Geotechnical Evaluation Report

Proposed Copper Rocks Development
2415 State Road
La Crosse, Wisconsin

Prepared for

Mettera, LLC

Brandon K. Wright, PE
Senior Engineer
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May 6, 2022

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Project B2202146

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May 6, 2022 Project B2202146

Mr. Roger Lundsten
Mettera, LLC
1243 Badger Street
La Crosse, WI 54601

Re: Geotechnical Evaluation
Proposed Copper Rocks Development
2415 State Road
La Crosse, Wisconsin

Dear Mr. Lundsten:

We are pleased to present this Geotechnical Evaluation Report for the proposed Copper Rock Development project.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Brandon Wright at 608.781.7277 or by email (bwright@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION

Brandon K. Wright, PE
Senior Engineer

Ray A. Huber
Vice President

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BRAUN INTERTEC

A. Introduction

A.1. Project Description

This Geotechnical Evaluation Report addresses the proposed design and construction of the proposed Copper Rocks Development project located at 2415 State Road in La Crosse, Wisconsin. The project will include the construction of up to six structures with mixed residential and commercial use. Figure 1 shows an illustration of the proposed site layout.

Figure 1. Proposed Site Layout

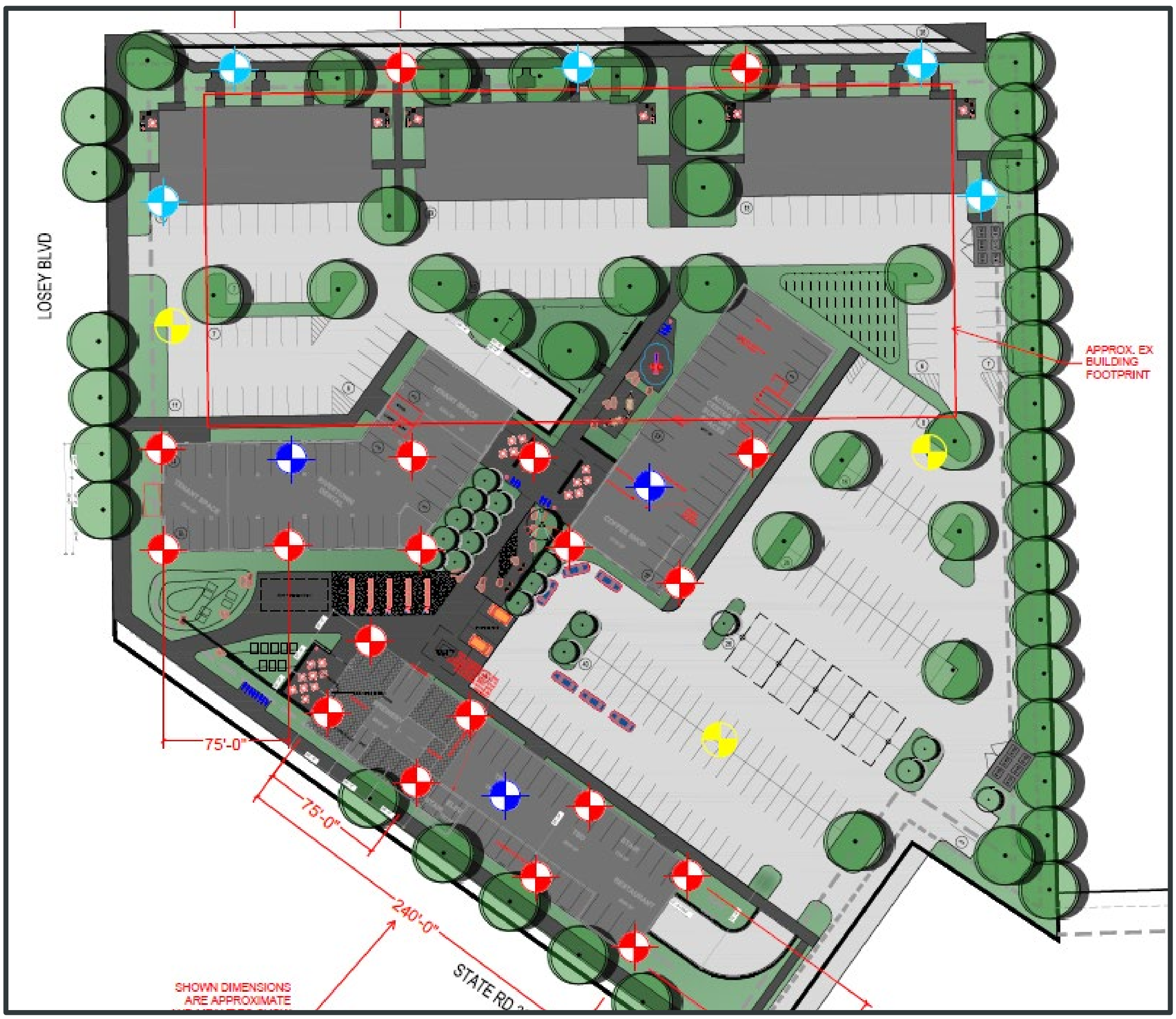


Figure provided by I&S Group, dated February 1, 2022.

Three of the structures will have below-grade parking and three of the structures will be slab-on-grade. The largest building is expected to be composed of one- to two-levels of pre-cast concrete framing with up to 4 levels of wood framing above. Buildings with below-grade parking will have a connecting below-grade tunnel providing access to each of the buildings. Associated parking, pavements, underground utilities, and landscaping are also planned for the project. Tables 1 and 2 provide project details.

Table 1. Building Description

Aspect	Description	
	Single-Story Commercial	Multi-Story Mixed Use
Below grade levels	None	1
Above grade levels	1	4 to 6
Provided Lowest level floor elevation (ft)	664.6 to 665.1	655.3
Assumed Column loads (kips)	100	550
Assumed Wall loads (kips/ft)	5	10

Table 2. Site Aspects and Grading Description

Aspect	Description
Pavement type(s)	Bituminous or Concrete
Provided/Assumed pavement loads	Light-duty: 50,000 ESALs*
	Heavy-duty: 150,000 ESALs*
Grade changes	Within 1 to 2 feet of existing site grades

*Equivalent 18,000-lb single axle loads based on 20-year design for bituminous and 35-year for concrete.

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.

A.2. Site Conditions and History

Currently, the site exists as a developed, but vacant, commercial property. The site is 6-acres and contains an approximate 90,000-square-foot, single story, former Kmart retail store. The site also contains an existing parking lot and underground utilities.

A.3. Purpose

The purpose of our geotechnical evaluation will be to characterize subsurface geologic conditions at selected exploration locations, evaluate their impact on the project, and provide geotechnical recommendations for the design and construction of footings, ground supported slabs, lateral earth pressures, pavement thickness designs, and storm water infiltration discussion.

A.4. Scope of Services

We performed our scope of services for the project in accordance with our Proposal QTB153342, dated March 14, 2022. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Staking and clearing the exploration location of underground utilities. I & S Group selected, and we staked the exploration locations. We acquired the surface elevations and locations with GPS technology. The Soil Boring Location Sketch included in the Appendix shows the approximate locations of the borings.
- Performing standard penetration test (SPT) borings, cone penetration test (CPT) soundings, and test pits (TP). In total, we drilled 8 SPT borings, 19 CPT soundings, and logged 3 test pits.
- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, results of laboratory tests, and recommendations for structure and pavement subgrade preparation and the design of foundations, floor slabs, exterior slabs, utilities, stormwater improvements and pavements.

Our scope of services did not include environmental services or testing and our geotechnical personnel performing this evaluation are not trained to provide environmental services or testing. We can provide environmental services or testing at your request.

B. Results

B.1. Geologic Overview

We based the geologic origins used in this report on the soil types, in-situ and laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain. We did not perform a detailed investigation of the geologic history for the site.

B.2. Boring Results

B.2.a. Standard Penetration Test Borings

Table 3 provides a summary of the soil boring results; in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheets in the Appendix include definitions of abbreviations used in Table 3.

Table 3. Subsurface Profile Summary*

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
Pavement materials	NA	NA	▪ Bituminous thickness 2 to 5 inches. ▪ Apparent aggregate** base is 6 to 9 inches.
Fill***	SP, SP-SM, SM	8 to 22 BPF	▪ Below the pavement materials, Borings ST-01, ST-02, ST-03, and ST-05 encountered fill. ▪ Fill was composed of sandy soils that extended to depths of 3 to 6 ½ feet. ▪ Based on penetration resistance testing, the fill appears to have received variable compaction effort.
Alluvial	SP, SP-SM	6 to 13 BPF	▪ Below the pavement and fill, the borings encountered alluvial soils. ▪ Alluvial soils were composed of poorly graded sand (SP) and poorly graded sand with silt (SP-SM). ▪ Penetration resistance indicates the alluvial sands are loose to medium dense in relative density. ▪ Moisture condition was moist.

*Abbreviations defined in the attached Descriptive Terminology sheets.

**We did not perform gradation analysis on the apparent aggregate base material encountered as part of the pavement section, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification.

***For simplicity in this report, we define existing fill to mean existing, uncontrolled, or undocumented fill.

B.2.b. Cone Penetration Test Sounding

We performed CPT soundings in addition to our SPT soil borings. The Appendix includes CPT Sounding Logs that present the tip resistance, sleeve resistance, pore pressure and correlations based on the data that indicates a soil boring penetration resistance (N_{60}) and soil behavior type (SBT). The SBT does not correlate to soil classification based on grain size distribution or plasticity, and the SBT is not a reliable indicator of existing fill material gradation or extents.

We performed CPT soundings to provide a continuous profile of in-situ conditions that we use to estimate soil behavior properties for our engineering analyses. Refer to the attached Descriptive Terminology Cone Penetration Test in the Appendix for more information.

The results of the soundings indicate a soil profile consistent with findings in our SPT borings. Based on the SBT, the CPT soundings indicate the site is composed of sandy alluvial soils to the termination depth.

B.3. Groundwater

We did not observe groundwater while advancing our SPT borings. However, based on pore water pressure readings from our CPT soundings, we estimate groundwater to be at a depth of about 33 to 34 feet, corresponding to elevations 631 to 631 ½ feet. Project planning should anticipate seasonal and annual fluctuations of groundwater.

B.4. Laboratory Test Results

Table 4 presents the results of our laboratory tests.

Table 4. Laboratory Classification Test Results

Location	Sample Depth (ft)	Classification	Moisture Content (w, %)	Percent Passing a #200 Sieve
ST-01	10	Poorly Graded Sand (SP)	5	2
ST-02	5	FILL: Poorly Graded Sand with Silt (SP-SM)	6	6
ST-03	5	Poorly Graded Sand with Silt (SP-SM)	6	6
ST-04	7 ½	Poorly Graded Sand (SP)	7	3
ST-05	5	Poorly Graded Sand with Silt (SP-SM)	8	8
ST-09	15	Poorly Graded Sand (SP)	5	2
ST-16	15	Poorly Graded Sand (SP)	5	2
ST-24	15	Poorly Graded Sand with Silt (SP-SM)	6	7

C. Recommendations

C.1. Design and Construction Discussion

C.1.a. Introduction

Based on our subsurface exploration, the site is composed of existing pavement materials, existing fill, and alluvial soils. The existing pavement materials were found to be about 1 foot in thickness. Below the pavement materials, a portion of the borings encountered fill that extended to depths of up to 6 ½ feet. Below these materials, the borings encountered alluvial sand soils. Based on strength testing, the soils present at the site are loose to medium dense in relative density.

C.1.b. Building Subgrade Preparation

Site preparation work should include demolition of the existing commercial building. This should include removal of the structure, including footings, slabs, and underground utilities. In addition, the existing pavement should also be removed. Following removal of these materials, and prior to placement of structural fill or footings, the subgrades should be thoroughly surface compacted with a self-propelled vibratory steel-drum compactor.

Following these site preparations, the single-story commercial buildings can be designed for a net allowable bearing pressure of 4,000 pounds per square foot. The multi-story buildings, however, having below grade levels, and having 12 to 15 feet of overburden soil removed will aid in a higher bearing pressure. Furthermore, based on our CPT data, the multi-story buildings with below-grade levels can be designed for a net allowable bearing pressure of up to 7,000 pounds per square foot.

C.1.c. Pavement

Areas that will be receiving new pavement should be prepared by first removing existing pavement material and enough existing fill to allow for placement of new pavement materials. Additionally, if any debris is present in the existing fill, we recommend removing it within 2 feet of the proposed subgrade elevation. Prior to placing aggregate base material, we recommend surface compacting the pavement subgrade to enhance uniformity.

C.2. Site Grading and Subgrade Preparation

C.2.a. Building Demolition

We recommend demolition of the existing commercial building include removal of footings, slabs, foundation walls and underground utilities. These materials will need to be completely removed and the excavation backfilled with compacted soil.

C.2.b. Building Subgrade Excavations

Following building demolition, we also recommend removing existing pavement materials and existing fill below the proposed structures and their oversize areas. Table 5 shows the anticipated excavation depths and bottom elevations for each of the SPT borings.

Table 5. Building Excavation Depths

SPT Boring	Approximate Surface Elevation (ft)	Anticipated Excavation Depth (ft)	Anticipated Bottom Elevation (ft)
ST-01	661.5	4	657 ½
ST-02	663.4	6 ½	657
ST-03	663.1	3	660
ST-04	664.1	1	663
ST-05	663.1	4	659
ST-09	664.2	1	663
ST-16	664.5	1	663 ½
ST-24	665.9	1	665

Excavation depths will vary between the borings. Portions of the excavations may also extend deeper than indicated by the borings. A geotechnical representative should observe the excavations to make the necessary field judgments regarding the suitability of the exposed soils.

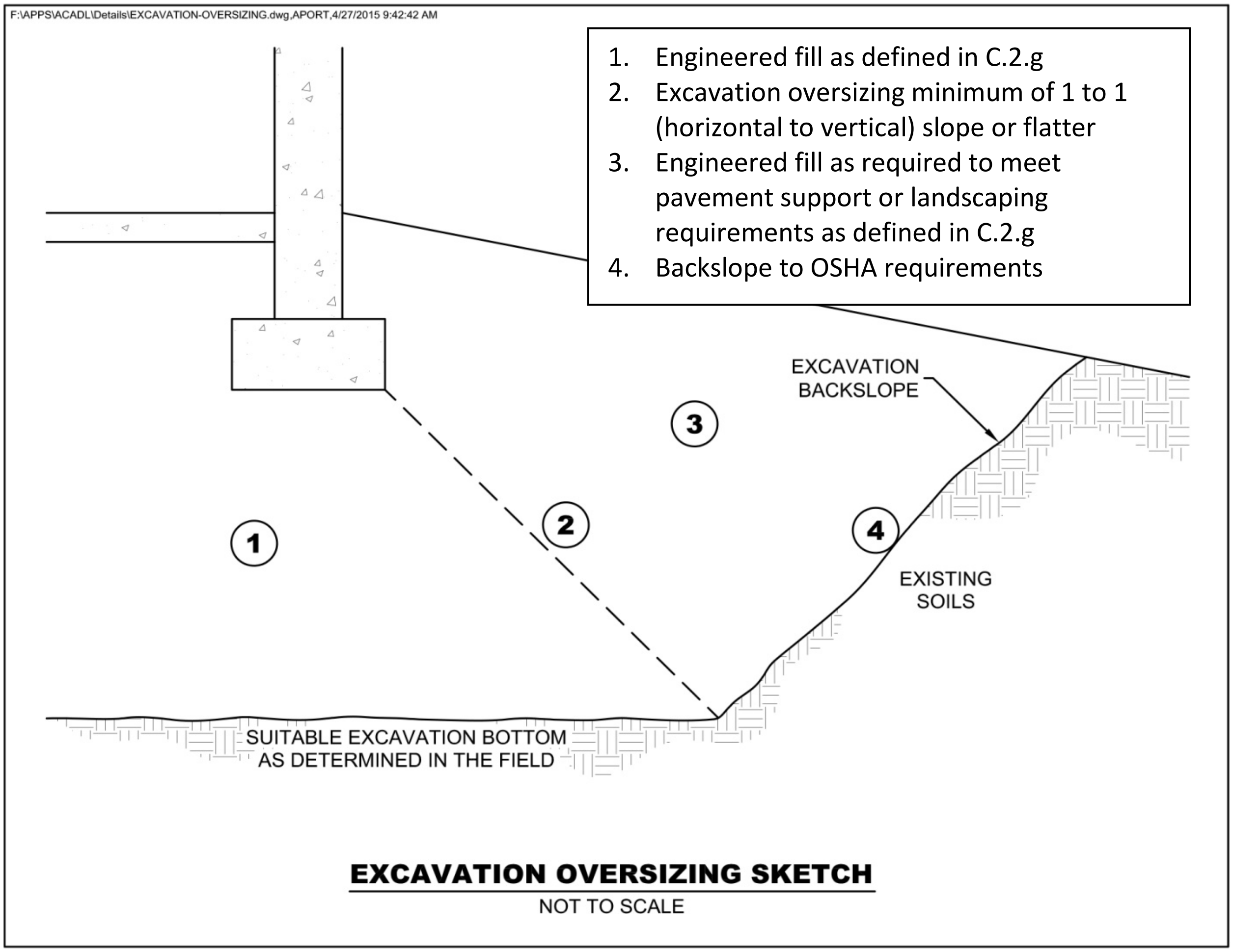
C.2.c. Surface Compaction

Prior to the placement of engineered fill or footings, we recommend surface compacting the exposed soils in the bottoms of the excavations with a minimum of five passes by a large (minimum diameter of 3 1/2 feet), smooth-drum compactor and be compacted to a minimum of 98 percent of the standard Proctor (ASTM D698) optimum density.

C.2.d. Excavation Oversizing

When removing unsuitable materials below structures or pavements, we recommend the excavation extend outward and downward at a slope of 1H:1V (horizontal: vertical) or flatter. See Figure 2 for an illustration of excavation oversizing.

Figure 2. Generalized Illustration of Oversizing



C.2.e. Excavated Slopes

Based on the borings, we anticipate on-site soils in excavations will consist of fill and alluvial sand soils. These soils are typically considered Type C Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type C soils should have a gradient no steeper than 1.5H:1V. Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.

An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, “Excavations and Trenches.” This document states excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

C.2.f. Pavement and Exterior Slab Subgrade Preparation

Areas that will be receiving new pavement should be prepared by first removing existing pavement material and enough existing fill to allow for placement of new pavement materials. Additionally, if any debris is present in the existing fill, we recommend removing it within 2 feet of the proposed subgrade elevation. Prior to placing aggregate base material, we recommend surface compacting the pavement subgrade to enhance uniformity. We recommend performing a proofroll after the aggregate base material is in place, and prior to placing bituminous or concrete pavement. We also recommend having a geotechnical representative observe the proofroll. Areas that fail the proofroll indicate soft or weak areas that will require additional soil correction work to support pavements.

C.2.g. Engineered Fill Materials and Compaction

Table 6 below contains our recommendations for engineered fill materials.

Table 6. Engineered Fill Materials*

Fill Classification	Locations To Be Used	Fill Source and Soil Descriptions	Gradation	Relative Compaction, percent (ASTM D698 – Standard Proctor)
Structural fill	▪ Soil correction backfill ▪ Below foundations ▪ Interior & exterior foundation wall backfill ▪ Below interior & exterior slabs	On-site alluvial sand soils or Imported sand and gravel consisting of GP, GW, SP, SW, SP-SM	100% passing 2-inch sieve <12% passing #200 sieve <2% Organic Content (OC)	98
Pavement Materials	Dense graded base	Imported aggregate	WisDOT Standard Spec 305 Dense Graded Base	98
	Pavement subgrades	On-site alluvial sand soils or Imported sand and gravel consisting of GP, GW, SP, SW, SP-SM, SM	100% passing 2-inch sieve <25% passing #200 sieve <3% OC	95
Non-structural fill	Below landscaped surfaces, where subsidence is not a concern	On-site soils and imported soils	100% passing 6-inch sieve < 10% OC	90

* More select soils comprised of coarse sands with < 5% passing #200 sieve may be needed to accommodate work occurring in periods of wet or freezing weather.

We recommend spreading engineered fill in loose lifts of approximately 12 inches thick. The project documents should specify relative compaction of engineered fill, based on the structure located above the engineered fill, and vertical proximity to that structure.

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under foundations during construction.

We recommend performing density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

C.3. Spread Footings

Table 7 below contains our recommended parameters for foundation design.

Table 7. Recommended Spread Footing Design Parameters

Item	Description	
	Single-Story Commercial	Multi-Story Mixed Use
Maximum net allowable bearing pressure (psf)	4,000	7,000
Minimum factor of safety for bearing capacity failure	3.0	3.0
Minimum width (inches)	18 for wall 36 for column	24 for wall 48 for column
Minimum embedment below final exterior grade for heated structures (inches)	48	48
Minimum embedment below final exterior grade for unheated structures or for footings not protected from freezing temperatures during construction (inches)	60	60
Total estimated settlement (inches)	Less than 1	1
Differential settlement (inch)	Less than 1/2	1/2

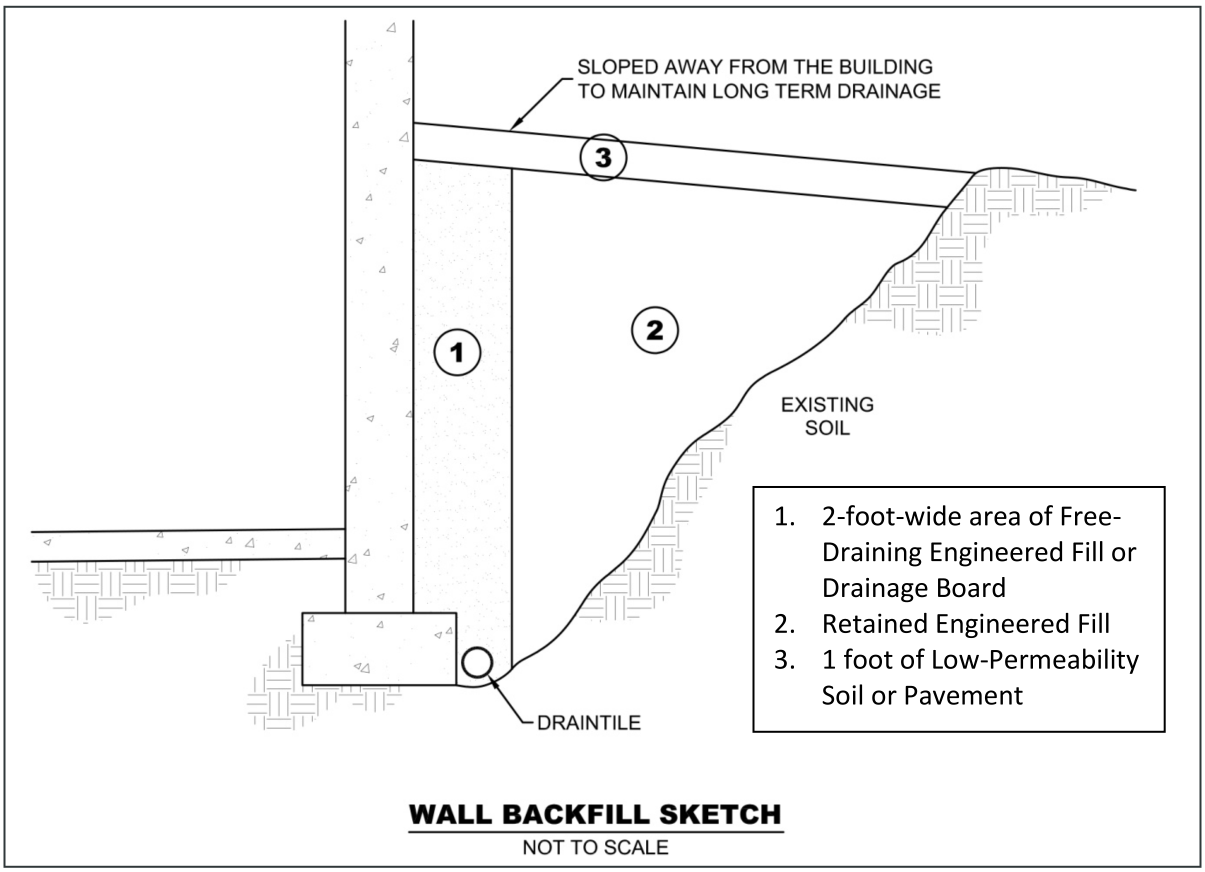
C.4. Below-Grade Walls

C.4.a. Drainage Control

We recommend installing drain tile to remove water behind the below-grade walls, at the location shown in Figure 3. The below-grade wall drainage system should also incorporate free-draining, engineered fill or a drainage board placed against the wall and connected to the drain tile.

Even with the use of free-draining, engineered fill, we recommend general waterproofing of below-grade walls that surround occupied or potentially occupied areas because of the potential cost impacts related to seepage after construction is complete.

Figure 3. Generalized Illustration of Wall Engineered Fill



The materials listed in the sketch should meet the definitions in Section C.2. Low-permeability material can direct water away from the wall, like clay, topsoil, or pavement. The project documents should indicate if the contractor should brace the walls prior to filling and allowable unbalanced fill heights.

As shown in Figure 3, we recommend Zone 2 consist of retained, engineered fill, and this material will control lateral pressures on the wall. However, we are also providing design parameters for using other engineered fill material. If final design uses non-sand material for engineered fill, project planning should account for the following items:

- Other fill material may result in higher lateral pressure on the wall.
- Other fill materials composed of silty or clayey soils may be more difficult to compact.
- Post-construction consolidation of other engineered fill material may result in settlement-related damage to the structures or slabs supported on the engineered fill. Post-construction settlement of other engineered fill material may also cause drainage towards the structure. The magnitude of consolidation could be up to about 3 percent of the wall fill thickness.

C.4.b. Configuring and Resisting Lateral Loads

Table 8 presents our recommended lateral equivalent fluid pressures for wall design of active, at-rest and passive earth pressure conditions. The table also provides recommended wet unit weights and internal friction angles. Designs should also consider the slope of any engineered fill and dead or live loads placed behind the walls within a horizontal distance that is equal to the height of the walls. Our recommended values assume the wall design provides drainage so water cannot accumulate behind the walls. The construction documents should clearly identify what soils the contractor should use for engineered fill of walls.

Table 8. Recommended Below-Grade Wall Design Parameters – Drained Conditions

Retained Soil	Wet Unit Weight (pcf)	Friction Angle (degrees)	Active Lateral Equivalent Fluid Pressure (pcf)	At-Rest Lateral Equivalent Fluid Pressure (pcf)	Passive Lateral Equivalent Fluid Pressure* (pcf)
On-site Sand	120	30	40	60	360

* Based on Rankine model for soils in a region behind the wall extending at least 2 horizontal feet beyond the bottom outer edges of the wall footings and then rising and away from the wall at an angle no steeper than 60 degrees from horizontal.

Sliding resistance between the bottom of the footing and the soil can also resist lateral pressures. We recommend assuming a sliding coefficient equal to 0.36 between the concrete and soil.

The values presented in this section are un-factored.

C.5. Interior Slabs

C.5.a. Subgrade Modulus

The anticipated floor subgrade is expected to consist of compacted structural fill or surface compacted alluvial soils. We recommend using a modulus of subgrade reaction, k, of 200 pounds per square inch per inch of deflection (pci) to design the slabs. If the slab design requires placing 6 inches of compacted crushed aggregate base immediately below the slab, the slab design may increase the k-value by 50 pci. We recommend that the aggregate base materials be free of bituminous. In addition to improving the modulus of subgrade reaction, an aggregate base facilitates construction activities and is less weather sensitive.

C.5.b. Moisture Vapor Protection

Excess transmission of water vapor could cause floor dampness, certain types of floor bonding agents to separate, or mold to form under floor coverings. If project planning includes using floor coverings or coatings, we recommend placing a vapor retarder or vapor barrier immediately beneath the slab. We also recommend consulting with floor covering manufacturers regarding the appropriate type, use and installation of the vapor retarder or barrier to preserve warranty assurances.

C.6. Pavements and Exterior Slabs

C.6.a. Design Sections

Our scope of services for this project did not include laboratory tests on subgrade soils to determine a California Bearing Ratio (CBR) value for pavement design. Based on our experience with similar sandy soils anticipated at the pavement subgrade elevation, we recommend pavement design assume a CBR-value of 10. Similarly, we based the concrete pavement designs on an assumed modulus of subgrade reaction (k) of 200 pci. Table 9 provides recommended pavement sections, based on the soils support and traffic loads.

Table 9. Recommended Bituminous Pavement Sections

Use	Asphalt Pavement		Concrete Pavement	
	Light Duty	Heavy Duty	Light Duty	Heavy Duty
Minimum asphalt thickness (inches)	4	5	---	---
Minimum concrete thickness (inches)	---	---	5	6
Minimum aggregate base thickness (inches)	8	10	6	6

C.6.b. Concrete Pavements

We recommend specifying concrete for pavements that has a minimum 28-day compressive strength of 4,500 psi, and a modulus of rupture (M_r) of at least 650 psi. We also recommend Type I cement meeting the requirements of ASTM International C 150. We recommend specifying 4.5 to 7.5 percent entrained air for exposed concrete to provide resistance to freeze-thaw deterioration. We also recommend using a water/cement ratio of 0.45 or less for concrete exposed to deicers.

C.6.c. Bituminous Pavement Materials

Appropriate mix designs are critical to the performance of flexible pavements. We recommend utilizing hot mix asphalt meeting the specifications of Wisconsin Department of Transportation (WisDOT) Section 460. We recommend utilizing a nominal 12.5 mm gradation for the base course and a nominal 9.5 mm gradation for the surface course as defined in Table 460-1 in Section 460.2.2.3. We recommend the Performance Graded Asphalt cement be a PG 58-28 in the lower and upper layer.

C.6.d. Performance and Maintenance

We based the above pavement designs on a 20-year performance life for bituminous and a 35-year life for concrete. This is the amount of time before we anticipate the pavement will require reconstruction. This performance life assumes routine maintenance, such as seal coating and crack sealing. The actual pavement life will vary depending on variations in weather, traffic conditions and maintenance.

It is common to place the non-wear course of bituminous and then delay placement of wear course. For this situation, we recommend evaluating if the reduced pavement section will have sufficient structure to support construction traffic.

Many conditions affect the overall performance of the exterior slabs and pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. Regarding bituminous pavements, it is common to have thermal cracking develop within the first few years of placement and continue throughout the life of the pavement. We recommend developing a regular maintenance plan for filling cracks in exterior slabs and pavements to lessen the potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

C.7. Utilities

C.7.a. Subgrade Stabilization

Earthwork activities associated with utility installations located inside the building area should adhere to the recommendations in Section C.2.

For exterior utilities, we anticipate the soils at typical invert elevations will be suitable for utility support. However, if construction encounters unfavorable conditions such as soft clay, organic soils or perched water at invert grades, the unsuitable soils may require some additional subcutting and replacement with sand or crushed rock to prepare a proper subgrade for pipe support. Project design and construction should not place utilities within the 1H:1V oversizing of foundations.

C.7.b. Corrosion Potential

Many of the soil borings indicated the site consists of sandy soils. We consider these soils non- to slightly corrosive to metallic conduits. If utilities extend through clay soils, we recommend bedding the utilities in sandy soil free of any clay lumps or constructing the utilities with non-corrosive materials.

C.8. Storm Water

C.8.a. Test Pits

We observed the excavation of three test pits that were extended to depths of approximately 10 feet each below existing grades. We labeled our exploration locations Test Pits, TP-28, TP-29, and TP-30. We visually examined the sidewalls of the test pit and classified the materials brought to the surface by the excavator bucket. We measured strata boundary depths with a tape measure to the nearest inch.

C.8.b. Storm Water Soil Profile Summary

Based on the test pit excavations, the storm water locations are composed of existing pavement materials over alluvial soils. Beneath the pavement, the alluvial soils were initially composed of sandy clay loam (USCS Soil Classification Sandy Lean Clay “CL”) and fine-grained loamy sand (USCS Soil Classification Poorly Graded Sand with Silt “SP-SM”). At depth, the test pits encountered alluvial soils composed of fine-grained sand (USCS Soil Classification Poorly Graded Sand “SP”).

Groundwater was not observed within the test pit excavations. Seasonal and annual fluctuations of groundwater should be anticipated.

C.8.c. Infiltration Discussion

In general, the alluvial sand soils present at the site are well suited for infiltration of storm water. However, lower infiltration rates should be anticipated in the sandy clay loam near Test Pit TP-28. Infiltration rates for the site are included on the Soil and Site Evaluation – Storm form attached in the Appendix.

Infiltration rates in natural soils are variable based on soil type, moisture content, void space between soil particles, and discontinuities in the soil structure. Discontinuities are not present in disturbed or compacted soils, such as existing fills, because void space between soil particles may have been reduced form compaction efforts, if applicable.

This geotechnical evaluation does not constitute a review of site suitability for storm water infiltration or evaluate the potential impacts, if any, from infiltration of large amounts of storm water.

C.9. Equipment Support

The recommendations included in the report may not be applicable to equipment used for the construction and maintenance of this project. We recommend evaluating subgrade conditions in areas of shoring, scaffolding, cranes, pumps, lifts, and other construction equipment prior to mobilization to determine if the exposed materials are suitable for equipment support or require some form of subgrade improvement. We also recommend project planning consider the effect that loads applied by such equipment may have on structures they bear on or surcharge – including pavements, buried utilities, and below-grade walls. We can assist you in this evaluation.

D. Procedures

D.1. Penetration Test Borings

We drilled the penetration test borings with a track-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

D.2. Cone Penetration Test Soundings

We performed CPT soundings by advancing a 1.75-inch diameter Vertek seismic piezocone with an unequal end area ratio of 0.8. We used a 15-ton track mounted rig to advance the cone into the ground. We performed the soundings in general accordance with ASTM D5778. While advancing the cone, we digitally recorded tip resistance (Q_t), sleeve friction (F_S) and pore pressure (U_2).

D.3. Exploratory Test Pits

Hess Excavation excavated the test pits with a track-mounted excavator, under the direction and observation of our staff. We prepared Test Pit Logs in accordance with the Wisconsin DSPS Technical Standard 1002. Soils excavated in the test pits were logged by visually examining the sidewalls of the test pits and classifying the materials brought to the surface by the bucket. We measured strata boundary depths with a tape measure.

D.4. Exploration Logs

D.4.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of laboratory tests performed on penetration test samples, and groundwater measurements. The Appendix also includes a Fence Diagram intended to provide a summarized cross-sectional view of the soil profile across the site.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate.

The boundary depths vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.4.b. Cone Penetration Test Sounding Logs

The Appendix also includes CPT Sounding Logs. The CPT sounding logs report the tip resistance (Q_t), sleeve friction (F_s) and pore pressure (U_2) measured by the cone during advancement, as well as the soil behavior type (SBT) inferred from established relationships between tip resistance, sleeve friction and pore pressure. The SBT does not indicate a soil classification based on grain size distribution. Refer to the attached Descriptive Terminology Cone Penetration Test in the Appendix for more information. The CPT logs also report the friction ratio, which calculated by dividing the sleeve friction by the tip resistance.

We inferred strata boundaries, like SBT, from changes in tip resistance, sleeve friction and pore pressure. While cone measurements are continuous with depth, the boundaries are still only approximate, vary away from the sounding locations and may also occur as gradual rather than abrupt transitions.

D.4.c. Log of Test Pit Sheets

The Appendix also includes Log of Test Pit sheets. The logs classify and describe the geologic materials exposed in the sidewalls and bottoms of the pits, present the results of laboratory tests performed on bulk samples obtained from them, and depict groundwater measurements.

D.4.d. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.5. Material Classification and Testing

D.5.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

D.5.b. Laboratory Testing

The exploration logs in the Appendix note most of the results of the laboratory tests performed on geologic material samples. The remaining laboratory test results follow the exploration logs. We performed the tests in general accordance with ASTM procedures.

D.6. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes or allowed them to remain open for an extended period of observation, as noted on the boring logs.

We inferred groundwater levels from pore pressure measurements made during advancement of the piezocone.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses, and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report.

Note that the observation periods were short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made several assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

E.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

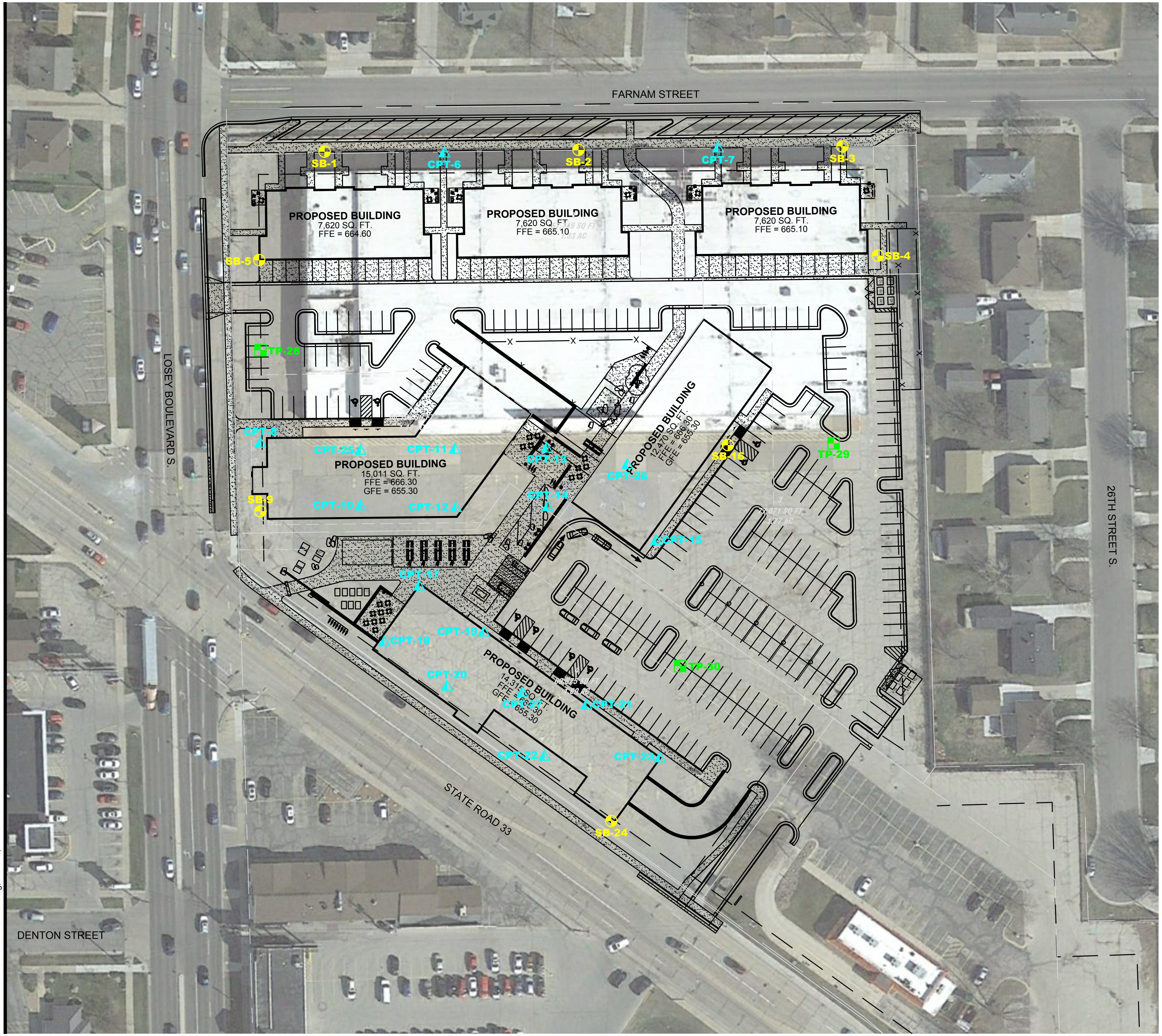
E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix



DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

DENOTES APPROXIMATE LOCATION OF CPT SOUNDING

DENOTES APPROXIMATE LOCATION OF TEST PIT

40' 0 80'

SCALE: 1"= 80'

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Drawing Information

Project No:	B2202146
Drawing No:	B2202146
Drawn By:	JAG
Date Drawn:	3/15/22
Checked By:	BW
Last Modified:	5/3/22

Project Information

Kmart Redevelopment Project

2415 State Road

La Crosse, Wisconsin

Soil Boring Location Sketch

F:\2022\B2202146\CAD\B2202146.dwg,Geotech,5/3/2022 9:00:04 AM

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2202146 **Geotechnical Evaluation** **Copper Rocks Development** **2415 State Road** **La Crosse, Wisconsin**	BORING: **ST-01**		
	LOCATION: See attached sketch		
	NORTHING:	EASTING:	
DRILLER: Subcontractor	LOGGED BY: B. Wright	START DATE: 03/31/22	END DATE: 03/31/22
SURFACE ELEVATION: 661.5 ft	RIG: Subcontractor	METHOD: 3 1/4" HSA	SURFACING: Pavement
WEATHER: Overcast			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Depth	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
660.6 / 0.9		PAVEMENT, 2 inches of bituminous over 9 inches of apparent aggregate base					
657.5 / 4.0		FILL: POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist		5-4-4 (8)			
640.5 / 21.0		POORLY GRADED SAND (SP), fine-grained, brown to light brown, moist, loose to medium dense (ALLUVIUM)	5	4-5-6 (11)			
				4-4-4 (8)			
			10	4-3-5 (8)		5	P200=2%
				3-3-5 (8)			
			15	3-4-6 (10)			
			20	3-4-6 (10)			Water not observed while drilling.
		END OF BORING Boring then grouted	25				
			30				
			35				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2202146
Geotechnical Evaluation
Copper Rocks Development
2415 State Road
La Crosse, Wisconsin

BORING:	**ST-02**		
LOCATION: See attached sketch			
NORTHING:		EASTING:	
DRILLER: Subcontractor	LOGGED BY: B. Wright	START DATE: 03/31/22	END DATE: 03/31/22
SURFACE ELEVATION: 663.4 ft	RIG: Subcontractor	METHOD: 3 1/4" HSA	SURFACING: Pavement
WEATHER: Overcast			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Depth	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
662.5 / 0.9		PAVEMENT, 2 inches of bituminous over 9 inches of apparent aggregate base						
		FILL: SILTY SAND (SM), fine-grained, trace bituminous debris, dark brown to brown, moist		X	15-10-12 (22)			
656.9 / 6.5			5	X	5-7-9 (16)		6	P200=6%
		POORLY GRADED SAND (SP), fine-grained, brown to light brown, moist, loose (ALLUVIUM)		X	2-3-4 (7)			
			10	X	3-4-4 (8)			
				X	4-4-4 (8)			
			15	X	4-4-4 (8)			
642.4 / 21.0			20	X	3-4-6 (10)			
		END OF BORING Boring then grouted						Water not observed while drilling.
			25					
			30					
			35					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2202146 **Geotechnical Evaluation** **Copper Rocks Development** **2415 State Road** **La Crosse, Wisconsin**	BORING: **ST-03** LOCATION: See attached sketch NORTHING: EASTING:
DRILLER: Subcontractor LOGGED BY: B. Wright	START DATE: 03/31/22 END DATE: 03/31/22
SURFACE ELEVATION: 663.1 ft RIG: Subcontractor METHOD: 3 1/4" HSA	SURFACING: Pavement WEATHER: Overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
662.2 0.9		PAVEMENT, 2 inches of bituminous over 9 inches of apparent aggregate base					
660.1 3.0		FILL: POORLY GRADED SAND (SP), fine-grained, trace Gravel, light brown, moist	X	7-7-7 (14)			
656.6 6.5		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown to light brown, moist, loose (ALLUVIUM)	X	5-6-3 (9)		6	P200=6%
642.1 21.0		POORLY GRADED SAND (SP), fine-grained, light brown, moist, loose (ALLUVIUM)	X	3-3-3 (6)			
			X	3-4-3 (7)			
			X	3-3-5 (8)			
			X	2-3-4 (7)			
			X	4-4-5 (9)			
		END OF BORING Boring then grouted					Water not observed while drilling.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2202146 **Geotechnical Evaluation** **Copper Rocks Development** **2415 State Road** **La Crosse, Wisconsin**		BORING: **ST-04**	
		LOCATION: See attached sketch	
		NORTHING:	EASTING:
DRILLER: Subcontractor	LOGGED BY: B. Wright	START DATE: 03/31/22	END DATE: 03/31/22
SURFACE ELEVATION: 664.1 ft	RIG: Subcontractor; METHOD: 3 1/4" HSA	SURFACING: Pavement	WEATHER: Overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Depth	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
663.2 / 0.9		PAVEMENT, 2 inches of bituminous over 9 inches of apparent aggregate base						
		POORLY GRADED SAND (SP), fine-grained, brown to light brown, moist, loose to medium dense (ALLUVIUM)		X	4-4-4 (8)			
			5	X	3-3-4 (7)			
				X	4-4-4 (8)		7	P200=3%
			10	X	4-4-4 (8)			
				X	4-4-5 (9)			
			15	X	4-5-7 (12)			
			20	X	3-4-6 (10)			
643.1 / 21.0		END OF BORING Boring then grouted						Water not observed while drilling.
			25					
			30					
			35					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2202146 **Geotechnical Evaluation** **Copper Rocks Development** **2415 State Road** **La Crosse, Wisconsin**	BORING: **ST-05**		
	LOCATION: See attached sketch		
	NORTHING:	EASTING:	
DRILLER: Subcontractor	LOGGED BY: B. Wright	START DATE: 03/31/22	END DATE: 03/31/22
SURFACE ELEVATION: 663.1 ft	RIG: Subcontractor	METHOD: 3 1/4" HSA	SURFACING: Pavement
WEATHER: Overcast			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
662.4 / 0.8		PAVEMENT, 2 inches over 7 inches of apparent aggregate base					
659.1 / 4.0		FILL: SILTY SAND (SM), fine-grained, dark brown, moist	X	4-4-4 (8)			
656.6 / 6.5		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, medium dense (ALLUVIUM)	X (5)	4-5-6 (11)		8	P200=8%
642.1 / 21.0		POORLY GRADED SAND (SP), fine-grained, brown to light brown, moist, loose (ALLUVIUM)	X	4-3-4 (7)			
			X (10)	3-3-4 (7)			
			X	3-4-5 (9)			
			X (15)	3-4-5 (9)			
			X (20)	4-5-5 (10)			
		END OF BORING Boring then grouted					Water not observed while drilling.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2202146
Geotechnical Evaluation
Copper Rocks Development
2415 State Road
La Crosse, Wisconsin

BORING:	ST-09		
LOCATION: See attached sketch			
NORTHING:		EASTING:	
DRILLER: Subcontractor	LOGGED BY: B. Wright	START DATE: 03/31/22	END DATE: 03/31/22
SURFACE ELEVATION: 664.2 ft	RIG: Subcontractor	METHOD: 3 1/4" HSA	SURFACING: Pavement
WEATHER: Overcast			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Depth	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
663.3 / 0.9		PAVEMENT, 2 inches of bituminous over 9 inches of apparent aggregate base					
		POORLY GRADED SAND (SP), fine-grained, brown to light brown, moist, loose to medium dense (ALLUVIUM)		5-4-3 (7)			
			5	4-4-5 (9)			
				3-3-3 (6)			
			10	4-4-4 (8)			
				4-4-4 (8)			
			15	3-4-5 (9)		5	P200=2%
			20	3-3-3 (6)			
			25	3-4-6 (10)			
633.2 / 31.0			30	5-5-6 (11)			Water not observed while drilling.
		END OF BORING Boring then grouted	35				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2202146 **Geotechnical Evaluation** **Copper Rocks Development** **2415 State Road** **La Crosse, Wisconsin**		BORING: **ST-16**	
		LOCATION: See attached sketch	
		NORTHING:	EASTING:
DRILLER: Subcontractor	LOGGED BY: B. Wright	START DATE: 03/31/22	END DATE: 03/31/22
SURFACE ELEVATION: 664.5 ft	RIG: Subcontractor / METHOD: 3 1/4" HSA	SURFACING: Pavement	WEATHER: Overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
663.6 0.9		PAVEMENT, 5 inches of concrete over 6 inches of apparent aggregate base					
		POORLY GRADED SAND (SP), fine-grained, brown to light brown, moist, loose to medium dense (ALLUVIUM)	X	4-5-5 (10)			
		5	X	5-4-5 (9)			
			X	4-4-5 (9)			
		10	X	3-4-3 (7)			
			X	5-6-6 (12)			
		15	X	4-4-4 (8)		5	P200=2%
		20	X	4-5-6 (11)			
		25	X	3-4-4 (8)			
633.5 31.0		30	X	6-6-7 (13)			Water not observed while drilling.
		END OF BORING Boring then grouted					
		35					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2202146
Geotechnical Evaluation
Copper Rocks Development
2415 State Road
La Crosse, Wisconsin

BORING:	**ST-24**		
LOCATION: See attached sketch			
NORTHING:		EASTING:	
DRILLER: Subcontractor	LOGGED BY: B. Wright	START DATE: 03/31/22	END DATE: 03/31/22
SURFACE ELEVATION: 665.9 ft	RIG: Subcontractor	METHOD: 3 1/4" HSA	
SURFACING: Pavement	WEATHER: Overcast		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
665.0 / 0.9		PAVEMENT, 2 inches of bituminous over 9 inches of apparent aggregate base					
662.9 / 3.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, medium dense (ALLUVIUM)	X	6-5-7 (12)			
651.9 / 14.0		POORLY GRADED SAND (SP), fine-grained, brown to light brown, moist, loose to medium dense (ALLUVIUM)	X (5)	4-4-4 (8)			
			X	3-3-4 (7)			
			X (10)	3-4-5 (9)			
			X	3-4-3 (7)			
647.9 / 18.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose (ALLUVIUM)	X (15)	3-4-5 (9)		6	P200=7%
634.9 / 31.0		POORLY GRADED SAND (SP), fine-grained, light brown, moist, loose to medium dense (ALLUVIUM)	X (20)	5-5-5 (10)			
			X (25)	5-5-6 (11)			
			X (30)	6-4-5 (9)			
		END OF BORING Boring then grouted					Water not observed while drilling.

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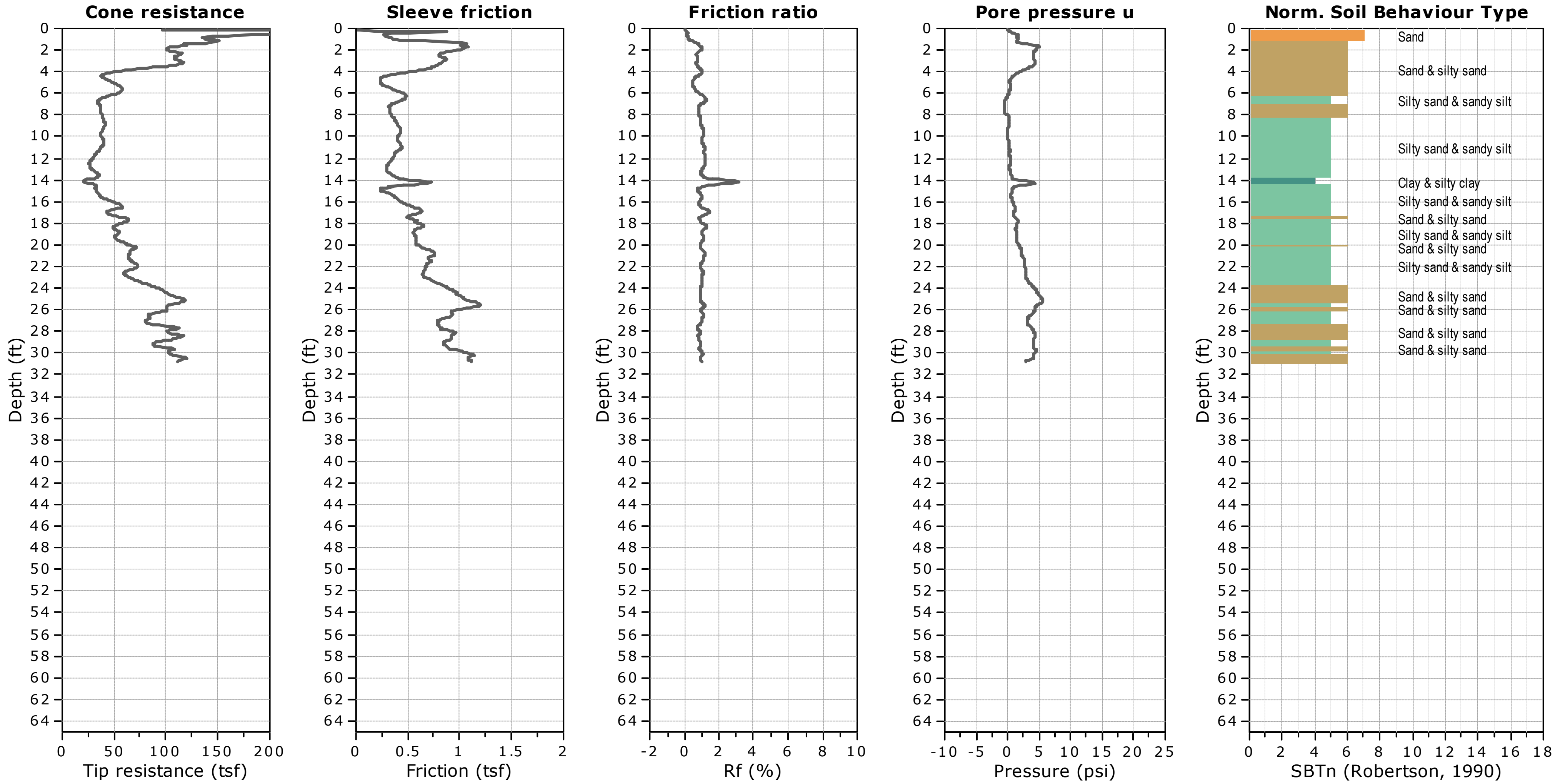
Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**

CPT: CPT-06
Total depth: 30.77 ft, Date: 4/8/2022
Surface Elevation: 662.30 ft
Coords: N 126408.696, E 453756.315
Cone Type: 200727
Cone Operator: Belch



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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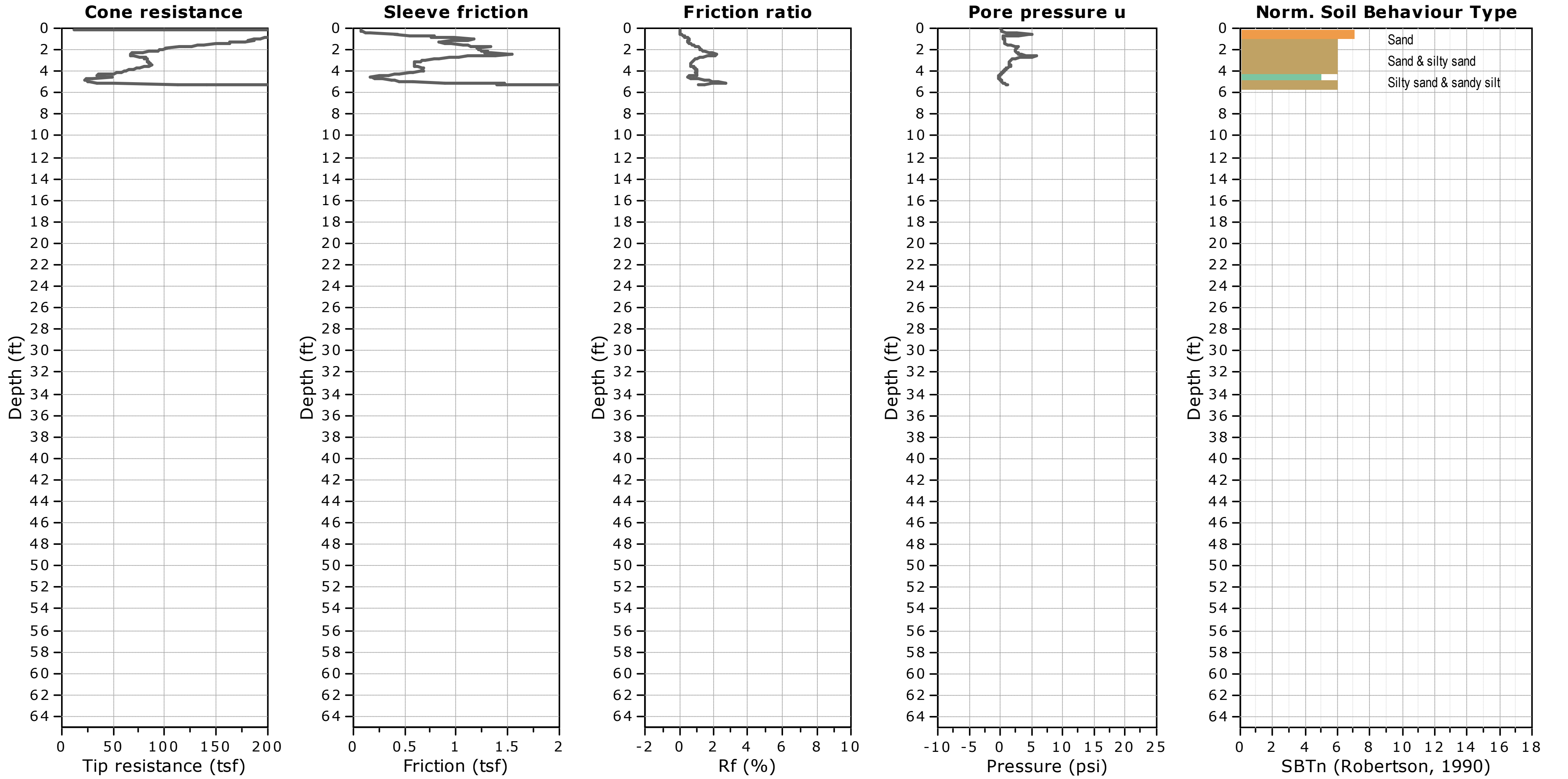
CPT: CPT-07
Total depth: 5.31 ft, Date: 4/8/2022
Surface Elevation: 664.30 ft
Coords: N 126412.690, E 453977.161
Cone Type: 200727
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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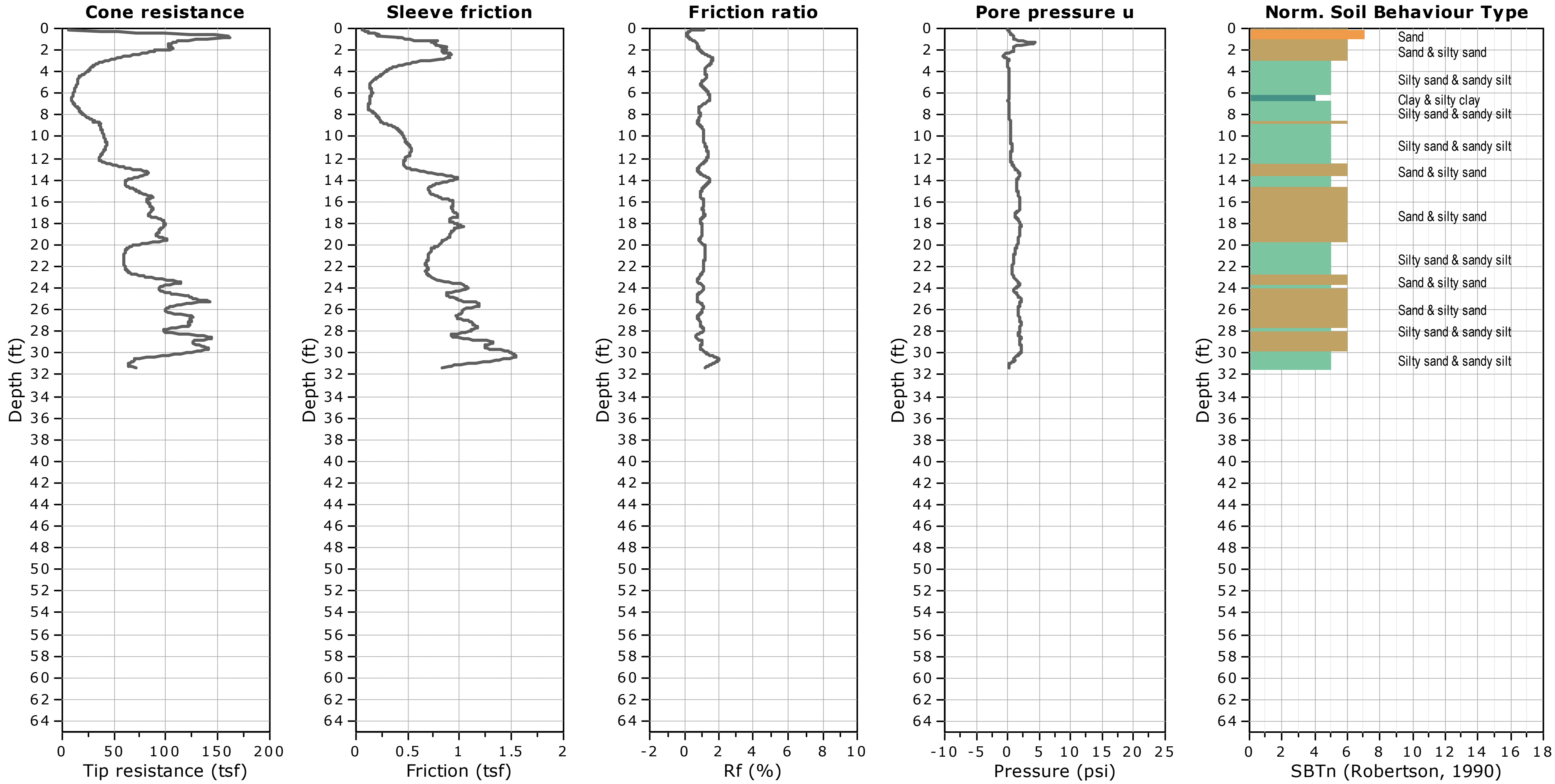
CPT: CPT-08
Total depth: 31.30 ft, Date: 4/8/2022
Surface Elevation: 663.90 ft
Coords: N 126174.571, E 453607.932
Cone Type: 200726
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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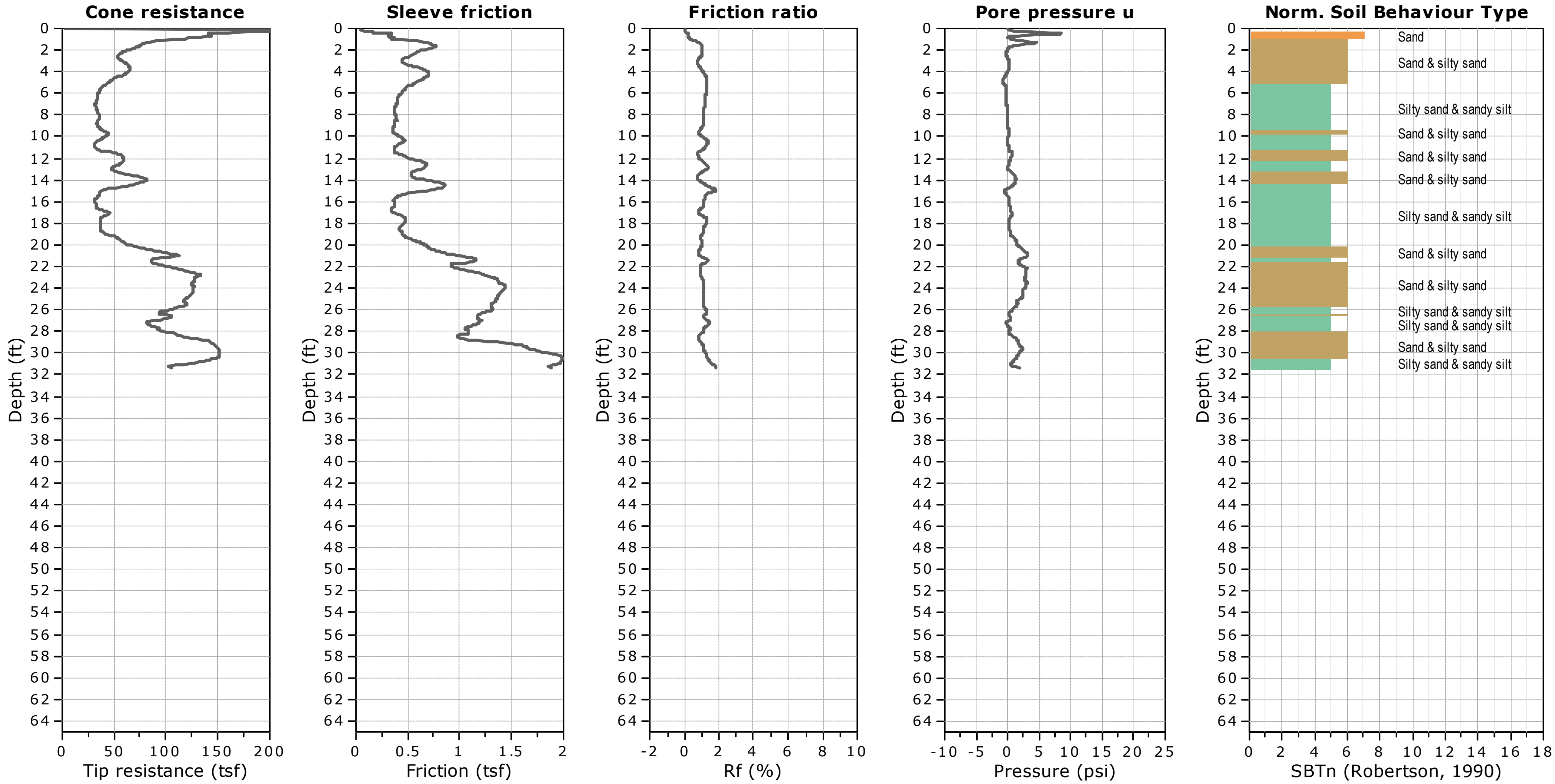
CPT: CPT-10
Total depth: 31.30 ft, Date: 4/8/2022
Surface Elevation: 663.73 ft
Coords: N 126124.095, E 453688.823
Cone Type: 200727
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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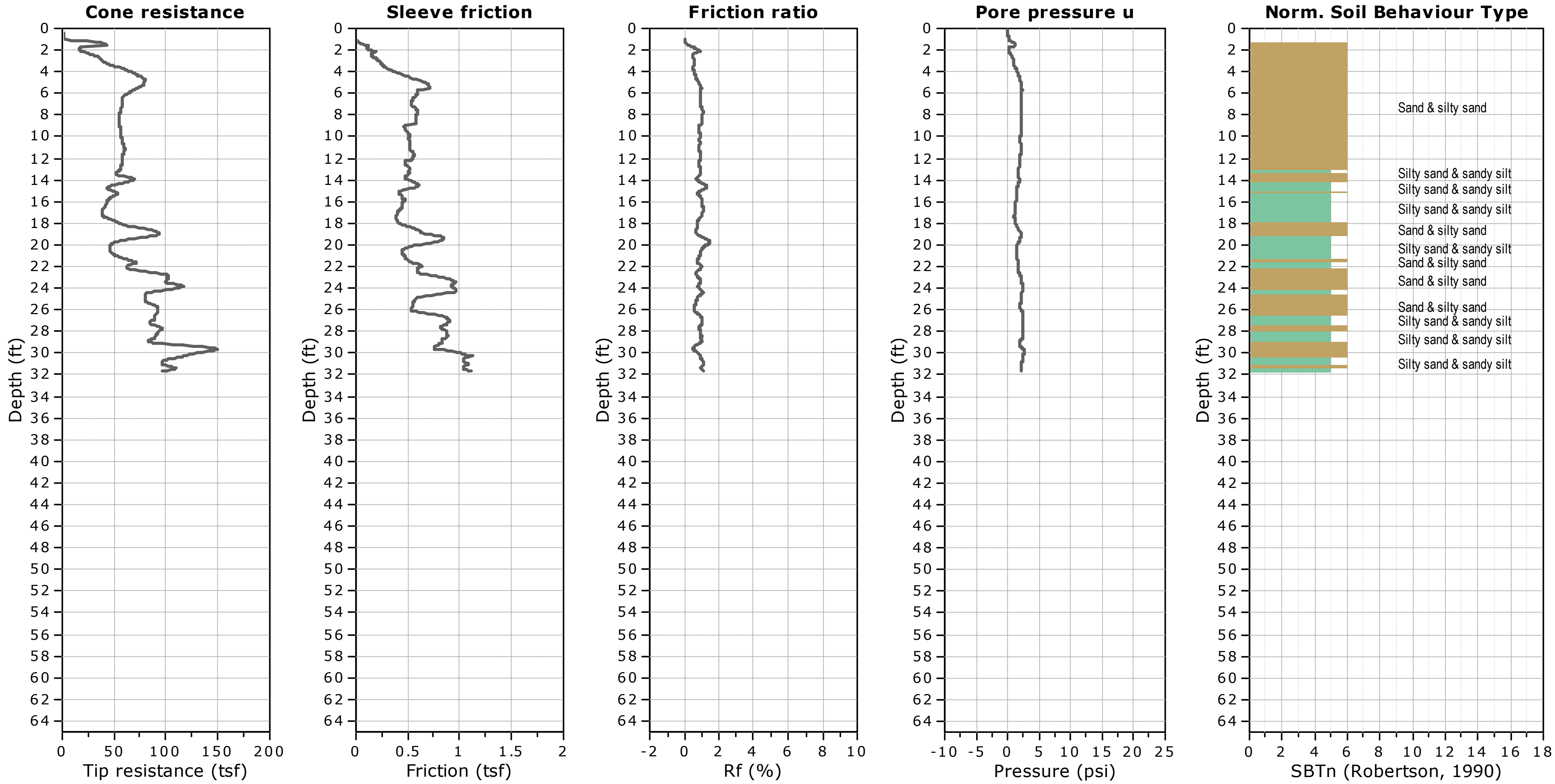
CPT: CPT-11
Total depth: 31.69 ft, Date: 4/9/2022
Surface Elevation: 664.48 ft
Coords: N 126169.688, E 453764.767
Cone Type: 200724
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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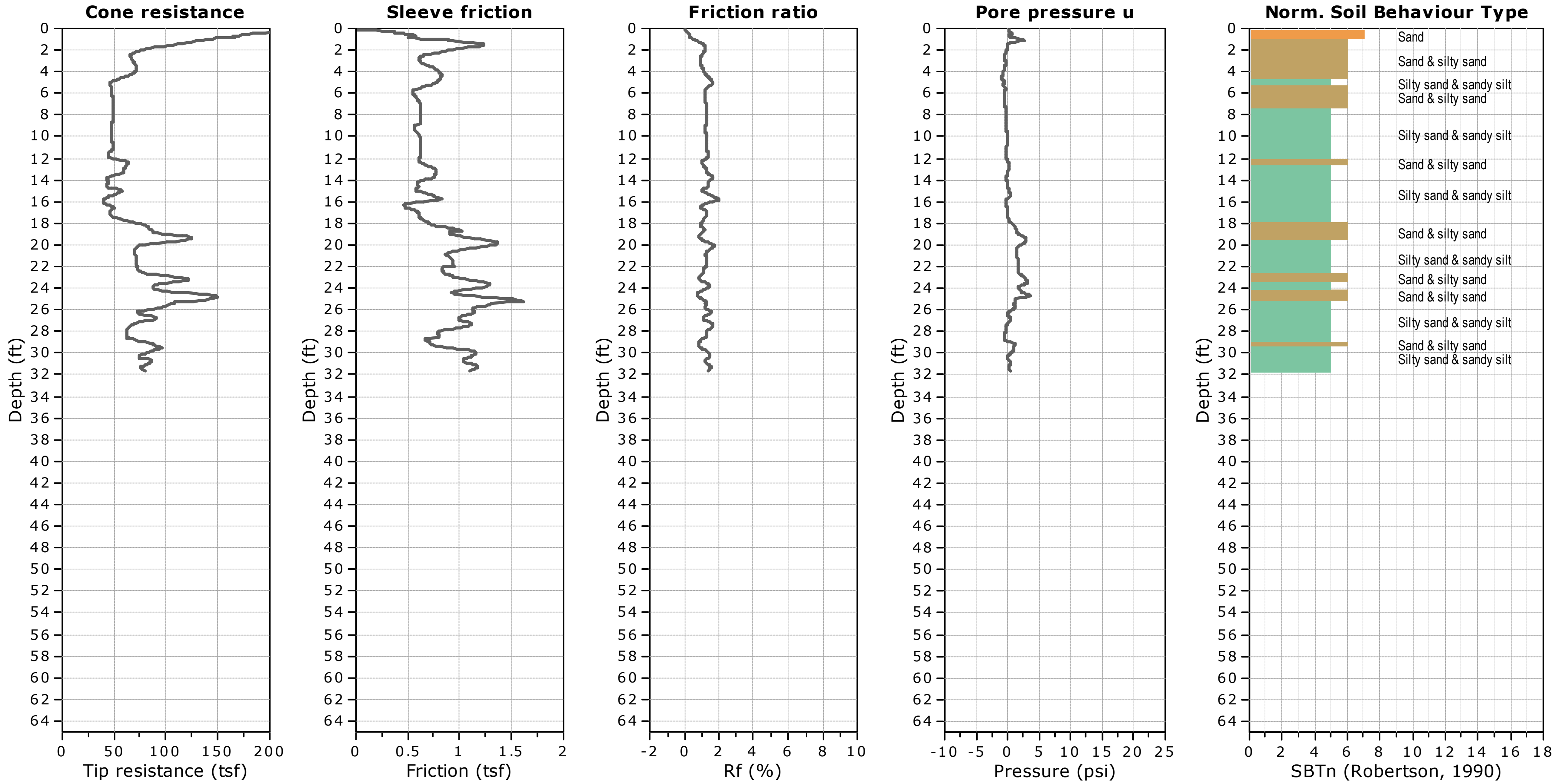
CPT: CPT-12
Total depth: 31.63 ft, Date: 4/8/2022
Surface Elevation: 663.81 ft
Coords: N 126122.632, E 453765.658
Cone Type: 200724
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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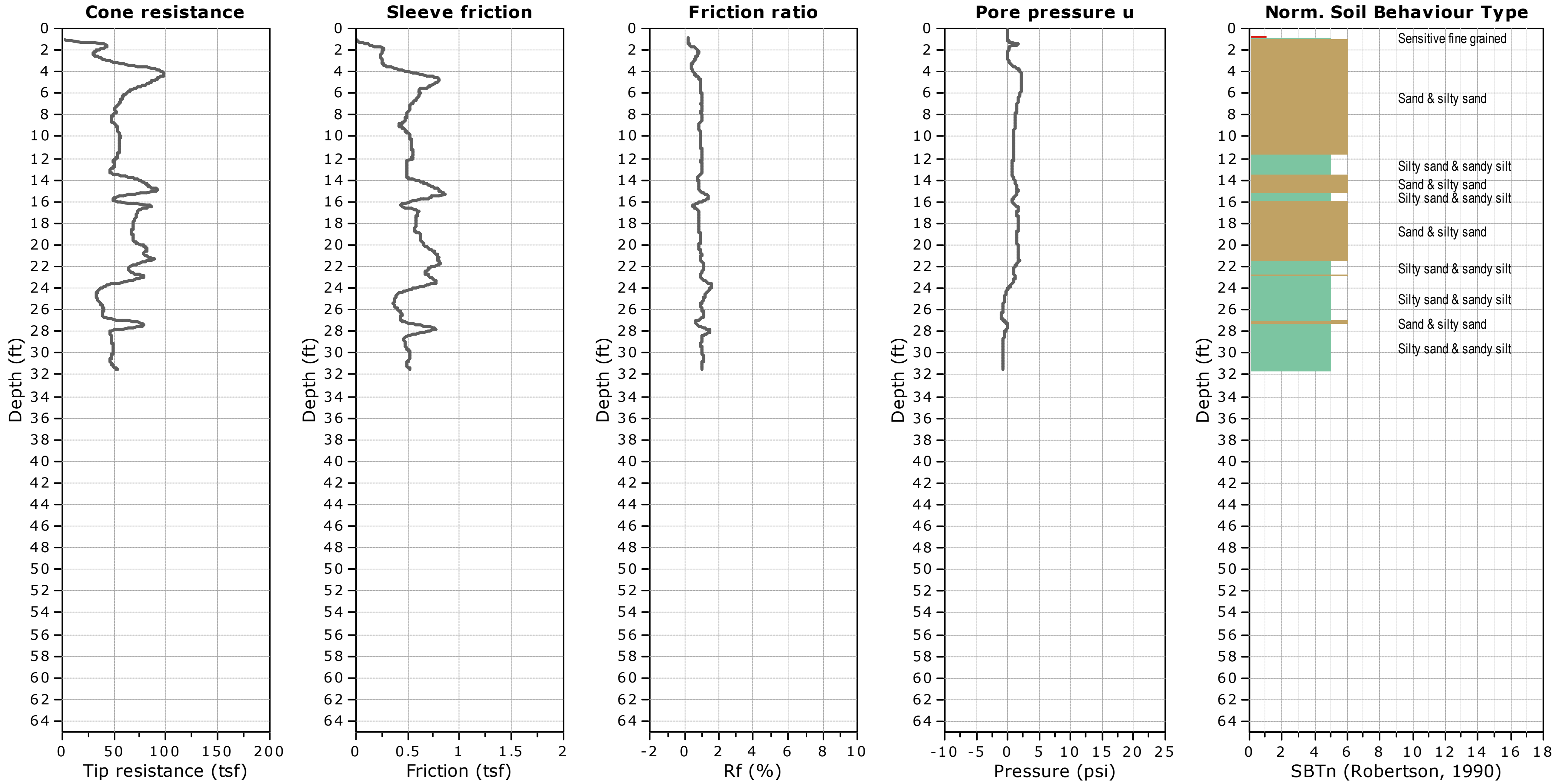
CPT: CPT-13
Total depth: 31.56 ft, Date: 4/9/2022
Surface Elevation: 664.50 ft
Coords: N 126170.618, E 453838.885
Cone Type: 200724
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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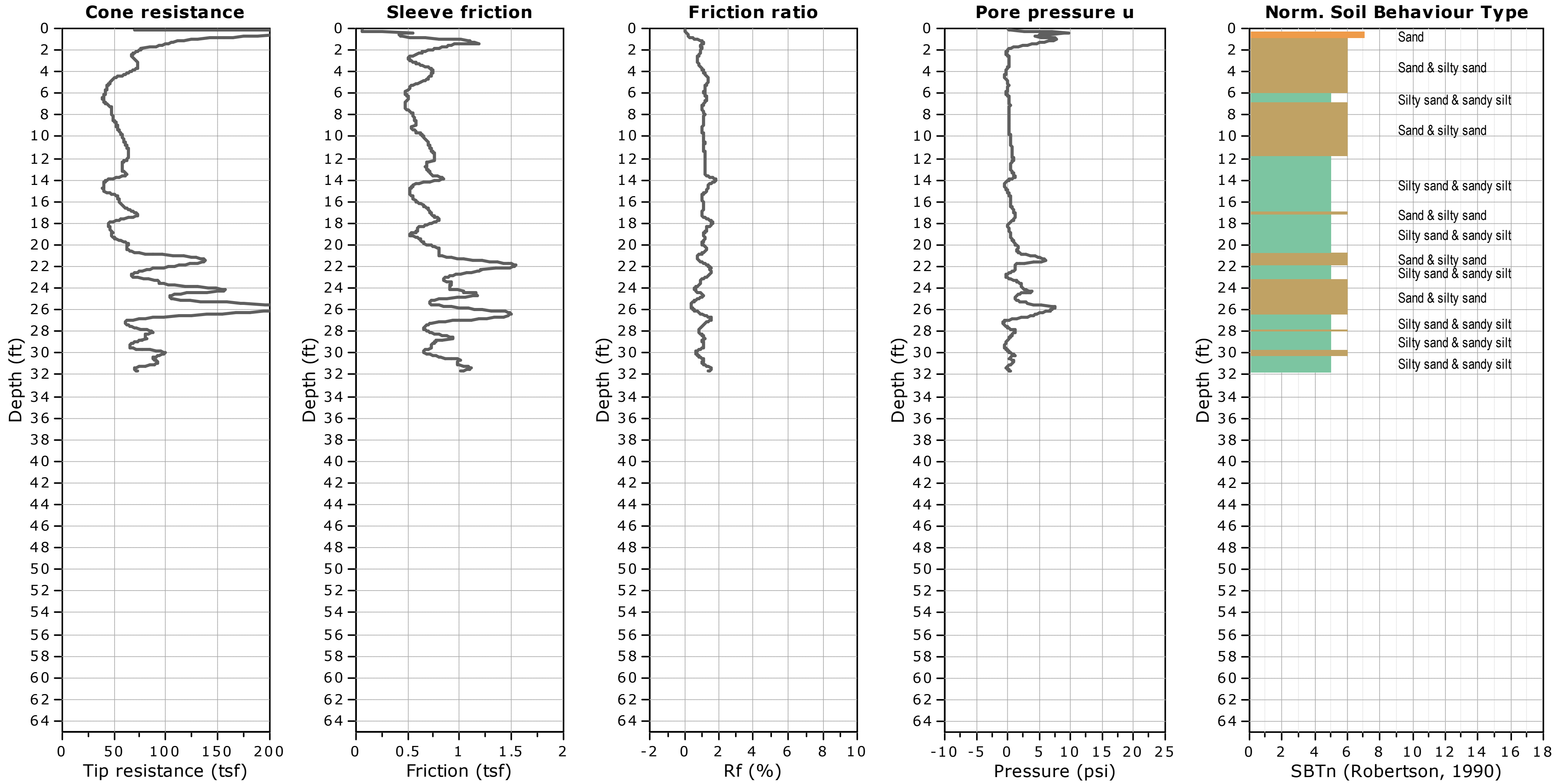
CPT: CPT-14
Total depth: 31.69 ft, Date: 4/8/2022
Surface Elevation: 663.72 ft
Coords: N 126123.229, E 453839.647
Cone Type: 200726
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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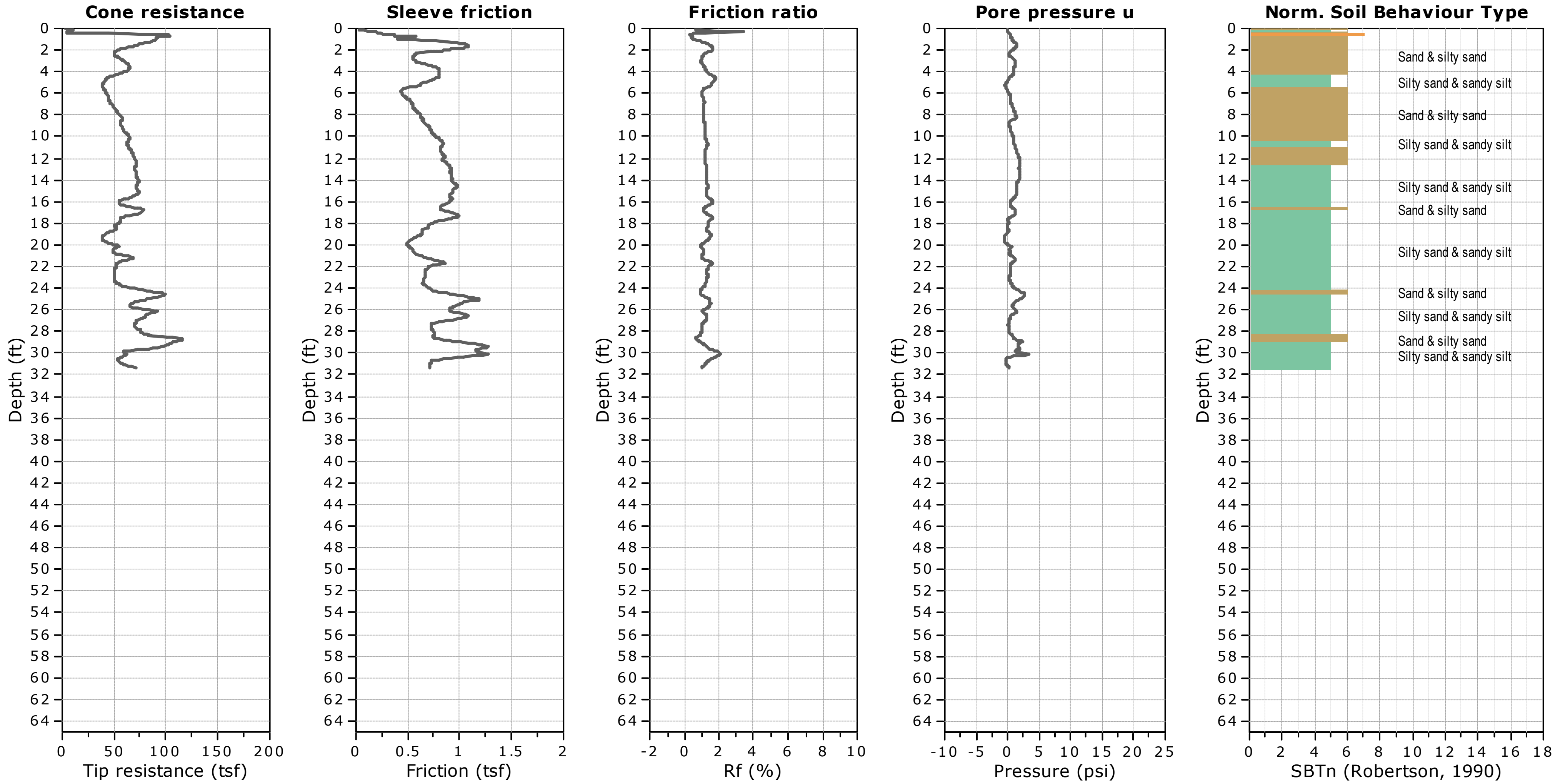
CPT: CPT-15
Total depth: 31.30 ft, Date: 4/8/2022
Surface Elevation: 663.42 ft
Coords: N 126095.902, E 453927.326
Cone Type: 200727
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravelly sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

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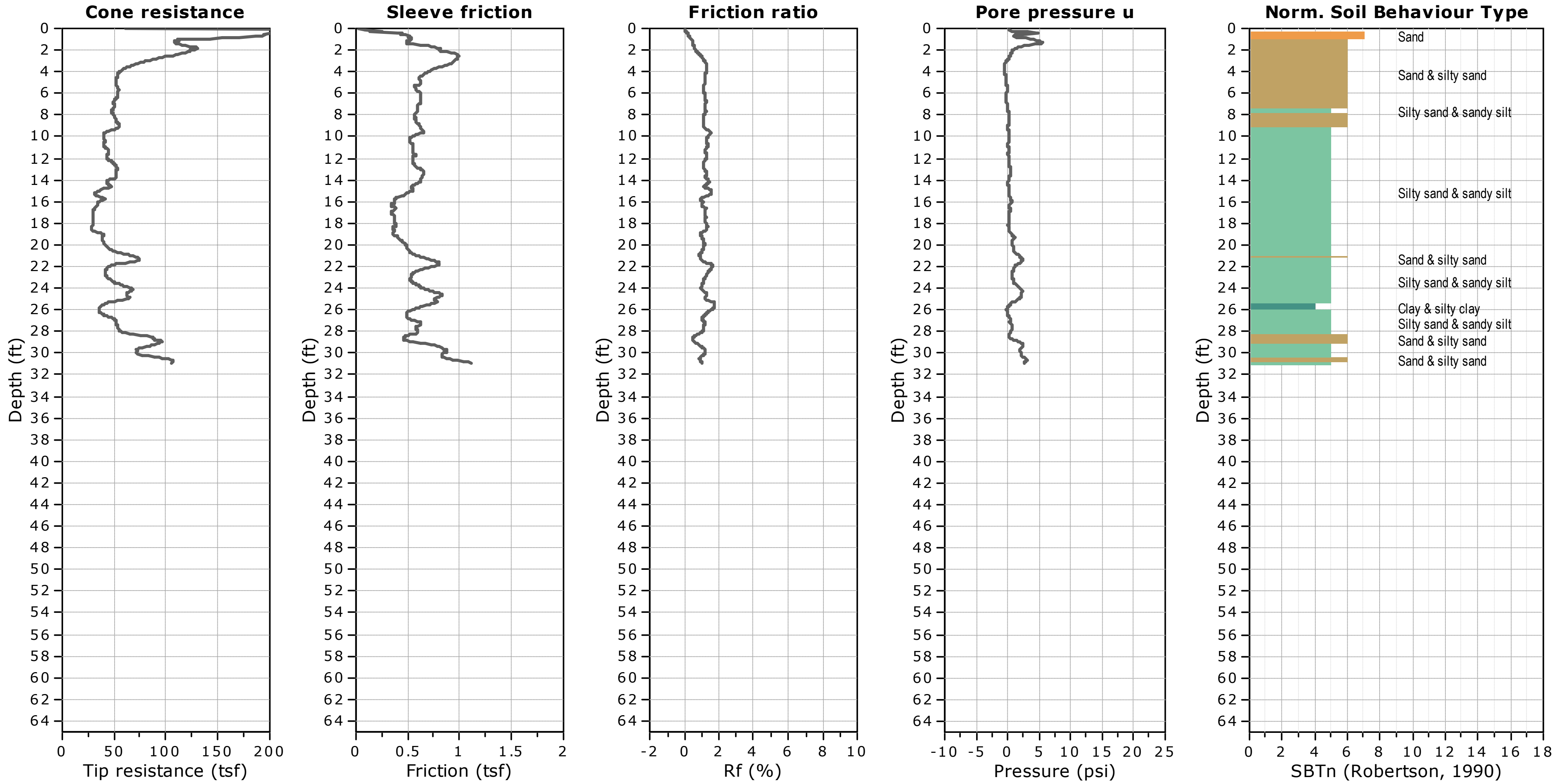
CPT: CPT-17
Total depth: 30.91 ft, Date: 4/8/2022
Surface Elevation: 663.85 ft
Coords: N 126059.291, E 453736.160
Cone Type: 200724
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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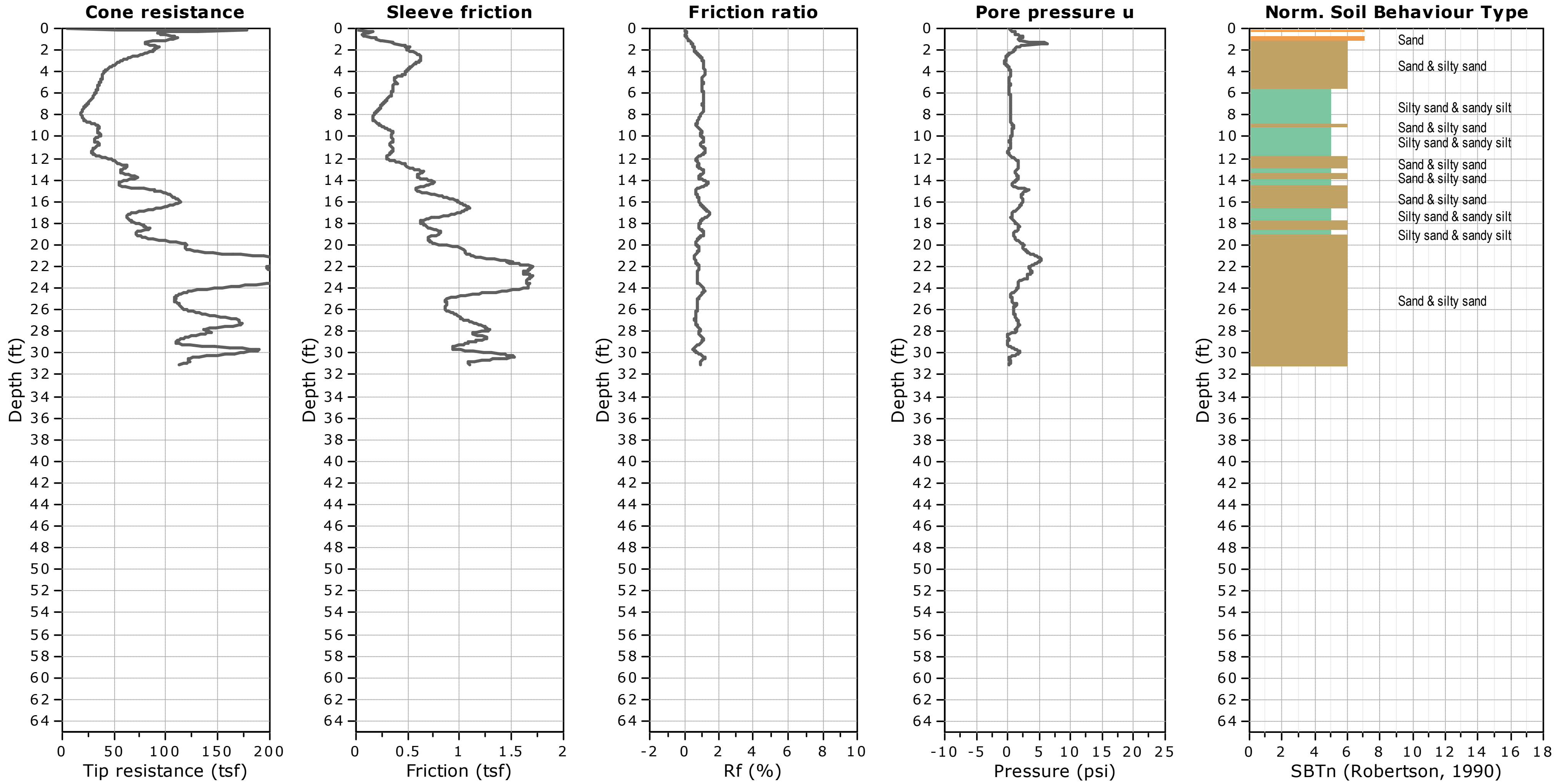
CPT: CPT-18
Total depth: 31.04 ft, Date: 4/8/2022
Surface Elevation: 664.98 ft
Coords: N 126014.262, E 453707.785
Cone Type: 200727
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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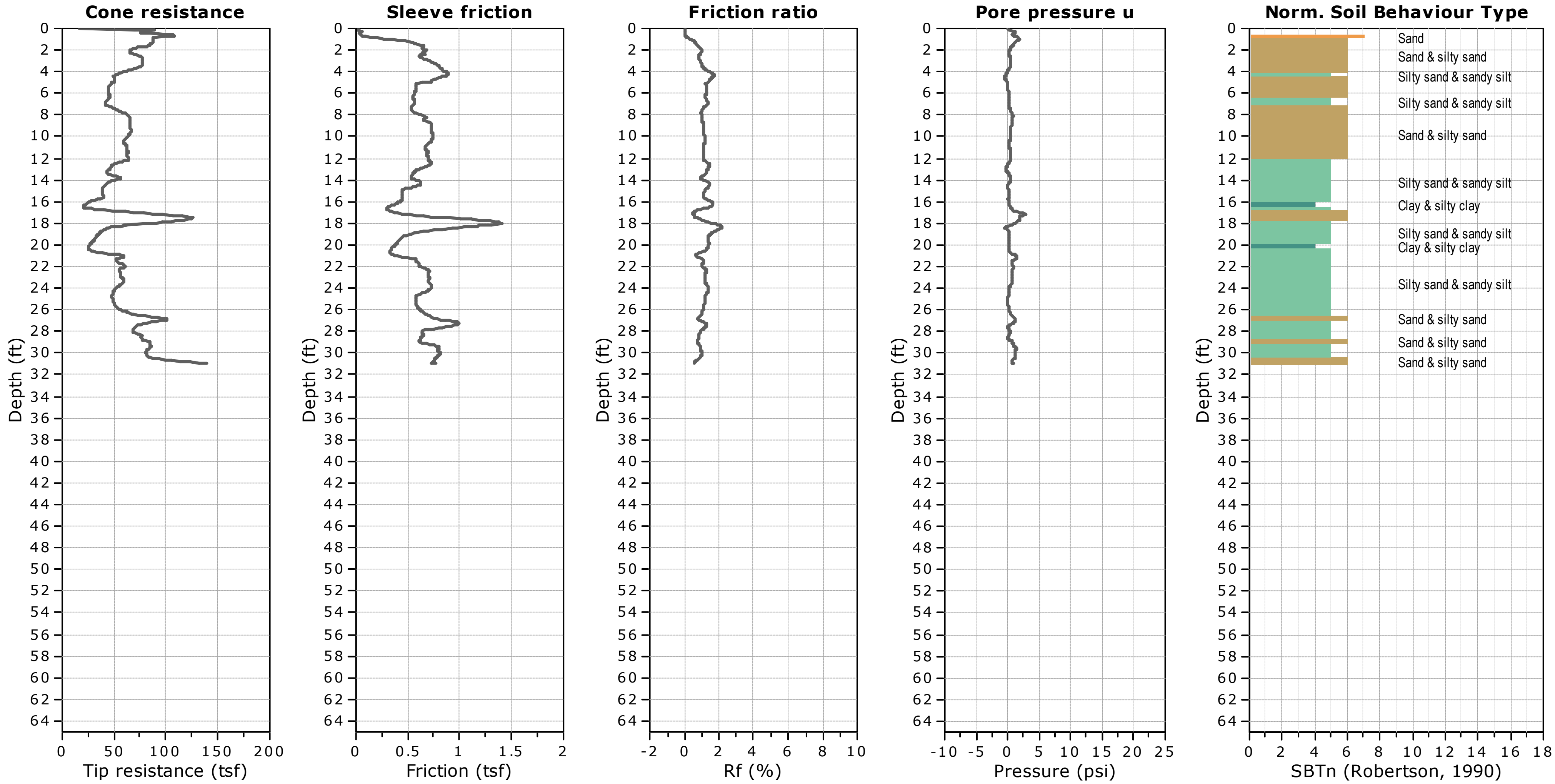
CPT: CPT-19
Total depth: 30.97 ft, Date: 4/8/2022
Surface Elevation: 664.86 ft
Coords: N 126022.157, E 453788.298
Cone Type: 200726
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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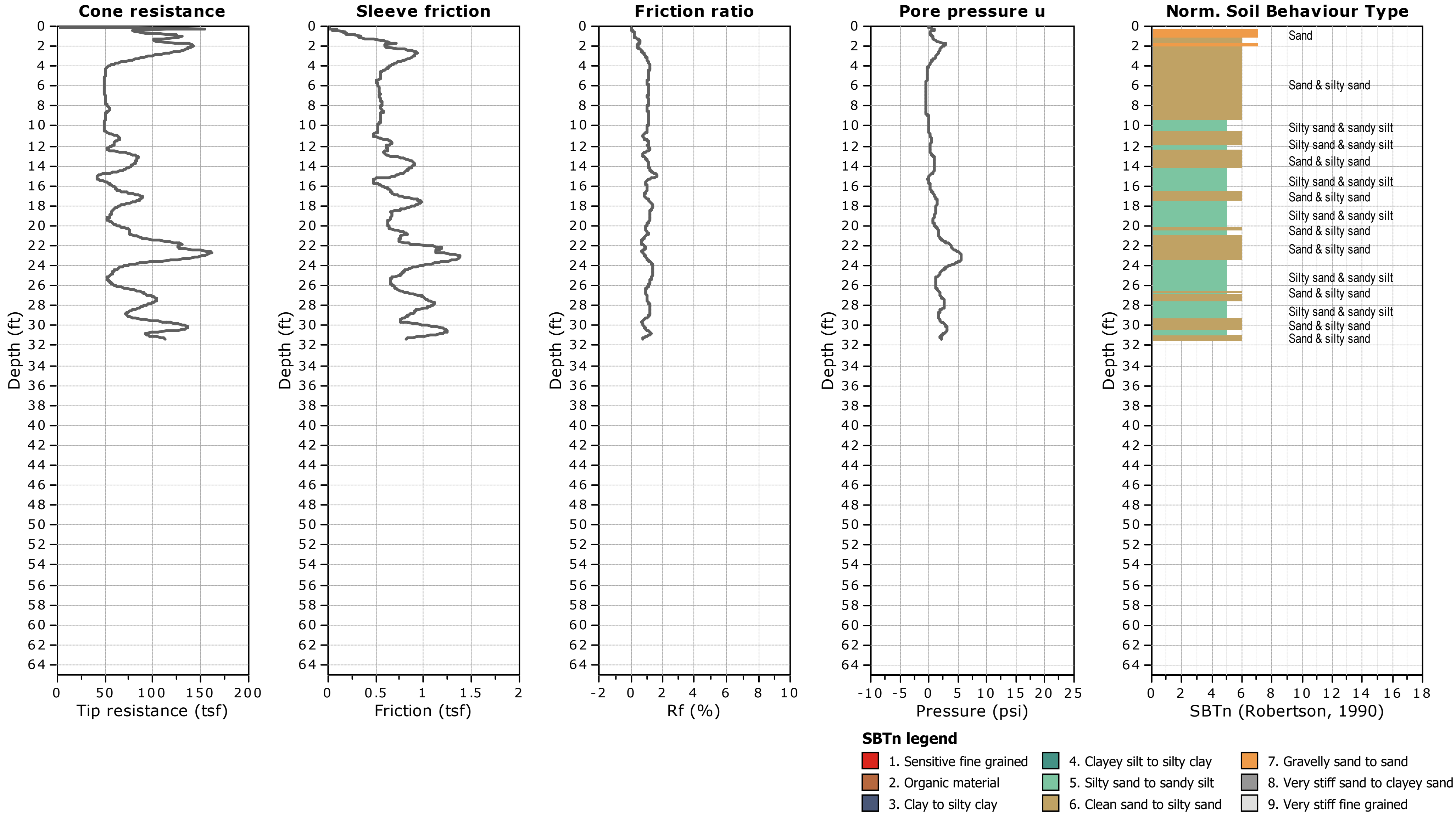
CPT: CPT-20

Total depth: 31.30 ft, Date: 4/8/2022
Surface Elevation: 665.65 ft
Coords: N 125978.434, E 453758.528
Cone Type: 200726
Cone Operator: Belch

Project: Copper Rocks Development
Location: La Crosse, WI **Project Number:** B2202146



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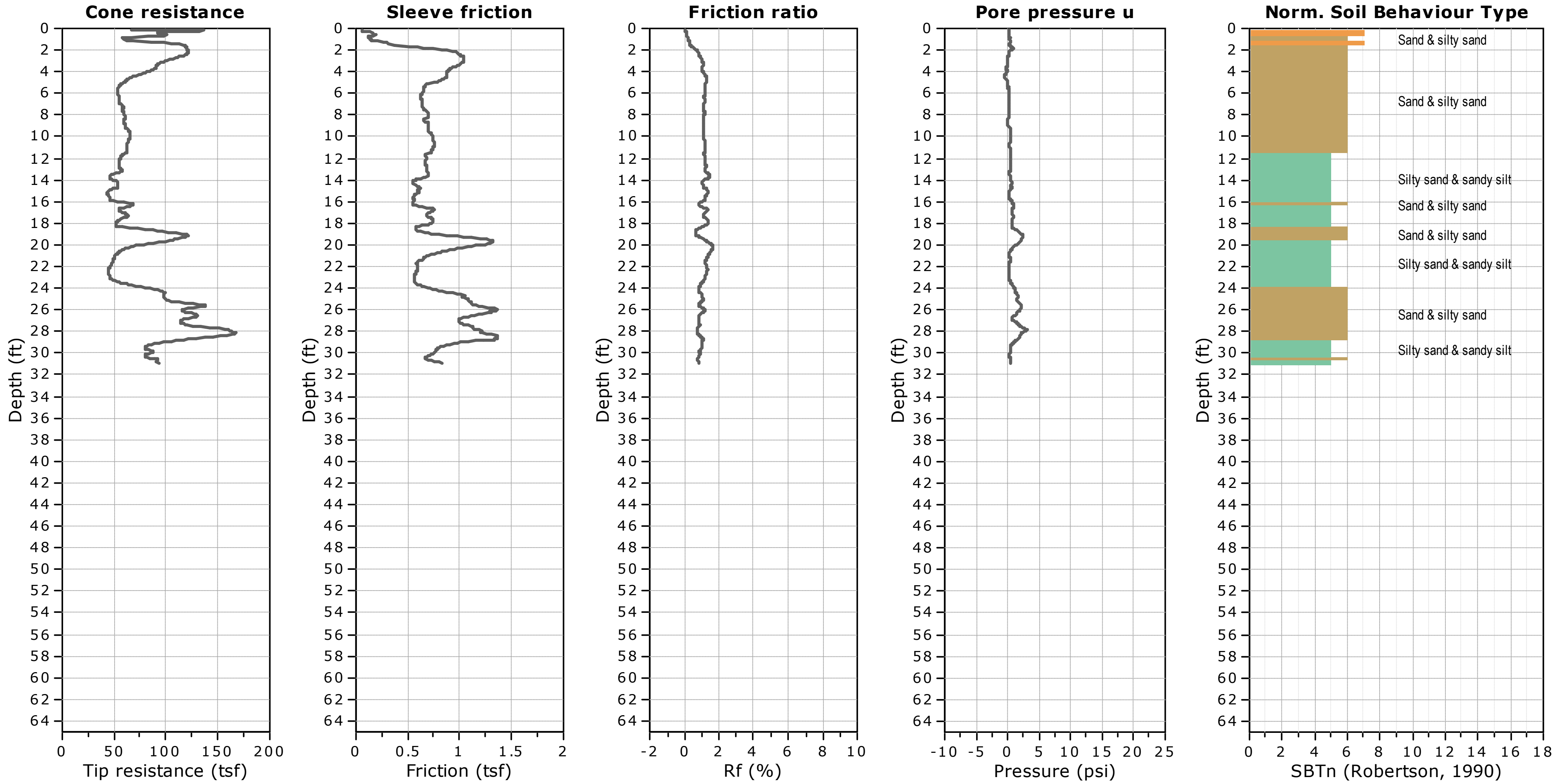
CPT: CPT-21
Total depth: 30.91 ft, Date: 4/8/2022
Surface Elevation: 665.22 ft
Coords: N 125963.332, E 453870.848
Cone Type: 200724
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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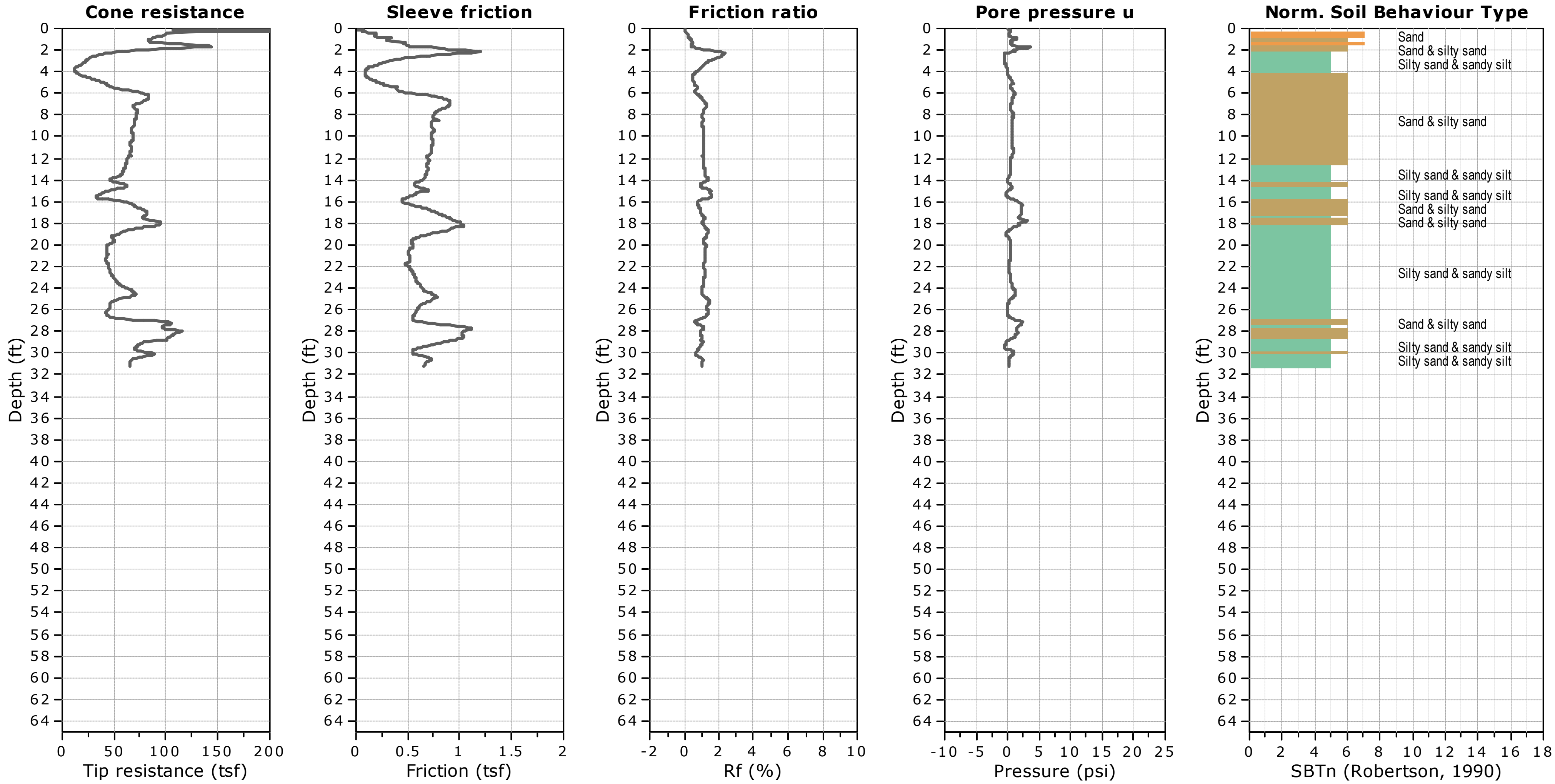
CPT: CPT-22
Total depth: 31.17 ft, Date: 4/8/2022
Surface Elevation: 665.99 ft
Coords: N 125922.067, E 453837.047
Cone Type: 200726
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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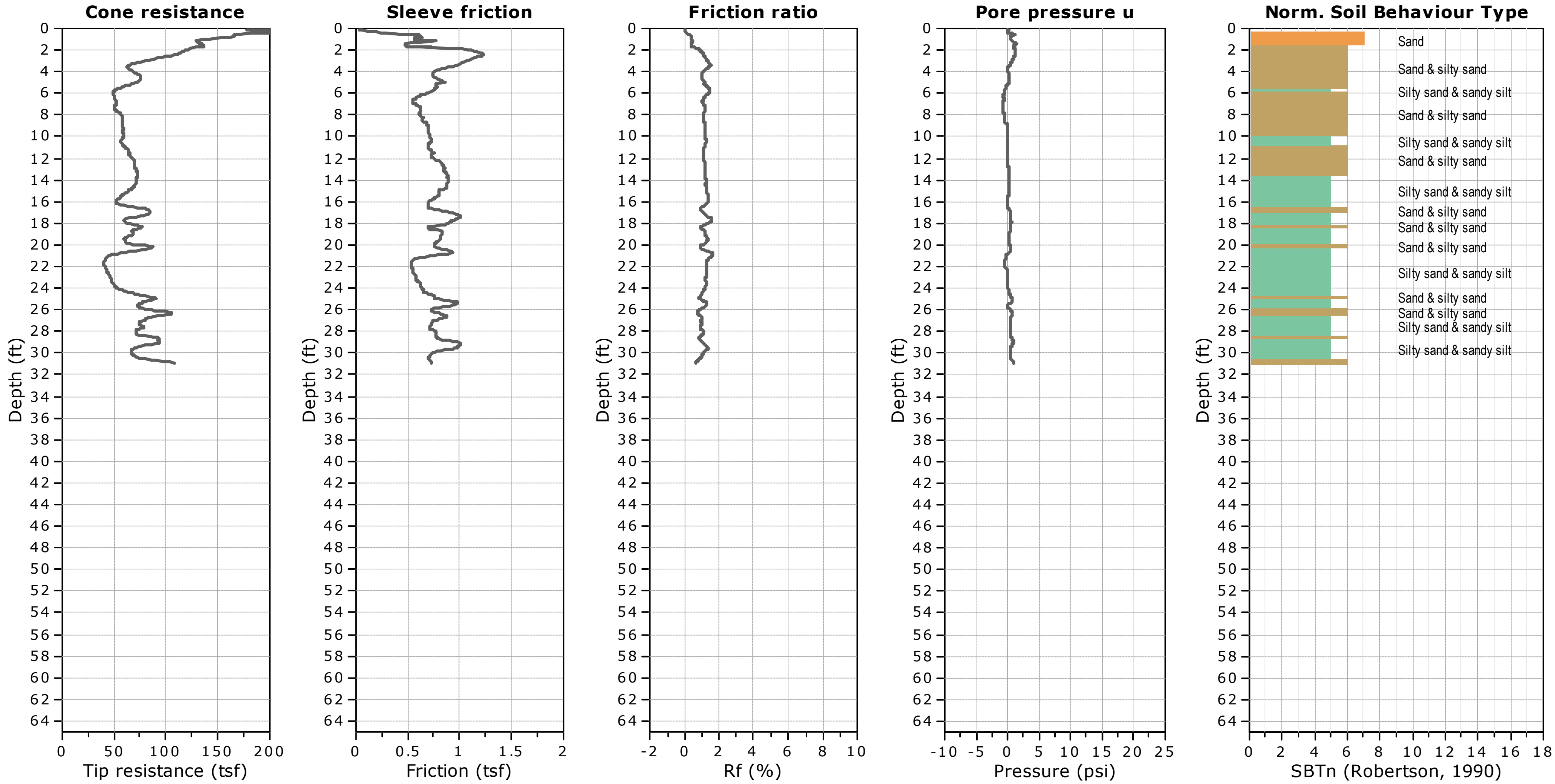
CPT: CPT-23
Total depth: 30.91 ft, Date: 4/8/2022
Surface Elevation: 665.50 ft
Coords: N 125920.674, E 453930.153
Cone Type: 200724
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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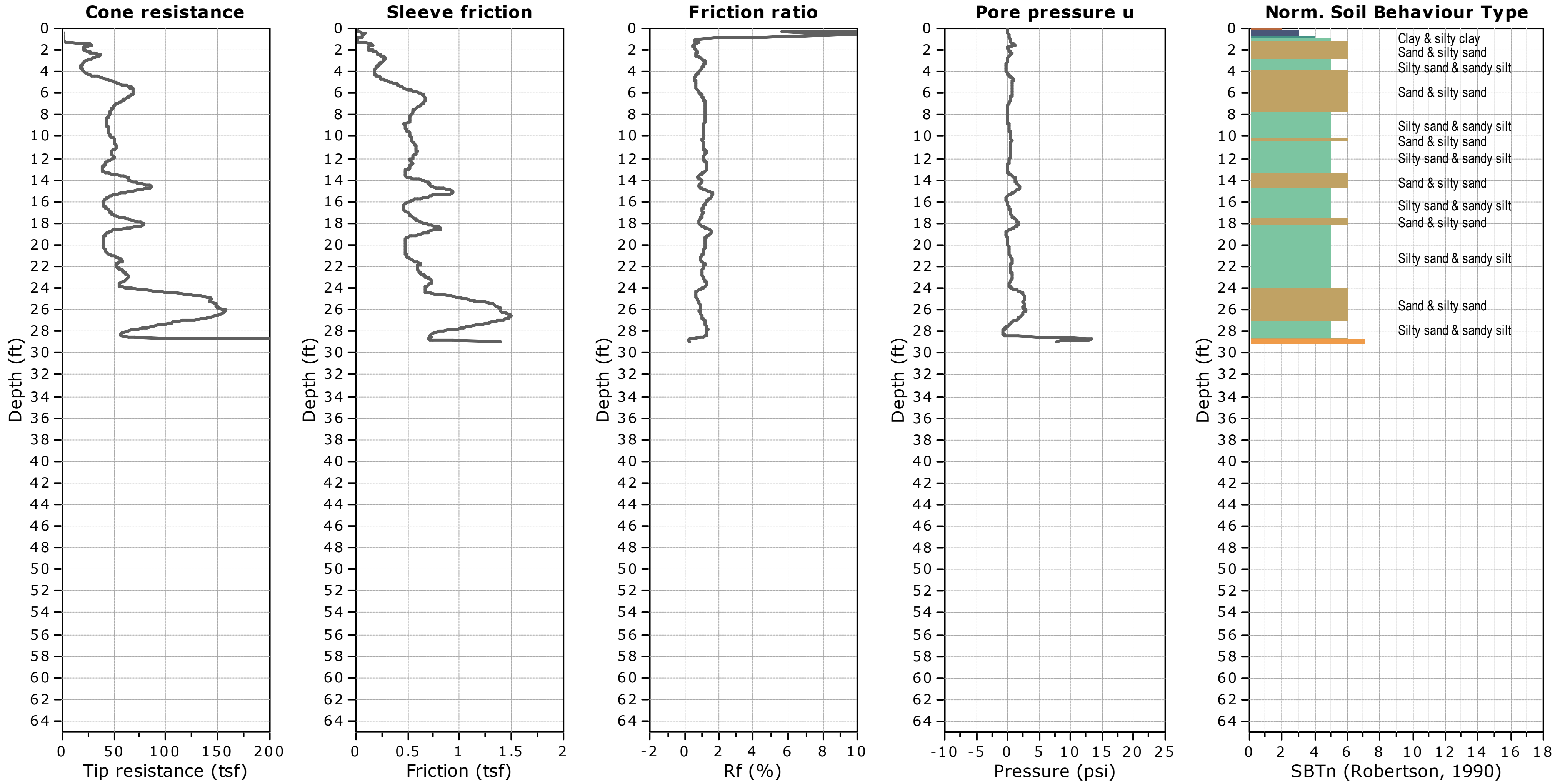
CPT: CPT-25
Total depth: 28.94 ft, Date: 4/9/2022
Surface Elevation: 664.45 ft
Coords: N 126168.685, E 453688.706
Cone Type: 200726
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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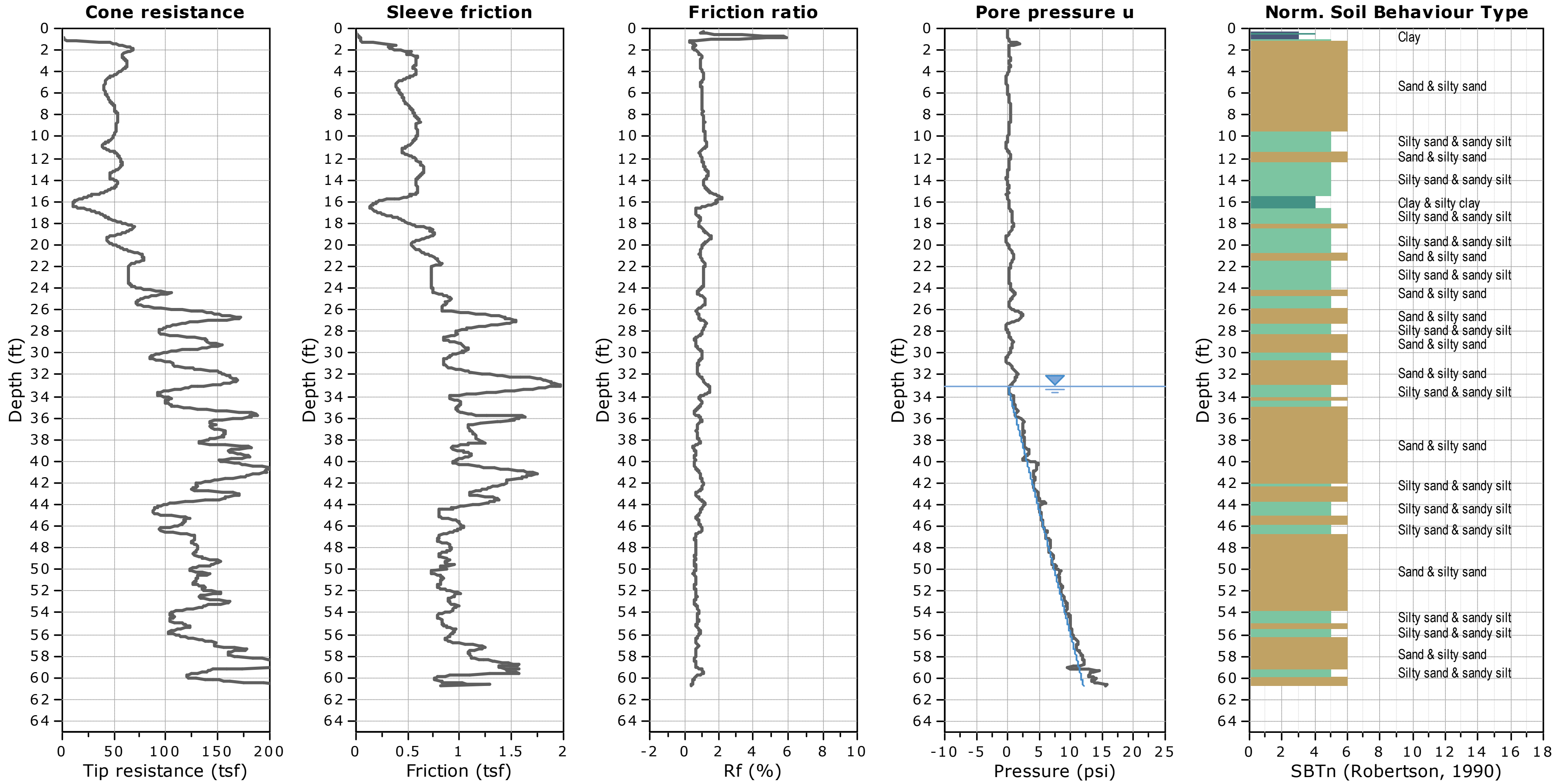
CPT: CPT-26
Total depth: 60.70 ft, Date: 4/9/2022
Surface Elevation: 664.16 ft
Coords: N 126157.368, E 453903.911
Cone Type: 200724
Cone Operator: Belch

Project: Copper Rocks Development
Location: La Crosse, WI **Project Number:** B2202146



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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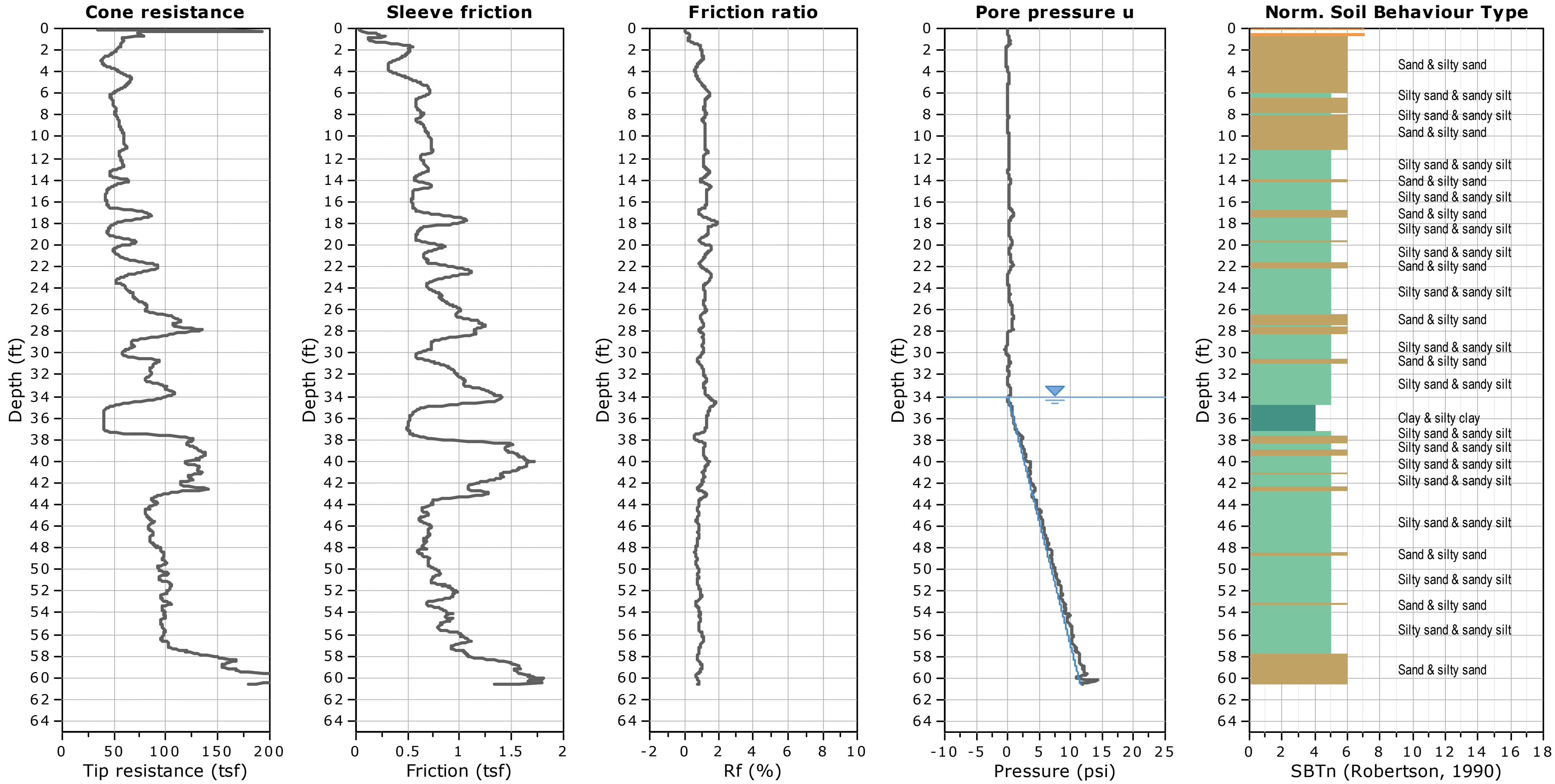
CPT: CPT-27
Total depth: 60.63 ft, Date: 4/8/2022
Surface Elevation: 665.44 ft
Coords: N 125973.239, E 453819.268
Cone Type: 200726
Cone Operator: Belch

Project: **Copper Rocks Development**
Location: **La Crosse, WI** **Project Number: B2202146**



SBTn legend
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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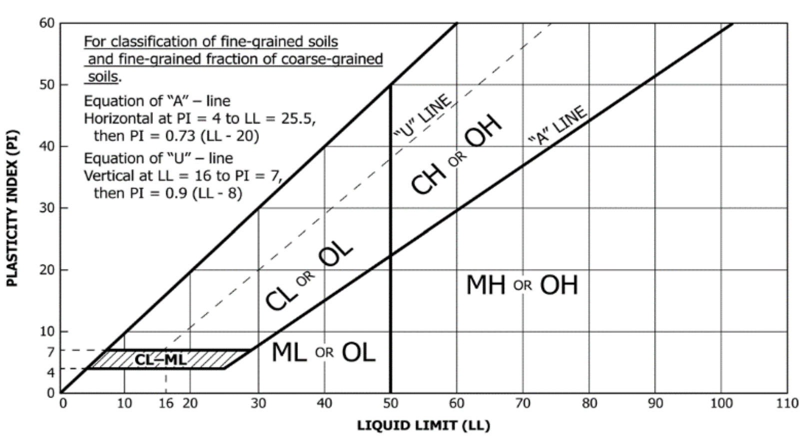
Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	**Clean Gravels** (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3$[D]	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	**Clean Sands** (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3$[D]	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	$\frac{\text{Liquid Limit – oven dried}}{\text{Liquid Limit – not dried}} < 0.75$	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	$\frac{\text{Liquid Limit – oven dried}}{\text{Liquid Limit – not dried}} < 0.75$	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
 GW-GM well-graded gravel with silt
 GW-GC well-graded gravel with clay
 GP-GM poorly graded gravel with silt
 GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
 SW-SM well-graded sand with silt
 SW-SC well-graded sand with clay
 SP-SM poorly graded sand with silt
 SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Particle Size Identification

Boulders............. over 12"
Cobbles............... 3" to 12"
Gravel
 Coarse............ 3/4" to 3" (19.00 mm to 75.00 mm)
 Fine................ No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
 Coarse............. No. 10 to No. 4 (2.00 mm to 4.75 mm)
 Medium........... No. 40 to No. 10 (0.425 mm to 2.00 mm)
 Fine................. No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt....................... No. 200 (0.075 mm) to .005 mm
Clay..................... < .005 mm

Relative Proportions[L, M]

trace............................ 0 to 5%
little............................. 6 to 14%
with............................. ≥ 15%

Inclusion Thicknesses

lens.............................. 0 to 1/8"
seam............................ 1/8" to 1"
layer............................. over 1"

Apparent Relative Density of Cohesionless Soils

Very loose .... 0 to 4 BPF
Loose .... 5 to 10 BPF
Medium dense............. 11 to 30 BPF
Dense........................... 31 to 50 BPF
Very dense................... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft..................	0 to 1 BPF..................	< 0.25 tsf
Soft..........................	2 to 4 BPF..................	0.25 to 0.5 tsf
Medium...................	5 to 8 BPF	0.5 to 1 tsf
Stiff..........................	9 to 15 BPF................	1 to 2 tsf
Very Stiff..................	16 to 30 BPF..............	2 to 4 tsf
Hard.........................	over 30 BPF...............	> 4 tsf

Moisture Content:

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.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▼).

Laboratory Tests

DD	Dry density, pcf	**OC**	Organic content, %	**LL**	Liquid limit
WD	Wet density, pcf	**q_p**	Pocket penetrometer strength, tsf	**PL**	Plastic limit
P200	% Passing #200 sieve	**MC**	Moisture content, %	**PI**	Plasticity index
		q_U	Unconfined compression test, tsf		

Descriptive Terminology
Cone Penetration Test

This document accompanies Cone Penetration Test Data. Please refer to the Boring Log Descriptive Terminology Sheet for information relevant to conventional v. Cone Penetration Test (CPT) boring logs.

Cone Penetration Test (CPT) sounding was performed in general accordance with ASTM D 5778 and consistent with the ordinary degree of care and skill used by reputable practitioners of the same discipline currently practicing under similar circumstances and in the same locality. No warranty, express or implied, is made.

Since subsurface conditions outside each CPT sounding are unknown, and soil, rock and pore water conditions cannot be relied upon to be consistent or uniform, no warranty is made that conditions adjacent to each sounding will necessarily be the same as or similar to those shown on this log. Braun Intertec is not responsible for any interpretations, assumptions, projections or interpolations of the data made by others.

Pore water pressure measurements and subsequently interpreted water levels shown on CPT logs should be used with discretion as they represent dynamic conditions. Dynamic pore water pressure measurements may deviate substantially from hydrostatic conditions, especially in cohesive soils. In cohesive soils, pore water pressures often take an extended time to reach equilibrium and thus reflect their true field level. Groundwater levels can be expected to vary both seasonally and yearly. The absence of notations on this log regarding water does not necessarily mean that groundwater is not present to the depth explored, or that a contractor will not encounter groundwater during excavation or construction.

CPT Terminology

CPT............ Cone Penetration Test
CPTU......... Cone Penetration Test with Pore Pressure measurements
SCPTU....... Cone Penetration Test with Pore Pressure and Seismic measurements
Piezocone...Common name for CPTU test

Q_T .... normalized cone resistance
B_q......................... pore pressure ratio
F_r.......................... normalized friction ratio
σ_{vo}........................ overburden pressure
σ'_{vo} .... effective overburden pressure

q_T TIP RESISTANCE

The resistance at the cone corrected for water pressure. Data is from cone with a 60 degree apex angle and a 15 cm^2 end area.

f_s SLEEVE FRICTION RESISTANCE

The resistance along the sleeve of the penetrometer.

F_r Friction Ratio

Ratio of sleeve friction over corrected tip resistance.
$F_r = f_s/q_t$

V_s Shear Wave Velocity

A measure of the speed at which a seismic wave travels through soil/rock.

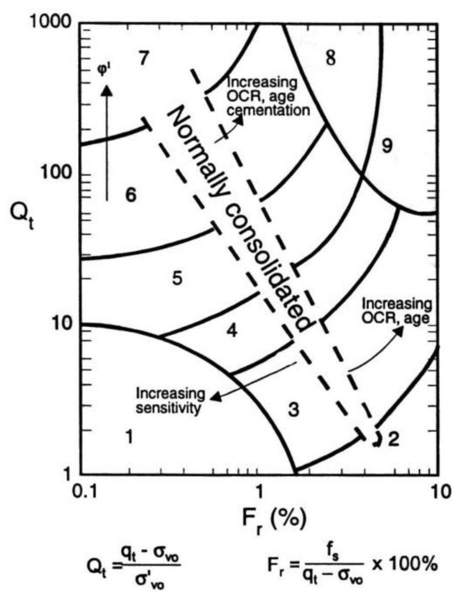
SBT SOIL BEHAVIOR TYPE

Soil Identification methods for the Cone Penetration Test are based on correlation charts developed from observations of CPT data and conventional borings. Please note that these identification charts are provided as a guide to Soil Behavior Type and should not be used to infer a soil classification based on grain size distribution.

Engineering judgment and comparison with augered borings is especially important in the proper interpretation of CPT data in certain geo-materials.

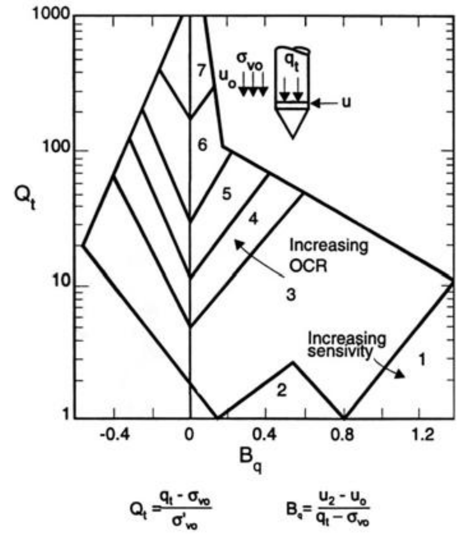
The following charts provide a Soil Behavior Type for the CPT Data. The numbers corresponding to different regions on the charts represent the following soil behavior types:

Soil Behavior Type based on friction ratio



Robertson CPT 1990

Soil Behavior Type based on pore pressure

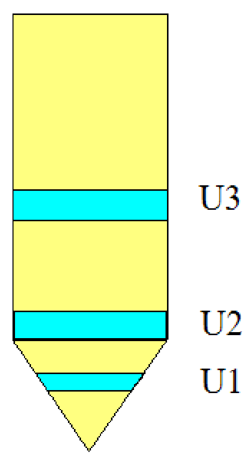


Robertson CPT 1990

1 Sensitive, Fine Grained
2 Organic Soils - Peat
3 Clays - Clay to Silty Clay
4 Silt Mixtures - Clayey Silt to Silty Clay
5 Sand Mixtures - Silty Sand to Sandy Silt
6 Sands - Clean Sand to Silty Sand
7 Gravelly Sand to Sand
8 Very Stiff Sand to Clayey Sand
9 Very Stiff, Fine Grained

U2 PORE WATER MEASUREMENTS

Pore water measurements reported on CPT logs are representative of pore water pressures measured at the U2 location, just behind the cone tip, prior to the sleeve, as shown in the figure below. These measurements are considered to represent dynamic pore water pressures due to the local disturbance caused by the cone tip. Dynamic pore water pressure decay and static pore water pressure measurements are reported on a Pore Water Pressure Dissipation Graph.



Division of Industry Services
PO Box 2658
Madison, Wisconsin

Attachment 2:

SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not limited to vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM reference to nearest road.	County
	Parcel I.D.
Please print all information Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	Reviewed by: Date:

Property Owner: MKB COPPER ROCKS, LLC	Property Location Govt. Lot ¼ ¼ S T N R E (or) W
Property Owner's Mailing Address: 3800 EMERALD DRIVE EAST	Lot / Block # / Subd. Name or CSM #/Address
City, State Zip: LA CROSSE, WI 54601 / Phone Number	☒ City ☐ Village ☐ Town: 2415 STATE ROAD, LA CROSSE, WI / Nearest Road: LOSEY BLVD

Drainage Area ______________ ☐ sq. ft. ☐ acres Test site suitable for (check all that apply): ☐ Bio-retention; ☐ Subsurface Dispersal System; ☐ Reuse; ☐ Irrigation ☐ Other	Hydraulic Application Test Method ☒ Morphological Evaluation ☐ Double Ring Infiltrometer Other: (specify)	Soil Moisture Date of soil Borings: APR. 4, 2022 USDA-NRCS WETS Value: ☐ Dry = 1; ☒ Normal = 2; ☐ Wet = 3.

TP-28 #OBS ☒ Pit ☐ Boring Ground surface Elevation 663.2 ft. Elevation of limiting factor NA ft.

Horizon	Depth In.	Dominate Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr.
PVMT	0 – 10	---	---	---	---	---	---	---	---	---
B	10 – 32	10YR 3/2	NONE	SCL	1.GR.F	ML	A.S	0	<30	0.07
C	32 – 55	10YR 4/2	NONE	F.LS	0.SG.F	ML	A.S	0	<15	0.50
C	55 – 120	10YR 4/4	NONE	F.S	0.SG.F	ML	A.S	0	<5	0.50

Comments:

TP-29 #OBS ☒ Pit ☐ Boring Ground surface Elevation 664.4 ft. Elevation of limiting factor NA ft.

Horizon	Depth In.	Dominate Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr.
PVMT	0 – 9	---	---	---	---	---	---	---	---	---
C	9 – 120	10YR 5/4	NONE	F.S	0.SG.F	ML	A.S	0	<5	0.50

Comments:

Name: BRANDON WRIGHT	Signature:	Credential Number: SP-041100003
Address: 2309 Palace Street, La Crosse, WI	Date of Evaluation: APRIL 4, 2022	Phone Number: 608.781.7277

TP-30 #OBS ☐ Pit ☒ Boring Ground surface Elevation 664.6 ft. Elevation of limiting factor NA ft.

Horizon	Depth In.	Dominate Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr.
PVMT	0 – 9	---	---	---	---	---	---	---	---	---
B	9 – 32	10YR 3/2	NONE	F.LS	0.SG.F	ML	A.S	0	<15	0.50
C	32 – 120	10YR 4/4	NONE	F.S	0.SG.F	ML	A.S	0	<5	0.50
Comments:										

Overall Site Comments: