architects planners interiors

FRENCH associates

236 Mill Street
Rochester, MI
48307

December 2, 2022

City of Rochester Hills
Planning Department
1000 Rochester Hills Dr.
Rochester Hills, MI 48309

**Attention:** **Sara Roediger, Planning and Economic Development Director**

**Subject:** **Rochester University Athletic Fields Improvement**
**City File #22-021 Section #15**
**Parcel No. 70-15-15-451-008**
Architect's Project No. 2020-003

Dear Sara,

This letter and the attached documents are a response to your Site Plan Review letters dated July 15, 2022.

Architectural Responses:

1. Sheet I1.01 – Aerial View
   a. In response to the comment regarding the accessible route, per Section 111.4.1, access to the site will only for players and officials who will be using the field. Access to the field is provided by gates in the outfield. The accessible route is the warning track and that surface satisfies the requirements for the surface of an accessible route.
   b. In response to the double doors not being shown on the press box in the southeast corner, there will be doors there per the building elevations. Please note that this aerial view was provided for reference to illustrate the concept of the project. It was not updated to reflect the final design of the buildings or other elements.

2. Sheet C1.0 – Overall Site Plan
   a. In response to the request for the soil borings, the soil borings report as issued by G2 Consulting Group has been attached.
   b. In response to the request for a description of the typical use and anticipated parking demands, please refer to the document from attached.

3. Sheet A2.01 – Press Box and Team Room Building
   a. Added the area of the Sales Room of the Second Floor Plan.

4. Sheet A4.01 – Building Elevations
   a. Changed the Field Side Elevation of the Teams Building to break up the massing of the large wall by modifying the extent and design of the masonry accent bands.

Civil Responses:

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1. Please refer to the attached drawings and narrative as prepared and issued by Creative Solutions, PLC.

Landscape

1. Please refer to the attached drawings and narrative as prepared and issued by Zaremba & Company.

Athletics

1. Please refer to the attached drawings and narrative as prepared and issued by Foresite Design.

Electrical

1. In response to the athletic field lighting, a Request for Waiver has been provided on Sheet ES1.00

Please contact me with any questions.

Sincerely,

Rick E. Lipski
Architect

cc: Jaymes Vettraino, Rochester University
Jason Arnold, Creative Site Solutions

Site Plan Statement

The approved PUD Plan for Rochester University provides for the development of separate baseball, soccer/lacrosse, and softball fields. Consistent with the PUD the new Rochester Athletic Field provides accommodations for these sports, but does it within one multi-use field.

The project is a response to student interests and an effort to maintain commensurate sports teams and facilities as RU's peer institutions within the Wolverine-Hoosier Athletic Conference of the National Association of Intercollegiate Athletics (NAIA). Currently, RU supports 25 men's and women's teams in 14 sports. Of those, seven (7) do not have on-campus practice or competition facilities. The proposed project is intended to address deficiency for five (5) of those teams. In addition, the facility will allow RU to add a men's lacrosse team and bolster current rosters. The new facilities will also add to the community inventory of appropriately sized athletic fields available for community use.

The proposed layout addresses these goals by co-locating multiple sports within the same field footprints. The layout reduces the overall scale of the project and amount of impact to regulated natural features. The below matrix provides a general description of the season and time of day each of the sports will be using the field. Two sports may practice on the field at the same time, but two RU athletic teams cannot play games at the same time.

| **New Athletic Field Activity** | **Anticipated Season (Month-to-Month)** | **Anticipated Time of Day (i.e. morning, afternoon, evening)** |
|---|---|---|
| Soccer (Men's) | August - October | Morning or afternoon depending on women's soccer |
| Soccer (Women's) | August - October | Morning or afternoon depending on men's soccer |
| Baseball (Men's) | September - October; March - April | Afternoon or evening depending on softball |
| Softball (Women's) | September - October; March - April | Afternoon or evening depending on baseball |
| Lacrosse (Men's) | February - April | Morning or afternoon depending on women's lacrosse |
| Lacrosse (Women's) | February - April | Morning or afternoon depending on men's lacrosse |
| Community Rental | May - July | Any time |

Suggested statement regarding parking:

Parking is currently provided for the existing baseball field, the new multi-use field will replace the existing baseball field. During the school year, the parking count for the existing and new field should be a one-for-one match. As noted, no two Rochester University games will be played at the same time on the field. Of the sports to be played on the field, men's baseball (current use of the field) has the most number of players and largest seating capacity. The other sports have lower number of players and less fan seating. There is potential for community rental of the multi-use field, which could host two little league games at the same time. As noted, these would occur during the summer months of May - July, when the parking needs of the RU are significantly lower than during the months when the students are on campus (August - April), providing a large excess of parking available to the public during the summer months

**CREATIVE SITE SOLUTIONS, PLC**
**CIVIL ENGINEERING & SITE DESIGN**
3728 Nash Drive  Troy, Michigan  48083  Tel: 248 259-2023

December 2, 2022

City of Rochester Hills
Planning & Economic Development
1000 Rochester Hills Drive
Rochester Hills, Michigan  48309

Re: Rochester University Site Plan Review Response to comments

In response to each of the comments placed on the Civil Sheets dated 6/20/2022:

C1.0 Overall Site Plan:

- The Legal Description for the campus has been added to the sheet.
- Engineer's seal/signature has been added to this sheet.
- A 25 foot wetland setback has been added to the plans. In some cases, the setback cannot be met due to the amount of clearing and fill necessary to construct the improvements. Therefore, a reduction of the setback needs to be requested for.
- Soil boring report will be provided to the Engineering Department at the time of plan resubmission.
- According to conversation with Mr. Boughton of the Engineering Department, the LIP application process should begin after Site Plan Approval has been received from the Planning Commission. This note was clarification that we will have to provide a LIP application at a later time.
- The City File number has been added to the lower right hand corner of each sheet of the Civil plans.

C1.1 Site Plan:

- The Athletic Fields facilities will share the dumpster enclosure that was constructed as part of the Garth Pleasant Arena project.
- Benchmark Legend has been added to the sheet.
- Liber and page of existing easements have been added to the easement labels on the sheet.

C1.2 Fire Protection Plan

- Location of fence gate for emergency vehicle access is shown on the plan.
- Previously shown "Crash Gate" has been replaced with a manual gate with Knox Lock.
- Width of the Fire Truck Access Route has been increased to 20 feet wide and the Fire Truck Turn Around has been adjusted accordingly.

C4.1 Grading Plan Area 1

- Dimensions for the two ADA parking spaces at the northwest corner of the development have been adjusted to meet what is required. Also, see sheet C4.5 for dimensions and spot grades in the area.
- Regarding the need for an accessible route to the batting cages, these are intended to only be accessed by the players and staff that are using the field. They are not intended to be accessible to the public or random people.

C4.3 Grading Plan Area 3

- The hatched area is part of the accessible route for the ADA parking spaces. It is the ramp portion of a MDOT Curb Ramp Type P. It has been shifted south to address the inaccessibility identified by the Building Dept.
- Dimensions for the ADA parking spaces have been added. Also, see sheet C4.5 for dimensions and spot grades in the area.

C4.4 Grading Plan Area 4

- See sheet C4.5 for dimensions and spot elevations have been added to the accessible parking spaces and access aisles.
- Proposed concrete pavement heading to the rear of the existing white house and barn is intended to be used by maintenance/campus vehicles and not for pedestrian use.

C5.1 Wall Profile and Section

- A structural engineer has been retained to create the retaining wall construction plans that will achieve approval for construction.

C7.0 Utility Plan

- The emergency overflow route for the proposed storm sewer network is to be controlled by the top of weir wall inside the Outlet Control Structure, OCS A2, and will discharge to the existing storm sewer system.
- A detail for OCS A2 has been added to sheet C7.2.
- Existing sanitary lead for Garth Pleasant Arena has been labeled as such.
- Since the previous submittal, the alignment for the private domestic has been revised and the connection to the building has moved further north. A shut off valve has been added to the water service nine feet away from the proposed building.
- The proposed private domestic service to the proposed building has been labeled as such.
- It is the intent of RU to amend their existing storm water maintenance agreement for the additional storm sewer. According to conversation with Mr. Boughton of the Engineering Department, the process for doing so may be done during the Construction Plan Review process and is not needed to receive Site Plan approval.

C8.0 Drainage Area Map

- The calculations have been corrected as well as updated based on site plan revisions made since the previous submittal was made.
- The detail for OCS A2 has a Vortex Valve specified at the outlet elevation because of the orifice calculation yielding a diameter less than 4”.

Feel free to call if there is anything for us to discuss.

Sincerely,

**Creative Site Solutions, PLC**

Jason Arnold, P.E.
Principal Civil Engineer

ZAREMBA & COMPANY

# Rochester University Athletic Field Improvements – SITE PLAN RESUBMISSION Landscape Summary – Zaremba & Co.

## Plans Dated 12/02/2022

**L100 Planting Plan**

- No Changes made specific to review comments on this sheet
- Engineeering Comment on C1.0 - City File #22-021 Section #15 in the lower right hand corner of each sheet
    - Added "City File #22-021 Section #15"
- Fire comment on C1.2 - Increase the width of the fire lane to 20 feet. The three story concession building will require an aerial apparatus.
    - Lawn areas and tree arrangements have been adjusted to fit the widened pavement (see civil plans)
- Building Comment on C4.1 - Dimension all accessible parking spaces…
    - Extents of lawn area expanded to include restoration of disturbed area adjacent to northwest parking spaces
- Building Comment on C4.3 - If this hatched area is the accessible route for both accessible parking spaces to the sidewalk…
    - Lawn areas and tree arrangements have been adjusted to fit revised walkway route adjacent to south parking spaces (see civil plans)
- Building Comment on C4.4 - Slope = 6.2%. Max. walking slope shall be 5%. Please resolve.
    - Lawn areas and tree arrangements have been adjusted to fit revised walkway route adjacent to southeast (see civil plans)

**L101 Planting Details**

- No Changes made specific to review comments on this sheet
- Engineeering Comment on C1.0 - City File #22-021 Section #15 in the lower right hand corner of each sheet
    - Added "City File #22-021 Section #15"

Prepared by: Zaremba & Company (Z & Co.)

Writer: Quentin Hyde, Z & Co. Date: December 1, 2022

FORESITE design

3269 Coolidge Highway
Berkley, Michigan 48072
Phone 248-547-7757
Fax 248-547-0218
Website: www.foresitedesign.com

# SITE PLAN RESUBMITTAL WRITE-UP

**Date:** December 02, 2022

**To:** Rick Lipski

**Company:** French Associates

**From:** Bruce Lemons

**Re:** Rochester University
Addendum #1

---

The following is the write-up for Addendum #1:

ITEM NO. ATHLETIC FACILITY SPECIFICATION CHANGES

NA

ITEM NO. ATHLETIC FACILITY DRAWING CHANGES

#1-L1.01 Refer to Sheet L1.03 Fence Plan

**A. Two (2) Gates were revised accommodate sidewalk revisions at Softball Field #1 (SB #1).**
**B. One (1) gate was at the batting cage. Access to the batting cage is from the field.**

End of Site Plan Resubmission Write-Up

CONSULTING GROUP

Report on Geotechnical Investigation

# Rochester University Athletic Improvements
# 800 West Avon Road
# Rochester Hills, Michigan
# 48307

Latitude 42.667839° N
Longitude 83.142757° W

Prepared for:

French Associates, Inc.
236 Mill Street
Rochester, Michigan 48307

G2 Project No. 220610
September 30, 2022

g2consultinggroup.com

| | | | | |
|---|---|---|---|---|
| **Headquarters** | 1866 Woodslee St | Troy, MI 48083 | P 248.680.0400 | F 248.680.9745 |
| **Ann Arbor** | 1350 Eisenhower Pl | Ann Arbor, MI 48108 | P 734.390.9330 | F 734.390.9331 |
| **Chicagoland** | 1186 Heather Dr | Lake Zurich, IL 60047 | P 847.353.8740 | F 847.353.8742 |

CONSULTING GROUP

September 30, 2022

Mr. Rick Lipski
French Associates, Inc.
236 Mill Street
Rochester, Michigan 48307

Re: Report on Geotechnical Investigation
Rochester University Athletic Improvements
800 West Avon Road
Rochester Hills, Michigan 48307
G2 Project No. 220610

Dear Mr. Lipski:

We have completed the geotechnical investigation for the proposed athletic field improvements at Rochester University in Rochester Hills, Michigan. This report presents the results of our observations and analyses, recommendations for subgrade preparation, synthetic turf, building, light pole, backstop, and retaining wall foundations, and construction considerations as they relate to the geotechnical conditions at the site.

We appreciate the opportunity to be of service to French Associates, Inc. and look forward to discussing the recommendations presented. In the meantime, if you have any questions regarding the report or any other matter pertaining to the project, please call us.

Sincerely,

**G2 Consulting Group, LLC**

Amy L. Schneider, P.E.
Project Manager

Noel J. Hargrave-Thomas, P.E.
Principal

ALS/NJHT/ljv

Enclosures

## EXECUTIVE SUMMARY

The project will include constructing a new synthetic turf athletic field, a two-story press box, a three-story concession and team building, four dugouts, retaining walls, and an elevated plaza. The synthetic turf field and structures will be constructed at an elevation of 766.70 feet and the elevated plaza will be construction at an elevation of 776.70 feet. Athletic light poles will be situated around the perimeter of the complex.

Approximately 2 to 6 inches of topsoil are present at the soil boring locations. Fill soils, consisting of clayey sand, silty sand, and very stiff to hard silty clay, underlie the topsoil at borings B-1, B-6, B-7, B-13, and B-19 and extend to approximate depths ranging from 1-1/4 to 6 feet below existing grade. In general, native silty clay and to a lesser extent clayey silt (decreasing in consistency from very stiff to hard to medium to stiff) underlie the topsoil and fill and extend to approximate depths ranging from 3-1/2 to 19-1/2 feet at borings B-2 through B-9, B-11 through B-13, and B-22 through B-24 and the explored depths at the remaining boring locations. Loose to medium compact sand, silty sand, and sandy silt are present below the cohesive soils and extend to approximate depths ranging from 8 to 15 feet at borings B-1 through B-5 and B-22 and the explored depths at borings B-6 through B-9, B-11 through B-13, B-23, and B-24. Medium to stiff silty clay underlies the granular soils at borings B-1 through B-5 and B-22 and extends to the explored depths. Groundwater was encountered at borings B-1 through B-13 and borings B-21 through B-24 at approximate depths ranging from 3-1/2 to 20 feet below existing grade, corresponding to elevations ranging from 756 to 765 feet. No measurable groundwater was encountered during or upon completion of drilling operations at borings B-14 through B-19, B-25, and B-26.

Based on the proposed grading plan, a significant amount of site balancing will be required to develop the site, including up to 10 feet of grade cuts at the south, east, and northeast sides of the field, up to 10 feet of engineered fill to achieve proposed finished grade at the plaza level, and up to 2 feet of fill at the west side of the complex.

We anticipate the existing native very stiff to hard silty clay and very stiff silty clay fill will provide suitable support for synthetic turf following satisfactory completion of proof rolling operations as described in the SITE PREPARTION section of this report. These soils typically have poor drainage characteristics and will prevent any water which percolates through the synthetic turf and aggregate layers to infiltrate into the subgrade. We recommended the turf system include a minimum 12-inches open-graded drainage stone to provide turf stability and promote subsurface drainage within the proposed artificial turf system. Additionally, we recommend a series of perforated drainpipes connected to nearby catch basins or stormwater structures be placed through the field in order to collect and remove the water.

The concessions and team building, east dugouts, and press box building will be constructed with a first floor elevation of 766.70 feet to match the turf elevation. Pavement and bleachers will extend over the top of the dugouts at the plaza elevation of 776.70 feet. The second floor of the press box and concessions buildings will also be at plaza level. Based on these elevations, three of the first floor walls at each structure will be below grade and act as retaining walls. We recommend the proposed structures be supported on conventional strip footings. Dewatering may be required where foundations extend into the water bearing granular soils at the southeast side of the complex to lower the groundwater table a minimum of 12 inches below design bearing elevation prior to excavation operations to allow foundation construction in dry conditions, as described in the CONSTRUCTION CONSIDERATIONS section of this report. Based on information provided by Foresite Design, Inc., the light poles are typically direct burial within drilled piers pier bearing at a depth of 16 to 20 feet and the backstops are typically supported on drilled piers on the order of 2-1/2 to 3 feet in diameter and bearing at depths ranging from 10 to 15 feet. Complete foundation design recommendations are presented in the sections herein.

This summary is not to be considered separate from the entire text of this report, with all the conclusions and qualifications mentioned herein. Details of our analysis and recommendations are discussed in the following sections and in the Appendix of this report.

## PROJECT DESCRIPTION

The project will include constructing a new athletic field which will be utilized for multiple sports. Details and proposed grades for the complex are presented on the Civil Plans prepared by French Associates and Creative Site Solutions, PLC, Sheet Nos. C1.0 through C5.1, dated September 21, 2022 (REV. Team Coordination). The field will have a finished elevation of 766.70 feet. An elevated plaza with a finished elevation of 776.70 feet will extend along the southeast and east sides of the athletic field.

A two-story press box will be constructed behind home base, with the first floor at the athletic field level (Elev. 766.70) and the second floor at plaza level (Elev. 776.70). A three-story concession building will be located at the northeast side of the complex with the first floor at field level and the second floor at plaza level. Four dugouts will be constructed around the field with a slab-on-grade elevation of 766.70 feet. The two dugouts on the west side of the field will be utilized for the softball field and will extend above proposed grade. The two dugouts on the east side of the field will be utilized for the baseball field and will be below grade with the plaza pavement and bleachers extending over the top of the dugouts. Based on the proposed grades, three of the four walls will be below grade at the east dugouts, the press box, and concession building.

Athletic light poles will be situated around the perimeter of the complex and backstops will be installed behind the softball and baseball home plates. Two retaining walls will extend along the northeast, east, and southeast sides of the complex which will facilitate construction of the raised plaza area. Wall A will front the field with a continuous front of wall elevation of 766.70 feet and a top of wall ranging from approximately 767 feet at the start, stepping up to 776.60 feet adjacent to the concession building and maintaining that elevation until beyond the south dugouts, and stepping back down to elevation 766.70 feet at the end of the wall. Based on these grades, Wall A will have a maximum exposed wall height of 10 feet. Wall B will be a curved wall at the northeast side of the complex and will facilitate construction of the proposed walkway around the field. The wall will have a top elevation ranging from 775.39 feet at the start and stepping down to 768.72 feet at the end. The bottom of wall elevation will range from approximately 775-1/2 feet at the beginning, stepping down to approximately 762 feet at the low point, and back up to approximately 768 feet at the end. Based on these grades, Wall B will have a maximum exposed wall height of 10 feet.

The overall property is currently an existing baseball field surrounded by chain link fencing with two dugouts and on-grade bleachers. The ground surface is grass covered. Existing grades slope upward gradually from west to east across the existing baseball field, ranging from approximately 764 to 770 feet. East and south of the field, the existing grades slope up sharply to elevations ranging from 775 to 780 feet. West and north of the field, the existing grade slopes down gently to the adjacent parking lot. At the northeast corner of the field, existing grades slope downward to the north extending to a low point of 759 feet.

A soil boring fence is presented in the Appendix, Plate No. 2, which depicts the existing grades at borings on the south side of the proposed complex relative to proposed grades. If the proposed grades vary from those presented in this report, G2 Consulting Group, LLC (G2) should be notified when this information is available so that we may review the recommendation presented herein.

## SCOPE OF SERVICES

The field operations, laboratory testing, and engineering report preparation were performed under direction and supervision of a licensed professional engineer. Our services were performed according to generally accepted standards and procedures in the practice of geotechnical engineering in this area. Our scope of services for this project is as follows:

1. We performed twenty-six soil borings throughout the athletic complex. The boring depths relative to the proposed structure, estimated existing and proposed grades, and estimated cut or fill depths are present in the table.

| STRUCTURE | BORING | ~ESTIMATED EXISTING GRADE | ~ESTIMATED FINISHED GRADE/FFF | ESTIMATED CUT / FILL DEPTHS (feet) | BORING DEPTH (feet) |
|---|---|---|---|---|---|
| LIGHTPOLES | B-1 | 764 | 767 | 3 | 20 |
| | B-2 | 765.5 | 768 | 2-1/2 | 20 |
| | B-3 | 764 | 766 | 2 | 20 |
| | B-4 | 765 | 766-1/2 | 1-1/2 | 20 |
| | B-5 | 768-1/2 | 768 | -1/2 | 20 |
| | B-6 | 770 | 774-1/2 | 4-1/2 | 20 |
| | B-7 | 778 | 773 | -5 | 25 |
| CONCESSIONS BUILDING | B-8 | 774 | 776.7 / 766.7 | 2 / -7-1/4 | 20 |
| | B-9 | 776 | 776.7 / 766.7 | 0/ -9-1/4 | 25 |
| DUGOUTS | B-10 | 778 | 776.7/ 766.7 | 1-1/2 / -11-1/4 | 20 |
| | B-11 | 774 | 776.7/ 766.7 | 2-1/2 / -7-1/4 | 20 |
| | B-12 | 767-1/2 | 766-1/2 | -1 | 10 |
| | B-13 | 765-1/2 | 766.7 | 1 | 10 |
| TURF FIELD | B-14 | 765 | 766.7 | 1.5 | 5 |
| | B-15 | 766-1/2 | 766.7 | 0 | 5 |
| | B-16 | 769 | 766.7 | -2-1/4 | 7-1/2 |
| | B-17 | 774 | 766.7 | -7-1/4 | 15 |
| | B-18 | 766-1/2 | 766.7 | 0 | 5 |
| | B-19 | 766-1/2 | 766.7 | 0 | 5 |
| | B-20 | 771 | 766.7 | -4-1/4 | 10 |
| RETAINING WALL | B-21 | 765 | 770 / 766 | 5 / 1 | 15 |
| | B-22 | 765 | 772-1/2 / 765 | 7-1/2 / 0 | 20 |
| | B-23 | 771 | 774-1/2 / 773 | 3-1/2 / 2 | 15 |
| | B-24 | 766 | 772 / 766.7 | 6 / 1/4 | 10 |
| | B-25 | 769 | 773-1/2 / 766.7 | 4-1/2 / 2-1/4 | 10 |
| | B-26 | 777 | 771 / 766.7 | -6 / -10-1/4 | 20 |

2. We performed laboratory testing on representative samples obtained from the soil borings. Laboratory testing included visual engineering classification, natural moisture content, dry density, organic matter content (loss-on-ignition), and unconfined compressive strength determinations.

3. We prepared this engineering report. This report includes recommendations for subgrade preparation and drainage related to the synthetic turf athletic field, foundation and floor slab recommendations for the miscellaneous buildings and dugouts, light pole foundation design, retaining wall design, and construction considerations related to the site improvements.

**FIELD OPERATIONS**

French Associates, in conjunction with G2, selected the number, depth, and location of the soil borings based on the location of the existing fields and proposed structures. The soil borings were located in the field by a G2 engineer by use of GPS assisted mobile technology prior to the commencement of drilling operations. The approximate soil boring locations are shown on the Soil Boring Location Plan, Plate No. 1. Ground surface elevations were interpolated from the topographic contour lines presented on the Topographical Survey prepared by Spalding DeDecker, dated February 10, 2021 (REV. 1).

Hand auger borings were performed by a G2 staff engineer at soil borings B-14, B-15, B-18, and B-19 to minimize damage to the existing baseball field grass. The hand auger borings were performed using a 3-inch diameter hand auger. Within each hand-auger boring, soil samples were obtained at 2-1/2 feet and 5 feet and at transitions in soil types. The soil samples were placed in sealed containers in the field and brought to the laboratory for testing and classification.

The remaining soil borings were drilled using an all-terrain vehicle (ATV) mounted rotary drilling rig. Continuous-flight, 3-1/4 inch inside diameter hollow-stem augers were used to advance the boreholes to the explored depths. Soil samples were obtained at intervals of 2-1/2 feet to a depth of 10 feet and at intervals of 5 feet thereafter, where applicable. The samples were obtained by the Standard Penetration Test Method (ASTM D 1586), which involves driving a 2-inch diameter split-spoon sampler into the soil with a 140-pound weight falling 30 inches. The sampler is generally driven three successive 6-inch increments, with the number of blows for each increment recorded. The number of blows required to advance the sampler the last 12 inches is termed the Standard Penetration Resistance (N). Blow counts for each six-inch increment and resulting N-values are presented on the individual soil boring logs.

The soil samples were placed in sealed containers in the field and brought to our laboratory for testing and classification. During the field operations for the mechanically performed borings, the drilling crew maintained logs of the encountered subsurface conditions, including changes in stratigraphy and observed groundwater levels. The final boring logs are based on the field logs supplemented by laboratory soil classification. After completion of drilling operations, the boreholes were backfilled with excavated material and also bentonite grout within the existing field location to minimize the potential for future settlement.

## LABORATORY TESTING

Representative soil samples were subjected to laboratory testing to determine soil parameters pertinent to turf field design and site preparation. An experienced geotechnical engineer classified the samples in general conformance with the Unified Soil Classification System.

Laboratory testing included moisture content, organic content (loss on ignition), dry density, and unconfined compressive strength determination. The organic matter content of representative samples was determined in accordance with ASTM D 2974, “Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils”. The unconfined compressive strengths were determined by ASTM Test Method D 2166 and using a spring-loaded hand penetrometer. Per ASTM D 2166, the unconfined compressive strength of cohesive soils is determined by axially loading a small cylindrical soil sample under a slow rate of strain. The unconfined compressive strength is defined as the maximum stress applied to the soil sample before shear failure. If shear failure does not occur prior to the total strain of 15 percent, the unconfined compressive strength is defined as the stress at a strain of 15 percent. The hand penetrometer estimates the unconfined compressive strength to a maximum of 4-1/2 tons per square foot (tsf) by measuring the resistance of the soil sample to the penetration of a calibrated spring-loaded cylinder.

The results of the moisture content, organic matter content, dry density, and unconfined compressive strength laboratory tests are indicated on the boring logs at the depths the samples were obtained. The unconfined compressive strength results determined using ASTM D2166 are also presented graphically on Figure No. 27. We will hold the soil samples for 60 days from the date of this report. If you would like the samples, please let us know.

## SITE CONDITIONS

Rochester University is located at 800 West Avon Road in Rochester Hills, Michigan. An existing grass covered baseball field is situated at the northeast side of the property. The new athletic complex will be situated within the footprint of the existing baseball field and beyond. Existing dugouts are present at the southeast corner of the existing baseball field.

Existing grades within the baseball field slope downward to the northwest, ranging from approximately 769 to 764 feet. Beyond the existing baseball field, the areas are grass covered with grades sloping upward to a maximum elevation of approximately 782 feet. Surrounding properties are generally residential in nature to the north, west, and south and commercial in nature to the east.

## SOIL CONDITIONS

Approximately 2 to 6 inches of topsoil are present at the soil boring locations. Fill soils, consisting of clayey sand, silty sand, and silty clay, underlie the topsoil at borings B-1, B-6, B-7, B-13, and B-19 and extend to approximate depths ranging from 1-1/4 to 6 feet below existing grade. In general, native silty clay and to a lesser extent clayey silt underlie the topsoil and fill and extend to approximate depths ranging from 3-1/2 to 19-1/2 feet at borings B-2 through B-9, B-11 through B-13, and B-22 through B-24 and the explored depths at the remaining boring locations. Sand, silty sand, and sandy silt are present below the cohesive soils and extend to approximate depths ranging from 8 to 15 feet at borings B-1 through B-5 and B-22 and the explored depths at borings B-6 through B-9, B-11 through B-13, B-23, and B-24. Silty clay underlies the granular soils at borings B-1 through B-5 and B-22 and extends to the explored depths.

The silty clay fill is very stiff to hard in consistency with moisture contents ranging from 12 to 15 percent, unconfined compressive strengths ranging from 4,000 to 9,000 psf, and organic matter contents ranging from 1.0 to 3.3 percent. The upper silty clay is very stiff to hard in consistency with natural moisture contents ranging from 9 to 29 percent and unconfined compressive strengths ranging from 4,000 to 9,000 psf. The underlying silty clay is medium to stiff in consistency with natural moisture contents ranging from 14 to 32 percent, dry densities ranging from 98 to 119 pounds per cubic foot (pcf), and unconfined compressive strengths ranging from 1,000 to 4,000 psf. The granular soils are generally loose to medium compact with Standard Penetration Test N-values ranging from 5 to 28 blows per foot. However, layers of compact sand are present at borings B-6 and B-8 with N-values of 32 and 34 blows per foot.

The stratification depths shown on the soil boring logs represent the soil conditions at the boring locations. Variations may occur between borings. Additionally, the stratigraphic lines represent the approximate boundaries between soil types. The transitions may be more gradual than what are shown. We have prepared the boring logs based on laboratory classification and testing as well as field logs of the soils encountered.

The Soil Boring Location Plan, Plate No. 1, Soil Boring Logs, Figure Nos. 1 through 26, and Unconfined Compressive Strength Test, Figure No. 27, are presented in the Appendix. The soil profiles described above are generalized descriptions of the conditions encountered at the boring locations. General Notes Terminology defining the nomenclature used on the boring logs and elsewhere in this report are presented on Figure No. 28.

## GROUNDWATER CONDITIONS

Groundwater measurements were obtained within the boreholes during drilling operations as well as following removal of the augers upon completion of drilling operations. Groundwater was encountered with borings B-1 through B-13 and borings B-21 through B-24 at approximate depths ranging from 3-1/2 to 20 feet below existing grade, corresponding to elevations ranging from 756 to 765 feet. A wet cave the boreholes was generally measured at the elevation groundwater was encountered. No measurable groundwater was encountered during or upon completion of drilling operations at borings B-14 through B-19, B-25, and B-26.

Fluctuations in perched and long-term groundwater levels should be anticipated due to seasonal variations and following periods of prolonged precipitation. It should also be noted that groundwater observations made during drilling operations in cohesive are not necessarily indicative of the static groundwater level. This is due to the low permeability of such soils and the tendency of drilling operations to seal off the natural paths of groundwater flow.

**SITE PREPARATION**

A significant amount of earthwork will be required to develop the site for the proposed athletic complex. Earthwork operations are expected to consist of the removal of the existing topsoil, vegetation, utilities, dugouts, and fencing, balancing the site to achieve proposed site grades, subgrade preparation for turf floor slabs, and pavement support, installation of drainage structures, excavation for foundations and utilities, backfilling foundation and below grade walls, and constructing the retaining wall. We recommend all earthwork operations be performed in accordance with comprehensive specifications and properly monitored in the field by qualified geotechnical engineers or technicians.

At the start of earthwork operations, the existing topsoil and vegetation should be completely removed from within the limits of the proposed field, buildings, and pavements. The existing utilities, dugouts, fencing, and associated foundations should be completely removed and backfilled with engineered fill. Based on the proposed grading plan, a significant amount of site balancing will be required to develop the site. Approximately 12 to 18 inches of engineered fill are required to achieve proposed finished grades within the northwest and west sides of the athletic field; the central portion of the field is at the approximate proposed finished grade; and the south, east, and northeast sides of the field will require up to 10 feet of grade cuts to achieve finished grade. Beyond the extent of the field, up to approximately 3 feet of engineered fill will be required along the west side of the complex; up to 7 feet of engineered fill will be required to achieve proposed finished grades at the plaza level on the south side of the complex; minimal grading will generally be required on the east side of the complex (with the exception of the lawn observation area between the concessions building and dugout which will require up to 7 feet of cut; and up to 6 feet of engineered fill will be required to achieve finished grades on the north side of the complex.

After removal of the existing topsoil and vegetation and prior to placement of any engineered fill, the exposed cohesive subgrade soils should be thoroughly proof-rolled using a heavily loaded tri-axle dump truck or equipment similar to what will be utilized for field construction. Any unstable or unsuitable areas noted during proof rolling operations should be undercut and replaced with engineered fill. Subgrade undercuts, where required, should be evaluated by a qualified engineer or technician to determine if subgrade stabilization is necessary.

Engineered fill should consist of an approved, environmentally clean material. Engineered fill should be free of organic matter, frozen soil, clods, or other harmful substances. The fill should be placed in uniform horizontal layers, not more than 9 inches in loose thickness. The engineered fill should be compacted to achieve a density of at least 95 percent of the maximum dry density, as determined by the modified Proctor compaction test (ASTM D 1557). For cohesive engineered fill material, we recommend placing and compacting the material within 1 percent below or 3 percent above optimum moisture content. Any granular fill used within the site may be compacted within 2 percent above or below optimum moisture content. Frozen material should not be used as fill, nor should fill be placed on a frozen subgrade.

The native silty clay removed during grade cuts and within the footprint of the proposed concession building, dugouts, and press box building (borings B-7 through B-10, B-17, B-20, and B-26) are suitable for reuse as engineered fill. Existing moisture contents typically range from approximately 10 to 15 percent, however some samples have up to 21 percent moisture. Optimum moisture contents for silty clay generally range between 10 and 12 percent. Based on the in-situ moisture contents, we anticipate some discing and drying will be required to use the native material as engineered fill. Between the alignment of the two retaining walls, we recommend engineered fill consist of MDOT Class II sand be utilized to raise site grades. This material is easier to compact and provides better drainage potential for behind the retaining walls.

If possible, earthwork operations should be performed in the drier summer months to minimize exposing the cohesive subgrade soils to precipitation. Given the cohesive nature of the soils within the site, some areas of instability may develop under the repeated loading from heavy construction

equipment, particularly after heavy precipitation events. Within areas that exhibit rutting or pumping, the contractor should be prepared to place crushed limestone or concrete, as necessary, to stabilize the subgrade soils.

## LIGHT POLE AND BACKSTOP FOUNDATION RECOMMENDATIONS

Based on information provided by Foresite Design, Inc., the light poles are typically direct burial within a 3-foot diameter drilled pier bearing at a depth of 16 to 20 feet with the annulus backfilled with concrete. The backstops are typically supported on drilled pier foundations on the order of 2-1/2 to 3 feet in diameter and bearing at depths ranging from 10 to 15 feet. The following soil parameters should be used for drilled pier design for the light pole and backstop foundations. Drilled shaft design is controlled by the overturning moment. Subsurface conditions between the soil borings are variable, and we recommend the following design parameters for evaluation of drilled piers at the following adjacent boring locations, as applicable. Based on the required cut areas across the property, we have assumed the native silty clay will be utilized as backfill within the location of the proposed light poles and backstop.

**Boring B-1 – Finished Grade ~ 767 feet**

| Depth / Elevation (feet) | Total Unit Weight (pcf) | Cohesion (psf) | Angle of Friction (Degrees) | Soil Modulus (pci) | Allowable Bearing Pressure (psf) |
|---|---|---|---|---|---|
| **0 to 3 (767 to 764)* | *100* | *1,000* | *0* | *100* | ---- |
| 3 to 4-1/2 (764 to 762-1/2) | 100 | 0 | 28 | 20 | ---- |
| 4-1/2 to 11 (762-1/2 to 756) | 110 | 0 | 30 | 75 | ---- |
| 11 to 23 (756 to 744) | 125 | 1,000 | 0 | 125 | 3,000 |

**Assumed to be cohesive engineered fill*

**Boring B-2 – Finished Grade ~ 768 feet**

| Depth / Elevation (feet) | Total Unit Weight (pcf) | Cohesion (psf) | Angle of Friction (Degrees) | Soil Modulus (pci) | Allowable Bearing Pressure (psf) |
|---|---|---|---|---|---|
| **0 to 2-1/2 (768 to 765-1/2)* | *100* | *1,000* | *0* | *100* | ---- |
| 2-1/2 to 8-1/2 (765-1/2 to 759-1/2) | 130 | 4,000 | 0 | 600 | ---- |
| 8-1/2 to 10 (759-1/2 to 758) | 125 | 1,000 | 0 | 100 | ---- |
| 10 to 13-1/2 (758 to 754-1/2) | 110 | 0 | 29 | 50 | ---- |
| 13-1/2 to 22-1/2 (754-1/2 to 745-1/2) | 125 | 1,000 | 0 | 125 | 3,000 |

**Assumed to be cohesive engineered fill*

**Boring B-3 – Finished Grade ~ 766 feet**

| Depth / Elevation (feet) | Total Unit Weight (pcf) | Cohesion (psf) | Angle of Friction (Degrees) | Soil Modulus (pci) | Allowable Bearing Pressure (psf) |
|---|---|---|---|---|---|
| **0 to 2 (766 to 764)* | *100* | *1,000* | *0* | *100* | ---- |
| 2 to 5-1/2 (764 to 760-1/2) | 130 | 3,000 | 0 | 450 | ---- |
| 5-1/2 to 10-1/2 (760-1/2 to 755-1/2) | 110 | 0 | 30 | 60 | ---- |
| 10-1/2 to 14 (755-1/2 to 752) | 125 | 1,500 | 0 | 175 | ---- |
| 14 to 22 (752 to 744) | 125 | 750 | 0 | 100 | 2,250 |

**Assumed to be cohesive engineered fill*

**Boring B-4 – Finished Grade ~ 766-1/2 feet**

| Depth / Elevation (feet) | Total Unit Weight (pcf) | Cohesion (psf) | Angle of Friction (Degrees) | Soil Modulus (pci) | Allowable Bearing Pressure (psf) |
|---|---|---|---|---|---|
| **0 to 1 (766-1/2 to 765-1/2)* | *100* | *1,000* | *30* | *100* | ---- |
| 1 to 7 (765-1/2 to 759-1/2) | 130 | 2,500 | 0 | 300 | ---- |
| 7 to 14-1/2 (759-1/2 to 752) | 110 | 0 | 32 | 90 | ---- |
| 14-1/2 to 21 (752 to 745-1/2) | 125 | 750 | 0 | 100 | 2,250 |

**Assumed to be cohesive engineered fill*

**Boring B-5 – Finished Grade ~ 774-1/2 feet**

| Depth / Elevation (feet) | Total Unit Weight (pcf) | Cohesion (psf) | Angle of Friction (Degrees) | Soil Modulus (pci) | Allowable Bearing Pressure (psf) |
|---|---|---|---|---|---|
| **0 to 6 (774-1/2 to 768-1/2)* | *100* | *1,000* | *0* | *100* | ---- |
| 6 to 14 (768-1/2 to 760-1/2) | 130 | 3,500 | 0 | 500 | ---- |
| 14 to 18 (760-1/2 to 756-1/2) | 110 | 0 | 31 | 60 | ---- |
| 18 to 26 (756-1/2 to 748-1/2) | 125 | 750 | 0 | 100 | 2,250 |

**Assumed to be cohesive engineered fill*
***Boring Performed 75 feet from Light pole*

**Boring B-11 – Finished Grade ~ 776 feet**

| Depth / Elevation (feet) | Total Unit Weight (pcf) | Cohesion (psf) | Angle of Friction (Degrees) | Soil Modulus (pci) | Allowable Bearing Pressure (psf) |
|---|---|---|---|---|---|
| **0 to 2 (776 to 774)* | *100* | *1,000* | *0* | *100* | ---- |
| 2 to 8 (774 to 768) | 130 | 4,000 | 0 | 600 | ---- |
| 8 to 14 (768 to 762) | 125 | 1,000 | 0 | 125 | ---- |
| 14 to 22 (762 to 754) | 110 | 0 | 33 | 100 | 7,000 |

**Assumed to be cohesive engineered fill*

**Boring B-7 – Finished Grade ~ 776 feet**

| Depth / Elevation (feet) | Total Unit Weight (pcf) | Cohesion (psf) | Angle of Friction (Degrees) | Soil Modulus (pci) | Allowable Bearing Pressure (psf) |
|---|---|---|---|---|---|
| 0 to 6-1/2 (776 to 769-1/2) | 130 | 4,000 | 0 | | ---- |
| 6-1/2 to 17 (769-1/2 to 759) | 125 | 1,500 | 0 | 150 | ---- |
| 17 to 22-1/2 (759 to 753-1/2) | 110 | 0 | 34 | 150 | 8,000 |

Our allowable soil bearing pressures are based on a factor or safety of 3. The recommended soil design parameters are based on the subsurface conditions at the specific boring locations. We recommend drilled pier construction be observed by an experienced geotechnical engineer or technician since soil conditions may vary between stadium light pole locations.

We estimate drilled pier settlement will be negligible for foundations bearing on the native medium to stiff silty clay. We base this estimate on our experience with similar soil and loading conditions.

## SYNTHETIC TURF DESIGN CONSIDERATIONS

Soil borings B-6 and B-14 through B-20 were drilled in the footprint of the new proposed athletic field which is to be synthetic turf. Synthetic turf is typically installed by excavating to the proposed subgrade level, placing a geotextile fabric, installing field drainage, placing an open-graded crushed stone layer, and placing an open-graded layer of fine gravel. Surface material varies by manufacturer of the synthetic turf. Vehicle loading conditions on the synthetic turf are expected to be relatively light and limited to operation of light-weight maintenance vehicles and emergency vehicles; however, during construction, heavy construction equipment is used to place, spread, and compact the drainage material as well as spread out the turf.

We anticipate the existing native very stiff to hard silty clay and very stiff silty clay fill will provide suitable support for synthetic turf following satisfactory completion of proof rolling operations as described in the SITE PREPARTION section of this report. These soils typically have poor drainage characteristics and will prevent any water which percolates through the synthetic turf and aggregate layers to infiltrate into the subgrade. The subgrade should be properly sloped to promote effective subsurface drainage and prevent water from ponding. We recommended the turf system include a minimum 12-inches open-graded drainage stone to provide turf stability and promote subsurface drainage within the proposed artificial turf system. Additionally, we recommend a series of perforated drainpipes be placed through the field in order to collect and remove the water. The drainpipes should be connected to nearby catch basins or stormwater structures.

## FOUNDATION RECOMMENDATIONS

The concessions and team building, east dugouts, and press box building will be constructed with a first floor elevation of 766.70 feet to match the turf elevation. Pavement and bleachers will extend over the top of the dugouts at the plaza elevation of 776.70 feet. The second floor of the press box and concessions buildings will also be at plaza level. Based on these elevations, three of the first floor walls at each structure will be below grade and act as retaining walls. We recommend the proposed structures be supported on conventional spread and strip footings.

### Concessions and Team Building, East Dugouts, and Press Box Building

The concessions and team building (Borings B-8 and B-9) will bear on the hard silty clay and medium compact sand. Dewatering will be required to lower the groundwater table a minimum of 12 inches below design bearing elevation prior to excavation operations to allow foundation construction in dry conditions, as described in the CONSTRUCTION CONSIDERATIONS section of this report. Following completion of dewatering operations, we recommend the concession building foundations be designed for a net allowable soil bearing capacity of 3,000 psf. Where not subjected to frost penetration, foundations should step up to shallower elevations to minimize the potential for extending into the groundwater.

We recommend foundations for the east dugouts and press box building (borings B-7, B-10, and B-11) be designed for a net allowable soil bearing capacity of 2,000 psf supported on the medium to stiff silty clay and clayey silt. Due to the presence of groundwater at or just below the foundation bearing elevation, the contractor should take extreme care to avoid extending foundations into the water bearing sand or wet granular layers, as able. Wet sand seams may be encountered during excavation operations and the contractor should be prepared to remove any encountered groundwater and place concrete immediately after excavation operations to avoid disturbing the bearing surface.

### West Dugouts

We recommend the proposed west dugouts (borings B-12 and B-13) be designed based on a net allowable bearing pressure of 3,000 psf bearing on the native very stiff silty clay or hard silty clay fill.

Due to the presence of groundwater at or just below the foundation bearing elevation, the contractor should take extreme care to avoid extending foundations into the water bearing sand and silty sand or dewatering may be required to stabilize the bearing surface.

**General**

Exterior footings must bear at a minimum depth of 3-1/2 feet relative to the finished grades for protection against frost heave. Interior foundations (such as a below grade wall) can bear at shallower elevations provided they are protected again frost penetration during and upon completion of construction operations. We recommend a G2 representative be on site during construction to observe the excavations, measure bearing depths, and verify the adequacy of the bearing soils.

Continuous wall or strip footings should be at least 16 inches in width and isolated spread footings should be at least 30 inches in their least dimension. To achieve a change in the level of a strip footing, the footing should be gradually stepped at a grade no steeper than two units horizontal to one unit vertical. If required to construct foundations at different levels, the adjacent foundations should be designed and constructed so the least lateral distance between the foundations is equivalent to or more than the difference in their bearing levels.

If the recommendations outlined in this report are adhered to, total and differential settlements for the completed structure should be within 1 inch and 1/2 inch, respectively. We expect settlements of these magnitudes are within tolerable limits for the type of addition proposed. We recommend all strip and spread footings be suitably reinforced to minimize the effects of differential settlements associated with local variations in subsoil conditions.

**FLOOR SLAB RECOMMENDATIONS**

The subgrade soils, anticipated to consist of predominantly stiff to hard silty clay sand and to a lesser extent hard silty clay fill, can be used for the support of floor slab following completion of earthwork and proof roll operations as described in the SITE PREPARATION section of this report. A subgrade modulus (k) of 150 per cubic inch (pci) may be used in the design of floor slabs supported on the aforementioned soils.

We recommend at least 4 inches of clean coarse sand or pea gravel be placed between the subgrade and the bottom of the floor slab for use as a capillary break to reduce moisture transmission through the concrete floors and to reduce the potential for concrete curling. If moisture sensitive floor coverings are planned or if greater protection against vapor transmission is desired, a vapor barrier consisting of 10-mil plastic sheeting, or equivalent, may be placed on the sand layer beneath floor slabs. However, additional floor slab curing techniques will be required especially if floor slab placement occurs in the winter months to prevent floor slab curling. The floor slab should be isolated from the foundation system to allow for independent movement.

**BELOW-GRADE WALL RECOMMENDATIONS**

Three of the walls for the concessions and team building, east dugouts, and press box building will act as retaining walls as the structures will be constructed into the existing grade with the fourth wall exposed to the athletic field. Below grade walls constructed as part of the structure should be designed to resist lateral soil loads modeled as an equivalent fluid pressure. Below-grade walls considered to be fixed at the top should be designed on the basis of at-rest earth lateral earth pressures corresponding to an equivalent fluid pressure of 55 pounds per square foot per foot of depth for drained soil conditions and 85 pounds per square foot per foot of depth for undrained soil conditions.

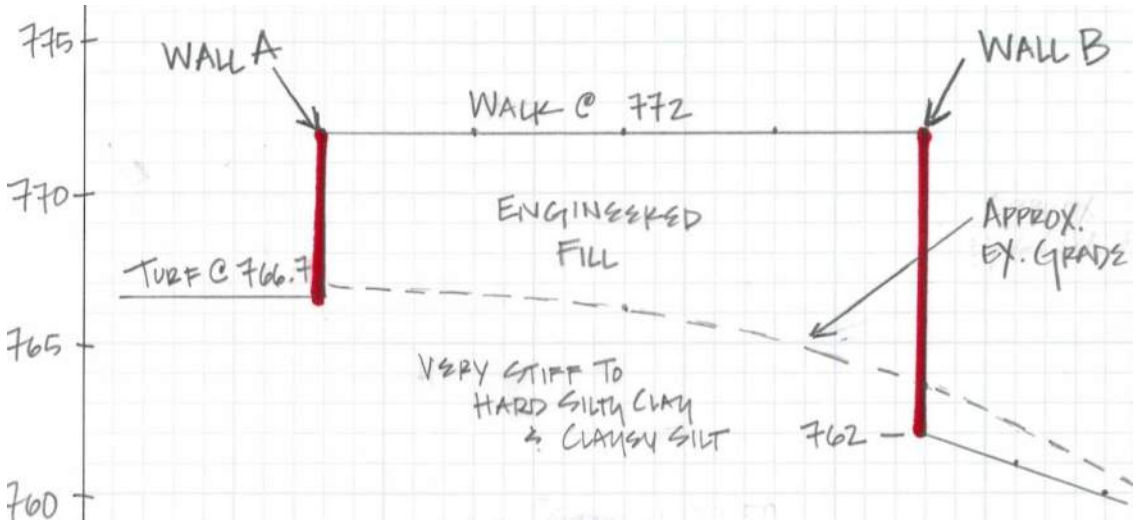
We recommend below grade walls be backfilled with free-draining granular soils. Lateral earth pressures are significantly influenced by the type and intensity of backfill compaction. We recommend only relatively small compaction equipment be used to compact backfill placed against below grade walls.

We recommend a perimeter foundation drain system be incorporated at the below grade foundation level to prevent the development of hydrostatic pressures on below-grade floors and walls. The perforated or slotted drain pipe should be protected with coarse aggregates. The drain pipe and aggregate should be wrapped with a non-woven filter fabric to prevent the migration of surrounding soil fines into the aggregate and drain pipe. The drainage system should outlet water to a sump/pump system or storm drain. If the existing groundwater level is within two feet of the first finished floor elevation of 766.70 feet, we recommend a backup sump pump system be installed.

In order to make below grade walls more resistant to passage of water vapor from outside and to increase their resistance to capillary penetration of water, the exterior below grade walls should be treated with an impervious membrane, such as MIRA-Dry or equivalent. The continuity and resulting effectiveness in resisting moisture penetration depends on the smoothness and regularity of the concrete surface and workmanship in applying the membrane materials to the dry concrete surface.

**RETAINING WALL RECOMMENDATIONS**

Two retaining walls will extend along the northeast, east, and southeast sides of the complex which will facilitate construction of the raised plaza area. Wall A will front the field with a continuous front of wall elevation of 766.70 feet and a top of wall ranging from approximately 767 feet 776.60 feet, with a maximum exposed wall height of 10 feet. Wall B will be a curved wall at the northeast side of the complex and will facilitate construction of the proposed walkway around the field. The wall will have top elevations ranging from 775.39 feet to 768.72 feet, and bottom elevations ranging from approximately 768 feet to 772 feet, with a maximum exposed wall height of 10 feet. Below is a cross section at the north side of the walkway. We recommend granular engineered fill be utilized to raise grades where both Walls A and B are located.




**~ STATION 3+50**

Based on the conditions observed within the soil borings, the retained soil and bearing soils will typically consist of engineered fill to raise site grades, native loose to medium compact silty sand and sand, or native stiff to hard silty clay and clayey silt. However, the alignment within the vicinity of the lawn viewing area north of the east dugouts (near boring B-7) extending south to west of the east dugouts (boring B-6), bearing soils will consist of medium to stiff silty clay.

Based on the expected soil conditions for retained and reinforced zones for the retaining wall, we recommend the following soil parameters for mechanically stabilized earth walls:

| Wall Element | Design Friction Angle | Total Unit Weight (pcf) |
|---|---|---|
| Reinforced Soil Zone | 32 | 110 |
| Retained Soil Zone | 28 | 120 |

It should be noted that the long-term aesthetics of mechanically stabilized earth walls are highly dependent on the quality of construction. We strongly recommend that a contractor with a proven record of past retaining wall construction of similar size walls be retained for construction of the proposed mechanically stabilized earth retaining walls. Additionally, a qualified geotechnical engineer or technician should be on site to observe construction of the wall and to perform appropriate testing.

An allowable soil bearing pressure of 3,000 psf may be used for design of the retaining walls supported on the engineered fill to raise site grades, native loose to medium compact silty sand and sand, or native stiff to hard silty clay and clayey silt. Within the vicinity of the lawn viewing area north of the east dugouts (near boring B-7) extending to west of the east dugouts (boring B-6), an allowable soil bearing pressure of 1,500 psf may be used for design of the retaining walls supported on the medium to stiff silty clay. We recommend a G2 engineer be on site during construction to observe the excavations, measure the bearing depths, and verify the adequacy of the bearing soils.

In order to maintain drained conditions behind the retaining wall, we recommend free-draining granular soils with less than 8 percent fines (minus No. 200 sieve size) be used as backfill behind retaining walls. The backfill should be compacted to 95 percent of the maximum dry density as determined by modified Proctor compaction test. Additionally, an open graded, clean, granular drainage layer and perforated drain pipe should be installed behind the retaining walls. The drain pipe should outlet at low points or at the end of wall. Open-graded stone should be separated from granular backfill using filter fabric such as Mirafi 140N or equivalent.

## CONSTRUCTION CONSIDERATIONS

### Shallow Foundations

Groundwater is anticipated at or just above the proposed foundation bearing elevation along the southeast and south sides of the complex (borings B-8 through B-12). We anticipate groundwater can be lowered within the granular layers and water bearing sand with a series of sumps and pumps installed prior to excavation operations. A sufficient amount of properly spaced sumps within foundation trenches where cohesive soils are present or within perimeter French drains where granular soils are present can typically temporarily lower the groundwater table 1 to 2 feet to allow foundation construction operations in dry conditions. The contractor should take extreme care to avoid extending excavations to the groundwater elevation without prior dewatering operations to avoid disturbing the bearing surface.

We anticipate the contractor can excavate strip footings within open, neat excavations in the cohesive. Caving and/or sloughing may occur where lower granular soils are present. The sides of the spread and/or strip footings should be constructed straight and vertical to reduce the risk of frozen soils adhering to the concrete and raising the foundations.

### Light Pole and Backstop Drilled Piers

Caving and sloughing of the granular soils will occur during excavation operations for the drilled pier foundations. Additionally, groundwater will be encountered at approximate elevations ranging from 756 to 765 feet. Due to the direct burial nature of the structures, we do not anticipate temporary steel casing can be used. Therefore, we recommend the contractor be prepared to use drilling mud and water, as necessary, to maintain a stable excavation and control groundwater. A minimum drilling mud head of 6 feet must be continuously maintained during construction operations to ensure a stable excavation. Under no circumstances should concrete fall through standing water in the excavation.

Therefore, if drilling mud and water are added to the excavation or groundwater cannot be removed prior to concrete placement, concrete must be placed by tremie method.

Once the drilled pier excavation has been completed to the design bearing depth, reinforcing steel should be set and concrete placed until a positive head of concrete has been established within the temporary casing. This positive concrete head must be maintained while pulling the casing to prevent the infiltration of loose soil and groundwater into the fresh concrete. After concrete has been placed to an appropriate grade, the casing may be removed and concrete placement operations completed.

To reduce lateral movement of the drilled piers, the contractor must place the drilled pier's concrete in intimate contact with undisturbed soil. This includes filling any voids or enlargements in the drilled pier shaft excavation with concrete at the time of drilled pier concrete placement. We recommend using a concrete mix design with a slump of 5 to 7 inches for free fall placement and 7 to 9 inches for tremie placement to reduce the potential for concrete arching and provide a workable material. We recommend using a short temporary top form, such as a sono tube, to form the top portion of the drilled piers.

**General**

Where excavations extend deeper than 5 feet and sufficient space is available, we recommend maximum slope of 2 horizontal units to 1 vertical unit (2H:1V) in the loose to medium compact granular soils, 1H:1V in the medium to stiff cohesive soils, and 3/4H:1V in the very stiff to hard cohesive soils. Where seepage from excavation cuts is observed, the slopes will need to be flattened sufficiently to achieve stability, but in no case left steeper than 3H:1V at and below the seepage level. Slopes should be barricaded to prevent vehicles and storage loads within 10 feet of the tops of the slopes. If the temporary construction excavations are to be maintained during the rainy season, berms are suggested along the tops of the slopes to prevent runoff water from entering the excavation and eroding the slope faces.

All excavations should be safely sheeted, shored, sloped, or braced in accordance with OSHA requirements. If material is stored or equipment is operated near an excavation, lower angle slopes or stronger shoring must be used to resist the extra pressure due to the superimposed loads. Care should be exercised when excavating near existing pavements, structure, or utilities to avoid undermining.

**GENERAL COMMENTS**

We have formulated the evaluations and recommendations presented in this report relative to site preparation and turf field, buildings, and retaining wall construction on the basis of data provided to us relating to the general location and grade. If changes occur in the design, location, or concept of the project, the conclusions and recommendations contained in this report are not valid unless G2 Consulting Group, LLC reviews the changes. G2 Consulting Group, LLC will then confirm the recommendations presented herein or make changes in writing.

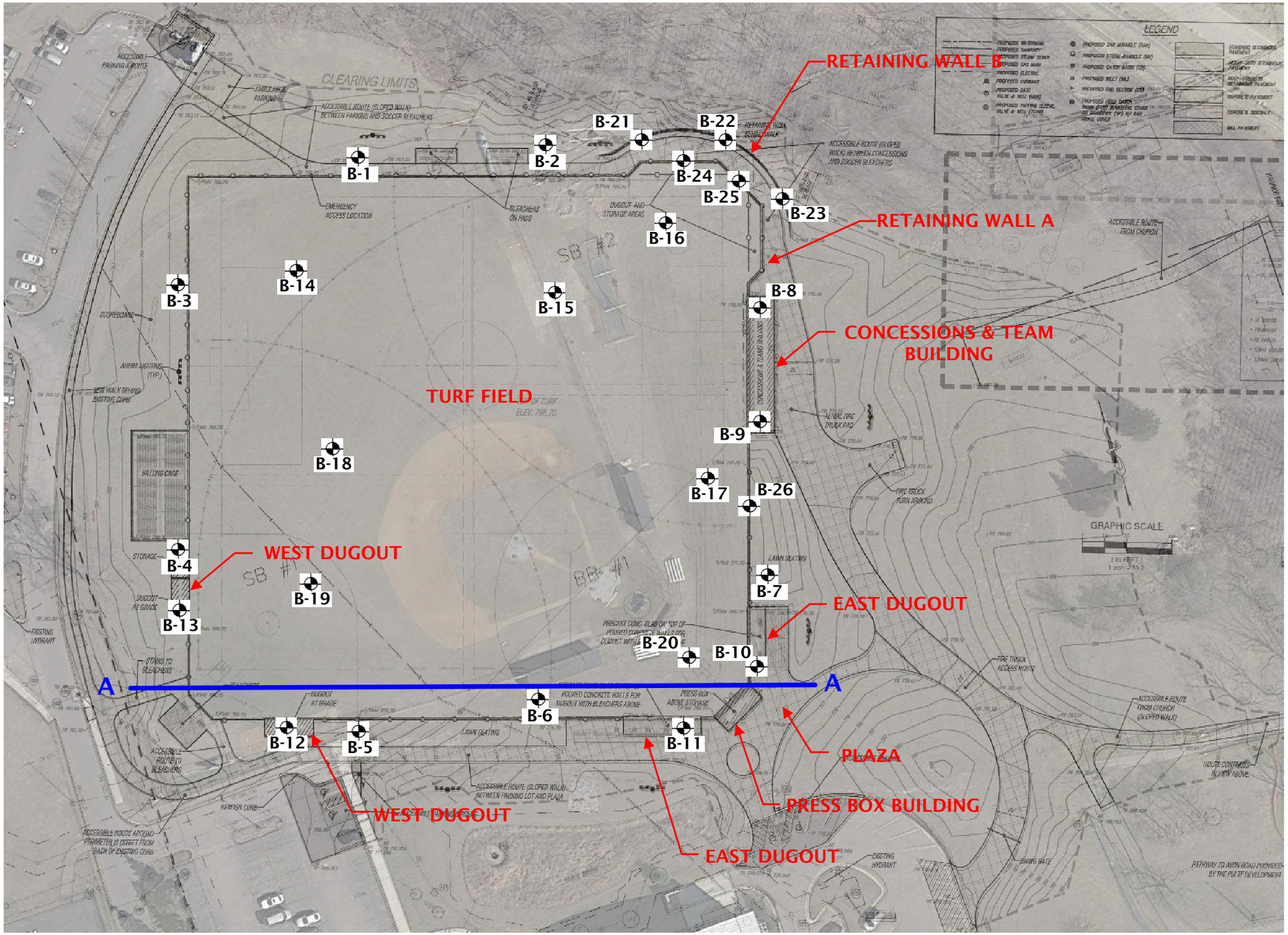
The scope of the present investigation was limited to evaluation of subsurface conditions for the support of the proposed fields and structures and other related aspects of the development. No chemical, environmental, or hydrogeological testing or analyses were included in the scope of this investigation.

We base the analyses and recommendations submitted in this report upon the data from the soil borings performed at the approximate locations shown on the Soil Boring Location Plan, Plate No. 1. This report does not reflect variations that may occur between the actual boring locations and the actual pavement locations. The nature and extent of any such variations may not become clear until the time of construction. If significant variations then become evident, it may be necessary for us to re-evaluate our report recommendations.

Soil conditions at the site could vary from those generalized on the basis of the soil borings made at specific locations. It is therefore recommended that G2 Consulting Group, LLC be retained to provide

soil engineering services during the site preparation and pavement construction phases of the proposed project. This is to observed compliance with the design concepts, specifications, and recommendations. Also, this is to allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction.

**APPENDIX**




## LEGEND

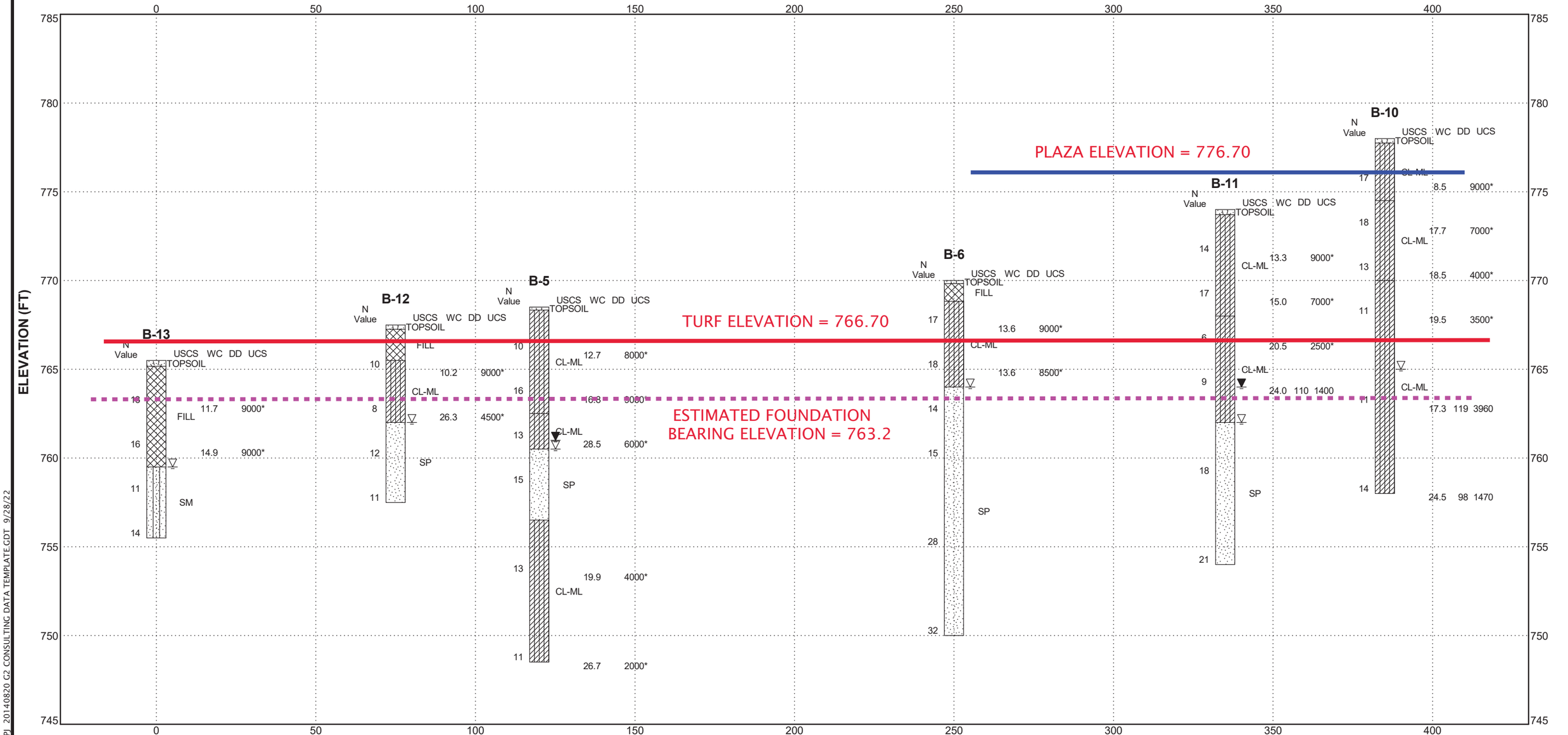
- Mechanical Soil Borings Performed by Strata Drilling on August 31 through September 3, 2022. Hand Auger Borings Performed by G2 Consulting Group, LLC on September 7, 2022.
- Soil Boring Profile

**Soil Boring Location Plan**

Rochester University Athletic Improvements
800 West Avon Road
Rochester Hills, Michigan 48307

G2 CONSULTING GROUP

| | |
|---|---|
| Project No. 220610 | |
| Drawn by: ALS | |
| Date: 9/22/22 | Plate No. 1 |
| Scale: NTS | |




## Legend

▽ Encountered Groundwater Level

▼ Groundwater Level at Completion

CONSULTING GROUP

# SOIL BORING FENCE A-A

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No.: 220610

Plate No. 2

SOIL BORING PROFILE WITH WATER LEVELS 220610.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 9/28/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-1

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 764.0 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Brown Sand (2 inches) 0.2 | | | | | | | |
| | | Fill: Brown Clayey Sand with trace silt and gravel 1.5 | | S-1 | 3 6 7 | 13 | | | |
| 759.0 | | Loose to Medium Compact Brown Silty Sand with trace silt and gravel | 5 | S-2 | 4 4 5 | 9 | | | |
| | | 6.0 | | S-3 | 4 4 6 | 10 | | | |
| | | Loose Gray Silty Sand with trace gravel 8.0 | | | | | | | |
| 754.0 | | | 10 | S-4 | 4 6 6 | 12 | 17.6 | | 2000* |
| | | Medium to Stiff Gray Silty Clay with trace sand and gravel | | | | | | | |
| 749.0 | | | 15 | S-5 | 4 5 4 | 9 | 31.1 | | 1500* |
| 744.0 | | 20.0 | 20 | S-6 | 4 5 6 | 11 | 34.2 | | 1500* |
| | | End of Boring @ 20 ft | | | | | | | |
| 739.0 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: August 31, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
3-1/2 feet during drilling operations; wet cave at 6 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and bentonite chips

Figure No. 1

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-2

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 765.5 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (3 inches) 0.3 | | | | | | | |
| | | | | S-1 | 3 4 5 | 9 | 11.0 | | 8000* |
| | | Hard Brown Silty Clay with trace sand, gravel, and fine roots | | | | | | | |
| 760.5 | | | 5 | S-2 | 3 6 7 | 13 | 14.1 | | 9000* |
| | | 6.0 | | | | | | | |
| | | Stiff Gray Silty Clay with trace sand and gravel | | S-3 | 2 3 2 | 5 | 18.8 | | 2000* |
| | | 7.5 | | | | | | | |
| 755.5 | | Loose Dark Gray Silty Sand with trace clay and little gravel | 10 | S-4 | 2 2 3 | 5 | | | |
| | | 11.0 | | | | | | | |
| 750.5 | | | 15 | S-5 | 2 3 4 | 7 | 29.9 | | 1500* |
| | | Medium to Stiff Gray Silty Clay with trace sand and gravel | | | | | | | |
| 745.5 | | 20.0 | 20 | S-6 | 2 4 5 | 9 | 26.7 | | 2000* |
| | | End of Boring @ 20 ft | | | | | | | |
| 740.5 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: August 31, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
7-1/2 feet during drilling operations; wet cave at 14 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 2

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-3

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 764.0 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Dark Brown Sand (4 inches) 0.3 | | | | | | | |
| | | Very Stiff Brown Silty Clay with trace sand and gravel | | S-1 | 4 5 7 | 12 | 15.7 | | 6000* |
| | | 3.5 | | | | | | | |
| 759.0 | | Medium Compact Brown Silty Sand with trace gravel | 5 | S-2 | 5 6 8 | 14 | | | |
| | | 6.0 | | | | | | | |
| | | Loose Gray Sand with trace silt and gravel 7.5 | | S-3 | 4 5 3 | 8 | | | |
| | | Loose Gray Sandy Silt with trace gravel 8.5 | | | | | | | |
| 754.0 | | | 10 | S-4 | 3 4 6 | 10 | 26.1 | | 3000* |
| | | Medium to Stiff Gray Silty Clay with trace sand and gravel | | S-5 | 4 5 7 | 12 | 31.6 | | 1500* |
| 749.0 | | | 15 | | | | | | |
| | | 20.0 | | S-6 | 5 5 6 | 11 | 30.5 | | 1000* |
| 744.0 | | End of Boring @ 20 ft | 20 | | | | | | |
| | | | | | | | | | |
| 739.0 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: August 31, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
6-1/2 feet during drilling operations; wet cave at 17 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and bentonite chips

Figure No. 3

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-4

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 765.5 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Dark Brown Silty Clay (4 inches) 0.3 | | | | | | | |
| | | Hard Brown Silty Clay with trace sand and gravel | | S-1 | 3 6 6 | 12 | 14.6 | | 9000* |
| | | 3.0 | | | | | | | |
| 760.5 | | Very Stiff Brown and Gray Silty Clay with trace sand and gravel | 5 | S-2 | 4 4 4 | 8 | 17.3 | | 4000* |
| | | 6.0 | | S-3 | 5 7 7 | 14 | | | |
| 755.5 | | Medium Compact Brown Silty Sand with trace gravel, occasional clay layers | 10 | S-4 | 5 7 6 | 13 | | | |
| | | 13.5 | | S-5 | 5 6 6 | 12 | 17.7 | | 3000* |
| 750.5 | | | 15 | | | | | | |
| 745.5 | | Medium to Stiff Gray Silty Clay with trace sand and gravel 20.0 | 20 | S-6 | 5 5 5 | 10 | 26.5 | | 1000* |
| | | End of Boring @ 20 ft | | | | | | | |
| 740.5 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: August 31, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
6 feet during drilling operations; wet cave at 17 feet upon auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and bentonite chips

Figure No. 4

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-5

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 768.5 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (2 inches) 0.2 | | | | | | | |
| | | | | S-1 | 5 5 5 | 10 | 12.7 | | 8000* |
| | | Hard Brown Silty Clay with trace sand and gravel | | | | | | | |
| 763.5 | | | 5 | S-2 | 4 7 9 | 16 | 16.8 | | 9000* |
| | | 6.0 | | | | | | | |
| | | Very Stiff Gray Silty Clay with trace sand and gravel | | S-3 | 4 6 7 | 13 | 28.5 | | 6000* |
| | | 8.0 | | | | | | | |
| 758.5 | | Medium Compact Brown Sand with trace silt and gravel | 10 | S-4 | 4 6 9 | 15 | | | |
| | | 12.0 | | | | | | | |
| 753.5 | | | 15 | S-5 | 4 6 7 | 13 | 19.9 | | 4000* |
| | | Stiff to Very Stiff Gray Silty Clay with trace sand and gravel, occasional silty sand layers | | | | | | | |
| 748.5 | | 20.0 | 20 | S-6 | 4 5 6 | 11 | 26.7 | | 2000* |
| | | End of Boring @ 20 ft | | | | | | | |
| 743.5 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: August 31, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
8 feet during drilling operations; 7-1/2 feet upon completion

Notes:
Borehole collapsed at 8-1/2 ft after auger removal
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 5

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-6

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 770.0 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Sand (2 inches) 0.2 | | | | | | | |
| | | Fill: Brown Silty Sand with trace gravel 1.2 | | S-1 | 6<br>8<br>9 | 17 | 13.6 | | 9000* |
| 765.0 | | Hard Brown Silty Clay with trace sand and gravel | 5 | S-2 | 4<br>7<br>11 | 18 | 13.6 | | 8500* |
| | | 6.0 | | S-3 | 5<br>6<br>8 | 14 | | | |
| 760.0 | | | 10 | S-4 | 4<br>7<br>8 | 15 | | | |
| | | Medium Compact to Compact Brown Sand with trace silt and gravel | | | | | | | |
| 755.0 | | | 15 | S-5 | 7<br>12<br>16 | 28 | | | |
| 750.0 | | 20.0 | 20 | S-6 | 9<br>13<br>19 | 32 | | | |
| | | End of Boring @ 20 ft | | | | | | | |
| 745.0 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: September 3, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
6 feet during drilling operations; wet cave at 6-1/2 after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 6

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-7

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 778.5 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (3 inches) 0.3 | | | | | | | |
| | | Fill: Hard Brown Silty Clay with trace sand, gravel, and roots (Organic Matter Content = 3.3%) | | S-1 | 4 7 8 | 15 | 11.9 | | 9000* |
| | | 3.0 | | | | | | | |
| 773.5 | | | 5 | S-2 | 6 10 12 | 22 | 13.4 | | 9000* |
| | | Very Stiff to Hard Brown Silty Clay with trace sand and gravel | | S-3 | 4 6 5 | 11 | 14.5 | | 7000* |
| | | 9.0 | | S-4 | 3 4 4 | 8 | 14.4 | | 3500* |
| 768.5 | | | 10 | | | | | | |
| | | Medium to Stiff Gray Silty Clay with trace sand and gravel | | S-5 | 3 3 6 | 9 | 22.6 | | 3000* |
| 763.5 | | | 15 | | | | | | |
| | | 19.5 | | S-6 | 7 8 11 | 19 | 17.2 | | 1500* |
| 758.5 | | | 20 | | | | | | |
| | | Medium Compact Gray Sand with trace silt and gravel | | S-7 | 9 11 14 | 25 | | | |
| 753.5 | | 25.0 | 25 | | | | | | |
| | | End of Boring @ 25 ft | | | | | | | |

Total Depth: 25 ft
Drilling Date: September 2, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
20 feet during drilling operations; 16 feet upon completion

Notes:
Borehole collapsed at 17 ft after auger removal
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 7

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-8

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 774.0 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (5 inches) 0.4 | | S-1 | 7 9 9 | 18 | 12.5 | | 9000* |
| 769.0 | | | 5 | S-2 | 9 11 13 | 24 | 12.7 | | 9000* |
| | | Hard Brown Silty Clay with trace sand and gravel | | S-3 | 6 7 9 | 16 | 12.5 | | 8000* |
| 764.0 | | | 10 | S-4 | 5 9 11 | 20 | 12.6 | | 9000* |
| | | 11.0 | | | | | | | |
| 759.0 | | Medium Compact Brown Sand with trace silt and gravel | 15 | S-5 | 5 7 7 | 14 | | | |
| | | 18.0 | | | | | | | |
| 754.0 | | Compact Brown Silty Sand with trace gravel 20.0 | 20 | S-6 | 13 19 15 | 34 | | | |
| | | End of Boring @ 20 ft | | | | | | | |
| 749.0 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: September 1, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
11 feet during drilling operations; wet cave at 9-1/2 after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 8

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-9

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 776.0 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (4 inches) 0.3 | | | | | | | |
| | | | | S-1 | 5<br>8<br>10 | 18 | 9.8 | | 9000* |
| 771.0 | | Hard Brown Silty Clay with trace sand and gravel | 5 | S-2 | 5<br>10<br>12 | 22 | 13.0 | | 9000* |
| | | 6.5 | | S-3 | 7<br>7<br>11 | 18 | 13.5 | | 7000* |
| | | Very Stiff Brown and Gray Silty Clay with trace sand and gravel 8.0 | | | | | | | |
| 766.0 | | Very Stiff Brown Silty Clay with trace sand and gravel | 10 | S-4 | 8<br>11<br>13 | 24 | 13.4 | | 6000* |
| | | 12.0 ▽ | | | | | | | |
| 761.0 | | | 15 | S-5 | 6<br>7<br>10 | 17 | | | |
| | | Medium Compact Brown Sand with trace silt and gravel | | | | | | | |
| 756.0 | | | 20 | S-6 | 8<br>9<br>13 | 22 | | | |
| | | 23.0 | | | | | | | |
| 751.0 | | Medium Compact Brown Silty Sand with trace gravel 25.0 | 25 | S-7 | 9<br>10<br>12 | 22 | | | |
| | | End of Boring @ 25 ft | | | | | | | |

Total Depth: 25 ft
Drilling Date: September 1, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
12 feet during drilling operations; wet cave at 11-1/2 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 9

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-10

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 778.0 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (0.3) | | | | | | | |
| | | Hard Brown Silty Clay with trace sand and gravel | | S-1 | 6<br>8<br>9 | 17 | 8.5 | | 9000* |
| | | (3.5) | | | | | | | |
| 773.0 | | Very Stiff Brown Silty Clay with trace sand and gravel, occasional silt partings | 5 | S-2 | 6<br>8<br>10 | 18 | 17.7 | | 7000* |
| | | | | S-3 | 5<br>7<br>6 | 13 | 18.5 | | 4000* |
| | | (8.0) | | | | | | | |
| 768.0 | | | 10 | S-4 | 4<br>5<br>6 | 11 | 19.5 | | 3500* |
| | | Medium to Stiff Gray Silty Clay with trace sand and gravel, occasional wet silt seams | | | | | | | |
| 763.0 | | | 15 | S-5 | 3<br>5<br>6 | 11 | 17.3 | 119 | 3960 |
| | | | | S-6 | 5<br>6<br>8 | 14 | 24.5 | 98 | 1470 |
| 758.0 | | (20.0) | 20 | | | | | | |
| | | End of Boring @ 20 ft | | | | | | | |
| 753.0 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: September 3, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
13 feet during drilling operations; dry upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 10

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-11

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 774.0 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (3.5 inches) 0.3 | | | | | | | |
| | | | | S-1 | 3 6 8 | 14 | 13.3 | | 9000* |
| | | Very Stiff to Hard Brown Silty Clay with trace sand and gravel | | | | | | | |
| 769.0 | | | 5 | S-2 | 4 8 9 | 17 | 15.0 | | 7000* |
| | | 6.0 | | | | | | | |
| | | | | S-3 | 3 3 3 | 6 | 20.5 | | 2500* |
| | | Medium to Stiff Gray Silty Clay with trace sand and gravel, occasional silt partings | | | | | | | |
| 764.0 | | | 10 | S-4 | 4 3 6 | 9 | 24.0 | 110 | 1400 |
| | | 12.0 | | | | | | | |
| 759.0 | | | 15 | S-5 | 4 7 11 | 18 | | | |
| | | Medium Compact Brown Sand with trace silt and gravel | | | | | | | |
| 754.0 | | 20.0 | 20 | S-6 | 5 7 14 | 21 | | | |
| | | End of Boring @ 20 ft | | | | | | | |
| 749.0 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: September 3, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
12 feet during drilling operations; 10 feet upon completion

Notes:
Borehole collapsed at 11 ft after auger removal
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 11

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-12

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 767.5 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (3 inches) 0.3 | | | | | | | |
| | | Fill: Hard Brown Silty Clay with trace sand and gravel 2.0 | | S-1 | 5 5 5 | 10 | 10.2 | | 9000* |
| 762.5 | | Very Stiff Brown and Gray Silty Clay with trace sand and gravel | 5 | S-2 | 3 3 5 | 8 | 26.3 | | 4500* |
| | | 5.5 | | S-3 | 4 5 7 | 12 | | | |
| 757.5 | | Medium Compact Brown Sand with trace silt and gravel 10.0 | 10 | S-4 | 5 5 6 | 11 | | | |
| | | End of Boring @ 10 ft | | | | | | | |
| 752.5 | | | 15 | | | | | | |
| 747.5 | | | 20 | | | | | | |
| 742.5 | | | 25 | | | | | | |

Total Depth: 10 ft
Drilling Date: August 31, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
5-1/2 feet during drilling operations; wet cave at 6 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and bentonite chips

Figure No. 12

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-13

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 765.5 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (4 inches) 0.3 | | | | | | | |
| | | Fill: Hard Gray Silty Clay with trace sand, gravel, and roots (Organic Matter Content S-1 = 1.6%, S-2 = 2.3%) | | S-1 | 5 6 7 | 13 | 11.7 | | 9000* |
| 760.5 | | | 5 | S-2 | 4 8 8 | 16 | 14.9 | | 9000* |
| | | 6.0 | | S-3 | 3 5 6 | 11 | | | |
| | | Medium Compact Brown silty Sand with trace clay and gravel | | | | | | | |
| 755.5 | | 10.0 | 10 | S-4 | 5 6 8 | 14 | | | |
| | | End of Boring @ 10 ft | | | | | | | |
| 750.5 | | | 15 | | | | | | |
| 745.5 | | | 20 | | | | | | |
| 740.5 | | | 25 | | | | | | |

Total Depth: 10 ft
Drilling Date: August 31, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
6 feet during drilling operations; wet cave at 5 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 13

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-14

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 765.0 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Dark Brown Silty Clay (6 inches) 0.5 | | | | | | | |
| | | Very Stiff Brown Silty Clay with trace sand and gravel | | S-1 | | | 10.7 | | 4000* |
| | | 4.0 | | | | | | | |
| 760.0 | | Stiff Brown and Gray Silty Clay with trace sand and gravel 5.0 | 5 | S-2 | | | 29.3 | | 3500* |
| | | End of Boring @ 5 ft | | | | | | | |
| 755.0 | | | 10 | | | | | | |
| 750.0 | | | 15 | | | | | | |
| 745.0 | | | 20 | | | | | | |
| 740.0 | | | 25 | | | | | | |

Total Depth: 5 ft
Drilling Date: September 7, 2022
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: E. Talabo

Drilling Method:
3-inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 14

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-15

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 766.5 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Dark Brown Silty Clay (6 inches) 0.5 | | | | | | | |
| | | Very Stiff Brown Silty Clay with trace sand and gravel | | S-1 | | | 14.6 | | 4500* |
| 761.5 | | 4.5 Very Stiff Brown and Gray Silty Clay with trace sand and gravel 5.0 | 5 | S-2 | | | 27.5 | | 5000* |
| | | End of Boring @ 5 ft | | | | | | | |
| 756.5 | | | 10 | | | | | | |
| 751.5 | | | 15 | | | | | | |
| 746.5 | | | 20 | | | | | | |
| 741.5 | | | 25 | | | | | | |

Total Depth: 5 ft
Drilling Date: September 7, 2022
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: E. Talabo

Drilling Method:
3-inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 15

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-16

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 769.0 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (4 inches) 0.3 | | | | | | | |
| | | | | S-1 | 5<br>7<br>8 | 15 | 10.1 | | 9000* |
| | | Hard Brown Silty Clay with trace sand and gravel | | | | | | | |
| 764.0 | | | 5 | S-2 | 6<br>9<br>11 | 20 | 12.6 | | 9000* |
| | | | | S-3 | 4<br>4<br>5 | 9 | 13.2 | | 9000* |
| | | 7.5 | | | | | | | |
| | | End of Boring @ 7.5 ft | | | | | | | |
| 759.0 | | | 10 | | | | | | |
| 754.0 | | | 15 | | | | | | |
| 749.0 | | | 20 | | | | | | |
| 744.0 | | | 25 | | | | | | |

Total Depth: 7.5 ft
Drilling Date: September 1, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 16

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-17

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 774.0 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Dark Brown Silty Clay (4 inches) 0.3 | | | | | | | |
| | | | | S-1 | 5 8 10 | 18 | 14.4 | | 7000* |
| 769.0 | | Very Stiff to Hard Brown Silty Clay with trace sand and gravel, occasional silt seams | 5 | S-2 | 4 7 9 | 16 | 15.2 | | 9000* |
| | | | | S-3 | 5 7 9 | 16 | 19.0 | | 6000* |
| 764.0 | | 10.0 | 10 | S-4 | 4 7 8 | 15 | 17.4 | | 9000* |
| | | Very Stiff Gray Silty Clay with trace sand and gravel, occasional silt seams | | | | | | | |
| 759.0 | | 15.0 | 15 | S-5 | 4 5 6 | 11 | 20.4 | | 7000* |
| | | End of Boring @ 15 ft | | | | | | | |
| 754.0 | | | 20 | | | | | | |
| 749.0 | | | 25 | | | | | | |

Total Depth: 15 ft
Drilling Date: September 1, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 17

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-18

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 766.5 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Dark Brown Silty Clay (4 inches) 0.3 | | | | | | | |
| | | Hard Brown Silty Clay with trace sand and gravel | | S-1 | | | 14.1 | | 9000* |
| | | 3.5 | | | | | | | |
| 761.5 | | Very Stiff Brown and Gray Silty Clay with trace sand and gravel 5.0 | 5 | S-2 | | | 29.7 | | 6000* |
| | | End of Boring @ 5 ft | | | | | | | |
| 756.5 | | | 10 | | | | | | |
| 751.5 | | | 15 | | | | | | |
| 746.5 | | | 20 | | | | | | |
| 741.5 | | | 25 | | | | | | |

Total Depth: 5 ft
Drilling Date: September 7, 2022
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: E. Talabo

Drilling Method:
3-inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 18

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-19

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 766.5 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Dark Brown Silty Clay (5 inches) 0.4 | | | | | | | |
| | | Fill: Very Stiff Brown Silty Clay with trace sand, gravel, and organic matter (Organic Matter Content = 1.0%) | | S-1 | | | 14.3 | | 4000* |
| | | 3.5 | | | | | | | |
| 761.5 | | Very Stiff Brown and Gray Silty Clay with trace sand and gravel 5.0 | 5 | S-2 | | | 27.7 | | 5000* |
| | | End of Boring @ 5 ft | | | | | | | |
| 756.5 | | | 10 | | | | | | |
| 751.5 | | | 15 | | | | | | |
| 746.5 | | | 20 | | | | | | |
| 741.5 | | | 25 | | | | | | |

Total Depth: 5 ft
Drilling Date: September 7, 2022
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: E. Talabo

Drilling Method:
3-inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 19

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-20

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 771.0 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Dark Brown Silty Clay (3 inches) 0.3 | | | | | | | |
| | | | | S-1 | 4 6 9 | 15 | 11.7 | | 9000* |
| | | Hard Brown and Gray Silty Clay with trace sand and gravel | | | | | | | |
| 766.0 | | | 5 | S-2 | 4 4 6 | 10 | 12.8 | | 6000* |
| | | 6.0 | | | | | | | |
| | | Stiff to Very Stiff Gray Silty Clay with trace sand and gravel | | S-3 | 3 4 5 | 9 | 19.8 | | 3000* |
| | | 9.0 | | | | | | | |
| 761.0 | | Stiff Gray Silt with trace sand and gravel 10.0 | 10 | S-4 | 4 4 4 | 8 | 24.7 | | 2000* |
| | | End of Boring @ 10 ft | | | | | | | |
| 756.0 | | | 15 | | | | | | |
| 751.0 | | | 20 | | | | | | |
| 746.0 | | | 25 | | | | | | |

Total Depth: 10 ft
Drilling Date: September 3, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
9 feet during drilling operations; dry upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 20

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-21

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 765.0 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (4 inches) 0.3 | | | | | | | |
| | | Hard Brown Silty Clay with trace sand and gravel | | S-1 | 4 5 5 | 10 | 11.3 | | 9000* |
| | | 3.0 | | | | | | | |
| 760.0 | | | 5 | S-2 | 5 6 6 | 12 | 15.3 | | 9000* |
| | | Very Stiff to Hard Brown Silty Clay with trace sand and gravel | | S-3 | 3 3 3 | 6 | 24.8 | | 6000* |
| | | 9.0 ▽ | | | | | | | |
| 755.0 | | | 10 | S-4 | 4 5 6 | 11 | 23.3 | | 2000* |
| | | Medium to Stiff Gray Silty Clay with trace sand and gravel, occasional wet sand layers | | S-5 | 3 3 4 | 7 | 17.2 | | 1000* |
| 750.0 | | 15.0 | 15 | | | | | | |
| | | End of Boring @ 15 ft | | | | | | | |
| 745.0 | | | 20 | | | | | | |
| 740.0 | | | 25 | | | | | | |

Total Depth: 15 ft
Drilling Date: August 31, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
9 feet during drilling operations; wet cave at 8 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 21

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-22

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 765.0 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (3 inches) 0.3 | | | | | | | |
| | | Hard Brown Silty Clay with trace sand and gravel | | S-1 | 5 7 9 | 16 | 8.6 | | 8000* |
| 760.0 | | Very Stiff Brown and Gray Clayey Silt with trace sand and gravel, frequent silt seams 4.0 | 5 | S-2 | 5 9 13 | 22 | 13.3 | | 4000* |
| | | Very Stiff Brown SIlty Clay with trace sand and gravel, frequent silt partings 6.0 | | S-3 | 5 7 10 | 17 | 19.0 | | 6000* |
| 755.0 | | ▽ 8.5 | 10 | S-4 | 1 2 3 | 5 | | | |
| | | Loose to Medium Compact Brown Sand with trace silt and gravel | | | | | | | |
| 750.0 | | 15.0 | 15 | S-5 | 8 11 15 | 26 | | | |
| | | Hard Brown Silty Clay with trace sand and gravel, frequent silt seams 19.0 | | | | | | | |
| 745.0 | | Hard Gray Silty Clay with trace sand and gravel, frequent silt seams 20.0 | 20 | S-6 | 7 9 11 | 20 | 21.0 | | 8000* |
| | | End of Boring @ 20 ft | | | | | | | |
| 740.0 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: September 1, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
8-1/2 feet during drilling operations; wet cave at 9-1/2 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 22

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-23

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 771.0 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (3 inches) 0.3 | | | | | | | |
| | | | | S-1 | 5 7 7 | 14 | 10.2 | | 9000* |
| | | Very Stiff to Hard Brown Silty Clay with trace sand and gravel | | | | | | | |
| 766.0 | | | 5 | S-2 | 9 12 16 | 28 | 11.4 | | 9000* |
| | | 6.0 | | | | | | | |
| | | Very Stiff Brown Clayey Silt with trace sand | | S-3 | 6 7 7 | 14 | 12.2 | | 5500* |
| | | 8.5 | | | | | | | |
| 761.0 | | Very Stiff Brown Silty Clay with trace sand and gravel, occasional silt seams | 10 | S-4 | 5 7 9 | 16 | 19.8 | | 5000* |
| | | 12.0 | | | | | | | |
| | | Medium Compact Brown Sand with trace silt and gravel | | | | | | | |
| 756.0 | | 15.0 | 15 | S-5 | 4 4 7 | 11 | | | |
| | | End of Boring @ 15 ft | | | | | | | |
| 751.0 | | | 20 | | | | | | |
| 746.0 | | | 25 | | | | | | |

Total Depth: 15 ft
Drilling Date: September 1, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
12 feet during drilling operations; wet cave at 12 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 23

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-24

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 766.0 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (5 inches) 0.4 | | | | | | | |
| | | Hard Brown Clayey Silt with trace sand and gravel | | S-1 | 3 5 7 | 12 | 16.3 | | 9000* |
| | | 3.0 | | | | | | | |
| 761.0 | | Very Stiff Brown and Gray Silty Clay with trace sand and gravel | 5 | S-2 | 4 8 8 | 16 | 12.0 | | 9000* |
| | | | | S-3 | 4 6 6 | 12 | 26.3 | | 6500* |
| | | 7.5 Very Stiff Gray Silty Clay with trace sand and gravel 8.5 | | | | | | | |
| 756.0 | | Loose Brown Sand with trace silt and gravel 10.0 | 10 | S-4 | 3 4 5 | 9 | | | |
| | | End of Boring @ 10 ft | | | | | | | |
| 751.0 | | | 15 | | | | | | |
| 746.0 | | | 20 | | | | | | |
| 741.0 | | | 25 | | | | | | |

Total Depth: 10 ft
Drilling Date: September 1, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
8-1/2 feet during drilling operations; wet cave at 8 feet after auger removal

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 24

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-25

CONSULTING GROUP

## SUBSURFACE PROFILE

## SOIL SAMPLE DATA

| ELEV. (ft) | PRO-FILE | GROUND SURFACE ELEVATION: 769.0 ft ± | DEPTH (ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
|---|---|---|---|---|---|---|---|---|---|
| | | Topsoil: Dark Brown Silty Clay (5 inches) 0.4 | | S-1 | 4 7 9 | 16 | 10.8 | | 9000* |
| 764.0 | | Very Stiff Brown Silty Clay with trace sand and gravel, frequent silt seams | 5 | S-2 | 6 15 11 | 26 | 8.9 | | 8000* |
| | | | | S-3 | 5 8 9 | 17 | 22.2 | | 4000* |
| 759.0 | | 9.8 | 10 | S-4 | 6 7 8 | 15 | 28.1 | | 9000* |
| | | Hard Gray Silty Clay with trace sand and gravel 10.0 | | | | | | | |
| | | End of Boring @ 10 ft | | | | | | | |
| 754.0 | | | 15 | | | | | | |
| 749.0 | | | 20 | | | | | | |
| 744.0 | | | 25 | | | | | | |

Total Depth: 10 ft
Drilling Date: September 1, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 25

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No. 220610

Latitude: N/A Longitude: N/A

# Soil Boring No. B-26

CONSULTING GROUP

| SUBSURFACE PROFILE | | | | SOIL SAMPLE DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ELEV. ( ft) | PRO-FILE | GROUND SURFACE ELEVATION: 777.0 ft ± | DEPTH ( ft) | SAMPLE TYPE-NO. | BLOWS/ 6-INCHES | STD. PEN. RESISTANCE (N) | MOISTURE CONTENT (%) | DRY DENSITY (PCF) | UNCONF. COMP. STR. (PSF) |
| | | Topsoil: Dark Brown Silty Clay (4.5 inches) 0.4 | | | | | | | |
| | | | | S-1 | 6 7 9 | 16 | 8.3 | | 9000* |
| 772.0 | | Hard Brown Silty Clay with trace sand and gravel | 5 | S-2 | 4 5 8 | 13 | 17.4 | | 9000* |
| | | | | S-3 | 5 6 8 | 14 | 13.5 | | 9000* |
| 767.0 | | 10.0 | 10 | S-4 | 5 7 9 | 16 | 12.8 | | 9000* |
| | | Very Stiff Gray Silty Clay with trace sand and gravel | | | | | | | |
| 762.0 | | | 15 | S-5 | 4 5 7 | 12 | 18.8 | | 7000* |
| | | 18.0 | | | | | | | |
| | | Stiff to Very Stiff Gray Clayey Silt with trace sand | | | | | | | |
| 757.0 | | 20.0 | 20 | S-6 | 4 6 6 | 12 | 23.7 | | 4000* |
| | | End of Boring @ 20 ft | | | | | | | |
| 752.0 | | | 25 | | | | | | |

Total Depth: 20 ft
Drilling Date: September 1, 2022
Inspector:
Contractor: Strata Drilling, Inc.
Driller: D. Watkins

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

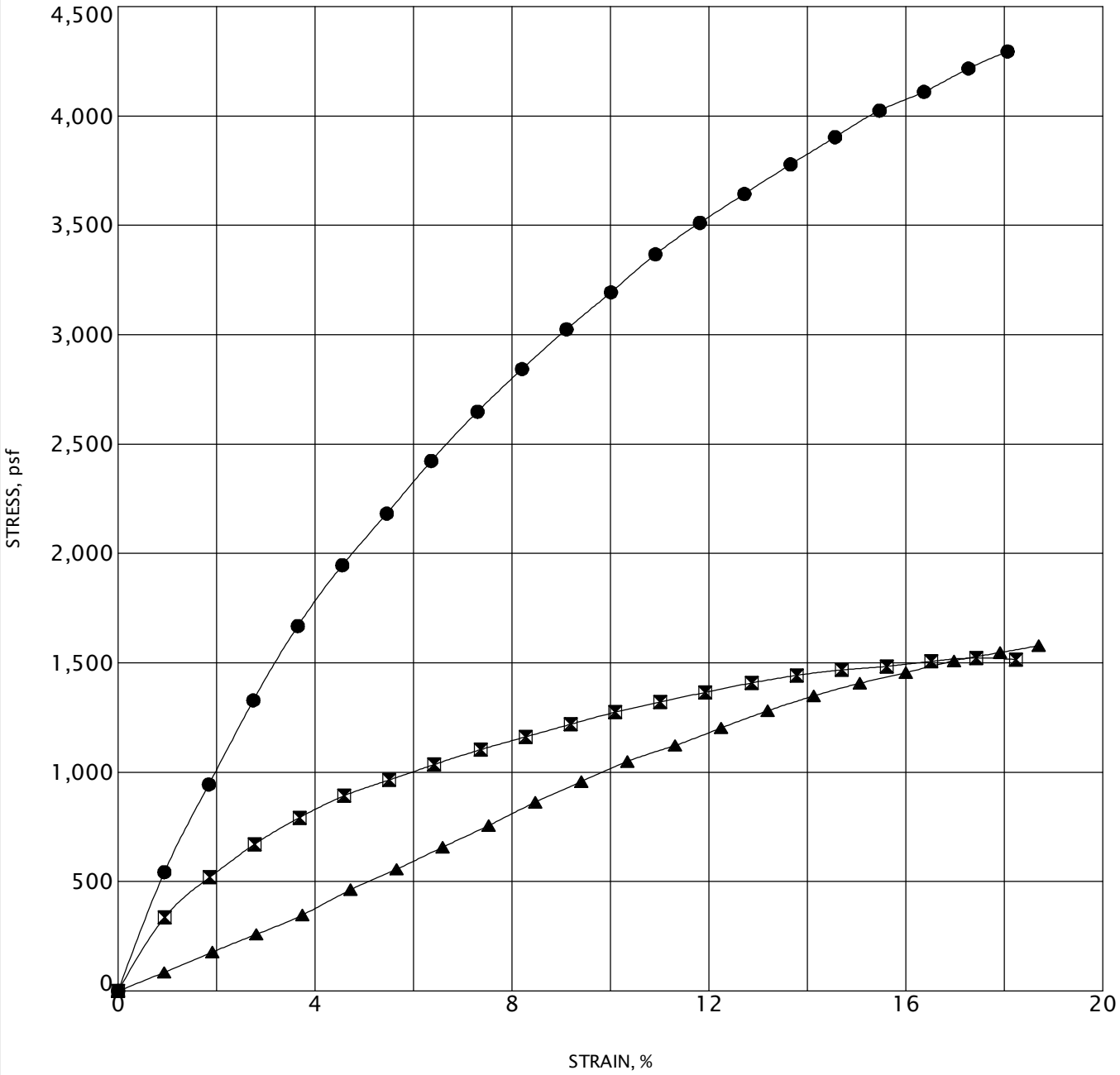
Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 26

SOIL / PAVEMENT BORING 220610.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22




| Specimen | | | Classification | MC% | $\gamma_d$ | UC |
|---|---|---|---|---|---|---|
| ● | B-10 | S-5 | Gray Silty Clay | 17 | 119 | 3960 |
| ⊠ | B-10 | S-6 | Gray Silty Clay | 24 | 98 | 1470 |
| ▲ | B-11 | S-4 | Gray Silty Clay | 24 | 110 | 1400 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

CONSULTING GROUP

## UNCONFINED COMPRESSIVE STRENGTH TEST

Project Name: Rochester University Athletic Improvements

Project Location: 800 West Avon Road
Rochester Hills, Michigan 48307

G2 Project No.: 220610

Figure No. 27

US_UNCONFINED 220610.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 9/29/22

# GENERAL NOTES TERMINOLOGY

Unless otherwise noted, all terms herein refer to the Standard Definitions presented in ASTM 653.

**PARTICLE SIZE**

| | | |
|---|---|---|
| Boulders | | - greater than 12 inches |
| Cobbles | | - 3 inches to 12 inches |
| Gravel | - Coarse | - 3/4 inches to 3 inches |
| | - Fine | - No. 4 to 3/4 inches |
| Sand | - Coarse | - No. 10 to No. 4 |
| | - Medium | - No. 40 to No. 10 |
| | - Fine | - No. 200 to No. 40 |
| Silt | | - 0.005mm to 0.074mm |
| Clay | | - Less than 0.005mm |

**CLASSIFICATION**

The major soil constituent is the principal noun, i.e. clay, silt, sand, gravel. The second major soil constituent and other minor constituents are reported as follows:

| Second Major Constituent (percent by weight) | Minor Constituent (percent by weight) |
|---|---|
| Trace - 1 to 12% | Trace - 1 to 12% |
| Adjective - 12 to 35% | Little - 12 to 23% |
| And - over 35% | Some - 23 to 33% |

**COHESIVE SOILS**

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier, i.e. sandy clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils, i.e. silty clay, trace sand, little gravel.

| Consistency | Unconfined Compressive Strength (psf) | Approximate Range of (N) |
|---|---|---|
| Very Soft | Below 500 | 0 - 2 |
| Soft | 500 - 1,000 | 3 - 4 |
| Medium | 1,000 - 2,000 | 5 - 8 |
| Stiff | 2,000 - 4,000 | 9 - 15 |
| Very Stiff | 4,000 - 8,000 | 16 - 30 |
| Hard | 8,000 - 16,000 | 31 - 50 |
| Very Hard | Over 16,000 | Over 50 |

Consistency of cohesive soils is based upon an evaluation of the observed resistance to deformation under load and not upon the Standard Penetration Resistance (N).

**COHESIONLESS SOILS**

| Density Classification | Relative Density % | Approximate Range of (N) |
|---|---|---|
| Very Loose | 0 - 15 | 0 - 4 |
| Loose | 16 - 35 | 5 - 10 |
| Medium Compact | 36 - 65 | 11 - 30 |
| Compact | 66 - 85 | 31 - 50 |
| Very Compact | 86 - 100 | Over 50 |

Relative Density of cohesionless soils is based upon the evaluation of the Standard Penetration Resistance (N), modified as required for depth effects, sampling effects, etc.

**SAMPLE DESIGNATIONS**

AS - Auger Sample – Cuttings directly from auger flight
BS - Bottle or Bag Samples
S - Split Spoon Sample - ASTM D 1586
LS - Liner Sample with liner insert 3 inches in length
ST - Shelby Tube sample - 3 inch diameter unless otherwise noted
PS - Piston Sample - 3 inch diameter unless otherwise noted
RC - Rock Core - NX core unless otherwise noted

STANDARD PENETRATION TEST (ASTM D 1586) - A 2.0 inch outside-diameter, 1-3/8 inch inside-diameter split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).