STRUCTURE GEOTECHNICAL REPORT
ROADWAY DITCH CULVERT
FRONTAGE ROAD AT STATION 56+36.40
PROPOSED SN 099-0761
WILL COUNTY, ILLINOIS

For

TranSystems

1475 Woodfield Road, Suite 600

Schaumburg, IL 60173-5440

Submitted by

Wang Engineering, Inc. a Terracon Company

1145 North Main Street

Lombard, IL 60148

Original Report: April 6, 2023
Revised Report: TBD

Technical Report Documentation Page

1. Title and Subtitle Structure Geotechnical Report Roadway Ditch Culvert Frontage Road at Station 56+36.40		**2. Original Date:** April 6, 2023 **Revised Date:** TBD **3. Report Type** ☒ SGR ☐ RGR ☐ Draft ☒ Final ☐ Revised
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6. PTB / Item No. 194/011	**7. Existing Structure Number(s)** N.A.	**8. Proposed Structure Number(s)** 099-0761
9. Prepared by Wang Engineering, Inc. 1145 N Main Street Lombard, IL 60148	**Contributor(s)** Author: Metin W. Seyhun, PE QA/QC: Corina T. Farez, PG, PE PM: Andri A. Kurnia, PE	**Contact** (630) 785-6226 akurnia@wangeng.com
10. Prepared for TranSystems Corporation 1475 E. Woodfield Road, Suite 600 Schaumburg, IL 60173-5440	**Design Manager** Jennifer M. Golemba, P.E. Vice President	**Contact** (847) 778-4975 jmgolemba@transystems.com

The existing double 48-inch diameter pipe culvert that carries Frontage Road over Roadway ditch will be replaced by a new C.I.P. double-cell box culvert, with an interior opening of 9-foot wide and 4-foot high in each cell. The culvert will have a length of 70.5 feet out-to-out headwalls, and total width of 19.5 feet with up to 2.5 feet of additional embankment fill at the south end. It has a proposed invert elevation of 614.76 feet at the upstream (north) and 613.76 feet at downstream (south) ends. The culvert installation will be done using staged construction to maintain traffic at Frontage Road.

Beneath the pavement and topsoil surface, the subsurface investigation shows up to 7.4 feet cohesive fill overlying up to 21.4 feet of stiff to hard, brown to gray silty clay to clay up to the boring termination depths of 30 feet below ground surface.

Groundwater was not encountered during and at the completion of drilling. Depending upon prevailing climate conditions and the time of the year the culvert construction taken place, control runoff and maintenance of existing flows may require temporary water diversion and control.

Average culvert base elevation is 613.14 feet. The new culvert is anticipated to rest on stiff to hard, brown to gray silty clay to clay till which could experience settlement of ¼ inches or less. Since horizontal wingwalls are expected to be the preferred type, we do not anticipate global instability concerns for this box culvert.

Temporary sheet piling using IDOT Design Guide 3.3.1.13 (IDOT 2012) is not feasible for staged construction due underlying very hard soil conditions; therefore, a Temporary Soil Retention System (TSRS) pay item should be included.

Unstable or unsuitable materials exposed during excavation should be removed and replaced with compacted structural fill. The replacement material could be IDOT CA-6 or IDOT District One "*Aggregate Subgrade Improvement*" materials.

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Wang Engineering
A Terracon Company

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

STRUCTURE GEOTECHNICAL REPORT
ROADWAY DITCH CULVERT
FRONTAGE ROAD AT STATION 56+36.40
PROPOSED SN 099-0761
WILL COUNTY, ILLINOIS
FOR
TRANSYSTEMS

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 a replacement roadway ditch culvert at Frontage Road at Station 56+36.40 in Joliet, Will County, Illinois. On the USGS *Quadrangle 7.5 Minute Series* map, the project site is generally located at SE $^1/_4$ of Section 18, Township 35N, Range 10E of the Third Principal Meridian. A *Site Location Map* is presented as 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 Sheets (GPE)* (Appendix C) provided by TranSystems Corporation, Wang Engineering, Inc. (Wang) understands the existing double 48-inch diameter pipe culvert will be replaced by a new C.I.P. double-cell box culvert, with an interior opening of 9-foot wide and 4-foot high for each cell. The new culvert will have a length of 70.5 feet out-to-out headwalls, and total width of 19.5 feet. There will be up to 2.5 feet of additional embankment fill added at the south end. The culvert will have a 27.5-degree skew with Frontage Road. It has a proposed invert elevation of 614.76 feet at the upstream (north) and 613.68 feet at downstream (south) ends. The culvert installation will be done on staged construction to maintain traffic along Frontage Road runs on an east-west direction. Horizontal wingwalls will be used at culvert ends.

1.2 Existing Structure and Land Use

The existing structure consists of a double 48-inch diameter pipe culvert with an overall length of 70.1 feet. The surrounding land of culvert is an I-80 off ramp on the north and greenspace with power lines in the south side with existing Frontage Road in the east-west direction.

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 BC3-01, BC3-02A, and BC3-02B drilled along the Frontage roadway shoulders and downslope. The borings were performed by Wang on February 21 and March 16, 2023. The borings were drilled from elevations of 614.53 to 625.98 feet to depths of 6.0 to 30.0 feet below ground surface (bgs). The as-drilled northings and eastings were obtained with a mapping-grade GPS unit. Elevations, stations, and offsets were provided by TranSystems. As-drilled boring locations are presented in the *Boring Logs* (Appendix A) and the as-completed boring locations are shown in the *Boring Location Plan* (Exhibit 2).

Truck and ATV-mounted drilling rigs, equipped with hollow stem augers, were used to advance, and maintain open boreholes for Borings BC3-01 and BC3-02A. 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 boring termination depths. Rig access was limited near the southside of the culvert, therefore a jackhammer driven Geoprobe sampler was used to continuously sample soils at Boring BC3-02B. 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 soil cuttings and/or bentonite chips. The pavement surface was restored as close 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

Boring BC3-01 was drilled within the grassy right-of-way of Frontage Road and revealed 7 inches of silty clay loam topsoil. Boring BC3-02A was drilled through the shoulder pavement which consists of 4 inches of asphalt pavement over 8 inches of gravel base course, and BC3-02B drilled at the downslope with clay surface. In descending order, the general lithologic succession encountered beneath the surface includes: 1) man-made ground (fill); and 2) stiff to hard silty clay to clay.

1) *Man-made ground (fill)*

Beneath the pavement or topsoil, the borings encountered up to 7.4 feet of stiff to hard, brown and gray silty clay fill material. The fill has unconfined compressive strength (Qu) values of 1.6 to greater than 4.5 tsf and moisture content values of 17 to 21%.

At an elevation of 620.5 feet (5.5 feet bgs), Boring BC3-02A revealed 3.1 feet of stiff, black silty clay buried topsoil. The buried topsoil has a Qu value of 1.0 tsf and a moisture content value of 35%. This layer is expected to be removed during the replacement work for the new culvert, however, if present below the proposed box culvert base, the buried topsoil should be removed.

2) *Stiff to hard silty clay to clay*

At elevations of 614.5 to 617.4 feet, the borings encountered up to 21.4 feet of stiff to hard, brown to gray silty clay to clay to the boring termination depths of up to 30 feet bgs. The unit has values of 1.0 to 7.6 tsf and moisture content values of 16 to 25%. Laboratory test results on this layer show Liquid Limit (LL) values of 35 and 39% and Plastic Limit (PL) values of 17 and 20%.

3.2 Groundwater Conditions

Groundwater was not encountered during and at the completion of drilling. Based on seasonal fluctuations, possible occurrences of groundwater may be encountered beneath the pavement within the gravel base course.

4.0 ANALYSES AND RECOMMENDATIONS

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

4.1 Scour Considerations

The design scour elevation should be taken at the bottom of the cutoff wall (IDOT 2012). For horizontal cantilever wingwalls, the cutoff walls are established at 3.0 feet below the culvert invert elevations. To prevent local erosion, we recommend placing stone riprap or a concrete apron at the ends of the culvert; this will be particularly important if precast sections are used. This will also prevent sediments from entering and accumulating in the culvert, minimize long term maintenance, and provide protection to the stream bed at the interface.

4.2 Culvert Foundations

The new culvert footprint will overlap with the existing one on its east half, with remaining on virgin ground. Settlement analysis was performed for the new culvert based on the soil information, and the estimated culvert and roadway fill pressures applied to the full width of the culvert. An additional 2.5 feet of fill is expected to be added to the south end of the new culvert with the proposed base slab bearing elevation of about 613.14 feet elevation. Borings revealed over 15 feet of stiff to hard, brown to gray silty clay to clay till below the culvert bottom. We estimate the foundation soils will experience a total settlement of 0.25 inches at south portion of the culvert. We estimate the foundation soils will experience a differential settlement of ¼-inches or less.

4.3 Wingwalls

Based on General Plan and Elevation and information provided by TranSystems, we understand the preferred wingwall type is horizontal cantilever wingwalls. The 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).

4.4 Global Stability

Since the horizontal cantilever walls are expected to be the preferred wingwall type, there is no global stability related issues.

4.5 Cast-In-Place or Precast Culvert Considerations

The results of the analyses indicate that both the cast-in-place and precast culvert options are appropriate and feasible at the site. The differential settlement will be a ¼ inches or less, which will not cause excessive separation of the precast sections. For precast end sections, we recommend considering either a concrete apron or riprap armoring at the downstream invert to protect against scour and erosion that could undermine the precast end section assuming a hydraulic analysis does not indicate a low-scour condition.

4.6 Stage Construction Considerations

The culvert installation will be done on staged construction to maintain traffic at Frontage Road. Based on the GPE, assuming an exposed height of about 12 feet (from elevation 626 to 614 feet), temporary sheet piling using IDOT Design Guide 3.3.1.13 (IDOT 2012) is not feasible due to very hard soil conditions within the proposed embedment depth with Qu values greater than 4.5 tsf. Therefore, a Temporary Soil Retention System (TSRS) pay item should be included and designed by the Contractor to be approved by IDOT prior construction of the culvert.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

The existing vegetation, surface topsoil, pavement, and debris should be cleared and stripped where the 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 design and at the time of construction. Therefore, Wang recommends that the impact of the proposed culvert on the existing utilities including gas, water, and sanitary sewer at the north end should be undertaken for safety and construction reasons.

The groundwater was not observed through boring terminations depths reaching 596 feet elevation which is 18 feet below the proposed culvert base slab. 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.

Unstable or unsuitable materials exposed during excavation should be removed and replaced with compacted structural fill. The replacement material could be an IDOT District One "*Aggregate Subgrade Improvement*" materials. Any culvert bedding material should be taken into account. The removal and replacement material should extend a minimum of two foot beyond the edge of the box. The actual extent of the removal shall be determined in the field by a geotechnical soil inspector at the time of construction. Geotechnical and field engineer may extend or reduce the limits of excavation based on soil condition encountered during construction.

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). The fill material should be free of organic matter and debris. Engineered fill should be placed in lifts and compacted according to Section 205, Embankment (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 TranSystems Corporation and the Illinois Department of Transportation on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.

Metin W. Seyhun, P.E.
Sr. Geotechnical Engineer

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

REFERENCES

AASHTO (2020) *LRFD Bridge Design Specifications, 9th Edition*. Washington DC.

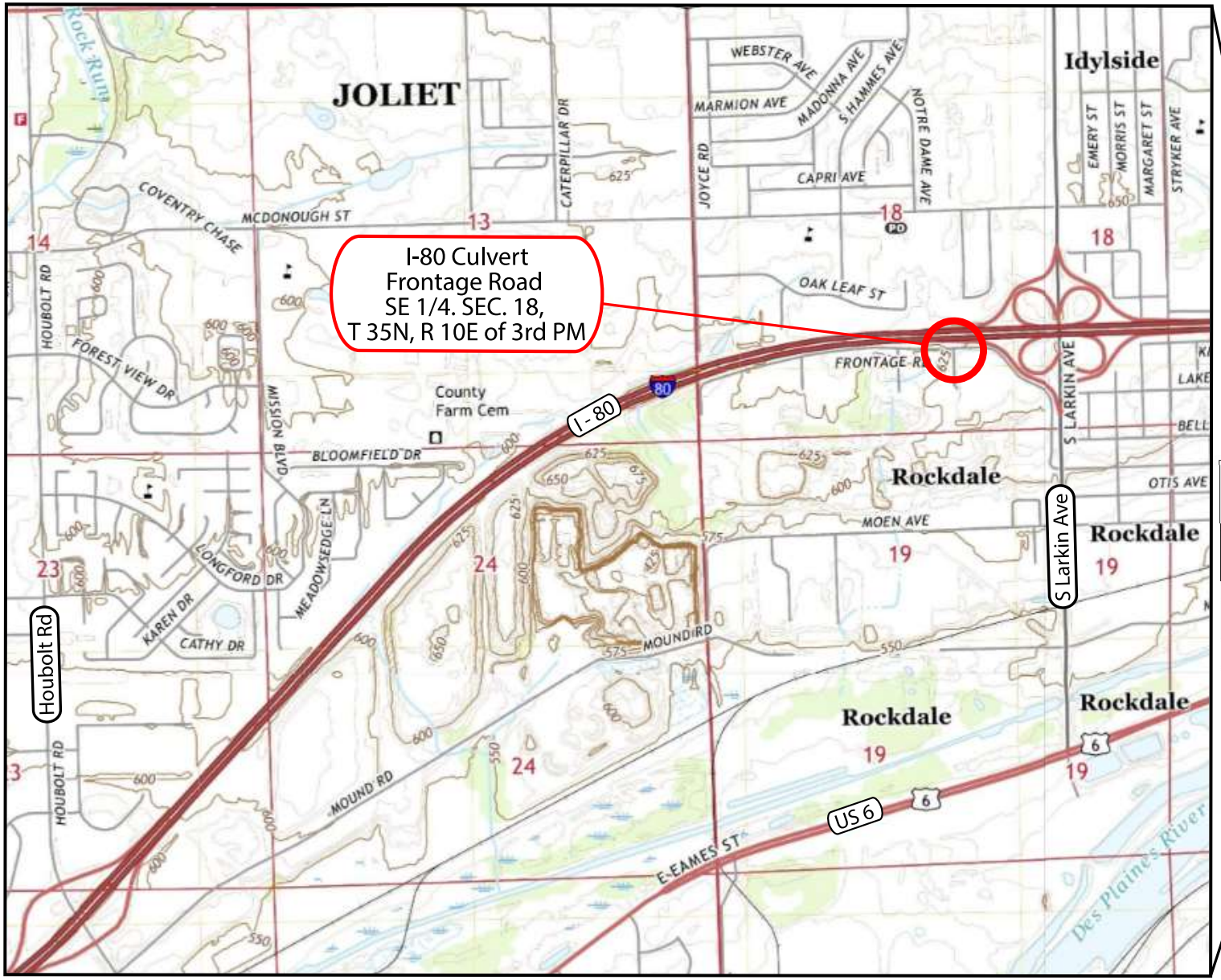
IDOT (2017) *Culvert Manual.* Illinois Department of Transportation.

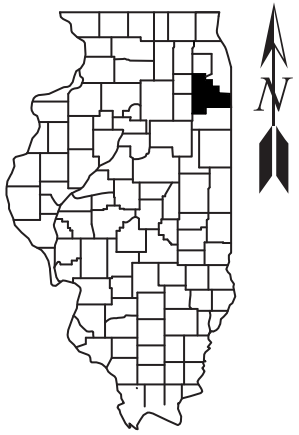
IDOT (2022) *Standard Specifications for Road and Bridge Construction.* Illinois Department of Transporation.

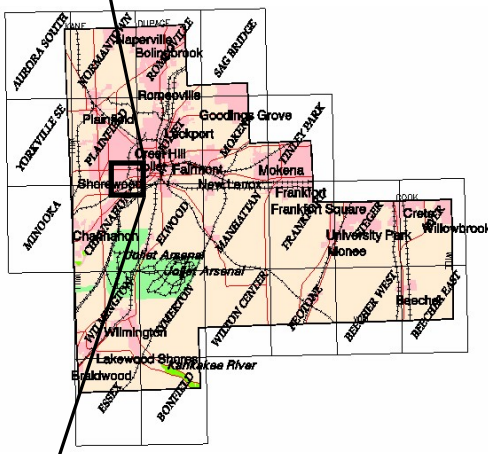
Wang Engineering
A Terracon Company

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

EXHIBITS







Legend

Site Locations

Scale

0 0.5 1.0 Miles

SITE LOCATION MAP: I-80 CULVERT, FRONTAGE ROAD; I-80 RECONSTRUCTION FORM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHAGNE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: D. You CHECKED BY: A. Kurnia

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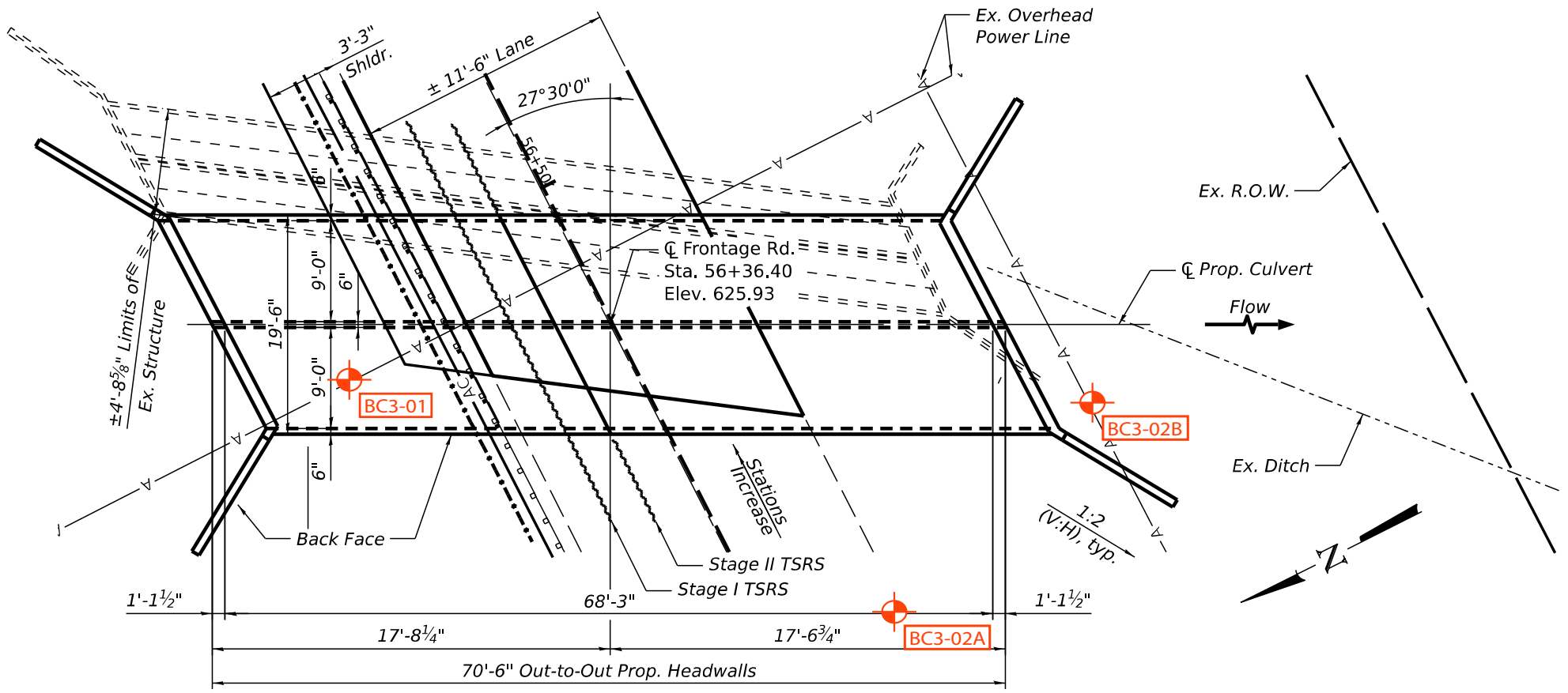
A Terracon Company
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR TRANSYSTEMS	KE225089 7901-15-01



PLAN

Legend

Boring Location

BORING LOCATION PLAN: I-80 CULVERT BC3, FRONTAGE ROAD; I-80 RECONSTRUCTION FROM HOUBOLT RD TO W CENTER ST & LARKIN AVE INTERCHAGNE, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: D. You CHECKED BY: A. Kurnia

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A Terracon Company
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www.wangeng.com

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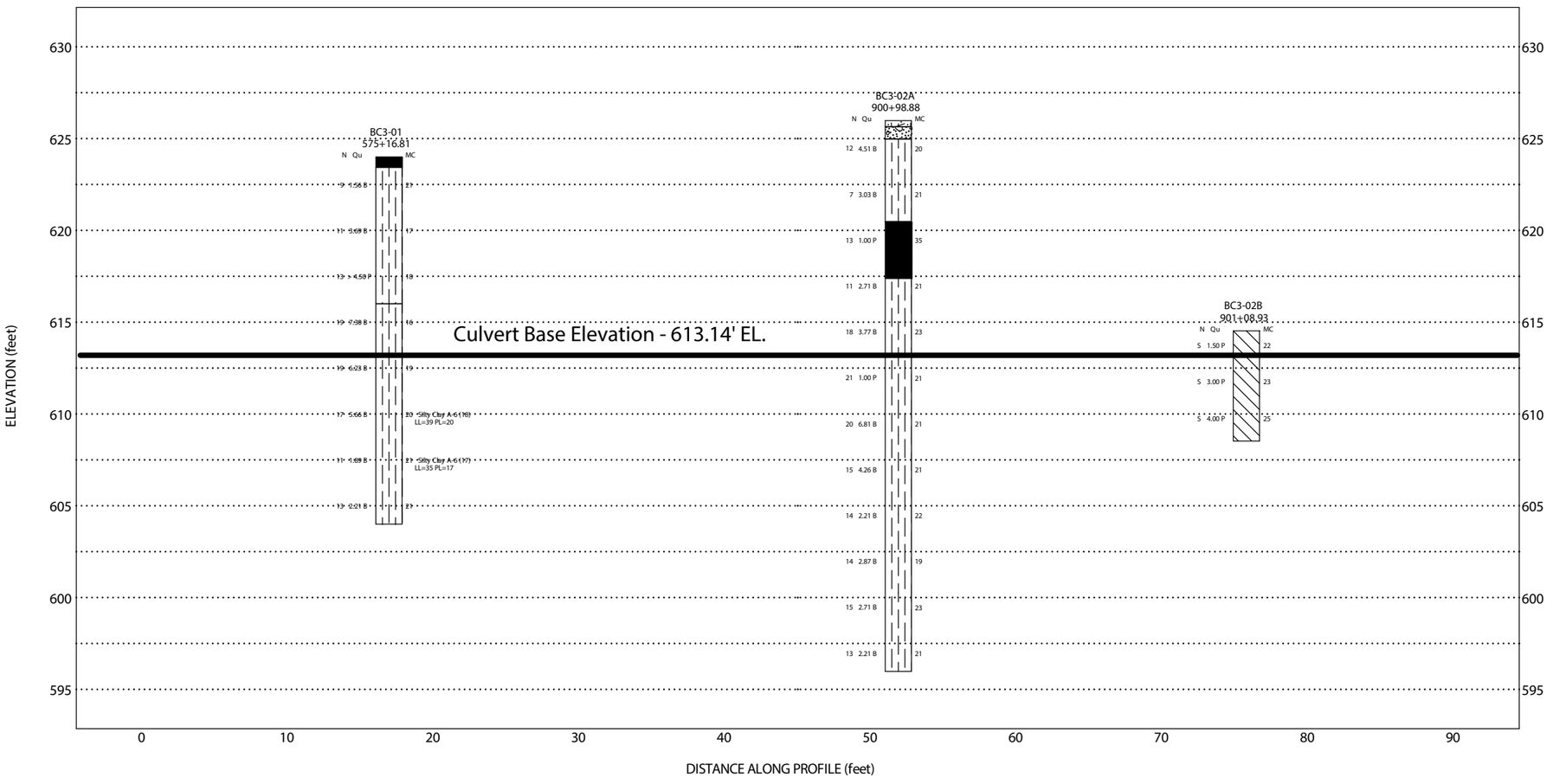
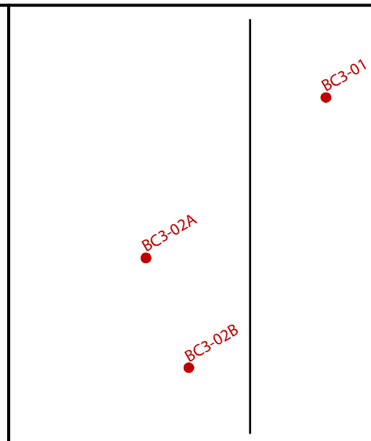


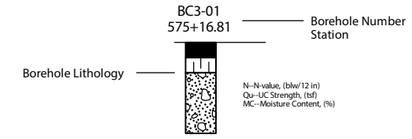
Lithology Graphics

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



Site Map Scale 1 inch equals 35 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: 1.5x

Terracon
1145 N. Main Street
Lombard, IL 60148

Soil Profile
Culvert BC3 SN. 099-0761

WEI SINCE 1982

I-80 Reconstruction (Houbolt Rd to Center St)
Will County, Illinois

JOB NUMBER	PLATE NUMBER
7901-15-01	EXHIBIT 3

WEI 11X17 7901150I.GPJ WANGENG.GDT 3/21/23

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
1145 N. Main Street
Lombard, IL 60148
Telephone: 630.953.9928
Fax: 630.953.9938

BORING LOG BC3-01

WEI Job No.: 7901-15-01

Client **TranSystems Corporation**
Project **I-80 Reconstruction (Houbolt Rd to Center St)**
Location **Will County, Illinois**

Datum: NAVD 88
Elevation: 624.01 ft
North: 1764380.12 ft
East: 1040106.65 ft
Station: 56+42.33
Offset: 23.058' LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	623.4	7-inch thick, dark brown SILTY CLAY LOAM						
		--TOPSOIL--						
		Stiff to hard, brown, dark brown, and gray SILTY CLAY, trace gravel			1	2 3 6	1.56 B	21
		--FILL--						
		--RDR 2--	5		2	3 5 6	3.69 B	17
					3	3 5 8	> 4.50 P	18
	616.0							
		Stiff to hard, gray SILTY CLAY, trace gravel; damp						
		--RDR 2--	10		4	4 8 11	7.30 B	16
					5	4 8 11	6.23 B	19
		--L_L(%)=39, P_L(%)=20--						
		--%Gravel=1.4--			6	4 6 11	5.66 B	20
		--%Sand=5.3--	15					
		--%Silt=55.7--						
		--%Clay=37.6--						
		--A-6 (18)--						
		--L_L(%)=35, P_L(%)=17--			7	3 5 6	1.89 B	21
		--%Gravel=0.9--						
		--%Sand=4.3--						
		--%Silt=55.0--						
		--%Clay=39.7--						
		--A-6 (17)--			8	2 5 8	2.21 B	21
	604.0		20					
		Boring terminated at 20.00 ft						
			25					

GENERAL NOTES

Begin Drilling **02-21-2023** Complete Drilling **02-21-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoA[96%]**
Driller **AG&EH** Logger **F. Bozga** Checked by **J. Bensen**
Drilling Method **2.25" IDA 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
1145 N. Main Street
Lombard, IL 60148
Telephone: 630.953.9928
Fax: 630.953.9938

BORING LOG BC3-02A

WEI Job No.: 7901-15-01

Client **TranSystems Corporation**
Project **I-80 Reconstruction (Houbolt Rd to Center St)**
Location **Will County, Illinois**

Datum: NAVD 88
Elevation: 625.98 ft
North: 1764345.16 ft
East: 1040067.44 ft
Station: 56+02.02
Offset: 10.612' RT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
625.6	4-inch thick ASPHALT						
625.0	--PAVEMENT--						
	Brown GRAVEL; damp						
	--BASE COURSE--						
	Very stiff to hard, greenish gray to brown SILTY CLAY, trace gravel; damp			1	6 5 7	4.51 B	20
	--FILL--						
	--RDR 2--	5		2	5 3 4	3.03 B	21
620.5	Stiff, black SILTY CLAY, trace gravel; moist			3	4 5 8	1.00 P	35
	--RDR 2--						
	--Buried TOPSOIL--						
617.4	Stiff to hard, brown to gray SILTY CLAY, trace gravel; damp to moist	10		4	3 4 7	2.71 B	21
	--RDR 2--			5	4 8 10	3.77 B	23
		15		6	6 10 11	1.00 P	21
				7	5 9 11	6.81 B	21
		20		8	5 7 8	4.26 B	21
				9	4 6 8	2.21 B	22
		25		10	3 6 8	2.87 B	19
		30		11	4 7 8	2.71 B	23
596.0				12	4 5 8	2.21 B	21
	Boring terminated at 30.00 ft						
		35					
		40					
		45					
		50					

GENERAL NOTES

Begin Drilling **03-16-2023** Complete Drilling **03-16-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoA[96%]**
Driller **AG&EH** Logger **D. Morken** Checked by **J. Bensen**
Drilling Method **2.25" IDA 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.

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Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard, IL 60148
Telephone: 630.953.9928
Fax: 630.953.9938

BORING LOG BC3-02B

WEI Job No.: 7901-15-01

Client: **TranSystems Corporation**
Project: **I-80 Reconstruction (Houbolt Rd to Center St)**
Location: **Will County, Illinois**

Datum: NAVD 88
Elevation: 614.53 ft
North: 1764321.27 ft
East: 1040076.77 ft
Station: 56+10.58
Offset: 34.796' RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		Stiff to hard, brown to gray CLAY, trace gravel; damp --RDR 2--			1	PUSH	1.50 P	22
					2	PUSH	3.00 P	23
			5		3	PUSH	4.00 P	25
	608.5	Boring terminated at 6.00 ft						
			10					
			15					
			20					
			25					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling: **03-16-2023** Complete Drilling: **03-16-2023**
Drilling Contractor: **Wang Testing Services** Drill Rig: **Geoprobe HA**
Driller: **AG&EH** Logger: **D. Morken** Checked by: **J. Bensen**
Drilling Method: **1" 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**

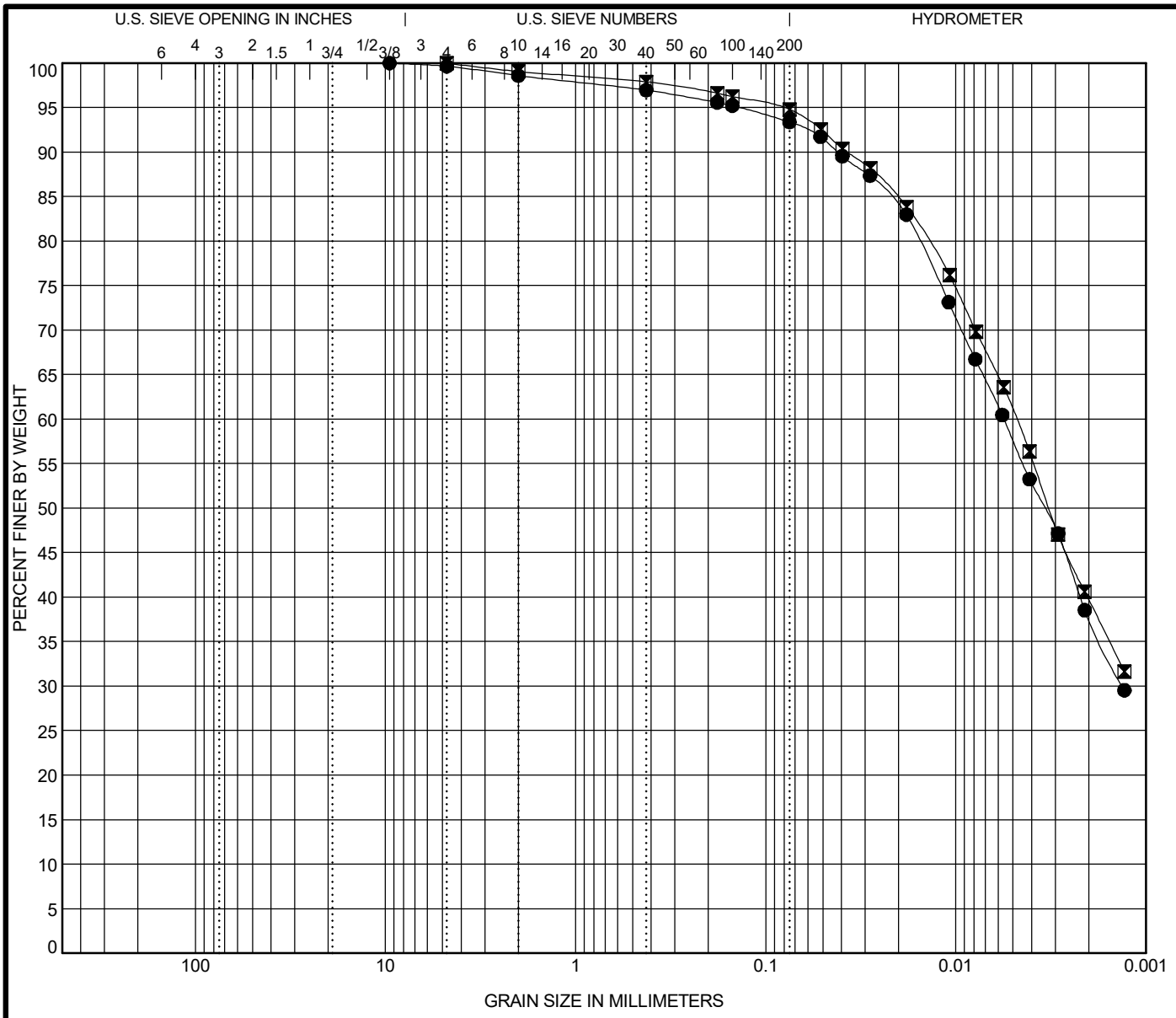
The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC 79011501.GPJ WANGENG.GDT 3/21/23

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
●	BC3-01#6	13.5 ft	**Silty Clay**	**39**	**20**	**19**		
⊠	BC3-01#7	16.0 ft	**Silty Clay**	**35**	**17**	**18**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BC3-01#6	13.5 ft	**9.5**	**0.006**	**0.001**		**1.4**	**5.3**	**55.7**	**37.6**
⊠	BC3-01#7	16.0 ft	**4.75**	**0.005**			**0.9**	**4.3**	**55.0**	**39.7**

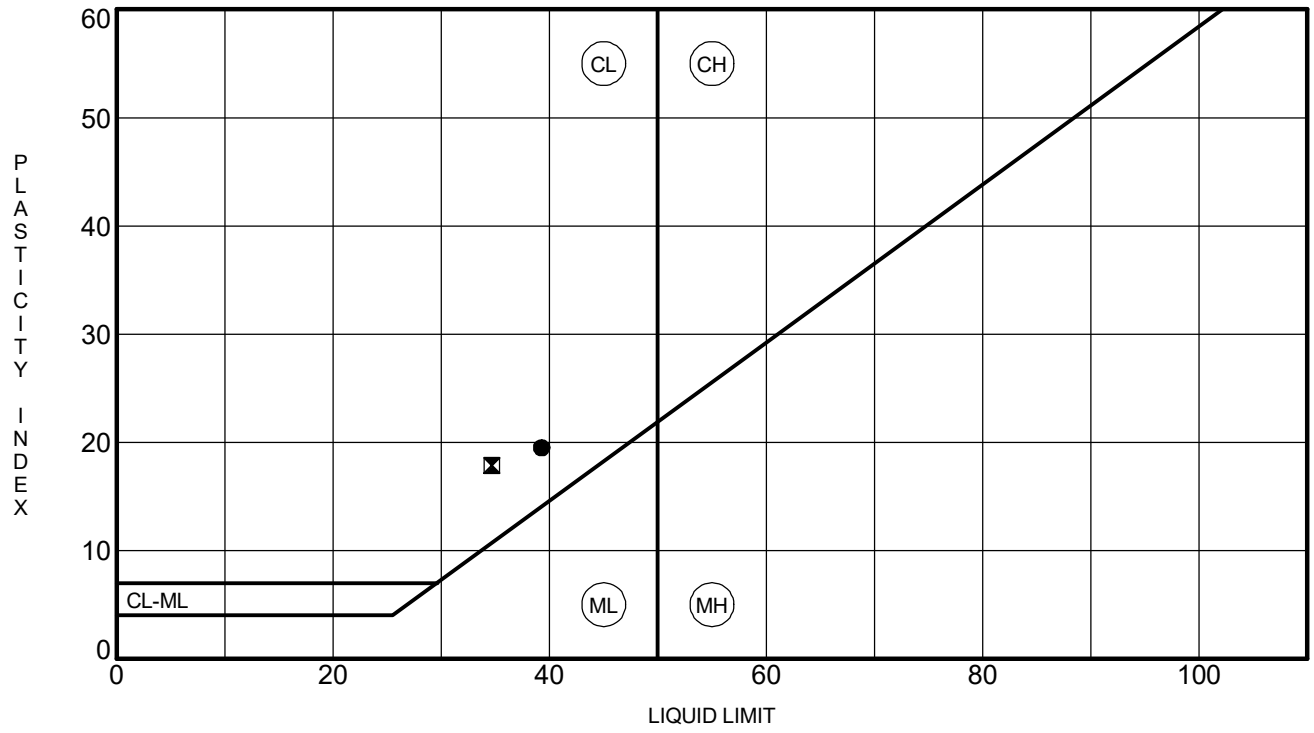
WEI SINCE 1982
Terracon
1145 N. Main Street
Lombard, IL 60148
Telephone: 630-953-9928
Fax: 630-953-9938

GRAIN SIZE DISTRIBUTION

Project: I-80 Reconstruction (Houbolt Rd to Center St)

Location: Will County, Illinois

Number: 7901-15-01



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**BC3-01#6**	**13.5 ft**	**39**	**20**	**19**	**93**	**Silty Clay**
⊠	**BC3-01#7**	**16.0 ft**	**35**	**17**	**18**	**95**	**Silty Clay**

WEI SINCE 1982

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ATTERBERG LIMITS' RESULTS

Project: I-80 Reconstruction (Houbolt Rd to Center St)

Location: Will County, Illinois

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APPENDIX C

Bench Mark: *BM 24 Set cut square on northwesterly corner of pier seat of most southerly Larkin Ave bridge pier on South side of Eastbound I-80. Elev. 634.804.*

Existing Structure: *The existing culvert is a 2-48" pipe culvert with concrete headwalls and wingwalls, with an overall length of approximately 71'-0".*

Salvage: *No Salvage.*
Traffic will be maintained utilizing Staged Construction.

DESIGN STRESSES

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

LOADING HL-93

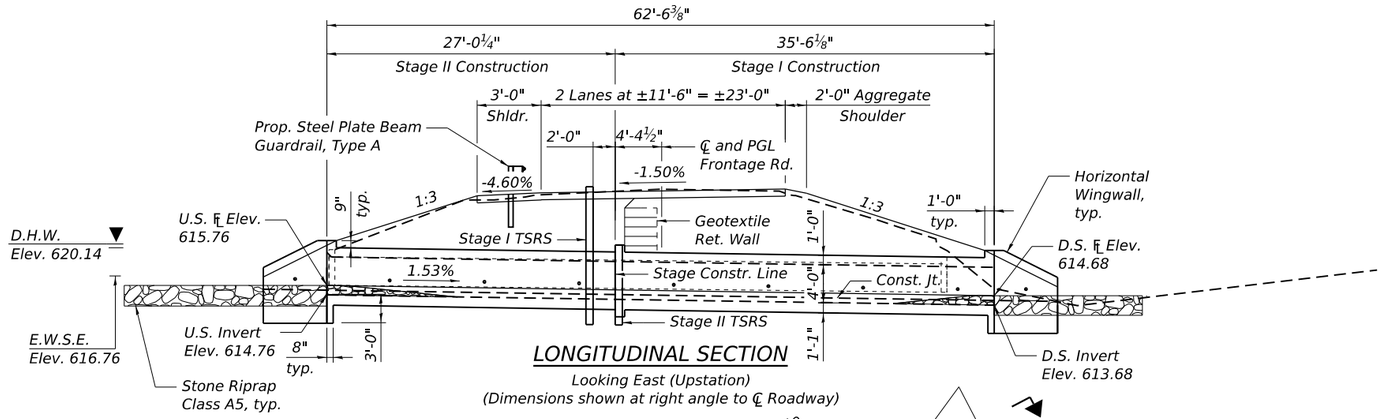
Allow 50 lb/sq.ft. for future wearing surface

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition.

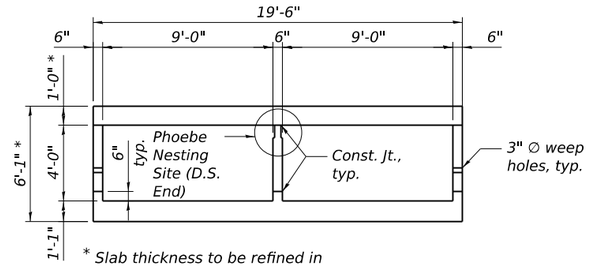
HIGHWAY CLASSIFICATION

Frontage Road
Functional Class: Local Road
ADT: N/A (2019); N/A (2040)
ADTT: N/A (2019); N/A (2040)
DHV: N/A (2040)
Design Speed: 40 mph
Posted Speed: 30 mph
2-Way Traffic
Directional Distribution 50-50



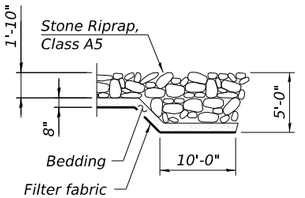
LONGITUDINAL SECTION

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

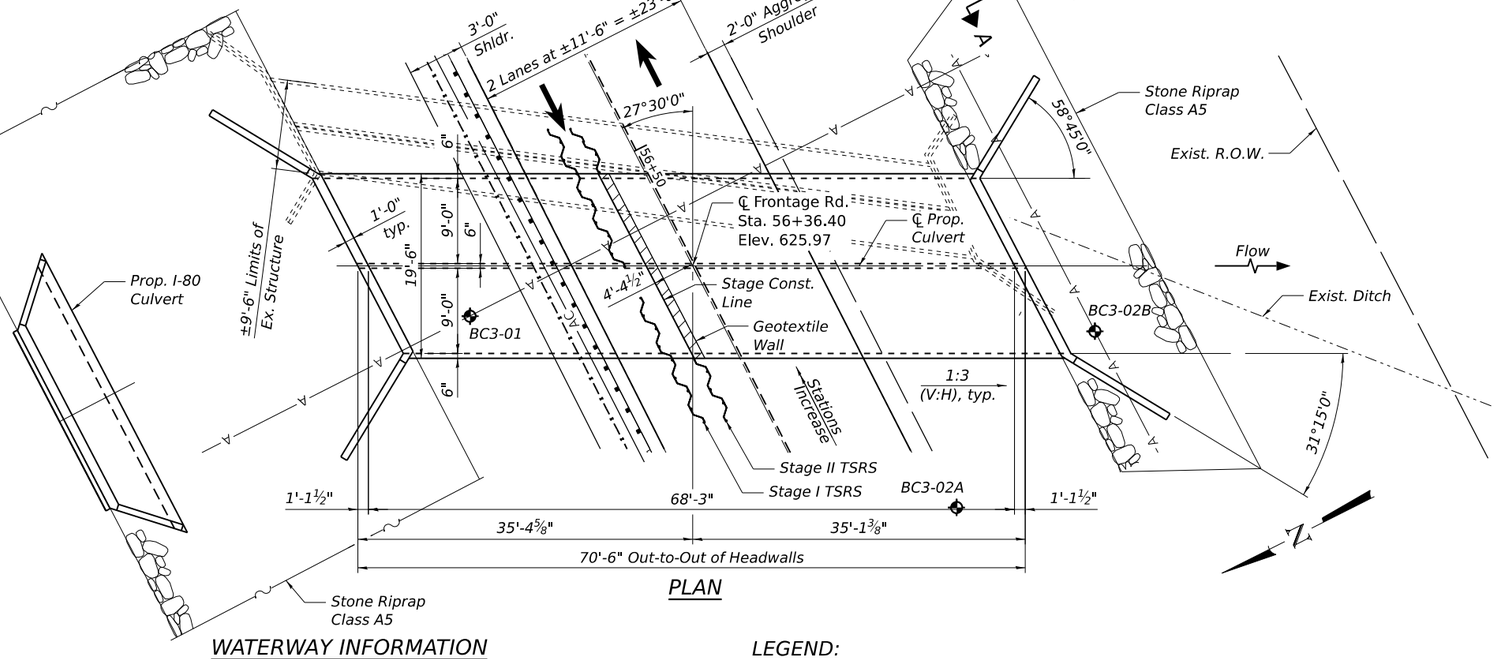


* *Slab thickness to be refined in final design.*

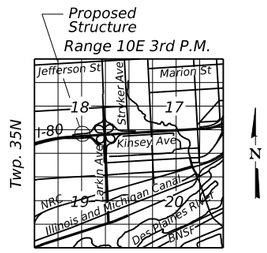
SECTION THRU BARREL



SECTION A-A



PLAN



LOCATION SKETCH

WATERWAY INFORMATION

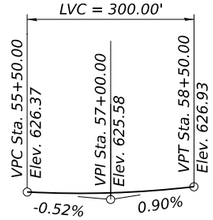
Drainage Area = 0.3 Sq. Mi.
Exist. Overtopping Elev. = 626.00 at Sta. 575+22
Prop. Overtopping Elev. = 626.00 at Sta. 575+11

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.
	5	115	6	26	617.19	2.01	1.47	619.20	618.66
	10	169	9	33	617.56	2.69	1.64	620.25	619.20
Design	50	279	13	45	618.19	5.08	1.95	623.27	620.14
Base	100	337	14	51	618.50	7.08	2.14	625.57	620.64
Overtopping	<500	347	14		618.66	7.34		626.00	
Max	500	505	14	54	618.76	7.85	4.28	626.61	623.04

Existing 10-year outlet Velocity = 10.6 ft/s
Proposed 10-year outlet Velocity = 6.7 ft/s

LEGEND:

- Soil Boring
- Access Control Fence
- A Exist. Overhead Power Line
- Exist. Guardrail
- Prop. Guardrail



PROFILE GRADE

(Along ℄ Roadway)

GENERAL PLAN & ELEVATION
FRONTAGE ROAD OVER ROADWAY DITCH
F.A.I. RTE. I-80
SEC. FAI 80 22 BR
WILL COUNTY
STATION 56+36.40
STRUCTURE NO. 099-0761

MODEL: Default
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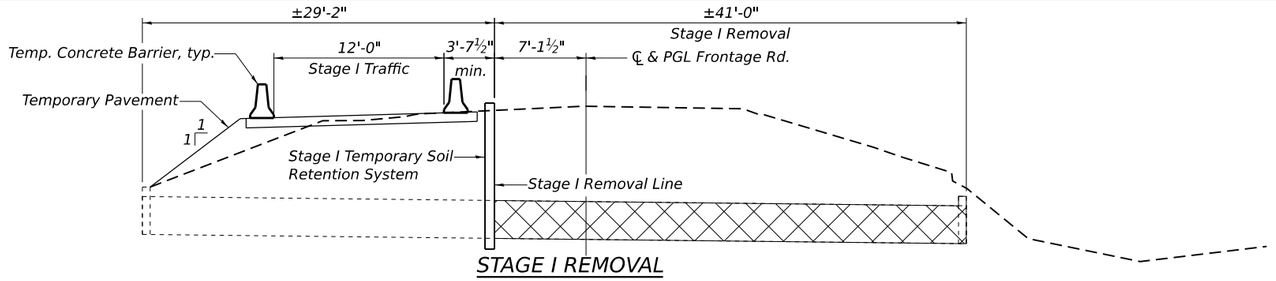
TRANSYSTEMS

USER NAME = iipsaropassione	DESIGNED - IIP	REVISED -	
	CHECKED - MDS	REVISED -	
PLOT SCALE = 16:0 '-' / in.	DRAWN - IIP	REVISED -	
PLOT DATE = 4/6/2023	CHECKED - MDS	REVISED -	

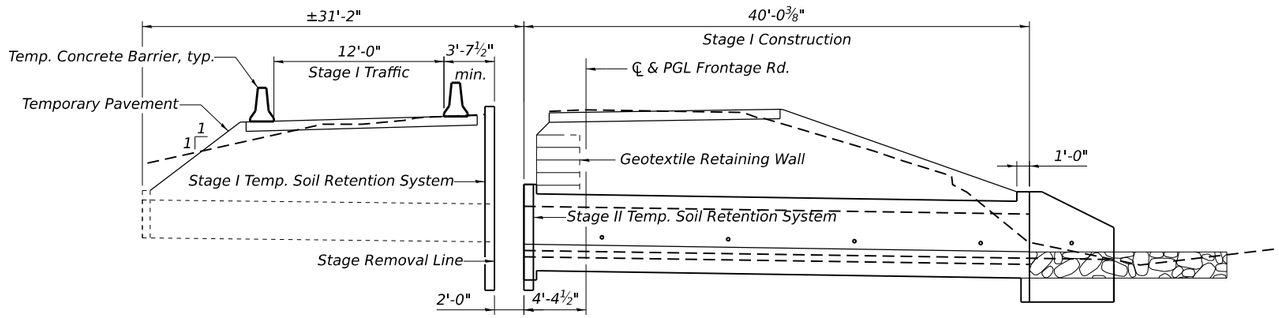
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET S4-01 OF S3-02 SHEETS

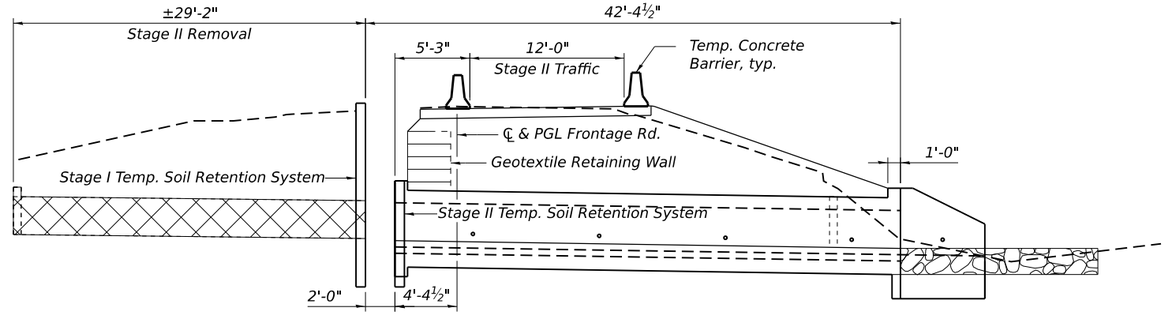
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 22 BR	WILL	906	642
		CONTRACT NO. 62R89		
		ILLINOIS	FED. AID PROJECT	



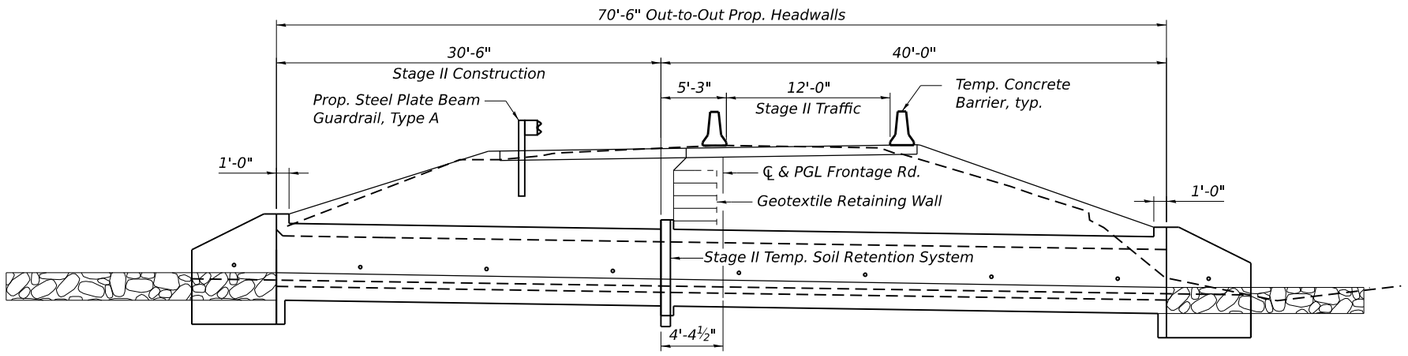
STAGE I REMOVAL



STAGE I CONSTRUCTION



STAGE II REMOVAL



STAGE II CONSTRUCTION

DETAILS
FRONTAGE ROAD OVER ROADWAY DITCH
F.A.I. RTE. I-80
SEC. 2021-151-B
WILL COUNTY
STATION 56+36.40
STRUCTURE NO. 099-0761

MODEL: Default
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TRANSYSTEMS

USER NAME = iipsaropassione	DESIGNED - IIP	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		
	CHECKED - MDS	REVISED -			
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F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
I-80	FAI 80 22 BR	WILL	906	643
		CONTRACT NO. 62R89		
	ILLINOIS	FED. AID PROJECT		