STRUCTURE GEOTECHNICAL REPORT

U.S. 20 over Kishwaukee River

Existing S.N. 101-0073 (EB) and 101-0074 (WB)
Proposed S.N. 101-0225 (EB) and S.N. 101-0226 (WB)

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WINNEBAGO COUNTY, ILLINOIS
JOB NO. D-92-064-19
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Authored By:
Matt D. Masterson, P.E. &
Christoph Opperman, P.E.
mmasterson@kaskaskiaeng.com
(618) 233-5877

Prepared For:
IDOT District 2
819 Depot Avenue
Dixon, Illinois 61602

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Kaskaskia
Engineering Group, LLC

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EXHIBITS

1.0 Project Description and Scope

1.1 Introduction

The geotechnical study summarized in this report was performed by Kaskaskia Engineering Group, LLC (KEG) for the replacement and expansion of the dual bridges carrying US 20 over the Kishwaukee River in Winnebago County, Illinois. The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and to present design and construction recommendations for the proposed structure.

1.2 Project Description

The project consists of the replacement and widening of the US 20 dual bridges (SN 101-0073 EB and SN-101-0074 WB) over the Kishwaukee River in Winnebago County, Illinois. The structure is located about 3400 feet from the US 20 intersection with I-39. The existing bridges were built in 1962. Each existing structure consisted of a three (3) span with rolled shape steel girders and a concrete deck. Both bridges have a length of 230'-0" back-to-back of abutments and an out-to-out width of 35'-8".

The general location of the proposed structure is shown on a Location Map, Exhibit A. The site lies within the limits of the Rock River Hill Country of the Till Plain Section of the Central Lowland Province.

1.3 Proposed Structure Information

The proposed structures (SN 101-0225 EB and SN 101-0226 WB) will consist of two three-span steel girder bridges, which will be built on a 30^{o} skew. Each bridge will provide three 12 ft.-wide driving lanes, a 10 ft.-wide outer shoulder, an 8.5 ft.-wide interior shoulder with a total width of 57 ft. – 5-inches out-to-out, in each direction. The proposed bridge centerline station will be at 1345+82.83 on US 20. The bridges will consist of three spans; the outer spans will measure 77'-6" and the central span will measure 115'-0", giving a total length of 270 ft. back-to-back of abutments. A Type, Size, and Location Plan (TS&L) is included in Exhibit C.

Further substructure details will be based on the findings of this Structure Geotechnical Report (SGR).

2.0 Field Exploration and Generalized Subsurface Conditions

The site exploration plan was developed and performed by KEG. A KEG representative was on-site to coordinate and log the borings, make site observations, and collect soil samples.

Eight standard penetration test (SPT) borings, designated SB-1, SB-2, SB-3, SB-4, SB-5, SB-6, SB-7, and SB-8 were drilled from July 12 through July 23, 2021. Borings SB-03, SB-04, SB-05 and SB-06 were drilled through the bridge deck and had around 35 to 40 feet of blind drilling to reach the ground surface. Boring Locations are shown on Exhibit B – Boring Plan. Detailed information regarding the nature and thickness of the soils encountered and the results of the field

sampling and laboratory testing are shown on the Boring Logs, Exhibit D. The soil profile for the above-mentioned borings can be found in Subsurface Profile, Exhibit E.

2.1 Subsurface Conditions

The profiles at the eight (8) boring locations exhibited layers of clay, clayey sand, clayey silt, gravelly sand, sand, sandy clay, sandy clay loam, sandy gravel, sandy loam, sandy silt, silt, and silty sand. Bedrock was not encountered in any of the borings, but evidence of a thin limestone layer was found in borings SB-01, SB-03, SB-04, SB-05, SB-06, SB-07, in depths around 30 and 45 feet. Table 2.1.1 shows a summary of the pavement structure and the ground surface elevation (GSE) of the borings. Borings SB-03, SB-04, SB-05, and SB-06, as mentioned, were blind drilling from the bridge deck, therefore the GSE represent the bridge deck elevations not the ground surface. A Summary of the general condition of the subsurface is described in Table 2.1.2.

Table 2.1.1 – Boring Information Summary

Designation	Asphalt (in)	Concrete (in)	Blind Drilling Casing (ft)	Depth (ft)	GSE (ft.)
SB-01	3.0	13.5	-	125.0	739.90
SB-02	4.5	12.0	-	75.00	739.99
SB-03	-	8.00	35.0	100.0	739.81
SB-04	-	8.25	40.0	100.0	739.96
SB-05	-	8.00	35.0	105.0	739.66
SB-06	-	8.25	40.0	100.0	739.91
SB-07	2.0	12.0	-	75.00	739.56
SB-08	4.0	12.0	-	125.0	739.87

Table 2.1.2 – Subsurface Profile Summary

Soil Type	N-Values (bpf)	Q_u (tsf)	WC (%)	Boring
Clay	9 to 59	1.0	18 to 36	SB-04, SB-07, SB-08
Clayey Sand	8 to 32	-	8 to 23	SB-01, SB-02, SB-07
Clayey Silt	10 to 61	0.30 to 1.70	11 to 27	SB-01, SB-02, SB-03, SB-05
Gravelly Sand	9 to 50/2”	-	7 to 20	SB-02, SB-04 through SB-08
Sand	5 to 78	-	4 to 29	All Borings
Sandy Clay	7 to 37	2.0 to 3.0	17 to 36	SB-01, SB-07, SB-08
Sandy Clay Loam	13 to 17	1.0	14 to 32	SB-02
Sandy Gravel	6 to 80	-	6 to 16	SB-01, SB-02, SB-06, SB-08
Sandy Loam	10 to 24	-	15 to 29	SB-02
Sandy Silty	15 to 31	0.40	17 to 22	SB-03, SB-08

Soil Type	N-Values (bpf)	Q_u (tsf)	WC (%)	Boring
Silt	22 to 48	0.5 to 1.0	17 to 23	SB-01 through SB-07
Silty Sand	40 to 52	-	14 to 18	SB-04, SB-07, SB-08

2.2 Groundwater

Due to the sandy nature of the natural soil, mud rotary wash was used during drilling, making it difficult to measure the groundwater table. Therefore, no groundwater level was obtained. It should be noted that the groundwater level is subject to seasonal and climatic variations, including fluctuations of the river. In addition, without extended periods of observation, measurement of true groundwater levels may not be possible.

3.0 Geotechnical Evaluations

3.1 Settlement

Since no significant grading or changes to the existing embankments are expected at the proposed structure, it is estimated that the existing embankments will experience no settlement. Therefore, no settlement calculations were performed for the proposed structure.

3.2 Slope Stability

A stability analysis using SLOPE/W was performed using the proposed bridge geometry on the TS&L and soil characteristics from Boring SB-01, SB-02, SB-07, and SB-08. Two conditions were modeled for each scenario: end-of-construction and long-term stability. A critical factor of safety (FOS) was calculated for each condition. According to the current standard of practice, the target FOS is 1.5 for end-of-construction and long-term slope stability. The slope stability analyses indicated that the required minimum FOS for all conditions were met.

In order to model the end-of-construction condition, full cohesion and a friction angle of 0 degrees were assumed, for cohesion soils. Nominal values for cohesion were used with full friction angle to model the long-term condition to analyze the theoretical condition where pore water pressure has dissipated. Nominal value was 100 and 150 psf for the cohesive soils, with friction angles between 26 and 30 degrees. N60-ϕ' correlation by Wolff (1989) was used to determine the friction angles of cohesionless soils.

The Bishop Circular Method, which generates circular-shaped failure surfaces, was used to calculate the critical failure surfaces and FOS for the proposed conditions. The FOS obtained in the analysis is shown in Table 3.2.1. SLOPE/W program output from this analysis can be found in SLOPE/W Slope Stability Analysis, Exhibit F.

Table 3.2.1 – Slope Stability Critical FOS

Location (2H:1V Slope)	Critical FOS	
	End-of Construction	Long Term
WB West Abutment (SB-01)	2.3	1.6
WB East Abutment (SB-07)	2.2	1.5
EB West Abutment (SB-02)	1.6	1.5
WB West Abutment (SB-08)	1.8	1.5

3.3 Scour

The design scour elevations for the proposed structures are shown in Table 3.3.1 and Table 3.3.2. To reduce the potential for future scour, Stone Riprap Class A5 will be placed on the surface of the proposed abutments end slopes and Type II Cofferdams will be required around the piers.

Table 3.3.1 – Design Scour Elevations EB SN 101-0225 and WB SN 101-0226

Event/Limit State	Design Scour Elevations (ft.)				Item 113
	West Abutment	Pier 1	Pier 2	East Abutment	
Q_{100}	731.14	704.52	704.52	730.77	5
Q_{200}	731.14	701.84	701.84	730.77	
Design	731.14	704.52	704.52	730.77	
Check	731.14	701.84	701.84	730.77	

3.4 Seismic Considerations

The estimate of Seismic Site Class was based on the method described by IDOT AGMU Memo 09.1 - Seismic Site Class Definition and the IDOT provided spreadsheet titled: '*Seismic Site Class Determination*.' Using these resources, the controlling global site class for this project is Soil Site Class D.

Additional seismic parameters were calculated for use in the design of the structure. Published information and mapping from the USGS, including software directly applicable to the AASHTO Guide Specifications for LRFD Seismic Bridge Design, was used to develop the parameters for the bridge location. The values, based on Soil Site Class D, are summarized below.

Table 3.4.1 – Summary of Seismic Parameters

Parameter	Value
Soil Site Class	D
Spectral Response Acceleration, 0.2 Sec, S_{DS}	0.135g (Site Class D)
Spectral Response Acceleration, 1.0 Sec, S_{D1}	0.079g (Site Class D)
Seismic Performance Zone	1

As indicated in the table above, the Seismic Performance Zone is 1, based on S_{D1} and Table 3.15.2 in the IDOT Bridge Manual, the Soil Site Class D, and Figure 2.3.10-2 in the IDOT Bridge Manual.

4.0 Foundation Evaluations and Design Recommendations

4.1 Driven Piles

The foundations supporting the proposed bridge must provide sufficient support to resist dead and live loads. The IDOT Static Method uses the LRFD Pile Design Guide Procedure to estimate the pile lengths (Pile Length/Pile Type, Exhibit G).

The preliminary design loads, as provided by Alfred Benesch & Company are provided in Table 4.1.1 below.

Table 4.1.1 - Preliminary Design Loads

Structure	Substructure Unit	Factored Reactions (kips)
Westbound	West Abutment (SB-01)	1,500
	Pier 1 (SB-03)	3,630
	Pier 2 (SB-05)	3,630
	East Abutment (SB-07)	1,500
Eastbound	West Abutment (SB-02)	1,500
	Pier 1 (SB-04)	3,630
	Pier 2 (SB-06)	3,630
	East Abutment (SB-08)	1,500

The estimated pile lengths for applicable H-pile types and Metal Shell pile types are shown in Tables 4.1.2 through 4.1.8 below. The Nominal Required Bearing (R_N) represents the resistance the pile will experience during driving and will assist the contractor in selecting a proper hammer size. The Factored Resistance Available (R_F) documents the net long-term axial factored pile capacity available at the top of the pile to support factored substructure loadings.

Table 4.1.2 - Estimated Pile Lengths for Metal Shell 12"Φ w/.25" walls

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
WB - West Abutment (SB-01)	392	216	35	732.78
WB - Pier 1 (SB-03)	392	216	17	711.50
WB - Pier 2 (SB-05)	392	216	52	711.50
WB - East Abutment (SB-07)	392	216	25	732.41
EB - West Abutment (SB-02)	392	216	33	732.87
EB - Pier 1 (SB-04)	392	216	17	711.50
EB - Pier 2 (SB-06)	392	216	10	711.50
EB - East Abutment (SB-08)	392	216	30	732.50

Table 4.1.3 - Estimated Pile Lengths for Metal Shell 14"Φ w/.312" walls

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
WB - West Abutment (SB-01)	570	314	37	732.78
WB - Pier 1 (SB-03)	570	314	18	711.50
WB - Pier 2 (SB-05)	570	314	54	711.50
WB - East Abutment (SB-07)	570	314	26	732.41
EB - West Abutment (SB-02)	570	314	39	732.87

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
EB - Pier 1 (SB-04)	570	314	18	711.50
EB - Pier 2 (SB-06)	570	314	10	711.50
EB - East Abutment (SB-08)	570	314	33	732.50

Table 4.1.4 - Estimated Pile Lengths for Metal Shell 16"Φ w/.312" walls

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
WB - West Abutment (SB-01)	654	360	36	732.78
WB - Pier 1 (SB-03)	654	360	17	711.50
WB - Pier 2 (SB-05)	654	360	54	711.50
WB - East Abutment (SB-07)	654	360	26	732.41
EB - West Abutment (SB-02)	654	360	37	732.87
EB - Pier 1 (SB-04)	654	360	17	711.50
EB - Pier 2 (SB-06)	654	360	10	711.50
EB - East Abutment (SB-08)	654	360	32	732.50

Table 4.1.5 - Estimated Pile Lengths for HP 10x42 Steel H-Piles

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
WB - West Abutment (SB-01)	335	184	89	732.78
WB - Pier 1 (SB-03)	335	184	82	711.50
WB - Pier 2 (SB-05)	335	184	98	711.50
WB - East Abutment (SB-07)	335	184	88	732.41
EB - West Abutment (SB-02)	335	184	--	732.87
EB - Pier 1 (SB-04)	335	184	78	711.50
EB - Pier 2 (SB-06)	335	184	74	711.50
EB - East Abutment (SB-08)	335	184	84	732.50

Table 4.1.6 - Estimated Pile Lengths for HP 12x53 Steel H-Piles

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
WB – West Abutment (SB-01)	418	230	89	732.78
WB - Pier 1 (SB-03)	418	230	81	711.50
WB - Pier 2 (SB-05)	418	230	98	711.50
WB - East Abutment (SB-07)	418	230	88	732.41

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
EB - West Abutment (SB-02)	418	230	--	732.87
EB - Pier 1 (SB-04)	418	230	77	711.50
EB - Pier 2 (SB-06)	418	230	74	711.50
EB - East Abutment (SB-08)	418	230	84	732.50

Table 4.1.7 - Estimated Pile Lengths for HP 12x63 Steel H-Piles

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
WB - West Abutment (SB-01)	497	273	97	732.78
WB - Pier 1 (SB-03)	497	273	--	711.50
WB - Pier 2 (SB-05)	497	273	--	711.50
WB - East Abutment (SB-07)	497	273	96	732.41
EB - West Abutment (SB-02)	497	273	--	732.87

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
EB - Pier 1 (SB-04)	497	273	--	711.50
EB - Pier 2 (SB-06)	497	273	83	711.50
EB - East Abutment (SB-08)	497	273	89	732.50

Table 4.1.8 - Estimated Pile Lengths for HP 14x73 Steel H-Piles

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
WB - West Abutment (SB-01)	578	318	95	732.78
WB - Pier 1 (SB-03)	578	318	--	711.50
WB - Pier 2 (SB-05)	578	318	--	711.50
WB - East Abutment (SB-07)	578	318	92	732.41
EB - West Abutment (SB-02)	578	318	--	732.87
EB - Pier 1 (SB-04)	578	318	--	711.50
EB - Pier 2 (SB-06)	578	318	78	711.50

Substructure Unit	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
EB - East Abutment (SB-08)	578	318	87	732.50

As shown in the Tables above and in Pile Length/Pile Type, Exhibit G, scour has been included at the substructure locations. Downdrag and liquefaction have not.

KEG recommends one test pile be performed, at a minimum. A test pile is performed prior to production driving so that actual, on-site field data can be gathered to determine pile driving requirements for the project. This is also the way the contractor's proposed equipment and methodologies identified in their Pile Installation Plan can be assessed.

The piles are expected to be driven into sandy gravel and gravelly sand layers that present cobbles in their composition. Therefore, pre-coring should not be required to reach estimated embedment depths. KEG recommends using pile tips or metal shell conical tips to facilitate driving, protect piles from damage, and avoid sudden overstress.

4.2 Lateral Pile Response

Generally, the geotechnical engineer provides soil parameters to the structural engineer so that an L-Pile program or other approved software can be used for the lateral or displacement analysis of the foundations. Table 4.2.1 is included for the structural engineer's use in evaluating lateral pile response. The values were estimated based on the descriptions listed on the boring logs. No specific hydrometer analyses were performed on the site soils.

Table 4.2.1 - Soil Parameters for Lateral Pile Load Analysis

Boring	Soil Description	Elev. at the Bottom of Layer	γ (pcf)	Undrained Parameters		N Value (Average)	Assumed % fines < #200	K (pci)	ε_{50}
				c (psf)	Φ (deg.)				
SB-01	Clayey Sand	736.4	120	-	29	8	25	25	-
	Sand	731.9	115	-	33	25	3	90	-
	Sandy Loam	723.4	120	-	32	17	35	90	-
	Sandy Clay	716.9	120	2500	0	11	45	1000	0.005
	Sand	714.4	115	-	35	26	3	90	-
	Sandy Gravel	706.9	120	-	35	25	3	-	-
	Coarse Sand	692.9	115	-	35	23	3	90	-
	Silt	685.4	110	1000	0	43	85	2000	0.004
	Fine Sand	671.4	115	-	45	58	5	225	-
	Silt	670.4	110	1000	0	67	85	2000	0.004
	Fine Sand	667.9	115	-	47	67	5	225	-
	Clayey Silt	660.9	110	1700	0	61	65	500	0.007
	Fine Sand	627.9	115	-	40	41	5	225	-

Boring	Soil Description	Elev. at the Bottom of Layer	γ (pcf)	Undrained Parameters		N Value (Average)	Assumed % fines < #200	K (pci)	ε50
				c (psf)	Φ (deg.)				
	Sand	614.9	115	-	43	51	3	225	-
SB-02	Sandy Loam	737	120	-	29	10	35	90	-
	Sand	729	115	-	34	24	3	90	-
	Clayey Sand	726.5	120	-	30	12	25	90	-
	Clayey Silt	725.5	110	1000	0	18	65	100	0.01
	Sand	724	115	-	33	18	3	90	-
	Sandy clay loam	715.5	120	-	32	16	45	90	-
	Sandy Gravel	714	120	-	31	13	3	-	-
	Gravelly Sand	691	120	-	35	24	3	90	-
	Sand	686	115	-	39	38	3	225	-
	Clayey Silt	683.5	110	1500	0	44	65	500	0.007
	Sand	673.5	115	-	41	46	3	225	-
	Silt	665	110	1000	0	44	85	2000	0.004
SB-03	Clayey Silt	710.8	110	1000	0	11	65	100	0.01
	Coarse Sand	707.3	115	-	30	9	3	25	-
	Sand	706.8	115	-	30	9	3	25	-
	Coarse Sand	694.3	115	-	33	18	3	90	-
	Sand	689.3	115	-	50	77	3	225	-
	Fine Sand	686.8	115	-	34	21	5	90	-
	Sand	682.8	115	-	36	26	3	90	-
	Silt	678.3	110	700	0	22	85	100	0.01
	Sandy Silt	672.8	115	-	32	16	25	90	-
	Sand	662.8	115	-	32	15	3	90	-
	Clayey Silt	650.8	110	900	0	32	65	100	0.01
	Fine Sand	639.8	115	-	41	44	5	225	-
SB-04	Clay	715.5	120	1000	0	34	85	100	0.01
	Gravelly Sand	709	120	-	33	19	3	90	-
	Sand	704.5	115	-	34	21	3	90	-
	Gravelly Sand	688	120	-	38	34	3	225	-
	Sand	668.5	115	-	40	41	3	225	-
	Silty Sand	663	115	-	42	47	25	225	-
	Silt	658	110	900	0	29	85	100	0.01
	Sand	640	115	-	44	55	3	225	-
SB-05	Sand	712.7	115	-	30	10	3	90	-
	Coarse Sand	694.2	115	-	35	23	3	90	-
	Gravelly Sand	689.2	120	-	36	27	3	90	-
	Fine Sand	682.7	115	-	34	21	5	90	-
	Silt	681.2	110	1000	0	26	85	100	0.01

Boring	Soil Description	Elev. at the Bottom of Layer	γ (pcf)	Undrained Parameters		N Value (Average)	Assumed % fines < #200	K (pci)	ε50
				c (psf)	Φ (deg.)				
	Clayey Silt	677.7	110	3000	0	38	65	1000	0.005
	Silt	672.7	110	500	0	46	85	30	0.02
	Sand	662.7	115	-	42	49	3	225	-
	Clayey Silt	651.2	110	1300	0	22	65	500	0.007
	Sand	634.7	115	-	41	46	3	225	-
SB-06	Gravelly Sand	710.4	120	-	32	15	3	90	-
	Sand	704.9	115	-	38	35	3	225	-
	Gravelly Sand	696.9	120	-	38	35	3	225	-
	Sandy Gravel	691.9	120	-	38	33	3	-	-
	Sand	686.9	115	-	36	27	3	90	-
	Silt	677.9	110	500	0	34	85	30	0.02
	Sand	655.4	115	-	45	57	3	225	-
	Silt	647.9	110	1000	0	43	85	100	0.01
	Sand	639.9	115	-	46	61	3	225	-
SB-07	Sandy Clay	735.6	120	2000	0	12	45	500	0.007
	Sand	725.1	115	-	35	28	3	90	-
	Clayey Sand	720.6	120	-	36	29	25	90	-
	Sand	718.6	115	-	32	17	3	90	-
	Clay	718.1	120	1000	0	9	85	100	0.01
	Sand	716.6	115	-	30	9	3	25	-
	Coarse Sand	714.1	115	-	39	38	3	225	-
	Gravelly Sand	711.6	120	-	35	23	3	90	-
	Coarse Sand	699.6	115	-	39	37	3	225	-
	Sand	692.6	115	-	35	25	3	90	-
	Coarse Sand	687.6	115	-	43	53	3	225	-
	Fine Sand	682.6	115	-	40	39	5	225	-
	Silt	679.6	110	1000	0	46	85	100	0.01
	Silty Sand	675.6	115	-	43	52	25	225	-
	Fine Sand	664.6	115	-	44	56	5	225	-
SB-08	Sand	736.9	115	-	29	10	3	90	-
	Sandy Clay	734.4	120	2000	0	16	45	500	0.007
	Gravelly Sand	722.9	120	-	34	23	3	90	-
	Clay	717.9	120	1000	0	17	85	100	0.01
	Sand	715.4	115	-	33	20	3	90	-
	Sandy Gravel	711.9	120	-	32	15	3	-	-
	Gravelly Sand	697.9	120	-	35	25	3	90	-
	Sandy Gravel	685.9	120	-	45	60	3	-	-
	Sand	681.9	115	-	41	43	3	225	-

Boring	Soil Description	Elev. at the Bottom of Layer	γ (pcf)	Undrained Parameters		N Value (Average)	Assumed % fines < #200	K (pci)	ε50
				c (psf)	Φ (deg.)				
	Silty Sand	677.9	115	-	40	40	25	225	-
	Sand	655.4	115	-	45	57	3	225	-
	Sandy Silt	647.9	115	-	34	22	25	90	-
	Sand	645.4	115	-	39	37	3	225	-
	Sandy Clay	642.9	120	2500	0	37	45	1000	0.005
	Sand	617.9	115	-	43	52	3	225	-
	Coarse Sand	614.9	115	-	42	48	3	225	-

5.0 Construction Considerations

5.1 Construction Activities

Construction activities should be performed in accordance with the current IDOT Standard Specifications for Road and Bridge Construction and any pertinent Special Provisions or Policies.

Should any design considerations assumed by KEG change, KEG should be contacted to determine if the recommendations stated in this report still apply.

5.2 Temporary Sheeting and Soil Retention

Temporary Sheeting would be required at various phases of this project due to the proposed staged construction layout shown in the TS&L. The soil at the site indicates that temporary sheeting is feasible. Temporary sheet piling shall be designed by the engineer responsible for the Contract plans. The contractor is responsible for retaining an Illinois Licensed Structural Engineer to detail the design of temporary soil retention systems.

5.3 Cofferdams and Seal Coats

Cofferdams will be required at the proposed pier locations. The estimated water surface elevation (E.W.S.E.) is listed as El. 716.75, making it greater than six ft. above the bottom elevation of the substructure. Therefore, a Type 2 cofferdam will be required. All cofferdams are required to be dewatered. Sand and gravel are present at the cofferdams' site, requiring a seal coat. A seal coat will reduce the potential for water to seep beneath the sheet piling in the dewatered cofferdam. As per the 2012 IDOT Bridge Manual, General Note 28 shall be added to the plans when a seal coat is specified.

The contractor is required to retain an Illinois-licensed structural engineer to design the cofferdams. Per the Bridge Manual, the plans and computations shall be submitted to the Bureau of Bridges and Structures for review and final approval before beginning any work on the structure.

5.4 Site and Soil Conditions

Provisions of the Standard Specifications should adequately address site and soil conditions.

6.0 Computations

Computations and analyses for special circumstances, if any, are included as exhibits. Please refer to each section of the report for reference to the exhibit containing any such calculations or analysis used.

7.0 Geotechnical Data

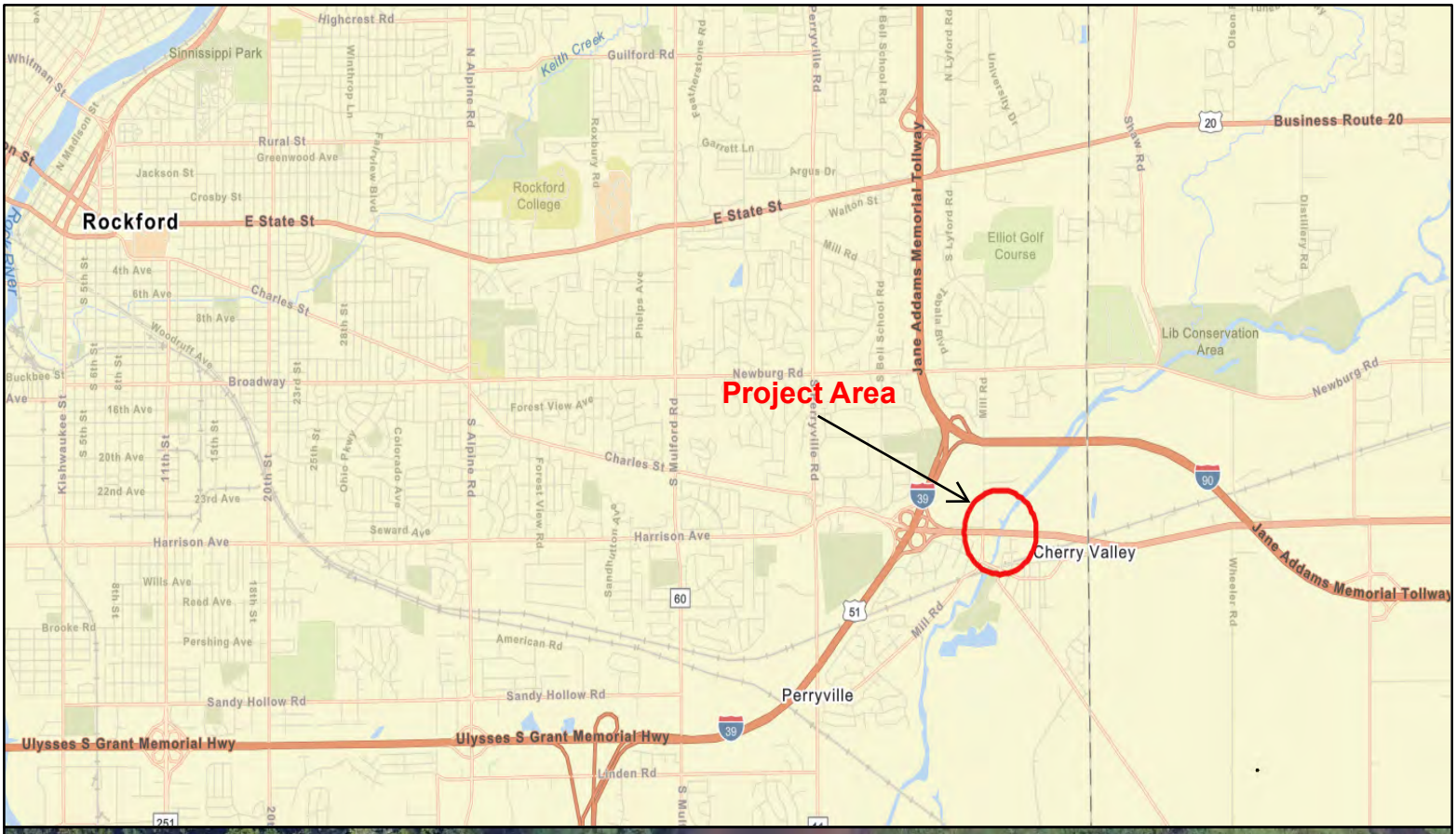
Soil boring logs can be found in Exhibit D. The Subsurface Profile can be found in Exhibit E.

8.0 Limitations

The recommendations provided herein are for the exclusive use of the Illinois Department of Transportation (IDOT) District 2 and Alfred Benesch and Company. They are specific only to the project described. They are based on the subsurface information obtained by KEG at eight boring locations within the structure area, KEG's understanding of the project as described herein, and geotechnical engineering practice consistent with the standard of care. No other warranty is expressed or implied. KEG should be contacted if conditions encountered during construction are inconsistent with those described.

EXHIBIT A

LOCATION MAP



LOCATION MAP

US 20 over Kishwaukee River

Winnebago County, Illinois

Kaskaskia Engineering Group, LLC

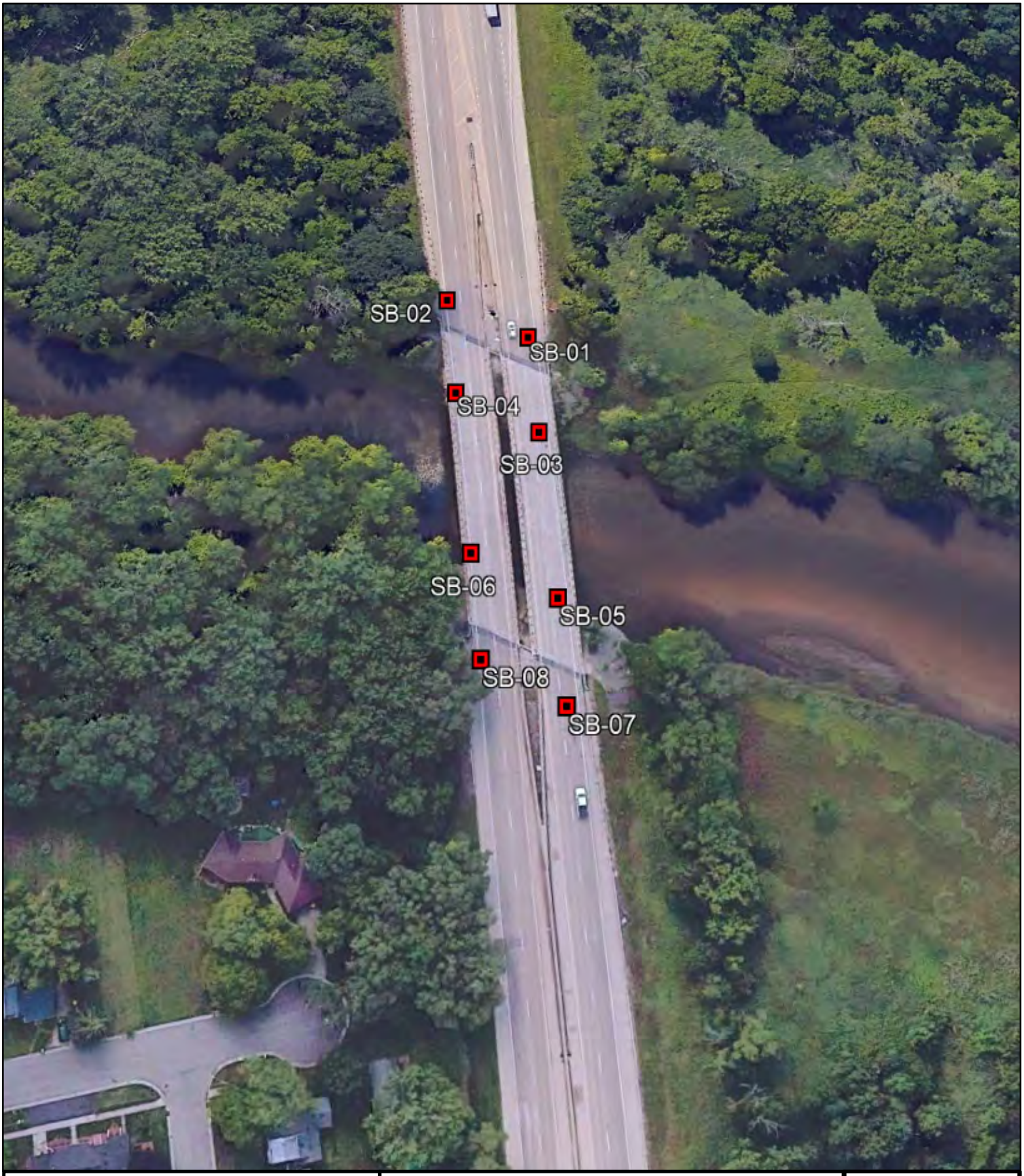
Exhibit No.

A

KEG JOB #19-1138.00

EXHIBIT B

BORING PLAN



Kaskaskia Engineering Group, LLC

BORING LOCATION MAP

US 20 over Kishwaukee River

Winnebago County, Illinois

Exhibit No.

B

KEG JOB #19-1138.00

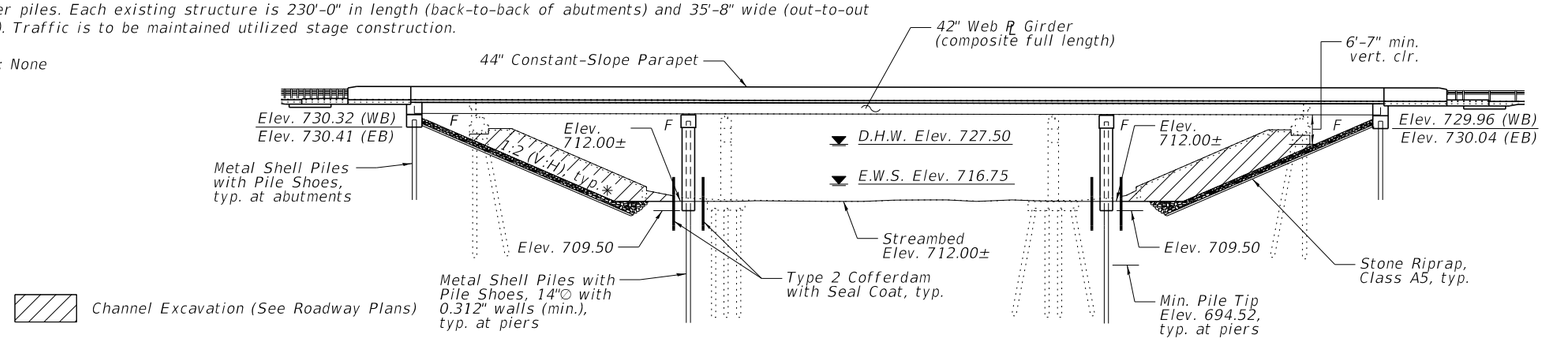
EXHIBIT C

TYPE, SIZE, AND LOCATION PLAN (TS&L)

Benchmark: McClure Benchmark Disk on northwest wingwall of westbound lane of US Rte. 20 over Kishwaukee River, approx. 600 ft east of Mill Road. Elevation 740.674.

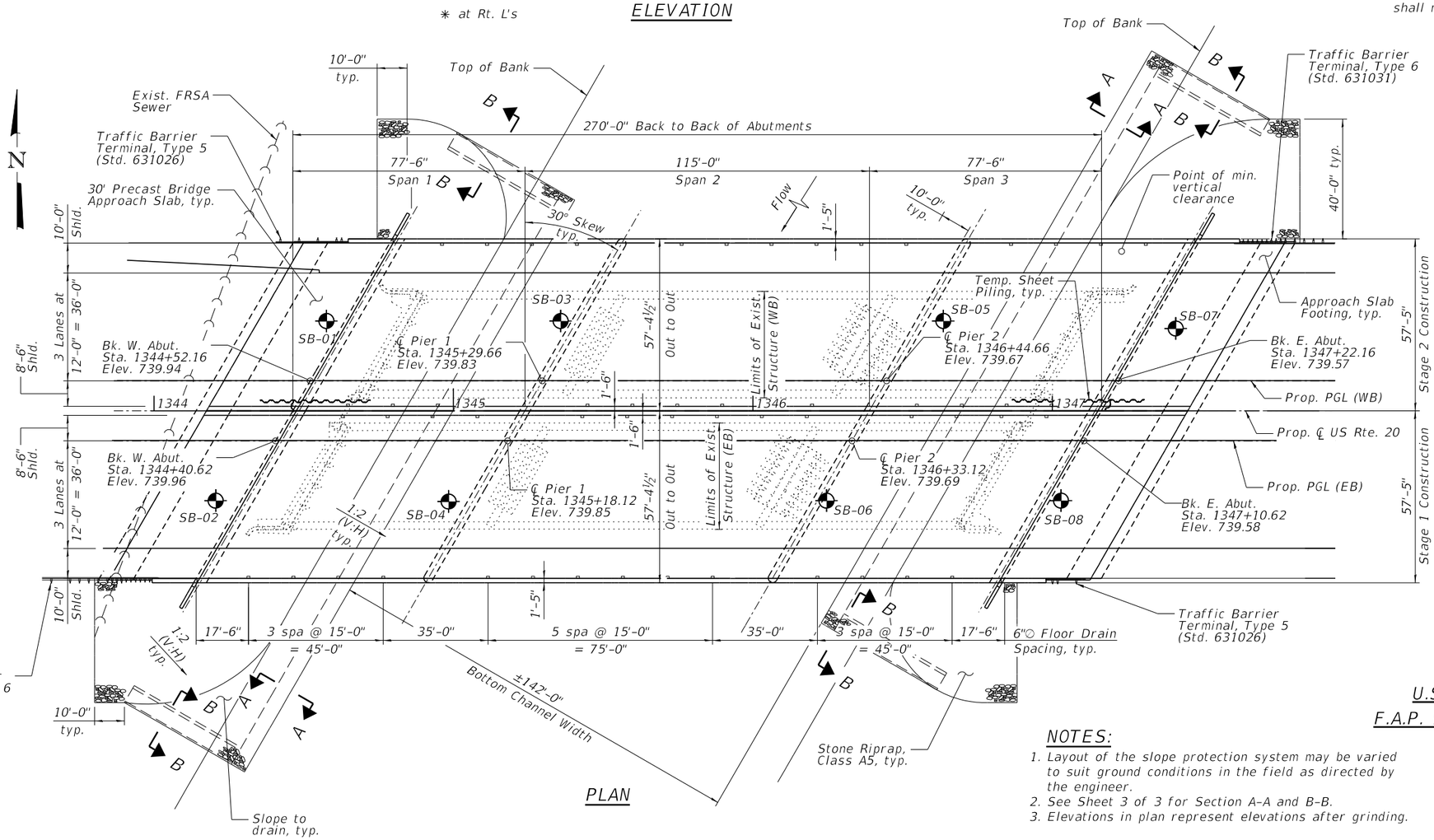
Existing Structure: SN 101-0073 (EB) and SN 101-0074 (WB) were constructed in 1962 as Project F-284(18) under Section No. 6-B for FA Route 194. Each structure is a three (3) span bridge with rolled shape steel girders and a non-composite concrete deck. The substructure is supported by stub abutments founded on concrete piles and trapezoidal piers founded on timber piles. Each existing structure is 230'-0" in length (back-to-back of abutments) and 35'-8" wide (out-to-out of deck). Traffic is to be maintained utilized stage construction.

Salvage: None



* at Rt. L's

ELEVATION



PLAN

** All structural steel shall metallized.

HIGHWAY CLASSIFICATION

F.A.P. Route 301 - U.S. Route 20
Functional Class: Other Principal Arterial
ADT: 28,050 (2020), 40,200 (2040)
ADTT: 2,244 (2020), 3,216 (2040)
DHV: 4,020 (2040)
Design Speed: 45 m.p.h.
Posted Speed: 45 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

LOADING HL-93

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

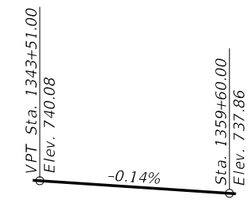
DESIGN STRESSES

FIELD UNITS

f'c = 4,000 psi (Superstructure)
f'c = 3,500 psi (Substructure)
fy = 60,000 psi (Reinforcement)
*fy = 50,000 psi (M270 Grade 50) ***

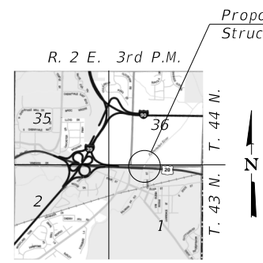
SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec (SD1) = 0.079g
Design Spectral Acceleration at 0.2 sec (SDS) = 0.135g
Soil Site Class = D



PROFILE GRADE

Along U.S. 20 EB/WB edge of inside lane/shoulder
Note: The profile grade shows the final elevations after grinding. Up to ¼" may be ground off the bridge deck and the bridge approach slabs.



LOCATION SKETCH

NOTES:

1. Layout of the slope protection system may be varied to suit ground conditions in the field as directed by the engineer.
2. See Sheet 3 of 3 for Section A-A and B-B.
3. Elevations in plan represent elevations after grinding.

GENERAL PLAN & ELEVATION
U.S. ROUTE 20 OVER KISHWAUKEE RIVER
F.A.P. ROUTE 301 - SECTION (201-3)K & (4-1, 5)R
WINNEBAGO COUNTY
STATION 1345+82.83
STRUCTURE NO. 101-0225 (EB)
STRUCTURE NO. 101-0226 (WB)

MODEL: $MODELNAME$
FILE NAME: $FILE$

benesch
Alfred Benesch & Company
35 W Wacker Drive, Suite 3300
Chicago, Illinois 60601
312-565-0450 Job No. 10800

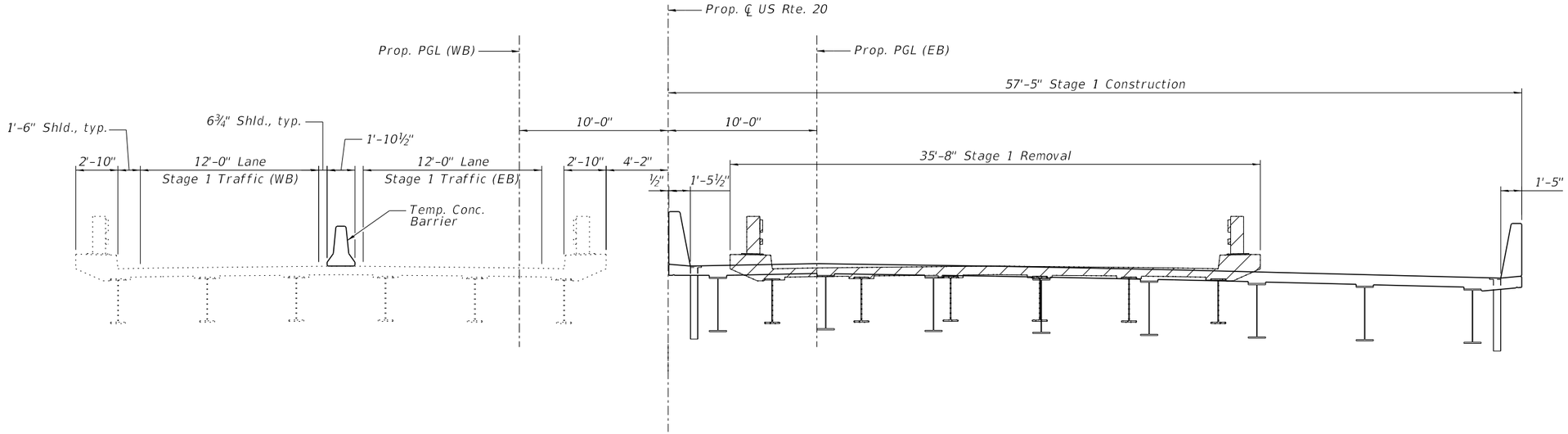
USER NAME =	DESIGNED - JPM	REVISED -
	CHECKED - MFH	REVISED -
PLOT SCALE =	DRAWN - JPM	REVISED -
PLOT DATE =	CHECKED - MFH	REVISED -

$DATE$ $TIME$

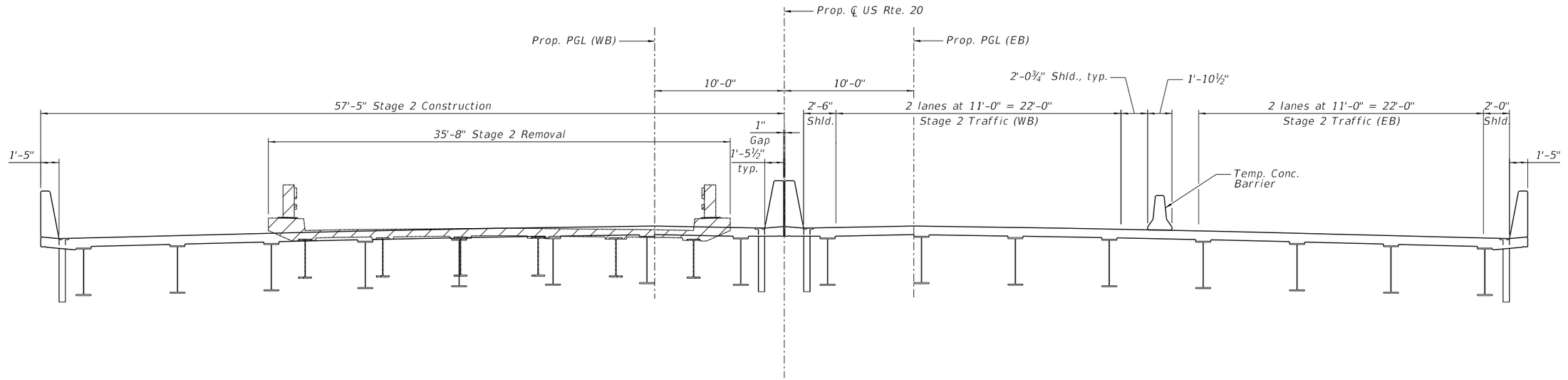
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 3 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
301	(201-3)K & (4-1, 5)R	WINNEBAGO		
		CONTRACT NO. 64R72		
		ILLINOIS FED. AID PROJECT		



STAGE 1
(Looking east)



STAGE 2
(Looking east)

NOTES:

1. Existing piers shall be removed to top of existing footing in each stage.

STAGE CONSTRUCTION DETAILS
U.S. ROUTE 20 OVER KISHWAUKEE RIVER
F.A.P. ROUTE 301 – SECTION (201-3)K & (4-1, 5)R
WINNEBAGO COUNTY
STATION 1345+82.83
STRUCTURE NO. 101-0225 (EB)
STRUCTURE NO. 101-0226 (WB)

MODEL: $MODELNAME$
FILE NAME: $FILE$

$DATE$ $TIME$

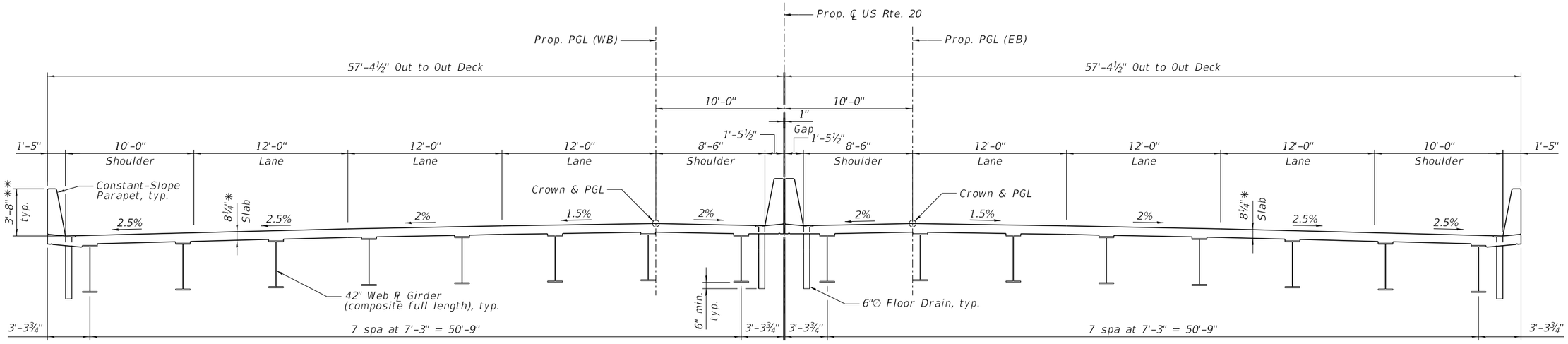
benesch
Alfred Benesch & Company
35 W Wacker Drive, Suite 3300
Chicago, Illinois 60601
312-565-0450 Job No. 10800

USER NAME =	DESIGNED - JPM	REVISED -	
	CHECKED - MFH	REVISED -	
PLOT SCALE =	DRAWN - JPM	REVISED -	
PLOT DATE =	CHECKED - MFH	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 2 OF 3 SHEETS

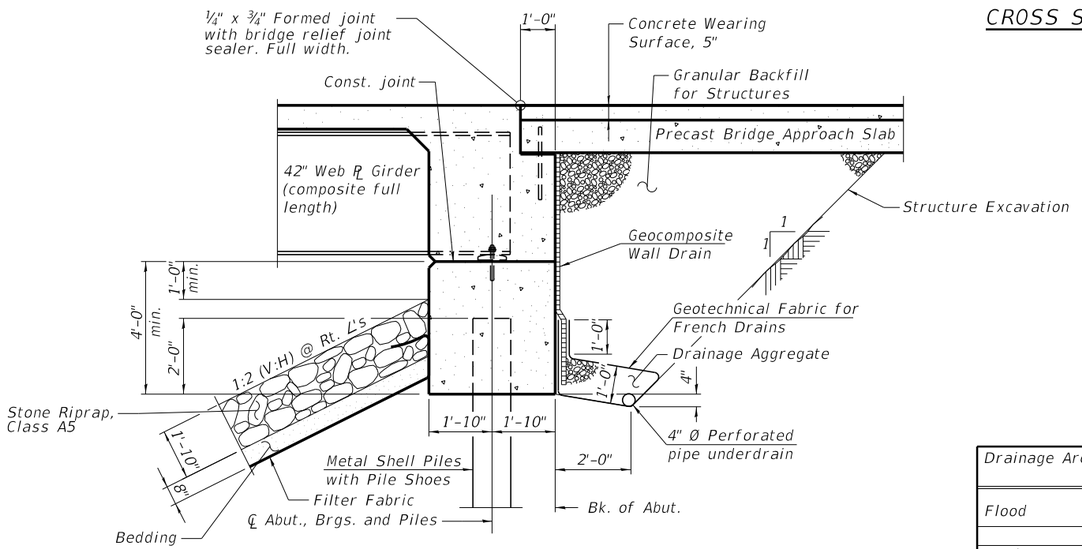
F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
301	(201-3)K & (4-1, 5)R	WINNEBAGO		
		CONTRACT NO. 64R72		
		ILLINOIS	FED. AID PROJECT	



* Prior to grinding
** After grinding

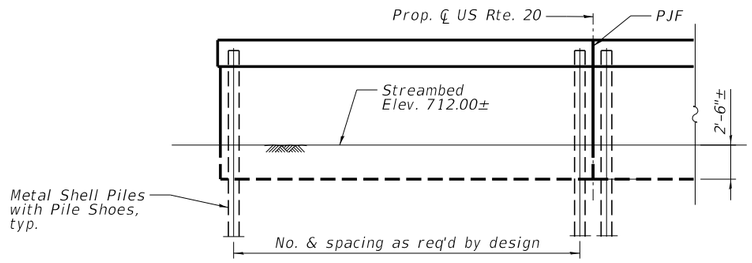
CROSS SECTION (FINAL CONDITION)

(Looking east)

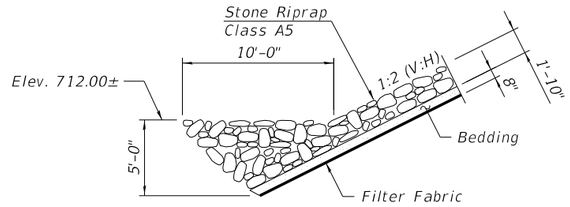


SECTION THRU INTEGRAL ABUTMENT

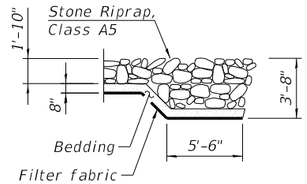
(Horiz. dim. @ Rt. ∠'s)



PIER SKETCH



SECTION A-A



SECTION B-B

WATERWAY INFORMATION

Drainage Area = 628.0 sq. mi.

Exist. Overtopping Elevation = 737.0 at Station 1359+50
Prop. Overtopping Elevation = 737.0 at Station 1359+50

Flood	Freq. Yr.	Q (C.F.S.)	Opening (Ft²)		Natural	Head (Ft)		Headwater El.	
			Exist.	Prop.	H.W.E.	Exist.	Prop.	Exist.	Prop.
	10	10,380	1,836	2,058	725.3	0.2	0.1	725.5	725.4
Design	50	16,100	2,220	2,535	727.5	0.5	0.2	728.0	727.7
Base	100	18,800	2,382	2,735	728.4	0.6	0.3	729.0	728.7
Check	200	21,500	2,567	2,962	729.4	0.7	0.4	730.1	729.8
Max. Calc.	500	25,100	2,851	3,309	730.9	0.8	0.4	731.7	731.3

10-year velocity through existing bridge = 5.7 ft/sec
10-year velocity through proposed bridge = 4.7 ft/sec

DESIGN SCOUR ELEVATION TABLE

Event / Limit State	Design Scour Elevations (ft.)				
	W. Abut.	Pier 1	Pier 2	E. Abut.	Item 113
Q100	730.32	704.52	704.52	729.96	5
Q200	730.32	701.84	701.84	729.96	
Design	730.32	704.52	704.52	729.96	
Check	730.32	701.84	701.84	729.96	

GENERAL DETAILS
U.S. ROUTE 20 OVER KISHWAUKEE RIVER
F.A.P. ROUTE 301 - SECTION (201-3)K & (4-1, 5)R
WINNEBAGO COUNTY
STATION 1345+82.83
STRUCTURE NO. 101-0225 (EB)
STRUCTURE NO. 101-0226 (WB)

MODEL: $MODELNAME$
FILE NAME: $FILE$

$DATE$ $TIME$

benesch
Alfred Benesch & Company
35 W Wacker Drive, Suite 3300
CHicago, Illinois 60601
312-565-0450 Job No. 10800

USER NAME =	DESIGNED - JPM	REVISED -	
	CHECKED - MFH	REVISED -	
PLOT SCALE =	DRAWN - JPM	REVISED -	
PLOT DATE =	CHECKED - MFH	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 3 OF 3 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
301	(201-3)K & (4-1, 5)R	WINNEBAGO		
		CONTRACT NO. 64R72		
		ILLINOIS	FED. AID PROJECT	

EXHBIT D

BORING LOGS

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/20/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-01
Station 1344+57.6
Offset 30.0 ft LT
Ground Surface Elev. 739.90 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
739.7				ASPHALT PAVEMENT - 3"
738.5				CONCRETE PAVEMENT - 13.5"
	2			CLAYEY SAND FILL- Dark Brown, Medium-Grained, Medium-Dense, with Gravel and Pebbles
	4		8	
	4			
736.4				
	8			SAND FILL - Brown, Medium-Grained, Medium-Dense, with Gravel and Pebbles
	10		7	
-5	14			
	8			
	11		8	
	15			
731.9				
	4			SANDY LOAM FILL - Black, Medium-Dense, with Gravel and Cobbles, Wet Diesel Smell
	3		18	
-10	9			
	5			
	12		15	
	12			
	6			Becomes Moist, No More Diesel Smell
	6		29	
-15	11			
	4			
723.4				
	6	2.0	23	SANDY CLAY FILL - Black, Stiff, Moist
	8	P		
	4			
	4	3.0	29	
-20	8	P		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SANDY CLAY FILL - Black, Stiff, Moist *(continued)*
	4			Some Organics
	4		36	
	3			
716.9				
	6			SAND - Gray, Medium-to-Coarse Grained, Medium-Dense, Moist
	13		16	
-25	13			
714.4				
	10			SANDY GRAVEL - Gray, Medium-Grained, Medium-Dense, Moist
	13		12	
	11			
	11			No Recovery
	11			
-30	15			
706.9				
	9			COARSE SAND - Gray, Medium-Dense, with Gravel, Moist
	10		13	
	12			
-35				
	12			Poor Recovery
	12		7	
	11			
-40				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/20/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-01
Station 1344+57.6
Offset 30.0 ft LT
Ground Surface Elev. 739.90 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				COARSE SAND - Gray, Medium-Dense, with Gravel, Moist *(continued)*
	11			Poor Recovery
	15		11	With Limestone Fragments
-45	9			
				692.9
				SILT - Gray, Hard, with Sand, Moist
	14			
	21		19	
-50	22			
				No More Sand
	21			
				685.4
	32		17	
-55	28			FINE SAND - Gray, Very-Dense, Moist
				2" Gray Silt
	18			Becomes Very-Fine
	25		18	
-60	26			
				FINE SAND - Gray, Very-Dense, Moist *(continued)*
	19			Becomes Fine
	31		20	
-65	32			
				671.4
	21			SILT - Gray, Hard, Moist
	33		17	670.4
-70	34			FINE SAND - Gray, Very-Dense, Moist
				667.9
				CLAYEY SILT - Gray, Hard, Moist
	24			
	30	1.7	17	
-75	31	B		
	11			660.9
	18		20	FINE SAND - Gray, Dense, Moist
-80	23			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/20/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-01
Station 1344+57.6
Offset 30.0 ft LT
Ground Surface Elev. 739.90 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				FINE SAND - Gray, Dense, Moist *(continued)*
	18			
	17		20	
-85	20			
	17			
	20		20	
-90	19			
	14			
	18		20	
-95	22			
	13			
	16		19	
-100	17			
	14			FINE SAND - Gray, Dense, Moist *(continued)*
	16		17	
-105	24			
	18			Becomes Very-Dense
	30		21	
-110	29			
				627.9
				SAND - Gray, Medium-Grained, Very-Dense, Moist
	23			
	27		16	
-115	26			
	19			
	26		15	
-120	30			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/20/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-01
Station 1344+57.6
Offset 30.0 ft LT
Ground Surface Elev. 739.90 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter _____ ft
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SAND - Gray, Medium-Grained, Very-Dense, Moist *(continued)*				
Becomes Dense		20		
		21		15
614.9	-125	23		
End of Boring				
	-130			
	-135			
	-140			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/13/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0073
Station 1345+79.08

BORING NO. SB-02
Station 1344+20.6
Offset 30.0 ft RT
Ground Surface Elev. 739.99 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
739.6				ASPHALT PAVEMENT - 4.5"
738.6				CONCRETE PAVEMENT - 12"
	4			
	4		14	SANDY LOAM FILL- Dark Brown, Dense, Medium-Grained, with Cobbles and Rubble, Moist
	6			
737.0				
	7			SAND FILL - Brown, Dense, Fine-to-Coarse Grained, Moist
	3		6	
-5	14			
	11			Becomes Brown-Gray
	14		4	
	16			
	14			
	13		6	Becomes Black
-10	12			
729.0				
	4			CLAYEY SAND FILL - Black, Medium-Dense, Medium-Grained, with Trace Gravel, Moist
	5		23	
	7			
726.5				
	3			CLAYEY SILT FILL - Black, Stiff, Some Organics, Moist
725.5				
	10		27	SAND FILL - Brown-Gray, Medium-Dense, Moist
-15	8			
724.0				
	3			SANDY CLAY LOAM FILL - Black, Stiff, with Some Organics, Moist
	5	1.0	29	
	12	P		
	3			
	6		32	
-20	9			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SANDY CLAY LOAM FILL - Black, Stiff, with Some Organics, Moist *(continued)*
	5			
715.5				
	6		26	SANDY GRAVEL - Gray, Medium-Dense, Moist
-25	7			
714.0				
	10			GRAVELLY SAND - Gray, Medium-Dense, Coarse-Grained, Moist
	14		14	
	10			
	8			
	10		12	
-30	6			
	16			
	20		10	Becomes Dense
-35	20			
	11			Becomes Medium-Dense
	10		11	
-40	6			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/13/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0073
Station 1345+79.08

BORING NO. SB-02
Station 1344+20.6
Offset 30.0 ft RT
Ground Surface Elev. 739.99 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				GRAVELLY SAND - Gray, Medium-Dense, Coarse-Grained, Moist *(continued)*
	14			
	13		8	
-45	13			
691.0	6			
	20		14	SAND - Gray, Dense, Very-Fine Grained, Moist
-50	18			
686.0	16			
	23	1.5	15	CLAYEY SILT - Gray with Trace Gravel, Moist
-55	21	P		
683.5				
				SAND - Gray, Dense, Very-Fine Grained, with Trace Gravel, Moist
	15			
	21		16	
-60	20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SAND - Gray, Dense, Very-Fine Grained, with Trace Gravel, Moist *(continued)*
	17			
	24		21	
-65	27			No More Gravel
673.5				
				SILT - Gray, Very Stiff, Moist
	17			
	23		17	
-70	25			
	17			
	20		17	
665.0 -75	20			
				End of Boring
-80				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/22/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-03
Station 1345+35.8
Offset 30.0 ft LT
Ground Surface Elev. 739.81 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Note: Drilling Through Bridge Deck
739.1				CONCRETE PAVEMENT - 8"
				Blind Drilling Total Casing used = 35 ft
-5				
-10				
-15				
-20				
-25				Blind Drilling Total Casing used = 35 ft *(continued)*
714.8	8			CLAYEY SILT (RIVER SEDIMENTS) - Black, with Gravel and Rubbles, Wet
	5 10 6		16	
	14			
	7 3 4		11	
710.8	6			COARSE SAND - Gray, Loose, with Gravel and Rubbles, Wet
-30	5 4 4		9	
	5			
	5 4 4		12	
707.3				SAND - Gray, Loose, Medium-Grained, Wet
706.8	3			COARSE SAND - Gray, Medium-Dense, Wet Poor Recovery
-35	7 6		24	
	5			Becomes Loose
	4 6		16	
	9			No Recovery
-40	8 8			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/22/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-03
Station 1345+35.8
Offset 30.0 ft LT
Ground Surface Elev. 739.81 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				COARSE SAND - Gray, Medium-Dense, Wet
	10			Poor Recovery *(continued)*
	13		15	Becomes Gray-Brown, with Gravel, Medium-Dense
	8			
	4			Poor Recovery
	20		14	Becomes Gray
-45	12			
694.3				
	19			SAND - Gray, Fine-to-Coarse Grained, Very Dense, with Gravel and Limestone Fragments
	33		11	
	44			
	50/1"			No Recovery
-50				
689.3				
	9			FINE SAND - Gray, Medium-Dense, with Limestone Fragments, Moist
	10		16	
	11			
686.8				
	11			SAND - Gray, Medium-Dense, Very-Fine Grained, Moist
	14		25	
-55	12			
682.8				
	9			SILT - Gray, Very Stiff 1" of Fine Sand
	11	0.7	17	
-60	11	B		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SILT - Gray, Very Stiff 1" of Fine Sand *(continued)*
678.3				
				SANDY SILT - Gray, Stiff, Moist
	7			
	8		22	
-65	8			
672.8				
				SAND - Gray, Dense, Very-Fine Grained, Moist
	6			
	6		24	
-70	7			
	12			
	8		24	
-75	10			
662.8				
	16			CLAYEY SILT - Gray, Hard, with Sand, Moist
	23		20	
-80	18			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/22/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-03
Station 1345+35.8
Offset 30.0 ft LT
Ground Surface Elev. 739.81 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
CLAYEY SILT - Gray, Hard, with Sand, Moist *(continued)*			
No More Sand	8		
	10 13	0.9 B	20
-85			
650.8	19		
FINE SAND - Gray, Dense, Moist	24 22		20
-90			
	19		
	23 25		19
-95			
	19		
	20 18		22
639.8 -100			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
End of Boring			
-105			
-110			
-115			
-120			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/15/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0073
Station 1345+79.08

BORING NO. SB-04
Station 1344+98.4
Offset 30.0 ft RT
Ground Surface Elev. 739.96 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
739.3			
Note: Drilling Through Bridge Deck CONCRETE PAVEMENT - 8.25"			
Blind Drilling Total Casing used = 40 ft			
-5			
-10			
-15			
-20			
719.0			
Blind Drilling Total Casing used = 40 ft *(continued)*	3		
	9 50		28
	5		
	5 4		36
715.5			
GRAVELLY SAND - Gray-Brown, Coarse-Grained, with Rubble and Pebbles, Moist	6		
-25	5 5		13
	5		
	6 3		14
	8		
-30	21 18		12
709.0			
SAND - Gray, Medium-Dense, Coarse-Grained, with Some Gravels, Moist	5		
	7 6		17
	11		
	18 12		9
-35			
704.5			
GRAVELLY SAND - Gray, Medium-Dense, Coarse-Grained, Moist	13		
	14 9		17
	14		
-40	14 11		14

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/15/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0073
Station 1345+79.08

BORING NO. SB-04
Station 1344+98.4
Offset 30.0 ft RT
Ground Surface Elev. 739.96 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	9			GRAVELLY SAND - Gray, Medium-Dense, Coarse-Grained, Moist *(continued)* Becomes Wet
	7 6		18	
	11			
	15 9		20	
-45	13			
	28 28		12	
	26			
	34 32			
-50				
688.0				SAND - Gray, Dense, Very-Fine Grained, Moist
	18			
	24 26		17	
-55				
	12			
	17 18		25	
-60				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	17			SAND - Gray, Dense, Very-Fine Grained, Moist *(continued)*
-65	18 19		18	
	15			
	22 22		22	
-70				
668.5				SILTY SAND - Gray, Dense, Very-Fine Grained, Moist
	20			
	25 22		14	
-75				
663.0				SILT - Gray, Very-Stiff, Moist
	12			
	13 16	0.9 B	17	
-80				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/15/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0073
Station 1345+79.08

BORING NO. SB-04
Station 1344+98.4
Offset 30.0 ft RT
Ground Surface Elev. 739.96 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter _____ ft
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILT - Gray, Very-Stiff, Moist *(continued)*				
658.0				
SAND - Gray, Very-Dense, Very-Fine Grained		20		
		28		17
	-85	27		
		24		
		39		22
	-90	39		
Becomes Medium-Grained				
		16		
		20		23
	-95	23		
		14		
		21		20
640.0	-100	24		

End of Boring

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/21/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-05
Station 1346+63.6
Offset 30.0 ft LT
Ground Surface Elev. 739.66 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
739.0			
Note: Drilling Through Bridge Deck CONCRETE PAVEMENT - 8"			
Blind Drilling Total Casing used = 35 ft			
-5			
-10			
-15			
-20			
-25			
712.7			
SAND - Brown, Fine-to-Coarse Grained, Loose, with Rubbles and Gravel, Moist	1 4 4 6		10
Poor Recovery	2		
-30	2 3 2		10
Poor Recovery No More Rubbles	8 7 9 7		7
-35	10 6 7		23
704.2			
COARSE SAND - Brown, Medium-Dense, with Gravel	10 10 10		18
Becomes Brown-Gray	10 10 9		13
-40			

Blind Drilling
Total Casing used = 35 ft
(continued)

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/21/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-05
Station 1346+63.6
Offset 30.0 ft LT
Ground Surface Elev. 739.66 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
COARSE SAND - Brown, Medium-Dense, with Gravel *(continued)*				
No Recovery		13		
		16		
		11		
With Limestone Fragments		12		
		14		7
	-45	15		
	694.2			
GRAVELLY SAND - Gray-Brown, Medium-Dense, Coarse-Grained, Moist		15		
		12		12
		13		
Poor Recovery		6		
Becomes Gray		20		14
	-50	9		
	689.2			
FINE SAND - Gray, Medium-Dense, Moist		10		
Becomes Very-Fine Grained		10		18
		10		
		7		
		13		22
	-55	9		
		10		
	682.7			
		12	1.0	23
		14	P	
SILT - Gray, Stiff, Moist				
	681.2			
CLAYEY SILT - Gray, Hard, Moist		10		
		16	3.0	18
	-60	22	P	

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
CLAYEY SILT - Gray, Hard, Moist *(continued)*				
	677.7			
SILT - Gray, Hard, with Sand, Moist		14		
		24	0.5	19
	-65	22	P	
	672.7			
SAND - Gray, Dense, Very-Fine Grained		17		
		21		20
	-70	24		
		20		
		24		21
	-75	30		
	662.7			
CLAYEY SILT - Gray, Very Stiff		11		
		15		18
	-80	13		

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/21/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-05
Station 1346+63.6
Offset 30.0 ft LT
Ground Surface Elev. 739.66 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				CLAYEY SILT - Gray, Very Stiff *(continued)*
	8			With Trace Gravel
	10	1.3	20	
-85	7	S		
651.2				
	11			SAND - Gray, Medium-Grained, Dense, Moist
	20	0.3	20	
-90	22	B		
	8			
	19		23	
-95	22			
	20			With Sandstone Fragments
	27		18	
-100	29			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SAND - Gray, Medium-Grained, Dense, Moist *(continued)*
	28			
	23		12	
634.7 -105	22			
				End of Boring
-110				
-115				
-120				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/14/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0073
Station 1345+79.08

BORING NO. SB-06
Station 1346+24.6
Offset 30.0 ft RT
Ground Surface Elev. 739.91 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
739.2				Note: Drilling Through Bridge Deck CONCRETE PAVEMENT - 8.25"
				Blind Drilling Total Casing used = 40 ft
-5				
-10				
-15				
-20				
-25				Blind Drilling Total Casing used = 40 ft *(continued)*
712.4				
	13			GRAVELLY SAND - Brown, Coarse-Grained, Loose
	10 5		11	
710.4				
-30	8			SAND - Brown, Fine-to-Coarse Grained, Loose, with Gravel Sample Refusal on Limestone Fragments at 33.5'
	4 3		14	
	10			
	50/0"		7	
	50/1"			
704.9			5	
-35				GRAVELLY SAND - Brown, Medium-Dense, Coarse-Grained, with Rubbles and Pebbles, Wet
	5			
	7 11		13	
	46			
-40	50/2"		7	

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/14/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0073
Station 1345+79.08

BORING NO. SB-06
Station 1346+24.6
Offset 30.0 ft RT
Ground Surface Elev. 739.91 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	15			GRAVELLY SAND - Brown, Medium-Dense, Coarse-Grained, with Rubbles and Pebbles, Wet *(continued)*
	18		7	Becomes Dense
	21			
696.9				
	14			SANDY GRAVEL - Brown-Gray, Dense, Fine-to-Coarse Grained, Moist
	15		6	
-45	19			
	11			
	15		16	
	17			
691.9				
	13			SAND - Gray, Medium-Dense, Very-Fine Grained, with Trace Gravel and Silt, Moist
	14		17	
-50	15			
	13			
	13		20	
	13			
686.9				
	9			SILT - Gray, Very-Stiff, Moist
	14	0.5	17	
-55	17	P		
	13			
	17		18	
	14			
	15			
	17		23	
-60	23			
	15			SILT - Gray, Very-Stiff, Moist *(continued)*
677.9				
	18			SAND - Gray- Brown, Dense, Very-Fine Grained, Moist
	20		20	
-65	25			
	18			
	27		19	Becomes Very Dense
-70	30			
	21			
	32		20	
-75	36			
	20			
	29		21	
-80	36			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/14/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0073
Station 1345+79.08

BORING NO. SB-06
Station 1346+24.6
Offset 30.0 ft RT
Ground Surface Elev. 739.91 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter _____ ft
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SAND - Gray- Brown, Dense, Very-Fine Grained, Moist *(continued)* Becomes Medium-Grained		25		
655.4		26		16
SILT - Gray, Hard, Moist	-85	24		
		16		
		16		18
	-90	20		
647.9				
SAND - Gray, Very-Dense, Medium-Grained, with Sandstone Fragments, Moist		18		
3" Seam of Silt		23		18
	-95	49		
		19		
		20		18
639.9	-100	31		

End of Boring

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/19/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-07
Station 1347+41.2
Offset 27.5 ft LT
Ground Surface Elev. 739.56 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
739.4				ASPHALT PAVEMENT - 2"
738.4				CONCRETE PAVEMENT - 12"
	7			SANDY CLAY FILL - Dark Brown, Medium-Stiff, with Trace Gravel
	5	2.0	17	
	7	P		
735.6	5			
	12		5	SAND FILL - Gray, Medium-Grained, Medium-Dense, with Trace Gravel
-5	16			
	11			Becomes Dark Brown
	16		6	
	18			
	5			
	11		6	
-10	12			
	12			becomes Moist
	15		10	
	10			
	5			Becomes Brown, Dense and Wet
725.1	19		15	
-15	13			CLAYEY SAND - Dark Brown, Medium-Dense, with Gravel, Wet
	10			
	17	2.5	23	
	9	P		
720.6	7			With Some Organics
	10		29	
-20	7			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
718.6				SAND - Dark Brown, Medium-Grained, Medium-Dense, with Trace Gravel and Organics, Wet *(continued)*
718.1	3			CLAY - Dark Brown, Soft, Wet
	4		21	
	5			
716.6				SAND - Dark Brown, Medium-Grained, Loose, Wet
	18			COARSE SAND - Gray, Dense, with Trace Gravel, Moist
	20		12	
-25	18			
714.1				GRAVELLY SAND - Brown, Dense, Moist, Coarse-Grained, Moist
	11			
	12		10	
	11			
711.6				COARSE SAND - Brown, Medium-Dense, with Gravel, Moist
	10			
	12		13	
-30	14			
	11			No Recovery
	10			
-35	9			
	10			Poor Recovery
	35			2" of Limestone Fragments
699.6 -40	32			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/19/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0074
Station 1345+79.08

BORING NO. SB-07
Station 1347+41.2
Offset 27.5 ft LT
Ground Surface Elev. 739.56 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SAND - Gray-Brown, Medium-Dense, Fine-to-Course Grained, Moist			
	7		
	14		11
-45	11		
692.6			
COARSE SAND - Gray, Very-Dense, Moist			
	13		
	25		12
-50	28		
687.6			
FINE SAND - Gray, Dense, Moist			
	12		
	18		19
-55	21		
682.6			
SILT - Gray, Stiff, Moist			
	15		
	21		20
679.6 -60	25		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SAND - Gray, Dense, Very-Fine Grained, Moist			
675.6	20		
SILTY SAND - Gray, Very-Dense	25		21
-65	27		
672.6			
FINE SAND - Gray, Very-Dense			
	20		
	27		23
-70	28		
Becomes Very-Fine	20		
	29		19
664.6 -75	29		
End of Boring			
-80			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/12/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0078
Station 1345+79.08

BORING NO. SB-08
Station 1347+02.9
Offset 30.0 ft RT
Ground Surface Elev. 739.87 ft

Surface Water Elev. ____ ft
Stream Bed Elev. ____ ft

Groundwater Elev.:
First Encounter ____ ft
Upon Completion ____ ft
After ____ **Hrs.** ____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
739.5				ASPHALT PAVEMENT - 4"
738.5				CONCRETE PAVEMENT - 12"
	7			SAND FILL - Brown, Medium-Grained, with Trace Gravel
	6		9	
	4			
736.9				SANDY CLAY FILL - Black, Medium-Stiff, with Cobbles and Pebbles
	2			
	6	2.0	18	
-5	10	P		
734.4				GRAVELLY SAND FILL - Black-Gray, Medium-Dense, Medium-Grained
	6			
	11		7	
	15			
	6			
	13		10	
729.9	11			
-10				GRAVELLY SAND - Brown-Gray, Medium-Dense, Medium-Grained, Wet
	11			
	18		15	
	15			
				Becomes Gray
	6			
	8		20	
-15	8			
				Becomes Dense
	13			
722.9	12		15	
	7			CLAY - Black, Medium-Stiff, with Trace Gravel and some Organic, Moist
	4			
	7			
-20	11			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
				CLAY - Black, Medium-Stiff, with Trace Gravel and some Organic, Moist *(continued)*
	3			
717.9	4	1.0	27	
	12	P		SAND - Brown, Loose, Fine-Grained, with Gravel, Moist
	7			
715.4	12		17	
-25	12			SANDY GRAVEL - Brown, Loose, Moist
	10			
	5		10	
	1			
711.9				GRAVELLY SAND - Brown, Loose, Coarse-Grained, Moist
	10			
	12		15	
-30	11			
	11			
	13		14	
-35	15			
				Becomes Gray
	15			
	12		8	
-40	13			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/12/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0078
Station 1345+79.08

BORING NO. SB-08
Station 1347+02.9
Offset 30.0 ft RT
Ground Surface Elev. 739.87 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
GRAVELLY SAND - Brown, Loose, Coarse-Grained, Moist *(continued)*			
697.9			
SANDY GRAVEL - Gray, Loose, Coarse-Grained, Some Pebbles, Moist	17		
	16		9
-45	25		
	18		
	30		10
-50	50		
	16		
685.9			
SAND - Gray, Dense, Very-Fine Grained, wiht Trace Gravel, Moist	21		18
-55	22		
681.9			
SILTY SAND - Gray, Dense, with Trace Gravel, Moist	15		
	15		19
-60	25		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY SAND - Gray, Dense, with Trace Gravel, Moist *(continued)*			
677.9			
SAND - Gray, Dense, Very-Fine Grained, Moist	18		
	21		25
-65	28		
	23		
	34		17
-70	35		
Becomes Gray-Brown and Very-Dense	21		
	30		18
-75	37		
	20		
	31		
-80	40		

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/12/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0078
Station 1345+79.08

BORING NO. SB-08
Station 1347+02.9
Offset 30.0 ft RT
Ground Surface Elev. 739.87 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SAND - Gray, Dense, Very-Fine Grained, Moist *(continued)*
	13			
655.4	15		17	Becomes Dense with Trace Gravel
-85	16			SANDY SILT - Gray, Stiff, Moist
	8			
	7	0.4	17	
-90	8	B		
647.9				
				SAND - Gray, Dense, Medium-Grained, Moist
	10			
645.4	13	2.5	18	
-95	24	P		SANDY CLAY - Gray, Stiff, with Trace Gravel, Moist
642.9				
				SAND - Gray, Dense, Coarse-Grained, with Trace Gravel, Moist
	18			
	20		18	
-100	20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SAND - Gray, Dense, Coarse-Grained, with Trace Gravel, Moist *(continued)*
	15			Becomes Very-Dense and No More Gravel
	25		15	
-105	30			
631.9				
	29			SAND - Gray, Very-Dense, Medium-Grained, Moist
	35		20	
-110	32			
	20			Becomes Dense
	21		23	
-115	23			
	22			Becomes Very-Dense with Trace Gravel
	24		14	
-120	33			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 7/12/21

ROUTE FAP Route 301 **DESCRIPTION** PTB 193-20 I-39 and U.S. 20 D2 **LOGGED BY** KEG

SECTION (201-3)K&(4-1,5)R **LOCATION** US-20 over Kishwaukee River

COUNTY Winnebago **DRILLING METHOD** MUD ROTARY **HAMMER TYPE** AUTO

STRUCT. NO. 101-0078
Station 1345+79.08

BORING NO. SB-08
Station 1347+02.9
Offset 30.0 ft RT
Ground Surface Elev. 739.87 ft

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft

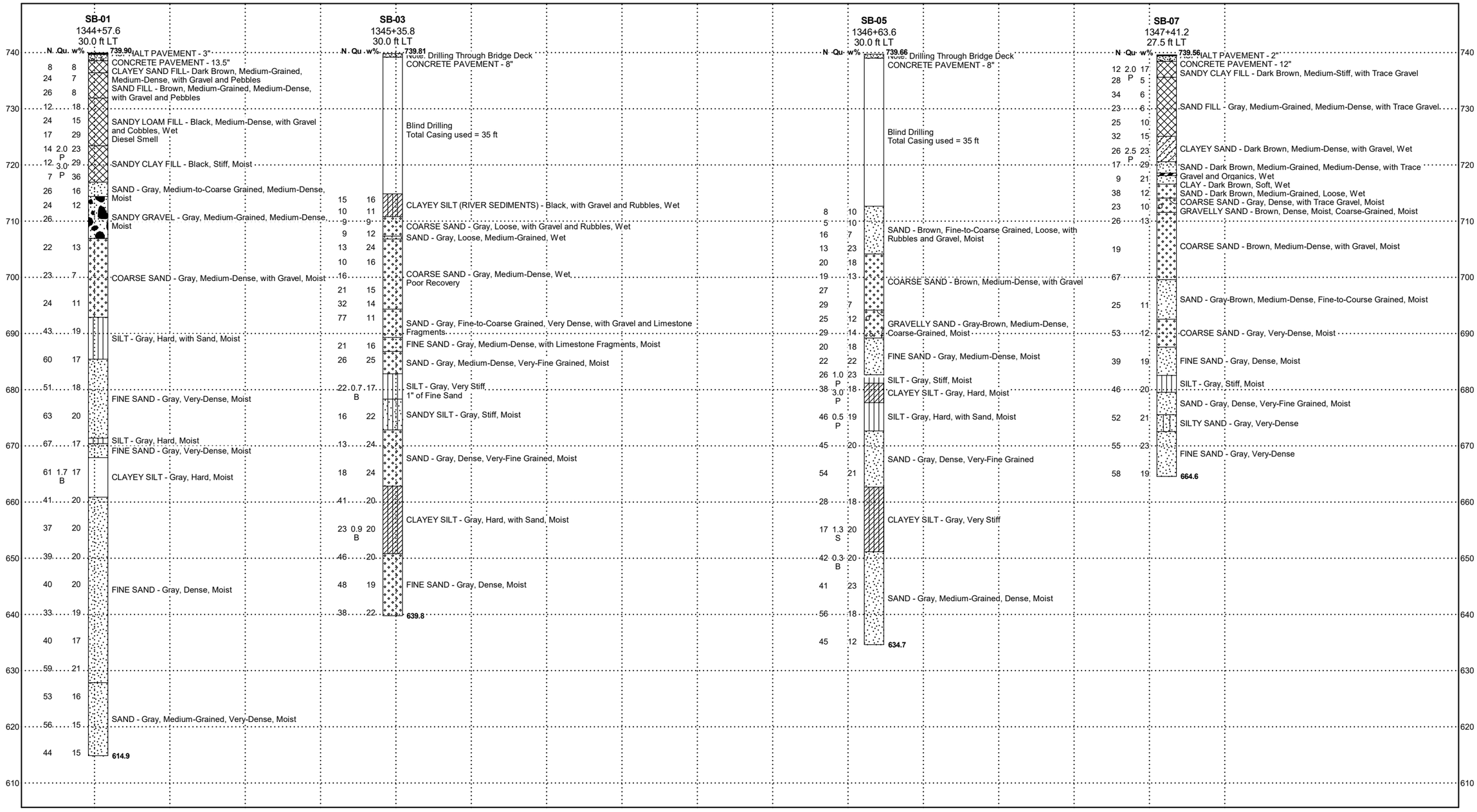
Groundwater Elev.:
First Encounter _____ ft
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SAND - Gray, Very-Dense, Medium-Grained, Moist *(continued)*				
617.9				
COARSE SAND - Gray, Dense, with Gravel and Sandstone Fragments, Moist		22		
		26		12
614.9	-125	22		
End of Boring				
	-130			
	-135			
	-140			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

EXHIBIT E

SUBSURFACE PROFILE



PRINTERMOD2 11X17 19-1138.00 US 20 OVER KISHWAUKEE RIVER.GPJ IL_DOT.GDT 6/29/23

Illinois Department of Transportation
Division of Highways

NOT TO HORIZONTAL SCALE

SUBSURFACE PROFILE

Route: FAP Route 301
Section: (201-3)K&(4-1,5)R
County: Winnebago

Elevation (ft)

SB-02
1344+20.6
30.0 ft RT

N		Qu	w%	
				739.99 ASPHALT PAVEMENT - 4.5"
10		14		CONCRETE PAVEMENT - 12"
17		6		SANDY LOAM FILL- Dark Brown, Dense, Medium-Grained, with Cobbles and Rubble, Moist
30		4		SAND FILL - Brown, Dense, Fine-to-Coarse Grained, Moist
25		6		
12		23		CLAYEY SAND FILL - Black, Medium-Dense, Medium-Grained, with Trace Gravel, Moist
18		27		CLAYEY SILT FILL - Black, Stiff, Some Organics, Moist
17	1.0 P	29		SAND FILL - Brown-Gray, Medium-Dense, Moist
15		32		SANDY CLAY LOAM FILL - Black, Stiff, with Some Organics, Moist
13		26		SANDY GRAVEL - Gray, Medium-Dense, Moist
24		14		
16		12		
40		10		
16		11		GRAVELLY SAND - Gray, Medium-Dense, Coarse-Grained, Moist
26		8		
38		14		
				SAND - Gray, Dense, Very-Fine Grained, Moist
44	1.5 P	15		CLAYEY SILT - Gray with Trace Gravel, Moist
41		16		
				SAND - Gray, Dense, Very-Fine Grained, with Trace Gravel, Moist
51		21		
48		17		
				SILT - Gray, Very Stiff, Moist
40		17		665.0

SB-04
1344+98.4
30.0 ft RT

N		Qu	w%	
				739.96 Note: Drilling Through Bridge Deck CONCRETE PAVEMENT - 8.25"
				Blind Drilling Total Casing used = 40 ft
59		28		CLAY - Dark Brown, Medium-Stiff, with Sand and Rubble
9		36		
10		13		
9		14		GRAVELLY SAND - Gray-Brown, Coarse-Grained, with Rubble and Pebbles, Moist
39		12		
13		17		SAND - Gray, Medium-Dense, Coarse-Grained, with Some Gravels, Moist
30		9		
23		17		
25		14		
13		18		
24		20		GRAVELLY SAND - Gray, Medium-Dense, Coarse-Grained, Moist
56		12		
66				
				SAND - Gray, Dense, Very-Fine Grained, Moist
50		17		
35		25		
				SAND - Gray, Dense, Very-Fine Grained, Moist
37		18		
44		22		
				SILTY SAND - Gray, Dense, Very-Fine Grained, Moist
47		14		
29	0.9 B	17		SILT - Gray, Very-Stiff, Moist
55		17		
78		22		SAND - Gray, Very-Dense, Very-Fine Grained
43		23		
45		20		640.0

SB-06
1346+24.6
30.0 ft RT

N		Qu	w%	
				739.91 Note: Drilling Through Bridge Deck CONCRETE PAVEMENT - 8.25"
				Blind Drilling Total Casing used = 40 ft
15		11		GRAVELLY SAND - Brown, Coarse-Grained, Loose
7		14		
		7		SAND - Brown, Fine-to-Coarse Grained, Loose, with Gravel
		5		Sample Refusal on Limestone Fragments at 33.5'
18		13		
		7		GRAVELLY SAND - Brown, Medium-Dense, Coarse-Grained, with Rubbles and Pebbles, Wet
39		7		
34		6		SANDY GRAVEL - Brown-Gray, Dense, Fine-to-Coarse Grained, Moist
32		16		
29		17		
26		20		SAND - Gray, Medium-Dense, Very-Fine Grained, with Trace Gravel and Silt, Moist
31	0.5 P	17		
31		18		SILT - Gray, Very-Stiff, Moist
40		23		
45		20		
57		19		
				SAND - Gray- Brown, Dense, Very-Fine Grained, Moist
68		20		
65		21		
50		16		
36		18		SILT - Gray, Hard, Moist
72		18		
				SAND - Gray, Very-Dense, Medium-Grained, with Sandstone Fragments, Moist
51		18		639.9

SB-08
1347+02.9
30.0 ft RT

N		Qu	w%	
				739.87 ASPHALT PAVEMENT - 4"
10		9		CONCRETE PAVEMENT - 12"
16	2.0 P	18		SAND FILL - Brown, Medium-Grained, with Trace Gravel
26		7		SANDY CLAY FILL - Black, Medium-Stiff, with Cobbles and Pebbles
24		10		GRAVELLY SAND FILL - Black-Gray, Medium-Dense, Medium-Grained
33		15		
16		20		GRAVELLY SAND - Brown-Gray, Medium-Dense, Medium-Grained, Wet
19		15		
18				
				CLAY - Black, Medium-Stiff, with Trace Gravel and some Organic, Moist
16	1.0 P	27		SAND - Brown, Loose, Fine-Grained, with Gravel, Moist
24		17		
6		10		SANDY GRAVEL - Brown, Loose, Moist
23		15		
28		14		GRAVELLY SAND - Brown, Loose, Coarse-Grained, Moist
25		8		
41		9		
				SANDY GRAVEL - Gray, Loose, Coarse-Grained, Some Pebbles, Moist
80		10		
43		18		
				SAND - Gray, Dense, Very-Fine Grained, wiht Trace Gravel, Moist
40		19		SILTY SAND - Gray, Dense, with Trace Gravel, Moist
49		25		
69		17		
				SAND - Gray, Dense, Very-Fine Grained, Moist
67		18		
71				
31		17		
15	0.4 B	17		SANDY SILT - Gray, Stiff, Moist
37	2.5 P	18		SAND - Gray, Dense, Medium-Grained, Moist
40		18		SANDY CLAY - Gray, Stiff, with Trace Gravel, Moist
55		15		SAND - Gray, Dense, Coarse-Grained, with Trace Gravel, Moist
67		20		
44		23		SAND - Gray, Very-Dense, Medium-Grained, Moist
57		14		
48		12		COARSE SAND - Gray, Dense, with Gravel and Sandstone Fragments, Moist
				614.9

740 730 720 710 700 690 680 670 660 650 640 630 620 610

PRINTERMOD2 11X17 19-1138.00 US 20 OVER KISHWAUKEE RIVER.GPJ IL_DOT.GDT 6/29/23

Illinois Department of Transportation
Division of Highways

NOT TO HORIZONTAL SCALE

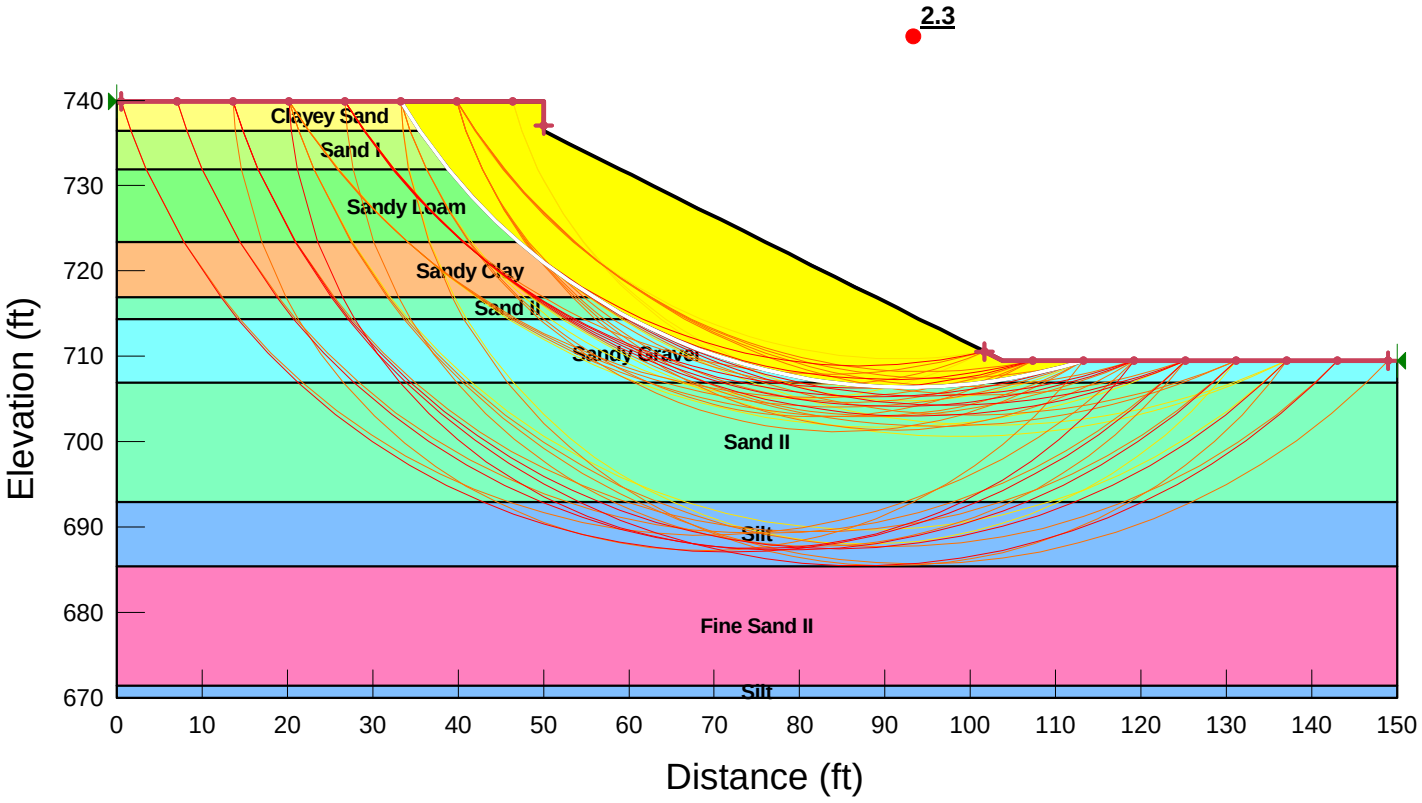
SUBSURFACE PROFILE

Route: FAP Route 301
Section: (201-3)K&(4-1,5)R
County: Winnebago

EXHIBIT F

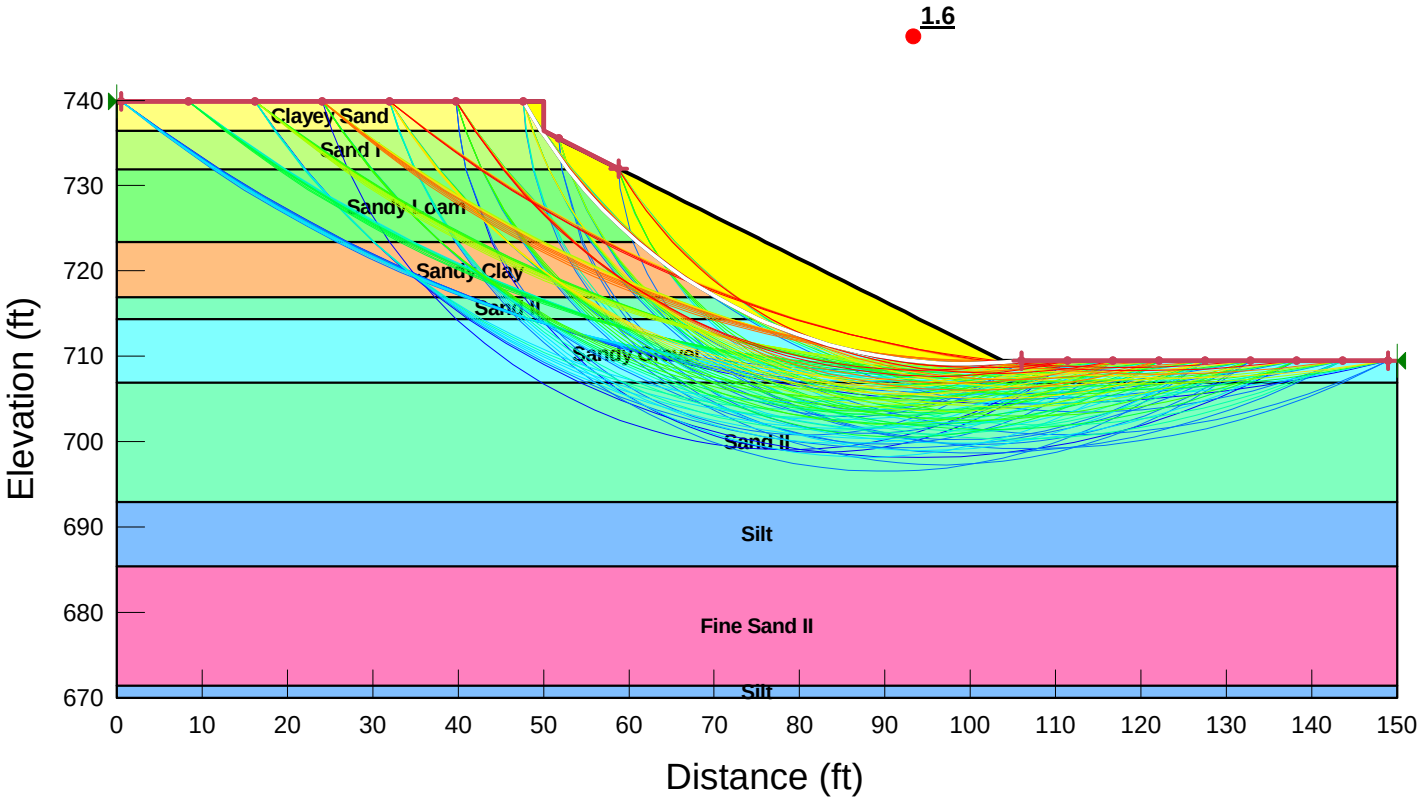
SLOPE W SLOPE STABILITY ANALYSIS

US 20 over Kishwaukee River
West Abutment (Westbound)
Boring SB-01
End of Construction (Undrained Analysis)



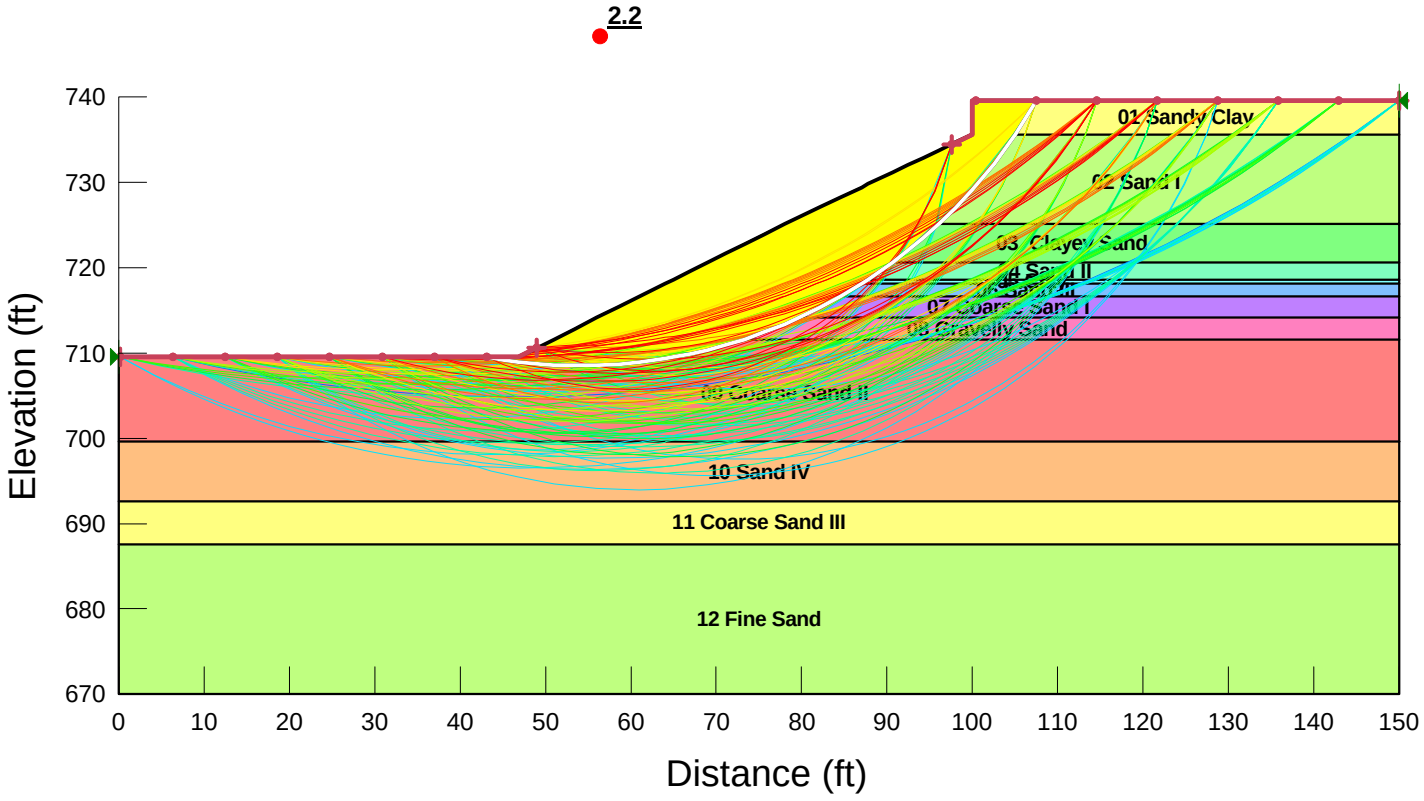
Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clayey Sand	Mohr-Coulomb	120	0	29
	Fine Sand II	Mohr-Coulomb	115	0	47
	Sand I	Mohr-Coulomb	115	0	33
	Sand II	Mohr-Coulomb	115	0	35
	Sandy Clay	Mohr-Coulomb	120	2,500	0
	Sandy Gravel	Mohr-Coulomb	120	0	35
	Sandy Loam	Mohr-Coulomb	120	0	32
	Silt	Mohr-Coulomb	110	1,000	0

US 20 over Kishwaukee River
West Abutment (Westbound)
Boring SB-01
Long Term (Drained Analysis)



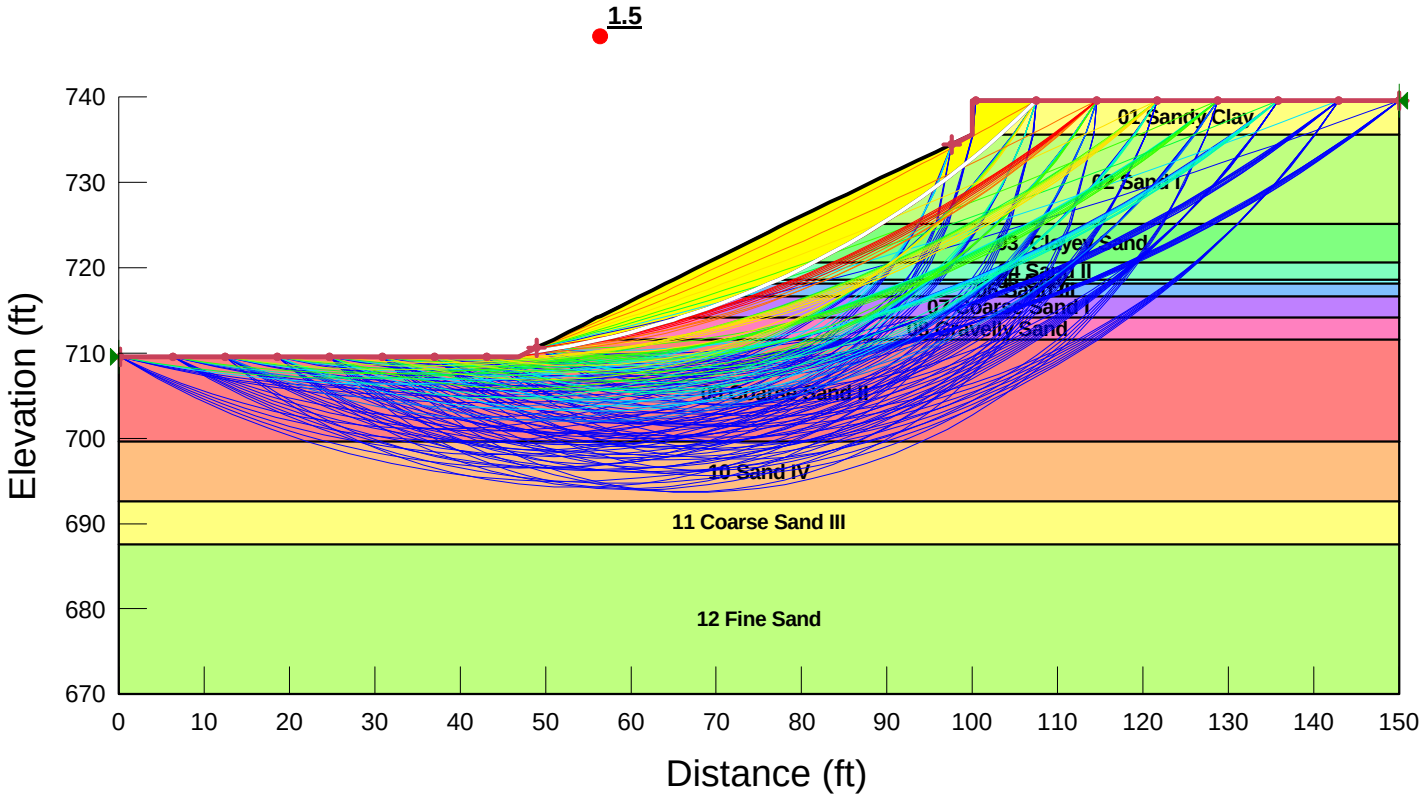
Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clayey Sand	Mohr-Coulomb	120	0	29
	Fine Sand II	Mohr-Coulomb	115	0	47
	Sand I	Mohr-Coulomb	115	0	33
	Sand II	Mohr-Coulomb	115	0	35
	Sandy Clay	Mohr-Coulomb	120	100	30
	Sandy Gravel	Mohr-Coulomb	120	0	35
	Sandy Loam	Mohr-Coulomb	120	0	32
	Silt	Mohr-Coulomb	110	150	26

US 20 over Kishwaukee River
East Abutment (Eastbound)
Boring SB-07
End of Construction (Undrained Analysis)



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	01 Sandy Clay	Mohr-Coulomb	120	2,000	0
	02 Sand I	Mohr-Coulomb	115	0	35
	03 Clayey Sand	Mohr-Coulomb	120	0	36
	04 Sand II	Mohr-Coulomb	115	0	32
	05 Clay	Mohr-Coulomb	120	1,000	0
	06 Sand III	Mohr-Coulomb	115	0	30
	07 Coarse Sand I	Mohr-Coulomb	115	0	39
	08 Gravelly Sand	Mohr-Coulomb	120	0	35
	09 Coarse Sand II	Mohr-Coulomb	115	0	39
	10 Sand IV	Mohr-Coulomb	115	0	35
	11 Coarse Sand III	Mohr-Coulomb	115	0	43
	12 Fine Sand	Mohr-Coulomb	115	0	40

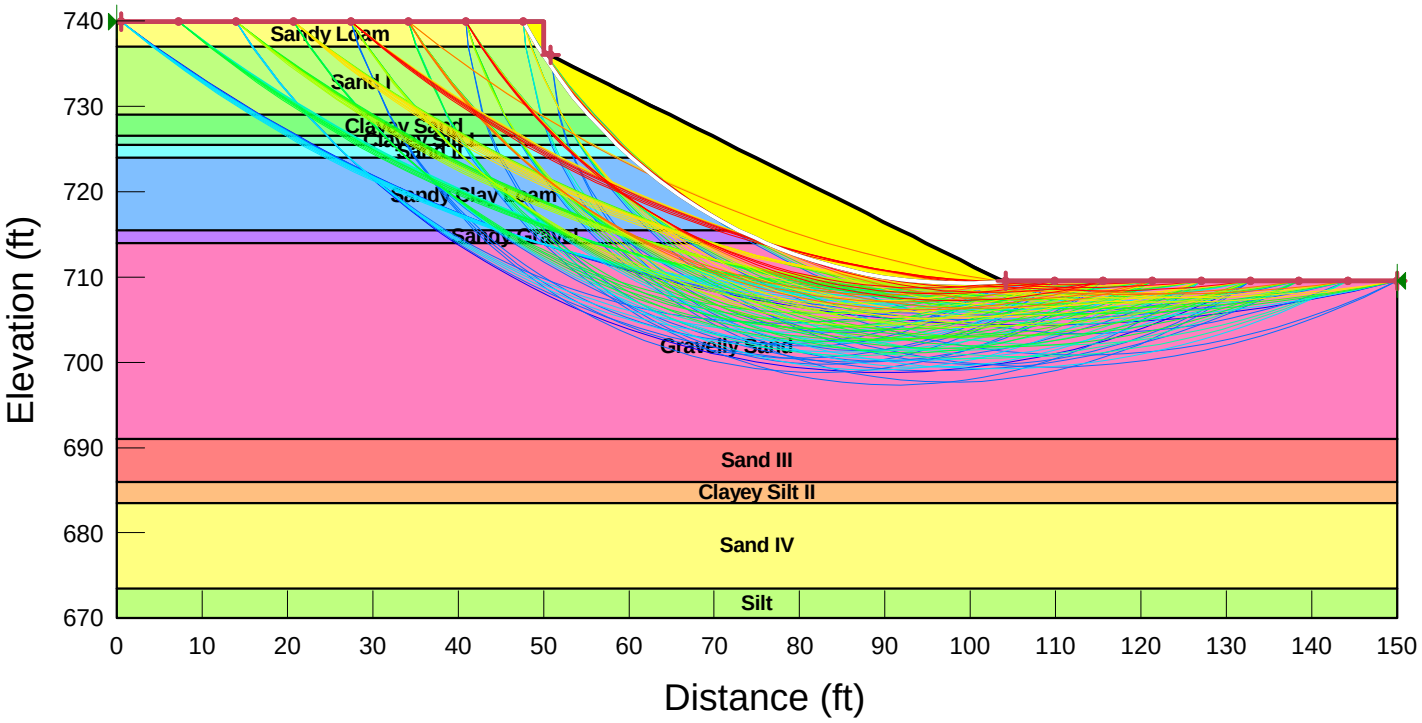
US 20 over Kishwaukee River
East Abutment (Eastbound)
Boring SB-07
Long Term (Drained Analysis)



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	01 Sandy Clay	Mohr-Coulomb	120	100	30
	02 Sand I	Mohr-Coulomb	115	0	35
	03 Clayey Sand	Mohr-Coulomb	120	0	36
	04 Sand II	Mohr-Coulomb	115	0	32
	05 Clay	Mohr-Coulomb	120	100	26
	06 Sand III	Mohr-Coulomb	115	0	30
	07 Coarse Sand I	Mohr-Coulomb	115	0	39
	08 Gravelly Sand	Mohr-Coulomb	120	0	35
	09 Coarse Sand II	Mohr-Coulomb	115	0	39
	10 Sand IV	Mohr-Coulomb	115	0	35
	11 Coarse Sand III	Mohr-Coulomb	115	0	43
	12 Fine Sand	Mohr-Coulomb	115	0	40

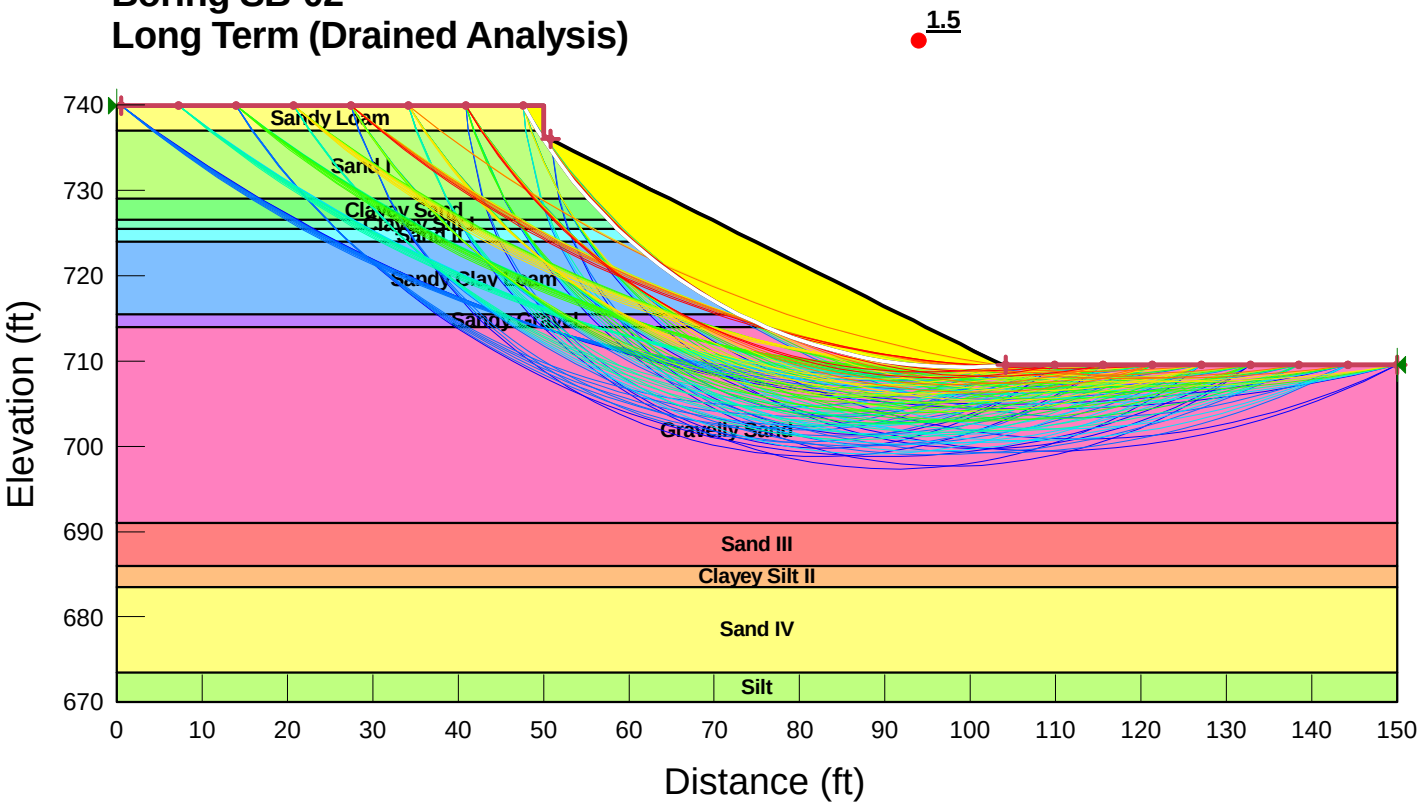
US 20 over Kishwaukee River
West Abutment (Eastbound)
Boring SB-02
End of Construction (Undrained Analysis)

1.6



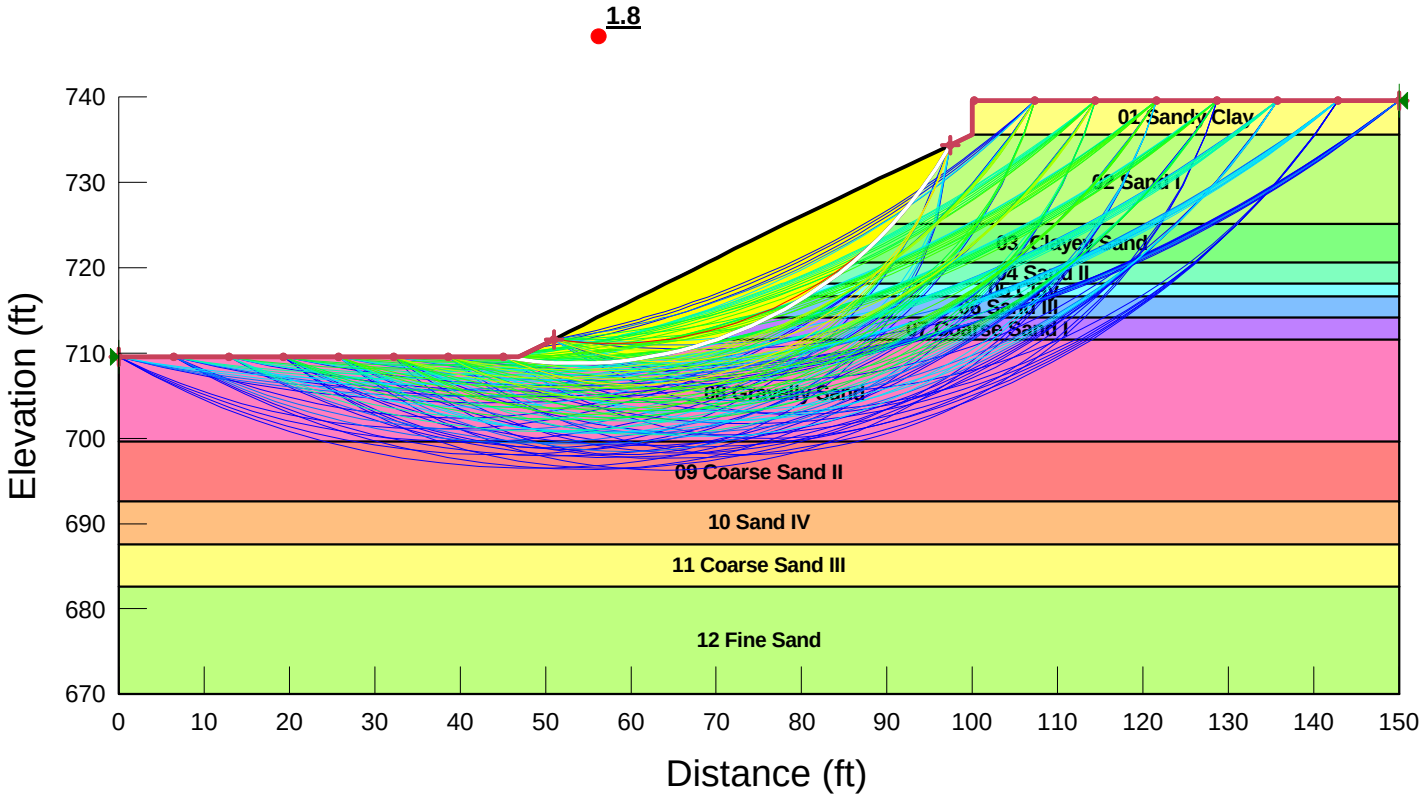
Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clayey Sand	Mohr-Coulomb	120	0	30
	Clayey Silt I	Mohr-Coulomb	110	1,000	0
	Clayey Silt II	Mohr-Coulomb	110	1,500	0
	Gravelly Sand	Mohr-Coulomb	120	0	35
	Sand I	Mohr-Coulomb	115	0	34
	Sand II	Mohr-Coulomb	115	0	33
	Sand III	Mohr-Coulomb	115	0	39
	Sand IV	Mohr-Coulomb	115	0	41
	Sandy Clay Loam	Mohr-Coulomb	120	0	32
	Sandy Gravel	Mohr-Coulomb	120	0	31
	Sandy Loam	Mohr-Coulomb	120	0	29
	Silt	Mohr-Coulomb	110	1,000	0

US 20 over Kishwaukee River
West Abutment (Eastbound)
Boring SB-02
Long Term (Drained Analysis)



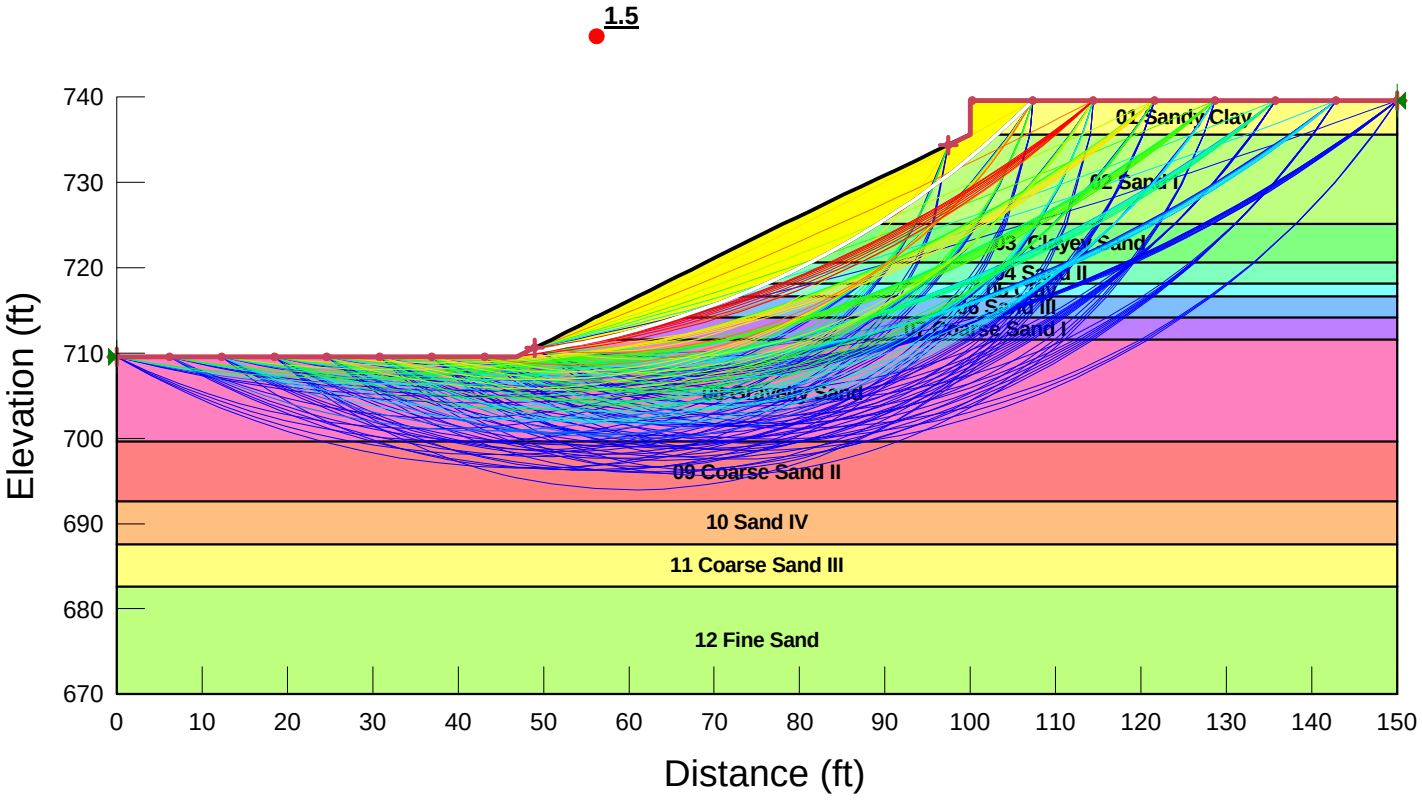
Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clayey Sand	Mohr-Coulomb	120	0	30
	Clayey Silt I	Mohr-Coulomb	110	100	26
	Clayey Silt II	Mohr-Coulomb	110	150	26
	Gravelly Sand	Mohr-Coulomb	120	0	35
	Sand I	Mohr-Coulomb	115	0	34
	Sand II	Mohr-Coulomb	115	0	33
	Sand III	Mohr-Coulomb	115	0	39
	Sand IV	Mohr-Coulomb	115	0	41
	Sandy Clay Loam	Mohr-Coulomb	120	0	32
	Sandy Gravel	Mohr-Coulomb	120	0	31
	Sandy Loam	Mohr-Coulomb	120	0	29
	Silt	Mohr-Coulomb	110	150	26

US 20 over Kishwaukee River
East Abutment (Eastbound)
Boring SB-08
End of Construction (Undrained Analysis)



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	01 Sandy Clay	Mohr-Coulomb	120	2,000	0
	02 Sand I	Mohr-Coulomb	115	0	35
	03 Clayey Sand	Mohr-Coulomb	120	0	36
	04 Sand II	Mohr-Coulomb	115	0	32
	05 Clay	Mohr-Coulomb	120	1,000	0
	06 Sand III	Mohr-Coulomb	115	0	30
	07 Coarse Sand I	Mohr-Coulomb	115	0	39
	08 Gravelly Sand	Mohr-Coulomb	120	0	35
	09 Coarse Sand II	Mohr-Coulomb	115	0	39
	10 Sand IV	Mohr-Coulomb	115	0	35
	11 Coarse Sand III	Mohr-Coulomb	115	0	43
	12 Fine Sand	Mohr-Coulomb	115	0	40

US 20 over Kishwaukee River
East Abutment (Eastbound)
Boring SB-08
Long Term (Drained Analysis)



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	01 Sandy Clay	Mohr-Coulomb	120	100	30
	02 Sand I	Mohr-Coulomb	115	0	35
	03 Clayey Sand	Mohr-Coulomb	120	0	36
	04 Sand II	Mohr-Coulomb	115	0	32
	05 Clay	Mohr-Coulomb	120	100	26
	06 Sand III	Mohr-Coulomb	115	0	30
	07 Coarse Sand I	Mohr-Coulomb	115	0	39
	08 Gravelly Sand	Mohr-Coulomb	120	0	35
	09 Coarse Sand II	Mohr-Coulomb	115	0	39
	10 Sand IV	Mohr-Coulomb	115	0	35
	11 Coarse Sand III	Mohr-Coulomb	115	0	43
	12 Fine Sand	Mohr-Coulomb	115	0	40

EXHIBIT G

PILE LENGTH/PILE TYPE

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== WB - West Abut.
REFERENCE BORING ========== SB-01
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 732.78 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 730.78 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 731.14 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1500 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 57.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 208.70 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 78.26 KIPS

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
335 KIPS	**330** KIPS	**182** KIPS	**88** FT.

PILE TYPE AND SIZE ========== Steel HP 10 X 42
Plugged Pile Perimeter========== 3.300 FT. Unplugged Pile Perimeter========== 4.858 FT.
Plugged Pile End Bearing Area========== 0.680 SQFT. Unplugged Pile End Bearing Area======== 0.086 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
729.78	1.00		12	Medium Sand	0.7		17.8	1.1		***3.2***	3	0	0	2	3
727.28	2.50		24	Medium Sand	3.6	17.1	30.3	5.3	2.2	***9.7***	10	0	0	5	6
723.28	4.00		17	Medium Sand	4.1	25.9	27.5	6.0	3.3	***14.8***	15	0	0	8	10
722.28	1.00	2.00	14		3.8	19.1	40.9	5.7	2.4	***21.7***	22	0	0	12	11
719.78	2.50	3.00	12		12.6	28.6	43.9	18.6	3.6	***39.0***	39	0	0	21	13
716.78	3.00	2.00	7		11.5	19.1	80.5	17.0	2.4	***59.2***	59	0	0	33	16
714.28	2.50		26	Medium Sand	3.9	44.1	81.0	5.8	5.6	***64.5***	65	0	0	35	19
712.28	2.00		24	Sandy Gravel	3.8	40.7	88.2	5.5	5.1	***70.5***	70	0	0	39	21
709.78	2.50		26	Sandy Gravel	5.3	44.1	86.6	7.7	5.6	***77.4***	77	0	0	43	23
707.28	2.50		22	Clean Coarse Sand	3.6	37.3	90.2	5.3	4.7	***82.7***	83	0	0	45	26
704.78	2.50		22	Clean Coarse Sand	3.6	37.3	95.6	5.3	4.7	***88.2***	88	0	0	49	28
699.78	5.00		23	Clean Coarse Sand	7.6	39.0	108.2	11.1	4.9	***100.0***	100	0	0	55	33
694.78	5.00		26	Clean Coarse Sand	8.8	44.1	145.8	12.9	5.6	***116.5***	117	0	0	64	38
689.78	5.00		43	Clean Coarse Sand	19.8	72.9	194.4	29.2	9.2	***149.4***	149	0	0	82	43
684.78	5.00		60	Fine Sand	25.8	101.7	205.0	38.1	12.9	***185.5***	186	0	0	102	48
679.78	5.00		51	Fine Sand	19.7	86.4	245.1	29.0	10.9	***217.1***	217	0	0	119	53
674.78	5.00		63	Fine Sand	28.0	106.8	279.8	41.2	13.5	***259.2***	259	0	0	143	58
669.78	5.00		67	Fine Sand	31.2	113.6	***300.8***	45.9	14.4	303.8	301	0	0	165	63
664.78	5.00		61	Fine Sand	26.6	103.4	***293.5***	39.1	13.1	338.6	293	0	0	161	68
659.78	5.00		41	Fine Sand	13.6	69.5	***300.3***	20.0	8.8	357.7	300	0	0	165	73
654.78	5.00		37	Fine Sand	11.4	62.7	***315.1***	16.9	7.9	375.0	315	0	0	173	78
649.78	5.00		39	Fine Sand	12.5	66.1	***329.3***	18.4	8.4	393.5	329	0	0	181	83
644.78	5.00		40	Fine Sand	13.0	67.8	***330.4***	19.2	8.6	411.2	330	0	0	182	88
639.78	5.00		33	Fine Sand	9.6	55.9	***351.9***	14.2	7.1	426.9	~~352~~	~~0~~	~~0~~	~~194~~	~~93~~
634.78	5.00		40	Fine Sand	13.0	67.8	***397.1***	19.2	8.6	450.1	~~397~~	~~0~~	~~0~~	~~218~~	~~98~~
629.78	5.00		59	Fine Sand	25.1	100.0	***412.1***	37.0	12.7	485.8	~~412~~	~~0~~	~~0~~	~~227~~	~~103~~
624.78	5.00		53	Fine Sand	21.0	89.8	***438.2***	30.9	11.4	517.4	~~438~~	~~0~~	~~0~~	~~241~~	~~108~~
619.78	5.00		56	Fine Sand	23.1	94.9	***440.9***	33.9	12.0	548.8	~~441~~	~~0~~	~~0~~	~~243~~	~~113~~
614.78	5.00		44	Fine Sand		74.6			9.4						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== WB - Pier 1
REFERENCE BORING ========== SB-03
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 711.50 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 709.50 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 701.84 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
335 KIPS	**314** KIPS	**170** KIPS	**78** FT.

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 3630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 57.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 505.04 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 189.39 KIPS

PILE TYPE AND SIZE ========== Steel HP 10 X 42
Plugged Pile Perimeter========== 3.300 FT. Unplugged Pile Perimeter========== 4.858 FT. 82.022438
Plugged Pile End Bearing Area========== 0.680 SQFT. Unplugged Pile End Bearing Area======== 0.086 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
708.50	1.00		9	Clean Coarse Sand	0.6		7.0	0.9		***1.7***	2	0	0	1	3
706.00	2.50		9	Clean Coarse Sand	1.5	6.4	17.9	2.2	0.8	***5.1***	5	1	0	2	6
703.50	2.50		13	Clean Coarse Sand	2.1	15.9	19.8	3.1	2.0	***8.2***	8	2	0	2	8
701.84	1.66		10	Clean Coarse Sand	1.1	15.6	22.3	1.6	2.0	***9.9***	10	3	0	3	10
701.00	0.84		10	Clean Coarse Sand	0.6	17.0	33.0	0.8	2.1	***12.1***	12	3	0	4	11
698.50	2.50		16	Clean Coarse Sand	2.6	27.1	44.1	3.9	3.4	***17.0***	17	3	0	6	13
696.00	2.50		21	Clean Coarse Sand	3.5	35.6	66.2	5.1	4.5	***24.4***	24	3	0	11	16
693.50	2.50		32	Clean Coarse Sand	5.9	54.2	148.4	8.7	6.9	***42.8***	43	3	0	21	18
691.00	2.50		77	Sandy Gravel	40.1	130.5	227.5	59.0	16.5	***106.8***	107	3	0	56	21
688.50	2.50		100	Sandy Gravel	57.8	169.5	***151.4***	85.1	21.5	174.9	151	3	0	80	23
686.00	2.50		21	Medium Sand	3.2	35.6	***163.0***	4.6	4.5	180.7	163	3	0	87	26
683.50	2.50		26	Medium Sand	3.9	44.1	***129.5***	5.8	5.6	181.7	130	3	0	68	28
678.50	5.00	0.70	22		8.7	6.7	***151.9***	12.8	0.8	196.2	152	3	0	81	33
673.50	5.00		16	Very Fine Silty Sand	4.1	20.3	***152.2***	6.1	2.6	201.8	152	3	0	81	38
668.50	5.00		13	Very Fine Silty Sand	3.3	16.5	***161.9***	4.9	2.1	207.5	162	3	0	86	43
663.50	5.00		18	Very Fine Silty Sand	4.6	22.9	***195.7***	6.8	2.9	218.0	196	3	0	105	48
658.50	5.00		41	Very Fine Silty Sand	11.4	52.1	***163.6***	16.8	6.6	229.3	164	3	0	87	53
653.50	5.00	0.90	26		10.8	8.6	***243.7***	15.8	1.1	253.9	244	3	0	131	58
648.50	5.00		46	Fine Sand	16.5	78.0	***263.6***	24.3	9.9	278.6	264	3	0	142	63
643.50	5.00		48	Fine Sand	17.8	81.4	***264.4***	26.1	10.3	302.6	264	3	0	143	68
638.50	5.00		38	Fine Sand	12.0	64.4	***276.4***	17.6	8.2	320.2	276	3	0	149	73
633.50	5.00		38	Fine Sand	12.0	64.4	***313.8***	17.6	8.2	341.0	314	3	0	170	78
628.50	5.00		53	Fine Sand	21.0	89.8	***339.9***	30.9	11.4	372.6	~~340~~	~~3~~	~~0~~	~~184~~	~~83~~
623.50	5.00		56	Fine Sand	23.1	94.9	***342.6***	33.9	12.0	404.0	~~343~~	~~3~~	~~0~~	~~186~~	~~88~~
618.50	5.00		44	Fine Sand	15.3	74.6	***357.9***	22.5	9.4	426.5	~~358~~	~~3~~	~~0~~	~~194~~	~~93~~
613.50	5.00		44	Fine Sand	15.3	74.6	***373.2***	22.5	9.4	449.0	~~373~~	~~3~~	~~0~~	~~202~~	~~98~~
608.50	5.00		44	Fine Sand		74.6			9.4						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== WB - Pier 2
REFERENCE BORING ========== SB-05
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 711.50 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 709.50 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 701.84 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 3630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 57.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 505.04 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 189.39 KIPS

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
335 KIPS	**330** KIPS	**177** KIPS	**97** FT.

PILE TYPE AND SIZE ========== Steel HP 10 X 42
Plugged Pile Perimeter========== 3.300 FT. Unplugged Pile Perimeter========== 4.858 FT.
Plugged Pile End Bearing Area========== 0.680 SQFT. Unplugged Pile End Bearing Area======== 0.086 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
707.00	2.50		16	Clean Coarse Sand	2.6		15.9	3.9		***5.5***	6	1	0	2	5
704.50	2.50		13	Clean Coarse Sand	2.1	13.2	35.3	3.1	1.7	***10.9***	11	3	0	3	7
702.00	2.50		20	Clean Coarse Sand	3.3	30.5	37.7	4.8	3.9	***15.6***	16	4	0	4	10
701.84	0.16		19	Clean Coarse Sand	0.2	29.6	40.5	0.3	3.7	***16.2***	16	5	0	4	10
699.50	2.34		19	Clean Coarse Sand	2.9	32.2	40.0	4.3	4.1	***20.1***	20	5	0	7	12
697.00	2.50		17	Clean Coarse Sand	2.8	28.8	63.1	4.1	3.6	***26.8***	27	5	0	10	15
694.50	2.50		29	Clean Coarse Sand	5.1	49.2	61.5	7.5	6.2	***33.5***	33	5	0	14	17
692.00	2.50		25	Sandy Gravel	5.0	42.4	73.2	7.3	5.4	***41.6***	42	5	0	18	20
689.50	2.50		29	Sandy Gravel	6.2	49.2	64.2	9.2	6.2	***48.9***	49	5	0	22	22
687.00	2.50		20	Fine Sand	2.8	33.9	70.4	4.2	4.3	***53.5***	53	5	0	25	25
684.50	2.50		22	Fine Sand	3.1	37.3	***45.8***	4.6	4.7	54.5	46	5	0	21	27
682.00	2.50	1.00	26		5.9	9.5	70.7	8.6	1.2	***65.6***	66	5	0	32	30
679.50	2.50	3.00	38		12.6	28.6	***59.5***	18.6	3.6	81.1	59	5	0	28	32
674.50	5.00	0.50	46		6.4	4.8	118.4	9.5	0.6	***97.3***	97	5	0	49	37
669.50	5.00		45	Very Fine Silty Sand	13.0	57.2	142.8	19.2	7.2	***117.9***	118	5	0	60	42
664.50	5.00		54	Very Fine Silty Sand	17.3	68.6	***114.3***	25.5	8.7	137.5	114	5	0	58	47
659.50	5.00		18	Very Fine Silty Sand	4.6	22.9	***108.5***	6.8	2.9	143.0	108	5	0	55	52
654.50	5.00	1.30	17		14.3	12.4	***163.8***	21.1	1.6	169.3	164	5	0	86	57
649.50	5.00		42	Very Fine Silty Sand	11.8	53.4	191.7	17.3	6.8	***188.7***	189	5	0	99	62
644.50	5.00		41	Medium Sand	15.6	69.5	232.7	22.9	8.8	***214.9***	215	5	0	114	67
639.50	5.00		56	Medium Sand	27.8	94.9	***241.9***	41.0	12.0	253.5	242	5	0	129	72
634.50	5.00		45	Medium Sand	18.4	76.3	***248.5***	27.1	9.7	279.1	248	5	0	132	77
629.50	5.00		38	Fine Sand	12.0	64.4	***285.9***	17.6	8.2	299.9	286	5	0	153	82
624.50	5.00		53	Fine Sand	21.0	89.8	***312.0***	30.9	11.4	331.5	312	5	0	167	87
619.50	5.00		56	Fine Sand	23.1	94.9	***314.7***	33.9	12.0	362.9	315	5	0	169	92
614.50	5.00		44	Fine Sand	15.3	74.6	***330.0***	22.5	9.4	385.4	330	5	0	177	97
609.50	5.00		44	Fine Sand	15.3	74.6	***345.3***	22.5	9.4	407.9	~~345~~	~~5~~	~~0~~	~~185~~	~~102~~
604.50	5.00		44	Fine Sand		74.6			9.4						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== WB - East Abut.
REFERENCE BORING ========== SB-07
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 732.41 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 730.41 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 730.77 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1500 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 57.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 208.70 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 78.26 KIPS

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
335 KIPS	**325** KIPS	**179** KIPS	**83** FT.

PILE TYPE AND SIZE ========== Steel HP 10 X 42
Plugged Pile Perimeter========== 3.300 FT. Unplugged Pile Perimeter========== 4.858 FT.
Plugged Pile End Bearing Area========== 0.680 SQFT. Unplugged Pile End Bearing Area======== 0.086 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
729.41	1.00		23	Medium Sand	1.4		19.2	2.0		***4.3***	4	0	0	2	3
726.91	2.50		25	Medium Sand	3.8	17.8	44.2	5.5	2.3	***12.5***	13	0	0	7	6
724.41	2.50		32	Medium Sand	5.2	39.1	34.2	7.6	4.9	***18.2***	18	0	0	10	8
721.91	2.50	2.50	26		11.1	23.8	50.3	16.4	3.0	***35.2***	35	0	0	19	11
719.41	2.50		17	Medium Sand	2.6	28.8	39.2	3.8	3.6	***37.3***	37	0	0	20	13
716.91	2.50		9	Clean Coarse Sand	1.5	15.3	89.9	2.2	1.9	***45.7***	46	0	0	25	16
714.41	2.50		38	Sandy Gravel	10.4	64.4	74.9	15.3	8.2	***57.7***	58	0	0	32	18
711.91	2.50		23	Clean Coarse Sand	3.8	39.0	83.7	5.6	4.9	***64.0***	64	0	0	35	21
709.41	2.50		26	Medium Sand	3.9	44.1	75.8	5.8	5.6	***68.2***	68	0	0	38	23
704.41	5.00		19	Medium Sand	5.7	32.2	162.9	8.4	4.1	***86.9***	87	0	0	48	28
699.41	5.00		67	Medium Sand	37.9	113.6	***129.6***	55.8	14.4	133.7	130	0	0	71	33
694.41	5.00		25	Medium Sand	7.5	42.4	184.5	11.1	5.4	***150.8***	151	0	0	83	38
689.41	5.00		53	Clean Coarse Sand	29.4	89.8	***190.3***	43.4	11.4	191.1	190	0	0	105	43
684.41	5.00		39	Fine Sand	12.5	66.1	***195.1***	18.4	8.4	208.5	195	0	0	107	48
679.41	5.00		46	Very Fine Silty Sand	13.4	58.5	***216.2***	19.8	7.4	229.3	216	0	0	119	53
674.41	5.00		52	Very Fine Silty Sand	16.3	66.1	***236.3***	23.9	8.4	253.7	236	0	0	130	58
669.41	5.00		55	Very Fine Silty Sand	17.8	69.9	***257.9***	26.2	8.8	280.5	258	0	0	142	63
664.41	5.00		58	Very Fine Silty Sand	19.5	73.7	***262.1***	28.7	9.3	307.2	262	0	0	144	68
659.41	5.00		46	Very Fine Silty Sand	13.4	58.5	***283.2***	19.8	7.4	328.0	283	0	0	156	73
654.41	5.00		52	Very Fine Silty Sand	16.3	66.1	***303.3***	23.9	8.4	352.4	303	0	0	167	78
649.41	5.00		55	Very Fine Silty Sand	17.8	69.9	***324.9***	26.2	8.8	379.2	325	0	0	179	83
644.41	5.00		58	Very Fine Silty Sand	19.5	73.7	***335.1***	28.7	9.3	406.7	~~335~~	~~0~~	~~0~~	~~184~~	~~88~~
639.41	5.00		38	Fine Sand	12.0	64.4	***372.5***	17.6	8.2	427.5	~~372~~	~~0~~	~~0~~	~~205~~	~~93~~
634.41	5.00		53	Fine Sand	21.0	89.8	***398.6***	30.9	11.4	459.1	~~399~~	~~0~~	~~0~~	~~219~~	~~98~~
629.41	5.00		56	Fine Sand	23.1	94.9	***401.3***	33.9	12.0	490.5	~~401~~	~~0~~	~~0~~	~~221~~	~~103~~
624.41	5.00		44	Fine Sand	15.3	74.6	***416.6***	22.5	9.4	513.0	~~417~~	~~0~~	~~0~~	~~229~~	~~108~~
619.41	5.00		44	Fine Sand	15.3	74.6	***431.9***	22.5	9.4	535.5	~~432~~	~~0~~	~~0~~	~~238~~	~~113~~
614.41	5.00		44	Fine Sand		74.6			9.4						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== EB - West Abut
REFERENCE BORING ========== SB-02
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 732.87 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 730.87 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 731.14 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1500 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 57.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 208.70 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 78.26 KIPS

PILE TYPE AND SIZE ========== Metal Shell 12"Φ w/.25" walls
Pile Perimeter========== 3.142 FT.
Pile End Bearing Area========== 0.785 SQFT.

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
392 KIPS	**374** KIPS	**206** KIPS	**32** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
727.37	3.50		12	Medium Sand	12.1		***65.5***				66	0	0	36	6
724.87	2.50		18	Medium Sand	13.0	53.4	***33.8***				34	0	0	19	8
722.37	2.50	1.00	17		8.7	8.6	***108.1***				108	0	0	59	11
719.87	2.50		15	Sandy Gravel	13.9	74.2	***112.1***				112	0	0	62	13
715.87	4.00		13	Sandy Gravel	19.3	64.3	***185.7***				186	0	0	102	17
713.37	2.50		24	Sandy Gravel	22.6	118.7	***168.8***				169	0	0	93	20
710.87	2.50		16	Sandy Gravel	14.8	79.1	***302.3***				302	0	0	166	22
705.87	5.00		40	Sandy Gravel	111.2	197.8	***294.9***				295	0	0	162	27
700.87	5.00		16	Sandy Gravel	29.7	79.1	***374.0***				374	0	0	206	32
695.87	5.00		26	Sandy Gravel	50.5	128.5	***436.9***				~~437~~	~~0~~	~~0~~	~~240~~	~~37~~
690.87	5.00		38	Very Fine Silty Sand	49.5	140.9	***508.6***				~~509~~	~~0~~	~~0~~	~~280~~	~~42~~
685.87	5.00		44	Very Fine Silty Sand	60.6	163.2	***558.1***				~~558~~	~~0~~	~~0~~	~~307~~	~~47~~
680.87	5.00		41	Very Fine Silty Sand	54.8	152.0	***650.0***				~~650~~	~~0~~	~~0~~	~~357~~	~~52~~
675.87	5.00		51	Very Fine Silty Sand	75.9	189.1	***714.7***				~~715~~	~~0~~	~~0~~	~~393~~	~~57~~
670.87	5.00		48	Very Fine Silty Sand	69.0	178.0	***754.0***				~~754~~	~~0~~	~~0~~	~~415~~	~~62~~
665.87	5.00		40	Very Fine Silty Sand		148.3									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== EB - Pier 1
REFERENCE BORING ========== SB-04
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 711.50 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 709.50 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 701.84 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 3630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 57.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 505.04 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 189.39 KIPS

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
335 KIPS	**329** KIPS	**175** KIPS	**77** FT.

PILE TYPE AND SIZE ========== Steel HP 10 X 42
Plugged Pile Perimeter========== 3.300 FT. Unplugged Pile Perimeter========== 4.858 FT.
Plugged Pile End Bearing Area========== 0.680 SQFT. Unplugged Pile End Bearing Area======== 0.086 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
707.00	2.50		13	Medium Sand	2.0		32.5	2.9		***6.7***	7	1	0	3	5
704.50	2.50		30	Medium Sand	4.7	30.5	30.8	7.0	3.9	***12.9***	13	4	0	3	7
704.34	0.16		23	Sandy Gravel	0.3	24.1	42.0	0.4	3.1	***14.7***	15	4	0	4	7
702.00	2.34		23	Sandy Gravel	4.2	35.1	53.5	6.1	4.4	***21.8***	22	6	0	6	10
699.50	2.50		25	Sandy Gravel	5.0	42.4	38.1	7.3	5.4	***26.5***	26	6	0	8	12
697.00	2.50		13	Sandy Gravel	2.5	22.0	59.3	3.7	2.8	***32.5***	33	6	0	12	15
694.50	2.50		24	Sandy Gravel	4.7	40.7	118.2	6.9	5.1	***46.3***	46	6	0	19	17
692.00	2.50		56	Sandy Gravel	23.9	94.9	159.1	35.2	12.0	***83.7***	84	6	0	40	20
689.50	2.50		66	Sandy Gravel	31.6	111.9	142.4	46.5	14.2	***124.1***	124	6	0	62	22
684.50	5.00		50	Very Fine Silty Sand	15.3	63.6	***138.6***	22.5	8.0	144.2	139	6	0	70	27
679.50	5.00		35	Very Fine Silty Sand	9.3	44.5	***150.4***	13.6	5.6	158.1	150	6	0	77	32
674.50	5.00		37	Very Fine Silty Sand	9.9	47.0	***169.2***	14.6	6.0	173.9	169	6	0	87	37
669.50	5.00		44	Very Fine Silty Sand	12.6	55.9	***185.6***	18.5	7.1	192.9	186	6	0	96	42
664.50	5.00		47	Very Fine Silty Sand	13.9	59.8	***148.3***	20.4	7.6	206.9	148	6	0	75	47
659.50	5.00	0.90	29		10.8	8.6	***220.4***	15.8	1.1	230.5	220	6	0	115	52
654.50	5.00		55	Very Fine Silty Sand	17.8	69.9	267.5	26.2	8.8	***260.4***	260	6	0	137	57
649.50	5.00		78	Very Fine Silty Sand	33.3	99.2	***256.3***	49.0	12.5	303.8	256	6	0	135	62
644.50	5.00		43	Very Fine Silty Sand	12.2	54.7	***271.1***	17.9	6.9	322.1	271	6	0	143	67
639.50	5.00		45	Very Fine Silty Sand	13.0	57.2	***291.3***	19.2	7.2	342.1	291	6	0	154	72
634.50	5.00		38	Fine Sand	12.0	64.4	***328.7***	17.6	8.2	363.0	329	6	0	175	77
629.50	5.00		53	Fine Sand	21.0	89.8	***354.8***	30.9	11.4	394.5	~~355~~	~~6~~	~~0~~	~~189~~	~~82~~
624.50	5.00		56	Fine Sand	23.1	94.9	***357.5***	33.9	12.0	425.9	~~357~~	~~6~~	~~0~~	~~190~~	~~87~~
619.50	5.00		44	Fine Sand	15.3	74.6	***372.8***	22.5	9.4	448.4	~~373~~	~~6~~	~~0~~	~~199~~	~~92~~
614.50	5.00		44	Fine Sand	15.3	74.6	***388.1***	22.5	9.4	470.9	~~388~~	~~6~~	~~0~~	~~207~~	~~97~~
609.50	5.00		44	Fine Sand		74.6			9.4						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== EB - Pier 2
REFERENCE BORING ========== SB-06
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 711.50 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 709.50 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 701.84 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1500 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 57.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 208.70 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 78.26 KIPS

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
335 KIPS	**327** KIPS	**176** KIPS	**73** FT.

PILE TYPE AND SIZE ========== Steel HP 10 X 42
Plugged Pile Perimeter========== 3.300 FT. Unplugged Pile Perimeter========== 4.858 FT.
Plugged Pile End Bearing Area========== 0.680 SQFT. Unplugged Pile End Bearing Area======== 0.086 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
706.50	3.00		7	Sandy Gravel	1.6		16.2	2.4		***4.2***	4	1	0	1	5
704.00	2.50		13	Sandy Gravel	2.5	14.5	32.2	3.7	1.8	***9.6***	10	2	0	3	8
701.84	2.16		18	Sandy Gravel	3.0	28.0	36.4	4.4	3.5	***14.2***	14	4	0	4	10
701.50	0.34		18	Sandy Gravel	0.5	29.3	177.1	0.7	3.7	***32.6***	33	4	0	14	10
699.00	2.50		100	Sandy Gravel	57.8	169.5	131.5	85.1	21.5	***104.7***	105	4	0	54	13
696.50	2.50		39	Sandy Gravel	11.0	66.1	134.0	16.2	8.4	***119.7***	120	4	0	62	15
694.00	2.50		34	Sandy Gravel	8.3	57.6	138.9	12.3	7.3	***131.6***	132	4	0	68	18
691.50	2.50		32	Sandy Gravel	7.4	54.2	***129.0***	10.9	6.9	140.3	129	4	0	67	20
689.00	2.50		29	Very Fine Silty Sand	3.7	36.9	***128.9***	5.5	4.7	145.3	129	4	0	67	23
686.50	2.50		26	Very Fine Silty Sand	3.3	33.1	***104.0***	4.9	4.2	146.6	104	4	0	53	25
684.00	2.50	0.50	31		3.2	4.8	***141.8***	4.7	0.6	155.8	142	4	0	74	28
681.50	2.50		31	Very Fine Silty Sand	4.0	39.4	***157.3***	5.9	5.0	163.1	157	4	0	83	30
679.00	2.50		40	Very Fine Silty Sand	5.5	50.9	***169.1***	8.1	6.4	172.0	169	4	0	89	33
674.00	5.00		45	Very Fine Silty Sand	13.0	57.2	197.4	19.2	7.2	***193.1***	193	4	0	102	38
669.00	5.00		57	Very Fine Silty Sand	18.9	72.5	230.3	27.9	9.2	***222.8***	223	4	0	119	43
664.00	5.00		68	Very Fine Silty Sand	25.9	86.4	***252.4***	38.1	10.9	260.3	252	4	0	135	48
659.00	5.00		65	Very Fine Silty Sand	23.8	82.6	***257.1***	35.1	10.5	293.0	257	4	0	137	53
654.00	5.00		50	Very Fine Silty Sand	15.3	63.6	***254.6***	22.5	8.0	313.2	255	4	0	136	58
649.00	5.00		36	Very Fine Silty Sand	9.6	45.8	***310.0***	14.1	5.8	333.2	310	4	0	167	63
644.00	5.00		72	Very Fine Silty Sand	28.7	91.5	***312.0***	42.3	11.6	372.1	312	4	0	168	68
639.00	5.00		51	Very Fine Silty Sand	15.8	64.8	***327.3***	23.2	8.2	395.2	327	4	0	176	73
634.00	5.00		38	Fine Sand	12.0	64.4	***364.7***	17.6	8.2	416.1	~~365~~	~~4~~	~~0~~	~~197~~	~~78~~
629.00	5.00		53	Fine Sand	21.0	89.8	***390.8***	30.9	11.4	447.6	~~391~~	~~4~~	~~0~~	~~211~~	~~83~~
624.00	5.00		56	Fine Sand	23.1	94.9	***393.5***	33.9	12.0	479.0	~~394~~	~~4~~	~~0~~	~~213~~	~~88~~
619.00	5.00		44	Fine Sand	15.3	74.6	***408.8***	22.5	9.4	501.5	~~409~~	~~4~~	~~0~~	~~221~~	~~93~~
614.00	5.00		44	Fine Sand	15.3	74.6	***424.1***	22.5	9.4	524.1	~~424~~	~~4~~	~~0~~	~~229~~	~~98~~
609.00	5.00		44	Fine Sand		74.6			9.4						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== EB - East Abut.
REFERENCE BORING ========== SB-08
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 732.41 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 730.41 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 730.77 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1500 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 57.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 208.70 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 78.26 KIPS

MAX. REQUIRED BEARING & RESISTANCE for Selected Pile, Soil Profile, & Losses

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
335 KIPS	**292** KIPS	**160** KIPS	**58** FT.

PILE TYPE AND SIZE ========== Steel HP 10 X 42
Plugged Pile Perimeter========== 3.300 FT. Unplugged Pile Perimeter========== 4.858 FT.
Plugged Pile End Bearing Area========== 0.680 SQFT. Unplugged Pile End Bearing Area======== 0.086 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
727.41	3.00		33	Sandy Gravel	9.4		27.3	13.9		***16.2***	16	0	0	9	5
724.91	2.50		16	Sandy Gravel	3.1	17.9	41.5	4.5	2.3	***22.1***	22	0	0	12	8
722.91	2.00		19	Sandy Gravel	2.9	29.0	46.0	4.3	3.7	***26.6***	27	0	0	15	10
719.91	3.00		18	Sandy Gravel	4.2	30.5	***29.2***	6.1	3.9	30.1	29	0	0	16	13
717.91	2.00	1.00	16		4.7	9.5	65.0	6.9	1.2	***40.9***	41	0	0	23	15
715.41	2.50		24	Sandy Gravel	4.7	40.7	***39.2***	6.9	5.1	44.0	39	0	0	22	17
712.41	3.00		6	Sandy Gravel	1.4	10.2	69.4	2.0	1.3	***49.7***	50	0	0	27	20
709.91	2.50		23	Sandy Gravel	4.5	39.0	82.3	6.6	4.9	***57.3***	57	0	0	32	23
704.91	5.00		28	Sandy Gravel	11.8	47.5	89.0	17.3	6.0	***74.0***	74	0	0	41	28
699.91	5.00		25	Sandy Gravel	9.9	42.4	126.1	14.6	5.4	***92.1***	92	0	0	51	33
694.91	5.00		41	Sandy Gravel	24.7	69.5	216.8	36.3	8.8	***136.8***	137	0	0	75	38
689.91	5.00		80	Sandy Gravel	84.8	135.6	***220.7***	124.8	17.2	251.3	221	0	0	121	43
684.91	5.00		43	Very Fine Silty Sand	12.2	54.7	***229.1***	17.9	6.9	268.8	229	0	0	126	48
679.91	5.00		40	Very Fine Silty Sand	11.0	50.9	***251.5***	16.2	6.4	286.5	252	0	0	138	53
674.91	5.00		49	Very Fine Silty Sand	14.8	62.3	***291.7***	21.8	7.9	311.5	292	0	0	160	58
669.91	5.00		69	Very Fine Silty Sand	26.6	87.7	***315.8***	39.1	11.1	350.2	316	0	0	174	63
664.91	5.00		67	Very Fine Silty Sand	25.2	85.2	***346.0***	37.0	10.8	387.9	~~346~~	~~0~~	~~0~~	~~190~~	~~68~~
659.91	5.00		71	Very Fine Silty Sand	28.0	90.3	***323.2***	41.2	11.4	422.7	323	0	0	178	73
654.91	5.00		31	Very Fine Silty Sand	8.0	39.4	***295.6***	11.8	5.0	430.0	296	0	0	163	78
649.91	5.00	0.40	15		5.2	3.8	***320.8***	7.7	0.5	440.3	321	0	0	176	83
644.91	5.00	2.50	37		22.2	23.8	***387.0***	32.7	3.0	478.6	~~387~~	~~0~~	~~0~~	~~213~~	~~88~~
639.91	5.00		40	Sandy Gravel	23.1	67.8	***435.6***	34.0	8.6	515.8	~~436~~	~~0~~	~~0~~	~~240~~	~~93~~
634.91	5.00		55	Sandy Gravel	46.2	93.2	***502.2***	68.1	11.8	586.5	~~502~~	~~0~~	~~0~~	~~276~~	~~98~~
629.91	5.00		67	Medium Sand	37.9	113.6	***501.1***	55.8	14.4	637.3	~~501~~	~~0~~	~~0~~	~~276~~	~~103~~
624.91	5.00		44	Medium Sand	17.7	74.6	***540.8***	26.0	9.4	666.2	~~541~~	~~0~~	~~0~~	~~297~~	~~108~~
619.91	5.00		57	Medium Sand	28.8	96.6	***554.3***	42.3	12.2	706.6	~~554~~	~~0~~	~~0~~	~~305~~	~~113~~
614.91	5.00		48	Clean Coarse Sand		81.4			10.3						