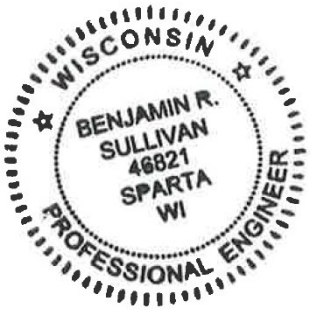
Geotechnical Evaluation Report

Proposed South Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

Prepared for

Mead & Hunt, Inc.

Benjamin R. Sullivan, PE
Senior Manager, Project Engineer
License Number: 46821
September 23, 2024



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Project B2407684

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September 23, 2024 Project B2407684

Ms. Lisa Kinsman, PE
Mead & Hunt, Inc.
2440 Deming Way
Middleton, WI 53562

Re: Geotechnical Evaluation
Proposed South Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

Dear Ms. Kinsman:

We are pleased to present this Geotechnical Evaluation Report for the proposed South Terminal Parking Lot Reconstruction located at the La Crosse Regional Airport in La Crosse, Wisconsin.

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 Ben Sullivan or Brandon Wright at 608.781.7277 or by email at bsullivan@braunintertec.com or bwright@braunintertec.com.

Sincerely,

BRAUN INTERTEC CORPORATION

Benjamin R. Sullivan, PE
Senior Manager, Project Engineer

Brandon K. Wright, PE
Senior Manager, Senior Engineer

c: Marcus Khun, Mead & Hunt, Inc.

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A. Introduction

A.1. Project Description

This Geotechnical Evaluation Report addresses the proposed design and reconstruction of the South Terminal Parking Lot at the La Crosse Regional Airport, located at 2850 Airport Road in La Crosse, Wisconsin. The reconstruction will include new concrete and bituminous pavements, utilities, light poles, and storm water improvements. Table 1 provides the project details.

Table 1. Site Aspects and Grading Description

Aspect	Description
Pavement Types	Bituminous pavements for the parking lot and drive lanes and concrete pavements for the aprons.
Assumed Traffic and Pavement Loads	The pavements will support passenger vehicles as well as occasional maintenance vehicles.
	Light-duty: 50,000 ESALs*
	Medium-duty: 150,000 ESALs*
Grade Changes	Final pavement elevations are assumed to be 1-foot or less from existing site grades.
Utilities	Site utilities are anticipated to include new light poles and below-grade facilities which may include, but are not limited to, water, sanitary sewer, storm sewer, electrical, gas, and fiber.
Storm Water Infiltration Basins	According to the conceptual site layout drawing provided to us by Mead & Hunt, Inc., dated November 13, 2023, three storm water infiltration basins are planned as part of the project. One larger infiltration basin will be located on the north side of the north terminal parking lot and two smaller infiltration basins will be located on the east and west sides of the south terminal parking lot.

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

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

Based on our referenced documents, the site was historically used as agricultural farmland since at least 1938. In 1945, the site was developed and the construction of the La Crosse Regional Airport was completed which remains today. The La Crosse Regional Airport contains a terminal airport building, car wash building, and associated structures and utilities as well as bituminous and concrete pavements. The location of the proposed parking lot reconstruction will occur within the boundaries of the south terminal parking lot. Storm water improvements are to be constructed on the north side of the north terminal parking lot and the east and west sides of the south termina parking lot. An aerial photograph of the site with the approximate reconstruction boundaries highlighted is shown in Photograph 1 below.

Based upon review of topographic maps from the United States Geologic Survey (USGS) and Environmental Risk Information Services (ERIS) and the surveyed elevations at our exploration locations, grade relief across the project area is relatively flat and has approximately 5 feet or less of grade change.

Photograph 1. Aerial of the Site with Approximate Reconstruction Boundaries

Photograph provided by Google Earth™, dated March 27, 2024.

A.3. Purpose

The purpose of our geotechnical evaluation was 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 the proposed pavements, underground utilities, and storm water improvements.

A.4. Background Information and Reference Documents

We reviewed the following information:

- Aerial photographs of the site from 1938 to 2024 from Google Earth™, La Crosse County GIS, and the ERIS. These photographs document previous land usage and development.
- Topographic maps of the site from the USGS website and the ERIS.
- Geologic maps of La Crosse County in Wisconsin from the USGS website.
- Preliminary site layout plan prepared by Mead & Hunt, Inc., dated November 13, 2023.
- Communications with Mead & Hunt, Inc. regarding the preliminary site layout, project details, design loads, and grading information.

A.5. Scope of Services

We performed our scope of services for the project in accordance with our revised Proposal QTB197143 to Mead & Hunt, Inc., dated July 10, 2024, and authorized on August 13, 2024. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Staking and clearing the exploration location of underground utilities. We contacted Digger's Hotline to clear public utilities and subcontracted Private Underground to locate private utilities at the site prior to drilling and excavating. Mead & Hunt, Inc. selected, and we staked the exploration locations. We acquired the surface elevations and locations with Global Positioning System (GPS) technology. The Soil Boring and Test Pit Location Sketch included in the Appendix shows the approximate locations of the exploration locations.
- Performing seven standard penetration test (SPT) borings, denoted as SB-1 to SB-7, to nominal depths of 11 feet below grade existing across the site for the proposed south terminal parking lot reconstruction.
- Performing eight test pit excavations, denoted as TP-1 to TP-8, to nominal depths of 10 to 13 feet below existing grades across the site for the proposed storm water infiltration basins.

- Performing one double ring infiltrometer test, denoted as DRI-1, within the proposed storm water infiltration basin on the north side of the north terminal parking lot.

- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.

- Preparing this report containing an exploration location sketch, logs of soil borings, logs of test pits, a summary of the soils encountered, results of laboratory tests, and recommendations for pavement and utility subgrade preparation and the design of pavements, underground utilities, and storm water improvements.

Our scope of services did not include environmental services. We can provide these services at your request.

B. Results

B.1. Geologic Overview

Based on our review of the geologic maps from the USGS website and our previous knowledge, the site is generally underlain with alluvial sand soils. Fill is also present due to previous site development. Given the proximity of the site to the Mississippi River, Black River, and Lake Onalaska shallow groundwater conditions are also expected.

We based the geologic origins used in this report on the soil types, in-situ and laboratory testing, and available interpreted 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. Previous Geotechnical Information

We performed six soil borings at this site in August 2018 for the La Crosse Regional Airport Car Wash Facility located on the south side of the south terminal parking lot. The previous evaluation encountered pavement materials and topsoil fill over sandy fill soils to depths of 2 to 4 feet sandy alluvial soils to the termination depths. Groundwater was encountered at depths of approximately 13 to 18 feet below existing grades corresponding to an elevation of 634 ½ to 638 ½ feet.

B.3. Exploration Results

Table 2 provides a summary of the exploration results; in the general order we encountered the strata. Please refer to the Log of Boring sheets and Log of Test Pit sheets in the Appendix for additional details.

Table 2. Subsurface Profile Summary*

Strata	Soil Type – USCS Soil Classification	Range of Penetration Resistances N-Values***	Commentary and Details
Pavement Materials	---	---	▪ Encountered at the ground surface in Borings SB-1 to SB-7. ▪ Consisted of approximately 2 to 4 inches of bituminous pavement over 5 to 16 inches of apparent aggregate base.
Topsoil / Topsoil Fill	SP-SM, SM, SC	---	▪ Encountered at the ground surface in Test Pits TP-1 to TP-8 and Double Ring Infiltrometer DRI-1. ▪ Thickness at the exploration locations varied from approximately 1 to 1 ½-feet. ▪ Consisted of fine-grained poorly graded sand with silt, silty sand, and clayey sand that contained roots and trace gravel and was dark brown in color and moist.
Fill**	SP, SP-SM	3 to 42 BPF	▪ Encountered below the topsoil and pavement materials in Borings SB-1 to SB-7 and Test Pits TP-5 to TP-8 and extended to depths of approximately 3 to 6 ½ feet below existing grades. ▪ Consisted of fine- to medium-grained poorly graded sand and poorly graded sand with silt with trace gravel that was light brown, brown, and dark brown in color and moist. ▪ General penetration resistance suggests the fill was not uniformly compacted.
Buried Topsoil	SM	---	▪ Encountered below the fill in Borings SB-1 to SB-4 and Test Pits TP-5 to TP-8 and extended to depths of approximately 5 to 8 feet below existing grades. ▪ Thicknesses at exploration locations varied from approximately 1 ½ to 2 ½ feet. ▪ Consisted of fine- to medium-grained silty sand with trace roots and gravel was dark brown in color and moist.
Alluvium	SP	10 to 23 BPF	▪ Encountered in all exploration locations below the pavement materials, topsoil, fill, and buried topsoil, and extended to the termination depths of the borings and test pit excavations. ▪ Generally consisted of fine- to coarse-grained poorly graded sand that was light brown to brown in color and moist. ▪ Penetration resistance testing in the alluvial soils indicates the relative density of these soils are loose to medium dense.

*Abbreviations defined in the attached Descriptive Terminology sheets.
**For simplicity in this report, we define existing fill to mean existing, uncontrolled, or undocumented fill.
***Penetration resistance values only apply to the soil borings.

B.4. Groundwater

Table 3 summarizes the depths where we observed groundwater; the attached Log of Boring sheets and Log of Test Pit sheets in the Appendix also include this information and additional details. Corresponding groundwater elevations were determined from comparisons of the measured/estimated depths to groundwater and surface elevations and were rounded to the nearest ½-foot.

Table 3. Groundwater Summary

Exploration Location	Surface Elevation (feet)	Measured or Estimated Depth to Groundwater (feet)	Corresponding Groundwater Elevation* (feet)
SB-1	649.8	Not Observed	---
SB-2	652.2	Not Observed	---
SB-3	650.6	Not Observed	---
SB-4	649.6	Not Observed	---
SB-5	651.6	Not Observed	---
SB-6	652.9	Not Observed	---
SB-7	650.0	Not Observed	---
TP-1	648.4	10 ½	638
TP-2	649.2	11	638
TP-3	648.5	12	637
TP-4	648.1	13	635 ½
TP-5	652.7	Not Observed	---
TP-6	652.8	Not Observed	---
TP-7	650.5	Not Observed	---
TP-8	650.3	Not Observed	---
DRI-1	648.9	10 ½	638

*Groundwater elevations rounded up to the nearest ½-foot.

At the time of our observation, we observed groundwater at depths of approximately 10 ½ to 13 feet below existing grades. These depths correspond to elevations of 635 ½ to 638 feet. Furthermore, considering the proximity of the site to the Mississippi River, Black River, and Lake Onalaska fluctuations with the groundwater will be like the stage, flow, and elevation of these water bodies. Project planning should anticipate seasonal and annual fluctuations of groundwater and be based on at least the 100-year flood elevation for the site.

B.5. Laboratory Test Results

Overall, the soils encountered within our exploration locations at this site generally consisted of sandy fill and alluvial soils with areas of buried topsoil. The following sections summarize our laboratory testing results. Laboratory testing was completed in general accordance with American Society for Testing and Materials (ASTM) standards.

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.

B.5.a. Mechanical Sieve Analysis Tests

We performed mechanical sieve analyses (ASTM D6913) on selected samples to assist in soil classification and particle size analysis. The tests indicated the samples tested classified as fine- to coarse-grained poorly graded sand (SP). The Log of Boring sheets and Log of Test Pit sheets present the moisture content and percent passing a #200 sieve results and the Appendix includes graphs showing the results of the mechanical sieve analyses.

B.5.b. Laboratory Soil Classification Tests

Results of our laboratory tests for soil classification, moisture content, and particles passing a #200 sieve are presented below in Table 4.

Table 4. Laboratory Soil Classification Test Results

Exploration Location	Sample Depth (feet)	Soil Type – USCS Soil Classification	Moisture Content (w, %)	Percent Passing a #200 Sieve
SB-1	1	FILL: SP-SM	5	7
SB-1	5	SM	12	---
SB-2	5	FILL: SP-SM	11	9
SB-2	7 ½	SM	9	---
SB-3	2 ½	FILL: SP-SM	10	12
SB-3	5	SM	6	---
SB-4	2 ½	FILL: SP-SM	7	---
SB-4	5	SM	12	13
SB-5	2 ½	FILL: SP	9	---
SB-5	7 ½	SP	4	2
SB-6	2 ½	FILL: SP-SM	6	9
SB-6	5	FILL: SP-SM	9	---

Exploration Location	Sample Depth (feet)	Soil Type – USCS Soil Classification	Moisture Content (w, %)	Percent Passing a #200 Sieve
SB-7	2 ½	FILL: SP-SM	4	6
SB-7	7 ½	SP	5	---
TP-1	8	SP	3	1
TP-2	4	SP	3	2
TP-3	6	SP	3	1
TP-4	3	SP	3	1
TP-5	12	SP	6	3
TP-6	4	FILL: SP-SM	8	7
TP-7	10	SP	5	2
TP-8	12	SP	5	1
DRI-1	7	SP	9	1

C. Recommendations

C.1. Design and Construction Discussion

Based upon our soil borings and test pit excavations, the site is composed of existing pavement materials, topsoil and topsoil fill, fill, buried topsoil, and alluvial soils that are generally sandy in composition. Groundwater was also encountered at depths of approximately 10 ½ to 13 feet below existing grades corresponding to elevations of 635 ½ to 638 feet.

Areas that will receive new pavements should be prepared by removing existing pavement materials, surficial vegetation, and topsoil, as well as enough underlying fill soils to allow for the placement of the new pavement materials. Prior to placing additional fill, the exposed subgrade soils should be surface compacted to densify and enhance uniformity of the exposed soils. A proofroll should also be performed after the aggregate base material is in place, and prior to placing bituminous or concrete pavements.

The sandy soils encountered at the site are well suited for rapid infiltration of storm water but may require a filtering medium. Groundwater, however, was encountered at depths of approximately 10 ½ to 13 feet below existing grades corresponding to elevations of 635 ½ to 638 feet. Groundwater is a limiting factor per the Wisconsin Department of Natural Resources (DNR) Storm Water Infiltration Technical Standard 1002 and should be accounted for in the design of the storm water infiltration basins. With location of the site, however, planning should utilize the 100-year flood elevation as the limiting layer to design the bottom elevation for the storm water features.

From a construction perspective, the project team should also be aware that:

- Demolition should include removal of existing pavement materials, slabs, and utilities. The areas should then be backfilled with compacted fill prior to the placement of additional fill, new pavements, or utilities.

- The on-site existing fill can be considered for re-use as backfill and additional required fill provided debris and organic soils (if encountered) are first removed. The alluvial soils can also be considered for reuse as backfill and additional required fill.

- Imported material needed to replace excavation spoils or balance cut and fill quantities should consist of sandy soils having less than 12 percent of the particles by weight passing a #200 sieve. Soil needed to facilitate drainage should consist of sand and/or gravel with 100 percent passing a 1-inch sieve, less than 50 percent passing a #40 sieve, and less than 5 percent passing a #200 sieve.

C.2. Earthwork and Subgrade Preparation

C.2.a. Subgrade Excavations and Removals

We recommend removing the existing pavement materials, surficial vegetation, and topsoil from below the proposed pavement areas. Based on the soil borings and test pit excavations, these materials are anticipated to be approximately 1 to 2 feet thick. Excavation depths will vary between the exploration locations. Portions of the excavations may also extend deeper than indicated by the soil borings and test pit excavations. We also recommend having a geotechnical engineer, or an engineering technician working under the direction of a geotechnical engineer, (geotechnical representative) evaluate the suitability of exposed soils to support the new pavements and utilities.

C.2.b. Excavated Slopes

Based on the soil borings and test pit excavations, we anticipate on-site soils in excavations will consist of sandy fill and alluvial sand soils. These soils are considered Type C Soil under Occupational Safety and Health Administration (OSHA) guidelines. OSHA guidelines indicate unsupported excavations in Type C soils should have a gradient no steeper than 1 ½H: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.c. Excavation Dewatering

We do not anticipate dewatering will be required for most of the excavations on this project but could be necessary during the installation of underground utilities, depending on the final design invert elevations. We recommend removing groundwater or surface runoff water from the excavations.

Project planning should include temporary sumps and pumps for excavations where groundwater or surface runoff water is encountered. Dewatering of high-permeability soils (e.g., sands) from within the excavation with conventional pumps has the potential to loosen the soils, due to upward flow. If excavations will be opened for an extended period, then a dewatering contractor should develop a dewatering plan, and the design team should review this plan.

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

We recommend the following steps for pavement and exterior slab subgrade preparation, understanding the site will have a grade change of 1-foot feet or less.

1. Strip unsuitable materials consisting of pavement materials, surficial vegetation, topsoil, organic soils, existing structures, and utilities from the area, as well as fill within 1 to 2 feet of the surface of the proposed pavement grade. Note, excavation depths may vary between exploration locations.

2. Have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary.

3. Slope subgrade soils to promote drainage and removal of accumulated water.

4. Surface compact the pavement subgrade with at least five passes of a large, vibratory, smooth-drum compactor with a minimum drum diameter of 3 ½ feet. This will density and enhance the uniformity of the exposed pavement subgrade soils.

5. Place pavement aggregate base in accordance with Wisconsin Department of Transportation (WisDOT) Standard Specification 305 using ¾- or 1 ¼-inch Dense Graded Base to bottom of pavement and exterior slab sections and compact in accordance with Section C.2.f. See Section C.3 for additional considerations related to frost heave.

6. Proofroll the pavement or exterior slab base layer as described in Section C.2.e below.

7. Place new concrete or bituminous pavement.

C.2.e. Pavement Subgrade Proofroll

We recommend performing a proofroll with a fully loaded tandem-axle truck after the aggregate base material is in place, and prior to placing bituminous or concrete pavement. The contractor should correct areas that display excessive yielding or rutting (1-inch or greater) during the proofroll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and re-compaction or sub-cutting and replacement with compacted granular subbase fill or crushed aggregate.

C.2.f. Engineered Fill Materials and Compaction

Table 5 below contains our recommendations for engineered fill materials.

Table 5. Engineered Fill Materials*

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
General site grading	General fill	On-site soils or imported soils consisting of SP, SP-SM, SP-SC, SM, SC	100% passing 2-inch sieve < 20% passing #200 sieve	< 2% Organic Content (OC)
Pavements	Dense graded base	¾- or 1 ¼-inch dense graded base	WisDOT Specification 305	---
	Granular subbase	On-site soils or imported soils consisting of SP, SP-SM, SP-SC	WisDOT Specification 209 Grade 1 or 2 Granular Backfill	---
	Pavement subgrades	On-site soils or imported soils consisting of SP, SP-SM, SP-SC, SM, SC	100% passing 3-inch sieve < 12% passing #200 sieve	< 2% OC
Utility trench backfill	Trench backfill	On-site soils or imported soils consisting of SP, SP-SM, SP-SC, SM, SC	100% passing 1-inch sieve < 20% passing #200 sieve	< 2% OC
▪ Drainage layer ▪ Non-frost-susceptible	▪ Free-draining ▪ Non-frost-susceptible fill	GP, GW, SW, SP	100% passing 1-inch sieve < 50% passing #40 sieve < 5% passing #200 sieve	< 2% OC
Landscaped surfaces and green space	Non-structural fill	---	100% passing 6-inch sieve	< 10% OC

*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 8 to 12 inches thick. Lift thicknesses should be reduced by half when walk behind compactors are used. We recommend compacting engineered fill in accordance with the criteria presented below in Table 6. 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.

Table 6. Compaction Recommendations Summary

Reference	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, percentage points	
		< 12% Passing #200 Sieve (typically: SP, SP-SM, SP-SC)	> 12% Passing #200 Sieve (typically: SM, SC)
General site grading	95*	-6 to +3	-1 to +3
Pavement materials (dense graded base and granular subbase)	100	±3	Not Applicable
Pavement subgrades	100 upper 3 feet 95 below upper 3 feet	-6 to +3	Not Applicable
Trench Backfill	95*	-6 to +3	-1 to +3
Non-frost susceptible fill or free draining fill	95*	-6 to +3	Not Applicable
Non-structural fill	90	-6 to +3	±4

*Increase compaction requirement to meet compaction required for pavement supported by engineered fill as applicable.

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. Frost Protection

We consider the sandy fill and alluvial sand soils to be non- to slightly-frost susceptible. Unfavorable amounts of heaving could occur if these soils become saturated and freeze. Soils with silt and clay content over 7 percent will have an elevated potential to heave when frozen and reduced strength during spring thaw. Site grades should be graded to promote drainage of the pavement areas and help limit the potential for saturation and subsequent heaving to occur.

Over the life of the pavement or slab, cracks may develop, and joints may open, which will expose the subgrade and allow water to enter the subgrade. This water entering the subgrade increases the likelihood of heave. It will be critical that the owner develop a detailed maintenance program to repair any cracks and joints that may develop during the useful life of the various surface features. The maintenance program should pay special attention to areas where dissimilar materials abut one another, where construction joints occur and where shrinkage cracks develop.

C.4. Pavements and Exterior Slabs

C.4.a. Design Thickness 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 15. Note the contractor may need to perform limited removal of unsuitable or less suitable soils and surface compact subgrade soils to achieve this value. Table 7 provides recommended light- and medium-duty bituminous pavement thickness sections, based on the soils estimated support and assumed traffic loads provided in Section A.1 above.

Table 7. Recommended Bituminous Pavement Thickness Sections

Pavement Material	Light-Duty Pavements Thickness/Preparations	Medium-Duty Pavements Thickness/Preparations
Minimum Bituminous Thickness (in.)	3	4
Minimum Dense Graded Base Thickness (in.)	8	12
Subgrade Preparation	Surface compact, then proofroll after placement of dense graded base to locate loose or weak subgrade materials prior to placement of bituminous pavement.	

For concrete pavements based upon the assumed traffic loads, and an estimated modulus of subgrade reaction (k) of 200 pci, we recommend light- and medium-duty concrete pavement thickness sections as shown in Table 8 below.

Table 8. Recommended Concrete Pavement Thickness Sections

Pavement Material	Light-Duty Pavements Thickness/Preparations	Medium-Duty Pavements Thickness/Preparations
Minimum Concrete Thickness (in.)	6	7
Minimum Dense Graded Base Thickness (in.)	4	6
Subgrade Preparation	Surface compact, then proofroll after placement of dense graded base to locate loose or weak subgrade materials prior to placement of concrete pavement.	

C.4.b. Bituminous Pavement Materials

Appropriate mix designs are critical to the performance of flexible bituminous 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.

C.4.c. 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 (Mr) of at least 650 psi. We recommend specifying 4.5 to 7.5 percent entrained air for exposed concrete to provide resistance to freeze-thaw deterioration and recommend using a water/cement ratio of 0.42 or less for concrete exposed to deicers.

We assumed the concrete pavement sections in Table 8 will have edge support. We recommend placing an aggregate base layer below the pavement to provide a suitable subgrade for concrete placement, reduce faulting, and help dissipate loads. Appropriate mix designs, panel sizing, jointing, doweling, and edge reinforcement are critical to performance of rigid pavements. We recommend you contact your civil engineer for the final design.

C.4.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 base course of bituminous and then delay placement of surface 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.5. Underground Utilities

C.5.a. Subgrade Stabilization

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.5.b. Corrosion Potential

The soil borings indicated the site predominantly 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.5.c. Utility Trench Backfill

Utility trench backfill should adhere to the recommendations in Section C.2 above.

C.6. Storm Water

C.6.a. Subsurface Profile

We observed the excavation of nine test pits that were extended to depths of approximately 10 to 13 feet below existing grades in the proposed storm water infiltration basins. We labeled our exploration locations Test Pits, TP-1 to TP-8 and Double Ring Infiltrometer, DRI-1.

Test Pits TP-1 to TP-4 and DRI-1 encountered topsoil consisting of fine-grained loamy sand over alluvial soils consisting of fine- to coarse-grained sand with various amounts of gravel at depth. Groundwater was encountered at depths of 10 ½ to 13 feet below existing grades in these test pit excavations corresponding to elevations of 635 ½ to 638 feet.

Test Pits TP-5 to TP-8 encountered topsoil fill consisting of fine-grained loamy sand and sandy loam over fill consisting of fine- to medium-grained sand and loamy sand to depths of approximately 4 feet below existing grades. Buried topsoil consisting of fine-grained loamy sand was encountered below the fill to depths of approximately 5 to 6 feet below existing grades. Below the buried topsoil the test pits encountered alluvial soils composed of fine- to medium-grained sand with trace amounts gravel to the termination depths. Groundwater was not encountered within these test pit excavations.

C.6.b. Morphological Evaluation

In general, the alluvial sand soils present at the site are well suited for rapid infiltration of storm water but may require a filtering medium. However, lower infiltration rates should be anticipated in the fill and buried topsoil composed of loamy sand and sandy loam in the storm water infiltration basins located on the west and east sides of the south terminal parking lot (Test Pits TP-5 to TP-8). Infiltration rates associated with the soils present at the exploration locations are included on the Soil Evaluation – Storm form included in the Appendix of this report. The reported infiltration rates were determined by referencing Table 2 in the Wisconsin DNR Storm Water Infiltration Technical Standard 1002, dated December 2022.

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 generally are not present in disturbed or compacted soils, such as existing fills, because void space between soil particles may have been reduced from compaction efforts.

In addition, groundwater was encountered at depths of approximately 10 ½ to 13 feet (elevation 635 ½ to 638 feet) below existing grades at the storm water infiltration basin to be located on the north side of the north terminal parking lot. Design of the storm water features should utilize the 100-year flood elevation as the limiting layer to design the bottom elevation for the storm water features. Groundwater is considered a limiting layer by the Wisconsin DNR Technical Standard 1002. The depth to groundwater and flood elevations should be accounted for in the design of the improvements to the storm water systems at the site. Considering the proximity of the site to the Mississippi River, Black River, and Lake Onalaska, fluctuations with the groundwater will likely be similar to the stage, flow, and elevation of these bodies of water. Seasonal and annual fluctuations of groundwater should also be anticipated.

Double Ring Infiltrometer Test Results

Table 9 presents the results of our double ring infiltrometer testing. One test was performed in accordance with ASTM D3385. We suggest adjusting field test rates by the appropriate correction factor, as provided in the Wisconsin DNR Storm Water Infiltration Technical Standard 1002 or as allowed by the local watershed. The data sheet for the completed double ring infiltration test is provided in the Appendix of this report.

Table 9. Double Ring Infiltrometer Test Results

Test Location	Approximate Test Elevation (feet)	Average Infiltration Rate over Entire Test (inch/hr)*	Steady State Infiltration Rate over Last 4 Intervals (inch/hr)*
DRI-1	642	104.4	105.4

*These values presented in this table are un-factored.

C.6.c. Performance and Maintenance

Fine-grained soils (silts and clays), topsoil, or organic matter that mixes into or washes onto the soil will lower the permeability. The contractor should maintain and protect infiltration areas during construction. Furthermore, organic matter and silt washed into the system after construction can fill the soil pores and reduce permeability over time. Proper maintenance is important for long-term performance of infiltration systems.

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

C.7. 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, below-grade walls, etc. We can assist you in this evaluation.

D. Procedures

D.1. Penetration Test Borings

Geotechnical Drilling Contractors, LLC drilled the penetration test borings with a truck-mounted core and auger drill equipped with hollow-stem auger. The borings were performed in general accordance with ASTM D6151 taking penetration test samples at 2 ½-foot intervals to the planned termination depths in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

Penetration test boreholes were sealed meeting the Wisconsin Administrative Code NR 141.25 criteria. A copy of the sealing record can be obtained upon request.

D.2. Exploratory Test Pits

Strupp Trucking and Excavating, Inc. excavated the test pits with a backhoe, under the direction and observation of our staff. We prepared Test Pit Logs by visually examining the sidewalls of the test pits and classifying the materials brought to the surface by the backhoe bucket. We measured strata boundary depths with a tape measure and generally rounded to the nearest ½-foot. We also collected bulk samples of the excavated material at selected depths for laboratory testing.

Test pit excavations were backfilled with uncompacted spoils from the excavation in the approximate order they removed upon completion and the area graded and reseeded.

D.3. Exploration Logs

D.3.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 likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.3.b. 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.3.c. 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 testing and in-situ testing performed for the project, (4) laboratory test results, and (5) available interpreted knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.4. Material Classification and Testing

D.4.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.4.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.5. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes as noted on the boring logs.

While excavating the test pits and at the termination depths, our field personnel observed the sides and bottoms of the excavation for evidence of groundwater seepage and/or accumulation.

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 to some extent. 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 relatively 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 Mead & Hunt, Inc. 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 TEST PIT

DENOTES APPROXIMATE LOCATION OF DOUBLE RING INFILTROMETER

N

75' 0 150'

SCALE: 1" = 150'

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2309 Palace Street
La Crosse, WI 54603
608.781.7277
braunintertec.com

Drawing Information

Project No:	B2407684
Drawing No:	B2407684
Drawn By:	BJB
Date Drawn:	8/27/24
Checked By:	BRS
Last Modified:	9/4/24

Project Information

Proposed Terminal Parking Lot Reconstruction

2850 Airport Road

La Crosse, Wisconsin

Soil Boring and Test Pit Location Sketch

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2407684
Geotechnical Evaluation
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

BORING: **SB-1**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Wisconsin CRS La Crosse (US Feet)
NORTHING: 154969.3 EASTING: 441814.1
DRILLER: Geotechnical Drilling Contractors, LLC LOGGED BY: B. Sullivan START DATE: 09/04/24 END DATE: 09/04/24
SURFACE ELEVATION: 649.8 ft RIG: Subcontractor METHOD: 4 1/4" HSA SURFACING: Pavement WEATHER: Sunny

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
648.8		PAVEMENT, 2 1/2 inches of bituminous over 10 inches of apparent aggregate base					
1.0		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, light brown to brown, moist		7-8-10 (18) 16"		5	P200=7%
645.8							
4.0		SILTY SAND (SM), fine to medium-grained, trace roots, dark brown, moist (BURIED TOPSOIL)	5	10-9-9 (18) 16"		12	
643.3							
6.5		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown to light brown, moist, medium dense (ALLUVIUM)		8-9-9 (18) 14"			
			10	5-7-9 (16) 16"			
638.8							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2407684
Geotechnical Evaluation
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

BORING: **SB-2**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Wisconsin CRS La Crosse (US Feet)
NORTHING: 154888.3 EASTING: 441690.5

DRILLER:	Geotechnical Drilling Contractors, LLC	LOGGED BY:	B. Sullivan	START DATE:	09/04/24
SURFACE ELEVATION:	652.2 ft	RIG:	Subcontractor	METHOD: 4 1/4" HSA	SURFACING: Pavement
END DATE:	09/04/24	WEATHER:	Sunny		

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
650.9		PAVEMENT, 4 inches of bituminous over 12 inches of apparent aggregate base					
1.3 650.2		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, dark brown, moist		5-7-12 (19) 10"			
2.0		FILL: POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, moist					
648.2							
4.0		FILL: POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist	5	16-18-22 (40) 14"		11	P200=9%
645.7							
6.5		SILTY SAND (SM), fine to medium-grained, dark brown, moist (BURIED TOPSOIL)		7-10-9 (19) 14"		9	
644.2							
8.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, light brown, moist, medium dense (ALLUVIUM)	10	5-6-9 (15) 14"			
641.2							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2407684
Geotechnical Evaluation
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

BORING: **SB-3**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Wisconsin CRS La Crosse (US Feet)
NORTHING: 154768.4 EASTING: 441756.1

DRILLER:	Geotechnical Drilling Contractors, LLC	LOGGED BY:	B. Sullivan	START DATE:	09/04/24
END DATE:	09/04/24	SURFACE ELEVATION:	650.6 ft	RIG:	Subcontractor
METHOD:	4 1/4" HSA	SURFACING:	Pavement	WEATHER:	Sunny

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
648.9		PAVEMENT, 4 inches of bituminous over 16 inches of apparent aggregate base					
1.7 647.1		FILL: POORLY GRADED SAND with SILT and GRAVEL (SP-SM), fine to medium-grained, brown, moist		3-4-8 (12) 16"		10	P200=12%
3.5 645.6		SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist (BURIED TOPSOIL)		5-9-11 (20) 16"		6	
5.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown to light brown, moist, medium dense to loose (ALLUVIUM)	5	4-4-8 (12) 16"			
639.6			10	3-4-6 (10) 16"			
11.0		END OF BORING Boring then backfilled with auger cuttings	15				Water not observed while drilling.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2407684
Geotechnical Evaluation
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

BORING: **SB-4**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Wisconsin CRS La Crosse (US Feet)
NORTHING: 154618.4 EASTING: 441867.3
DRILLER: Geotechnical Drilling Contractors, LLC LOGGED BY: B. Sullivan START DATE: 09/04/24 END DATE: 09/04/24
SURFACE ELEVATION: 649.6 ft RIG: Subcontractor METHOD: 4 1/4" HSA SURFACING: Pavement WEATHER: Sunny

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
648.5		PAVEMENT, 2 inches of bituminous over 11 inches of apparent aggregate base					
1.1 645.6		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown to dark brown, moist		5-6-8 (14) 12"		7	
4.0 643.1		SILTY SAND (SM), fine to medium-grained, dark brown, moist (BURIED TOPSOIL)	5	8-7-7 (14) 16"		12	P200=13%
6.5 638.6		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown to light brown, moist, medium dense (ALLUVIUM)		7-7-8 (15) 16"			
			10	7-8-9 (17) 16"			
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2407684
Geotechnical Evaluation
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

BORING: **SB-5**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Wisconsin CRS La Crosse (US Feet)
NORTHING: 154544.2 EASTING: 441696.3
DRILLER: Geotechnical Drilling Contractors, LLC LOGGED BY: B. Sullivan START DATE: 09/04/24 END DATE: 09/04/24
SURFACE ELEVATION: 651.6 ft RIG: Subcontractor METHOD: 4 1/4" HSA SURFACING: Pavement WEATHER: Sunny

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
650.5		PAVEMENT, 4 inches of bituminous over 9 inches of apparent aggregate base					
1.1		FILL: POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, moist		2-3-2 (5) 12"		9	
			5	2-1-2 (3) 12"			
645.1							
6.5		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, light brown, moist, medium dense (ALLUVIUM)		5-7-10 (17) 14"		4	P200=2%
			10	5-9-11 (20) 12"			
640.6							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2407684
Geotechnical Evaluation
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

BORING: **SB-6**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Wisconsin CRS La Crosse (US Feet)
NORTHING: 154348.9 EASTING: 441677.8
START DATE: 09/04/24 END DATE: 09/04/24
SURFACING: Pavement WEATHER: Sunny

DRILLER: Geotechnical Drilling Contractors, LLC
LOGGED BY: B. Sullivan
SURFACE ELEVATION: 652.9 ft
RIG: Subcontractor
METHOD: 4 1/4" HSA

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
652.1		PAVEMENT, 4 inches of bituminous over 6 inches of apparent aggregate base					
0.8		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown to dark brown, moist		12-12-14 (26) 8"		6	P200=9%
			5	16-23-19 (42) 10"		9	
646.4							
6.5		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, light brown, moist, medium dense (ALLUVIUM)		10-10-10 (20) 12"			
			10	7-8-10 (18) 10"			
641.9							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				

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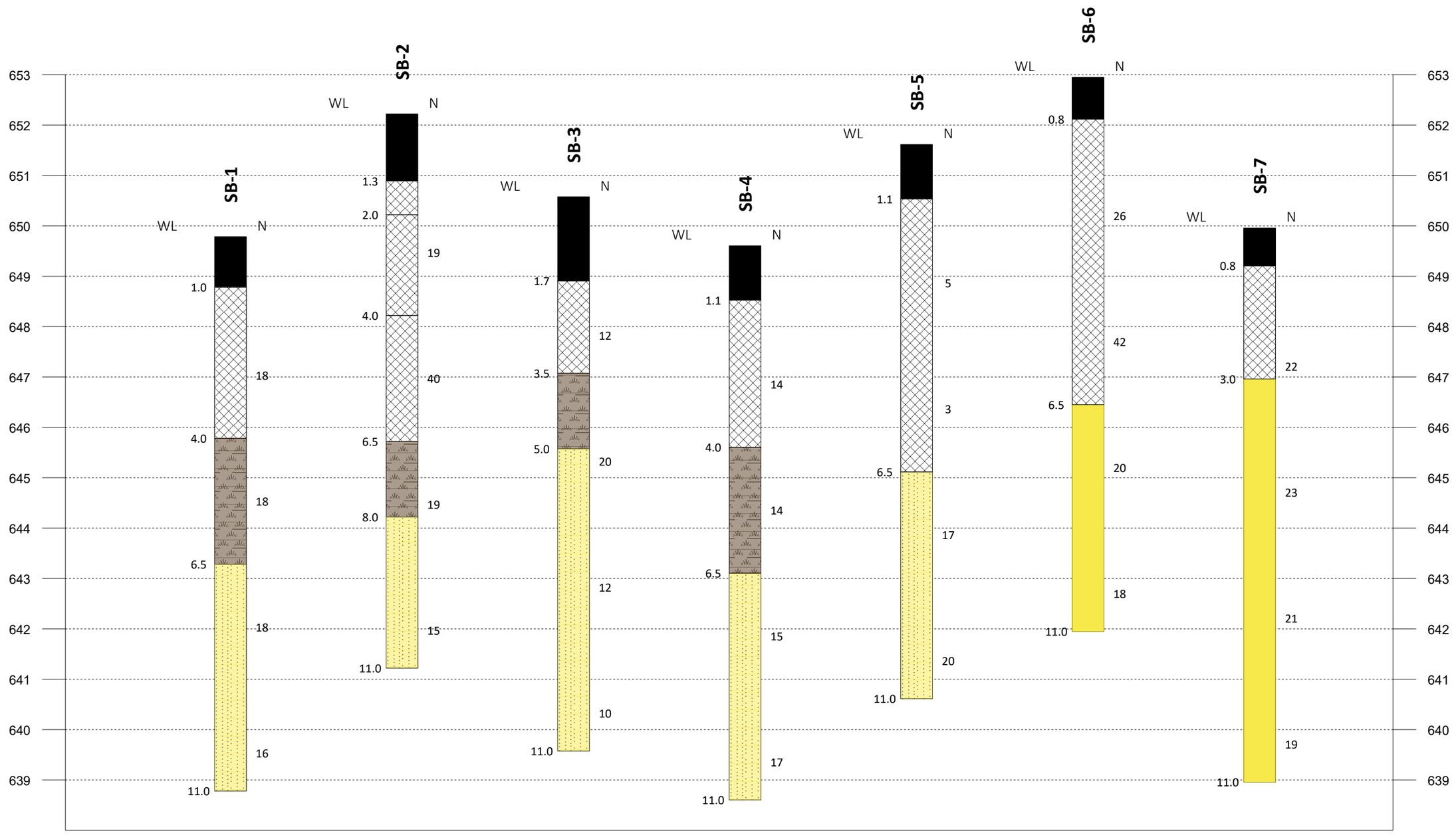
See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2407684
Geotechnical Evaluation
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

BORING: **SB-7**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Wisconsin CRS La Crosse (US Feet)
NORTHING: 154221.1 EASTING: 441800.2

DRILLER:	Geotechnical Drilling Contractors, LLC	LOGGED BY:	B. Sullivan	START DATE:	09/04/24
SURFACE ELEVATION:	650.0 ft	RIG:	Subcontractor	METHOD: 4 1/4" HSA	SURFACING: Pavement
END DATE:	09/04/24	WEATHER:	Sunny		

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
649.2		PAVEMENT, 4 inches of bituminous over 5 inches of apparent aggregate base					
0.8		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, moist		10-11-11 (22) 10"		4	P200=6%
647.0							
3.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, light brown, moist, medium dense (ALLUVIUM)		11-11-12 (23) 10"			
5							
				10-10-11 (21) 8"		5	
10				9-9-10 (19) 10"			
639.0							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
15							



Legend Key

- Asphalt
- Fill
- Topsoil
- SP

Project ID:	B2407684
Vert. Scale:	1"= 2'
Hor. Scale:	NTS
Date:	09/09/2024

Fence Diagram
Geotechnical Evaluation
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, Wisconsin

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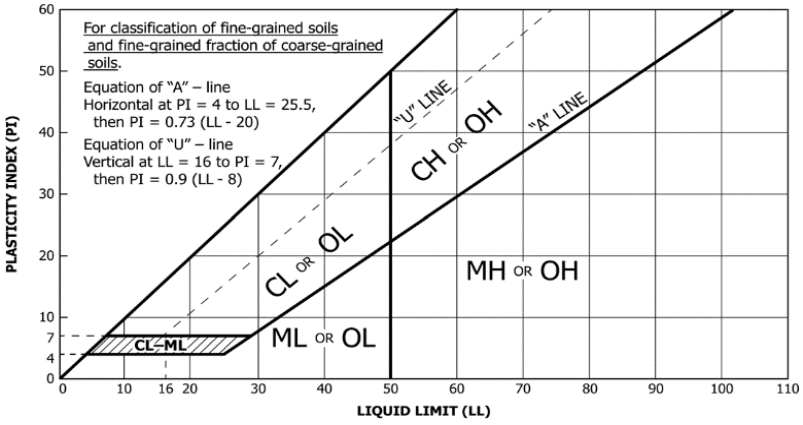
Descriptive Terminology of Soil

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	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	Liquid Limit – oven dried / 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	Liquid Limit – oven dried / 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.



Laboratory Tests

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

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.

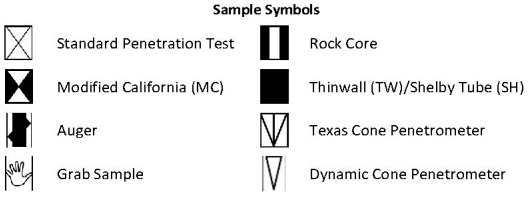
Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

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 (▼).

Sample Symbols



5/2021

BRAUN INTERTEC
The Science You Build On.

Sieve Analysis Of Soil

ASTM D6913

09/06/2024

2309 Palace Street
La Crosse, WI 54603
Phone: 608-781-7277

Client:

Mead & Hunt, Inc.
7900 International Drive
Suite 980
Minneapolis, MN 55425

Project:

B2407684
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, WI 54603

Sample Information

Sample Number:	614673	**Depth (ft):**	7.5
Sampling Method:	Penetration Boring ASTM D1586	**Sampled By:**	Drill Crew
Boring Number:	SB-5		
Location:	In-place		
Sample Date:	09/04/2024		
Received Date:	09/04/2024	**Lab:**	2309 Palace Street, La Crosse, WI
Tested Date:	09/05/2024	**Tested By:**	Goetz, Kadin

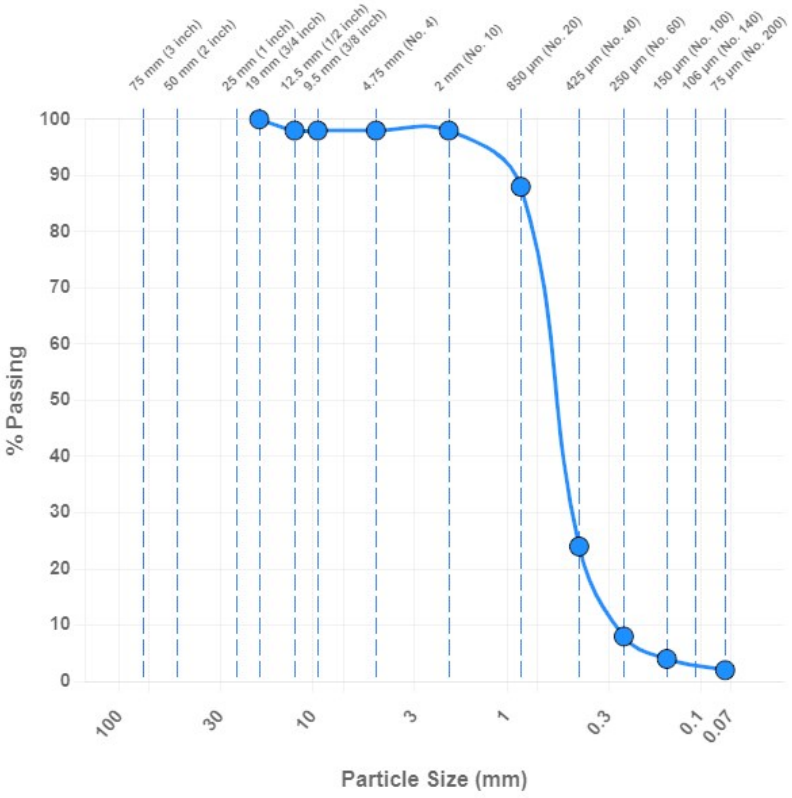
Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100	
12.5 mm (1/2 inch)	98	
9.5 mm (3/8 inch)	98	
4.75 mm (No. 4)	98	
2 mm (No. 10)	98	
850 µm (No. 20)	88	
425 µm (No. 40)	24	
250 µm (No. 60)	8	
150 µm (No. 100)	4	
75 µm (No. 200)	2	

Gravel (%)	Sand (%)	Silt & Clay (%)
2.0	96.0	2.0

D10	D30	D60
0.272	0.465	0.664

C_U	C_C
2.44	1.20



Classification: SP Poorly graded sand, fine to medium grained

Specimen Obtained: Moist

Test Method: Single Sieve Set

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Moisture Content (ASTM D2216) = 4%

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Sieve Analysis Of Soil

ASTM D6913

09/06/2024

2309 Palace Street
La Crosse, WI 54603
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Client:

Mead & Hunt, Inc.
7900 International Drive
Suite 980
Minneapolis, MN 55425

Project:

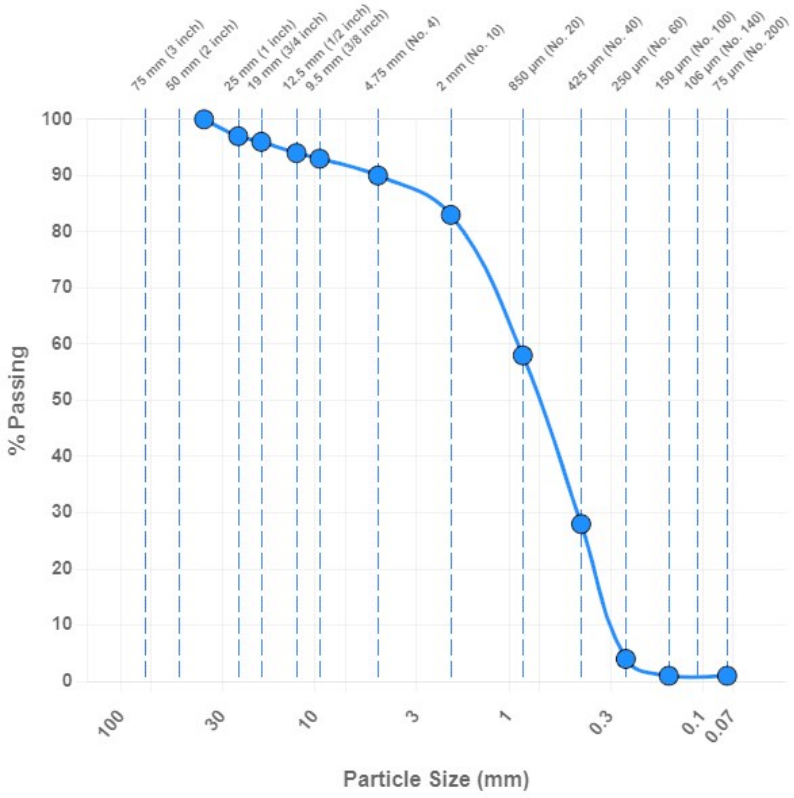
B2407684
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, WI 54603

Sample Information

Sample Number:	614672	**Depth (ft):**	8
Sampling Method:	Backhoe ASTM D75/AASHTO T2	**Sampled By:**	Sullivan, Benjamin
Boring Number:	TP-1		
Location:	Test Pit		
Sample Date:	09/04/2024		
Received Date:	09/04/2024	**Lab:**	2309 Palace Street, La Crosse, WI
Tested Date:	09/06/2024	**Tested By:**	Goetz, Kadin

Laboratory Data

Sieve Size	Passing (%)	Specification
37.5 mm (1.5 inch)	100	
25 mm (1 inch)	97	
19 mm (3/4 inch)	96	
12.5 mm (1/2 inch)	94	
9.5 mm (3/8 inch)	93	
4.75 mm (No. 4)	90	
2 mm (No. 10)	83	
850 µm (No. 20)	58	
425 µm (No. 40)	28	
250 µm (No. 60)	4	
150 µm (No. 100)	1	
75 µm (No. 200)	1	



Gravel (%)	Sand (%)	Silt & Clay (%)
10.0	89.0	1.0

D10	D30	D60
0.294	0.453	0.942

C_U	C_C
3.20	0.74

Classification: SP Poorly graded sand, fine to coarse grained, brown

Specimen Obtained: Moist

Test Method: Single Sieve Set

Split At What Size: 4.75 mm (No. 4)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Moisture Content (ASTM D2216) = 3%

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Sieve Analysis Of Soil

ASTM D6913

09/06/2024

2309 Palace Street
La Crosse, WI 54603
Phone: 608-781-7277

Client:

Mead & Hunt, Inc.
7900 International Drive
Suite 980
Minneapolis, MN 55425

Project:

B2407684
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, WI 54603

Sample Information

Sample Number:	614670	**Depth (ft):**	6
Sampling Method:	Backhoe ASTM D75/AASHTO T2	**Sampled By:**	Sullivan, Benjamin
Boring Number:	TP-3		
Location:	Test Pit		
Sample Date:	09/04/2024		
Received Date:	09/04/2024	**Lab:**	2309 Palace Street, La Crosse, WI
Tested Date:	09/06/2024	**Tested By:**	Goetz, Kadin

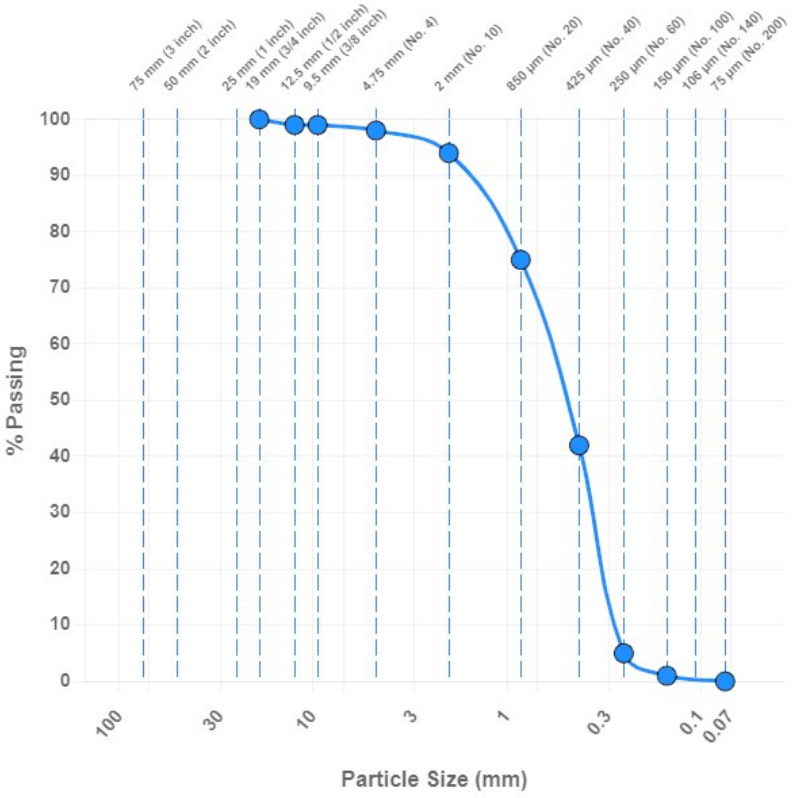
Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100	
12.5 mm (1/2 inch)	99	
9.5 mm (3/8 inch)	99	
4.75 mm (No. 4)	98	
2 mm (No. 10)	94	
850 µm (No. 20)	75	
425 µm (No. 40)	42	
250 µm (No. 60)	5	
150 µm (No. 100)	1	
75 µm (No. 200)	0	

Gravel (%)	Sand (%)	Silt & Clay (%)
2.0	98.0	0.0

D10	D30	D60
0.274	0.368	0.657

C_U	C_C
2.40	0.75



Classification: SP Poorly graded sand, fine to coarse grained, brown

Specimen Obtained:	Moist	**Test Method:**	Single Sieve Set
Split At What Size:	4.75 mm (No. 4)	**Dispersion Apparatus:**	Shaking

General

Results: The test is for informational purposes.

Remarks: Moisture Content (ASTM D2216) = 3%

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Sieve Analysis Of Soil

ASTM D6913

09/07/2024

2309 Palace Street
La Crosse, WI 54603
Phone: 608-781-7277

Client:

Mead & Hunt, Inc.
7900 International Drive
Suite 980
Minneapolis, MN 55425

Project:

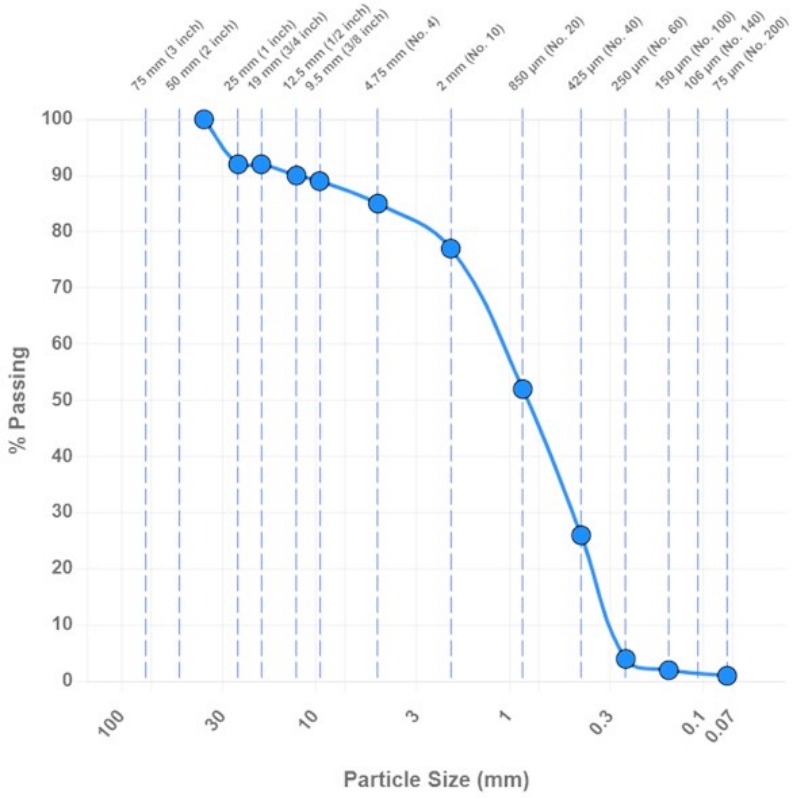
B2407684
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, WI 54603

Sample Information

Sample Number:	614669	**Depth (ft):**	11
Sampling Method:	Backhoe ASTM D75/AASHTO T2	**Sampled By:**	Sullivan, Benjamin
Boring Number:	TP-4		
Location:	Test Pit		
Sample Date:	09/04/2024		
Received Date:	09/04/2024	**Lab:**	2309 Palace Street, La Crosse, WI
Tested Date:	09/06/2024	**Tested By:**	Goetz, Kadin

Laboratory Data

Sieve Size	Passing (%)	Specification
37.5 mm (1.5 inch)	100	
25 mm (1 inch)	92	
19 mm (3/4 inch)	92	
12.5 mm (1/2 inch)	90	
9.5 mm (3/8 inch)	89	
4.75 mm (No. 4)	85	
2 mm (No. 10)	77	
850 µm (No. 20)	52	
425 µm (No. 40)	26	
250 µm (No. 60)	4	
150 µm (No. 100)	2	
75 µm (No. 200)	1	



Gravel (%)	Sand (%)	Silt & Clay (%)
15.0	84.0	1.0

D10	D30	D60
0.298	0.490	1.218

C_U	C_C
4.09	0.66

Classification: SP Poorly graded sand with gravel, fine to coarse grained, light brown

Specimen Obtained: Moist

Test Method: Composite Sieving

Split At What Size: 4.75 mm (No. 4)

Dispersion Apparatus: Shaking

General

Results: The test is for informational purposes.

Remarks: Moisture Content (ASTM D2216) = 3%

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Sieve Analysis Of Soil

ASTM D6913

09/07/2024

2309 Palace Street
La Crosse, WI 54603
Phone: 608-781-7277

Client:

Mead & Hunt, Inc.
7900 International Drive
Suite 980
Minneapolis, MN 55425

Project:

B2407684
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, WI 54603

Sample Information

Sample Number:	614667	**Depth (ft):**	12
Sampling Method:	Backhoe ASTM D75/AASHTO T2	**Sampled By:**	Sullivan, Benjamin
Boring Number:	TP-5		
Location:	Test Pit		
Sample Date:	09/04/2024		
Received Date:	09/04/2024	**Lab:**	2309 Palace Street, La Crosse, WI
Tested Date:	09/06/2024	**Tested By:**	Goetz, Kadin

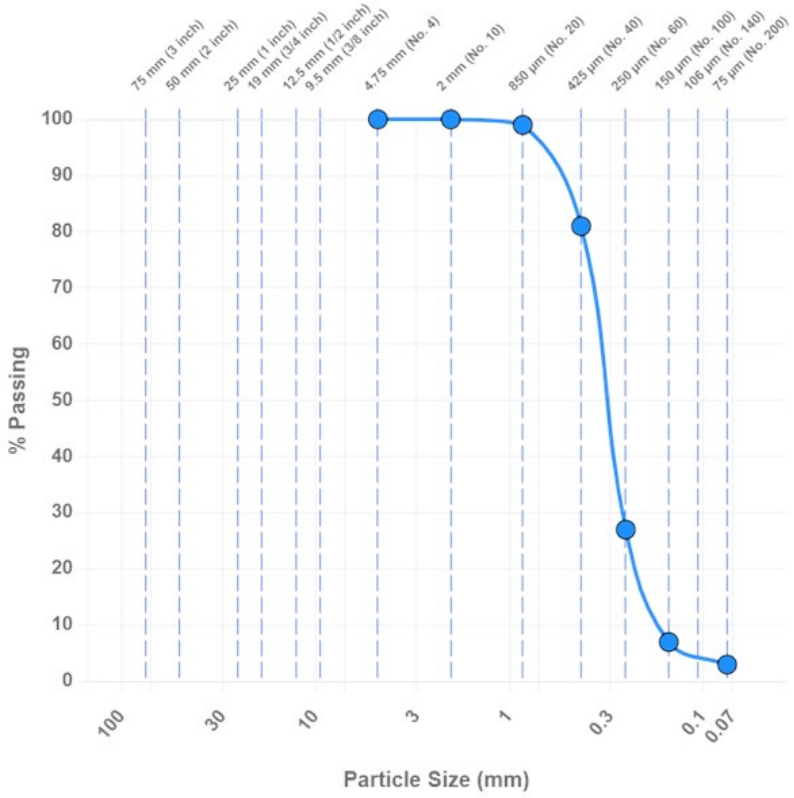
Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100	
2 mm (No. 10)	100	
850 µm (No. 20)	99	
425 µm (No. 40)	81	
250 µm (No. 60)	27	
150 µm (No. 100)	7	
75 µm (No. 200)	3	

Sand (%)	Silt & Clay (%)
97.0	3.0

D10	D30	D60
0.165	0.260	0.357

C_U	C_C
2.16	1.15



Classification: SP Poorly graded sand, fine to medium grained, light brown

Specimen Obtained:	Moist	**Test Method:**	Composite Sieving
Split At What Size:	4.75 mm (No. 4)	**Dispersion Apparatus:**	Shaking

General

Results: The test is for informational purposes.

Remarks: Moisture Content (ASTM D2216) = 6%

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Sieve Analysis Of Soil

ASTM D6913

09/07/2024

2309 Palace Street
La Crosse, WI 54603
Phone: 608-781-7277

Client:

Mead & Hunt, Inc.
7900 International Drive
Suite 980
Minneapolis, MN 55425

Project:

B2407684
Proposed Terminal Parking Lot Reconstruction
2850 Airport Road
La Crosse, WI 54603

Sample Information

Sample Number:	614668	**Depth (ft):**	10
Sampling Method:	Backhoe ASTM D75/AASHTO T2	**Sampled By:**	Sullivan, Benjamin
Boring Number:	TP-7		
Location:	Test Pit		
Sample Date:	09/04/2024		
Received Date:	09/04/2024	**Lab:**	2309 Palace Street, La Crosse, WI
Tested Date:	09/06/2024	**Tested By:**	Goetz, Kadin

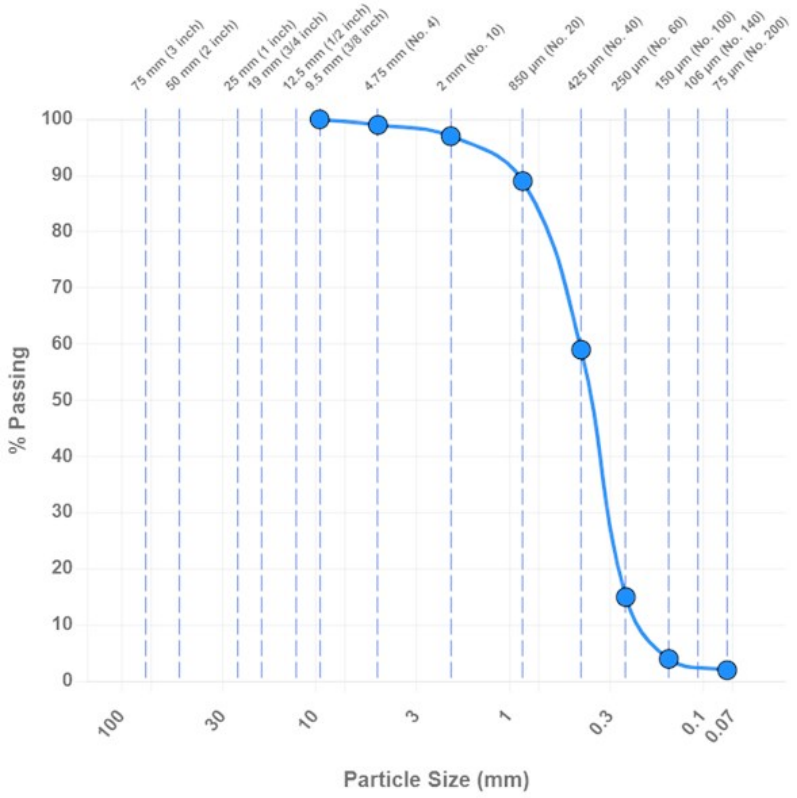
Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100	
4.75 mm (No. 4)	99	
2 mm (No. 10)	97	
850 µm (No. 20)	89	
425 µm (No. 40)	59	
250 µm (No. 60)	15	
150 µm (No. 100)	4	
75 µm (No. 200)	2	

Gravel (%)	Sand (%)	Silt & Clay (%)
1.0	97.0	2.0

D10	D30	D60
0.205	0.310	0.439

C_U	C_C
2.14	1.07



Classification: SP Poorly graded sand, fine to coarse grained, light brown

Specimen Obtained:	Moist	**Test Method:**	Composite Sieving
Split At What Size:	4.75 mm (No. 4)	**Dispersion Apparatus:**	Shaking

General

Results: The test is for informational purposes.

Remarks: Moisture Content (ASTM D2216) = 5%

Wisconsin Department of Safety and Professional Services
Division of Industry Services
4822 Madison Yards Way
PO Box 7302
Madison, WI 53707

Phone: 608-266-2112
Web: http://dsps.wi.gov
Email: dsps@wisconsin.gov

Program: Plumbing
Web: https://dsps.wi.gov/Pages/Programs/Plumbing

Soil and Site Evaluation – Stormwater Infiltration

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 is not limited to: vertical and horizontal reference point (BM); direction and percent of slope; scale or dimensions; north arrow; and BM referenced to nearest road.

PLEASE PRINT ALL INFORMATION

Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]

County: La Crosse
Parcel I.D.: 17-10253-20
Reviewed By:
Reviewed Date:

Property Owner: City of La Crosse

Property Owner's Mailing Address: 400 La Crosse Street

City	State	Zip Code	Phone Number
La Crosse	WI	54601	608.789.7464

PROPERTY LOCATION
Govt. Lot NE ¼ SE ¼ 07 S 16 T N 7 R W
La Crosse Regional Airport
2850 Airport Road, La Crosse, WI 54601
Lot #, Block #, Subd. Name or CSM #: _____
Municipality: City of La Crosse X City ☐ Village ☐ Town
Nearest Road: Airport Road and Breezy Point Road

Drainage area _____ X sq. ft ☐acres

Test site suitable for (check all that apply):

☐ Site not suitable ☐Bioretention ☐Subsurface Dispersal System

☐ Reuse ☐Irrigation ☐Other _____

HYDRAULIC APPLICATION TEST METHOD
X Morphological Evaluation
X Double Ring Infiltrometer
☐ Other: (specify)

SOIL MOISTURE
Date of Test Pits: September 4, 2024

USDA-NRCS WETS Value:
X Dry = 1
X Normal = 2
X Wet = 3

TP-1 X Pit ☐ Boring Ground Surface Elevation 648.4 ft. Elevation of Limiting Factor 10 ½ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
A	0 – 14	10YR 3/2	---	f.ls	1.f.gr	mvfr	c	0	<15	0.50
B	14 – 24	10YR 4/4	---	f/c.s	0.f/c.sg	ml	g	~15	<10	3.60
C	24 – 126	10YR 5/4	---	f/c.s	0.f/c.sg	ml	g	~10	1*	3.60

Comments: Groundwater encountered at a depth of approximately 10 ½ feet below existing grade while excavating. Groundwater is considered a limiting layer.
*Sieve Analysis of Soil (ASTM 6913) performed on sample from 8 feet below existing grade.

TP-2 X Pit ☐ Boring Ground Surface Elevation 649.2 ft. Elevation of Limiting Factor 11 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
A	0 – 16	10YR 3/2	---	f.ls	1.f.gr	mvfr	c	0	<15	0.50
B	16 – 24	10YR 4/4	---	f/c.s	0.f/c.sg	ml	g	~20	<10	3.60
C	24 – 132	10YR 5/4	---	f/c.s	0.f/c.sg	ml	g	~10	2*	3.60

Comments: Groundwater encountered at a depth of approximately 11 feet below existing grade while excavating. Groundwater is considered a limiting layer.
*Percent Passing a #200 Sieve (ASTM D1140) performed on sample at 4 feet below existing grade.

TP-3 X Pit ☐ Boring Ground Surface Elevation 648.5 ft. Elevation of Limiting Factor 12 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
A	0 – 10	10YR 3/2	---	f.ls	1.f.gr	mvfr	c	0	<15	0.50
B	10 – 20	10YR 4/4	---	f/c.s	0.f/c.sg	ml	g	~10	<10	3.60
C	20 – 144	10YR 5/4	---	f/c.s	0.f/c.sg	ml	g	~10	1*	3.60

Comments: Groundwater encountered at a depth of approximately 12 feet below existing grade while excavating. Groundwater is considered a limiting layer.
*Sieve Analysis of Soil (ASTM 6913) performed on sample from 6 feet below existing grades.

TP-4 X Pit ☐ Boring Ground Surface Elevation 648.1 ft. Elevation of Limiting Factor 13 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
A	0 – 8	10YR 3/2	---	f.ls	1.f.gr	mvfr	c	0	<15	0.50
B	8 – 18	10YR 4/4	---	f/c.s	0.f/c.sg	ml	g	~15	<10	3.60
C	18 – 156	10YR 5/4	---	f/c.s	0.f/c.sg	ml	g	~15	1*	3.60

Comments: Groundwater encountered at a depth of approximately 13 feet below existing grade while excavating. Groundwater is considered a limiting layer.
*Sieve Analysis of Soil (ASTM 6913) performed on sample from 11 feet below existing grade.

TP-5 X Pit ☐ Boring Ground Surface Elevation 652.7 ft. Elevation of Limiting Factor NA ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
FILL	0 – 8	10YR 3/1	---	f.sl	0.f.m	mvfr	c	0	<20	0.50
FILL	8 – 48	10YR 3/3	---	f/m.ls	0.f/m.sg	ml	c	~5	<10	1.63
A	48 – 60	10YR 3/1	---	f.sl	1.f.gr	mvfr	c	0	<15	0.50
B	60 – 90	10YR 5/6	---	f/m.s	0.f/m.sg	ml	g	0	<10	3.60
C	90 – 156	10YR 5/4	---	f/m.s	0.f/m.sg	ml	g	0	3*	3.60

Comments: Groundwater not encountered while excavating.
*Sieve Analysis of Soil (ASTM 6913) performed on sample from 12 feet below existing grades.

TP-6 X Pit ☐ Boring Ground Surface Elevation 652.8 ft. Elevation of Limiting Factor NA ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
FILL	0 – 10	10YR 3/1	---	f.sl	0.f.m	mvfr	c	0	<20	0.50
FILL	10 – 48	10YR 3/3	---	f/m.ls	0.f/m.sg	ml	c	~5	<10	1.63
A	48 – 60	10YR 3/1	---	f.ls	1.f.gr	mvfr	c	0	7*	0.50
C	60 – 156	10YR 5/4	---	f/m.s	0.f/m.sg	ml	g	~10	<5	3.60

Comments: Groundwater not encountered while excavating.
*Percent Passing a #200 Sieve (ASTM D1140) performed on sample at 4 feet below existing grade.

TP-7 X Pit ☐ Boring Ground Surface Elevation 650.5 ft. Elevation of Limiting Factor NA ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
FILL	0 – 14	10YR 3/1	---	f.sl	0.f.m	mvfr	c	0	<20	0.50
FILL	14 – 38	10YR 3/2	---	f.ls	0.f.sg	ml	g	~10	<10	1.63
FILL	38 – 48	10YR 4/4	---	f.s	0.f.sg	ml	c	0	<5	0.50
A	48 – 72	10YR 3/1	---	f.ls	1.f.gr	mvfr	c	0	<15	0.50
B	72 – 84	10YR 4/4	---	f/m.s	0.f/m.sg	ml	g	0	<10	3.60
C	84 – 121	10YR 5/4	---	f/m.s	0.f/m.sg	ml	g	~1	2*	3.60

Comments: Groundwater not encountered while excavating. Roots encountered in the fill from 14 to 38 inches.
*Sieve Analysis of Soil (ASTM 6913) performed on sample from 10 feet below existing grade.

TP-8 X Pit ☐ Boring Ground Surface Elevation 650.3 ft. Elevation of Limiting Factor NA ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
FILL	0 – 8	10YR 3/1	---	f.sl	0.f.m	mvfr	c	0	<20	0.50
FILL	8 – 48	10YR 3/2	---	f/m.ls	0.f/m.sg	ml	c	~5	<10	1.63
A	48 – 72	10YR 3/1	---	f.ls	1.f.gr	mvfr	c	0	<15	0.50
B	72 – 84	10YR 4/4	---	f/m.s	0.f/m.sg	ml	g	0	<10	3.60
C	84 – 144	10YR 5/4	---	f/m.s	0.f/m.sg	ml	g	~5	1*	3.60

Comments: Groundwater not encountered while excavating. Roots and metal debris encountered in the fill.
*Percent Passing a #200 Sieve (ASTM D1140) performed on sample at 12 feet below existing grade.

DRI-1 X Pit ☐ Boring Ground Surface Elevation 648.9 ft. Elevation of Limiting Factor 10 ½ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
A	0 – 13	10YR 3/2	---	f.ls	1.f.gr	mvfr	c	0	<15	0.50
B	13 – 20	10YR 4/4	---	f/c.s	0.f/c.sg	ml	g	~15	<10	3.60
C	20 – 126	10YR 5/4	---	f/c.s	0.f/c.sg	ml	g	~10	1*	104.4**

Comments: Groundwater encountered at a depth of approximately 10 ½ feet below existing grade while excavating. Groundwater is considered a limiting layer.
*Percent Passing a #200 Sieve (ASTM D1140) performed on sample at 7 feet below existing grade.
**Double ring infiltrometer test performed at a depth of approximately 7 feet below existing grade. See attached test report.

☐ Pit ☐ Boring Ground Surface Elevation_____ ft. Elevation of Limiting Factor_____ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr

Overall Site Comments: 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 in the fill and buried topsoil composed of loamy sand and sandy loam in the storm water infiltration basins located on the west and east sides of the south terminal parking lot (Test Pits TP-5 to TP-8). In addition, groundwater is a limiting factor per the Wisconsin Department of Natural Resources (DNR) Site Evaluation for Storm Water Infiltration Technical Standard 1002. The depth to groundwater and flood elevations should be accounted for in the design of the infiltration basins.

Benjamin R. Sullivan — Name (Please Print)
Ben Sullivan — Signature
SP-091500003 — Credential Number
2309 Palace Street, La Crosse, WI 54603 — Address
September 4, 2024 — Date Evaluation Conducted
608.781.7277 — Phone Number

Results of Double Ring Infiltrometer Testing (ASTM D 3385) - Gallon Meter Method

BRAUN INTERTEC

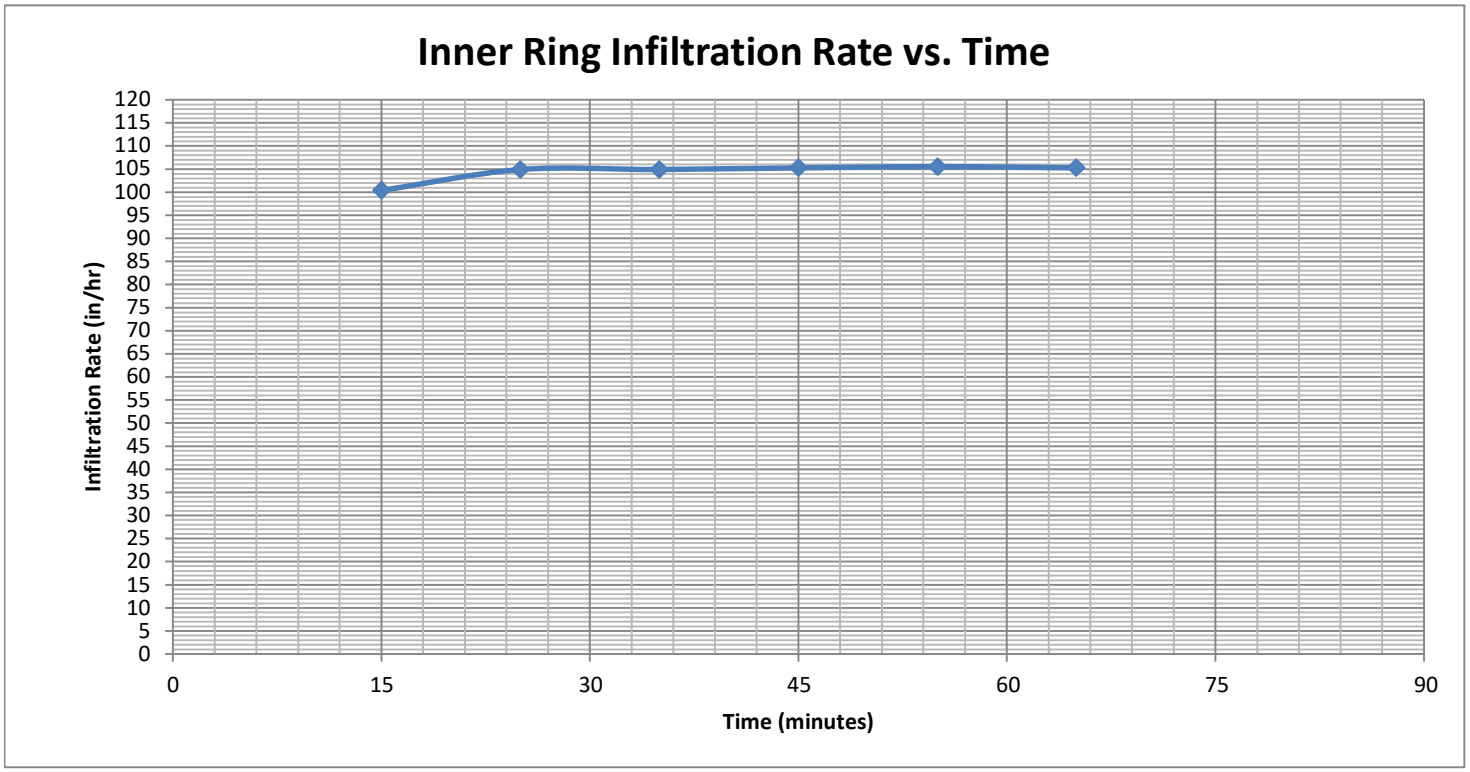
Test Number:	DRI-1
Project Description:	South Terminal Parking Lot
Project Number:	B2407684
Date:	September 4, 2024
Liquid used:	Potable water
Inner Ring Area:	113 square inches
Outer Ring Area:	452 square inches
Test performed by:	Janney Patel
Weather:	68°F/Sunny

Test Location:	See Attached Location Sketch
Test Elevation:	Approximately 642 feet
Ground Temperature F°:	70
Water Temperature F°:	70
Moisture Content of soil at test depth before test:	9%
Percent Fines passing a 200 sieve on soil at test depth:	1%

Time	Infiltration Rate (in/hr)
15	100.4
25	104.9
35	104.9
45	105.3
55	105.5
65	105.3
75	
85	

Subgrade Conditions Below Tested Depth	
Depth	**Soil Profile**
0-6 inches	Sand, F/C grained, brown, moist
6-12 inches	Sand, F/C grained, brown, moist
12-18 inches	Sand, F/C grained, brown, moist
18-24 inches	Sand, F/C grained, brown, moist
24-30 inches	Sand, F/C grained, brown, moist
30-36 inches	Sand, F/C grained, brown, moist
36-42 inches	Sand, F/C grained, brown, wet
Groundwater depth	Approximately 3 1/2 feet

Average Infiltration Rate of Inner Ring Over Entire Test (in/hr)	**104.4**
Steady State Infiltration Rate of Inner Ring Over Last 4 intervals (in/hr)	**105.4**



Test performed by Braun Intertec personnel in general accordance with test method ASTM D 3385.