Illinois Department of Transportation

Abbreviated Structure Geotechnical Report

Original Report Date: 4/29/22	**Proposed SN:** 062-0074	**Route:**	FAP 318 (IL 29)
Revised Date: 4/13/23	**Existing SN:** 062-0008	**Section:**	(3-B) BR
Geotechnical Engineer: Joe Olson - IDOT D4		**County:**	Marshall
Structural Engineer: Hurst-Roche, Inc.		**Contract:**	68E33

Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing): The proposed structure will be a 57'-0" long, single span bridge on a 10-degree skew. The new bridge consists of IL27-1830 PPC beams with a concrete deck set on integral abutments. According to information provided by the structural designer, the estimated factored load at each abutment is 882 kips. The TSL general plan and elevation is attached.

The new structure will be approximately 18 feet longer than the existing structure. The integral abutments will be located behind the existing abutments to allow sufficient waterway opening and construction of riprap-lined endslopes.

Stage construction is planned to maintain traffic on IL 29.

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): Existing boring data is limited to one soil boring log included in the 1944 bridge plans. The plans show soil profile of 22 feet of sand and gravel over 6.5 feet of clay over hard shale at El. 427.4. The existing bridge was built in 1948 with closed abutments set on spread footing foundations at El. 450.2.

Two soil borings were drilled in September 2021 for the proposed structure. One boring was drilled near each abutment by Geo Services Inc. The borings were logged by Terracon. The soil profile generally consists of an average 15 inches of pavement overlying up to 5 feet of silty loam fill. Below the fill is 20 to 30 feet of cohesive soil consisting of layers of silt, clay, silty loam, and silty clay loam. Below the cohesive soil is 6 to 10 feet of more granular material consisting of layers of sandy loam and sand. Below this is a gray hard shale encountered at El. 426.4 on the north side of Barrville Creek and at El. 434.4 on the south side. All standard penetration tests on the shale resulted in N >100 blows per foot. SB-1 was drilled for the proposed north abutment and terminated in 1.5 feet of coal at El. 412.4. SB-2 was drilled for the south abutment and terminated in the referenced shale at El. 422.4. The boring logs and a subsurface profile 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: No additional soil fill height is planned for the project, so settlement should be minimal. No further settlement analysis or ground treatment 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: New 1V:2H slopes will be established between the streambed and integral abutments. These cut slopes will be a maximum of 7 feet high and ultimately lined with Class A4 riprap. Due to the relatively low slope height, the factor of safety against slope failure can be assumed to exceed 1.5 without detailed analysis. No ground improvement or treatment is necessary.

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: The new integral abutments will be set back away from the channel and positioned behind 1V:2H slopes lined with Class A4 riprap. This is considered an adequate level of scour protection such that no scour is anticipated below the bottom of the abutments. The design scour elevations at the abutments are therefore set to El. 460.45.

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: Seismic soil site class = D, SPZ = 1, SDS = 0.165g and SD1 = 0.105g. Liquefaction analysis is not required for sites in SPZ 1. The IDOT Seismic Site Class Determination spreadsheet is attached along with a screenshot from the AASHTO Guide Specifications for LRFD Seismic Bridge Design software, Version 2.1.

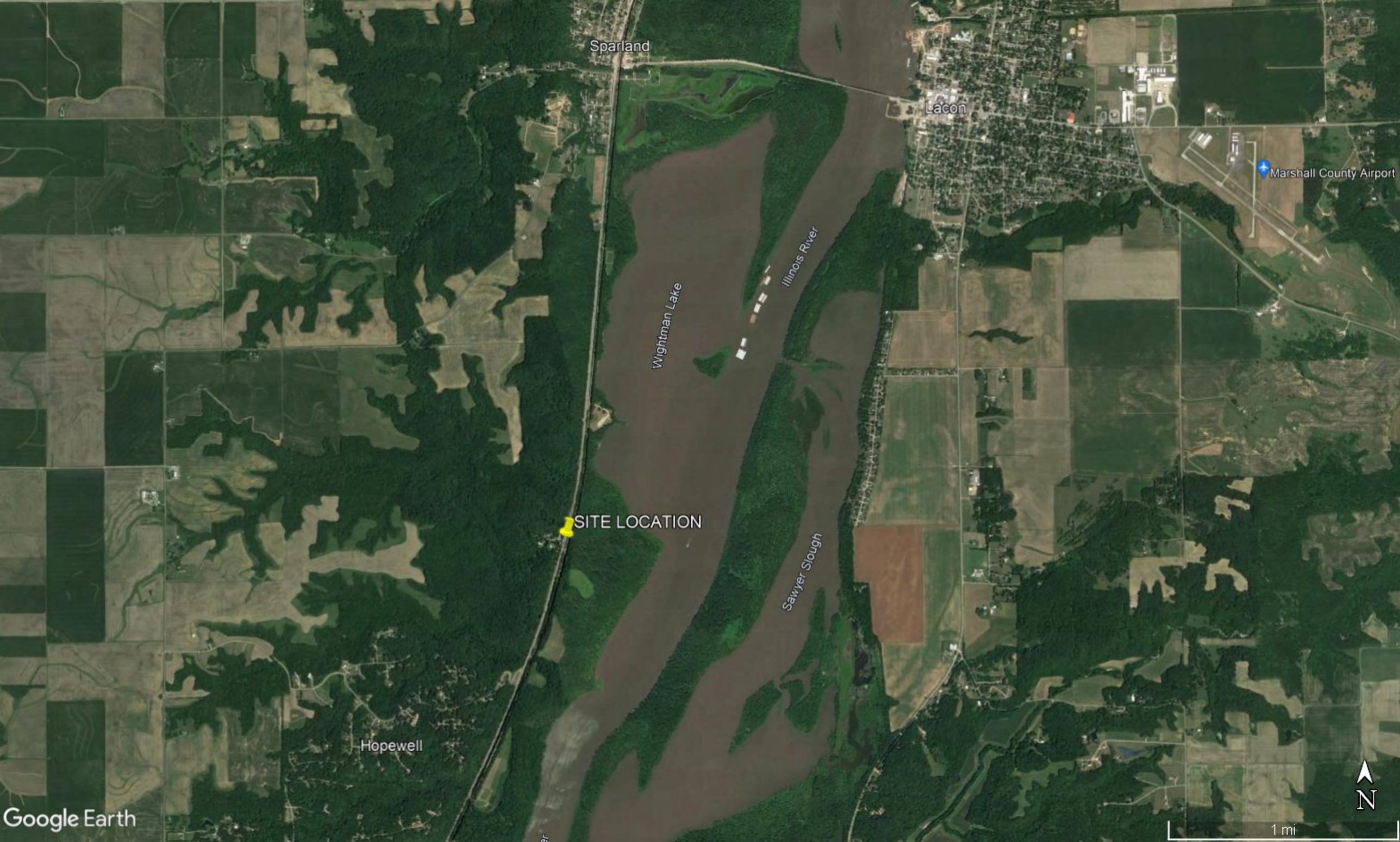
Confirm feasibility of the proposed foundation or wall type and provide design parameters. Attach a pile design table indicating feasible pile types, various nominal required bearings, factored resistances available and corresponding estimated lengths at locations where piles will be used. Provide factored 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: It is recommended that H-piles be driven to their maximum nominal required bearing in shale. The attached Pile Design Tables provide the maximum bearing values for various sizes of H-pile. The tables also provide factored resistance values, estimated pile lengths, and pile cutoff elevations.

A test pile is recommended for the north abutment where the top of the shale is expected to be deepest.

The structure designer should evaluate the lateral resistance of the piles supporting the abutments considering both soil and structure properties. Soil parameters for generating P-y curves with the LPILE computer program are provided in the attached table.

Calculate the estimated water surface elevation and determine the need for cofferdams (type 1 or 2), and seal coat: The attached TSL shows EWSE = 459.3. The proposed structure is a single span bridge. Since there are no piers or other foundations to be constructed in the waterway, there should be no need for cofferdams.

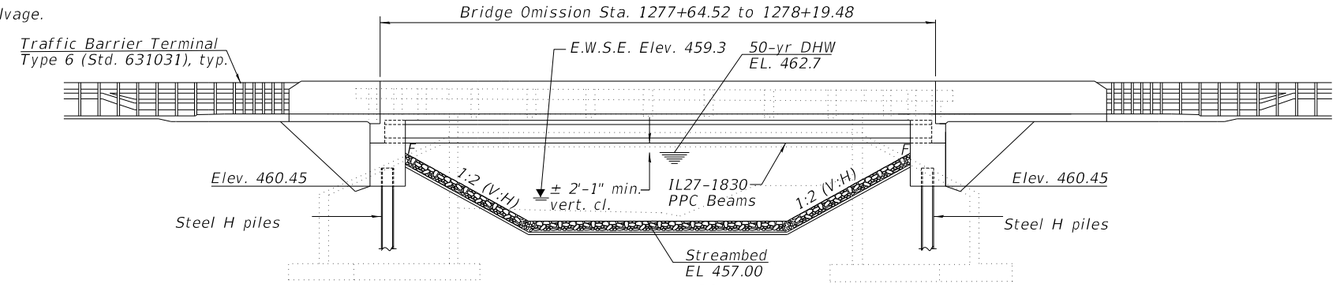
Assess the need for sheeting or soil retention or temporary construction slope and provide recommendation for other construction concerns: Temporary soil retention will be needed since stage construction is planned. The TSL indicates the new abutments will be installed behind the existing abutments. The backfill placed behind the first stage of the new abutments will need to be retained for an estimated 7 foot height along the stage line to allow for construction of the second stage. This should be feasible with temporary sheet piling designed according to IDOT Bridge Manual Design Guide 3.13.1.


Sparland
Lacon
Marshall County Airport
Wightman Lake
Illinois River
SITE LOCATION
Sawyer Slough
Hopewell
Google Earth
N
1 mi

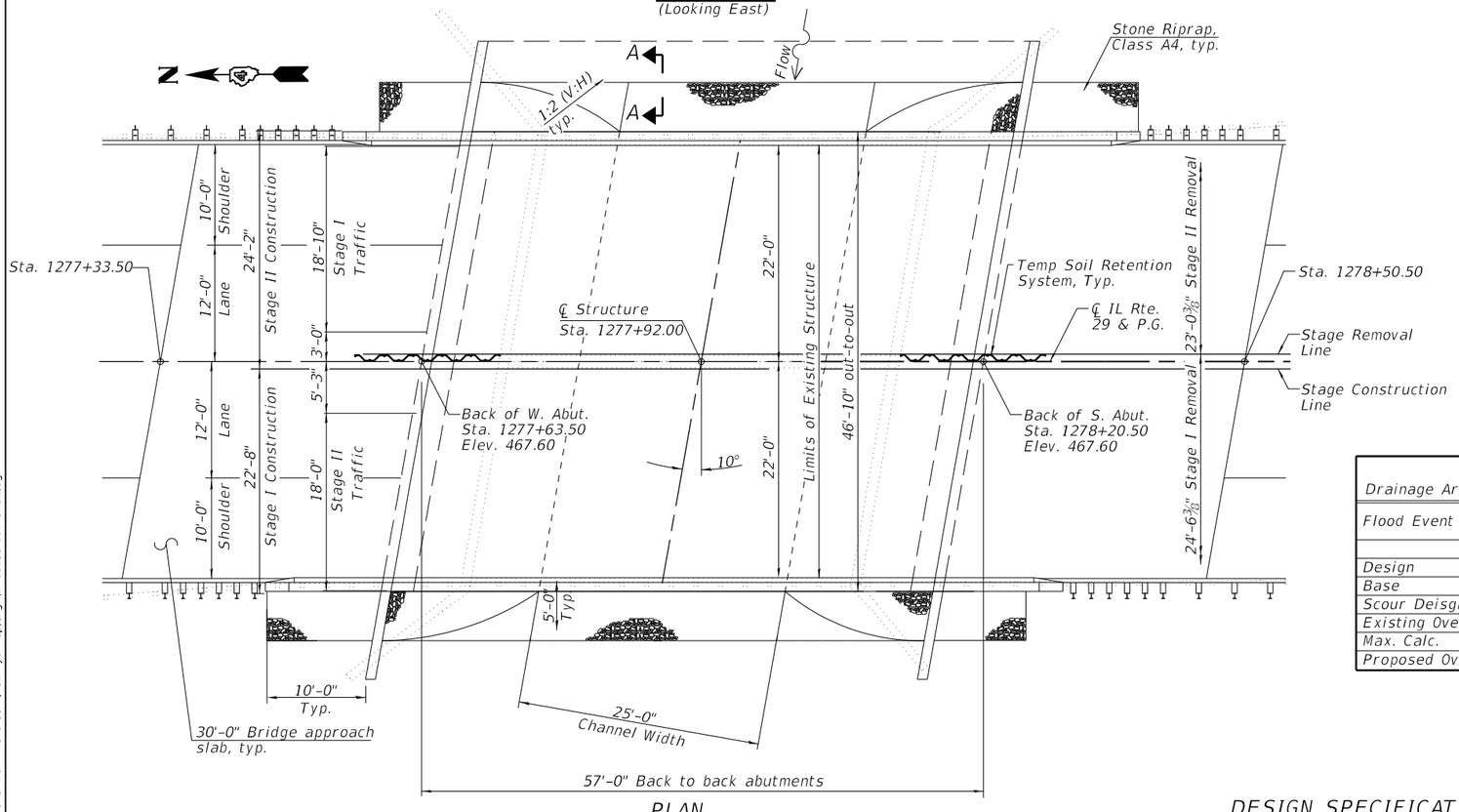
Benchmark: M-233 USC & GS East end of South Abutment Sta. 1262+16, 25' Rt, Elev. 468.06

Existing Structure: SN 062-0008 originally built in 1948 as Section 3-B. The existing single span, cast in place reinforced concrete T-beam superstructure is supported by closed abutments on spread footings. The back to back abutment length is 39'-0" with no skew and out-to-out width of 45'. Traffic to be maintained using stage construction.

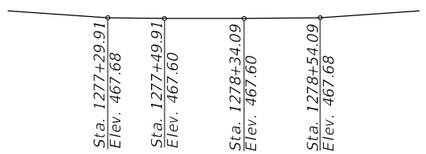
No salvage.



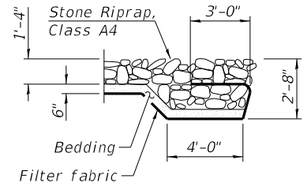
ELEVATION
(Looking East)



PLAN



PROFILE GRADE
Along ℄ Roadway



SECTION A-A

DESIGN SCOUR ELEVATION TABLE

Event / Limit State	N. Abut.	S. Abut.	Item 113
Q100	460.45	460.45	8
Q500	460.45	460.45	
Design	460.45	460.45	
Check	460.45	460.45	

WATERWAY INFORMATION

Drainage Area = 2.0 sq. mi.

Existing Overtopping Elev. =467.60 at Sta. 1277+92
Proposed Overtopping Elev. =467.60 at Sta. 1277+92

Flood Event	Freq. Yr.	Discharge Ft³/s	Waterway Opening Ft² Exist.	Waterway Opening Ft² Prop.	Natural H.W.E. ft.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Ft. Exist.	Headwater El. Ft. Prop.
	10	1020	164	194	462.4	1.5	0.5	464.0	463.0
Design	50	1720	176	208	462.7	2.5	1.1	465.2	463.9
Base	100	2050	178	212	462.8	3.9	1.2	466.7	464.0
Scour Deisgn Check	200	2250	178	214	462.8	4.8	2.8	467.6	465.6
Existing Overtopping	200	2250	178	NA	462.8	3.9	NA	466.7	NA
Max. Calc.	500	2870	203	244	463.5	4.4	3.8	467.8	467.2
Proposed Overtopping	500	2870	NA	244	463.5	NA	3.8	NA	467.2

HIGHWAY CLASSIFICATION

FAP 318 IL Rte. 29
Functional Class: Other Principal Arterial
ADT: 6600 (2021): 8132 (2032)
ADTT: 726 (2021): 895 (2032)
DHV: 813
Design Speed: 55 m.p.h.
Posted Speed: 55 m.p.h.
Two Way Traffic
Directional Distribution: 50:50

DESIGN STRESSES

FIELD UNITS

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

PRECAST PRESTRESSED UNITS

f'c = 8,500 psi
f'ci = 6,500 psi
fpu = 270,000 psi (0.6" ∅ Low Relaxation Strands)
fpbt = 202,300 psi (0.6" ∅ Low Relaxation Strands)

DESIGN SPECIFICATIONS

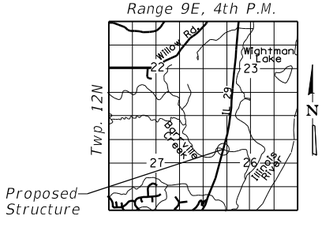
2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

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) = 0.105
Design Spectral Acceleration at 0.2 sec. (SDS) = 0.165
Soil Site Class = D



LOCATION SKETCH

GENERAL PLAN
IL 29 OVER BARRVILLE CREEK
F.A.P. RTE. 318 - SEC. (3-B) BR
MARSHALL COUNTY
STATION 1277+92.00
STRUCTURE NO. 062-0074

MODEL: $MODELNAME$
FILE NAME: X:\Projects\Current\192-3091 IDOT D4 WO11 IL 29 over Barrville Creek (TSL-Hyd Rep)\Dgn\D468E33-001-GP&E.dgn
12/16/2022 10:55:53 AM

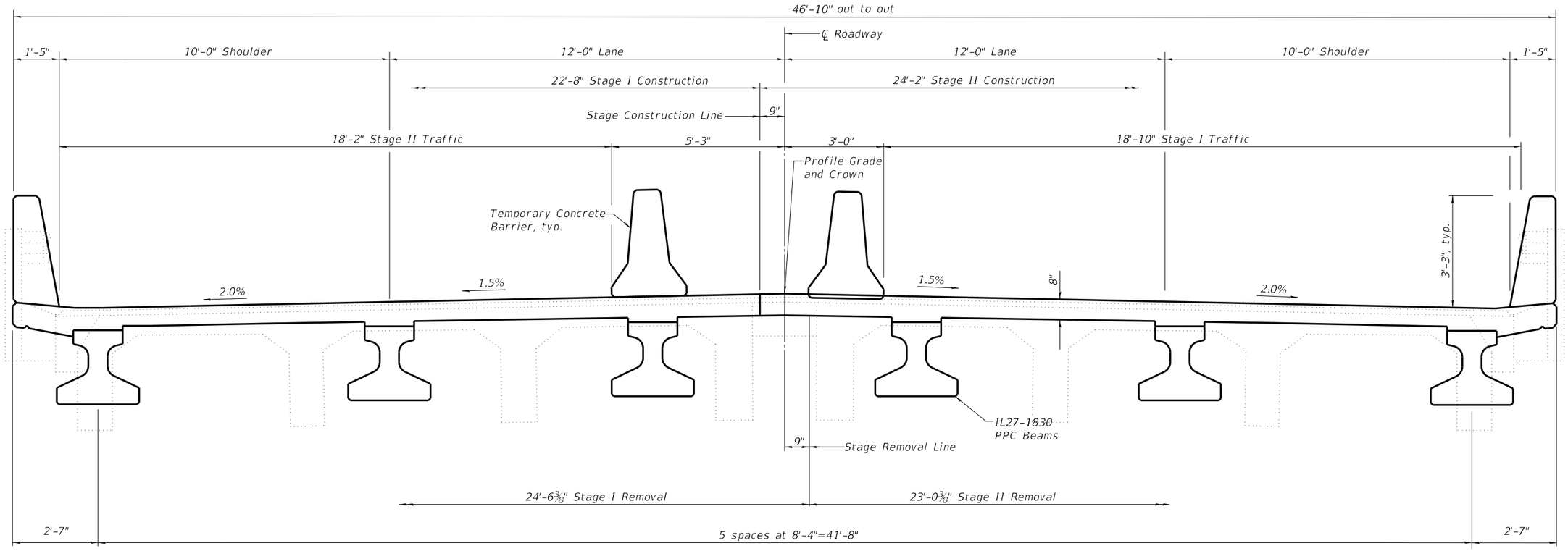
Hurst-Rosche, Inc.
PROFESSIONAL DESIGN NUMBERS 184-005268
1400 E. TREMONT ST.
HILLSBORO, IL
PH: 217.532.3959
JOB NO. 192-3091

USER NAME	DESIGNED - CJC	REVISED -	
	CHECKED - CJC	REVISED -	
PLOT SCALE	DRAWN - BP	REVISED -	
PLOT DATE 1/20/2022	CHECKED - CJC	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

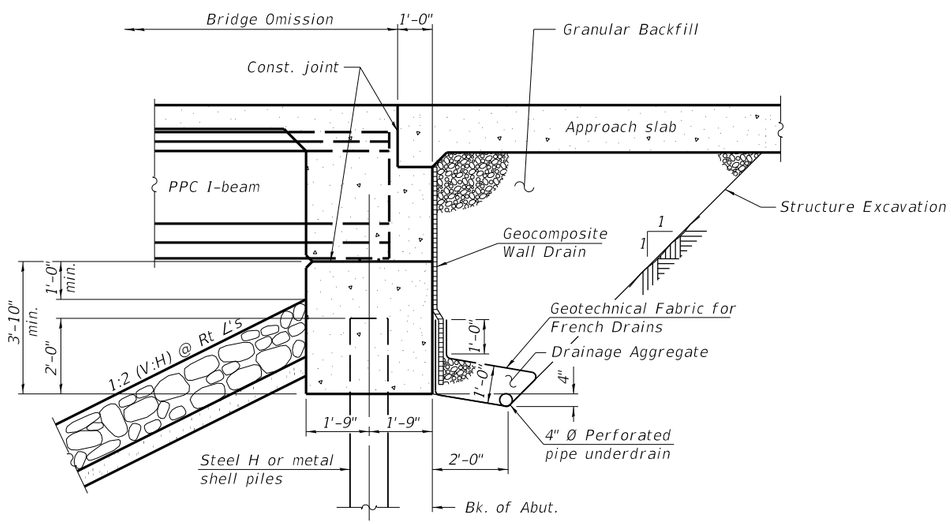
GENERAL PLAN AND ELEVATION
STRUCTURE NO. 062-0074
SHEET 1 OF 2

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
318	(3-B) BR	MARSHALL	2	1
		CONTRACT NO. 68E33		
	ILLINOIS	FED. AID PROJECT		



CROSS SECTION

(Looking North)



SECTION THRU INTEGRAL ABUTMENT

(Horiz. dim. @ Rt. ℄'s)

GENERAL PLAN & ELEVATION
IL 29 OVER BARRVILLE CREEK
SECTION (3-B) BR
MARSHALL COUNTY
STATION 1277+92.00
STRUCTURE NO. 062-0074

Hurst-Rosche, Inc.
PROFESSIONAL DESIGN NUMBER 184.002509
1400 E. TREMONT ST.
HILLSBORO, IL
PH: 217.532.3959
JOB NO. 192-3091

USER NAME =	DESIGNED - CJC	REVISED -
	CHECKED - CJC	REVISED -
PLOT SCALE =	DRAWN - BP	REVISED -
PLOT DATE = 1/20/2022	CHECKED - CJC	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTION AND DETAILS
STRUCTURE NO. 062-0074

SHEET 2 OF 2 SHEETS

F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
318	(3-B) BR	MARSHALL	2	2
		CONTRACT NO. 68E33		
	ILLINOIS	FED. AID PROJECT		

MODEL: $MODELNAME$
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12/16/2022 11:13:59 AM

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 9/23/21

ROUTE FAP 318 (IL 29) **DESCRIPTION** Structure boring for north abutment **LOGGED BY** JS (Terracon)

SECTION (3-B) BR **LOCATION** IL-29 over Barrville Creek, **SEC.** 26, **TWP.** 12 N, **RNG.** 9, 4th **PM**, **Latitude** 40.9973, **Longitude** -89.4432

COUNTY Marshall County **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 062-0008 (EX) 062-0074 (PR)
Station 1277+92

BORING NO. SB-1
Station 1277+67
Offset 18.0 ft RT
Ground Surface Elev. 467.40 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 458.9 ft ▼
Upon Completion 456.9 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
467.20			
Asphalt, approximate thickness of 2"			
465.90			
Concrete, approximate thickness of 16"	5		
	4 4		17
FILL: Silty Loam, trace gravel, brown, very moist			
463.40	4		
Clay, brown, stiff	4 4	1.2 B	26
-5	3		
	3 3	1.1 B	25
▼	3		
	3 3	1.6 B	23
-10			
▽ 456.40			
	3		
Silt Loam, brown, medium stiff, moist to very moist	5 5		17
	2		
	2 3		13
-15			
	5		
No Recovery from 16.5 to 19.5	3 1		-
	1		
	3 4		15
447.40 -20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	5		
Silt Loam, with gravel and cobbles, brown, medium stiff to stiff, very moist	6 8		14
	3		
-25	3 4		15
	4		
440.40	3 2		26
Silty Clay Loam, brown, stiff, wet to very moist	3		
-30	5 6		16
	1		
432.90	3 6		12
-35 Sandy Clay Loam, with gravel and coal, brown to black, loose, moist			
429.40			
Sand, brown, medium dense, moist	12		
	8 11		12
-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 9/23/21

ROUTE FAP 318 (IL 29) **DESCRIPTION** Structure boring for north abutment **LOGGED BY** JS (Terracon)

SECTION (3-B) BR **LOCATION** IL-29 over Barrville Creek, **SEC.** 26, **TWP.** 12 N, **RNG.** 9, 4th **PM**, **Latitude** 40.9973, **Longitude** -89.4432

COUNTY Marshall County **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 062-0008 (EX) 062-0074 (PR)
Station 1277+92

BORING NO. SB-1
Station 1277+67
Offset 18.0 ft RT
Ground Surface Elev. 467.40 ft

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

Groundwater Elev.:
First Encounter 458.9 ft ▼
Upon Completion 456.9 ft ▽
After ____ **Hrs.** ____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Sand, brown, medium dense, moist *(continued)* 426.40				
Shale, highly weathered, gray, hard, very moist to wet		50/3"		14
	-45			
		50/2"		20
	-50			
413.90				
Coal Seam, black, hard, wet		50/3"		24
412.40	-55			
End of Boring				
	-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 9/23/21

ROUTE FAP 318 (IL 29) **DESCRIPTION** Structure boring for south abutment **LOGGED BY** JS (Terracon)

SECTION (3-B) BR **LOCATION** IL-29 over Barrville Creek, **SEC.** 26, **TWP.** 12 N, **RNG.** 9, 4th **PM**, **Latitude** 40.9972, **Longitude** -89.4431

COUNTY Marshall County **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 062-0008 (EX) 062-0074 (PR)
Station 1277+92

BORING NO. SB-2
Station 1278+28
Offset 16.0 ft LT
Ground Surface Elev. 467.40 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 459.9 ft ▼
Upon Completion 457.4 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Asphalt, approximate thickness of 13" 466.30			
FILL: Silt Loam, trace gravel, brown and orange	1		
	4 2		16
	1		
-5	1 2		24
461.40			
Silt Loam, trace gravel, brown, medium stiff, very moist to wet	4		
▼	4 4		16
	4		
-10 ▽	3 3		22
456.90			
Silt, brown, very soft, wet	0		
	0 0		30
	0		
-15	0 1		25
450.90	1		
Silt Loam, trace gravel, brown, wet, medium stiff	2 3		20
448.40	0		
Clay, trace gravel, medium stiff to soft	2	1.0	26
-20	2	B	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Clay, trace gravel, medium stiff to soft *(continued)*	0		
	0 2	dist.	22
443.90	4		
Sandy Loam, brown, loose to medium dense, wet	3		23
-25	4		
	8		
	6 8		18
	10		
	8		13
-30	6		
434.40			
Shale, slightly weathered, gray, hard, wet	50		
	50/2"		19
-35			
	50/4"		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 9/23/21

ROUTE FAP 318 (IL 29) **DESCRIPTION** Structure boring for south abutment **LOGGED BY** JS (Terracon)

SECTION (3-B) BR **LOCATION** IL-29 over Barrville Creek, **SEC.** 26, **TWP.** 12 N, **RNG.** 9, 4th **PM**,
Latitude 40.9972, **Longitude** -89.4431

COUNTY Marshall County **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 062-0008 (EX) 062-0074 (PR)
Station 1277+92

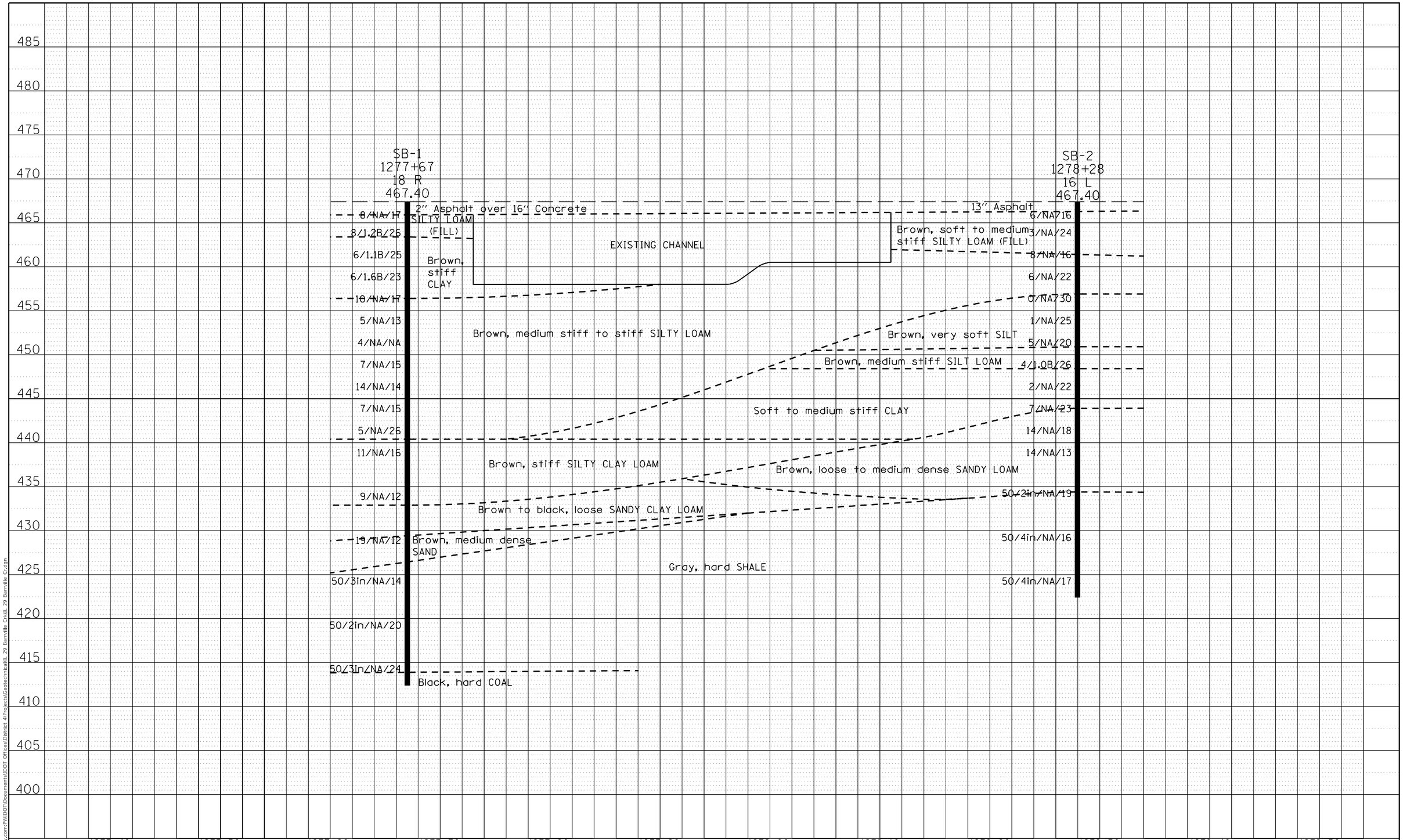
BORING NO. SB-2
Station 1278+28
Offset 16.0 ft LT
Ground Surface Elev. 467.40 ft

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

Groundwater Elev.:
First Encounter 459.9 ft ▼
Upon Completion 457.4 ft ▽
After _____ **Hrs.** _____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Shale, slightly weathered, gray, hard, wet *(continued)*				
		50/4"		17
422.40	-45			
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)



PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
GRADES CHECKED
B.M. NOTED
STRUCTURE NOTATNS CHKD
NOTE BOOK
NO.
BY
DATE

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FILE NAME: pw:\\dist-pw.pentley.com:PWIDOT\Documents\IDOT Offices\District 4\Projects\Geotechnical\IL 29 Barrville Crk\IL 29 Barrville Cr.dgn

USER NAME = withrowjm	DESIGNED - _____	REVISED - _____	**STATE OF ILLINOIS** **DEPARTMENT OF TRANSPORTATION**
	DRAWN - _____	REVISED - _____	
PLOT SCALE = 40.0000 ' / in.	CHECKED - _____	REVISED - _____	
PLOT DATE = 4/29/2022	DATE - _____	REVISED - _____	

SUBSURFACE PROFILE
IL 29 OVER BARRVILLE CREEK

SCALE: _____ | SHEET __ OF __ SHEETS | STA. 1277+40 | TO STA. 1278+50

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
318	(3-B) BR	MARSHALL	___	___
062-0008 (EX) 062-0074 (PR)		CONTRACT NO. 68E33		
	ILLINOIS	FED. AID PROJECT		

Illinois Department of Transportation

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE=====

Substructure 1

Base of Substruct. Elev. (or ground surf for bents)	460.45	ft.
Pile or Shaft Dia.	12	inches
Boring Number	SB-1	
Top of Boring Elev.	467.4	ft.
Approximate Fixity Elev.	454.45	ft.

Individual Site Class Definition:

N (bar):	25 (Blows/ft.)	Soil Site Class D	<----Controls
N_{ch} (bar):	25 (Blows/ft.)	Soil Site Class D	
s_u (bar):	(ksf)	NA, H < 0.1*H (Soil)	

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	464.9	2.50	8		
	463.4	1.50	8		B
	460.9	2.50	8	1.20	
	458.4	2.50	6	1.10	
	456.4	2.00	6	1.60	B
0.6	453.9	2.50	10		
3.1	451.4	2.50	5		
5.6	448.9	2.50	4		
8.1	446.4	2.50	7		
10.6	443.9	2.50	14		
13.1	441.4	2.50	7		
14.6	439.9	1.50	5		B
17.1	437.4	2.50	11		
19.6	434.9	2.50	11		
22.1	432.4	2.50	9		B
24.1	430.4	2.00	9		
25.1	429.4	1.00	9		B
27.1	427.4	2.00	19		
28.1	426.4	1.00	19		B
100.0	354.5	71.90	100	5.00	R

Substructure 2

Base of Substruct. Elev. (or ground surf for bents)	460.45	ft.
Pile or Shaft Dia.	12	inches
Boring Number	SB-2	
Top of Boring Elev.	467.4	ft.
Approximate Fixity Elev.	454.45	ft.

Individual Site Class Definition:

N (bar):	14 (Blows/ft.)	Soil Site Class E	
N_{ch} (bar):	17 (Blows/ft.)	Soil Site Class D	<----Controls
s_u (bar):	4.12 (ksf)	Soil Site Class C	

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	464.9	2.50	6		
	463.9	1.00	6		
	461.4	2.50	3		B
	458.9	2.50	8		
	456.9	2.00	6		B
0.1	454.4	2.50	1		
2.1	452.4	2.00	1		
3.6	450.9	1.50	1		B
6.1	448.4	2.50	5		B
8.6	445.9	2.50	4	1.00	
10.6	443.9	2.00	2		B
13.1	441.4	2.50	7		
15.6	438.9	2.50	14		
18.1	436.4	2.50	14		
20.1	434.4	2.00	14		B
100.0	354.5	79.90	100	5.00	R

Substructure 3

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

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 2

N (bar):	20 (Blows/ft.)	Soil Site Class D	
N_{ch} (bar):	21 (Blows/ft.)	Soil Site Class D	<----Controls
s_u (bar):	(ksf)	NA, H < 0.1*H (Total)	

AASHTO Earthquake Ground Motion Parameters E. V. Leyendecker, A.D. Frankel, and K. S....

ile Help

AASHTO Guide Specifications for LRFD Seismic Bridge Design

This program allows the user to obtain seismic design parameters for sites in the 50 states of the United States, Puerto Rico and the U.S. Virgin Islands. Ground motion maps are also included in PDF format.

Click on Okay to begin calculatio

Correct application of the data obtain responsibility of the user. This softw design and/or analysis.

USGS

ANALYSIS - Map Parameters, Design Parameters, and Response Spectra

File Project Name Help

Input Data and Parameter Calculations

Select Geographic Region

Conterminous 48 States

Guidelines Edition

2007 AASHTO Bridge Design Guidelines

Specify Site Location by Latitude-Longitude or Zip Code

(•) Latitude-Longitude : Recommended ( ) Zip Code

40.99647 -89.4434

Latitude (50.0 to 24.6) Longitude (-125.0 to -65.0)

Calculate Basic Design Parameters

Probability of Exceedance: 7% PE in 75 years

Calculate PGA, Ss, and S1 | Calculate As, SDs, and SD1

Calculate Response Spectra

Map Spectrum | Design Spectrum

View Spectra

Output Calculations and Ground Motion Maps

2007 AASHTO Bridge Design Guidelines
AASHTO Spectrum for 7% PE in 75 years
Latitude = 40.996470
Longitude = -89.443400
Site Class B
Data are based on a 0.05 deg grid spacing.

Period (sec)	Sa (g)	
0.0	0.045	PGA - Site Class B
0.2	0.103	Ss - Site Class B
1.0	0.044	S1 - Site Class B

Conterminous 48 States
2007 AASHTO Bridge Design Guidelines
Spectral Response Accelerations SDs and SD1
Latitude = 40.996470
Longitude = -89.443400
As = FpgaPGA, SDs = FaSs, and SD1 = FvS1
Site Class D - Fpga = 1.60, Fa = 1.60, Fv = 2.40
Data are based on a 0.05 deg grid spacing.

Period (sec)	Sa (g)	
0.0	0.071	As - Site Class D
0.2	0.165	SDs - Site Class D
1.0	0.105	SD1 - Site Class D

Clear Output | View Maps

SN 062-0074
Pile Design Tables

North Abutment - Boring SB-1

Pile Type & Size	Nominal Required Bearing (kips)	Factored Resistance Available (kips)	Estimated Length (feet)	Pile Cutoff Elevation
HP 10 x 57	454	250	44	462.5
HP 12 x 53	418	230	42	462.5
HP 12 x 63	497	273	43	462.5
HP 12 x 74	589	324	45	462.5
HP 12 x 84	664	365	46	462.5
HP 14 x 73	578	318	43	462.5
HP 14 x 89	705	388	45	462.5
HP 14 x 102	810	445	46	462.5
HP 14 x 117	929	511	48	462.5

South Abutment - Boring SB-2

Pile Type & Size	Nominal Required Bearing (kips)	Factored Resistance Available (kips)	Estimated Length (feet)	Pile Cutoff Elevation
HP 10 x 57	454	250	37	462.5
HP 12 x 53	418	230	34	462.5
HP 12 x 63	497	273	36	462.5
HP 12 x 74	589	324	38	462.5
HP 12 x 84	664	365	39	462.5
HP 14 x 73	578	318	35	462.5
HP 14 x 89	705	388	37	462.5
HP 14 x 102	810	445	39	462.5
HP 14 x 117	929	511	41	462.5

SN 062-0074
Soil Parameters for Lateral Pile Analysis

Location	Expected Groundwater Elevation (ft)	Elevation (ft)	Unit Weight (pcf)	Cohesion (psf)	Phi (degrees)	K (pci)	E_{50}
North Abutment SB-1	457	460 to 456	120	1300	--	393	0.008
		456 to 440	115	1000	--	233	0.009
		440 to 429	118	1500	--	500	0.007
		429 to 426	115	--	34	--	--
		426 to 412	130	>4500	--	1500	0.005
South Abutment SB-2	457	460 to 457	115	1000	--	233	0.009
		457 to 451	112	250	--	<30	>0.02
		451 to 448	115	750	--	100	0.010
		448 to 444	120	1000	--	233	0.009
		444 to 434	112	--	33	--	--
		434 to 422	130	>4500	--	1500	0.005