Chosen Valley Testing

Design Phase Geotechnical Evaluation:

Proposed Roadway, Utilities, and Stormwater Areas
River Point District
Copeland Ave.
La Crosse, Wisconsin
SEH No. WIRRN 148437 45.00d

Prepared for:

Mr. Jason Gilman
Director of Planning, Development and Assessment
City of La Crosse
C/O: Mr. David Schofield, PE
Short Elliot Hendrickson, INC

April 9, 2020
16290.20.WIL

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly registered engineer under the laws of the State of Wisconsin.

Frederick E. Schuster, PE
Geotechnical Engineer
Registration Number 46610
Date: April 9, 2020

Chosen Valley Testing, Inc.

Geotechnical Engineering and Testing • 1019 2nd Ave. SW, Onalaska, WI 54650 • Telephone (608) 782-5505 • Fax (608) 785-2818

Mr. Jason Gilman
Director of Planning, Development and Assessment
City of La Crosse
400 La Crosse Street
La Crosse, WI 54601
C/O: Mr. David Schofield, PE
Sr. Professional Engineer
Short Elliot Hendrickson, INC
dschofield@sehinc.com

April 9, 2020

Re: Design Phase Geotechnical Evaluation
Proposed Roadway, Utilities, and Stormwater Areas
River Point District
Copeland Ave.
La Crosse, Wisconsin
SEH No. WIRRN 148437 45.00d

Dear Mr. Gilman:

We have completed the geotechnical evaluation authorized for the proposed River Point District on Copeland Ave. in La Crosse, Wisconsin. The attached report provides a description of our findings, recommendations, and analysis. We appreciate the opportunity to provide our services on this project. If you have any questions or need additional information, please contact us at (608) 782-5505.

Sincerely,
Chosen Valley Testing, Inc.

Frederick Schuster, PE
Geotechnical Engineer

Colby T. Verdegan, PE
Sr. Geotechnical/Materials Engineer

TABLE OF CONTENTS

A. INTRODUCTION 2

A.1. Purpose 2
A.2. Scope 2
A.3. Exploration Locations and Elevations 2
A.4. Geologic Background 2

B. SUBSURFACE DATA 3

B.1. Stratification 3
B.2. Penetration Test Results 4
B.3. Groundwater Data 4
B.4. Laboratory Testing 5

C. DESIGN INFORMATION 5

D. DEVELOPMENT ROUGH GRADING 5

D.1. Stripping 5
D.2. Over-Sizing 5
D.3. Filling and Compaction 6
D.4. Building Area 6

E. UTILITY RECOMMENDATIONS 6

E.1. Dewatering 6
E.2. General Support 6
E.3. Trench Sidewalls 7
E.4. Fill Placement and Compaction 7

D. PAVEMENT RECOMMENDATIONS 7

E. POND INFILTRATION 7

F. LEVEL OF CARE 8

APPENDIX 9

BORING LOCATION SKETCH
LOG OF BORING # 1-15
GRADATION CURVES
SOIL EVALUATION - STORM
LEGEND TO SOIL DESCRIPTION

Design Phase Geotechnical Evaluation
Proposed Roadway, Utilities, and Stormwater Areas
River Point District
Copeland Ave.
La Crosse, Wisconsin
SEH No. WIRRN 148437 45.00d

CVT Project Number: 16290.20.WIL
Date: April 9, 2020

A. Introduction

The intent of this report is to present our results to the client in the same logical sequence that led us to arrive at the opinions and recommendations expressed. Since our services must often be completed before the design, assumptions are sometimes needed to prepare a proper evaluation and to analyze the data. A complete and thorough review of this entire document, including the assumptions and the appendices, should be undertaken immediately upon receipt.

A.1. Purpose

This report was prepared to assist planning and design of the proposed Streets, utilities, and stormwater infiltration areas for the River Point District on Copeland Ave. in La Crosse, Wisconsin. Our services were authorized Mr. Jason Gilman, Director of Planning, Development and Assessment for the City of La Crosse.

A.2. Scope

To provide data for analysis, a total of fifteen penetration test borings. The borings were drilled to depths of about 20 feet or auger advancement refusal. Our engineering scope was limited to providing this report summarizing the conditions in the borings and providing recommended pavement design parameters for the soils encountered and utility construction recommendations as well as preliminary field verification of suitability for water infiltration information in the form of SBD 10793.

A.3. Exploration Locations and Elevations

The desired boring locations were indicated to Chosen Valley Testing (CVT) on a schematic drawing provided to us by the client and staked by SEH. The boring location sketch in the Appendix shows the approximate locations of the soil borings as drilled. This sketch was created by plotting GPS coordinates for the borings onto an aerial of the site and overlaying the site layout using Google Earth Software.

Ground surface elevations at the borings were provided by SEH.

A.4. Geologic Background

A geotechnical report is based on subsurface data collected for the specific structure or problem. Available geologic data from the region can help interpretation of the data and is briefly summarized in this section.

Geologic maps suggest that the natural soils in the area are primarily alluvial sands and gravels overlying terrace deposits of sands and gravels. Some organic deposits are known to exist at depth in the area based on previous exploration by CVT. Bedrock is commonly more than 100 feet below the surface. The uppermost bedrock is indicated to be Cambrian Age sandstone.

B. Subsurface Data

Methods: All of the borings were performed using penetration test procedures (Method of Test D1586 of the American Society for Testing and Materials). This procedure allows for the extraction of intact soil specimen from deep in the ground. With this method, a hollow-stem auger is drilled to the desired sampling depth. A 2-inch OD sampling tube is then screwed onto the end of a sampling rod, inserted through the hole in the auger's tip, and then driven into the soil with a 140-pound hammer dropped repeatedly from a height of 30 inches above the sampling rod. The sampler is driven 18-inches into the soil, unless the material is too hard. The samples are generally taken at 2½ to 5-foot intervals. The core of soil obtained is classified and logged by the driller and a representative portion is then sealed in a jar and delivered to the soils engineer for review.

B.1. Stratification

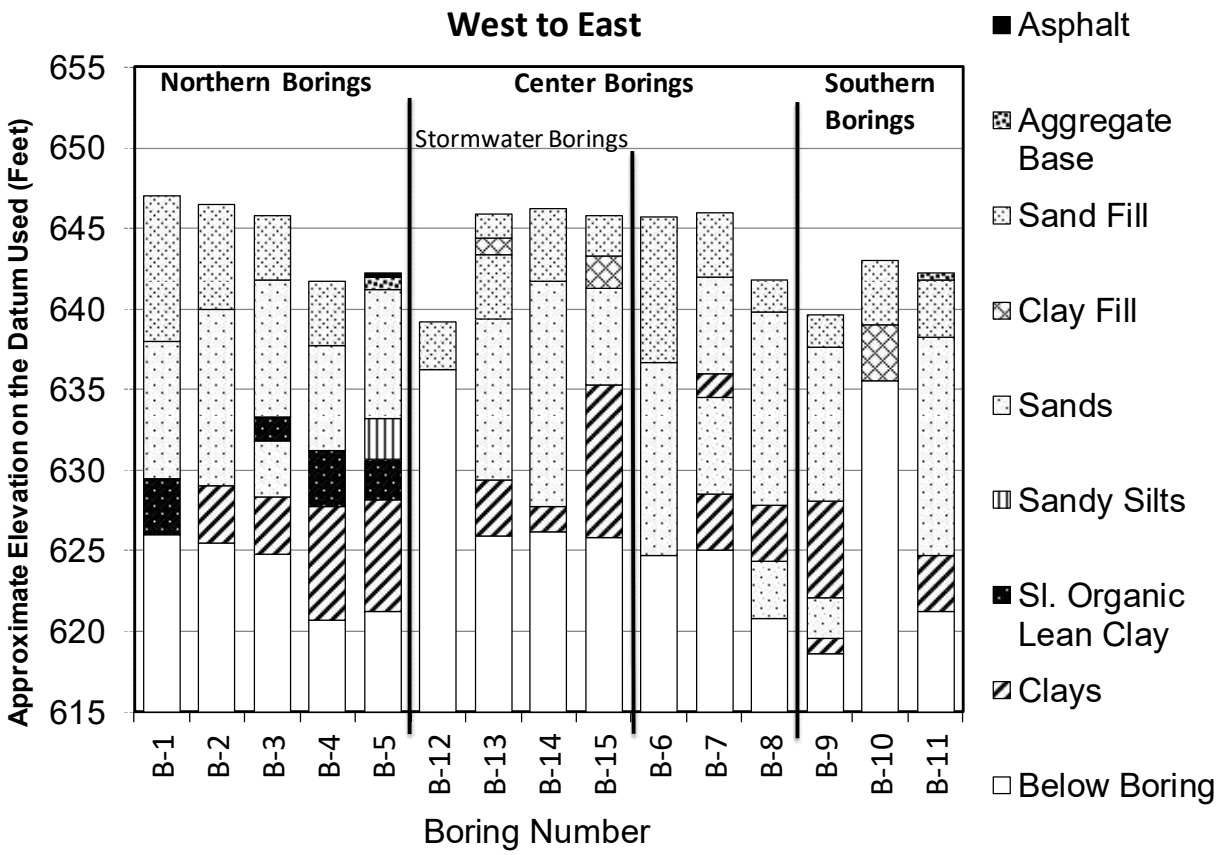
The southeasternmost boring encountered about 5 inches of aggregate base at the surface overlying sandy fill while the northeasternmost boring encountered 2 inches of asphalt and 10 inches of aggregate base overlying natural sands.

The remaining borings encountered fill at the surface. The fill consisted primarily of mixed sands and silty sands and extended to depths of about 2 to 7 feet. Two borings encountered zones of clay fill and clays were mixed in with the sands and silty sands at some other locations. Two of the lower elevation southwestern borings met auger refusal within the fill materials at depths of 3 to 7½ feet beneath the surface. The other borings penetrated deeper into natural deposits.

The natural soils beneath the paving materials and fill were dominated by sands to depths of about 9 to 19 feet. The deeper soils encountered were primarily clays, and most borings terminated in these soils.

The three northern borings met a layer of slightly organic clay above the lean clays. The northeasternmost boring terminated in the organic layer and did not encounter the lean clay layer.

The boring data has been summarized in the following depth and elevation cross-sections. For more detailed information, the reader is referred to the individual Log of Boring sheets in the Appendix.



B.2. Penetration Test Results

The number of blows needed for the hammer to advance the penetration test sampler is an indicator of soil characteristics. The number of blows to advance the sampler 1 foot is called the penetration resistance or "N"-value. The results tend to be more meaningful for natural mineral soils, than for fill soils. In fill soils, compaction tests are more meaningful.

Penetration resistance values (N-values) of 2 to 22 Blows per Foot (BPF) were recorded in the sands, indicating they were very loose to medium dense. The silts and clays returned values ranging from weight of hammer to 7 BPF, indicating they were very soft to medium. The slightly organic to organic clays returned values ranging from 3 to 6 BPF, indicating they were soft to medium.

A key to the descriptors used to qualify the relative density of soil (such as *soft, stiff, loose*, and *dense*,) can be found on the Legend to Soil Description in the Appendix.

B.3. Groundwater Data

During the drilling operation, the drillers may note the presence of moisture on the sampling instrument, in the cuttings, or within the boreholes. These observations are recorded on the boring logs. The water level may vary with weather; time of year and other factors and the presence or absence of water during the drilling is subject to interpretation and is not always conclusive.

Not including the borings which terminated on obstructions, water was observed in all of the borings at depths of 2 to 10½ feet or at elevations of 636½ to 639 feet. We would expect groundwater levels to fluctuate

similarly to the nearby Mississippi river, along with local weather patterns.

B.4. Laboratory Testing

Fine sieve analyses was performed on the stormwater borings to aid in classification. The following table outlines the results of the analyses and the corresponding USDA soil classification. All tests were performed according to ASTM standards.

Boring	Depth Below Surface (Feet)	Percent Passing #10 Sieve (%)	Percent Passing #35 Sieve (%)	Percent Passing #60 Sieve (%)	Percent Passing #140 Sieve (%)	Percent Passing #270 Sieve (%)	USDA Soil Classification
B-12	1	37.0	27.6	19.4	12.3	7.2	Sand, S
B-13	9	99.5	66.5	10.0	1.6	0.8	Sand, S
B-14	3	96.1	76.6	35.7	5.3	2.3	Sand, S
B-15	3	99.6	96.5	89.0	72.7	54.8	Loam, L

C. Design Information

Each structure has a different loading configuration and intensity, different grades, and different structural and performance tolerances. Therefore, the geotechnical exploration will be construed differently from one structure to another. If the initial structure should change design, we should be engaged to review these conditions with respect to the prevailing soil conditions. Without the opportunity to review any such changes, the recommendations may no longer be valid or appropriate.

Design information for the development was not provided. We understand that mixed uses are planned. Additional fill earthwork is expected to be required to achieve proper drainage and construction elevations. Utility pipes are assumed to bear on the order of 7 to 12 feet below the final grades.

D. Development Rough Grading

D.1. Stripping

Although no discernable topsoil was noted, any surface vegetation or root zones and all existing pavement materials should be stripped from the pavements. The rootzones are likely less than 1-foot thick at the locations explored within the industrial park. The stripped materials should be removed from the site or placed in green areas.

D.2. Over-Sizing

The stripped surfaces should be over-sized at least 1-foot beyond the edge of pavements for each foot of fill needed below. This over-sizing can be reduced by up to 50% if rather precise staking is present during grading. However, additional over-sizing provides a nominal safety factor against stakes getting moved or

knocked down during construction. However, additional over-sizing provides a nominal safety factor against stakes getting moved or knocked down during construction.

D.3. Filling and Compaction

All fill should be compacted to at least 95% of the soil's maximum standard Proctor density. Compaction to 90% is usually sufficient in green areas.

The sandy fill materials dominating the upper part of the site profile appear suitable for use as bulk fill below the pavements. As noted earlier, clayey fill was noted at a couple locations and clay was mixed with the sands at some other locations. To provide a more uniform subgrade, we recommend removing any concentrations of clay that may be present in at least the upper 2 feet of the roadway profile and replacing those materials with on-site or imported granular soils.

If imported fill is needed, we would recommend using sand or gravel having less than 20% particles passing a #200 sieve. Crushed sandstone or limestone screenings can also likely be used. Proposed fill materials should be submitted for review before importation and use.

D.4. Building Area

The grading recommendations provided are not intended to address building pads. Site specific corrections can then be made in the future for individual pads when designs, locations and elevations are determined.

E. Utility Recommendations

E.1. Dewatering

Based on the boring data and the assumed utility depths of 7 to 12 feet, water bearing sands are expected to be encountered in deeper utility trenches and would likely change with variations in the level of the Mississippi River. Because dominant soils are highly permeable, aggressive water removal techniques, such as well points, are expected to be required to keep excavations dry.

E.2. General Support

Based on the assumed utility embedment depths, open cut installations are expected to encounter primarily cleaner sands with some clay. These materials appear to be generally suitable for support of utilities, provided the clay is not overly wet. In the event that unstable soils are encountered at invert elevation, a bedding of clean sand or gravel is recommended in the base of the utility trenches to provide a stable surface for the crew laying the pipes. Correction depths on the order of 1 to 2 feet is typically adequate to treat this condition, but should be evaluated during construction by geotechnical personnel.

Two borings terminated on obstructions. To prevent any point loads on pipes, we recommend removing oversize materials to a distance of at least ½ to 1-foot from the pipes and replacing the obstructing material with clean sand or gravel.

E.3. Trench Sidewalls

The contractor will be required to slope or shore the excavations as needed to meet OSHA requirements for safety. The dominant soils will likely classify as Type C soils as defined by OSHA. Trench boxes or other stabilization methods may be necessary when excavating close to property limits or structures.

E.4. Fill Placement and Compaction

Materials placed as backfill below paved areas should be compacted to at least 95% of their maximum standard Proctor density (ASTM D 698). In green areas, 90% compaction is normally adequate. Again, debris or oversize materials should be kept at least ½ to 1-foot away from utilities, to limit potential for point loads on the pipes.

The materials available for use as fill are expected to consist primarily of existing clean fill sands and native sands. To promote uniformity with adjoining portions of the subgrade through any paved areas, we recommend using fill material that is similar to the surrounding subgrade soil type.

D. Pavement Recommendations

Based on the borings and implementation of our grading recommendations, the near surface soils are expected to be dominated by clean sands to silty sand. If not removed, some areas may have clays. We recommend designing pavements using support values with the following estimated characteristics:

Soil Type	AASHTO Classification	Frost Index	Design Group Index	K-Value	Soil Support Factor	Est. California Bearing Ratio
Lean Clay	A-4/A-6	F-3	15	125	3.8	5 or less
Silty Sand	A-2-4/A-4	F-3	10	200	4.5	10 – 20
Poorly-Graded Sand	A-3	F-2	6	250	5.0	10 – 20

E. Pond Infiltration

Infiltration rates were estimated for the various materials encountered in the stormwater borings (Borings B-12, B-13, B-14, and B-15). The borings encountered materials ranging from clay to loams and loamy sands to sands. Infiltration rates for these materials were estimated to range from 3.60 to 0.07 inches per hour, based on USDA soil classification. These infiltration/permeability values are the recommended design values from the Wisconsin DNR. Please see the Soil Evaluation – Storm sheets in the Appendix for more details. Double ring infiltrometer testing could be used to better assess infiltration rates, though a safety factor is normally required to be applied to the rates.

F. Level of Care

The services provided for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area, under similar budget and time constraints. This is our professional responsibility. No other warranty, expressed or implied, is made.

Appendix

Boring Location Sketch

Log of Boring 1-15

Gradation Curves

Soil Evaluation – Storm

Legend to Soil Description

Chosen Valley Testing, Inc.

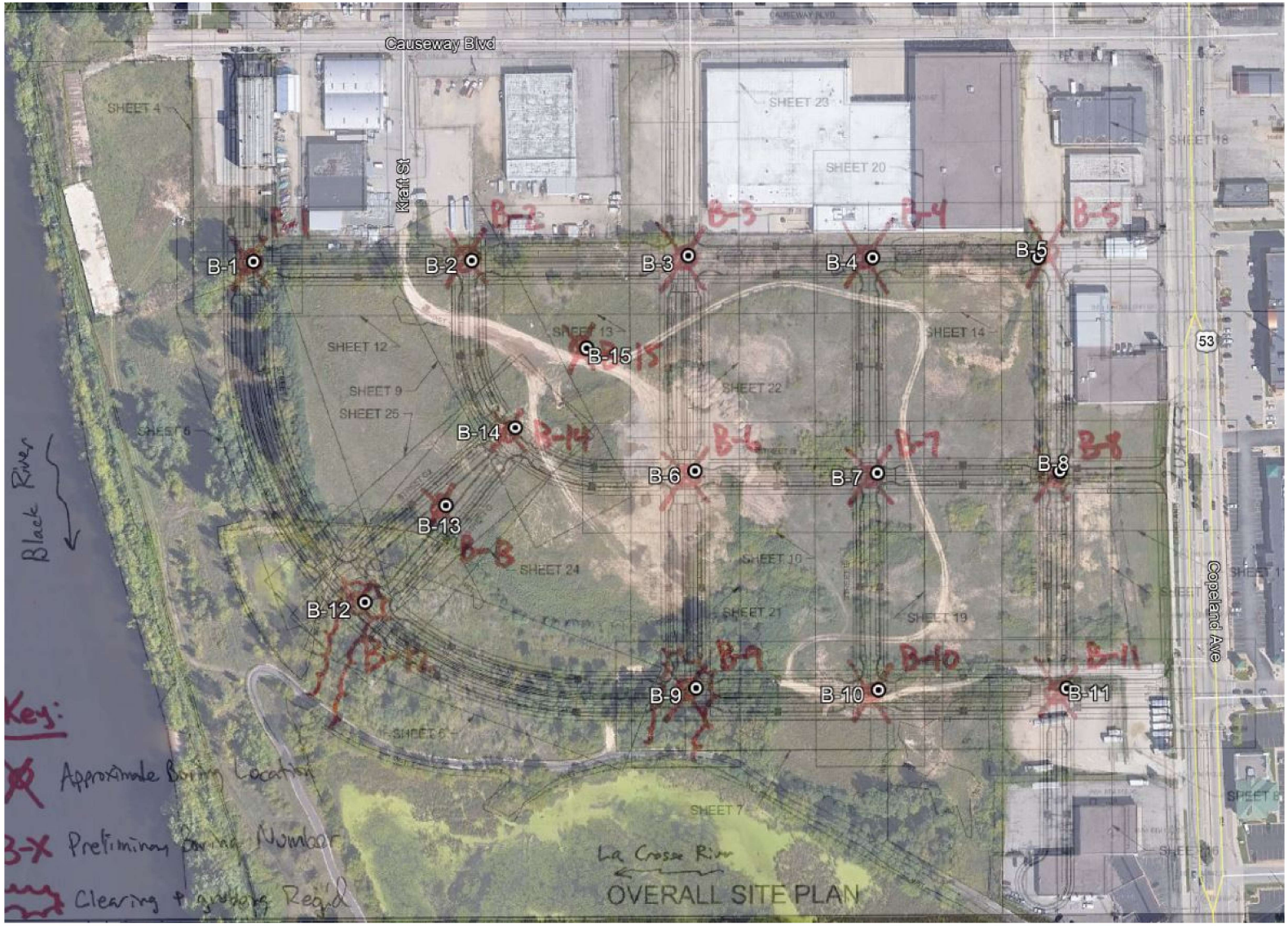
Legend

Boring Location

N

Boring Location Sketch

Proposed Roadway, Utilities, and Stormwater Areas
River Point District
Copeland Ave.
La Crosse, Wisconsin
16290.20.WIL



LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-01** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
647.0	0.0	SP SM	**POORLY GRADED SAND with SILT** pockets of lean clay, fine grained, brown, moist, loose to medium dense. (Fill)	7		Elevations provided by SEH.
				22		
			Trace pin roots below 6.5'.	18		
638.0	9.0	SP	**POORLY GRADED SAND** trace gravel, fine to medium grained, brown, wet to water bearing, loose. (Alluvium)	6	▽	
635.5	11.5	SP SM	Water bearing below 10.5'. **POORLY GRADED SAND with SILT** trace gravel, trace wood, fine to medium grained, dark gray, water bearing, loose to medium dense. (Alluvium)	4		
			No wood below 14'. No gravel below 14'. Gray below 14'.	11		
629.5	17.5	OL	**Organic LEAN CLAY** trace roots, black, wet, soft. (Alluvium / Swamp Deposit)	3		PP = 0.75 tsf, MC = 45.4%
626.0	21.0		End of boring. Water encountered during drilling below around 10.5'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-02** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
646.5	0.0	SP SM	**POORLY GRADED SAND with SILT** fin grained, brown, moist, loose to medium dense. (Fill)	8		
			Seam of clayey sand around 5'.	22		
640.0	6.5	SP	**POORLY GRADED SAND** fine to medium grained, brown, moist to water bearing, loose to medium dense. (Alluvium)	8		
			Gray below 9'.			
			Trace wood around 10'. Water bearing below 10'.	8	▽	
				8		
			Seams of organic lean clay around 15'.	12		
629.0	17.5	CL	**LEAN CLAY** dark gray, wet, soft. (Alluvium)			
625.5	21.0			3		PP = 0.5 tsf, MC = 36.2%
			End of boring. Water encountered during drilling below around 10'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-03** LOCATION: See attached sketch DATE: 3/16/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.8	0.0	SP SM	**POORLY GRADED SAND with SILT** trace gravel, fine grained, brown, moist, loose. (Fill)	6		
641.8	4.0	SP	**POORLY GRADED SAND** trace gravel, fine to medium grained brown, moist to water bearing, loose to medium dense. (Alluvium)	11		
			No gravel below 6.5'. Water bearing below 7'.	8	▽	
634.3	11.5			4		
633.3	12.5	SP SM	**POORLY GRADED SAND with SILT** fine grained, gray, water bearing, loose. (Alluvium)	3		
631.8	14.0	CL OL	**Slightly Organic LEAN CLAY** trace roots, black, very wet, soft. (Alluvium / Swamp Deposit)			PP < 0.25 tsf, MC = 74.3%, OC = 5.7%
628.3	17.5	SP	**POORLY GRADED SAND** fine to medium grained, brown, water bearing, loose. (Alluvium)	4		
624.8	21.0	CL	**LEAN CLAY** dark gray, wet, soft. (Alluvium)	3		PP = 1.0 tsf, MC = 39.1%
			End of boring. Water encountered during drilling below around 7'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-04** LOCATION: See attached sketch DATE: 3/16/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
641.7	0.0	SP	**POORLY GRADED SAND** pockets of silty sand, fine to medium grained, brown, moist, medium dense. (Fill)	11		
637.7	4.0	SP	**POORLY GRADED SAND** fine to medium grained, brown, wet to water bearing, very loose to loose. (Alluvium) Water bearing below 4.5'. Gray below 6.5'.	5 3 5	▽	
631.2	10.5	CL OL	**Slightly Organic LEAN CLAY** black, wet, rather soft to medium. (Alluvium / Swamp Deposit)	6		PP = 0.75 tsf, MC = 36.4%
627.7	14.0	CL	**LEAN CLAY** dark gray, wet, soft to rather soft. (Alluvium) Trace roots below 17.5'.	4 3		PP = 0.5 tsf PP = 0.5 tsf, MC = 47.6%
620.7	21.0		End of boring. Water encountered during drilling below around 4.5'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-05** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
642.2	0.0					
642.0	0.2		**2" ASPHALT**			
641.2	1.0		**10" AGGREGATE BASE**			
		SP	**POORLY GRADED SAND** fine to medium grained, brown, moist to water bearing, loose to medium dense. (Alluvium)	7		
			Water bearing below 5.5'.	10	▽	
				11		
633.2	9.0					
		ML	**SANDY SILT** seams of peat, gray, wet, medium. (Alluvium)	7		PP = 0.5 tsf
630.7	11.5					
		CL OL	**Slightly Organic LEAN CLAY** black, wet, medium. (Alluvium / Swamp Deposit)	6		PP = 0.5 tsf, MC = 57.0%
628.2	14.0					
		CL	**LEAN CLAY** dark gray, very wet, soft to rather soft. (Alluvium)	2		PP = 0.25 tsf, MC = 43.8%
			Wet below 17.5'.	3		PP = 0.5 tsf
621.2	21.0					
			End of boring. Water encountered during drilling below around 5.5'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-06** LOCATION: See attached sketch DATE: 3/16/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.7	0.0	SM	**SILTY SAND** trace gravel, fine grained, brown and gray mixed, wet, medium dense. (Fill)	10		
641.7	4.0	SM	**SILTY SAND with GRAVEL** medium to coarse grained, light brown, moist, medium dense. (Fill)	14		
639.2	6.5	SM	**SILTY SAND** trace gravel, fine grained, brown and gray mixed, wet, medium dense. (Fill)	19		
636.7	9.0	SP	**POORLY GRADED SAND** fine to medium grained, brown, water bearing, very loose to loose. (Alluvium)	6	▽	
				4		
			Seams of lean clay around 15'.	8		
624.7	21.0		Seams of organic lean clay around 20'. Faint petroleum smells around 20'.	2		
			End of boring. Water encountered during drilling below around 9'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-07** LOCATION: See attached sketch DATE: 3/16/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
646.0	0.0	SM	**SILTY SAND** trace pin roots, fine grained, brown, moist, loose. (Fill)	5		
642.0	4.0	SP	**POORLY GRADED SAND** fine to medium grained, brown, moist to water bearing, loose to medium dense. (Alluvium)	10		
			Water bearing below 8'.	11	▽	
636.0	10.0	CL	**LEAN CLAY** strong petroleum smells, gray, very wet, rather soft. (Alluvium)	5		PP = 0.5 tsf
634.5	11.5	SP SM	**POORLY GRADED SAND with SILT** fine grained, gray, water bearing, loose. (Alluvium) Faint petroleum smells around 12.5'.	8		
			Seams of organic lean clay around 15'. Brown around 15'.	7		
628.5	17.5	CL	**LEAN CLAY** dark gray, wet, soft. (Alluvium)	3		MC = 56.1%
625.0	21.0		End of boring. Water encountered during drilling below around 8'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-08** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
641.8	0.0	SP	**POORLY GRADED SAND** (Fill)			
639.8	2.0	SP	**POORLY GRADED SAND** fine to medium grained, brown, moist to water bearing, very loose to medium dense. (Alluvium)	7		
			Seams of silty sand around 5'. Water bearing below 5.5'.	10	▽	
			Gray below 6.5'.	3		
				4		
				4		
627.8	14.0	CL	**LEAN CLAY** dark gray, very wet, very soft. (Alluvium)	1		PP = 0.25 tsf, MC = 34.3%
624.3	17.5	SP	**POORLY GRADED SAND** fine grained, light gray, water bearing, very loose. (Alluvium)	3		
620.8	21.0		End of boring. Water encountered during drilling below around 5.5'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-09** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
639.6	0.0	SP	**POORLY GRADED SAND** (Fill)			
637.6	2.0	SP	**POORLY GRADED SAND** fine to medium grained, brown, water bearing, very loose to loose. (Alluvium)	2	▽	
				7		
				4		
630.6	9.0	SP SM	**POORLY GRADED SAND with SILT** trace gravel, medium to coarse grained, black, wet, loose. (Alluvium)	7		
628.1	11.5	CL	**LEAN CLAY** dark gray, very wet, very soft. (Alluvium)	1		PP = 0.25 tsf, MC = 41.3%
				W		
622.1	17.5	SP	**POORLY GRADED SAND** fine grained, light gray, water bearing, very loose, water bearing. (Alluvium)			
619.6	20.0	CL	**LEAN CLAY** trace roots, dark gray, very wet, very soft. (Alluvium)	1		
618.6	21.0		End of boring. Water encountered during drilling below around 2'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-10** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
643.0	0.0	SM	**SILTY SAND** pockets of sand lean clay, brown, wet, very loose. (Fill)	1		
639.0	4.0	CL	**SANDY LEAN CLAY** trace gravel, gray and brown mixed, wet, medium. (Fill)	8		MC = 21.5%
636.5	6.5	CL	**LEAN CLAY with GRAVEL** brown, wet, hard. (Fill)	*		Hard drilling below 6.5'. * 50 = 4" (set)
635.5	7.5		End of boring. Boring terminated due to auger refusal around 7.5'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-11** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
642.2	0.0					
641.8	0.4		**5" AGGREGATE BASE**			
		SP	**POORLY GRADED SAND** pockets of silty sand, trace gravel, fine to medium grained, brown, moist, loose. (Fill)	4		
638.2	4.0					
		SP	**POORLY GRADED SAND** fine to medium grained, gray, moist to water bearing, very loose to loose. (Alluvium)	6		
			Fine grained around 7.5'. Water bearing below 7.5'.	7	▽	
			Seams of lean clay around 10'. Faint petroleum smells around 10'.	5		
				3		
				2		
624.7	17.5					
		CL	**LEAN CLAY** gray, wet, very soft. (Alluvium)	1		PP = 0.75 tsf, MC = 36.8%
621.2	21.0					
			End of boring. Water encountered during drilling below around 7.5'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-12** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
639.2	0.0	SM	**SILTY SAND with GRAVEL** fine grained, light brown, moist, loose to very dense. (Fill)	*		* 5 / 6 / 6 / 8
			Trace concrete below 2'.	*		* 50 = 2" (set) Auger grinding below 2.5'.
636.2	3.0		End of boring. Boring terminated due to auger refusal around 3'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-13** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.9	0.0	SP SM	**POORLY GRADED SAND with SILT** fine grained, brown, moist, very loose. (Fill)	*		* W / 1 / 1 / 1
644.4	1.5	CL	**LEAN CLAY** trace roots, gray, wet, soft. (Fill)			
643.4	2.5	SP	**POORLY GRADED SAND** trace gravel, fine grained, brown, moist, medium dense. (Fill)	*		* 2 / 2 / 2 / 2
640.9	5.0	SM	**SILTY SAND with GRAVEL** medium to coarse grained, light brown, moist, dense. (Fill)	*		* 6 / 12 / 18 / 22
639.4	6.5	SP	**POORLY GRADED SAND** fine to medium grained, brown, moist to water bearing, very loose to medium dense. (Alluvium)	*		* 13 / 9 / 18 / 16
				*		* 9 / 10 / 11 / 11
			Water bearing below 10'.		▽	
				*		* 4 / 3 / 5 / 5
			Gray below 13.5'. Seams of lean clay around 14'.	*		* 2 / 2 / 3 / 3
				*		* 1 / 1 / 2 / 2
629.4	16.5	CL	**LEAN CLAY** dark gray, wet, soft to medium. (Alluvium)	*		* 1 / 1 / 1 / 1 PP = 0.5 tsf
				*		* 1 / 3 / 3 / 2 PP = 0.75 tsf
625.9	20.0		End of boring. Water encountered during drilling below around 10'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-14** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
646.2	0.0	SP SM	**POORLY GRADED SAND with SILT** fine grained, brown, moist, very loose to loose. (Fill)	*		* 1 / 1 / 1 / 1
				*		* 2 / 2 / 3 / 3
641.7	4.5	SP	**POORLY GRADED SAND** fine to medium grained, brown, moist, very loose to medium dense. (Alluvium)	*		* 3 / 3 / 4 / 4
			Seams of lean clay around 7'.	*		* 4 / 5 / 6 / 6
			Trace gravel around 9'.	*		* 5 / 5 / 5 / 6
			Water bearing below 10'.		▽	
				*		* 3 / 4 / 4 / 3
				*		* 1 / 1 / 1 / 2
			Gray around 15'.	*		* 1 / 1 / 1 / 1
				*		* 1 / 1 / 1 / 2
627.7	18.5	CL	**LEAN CLAY** dark gray, wet, soft. (Alluvium)	*		* 1 / 1 / 1 / 2 PP = 0.75 tsf
626.2	20.0		End of boring. Water encountered during drilling below around 10'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20

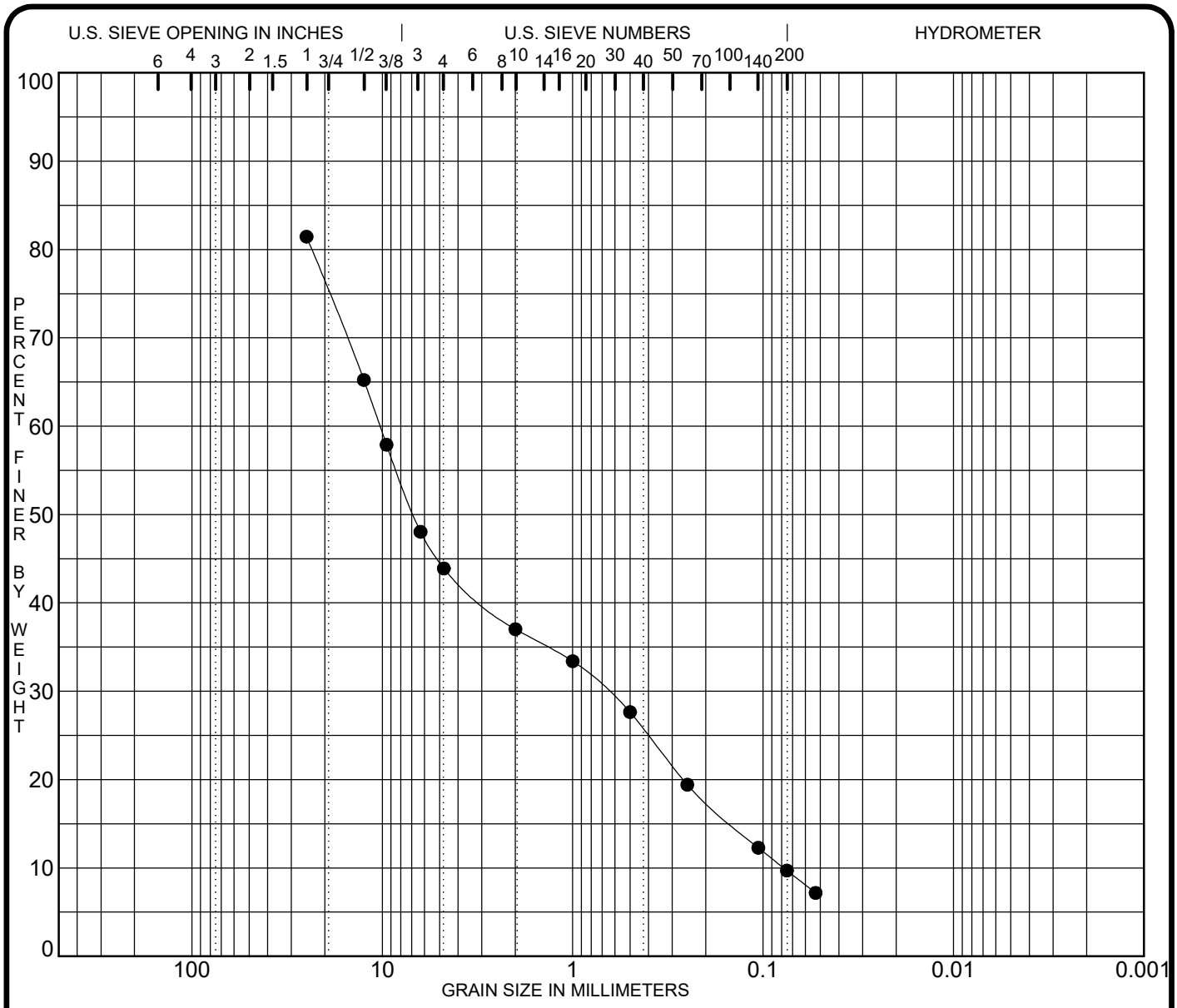
LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 16290.20.WIL Design Phase Geotechnical Evaluation Proposed River Point District Copeland Ave. La Crosse, Wisconsin	BORING: **B-15** LOCATION: See attached sketch DATE: 3/17/2020 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
645.8	0.0	SM	**SILTY SAND** trace gravel, fine grained, brown, moist, loose to very dense. (Fill)	*		* 3 / 6 / 25 / 38
643.3	2.5	CL ML	**SILTY CLAY with SAND** gray, wet, stiff. (Fill) Brown below 4.5'.	*		* 3 / 5 / 6 / 7
641.3	4.5	SP	**POORLY GRADED SAND** trace gravel, fine to medium grained, brown, moist to water bearing, very loose to loose. (Alluvium)	*		* 8 / 10 / 12 / 14
				*		* 3 / 3 / 2 / 3
			Water bearing below 8'.		▽	
635.3	10.5			*		* 2 / 2 / 3 / 4
		CL	**LEAN CLAY** dark gray, wet, soft to medium. (Alluvium)	*		* 1 / 1 / 1 / 1 PP = 0.5 tsf
			Trace pin roots below 13'.	*		* 1 / 2 / 2 / 3 PP = 0.75 tsf
				*		* 1 / 1 / 2 / 2 PP = 0.75 tsf
				*		* 2 / 1 / 1 / 2 PP = 0.75 tsf
625.8	20.0			*		* 2 / 2 / 3 / 3
			End of boring. Water encountered during drilling below around 8'. Boring sealed upon completion.			

CVT STANDARD 16290.20.WIL (RIVER POINT DISTRICT).GPJ LOG A GNNN06.GDT 4/9/20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-12**	**1.0**						**0.55**	**131.7**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-12**	**1.0**	**25.00**	**10.28**	**0.664**	**0.0780**	**37.6**	**34.2**	**9.7**	

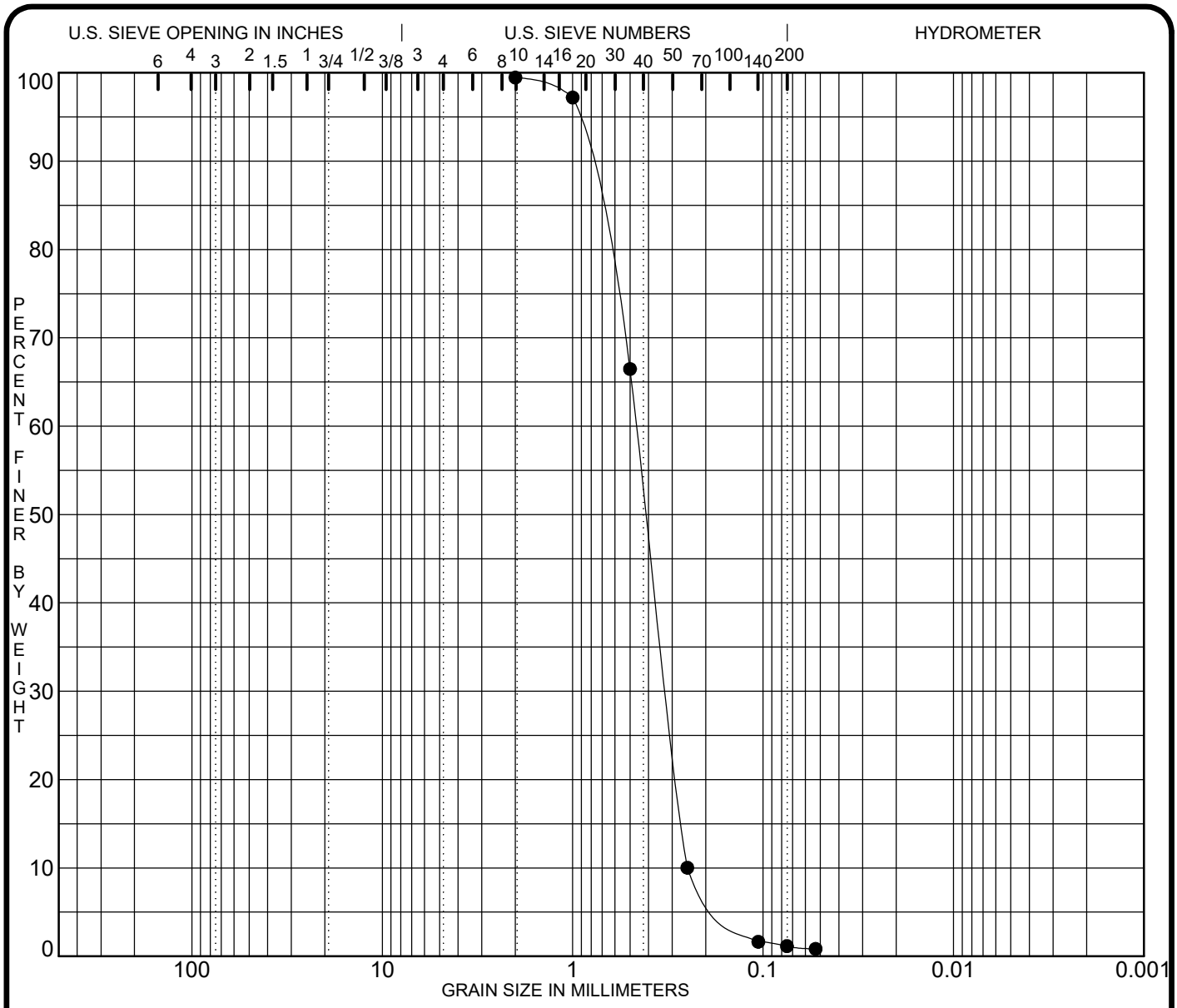
PROJECT **Proposed River Point District - Copeland Ave.**

JOB NO. **16290.20.WIL**

DATE **3/25/20**

GRADATION CURVES

Chosen Valley Testing



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-13**	**9.0**	**POORLY GRADED SAND SP**					**0.89**	**1.9**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-13**	**9.0**	**2.00**	**0.46**	**0.320**	**0.2495**	**0.0**	**98.3**	**1.2**	

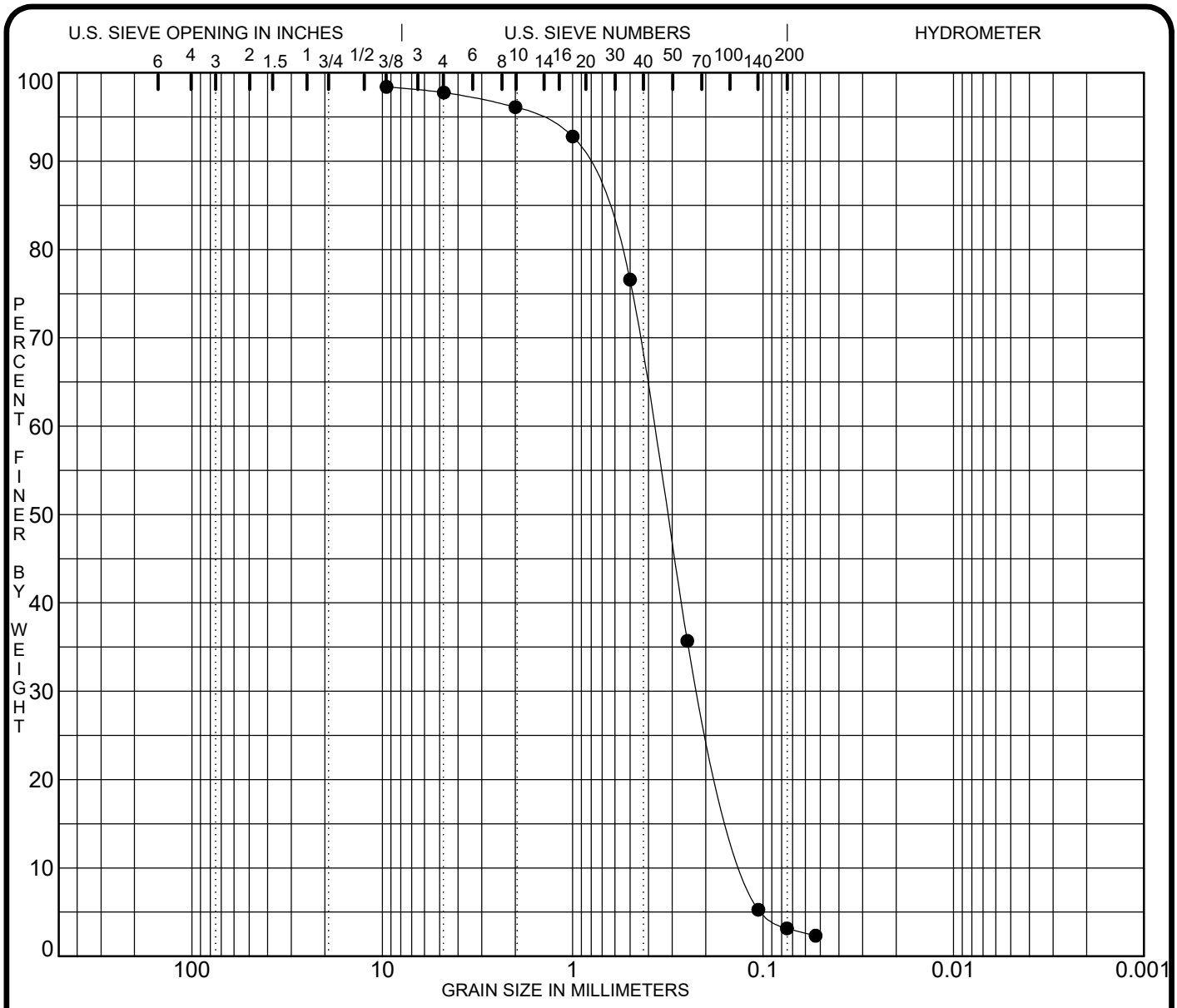
PROJECT **Proposed River Point District - Copeland Ave.**

JOB NO. **16290.20.WIL**

DATE **3/25/20**

GRADATION CURVES

Chosen Valley Testing



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
● **B-14**	**3.0**	**POORLY GRADED SAND SP**					**0.99**	**3.1**

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **B-14**	**3.0**	**9.50**	**0.38**	**0.213**	**0.1211**	**0.6**	**94.6**	**3.2**	

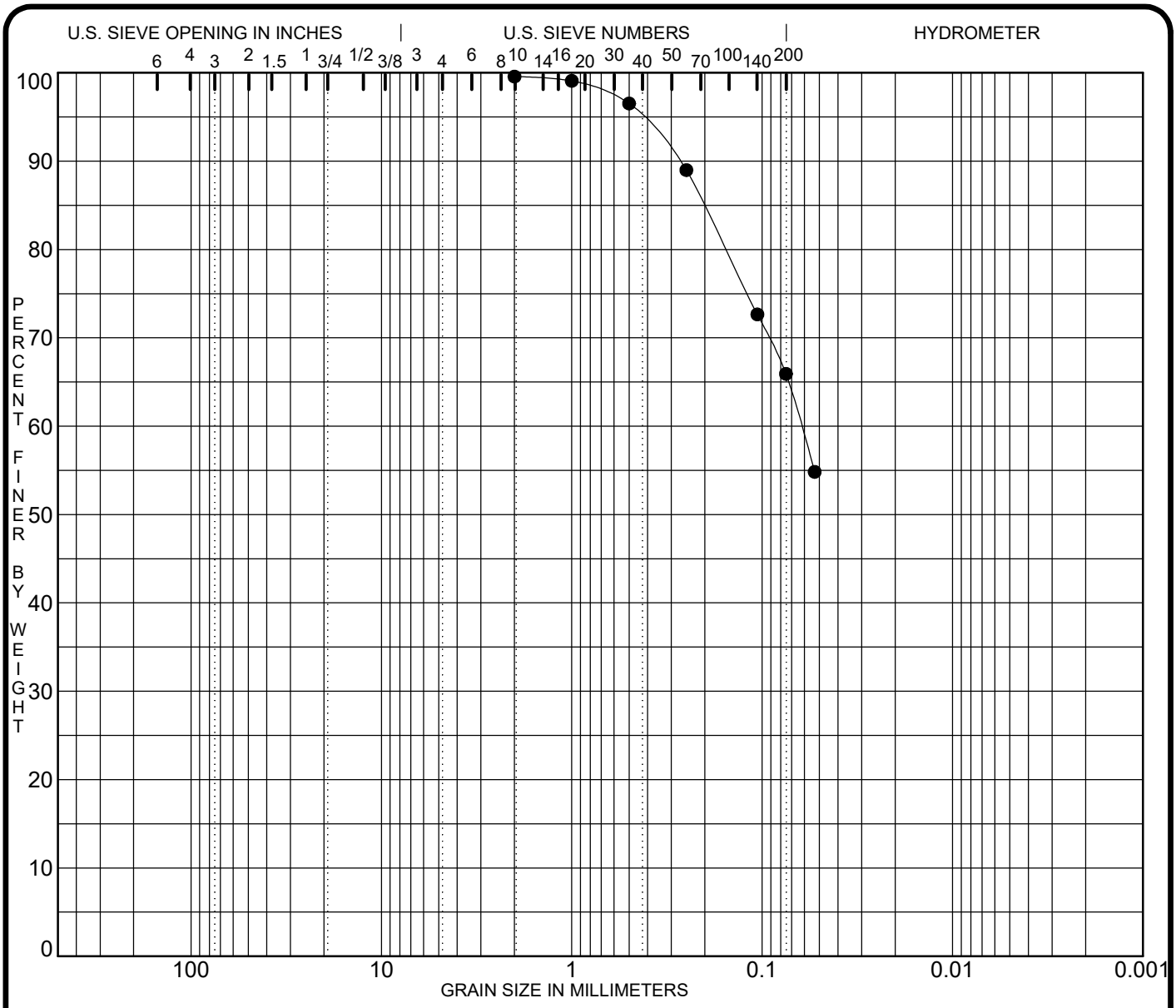
PROJECT **Proposed River Point District - Copeland Ave.**

JOB NO. **16290.20.WIL**

DATE **3/25/20**

GRADATION CURVES

Chosen Valley Testing



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-15**	**3.0**							

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-15**	**3.0**	**2.00**	**0.06**			**0.0**	**33.6**	**65.9**	

PROJECT **Proposed River Point District - Copeland Ave.**

JOB NO. **16290.20.WIL**

DATE **3/31/20**

GRADATION CURVES

Chosen Valley Testing

1002-CPS-23
Division of Industry Services
P. O. Box 2658
Madison, Wisconsin 53701
Scott Walker, Governor
Laura Gutierrez, Secretary

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 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.:
Reviewed by:
Date:

Property Owner	Property Location
City of La Crosse	Govt. Lot NE ¼ NE ¼ S 31 T 16 N R 7 ☒ (or) ☐ W
Property Owner' Mail Address: 400 La Crosse Street	Lot # / Block # / Subd. Name or CSM #
City: La Crosse; State: WI; Zip Code: 54601; Phone Number	☒ City ☐ Village ☐ Town; Nearest Road: Copeland Ave.

Drainage area _____ ☐ 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
☒ Morphological Evaluation
☐ Double Ring Infiltrometer
☐ Other: (specify) _____

Soil Moisture
Date of soil borings: 3/17/2020

USDA-NRCS WETS Value:
☐ Dry =1;
☐ Normal = 2;
☐ Wet = 3.

B-12 #OBS. ☐ Pit ☒ Boring Ground surface elevation. 639.2 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
1	0-36	10YR 7/2		LS	0sg	ml		20-30	15-25	1.63

Comments: Met auger advancement refusal at approximately 3 feet beneath the surface.

B-13 #OBS. ☐ Pit ☒ Boring Ground surface elevation. 645.9 ft. Elevation of limiting factor 635.9 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
1	0-18	10YR 4/3		S	0sg	ml	as	<10	<15	3.60
2	18-30	10YR 4/1		C	1 f sbk	mfr	as	<10	>80	0.07
3	30-60	10YR 5/4		S	0sg	ml	as	<10	<10	3.60
4	60-78	10YR 8/2		LS	0sg	ml	as	20-30	15-25	1.63
5	78-162	10YR 6/3	Water bearing below 10'	S	0sg	ml	gw	<10	<10	3.60
6	162-198	10YR 5/1		S	0sg	ml	gw	<10	<10	3.60
7	198-240	10YR 4/1		C	2 f sbk	mfi		<10	>80	0.07

Comments:

Name (Please Print)	Signature	Credential Number
Frederick Schuster	Frederick Schuster	CST 1356930 / PE 46610
Address	**Date Evaluation Conducted**	**Telephone Number**
1019 2nd Ave. SW., Onalaska, WI 54650	3/25/2020	608-782-5505

SBD-10793 (R01/17)

WDNR
September 2017

B-14 #OBS. ☐ Pit ☒ Boring Ground surface elevation. 646.2 ft. Elevation of limiting factor 636.2 ft. Page 2 of 2

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
1	0-54	10YR 5/3		S	0sg	ml	as	<10	<15	3.60
2	54-174	10YR 5/4	Water bearing below 10'	S	0sg	ml	gw	<10	<10	3.60
3	174-198	10YR 5/1		S	0sg	ml	gw	<10	<10	3.60
4	198-222	10YR 4/3		S	0sg	ml	gw	<10	<10	3.60
5	222-240	10YR 3/1		C	1 f sbk	mfi		<10	>80	0.07

Comments:

B-15 #OBS. ☐ Pit ☒ Boring Ground surface elevation. 645.8 ft. Elevation of limiting factor 637.8 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
1	0-30	10YR yr 6/3		LS	0sg	ml	as	5-15	15-25	1.63
2	30-54	10YR 4/1		L	1 f sbk	mvfi	as	<10	40-50	0.24
3	54-66	10YR 4/3		L	1 f sbk	mfi	as	<10	40-50	0.24
4	66-126	10YR 5/3	Water bearing below 8'	S	0sg	ml	gw	<10	<10	3.60
5	126-240	10YR 7/1		C	2 f sbk	mfi		<10	>80	0.07

Comments:

☐ #OBS. ☐ 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

Comments:

☐ #OBS. ☐ 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

Comments:

Overall Site Comments:

UNIFIED SOIL CLASSIFICATION (ASTM D-2487/2488)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	Cu>4 AND 1<Cc<3	GW	WELL-GRADED GRAVEL
			Cu>4 AND 1>Cc>3	GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	Cu>6 AND 1<Cc<3	SW	WELL-GRADED SAND
			Cu>6 AND 1>Cc>3	SP	POORLY-GRADED SAND
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LEAN CLAY
			PI>4 AND PLOTS<"A" LINE	ML	SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	FAT CLAY
			PI PLOTS <"A" LINE	MH	ELASTIC SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT

Relative Proportions of Sand and Gravel

TERM	PERCENT
Trace	< 15
With	15 - 29
Modifier	> 30

Relative Proportions of Fines

TERM	PERCENT
Trace	< 5
With	5 - 12
Modifier	> 12

Grain Size Terminology

TERM	SIZE
Boulder	< 12 in.
Cobble	3 in. - 12 in.
Gravel	#4 sieve to 3 in.
Sand	#200 sieve to #4 sieve
Silt or Clay	Passing #200 sieve

SAMPLE TYPES

Hollow Stem

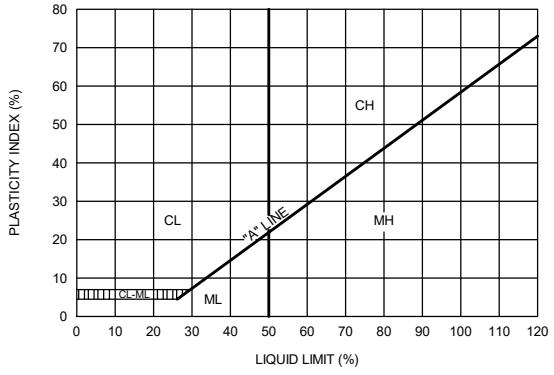
Standard Penetration Test

TEST SYMBOLS

MC	-	MOISTURE CONTENT	LL	-	LIQUID LIMIT
OC	-	ORGANIC CONTENT	PI	-	PLASTISITY INDEX
CN	-	CONSOLIDATION	SW	-	SWELL TEST
DD	-	DRY DENSITY	UU		Unconsolidated Undrained triaxial
PP	-	POCKET PENETROMETER			
RV	-	R-VALUE			
SA	-	SIEVE ANALYSIS			
P200	-	% PASSING #200 SIEVE			

▽ - WATER LEVEL (WITH TIME OF) MEASUREMENT

PLASTICITY CHART



PENETRATION RESISTANCE
(RECORDED AS BLOWS / 0.5 FT)

SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	COMPRESSIVE STRENGTH (TSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 1	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 3	0.25 - 0.50
MEDIUM DENSE	10 - 30	RATHER SOFT	4 - 5	0.50 - 1.0
DENSE	30 - 50	MEDIUM	6 - 8	
VERY DENSE	OVER 50	RATHER STIFF	9 - 12	1.0 - 2.0
		STIFF	13 - 16	
		VERY STIFF	17 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

Chosen Valley Testing

Job No. CVT

LEGEND TO SOIL DESCRIPTIONS

CVT

CVT LEGEND.GPJ 3/8/19