STRUCTURE GEOTECHNICAL REPORT
INTERSTATE 80 EB/WB OVER ROADWAY DITCH
CULVERT AT STATION 209+76.81
PR SN 099-8342, SECTION 2021-154-R
WILL COUNTY, ILLINOIS

For
Stantec

350 North Orleans Street, Suite 1301

Chicago, IL 60654

Submitted by

Wang Engineering, Inc.

1145 North Main Street

Lombard, IL 60148

Original Report: June 6, 2022
Revised Report: June 24, 2022

Technical Report Documentation Page

1. Title and Subtitle Structure Geotechnical Report, Culvert at Station 209+76.81		**2. Original Date:** June 6, 2022 **Revised Date:** June 24, 2022 **3. Report Type** ☒ SGR ☐ RGR ☒ Draft ☐ Final ☒ Revised
4. Route / Section / County/ District/ Region FAI 80 / 2021-154-R / Will / 1 / 1		**5. IDOT Job / Contract** D-91-196-09 / 62P71
6. PTB / Item No. 194/010	**7. Existing Structure Number(s)** NA	**8. Proposed Structure Number(s)** 099-8342
9. Prepared by Wang Engineering, Inc. 1145 N Main Street Lombard, IL 60148	**Contributor(s)** Author: Nesam S. Balakumaran, P.Eng. QA/QC: Corina T. Farez, P.G., P.E. PM: Azza Hamad, P.E.	**Contact** (630) 480-5540 nbalakumaran@wangeng.com
10. Prepared for Stantec 350 North Orleans Street, Suite 1301 Chicago, IL, 60654	**Design Engineer** HBM Engineering Group, LLC John Saraceno, P.E., S.E	**Contact** (312) 262-2245 Dave.Pieniazek@stantec.com (708) 236-0900 John.saraceno@hbmeng.com

11. Abstract

The existing reinforced concrete single cell box culvert with 6-foot wide and 3.5-high opening that carries Interstate 80 over roadway ditch will be replaced. The proposed culvert will be a cast-in-place three-cell box culvert with an interior opening of 6-foot wide and 4-foot high each cell. The culvert will have a length of 187.3 feet (out-to-out headwalls measured perpendicular to the centerline of the roadway), a width of 20 feet, and up to 5.0 feet of embankment fill on top.

Beneath the surface and up to 4.5 feet of fill, the soil is made up of very stiff clay to silty clay with organic matter followed by stiff to hard silty clay to silty clay loam. Although the groundwater was not encountered in the culvert borings, the groundwater can be encountered at an elevation of 589 feet based on the 24-hour water level reading in the nearby structure boring.

At the culvert base at elevations of 590.9 to 589.5 feet, the clay to silty clay with organic matter is expected to be encountered. We recommend removing this soil to elevation 589.0 feet and replacing with aggregate subgrade improvement material or rockfill capped with 6 inches of 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.

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 be considered for precast and cast-in-place culverts.

Since the groundwater is expected to be encountered about 0.5 to 1.0 feet above culvert base slab elevations, the contractor should be prepared for dewatering measures. Any excavation that cannot be sloped 1:2.0 (V:H) should be properly shored in accordance with the temporary sheet piling charts provided in IDOT Design Guide-Simplified Temporary Sheet Piling Design Charts (IDOT 2020).

12. Path to archived file

N:_WANGLegacy\SHARED\Netprojects\2553901\Reports\SGRs\Culverts\Culvert1_SN099_8342\RPT_Wang_NSB_AZH_2553901_Culvert1SN0998342_V02_20220624.doc

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 PROPOSED STRUCTURE 1

1.2 EXISTING STRUCTURE 2

2.0 METHODS OF INVESTIGATION 2

2.1 FIELD INVESTIGATION 2

2.2 LABORATORY TESTING 3

3.0 INVESTIGATION RESULTS 3

3.1 LITHOLOGICAL PROFILE 3

3.2 GROUNDWATER CONDITIONS 4

4.0 ANALYSES AND RECOMMENDATIONS 4

4.1 CULVERT FOUNDATIONS 4

4.2 WINGWALLS 5

4.3 GLOBAL STABILITY 5

5.0 CONSTRUCTION CONSIDERATIONS 5

5.1 SITE PREPARATION 5

5.2 EXCAVATION, DEWATERING, AND UTILITIES 6

5.3 FILLING AND BACKFILLING 6

5.4 EARTHWORK OPERATIONS 6

6.0 QUALIFICATIONS 7

REFERENCES

EXHIBITS

1. SITE LOCATION MAP

2. BORING LOCATION PLAN

3. SOIL PROFILE

APPENDIX A

BORING LOGS

APPENDIX B

LABORATORY TEST RESULTS

APPENDIX C

GENERAL PLAN AND ELEVATION SHEETS

Wang Engineering
A Terracon Company

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

STRUCTURE GEOTECHNICAL REPORT
INTERSTATE 80 EB/WB OVER ROADWAY DITCH
CULVERT AT STATION 209+76.81
PR SN 099-8342, SECTION 2021-154-R
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 reconstruction of culvert for Interstate 80 (I-80) over the roadway ditch at Station 209+76.81 in Will County, Illinois. The project site is located about 200 feet west of Shepley Road crossing at I-80 in west central Will County, less than 2.0 miles northeast of the Village of Minooka. On the USGS *Channahon Quadrangle 7.5 Minute Series* map, the project site is generally located at E½ of Section 31, Township 35N, Range 9 E of the Third Principal Meridian (Exhibit 1).

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 replacement.

1.1 Proposed Structure

Based on *General Plan and Elevation* (GPE) drawing dated May 20, 2022 prepared by HBM Engineering, LLC (HBM), Wang Engineering, Inc. (Wang) understands the existing single cell concrete box culvert will be removed and replaced with a cast-in-place three-cell box culvert with an interior opening of 6-foot wide and 4-foot high each cell. The new culvert has proposed invert elevations of 591.72 and 590.30 feet at the upstream and downstream ends, respectively. The culvert will have a length of 187.3 feet (out-to-out headwalls measured perpendicular to the centerline of the roadway) and a total width of 20 feet with up to 5.0 feet of embankment fill on the top as the I-80 proposed 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 on staged construction to maintain traffic on I-80.

1.2 Existing Structure

Based on the GPE, the existing culvert was constructed in 1960 as a single 6-foot wide and 3.5-foot high concrete box culvert. The overall length of the culvert is approximately 206.2 feet (out-to-out headwalls). The existing culvert will be removed and replaced.

2.0 METHODS OF INVESTIGATION

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

2.1 Field Investigation

The field investigation consisted of three structure borings, designated as I-80-CUL-1-01 through I-80-CUL-1-03 drilled by Wang from April 11 to April 24, 2022. The borings were drilled from elevations of 594.1 to 596.4 feet to depths of 30.0 to 35.0 feet below the grade (bgs). 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 boring termination depths. Soil samples collected from each sampling interval were placed in sealed jars and transported to the laboratory for further examination and laboratory 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.

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, the borings encountered 5 to 9 inches of silty clay topsoil. In descending order, the general lithologic succession encountered beneath the surface includes: 1) man-made ground (fill); 2) very stiff clay to silty clay; and 3) medium stiff to hard silty clay to silty clay loam.

1) Man-made ground (fill)

Beneath the topsoil, Borings I-80-CUL-1-02 and I-80-CUL-1-03 encountered up to 4.5 feet of stiff to hard, brown and gray, silty clay loam to clay loam fill with unconfined compressive strength (Q_u) values of 2.8 to 4.7 tsf and moisture content values of 14 to 17%. Beneath the fill, the borings encountered 1.0 to 2.3 feet of black silty clay loam buried topsoil.

2) Very stiff clay to silty clay

At an elevation of 590.2 feet and immediately below the buried topsoil, Boring I-80-CUL-1-02 encountered 1.8 feet of very stiff, gray, clay to silty clay with organic matter. The soil layer has a Q_u value of 2.2 tsf and moisture content value of 33%. This soil layer represents the foundation soil beneath the culvert box.

3) Medium stiff to hard silty clay to silty clay loam

At elevations of 588.4 to 589.8 feet, the borings encountered medium stiff to hard, brown to gray, silty clay to silty clay loam extending to the boring termination depths of 30.0 to 35.0 feet bgs. The unit has

Q_u values of 1.2 to 7.1 tsf with few low Q_u values of 0.6 to 0.9 tsf and moisture content values of 14 to 20%. The low Q_u values of 0.6 to 0.9 tsf were encountered below depths of 23.0 to 25.0 feet bgs or elevations of 570.9 to 571.2 feet.

3.2 Groundwater Conditions

The borings were found dry while drilling and upon completion of drilling. Since the borings encountered mostly clayey soils, we anticipate the groundwater was deep seated. However, Boring SHP-BSB-02B drilled for the Shepley Road bridge and located about 200 feet of east of the culvert was blind-drilled to a depth of 30.0 feet bgs and kept open to measure 24-hour water level. At Boring SHP-BSB-02B, the 24-hour water level was recorded at an elevation of about 589 feet (12.1 feet bgs). The design groundwater elevation may be considered at elevation of 589 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 barrel and wingwalls.

4.1 Culvert Foundations

Based on the subsurface investigation and proposed invert elevations of 591.72 to 590.30 feet at the upstream and downstream ends, the soils at the base of culvert barrel are expected to be stiff to very stiff silty clay. However, at the base of the culvert, Boring I-80-CUL-1-02 encountered up to 2.5 feet of buried topsoil and very stiff clay to silty clay with organic matter and moisture content value of 33% followed by stiff to hard silty clay to silty clay loam. Prior to culvert box construction, we recommend removing buried topsoil and high moisture soil with organic matter to an elevation of 589.0 feet for the culvert length starting at about 35 feet from the upstream end of culvert (approximate midpoint of Borings I-80-CUL-1-01 and I-80-CUL-01-02) and ending at the downstream end of the culvert. The replacement material could be *Aggregate Subgrade Improvement* material or rockfill capped with 6 inches of 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 by a geotechnical soil inspector at the time of construction. Based on the 24-hour water level reading nearby Shepley Road bridge site, the groundwater may be encountered at elevation of 589 feet; thus, the water control may be needed during construction.

Following the recommended treatment, 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 the precast culvert, the wingwall types generally include cast-in-place T-type wall, cast-in-place or precast apron end sections.

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 587.7 and 586.3 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 silty clay to silty clay 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 following the IDOT Standard Specifications.

4.3 Global Stability

Since the horizontal cantilever walls are proposed to be 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 in accordance with the temporary sheet piling charts provided in *IDOT Design Guide-Simplified Temporary Sheet Piling Design Charts* (IDOT 2020).

Although the groundwater was not observed in the culvert borings, the groundwater can be encountered at an elevation of 589 feet based on the Shepley Road bridge boring 24-hour water level reading. Therefore, the groundwater should be expected at an elevation of 589 feet, about 0.5 to 1.0 feet above the proposed culvert base slab. The contractor should be prepared for dewatering measures. 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 HBM Engineering Group, LLC., Stantec, 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.

Nesam S. Balakumaran, P.Eng.
Project Geotechnical Engineer

Corina T. Farez, P.E., P.G.
QA/QC Reviewer

REFERENCES

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

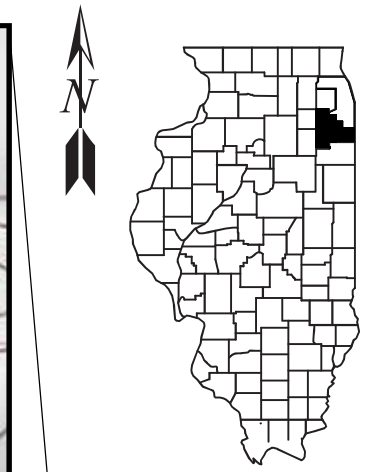
IDOT (2022) *Standard Specifications for Road and Bridge Construction.* Illinois Department of Transportation. 1098 pp.

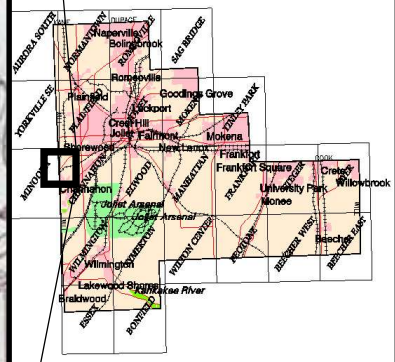
IDOT (2015) *Geotechnical Manual,* Illinois Department of Transportation.

Wang Engineering
A Terracon Company

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

EXHIBITS





Will County

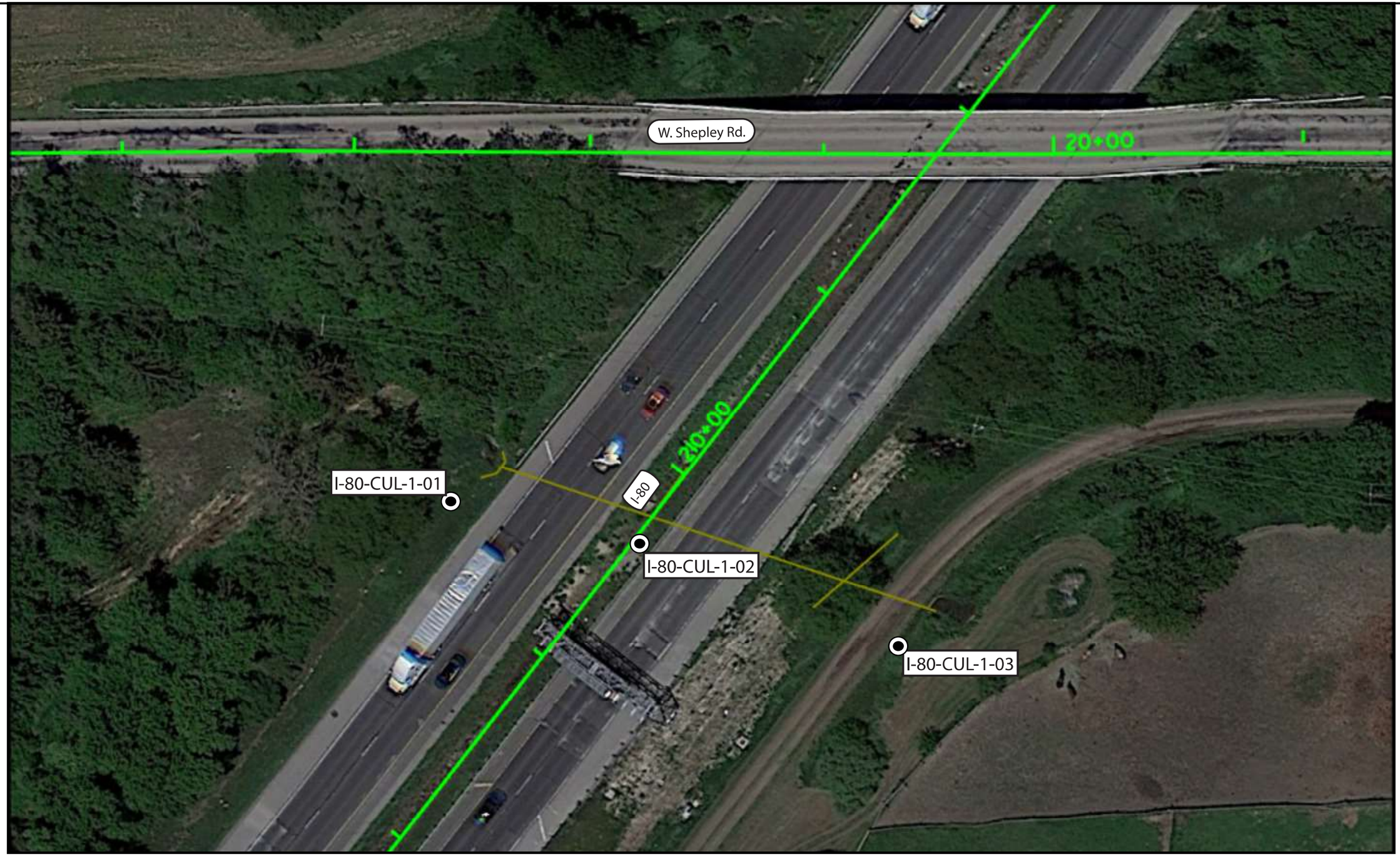
0 0.5 1.0 Mile

SITE LOCATION MAP: I-80 EB/WB CULVERT OVER ROADWAY DITCH, SN 099-8342, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: J. Bensen CHECKED BY: N. Balakumaran

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

FOR STANTEC	255-39-01



Legend

Boring Location

0 50 100 Feet

BORING LOCATION PLAN: I-80 EB/WB CULVERT OVER ROADWAY DITCH, SN 099-8342, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: J. Bensen CHECKED BY: N. Balakumaran

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

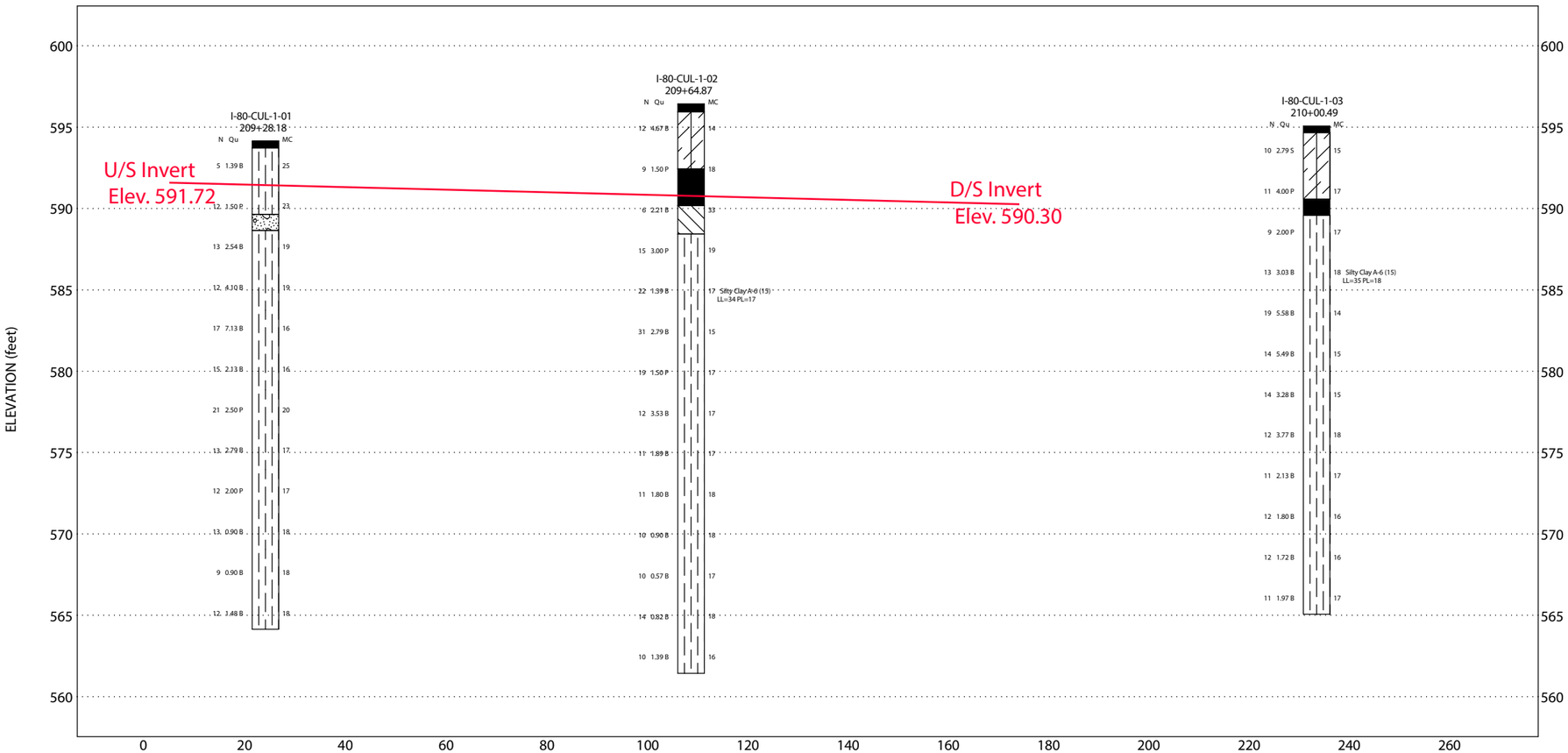
FOR STANTEC

255-39-01

W

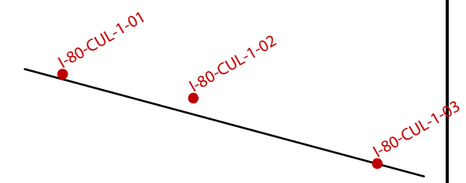
E

N



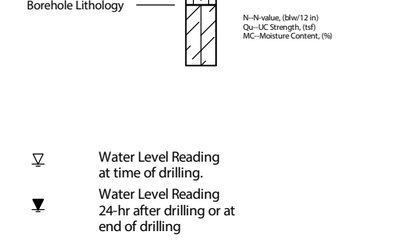
Lithology Graphics

- Topsoil
- IDH Silty Clay, Silty Clay Loam
- Gravelly sand, sandy gravel
- IDH Clay Loam
- IDH Clay



Site Map Scale 1 inch equals 95 feet

Explanation:



Water Level Reading at time of drilling.

Water Level Reading 24-hr after drilling or at end of drilling

Horizontal Scale (feet)

Vertical Exaggeration: 3x

Terracon

Soil Profile
Culvert at Sta. 209+76.81, SN 099-8342

WEI SINCE 1982

I-80 Reconstruction, Ridge Road to Houbolt Road
Will County, Illinois

JOB NUMBER	PLATE NUMBER
255-39-01	EXHIBIT 3

WEI 11X17 2553901.GPJ WANGENG.GDT 6/3/22

Wang Engineering
A Terracon Company

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

APPENDIX A

Wang Engineering
wangeng@wangeng.com
Telephone:
Fax:

BORING LOG I-80-CUL-1-01

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: 594.15 ft
North: 1749429.60 ft
East: 1009339.46 ft
Station: 209+28.18
Offset: 72.77 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	593.7	5-inch thick, black SILTY CLAY --TOPSOIL--						
		Stiff, gray SILTY CLAY, trace gravel; damp --RDR 2--			1	2 2 3	1.39 B	25
					2	2 5 7	1.50 P	23
	589.7	Brown GRAVEL; damp --RDR 2--	5					
	588.7	Medium stiff to hard, brown to gray SILTY CLAY, trace gravel; damp to moist --RDR 2--			3	4 7 6	2.54 B	19
					4	2 5 7	4.10 B	19
			10		5	2 7 10	7.13 B	16
					6	3 7 8	2.13 B	16
			15		7	6 10 11	2.50 P	20
					8	6 6 7	2.79 B	17
			20					
					9	6 6 6	2.00 P	17
		--gray--						
		--moist--			10	4 6 7	0.90 B	18
			25		11	8 4 5	0.90 B	18
					12	6 5 7	1.48 B	18
	564.2	Boring terminated at 30.00 ft	30					
			35					
			40					

GENERAL NOTES

Begin Drilling **04-22-2022** Complete Drilling **04-22-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **20D25A [83%]**
Driller **KG&TC** Logger **M. Rojo** 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.

Wang Engineering
wangeng@wangeng.com
Telephone:
Fax:

BORING LOG I-80-CUL-1-02

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: 596.44 ft
North: 1749414.49 ft
East: 1009421.68 ft
Station: 209+64.87
Offset: 2.35 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	595.9	6-inch thick, black SILTY CLAY --TOPSOIL--						
		Stiff to hard, gray CLAY LOAM, trace to little gravel; moist --FILL-- --RDR 2--			1	6 6 6	4.67 B	14
	592.4	Black SILTY CLAY, trace organic matter --Buried TOPSOIL--	5		2	5 4 5	1.50 P	18
	590.2	Very stif, gray CLAY to SILTY CLAY, trace organic matter; damp --RDR 2--			3	2 3 3	2.21 B	33
	588.4	Medium stiff to very stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; moist --RDR 2--	10		4	4 7 8	3.00 P	19
		--L_L(%)=34, P_L(%)=17-- --%Gravel=2.0-- --%Sand=6.4-- --%Silt=59.1-- --%Clay=32.4--			5	7 8 14	1.39 B	17
			15		6	9 19 12	2.79 B	15
					7	10 9 10	1.50 P	17
			20		8	4 5 7	3.53 B	17
		--slow hard drilling-- --possible cobbles-- --RDR 3--	25		9	3 5 6	1.89 B	17
					10	3 5 6	1.80 B	18
					11	3 4 6	0.90 B	18
			30		12	2 4 6	0.57 B	17
					13	5 6 8	0.82 B	18
	561.4	Boring terminated at 35.00 ft	35		14	4 4 6	1.39 B	16
			40					

GENERAL NOTES

Begin Drilling **04-24-2022** Complete Drilling **04-24-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21D50A [84%]**
Driller **PA&TC** Logger **A. Scifers** 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.

Wang Engineering
wangeng@wangeng.com
Telephone:
Fax:

BORING LOG I-80-CUL-1-03

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: 595.08 ft
North: 1749373.32 ft
East: 1009537.42 ft
Station: 210+00.49
Offset: 119.91 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	594.7	5-inch thick, black SILTY CLAY --TOPSOIL--						
		Very stiff to hard, brown and gray SILTY CLAY LOAM to CLAY LOAM, trace gravel; damp --FILL-- --RDR 2--			1	4 6 4	2.79 S	15
					2	4 4 7	4.00 P	17
	590.6	Very stiff (2.00P), black SILTY CLAY LOAM; damp	5					
	589.6	--Buried TOPSOIL--						
		Stiff to hard, brown to gray SILTY CLAY, trace to some gravel; damp --RDR 2--			3	2 3 6	2.00 P	17
		--L_L(%)=35, P_L(%)=18-- --%Gravel=1.4-- --%Sand=6.6-- --%Silt=59.8-- --%Clay=32.3--			4	4 5 8	3.03 B	18
			10		5	3 9 10	5.58 B	14
					6	4 6 8	5.49 B	15
			15		7	6 7 7	3.28 B	15
					8	4 6 6	3.77 B	18
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
			25		9	4 4 7	2.13 B	17
					10	3 6 6	1.80 B	16
					11	4 5 7	1.72 B	16
	565.1		30		12	3 5 6	1.97 B	17
		Boring terminated at 30.00 ft						
			35					
			40					

GENERAL NOTES

Begin Drilling **04-11-2022** Complete Drilling **04-11-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **R&R** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

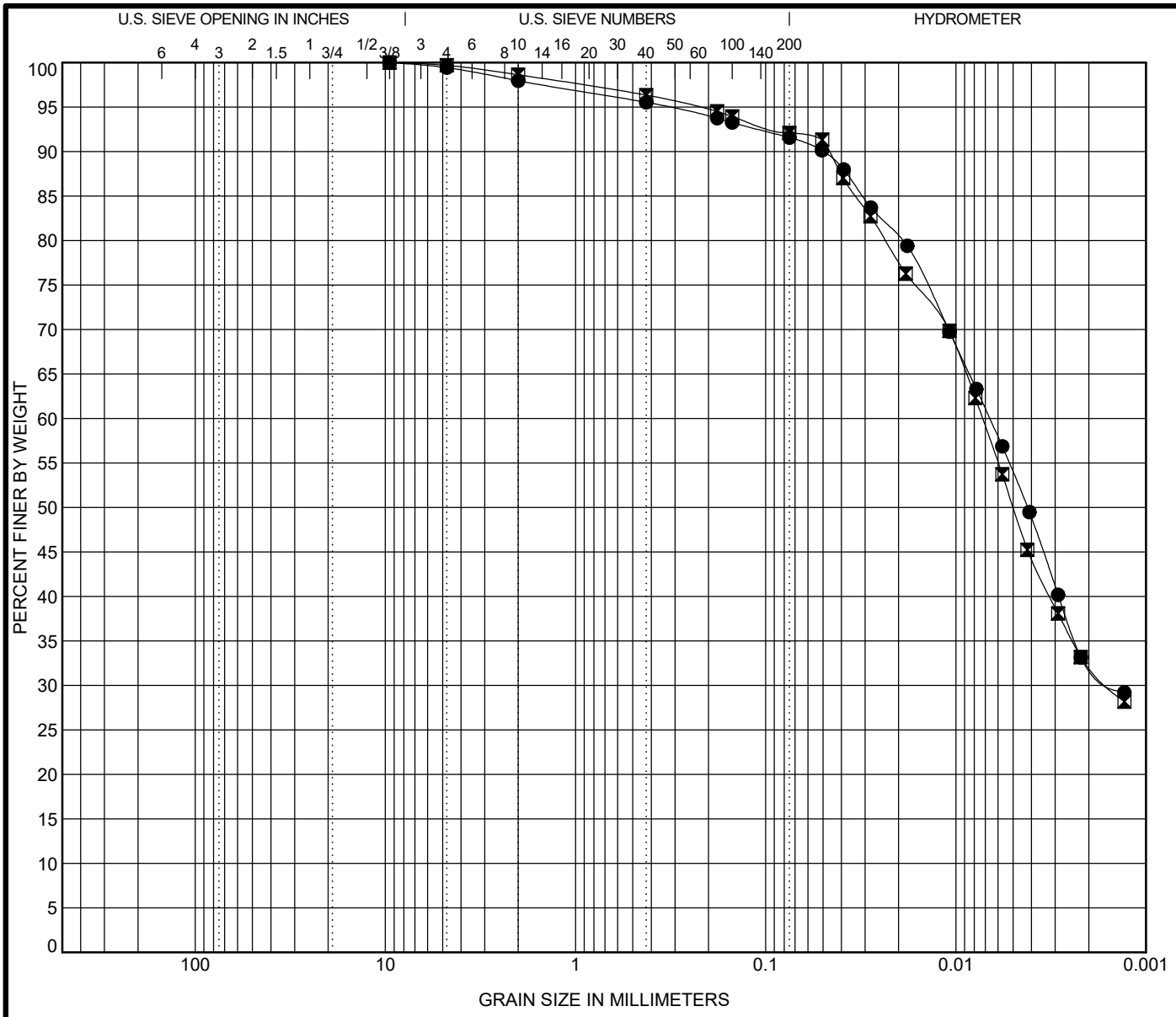
While Drilling ▽ **DRY**
At Completion of Drilling ▼ **DRY**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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

Wang Engineering
A Terracon Company

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	I-80-CUL-1-02#5	11.0 ft	**Silty Clay**	**34**	**17**	**17**		
⊠	I-80-CUL-1-03#4	8.5 ft	**Silty Clay**	**35**	**18**	**17**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	I-80-CUL-1-02#5	11.0 ft	**9.5**	**0.007**	**0.001**		**2.0**	**6.4**	**59.1**	**32.4**
⊠	I-80-CUL-1-03#4	8.5 ft	**9.5**	**0.007**	**0.002**		**1.4**	**6.6**	**59.8**	**32.3**

WEI GRAIN_SIZE_IDH 2553901.GPJ US_LAB.GDT 5/25/22

WEI SINCE 1982

Terracon

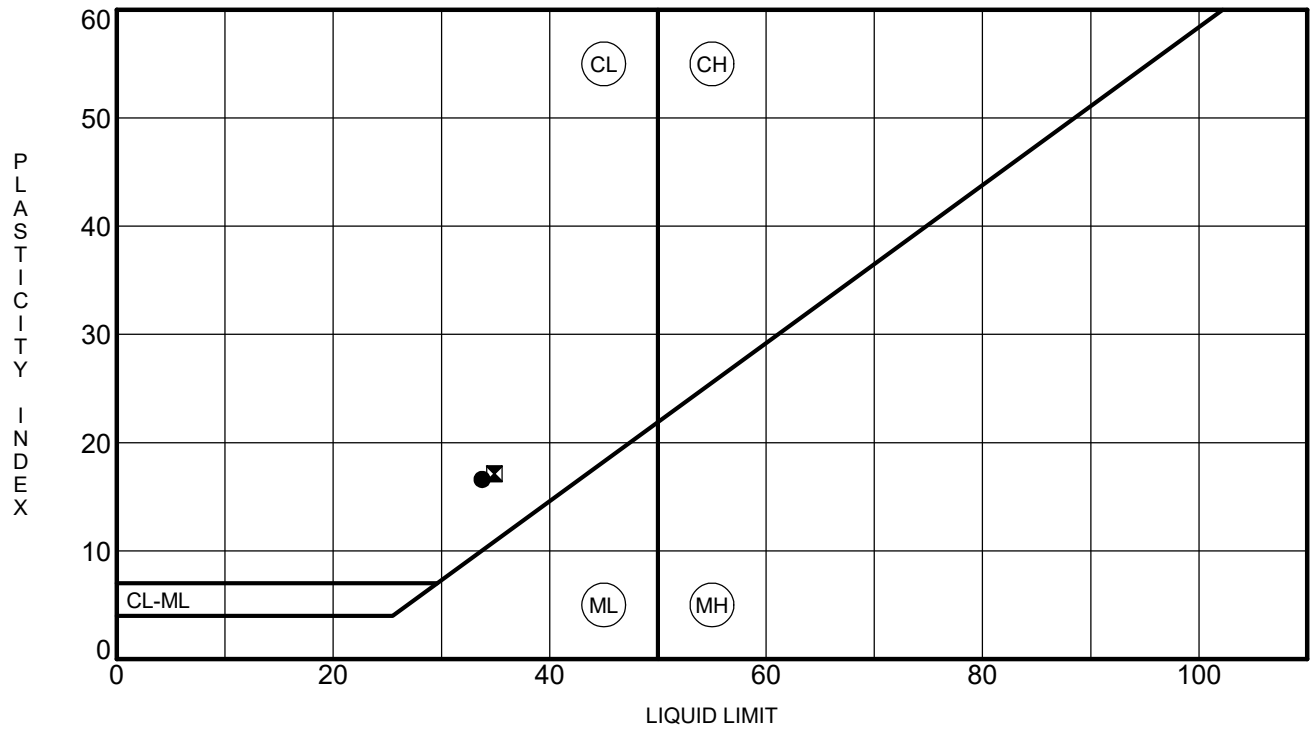
Telephone:
Fax:

GRAIN SIZE DISTRIBUTION

Project: I-80 Reconstruction, Ridge Road to Houbolt Road

Location: Will County, Illinois

Number: 255-39-01



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	I-80-CUL-1-02#5	11.0 ft	34	17	17	92	Silty Clay
⊠	I-80-CUL-1-03#4	8.5 ft	35	18	17	92	Silty Clay

WEI SINCE 1982

Terracon

Telephone:
Fax:

ATTERBERG LIMITS' RESULTS

Project: I-80 Reconstruction, Ridge Road to Houbolt Road

Location: Will County, Illinois

Number: 255-39-01

Wang Engineering
1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

APPENDIX C

Bench Mark: Set 2" CWA aluminum disc in concrete pier seat in southerly pier of Shepley Road bridge on south side of eastbound I-80. Elev. 599.980.

Existing Structure: The existing culvert was originally constructed in 1960 as a 6'-0" x 3'-6" (WxH) reinforced concrete single-cell box culvert with 20° skew carrying a roadside ditch beneath eastbound/westbound I-80 and a local Frontage road (FAI Route 80; Section 99-1; Project I-80-4(12)124). The culvert consists of a 7" thick top slab, 8" bottom slab, 6" sidewalls with horizonatl cantilever wingwalls and maximum fill height of approximately 6". The overall length of the culvert is approximately 198'-6" (out-to-out headwalls) at right angles to the center line of roadway and 206'-2" (out-to-out headwalls) of culvert. The structure will be removed and replaced.

Salvage: No Salvage.
Traffic will be maintained utilizing Staged Construction.
Precast alternate is not allowed.

DESIGN STRESSES

FIELD UNITS
f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)

LOADING HL-93

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

DESIGN SPECIFICATIONS

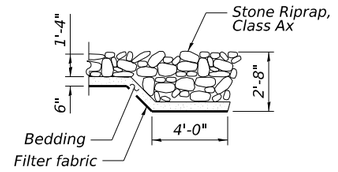
2020 AASHTO LRFD Bridge Design Specifications, 9th Edition.

HIGHWAY CLASSIFICATION

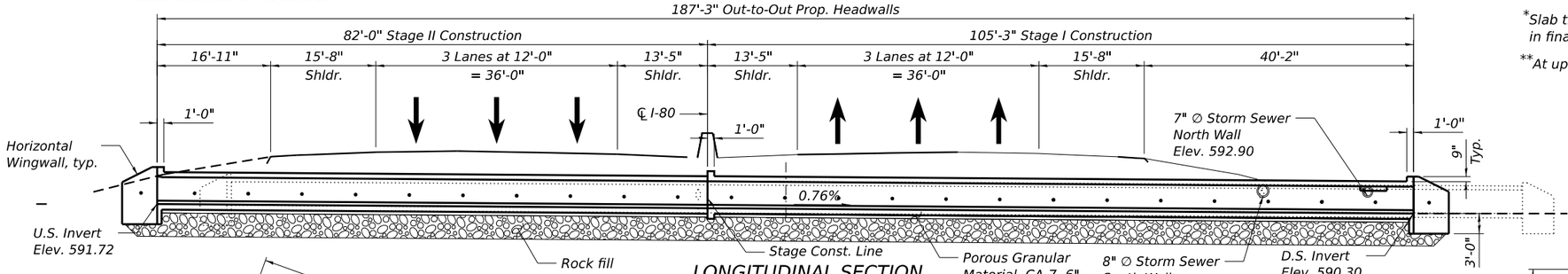
F.A.I. Rte. 80 - I-80
Functional Class: Interstate
ADT: 57,400 (2019); 61,284 (2032)
ADTT: 10,906 (2019); 11,644 (2032)
DHV: 6,746 (2032)
Design Speed: 70 mph
Posted Speed: 65 mph
2-Way Traffic
Directional Distribution 50-50

*Slab thickness may be refined in final design.

**At upstream end, XX cell only.

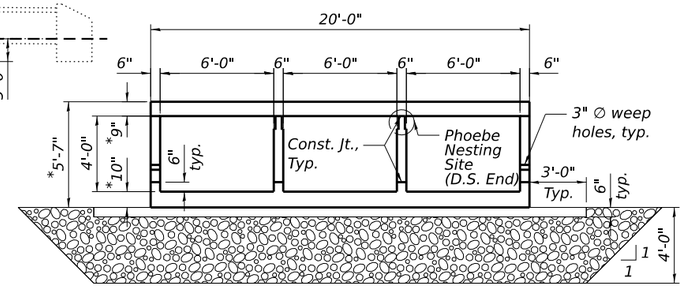


SECTION A-A

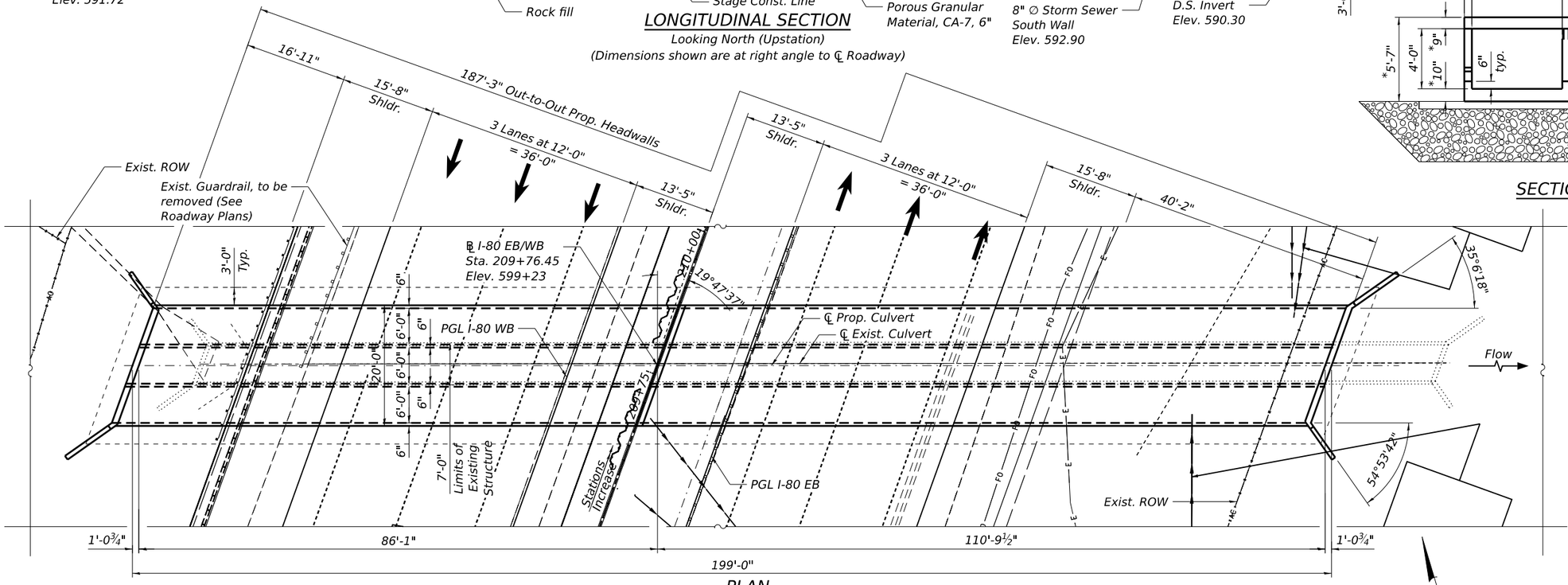


LONGITUDINAL SECTION

Looking North (Upstation)
(Dimensions shown are at right angle to ℄ Roadway)



SECTION THRU BARREL



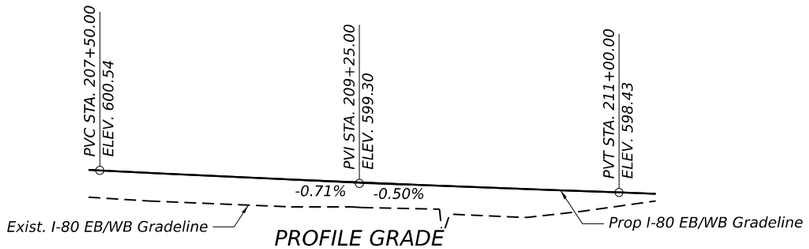
PLAN

WATERWAY INFORMATION

Drainage Area = 0.6 Sq. Mi.
Exist. Overtopping Elev. = 598.57 at Sta. 211+00
Prop. Overtopping Elev. = 598.85 at Sta. 211+00

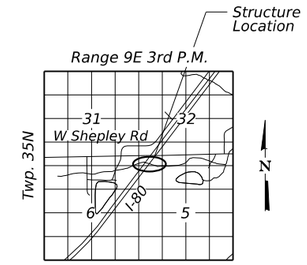
Flood	Freq. Yr.	Q C.F.S.	Opening Ft² Exist.	Opening Ft² Prop.	Nat. H.W.E.	Head - Ft Exist.	Head - Ft Prop.	Headwater El. Exist.	Headwater El. Prop.
	10	117	21	52	594.28	0.99	0.34	595.27	594.62
Design	50	196	21	6	594.91	2.49	0.47	597.40	595.38
Base	100	234	21	72	595.16	3.46	0.55	598.62	596.48
Overtopping	<500	300	21		595.54	3.03		598.57	
Max. Calc.	500	331	21	72	595.70	3.32	0.78	599.02	596.48

LEGEND:
Soil Boring
Stone Riprap



PROFILE GRADE

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



LOCATION SKETCH

GENERAL PLAN
I-80 EB/WB OVER ROADWAY DITCH
F.A.I. RTE. I-80
SEC. xxx
WILL COUNTY
STATION 209+76.81
STRUCTURE NO. 099-8342

HBM ENGINEERING GROUP, LLC

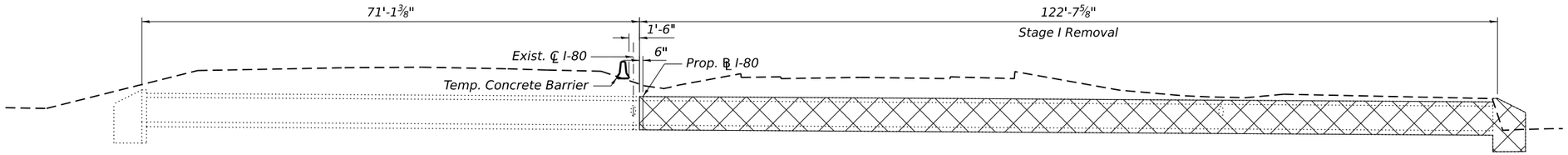
USER NAME =	DESIGNED - AMS	REVISED -	
	CHECKED - JJS, MI	REVISED -	
PLOT SCALE =	DRAWN - AMS	REVISED -	
PLOT DATE =	CHECKED - JJS, MI	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

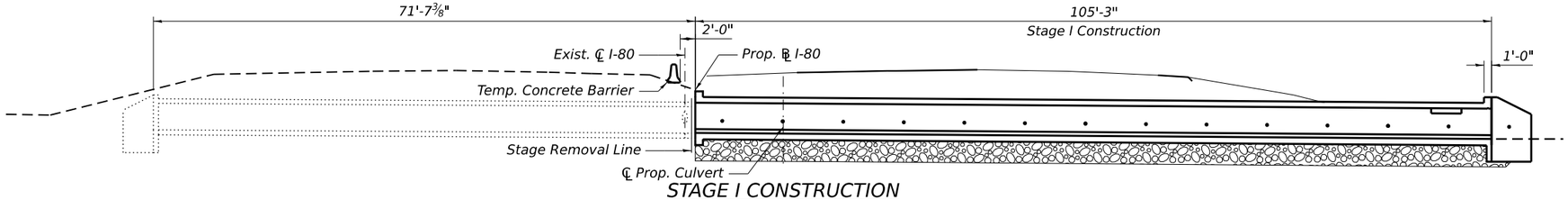
STRUCTURE NO. 099-8342
SHEET 1 OF 2 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2021-151-B	WILL	2	1
		CONTRACT NO. 62P71		
	ILLINOIS	FED. AID PROJECT		

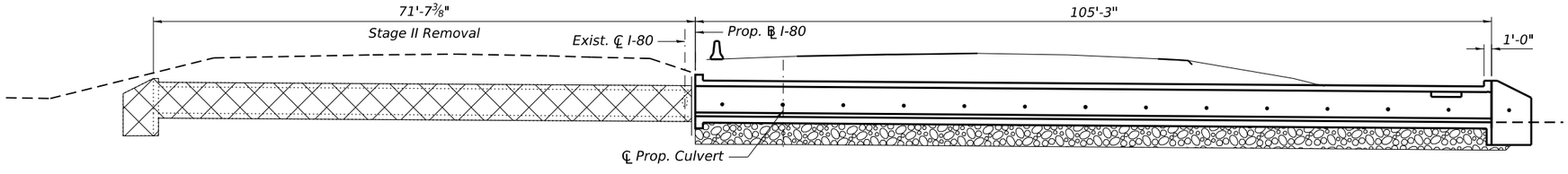
MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transystemscorp-pw1-hosted/Documents/Projects_2018/CH401/401180022/01-Stantec/CAD/ML-01_62P71/04-Sheets/04-Structures/Culverts/0998342-D162P71-TSL 1
5/20/2022 10:17:49 AM



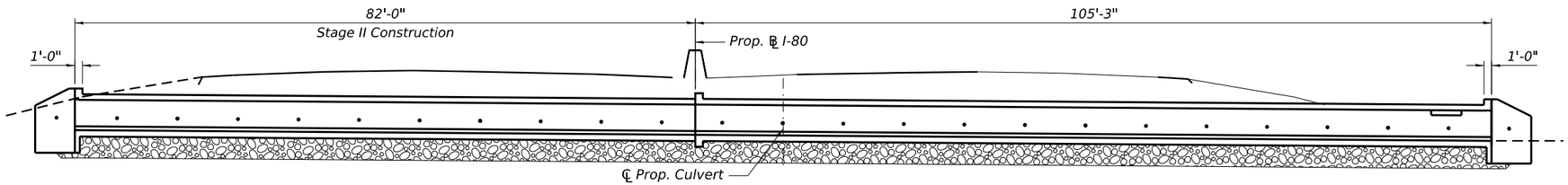
STAGE I REMOVAL



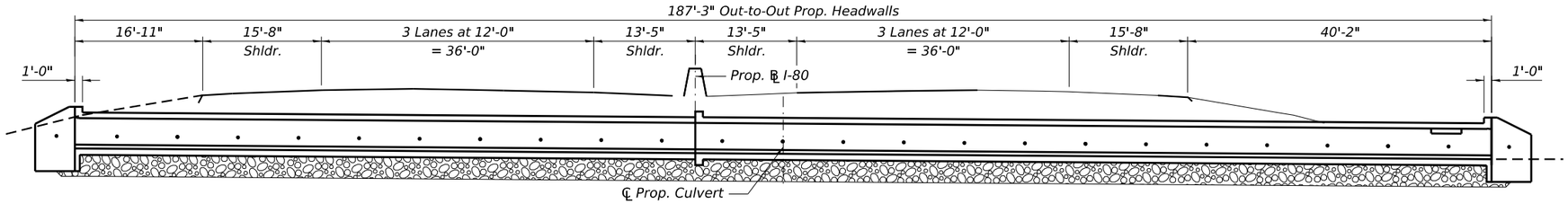
STAGE I CONSTRUCTION



STAGE II REMOVAL



STAGE II CONSTRUCTION



FINAL CROSS SECTION

DETAILS
I-80 EB/WB OVER ROADWAY DITCH
F.A.I. RTE I-80
SEC-XXX
WILL COUNTY
STA. 209+76.45
STRUCTURE NO.099-8342

MODEL: Default
FILE NAME: pw://transystems-pw.bentley.com:transyscorp-pw1-hosted/Documents/Projects_2018/CH401/401180022/01-Stantec/CAD/ML-01_62P71/04-Sheets/04-Structures/Culverts/0998342-D162P71-TSL 2
5/20/2022 10:18:08 AM

HBM ENGINEERING GROUP, LLC

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

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 099-8342
SHEET 2 OF 2 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
80	2021-151-B	WILL	2	2
		CONTRACT NO. 62P71		
	ILLINOIS	FED. AID PROJECT		