Illinois Department of Transportation

Abbreviated Structure Geotechnical Report

Original Report Date: 3/2/2018	**Proposed SN:** 050-0261	**Route:**	CH 9
Revised Date: 4/2/2019	**Existing SN:** 050-0081	**Section:**	(50-3)HBR-3
Geotechnical Engineer: Adam Bohnhoff, Civil Design Inc.		**County:**	LaSalle
Structural Engineer: Jim Clinard, Chamlin & Associates Inc.		**Contract:**	66C59

Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing): The proposed two span structure carries CH 9 over I-80 and will be a reinforced concrete deck on steel plate girders with integral abutments. The abutments will be support by steel H pile driven to refusal. The pier will be supported by a spread footing. A preliminary TSL drawing 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): The existing plans indicate abutments are supported on concrete piles and the 3 piers are supported on creosote pile supported spread footings. The original 1961 logs included soil borings at both abutments and all 3 piers. In 2011, a soil boring was taken near each abutment. In 2016, a soil boring was taken at the proposed pier location. Copies of these logs 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 profile of CH 9 will be increased by approximately 4 feet. The soils within the existing embankments have strengths exceeding 3 tsf and moisture contents around 25% or less. Minimal settlement is anticipated under the existing embankments. No additional testing or treatment for settlement is necessary.

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 CH 9 alignment is shifted to the east. The existing embankment will be widened to accommodate. Side and end slopes will be 2:1. Due to the cohesive soil strengths in the existing embankment and below, long term drained conditions control over short term undrained conditions. The SF against slope failure is 1.5 at the abutment cross sections and 1.7 for the end slopes using the Bishop Method with long term drained conditions. Note the toe of the slope at the existing building on the southwest side of the bridge is not considered critical for slope stability. No additional analysis or treatment is required.

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: Scour is not applicable because this is a grade separation structure.

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: The seismic data is as follows: Seismic Soil Site Class = C; Seismic Performance Zone = SPZ 1; Design Spectral Acceleration at 0.2 sec. (SDS) = 0.124; Design Spectral Acceleration at 1.0 sec. (SD1) = 0.070. Liquefaction is not applicable because the SPZ = 1.

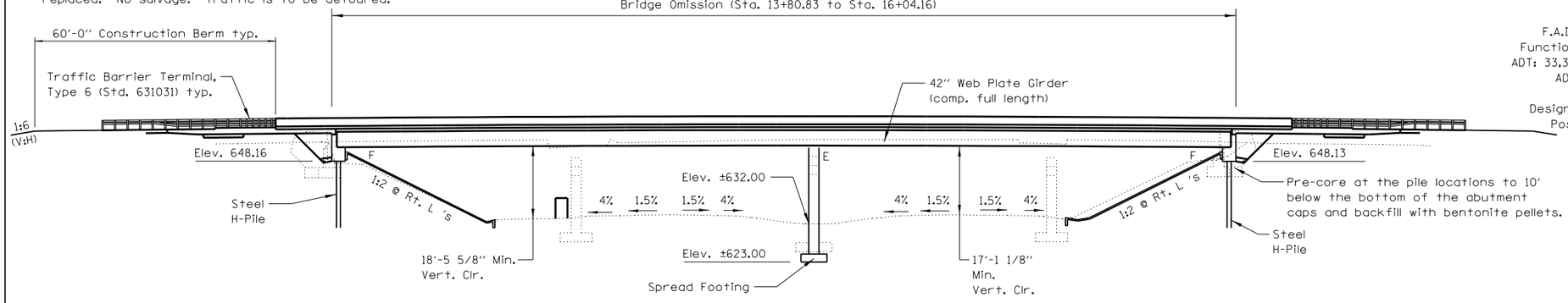
Confirm feasibility of the proposed foundation or wall type and provide design parameters. Attach a pile design table indicating feasible pile types, various nominal required bearings, factored resistances available and corresponding estimated lengths at locations where piles will be used. Provide factored 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: See the attached supplemental information.

Calculate the estimated water surface elevation and determine the need for cofferdams (type 1 or 2), and seal coat: Water surface elevations and cofferdams/seal coat are not applicable because this is a grade separation structure.

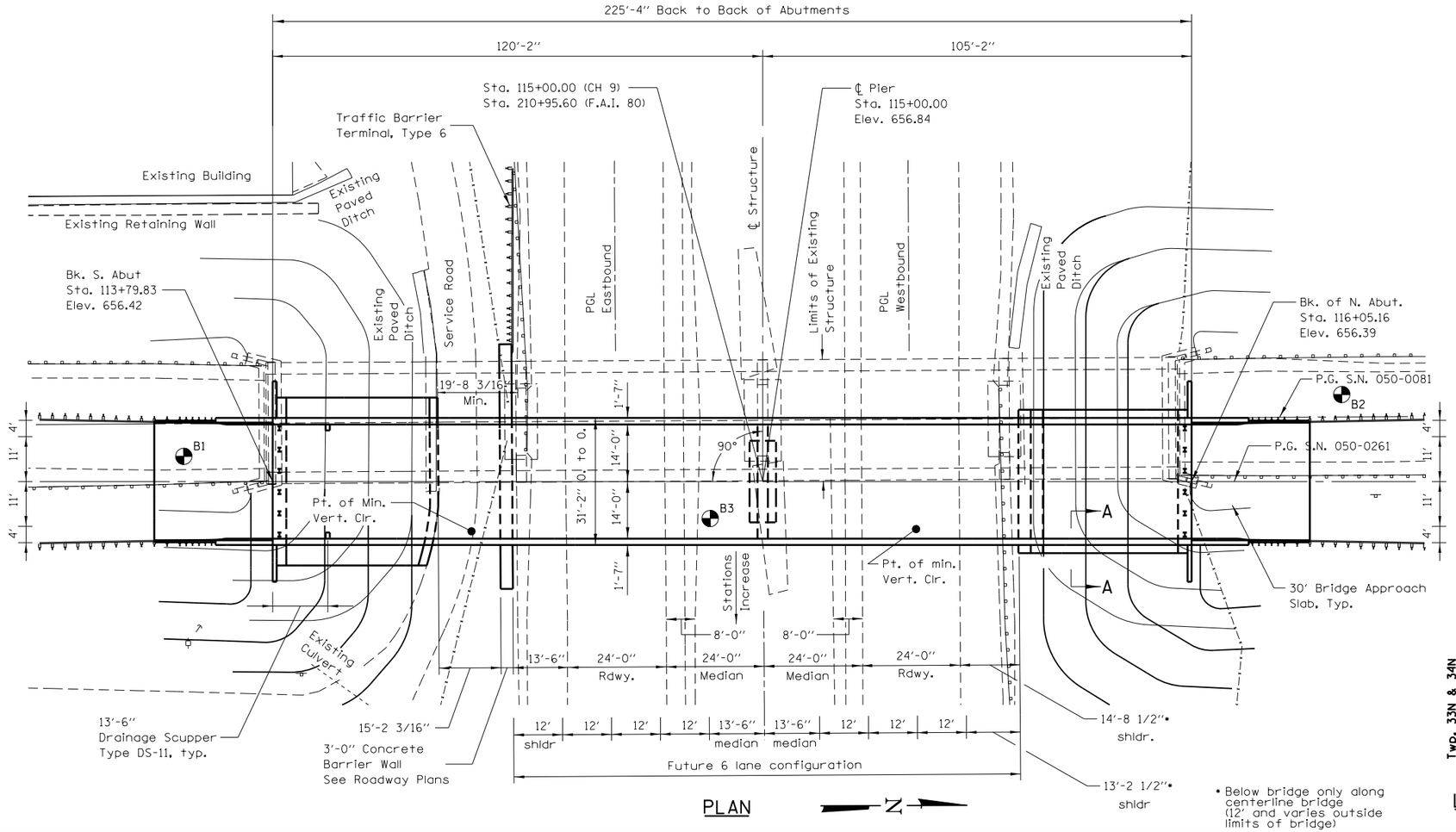
Assess the need for sheeting or soil retention or temporary construction slope and provide recommendation for other construction concerns: Temporary sheet piling will not be needed to construct the abutments because the structure will closed to all traffic during construction. Constructing the footing at the pier is feasible within the median without requiring braced excavation.

Bench Mark: "O" - Chiseled square on S.E. concrete curb of bridge S.N. 050-0081. Elev. 653.755

Existing Structure: SN 050-0081 (Sec 50-3HB-1) was constructed in 1961 as a four-span continuous steel I-beam structure with concrete piers on pile supported spread footings. The structure measures 224'-6" back to back of abutments and 29'-8" out to out of deck with 24'-0" clear width between the curbs. The deck was constructed as a 6 1/2" concrete deck. Structure to be removed and replaced. No salvage. Traffic is to be detoured.



ELEVATION



PLAN

DESIGN SPECIFICATIONS

2017 AASHTO LRFD Bridge Design Specifications

HIGHWAY CLASSIFICATION

F.A.I. Rte. 80 - I-80.
Functional Class: Interstate
ADT: 33,384 (2020); 39,804 (2040)
ADTT: 14,767 (2040)
DHV: 3980
Design Speed: 70 m.p.h.
Posted Speed: 70 m.p.h.

C.H. 9 - County Highway 9
Functional Class: Major Collector
ADT: 468 (2020); 558 (2040)
ADTT: 25(2040)
DHV: 56
Design Speed: 55 m.p.h.
Posted Speed: 55 m.p.h.

LOADING HL-93

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

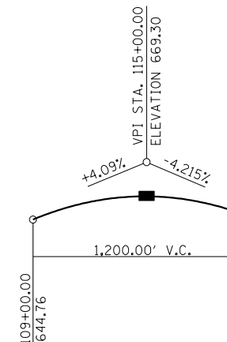
SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (SD1) = 0.070
Design Spectral Acceleration at 0.2 sec. (SDS) = 0.124
Soil Site Class = C

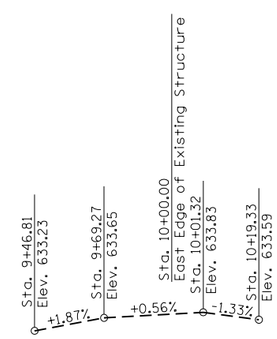
DESIGN STRESSES

FIELD UNITS

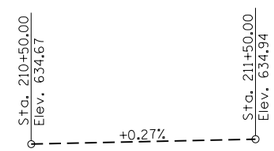
f'c = 3,500 psi
f'c = 4,000 psi (Superstructure Concrete)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50)



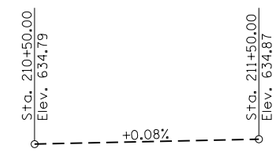
PROFILE GRADE CH 9
(Along ℄ Roadway)



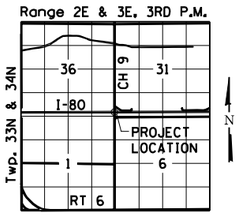
PROFILE GRADE SERVICE ROAD
(Along Westbound ℄ Roadway)



PROFILE GRADE I-80
(Along Eastbound ℄ Roadway)



PROFILE GRADE I-80
(Along Westbound ℄ Roadway)



LOCATION SKETCH

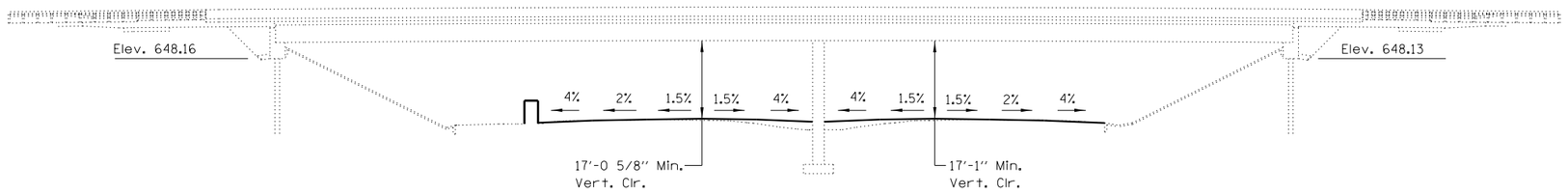
GENERAL PLAN & ELEVATION
CH 9 OVER I-80
F.A.I. RTE. 80 (I-80)
SECTION (50-3) HBR-3
LASALLE COUNTY
STATION 115+00
SN 050-0261 (PROP.)

FILE NAME =	USER NAME = --	DESIGNED - JKC	REVISED -
CHAMLIN & ASSOCIATES, INC.		CHECKED - JKC	REVISED -
	PLOT SCALE = 1"=32'	DRAWN - ARR / LAG	REVISED -
	PLOT DATE = 01/16/2019	CHECKED - JKC	REVISED -

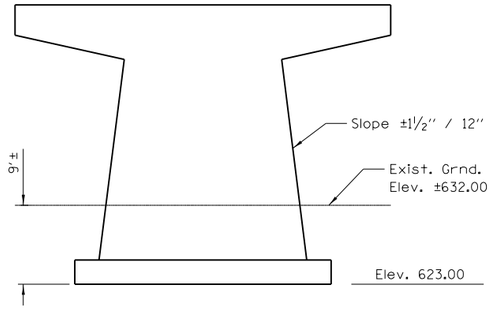
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. OF SHEETS

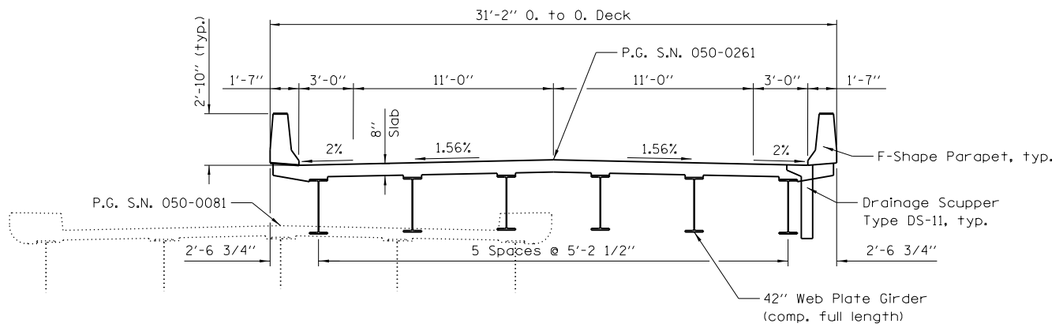
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
			2	1
		CONTRACT NO. 66C59		
		ILLINOIS FED. AID PROJECT		



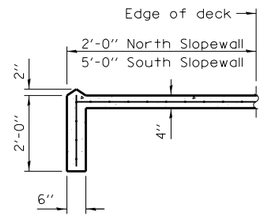
FUTURE ELEVATION
(Assumed PG Elev. 635.00)



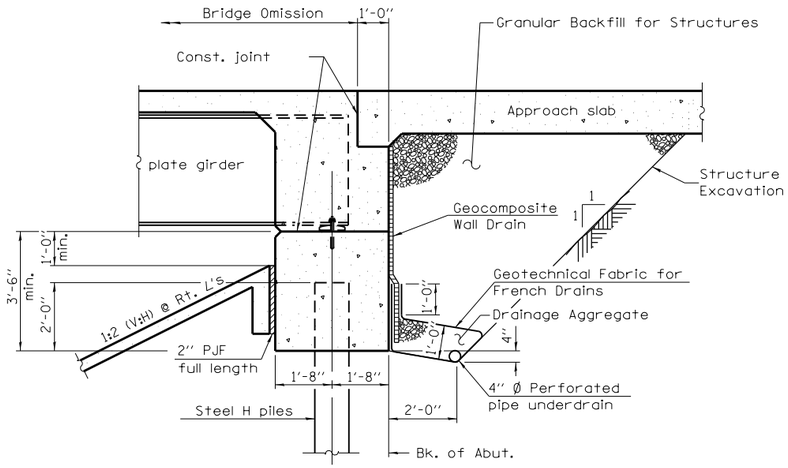
PIER SKETCH



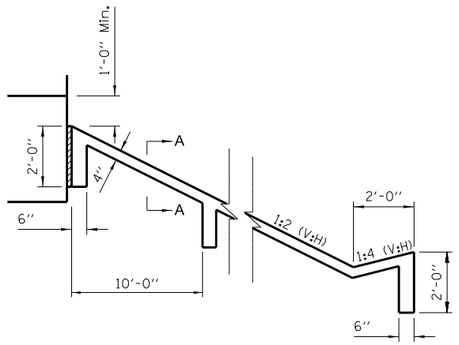
CROSS SECTION
Looking North



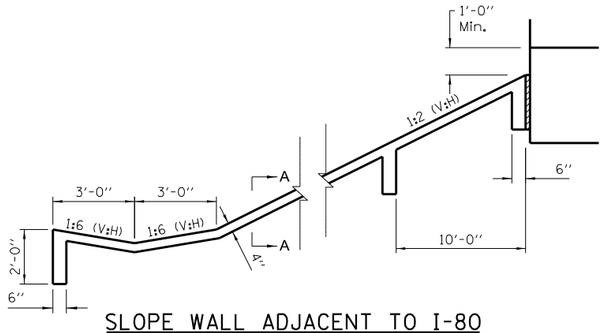
SECTION A-A



SECTION THRU INTEGRAL ABUTMENT
(Horiz. dim. @ Rt. L's)



SLOPE WALL ADJACENT TO SERVICE ROAD
(South)

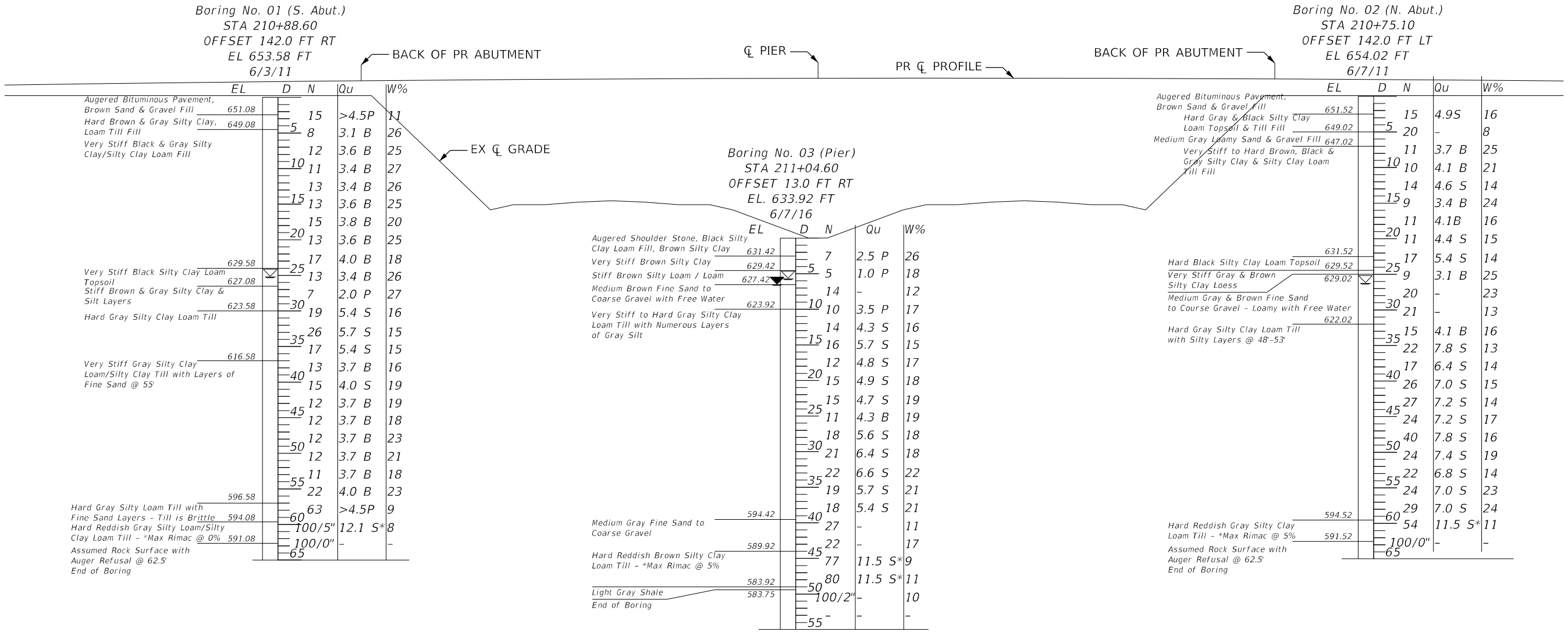


SLOPE WALL ADJACENT TO I-80
(North)

GENERAL PLAN & ELEVATION
CH 9 OVER I-80
F.A.I. RTE. 80 (I-80)
SECTION (50-3) HBR-3
LASALLE COUNTY
STATION 115+00
SN 050-0261 (PROP.)

FILE NAME =	USER NAME = --	DESIGNED - JKC	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		F.A. RTE.	SECTION / COUNTY / TOTAL SHEETS / SHEET NO.
CHAMLIN & ASSOCIATES, INC.		CHECKED - JKC	REVISED -				2 / 2
	PLOT SCALE = 1"=32'	DRAWN - ARR / LAG	REVISED -				CONTRACT NO. 66C59
	PLOT DATE = 01/16/2019	CHECKED - JKC	REVISED -		SHEET NO. OF SHEETS		ILLINOIS FED. AID PROJECT

Note: Boring Stationing and Offsets shown in reference to I-80 profile.



LEGEND

EL = Elevation (FT)
D = Depth Below Existing Ground Surface (FT)
N = SPT N-VALUE (AASHTO T206)
Qu = Unconfined Compressive Strength in tons per sq. ft. (tsf)
Failure Mode (B=bulge, S=shear, P=penetrometer)
W% = Moisture Content Percentage
▼ = Groundwater Level First Encountered
▽ = Groundwater Upon Completion
▽ = Groundwater After 24 to 72 hours
Soil profile is or illustrative purposes only. Actual conditions will vary.

SUBSURFACE DATA PROFILE
CH 9 OVER I-80
F.A.I. RTE. 80 (I-80)
SECTION (50-3) HBR-3
LASALLE COUNTY
STATION 115+00
SN 050-0261 (PROP.)

FILE NAME = P:\Effingham\2685,01 - CH 9 at I-80_SGR\SGR\Soil Borings\Subsurface Data Profile.dgn	USER NAME = tziegler	DESIGNED - EJS	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	PLOT SCALE = 2,0000 ' / In.	DRAWN - EJS	REVISED -			80	(50-3) HBR-3	LASALLE	1	1
Default	PLOT DATE = 7/12/2018	CHECKED - TJZ	REVISED -		SHEET 1 OF 1 SHEETS			CONTRACT NO. 66C59		
		DATE - 7/11/18	REVISED -					ILLINOIS FED. AID PROJECT		

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 2/27/61

ROUTE I-80 (FAI 80) **DESCRIPTION** County Highway 9-D over FAI 80 (Sta 210+80.6) **LOGGED BY** Gehler

SECTION 50-3HB-1 **LOCATION** SW 1/4, **SEC.** 31, **TWP.** 34N, **RNG.** 3E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 050-0081
Station 210+80.6

BORING NO. 1 (Pier #2)
Station 15+00
Offset 15.0 ft Lt.
Ground Surface Elev. 632.97 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 625.0 ft
After 24 **Hrs.** 625.5 ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				Very Stiff Brownish Black Silty Clay
	15	2.9 S	25	
629.47				
				Stiff Yellowish Brown Silty Clay
627.97	7	1.7 S	26	
-5				
				Loose Yellowish Brown Sandy Loam
626.97				
				Medium Yellowish Brown Coarse Rounded Sand to Coarse Rounded Gravel
	14			
624.47				
				Hard Brown Clay (Till)
-10	14	4.3 B	17	
621.97				
				Hard Gray Clay (Till)
	24	6.2 S	15	
-15	22	8.3 B	14	
	21	5.4 S	17	
-20	18	4.3	19	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
		S		Hard Gray Clay (Till) *(continued)*
	16	4.4 B	18	
-25	16	4.1 B	19	
	27	5.5 B	18	
602.97				
-30	37	6.2 B	17	Dense Gray Sandy Loam
600.97				
	24	3.9 S	18	Very Stiff Gray Clay (Till)
599.47				
				Very Stiff Gray Clay
-35	28	3.1 S	24	
	27	4.3 B	21	
594.47				
				Dense Gray Gravely Loam
592.97				
-40	54	6.3	9	

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, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 2/27/61

ROUTE I-80 (FAI 80) **DESCRIPTION** County Highway 9-D over FAI 80 (Sta 210+80.6) **LOGGED BY** Gehler

SECTION 50-3HB-1 **LOCATION** SW 1/4, **SEC.** 31, **TWP.** 34N, **RNG.** 3E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 050-0081
Station 210+80.6

BORING NO. 1 (Pier #2)
Station 15+00
Offset 15.0 ft Lt.
Ground Surface Elev. 632.97 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 625.0 ft
After 24 **Hrs.** 625.5 ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Hard Gray Clay (Till)			B	
591.97				
Hard Gray Clay Loam (Till)				
		175	9.7 +	9
589.97				
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
IDOT

SOIL BORING LOG

Date 2/28/61

ROUTE I-80 (FAI 80) **DESCRIPTION** County Highway 9-D over FAI 80 (Sta 210+80.6) **LOGGED BY** Gehler

SECTION 50-3HB-1 **LOCATION** SE 1/4, **SEC.** 36, **TWP.** 34N, **RNG.** 2E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 050-0081
Station 210+80.6

BORING NO. 2 (Pier #1)
Station 14+40.75
Offset 15.5 ft Rt.
Ground Surface Elev. 632.53 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 624.5 ft
After 24 **Hrs.** 625.4 ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Stiff Yellowish Brown and Black Silty Clay				
		17	3.3 S	24
629.03				
Stiff Yellowish Brown Silty Clay				
628.03				
Loose Yellowish Brown Sandy Loam	-5	9	1.2 B	22
626.53				
Medium Yellowish Brown Gravely Loam				
		20		
624.03				
Very Stiff Brown Clay (Till)				
	-10	15	2.6 B	17
621.53				
Stiff Gray Clay (Till)				
		14	1.8 S	17
619.03				
Very Stiff Gray Clay (Till)				
	-15	13	2.7 S	16
		17	2.3 S	16
614.03				
Hard Gray Clay (Till)				
	-20	19	5.2	16
Hard Gray Clay (Till) *(continued)*			B	
		18	4.3 B	15
609.03				
Very Stiff Gray Clay (Till)				
	-25	23	3.5 B	16
		25	3.4 B	16
	-30	21	3.3 B	20
601.53				
Medium Gray Silt Loam				
		30	1.7 S	17
599.03				
Hard Gray Clay				
	-35	30	4.3 S	25
596.53				
Very Stiff Gray Clay				
595.53				
Medium Gray Coarse Angular Sand to Coarse Angular Gravel 594.53		33	2.9 B	23
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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 2/28/61

ROUTE I-80 (FAI 80) **DESCRIPTION** County Highway 9-D over FAI 80 (Sta 210+80.6) **LOGGED BY** Gehler

SECTION 50-3HB-1 **LOCATION** SE 1/4, **SEC.** 36, **TWP.** 34N, **RNG.** 2E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 050-0081
Station 210+80.6

BORING NO. 3 (Pier #3)
Station 15+59.25
Offset 17.0 ft Rt.
Ground Surface Elev. 634.15 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 625.8 ft
After 24 **Hrs.** 626.2 ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Medium Brownish Black Silty Clay
	13	0.5 E	26	
630.65				
				Very Stiff Yellowish Brown Silty Clay
-5	13	2.8 S	24	
628.15				
				Loose Yellowish Brown Gravely Loam
	8		14	
625.65 ▽				
				Very Stiff Brown Clay Loam (Till)
-10	14	2.7 B	17	
623.15				
				Hard Brown Clay Loam (Till)
	19	4.1 B	16	
620.65				
				Hard Gray Clay (Till)
-15	27	4.3 B	15	
	24	4.9 B	15	
-20	21	4.0	16	
		E		Hard Gray Clay (Till) *(continued)*
	22	6.4 B	15	
-25	30	Lost Sample		
	24	3.9 B	18	
-30	29	4.1 B	19	
603.15				
				Very Stiff Gray Clay
	26	3.5 S	25	
-35	23	Lost Sample		
598.15				
				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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 3/9/61

ROUTE I-80 (FAI 80) **DESCRIPTION** County Highway 9-D over FAI 80 (Sta 210+80.6) **LOGGED BY** Gehler

SECTION 50-3HB-1 **LOCATION** SW 1/4, **SEC.** 31, **TWP.** 34N, **RNG.** 3E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 050-0081
Station 210+80.6

BORING NO. 4 (S. Abut.)
Station 16+02.25
Offset 13.0 ft Lt.
Ground Surface Elev. 632.81 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 624.5 ft
After 24 **Hrs.** 625.0 ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Stiff Yellowish Brown and Black Silty Clay
	18	1.0 S	22	
629.31				
				Stiff Yellowish Brown and Gray Silty Clay
627.81				
-5	10	1.7 S	25	
				Medium Yellowish Brown Sandy Loam
625.31				
	11	2.0 E	21	
				Very Stiff Brown and Gray Clay (Till)
-10	17	3.3 B	20	
621.81				
				Hard Gray Clay (Till)
	21	5.0 S	17	
-15	28	6.2 S	17	
	23	5.0 S	17	
614.31				
				Very Stiff Gray Clay (Till)
-20	25	3.7	19	
		B		Very Stiff Gray Clay (Till) *(continued)*
	24	Lost Sample		
609.31				
				Medium Gray Silt
-25	19		20	
606.81				
				Hard Gray Clay (Till)
	27	4.3 B	19	
604.31				
				Medium Gray Gravely Loam
-30	21		19	
601.81				
				Very Stiff Gray Clay
	24	3.7 B	26	
599.31				
				Medium Gray Coarse Angular Sand
598.31				
-35	22	2.4 S	26	Very Stiff Gray Clay
597.31				
				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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 3/10/61

ROUTE I-80 (FAI 80) **DESCRIPTION** County Highway 9-D over FAI 80 (Sta 210+80.6) **LOGGED BY** Gehler

SECTION 50-3HB-1 **LOCATION** SW 1/4, **SEC.** 31, **TWP.** 34N, **RNG.** 3E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 050-0081
Station 210+80.6

BORING NO. 5 (N. Abut.)
Station 13+97.75
Offset 16.0 ft Lt.
Ground Surface Elev. 632.15 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 624.3 ft
After 24 **Hrs.** 624.7 ft

Material	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Yellowish Brown and Black Silty Clay				
		14	1.0 E	21
628.65				
Stiff Yellowish Brown and Gray Silty Clay				
627.15	-5	7	1.0 E	25
Medium Yellowish Brown Gravely Loam				
		17		
623.65				
Medium Yellowish Brown Silty Clay				
	-10	11	1.8 B	13
621.15				
Very Stiff Gray Clay (Till)				
		20	3.5 S	19
	-15	23	3.5 B	15
616.15				
Hard Gray Clay (Till)				
		24	5.4 B	13
613.65				
Very Stiff Gray Clay (Till)				
	-20	21	3.1	16

Material	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Stiff Gray Clay (Till) *(continued)*			B	
		23	4.1 B	15
	-25	23	2.0 S	16
		18	1.9 S	21
	-30	22	2.7 B	20
601.15				
Very Stiff Gray Clay				
		25	3.1 B	22
598.15				
Hard Gray Clay				
	-35	28	4.7 B	23
		40	4.1 S	21
594.15				
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, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 6/3/11

ROUTE I-80 (FAI 80) **DESCRIPTION** FAS 174 (CH 9) over I-80, 4 miles East of IL 178 **LOGGED BY** Larry Myers

SECTION 50-3HB-1 **LOCATION** SW 1/4, **SEC.** 31, **TWP.** 34N, **RNG.** 3E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 050-0081 (Exist.)
Station 210+80.6

BORING NO. 01 (S. Abut.)
Station 210+88.6
Offset 142.0 ft Rt.
Ground Surface Elev. 653.58 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 628.6 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Augered Bituminous Pavement, Brown Sand & Gravel Fill
651.08				
	6			Hard Brown & Gray Silty Clay Loam Till Fill
	7 8	>4.5 P	11	
649.08				
-5				Very Stiff Black & Gray Silty Clay/Silty Clay Loam Fill
	4			
	3 5	3.1 B	26	
	4			
	5 7	3.6 B	25	
-10				
	3			
	5 6	3.4 B	27	
	4			
	6 7	3.4 B	26	
-15				
	3			
	6 7	3.6 B	25	
	4			
	7 8	3.8 B	20	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	3			Very Stiff Black & Gray Silty Clay/Silty Clay Loam Fill *(continued)*
	6 7	3.6 B	25	
	11			
	8 9	4.0 B	18	
629.58				
▽ -25				Very Stiff Black Silty Clay Loam Topsoil
	5			
	6 7	3.4 B	26	
627.08				
	3			Stiff Brown & Gray Silty Clay & Silt Layers
	3 4	2.0 P	27	
623.58 -30				
	5			Hard Gray Silty Clay Loam Till
	7 12	5.4 S	16	
	6			
	12 14	5.7 S	15	
-35				
	5			
	8 9	5.4 S	15	
616.58				
	3			Very Stiff Gray Silty Clay Loam/Silty Clay Till with Layers of Fine Sand @ 55'
	6 7	3.7 B	16	
-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
IDOT

SOIL BORING LOG

Date 6/3/11

ROUTE I-80 (FAI 80) **DESCRIPTION** FAS 174 (CH 9) over I-80, 4 miles East of IL 178 **LOGGED BY** Larry Myers

SECTION 50-3HB-1 **LOCATION** SW 1/4, **SEC.** 31, **TWP.** 34N, **RNG.** 3E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 050-0081 (Exist.)
Station 210+80.6

BORING NO. 01 (S. Abut.)
Station 210+88.6
Offset 142.0 ft Rt.
Ground Surface Elev. 653.58 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 628.6 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
	4			Very Stiff Gray Silty Clay Loam/Silty Clay Till with Layers of Fine Sand @ 55' *(continued)*
	7 8	4.0 S	19	
	3			
	5 7	3.7 B	19	
-45	4			
	4 8	3.7 B	18	
	4			
	5 7	3.7 B	23	
-50	4			
	5 7	3.7 B	21	
	5			
	4 7	3.7 B	18	
-55	9			
	10 12	4.0 B	23	
596.58				
	21			Hard Gray Silty Loam Till with Fine Sand Layers - Till is Brittle
	27 36	>4.5 P	9	
594.08				
-60				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
	47			Hard Reddish Gray Silty Loam/ Silty Clay Loam Till
	100/5"	12.1 S*	8	
				* Max Rimac @ 0% *(continued)*
591.08				
	100/0"			Assumed Rock Surface with Auger Refusal @ 62.5' 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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 6/7/11

ROUTE I-80 (FAI 80) **DESCRIPTION** FAS 174 (CH 9) over I-80, 4 miles East of IL 178 **LOGGED BY** Larry Myers

SECTION 50-3HB-1 **LOCATION** SE 1/4, **SEC.** 36, **TWP.** 34N, **RNG.** 2E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 050-0081 (Exist.)
Station 210+80.6

BORING NO. 02 (N. Abut.)
Station 210+75.1
Offset 142.0 ft Lt.
Ground Surface Elev. 654.02 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 628.0 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Bituminous Pavement, Brown Sand & Gravel Fill				
651.52				
Hard Gray & Black Silty Clay Loam Topsoil & Till Fill		7		
		7 8	4.9 S	16
649.02	-5			
Medium Gray Loamy Sand & Gravel Fill		10		
		10 10		8
647.02				
Very Stiff to Hard Brown, Black & Gray Silty Clay & Silty Clay Loam Till Fill		4		
		5 6	3.7 B	25
	-10			
		4		
		3 7	4.1 B	21
		3		
		6 8	4.6 S	14
	-15			
		3		
		4 5	3.4 B	24
		4		
		5 6	4.1 B	16
	-20			
Very Stiff to Hard Brown, Black & Gray Silty Clay & Silty Clay Loam Till Fill *(continued)*		4		
		5 6	4.4 S	15
631.52				
Hard Black Silty Clay Loam Topsoil		8		
		8 9	5.4 S	14
629.52				
Very Stiff Gray & Brown Silty Clay Loess	629.02 -25	3		
Medium Gray & Brown Fine Sand to Coarse Gravel - Loamy with Free Water ▽		4 5	3.1 B	25
		10		
		10 10		23
	-30			
		5		
		9 12		13
622.02				
Hard Gray Silty Clay Loam Till with Silt Layers @ 48' - 53'		3		
		5 10	4.1 B	16
	-35			
		7		
		10 12	7.8 S	13
		5		
		7 10	6.4 S	14
	-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
IDOT

SOIL BORING LOG

Date 6/7/11

ROUTE I-80 (FAI 80) **DESCRIPTION** FAS 174 (CH 9) over I-80, 4 miles East of IL 178 **LOGGED BY** Larry Myers

SECTION 50-3HB-1 **LOCATION** SE 1/4, **SEC.** 36, **TWP.** 34N, **RNG.** 2E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 050-0081 (Exist.)
Station 210+80.6

BORING NO. 02 (N. Abut.)
Station 210+75.1
Offset 142.0 ft Lt.
Ground Surface Elev. 654.02 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 628.0 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	7			Hard Gray Silty Clay Loam Till with Silt Layers @ 48' - 53' *(continued)*
	11	7.0	15	
	15	S		
	7			
	12	7.2	14	
	15	S		
-45				
	7			
	9	7.2	17	
	15	S		
	10			
	18	7.8	16	
	22	S		
-50				
	10			
	12	7.4	19	
	12	S		
	6			
	10	6.8	14	
	12	S		
-55				
	8			
	10	7.0	23	
	14	S		
	9			
	12	7.0	24	
	17	S		
594.52				
-60				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	17			Hard Reddish Gray Silty Clay Loam Till
	21	11.5	11	
	33	S*		
				* Max Rimac @ 5% *(continued)*
591.52				
	100/0"			Assumed Rock Surface with Auger Refusal @ 62.5'
				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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 6/7/16

ROUTE I-80 (FAI 80) **DESCRIPTION** FAS 174 (CH 9) over I-80, 4 miles East of IL 178 **LOGGED BY** Larry Myers

SECTION 50-3HB-1 **LOCATION** SW 1/4, **SEC.** 31, **TWP.** 34N, **RNG.** 3E, 3rd **PM**,
Latitude 41.368118, **Longitude** -88.933246

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 050-0081 (Exist.)
Station 210+80.6

BORING NO. 03 (Pier)
Station 211+04.6
Offset 13.0 ft Rt.
Ground Surface Elev. 633.92 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 627.4 ft ▼
Upon Completion 627.9 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Shoulder Stone, Black Silty Clay Loam Fill, Brown Silty Clay			
631.42			
Very Stiff Brown Silty Clay	3		
	3 4	2.5 P	26
629.42			
Stiff Brown Silty Loam / Loam	-5 1		
	2 3	1.0 P	18
▽ 627.42 ▼			
Medium Brown Fine Sand to Coarse Gravel with Free Water	5		
	7 7		12
623.92	-10 3		
Very Stiff to Hard Gray Silty Clay Loam Till with Numerous Layers of Gray Silt	4 6	3.5 P	17
	4		
	6 8	4.3 S	16
	-15 5		
	6 10	5.7 S	15
	2		
	5 7	4.8 S	17
	-20		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Stiff to Hard Gray Silty Clay Loam Till with Numerous Layers of Gray Silt *(continued)*	5		
	7 8	4.9 S	18
	4		
	5 10	4.7 S	19
	-25 6		
	5 6	4.3 B	19
	5		
	7 11	5.6 S	18
	-30 7		
	9 12	6.4 S	18
	7		
	9 13	6.6 S	22
	-35 4		
	7 12	5.7 S	21
	4		
	8 10	5.4 S	21
594.42			
	-40		

SOIL BORING 050-0081.GPJ IL_DOT.GDT 6/15/16

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, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 6/7/16

ROUTE I-80 (FAI 80) **DESCRIPTION** FAS 174 (CH 9) over I-80, 4 miles East of IL 178 **LOGGED BY** Larry Myers

SECTION 50-3HB-1 **LOCATION** SW 1/4, **SEC.** 31, **TWP.** 34N, **RNG.** 3E, 3rd **PM**,
Latitude 41.368118, **Longitude** -88.933246

COUNTY LaSalle **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 050-0081 (Exist.)
Station 210+80.6

BORING NO. 03 (Pier)
Station 211+04.6
Offset 13.0 ft Rt.
Ground Surface Elev. 633.92 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 627.4 ft ▼
Upon Completion 627.9 ft ▽
After Hrs. ft

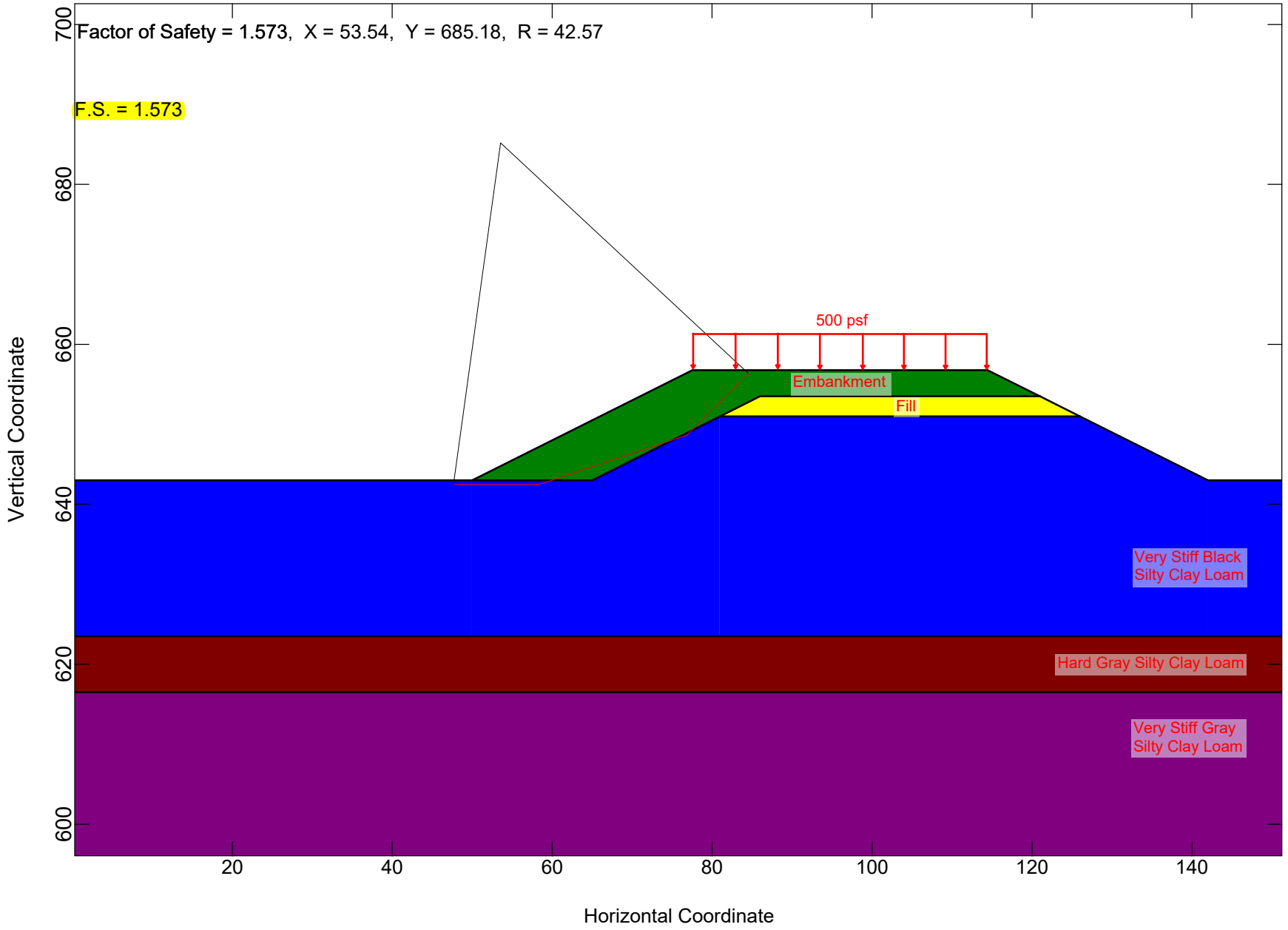
	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Gray Fine Sand to Coarse Gravel *(continued)*		7		
		12		11
		15		
		8		
		10		17
	589.92	12		
Hard Reddish Brown Silty Clay Loam Till	-45			
		27		
* Max Rimac @ 5%		36	11.5	9
		41	S*	
		25		
		35	11.5	11
		45	S*	
	583.92 -50			
Light Gray Shale	~~583.75~~	100/2"		10
End of Boring				
	-55			
	-60			

SOIL BORING 050-0081.GPJ IL_DOT.GDT 6/15/16

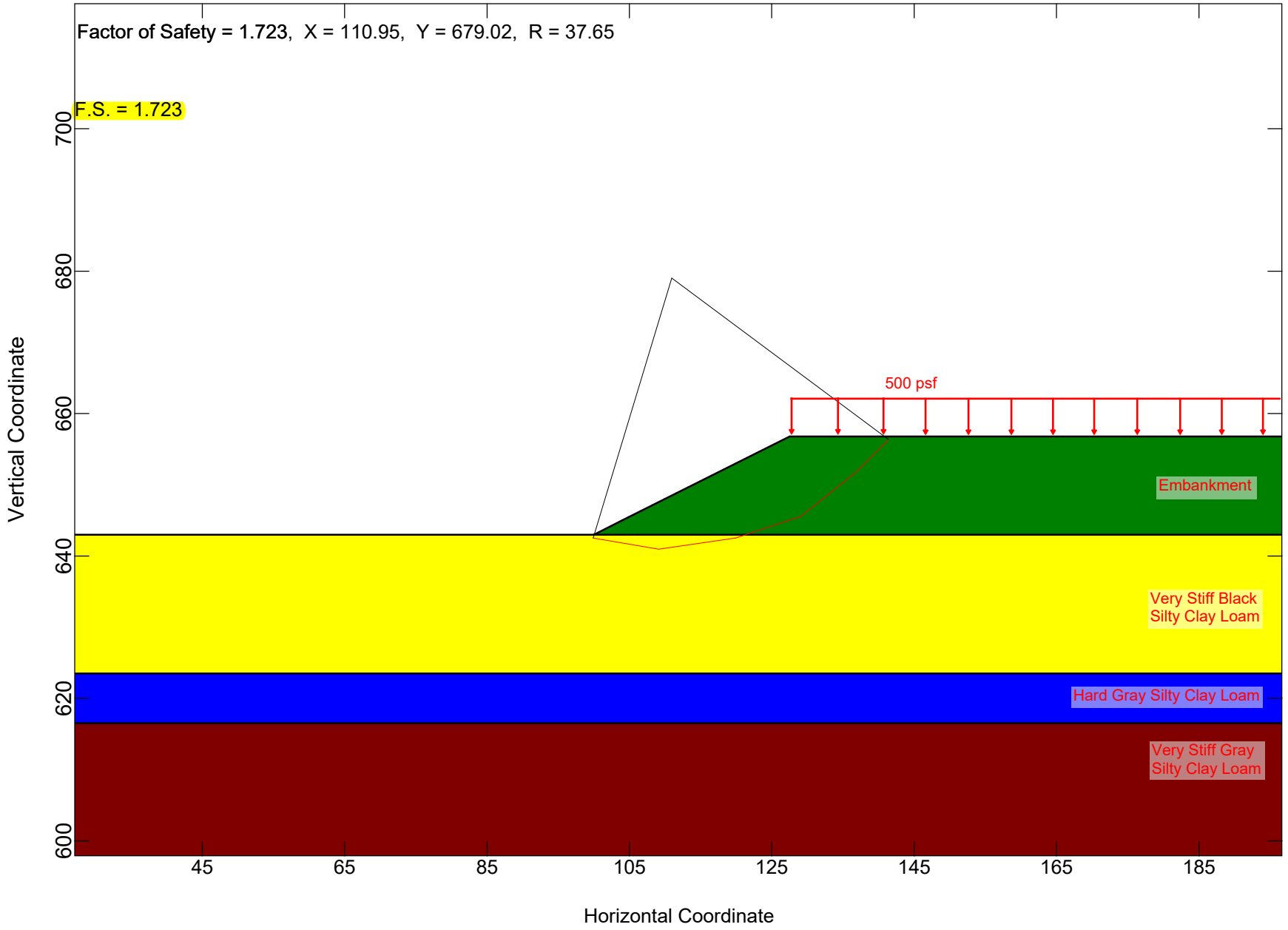
The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

BBS, form 137 (Rev. 8-99)

Slope Stability - CH 9 over I-80, Abutment Cross Section, Long Term Conditions



Slope Stability - CH 9 over I-80, Abutment End Slope, Long Term Conditions



Illinois Department of Transportation

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE=====

Substructure 1

Base of Substruct. Elev. (or ground surf for bents	648	ft.
Pile or Shaft Dia.	12	inches
Boring Number	B-1	
Top of Boring Elev.	651.08	ft.
Approximate Fixity Elev.	642	ft.

Individual Site Class Definition:

N (bar): 26 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 4.24 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	649.1	2.00	15	4.50	B
	646.6	2.50	8	3.10	
	644.1	2.50	12	3.60	
0.4	641.6	2.50	11	3.40	
2.9	639.1	2.50	13	3.40	
5.4	636.6	2.50	13	3.60	
7.9	634.1	2.50	15	3.80	
10.4	631.6	2.50	13	3.60	
12.4	629.6	2.00	17	4.00	B
14.9	627.1	2.50	13	3.40	B
18.4	623.6	3.50	7	2.00	B
20.9	621.1	2.50	19	5.40	
23.4	618.6	2.50	26	5.70	
25.4	616.6	2.00	17	5.40	B
27.9	614.1	2.50	13	3.70	
30.4	611.6	2.50	15	4.00	
32.9	609.1	2.50	12	3.70	
35.4	606.6	2.50	12	3.70	
37.9	604.1	2.50	12	3.70	
40.4	601.6	2.50	12	3.70	
42.9	599.1	2.50	11	3.70	
45.4	596.6	2.50	22	4.00	B
47.9	594.1	2.50	63	4.50	B
100.0	542.0	52.10	100	12.10	R

Substructure 2

Base of Substruct. Elev. (or ground surf for bents	648	ft.
Pile or Shaft Dia.	12	inches
Boring Number	B-2	
Top of Boring Elev.	651.52	ft.
Approximate Fixity Elev.	642	ft.

Individual Site Class Definition:

N (bar): 32 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 4.67 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	649.0	2.50	15	4.90	B
	647.0	2.00	20		B
	644.0	3.00	11	3.70	
0.5	641.5	2.50	10	4.10	
3.0	639.0	2.50	14	4.60	
5.5	636.5	2.50	9	3.40	
8.0	634.0	2.50	11	4.10	
10.5	631.5	2.50	11	4.40	B
13.0	629.0	2.50	17	5.40	B
15.5	626.5	2.50	9	3.10	
18.0	624.0	2.50	20		
20.0	622.0	2.00	21		B
22.5	619.5	2.50	15	4.10	
25.0	617.0	2.50	22	7.80	
27.5	614.5	2.50	17	6.40	
30.0	612.0	2.50	26	7.00	
32.5	609.5	2.50	27	7.20	
35.0	607.0	2.50	24	7.20	
37.5	604.5	2.50	40	7.80	
40.0	602.0	2.50	24	7.40	
42.5	599.5	2.50	22	6.80	
45.0	597.0	2.50	24	7.00	
47.5	594.5	2.50	29	7.00	B
50.0	592.0	2.50	54	11.50	B
100.0	542.0	50.00	100	11.50	R

Substructure 3

Base of Substruct. Elev. (or ground surf for bents	623	ft.
Pile or Shaft Dia.	12	inches
Boring Number	B-3	
Top of Boring Elev.	631.42	ft.
Approximate Fixity Elev.	617	ft.

Individual Site Class Definition:

N (bar): 44 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 4.96 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	629.4	2.00	7	2.50	B
	627.4	2.00	5	1.00	B
	623.9	3.50	14		B
	621.4	2.50	10	3.50	
0.6	618.9	2.50	14	4.30	
3.1	616.4	2.50	16	5.70	
5.6	613.9	2.50	12	4.80	
8.1	611.4	2.50	15	4.90	
10.6	608.9	2.50	15	4.70	
13.1	606.4	2.50	11	4.30	
15.6	603.9	2.50	18	5.60	
18.1	601.4	2.50	21	6.40	
20.6	598.9	2.50	22	6.60	
22.6	596.4	2.50	19	5.70	
25.1	594.4	2.00	18	5.40	
27.1	591.9	2.50	27		
30.1	589.9	2.00	22		B
33.1	586.9	3.00	77	11.50	
100.0	583.9	3.00	80	11.50	B
	517.0	66.90	100	11.50	R

Substructure 4

Base of Substruct. Elev. (or ground surf for bents)		ft.
Pile or Shaft Dia.		inches
Boring Number		
Top of Boring Elev.		ft.
Approximate Fixity Elev.		ft.

Individual Site Class Definition:

N (bar): (Blows/ft.) NA
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary

Global Site Class Definition: Substructures 1 through 3

N (bar): 34 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 4.62 (ksf) Soil Site Class C <----Controls

Abbreviated Structure Geotechnical Report – Supplemental Information

Proposed SN 050-0261

Existing SN 050-0081

Integral Abutment Feasibility

Integral abutments are the preferred end bent type due to elimination of the joints in the bridge decks, decreasing maintenance costs and increasing service life. The proposed structure length typically fits in the range of applicability for integral abutments; however, the soil at a critical depth of 10 feet below the abutment is very stiff (Unconfined compressive strength, Qu: 3.4 tsf – 3.9 tsf). According to the IDOT ABD Memo 12.3, the integral abutment study only pertains to soils with Qu less than 3.0 tsf. See the attached IDOT BBS 145 spreadsheet for In Situ Integral Abutment Feasibility.

Investigating further, the IDOT Geotechnical Manual discusses pre-coring pile locations to 10 feet below the abutment and backfilling with bentonite pellets, which reduces the soil pressures on the pile during expansion. To simulate the effects of bentonite, assume Qu = 1.5 tsf over the critical depth.

Also, note the proposed bridge is shifted to the east of the original alignment. Approximately half of the piles will be located over a new embankment cone. Piles embedded into existing soil 10 feet below the abutment will require pre-coring and backfilling, whereas piles embedded into new embankment will not. Per ABD Memo 12.3, an abutment constructed on new embankment shall assume Qu = 1.5 tsf.

Using Qu=1.5 tsf for both bentonite and embankment conditions, the results show integral abutments are applicable for all piles sizes. See attached Bentonite/Embankment Integral Abutment Feasibility spreadsheet.

Abutment Pile Discussion

Metal shell piles and HP piles are both considered for integral abutment applications. While the pile could develop sufficient capacity before reaching rock, it is likely to be less expensive to drive the piles to rock and eliminate the cost of the test pile at each abutment. For piles driven to rock surface, test piles are not needed provided the designer adds two extra feet to the estimated length of each pile as indicated in the table below. This will accommodate any changes in the driven length of the pile without requiring splices. HP piles are most effective in point bearing applications; therefore, HP piles are recommended over metal shell piles. Pile shoes are not recommended. The proposed pile locations need to be checked for conflict with the existing piling.

Substructure Unit	Pile Length	Pile Length plus Addl. 2 ft.
South Abutment	66 ft.	68 ft.
North Abutment	66 ft.	68 ft.

South Abutment - H-Pile Capacity at 66 ft Pile Length

Pile Size	Maximum Nominal Required Bearing (k)	Factored Resistance Available (k)
HP 12x74	589	324
HP 12x84	664	365
HP 14x89	705	388
HP 14x102	810	446
HP 14x117	929	511

North Abutment - H-Pile Capacity at 66 ft Pile Length

Pile Size	Maximum Nominal Required Bearing (k)	Factored Resistance Available (k)
HP 12x74	589	324
HP 12x84	664	365
HP 14x89	705	388
HP 14x102	810	446
HP 14x117	929	511

Pier Foundation Discussion

A shallow foundation (spread footing) and deep foundation (pile supported spread footing) were investigated for the proposed pier foundation type. The existing piers are founded on creosote timber pile supported spread footings; however, approximately 8 feet beneath the ground line at the proposed pier location is very stiff silty clay loam till, which is conducive to using a spread footing.

Based on a 30 foot long by 10 foot wide spread footing with bottom of footing elevation at 623.0, the factored bearing resistance is 10.1 ksf and the factored sliding resistance is 3.0 ksf. Evaluating the factored loads and factored bearing resistance, a spread footing is determined feasible. Spread footings are the preferred foundation over pile supported spread footings due to potential issues with proposed deep foundation piles avoiding the existing pier piles. Also, using a spread footing simplifies construction and eliminates the need for large pile driving equipment in the interstate median.

Due to the alignment of the bridge being shifted to the east, the proposed spread footing will be resting partially over the existing timbers piles and partially over virgin soil, causing potential differential settlement. To minimize differential settlement concerns, the limits of the excavation shall be the minimum necessary to remove each existing timber pile 2 ft below the proposed footing elevation. The excavation shall be backfilled with uncompacted FA-1 or FA-2 sand.

No ground improvement/treatment of the virgin soil is necessary at the spread footing.

Illinois Department of Transportation

IN SITU - INTEGRAL ABUTMENT FEASIBILITY ANALYSIS

Modified 10/30/17

GENERAL DATA

STRUCTURE NUMBER	050-0261		TOTAL STRUCTURE LENGTH	220.00	FT
STRUCTURE TYPE	MULTI-SPAN		NUMBER OF SPANS	2	
STRUCTURE SKEW	0	DEGREES	END SPAN LENGTH	119.00	FT
SUPER. DATA IN REFERENCE TO SUB. DATA	ABUT 1		ADJACENT INTERIOR SPAN LENGTH	0.01	FT

SUPERSTRUCTURE POSITIVE MOMENT REGION DATA (END OR MAIN SPAN)

BEAM TYPE	PLATE GIRDER	
TOP FLANGE WIDTH	12.00	IN
TOP FLANGE THICKNESS	0.75	IN
WEB DEPTH	48.00	IN
WEB THICKNESS	0.44	IN
BOTTOM FLANGE WIDTH	12.00	IN
BOTTOM FLANGE THICKNESS	0.75	IN
BEAM SPACING PERP. TO CL	5.20	FT
SLAB THICKNESS	8.00	IN
SLAB F'C	4.00	KSI

SUPERSTRUCTURE POSITIVE MOMENT REGION DATA (ADJACENT SPAN)

TOP FLANGE WIDTH	12.00	IN
TOP FLANGE THICKNESS	0.75	IN
WEB DEPTH	48.00	IN
WEB THICKNESS	0.44	IN
BOTTOM FLANGE WIDTH	12.00	IN
BOTTOM FLANGE THICKNESS	0.75	IN
BEAM SPACING PERP. TO CL	5.20	FT
SLAB THICKNESS	8.00	IN
SLAB F'C	4.00	KSI

ABUTMENT #1 DATA

ABUTMENT NAME	South	
ABUTMENT REFERENCE BORING	B-1	
BOTTOM OF ABUTMENT ELEVATION	648	FT
ESTIMATED NUMBER OF PILES AT ABUT.	6	
PILE SPACING PERP. TO CL	5.2	FT

ABUTMENT #2 DATA

ABUTMENT NAME	North	
ABUTMENT REFERENCE BORING	B-2	
BOTTOM OF ABUTMENT ELEVATION	648	FT
ESTIMATED NUMBER OF PILES AT ABUT.	6	
PILE SPACING PERP. TO CL	5.2	FT

SOIL DATA FOR 10 FT BENEATH BOTTOM OF ABUTMENT #1

BOT. OF LAYER ELEV. (FT)	*LAYER THICKNESS (FT)*	*UNCONFINED COMPRESSIVE STRENGTH (TSF)*	*N S.P.T. VALUE (BLOWS/12 IN.)*	*Qu EQUIV. FOR N VALUE (TSF)*
645.50	2.50	3.1		
643.00	2.50	3.6		
640.50	2.50	3.4		
638.00	2.50	3.4		

10.00 FT = TOTAL DEPTH ENTERED

SOIL DATA FOR 10 FT BENEATH BOTTOM OF ABUTMENT #2

BOT. OF LAYER ELEV. (FT)	*LAYER THICKNESS (FT)*	*UNCONFINED COMPRESSIVE STRENGTH (TSF)*	*N S.P.T. VALUE (BLOWS/12 IN.)*	*Qu EQUIV. FOR N VALUE (TSF)*
646.00	2.00		20	2.9
643.50	2.50	3.7		
641.00	2.50	4.1		
638.50	2.50	4.60		
636.00	2.50	3.40		

12.00 FT = TOTAL DEPTH ENTERED

ENTER 10 FT OF SOIL DATA

WEIGHTED AVERAGE Qu FOR ABUTMENT #1 = 3.38 TSF

PILE STIFFNESS MODIFIER FOR ABUTMENT #1
= 1/(1.45-[0.3*3.38]) = 2.29

WEIGHTED AVERAGE Qu FOR ABUTMENT #2 = 3.78 TSF

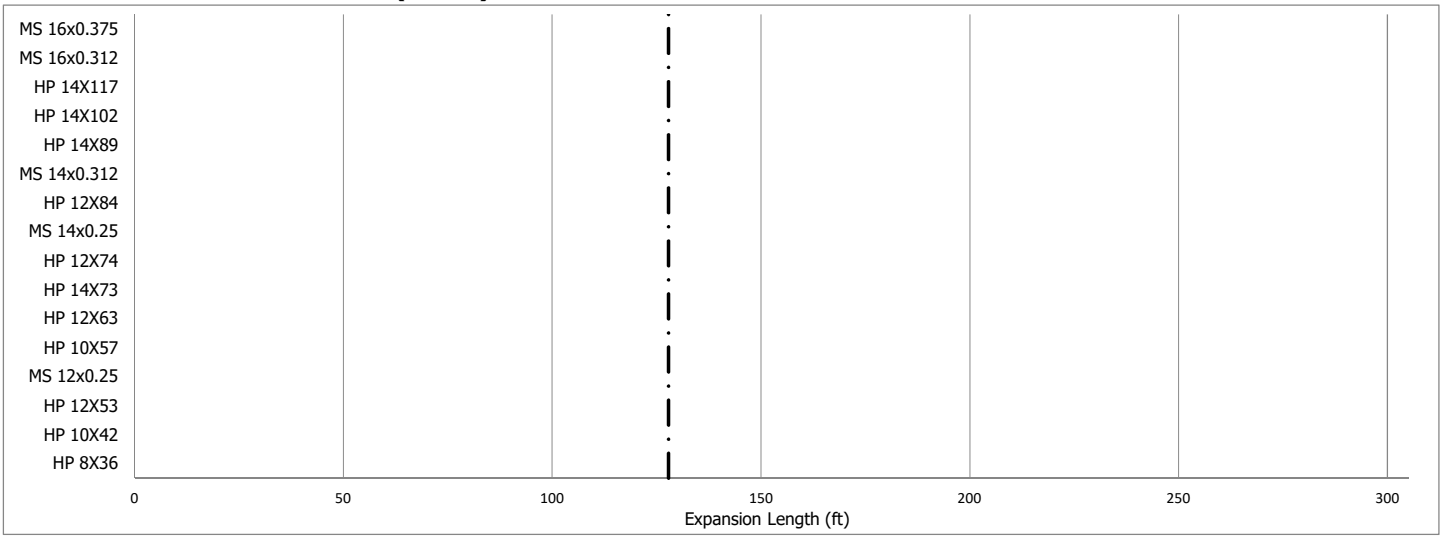
PILE STIFFNESS MODIFIER FOR ABUTMENT #2
= 1/(1.45-[0.3*3.78]) = 3.17

WEIGHTED AVG. Qu > 3.0 TSF WITH TRIB. LENGTH > 20%, INTEGRAL ABUTMENT STRUCTURE NOT ALLOWED

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #1 = [2.29*6*0+3.17*6*220]/[2.29*6+3.17*6] = ~~127.88~~ FT

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #2 = [3.17*6*0+2.29*6*220]/[3.17*6+2.29*6] = ~~92.12~~ FT

ABUT 1 (South) - EXPANSION LENGTH LIMIT CHART - 0 DEG. SKEW



= Estimated expansion length for the indicated abutment. Piles with an expansion length greater than this are suitable for consideration.
(Note: The same size pile should be used at both abutments.)

Illinois Department of Transportation

BENTONITE/EMBANKMENT - INTEGRAL ABUTMENT FEASIBILITY ANALYSIS

Modified 10/30/17

GENERAL DATA

STRUCTURE NUMBER	050-0261 w/ Bentonite/Embankment		TOTAL STRUCTURE LENGTH	220.00	FT
STRUCTURE TYPE	MULTI-SPAN		NUMBER OF SPANS	2	
STRUCTURE SKEW	0	DEGREES	END SPAN LENGTH	119.00	FT
SUPER. DATA IN REFERENCE TO SUB. DATA	ABUT 1		ADJACENT INTERIOR SPAN LENGTH	0.01	FT

SUPERSTRUCTURE POSITIVE MOMENT REGION DATA (END OR MAIN SPAN)

BEAM TYPE	PLATE GIRDER	
TOP FLANGE WIDTH	12.00	IN
TOP FLANGE THICKNESS	0.75	IN
WEB DEPTH	48.00	IN
WEB THICKNESS	0.44	IN
BOTTOM FLANGE WIDTH	12.00	IN
BOTTOM FLANGE THICKNESS	0.75	IN
BEAM SPACING PERP. TO CL	5.20	FT
SLAB THICKNESS	8.00	IN
SLAB F'C	4.00	KSI

SUPERSTRUCTURE POSITIVE MOMENT REGION DATA (ADJACENT SPAN)

TOP FLANGE WIDTH	12.00	IN
TOP FLANGE THICKNESS	0.75	IN
WEB DEPTH	48.00	IN
WEB THICKNESS	0.44	IN
BOTTOM FLANGE WIDTH	12.00	IN
BOTTOM FLANGE THICKNESS	0.75	IN
BEAM SPACING PERP. TO CL	5.20	FT
SLAB THICKNESS	8.00	IN
SLAB F'C	4.00	KSI

ABUTMENT #1 DATA

ABUTMENT NAME	South	
ABUTMENT REFERENCE BORING	B-1	
BOTTOM OF ABUTMENT ELEVATION	648	FT
ESTIMATED NUMBER OF PILES AT ABUT.	6	
PILE SPACING PERP. TO CL	5.2	FT

ABUTMENT #2 DATA

ABUTMENT NAME	North	
ABUTMENT REFERENCE BORING	B-2	
BOTTOM OF ABUTMENT ELEVATION	648	FT
ESTIMATED NUMBER OF PILES AT ABUT.	6	
PILE SPACING PERP. TO CL	5.2	FT

SOIL DATA FOR 10 FT BENEATH BOTTOM OF ABUTMENT #1

BOT. OF LAYER ELEV. (FT)	*LAYER THICKNESS (FT)*	*UNCONFINED COMPRESSIVE STRENGTH (TSF)*	*N S.P.T. VALUE (BLOWS/12 IN.)*	*Qu EQUIV. FOR N VALUE (TSF)*
645.50	2.50	1.5		
643.00	2.50	1.5		
640.50	2.50	1.5		
638.00	2.50	1.5		

10.00 FT = TOTAL DEPTH ENTERED

SOIL DATA FOR 10 FT BENEATH BOTTOM OF ABUTMENT #2

BOT. OF LAYER ELEV. (FT)	*LAYER THICKNESS (FT)*	*UNCONFINED COMPRESSIVE STRENGTH (TSF)*	*N S.P.T. VALUE (BLOWS/12 IN.)*	*Qu EQUIV. FOR N VALUE (TSF)*
645.50	2.50	1.5		
643.00	2.50	1.5		
640.50	2.50	1.5		
638.00	2.50	1.50		

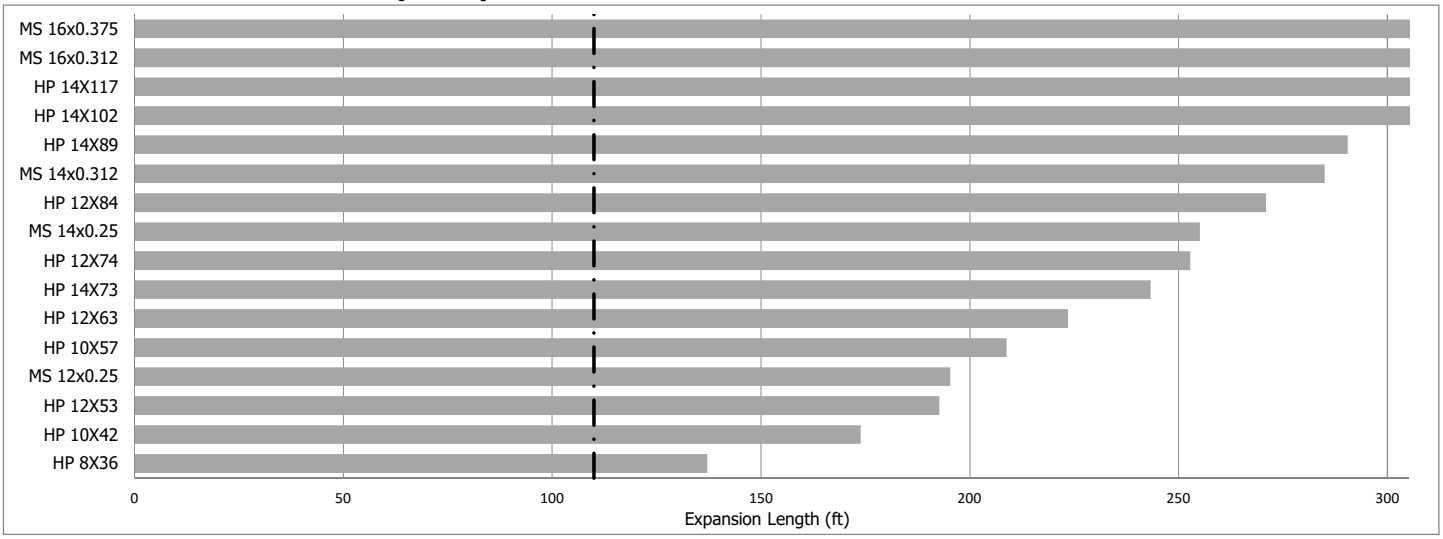
10.00 FT = TOTAL DEPTH ENTERED

WEIGHTED AVERAGE Qu FOR ABUTMENT #1	1.50	TSF	WEIGHTED AVERAGE Qu FOR ABUTMENT #2	1.50	TSF
PILE STIFFNESS MODIFIER FOR ABUTMENT #1 = 1/(1.45-[0.3*1.5])	1.00		PILE STIFFNESS MODIFIER FOR ABUTMENT #2 = 1/(1.45-[0.3*1.5])	1.00	

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #1 = [1*6*0+1*6*220]/[1*6+1*6] = 110.00 FT

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #2 = [1*6*0+1*6*220]/[1*6+1*6] = 110.00 FT

ABUT 1 (South) - EXPANSION LENGTH LIMIT CHART - 0 DEG. SKEW



= Estimated expansion length for the indicated abutment. Piles with an expansion length greater than this are suitable for consideration.
(Note: The same size pile should be used at both abutments.)

Substructure Loading

	Service			Load	Factored (Str. 1)		
	S. Abut.	Pier	N. Abut.	Factor	S. Abut.	Pier	N. Abut.
Non-composite (DC1)	30.8	103.3	23.1	1.25	38.5	129.1	28.9
Composite (DC2)	6.7	21.3	5	1.25	8.4	26.6	6.3
Wearing Surface (DW)	10.3	33.2	7.7	1.5	15.5	49.8	11.6
One Beam Total	47.8	157.8	35.8		62.3	205.6	46.7
Six Beam Total	286.8	946.8	214.8		374.0	1233.3	280.1
Appr. Slab (DC)	106.9		106.9	1.25	133.6		133.6
Appr. Slab Wearing Surface (DW)	18.3		18.3	1.5	27.5		27.5
Two Lane Reaction (w/ Impact)	235.4		225.8	1.75	411.95		395.15
Two Lane Reaction (w/o Impact)		380.6		1.75		666.05	
Substructure Dead Load (DC)	148.9	248	148.9	1.25	186.1	310.0	186.1
Soil Above Spread Footing (EV)		105.1		1.35		141.9	
Total Substructure Load	796.3	1680.5	714.7		1133.1	2351.2	1022.4

Note: Load units = kips