STRUCTURE GEOTECHNICAL REPORT

US-51 OVER STREAM IN ELKVILLE
FAP ROUTE 322, SECTION 4B-2
REPLACEMENT STRUCTURE 039-2032
JACKSON COUNTY, ILLINOIS
PTB 168-023 WO #5

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1.0 PROJECT DESCRIPTION AND PROPOSED STRUCTURE INFORMATION

1.1 INTRODUCTION

This report summarizes the results of a geotechnical investigation performed for the design of a replacement structure for the existing bridge carrying US 51 over an unnamed stream located within the City Limits of Elkville, Jackson County, Illinois. The purpose of this study was to provide a geotechnical assessment of the planned replacement structure, based on subsurface conditions encountered at two borings performed by the Illinois Department of Transportation (IDOT) at the existing structure in March 2010. This report describes the exploration procedures used, presents the field and laboratory data, includes an assessment of the subsurface conditions in the area, and provides geotechnical recommendations for construction.

1.2 PROJECT DESCRIPTION

The project consists of the removal of the existing bridge and replacement with a double box culvert. Based on the information provided, it appears that staged construction will be required to maintain traffic during construction. The general site area is shown on the attached Vicinity Map, Figure 1 in Appendix A. A plan that shows the approximate locations of the borings used for this study is presented as the Site and Boring Location Plan, Figure 2 in Appendix A. The unnamed stream flows west to east beneath the existing bridge. The existing bridge was constructed in 1921 as a single-span concrete slab structure spanning approximately 24 feet clear, with a 20-foot roadway width. This structure had wing walls nearly parallel with the roadway that were tied together with concrete tie beams. The abutments and wing walls were supported on shallow footings. A 1954 reconstruction involved widening both edges of the bridge to provide a 39-foot roadway width and a 4-foot sidewalk on the east side. The abutments were widened accordingly, and 45-degree flared wing walls supported on footings were added. The original and reconstructed abutments were supported on spread footings 3 feet wide, founded at Elevation 381.9. The added wing walls are supported on 7.5-foot wide footings at the same elevation. It appears that the original wing walls were removed, but that the footings and tie beams may have been left in place.

1.3 Proposed Structure Information

The proposed replacement structure will consist of a double box culvert skewed 10 degrees clockwise to a perpendicular to the roadway. The structure will accommodate two 13-foot roadway lanes with 7-foot shoulders, curbing, and a 5-foot wide sidewalk on the east side, for a headwall out-to-out distance of 50 feet-1 inch as measured perpendicular to the roadway. Each box will have interior dimensions of 12 feet wide and 7 feet high, with a central wall 7 inches thick and exterior walls 7 inches thick, increasing slightly 5 feet from each end. The culvert base will be 13 inches thick and the top 12 inches thick. The northwest and southeast wingwalls are angled at 40 degrees with respect to the centerline (CL) of the culvert and are 14 feet long. The northeast and southwest wingwalls are angled 50 degrees with respect to the CL of the culvert and are 12 feet long. Both sets of wingwalls will be cantilevered off the culvert. The dead loads imposed on the base of the slab are assumed to total less than 1,300 kips. A copy of the current TS&L is included in Appendix C. The roadway profile across the present bridge is anticipated to remain essentially unchanged.

2.0 Subsurface Exploration and Laboratory Testing

2.1 Subsurface Exploration

The field exploration for this project was conducted by IDOT. The exploration consisted of completing two soil borings within the roadway pavement, with one boring on the north side and one on the south side of the existing bridge. The borings were designated as Borings 1-S and 2-S. The approximate locations of the borings are shown on the Site and Boring Location Plan, Figure 2 in Appendix A.

The two borings for this study were completed on March 11, 2010. Boring 1-S was located just north of the existing bridge at Station 642+15, offset 14 feet right of the roadway centerline. Boring 2-S was located just south of the existing bridge at Station 641+55, offset 13 feet left of the centerline. Each boring was augered through the pavement section and base rock, and then advanced to the top of intact bedrock at depths of 32.5 and 29.5 feet for Borings 1-S and 2-S, respectively, using hollow-stem auger drilling equipment. Split-spoon (SPT) samples were obtained on 2.5-foot centers in the overburden soils. Boring 1-S was advanced into the underlying bedrock using the hollow-stem auger equipment to a termination depth of 45 feet; Boring 2-S was extended using this equipment to a termination depth of 32.5 feet. The sampling sequence for each boring is summarized on the Boring Logs in Appendix B of this report. A Subsurface Profile is provided as Figure 3 in Appendix A.

Unconfined compression tests were performed in the field on selected split-spoon samples using a RIMAC field testing machine. The resulting unconfined compressive strengths are reported on the Boring Logs.

2.2 Laboratory Testing

A laboratory testing program consisting of natural moisture contents was conducted by IDOT on the obtained soil samples. The results of the individual tests are presented on the Boring Logs in Appendix B.

3.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered at the borings are shown on the Boring Logs. The general subsurface conditions encountered and their pertinent engineering characteristics are described in the following paragraphs. Conditions represented by the borings should be considered applicable only at the boring locations on the dates shown; the reported conditions may be different at other locations and at other times.

3.1 GEOLOGY

The site lies on the west edge of the Little Muddy River Valley, which was formed on glacial lakebed deposits. These deposits were laid down during late glacial times when major rivers, the Mississippi and the Ohio, were rapidly aggraded during glacial recessions by high-velocity meltwater carrying sediment loads. The rise in these riverbeds blocked tributary channels such as the Little Muddy Valley, forming lakes up these channels that became filled with lakebed deposits of silt and clay. Later, the surface of these lacustrine sediments was covered with loess, windblown silts transported from the major river valleys near the end of the last glacial period. Subsequent to this, drainage channels were established across these deposits, cutting into the loess and lacustrine soils.

The underlying bedrock formation consists of the lower portion of the Modesto Formation of the Pennsylvanian System. The Modesto Formation consists primarily of shale and sandstone with some minor constituents of limestone and coal. That formation is underlain by the Carbondale Formation, which consists of shale, sandstone, and limestone with two mineable coal seams, the Herrin and the underlying Springfield. The Herrin is the host coal for mining in the site area.

3.2 GENERALIZED SUBSURFACE PROFILE

The natural soils at the site are predominantly lacustrine deposits, made up of silty clay, silty clay loam, silt loam, clay loam, and clay. These soils extend to depths of 27 to 29 feet below the roadway, and may occasionally contain trace amounts of sand and gravel. The soils encountered beneath the lacustrine unit are believed to be residual, formed by weathering of the underlying bedrock. Moisture contents in the lacustrine unit vary from 21 to 47%. The standard penetration test (N) values range from 1 to 7 blows per foot (bpf), with one value of 0, where the sampler advanced for 18 inches under the weight of the hammer. RIMAC unconfined compression test values on samples typically range from 0.3 to 1.6 tons per square foot (tsf), with outlier values of 0.1 and 1.9 tsf. The residual soils encountered in the borings consist of a thin layer of clay and clay loam with sand and gravel, with N values of 13 and 20 bpf, and moisture contents of 17 and 50%. The latter value may be influenced by disturbance or the presence of organic matter.

Intact bedrock was encountered at depths of 29.5 and 32.5 feet in Borings 2-S and 1-S, respectively, corresponding to approximate Elevations 365 and 362. The borings were continued into the bedrock for 3 feet and 12.5 feet, respectively. The bedrock consists of hard clay shale and shale, with N values of 100 blows for penetrations of 2 to 5 inches.

3.3 GROUNDWATER

At the time of drilling, groundwater was observed in Borings 1-S and 2-S at depths of 8 and 9.5 feet, corresponding to Elevations 385 and 386.6, respectively. The presence or absence of groundwater at a particular location does not necessarily mean that groundwater will be present or absent at that location at other times. Groundwater levels may vary significantly over time due to the effect of seasonal variations in precipitation, the water level in the stream, or other factors not evident at the time of exploration.

4.0 GEOTECHNICAL EVALUATIONS

4.1 EARTHWORK

Grade changes on the approach embankments will be minimal along the roadway. For lane shifts or constructability, it may require that the roadway shoulders be widened accordingly in the vicinity of the existing abutments. Any significant widening should be accomplished by placing fill in horizontal layers starting from the bottom, rather than attempting to place and compact material on the slope. Assuming that there are right-of-way restrictions limiting the work space at the toe of the slope, it may be necessary to cut into the existing slope to permit standard-width equipment to operate while placing additional fill up the slope. This will effectively key the new fill into the existing slope.

4.2 SETTLEMENT

The upper portion of the soil profile as found in the borings could be compressible, particularly above Elevation 385, the approximate planned invert level of the culvert. Excavations to install the new box culvert will extend at least 2 or 3 feet below that level to remove the existing abutment and wing wall foundations, which should result in the removal of these upper soils. The native soils below that level could be moderately compressible with the imposition of loads greater than those that have been previously imposed. A review of the surrounding terrain within the extent of the lakebed deposits described in Sections 3.1 and 3.2 indicates these deposits were originally level at Elevation 400 or greater after deposition, and then drainage channels were eventually eroded, flowing east to the adjacent Little Muddy River. On this basis, the lacustrine deposits have been preloaded to pressures greater than the assumed design loads imposed by the new box culvert, so that the maximum settlement will occur as recompression rather than virgin consolidation. Settlement calculations using the assumptions given above and assuming a total weight of the structure, wing walls, and overlying roadway materials of less than 1,300 kips indicate the removal of existing native soils down to Elevation 382 would reduce total settlement to less than 2 inches. This removal of existing soils down to Elevation 382 must include the entire footprint of the new culvert structure and extend 2 feet horizontally beyond the footprint limits.

4.3 MINING ACTIVITY

A review of undermining was made using the Illinois State Geological Survey (ISGS) website for mapped coal mines in Jackson County, Illinois. Based on this information, the project site appears to be very close to two underground mines, and slightly removed from two strip mines. The location of the site in relation to nearby mine activity is shown on Figure 4 in Appendix A. The underground mines are of some concern, particularly a very small operation just south of the site, the Elkville Coal Company Elkville Mine (Mine Index #2444), which operated from 1936 to 1940. The total mined-out acreage is 2 acres, with the main shaft located in the southwest quadrant of the intersection of US 51 and Royalton Road. The host coal seam was the Herrin, located 60 feet below the surface, with an average reported thickness of 3.5 feet. The next closest mine is the Elk Coal Company Elk Mine (Mine Index #692) with the nearest approach some 1,000 feet to the east. Here the Herrin coal seam is at a depth of 128 feet, with an average

thickness of 8 to 8.5 feet. The mine operated from 1934 to 1964, covering an estimated 292 acres. The latter mine is far enough removed to be at a relatively low risk of having an impact at the site. The two strip mines closest to the site are the S Coal Company Elkville Mine (Mine Index #1037) and the Ajax Coal Company Ajax Mine (Mine Index #2441). These mines operated to depths of less than 100 feet. The closest approach of the limits of these mines to the site is about a half mile, considered far enough from the site to have no impact.

5.0 Foundation Evaluations and Design Recommendations

5.1 Box Culvert Design

A cast-in-place (CIP) culvert with flared wingwalls was selected during initial design because the CIP barrels can better accommodate staged construction and skewed conditions, and past history indicates the CIP barrels have been more durable. Also, we understand that District 9 prefers CIP over precast for their 2000-numbered culverts.

Flared wingwalls have been selected to provide better hydraulic efficiency than standard precast sections, and result in more reliable and aesthetically pleasing grading. Considering the culvert skew, the design height, and the use of CIP construction, cantilever wingwalls have been selected for design. This will eliminate the potential for differential movement and rotation between independently-supported barrels and wingwalls, as well as the need to overexcavate beneath wingwall footings to provide settlement control.

Surface water flow and groundwater seepage into the culvert excavation from the stream bed must be controlled so that the integrity of the culvert bearing surface is maintained. The soils at the site appear to be moisture-sensitive and will deteriorate rapidly when saturated. Surface flow control will require the installation of a diversion system, such as a temporary dam at each end of the construction area, with adequate pumping capacity or other means to transfer stream flow across the area.

5.2 General Slope Stability

Available information and photographs from the 2017 Bridge Condition Report by Oates Associates indicate the existing ground surface in the vicinity of the project is at Elevation 390 to 392, or 3 to 5 feet below the roadway. The undrained shear strength values from the upper two samples in the current borings indicate a minimum shear strength of 400 pounds per square foot (psf). Using stability chart analyses for a 2H:1V slope having a height of 5 feet, a factor of safety in excess of 3 is found. Softer soils below this level would reduce the factor of safety, but it is judged the reduction for the site slopes and subsurface conditions would result in a minimum value of more than 1.5. On this basis, the side slopes for the new box culvert are considered to be stable.

6.0 Construction Considerations

6.1 Temporary Sheeting and Soil Retention

The construction activities should be performed in accordance with the current IDOT Standard Specifications for Road and Bridge Construction. Trenching, excavating, and bracing should be performed in accordance with Occupational Safety and Health Administration (OSHA) regulations, and other applicable regulatory agencies. In accordance with the OSHA excavation standards, the soil at the site is considered to be Type C, which requires a side slope for excavations no steeper than 1.5 horizontal to 1.0 vertical (1.5H:1.0V). However, worker safety and classification of the excavation soil is the responsibility of the contractor. The excavation side slopes for structure foundations may interfere with existing utilities, if present. This would require a temporary soil retention system such as a cantilever sheet pile wall, sheeting, or other temporary support.

Traffic along US-51 will be maintained by utilizing staged construction. It appears as though either a temporary sheet pile, which includes cantilever temporary sheet piling, or a soil retention system, will be feasible at the abutments. Soft soils observed below the anticipated retained height of approximately 13.5 feet may require additional embedment. Cantilever sheet pile systems may be designed using IDOT Design Guide 3.13.1 – Temporary Sheet Piling Design.

6.2 Subgrade Water Protection

Groundwater seepage should be anticipated for excavations extending down to the level of the stream at the site. The free water surface stated on the Boring Logs is Elevation 388.3, almost 3 feet above the invert level of the new culvert. It is anticipated that if surface flows are controlled by temporary dams upstream and downstream of the construction area, excavations within the planned culvert location down to approximately Elevation 381 feet may be adequately dewatered using sump and pump methods. Excavations below that level may result in base instability or excessive flows into the excavation. Such excavations should be accomplished using a backhoe or trackhoe operating from a level well above the invert. Construction equipment operating on the subgrade below the invert level would quickly result in excessive disturbance of the soils and loss of bearing capacity.

6.3 Subgrade, Fill, and Backfill

Earthwork activities including backfill and fill should be performed in accordance with Section 205 of the IDOT Standard Specifications.

7.0 Report Limitations

This geotechnical report has been prepared for the exclusive use of **Oates Associates, Inc.** and the **Illinois Department of Transportation** for the specific application to the subject project. The information and recommendations contained in this report have been made in accordance with generally accepted geotechnical and foundation engineering practices; no other warranties are implied or expressed.

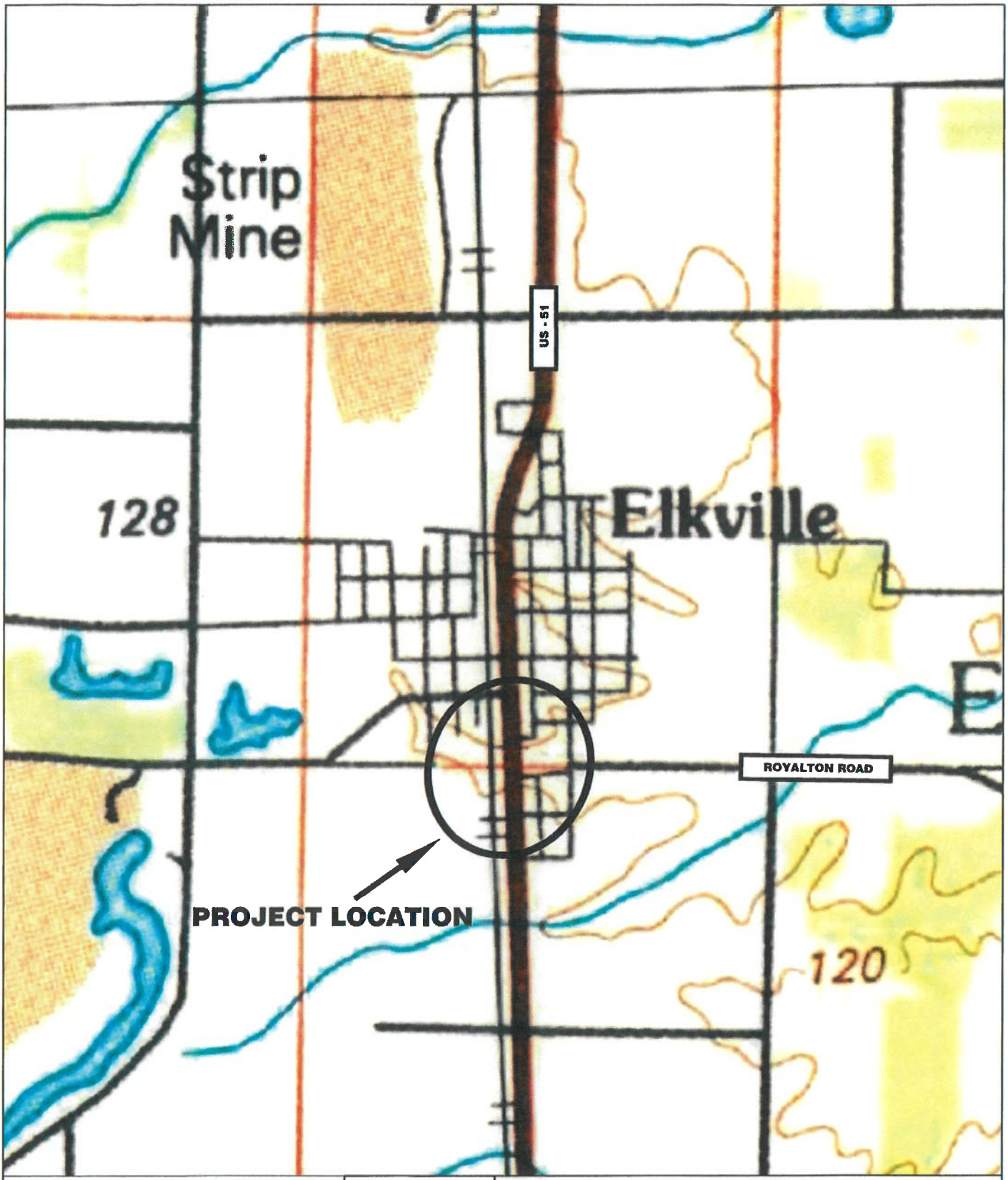
The assessments and recommendations submitted in this report are based in part upon the data obtained from the borings. The nature and extent of variations between and away from the borings may not be evident at this time. If variations appear evident at a later date, it may be necessary to re-evaluate the recommendations of this report.

We emphasize that this report was prepared for design purposes only and may not be sufficient to prepare an accurate construction bid. Contractors reviewing this report should acknowledge that the information and recommendations contained herein are for design purposes.

If conditions at the site have changed due to natural causes or other operations, this report should be reviewed by TSi to determine the applicability of the analyses and recommendations considering the changed conditions. The report should also be reviewed by TSi if changes occur in the structure locations, sizes, and types, in the planned loads, elevations, grading and site development plans or the project concepts.

TSi requests the opportunity to review the final plans and specifications for the project prior to construction to verify that the recommendations in this report are properly interpreted and incorporated in the design and construction documents. If TSi is not accorded the opportunity to make this recommended review, we can assume no responsibility for the misinterpretation of our recommendations.

APPENDIX A



NOT TO SCALE

N

NOTE:
DRAWING PREPARED FROM AN IMAGE OBTAINED FROM USGS ON 4/24/18.

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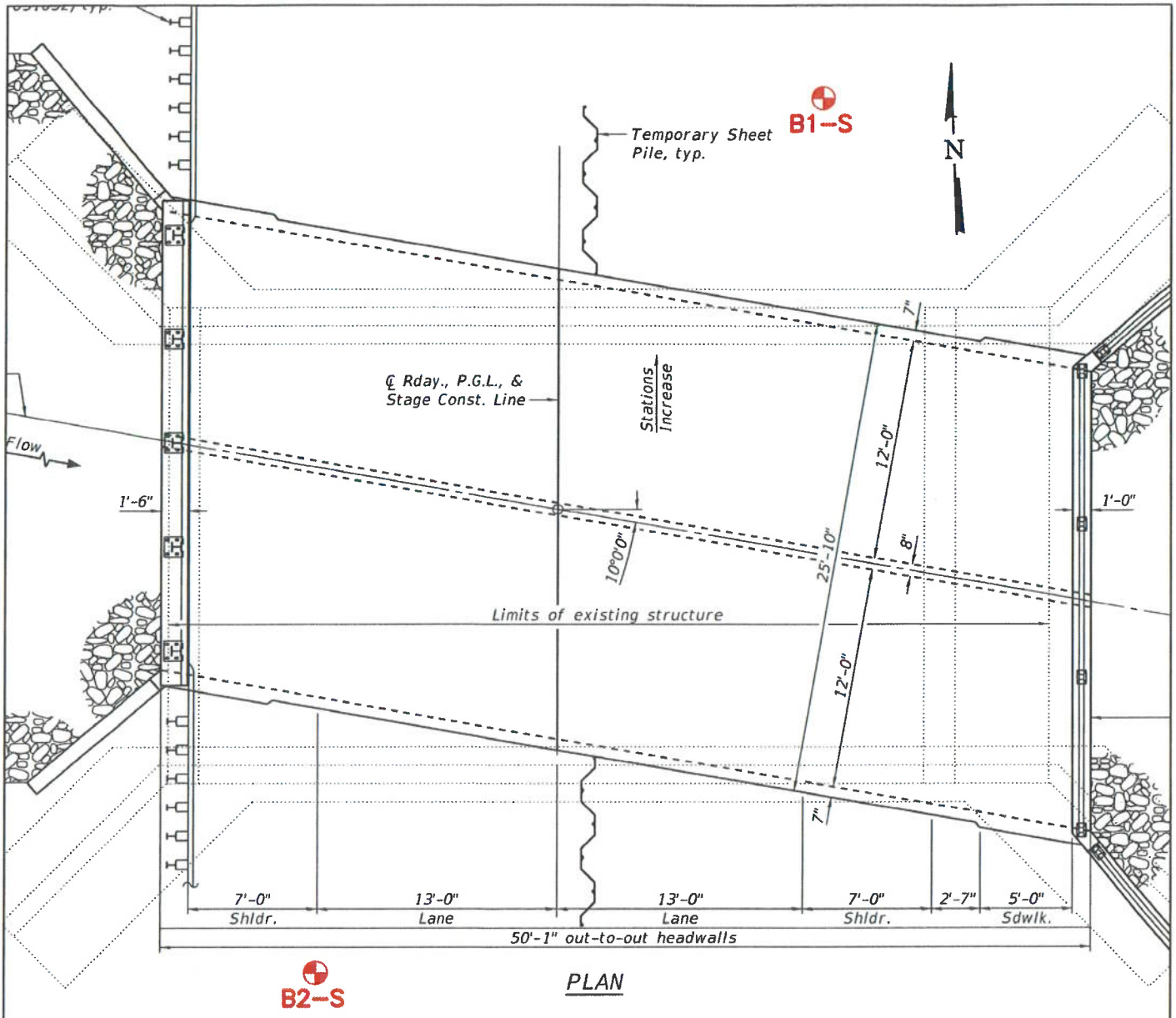
1340 NORTH PRICE ROAD
ST. LOUIS, MISSOURI 63132

VICINITY MAP
US-51 OVER STREAM IN ELKVILLE FAP ROUTE 322, SECTION 4B-2
JACKSON COUNTY, ILLINOIS

Drawn By: ACE	Checked By: WJG	
Project No.: 20185013.00	Date: 4/25/18	Figure 1



NOT TO SCALE

LEGEND

B1–S APPROXIMATE BORING LOCATION AND NUMBER

NOTE: THIS PLAN WAS PREPARED FROM AN IMAGE OBTAINED FROM OATES ON 3/16/18.

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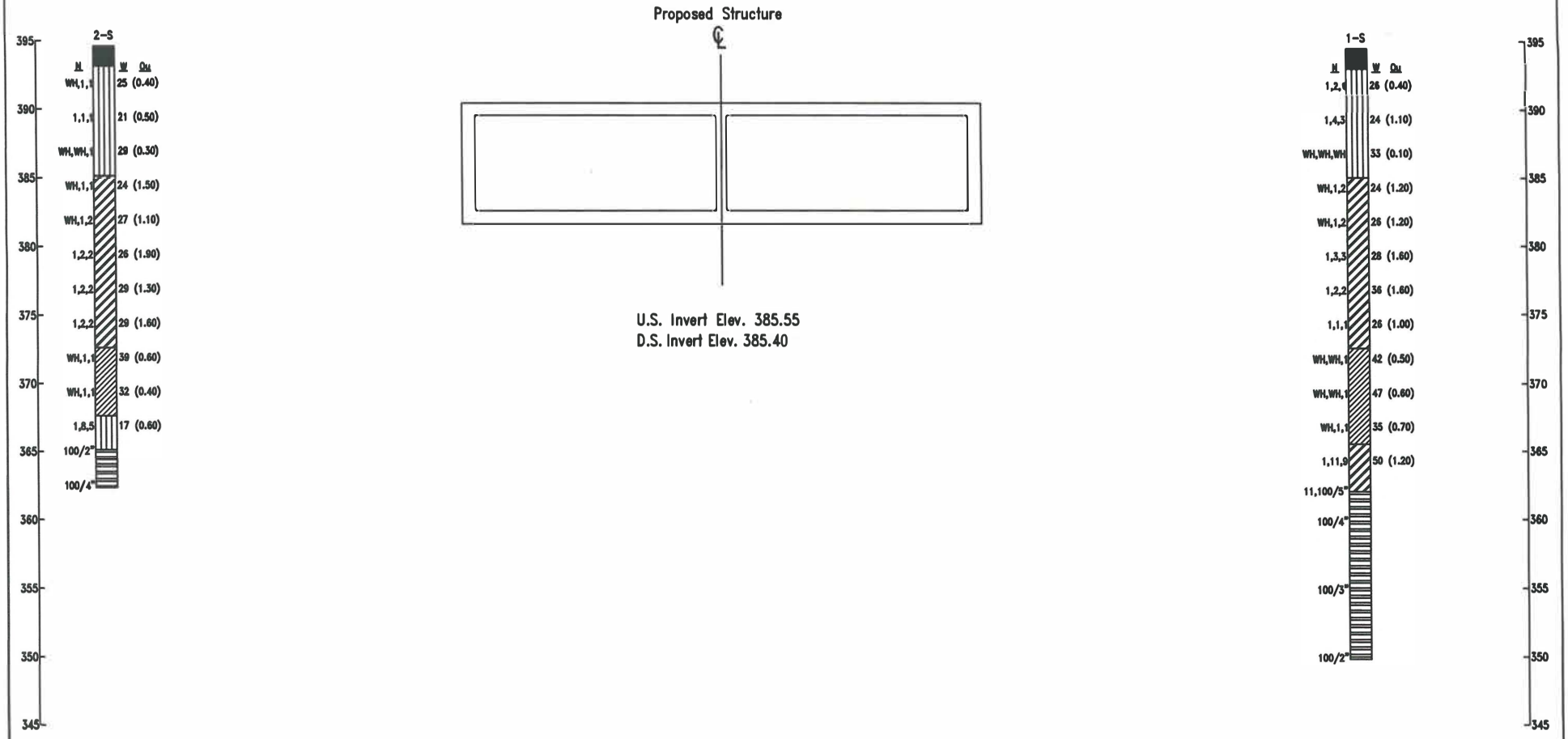
1340 N. PRICE ROAD
ST. LOUIS, MISSOURI 63132

SITE AND BORING LOCATION PLAN
US-51 OVER STREAM IN ELKVILLE FAP ROUTE 322, SECTION 4B-2
JACKSON COUNTY, ILLINOIS

Drawn By: ACE	Checked By: WJG	
Project No.: 20185013.00	Date: 4/25/18	Figure 2



PROFILE KEY:

BORING — N: SPT BLOW-COUNT — Qu: RIMAC/PP VALUE (TSF) — w%: MOISTURE CONTENT

NOTE: THIS PLAN WAS PREPARED FROM A DRAWING OBTAINED FROM OATES ON 3/16/18.

NOT TO SCALE

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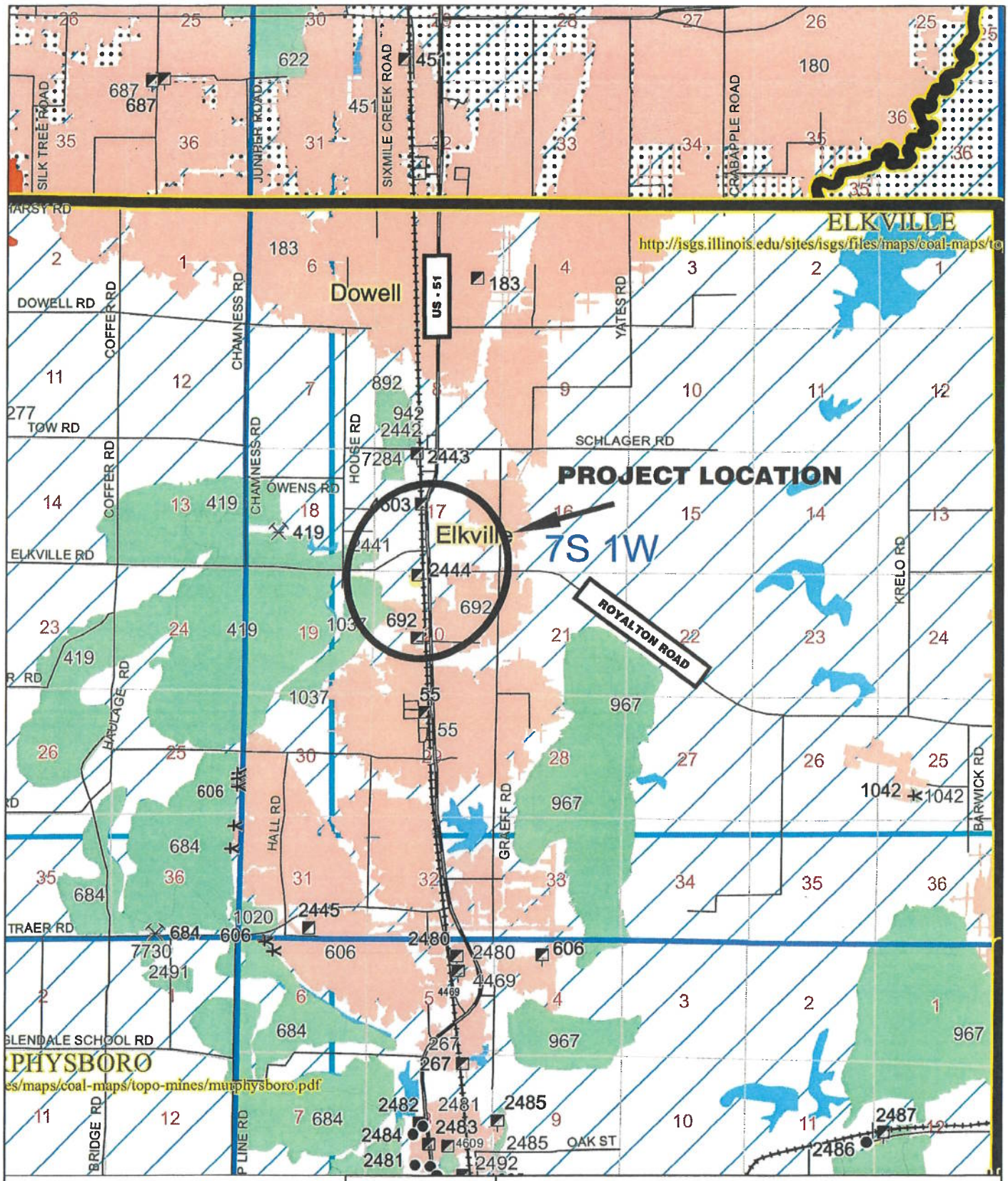
SUBSURFACE PROFILE

US-51 OVER STREAM IN ELKVILLE FAP ROUTE 322, SECTION 4B-2
JACKSON COUNTY, ILLINOIS

Drawn By: ACE	Checked By: WJG	
Project No. 20185013.00	Date: 04/25/18	Figure 3



NOT TO SCALE

NOTE:
DRAWING PREPARED FROM AN IMAGE OBTAINED FROM ISGS ON 4/23/18

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MINE LOCATION MAP
US-51 OVER STREAM IN ELKVILLE FAP ROUTE 322, SECTION 4B-2
JACKSON COUNTY, ILLINOIS

Drawn By: ACE	Checked By: WJG	
Project No.: 20185013.00	Date: 4/25/18	Figure 4

APPENDIX B

ILLINOIS DEPARTMENT OF TRANSPORTATION
District Nine Materials

Bridge Foundation Boring Log

FAP 322 (US Route 51) Over stream

Sheet 1 of 1

Route: FAP 322 (US 51) Structure Number: 039-0002 Date: 3/11/2010

Section 4-BY Bored By: R Moberly

County: Jackson Location: N of SCL Elkville Checked By: R Graeff

Boring No 1-S
Station 642+15
Offset 14' Rt CL
Ground Surface 394.5 Ft

Surf Wat Elev: 388.3
Ground Water Elevation
when Drilling 385
At Completion
At: Hrs:

DEPTH	BLOWS	Qu tsf	W%	Material
				Asphalt over Crushed aggregate
393.0				
				Soft, very moist, grey, Silt Loam A-4
	1			
	2	0.4B	26	
	1			
390.0				
5.0	1			Stiff, moist, grey, Silt Loam to Silty Clay Loam A-4
	4	1.1B	24	
	3			
387.5				
	WH			Very soft, very moist, grey, Silty Clay Loam A-4
	WH	0.1B	33	
	WH			
385.0				
10.0	WH			Stiff, moist, grey mottled brown, Silty Clay A7-6
	1	1.2B	24	
	2			
	WH			
	1	1.2B	26	
	2			
380.0				
15.0	1			Stiff, moist, grey mottled brown, Clay A7-6
	3	1.6B	28	
	3			
	1			
	2	1.6B	36	
	2			
375.0				
20.0	1			Medium to stiff, moist to very moist, grey mottled brown, Silty Clay A7-6
	1	1.0B	26	
	1			
372.5				
	WH			Medium to soft, very moist, grey, Silty Clay A-6
	WH	0.5B	42	
	1			
25.0	WH			

DEPTH	BLOWS	Qu tsf	W%	Material
	WH	0.6B	47	Medium to soft, very moist, grey, Silty Clay A-6
	1			
	WH			
	1	0.7B	35	
365.5	1			
30.0	1			Stiff, moist, grey, Clay A7-6 with some sand and gravel
	11	1.2B	50	
	9			
362.0	11			
	100/5"			Hard, dry, grey, Clay Shale
35.0	100/4"			
40.0	100/3"			Hard, dry, grey, Clay Shale
				********** Borehole Advanced with Hollow Stem Augers (8" OD; 3.25" ID) **********
349.5	45.0	100/2"		
				Bottom of hole = 44.7 feet
				Free water observed at 9.5 feet
				Elevation referenced to BM @ NW wingwall; Elev = 394.9
				To convert "N" values to "N60" multiply by 1.25
50.0				

N-Std Pentr Test: 2" OD Sampler,140# Hammer, 30" Fall (Type Fail. B-Bulge S-Shear E-Estimated P-Penetrometer)

ILLINOIS DEPARTMENT OF TRANSPORTATION
District Nine Materials

Bridge Foundation Boring Log
Sheet 1 of 1

FAP 322 (US Route 51) Over stream

Route: FAP 322 (US 51) Structure Number: 039-0002 Date: 3/11/2010
Section 4-BY Bored By: R Moberly
County: Jackson Location: N of SCL Elkville Checked By: R Graeff

Boring No 2-S
Station 641+55
Offset 13' Lt CL
Ground Surface 394.6 Ft

Surf Wat Elev: 388.3
Ground Water Elevation when Drilling 386.6
At Completion
At: Hrs:

DEPTH	BLOWS	Qu tsf	W%
	Asphalt over crushed aggregate		
393.1			
	Soft, very moist, grey, Silty Clay Loam A-4		
	WH		
	1	0.4B	25
	1		
5.0	1		
	1	0.5B	21
	1		
	WH		
	WH	0.3B	29
	1		
385.1			
10.0	Stiff, moist, grey mottled brown, Silty Clay A7-6 WH		
	1	1.5B	24
	1		
	WH		
	1	1.1B	27
	2		
380.1			
15.0	Stiff, moist, grey, Clay A7-6 1		
	2	1.9B	26
	2		
	1		
	2	1.3B	29
	2		
20.0	1		
	2	1.6B	29
	2		
372.6			
	Medium, very moist, grey, Silty Clay A-6 WH		
	1	0.6B	39
	1		
370.1			
25.0	WH		

DEPTH	BLOWS	Qu tsf	W%
	Soft, very moist, grey, Silty Clay A-6 1		
	1	0.4B	32
367.6			
	Medium, very moist, grey, Clay Loam A-4 with sand layers 1		
	8	0.6S	17
	5		
365.1			
30.0	Hard, dry, brown, Slate boulder/capstone 100/2"		
364.1			
	Hard, dry, grey, Clay Shale		
362.1	100/4"		
	Bottom of hole = 32.3 feet		
	Free water observed at 8.0 feet		
35.0			
	Elevation referenced to BM @ NW wingwall; Elev = 394.9		
	To convert "N" values to "N60" multiply by 1.25		
	Borehole Advanced with Hollow Stem Augers (8" OD - 3.25" ID)		
40.0			
45.0			
50.0			

N-Std Pentr Test: 2" OD Sampler,140# Hammer, 30" Fall (Type Fail. B-Bulge S-Shear E-Estimated P-Penetrometer)

APPENDIX C

Bench Mark: BM "A" - RR spike in light pole at the Southeast quadrant of US-51 and Kimmel Road, Sta. 640+18.43, 26.25' Rt., Elev. 396.66.

Existing Structure: S.N. 039-0002 was originally built in 1921 as S.B.I. Route 2, Section 4-B. The structure was widened in kind on both edges in 1954. The structure consists of a single span cast-in-place concrete slab supported by concrete closed abutments founded on spread footings. The back-to-back abutment length is 25'-11½" and the out-to-out deck width is 47'-5". Structure to be removed and replaced.

Traffic Control: One traffic lane will be maintained by utilizing staged construction.

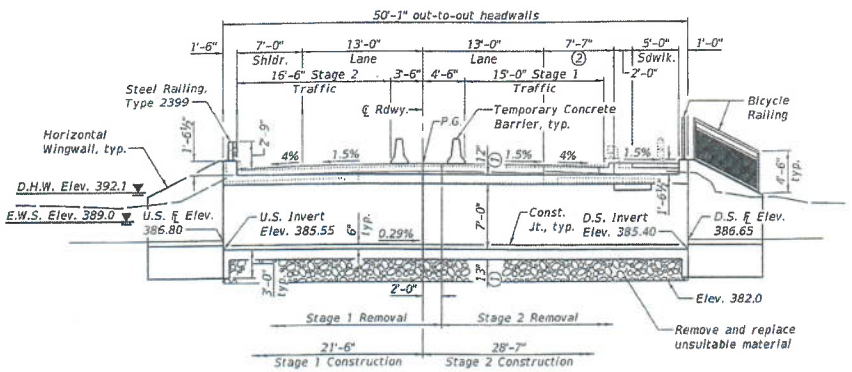
Salvage: None.

WATERWAY INFORMATION

Drainage Area = 1.48 Sq. Mi.

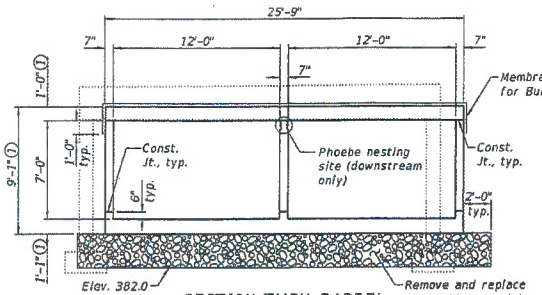
Existing Low Grade Elev. 394.8 @ Sta. 641+50
Proposed Low Grade Elev. 394.8 @ Sta. 641+50

Flood	Freq. Yr.	Discharge 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	543	83	117	391.7	1.0	0.1	392.7	391.8
Design	50	883	94	128	392.1	2.5	0.7	394.6	392.8
Base	100	1,040	98	132	392.3	2.8	1.0	395.1	393.3
Max. Calc.	500	1,430	105	138	392.6	2.8	2.2	395.4	394.8



LONGITUDINAL SECTION

(All horizontal dimensions are at Rt. L's to ℄ Rdwy.)



SECTION THRU BARREL

LOADING HL-93

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

DESIGN SPECIFICATIONS

2017 AASHTO LRFD Bridge Design Specifications, 8th Edition

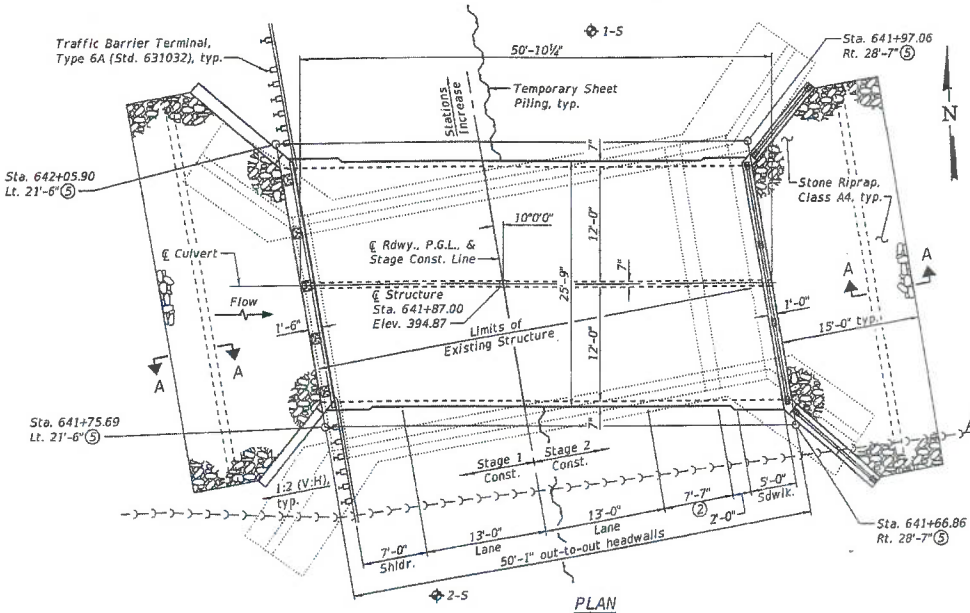
DESIGN STRESSES

FIELD UNITS

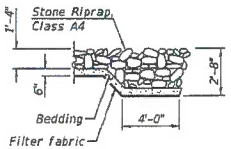
f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)

HIGHWAY CLASSIFICATION

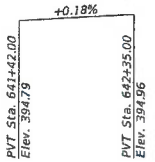
F.A.P. Rte. 322 - U.S. Rte. 51
Functional Class: Other Principal Arterial
ADT: 7,450 (2017); 9,090 (2037)
ADTT: 670 (2017); 818 (2037)
DHV: 1,000 (2037)
Design Speed: 40 m.p.h.
Posted Speed: 40 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50



PLAN



SECTION A-A



PROFILE GRADE

(Along ℄ Roadway)

LOCATION SKETCH

APPROVED

JUN 27 2019

AS A BASIS FOR PREPARATION OF DETAILED PLANS

Notes:
① Thickness is subject to refinement during final design.
② 6'-0" shoulder with 1'-7" Curb & Gutter B6.12.
③ Utility coordination to be completed by the District.
④ Precast alternate is not allowed.
⑤ Limits of removal and replacement of unsuitable material.

GENERAL PLAN & ELEVATION
U.S. ROUTE 51 OVER STREAM IN ELKVILLE
F.A.P. RTE. 322 - SEC. 4B-2
JACKSON COUNTY
STATION 641+87.00
STRUCTURE NO. 039-2032

OATES ASSOCIATES
www.oatesassociates.com
ILLINOIS DESIGN FIRM LICENSE NO.: 184.001115

USER NAME =	DESIGNED - KBC	REVISED -	
	CHECKED - JAD	REVISED -	
PLOT SCALE =	DRAWN - KBC	REVISED -	
PLOT DATE = 6/6/2019	CHECKED - JAD	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 1 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
322	4B-2	JACKSON		
		CONTRACT NO. 78595		
		ILLINOIS FED. AID PROJECT		

FILE NAME: H:\P\13042\13042.005\Structural\TSL\Microstation\0292032-78595-General Plan & Elevation.dgn