Illinois Department of Transportation

Abbreviated Structure Geotechnical Report

Original Report Date: 2/4/20202	**Proposed SN:** 044-0063	**Route:**	FAP-885
Revised Date: 4/3/20	**Existing SN:** 044-0053	**Section:**	107B-2
Geotechnical Engineer: BBS Foundation & Geotech Unit Bill Kramer		**County:**	Johnson
Structural Engineer: BBS Planning Justin Belue		**Contract:**	78681

Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing): The anticipated structure type is a three-span slab bridge superstructure with integral abutments and encased pile bent piers. We recommend using steel H-piles driven to bedrock at all substructures. The estimated factored loading is reported to be 752.17 kips/abutment and 1047.36 kips/pier. Assuming a pile spacing of 7.5' (3 piles per stage), the abutment would have a nominal required bearing of 126 kips/pile and the pier would have a nominal required bearing of 175 kips/pile which are relatively low. The existing three span bridge is supported HP8x36 piles.

Discuss the existing boring data, existing plans foundation information, new subsurface exploration and need for any additional exploration to be provided with SGR Technical Memo (attach all data and subsurface profile plot): Two borings were taken by the district behind the abutments but no pier borings were obtained. Rock is relativity close at the West abutment (28' below the abutment) while the East abutment boring shows rock around 45' below the East abutment. One 5' core was taken which provided a 23% RQD and an Unconfined Compressive Strength of 875 tsf. which is quite strong for a Shale deposit. No additional data will be needed.

Provide the location and maximum height of any new soil fill or magnitude of footing bearing pressure. Estimate the amount and time of the expected settlement. Indicate if further testing, analysis, and/or ground improvement/treatment is necessary: Although there are some soft soils at the site, no significant raise in grade is expected and with no new load, we would not expect any settlement at this location.

Identify any new cuts or fill slope angles and heights. Estimate the factor of safety against slope failure. Indicate if further testing, analysis or ground improvement/treatment is necessary: The existing slopes are cut back on a 2:1 with no sign of existing end slope or side slope instability. Given no new loading or change in slope angle, we believe the factor of safety against slope instability if well above the minimum 1.5 required by IDOT.

Indicate at each substructure, the 100-year and 200-year total scour depths in the Hydraulics report, the non-granular scour depth reduction, the proposed ground surface, and the recommended foundation design scour elevations: We have developed a scour table shown in red on the draft TSL attached. The soils at Pier 1 are more resistant to scour allowing an overall 21% reduction in the hydraulic report calculated scour depth of 15.9 feet. At Pier 2, the overall scour reduction is only 17 %. The abutments have no scour loss based on the end slopes being riprapped per Bridge manual policy. 200-year scour depths at the piers were less than the 100-year values due to the overtopping which is why the scour table show the same depths for both the 100-year and the 200-year events.

Determining the seismic soil site class, the seismic performance zone, the 0.2 and 1.0 second design spectral accelerations and indicate if that the soils are liquefiable: Soil Site Class was determined to be a "D", the SD1 & SDS are equal to 0.497g and 1.144g respectively, which puts the structure in a Seismic Performance Zone of "3". Liquefaction potential evaluation has been checked and found to not be an issue at this site.

Confirm feasibility of the proposed foundation or wall type and provide design parameters. Attach a pile design table indicating feasible pile types, various nominal required bearings, factored resistances available and corresponding estimated lengths at locations where piles will be used. Provide factored bearing resistance and unit sliding resistance at various elevations and confirm no ground improvement/treatment is necessary where spread footings are proposed. Estimated top of rock elevations as well as preliminary factored unit side and tip resistance values shall be indicated when drilled shafts are proposed: The depth to bedrock at the West abutment is around 25' which requires an H-pile be used as a metal shell would likely be damaged by the rock prior to getting bearing. However, the depth to rock is apparently highly variable as an H-pile would refuse in bedrock around 45' at the East Abutment. Please see the attached table for a list of Nominal Required Bearings, Factored Resistances Available and the corresponding Estimated Pile Lengths. The H-piles will require a metal shoe due to the relatively hard rock at this site. The pile lengths provided in the attached tables are based on assumed pile cutoff elevations of 370.3' and 367.3' at the piers and abutments respectively. Given this variability, we recommend one test pile be driven at the West Abutment and one be driven at Pier 2. Pier 1 is expected to be shorter than Pier 2 so its test pile can be used to order pier 1. The East Abutment is West of where the boring was taken so ordering this pile based on the boring data top of rock should be conservative and this is reflected in this Report's estimated lengths.

Calculate the estimated water surface elevation and determine the need for cofferdams (type 1 or 2), and seal coat: The estimated water surface elevation (EWSE) was calculated to be equal to 358.7'. Since the pier encasement is 9.1' below the EWSE, Type 2 cofferdams will be required. We do not think a seal coat will be required.

Assess the need for sheeting or soil retention or temporary construction slope and provide recommendation for other construction concerns: The structure will be stage constructed and require Temporary Sheet Piling which is found to be feasible.

West Abutment Pile Design Table

	Nominal Required Bearing (Kips)	**Factored Resistance Available** (Kips)	**Estimated Pile Length** (Ft.)
Steel HP 12 X 53	418	230	41
Steel HP 12 X 63	497	273	41
Steel HP 12 X 74	589	324	42
Steel HP 12 X 84	664	365	42
Steel HP 14 X 73	578	318	43
Steel HP 14 X 89	705	388	43
Steel HP 14 X 102	810	445	44
Steel HP 14 X 117	929	511	44

East Abutment Pile Design Table

	Nominal Required Bearing (Kips)	**Factored Resistance Available** (Kips)	**Estimated Pile Length** (Ft.)
Steel HP 12 X 53	418	230	54
Steel HP 12 X 63	497	273	54
Steel HP 12 X 74	589	324	55
Steel HP 12 X 84	664	365	55
Steel HP 14 X 73	578	318	56
Steel HP 14 X 89	705	388	56
Steel HP 14 X 102	810	445	57
Steel HP 14 X 117	929	511	58

Pier 1 Pile Design Table

	Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 12 X 53	418	225	45
Steel HP 12 X 63	497	268	45
Steel HP 12 X 74	589	319	46
Steel HP 12 X 84	664	360	46
Steel HP 14 X 73	578	312	47
Steel HP 14 X 89	705	382	47
Steel HP 14 X 102	810	439	48
Steel HP 14 X 117	929	505	48

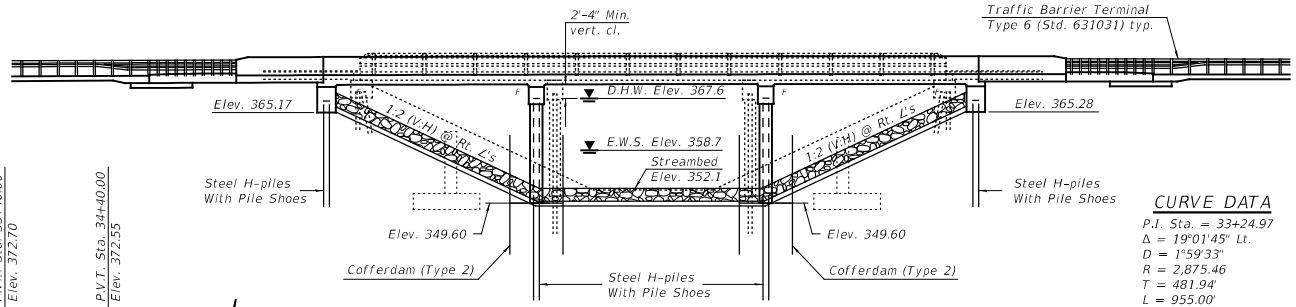
Pier 2 Pile Design Table

	Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 12 X 53	418	222	56
Steel HP 12 X 63	497	265	57
Steel HP 12 X 74	589	316	59
Steel HP 12 X 84	664	357	60
Steel HP 14 X 73	578	308	57
Steel HP 14 X 89	705	378	59
Steel HP 14 X 102	810	435	60
Steel HP 14 X 117	929	501	62

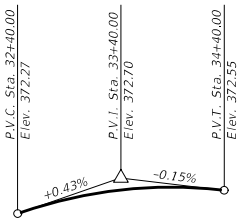
Benchmark: R105 reset disk located on Northeast wingwall of SN 044-0053. NGS Monument; Elev. 371.61.

Existing Structure: Structure No. 044-0053 was originally constructed in 1981 as F.A. 885, Section 110BC-1. The structure is a three span deck beam bridge with 1¾" bituminous concrete surface and waterproofing membrane system on pile bent abutments and pile bent piers. In 2002, 1" of the bituminous concrete surface was removed and replaced. In 2007, stone riprap was placed at the north end of Pier 1. In 2016, tie rods were placed between beam 3 in span 3 due to a broken keyway. Existing structure will be removed and replaced. Traffic is to be maintained utilizing stage construction.

No Salvage

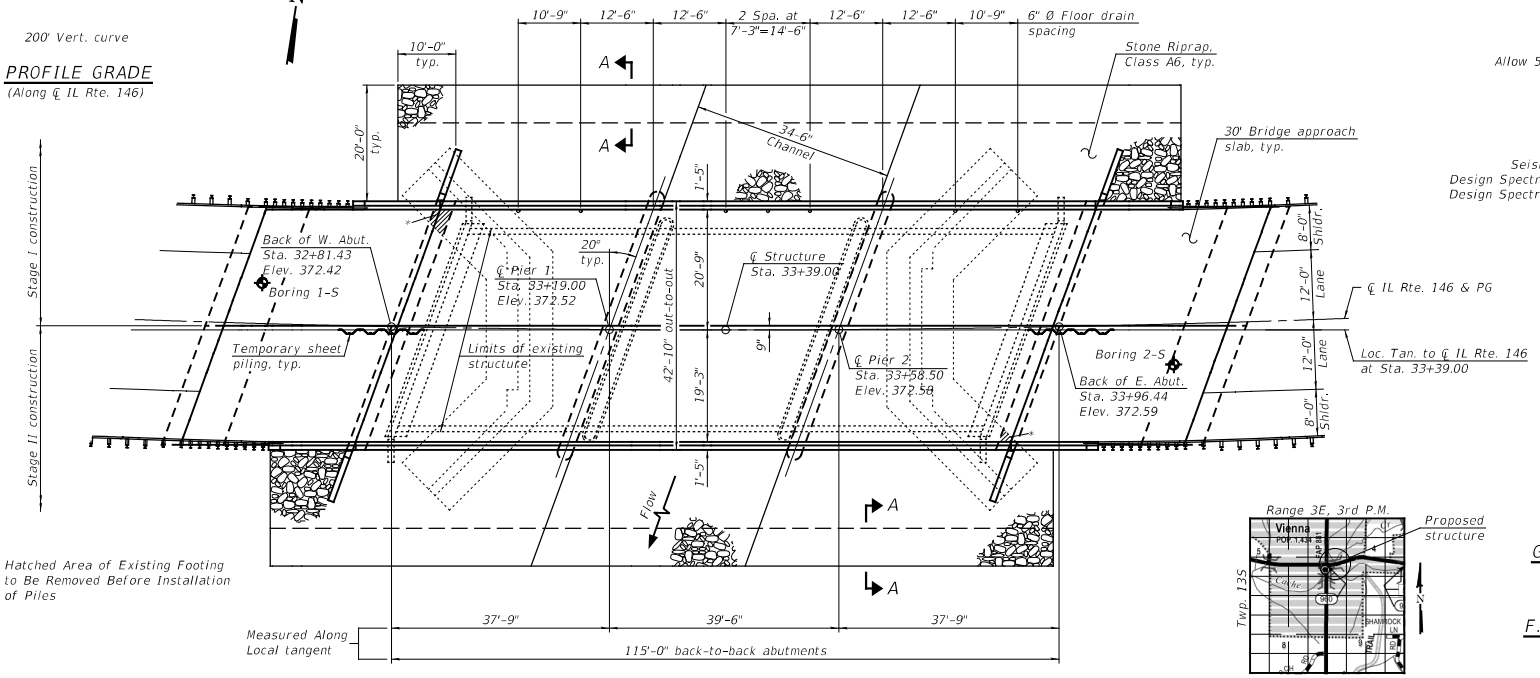


ELEVATION



200' Vert. curve

PROFILE GRADE
(Along ℄ IL Rte. 146)



* Hatched Area of Existing Footing to Be Removed Before Installation of Piles

PLAN

LOCATION SKETCH

DESIGN SPECIFICATIONS

2017 AASHTO LRFD Bridge Design Specifications, 8th Edition

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi
f'c = 4,000 psi (Superstructure Concrete)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50 for steel H-piles)

CURVE DATA

P.I. Sta. = 33+24.97
Δ = 19°01'45" Lt.
D = 1°59'33"
R = 2,875.46
T = 481.94'
L = 955.00'
E = 40.11'
P.C. Sta. = 28+43.03
P.T. Sta. = 37+98.03

HIGHWAY CLASSIFICATION

F.A.P. Rte. 885 - IL Rte. 146
Functional Class: Minor Arterial
ADT: 6,900 (2017); 7,930 (2031)
ADTT: 596 (2017); 685 (2031)
DHV: 715 (2031)
Design Speed: 40 m.p.h.
Posted Speed: 40 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50

LOADING HL-93

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

SEISMIC DATA

Seismic Performance Zone (SPZ) = 3
Design Spectral Acceleration at 1.0 sec. (SD1) = 0.497g
Design Spectral Acceleration at 0.2 sec. (SDS) = 1.144g
Soil Site Class = D

GENERAL PLAN & ELEVATION
ILLINOIS ROUTE 146 OVER
LITTLE CACHE CREEK
F.A.P. RTE. 885 - SEC. 107B-2
JOHNSON COUNTY
STATION 33+39.00
STRUCTURE NO. 044-0063

DESIGNED	-	JUSTIN T. BELUE
CHECKED	-	JOSUE D. ORTIZ-VARELA
DRAWN	-	MICHAEL B. MOSSMAN
CHECKED	-	J.T.B. / J.O.V.

3/31/2020 - 9:51:09 AM

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 2 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
885	107B-2	JOHNSON	—	—
		CONTRACT NO. 78681		
		ILLINOIS FED. AID PROJECT		

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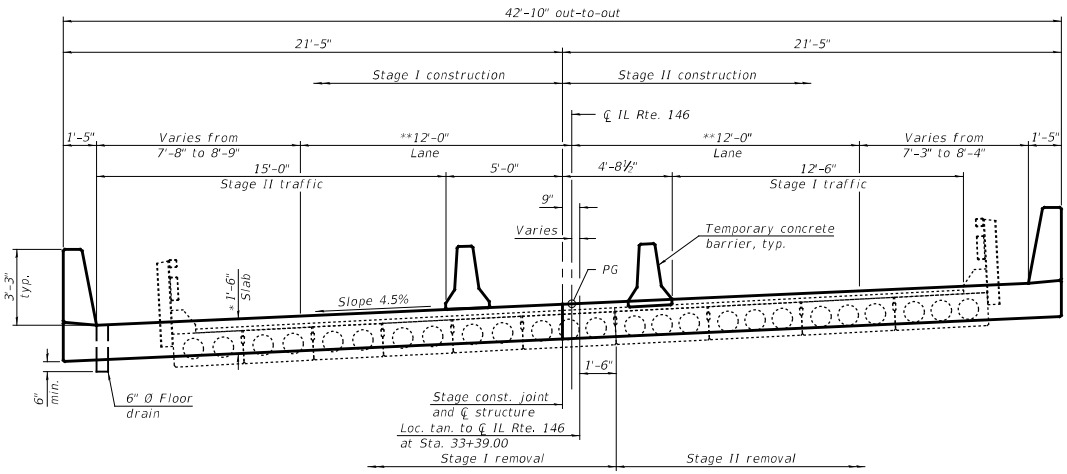
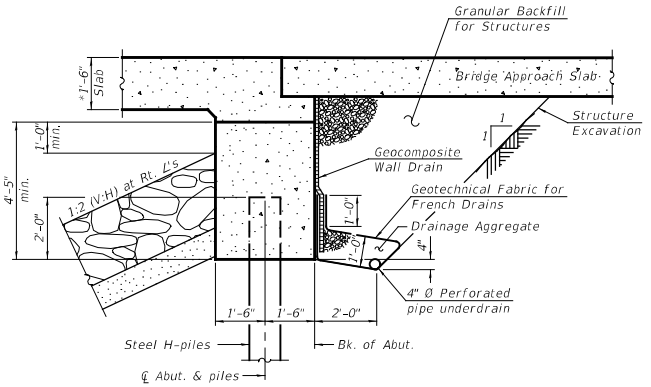


CROSS SECTION

(Looking East)



SECTION THRU ABUTMENT

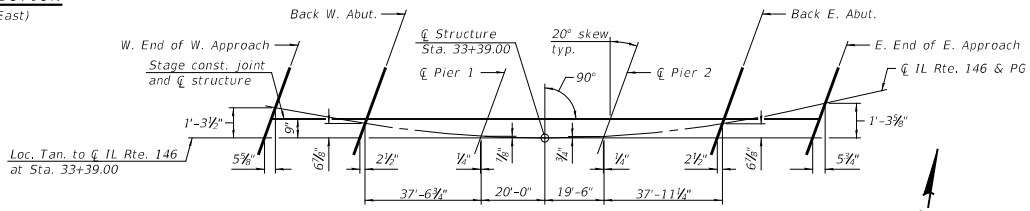
(Horiz. dim. @ Rt. ∠'s)

* Slab thickness may be refined in final design.

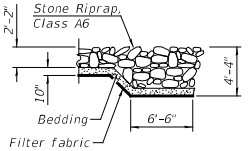
** Radial Dimension

DESIGN SCOUR ELEVATION TABLE

Event / Limit State	Design Scour Elevations (ft.)				
	W. Abut.	Pier 1	Pier 2	E. Abut.	Item 113
Q100	365.17	339.6	338.9	365.28	5
Q200	365.17	339.6	338.9	365.28	
Design	365.17	339.6	338.9	365.28	
Check	365.17	339.6	338.9	365.28	



OFFSET SKETCH



SECTION A-A

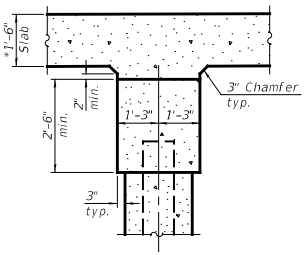
WATERWAY INFORMATION

Drainage Area = 27.6 sq. mi.

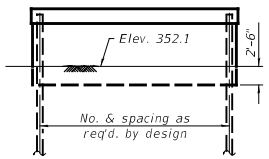
Existing Low Grade Elev. 368.8 at Sta. 28+68
Proposed Low Grade Elev. 368.8 at Sta. 28+68

Flood		Discharge C.F.S.		Opening Ft²		Nat.	Head - Ft.		Headwater El.	
Frequency Year	Flow Type	Exist.	Prop.	Exist.	Prop.	H.W.E.	Exist.	Prop.	Exist.	Prop.
10	Main	4,820	4,820	683	714	366.7	1.0	0.9	367.7	367.6
	Weir	0	0	0	0					
	Total	4,820	4,820	683	714					
35 (Existing OT)	Main	6,450	-	734	-	367.3	1.2	-	368.5	-
	Weir	0	-	0	-					
	Total	6,450	-	734	-					
50 (Design)	Main	7,057	7,110	760	784	367.6	1.5	1.1	369.1	368.7
	Weir	53	0	0	0					
	Total	7,110	7,110	760	784					
85 (Proposed OT)	Main	-	7,690	-	784	367.6	-	1.3	-	368.9
	Weir	-	0	-	0					
	Total	-	7,690	-	784					
100	Main	7,725	8,030	777	799	367.8	1.4	1.3	369.2	369.1
	Weir	365	60	0	0					
	Total	8,090	8,090	777	799					
200 (Scour Check)	Main	8,074	8,706	813	831	368.2	2.1	1.4	370.3	369.6
	Weir	1,006	374	0	0					
	Total	9,080	9,080	813	831					

10 year velocity through existing structure = 7.1 ft. / sec.
10 year velocity through proposed structure = 6.8 ft. / sec.



SECTION THRU PIER



PIER SKETCH

DETAILS
ILLINOIS ROUTE 146 OVER LITTLE CACHE CREEK
F.A.P. RTE. 885 - SEC. 107B-2
JOHNSON COUNTY
STATION 33+39.00
STRUCTURE NO. 044-0063

DESIGNED -	JUSTIN T. BELUE
CHECKED -	JOSUE D. ORTIZ-VARELA
DRAWN -	MICHAEL B. MOSSMAN
CHECKED -	J.T.B. / J.O.V.

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

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SHEET 2 OF 2 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
885	107B-2	JOHNSON	__	__
		CONTRACT NO. 78681		
		ILLINOIS	FED. AID PROJECT	

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WMK
2/24/19 044-0063

ng, Bradly L

Please see forwarded e-mail from Justin Belue

From: Belue, Justin T.
Sent: Tuesday, November 26, 2019 3:34 PM
To: Hessing, Bradly L
Subject: SN 044-0063
Attachments: Loads for Pile Type Selection.pdf; Boring Logs.pdf; Foundations Info.pdf

Brad,
I am beginning work on an in-house TSL. It is a total replacement (3 span slab bridge). The abutments will be replaced with integral abutments. The Structure Report along with the borings and plan & profile is attached. I also attached the preliminary superstructure loads on the proposed abutments & piers, loads for pile type selection.

In order to complete the TSL, please provide an SGR by January 10, 2020.

If you need anything else please let me know. I will also send a request in BPTR.

Thanks,

Justin T. Belue
Illinois Department of Transportation
Bureau of Bridges & Structures – Planning
Phone: (217) 782-9254
E-mail: Justin.Belue@illinois.gov

Please consider the environment before printing this email

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Need SGR for In House 044-0063

Illinois Department of Transportation

Route FAP 885 Sheet ____ of ____
Section 107R-2 Computed by JTB Date 10/29/19
County Johnson Checked by ____ Date ____
Structure No. 044-0063

ITEMS TO BE PROVIDED BY FGU

- DESIGN SCOUR ELEVATION TABLE SEE DRAFT TSL
- SEISMIC DATA SEE DRAFT TSL
- PILE TYPE H-PILES END BEARING
- NEED FOR COFFERDAMS @ PIERS NEED COFFERDAMS W/OUT SEAL
- BORING LOCATIONS IN PLAN VIEW
- TEMP. SHEET PILING ✓ OR TEMP SOIL ~~RET~~ SYSTEM @ STAGE CONST. LINE

PIER TYPE

- PREFERED PIER TYPE IS PILE BENT PIER OK
- FGU WILL VERIFY IF SINGLE ROW OF PILES CAN BE USED YES SINGLE
- PER BM. 2.3.6.2.2, SOLID WALL ENCASEMENT SHALL EXTEND 2.5 FT. BELOW STREAMBED OK
- PIERS WILL BE FIXED SEE B.M. FIG. 3.9.5-2 OK

BBS 2049 (Rev. 9/06)

12/24/19

Loads for Pile Type Selection

SN 044-0063

Beam Spacing=	42.833 ft
Number of Lanes=	3
Number of Beams=	1
Out-to Out Width=	42.833 ft
Distribution Factor @ Abutment=	1
Distribution Factor @ Pier=	1

Abutments:

PER BEAM				
	Service		Factored	
DC1=	174.294	k	217.87	k
DC2=	18.99	k	23.74	k
DW=	38.73	k	58.10	k
LL+IM=	60.6	k	106.05	k
Approach=	145.6333	k	182.04	k
∑	438.2473	k	587.7917	k

TOTAL				
	Service		Factored	
DC1=	174.29	k	217.87	k
DC2=	18.99	k	23.74	k
DW=	38.73	k	58.10	k
LL+IM=	154.53	k	270.43	k
Approach=	145.63	k	182.04	k
∑	532.18	k	752.17	k

Piers:

PER BEAM				
	Service		Factored	
DC1=	364.63	k	455.79	k
DC2=	39.73	k	49.66	k
DW=	81.03	k	121.55	k
LL+IM=	94.2	k	164.85	k
∑	579.59	k	791.845	k

TOTAL				
	Service		Factored	
DC1=	364.63	k	455.79	k
DC2=	39.73	k	49.66	k
DW=	81.03	k	121.55	k
LL+IM=	240.21	k	420.37	k
∑	725.60	k	1047.36	k

Illinois Department of Transportation

Memorandum

To:	Carrie Nelsen	Attn: Dave Piche
From:	Keith Roberts	By: Aaron Hayes AWH
Subject:	Boring Logs SN 044-0053	
Date:	July 30, 2018	

FAP 885 (IL 146) over Little Cache Creek
Structure 044-0053
Johnson County

Foundation boring logs have been obtained for the above listed structure and are attached.

Attachments
AH:ah

cc: Soils File

ILLINOIS DEPARTMENT OF TRANSPORTATION
District Nine Materials

Bridge Foundation Boring Log
Sheet 1 of 1

FAP 885 (IL 146) Over Little Cache Creek

Route: FAP 885 (IL 146 Structure Number: 044-0053 Date: 6/6/2018

Section 110-BC-1 Bored By: L Estel

County: Johnson Location: 0.1 mile East of US 45 Checked By: A Hayes

Boring No 1-S
Station 32+59
Offset 7' Lt CL
Ground Surface 371.9 Ft

Surf Wat Elev:
Ground Water Elevation
when Drilling 25
At Completion
At: Hrs:

	DEPTH	BLOWS	Qu tsf	W%
Asphalt (18")				
370.4				
Stiff, moist, brown and grey, Silty Clay Loam A-4		2		
		3	1.8S	18
		5		
367.9				
Soft, very moist to wet, grey, Silt Loam A-4		WH		
	5.0	WH	0.4B	26
		2		
365.4				
Soft, very moist, grey, Silty Clay Loam A-4		WH		
		WH	0.4B	27
		WH		
362.9				
Medium, moist, grey, Silty Clay Loam A-4		1		
	10.0	1	0.9B	23
		1		
360.4				
Stiff, moist, grey, Silty Clay Loam A-4		WH		
		2	1.1B	23
		3		
357.9				
Medium, very moist, grey, Silty Clay Loam A-4		WH		
	15.0	WH	0.6B	25
		2		
355.4				
Stiff, moist to very moist, grey, Silty Clay Loam A-4		WH		
		1	1.3B	24
		2		
352.9				
Medium, very moist, brown, Silty Clay A-6		1		
	20.0	2	0.7B	27
		2		
350.4				
Very soft, wet, grey, Silt Loam A-4		WH		
		WH	0.2B	26
		WH		
		WH		
346.9	25.0	WH		

	DEPTH	BLOWS	Qu tsf	W%
Very loose, wet, grey, Sand		WH		
344.9		WH		
Very soft, wet, grey, Silt Loam A-4 with rotten wood		WH	0.2S	60
		WH		
343.4				
Very loose, wet, grey, Sand				
342.4		1		
Very stiff, moist, grey streaked brown, Clay to weathered Clay Shale	30.0	7	2.0S	26
		12		
		8		
		15		
		20		
337.4		17		
Hard, dry, grey, Clay Shale	35.0	100/12		
		100/6"		
==========	40.0			
Elevation referenced to BM R105 = 371.6 feet				
To convert "N" values to "N60" multiply by 1.5				
==========				
Clay Shale 327.4		100"1"		
	45.0			
Bottom of hole = 44.1 feet				
Free water observed at 25.0 feet				
Elevation referenced to BM R105 = 371.6 feet				
	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

FAP 885 (IL 146) Over Little Cache Creek — Sheet 1 of 2

Route: FAP 885 (IL 146 — Structure Number: 044-0053 — Date: 6/13/2018

Section 110-BC-1 — Bored By: L Estel

County: Johnson — Location: 0.1 mile East of US 45 — Checked By: A Hayes

Boring No 2-S
Station 34+16
Offset 7' Rt CL
Ground Surface 372.7 Ft

Surf Wat Elev:
Ground Water Elevation
when Drilling 25.5
At Completion
At: Hrs:

DEPTH	BLOWS	Qu tsf	W%	Description
				25" Asphalt
370.7				
		1.5E	17	Stiff, moist, brown and grey, Silty Clay Loam A-4
368.7				
	1			Medium, very moist, brown, Silty
5.0	1	0.8B	22	Clay to Silty Clay Loam A-6
	1			
366.2				
	1			Medium, moist to very moist, grey,
	2	0.8B	22	Silt Loam A-4
	4			
363.7				
	WH			Soft, very moist, grey, Silt Loam
10.0	1	0.4B	27	A-4
	2			
361.2				
	WH			Very soft, wet, grey, Silt Loam
	WH	0.2B	29	A-4
	WH			
358.7				
	1			Stiff, moist, brown mottled grey,
15.0	3	1.2B	24	Silt Loam to Silty Clay Loam A-4
	3			
356.2				
	2			
	6	0.8S	23	Medium, moist, brown, Silt A-4
	5			
	2			
20.0	6	0.8S	19	
	6			
351.2				
	1			Medium, very moist, brown,
	2	0.6B	26	Silty Clay Loam A-6
	2			
348.7				
	WH			Soft, very moist, grey, Silty Clay
25.0	1	0.3B	28	A-6

DEPTH	BLOWS	Qu tsf	W%	Description
347.2	2			
				Loose, wet, grey, Fine Sand
345.7	WH			
	WH	0.4B	28	Soft, very moist to wet, grey,
	WH			Silty Clay A-6 with rotten wood
343.7				
	WH			Soft to medium, very moist, grey,
30.0	WH	0.5B	32	Clay A7-6
	WH			
	WH			
	WH	0.5B	30	
	WH			
338.7				
	WH			Soft, very moist, grey, Clay A7-6
35.0	WH	0.3B	27	
	WH			
336.2				
	WH			
	WH	0.4B	27	Soft, very moist, grey, Silty Clay
	WH			A-6
333.7				
	WH			Medium, very moist, grey, Silty
40.0	WH	0.7B	34	Clay to Silty Clay Loam A-6
	1			
328.7				
	WH			Soft, very moist to wet, grey,
45.0	WH	0.4B	31	Silty Clay Loam A-4 with Sand
	WH			layers
323.7				
	3			Very loose, wet, grey, Sand and
50.0	1			Gravel

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

Route: FAP 885 (IL 146)
Section: 110-BC-1
County: Johnson
Date: 6/13/2018

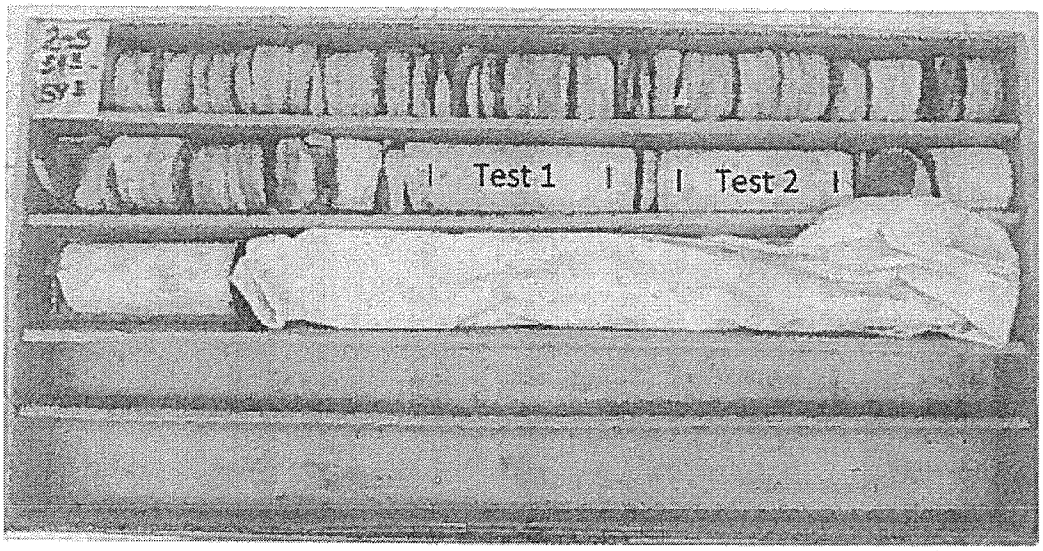
Boring No: 2-S
Station: 34+16
Offset: 7' Rt CL
Ground Surface: 372.7 Ft

DEPTH	BLOWS	Qu tsf	W%	DEPTH	BLOWS	Qu tsf	W%
59% Sand	1						
13% Silt							
3% Clay							
25% Gravel							
320.2							
Hard, dry, grey, Clay Shale							
Auger refusal 318.2	100/2"						
55.0				80.0			
Cored 54.2 to 59.2 feet							
88% Recovery; 23% RQD							
Very dense, dry, grey and dark grey, laminated Sandstone and Shale turning to Sandstone at @ 58.0 feet		12125.0 12189.0					
313.2							
60.0				85.0			
Bottom of hole = 59.2 feet							
Free water observed at 25.5 feet							
Elevation referenced to BM at NE wingwall = 371.6 feet							
To convert "N" values to "N60" multiply by 1.5				90.0			
70.0				95.0			
75.0				100.0			

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
Unconfined Compressive Strength

FAP 885 (IL 146)
Structure 044-0053 (Boring 2-S)
Johnson County



Boring #	Specimen#	Depth	Unconfined Compression
2-S	1	57.2'	12,125 psi
2-S	2	57.7'	12,189 psi

*Both samples manually stopped, no break

Foundation Core Instructions
Use 1.78" for the diameter
3.8" is the length

$$\frac{\pi d^2}{4} = 2.487$$

Pounds divided by 2.487 = psi

Site FAP 885 (IL 146) Section: 110-BC-1 County: Johnson Lab Date 6/20/2018

Job Number: Contract: Owner: Tested By K. Richards

Lab Number	7				
Station	34+16				
Location	0.1 mi. E. of US 45				
Depth	49.0' - 52.5'				
Soil Type (7 hour 10 minute)	SAL				
Subgrade Group (7 hour 10 minute)					
Soil Type (1 hour)	SAL				
Subgrade Group (1 hour)					
Weight Ret. #10 Sieve	95.3				
% Ret. #10 Sieve	24.7				
Wet Hygroscopic	100				
Dry Hygroscopic					
% Hygroscopic					
Wt. Hydrometer Sample	100				
Corr. WT. Hyd. Sample	99.67				
Correction Factor	1.003				
Sand %	59				
Silt %	13				
Clay %	3				

Hydrometer Reading	T	R	CC	CR	T	R	CC	CR	T	R	CC	CR	T	R	CC	CR	T	R	CC	CR
2 Min.																				
5 Min.																				
15 Min.																				
30 Min.																				
60 Min.	70.0	10.5	-4.8	5.7																
250 Min.																				
430 Min.	70.0	9.0	-4.8	4.2																
1440 Min.																				

	WTRET	% PASS	WTRET	% PASS	WTRET	% PASS	WTRET	% PASS	WTRET	% PASS
#40 Sieve										
#50 Sieve										
#200 Sieve	78.7	41								

LIQUID LIMIT

Pat. Number										
Pat. Weight										
Wt. Soil + Wet Pat.										
Wt. Soil + Dry Pat.										
% Moisture										
Number Blows										
Correction Factor										
Liquid Limit										

PLASTIC LIMIT

Pat. Number										
Pat. Weight										
Wt. Soil + Wet Pat.										
Wt. Soil + Dry Pat.										
Plastic Limit										
Plasticity Index										

COMPOSITE TEMPERATURE CORRECTION HYDROMETER (NaPO3)

66°F = -5.7	69°F = -5.0	72°F = -4.4	75°F = -3.7	78°F = -3.1	81°F = -2.4
67°F = -5.5	70°F = -4.8	73°F = -4.2	76°F = -3.5	79°F = -2.9	82°F = -2.2
68°F = -5.2	71°F = -4.6	74°F = -3.9	77°F = -3.3	80°F = -2.6	83°F = -2.0

LIQUID LIMIT CORRECTION

22 = 0.985	23 = 0.990	24 = 0.995	25 = 1.000	26 = 1.005	27 = 1.009	28 = 1.014