McMahon
& Mann

GEOTECHNICAL ENGINEERING ASSESSMENT REPORT – PARTS A AND B

NEW BILLS STADIUM

ORCHARD PARK, NEW YORK

***Prepared for*:**

Pegula Sports + Entertainment
Buffalo Bills, LLC
79 Perry Street, Suite 400
Buffalo, New York 14203

***Prepared by*:**

McMahon & Mann Consulting Engineeing and Geology, P.C.
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File: 22-011
JULY 2022

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July 26, 2022
File: 22-011
Sent via E-mail

Mr. Ron Raccuia
c/o Dave Hatheway, Legends Project Development
Pegula Sports + Entertainment
Buffalo Bills, LLC
79 Perry Street, Suite 400
Buffalo, New York 14203

RE: Geotechnical Engineering Assessment Report – Parts A and B,
New Bills Stadium,
Orchard Park, New York

Dear Mr. Raccuia:

McMahon & Mann Consulting Engineering and Geology, P.C. (McMahon & Mann) has prepared this report to Pegula Sports + Entertainment (PS+E) describing our findings from the subsurface explorations and field and laboratory testing programs and our geotechnical design and construction considerations for the proposed stadium in Orchard Park, New York.

We appreciate the opportunity to work on this project and are available to discuss this information or to answer questions.

Sincerely yours,

McMAHON & MANN CONSULTING ENGINEERING AND GEOLOGY, P.C.

Jon K. Whiting, E.I.T.

Todd Swackhamer, P.E.

Enclosure

GEOTECHNICAL ENGINEERING
ASSESSMENT REPORT
PART A

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PRELIMINARY GEOTECHNICAL ENGINEERING ASSESSMENT REPORT NEW BILLS STADIUM ORCHARD PARK, NEW YORK

1.0 INTRODUCTION

The Buffalo Bills, LLC (Team) is planning on building a new stadium to replace Highmark Stadium in Orchard Park (refer to Figure 1 for a site location map). The Team has engaged Legends Project Development (LPD) to coordinate the planning, design, and construction of the facility. To date, the design team consists of Populous as the stadium architect, Walter P. Moore (WPM) as the structural engineer, and McMahon & Mann Consulting Engineering and Geology, P.C. (McMahon & Mann) as the geotechnical engineer.

The new stadium will be located on the west side of Abbott Road, across from Highmark Stadium. The playing field will be roughly oriented in a north-south direction, parallel to Abbott Road. The site is currently occupied by event parking lots and athletic fields on the campus of Erie Community College – South Campus (ECC). We understand that the ground surface slopes down approximately 14 feet from north to south in the area of the proposed new stadium.

Based on conversations with the design team, we understand that, conceptually, the new stadium will be an open-air, approximately 1.35 million square-foot structure that will seat approximately 60,000 people. A few options are being considered for the stadium's configuration. The first option is a stadium with its playing field depressed below the existing grade. This stadium configuration will consist of at least five levels, with possibly a sixth level around only a portion of the stadium. The main concourse will be at roughly the existing grade at either the second or third level. As such, we understand that the playing field will be approximately 20 feet below existing grade at the south end of the new stadium and 35 feet below grade at the north end [at about elevation (El.) 735] due to the differences in the ground surface elevation at the site.

Another option is to have the playing field near the existing grade at about El. 755. Although this option has not been developed to the extent as the first, the idea is that this option will require significantly less excavation and dewatering.

The project will also consist of an auxiliary building to provide event staging and storage to support stadium operations. This building will be a single-story, 75,000 square-foot (minimum), rectangular building to be located south of the new stadium. LPD indicated that a second story might be added to this structure during the program or design phase that could bring its size to up to 150,000 square feet.

LPD has requested that McMahon & Mann collect available information about the site and existing stadium and summarize our assessment of the site to understand how the ground conditions will impact the design, construction, and performance of the new stadium. This is referred to as "Part A" of the geotechnical portion of the project.

To accomplish this, McMahon & Mann completed the following:

1. Reviewed its project records for subsurface data collected at Highmark Stadium and the surrounding area,
2. Visited Highmark Stadium to meet with stadium operations personnel to discuss the existing stadium, collect available subsurface data and historical information, and observe site and stadium conditions,
3. Considered the anticipated conditions at the proposed new stadium site and the implications for design and construction of the new structures, and
4. Prepared this report summarizing the information collected and our opinion on its implications for design and construction of the new stadium.

The next part of the project (Part B) will include geotechnical explorations of the proposed site, laboratory and field testing, analyses, and recommendations for conceptual design of the stadium, auxiliary building, and support structures.

2.0 INFORMATION REVIEWED

McMahon & Mann reviewed the following information in preparation of this report:

- Historical photographs of stadium construction, from 1972 and 1973, provided by Team personnel,
- Excerpts from the original stadium plans, including subsurface boring logs and plans depicting a portion of the proposed stadium site,
- Bid Package No. 3 Foundation Work (Contract C-301) Practice Fieldhouse at Rich Stadium, February 1995,
- “Proposed Practice Building Rich Stadium Geotechnical Analysis and Foundation Report” Glynn Geotechnical Engineering, January 1995,
- “Geotechnical Engineering Report Erie County Stadium Lease Improvements” McMahon & Mann Consulting Engineers, P.C., May 1998,
- “Geotechnical Engineering Report Erie County Stadium Lease Improvements Projects New Training Facility / Operations Facility” McMahon & Mann Consulting Engineers, P.C., August 1998,
- “Geotechnical Evaluation Report for Proposed Operations Building” Empire Geo-Services, Inc., May 2013,
- “Geotechnical Evaluation Report for Proposed Commissary Building” Empire Geo-Services, Inc., May 2013,
- “Geotechnical Evaluation Report for Proposed Team Store” Empire Geo-Services, Inc., May 2013,
- “Geotechnical Evaluation Report for Proposed Entry Gates” Empire Geo-Services, Inc., May 2013,
- “Geotechnical Evaluation Report for Proposed Training Facility Additions” Empire Geo-Services, Inc., June 2013,
- “Geotechnical Evaluation Report for Proposed Video Boards” Empire Geo-Services, Inc., June 2013,

- "Geotechnical Evaluation Report for Proposed Monumental Stairs" Empire Geo-Services, Inc., March 2014, and
- Geotechnical Engineering Report New Era Field Training Facility Addition" McMahon & Mann Consulting Engineering and Geology, P.C., July 2018.

3.0 SITE CONDITIONS

3.1 GENERAL SITE CONDITIONS AND TOPOGRAPHY

The existing stadium and supporting structures are located on the east side of Abbott Road between Southwestern Boulevard (US Route 20) and Big Tree Road (US Route 20A). The proposed new stadium will be located across Abbott Road, directly to the west of Highmark Stadium. Erie Community College's South Campus (ECC) borders the west side of the proposed stadium site. Refer to Figure 2 for a site plan showing the Highmark Stadium site, the proposed site, and the surrounding area.

Excluding the stadium and support structures, the ground surface at the Highmark Stadium site (east of Abbott Road) is generally covered with paved parking lots. Various landscaped or grass covered areas are present but take up a small proportion of the site. A valley containing Smoke Creek, which flows from south to north, borders the east side of the site.

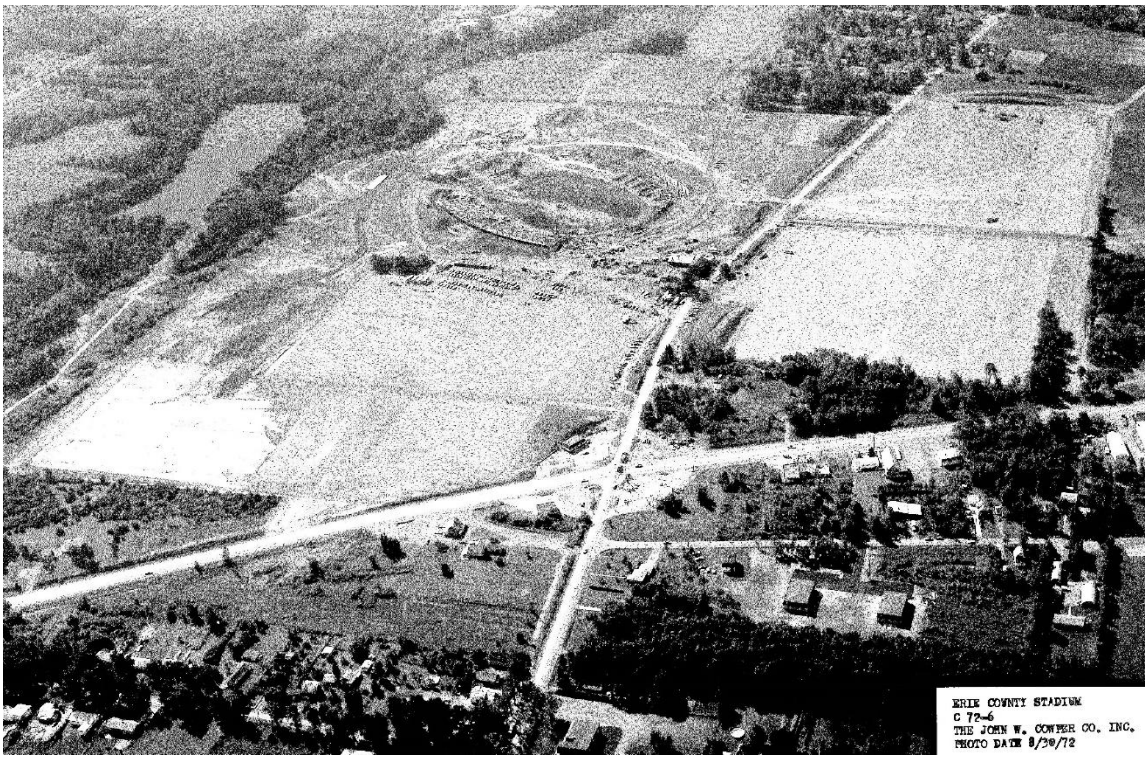
The proposed stadium site is mostly covered by paved parking lots with the western side covered by athletic fields. A bath house for overnight parking is located near the south end of the site.

The ground surface slopes away from Abbott Road to the east and west. On the east side of Abbott Road, it generally slopes down from between El. 760 to 770 (at Abbott Road) to the top of the Smoke Creek valley (on the east side of the stadium) at about El. 750, and then down the steep valley sides to about El. 710 at the creek.

On the west side of Abbott Road, the ground surface slopes from its highest at about El. 760 to 770 to about El. 750 on the west side of the proposed site. The ground continues to slope downward to the west to about El. 720 on the west side of the ECC campus. The proposed site also slopes from north to south within the footprint of the new stadium, from a reported El. 772 to El. 758. Surface water at this location is collected in drop inlets.

3.2 HIGHMARK STADIUM

Highmark Stadium (originally Rich Stadium) was constructed in the early 1970's. It is partially buried below the surrounding ground surface, with the playing field at around El. 720. Construction photographs show that most of the excavation was in rock. Most of the stadium, including the 100 level and footings for heavier structures (upper deck, restroom towers, light towers, field house) are generally supported directly on the rock. Lighter structures (stairways, foundations for the Team Store and administrative buildings) are typically supported on native soil or fill. In speaking with stadium operations personnel, they reported that they knew of no major settlement issues with the existing structure.



Aerial view of Highmark Stadium (originally Rich Stadium) during construction in 1972. This view is looking from north to south. The proposed site is in the fields on the right side of Abbott Road (vertically bisecting the photograph). Southwestern Boulevard is in the foreground and Smoke Creek can be seen on the left side of the photograph.

The below-grade portion of the stadium bowl is drained by gravity through pipes leading to Smoke Creek. Team personnel indicated that flow from the drainage system continues year-round, even during seasonally dry seasons. However, they also indicated that this system has seemed to be sufficient to keep the stadium and playing surface drained.

Team personnel reported that they have frequently seen a silty discharge coming from various below-grade drainpipes around the site, including the tunnel area on the southeast end of the stadium, where it was creating voids behind the tunnel concrete. Rehabilitation of the tunnel to fill the void areas and limit further erosion, by placing screens over the drain pipe outlets, occurred several years ago and appeared to be effective.

4.0 SUMMARY OF SUBSURFACE CONDITIONS

4.1 GEOLOGIC SETTING

Understanding the geological history of the area surrounding the proposed new stadium is important at this stage of the project as it informs us as to what we expect to find during the subsurface exploration program. Further, the elements described below need to be considered to ensure the efficient and successful design and construction of the new stadium.

This section begins with a discussion about the formation of the rock found beneath the site, provides a brief narrative of the relevant tectonic history that stressed and strained the rock, and describes the surface processes that placed soil over top of the rock.

4.1.1 Bedrock Geology

The ground beneath the proposed stadium has a mantle of glacial till soil resting on top of Devonian-age sedimentary rock. The rock types vary with depth and lateral extent, but shale is the most predominant rock type. The shale is made of thin beds, commonly less than an inch thick, that are stacked together into units ranging up to 15 feet thick. Occasional layers of harder limestone are encountered between shale beds, typically occurring in single beds ranging from 4 to 18 inches thick.

Thin-bedded and jointed shale exposed in a mechanical room at the existing stadium, approximately 1,000 feet east of the proposed stadium. Similar rock mass conditions are expected at the proposed stadium location.

The shale in the area is derived from clay or silt that were subjected to pressure from being buried beneath subsequent sediments. The burial pressure converted the clay or silt into shale. This process leaves the shale in a “fissile” state, meaning that the shale can be broken along existing planes with relative ease. The limestones in the area were cemented by calcium carbonate and they are harder to break compared to the shale. Both the shale and limestone are horizontally bedded.

During a site visit, we were able to observe an exposure of the shale rock in a mechanical room on the western side of the stadium. The photograph above shows the thin-bedded nature of the shale rock below the weathered zone.

4.1.2 Tectonic History

Western New York is several hundred miles inland from the passive continental margin of the east coast of North America. The tectonic forces that built the Appalachian Mountains also uplifted the rock of Western New York into an elevated plateau but left the horizontally bedded sedimentary rock relatively undeformed compared to the folded-rock belt regions to the southeast in Pennsylvania.

Past tectonic forces caused the beds to tilt slightly downward toward the south at an average of 30 feet per mile. The same tectonic forces broke the rock into systematic patterns of joints. The joint patterns correlate to the direction of the tectonic forces, which at the proposed stadium site caused one prominent joint set approximately east-west and another prominent set approximately north-south. Intersecting joints effectively reduce the effort required to excavate the rock.

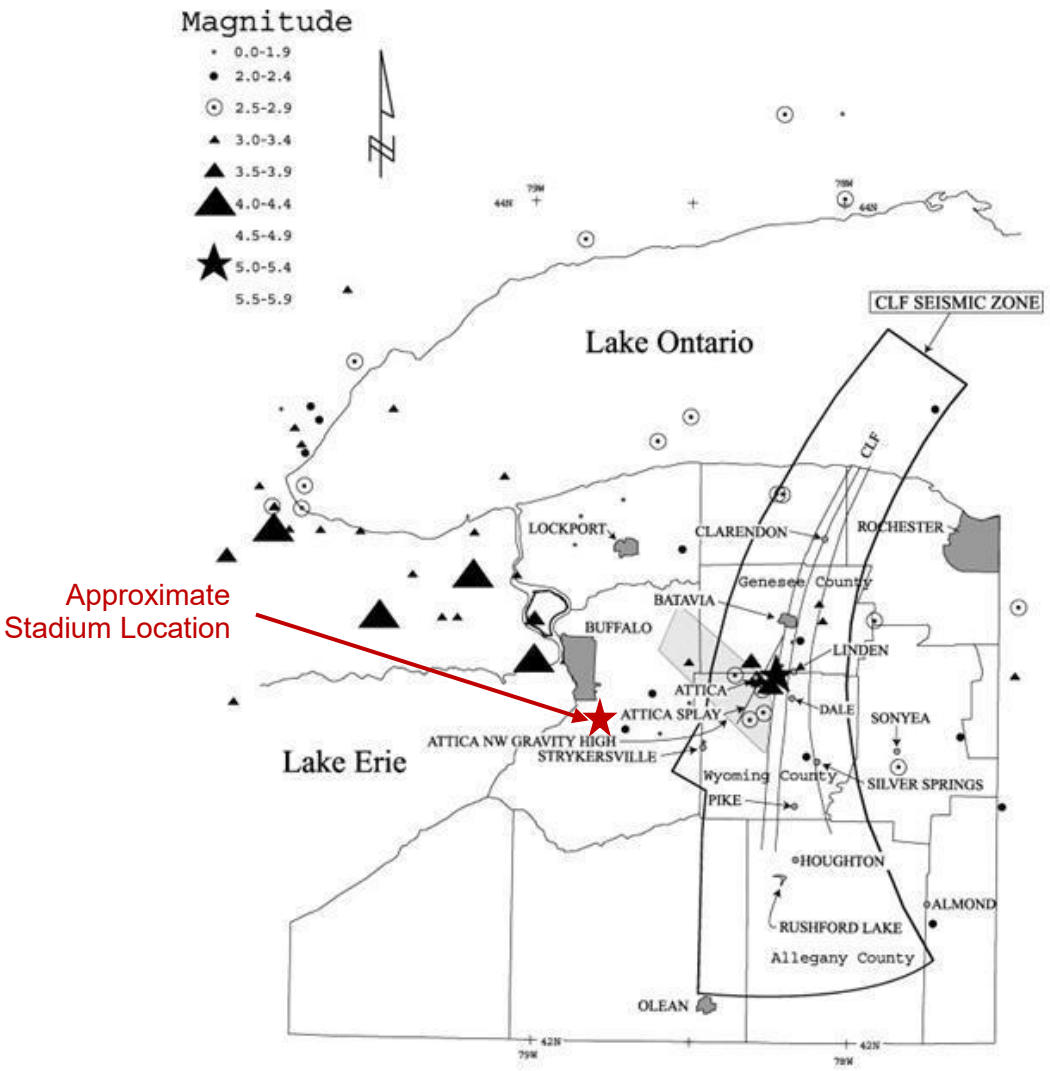
4.1.3 Regional Seismicity

Western New York experienced a series of continental-scale glacial oscillations (i.e., north-to-south advances and then retreats). As thick ice advanced into the area, the earth’s crust subsided from the massive weight. The glaciers deposited a mantle of soil over top of the Devonian shales and limestones (i.e., the glacial till). The most recent glaciers melted and retreated from the area at least 12,000 years ago.

Seismic activity in the area is often attributable to the surface of the earth rebounding since the glaciers retreated and the load was removed. Seismic events in this region, though minor, are concentrated on the Niagara Peninsula and within the Clarendon-Linden seismic zone as shown in the map below. The stadium is several miles away from these areas.

The stadium personnel recalled three notable seismic events over the last few decades. They indicated that they know of no damage caused by these events.

In our opinion, the seismic setting of the site needs to be considered but will not likely drive the overall design of the stadium. Anecdotally, only minor, if any, damage to local structures has been attributed to seismic activity.



Western New York map showing the Clarendon-Linden seismic zone (excerpted from the New York State Department of Transportation Geotechnical Design Manual).

4.2 SITE SPECIFIC INFORMATION

A review of the available boring information shows that the subsurface conditions observed at the stadium are consistent with our understanding of the geologic setting. Generally, the stadium site is underlain by varying amounts of fill soil over glacial till. The glacial till is underlain by shale bedrock. The shale can be generalized as being "weathered" or "competent", with the softer, more fractured weathered shale directly below the till and the harder, competent shale below the weathered zone. The transition between weathered and competent shale is often gradual and can be difficult to distinguish.

4.2.1 Soil and Rock Descriptions

Fill soils, primarily consisting of sand, silt, and shale stone fragments, were observed in all of the borings across the site. The depth of the fill varies from typically just a few feet (2 to 4 feet) under parking lots to upwards of 40 feet in some locations close to Highmark Stadium, where fill was placed to level the site (particularly closer to the Smoke Creek Valley) during construction to accommodate the stadium.

The glacial deposits observed in the borings consist primarily of sandy silt or silty sand with varying amounts of gravel and shale stone fragments. Observations of this layer, and similar formations in this region, generally indicate that these are dense to very dense soil deposits.

The weathered shale rock was observed below the native glacial deposits in nearly all borings. This layer is distinguished by generally being easy to auger through and sample using split-spoon samplers, which are typically used to sample soil. The rock crumbles easily during sampling. Based on the sampling efforts and observations recorded, the weathered shale has properties close to hard/very dense soil. According to the boring logs reviewed, the weathered shale ranged in thickness from non-existent to about 12 feet, but is typically 4 to 6 feet thick.

Horizontally bedded “competent” shale rock underlies the weathered shale zone. This is distinguished as causing refusal to advancing augers and requiring rock coring to collect samples. It is much harder than the weathered zone and samples are generally collected intact.

The quality of the competent shale appears to increase with depth. Unconfined compressive strength values obtained from laboratory testing of rock core samples from the data reviewed ranged from 3,880 pounds per square inch (psi) to 17,740 psi, with most values falling between 4,000 and 9,000 psi, indicating very hard rock[1]. The rock specimens with higher unconfined compressive strengths are likely limestone inclusions.

4.2.2 Groundwater Conditions

We understand that groundwater in the area of the existing stadium generally flows either to the stadium drainage system or directly to Smoke Creek, with flow primarily occurring through the relatively permeable weathered rock layer or through the joints in the more competent rock. Measurements of two groundwater monitoring wells that were installed in 2014 (since decommissioned) show that groundwater is in, or within a few feet of, the weathered rock layer near the existing stadium, approximately between EL. 740 and El. 750.

[1] “Geological Factors Significant in the Assessment of Rippability”, J.M. Weaver, Civil Engineer in South Africa, December 1975

The measurements also show that groundwater is influenced by the presence of the Smoke Creek valley. We expect that water flows downward toward the valley and creek. This was confirmed by the lower levels measured in the monitoring well closer to the creek.

Measurements made during drilling, which are less reliable but still valuable when considered in aggregate for identifying groundwater trends, support the observations from the groundwater monitoring wells. These measurements show that water levels dropped in borings made closer to the stadium, indicating that the stadium drainage system acts as a sink and locally depresses the groundwater levels.

A 48-inch diameter culvert, with an invert approximately 8 feet below grade and oriented east to west along Bills Drive, reportedly flows year-round, indicating relatively shallow groundwater levels.

We estimate that the groundwater table will roughly coincide with the weathered rock layer at the proposed stadium site, likely a few feet deep. This is consistent with observations made by stadium personnel of signs of shallow groundwater (e.g., slow drainage, water flow in shallow drop inlets, etc.) at the proposed site.

4.2.3 Subsurface Geometry

Using the information collected from the available borings and topography obtained from Google Earth, we created a subsurface cross section across the site (east to west) from Smoke Creek to the west side of the proposed stadium location (see Figure 3, attached). The boring data is concentrated on the east side of the section, near Highmark Stadium, but shows trends that provide clues as to what we expect to encounter at the proposed stadium.

The most significant trend relates to the surface of the rock from east to west. The borings show that the top of rock is getting deeper toward the east and Smoke Creek. This is expected, as the creek has eroded the rock to form the valley. These also show that the rock surface is trending upward from east to west and that the top of rock could be within a few feet of the existing ground surface at the proposed site. This is consistent with stadium operations personnel's observations of encountering shale rock just a few feet deep during excavation of the foundations for the bath house on the west side of Abbott Road (south of the proposed stadium site).

The data and information provided show that the proposed stadium location is likely underlain by a few feet of fill and glacial till over 4 to 6 feet of weathered shale. We estimate that competent shale will be encountered 10 to 20 feet deep at this location and limestone might be encountered within the shale.

5.0 ENGINEERING IMPLICATIONS

Based on the information collected and our understanding of the project, it is our opinion that the most significant subsurface conditions that will affect design, construction, and operation of the new stadium will be the geometry and condition of the rock and the

elevation of groundwater. This section presents our opinion of how this will affect the excavation for the stadium, temporary and permanent dewatering issues, foundations of the existing stadium and support structures, and retaining structures. These will be described with respect to both stadium options currently being considered, the “depressed configuration” with the playing surface around El. 735 and the “at-grade configuration” with the stadium constructed close to existing grade with the playing surface around El. 755.

5.1 EXCAVATION CONSIDERATIONS

Excavations will be required for both stadium configurations, but we expect that both will extend into the competent shale at least at some locations. The fill soil, glacial till, and weathered shale will all be relatively easy to excavate with standard equipment.

Though more difficult than the soil and weathered zones, the fissile nature of the competent shale makes the rock easier to excavate than harder rock types. The tightly spaced joint patterns in the rock combine to make excavation less difficult than a more massive (i.e., less jointed) rock. Our experience is that it can be removed using excavators, possible with a hydraulic hammer attachment at some locations, but may also be rippable by a large bulldozer.

We expect that the thinner (generally less than 2 feet deep) beds of limestone will be harder to excavate but can also be removed using an excavator with a hydraulic hammer attachment. Identifying the frequency and depths of these zones will be part of the subsurface exploration program planned for Part B.

If the quality of the shale improves such that it is increasingly difficult to excavate, or that the limestone layers become thicker and harder than expected, portions of these formations can be blasted. Though not ordinarily required for most excavations in shale to the depths expected for either option, blasting is viable in Western New York to fracture harder formations. There are local contractors that are equipped to use this technique. Blasting would add some costs to the excavation, but these are not expected to be prohibitive considering the scale of the project.

5.2 GROUNDWATER CONSIDERATIONS

Based on the information available, we estimate that groundwater could be within a few feet of the existing ground surface at the proposed stadium site. As described above, groundwater has been observed to be near the top of the weathered shale at the Highmark Stadium site. At the new facility, we expect groundwater to flow into the stadium excavation through the weathered shale and along the horizontal bedding planes and along the joint patterns of the competent rock.

In our estimation, both temporary and permanent dewatering systems will be required to some extent with both configurations. However, it will be more substantial for the “depressed configuration” where the excavation will be about 20 feet deeper.

Dewatering should begin before excavations are advanced below the weathered shale. Although data on the permeability of the formations below the site aren't available, it's plausible that groundwater will be entering the stadium excavation faster than it can easily and cost effectively be pumped, especially as the excavation becomes deeper. However, since the elevation of both configurations set the playing field subgrade above the level of Smoke Creek, we recommend draining the site by gravity.

Gravity draining will require coordination and planning but can be used for the temporary and permanent cases for both configurations. Drainage pipes should be installed in advance of the stadium excavation. The pipes need to extend from the stadium subgrade, below Abbott Road, to the creek. These will need to be placed in a trench, most of which will be excavated in rock.

Alternatively, the pipes might be able to be installed with directional/horizontal drilling techniques. If the pipes will need to be larger than a few feet in diameter, directional/horizontal drilling might not be a viable option.

More information is required to characterize the permeability of the rock and groundwater levels. Data for this will be collected for Part B. This will help us better estimate the dewatering efforts that will be required.

Shallower excavations, such as those for support structures or for shallow footings might be able to be temporarily dewatered by pumping.

5.3 FOUNDATION TYPES

We estimate that the new stadium, the auxiliary building, and other support structures can be supported by spread footings bearing on either glacial till, weathered shale, or competent rock. Most of the stadium foundations for the "depressed configuration" will likely be deep enough to bear directly on competent rock. The bearing materials for the "at-grade configuration" will depend on the foundation loading, depth of the structure, and geometry of the subsurface conditions.

The allowable bearing capacities will depend on the bearing material, the geometry of the footing, and the bearing elevation. A review of reports prepared for the Highmark Stadium site indicate that footings bearing on the till or weathered rock should be designed for a net allowable bearing pressure of 6,000 to 8,000 pounds per square foot. We anticipate that footings bearing on competent rock will be greater than that value.

Shallow spread footings will provide little, if any, resistance to uplift forces. This resistance might be required for lighter structures such as the auxiliary building, light posts, or other support structures. Drilled piers, or caissons, socketed into competent rock could be used to provide uplift resistance, if necessary.

5.4 RETAINING STRUCTURES

Permanent retaining structures might be required, particularly if the "depressed configuration" is selected. Retaining walls that can't economically be cantilevered, or supported internally with floor slabs acting as struts, should be tied back. Tie backs should be anchored into competent rock.

The "at-grade configuration" should have shorter retaining structures, most of which could be designed as cantilevered or gravity walls.

All retaining walls should be designed to collect groundwater and direct it to the permanent dewatering system.

6.0 CONCLUSION

Based on the data and information available to review, it is our opinion that both stadium configurations, the "depressed" and "at-grade", are feasible from a geotechnical standpoint. Excavation efforts and quantities and dewatering efforts will be greater with the "depressed configuration", but we do not expect that this effort will be prohibitive. Conditions will be similar to those encountered at Highmark Stadium, which was constructed successfully in the 1970's. A benefit of the "depressed configuration" is that it will provide opportunities to support the stadium structure on more competent rock with little, if any, additional excavation.

7.0 NEXT STEPS

The next phase of this project (Part B) begins with a subsurface exploration and laboratory testing program. These programs will include drilling about 33 bore holes, collecting soil and rock samples, installing groundwater monitoring wells, and laboratory testing selected soil and rock samples.

We've prepared a proposed boring location plan for the Part B explorations (refer to Figure 4). These are based on the most current stadium and auxiliary building layout. Generally, borings are spaced on a 200-foot grid within the limits of the stadium. We also propose 8 borings within the auxiliary building.

Information from ECC's South Campus could be valuable to understand the subsurface conditions and potential geotechnical issues encountered. We will request access to boring logs for work completed on the campus. We will also request to meet with maintenance personnel to discuss potential geotechnical issues.

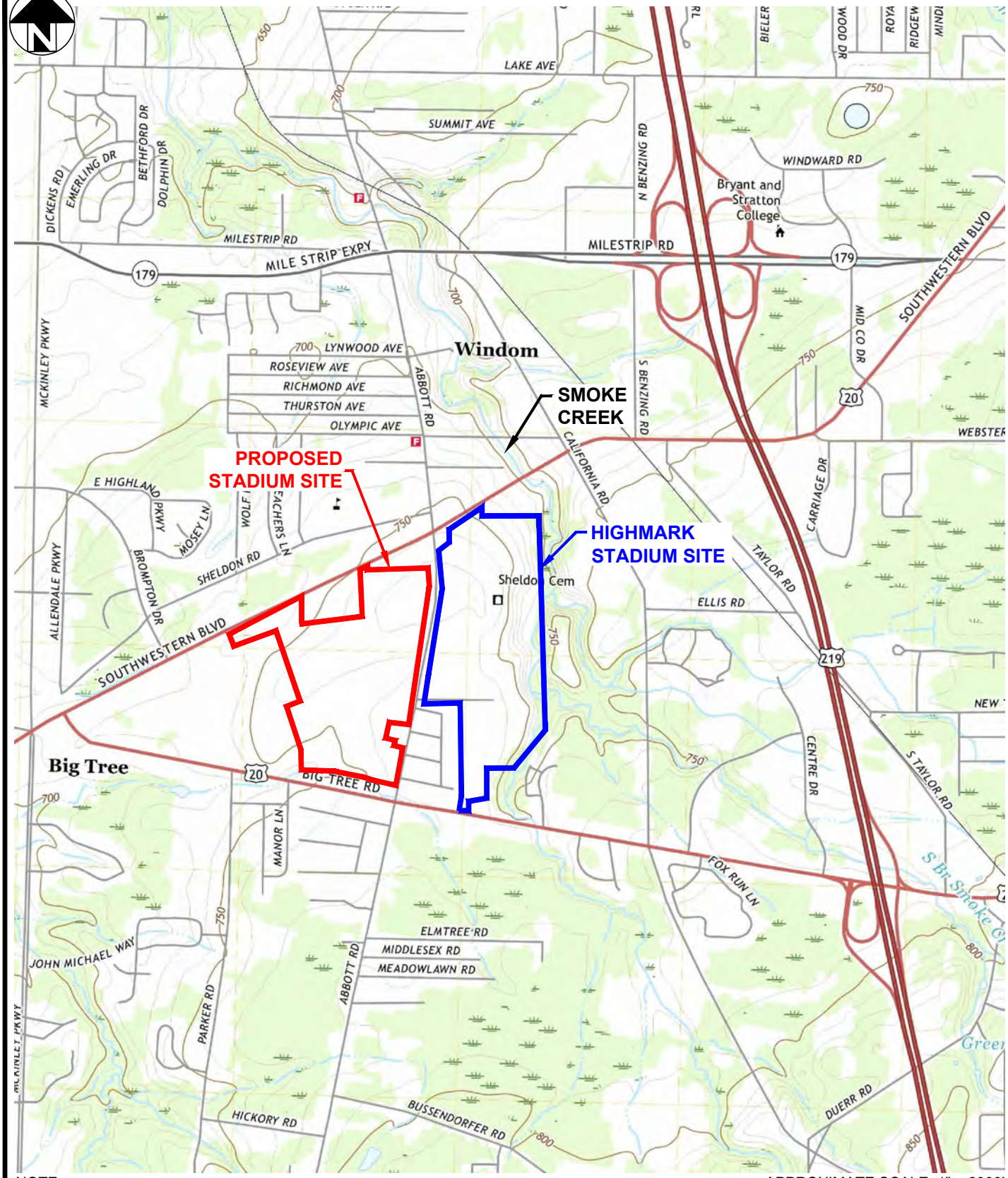
Observations and data collected during these programs will provide information required to estimate engineering properties of the soil and rock formations and to develop recommendations for design of the new stadium, auxiliary building, and other support structures.

Specifically, we intend to collect data to estimate:

- The effort required for rock excavation,
- The permeability of each soil and rock zone encountered for dewatering planning,
- Allowable bearing pressures for each soil and rock zone encountered,
- Lateral pressures to be applied by soil and rock,
- Rock capacity for anchor design,
- Uplift capacities for foundations embedded in rock, and
- Other engineering properties required for design of the new stadium facility.

We will prepare a design report summarizing the data collected and providing recommendations for the conceptual design of the stadium. As described in our proposal, once the conceptual design is completed and the locations and depths of the structures' foundations are known, additional explorations and testing will be needed for design.

Figures



NOTE:

1. Base map image adapted from a 7.5 Minute Series USGS map of Buffalo SE, NY, dated 2019.
2. Existing and proposed stadium site limits based on drawing titled, "Property Ownership Diagram Bills Campus", provided by Legends Project Development, dated March 8, 2022.

APPROXIMATE SCALE: 1" = 2000'

MARCH 2022

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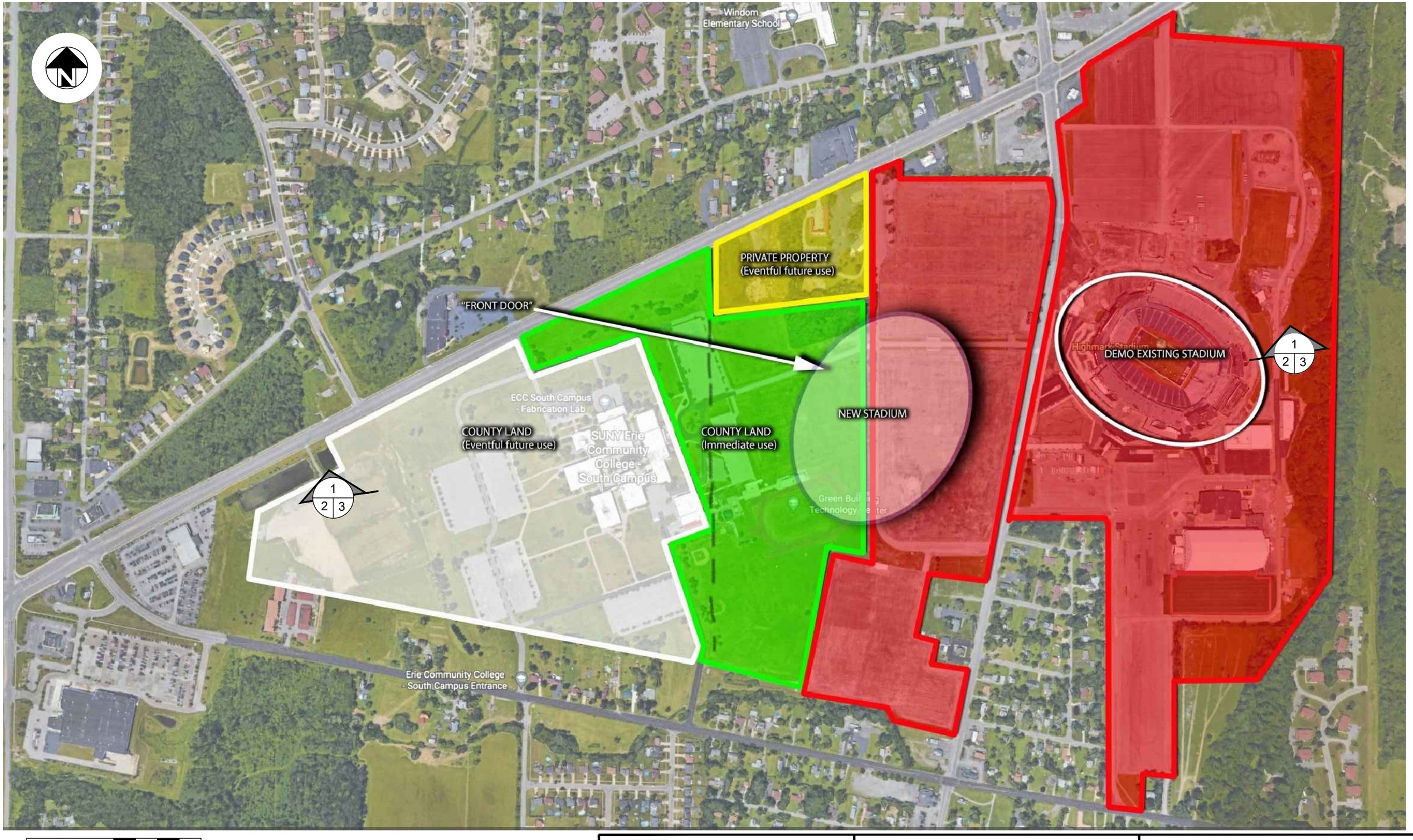
BUFFALO BILLS STADIUM

ERIE COUNTY NEW YORK

SITE LOCATION PLAN

DWG. NO. 22011-001

FIGURE 1



500 0 250 500

SCALE: 1" = 500'

REFERENCE:
Proposed stadium site limit based on drawing titled, "Inked Plan with ECC 2_LI", provided by Legends Project Development, dated March 8, 2022.

NOTE:
UNAUTHORIZED ALTERATION OR ADDITION TO ANY SURVEY, DRAWING, DESIGN, SPECIFICATION, PLAN, OR REPORT IS A VIOLATION OF SECTION 7209 PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

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BUFFALO BILLS STADIUM

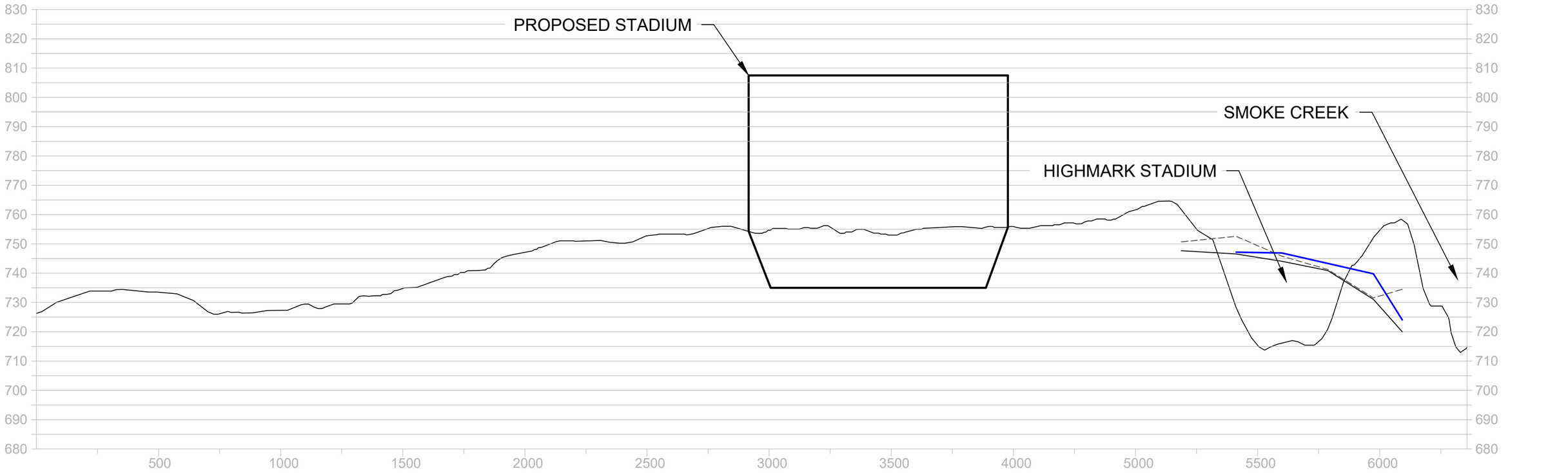
ERIE COUNTY NEW YORK

SITE PLAN

DWG. NO. 22011-003

FIGURE 2

MARCH 2022



1 / 2 3 EAST - WEST PROFILE

LEGEND
EXISTING GROUND SURFACE
WATER TABLE
TOP OF WEATHERED ROCK
TOP OF COMPETENT ROCK

NOTES:

1. Approximate Existing Ground Surface Profile obtained from Google Earth.
2. Water table elevation, top of weathered rock elevation, and top of competent rock elevation estimated from a review of previously-collected subsurface information.

MARCH 2022

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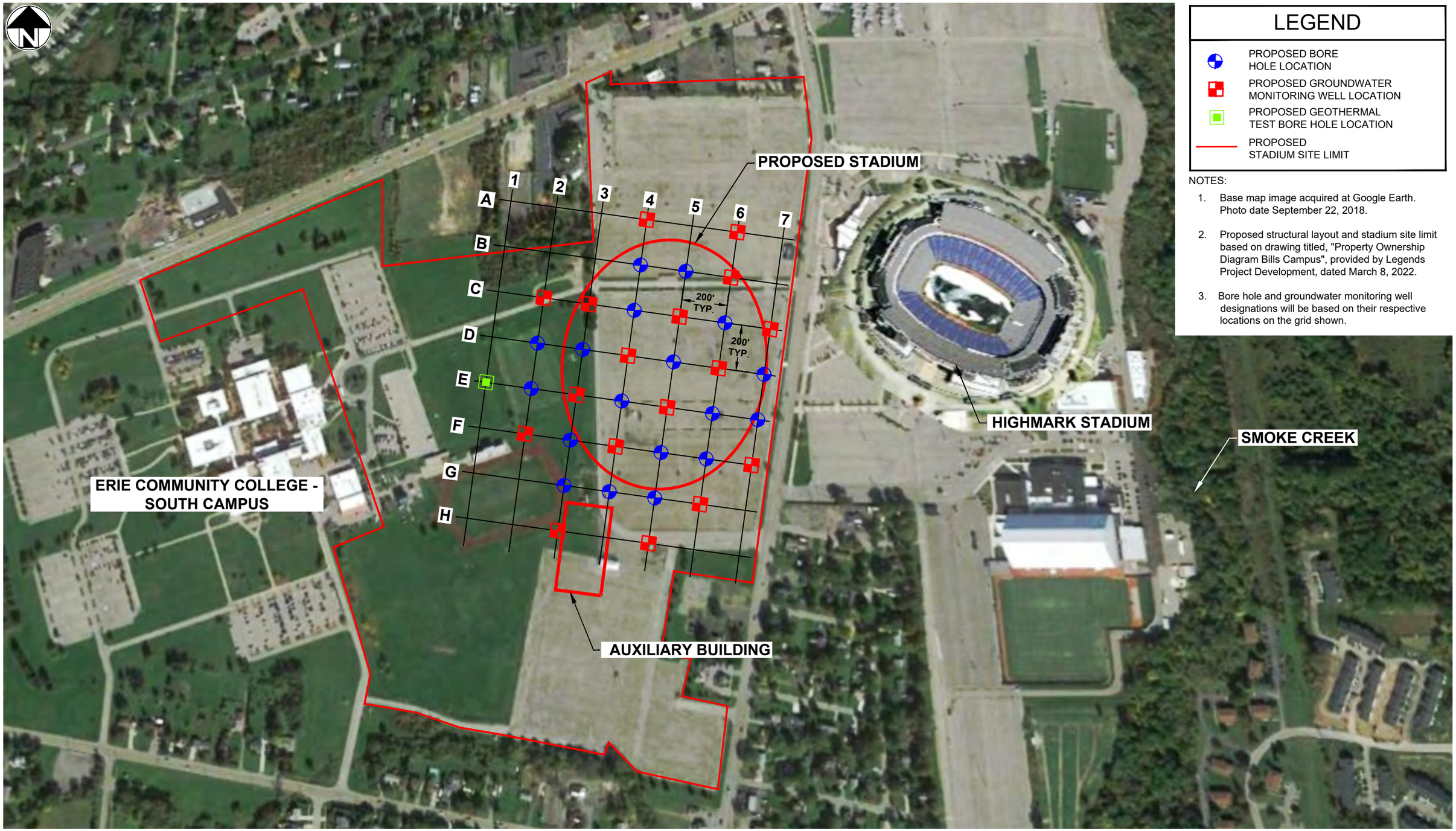
BUFFALO BILLS STADIUM
ERIE COUNTY NEW YORK

EAST-WEST SECTION

DWG. NO. 22011-003

FIGURE 3



LEGEND

- PROPOSED BORE HOLE LOCATION
- PROPOSED GROUNDWATER MONITORING WELL LOCATION
- PROPOSED GEOTHERMAL TEST BORE HOLE LOCATION
- PROPOSED STADIUM SITE LIMIT

NOTES:

1. Base map image acquired at Google Earth. Photo date September 22, 2018.
2. Proposed structural layout and stadium site limit based on drawing titled, "Property Ownership Diagram Bills Campus", provided by Legends Project Development, dated March 8, 2022.
3. Bore hole and groundwater monitoring well designations will be based on their respective locations on the grid shown.

400' 0 200' 400'

SCALE: 1" = 400'

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BUFFALO BILLS STADIUM

ERIE COUNTY NEW YORK

PROPOSED BORING LOCATION PLAN

DWG. NO. 22011-002

FIGURE 4

APRIL 2022

GEOTECHNICAL ENGINEERING
ASSESSMENT REPORT
PART B

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GEOTECHNICAL ENGINEERING REPORT – PART B
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

1.0 INTRODUCTION

1.1 BACKGROUND AND REPORT FORMAT

This is Part B of the Geotechnical Engineering Report for the New Bills Stadium to be constructed in Orchard Park, New York.

Part A of this report was prepared and submitted to the Buffalo Bills, LLC (Team) and Legends Project Development (LPD), the project management consultant for the Team, in March 2022 and is considered, along with Part B and future addenda, the complete geotechnical engineering report for this project.

Part A includes:

1. An introduction describing the project as it had been developed by the end of March 2022,
2. A list of available background information reviewed to support the preparation of Part A.
3. A description of the site conditions for the existing and proposed stadium locations and surrounding area,
4. A description of the geologic setting for the new stadium and our understanding of site-specific subsurface conditions based on our background review, and
5. Our estimate of the engineering implications of the ground conditions based on our review.

We concluded in the Part A report that the construction of the stadium as planned would be feasible from a geotechnical perspective. In our opinion, the biggest geotechnical challenges will be related to excavation of the rock underlying the site and control of groundwater during construction and through the lifetime of the stadium.

Since the completion of Part A, we have completed the following tasks:

1. Worked with the project architect (Populous), structural engineer (Walter P. Moore [WPM]), the Team, and LPD to develop a subsurface exploration program to characterize the subsurface conditions across the proposed site,
2. Worked with Foit-Albert Associates (Foit-Albert), the project surveyor, to locate and mark proposed boring and monitoring well locations,
3. Engaged Ground Penetrating Radar Systems, LLC (GPRS) to clear proposed boring and test pit locations of underground utilities,
4. Engaged Earth Dimensions, Inc. (EDI) to complete 38 borings with rock cores and install 19 monitoring wells (described in Section 2.1),
5. Monitored the drilling on a part-time basis,

6. Sent selected soil and rock core samples to 3rd Rock, LLC (3rd Rock) for laboratory testing (described in Section 2.3),
7. Observed the excavation of test pits at two locations within the project limits (described in Section 2.2),
8. Completed rising and falling head permeability (i.e., slug) testing at the wells (described in Section 2.2), and
9. Prepared this report describing our findings and recommendations for the construction of the new stadium, auxiliary building, and appurtenant structures.

1.2 NOTES ON THE REPORT

Refer to Part A for the project background, a description of site conditions, and a description of the geologic setting, including information on local bedrock geology, tectonic history, and regional seismicity. Most of this information is unchanged since Part A was issued in March 2022. Other information, such as the stadium location and depths, site-specific information on the ground conditions, and the engineering implications have evolved since March 2022 as data were collected. Discrepancies of data or recommendations between Parts A and B are always superseded by information presented in Part B (or future addenda) unless specifically stated otherwise.

2.0 SUBSURFACE EXPLORATIONS AND FIELD AND LABORATORY TESTING

McMahon & Mann Consulting Engineering and Geology, P.C. (McMahon & Mann) developed and implemented subsurface exploration, field testing, and laboratory testing programs to better characterize the subsurface conditions at the proposed site.

2.1 SUBSURFACE EXPLORATION PROGRAM

We engaged EDI to complete 38 borings across the site. Generally, the borings were spaced evenly on a 200 by 200-foot grid (approximately one boring per acre) across and surrounding the proposed stadium footprint, as shown on Figures 1 through 4. Some borings were moved to avoid surface or buried obstructions that were present at several of the grid locations.

The borings were advanced from the ground surface until split-spoon refusal was encountered. Soil and weathered rock samples were retrieved using a split-spoon sampler on a continuous basis (i.e., 2-foot interval). Upon encountering split-spoon refusal, EDI cored the rock. A minimum of approximately 10 feet of rock was cored in most borings, and a maximum of 49.5 feet of rock was cored in one boring. Rock coring was extended below Elevation (El.) 730 (approximate planned bottom of excavation) in several borings, extending as low as El. 696.5.

Standpipe piezometers (i.e., monitoring wells) were installed at 19 of the boring locations. These were either installed in the bore holes or in separate holes (no sampling) made next to the parent holes.

Monitoring wells consist of a slotted section of 2-inch inside diameter PVC pipe (various lengths) placed at the bottom of the selected bore holes. The annulus between the slotted section of pipe (i.e., the “screened zone”) and surrounding rock is backfilled with sand. This allows groundwater in the surrounding formations to enter the well and equalize with the surrounding groundwater level in the formation. A solid PVC riser pipe is attached to the top of the slotted pipe section and extends to the ground surface. Groundwater readings are then made by measuring the distance from the ground surface to the water level in the well.

All of the monitoring wells were either screened in weathered rock or competent rock. Flush-mounted protective casing was installed over each of the monitoring wells.

Two test pits were completed at the site near boring locationsBH-B4-22 and BH-F6-22. One test pit (TP-2-22) was completed towards the north end (BH-B4-22) of the proposed stadium footprint, and the other (TP-1-22) was completed towards the south end (BH-F6-22).

The boring logs and test pit logs and further details on the subsurface exploration program are presented in Appendix A, and summarized in Tables A-1 and A-2, respectively. The boring location plan is included in Appendix A as Figure A-1.

2.2 FIELD TESTING

McMahon & Mann developed each of the monitoring wells by removing water from the well using a bailer. This is done to agitate, suspend, and remove fine-grained particles and to check that the wells are operating properly. All wells had the equivalent of at least five times its volume (cross sectional area of the inside of the pipe times the height of water in the well), or more, removed for development.

Following development, we measured the groundwater levels in each well. These measurements provide the piezometric head in the rock formation adjacent to the screen zone.

In addition to groundwater levels, we also performed rising and falling head permeability tests. These tests provide data to estimate the hydraulic conductivity of the rock formations adjacent to each screen zone. The hydraulic conductivity values can be used to estimate dewatering efforts that will be required during and after construction.

The field-testing program is described in detail in Appendix A, and the hydraulic conductivity estimates are summarized in Table A-3.

2.3 LABORATORY TESTING

We sent selected soil and rock core samples to 3rd Rock for laboratory testing. The results of the laboratory testing program were used to confirm the soil classifications made in the field and for estimating properties of the different soil and rock layers observed.

In summary, 3rd Rock performed the following:

Soil Samples

- 65 samples for moisture content (ASTM D 2216),
- 48 samples for gradation with 30 of these including hydrometer analyses (ASTM D 422), and
- 10 samples for Atterberg limits (ASTM D 4318)

Rock Core Samples

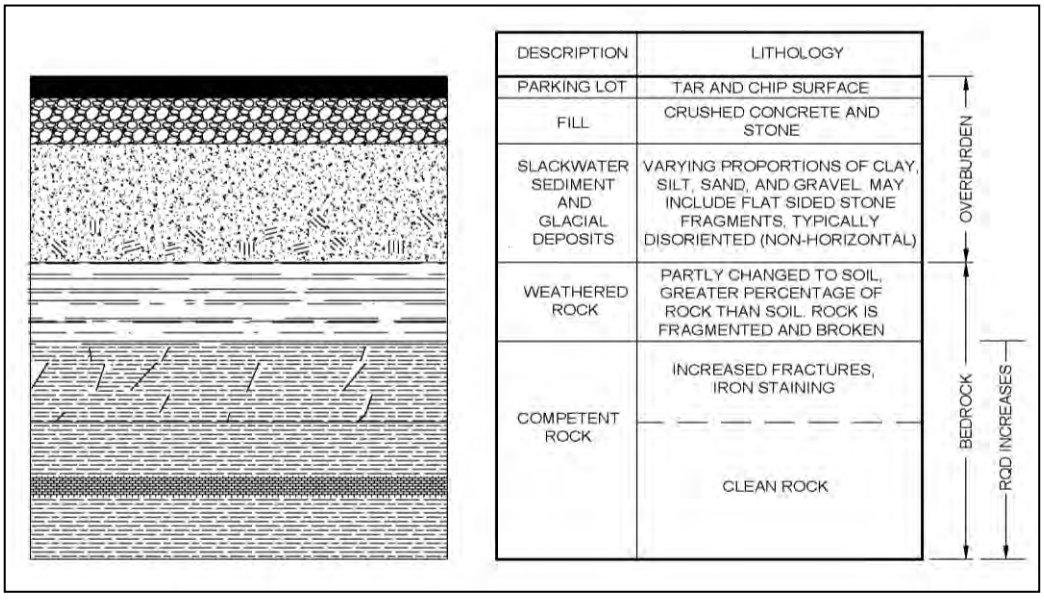
- 38 samples for unconfined compression (ASTM D 7012)

The laboratory test results are included in Appendix B.

3.0 SUBSURFACE CONDITIONS

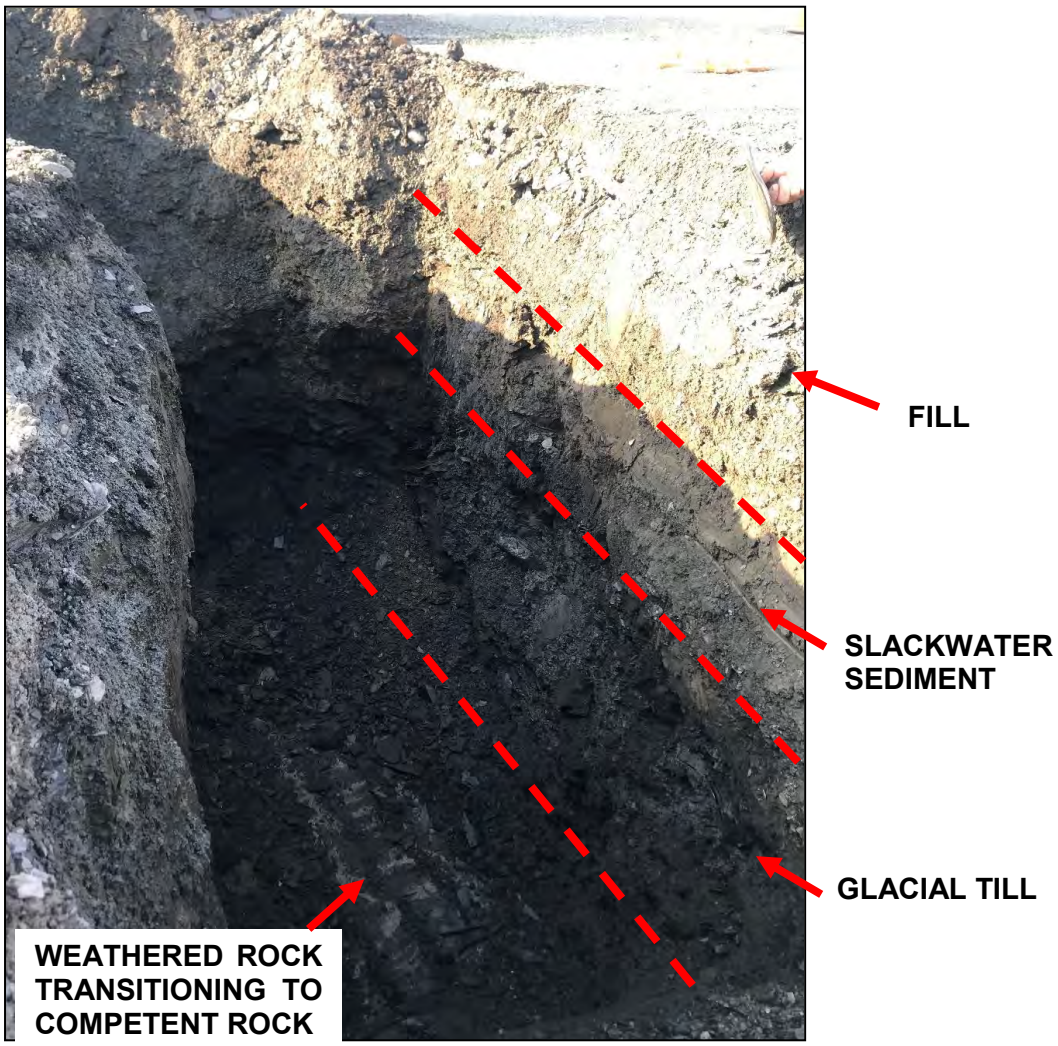
Generally, the material underlying the site of the proposed stadium consists of road base fill overtop of fine-grained native deposits (i.e., slackwater sediment) and glacial deposits (collectively referred to as "overburden") overtop of bedrock (see Diagram 1). We compiled the subsurface exploration data to estimate the depths at which material transitions occur in each of the 38 borings. The characteristics and depths of the fill, native overburden, and bedrock are described in Sections 3.1 and 3.2, respectively. The groundwater conditions are described in Section 3.3. Refer to the borings and test pit logs in Appendix A for more details.

DIAGRAM



3.1 FILL AND OVERBURDEN

The material immediately underlying the site for the proposed stadium consists of a thin layer of tar and chip parking lot (0.1 to 0.2 feet) and up to approximately 4 feet of road base fill (e.g., crushed concrete, gravelly, sandy silt, etc.) overtop of slackwater sediment and glacial till. The slackwater sediment is generally thinly laminated silty-clay or clayey-silt, while the glacial till has varying proportions of fine (clay and silt) and coarse (sand and gravel) sediments, typically with shale stone fragments mixed into the matrix. Photograph 1 shows the fill and overburden encountered during excavation of TP-1-22.



<u>Photograph 1</u> – TP-1-22 excavated to a depth of approximately 11.3 feet. Road base fill material transitions to native overburden material at approximately 1.6 feet, which transitions to weathered rock at approximately 10.0 feet. Transition from weathered rock to competent rock is at approximately 10.7 feet.

The thickness of the fill and native overburden material is the distance between the ground surface and the top of the weathered rock. The average thickness of the fill and native overburden within the proposed stadium footprint is approximately 8 feet, however it ranges from less than 1 foot to over 12 feet. The overburden is thinnest at the north end of the proposed stadium and generally increases in thickness toward the south, as shown on Figure 1.

Laboratory test results from selected soil samples will be used in the future to estimate the compatibility of selected backfill with different native soil deposits as necessary. The soil testing results are included in Appendix B and summarized in Table B-1.

3.2 ROCK

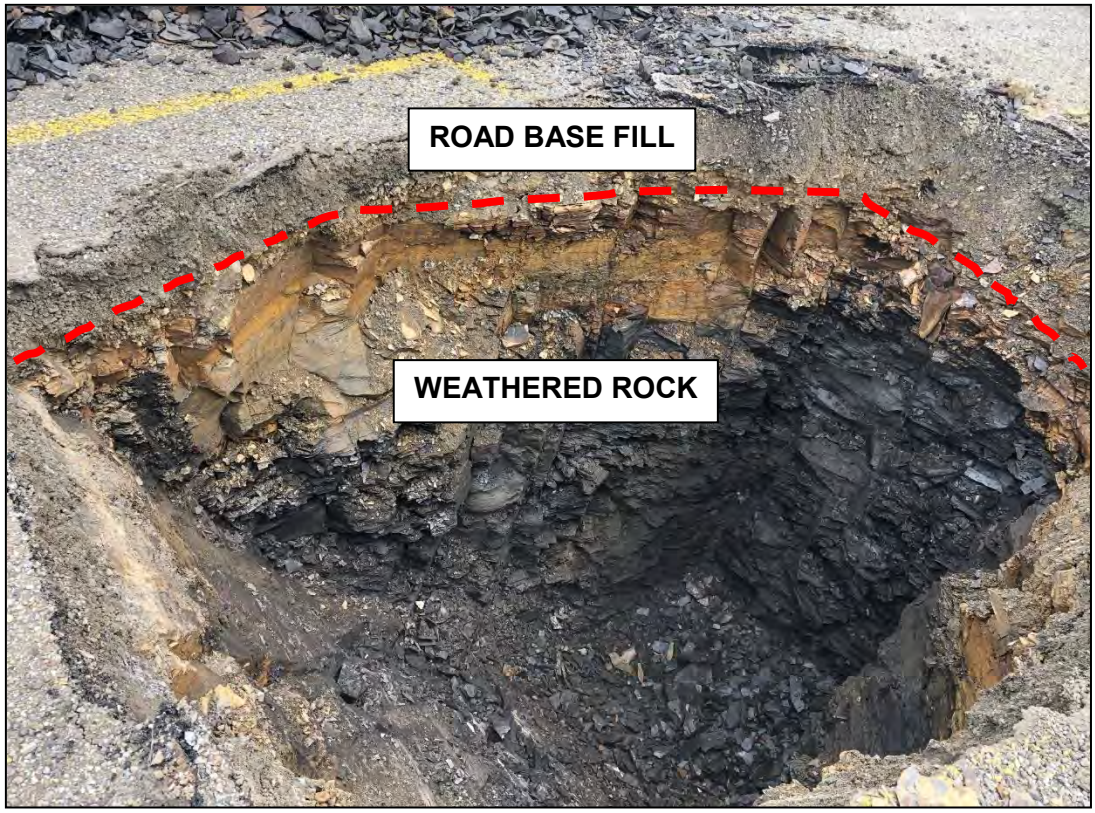
Bedrock, primarily consisting of shale, with occasional pyrite and calcite deposits and limestone nodules (i.e., gravel size pieces), lies below the native overburden. The shale is generally soft[1] and thinly laminated to thinly bedded (i.e., bedding thickness ranges between 0.1 and 4 inches thick). At least two near-vertical joint sets were identified during observations of the test pits and outcrops in Smoke Creek. These joint sets are observed to cause varying degrees of fracturing throughout the observed rock core. Additional joint sets were observed; however, these sets were less predictable in terms of frequency, spacing, and orientation.

The rock can further be described as either “weathered” or “competent,” as previously discussed in Report A and shown in Diagram 1. The weathered rock is underlain by competent rock.

3.2.1 Weathered Rock

For the purposes of this report, we have defined the weathered rock at the site as the zone of shale encountered between the bottom of the overburden and the top of the competent rock. The weathered rock is typically very soft[2] to soft, fragmented and broken shale with varying degrees of iron staining (an indication of varying groundwater levels). It has typical characteristics of the competent shale below (i.e., cemented sediment aligned in bedding planes), however natural processes (i.e., freeze-thaw cycles, groundwater flow, and chemical dissolution) have weathered the rock into fractured and broken pieces. A representative picture of the weathered rock is shown in Photograph 2.

[1] “Soft” was defined by EDI and in The New York State Department of Transportation, “Rock Core Evaluation Manual,” dated August 2015, as “Handheld specimen crumbles under firm blows with point of geologic pick.”
[2] “Very soft” was defined in The New York State Department of Transportation, “Rock Core Evaluation Manual,” dated August 2015, as “Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.”



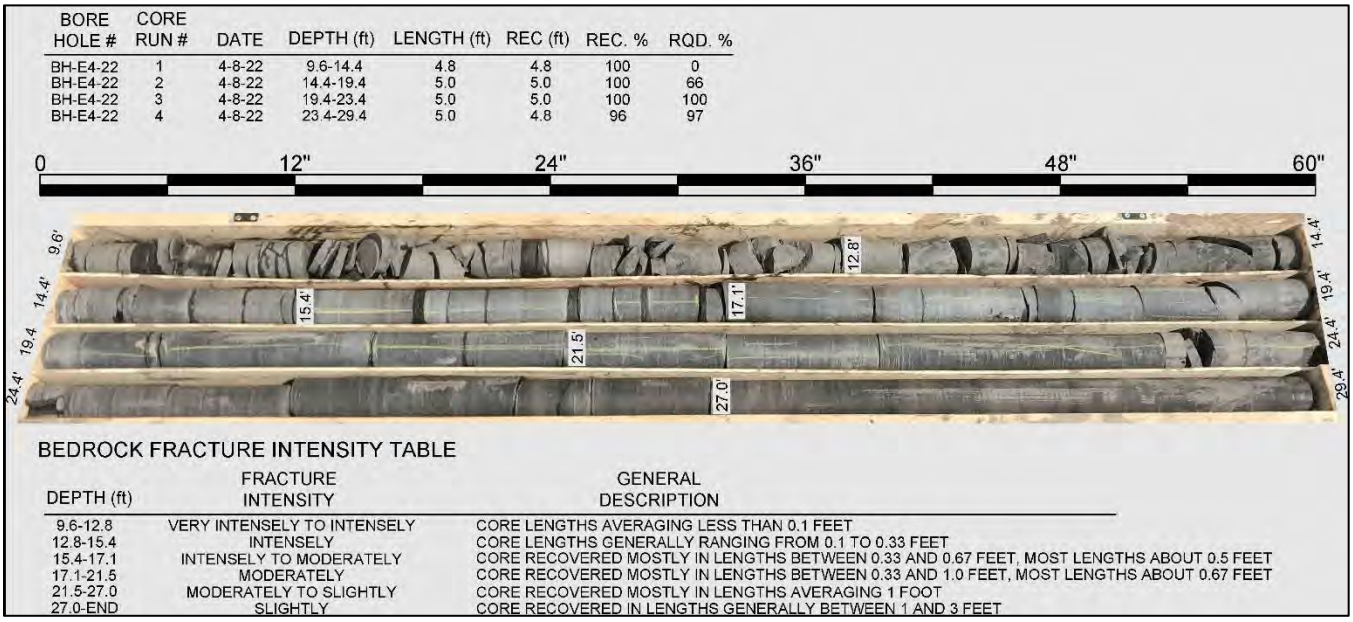
<u>Photograph 2</u> –TP-2-22 excavated to a depth of approximately 10.0 feet. Road base fill material transitions to weathered rock at 0.8 feet. Weathered rock continues to a depth of 9.2 feet and transitions to competent rock.

The thickness of the weathered rock within the proposed stadium footprint is on average about 4.5 feet and ranges from less than 1 foot to nearly 14 feet. The zone of the weathered rock is generally the thickest toward the north end of the proposed stadium where the overburden is thinnest. As the overburden thickness increases toward the south, the zone of weathered rock tends to thin out as shown on Figure 2.

3.2.2 Competent Rock

The competent rock at the site is defined as the rock underlying the weathered rock. It is typically soft shale, very intensely to slightly fractured horizontally along bedding planes, with high angle to near-vertical fractures throughout. Fracture intensity decreases with depth, therefore the rock quality designation (RQD)[3], a measure of the frequency of rock fractures, increases with depth. Photograph 3 shows a typical rock core of competent rock along with descriptions of fracture intensity.

[3] RQD is defined as the cumulative length of intact pieces 4 inches or longer from a core run divided by the total length of the core run, expressed as a percentage. It is a measure of the quality of the rock.



BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-E4-22	1	4-8-22	9.6-14.4	4.8	4.8	100	0
BH-E4-22	2	4-8-22	14.4-19.4	5.0	5.0	100	66
BH-E4-22	3	4-8-22	19.4-23.4	5.0	5.0	100	100
BH-E4-22	4	4-8-22	23.4-29.4	5.0	4.8	96	97

BEDROCK FRACTURE INTENSITY TABLE

DEPTH (ft)	FRACTURE INTENSITY	GENERAL DESCRIPTION
9.6-12.8	VERY INTENSELY TO INTENSELY	CORE LENGTHS AVERAGING LESS THAN 0.1 FEET
12.8-15.4	INTENSELY	CORE LENGTHS GENERALLY RANGING FROM 0.1 TO 0.33 FEET
15.4-17.1	INTENSELY TO MODERATELY	CORE RECOVERED MOSTLY IN LENGTHS BETWEEN 0.33 AND 0.67 FEET, MOST LENGTHS ABOUT 0.5 FEET
17.1-21.5	MODERATELY	CORE RECOVERED MOSTLY IN LENGTHS BETWEEN 0.33 AND 1.0 FEET, MOST LENGTHS ABOUT 0.67 FEET
21.5-27.0	MODERATELY TO SLIGHTLY	CORE RECOVERED MOSTLY IN LENGTHS AVERAGING 1 FOOT
27.0-END	SLIGHTLY	CORE RECOVERED IN LENGTHS GENERALLY BETWEEN 1 AND 3 FEET

Photograph 3 – Rock core photograph for BH-E4-22 showing the transitions in fracture density for competent rock.

The thickness of competent rock that will require excavation is the difference between the elevation of the top of competent rock and the bottom of the proposed excavation (approximately El. 730). The average thickness of competent rock requiring excavation within the proposed stadium footprint is about 19 feet, however it ranges from about 14.5 to 30 feet as shown on Figure 3.

Unconfined compressive strength (UCS) values ranged from approximately 900 to 6,050 pounds per square inch (psi) and averaged around 2,400 psi. In general, the strength of the rock core samples increased with depth, particularly below El. 730. The UCS test results are included in Appendix B and summarized in Table B-2.

3.3 GROUNDWATER CONDITIONS

Groundwater elevations were measured at the site on June 10, 2022 and June 15, 2022. Using these data, we created a groundwater contour map for the site, as shown on Figure 4. The groundwater contours generally follow the topography of the site, with a hydraulic gradient to the south or southwest. For these dates in June, the groundwater within the proposed stadium footprint is on average about 4 feet deep, but ranges between less than 1 foot and over 8 feet deep. Due to the variable nature of groundwater, we expect that these values will fluctuate throughout the year, although the direction of the hydraulic gradient is likely to remain to the south or southwest until the site is developed.

We completed rising and falling head permeability (i.e., slug) tests in the wells in June 2022. Data from these tests are used to estimate the permeability of the formations

adjacent to the well screened zones. Permeability (or hydraulic conductivity) is a property that indicates water's ability to flow through the formation. It can be used to estimate the required dewatering efforts. Data from the tests yielded an average hydraulic conductivity of 1.5×10^{-3} centimeters per second (cm/s), with a range between 1.1×10^{-4} and 4.2×10^{-3} cm/s. A summary table of hydraulic conductivity estimates and groundwater elevations is included in Appendix A in Table A-3.

Groundwater entered both test pits during excavation. Infiltration of groundwater into the southern test pit (TP-1-22) was at a rate such that pumping was not necessary to keep the excavation from filling with water in the time that the test pit was left open (approximately 1-hour). Infiltration in the northern test pit (TP-2-22) was at a rate such that standing water was about 1 foot deep at the bottom of the excavation upon completion. These were slower infiltrations than were qualitatively expected based on the rapid recovery (returning to equilibrium conditions) of the wells during development.

3.4 SEISMIC SITE CLASSIFICATION

We evaluated the conditions in BH-I3-22 (boring with thickest overburden material encountered at the site), to estimate the seismic site class following the procedures in the American Society of Civil Engineers (ASCE) 7-16 "Minimum Design Loads and Associated Criteria for Buildings and Other Structures." Based on the Standard Penetration Test (SPT) N-values and conditions observed in the boring, the Site Class is C. Using the Site Class C designation, we recommend the following parameters for design:

Peak ground acceleration (PGA_M) = 0.114g (adjusted for site class effects)
MCE_R spectral response acceleration for short periods, S_S = 0.159g
MCE_R spectral response acceleration at 1 second period, S_1 = 0.044g
Short-period site coefficient (Table 11.4-1), F_a = 1.3
Long-period site coefficient (Table 11.4-2), F_v = 1.5

The soils encountered during the subsurface exploration program are not susceptible to settlement due to liquefaction.

4.0 GEOTECHNICAL DESIGN AND CONSTRUCTION RECOMMENDATIONS

The subsurface conditions at this site are well suited to support the new stadium, auxiliary building, and associated structures. We anticipate that the most significant geotechnical issues facing construction and operation of the stadium will be excavation of the competent shale rock and temporary and permanent dewatering of the stadium.

This section provides further details and recommendations for the design and construction of the new facility.

4.1 STADIUM STRUCTURE

We recommend that the new stadium structure be supported by spread footings bearing directly on the competent shale encountered in all the borings.

For the field level to be at El. 735, a significant amount of excavation (up to about 40 feet deep) will be required to accommodate the foundations and drainage system. For the required excavation and operation of the stadium, construction and permanent dewatering plans should be developed based on the groundwater measurements and the conditions presented in this report. Dewatering plans might need to be refined during construction as we observe actual groundwater inflow into the excavations.

This section provides geotechnical design and construction recommendations for the stadium structure.

4.1.1 Excavation Considerations

We evaluated the test boring and test pit information along with the laboratory testing results to estimate the level of difficulty of excavation of the overburden, the underlying weathered rock, and the underlying competent rock. We made the following observations throughout the subsurface explorations:

- The SPT N-values[4] typically increased as the material description transitioned to "shale stone fragments," which is the transition to weathered rock. EDI typically was able to advance through the weathered rock with the split spoon sampler.

- EDI typically started coring rock when it encountered one, or more consecutive, split spoon refusals. This is generally where we designated the transition from weathered rock to competent rock.

- Test pits were advanced until it was too difficult to proceed, given the size of the excavator (Kobelco SK210 LC) and the size of the test pit. The depth of completion was approximately at the transition between weathered and competent rock.

4.1.1.1 *Fill and Overburden Materials*

Test pits were completed at two of the borings (BH-B4-22 and BH-F6-22) using a 200-series excavator. We observed the excavated materials, relative ease of excavation, and final depth of the excavation. Observations throughout the completion of the test pits indicate that a 200-series excavator is sufficient for excavating the overburden material (i.e., road base fill, slackwater sediment, and glacial till).

[4] N-values are an indication of the relative density or consistency of geologic deposits. Higher numbers generally correlate to higher strengths and density.

4.1.1.2 *Weathered Rock*

Observations from the test pits indicate that a 200-series excavator is generally capable of excavating the weathered rock to a depth that approximately corresponds with the transition to competent rock. It should be noted, however, that this excavator was operating near the limit of its boom and in a confined space. It is likely that the same excavator could advance deeper in a more open excavation and with a shorter required reach. Further, it is also likely that the test pits could have been advanced deeper with a larger excavator (i.e., 300-series), rock chipper (jack hammer attachment), or specialized rock ripping equipment.

4.1.1.3 *Competent Rock*

Competent rock was generally not able to be excavated in the test pits using a 200-series excavator from the existing grade and within the confined conditions. Therefore, information from the boring logs and rock core testing was used to estimate the rippability of the competent rock.

Rock rippability was estimated using the rock mass characteristic index method[5]. This method considers the following parameters:

- UCS,
- RQD, and
- Joint presence and condition.

Estimation of the prevalence, orientation, and conditions of joints were made based on observations from the test pits, outcrops along Smoke Creek, and rock cores collected during test borings. RQD and UCS are based on laboratory data and observations of the rock core. This information was used along with engineering experience in rock excavations to estimate rock rippability across the footprint of the proposed new stadium.

As discussed in Section 3.0, we reviewed the subsurface exploration and laboratory testing data to estimate the depths at which materials transition from fill and native overburden to weathered rock to competent rock at each of the 38 borings. This information was used to complete color-coded tick maps showing the estimated thickness of each material type as follows:

- Figure 1: Thickness of Fill and Overburden – This figure shows the depth between the existing ground surface and the top of the weathered rock. We expect that this material may be excavated using a 200-series excavator.

[5] "Rock Classification Systems for Engineering Purposes," American Society for Testing and Materials (ASTM), dated 1988.

- Figure 2: Thickness of Weathered Rock – This figure shows the depth between the top of the weathered rock and the top of the competent rock. We expect that this material may be excavated with a 200- or 300-series excavator.

- Figure 3: Thickness of Competent Rock – This figure shows the depth between the top of the competent rock and the proposed bottom of excavation. We expect that this material may require a 300-series excavator and/or a D8/D9 bulldozer with specialty ripping/chipping attachments designed to fracture the rock before excavation. Based on our observations during the subsurface explorations and analyses of the data, we do not expect that blasting will be required for excavation of this material.

Our recommended excavation methods for the types of materials encountered are summarized in Table 1.

TABLE 1
MATERIALS TYPE AND RECOMMENDED EXCAVATION METHODS

Material Type	Description[1]	Excavation Method[2]
Fill and Overburden	Road base fill, slackwater sediment, glacial deposits. N-Values typically less than 35.	200-series excavator
Weathered Rock	Shale stone fragments. N-values typically greater than 35, or refusal.	200- or 300-series excavator
Competent Rock	Shale typically ranging from very intensely to slightly fractured. Typically retrieved in borings with coring apparatus.	300-series excavator or D8/D9 bulldozer with specialty ripping/chipping attachments designed to fracture rock before excavation

Notes:
1. Material description is based on the boring logs and our observations during advancement of the test pits.
2. Equipment size and excavation methods are based on our observations during advancement of the test pits and reference from American Society for Testing and Materials (ASTM), “Rock Classification Systems for Engineering Purposes,” 1988.

We also compiled a section (oriented generally north to south across the site) to illustrate the excavation limits, as shown on Figure 5. The section shows the existing ground surface (April 2022 survey), the transition from the overburden to the weathered rock, the transition from the weathered rock to the competent rock, and the estimated bottom of excavation at El. 730. Based on this figure, we expect:

- The greatest volume of overburden excavation will be at the southern end of the proposed stadium.
- The greatest volume of rock excavation (both weathered and competent) will be at the northern end of the proposed stadium.
- Groundwater will be encountered within the upper 10 feet of excavation.

4.1.1.4 *Excavation Considerations*

We recommend sloping the excavation banks in the overburden and weathered shale for the footings for stability and worker safety. All excavations should be made in accordance with standards set by the Occupational Safety and Health Administration (OSHA). For estimating purposes, excavations should be planned considering the soil as Soil Type C. For Soil Type C, the slopes should be no steeper than 1.5 horizontal to 1 vertical (1.5H:1V).

Excavations in the competent rock can be maintained in a near vertical condition on a temporary basis. Once exposed, the excavation face will degrade over time and may slake. This should be monitored as degrading walls could be a safety risk or could damage completed work.

The toe of the overburden/weathered shale excavation should be offset from the top of the competent shale excavation. We recommend this separation be at least equal to the height of the excavation in competent rock.

The contractor should assign a “competent person” during construction to make the OSHA required field observations and tests. Excavation slopes should be flattened as necessary, based on the results of those observations and tests, to maintain stability of the excavation slopes, and to protect workers.

4.1.2 Dewatering Considerations

Based on the groundwater measurements summarized in Section 3.3 and shown on Figure 4, the excavation for the new stadium will be up to about 30 feet below the groundwater level. Furthermore, the proposed field elevation of El. 735 will be up to about 25 feet below the surrounding groundwater elevation. To accommodate construction and operation of the stadium over its lifespan, the footprint of the stadium will need to be dewatered.

Highmark Stadium is currently dewatered by gravity with drainpipes collecting groundwater and directing it to Smoke Creek to the east. We recommend a similar method for the new stadium. In our opinion, the most feasible way to achieve this is by collecting groundwater in a sump in the northeast corner of the stadium footprint and directing it north of Highmark Stadium to Smoke Creek. All drainage features for the stadium should direct collected groundwater and run-off to this sump.

Drainpipes in the sump should then direct the collected water to the northeast, below Abbott Road and north of Highmark Stadium, to discharge into Smoke Creek, about 2,300 feet to the east. The flood plain of Smoke Creek is at about El. 707 in this area. Considering the alignment and elevation drop of about 23 feet available, the drainpipes from the stadium to the creek could be sloped up to about 1.0 percent.

The quantity and number of drainpipes will need to be determined based on the anticipated flow from groundwater and potential run-off. The contract documents should allow for a provision to adjust the number of drainpipes needed during construction as conditions are evaluated based on the observed groundwater inflow. Initial inflow estimates to size the drainpipes should be based on the groundwater and permeability data collected during the subsurface exploration and monitoring program (refer to Section 3.3.) and the final excavation configuration. McMahon & Mann can assist with a detailed seepage analyses to estimate groundwater inflow once the design is developed.

Most of the alignment of the drainpipes between the stadium and Smoke Creek will be installed in the competent shale. In our opinion, installing the pipes using horizontal directional drilling (HDD) techniques is preferable to a cut and cover method. HDD will be less disruptive at the surface, especially considering the alignment of Abbott Road and parking lots north of Highmark Stadium that will need to be maintained throughout construction.

4.1.2.1 *Horizontal Directional Drilling*

The HDD process begins with the drilling of a pilot hole along the planned horizontal and vertical alignment. Drilling equipment should be located such that the drainpipe alignment reaches maximum stadium excavation depth (about El. 730) at the planned sump location. We recommend that excavation for the stadium begin at this location and the drainage system be installed as soon as practical. Therefore, as the excavation for the remainder of the stadium proceeds, the permanent dewatering system can be utilized to control groundwater throughout construction.

The pilot drill hole is initiated from the starting location and advanced along the planned alignment, through the sump, and to the planned exit location. The pilot drill bit has a geometry that is biased in one direction. While the pilot drill stem is rotated and pushed into the ground, it travels in a generally straight direction. The horizontal and vertical locations of the drill bit are monitored from the surface using remote sensing techniques. The drill stem is pushed but not rotated when the direction of the drill bit needs to be adjusted. This process is continued until the pilot drill bit exits the ground at the outlet. At

this point, the bore diameter will then be increased using a reamer. This process is repeated until the hole diameter is sufficient for installation of the drainpipe.

We recommend that the alignment be made through the competent rock along its entire length until overburden is encountered at the exit location. Passing through different strata (e.g., from rock to soil and back) is problematic to maintain the desired vertical alignment and can create bellies in the pipe. Additional borings along the planned alignment might be required to further characterize the ground conditions along the planned HDD alignment.

4.1.2.2 *Temporary Dewatering*

The advantage to draining the stadium by gravity using HDD techniques is that, if installed early in construction, this system can also be used for dewatering as the excavation proceeds.

To accommodate this, the earliest excavations should be for the sump. Sump excavation will need to be pumped until the drains are installed. Once completed, however, the excavation can proceed to the south and west with the subgrade sloping toward the drainpipes or perimeter drainage trenches.

4.1.2.3 *Other Dewatering Options*

Our recommendation is to both temporarily and permanently dewater the stadium as described in the previous sections. While, in our opinion, gravity draining is the most reliable and cost-effective method over the lifespan of the stadium, other dewatering options are available.

4.1.2.3.1 Sumps and Pumps

One option discussed early in the process is to collect the groundwater in underground holding tanks and using riser pumps to direct it to shallower drainpipes that would be installed in the overburden and that would drain towards Smoke Creek. The alignment of the new drainpipes would likely have to be through the existing campus, along Bills Drive, between Highmark Stadium and the training facility, and to the creek.

While this eliminates the need for HDD and might accommodate steeper grades for the drainpipes, we do not recommend this option. This will require primary and redundant pumps to be maintained online and operating throughout the life of the stadium. Operation and maintenance of these will have a significant cost.

This plan will also be more disruptive at the surface during construction as it will require excavations along the planned alignment to Smoke Creek, much of which will be through the Teams' current campus.

4.1.2.3.2 Connecting to the Highmark Stadium System

Highmark Stadium's dewatering system appears to still be effective. There have been discussions of connecting the new stadium's system to Highmark's. This could be feasible, but more details on the operation and condition of the system are required to decide if this is feasible for the long-term.

The capacity, condition, alignment, and consideration of it supporting both stadiums throughout construction need to be explored. The connection would also require disturbance at Highmark Stadium and either cut and cover or HDD installation across Abbott Road. Furthermore, to utilize this system during construction, it would all have to be installed early to limit pumping.

Finally, we understand that Highmark Stadium will be demolished once the new stadium is completed. If the drainage system is utilized, special provisions will be needed to protect the system and allow access for maintenance throughout its service life.

4.1.3 Foundations

4.1.3.1 *Bearing Grades and Capacities*

The bearing grade for the spread footings should be competent shale bedrock, free of loose rock particles and debris.

For the stadium, we recommend that spread footings bear at least 2 feet below the top of the competent shale. The elevation of this zone varies across the proposed stadium footprint. The maximum recommended bearing grades at borings located within or adjacent to the stadium footprint are listed in Table 2.

Even within the competent rock, however, the net allowable bearing pressure varies with elevation, increasing with depth as the rock quality and strength generally increases. Footings supported on competent rock above El. 730 should be designed with a maximum allowable pressure of 11,000 pounds per square foot (psf). Below El. 730, the footings can be designed with a maximum allowable pressure of 15,000 psf.

TABLE 2
MAXIMUM ALLOWABLE BEARING GRADE
AT STADIUM STRUCTURE

Boring Designation	Maximum Allowable Bearing Grade Elevation
BH-B3-22	752.8
BH-B4-22	756.1
BH-B5-22	750.2
BH-B6-22	753.1
BH-C3-22	742.4
BH-C4-22	749.2
BH-C5-22	746.7
BH-C6-22	748.2
BH-D3-22	744.0
BH-D4-22	746.3
BH-D5-22	745.4

Boring Designation	Maximum Allowable Bearing Grade Elevation
BH-D6-22	747.1
BH-D7-22	747.6
BH-E3-22	745.8
BH-E4-22	745.8
BH-E5-22	744.1
BH-E6-22	746.3
BH-E7-22	749.3
BH-F4-22	743.8
BH-F5-22	742.5
BH-F6-22	744.6

Notes:

1. This table shows the elevation 2 feet below where competent rock was encountered in borings made within or adjacent to the proposed limits of the stadium.
2. Actual bearing grade will likely be deeper than the elevations in this table. The footings should be designed with a maximum allowable bearing pressure of 11,000 psf for footings bearing above El. 730 and 15,000 psf for footings bearing below El. 730.

Footings loaded to these pressures will settle, but we estimate that the total settlement will be less than 1 inch.
Footings for lightly loaded structures with the limits of the stadium could bear above competent rock and in the glacial deposits/weathered shale. These should be designed as recommended in Section 4.2.1.1.

All footings for the stadium should be embedded at least 4 feet below the final grade for frost considerations.

4.1.3.2 *Uplift and Lateral Loading*

The disadvantage of spread footings is that they do not provide uplift resistance beyond their dead weight. If a net uplift is anticipated, we recommend developing this resistance by using vertical or inclined rock anchors bonded in the competent shale.

Some lateral load can be resisted due to friction between the concrete and competent shale and the shale bedding planes below the footing. The frictional resistance between the bedding planes will likely be about the same as those between the placed concrete

and the prepared shale. We recommend using an allowable horizontal frictional resistance of 35 degrees below the foundations to develop lateral resistance.

If needed, the resistance to lateral loading can be developed by several methods. Footings with lateral loading, but little or no uplift, can be designed with steel bars doweled into the shale and integrated in the footings. For a combination of lateral and uplift, post-tensioned rock anchors will provide an increase in the normal stress between the footing and the competent rock and rock bedding planes, thus increasing the lateral capacity due to friction. By inclining the anchors, a horizontal component of the anchor capacity can be used to resist lateral loading, as well. Additional recommendations for the design of rock anchors are provided in Section 4.1.4.2.

4.1.4 Retaining Structures

Since the stadium will be embedded about 35 feet below existing grades, exterior foundation walls for the event (i.e., field) level should be designed to resist lateral pressures from exterior backfill and surcharge loading. Access ramps will also require retaining walls to accommodate grade changes.

4.1.4.1 *Foundation Walls*

The perimeter of the excavation in the competent shale will be close to vertical. Preliminary plans indicate that the foundation walls will be constructed a few feet inside of the excavation around the entire perimeter to accommodate drainage. We recommend that enough space be provided between the rock excavation and the interior foundation wall to allow access to construct forms, place waterproofing, etc. The space between the walls and excavation should be backfilled with free draining, granular stone (i.e., drainage stone, refer to Appendix C) to collect groundwater and direct it to a drainage system (described in Section 4.1.2). These walls should be designed to resist loads applied from the backfill around the stadium perimeter, including planned surcharge loading. Lateral earth pressures to be used for design are described in Section 4.1.4.4.

The perimeter foundation walls will be up to 35 feet high and can be supported internally with floor slabs. If the span between slabs is large enough to make this concept prohibitive, lateral support can alternatively be achieved by post-tensioned rock anchors embedded in the competent shale.

4.1.4.2 *Rock Anchors/Tie-Backs*

Rock anchors (i.e., tie-backs) should gain their capacity from embedment in the competent shale. The bond zone should be below El. 730. Below this elevation, the bond zone should be designed with an allowable bond stress of 50 pounds per square inch (psi).

Rock anchors should be designed and installed in general accordance with the recommendations found in *Recommendations for Prestressed Rock and Soil Anchors (PTI DC35.1-14)* published by the Post-Tensioning Institute.

4.1.4.3 *Other Walls*

Other walls, such as those for access ramps or to accommodate other grade changes can generally be designed as cantilevered retaining walls or walls with tiebacks, depending on the height, anticipated surcharge, and space for construction.

Cantilevered walls should be designed using the allowable bearing pressures for the planned bearing stratum as described in Section 4.1.3.1 for rock or Section 4.2.1.1 for till or weathered shale.

Tiebacks for walls, where required, should extend into the competent shale. These should be designed as described in Section 4.1.4.2.

4.1.4.4 *Earth Pressures*

We recommend designing the foundation walls considering the at-rest condition. For drainage stone, the at-rest earth pressure coefficient (k_0) will be 0.5 and the stone should be assigned a unit weight of 120 pounds per cubic foot (pcf). In areas, where there will be a narrow space between the foundation wall and competent rock, the earth pressure will be lower than those calculated using the at-rest condition. The magnitude, however, is dependent on the height of the zone, width of the space, and anticipated surcharge. McMahon & Mann can assist the structural engineer with estimating earth pressures applied to the foundation walls at these locations.

Cantilevered walls or walls with a single row of tie-backs can be designed considering the active-earth pressure condition. We recommend using an active earth pressure coefficient (k_a) of 0.33 and a unit weight of 120 pcf for design.

A passive earth pressure coefficient of 3.0 should be used for walls embedded in overburden or weathered rock. A factor of safety of 1.5 should be applied to this value for the design of permanent structures. Walls embedded in competent rock should be designed according to the procedures defined by the *American Association of State Highway and Traffic Officials (AASHTO) LRFD Bridge Design Specifications.*

We recommend a coefficient of friction of 0.5 (i.e.26.6 degrees) for concrete structures bearing on glacial till or weathered rock and 0.7 (i.e.,35 degrees) for concrete structures bearing on clean (free from loose particles or debris) competent rock.
Multiple rows of slabs or bracing from anchors can alter the lateral earth pressures imparted on the retaining or foundation walls. McMahon & Mann should review the planned configuration to assist with estimating the lateral pressures on these types of walls.

All walls should be designed to collect and direct groundwater away from the structure. With adequate drainage, no consideration for groundwater pressure against the wall above the drainpipe will be necessary.

4.1.4.5 *Waterproofing*

The exterior of the foundation walls should be waterproofed below El. 765.

4.1.5 Backfill and Drainage Considerations

Foundation Walls

The area between the stadium foundation walls and rock excavations should be backfilled with drainage stone. A perforated pipe should be embedded in the drainage stone below the floor slab elevation to direct groundwater to the permanent dewatering system (described in Section 4.1.2).

Event Level

The bottom of the excavation will be several feet below the planned event level and playing surface at El. 735. The event level and playing surface subgrade, in competent rock, should be sloped to direct runoff toward the dewatering system.

Drainage Stone should be used to backfill between the top of competent rock and event level floor slabs and the playing surface subgrade. A network of perforated drainage pipes should be embedded in the drainage stone to direct groundwater and run-off to the dewatering system.

Other Backfill

The remainder of the excavations, and any excavations that will support structures (e.g., concession stands, concrete sidewalks, etc.) should be backfilled with structural fill (refer to Appendix C).

Excavation spoil, including the excavated shale, might have uses for grading across the site. Most likely, it can be used to raise site grades at locations where no structures are planned (i.e., landscaping) or for areas with a higher tolerance for settlement (e.g., flexible pavement, gravel parking areas, etc.). It could also be stockpiled and used as backfill following the demolition of Highmark Stadium. Any material that will be used for these purposes should be treated as suitable fill (refer to Appendix C) and will need to be evaluated before being used. Suitable fill should be free of deleterious materials (e.g., frozen soil, organics, construction debris, particles larger than 4 inches, etc.).

Excavation spoil not suitable for use on site will need to be disposed of or recycled. If the material is not contaminated (no contamination was detected during the subsurface exploration program), a nearby disposal location should be identified. Alternatively, the material might be suitable for use as daily cover at a local landfill. Often, landfill facilities

will waive tipping fees or even subsidize shipping costs for the spoil. McMahon & Mann can assist with identifying acceptable disposal options.

4.2 AUXILIARY BUILDING AND OTHER STRUCTURES

The auxiliary building will be a one, or possibly two, story building located directly to the south of the new stadium. We recommend that this structure be supported by spread and strip footings. There will also be other support structures, parking lots, roadways, and landscaping across the site.

Additional geotechnical recommendations for these structures are included in the next section.

4.2.1 Design Considerations

4.2.1.1 *Foundations*

Auxiliary Building

Since weathered rock is estimated to be between 9 to 13 feet within the limits of the auxiliary building, we recommend the footings bear on the native glacial till. The maximum suitable bearing grades based on the borings made near the proposed auxiliary building footprint are summarized in the following table.

TABLE 3
MAXIMUM ALLOWABLE BEARING GRADE
AT AUXILIARY BUILDING

Boring Designation	Maximum Allowable Bearing Grade Elevation	Boring Designation	Maximum Allowable Bearing Grade Elevation
BH-G3-22	751.6	BH-I3-22	750.0
BH-G4-22	752.9	BH-I4-22	753.2
BH-H3-22	750.5	BH-I5-22	755.0
BH-H5-22	758.8		

Note: These elevations represent the top of the glacial till/weathered shale at these locations.

Spread and strip footings bearing on the till (or weathered shale, if encountered) should be designed with a maximum allowable bearing capacity of 8,000 psf. Footings loaded to this pressure will settle, but we expect the total settlement to be about one inch, or less.

Footings should be embedded at least 4 feet below the final grade for frost protection.

Spread footings should have a minimum dimension of 4 feet in either direction in plan. Strip footings should have a minimum width of 2 feet.

Other Support Structures

Foundations and slabs for other support structures should be designed similar to those for the auxiliary building. McMahon & Mann can assist with estimating the maximum suitable bearing grade at the selected locations. Additional borings might be required if the planned structure locations are outside of the limits of the subsurface exploration program.

4.2.1.2 *Concrete Slab Design*

A 1-foot-thick layer of structural fill shall be placed over the subgrade following proof rolling (see Section 4.2.2.2) within the limits of the auxiliary building and other planned concrete slabs on grade. The structural fill should be covered with a vapor retarder that complies with the American Society for Testing and Materials (ASTM) E 1745-17 "Standard Specifications for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs" prior to the placement of concrete.

The concrete slab should be designed and constructed following the procedure outlined in the ACI 302.1R "Guide for Concrete Floor and Slab Construction." In particular, the mix design should comply with the requirements to limit slab curling. Refer also to the procedures outlined in ACI 302.2R-06 "Guide for Concrete Slabs that receive Moisture-Sensitive Flooring Materials."

The slab should be constructed after the footings have been built and loaded with the weight of the building. This will limit the effect on the slab from subgrade elastic compression caused by the footing loads.

We recommend using a modulus of subgrade reaction of 200 pounds per cubic inch (pci) for designing the concrete slab.

4.2.1.3 *Pavement Design*

Grades below the planned pavement limits should be raised with compacted structural fill, as necessary. The pavement subgrade should be prepared by clearing it of deleterious and unsuitable material and proofrolled as described in Section 4.2.2.2. The subbase below the asphalt pavement should also be structural fill.

The subgrade should be lined with a stabilization geotextile (refer to Appendix C) prior to placing the structural fill subbase layer. We recommend a minimum subbase thickness of 1-foot. However, more may be necessary depending on the traffic loads and pavement analysis. We recommend using a modulus of subgrade reaction of 200 pci for designing the pavement.

The subgrade for all pavement areas should be pitched to direct water collected in the subbase to drainage structures.

4.2.1.4 *Light Posts*

We recommend supporting light posts using drilled piers socketed in competent shale rock. With this construction technique, they will develop axial resistance from adhesion and friction between the concrete and rock on the sides of the socket. Lateral and flexural resistance is developed based on the strength of rock and depth and diameter of the socket. Therefore, dimensions of the drilled piers will depend on the anticipated overturning moment.

We can assist with the design of the light post foundations. Additional borings might be required if the planned structure locations are outside of the limits of the subsurface exploration program.

Once drilled, concrete should be placed using the tremie method of concrete placement as outlined in ACI 336.1-01.

The drilled piers should also be designed and constructed in accordance with ACI 336.3R-14 publication, “Report on Design and Construction of Drilled Piers.” These manuals state allowable construction tolerances and procedures. It is recommended that appropriate reinforcing steel be included in the design to resist overturning moments that result from applied lateral loads and due to construction eccentricities.

4.2.2 Construction Considerations

4.2.2.1 *Utility Relocation and/or Protection*

Multiple utilities, including sewer, water, and overhead utilities, are located within the vicinity of the project site. Contract documents should alert the contractor to the location of any existing utilities. The contractor should relocate, decommission, or protect the existing utilities that will be within the construction limits.

4.2.2.2 *Subgrade Preparation*

The footprint of the auxiliary building, support structures, pavements, and other structures should be prepared by removing asphalt, soil with debris, soil containing deleterious materials, etc. to expose the planned subgrade elevation.

Once the subgrade elevation is reached, it should be proofrolled using either a smooth drum roller with an operating weight of at least 10 tons or a loaded 10-wheel dump truck. The proofrolling should be used to identify soft and/or unstable areas. The roller should be driven slowly over the subgrade and its response should be observed. A subgrade deflection of less than 1 inch is acceptable. Larger deflections, rutting, and/or pumping are signs of subgrade instability. These areas should be compacted until they are stable or overexcavated and replaced with compacted structural fill.

Grades should be raised with compacted structural fill as necessary.

4.2.2.3 *Excavation Considerations*

The depth of excavations for structures, pavement, and utilities will likely vary across the site. We recommend that these excavations be sloped. The sloped excavations will likely extend through the fill and native deposits into the glacial deposits or weathered shale. For estimating purposes, excavations should be planned considering the soil as Soil Type C. For Soil Type C, the slopes should be no steeper than 1.5H:1V. However, the slopes may need to be flatter to maintain stability and for worker safety.

Excavations should be dewatered until they are backfilled. If access to the dewatering system for the stadium is not possible, the excavations will likely be able to be sloped to a low area and pumped.

4.2.2.4 *Backfill and Placement*

Backfill for the structures' (i.e., auxiliary building, other structures) foundation walls, floor slabs, and utility excavations below future structures should be structural fill.

On the exterior side of buildings or for utilities where no structures will be constructed, the excavations can be backfilled with suitable fill.

The ground surface adjacent to backfilled structures should be sloped to direct surface water away from the structures.

4.3 CONSTRUCTION MONITORING

McMahon & Mann should monitor geotechnical aspects of construction including the following:

- Review design drawings and specifications before construction begins,
- Review the plans for excavation and dewatering,
- Review the plans for installing rock anchors/tiebacks,
- Observe the excavation as it proceeds to see if there are adjustments in estimated excavation efforts or dewatering,
- Observe the excavation spoil for appropriateness for use as *suitable fill*,
- Observe the subgrade prior to construction of the footings and slabs,
- Observe the installation of rock anchors/tiebacks,
- Observe the installation of the footings and slabs, and
- Observe backfill placement and compaction.

5.0 ENVIRONMENTAL ASSESSMENT FORM

LPD requested that McMahon & Mann assist it in completing a portion of the Full Environmental Assessment Form (FEAF) as part of the State Environmental Quality Review (SEQR) Act for environmental permit submission to the New York State Department of Environmental Conservation (NYSDEC). Specifically, McMahon & Mann completed Section E.2a through E.2g.

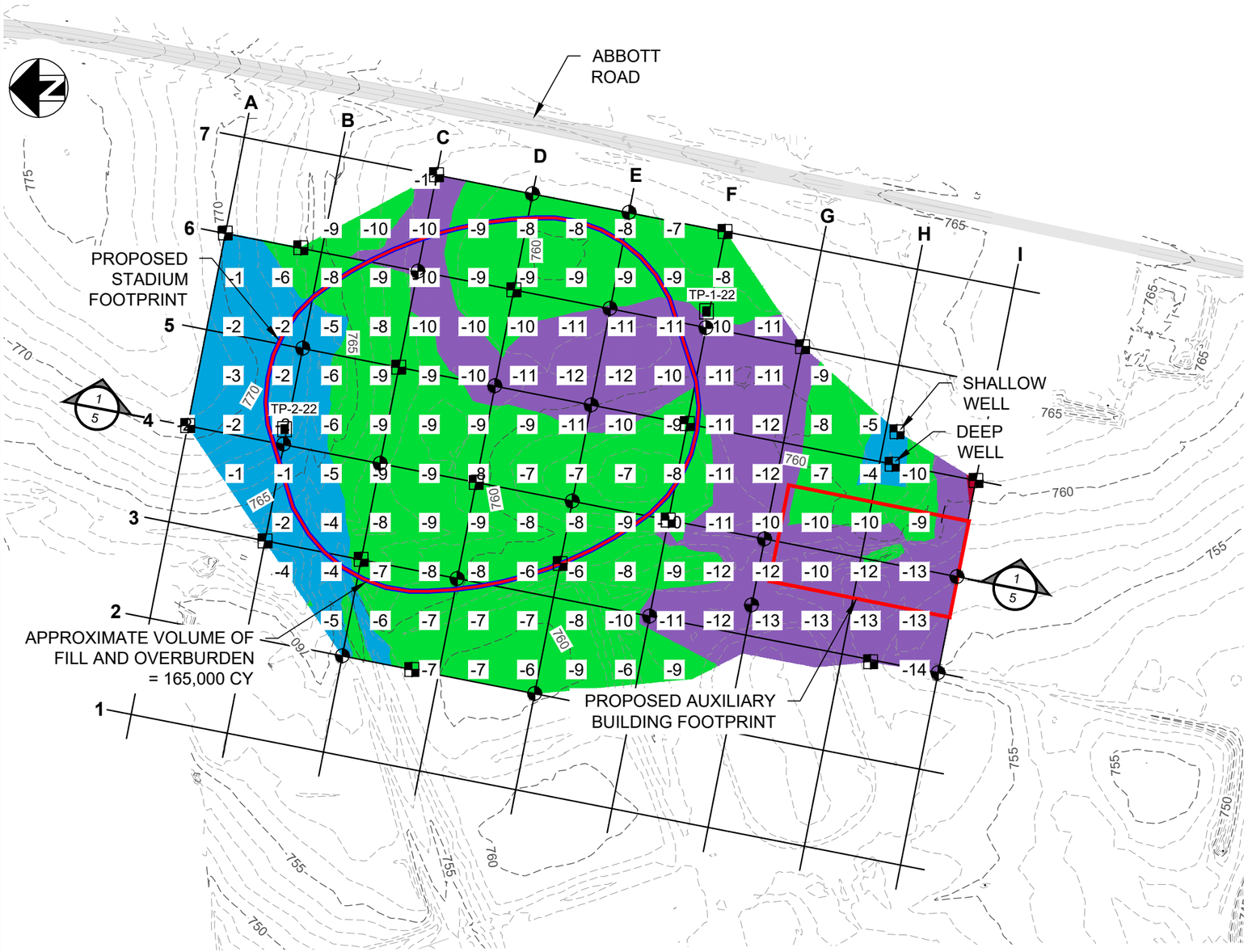
The completed form is included in Appendix D, with our responses to Sections E.2a through E.2g outlined in red. These responses are based on our observations of site conditions, results of the subsurface exploration program, and a review of published data[6].

6.0 LIMITATIONS

Limitations to this report are included in Appendix E.

[6] *Soil Survey of Erie County, New York*, published by the United States Department of Agriculture and the Soil Conservation Service, issued December 1988.

FIGURES



LEGEND

- 760 — EXISTING GROUND CONTOURS (SEE NOTE 1)
- PROPOSED STADIUM FOOTPRINT (SEE NOTE 4)
- PROPOSED AUXILIARY BUILDING FOOTPRINT (SEE NOTE 4)
- TP-1-22 — TEST PIT DESIGNATION AND APPROXIMATE LOCATION (SEE NOTE 3)
- BORE HOLE LOCATION (SEE NOTE 3)
- MONITORING WELL LOCATION (SEE NOTE 3)
- A / 7 — GRID LINES FOR BORING AND MONITORING WELL DESIGNATION

THICKNESS OF FILL AND NATIVE OVERBURDEN: (SEE NOTE 2)

- BETWEEN 0 AND 5 FEET
- BETWEEN 5 AND 10 FEET
- BETWEEN 10 AND 15 FEET
- BETWEEN 15 AND 20 FEET
- -5 — THICKNESS OF FILL AND NATIVE OVERBURDEN (FEET)

NOTE:

1. Existing ground surface based on topographic survey provided by Foit-Albert Associates, Architecture, Engineering and Survey, P.C., dated April 29, 2022.
2. Fill and native overburden thickness is defined as the vertical depth between existing ground and the top of weathered rock. Thickness tick marks are based on linear interpolation between borings. See report text for further information.
3. Borings and monitoring wells completed by Earth Dimensions, Inc. in April - May 2022. See grid lines for designations. Test pits completed by McMahon & Mann Consulting Engineering and Geology, P.C. with assistance from Pinto Construction Services on June 15, 2022. See Appendix A for the boring location plan (Figure A-1) and boring, monitoring well, and test pit logs.
4. Proposed stadium and auxiliary building footprint provided by Legends Project Development in drawing titled, "BBS - Site Base 2022.0428 with stadium location," dated April 28, 2022.

1 THICKNESS OF FILL AND OVERBURDEN

250' 0 125' 250'

SCALE: 1" = 250'

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BUFFALO BILLS STADIUM
ERIE COUNTY NEW YORK

THICKNESS OF FILL AND OVERBURDEN

DWG. NO. 22011-008 FIGURE 1

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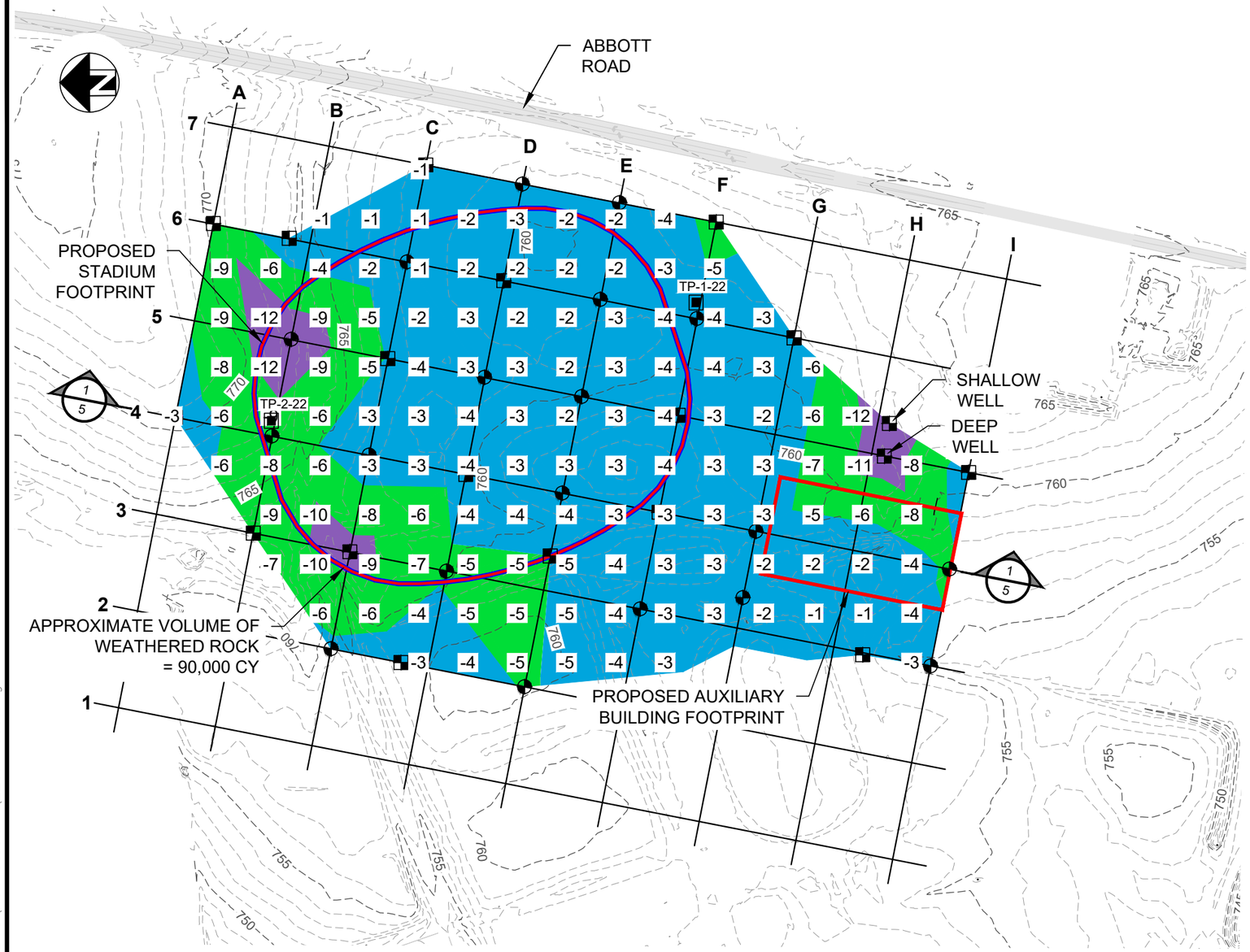

LEGEND

- 760 — EXISTING GROUND CONTOURS (SEE NOTE 1)
- PROPOSED STADIUM FOOTPRINT (SEE NOTE 4)
- PROPOSED AUXILIARY BUILDING FOOTPRINT (SEE NOTE 4)
- TP-1-22 — TEST PIT DESIGNATION AND APPROXIMATE LOCATION (SEE NOTE 3)
- BORE HOLE LOCATION (SEE NOTE 3)
- MONITORING WELL LOCATION (SEE NOTE 3)
- A / 7 — GRID LINES FOR BORING AND MONITORING WELL DESIGNATION

THICKNESS OF WEATHERED ROCK: (SEE NOTE 2)

- BETWEEN 0 AND 5 FEET
- BETWEEN 5 AND 10 FEET
- BETWEEN 10 AND 15 FEET
- -5 — THICKNESS OF WEATHERED ROCK (FEET)

NOTE:

1. Existing ground surface based on topographic survey provided by Foit-Albert Associates, Architecture, Engineering and Survey, P.C., dated April 29, 2022.
2. Weathered rock thickness is defined as the vertical depth between the bottom of overburden and top of compenent rock. Thickness tick marks are based on linear interpolation between borings. See report text for further information.
3. Borings and monitoring wells completed by Earth Dimensions, Inc. in April - May 2022. See grid lines for designations. Test pits completed by McMahon & Mann Consulting Engineering and Geology, P.C. with assistance from Pinto Construction Services on June 15, 2022. See Appendix A for the boring location plan (Figure A-1) and boring, monitoring well, and test pit logs.
4. Proposed stadium and auxiliary building footprint provided by Legends Project Development in drawing titled, "BBS - Site Base 2022.0428 with stadium location," dated April 28, 2022.

2 THICKNESS OF WEATHERED ROCK

250' 0 125' 250'

SCALE: 1" = 250'

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BUFFALO BILLS STADIUM
ERIE COUNTY NEW YORK

THICKNESS OF WEATHERED ROCK

DWG. NO. 22011-009 FIGURE 2

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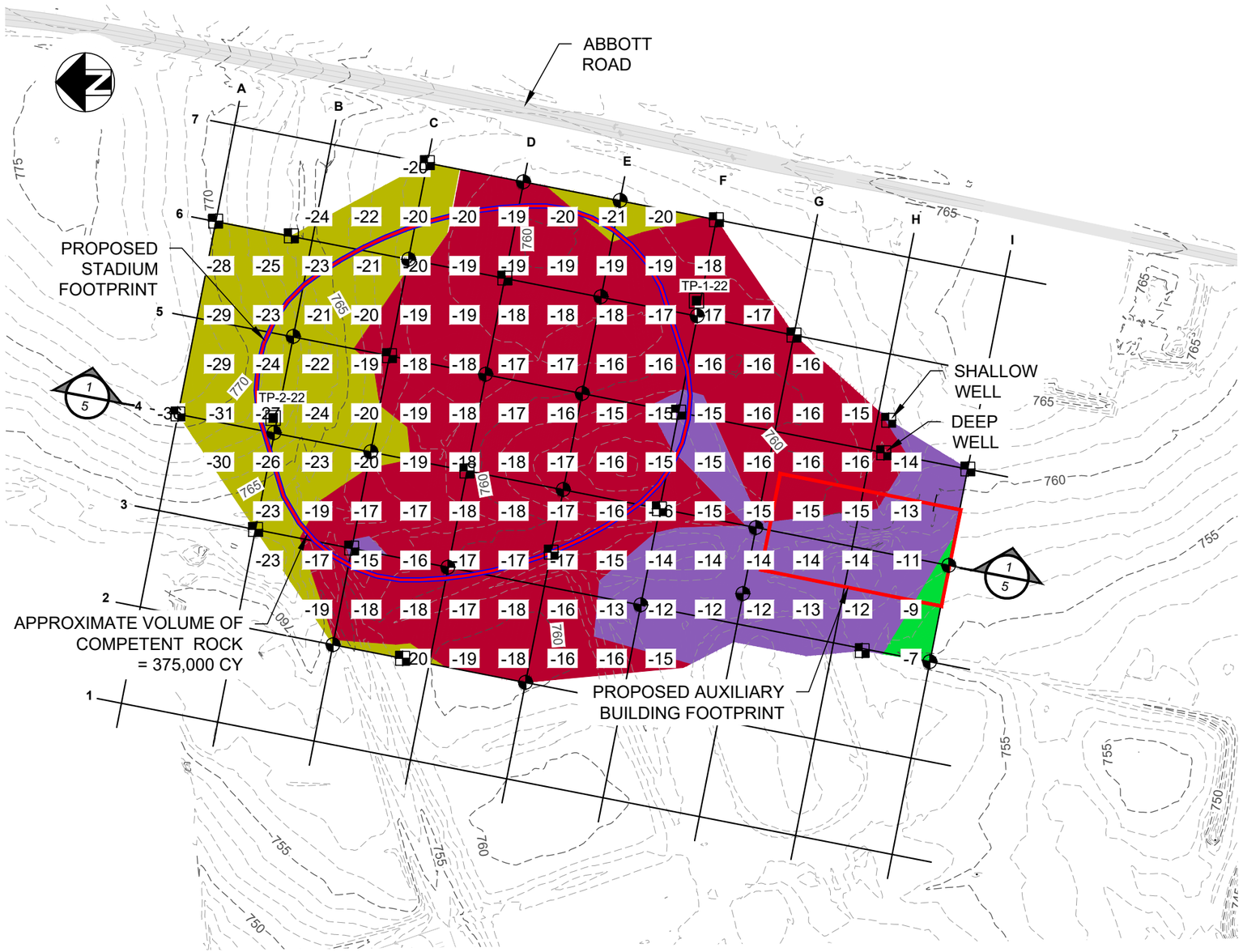

LEGEND

- 760 — EXISTING GROUND CONTOURS (SEE NOTE 1)
- PROPOSED STADIUM FOOTPRINT (SEE NOTE 4)
- PROPOSED AUXILIARY BUILDING FOOTPRINT (SEE NOTE 4)
- TP-1-22 — TEST PIT DESIGNATION AND APPROXIMATE LOCATION (SEE NOTE 3)
- BORE HOLE LOCATION (SEE NOTE 3)
- MONITORING WELL LOCATION (SEE NOTE 3)
- A / 7 — GRID LINES FOR BORING AND MONITORING WELL DESIGNATION

THICKNESS OF COMPETENT ROCK: (SEE NOTE 2)

- BETWEEN 5 AND 10 FEET
- BETWEEN 10 AND 15 FEET
- BETWEEN 15 AND 20 FEET
- GREATER THAN 20 FEET
- -5 — THICKNESS OF COMPETENT ROCK (FEET)

NOTE:

1. Existing ground surface based on topographic survey provided by Foit-Albert Associates, Architecture, Engineering and Survey, P.C., dated April 29, 2022.
2. Competent rock thickness is defined as the vertical depth between the bottom of weathered rock and top of proposed subgrade (El. 730). Thickness tick marks are based on linear interpolation between borings. See report text for further information.
3. Borings and monitoring wells completed by Earth Dimensions, Inc. in April - May 2022. See grid lines for designations. Test pits completed by McMahon & Mann Consulting Engineering and Geology, P.C. with assistance from Pinto Construction Services on June 15, 2022. See Appendix A for the boring location plan (Figure A-1) and boring, monitoring well, and test pit logs.
4. Proposed stadium and auxiliary building footprint provided by Legends Project Development in drawing titled, "BBS - Site Base 2022.0428 with stadium location," dated April 28, 2022.

3 THICKNESS OF COMPETENT ROCK

250' 0 125' 250'

SCALE: 1" = 250'

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BUFFALO BILLS STADIUM
ERIE COUNTY NEW YORK

THICKNESS OF COMPETENT ROCK

DWG. NO. 22011-010 FIGURE 3

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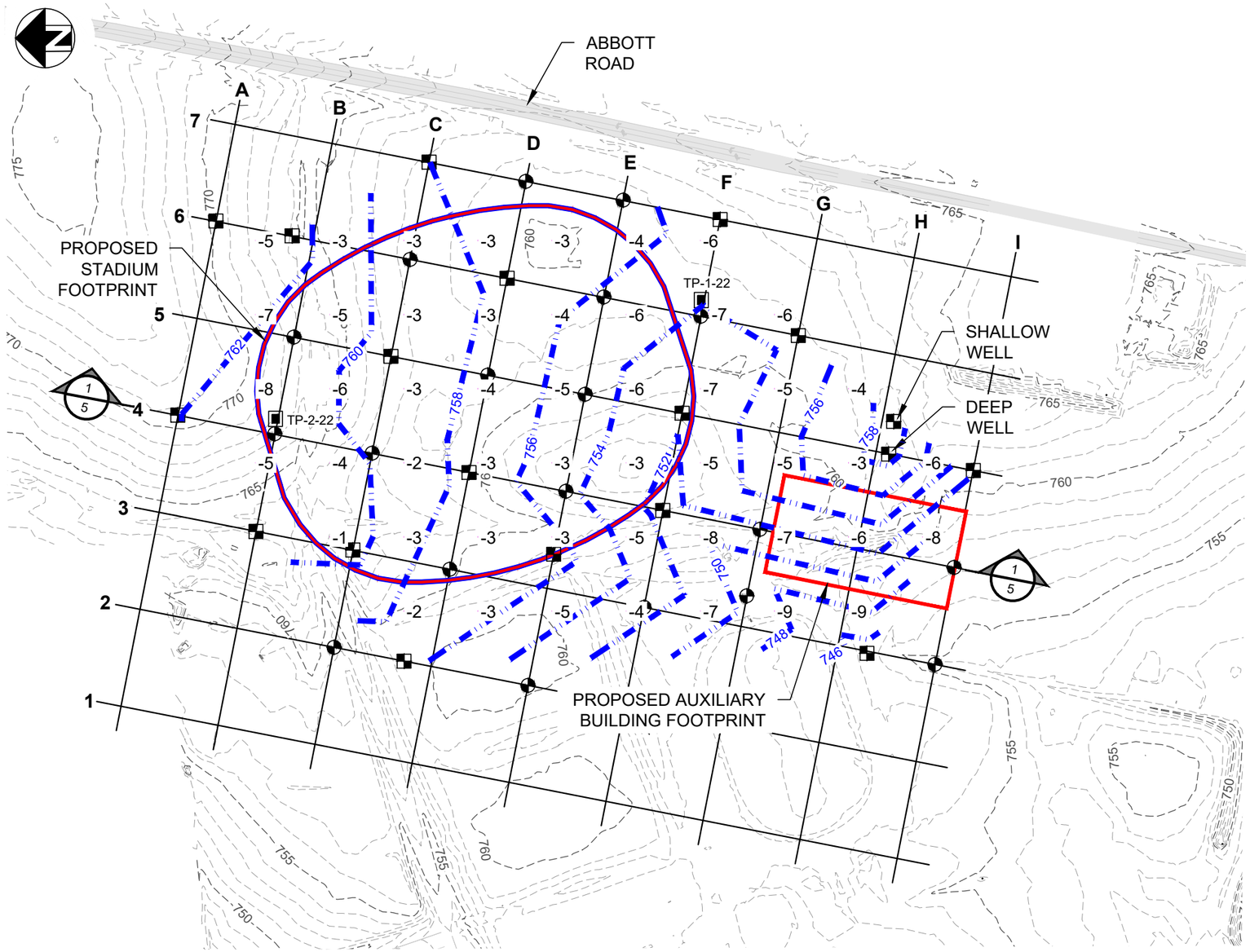

LEGEND

- EXISTING GROUND CONTOURS (SEE NOTE 1)
- GROUNDWATER CONTOURS (SEE NOTE 2)
- PROPOSED STADIUM FOOTPRINT (SEE NOTE 4)
- PROPOSED AUXILIARY BUILDING FOOTPRINT (SEE NOTE 4)
- GRID LINES FOR BORING AND MONITORING WELL DESIGNATION
- TEST PIT DESIGNATION AND APPROXIMATE LOCATION (SEE NOTE 3)
- BORE HOLE LOCATION (SEE NOTE 3)
- MONITORING WELL LOCATION (SEE NOTE 3)
- -5 DEPTH FROM GROUND SURFACE TO GROUNDWATER (FEET)

NOTE:

1. Existing ground surface based on topographic survey provided by Foit-Albert Associates, Architecture, Engineering and Survey, P.C., dated April 29, 2022.
2. Water elevations were measured in monitoring wells on June 10 and 15, 2022. The groundwater contours are based on linear interpolations between the monitoring wells.
3. Borings and monitoring wells completed by Earth Dimensions, Inc. in April - May 2022. See grid lines for designations. Test pits completed by McMahon & Mann Consulting Engineering and Geology, P.C. with assistance from Pinto Construction Services on June 15, 2022. See Appendix A for the boring location plan (Figure A-1) and boring, monitoring well, and test pit logs.
4. Proposed stadium and auxiliary building footprint provided by Legends Project Development in drawing titled, "BBS - Site Base 2022.0428 with stadium location," dated April 28, 2022.

4 GROUNDWATER CONTOUR MAP

250' 0 125' 250'

SCALE: 1" = 250'

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GROUNDWATER CONTOUR MAP

DWG. NO. 22011-012 FIGURE 4

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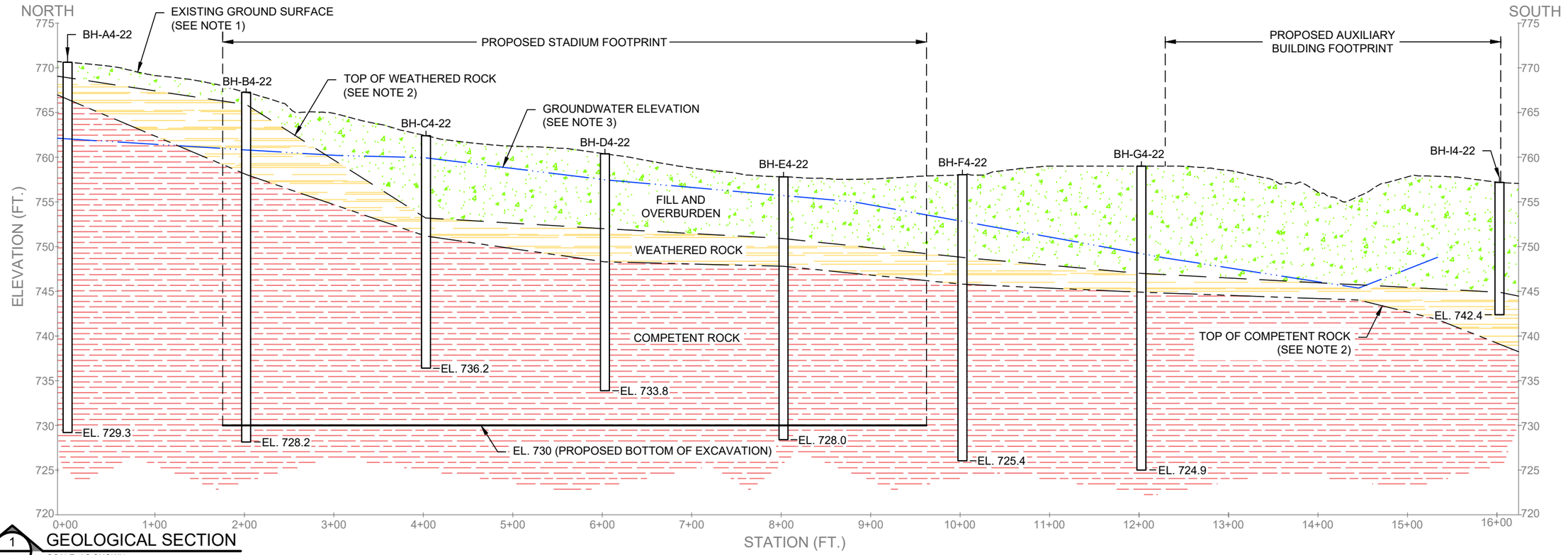
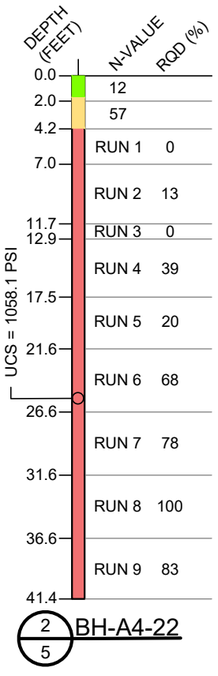
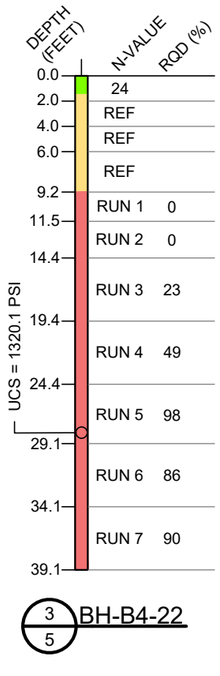


1/5 GEOLOGICAL SECTION

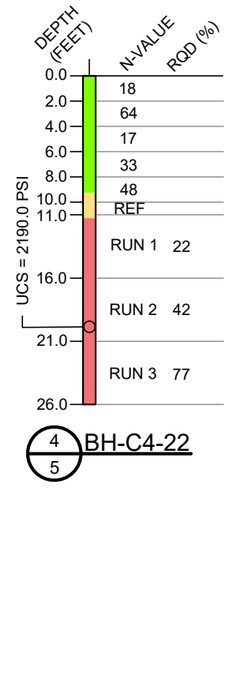
SCALE: AS SHOWN



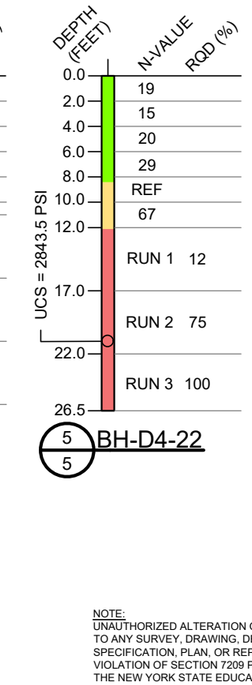
2/5 BH-A4-22



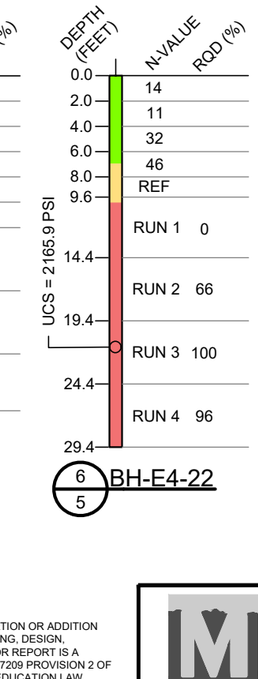
3/5 BH-B4-22



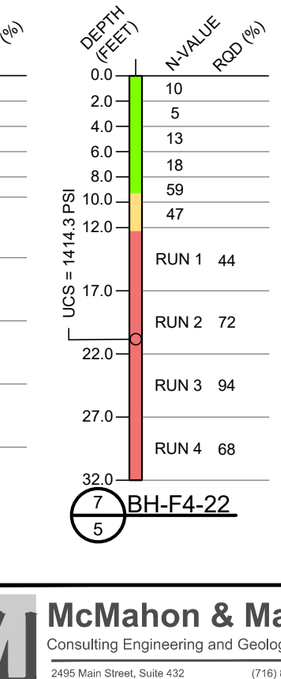
4/5 BH-C4-22



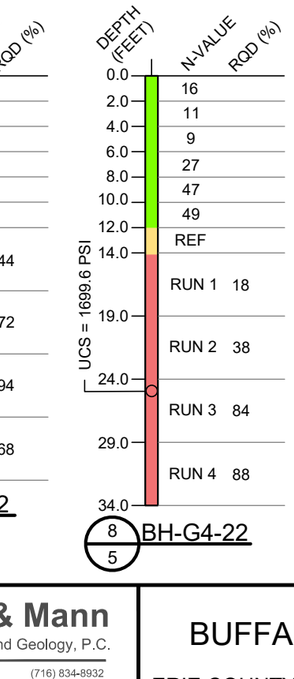
5/5 BH-D4-22



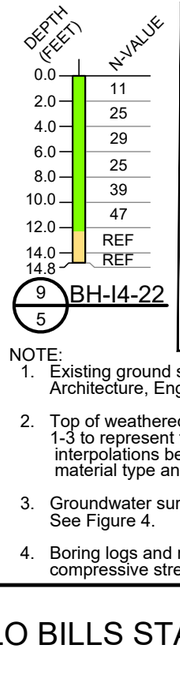
6/5 BH-E4-22



7/5 BH-F4-22

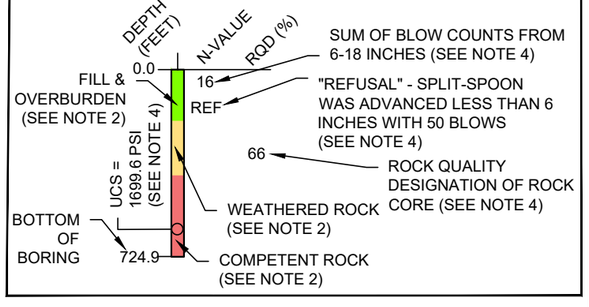


8/5 BH-G4-22



9/5 BH-I4-22

LEGEND



NOTE:

1. Existing ground surface based on topographic survey provided by Foit-Albert Associates, Architecture, Engineering and Survey, P.C., dated April 29, 2022.
2. Top of weathered rock and top of competent rock based on surfaces created in Figures 1-3 to represent the thickness of material type. These surfaces were based on linear interpolations between borings. See report text for further information on material type and excavatability.
3. Groundwater surface is based on measurements recorded on June 10 and 15, 2022. See Figure 4.
4. Boring logs and rock core photographs are included in Appendix A. Unconfined compressive strength (UCS) test results are included in Appendix B.

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GEOLOGICAL SECTION

DWG. NO. 22011-011

FIGURE 5

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APPENDIX A

SUMMARY OF SUBSURFACE EXPLORATIONS
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

APPENDIX A

SUMMARY OF SUBSURFACE EXPLORATIONS
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

I. BORINGS

In April and May 2022, Earth Dimensions, Inc. (EDI) advanced 38 borings at the site after Ground Penetrating Radar Systems, LLC (GPRS) cleared each location for underground utilities. EDI used a track mounted drill rig to complete the borings and monitoring wells, which are designated as shown in Table A-1, included in this appendix. The designations are in relation to the coordinates of the 200 by 200-foot grid layout. The locations of the borings and wells are shown on Figure A-1 in this appendix and are presented on the grid layout in Figures 1 through 4.

Foit-Albert Associates, Architecture, Engineering and Survey, P.C. (Foit-Albert) provided a topographic survey of the stadium site which included the boring locations and the adjacent ground surface elevations. Legends Project Development (LPD) provided the proposed stadium and auxiliary building limits.

The borings were drilled with 4-1/4 inch inside diameter hollow stem augers. Soil samples were collected in the borings from below the bottom of the augers. All of the borings were sampled at 2-foot intervals to split-spoon or auger refusal. Rock core samples were retrieved from all of the borings except for BH-I4-22. The boring logs are included in Appendix A-1 and the boring locations are summarized in Table A-1.

II. SOIL SAMPLING

Soil samples were collected using a 1-3/8 inch inside diameter, 24-inch long split-spoon sampler in general accordance with ASTM D 1586. Samples were obtained by driving the sampler into the ground with a 140-pound hammer falling 30 inches. The sampler was driven 24 inches, the soil sample was removed from the sampler, and a description of the sample was recorded on the boring log.

The number of hammer blows required to drive the sampler through each 6-inch interval was recorded. The sum of the number of blows required to advance the sampler in the second and third 6-inch interval is the Standard Penetration Test (SPT) N-value.

The SPT N-values are correlated to the consistency of plastic soils, as shown below:

Consistency	N-value
Very Soft	<2
Soft	2-4
Medium Stiff	5-8
Stiff	9-15
Very Stiff	16-30
Hard	>30

The SPT N-values are also correlated to the density of granular soils, as shown below:

Density	N-value
Very Loose	0-4
Loose	5-10
Medium Dense	11-30
Dense	31-50
Very Dense	>50

III. ROCK CORING

EDI cored a minimum of approximately 10 feet of rock in most borings using a NQ-2 size double tubed wireline core barrel and diamond bit, which yields a 2-inch diameter core sample. The rock type and the condition of the cores are recorded on the boring logs. Photographs of the rock core are included following each boring log (See Appendix A-1).

The core recovery and the Rock Quality Designation (RQD) for the core runs are also recorded on the boring logs. Core recovery is the length of core retrieved from the boring compared to the actual length of rock that was cored, expressed as a percentage. The RQD is a measure of the frequency of discontinuities and is defined as the sum of the core pieces that are 4 inches or greater in length divided by the length of the core run.

IV. TEST PITS

In June 2022, Pinto Construction Services (Pinto) used a Kobelco SK210 LC excavator to complete two (2) test pits at the site adjacent to existing test borings. Test pits are designated as TP-1-22 and TP-2-22 and their locations are shown on Figure A-1.

McMahon & Mann Consulting Engineering and Geology, P.C. observed the advancement of the test pits and prepared test pit logs. The test pit logs are included in Appendix A-2. The approximate ground surface elevations and test pit depths are summarized in Table A-2.

V. GROUNDWATER MONITORING WELLS

Upon completion of select borings, groundwater monitoring wells were installed in the bore holes, as noted in Table A-1. The monitoring wells are constructed of 2-inch diameter PVC well screen and riser pipe. Refer to the attached boring logs for details of installation.

McMahon & Mann developed the monitoring wells by removing water from the well using a bailer. This is done to agitate, suspend, and remove fine-grained particles and to check that the wells are operating properly. All wells had the equivalent of at least five times its volume (cross sectional area of the inside of the pipe times the height of water in the well), or more, removed for development.

Following development, we measured the groundwater levels in the wells. These measurements are summarized in the table below:

Designation	Groundwater Elevation, ft
BH-A4-22	762.1
BH-A6-22	763.4
BH-B3-22	761.1
BH-B6-22	762.7
BH-C3-22	760.5
BH-C5-22	759.3
BH-C7-22	758.0
BH-D2-22	756.6
BH-D4-22	757.5
BH-D6-22	757.7

Designation	Groundwater Elevation, ft
BH-E3-22	756.9
BH-F4-22	751.4
BH-F5-22	752.2
BH-F7-22	755.5
BH-G6-22	754.4
BH-H3-22	745.2
BH-H5(D)-22	745.5
BH-H5(S)-22	759.0
BH-I5-22	752.3

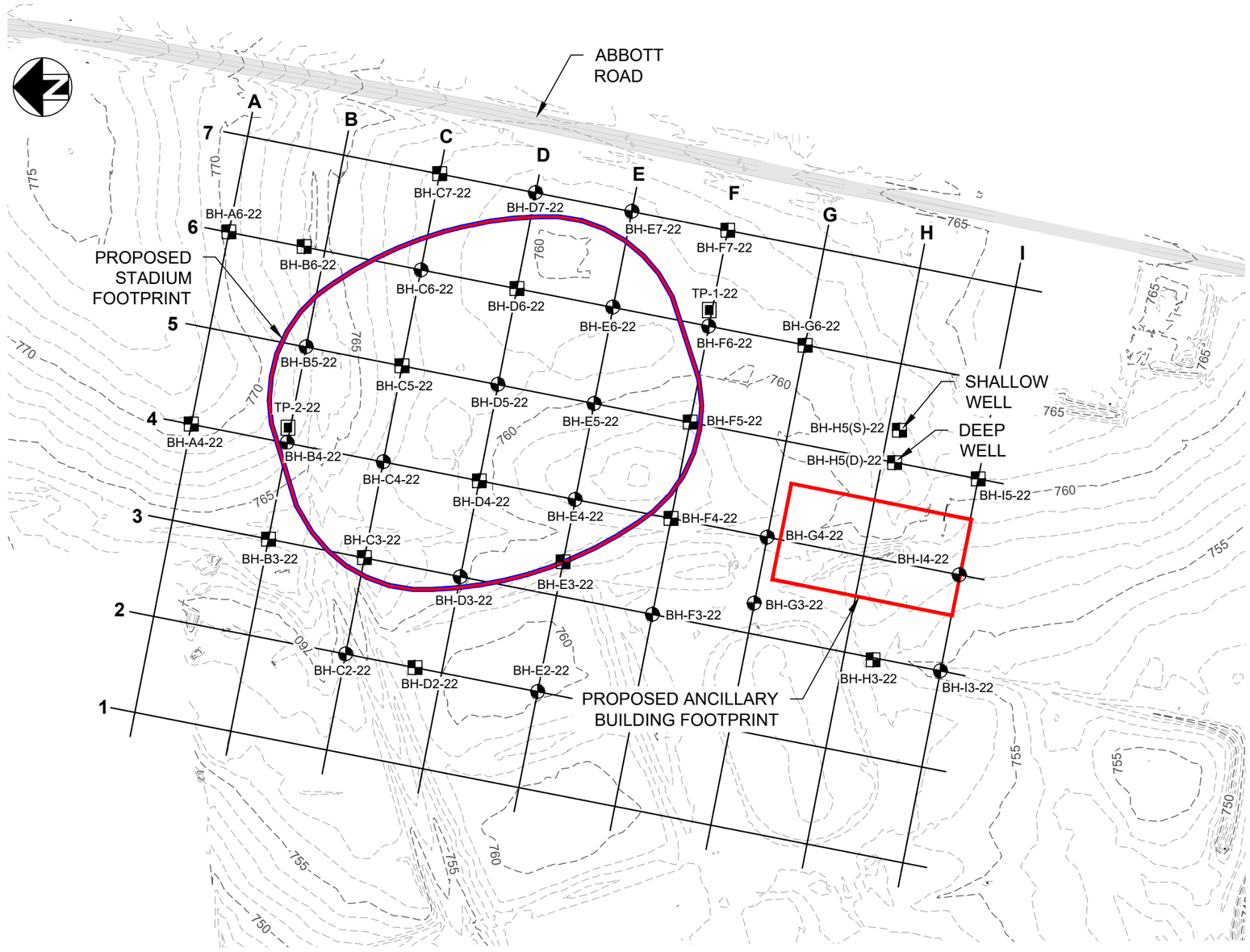
VI. HYDRAULIC CONDUCTIVITY ESTIMATES

Monitoring wells were developed after installation by removing a minimum of five (5) well volumes of water to ensure that the well was hydraulically connected to the formation and operating properly. Following well development, groundwater was allowed to return to an equilibrium elevation in the wells.

Rising and falling head tests (i.e., slug tests) were then performed at the monitoring wells. A slug was either added or removed to induce a change in head and the water level was measured as it returned to the equilibrium elevation. These data were then used to estimate the hydraulic conductivity of the rock formations adjacent to the wells' screened interval. The estimated hydraulic conductivities are summarized in Table A-3.

FIGURE A-1

BORING LOCATION PLAN



A-1 BORING LOCATION PLAN

250' 0 125' 250'

SCALE: 1" = 250'

LEGEND

- 760 — EXISTING GROUND CONTOURS (SEE NOTE 1)
- PROPOSED STADIUM FOOTPRINT (SEE NOTE 3)
- PROPOSED ANCILLARY BUILDING FOOTPRINT (SEE NOTE 3)
- TP-1-22 — TEST PIT DESIGNATION AND APPROXIMATE LOCATION (SEE NOTE 2)
- BH-B3-22 — BORE HOLE DESIGNATION AND LOCATION (SEE NOTE 2)
- BH-A4-22 — MONITORING WELL DESIGNATION AND LOCATION (SEE NOTE 2)
- A / 7 — GRID LINES FOR BORING AND MONITORING WELL DESIGNATION

NOTE:

1. Existing ground surface based on topographic survey provided by Foit-Albert Associates, Architecture, Engineering and Survey, P.C. (Foit-Albert), dated April 29, 2022.
2. Borings and monitoring wells completed by Earth Dimensions, Inc. in April - May 2022, and locations and elevations surveyed by Foit-Albert. Boring designations based on 200 x 200 ft. grid. Test pits completed by McMahon & Mann Consulting Engineering and Geology, P.C. with assistance from Pinto Construction Services on June 15, 2022. See Appendix A for boring, monitoring well, and test pit logs.
3. Proposed stadium and ancillary building footprint provided by Legends Project Development in drawing titled, "BBS - Site Base 2022.0428 with stadium location,"dated April 28, 2022.

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BUFFALO BILLS STADIUM
ERIE COUNTY NEW YORK

BORING LOCATION PLAN
DWG. NO. 22011-013 FIGURE A-1

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APPENDIX A-1

SUMMARY TABLE, BORING LOGS, AND ROCK CORE PHOTOGRAPHS

Table A-1
Boring Locations, Elevations, and Total Depths

Boring	Northing[2]	Easting[2]	Ground Surface Elevation, ft[2]	Total Depth, ft
BH-A4-22[1]	1011031.00	1092206.00	770.7	41.4
BH-A6-22[1]	1010954.00	1092599.00	769.5	32.3
BH-B3-22[1]	1010873.00	1091970.68	764.0	24.2
BH-B4-22	1010835.10	1092168.00	767.3	39.1
BH-B5-22	1010796.00	1092364.00	767.4	25.0
BH-B6-22[1]	1010800.00	1092569.00	766.0	25.9
BH-C2-22	1010715.00	1091736.00	758.9	23.7
BH-C3-22[1]	1010677.00	1091933.00	762.6	27.2
BH-C4-22	1010638.00	1092129.00	762.2	26.0
BH-C5-22[1]	1010600.00	1092325.00	762.5	42.1
BH-C6-22	1010561.00	1092521.00	761.4	21.2
BH-C7-22[1]	1010523.00	1092718.00	761.6	26.2
BH-D2-22[1]	1010573.44	1091708.19	759.8	24.0
BH-D3-22	1010480.83	1091893.74	760.0	63.5
BH-D4-22[1]	1010442.00	1092090.00	760.3	26.5
BH-D5-22	1010404.00	1092287.00	761.1	23.7
BH-D6-22[1]	1010365.00	1092483.00	760.3	29.5
BH-D7-22	1010327.00	1092679.00	760.7	20.4
BH-E2-22	1010322.68	1091659.00	760.1	21.6
BH-E3-22[1]	1010270.70	1091924.51	759.8	31.7
BH-E4-22	1010246.00	1092052.00	757.4	29.4
BH-E5-22	1010207.00	1092248.00	759.9	23.8
BH-E6-22	1010169.00	1092445.00	760.4	27.0
BH-E7-22	1010130.00	1092641.00	760.4	23.0
BH-F3-22	1010088.00	1091817.00	757.5	24.2
BH-F4-22[1]	1010050.00	1092013.00	757.8	32.0
BH-F5-22[1]	1010011.00	1092210.00	758.0	24.0
BH-F6-22	1009973.00	1092406.00	760.5	23.9
BH-F7-22[1]	1009934.00	1092602.00	761.6	25.5
BH-G3-22	1009880.00	1091840.00	757.1	24.3
BH-G4-22	1009853.35	1091974.61	758.9	34.0

Boring	Northing[2]	Easting[2]	Ground Surface Elevation, ft[2]	Total Depth, ft
BH-G6-22[1]	1009776.00	1092367.00	760.6	28.8
BH-H3-22[1]	1009637.00	1091724.00	756.5	24.2
BH-H5(D)-22[1]	1009593.00	1092127.00	760.6	34.1
BH-H5(S)-22[1]	1009582.94	1092193.30		15.5
BH-I3-22	1009499.15	1091701.37	754.0	27.3
BH-I4-22	1009460.68	1091897.64	757.2	14.8
BH-I5-22[1]	1009421.95	1092093.90	761.0	34.0

Table Note:

1. A monitoring well was installed following the completion of the boring. A well log is included with the boring log.
2. Boring locations and elevations were provided by Foit-Albert.

EARTH DIMENSIONS, INC.
Geotechnical and Environmental Drilling | Wetland Delineations and Consulting
1091 Jamison Road | Elma, NY 14059
(716) 655-1717 | EDI@earthdimensions.com

EDI Job Code: 12K93e **Hole Number** BH-A4-22 **Surface Elevation:** 770.7

Project Name: Proposed Site Development **Northing:** 1011031 **Easting:** 1092206

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/12/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/13/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	20	7	6	6	13	12
	2	22	13	27	30	50/4	57
5	Run		#1				
	Run		#2				
10	Run		#3				
	Run		#4				
15	Run		#5				
20							

LITH

Description and Classification

Tar and chip surface. 0.1

Moist brownish gray very gravelly (SAND) fill with 40 to 60% mostly angular gravel, trace silt and slag, compact, massive soil structure, (SM),(GM). 0.4

Dry to moist dark gray very gravelly (SAND-SILT-CLAY) fill with 30 to 50% mostly shale stone fragments, little to some sand, trace to little clay, stiff, massive soil structure, (GM),(GC). 1.8

grades downward to

Dark gray shale stone fragments, very soft with iron staining. 4.2

Dark gray shale bedrock, very soft to soft, thinly laminated, intensely fractured in all directions, some iron staining, core lengths range from (0.01-0.05'). 4.8

Dark gray shale bedrock, soft, thinly laminated, intensely fractured, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-0.07').

Dark gray shale bedrock, soft, thinly laminated, moderately fractured horizontally along bedding planes with high angle fractures at 15.0 to 15.6, 16.4 to 16.5, 18.0 to 18.2, 18.7 to 18.8, 19.1 to 19.2, 19.5 to 19.8, 20.2 to 20.4, 20.7 to 21.7, 22.2 to 22.8, 25.0 to 25.1, 26.2 to 26.5, 27.1 to 27.2, 28.3 to 28.7, and 29.2 to 29.3 feet, dense, no iron staining, core breaks appear fresh, core lengths range from (0.02-1.3'). 14.2

Water Table and Remarks

Tar and chip surface to 0.1 feet over sandy soil fill with some gravel, trace silt and slag to 0.4 feet over shaley soil fill with little to some sand, trace to little clay to 1.8 feet over apparent shale bedrock to 4.2 feet over shale bedrock to end of coring.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 4.2 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to 7.0 feet. Removed core equipment and advanced bore hole with hollow stem auger casing to 7.0 feet. Cleaned bore hole with a 3 7/8" tri-cone roller bit using fluid rotary techniques. Removed rods and continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 41.4 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 27.0 feet in completed bore hole.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	4.2 to 7.0	2.8	2.0	71	0	35
2	7.0 to 11.7	4.7	3.5	74	13	110
3	11.7 to 12.9	1.2	1.2	100	0	40
4	12.9 to 17.5	4.6	4.6	100	39	45
5	17.5 to 21.6	4.1	4.1	100	20	35

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

EARTH DIMENSIONS, INC.
Geotechnical and Environmental Drilling | Wetland Delineations and Consulting
1091 Jamison Road | Elma, NY 14059
(716) 655-1717 | EDI@earthdimensions.com

EDI Job Code: 12K93e **Hole Number** BH-A4-22 **Surface Elevation:** 770.7
Project Name: Proposed Site Development **Northing:** 1011031 **Easting:** 1092206
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/12/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/13/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#5						Dark gray shale bedrock, soft, thinly laminated, moderately fractured horizontally along bedding planes with high angle fractures at 15.0 to 15.6, 16.4 to 16.5, 18.0 to 18.2, 18.7 to 18.8, 19.1 to 19.2, 19.5 to 19.8, 20.2 to 20.4, 20.7 to 21.7, 22.2 to 22.8, 25.0 to 25.1, 26.2 to 26.5, 27.1 to 27.2, 28.3 to 28.7, and 29.2 to 29.3 feet, dense, no iron staining, core breaks appear fresh, core lengths range from (0.02-1.3').	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 5 / 17.5 to 21.6 / 4.1 / 4.1 / 100 / 20 / 35 6 / 21.6 to 26.6 / 5.0 / 5.0 / 100 / 68 / 40 7 / 26.6 to 31.6 / 5.0 / 5.0 / 100 / 78 / 40 8 / 31.6 to 36.6 / 5.0 / 5.0 / 100 / 100 / 45 9 / 36.6 to 41.4 / 4.8 / 4.8 / 100 / 83 / 45
	Run		#6							
25	Run		#7							
									29.3	
30	Run		#8						Dark gray shale bedrock, soft, thinly laminated, slightly fractured horizontally along bedding planes, occasional small pyrite deposits, dense, no iron staining, core breaks appear fresh, core lengths range from (0.35-1.8').	Water level at 10.4 feet below ground surface after hole sat open overnight at 12.9 feet.
35	Run		#9							Water level at 10.8 feet below ground surface at coring and roller bitting completion with tooling removed from bore hole.
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-A4-22 **Surface Elevation:** 770.7
Project Name: Proposed Site Development **Northing:** 1011031 **Easting:** 1092206
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/12/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/13/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#9						Dark gray shale bedrock, soft, thinly laminated, slightly fractured horizontally along bedding planes, occasional small pyrite deposits, dense, no iron staining, core breaks appear fresh, core lengths range from (0.35-1.8'). 41.4	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 9 / 36.6 to 41.4 / 4.8 / 4.8 / 100 / 83 / 45
									Coring completed at 41.4 ft	EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
45										
50										
55										
60										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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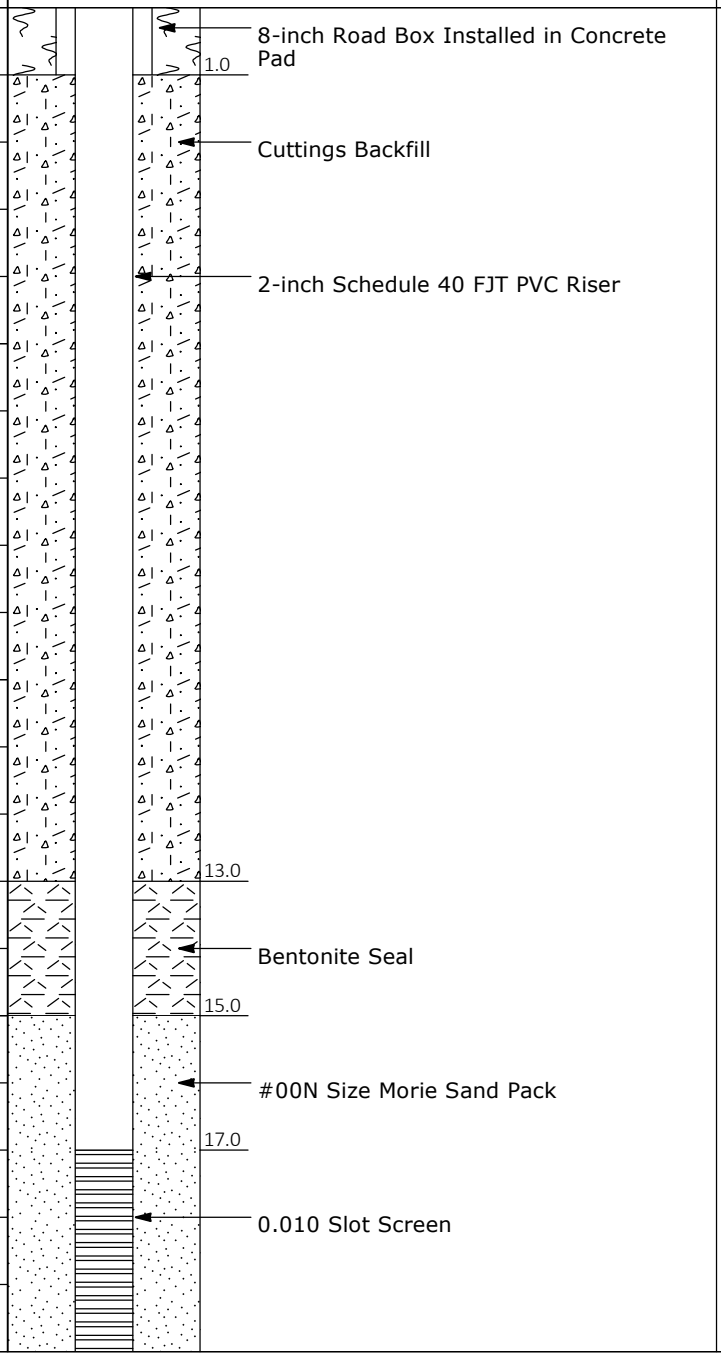
EDI Job Code: 12K93e **Hole Number** W-A4-22 **Surface Elevation:** 770.7
Project Name: Proposed Site Development **Northing:** 1011031 **Easting:** 1092206
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/12/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/13/2022

Depth (ft)	Well	Remarks



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** W-A4-22 **Surface Elevation:** 770.7
Project Name: Proposed Site Development **Northing:** 1011031 **Easting:** 1092206
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/12/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/13/2022

Depth (ft)	Well	Remarks
25	#00N Size Morie Sand Pack 0.010 Slot Screen 27.0 27.5 Bentonite Seal	
30	32.0	
35	Rock Cuttings Backfill	
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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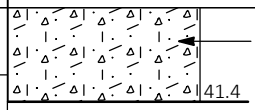
EDI Job Code: 12K93e **Hole Number** W-A4-22 **Surface Elevation:** 770.7
Project Name: Proposed Site Development **Northing:** 1011031 **Easting:** 1092206
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/12/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/13/2022

Depth (ft)	Well	Remarks
	 Rock Cuttings Backfill 41.4	
45		
50		
55		
60		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

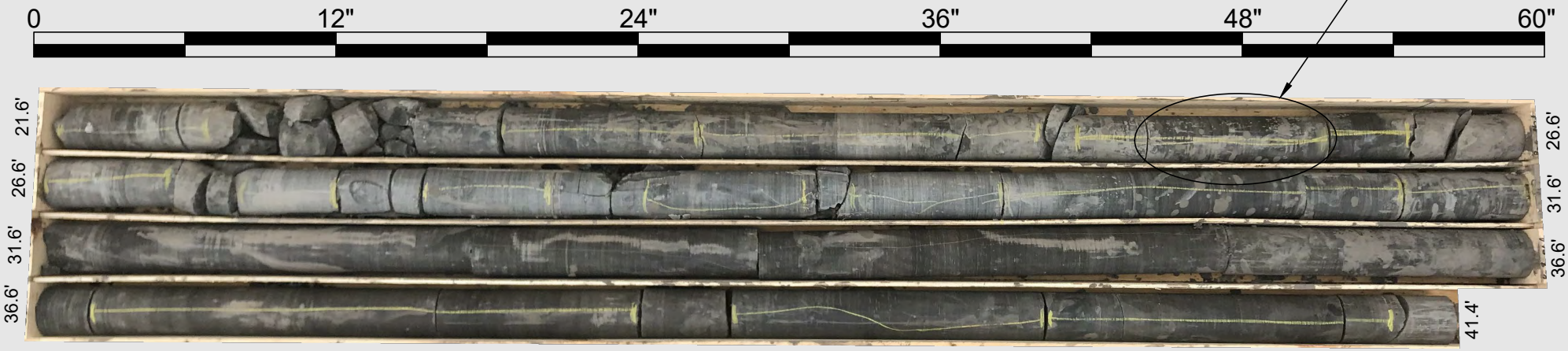
BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-A4-22	1	4-12-22	4.2-7.0	2.8	2.0	71	0
BH-A4-22	2	4-12-22	7.0-11.7	4.7	3.5	74	13
BH-A4-22	3	4-12-22	11.7-12.9	1.2	1.2	100	0
BH-A4-22	4	4-12-22	12.9-17.5	4.6	4.6	100	39
BH-A4-22	5	4-13-22	17.5-21.6	4.1	4.1	100	20

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-A4-22	6	4-13-22	21.6-26.6	5.0	5.0	100	68
BH-A4-22	7	4-13-22	26.6-31.6	5.0	5.0	100	78
BH-A4-22	8	4-13-22	31.6-36.6	5.0	5.0	100	100
BH-A4-22	9	4-13-22	36.6-41.4	4.8	4.8	100	83

Sample 22-108
Unconfined Compressive Strength: 1058.1 PSI



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EDI Job Code: 12K93e **Hole Number** BH-A6-22 **Surface Elevation:** 769.5

Project Name: Proposed Site Development **Northing:** 1010954 **Easting:** 1092599

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/14/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/15/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	21	9	13	24	40	37		Tar and chip surface. 0.1 Moist gray very gravelly (SAND) fill with 40 to 60% mostly angular gravel with fine to coarse size sand, trace silt, compact, single grain, (SW),(GW). 0.6 Moist to dry brown shaley (SILTY-SAND) fill with 30 to 50% shale stone fragments, little silt, very dense and dense, massive soil structure, (SM),(GM). 1.3	Tar and chip surface to 0.1 feet over sandy soil fill with some gravel, trace silt to 0.6 feet over shaley soil fill with little silt to 1.3 feet over apparent shale bedrock to 9.8 feet over shale bedrock to end of coring.
	2	18	15	26	51	50/4	77			
5	3	10	23	50/5					Moist to dry, wet below 6.0 feet, gray shale stone fragments, very soft and soft.	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 9.8 feet. Removed coring equipment and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to 11.3 feet. Hole caving. Removed coring equipment and advanced augers to 14.0 feet. Continued below with coring equipment to end of coring at 32.3 feet. Reamed core hole with 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 26.0 feet in completed bore hole.
	4	10	42	50/4					9.8	
	5	4	50/4							
10	Run		#1						Dark gray shale bedrock, soft, thinly laminated, intensely fractured in all directions, core breaks appear fresh, core lengths range from (0.01-0.3'). 11.3 Auger without split spoon sampling. 14.0	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 1 / 9.8 to 11.3 / 1.5 / 1.3 / 87 / 0 / 15 2 / 14.0 to 17.3 / 3.3 / 3.3 / 100 / 27 / 35 3 / 17.3 to 22.3 / 5.0 / 5.0 / 100 / 40 / 50
15	Run		#2						Dark gray shale bedrock, soft, thinly laminated, intensely to moderately fractured horizontally along bedding planes with high angle to near vertical fractures from 14.7 to 16.7, 17.0 to 17.2, 18.9 to 19.7, 20.7 to 21.1, and 21.6 to 22.0 feet, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-0.78').	
	Run		#3							
20										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-A6-22 **Surface Elevation:** 769.5
Project Name: Proposed Site Development **Northing:** 1010954 **Easting:** 1092599
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/14/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/15/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification
	Run		#3						Dark gray shale bedrock, soft, thinly laminated, intensely to moderately fractured horizontally along bedding planes with high angle to near vertical fractures from 14.7 to 16.7, 17.0 to 17.2, 18.9 to 19.7, 20.7 to 21.1, and 21.6 to 22.0 feet, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-0.78').
	Run		#4						22.3
25									Dark gray shale bedrock, soft, thinly laminated, moderately to slightly fractured horizontally along bedding planes with occasional high angle to near vertical fractures from 22.8 to 22.9, 24.8 to 25.9, 27.8 to 27.9 and 28.2 to 28.4, dense, no iron staining, core breaks appear fresh, core lengths range from (0.1-2.2').
	Run		#5						
30									32.3
									Coring completed at 32.3 ft
35									
40									

Water Table and Remarks

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
3	17.3 to 22.3	5.0	5.0	100	40	50
4	22.3 to 27.3	5.0	5.0	100	74	50
5	27.3 to 32.3	5.0	5.0	100	84	80

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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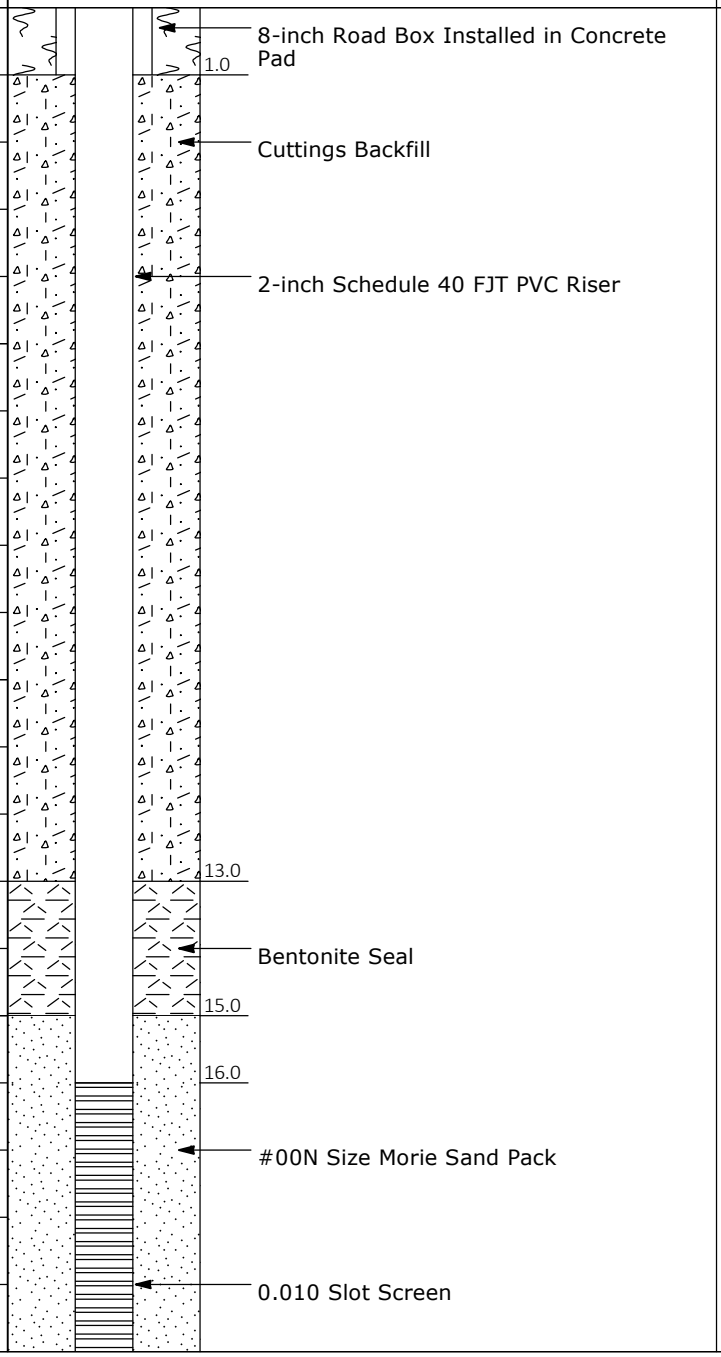
EDI Job Code: 12K93e **Hole Number** W-A6-22 **Surface Elevation:** 769.5
Project Name: Proposed Site Development **Northing:** 1010954 **Easting:** 1092599
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/14/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/15/2022

Depth (ft)	Well	Remarks



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** W-A6-22 **Surface Elevation:** 769.5
Project Name: Proposed Site Development **Northing:** 1010954 **Easting:** 1092599
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/14/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/15/2022

Depth (ft)	Well	Remarks
25	#00N Size Morie Sand Pack 0.010 Slot Screen 26.0 26.5 Bentonite Seal 28.0	
30	Rock Cuttings Backfill 32.3	
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

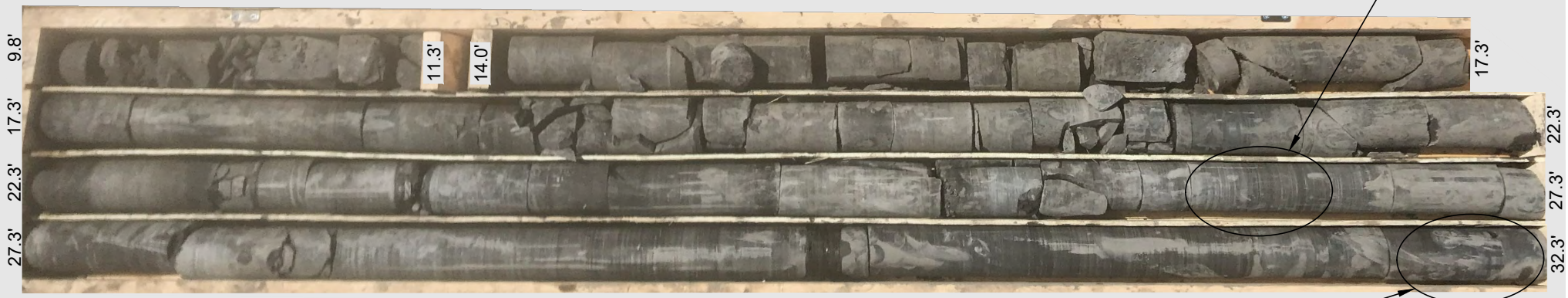
BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-A6-22	1	4-14-22	9.8-11.3	1.5	1.3	87	0
BH-A6-22	2	4-14-22	14.0-17.3	3.3	3.3	100	27
BH-A6-22	3	4-14-22	17.3-22.3	5.0	5.0	100	40
BH-A6-22	4	4-14-22	22.3-27.3	5.0	5.0	100	74
BH-A6-22	5	4-14-22	27.3-32.3	5.0	5.0	100	84

Sample 22-119
Unconfined Compressive Strength: 1968.5 PSI

0 12" 24" 36" 48" 60"



Sample 22-120
Unconfined Compressive Strength: 3378.3 PSI

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EDI Job Code: 12K93e **Hole Number** BH-B3-22 **Surface Elevation:** 764

Project Name: Proposed Site Development **Northing:** 1010873 **Easting:** 1091970.68

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/12/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/13/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
									Gray asphalt pavement. 0.6	Note: Sample number 1 taken from 1.0 to 2.0 feet.
	1	7	2	9					Mostly crushed concrete fill. 1.5	Gray asphalt pavement to 0.6 feet over mostly crushed concrete fill to 1.5 feet over apparent shale bedrock to 9.2 feet over shale bedrock to end of coring.
	2	22	11	14	16	23	30		Gray and dark gray shale stone fragments, very soft and soft.	
5	3	24	20	22	30	38	52			Note: Water level at 5.8 feet below ground surface prior to coring.
	4	14	28	31	50/4					Note: Started loosing water to formation below 16.0 feet.
	5	3	50/3						9.2	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 9.2 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 24.2 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 19.0 feet in completed bore hole.
10	Run		#1						Dark gray shale bedrock, soft, very intensely to intensely fractured horizontally along bedding planes, thickly laminated to thinly bedded, dense, no iron staining, core pieces range from (0.025-0.1'). 10.2	
									Dark gray shale bedrock, soft, intensely to moderately fractured, thickly laminated to medium bedding, dense, no iron staining.	
15	Run		#2							
									19.2	
20	Run		#3						See next sheet	

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	9.2 to 14.2	5.0	5.0	100	42	0
2	14.2 to 19.2	5.0	5.0	100	34	30
3	19.2 to 24.2	5.0	4.9	98	95	30

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-B3-22 **Surface Elevation:** 764
Project Name: Proposed Site Development **Northing:** 1010873 **Easting:** 1091970.68
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/12/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/13/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#3						Dark gray shale bedrock, soft, slightly fractured horizontally along bedding planes, thickly laminated to thinly bedded, dense, no iron staining, core pieces range from (0.1-2.8').	Run # 3 Depth (ft) 19.2 to 24.2 Length (ft) 5.0 REC (ft) 4.9 REC % 98 RQD % 95 WL gal 30
									24.2 Coring completed at 24.2 ft	EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
25										
30										
35										
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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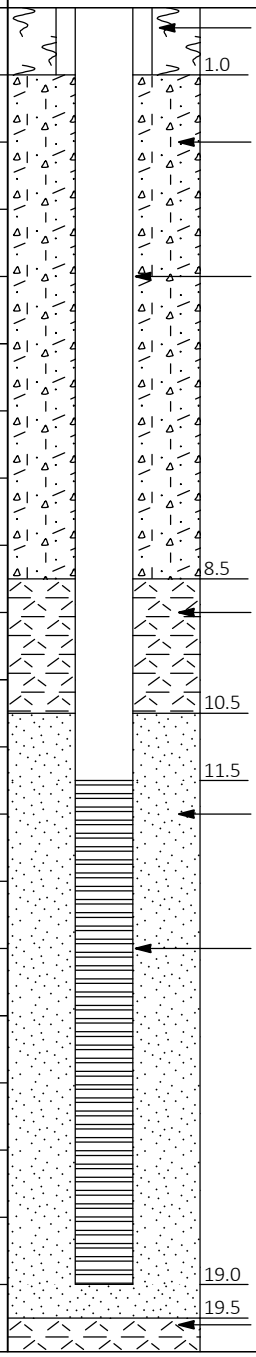
EDI Job Code: 12K93e **Hole Number** W-B3-22 **Surface Elevation:** 764
Project Name: Proposed Site Development **Northing:** 1010873 **Easting:** 1091970.68
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/12/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/13/2022

Depth (ft)	Well	Remarks
		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** W-B3-22 **Surface Elevation:** 764
Project Name: Proposed Site Development **Northing:** 1010873 **Easting:** 1091970.68
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/12/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/13/2022

Depth (ft)	Well	Remarks
	Bentonite Seal	
21.5		
	Rock Cuttings Backfill	
24.2		
25		
30		
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-B3-22	1	5-12-22	9.2-14.2	5.0	5.0	100	42
BH-B3-22	2	5-12-22	14.2-19.2	5.0	5.0	100	34
BH-B3-22	3	5-12-22	19.2-24.2	5.0	4.9	98	95

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EDI Job Code: 12K93e **Hole Number** BH-B4-22 **Surface Elevation:** 767.3

Project Name: Proposed Site Development **Northing:** 1010835.1 **Easting:** 1092168

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/10/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/11/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	22	7	8	16	31	24
	2	15	17	31	50/3		
5	3	7	36	50/3			
	4	4	50/5				
10	Run		#1				
	Run		#2				
15	Run		#3				
20	Run		#4				

LITH / Description and Classification:

- Tar and chip surface. (0.1)
- Mostly crushed concrete fill. (0.6)
- Dry brownish gray gravelly (SAND-SILT-CLAY) fill with 20 to 40% mostly flat sided shale stone fragments, little sand and clay, very stiff, massive soil structure, (SC),(GC). (1.4)
- Gray to dark gray shale stone fragments with iron staining to 4.5 feet.
- Dark gray shale bedrock, soft, very intensely to intensely fractured becoming intensely fractured below 11.5 feet, very thin to medium bedding with occasional gray shale beds, dense, no iron staining, core breaks appear fresh, core lengths range from (0.025-0.7'). (9.2)

Well: Cuttings Backfill; Bentonite Seal (11.0); (19.8)

Water Table and Remarks

Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.6 feet over silty glacial till with some mostly flat sided shale stone fragments, little sand and clay to 1.4 feet over apparent shale bedrock to 9.2 feet over shale bedrock to end of coring.

Note: Water level at 7.0 feet below ground surface prior to coring.

Note: Water level at 7.0 feet below ground surface at coring completion with tooling removed from bore hole.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 9.2 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to 11.5 feet. Experienced difficult coring with water loss and hole caving. Removed coring equipment and advanced augers to 11.5 feet. Returned to rock coring below to coring completion at 39.1 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	9.2 to 11.5	2.3	2.1	91	0	-
2	11.5 to 14.4	2.9	2.6	90	0	20
3	14.4 to 19.4	5.0	5.0	100	23	60
4	19.4 to 24.4	5.0	5.0	100	49	45

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-B4-22 **Surface Elevation:** 767.3
Project Name: Proposed Site Development **Northing:** 1010835.1 **Easting:** 1092168
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/10/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/11/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#4						Dark gray shale bedrock, soft, very thin to medium bedding, moderately fractured horizontally to 20.6 feet below ground surface becoming slightly to moderately fractured below with high angle fractures from 20.7 to 21.0, 23.1 to 23.4, 32.8 to 33.1, and 36.0 to 36.7 feet, dense with no iron staining, limestone nodule from 25.30 to 25.45 feet, core breaks appear fresh, core pieces range from (0.05-1.65').	Bentonite Seal	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal
25	Run		#5								4: 19.4 to 24.4 — 5.0 — 5.0 — 100 — 49 — 45
30	Run		#6								5: 24.4 to 29.1 — 4.7 — 4.7 — 100 — 98 — 45
35	Run		#7								6: 29.1 to 34.1 — 5.0 — 5.0 — 100 — 86 — 45
											7: 34.1 to 39.1 — 5.0 — 5.0 — 100 — 90 — 45
40									39.1	39.1	EDI Bedrock Hardness Classification: Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

Coring completed at 39.1 ft

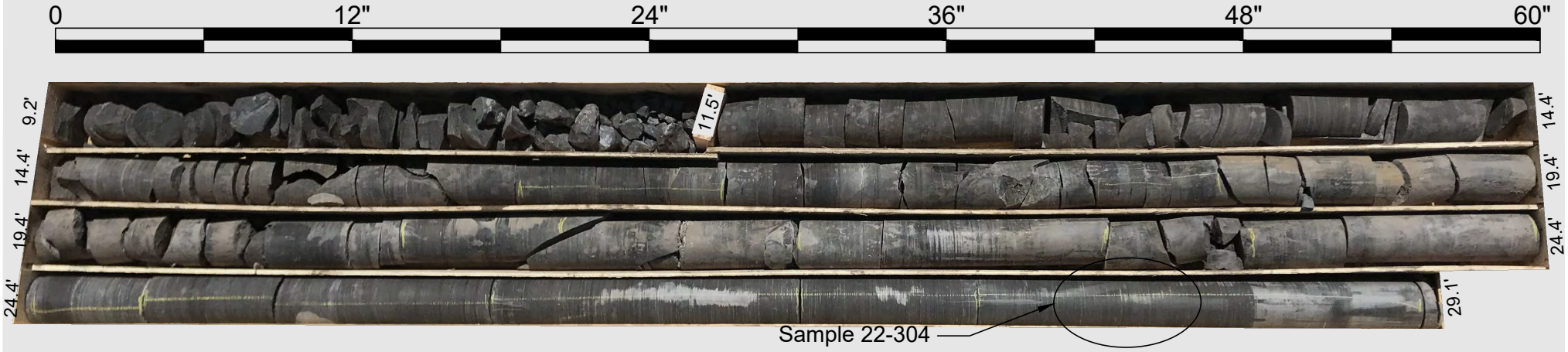
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-B4-22	1	5-11-22	9.2-11.5	2.3	2.1	91	0
BH-B4-22	2	5-11-22	11.5-14.4	2.9	2.6	90	0
BH-B4-22	3	5-11-22	14.4-19.4	5.0	5.0	100	23
BH-B4-22	4	5-11-22	19.4-24.4	5.0	5.0	100	49
BH-B4-22	5	5-11-22	24.4-29.1	4.7	4.7	100	98



Unconfined Compressive Strength: 1320.1 PSI

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-B4-22	6	5-11-22	29.1-34.1	5.0	5.0	100	86
BH-B4-22	7	5-11-22	34.1-39.1	5.0	5.0	100	90

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EDI Job Code: 12K93e **Hole Number** BH-B5-22 **Surface Elevation:** 767.4
Project Name: Proposed Site Development **Northing:** 1010796 **Easting:** 1092364
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/10/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/10/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	16	5	8	15	30	23
	2	21	20	22	40	50/4	62
5	3	11	29	50/5			
	4	18	18	19	41	50/4	60
	5	4	50/5				
10	6	22	16	19	29	20	48
	7	20	12	20	22	50/5	
	8	7	27	50/1			
15	Run		#1				
20							

LITH / Description and Classification:

- 0.0 – 0.1: Tar and chip surface.
- 0.1 – 0.4: Mostly crushed concrete fill.
- 0.4 – 1.5: Dry brown gravelly (SILTY-SAND) with 20 to 40% mostly flat sided shale stone fragments, little silt, compact, massive soil structure, (SM),(GM).
- 1.5 – 15.2: Gray and dark brown shale stone fragments, very soft to soft.
- 15.2 – 20.0: Dark gray shale bedrock, soft, intensely fractured, very thin to thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.6').

Well: Cuttings Backfill 0.0 – 15.0; Bentonite Seal 15.0 – 20.0

Water Table and Remarks:

Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.4 feet over sandy glacial till with some mostly flat sided shale stone fragments, little silt to 1.5 feet over apparent shale bedrock to 15.2 feet over shale bedrock to end of coring.

Note: Water level at 7.0 feet below ground surface prior to coring.

Note: Water level at 6.0 feet below ground surface at coring completion with tooling removed from bore hole.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 15.2 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 25.0 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	15.2 to 20.0	4.8	4.8	100	12	15

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-B5-22 **Surface Elevation:** 767.4

Project Name: Proposed Site Development **Northing:** 1010796 **Easting:** 1092364

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/10/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/10/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray with occasional beds of gray shale bedrock, soft, intensely to moderately fractured to moderately fractured horizontally along bedding planes with high angle to almost vertical fractures from 20.5 to 21.2 and 23.0 to 23.4 feet, very thin to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.9').	Bentonite Seal	
25									25.0 Coring completed at 25 ft	25.0	
30											
35											
40											

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal

2 | 20.0 to 25.0 | 5.0 | 5.0 | 100 | 60 | 35

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-B5-22	1	5-10-22	15.2-20.0	4.8	4.8	100	12
BH-B5-22	2	5-10-22	20.0-25.0	5.0	5.0	100	60

Sample 22-305
Unconfined Compressive Strength: 939.9 PSI

Sample 22-306
Unconfined Compressive Strength: 6050.4 PSI

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EDI Job Code: 12K93e **Hole Number** BH-B6-22 **Surface Elevation:** 766
Project Name: Proposed Site Development **Northing:** 1010800 **Easting:** 1092569
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/11/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/12/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	15	4	9	7	8	16		Tar and chip surface. 0.1 Mostly crushed concrete fill. 0.5	Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.5 feet over coarse silty soil fill with some gravel and flat sided shale stone fragments to 1.5 feet over silty soil fill with little to some gravel and flat sided shale stone fragments, little sand, trace to little clay to 2.0 feet over shaley glacial till with some sand, little silt, trace clay to 9.3 feet over apparent shale bedrock to 10.9 feet over shale bedrock to end of coring.
	2	22	20	22	19	21	41		Dry gray gravelly (SANDY-SILT) fill with 30 to 50% mostly flat sided shale stone fragments, some sand, compact, massive soil structure, (GM),(SM). 1.5 Dry light grayish brown gravelly (SANDY-SILT) fill with 15 to 25% gravel and flat sided shale stone fragments, little sand, trace to little clay, massive soil structure, (ML-CL). 2.0	
5	3	20	12	11	16	24	27		Dry, moist below 5.0 feet, dark gray shaley (SILTY-SAND) with 30 to 50% mostly flat sided shale stone fragments, little silt, trace clay, compact and dense, massive soil structure, (SM),(GM).	
	4	17	16	16	15	21	31			Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 10.9 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 25.9 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 18.5 feet in completed bore hole.
	5	19	11	22	25	50/3	47		9.3 Gray shale stone fragments, very soft to soft.	
10	6	2	50/3						10.9	
	Run		#1						Gray limey shale bedrock, effervesces without etching, thinly laminated, slightly porous, single core piece. 11.4 Dark gray shale bedrock, soft, very intensely to intensely fractured to 13.3 feet, intensely fractured below, thinly laminated to thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.65').	
15	Run		#2						18.2	
20									See next sheet	

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	10.9 to 15.9	5.0	4.8	96	23	35
2	15.9 to 20.9	5.0	5.0	100	59	35

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-B6-22 **Surface Elevation:** 766
Project Name: Proposed Site Development **Northing:** 1010800 **Easting:** 1092569
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/11/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/12/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#2						Dark gray with occasional gray layers of shale bedrock, soft, moderately to moderately to slightly fractured horizontally along bedding planes with a vertical fracture from 20.9 to 21.4 feet, very thin to medium bedding with a thin very soft shale bed at 20.6 feet, dense, core breaks appear fresh, no iron staining, core pieces range from (0.2-1.5').	
	Run		#3							
25									25.9	
									Coring completed at 25.9 ft	
30										
35										
40										

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
2	15.9 to 20.9	5.0	5.0	100	59	35
3	20.9 to 25.9	5.0	5.0	100	70	30

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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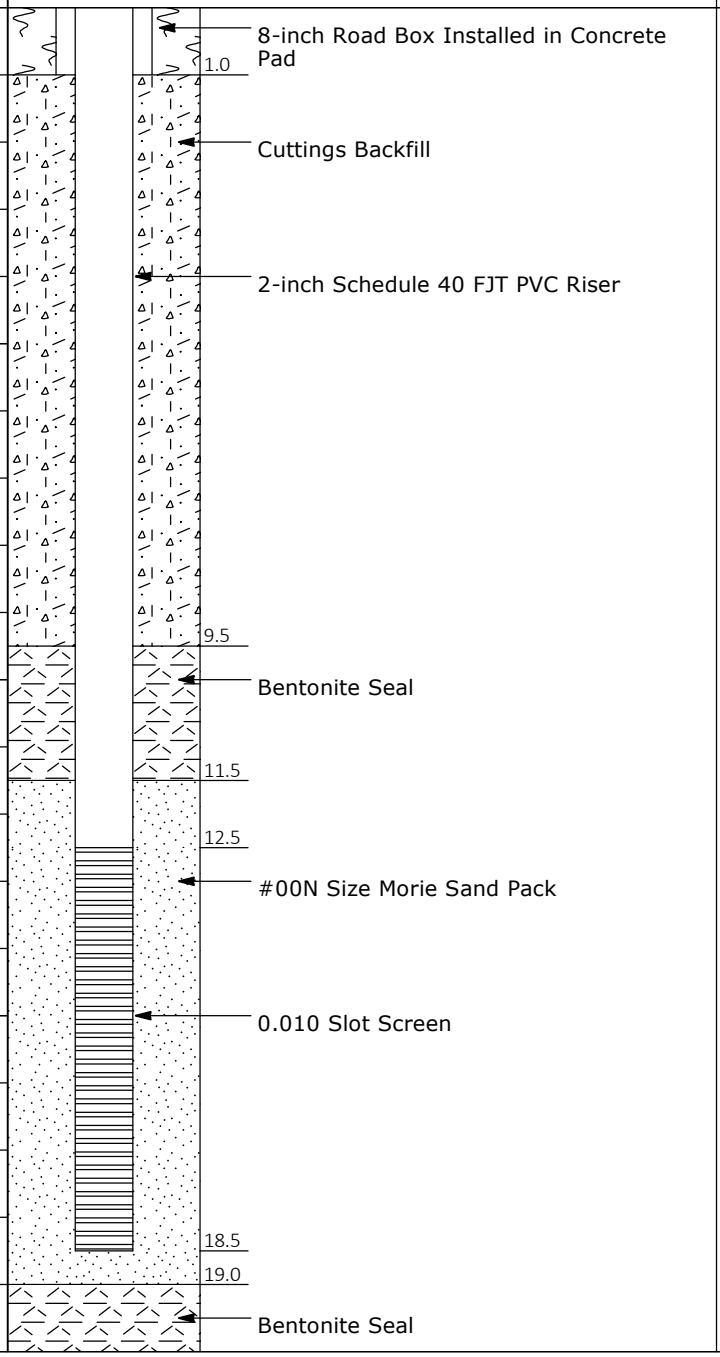
EDI Job Code: 12K93e **Hole Number** W-B6-22 **Surface Elevation:** 766
Project Name: Proposed Site Development **Northing:** 1010800 **Easting:** 1092569
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/11/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/12/2022

Depth (ft)	Well	Remarks



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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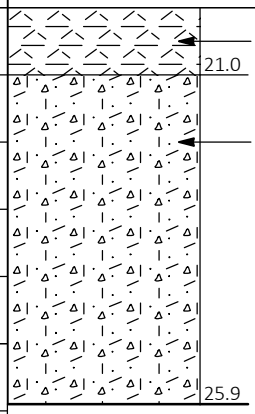
EDI Job Code: 12K93e **Hole Number** W-B6-22 **Surface Elevation:** 766
Project Name: Proposed Site Development **Northing:** 1010800 **Easting:** 1092569
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/11/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/12/2022

Depth (ft)	Well	Remarks
25		
30		
35		
40		

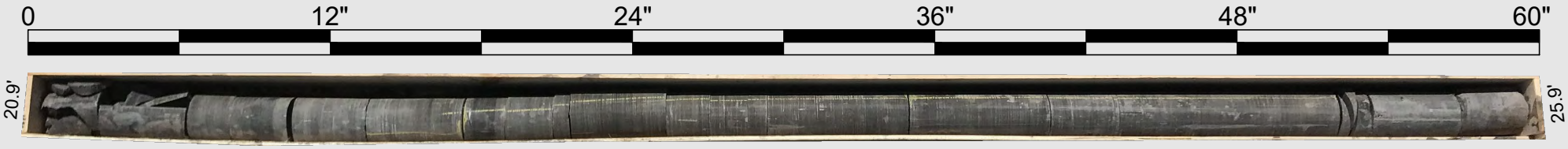
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-B6-22	1	5-12-22	10.9-15.9	5.0	4.8	96	23
BH-B6-22	2	5-12-22	15.9-20.9	5.0	5.0	100	59
BH-B6-22	3	5-12-22	20.9-25.9	5.0	5.0	100	70



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EDI Job Code: 12K93e **Hole Number** BH-C2-22 **Surface Elevation:** 758.9

Project Name: Proposed Site Development **Northing:** 1010715 **Easting:** 1091736

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/22/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/22/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	6	1	3	3	9	6		Wet to moist dark brown (SANDY-SILT) topsoil fill with 0 to 3% gravel, little sand, trace to little organic matter, very loose, weakly granular soil structure, (ML). 0.7		Coarse silty topsoil fill with little sand, trace to little organic matter, trace gravel to 0.7 feet over coarse silty galcial till with some gravel and flat sided shale stone fragments, little sand, trace clay to 4.6 feet over apparent shale bedrock to 8.6 feet over shale bedrock to end of coring.
	2	20	6	9	12	14	21		Moist to dry brown and grayish brown (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, little sand, trace clay, compact, dense below 3.5 feet, massive soil structure, (SM),(GM). 4.6	Cuttings Backfill	Note: No water in bore hole prior to taking sample number 4. Water level at 4.0 feet below ground surface after taking sample number 4.
5	3	11	16	50/5					Gray shale stone fragments, very soft to soft.		Note: Water level at 3.4 feet below ground surface prior to coring.
	4	3	50/4								Note: Water level at 3.0 feet below ground surface at coring completion with tooling removed from bore hole.
	5	2	50/2						8.6	8.9	
	Run		#1						Dark gray shale bedrock, soft, very intensely to intensely fractured below 10.0 feet, very thin to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.4').		Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 8.6 feet. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 23.7 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
10											
	Run		#2							Bentonite Seal	
15									16.9		
	Run		#3						See next sheet		
20											

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	8.9 to 13.9	5.0	4.9	98	0	20
2	13.9 to 18.7	4.8	4.8	100	45	30
3	18.7 to 23.7	5.0	5.0	100	77	30

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-C2-22 **Surface Elevation:** 758.9

Project Name: Proposed Site Development **Northing:** 1010715 **Easting:** 1091736

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/22/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/22/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#3						Dark gray shale bedrock, soft, moderately fractured horizontally along bedding planes with a near vertical fracture from 19.1 to 19.8 feet and a high angle fracture from 19.8 to 20.0 feet, very thin to thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.2-1.0'). 23.7	Bentonite Seal 23.7	
									Coring completed at 23.7 ft		
25											
30											
35											
40											

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal

3 | 18.7 to 23.7 | 5.0 | 5.0 | 100 | 77 | 30

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-C2-22	1	4-22-22	8.9-13.9	5.0	4.9	98	0
BH-C2-22	2	4-22-22	13.9-18.7	4.8	4.8	100	45
BH-C2-22	3	4-22-22	18.7-23.7	5.0	5.0	100	77

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EDI Job Code: 12K93e **Hole Number** BH-C3-22 **Surface Elevation:** 762.6

Project Name: Proposed Site Development **Northing:** 1010677 **Easting:** 1091933

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/25/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/25/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	16	2	3	4	8	7		Moist dark brown (SANDY-SILT) topsoil fill with 0 to 3% gravel, little sand, trace to little organic matter, very loose, granular soil structure, (ML). 0.4 / 0.8	Coarse silty topsoil fill with little sand, trace to little organic matter, trace gravel to 0.4 feet over silty soil fill with little sand and clay, trace to little flat sided shale stone fragments to 0.8 feet over coarse silty slackwater sediment with little sand, trace clay to 1.8 feet over shaley glacial till with little sand to 6.5 feet over apparent shale bedrock to 18.2 feet over shale bedrock to end of coring.
	2	21	9	12	23	36	35		Moist to dry brown (SAND-SILT-CLAY) fill with 5 to 15% flat sided shale stone fragments, little sand and clay, trace organic matter, firm, massive soil structure, (ML-CL). 1.8	
5	3	18	36	33	25	24	58		Moist brown (SANDY-SILT) with little mostly fine size sand, trace clay, loose, blocky soil structure, (ML).	
	4	24	21	25	40	29	65		Dry to moist brownish gray shaley (SANDY-SILT) with 40 to 60% mostly flat sided shale stone fragments, little sand, dense, very dense below 4.0 feet, massive soil structure, (SM),(GM). 6.5	Note: No water in bore hole prior to taking sample number 5. Water level at 4.0 feet below ground surface.
	5	18	17	21	23	13	44		Gray shale stone fragments, very soft to soft, wet below 7.5 feet.	Note: Water level at 6.5 feet in bore hole prior to coring.
10	6	15	12	19	12	13	31			Note: Water level at 7.2 feet below ground surface at coring completion with tooling removed and hole sitting idle for 45 minutes.
	7	24	24	31	35	23	66			Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 18.2 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 27.2 feet. Core hole was backfilled with bentonite and a 2-inch PVC standpipe piezometer was installed to 18.0 feet in completed bore hole.
15	8	20	16	12	12	8	24			
	9	9	12	50/3					18.2	Run # 1: Depth (ft) 18.2 to 22.2; Length (ft) 4.0; REC (ft) 3.9; REC % 98; RQD % 75; WL gal 0
	Run		#1							
20									See next sheet	

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-C3-22 **Surface Elevation:** 762.6
Project Name: Proposed Site Development **Northing:** 1010677 **Easting:** 1091933
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/25/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/25/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#1						Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes, moderately fractured horizontally below 22.5 feet, thin to medium bedding, dense, core breaks appear fresh, core pieces range from (0.05-1.5').	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 1 — 18.2 to 22.2 — 4.0 — 3.9 — 98 — 75 — 0 2 — 22.2 to 27.2 — 5.0 — 5.0 — 100 — 87 — 0
	Run		#2							
25										EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
									27.2 Coring completed at 27.2 ft	
30										
35										
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** W-C3-22 **Surface Elevation:** 762.6
Project Name: Proposed Site Development **Northing:** 1010677 **Easting:** 1091933
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/25/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/25/2022

Depth (ft)	Well	Remarks
	8-inch Road Box Installed in Concrete Pad (1.0)	
	Cuttings Backfill	
	2-inch Schedule 40 FJT PVC Riser	
5	(6.0)	
	Bentonite Seal (8.0)	
10	(10.0)	
	#00N Size Morie Sand Pack	
	0.010 Slot Screen	
15	(18.0) (18.5)	
20	Bentonite Seal	

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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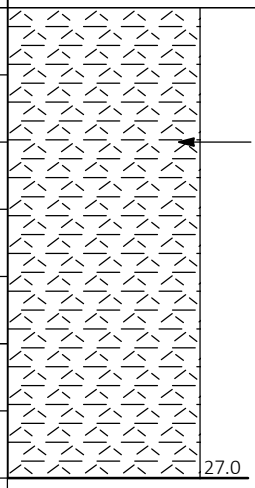
EDI Job Code: 12K93e **Hole Number** W-C3-22 **Surface Elevation:** 762.6
Project Name: Proposed Site Development **Northing:** 1010677 **Easting:** 1091933
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/25/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/25/2022

Depth (ft)	Well	Remarks
25		
30		
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-C3-22	1	4-25-22	18.2-22.2	4.0	3.9	98	75
BH-C3-22	2	4-25-22	22.2-27.2	5.0	5.0	100	87

Sample 22-128

Unconfined Compressive Strength: 2347.7 PSI

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EDI Job Code: 12K93e **Hole Number** BH-C4-22 **Surface Elevation:** 762.2

Project Name: Proposed Site Development **Northing:** 1010638 **Easting:** 1092129

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/5/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/5/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	17	7	8	10	14	18		Tar and chip surface. 0.1 Mostly crushed concrete fill. 0.6 Moist dark brownish gray gravelly (SAND-SILT-CLAY) fill with 15 to 25% mostly flat sided shale stone fragments, little sand, trace to little clay, very stiff, massive soil structure, (ML-CL). 1.3	Cement Bentonite Grout	Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.6 feet over silty soil fill with little to some mostly flat sided stone fragments, little sand, trace to little clay to 1.3 feet over shaley soil fill with some sand, little silt to 4.3 feet over water sorted and deposited sand with some flat sided shale stone fragments, little silt to 7.0 feet over coarse silty glacial till with some sand and flat sided stone fragments to 9.0 feet over apparent shale bedrock to 11.0 feet over shale bedrock to end of coring.
	2	24	12	29	35	41	64		Dry faintly mottled grayish brown gravelly (SILTY-SAND) fill with 30 to 50% flat sided shale stone fragments, little silt, very dense, massive soil structure, (SM),(GM). 4.3		
5	3	16	14	10	7	7	17		Wet gray and brown mixed gravelly (SILTY-SAND) with 20 to 40% mostly flat sided shale stone fragments, little silt, compact, weakly stratified, massive soil structure, (SM),(GM). 7.0		
	4	21	7	12	21	27	33		Moist to dry gray gravelly (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, some sand, dense, massive soil structure, (SM),(GM). 9.0		Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 11.0 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 26.0 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
	5	24	14	27	21	22	48		clear transition to 11.0	11.0	
10	6	8	25	50/3					Gray shale stone fragments, very soft to soft.	Bentonite Seal	
	Run		#1						Dark gray shale bedrock, soft, intensely fractured, intensely to moderately fractured below 13.9 feet, very thin to thinly bedded, dense, no iron staining, core breaks appear fresh, core lengths range from (0.025-0.75').		
15	Run		#2						19.3		
20									See next sheet		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	11.0 to 16.0	5.0	5.0	100	22	30
2	16.0 to 21.0	5.0	4.9	98	42	30

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** BH-C4-22 **Surface Elevation:** 762.2

Project Name: Proposed Site Development **Northing:** 1010638 **Easting:** 1092129

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/5/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/5/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
25	Run		#2						Dark gray shale bedrock, soft, moderately to moderately to slightly fractured horizontally along bedding planes with a short vertical fracture from 21.35 to 21.45 and short high angle fracture from 23.05 to 23.15 feet, very thin to thinly bedded, no iron staining, core breaks appear fresh, core lengths range from (0.35-2.05'). 26.0	Bentonite Seal 26.0	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 2 — 16.0 to 21.0 — 5.0 — 4.9 — 98 — 42 — 30 3 — 21.0 to 26.0 — 5.0 — 5.0 — 100 — 77 — 30
	Run		#3								
30									Coring completed at 26 ft		EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
35											
40											

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-C4-22	1	5-5-22	11.0-16.0	5.0	5.0	100	22
BH-C4-22	2	5-5-22	16.0-21.0	5.0	4.9	98	42
BH-C4-22	3	5-5-22	21.0-26.0	5.0	5.0	100	77

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EDI Job Code: 12K93e **Hole Number** BH-C5-22 **Surface Elevation:** 762.5
Project Name: Proposed Site Development **Northing:** 1010600 **Easting:** 1092325
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/26/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/27/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification
	1	20	8	6	8	6	14		Tar and chip surface. 0.1 Mostly crushed concrete fill. 0.7
	2	24	9	6	8	7	14		Moist to dry brownish gray to grayish brown gravelly (SANDY-SILT) with 15 to 25% gravel and flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (ML). 4.4
5	3	21	5	5	4	4	9		Moist brownish gray (SILTY-SAND) with mostly fine to medium size sand, trace to little silt, loose, thinly bedded, (SM). 5.3
	4	14	2	2	5	9	7		Moist brown to olive brown (SAND-SILT-CLAY) with little mostly fine size sand and clay, stiff, weakly thinly laminated and thinly bedded, (ML-CL). 6.0 7.0 grades downward to
	5	20	7	18	32	25	50		Wet light grayish brown (SAND-SILT-CLAY) with 5 to 15% gravel and flat sided shale stone fragments, little sand and clay, soft, weakly thinly bedded, (ML-CL). 9.0 clear transition to
10	6	15	20	22	50/5				Moist gray gravelly (SANDY-SILT) with 15 to 25% mostly flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (ML).
	7	3	50/4						Gray shale stone fragments, very soft to soft. 13.8
15	Run		#1						Dark gray shale bedrock, soft, very intensely to intensely fractured horizontally along bedding planes, thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.25'). 16.3
	Run		#2						Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes, thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.1-0.8').
20									

Water Table and Remarks

Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.7 feet over coarse silty glacial drift with little to some gravel and flat sided shale stone fragments, little sand, trace clay to 4.4 feet over water sorted and deposited sand with trace to little silt to 5.3 feet over silty slackwater sediment with little sand and clay to 6.0 feet over water sorted and deposited coarse silt with little sand and clay to 7.0 feet over coarse silty glacial till with some flat sided shale stone fragments, little sand, trace clay to 9.0 feet over apparent shale bedrock to 13.8 feet over shale bedrock to 22.7 feet over limey shale bedrock to 23.6 feet over shale bedrock to end of coring.

Note: No water in bore hole prior to taking sample number 4. Water came up to 3.1 feet below ground surface.

Note: Water level at 6.5 feet below ground surface prior to coring.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 13.8 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 42.1 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 34.5 feet in completed bore hole.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	13.8 to 17.3	3.5	3.4	97	26	0
2	17.3 to 22.3	5.0	5.0	100	78	0

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** BH-C5-22 **Surface Elevation:** 762.5
Project Name: Proposed Site Development **Northing:** 1010600 **Easting:** 1092325
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/26/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/27/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification
	Run		#2						Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes, thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.1-0.8').
	Run		#3						22.7 Light gray limey shale bedrock, effervesces without etching, moderately soft to moderately hard, non-fractured, very thin to thinly bedded, slightly porous with gypsum nodules. 23.6
25									Dark gray shale bedrock, soft, moderately to slightly fractured horizontally along bedding planes with a high angle fracture from 27.9 to 28.3 feet, thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.5-1.6').
	Run		#4						
30									
	Run		#5						32.1 Dark gray shale bedrock, soft, intensely to intensely to moderately fractured horizontally and at high angles, thinly bedded, dense, no iron staining, core pieces range from (0.1-0.6'). 34.2
35									Dark gray shale bedrock, soft, very slightly fractured horizontally along bedding planes, thinly laminated to thinly bedded, dense, no iron staining, with occasional thin pyrite deposits, core pieces range from (1.6-3.4').
	Run		#6						
40									

Water Table and Remarks						
Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
2	17.3 to 22.3	5.0	5.0	100	78	0
3	22.3 to 27.3	5.0	4.9	98	88	0
4	27.3 to 32.1	4.8	4.8	100	82	0
5	32.1 to 37.1	5.0	4.9	98	75	0
6	37.1 to 42.1	5.0	5.0	100	100	0

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** BH-C5-22 **Surface Elevation:** 762.5
Project Name: Proposed Site Development **Northing:** 1010600 **Easting:** 1092325
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/26/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/27/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#6						Dark gray shale bedrock, soft, very slightly fractured horizontally along bedding planes, thinly laminated to thinly bedded, dense, no iron staining, with occasional thin pyrite deposits, core pieces range from (1.6-3.4'). 42.1	Run # 6 Depth (ft) 37.1 to 42.1 Length (ft) 5.0 REC (ft) 5.0 REC % 100 RQD % 100 WL gal 0
									Coring completed at 42.1 ft	
45										
50										
55										
60										

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

Moderately Soft: Shallow indentations (0.04 to 0.12 inch (1 to 3 mm)) can be made by firm blows with point of geologic pick. Can be peeled with pocket knife with difficulty.

Moderately Hard: Cannot be peeled or scraped with knife. Can be distinctly scratched with a steel nail.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** W-C5-22 **Surface Elevation:** 762.5
Project Name: Proposed Site Development **Northing:** 1010600 **Easting:** 1092325
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/26/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/27/2022

Depth (ft)	Well	Remarks
	8-inch Road Box Installed in Concrete Pad	
1.0		
	Cuttings Backfill	
5		
	2-inch Schedule 40 FJT PVC Riser	
10		
15		
19.0		
	Bentonite Seal	
20		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** W-C5-22 **Surface Elevation:** 762.5
Project Name: Proposed Site Development **Northing:** 1010600 **Easting:** 1092325
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/26/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/27/2022

Depth (ft)	Well	Remarks
	20.5 Bentonite Seal	
	2-inch Schedule 40 FJT PVC Riser	
	21.5 #00N Size Morie Sand Pack	
	0.010 Slot Screen	
25		
30		
	34.5	
35	35.0 Bentonite Seal	
	37.0	
	Rock Cuttings Backfill	
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** W-C5-22 **Surface Elevation:** 762.5
Project Name: Proposed Site Development **Northing:** 1010600 **Easting:** 1092325
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/26/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/27/2022

Depth (ft)	Well	Remarks
	Rock Cuttings Backfill	
	42.1	
45		
50		
55		
60		

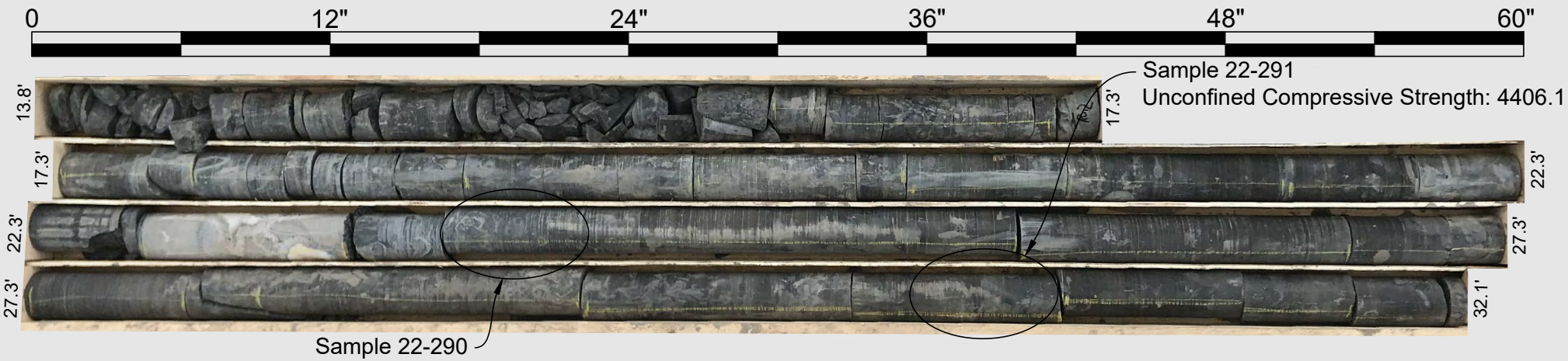
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-C5-22	1	4-26-22	13.8-17.3	3.5	3.4	97	26
BH-C5-22	2	4-26-22	17.3-22.3	5.0	5.0	100	78
BH-C5-22	3	4-26-22	22.3-27.3	5.0	4.9	98	88
BH-C5-22	4	4-26-22	27.3-32.1	4.8	4.8	100	82



BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-C5-22	5	4-26-22	32.1-37.1	5.0	4.9	98	75
BH-C5-22	6	4-26-22	37.1-42.1	5.0	5.0	100	100

Sample 22-292
Unconfined Compressive Strength: 1603.5 PSI

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EDI Job Code: 12K93e **Hole Number** BH-C6-22 **Surface Elevation:** 761.4

Project Name: Proposed Site Development **Northing:** 1010561 **Easting:** 1092521

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/27/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/27/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	19	7	11	9	4	20
	2	20	5	6	8	8	14
5	3	18	2	2	5	6	7
	4	21	8	9	13	14	22
	5	24	13	13	14	10	27
10	6	7	12	50/3			
	Run		#1				
15	Run		#2				
20							

LITH / Description and Classification / Well

- 0.2 — Mostly clean fine size gravel fill.
- 0.6 — Mostly crushed concrete fill.
- 1.4 — Moist brownish gray gravelly (SILTY-SAND) fill with 20 to 40% gravel and flat sided shale stone fragments, little silt, compact, massive soil structure, (GM),(SM).
- 3.0 — Moist dark brownish gray (SAND-SILT-CLAY) fill with 20 to 40% gravel, little sand and clay, stiff, massive soil structure, (ML-CL).
- 4.0 — Moist to dry brown (SAND-SILT-CLAY) with 5 to 15% gravel, little sand and clay, very stiff, thinly laminated and thinly bedded, (ML-CL).
- 5.5 — Wet light grayish brown (SAND-SILT-CLAY) with 5 to 15% gravel, little to some sand, trace to little clay, firm, stratified, (ML-CL).
- 8.0 — clear transition to
- 10.4 — Moist to dry brownish gray to gray gravelly (SAND-SILT-CLAY) with 15 to 25% gravel and flat sided shale stone fragments, little sand and clay, very stiff, massive soil structure, (ML-CL).
- 11.2 — grades downward to
- Moist gray gravelly (SANDY-SILT) with 15 to 25% gravel, some sand, trace clay, compact, massive soil structure, (SM).
- Gray shale stone fragments, very soft to soft.
- 18.4
- See next sheet

Well: Cuttings Backfill 0 to 11.2; Bentonite Seal 11.2 to 18.4

Water Table and Remarks

Gravel fill to 0.2 feet over mostly crushed concrete fill to 0.6 feet over sandy soil fill with some gravel and flat sided shale stone fragments, little silt to 1.4 feet over silty soil fill with little sand and clay, trace to little gravel to 3.0 feet over silty slackwater sediment with some sand, trace to little clay and gravel to 5.5 feet over silty glacial till with little to some gravel and flat sided shale stone fragments, little sand and clay to 8.0 feet over coarse silty glacial till with some sand, little to some gravel, trace clay to 10.4 feet over apparent shale bedrock to 11.2 feet over shale bedrock to end of coring.

Note: Water level at 7.5 feet in bore hole prior to coring.

Note: Lost no water to formation above 17.0 feet.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 11.2 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 21.2 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	11.2 to 16.2	5.0	5.0	100	0	30
2	16.2 to 21.2	5.0	4.9	98	52	45

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-C6-22 **Surface Elevation:** 761.4

Project Name: Proposed Site Development **Northing:** 1010561 **Easting:** 1092521

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/27/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/27/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, very intensely to intensely fractured, intensely fractured horizontally along bedding planes below 12.4 feet with an occasional short high angle vertical fracture, thinly laminated to thinly bedded, dense, no iron staining, core pieces range from (0.025-0.3').	(1)	(1) Bentonite Seal
25									Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes, thinly laminated to thinly bedded, dense, no iron staining, core pieces range from (0.15-0.85').		
									Coring completed at 21.2 ft	21.2	21.2
30											
35											
40											

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal

2 | 16.2 to 21.2 | 5.0 | 4.9 | 98 | 52 | 45

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-C6-22	1	4-27-22	11.2-16.2	5.0	5.0	100	0
BH-C6-22	2	4-27-22	16.2-21.2	5.0	4.9	98	52

Sample 22-293

Unconfined Compressive Strength: 1653.9 PSI

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EDI Job Code: 12K93e **Hole Number** BH-C7-22 **Surface Elevation:** 761.6
Project Name: Proposed Site Development **Northing:** 1010523 **Easting:** 1092718
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/6/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/6/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	6	7	11	18	21	29		Tar and chip surface. 0.1 Mostly crushed concrete fill. 0.5 Dry grayish brown and brownish gray mixed gravelly (SANDY-SILT) fill with 15 to 25% mostly flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (ML). 4.0	Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.5 feet over coarse silty soil fill with little to some gravel, little sand, trace clay to 4.0 feet over silty soil fill with little sand and clay, trace to little gravel to 5.7 feet over silty glacial till with little to some gravel, little sand, trace to little clay to 7.5 feet over shaley glacial till with some sand to 10.4 feet over apparent shale bedrock to 11.4 feet over shale bedrock to end of coring.
	2	20	8	7	5	6	12			
5	3	10	3	5	4	8	9		Moist grayish brown and brownish gray (SAND-SILT-CLAY) fill with 5 to 15% gravel, little sand and clay, stiff, massive soil structure, (ML-CL). 5.7	
	4	22	5	6	8	9	14		Dry faintly mottled olive gray to olive brown gravelly (SAND-SILT-CLAY) with 15 to 25% mostly flat sided shale stone fragments, little sand, trace to little clay, stiff, massive soil structure, (ML-CL). 7.5	Note: Water at 10.2 feet below ground surface prior to coring. Note: Started loosing water below 14.5 feet.
	5	24	9	13	15	13	28		Dry, wet below 9.5 feet, gravelly (SANDY-SILT) with 30 to 50% mostly flat sided shale stone fragments, some sand, compact, massive soil structure, (SM),(GM). 10.4	
10	6	8	19	50/3					Gray shale stone fragments, very soft to soft. 11.4	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 11.4 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 26.2 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 21.0 feet in completed bore hole.
	Run		#1						Gray shale bedrock, soft, very intensely to intensely fractured, very thin to thinly bedded, no iron staining, dense, core breaks appear fresh, core pieces range from (0.025-0.9').	
15	Run		#2						17.2	
20									See next sheet	

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	11.4 to 16.4	5.0	4.9	98	18	25
2	16.4 to 21.3	4.9	4.9	100	71	100

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-C7-22 **Surface Elevation:** 761.6

Project Name: Proposed Site Development **Northing:** 1010523 **Easting:** 1092718

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/6/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/6/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#2						Dark gray with occasional thin gray beds of shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes becoming moderately to slightly to slightly fractured below 21.55 feet, very thin to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.1-2.9').	
	Run		#3							
25									26.2	
									Coring completed at 26.2 ft	
30										
35										
40										

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal

2 | 16.4 to 21.3 | 4.9 | 4.9 | 100 | 71 | 100

3 | 21.3 to 26.2 | 4.9 | 4.9 | 100 | 92 | 100

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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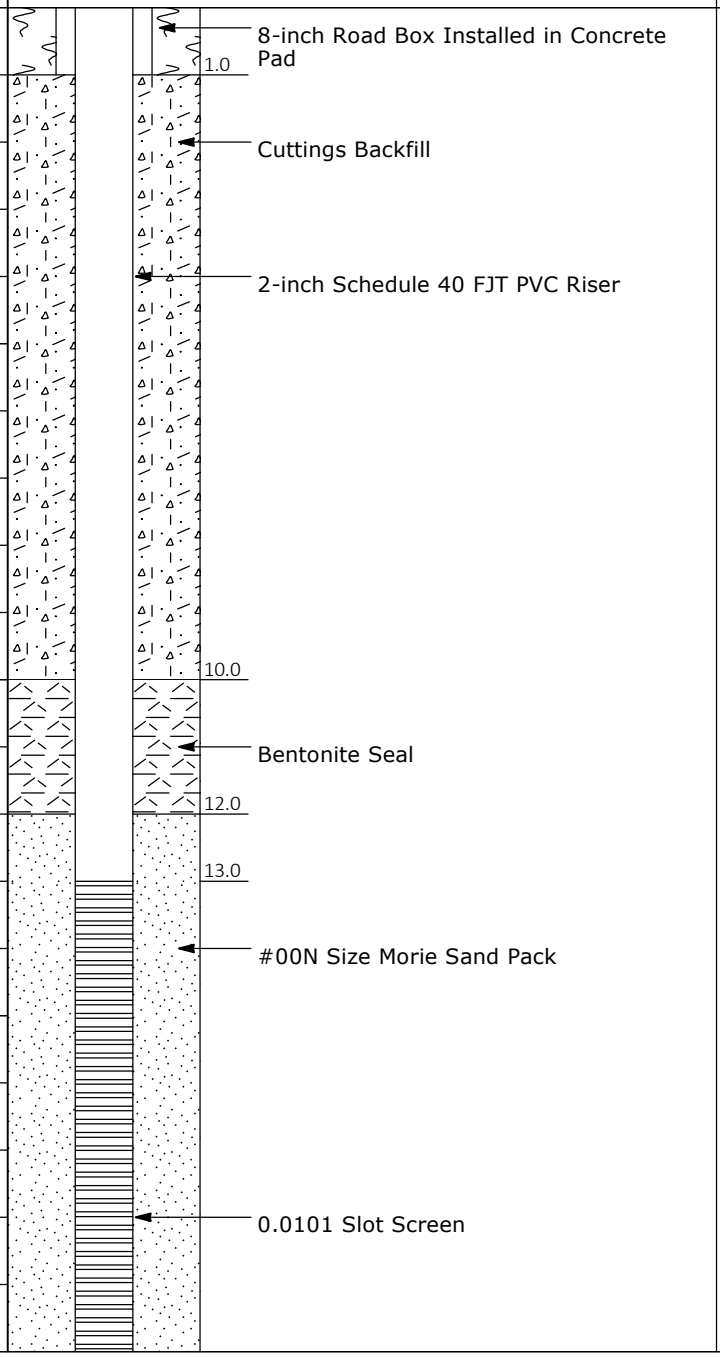
EDI Job Code: 12K93e **Hole Number** W-C7-22 **Surface Elevation:** 761.6
Project Name: Proposed Site Development **Northing:** 1010523 **Easting:** 1092718
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/6/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/6/2022

Depth (ft)	Well	Remarks



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** W-C7-22 **Surface Elevation:** 761.6
Project Name: Proposed Site Development **Northing:** 1010523 **Easting:** 1092718
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/6/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/6/2022

Depth (ft)	Well	Remarks
	#00N Size Morie Sand Pack 0.010 Slot Screen 21.0 21.5 Bentonite Seal 23.5 Rock Cuttings Backfill 26.2	
25		
30		
35		
40		

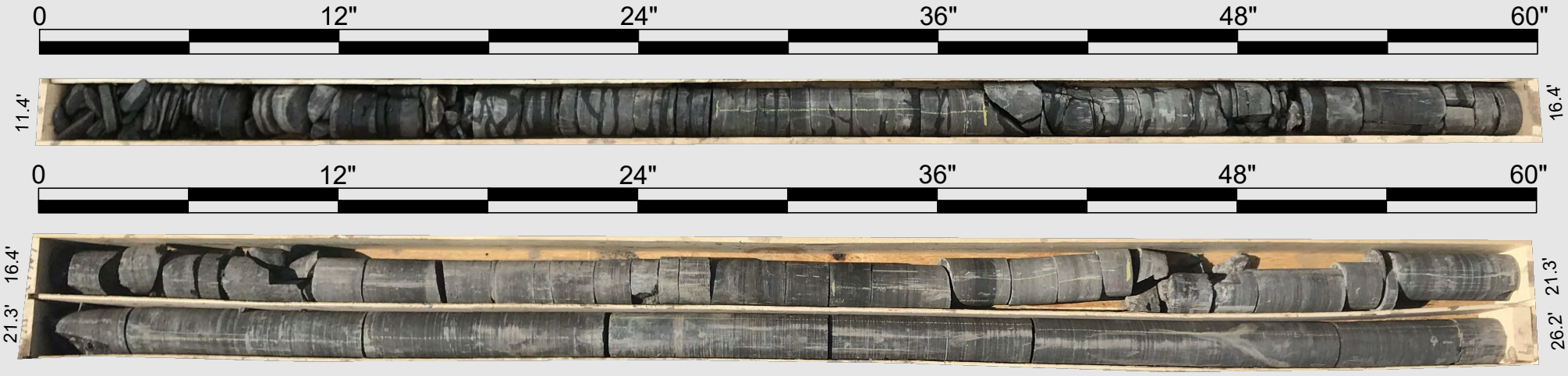
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-C7-22	1	5-6-22	11.4-16.4	5.0	4.9	98	18
BH-C7-22	2	5-6-22	16.4-21.3	4.9	4.9	100	71
BH-C7-22	3	5-6-22	21.3-26.2	4.9	4.9	100	92



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EDI Job Code: 12K93e **Hole Number** BH-D2-22 **Surface Elevation:** 759.8

Project Name: Proposed Site Development **Northing:** 1010573.44 **Easting:** 1091708.19

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/18/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/18/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	17	1	1	3	2	4		Moist dark brown (SANDY-SILT) topsoil fill with 0 to 3% gravel, little sand and organic matter, very loose, granular soil structure, (ML). 0.8	Coarse silty topsoil fill with little sand and organic matter to 0.8 feet over silty soil fill with trace to little sand and clay, trace gravel to 2.0 feet over sandy glacial till with some gravel and flat sided shale stone fragments, little silt to 5.0 feet over shaley glacial till with some silt, little sand to 6.6 feet over apparent shale bedrock to 9.0 feet over shale bedrock to end of coring.
	2	22	11	9	16	25	25		Moist to dry brown (SAND-SILT-CLAY) fill with 0 to 3% gravel, trace to little sand and clay, firm, massive soil structure, (ML-CL). 2.0	
5	3	24	10	20	20	26	40		Dry grayish brown gravelly (SILTY-SAND) with 20 to 40% gravel and flat sided shale stone fragments, little silt, compact, massive soil structure, (SM),(GM). 5.0	
	4	8	16	50/3					Dry to moist gray shale (SANDY-SILT) with 30 to 50% mostly flat sided shale stone fragments, little sand, dense, massive soil structure, (SM),(GM). 6.6	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 9.0 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 24.0 feet. Installed a 2-inch PVC standpipe piezometer to 18.0 feet in completed bore hole.
	5	2	50/2						Gray shale stone fragments, very soft to soft. 9.0	
	Run		#1						Dark gray shale bedrock, soft, very intensely to intensely fractured, becoming intensely fractured below 11.0 feet, thinly laminated to thinly bedded, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.25').	
10										
	Run		#2							
15										
	Run		#3						19.8	
20										

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	9.0 to 14.0	5.0	5.0	100	0	0
2	14.0 to 19.0	5.0	5.0	100	70	30
3	19.0 to 24.0	5.0	5.0	100	93	50

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-D2-22 **Surface Elevation:** 759.8

Project Name: Proposed Site Development **Northing:** 1010573.44 **Easting:** 1091708.19

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/18/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/18/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#3						Gray shale bedrock, soft, moderately fractured horizontally along bedding planes with a very intensely fractured zone from 22.35 to 22.4 feet with high angle fractures from 20.55 to 20.65 and 22.95 to 23.20 feet, thickly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.2-0.7').	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 3 / 19.0 to 24.0 / 5.0 / 5.0 / 100 / 93 / 50
									22.9	EDI Bedrock Hardness Classification
									Dark gray shale bedrock, soft, moderately to slightly fractured horizontally along bedding planes with a high angle fracture from 23.75 to 23.85 feet, thinly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.07-2.3').	Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.
									24.0	Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
25									Coring completed at 24 ft	
30										
35										
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** W-D2-22 **Surface Elevation:** 759.8
Project Name: Proposed Site Development **Northing:** 1010573.44 **Easting:** 1091708.19
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/18/2022

Depth (ft)	Well	Remarks
0	8-inch Road Box Installed in Concrete Pad	
1.0	Cuttings Backfill	
	2-inch Schedule 40 FJT PVC Riser	
5		
8.0	Bentonite Seal	
10	10.0	
11.0	#00N Size Morie Sand Pack	
	0.010 Slot Screen	
15		
18.0		
18.5	Bentonite Seal	
20		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** W-D2-22 **Surface Elevation:** 759.8
Project Name: Proposed Site Development **Northing:** 1010573.44 **Easting:** 1091708.19
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/18/2022

Depth (ft)	Well	Remarks
	20.5 Bentonite Seal	
	Rock Cuttings Backfill	
	24.0	
25		
30		
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-D2-22	1	5-18-22	9.0-14.0	5.0	5.0	100	0
BH-D2-22	2	5-18-22	14.0-19.0	5.0	5.0	100	70
BH-D2-22	3	5-18-22	19.0-24.0	5.0	5.0	100	93

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EDI Job Code: 12K93e **Hole Number** BH-D3-22 **Surface Elevation:** 760
Project Name: Proposed Site Development **Northing:** 1010480.83 **Easting:** 1091893.74
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/20/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/23/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	18	2	3	5	9	8		Moist to dry dark brown (SANDY-SILT) topsoil fill with 3 to 7% gravel, some sand, trace to little organic matter, very loose, granular soil structure, (ML). 0.5 / 0.9		Coarse silty topsoil with some sand, trace to little organic matter, trace gravel to 0.5 feet over silty soil fill with little sand and clay, trace to little gravel to 0.9 feet over silty slackwater sediment with little sand and clay, trace gravel to 1.8 feet over silty glacial till with little to some gravel and flat sided shale stone fragments, little sand, trace to little clay to 6.0 feet over sandy glacial till with some gravel and flat sided shale stone fragments, some silt to 8.5 feet over apparent shale bedrock to 14.0 feet over shale bedrock to 43.0 feet over shale bedrock with an occasional thin siltstone interbed to end of coring.
	2	22	4	6	8	15	14		Dry brown (SAND-SILT-CLAY) fill with 5 to 15% gravel, little sand and clay, firm, massive soil structure, (ML-CL). 1.8		
5	3	14	7	5	4	5	9		Dry distinctly mottled brown (SAND-SILT-CLAY) with 0 to 3% gravel, little sand and clay, stiff, blocky soil structure, (ML-CL).		
	4	24	11	15	16	17	31		Dry to moist grayish brown to brownish gray gravelly (SAND-SILT-CLAY) with 15 to 25% gravel and flat sided stone fragments, little sand, trace to little clay, stiff massive soil structure, (ML-CL). 6.0	Cuttings Backfill	Note: No water in bore hole prior to taking sample number 8. Water level up to 5.0 feet below ground surface. Note: Water level at 5.5 feet below ground surface prior to coring.
	5	24	11	16	18	20	34		grades downward to Moist grayish brown to gray gravelly (SILTY-SAND) with 20 to 40% gravel and flat sided shale stone fragments, some silt, dense, massive soil structure, (SM),(GM). 8.5		Note: Water level at 3.8 feet below ground surface at coring completion with tooling removed from bore hole.
10	6	8	8	50/4					Gray shale stone fragments, very soft and soft.		
	7	3	50/3						14.0	14.0	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 14.0 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 63.5 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
15	Run		#1						Dark gray shale bedrock, soft, intensely fractured to intensely to moderately fractured, thinly laminated to thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-1.0').	Bentonite Seal	
									18.5		
	Run		#2						See next sheet		
20											

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	14.0 to 19.0	5.0	4.8	96	30	20
2	19.0 to 24.0	5.0	5.0	100	70	20

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-D3-22 **Surface Elevation:** 760

Project Name: Proposed Site Development **Northing:** 1010480.83 **Easting:** 1091893.74

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/20/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/23/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, intensely to moderately fractured to moderately fractured horizontally along bedding planes with high angle fractures from 19.0 to 19.5, 24.9 to 25.1, and 28.7 to 29.0 feet with near vertical fractures at 22.6 to 23.0, 23.4 to 24.0 and 26.85 to 27.1 feet, thinly laminated to medium bedding with a limey shale interbed, effervesces without etching, with a calcite deposit from 20.6 to 21.2 feet, dense, no iron staining, core breaks appear fresh, thin pyrite deposit at 28.3 feet, core pieces range from (0.1-1.0').	Bentonite Seal	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 2 / 19.0 to 24.0 / 5.0 / 5.0 / 100 / 70 / 20 3 / 24.0 to 29.0 / 5.0 / 5.0 / 100 / 76 / 20 4 / 29.0 to 34.0 / 5.0 / 5.0 / 100 / 70 / 20 5 / 34.0 to 39.0 / 5.0 / 5.0 / 100 / 92 / 20 6 / 39.0 to 44.0 / 5.0 / 4.95 / 99 / 95 / 20
25	Run		#3								
	Run		#4						Gray shale bedrock, soft, moderately to slightly fractured horizontally along bedding planes with occasional zones of moderately fractured rock with high angle fractures from 30.6 to 31.1, 32.8 to 32.9, 33.1 to 33.3, and 33.7 to 34.0 feet, thinly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-1.75').		
30											
	Run		#5						Dark gray shale bedrock, soft, slightly fractured horizontally along bedding planes, thinly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.51-3.16').		
35											
	Run		#6								
40											

29.0

34.0

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** BH-D3-22 **Surface Elevation:** 760

Project Name: Proposed Site Development **Northing:** 1010480.83 **Easting:** 1091893.74

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/20/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/23/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#6						Dark gray shale bedrock, soft, slightly fractured horizontally along bedding planes, thinly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.51-3.16').		
									43.0		
45	Run		#7						Gray shale bedrock, soft, with occasional thin light gray siltstone interbeds, moderately soft, slightly fractured horizontally along bedding planes, thinly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.17-4.49').	Bentonite Seal	
50	Run		#8								
55	Run		#9								
60	Run		#10								

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
6	39.0 to 44.0	5.0	4.95	99	95	20
7	44.0 to 49.0	5.0	5.0	100	100	20
8	49.0 to 53.9	4.9	4.9	100	98	20
9	53.9 to 59.0	5.1	5.1	100	88	20
10	59.0 to 63.5	4.5	4.5	100	100	20

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-D3-22 **Surface Elevation:** 760

Project Name: Proposed Site Development **Northing:** 1010480.83 **Easting:** 1091893.74

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/20/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/23/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#10						Gray shale bedrock, soft, with occasional thin light gray siltstone interbeds, moderately soft, slightly fractured horizontally along bedding planes, thinly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.17-4.49').	Bentonite Seal	
65									Coring completed at 63.5 ft	63.5	
70											
75											
80											

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal
10 | 59.0 to 63.5 | 4.5 | 4.5 | 100 | 100 | 20

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

Moderately Soft: Shallow indentations (0.04 to 0.12 inch (1 to 3 mm)) can be made by firm blows with point of geologic pick. Can be peeled with pocket knife with difficulty.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

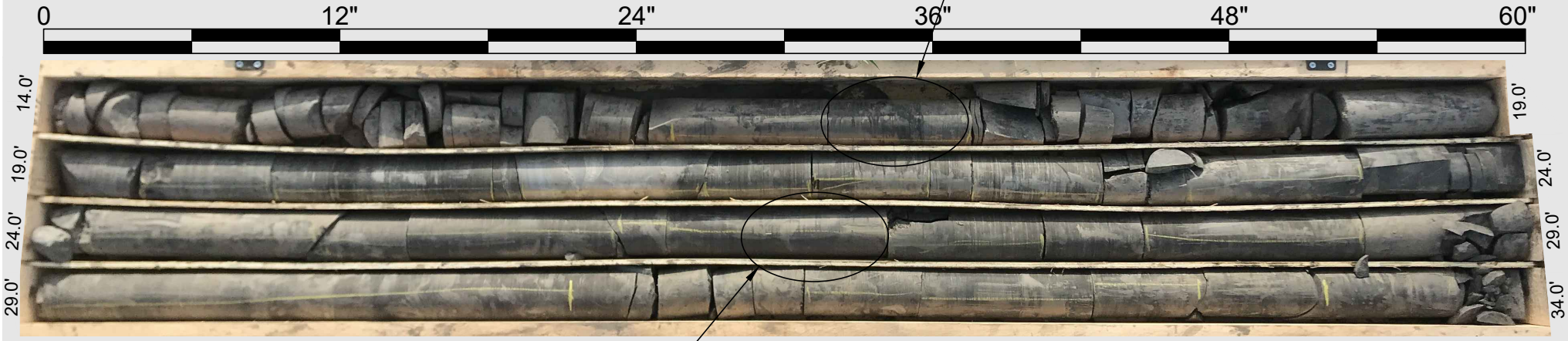
Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-D3-22	1	5-20-22	14.0-19.0	5.0	4.8	96	30
BH-D3-22	2	5-20-22	19.0-24.0	5.0	5.0	100	70
BH-D3-22	3	5-23-22	24.0-29.0	5.0	5.0	100	76
BH-D3-22	4	5-23-22	29.0-34.0	5.0	5.0	100	70

Sample 22-299
Unconfined Compressive Strength: 2198.1 PSI

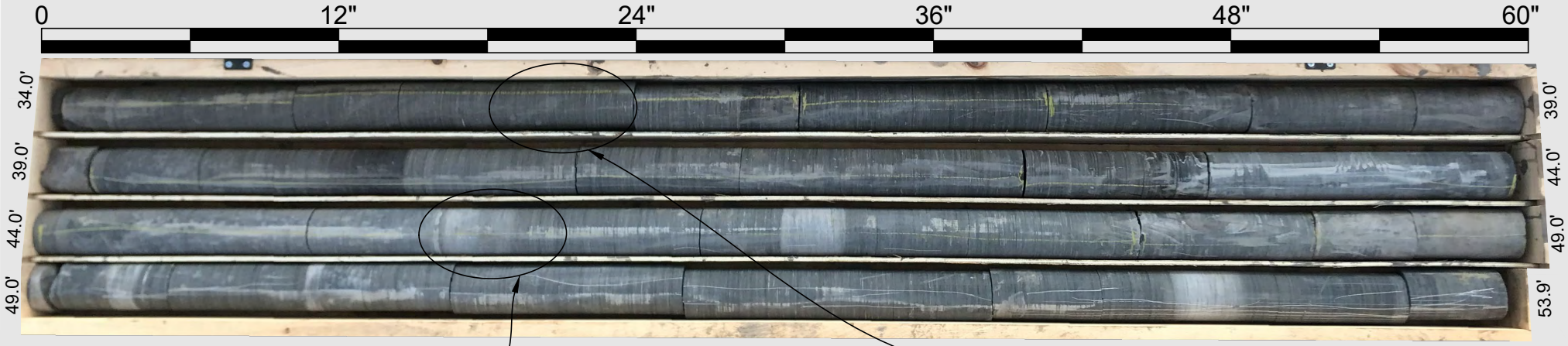


Sample 22-298
Unconfined Compressive Strength: 899.9 PSI

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-D3-22	5	5-23-22	34.0-39.0	5.0	5.0	100	92
BH-D3-22	6	5-23-22	39.0-44.0	5.0	4.95	99	95
BH-D3-22	7	5-23-22	44.0-49.0	5.0	5.0	100	100
BH-D3-22	8	5-23-22	49.0-53.9	4.9	4.9	100	98



Sample 22-296
Unconfined Compressive Strength: 3342.1 PSI

Sample 22-297
Unconfined Compressive Strength: 3220.2 PSI

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-D3-22	9	5-23-22	53.9-59.0	5.1	5.1	100	88
BH-D3-22	10	5-23-22	59.0-63.5	4.5	4.5	100	100

Sample 22-295

Unconfined Compressive Strength: 2310.8 PSI

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EDI Job Code: 12K93e **Hole Number** BH-D4-22 **Surface Elevation:** 760.3
Project Name: Proposed Site Development **Northing:** 1010442 **Easting:** 1092090
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/4/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/4/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	16	5	13	6	3	19		Tar and chip surface. 0.1 Mostly crushed concrete fill. 0.6 Moist to dry dark brownish gray gravelly (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, little sand, trace clay and organic matter, compact, massive soil structure, (SM),(GM). 1.7	Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.6 feet over coarse silty soil fill with some flat sided shale stone fragments, little sand, trace clay to 1.7 feet over silty glacial till with little to some flat sided shale stone fragments, little sand, trace to little clay to 5.5 feet over shaley glacial till with some sand to 8.3 feet over apparent shale bedrock to 12.0 feet over shale bedrock to end of coring.
	2	20	6	8	7	11	15		Dry faintly mottled brown to grayish brown gravelly (SAND-SILT-CLAY) with 15 to 25% mostly flat sided shale stone fragments, little sand, trace to little clay, very stiff, massive soil structure, (ML-CL). 5.5	
5	3	24	7	9	11	12	20		Moist gray gravelly (SANDY-SILT) with 30 to 50% mostly flat sided shale stone fragments, some sand, compact, massive soil structure, (SM),(GM). 8.3	Note: Water level at 6.5 feet below ground surface prior to coring. Note: Water level at 2.5 feet below ground surface at coring completion with tooling removed from core hole.
	4	18	12	13	16	14	29			
	5	10	27	50/4					Dry shale stone fragments, very soft to soft. 12.0	
10	6	18	30	32	35	50/3	67			Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 12.0 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 26.5 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch standpipe piezometer to 17.5 feet in completed bore hole.
	Run		#1						Gray shale bedrock, soft, intensely fractured, thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.25').	
15									15.5	
	Run		#2						Dark gray shale bedrock, soft, intensely to moderately fractured, slightly fractured below 21.0 feet, horizontally along bedding planes, very thin to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.2-3.9').	
20										

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	12.0 to 17.0	5.0	5.0	100	12	35
2	17.0 to 22.0	5.0	5.0	100	75	100

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-D4-22 **Surface Elevation:** 760.3
Project Name: Proposed Site Development **Northing:** 1010442 **Easting:** 1092090
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/4/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/4/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, intensely to moderately fractured, slightly fractured below 21.0 feet, horizontally along bedding planes, very thin to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.2-3.9').	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 2 / 17.0 to 22.0 / 5.0 / 5.0 / 100 / 75 / 100 3 / 22.0 to 26.5 / 4.5 / 4.5 / 100 / 100 / 100
	Run		#3							
25										EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
									26.5 Coring completed at 26.5 ft	
30										
35										
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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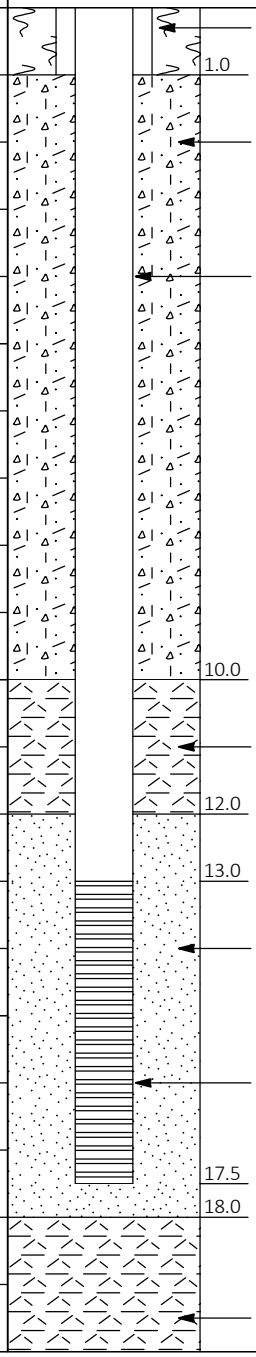
EDI Job Code: 12K93e **Hole Number** W-D4-22 **Surface Elevation:** 760.3
Project Name: Proposed Site Development **Northing:** 1010442 **Easting:** 1092090
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/4/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/4/2022

Depth (ft)	Well	Remarks



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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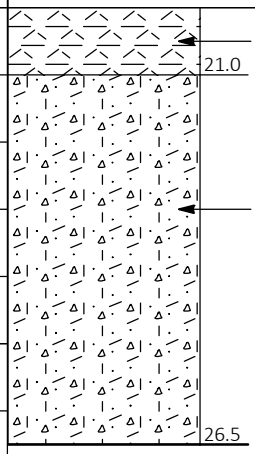
EDI Job Code: 12K93e **Hole Number** W-D4-22 **Surface Elevation:** 760.3
Project Name: Proposed Site Development **Northing:** 1010442 **Easting:** 1092090
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/4/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/4/2022

Depth (ft)	Well	Remarks
25		
30		
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

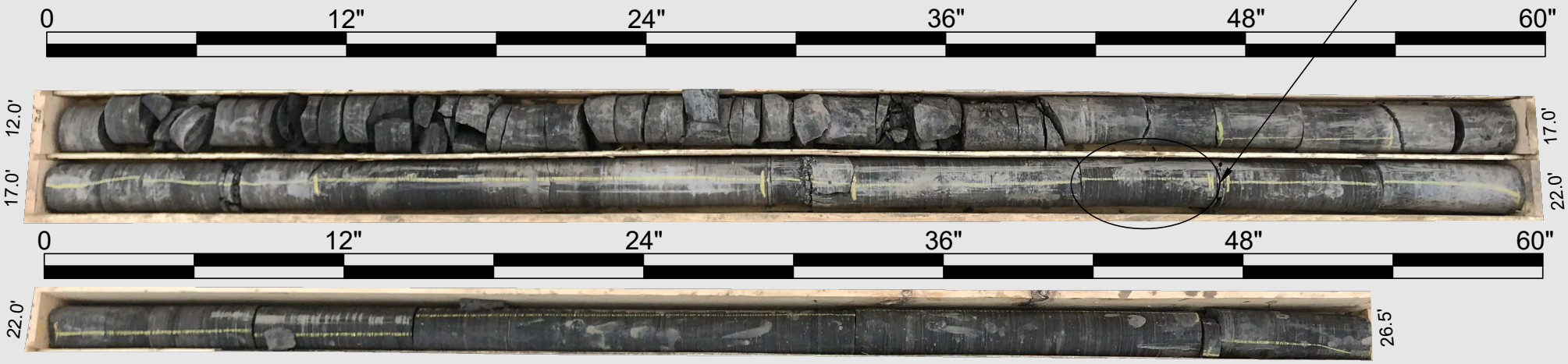
Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-D4-22	1	5-4-22	12.0-17.0	5.0	5.0	100	12
BH-D4-22	2	5-4-22	17.0-22.0	5.0	5.0	100	75
BH-D4-22	3	5-4-22	22.0-26.5	4.5	4.5	100	100

Sample 22-301
Unconfined Compressive Strength: 2843.5 PSI



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EDI Job Code: 12K93e **Hole Number** BH-D5-22 **Surface Elevation:** 761.1
Project Name: Proposed Site Development **Northing:** 1010404 **Easting:** 1092287
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/4/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/5/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	18	4	7	6	9	13
	2	20	4	3	4	7	7
5	3	24	5	6	7	13	13
	4	20	17	18	17	19	35
	5	22	9	8	11	23	19
10	6	19	17	22	49	50/3	71
	7	15	24	33	50/3		
	Run		#1				
15							
	Run		#2				
20							

LITH / Description and Classification:

- 0.0 – 0.1: Tar and chip surface.
- 0.1 – 0.5: Mostly crushed concrete fill.
- 0.5 – 1.5: Moist to dry gray gravelly (SANDY-SILT) fill with 20 to 40% gravel, little sand, trace clay, compact, massive soil structure, (SM),(GM).
- 1.5 – 2.2: Gray shale stone fragment fill.
- 2.2 – 3.0: Moist to wet faintly mottled grayish brown gravelly (SAND-SILT-CLAY) fill with 20 to 40% mostly flat sided shale stone fragments, little sand and clay, firm, massive soil structure, (SC),(GC).
- 3.0 – 3.8: Moist to dry faintly mottled alternating layers of brown and brownish gray (SILTY-CLAY) firm, thinly laminated, (CL).
- 3.8 – 5.5: Moist distinctly mottled brown to grayish brown (SAND-SILT-CLAY) with 5 to 15% mostly flat sided shale stone fragments, little sand and clay, stiff, massive soil structure, (ML-CL).
- 5.5 – 10.2: Moist to wet brownish gray to gray very gravelly (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, some sand, trace clay, dense, compact below 8.0 feet, massive soil structure, (SM),(GM).
- 10.2 – 13.7: Gray shale stone fragments, very soft to soft.
- 13.7 – 18.7: Gray shale bedrock, soft, very intensely to intensely fractured, very thin to thinly bedded, dense, core breaks appear fresh, no iron staining, core pieces range from (0.025-0.65').
- 18.7 – 20: See next sheet

Well: Cuttings Backfill 0.0 – 13.7; Bentonite Seal 13.7 – 18.7

Water Table and Remarks:

Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.5 feet over coarse silty soil fill with some gravel, little sand, trace clay to 1.5 feet over mostly shale stone fragment fill to 2.2 feet over silty soil fill with some flat sided shale stone fragments, little sand and clay to 3.0 feet over clayey slackwater sediment to 3.8 feet over silty glacial till with little sand and clay, trace to little flat sided shale stone fragments to 5.5 feet over coarse silty glacial till with some flat sided shale stone fragments, some sand, trace clay to 10.2 feet over apparent shale bedrock to 13.7 feet over shale bedrock to end of coring.

Note: Water at 11.0 feet below ground surface prior to coring with augers left in overnight at 13.7 feet.

Note: Water level at 3.3 feet below ground surface at coring completion with tooling removed from core hole.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 13.7 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 23.7 feet. Core hole was backfilled with bentonite with the remainder of the bore hole backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	13.7 to 18.7	5.0	5.0	100	22	0
2	18.7 to 23.7	5.0	5.0	100	94	20

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-D5-22 **Surface Elevation:** 761.1

Project Name: Proposed Site Development **Northing:** 1010404 **Easting:** 1092287

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/4/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/5/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, slightly fractured horizontally along bedding planes, thinly bedded, dense, no iron staining, calcite nodule from 21.4 to 21.5 feet, core breaks appear fresh, core pieces range from (0.35-2.1'). 23.7	Bentonite Seal 23.7	
									Coring completed at 23.7 ft		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
2	18.7 to 23.7	5.0	5.0	100	94	20

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-D5-22	1	5-5-22	13.7-18.7	5.0	5.0	100	22
BH-D5-22	2	5-5-22	18.7-23.7	5.0	5.0	100	94

Sample 22-302

Unconfined Compressive Strength: 3135.3 PSI

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EDI Job Code: 12K93e **Hole Number** BH-D6-22 **Surface Elevation:** 760.3
Project Name: Proposed Site Development **Northing:** 1010365 **Easting:** 1092483
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/27/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/29/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	13	7	6	6	5	12		Tar and chip surface. 0.1 Mostly crushed concrete fill. 0.7	Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.7 feet over silty soil fill with some gravel, little sand and clay to 4.2 feet over clayey slackwater sediment with trace sand to 5.5 feet over silty glacial till with little to some mostly flat sided shale stone fragments, little sand and clay to 8.8 feet over apparent shale bedrock to 11.2 feet over shale bedrock to end of coring.
	2	15	7	5	3	3	8		Moist dark brownish gray gravelly (SAND-SILT-CLAY) fill with 20 to 30% gravel and flat sided shale stone fragments, little sand and clay, stiff, massive soil structure, (ML-CL). 4.2	
5	3	17	1	3	5	6	8		Moist to dry alternating layers of brown and brownish gray (CLAYEY-SILT) with some clay, trace sand, stiff, thinly laminated, (CL). 5.5 clear transition to	
	4	20	7	9	8	9	17		Moist grayish brown to olive gray gravelly (SAND-SILT-CLAY) with 15 to 25% mostly flat sided shale stone fragments, little sand and clay, (ML-CL) tending toward (GC),(SC). 8.8	Note: Water level at ground surface prior to coring. Hole left open for thirty-six hours.
	5	14	8	17	25	47	42		Gray shale stone fragments, very soft to soft.	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 11.2 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 29.5 feet. Reamed core hole with a 3 7/8" tricone roller bit to 20.0 feet and installed a 2-inch PVC standpipe piezometer to 17.5 feet in completed bore hole.
10	6	8	19	50/4					11.2	
	Run		#1						Dark gray shale bedrock, soft, very intensely to intensely fractured, dense, no iron staining, core pieces range from (0.025-0.2').	
15	Run		#2						15.3	
									Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes with high angle fractures from 15.6 to 15.7, 16.8 to 17.1, and 17.2 to 17.5 feet, thinly bedded, dense, no iron staining, core pieces range from (0.1-1.2').	
									19.5	
20	Run		#3						See next sheet	

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	11.2 to 14.7	3.5	3.4	97	0	0
2	14.7 to 19.5	4.8	4.7	98	53	30
3	19.5 to 24.5	5.0	5.0	100	94	30

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-D6-22 **Surface Elevation:** 760.3
Project Name: Proposed Site Development **Northing:** 1010365 **Easting:** 1092483
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/27/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/29/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#3						Dark gray shale bedrock, soft, slightly to moderately fractured horizontally along bedding planes becoming slightly fractured below 24.5 feet, thin to medium bedding, dense, no iron staining, core pieces range from (0.25-2.5').	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 3 / 19.5 to 24.5 / 5.0 / 5.0 / 100 / 94 / 30 4 / 24.5 to 29.5 / 5.0 / 4.95 / 99 / 88 / 15
25	Run		#4							EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
									29.5	
30									Coring completed at 29.5 ft	
35										
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** W-D6-22 **Surface Elevation:** 760.3
Project Name: Proposed Site Development **Northing:** 1010365 **Easting:** 1092483
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/27/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/29/2022

Depth (ft)	Well	Remarks
	8-inch Road Box Installed in Concrete Pad (1.0)	
	Cuttings Backfill	
	2-inch Schedule 40 FJT PVC Riser	
5		
10	(10.0) Bentonite Seal (11.0)	
	(11.5) #00N Size Morie Sand Pack	
	0.010 Slot Screen	
15		
	(17.5) (18.0) Bentonite Seal	
20		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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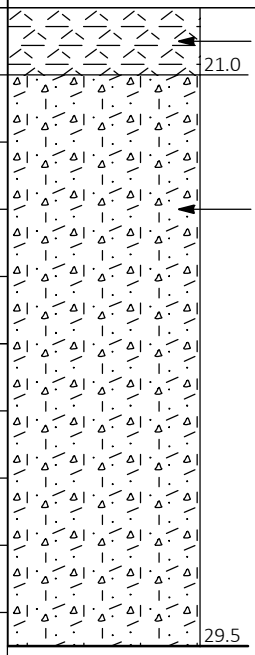
EDI Job Code: 12K93e **Hole Number** W-D6-22 **Surface Elevation:** 760.3
Project Name: Proposed Site Development **Northing:** 1010365 **Easting:** 1092483
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/27/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/29/2022

Depth (ft)	Well	Remarks
25		
30		
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-D6-22	1	4-29-22	11.2-14.7	3.5	3.4	97	0
BH-D6-22	2	4-29-22	14.7-19.5	4.8	4.7	98	53
BH-D6-22	3	4-29-22	19.5-24.5	5.0	5.0	100	94
BH-D6-22	4	4-29-22	24.5-29.5	5.0	4.95	99	88

Sample 22-294

Unconfined Compressive Strength: 2351.3 PSI

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EDI Job Code: 12K93e **Hole Number** BH-D7-22 **Surface Elevation:** 760.7

Project Name: Proposed Site Development **Northing:** 1010327 **Easting:** 1092679

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/29/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/2/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	18	6	8	11	6	19		Tar and chip surface. 0.1 Mostly crushed concrete fill. 0.6 Dry to moist dark gray gravelly (SANDY-SILT) fill with 30 to 50% mostly flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (ML). 3.0	Cuttings Backfill	Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.6 feet over shaley soil fill with little sand, trace clay to 3.0 feet over clayey silt topsoil with little clay, trace to little organic matter, trace sand and gravel to 3.2 feet over clayey slackwater sediment to 4.0 feet over coarse silty glacial till with some gravel, little sand, trace clay to 8.5 feet over apparent shale bedrock to 11.1 feet over shale bedrock to end of coring.
	2	20	3	5	5	6	10		3.2 Dry dark brown (CLAYEY-SILT) topsoil with 0 to 3% gravel, trace to little organic matter, trace sand, loose, granular soil structure, (ML-CL). 4.0		Note: Water level at 4.0 feet below ground surface prior to coring.
5	3	24	2	7	9	12	16		Dry alternating layers of olive gray to brown (SILTY-CLAY) stiff, thinly laminated with very thin coarse silt lenses, (CL).		Note: Started losing water to formation below 17.0 feet. Lost 60 gallons to formation.
	4	24	5	7	10	41	17		Dry to moist dark brown gray gravelly (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, occasional cobble, little sand, trace clay, compact, massive soil structure, (SM),(GM). 8.5		Note: Water level at 2.7 feet below ground surface at completion with tooling removed from bore hole.
	5	20	18	24	25	50/3	49				
10	6	11	27	50/2					Gray shale stone fragments, very soft to soft. 11.1	11.1	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 11.1 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 20.4 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
	Run		#1						Dark gray shale bedrock, soft, very intensely to intensely fractured, intensely fractured below 11.8 feet, high angle fracture in two directions from 13.4 to 13.6 feet, limey shale bedrock lense, moderately hard, from 14.8 to 15.0 feet, thinly bedded, dense, no iron staining, core pieces range from (0.025-0.5')	Bentonite Seal	
15	Run		#2						17.7		
20									See next sheet		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	11.1 to 15.4	4.3	4.3	100	28	0
2	15.4 to 20.4	5.0	4.9	98	50	60

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-D7-22 **Surface Elevation:** 760.7
Project Name: Proposed Site Development **Northing:** 1010327 **Easting:** 1092679
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/29/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/2/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, moderately fractured horizontally along bedding planes, thinly to medium bedding, dense, no iron staining, core pieces range from (0.05-1.6')	20.4 20.4	(1) Bentonite Seal
									Coring completed at 20.4 ft		

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal
2 | 15.4 to 20.4 | 5.0 | 4.9 | 98 | 50 | 60

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-D7-22	1	5-2-22	11.1-15.4	4.3	4.3	100	28
BH-D7-22	2	5-2-22	15.4-20.4	5.0	4.9	98	50

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EDI Job Code: 12K93e **Hole Number** BH-E2-22 **Surface Elevation:** 760.1
Project Name: Proposed Site Development **Northing:** 1010322.68 **Easting:** 1091659
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/19/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/20/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	15	1	1	3	5	4		Moist to dry dark brown (SILTY-SAND) topsoil with little silt and organic matter, very loose, granular soil structure, (ML). 0.7	Cuttings Backfill	Sandy topsoil with little silt and organic matter to 0.7 feet over silty soil fill with little sand and clay to 2.5 feet over coarse silty soil fill with little sand, trace clay to 4.0 feet over shaley glacial till with little sand, trace clay to 6.4 feet over apparent shale bedrock to 11.6 feet over shale bedrock to end of coring.
	2	18	4	7	9	11	16		Dry brown (SAND-SILT-CLAY) fill with 0 to 3% gravel, little sand and clay, stiff, massive soil structure, (ML-CL). 2.5		
5	3	21	9	12	10	13	22		Moist gray gravelly (SANDY-SILT) fill with 20 to 40% mostly flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (SM),(GM). 4.0		
	4	8	19	50/2					Moist gray shaley (SANDY-SILT) with 30 to 50% mostly flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (SM),(GM). 6.4		Note: Water level at 7.5 feet below ground surface prior to coring. Note: Water level at 6.5 feet below ground surface after coring and tooling was removed from bore hole.
	5	20	21	17	25	28	42		Gray shale stone fragments, very soft to soft.		
10	6	15	17	29	50/5					11.0	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 11.6 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 21.6 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired with sod upon completion.
	Run		#1						11.6		
									Dark gray shale bedrock, soft, intensely fractured with zones of very intensely to intensely fractured rock, thinly laminated to thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.4').		
15										Bentonite Seal	
	Run		#2						17.3		
20									See next sheet		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	11.6 to 16.6	5.0	4.8	96	8	40
2	16.6 to 21.6	5.0	4.9	98	73	100

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** BH-E2-22 **Surface Elevation:** 760.1
Project Name: Proposed Site Development **Northing:** 1010322.68 **Easting:** 1091659
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/19/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/20/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes with a short vertical fracture from 18.9 to 19.1 feet, thinly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.04-1.65').	(1) 21.6 21.6	(1) Bentonite Seal
									Coring completed at 21.6 ft		

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal
2 | 16.6 to 21.6 | 5.0 | 4.9 | 98 | 73 | 100

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

25
30
35
40

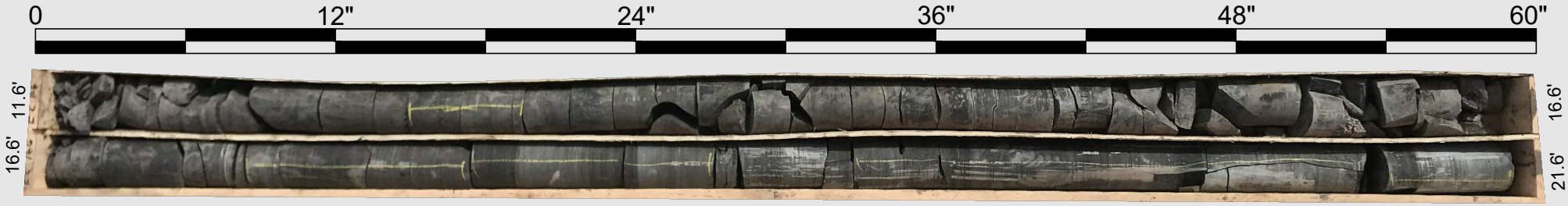
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-E2-22	1	5-20-22	11.6-16.6	5.0	4.8	98	8
BH-E2-22	2	5-20-22	16.6-21.6	5.0	4.9	98	73



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EDI Job Code: 12K93e **Hole Number** BH-E3-22 **Surface Elevation:** 759.8
Project Name: Proposed Site Development **Northing:** 1010270.7 **Easting:** 1091924.51
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/19/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	15	1	1	5	8	6		Moist dark brown (SANDY-SILT) topsoil fill with 0 to 3% gravel, little silt, trace to little organic matter, very loose, granular soil structure, (ML). 0.5	Coarse silty topsoil fill with little sand, trace to little organic matter, trace gravel to 0.5 feet over coarse silty soil fill with little sand, trace clay and gravel to 1.5 feet over coarse silty soil fill with little sand, gravel, and flat sided shale stone fragments to 3.0 feet over silty soil fill with some clay and gravel and flat sided shale stone fragments to 3.5 feet over silty slackwater sediment with little clay, trace sand to 4.3 feet over silty glacial till with little to some gravel and flat sided shale stone fragments, little sand, trace to little clay to 5.8 feet over coarse silty glacial till with some mostly flat sided shale stone fragments, little sand, trace clay to 7.0 feet over apparent shale bedrock to 17.0 feet over shale bedrock to end of coring.
	2	18	5	3	3	2	6		Moist to dry brown (SANDY-SILT) fill with 5 to 15% gravel, little sand, trace clay, compact, massive soil structure, (ML). 1.5	
	3	22	2	5	6	7	11		Dry grayish brown (SANDY-SILT) fill with 10 to 20% gravel and flat sided shale stone fragments, little sand, loose, massive soil structure, (ML). 3.0	
5									Moist to wet light gray (SAND-SILT-CLAY) fill with 10 to 20% gravel and flat sided shale stone fragments, little sand and clay, firm, massive soil structure, (ML-CL). 3.5	
	4	20	6	8	41	39	49		Moist distinctly mottled brown (CLAYEY-SILT) with little clay, trace sand, soft, thinly laminated, (ML-CL). 4.3	
	5	24	15	19	14	16	33		Moist to dry grayish brown to brownish gray gravelly (SAND-SILT-CLAY) with 15 to 25% gravel and flat sided shale stone fragments, little sand, trace to little clay, stiff, massive soil structure, (ML-CL). 5.8	
10									Moist gray gravelly (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (SM),(GM). 7.0	
	6	19	14	15	19	50/2	34		Gray shale stone fragments, very soft to soft. 12.0	
	Run		#1						Dark gray shale bedrock, soft, intensely fractured, with zones of very intensely and very intensely to intensely fractured rock, thinly laminated to thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.25').	
15									17.2	
	Run		#2						See next sheet	
20										

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	12.0 to 17.0	5.0	5.0	100	0	100
2	17.0 to 22.0	5.0	5.0	100	58	60

Note: Augers left in overnight at 10.0 feet, water level the next morning at 3.2 feet below ground surface.

Note: Water level at 3.2 feet below ground surface prior to coring.

Water level at 2.9 feet below ground surface at coring completion.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 12.0 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 31.7 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 26.0 feet in completed bore hole.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-E3-22 **Surface Elevation:** 759.8
Project Name: Proposed Site Development **Northing:** 1010270.7 **Easting:** 1091924.51
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/19/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification
	Run		#2						Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes with very intensely fractured rock from 18.65 to 18.75 and 19 to 19.05 feet, thickly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-1.0').
	Run		#3						23.8
25									Dark gray shale bedrock, soft, moderately to slightly fractured horizontally along bedding planes with a high angle fracture from 25 to 25.5 feet, thickly laminated to medium bedding, dense, no iron staining, thin pyrite deposites, core pieces range from (0.5-1.75').
	Run		#4						31.7
30									Coring completed at 31.7 ft
35									
40									

Water Table and Remarks

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
2	17.0 to 22.0	5.0	5.0	100	58	60
3	22.0 to 26.7	4.7	4.7	100	79	30
4	26.7 to 31.7	5.0	5.0	100	98	30

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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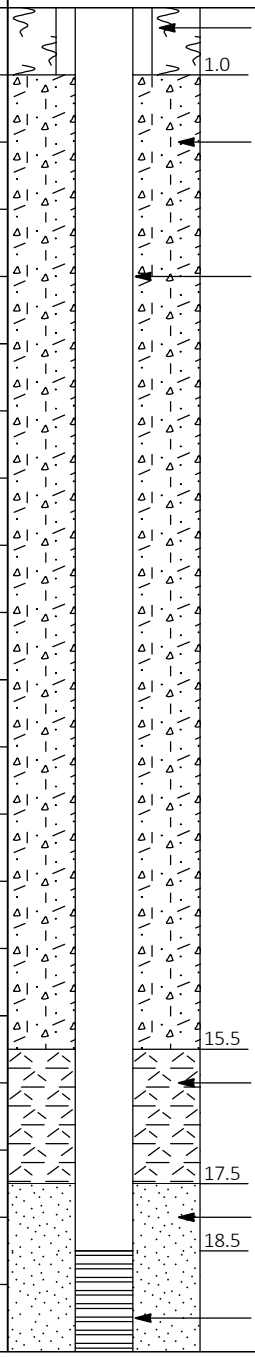
EDI Job Code: 12K93e **Hole Number** W-E3-22 **Surface Elevation:** 759.8
Project Name: Proposed Site Development **Northing:** 1010270.7 **Easting:** 1091924.51
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/19/2022

Depth (ft)	Well	Remarks



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/19/2022

Depth (ft)	Well	Remarks
25	#00N Size Morie Sand Pack 0.010 Slot Screen 26.0 26.5 Bentonite Seal 28.5	
30	Rock Cuttings Backfill 31.7	
35		
40		

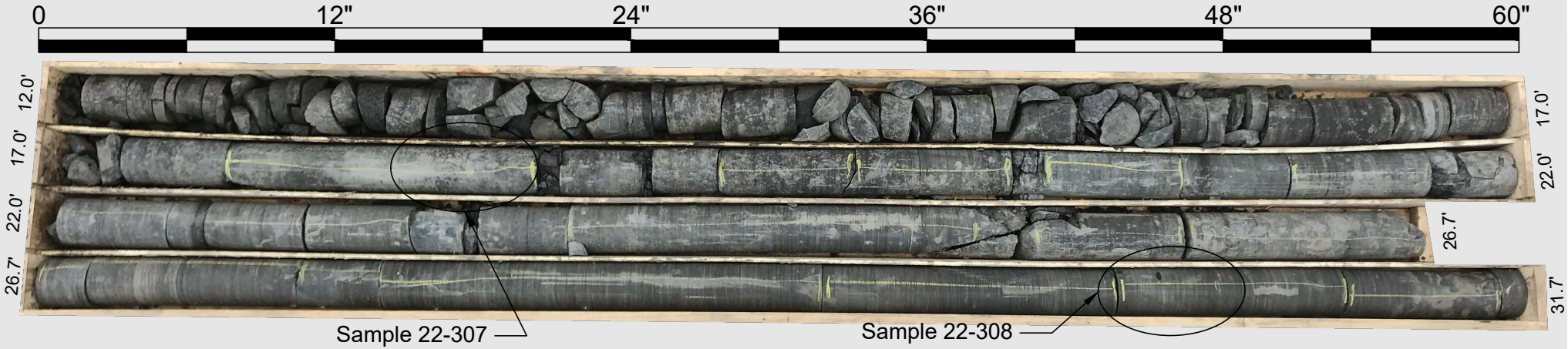
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-E3-22	1	5-19-22	12.0-17.0	5.0	5.0	100	0
BH-E3-22	2	5-19-22	17.0-22.0	5.0	5.0	100	58
BH-E3-22	3	5-19-22	22.0-26.7	4.7	4.7	100	79
BH-E3-22	4	5-19-22	26.7-31.7	5.0	5.0	100	98



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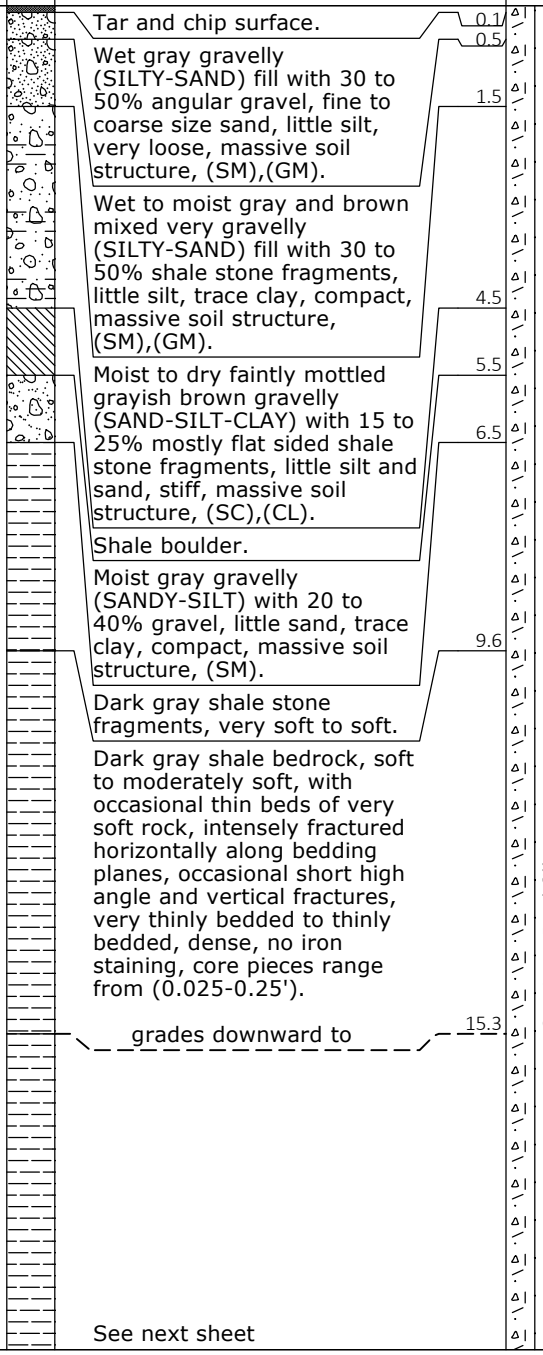
EDI Job Code: 12K93e **Hole Number** BH-E4-22 **Surface Elevation:** 757.4

Project Name: Proposed Site Development **Northing:** 1010246 **Easting:** 1092052

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/8/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/8/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	18	1	6	8	6	14
	2	12	5	5	6	11	11
5	3	15	5	15	17	9	32
	4	13	8	20	26	18	46
	5	15	15	13	50/3		
10	Run		#1				
15	Run		#2				
20	Run		#3				



Description and Classification	Well	Water Table and Remarks
Tar and chip surface. (0.1)	Cuttings Backfill	Tar and chip surface to 0.1 feet over mostly crushed stone fill with little silt to 0.5 feet over mostly sand and shale stone fragment fill with little silt, trace clay to 1.5 feet over clayey glacial drift with little to some mostly flat sided shale stone fragments, little silt and sand to 4.5 feet over gray shale boulder to 5.5 feet over silty glacial till with some gravel, little sand and clay to 6.5 feet over apparent shale bedrock to 9.6 feet over shale bedrock to end of coring.
Wet gray gravelly (SILTY-SAND) fill with 30 to 50% angular gravel, fine to coarse size sand, little silt, very loose, massive soil structure, (SM),(GM). (0.5)		Note: Lost no water to formation until 16.5 feet.
Wet to moist gray and brown mixed very gravelly (SILTY-SAND) fill with 30 to 50% shale stone fragments, little silt, trace clay, compact, massive soil structure, (SM),(GM). (1.5)		Note: Water level prior to coring 5.9 feet below ground surface.
Moist to dry faintly mottled grayish brown gravelly (SAND-SILT-CLAY) with 15 to 25% mostly flat sided shale stone fragments, little silt and sand, stiff, massive soil structure, (SC),(CL). (4.5)		Note: Lost a total of 150 gallons of water during coring.
Shale boulder. (5.5)		Note: Water level at ground surface at coring completion with core tooling removed from hole.
Moist gray gravelly (SANDY-SILT) with 20 to 40% gravel, little sand, trace clay, compact, massive soil structure, (SM). (6.5)		
Dark gray shale stone fragments, very soft to soft. (9.6)		Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 9.6 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 29.4 feet. Bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
Dark gray shale bedrock, soft to moderately soft, with occasional thin beds of very soft rock, intensely fractured horizontally along bedding planes, occasional short high angle and vertical fractures, very thinly bedded to thinly bedded, dense, no iron staining, core pieces range from (0.025-0.25').		
grades downward to (15.3)		
See next sheet		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	9.6 to 14.4	4.8	4.8	100	0	0
2	14.4 to 19.4	5.0	5.0	100	66	30
3	19.4 to 24.4	5.0	5.0	100	100	60

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-E4-22 **Surface Elevation:** 757.4
Project Name: Proposed Site Development **Northing:** 1010246 **Easting:** 1092052
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/8/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/8/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#3						Dark gray with occasional gray layers of shale bedrock, moderately soft, moderately fractured horizontally along bedding planes with a vertical gray fracture from 16.5 to 16.9 feet and a short high angle fracture at 19.0 feet, becomes moderately to slightly fractured below 19.0 feet, thinly bedded, dense, no iron staining, core pieces range from (0.1-1.4').	Cuttings Backfill	
25	Run		#4								
									29.4	29.4	
30									Coring completed at 29.4 ft		
35											
40											

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
3	19.4 to 24.4	5.0	5.0	100	100	60
4	24.4 to 29.4	5.0	4.8	96	96	60

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

Moderately Soft: Shallow indentations (0.04 to 0.12 inch (1 to 3 mm)) can be made by firm blows with point of geologic pick. Can be peeled with pocket knife with difficulty.

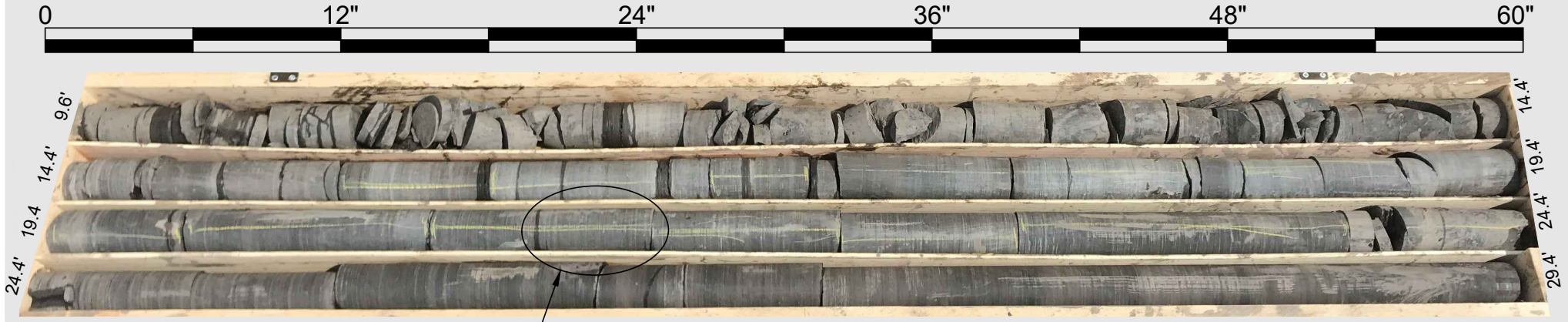
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-E4-22	1	4-8-22	9.6-14.4	4.8	4.8	100	0
BH-E4-22	2	4-8-22	14.4-19.4	5.0	5.0	100	66
BH-E4-22	3	4-8-22	19.4-24.4	5.0	5.0	100	100
BH-E4-22	4	4-8-22	24.4-29.4	5.0	4.8	96	97



Sample 22-110

Unconfined Compressive Strength: 2165.9 PSI

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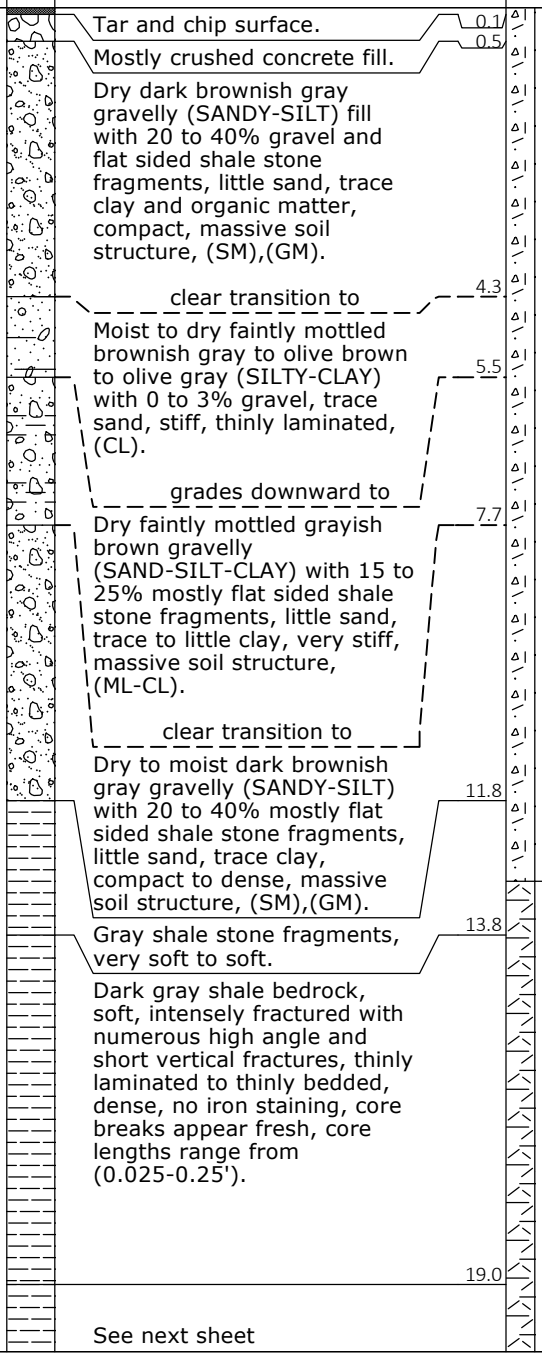
EDI Job Code: 12K93e **Hole Number** BH-E5-22 **Surface Elevation:** 759.9

Project Name: Proposed Site Development **Northing:** 1010207 **Easting:** 1092248

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/3/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/3/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	18	8	9	9	5	18
	2	15	5	6	7	7	13
5	3	20	3	4	5	7	9
	4	24	7	10	14	27	24
	5	17	12	18	14	16	32
10	6	24	9	13	18	41	31
	7	3	50/3				
	Run		#1				
15							
	Run		#2				
20							



LITH	Description and Classification	Well	Water Table and Remarks
	Tar and chip surface. 0.1		Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.5 feet over coarse silty soil fill with some flat sided shale stone fragments, little sand, trace clay and organic matter to 4.3 feet over clayey slackwater sediment with trace sand and gravel to 5.5 feet over silty glacial till with little to some mostly flat sided stone fragments, little sand, trace to little clay to 7.7 feet over coarse silty glacial till with some flat sided shale stone fragments, little sand, trace to little clay to 11.8 feet over apparent shale bedrock to 13.8 feet over shale bedrock to end of coring.
	Mostly crushed concrete fill. 0.5		
	Dry dark brownish gray gravelly (SANDY-SILT) fill with 20 to 40% gravel and flat sided shale stone fragments, little sand, trace clay and organic matter, compact, massive soil structure, (SM),(GM).		
	clear transition to 4.3		
	Moist to dry faintly mottled brownish gray to olive brown to olive gray (SILTY-CLAY) with 0 to 3% gravel, trace sand, stiff, thinly laminated, (CL). 5.5		
	grades downward to		
	Dry faintly mottled grayish brown gravelly (SAND-SILT-CLAY) with 15 to 25% mostly flat sided shale stone fragments, little sand, trace to little clay, very stiff, massive soil structure, (ML-CL). 7.7		Water level at 8.0 feet below ground surface prior to coring.
	clear transition to		Water level at 6.3 feet below ground surface at coring completion with tooling removed from core hole.
	Dry to moist dark brownish gray gravelly (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, little sand, trace clay, compact to dense, massive soil structure, (SM),(GM). 11.8	Cuttings Backfill	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 13.8 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 23.8 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
	Gray shale stone fragments, very soft to soft. 13.8	13.0	
	Dark gray shale bedrock, soft, intensely fractured with numerous high angle and short vertical fractures, thinly laminated to thinly bedded, dense, no iron staining, core breaks appear fresh, core lengths range from (0.025-0.25').	Bentonite Seal	
	19.0		
	See next sheet		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	13.8 to 18.8	5.0	5.0	100	0	45
2	18.8 to 23.8	5.0	5.0	100	86	35

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-E5-22 **Surface Elevation:** 759.9

Project Name: Proposed Site Development **Northing:** 1010207 **Easting:** 1092248

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/3/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/3/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, moderately to slightly fractured horizontally along bedding planes, very thinly to thinly bedded, dense, no iron staining, core breaks appear fresh, core pieces range from (0.35-1.5'). 23.8	Bentonite Seal 23.8	
									Coring completed at 23.8 ft		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
2	18.8 to 23.8	5.0	5.0	100	86	35

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

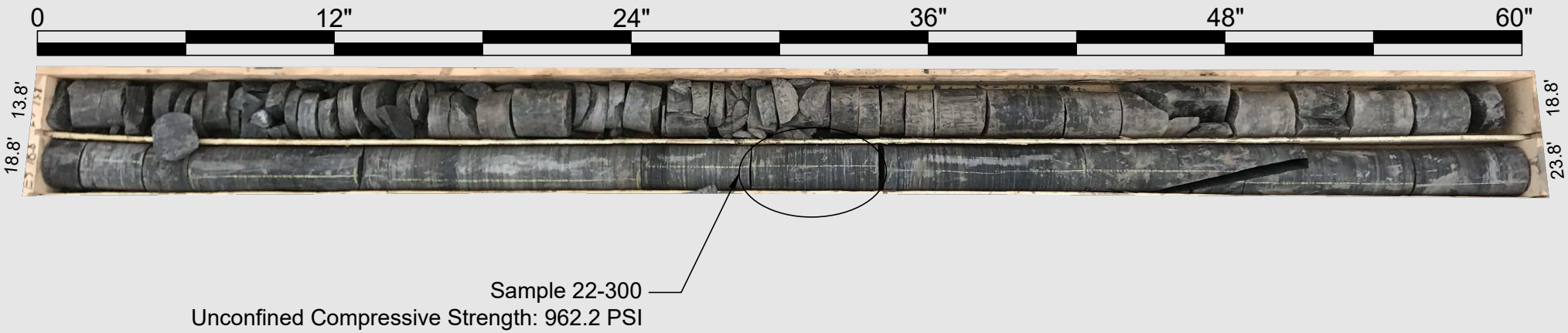
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-E5-22	1	5-3-22	13.8-18.8	5.0	5.0	100	0
BH-E5-22	2	5-3-22	18.8-23.8	5.0	5.0	100	86



Sample 22-300
Unconfined Compressive Strength: 962.2 PSI

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EDI Job Code: 12K93e **Hole Number** BH-E6-22 **Surface Elevation:** 760.4

Project Name: Proposed Site Development **Northing:** 1010169 **Easting:** 1092445

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/2/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/3/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	16	6	8	5	4	13		Tar and chip surface. 0.1 Mostly crushed concrete fill. 0.5 Moist to dry dark brownish gray (SAND-SILT-CLAY) fill with 10 to 20% mostly flat sided shale stone fragments, little sand, trace to little clay, trace organic matter, stiff, massive soil structure, (ML-CL). 1.8		Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.5 feet over silty soil fill with little gravel and shale stone fragments, trace to little clay, trace organic matter to 1.8 feet over clayey slackwater sediment with trace sand and an occasional dropstone to 3.5 feet over water sorted and deposited coarse silt with little sand and clay, trace to little gravel to 4.5 feet over clayey slackwater sediment to 5.7 feet over silty glacial till with little to some mostly flat sided shale stone fragments, little sand and clay to 6.5 feet over coarse silty glacial till with some flat sided shale stone fragments, little sand, trace clay to 9.9 feet over apparent shale bedrock to 12.1 feet over shale bedrock to end of coring.
	2	22	2	3	6	6	9		Dry to moist olive brown to olive gray (CLAYEY-SILT) with 0 to 3% gravel, some clay, trace sand and organic matter, stiff, weakly thinly laminated, (CL). 3.5 4.5 5.7		
5	3	24	1	1	4	6	5		Moist to wet light grayish brown (SAND-SILT-CLAY) with 5 to 15% mostly flat sided shale stone fragments, little sand and clay, firm, weakly stratified, (ML-CL). 6.5		Note: Water at 2.0 feet below ground surface after leaving augers in overnight at 12.1 feet prior to coring.
	4	24	18	14	13	15	27		clear transition to Moist to dry faintly mottled alternating layers of brown and grayish brown (SILTY-CLAY) firm, thinly laminated with very thin coarse silt lenses, (CL). 9.9		Note: Water level at 3.5 feet below ground surface after coring completion with tooling removed from bore hole.
	5	17	10	14	50/5				clear transition to Dry highly mottled brown gravelly (SAND-SILT-CLAY) with 15 to 25% mostly flat sided shale stone fragments, little sand and clay, stiff, massive soil structure, (ML-CL). 12.1		Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 12.1 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 27.0 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
10	6	2	50/3						Dry to moist brownish gray gravelly (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (SM),(GM).	Cuttings Backfill	
	Run		#1						Gray shale stone fragments, very soft to soft. 18.6	Bentonite Seal	
15											
	Run		#2								
20									See next sheet		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	12.1 to 17.1	5.0	5.0	100	0	20
2	17.1 to 22.1	5.0	5.0	100	32	60

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-E6-22 **Surface Elevation:** 760.4

Project Name: Proposed Site Development **Northing:** 1010169 **Easting:** 1092445

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/2/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/3/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, very intensely to intensely fractured with occasional high angle and vertical fractures, very thinly to thinly bedded, dense, no iron staining, core pieces range from (0.025-0.3').		
	Run		#3						Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes, high angle to near vertical fracture from 19.9 to 20.6 feet, dense, no iron staining, core pieces range from (0.025-0.65').		
25									Dark gray shale bedrock, soft, slightly fractured horizontally along bedding planes, very thin to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.2-2.0').		
									Coring completed at 27 ft		
30											
35											
40											

22.1

27.0

Bentonite Seal

27.0

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
2	17.1 to 22.1	5.0	5.0	100	32	60
3	22.1 to 27.0	4.9	4.9	100	90	100

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-E6-22	1	5-3-22	12.1-17.1	5.0	5.0	100	0
BH-E6-22	2	5-3-22	17.1-22.1	5.0	5.0	100	32
BH-E6-22	3	5-3-22	22.1-27.0	4.9	4.9	100	90

Sample 22-309
Unconfined Compressive Strength: 2416.9 PSI

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EDI Job Code: 12K93e **Hole Number** BH-E7-22 **Surface Elevation:** 760.4

Project Name: Proposed Site Development **Northing:** 1010130 **Easting:** 1092641

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/2/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/2/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	19	3	11	8	5	19
	2	22	8	8	10	26	18
5	3	24	24	13	23	14	36
	4	24	12	20	28	51	48
	5	3	50/5				
	Run		#1				
10							
	Run		#2				
15							
	Run		#3				
20							

Depth	Description and Classification
0.1	Tar and chip surface.
0.5	Mostly crushed concrete fill.
2.8	Moist dark brownish gray gravelly (SANDY-SILT) fill with 20 to 40% gravel and flat sided shale stone fragments, little sand, trace clay, organic matter, and wood fiber, compact, massive soil structure, (SM),(GM).
3.5	Moist to dry grayish brown to brownish gray gravelly (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (SM),(GM).
4.8	clear transition to
7.6	Shale stone fragments, very soft to soft (shale channer).
	clear transition to
9.1	Moist dark gray gravelly (SANDY-SILT) with 30 to 50% mostly flat sided shale stone fragments, little sand, trace clay, dense, massive soil structure, (GM),(SM).
11.0	Gray shale stone fragments, very soft to soft.
	Gray limey shale bedrock, effervesces without etching, moderately soft, intensely to moderately fractured horizontally along bedding planes, high angle fracture from 10.1 to 10.4 feet, very thin bedding, slighty porous with calcite deposits with pits, no iron staining, core pieces range from (0.05-0.55').
17.3	Dark gray shale bedrock, soft, intensely fractured horizontally along bedding planes with several high angle and vertical fractures along with occasional layers of very intensely fractured rock.
	See next sheet

Well: Cuttings Backfill (0.1 to 9.1); Bentonite Seal (9.1 to 11.0)

Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.5 feet over coarse silty soil fill with some gravel, little sand, trace clay, organic matter, and wood fiber to 2.8 feet over coarse silty glacial till with some mostly flat sided shale stone fragments, little sand, trace clay to 3.5 feet over shale channer to 4.8 feet over shaley glacial till with little sand, trace clay to 7.6 feet over apparent shale bedrock to 9.1 feet over limey shale bedrock to 11.0 feet over shale bedrock to end of coring.

Water level at 2.8 feet below ground surface at coring completion with tooling removed from bore hole.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 9.1 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 23.0 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	9.1 to 13.0	3.9	3.8	97	38	20
2	13.0 to 18.0	5.0	5.0	100	15	50
3	18.0 to 23.0	5.0	5.0	100	62	50

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-E7-22 **Surface Elevation:** 760.4

Project Name: Proposed Site Development **Northing:** 1010130 **Easting:** 1092641

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/2/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/2/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#3						Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes, high angle to vertical fracture from 19.6 to 20.1 feet, very thin to thin bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.07-0.7'). 23.0	Bentonite Seal 23.0	
									Coring completed at 23 ft		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
3	18.0 to 23.0	5.0	5.0	100	62	50

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

Moderately Soft: Shallow indentations (0.04 to 0.12 inch (1 to 3 mm)) can be made by firm blows with point of geologic pick. Can be peeled with pocket knife with difficulty.

25

30

35

40

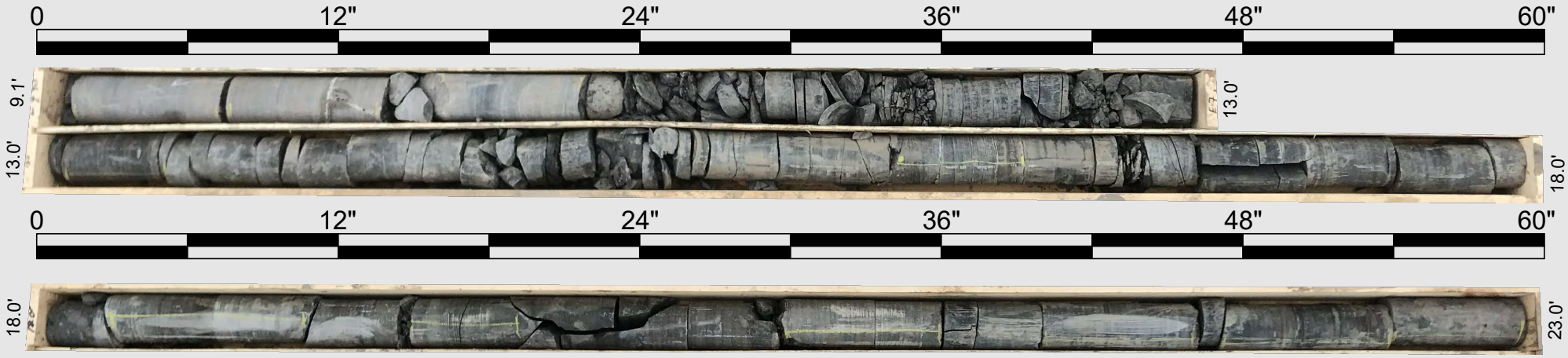
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-E7-22	1	5-2-22	9.1-13.0	3.9	3.8	97	38
BH-E7-22	2	5-2-22	13.0-18.0	5.0	5.0	100	15
BH-E7-22	3	5-2-22	18.0-23.0	5.0	5.0	100	62



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EDI Job Code: 12K93e **Hole Number** BH-F3-22 **Surface Elevation:** 757.5
Project Name: Proposed Site Development **Northing:** 1010088 **Easting:** 1091817
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/21/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/22/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	16	1	1	3	4	4		Moist dark brown (SAND-SILT-CLAY) topsoil fill with 0 to 3% gravel, little sand and clay, trace to little organic matter, very soft, massive soil structure, (ML-CL). 0.3		Silty topsoil fill with little sand and clay, trace to little organic matter, trace gravel to 0.3 feet over silty soil fill with little sand and clay, trace organic matter to 1.6 feet over clayey slackwater sediment with trace sand and organic matter to 2.8 feet over silty glacial drift with some gravel and flat sided stone fragments, little sand and clay to 7.0 feet over shaley glacial till with little sand, trace clay to 11.2 feet over apparent shale bedrock to 14.9 feet over shale bedrock to end of coring.
	2	20	5	6	4	7	10		1.6 Moist brown (SAND-SILT-CLAY) fill with 3 to 7% gravel, little sand and clay, trace organic matter, firm, massive soil structure, (ML-CL). 2.8		
5	3	20	6	7	6	8	13		Moist to dry brown to orangish brown (CLAYEY-SILT) with some clay, trace sand and organic matter, stiff, blocky soil structure, (ML).		Note: Water level at 6.0 feet below ground surface after leaving augers in overnight at 14.9 feet.
	4	22	6	7	19	23	26		7.0 Moist gray gravelly (SAND-SILT-CLAY) with 20 to 40% gravel and flat sided shale stone fragments, little sand and clay, stiff, massive soil structure, (ML-CL),(GC).		
	5	24	11	11	11	11	22		Moist gray very gravelly (SILTY-SAND) with 30 to 50% mostly flat sided shale stone fragments, little silt, trace clay, dense and compact, massive soil structure, (SM).		Note: Water level at 8.0 feet below ground surface at coring completion with tooling removed from bore hole.
10	6	15	6	12	50/4				11.2 Gray shale stone fragments, very soft to soft.		Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 14.9 feet. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 24.2 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
	7	2	50/2								
	8	2	50/3						14.9	14.9	
15	Run		#1						Dark gray shale bedrock, soft, very intensely fractured, very thin to thinly bedded, core pieces range from (0.025-0.2'). 16.4	Cuttings Backfill / Bentonite Seal	
									Dark gray shale bedrock, soft, intensely fractured horizontally along bedding planes with a high angle fracture from 17.7 to 17.9 feet and short vertical fractures from 18.5 to 18.6 and 19.3 to 19.4 feet, dense, no iron staining. 19.3		
20	Run		#2								

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	14.9 to 19.2	4.3	4.1	95	16	30
2	19.2 to 24.2	5.0	4.9	98	82	50

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-F3-22 **Surface Elevation:** 757.5

Project Name: Proposed Site Development **Northing:** 1010088 **Easting:** 1091817

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/21/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/22/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, intensely to moderately fractured horizontally along bedding planes, dense, no iron staining, core breaks appear fresh, core pieces range from (0.2-0.8').	Bentonite Seal	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal
											2 / 19.2 to 24.2 / 5.0 / 4.9 / 98 / 82 / 50
									24.2	24.2	
									Coring completed at 24.2 ft		
25											
30											
35											
40											

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-F3-22	1	4-22-22	14.9-19.2	4.3	4.1	95	16
BH-F3-22	2	4-22-22	19.2-24.2	5.0	4.9	98	82

Sample 22-125
Unconfined Compressive Strength: 1925.8 PSI

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EDI Job Code: 12K93e **Hole Number** BH-F4-22 **Surface Elevation:** 757.8

Project Name: Proposed Site Development **Northing:** 1010050 **Easting:** 1092013

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/11/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/12/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	18	12	7	3		5
	2	20	2	2	3	5	13
5	3	24	3	4	9	10	18
	4	20	3	9	9	13	59
	5	22	10	19	40	50/5	47
10	6	16	5	11	36	50/3	
	Run		#1				
15	Run		#2				
20							

LITH

Description and Classification

Tar and chip surface. 0.1

Moist gray very gravelly (SAND) fill with 40 to 60% mostly angular gravel, trace silt, compact, massive soil structure, (SM),(GM). 0.7

Moist dark gray very gravelly (SAND-SILT-CLAY) fill with 30 to 50% mostly flat sided shale stone fragments, little sand and clay, stiff to very stiff, massive soil structure, (ML-CL). 2.0

grades downward to

Moist dark gray (SAND-SILT-CLAY) topsoil with little clay, trace to little sand, trace organic matter, soft, weakly granular soil structure to weakly thinly laminated and thinly bedded, (ML-CL). 3.0

grades downward to

Moist faintly mottled olive gray (CLAYEY-SILT) with 0 to 3% gravel, little to some clay, trace sand and organic matter, firm, weakly thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (ML-CL) tending toward (CL). 5.0

grades downward to

Dry to moist grayish brown to olive brown gravelly (SAND-SILT-CLAY) with 15 to 30% mostly shale stone fragments, little sand and clay, very stiff, massive soil structure, (ML-CL). 6.0

grades downward to

Moist to wet olive gray to dark gray gravelly (SAND-SILT-CLAY) with 10 to 25% mostly shale stone fragments, little to some clay, trace to little sand, very stiff, massive soil structure, (ML-CL) tending toward (CL). 9.0

grades downward to

Wet dark gray shale stone fragments, very soft to soft. 12.0

19.2

See next sheet

Water Table and Remarks

Tar and chip surface to 0.1 feet over sandy soil fill with some gravel, trace silt to 0.7 feet over silty soil fill with some flat sided shale stone fragments, little sand and clay to 2.0 feet over silty topsoil with little clay, trace to little sand, trace organic matter to 3.0 feet over silty slackwater sediment with little to some clay, trace sand, gravel, and organic matter to 5.0 feet over silty glacial till with little to some flat sided shale stone fragments, little sand and clay to 6.0 feet over silty glacial till with little to some clay, trace to little sand and flat sided shale stone fragments to 9.0 feet over apparent shale bedrock to 12.0 feet over shale bedrock to end of coring.

Note: Water pouring in at 0.8 feet upon well completion.

Water level at 6.8 feet below ground surface at coring completion with tooling removed.

Water level at 4.5 feet below ground surface at end of day on 04/11/2022 prior to coring.

Water level at 4.0 feet below ground surface after hole sat open overnight.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 12.0 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 32.0 feet. Removed tooling and installed a 2-inch PVC standpipe piezometer in completed bore hole to 32.0 feet.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	12.0 to 17.0	5.0	5.0	100	44	15
2	17.0 to 22.0	5.0	5.0	100	72	20

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-F4-22 **Surface Elevation:** 757.8
Project Name: Proposed Site Development **Northing:** 1010050 **Easting:** 1092013
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/11/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/12/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification
	Run		#2						Dark gray shale bedrock, soft, thinly laminated, intensely fractured horizontally along bedding planes with high angle fractures from 12.4 to 12.5, 13.2 to 13.3, 13.8 to 15.9, and 17.0 to 17.1 feet with occasional thin pyrite deposites, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-1.0').
	Run		#3						Dark gray shale bedrock, soft, thinly laminated, moderately fractured horizontally along bedding planes with a near vertical fracture from 27.8 to 31.5 feet, fracture is partially healed, dense, no iron staining, occasional thin pyrite deposits, core breaks appear fresh, core lengths range from (0.1-1.6').
25	Run		#4						
30									32.0 Coring completed at 32 ft
35									
40									

Water Table and Remarks

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
2	17.0 to 22.0	5.0	5.0	100	72	20
3	22.0 to 27.0	5.0	5.0	100	94	35
4	27.0 to 32.0	5.0	5.0	100	68	40

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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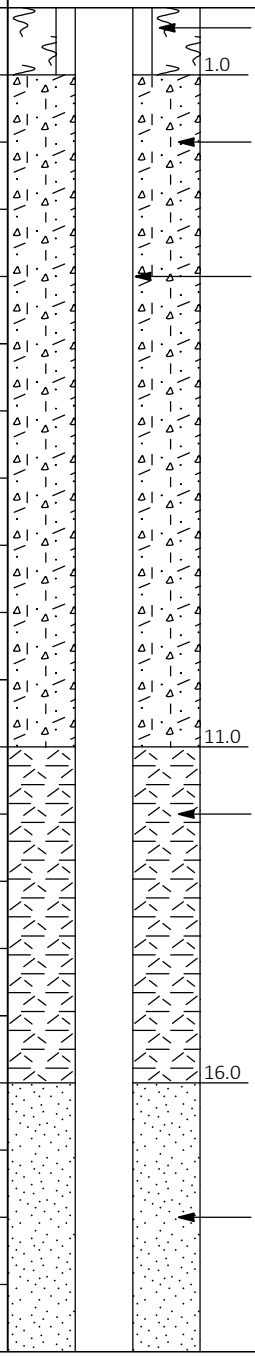
EDI Job Code: 12K93e **Hole Number** W-F4-22 **Surface Elevation:** 757.8
Project Name: Proposed Site Development **Northing:** 1010050 **Easting:** 1092013
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/11/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/12/2022

Depth (ft)	Well	Remarks



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** W-F4-22 **Surface Elevation:** 757.8
Project Name: Proposed Site Development **Northing:** 1010050 **Easting:** 1092013
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/11/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/12/2022

Depth (ft)	Well	Remarks
25	2-inch Schedule 40 FJT PVC Riser 22.8 0.010 Slot Screen	
30	#00N Size Morie Sand Pack 32.0	
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-F4-22	1	4-12-22	12.0-17.0	5.0	5.0	100	44
BH-F4-22	2	4-12-22	17.0-22.0	5.0	5.0	100	72
BH-F4-22	3	4-12-22	22.0-27.0	5.0	5.0	100	94
BH-F4-22	4	4-12-22	27.0-32.0	5.0	5.0	100	68

Unconfined Compressive Strength: 1414.3 PSI

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EDI Job Code: 12K93e **Hole Number** BH-F5-22 **Surface Elevation:** 758

Project Name: Proposed Site Development **Northing:** 1010011 **Easting:** 1092210

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/19/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/20/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	18	6	6	18	22	24
	2	20	2	3	5	10	8
5	3	20	5	9	15	14	24
	4	24	8	27	30	20	57
	5	22	15	25	34	48	59
10	6	20	26	34	30	50/3	64
	7	4	50/4				
	Run		#1				
15							
	Run		#2				
	Run		#3				
20							

LITH	Description and Classification	Water Table and Remarks
	Tar and chip surface. 0.1	Tar and chip surface to 0.1 feet over sandy soil fill with some gravel and shale stone fragments, little silt, trace slag to 2.5 feet over clayey slackwater sediment with trace sand and organic matter to 3.5 feet over silty glacial till with little to some clay and shale stone fragments, trace sand to 6.5 feet over silty glacial till with some shale stone fragments, little to some sand, little clay to 9.0 feet over apparent shale bedrock to 13.5 feet over shale bedrock to end of coring.
	Wet light grayish brown very gravelly (SILTY-SAND) fill with 40 to 60% gravel and shale stone fragments, little silt, trace slag, compact to dense, massive soil structure, (SM),(GM). 2.5	
	grades downward to	
	Moist olive gray (CLAYEY-SILT) with some clay, trace sand and organic matter, firm, weakly thinly laminated with very thin coarse silt lenses, (CL). 3.5	Water level at 8.0 feet below ground surface prior to coring.
	grades downward to	
	Dry to moist grayish brown gravelly (CLAYEY-SILT) with 10 to 25% mostly flat sided shale stone fragments, occasional channer, little to some clay, trace sand, very stiff, massive soil structure, (ML-CL) tending toward (GC). 6.5	Water level at 6.5 feet below ground surface after coring and hole sat open overnight to 24.0 feet.
	grades downward to	
	Moist dark gray very gravelly (SAND-SILT-CLAY) with 40 to 60% mostly flat sided shale stone fragments, little to some sand, little clay, hard, massive soil structure, (ML-CL) tending toward (GM),(GC). 9.0	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 13.5 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 24.0 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 18.0 feet in completed bore hole.
	Moist to wet dark gray shale stone fragments, very soft to soft. 13.5	
	Dark gray shale bedrock, soft, thinly laminated, intensely fractured horizontally along bedding planes with high angle to near vertical fractures from 13.8 to 13.9, 14.6 to 14.7, 15.2 to 15.3, 15.6 to 16.4, 16.8 to 17.2, and 17.6 to 18.0 feet, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-0.45'). 18.0	
	See next sheet	

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	13.5 to 18.0	4.5	4.2	93	36	50
2	18.0 to 19.0	1.0	0.8	80	80	10
3	19.0 to 24.0	5.0	5.0	100	98	50

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-F5-22 **Surface Elevation:** 758
Project Name: Proposed Site Development **Northing:** 1010011 **Easting:** 1092210
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/19/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/20/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#3						Dark gray shale bedrock, soft, thinly laminated, moderately to slightly fractured horizontally along bedding planes, dense, no iron staining, core breaks appear fresh, core lengths range from (0.3-1.45').	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 3 / 19.0 to 24.0 / 5.0 / 5.0 / 100 / 98 / 50
									24.0 Coring completed at 24 ft	EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
25										
30										
35										
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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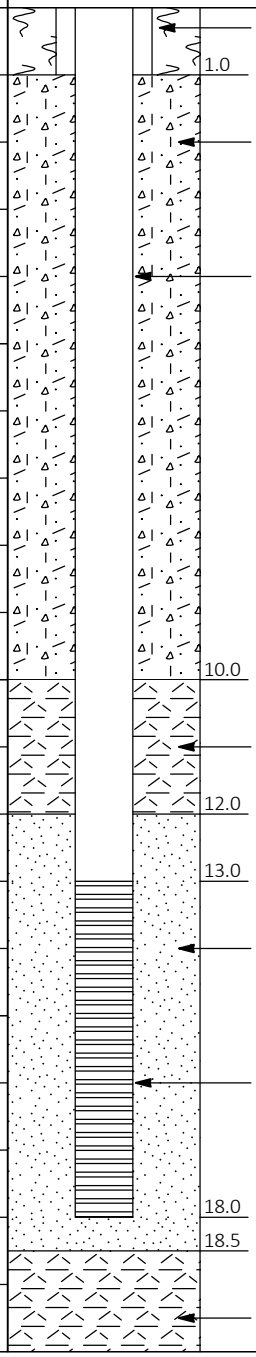
EDI Job Code: 12K93e **Hole Number** W-F5-22 **Surface Elevation:** 758
Project Name: Proposed Site Development **Northing:** 1010011 **Easting:** 1092210
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/20/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/20/2022

Depth (ft)	Well	Remarks



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** W-F5-22 **Surface Elevation:** 758
Project Name: Proposed Site Development **Northing:** 1010011 **Easting:** 1092210
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/20/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/20/2022

Depth (ft)	Well	Remarks
	Bentonite Seal	
21.0		
	Rock Cuttings Backfill	
24.0		
25		
30		
35		
40		

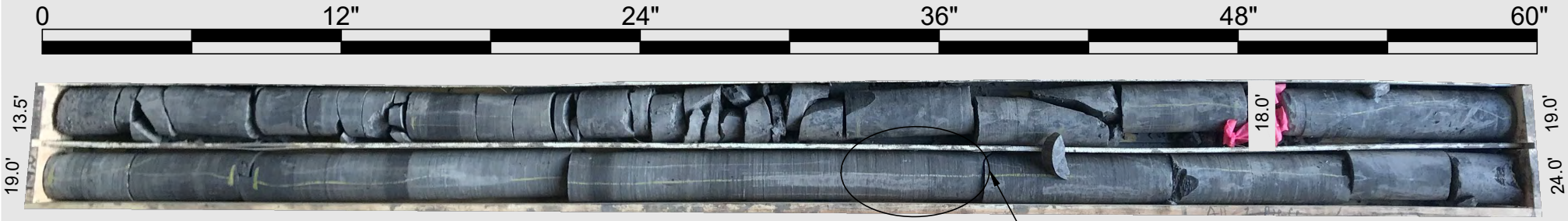
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-F5-22	1	4-19-22	13.5-18.0	4.5	4.2	93	36
BH-F5-22	2	4-19-22	18.0-19.0	1.0	0.8	80	80
BH-F5-22	3	4-19-22	19.0-24.0	5.0	5.0	100	98



Sample 22-122

Unconfined Compressive Strength: 1393.3 PSI

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EDI Job Code: 12K93e **Hole Number** BH-F6-22 **Surface Elevation:** 760.5

Project Name: Proposed Site Development **Northing:** 1009973 **Easting:** 1092406

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/19/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/19/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	20	6	9	3	4	12
	2	24	4	6	13	10	19
5	3	20	3	8	12	27	20
	4	22	21	11	14	13	25
	5	24	13	27	34	36	61
10	6	5	50/5				
	7	1	50/2				
	Run		#1				
15							
	Run		#2				
20							

LITH / Description and Classification / Well

0.1 — Tar and chip surface.

1.0 — Wet brownish gray very gravelly (SAND) fill with 40 to 60% gravel and shale stone fragments, trace silt and slag, compact, massive soil structure, (SM),(GM).

1.5

2.0 — Moist olive gray (CLAYEY-SILT) fill with 0 to 3% gravel, some clay, trace sand and organic matter, firm, massive soil structure, (CL).

3.0 — Moist to wet grayish brown very gravelly (SILTY-SAND) fill with 20 to 40% mostly shale stone fragments, little to some silt, loose, massive soil structure, (SM),(GM).

grades downward to

Dry brownish gray (CLAYEY-SILT) with little to some clay, trace sand, stiff, weakly thinly laminated with very thin coarse silt lenses, (ML-CL) tending toward (CL).

10.0 — grades downward to

Dry dark gray (SAND-SILT-CLAY) with 40 to 60% mostly shale stone fragments, little to some sand, little clay, very stiff to hard, massive soil structure, (ML-CL) tending toward (GM),(GC).

13.9 — grades downward to

Dry dark gray weathered shale stone fragments, very soft to soft.

19.0 — Dark gray shale bedrock, soft, thinly laminated, intensely to moderately fractured horizontally along bedding planes with occasional high angle to near vertical fractures from 14.8 to 14.9 and 16.3 to 16.8 feet, core breaks appear fresh, no iron staining, core lengths range from (0.01-0.65').

See next sheet

Well: Cuttings Backfill; Bentonite Seal (13.9)

Water Table and Remarks

Tar and chip surface to 0.1 feet over sandy soil fill with some gravel and shale stone fragments with trace silt and slag to 1.0 feet over clayey soil fill with trace sand, gravel, and organic matter to 1.5 feet over sandy soil fill with some shale stone fragments, little to some silt to 2.0 feet over silty slackwater sediment, little to some clay, trace sand to 3.0 feet over shaley glacial till with little to some sand, little clay to 10.0 feet over apparent shale bedrock to 13.9 feet over shale bedrock to end of coring.

No water prior to coring.

Water level at 7.5 feet below ground surface at coring completion with tooling removed from bore hole.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 13.9 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 23.9 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	13.9 to 18.9	5.0	5.0	100	58	0
2	18.9 to 23.9	5.0	5.0	100	88	0

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-F6-22 **Surface Elevation:** 760.5

Project Name: Proposed Site Development **Northing:** 1009973 **Easting:** 1092406

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/19/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/19/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, thinly laminated, moderately to slightly fractured horizontally along bedding planes, occasional thin pyrite deposits, no iron staining, core breaks appear fresh, core lengths range from (0.05-0.92'). 23.9	Bentonite Seal 23.9	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 2 / 18.9 to 23.9 / 5.0 / 5.0 / 100 / 88 / 0
									Coring completed at 23.9 ft		
25											EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
30											
35											
40											

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-F6-22	1	4-19-22	13.9-18.9	5.0	5.0	100	58
BH-F6-22	2	4-19-22	18.9-23.9	5.0	5.0	100	88

Sample 22-121
Unconfined Compressive Strength: 2106.0 PSI

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EDI Job Code: 12K93e **Hole Number** BH-F7-22 **Surface Elevation:** 761.6

Project Name: Proposed Site Development **Northing:** 1009934 **Easting:** 1092602

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/6/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/10/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	20	7	12	12	16	24		Tar and chip surface. 0.1 Mostly crushed concrete fill. 0.4 Dry grayish brown and brownish gray gravelly (SANDY-SILT) with 25 to 40% mostly flat sided shale stone fragments, little sand, trace clay, compact, massive soil structure, (SM),(GM).	Tar and chip surface to 0.1 feet over mostly crushed concrete fill to 0.4 feet over coarse silty glacial till with some mostly flat sided shale stone fragments, little sand, trace clay to 5.0 feet over shaley glacial till with some sand, little silt with an occasional shale channer to 5.8 feet over apparent shale bedrock to 11.8 feet over shale bedrock to end of coring.
	2	22	12	12	15	18	27			
5	3	24	18	31	35	22	66		5.0 Wet gray very gravelly (SILTY-SAND) with 40 to 60% mostly flat sided shale stone fragments, occasional channer, little silt, very dense, massive soil structure, (SM),(GM). 5.8	Note: Water level at 4.5 feet below ground surface prior to coring.
	4	24	29	39	37	48	76		Gray shale stone fragments, very soft to soft.	Note: Water level at 3.0 feet below ground surface after leaving hole open to 16.8 feet.
	5	24	28	35	31	47	66			Note: Water level at 3.0 feet below ground surface at coring completion with tooling removed from bore hole.
10	6	9	27	50/3					11.8	
	Run		#1						Dark gray shale bedrock, soft, intensely fractured, very thin to thinly bedded, dense, core breaks appear fresh, no iron staining, core pieces range from (0.025-0.5').	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 11.8 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 25.5 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 20.5 feet in completed bore hole.
15										
	Run		#2						19.5	
20									See next sheet	

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	11.8 to 16.8	5.0	4.8	96	17	30
2	16.8 to 20.5	3.7	3.7	100	21	45

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-F7-22 **Surface Elevation:** 761.6

Project Name: Proposed Site Development **Northing:** 1009934 **Easting:** 1092602

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/6/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/10/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, moderately fractured horizontally along bedding planes, very thin to thinly bedded with an occasional thin very soft shale interbed, dense, no iron staining, occasional thin pyrite deposits, core breaks appear fresh, core pieces range from (0.2-1.0').	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 2 — 16.8 to 20.5 — 3.7 — 3.7 — 100 — 21 — 45 3 — 20.5 to 25.5 — 5.0 — 5.0 — 100 — 60 — 60 EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
	Run		#3							
25									25.5	
									Coring completed at 25.5 ft	
30										
35										
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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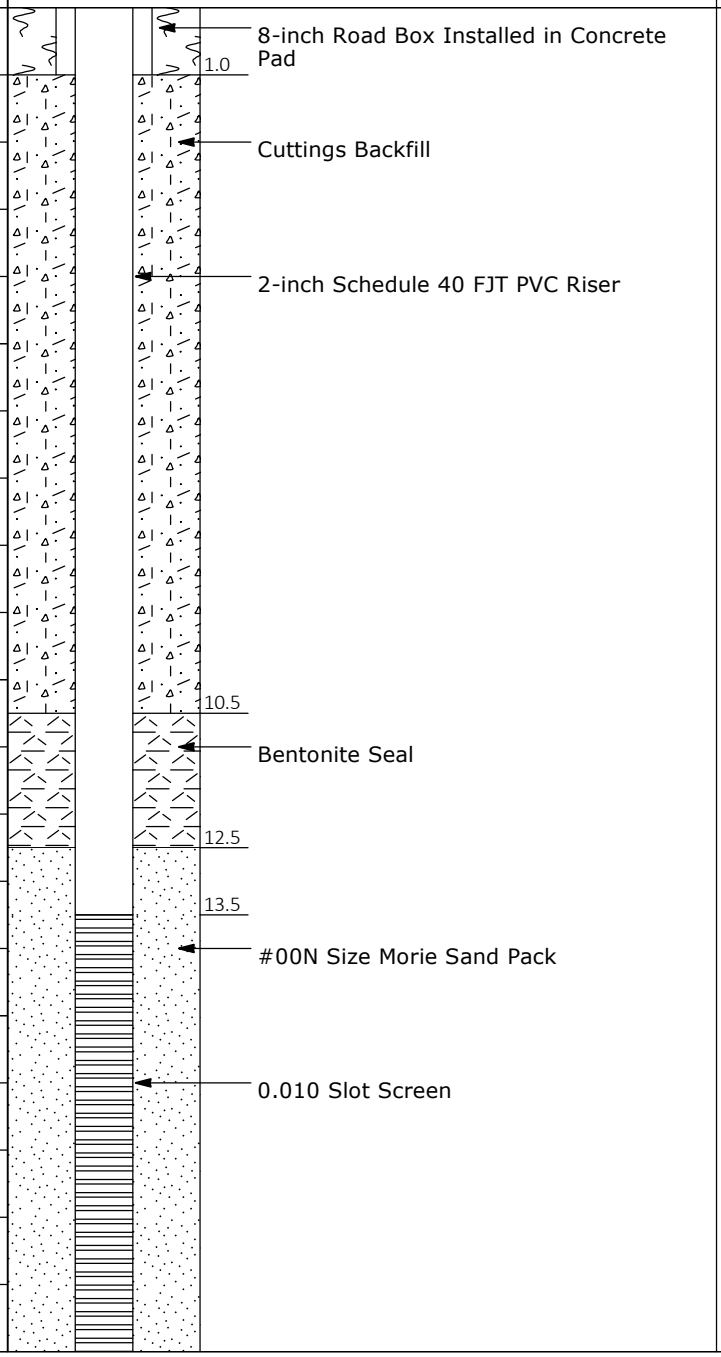
EDI Job Code: 12K93e **Hole Number** W-F7-22 **Surface Elevation:** 761.6
Project Name: Proposed Site Development **Northing:** 1009934 **Easting:** 1092602
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/10/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/10/2022

Depth (ft)	Well	Remarks
5	8-inch Road Box Installed in Concrete Pad (1.0)	
	Cuttings Backfill	
	2-inch Schedule 40 FJT PVC Riser	
10	(10.5) Bentonite Seal (12.5)	
	(13.5) #00N Size Morie Sand Pack	
15	0.010 Slot Screen	
20		



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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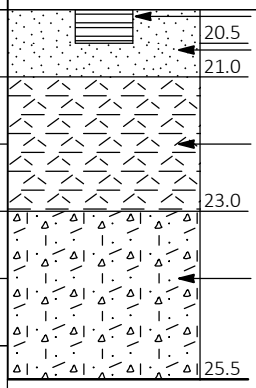
EDI Job Code: 12K93e **Hole Number** W-F7-22 **Surface Elevation:** 761.6
Project Name: Proposed Site Development **Northing:** 1009934 **Easting:** 1092602
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/10/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/10/2022

Depth (ft)	Well	Remarks
	 20.5 0.010 Slot Screen; 21.0 #00N Size Morie Sand Pack; Bentonite Seal; 23.0 Rock Cuttings Backfill; 25.5	
25		
30		
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-F7-22	1	5-6-22	11.8-16.8	5.0	4.8	96	17
BH-F7-22	2	5-9-22	16.8-20.5	3.7	3.7	100	21
BH-F7-22	3	5-9-22	20.5-25.5	5.0	5.0	100	60

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EDI Job Code: 12K93e **Hole Number** BH-G3-22 **Surface Elevation:** 757.1
Project Name: Proposed Site Development **Northing:** 1009880 **Easting:** 1091840
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/21/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/21/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	21	1	3	4	4	7		Moist dark brown (SANDY-SILT) topsoil fill with little sand and organic matter, very loose, granular soil structure, (ML). 0.4		Coarse silty topsoil fill with little sand and organic matter to 0.4 feet over sandy soil fill, little to some shale stone fragments, little silt to 1.7 feet over clayey slackwater sediment with trace sand and occasional dropstone to 5.5 feet over shaley glacial till with some sand, little silt to 12.2 feet over apparent shale bedrock to 14.9 feet over shale bedrock to end of coring.
	2	17	2	3	6	7	9		Moist brown gravelly (SILTY-SAND) fill with 15 to 25% mostly flat sided shale stone fragments, little silt, loose, massive soil structure, (GM). 1.7		
5	3	22	3	5	5	7	10		Moist to dry olive gray (CLAYEY-SILT) with 0 to 3% gravel, some clay, trace sand, stiff, weakly thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (CL). 4.0		Note: Water level prior to coring 6.0 feet below ground surface.
	4	24	6	12	15	18	27		grades downward to		Note: Water level at 9.5 feet below ground surface at coring completion with tooling removed from bore hole.
	5	20	7	18	14	21	32		Dry alternating layers of brown and gray (CLAYEY-SILT) with 0 to 3% gravel, some clay, trace sand, stiff, thinly laminated with very thin coarse silt lenses, (CL). 5.5		Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 14.9 feet. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 24.3 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface was repaired to match surrounding conditions upon completion.
10	6	18	10	18	33	33	51		clear transition to		
	7	8	23	50/5					Dry gray to dark gray gravelly (SILTY-SAND) with 30 to 50% mostly flat sided shale stone fragments, little silt, compact, dense below 7.0 feet, massive soil structure, (SM),(GM). 12.2		
									Dark gray shale stone fragments, very soft to soft. 14.9	Cuttings Backfill 14.9	
15	Run		#1						Dark gray shale bedrock, soft, very intensely to intensely fractured, thinly bedded, core breaks appear fresh, no iron staining, core pieces range from (0.025-0.4'). 18.1	Bentonite Seal	
	Run		#2								
20	Run		#3						See next sheet		

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	14.9 to 17.8	2.9	2.2	76	13	50
2	17.8 to 19.3	1.5	1.4	93	61	35
3	19.3 to 24.3	5.0	5.0	100	72	85

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-G3-22 **Surface Elevation:** 757.1

Project Name: Proposed Site Development **Northing:** 1009880 **Easting:** 1091840

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/21/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/21/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#3						Dark gray shale bedrock, soft, very thinly to moderately bedded, moderately fractured horizontally along bedding planes, dense with occasional thin pyrite deposits, no iron staining, core pieces range from (0.05-1.2'). 24.3	Bentonite Seal 24.3	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 3 / 19.3 to 24.3 / 5.0 / 5.0 / 100 / 72 / 85
									Coring completed at 24.3 ft		
25											
30											
35											
40											

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-G3-22	1	4-21-22	14.9-17.8	2.9	2.2	76	13
BH-G3-22	2	4-21-22	17.8-19.3	1.5	1.4	93	61
BH-G3-22	3	4-21-22	19.3-24.3	5.0	5.0	100	72

Sample 22-118
Unconfined Compressive Strength: 2676.7 PSI

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EDI Job Code: 12K93e **Hole Number** BH-G4-22 **Surface Elevation:** 758.9

Project Name: Proposed Site Development **Northing:** 1009853.35 **Easting:** 1091974.61

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/11/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/11/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	18	14	10	6		16		Tar and chip surface. 0.1 Moist gray very gravelly (SAND) fill with 40 to 60% mostly angular gravel, trace silt and slag, compact, massive soil structure, (SM),(GM). 0.7		Tar and chip surface to 0.1 feet over sandy soil fill with some gravel, trace silt and slag to 0.7 feet over silty soil fill with little to some shale stone fragments, little clay, trace to little sand to 1.6 feet over silty slackwater sediment with little to some clay, trace sand, organic matter, and shale stone fragments to 2.2 feet over silty slackwater sediment with little to some clay, trace to little sand, trace shale stone fragments to 4.5 feet over silty glacial till with little to some shale stone fragments, little sand and clay to 6.5 feet over sandy glacial till with some silt and shale stone fragments to 10.0 feet over silty glacial till with some sand and shale stone fragments, trace to little clay to 11.9 feet over apparent shale bedrock to 14.0 feet over shale bedrock to end of coring.
	2	24	2	4	7	9	11		Moist dark gray to dark brown gravelly (SAND-SILT-CLAY) fill with 15 to 30% mostly shale stone fragments, little clay, trace to little sand, very stiff, massive soil structure, (ML-CL). 1.6 grades downward to 2.2		
5	3	22	4	5	4	4	9		Moist dark gray (CLAYEY-SILT) with 0 to 5% mostly shale stone fragments, little to some clay, trace sand and organic matter, stiff, weakly thinly laminated to thinly bedded, (ML-CL) tending toward (CL). 4.5 grades downward to 6.5		No water in bore hole prior to coring.
	4	24	4	12	15	14	27		Moist faintly mottled brownish gray (SAND-SILT-CLAY) with 5 to 10% mostly shale stone fragments, little to some clay, trace to little sand, stiff to very stiff, weakly blocky soil structure to weakly thinly laminated with very thin coarse silt lenses and nearly vertical gray desiccation cracks, (ML-CL) tending toward (CL). 10.0 grades downward to 11.9		Lost approximately 225 gallons of water while coring between 19.0 and 34.0 feet below ground surface. Water level at 7.0 feet below ground surface at coring completion with all tooling removed.
10	5	24	11	22	25	26	47		Moist dark gray gravelly (SAND-SILT-CLAY) with 20 to 40% mostly shale stone fragments, little sand and clay, stiff, massive soil structure, (ML-CL) tending toward (GC). 14.0 grades downward to	Cuttings Backfill	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 14.0 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 34.0 feet. Bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
	6	22	3	24	25	50/5	49				
	7	2	50/2								
15	Run		#1								
	Run		#2						See next sheet 19.8		
20											

Run Depth Length REC REC RQD WL
(ft) (ft) (ft) % % gal

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	14.0 to 19.0	5.0	5.0	100	18	0
2	19.0 to 24.0	5.0	5.0	100	38	75

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-G4-22 **Surface Elevation:** 758.9

Project Name: Proposed Site Development **Northing:** 1009853.35 **Easting:** 1091974.61

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/11/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/11/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#2						Dry to moist dark gray very gravelly (SILTY-SAND) with 30 to 50% mostly shale stone fragments, some silt, compact to dense, massive soil structure, (SM),(GM).		
									grades downward to		
									Moist to wet dark gray very gravelly (SAND-SILT-CLAY) with 40 to 60% mostly shale stone fragments, some sand, trace to little clay, hard, massive soil structure, (GM).		
									Dark gray shale stone fragments, very soft to soft.		
	Run		#3						Dark gray shale bedrock, soft, thinly laminated, intensely fractured horizontally along bedding planes with high angle fractures at 14.7 to 14.8, 15.1 to 15.2, 15.7 to 16.2, 16.6 to 16.8, 17.3 to 17.5, 17.9 to 18.1, 18.7 to 18.8, 19.0 to 19.1, and 19.3 to 19.8 feet, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-0.5').		
25											
	Run		#4						Dark gray to gray shale bedrock, soft, with a gray limestone nodule, moderately hard, from 26.5 to 27.2 feet, thinly laminated, moderately fractured horizontally along bedding planes with high angle fractures from 25.5 to 25.6, 31.5 to 31.6, 32.6 to 32.8, and 39.1 to 39.2 feet, dense, no iron staining, core breaks appear fresh, core lengths range from (0.12-1.3').		
30											
									Coring completed at 34 ft	34.0	
35										Cuttings Backfill 34.0	
40											

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
2	19.0 to 24.0	5.0	5.0	100	38	75
3	24.0 to 29.0	5.0	5.0	100	84	75
4	29.0 to 34.0	5.0	5.0	100	88	75

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

Moderately Hard: Cannot be peeled or scraped with knife. Can be distinctly scratched with a steel nail.

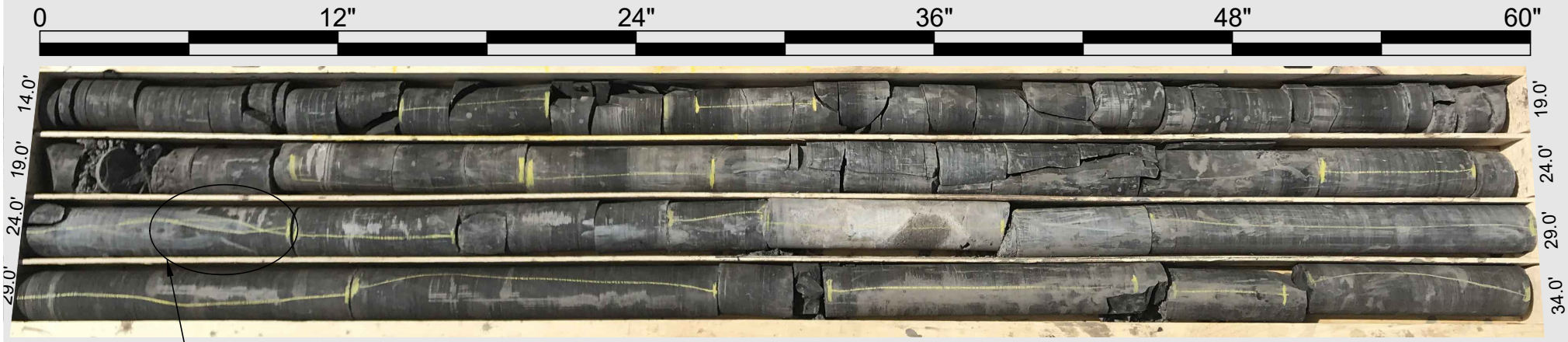
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-G4-22	1	4-11-22	14.0-19.0	5.0	5.0	100	18
BH-G4-22	2	4-11-22	19.0-24.0	5.0	5.0	100	38
BH-G4-22	3	4-11-22	24.0-29.0	5.0	5.0	100	84
BH-G4-22	4	4-11-22	29.0-34.0	5.0	5.0	100	88



Sample 22-109
Unconfined Compressive Strength: 1699.6 PSI

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EDI Job Code: 12K93e **Hole Number** BH-G6-22 **Surface Elevation:** 760.6

Project Name: Proposed Site Development **Northing:** 1009776 **Easting:** 1092367

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/18/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/18/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification
	1	22	8	10	6	9	16		Tar and chip surface. 0.1 Moist brownish gray very gravelly (SAND) fill with 40 to 60% gravel and flat sided shale stone fragments, trace silt and slag, compact, massive soil structure, (SM),(GM). 0.9
	2	22	7	9	9	9	18		1.8 Dry dark grayish brown gravelly (CLAYEY-SILT) fill with 10 to 25% mostly flat sided shale stone fragments, little clay, trace sand and wood fiber, very stiff, massive soil structure, (ML-CL).
5	3	22	5	13	20	20	33		Dry to moist dark gray to dark grayish brown gravelly (SAND-SILT-CLAY) fill with 20 to 40% mostly shale stone fragments, little sand, trace to little clay, trace slag, very stiff to hard, massive soil structure, (ML-CL).
	4	24	9	10	11	14	21		
	5	24	12	20	32	32	52		8.5 grades downward to Dry to moist dark gray very gravelly (SAND-SILT-CLAY) with 40 to 60% mostly shale stone fragments, little to some silt, trace to little clay, hard, massive soil structure, (SM),(GM).
10	6	22	17	30	32	50/5	62		11.5 grades downward to Dark gray shale stone fragments, very soft to soft.
	7	1	50/2						13.8
	Run		#1						Dark gray shale bedrock, soft, thinly laminated, intensely to moderately fractured horizontally along bedding planes, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-0.5').
15	Run		#2						
	Run		#3						
20									

Water Table and Remarks

Tar and chip surface to 0.1 feet over sandy soil fill with some gravel and shale stone fragments, trace silt and slag to 1.8 feet over silty soil fill with little to some shale stone fragments, little sand, trace to little clay, trace slag to 8.5 feet over sandy glacial till with some shale stone fragments, little to some silt, trace to little clay to 11.5 feet over apparent shale bedrock to 13.8 feet over shale bedrock to end of coring.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 13.8 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 28.8 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 25.0 feet in completed bore hole.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	13.8 to 15.9	2.1	1.9	90	17	0
2	15.9 to 19.0	3.1	3.1	100	68	0
3	19.0 to 23.8	4.8	4.8	100	67	35

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-G6-22 **Surface Elevation:** 760.6
Project Name: Proposed Site Development **Northing:** 1009776 **Easting:** 1092367
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/18/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification
	Run		#3						Dark gray shale bedrock, soft, thinly laminated, intensely to moderately fractured horizontally along bedding planes, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-0.5').
									21.3
									Dark gray shale bedrock, soft, thinly laminated, moderately to slightly fractured horizontally along bedding planes with high angle to near vertical fractures from 22.3 to 22.4, 25.1 to 25.2, 26.1 to 26.3, 26.6 to 26.7, 26.9 to 27.0, and 27.2 to 27.4 feet, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-1.25').
	Run		#4						
25									
30									
35									
40									

28.8

Coring completed at 28.8 ft

Run # | Depth (ft) | Length (ft) | REC (ft) | REC % | RQD % | WL gal

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
3	19.0 to 23.8	4.8	4.8	100	67	35
4	23.8 to 28.8	5.0	5.0	100	66	45

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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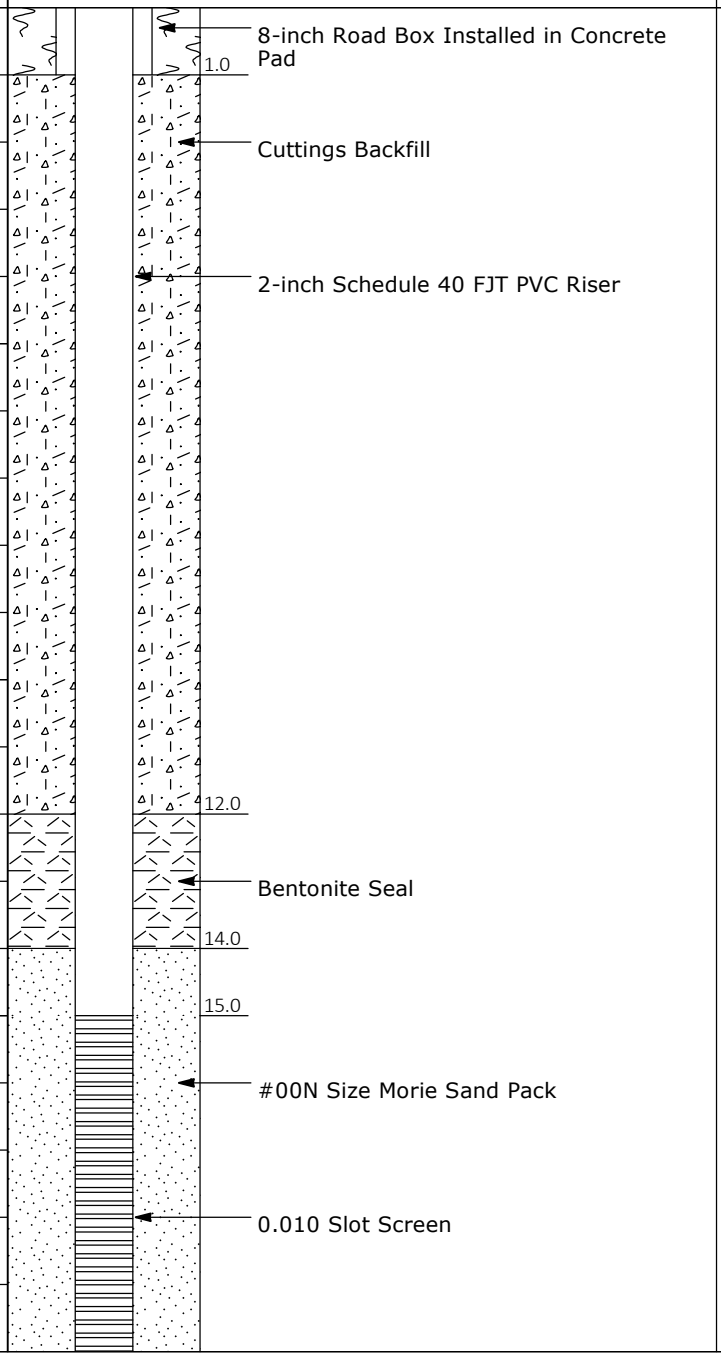
EDI Job Code: 12K93e **Hole Number** W-G6-22 **Surface Elevation:** 760.6
Project Name: Proposed Site Development **Northing:** 1009776 **Easting:** 1092367
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/18/2022

Depth (ft)	Well	Remarks



N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** W-G6-22 **Surface Elevation:** 760.6
Project Name: Proposed Site Development **Northing:** 1009776 **Easting:** 1092367
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/18/2022

Depth (ft)	Well	Remarks
25	#00N Size Morie Sand Pack 0.010 Slot Screen 25.0 25.5 Bentonite Seal 27.5 Rock Cuttings Backfill 28.8	
30		
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-G6-22	1	4-18-22	13.8-15.9	2.1	1.9	90	17
BH-G6-22	2	4-18-22	15.9-19.0	3.1	3.1	100	68
BH-G6-22	3	4-18-22	19.0-23.8	4.8	4.8	100	67
BH-G6-22	4	4-18-22	23.8-28.8	5.0	5.0	100	66

Sample 22-116
Unconfined Compressive Strength: 1814.9 PSI

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EDI Job Code: 12K93e **Hole Number** BH-H3-22 **Surface Elevation:** 756.5
Project Name: Proposed Site Development **Northing:** 1009637 **Easting:** 1091724
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/20/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/20/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	1	18	4	20	21	14	41		Moist brown (SANDY-SILT) topsoil fill with 3 to 7% gravel, some sand, trace to little organic matter, loose, massive soil structure, (ML). 0.5	Coarse silty topsoil fill with some sand, trace to little organic matter, trace gravel to 0.5 feet over sandy soil fill with little to some gravel and shale stone fragments, trace slag and organic matter to 2.0 feet over silty slackwater sediment with little to some clay, trace sand, organic matter, gravel, and shale stone fragments to 3.7 feet over silty slackwater sediment with little to some clay, trace to little sand and shale stone fragments to 6.0 feet over silty glacial till with some shale stone fragments, little sand, trace to little clay with occasional shale channer to 14.0 feet over apparent shale bedrock to 14.8 feet over shale bedrock to end of coring.
	2	22	3	5	5	9	10		Dry dark gray to brownish gray gravelly (SILTY-SAND) fill with 15 to 30% gravel and flat sided shale stone fragments, trace to little silt, trace slag and organic matter, dense, massive soil structure, (SM) tending toward (SM),(GM). 2.0 3.7 grades downward to	
5	3	20	6	8	8	13	16		Dry to moist dark gray (CLAYEY-SILT) with 0 to 5% gravel and flat sided shale stone fragments, little to some clay, trace sand and organic matter, firm, weakly thinly laminated with very thin coarse silt lenses, (ML-CL). 6.0 grades downward to	No water prior to taking sample number 8.
	4	20	14	17	24	36	41			Water level at 14.4 feet below ground surface prior to coring.
	5	22	14	22	22	21	44		Dry faintly mottled olive brown (SAND-SILT-CLAY) with 5 to 15% mostly flat sided shale stone fragments, little to some clay, trace to little sand, stiff to very stiff, weakly thinly laminated with very thin coarse silt lenses, (ML-CL).	
10	6	20	13	17	14	15	31		Dry dark gray very gravelly (SAND-SILT-CLAY) with 40 to 60% mostly flat sided shale stone fragments, occasional shale channer, little sand, trace to little clay, hard, massive soil structure, (GM),(GC).	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 14.8 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 24.2 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 19.0 feet in completed bore hole.
	7	24	8	13	17	19	30		14.0	
	8		50/5						Wet dark gray shale stone fragments, soft. 14.8	
15	Run	4	#1						Dark gray shale bedrock, soft, thinly laminated, intensely fractured horizontally along bedding planes with high angle to near vertical fractures from 14.8 to 16.4, 16.6 to 16.7, 17.0 to 17.1, 17.6 to 18.2, 18.5 to 18.7, and 18.9 to 19.2 feet, dense, no iron staining, core breaks appear fresh, core lengths range from (0.01-0.35').	
									19.2	
20	Run		#2						See next sheet	

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	14.8 to 19.2	4.4	4.4	100	18	30
2	19.2 to 24.2	5.0	5.0	100	94	30

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-H3-22 **Surface Elevation:** 756.5
Project Name: Proposed Site Development **Northing:** 1009637 **Easting:** 1091724
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/20/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/20/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, thinly to thickly laminated, slightly fractured horizontally along bedding planes, occasional thin pyrite deposits, dense, no iron staining, core breaks appear fresh, core lengths range from (0.05-1.5').	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 2 / 19.2 to 24.2 / 5.0 / 5.0 / 100 / 94 / 30
									24.2 Coring completed at 24.2 ft	EDI Bedrock Hardness Classification Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
25										
30										
35										
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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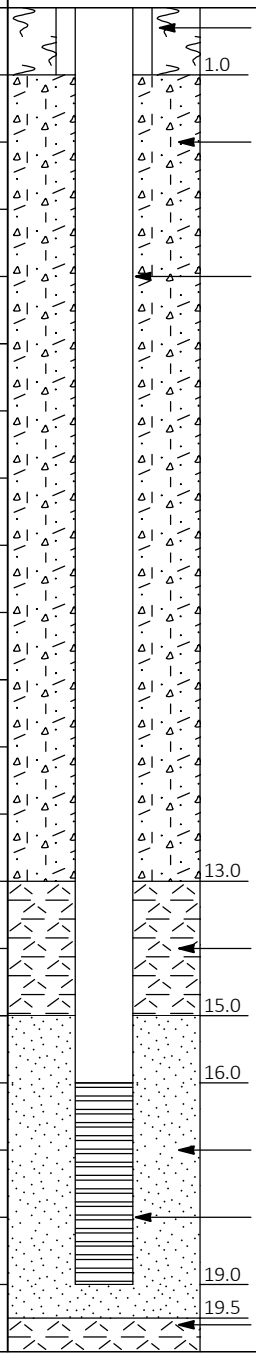
EDI Job Code: 12K93e **Hole Number** W-H3-22 **Surface Elevation:** 756.5
Project Name: Proposed Site Development **Northing:** 1009637 **Easting:** 1091724
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/20/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/20/2022

Depth (ft)	Well	Remarks
		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** W-H3-22 **Surface Elevation:** 756.5
Project Name: Proposed Site Development **Northing:** 1009637 **Easting:** 1091724
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/20/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/20/2022

Depth (ft)	Well	Remarks
	Bentonite Seal (21.5)	
	Rock Cuttings Backfill (24.2)	
25		
30		
35		
40		

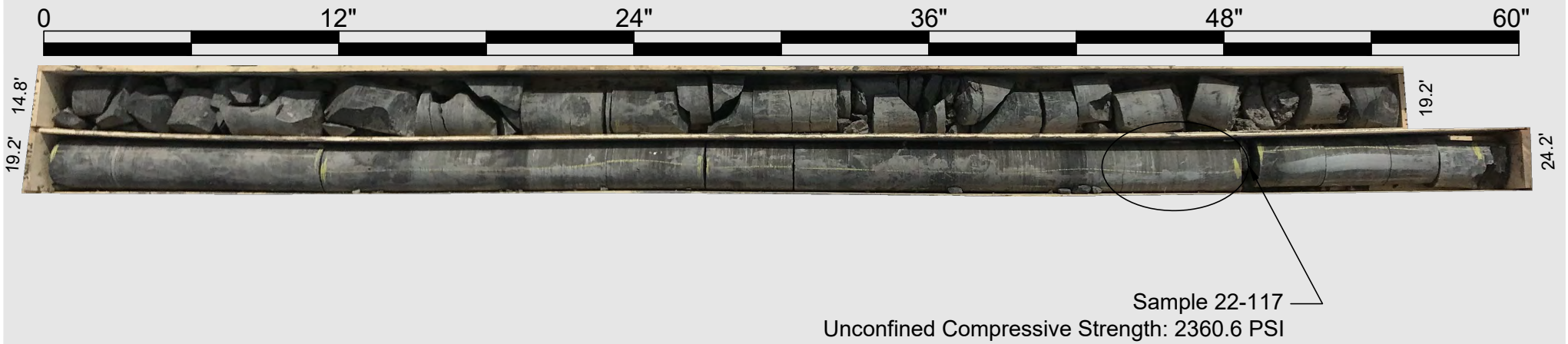
N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-H3-22	1	4-20-22	14.8-19.2	4.4	4.4	100	18
BH-H3-22	2	4-20-22	19.2-24.2	5.0	5.0	100	94



Sample 22-117
Unconfined Compressive Strength: 2360.6 PSI

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EDI Job Code: 12K93e **Hole Number** BH-H5(D)-22 **Surface Elevation:** 760.6

Project Name: Proposed Site Development **Northing:** 1009593 **Easting:** 1092127

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/15/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/15/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	22	4	4	8	12	12
	2	22	15	25	25	26	50
5	3	22	17	22	25	34	47
	4	17	22	42	50/5		
	5	9	48	50/3			
10	6	10	42	50/4			
	7	20	33	28	20	30	48
	8	4	50/4				
15	Run		#1				
	Run		#2				
20							

LITH

Description and Classification

- Fine size gravel fill. (0.2)
- Moist brownish gray very gravelly (SILTY-SAND) fill with 40 to 60% gravel, trace to little silt, trace clay, loose, massive soil structure, (SM),(GM). (0.4 – 1.8)
- Dry to moist dark gray to dark brown gravelly (SAND-SILT-CLAY) with 15 to 30% mostly shale stone fragments, little sand and clay, stiff to very stiff, massive soil structure, (ML-CL).
- Dry dark gray shale stone fragments, soft to very soft, with iron staining. (5.0)
- Wet dark gray shale stone fragments, soft, with occasional thin interbeds of (CLAYEY-SILT) saprolite soil.
- (15.8) Dark gray shale bedrock, soft, thinly laminated slightly fractured horizontally along bedding planes with high angle to near vertical fractures from 16.8 to 17.2, 18.1 to 18.4, 20.0 to 20.1, 20.4 to 20.6, 23.0 to 23.1, 25.9 to 27.2, and 32.5 to 32.8 feet, dense, no iron staining, core breaks appear fresh, occasional thin pyrite deposits, core lengths range from (0.02-3.6').

Water Table and Remarks

Gravel fill to 0.2 feet over mostly sand and gravel fill with trace to little silt, trace slag to 0.4 feet over silty glacial till with little to some shale stone fragments, little sand and clay to 1.8 feet over apparent shale bedrock with occasional saprolite soil interbeds to 15.8 feet over shale bedrock to end of coring.

Note: Started losing water to formation below 23.0 feet.

Water first encountered at 5.0 feet below ground surface.

Water level at 9.0 feet below ground surface at roller bit completion.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to 15.8 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 34.1 feet. Reamed core hole with a 3 7/8" tricone roller bit and installed a 2-inch PVC standpipe piezometer to 30.0 feet in completed bore hole.

Saprolite - soil derived from bedrock weathered in place

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	15.8 to 19.1	3.3	3.3	100	73	0
2	19.1 to 24.1	5.0	5.0	100	90	25

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** BH-H5(D)-22 **Surface Elevation:** 760.6
Project Name: Proposed Site Development **Northing:** 1009593 **Easting:** 1092127
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/15/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/15/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Water Table and Remarks
	Run		#2						Dark gray shale bedrock, soft, thinly laminated slightly fractured horizontally along bedding planes with high angle to near vertical fractures from 16.8 to 17.2, 18.1 to 18.4, 20.0 to 20.1, 20.4 to 20.6, 23.0 to 23.1, 25.9 to 27.2, and 32.5 to 32.8 feet, dense, no iron staining, core breaks appear fresh, occasional thin pyrite deposits, core lengths range from (0.02-3.6').	Run # / Depth (ft) / Length (ft) / REC (ft) / REC % / RQD % / WL gal 2 — 19.1 to 24.1 — 5.0 — 5.0 — 100 — 90 — 25 3 — 24.1 to 29.1 — 5.0 — 5.0 — 100 — 92 — 45 4 — 29.1 to 34.1 — 5.0 — 5.0 — 100 — 96 — 35 EDI Bedrock Hardness Classification Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation. Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.
25	Run		#3							
30	Run		#4							
									34.1	
35									Coring completed at 34.1 ft	
40										

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** W-H5(D)-22 **Surface Elevation:** 760.6
Project Name: Proposed Site Development **Northing:** 1009593 **Easting:** 1092127
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/15/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/15/2022

Depth (ft)	Well	Remarks
	8-inch Road Box Installed in Concrete Pad	
	1.0	
	Cuttings Backfill	
	2-inch Schedule 40 FJT PVC Riser	
5		
10		
15	15.0	
	Bentonite Seal	
	19.0	
	#00N Size Morie Sand Pack	
20	20.0	

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** W-H5(D)-22 **Surface Elevation:** 760.6
Project Name: Proposed Site Development **Northing:** 1009593 **Easting:** 1092127
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/15/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/15/2022

Depth (ft)	Well	Remarks
25	#00N Size Morie Sand Pack 0.010 Slot Screen	
30	30.0 30.5 Bentonite Seal 32.0 Rock Cuttings Backfill 34.1	
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

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EDI Job Code: 12K93e **Hole Number** W-H5(S)-22 **Surface Elevation:** 760.6
Project Name: Proposed Site Development **Northing:** 1009582.94 **Easting:** 1092193.3
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 4/18/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 4/18/2022

Depth (ft)	Well	Remarks
	8-inch Road Box Installed in Concrete Pad (1.0)	Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing without sampling to 15.5 feet. Installed a 2-inch Schedule 40 PVC standpipe piezometer in completed bore hole to 15.0 feet.
	Cuttings backfill	
	2-inch Schedule 40 FJT PVC Riser	
5	(6.0) Bentonite Seal (8.0)	
	#00N Size Morie Sand Pack	
10	(10.0) 0.010 Slot Screen	
15	(15.0) (15.5)	
20		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron, Kyle Shearing

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-H5-22	1	4-15-22	15.8-19.1	3.3	3.3	100	73
BH-H5-22	2	4-15-22	19.1-24.1	5.0	5.0	100	90
BH-H5-22	3	4-15-22	24.1-29.1	5.0	5.0	100	92
BH-H5-22	4	4-15-22	29.1-34.1	5.0	5.0	100	96

Sample 22-123
Unconfined Compressive Strength: 3126.4 PSI

Sample 22-124
Unconfined Compressive Strength: 4331.9 PSI

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EDI Job Code: 12K93e **Hole Number** BH-I3-22 **Surface Elevation:** 754

Project Name: Proposed Site Development **Northing:** 1009499.15 **Easting:** 1091701.37

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/17/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/17/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	18	5	17	20	4	37
	2	20	9	12	10	8	22
5	3	22	8	12	16	16	28
	4	24	11	15	19	20	34
	5	20	15	18	24	26	42
10	6	24	18	26	28	29	54
	7	24	14	27	25	25	52
	8	3	50/4				
15	9	4	50/4				
	Run		#1				
20							

Description and Classification	Depth (ft)
Tar and chip surface.	0.1
Moist brown, light gray, and gray mixed, gravelly (SILTY-SAND) fill with 20 to 40% gravel and slag, little silt, trace organic matter, dense, massive soil structure, (SM),(GM).	1.5
Moist to dry distinctly mottled brown (SILTY-CLAY) with 0 to 3% gravel, trace sand, stiff, blocky soil structure becoming thinly laminated below 2.0 feet, (CL).	2.7
clear transition to	4.0
Dry faintly mottled brownish gray gravelly (SAND-SILT-CLAY) with 20 to 40% gravel and flat sided shale stone fragments, little sand and clay, very stiff, massive soil structure, (SC),(GC).	6.0
grades downward to	
Dry to moist gray gravelly (SILTY-SAND) with 20 to 40% gravel, little silt, dense, massive soil structure, (SM),(GM).	10.0
clear transition to	12.0
Dry gray (SAND) with 5 to 10% gravel, trace silt, dense, weakly stratified, (SW).	
clear transition to	14.2
Dry gray gravelly (SAND) with 15 to 25% gravel and flat sided shale stone fragments, trace silt, very dense, massive soil structure, (SW).	
grades downward to	17.3
Moist gray gravelly (SANDY-SILT) with 30 to 50% mostly flat sided shale stone fragments, little sand, trace clay, dense and very dense, massive soil structure, (SM),(GM).	18.7
See next sheet	

Well: Cuttings Backfill (0.1 – 17.3); Bentoite Seal (17.3 – 18.7)

Water Table and Remarks

Tar and chip surface to 0.1 feet over sandy soil fill wtih some gravel and slag, little silt, trace organic matter to 1.5 feet over clayey slackwater sediment with trace sand and gravel to 2.7 feet over sandy glacial till with some gravel, little silt to 6.0 feet over water sorted and deposited sand with trace silt and gravel to 10.0 feet over sandy glacial till with little to some gravel and flat sided shale stone fragments, trace silt to 12.0 feet over shaley glacial till with some silt, little sand, trace clay to 14.2 feet over apparent shale bedrock to 17.3 feet over shale bedrock to end of coring.

Note: No water in bore hole prior to coring.

Note: Water level at 12.8 feet below ground surface at coring completion with tooling removed from core hole.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 17.3 feet. Removed drill rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 27.3 feet. Core hole was backfilled with bentonite and the remainder of the bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	17.3 to 22.3	5.0	5.0	100	33	40

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-I3-22 **Surface Elevation:** 754

Project Name: Proposed Site Development **Northing:** 1009499.15 **Easting:** 1091701.37

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/17/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/17/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	Run		#1						Gray shale stone fragments, very soft to soft.		
									Gray shale bedrock, soft, very intensely fractured.		
									Gray shale bedrock, soft with occasional thin beds of very soft rock, intensely fractured horizontally along bedding planes with occasional short high angle fractures, thinly laminated to medium bedding, no iron staining, core breaks appear fresh, dense, core pieces range from (0.025-0.450').	22.3	
	Run		#2						Gray shale bedrock, soft, moderately to slightly fractured horizontally along bedding planes to 23.75 feet, moderately fractured below, thickly laminated to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.25-1.4').	27.3	27.3
									Coring completed at 27.3 ft		
25											
30											
35											
40											

Bentonite Seal

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	17.3 to 22.3	5.0	5.0	100	33	40
2	22.3 to 27.3	5.0	5.0	100	88	175

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-I3-22	1	5-17-22	17.3-22.3	5.0	5.0	100	33
BH-I3-22	2	5-17-22	22.3-27.3	5.0	5.0	100	88

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EDI Job Code: 12K93e **Hole Number** BH-I4-22 **Surface Elevation:** 757.2

Project Name: Proposed Site Development **Northing:** 1009460.68 **Easting:** 1091897.64

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/17/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/17/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification	Well	Water Table and Remarks
	1	16	12	6	5	4	11		Tar and chip surface. 0.1 Dry light gray gravelly (SAND) fill with 30 to 50% gravel, trace silt, compact, single grain, (SW),(GW). 1.2		Tar and chip surface to 0.1 feet over mostly sand and gravel fill with trace silt to 1.2 feet over silty slackwater sediment with little clay, trace sand to 2.0 feet over clayey slackwater sediment with trace sand and gravel to 3.0 feet over silty glacial till with little to some gravel, little sand, trace to little clay to 4.0 feet over sandy glacial till with some gravel and flat sided shale stone fragments, little silt to 8.0 feet over coarse silty glacial till wtih some mostly flat sided shale stone fragments, little sand to 12.3 feet over apparent shale bedrock to spoon refusal.
	2	20	6	10	15	19	25		Dry distinctly mottled olive gray (CLAYEY-SILT) with little clay, trace sand, stiff, blocky soil structure, (ML-CL). 2.0 grades downward to 3.0		
5	3	24	8	15	14	19	29		Dry faintly mottled alternating layers of brownish gray and grayish brown (SILTY-CLAY) very stiff, thinly laminated with very thin coarse silt lenses, (CL). 4.0 clear transition to		
	4	22	7	11	14	13	25		Dry faintly mottled grayish brown to brownish gray gravelly (SAND-SILT-CLAY) with 15 to 25% gravel, little sand, trace to little clay, very stiff to hard, massive soil structure, (ML-CL). 8.0 grades downward to		Note: No water in bore hole prior to taking sample number 8. Note: Water level at 12.0 feet below ground surface at completion.
	5	19	16	20	19	22	39				
10	6	24	13	21	26	29	47		Dry grayish brown, gray below 4.8 feet, gravelly (SILTY-SAND) with 20 to 40% gravel and flat sided shale stone fragments, little silt, compact, massive soil structure, (SM). 12.3 grades downward to		Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to split spoon refusal at 14.8 feet. Bore hole was backfilled with cuttings and ground surface repaired to match surrounding conditions upon completion.
	7	3	50/5						Dry gray gravelly (SANDY-SILT) with 20 to 40% mostly flat sided shale stone fragments, little sand, dense, massive soil structure, (SM),(GM). 14.8	Cuttings Backfill 14.8	
15	8	10	36	50/4					Gray shale stone fragments, very soft to soft. Boring completed at 14.8 ft		
20											

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-I5-22 **Surface Elevation:** 761

Project Name: Proposed Site Development **Northing:** 1009421.95 **Easting:** 1092093.9

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/16/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/16/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N
	1	18	9	12	20	6	32
	2	21	12	10	9	12	19
5	3	24	14	7	11	9	18
	4	17	11	17	21	23	38
	5	11	19	50/5			
10	6	4	49	50/2			
	7	16	25	39	50/5		
15	8	20	39	41	47	50/4	88
	9	6	17	50/3			
	10	1	50/2				
20	Run		#1				

LITH

Description and Classification

Tar and chip surface. 0.1

Dry gray very gravelly (SILTY-SAND) fill with 40 to 60% mostly angular gravel, trace to little silt, dense, massive soil structure, (SM),(GM). 1.5

Dry to moist brown to dark brown (CLAYEY-SILT) with some clay, trace sand and organic matter, stiff, thinly laminated, (CL). 2.5

clear transition to

Moist faintly mottled brown gravelly (SILTY-SAND) with 15 to 25% gravel and flat sided shale stone fragments, little silt, compact, massive soil structure, (SM).

clear transition to 7.0

Moist to dry dark gray gravelly (SANDY-SILT) with 30 to 50% mostly flat sided shale stone fragments, little sand, dense, massive soil structure, (SM),(GM). 9.3

Gray shale stone fragments, very soft to soft (shale boulder). 11.0

Moist gray gravelly (SILTY-SAND) with 30 to 50% gravel and flat sided shale stone fragments, little silt, very dense with brittle consistence, massive soil structure, (SM),(GM). 16.6

Gray shale stone fragments, very soft and soft. 19.0

See next sheet

Water Table and Remarks

Tar and chip surface to 0.1 feet over mostly crushed stone fill with trace to little silt to 1.5 feet over clayey slackwater sediment with trace sand and organic matter to 2.5 feet over sandy glacial till with little to some gravel and shale stone fragments, little silt to 7.0 feet over shaley glacial till with little sand to 9.3 feet over shale boulder to 11.0 feet over shaley glacial till with little silt to 16.6 feet over apparent shale bedrock to 19.0 feet over shale bedrock to end of coring.

Note: No water in bore hole prior to taking sample number 10. Water level at 15.0 feet below ground surface.

Note: Started losing water to formation below 25.0 feet.

Note: Water at 14.5 feet below ground surface prior to coring.

Note: Advanced bore hole with 4 1/4" ID x 8" OD hollow stem auger casing with continuous split spoon sampling to auger refusal at 19.0 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to coring completion at 34.0 feet. Core hole was reamed with a 3 7/8" tricone roller bit and a 2-inch PVC standpipe piezometer to 28.0 feet in completed bore hole.

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	19.0 to 24.0	5.0	5.0	100	71	42

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** BH-I5-22 **Surface Elevation:** 761

Project Name: Proposed Site Development **Northing:** 1009421.95 **Easting:** 1092093.9

Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/16/2022

Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/16/2022

Depth (ft)	SN	Rec (in)	Blows on Sampler 0/6	6/12	12/18	18/24	N	LITH	Description and Classification
	Run		#1						Dark gray shale bedrock, soft, intensely to intensely to moderately fractured horizontally along bedding planes, high angle to near vertical fracture from 21.7 to 21.9 feet, very thin to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-0.7').
									22.9
									Dark gray shale bedrock, soft, moderately fractured horizontally along bedding planes with very intensely fractured zones from 25 to 25.2 and 27.35 to 27.5 feet, rock becomes slightly fractured below 29.0 feet, very thin to medium bedding, dense, no iron staining, core breaks appear fresh, core pieces range from (0.025-3.1').
25	Run		#2						
30	Run		#3						
									34.0
35									Coring completed at 34 ft
40									

Water Table and Remarks

Run #	Depth (ft)	Length (ft)	REC (ft)	REC %	RQD %	WL gal
1	19.0 to 24.0	5.0	5.0	100	71	42
2	24.0 to 29.0	5.0	4.9	98	79	50
3	29.0 to 34.0	5.0	5.0	100	95	50

EDI Bedrock Hardness Classification

Very Soft: Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.

Soft: Hand-held specimen crumbles under firm blows with point of geologic pick.

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

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EDI Job Code: 12K93e **Hole Number** W-I5-22 **Surface Elevation:** 761
Project Name: Proposed Site Development **Northing:** 1009421.95 **Easting:** 1092093.9
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/16/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/16/2022

Depth (ft)	Well	Remarks
0	8-inch Road Box Installed in Concrete Pad	
1.0	Cuttings Backfill	
	2-inch Schedule 40 FJT PVC Riser	
5		
10		
15		
18.0	Bentonite Seal	
20	20.0	

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

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EDI Job Code: 12K93e **Hole Number** W-I5-22 **Surface Elevation:** 761
Project Name: Proposed Site Development **Northing:** 1009421.95 **Easting:** 1092093.9
Project Location: Town of Orchard Park, Erie County, NY **Date Started:** 5/16/2022
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date Completed:** 5/16/2022

Depth (ft)	Well	Remarks
25	2-inch Schedule 40 FJT PVC Riser 21.0 #00N Size Morie Sand Pack 0.010 Slot Screen 28.0 28.5 Bentonite Seal	
30	30.5 Rock Cuttings Backfill 34.0	
35		
40		

N = Number of Blows to Drive 2" Spoon 12" with 140lb. Weight Falling 30" per Blow

Logged By: Brian Bartron

BUFFALO BILLS STADIUM

PROJECT NO. 22-011

BORE HOLE #	CORE RUN #	DATE	DEPTH (ft)	LENGTH (ft)	REC (ft)	REC. %	RQD. %
BH-I5-22	1	5-16-22	19.0-24.0	5.0	5.0	100	71
BH-I5-22	2	5-16-22	24.0-29.0	5.0	4.9	98	79
BH-I5-22	3	5-16-22	29.0-34.0	5.0	5.0	100	95

APPENDIX A-2

SUMMARY TABLE, TEST PIT LOGS, AND PHOTOGRAPHS

Table A-2
Test Pit Locations, Approximate Elevations, and Total Depths

Test Pit	Approximate Location	Approximate Ground Surface Elevation, ft	Total Depth, ft
TP-1-22	Near BH-F6-22	760.5	11.3
TP-2-22	Near BH-B4-22	767.3	12.0

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Buffalo, New York 14214
(716) 834-8932
www.mmce.net

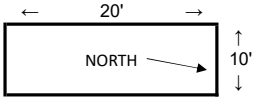
TEST PIT FIELD LOG

PROJECT	Buffalo Bills Stadium	APPROXIMATE GROUND ELEV.	760.5	DATE	6/15/2022
PROJECT NO.	22-011	LOCATION	NEAR BH-F6-22	TIME STARTED	7:00 AM
TEST PIT NO.	TP-1-22			TIME COMPLETED	8:30 AM
MMCEG REP.	JKW, RJS	CONTRACTOR	PINTO CONSTRUCTION SERVICES		
WEATHER	Sunny, 80-85°F	OPERATOR	George Panepinto		
		MAKE / MODEL	KOBELCO SK210 LC		
		BUCKET / MAX DEPTH	4 FEET WIDE / 22 FEET		

DEPTH (FT)	SYMBOL	SOIL DESCRIPTION	EXCAVATION EFFORT	REMARK	BOULDER COUNT / SIZE	DEPTH (FT)	ELEV. (FT)
0		Tar & chip surface (fill)	Easy				760.5
		Moist brownish gray gravelly sand with mostly gravel (fill)	Easy			0.2	
1		Dry gray flat sided shale stone fragments (fill)	Easy			0.6	759.5
						1.6	
2		Dry brownish gray clayey-silt, trace sand	Easy				758.5
3							757.5
4						4.0	756.5
5		Dry to moist, dark gray sand-silt-clay with 40-60% flat sided shale stone fragments (shaley glacial till)	Easy	(1)			755.5
6							754.5
7							753.5
8				(2)			752.5
9							751.5
10		Wet, dark gray shale stone fragments, soft (weathered rock)	Easy to Moderate			10.0	750.5
11		Wet, dark gray shale, soft, very intensely fractured, thinly laminated (competent rock)	Difficult	(3) (4)		10.7 11.3	749.5
12							748.5
13							747.5
14							746.5
15							745.5
16							744.5
17							743.5
18							742.5
19							741.5
20							740.5
21							739.5
22							738.5
23							737.5

Remarks:
(1) Material transitioned from dry to moist at approximately 6.0 feet.
(2) Water infiltrated through the side wall of the excavation at a depth of approximately 8.5 feet.
(3) Excavation effort increased at the transition between weathered and competent rock.
(4) Test pit completed at a depth of 11.3 feet due to difficulty of excavation.

Test Pit Plan



Proportions (Per ASTM D2488):

Trace: <5%
Few: 5-10%
Little: 15-25%
Some: 30-45%
Mostly: 50-100%

Notes:
Weathered bedrock encountered at approximately 10.0 feet.
Water encountered at approximately 8.5 feet.

TEST PIT TP-1-22. Bottom of test pit at 11.3 feet deep. Transition from overburden to weathered rock at approximately 10.0 feet, and transition to competent rock at approximately 10.7 feet.

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TEST PIT FIELD LOG

PROJECT	Buffalo Bills Stadium	APPROXIMATE GROUND ELEV.	767.3	DATE	6/15/2022
PROJECT NO.	22-011	LOCATION	NEAR BH-B4-22	TIME STARTED	10:15 AM
TEST PIT NO.	TP-2-22			TIME COMPLETED	12:00 PM
MMCEG REP.	JKW, RJS	CONTRACTOR	PINTO CONSTRUCTION SERVICES		
WEATHER	Sunny, 80-85°F	OPERATOR	George Panepinto		
		MAKE / MODEL	KOBELCO SK210 LC		
		BUCKET / MAX DEPTH	4 FEET WIDE / 22 FEET		

DEPTH (FT)	SYMBOL	SOIL DESCRIPTION	EXCAVATION EFFORT	REMARK	BOULDER COUNT / SIZE	DEPTH (FT)	ELEV. (FT)
0		Tar & chip surface	Easy				767.3
		Moist light gray silty sand with some gravel	Easy			0.2	
1		Moist, brownish gray shale stone fragments, soft, iron staining (weathered rock)	Easy	(1)		0.8	766.3
2						1.6	765.3
3							764.3
4							763.3
5		Dry, dark gray shale stone fragments, soft, iron staining (weathered rock)	Easy		6-12 boulders, approximately 1-2 feet in diameter		762.3
6							761.3
7							760.3
8							759.3
9				(2)			758.3
10		Wet, dark gray shale, soft, very intensely to intensely fractured, thinly laminated	Easy to Moderate	(3)		9.2	757.3
11							756.3
12			Difficult	(4)		11.2 12.0	755.3
13							754.3
14							753.3
15							752.3
16							751.3
17							750.3
18							749.3
19							748.3
20							747.3
21							746.3
22							745.3
23							744.3

Remarks:

(1) Two predominant, near-vertical joint sets were observed throughout the bedrock, oriented approximately northeast to southwest and northwest to southeast. Joints were spread approximately 6-12 inches apart. Additional random joints were also observed.

(2) Excavation effort increased at the transition between weathered and competent rock.

(3) Water infiltrated through the side wall of the excavation at a depth of approximately 10.0 feet.

(4) Excavation effort increased at a depth of approximately 11.2 feet. Test pit completed at a depth of 12.0 feet due to difficulty of excavation.

Test Pit Plan

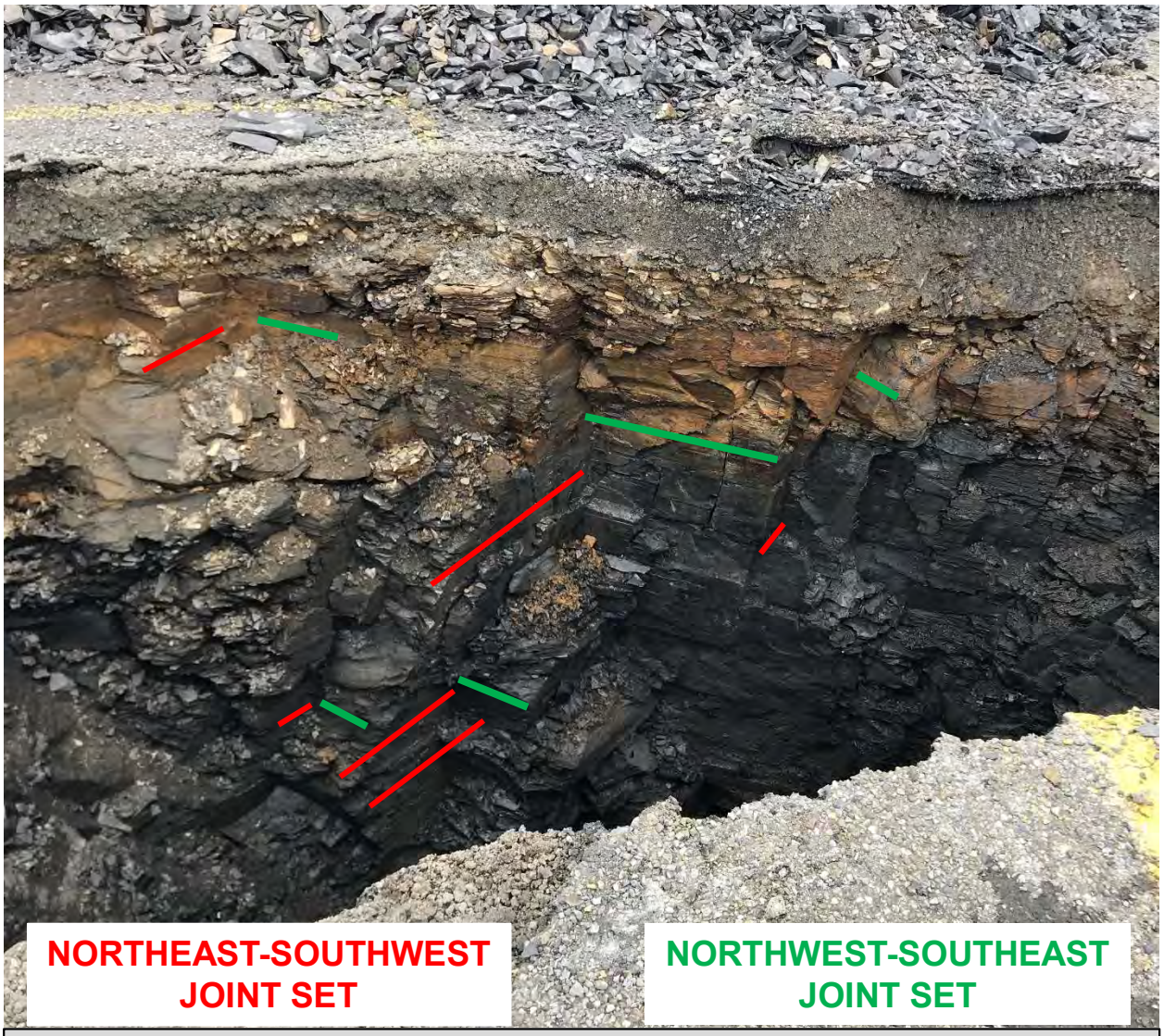
Proportions (Per ASTM D2488):

Trace: <5%
Few: 5-10%
Little: 15-25%
Some: 30-45%
Mostly: 50-100%

Notes:

Weatherd bedrock encountered at approximately 0.8 feet.
Water encountered at approximately 10.0 feet.

TEST PIT TP-2-22. Test pit excavated to a depth of approximately 10.0 feet. Weathered rock transitions to competent rock at approximately 9.2 feet.



TEST PIT TP-2-22. Two predominant, near-vertical joint sets observed. Standing on the south side of the test pit looking north. Example joint orientations are marked in red and green.

TEST PIT TP-2-22. Water began infiltrating the excavation at a depth of approximately 10.0 feet.

TEST PIT TP-2-22. Excavated weathered rock with excavator (Kobelco SK210 LC) for scale.

APPENDIX A-3

HYDRAULIC CONDUCTIVITY ESTIMATES SUMMARY TABLE

Table A-3
Hydraulic Conductivity Estimates

Well Designation	Ground Surface Elevation, ft	Test Elevation, ft[1]		Hydraulic Conductivity, K (cm/s)
W-A4-22	770.7	755.7	743.2	3.5E-03
W-A6-22	769.5	754.5	743	6.9E-04
W-B3-22	764.0	753.5	744.5	6.4E-04
W-B6-22	766.0	754.5	747	9.0E-04
W-C3-22	762.6	754.6	744.1	4.2E-03
W-C5-22	762.5	742	727.5	9.3E-04
W-C7-22	761.6	749.6	740.1	1.7E-03
W-D2-22	759.8	749.8	741.3	8.6E-04
W-D4-22	760.3	748.3	742.3	2.6E-03
W-D6-22	760.3	749.3	742.3	2.1E-04
W-E3-22	759.8	742.3	733.3	1.1E-04
W-F5-22	758.0	746	739.5	2.4E-03
W-F7-22	761.6	749.1	740.6	1.5E-03
W-G6-22	760.6	746.6	735.1	1.7E-03
W-H3-22	756.5	741.5	737	2.2E-03
W-H5(D)-22	760.6	741.6	730.1	1.5E-03
W-H5(S)-22	760.6	752.6	745.1	4.2E-04
W-I5-22	761.0	741	732.5	1.2E-03

Table Note:

1. The elevation limits of the saturated interval of screened zone, including the sand pack, is shown for slug test intervals.

APPENDIX B

SUMMARY OF GEOTECHNICAL TESTS AND RESULTS
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

APPENDIX B

SUMMARY OF GEOTECHNICAL TESTS AND RESULTS
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

Geotechnical tests were completed on selected soil and rock samples collected during the subsurface exploration program. Samples were collected and tested to provide information necessary to confirm field soil classifications and for estimating the properties of the different soil and rock layers present in the subsurface.

Soil classification tests include moisture content, grain size distribution, and Atterberg limits. Unconfined compressive strength (UCS) testing was completed to estimate the strength of selected rock samples. A summary of test procedures and the test data is shown below.

I. MOISTURE CONTENT

Soil moisture content is defined as the amount of water which is contained in the voids of the soil.

3rd Rock, LLC (3rd Rock) measured the moisture content on selected soil samples. The tests were completed in general accordance with ASTM D 2216. The moisture content test results are included in Appendix B-1 and are summarized in Table B-1.

II. SIEVE AND HYDROMETER ANALYSIS

3rd Rock measured the grain size distribution of selected soil samples. The testing was completed in general accordance with ASTM D 422. The sieve analysis and hydrometer analysis results are included in Appendix B-1. The results are summarized in Table B-1.

III. ATTERBERG LIMITS

Atterberg limits are used to characterize the consistency characteristics of cohesive soils and for soil identification and classification purposes.

3rd Rock measured the Atterberg limits of selected soil samples. The testing was completed in general accordance with ASTM D 4318. The results are included in Appendix B-1 and are summarized in Table B-1.

IV. UNCONFINED COMPRESSION STRENGTH

3rd Rock measured the unconfined compressive strength of selected rock samples in general accordance with ASTM D 7012. The unconfined compression strength test results are included in Appendix B-2. The results are summarized in Table B-2.

APPENDIX B-1

SOIL LABORATORY TESTING RESULTS

Table B-1
Soil Testing Results Summary Table

Boring Designation[2]	Sample Depth (ft)	Moisture Content (%)[1]	Percent Passing No. 200 Sieve	Atterberg Limits			USCS Symbol
				LL (%)	PL (%)	PI (%)	
BH-A4-22	2-4	11.6	10.3	-	-	-	-
BH-A6-22	2-6	4.4	2.1	-	-	-	GW
BH-A6-22	6-10	6.1	6.0	-	-	-	-
BH-B3-22	4-8	6.5	11.3	-	-	-	-
BH-B4-22	4-8	1.8	7.3	-	-	-	-
BH-B5-22	6-8	2.6	7.7	-	-	-	-
BH-B6-22	4-8	4.0	15.6	-	-	-	-
BH-C2-22	6-8.2	5.5	5.5	-	-	-	-
BH-C3-22	2-6	8.5	18.5	-	-	-	-
BH-C4-22	4-8	7.4	20.0	-	-	-	-
BH-C5-22	4-6	15.3	41.1	22	14	8	SC
BH-C5-22	10-12.3	4.8	11.8	-	-	-	-
BH-C6-22	10-10.8	9.9	23.0	-	-	-	-
BH-C7-22	6-8	10.5	45.8	25	16	9	SC
BH-D2-22	4-6	7.2	26.0	-	-	-	-
BH-D3-22	6-10	5.8	26.9	-	-	-	-
BH-D4-22	8-12	6.0	12.8	-	-	-	-
BH-D5-22	6-10	7.9	28.1	-	-	-	-
BH-D6-22	8.8-10.8	6.7	6.8	-	-	-	-
BH-D7-22	4-8	13.0	24.5	29	22	7	SC-SM
BH-E2-22	2-6	7.1	17.7	-	-	-	-
BH-E3-22	6-8	3.4	17.4	-	-	-	-
BH-E4-22	6-10	9.9	13.4	-	-	-	-
BH-E5-22	4-6	23.8	90.9	45	22	23	CL
BH-E6-22	6-10	10.5	29.9	-	-	-	-
BH-E7-22	6-8	-	13.3	-	-	-	-
BH-F3-22	6-10	6.9	24.4	-	-	-	-
BH-F4-22	4-6	14.6	63.7	36	19	17	CL
BH-F4-22	6-8	16.9	64.3	30	19	11	CL
BH-F4-22	9-12	8.3	13.4	-	-	-	-
BH-F5-22	0-2	12.6	-	-	-	-	-
BH-F5-22	2-4	17.2	-	-	-	-	-
BH-F5-22	4-5	15.2	51.6	30	18	12	CL
BH-F5-22	5-6	14.1	-	-	-	-	-
BH-F5-22	6-8	9.3	17.8	-	-	-	-
BH-F5-22	8-10	8.0	-	-	-	-	-
BH-F5-22	10-12	8.4	-	-	-	-	-

Boring Designation[2]	Sample Depth (ft)	Moisture Content (%)[1]	Percent Passing No. 200 Sieve	Atterberg Limits			USCS Symbol
				LL (%)	PL (%)	PI (%)	
BH-F5-22	12-12.3	11.8	-	-	-	-	-
BH-F6-22	6-10	8.7	13.1	-	-	-	-
BH-F7-22	8-12	6.5	15.0	-	-	-	-
BH-G3-22	4-6	25.6	76.7	42	26	16	CL
BH-G3-22	6-10	10.5	20.1	-	-	-	-
BH-G4-22	6-10	8.1	19.2	-	-	-	-
BH-G6-22	2-6	11.4	33.8	-	-	-	-
BH-G6-22	8-12	8.5	20.3	-	-	-	-
BH-H3-22	2-6	20.5	79.5	44	27	17	ML
BH-H3-22	10-14	7.6	25.3	-	-	-	-
BH-H5-22	0-2	17.9	54.5	42	25	17	CL
BH-H5-22	2-4	8.3	-	-	-	-	-
BH-H5-22	4-6	7.8	-	-	-	-	-
BH-H5-22	6-8	9.9	11.3	-	-	-	-
BH-H5-22	8-10	8.0	11.3	-	-	-	-
BH-H5-22	10-12	7.8	-	-	-	-	-
BH-H5-22	12-14	8.4	13.8	-	-	-	-
BH-H5-22	14-14.3	11.2	13.8	-	-	-	-
BH-I3-22	4-8	7.2	35.1	-	-	-	-
BH-I3-22	8-10	7.2	35.1	-	-	-	-
BH-I3-22	10-12	6.0	30.9	-	-	-	-
BH-I4-22	0-2	18.6	-	-	-	-	-
BH-I4-22	2-4	17.8	-	-	-	-	-
BH-I4-22	4-6	11.6	-	-	-	-	-
BH-I4-22	6-8	8.5	-	-	-	-	-
BH-I4-22	8-10	5.5	31.9	-	-	-	-
BH-I4-22	10-12	7.8	31.9	-	-	-	-
BH-I4-22	12-14	6.7	-	-	-	-	-
BH-I4-22	14-14.8	9.0	-	-	-	-	-
BH-I5-22	12-16	4.7	38.5	-	-	-	-

Notes: 1. Moisture content data are included on “Water Content Test Results,” if not included on Grain Size and/or Atterberg Limit Reports.
2. Highlighted borings indicate outstanding laboratory data.

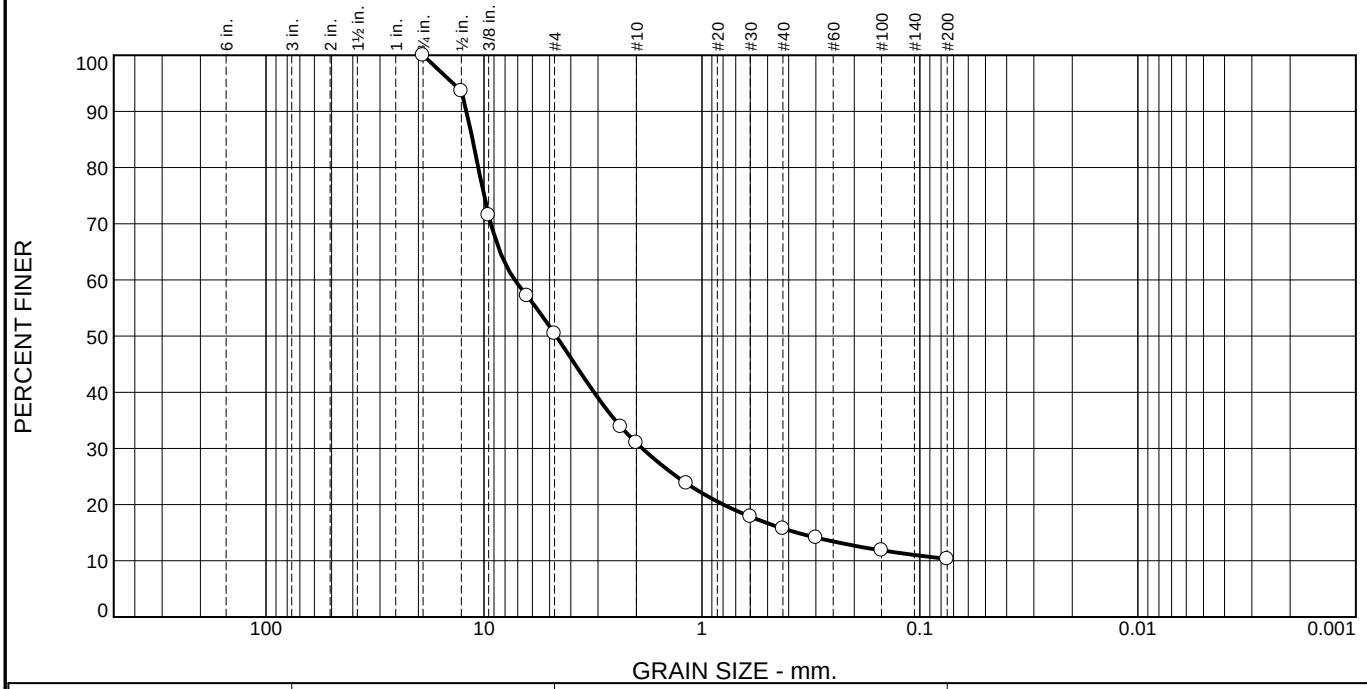
Water Content Test Results by ASTM D2216

Project: Buffalo Bills Stadium, Orchard Park, NY **Project No:** 22-023
Client: McMahon & Mann Consulting Engineering & Geology, P.C. **Date:** 06/23/22

Borehole No.	Sample Nos.	Lab ID No.	Natural Water Content, %
BH-H5	S-2	22-207	8.3
	S-3	22-208	7.8
	S-4	22-209	9.9
	S-5	22-210	8.0
	S-6	22-211	7.8
	S-7	22-212	8.4
	S-8	22-213	11.2
BH-F5	S-1	22-214	12.6
	S-2	22-215	17.2
	S-3B	22-216	14.1
	S-5	22-217	8.0
	S-6	22-218	8.4
	S-7	22-219	11.8
BH-I4	S-1	22-220	18.6
	S-2	22-221	17.8
	S-3	22-222	11.6
	S-4	22-223	8.5
	S-5	22-224	5.5
	S-6	22-225	7.8
	S-7	22-226	6.7
	S-8	22-227	9.0

3rd Rock, LLC
580 Olean Road
East Aurora, NY 14052
(716)655-4933
(716)655-8638 fax

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	49.5	19.5	15.3	5.4	10.3	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	93.6		
.375	71.5		
.25	57.2		
#4	50.5		
#8	33.9		
#10	31.0		
#16	23.8		
#30	17.9		
#40	15.7		
#50	14.1		
#100	11.9		
#200	10.3		

* (no specification provided)

Material Description

ID#22-233

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 12.0227 D_{85}= 11.2775 D_{60}= 7.2304
D_{50}= 4.6632 D_{30}= 1.8753 D_{15}= 0.3661
D_{10}= C_u= C_c=

Remarks

Water Content: 11.6%
F.M.=4.76

Date Received: 5/25/22 **Date Tested:** 6/16/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 2-4' **Date Sampled:**
Sample Number: A4, S2

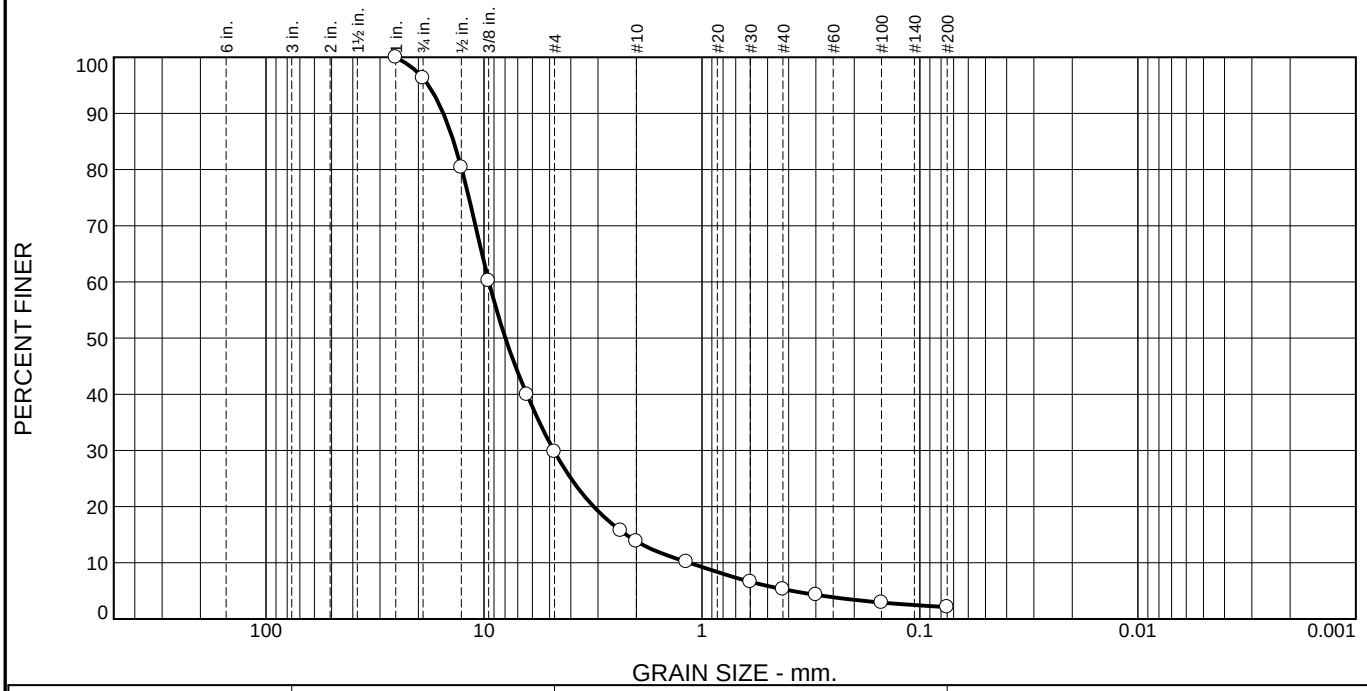
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.7	66.5	16.0	8.5	3.2	2.1	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	96.3		
.5	80.4		
.375	60.2		
.25	40.0		
#4	29.8		
#8	15.7		
#10	13.8		
#16	10.2		
#30	6.6		
#40	5.3		
#50	4.3		
#100	2.9		
#200	2.1		

* (no specification provided)

Material Description

ID#22-234

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= GW **AASHTO (M 145)=**

Coefficients

D_{90}= 15.3623 D_{85}= 13.7697 D_{60}= 9.4971
D_{50}= 7.9833 D_{30}= 4.7864 D_{15}= 2.2263
D_{10}= 1.1429 C_u= 8.31 C_c= 2.11

Remarks

Water Content: 4.4%
Not enough material for a hydrometer test.
F.M.=5.74

Date Received: 5/25/22 **Date Tested:** 6/8/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 2-6' **Date Sampled:**
Sample Number: A6, S2,3

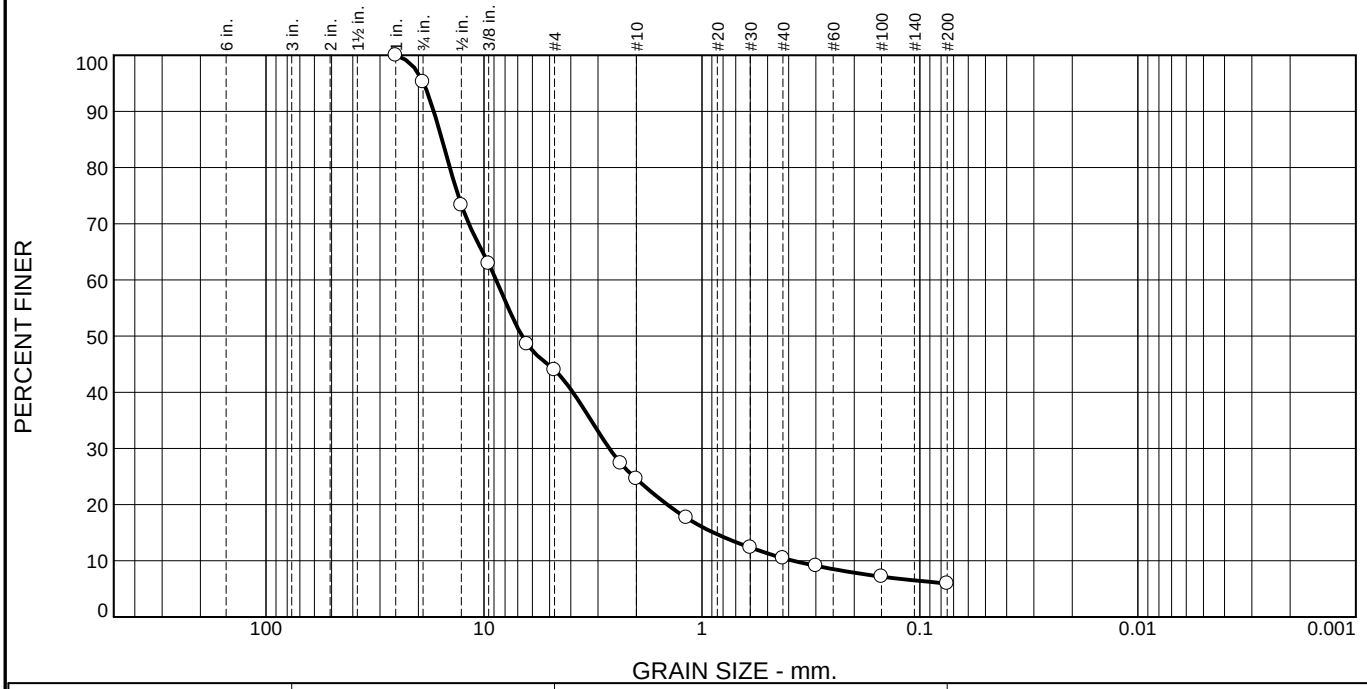
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.7	51.3	19.4	14.1	4.5	6.0	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	95.3		
.5	73.3		
.375	62.9		
.25	48.6		
#4	44.0		
#8	27.4		
#10	24.6		
#16	17.7		
#30	12.4		
#40	10.5		
#50	9.1		
#100	7.2		
#200	6.0		

* (no specification provided)

Material Description

ID#22-235

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 16.9976 D_{85}= 15.5857 D_{60}= 8.8008
D_{50}= 6.6901 D_{30}= 2.6603 D_{15}= 0.8838
D_{10}= 0.3810 C_u= 23.10 C_c= 2.11

Remarks

Water Content: 6.1%
F.M.=5.24

Date Received: 5/25/22 **Date Tested:** 6/8/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-10' **Date Sampled:**
Sample Number: A6, S4,5

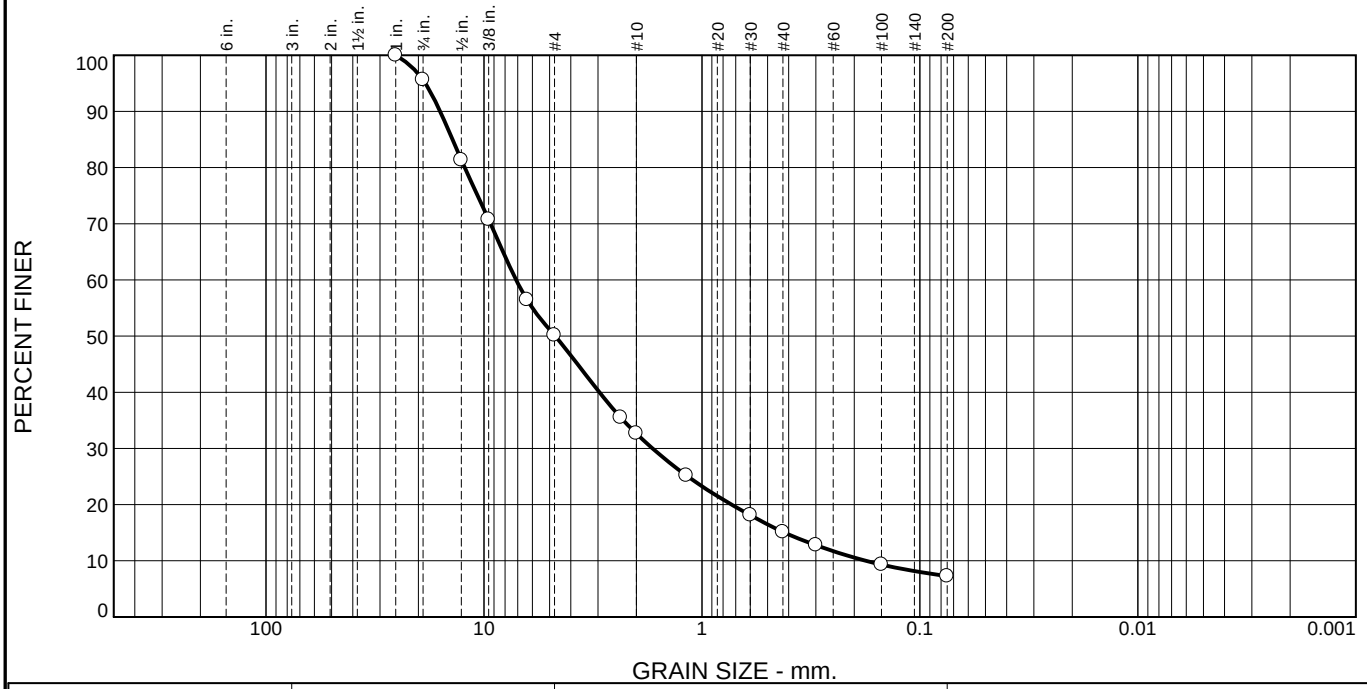
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.4	45.5	17.4	17.6	7.8	7.3	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75"	95.6		
.5	81.4		
.375	70.8		
.25	56.5		
#4	50.1		
#8	35.5		
#10	32.7		
#16	25.2		
#30	18.1		
#40	15.1		
#50	12.8		
#100	9.3		
#200	7.3		

* (no specification provided)

Material Description

ID#22-261

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 15.8927 D_{85}= 13.9432 D_{60}= 7.1204
D_{50}= 4.7148 D_{30}= 1.6844 D_{15}= 0.4178
D_{10}= 0.1771 C_u= 40.21 C_c= 2.25

Remarks

Water Content: 1.8%
F.M.=4.83

Date Received: 5/25/22 **Date Tested:** 6/8/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 4-8' **Date Sampled:**
Sample Number: B4, S3,4

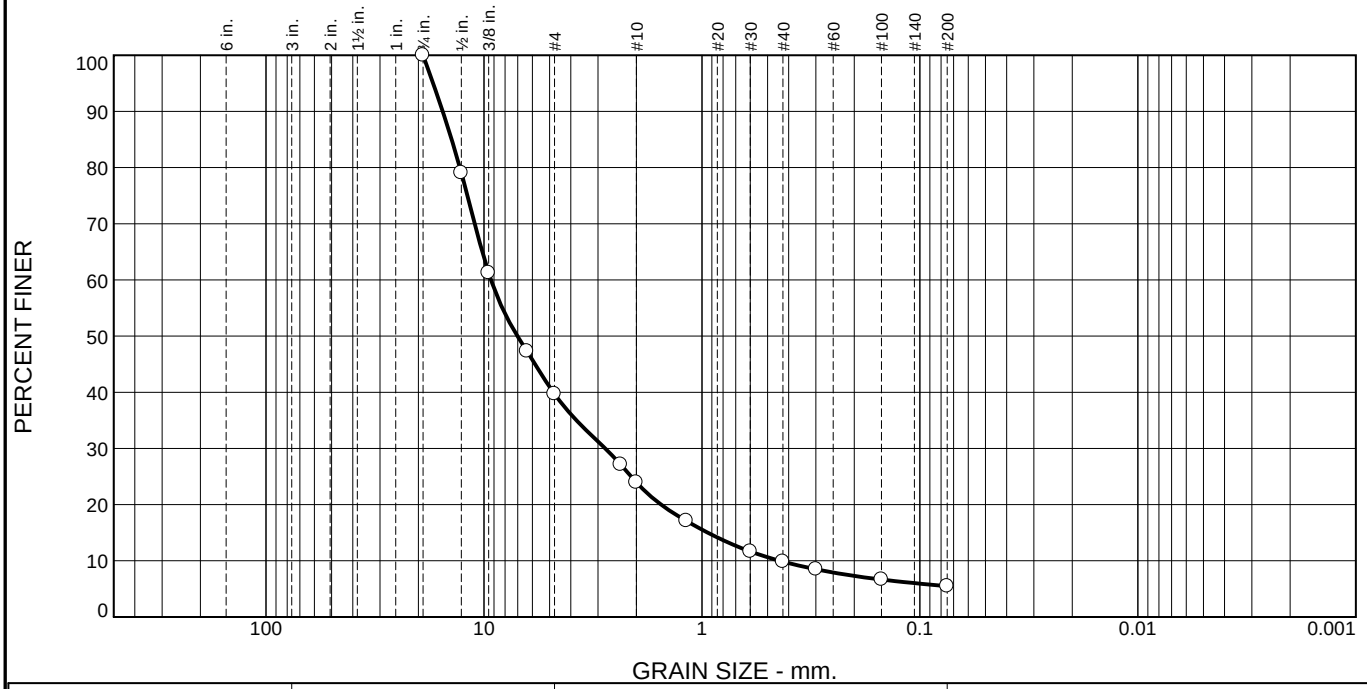
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	60.3	15.7	14.1	4.4	5.5	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	79.1		
.375	61.3		
.25	47.3		
#4	39.7		
#8	27.1		
#10	24.0		
#16	17.1		
#30	11.7		
#40	9.9		
#50	8.5		
#100	6.7		
#200	5.5		

* (no specification provided)

Material Description

ID#22-247

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 15.4665 D_{85}= 14.0652 D_{60}= 9.2891
D_{50}= 7.0216 D_{30}= 2.7801 D_{15}= 0.9402
D_{10}= 0.4387 C_u= 21.17 C_c= 1.90

Remarks

Water Content: 5.5%
F.M.=5.28

Date Received: 5/25/22 **Date Tested:** 6/9/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-8.2' **Date Sampled:**
Sample Number: C2, S4,5

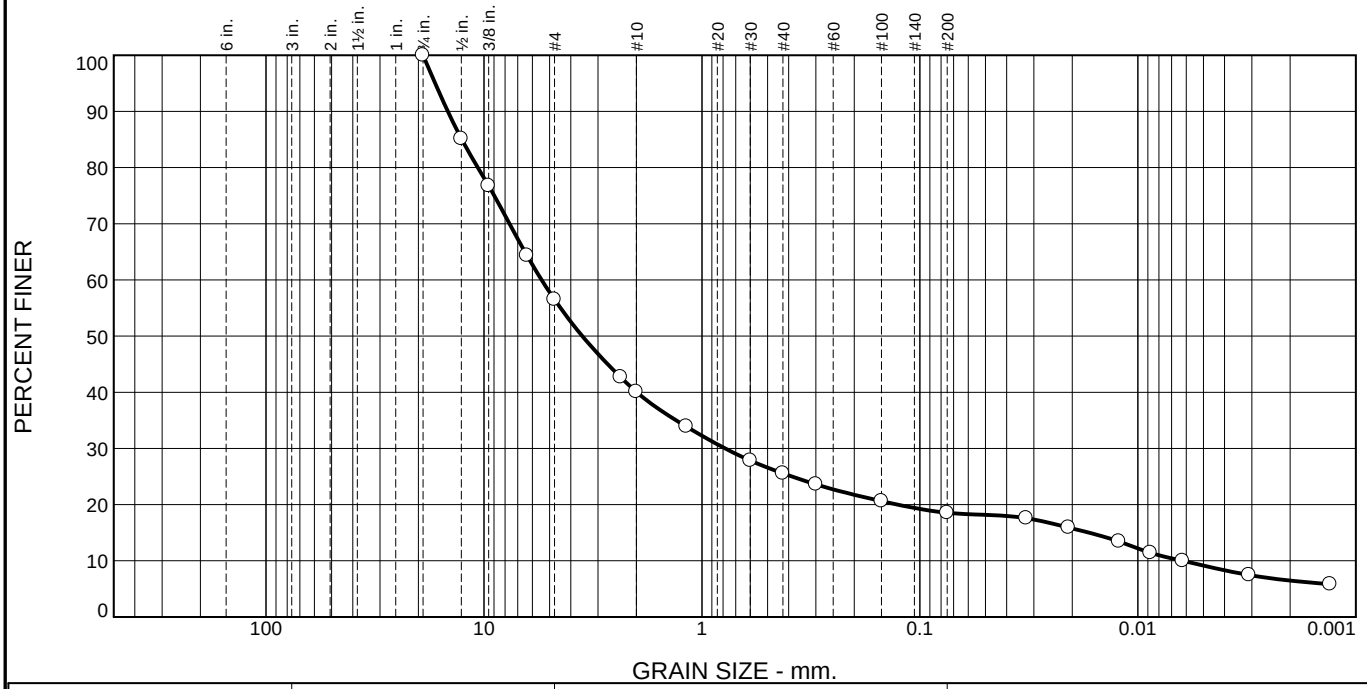
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	43.5	16.4	14.5	7.1	9.3	9.2

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	85.1		
.375	76.8		
.25	64.3		
#4	56.5		
#8	42.7		
#10	40.1		
#16	33.9		
#30	27.8		
#40	25.6		
#50	23.6		
#100	20.6		
#200	18.5		
0.0325 mm.	17.6		
0.0208 mm.	15.9		
0.0122 mm.	13.4		
0.0088 mm.	11.4		
0.0062 mm.	10.0		
0.0031 mm.	7.5		
0.0013 mm.	5.8		

* (no specification provided)

Material Description

ID#22-248

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 14.6516 D_{85}= 12.6448 D_{60}= 5.4402
D_{50}= 3.5385 D_{30}= 0.7832 D_{15}= 0.0167
D_{10}= 0.0062 C_u= 871.53 C_c= 18.06

Remarks

Water Content: 8.5%
F.M.=4.18

Date Received: 5/25/22 **Date Tested:** 6/10/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 2-6' **Date Sampled:**
Sample Number: C3, S2,3

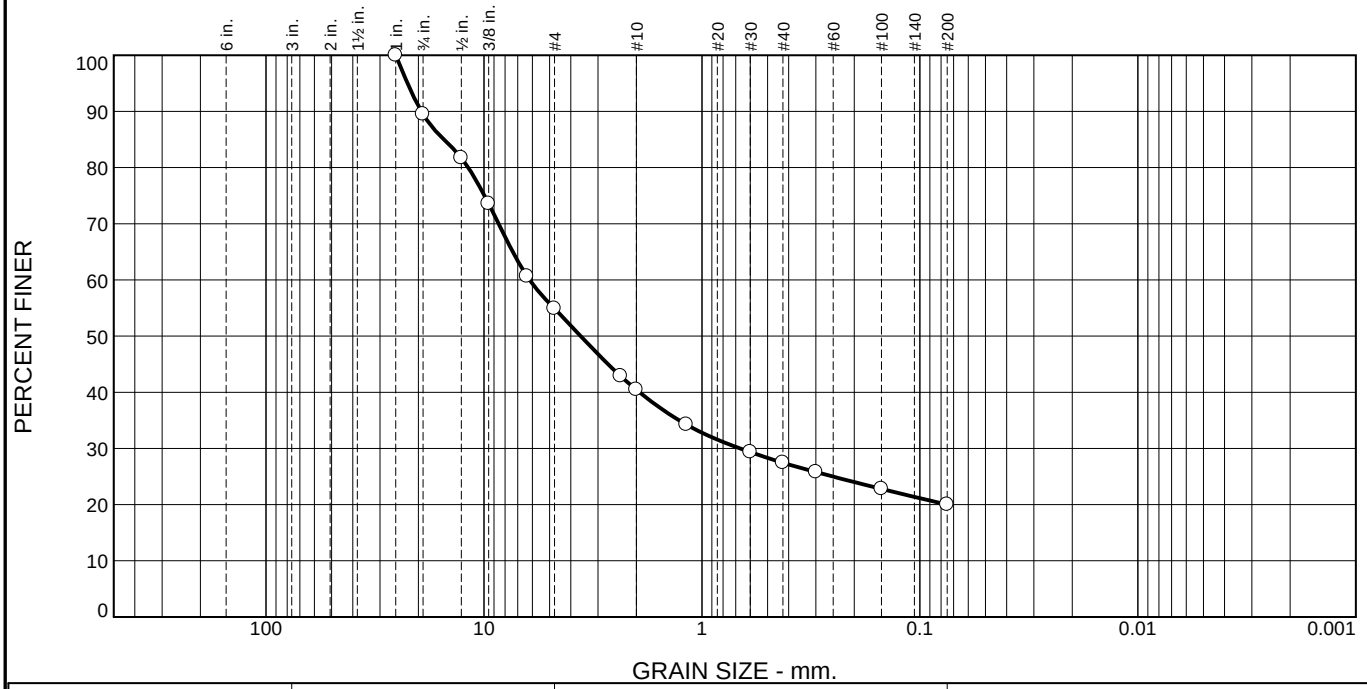
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.5	34.6	14.4	13.1	7.4	20.0	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	89.5		
.5	81.7		
.375	73.6		
.25	60.7		
#4	54.9		
#8	42.9		
#10	40.5		
#16	34.3		
#30	29.3		
#40	27.4		
#50	25.8		
#100	22.8		
#200	20.0		

* (no specification provided)

Material Description

ID#22-258

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 19.3896 D_{85}= 15.2711 D_{60}= 6.1807
D_{50}= 3.6000 D_{30}= 0.6692 D_{15}=
D_{10}= C_u= C_c=

Remarks

Water Content: 7.4%
F.M.=4.27

Date Received: 5/25/22 **Date Tested:** 6/23/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 4-8' **Date Sampled:**
Sample Number: C4, S3,4

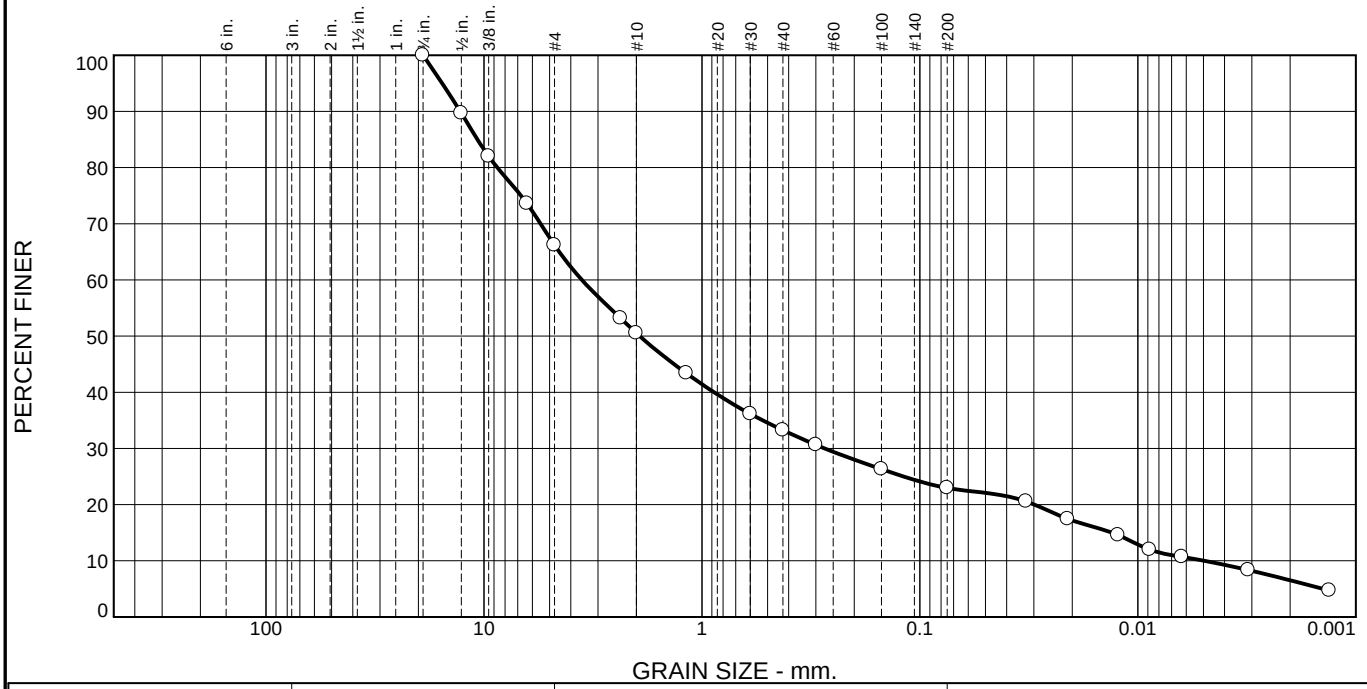
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	33.8	15.7	17.2	10.3	13.0	10.0

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	89.7		
.375	82.0		
.25	73.6		
#4	66.2		
#8	53.2		
#10	50.5		
#16	43.4		
#30	36.1		
#40	33.3		
#50	30.6		
#100	26.3		
#200	23.0		
0.0326 mm.	20.6		
0.0210 mm.	17.5		
0.0123 mm.	14.6		
0.0088 mm.	12.0		
0.0063 mm.	10.7		
0.0031 mm.	8.3		
0.0013 mm.	4.7		

* (no specification provided)

Material Description

ID#22-251

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 12.8454 D_{85}= 10.7146 D_{60}= 3.5550
D_{50}= 1.9293 D_{30}= 0.2735 D_{15}= 0.0131
D_{10}= 0.0050 C_u= 716.83 C_c= 4.24

Remarks

Water Content: 9.9%
F.M.=3.62

Date Received: 5/25/22 **Date Tested:** 6/10/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 10-10.8' **Date Sampled:**
Sample Number: C6, S6

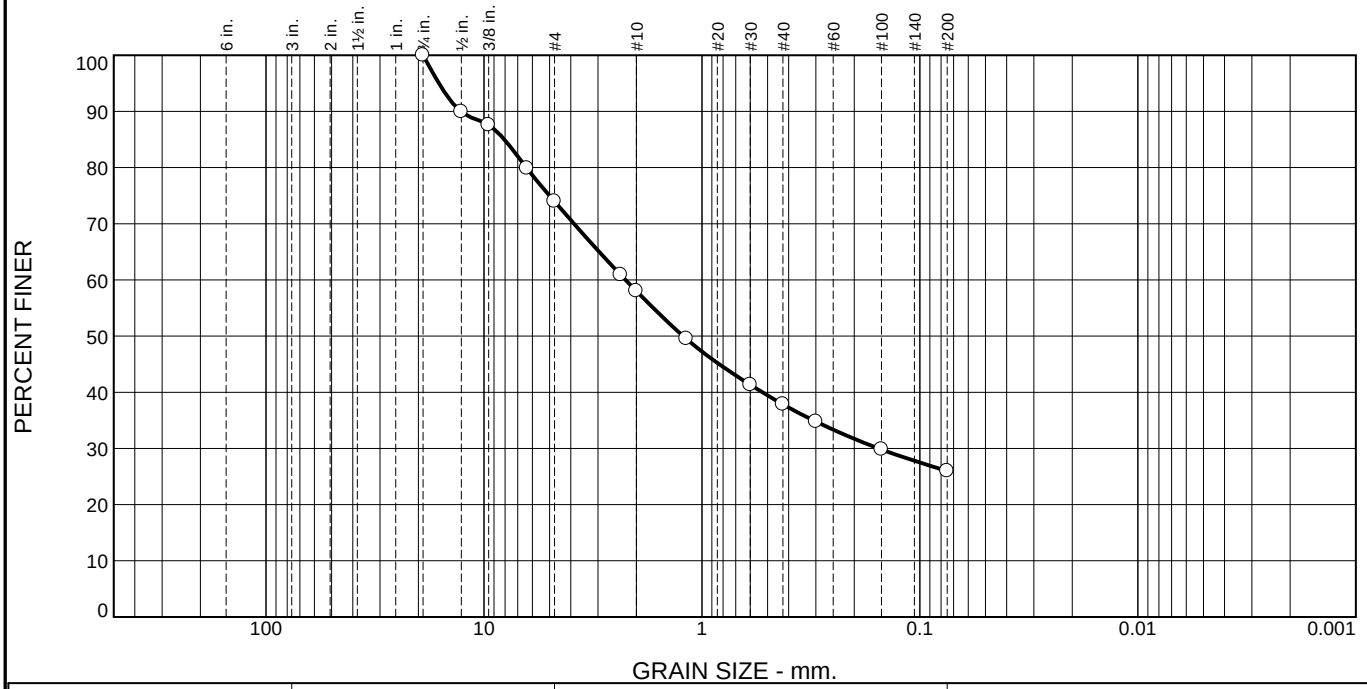
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	26.0	16.0	20.2	11.8	26.0	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	89.9		
.375	87.6		
.25	79.9		
#4	74.0		
#8	60.9		
#10	58.0		
#16	49.5		
#30	41.3		
#40	37.8		
#50	34.8		
#100	29.8		
#200	26.0		

* (no specification provided)

Material Description

ID#22-261

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 12.7783 D_{85}= 8.0622 D_{60}= 2.2412
D_{50}= 1.2193 D_{30}= 0.1546 D_{15}=
D_{10}= C_u= C_c=

Remarks

Water Content: 7.2%
F.M.=3.22

Date Received: 5/25/22 **Date Tested:** 6/24/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 4-6' **Date Sampled:**
Sample Number: D2, S3

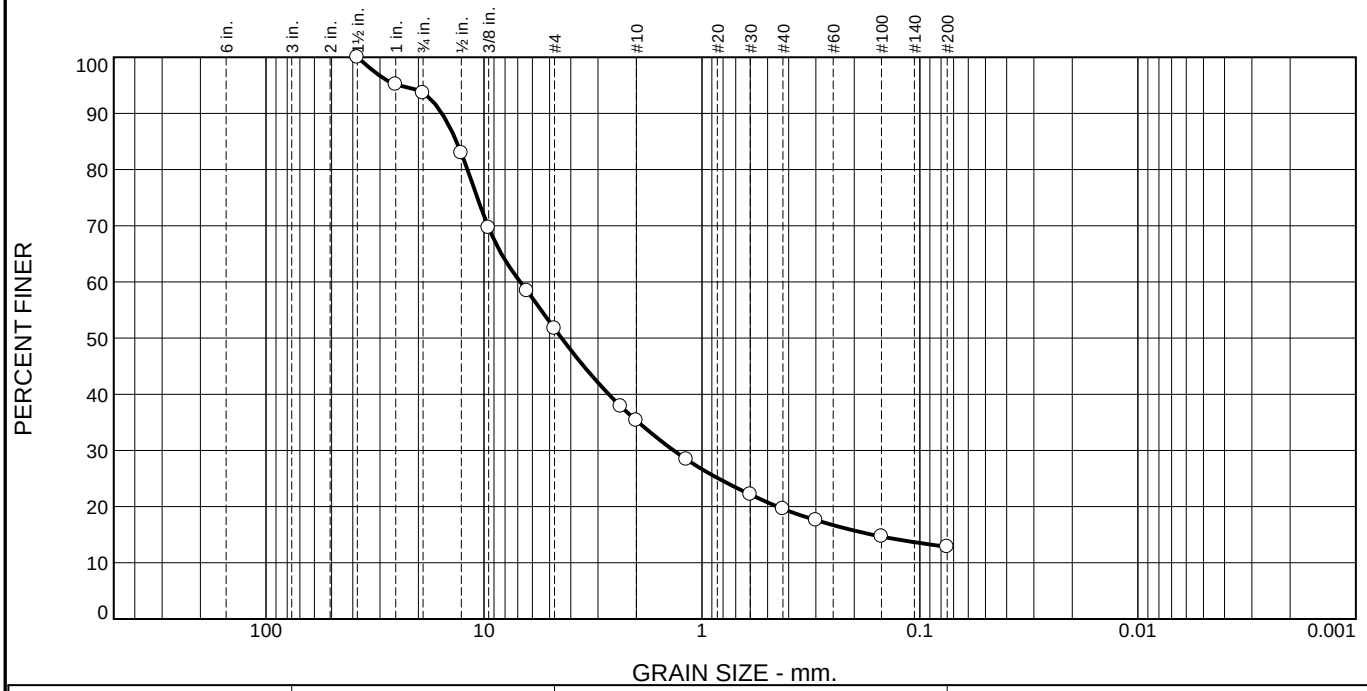
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	41.9	16.4	15.7	6.8	12.8	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5"	100.0		
1	95.1		
.75	93.6		
.5	82.9		
.375	69.7		
.25	58.4		
#4	51.7		
#8	37.9		
#10	35.3		
#16	28.4		
#30	22.2		
#40	19.6		
#50	17.6		
#100	14.7		
#200	12.8		

* (no specification provided)

Material Description

ID#22-256

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 15.5932 D_{85}= 13.3575 D_{60}= 6.8161
D_{50}= 4.4054 D_{30}= 1.3493 D_{15}= 0.1653
D_{10}= C_u= C_c=

Remarks

Water Content: 6.0%
F.M.=4.64

Date Received: 5/25/22 **Date Tested:** 6/16/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 8-12' **Date Sampled:**
Sample Number: D4, S5,6

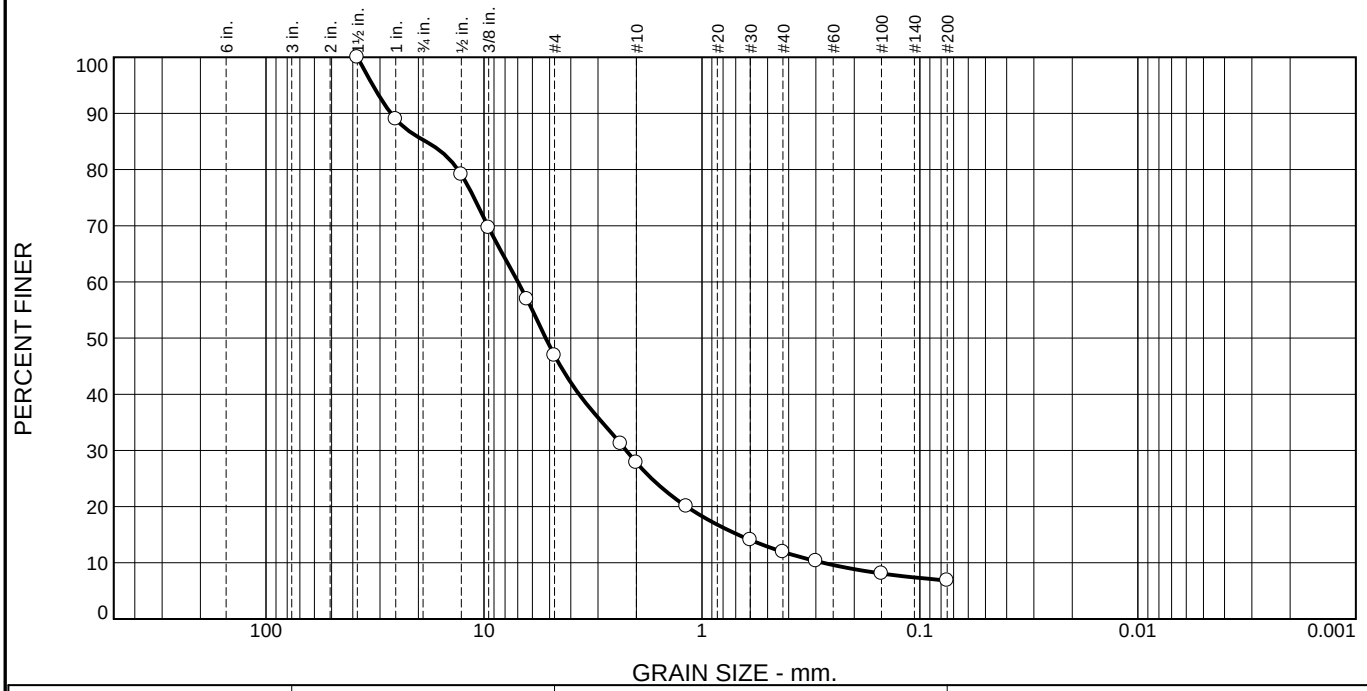
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.7	38.4	19.1	15.9	5.1	6.8	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5"	100.0		
1	89.0		
.5	79.1		
.375	69.7		
.25	56.9		
#4	46.9		
#8	31.2		
#10	27.8		
#16	20.0		
#30	14.1		
#40	11.9		
#50	10.3		
#100	8.1		
#200	6.8		

* (no specification provided)

Material Description

ID#22-252

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 26.7140 D_{85}= 18.4895 D_{60}= 6.9809
D_{50}= 5.2079 D_{30}= 2.2253 D_{15}= 0.6834
D_{10}= 0.2778 C_u= 25.13 C_c= 2.55

Remarks

Water Content: 6.7%
F.M.=5.14

Date Received: 5/25/22 **Date Tested:** 6/9/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 8.8-10.8' **Date Sampled:**
Sample Number: D6, S5,6

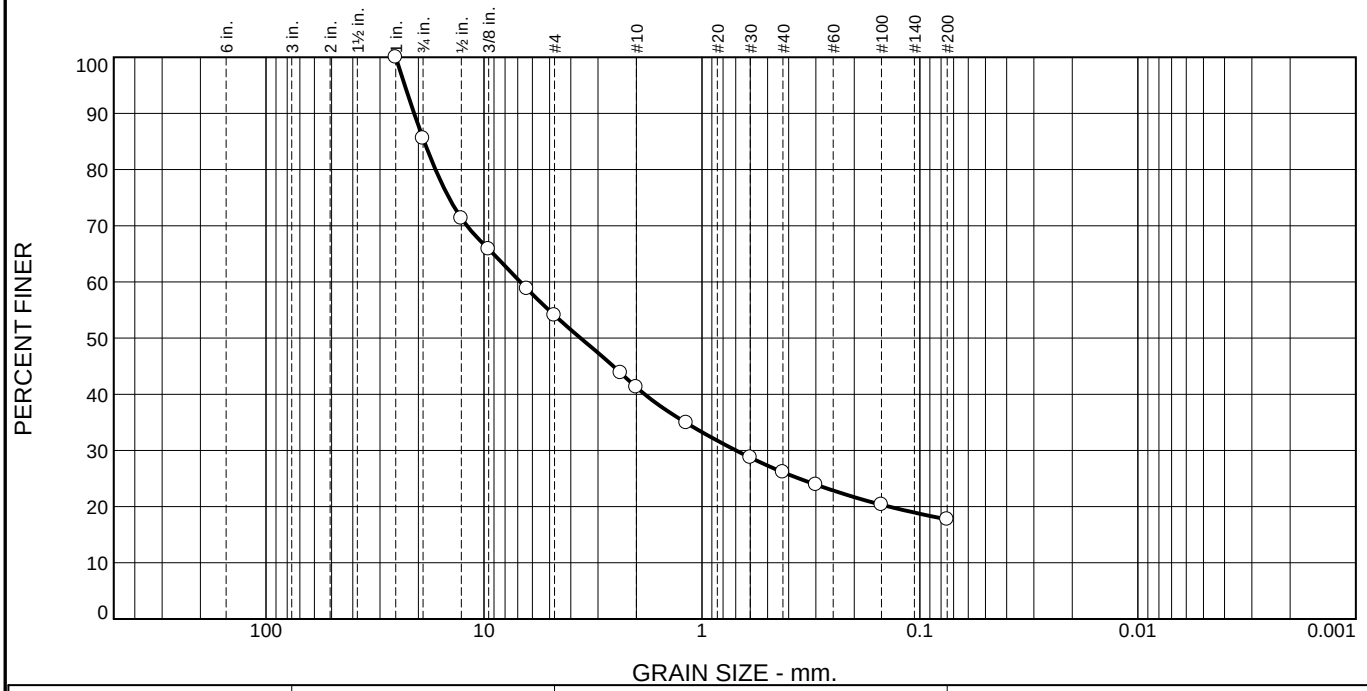
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.4	31.5	12.8	15.2	8.4	17.7	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	85.6		
.5	71.3		
.375	65.8		
.25	58.8		
#4	54.1		
#8	43.8		
#10	41.3		
#16	34.9		
#30	28.7		
#40	26.1		
#50	23.9		
#100	20.3		
#200	17.7		

* (no specification provided)

Material Description

ID#22-266

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 20.9143 D_{85}= 18.8151 D_{60}= 6.8125
D_{50}= 3.6037 D_{30}= 0.6985 D_{15}=
D_{10}= C_u= C_c=

Remarks

Water Content: 7.1%
F.M.=4.43

Date Received: 5/25/22 **Date Tested:** 6/24/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 2-6' **Date Sampled:**
Sample Number: E2, S2,3

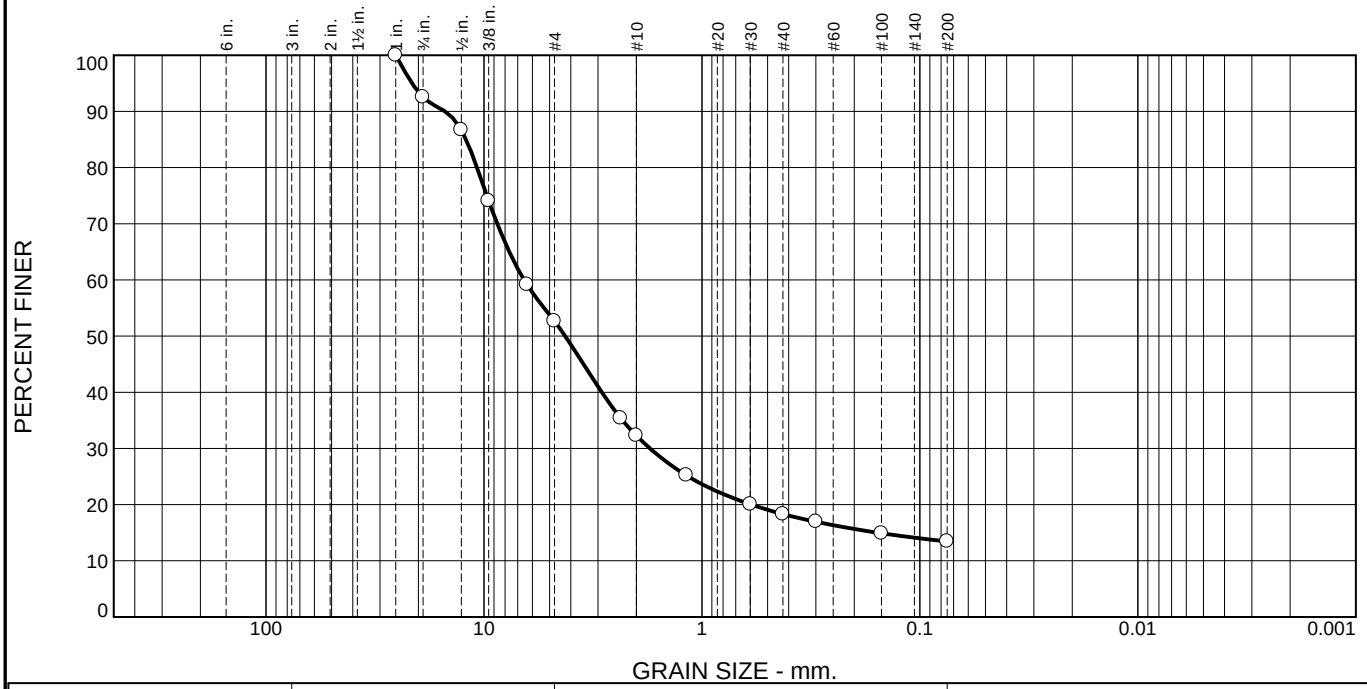
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.5	39.8	20.4	14.0	4.9	13.4	

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	92.5		
.5	86.7		
.375	74.1		
.25	59.2		
#4	52.7		
#8	35.4		
#10	32.3		
#16	25.2		
#30	20.1		
#40	18.3		
#50	17.0		
#100	14.9		
#200	13.4		

* (no specification provided)

Material Description

ID#22-228

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 15.0860 D_{85}= 12.0784 D_{60}= 6.5477
D_{50}= 4.2427 D_{30}= 1.7309 D_{15}= 0.1566
D_{10}= C_u= C_c=

Remarks

Water Content: 9.9%
Used entire sample provided for testing.
F.M.=4.68

Date Received: 5/25/22 **Date Tested:** 6/2/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-10' **Date Sampled:**
Sample Number: E4, S4,5

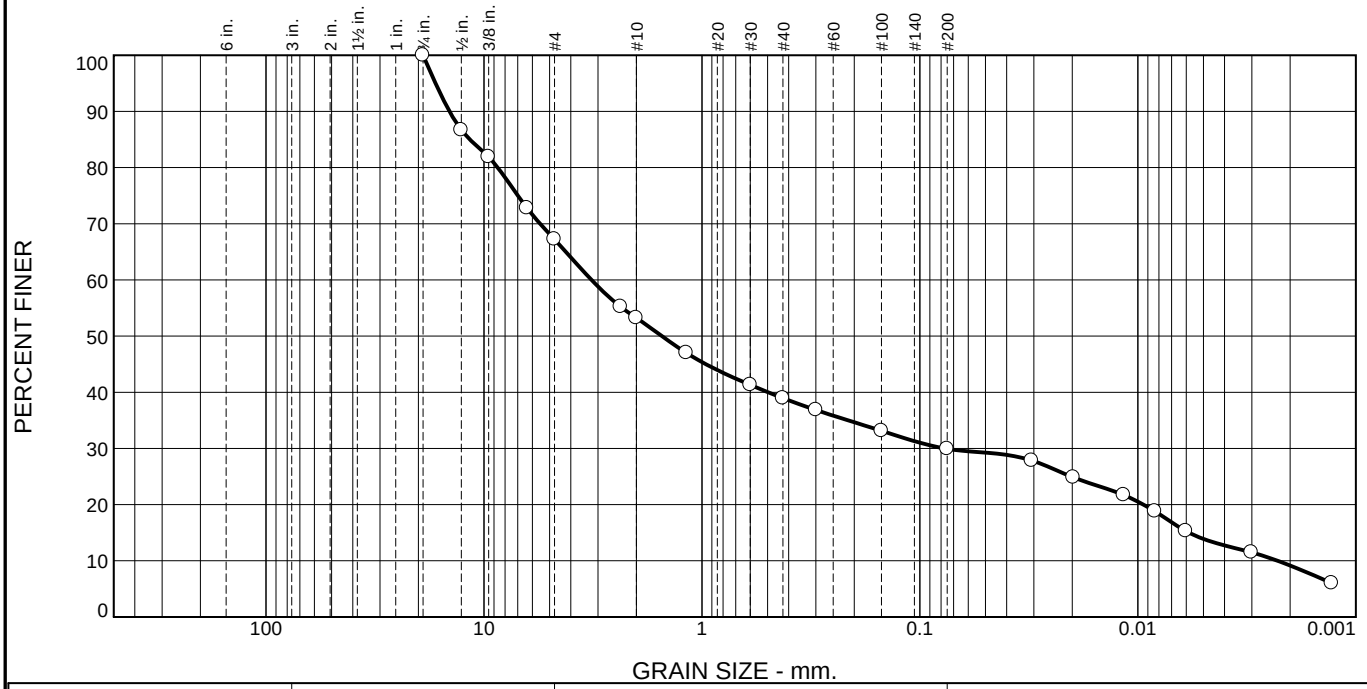
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	32.8	14.0	14.3	9.0	16.0	13.9

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	86.7		
.375	81.9		
.25	72.8		
#4	67.2		
#8	55.2		
#10	53.2		
#16	47.0		
#30	41.3		
#40	38.9		
#50	36.8		
#100	33.1		
#200	29.9		
0.0307 mm.	27.9		
0.0197 mm.	24.8		
0.0116 mm.	21.7		
0.0083 mm.	18.8		
0.0060 mm.	15.3		
0.0030 mm.	11.5		
0.0013 mm.	6.0		

* (no specification provided)

Material Description

ID#22-254

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 14.3962 D_{85}= 11.6214 D_{60}= 3.2107
D_{50}= 1.5269 D_{30}= 0.0769 D_{15}= 0.0058
D_{10}= 0.0023 C_u= 1404.71 C_c= 0.80

Remarks

Water Content: 10.5%
F.M.=3.37

Date Received: 5/25/22 **Date Tested:** 6/10/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-10' **Date Sampled:**
Sample Number: E6, S4,5

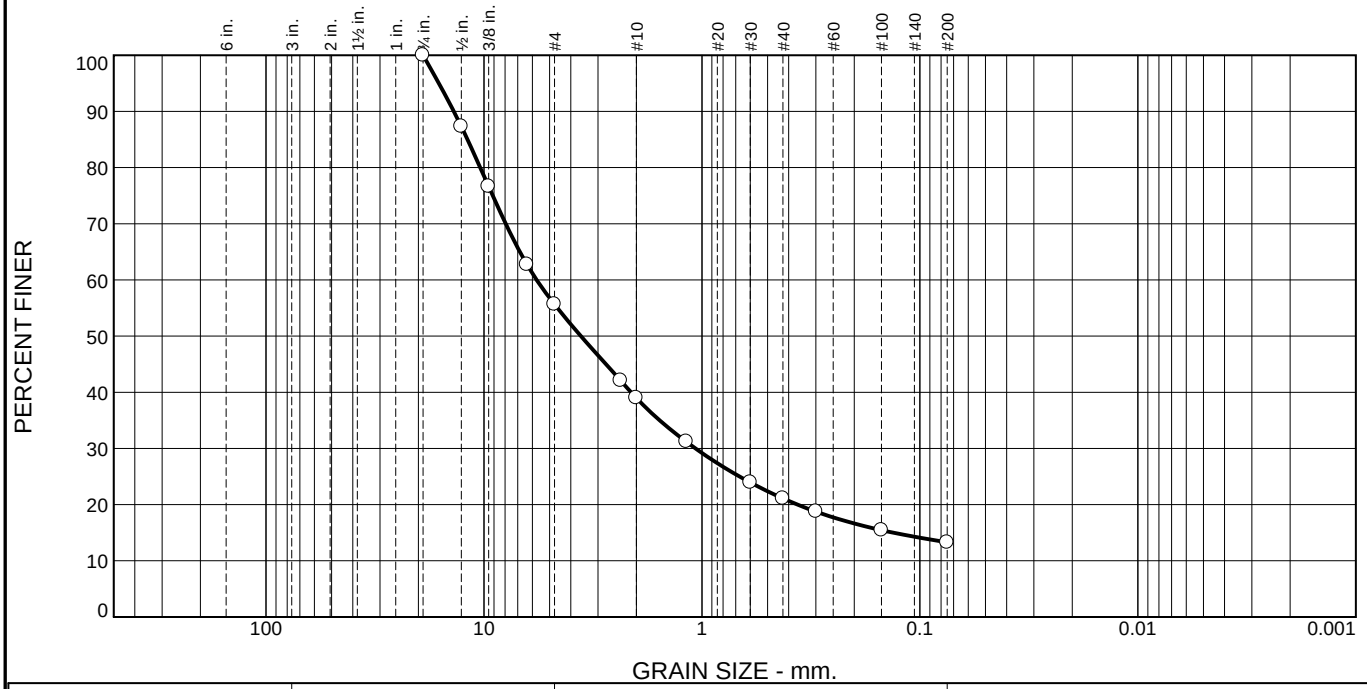
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	44.3	16.7	17.9	7.8	13.3	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	87.3		
.375	76.7		
.25	62.7		
#4	55.7		
#8	42.1		
#10	39.0		
#16	31.2		
#30	23.9		
#40	21.1		
#50	18.8		
#100	15.4		
#200	13.3		

* (no specification provided)

Material Description

ID#22-271

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 13.7511 D_{85}= 11.9013 D_{60}= 5.7340
D_{50}= 3.5930 D_{30}= 1.0711 D_{15}= 0.1325
D_{10}= C_u= C_c=

Remarks

F.M.=4.36

Date Received: 5/25/22 **Date Tested:** 6/24/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-8' **Date Sampled:**

Sample Number: E7, S4

3rd Rock, LLC

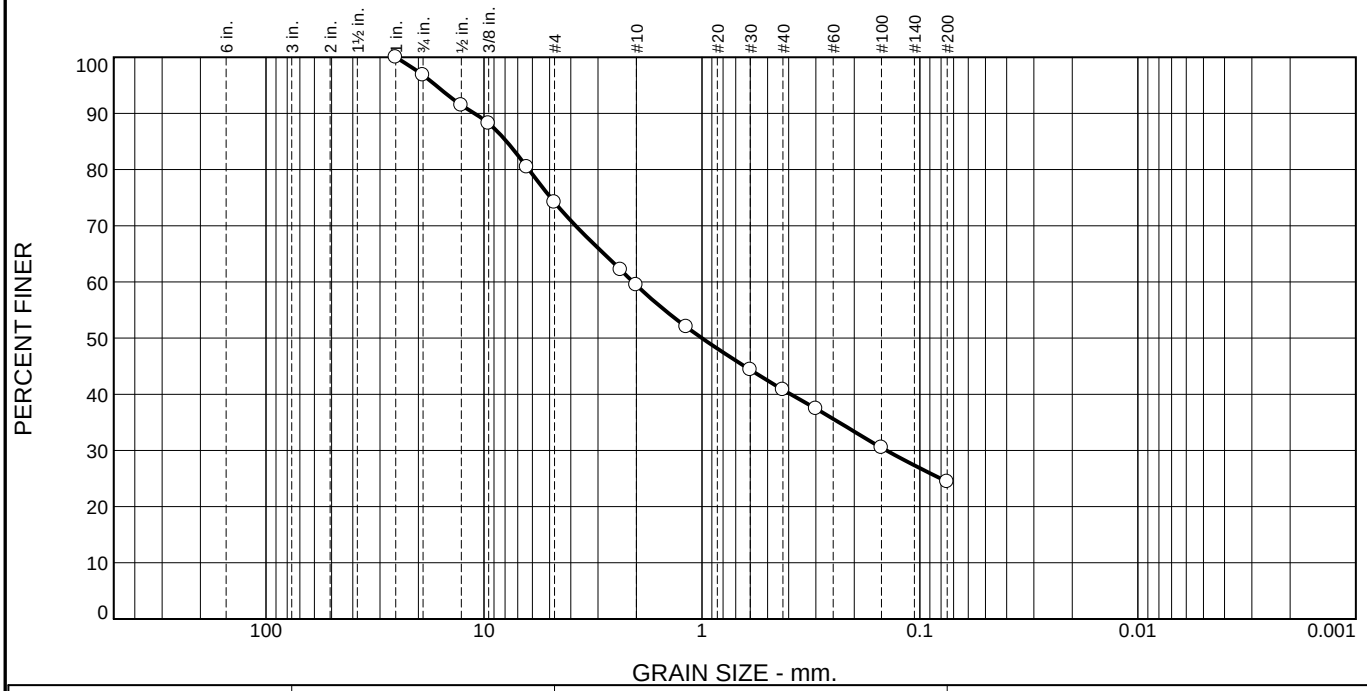
East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.

Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.2	22.6	14.8	18.6	16.4	24.4	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	96.8		
.5	91.5		
.375	88.2		
.25	80.4		
#4	74.2		
#8	62.2		
#10	59.4		
#16	52.0		
#30	44.4		
#40	40.8		
#50	37.4		
#100	30.5		
#200	24.4		

* (no specification provided)

Material Description

ID#22-246

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 11.0598 D_{85}= 7.8738 D_{60}= 2.0708
D_{50}= 1.0001 D_{30}= 0.1424 D_{15}=
D_{10}= C_u= C_c=

Remarks

Water Content: 6.9%
F.M.=3.14

Date Received: 5/25/22 **Date Tested:** 6/8/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-10' **Date Sampled:**
Sample Number: F3, S4,5

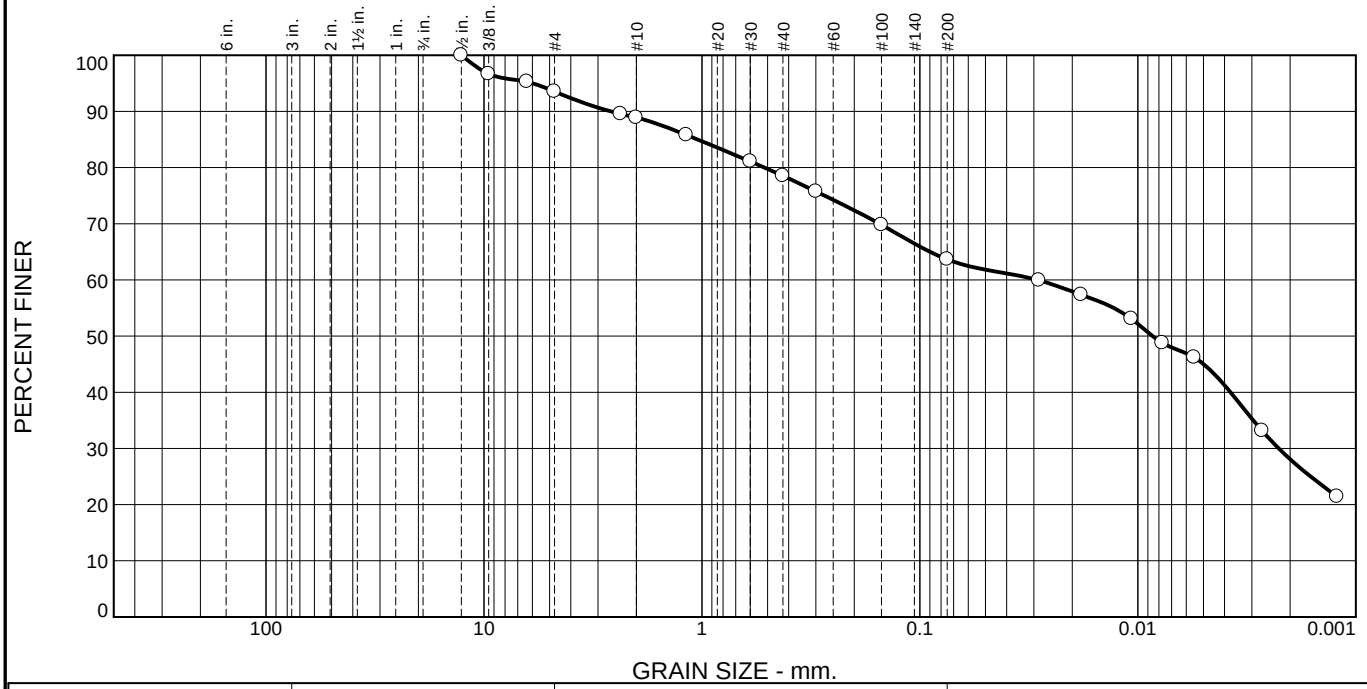
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.5	4.6	10.4	14.8	18.7	45.0

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.5"	100.0		
.375	96.7		
.25	95.3		
#4	93.5		
#8	89.6		
#10	88.9		
#16	85.8		
#30	81.1		
#40	78.5		
#50	75.8		
#100	69.8		
#200	63.7		
0.0284 mm.	59.9		
0.0182 mm.	57.4		
0.0107 mm.	53.1		
0.0077 mm.	48.8		
0.0055 mm.	46.2		
0.0027 mm.	33.1		
0.0012 mm.	21.4		

* (no specification provided)

Material Description

ID#22-230

Atterberg Limits (ASTM D 4318)

PL= 19 **LL=** 36 **PI=** 17

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-6(9)

Coefficients

D_{90}= 2.6170 D_{85}= 1.0474 D_{60}= 0.0289
D_{50}= 0.0086 D_{30}= 0.0023 D_{15}=
D_{10}= C_u= C_c=

Remarks

F.M.=1.08

Date Received: 5/25/22 **Date Tested:** 6/10/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 4-6' **Date Sampled:**
Sample Number: F4, S3

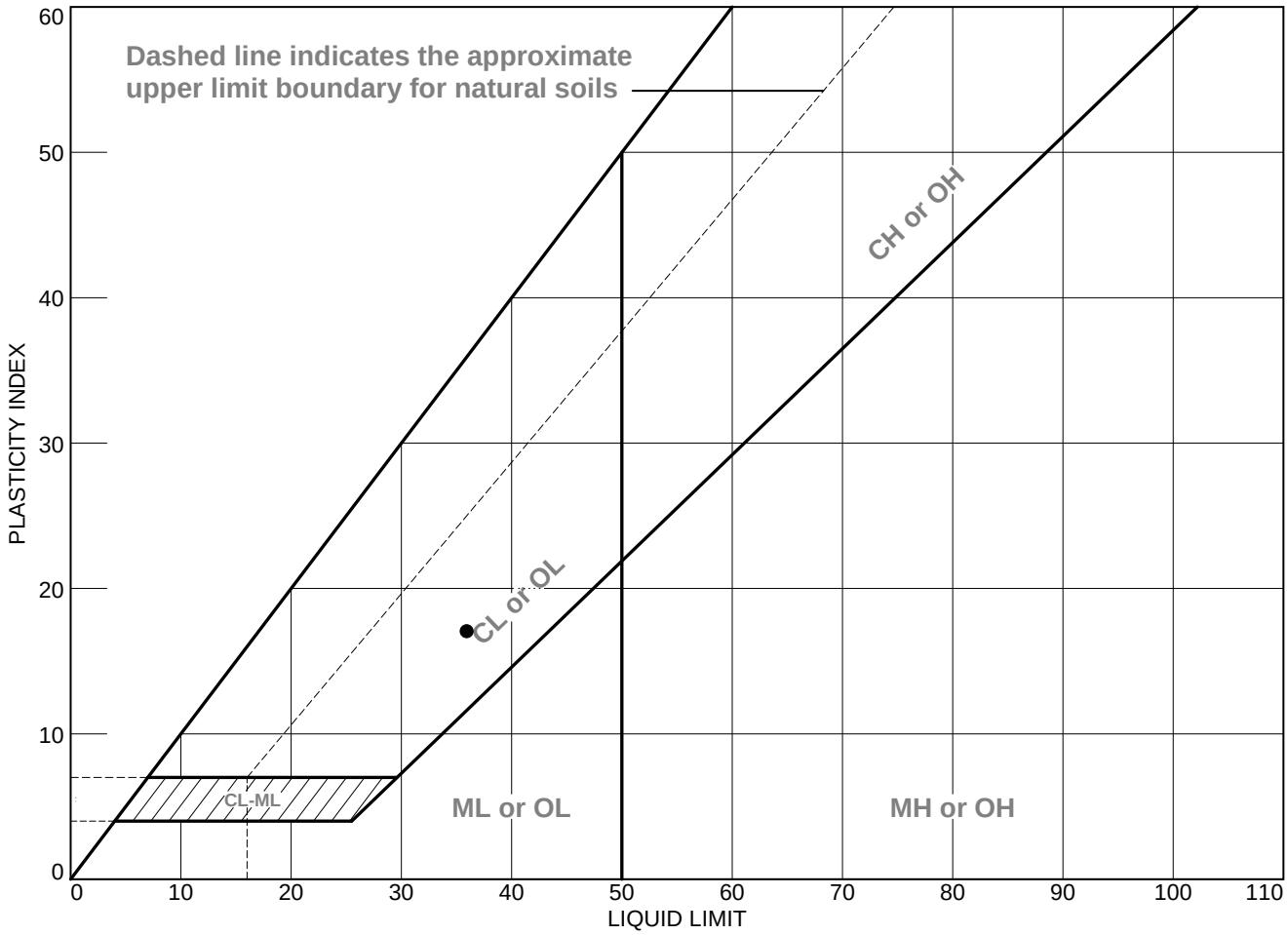
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Buffalo Bills Stadium	F4, S3	4-6'	14.6	19	36	17	CL

3rd Rock, LLC

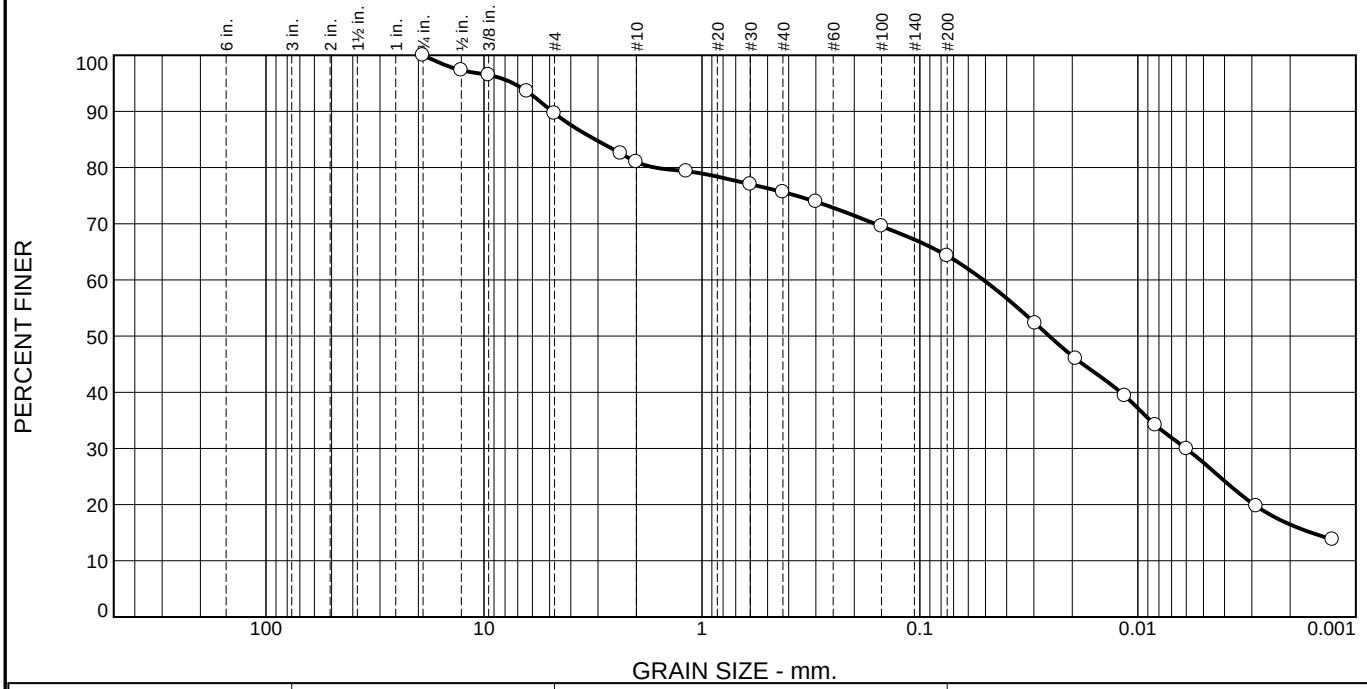
East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No.: 22-023 **Figure**

Tested By: JR 6/7/22 **Checked By:** JMA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.3	8.7	5.4	11.3	36.8	27.5

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	97.3		
.375	96.5		
.25	93.6		
#4	89.7		
#8	82.5		
#10	81.0		
#16	79.3		
#30	77.0		
#40	75.6		
#50	73.9		
#100	69.5		
#200	64.3		
0.0296 mm.	52.3		
0.0193 mm.	46.0		
0.0115 mm.	39.4		
0.0083 mm.	34.2		
0.0060 mm.	29.9		
0.0029 mm.	19.7		
0.0013 mm.	13.8		

* (no specification provided)

Material Description

ID#22-231

Atterberg Limits (ASTM D 4318)

PL= 19 **LL=** 30 **PI=** 11

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-6(5)

Coefficients

D_{90}= 4.8683 D_{85}= 3.0868 D_{60}= 0.0511
D_{50}= 0.0255 D_{30}= 0.0060 D_{15}= 0.0016
D_{10}= C_u= C_c=

Remarks

F.M.=1.31

Date Received: 5/25/22 **Date Tested:** 6/10/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-8' **Date Sampled:**

Sample Number: F4, S4

3rd Rock, LLC

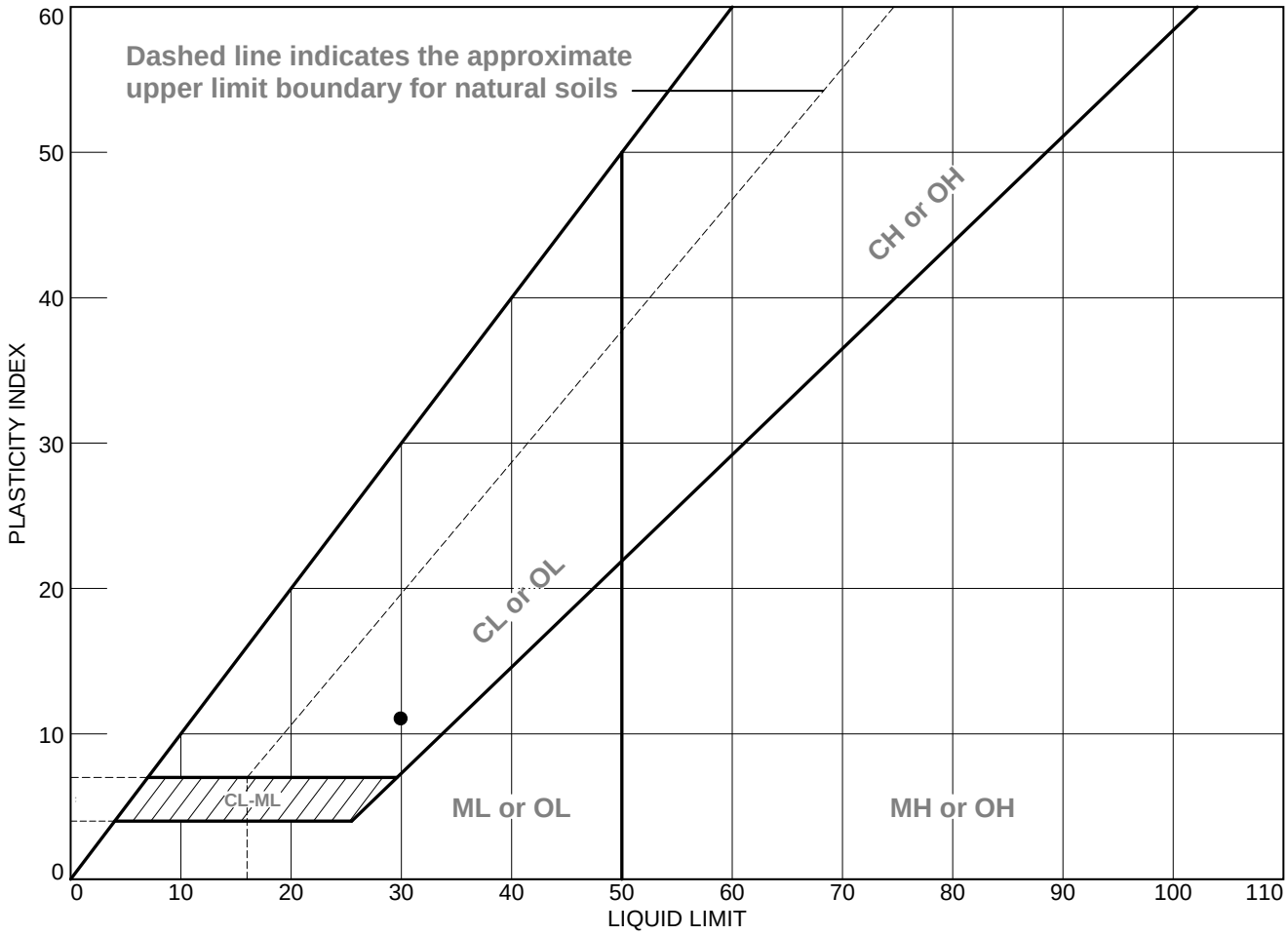
East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.

Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Buffalo Bills Stadium	F4, S4	6-8'	16.9	19	30	11	CL

3rd Rock, LLC

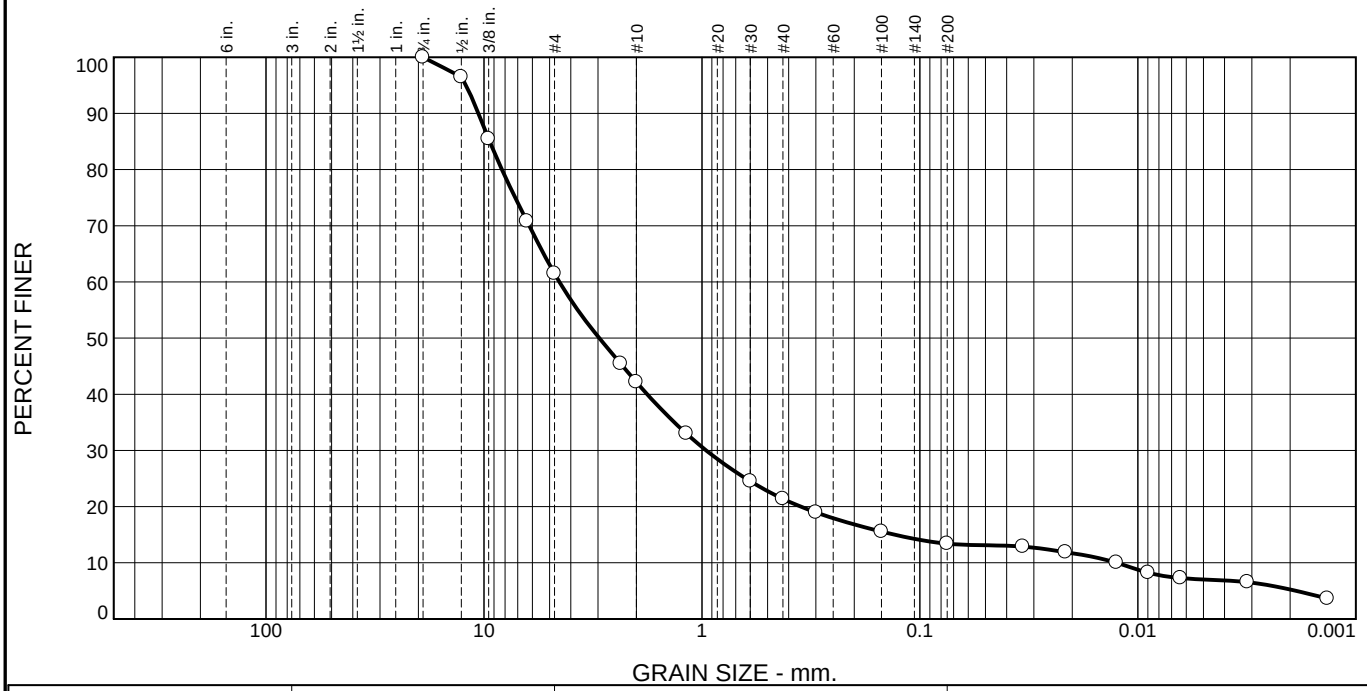
East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No.: 22-023 **Figure**

Tested By: JR 6/7/22 **Checked By:** JMA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	38.5	19.3	20.8	8.0	6.4	7.0

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	96.5		
.375	85.5		
.25	70.8		
#4	61.5		
#8	45.4		
#10	42.2		
#16	33.0		
#30	24.5		
#40	21.4		
#50	19.0		
#100	15.6		
#200	13.4		
0.0337 mm.	12.9		
0.0214 mm.	11.9		
0.0125 mm.	10.0		
0.0090 mm.	8.2		
0.0064 mm.	7.3		
0.0031 mm.	6.5		
0.0013 mm.	3.6		

* (no specification provided)

Material Description

ID#22-232

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 10.6069 D_{85}= 9.4178 D_{60}= 4.5102
D_{50}= 2.9602 D_{30}= 0.9562 D_{15}= 0.1305
D_{10}= 0.0125 C_u= 360.72 C_c= 16.21

Remarks

Water Content: 8.3%
Used entire sample provided.
F.M.=4.16

Date Received: 5/25/22 **Date Tested:** 6/6/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 9-12' **Date Sampled:**
Sample Number: F4, S5,6

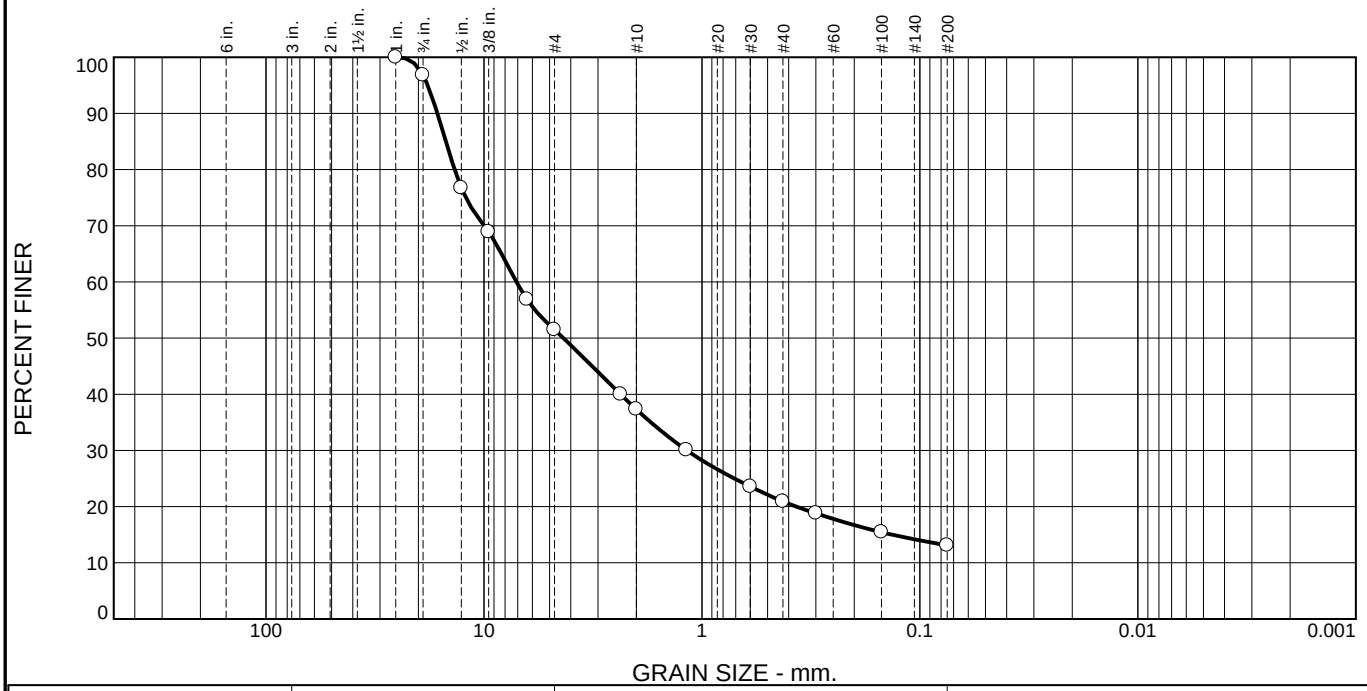
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.2	45.3	14.2	16.4	7.8	13.1	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	96.8		
.5	76.7		
.375	68.9		
.25	56.9		
#4	51.5		
#8	40.0		
#10	37.3		
#16	30.1		
#30	23.6		
#40	20.9		
#50	18.8		
#100	15.4		
#200	13.1		

* (no specification provided)

Material Description

ID#22-239

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 16.3597 D_{85}= 14.9565 D_{60}= 7.0928
D_{50}= 4.3226 D_{30}= 1.1720 D_{15}= 0.1340
D_{10}= C_u= C_c=

Remarks

Water Content: 8.7%
Used entire sample provided.
F.M.=4.55

Date Received: 5/25/22 **Date Tested:** 5/31/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-10' **Date Sampled:**
Sample Number: F6, S4,5

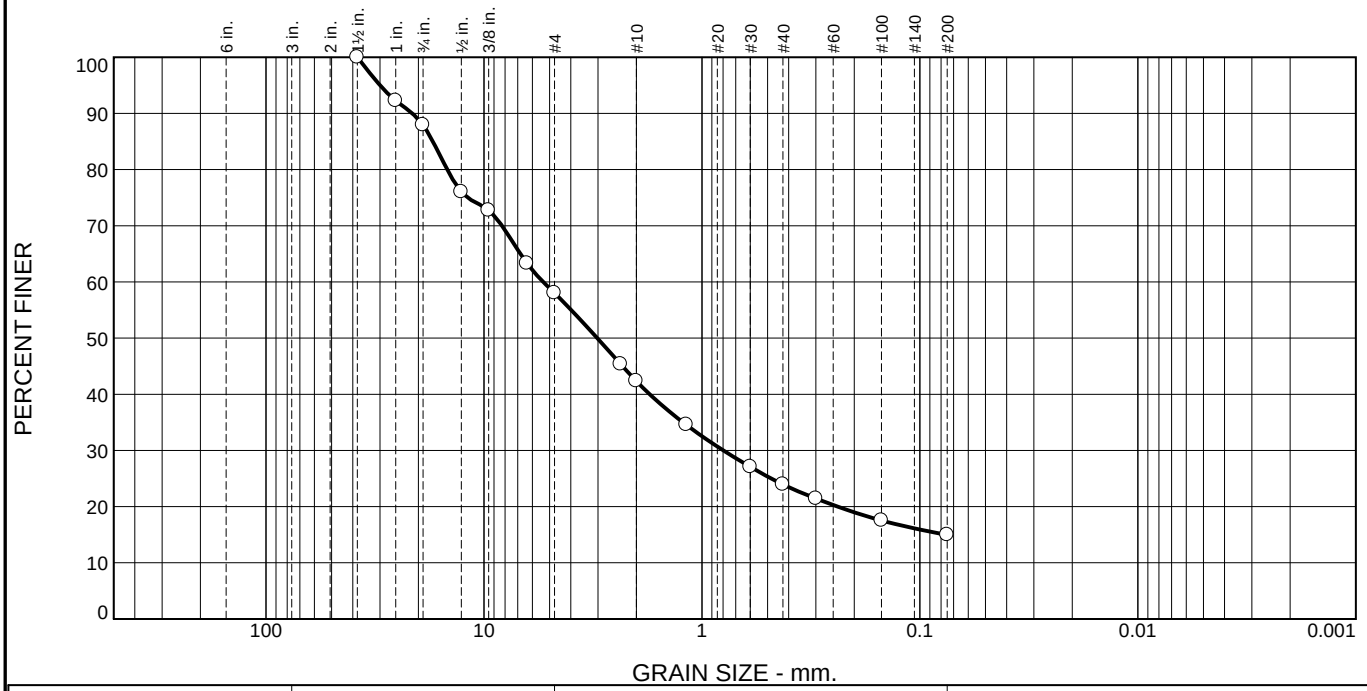
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.1	29.9	15.6	18.5	8.9	15.0	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5"	100.0		
1	92.3		
.75	87.9		
.5	76.0		
.375	72.8		
.25	63.3		
#4	58.0		
#8	45.4		
#10	42.4		
#16	34.6		
#30	27.1		
#40	23.9		
#50	21.4		
#100	17.5		
#200	15.0		

* (no specification provided)

Material Description

ID#22-260

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 21.3088 D_{85}= 17.1625 D_{60}= 5.3511
D_{50}= 3.0246 D_{30}= 0.7978 D_{15}= 0.0760
D_{10}= C_u= C_c=

Remarks

Water Content: 6.5%
F.M.=4.35

Date Received: 5/25/22 **Date Tested:** 6/24/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 8-12' **Date Sampled:**
Sample Number: F7, S5,6

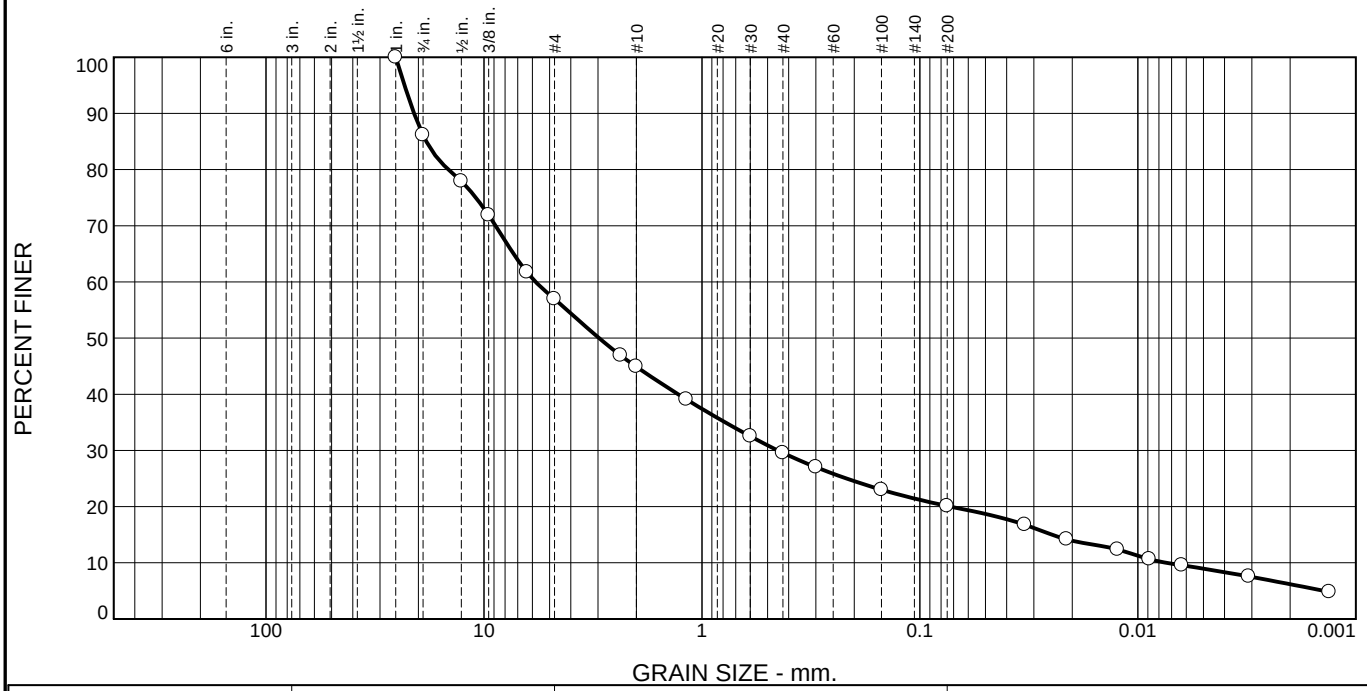
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.8	29.2	12.1	15.3	9.5	11.1	9.0

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	86.2		
.5	77.9		
.375	71.9		
.25	61.7		
#4	57.0		
#8	46.9		
#10	44.9		
#16	39.1		
#30	32.5		
#40	29.6		
#50	27.0		
#100	23.0		
#200	20.1		
0.0330 mm.	16.8		
0.0212 mm.	14.2		
0.0124 mm.	12.4		
0.0089 mm.	10.6		
0.0063 mm.	9.6		
0.0031 mm.	7.6		
0.0013 mm.	4.8		

* (no specification provided)

Material Description

ID#22-245

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 20.9204 D_{85}= 18.3998 D_{60}= 5.7925
D_{50}= 2.9654 D_{30}= 0.4488 D_{15}= 0.0248
D_{10}= 0.0074 C_u= 781.21 C_c= 4.69

Remarks

Water Content: 10.5%
F.M.=4.16

Date Received: 5/25/22 **Date Tested:** 6/2/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-10' **Date Sampled:**
Sample Number: G3, S4,5

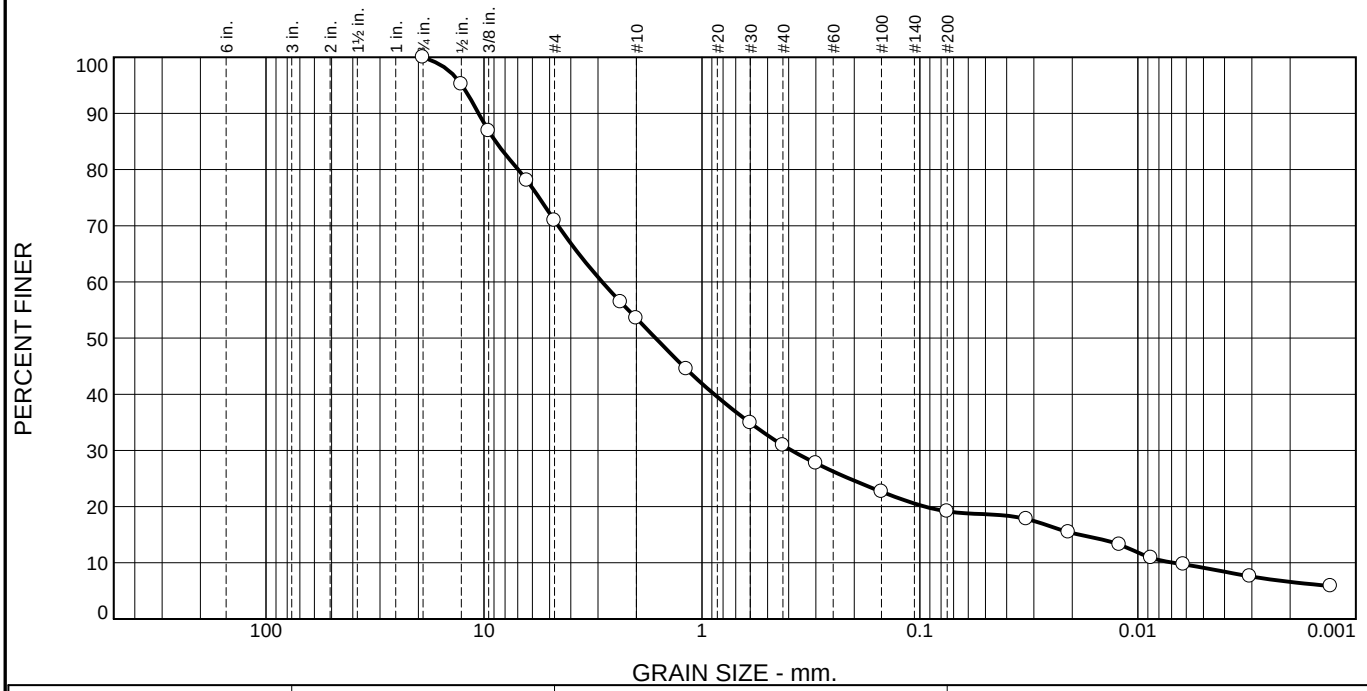
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	29.1	17.4	22.6	11.7	10.1	9.1

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	95.2		
.375	86.9		
.25	78.1		
#4	70.9		
#8	56.4		
#10	53.5		
#16	44.5		
#30	34.9		
#40	30.9		
#50	27.7		
#100	22.6		
#200	19.2		
0.0324 mm.	17.8		
0.0208 mm.	15.5		
0.0121 mm.	13.2		
0.0087 mm.	10.9		
0.0062 mm.	9.7		
0.0031 mm.	7.6		
0.0013 mm.	5.9		

* (no specification provided)

Material Description

ID#22-229

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 10.5868 D_{85}= 8.8499 D_{60}= 2.8698
D_{50}= 1.6322 D_{30}= 0.3880 D_{15}= 0.0186
D_{10}= 0.0069 C_u= 417.71 C_c= 7.64

Remarks

Water Content: 8.1%
Used entire sample provided.
F.M.=3.56

Date Received: 5/25/22 **Date Tested:** 6/2/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 6-10' **Date Sampled:**
Sample Number: G4, S4,5

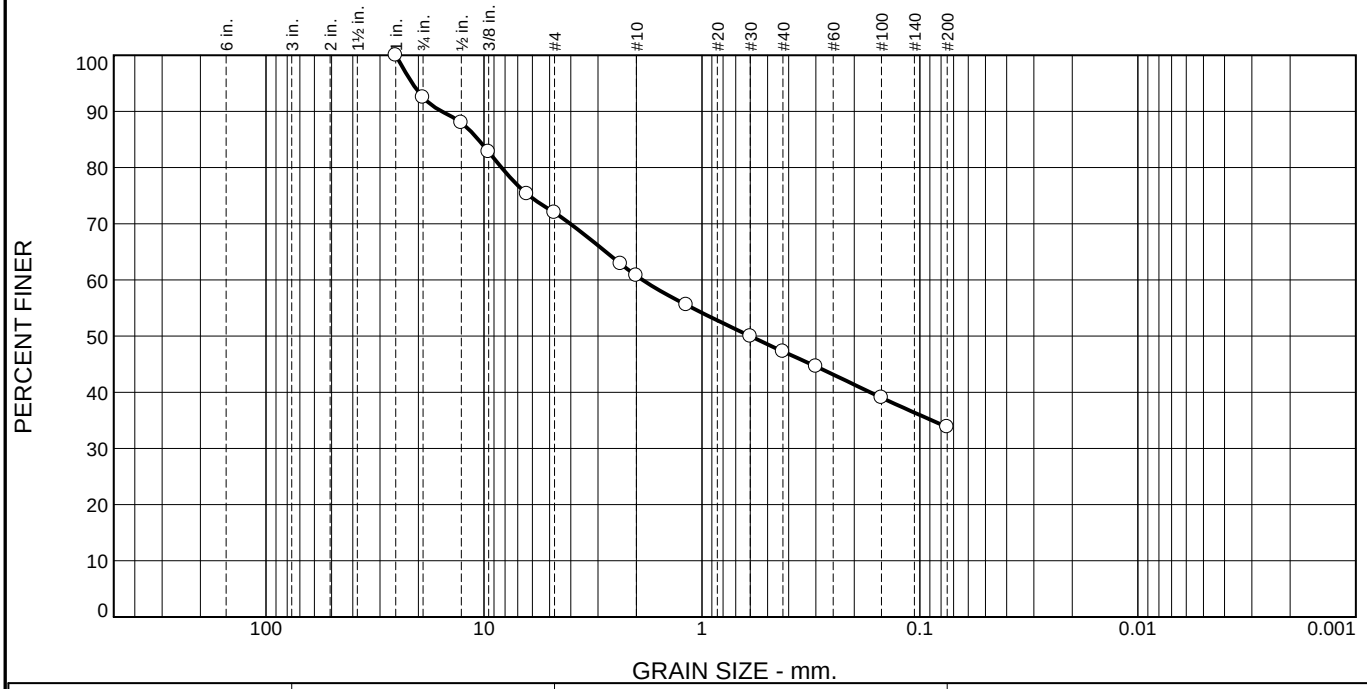
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.5	20.5	11.2	13.5	13.5	33.8	

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	92.5		
.5	88.0		
.375	82.8		
.25	75.3		
#4	72.0		
#8	62.9		
#10	60.8		
#16	55.6		
#30	50.0		
#40	47.3		
#50	44.6		
#100	39.0		
#200	33.8		

* (no specification provided)

Material Description

ID#22-237

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 15.6113 D_{85}= 10.6188 D_{60}= 1.8717
D_{50}= 0.6015 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Water Content: 11.4%
Used entire sample provided.
F.M.=3.01

Date Received: 5/25/22 **Date Tested:** 5/31/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 2-6' **Date Sampled:**
Sample Number: G6, S2,3

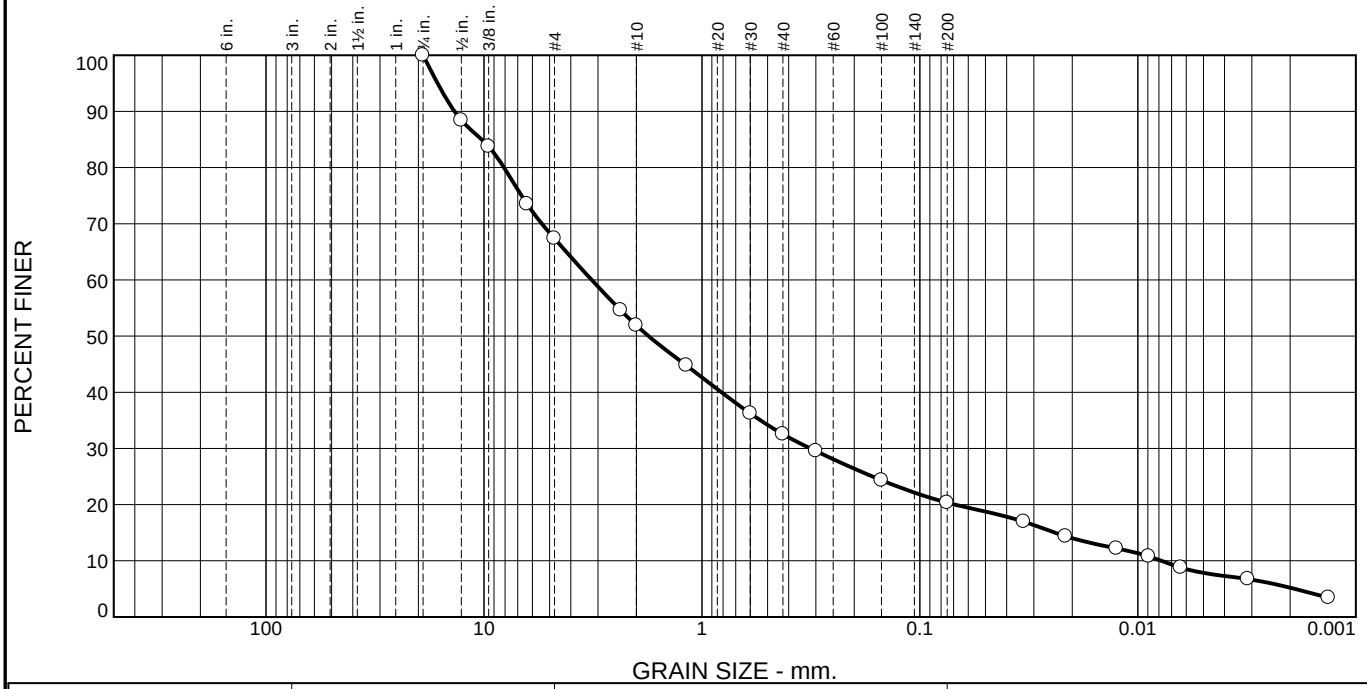
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	32.6	15.5	19.4	12.2	12.5	7.8

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75"	100.0		
.5	88.4		
.375	83.8		
.25	73.5		
#4	67.4		
#8	54.6		
#10	51.9		
#16	44.8		
#30	36.2		
#40	32.5		
#50	29.5		
#100	24.3		
#200	20.3		
0.0334 mm.	17.0		
0.0214 mm.	14.4		
0.0125 mm.	12.2		
0.0089 mm.	10.8		
0.0064 mm.	8.8		
0.0031 mm.	6.7		
0.0013 mm.	3.4		

* (no specification provided)

Material Description

ID#22-238

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 13.6636 D_{85}= 10.2277 D_{60}= 3.2052
D_{50}= 1.7579 D_{30}= 0.3178 D_{15}= 0.0240
D_{10}= 0.0078 C_u= 410.53 C_c= 4.04

Remarks

Water Content: 8.5%
F.M.=3.59

Date Received: 5/25/22 **Date Tested:** 5/31/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 8-12' **Date Sampled:**
Sample Number: G6, S5,6

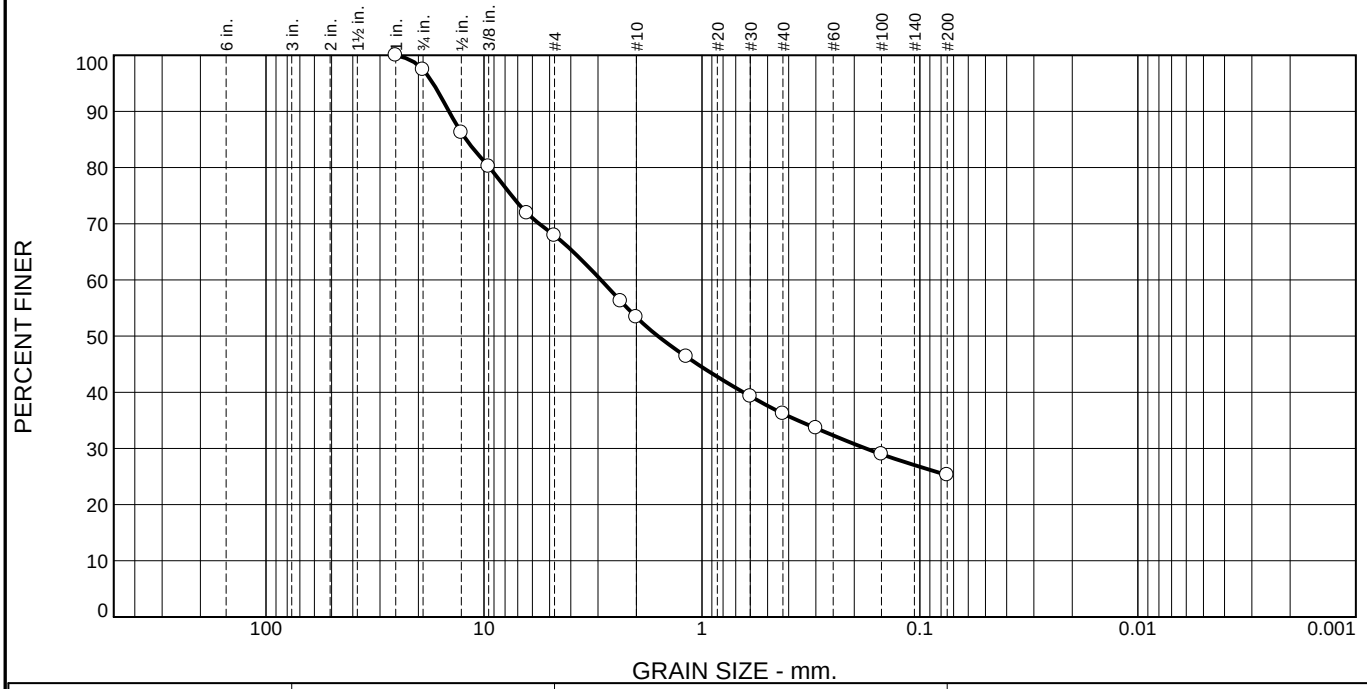
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.6	29.5	14.5	17.2	10.9	25.3	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75	97.4		
.5	86.2		
.375	80.2		
.25	71.9		
#4	67.9		
#8	56.2		
#10	53.4		
#16	46.3		
#30	39.3		
#40	36.2		
#50	33.6		
#100	29.0		
#200	25.3		

* (no specification provided)

Material Description

ID#22-243

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 14.4740 D_{85}= 12.0779 D_{60}= 2.9073
D_{50}= 1.5919 D_{30}= 0.1770 D_{15}=
D_{10}= C_u= C_c=

Remarks

Water Content: 7.6%
F.M.=3.50

Date Received: 5/25/22 **Date Tested:** 6/2/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 10-14' **Date Sampled:**
Sample Number: H3, S6,7

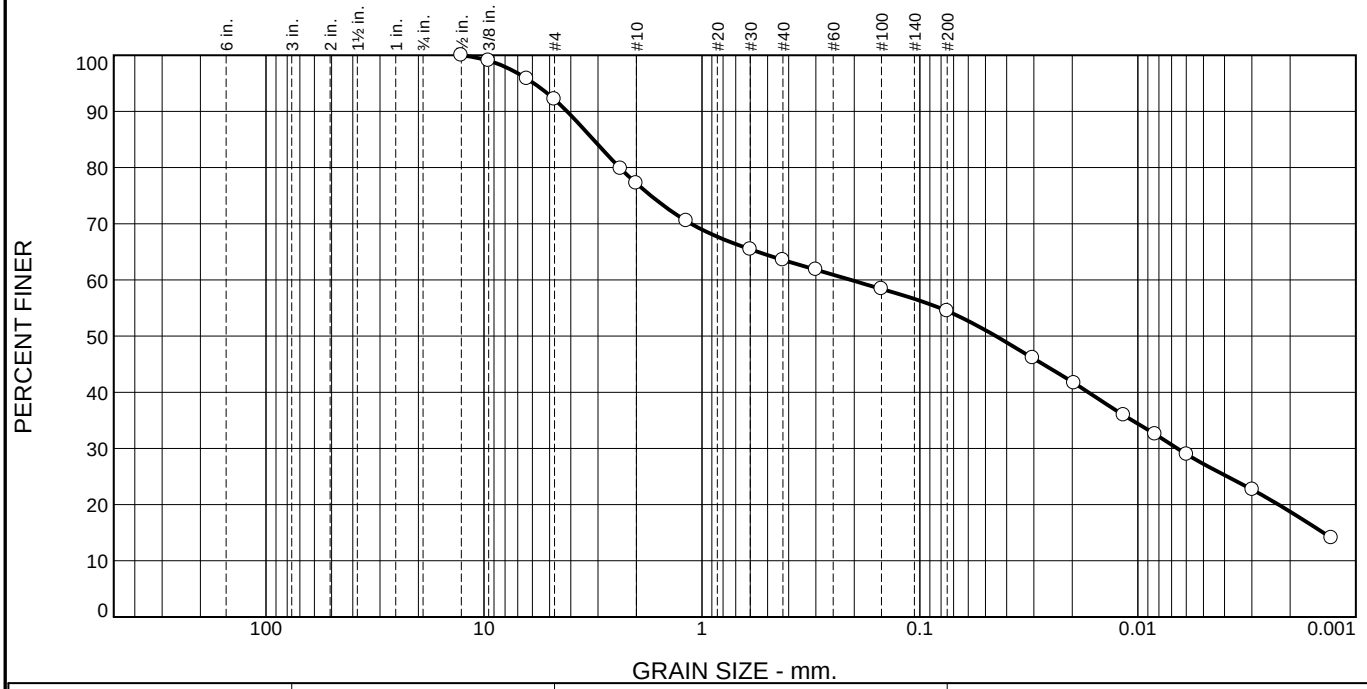
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.9	14.9	13.7	9.0	27.3	27.2

TEST RESULTS (ASTM D6913, D7928)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.5"	100.0		
.375	99.0		
.25	95.8		
#4	92.1		
#8	79.8		
#10	77.2		
#16	70.5		
#30	65.5		
#40	63.5		
#50	61.8		
#100	58.4		
#200	54.5		
0.0304 mm.	46.1		
0.0196 mm.	41.6		
0.0116 mm.	35.9		
0.0083 mm.	32.5		
0.0060 mm.	28.9		
0.0030 mm.	22.6		
0.0013 mm.	14.1		

* (no specification provided)

Material Description

ID#22-236

Atterberg Limits (ASTM D 4318)

PL= 25 **LL=** 42 **PI=** 17

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-7-6(7)

Coefficients

D_{90}= 4.1554 D_{85}= 3.1514 D_{60}= 0.2074
D_{50}= 0.0448 D_{30}= 0.0066 D_{15}= 0.0014
D_{10}= C_u= C_c=

Remarks

F.M.=1.73

Date Received: 5/25/22 **Date Tested:** 5/31/22

Tested By: JR

Checked By: JMA

Title: LM

Source of Sample: Buffalo Bills Stadium **Depth:** 0-2' **Date Sampled:**
Sample Number: H5, S1

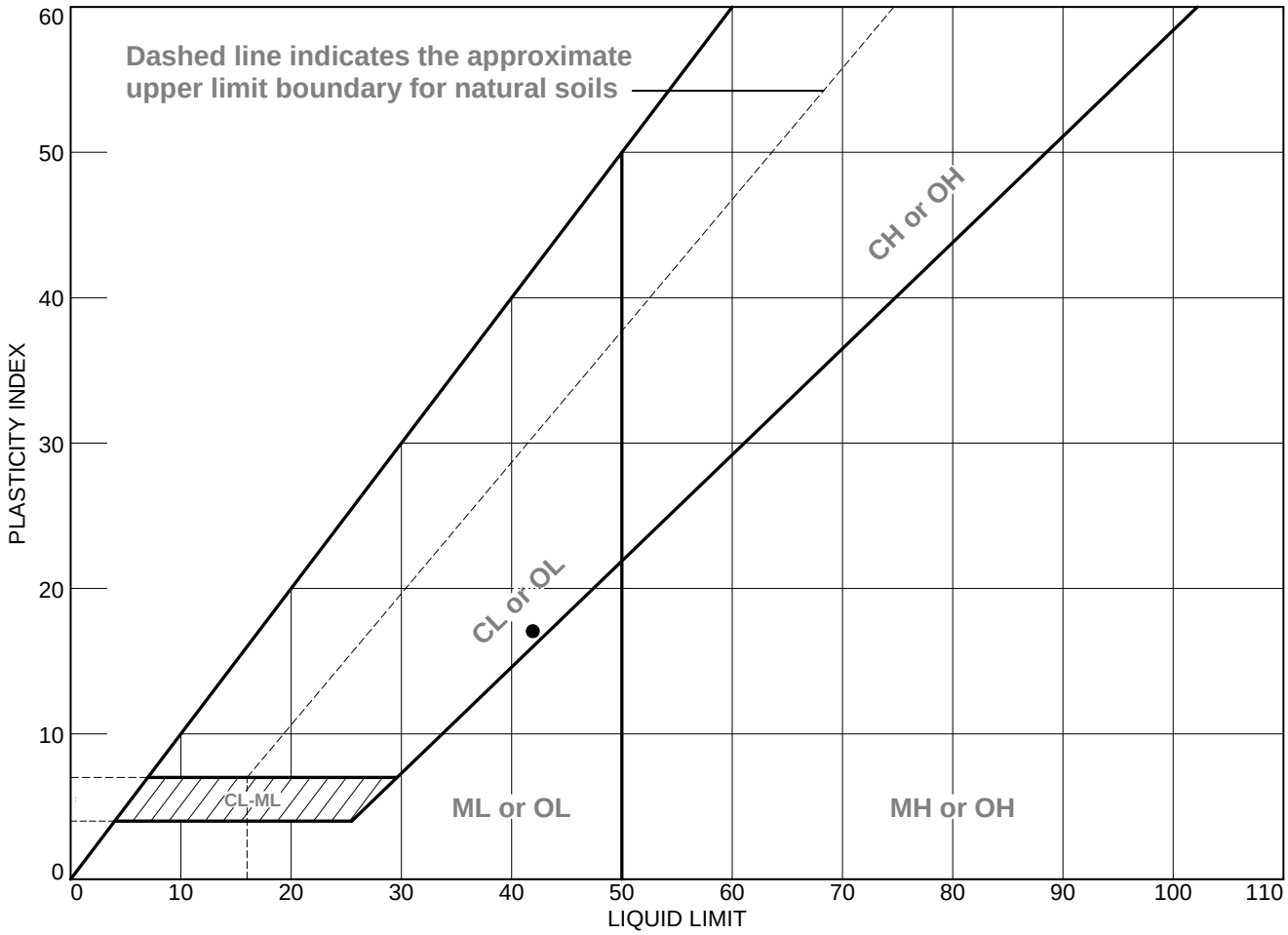
3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No: 22-023 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Buffalo Bills Stadium	H5, S1	0-2'	17.9	25	42	17	CL

3rd Rock, LLC

East Aurora, NY

Client: McMahon & Mann Consulting Engineering & Geology, P.C.
Project: New Buffalo Bills Stadium, OP

Project No.: 22-023 **Figure**

Tested By: JR 5/31/22 **Checked By:** JMA

APPENDIX B-2

ROCK STRENGTH TESTING RESULTS

Table B-2
Unconfined Compressive Strength Summary Table

Boring Designation	Sample Depth (ft)	Unconfined Compressive Strength (psi) (ASTM D7012)
BH-A4-22	25.3-25.7	1,058.1
BH-A6-22	26.2-26.6	1,968.5
BH-A6-22	31.8-32.3	3,378.3
BH-B4-22	27.8-28.2	1,320.1
BH-B5-22	21.5-21.9	939.9
BH-B5-22	24.6-25.0	6,050.4
BH-C2-22	17.3-17.7	2,100.5
BH-C2-22	23.2-23.7	2,555.1
BH-C3-22	19.7-20.1	2,347.7
BH-C4-22	19.4-19.8	2,190.0
BH-C4-22	24.4-24.8	3,939.2
BH-C5-22	23.7-24.2	2,295.7
BH-C5-22	30.1-30.5	4,406.1
BH-C5-22	40.5-40.9	1,603.5
BH-C6-22	19.5-19.9	1,653.9
BH-D3-22	61.8-62.2	2,310.8
BH-D3-22	45.3-45.7	3,342.1
BH-D3-22	35.6-36.0	3,220.2
BH-D3-22	26.4-26.8	899.9
BH-D3-22	16.7-17.1	2,198.1
BH-D4-22	20.5-20.9	2,843.5
BH-D5-22	20.0-20.5	3,135.3
BH-D6-22	25.2-25.7	2,351.3
BH-E3-22	18.2-18.6	1,698.1
BH-E3-22	30.3-30.7	3,516.4
BH-E4-22	21.0-21.4	2,165.9
BH-E5-22	21.2-21.6	962.2
BH-E6-22	24.7-25.1	2,416.9
BH-F3-22	20.7-21.1	1,925.8
BH-F4-22	20.4-20.8	1,414.3
BH-F5-22	21.8-22.3	1,393.3
BH-F6-22	20.2-20.6	2,106.0
BH-G3-22	18.4-18.9	2,676.7
BH-G4-22	24.5-24.9	1,699.6
BH-G6-22	25.2-25.6	1,814.9
BH-H3-22	22.8-23.2	2,360.6
BH-H5-22	18.5-18.9	3,126.4
BH-H5-22	33.1-33.5	4,331.9

3rd rock

Compressive Strength Report
ASTM D2166

Project: Buffalo Bills' Stadium
McMahon & Mann Consulting Engineering and Geology, P.C.
Project No.: 22-023
Sample No.: Various
Lab ID No.: Various
Analyst: EBS/JR
Date: 6/9/22-6/17/22

Specimen Type: 2"x4" Bedrock Core
Cross-Head Speed: 0.05 in/min
Temp Conditioned: 70 deg. F

Sample Name:	Sample ID:	Maximum Load lbf	Maximum Compressive Strength psi
BH C4 19.4-19.8'	22-289	6756.9	2190.0
BH C5 23.7-24.2'	22-290	7094.8	2295.7
BH C5 30.1-30.5'	22-291	13617.1	4406.1
BH C5 40.5-40.9'	22-292	4947.2	1603.5
BH C6 19.5-19.9'	22-293	5107.9	1653.9
BH D6 25.2-25.7'	22-294	7286.3	2351.3
BH D3 61.8-62.2'	22-295	7122.2	2310.8
BH D3 45.3-45.7'	22-296	10367.0	3342.1
BH D3 35.6-36.0'	22-297	9952.1	3220.2
BH D3 26.4-26.8'	22-298	2778.4	899.9
BH D3 16.7-17.1'	22-299	6800.0	2198.1
BH E5 21.2-21.6'	22-300	2977.7	962.2
BH D4 20.5-20.9'	22-301	8790.9	2843.5
BH D5 20.0-20.5'	22-302	9673.2	3135.3
BH C4 24.4-24.8'	22-303	12169.8	3939.2
BH B4 27.8-28.2'	22-304	4076.9	1320.1
BH B5 21.5-21.9'	22-305	2912.7	939.9
BH B5 24.6-25.0'	22-306	18723.8	6050.4
BH E3 18.2-18.6'	22-307	5285.1	1698.1
BH E3 30.3-30.7'	22-308	10904.0	3516.4
BH E6 24.7-25.1'	22-309	7456.9	2416.9

Respectfully Submitted,
3rd Rock, LLC

580 Olean Road
East Aurora, NY 14052
Phone (716)655-4933, fax 655-8638

Compressive Strength Report
ASTM D2166

Project:	Buffalo Bills' Stadium
	McMahon & Mann Consulting Engineering and Geology, P.C.
Project No.:	22-023
Sample No.:	Various
Lab ID No.:	Various
Analyst:	EBS
Date:	4/27/2022-4/29/22
Specimen Type:	2"x4" Bedrock Core
Cross-Head Speed:	0.05 in/min
Temp Conditioned:	70 deg. F

Sample Name:	Sample ID:	Maximum Load lbf	Maximum Compressive Strength psi
BH G6, 25.2-25.6'	22-116	5609.1	1814.9
BH H3, 22.8-23.2'	22-117	7302.9	2360.6
BH G3, 18.4-18.9'	22-118	8289.0	2676.7
BH A6, 26.2-26.6'	22-119	6083.6	1968.5
BH A6, 31.8-32.3'	22-120	10412.6	3378.3
BH F6, 20.2-20.6'	22-121	6504.3	2106.0
BH F5, 21.8-22.3'	22-122	4327.9	1393.3
BH H5, 18.5-18.9'	22-123	9688.2	3126.4
BH H5, 33.1-33.5'	22-124	13405.7	4331.9
BH F3, 20.7-21.1'	22-125	5971.7	1925.8
BH C2, 17.3-17.7'	22-126	6513.5	2100.5
BH C2, 23.2-23.7'	22-127	7883.2	2555.1
BH C3, 19.7-20.1'	22-128	7277.6	2347.7

Respectfully Submitted,
3rd Rock, LLC

580 Olean Road
East Aurora, NY 14052
Phone (716)655-4933, fax 655-8638

Compressive Strength Report
ASTM D2166

Project:	Buffalo Bills' Stadium McMahon & Mann Consulting Engineering and Geology, P.C.
Project No.:	22-023
Sample No.:	Various
Lab ID No.:	Various
Analyst:	EBS
Date:	4/20/2022
Specimen Type:	2"x4" Bedrock Core
Cross-Head Speed:	0.05 in/min
Temp Conditioned:	70 deg. F

Sample Name:	Sample ID:	Maximum Load lbf	Maximum Compressive Strength psi
BH F4, 20.4-20.8'	22-107	4376.6	1414.3
BH A4, 25.3-25.7'	22-108	3318.4	1058.1
BH G4, 24.5-24.9'	22-109	5265.0	1699.6
BH E4, 21.0-21.4'	22-110	6691.4	2165.9

Respectfully Submitted,
3rd Rock, LLC

580 Olean Road
East Aurora, NY 14052
Phone (716)655-4933, fax 655-8638

APPENDIX C

MATERIAL AND PLACEMENT REQUIREMENTS
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

APPENDIX C

MATERIAL AND PLACEMENT REQUIREMENTS
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

This appendix presents material types and recommended compaction requirements for various materials recommended for the new Bills Stadium facility located in the Town of Orchard Park, New York.

I. DRAINAGE STONE

Drainage stone should be used to backfill the space between the stadium foundation walls and rock excavations behind retaining walls, backfill between the top of competent rock and event level floor slabs and playing surface subgrade, and within the groundwater collection system. The drainage stone should meet the requirements specified by New York State Department of Transportation (NYSDOT) Standard Specifications Section 703, size designation 1. It should be placed in loose lifts approximately 12 inches thick and lightly tamped into place to limit voids.

II. STRUCTURAL FILL

Structural fill should be used below slabs-on-grade, as subbase below paved areas, to raise site grades below planned structures, to replace unsuitable materials in the subgrade, and to backfill foundation, utility, and floor slab excavations below planned structures.

Structural fill should be crushed stone, sand, gravel, or a blend of these materials satisfying the requirements specified by the NYSDOT Standard Specifications Section 304, Item No. 304.14 (no slag shall be permitted). Structural fill should be compacted in loose lifts not exceeding 6 inches in thickness. It should be compacted to 90 percent of the maximum dry density as measured in the Modified Proctor test (ASTM D 1557). Each lift of structural fill should be tested for dry density and each test result should meet or exceed the minimum requirements.

The contractor should use hand compaction equipment (e.g., vibratory plate tamper, jumping jack, etc.) to compact the structural fill within 5 feet of foundations to limit the potential for damage to the concrete. In these areas, the structural fill should be placed in loose lifts approximately 4 inches thick and compacted to a visually stable condition.

III. SUITABLE FILL

Suitable fill should be used to raise site grades and for backfill of foundation and utility excavations not below planned structures. Excavated glacial deposits, weathered shale, or competent shale can be used as suitable fill. It should be a mixture of crushed shale, gravel, sand, silt, and clay; free of organics, topsoil, particles larger than 4 inches in

diameter, and deleterious materials (e.g., slag, frozen soil, construction debris wood, etc.). It should have a plasticity index of no greater than 10.

The contractor should place the suitable fill in loose lifts not exceeding 8 inches thick and compact the material with a compactor compatible with the material type and lift thickness. The suitable fill should be compacted to 90 percent of its maximum dry density, as measured by the Modified Proctor test (ASTM D1557).

The contractor should use hand compaction equipment (e.g., vibratory plate tamper, jumping jack, etc.) to compact the suitable fill within 5 feet of foundations to limit the potential for damage to the concrete. In these areas, the suitable fill should be placed in loose lifts approximately 4 inches thick and compacted to a visually stable condition.

IV. STABILIZATION GEOTEXTILE

Stabilization geotextiles should be used to line the prepared subgrade for pavement. All stabilization geotextiles should satisfy the requirements specified by the NYSDOT Standard Specifications Section 207 for stabilization geotextiles. Approved products and installation requirements are given in the specifications. All overlapped seams should have a minimum overlap of 12 inches.

APPENDIX D

ENVIRONMENTAL ASSESSMENT FORM
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

Instructions for Completing Part 1

Part 1 is to be completed by the applicant or project sponsor. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification.

Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information; indicate whether missing information does not exist, or is not reasonably available to the sponsor; and, when possible, generally describe work or studies which would be necessary to update or fully develop that information.

Applicants/sponsors must complete all items in Sections A & B. In Sections C, D & E, most items contain an initial question that must be answered either "Yes" or "No". If the answer to the initial question is "Yes", complete the sub-questions that follow. If the answer to the initial question is "No", proceed to the next question. Section F allows the project sponsor to identify and attach any additional information. Section G requires the name and signature of the applicant or project sponsor to verify that the information contained in Part 1is accurate and complete.

A. Project and Applicant/Sponsor Information.

Name of Action or Project: New Bills Stadium		
Project Location (describe, and attach a general location map): Towns of Orchard Park and Hamburg, Erie Co., NY (All or parts of SBLs: 160.16-1-12, 160.19-1-4.1, 161.00-5-3.1, 161.00-5-1, 161.00-5-16.1, 161.17-6-1, and 161.17-6-3). See attached concept plan.		
Brief Description of Proposed Action (include purpose or need): See attached project description for more information. See attached Project Description.		
Name of Applicant/Sponsor: Buffalo Bills - Kathryn D'Angelo, Assistant General Counsel	Telephone: (716) 312-8607 E-Mail: kathryn.d'angelo@bills.nfl.net	
Address: One Bills Drive		
City/PO: Orchard Park	State: NY	Zip Code: 14127
Project Contact (if not same as sponsor; give name and title/role):	Telephone: E-Mail:	
Address:		
City/PO:	State:	Zip Code:
Property Owner (if not same as sponsor): Erie County	Telephone: (716) 858-8008 E-Mail: Mark.Rountree@erie.gov	
Address: 95 Franklin Street, 10th Floor		
City/PO: Buffalo	State: NY	Zip Code: 14202

B. Government Approvals See attached list of government entities and approvals

B. Government Approvals, Funding, or Sponsorship. ("Funding" includes grants, loans, tax relief, and any other forms of financial assistance.)

Government Entity	If Yes: Identify Agency and Approval(s) Required	Application Date (Actual or projected)
a. City Council, Town Board, or Village Board of Trustees ☐Yes ☑No		
b. City, Town or Village Planning Board or Commission ☐Yes ☑No		
c. City, Town or Village Zoning Board of Appeals ☐Yes ☑No		
d. Other local agencies ☐Yes ☑No		
e. County agencies ☑Yes ☐No	County (transfer), County DPW (planning), County Water (water/sewer), County Leg. (transfer)	TBD
f. Regional agencies ☐Yes ☑No		
g. State agencies ☑Yes ☐No	ESD, ECSC, SUNY, ECC (land transfer/funding approvals);	TBD
h. Federal agencies ☐Yes ☑No	(State cont.) SHPO (consult only), NYSDOT (stormwater discharge/traffic consult)	TBD

i. Coastal Resources.

i. Is the project site within a Coastal Area, or the waterfront area of a Designated Inland Waterway? ☐Yes ☑No

ii. Is the project site located in a community with an approved Local Waterfront Revitalization Program? ☑Yes ☐No

iii. Is the project site within a Coastal Erosion Hazard Area? ☐Yes ☑No

C. Planning and Zoning

C.1. Planning and zoning actions.

Will administrative or legislative adoption, or amendment of a plan, local law, ordinance, rule or regulation be the only approval(s) which must be granted to enable the proposed action to proceed? ☐Yes ☑No

- **If Yes,** complete sections C, F and G.
- **If No,** proceed to question C.2 and complete all remaining sections and questions in Part 1

C.2. Adopted land use plans.

a. Do any municipally- adopted (city, town, village or county) comprehensive land use plan(s) include the site where the proposed action would be located? ☑Yes ☐No

If Yes, does the comprehensive plan include specific recommendations for the site where the proposed action would be located? ☑Yes ☐No

b. Is the site of the proposed action within any local or regional special planning district (for example: Greenway; Brownfield Opportunity Area (BOA); designated State or Federal heritage area; watershed management plan; or other?) ☑Yes ☐No

If Yes, identify the plan(s):

NYS Heritage Areas:West Erie Canal Corridor

c. Is the proposed action located wholly or partially within an area listed in an adopted municipal open space plan, or an adopted municipal farmland protection plan? ☐Yes ☑No

If Yes, identify the plan(s):

C.3. Zoning

a. Is the site of the proposed action located in a municipality with an adopted zoning law or ordinance. ☑ Yes ☐ No
If Yes, what is the zoning classification(s) including any applicable overlay district?
Town of Hamburg - R3
Town of Orchard Park - R1

b. Is the use permitted or allowed by a special or conditional use permit? ☑ Yes ☐ No

c. Is a zoning change requested as part of the proposed action? ☐ Yes ☑ No
If Yes,
i. What is the proposed new zoning for the site?

C.4. Existing community services.

a. In what school district is the project site located? Orchard Park Central School District, Hamburg Central School District

b. What police or other public protection forces serve the project site?
Orchard Park Police Department, Town of Hamburg Police Department, Erie County Sheriff, NYS Troopers

c. Which fire protection and emergency medical services serve the project site?
Orchard Park Fire District EMS, Orchard Park Fire District, Town of Hamburg Fire Chiefs Association

d. What parks serve the project site?
Orchard Acres Park, California Road Recreational Area, Burmon Recreational Area, Blasdell Fireman's Memorial Park, Honeycrest Playground, Yates Park, Birdsong Park Nature Trail, Penn Dixie Fossil Park and Nature Preserve

D. Project Details

D.1. Proposed and Potential Development

a. What is the general nature of the proposed action (e.g., residential, industrial, commercial, recreational; if mixed, include all components)? Construction of new athletic stadium facility (including new parking lots/improvements to existing lots and pedestrian walking connections) and demolition of existing athletic stadium facility

b. a. Total acreage of the site of the proposed action? +/- 18 acres
b. Total acreage to be physically disturbed? +/- 185* acres
c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? +/- 284 acres

*Approx. 30 acres of the Erie Community College Campus will be used for construction laydown, trade contractor parking, and storage. Applicant does not intend to completely demolish and reconstruct those areas.

c. Is the proposed action an expansion of an existing project or use? ☐ Yes ☑ No
i. If Yes, what is the approximate percentage of the proposed expansion and identify the units (e.g., acres, miles, housing units, square feet)? % _____ Units: _____

d. Is the proposed action a subdivision, or does it include a subdivision? ☑ Yes ☐ No
If Yes,
i. Purpose or type of subdivision? (e.g., residential, industrial, commercial; if mixed, specify types)
commercial subdivision
ii. Is a cluster/conservation layout proposed? ☐ Yes ☑ No
iii. Number of lots proposed? 2
iv. Minimum and maximum proposed lot sizes? Minimum +/- 1.0 acres Maximum +/-243 acres land transfer

e. Will the proposed action be constructed in multiple phases? ☑ Yes ☐ No
i. If No, anticipated period of construction: _____ months
ii. If Yes:
- Total number of phases anticipated 2
- Anticipated commencement date of phase 1 (including demolition) 12 month 2022 year
- Anticipated completion date of final phase 10 month 2026 year
- Generally describe connections or relationships among phases, including any contingencies where progress of one phase may determine timing or duration of future phases:

The project consists of two phases: 1): all work associated with the new stadium build. As the construction schedule is developed, additional detail can be provided as required, and 2) demolition of the existing stadium and site restoration.

f. Does the project include new residential uses? ☐ Yes ☑ No

If Yes, show numbers of units proposed.

	One Family	Two Family	Three Family	Multiple Family (four or more)
Initial Phase				
At completion of all phases				

g. Does the proposed action include new non-residential construction (including expansions)? ☑ Yes ☐ No

If Yes,

i. Total number of structures 2

ii. Dimensions (in feet) of largest proposed structure: +/- 190 height; +/- 730 width; and +/- 880 length

iii. Approximate extent of building space to be heated or cooled: +/- 700,000 square feet

h. Does the proposed action include construction or other activities that will result in the impoundment of any liquids, such as creation of a water supply, reservoir, pond, lake, waste lagoon or other storage? ☑ Yes ☐ No

If Yes,

i. Purpose of the impoundment: Bioretention facilities, underground chambers, wet ponds, and wastewater attenuation will be designed to reduce runoff rates below existing conditions and improve control of runoff.

ii. If a water impoundment, the principal source of the water: ☐ Ground water ☐ Surface water streams ☑ Other specify:

Stormwater tormwater runoff from the project site and tributary surface run-on to it. Some wastewater will also be impounded.

iii. If other than water, identify the type of impounded/contained liquids and their source.

In addition to stormwater runoff, wastewater from sources including bathrooms, locker room showers, sports facilities, and cooking facilities is anticipated.

iv. Approximate size of the proposed impoundment. Volume: +/-65,000 cubic yards surface area: +/-15 acres

v. Dimensions of the proposed dam or impounding structure: 4 '-5' height; 500' length average dimensions

vi. Construction method/materials for the proposed dam or impounding structure (e.g., earth fill, rock, wood, concrete):

Biorention facilities (shallow depression and biosoil filter), underground chambers (prefab underground detention system), wet ponds (ditch with grass and landscaping) and wastewater attenuation (concrete box)

D.2. Project Operations

a. Does the proposed action include any excavation, mining, or dredging, during construction, operations, or both? (Not including general site preparation, grading or installation of utilities or foundations where all excavated materials will remain onsite) ☑ Yes ☐ No

If Yes:

i .What is the purpose of the excavation or dredging? Required for construction of new stadium, setback perimeter, and ancillary building location

ii. How much material (including rock, earth, sediments, etc.) is proposed to be removed from the site?

- Volume (specify tons or cubic yards): Approx. 500,000 cubic yards
- Over what duration of time? The duration of mass excavation is currently anticipated to be 6/1/23 – 12/1/23

iii. Describe nature and characteristics of materials to be excavated or dredged, and plans to use, manage or dispose of them.

Soil, gravel, and shale will be excavated. Any material not suitable for re-use on this site will be recycled off-site.

iv. Will there be onsite dewatering or processing of excavated materials? ☑ Yes ☐ No

If yes, describe. Onsite watering will occur during construction. Some of the excavated materials may be processed (crushed to make excavated materials suitable for re-use).

v. What is the total area to be dredged or excavated? Approx. 14.4 acres

vi. What is the maximum area to be worked at any one time? * See no acres

vii. What would be the maximum depth of excavation or dredging? approx. 35 feet

viii. Will the excavation require blasting? ☐ Yes ☑ No

ix. Summarize site reclamation goals and plan:

The project's objectives are to re-use all excavated material as fill either on the new stadium site, on the existing stadium site, at other nearby locations and/or as needed cover at nearby landfills.

*To meet project schedule requirements, it is possible that the entire area indicated above could be in operation at some point in the excavation process.

b. Would the proposed action cause or result in alteration of, increase or decrease in size of, or encroachment into any existing wetland, waterbody, shoreline, beach or adjacent area? ☐ Yes ☑ No

If Yes:

i. Identify the wetland or waterbody which would be affected (by name, water index number, wetland map number or geographic description):

ii. Describe how the proposed action would affect that waterbody or wetland, e.g. excavation, fill, placement of structures, or alteration of channels, banks and shorelines. Indicate extent of activities, alterations and additions in square feet or acres:

iii. Will the proposed action cause or result in disturbance to bottom sediments? ☐Yes ☐No
If Yes, describe:

iv. Will the proposed action cause or result in the destruction or removal of aquatic vegetation? ☐Yes ☐No
If Yes:

- acres of aquatic vegetation proposed to be removed:
- expected acreage of aquatic vegetation remaining after project completion:
- purpose of proposed removal (e.g. beach clearing, invasive species control, boat access):
- proposed method of plant removal:
- if chemical/herbicide treatment will be used, specify product(s):

v. Describe any proposed reclamation/mitigation following disturbance:

c. Will the proposed action use, or create a new demand for water? See note below. ☑Yes ☐No
If Yes:

i. Total anticipated water usage/demand per day: 30,000 to 40,000 gallons/day

ii. Will the proposed action obtain water from an existing public water supply? ☑Yes ☐No
If Yes:

- Name of district or service area: A majority of the existing field site east of Abbott Road is in Water District #17, while the ECC Campus and all areas west of Abbott Road are in Water District #6.
- Does the existing public water supply have capacity to serve the proposal? ☑Yes ☐No
- Is the project site in the existing district? ☑Yes ☐No
- Is expansion of the district needed? ☐Yes ☑No
- Do existing lines serve the project site? ☑Yes ☐No

iii. Will line extension within an existing district be necessary to supply the project? ☑Yes ☐No
If Yes:

- Describe extensions or capacity expansions proposed to serve this project: The existing domestic cold water service line already to the site will be extended within the same site to the point of interconnection at the new stadium.
- Source(s) of supply for the district: Lake Erie

iv. Is a new water supply district or service area proposed to be formed to serve the project site? ☐Yes ☑No
If, Yes:

- Applicant/sponsor for new district:
- Date application submitted or anticipated:
- Proposed source(s) of supply for new district:

v. If a public water supply will not be used, describe plans to provide water supply for the project: N/A

vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: N/A gallons/minute.

d. Will the proposed action generate liquid wastes? ☑Yes ☐No
If Yes:

i. Total anticipated liquid waste generation per day: 27,000-35,000 gallons/day

ii. Nature of liquid wastes to be generated (e.g., sanitary wastewater, industrial; if combination, describe all components and approximate volumes or proportions of each):
Sanitary wastewater will be generated from cooling tower, bathroom, locker room showers, team facilities, and cooking facilities. Peak flows will continue to be managed using on-site retention that allows for timed releases within the capacity of the sewage infrastructure, including the servicing treatment plant.

iii. Will the proposed action use any existing public wastewater treatment facilities? ☑Yes ☐No
If Yes:

- Name of wastewater treatment plant to be used: Southtowns Advanced Wastewater Treatment Facility
- Name of district: Erie County Sewer District # 3
- Does the existing wastewater treatment plant have capacity to serve the project? ☑Yes ☐No
- Is the project site in the existing district? ☑Yes ☐No
- Is expansion of the district needed? ☐Yes ☑No

D.2.c.: No. The new stadium will have less seating and will utilize high efficiency water saving fixtures. It is anticipated that there will be additional water usage at the construction site but not during events when the peak usage at the existing stadium occurs. Daily usage is estimated at between 550,000 GPD (including irrigation) with a peak load of 1,350 GPM for a game day event.

- Do existing sewer lines serve the project site? ☑ Yes ☐ No
- Will a line extension within an existing district be necessary to serve the project? ☐ Yes ☑ No

If Yes:

- Describe extensions or capacity expansions proposed to serve this project: _____

iv. Will a new wastewater (sewage) treatment district be formed to serve the project site? ☐ Yes ☑ No

If Yes:

- Applicant/sponsor for new district: _____
- Date application submitted or anticipated: _____
- What is the receiving water for the wastewater discharge? _____

v. If public facilities will not be used, describe plans to provide wastewater treatment for the project, including specifying proposed receiving water (name and classification if surface discharge or describe subsurface disposal plans):

vi. Describe any plans or designs to capture, recycle or reuse liquid waste: _____

There are no current plans or design to capture, recycle, or reuse liquid waste.

e. Will the proposed action disturb more than one acre and create stormwater runoff, either from new point sources (i.e. ditches, pipes, swales, curbs, gutters or other concentrated flows of stormwater) or non-point source (i.e. sheet flow) during construction or post construction? ☑ Yes ☐ No

If Yes:

i. How much impervious surface will the project create in relation to total size of project parcel?

_____ Square feet or 2+ acres (impervious surface) Approx. acreage of impervious surface.

_____ Square feet or 18+ acres (parcel size) Approx. project area in acres.

ii. Describe types of new point sources. Bioretention facilities and ponds will have point source discharges but will connect to existing storm sewer piping or existing point source locations. See table at bottom of page for receiving points/discharge points.

iii. Where will the stormwater runoff be directed (i.e. on-site stormwater management facility/structures, adjacent properties, groundwater, on-site surface water or off-site surface waters)?

Most stormwater will be directed to on-site stormwater management facilities. Some runoff may be collected in the NYSDOT storm sewer (as under existing conditions). Other runoff will be directed to existing stormwater systems or new stormwater systems similar to existing conditions.

- If to surface waters, identify receiving water bodies or wetlands: _____

RP #1: Unnamed Tributary of Rush Creek, RP#2: Smokes Creek South Branch. Some runoff may be collected in the NYSDOT storm sewer (as under existing conditions) prior to discharge to RP #1 and #2.

- Will stormwater runoff flow to adjacent properties? The perimeter project area may have minor runoff that sheet drains over adjacent properties as with existing conditions. ☑ Yes ☐ No

iv. Does the proposed plan minimize impervious surfaces, use pervious materials or collect and re-use stormwater? ☑ Yes ☐ No

f. Does the proposed action include, or will it use on-site, one or more sources of air emissions, including fuel combustion, waste incineration, or other processes or operations? ☑ Yes ☐ No

If Yes, identify:

i. Mobile sources during project operations (e.g., heavy equipment, fleet or delivery vehicles)

Equipment, trucks and vehicles

ii. Stationary sources during construction (e.g., power generation, structural heating, batch plant, crushers)

Batch plant

iii. Stationary sources during operations (e.g., process emissions, large boilers, electric generation)

Power generation for life safety (emergency/standby power generation), large boilers, and water heaters

g. Will any air emission sources named in D.2.f (above), require a NY State Air Registration, Air Facility Permit, or Federal Clean Air Act Title IV or Title V Permit? ☐ Yes ☑ No

If Yes:

i. Is the project site located in an Air quality non-attainment area? (Area routinely or periodically fails to meet ambient air quality standards for all or some parts of the year) ☐ Yes ☐ No

ii. In addition to emissions as calculated in the application, the project will generate:

- _____ Tons/year (short tons) of Carbon Dioxide (CO_2)
- _____ Tons/year (short tons) of Nitrous Oxide (N_2O)
- _____ Tons/year (short tons) of Perfluorocarbons (PFCs)
- _____ Tons/year (short tons) of Sulfur Hexafluoride (SF_6)
- _____ Tons/year (short tons) of Carbon Dioxide equivalent of Hydroflourocarbons (HFCs)
- _____ Tons/year (short tons) of Hazardous Air Pollutants (HAPs)

D.2.e.ii: Receiving Point #1: Unnamed Tributary of Rush Creek.
Discharge Point #1A: Direct Discharge to Creek
Discharge Point #1B: To NYSDOT St. Sewer System in S.R. 20A that is believed to discharge to Creek (to be confirmed).
Receiving Point #2: Southern Branch of Smokes Creek
Discharge Point #2A: Direct Discharge to Creek
Discharge Point #2B: to NYSDOT St. Swr. System in S.R. 20 that is believed to discharge to Creek (to be confirmed).

h. Will the proposed action generate or emit methane (including, but not limited to, sewage treatment plants, landfills, composting facilities)? ☐Yes ☑No

If Yes:

i. Estimate methane generation in tons/year (metric): _____

ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): _____

i. Will the proposed action result in the release of air pollutants from open-air operations or processes, such as quarry or landfill operations? ☐Yes ☑No

If Yes: Describe operations and nature of emissions (e.g., diesel exhaust, rock particulates/dust):

_____

j. Will the proposed action result in a substantial increase in traffic above present levels or generate substantial new demand for transportation facilities or services? See note below. ☐Yes ☑No

If Yes:

i. When is the peak traffic expected (Check all that apply): ☐ Morning ☐ Evening ☐Weekend ☐ Randomly between hours of _____ to _____.

ii. For commercial activities only, projected number of truck trips/day and type (e.g., semi trailers and dump trucks): _____

iii. Parking spaces: Existing _____ Proposed _____ Net increase/decrease _____

iv. Does the proposed action include any shared use parking? ☐Yes ☐No

v. If the proposed action includes any modification of existing roads, creation of new roads or change in existing access, describe:

vi. Are public/private transportation service(s) or facilities available within ½ mile of the proposed site? ☐Yes ☐No

vii Will the proposed action include access to public transportation or accommodations for use of hybrid, electric or other alternative fueled vehicles? ☐Yes ☐No

viii. Will the proposed action include plans for pedestrian or bicycle accommodations for connections to existing pedestrian or bicycle routes? ☐Yes ☐No

k. Will the proposed action (for commercial or industrial projects only) generate new or additional demand for energy? ☐Yes ☑No

If Yes:

i. Estimate annual electricity demand during operation of the proposed action: _____

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other):

iii. Will the proposed action require a new, or an upgrade, to an existing substation? ☐Yes ☑No

l. Hours of operation. Answer all items which apply.

i. During Construction: Construction team will coordinate with the Bills on Game Days.

- Monday - Friday: 6 AM -11 PM
- Saturday: 7 AM to 6 PM
- Sunday: 8 AM to 5 PM
- Holidays: N/A

ii. During Operations: Security presence is 24/7/365.

- Monday - Friday: Reg. business hours on campus are 9 AM to 5 PM
- Saturday: Hours will vary on event days
- Sunday: Hours will vary on event days
- Holidays: Hours will vary on event days

D.2.j.:No. The function, use and operation of the new Stadium will be similar to the existing Highmark Stadium which will be demolished. The current 71,600 seat capacity of Highmark Stadium generates an established traffic demand on event days. The new Stadium will have a reduced approximate 60,000 seat capacity of about 16%. Thus, it is anticipated that trip counts on the largest events such as Bills games and concerts will be reduced accordingly. The existing site controlled by the Buffalo Bills contains approximately 9,600 public use parking spaces and the proposed action will result in approximately 10,300 public use parking spaces, therefore the parking demand on the surrounding neighborhood is anticipated to be reduced.

m. Will the proposed action produce noise that will exceed existing ambient noise levels during construction, operation, or both? ☑ Yes ☐ No

If yes:

i. Provide details including sources, time of day and duration:

Construction activities would exceed existing ambient noise levels. Once the stadium is operational, ambient noise would be comparable to the existing stadium. The partial canopy and extent of exterior envelope enclosure may help contain sound levels as compared to existing conditions.

ii. Will the proposed action remove existing natural barriers that could act as a noise barrier or screen? ☐ Yes ☑ No

Describe:

n. Will the proposed action have outdoor lighting? See note below. ☑ Yes ☐ No

If yes:

i. Describe source(s), location(s), height of fixture(s), direction/aim, and proximity to nearest occupied structures:

The parking areas altered by the project will replace the existing lighting with shorter poles and will consider use of lower poles near the stadium, pedestrian pathway areas, and adjacent to the residential property near Abbott Road. All light sources will be LED.

ii. Will proposed action remove existing natural barriers that could act as a light barrier or screen? ☐ Yes ☑ No

Describe:

o. Does the proposed action have the potential to produce odors for more than one hour per day? ☑ Yes ☐ No

If Yes, describe possible sources, potential frequency and duration of odor emissions, and proximity to nearest occupied structures:

Odors would be created by cooking food at the stadium. The stadium will feature concession stands will generate food odors on game and event days. Similarly, tailgating activities in parking lots on game days would generate food odors. Any odors generated would be similar to existing conditions.

p. Will the proposed action include any bulk storage of petroleum (combined capacity of over 1,100 gallons) or chemical products 185 gallons in above ground storage or any amount in underground storage? See note below. ☑ Yes ☐ No

If Yes:

i. Product(s) to be stored Liquid Fertilizer, Pesticides, and Fungicides as well as #2 diesel for emergency power generation

ii. Volume(s) 200 gallon per unit time year (e.g., month, year) for liquid fertilizer, pesticides, and fungicides.

iii. Generally, describe the proposed storage facilities: There will be one (1) 8,000 gallon underground diesel storage tank. Per unit time is TBD. Restricted use products will be stored in a fertilizer/pesticide cabinet that can be locked. Other fertilizers will stored on shelving in controlled access room.

q. Will the proposed action (commercial, industrial and recreational projects only) use pesticides (i.e., herbicides, insecticides) during construction or operation? ☑ Yes ☐ No

If Yes:

i. Describe proposed treatment(s):

No pesticide use is anticipated during construction. Once the project is operational, there will be bi-weekly applications of fertilizer and monthly applications of fungicides. Pesticide application will be completed once annually (May/June) and then done on an as needed basis the remainder of the year.

ii. Will the proposed action use Integrated Pest Management Practices? ☐ Yes ☑ No

r. Will the proposed action (commercial or industrial projects only) involve or require the management or disposal of solid waste (excluding hazardous materials)? ☑ Yes ☐ No

If Yes:

i. Describe any solid waste(s) to be generated during construction or operation of the facility:

- Construction: approx. 2100-2800 tons per construction period (unit of time)
- Operation : approx. 84 tons per year (unit of time) Note: Assumes 12 Bills home games and 3 other major events.

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

- Construction: Based on data from similar projects, demolition of the existing stadium would produce approx. 1,000 tons of debris (55% recycled), approx. 18,000 tons of concrete (95% recycled), and 100 tons of aluminum and metals (100% recycled).
- Operation: Recyclable materials will primarily consist of cardboard, aluminum cans and paper products. Cardboard balers and trash and dedicated recycling containers will be provided in the loading dock and service area of the stadium.

iii. Proposed disposal methods/facilities for solid waste generated on-site:

- Construction: The exact disposal method will be determined by the contractor and will follow all applicable NYSDEC guidelines and standards.
- Operation: The Buffalo Bills are aware of NYS laws regarding food waste regulations and requires its food service operator and vendors comply with all applicable laws. The stadium uses Modern Waste and Disposal for trash and recycling services.

D.2.n.: The types of sources will all be LED and will include a combination of post lights, bollards, steplights, low level pathlights, integral lighting within furniture, and adjustable general illumination lights mounted within trees. Uplighting will be sensitively used to accentuate key features of the New Stadium structure as well as specific moments within the plazas/landscaped areas. Any fixture that sits close to the perimeter of site will be equipped with shielding to prevent light trespass. A lighting control system will be implemented and will play a key role in the outdoor environment, allowing fixtures to be regulated to appropriate light levels during evening hours when guests are on site as well as after hours for security.

D.2.p.: The stadium facility currently stores diesel fuel, pesticides, and fungicides on site. With respect to pesticides and fungicides, all products, usage, frequency and process will be similar to what is currently done to the practice fields at the Training Facility. However, the existing stadium field is artificial turf so a new natural grass field at the new stadium will increase the overall quantity used annually. The new stadium will also increase the storage of diesel from existing conditions.

s. Does the proposed action include construction or modification of a solid waste management facility? ☐ Yes ☑ No

If Yes:

i. Type of management or handling of waste proposed for the site (e.g., recycling or transfer station, composting, landfill, or other disposal activities): _____

ii. Anticipated rate of disposal/processing:

- _____ Tons/month, if transfer or other non-combustion/thermal treatment, or
- _____ Tons/hour, if combustion or thermal treatment

iii. If landfill, anticipated site life: _____ years

t. Will the proposed action at the site involve the commercial generation, treatment, storage, or disposal of hazardous waste? ☐ Yes ☑ No

Hazardous waste, if encountered during demolition, will be disposed of according to local, state, and federal guidelines.

If Yes:

i. Name(s) of all hazardous wastes or constituents to be generated, handled or managed at facility: _____

ii. Generally describe processes or activities involving hazardous wastes or constituents: _____

iii. Specify amount to be handled or generated _____ tons/month

iv. Describe any proposals for on-site minimization, recycling or reuse of hazardous constituents: _____

v. Will any hazardous wastes be disposed at an existing offsite hazardous waste facility? ☐ Yes ☐ No

If Yes: provide name and location of facility: _____

If No: describe proposed management of any hazardous wastes which will not be sent to a hazardous waste facility:

E. Site and Setting of Proposed Action

E.1. Land uses on and surrounding the project site

a. Existing land uses.

i. Check all uses that occur on, adjoining and near the project site.

☐ Urban ☐ Industrial ☑ Commercial ☑ Residential (suburban) ☐ Rural (non-farm)
☑ Forest ☐ Agriculture ☑ Aquatic ☑ Other (specify): Educational Facility (Erie County Community College)

ii. If mix of uses, generally describe:

Bills Stadium is located in a suburban area and is surrounded by residential and commercial uses and a community college.

b. Land uses and covertypes on the project site.

Land use or Covertype	Current Acreage	Acreage After Project Completion	Change (Acres +/-)
• Roads, buildings, and other paved or impervious surfaces	95.0	120.0	+25.0
• Forested	2.0	0	-2.0
• Meadows, grasslands or brushlands (non-agricultural, including abandoned agricultural)	0	0	
• Agricultural (includes active orchards, field, greenhouse etc.)	0	0	
• Surface water features see note below (lakes, ponds, streams, rivers, etc.)	0	1.5	+1.5
• Wetlands (freshwater or tidal)	0		
• Non-vegetated (bare rock, earth or fill)			
• Other Describe: manicured/dense lawn	88.0	63.5	-24.5

Surface Water Features: 1.5 acres of permanent retention features are added by new stadium design.

Acreage represented in land use table equals the limit of disturbance.

c. Is the project site presently used by members of the community for public recreation? ☑ Yes ☐ No

i. If Yes: explain: Highmark Stadium hosts public events at their facility.

d. Are there any facilities serving children, the elderly, people with disabilities (e.g., schools, hospitals, licensed day care centers, or group homes) within 1500 feet of the project site? ☑ Yes ☐ No

If Yes,

i. Identify Facilities:

Erie Community College is located to the west of Highmark Stadium. Windom Elementary School is located to the northwest of Highmark Stadium.
Southtowns Childrens Associates is a special education school located north of Highmark Stadium.

e. Does the project site contain an existing dam? Does not include impoundments discussed in D.1.h. ☐ Yes ☑ No

If Yes:

i. Dimensions of the dam and impoundment:

- Dam height: _____ feet
- Dam length: _____ feet
- Surface area: _____ acres
- Volume impounded: _____ gallons OR acre-feet

ii. Dam's existing hazard classification: _____

iii. Provide date and summarize results of last inspection:

f. Has the project site ever been used as a municipal, commercial or industrial solid waste management facility, or does the project site adjoin property which is now, or was at one time, used as a solid waste management facility? ☐ Yes ☑ No

If Yes:

i. Has the facility been formally closed? ☐ Yes ☐ No

- If yes, cite sources/documentation: _____

ii. Describe the location of the project site relative to the boundaries of the solid waste management facility:

iii. Describe any development constraints due to the prior solid waste activities: _____

g. Have hazardous wastes been generated, treated and/or disposed of at the site, or does the project site adjoin property which is now or was at one time used to commercially treat, store and/or dispose of hazardous waste? ☑ Yes ☐ No

If Yes:

i. Describe waste(s) handled and waste management activities, including approximate time when activities occurred:

ECC handles hazardous wastes according to federal (RCRA) and state requirements.

h. Potential contamination history. Has there been a reported spill at the proposed project site, or have any remedial actions been conducted at or adjacent to the proposed site? ☑ Yes ☐ No

If Yes:

i. Is any portion of the site listed on the NYSDEC Spills Incidents database or Environmental Site Remediation database? Check all that apply: ☑ Yes ☐ No

☑ Yes – Spills Incidents database — Provide DEC ID number(s): 8803429, 9214217,0905583,1302788, 1607784,1802979

☐ Yes – Environmental Site Remediation database — Provide DEC ID number(s): _____

☐ Neither database

ii. If site has been subject of RCRA corrective activities, describe control measures: _____

None

iii. Is the project within 2000 feet of any site in the NYSDEC Environmental Site Remediation database? ☐ Yes ☑ No

If yes, provide DEC ID number(s): _____

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s):

No current violations or active spills

v. Is the project site subject to an institutional control limiting property uses? ☐ Yes ☑ No

- If yes, DEC site ID number: _____
- Describe the type of institutional control (e.g., deed restriction or easement): _____
- Describe any use limitations: _____
- Describe any engineering controls: _____
- Will the project affect the institutional or engineering controls in place? ☐ Yes ☐ No
- Explain: _____

THIS PORTION OF THE FORM COMPLETED BY MCMAHON & MANN

E.2. Natural Resources On or Near Project Site

a. What is the average depth to bedrock on the project site? +/- 7.8 feet

b. Are there bedrock outcroppings on the project site? ☐ Yes ☑ No
If Yes, what proportion of the site is comprised of bedrock outcroppings? _____ %

c. Predominant soil type(s) present on project site:

MfA - Marilla shaly silt loam	33 %
MaB - Manlius shaly silt loam	33 %
DbA - Darien silt loam	34 %

d. What is the average depth to the water table on the project site? Average: +/- 6.4 feet

e. Drainage status of project site soils:
☑ Well Drained: 33 % of site
☑ Moderately Well Drained: 33 % of site
☑ Poorly Drained 34 % of site

f. Approximate proportion of proposed action site with slopes:
☑ 0-10%: 100 % of site
☐ 10-15%: _____ % of site
☐ 15% or greater: _____ % of site

g. Are there any unique geologic features on the project site? ☐ Yes ☑ No
If Yes, describe: _____

h. Surface water features.

i. Does any portion of the project site contain wetlands or other waterbodies (including streams, rivers, ponds or lakes)? ☑ Yes ☐ No

ii. Do any wetlands or other waterbodies adjoin the project site? see note below. ☑ Yes ☐ No

If Yes to either *i* or *ii*, continue. If No, skip to E.2.i.

iii. Are any of the wetlands or waterbodies within or adjoining the project site regulated by any federal, state or local agency? ☑ Yes ☐ No

iv. For each identified regulated wetland and waterbody on the project site, provide the following information:

- Streams: Name 837-226, 837-229, 837-235 Classification C
- Lakes or Ponds: Name _____ Classification _____
- Wetlands: Name federal wetland (PFO1A) Approximate Size +/- 4 acres
- Wetland No. (if regulated by DEC) _____

v. Are any of the above water bodies listed in the most recent compilation of NYS water quality-impaired waterbodies? ☑ Yes ☐ No

If yes, name of impaired water body/bodies and basis for listing as impaired: _____
Name - Pollutants - Uses:Rush Creek and tribs – Pathogens;Nutrients – Recreation;Public Bathing;Aquatic Life, Name - Pollutants - Uses:South Branch Smoke Creek (lower) Branch Smoke Creek, Lower, and tribs – Nutrients;Silt/Sediment – Recreation; Aquatic Life

i. Is the project site in a designated Floodway? ☑ Yes ☐ No

j. Is the project site in the 100-year Floodplain? ☑ Yes ☐ No

k. Is the project site in the 500-year Floodplain? ☑ Yes ☐ No

l. Is the project site located over, or immediately adjoining, a primary, principal or sole source aquifer? ☐ Yes ☑ No
If Yes:

i. Name of aquifer: _____

E.2.h: The streams and wetlands listed above are located on the project site but will not be impacted by the project.

m. Identify the predominant wildlife species that occupy or use the project site:
Typical suburban species such as rodents, deer, songbirds, crows, foxes, coyotes, squirrels, rabbits, raptors, crows, frogs, and snakes raccoons, woodchucks, chipmunks, may pass through the site.

n. Does the project site contain a designated significant natural community? ☐ Yes ☑ No
If Yes:
i. Describe the habitat/community (composition, function, and basis for designation):
ii. Source(s) of description or evaluation:
iii. Extent of community/habitat:
- Currently: acres
- Following completion of project as proposed: acres
- Gain or loss (indicate + or -): acres

o. Does project site contain any species of plant or animal that is listed by the federal government or NYS as endangered or threatened, or does it contain any areas identified as habitat for an endangered or threatened species? ☐ Yes ☑ No
If Yes:
i. Species and listing (endangered or threatened):

p. Does the project site contain any species of plant or animal that is listed by NYS as rare, or as a species of special concern? ☐ Yes ☑ No
If Yes:
i. Species and listing:

q. Is the project site or adjoining area currently used for hunting, trapping, fishing or shell fishing? ☑ Yes ☐ No
If yes, give a brief description of how the proposed action may affect that use:
Recreational fishing activities take place in Smokes Creek and Rush Creek.

E.3. Designated Public Resources On or Near Project Site

a. Is the project site, or any portion of it, located in a designated agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304? ☐ Yes ☑ No
If Yes, provide county plus district name/number:

b. Are agricultural lands consisting of highly productive soils present? ☑ Yes ☐ No
i. If Yes: acreage(s) on project site? +/- 1 acre
ii. Source(s) of soil rating(s): USDA Farmland Classification (Prime Soils)

c. Does the project site contain all or part of, or is it substantially contiguous to, a registered National Natural Landmark? ☐ Yes ☑ No
If Yes:
i. Nature of the natural landmark: ☐ Biological Community ☐ Geological Feature
ii. Provide brief description of landmark, including values behind designation and approximate size/extent:

d. Is the project site located in or does it adjoin a state listed Critical Environmental Area? ☐ Yes ☑ No
If Yes:
i. CEA name:
ii. Basis for designation:
iii. Designating agency and date:

e. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places? ☐ Yes ☑ No

If Yes:

i. Nature of historic/archaeological resource: ☐ Archaeological Site ☐ Historic Building or District

ii. Name: _____

iii. Brief description of attributes on which listing is based:

_____

f. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory? ☑ Yes ☐ No

g. Have additional archaeological or historic site(s) or resources been identified on the project site? ☐ Yes ☑ No

If Yes:

i. Describe possible resource(s): _____

ii. Basis for identification: _____

h. Is the project site within fives miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource? ☑ Yes ☐ No

If Yes:

i. Identify resource: Woodlawn Beach State Park

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.): State Park

iii. Distance between project and resource: approx. 5 miles.

i. Is the project site located within a designated river corridor under the Wild, Scenic and Recreational Rivers Program 6 NYCRR 666? ☐ Yes ☑ No

If Yes:

i. Identify the name of the river and its designation: _____

ii. Is the activity consistent with development restrictions contained in 6NYCRR Part 666? ☐ Yes ☐ No

F. Additional Information

Attach any additional information which may be needed to clarify your project.

If you have identified any adverse impacts which could be associated with your proposal, please describe those impacts plus any measures which you propose to avoid or minimize them.

G. Verification

I certify that the information provided is true to the best of my knowledge.

Applicant/Sponsor Name Kathryn D'Angelo Date 7/1/2022

Signature DocuSigned by: Kathryn D'Angelo 006622D6FE0147A... Title Assistant General Counsel

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APPENDIX E

LIMITATIONS
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

APPENDIX E

LIMITATIONS
NEW BILLS STADIUM
ORCHARD PARK, NEW YORK

1. The scope of McMahon & Mann Consulting Engineering and Geology, P.C.'s services is limited to the geotechnical engineering considerations identified in our agreement.

2. The scope of work for this project does not include an evaluation of the presence of hazardous substances. The Buffalo Bills, LLC should contact McMahon & Mann Consulting Engineering and Geology, P.C. in the event that hazardous substances are encountered to evaluate the impact on the geotechnical recommendations.

3. The analyses and recommendations submitted in this report are based in part upon the data obtained from the subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear, it will be necessary to re-evaluate the recommendations in this report.

4. The generalized soil and rock profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized. They have been developed by interpretations of widely-spaced explorations and samples. Actual soil and rock transitions can vary.

5. Groundwater was observed at the times and under the conditions stated. Fluctuations in the groundwater levels occur from rainfall, seasonal runoff and other factors differing from the time that the observations were made.

6. In the event that any changes in the nature or design of the project are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions of this report are modified or verified in writing by McMahon & Mann Consulting Engineering and Geology, P.C. It is recommended that McMahon & Mann Consulting Engineering and Geology, P.C. be given the opportunity to review the final design and specifications to verify that our recommendations are properly interpreted.

7. It is recommended that McMahon & Mann Consulting Engineering and Geology, P.C. be retained to monitor geotechnical aspects of the project construction.

8. This report has been prepared for the exclusive use of Legends Project Development and the Buffalo Bills, LLC for the specific application to the proposed stadium and associate structures in Orchard Park, New York in accordance with generally accepted soil and foundation engineering practice. No other warranty, expressed or implied, is made.