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**STRUCTURE GEOTECHNICAL REPORT  
INTERSTATE 80 EB/WB OVER RIVER ROAD ZONE A  
CULVERT AT STATION 283+38.40  
PR SN 099-8339, SECTION 2021-151-B  
WILL COUNTY, ILLINOIS**

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**For  
Stantec**

**350 North Orleans Street, Suite 1301  
Chicago, IL 60654**

**Submitted by  
Wang Engineering, Inc.  
A Terracon Company  
1145 North Main Street  
Lombard, IL 60148**

**Original Report: February 9, 2023  
Revised Report: February 24, 2023**

### Technical Report Documentation Page

<b>1. Title and Subtitle</b> Structure Geotechnical Report Culvert at Station 283+38.40		<b>2. Original Date:</b> February 9, 2023 <b>Revised Date:</b> February 24, 2023
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<b>6. PTB / Item No.</b> 194/010		<b>5. IDOT Job / Contract</b> D-91-206-19 / 62P71
<b>7. Existing Structure Number(s)</b> NA		<b>8. Proposed Structure Number(s)</b> 099-8339
<b>9. Prepared by</b> Wang Engineering, Inc. 1145 N Main Street Lombard, IL 60148	<b>Contributor(s)</b> Author: Nesam S. Balakumaran, P.E. (WI) QA/QC: Mohammed Kothawala, P.E, DGE PM: Azza Hamad, P.E.	<b>Contact</b> (630) 785 6220 <a href="mailto:ahamad@wangeng.com">ahamad@wangeng.com</a>
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<b>11. Abstract</b> <p>A new single box culvert is proposed at Station 283+38.40 along Interstate 80. The proposed culvert will have an interior opening of 8-foot wide and 4-foot high. The culvert will have a length of 185.98 feet (measured out-to-out headwalls), a total width of 9.0 feet, and up to 10.2 feet of embankment fill on the top.</p> <p>Beneath the surface and up to 5.5 feet of fill, the lithologic profile includes stiff to hard clay to silty clay interbedded with medium dense sandy loam overlying dense silty loam to silt or very dense gravel weathered bedrock. Bedrock encountered at elevations of 559.5 to 560.2 feet and auger refusal at elevation of 561.7 feet indicating possible top of bedrock. Groundwater was encountered at elevation of 570 to 572 feet.</p> <p>At the estimated culvert base elevations of 568.4 to 569.0 feet, very stiff to hard clay to silty clay loam at the upstream and downstream sections and sandy loam at the middle section are expected to be encountered. We recommend removing sandy loam soil to elevation 568.7 feet at the middle section. For the estimating purposes, the length of removal along the culvert can be considered as 92 feet. The replacement material could be IDOT gradation CA-7. Following the recommended treatment, the foundation soils will experience long-term settlement of 1.0 inch or less with differential settlement of 0.5 inches or less.</p> <p>Horizontal cantilever wingwalls are proposed at each end. In general, wingwalls types suitable for a cast-in-place culvert include horizontal cantilever and L-type walls. T-type, precast, or cast-in-place apron wingwalls could also considered for the cast-in-place and precast culverts.</p> <p>Since the groundwater will be encountered about 1.0 to 2.0 feet above culvert base slab elevations, dewatering measures will be required. Any excavation that cannot be sloped 1:2.0 (V:H) should be properly shored. A <i>Temporary Soil Retention System</i> will be needed for the staged construction. Additionally, a temporary geotextile retaining wall is proposed for the retention of Stage I construction backfill over the new culvert. Geotextile retaining walls should be constructed in accordance with Article 522.11 of IDOT Standard Specifications.</p>		
<b>12. Path to archived file</b> <small>N:\_WANGLegacy\SHARED\Netprojects\2553901\Reports\SGRs\Culverts\Culvert4_SN099_8339\UpdatedCulvert4Location\RPT_Wang_NSB_2553901_Culvert4SN0998339_v02_20230224.doc</small>		

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WILL COUNTY, ILLINOIS  
FOR  
STANTEC**

## **1.0 INTRODUCTION**

This report presents the results of our subsurface investigation, laboratory testing, geotechnical evaluations, and recommendations to support the design and construction of the culvert for Interstate 80 (I-80) over River Road Zone A at Station 283+38.40 in Will County, Illinois. The project site is located about 0.4 miles west of the River Road crossing at I-80 in west central Will County, about 2.5 miles northeast of the Village of Minooka. On the USGS *Channahon Quadrangle 7.5 Minute Series* map, the project site is generally located at W $\frac{1}{2}$  of Section 29, Township 35N, Range 9 E of the Third Principal Meridian (Exhibit 1).

The improvement was initially proposed as a replacement of the existing culvert near Station 284+38 where the original subsurface investigation was completed. We understand the culvert was relocated about 100 feet east of its originally proposed location necessitating a new geotechnical investigation. This report addresses the new culvert at Station 283+38.40.

The purpose of this investigation was to characterize the site soil and groundwater conditions, perform geotechnical analyses, and provide recommendations for the design and construction of the proposed culvert.

### **1.1 Proposed Structure**

Based on *General Plan and Elevation (GPE)* drawing, dated October 31, 2022, and prepared by HBM Engineering, LLC (HBM), Wang Engineering, Inc. (Wang) understands the proposed culvert will be a cast-in-place single box culvert with an interior opening of 8-foot wide and 4-foot high. The new culvert has proposed invert elevations of 570.00 and 569.35 feet at the upstream and downstream ends, respectively. The culvert will have a length of 198.0 feet between out-to-out headwalls

(measured along the centerline of culvert) and a width of 9.0 feet with up to 10.2 feet of embankment fill on the top. The existing I-80 grade will be raised by up to 3.0 feet at the culvert location. Horizontal cantilever wingwalls are proposed at each end. The culvert replacement will be done utilizing staged construction to maintain traffic on I-80.

## 1.2 Existing Structure

There is no existing culvert at the proposed culvert location. There is currently a culvert at Station 284+38. However, due to conflicts with existing gas lines during construction, the proposed culvert has been offset to the new location, Station 283+38.40.

## 2.0 METHODS OF INVESTIGATION

The following sections outline the field and laboratory investigations performed by Wang.

### 2.1 Field Investigation

The current field investigation consisted of three structure borings, designated as I-80-CUL-4-04 through I-80-CUL-4-06 drilled by Wang Testing Services (WTS) on January 3 and January 16, 2023. The borings were drilled from elevations of 575.5 to 579.2 feet to depths of 17.5 to 27.0 feet below the grade (bgs). We considered original investigation Borings I-80-CUL-4-01 through I-80-CUL-4-03 drilled by WTS in April 2022 to supplement our analysis. The as-drilled northings and eastings were obtained with a mapping-grade GPS unit. Elevation, station and offsets were provided by Stantec. As-drilled boring locations are presented in the *Boring Logs* (Appendix A) and are shown in the *Boring Location Plan* (Exhibit 2).

ATV and truck-mounted drilling rigs, equipped with hollow stem augers, were used to advance and maintain open boreholes. Soil sampling was performed according to AASHTO T206, "*Penetration Test and Split Barrel Sampling of Soils.*" The soil was sampled at 2.5-foot intervals to the top of bedrock or boring termination depth. Bedrock cores were obtained in Borings I-80-CUL-4-04 and I-80-CUL-4-06 in 5- to 10-foot runs with an NWD4-sized core barrel. Soil samples collected from each sampling interval were placed in sealed jars and rock cores were placed into marked core boxes and transported to the laboratory for further examination and testing.

Field boring logs, prepared and maintained by Wang geologists, include lithological descriptions, visual-manual soil (IDH Textural) classifications, results of Rimac and pocket penetrometer

unconfined compressive strength tests, and results of Standard Penetration Tests (SPT) recorded as blows per 6 inches of penetration.

Groundwater levels were measured while drilling and at completion of each boring. Each borehole was backfilled upon completion with lean grout and bentonite chips and the surface was restored as much as possible to its original condition.

## **2.2 Laboratory Testing**

The soil samples were tested in the laboratory for moisture content (AASHTO T265). Atterberg limits (AASHTO T89 and T90) and particle size analyses (AASHTO T88) were performed on selected samples. Tested samples were classified according to the IDH classification system. Field visual descriptions of the soil samples were verified in the laboratory. Laboratory test results are shown in the *Boring Logs* (Appendix A) and in the *Laboratory Test Results* (Appendix B).

## **3.0 INVESTIGATION RESULTS**

Detailed descriptions of the soil conditions encountered during the subsurface investigation are presented in the attached *Boring Logs* (Appendix A) and in the *Soil Profile* (Exhibit 3). Please note that strata contact lines represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in horizontal and vertical directions.

### **3.1 Lithological Profile**

At the surface, Borings I-80-CUL-4-04 and I-80-CUL-4-06 encountered 5 to 15 inches of black silty clay topsoil. Boring I-80-CUL-4-05 was drilled within the median and encountered cohesive fill at the surface. In descending order, the general lithologic succession encountered beneath the surface includes: 1) man-made ground (fill); 2) very stiff to hard clay to silty clay loam; 3) dense silty loam to silt; 4) very dense weathered bedrock; 5) shaly dolostone.

#### *1) Man-made ground (fill)*

Beneath the surface, the borings encountered 4 to 5.5 feet of stiff to very stiff to hard, brown silty clay to clay loam fill with unconfined compressive strength ( $Q_u$ ) values of 2.0 to 5.6 tsf and moisture content values of 12 to 31%.

2) *Stiff to hard clay to silty clay*

At elevations of 570.0 to 573.7 feet, the borings encountered up to 10 feet of very stiff to hard, brown to gray, clay to silty clay interbedded with sandy loam. The unit has  $Q_u$  values of 1.5 to greater than 4.5 tsf and moisture content values of 11 to 31%. Laboratory index testing on samples from this unit showed liquid limit ( $L_L$ ) values of 39 and 44% and plastic limit ( $P_L$ ) values of 16 and 18%.

3) *Dense silty loam to silt*

At elevations of 564.2 and 566.2 feet, Borings I-80-CUL-4-04 and I-80-CUL-4-06 encountered dense silty loam to silt and very stiff silty clay loam to silty loam. The unit has  $Q_u$  value of 2.8 tsf, SPT-N values of 28 and 34 blows per foot, and moisture content values of 15%.

4) *Very dense weathered bedrock*

At elevations of 561.7 and 563.7 feet, Borings I-80-CUL-4-04 and I-80-CUL-4-05 encountered up to 2.0 feet of very dense, gray sandy gravel weathered bedrock extending to the bedrock or boring termination depth. Boring I-80-CUL-4-05 encountered auger refusal at an elevation of 561.7 feet indicating the possible top of bedrock. The unit has SPT-N values of 50 blows for 2 to 5 inches of sampler penetration. Sampler refusal was noted in Borings I-80-CUL-4-04 and I-80-CUL-4-05, indicating the possible presence of cobbles within the weathered bedrock.

5) *Strong, very poor to poor quality shaly dolostone*

At elevations of 559.5 and 560.2 feet (16.0 to 17.0 feet bgs), Borings I-80-CUL-4-04 and I-80-CUL-4-06 encountered and cored strong, very poor to poor quality, slightly to highly weathered shaly dolostone bedrock. The slightly to highly weathered bedrock has horizontal, oblique, and vertical joints with Rock Quality Designation (RQD) values of 7 to 48%. The bedrock core data is shown in the *Bedrock Core Photographs* (Appendix C).

### 3.2 Groundwater Conditions

Groundwater was encountered while drilling at elevations of 562 to 573 feet (4 to 14 feet bgs) and was measured upon completion of drilling at elevations of 570 and 572 feet (5 and 9 feet bgs) within the granular layers. The design groundwater elevation may be considered at elevation of 570 feet. It should be noted that groundwater levels might change with seasonal rainfall patterns and long-term climate fluctuations or may be influenced by local site conditions.



## 4.0 ANALYSES AND RECOMMENDATIONS

In the following sections, we present the results of our analyses and recommendations for the proposed culvert box and wingwalls.

### 4.1 Culvert Foundations

Based on the subsurface investigation, the soils at the base of culvert box are expected to be up to 0.5 feet of saturated sandy loam or up to 4.0 feet of very stiff to hard clay to silty clay followed by very dense silty loam to silt or sandy gravel weathered bedrock. Prior to culvert box construction, we recommend removing up to 4 inches of sandy loam to an elevation of 568.7 feet at the middle section. For the estimating purposes, the length of removal along the culvert can be considered as 92 feet (offset of 40 feet LT to 52 feet RT along the culvert centerline). The replacement material could be IDOT gradation CA-7. The removal and replacement material should extend a minimum of two foot beyond the edge of the box. The actual extent of the removal should be determined in the field at the time of construction.

We estimate the foundation soils will experience long-term settlement of 1 inch or less with a differential settlement of 0.5 inches or less. Based on our geotechnical analysis, both precast and cast-in-place culverts are feasible at this site.

### 4.2 Wingwalls

Horizontal cantilever wingwalls are proposed at each end. For the cast-in-place culvert, horizontal cantilever and L-type wingwalls are typically used. The other wingwall types, such as cast-in-place T-type or precast apron end sections may also be considered for cast-in place culvert. For the precast culvert, the wingwall types generally include cast-in-place T-type wall, cast-in-place or precast apron end sections.

The proposed horizontal cantilever wingwalls are supported by the culvert box rather than the foundation soils. Horizontal cantilever wingwalls should be designed based on the guidelines provided in Section 4.2 of the IDOT *Culvert Manual* (2017).

For the cast-in-place T-type walls, the footings should be established at a depth such that they would be at least 4 feet below culvert barrel invert elevation. Footing will be established at elevations of 566.0 and 565.35 feet at upstream and downstream ends, respectively. Based on the

subsurface investigation, the soils at the T-type wall footing expected to be very stiff to hard stiff silty clay loam to silty loam. The T-type walls could be designed based on a maximum factored resistance of 5,000 psf, determined with a bearing resistance factor of 0.45 (AASHTO 2020).

If the precast apron end sections are selected, they should be designed IDOT Base sheet dated 2/17/2017 “*MCB-AES, Multi-Cell Precast Concrete Box Culvert Apron End Section Details*” and constructed based on IDOT Standard Specifications.

### **4.3 Global Stability**

Since the horizontal cantilever walls are preferred wingwall type, we do not anticipate global instability concerns for wingwalls.

## **5.0 CONSTRUCTION CONSIDERATIONS**

### **5.1 Site Preparation**

The existing vegetation, surface topsoil, pavement, and debris should be cleared and stripped where the culvert foundations will be placed.

### **5.2 Excavation, Dewatering, and Utilities**

Excavations should be performed in accordance with local, state, and federal regulations. The potential effect of ground movements upon nearby roadways and utilities should be considered during construction. Any excavation that cannot be sloped 1:2.0 (V:H) should be properly shored. Excavation up to 14 feet will be required. The temporary sheet piling is not feasible using charts provided in *IDOT Design Guide-Simplified Temporary Sheet Piling Design Charts* (IDOT 2020) due to the hard cohesive soils and bedrock within the embedment depth. A *Temporary Soil Retention System* will be needed for the staged construction. A temporary geotextile retaining wall, as per GPE (Appendix C), could also be used for the retention of Stage I construction backfill over the new culvert. Geotextile retaining walls should be constructed in accordance with Article 522.11 of IDOT Standard Specifications.

The groundwater will be expected at about elevation of 570 feet, about 1.0 to 2.0 above the proposed culvert base slab and dewatering measures will be required. Additionally, perched or temporary water, such as that encountered within the upper granular layer in Boring I-80-CUL-4-04 may be encountered during times of heavy precipitation while excavating within the upper fill soils and will

require dewatering efforts. Depending upon prevailing climate conditions and the time of the year when wingwalls construction taken place, control runoff and maintenance of existing flows may require temporary water diversion and control. Any water that accumulates in open excavations by seepage or runoff should be immediately removed by sump pump.

### **5.3 Filling and Backfilling**

Fill used as embankment material and for replacement of any unstable or unsuitable soils encountered during construction should be pre-approved by the Engineer. The material used to backfill around and to a level at least 1 foot over the top of the culvert box, should be porous granular material conforming to the requirements specified in the IDOT 2022 Standard Specifications (IDOT 2022).

### **5.4 Earthwork Operations**

The required earthwork can be accomplished with conventional construction equipment. Moisture and traffic will cause deterioration of exposed subgrade soils. Precautions should be taken by the Contractor to prevent water erosion of the exposed subgrade. A compacted subgrade will minimize water runoff erosion.

Earth moving operations should be scheduled to not coincide with excessive cold or wet weather (early spring, late fall or winter). Any soil allowed to freeze or soften due to the standing water should be removed. Wet weather can cause problems with subgrade compaction.

It is recommended that an experienced geotechnical engineer be retained to inspect the exposed subgrade, monitor earthwork operations, and provide material inspection services during the construction phase of this project.

## 6.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on the boring logs and in Exhibit 2. This report does not reflect any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. If changes are planned to the proposed improvements as described in this report, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Stantec, HBM Engineering Group, LLC., and the Illinois Department of Transportation and Highways on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

### **WANG ENGINEERING, INC.**

Azza Hamad, P.E.  
Senior Geotechnical Engineer

Nesam S. Balakumaran, P.E (WI), P.Eng.  
Project Geotechnical Engineer

Mohammed Kothawala, P.E., DGE  
QA/QC Reviewer

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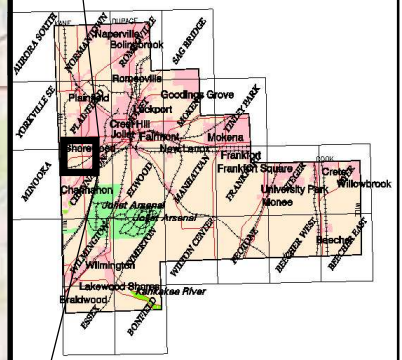
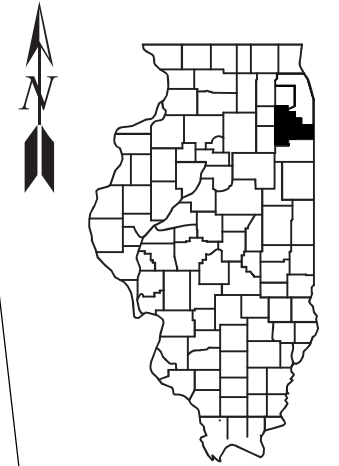
## ***REFERENCES***

IDOT (2017) *Culvert Manual*. Illinois Department of Transportation.

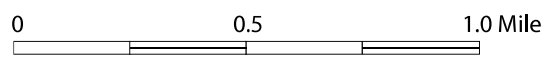
IDOT (2022) *Standard Specifications for Road and Bridge Construction*. Illinois Department of Transportation. 1098 pp.

IDOT (2015) *Geotechnical Manual*, Illinois Department of Transportation.

## **EXHIBITS**



Will County

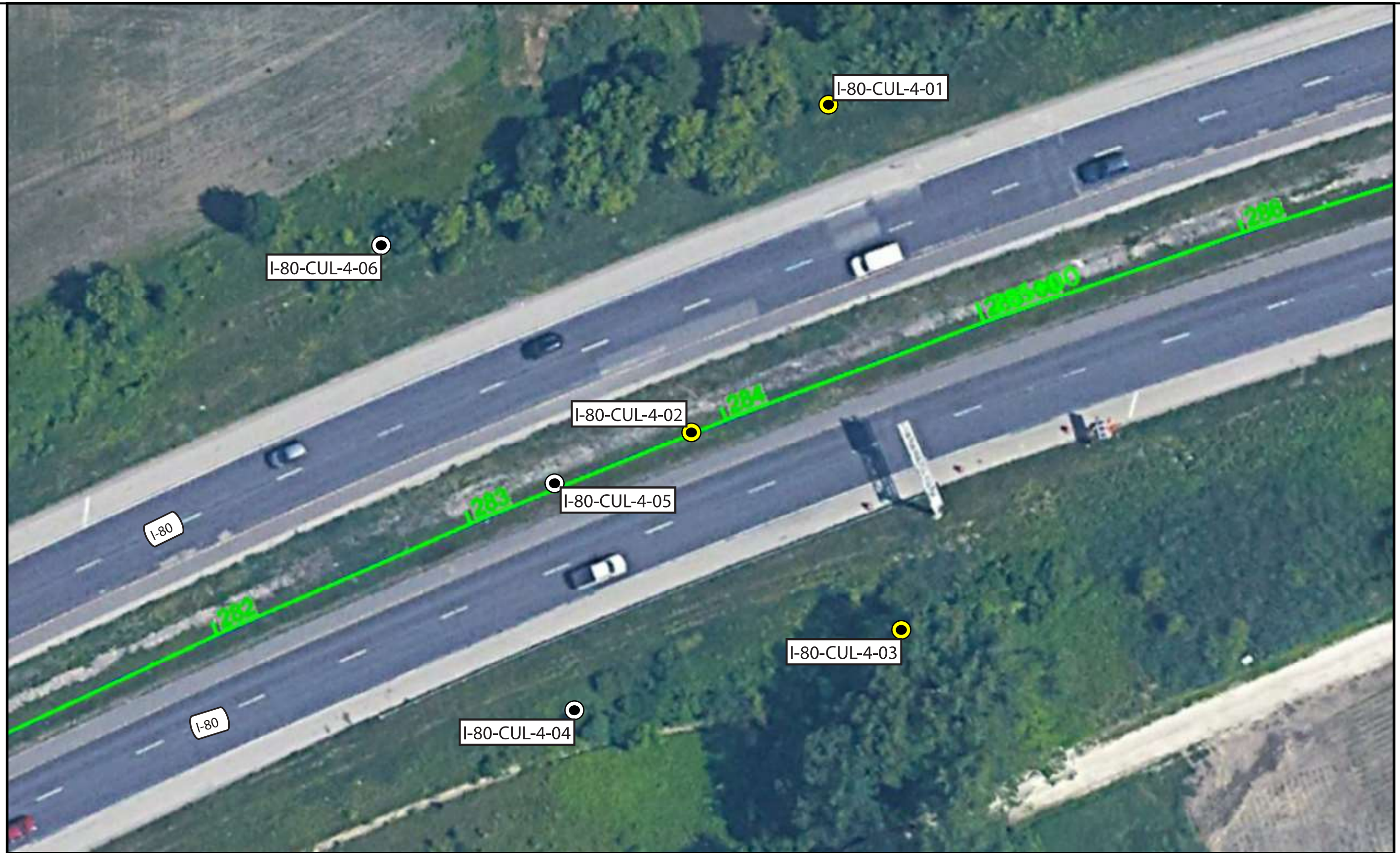


SITE LOCATION MAP: I-80 EB/WB CULVERT OVER RIVER ROAD ZONE A, SN 099-8339, WILL COUNTY, ILLINOIS



SCALE: GRAPHICAL	<b>EXHIBIT 1</b>	DRAWN BY: J. Bensen CHECKED BY: N. Balakumaran
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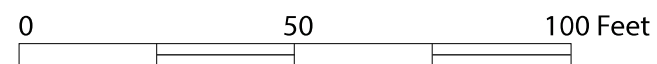
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FOR STANTEC	255-39-01
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**Legend**

-  Boring Location
-  Original Investigation Boring Location



BORING LOCATION PLAN: I-80 EB/WB CULVERT OVER RIVER ROAD ZONE A, SN 099-8339, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: J. Bensen CHECKED BY: N. Balakumaran
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FOR STANTEC	255-39-01
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## APPENDIX A



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# BORING LOG I-80-CUL-4-01

WEI Job No.: 255-39-01

Client **Stantec**  
 Project **I-80 Reconstruction, Ridge Road to Houbolt Road**  
 Location **Will County, Illinois**

Datum: NAVD 88  
 Elevation: 576.24 ft  
 North: 1755073.57 ft  
 East: 1014281.80 ft  
 Station: 284+75.75  
 Offset: 94.47 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	575.94	inch thick, dark brown SILTY CLAY LOAM --TOPSOIL-- Stiff to very stiff, brown and gray SILTY CLAY LOAM to CLAY LOAM, trace gravel; damp --FILL-- --RDR 2--			1	3 5 6	2.00 P	18									
			5		2	2 2 5	1.50 P	21									
	570.7	Stiff, gray SILTY LOAM to SILTY CLAY LOAM, trace gravel; moist --RDR 2--			3	2 4 6	1.64 S	23									
	568.2	Soft, gray CLAY to SILTY CLAY LOAM, trace gravel; damp to moist --RDR 2-- --L <sub>L</sub> (%)=41, P <sub>L</sub> (%)=13-- --%Gravel=0.4-- --%Sand=21.0-- --%Silt=48.4-- --%Clay=30.1-- --A-7-6 (21)--			4	2 3 4	0.41 B	33									
					5	1 1 2	0.33 B	32									
	563.5	Possible SAND; saturated --wet spoon recovery-- Very soft, gray CLAY to SILTY CLAY, trace gravel; moist --RDR 2--			6	3 6 5	0.16 B	38									
	561.4				7	50/3"	NP										
	561.0	Very dense, gray GRAVEL --AUGER REFUSAL-- --Possible BEDROCK-- Boring terminated at 15.25 ft															

### GENERAL NOTES

Begin Drilling **04-26-2022** Complete Drilling **04-26-2022**  
 Drilling Contractor **Wang Testing Services** Drill Rig **20D25A [83%]**  
 Driller **KG&JD** Logger **M. Rojo** Checked by **C. Marin**  
 Drilling Method **2.25" ID HSA; boring backfilled upon completion**

### WATER LEVEL DATA

While Drilling  $\nabla$  **13.00 ft**  
 At Completion of Drilling  $\nabla$  **13.00 ft**  
 Time After Drilling **NA**  
 Depth to Water  $\nabla$  **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



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# BORING LOG I-80-CUL-4-02

WEI Job No.: 255-39-01

Client **Stantec**  
 Project **I-80 Reconstruction, Ridge Road to Houbolt Road**  
 Location **Will County, Illinois**

Datum: NAVD 88  
 Elevation: 578.85 ft  
 North: 1754954.54 ft  
 East: 1014231.82 ft  
 Station: 283+87.56  
 Offset: 1.20 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	578.4	6-inch thick, brown GRAVEL --FILL--															
		Stiff to very stiff, brown and gray SILTY CLAY LOAM to CLAY LOAM, trace gravel; damp --FILL-- --RDR 2-3--			1	4 6 8	3.77 S	18									
			5		2	3 5 6	2.50 P	14									
					3	4 4 9	1.50 P	21									
	570.9	Very stiff (2.50P), black SILTY CLAY; damp			4	4 5 7	2.30 B	26									
	569.9	--Buried TOPSOIL-- Stiff to very stiff, gray and brown CLAY to SILTY CLAY LOAM, trace gravel; damp --RDR 2-- --L <sub>L</sub> (%)=41, P <sub>L</sub> (%)=14-- --%Gravel=1.9-- --%Sand=13.6-- --%Silt=57.5-- --%Clay=27.0--	10		5	3 2 3	1.31 B	28									
	565.9	Stiff, brown and gray SILTY CLAY LOAM, little gravel; damp --RDR 2--	15		6	3 6 8	1.31 B	15									
	563.4	Very dense, gray GRAVEL; dry --Weathered BEDROCK-- --RDR 2-4-- --hard slow drilling--  --AUGER REFUSAL--			7	50/5"	NR										
	559.9	Boring terminated at 19.00 ft	20		8	50/4"	NP	5									

### GENERAL NOTES

Begin Drilling **04-25-2022** Complete Drilling **04-25-2022**  
 Drilling Contractor **Wang Testing Services** Drill Rig **20D25A [83%]**  
 Driller **P&T** Logger **M. Sadowski** Checked by **C. Marin**  
 Drilling Method **2.25" ID HSA; boring backfilled upon completion**

### WATER LEVEL DATA

While Drilling  **DRY**  
 At Completion of Drilling  **DRY**  
 Time After Drilling **NA**  
 Depth to Water  **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



# BORING LOG I-80-CUL-4-03

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 1145 N Main Street  
 Lombard, IL, 60148  
 Telephone: 630 953 9928  
 Fax: 630 953 9938

WEI Job No.: 255-39-01

Client **Stantec**  
 Project **I-80 Reconstruction, Ridge Road to Houbolt Road**  
 Location **Will County, Illinois**

Datum: NAVD 88  
 Elevation: 573.06 ft  
 North: 1754882.10 ft  
 East: 1014308.83 ft  
 Station: 284+33.59  
 Offset: 94.26 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--bare ground-- Stiff, brown CLAY LOAM, trace gravel; damp															
	570.1	--FILL--			1	3 4 5	1.50 P	16									
		Medium stiff to stiff, brown and gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; damp			2	3 2 4	1.50 P	29									
		--RDR 2--	5														
					3	3 4 4	1.50 P	20									
					4	3 3 4	0.50 P	18									
	562.6		10														
	562.1	Possible SAND; saturated --wet spoon recovery--			5	1 3 5	0.88 B	27									
	560.1	Medium stiff, gray SILTY CLAY, trace gravel; moist															
	559.1	Very dense, gray GRAVEL; damp			6			13									
		--RDR 3--			7	50/5"	NP NR										
		--AUGER REFUSAL--				50/0"											
		--Possible BEDROCK--	15														
		Boring terminated at 14.00 ft															

### GENERAL NOTES

Begin Drilling **04-26-2022** Complete Drilling **04-26-2022**  
 Drilling Contractor **Wang Testing Services** Drill Rig **20D25A [83%]**  
 Driller **KG&JD** Logger **M. Rojo** Checked by **C. Marin**  
 Drilling Method **2.25" ID HSA; boring backfilled upon completion**

### WATER LEVEL DATA

While Drilling  $\nabla$  **11.00 ft**  
 At Completion of Drilling  $\blacktriangledown$  **13.00 ft**  
 Time After Drilling **NA**  
 Depth to Water  $\nabla$  **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



# BORING LOG I-80-CUL-4-04

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 Fax: 630 953 9938

WEI Job No.: 255-39-01

Client **Stantec**  
 Project **I-80 Reconstruction, Ridge Road to Houbolt Road**  
 Location **Will County, Illinois**

Datum: NAVD 88  
 Elevation: 577.21 ft  
 North: 1754853.40 ft  
 East: 1014189.27 ft  
 Station: 283+09.2  
 Offset: 76.4 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	576.8	5-inch thick, brown SILTY CLAY, trace gravel; damp --TOPSOIL-- Very stiff, brown SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--			1	2 3 3	2.00 P	31			and 0 - 0.2 inch thick clay infill. --Run 1: 17.0 to 22.0 feet-- --Recovery= 100%-- --RQD= 7%--  --Run 2: 22.0 to 27.0 feet-- --Recovery= 100%-- --RQD= 48%--						
	573.1	Medium dense, organish brown SANDY LOAM, little gravel; wet --RDR 2--			2	4 5 7	2.95 B	27				25		9			
	571.7	Very stiff to hard, brown to gray CLAY to SILTY CLAY, trace gravel; damp --RDR 2--			3	3 4 6	2.38 B	19		550.2	Boring terminated at 27.00 ft						
					4	4 7 9	4.35 B	19									
		--L <sub>L</sub> (%)=44, P <sub>L</sub> (%)=18-- --%Gravel=0.0-- --%Sand=4.0-- --%Silt=42.0-- --%Clay=54.0--			5	4 9 10	5.33 B	25									
	564.2	Very stiff, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel; damp --RDR 2--			6	4 10 18	2.79 B	15									
	561.7	Very dense, gray SANDY GRAVEL; damp --WEATHERED BEDROCK--			7		NP	4									
	560.2	Strong, light gray, very poor to poor quality, Shaly DOLOSTONE; very closely spaced, highly weathered, horizontal, oblique, and vertical joints, with 0-0.2 inch opening, slicken to slightly rough walls,			8												

### GENERAL NOTES

Begin Drilling **01-03-2023** Complete Drilling **01-03-2023**  
 Drilling Contractor **Wang Testing Services** Drill Rig **21GeoT[92%]**  
 Driller **AG&EH** Logger **B. Miller** Checked by **C. Marin**  
 Drilling Method **3.25" ID HSA; boring backfilled upon completion**

### WATER LEVEL DATA

While Drilling  $\nabla$  **4.00 ft**  
 At Completion of Drilling  $\nabla$  **5.00 ft**  
 Time After Drilling **NA**  
 Depth to Water  $\nabla$  **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



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# BORING LOG I-80-CUL-4-05

WEI Job No.: 255-39-01

Client **Stantec**  
 Project **I-80 Reconstruction, Ridge Road to Houbolt Road**  
 Location **Will County, Illinois**

Datum: NAVD 88  
 Elevation: 579.18 ft  
 North: 1754936.03 ft  
 East: 1014182.13 ft  
 Station: 283+32.9  
 Offset: 5.2 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	
		Very stiff to hard, brown CLAY LOAM, trace to little gravel; damp --FILL-- --RDR 2--			1	8 7 6	5.33 B	12										
					2	3 6 8	3.28 B	18										
	573.7				3	5 8 12	3.20 B	24										
			Very stiff, black and gray CLAY to SILTY CLAY, trace gravel; damp --RDR 2--			4	3 5 7	4.92 B	20									
	569.9		Gray SANDY LOAM; saturated			5	4 7 9	5.74 B	23									
	568.7		Very stiff to hard, brown and gray to gray SILTY CLAY, trace gravel; damp --RDR 2--			6	3 5 8	2.38 B	31									
			--L <sub>L</sub> (%)=39, P <sub>L</sub> (%)=16-- --%Gravel=0.0-- --%Sand=6.8-- --%Silt=58.1-- --%Clay=35.0--			7	50/5"	NP	7									
563.7		Very dense, gray SANDY GRAVEL; damp --WEATHERED BEDROCK--																
561.7		--AUGER REFUSAL-- Boring terminated at 17.50 ft																
			20															

### GENERAL NOTES

### WATER LEVEL DATA

Begin Drilling **01-03-2023** Complete Drilling **01-03-2023**  
 Drilling Contractor **Wang Testing Services** Drill Rig **21GeoT[92%]**  
 Driller **AG&EH** Logger **B. Miller** Checked by **C. Marin**  
 Drilling Method **3.25" ID HSA; boring backfilled upon completion**

While Drilling **9.50 ft**  
 At Completion of Drilling **9.00 ft**  
 Time After Drilling **NA**  
 Depth to Water **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



# BORING LOG I-80-CUL-4-06

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 Lombard, IL, 60148  
 Telephone: 630 953 9928  
 Fax: 630 953 9938

WEI Job No.: 255-39-01

Client **Stantec**  
 Project **I-80 Reconstruction, Ridge Road to Houbolt Road**  
 Location **Will County, Illinois**

Datum: NAVD 88  
 Elevation: 575.47 ft  
 North: 1755022.53 ft  
 East: 1014117.96 ft  
 Station: 283+09.0  
 Offset: 107.2 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	574.2	15-inch thick, black SILTY CLAY --TOPSOIL--									--Recovery= 91%-- --RQD= 34%--			7			9
		Hard, brown and gray SILTY CLAY LOAM to CLAY LOAM, little gravel; damp --RDR 2--	5		1	5 5 11	1.50 P	40									
			5		2	10 16 18	4.50 P	11									
	570.0	Hard, Brown and gray to gray CLAY to SILTY CLAY, trace gravel; damp to moist --RDR 2--			3	7 14 24	6.72 B	21		549.5	Boring terminated at 26.00 ft						
			10		4	9 15 21	5.74 B	22									
	565.0	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel; damp --RDR 2--			5	7 11 15	4.43 B	12									
	562.5	Dense, gray SILTY LOAM to SILT, trace to little gravel; saturated --RDR 2--			6	11 14 20	NP	15									
	559.5	Strong, light gray, poor rock mass quality, DOLOSTONE, some shale partings; closely spaced, slightly weathered, horizontal, oblique, and vertical joints, with <0.05 inch opening, slightly rough walls, and >0.2 inch thick clay infill. --Run 1: 16.0 to 26.0 feet--	20														

### GENERAL NOTES

Begin Drilling **01-16-2023** Complete Drilling **01-16-2023**  
 Drilling Contractor **Wang Testing Services** Drill Rig **20D25A [83%]**  
 Driller **RH&JD** Logger **A. Scifers** Checked by **C. Marin**  
 Drilling Method **2.25" ID HSA to 10 ft; mud rotary thereafter; boring backfilled upon completion**

### WATER LEVEL DATA

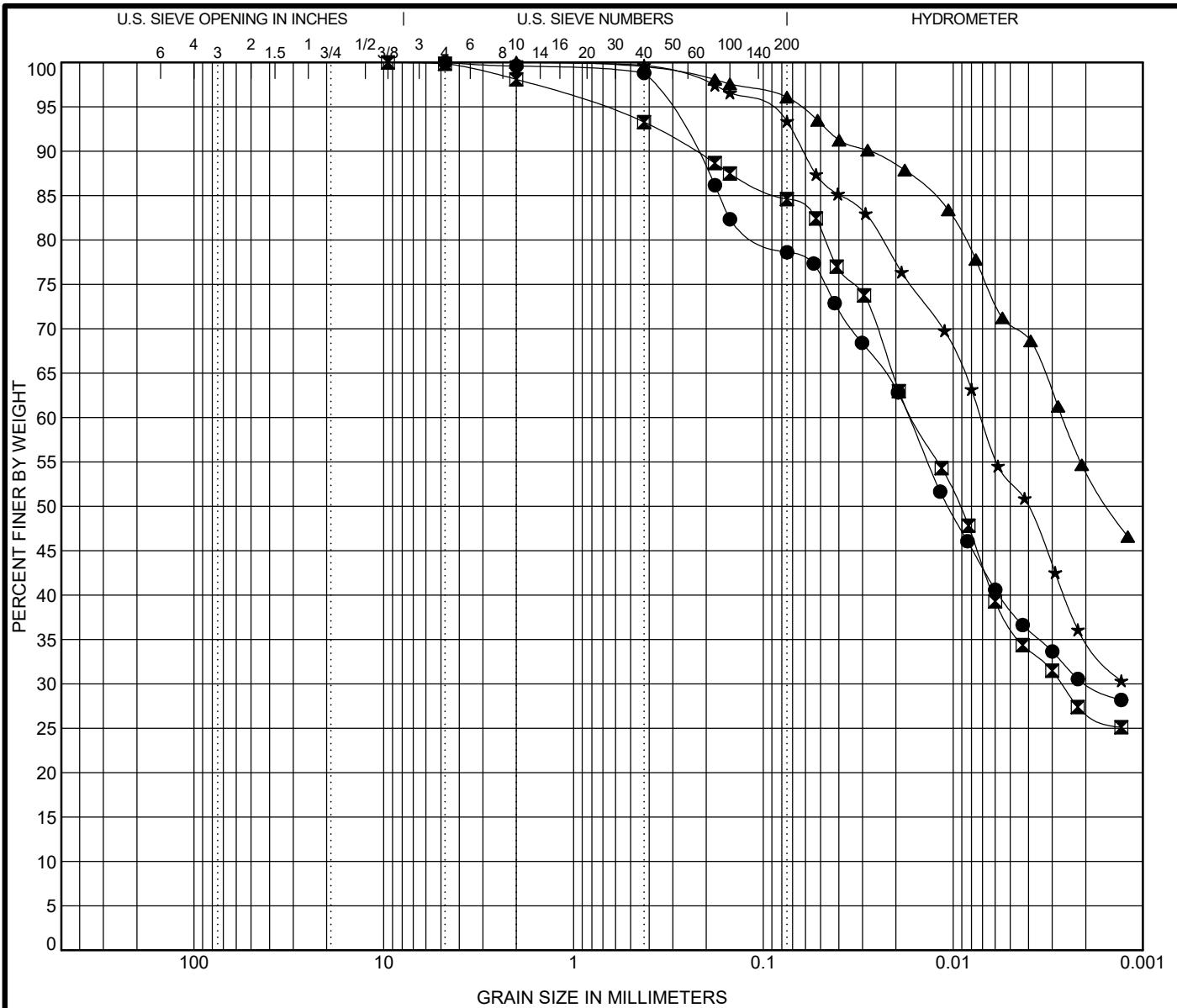
While Drilling  $\nabla$  **14.00 ft**  
 At Completion of Drilling  $\nabla$  **mud in the borehole**  
 Time After Drilling **NA**  
 Depth to Water  $\nabla$  **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC 2553901.GPJ WANGENG.GDT 2/1/23



## **APPENDIX B**



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification	IDH Classification	LL	PL	PI	Cc	Cu
● I-80-CUL-4-01#4 8.5 ft	Clay	41	13	28		
☒ I-80-CUL-4-02#5 11.0 ft	Silty Clay Loam	41	14	27		
▲ I-80-CUL-4-04#5 11.0 ft	Clay	47	18	29		
★ I-80-CUL-4-05#6 13.5 ft	Silty Clay	39	16	23		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● I-80-CUL-4-01#4 8.5 ft	4.75	0.017	0.002		0.4	21.0	48.4	30.1
☒ I-80-CUL-4-02#5 11.0 ft	9.5	0.016	0.003		1.9	13.6	57.5	27.0
▲ I-80-CUL-4-04#5 11.0 ft	2	0.003			0.0	4.0	42.0	54.0
★ I-80-CUL-4-05#6 13.5 ft	2	0.007			0.0	6.8	58.1	35.0



Wang Engineering, Inc.  
 1145 N Main Street  
 Lombard, IL, 60148  
 Telephone: 630 953 9928  
 Fax: 630 953 9938

**GRAIN SIZE DISTRIBUTION**  
 Project: I-80 Reconstruction, Ridge Road to Houbolt Road  
 Location: Will County, Illinois  
 Number: 255-39-01

WEI GRAIN SIZE IDH 2553901.GPJ US LAB.GDT 2/9/23

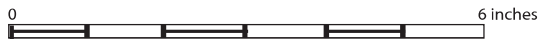


## APPENDIX C

Run #1



Run #2



Boring I-80-CUL-4-04:  
 Run #1, 17.0 to 22.0 feet, RECOVERY=100%, RQD=7%  
 Run #2, 22.0 to 27.0 feet, RECOVERY=100%, RQD=48%

BEDROCK CORE: I-80 EB/WB CULVERT OVER RIVER ROAD ZONE A, SN 099-8339,  
 WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	APPENDIX C-1	DRAWN BY: J. Bensen CHECKED BY: A. Hamad
------------------	--------------	---



FOR STANTEC	255-39-01
-------------	-----------

Run #1



0 6 inches

Boring I-80-CUL-4-06:  
Run #1, 16.0 to 26.0 feet, RECOVERY=91%, RQD=34%

BEDROCK CORE: I-80 EB/WB CULVERT OVER RIVER ROAD ZONE A, SN 099-8339,  
WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL

APPENDIX C-2

DRAWN BY: D. You  
CHECKED BY: A. Hamad



1145 N. Main Street  
Lombard, IL 60148  
www.wangeng.com

FOR STANTEC

255-39-01

## **APPENDIX D**

Bench Mark: Set 2" CWA aluminum disc in north side of concrete base of overhead sign " Exist 126A" on south side of EB I-80, approximately 2000' ± west of River Road. Elev. 582.759.

Existing Structure: None.

Traffic will be maintained utilizing Staged Construction. Precast alternative is not allowed.

**NOTES:**

1. Upstream and downstream channels are to be regraded to align with new culvert.
2. For Section A-A, General notes, Index of Sheets and Name Plate, see Sheet S4-02.

**DESIGN STRESSES**

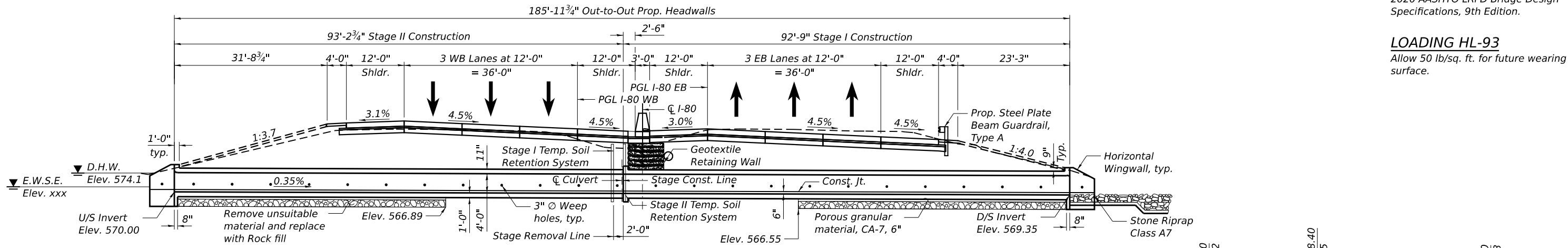
FIELD UNITS  
 f<sub>c</sub> = 3,500 psi  
 f<sub>y</sub> = 60,000 psi (Reinforcement)

**DESIGN SPECIFICATIONS**

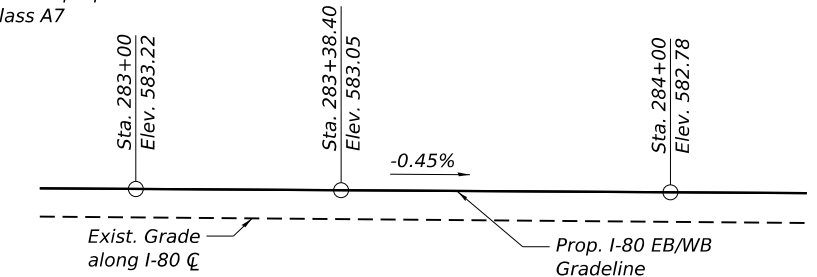
2020 AASHTO LRFD Bridge Design Specifications, 9th Edition.

**LOADING HL-93**

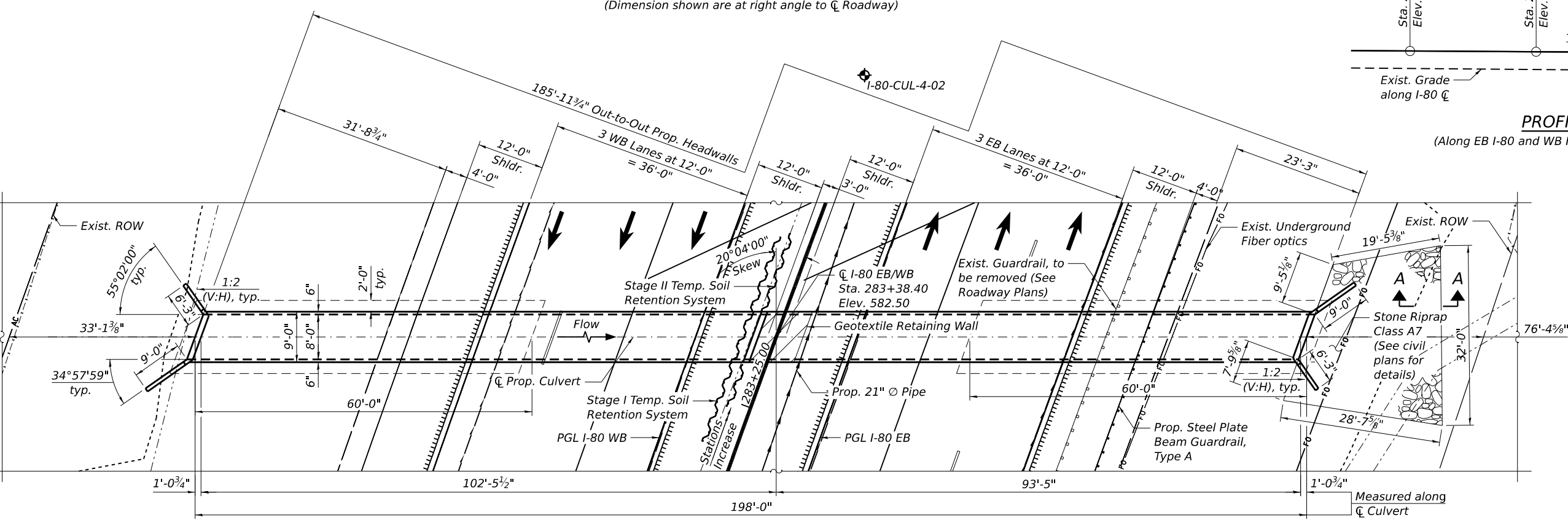
Allow 50 lb/sq. ft. for future wearing surface.



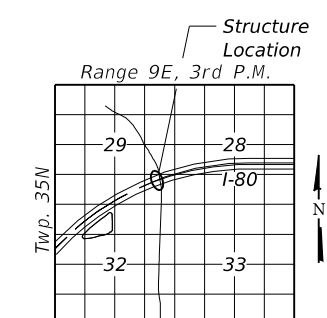
**LONGITUDINAL SECTION**  
 Looking North (Upstation)  
 (Dimension shown are at right angle to C Roadway)



**PROFILE GRADE**  
 (Along EB I-80 and WB I-80, Inside Edge of Pavement)



**PLAN**



**LOCATION SKETCH**

**WATERWAY INFORMATION**

Exist. Overtopping Elev. = 580.50 at Sta. 289+00  
 Drainage Area = 1.64 Sq. Mi. Prop. Overtopping Elev. = 582.21 at Sta. 289+00

Flood Yr.	Freq. C.F.S.	Q	Opening Ft <sup>2</sup>		Nat. H.W.E.	Head - Ft.		Headwater El.	
			Exist.	Prop.		Exist.	Prop.	Exist.	Prop.
10	271	31.0	31.0	31.0	571.6	2.6	0.7	574.2	572.4
Design	50	414	32.2	33.1	572.6	7.1	1.5	579.7	574.1
Base	100	472	32.2	35.7	572.9	8.0	1.8	580.9	574.7
Overtopping	>500								
Max. Calc.	500	612	32.2	41.7	573.7	7.7	3.0	581.4	576.7

10-Year Velocity through Exist. Culvert = 8.88 ft/s  
 10-Year Velocity through Prop. Culvert = 6.49 ft/s

- LEGEND:**
- Soil Boring
  - Limit of Rockfill
  - Stone Riprap

**GENERAL PLAN & ELEVATION**  
**I-80 EB/WB OVER RIVER ROAD ZONE A**  
**F.A.I. ROUTE I-80**  
**SEC -2021-151-B**  
**WILL COUNTY**  
**STA. 283+38.40**  
**STRUCTURE NO. 099-8339**



USER NAME	DESIGNED - JJS, EBK	REVISED -
PLOT SCALE	CHECKED - MI	REVISED -
PLOT DATE	DRAWN - EBK	REVISED -
	CHECKED - MI	REVISED -

**STATE OF ILLINOIS**  
**DEPARTMENT OF TRANSPORTATION**

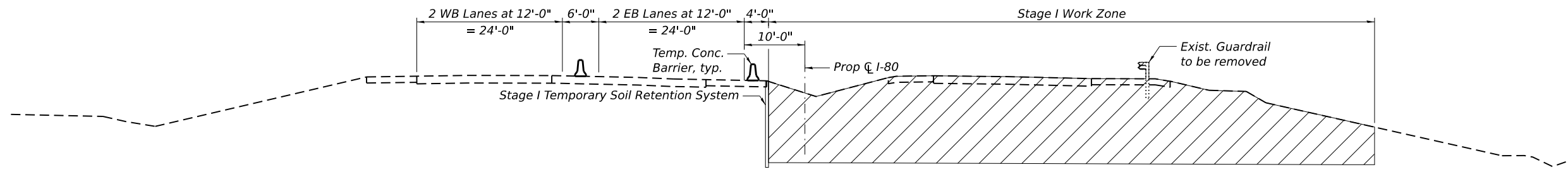
**STRUCTURE NO. 099-8339**  
 SHEET S4-01 OF S4-10 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2021-151-B	WILL	420	262
CONTRACT NO. 62P71				
ILLINOIS FED. AID PROJECT				

MODEL: Default  
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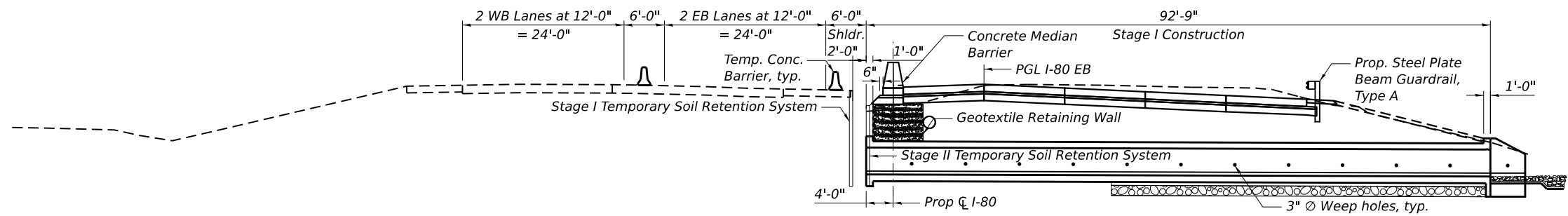


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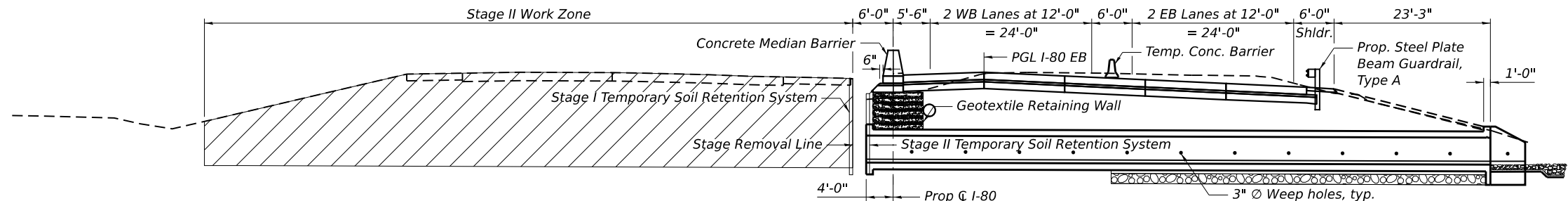
**STAGE I REMOVAL**

- STAGE I REMOVAL**
1. Install temporary concrete barrier as shown to locate construction work areas on the EB side of the roadway.
  2. Install Temporary Soil Retention System as shown.
  3. Remove portions of existing pavement on EB side of the roadway.



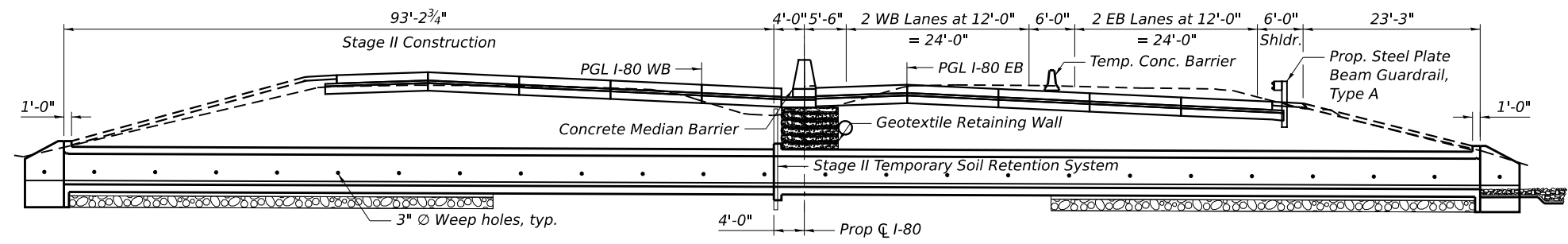
**STAGE I CONSTRUCTION**

- STAGE I CONSTRUCTION**
1. Construct 98'-8<sup>7</sup>/<sub>8</sub>" portion of the south culvert barrel and construct the south headwall and wingwalls.
  2. Construct the pavement and shoulder on EB side of the roadway.



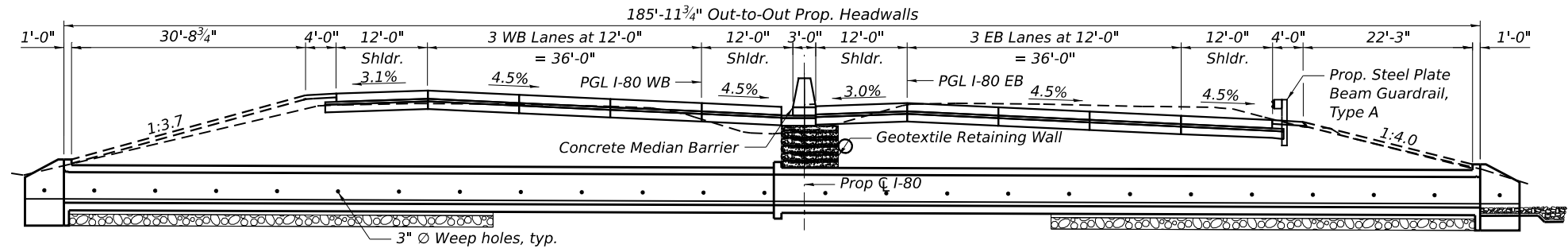
**STAGE II REMOVAL**

- STAGE II REMOVAL**
1. Install temporary concrete barrier as shown to locate construction work areas on the WB side of the roadway.
  2. Install Temporary Soil Retention System as shown.
  3. Remove portions of existing pavement on WB side of the roadway.



**STAGE II CONSTRUCTION**

- STAGE II CONSTRUCTION**
1. Construct 99'-3<sup>3</sup>/<sub>8</sub>" portion of the north culvert barrel and construct the north headwall and wingwalls.
  2. Construct the pavement and shoulder on WB side of the roadway.



**FINAL CROSS SECTION**



USER NAME =	DESIGNED - JJS, EBK	REVISED -
PLOT SCALE =	CHECKED - MI	REVISED -
PLOT DATE =	DRAWN - EBK	REVISED -
	CHECKED - MI	REVISED -

**STATE OF ILLINOIS  
 DEPARTMENT OF TRANSPORTATION**

**STAGE REMOVAL AND CONSTRUCTION  
 STRUCTURE NO. 099-8339**

SHEET S4-03 OF S4-10 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2021-151-B	WILL	420	264
CONTRACT NO. 62P71				
ILLINOIS FED. AID PROJECT				