approximate and simplified representations of the strata and transitions. There is the possibility that variations in soil and rock conditions and boundaries will be encountered during construction. In order to permit correlation between the exploratory soil data and the actual soil conditions encountered during construction and so as to assess conformance with the plans and specifications as originally contemplated, it is recommended that a geotechnical engineer, who is experienced in foundation construction and earthwork monitoring, should be retained to perform continuous construction review during the site preparation and foundation construction operations.
3. The subsurface exploration logs and subsurface conditions may aid in estimating material quality and quantities, such as topsoil/organic matter, fills, natural soils, and rock, but are not to be relied upon as the exclusive means for bid preparation purposes. It is the responsibility of the contractor to perform any additional site examinations and explorations and to prepare an accurate bid.
4. Disclaimers:
  - a. In the event that any changes in the nature, design or location of the structure are planned, the conclusions that are contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are modified or verified in writing.
  - b. The geotechnical engineering report has been prepared for this project by Barron & Associates, P.C. This report is for assistance in design only and is not a sufficient basis on which to prepare an accurate bid.
  - c. This report has been prepared for the exclusive use of Uniland Construction Corporation of Amherst, New York, their client(s), and their designated design representatives, for specific application to the construction of an industrial complex at 2 Bailey Avenue, in the City of Buffalo, Erie County, New York and in accordance with generally accepted geotechnical engineering practice. No other warranty, expressed or implied, is made.