CONSULTING GROUP

Report of Geotechnical Investigation

Starbucks
1360 Walton Boulevard
Rochester Hills, Michigan
48309

Latitude 42.681914° N
Longitude -83.155702° W

Prepared for:

Verus Development Group
36400 Woodward Ave, Suite 240
Bloomfield Hills, Michigan 48304

G2 Project No. 210816
January 4, 2022

g2consultinggroup.com

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CONSULTING GROUP

January 4, 2022

Mr. Frank Arcori
Verus Development Group
36400 Woodward Ave, Suite 240
Bloomfield Hills, Michigan 48304

c/o Mr. J. Reid Cooksey, P.E., LEED AP BD+C
Stonefield Engineering & Design, LLC

Re: Report of Geotechnical Investigation
Starbucks
1360 Walton Boulevard
Rochester Hills, Michigan 48309
G2 Project No. 210816

Dear Mr. Arcori,

We have completed the geotechnical investigation for the proposed Starbucks to be constructed at 1360 Walton Boulevard in Rochester Hills, Michigan. This report presents the results of our observations and analyses and our recommendations for subgrade preparation, foundation, pavement, stormwater detention, and retaining wall design, and construction considerations as they relate to the geotechnical conditions at the site.

We appreciate the opportunity to be of service to Verus Development Group and Stonefield Engineering & Design, LLC on this project and we look forward to discussing the recommendations presented herein. In the meantime, if you have any questions regarding this report or any other matter pertaining to the project, please contact us.

Sincerely,

G2 Consulting Group, LLC

Jennifer M. Casey, P.E.
Project Manager

Amy L. Schneider, P.E.
Project Manager

JMC/ALS/jmc

EXECUTIVE SUMMARY

We understand the proposed development will consist of constructing a single-story 2,219 square foot, single-story, slab-on-grade building. A retaining wall with a maximum exposed height of 5 feet is proposed along the north and east sides of the property. Additionally, utilities and a below grade detention system will be constructed in conjunction with the development.

Approximately 2 to 6 inches of topsoil are present at soil borings B-3, B-6, and B-10 and hand auger borings HA-1 and HA-2. Approximately 4 to 5 inches of bituminous concrete are present at the remaining soil boring locations. Sand and gravel fill or silty sand fill with asphalt millings are present beneath the pavement section within soil borings B-2 and B-8 and extend to an approximate depth of 1-1/2 feet. Very loose to loose silty sand fill soil is present beneath the pavement section within soil borings B-1 and B-4 and beneath the topsoil in hand auger borings HA-1 and HA-2 and extends to depths ranging from 3 to 5 feet. Native very loose to medium compact silty sand is present beneath the topsoil, pavement, and fill soils in soil borings B-1, B-2, B-3, B-5, B-7, and B-11 and extends to depths ranging from 3 to 8 feet. Loose to medium compact sand is generally present beneath the silty sand or the fill soil, pavement section, and topsoil in the remaining borings and generally extends to the explored depths. Very stiff silty clay is present beneath the silty sand in soil boring B-7 and extends to the explored depth of 10 feet. No measurable groundwater was observed within soil borings B-1 through B-8 or B-11 or hand auger borings HA-1 and HA-2 during or upon completion of drilling operations. Groundwater was encountered at approximate depths of 18 and 20 feet within soil borings B-9 and B-10, respectively, during drilling operations.

The existing fill soils are not suitable for support of building foundations. We recommend the proposed building be supported on conventional shallow spread and strip footings extending through any existing fill soils and bearing on the underlying native loose to medium compact sand and silty sand. A net allowable soil bearing capacity of 1,500 pounds per square foot (psf) can be used for design of foundations bearing on the native loose to medium compact sand or silty sand. Exterior footings must bear at a minimum depth of 3-1/2 feet for protection against frost heave. We recommend a G2 Consulting Group, LLC (G2) representative be on site during construction to observe the excavations, measure bearing depths, and verify the adequacy of the bearing soils.

Based on the results of our pavement analysis, we recommend a minimum standard-duty pavement design cross section consist of 2 inches of MDOT 5E1 wearing course atop 2 inches of MDOT 4E1 leveling course supported on a minimum of 8 inches of MDOT 21AA dense graded aggregate base.

Caving and/or sloughing of any granular engineered fill used to backfill excavations or raise site grades will occur during strip and spread foundation excavation operations. Therefore, we recommend the contractor be prepared to form the shallow foundations, as necessary. In general, we do not anticipate any groundwater seepage within the excavations and expect any accumulations of surface run-off water should be controllable with normal pumping from properly constructed sumps.

Care should always be exercised where excavating near existing buildings, utilities, and pavements to avoid undermining. In no case shall excavations extend below the level of adjacent foundations, utilities, or pavements without properly designed underpinning. We recommend maximum slope inclinations of 1-1/2H:1V within the granular 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. We anticipate excavations for the proposed retaining wall will extend beyond the property lines due to the required slope angles.

Do not consider this summary 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

We understand the proposed development will consist of constructing a single-story 2,219 square foot, single-story, slab-on-grade building with a drive-thru on the west side of the building. Bituminous concrete pavement will be constructed throughout the property with the exception of within the drive-thru and dumpster pad which will be Portland cement concrete. A retaining wall with a maximum exposed height of 5 feet is proposed along the north and east sides of the property. Additionally, utilities and a below grade detention system will be constructed in conjunction with the development.

The proposed finished floor elevation is 826.20 feet, which is similar to existing grade within the proposed building footprint. Proposed finished grades south of the building will be similar to existing grades. North and east of the building, site grades will be lowered by as much as 5 feet.

Structural loading conditions were not available at the time of the investigation; however, we anticipate interior column loads will be up to 100 kips and wall loads ranging from 2 to 4 kips per linear foot. When the proposed loading conditions become available, G2 should be notified so that we can review the recommendations presented herein.

The purpose of our exploration is to determine and evaluate the general subsurface conditions at the site and develop recommendations for the subgrade preparation, foundation, stormwater detention, pavement, and retaining wall design, and construction considerations as they relate to the geotechnical conditions at the site.

SCOPE OF SERVICES

The field operations, laboratory testing, and engineering report preparation were performed under the 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 drilled eleven soil borings throughout the proposed development. Soil borings B-1 and B-2 were drilled adjacent to the proposed structure footprint and extended to a depth of 15 feet each below existing grade. Soil borings B-3 through B-5 were drilled within proposed pavement areas and the underground detention area and extended to a depth of 5 feet each below existing grade. Soil borings B-6 and B-7 were drilled within proposed pavement areas and extended to a depth of 10 feet each below existing grade. Soil borings B-8 through B-11 were drilled within the proposed retaining wall alignment and extended to depths ranging from 15 to 25 feet each below existing grade.

2. We performed two hand auger soil borings within the slope on the north side of the property. The hand auger boings extended to depths of 5 and 7 feet below existing grade.

3. We performed laboratory testing on representative samples obtained from the soil boring. Laboratory testing included visual engineering classification, natural moisture content, organic matter content, grain size distribution, and unconfined compressive strength determinations.

4. We prepared this engineering report which includes our recommendations regarding foundation types, allowable bearing capacity, estimated settlement, pavement recommendations, retaining wall recommendations, and construction considerations as they relate to the subsurface conditions.

FIELD OPERATIONS

G2, in conjunction with Verus Development Group and Stonefield Engineering, selected the number, depth, and location of the soil borings. The soil boring locations were determined in the field by a G2 staff engineer using hand held GPS technology and by measuring from existing site features using conventional taping methods. The approximate soil boring locations are shown on the Soil Boring Location Plan, Plate No. 1, in the Appendix. The ground surface elevations at the soil boring locations

were interpolated from topographical contour lines and spot elevations presented on Grading Plan, Drawing C-4, prepared by Stonefield Engineering & Design, dated October 28, 2021.

The soil borings were drilled using a truck-mounted rotary drilling rig. Continuous flight 2-1/4 inch inside-diameter hollow stem augers were used to advance boreholes to the explored depth. Soil samples were obtained at intervals of 2-1/2 feet within the upper 10 feet and at intervals of 5 feet thereafter. These 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 6-inch increment and the resulting N-values are presented on the soil boring log. Upon completion of the soil boring operations, the soil boring was backfilled with auger cuttings and capped with cold patch where borings extended through existing pavement.

The soil samples were placed in sealed containers in the field and brought to our laboratory for testing and classification. During drilling operations, the driller maintained field 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 and test results.

LABORATORY TESTING

Representative samples were subjected to laboratory testing to determine soil parameters pertinent to foundation design and site preparation. An experienced geotechnical engineer classified the soils in accordance with the G2 General Notes Terminology and Unified Soil Classification System ASTM D2488.

Laboratory testing included natural moisture content, organic matter content, unconfined compressive strength, and grain size distribution determinations. The organic matter content of representative samples was determined in accordance with ASTM Test Method D 2974, “Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils”. The unconfined compressive strengths were determined using a spring-loaded hand penetrometer. 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. Grain-size distribution was determined in general conformance with ASTM D 422 method of testing.

The results of the natural moisture content, organic matter content, and unconfined compressive strength laboratory testing are presented on the individual soil boring logs at the depths samples were taken. The grain size distribution results are presented on Figure No. 14 in the Appendix. We will retain the soil samples for 60 days from the date of this report, after which time the samples will be discarded. If you would like the samples, please let us know.

SITE DESCRIPTION

The proposed development is located at 1360 Walton Boulevard in Rochester Hills, Michigan. An existing single-story building to be demolished is currently present within the entire footprint of the proposed building. Bituminous pavements are present east and north of the building, with concrete sidewalk about the building. Existing grades slope upward to the edge of the pavement at the northeast side of the existing development, ranging from approximately 824 feet along Walton Boulevard to 833 feet adjacent to the trash enclosure. Beyond the pavement, grades slope up significantly toward the residential properties, extending up to Elevation 850 feet at the northeast property corner. A timber retaining wall is present along the north side of the parking lot at the base of the slope. Surrounding properties are generally retail or restaurant. Rochester High School is south of the site.

SOIL CONDITIONS

Approximately 2 to 6 inches of topsoil are present at soil borings B-3, B-6, and B-10 and hand auger borings HA-1 and HA-2. Approximately 4 to 5 inches of bituminous concrete are present at the remaining soil boring locations. Approximately 1 to 2 inches of aggregate base are present beneath the bituminous concrete at soil borings B-8, B-9, and B-11. Sand and gravel fill or silty sand fill with asphalt millings are present beneath the pavement section within soil borings B-2 and B-8 and extend to an approximate depth of 1-1/2 feet. Silty sand fill is present beneath the pavement section within soil borings B-1 and B-4 and beneath the topsoil in hand auger borings HA-1 and HA-2 and extends to depths ranging from 3 to 5 feet. Native silty sand is present beneath the topsoil, pavement, and fill soils in soil borings B-1, B-2, B-3, B-5, B-7, and B-11 and extends to depths ranging from 3 to 8 feet. Sand is present beneath the silty sand or the fill soil, pavement section, and topsoil in the remaining borings and generally extends to the explored depths. Silty clay is present beneath the silty sand in soil boring B-7 and extends to the explored depth of 10 feet.

The silty sand fill is very loose to loose in compactness with Standard Penetration Test N-values ranging from 3 to 9 blows per foot. The silty sand fill within soil boring B-4 has 0.7 to 1.0 percent organic matter. The native silty sand is very loose to medium compact with N-values ranging from 2 to 13 blows per foot. The sand is generally loose to medium compact with N-values ranging from 8 to 23 blows per foot. Very loose sand layers are present within soil borings B-1 between the approximate depths of 8 and 13 feet and B-8 and B-9 between the approximate depths of 3 and 5-1/2 feet with N-values ranging from 2 to 3 bows per foot. The silty clay is very stiff in consistency with a natural moisture content of 25 percent and an unconfined compressive strength of 6,000 psf.

The stratification depths shown on the soil boring logs represent the soil conditions at the boring location. Variations may occur between borings. Additionally, the stratigraphic lines represent the approximate boundaries between soil types. The transition may be more gradual than what is shown. We have prepared the individual soil boring logs on the basis of the laboratory soil classification and testing in conjunction with the field logs of the encountered soil conditions.

The Soil Boring Location Plan, Plate No. 1, Soil Boring Logs, Figure Nos. 1 through 13, and Grain Size Distribution, Figure No. 14, 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 soil boring logs and elsewhere in this report is presented on Figure No. 15.

GROUNDWATER CONDITIONS

Groundwater observations were made during and upon completion of drilling operations. No measurable groundwater was observed within soil borings B-1 through B-8 or B-11 or hand auger borings HA-1 and HA-2 during or upon completion of drilling operations. Groundwater was encountered at approximate depths of 18 and 20 feet within soil borings B-9 and B-10, respectively, during drilling operations. Upon completion of drilling and removal of the augers, these boreholes collapsed above the encountered groundwater level; therefore a measure of the groundwater level at completion was not possible. Fluctuations in perched and long-term groundwater levels should be anticipated due to seasonal variations and following periods of prolonged precipitation.

SITE PREPARATION RECOMMENDATIONS

We anticipate earthwork operations will consist of the complete demolition and removal of the existing building, pavement, vegetation, and topsoil within the area of the proposed development, proof compacting the exposed subgrade, constructing the proposed retaining wall, placing and compacting engineered fill, excavating for the proposed foundations and utilities, and preparing the site for floor slab and pavement support. We recommend all earthwork operations be performed in accordance with

comprehensive specifications and be properly monitored in the field by G2 geotechnical engineers or technicians under the direction of a licensed professional engineer.

At the start of earthwork operations, the existing building, pavement, vegetation, and topsoil should be removed in their entirety from within the area of the proposed development. Following removal of the existing topsoil, vegetation, and asphalt and prior to placement of any engineered fill, the exposed granular subgrade should thoroughly proof compacted with a heavy vibratory roller making a minimum of 10 passes across the subgrade in two perpendicular directions. However, the vibratory setting of the roller should be turned off within 20 feet of the existing timber retaining walls along the western property line. Any unstable or unsuitable areas noted should be improved by additional compaction. Any soils that are disturbed should be removed and replaced with engineered fill. Any abandoned utilities within the area of the new structure must be removed and replaced with engineered fill. Utilities outside the proposed structure can be abandoned in place and completely filled with grout.

Engineered fill should be free of organic matter, frozen soil, clods, or otherwise harmful material. The fill should be placed in uniform horizontal layers, not to exceed 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 D1557). Any engineered fill should be placed at the approximate optimum moisture content. Frozen material should not be used as fill, nor should fill be placed on a frozen subgrade.

FOUNDATION RECOMMENDATIONS

The existing fill soils are not suitable for support of building foundations. We recommend the proposed building be supported on conventional shallow spread and strip footings extending through any existing fill soils and bearing on the underlying native loose to medium compact sand or silty sand. A net allowable soil bearing capacity of 1,500 psf can be used for design of foundations bearing on the native loose to medium compact sand or silty sand. Exterior footings must bear at a minimum depth of 3-1/2 feet relative to the finished grades for protection against frost heave. Interior footings can bear at a shallower depth provided suitable bearing soils are present and foundations are protected from frost during construction. 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. We recommend all strip and spread footings be suitably reinforced to minimize the effects of differential settlements associated with local variations in subsoil conditions.

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 structure proposed.

FLOOR SLAB RECOMMENDATIONS

The subgrade soils, anticipated to consist of loose to medium compact silty sand or silty sand fill, can be used for the support of floor slab provided they pass proof compaction operations as described in the SITE PREPARATION section of this report. A subgrade modulus (k) of 125 per cubic inch (pci) may be used in the design of floor slabs supported on the existing granular 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.

PAVEMENT RECOMMENDATIONS

We anticipate site pavements will consist primarily of bituminous concrete. Based on the soil boring data, we anticipate the pavement subgrade may consist of sand or silty sand. Sand and silty sand are considered fair to good for support of conventional pavement structures, have fair to good drainage characteristics, and have a low to moderate susceptibility to frost action. No data regarding expected traffic frequencies and type of vehicles was available. We anticipate the majority of traffic will be passenger vehicles. For a design life of 20 years, we estimate this combination of vehicles may result in approximately 50,000 equivalent 18-kip single-axle loads (ESALs) for the pavements. We performed pavement design analysis in accordance with the "AASHTO Guide for Design of Pavement Structures." Based on the existing granular soils within the proposed parking lot area, we recommend the subgrade soils be assigned an effective roadbed soil resilient modulus of 10,000 pounds per square inch (psi) for use in pavement design after proof-compacting operations are completed as described in the SITE PREPARATION section of this report.

For evaluation purposes, we estimated a serviceability loss of 2.0, a standard deviation of 0.45 for flexible pavement design, and a reliability factor of 0.95. Based on the results of our analysis, we recommend a minimum standard-duty pavement design cross section consist of 2 inches of MDOT 5E1 wearing course atop 2 inches of MDOT 4E1 leveling course supported on a minimum of 8 inches of MDOT 21AA aggregate base.

Large front-loading refuse trucks can impose significant concentrated wheel loads within trash pick-up areas. This type of loading can result in rutting of asphalt pavements and ultimately in failure. We recommend reinforced concrete pavement, at least 8 inches in thickness, be used in these areas. The concrete pad should be large enough to support the entire refuse truck during pick-up operations.

All pavement materials are specified within the 2012 Standard Specifications for Construction from the Michigan Department of Transportation. The bituminous pavement materials are described in Sections 501 through 506. The aggregate materials for dense-graded base and asphalt are described in Section 902. Per MDOT specifications, the asphalt pavement materials can be assigned a structural coefficient number of 0.42 and the dense-graded aggregate base material can be assigned a structural coefficient number of 0.14.

Proper drainage is considered to be an important consideration for pavement design. The pavement and subgrade should be properly sloped to promote effective surface and subsurface drainage and prevent water ponding.

We recommend regular timely maintenance be performed on the pavement to reduce the potential deterioration associated with moisture infiltration through surface cracks. The owner should be prepared to seal the cracks with a hot-applied elastic crack filler as soon as possible after cracking develops and as often as necessary to block the passage of water to the subgrade soils. We recommend that crack sealing be performed on a yearly basis for pavements that are in good and fair condition to extend the life of the pavements.

BELOW GRADE DETENTION BASIN RECOMMENDATIONS

We understand a below grade detention basin will be installed on the east side of the site beneath the parking lot, in the location of soil borings B-1, B-2, B-4, and B-5. We understand the basin invert will be at Elevation 817.55 feet. Soil conditions beneath the proposed detention basin consist of brown sand. Based on the results of the grain size analyses, the granular soils have expected hydraulic conductivities ranging from $4x10^{-3}$ to $4x10^{-2}$ centimeters per second (cm/s).

RETAINING WALL RECOMMENDATIONS

Based on the conditions observed within the soil borings, the retained soils and bearing soils are expected to consist of very loose to loose silty sand or sand. We recommend the following soil parameters be used in design of the retaining walls for the existing soils:

Elevation (feet)	Total Unit Weight (pcf)	Long-term Friction Angle (degrees)
832 and Above	115	29
832 to 829	120	33
829 to 826-1/2	115	31
826-1/2 and Below	120	33

An allowable soil bearing pressure of 1,000 psf may be used for design of the retaining walls supported on the existing very loose to loose granular soils. Lateral earth pressures are significantly influenced by the type and intensity of backfill compaction. We recommend thin lifts (approximately 6 inches per lift) of backfill be placed and relatively small compaction equipment be used to compact retaining wall backfill. 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.

SLOPE STABILITY ANALYSIS

We performed a slope stability analysis of the existing slope, the anticipated slope during construction, and the proposed slope and retaining wall configuration using the results of the soil borings and the survey data provided. Stability analyses were performed using the Bishop method of slices failure model as calculated by the computer program SLIDE (Version 6.0). Our analysis shows that the proposed retaining wall construction within the existing slope results in a factor of safety against a deep-seated global stability failure of greater than 1.3, which is the industry standard for slopes. Therefore, we do not anticipate slope stability issues once the proposed retaining wall construction is complete.

The critical slope condition will be during excavation for the proposed wall. Shallow, surficial failure surfaces, or sloughing, should be expected where excavation slope angles exceed the internal friction angle of the soils. Based on our evaluation, the existing slope soils are expected to have an internal angle of friction of approximately 29 degrees; therefore, temporary slopes cut steeper than 29 degrees from horizontal will likely exhibit signs of sloughing when left open for an extended period of time. The anticipated sloughing is expected to propagate to at least the property line along the north side of the site and several feet beyond the property line on the east side of the site.

Based on the available data, an existing timber retaining wall is located slightly north of the north property line. The existing survey data indicates a possible berm at the top of the slope, south of the timber retaining wall on the adjacent property, and that the grade beyond the timber retaining wall is low. View of the northern adjacent property was obstructed by a wooden privacy fence at the time of our site visit so these conditions could not be verified by visual observation. If the berm condition is present, we do not anticipate any impact on the existing timber retaining wall due to proposed retaining wall construction operations. It is possible, however, that the existing fence could be affect by surficial slope sloughing. We recommend the temporary construction slope be cut no steeper than 1-1/2

horizontal to 1 vertical (1-1/2H:1V) and that the slope be carefully monitored for signs of sloughing. If sloughing is observed at or beyond the north property line, the existing fence should immediately be removed so that it does not collapse into the work area. If retaining wall construction is performed during rain or snow melt events, increased sloughing will occur; therefore, we recommend retaining wall construction be coordinated to occur during periods of prolonged dry weather and that the weather forecast be taken into account prior to excavating into the existing slope.

No significant structural features are present beyond the east property line in the vicinity of the proposed retaining wall. In addition, the grade on the adjacent property to the east is relatively flat; therefore, less sloughing is expected. A temporary construction easement from the adjacent property will be required in order to construct the retaining wall along the eastern property line.

CONSTRUCTION CONSIDERATIONS

Caving and/or sloughing of any granular engineered fill used to backfill excavations or raise site grades will occur during strip and spread foundation excavation operations. Therefore, we recommend the contractor be prepared to over-excavate and form the shallow foundations, as necessary. 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.

In general, we do not anticipate any groundwater seepage within the excavations and expect any accumulations of surface run-off water should be controllable with normal pumping from properly constructed sumps.

Care should always be exercised where excavating near existing buildings, utilities, and pavements to avoid undermining. In no case shall excavations extend below the level of adjacent foundations, utilities, or pavements without properly designed underpinning. We recommend maximum slope inclinations of 1-1/2H:1V within the granular 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. All excavations should be safely sheeted, shored, sloped, or braced in accordance with MI-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.

GENERAL COMMENTS

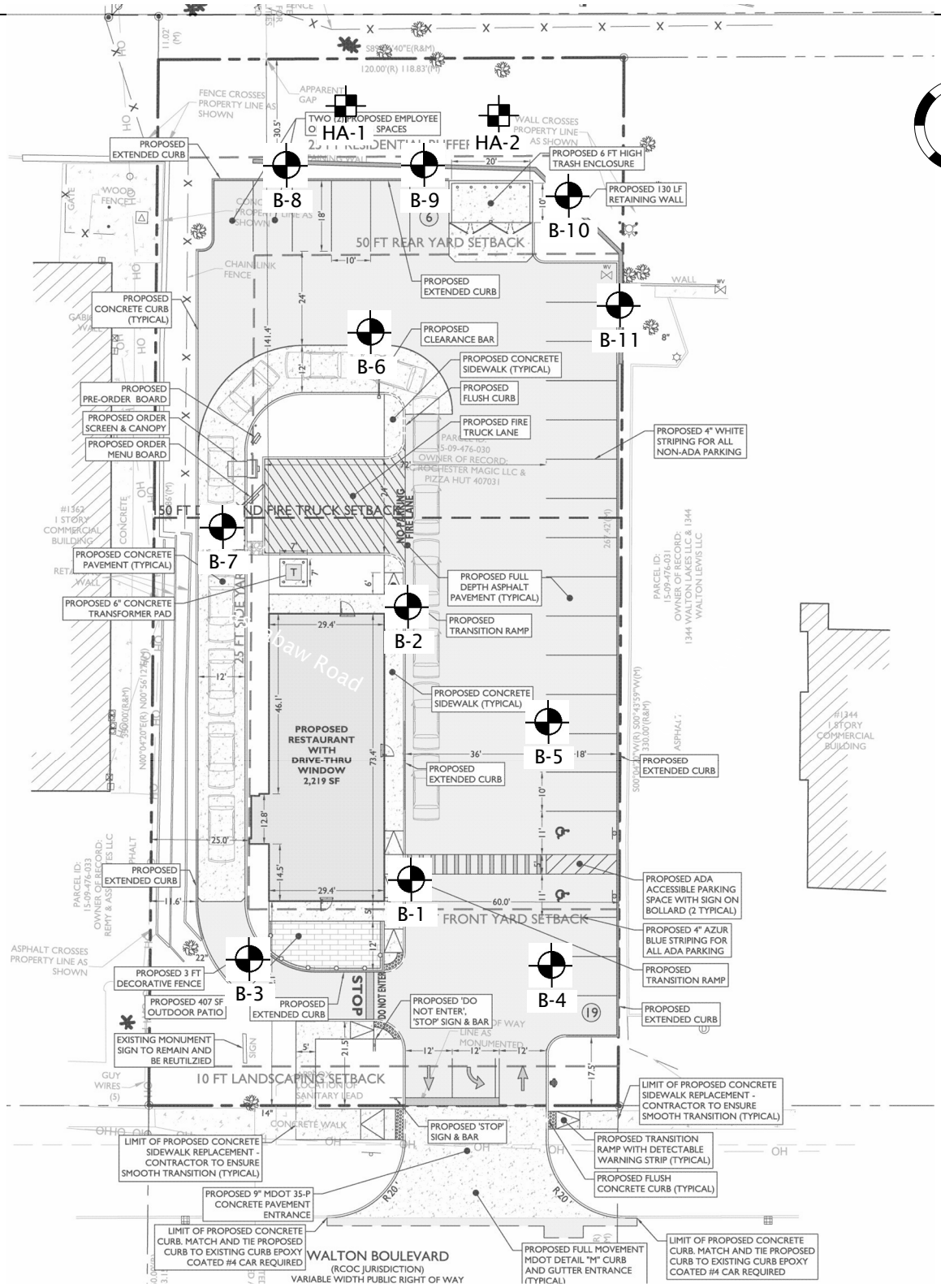
We have formulated the evaluations and recommendations presented in this report relative to site preparation and foundations on the basis of data provided to us relating to the project location, type of structure, and anticipated surface grade for the proposed site. Any significant change in this data should be brought to our attention for review and evaluation with respect to prevailing subsurface conditions. Furthermore, if changes occur in the design, location, or concept of the project, 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 this report is limited to evaluation of subsurface conditions for the support of the proposed building and other related aspects of the development. No chemical, environmental, or hydrogeological testing or analyses were included in the scope of this report.

We base the analyses and recommendations submitted in this report upon the data from the soil boring performed at the approximate location shown on the Soil Boring Location Plan, Plate No. 1. This report does not reflect variations that may occur between the actual boring location and the actual structure location. 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.

We recommend G2 Consulting Group, LLC observe all geotechnical related work, including foundation construction, subgrade preparation, and engineered fill placement. G2 Consulting Group, LLC will perform the appropriate testing to confirm the geotechnical conditions given in the report are found during construction.

APPENDIX



Legend

- Soil borings drilled by Triple R Drilling on November 23, 2021
- Hand auger borings performed by G2 Consulting Group, LLC on December 16, 2021

Soil Boring Location Plan

Proposed Starbucks
1360 Walton Boulevard
Rochester Hills, Michigan

G2 CONSULTING GROUP

Project No. 210816	
Drawn by: JMC	
Date: 12-29-21	Plate No. 1
Scale: NTS	

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 825.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (5 inches) 0.4							
		Fill: Loose Dark Brown and Brown Silty Sand with trace gravel		S-1	2 4 5	9			
		3.0							
820.5		Medium Compact Brown Silty Sand with trace gravel 5.0	5	S-2	5 6 7	13			
		Very Loose Brown Brown Silty Sand with trace gravel		S-3	1 2 2	4			
		8.0							
815.5		Very Loose Brown Sand with trace silt and gravel	10	S-4	1 1 2	3			
		13.0							
810.5		Medium Compact Brown Sand with trace silt and gravel 15.0	15	S-5	3 9 14	23			
		End of Boring @ 15 ft							
805.5			20						
800.5			25						

Total Depth: 15 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

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

Figure No. 1

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 826.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (5 inches) 0.4							
		Fill: Sand and Gravel with asphalt millings 1.5							
		Medium Compact Brown Silty Sand with trace gravel		S-1	3 5 6	11			
		3.5							
821.0			5	S-2	2 4 5	9			
				S-3	3 5 5	10			
		Loose to Medium Compact Brown Sand with trace silt and gravel		S-4	3 5 5	10			
816.0			10						
				S-5	4 8 14	22			
811.0		15.0	15						
		End of Boring @ 15 ft							
806.0			20						
801.0			25						

Total Depth: 15 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

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

Notes:
Borehole collapsed at 10 ft after auger removal

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 2

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 826.0 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 (3 inches) 0.3							
		Loose to Medium Compact Brown Silty Sand with trace gravel		S-1	2 3 5	8			
821.0		5.0	5	S-2	5 6 6	12			
		End of Boring @ 5 ft							
816.0			10						
811.0			15						
806.0			20						
801.0			25						

Total Depth: 5 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

Excavation Backfilling Procedure:
Auger cuttings

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

Figure No. 3

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 826.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (4 inches) 0.3							
		Fill: Very Loose to Loose Dark Brown Silty Sand with trace gravel and organic matter (Organic Matter Content = 0.7 to 1.0%)		S-1	1 1 2	3			
821.0		5.0	5	S-2	1 3 3	6			
		End of Boring @ 5 ft							
816.0			10						
811.0			15						
806.0			20						
801.0			25						

Total Depth: 5 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

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

Figure No. 4

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 827.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (5 inches) 0.4							
		Very Loose to Loose Brown Silty Sand with trace gravel		S-1	1 1 1	2			
822.5		5.0	5	S-2	1 2 3	5			
		End of Boring @ 5 ft							
817.5			10						
812.5			15						
807.5			20						
802.5			25						

Total Depth: 5 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

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

Figure No. 5

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 829.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (4 inches) 0.3							
		Loose Brown Sand with trace silt and gravel, occasional clay layers		S-1	2 5 6	11			
		3.0							
824.0			5	S-2	3 4 4	8			
		Loose to Medium Compact Brown Sand with trace silt and gravel		S-3	4 5 5	10			
819.0		10.0	10	S-4	3 5 6	11			
		End of Boring @ 10 ft							
814.0			15						
809.0			20						
804.0			25						

Total Depth: 10 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

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

Notes:
Borehole collapsed at 8 ft after auger removal

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 6

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 827.5 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 Sand (6 inches) 0.5							
				S-1	1 1 1	2			
822.5		Very Loose to Loose Brown Silty Sand with trace gravel	5	S-2	1 3 4	7			
				S-3	1 3 3	6			
		8.0							
817.5		Very Stiff Brown Silty Clay with trace sand and gravel 10.0	10	S-4	1 2 3	5	24.8		6000*
		End of Boring @ 10 ft							
812.5			15						
807.5			20						
802.5			25						

Total Depth: 10 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

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

Notes:
Borehole collapsed at 7 ft after auger removal
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 7

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 830.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (5 inches) 0.4							
		Aggegate Base: Sand and Gravel (1 inch) 0.5							
		Fill: Brown Silty Sand with trace gravel and asphalt millings 1.5		S-1	3 4 4	8			
		Very Loose to Loose Brown Silty Sand with trace gravel							
825.0			5	S-2	1 1 1	2			
		5.5		S-3	5 5 6	11			
820.0		Medium Compact Brown Sand with trace silt and gravel	10	S-4	5 6 8	14			
815.0		15.0	15	S-5	5 6 7	13			
		End of Boring @ 15 ft							
810.0			20						
805.0			25						

Total Depth: 15 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

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

Figure No. 8

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 832.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (5 inches) 0.4							
		Aggegate Base: Sand and Gravel (1 inch) 0.5		S-1	3 4 5	9			
		Very Loose to Loose Brown Sand with trace silt and gravel							
827.0			5	S-2	1 1 2	3			
		5.5		S-3	5 5 7	12			
822.0			10	S-4	5 7 8	15			
817.0		Medium Compact Brown Sand with trace silt and gravel (clay layers below 18 feet)	15	S-5	6 6 7	13			
812.0			20	S-6	4 8 15	23			
807.0		25.0	25	S-7	4 8 14	22			
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

Water Level Observation:
18 feet during drilling; dry upon completion

Notes:
Borehole collapsed at 16 ft after auger removal

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 9

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 834.0 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							
		Loose Brown Sand with trace clay and gravel		S-1	3 4 5	9			
		3.0							
829.0			5	S-2	1 3 5	8			
				S-3	5 6 7	13			
824.0			10	S-4	6 6 7	13			
		Loose to Medium Compact Brown Sand with trace silt and gravel							
819.0			15	S-5	5 6 7	13			
814.0		▽	20	S-6	4 7 15	22			
809.0		25.0	25	S-7	4 8 15	23			
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

Water Level Observation:
20 feet during drilling; dry upon completion

Notes:
Borehole collapsed at 17 ft after auger removal

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 10

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

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: 833.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (5 inches) 0.4							
		Aggregate Base: Sand and Gravel (2 inches) 0.6							
		Loose Brown Silty Sand with trace gravel		S-1	2 5 6	11			
		3.0							
828.0			5	S-2	3 4 5	9			
				S-3	4 5 5	10			
		Loose to Medium Compact Brown Sand with trace silt and gravel							
823.0			10	S-4	3 5 8	13			
818.0		15.0	15	S-5	3 9 14	23			
		End of Boring @ 15 ft							
813.0			20						
808.0			25						

Total Depth: 15 ft
Drilling Date: November 23, 2021
Inspector:
Contractor: Triple R Drilling
Driller: M. Burgess

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

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

Notes:
Borehole collapsed at 11 ft after auger removal

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 11

SOIL / PAVEMENT BORING 210816.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/8/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

Latitude: N/A Longitude: N/A

Soil Boring No. **HA-1**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 839.5 ft ±	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Topsoil: Dark Brown Silty Sand (4 inches) 0.3						
		Fill: Very Loose Dark Brown Silty Sand with trace gravel and roots (Organic Matter Content = 1.2%)		S-1	4			
		3.7						
834.5		Very Loose Brown Sand with trace silt, gravel, and roots (Organic Matter Content = 0.3%) 5.0	5	S-2	3			
		End of Boring @ 5 ft						
829.5			10					
824.5			15					
819.5			20					
814.5			25					

Total Depth: 5 ft
Drilling Date: December 16, 2021
Inspector:
Contractor: G2 Consulting Group
Driller: E. Talabo

Drilling Method:
Hand Auger

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

Notes:
Borehole collapsed at 5 ft after auger removal

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 12

PAVEMENT CORE DCP 210816.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 12/21/21

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No. 210816

Latitude: N/A Longitude: N/A

Soil Boring No. **HA-2**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 846.1 ft ±	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Topsoil: Dark Brown Silty Sand (2 inches) 0.2						
		Fill: Very Loose Dark Brown Silty Sand with trace gravel and roots (Organic Matter Content = 1.3%)		S-1	3			
		2.8						
841.1		Very Loose Brown Sand with trace silt, gravel, and roots (Organic Matter Content = 0.4%)	5	S-2	3			
		7.0						
		End of Boring @ 7 ft						
836.1			10					
831.1			15					
826.1			20					
821.1			25					

Total Depth: 7 ft
Drilling Date: December 16, 2021
Inspector:
Contractor: G2 Consulting Group
Driller: E. Talabo

Drilling Method:
Hand Auger

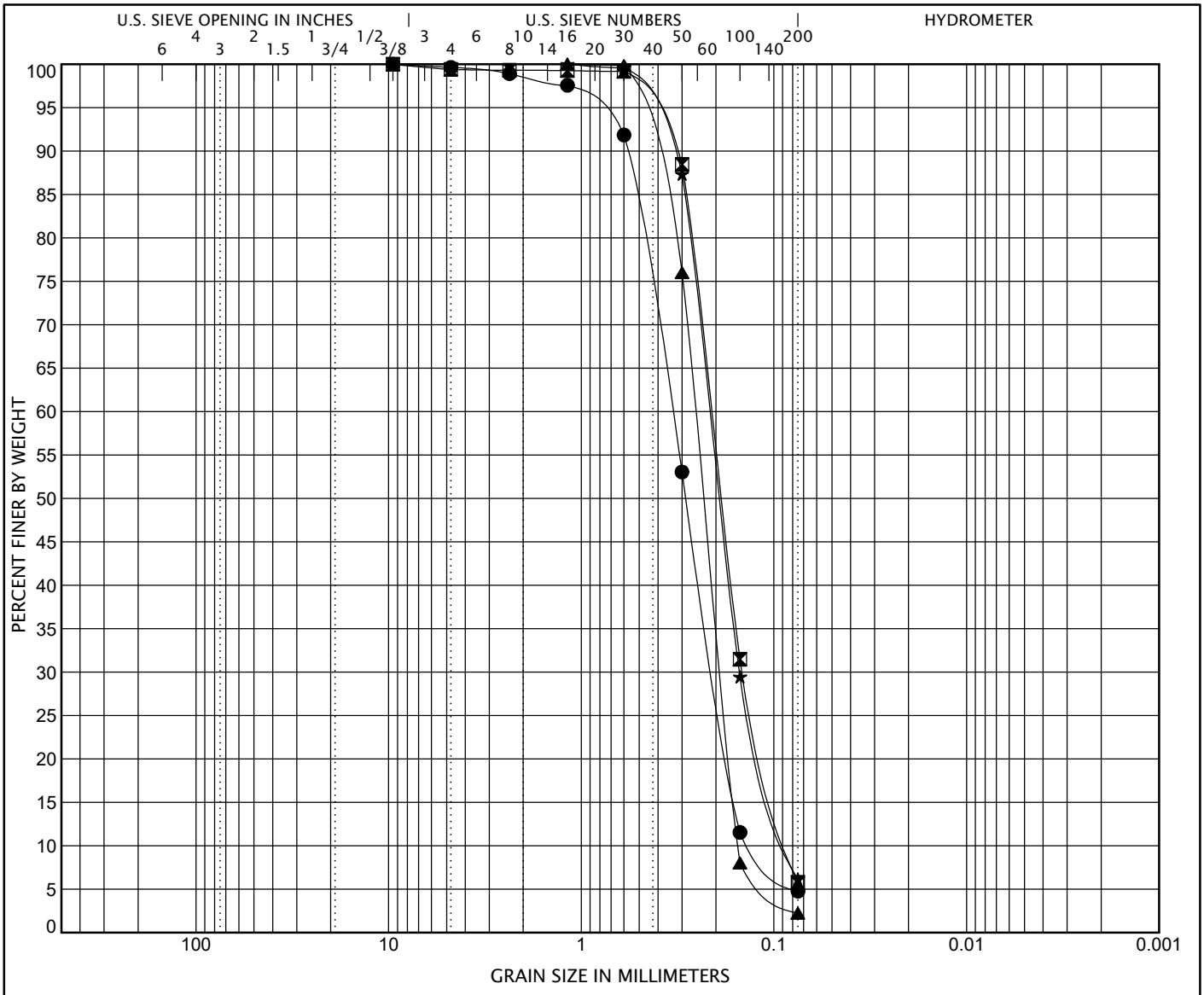
Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Borehole collapsed at 7 ft after auger removal

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 13

PAVEMENT CORE DCP 210816.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 12/21/21



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID		Description	LL	PL	PI	Cc	Cu
●	B-1	S-4	Sand with trace silt and gravel				1.0	2.7
⊠	B-1	S-5	Sand with trace silt and gravel				1.2	2.5
▲	B-2	S-4	Sand with trace silt				0.9	1.7
★	B-2	S-5	Sand with trace silt				1.3	2.6

	Specimen ID		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	S-4	9.5	0.34	0.204	0.128	0.4	94.9	4.8	
⊠	B-1	S-5	9.5	0.212	0.144	0.084	0.6	93.6	5.8	
▲	B-2	S-4	1.18	0.255	0.188	0.153	0.0	97.8	2.2	
★	B-2	S-5	1.18	0.216	0.151	0.084	0.0	93.8	6.2	

CONSULTING GROUP

GRAIN SIZE DISTRIBUTION

Project Name: Starbucks

Project Location: 1360 Walton Boulevard
Rochester Hills, Michigan

G2 Project No.: 210816

Figure No. 14

US_GRAIN_SIZE 210816.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 1/4/22

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

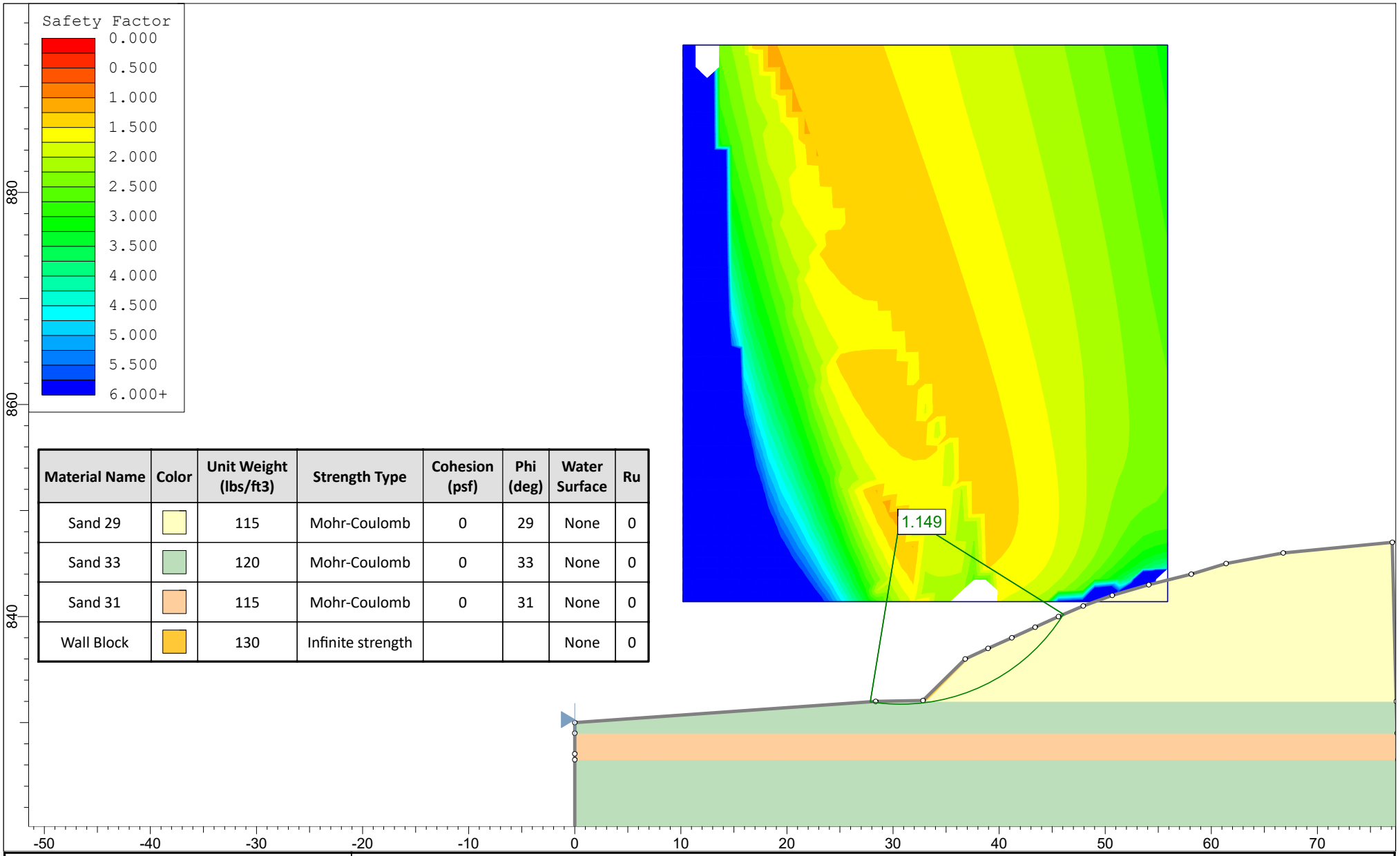
Density Classification	Relative Density %	Approximate Range of (N)
Very Loose	0 - 15	0 - 4
Loose	16 - 35	5 - 10
Medium Compact	36 - 65	11 - 30
Compact	66 - 85	31 - 50
Very Compact	86 - 100	Over 50

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).

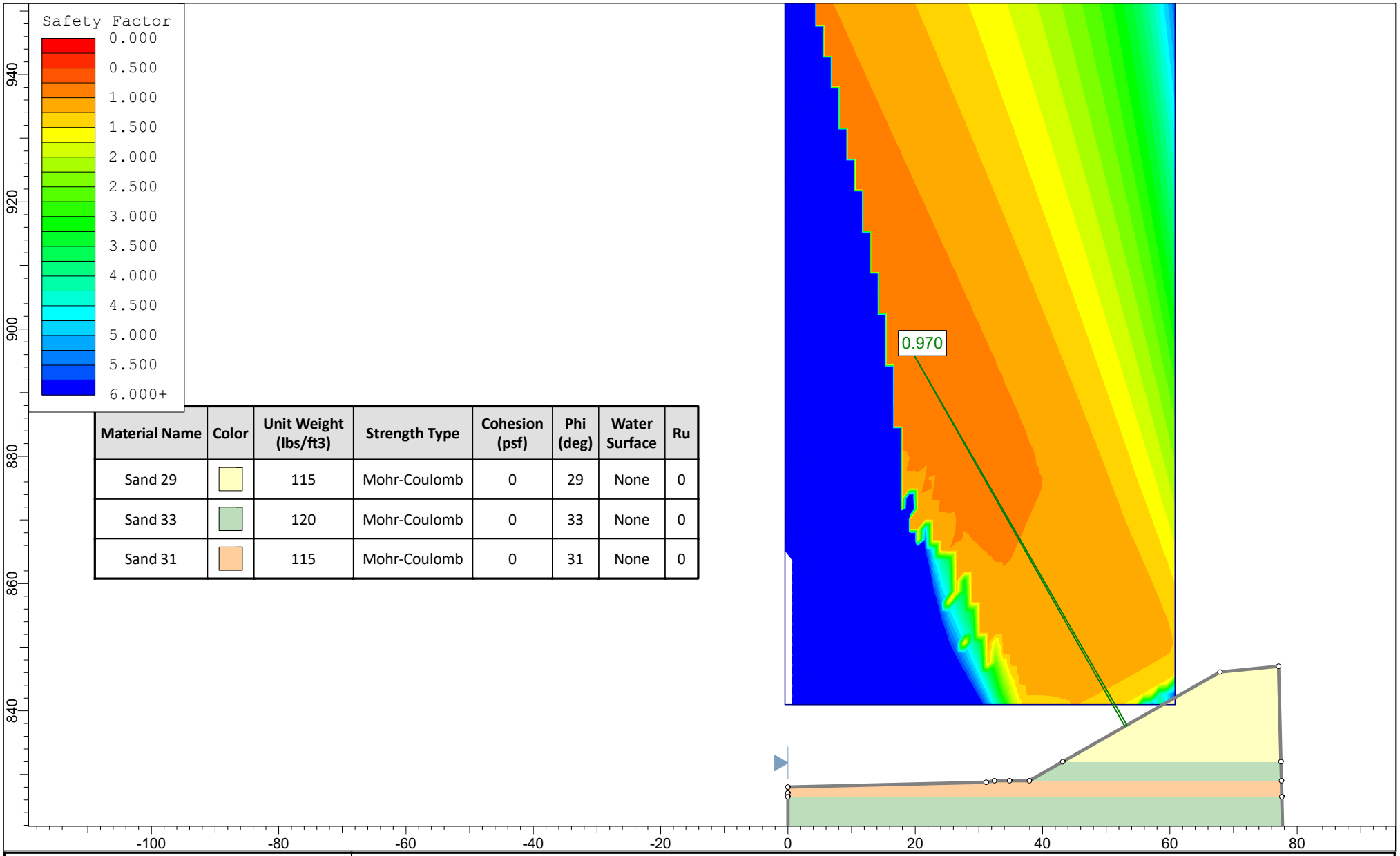


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Sand 29		115	Mohr-Coulomb	0	29	None	0
Sand 33		120	Mohr-Coulomb	0	33	None	0
Sand 31		115	Mohr-Coulomb	0	31	None	0
Wall Block		130	Infinite strength			None	0

rocscience	Project: SLIDE - An Interactive Slope Stability Program		
	Analysis Description: Existing Condition		
	Drawn By: JMC	Scale: 1:150	Company: G2 Consulting Group, LLC
	Date: 12/23/2021, 1:05:40 PM		File Name: Slide0.slim

SLIDEINTERPRET 6.039

Figure No. 16

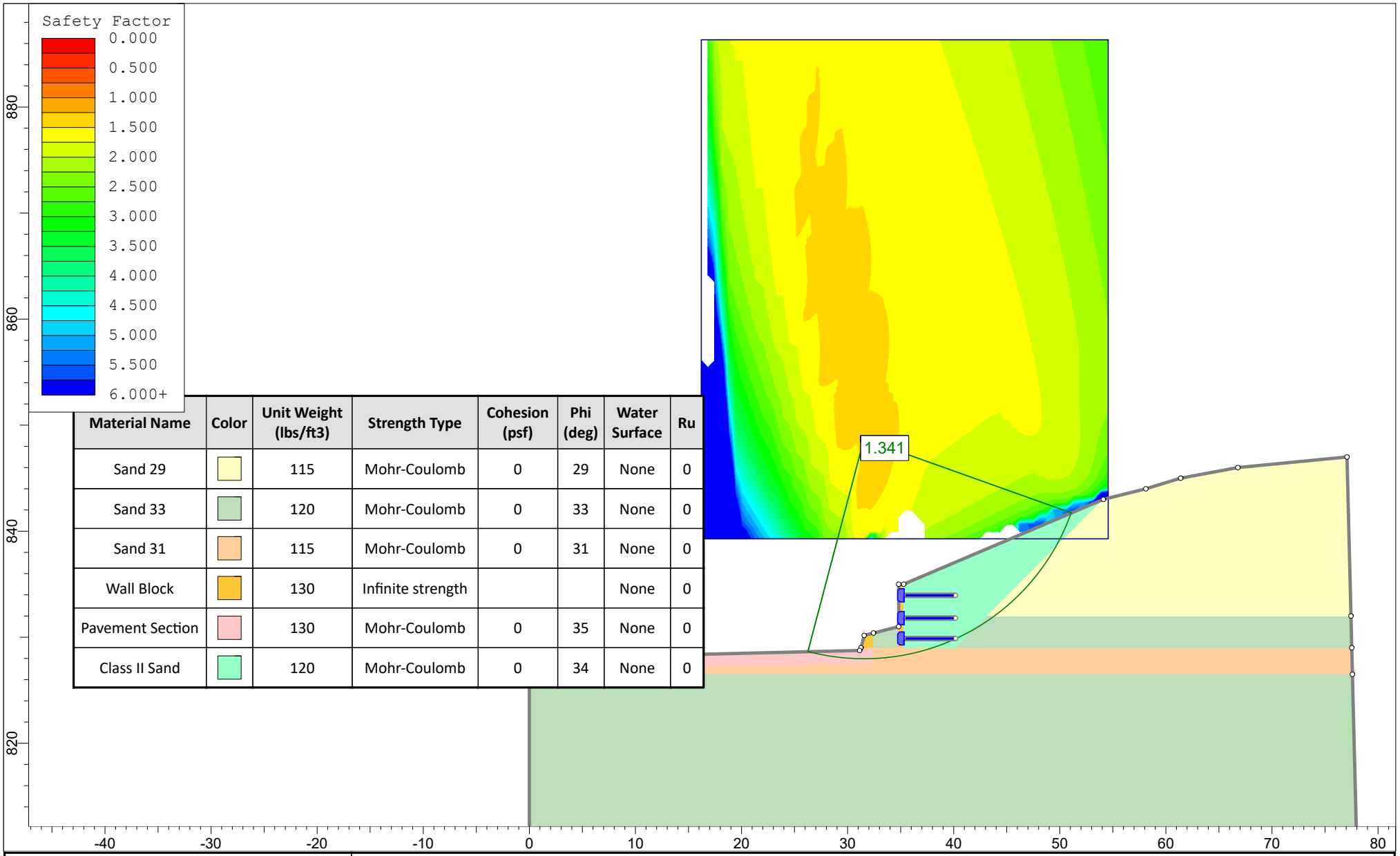


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Sand 29		115	Mohr-Coulomb	0	29	None	0
Sand 33		120	Mohr-Coulomb	0	33	None	0
Sand 31		115	Mohr-Coulomb	0	31	None	0

SLIDEINTERPRET 6.039

Project	SLIDE - An Interactive Slope Stability Program			
Analysis Description	Construction Condition			
Drawn By	JMC	Scale	1:250	Company: G2 Consulting Group, LLC
Date	12/23/2021, 1:05:40 PM			File Name: Slide4.slim

Figure No. 17



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Sand 29		115	Mohr-Coulomb	0	29	None	0
Sand 33		120	Mohr-Coulomb	0	33	None	0
Sand 31		115	Mohr-Coulomb	0	31	None	0
Wall Block		130	Infinite strength			None	0
Pavement Section		130	Mohr-Coulomb	0	35	None	0
Class II Sand		120	Mohr-Coulomb	0	34	None	0

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SLIDEINTERPRET 6.039

Project	SLIDE - An Interactive Slope Stability Program		
Analysis Description	Proposed Condition		
Drawn By	JMC	*Scale* 1:150	*Company* G2 Consulting Group, LLC
Date	12/23/2021, 1:05:40 PM		*File Name* Slide1.slim

Figure No. 18