Traverse City Light & Power
Bid ADDENDUM

Date: January 12, 2022
Addendum #: 1
Project Name: Barlow to Parsons Steel Riser Poles
Bid Due Date: Friday, January 28, 2022, at 2:00PM

A request for more information was submitted, and in response to this request a Geotechnical Report is being provided along with foundation drawings F-16 and F-17 as referenced in the RFP.

Report of Geotechnical Exploration

Parsons Road Substation

GRP Engineering

City of Traverse City

Grand Traverse County, Michigan

March 19, 2018

Prepared by:
Gosling Czubak Engineering Sciences, Inc.
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GCES Project # 2018892001.02

CIVIL ENGINEERING
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ATTACHMENTS

1.0 PURPOSE

The purpose of this study was to evaluate subsurface conditions at the site and develop geotechnical design criteria regarding foundations for the proposed Parsons Road substation in Traverse City, Michigan. Gosling Czubak's scope of services included drilling two soil borings with standard penetration testing and preparation of this geotechnical report. Traverse City Light & Power (TCLP) is the Owner of this substation, and GRP Engineering was Gosling Czubak's Client for this project.

2.0 PROJECT DESCRIPTION

The project involves the construction of an addition to the existing substation located on the south side of Parsons Road, north of Aero Park Court, in the City of Traverse City, Michigan. This site is located in Section 7, Town 27 North, Range 10 West, East Bay Township, Grand Traverse County, Michigan.

Anticipated components of the substation addition may include pole-type structures, breakers, transformers, and/or control buildings. Pole-type structures are typically supported on drilled piers, while the remainder of the construction is anticipated to be founded on shallow foundations. We assume the planned grade for the addition to the substation will be at or near existing grades. The project may include other items of work such as site grading, driveway construction, utility installation, and restoration. This office should be notified if the project details differ from these assumptions, or if they change.

3.0 SITE CONDITIONS

The portion of the property where the proposed substation addition is located is currently undeveloped and is covered with topsoil. The site topography is fairly flat. Ground surface elevations at the boring locations were estimated at Elevation 606. The surrounding areas around the site are primarily residential and commercial.

3.1 Environmental Site Conditions

An environmental site review was not part of this evaluation. Any Due Care Plans completed for this site as they relate to worker health and safety should be made available for contractor review.

Furthermore, compliance with local Health Department and MDEQ requirements is the responsibility of others, and is not part of this geotechnical exploration report.

4.0 FIELD EXPLORATION

The field exploration consisted of two soil borings (SB-1 and SB-2) to depths of 35 feet each. The boring locations are shown on the Soil Boring Location Map, included as Attachment 1 of this report. The map depicts approximate boring locations and locations of the existing substation and site features.

4.1 General Considerations

The observations, conclusions, and recommendations contained in this report pertain to these soil borings as they relate to the project described. The recommendations in this report should not be used if this project is altered or the structure locations changed, or if the structural information is incorrect. The borehole logs and other testing information provided for this project are intended for use with the complete report. The logs and other testing results should not be separated from the report.

The soil boring locations are shown on the Soil Boring Location Map included in Attachment 1 of this report. The drawing in Attachment 1 is intended to show the approximate borehole locations with respect to existing substation location and other site features and may not include all existing or proposed site elements. The drawing(s) included in this report should not be used for site design, or to determine locations of utilities, building elements, or other proposed or existing features of the site.

5.0 EVALUATION METHODS

Soil borings and limited laboratory soil testing was completed to evaluate geotechnical conditions for this project.

5.1 Soil Borings

Soil borings were used to gather subsurface soils information. The soil borings were completed with conventional hollow stem auger drilling procedures. Soil samples were obtained at regular intervals throughout the borings by performing standard penetration tests through the center of the hollow augers. The standard penetration test (ASTM D-1586) consists of driving a two-inch outside diameter split barrel sampler into the soil with a 140-pound hammer falling 30 inches. The sampler is driven 18 inches, with the hammer blows recorded for each six-inch increment. The number of blows for the second and third increments are summed and referred to as the standard penetration resistance (N).

Soils were removed from the sampler and described on boring logs; driving resistance values and strata depths were also recorded. Field soil classifications were made using procedures similar to ASTM, D-2488. Representative soil samples were preserved in glass jars for future reference and laboratory testing as required. Soil samples were reviewed in the laboratory and final boring logs were prepared. Unless otherwise directed, soil samples will be stored for 90 days prior to disposal.

Borings drilled at the time of the field exploration were backfilled and additional soil placed over the borings proper. Due to the impracticality of compacting soils into deep borings, subsidence of loose backfill may occur, partially reopening the borings. It is not within the scope of this exploration to maintain the borings during settlement of the loose backfill. It is the Owner's responsibility to ensure that a hazard to property, person, or animals is not presented by the borings after completion. Following demobilization of the drilling crew, the borings are the property and sole responsibility of the Owner.

5.2 Laboratory Testing

The laboratory testing program consisted of visual soil classification on recovered samples in general accordance with ASTM standards. Representative soil samples were returned to Gosling Czubak’s soil laboratory where limited laboratory testing on select soils may be conducted to aid in identifying and describing the physical characteristics of the soils and to assist in defining the site soil stratigraphy.

5.3 Soil Resistivity Testing

Soil resistivity testing was not requested as part of this evaluation. Therefore, no soil resistivity information is included in this report.

6.0 SUBSURFACE CONDITIONS

Onsite borings indicate that subsurface soil conditions are rather consistent at this site. The surface elevations of the soil boring locations are assumed to be at or near the proposed finished grade elevation. The following sections describe the soil and groundwater conditions encountered.

6.1 Soil Borings

The soil borings indicate approximately 12 inches of topsoil exists at the surface. Below the topsoil, sand with varying trace amounts of silt and gravel was found to the explored depths of 35 feet. The relative density of these native granular soils ranged from very loose to dense. In general, the relative density increased with increasing depth. Although not encountered in the soil borings, the regional geology often includes the presence of cobbles and/or boulders.

These soils are well-draining and generally have good strength and settlement properties. The upper very loose granular material found onsite is unsuitable for direct foundation support without densification by compaction.

6.2 Groundwater

Groundwater was encountered in the soil borings at depths of approximately 13.5 to 14 feet. It should be noted that groundwater depths will vary with time, season, lake levels, and natural climate variations.

6.3 General Considerations

The borehole logs depict the subsurface data obtained (see Attachment 2). This information is representative of each location only; it should be understood that the soil conditions may vary between the test locations. In addition, the boreholes reflect soil and groundwater conditions at the time they were performed. The soil information was obtained for preliminary use for the project described. This information should not be used for determining earthwork quantities, construction estimating, or other purposes.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This report is intended to present the geotechnical evaluation findings and construction recommendations for the proposed new foundation and other construction features.

7.1 Geotechnical

Generally, the soil borings indicate the site has granular (sandy) soils extending to the maximum explored depths of the borings. The very loose soils, and soils with N-values at the lower end of the loose range are not considered suitable for the support of the shallow foundation loads without sufficient compaction to depths within the zone of influence for the proposed footings. The following sections include foundation and site preparation options to provide structure support.

All site grading work should be completed in the construction area prior to foundation subgrade preparation. If remnants of previous construction such as underground tanks, foundations, tunnels, fill, utilities, or other items are encountered they should be completely removed and replaced with engineered fill.

7.1.1 SITE PREPARATION FOR SHALLOW FOUNDATIONS

All topsoil in the construction areas should be completely removed to the depth it occurs. Next, the existing very loose sand soils should be thoroughly compacted with appropriate heavy compaction equipment and tested by Gosling Czubak personnel. If the initial compaction does not produce acceptable density test results or if very loose soil is present to a greater depth below the bearing level of the foundations, the loose soil should be removed and replaced in properly compacted lifts to return to the foundation subgrade level. A minimum of three to four feet of properly compacted soils should be present below the footings, depending on the footing width. Only soils that meet MDOT Class II requirements, or on-site soil approved by Gosling Czubak should be used as fill directly below slabs, footings and driveways.

The soil at subgrade level should be compacted to a minimum of 95% of the maximum density as determined by the Modified Proctor or Michigan Cone Test. A representative of Gosling Czubak should observe and test all subgrade soil prior to any footing or foundation construction. If loose areas or variations in the soil density are observed, some additional subgrade preparation may be required such as additional compaction or overexcavation and replacement with engineered fill.

The footings may be established directly on the properly compacted native sandy soils or engineered fill and designed in a conventional manner. Footings may be sized using a soil contact pressure of up to 2,500 pounds per square foot. These recommendations are predicated upon a representative of Gosling Czubak observing the subgrade prior to construction. A minimum footing depth of 3.5 feet should be maintained for frost protection, and a minimum width of 24 inches should be maintained, regardless of the bearing pressure. Backfill should meet the requirements given in Section 8.0 Site Preparation, or be approved by Gosling Czubak.

For slab on grade foundations, such as for transformers and/or breakers, the recommended coefficient of friction is 0.4 for sliding resistance, with a respective factor of safety of 2.

Foundation settlements less than one inch are anticipated when footings are loaded to the recommended soil contact pressures described above and placed on properly prepared surfaces, using the methods described. Differential settlements of ½-inch may result between structural elements depending on spacing, relative footing loads, and structural rigidity of the structures.

7.1.2 RECOMMENDATIONS FOR DRILLED SHAFT FOUNDATIONS

A deep foundation system consisting of drilled shafts is recommended for support of the pole-type structures. The drilled shafts should be designed to resist the lateral loads and overturning moments. At a minimum, the diameter of the drilled shafts should be large enough to accommodate the diameter of the pole structure, and may need to be larger to accommodate the design lateral loads.

The end-bearing component of the pile capacity can be designed using a soil contact pressure of up to 4,000 pounds per square foot, provided the length to diameter ratio of the drilled piers is at least three, and for the soils encountered at depths below 5 feet. Axial loads will also be resisted by concrete to soil skin friction. We recommend a skin friction value, αbond of 22 pounds per square inch (ultimate), and a recommended factor of safety of 1.5 should be applied. It is permissible to use end bearing and skin friction concurrently.

An active lateral earth pressure coefficient of 0.28, and a passive lateral earth pressure coefficient of 3.5 can be used for design. The final design depth of the drilled shafts will be dependent on the diameter, lateral resistance of the soils, design loads and overturning moments, and the maximum allowable lateral deflection.

The following soil parameters can be used for the design of the drilled piers, based on a general design profile for the soils encountered:

Boring No.	Soil Description	Elevation Range (feet)	Design Unit Weight (pcf)	Average N-value	Friction Angle	Average Shear Strength (psf)
SB-1	SAND (SP) very loose to loose	605 – 592.5	110	7	30	NA
	SAND (SP) loose to medium dense	592.5 – 582.5	110	10	30	NA
	SAND (SP) medium dense to dense	582.5 – 571	115	31	32	NA
SB-2	SAND (SP) loose to medium dense	605 – 592	110	8	30	NA
	SAND (SP) medium dense	592 – 582.5	110	12	30	NA
	SAND (SP) medium dense	582.5 – 571	115	27	32	NA

Foundation settlements are expected to be less than ½ inch with the use of drilled shaft foundations, provided they are constructed as recommended above, and field verified by Gosling Czubak. We should be retained to observe drilled pier construction, verify the bearing capacity at each location, observe the bearing surfaces, and verify the surface has been adequately cleaned or if standing water is present.

After the pile foundations are installed, care should be taken not to load the site with substantial fill material, particularly after the structures are constructed. If fill is placed on the property with the piles installed, the soil adjacent to the piles may settle with respect to the pile foundations. This may cause damage to the structure or structure foundation, utility lines, and other structures located on the property. The settlement will also induce additional loads on the piles themselves, which will result in a lower available capacity of the piles for building support. Any fill that is required on the site should be placed and compacted well in advance of the pile installation, and should be a nominal thickness. If thicker imported fill is required to arrive at the desired grade, a preloading program will be required to provide a suitable foundation subgrade, and the weight of the fill will need to be considered for the pile capacity estimates.

7.1.3 GROUNDWATER

Groundwater was encountered at depths of approximately 13.5 to 14 feet during drilling. It should be noted that water levels and patterns may vary with time, season, and variations in precipitation.

It is anticipated that a dewatering system will not be necessary for proposed construction on site. However, any precipitation runoff should be controlled during construction, and must not be allowed to collect within excavations or cause soil erosion. Any backfill should consist of well graded granular material and be compacted as outlined in the Site Preparation Section of this report.

7.1.4 SEISMIC SITE CLASS

Section 1613 of the latest edition of the Michigan Building Code requires that the site shall be classified in accordance with Chapter 20 of ASCE 7. Based on the subsurface information obtained from our borings to a maximum depth of 40 feet, seismic Site Class D applies to this site.

7.1.5 SITE GRADING

It is important that the site grading plan be properly designed for controlled surface drainage. The foundation drainage system should be segregated from the surface drainage anticipated on site. In other words, the site should be designed to shed surface water. In order to help achieve this, the area around the structures should be graded so that surface water will flow away from the structure.

8.0 SITE PREPARATION

It is recommended that any cut and fill operations which take place on the site follow the standard procedures outlined below:

- If encountered, remove all topsoil and organic or unstable soils, roots, stumps, old footings, septic tanks, drain fields and any other unsuitable materials from the foundation areas, and construction limits including areas to be paved.
- Compact the backfill soils using a suitable compactor and method as described in Section 7.0 *Conclusions and Recommendations*. If unsuitable soils are encountered, they should be removed as required and suitable backfill should be replaced and compacted as specified below.

- Backfill should meet MDOT Class II specifications or otherwise as specified in Section 7.0 *Conclusions and Recommendations*.
- Fill should be spread in shallow lifts, six inches to eight inches maximum, and compacted to 95 percent of the modified proctor value (ASTM D-1557).
- For these recommendations to be valid, earthwork should be done under the observation of a qualified engineer or technician and density tests performed to determine if each lift is sufficiently compacted.
- If earthwork activities occur during winter months, fill must not be placed on frozen ground, and fill with frozen conglomerations of soil must not be used.
- In general, the construction contractor is responsible for safety during all activities on the site during construction. The contractor is obligated to observe all applicable regulations and codes regarding site safety, including the codes pertaining to open cuts and trenches in soils during excavation, site improvement activities, and foundation construction.

9.0 LIMITATIONS

This report was prepared using generally accepted geotechnical engineering practices. Recommendations were developed based on the information gained from the soil borings performed, and the other information reviewed. No other warranty, expressed or implied, regarding the recommendations and conclusions provided in this report is offered.

Changes to the project should also be brought to the attention of this office prior to construction so that they can be reviewed to see that they are consistent with the recommendations presented in this report.

Readers of this report are encouraged to also review the advice included in Attachment 3, "Important Information about This Geotechnical-Engineering Report."

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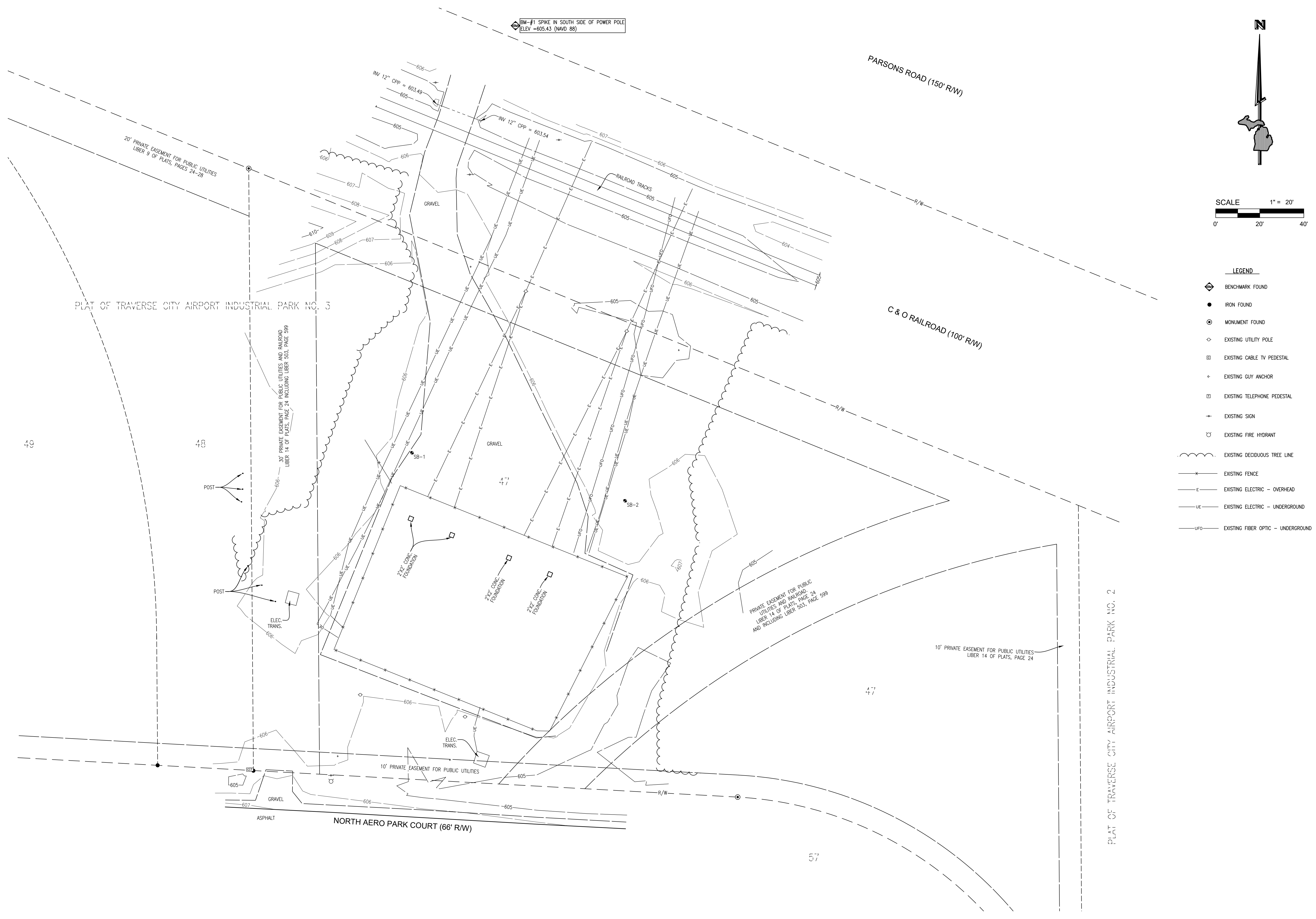
Attachment 1

Soil Boring Location Map



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No.	Date	Revision	By

GRP ENGINEERING
TCL&P PARSONS ROAD SUBSTATION
TOPOGRAPHIC SURVEY

Date Issued:	03/01/2018
Date Surveyed:	02/21/2018
Designed By:	
Drawn By:	ADB
Checked By:	CJP
Scale:	1" = 20'

Original sheet size is 22x34

Location:
PART OF SW1/4, SEC. 7
T27N-R10W
EAST BAY TWP.
CITY OF TRAVERSE CITY
GRAND TRAVERSE CO., MI

Project Number:
2018892001.01

Sheet:
1

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Attachment 2

Boring Logs

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Key to Gosling Czubak Boring Logs and Well Construction Diagrams

SOIL CLASSIFICATION INFORMATION

SOIL DESCRIPTIONS

Example: **Silty fine SAND (SM) - trace clay - occasional clay seams - dense - brown/gray below 40 feet - wet**
(1 - 2 - 3 - 4 - 5 - 6 - 7- 8 - 9 - 10)

1a FOR COARSE GRAINED PRIMARY MATERIAL: Secondary Material of 15 to 50%, if applicable. (eg. Silty, Clayey)
1b FOR FINE GRAINED PRIMARY MATERIAL: Secondary Material of 30 to 50%, if applicable (eg. Gravelly, Sandy)

2 PRIMARY MATERIAL (in CAPs)- SILT, SAND, GRAVEL, or CLAY
Note: fine, medium and/or coarse grained SAND
fine and/or coarse grained GRAVEL

3 (USCS) Unified Soil Classification System (USCS) symbol(s) is presented at the end of the soil description (in parentheses) based on ASTM gradation and plasticity testing. See attached USCS chart.

4 Additional Materials (with percentage descriptors as below)

Fine Grained Material	**Coarse-Grained Material**
15 to 30% - "some" or "with"	5 to 15% - "little"
5 to 15% - "little"	< 5% - "trace" or "few"
< 5% - "trace" or "few"	

5 Description of sorting or grading. For example, "well-sorted, or "poorly graded."

6 Occurrences (with frequency descriptors as below) - cobbles, boulders, bricks, layers, seams, etc.
Greater than one per 12-inches = "frequent"
One per 12-inches = "occasional"

Note: Seams = < 1-inch in thickness
Layers = > 1-inch in thickness

7 Angularity and mineral composition, if warranted

8 Odor or Sheen, if applicable

9 Soil Strength Description (Relative Density for sand and silt, or Consistency for clay)

10 Color

11 Moisture - "dry" or "wet" or "moist"
"dry" = absence of apparent moisture
"moist" = damp but not saturated
"wet" = saturated

Particle Sizes

Boulders	- > 12-in
Cobbles	- 12 to 3 in
Course gravel	- 3 to 3/4 in
Fine gravel	- 3/4 to 0.187-in
Coarse sand	- 4.75 to 2.0-mm
Medium sand	- 2.0 to 0.425-mm
Fine sand	- 0.425 to 0.075-mm
Clay/Silt	- < 0.075-mm

Relative Density

	SPT N-Value
"very loose"	W.O.H. to 4
"loose"	5 to 10
"medium dense"	11 to 30
"dense"	31 to 50
"very dense"	over 50

Consistency

	SPT N-Value	**Ppen, tsf**
"very soft"	WOH to 2	0 - 0.125
"soft"	2 to 4	0.125 - 0.25
"medium stiff"	4 to 8	0.25 - 0.5
"stiff"	8 to 15	0.5 - 1.0
"very stiff"	15 to 30	1.0 - 2.0
"hard"	over 30	2.0 - 4.0

NOTES AND GENERAL INFORMATION

1. Drilling and sampling activities are indicative of subsurface conditions only at locations where data are taken, and when data are taken. Conditions at locations not evaluated may differ from professional interpretation.

2. Environmental boring logs present soil and groundwater data collected for resource development, depositional environment, groundwater flow and/or contaminant transport analyses and may not for be suited for geotechnical or structural engineering use unless otherwise arranged.

3. Stratigraphic Contacts: Solid line denotes a sudden, observed soil transition.
Dashed line denotes a gradual or gradational soil transition.
Dotted line denotes an inferred transition, therefore the type and specific location of the transition is unknown / approximated.

3. Common abbreviations: WOH = Weight of (SPT) Hammer DHH = Down Hole Hammer HA = Hand Auger
DR = Drove Rock (During SPT) NR = No Recovery
Ppen = Pocket Penetrometer (unconfined compressive strength in tons per square foot)

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UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
	Clean Gravels (Less than 5% fines)		
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	▨	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 (More than 12% fines)		
	▨	GM	Silty gravels, gravel-sand-silt mixtures
	▨	GC	Clayey gravels, gravel-sand-clay mixtures
	Clean Sands (Less than 5% fines)		
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	▨	SW	Well-graded sands, gravelly sands, little or no fines
	▨	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)		
	▨	SM	Silty sands, sand-silt mixtures
	▨	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more 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 of 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 50% or greater	▨	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	▨	CH	Inorganic clays of high plasticity, fat clays
	▨	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	▨	PT	Peat and other highly organic soils

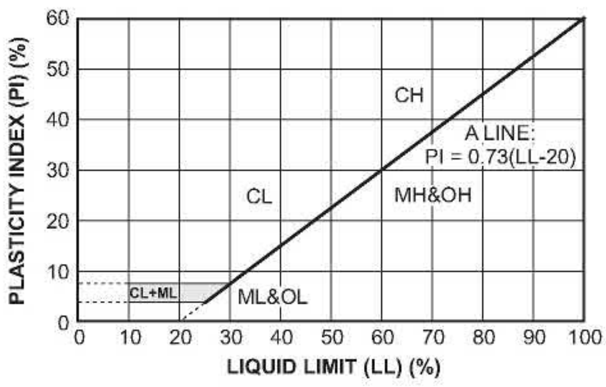
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent	GW, GP, SW, SP
More than 12 percent	GM, GC, SM, SC
5 to 12 percent	Borderline cases requiring dual symbols

PLASTICITY CHART



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(231) 946-9191

PROJECT: Parsons Road Substation
PROJECT NO.: 2018892001.02
PROJECT LOCATION: Traverse City, MI
CLIENT: GRP Engineering
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: M. Allen **LOGGED BY:** R. Farve

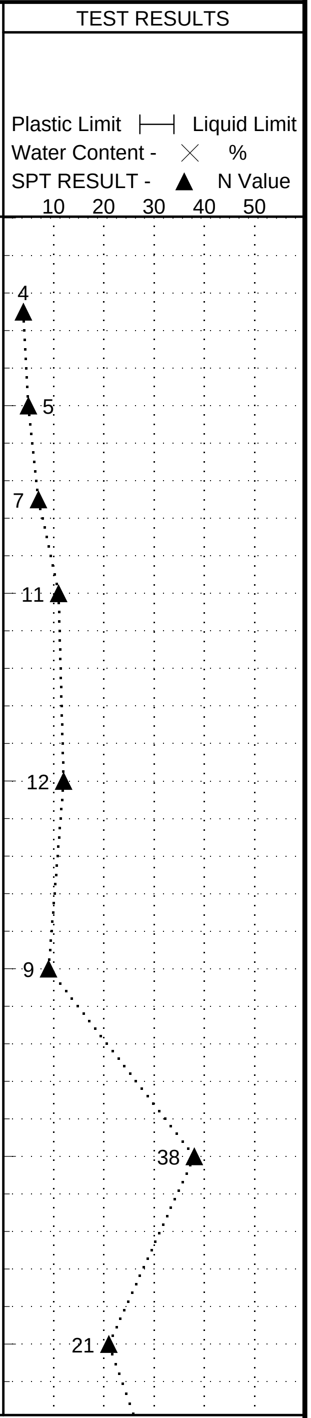
LOG OF BORING: SB-1

GROUND ELEVATION: 606 +/- **DATE:** 2/27/2018
DRILLING LOCATION: As shown on location sketch
DRILLING METHOD: 4.25-inch ID Hollow Stem Augers
BOREHOLE DIAMETER (IN): 10 +/- **TOTAL DEPTH (FT):** 35
STATIC WATER LEVEL: ▽ N.A. **CAVING DEPTH:** C 15.0

Soil Description (See Boring Log Key)	Depth (feet)	Sample No.	Recovery (in)	Blow Counts
12 inches of TOPSOIL	0			
Fine to medium SAND (SP) - very loose to loose - brown - dry	1.0	SS1	18	3 2 2
		SS2	18	2 2 3
		SS3	18	3 3 4
Fine to medium SAND (SP) - medium dense - brown - dry	8.0	SS4	18	3 5 6
Fine to medium SAND (SP) - trace silt - medium dense - brown - wet	13.5	SS5	18	3 5 7
Fine to medium SAND (SP) - trace silt - loose - brown - wet	17.0	SS6	18	3 4 5
Fine to medium SAND (SP) - trace silt - trace gravel - dense - brown - wet	23.5	SS7	18	7 17 21
Fine to medium SAND (SP) - trace silt - trace gravel - medium dense - brown - wet	28.5	SS8	18	6 8 13

Elevation (feet): 605, 600, 595, 590, 585, 580, 575
Depth (feet): 0, 5, 10, 15, 20, 25, 30

TEST RESULTS



Borehole backfilled with augered soil cuttings.

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

PROJECT: Parsons Road Substation
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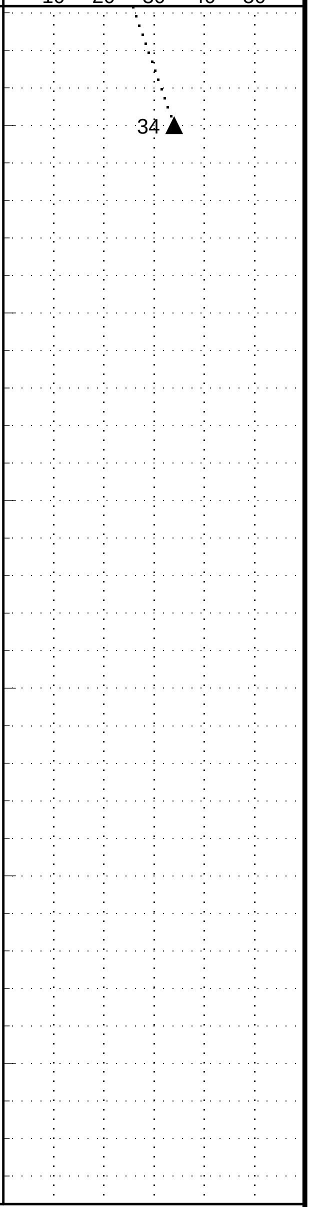
STATIC WATER LEVEL: ▽ N.A. **CAVING DEPTH:** C 15.0

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS Plastic Limit ├─┤ Liquid Limit Water Content - × % SPT RESULT - ▲ N Value 10 20 30 40 50
	⁙	Fine to medium SAND (SP) - trace silt - trace gravel - dense - brown - wet	32.5								
	⁙		35	◣	SS9	18	13 16 18				34 ▲
		Boring terminated at 35 ft.									
570											
565											
560											
555											
550											
545											



Borehole backfilled with augered soil cuttings.

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Gosling Czubak
engineering sciences, inc.

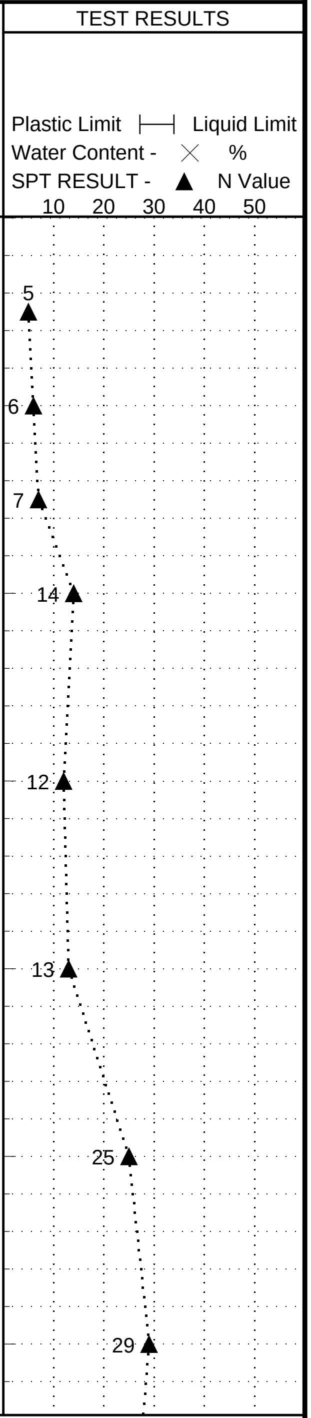
Engineers Surveyors
Landscape Architecture
Environmental and Drilling Services
1280 Business Park Dr., Traverse City, Michigan 49686
(231) 946-9191

PROJECT: Parsons Road Substation
PROJECT NO.: 2018892001.02
PROJECT LOCATION: Traverse City, MI
CLIENT: GRP Engineering
DRILLING COMPANY: Gosling Czubak **RIG:** CME-75
DRILLER: M. Allen **LOGGED BY:** R. Farve

LOG OF BORING: SB-2

GROUND ELEVATION: 606 +/- **DATE:** 2/27/2018
DRILLING LOCATION: As shown on location sketch
DRILLING METHOD: 4.25-inch ID Hollow Stem Augers
BOREHOLE DIAMETER (IN): 10 +/- **TOTAL DEPTH (FT):** 35
STATIC WATER LEVEL: ∇ N.A. **CAVING DEPTH:** C 14.0

Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS: SPT N Value
		12 inches of TOPSOIL	0								
605		Fine to medium SAND (SP) - trace silt - loose to medium dense - brown - dry	1.0		SS1	18	2 2 3				5
600			5		SS2	18	4 3 3				6
					SS3	18	3 3 4				7
595			10		SS4	18	4 7 7				14
590		Fine to medium SAND (SP) - trace silt - medium dense - brown - wet	14.0		SS5	18	4 5 7				12
585			20		SS6	18	5 6 7				13
580		Fine to medium SAND (SP) - trace silt - trace gravel - medium dense - brown - wet	23.5		SS7	8	9 12 13				25
575			30		SS8	18	7 11 18				29



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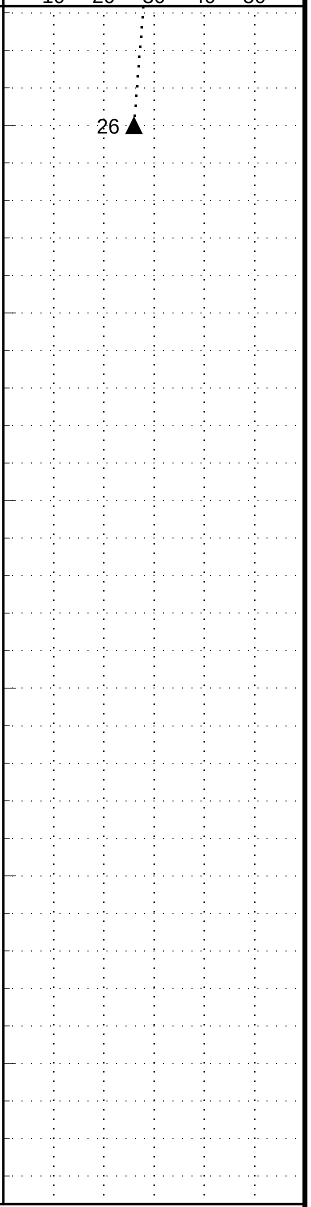
Elevation (feet)	Graphic	Soil Description (See Boring Log Key)	Depth (feet)	Sample Type	Sample No.	Recovery (in)	Blow Counts	Notes	Pocket Penetrometer (tsf)	% < #200	TEST RESULTS
	⁙		35	◣	SS9	18	7 11 15				26 ▲
570		Boring terminated at 35 ft.									
565											
560											
555											
550											
545											



Borehole backfilled with augered soil cuttings.

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Figure PAGE 2 of 2

Attachment 3

Important Information about This Geotechnical-Engineering Report

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

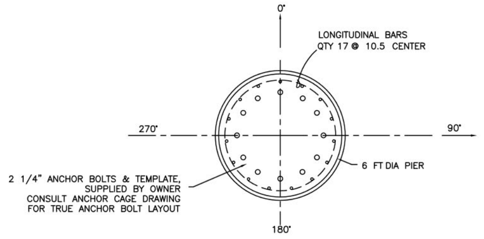
The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

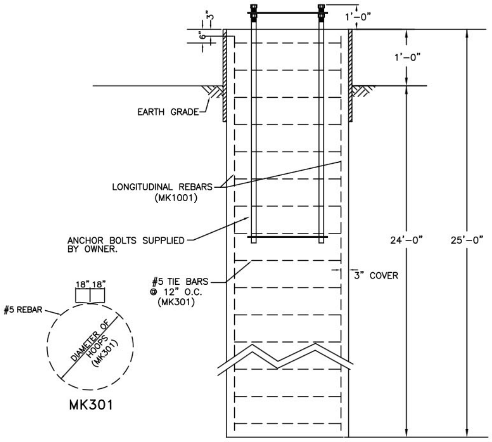
Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL
BUSINESS
ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org





CONCRETE & REBAR SCHEDULE

ITEM NO.	MARK NO.	QTY.	SIZE	LENGTH	SHAPE	TYPE & REMARKS
1	MK1001	17	#10	24.5 FT	STRAIGHT	GRADE 60
2	MK301	24	#5	18.8 FT	66" ø CIR.	GRADE 60
3	ANCHOR BOLT	See Note 2	2 1/4"	See Note2	STRAIGHT	SUPPLIED BY OWNER
4	CONCRETE	26.7 CU YDS. 4000 PSI				

NOTES:

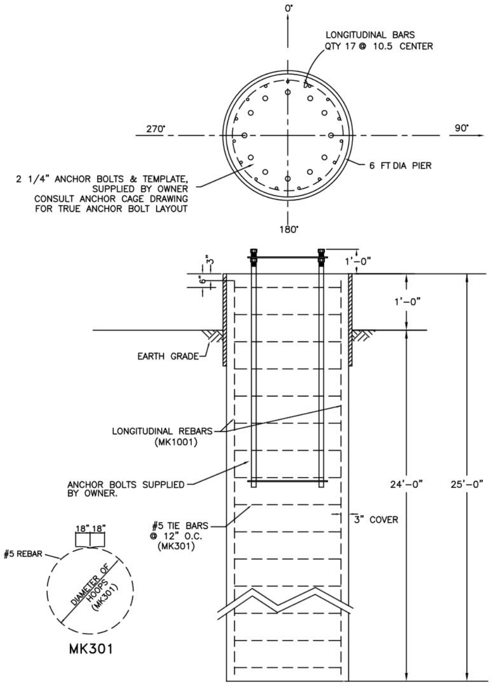
1. ALL EXPOSED CONCRETE EDGES TO HAVE 3/4" CHAMFER.
2. CONSULT ANCHOR CAGE DRAWING FOR TRUE ANCHOR BOLT LAYOUT, LENGTH AND WEIGHTS.
3. VERIFY ANCHOR BOLT ORIENTATION BEFORE INSTALLATION.

FINLEY ENGINEERING
104 E. 11TH STREET LAMAR, MO 64759
TEL.: 417.682.5531 EMAIL: FECINC.COM

DRAWN: PE
REFER:
APPROVALS:

DATE: 12/10/2021 **SCALE:** NONE
TITLE:
BARLOW–PARSONS
PIER STR #16
6 FT x 24 FT

J.O.
022101001
DWG. NO.
F–16



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