Abbreviated Structure Geotechnical Report

F.A.I. 39 (I-39)/F.A.P. 301 (US 20)
Section (201-3)K & (4-1, 5)R
Winnebago County
Job No. P-92-111-06
Contract No. 64C24
PTB No. 141-004
I-39/US 20 over Union Pacific Railroad.
Structure Nos. 101-0210 & 101-0211
Ex. Structure Nos. 101-0069 & 101-0070

Submitted: August 2016
Resubmitted: January 2017

Prepared for:
Illinois Department of
Transportation, District 2
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Dixon, Illinois 61021

Structure Designer:
Infrastructure Engineering, Inc.
33 West Monroe , Suite 1540
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Prepared By:
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EXP 11/30/2017

01/19/2017

Illinois Department of Transportation

Abbreviated Structure Geotechnical Report

Original Report Date: 8/17/2016	**Proposed SN:** 101-0210/0211	**Route:**	FAI 39 (I-39)/FAP 301 (US 20)
Revised Date: 01/19/2017	**Existing SN:** 101-0069/0070	**Section:**	(201-3)K & (4-1,5)R
Geotechnical Engineer: Kipkoech Chepkoit		**County:**	Winnebago
Structural Engineer: Infrastructure Engineering, Inc.		**Contract:**	64C24

Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing):

The new structures will be three-span 50" web plate girder bridges. The substructures will consist of stub abutments and multiple column piers with crash walls and pile-supported footings. S.N. 101-0210 will replace existing S.N. 101-0069, which is the bridge carrying the westbound traffic, and S.N. 101-0211 will replace existing S.N. 101-0070, which is the bridge carrying the eastbound traffic. According to information provided by the structural designer, the estimated vertical factored substructure loads are 2,600 kips at the abutments and 6,900 kips at the piers. The general plan and elevation drawing for the new structures is attached.

Discuss the existing boring data, existing plans foundation information, new subsurface exploration and need for any additional exploration to be provided with SGR Technical Memo (attach all data and subsurface profile plot):

Underground coal mine information available from ISGS indicates that the project area has not been undermined.

Existing structure plans show the current structures are three span bridges. The substructures are pile-supported stub abutments and multiple column piers with pile-supported footings. The existing structures were constructed in 1962 and rehabbed in the early 1990's, including deck replacement and substructure widening. The abutments are supported by metal shell and H-piles and the piers are supported by treated timber piles and H-piles. Pile driving records from the original construction confirm that the existing piles are tipped within glacial soils at the two abutments and at Pier 2, and within sands at Pier 1. The existing piles were driven to consistent lengths at each substructure unit. The pile lengths were shorter and more consistent at the piers than at the abutments.

Four boring logs were provided to Hanson Professional Services Inc. (Hanson) by IDOT for borings B-1f through B-4f, which were drilled in May and June, 2008. Locations of the borings are as shown on the attached Boring Location Plan. The stations and offsets shown on the boring logs are relative to existing alignments. Boring locations along the current alignment are shown on the attached Subsurface Data Profile. Bedrock was not encountered in any of the borings. The upper soils in the borings generally consisted of silty clay loam, loam, and sandy loam, with a few sand lenses. In Borings B-3f and B-2f, which were located at the North Abutment and Pier 2, respectively, these soils extended to approximately El. 767.5 and 765.5, and were underlain by loam till to the end of the boring. In Boring B-4f, which was located at the South Abutment, the loamy soils extended to approximately El. 763.5 and were underlain by sandy loam till with sand lenses to approximately El. 746. The underlying soils consisted of very dense sands. In Boring B-1f, which was located at Pier 1, the loamy soils extended to approximately El. 762 and were underlain by fine sand to approximately El. 744.5, and then alternating layers of sands and silts with occasional gravel to the end of the boring. Only one sample of glacial till was encountered in this boring. Subsurface conditions encountered in Boring B-1f appear to be different than those encountered in the other three borings. In view of this, the pile driving records and the boring drilled for the original bridge Pier 1 were reviewed. Results of this review indicated that the subsurface conditions at the existing bridge Pier 1 are more similar to the subsurface conditions encountered at Borings B-2f, 3f, and 4f. Based on the location of B-1f, the conditions in that boring are likely present around the southeastern part of the site, near the east end of Pier 1. They may also be present around the northeastern part of the site, near the east end of Pier 2.

Provide the location and maximum height of any new soil fill or magnitude of footing bearing pressure. Estimate the amount and time of the expected settlement. Indicate if further testing, analysis, and/or ground improvement/treatment is necessary:

Approximately 3 ft of fill will be required to raise the profile and approximately 9 to 12 ft of fill will be required to accommodate widening of the existing structures. The location with the greatest amount of fill (12 ft) is the east edge of the South Abutment. Based on the IDOT Cohesive Soil Settlement Estimate spreadsheet, the maximum estimated settlement is approximately 0.1 inch. No treatment or settlement waiting period is required.

Identify any new cuts or fill slope angles and heights. Estimate the factor of safety against slope failure. Indicate if further testing, analysis or ground improvement/treatment is necessary:

The end slopes will be cut to the same inclination as the existing end slopes, which show no signs of instability. Therefore, global stability analyses are not needed, and the proposed end slopes may be assumed to meet IDOT and AASHTO requirements.

The side slopes of the embankments approaching the North and South Abutments will be inclined at an angle of approximately 1V:3H that may transition to 1V:2H near the bridge. The global factor of safety against slope failure of the side slope is approximately 1.85 and 1.89 at the North and South Abutments, respectively. The global stability factors of safety meet IDOT and AASHTO requirements. Plots of the global stability analysis results are attached.

Indicate at each substructure, the 100-year and 200-year total scour depths in the Hydraulics report, the non-granular scour depth reduction, the proposed ground surface, and the recommended foundation design scour elevations:

N/A

Determine the seismic soil site class, the seismic performance zone, the 0.2 and 1.0 second design spectral accelerations and indicate if that the soils are liquefiable:

The seismic Site Class is D, the SPZ is 1, S_{DS} = 0.135g, and S_{D1} = 0.079g. The soils are not considered to be liquefiable for the design earthquake.

Confirm feasibility of the proposed foundation or wall type and provide design parameters. Attach a pile design table indicating feasible pile types, various nominal required bearings, factored resistances available and corresponding estimated lengths at locations where piles will be used. Provide factored bearing resistance and unit sliding resistance at various elevations and confirm no ground improvement/treatment is necessary where spread footings are proposed. Estimated top of rock elevations as well as preliminary factored unit side and tip resistance values shall be indicated when drilled shafts are proposed:

A Pile Design Table including data for several pile types at each substructure is attached.

<u>Foundations at South and North Abutments</u>

- Steel H-piles are feasible, but would be significantly longer than similar capacity metal shell piles. H-piles driven to MNRB would be beyond the depth of the borings. Therefore, only the NRB within the limits of the borings are provided in the Pile Design Table.
- Metal shell piles that extend to hard till or very dense sand are recommended for the subsurface conditions encountered at the boring locations at the abutments.

<u>Foundations at Piers</u>

- Shallow continuous footing foundations bearing on the soils at the piers are not feasible because of varying subsurface conditions between the piers that could result in excessive differential settlement.
- Steel H-piles are feasible, but would be significantly longer than similar capacity metal shell piles. H-piles driven to MNRB would be beyond the depth of the borings. Therefore, only the NRB within the limits of the borings are provided in the Pile Design Table. If the subsurface conditions were extrapolated, the depths for the types of H-piles in the Pile Design Table would range from approximately 42 to 62 feet at the westbound bridge and approximately 90 to 130 feet at the eastbound bridge.
- Metal shell piles that extend to hard till or very dense sand are recommended for the subsurface conditions encountered at the boring locations at the piers. Piles driven into the fine sands and alternating layers of sands and silts that are expected to be found at the east end of Piers 1 and 2 will be much longer than those driven into the hard till that is expected to be found under the remainder of the pier footprints. Metal shell piles that are started in the hard till layer (boring B-2f) may reach refusal at very shallow depths. In view of this, a minimum pile tip elevation of 749 (minimum pile length of 11 feet) should be placed in contract plans. If driveabilty cannot achieve above mentioned minimum pile tip elevation, it is recommended to perform 18-inch-diameter precoring at the piers to a depth of 10 feet below the bottom of footing (El. 749). After precoring, the piles should be placed in the hole and driven to achieve MNRB. The designer should add to the contract plans a note stating that the annulus between the pile and the 18-inch diameter pre-cored hole

should be filled with sand after placing the pile in the pre-cored hole prior to driving the pile. Pre-coring is not necessary in areas where the piles are started in sand layer.

"If pier piles cannot be driven to minimum tip elevation as stated on the Contract Plans without damage to the piles, the Contractor shall pull or drive an adjacent pile next to the damaged one, using such measures as pre-coring and limiting the hammer energy. This work shall be performed at the Contractor's expense and considered in the cost of driving piles."

Shoes are not required for H-piles, but are recommended for metal shell piles to protect against damage during driving.

The estimated pile lengths for the eastbound piers are longer than at the westbound piers because they are based on the subsurface conditions in Boring B-1f. It is not known how the subsurface conditions will transition along the length of the piers. To account for this uncertainty, two test piles should be specified at each pier (one per bridge) and one at each abutment to determine the pile lengths. One test pile should be driven at each pier and one at each abutment within the first phase of construction. The two longer test piles for the eastbound piers should be driven near the east end of the piers during a later phase.

Calculate the estimated water surface elevation and determine the need for cofferdams (type 1 or 2), and seal coat:

N/A

Assess the need for sheeting or soil retention or temporary construction slope and provide recommendation for other construction concerns:

The proposed structures will be staged to maintain traffic on I-39/US 20 during construction. Temporary excavations with approximately 11 feet and 12 feet retained height will be required to construct the South and North Abutments, respectively, near active traffic lanes. Temporary excavations with up to approximately 24 feet and 19 feet will be required to construct Pier 1 and Pier 2, respectively.

At the abutments, Temporary Sheet Piling, designed in accordance with IDOT Design Guide 3.13.1 – Temporary Sheet Piling Design, is feasible within the embankments.

At the piers, the excavations cannot be sloped back because the proposed piers are located too close to the existing abutments. A Temporary Soil Retention System is required because the conditions do not meet the limitations of the Temporary Sheet Piling Design Charts. The ground surface is inclined at a 1V:2H slope, and the soil is too stiff to allow adequate penetration of sheet piling.

Structure No. 101-0210 and 101-0211
Pile Design Parameters

Location	Cutoff Elevation (ft)	Pile Type	Factored Resistance Available, R_F (kips)	Geotechnical Losses, R_{Sdd} (kips)	Nominal Required Bearing, R_N (kips)	Estimated Pile Length (ft)
South Abutment B-4f	787.0	12"Φ w/.25" walls	86	0	157	26
			180	0	328	34
		14"Φ w/.25" walls	105	0	190	26
			224	0	408	34
		14"Φ w/.312" walls	105	0	190	26
			224	0	408	34
			282	0	513	35
		HP 12x53	107	0	194	34
			161	0	293	44
		HP 12x63	108	0	196	34
			166	0	301	44
		HP 14x73	130	0	237	34
			196	0	356	44
		HP 14x89	133	0	241	34
			201	0	365	44
Pier 1 Eastbound B-1f	761.0	12"Φ w/.25" walls	68	0	123	22
			122	0	221	27
			150	0	272	34
			194	0	353	37
		14"Φ w/.25" walls	84	0	153	22
			151	0	274	27
			183	0	333	34
			227	0	413	37
		14"Φ w/.312" walls	84	0	153	22
			151	0	274	27
			183	0	333	34
			282	0	513	40
		HP 12x53	63	0	115	39
			113	0	206	47
		HP 12x63	65	0	118	39
			116	0	211	47
		HP 14x73	77	0	140	39
			138	0	250	47
		HP 14x89	79	0	143	39
			140	0	255	47
Pier 1 Westbound B-2f	761.0	12"Φ w/.25" walls*	194	0	353	12
		14"Φ w/.25" walls*	227	0	413	12
		14"Φ w/.312" walls*	282	0	513	14
		HP 12x53	73	0	133	13
		HP 12x63	75	0	137	13
		HP 14x73	89	0	162	13
		HP 14x89	93	0	169	13

Where a range of values is shown, pile lengths and capactities may be interpolated between the values given.
MNRB for H-piles occurs below the depth of the borings.
* Estimated lengths assume precoring to 10 feet below the bottom of footing elevation, as further discussed in the Abbreviated SGR.

Structure No. 101-0210 and 101-0211
Pile Design Parameters

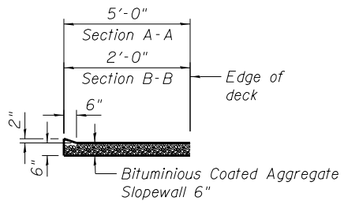
Location	Cutoff Elevation (ft)	Pile Type	Factored Resistance Available, R_F (kips)	Geotechnical Losses, R_{Sdd} (kips)	Nominal Required Bearing, R_N (kips)	Estimated Pile Length (ft)
Pier 2 Eastbound B-1f	761.0	12"Φ w/.25" walls	68	0	123	22
			122	0	221	27
			150	0	272	34
			194	0	353	37
		14"Φ w/.25" walls	84	0	153	22
			151	0	274	27
			183	0	333	34
			227	0	413	37
		14"Φ w/.312" walls	84	0	153	22
			151	0	274	27
			183	0	333	34
			282	0	513	40
		HP 12x53	63	0	115	39
			113	0	206	47
		HP 12x63	65	0	118	39
			116	0	211	47
		HP 14x73	77	0	140	39
			138	0	250	47
		HP 14x89	79	0	143	39
			140	0	255	47
Pier 2 Westbound B-2f	761.0	12"Φ w/.25" walls*	194	0	353	12
		14"Φ w/.25" walls*	227	0	413	12
		14"Φ w/.312" walls*	282	0	513	14
		HP 12x53	73	0	133	13
		HP 12x63	75	0	137	13
		HP 14x73	89	0	162	13
		HP 14x89	93	0	169	13
North Abutment B-3f	784.0	12"Φ w/.25" walls	54	0	99	17
			87	0	158	22
			194	0	353	26
		14"Φ w/.25" walls	65	0	119	17
			106	0	192	22
			227	0	413	25
		14"Φ w/.312" walls	65	0	119	17
			106	0	192	22
			282	0	513	27
		HP 12x53	95	0	172	27
			158	0	287	37
		HP 12x63	97	0	177	27
			162	0	295	37
		HP 14x73	115	0	209	27
			192	0	349	37
		HP 14x89	118	0	215	27
			197	0	358	37

Where a range of values is shown, pile lengths and capactities may be interpolated between the values given.
MNRB for H-piles occurs below the depth of the borings.
* Estimated lengths assume precoring to 10 feet below the bottom of footing elevation, as further discussed in the Abbreviated SGR.

Bench Mark: BM#402 - Cut square in southeast wingwall of S.N. 101-0070. Elevation 796.69

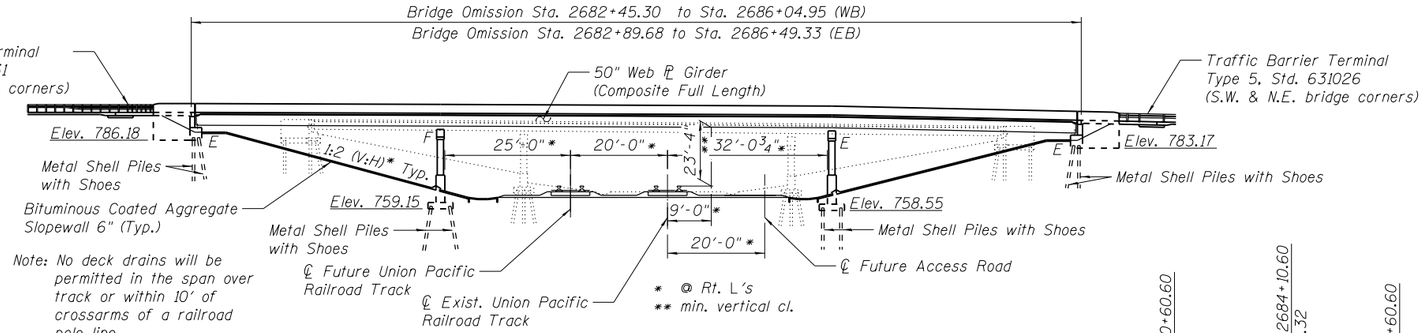
Exisiting Structure: S.N. 101-0069 (W.B.) and S.N. 101-0070 (E.B.) built as F.A. Route 194, Section 4 VB-1 at Station 832 +49.16 in 1963. Bridges widened and deck replaced in 1991 as F.A.I. Route 39, Section 4 VBY-1. Each superstructure consists of 3 spans of continous composite rolled steel beams with partial length flange cover plates. Each substructure consists of concrete stub abutments and concrete 5 column piers supported on piles. Length = 279'-8½" (back-to-back of abutments). Width = 42'-2" (out-to-out deck). Traffic is to be maintained utilizing stage construction.

No Salvage



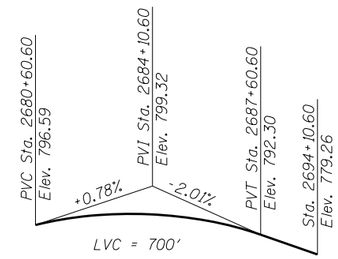
SECTION A-A

SECTION B-B



ELEVATION

Note A: Limits of soil retention system
Note B: Limits of temporary sheet piling



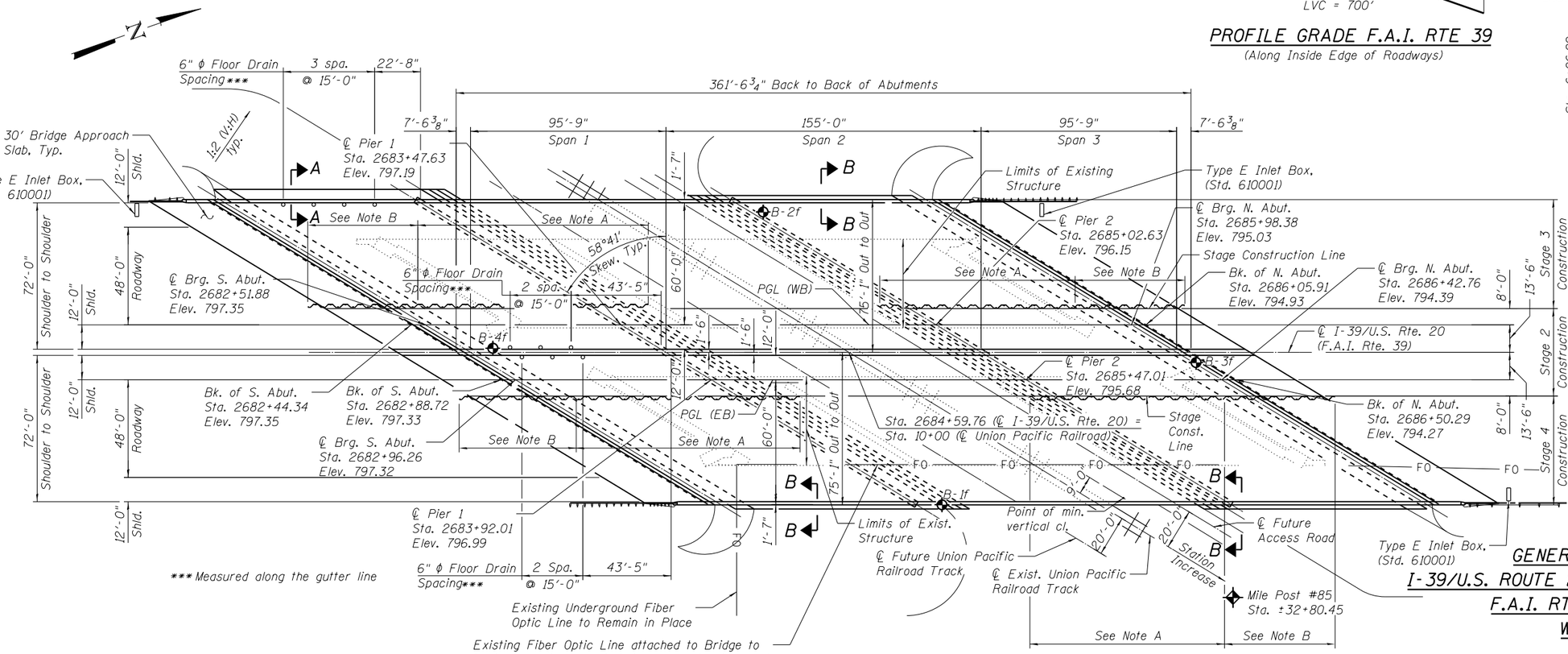
PROFILE GRADE F.A.I. RTE 39

(Along Inside Edge of Roadways)

Sta. 6+96.99	Sta. 7+96.99	Sta. 8+96.99	Sta. 10+04.09	Sta. 11+11.79	Sta. 12+11.79	Sta. 13+11.79
Elev. 768.46	Elev. 767.91	Elev. 767.47	Elev. 766.91	Elev. 766.23	Elev. 765.88	Elev. 765.47

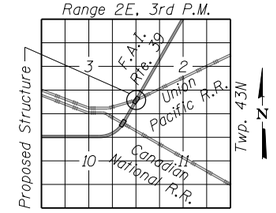
TOP OF RAIL ELEVATIONS

(Union Pacific Railroad)



PLAN

Indicates Soil Boring Location



LOCATION SKETCH

HIGHWAY CLASSIFICATION

F.A.I. Rte. 39 - I-39/U.S. Rte. 20
Functional Class: Interstate
ADT: 44,600 (2013); 106,610 (2040)
ADTT: 12,950 (2013); 32,000 (2040)
DHV: 10,600 (2040)
Design Speed: 70 m.p.h.
Posted Speed: 65 m.p.h

DESIGN SPECIFICATIONS

2014 AASHTO LRFD Bridge Design Specifications, 7th Edition with 2015 and 2016 Interims

LOADING HL-93

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

DESIGN STRESSES

FIELD UNITS

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

Note: Structural Steel to be glavanized in accordance with AASHTO M111.

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.079g
Design Spectral Acceleration at 0.2 sec. (S_{DS}) =0.135g
Soil Site Class = D

GENERAL PLAN & ELEVATION
I-39/U.S. ROUTE 20 OVER UNION PACIFIC RAILROAD
F.A.I. RTE. 39 - SECTION (4-1,5)R
WINNEBAGO COUNTY
STA. 2684+59.76
STRUCTURE NUMBER 101-0210 (WB)
STRUCTURE NUMBER 101-0211 (EB)

INFRASTRUCTURE ENGINEERING | INCORPORATED
33 West Monroe | Suite 1540 | Chicago, IL 60603
P 312.425.9560 | F 312.425.9564 | www.infrastructure-eng.com

USER NAME = ___	DESIGNED - SPK	REVISED - ___
	CHECKED - PK	REVISED - ___
PLOT SCALE = ___	DRAWN - PK	REVISED - ___
PLOT DATE = ___	CHECKED - SPK	REVISED - ___

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 3 SHEETS

F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
39	(4-1,5)R	WINNEBAGO	___	___
		CONTRACT NO. 64C24		
	ILLINOIS FED. AID PROJECT			

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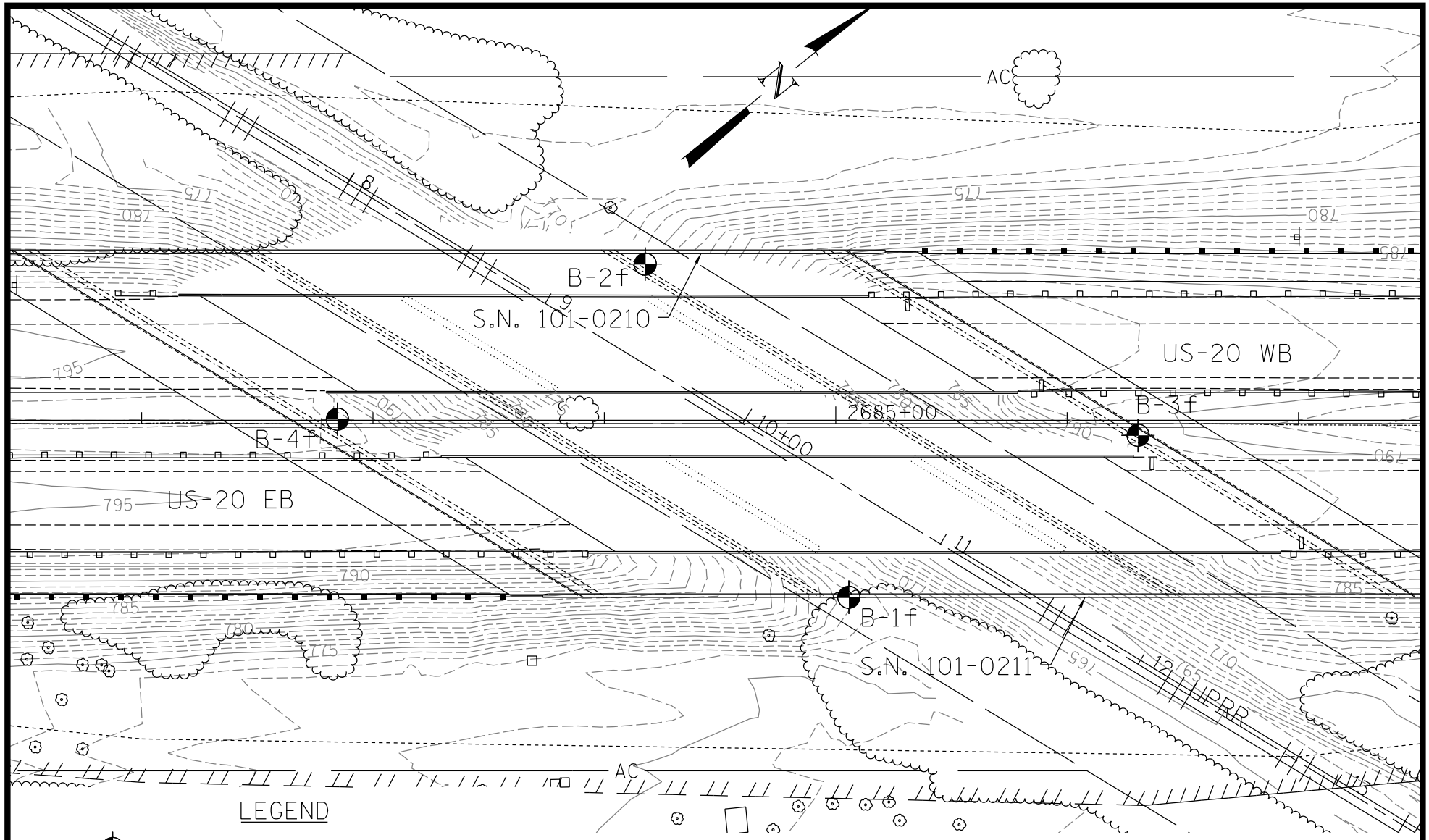


HANSON

BORING LOCATION PLAN

US-20 OVER UPRR
S.N. 101-0210 & 101-0211
WINNEBAGO COUNTY, ILLINOIS

06S2055 1/18/17

B-4f
Sta. 2682+85, 2' LT
6/12/2008

	N	Qu	w%	
793.0				
		1.1P	17.0	STIFF brown SILTY CLAY LOAM
	7	1.1B	19.0	STIFF brown LOAM
	5	1.2B	25.0	STIFF brown SILTY CLAY LOAM
	8	0.7S	24.0	MEDIUM gray LOAM
	13	1.2B	23.0	STIFF gray SILTY CLAY LOAM with SAND lens
	15	1.2B	17.0	STIFF gray/brown LOAM
	13	2.5B	22.0	VERY STIFF gray LOAM
	11	2.8P	9.0	VERY STIFF tan SANDY LOAM
	11	2.0B	15.0	STIFF reddish brown CLAY LOAM
	8	0.8S	32.0	MEDIUM dark gray SILTY LOAM
	9	1.7B	25.0	STIFF gray SILTY CLAY LOAM
	11	0.6B	17.0	MEDIUM gray SANDY LOAM with SAND lens
763.5				
	12	2.5P	9.0	VERY STIFF tan SANDY LOAM TILL
	30	4.5P	8.0	HARD tan SANDY LOAM TILL
DD	54			VERY DENSE tan SANDY LOAM TILL
755.5	51			VERY DENSE tan SANDY LOAM TILL with SAND lens
753.5				
	35	3.3P	9.0	VERY STIFF tan SANDY LOAM TILL with SAND lens
	100/6"			VERY DENSE tan SANDY LOAM TILL
	100/10"			VERY DENSE tan SANDY LOAM TILL
	69			VERY DENSE tan fine SAND
741.5	100/10"			VERY DENSE tan clean medium coarse SAND

Bottom of Hole = 51.5 feet

B-1f
Sta. 2685+06, 75' RT
5/19/2008

	N	Qu	w%	
773.5				
		0.3P	20.0	SOFT brown SILTY CLAY LOAM
	6	1.5B	27.0	STIFF brown SILTY CLAY LOAM
	6	1.0P	26.0	MEDIUM brown SILTY LOAM
	7	1.5B	26.0	STIFF tan/gray SILTY CLAY LOAM
762.0	12	0.5P	15.0	MEDIUM brown SANDY LOAM
	8			LOOSE tan moist fine SAND
DD	8			LOOSE tan very moist fine SAND
756.5	12			MEDIUM tan fine SAND
	9			Wash - LOOSE tan fine SAND
	24			MEDIUM tan fine SAND
	16			MEDIUM tan fine SAND
744.5	9			LOOSE tan fine SAND
	10	1.0P	26.0	STIFF tan SILT
739.5	15	1.7P	22.0	STIFF tan/gray SILT with SAND lenses
	10			MEDIUM tan dirty medium SAND with GRAVEL
	51			VERY DENSE tan medium SAND with GRAVEL, bottom 2" LOAM
732.0	17			MEDIUM tan fine SAND, bottom 2" SILT
	26			MEDIUM gray SILT
729.5	36			DENSE tan fine SAND with gray SILT lens
	17			MEDIUM tan fine SAND
722.0	48			DENSE tan clean medium SAND with GRAVEL
	22	4.3B	12.0	Wash - HARD gray CLAY LOAM TILL
719.5	63			VERY DENSE tan/brown dirty SAND & GRAVEL with 2" TILL lens in middle
	22			MEDIUM tan dirty medium SAND with GRAVEL
712.5	42			DENSE tan/gray dirty medium SAND with GRAVEL

Bottom of Hole = 61.0 feet

B-2f
Sta. 2684+18, 69' LT
5/21/2008

	N	Qu	w%	
772.0				
		1.0P	18.0	STIFF brown SILTY CLAY LOAM
	13	1.5P	26.0	STIFF tan/brown SILTY CLAY LOAM
765.5	10	0.4B	24.0	SOFT tan/brown SILTY CLAY LOAM
	11	0.9B	12.0	MEDIUM tan LOAM TILL
	14	2.0P	8.0	STIFF tan LOAM TILL
	24	2.3P	10.0	VERY STIFF tan LOAM TILL
	85	4.5P	6.0	HARD tan LOAM TILL
	100/11"		6.0	HARD tan LOAM TILL
DD	95		6.0	HARD tan LOAM TILL
750.0	100/7"		8.0	HARD tan LOAM TILL
Oh				
747.5				
746.0	85		7.0	HARD tan LOAM TILL

Bottom of Hole = 26.0 feet

B-3f
Sta. 2686+31, 5' RT
5/22/2008

	N	Qu	w%	
792.0				
		0.5P	11.0	MEDIUM brown SILTY CLAY LOAM
	6	1.8P	16.0	STIFF brown SILTY CLAY LOAM
DD	3	0.5P	20.0	MEDIUM brown SILTY CLAY LOAM
784.5	13	3.3B	19.0	VERY STIFF brown CLAY LOAM
	19	2.0B	14.0	VERY STIFF brown CLAY LOAM
	14	3.3B	20.0	VERY STIFF brown CLAY LOAM
	13	1.3P	17.0	STIFF brown/gray CLAY LOAM
	21	2.5S	13.0	VERY STIFF brown/gray LOAM
	9	0.8P	28.0	MEDIUM dark gray SILTY LOAM
	6	1.5B	26.0	STIFF tan/brown SILTY CLAY LOAM
767.5				
	17	1.8P	9.0	STIFF tan/gray LOAM TILL
	46	4.5P	7.0	HARD tan LOAM TILL
	18	4.5P	7.0	HARD tan LOAM TILL
	40	4.5P	8.0	HARD tan LOAM TILL
	64	4.5P	9.0	HARD tan LOAM TILL
	100/10"		8.0	HARD tan LOAM TILL
	100/12"		8.0	HARD tan LOAM TILL
	100/10"		9.0	HARD tan LOAM TILL
745.5	100/9"		9.0	HARD tan LOAM TILL

Bottom of Hole = 46.5 feet

LEGEND

N	Standard Penetration Test N (blows/ft)
Qu	Unconfined Strength (tsf)
w%	Natural Moisture Content (%)
DD 507.20	Water Surface Elevation Encountered in Boring DD = during drilling Oh = at completion 24h = 24 hours after completion
	Approximate Finish Grade
	Bottom of Footing

FILE NAME =	USER NAME =	DESIGNED - RGC	REVISED
HANSON		CHECKED - JLD	REVISED
	PLOT SCALE =	DRAWN - EJM	REVISED
	PLOT DATE = 01/08/16	CHECKED - JLD	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SUBSURFACE DATA PROFILE
STRUCTURE NO. 101-0210 & 101-0211
SHEET NO. 1 OF 1 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
39	(201-3)K & (4-1,5)R	WINNEBAGO		
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

Illinois Department of Transportation
Division of Highways
Illinios Department of Transportation/D-2

SOIL BORING LOG

Date 5/19/08

ROUTE Bypass 20 **DESCRIPTION** P92-111-06 US Bypass 20 Bridge over U.P.R.R., .8 m. S. of Harrison Avenue **LOGGED BY** J. Strating

SECTION _____ **LOCATION** Cherry Valley Twp. - 2 SW, **SEC.**, **TWP.** 43N, **RNG.** 2E

COUNTY Winnebago **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME-45 Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-1f
Station 832+95
Offset 43.00ft Rt EB CL
Ground Surface Elev. 773.50 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 765.00 ft

Groundwater Elev.:
First Encounter 756.5 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SOFT brown SILTY CLAY LOAM				
			0.3 P	20.0
	771.50			
STIFF brown SILTY CLAY LOAM		2		
		2 4	1.5 B	27.0
	770.00			
MEDIUM brown SILTY LOAM	-5	1		
		2 4	1.0 P	26.0
	767.50			
STIFF tan/gray SILTY CLAY LOAM		2		
		3 4	1.5 B	26.0
	765.00			
MEDIUM brown SANDY LOAM	-10	2		
		4 8	0.5 P	15.0
	762.00			
LOOSE tan moist fine SAND		4		
		3 5		
	760.00			
LOOSE tan very moist fine SAND	-15	1		
		4 4		
	757.50			
MEDIUM tan fine SAND ▼		2		
		6 6		
	755.00			
	-20	3		
Wash		4		
LOOSE tan fine SAND *(continued)*	752.50	5		
MEDIUM tan fine SAND		8		
		13 11		
	750.00			
MEDIUM tan fine SAND	-25	4		
		9 7		
	747.50			
LOOSE tan fine SAND		0		
		2 7		
	744.50			
STIFF tan SILT	-30	3		
		3 7	1.0 P	26.0
	742.50			
STIFF tan/gray SILT with SAND lenses		3		
		5 10	1.7 P	22.0
	739.50			
MEDIUM tan dirty medium SAND with GRAVEL	-35	1		
		2 8		
	737.50			
VERY DENSE tan medium SAND with GRAVEL, bottom 2" LOAM		13		
		26 25		
	735.00			
	-40	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)

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 5/19/08

ROUTE Bypass 20 **DESCRIPTION** P92-111-06 US Bypass 20 Bridge over U.P.R.R., .8 m. S. of Harrison Avenue **LOGGED BY** J. Strating

SECTION _____ **LOCATION** Cherry Valley Twp. - 2 SW, **SEC.**, **TWP.** 43N, **RNG.** 2E

COUNTY Winnebago **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME-45 Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-1f
Station 832+95
Offset 43.00ft Rt EB CL
Ground Surface Elev. 773.50 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 765.00 ft

Groundwater Elev.:
First Encounter 756.5 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
MEDIUM tan fine SAND, bottom 2" SILT *(continued)*		8 9		
	732.00			
MEDIUM gray SILT		8 12 14		
	729.50			
DENSE tan fine SAND with gray SILT lens	-45	0 14 22		
	727.50			
MEDIUM tan fine SAND		5 8 9		
	725.00			
DENSE tan clean medium SAND with GRAVEL	-50	14 17 31		
	722.00			
Wash HARD gray CLAY LOAM TILL		15 9 13	4.3 B	12.0
	719.50			
VERY DENSE tan/brown dirty SAND & GRAVEL with 2" TILL lens in middle	-55	17 30 33		
	717.50			
MEDIUM tan dirty medium SAND with GRAVEL		14 9 13		
	715.00			
	-60	18		
DENSE tan/gray dirty medium SAND with GRAVEL *(continued)*	712.50	20 22		
End of Boring	-65			
	-70			
	-75			
	-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)

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 5/21/08

ROUTE Bypass 20 **DESCRIPTION** P92-111-06 US Bypass 20 Bridge over U.P.R.R., .8 m. S. of Harrison Avenue **LOGGED BY** J. Strating

SECTION _____ **LOCATION** Cherry Valley Twp. - 2 SW, **SEC.**, **TWP.** 43N, **RNG.** 1E

COUNTY Winnebago **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-2f
Station 832+07
Offset 37.00ft Lt WB CL
Ground Surface Elev. 772.00 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 765.00 ft

Groundwater Elev.:
First Encounter 750.0 ft ▼
Upon Completion 747.5 ft ▽
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
STIFF brown SILTY CLAY LOAM				
			1.0 P	18.0
	770.00			
STIFF tan/brown SILTY CLAY LOAM		4		
		6	1.5	26.0
	768.50	7	P	
SOFT tan/brown SILTY CLAY LOAM	-5	2		
		2	0.4	24.0
		8	B	
	765.50			
MEDIUM tan LOAM TILL		2		
		5	0.9	12.0
	763.50	6	B	
STIFF tan LOAM TILL	-10	6		
		7	2.0	8.0
	761.00	7	P	
VERY STIFF tan LOAM TILL		6		
		10	2.3	10.0
	758.50	14	P	
HARD tan LOAM TILL	-15	24		
		40	4.5	6.0
	756.00	45	P	
HARD tan LOAM TILL		21		
		100/11"		6.0
	753.50			
HARD tan LOAM TILL	-20	25		
HARD tan LOAM TILL *(continued)*		45		6.0
	751.00	50		
HARD tan LOAM TILL		20		
		100/7"		8.0
	748.50			
HARD tan LOAM TILL	-25	18		
		43		7.0
	746.00	42		
End of Boring				
	-30			
	-35			
	-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)

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 5/22/08

ROUTE Bypass 20 **DESCRIPTION** P92-111-06 US Bypass 20 Bridge over U.P.R., .8 m. S. of Harrison Avenue **LOGGED BY** J. Strating

SECTION _____ **LOCATION** Cherry Valley Twp. - 2 SW, **SEC.**, **TWP.** 43N, **RNG.** 1E

COUNTY Winnebago **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-3f
Station 834+20
Offset 5.00ft Rt Med CL
Ground Surface Elev. 792.00 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 765.00 ft

Groundwater Elev.:
First Encounter 784.5 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
MEDIUM brown SILTY CLAY LOAM				
			0.5 P	11.0
	789.50			
STIFF brown SILTY CLAY LOAM		2		
		3 3	1.8 P	16.0
	788.00			
	-5			
MEDIUM brown SILTY CLAY LOAM		1		
		1 2	0.5 P	20.0
	785.50			
VERY STIFF brown CLAY LOAM	▼	3		
		4 9	3.3 B	19.0
	783.00			
	-10			
VERY STIFF brown CLAY LOAM		7		
		9 10	2.0 B	14.0
	780.50			
VERY STIFF brown CLAY LOAM		4		
		7 7	3.3 B	20.0
	778.00			
	-15			
STIFF brown/gray CLAY LOAM		4		
		6 7	1.3 P	17.0
	775.50			
VERY STIFF brown/gray LOAM		7		
		10 11	2.5 S	13.0
	773.00			
	-20			
MEDIUM dark gray SILTY LOAM		3		
		4 5	0.8 P	28.0
	770.50			
STIFF tan/brown SILTY CLAY LOAM		1		
		3 3	1.5 B	26.0
	767.50			
	-25			
STIFF tan/gray LOAM TILL		4		
		7 10	1.8 P	9.0
	765.50			
HARD tan LOAM TILL		15		
		23 23	4.5 P	7.0
	763.00			
	-30			
HARD tan LOAM TILL		10		
		9 9	4.5 P	7.0
	760.50			
HARD tan LOAM TILL		5		
		14 26	4.5 P	8.0
	758.00			
	-35			
HARD tan LOAM TILL		16		
		28 36	4.5	9.0
	755.50			
HARD tan LOAM TILL		17		
(added water to help drilling)		100/10"		8.0
	753.00			
	-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)

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 5/22/08

ROUTE Bypass 20 DESCRIPTION P92-111-06 US Bypass 20 Bridge over U.P.R.R., .8 m. S. of Harrison Avenue LOGGED BY J. Strating

SECTION _____ LOCATION Cherry Valley Twp. - 2 SW, SEC., TWP. 43N, RNG. 1E

COUNTY Winnebago DRILLING METHOD Hollow Stem Auger HAMMER TYPE B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-3f
Station 834+20
Offset 5.00ft Rt Med CL
Ground Surface Elev. 792.00 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 765.00 ft

Groundwater Elev.:
First Encounter 784.5 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
HARD tan LOAM TILL		39		
		100/12"		8.0
	750.50			
HARD tan LOAM TILL		29		
		100/10"		9.0
	748.00			
	-45			
HARD tan LOAM TILL		100/9"		
				9.0
	745.50			
End of Boring				
	-50			
	-55			
	-60			

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
Illinios Department of Transportation/D-2

SOIL BORING LOG

Date 6/12/08

ROUTE Bypass 20 **DESCRIPTION** P92-111-06 US Bypass 20 Bridge over U.P.R., .8 m. S. of Harrison Avenue **LOGGED BY** W. Garza

SECTION _____ **LOCATION** Cherry Valley Twp. - 2 SW, **SEC.** , **TWP.** 43N, **RNG.** 1E

COUNTY Winnebago **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

BORING NO. B-4f
Station 830+74
Offset 2.00ft Lt Med CL
Ground Surface Elev. 793.00 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 765.00 ft

Groundwater Elev.:
First Encounter 755.5 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
STIFF brown SILTY CLAY LOAM				
			1.1 P	17.0
	790.50			
STIFF brown LOAM		2		
		3 4	1.1 B	19.0
	789.00			
	-5			
STIFF brown SILTY CLAY LOAM		2		
		2 3	1.2 B	25.0
	786.50			
MEDIUM gray LOAM		1		
		2 6	0.7 S	24.0
	784.00			
	-10			
STIFF gray SILTY CLAY LOAM with SAND lens		5		
		5 8	1.2 B	23.0
	781.50			
STIFF gray/brown LOAM		3		
		7 8	1.2 B	17.0
	779.00			
	-15			
VERY STIFF gray LOAM		5		
		5 8	2.5 B	22.0
	776.50			
VERY STIFF tan SANDY LOAM		5		
		6 5	2.8 P	9.0
	774.00			
	-20			
STIFF redish brown CLAY LOAM		3		
		4 7	2.0 B	15.0
	771.50			
MEDIUM dark gray SILTY LOAM		1		
		3 5	0.8 S	32.0
	769.00			
	-25			
STIFF gray SILTY CLAY LOAM		3		
		3 6	1.7 B	25.0
	766.50			
MEDIUM gray SANDY LOAM with SAND lens		1		
		3 8	0.6 B	17.0
	763.50			
	-30			
VERY STIFF tan SANDY LOAM TILL		4		
		4 8	2.5 P	9.0
	761.50			
HARD tan SANDY LOAM TILL		10		
		13 17	4.5 P	8.0
	759.00			
	-35			
VERY DENSE tan SANDY LOAM TILL		12		
		22 32		
	756.50			
	▼			
VERY DENSE tan SANDY LOAM TILL with SAND lens		3		
		16 35		
	753.50			
	-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)

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
Illinios Department of Transportation/D-2

SOIL BORING LOG

Date 6/12/08

ROUTE Bypass 20 **DESCRIPTION** P92-111-06 US Bypass 20 Bridge over U.P.R.R., .8 m. S. of Harrison Avenue **LOGGED BY** W. Garza

SECTION _____ **LOCATION** Cherry Valley Twp. - 2 SW, **SEC.** , **TWP.** 43N, **RNG.** 1E

COUNTY Winnebago **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** B-53 Diedrich Automatic

STRUCT. NO. _____
Station _____

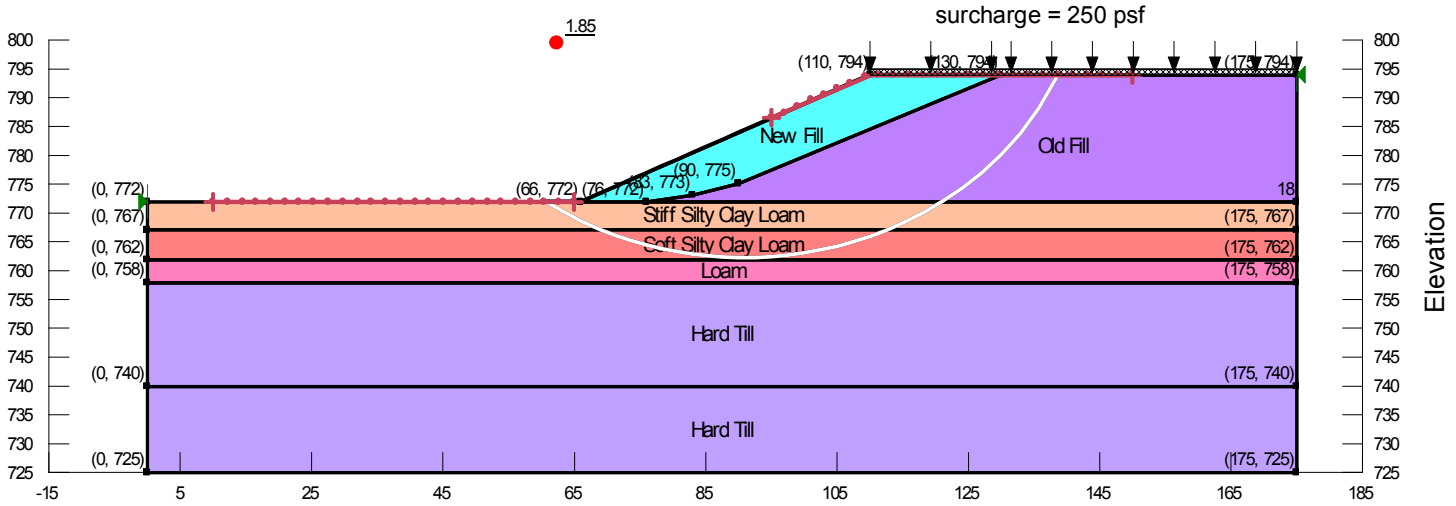
BORING NO. B-4f
Station 830+74
Offset 2.00ft Lt Med CL
Ground Surface Elev. 793.00 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 765.00 ft

Groundwater Elev.:
First Encounter 755.5 ft ▼
Upon Completion _____ ft
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
VERY SOFT tan SANDY LOAM TILL with SAND lens		26		
		22	3.3	9.0
	751.50	13	P	
VERY DENSE tan SANDY LOAM TILL		39		
		100/6"		
	749.00			
	-45			
VERY DENSE tan SANDY LOAM TILL		100/10"		
	746.50			
VERY DENSE tan fine SAND		12		
		22		
	744.00	47		
	-50			
VERY DENSE tan clean medium coarse SAND		38		
		100/10"		
	741.50			
End of Boring				
	-55			
	-60			

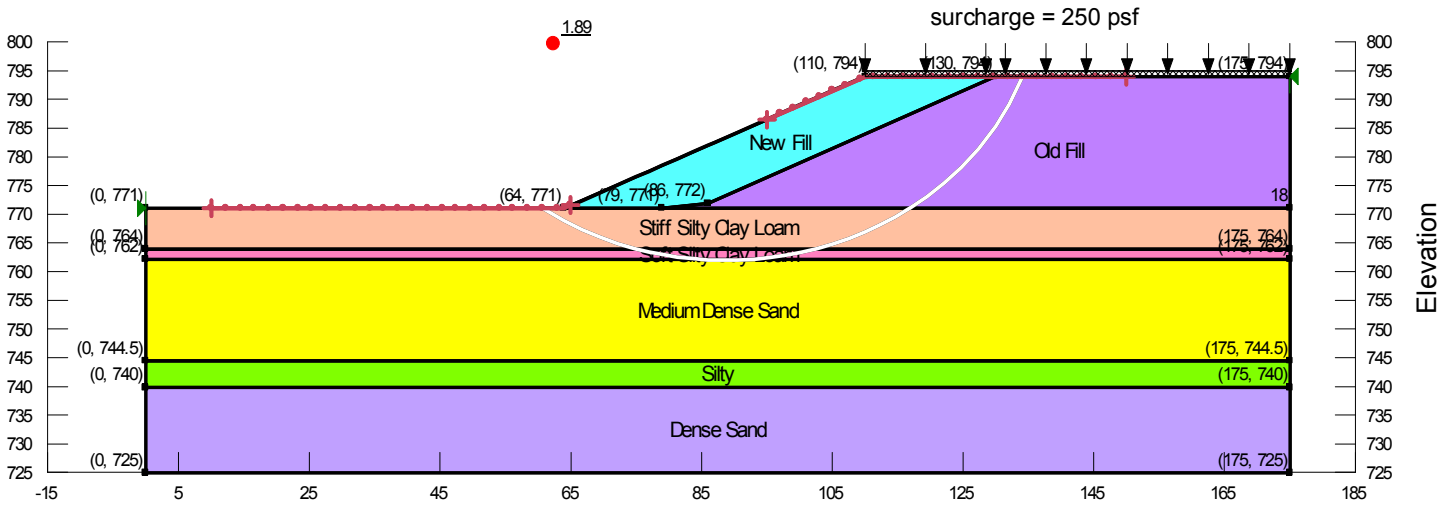
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)



Name: Stiff Silty Clay Loam Model: Undrained (Phi=0) Unit Weight: 120 pcf Cohesion': 1,250 psf
Name: Hard Till Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 4,500 psf Phi': 0 °
Name: New Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,000 psf
Name: Old Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,000 psf
Name: Loam Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 2,000 psf
Name: Soft Silty Clay Loam Model: Undrained (Phi=0) Unit Weight: 115 pcf Cohesion': 650 psf

Title: U.S. 20 over UPRR
Name: 210 North Abutment Slope
Created By: Jennifer Damery
Date: 11/1/2015

Structure 101-0210 – North Abutment Side Slope



Name: Stiff Silty Clay Loam Model: Undrained (Phi=0) Unit Weight: 115 pcf Cohesion': 1,200 psf
Name: Silty Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 1,350 psf Phi': 0 °
Name: Dense Sand Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 0 psf Phi': 34 °
Name: New Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,000 psf
Name: Medium Dense Sand Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 0 psf Phi': 30 °
Name: Old Fill Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion': 1,000 psf
Name: Soft Silty Clay Loam Model: Undrained (Phi=0) Unit Weight: 110 pcf Cohesion': 550 psf

Title: U.S. 20 over UPRR
Name: 211 South Abutment Slope
Created By: Jennifer Damery
Date: 11/1/2015

Structure 101-0211 – South Abutment Side Slope