Illinois Department of Transportation

Abbreviated Structure Geotechnical Report

Original Report Date: 07/09/2021 **Proposed SN:** 101-0206 **Route:** F.A.I. 39 (I-39)
Revised Date: **Existing SN:** 101-0098 **Section:** 4HBR-3
Geotechnical Engineer: Michael Haley, Lin Engineering, Ltd **County:** Winnebago
Structural Engineer: Eric Henkel, ESCA Consultants, Inc **Contract:** 64G68

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

The new structure will be a two-span steel girder bridge. The substructures will consist of semi-integral abutments and a multi-column pier with pile-supported footing. According to information provided by the structural designer, the estimated vertical factored substructure loads are 2,600 kips at each abutment and 7,100 kips at the pier. The TSL plan drawings for the new structure are 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. The existing embankment for Perryville Road was constructed in 1963. Seven boring logs were provided by IDOT for borings B-1e through B-6e. B-1e was drilled in June 2007 and B-2e through B-5e were drilled in May and June, 2008, B-6e (SPT) was drilled in February 2016, and B-6e (ST) was drilled in May 2016. Locations of the borings are as shown on the attached TSL 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 and the following table.

Boring	Old/Other Alignment		Current Alignment	
	Station	Offset	Station	Offset
B-1e	9+30	65' RT	30+70	65' LT
B-2e	10+55	23' LT	29+45	23' RT
B-3e	9+85	23' LT	30+15	23' RT
B-4e	11+80	7' LT	28+20	7' RT
B-5e	8+25	5' RT	31+75	5' LT
B-6e	2663+22	94' RT	27+45	90' LT
B-6e Shelby	2663+80	65' RT	28+08	76' LT

The upper soils in the borings generally consisted of silty loam, silty clay loam, and clay loam, with occasional sand. The loamy soils extended to approximately El. 777 to 774. The underlying soils, encountered on the east side of the bridge, were generally very stiff to hard loam till. On the west side, the underlying soils were loose to very dense sandy gravel. The bottom samples in these borings had N-values exceeding 100 blows per foot. However, bedrock was not encountered in any of the borings.

Laboratory tests were performed on selected samples from Shelby tube boring B-6e (ST) and summary results are attached.

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:

The new profile grade will be approximately 3 to 7 ft higher than existing grade.

The height of the new embankment fill at the centerline of the south abutment will be approximately 6.5 feet. The magnitude of settlement at the south abutment is estimated to be 0.16 inches. The height of the new embankment fill at the centerline of the north abutment will be approximately 3.0 feet. The magnitude of settlement at the north abutment is estimated to be 0.00 inches. Down drag on proposed piles is not expected. No soil

remediation or settlement monitoring 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 proposed abutments and slope walls will provide cut situations at each end of the structure. Preliminary stability analyses using Bishop's method were performed for each abutment. According to AASHTO LRFD 11.6.3.7 and the 2020 IDOT Geotechnical Manual 6.5.1, the slope stability factor of safety for cut slopes is 1.5.

The maximum height of the embankment will be approximately 24.5 feet at the centerline of the south abutment. The end slopes will be inclined at an angle of approximately 1 Vertical to 2 Horizontal. The global factor of safety against slope failure of the south abutment end slope is approximately 2.9 using soil parameters from SPT soil boring.

The maximum height of the embankment will be approximately 23.3 feet at the centerline of the north abutment. The end slopes will be inclined at an angle of approximately 1 Vertical to 2 Horizontal. The global factor of safety against slope failure of the north abutment end slope is approximately 3.6 using soil parameters from SPT soil boring.

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

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

Based on IDOT Design Guide LRFD Soil Site Class Definition, Soil Site Class C controls. The Design Spectral Acceleration at 1.0 sec (SD1) is 0.056g and at 0.2 sec (SDS) is 0.101g. These values are based on a 1000-year design return period earthquake. According to AASHTO LRFD 3.10.6 the Seismic Performance Zone is 1. Liquefaction analysis is not required for SPZ 1.

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.

Proposed piles at the south abutment shall be positioned to avoid existing piles.

Metal shell piles that extend to hard till are preferred for the subsurface conditions encountered at the substructure locations. Steel H-piles are feasible, but would be significantly longer than similar capacity metal shell piles. H-piles driven to maximum nominal required bearing (MNRB) would be beyond the depth of the borings. Therefore, only the nominal required bearing within the limits of the borings are provided in the Pile Design Table.

Shoes are not required for H-piles, but are recommended for metal shell piles to protect against damage during driving. In addition using piles with thicker steel sections such as 14-inch metal shell pipes with 0.312 inch thick wall verses 0.25 inch thick wall, will improve drivability because it can endure high driving stresses.

One test pile should be specified at each abutment and the center pier to determine the pile lengths.

If the lateral loads on the piles supporting the pier are larger than can be resisted with battered piles, the structure designer should evaluate lateral resistance considering both soil and structure properties. Soil parameters for generating P-y curves with the LPILE computer program are provided in the attached table.

The TSL indicates that the abutment wingwalls will require extensions and shows permanent sheet pilling to be the wall type for the extensions. Permanent sheet pilling is a feasible wall type for this application: the subsurface

conditions are suitable for this wall type, and there is adequate vertical clearance to achieve sheet pile embedment prior to reaching the hard till and sand layers below. A Geotechnical Design Memorandum will be required in the design phase in order to provide the geotechnical design parameters necessary to complete the final plans.

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:

Perryville Road traffic shall be maintained by detour. The bridge will be closed to traffic during construction.

The I-39/US 20 traffic will be maintained during construction. Due to the proximity of the proposed pier to the I-39 traffic, Temporary Sheet Piling, designed in accordance with IDOT Design Guide 3.13.1 – Temporary Sheet Piling Design, shall be used for the pier excavation. With the limited retained height required, sheet pile embedment should be achieved prior to entering the hard till layers.

Structure No. 101-0206
Pile Design Table

Pier (Boring B-3e)

Pile Size	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (kips)	Estimated Pile Length (ft)
Metal Shell 14"Φ w/.312" walls	62	34	5
	195	107	7
	235	129	8
	378	208	9
	400	220	10
	570	313	11
Metal Shell 16"Φ w/.312" walls	79	43	5
	249	137	7
	300	165	8
	484	266	9
	510	280	10
	654	360	11
Metal Shell 16"Φ w/.375" walls	79	43	5
	249	137	7
	300	165	8
	484	266	9
	510	280	10
	772	425	12
	782	430	13
Steel HP 10 X 42	136	75	20
Steel HP 12 X 53	163	90	20
Steel HP 12 X 63	169	93	20
Steel HP 14 X 73	163	89	18
	181	99	19
	199	110	20
Steel HP 14 X 89	168	93	18
	188	103	19
	207	114	20

Pile Cut off Elevation = 781.50 ft

Structure No. 101-0206
Pile Design Table

South Abutment (Boring B-4e)

Pile Size	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (kips)	Estimated Pile Length (ft)
Metal Shell 14"Φ w/.312" walls	69	38	7
	95	52	9
	118	65	12
	123	67	14
	135	74	17
	152	84	19
	170	94	22
	173	95	25
	570	313	26
Metal Shell 16"Φ w/.312" walls	83	46	7
	114	62	9
	140	77	12
	143	79	14
	157	86	17
	177	97	19
	199	109	25
	654	360	26
Metal Shell 16"Φ w/.375" walls	83	46	7
	114	62	9
	140	77	12
	143	79	14
	157	86	17
	177	97	19
	199	109	25
	782	430	26
Steel HP 10 X 42	92	51	19
	101	55	25
	161	89	27
	180	99	29
	197	109	32
	234	129	35
Steel HP 12 X 53	93	51	14
	101	56	17
	115	63	19
	122	67	25
	193	106	27
	215	118	29
	236	130	32
	281	154	35
Steel HP 12 X 63	91	50	12
	94	52	14
	102	56	17
	116	64	19
	123	68	25
	200	110	27
	220	121	29
	243	134	32
	288	158	35
Steel HP 14 X 73	82	45	9
	108	59	12
	115	63	14
	124	68	17
	141	78	19
	146	81	25
	236	130	27
	261	143	29
	288	158	32
	341	188	35
Steel HP 14 X 89	84	46	9
	110	60	12
	117	64	14
	126	69	17
	143	79	19
	148	81	25
	244	134	27
	266	146	29
	296	163	32
	350	192	35

Pile Cut off Elevation = 799.12 ft

Structure No. 101-0206
Pile Design Table

North Abutment (Boring B-5e)

Pile Size	R_n Nominal Required Bearing (kips)	R_F Factored Resistance Available (kips)	Estimated Pile Length (ft)
Metal Shell 14"Φ w/.312" walls	88	48	10
	115	63	12
	129	71	15
	155	85	17
	271	149	20
	570	313	21
Metal Shell 16"Φ w/.312" walls	79	44	7
	105	58	10
	138	76	12
	152	84	15
	183	101	17
	334	184	20
	654	360	21
Metal Shell 16"Φ w/.375" walls	79	44	7
	105	58	10
	138	76	12
	152	84	15
	183	101	17
	334	184	20
	782	430	21
Steel HP 10 X 42	78	43	17
	107	59	20
	123	68	23
	160	88	25
	181	100	27
	207	114	30
Steel HP 12 X 53	84	46	12
	96	53	17
	128	71	20
	148	82	23
	192	106	25
	217	119	27
	248	137	30
Steel HP 12 X 63	86	47	12
	97	53	17
	131	72	20
	154	85	23
	198	109	25
	224	123	27
	256	141	30
Steel HP 14 X 73	76	42	10
	101	56	12
	116	64	17
	155	86	20
	182	100	23
	235	129	25
	265	146	27
	302	166	30
Steel HP 14 X 89	78	43	10
	104	57	12
	118	65	17
	158	87	20
	189	104	23
	243	133	25
	273	150	27
	311	171	30

Pile Cut off Elevation = 798.91 ft

Structure No. 101-0206
Pile Design Parameters

Pier 1 (Boring B-3e)

Elevation	LPILE Soil Type	γ' (pcf)	c (psf)	k (pci)	ϵ_{50}
786.5 - 779.5	Stiff Clay w/o Free Water	117	800	100	0.010
779.5 - 777.0	Stiff Clay w/o Free Water	110	500	100	0.010
777.0 - 764.0	Stiff Clay w/o Free Water	130	4,500	2,000	0.004
764.0 - 760.0	Stiff Clay w/o Free Water	68	4,500	2,000	0.004

BENCHMARK: #401 – Cut square on southerly of center crash wall of bridge under Perryville Rd. – Elev. 788.53

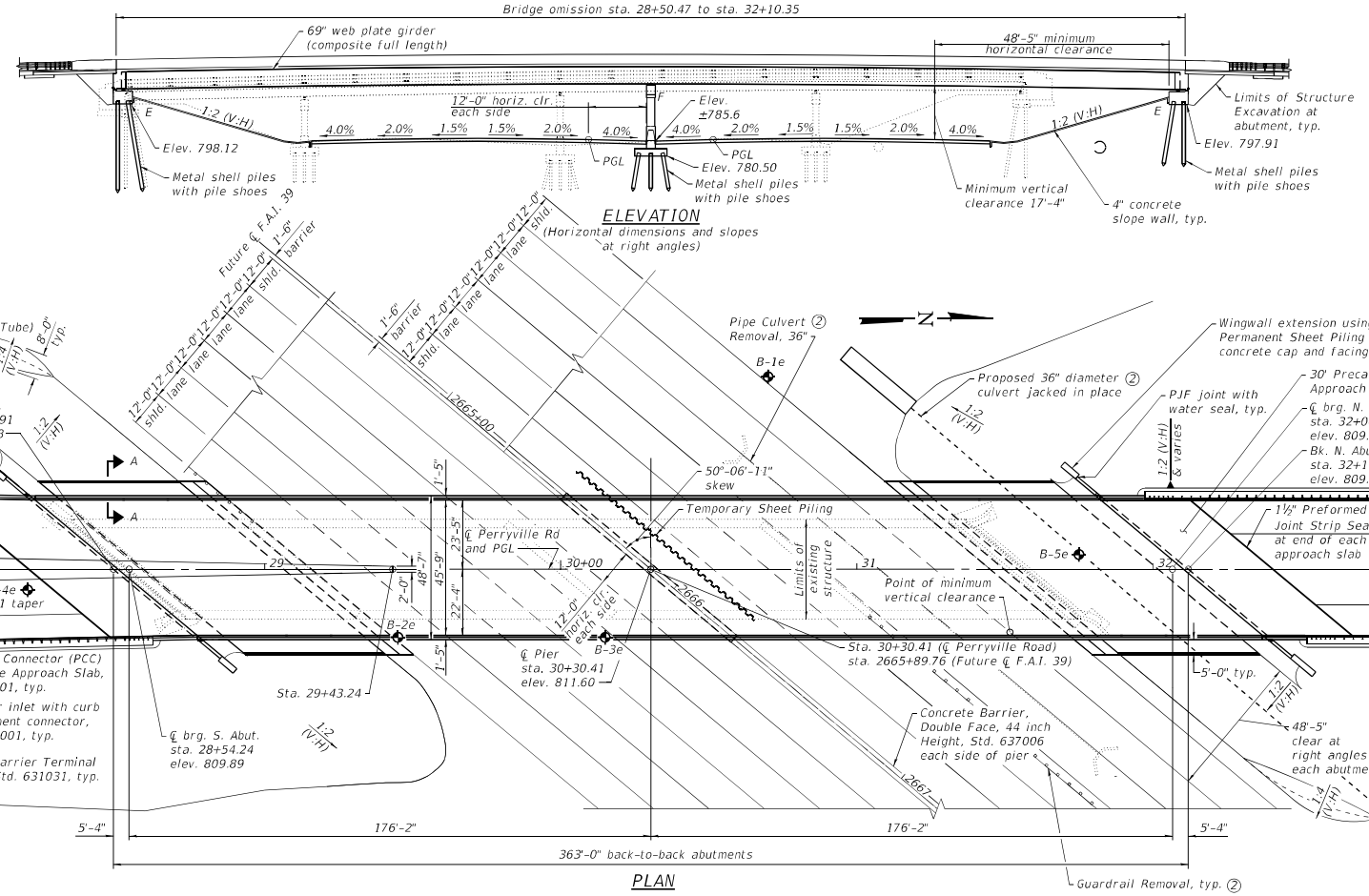
EXISTING STRUCTURE:
SN101-0098 was originally constructed in 1963 under F.A.P. 194, Section 4-HB-3. The structure is a 4-span, concrete deck on continuous steel beam superstructure with concrete piers and pile bent abutments. The piers are supported on timber piles and the abutments are supported on concrete piles. The skew is 50°-01'. The west fascia beam between Piers 2 and 3 was replaced in 1999 and again in 2007. The structure length is 304'-6" bk. to bk. abutments and the deck width is 33'-8" out-to-out.

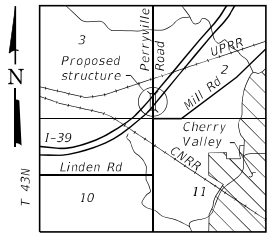
Perryville Road will be closed during construction, and traffic will be detoured. Interstate 39 will be closed for short time periods for removing or setting bridge beams. A lane shift on Interstate 39 will allow construction of the proposed pier.

No salvage.

Up to ¼" may be ground off the bridge deck, the approach slabs, and the pavement connectors.

Proposed piles at the South Abutment shall be located to clear existing piles.





LOCATION SKETCH

SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.056g
Design Spectral Acceleration at 0.2 sec. (S_{DS}) = 0.101g
Soil Site Class = C

LOADING HL-93

Allow 50 psf for future wearing surface

DESIGN SPECIFICATIONS

2020 AASHTO LRFD
Bridge Design Specifications 9th Edition

HIGHWAY CLASSIFICATION

F.A.U. 5148 (Perryville Rd)
Functional Class: Minor Arterial
ADT: 7500 (2023)/8220 (2043)
DHV: 876 (2043)
ADTT: 555 (2023)/608 (2043)
Design Speed: 45 mph
Posted Speed: 45 mph
Directional Distribution: 50:50

F.A.I. 39 (I-39)
Functional Class: Interstate
ADT: 64900 (2023)/116370 (2043)
DHV: 11570 (2043)
ADTT: 19068 (2023)/34191 (2043)
Design Speed: 70 mph
Posted Speed: 65 mph
Directional Distribution: 50:50

① All structural steel shall be metallized. Exterior fascia and bottom of bottom flange areas shall be metallized and shop painted
② See Roadway Plans

DESIGN STRESSES

FIELD UNITS
f'c = 3,500 psi (substructure)
f'c = 4,000 psi (superstructure)
fy = 50,000 psi (AASHTO M270 Grade 50) ①
fy = 60,000 psi (reinforcement)
fy = 50,000 psi (ASTM A572 Grade 50)(sheet piling)

PRECAST UNITS
f'c = 6,000 psi
f'ci = 5,000 psi

GENERAL PLAN AND ELEVATION
PERRYVILLE ROAD OVER I-39 & US 20
F.A.I. 39 – SECTION 4HBR-3
WINNEBAGO COUNTY
STATION 30+30.41
STRUCTURE NO. 101-0206

ESCA CONSULTANTS, INC.

USER NAME = kah	DESIGNED - ELH	06/21	REVISED -
ESCA PROJECT NO. 1140.22	CHECKED - RDP	06/21	REVISED -
PLOT SCALE = 6.17 ' / In.	DRAWN - KAH	06/21	REVISED -
PLOT DATE = 6/28/2021	CHECKED - ELH	06/21	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 3 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
39	4HBR-3	WINNEBAGO	-	-
		CONTRACT NO. 64G68		
	ILLINOIS	FED. AID PROJECT		

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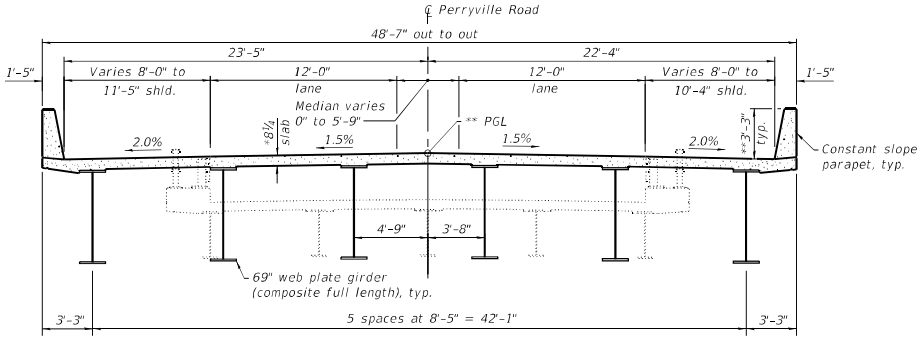
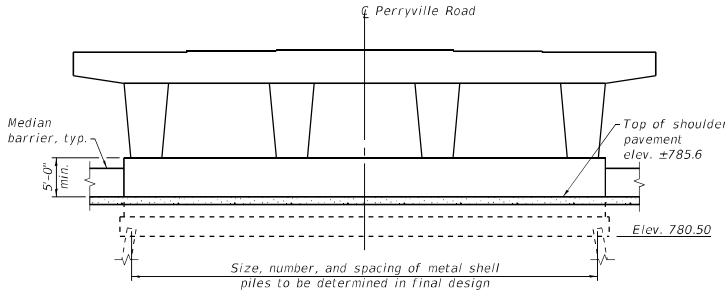


PROPOSED CROSS SECTION

(Looking north)

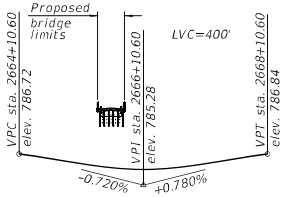
* Prior to grinding

** After grinding



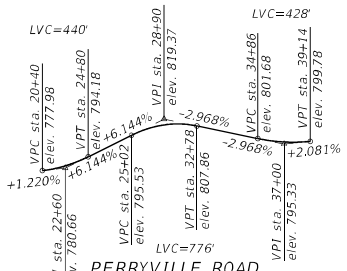
PIER SKETCH

(Looking northwest)



I-39 PROFILE GRADE

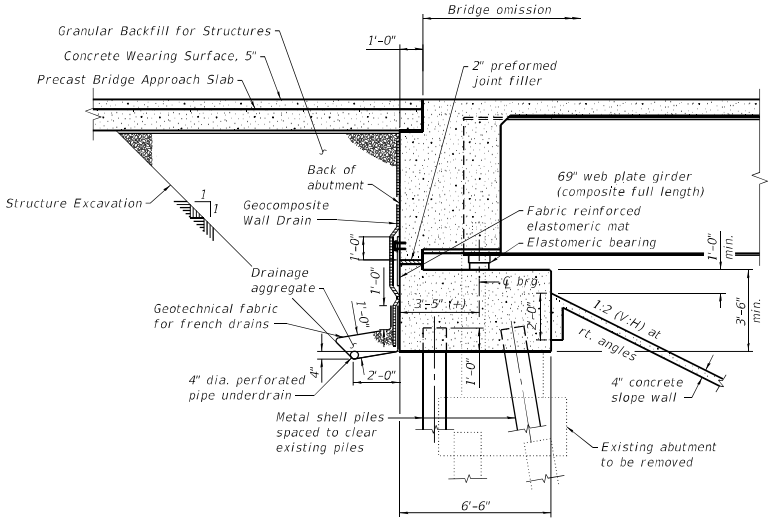
Along Future I-39 inside EOP



PERRYVILLE ROAD PROFILE GRADE

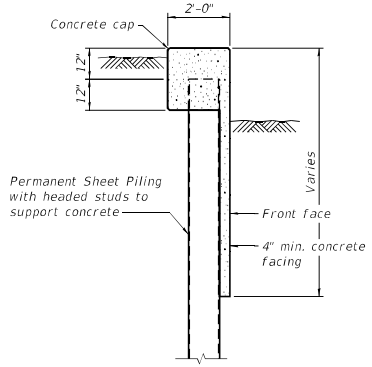
Along ℄ Perryville Road

(PG shows the final elevations after grinding)



SECTION THRU SEMI-INTEGRAL ABUTMENT

(South Abutment shown, North Abutment similar; Horizontal dimensions at right angles)



SECTION THRU WINGWALL EXTENSION

(Horizontal dimensions at right angles)

DETAILS

PERRYVILLE ROAD OVER I-39 & US 20

F.A.I. 39 - SECTION 4HBR-3

WINNEBAGO COUNTY

STATION 30+30.41

STRUCTURE NO. 101-0206

ESCA CONSULTANTS, INC.	USER NAME = kah	DESIGNED - ELH	06/21	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		
	ESCA PROJECT NO. 1140.22	CHECKED - RDP	06/21	REVISED -			
	PLOT SCALE = 0.2 '/ In.	DRAWN - KAH	06/21	REVISED -			
	PLOT DATE = 6/28/2021	CHECKED - ELH	06/21	REVISED -		SHEET 2 OF 3 SHEETS	

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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		CONTRACT NO. 64G68		
		ILLINOIS FED. AID PROJECT		

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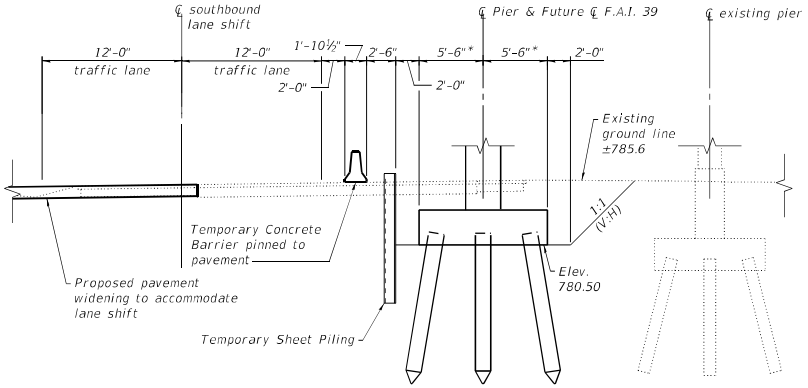
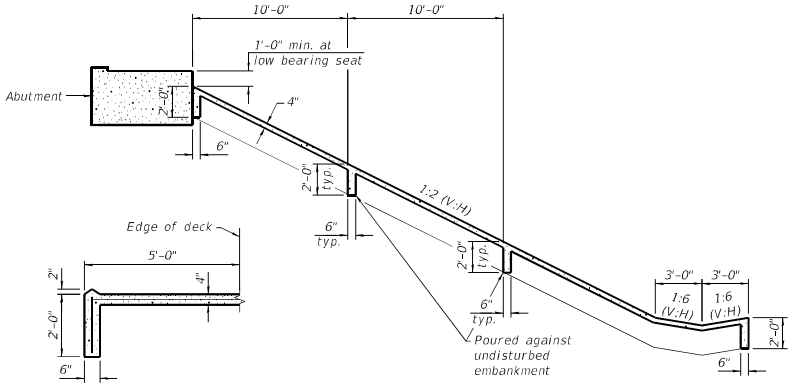


SECTION THRU PIER EXCAVATION

(Looking northbound; slopes and horizontal dimensions at right angles to pier)

* To be determined in final design



SECTION A-A

SECTION THRU CONCRETE SLOPE WALL

(Slopes and horizontal dimensions at right angles to abutment cap)

DETAILS
PERRYVILLE ROAD OVER I-39 & US 20
F.A.I. 39 - SECTION 4HBR-3
WINNEBAGO COUNTY
STATION 30+30.41
STRUCTURE NO. 101-0206

ESCA CONSULTANTS, INC.

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ESCA PROJECT NO. 1140.22	CHECKED - RDP	06/21	REVISED -
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PLOT DATE = 6/28/2021	CHECKED - ELH	06/21	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 3 OF 3 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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		CONTRACT NO. 64G68		
		ILLINOIS FED. AID PROJECT		

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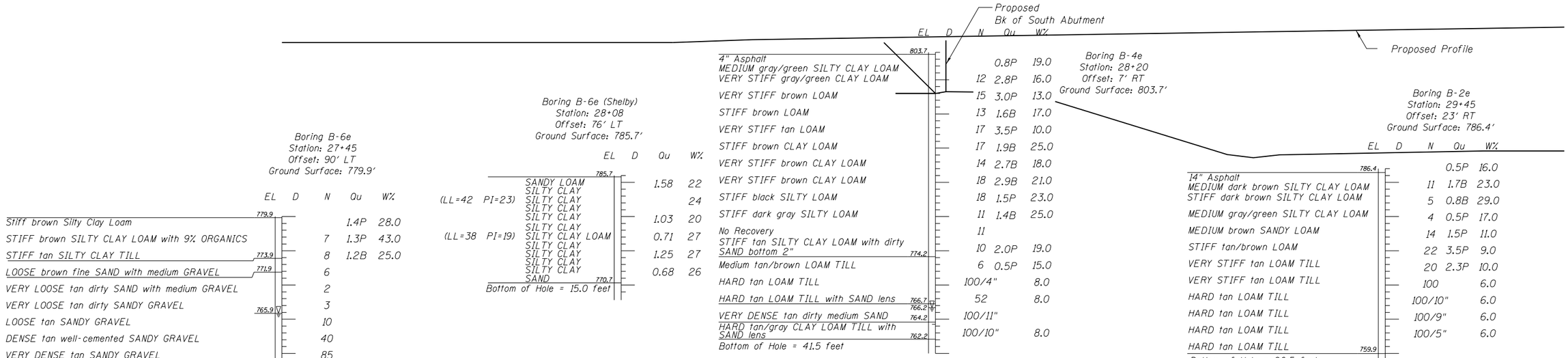

LEGEND

- EL = Elevation (FT)
- D = Depth Below Existing Ground Surface (FT)
- N = SPT N-VALUE (AASTHTO T206)
- Qu = Unconfined Compressive Strength in tons per sq. ft. (tsf)
  Failure Mode (B=buige, S=shear, P=penetrometer)
- W% = Moistrure Content Percentage
- ▽ = Groundwater Level First Encountered
- ▼ = Groundwater Level Upon Completion
- ▽ = Groundwater Level after 7 hours
- ——— = Bottom of Footing

LIN ENGINEERING,LTD.
Consulting Engineers
Springfield, Illinois

USER NAME = ___	DESIGNED - ___	REVISED - ___
FILE NAME = ___	CHECKED - ___	REVISED - ___
PLOT SCALE = ___	DRAWN - DAS	REVISED - ___
PLOT DATE = ___	CHECKED - MTH	REVISED - ___

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SUBSURFACE DATA PROFILE
STRUCTURE NO 101-0206

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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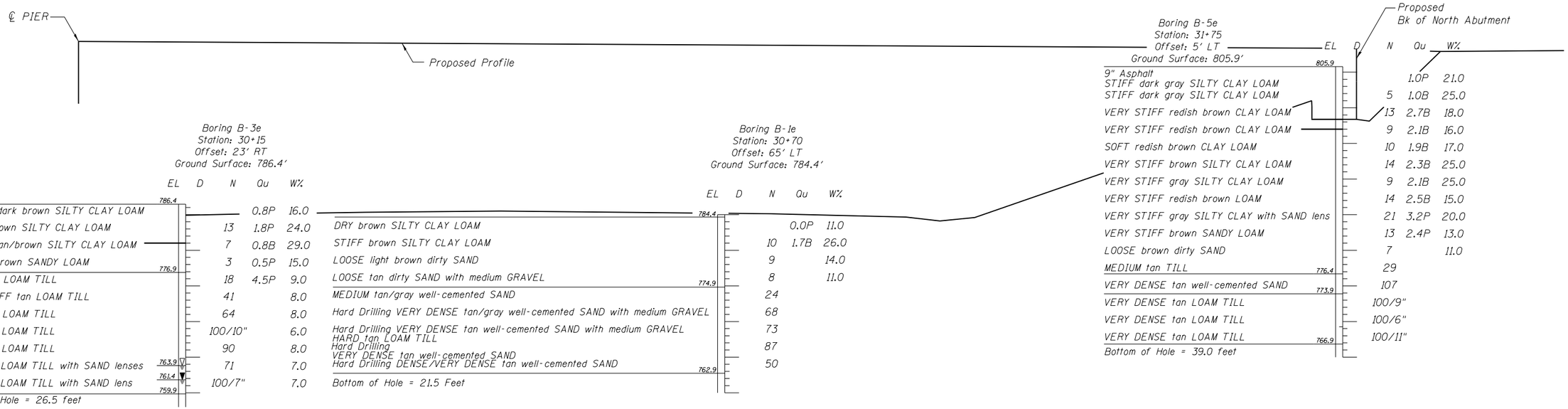
		CONTRACT NO. ___		
	ILLINOIS FED. AID PROJECT			



LEGEND

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Consulting Engineers
Springfield, Illinois

USER NAME = ___	DESIGNED - ___	REVISED - ___
FILE NAME =	CHECKED - ___	REVISED - ___
PLOT SCALE = ___	DRAWN - DAS	REVISED - ___
PLOT DATE = ___	CHECKED - MTH	REVISED - ___

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SUBSURFACE DATA PROFILE
STRUCTURE NO 101-0206

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
5148	(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 6/1/07

ROUTE Bypass 20 DESCRIPTION P92-111-06 US Bypass 20 Bridge at Perryville Road, .5 m. S. of Rockford LOGGED BY W. Garza

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

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

STRUCT. NO. _____
Station 10+00

BORING NO. B-1e
Station 9+30
Offset 65.00ft Rt CL
Ground Surface Elev. 784.40 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 80.00 ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
DRY brown SILTY CLAY LOAM				
			0.0 P	11.0
	781.90			
STIFF brown SILTY CLAY LOAM		3		
		5 5	1.7 B	26.0
	780.40			
	-5			
LOOSE light brown dirty SAND		4		
		5 4		14.0
	777.90			
LOOSE tan dirty SAND with medium GRAVEL		2		
		4 4		11.0
	774.90			
	-10			
MEDIUM tan/gray well-cemented SAND		5		
		9 15		
	772.90			
Hard Drilling VERY DENSE tan/gray well-cemented SAND with medium GRAVEL		28		
		32 36		
	770.40			
	-15			
Hard Drilling VERY DENSE tan well-cemented SAND with medium GRAVEL		28		
		35 38		
	767.90			
HARD tan LOAM TILLHard Drilling		43		
		46		
VERY DENSE tan well-cemented SAND	765.40	41		
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Hard Drilling		26		
DENSE/VERY DENSE tan well-cemented SAND		26		
	762.90	24		
End of Boring				
	-25			
	-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 5/27/08

ROUTE Bypass 20 DESCRIPTION P92-111-06 US Bypass 20 Bridge at Perryville Road, .5 m. S. of Rockford 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 B-53 Diedrich Automatic

STRUCT. NO. _____
Station 10+00

BORING NO. B-2e
Station 10+55
Offset 23.00ft Lt CL
Ground Surface Elev. 786.40 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 80.00 ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
14" Asphalt				
MEDIUM dark brown SILTY CLAY LOAM			0.5 P	16.0
	783.90			
STIFF dark brown SILTY CLAY LOAM		3		
		4 7	1.7 B	23.0
	782.40			
	-5			
MEDIUM gray/green SILTY CLAY LOAM		2		
		2 3	0.8 B	29.0
	779.90			
MEDIUM brown SANDY LOAM		1		
		2 2	0.5 B	17.0
	777.40			
	-10			
STIFF tan/brown LOAM		3		
		6 8	1.5 P	11.0
	774.90			
VERY STIFF tan LOAM TILL		7		
		10 12	3.5 P	9.0
	772.40			
	-15			
VERY STIFF tan LOAM TILL		9		
		7 13	2.3 P	10.0
	769.90			
HARD tan LOAM TILL		25		
		40 60		6.0
	767.40			
	-20			
HARD tan LOAM TILL		36		
		100/10"		6.0
	764.90			
HARD tan LOAM TILL		29		
		100/9"		6.0
	762.40			
	-25			
HARD tan LOAM TILL		38		
		100/5"		6.0
	759.90			
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
Illinios Department of Transportation/D-2

SOIL BORING LOG

Date 5/28/08

ROUTE Bypass 20 DESCRIPTION P92-111-06 US Bypass 20 Bridge at Perryville Road, .5 m. S. of Rockford 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 B-53 Diedrich Automatic

STRUCT. NO. _____
Station 10+00

BORING NO. B-3e
Station 9+85
Offset 23.00ft Lt CL
Ground Surface Elev. 786.40 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 80.00 ft

Groundwater Elev.:
First Encounter 763.9 ft ▼
Upon Completion 761.4 ft ▽
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				MEDIUM dark brown SILTY CLAY LOAM
		0.8 P	16.0	
783.90				
	6			STIFF brown SILTY CLAY LOAM
	6	1.8 P	24.0	
782.40	7			
-5				
	2			MEDIUM tan/brown SILTY CLAY LOAM
	3	0.8 B	29.0	
779.90	4			
	1			MEDIUM brown SANDY LOAM
	1	0.5 P	15.0	
776.90	2			
-10				
	3			HARD tan LOAM TILL
	7	4.5 P	9.0	
774.90	11			
	17			VERY STIFF tan LOAM TILL
	20		8.0	
772.40	21			
-15				
	16			HARD tan LOAM TILL
	28		8.0	
769.90	36			
	28			HARD tan LOAM TILL
	100/10"		6.0	
767.40				
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	36			HARD tan LOAM TILL
	40		8.0	
764.90	50			
▼				
	12			HARD tan LOAM TILL with SAND lenses
	29		7.0	
762.40	42			
▽ -25				
	100/7"			HARD tan LOAM TILL with SAND lens
			7.0	
759.90				
				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 5/29/08

ROUTE Bypass 20 DESCRIPTION P92-111-06 US Bypass 20 Bridge at Perryville Road, .5 m. S. of Rockford 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 B-53 Diedrich Automatic

STRUCT. NO. _____
Station 10+00

BORING NO. B-4e
Station 11+80
Offset 7.00ft Lt CL
Ground Surface Elev. 803.70 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 80.00 ft

Groundwater Elev.:
First Encounter 766.2 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4" Asphalt				
MEDIUM gray/green SILTY CLAY LOAM			0.8 P	19.0
	801.20			
VERY STIFF gray/green CLAY LOAM		2		
		5	2.8	16.0
	799.70	7	P	
	-5			
VERY STIFF brown LOAM		8		
		8	3.0	13.0
	797.20	7	P	
STIFF brown LOAM		4		
		5	1.6	17.0
	794.70	8	B	
	-10			
VERY STIFF tan LOAM		5		
		9	3.5	10.0
	792.20	8	P	
STIFF brown CLAY LOAM		3		
		7	1.9	25.0
	789.70	10	B	
	-15			
VERY STIFF brown CLAY LOAM		5		
		5	2.7	18.0
	787.20	9	B	
VERY STIFF brown CLAY LOAM		3		
		7	2.9	21.0
	784.70	11	B	
	-20			
STIFF black SILTY LOAM		9		
		7	1.5	23.0
	782.20	11	P	
STIFF dark gray SILTY LOAM		2		
		4	1.4	25.0
	779.70	7	B	
	-25			
No Recovery		3		
		5		
	777.20	6		
STIFF tan SILTY CLAY LOAM with dirty SAND bottom 2"		2		
		2	2.0	19.0
	774.20	8	P	
	-30			
MEDIUM tan/brown LOAM TILL		2		
		2	0.5	15.0
	772.20	4	P	
HARD tan LOAM TILL		1		
		100/4"		8.0
	769.70			
	-35			
HARD tan LOAM TILL with SAND lens		10		
		18		8.0
	766.70	34		
	▼			
VERY DENSE tan dirty medium SAND		26		
		100/11"		
	764.20			
	-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 5/29/08

ROUTE Bypass 20 DESCRIPTION P92-111-06 US Bypass 20 Bridge at Perryville Road, .5 m. S. of Rockford 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 B-53 Diedrich Automatic

STRUCT. NO. _____
Station 10+00

BORING NO. B-4e
Station 11+80
Offset 7.00ft Lt CL
Ground Surface Elev. 803.70 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 80.00 ft

Groundwater Elev.:
First Encounter 766.2 ft ▼
Upon Completion _____ ft
After _____ Hrs. _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
HARD tan/gray CLAY LOAM TILL with SAND lens	13		
	100/10"		8.0
762.20			
End of Boring			
-45			
-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 6/2/08

ROUTE Bypass 20 DESCRIPTION P92-111-06 US Bypass 20 Bridge at Perryville Road, .5 m. S. of Rockford LOGGED BY W. Garza

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

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

STRUCT. NO. _____
Station 10+00

BORING NO. B-5e
Station 8+25
Offset 5.00ft Rt CL
Ground Surface Elev. 805.90 ft

Surface Water Elev. _____ ft
Stream Bed Elev. 80.00 ft

Groundwater Elev.:
First Encounter None ft
Upon Completion _____ ft
After _____ Hrs. _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
9" Asphalt				
STIFF dark gray SILTY CLAY LOAM			1.0 P	21.0
	803.40			
STIFF dark gray SILTY CLAY LOAM		1		
		2	1.0 B	25.0
	801.90	3		
	-5			
VERY STIFF redish brown CLAY LOAM		1		
		6	2.7 B	18.0
	799.40	7		
VERY STIFF redish brown CLAY LOAM		2		
		4	2.1 B	16.0
	796.90	5		
	-10			
SOFT redish brown CLAY LOAM		2		
		4	1.9 B	17.0
	794.40	6		
VERY STIFF brown SILTY CLAY LOAM		2		
		5	2.3 B	25.0
	791.90	9		
	-15			
VERY STIFF gray SILTY CLAY LOAM		2		
		4	2.1 B	25.0
	789.40	5		
VERY STIFF redish brown LOAM		4		
		5	2.5 B	15.0
	786.90	9		
	-20			
VERY STIFF gray SILTY CLAY with SAND lens		20		
		11	3.2 P	20.0
	784.40	10		
VERY STIFF brown SANDY LOAM		2		
		5	2.4 P	13.0
	781.90	8		
	-25			
LOOSE brown dirty SAND		5		
		2		11.0
	779.40	5		
MEDIUM tan TILL		12		
		12		
	776.40	17		
	-30			
VERY DENSE tan well-cemented SAND		10		
		40		
	773.90	67		
VERY DENSE tan LOAM TILL		13		
		100/9"		
	771.90			
	-35			
VERY DENSE tan LOAM TILL		41		
		100/6"		
	769.40			
VERY DENSE tan LOAM TILL		100/11"		
	766.90			
End of Boring				
	-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
IDOT

SOIL BORING LOG

Date 2/16/16

ROUTE FAI 39 & FAP 301 DESCRIPTION P92-111-06 Perryville Road over Bypass 20 LOGGED BY W. Garza

SECTION (201-3)K & 4-1,5)K LOCATION Cherry Valley Twp. - 3SE, SEC. , TWP. 43N, RNG. 2E

COUNTY Winnebago DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-55

STRUCT. NO.
Station

Latitude 42° 13' 33.32" Northing 2,027,089.2509
Longitude -88° 58' 46.29" Easting 2,618,111.4276

BORING NO. B-6e
Station 2663+22
Offset 94.00ft Rt
Ground Surface Elev. 779.90 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 765.9 ft
Upon Completion 754.9 ft
After 7 Hrs. 755.9 ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
STIFF brown SILTY CLAY LOAM			1.4 P	28.0
778.40				
STIFF brown SILTY CLAY LOAM with 9% ORGANICS		2 3 4	1.3 P	43.0
STIFF tan SILTY CLAY TILL	-5	2 3 5	1.2 B	25.0
773.90				
LOOSE brown fine SAND with medium GRAVEL		2 3 3		
771.90				
VERY LOOSE tan dirty SAND with medium GRAVEL	-10	0 0 2		
769.40				
VERY LOOSE tan dirty SANDY GRAVEL		0 1 2		
766.90				
LOOSE tan SANDY GRAVEL	-15	5 6 4		
764.40				
DENSE tan well-cemented SANDY GRAVEL		1 12 28		
761.90				
VERY DENSE tan SANDY GRAVEL	-20	32 30		
759.40		55		
VERY DENSE tan well-cemented SANDY GRAVEL		28 32 30		
756.90				
Wash		28		
VERY DENSE tan clean medium dry SAND	-25	100/9"		
754.40				
Wash		28		
VERY DENSE gray hard CLAY TILL		100/10"		
751.90				
VERY DENSE tan SANDY GRAVEL	-30	80 100/2"		
749.40				
End of Boring	-35			
	-40			

Northing and Easting were calculated using the ILHP-WF coordinate system

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
IDOT

SOIL BORING LOG

Date 5/4/16

ROUTE FAI 39 & FAP 301 DESCRIPTION P92-111-06 Perryville Road over Bypass 20 LOGGED BY W. Garza

SECTION (201-3)K & 4-1,5)K LOCATION , SEC. , TWP. , RNG.

COUNTY Winnebago DRILLING METHOD Shelby HAMMER TYPE Shelby

STRUCT. NO. Latitude Northing
Station Longitude Easting

BORING NO. B-6e Shelby
Station 2663+80
Offset 65.00ft Rt
Ground Surface Elev. 785.70 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 (%)
24" Recovery 783.20				
25" Recovery 780.70	-5			
20" Recovery 778.20				
21" Recovery 775.70	-10			
24" Recovery 773.20				
20" Recovery 770.70	-15			
End of Boring	-20			

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)

Wang Engineering

AASHTO R18

SUMMARY OF LABORATORY TEST RESULTS

Project: Ramp BD North, Ramp BD South, Perryville, Mulford
Client: WBK
Wang Job: 412-04-10

Prepared by: C. Iordache
Checked by: L. Iordache
Date: 8/1/2016

SAMPLE IDENTIFICATION				LABORATORY TESTS AND SOIL CLASSIFICATION													
				Water Content	**Atterberg Limits**			**Visual Soil Classification**	**Unconfined Compressive Strength**	**One-Dimensional Consolidation**			**UU Triaxial Compression**				
				AASHTO	AASHTO			IDOT	AASHTO	AASHTO			AASHTO				
				T265	T89 & T90			1999	T208	T216			T296				
Site	**Boring**	**Sample**	**Top Depth**	w	LL	PL	PI	IDH	q_u	Cc	Cs	OCR	σ_1	S_u	σ_1	S_u	σ_1	S_u
			ft	%	%	%	%		tsf				psi	tsf	psi	tsf	psi	tsf
Mulford	B-4g	ST-2a	2.5	8				GRAVELLY SAND	NA									
Mulford	B-4g	ST-2b	3.5	20	49	19	30	SILTY CLAY		0.129	0.042	6.32						
Mulford	B-4g	ST-3a	5.0	25	40	19	21	SILTY CLAY	1.18	0.211	0.045	2.61						
Mulford	B-4g	ST-3b	6.0	11														
Mulford	B-4g	ST-4a	7.5	31				SILTY CLAY	0.61									
Mulford	B-4g	ST-4b	8.5					SILTY CLAY LOAM										
Mulford	B-4g	ST-5a	10.0	20				SANDY LOAM	0.25									
Mulford	B-4g	ST-5b	11.0					SANDY LOAM										
Mulford	B-4g	ST-6a	12.5	15				SANDY LOAM	0.15									
Mulford	B-4g	ST-6b	13.5					SANDY LOAM										
Perryville	B-6e	ST-1a	0.0					SANDY LOAM										
Perryville	B-6e	ST-1b	1.0	22				SILTY CLAY	1.58									
Perryville	B-6e	ST-2a	2.5	24	42	19	23	SILTY CLAY		0.197	0.063	3.08						
Perryville	B-6e	ST-2b	3.5					SILTY CLAY										
Perryville	B-6e	ST-3a	5.0	20				SILTY CLAY	1.03									

SUMMARY OF LABORATORY TEST RESULTS

Project: Ramp BD North, Ramp BD South, Perryville, Mulford
Client: WBK
Wang Job: 412-04-10

Prepared by: C. Iordache
Checked by: L. Iordache
Date: 8/1/2016

SAMPLE IDENTIFICATION				LABORATORY TESTS AND SOIL CLASSIFICATION														
				Water Content	Atterberg Limits			Visual Soil Classification	Unconfined Compressive Strength	One-Dimensional Consolidation			UU Triaxial Compression					
				AASHTO T265	AASHTO T89 & T90			IDOT 1999	AASHTO T208	AASHTO T216			AASHTO T296					
Site	Boring	Sample	Top Depth	w	LL	PL	PI	IDH	q_u	Cc	Cs	OCR	σ_1	S_u	σ_1	S_u	σ_1	S_u
			ft	%	%	%	%		tsf				psi	tsf	psi	tsf	psi	tsf
Perryville	B-6e	ST-3b	5.0					SILTY CLAY										
Perryville	B-6e	ST-4a	7.5	27	38	19	19	SILTY CLAY LOAM	0.71									
Perryville	B-6e	ST-4b	8.5					SILTY CLAY										
Perryville	B-6e	ST-5a	10.0	27				SILTY CLAY	1.25									
Perryville	B-6e	ST-5b	11.0					SILTY CLAY										
Perryville	B-6e	ST-6a	12.5	26				SILTY CLAY	0.68									
Perryville	B-6e	ST-6b	13.5					SAND										
Ramp BD South	B-12i	ST-1a	0.0					SILTY CLAY										
Ramp BD South	B-12i	ST-1b	1.0	14				SILTY LOAM	3.5									
Ramp BD South	B-12i	ST-2a	2.5	17	42	20	22	SILTY CLAY LOAM		0.113	0.020	5.76						
Ramp BD South	B-12i	ST-2b	3.5					SILTY CLAY LOAM	1.73									
Ramp BD South	B-12i	ST-3a	5.0					SILTY LOAM										
Ramp BD South	B-12i	ST-3b	6.0	19				SILTY CLAY	1.56									
Ramp BD South	B-12i	ST-4	7.5					SILTY CLAY/SANDY LOAM					3.50	0.31	7.50	0.40	12.50	0.29
Ramp BD South	B-12i	ST-5a	10.0	27				SILTY CLAY	0.46									

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

ONE-DIMENSIONAL CONSOLIDATION TEST

AASHTO T 216 / ASTM D 2435

Project: SN 101-0206, Perryville
Client: Wills, Burke Kelsey & Associates
Soil Sample ID: Boring B-6e, ST#2a, 2.5' to 3.5'
Sample Description: Brown SILTY CLAY

Tested by: M. Snider
Prepared by: M. Snider
Test date: 7/5/2016
WEI: 412-04-10

Initial sample height =	0.780	in	Ring diameter =	2.504	in
Initial sample mass =	121.19	g	Ring mass =	62.90	g
Initial water content =	24.81%		Initial sample and ring mass =	184.09	g
Initial dry unit weight =	96.32	pcf	Tare mass =	68.22	g
Initial void ratio =	0.782		Final ring and sample mass =	181.50	g
Initial degree of saturation =	87.30%		Mass of wet sample and tare =	186.26	g
			Mass of dry sample and tare =	165.32	g
Final sample mass =	118.04	g	Initial dial reading =	0.01000	in
Final dry sample mass =	97.10	g	Final dial reading =	0.09475	in
Final water content =	21.57%		LL=	42	%
Final dry unit weight =	108.06	pcf	PL=	19	%
Final void ratio =	0.588		% Sand=	n.a.	%
Final degree of saturation =	100.00%		% Silt=	n.a.	%
Estimated specific gravity =	2.75		% Clay=	n.a.	%
			In-Situ Vertical Effective Stress =	600	psf

Compression and Swelling Indices

Compression index C_c =	0.192	**Preconsolidation pressure,s_C**	
Field corrected C_c =	0.197	Casagrande Method =	1846 psf
Swelling index C_s =	0.063	**Over-Consolidation Ratio (OCR) =**	3.08

Load number	Vertical stress	Dial reading	System deflection	Vertical strain	Void ratio	C_v	Cae	Elapsed time
	psf	in	in	%		ft^2/day	%	min
1	100.0	0.01017	0.00047	0.08	0.780	N/A	N/A	480
2	200.0	0.01033	0.00066	0.13	0.779	0.3274	0.00	720
3	500.0	0.01292	0.00087	0.49	0.773	0.0765	0.03	480
4	1000.0	0.02118	0.00138	1.61	0.753	0.0753	0.21	480
5	2000.0	0.03593	0.00198	3.58	0.718	0.0427	0.33	480
6	4000.0	0.05342	0.00425	6.11	0.673	0.0275	0.36	480
7	8000.0	0.07492	0.00648	9.15	0.618	0.0152	0.54	573
8	16000.0	0.09815	0.00903	12.46	0.560	0.0144	0.26	1392
9	32000.0	0.12135	0.01063	15.64	0.503	0.0151	0.52	480
10	8000.0	0.12146	0.00809	15.33	0.508	N/A	N/A	480
11	2000.0	0.10935	0.00386	13.23	0.546	N/A	N/A	720
11	500.0	0.09470	0.00183	11.09	0.584	N/A	N/A	1480

Prepared by: _____ Date: _____

Checked by: _____ Date: _____

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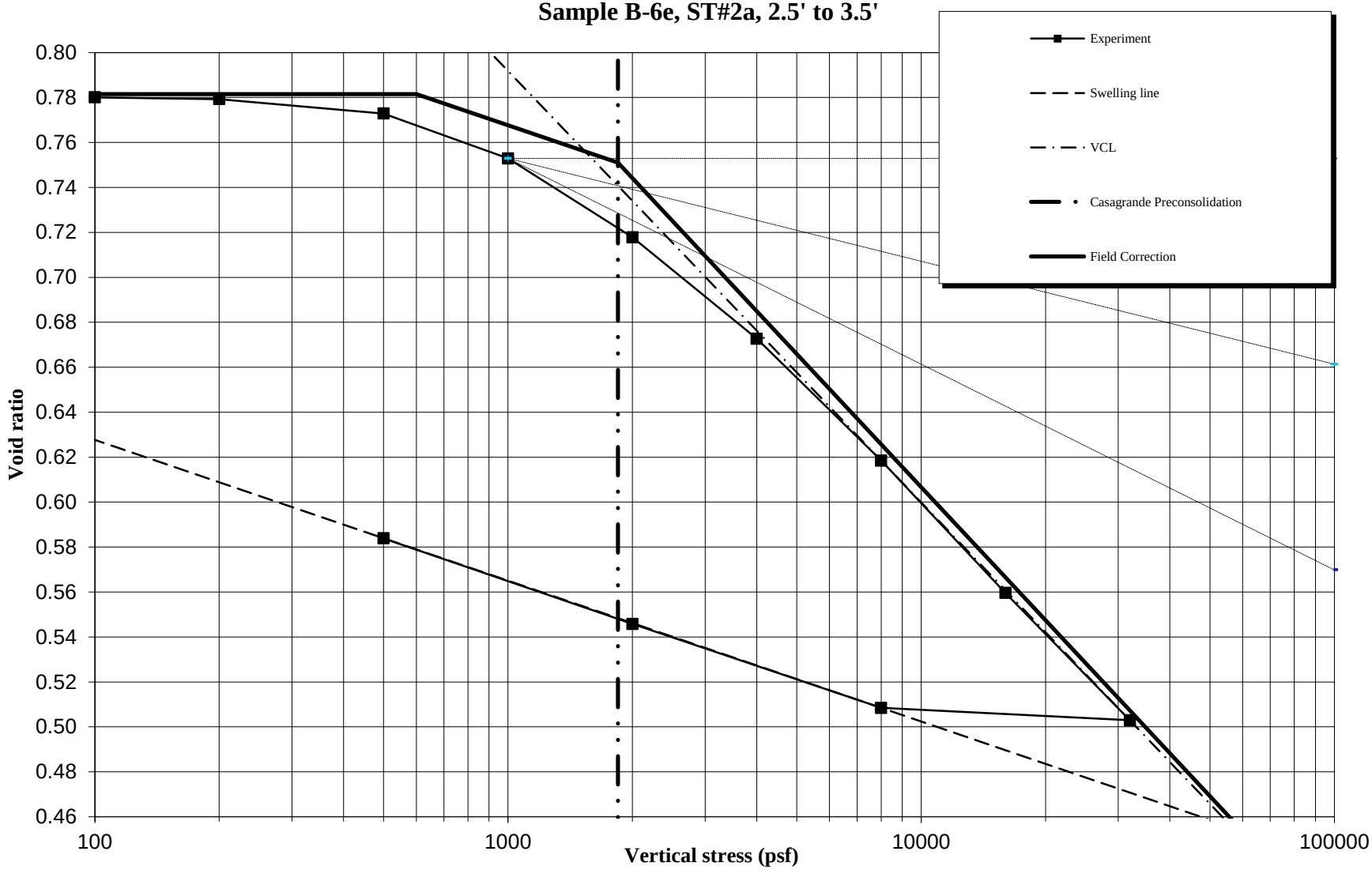
CONSOLIDATION CURVE

Sample B-6e, ST#2a, 2.5' to 3.5'



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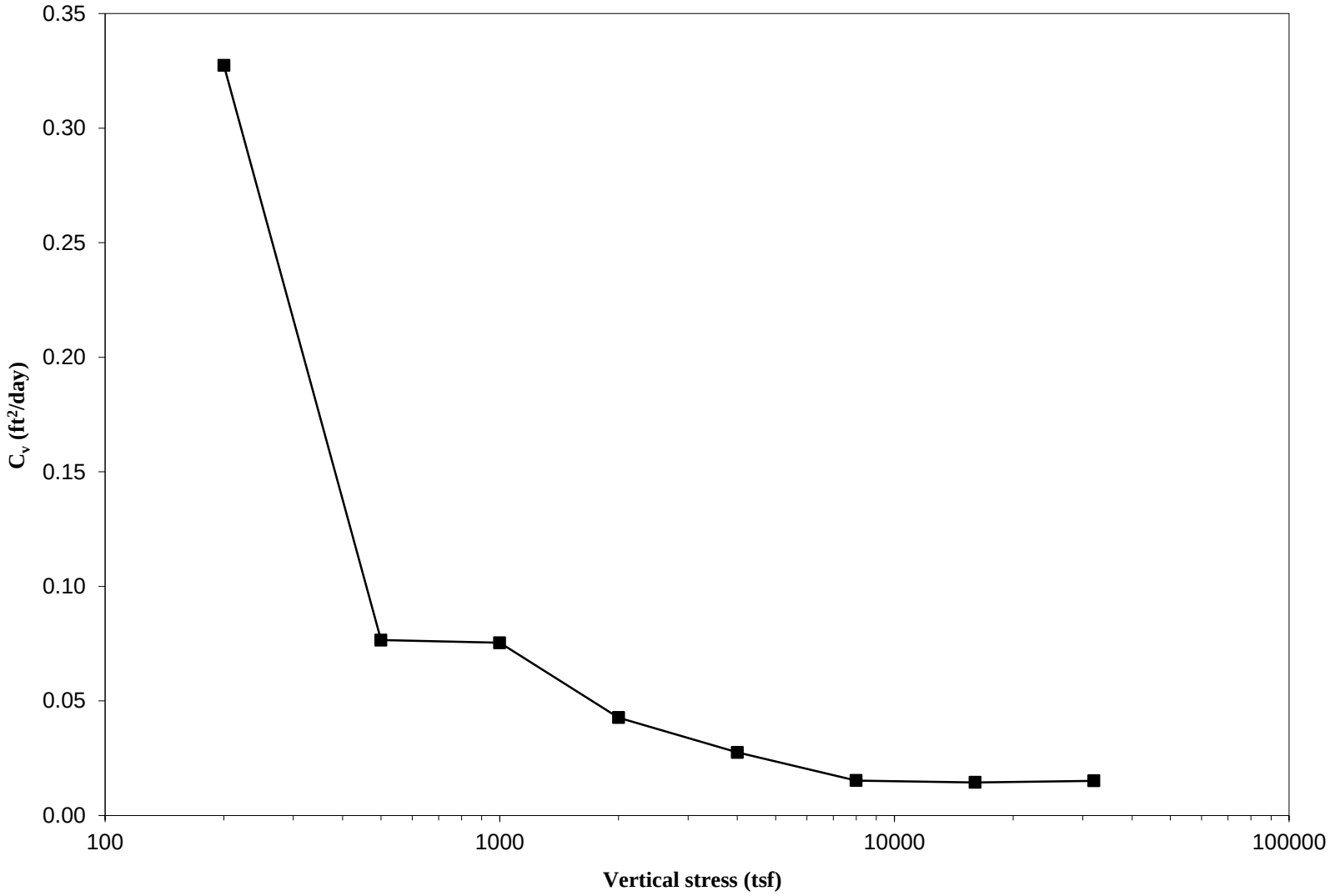
CONSOLIDATION COEFFICIENT (C_v) vs. VERTICAL STRESS

Sample B-6e, ST#2a, 2.5' to 3.5'



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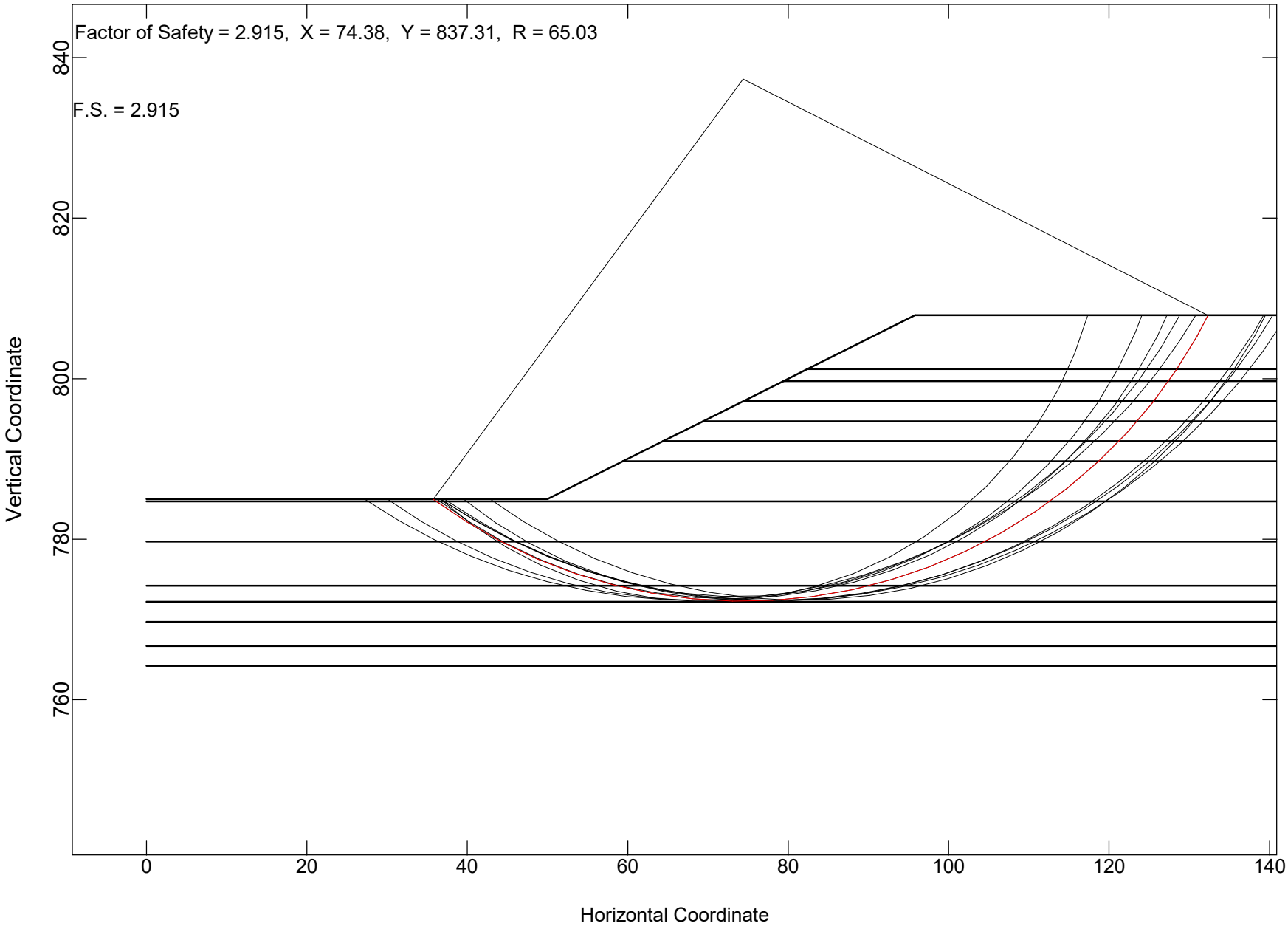
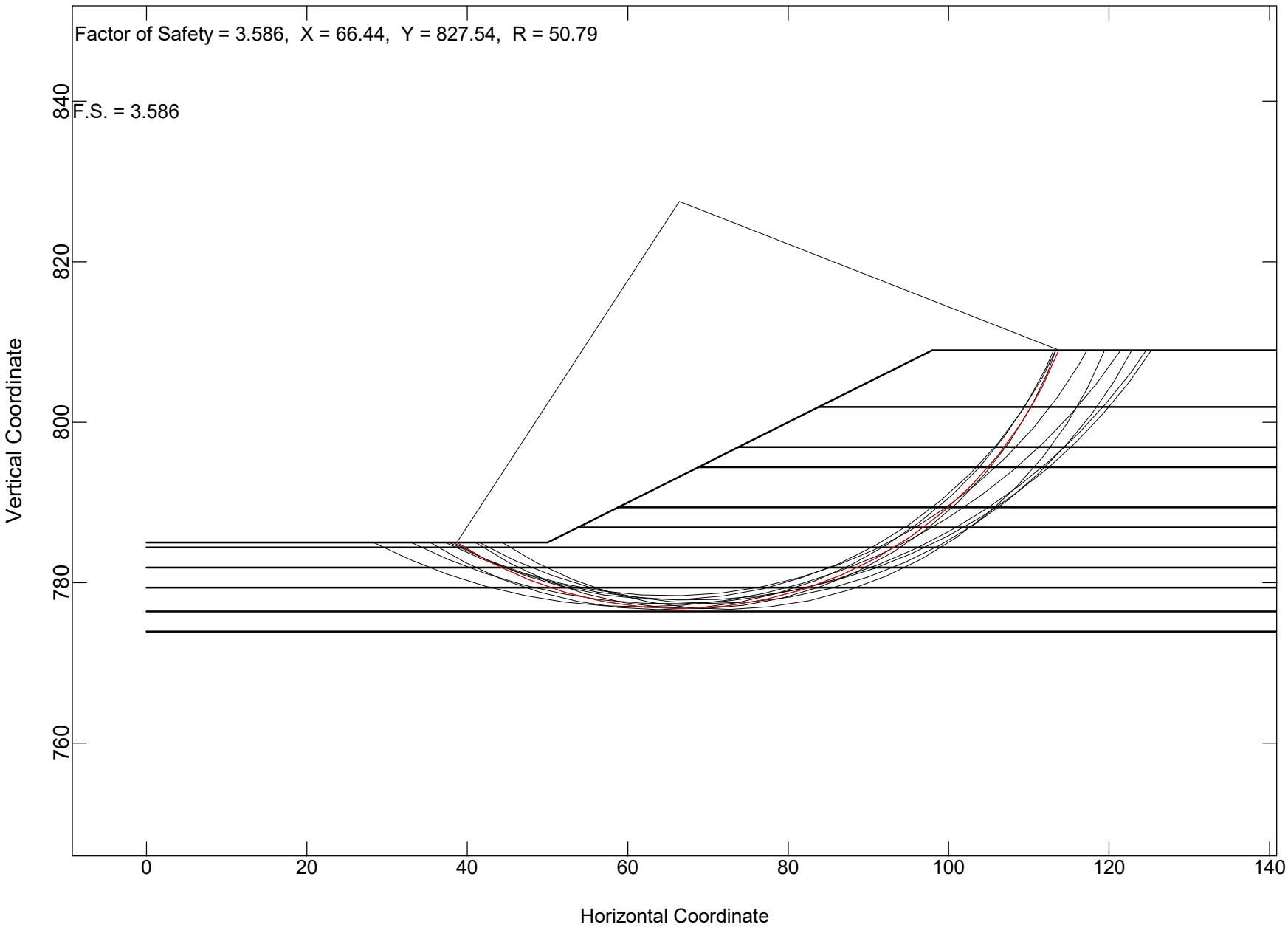

Factor of Safety = 2.915, X = 74.38, Y = 837.31, R = 65.03
F.S. = 2.915
Vertical Coordinate
840
820
800
780
760
0
20
40
60
80
100
120
140
Horizontal Coordinate


Factor of Safety = 3.586, X = 66.44, Y = 827.54, R = 50.79
F.S. = 3.586
Vertical Coordinate
840
820
800
780
760
0
20
40
60
80
100
120
140
Horizontal Coordinate