STRUCTURE GEOTECHNICAL REPORT

085-0504

Existing SN 085-0002

US 67 over Bluff Ditch
Section FAP 310
Schuyler County

D-96-072-17

Contract 72K08

Prepared By: Brian Laningham
IDOT Region 4 District 6
Geotechnical Unit
217-782-6709

Date: May 9, 2019

Checked By: BKL

Approved By:
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D-6 Geotechnical Engr.
Lic. #062-053757

Date: May 9, 2019

Prepared For: Poepping, Stone,
Bach & Assoc.
217-223-4605

Attachments: Preliminary TSL
Subsurface Profile
Boring Logs
Existing Plans

This Report has been prepared based on a preliminary TSL from February 2019. Contact the author if there are any questions regarding this Report or if there are modifications to structure location, size, geometry, or vertical alignment.

Electronic copies of boring logs are available upon request for inclusion in the plans. Calculations are also available upon request.

This Report has been prepared according to the 2012 IDOT Bureau of Bridges and Structures Bridge Manual and AASHTO LRFD Bridge Design Specifications 8th Edition – 2017

Project Description and Proposed Structure Information

The project includes replacing an existing 113-8" long and 36'-4" wide three-span slab bridge structure (SN 085-0002) with a new 93'-2 ½" long and 38'-10" wide, single span structure (SN 085-0504). The proposed structure will utilize integral abutments founded on piling. Work will be completed under stage construction.

Site Investigation

The project is located approximately 3.5 miles Northeast of Beardstown over Bluff Creek on US 67. The land surrounding this site is varied. To the north are bluffs of the IL River basin, at the south is the flood plain of the IL river. The structure sets on a levee of the Coal Creek Drainage & Levee District. The Illinois river is located approximately 3.0 miles to the Southeast.

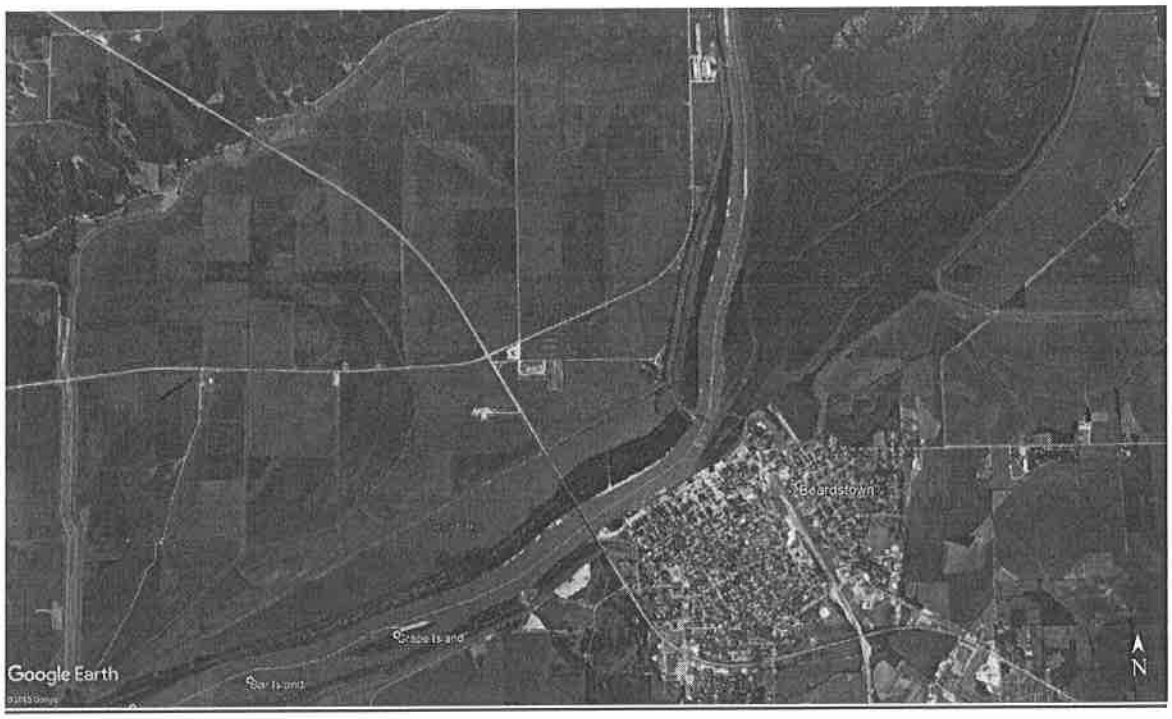
The original structure was built in 1958, as a 113-8" long and 36'-4" wide three-span slab bridge structure founded on piling. Its superstructure has a 3"-6" HMA wearing surface overlay.

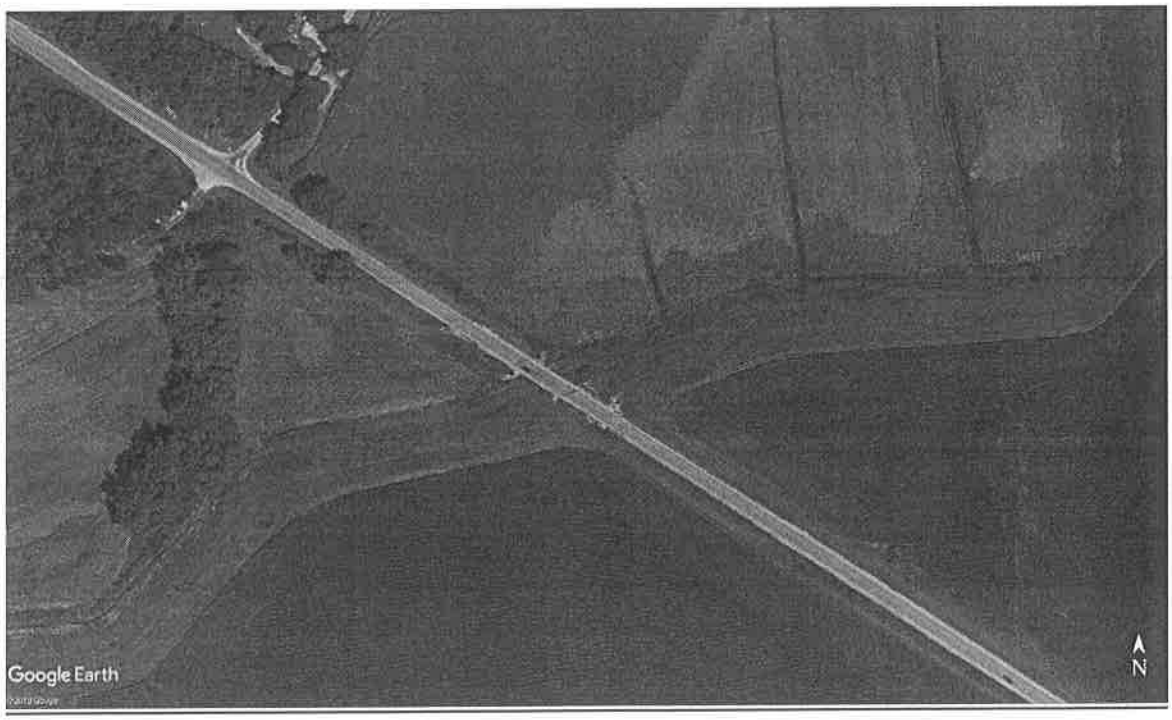
Water flows from the northeast to southwest. There is no evidence of scour at the abutments or pier. There are concrete slope walls which a badly cracked.

The existing roadway crosses the top of the levee. No embankment slope stability problems have been observed, and there is no evidence of approach settlement problems. Both borings indicate +/- 20 of Silty Clay, and Silty Clay Loam with strengths ranging from .05 – 4.0 tsf. From +/- 20' to +/- 60', weak Silts, with strengths of 0.0 - 0.5 tsf were identified. Bedrock was encountered at elevation +/-399.00' (Boring #1) and +/-402.00' (Boring #2). Borings from the 1958 plans indicate very similar subsurface material.

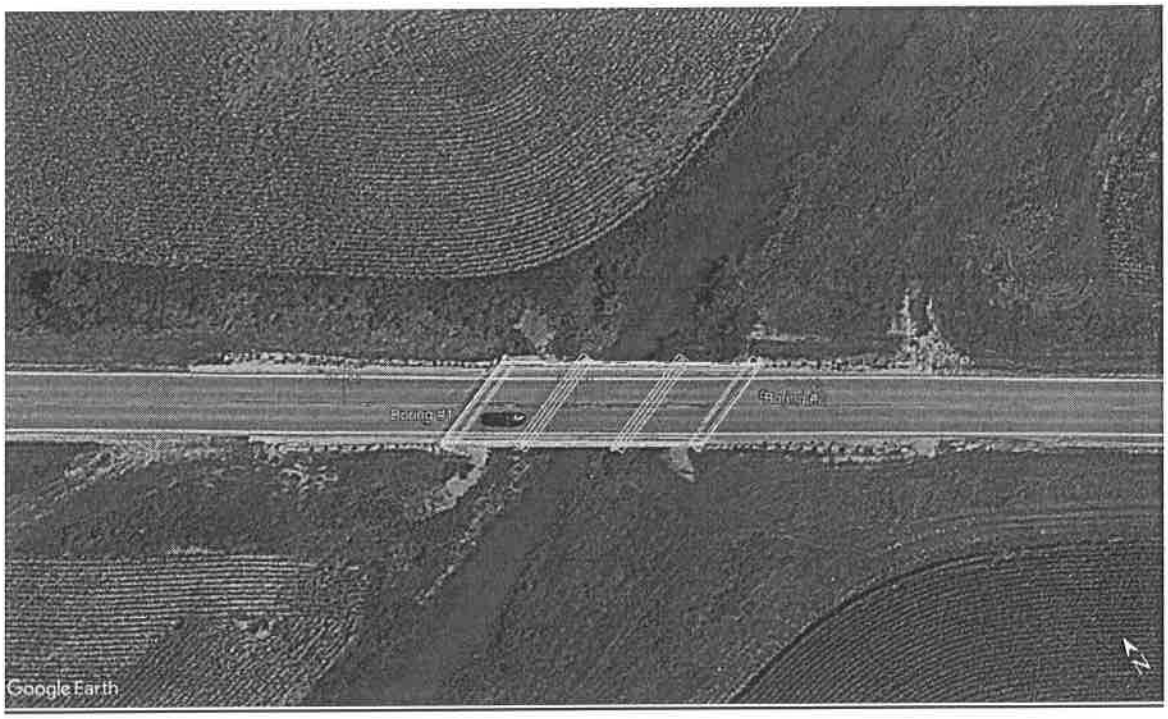
Borings were advanced by the District 6 drill crew using hollow stem auger methods according to AASHTO T 206 and the IDOT Geotechnical Manual. Borings were filled with cuttings immediately after drilling to allow traffic on the roadway.

Location Map

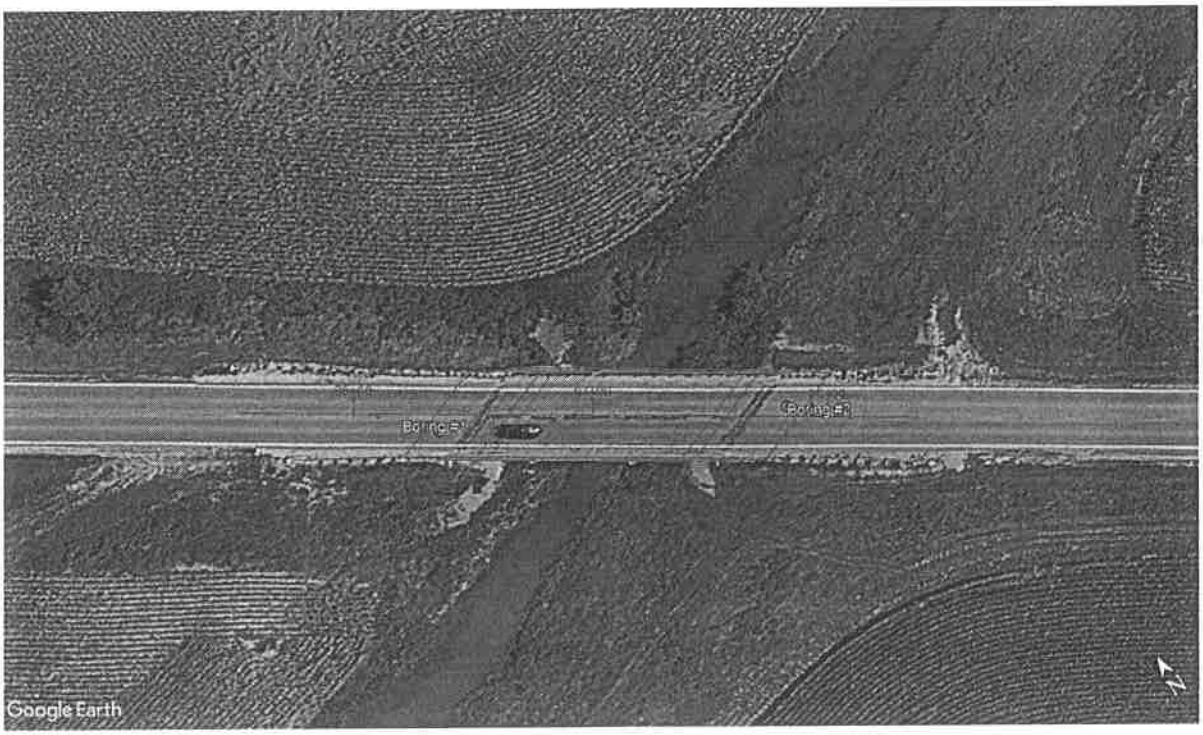




Existing Structure



Proposed Structure



Geotechnical Evaluation

Settlement: No change in grade is proposed. No settlement problems are anticipated

Slope Stability: There is no evidence of any slope stability problems with the existing cross slopes. Slope stability analysis indicated a Factor-of-Safety greater than the 1.5 required.

Seismic Considerations: The following table shows recommended seismic design data based on a 1000-year return period event.

Seismic Performance Zone (SPZ)	2
Spectral Acceleration at 1 second (S_{D1})	0.186g
Design Spectral Acceleration at 0.2 Seconds (S_{DS})	0.328g
Soil Site Class	E

Seismic Performance Zone 2 requires liquefaction and seismic slope stability analysis to be performed.

Liquefaction. In general, the liquefiable layers are below the non-liquefiable layers beginning at elevation +/- 439.00' and terminating at +/- 400.00 at the North abutment. At the South abutment liquefiable layers begin at +/- 438.00' and terminate at +/- 402.00.

Seismic Slope Stability. The stability of a 2:1 end slope using a Peak Ground Acceleration (PGA) of 0.034g with a return period of 5% in 50 years has been analyzed at the North and South abutments. The Factor-of-Safety is greater than the required 1.5 for both abutments. Slope stability problems are not anticipated following a seismic event.

Scour: Scour elevations for a 100 and 200-year event was determined by the District 6 Hydraulics unit. The following table shows recommended design scour elevations at each substructure unit. The design scour elevation at abutments is equal to the proposed bottom of abutment elevation. Some adjustment to bottom of abutment elevation may be made during final design.

Design Scour Elevation Table			
Design Scour Elevation (ft.)	South Abut.	North Abut.	Item 113
Q_{100}	451.27	453.06	8
Q_{200}	451.27	453.06	

Mining Activity: ISGS records indicate no mines in the proposed project area.

Foundation Evaluation

Vertical Loading

Preliminary maximum factored loads, provided by the structure designer, are approximately 1673 kips vertical at the abutments. Spread footings will not be evaluated because of inadequate bearing capacity. Drilled shafts will not be evaluated because the required shaft depth would make them uneconomical when compared to driven piles. A driven pile foundation is recommended at each substructure.

Because Shale bedrock is shallow at ±51ft. to ±55ft., Metal Shell and H-Piles were analyzed. After analyzing Metal Shell pile, it was determined that not enough skin friction was developed before encountering Shale bedrock. The pile supported foundation would need to utilize end bearing. Metal Shell piles are not recommended because of potential damage that could occur during driving. **H-piles are** recommended. No piles shoes are required.

The following table shows Max. Nominal Required Bearing (NRB), Max. Factored Resistance Available (FRA) and Max. Seismic Resistance Available (SRA) for each pile size.

North Abutment

Pile Section	NRB, (kips)	FRA, (kips)	Seismic Downdrag, (kips)	SRA, (kips)	Driving Elev. (Ft.)	Cutoff Elev. (Ft).	Est. Tip Elev. (Ft.)	Est. Cutoff Elev. (Ft.)
HP 8x36	286	187	74	212	453.40	455.40	399.00	56.4
HP 10x42	335	184	91	244	453.40	455.40	399.00	56.4
HP 12x53	419	230	110	309	453.40	455.40	399.00	56.4
HP 12x63	497	273	110	387	453.40	455.40	399.00	56.4

South Abutment

Pile Section	NRB, kips	FRA, kips	Seismic Downdrag, kips	SRA, kips	Driving Elev. (Ft.)	Cutoff Elev. (Ft).	Est. Tip Elev. (Ft.)	Est. Cutoff Elev. (Ft.)
HP 8x36	286	187	67	219	451.60	453.60	402.00	51.6
HP 10x42	335	184	83	252	451.60	453.60	402.00	51.6
HP 12x53	419	230	100	319	451.60	453.60	402.00	51.6
HP 12x63	497	273	100	397	451.60	453.60	402.00	51.6

Lateral Loading

Soil inputs have been provided to facilitate a more detailed analysis as requested by the structural designer.

Soil Parameters

Substructure Unit	Layer	Elevation		Unit Weight		Cohesion	ϕ	k	e_{50}	Description
		Top	Bottom	(pcf)	(pci)	(psi)	(deg)	(pci)		
North Abutment Boring #1	1	453.40	449.60	115	0.066	7.64	-	268.7	0.0086	Silty Loam
	2	449.60	447.10	110	0.064	3.47	-	53.4	0.0167	Silty Loam
	3	447.10	444.60	120	0.069	18.1	-	866.0	0.0055	Silty Clay Loam
	4	444.60	441.60	120	0.069	9.72	-	446.5	0.0074	Silt
	5	441.60	439.6	115	0.066	4.17	-	72.0	0.0140	Silt
	6	439.6	437.1	110	0.064	0.69	-	8.0	0.010	Silty Clay Loam
	7	437.1	432.1	105	0.061	0.0	-	0.1	0.010	Silty Clay Loam
	8	432.1	429.6	115	0.066	2.1	-	24	0.0238	Silty Clay Loam
	9	429.6	423.6	105	0.061	0.0	-	0.1	0.015	Silty Clay Loam
	10	423.6	417.6	115	0.066	-	30	20	-	Sand
	11	417.6	412.1	110	0.064	0.0		0.1	0.02	Loam
	12	412.1	407.1	105	0.061	3.5		53.4	0.0167	Loam
	13	407.1	402.1	105	0.061	0.0		0.1	0.10	Loam
	14	402.1	399.6	105	0.061	3.5		53.4	0.0167	Silt
South Abutment Boring #2	1	451.6	448.6	125	0.072	27.8		1332.3	0.0047	Silt
	2	448.6	446.1	115	0.066	9		393	0.0078	Silt
	3	446.1	443.6	115	0.066	1.4		16	0.029	Silt
	4	443.6	440.6	115	0.066	4.9		90.8	0.011	Silt Loam
	5	440.6	438.6	115	0.066	4.2		72	0.014	Silt loam
	6	438.6	420.6	105	0.061	0.0		0.1	0.010	Silt Loam
	7	420.6	402.0	105	0.061	2.1		24	0.024	Silty Clay Loam

ϕ = phi angle
k = subgrade modulus
E_{50} = strain at 50% deflection in p-y curve

Losses

Liquefaction was analyzed for Seismic Performance Zone (SPZ) 2, there is potential Downdrag losses if a significant earthquake event occurs.

Because there is no change in the roadway profile grade, there are no Downdrag (DD) losses.

There are no scour losses at the abutments.

Approach Pavement

Foundation conditions beneath proposed approach pavement footings have been reviewed, based on available boring data, the available bearing capacity is greater than required. For structure replacement projects, experience indicates approach pavement footings do not experience excessive settlement when there is no new fill beneath the footing, and it is constructed on undisturbed soil. No remedial action is required.

Construction Considerations

Stage Construction: This project will be constructed under Detour; No Stage Construction will be required in that case.

Ground Improvement: No ground improvement is required.

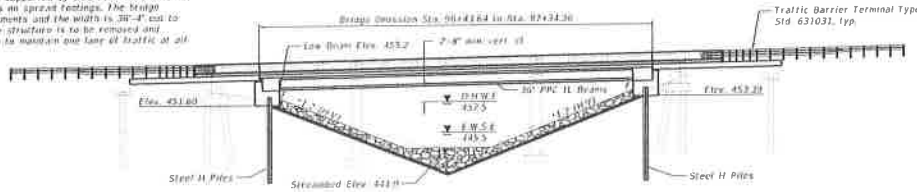
The following is a list of spreadsheets and software programs that were used in the geotechnical analysis:

- AASHTO Guide Specifications for LRFD Seismic Bridge Design 2018
- BBS 145 "Integral Abutment Feasibility Analysis" spreadsheet
- BBS 146 "Liquefaction Analysis" spreadsheet
- BBS 147 "IDOT Static Method of Estimating Pile Length" spreadsheet
- BBS 149 "Seismic Site Class Determination" spreadsheet
- "Slide" by Rocscience

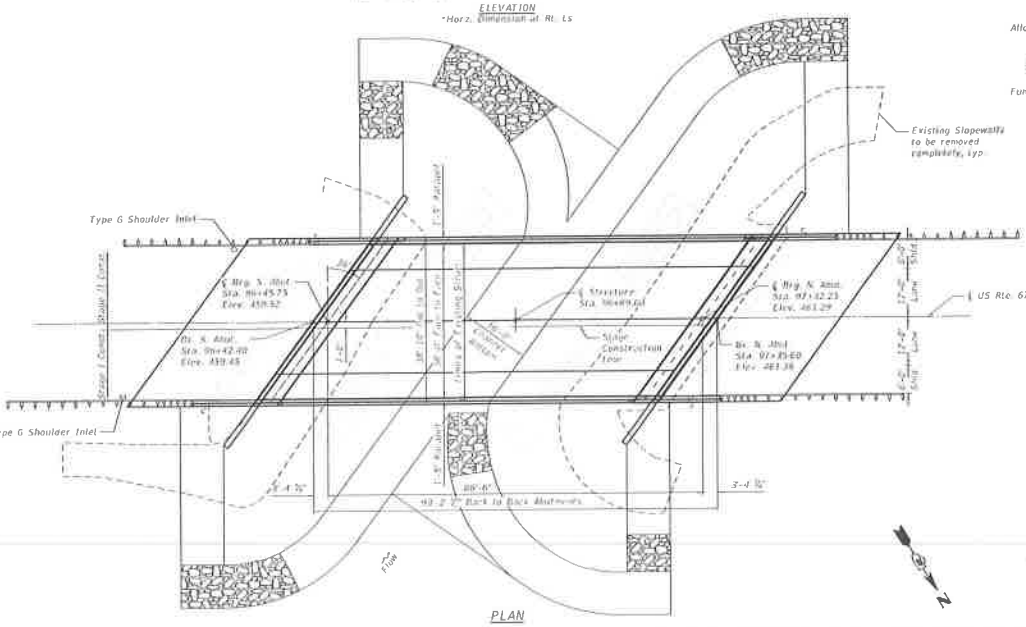
Benchmark: Brass tablet in Southwest wingwall Bluff Ditch bridge from field book FAP 310 Book 30, page 8, Elev. 459.940

Existing Structure - SN 085-0002, built 1958 as F.A. 4 Sec. 87-B at Sta. 96+38. In 1988, the abutment back walls were removed and replaced as F.A. A Sec. 87-B.I. DL. The existing structure is a 3-span bridge with a reinforced concrete slab deck/superstructure, supported by stub abutments on steel piles, and solid wall concrete piers on spread footings. The bridge length is 113'-8" back to back abutments and the width is 38'-4" out to out deck on a 36 degree skew. The structure is to be removed and replaced using staged construction to maintain one lane of traffic at all times.

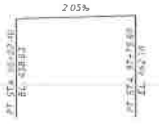
No salvage.



ELEVATION
*Horz. Dimension at Rt. Ls



PLAN



PROFILE GRADE
(Along ℄ Roadway)

DESIGN STRESSES

FIELD UNITS
f'c = 3,500 psi (substructure)
f'c = 4,000 psi (superstructure)
fy = 60,000 psi (Reinforcement)

PRECAST PRESTRESSED UNITS
f'c = 8,500 psi
f'ci = 7,000 psi
fpu = 270,000 psi (0.6" Ø low lax. strands)
fpbl = 202,300 psi (0.6" Ø low lax. strands)

SEISMIC DATA

Seismic Performance Zone (SPZ) =
Design Spectral Acceleration at 1.0 sec (SD1) =
Design Spectral Acceleration at 0.2 sec (SDS) =
Soil Site Class =

DESIGN SPECIFICATIONS

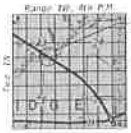
2017 AASHTO LRFD Bridge Design Specifications, Customary U.S. Units, 8th Ed

LOADING HL-93

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

HIGHWAY CLASSIFICATION

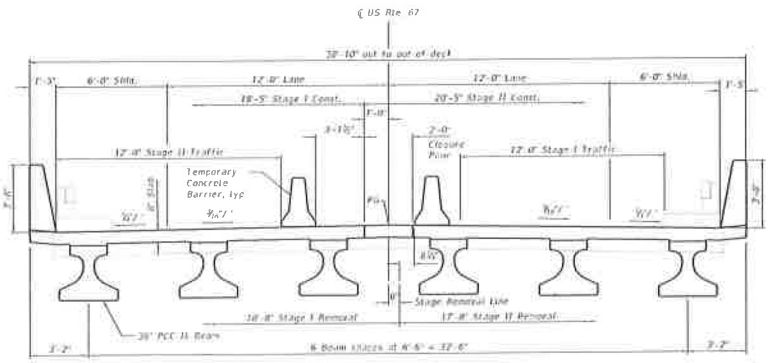
F.A.P. Rte. 310 - US Rte. 67
Functional Class: Other Principal Arterial
ADT: 4050 (2017); 4100 (2032)
ADTT: 10%
Design Speed: 60 m.p.h.
Posted Speed: 55 m.p.h.
2-Way Traffic
Directional Distribution: 50/50



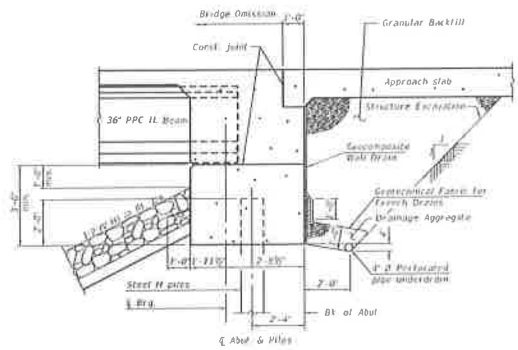
LOCATION SKETCH

GENERAL PLAN
U.S. RTE. 67
OVER BLUFF DITCH
F.A.P. RTE. 310 - SEC. (87)B-2
SCHUYLER COUNTY
STATION 96+88.00
STRUCTURE NO. 085-0504

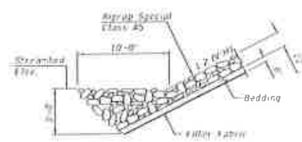
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION



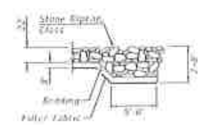
CROSS SECTION
(Looking South)



SECTION THRU INTEGRAL ABUTMENT



SECTION A-A



SECTION B-B

WATERWAY INFORMATION

Drainage Area = 5.0 sq. mi.		Low Grade Elev. 459.5 @ Sta. 95+75									
Flood		Freq. Yr.	Discharge Cfs Exist.	Discharge Cfs Prop.	Opening Ft² Exist.	Opening Ft² Prop.	Nat. H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	Main Channel	10	1326	1328	200	227	451.8	0.4	0.3	452.2	452.1
	Relief Structure		84	82	22	22					
	Total		1410	1410	[illegible]	249					
Design	Main Channel	50	2115	2138	346	367	452.5	0.7	0.7	453.2	453.2
	Relief Structure		155	152	28	28					
	Total		2270	2290	374	395					
Base	Main Channel	100	2480	2485	385	403	453.1	0.9	0.8	454.0	453.9
	Relief Structure		390	385	33	33					
	Total		2870	2870	413	436					
[illegible]	Main Channel	500	3359	3367	459	485	454.4	1.1	1.1	455.5	455.5
	Relief Structure		281	273	33	43					
	Total		3640	3640	502	528					

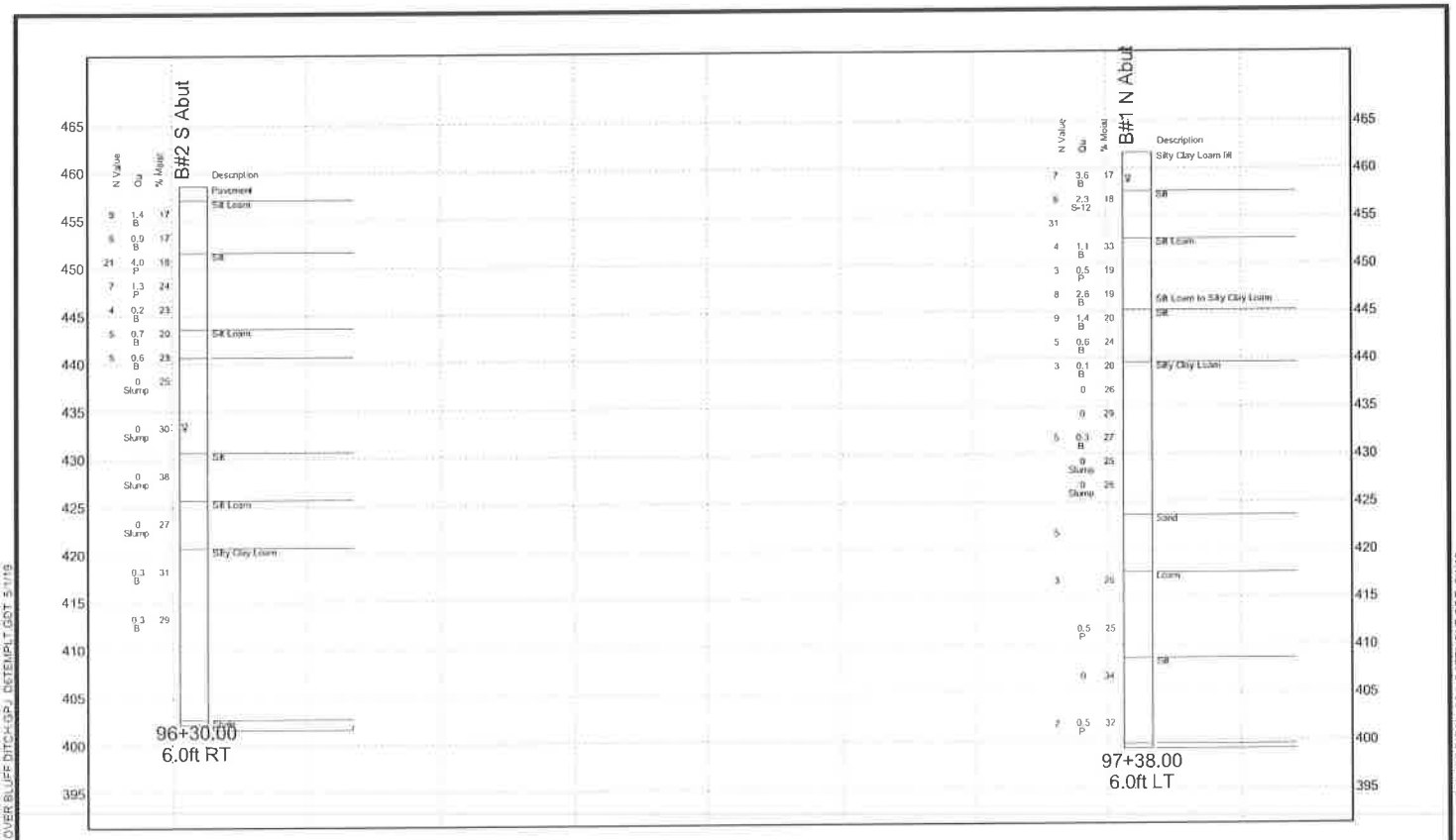
DESIGN SCOUR ELEVATION TABLE

Event / Limit State	Design Scour Elevations (ft.) S. Abut.	N. Abut.	Item 113
Q100	451.60	453.38	8
Q200	451.60	453.30	
Design	451.60	453.39	
Check	451.60	453.39	

GENERAL PLAN
U.S. RTE. 67
OVER BLUFF DITCH
F.A.P. RTE. 310 - SEC. (87)B-2
SCHUYLER COUNTY
STATION 96+88.00
STRUCTURE NO. 085-0504

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

Structure Number EX SN 085-0002 PR SN 085-0504 US 67 over Bluff Ditch N of Beardstown
Located in the NE 1/4, SE 1/4 of Section 23, Township 1N, Range 1W of the 4 P.M.



NOT TO HORIZONTAL SCALE

Illinois Department of Transportation
Division of Highways
IDOT

VARIATIONS IN SUBSURFACE CONDITIONS MAY EXIST BETWEEN BORINGS

Groundwater
▽ First Encounter
▽ Completion
▽ after (refer to log) hours

Abbreviations
WOH - Sampler Advanced by Weight of Hammer, WOP - Weight of Pipe
B.S. - Before Seating

SUBSURFACE DATA PROFILE

Route: 67
Section: FAP Rte. 310 -- SEC. (87)B-2
County: Schuyler

SUBSURFACE DATA PROFILE IL67 OVER BLUFF DITCH.GPJ D6TEMPLT.GDT 5/1/19

SUBSURFACE DATA PROFILE IL67 OVER BLUFF DITCH.GPJ D6TEMPLT.GDT 5/1/19

Illinois Department of Transportation
Division of Highways
District 6

SOIL BORING LOG

Date 4/9/19

ROUTE 67 DESCRIPTION US 67 over Bluff Ditch N of Beardstown LOGGED BY S. Jones

SECTION FAP Rte. 310 – SEC. (87)B-2 LOCATION NE 1/4, SE 1/4, SEC. 23, TWP. 1N, RNG. 1W, 4 PM

COUNTY Schuyler DRILLING METHOD HSA HAMMER TYPE 140# Auto

STRUCT. NO. EX SN 085-0002 PR SN 085-0504
Station 96+89.00

BORING NO. 1 N Abut
Station 97+38.00
Offset 6.0ft LT
Ground Surface Elev. 461.63 ft

Surface Water Elev. 443.57 ft
Stream Bed Elev. 442.57 ft

Groundwater Elev.:
▽ First Encounter 458.6 ft
▽ Upon Completion Plugged ft
▼ After ____ Hrs. Plugged ft

DEPTH (ft)	BLOWS	UCS Qu (tsf)	MOIST (%)	Description
				Dk Gray SILTY CLAY LOAM (Till) Fill
	0			
	3	3.6	17	
	4	B		
				457.63
				Gray SILT
-5	1			
	3	2.3	18	
	3	S-12		
				Poor Recovery
	12			
	15			Hit boulder
	16			Fill
				452.63
				Brown Moist SILT LOAM
-10	1			
	1	1.1	33	
	3	B		
	1			
				Poor Recovery
	1	0.5	19	
	2	P		
-15	0			
	4	2.6	19	Brown and Gray Moist SILT LOAM
	4	B		to Dk Gray SILTY CLAY LOAM
				445.13
				Gray Moist SILT
	1			
	4	1.4	20	
	5	B		
-20	2			

DEPTH (ft)	BLOWS	UCS Qu (tsf)	MOIST (%)	Description
	3	0.6	24	Gray Moist SILT *(continued)*
	2	B		Dk Gray
				439.63
	WOH			Gray and Brown Moist SILTY
	1	0.1	20	CLAY LOAM
	2	B		
-25	0			
	WOH	0	26	Brown
	1			
	W			
	O	0	29	Brown V. Moist Silty Clay Loam
	H			w/ Iron Oxide staining
-30	0			
	2	0.3	27	Gray and Brown
	3	B		
	W			
	O	0	25	
	H	Slump		
-35	W			
	O	0	26	
	H	Slump		
				423.63
				Med Grained Tan SAND
				w/ 1/4" aggregate
				Poor Recovery
-40	0			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated)
Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced by Weight of Pipe, B.S. - Before Seating
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) BBS, from 137 (Rev. 8-99)

File Name S:\SOILS\GINT FILES\085 SCHUYLER\BRIDGE BORINGS\IL67 OVER BLUFF DITCH.GPJ Data Template D6TEMPLT.GDT Date Printed 4/19/19
Latitude 40D 28.8177'N Longitude 90D 28.8442'W Datum NAD83 Job Number

Illinois Department of Transportation
Division of Highways
District 6

SOIL BORING LOG

Date 4/9/19

ROUTE 67 DESCRIPTION US 67 over Bluff Ditch N of Beardstown LOGGED BY S. Jones

SECTION FAP Rte. 310 – SEC. (87)B-2 LOCATION NE 1/4, SE 1/4, SEC. 23, TWP. 1N, RNG. 1W, 4 PM

COUNTY Schuyler DRILLING METHOD HSA HAMMER TYPE 140# Auto

STRUCT. NO. EX SN 085-0002 PR SN 085-0504
Station 96+89.00

BORING NO. 1 N Abut
Station 97+38.00
Offset 6.0ft LT
Ground Surface Elev. 461.63 ft

Surface Water Elev. 443.57 ft
Stream Bed Elev. 442.57 ft

Groundwater Elev.:
▽ First Encounter 458.6 ft
▽ Upon Completion Plugged ft
▼ After ____ Hrs. Plugged ft

DEPTH (ft)	BLOWS	UCS Qu (tsf)	MOIST (%)	Material
	1			Med Grained Tan SAND w/ 1/4" aggregate Poor Recovery *(continued)*
	4			
417.63				
				Gray Wet LOAM
-45	0			
	1		26	
	2			
-50	W			
	O	0.5	25	V. Wet Gray Loam to Loam w/ Sand Seams
	H	P		
408.63				
				Wet Gray SILT w/ thin seams of V. Weathered Shale
-55	W			
	O	0	34	
	H			
-60	0			

DEPTH (ft)	BLOWS	UCS Qu (tsf)	MOIST (%)	Material
	0	0.5	32	Wet Gray SILT w/ thin seams of V. Weathered Shale *(continued)* Sand Seams @61ft
	2	P		
399.63				
399.13				Auger Refusal No Recovery
	100/4"			
-65				
-70				
-75				
-80				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated)
Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced by Weight of Pipe, B.S. - Before Seating
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) BBS, from 137 (Rev. 8-99)

File Name S:\SOILS\GINT FILES\085 SCHUYLER\BRIDGE BORINGS\IL67 OVER BLUFF DITCH.GPJ Data Template D6TEMPLT.GDT Date Printed 4/19/19
Latitude 40D 2.8177N Longitude 90D 28.8442W Datum NAD83 Job Number

Illinois Department of Transportation
Division of Highways
District 6

SOIL BORING LOG

Date 4/15/19

ROUTE 67 DESCRIPTION US 67 over Bluff Ditch N of Beardstown LOGGED BY S. Jones

SECTION FAP Rte. 310 – SEC. (87)B-2 LOCATION NE 1/4, SE 1/4, SEC. 23, TWP. 1N, RNG. 1W, 4 PM

COUNTY Schuyler DRILLING METHOD HSA HAMMER TYPE 140# Auto

STRUCT. NO. ~~EX SN 085-0002~~ ~~PR SN 085-0504~~ EX SN 085-0002 PR SN 085-0504

Station 96+89.00

BORING NO. 2 S Abut

Station 96+30.00

Offset 6.0ft RT

Ground Surface Elev. 458.67 ft

Surface Water Elev. 443.57 ft

Stream Bed Elev. 442.57 ft

Groundwater Elev.:

▽ First Encounter 433.2 ft

▼ Upon Completion Plugged ft

▼ After ____ Hrs. Plugged ft

DEPTH (ft)	BLOWS	UCS Qu (tsf)	MOIST (%)	Description
				Pavement
457.17				
	1			Brown Moist SILT LOAM (Levy Fill)
	5 4	1.4 B	17	
-5				
	2			
	3 3	0.9 B	17	Silt Loam to Silty Clay Loam
451.67				
	2			Gray and Brown SILT sample broken
	11 10	4.0 P	18	
-10				
	1			
	3 4	1.3 P	24	Gray Moist Silt sample broken
	0			
	2 2	0.2 B	23	
443.67 -15				
	0			Gray Moist SILT LOAM
	2 3	0.7 B	20	
440.67				
	1			
	2 3	0.6 B	23	Brown Moist SILT LOAM (Till) natural ground
-20				
				Brown Moist SILT LOAM (Till) natural ground *(continued)*
	WOH			
	WOH 2	0 Slump	25	
-25				
	W			▽
	O H	0 Slump	30	w/ Sand Seam FREE WATER
430.67				
				Brown Wet SILT w/ Iron Oxide Nodules
-30				
	W			
	O H	0 Slump	38	
425.67				
				Gray and Brown Wet SILT LOAM w/ 6" Med Grained Sand Seam @36ft
-35				
	W			
	O H	0 Slump	27	
420.67				
				Gray Wet SILTY CLAY LOAM
-40				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated)
Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced by Weight of Pipe, B.S. - Before Seating
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) BBS, from 137 (Rev. 8-99)

File Name S:\SOILS\GINT FILES\085 SCHUYLER\BRIDGE BORINGS\IL67 OVER BLUFF DITCH.GPJ Data Template D6TEMPLT.GDT Date Printed 4/19/19
Latitude 40D 2.8062'W Longitude 90D 28.8163'W Datum NAD83 Job Number

Illinois Department of Transportation
Division of Highways
District 6

SOIL BORING LOG

Date 4/15/19

ROUTE 67 DESCRIPTION US 67 over Bluff Ditch N of Beardstown LOGGED BY S. Jones

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Surface Water Elev. 443.57 ft

Stream Bed Elev. 442.57 ft

Groundwater Elev.:

▽ First Encounter 433.2 ft

▽ Upon Completion Plugged ft

▼ After ____ Hrs. Plugged ft

DEPTH (ft)	BLOWS	UCS Qu (tsf)	MOIST (%)	
Gray Wet SILTY CLAY LOAM *(continued)*	W O H	0.3 B	31	
-45	WOH			
	WOH 1	0.3 B	29	
-50				
-55				
402.67				
Gray Weathered SHALE Auger Refusal @56ft 402.17	55 /4"			
-60				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated)
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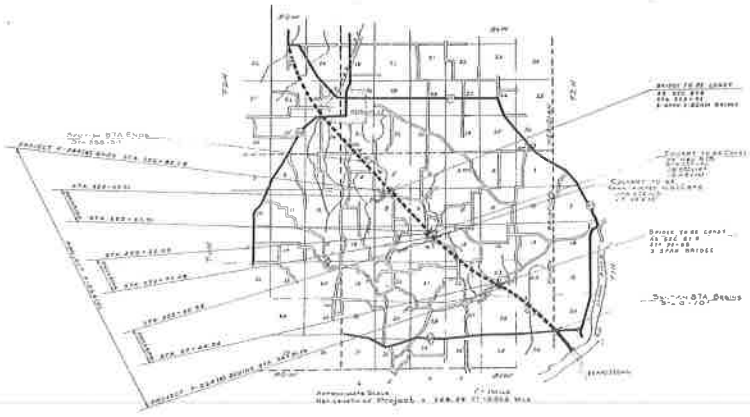
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS

PLANS FOR PROPOSED FEDERAL AID HIGHWAY

SCALES

F.A. 4 SECTION 87-B
PROJECT F-264(8)
SCHUYLER \ COUNTY



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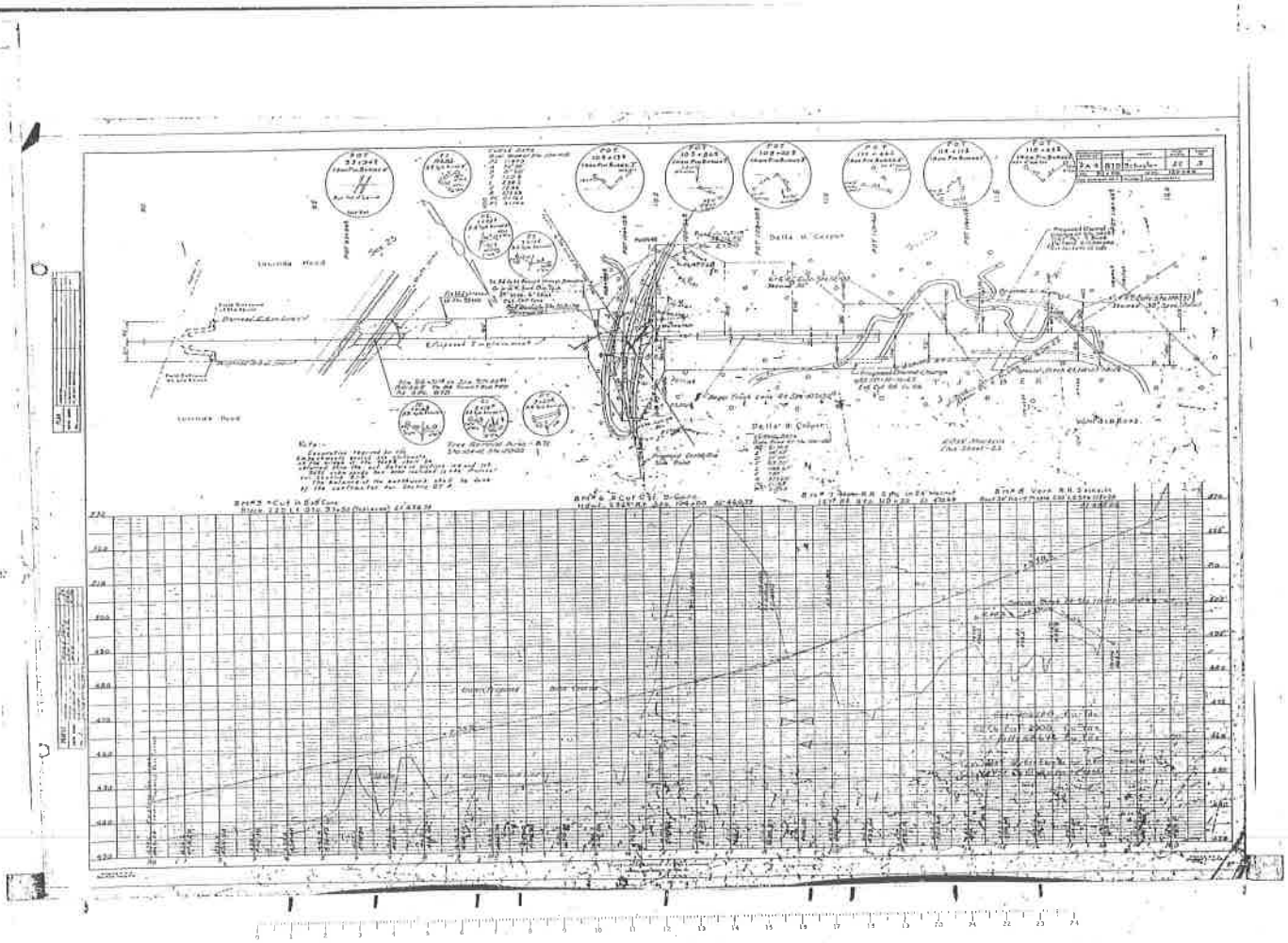
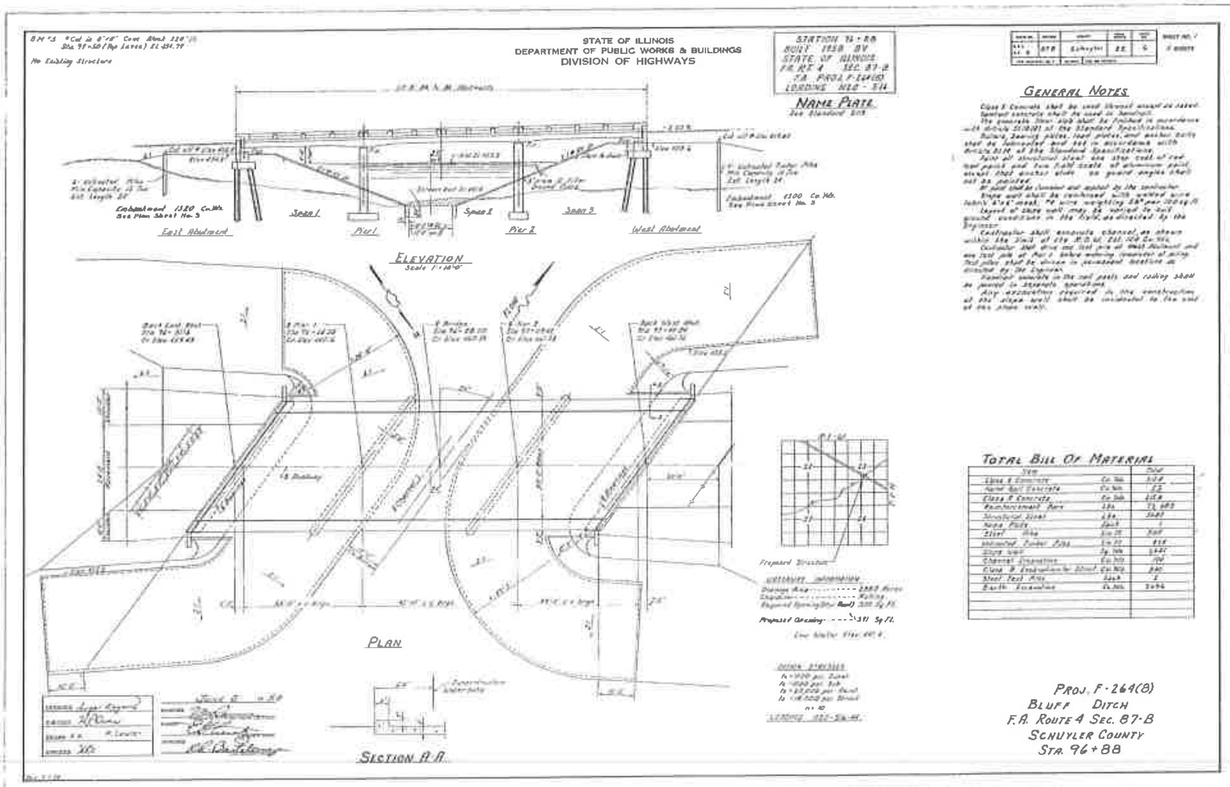
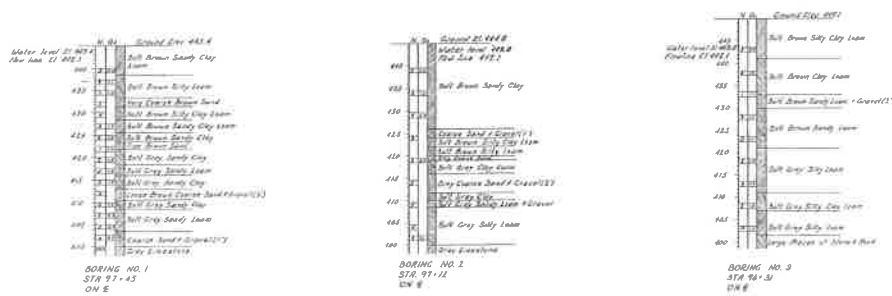
DEPARTMENT OF TRANSPORTATION
BUREAU OF PUBLIC ROADS
APPROVED
DIVISION ENGINEER




STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS
NAME PLATE
ELEVATION
East Abutment
Pier 1
Pier 2
West Abutment
PLAN
SECTION A-A
GENERAL NOTES
TOTAL BILL OF MATERIAL
PROJ. F-264(8)
BLUFF DITCH
F.A. ROUTE 4 SEC. 87-B
SCHUYLER COUNTY
STA. 96+88

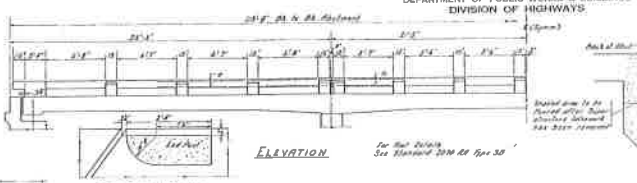
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS



Note: N = Blows per foot of penetration of sampling spoon Hammer Weight = [illegible] lbs. Drop = [illegible] inches
Qu = Unconfined compressive strength in tons per square foot

BORING DATA
BLUFF DITCH
F.A. RT. 4 SEC. 87-B
SCHUYLER COUNTY
STA. 96+88

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS


ELEVATION

END POST DETAIL

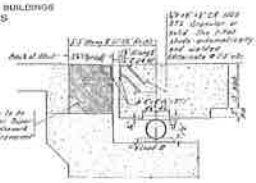

END POST DETAIL

PLAN

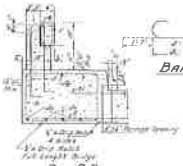

BAR S.


CROSS SECTION


DEAD LOAD DEFLECTION


SEC. THRU ABUT.


SEC. A-A


SEC. B-B

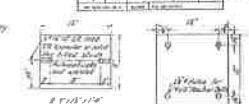
BAR 21 a


BAR d

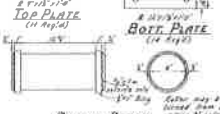

BAR S


BAR Γ

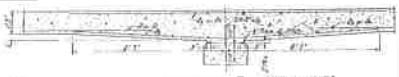

BAR Γ


TOP PLATE (11 Reqd)

BOTT. PLATE (14 Reqd)


ROLLER DETAIL

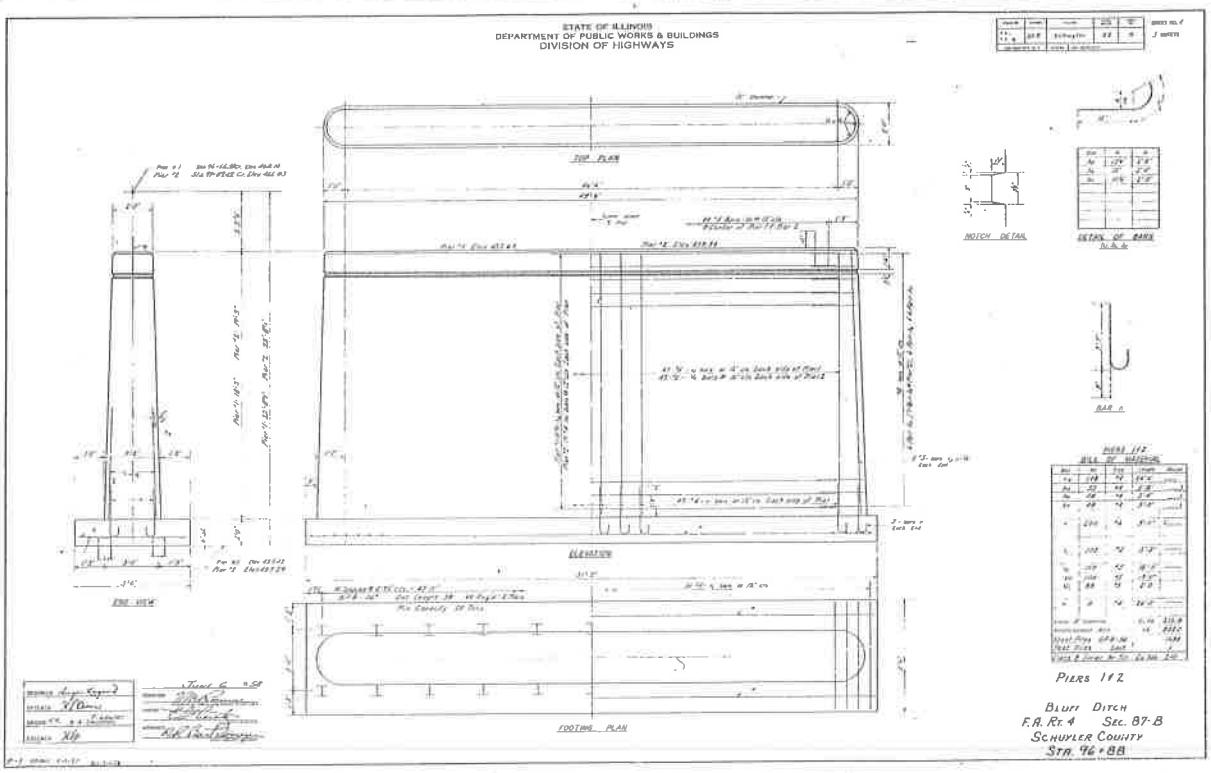

BAR B1


SEC. THRU PIER (ALONG ℄)

BILL OF MATERIAL

SUPER STRUCTURE
BLUFF DITCH
F.A. Rt. 4 Sec. 87-B
SCHUYLER COUNTY
STA. 96+88

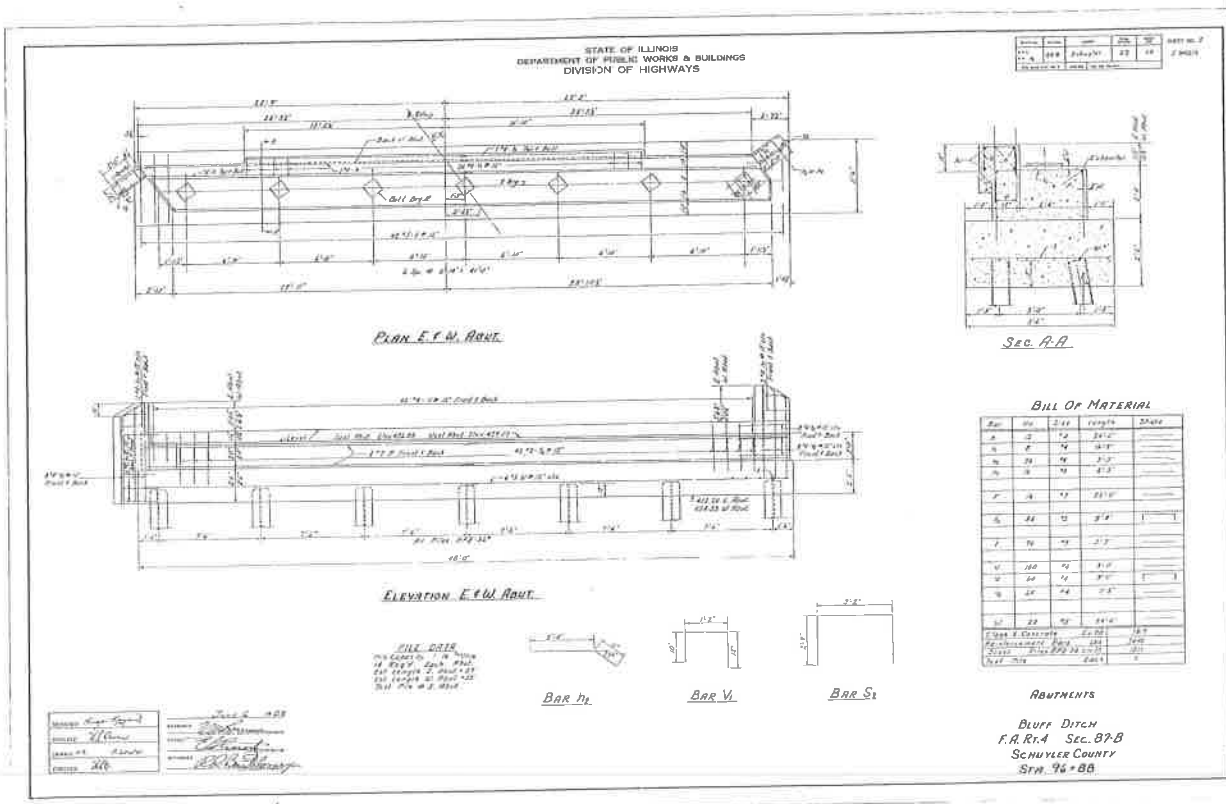
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS



PIERS 1 & 2
BILL OF MATERIAL

PIERS 1 & 2

BLUFF DITCH
F.A. RT. 4 SEC. 87-B
SCHUYLER COUNTY
STA. 96+88


STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS
PLAN E. & W. ABUT.
SEC. A-A
ELEVATION E & W. ABUT.
PILE DATA
BAR h2
BAR V1
BAR S2
BILL OF MATERIAL
ABUTMENTS
BLUFF DITCH
F.A. RT. 4 SEC. 87-B
SCHUYLER COUNTY
STA. 96+88