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May 28, 2021

Mr. Steve Pulcheon
Sr. Manager of Construction
Taco Bell of America, Inc.
1 Glen Bell Way, MD #534
Irvine, CA 92618

RE: Level I Investigation
Proposed Taco Bell
18550 E. Warren Avenue
Detroit, Michigan
Taco Bell Site No. 314481
PSI Project No. 03811234

Dear Mr. Pulcheon:

In accordance with the Project Agreement for Architectural/Engineering/Consultant Services dated April 6, 2021, PSI has conducted a Level I investigation for the above referenced property.

Thank you for choosing PSI as your consultant for this project. If you have any questions, or if we can be of additional service, please contact us at your earliest convenience.

Respectfully submitted,
Professional Service Industries, Inc.

Mr. Kevin F. Dubnicki, PE
Project Manager

Copy: Mr. Billy N. Mitchell – PSI, Inc. – Kennesaw, GA

PHASE II LEVEL I
INVESTIGATION

FOR

PROPOSED TACO BELL
18550 E. WARREN AVENUE
DETROIT, MICHIGAN
TACO BELL SITE NO. 314481

PREPARED FOR

TACO BELL OF AMERICA, INC.
1 GLEN BELL WAY, MD #534
IRVINE, CA 92618

PREPARED BY

PROFESSIONAL SERVICE INDUSTRIES, INC.
37483 INTERCHANGE DRIVE
FARMINGTON HILLS, MICHIGAN, 48335
TELEPHONE (248) 957-9911

PSI NCG PROJECT NO. 03811234

MAY 28, 2021

Larisa Nouri
Staff Engineer

Kevin F. Dubnicki, P.E.
Project Manager
MI No. 57718

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EXECUTIVE SUMMARY

PSI has completed a Level I Investigation of the proposed Taco Bell Site No. 314481 located in the city of Detroit, Michigan. The assessment was performed in general accordance with the scope and limitations of Yum! Brands, Inc.'s Guidelines for Environmental Assessments and Geotechnical Engineering Studies, dated August 2006, to comply with the Project Agreement for Architectural/Engineering/Consultant Services between PSI and Yum! Brands, Inc. dated April 6, 2021.

This summary does not contain all the information that is found in the full report. The report should be reviewed in its entirety to obtain a more complete understanding of the information provided, and to aid in any decisions made or actions taken based on this information.

1. The site is surrounded by East Warren Avenue, Anatole Street, Mack Avenue and Opal Street in the city of Detroit, Wayne County, Michigan. At the time of PSI's geotechnical investigation, the property consisted of an existing 2-story Bank of America structure, existing dumpster enclosure, existing screen wall, existing pole sign, freestanding drive-thru ATM and limit green space. Access to the site will be from Mack Avenue located on the Southeast side of the proposed building and Opal Street located on the Southwest side of the proposed building. The topography of the site was relatively flat and exhibited an elevation difference of less than 1 feet based on Google Earth Pro and visual observations.

2. PSI encountered approximately 2 to 5 inches of asphalt at the locations of Borings B-1 through B-7. The asphalt pavement was underlain by approximately 6.5 to 8 inches of gravel base at the boring locations. An apparently native brown and yellowish brown sand with variable percentages of silt and gravel was encountered below the pavement section at boring locations B-1 through B-6 and extended to a depth of approximately 6.5 feet below the existing ground surface. Dark brown and black sand fill with variable percentage of silt and organics encountered bellow pavement section in boring location B-7 and extended to a depth of approximately of 4.0 feet below the existing ground surface. A stratum of gray silty clay was encountered below the brown and yellowish brown sand at all locations. The gray silty clay extended through the final explored depths approximately 20.5 feet below the existing ground surface.

3. Groundwater or perched water was generally not encountered at the location of borings B-1 through B-7. It should be noted that water levels in the boreholes may require additional time to stabilize depending on the permeability of the soils. Due to the project schedule and for safety reasons, the boreholes were backfilled at the end of the field exploration day. The change in color of the soil from brown to gray may indicate the long-term minimum piezometric level in the area. Based on the subsurface conditions at the boring locations performed, the long term piezometric level at this site may be located at a depth of approximately 6.5 feet or greater.

4. It should also be noted that groundwater levels at this site may be subject to seasonal fluctuations or other mechanical control. Based on the Soil Conservation Service (SCS) Soil Survey of Wayne County (Issued November 1977), seasonal high groundwater elevations may be encountered at 1 to 2 feet below the ground surface present at this site. PSI recommends that the contractor verify the actual groundwater and seepage conditions at the time of the construction activities and propose his site-specific groundwater control

methods for the Engineer's approval, including the disposal of discharge water (if necessary).

5. The site is generally suitable for the planned construction of a lightly loaded structure following site preparation detailed in Section 5.8 of this report. Conventional shallow spread footings or grade beams can be placed on the native sand soils (provided they are stable at the time of construction). The footings or grade beams should be designed for a maximum allowable net bearing pressure of 3,000 psf. A single isolated footing or a grade beam designed as discussed should experience a settlement of less than 1 inch. However, if a cluster of closely spaced footings is planned, PSI should be contacted to calculate the potential settlement.

6. Fill was encountered at the location of the proposed trash enclosure. The proposed trash enclosure masonry walls can be supported on conventional shallow spread footing foundations extending through the encountered fill and bear on native sandy soils. The footings or grade beams should be designed for a maximum allowable net bearing pressure of 3,000 psf for support of the proposed building, trash enclosure and monument sign.

Detailed analyses of subsurface conditions and pertinent design recommendations are included herein. PSI cannot be responsible for the interpretation or implementation of this report by others. PSI should be retained to perform services sufficient to determine compliance with its recommendations. If PSI is not so retained, it will not accept any responsibility for the performance of the structure.

SUMMARY OF RECOMMENDATIONS

Design Item	Recommended Parameter	Reference Page No.
Foundations:		
Allowable Bearing Pressure: Spread Footing Wall Footing	3,000 psf 3,000 psf	1,12,13
Foundation Type	Spread Footing	1,12,13
Bearing Materials	Native Sand	1,12,13
Ultimate Passive Lateral Resistance (EFP)	160 pcf per foot (Sand)	13
Coefficient of Friction	0.40	13
Soil Expansion Potential	Low	14
Geologic Hazards:		
Liquefaction Potential	Low	8
Nearest Fault and Magnitude	N/A	--
Fault Type	N/A	--
Seismic Zone	1	8
Soil Profile Type	S_D	8
Near-Source Distance	N/A	--
Seismic Coefficient, N_A	1.6	8
Seismic Coefficient, N_V	2.4	8
Subsidence Potential	NA	--
Pavement:		
AASHTO SN equal to or greater than 2.10 Light Traffic	3.5” AC / 8.0” AB Concrete: 5.0” PC / 6.0” AB	15,16,17
AASHTO SN equal to or greater than 2.94 Heavy Traffic	4.5” AC/ 8.0” AB Concrete: 8.0” PC /6.0” AB	15,16,17
Slabs:		
Building Floor Slabs	On Native Sand	14
Modulus of Subgrade Reaction	175 pci	14
Existing Site Conditions:		
Existing Fill/Native Soils	Varies	1,9,10
Groundwater Depth (Historical High)	~Not encountered during drilling; Seasonal high between 0’ and 2‘ per SCS	1,10
Near-Surface Corrosivity	Steel – Low (per SCS) Concrete – Moderate (per SCS)	--
Estimated Cut and Fill	To be determined after excavation	5,15,16
Existing Underground Structures	Unknown	--
Existing Aboveground Structures	2-story structure	4,18,19
Is the site in a 500 or 100-year flood plain	No	--
Special Notes: Existing Bank of America 2-story structure was located within the proposed building footprint.		

1. INTRODUCTION

1.1 Authorization

Authorization to perform this assessment was given by Mr. Steve Pulcheon, Taco Bell Construction Manager, on April 21, 2021 and performed in general accordance with the Project Agreement for Architectural / Engineering / Consultant Services Form between Taco Bell of America, Inc. and PSI dated April 6, 2021.

1.2 Purpose and Scope of Work

The purpose of this study was to determine the geotechnical engineering parameters of the site. All work was conducted in accordance with Yum! Brands, Inc. Guidelines for Environmental Assessments and Geotechnical Engineering Studies, dated August 2006.

The scope of the geotechnical exploration and analysis included subsurface exploration, field and laboratory testing, and an engineering analysis and evaluation of the foundation materials.

1.3 Site Location

The site is surrounded by East Warren Avenue, Anatole Street, Mack Avenue and Opal Street in the city of Detroit, Wayne County, Michigan. A site location map is attached as Figure No. 1.

1.4 Site Description and Conditions

At the time of PSI's geotechnical investigation, the property consisted of an existing 2-story Bank of America structure, existing dumpster enclosure, existing screen wall, existing pole sign, freestanding drive-thru ATM and limit green space. Access to the site will be from Mack Avenue located on the Southeast side of the proposed building and Opal Street located on the Southwest side of the proposed building. The topography of the site was relatively flat and exhibited an elevation difference of less than 1 feet based on Google Earth Pro and visual observations. A boring location plan is attached as Figure No. 2.

1.5 Previous Geotechnical Data

No previous geotechnical engineering assessment was provided.

2. PROJECT DESIGN DATA

2.1 Development Plans

Based upon the information provided, it is understood that the proposed project consists of the construction of END-XS6 Taco Bell restaurant building with at-grade parking for 20 vehicles. A drive-thru lane will be constructed along the south side of the proposed building. Access to the site will be from Mack Avenue located on the southeast side of the proposed lot and Opal Street located on the Southwest side of the proposed lot. The site currently consisted of an existing 2-story Bank of America structure, existing dumpster enclosure, existing screen wall, existing pole sign, freestanding drive-thru ATM and limit green space.

2.2 Structure Types

The building will be a single story, wood frame or masonry structure with a truss roof system supported on the exterior foundation only. The trusses span the transverse (short) direction of the building. At the front of the building, columns, which support beams and headers, are concealed within longitudinal exterior walls.

2.3 Foundation Loads

The maximum structural loads on longitudinal (side) bearing walls are about 1,300 pounds per linear foot (plf). Maximum column loads are approximately 20 kips. Maximum loads to the transverse (front and rear) non-bearing walls are about 300 plf (dead load only). The floor slab will carry a maximum design live load of 100 pounds per square foot (psf).

2.4 Grading and Slopes

Neither a site grading plan nor the finished floor elevation of the proposed building was provided at the time of our investigation. For the purposes of our analysis, PSI assumes that the proposed building finished floor will be constructed at or near the existing grade. Based on visual observations of the existing site topography. If any of this information is incorrect, please notify the geotechnical engineer so that he may determine if changes in the foundation recommendations are required.

2.5 Pavement

Depending on the site conditions, either of two types of pavements may be used: Flexible Asphalt Concrete (AC) surfaced pavement; or Rigid Portland Cement (PC) Concrete pavement. It is anticipated that the parking lot is divided into two areas: 1) driving lanes, 2) parking stalls. The driving lanes will be subjected to a minimum daily traffic of 1,000 cars and five 18,000 pounds single axle load from heavy trucks. The parking stalls will experience 100 cars per day. Parking stall pavements will only be used where there are portions of lots that will not receive truck traffic. The structural section design shall be based on a twenty-year design period to determine pavement thickness and subgrade preparation requirements.

Pavement structural sections are to be designed according to American Association of State Transportation and Highway Official Standards, Portland Cement Association procedures, or applicable design procedures used by local government or State Transportation Department. Repeated stopping and starting motions will be taken into account during the design.

3. SUBSURFACE INVESTIGATION

3.1 Soil Borings

A total of seven (7) soil borings were performed with a truck-mounted rotary drill rig (CME-75). Conventional hollow-stem augers were used to advance the holes.

Standard Penetration Tests were performed in accordance with ASTM designation D1586. Split spoon samples were collected in the field at the surface, at 2.5-foot intervals in the top 15 feet, and on five-foot centers thereafter. The samples were transported to our laboratory for visual classification and laboratory testing. The samples were identified according to boring number and depth, and sealed in glass jars to protect against moisture loss.

3.2 Field Testing

3.2.1 Strength Tests

During the field boring operations, Standard Penetration Tests were performed at all sample depths. A hand penetrometer was used in the laboratory on intact samples as an aid in estimating the shear strength of the soil.

3.2.2 Water Level Measurements

Water level depths were obtained during performance of the test boring operations. They are noted on the test boring logs presented in the Appendix. In relatively pervious soils, such as sandy soils, the indicated depths are usually reliable groundwater levels. In relatively impervious soils, a suitable estimate of the groundwater depth may not be possible, even after several days of observation. Seasonal variations, temperature, land-use, proximity to a river, canal, or large body of water and recent rainfall conditions may influence the depths to the groundwater. Volumes of water will largely depend on the permeability of the soils.

3.2.3 Ground Surface Elevations

Ground surface elevations at the test boring locations were not provided. Prior to final design and construction, PSI recommends the elevation of the existing ground surface at the boring locations performed by determined by a professional land surveyor registered in the State of Michigan. References to depth of the various strata encountered are from existing grade at the time of our drilling operations.

3.3 Laboratory Testing

In addition to the field investigation, a supplemental laboratory testing program was conducted to determine additional pertinent engineering characteristics of the foundation materials necessary in analyzing the behavior of the foundation systems for the proposed restaurant.

The laboratory testing program included supplementary visual classification (ASTM D2487), water content tests (ASTM D2216), Loss-On-Ignition (LOI – Organic Content) (ASTM D2974), partial sieve analysis (ASTM 6913), unconfined compressive strength (ASTM D2166) and Atterberg limit tests (ASTM D4318) on selected samples.

Estimates of unconfined compressive strengths were made by the use of a calibrated hand penetrometer.

All phases of the laboratory testing program were conducted in general accordance with applicable ASTM Specifications. The results of these tests are to be found on the accompanying boring logs in the Appendix.

4. FINDINGS AND INTERPRETATION

4.1 Regional and Local Geology

The general geomorphology and near-surface geology of the site is associated with Lacustrine clay and silts. The near surface geology of the site area belongs to the Pewamo-Blount-Metamora Series that are somewhat very poorly drained to somewhat poorly drained soils that have a fine textured to moderately coarse textured subsoil. These soils occur nearly level soils over Lacustrine clay and silt according to the Soil Conservation Service (SCS) Soil Survey of Wayne County (Issued November 1977). The Lacustrine clay and silt is underlain by the Antrim Shale bedrock formed during the Middle Devonian period (USGS On-line Spatial Data).

4.2 Seismicity

Wayne County, Michigan lies in the Central Stable Tectonic Region and in the Seismic Zone 1 of probable seismic activity of the Building Officials Congress of America (BOCA), National Building Code and the Uniform Building Code (UBC). This zone indicates that minor damages due to occasional earthquakes might be expected in this area.

Soil borings at the project site extended to a maximum depth of approximately 20 feet below the existing ground surface. Based on regional geologic mapping and past experience in the general project area, PSI anticipates that the subsurface conditions below the explored depth may generally consist of Lacustrine clay and silt underlain by Antrim Shale bedrock at depths assumed to be greater than 100 feet below the existing ground surface. Based on our review of the available data, knowledge of regional geology, the Standard Penetration Test (SPT) N-values and unconfined compressive strength tests, we recommend that the seismic design for this project be based on **Site Class D**.

The 2015 IBC recommended seismic parameters for the site (which uses 2008 USGS hazard data) interpolated between the nearest four grid points from latitude 42.411650 and longitude -82.913500 and Site Class D obtained from the USGS geohazards web page (http://eqdesign.cr.usgs.gov/html/designmaps/us/application.php), are as follows (based on site class D):

Period (seconds)	2% Probability of Event in 50 years* (%g)	Site Coefficients	Max. Spectral Acceleration Parameters	Design Spectral Acceleration Parameters	
0.2 (S_s)	9.4	F_a = 1.60	S_{ms} = 0.151	S_{Ds} = 0.101	T_0 = 0.146
1.0 (S_1)	4.6	F_v = 2.40	S_{m1} = 0.111	S_{D1} = 0.074	T_s = 0.732

$S_{ms} = F_aS_s$ $S_{Ds} = 2/3*S_{ms}$ $T_0=0.2*S_{D1}/S_{Ds}$

$S_{m1} = F_vS_1$ $S_{D1} = 2/3*S_{m1}$ $T_s = S_{D1}/S_{Ds}$

The site coefficients F_a and F_v were interpolated from the 2015 IBC Tables 1613.3.3(1) and 1613.3.3(2) as a function of the site classification and the mapped spectral response acceleration at the short (S_s) and 1 second (S_1) periods.

Based on the spectral response acceleration coefficients S_{Ds} and S_{D1} above, the Seismic Design Category for this site is **Category A** and **Category B** for occupancy categories I through III, and **Category A** and **Category C** for occupancy category IV, respectively as prescribed by the 2015 IBC Tables 1613.3.5(1) and 1613.3.5(2).

4.3 **Subsurface Soil Conditions**

4.3.1 General

The types of foundation bearing materials encountered in the test borings have been visually classified. They are described in detail on the boring records. The results of the field penetration tests, strength tests, water level observations, and other laboratory tests are presented on the boring records in numerical form. Representative samples of the soils were placed in glass containers and are now stored in the laboratory for further analysis, if desired. Unless notified to the contrary, all samples will be disposed after 3 months.

The stratification of the soil as shown on the boring records represents the soil conditions at the actual boring locations. Variations may occur between, or beyond, the borings. Lines of demarcation represent the approximate boundary between the soil types, but the transition may be gradual, or not clearly defined.

It is to be noted that, whereas the test borings are drilled and sampled by experienced drillers, it is sometimes difficult to record changes in stratification within narrow limits, especially at great depths. In the absence of foreign substances, it is also difficult to distinguish between discolored soils and clean soil fill.

4.3.2 Soil Conditions

The site was explored by drilling seven (7) soil test borings. The following summarizes the approximate locations:

Boring Number	Existing Conditions	Proposed Location
B-1	Sand underlain by Silty Clay	Building Corner
B-2	Sand underlain by Silty Clay	Building Corner
B-3	Sand underlain by Silty Clay	Pavement Area
B-4	Sand underlain by Silty Clay	Pavement Area
B-5	Sand underlain by Silty Clay	Pavement Area
B-6	Sand underlain by Silty Clay	Pavement Area
B-7	Sand (Fill) underlain by Native Sand and Silty Clay	Trash Enclosure

PSI encountered approximately 2 to 5 inches of asphalt at the locations of Borings B-1 through B-7. The asphalt pavement was underlain by approximately 6.5 to 8 inches of gravel base at the boring

locations. A generalized soil description encountered in the borings, beginning below the gravel base proceeding downward, is as follows:

An apparently native brown and yellowish brown sand with variable percentages of silt and gravel was encountered below the pavement section at boring locations B-1 through B-6 and extended to a depth of approximately 6.5 feet below the existing ground surface. Dark brown and black sand fill with variable percentage of silt and organics encountered bellow pavement section in boring location B-7 and extended to a depth of approximately of 4.0 feet below the existing ground surface. The Loss-On-Ignition (LOI) or organic content of the fill soils with organics was approximately 3.2 percent (which is characterized as low to moderate for pavements) at the location of Boring B-7. Standard Penetration Test values ("N"-values) ranged from 5 to 14 blows per foot, indicating relative densities of loose to medium dense. The natural moisture contents of the tested soil samples from the brown and yellowish brown sand ranged from approximately 5 to 19 percent. The recovered soil samples visually appeared to be in a moist condition when examined in the laboratory.

A stratum of gray silty clay with variable percentage of sand was encountered below the brown and yellowish brown sand at all boring locations. The gray silty clay extended through the final explored depths approximately 20.5 feet below the existing ground surface. Standard Penetration Test values ("N"-values) ranged from 5 to 19 blows per foot. The un-drained shear strength of the gray silty clay stratum ranged between 1,000 to 7,000 psf, thereby indicating a consistency of stiff to very stiff. The natural moisture contents of the tested soil samples from the gray silty clay ranged from approximately 14 to 31 percent. The recovered soil samples visually appeared to be in a moist to very moist condition when examined in the laboratory. An Atterberg limit test performed on a representative samples of the silty clay stratum prepared from Boring B-1, B-2 and B-7 indicates the soil to be moderate in plasticity with Liquid Limit's (LL) ranging from 22 to 40 and a Plastic Limit's (PL) ranging from 13 to 19.

4.4 Groundwater Conditions

Groundwater or perched water was generally not encountered at the location of borings B-1 through B-7. It should be noted that water levels in the boreholes may require additional time to stabilize depending on the permeability of the soils. Due to the project schedule and for safety reasons, the boreholes were backfilled at the end of the field exploration day. In addition, it should be noted that soils were observed to be in a moist to very moist condition in the laboratory and that groundwater levels at this site may be subject to seasonal fluctuations or other mechanical control. The change in color of the soil from brown to gray may indicate the long-term minimum piezometric level in the area. Based on the subsurface conditions at the boring locations performed, the long term piezometric level at this site may be located at a depth of approximately 6.5 feet or greater.

It should also be noted that groundwater levels at this site may be subject to seasonal fluctuations or other mechanical control. Based on the Soil Conservation Service (SCS) Soil Survey of Wayne County (Issued November 1977), seasonal high groundwater elevations may be encountered at 1 to 2 feet below the ground surface present at this site. PSI recommends that the contractor verify the actual groundwater and seepage conditions at the time of the construction activities and propose his site-specific groundwater control methods for the Engineer's approval, including the disposal of discharge water (if necessary).

5. ENGINEERING RECOMMENDATIONS

5.1 Special Conditions and Mitigating Measures

The site is generally suitable for the planned construction of a lightly loaded structure following site preparation detailed in Section 5.8 of this report.

PSI understands that the existing 2-story Bank of America building will be removed from the project site and is currently located in the footprint of the proposed Taco Bell. Former foundations and floor slabs should be removed and all debris cleared from the site. Depressions resulting from the removal of these items, including any existing depressions, should be backfilled with properly compacted engineered fill or specified materials, such as lean concrete or grout, to the final design grade under supervision of a PSI geotechnical representative. Engineered fill should be placed, compacted and tested as outlined in the following paragraphs of this report.

Where the removal of localized unsuitable bearing material is performed beneath the proposed footings and the excavation is backfilled with compacted fill materials, the excavation must extend laterally beyond the perimeter of the foundation for a distance equal to one-half of the thickness of the engineered backfill placed below the footing bottom. The over excavation is necessary for proper support of lateral loads exerted through the new fill by the foundations.

5.1.1 Proposed Structure

PSI understands that a shallow spread footing and grade beam system is the preferred foundation type for the proposed restaurant structure. In general, the existing site conditions are suitable for support of the proposed structure.

Conventional shallow spread footings or grade beams can be placed on the native loose sand soils (provided they are stable at the time of construction). The footings or grade beams should be designed for a maximum allowable net bearing pressure of 3,000 psf bearing on native soils. A single isolated footing or a grade beam designed as discussed should experience a settlement of less than 1 inch. However, if a cluster of closely spaced footings is planned, PSI should be contacted to calculate the potential settlement.

Exterior footings and footings in unheated areas should be located at a minimum depth of 42 inches below the final exterior grade for proper protection against frost during normal winters. Interior footings may be supported at a shallower depth, while providing necessary clearance for pavement and utility construction, provided they are bearing on suitable, undisturbed native soils or properly placed and compacted engineered fill. A minimum depth of 24 inches is recommended for stability. If the structures are to be constructed during the winter months or if footings will likely be subjected to freezing temperatures after foundation construction, then all footings should be adequately protected from freezing.

PSI recommends that the foundation inverts be properly compacted in place under PSI representative's supervision prior to placement of formwork or cast-in-place foundation concrete to densify any soils disturbed during excavation. The compaction should continue until no additional densification is observed with additional passes. However, earthwork and construction operations taking place within a distance of approximately 2 to 3 feet or so of the prevailing groundwater can cause groundwater to be 'wicked' upward, resulting in subgrade instability. Therefore, depending on the groundwater conditions at the time of construction, it may be

necessary to compact the foundation invert with a 'static' roller if vibration causes moisture to be 'wicked' upward, resulting in subgrade instability. In areas where high groundwater or perched water conditions are encountered during site grading and foundation excavation activities, the contractor should be prepared to perform site-dewatering measures to allow earthwork, subgrade preparation including undercutting and proof-rolling and fill placement as well as foundation excavation and construction, to take place under relatively dry conditions. PSI recommends that the Contractor verify the actual groundwater and seepage conditions at the time of the construction activities and propose a groundwater control method(s) for the Engineer's approval, including the disposal of discharge water. If the contractor elects to attempt earthwork operations at this site without first lowering the groundwater level or controlling the groundwater seepage, remedial measures may be necessary to re-establish stable subgrade conditions.

Depending on the conditions of the exposed soils at the time of construction, it may be necessary to place a layer of crushed stone and geotextile separator fabric such as an Amoco 2000 series or locally available equivalent such as SKAPS GT180 at the bottom of the foundation excavations to maintain the stability of the bearing surface and create a working platform on which to construct the shallow spread footing foundations or grade beams.

5.1.2 Proposed Sign Area

At the time of this investigation, the exact loads for the sign pole were not available. However, we understand that the sign foundation typically consists of a shallow spread footing or drilled pier. Boring B-2 was drilled nearest the proposed monument sign location. The sign foundation should be placed a minimum of 3.5 feet below the existing ground surface on the loose sandy soils. Spread footings should be designed for a maximum allowable net bearing pressure of 3,000 psf bearing on the native sand.

5.1.3 Proposed Trash Enclosure

Fill was encountered at the location of the proposed trash enclosure. The proposed trash enclosure masonry walls can be supported on conventional shallow spread footing foundations extending through the encountered fill and bear on native sandy soils. The footings or grade beams should be designed for a maximum allowable net bearing pressure of 3,000 psf. The footings should bear a minimum of 42 inches below existing grade for proper protection against frost during normal winters. PSI recommends that the foundation inverts be compacted in place prior to placement of formwork or cast-in-place foundation concrete to densify any soils disturbed during excavation as recommended above in Section 5.2.1 for the proposed building structure.

5.2 **Concrete Slabs-on-Grade**

PSI anticipates the floor slab will be supported by native sandy soils. Floor slabs utilized in conjunction with a spread footing or grade beam foundation system may consist of a soil supported slab-on-grade. PSI recommends the placement of a minimum of 4 inches of crushed stone beneath the slabs. It may also be desirable to use polyethylene sheeting between the crushed stone and the slab as a vapor barrier. PSI recommends that a vertical subgrade modulus, k value of 175 pounds per cubic inch, as determined by a 1-foot by 1-foot plate load test, be used in floor slab-on-grade design calculations.

5.3 Expansive Soils

Not encountered at this project site.

5.4 Lateral Earth Pressures

This site does not require the design of geotechnical systems for lateral earth pressures and therefore, no information is provided.

5.5 Slopes

No slopes are planned to be a part of the final design for this site and therefore no information is provided.

5.6 Excavation De-Watering

Groundwater or perched water was generally not encountered at the location of borings B-1 through B-7. It should be noted that water levels in the boreholes may require additional time to stabilize depending on the permeability of the soils. The change in color of the soil from brown to gray may indicate the long-term minimum piezometric level in the area. Based on the subsurface conditions at the boring locations performed, the long term piezometric level at this site may be located at a depth of approximately 6.5 feet or greater. Therefore, groundwater is generally not anticipated during excavations associated with the proposed foundations.

PSI recommends that the contractor verify the actual groundwater and seepage conditions at the time of the construction activities and propose his site-specific groundwater control methods for the Engineer's approval, including the disposal of discharge water (if necessary).

Because the foundation materials and soils exposed in the bottom of undercut excavations generally tend to soften when exposed to free water, every effort should be made to keep any excavations dry if water is encountered or if storm water runoff enters the excavations. A gravity drainage system, sump pump, or other conventional minor dewatering procedure should be sufficient for excavations shallower than about 6 feet depending on the water table at the time of construction. Sloping excavations to one corner will aid in removal of accumulated groundwater or surface runoff.

5.7 Pavement Design

In designing the proposed parking lots or roadways, the existing subgrade conditions must be considered together with the expected traffic use and loading conditions. The conditions that will influence the pavement design can be summarized as follows:

- Bearing values of the subgrade. These can be represented by a California Bearing Ratio (CBR) for the design of flexible pavements, or a Modulus of Subgrade Reaction (K) for rigid pavements.
- Vehicular traffic, in terms of the number and frequency of vehicles and their range of axle loads.
- Probable increase in vehicular use over the life of the pavement.
- The availability of suitable materials to be used in the construction of the pavement and their relative costs.

As indicated above, fill soils were encountered within the proposed parking lot borings. PSI recommends visual inspection of the prepared surface following removal of the surficial topsoil and pavement to allow for undercut recommendations if needed. **We highly recommend that the exposed surface be proof rolled and any soft areas removed.** In addition, we recommend the upper 18 inches of the existing soils at the site be scarified and properly recompacted in place to not less than 95 percent of the maximum dry density as determined by ASTM D698 (Standard Proctor). The moisture content at the time of compaction should be within 2 percentage points of the optimum value. Any removed fill should be replaced by compacted structural fill to arrive at the desired grade.

Based on the traffic information provided and the Yum! Brands minimum pavement requirements, the pavement thickness values are shown in the following tables. The pavement section thicknesses are being provided based on our experience with similar subgrade soil conditions in the project area. The recommended pavement sections meet or exceed the Yum! Brands minimum pavement requirements in terms of AASHTO structural number analysis methodology of 2.10 for the light duty section and 2.94 for the heavy-duty pavement section. The pavement design values presented below should be considered the minimum recommended thickness. Based on the traffic information provided, the pavement thickness values are shown in the following tables.

Light Duty Flexible Pavement Options	
Asphaltic Concrete Surface Course MDOT 5E03	1.5"
Asphaltic Concrete Binder Course MDOT 4E03	2”
Dense Aggregate Base Stone MDOT 21AA	8”
Compacted Subgrade (Minimum)	12"

Heavy Duty Flexible Pavement Options	
Asphaltic Concrete Surface Course MDOT LVSP	2.0"
Asphaltic Concrete Binder Course MDOT LVSP	2.5”
Dense Aggregate Base Stone MDOT 21AA	8”
Compacted Subgrade (Minimum)	12"

The recommended light and heavy-duty rigid concrete pavement sections are provided in the following table:

Rigid Pavement	Light	Heavy
Portland Cement Concrete	5”	8”
Dense Aggregate Base Stone, MDOT 21AA	6”	6”
Compacted Subgrade (Minimum)	12”	12”

Dense Aggregate Base materials in flexible pavement areas should be placed in maximum 8-inch loose lifts and compacted to at least 100% of the Standard Proctor (ASTM D 698) maximum dry density near optimum moisture content.

The use of concrete for paving has become more prevalent in recent years due to a decrease in the material cost of concrete and to the long-term maintenance cost benefits of concrete compared to asphaltic pavements. Should concrete pavement be utilized, the concrete should be properly jointed, and should have a minimum 28-day compressive strength of 3500 psi. Expansion joints should be sealed with a polyurethane sealant so that moisture infiltration into the subgrade soils and resultant concrete deterioration at the joints is minimized.

Allowances for proper drainage and proper material selection of base materials are most important for performance of asphaltic pavements. Ruts and birdbaths in asphalt pavement allow for quick deterioration of the pavement primarily due to saturation of the underlying base and subgrade. Concrete pavement at least seven (7) inches thick is recommended for the trash dump approach due to the high wheel and impact loads that this area receives. Concrete pavement is recommended in areas, which receive continuous repetitive traffic such as drive-through or loading lanes and parking lot entrances.

5.8 Site Grading

Prior to site grading activities or excavation for foundation elements, PSI recommends that existing underground utilities be identified and rerouted or properly abandoned in-place. Existing underground utilities that are not re-routed or abandoned should be adequately marked and protected to minimize the potential for damage during construction activities.

PSI understands that the existing 2-story Bank of America building will be removed from the project site and is currently located in the footprint of the proposed Taco Bell. Former foundations and floor slabs should be removed and all debris cleared from the site. Depressions resulting from the removal of these items, including any existing depressions, should be backfilled with properly compacted engineered fill or specified materials, such as lean concrete or grout, to the final design grade under supervision of a PSI geotechnical representative. Engineered fill should be placed, compacted and tested as outlined in the following paragraphs of this report.

Where the removal of localized unsuitable bearing material is performed beneath the proposed footings and the excavation is backfilled with properly compacted engineered fill materials, the excavation must extend laterally beyond the perimeter of the foundation for a distance equal to one-half of the thickness of the engineered backfill placed below the footing bottom. The over excavation is necessary for proper support of lateral loads exerted through the new fill by the foundations. Removal of the old fill should be performed under full time supervision of PSI's geotechnical representative.

Based on the borings performed, fill consisting predominately of dark brown and black sand fill with variable percentage of silt and organics encountered bellow pavement section in boring location B-7 and extended to a depth of approximately of 4.0 feet below the existing ground surface. The Loss-On-Ignition (LOI) or organic content of the fill soils with organics was approximately 3.2 percent (which is characterized as low to moderate for pavements) at the boring location.

Uncontrolled fills (defined as fill material that consist of organics and other deleterious materials or soil materials that have not been placed in a manner to produce consistent density, uniform moisture content and consistent engineering properties) and native soils with organics may experience significant volume changes, resulting in excessive foundation settlement and poor floor slab and pavement performance including faulting and cracking, when subjected to loads from foundations, floor slabs and pavements placed over them. Due to the variability of the fill soil materials, presence of deleterious materials and variability of the N-values, the engineering characteristics of the fill soils, including bearing capacity and settlement potential, are likely to be extremely variable. **Therefore, the uncontrolled fill and native soils with organics are generally not considered to be suitable for direct support of at-grade structures such as foundations, floor slabs and pavements.**

If the owner is willing to accept the risk in doing so, a portion of the existing fill may remain in-place below the proposed site pavements. The long-term performance of the pavement section will typically be a function of the quality of the subgrade at the time of construction, and the quality, thickness and strength of the pavement section. The most critical portion of the subgrade is the upper 2 to 3-foot section. This zone provides the primary strength needed for support of the pavement section. Therefore, the risk of poor pavement performance can be reduced (but not completely eliminated) by partial depth undercutting of the critical upper 2 to 3 foot section of the subgrade and replacement of the existing fill with clean imported engineered fill. Risk remains of poor pavement performance due to the inherent uncertainty associated with supporting the pavements over existing uncontrolled fill or discolored, organic-containing native soils, which the Owner must recognize and accept if some or the entire fill thickness is left in place.

After site stripping and undercutting unstable soil sections (as necessary), the exposed soils should be thoroughly proof rolled/compacted with a large, heavy rubber-tired vehicle prior to the placement of new engineered fill or backfill required to achieve the proposed subgrade elevation. Areas that exhibit instability or are observed to rut or deflect excessively under the moving load should be further undercut, stabilized by aeration, drying (if wet) and additional compaction to attain a stable finished subgrade. The proof rolling/compacting and undercutting activities should be performed during a period of dry weather and should be performed under the supervision of the geotechnical engineer's representative.

Where subgrade conditions are not improved through aeration, drying and compaction, or where undercut and replacement is considered impractical due to the underlying soil and groundwater conditions, it will likely be necessary to stabilize localized areas of subgrade instability with a woven geotextile, geogrid and a layer of well graded crushed concrete or well graded coarse aggregate. The need for the use of geotextile, geogrid and the thickness and gradation requirements of the crushed aggregate layer required should be determined at the time of the subgrade preparation, based on the condition of the exposed subgrade at the time of construction. The subgrade should be stabilized prior to placement of engineered fill or aggregate base course.

New fill supporting at-grade structures should be an environmentally clean material, free of organic matter, frozen soil, or other deleterious material. The material proposed to be used as engineered fill should be evaluated and approved for use by a PSI geotechnical engineer or his representative prior to placement in the field. Fill materials should be placed in maximum horizontal lifts of 8 inches of loose material and should be compacted within the range of ±2% of the optimum moisture content value. Moisture contents should be adjusted to the proper levels prior to placement and compaction. Adequate compaction will not be achieved if the fill is in a saturated condition. Wet soils may require drying or mixing with dry soil to facilitate compaction. If water must be added to dry soil, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying prior to compaction.

Organic soils, old fill and other deleterious materials, which are removed or uncovered during site grading and subgrade undercut operations, foundation and utility excavations at this site, must be wasted in non-load bearing areas such as landscaped areas or removed from the site as directed by the project's engineer and should not be reused as engineered fill in other areas of the site.

The excavation side slopes should be sloped or benched in accordance with OSHA requirements. The bottom of the excavation should be sloped to drain toward one end in the event rain or natural groundwater seepage occurs while the excavation is open. The bottom of the excavation should then be compacted/proofrolled using a sheep's foot vibratory compactor making a minimum of 8 passes across the excavation. The area should be checked by a geotechnical engineer and judged suitable prior to placement of new compacted engineered fill. Engineered fill should then be placed in accordance with the guidelines and procedures found in the following paragraphs.

In parking and drive areas of the site, the subgrade should be proofrolled to detect zones of loose, soft or wet soils following undercutting and before placement of engineered fill. Proofrolling consists of repeated passes over the subgrade with a loaded dump truck or loaded bucket loader. Areas, which rut or pump excessively should be further undercut and replaced with properly compacted fill. The near-surface soils are anticipated to consist predominately of fine and fine to medium grained granular soil. PSI generally does not anticipate difficulty in achieving a stable subgrade within these soils. However, to reduce the undercut depths in any isolated of subgrade instability, a geotextile fabric such as an Amoco 2000 series or locally available equivalent such as SKAPS GT180 may be used in lieu of undercutting greater than 2 feet below subgrade. The fabric would serve to reinforce the subgrade and provide a suitable working base for fill placement.

PSI recommends that all fill be compacted to a minimum of 95 percent of the soils standard Proctor maximum dry density (ASTM D698), with a moisture content within 2 percentage points of the optimum moisture. Lift thickness' should be 8 inches or less, loose measure. Fill soils should have the following characteristics:

- A liquid limit (LL) of less than 40 and a plasticity index (PI) of less than 20.
- A standard Proctor maximum dry density of at least 100 pounds per cubic foot.
- The fill soils have a maximum particle size of no more than 3 inches.

Fill placement should be monitored and tested during construction by experienced engineering technicians. Field density tests should be conducted as required to document compaction requirements with a minimum of 5 tests conducted for every lift of fill placed. Any area failing to achieve both the required compaction and moisture requirements should be recompacted or moisture conditioned and retested.

It will be important to maintain positive site drainage during construction. Storm water runoff should be diverted around the building and parking areas. The site should be graded at all times such that water is not allowed to pond. If any surface soils become wet due to rains, they should be removed or allowed to dry prior to further site work operations and/or fill placement.

5.9 Post Investigation Services

As indicated above within sections 5.2 and 5.7.

6. REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information obtained by PSI and design details furnished by Taco Bell of America, Inc. for the purpose of this project. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not notified of such changes, PSI will not be responsible for the impact of those changes on the project.

Subsurface conditions may vary between boring locations. PSI recommends that the contract specifications include the following clause:

"The contractor will, upon becoming aware of subsurface or latent physical conditions differing from those disclosed by the original soil exploration work, promptly notify the owner verbally to permit verification of the conditions, and in writing, as to the nature of the differing conditions. No claim by the contractor for any conditions differing from those anticipated in the plans and specifications and disclosed by the soil studies will be allowed unless the contractor has so notified the owner, verbally and in writing, as required above, of such differing conditions."

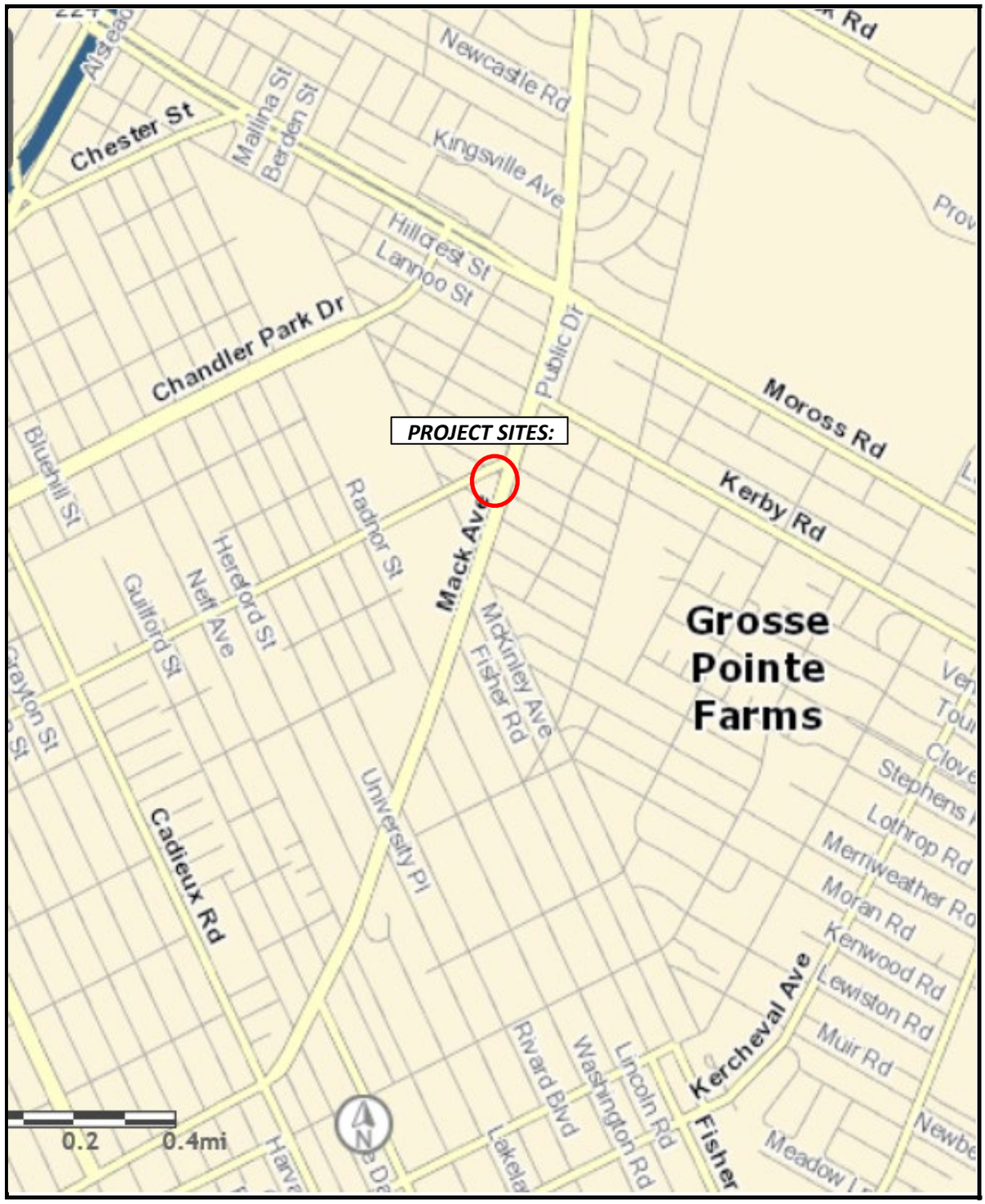
The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project. This report has been prepared for the exclusive use of the Taco Bell of America, Inc. for the specific application to the proposed Taco Bell Site #314481 to be located at 18550 E. Warren Avenue in the city of Detroit, Wayne County, Michigan.

APPENDIX

SITE VICINITY SKETCH

SITE LOCATION MAP



PROJECT NAME:	PROJECT NUMBER	Figure No.
Proposed Taco Bell #314481 18550 E. Warren Avenue City of Detroit, Wayne County, Michigan	03811234	1
	Date: May 26, 2021	

BORING LOCATION PLAN

BORING LOCATION PLAN

N

Approximate Boring Location

PROJECT NAME:		PROJECT NUMBER	Figure No.
Proposed Taco Bell #314481 18550 E. Warren Avenue City of Detroit, Wayne County, Michigan	Prepared by PSI using Google Earth for use in the geotechnical exploration and report	03811234	2
		Date: May 26, 2021	intertek psi

Site Photographs

Photo No. 1 - From B-01 Facing Northeast

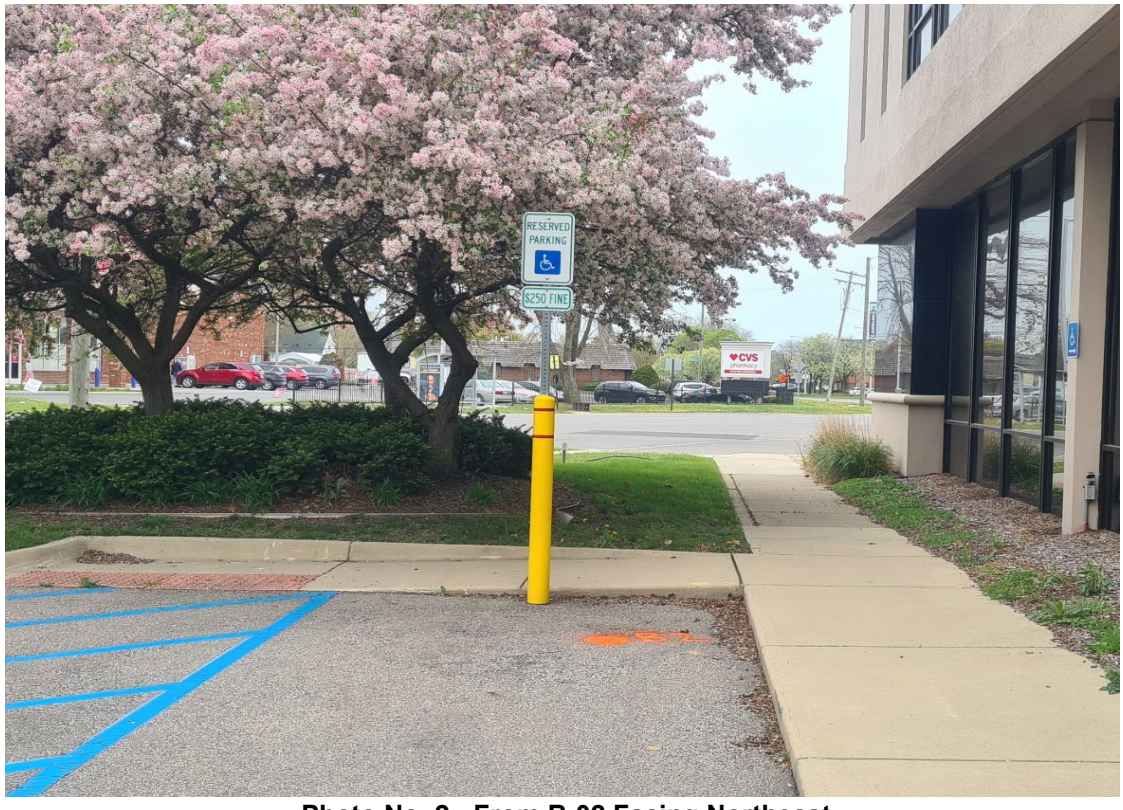


Photo No. 2 - From B-02 Facing Northeast

PROJECT NAME:		PROJECT NUMBER	Sheet
Proposed Taco Bell #314481 18550 E. Warren Avenue City of Detroit, Wayne County, Michigan	SITE PHOTOGRAPHS	03811234	1
		Date: May 26, 2021	intertek psi

Site Photographs

Photo No. 3 - From B-03 Facing Northeast

Photo No. 4 - From B-04 Facing Northwest

PROJECT NAME:		PROJECT NUMBER	Sheet
Proposed Taco Bell #314481 18550 E. Warren Avenue City of Detroit, Wayne County, Michigan	SITE PHOTOGRAPHS	03811234	2
		Date: May 26, 2021	intertek psi

Site Photographs

Photo No. 5 - From B-05 Facing Northwest

Photo No. 6 - From B-06 Facing Northeast

PROJECT NAME:		PROJECT NUMBER	Sheet
Proposed Taco Bell #314481 18550 E. Warren Avenue City of Detroit, Wayne County, Michigan	SITE PHOTOGRAPHS	03811234	3
		Date: May 26, 2021	intertek psi

Site Photographs

Photo No. 7 - From B-07 Facing Northeast

BORING LOGS

BORING B-1

DATE STARTED:	5/4/21	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	5/4/21	**DRILLER:** H. Pace	**LOGGED BY:** L. Nouri
COMPLETION DEPTH	20.5 ft	**DRILL RIG:**	CME-75
BENCHMARK:	N/A	**DRILLING METHOD:**	2.25" Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2" SS
LATITUDE:		**HAMMER TYPE:**	Automatic
LONGITUDE:		**EFFICIENCY**	89%
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	K. Dubnicki

Water

While Drilling	Dry
Upon Completion	Dry
Delay	N/A

BORING LOCATION:
See Boring Location Plan

REMARKS: Borehole backfilled with auger cuttings and pavement patched upon completion

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					Approximately 4.5" of ASPHALT					
						Approximately 6.5" of DARK GRAY GRAVELLY SAND BASE					
				1	17	SAND - fine to medium, with silt, trace gravel, light brown, moist, loose *Sieve Analysis	SP-SM	3,3,2 N=5	5		
	5			2	18			3,3,4 N=7	9		
				3	17	SILTY CLAY - trace sand and gravel, gray, moist, very stiff	CL	2,3,3 N=6	27		Qp = 2.75 tsf
	10			4	18			3,3,5 N=8	22		DD = 110 pcf Q_u = 2.6 tsf Qp = 2.25 tsf
				5	18	SILTY CLAY - with sand, trace gravel, gray, very moist, medium stiff to stiff		2,3,4 N=7	17		LL = 23 PL = 13 Qp = 0.5 tsf
	15			6	18		CL	2,2,4 N=6	16		Qp = 0.5 tsf
	20			7	18			2,3,4 N=7	15		Qp = 1.25 tsf
						*End of Boring					

intertek psi

Professional Service Industries, Inc.
37483 Interchange Drive
Farmington Hills, MI 48335
Telephone: (248) 857-9911

PROJECT NO.:	03811234
PROJECT:	Proposed Taco Bell - #314481
LOCATION:	18550 E. Warren Avenue
	City of Detroit
	Wayne County, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-2

DATE STARTED:	5/4/21	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	5/4/21	**DRILLER:** H. Pace	**LOGGED BY:** L. Nouri
COMPLETION DEPTH	20.5 ft	**DRILL RIG:**	CME-75
BENCHMARK:	N/A	**DRILLING METHOD:**	2.25" Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2" SS
LATITUDE:		**HAMMER TYPE:**	Automatic
LONGITUDE:		**EFFICIENCY**	89%
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	K. Dubnicki

Water

While Drilling	Dry
Upon Completion	Dry
Delay	N/A

BORING LOCATION:
See Boring Location Plan

REMARKS: Borehole backfilled with auger cuttings and pavement patched upon completion

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ Moisture PL LL (0 25 50) STRENGTH, tsf Qu Qp (0 2.0 4.0)	Additional Remarks
	0					Approximately 4" of ASPHALT					
						Approximately 7" of DARK GRAY GRAVELLY SAND BASE					
				1	18	SAND - fine, with silt, trace gravel, brown, moist, loose	SP-SM	2,3,3 N=6	13		
	5			2	12			2,2,3 N=5	13		
				3	18	SILTY CLAY - trace sand and gravel, gray, moist, very stiff	CL	3,6,6 N=12	27		DD = 100 pcf Q_u = 2.4 tsf Qp = 3.25 tsf
	10			4	18			3,4,4 N=8	23		LL = 40 PL = 19 Qp = 2.0 tsf
				5	18	SILTY CLAY - with sand, trace gravel, gray, very moist, medium stiff		2,3,4 N=7	15		DD = 119 pcf Q_u = 0.7 tsf Qp = 0.75 tsf
	15			6	18		CL	2,2,2 N=4	15		LL = 22 PL = 13 Qp = 0.5 tsf
	20			7	18			2,3,3 N=6	15		Qp = 0.75 tsf
						*End of Boring					

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LOCATION:	18550 E. Warren Avenue
	City of Detroit
	Wayne County, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-3

DATE STARTED:	5/4/21	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	5/4/21	**DRILLER:** H. Pace	**LOGGED BY:** L. Nouri
COMPLETION DEPTH	20.5 ft	**DRILL RIG:**	CME-75
BENCHMARK:	N/A	**DRILLING METHOD:**	2.25" Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2" SS
LATITUDE:		**HAMMER TYPE:**	Automatic
LONGITUDE:		**EFFICIENCY**	89%
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	K. Dubnicki

Water

While Drilling	Dry
Upon Completion	Dry
Delay	N/A

BORING LOCATION:
See Boring Location Plan

REMARKS: Borehole backfilled with auger cuttings and pavement patched upon completion

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft / STRENGTH, tsf	Additional Remarks
	0					Approximately 5" of ASPHALT					
						Approximately 7" of DARK GRAY GRAVELLY SAND BASE					
			SS	1	17	SAND - fine, with silt, trace gravel, yellowish brown, moist, medium dense	SP-SM	5,5,6 N=11	6		
	5		SS	2	18	SAND - fine, with silt, trace gravel, brown, moist, loose	SP-SM	3,3,3 N=6	14		
			SS	3	16	SILTY CLAY - trace sand and gravel, gray, moist, very stiff to stiff	CL	2,3,5 N=8	28		Qp = 3.5 tsf
	10		SS	4	18			2,3,4 N=7	22		Qp = 1.75 tsf
			SS	5	18	SILTY CLAY - with sand, trace gravel, gray, very moist, stiff		3,3,3 N=6	16		Qp = 1.0 tsf
	15		SS	6	18		CL	3,2,4 N=6	16		Qp = 1.0 tsf
	20		SS	7	18			2,3,3 N=6	15		Qp = 1.0 tsf
						*End of Boring					

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PROJECT NO.: 03811234
PROJECT: Proposed Taco Bell - #314481
LOCATION: 18550 E. Warren Avenue
City of Detroit
Wayne County, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-4

DATE STARTED:	5/4/21	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	5/4/21	**DRILLER:** H. Pace	**LOGGED BY:** L. Nouri
COMPLETION DEPTH	20.5 ft	**DRILL RIG:**	CME-75
BENCHMARK:	N/A	**DRILLING METHOD:**	2.25" Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2" SS
LATITUDE:		**HAMMER TYPE:**	Automatic
LONGITUDE:		**EFFICIENCY**	89%
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	K. Dubnicki

Water

While Drilling	Dry
Upon Completion	Dry
Delay	N/A

BORING LOCATION:
See Boring Location Plan

REMARKS: Borehole backfilled with auger cuttings and pavement patched upon completion

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft / STRENGTH, tsf	Additional Remarks
	0					Approximately 5" of ASPHALT					
						Approximately 7" of DARK BROWN GRAVELLY SAND BASE					
				1	13	SAND - fine, with silt, trace gravel, light brown, moist, loose	SP-SM	5,4,3 N=7	10		
	5			2	18			3,4,4 N=8	18		
				3	18	SILTY CLAY - trace sand and gravel, occasional pink silt partings, gray, moist, stiff to very stiff	CL	2,5,6 N=11	26		Qp = 3.25 tsf
	10			4	18			3,4,3 N=7	29		Qp = 1.75 tsf
				5	18	SILTY CLAY - with sand, trace gravel, gray, very moist, soft to medium stiff		2,2,4 N=6	19		Qp = 0.25 tsf
	15			6	18		CL	2,2,3 N=5	12		Qp = 0.5 tsf
	20			7	18			2,3,4 N=7	14		Qp = 1.0 tsf
						*End of Boring					

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

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PROJECT: Proposed Taco Bell - #314481
LOCATION: 18550 E. Warren Avenue
City of Detroit
Wayne County, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-5

DATE STARTED:	5/4/21	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	5/4/21	**DRILLER:** H. Pace	**LOGGED BY:** L. Nouri
COMPLETION DEPTH	20.5 ft	**DRILL RIG:**	CME-75
BENCHMARK:	N/A	**DRILLING METHOD:**	2.25" Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2" SS
LATITUDE:		**HAMMER TYPE:**	Automatic
LONGITUDE:		**EFFICIENCY**	89%
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	K. Dubnicki

Water

While Drilling	Dry
Upon Completion	Dry
Delay	N/A

BORING LOCATION:
See Boring Location Plan

REMARKS: Borehole backfilled with auger cuttings and pavement patched upon completion

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					Approximately 4" of ASPHALT					
						Approximately 8" of DARK GRAY GRAVELLY SAND BASE					
				1	17	SAND - fine, with silt, trace gravel, yellowish brown, moist, loose	SP-SM	4,4,5 N=9	7		
	5			2	18	SAND - fine, with silt, trace gravel, light brown, moist, loose	SP-SM	3,4,5 N=9	19		
				3	16	SILTY CLAY - trace sand and gravel, gray, moist, very stiff	CL	3,4,6 N=10	25		Qp = 3.25 tsf
	10			4	18			2,3,3 N=6	21		Qp = 1.5 tsf
				5	18	SILTY CLAY - with sand, trace gravel, gray, very moist, medium stiff to stiff		2,3,2 N=5	16		Qp = 0.5 tsf
	15			6	18		CL	2,3,4 N=7	16		Qp = 1.0 tsf
	20			7	18			2,4,5 N=9	14		Qp = 1.25 tsf
						*End of Boring					

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Farmington Hills, MI 48335
Telephone: (248) 857-9911

PROJECT NO.: 03811234
PROJECT: Proposed Taco Bell - #314481
LOCATION: 18550 E. Warren Avenue
City of Detroit
Wayne County, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-6

DATE STARTED:	5/4/21	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	5/4/21	**DRILLER:** H. Pace	**LOGGED BY:** L. Nouri
COMPLETION DEPTH	20.5 ft	**DRILL RIG:**	CME-75
BENCHMARK:	N/A	**DRILLING METHOD:**	2.25" Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2" SS
LATITUDE:		**HAMMER TYPE:**	Automatic
LONGITUDE:		**EFFICIENCY**	89%
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	K. Dubnicki

Water

While Drilling	Dry
Upon Completion	Dry
Delay	N/A

BORING LOCATION:
See Boring Location Plan

REMARKS: Borehole backfilled with auger cuttings and pavement patched upon completion

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					Approximately 5" of ASPHALT					
						Approximately 7" of DARK GRAY GRAVELLY SAND BASE					
				1	16	SAND - fine, with silt, trace gravel, brown, moist, loose	SP-SM	5,3,4 N=7	10		
	5			2	18	SAND - fine, with silt, trace gravel, yellowish brown, moist, medium dense	SP-SM	5,6,8 N=14	15		
				3	18	SILTY CLAY - trace sand and gravel, gray, moist, very stiff	CL	2,3,4 N=7	19		Qp = 3.25 tsf
	10			4	18			3,3,5 N=8	18		Qp = 2.25 tsf
				5	18	SILTY CLAY - with sand, trace gravel, gray, very moist, medium stiff	CL	3,2,3 N=5	15		Qp = 0.75 tsf
	15			6	18			2,2,3 N=5	18		Qp = 0.75 tsf
	20			7	18			2,3,5 N=8	15		Qp = 1.0 tsf
						*End of Boring					

intertek psi

Professional Service Industries, Inc.
37483 Interchange Drive
Farmington Hills, MI 48335
Telephone: (248) 857-9911

PROJECT NO.: 03811234
PROJECT: Proposed Taco Bell - #314481
LOCATION: 18550 E. Warren Avenue
City of Detroit
Wayne County, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-7

DATE STARTED:	5/4/21	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	5/4/21	**DRILLER:** H. Pace	**LOGGED BY:** L. Nouri
COMPLETION DEPTH	20.5 ft	**DRILL RIG:**	CME-75
BENCHMARK:	N/A	**DRILLING METHOD:**	2.25" Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2" SS
LATITUDE:		**HAMMER TYPE:**	Automatic
LONGITUDE:		**EFFICIENCY**	89%
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	K. Dubnicki

Water

While Drilling	Dry
Upon Completion	Dry
Delay	N/A

BORING LOCATION:
See Boring Location Plan

REMARKS: Borehole backfilled with auger cuttings and pavement patched upon completion

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					Approximately 2" of ASPHALT					
						Approximately 7" of DARK GRAY SANDY GRAVEL BASE					
				1	17	FILL - SAND, fine, with silt, trace gravel, black and dark brown, moist, loose Organic Content = 3.2%		3,4,3 N=7	19		
	5			2	18	SAND - fine, with silt, trace gravel, brown, moist, loose	SP-SM	2,3,4 N=7	10		
				3	16	SILTY CLAY - trace sand and gravel, occasional reddish brown and brown silt partings, gray, moist, very stiff		2,3,4 N=7	27		Qp = 3.5 tsf
	10			4	17		CL	3,3,3 N=6	26		Qp = 3.0 tsf
				5	18			2,2,3 N=5	27		LL = 27 PL = 16
	15			6	18	SILTY CLAY - with sand, trace gravel, gray, very moist, stiff	CL	3,2,3 N=5	15		Qp = 1.0 tsf
	20			7	18			2,3,3 N=6	14		Qp = 1.0 tsf
						*End of Boring					

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LOCATION: 18550 E. Warren Avenue
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The stratification lines represent approximate boundaries. The transition may be gradual.

LABORATORY TESTING

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
RC: Rock Core
TC: Texas Cone
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,⧩ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 - 80
Extremely Dense	80+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_U - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 2	Very Soft
0.25 - 0.50	2 - 4	Soft
0.50 - 1.00	4 - 8	Firm (Medium Stiff)
1.00 - 2.00	8 - 15	Stiff
2.00 - 4.00	15 - 30	Very Stiff
4.00 - 8.00	30 - 50	Hard
8.00+	50+	Very Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_U - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

DEGREE OF WEATHERING

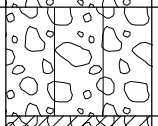
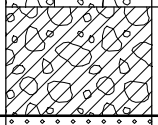
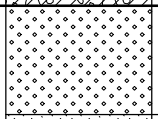
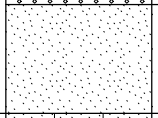
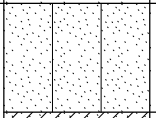
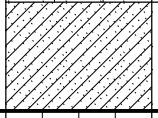
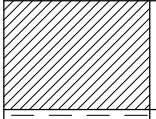
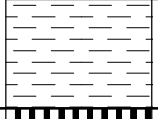
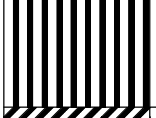
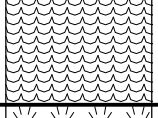
Slightly Weathered: Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.

Weathered: Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.

Highly Weathered: Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

psi

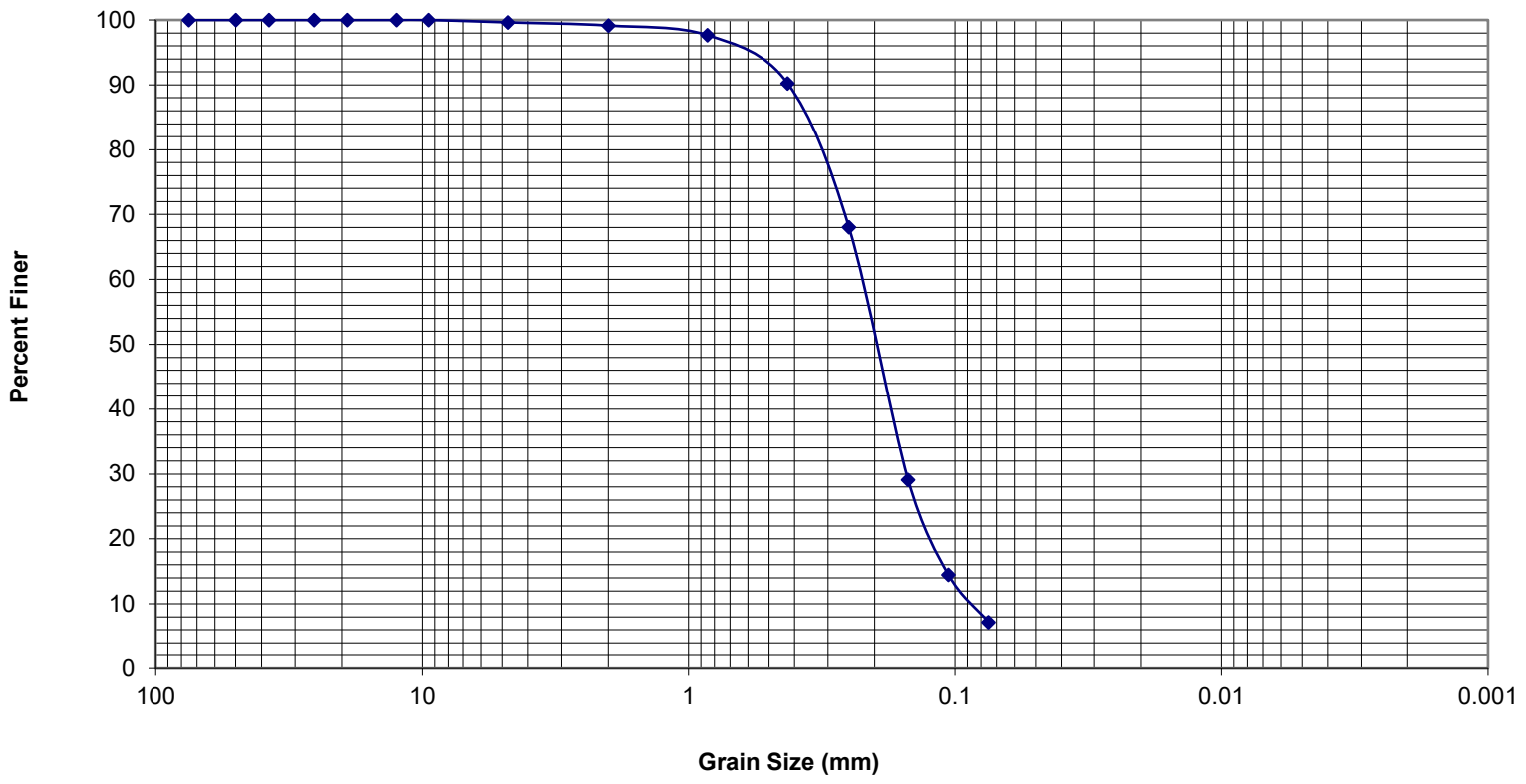
Sieve Analysis

ASTM D6913/D6913M-17(Washed Gradation)

Project:	Proposed Taco Bell #314481	**Project #:**	03811234
Client:		**Date Tested:**	5/7/2021
Date Sampled:	5/4/2021	**Sample Source:**	B-1 ; SS1 and SS2
Sampled by:	PSI - Harold Pace	**Depth:**	1.5' -5.5'

Soil Information:							
% Gravel=	**0.4**		LL=	**--**	D_{10}=	0.09
% Sand=	**92.5**		PL=	**--**	D_{30}=	0.17
	Coarse	**0.5%**	PI=	**--**	D_{60}=	0.22
	Medium	**8.9%**	USCS:	**SM**	Cu=	2.44
	Fine	**83.1%**	AASHTO:	**A-3**	Cc=	1.46
% Fines=	**7.2**		Description:	**SAND, fine to medium, with silt, light brown**		
	Silt	**n/a**				
	Clay	**n/a**				

Grain Size Distribution



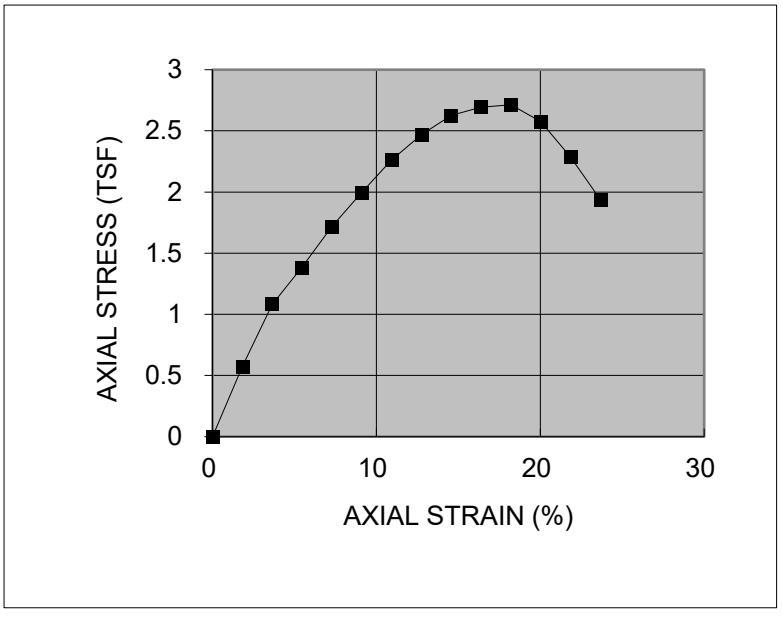
UNCONFINED COMPRESSIVE STRENGTH (ASTM D2166)

Project Name: Proposed Taco Bell #314481
Location: Detroit,MI
Project No.: 03811234
Source: B-1; SS4 **Sample Depth:** 9.0'-10.5'
Description: SILTY CLAY - trace sand and gravel, gray (CL)
Qp (tsf): 2.25
Wet Weight (gm): 142.65
Date Tested: 5/10/2021
Tested By: PJ
Checked By: KFD

Height:	2.746 inches	69.76 mm	
Diameter:	1.371 inches	34.82 mm	
Moisture Content:	22%	**Saturation (%):**	
Ht.-Diameter Ratio:	2.00	**Specific Gravity:**	
Dry Density:	110 pcf		

READING NUMBER	DEFORM. (in.)	LOAD DIAL READING	LOAD (lbs)	STRAIN (%)	CORRECTED AREA (in^2)	AXIAL STRESS (tsf)
0	0.000	0	0.0	0.00	1.476	0.00
1	0.050	41	12	1.82	1.503	0.57
2	0.100	74	23	3.64	1.532	1.08
3	0.150	98	30	5.46	1.561	1.38
4	0.200	126	38	7.28	1.592	1.72
5	0.250	149	45	9.10	1.624	2.00
6	0.300	173	52	10.92	1.657	2.26
7	0.350	193	58	12.74	1.691	2.47
8	0.400	208	63	14.56	1.728	2.63
9	0.450	220	66	16.39	1.765	2.69
10	0.500	226	68	18.21	1.804	2.71
11	0.550	218	66	20.03	1.846	2.57
12	0.600	200	60	21.85	1.888	2.29
13	0.650	171	52	23.67	1.934	1.94
14	0.700					
15	0.750					
16	0.800					
17	0.850					
18	0.900					
19	0.950					
20	1.000					

Qu = 2.63 tsf 251.44 kPa, Strain 15.00%



Failure Sketch

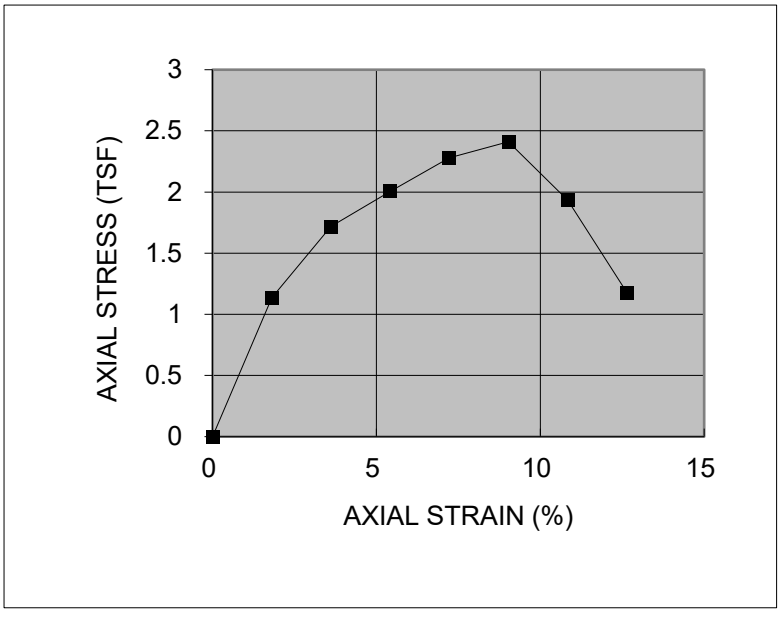
UNCONFINED COMPRESSIVE STRENGTH (ASTM D2166)

Project Name: Proposed Taco Bell #314481
Location: Detroit,MI
Project No.: 03811234
Source: B-2; SS3 **Sample Depth:** 6.5'-8.0'
Description: SILTY CLAY - trace sand and gravel, gray (CL)
Qp (tsf): 3.25
Wet Weight (gm): 133.86
Date Tested: 5/7/2021
Tested By: PJ
Checked By: KFD

Height:	2.769 inches	70.33 mm	
Diameter:	1.379 inches	35.04 mm	
Moisture Content:	27%	**Saturation (%):**	
Ht.-Diameter Ratio:	2.01	**Specific Gravity:**	
Dry Density:	97 pcf		

READING NUMBER	DEFORM. (in.)	LOAD DIAL READING	LOAD (lbs)	STRAIN (%)	CORRECTED AREA (in^2)	AXIAL STRESS (tsf)
0	0.000	0	0.0	0.00	1.494	0.00
1	0.050	79	24	1.81	1.522	1.14
2	0.100	123	37	3.61	1.550	1.72
3	0.150	146	44	5.42	1.580	2.01
4	0.200	170	51	7.22	1.611	2.28
5	0.250	181	55	9.03	1.643	2.41
6	0.300	148	45	10.83	1.676	1.93
7	0.350	91	28	12.64	1.710	1.18
8	0.400					
9	0.450					
10	0.500					
11	0.550					
12	0.600					
13	0.650					
14	0.700					
15	0.750					
16	0.800					
17	0.850					
18	0.900					
19	0.950					
20	1.000					

Qu = 2.41 tsf 230.86 kPa, Strain 9.03%



Failure Sketch

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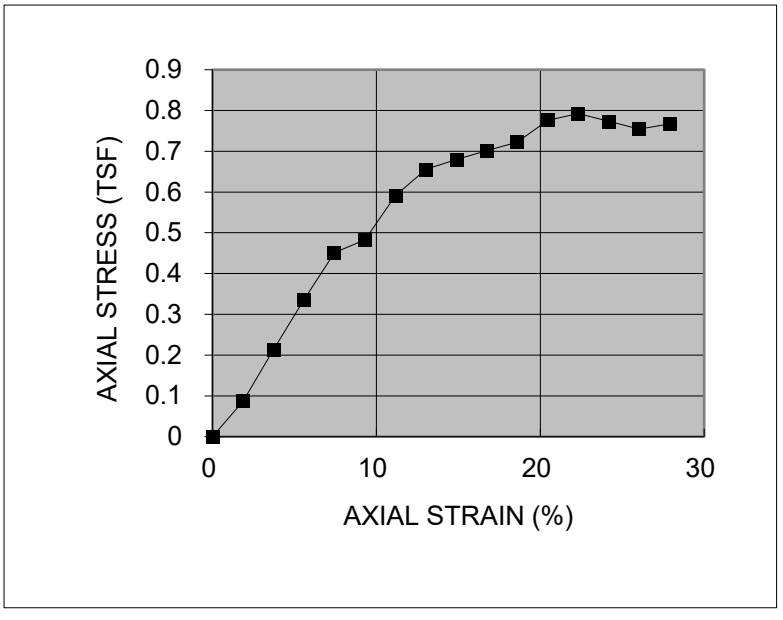
UNCONFINED COMPRESSIVE STRENGTH (ASTM D2166)

Project Name: Proposed Taco Bell #314481
Location: Detroit,MI
Project No.: 03811234
Source: B-2; SS5 **Sample Depth:** 11.5'-13.0'
Description: SILTY CLAY - trace sand and gravel, gray (CL)
Qp (tsf): 0.75
Wet Weight (gm): 156.50
Date Tested: 5/10/2021
Tested By: PJ
Checked By: KFD

Height:	2.689 inches	68.29 mm	
Diameter:	1.438 inches	36.52 mm	
Moisture Content:	15%	**Saturation (%):**	
Ht.-Diameter Ratio:	1.87	**Specific Gravity:**	
Dry Density:	119 pcf		

READING NUMBER	DEFORM. (in.)	LOAD DIAL READING	LOAD (lbs)	STRAIN (%)	CORRECTED AREA (in^2)	AXIAL STRESS (tsf)
0	0.000	0	0.0	0.00	1.623	0.00
1	0.050	8	2	1.86	1.654	0.09
2	0.100	17	5	3.72	1.686	0.21
3	0.150	27	8	5.58	1.719	0.34
4	0.200	35	11	7.44	1.754	0.45
5	0.250	41	12	9.30	1.790	0.48
6	0.300	51	15	11.16	1.827	0.59
7	0.350	55	17	13.02	1.866	0.66
8	0.400	59	18	14.88	1.907	0.68
9	0.450	64	19	16.74	1.950	0.70
10	0.500	67	20	18.60	1.994	0.72
11	0.550	71	22	20.46	2.041	0.78
12	0.600	74	23	22.32	2.090	0.79
13	0.650	75	23	24.18	2.141	0.77
14	0.700	77	23	26.04	2.195	0.75
15	0.750	80	24	27.90	2.251	0.77
16	0.800					
17	0.850					
18	0.900					
19	0.950					
20	1.000					

Qu = 0.68 tsf 65.08 kPa, Strain 15.00%



Failure Sketch

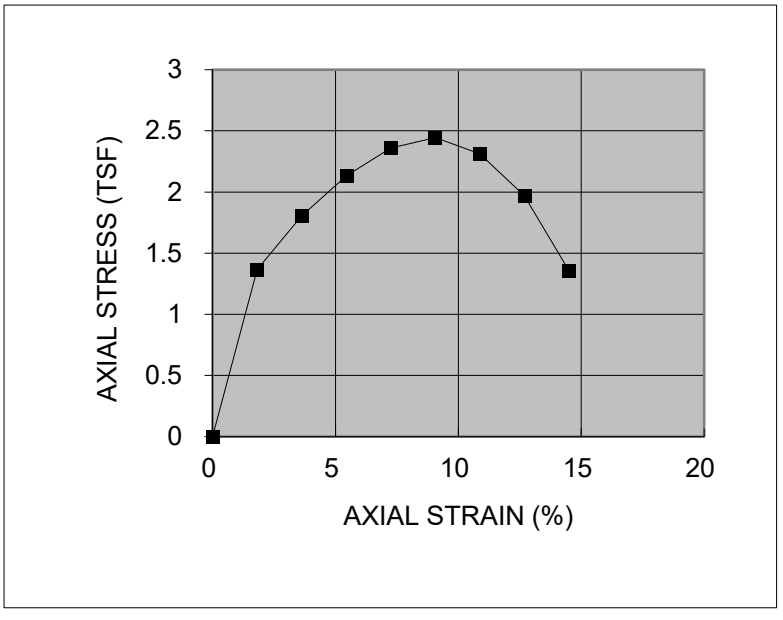
UNCONFINED COMPRESSIVE STRENGTH (ASTM D2166)

Project Name: Proposed Taco Bell #314481
Location: Detroit,MI
Project No.: 03811234
Source: B-4; SS3 **Sample Depth:** 6.5'-8.0'
Description: SILTY CLAY - trace sand and gravel, gray (CL)
Qp (tsf): 3.25
Wet Weight (gm): 138.53
Date Tested: 5/10/2021
Tested By: PJ
Checked By: KFD

Height:	2.758	inches	70.05	mm	
Diameter:	1.382	inches	35.10	mm	
Moisture Content:	25%		**Saturation (%):**		
Ht.-Diameter Ratio:	2.00		**Specific Gravity:**		
Dry Density:	102	pcf			

READING NUMBER	DEFORM. (in.)	LOAD DIAL READING	LOAD (lbs)	STRAIN (%)	CORRECTED AREA (in^2)	AXIAL STRESS (tsf)
0	0.000	0	0.0	0.00	1.500	0.00
1	0.050	94	29	1.81	1.527	1.37
2	0.100	129	39	3.63	1.556	1.80
3	0.150	155	47	5.44	1.586	2.13
4	0.200	174	53	7.25	1.617	2.36
5	0.250	184	56	9.06	1.649	2.44
6	0.300	178	54	10.88	1.683	2.31
7	0.350	154	47	12.69	1.718	1.97
8	0.400	107	33	14.50	1.754	1.35
9	0.450					
10	0.500					
11	0.550					
12	0.600					
13	0.650					
14	0.700					
15	0.750					
16	0.800					
17	0.850					
18	0.900					
19	0.950					
20	1.000					

Qu = 2.44 tsf 234.12 kPa, Strain 9.06%



Failure Sketch


intertek
psi