PIONEER
Engineering & Environmental Services, LLC

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December 22, 2022

Peak Car Wash
1611 Waterbury Drive
Bourbonnais, IL 60914
ATTN: Tracey Erickson

Re: Report of Geotechnical Investigation
Proposed Car Wash
300 & 316 W. Sunset Drive
Waukesha, Wisconsin
Pioneer Project No. 22-0495-151

Dear Mr. Erickson:

Pioneer Engineering & Environmental Services, LLC (Pioneer) was contracted to conduct a geotechnical investigation for the proposed car wash facility to be located at 300 & 316 W. Sunset Drive in Waukesha, Wisconsin. The investigation was performed in general accordance with Pioneer Proposal No. 18970, dated November 22, 2022. The scope of the investigation included drilling, sampling, and laboratory testing of soil obtained in five (5) borings in support of the proposed foundation design of the project.

Project Overview

The Project Site consists of 2 parcels. One of the parcels is developed with a 1-story restaurant building and a parking lot at 316 W. Sunset Drive. The other parcel consists of a convenience store associated with a former gas station at 300 W. Sunset Drive. The parcel is bordered by a church to the north, a 1-story commercial building to the west, S. Grand Avenue to the east, and W. Sunset Drive to the south.

The proposed development includes constructing a 1-story rectangular-shaped car wash in the central part of the project site that will be surrounded by paved parking and access roads.

Historical Site Information

A cursory review of available historical aerial photos were made to help determine if the past history of the site, such as previous structures, may provide insight into the existing site subsurface conditions. Aerial photographs from 1937 to 2022 were reviewed to help determine where foundations or floor slabs from previous site use might be located.

Aerial photographs indicate that in 1937 the site was undeveloped grassland and/or agricultural land. By 1963, 1-story commercial buildings were developed in each of the parcels. By 1976 the building at 316 W. Sunset Drive was demolished and replaced with 1-story restaurant building at the site today. By 1995, the site was converted into a gas station and remained as such until 2017. By 2017, the pumps were removed and the building remained a convenience store. Since then, the site has remained relatively unchanged.

Subsurface Investigation

Five (5) soil borings were performed for the current project (reference the attached Boring Location Diagram, Figure 1). The borings were located in the field using conventional taping procedures from building corners.

The borings were performed within the footprint of the proposed car wash facility and were advanced to depths of 7.5 and 15 feet below existing grade.

The borings were drilled with an ATV-mounted Geoprobe 7822DT drill rig using 3 ¼-inch diameter hollow stem augers (HSAs). Representative soil samples were obtained from each sampling interval using the split barrel sampling procedure performed in accordance with ASTM Standard D 1586, "Method for Penetration Test and Split Barrel Sampling of Soils". In the split barrel sampling procedure, a 140-pound hammer falls 30 inches and drives a two-inch outer diameter split barrel sampler 18 inches into the soil. The number of blows required to drive the barrel sampler the final 12 inches is the Standard Penetration Resistance (SPT N-value) for that interval. This test result indicates the soil's relative density and comparative consistency, and provides a basis for estimating the relative strength and compressibility of soil. Representative soil samples were obtained at 2.5-foot intervals to a depth of 15 feet.

The soil samples obtained from each interval were logged in the field according to their predominant geological characteristics. The field log was subsequently used to prepare the final boring logs that are included as an attachment to this report. Soil samples obtained from the drilling operations were identified by boring number and sampling depth, and brought to Pioneer's laboratory for further examination and testing. Upon completion of the drilling, the boreholes were backfilled with bentonite chips to the existing ground surface.

The soil samples were analyzed for physical soil parameters including moisture content and unconfined compressive strength. In addition, the soil was further classified in accordance with the Unified Soil Classification System. A natural moisture content test was performed for each sampling interval and/or stratum in accordance with ASTM Standard D 2216. Fines content was measured in two samples in accordance with ASTM Standard D 1140. Additional estimated unconfined compressive strength values for cohesive soil samples were obtained by using a spring-loaded pocket penetrometer and/or Rimac machine. The laboratory test data is included on the attached Boring Logs.

Subsurface Conditions

The following generalized soil profile was encountered in the borings.

- *Asphalt Pavement.* The surface cover of the site consists of a 3 inch layer of Asphalt Surface over a thin Gravel Base Course.

- *Black Silty Clay Topsoil.* In Borings B-1 through B-3, the Pavement is underlain by a 2-foot thick deposit of Black silty Clay Topsoil. The Topsoil possesses moisture contents ranging from 30.1 to 35.2 percent and unconfined compressive strengths ranging from 0.7 to 1.5 tons per square foot (tsf). The Topsoil extends to an approximate depth of 3 feet below grade.

- *Brown Silty Sand FILL.* In Borings B-4 and B-5, the Pavement is underlain by a layer of Brown Silty Sand Fill to a depth of 3 to 5.5 feet below grade. The deposit possesses Standard Penetration Test (SPT) N-values ranging from 3 to 9 bpf and moisture contents ranging from 4.8 to 15.2 percent.

- *Brown Silty Clay.* In Borings B-1, B-3, and B-5, the Fill is underlain by a deposit of stiff to tough Brown Silty Clay to a depth of 5.5 to 7.5 feet below grade. The deposit possesses Standard Penetration Test (SPT) N-values ranging from 4 to 12 bpf, unconfined compressive strengths ranging from 0.5 to 1.5 tsf, and moisture contents ranging from 120.2 to 22.4 percent. Boring B-3 was terminated in the deposit.

- *Very Loose to Loose Brown Clayey to Silty Sand.* The upper profile soils are underlain by a deposit of loose to medium dense Brown Silty Sand to Clayey Sand. The deposit possesses SPT N-values ranging from 1 to 25 bpf and moisture contents ranging from 5.2 to 18.5 percent. Borings B-2 and B-5 were terminated in the deposit.

- _Dense Brown Clayey Sand._ Borings B-1 and B-4 were terminated in a deposit of dense to very dense Brown Clayey Sand at a depth of 15 feet below grade. The deposit possesses SPT N-values of 35 to 64 bpf and moisture contents ranging from 8.6 to 12.4 percent.

Groundwater Conditions. Groundwater was encountered in Borings B-1 and B-4 during drilling at a depth of 10 feet below existing grade. The water table was not encountered in any other borings during drilling operations. A seasonal high table of 10 feet below existing grade can be used for design purposes.

Seasonal and yearly fluctuations in the water table can be expected due to variations in precipitation, evaporation, and surface runoff. Also, it is likely that pockets of perched groundwater may occur after precipitation events.

The subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistance, locations of the samples and laboratory test data. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual.

Conclusions and Recommendations

Site Preparation

Demolition. Current development plans include the demolition of the existing structures. Concrete from the existing building floor slabs and foundation walls/footings should be removed from the site or crushed and stockpiled for reuse in project earthwork. If properly sized, the crushed concrete can be used as structural backfill.

Pavement Removal. The asphalt pavement should be stripped from the Site. The site should then be proofrolled to identify soft or unstable soils. Areas that exhibit excessive rutting or deflection should be disked, dried and recompacted. If unsuccessful, the unstable areas can be removed and replaced with Structural Fill.

Stormwater Infiltration. In order to evaluate the infiltration properties of the soils at the site laboratory testing was done on two samples in Boring B-2 to approximate the fines content in the soils. The results from the tests are presented in the test below.

Table 1: Summary of ASTM D 1140 Testing Results

Location	Depth (ft)	Percent Fines	Soil Classification (USDA)
B-2	3.5 - 5.0	31.3%	Sand, Clay Loam
B-2	6.0 - 7.5	19.5%	Loamy Sand

As part of our evaluation we also reviewed applicable sections of the “Soil Survey for the Waukesha County, Wisconsin” as prepared by the U.S. Department of Agriculture Natural Resource Conservation Service

(NRCS, formerly the Soil Conservation Service). According to the soil survey, Sandy/Gravelly Clay in the area has infiltration rates ranging from 0.1 to 1.6 in/hr.

Based on the results from our laboratory testing and the data from NRCS, a field infiltration rate of 0.5 inches per hour should be used for design purposes.

Foundation System

Design Criteria. The proposed building is planned as a 1-story carwash facility with a first floor slab-on-grade. For discussion purposes, it is assumed that the design bottom of frost-depth footings will be approximately 4 feet below existing surface grade.

Footing Support Soils. The following soil deposits were considered for support of the foundation system.

- The upper soil profile of Fill and Topsoil possess poor engineering properties and will not provide adequate support for the proposed structure. The deposit extends to a depth of 3 feet below existing grade.
- The Clayey/Silty Sand that underlies the Fill possesses marginal engineering properties and will not provide adequate support for footings in direct contact with the soil. To attain a modest allowable bearing capacity, Pioneer recommends that the very loose to loose Clayey Silt/Sandy Silt be excavated to a minimum depth of 1 foot below design bottom-of-footing and be replaced with Structural Fill.

The following recommendations should be used for design and construction of frost-depth foundations.

Continuous/Spread Footings. The planned footings will be located in the very loose to loose Brown Clayey/Silty Sand or tough Brown Silty Clay at a depth of approximately 4 feet below existing grade. The deposit possesses marginal engineering properties and will not provide adequate support for footings in direct contact with the soil. Pioneer recommends that the very loose to loose Clayey Silt/Sandy Silt or tough Brown Silty Clay be excavated to a minimum depth of 1 foot below design bottom-of-footing and be replaced with Structural Fill.

Frost-depth footings founded on a 1-foot thick pad of Structural Fill over the native Brown, Light Brown Clayey Sand to Silty Sand or tough Brown Silty Clay can be dimensioned using a net allowable bearing capacity of 2,500 psf. The net allowable soil bearing pressure refers to that pressure which may be imposed on the foundation soils in excess of the final minimum surrounding overburden pressure.

Settlement. Pioneer anticipates that properly designed and constructed footings supported upon the recommended bearing soil should experience a maximum total settlement on the order of 0.75 inches or less. Differential settlements ranging from ½ to ⅔ the total settlement are possible across the building area due to variations in subsurface conditions and foundation loadings.

Undercut/Replacement of Unsuitable Soil. The following should be used where unsuitable soil is encountered below the design footing subgrade and an undercut-replacement scheme is used for footing support. Any unsuitable soils as described above that are encountered at the design footing subgrade should be removed to the depth encountered and replaced with Structural Fill. Typical Structural Fill, such as 3-inch crushed limestone or concrete choked with 1-inch nominal granular material per Wisconsin DOT (WisDOT) Specifications, should be placed in 12-inch lifts and compacted by use of a vibratory compactor or through the force of a backhoe's bucket to seat the stone. Alternatively, the excavation may be filled with lean concrete or the footing elevation may be lowered to the new bearing surface. The width of the excavation should extend at least one foot horizontally beyond the perimeter of the footing on all sides for each one foot of vertical undercut below the bottom of the footing, thus providing for adequate lateral distribution of the foundation stresses.

An additional discussion of the placement and compaction of Structural Fill is included in the Earthwork Controls section of this report.

Additional Footing Design Criteria. All footings should be founded a minimum of 4 feet below final exterior grade to eliminate the effects of frost on footing behavior. Interior column footings below a heated building should be founded at least 2 feet below the final floor slab level. In order to prevent local bearing failure, isolated column footings should have a minimum lateral dimension of 24-inches and continuous footings should have a minimum width of 18-inches. If the building is constructed during winter months or if the footings will likely be subjected to freezing temperatures after construction is completed, then the footings should be protected from freezing.

In order to limit the effects of differential movement that may occur due to variations in the character of the supporting soils and variations in seasonal moisture contents, Pioneer recommends that the continuous footings be suitably reinforced to make them as rigid as practical.

Floor Slab

First Floor Slab-On-Grade. After excavating to floor slab design subgrade, the exposed soil should be visually inspected for unsuitable soils. All Topsoil, root mat, and soils containing a high content of organic material or wood debris should be removed to the depth encountered. If possible, the subgrade can also be proofrolled using a fully loaded dump truck. Although not expected, Fill containing a high content of concrete or brick debris with large voids between pieces should be removed and recompacted, if possible, to minimize voids. Zones of Fill that are primarily sand should be compacted to attain stability.

All unsuitable soils should be replaced with compacted Structural Fill. Structural Fill should be an approved granular soil. Engineered fill should be placed and compacted in lifts with a maximum lift thickness of 8 inches. Each lift of Open-Graded aggregate, per WisDOT Specifications, should be compacted to a minimum of 75 percent of the relative density in accordance with ASTM Standards D 4253 and D 4254. Dense-Graded aggregate should be compacted to a minimum of 95 percent of the maximum density per ASTM D 1557 (Modified Proctor).

Assuming the floor slab subgrade is prepared as recommended, a modulus of subgrade reaction of 100 pounds per cubic inch (pci) should be used.

The floor slab should be supported by a minimum 6-inch thick granular base course of Dense-Graded aggregate per WisDOT Specifications. The base course will not only facilitate fine grading of the slab subgrade surface, but will also serve as a capillary cutoff layer, which will minimize the migration of moisture through the floor slab. The use of a vapor barrier beneath the floor slab is also recommended. A simple polyethylene membrane can generally be installed at a minimal cost, further minimizing the migration of moisture through the floor slab, which may damage sensitive floor coverings. Floor slabs-on-grade should be isolated from the foundation system and contain the proper number of isolation and contraction joints to maintain the integrity of the slab should minor differential movements occur.

Pavement Design Considerations

Pavement Support. The proposed pavement areas should be excavated to design subgrade to outside the limits of the paved area. Any Topsoil, root mat, or unsuitable soil should be removed from the pavement area to a maximum depth of 2 feet below design subgrade and replaced with Structural Fill. Uniformity in support characteristics for the pavement can be attained by using the following procedures.

After removing the Fill and excavating to pavement design subgrade, the exposed soil should be proofrolled with a vibratory steel drum roller or fully loaded dump truck. The subgrade should also be visually inspected for unsuitable soils. Any Fill containing a high content of topsoil, organic material, or wood debris should be removed to the depth encountered to a maximum depth of 2 feet below design subgrade. Zones of instability (generally identified as more than 1 inch of pumping or rutting) should be disked, dried and recompacted. Engineered fill should be placed and compacted in lifts as described above for Floor Slabs.

Pavement Section. Pioneer recommends a flexible pavement section be constructed using the following pavement design. It is recommended that the completed site plans be analyzed to determine the most likely traffic patterns for heavy delivery trucks and garbage trucks. The recommended Heavy-Duty Pavement section should be used in these traffic corridors.

Table 2: Pavement Section Recommendations

Pavement Material	Compacted Material Thickness (Inches)		
	Flexible Pavement (Light Duty)	Flexible Pavement (Heavy Duty)	Rigid Pavement (Heavy Duty)
Portland Cement Concrete	—	—	6.5
Bituminous Surface Coarse	1.5	2	—
Bituminous Binder Coarse	1.5	3	—
Dense-Graded Aggregate Base Coarse per WisDOT Specficiations	8	10	6
Total Pavement Section Thickness	11	15	12.5

The bituminous concrete binder and surface courses should consist of Hot Mix Asphalt pavement as defined in the WisDOT Standard Specifications. All placement and compaction activities should meet the requirements of the WisDOT Standard Specifications.

The design of pavements should incorporate provisions for drainage of both the pavement surface and the base course layer. Should standing water be allowed to accumulate on the pavement surface or within the base course, the sub-grade will soften and it is likely that the pavement will deteriorate. The base course should be protected from water inflow along drainage paths. The base course should extend beyond the edges of the pavement in low areas to allow any water that enters the base course a path for exit.

Seismic Design

The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with ASCE 7-16 and the International Building Code (IBC 2015).

Based on the soil properties encountered at the site and as described on the boring logs, it is our opinion that the Seismic Site Classification is D (“Stiff Soil”) as detailed in the table below. Subsurface explorations at the site were extended to a maximum depth of 15 feet below existing grade and data from other projects were used to estimate the soil properties below this depth.

Table 3: Seismic Site Class

Description	**Type**	**Value**
Site Classification	Stiff Soil	D
Risk Category	I, II or II	II
Seismic Design Category	SDC	B
MCE_R Ground Motion (0.2 Sec Period)	S_S	0.077
MCE_R Ground Motion (1.0 Sec Period)	S_1	0.049
MCE_G Peak Ground Acceleration	PGA	0.038

Based on a Seismic Design Category B, a liquefaction or seismic response analysis is not required at the site.

Groundwater Control and Excavation Stability

Groundwater was encountered at a depth of 10 feet below existing grade during drilling. For excavations above the water table, pumps should be readily available to maintain relatively dry excavations in the event of water seepage.

Although not expected, dewatering equipment may be required for excavations located below the water table. Pumps should be used to maintain as dry of an excavation as possible.

During rainy seasons and under normal conditions, surface runoff and seepage water that may accumulate overnight or momentarily in foundation excavations should be promptly removed through standard perimeter ditch, sump, and pump procedures. Water, as well as loosed or disturbed materials, should be removed from the base of excavations immediately prior to the placement of concrete.

Precautions should also be taken so that the foundation systems of existing structures and utilities are not undermined. If temporary shoring will not be used to brace the sides of the excavation, Pioneer recommends sloping the sides of the excavation in accordance with local ordinances and OSHA regulations. Materials removed from the excavation should not be stockpiled immediately adjacent to the excavation, since this surcharge load may cause a sudden collapse of the slope.

Earthwork Controls

Structural Fill should meet the following properties for use as floor slab support soils.

Table 4: Structural Fill Material Requirements

Fill Type	USCS Classification	Acceptable Location for Placement
Cohesive	CL, CL-ML	Below floor slabs and pavement
Granular	GW, GP, GM, GC SW, SP, SM, SC	Below floor slabs, pavement and foundations
Unsuitable	CH, MH, ML, OL, OH, PT	Non-structural areas

Structural Fill should be placed and compacted in accordance with the following requirements.

Table 5: Fill Placement and Compaction Requirements

Description	Requirement
Fill Lift Thickness	10 inches loose measurement when sheepsfoot or steel drum rollers are used 6 inches loose measurement when jumping jacks or plate compactors are used
Minimum Compaction Requirement Below Foundations and Slabs-on-Grade and Upper 12 Inches of Paved Areas	95% of the maximum dry density per ASTM D-1557 (Modified Proctor)
Minimum Compaction Requirement Below 12 Inches of Paved Areas and Landscaped Areas	90% of the maximum dry density per ASTM D 1557 (Modified Proctor)
Moisture Content of Cohesive Soils	-2% to +3 % of optimum moisture content per ASTM D 1557
Open-Graded Aggregate per Wisconsin DOT Specifications	Compact in 8-inch thick lifts loose measure to achieve stability through particle interlock

All subgrade surfaces should be protected during construction from deterioration or softening caused by frost or ponding of water. Water should not be allowed to stand in the excavations for a sustained period of time. All soft, loose, or disturbed soils should be removed to competent support materials. If the floor slab or pavement subgrade is prepared in the winter, exposed subgrade soils should be protected from freezing. Structural fill should not be placed on frozen soils.

Report Limitations

This geotechnical investigation report has been prepared to aid in the evaluation and design of this project. As a result, this report has provided generalized guidelines to be considered during the actual design and construction phases of the proposed building. The information provided in this report should be evaluated by, and the site improvements should be designed by a licensed structural engineer or architect. Should deviations from the noted subsurface conditions be encountered during construction, this information should be brought to Pioneer's attention. Pioneer would welcome the opportunity to provide field construction services for this project. The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated on the location diagram. It should be understood that this location was approximate, since the boring locations were not surveyed. This report does not reflect any variations that may occur between and beyond these borings.

This report has been prepared for the sole use of the client identified in the report and cannot be relied upon by other persons or entities without Pioneer's permission. The observations and conclusions contained herein are limited by the scope and intent of the work mutually agreed upon by the client and Pioneer and the work actually performed. There are no warranties, implied or expressed, concerning the integrity of the areas and/or mediums not analytically tested.

Pioneer appreciates the opportunity to provide our services for this project. Please feel free to contact us if you have any questions or concerns.

Respectfully Submitted,
Pioneer Engineering & Environmental Services, LLC

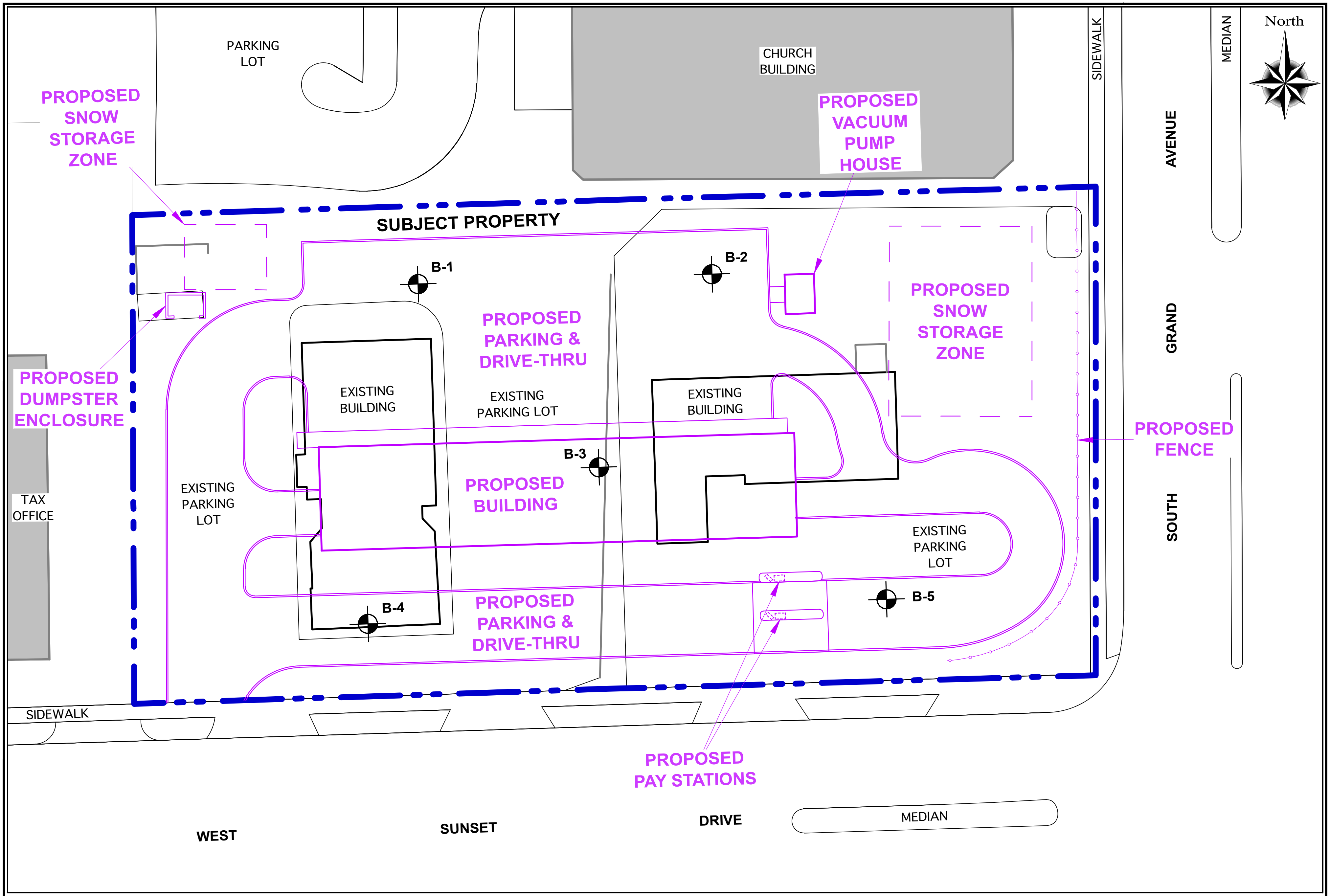
ROBERT L.
GAY
E-45310-6
LOMBARD,
IL

Muhamad Saeed, E.I.T.
Geotechnical Engineer

Robert L. Gay, P.E.
Senior Geotechnical Engineer

Expire
7/31/23

Attachments: Boring Locations and Site Diagram (Figure 1)
Boring Logs
Soil Classification Chart



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Legend:
Approximate Property Line — — —
⌖ Geotechnical Soil Boring Location

Scale: 1" = 40' 0' 40'

Date: December 2022

Drawn by: M. Sanabria Valadez

Checked by: Robert Gay

Job No.: 22-0495-151

FIGURE 1
Soil Boring Locations & Site Diagram
300 - 316 West Sunset Drive
Waukesha, WI

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BORING LOG B-1

Sheet 1 of 1

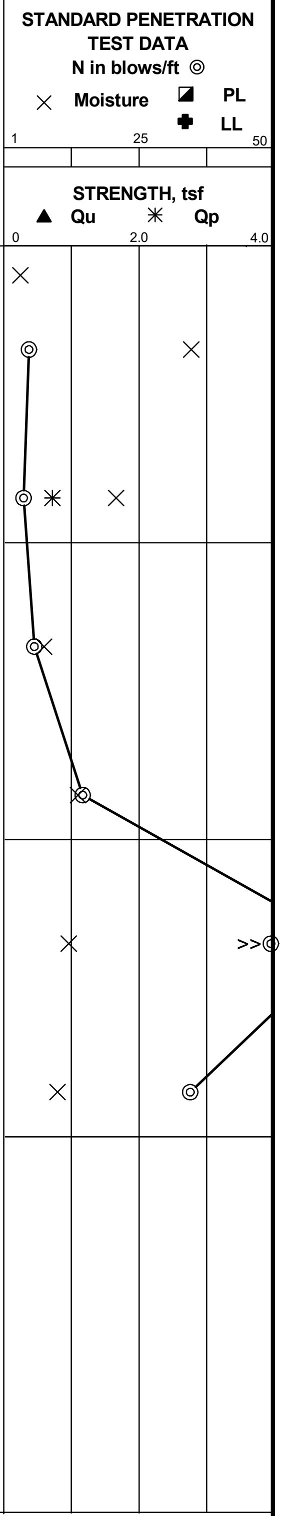
Project No.: 22-0495-151
Project: Proposed Car Wash
Location: 300 & 316 W. Sunset Drive
Waukesha, Wisconsin
Client: Peak Car Wash

Drilling Method: 3.25" Hollow Stem Augers
Sampling Method: Split-Spoon Sampling
Hammer Type: Automatic Hammer
Drill Rig Type: Geoprobe 7822DT
Backfill Method: Auger Cuttings

WATER LEVELS	
▽ During Drilling	10 ft
▼ At Completion	ft
▼ After 1 Day	ft

Surface Elev.: ft Existing Surface

Elevation, (feet)	Depth, (feet)	USCS Classification	MATERIAL DESCRIPTION	Sample No.	Recovery (inches)	SPT Blows per 6-inch N-values	Hand Penetrometer Qp (tsf)	Unconfined Compressive Strength Qu (tsf)	Vane Shear (Peak) Su (tsf)	Moisture, %	Dry Density (pcf)
	0		3" Asphalt Pavement								
		FILL	Brown Silty Sand FILL, some gravel	1						3.4	
		TPSOIL	Black Silty Clay TOPSOIL, trace sand, trace organics	2	14	3/2/3 N=5				35.2	
		CL	Brown Silty CLAY, trace sand, trace gravel	3	10	1/2/2 N=4	0.75			21.2	
	5	SC	Light Brown Clayey SAND, little gravel	4	8	4/4/2 N=6				7.8	
		SC		5	6	9/8/7 N=15				14.1	
	10 ▽	SC	Light Brown Clayey SAND, some gravel	6	10	8/26/38 N=64				12.4	
		SC		7		10/15/20 N=35				10.3	
	15		End of boring at 15-feet								



Completion Depth: 15.0 ft
Date Boring Started: 11/29/22
Driller: DG
Checked By: RG
Logged By: JD

Sample Types:
- Vane Shear
- Split-Spoon
- Rock Core
- Shelby Tube
- Hand Auger
- Auger Cutting

Remarks:

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

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BORING LOG B-2

Sheet 1 of 1

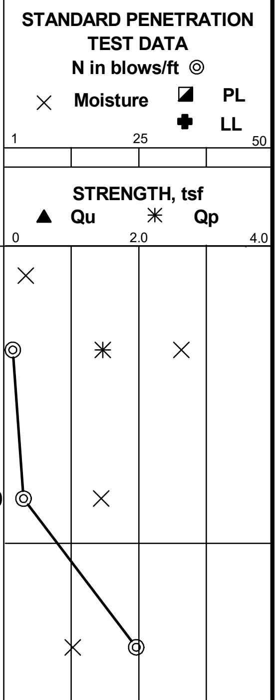
Project No.: 22-0495-151
Project: Proposed Car Wash
Location: 300 & 316 W. Sunset Drive
Waukesha, Wisconsin
Client: Peak Car Wash

Drilling Method: 3.25" Hollow Stem Augers
Sampling Method: Split-Spoon Sampling
Hammer Type: Automatic Hammer
Drill Rig Type: Geoprobe 7822DT
Backfill Method: Auger Cuttings

WATER LEVELS	
▽ During Drilling	None ft
▼ At Completion	ft
▼ After 1 Day	ft

Surface Elev.: ft Existing Surface

Elevation, (feet)	Depth, (feet)	USCS Classification	MATERIAL DESCRIPTION	Sample No.	Recovery (inches)	SPT Blows per 6-inch N-values	Hand Penetrometer Qp (tsf)	Unconfined Compressive Strength Qu (tsf)	Vane Shear (Peak) Su (tsf)	Moisture, %	Dry Density (pcf)
	0	FILL	3" Asphalt Pavement Dark Brown Silty Sand FILL, some gravel	1						4.4	
		TPSOIL	Black Silty Clay TOPSOIL, trace sand, trace organics	2	12	1/1/1 N=2	1.5			33.4	
		CL	Light Brown Clayey to Silty SAND, some gravel	3	12	2/2/2 N=4				18.5	116.0
	5										
		CL		4	7	7/15/10 N=25				13.2	
			End of boring at 7.5-feet								



Completion Depth: 7.5 ft
Date Boring Started: 11/29/22
Driller: DG
Checked By: RG
Logged By: JD

Sample Types:

- **Vane Shear**
- **Split-Spoon**
- **Rock Core**
- **Shelby Tube**
- **Hand Auger**
- **Auger Cutting**

Remarks:

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

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BORING LOG B-3

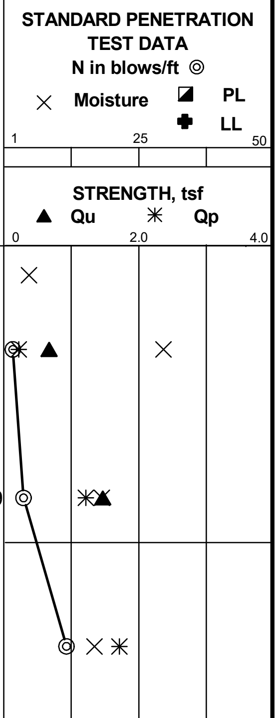
Sheet 1 of 1

Project No.: 22-0495-151
Project: Proposed Car Wash
Location: 300 & 316 W. Sunset Drive
Waukesha, Wisconsin
Client: Peak Car Wash

Drilling Method: 3.25" Hollow Stem Augers
Sampling Method: Split-Spoon Sampling
Hammer Type: Automatic Hammer
Drill Rig Type: Geoprobe 7822DT
Backfill Method: Auger Cuttings

WATER LEVELS	
▽ During Drilling	None ft
▼ At Completion	ft
▼ After 1 Day	ft

Elevation, (feet)	Depth, (feet)	Graphic Log	Sample Type	USCS Classification	MATERIAL DESCRIPTION Surface Elev.: ft Existing Surface	Sample No.	Recovery (inches)	SPT Blows per 6-inch N-values	Hand Penetrometer Qp (tsf)	Unconfined Compressive Strength Qu (tsf)	Vane Shear (Peak) Su (tsf)	Moisture, %	Dry Density (pcf)
	0			FILL	3" Asphalt Pavement Brown Silty Sand FILL, some gravel	1						5.0	
				TPSOIL	Black Silty Clay TOPSOIL, trace sand, trace organics	2	8	1/1/1 N=2	0.25	0.7		30.1	95.0
				CL	Brown Silty CLAY, little sand, trace gravel	3	8	2/2/2 N=4	1.25	1.5		18.6	100.9
	5			CL		4	8	2/6/6 N=12	1.75			17.2	
					End of boring at 7.5-feet								



Completion Depth: 7.5 ft
Date Boring Started: 11/29/22
Driller: DG
Checked By: RG
Logged By: JD

Sample Types:
- **Vane Shear**
- **Split-Spoon**
- **Rock Core**
- **Shelby Tube**
- **Hand Auger**
- **Auger Cutting**

Remarks:

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

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BORING LOG B-4

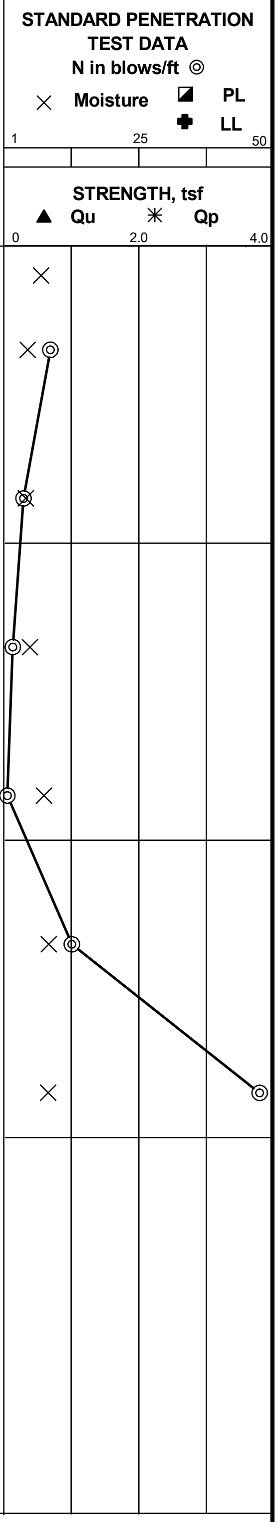
Sheet 1 of 1

Project No.: 22-0495-151
Project: Proposed Car Wash
Location: 300 & 316 W. Sunset Drive
Waukesha, Wisconsin
Client: Peak Car Wash

Drilling Method: 3.25" Hollow Stem Augers
Sampling Method: Split-Spoon Sampling
Hammer Type: Automatic Hammer
Drill Rig Type: Geoprobe 7822DT
Backfill Method: Auger Cuttings

WATER LEVELS	
∇ During Drilling	10 ft
▼ At Completion	ft
▼ After 1 Day	ft

Elevation, (feet)	Depth, (feet)	USCS Classification	MATERIAL DESCRIPTION Surface Elev.: ft Existing Surface	Sample No.	Recovery (inches)	SPT Blows per 6-inch N-values	Hand Penetrometer Qp (tsf)	Unconfined Compressive Strength Qu (tsf)	Vane Shear (Peak) Su (tsf)	Moisture, %	Dry Density (pcf)
	0	FILL	3" Asphalt Pavement Gray Silty Sand FILL, trace gravel	1						7.3	
		FILL	Brown Silty Sand FILL, trace gravel	2	12	5/5/4 N=9				4.8	
		SM	Light Brown Silty SAND, trace gravel	3	8	2/2/2 N=4				4.4	
	5	SC	Light Brown Clayey SAND, little gravel	4	6	1/1/1 N=2				5.2	
		SC		5	6	1/0/1 N=1				7.8	
	10		∇								
		SC		6	10	6/6/7 N=13				8.7	
		SC	Light Brown Clayey SAND, some gravel	7	6	6/20/28 N=48				8.6	
	15		End of boring at 15-feet								



Completion Depth: 15.0 ft
Date Boring Started: 11/29/22
Driller: DG
Checked By: RG
Logged By: JD

Sample Types:
- Vane Shear
- Split-Spoon
- Rock Core
- Shelby Tube
- Hand Auger
- Auger Cutting

Remarks:

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

Pioneer Engineering & Environmental Svcs
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BORING LOG B-5

Sheet 1 of 1

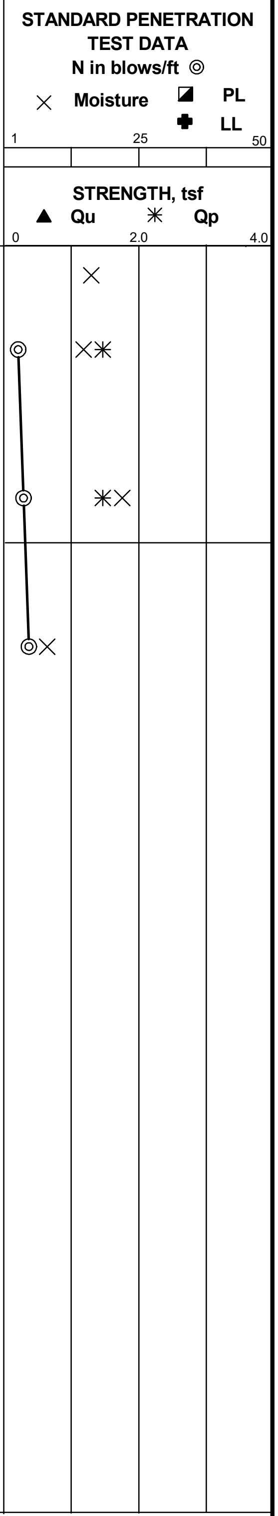
Project No.: 22-0495-151
Project: Proposed Car Wash
Location: 300 & 316 W. Sunset Drive
Waukesha, Wisconsin
Client: Peak Car Wash

Drilling Method: 3.25" Hollow Stem Augers
Sampling Method: Split-Spoon Sampling
Hammer Type: Automatic Hammer
Drill Rig Type: Geoprobe 7822DT
Backfill Method: Auger Cuttings

WATER LEVELS

∇ During Drilling	None	ft
▼ At Completion		ft
▼ After 1 Day		ft

Elevation, (feet)	Depth, (feet)	Graphic Log	Sample Type	USCS Classification	MATERIAL DESCRIPTION Surface Elev.: ft Existing Surface	Sample No.	Recovery (inches)	SPT Blows per 6-inch N-values	Hand Penetrometer Qp (tsf)	Unconfined Compressive Strength Qu (tsf)	Vane Shear (Peak) Su (tsf)	Moisture, %	Dry Density (pcf)
	0			FILL	3" Asphalt Pavement Brown Silty Sand FILL, some gravel	1						16.6	
			☒	FILL		2	8	3/2/1 N=3	1.5			15.2	
	5		☒	CL	Brown Silty CLAY, trace sand, trace gravel	3	12	1/2/2 N=4	1.5			22.4	
			☒	SC	Light Brown Clayey SAND, trace gravel	4	15	5/3/2 N=5				8.4	
					End of boring at 7.5-feet								



Completion Depth: 7.5 ft
Date Boring Started: 11/29/22
Driller: DG
Checked By: RG
Logged By: JD

Sample Types:
- **Vane Shear**
- **Split-Spoon**
- **Rock Core**
- **Shelby Tube**
- **Hand Auger**
- **Auger Cutting**

Remarks:

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
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

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SOIL CLASSIFICATION CHART

Drilling and Sampling Abbreviations:

Sample/Drilling:
SS- Split Spoon Sampler
ST- Shelby Tube Sampler
RC- Rock Core: NX, BX, AX
HSA- Hollow Stem Auger

In-Situ Tests:
SPT-Standard Penetration Test
PMT-Pressuremeter Test
VS-Vane Shear
DCP-Dynamic Cone Penetrometer
Q_p-Estimated Unconfined Compressive Strength using Pocket Penetrometer
Q_u-Estimated Unconfined Compressive Strength using Rimac Tester

Correlation of Penetration Resistances to Soil Properties:

Relative Density- Sands, Silts
More than 50% retained onto the No. 200 sieve

SPT-N Value	Relative Density
0-3	Very Loose
4-9	Loose
10-29	Medium Dense
30-49	Dense
50-80	Very Dense

Consistency of Cohesive Soils
More than 50% passing the No. 200 sieve

Unconfined Compressive Strength Q_p, tsf	Consistency
under 0.25	Very Soft
0.25-0.49	Soft
0.50-0.99	Stiff
1.00-1.99	Tough
2.00-3.99	Very Tough
4.00-8.00	Hard
over 8.00	Very Hard

Gradation Description and Terminology:

Major Component of Sample	Size Range
Boulders	Over 12 inches
Cobbles	12 inches to 3 inches
Gravel	3 inches to No. 4 sieve
Coarse	*3 inches to ¾ inches*
Fine	*¾ inches to No. 4 sieve*
Sand	No. 4 sieve to No. 200 sieve
Coarse	*No. 4 sieve to No. 10 sieve*
Medium	*No. 10 sieve to No. 40 sieve*
Fine	*No. 40 sieve to No. 200 sieve*
Silt/Clay	Passing No. 200 sieve

Description of Minor Components	Percent of Dry Weight
Trace	1-9
Little	10-19
Some	20-34
And	35-50

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REFERENCE NOTES FOR BORING LOGS