Illinois Department of Transportation

Abbreviated Structure Geotechnical Report

Original Report Date: 7/13/2023	**Proposed SN:** 038-0229,30	**Route:**	F.A.I. Route 57
Revised Date: February 7, 2024	**Existing SN:** 038-0151	**Section:**	(38-7B)ES
Geotechnical Engineer: Rubino Engineering, Inc. (Report G22.258)		**County:**	Iroquois
Structural Engineer: EFK Moen / Oates Associates		**Contract:**	66M23

Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing): The proposed bridge replacements of I-57 S.B. and N.B. over Louis Creek, Iroquois County, District 3 are 3-span structures with a 15 1/4-inch thick concrete slab (thickness subject to change during design phase per Preliminary TS & L Note #3). The proposed structures span 80 feet - 6 3/4 inches between the back of the abutments, out-to-out deck width of 42 feet - 10 inches, and 10 degree skew (Per the Preliminary TS&L, the skew of the proposed structures is at 10 degrees - Right Ahead to match the existing structures). The Preliminary TS & L was provided by EFK Moen, prepared by Oates Associates, dated January 25, 2024 and attached herein. It is the understanding of Rubino that the TS & L has not been approved by the IDOT - Bureau of Bridges and Structures. Rubino understands that replacement bridges are planned for construction. Each replacement structure will be supported by two (2) Abutments and two (2) Piers supported on Metal Shell Piles. The Preliminary TS & L does not show the number of piles or beams supporting the slab; therefore, Rubino has estimated the number of piles at each Abutment and Pier. These estimates were used in our analyses given the limited information at the time of this report. Integral abutments will be included in the replacement structures. Load information was provided by EFK Moen on March 29, 2023 and indicated a Strength Load of 630 kips and a Service Load of 460 kips per Abutment. In addition, a Strength Load of 940 kips and a Service Load of 700 kips per Pier was provided.

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 Bridge Condition Report for the S.B. structure was prepared by Quigg Engineering, Inc., dated June 16, 2022 and provided by IDOT. Per this report and the Preliminary TS&L, the existing bridges, 038-0151 (S.B.) and 038-0152 (N.B.), of I-57 over Louis Creek are 3-span structures supported by shallow spread footings. The bridges were originally constructed in the year 1968. The existing deck has an out-to-out width of 42 feet-6 inches. The length of the existing structures, back-to-back abutments, is 93 feet-6 inches.

Four soil borings were performed by IDOT starting on August 17, 2022 through August 22, 2022. Boring No. 1 (NE Quad.) was performed near the North Abutment of the N.B. Structure. Boring No. 4 (S Median) was performed near the South Abutment of the N.B. Structure. Boring No. 3 (N Median) was performed near the North Abutment of the S.B. Structure. Boring No. 2 (SW Quad.) was performed near the South Abutment of the S.B. Structure.

N.B. Structure: In Boring Nos. 1 and 4 the surface was underlain by augered shoulder stone / black silty clay loam fill to an approximate elevation EL. 682 feet. Beneath this surficial fill, an additional layer of fill was encountered. This fill consisted of silty clay loam and silty clay to an approximate EL. 681 - EL. 678 feet. The fill strata were underlain by native, very stiff to hard, silty clay loam till, silty clay till, and silty loam till with interbedded pockets of sand and silt to approximate EL. 635 - EL. 633 feet. The till was underlain by dense fine sand to course gravel to approximate EL. 630 - EL. 629 feet. The granular soils were underlain by hard silty clay loam / silty loam till with sand seams / layers to the end of the borings at approximate EL. 629 - EL. 628 feet. Bedrock was not encountered in the borings. Copies of the soil boring logs and a soil profile are attached herein.

S.B. Structure: In Boring Nos. 2 and 3 the surface was underlain by augered shoulder stone, brown and black silty clay loam fill and sand and gravel fill to an approximate EL. 683 - EL. 680 feet. The fill materials were underlain by native, very stiff to hard, silty clay loam till, silty clay till and silty loam till to approximate EL. 636 - EL. 635 feet. The till was underlain by medium to dense fine sand to medium gravel to an approximate EL. 631 feet. The granular soils were underlain by hard (very dense) gray sandy loam / loamy sand / gravel to the end of Boring No. 2 at approximate EL. 629 feet. Boring No. 3 was terminated in the fine sand to medium gravel at approximate EL. 635 - EL. 634 feet. Bedrock was not encountered in the borings. Copies of the soil borings and a soil profile are attached herein.

The Subsurface Data Profile differs from the example provided for a bridge in the IDOT Geotechnical Manual. No soil borings were performed for the proposed Piers. Therefore, only borings taken for the Abutments are shown on the Subsurface Data Profile.

Since the existing structure is supported by spread footings, Rubino can evaluate the use of spread footings in light of the proposed loading with additional subsurface exploration. Namely, soil borings should be performed at or adjacent to the proposed Piers. If Metal Shell Piles are the chosen pile type per the Preliminary TS & L, Rubino does not recommend additional borings. Rubino agrees that Metal Shell Piles are a feasible foundation option for the proposed replacement structures. See below for more details.

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: Based on the provided Preliminary TS&L, the proposed profile grade changes minimally from the existing profile grade. Therefore, Rubino does not anticipate a settlement issue from fill placement for the approach embankments. Cuts or fills are not anticipated for the proposed slopewalls based on the elevation view in the Preliminary TS&L. Rubino anticipates that the existing abutments / spread footing foundations will be completely removed. Rubino anticipates that structural fill will be used to backfill the former abutments / foundations.

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: Based on the Preliminary TS&L provided, the slopes of the existing embankments 1:2 (V:H) will not change. Cuts are proposed at the edge of the crests of the existing embankments to construct new abutments. The existing abutments and spread footings on the crest will be removed. In addition, the existing spread footings on the existing embankment slopes will be removed. The excavations of the former footings are anticipated to be backfilled with structural fill. Rubino anticipates that the new fill will reestablish the existing slope configuration. Subsequently, the slopes will be covered by filter fabric and Stone Riprap Class A4.

Slope stability analyses were performed at the North Abutment of the S.B. structure using Boring No. 3 (N. Median) where the SPT values were lower than the other borings to EL. 655 feet. In the slope stability analyses, the drained (long-term) conditions control over the undrained (short-term) conditions. Rubino used the slope stability program Stedwin Version 2.90 to run the Modified Bishop Method. A factor of safety (FS) of 2.16 was achieved in the Drained Condition and a FS of 3.00 was achieved in the Undrained Condition. No additional analysis or treatment is recommended.

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 proposed ground surface elevations of the North and South Abutments (S.B.) are EL. 680.0 feet and EL. 680.3 feet, respectively. The proposed ground surface elevations of the North and South Abutments (N.B.) are EL. 679.9 feet and EL. 680.2 feet, respectively. Stone Riprap Class A4 is proposed for the abutment slopewalls with a slope of 1:2 (V:H). Based on the proposed abutments being open, Stone Riprap Class A4, and a slope of 1:2 (V:H), the recommended foundation design scour elevations are at the ground surface of the Abutments per Section 2.3.6 of the IDOT Bridge Manual (2023).

The proposed streambed elevation at Pier 1 (N.B.), Pier 1 (S.B.), Pier 2 (N.B.) and Pier 2 (S.B.) is EL. 668.3 feet. Per the Final Scour Depths in the Hydraulics Report, the 100-year Scour Depth is 16.19 feet and the 200-year Scour Depth is 19.22 feet.

Although no borings were performed at the proposed Piers, Rubino recommends a 50% reduction in scour for calculation of the pile capacities (100-Year Scour Depth reduced to 8.1 feet). This recommendation is based on the following:

- The soil profile in the 4 abutment borings were relatively consistent with silty clay till / silty clay loam till soils (with interbedded silt layers at EL. 661.6 feet in one boring) and Qu values ranging from 1.8 tsf - 3.9 tsf. These findings were obtained from the boring logs between approximate EL. 668.3 feet (streambed elevation at Piers) and extending 16.2 feet to approximate EL. 652.1 feet.
- In addition, the abutment borings were taken in close proximity to the proposed Piers, approximately 50 - 70 feet away.
- per IDOT Bridge Manual (2023) Section 2.3.6.3.2 a 50% reduction in scour depth is feasible.

Therefore, the Bottom Elevations of Scour at the proposed Piers are as follows:

Pier 1 (N.B. & S.B.) / Pier 2 (N.B. & S.B.) :

EL. 668.3 (Streambed Elevation) - 1.8 (riprap) - 1.0 (riprap) = EL. 665.5 feet
Q100 = 16.19 feet
16.19 feet - 1.8 feet (riprap) - 1.0 feet (riprap) = 13.39 feet
13.39 feet * 0.50 = 6.7 feet
EL. 665.5 feet - 6.7 feet = EL. 658.8 feet Bottom Elevation of Scour

The 100-Year Scour Depth with a 50% reduction (8.1 feet) was used to calculate the Bottom Elevations of Scour.

These elevations were used in the pile spreadsheets to apply factored loss from scour.

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 Site Class = C; Seismic Performance Zone = SPZ 1 ; Design Spectral Acceleration at 0.2 sec. (SDS) = 0.141; Design Spectral Acceleration at 1.0 sec. (SD1) = 0.082 (per AASHTO 2009). Liquefaction is not applicable because the SPZ = 1. Please see the Seismic Site Class Determination results attached herein.

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: Per the Preliminary TS&L, Rubino agrees that Metal Shell Piles are a feasible foundation option at each proposed Abutments and Piers. Per the loading proposed by EFK Moen, the Strength Load at each Abutment is 630 kips and 940 kips at each Pier. The number of piles for each substructure was not provided. Therefore, Rubino has provided a list of Nominal Required Bearings, Factored Resistances Available, and the corresponding Estimated Pile Lengths for Driven Metal Shell Piles of 12 and 14-inch diameter for the designers consideration.

Due to the very stiff to hard soil consistencies, the piles will be precored to 10 feet below the bottom of the Abutments (see Integral Abutment Feasibility Analysis). Therefore, the upper 10 feet was not included in the calculation of the pile capacities for the Abutments. For 12 or 14-inch diameter Driven Metal Shell Piles, the IDOT Bridge Manual (2023) Section 3.1.3, Page #259, Note #38 recommends a precore hole diameter of 24 inches.

See the attached pile tables herein for a list of Nominal Required Bearings, Factored Resistances Available, and the corresponding Estimated Pile lengths for driven Metal Shell Piles at each Abutment and Pier. The tables for both Abutments and Piers have been updated from the previous submittal on August 18, 2023.

Rubino recommends that conical tips be installed on Metal Shell Piles due to probable cobbles/boulders, hard cohesive soils, and dense to very dense granular soils noted on the boring logs. This recommendation was made in accordance with the IDOT Geotechnical Manual (2020) section 6.13.2.3.4.3.

Rubino recommends that at least one test pile be conducted for each bridge structure if driven Metal Shell Piles are the selected pile type based on the consistency of the soils encountered within each Abutment / Pier soil boring. These recommendations were made in reference to section 6.13.2.3.4.1 of the IDOT Geotechnical Manual (2020).

Calculate the estimated water surface elevation and determine the need for cofferdams (type 1 or 2), and seal coat: Per the Preliminary TS&L provided, the EWS Elevation is EL. 671.0 feet which is above the proposed bottom of Pier elevations at EL. 665.8 feet. Therefore, the depth of water above the bottom of the encasement is anticipated to be EL. 671.0 - EL. 665.8 feet = 5.2 feet. Since less than 6 feet of water is expected, Type 1 Cofferdams may be considered (see IDOT Bridge Manual Section 2.3.6.4.2) per Note #4 on the Preliminary TS & L.

Assess the need for sheeting or soil retention or temporary construction slope and provide recommendation for other construction concerns: A temporary soil retention system will likely be needed for the construction of the Piers. As stated in the previous section, Cofferdams Type 1 will be necessary for Pier construction. See Note # 4 on the Preliminary TS&L.

Referencing the boring logs provided by IDOT (attached herein), at the North Abutment (N.B.) (Boring 1 NE Quad.) the soil retained and in which the sheet pile will be embedded is very stiff silty clay loam fill and natural very stiff to hard silty clay till (EL. 684.4 - EL. 669.4 feet). Qu and Qp values in this elevation range were from 3.5 to 5.1 tsf.

At the South Abutment (S.B.) (Boring 2 SW Quad.) the soil retained and in which the sheet pile will be embedded is very stiff to hard silty clay loam fill and natural very stiff to hard silty clay loam till (EL. 685.3 - EL. 670.3 feet). Qu and Qp values in this elevation range were from 3.0 to 5.1 tsf.

At the North Abutment (S.B.) (Boring 3 N Median) the soil retained and in which the sheet pile will be embedded is very stiff silty clay loam fill and natural very stiff to hard silty clay loam till (EL. 684.6 - EL. 669.6 feet). Qu and Qp values in this elevation range were from 3.0 to 5.1 tsf.

At the South Abutment (N.B.) (Boring 4 S Median) the soil retained and in which the sheet pile will be embedded is very stiff silty clay fill and natural silty clay loam till (EL. 685.1 - EL. 670.1 feet). Qu and Qp values in this elevation range were from 3.5 to 4.6 tsf.

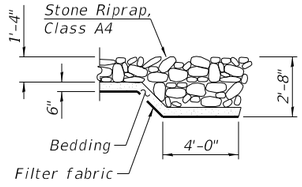
The IDOT Simplified Temporary Sheet Piling Design Charts provide soil requirements for the use of the design charts. No significant cuts or fills are anticipated for the slopewalls or approach embankment, meeting the criteria for use of the design charts. Rubino estimated an approximate sheet pile length of 15 feet. The soils between the existing ground surface elevations at the abutments and an approximate pile embedment length of 15 feet (approximate EL. 685 feet and EL. 670 feet) DO NOT meet the criteria for the design charts. Several samples exhibited Qu values in excess of 4.5 tsf. Therefore, the simplified charts cannot be utilized. Per Section 7.4.5.6 of the IDOT Geotechnical Manual, a temporary soil retention system construction specification will be necessary.

Bench Mark: BM 443 – Chiseled square on southwest wingwall of southbound structure, Sta. 1187+57.4, 68.1' RT., Elev. 685.89.

Existing Structure: S.N. 038-0151 (S.B.) and S.N. 038-0152 (N.B.) were originally built in 1968 as F.A.I. Route 57, Section 38-7B. The longitudinal joint was closed and bituminous overlay with waterproofing membrane system were added in 1976. Expansion joints were replaced and bituminous overlay was replaced with a microsilica overlay in 1999. Concrete repairs to superstructure and substructure in 2000. A 1½" HMA overlay without waterproofing was added to the deck and the inside shoulder concrete railings were replaced with Type 2399 steel railings in 2022 under Contract 66H63. The back to back abutment length is 93'-6" and the out to out deck width is 42'-6". The existing structure consists of a three span 15½" thick continuous cast-in-place slab superstructure supported by concrete stub abutments founded on spread footings and concrete solid wall piers founded on spread footings. Structure is to be removed and replaced.

Traffic Control: One lane of traffic will be maintained by utilizing staged construction.

Salvage: None



SECTION A-A

Notes:
1. Traffic Barrier Terminal Type 5, Std. 631026 (S.B. Structure) Type 6, Std. 631031 (N.B. Structure)
2. Traffic Barrier Terminal Type 5, Std. 631026 (N.B. Structure) Type 6, Std. 631031 (S.B. Structure)
3. Prior to grinding. Slab thickness is subject to refinement during the design phase.
4. Type 1 Cofferdam required for pier construction.
5. Piles shall be driven through precored holes to 10' below bottom of abutment and the void filled with bentonite.
6. Up to ¼" may be ground off the bridge decks and approach slabs. Profile Grade shows the final elevations after grinding.

DESIGN SCOUR ELEVATION TABLE (S.B.)

Event / Limit State	Design Scour Elevations (ft.) N. Abut.	Pier 1	Pier 2	S. Abut.	Item 113
Q100	680.0	661.8	662.1	680.3	5
Q200	680.0	660.3	660.6	680.3	
Design	680.0	661.8	662.1	680.3	
Check	680.0	660.3	660.6	680.3	

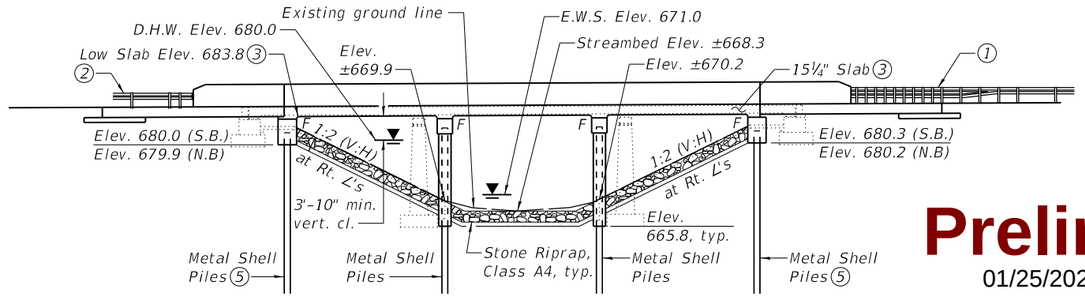
DESIGN SCOUR ELEVATION TABLE (N.B.)

Event / Limit State	Design Scour Elevations (ft.) N. Abut.	Pier 1	Pier 2	S. Abut.	Item 113
Q100	679.9	661.8	662.1	680.2	5
Q200	679.9	660.3	660.6	680.2	
Design	679.9	661.8	662.1	680.2	
Check	679.9	660.3	660.6	680.2	

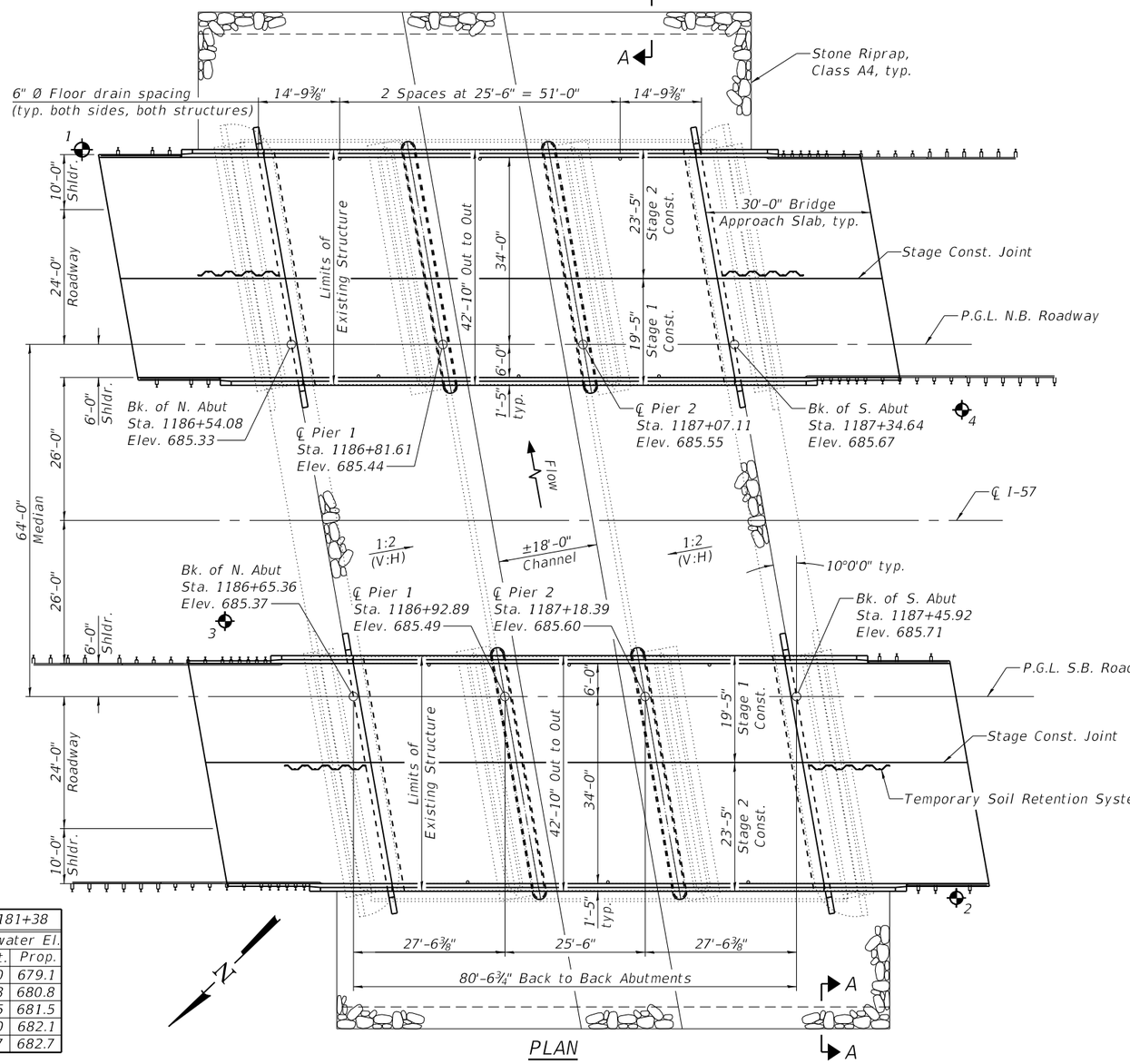
WATERWAY INFORMATION

Drainage Area = 10.7 sq. mi. Low Grade Elev. 683.73 @ Sta. 1181+38

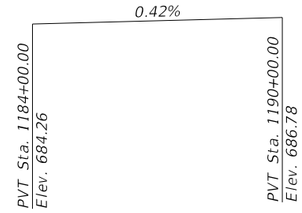
Flood	Freq. Yr.	Q C.F.S.	Opening Ft² Exist.	Prop.	Nat. H.W.E.	Head - Ft. Exist.	Prop.	Headwater El. Exist.	Prop.
	10	1,590	285	320	678.4	0.6	0.7	679.0	679.1
Design	50	2,550	369	409	680.0	0.8	0.8	680.8	680.8
Base	100	2,980	398	439	680.5	1.0	1.0	681.5	681.5
Scour Check	200	3,400	416	458	680.8	1.2	1.3	682.0	682.1
Max. Calc.	500	4,000	434	477	681.1	1.6	1.6	682.7	682.7



ELEVATION



PLAN



PROFILE GRADE – F.A.I. RTE. 57 (6)
(along P.G.L. of N.B. and S.B. roadway)

Preliminary
01/25/2024 9:14:03 AM

HIGHWAY CLASSIFICATION

F.A.I. Rte. 57 – I-57
Functional Class: Interstate
ADT (one-way): 8,700 (2021); 8,740 (2046)
ADTT (one-way): 3,650 (2021); 3,670 (2046)
DHV (one-way): 874
Design Speed: 70 m.p.h.
Posted Speed: 70 m.p.h.

DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

DESIGN STRESSES

FIELD UNITS

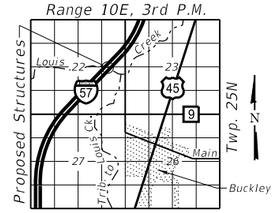
f'c = 3,500 psi
f'c = 4,000 psi (Superstructure concrete)
fy = 60,000 psi (Reinforcement)

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) = 0.082g
Design Spectral Acceleration at 0.2 sec. (SDS) = 0.141g
Soil Site Class = C



LOCATION SKETCH

GENERAL PLAN & ELEVATION
I-57 OVER LOUIS CREEK
F.A.I. RTE. 57 – SEC. (38-7B)ES
IROQUOIS COUNTY
STA. 1187+00.00
STRUCTURE NO. 038-0229 (S.B.)
STRUCTURE NO. 038-0230 (N.B.)

OATES ASSOCIATES
www.oatesassociates.com
ILLINOIS DESIGN FIRM LICENSE NO.: 184.001115

USER NAME =	DESIGNED - JAD	REVISED -	
	CHECKED - KBC	REVISED -	
PLOT SCALE =	DRAWN - JAD	REVISED -	
PLOT DATE = 8/23/2023	CHECKED - KBC	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 2 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
57	(38-7B)ES	IROQUOIS		
		CONTRACT NO. 66M23		
		ILLINOIS FED. AID PROJECT		

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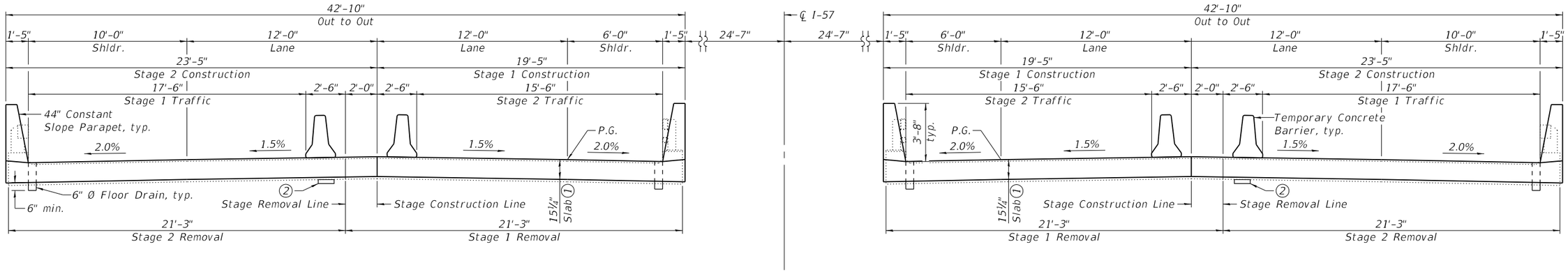
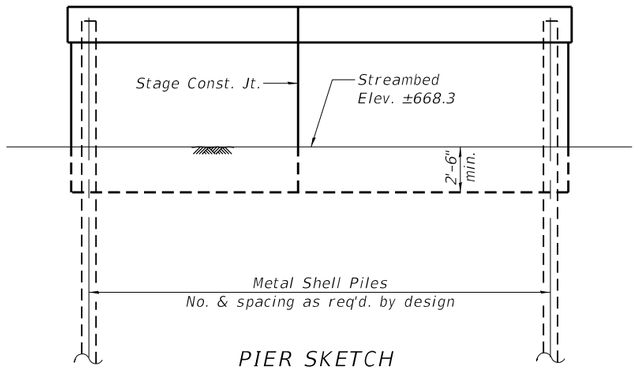
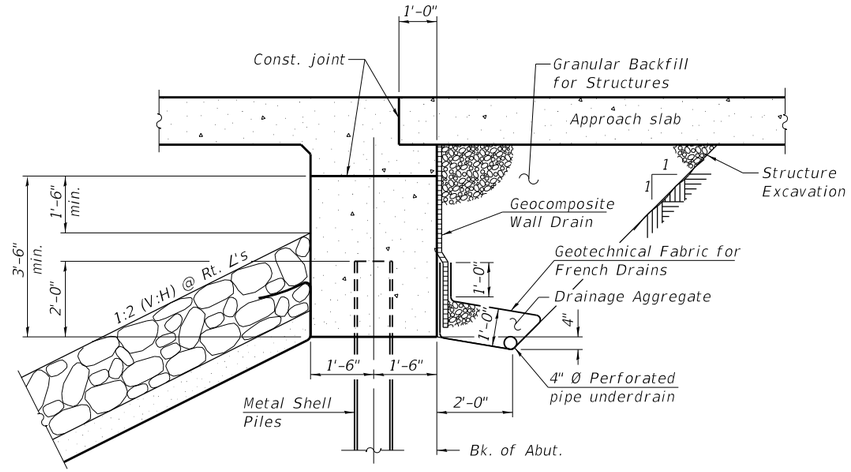


CROSS SECTION



PIER SKETCH



SECTION THRU INTEGRAL ABUTMENT

(Horiz. dim. at Rt. ℄'s)

Notes:
1. Prior to grinding. Slab thickness is subject to refinement during the design phase.
2. Provide temporary bearing plate beneath slab near stage removal line at abutments.

DETAILS
I-57 OVER LOUIS CREEK
F.A.I. RTE. 57 - SEC. (38-7B)ES
IROQUOIS COUNTY
STA. 1187+00.00
STRUCTURE NO. 038-0229 (S.B.)
STRUCTURE NO. 038-0230 (N.B.)

FILE NAME: H:\P\222101 - D3 V-V\WO 4-I-57 over Louis Creek-TSL\Bridge\Microstation\0380229_0230-66M23-TS&L.dgn

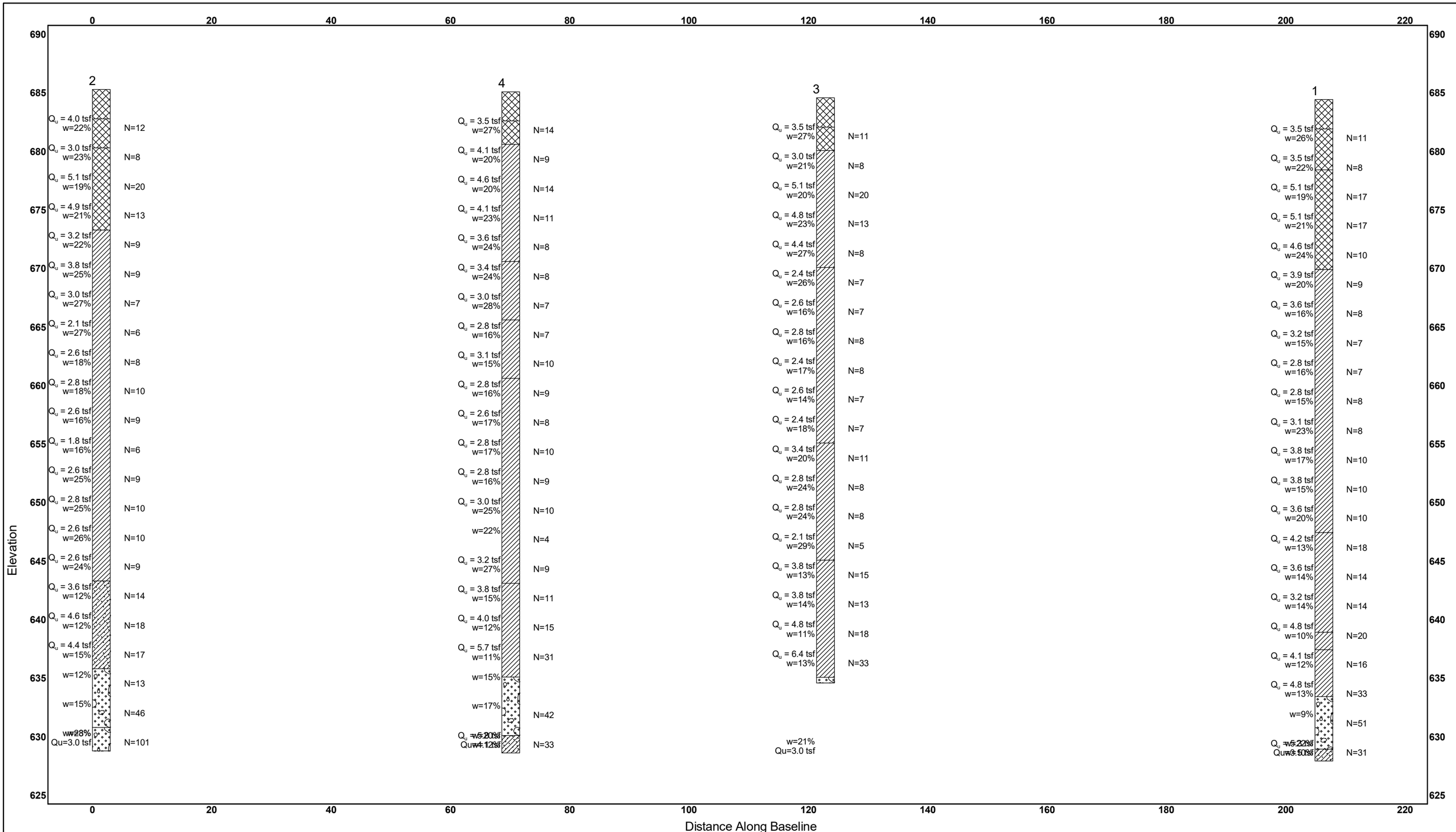
OATES ASSOCIATES
www.oatesassociates.com
ILLINOIS DESIGN FIRM LICENSE NO.: 184.001115

USER NAME =	DESIGNED - JAD	REVISED -	
	CHECKED - KBC	REVISED -	
PLOT SCALE =	DRAWN - JAD	REVISED -	
PLOT DATE = 8/23/2023	CHECKED - KBC	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET 2 OF 2 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
57	(38-7B)ES	IROQUOIS		
		CONTRACT NO. 66M23		
		ILLINOIS	FED. AID PROJECT	



rubino ENGINEERING INC.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

Soil Profile

Rubino Job No.: G22.258
Project: IDOT PTB 197-022 WO18
Location: I-57 Over Louis Creek
City, State: Iroquois County, Illinois
Client: IDOT District 3

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation

SOIL BORING LOG

Date 8/17/22

ROUTE FAI 57 (I-57) **DESCRIPTION** I-57 over Louis Creek, 0.7 mi N of Buckley Interchange **LOGGED BY** Larry Myers

SECTION ((38-7B)BR)ES **LOCATION** NE 1/4, **SEC.** 22, **TWP.** 25N, **RNG.** 10E, 3rd **PM**, **Latitude** , **Longitude**

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

STRUCT. NO. 038-0152 (Exist.)
Station 1187+00

BORING NO. 1 (NE Quad.)
Station 1186+16
Offset 67.4 ft Rt.
Ground Surface Elev. 684.42 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 634.4 ft ▼
Upon Completion 654.4 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Augered Shoulder Stone, Black Silty Clay Loam Fill
681.92				
	3			Very Stiff Black and Brown Silty Clay Loam Fill
	4 7	3.5 P	26	
-5				
	3			
678.42	4 4	3.5 P	22	
				Very Stiff to Hard Brown and Gray Silty Clay Loam Till
	5			
	7 10	5.1 S	19	
-10				
	5			
	7 10	5.1 S	21	
	4			
	4 6	4.6 S	24	
669.92				
-15				Very Stiff Gray Silty Clay Till with Minor Silt Pockets/Layers
	3			
	4 5	3.9 B	20	
	3			
	4 4	3.6 B	16	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	3			Very Stiff Gray Silty Clay Till with Minor Silt Pockets/Layers *(continued)*
	3 4	3.2 B	15	
	3			
	3 4	2.8 B	16	
-25				
	2			
	3 5	2.8 B	15	
	3			
	3 5	3.1 B	23	
▽ -30				
	4			
	4 6	3.8 B	17	
	4			
	4 6	3.8 B	15	
-35				
	2			
	4 6	3.6 B	20	
647.42				
	7			Hard Gray Silty Loam/Silty Clay Loam Till
	8 10	4.2 S	13	
-40				

SOIL BORING 038-0151,0152.GPJ IL_DOT.GDT 9/27/22

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
Illinois Department of Transportation

SOIL BORING LOG

Date 8/17/22

ROUTE FAI 57 (I-57) **DESCRIPTION** I-57 over Louis Creek, 0.7 mi N of Buckley Interchange **LOGGED BY** Larry Myers

SECTION ((38-7B)BR)ES **LOCATION** NE 1/4, **SEC.** 22, **TWP.** 25N, **RNG.** 10E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 038-0152 (Exist.)
Station 1187+00

BORING NO. 1 (NE Quad.)
Station 1186+16
Offset 67.4 ft Rt.
Ground Surface Elev. 684.42 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 634.4 ft ▼
Upon Completion 654.4 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Hard Gray Silty Loam/Silty Clay Loam Till *(continued)*		7		
		7 7	3.6 S	14
		4		
		6 8	3.2 S	14
	-45			
	638.92	5		
Hard Pinkish Brown Silty Clay Loam Till		8 12	4.8 S	10
	637.42			
Hard and Very Stiff Gray Silty Clay Loam Till		6		
		7 9	4.1 S	12
	▼-50	12		
	633.42	14 19	4.8 S	13
Dense Gray Fine Sand to Course Gravel				
*Washed Sample 52.5'-54.0'		30		
		25 26	* 	9
	-55			
*Washed Sample 55.0'-56.5'	628.92	17		
Hard Gray Silty Loam Till with Sand Seams	627.92	15 16	5.3 S*	10
End of Boring				
	-60			

SOIL BORING 038-0151,0152.GPJ IL_DOT.GDT 9/27/22

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
Illinois Department of Transportation

SOIL BORING LOG

Date 8/18/22

ROUTE FAI 57 (I-57) **DESCRIPTION** I-57 over Louis Creek, 0.7 mi N of Buckley Interchange **LOGGED BY** Larry Myers

SECTION ((38-7B)BR)ES **LOCATION** NE 1/4, **SEC.** 22, **TWP.** 25N, **RNG.** 10E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 038-0151 (Exist.)
Station 1187+00

BORING NO. 2 (SW Quad.)
Station 1187+75
Offset 68.6 ft Rt.
Ground Surface Elev. 685.29 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 635.3 ft ▼
Upon Completion 665.3 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Shoulder Stone, Brown Silty Clay Loam Fill and Sand and Gravel Fill			
682.79			
Very Stiff to Hard Black Silty Clay Loam Fill	4		
	5 7	4.0 P	22
680.29 -5			
Very Stiff to Hard Brown and Gray Silty Clay Loam Till	3		
	3 5	3.0 P	23
	6		
	8 12	5.1 S	19
-10			
	5		
	5 8	4.9 S	21
673.29			
Very Stiff Gray Silty Clay Till	3		
	4 5	3.2 B	22
-15			
	3		
	4 5	3.8 B	25
	2		
	3 4	3.0 B	27
▽ -20			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Stiff Gray Silty Clay Till *(continued)*	2		
	3 3	2.1 B	27
	2		
	3 5	2.6 B	18
-25			
	3		
	4 6	2.8 B	18
	3		
	4 5	2.6 B	16
-30			
	1		
	2 4	1.8 B	16
	3		
	4 5	2.6 B	25
-35			
	3		
	4 6	2.8 B	25
	3		
	4 6	2.6 B	26
-40			

SOIL BORING 038-0151,0152.GPJ IL_DOT.GDT 9/27/22

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
Illinois Department of Transportation

SOIL BORING LOG

Date 8/18/22

ROUTE FAI 57 (I-57) **DESCRIPTION** I-57 over Louis Creek, 0.7 mi N of Buckley Interchange **LOGGED BY** Larry Myers

SECTION ((38-7B)BR)ES **LOCATION** NE 1/4, **SEC.** 22, **TWP.** 25N, **RNG.** 10E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 038-0151 (Exist.)
Station 1187+00

BORING NO. 2 (SW Quad.)
Station 1187+75
Offset 68.6 ft Rt.
Ground Surface Elev. 685.29 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 635.3 ft ▼
Upon Completion 665.3 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Stiff Gray Silty Clay Till *(continued)*		3		
		4 5	2.6 B	24
643.29				
Very Stiff to Hard Gray Silty Loam/Silty Clay Loam Till		4		
		6 8	3.6 S	12
	-45	6		
		8 10	4.6 S	12
		5		
		8 9	4.4 S	15
635.79				
Medium to Dense Gray Fine Sand to Medium Gravel	▼-50	3		
		3 10		12
		8		
		15 31		15
630.79				
Hard (Very Dense) Gray Sandy Loam/Loamy Sand/Gravel	-55	30		
		40 61		8
628.79				
End of Boring				
	-60			

SOIL BORING 038-0151.0152.GPJ IL_DOT.GDT 9/27/22

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
Illinois Department of Transportation

SOIL BORING LOG

Date 8/19/22

ROUTE FAI 57 (I-57) **DESCRIPTION** I-57 over Louis Creek, 0.7 mi N of Buckley Interchange **LOGGED BY** Larry Myers

SECTION ((38-7B)BR)ES **LOCATION** NE 1/4, **SEC.** 22, **TWP.** 25N, **RNG.** 10E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 038-0151 (Exist.)
Station 1187+00

BORING NO. 3 (N Median)
Station 1186+42
Offset 18.3 ft Rt.
Ground Surface Elev. 684.57 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 637.1 ft ▼
Upon Completion 659.6 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Black Silty Clay Loam fill			
682.07			
Very Stiff Black Silty Clay Loam Fill	5		
	5 6	3.5 P	27
680.07			
Very Stiff to Hard Brown and Gray Silty Clay Loam Till	-5		
	3		
	3 5	3.0 P	21
	6		
	8 12	5.1 S	20
	-10		
	4		
	5 8	4.8 S	23
	3		
	3 5	4.4 S	27
670.07			
Very Stiff Gray Silty Clay Loam Till	-15		
	1		
	3 4	2.4 B	26
	1		
	3 4	2.6 B	16
	-20		
Very Stiff Gray Silty Clay Loam Till *(continued)*			
	2		
	4 4	2.8 B	16
	2		
Silt Layers at 23'	3 5	2.4 B	17
▽	-25		
	2		
	3 4	2.6 B	14
	1		
	3 4	2.4 B	18
655.07			
Very Stiff Gray Silty Clay Till	-30		
	3		
	5 6	3.4 B	20
	1		
	3 5	2.8 B	24
	-35		
	2		
	3 5	2.8 B	24
	1		
	2 3	2.1 B	29
645.07			
	-40		

SOIL BORING 038-0151,0152.GPJ IL_DOT.GDT 9/27/22

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
Illinois Department of Transportation

SOIL BORING LOG

Date 8/19/22

ROUTE FAI 57 (I-57) **DESCRIPTION** I-57 over Louis Creek, 0.7 mi N of Buckley Interchange **LOGGED BY** Larry Myers

SECTION ((38-7B)BR)ES **LOCATION** NE 1/4, **SEC.** 22, **TWP.** 25N, **RNG.** 10E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 038-0151 (Exist.)
Station 1187+00

BORING NO. 3 (N Median)
Station 1186+42
Offset 18.3 ft Rt.
Ground Surface Elev. 684.57 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 637.1 ft ▼
Upon Completion 659.6 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Stiff to Hard Gray Silty Loam/Silty Clay Till *(continued)*		4		
		6 9	3.8 S	13
		3		
		5 8	3.8 S	14
	-45	5		
		7 11	4.8 S	11
Sand Layer at 47' ▼		11		
		16 17	6.4 S	13
	635.07			
Fine Sand to Medium Gravel	634.57 -50			
15' Blow in End of Boring	-55			
	-60			

SOIL BORING 038-0151.0152.GPJ IL_DOT.GDT 9/27/22

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
Illinois Department of Transportation

SOIL BORING LOG

Date 8/22/22

ROUTE FAI 57 (I-57) **DESCRIPTION** I-57 over Louis Creek, 0.7 mi N of Buckley Interchange **LOGGED BY** Larry Myers

SECTION ((38-7B)BR)ES **LOCATION** NE 1/4, **SEC.** 22, **TWP.** 25N, **RNG.** 10E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 038-0152 (Exist.)
Station 1187+00

BORING NO. 4 (S Median)
Station 1187+76
Offset 20.1 ft Lt.
Ground Surface Elev. 685.09 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 635.1 ft ▼
Upon Completion 665.1 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Shoulder Stone, Black Silty Clay Loam Fill			
682.59			
Very Stiff Gray and Brown Silty Clay Fill	5		
	6 8	3.5 P	27
680.59			
Hard to Very Stiff Brown and Gray Silty Clay Till	3		
-5	3 6	4.1 S	20
	4		
	6 8	4.6 S	20
-10	4		
	5 6	4.1 S	23
	3		
	3 5	3.6 B	24
670.59			
Very Stiff Gray Silty Clay Till			
-15	2		
	3 5	3.4 B	24
	2		
	3 4	3.0 B	28
665.59			
▽ -20			
Very Stiff Gray/Brown Silty Clay Loam Till *(continued)*	2		
	3 4	2.8 B	16
	3		
	4 6	3.1 B	15
660.59			
Very Stiff Gray Silty Clay Till -25	3		
	4 5	2.8 B	16
	1		
	3 5	2.6 B	17
-30	3		
	4 6	2.8 B	17
	3		
	4 5	2.8 B	16
-35	2		
	4 6	3.0 B	25
Sand and Silt at 37.5'	1		
	2 2		22
-40			

SOIL BORING 038-0151,0152.GPJ IL_DOT.GDT 9/27/22

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
Illinois Department of Transportation

SOIL BORING LOG

Date 8/22/22

ROUTE FAI 57 (I-57) **DESCRIPTION** I-57 over Louis Creek, 0.7 mi N of Buckley Interchange **LOGGED BY** Larry Myers

SECTION ((38-7B)BR)ES **LOCATION** NE 1/4, **SEC.** 22, **TWP.** 25N, **RNG.** 10E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 038-0152 (Exist.)
Station 1187+00

BORING NO. 4 (S Median)
Station 1187+76
Offset 20.1 ft Lt.
Ground Surface Elev. 685.09 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 635.1 ft ▼
Upon Completion 665.1 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Stiff Gray Silty Clay Till *(continued)*		1		
		3 6	3.2 B	27
	643.09			
Very Stiff to Hard Gray Silty Clay Loam/Silty Loam Till with Silt Pockets		3		
		5 6	3.8 S	15
	-45	4		
		6 9	4.0 S	12
		12		
		15 16	5.7 S	11
	635.09 ▼ -50	WH		
Dense Fine Sand to Medium Gravel - Free Water		WH WH		15
WH = Weight of Hammer		12		
		20 22		17
	630.09 -55	10		
Hard Gray Silty Clay Loam/Silty Loam Till with Sand Layers		14 19	5.8 S	12
	628.59			
End of Boring	-60			

SOIL BORING 038-0151,0152.GPJ IL_DOT.GDT 9/27/22

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

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE=====WO 18 - I-57 Over Louis Creek N.B. Bridge Structure

Substructure 1

Base of Substruct. Elev. (or ground surf for bents	679.2	ft.
Pile or Shaft Dia.	12	inches
Boring Number	1 (NE Quad)	
Top of Boring Elev.	684.42	ft.
Approximate Fixity Elev.	673.2	ft.

Individual Site Class Definition:

N (bar): 18 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 4.41 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	684.4	0.00			
	681.9	2.50	5	0.50	
	679.4	2.50	11	3.50	
	676.9	2.50	8	3.50	B
	674.4	2.50	17	5.00	
1.3	671.9	2.50	17	5.00	
3.8	669.4	2.50	10	4.60	
6.3	666.9	2.50	9	3.90	
8.8	664.4	2.50	8	3.60	
11.3	661.9	2.50	7	3.20	
13.8	659.4	2.50	7	2.80	
16.3	656.9	2.50	8	2.80	
18.8	654.4	2.50	8	3.10	
21.3	651.9	2.50	10	3.80	
23.8	649.4	2.50	10	3.80	
26.3	646.9	2.50	10	3.60	B
28.8	644.4	2.50	18	4.20	
31.3	641.9	2.50	14	3.60	
33.8	639.4	2.50	14	3.20	B
36.3	636.9	2.50	20	4.80	
38.8	634.4	2.50	16	4.10	
39.8	633.4	1.00	26	4.80	
41.3	631.9	1.50	38		
44.3	628.9	3.00	51		B
45.3	627.9	1.00	31	5.00	
100.0	573.2	54.70	31	5.00	

Substructure 2

Base of Substruct. Elev. (or ground surf for bents	665.8	ft.
Pile or Shaft Dia.	12	inches
Boring Number	1 (NE Quad)	
Top of Boring Elev.	665.8	ft.
Approximate Fixity Elev.	659.8	ft.

Individual Site Class Definition:

N (bar): 22 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 4.53 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	665.8	0.00			
	664.4	1.40	8	3.60	
	661.9	2.50	7	3.20	
0.4	659.4	2.50	7	2.80	
2.9	656.9	2.50	8	2.80	
5.4	654.4	2.50	8	3.10	
7.9	651.9	2.50	10	3.80	
10.4	649.4	2.50	10	3.80	
12.9	646.9	2.50	10	3.60	B
15.4	644.4	2.50	18	4.20	
17.9	641.9	2.50	14	3.60	
20.4	639.4	2.50	14	3.20	B
22.9	636.9	2.50	20	4.80	
25.4	634.4	2.50	16	4.10	
26.4	633.4	1.00	26	4.80	
27.9	631.9	1.50	38		
30.9	628.9	3.00	51		B
32.9	626.9	2.00	31	5.00	
100.0	559.8	67.10	31	5.00	

Substructure 3

Base of Substruct. Elev. (or ground surf for bents	665.8	ft.
Pile or Shaft Dia.	12	inches
Boring Number	4 (Median)	
Top of Boring Elev.	665.8	ft.
Approximate Fixity Elev.	659.8	ft.

Individual Site Class Definition:

N (bar): 19 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 4.06 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	665.8	0.00			
	665.1	0.70	7	3.00	
	662.6	2.50	7	2.80	
	660.1	2.50	10	3.10	
2.2	657.6	2.50	9	2.80	
4.7	655.1	2.50	8	2.60	
7.2	652.6	2.50	10	2.80	
9.7	650.1	2.50	9	2.80	
12.2	647.6	2.50	10	3.00	B
14.7	645.1	2.50	4		B
17.2	642.6	2.50	9	3.20	
19.7	640.1	2.50	11	3.80	
22.2	637.6	2.50	15	4.00	
24.7	635.1	2.50	31	5.00	
29.7	630.1	5.00	42		
31.2	628.6	1.50	33	5.00	
100.0	559.8	68.80	35	5.00	

Substructure 4

Base of Substruct. Elev. (or ground surf for bents	679.5	ft.
Pile or Shaft Dia.	12	inches
Boring Number	4 (Median)	
Top of Boring Elev.	685.09	ft.
Approximate Fixity Elev.	673.5	ft.

Individual Site Class Definition:

N (bar): 16 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 3.69 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	685.1	0.00			
	682.6	2.50	7		
	680.6	2.00	14	3.50	B
	677.6	3.00	9	4.10	
	675.1	2.50	14	4.60	
0.9	672.6	2.50	11	4.10	
3.4	670.1	2.50	8	3.60	
5.9	667.6	2.50	8	3.40	
8.4	665.1	2.50	7	3.00	
10.9	662.6	2.50	7	2.80	
13.4	660.1	2.50	10	3.10	
15.9	657.6	2.50	9	2.80	
18.4	655.1	2.50	8	2.60	
20.9	652.6	2.50	10	2.80	
23.4	650.1	2.50	9	2.80	
25.9	647.6	2.50	10	3.00	B
28.4	645.1	2.50	4		B
30.9	642.6	2.50	9	3.20	
33.4	640.1	2.50	11	3.80	
35.9	637.6	2.50	15	4.00	
38.4	635.1	2.50	31	5.00	
43.4	630.1	5.00	42		
44.9	628.6	1.50	33	5.00	
100.0	573.5	55.10	35	5.00	

Global Site Class Definition: Substructures 1 through 4

N (bar): 19 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA, H < 0.1*H (Total)
s_u (bar): 4.18 (ksf) Soil Site Class C <----Controls

Illinois Department of Transportation

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE=====WO 18 - I-57 Over Louis Creek S.B. Bridge Structure

Substructure 1

Base of Substruct. Elev. (or ground surf for bents	679.3	ft.
Pile or Shaft Dia.	12	inches
Boring Number	3 (N Median)	
Top of Boring Elev.	684.57	ft.
Approximate Fixity Elev.	673.3	ft.

Individual Site Class Definition:

N (bar): 12 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 3.38 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	682.1	2.50	5	0.50	B
	679.6	2.50	11	3.50	B
	677.1	2.50	8	3.00	
	674.6	2.50	20	5.00	
1.2	672.1	2.50	13	4.80	
3.7	669.6	2.50	8	4.40	
6.2	667.1	2.50	7	2.40	
8.7	664.6	2.50	7	2.60	
11.2	662.1	2.50	8	2.80	
13.7	659.6	2.50	8	2.40	
16.2	657.1	2.50	7	2.60	
18.7	654.6	2.50	7	2.40	
21.2	652.1	2.50	11	3.40	
23.7	649.6	2.50	8	2.80	
26.2	647.1	2.50	8	2.80	
28.7	644.6	2.50	5	2.10	
31.2	642.1	2.50	15	3.80	
33.7	639.6	2.50	13	3.80	
36.2	637.1	2.50	18	4.80	
38.7	634.6	2.50	33	5.00	
100.0	573.3	61.30	21	4.50	

Substructure 2

Base of Substruct. Elev. (or ground surf for bents	665.8	ft.
Pile or Shaft Dia.	12	inches
Boring Number	3 (N Median)	
Top of Boring Elev.	665.8	ft.
Approximate Fixity Elev.	659.8	ft.

Individual Site Class Definition:

N (bar): 13 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 3.37 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	665.8	0.00			
	664.6	1.20	7	2.60	
	662.1	2.50	8	2.80	
0.2	659.6	2.50	8	2.40	
2.7	657.1	2.50	7	2.60	
5.2	654.6	2.50	7	2.40	
7.7	652.1	2.50	11	3.40	
10.2	649.6	2.50	8	2.80	
12.7	647.1	2.50	8	2.80	
15.2	644.6	2.50	5	2.10	
17.7	642.1	2.50	15	3.80	
20.2	639.6	2.50	13	3.80	
22.7	637.1	2.50	18	4.80	
25.2	634.6	2.50	33	5.00	
100.0	559.8	74.80	21	4.50	

Substructure 3

Base of Substruct. Elev. (or ground surf for bents	665.8	ft.
Pile or Shaft Dia.	12	inches
Boring Number	4 (Median)	
Top of Boring Elev.	665.8	ft.
Approximate Fixity Elev.	659.8	ft.

Individual Site Class Definition:

N (bar): 19 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 4.06 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	665.8	0.00			
	665.1	0.70	7	3.00	
	662.6	2.50	7	2.80	
	660.1	2.50	10	3.10	
2.2	657.6	2.50	9	2.80	
4.7	655.1	2.50	8	2.60	
7.2	652.6	2.50	10	2.80	
9.7	650.1	2.50	9	2.80	
12.2	647.6	2.50	10	3.00	B
14.7	645.1	2.50	4		B
17.2	642.6	2.50	9	3.20	
19.7	640.1	2.50	11	3.80	
22.2	637.6	2.50	15	4.00	
24.7	635.1	2.50	31	5.00	
29.7	630.1	5.00	42		
31.2	628.6	1.50	33	5.00	
100.0	559.8	68.80	35	5.00	

Substructure 4

Base of Substruct. Elev. (or ground surf for bents	679.5	ft.
Pile or Shaft Dia.	12	inches
Boring Number	4 (Median)	
Top of Boring Elev.	685.09	ft.
Approximate Fixity Elev.	673.5	ft.

Individual Site Class Definition:

N (bar): 16 (Blows/ft.) Soil Site Class D
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 3.69 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	685.1	0.00			
	682.6	2.50	7	0.50	
	680.6	2.00	14	3.50	B
	677.6	3.00	9	4.10	
	675.1	2.50	14	4.60	
0.9	672.6	2.50	11	4.10	
3.4	670.1	2.50	8	3.60	
5.9	667.6	2.50	8	3.40	
8.4	665.1	2.50	7	3.00	
10.9	662.6	2.50	7	2.80	
13.4	660.1	2.50	10	3.10	
15.9	657.6	2.50	9	2.80	
18.4	655.1	2.50	8	2.60	
20.9	652.6	2.50	10	2.80	
23.4	650.1	2.50	9	2.80	
25.9	647.6	2.50	10	3.00	B
28.4	645.1	2.50	4		B
30.9	642.6	2.50	9	3.20	
33.4	640.1	2.50	11	3.80	
35.9	637.6	2.50	15	4.00	
38.4	635.1	2.50	31	5.00	
43.4	630.1	5.00	42		
44.9	628.6	1.50	33	5.00	
101.0	572.5	56.10	35	5.00	

Global Site Class Definition: Substructures 1 through 4

N (bar): 15 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA, H < 0.1*H (Total)
s_u (bar): 3.62 (ksf) Soil Site Class C <----Controls

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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. The soil at critical depth of 10 feet below the abutments is very stiff to hard. The bottom abutment elevations are EL. 679.9 feet at the North Abutment (N.B.), EL. 680.2 feet at the South Abutment (N.B.), EL. 680.0 feet at the North Abutment (S.B.) and EL. 680.3 feet at the South Abutment (S.B.). Critical depth for integral abutment analysis is 10 feet below the bottom of the abutment elevations.

Abutment	Soil Strengths at Critical Depth	Recommendation
North Abutment (N.B.)	Qu or Qp between 3.5 and 5.1 tsf	Pre-core with bentonite
South Abutment (N.B.)	Qu between 3.6 and 4.6 tsf	Pre-core with bentonite
North Abutment (S.B.)	Qu or Qp between 3.0 and 5.1 tsf	Pre-core with bentonite
South Abutment (S.B.)	Qu or Qp between 3.0 and 5.1 tsf	Pre-core with bentonite

The 2023 Bridge Manual, Section 3.1.3 *General Notes*, Note 38, added a soil improvement technique of precoring holes for piles and backfilling with bentonite as a permissible option when the Qu exceeds 3.0 tsf. See the attached IDOT BBS 145 spreadsheets for in-situ Integral Abutment Feasibility Analysis.

Piles shall be driven through 24-inch diameter precored holes extending to elevation EL. 669.9 feet at the North Abutment (N.B.), EL. 670.2 feet at the South Abutment (N.B.), EL. 670.0 feet at the North Abutment (S.B.) and EL. 670.3 feet at the South Abutment (S.B.) according to Article 512.09(c) of the Standard Specifications except that the void space outside the pile shall be filled with bentonite according to the manufacturer's recommendations to achieve a Qu of 1.5 tsf. Cost included in driving piles.

The aforementioned procedure is to make integral abutments feasible. The bentonite inclusion reduces the soils pressures on the pile during expansion. Rubino has input a Qu of 1.5 tsf over the critical depth in the integral abutment spreadsheet. Rubino has also omitted the soil strength in the critical depth in the static pile spreadsheets (i.e. pile capacities).

Utilizing a Qu value of 1.5 tsf for both bentonite and embankment conditions, the results show integral abutments are applicable for Metal Shell Piles of 12 and 14-inch diameter. See attached Integral Abutment Feasibility Analysis spreadsheets.

Abutment Pile Discussion

Metal Shell Piles and H-Piles are both used for integral abutment applications. Metal shell piles are recommended over H-piles due to bedrock not being encountered. Tables of estimated pile lengths are attached. Conical tips are recommended for Metal Shell Piles given the very stiff, hard, and dense / very dense soils encountered in the borings. Rubino understands that the existing spread footing foundations will be removed in their entirety and properly backfilled. This procedure should be performed prior to pile installation. If Metal Shell Piles are the selected pile type, Rubino recommends a minimum of one test pile be conducted for each structure located at the substructure with the longest estimated pile length. This recommendation has been made in reference to the 2023 IDOT Bridge Manual Section 3.10.1.7.

Illinois Department of Transportation

Without Bentonite

INTEGRAL ABUTMENT FEASIBILITY ANALYSIS

Modified 10/30/17

GENERAL DATA

STRUCTURE NUMBER==========	SN 038-XXXX (NB)		TOTAL STRUCTURE LENGTH==========	80.50	FT
STRUCTURE TYPE ==========	MULTI-SPAN		NUMBER OF SPANS ==========	3	
STRUCTURE SKEW==========	10	DEGREES	END SPAN LENGTH ==========	27.50	FT
SUPER. DATA IN REFERENCE TO SUB. DATA ====	ABUT 1		ADJACENT INTERIOR SPAN LENGTH ==========	25.50	FT

SUPERSTRUCTURE DATA (END OR MAIN SPAN)

BEAM TYPE ==========	SLAB BRIDGE	
SLAB THICKNESS ==========	15.00	IN
SLAB F'C ==========	4.00	KSI

SUPERSTRUCTURE DATA (ADJACENT SPAN)

SLAB THICKNESS ==========	15.00	IN
SLAB F'C ==========	4.00	KSI

ABUTMENT #1 DATA

ABUTMENT NAME ==========	North Abutment	
ABUTMENT REFERENCE BORING ==========	1 (NE Quad.)	
BOTTOM OF ABUTMENT ELEVATION ==========	679.9	FT
ESTIMATED NUMBER OF PILES AT ABUT. =======	4	
PILE SPACING PERP. TO CL ==========	4	FT

ABUTMENT #2 DATA

ABUTMENT NAME ==========	South Abutment	
ABUTMENT REFERENCE BORING==========	4 (S Median)	
BOTTOM OF ABUTMENT ELEVATION==========	680.2	FT
ESTIMATED NUMBER OF PILES AT ABUT.=======	4	
PILE SPACING PERP. TO CL ==========	4	FT

ENTER ONLY Qu VALUE IF AVAILABLE, OTHERWISE ENTER N VALUE

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)*
677.40	2.50	3.5	8	2.3
674.90	2.50	5.1	17	2.8
672.40	2.50	5.1	17	2.8
669.90	2.50	4.6	10	2.4

10.00 FT = TOTAL DEPTH ENTERED

ENTER ONLY Qu VALUE IF AVAILABLE, OTHERWISE ENTER N VALUE

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)*
677.70	2.50	4.1	9	2.3
675.20	2.50	4.6	14	2.7
672.70	2.50	4.1	11	2.5
670.20	2.50	3.6	8	2.3

10.00 FT = TOTAL DEPTH ENTERED

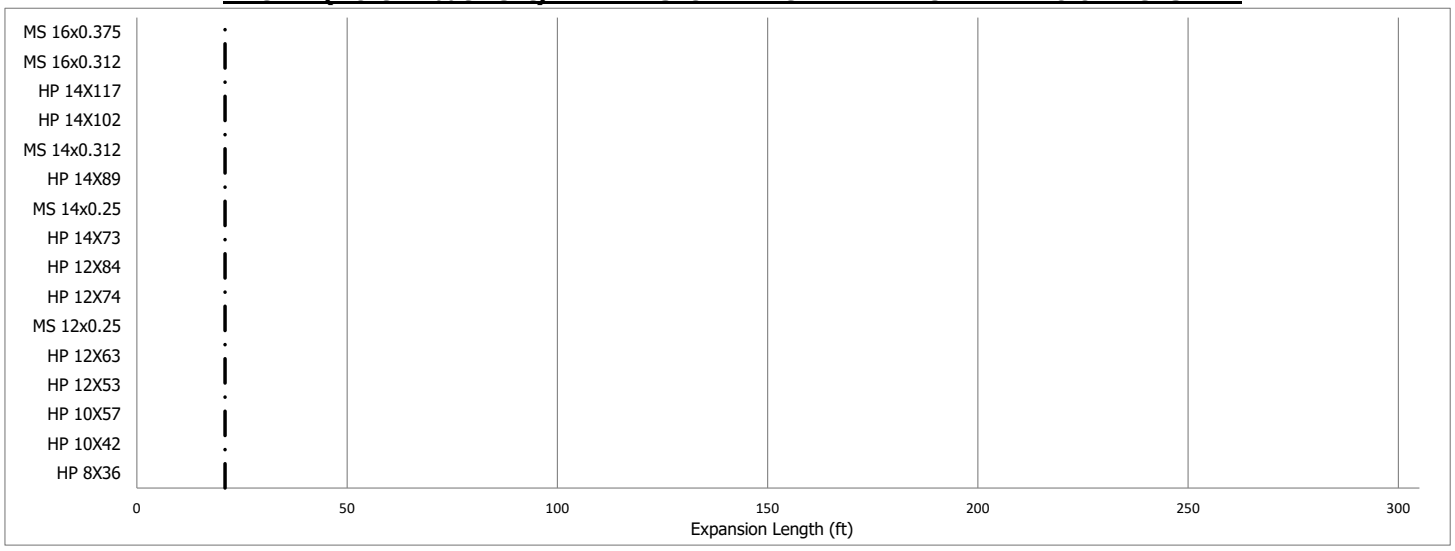
WEIGHTED AVERAGE Qu FOR ABUTMENT #1=======	4.58	TSF	WEIGHTED AVERAGE Qu FOR ABUTMENT #2=======	4.10	TSF
PILE STIFFNESS MODIFIER FOR ABUTMENT #1 = 1/(1.45-[0.3*4.58])==========	12.90		PILE STIFFNESS MODIFIER FOR ABUTMENT #2 = 1/(1.45-[0.3*4.1])==========	4.55	

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

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #1 = [12.9*4*0+4.55*4*80.5]/[12.9*4+4.55*4]========== ~~20.97~~ FT

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #2 = [4.55*4*0+12.9*4*80.5]/[4.55*4+12.9*4]========== ~~59.53~~ FT

ABUT 1 (North Abutment) - EXPANSION LENGTH LIMIT CHART - 10.0 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

Without Bentonite

INTEGRAL ABUTMENT FEASIBILITY ANALYSIS

Modified 10/30/17

GENERAL DATA

STRUCTURE NUMBER==========	SN 038-XXXX (SB)		TOTAL STRUCTURE LENGTH==========	80.50	FT
STRUCTURE TYPE ==========	MULTI-SPAN		NUMBER OF SPANS ==========	3	
STRUCTURE SKEW==========	10	DEGREES	END SPAN LENGTH ==========	27.50	FT
SUPER. DATA IN REFERENCE TO SUB. DATA ====	ABUT 1		ADJACENT INTERIOR SPAN LENGTH ==========	25.50	FT

SUPERSTRUCTURE DATA (END OR MAIN SPAN)

BEAM TYPE ==========	SLAB BRIDGE	
SLAB THICKNESS ==========	15.00	IN
SLAB F'C ==========	4.00	KSI

SUPERSTRUCTURE DATA (ADJACENT SPAN)

SLAB THICKNESS ==========	15.00	IN
SLAB F'C ==========	4.00	KSI

ABUTMENT #1 DATA

ABUTMENT NAME ==========	North Abutment	
ABUTMENT REFERENCE BORING ==========	3 (N Median)	
BOTTOM OF ABUTMENT ELEVATION ==========	680	FT
ESTIMATED NUMBER OF PILES AT ABUT. =======	4	
PILE SPACING PERP. TO CL ==========	4	FT

ABUTMENT #2 DATA

ABUTMENT NAME ==========	South Abutment	
ABUTMENT REFERENCE BORING==========	2 (SW Quad.)	
BOTTOM OF ABUTMENT ELEVATION==========	680.3	FT
ESTIMATED NUMBER OF PILES AT ABUT.=======	4	
PILE SPACING PERP. TO CL ==========	4	FT

ENTER ONLY Qu VALUE IF AVAILABLE, OTHERWISE ENTER N VALUE

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)*
677.50	2.50	3.0	8	2.3
675.00	2.50	5.1	20	2.9
672.50	2.50	4.8	13	2.6
670.00	2.50	4.4	8	2.3

10.00 FT = TOTAL DEPTH ENTERED

ENTER ONLY Qu VALUE IF AVAILABLE, OTHERWISE ENTER N VALUE

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)*
677.80	2.50	3.0	8	2.3
675.30	2.50	5.1	20	2.9
672.80	2.50	4.9	13	2.6
670.30	2.50	3.2	9	2.3

10.00 FT = TOTAL DEPTH ENTERED

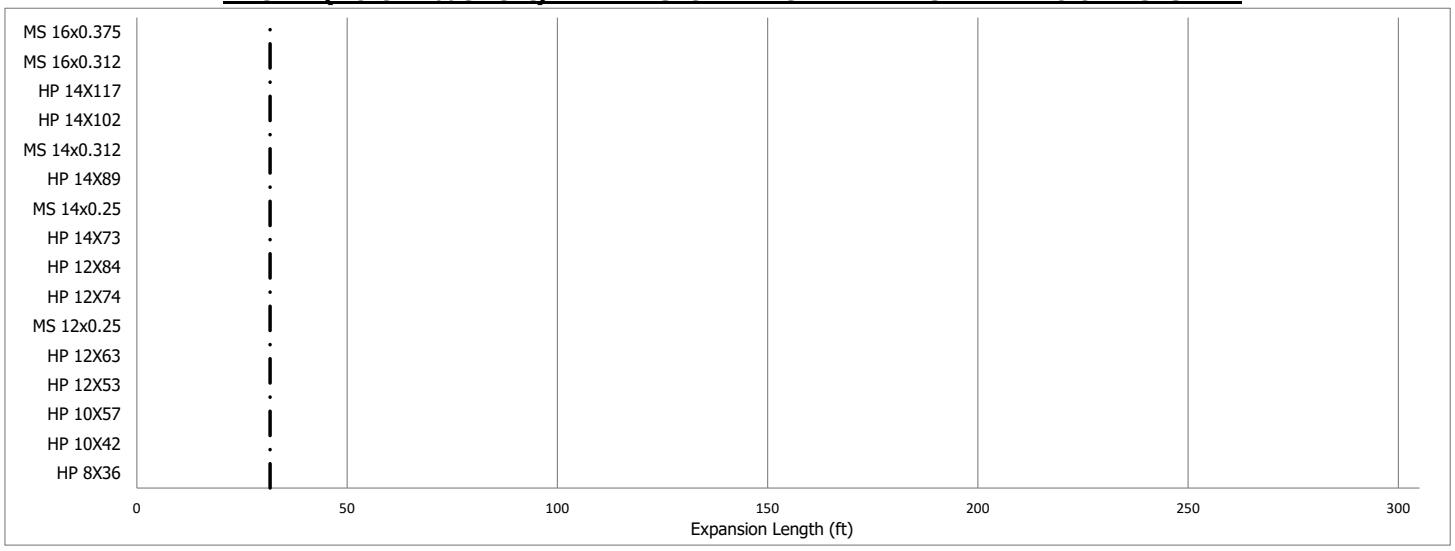
WEIGHTED AVERAGE Qu FOR ABUTMENT #1=======	4.33	TSF	WEIGHTED AVERAGE Qu FOR ABUTMENT #2=======	4.05	TSF
PILE STIFFNESS MODIFIER FOR ABUTMENT #1 = 1/(1.45-[0.3*4.33])==========	6.56		PILE STIFFNESS MODIFIER FOR ABUTMENT #2 = 1/(1.45-[0.3*4.05])==========	4.26	

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

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #1 = [6.56*4*0+4.26*4*80.5]/[6.56*4+4.26*4]========== ~~31.68~~ FT

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #2 = [4.26*4*0+6.56*4*80.5]/[4.26*4+6.56*4]========== ~~48.82~~ FT

ABUT 1 (North Abutment) - EXPANSION LENGTH LIMIT CHART - 10.0 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

With Bentonite

INTEGRAL ABUTMENT FEASIBILITY ANALYSIS

Modified 10/30/17

GENERAL DATA

STRUCTURE NUMBER==========	SN 038-XXXX (N.B.)		TOTAL STRUCTURE LENGTH==========	80.50	FT
STRUCTURE TYPE ==========	MULTI-SPAN		NUMBER OF SPANS ==========	3	
STRUCTURE SKEW==========	10	DEGREES	END SPAN LENGTH ==========	27.50	FT
SUPER. DATA IN REFERENCE TO SUB. DATA ====	ABUT 1		ADJACENT INTERIOR SPAN LENGTH ==========	25.50	FT

SUPERSTRUCTURE DATA (END OR MAIN SPAN)

BEAM TYPE ==========	SLAB BRIDGE	
SLAB THICKNESS ==========	15.00	IN
SLAB F'C ==========	4.00	KSI

SUPERSTRUCTURE DATA (ADJACENT SPAN)

SLAB THICKNESS ==========	15.00	IN
SLAB F'C ==========	4.00	KSI

ABUTMENT #1 DATA

ABUTMENT NAME ==========	North Abutment	
ABUTMENT REFERENCE BORING ==========	1 (NE Quad.)	
BOTTOM OF ABUTMENT ELEVATION ==========	679.9	FT
ESTIMATED NUMBER OF PILES AT ABUT. =======	4	
PILE SPACING PERP. TO CL ==========	4	FT

ABUTMENT #2 DATA

ABUTMENT NAME ==========	South Abutment	
ABUTMENT REFERENCE BORING==========	4 (S Median)	
BOTTOM OF ABUTMENT ELEVATION==========	680.2	FT
ESTIMATED NUMBER OF PILES AT ABUT.=======	4	
PILE SPACING PERP. TO CL ==========	4	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)*
677.40	2.50	1.5		
674.90	2.50	1.5		
672.40	2.50	1.5		
669.90	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)*
677.70	2.50	1.5		
675.20	2.50	1.5		
672.70	2.50	1.5		
670.20	2.50	1.5		

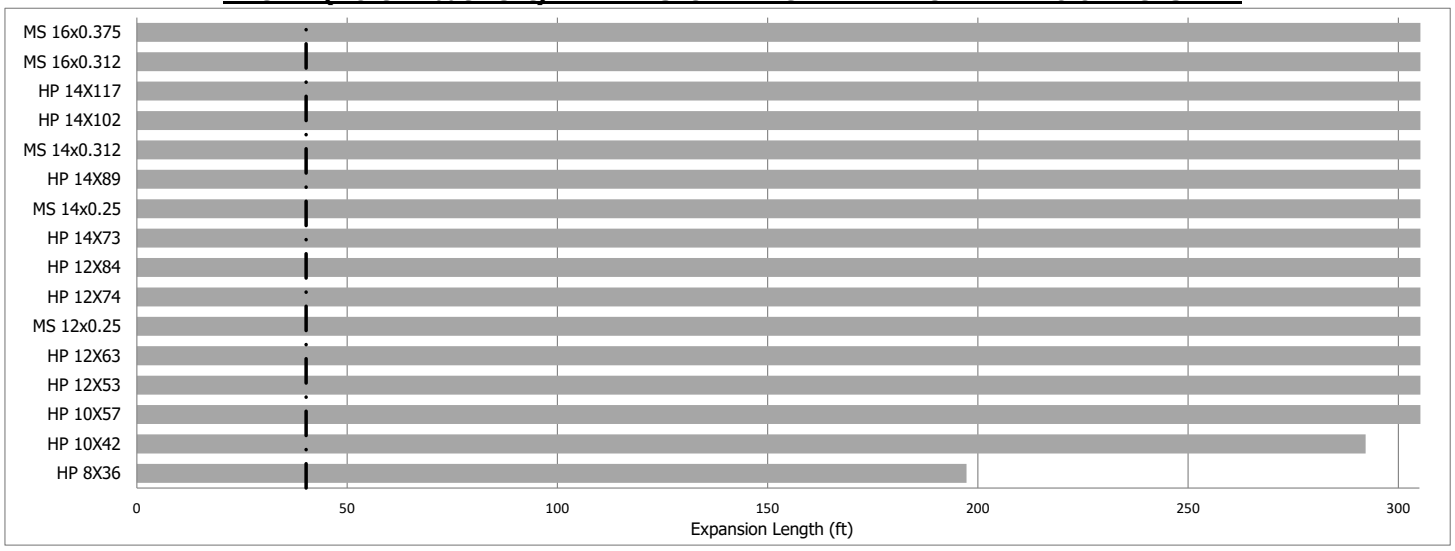
10.00 FT = TOTAL DEPTH ENTERED

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*4*0+1*4*80.5]/[1*4+1*4]========== 40.25 FT

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #2 = [1*4*0+1*4*80.5]/[1*4+1*4]========== 40.25 FT

ABUT 1 (North Abutment) - EXPANSION LENGTH LIMIT CHART - 10.0 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

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INTEGRAL ABUTMENT FEASIBILITY ANALYSIS

Modified 10/30/17

GENERAL DATA

STRUCTURE NUMBER==========	SN 038-XXXX (S.B.)		TOTAL STRUCTURE LENGTH==========	80.50	FT
STRUCTURE TYPE ==========	MULTI-SPAN		NUMBER OF SPANS ==========	3	
STRUCTURE SKEW==========	10	DEGREES	END SPAN LENGTH ==========	27.50	FT
SUPER. DATA IN REFERENCE TO SUB. DATA ====	ABUT 1		ADJACENT INTERIOR SPAN LENGTH ==========	25.50	FT

SUPERSTRUCTURE DATA (END OR MAIN SPAN)

BEAM TYPE ==========	SLAB BRIDGE	
SLAB THICKNESS ==========	15.00	IN
SLAB F'C ==========	4.00	KSI

SUPERSTRUCTURE DATA (ADJACENT SPAN)

SLAB THICKNESS ==========	15.00	IN
SLAB F'C ==========	4.00	KSI

ABUTMENT #1 DATA

ABUTMENT NAME ==========	North Abutment	
ABUTMENT REFERENCE BORING ==========	3 (N Median)	
BOTTOM OF ABUTMENT ELEVATION ==========	680	FT
ESTIMATED NUMBER OF PILES AT ABUT. =======	4	
PILE SPACING PERP. TO CL ==========	4	FT

ABUTMENT #2 DATA

ABUTMENT NAME ==========	South Abutment	
ABUTMENT REFERENCE BORING==========	2 (SW Quad)	
BOTTOM OF ABUTMENT ELEVATION==========	680.3	FT
ESTIMATED NUMBER OF PILES AT ABUT.=======	4	
PILE SPACING PERP. TO CL ==========	4	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)*
677.50	2.50	1.5		
675.00	2.50	1.5		
672.50	2.50	1.5		
670.00	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)*
677.80	2.50	1.5		
675.30	2.50	1.5		
672.80	2.50	1.5		
670.30	2.50	1.5		

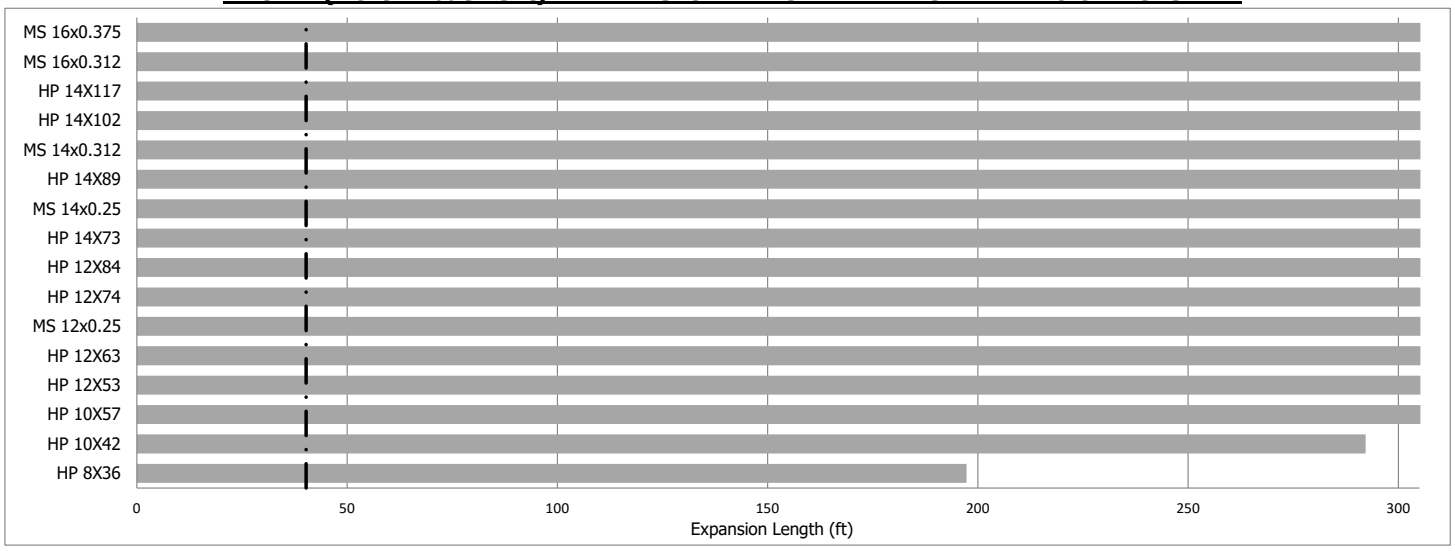
10.00 FT = TOTAL DEPTH ENTERED

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*4*0+1*4*80.5]/[1*4+1*4]========== 40.25 FT

DISTANCE TO CENTROID OF STIFFNESS FROM ABUTMENT #2 = [1*4*0+1*4*80.5]/[1*4+1*4]========== 40.25 FT

ABUT 1 (North Abutment) - EXPANSION LENGTH LIMIT CHART - 10.0 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.)*

North Abutment (N.B.) Pile Design Table - Boring 01 (NE Quad)

Strength I Load of 630 kips per Abutment / 4 Piles

Pile Type and Size	Nominal Required Bearing R_N (kips)	Factored Resistance Available R_F (kips)	Estimated Driveable Pile Length (feet)
Metal Shell 12"Φ w/.25" walls	226	124	35
	245	135	38
	263	145	40
	296	163	43
	316	174	45
	392*	216*	49
Metal Shell 14"Φ w/0.25" walls	271	149	35
	292	160	38
	312	172	40
	354	195	43
	375	207	45
	459*	252*	49
Metal Shell 14"Φ w/0.312" walls	271	149	35
	292	160	38
	312	172	40
	354	195	43
	375	207	45
	570*	314*	49

*Maximum Nominal Required Bearing of the Pile

Pile Cutoff Elevation of EL. 681.9 feet

Piles shall be driven through 24" diameter precored holes extending to elevation EL. 669.9 feet according to Article 512.09(c) of the Standard Specifications except that the void space outside the pile shall be filled with bentonite according to the manufacturer's recommendations to achieve a Qu of 1.5 tsf. Cost included in driving piles (IDOT Bridge Manual (January 2023) Section 3.1.3 *General Notes*, Note 38).

Since the pile installations will be pre-cored 10 feet and filled with bentonite, the pile capacities were calculated based on the ground surface at EL. 669.9 feet

Pier 1 (N.B.) Pile Design Table - Boring 01 (NE Quad)

Strength I Load of 940 kips per Pier / 5 Piles

Pile Type and Size	Nominal Required Bearing R_N (kips)	Factored Resistance Available R_F (kips)	Estimated Driveable Pile Length (feet)
Metal Shell 12"Φ w/.25" walls	207	87	38
	225	97	40
	259	116	43
	278	126	45
	308	143	48
	392*	188*	50
Metal Shell 14"Φ w/0.25" walls	248	105	38
	268	116	40
	310	139	43
	332	151	45
	368	171	48
	459*	221*	50
Metal Shell 14"Φ w/0.312" walls	268	116	40
	310	139	43
	332	151	45
	368	171	48
	545	269	49
	570*	282*	50

*Maximum Nominal Required Bearing of the Pile

Pile Cutoff Elevation of EL. 682.0 feet

The pile capacities were calculated based on a Design Scour elevation of EL. 658.8 feet

South Abutment (S.B.) Pile Design Table - Boring 02 (SW Quad)

Strength I Load of 630 kips per Abutment / 4 Piles

Pile Type and Size	Nominal Required Bearing R_N (kips)	Factored Resistance Available R_F (kips)	Estimated Driveable Pile Length (feet)
Metal Shell 12"Φ w/.25" walls	196	108	37
	221	122	40
	251	138	42
	275	151	45
	322	177	47
	392*	216*	48
Metal Shell 14"Φ w/0.25" walls	233	128	37
	264	145	40
	301	166	42
	328	181	45
	388	213	47
	459*	252*	48
Metal Shell 14"Φ w/0.312" walls	233	128	37
	264	145	40
	301	166	42
	328	181	45
	388	213	47
	570*	314*	49

*Maximum Nominal Required Bearing of the Pile

Pile Cutoff Elevation of EL. 682.3 feet

Piles shall be driven through 24" diameter precored holes extending to elevation EL. 669.9 feet according to Article 512.09(c) of the Standard Specifications except that the void space outside the pile shall be filled with bentonite according to the manufacturer's recommendations to achieve a Qu of 1.5 tsf. Cost included in driving piles (IDOT Bridge Manual (January 2023) Section 3.1.3 *General Notes*, Note 38).

Since the pile installations will be pre-cored 10 feet and filled with bentonite, the pile capacities were calculated based on the ground surface at EL. 670.3 feet

Pier 2 (S.B.) Pile Design Table - Boring 02 (SW Quad)

Strength I Load of 940 kips per Pier / 5 Piles

Pile Type and Size	Nominal Required Bearing R_N (kips)	Factored Resistance Available R_F (kips)	Estimated Driveable Pile Length (feet)
Metal Shell 12"Φ w/.25" walls	140	58	34
	157	67	37
	183	82	39
	213	98	42
	236	111	49
	392*	196*	50
Metal Shell 14"Φ w/0.25" walls	168	70	34
	188	81	37
	219	98	39
	256	119	42
	276	129	49
	459*	230*	50
Metal Shell 14"Φ w/0.312" walls	168	70	34
	188	81	37
	219	98	39
	256	119	42
	276	129	49
	570*	291*	50

*Maximum Nominal Required Bearing of the Pile

Pile Cutoff Elevation of EL. 682.0 feet

The pile capacities were calculated based on a Design Scour elevation of EL. 658.8 feet

North Abutment (S.B.) Pile Design Table - Boring 03 (N Median)

Strength I Load of 630 kips per Abutment / 4 Piles

Pile Type and Size	Nominal Required Bearing R_N (kips)	Factored Resistance Available R_F (kips)	Estimated Driveable Pile Length (feet)
Metal Shell 12"Φ w/.25" walls	207	114	37
	229	126	40
	260	143	42
	367	202	45
	379	209	47
	392*	216*	48
Metal Shell 14"Φ w/0.25" walls	210	116	35
	248	136	37
	274	151	40
	312	171	42
	452	248	45
	459*	252*	46
Metal Shell 14"Φ w/0.312" walls	210	116	35
	248	136	37
	274	151	40
	312	171	42
	452	248	45
	467	257	47
	570*	314*	48

*Maximum Nominal Required Bearing of the Pile

Pile Cutoff Elevation of EL. 682.0 feet

Piles shall be driven through 24" diameter precored holes extending to elevation EL. 669.9 feet according to Article 512.09(c) of the Standard Specifications except that the void space outside the pile shall be filled with bentonite according to the manufacturer's recommendations to achieve a Qu of 1.5 tsf. Cost included in driving piles (IDOT Bridge Manual (January 2023) Section 3.1.3 *General Notes*, Note 38).

Since the pile installations will be pre-cored 10 feet and filled with bentonite, the pile capacities were calculated based on the ground surface at EL. 670.0 feet

Pier 1 (S.B.) Pile Design Table - Boring 03 (N Median)

Strength I Load of 940 kips per Pier / 5 Piles

Pile Type and Size	Nominal Required Bearing R_N (kips)	Factored Resistance Available R_F (kips)	Estimated Driveable Pile Length (feet)
Metal Shell 12"Φ w/.25" walls	179	75	37
	202	88	40
	233	105	42
	339	163	45
	352	170	47
	392*	192*	48
Metal Shell 14"Φ w/0.25" walls	215	91	37
	242	106	40
	279	127	42
	420	204	45
	435	212	47
	459*	225*	48
Metal Shell 14"Φ w/0.312" walls	215	91	37
	242	106	40
	279	127	42
	420	204	45
	435	212	47
	570*	286*	49

*Maximum Nominal Required Bearing of the Pile

Pile Cutoff Elevation of EL. 682.0 feet

The pile capacities were calculated based on a Design Scour elevation of EL. 658.8 feet

South Abutment (N.B.) Pile Design Table - Boring 04 (S Median)

Strength I Load of 630 kips per Abutment / 4 Piles

Pile Type and Size	Nominal Required Bearing R_N (kips)	Factored Resistance Available R_F (kips)	Estimated Driveable Pile Length (feet)
Metal Shell 12"Φ w/.25" walls	182	100	35
	197	108	37
	222	122	40
	246	135	42
	350	192	45
	392*	216*	46
Metal Shell 14"Φ w/0.25" walls	215	118	35
	235	129	37
	265	146	40
	294	162	42
	430	237	45
	459*	252*	46
Metal Shell 14"Φ w/0.312" walls	215	118	35
	235	129	37
	265	146	40
	294	162	42
	430	237	45
	570*	314*	47

*Maximum Nominal Required Bearing of the Pile

Pile Cutoff Elevation of EL. 682.2 feet

Piles shall be driven through 24" diameter precored holes extending to elevation EL. 669.9 feet according to Article 512.09(c) of the Standard Specifications except that the void space outside the pile shall be filled with bentonite according to the manufacturer's recommendations to achieve a Qu of 1.5 tsf. Cost included in driving piles (IDOT Bridge Manual (January 2023) Section 3.1.3 *General Notes*, Note 38).

Since the pile installations will be pre-cored 10 feet and filled with bentonite, the pile capacities were calculated based on the ground surface at EL. 670.2 feet

Pier 2 (N.B.) Pile Design Table - Boring 04 (S Median)

Strength I Load of 940 kips per Pier / 5 Piles

Pile Type and Size	Nominal Required Bearing R_N (kips)	Factored Resistance Available R_F (kips)	Estimated Driveable Pile Length (feet)
Metal Shell 12"Φ w/.25" walls	147	57	34
	162	66	37
	187	79	39
	211	93	42
	315	150	44
	392*	192*	46
Metal Shell 14"Φ w/0.25" walls	194	80	37
	224	96	39
	253	112	42
	390	187	44
	459*	225*	46
Metal Shell 14"Φ w/0.312" walls	194	80	37
	224	96	39
	253	112	42
	390	187	44
	538	269	47
	570*	286*	48

*Maximum Nominal Required Bearing of the Pile

Pile Cutoff Elevation of EL. 682.0 feet

The pile capacities were calculated based on a Design Scour elevation of EL. 658.8 feet

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== North Abutment (N.B.)
REFERENCE BORING ========== 1 (NE Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 681.90 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 669.90 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 679.90 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

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

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
392 KIPS	**316** KIPS	**174** KIPS	**45** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.60	2.30	3.90	9		21.0		***52.0***				52	0	0	29	14
664.40	3.20	3.60	8		27.5	31.0	***76.1***				76	0	0	42	18
661.90	2.50	3.20	7		19.7	27.6	***92.4***				92	0	0	51	20
659.40	2.50	2.80	7		17.9	24.1	***110.3***				110	0	0	61	23
656.90	2.50	2.80	8		17.9	24.1	***130.8***				131	0	0	72	25
654.40	2.50	3.10	8		19.3	26.7	***156.1***				156	0	0	86	28
651.90	2.50	3.80	10		22.4	32.7	***178.5***				178	0	0	98	30
649.40	2.50	3.80	10		22.4	32.7	***199.2***				199	0	0	110	33
646.90	2.50	3.60	10		21.5	31.0	***225.8***				226	0	0	124	35
644.40	2.50	4.20	18		24.2	36.2	***244.9***				245	0	0	135	38
641.90	2.50	3.60	14		21.5	31.0	***262.9***				263	0	0	145	40
639.40	2.50	3.20	14		19.7	27.6	***296.4***				296	0	0	163	43
636.90	2.50	4.80	20		25.6	41.4	***316.0***				316	0	0	174	45
633.40	3.50	4.10	16		33.3	35.3	***477.1***				~~477~~	~~*0*~~	~~*0*~~	~~*262*~~	~~*49*~~
631.90	1.50		33	Sandy Gravel	22.7	163.2	***588.8***				~~589~~	~~*0*~~	~~*0*~~	~~*324*~~	~~*50*~~
629.40	2.50		51	Sandy Gravel	96.4	252.1	***548.0***				~~548~~	~~*0*~~	~~*0*~~	~~*301*~~	~~*53*~~
627.90	1.50		31	Hard Till	8.0	115.0	***441.0***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== North Abutment (N.B.)
REFERENCE BORING ========== 1 (NE Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 681.90 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 669.90 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 679.90 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.25" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
459 KIPS	**375** KIPS	**207** KIPS	**45** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.60	2.30	3.90	9		24.5		***66.7***				67	0	0	37	14
664.40	3.20	3.60	8		32.1	42.2	***94.2***				94	0	0	52	18
661.90	2.50	3.20	7		23.0	37.5	***112.5***				112	0	0	62	20
659.40	2.50	2.80	7		20.9	32.8	***133.4***				133	0	0	73	23
656.90	2.50	2.80	8		20.9	32.8	***157.8***				158	0	0	87	25
654.40	2.50	3.10	8		22.5	36.3	***188.5***				188	0	0	104	28
651.90	2.50	3.80	10		26.1	44.6	***214.6***				215	0	0	118	30
649.40	2.50	3.80	10		26.1	44.6	***238.4***				238	0	0	131	33
646.90	2.50	3.60	10		25.1	42.2	***270.5***				271	0	0	149	35
644.40	2.50	4.20	18		28.2	49.2	***291.7***				292	0	0	160	38
641.90	2.50	3.60	14		25.1	42.2	***312.1***				312	0	0	172	40
639.40	2.50	3.20	14		23.0	37.5	***353.9***				354	0	0	195	43
636.90	2.50	4.80	20		29.8	56.3	***375.5***				375	0	0	207	45
633.40	3.50	4.10	16		38.8	48.1	***588.3***				~~588~~	~~*0*~~	~~*0*~~	~~*324*~~	~~*49*~~
631.90	1.50		33	Sandy Gravel	26.5	222.1	***735.9***				~~736~~	~~*0*~~	~~*0*~~	~~*405*~~	~~*50*~~
629.40	2.50		51	Sandy Gravel	112.5	343.2	***661.7***				~~662~~	~~*0*~~	~~*0*~~	~~*364*~~	~~*53*~~
627.90	1.50		31	Hard Till	9.4	156.5	***514.6***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== North Abutment (N.B.)
REFERENCE BORING ========== 1 (NE Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 681.90 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 669.90 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 679.90 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**375** KIPS	**207** KIPS	**45** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.60	2.30	3.90	9		24.5		***66.7***				67	0	0	37	14
664.40	3.20	3.60	8		32.1	42.2	***94.2***				94	0	0	52	18
661.90	2.50	3.20	7		23.0	37.5	***112.5***				112	0	0	62	20
659.40	2.50	2.80	7		20.9	32.8	***133.4***				133	0	0	73	23
656.90	2.50	2.80	8		20.9	32.8	***157.8***				158	0	0	87	25
654.40	2.50	3.10	8		22.5	36.3	***188.5***				188	0	0	104	28
651.90	2.50	3.80	10		26.1	44.6	***214.6***				215	0	0	118	30
649.40	2.50	3.80	10		26.1	44.6	***238.4***				238	0	0	131	33
646.90	2.50	3.60	10		25.1	42.2	***270.5***				271	0	0	149	35
644.40	2.50	4.20	18		28.2	49.2	***291.7***				292	0	0	160	38
641.90	2.50	3.60	14		25.1	42.2	***312.1***				312	0	0	172	40
639.40	2.50	3.20	14		23.0	37.5	***353.9***				354	0	0	195	43
636.90	2.50	4.80	20		29.8	56.3	***375.5***				375	0	0	207	45
633.40	3.50	4.10	16		38.8	48.1	***588.3***				~~588~~	~~*0*~~	~~*0*~~	~~*324*~~	~~*49*~~
631.90	1.50		33	Sandy Gravel	26.5	222.1	***735.9***				~~736~~	~~*0*~~	~~*0*~~	~~*405*~~	~~*50*~~
629.40	2.50		51	Sandy Gravel	112.5	343.2	***661.7***				~~662~~	~~*0*~~	~~*0*~~	~~*364*~~	~~*53*~~
627.90	1.50		31	Hard Till	9.4	156.5	***514.6***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== South Abutment (S.B.)
REFERENCE BORING ========== 2 (SW Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.30 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 670.30 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 680.30 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

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

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
392 KIPS	**322** KIPS	**177** KIPS	**47** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.80	2.50	3.80	9		22.4		***48.3***				48	0	0	27	15
665.30	2.50	3.00	7		18.8	25.8	***59.3***				59	0	0	33	17
662.80	2.50	2.10	6		14.8	18.1	***78.4***				78	0	0	43	20
660.30	2.50	2.60	8		17.0	22.4	***97.1***				97	0	0	53	22
657.80	2.50	2.80	10		17.9	24.1	***113.3***				113	0	0	62	25
655.30	2.50	2.60	9		17.0	22.4	***123.4***				123	0	0	68	27
652.80	2.50	1.80	6		13.4	15.5	***143.7***				144	0	0	79	30
650.30	2.50	2.60	9		17.0	22.4	***162.4***				162	0	0	89	32
647.80	2.50	2.80	10		17.9	24.1	***178.6***				179	0	0	98	35
645.30	2.50	2.60	10		17.0	22.4	***195.6***				196	0	0	108	37
642.80	2.50	2.60	9		17.0	22.4	***221.2***				221	0	0	122	40
640.30	2.50	3.60	14		21.5	31.0	***251.3***				251	0	0	138	42
637.80	2.50	4.60	18		25.6	39.6	***275.2***				275	0	0	151	45
635.80	2.00	4.40	17		20.1	37.9	***321.6***				322	0	0	177	47
633.30	2.50		13	Sandy Gravel	12.1	64.3	***496.8***				~~497~~	~~0~~	~~0~~	~~273~~	~~49~~
630.80	2.50		46	Sandy Gravel	77.9	227.4	***721.8***				~~722~~	~~0~~	~~0~~	~~397~~	~~52~~
628.80	2.00		101	Hard Till	69.7	374.5	***417.0***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== South Abutment (S.B.)
REFERENCE BORING ========== 2 (SW Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.30 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 670.30 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 680.30 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.25" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
459 KIPS	**388** KIPS	**213** KIPS	**47** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.80	2.50	3.80	9		26.1		***61.3***				61	0	0	34	15
665.30	2.50	3.00	7		21.9	35.2	***72.7***				73	0	0	40	17
662.80	2.50	2.10	6		17.2	24.6	***95.8***				96	0	0	53	20
660.30	2.50	2.60	8		19.8	30.5	***118.0***				118	0	0	65	22
657.80	2.50	2.80	10		20.9	32.8	***136.5***				137	0	0	75	25
655.30	2.50	2.60	9		19.8	30.5	***147.0***				147	0	0	81	27
652.80	2.50	1.80	6		15.6	21.1	***172.0***				172	0	0	95	30
650.30	2.50	2.60	9		19.8	30.5	***194.2***				194	0	0	107	32
647.80	2.50	2.80	10		20.9	32.8	***212.7***				213	0	0	117	35
645.30	2.50	2.60	10		19.8	30.5	***232.6***				233	0	0	128	37
642.80	2.50	2.60	9		19.8	30.5	***264.1***				264	0	0	145	40
640.30	2.50	3.60	14		25.1	42.2	***300.9***				301	0	0	166	42
637.80	2.50	4.60	18		29.8	53.9	***328.4***				328	0	0	181	45
635.80	2.00	4.40	17		23.4	51.6	***387.7***				388	0	0	213	47
633.30	2.50		13	Sandy Gravel	14.1	87.5	***623.9***				~~624~~	~~*0*~~	~~*0*~~	~~*343*~~	~~*49*~~
630.80	2.50		46	Sandy Gravel	90.8	309.6	***914.9***				~~915~~	~~*0*~~	~~*0*~~	~~*503*~~	~~*52*~~
628.80	2.00		101	Hard Till	81.4	509.7	***486.5***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== South Abutment (S.B.)
REFERENCE BORING ========== 2 (SW Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.30 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 670.30 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 680.30 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**388** KIPS	**213** KIPS	**47** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.80	2.50	3.80	9		26.1		***61.3***				61	0	0	34	15
665.30	2.50	3.00	7		21.9	35.2	***72.7***				73	0	0	40	17
662.80	2.50	2.10	6		17.2	24.6	***95.8***				96	0	0	53	20
660.30	2.50	2.60	8		19.8	30.5	***118.0***				118	0	0	65	22
657.80	2.50	2.80	10		20.9	32.8	***136.5***				137	0	0	75	25
655.30	2.50	2.60	9		19.8	30.5	***147.0***				147	0	0	81	27
652.80	2.50	1.80	6		15.6	21.1	***172.0***				172	0	0	95	30
650.30	2.50	2.60	9		19.8	30.5	***194.2***				194	0	0	107	32
647.80	2.50	2.80	10		20.9	32.8	***212.7***				213	0	0	117	35
645.30	2.50	2.60	10		19.8	30.5	***232.6***				233	0	0	128	37
642.80	2.50	2.60	9		19.8	30.5	***264.1***				264	0	0	145	40
640.30	2.50	3.60	14		25.1	42.2	***300.9***				301	0	0	166	42
637.80	2.50	4.60	18		29.8	53.9	***328.4***				328	0	0	181	45
635.80	2.00	4.40	17		23.4	51.6	***387.7***				388	0	0	213	47
633.30	2.50		13	Sandy Gravel	14.1	87.5	***623.9***				~~624~~	~~*0*~~	~~*0*~~	~~*343*~~	~~*49*~~
630.80	2.50		46	Sandy Gravel	90.8	309.6	***914.9***				~~915~~	~~*0*~~	~~*0*~~	~~*503*~~	~~*52*~~
628.80	2.00		101	Hard Till	81.4	509.7	***486.5***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== North Abutment (S.B.)
REFERENCE BORING ========== 3 (N Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 670.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 680.00 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

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

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
392 KIPS	**379** KIPS	**209** KIPS	**47** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.10	2.90	2.40	7		18.7		***41.1***				41	0	0	23	15
664.60	2.50	2.60	7		17.0	22.4	***59.8***				60	0	0	33	17
662.10	2.50	2.80	8		17.9	24.1	***74.3***				74	0	0	41	20
659.60	2.50	2.40	8		16.1	20.7	***92.1***				92	0	0	51	22
657.10	2.50	2.60	7		17.0	22.4	***107.4***				107	0	0	59	25
654.60	2.50	2.40	7		16.1	20.7	***132.1***				132	0	0	73	27
652.10	2.50	3.40	11		20.6	29.3	***147.6***				148	0	0	81	30
649.60	2.50	2.80	8		17.9	24.1	***165.5***				165	0	0	91	32
647.10	2.50	2.80	8		17.9	24.1	***177.3***				177	0	0	98	35
644.60	2.50	2.10	5		14.8	18.1	***206.8***				207	0	0	114	37
642.10	2.50	3.80	15		22.4	32.7	***229.2***				229	0	0	126	40
639.60	2.50	3.80	13		22.4	32.7	***260.2***				260	0	0	143	42
637.10	2.50	4.80	18		25.6	41.4	***366.8***				367	0	0	202	45
635.10	2.00		33	Hard Till	11.5	122.4	***379.5***				379	0	0	209	47
632.60	2.50		25	Sandy Gravel	23.9	123.6	***507.2***				~~507~~	~~*0*~~	~~*0*~~	~~*279*~~	~~*49*~~
630.10	2.50		46	Sandy Gravel	77.9	227.4	***561.6***				~~562~~	~~*0*~~	~~*0*~~	~~*309*~~	~~*52*~~
627.90	2.20		55	Hard Till	25.9	203.9	***383.5***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== North Abutment (S.B.)
REFERENCE BORING ========== 3 (N Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 670.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 680.00 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.25" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
459 KIPS	**452** KIPS	**248** KIPS	**45** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.10	2.90	2.40	7		21.8		***52.3***				52	0	0	29	15
664.60	2.50	2.60	7		19.8	30.5	***74.5***				74	0	0	41	17
662.10	2.50	2.80	8		20.9	32.8	***90.7***				91	0	0	50	20
659.60	2.50	2.40	8		18.8	28.1	***111.8***				112	0	0	62	22
657.10	2.50	2.60	7		19.8	30.5	***129.3***				129	0	0	71	25
654.60	2.50	2.40	7		18.8	28.1	***159.8***				160	0	0	88	27
652.10	2.50	3.40	11		24.0	39.9	***176.8***				177	0	0	97	30
649.60	2.50	2.80	8		20.9	32.8	***197.7***				198	0	0	109	32
647.10	2.50	2.80	8		20.9	32.8	***210.4***				210	0	0	116	35
644.60	2.50	2.10	5		17.2	24.6	***247.6***				248	0	0	136	37
642.10	2.50	3.80	15		26.1	44.6	***273.7***				274	0	0	151	40
639.60	2.50	3.80	13		26.1	44.6	***311.6***				312	0	0	171	42
637.10	2.50	4.80	18		29.8	56.3	***451.7***				452	0	0	248	45
635.10	2.00		33	Hard Till	13.4	166.6	***466.7***				~~467~~	~~0~~	~~0~~	~~257~~	~~47~~
632.60	2.50		25	Sandy Gravel	27.9	168.2	***635.9***				~~636~~	~~0~~	~~0~~	~~350~~	~~49~~
630.10	2.50		46	Sandy Gravel	90.8	309.6	***694.8***				~~695~~	~~0~~	~~0~~	~~382~~	~~52~~
627.90	2.20		55	Hard Till	30.2	277.6	***447.4***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== North Abutment (S.B.)
REFERENCE BORING ========== 3 (N Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 670.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 680.00 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**467** KIPS	**257** KIPS	**47** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.10	2.90	2.40	7		21.8		***52.3***				52	0	0	29	15
664.60	2.50	2.60	7		19.8	30.5	***74.5***				74	0	0	41	17
662.10	2.50	2.80	8		20.9	32.8	***90.7***				91	0	0	50	20
659.60	2.50	2.40	8		18.8	28.1	***111.8***				112	0	0	62	22
657.10	2.50	2.60	7		19.8	30.5	***129.3***				129	0	0	71	25
654.60	2.50	2.40	7		18.8	28.1	***159.8***				160	0	0	88	27
652.10	2.50	3.40	11		24.0	39.9	***176.8***				177	0	0	97	30
649.60	2.50	2.80	8		20.9	32.8	***197.7***				198	0	0	109	32
647.10	2.50	2.80	8		20.9	32.8	***210.4***				210	0	0	116	35
644.60	2.50	2.10	5		17.2	24.6	***247.6***				248	0	0	136	37
642.10	2.50	3.80	15		26.1	44.6	***273.7***				274	0	0	151	40
639.60	2.50	3.80	13		26.1	44.6	***311.6***				312	0	0	171	42
637.10	2.50	4.80	18		29.8	56.3	***451.7***				452	0	0	248	45
635.10	2.00		33	Hard Till	13.4	166.6	***466.7***				467	0	0	257	47
632.60	2.50		25	Sandy Gravel	27.9	168.2	***635.9***				~~636~~	~~*0*~~	~~*0*~~	~~*350*~~	~~*49*~~
630.10	2.50		46	Sandy Gravel	90.8	309.6	***694.8***				~~695~~	~~*0*~~	~~*0*~~	~~*382*~~	~~*52*~~
627.90	2.20		55	Hard Till	30.2	277.6	***447.4***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== South Abutment (N.B.)
REFERENCE BORING ========== 4 (S Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.20 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 670.20 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 680.20 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

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

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
392 KIPS	**350** KIPS	**192** KIPS	**45** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.60	2.60	3.40	8		21.4		***47.3***				47	0	0	26	15
665.10	2.50	3.00	7		18.8	25.8	***64.4***				64	0	0	35	17
662.60	2.50	2.80	7		17.9	24.1	***84.9***				85	0	0	47	20
660.10	2.50	3.10	10		19.3	26.7	***101.5***				102	0	0	56	22
657.60	2.50	2.80	9		17.9	24.1	***117.7***				118	0	0	65	25
655.10	2.50	2.60	8		17.0	22.4	***136.4***				136	0	0	75	27
652.60	2.50	2.80	10		17.9	24.1	***154.4***				154	0	0	85	30
650.10	2.50	2.80	9		17.9	24.1	***174.0***				174	0	0	96	32
647.60	2.50	3.00	10		18.8	25.8	***181.8***				182	0	0	100	35
645.10	2.50		4	Very Fine Silty Sand	2.5	14.8	***197.0***				197	0	0	108	37
642.60	2.50	3.20	9		19.7	27.6	***221.9***				222	0	0	122	40
640.10	2.50	3.80	11		22.4	32.7	***246.0***				246	0	0	135	42
637.60	2.50	4.00	15		23.3	34.5	***349.8***				350	0	0	192	45
635.10	2.50		31	Very Fine Silty Sand	19.3	115.0	***461.8***				~~462~~	~~0~~	~~0~~	~~254~~	~~47~~
630.10	5.00		42	Sandy Gravel	126.1	207.7	***502.6***				~~503~~	~~0~~	~~0~~	~~276~~	~~52~~
628.60	1.50		33	Hard Till	8.6	122.4	***388.8***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== South Abutment (N.B.)
REFERENCE BORING ========== 4 (S Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.20 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 670.20 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 680.20 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.25" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
459 KIPS	**430** KIPS	**237** KIPS	**45** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.60	2.60	3.40	8		25.0		***60.2***				60	0	0	33	15
665.10	2.50	3.00	7		21.9	35.2	***79.8***				80	0	0	44	17
662.60	2.50	2.80	7		20.9	32.8	***104.2***				104	0	0	57	20
660.10	2.50	3.10	10		22.5	36.3	***123.1***				123	0	0	68	22
657.60	2.50	2.80	9		20.9	32.8	***141.7***				142	0	0	78	25
655.10	2.50	2.60	8		19.8	30.5	***163.9***				164	0	0	90	27
652.60	2.50	2.80	10		20.9	32.8	***184.8***				185	0	0	102	30
650.10	2.50	2.80	9		20.9	32.8	***208.0***				208	0	0	114	32
647.60	2.50	3.00	10		21.9	35.2	***215.0***				215	0	0	118	35
645.10	2.50		4	Very Fine Silty Sand	2.9	20.2	***235.2***				235	0	0	129	37
642.60	2.50	3.20	9		23.0	37.5	***265.2***				265	0	0	146	40
640.10	2.50	3.80	11		26.1	44.6	***293.7***				294	0	0	162	42
637.60	2.50	4.00	15		27.2	46.9	***430.4***				430	0	0	237	45
635.10	2.50		31	Very Fine Silty Sand	22.5	156.5	***579.2***				~~579~~	~~*0*~~	~~*0*~~	~~*319*~~	~~*47*~~
630.10	5.00		42	Sandy Gravel	147.1	282.6	***610.2***				~~610~~	~~*0*~~	~~*0*~~	~~*336*~~	~~*52*~~
628.60	1.50		33	Hard Till	10.0	166.6	***453.6***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== South Abutment (N.B.)
REFERENCE BORING ========== 4 (S Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.20 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 670.20 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 680.20 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 630 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 115.86 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 43.45 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**430** KIPS	**237** KIPS	**45** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
667.60	2.60	3.40	8		25.0		***60.2***				60	0	0	33	15
665.10	2.50	3.00	7		21.9	35.2	***79.8***				80	0	0	44	17
662.60	2.50	2.80	7		20.9	32.8	***104.2***				104	0	0	57	20
660.10	2.50	3.10	10		22.5	36.3	***123.1***				123	0	0	68	22
657.60	2.50	2.80	9		20.9	32.8	***141.7***				142	0	0	78	25
655.10	2.50	2.60	8		19.8	30.5	***163.9***				164	0	0	90	27
652.60	2.50	2.80	10		20.9	32.8	***184.8***				185	0	0	102	30
650.10	2.50	2.80	9		20.9	32.8	***208.0***				208	0	0	114	32
647.60	2.50	3.00	10		21.9	35.2	***215.0***				215	0	0	118	35
645.10	2.50		4	Very Fine Silty Sand	2.9	20.2	***235.2***				235	0	0	129	37
642.60	2.50	3.20	9		23.0	37.5	***265.2***				265	0	0	146	40
640.10	2.50	3.80	11		26.1	44.6	***293.7***				294	0	0	162	42
637.60	2.50	4.00	15		27.2	46.9	***430.4***				430	0	0	237	45
635.10	2.50		31	Very Fine Silty Sand	22.5	156.5	***579.2***				~~579~~	~~0~~	~~0~~	~~319~~	~~47~~
630.10	5.00		42	Sandy Gravel	147.1	282.6	***610.2***				~~610~~	~~0~~	~~0~~	~~336~~	~~52~~
628.60	1.50		33	Hard Till	10.0	166.6	***453.6***					0	0		
				Hard Till		0.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 1 (N.B.)
REFERENCE BORING ========== 1 (NE Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

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

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
392 KIPS	**308** KIPS	**143** KIPS	**48** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
661.90	3.90	3.20			30.7		***54.9***				55	17	0	13	20
661.80	0.10	2.80			0.7	24.1	***55.6***				56	17	0	13	20
660.20	1.60	2.80			11.5	24.1	***67.0***				67	24	0	13	22
659.40	0.80	2.80			5.7	24.1	***72.8***				73	27	0	13	23
657.40	2.00	2.80			14.3	24.1	***87.1***				87	27	0	21	25
656.90	0.50	2.80			3.6	24.1	***93.3***				93	27	0	25	25
654.40	2.50	3.10	8		19.3	26.7	***118.6***				119	27	0	38	28
651.90	2.50	3.80	10		22.4	32.7	***141.0***				141	27	0	51	30
649.40	2.50	3.80	10		22.4	32.7	***161.6***				162	27	0	62	33
646.90	2.50	3.60	10		21.5	31.0	***188.3***				188	27	0	77	35
644.40	2.50	4.20	18		24.2	36.2	***207.4***				207	27	0	87	38
641.90	2.50	3.60	14		21.5	31.0	***225.4***				225	27	0	97	40
639.40	2.50	3.20	14		19.7	27.6	***258.9***				259	27	0	116	43
636.90	2.50	4.80	20		25.6	41.4	***278.4***				278	27	0	126	45
634.40	2.50	4.10	16		23.8	35.3	***308.2***				308	27	0	143	48
633.40	1.00	4.80	16		10.2	41.4	***440.3***				~~440~~	~~*27*~~	~~*0*~~	~~*215*~~	~~*49*~~
631.90	1.50		33	Sandy Gravel	22.7	163.2	***552.0***				~~552~~	~~*27*~~	~~*0*~~	~~*277*~~	~~*50*~~
628.90	3.00		51	Sandy Gravel	115.7	252.1	***530.5***				~~530~~	~~*27*~~	~~*0*~~	~~*265*~~	~~*53*~~
627.90	1.00		31	Hard Till		115.0									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 1 (N.B.)
REFERENCE BORING ========== 1 (NE Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.25" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
459 KIPS	**368** KIPS	**171** KIPS	**48** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
661.90	3.90	3.20			35.9		***68.7***				69	20	0	18	20
661.80	0.10	2.80			0.8	32.8	***69.5***				70	20	0	18	20
660.20	1.60	2.80			13.4	32.8	***82.9***				83	28	0	18	22
659.40	0.80	2.80			6.7	32.8	***89.6***				90	31	0	18	23
657.40	2.00	2.80			16.7	32.8	***106.3***				106	31	0	27	25
656.90	0.50	2.80			4.2	32.8	***114.0***				114	31	0	31	25
654.40	2.50	3.10	8		22.5	36.3	***144.7***				145	31	0	48	28
651.90	2.50	3.80	10		26.1	44.6	***170.8***				171	31	0	63	30
649.40	2.50	3.80	10		26.1	44.6	***194.6***				195	31	0	76	33
646.90	2.50	3.60	10		25.1	42.2	***226.7***				227	31	0	93	35
644.40	2.50	4.20	18		28.2	49.2	***248.0***				248	31	0	105	38
641.90	2.50	3.60	14		25.1	42.2	***268.4***				268	31	0	116	40
639.40	2.50	3.20	14		23.0	37.5	***310.1***				310	31	0	139	43
636.90	2.50	4.80	20		29.8	56.3	***331.7***				332	31	0	151	45
634.40	2.50	4.10	16		27.7	48.1	***367.6***				368	31	0	171	48
633.40	1.00	4.80	16		11.9	56.3	***545.4***				~~545~~	~~*31*~~	~~*0*~~	~~*269*~~	~~*49*~~
631.90	1.50		33	Sandy Gravel	26.5	222.1	***693.0***				~~693~~	~~*31*~~	~~*0*~~	~~*350*~~	~~*50*~~
628.90	3.00		51	Sandy Gravel	135.0	343.2	***641.2***				~~641~~	~~*31*~~	~~*0*~~	~~*321*~~	~~*53*~~
627.90	1.00		31	Hard Till		156.5									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 1 (N.B.)
REFERENCE BORING ========== 1 (NE Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**545** KIPS	**269** KIPS	**49** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
661.90	3.90	3.20			35.9		***68.7***				69	20	0	18	20
661.80	0.10	2.80			0.8	32.8	***69.5***				70	20	0	18	20
660.20	1.60	2.80			13.4	32.8	***82.9***				83	28	0	18	22
659.40	0.80	2.80			6.7	32.8	***89.6***				90	31	0	18	23
657.40	2.00	2.80			16.7	32.8	***106.3***				106	31	0	27	25
656.90	0.50	2.80			4.2	32.8	***114.0***				114	31	0	31	25
654.40	2.50	3.10	8		22.5	36.3	***144.7***				145	31	0	48	28
651.90	2.50	3.80	10		26.1	44.6	***170.8***				171	31	0	63	30
649.40	2.50	3.80	10		26.1	44.6	***194.6***				195	31	0	76	33
646.90	2.50	3.60	10		25.1	42.2	***226.7***				227	31	0	93	35
644.40	2.50	4.20	18		28.2	49.2	***248.0***				248	31	0	105	38
641.90	2.50	3.60	14		25.1	42.2	***268.4***				268	31	0	116	40
639.40	2.50	3.20	14		23.0	37.5	***310.1***				310	31	0	139	43
636.90	2.50	4.80	20		29.8	56.3	***331.7***				332	31	0	151	45
634.40	2.50	4.10	16		27.7	48.1	***367.6***				368	31	0	171	48
633.40	1.00	4.80	16		11.9	56.3	***545.4***				545	31	0	269	49
631.90	1.50		33	Sandy Gravel	26.5	222.1	***693.0***				~~693~~	~~31~~	~~0~~	~~350~~	~~50~~
628.90	3.00		51	Sandy Gravel	135.0	343.2	***641.2***				~~641~~	~~31~~	~~0~~	~~321~~	~~53~~
627.90	1.00		31	Hard Till		156.5									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 2 (S.B.)
REFERENCE BORING ========== 2 (SW Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

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

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
392 KIPS	**236** KIPS	**111** KIPS	**49** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
662.80	3.00	2.10			17.7		***40.1***				40	10	0	12	19
660.30	2.50	2.60			17.0	22.4	***58.8***				59	19	0	13	22
657.80	2.50	2.80			17.9	24.1	***75.0***				75	19	0	22	24
657.40	0.40	2.60			2.7	22.4	***77.7***				78	19	0	24	25
655.30	2.10	2.60			14.3	22.4	***85.1***				85	19	0	28	27
652.80	2.50	1.80			13.4	15.5	***105.4***				105	19	0	39	29
650.30	2.50	2.60			17.0	22.4	***124.1***				124	19	0	49	32
647.80	2.50	2.80			17.9	24.1	***140.3***				140	19	0	58	34
645.30	2.50	2.60			17.0	22.4	***157.3***				157	19	0	67	37
642.80	2.50	2.60			17.0	22.4	***183.0***				183	19	0	82	39
640.30	2.50	3.60	14		21.5	31.0	***213.1***				213	19	0	98	42
637.80	2.50	4.60	18		25.6	39.6	***236.9***				237	19	0	111	44
635.30	2.50	4.40	17		25.1	37.9	***288.4***				288	19	0	140	47
632.80	2.50		13	Sandy Gravel	12.1	64.3	***236.2***				236	19	0	111	49
630.80	2.00		46	Sandy Gravel	0.0	0.0	***610.7***				~~611~~	~~*19*~~	~~*0*~~	~~*317*~~	~~*51*~~
628.80	2.00		101	Hard Till		374.5									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 2 (S.B.)
REFERENCE BORING ========== 2 (SW Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.25" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
459 KIPS	**276** KIPS	**129** KIPS	**49** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
662.80	3.00	2.10			20.7		***51.1***				51	11	0	17	19
660.30	2.50	2.60			19.8	30.5	***73.3***				73	22	0	18	22
657.80	2.50	2.80			20.9	32.8	***91.9***				92	22	0	28	24
657.40	0.40	2.60			3.2	30.5	***95.1***				95	22	0	30	25
655.30	2.10	2.60			16.7	30.5	***102.4***				102	22	0	34	27
652.80	2.50	1.80			15.6	21.1	***127.3***				127	22	0	48	29
650.30	2.50	2.60			19.8	30.5	***149.5***				150	22	0	60	32
647.80	2.50	2.80			20.9	32.8	***168.1***				168	22	0	70	34
645.30	2.50	2.60			19.8	30.5	***187.9***				188	22	0	81	37
642.80	2.50	2.60			19.8	30.5	***219.5***				219	22	0	98	39
640.30	2.50	3.60	14		25.1	42.2	***256.3***				256	22	0	119	42
637.80	2.50	4.60	18		29.8	53.9	***283.8***				284	22	0	134	44
635.30	2.50	4.40	17		29.3	51.6	***349.0***				349	22	0	170	47
632.80	2.50		13	Sandy Gravel	14.1	87.5	***275.5***				276	22	0	129	49
630.80	2.00		46	Sandy Gravel	0.0	0.0	***785.3***				~~785~~	~~22~~	~~0~~	~~410~~	~~51~~
628.80	2.00		101	Hard Till		509.7									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 2 (S.B.)
REFERENCE BORING ========== 2 (SW Quad)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**276** KIPS	**129** KIPS	**49** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
662.80	3.00	2.10			20.7		***51.1***				51	11	0	17	19
660.30	2.50	2.60			19.8	30.5	***73.3***				73	22	0	18	22
657.80	2.50	2.80			20.9	32.8	***91.9***				92	22	0	28	24
657.40	0.40	2.60			3.2	30.5	***95.1***				95	22	0	30	25
655.30	2.10	2.60			16.7	30.5	***102.4***				102	22	0	34	27
652.80	2.50	1.80			15.6	21.1	***127.3***				127	22	0	48	29
650.30	2.50	2.60			19.8	30.5	***149.5***				150	22	0	60	32
647.80	2.50	2.80			20.9	32.8	***168.1***				168	22	0	70	34
645.30	2.50	2.60			19.8	30.5	***187.9***				188	22	0	81	37
642.80	2.50	2.60			19.8	30.5	***219.5***				219	22	0	98	39
640.30	2.50	3.60	14		25.1	42.2	***256.3***				256	22	0	119	42
637.80	2.50	4.60	18		29.8	53.9	***283.8***				284	22	0	134	44
635.30	2.50	4.40	17		29.3	51.6	***349.0***				349	22	0	170	47
632.80	2.50		13	Sandy Gravel	14.1	87.5	***275.5***				276	22	0	129	49
630.80	2.00		46	Sandy Gravel	0.0	0.0	***785.3***				~~785~~	~~22~~	~~0~~	~~410~~	~~51~~
628.80	2.00		101	Hard Till		509.7									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 1 (S.B.)
REFERENCE BORING ========== 3 (N Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========= 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

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

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
392 KIPS	**352** KIPS	**170** KIPS	**47** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
664.60	1.20	2.60			8.2		***32.3***				32	4	0	13	17
662.10	2.50	2.80			17.9	24.1	***46.7***				47	14	0	11	20
661.80	0.30	2.40			1.9	20.7	***48.7***				49	15	0	11	20
660.20	1.60	2.40			10.3	20.7	***59.0***				59	21	0	11	22
659.60	0.60	2.40			3.9	20.7	***64.6***				65	23	0	12	22
657.40	2.20	2.60			15.0	22.4	***79.5***				80	23	0	21	25
657.10	0.30	2.60			2.0	22.4	***79.9***				80	23	0	21	25
654.60	2.50	2.40			16.1	20.7	***104.6***				105	23	0	34	27
652.10	2.50	3.40	11		20.6	29.3	***120.0***				120	23	0	43	30
649.60	2.50	2.80			17.9	24.1	***137.9***				138	23	0	53	32
647.10	2.50	2.80			17.9	24.1	***149.8***				150	23	0	59	35
644.60	2.50	2.10			14.8	18.1	***179.2***				179	23	0	75	37
642.10	2.50	3.80	15		22.4	32.7	***201.6***				202	23	0	88	40
639.60	2.50	3.80	13		22.4	32.7	***232.7***				233	23	0	105	42
637.10	2.50	4.80	18		25.6	41.4	***339.2***				339	23	0	163	45
635.10	2.00		33	Hard Till	11.5	122.4	***351.9***				352	23	0	170	47
632.60	2.50		25	Sandy Gravel	23.9	123.6	***479.6***				~~480~~	~~*23*~~	~~*0*~~	~~*241*~~	~~*49*~~
630.10	2.50		46	Sandy Gravel	77.9	227.4	***534.0***				~~534~~	~~*23*~~	~~*0*~~	~~*271*~~	~~*52*~~
627.90	2.20		55	Hard Till		203.9									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 1 (S.B.)
REFERENCE BORING ========== 3 (N Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.25" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
459 KIPS	**435** KIPS	**212** KIPS	**47** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
664.60	1.20	2.60			9.5		***42.4***				42	5	0	18	17
662.10	2.50	2.80			20.9	32.8	***58.6***				59	17	0	15	20
661.80	0.30	2.40			2.3	28.1	***60.8***				61	18	0	15	20
660.20	1.60	2.40			12.0	28.1	***72.8***				73	25	0	15	22
659.60	0.60	2.40			4.5	28.1	***79.7***				80	27	0	17	22
657.40	2.20	2.60			17.5	30.5	***97.2***				97	27	0	26	25
657.10	0.30	2.60			2.4	30.5	***97.2***				97	27	0	26	25
654.60	2.50	2.40			18.8	28.1	***127.7***				128	27	0	43	27
652.10	2.50	3.40	11		24.0	39.9	***144.7***				145	27	0	53	30
649.60	2.50	2.80			20.9	32.8	***165.6***				166	27	0	64	32
647.10	2.50	2.80			20.9	32.8	***178.3***				178	27	0	71	35
644.60	2.50	2.10			17.2	24.6	***215.5***				215	27	0	91	37
642.10	2.50	3.80	15		26.1	44.6	***241.6***				242	27	0	106	40
639.60	2.50	3.80	13		26.1	44.6	***279.5***				279	27	0	127	42
637.10	2.50	4.80	18		29.8	56.3	***419.6***				420	27	0	204	45
635.10	2.00		33	Hard Till	13.4	166.6	***434.6***				435	27	0	212	47
632.60	2.50		25	Sandy Gravel	27.9	168.2	***603.8***				~~604~~	~~27~~	~~0~~	~~305~~	~~49~~
630.10	2.50		46	Sandy Gravel	90.8	309.6	***662.7***				~~663~~	~~27~~	~~0~~	~~337~~	~~52~~
627.90	2.20		55	Hard Till		277.6									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 1 (S.B.)
REFERENCE BORING ========== 3 (N Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**435** KIPS	**212** KIPS	**47** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
664.60	1.20	2.60			9.5		***42.4***				42	5	0	18	17
662.10	2.50	2.80			20.9	32.8	***58.6***				59	17	0	15	20
661.80	0.30	2.40			2.3	28.1	***60.8***				61	18	0	15	20
660.20	1.60	2.40			12.0	28.1	***72.8***				73	25	0	15	22
659.60	0.60	2.40			4.5	28.1	***79.7***				80	27	0	17	22
657.40	2.20	2.60			17.5	30.5	***97.2***				97	27	0	26	25
657.10	0.30	2.60			2.4	30.5	***97.2***				97	27	0	26	25
654.60	2.50	2.40			18.8	28.1	***127.7***				128	27	0	43	27
652.10	2.50	3.40	11		24.0	39.9	***144.7***				145	27	0	53	30
649.60	2.50	2.80			20.9	32.8	***165.6***				166	27	0	64	32
647.10	2.50	2.80			20.9	32.8	***178.3***				178	27	0	71	35
644.60	2.50	2.10			17.2	24.6	***215.5***				215	27	0	91	37
642.10	2.50	3.80	15		26.1	44.6	***241.6***				242	27	0	106	40
639.60	2.50	3.80	13		26.1	44.6	***279.5***				279	27	0	127	42
637.10	2.50	4.80	18		29.8	56.3	***419.6***				420	27	0	204	45
635.10	2.00		33	Hard Till	13.4	166.6	***434.6***				435	27	0	212	47
632.60	2.50		25	Sandy Gravel	27.9	168.2	***603.8***				~~604~~	~~27~~	~~0~~	~~305~~	~~49~~
630.10	2.50		46	Sandy Gravel	90.8	309.6	***662.7***				~~663~~	~~27~~	~~0~~	~~337~~	~~52~~
627.90	2.20		55	Hard Till		277.6									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 2 (N.B.)
REFERENCE BORING ========== 4 (S Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

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

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
392 KIPS	**315** KIPS	**150** KIPS	**44** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
665.10	0.70	3.00			5.3		***29.4***				29	3	0	13	17
662.60	2.50	2.80			17.9	24.1	***49.9***				50	13	0	15	19
660.10	2.50	3.10	10		19.3	26.7	***66.6***				67	23	0	13	22
657.60	2.50	2.80			17.9	24.1	***82.7***				83	23	0	22	24
657.40	0.20	2.60			1.4	22.4	***84.1***				84	23	0	23	25
655.10	2.30	2.60			15.6	22.4	***101.5***				101	23	0	32	27
652.60	2.50	2.80			17.9	24.1	***119.4***				119	23	0	42	29
650.10	2.50	2.80			17.9	24.1	***139.0***				139	23	0	53	32
647.60	2.50	3.00			18.8	25.8	***146.8***				147	23	0	57	34
645.10	2.50		4	Very Fine Silty Sand	2.5	14.8	***162.0***				162	23	0	66	37
642.60	2.50	3.20	9		19.7	27.6	***186.9***				187	23	0	79	39
640.10	2.50	3.80	11		22.4	32.7	***211.0***				211	23	0	93	42
637.60	2.50	4.00	15		23.3	34.5	***314.8***				315	23	0	150	44
635.10	2.50		31	Very Fine Silty Sand	19.3	115.0	***426.8***				~~427~~	~~23~~	~~0~~	~~211~~	~~47~~
632.60	2.50		42	Sandy Gravel	63.0	207.7	***489.9***				~~490~~	~~23~~	~~0~~	~~246~~	~~49~~
630.10	2.50		42	Sandy Gravel	63.0	207.7	***467.6***				~~468~~	~~23~~	~~0~~	~~234~~	~~52~~
628.60	1.50		33	Hard Till		122.4									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 2 (N.B.)
REFERENCE BORING ========== 4 (S Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.25" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
459 KIPS	**390** KIPS	**187** KIPS	**44** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
665.10	0.70	3.00			6.1		***39.0***				39	3	0	18	17
662.60	2.50	2.80			20.9	32.8	***63.4***				63	15	0	20	19
660.10	2.50	3.10	10		22.5	36.3	***82.3***				82	27	0	18	22
657.60	2.50	2.80			20.9	32.8	***100.9***				101	27	0	28	24
657.40	0.20	2.60			1.6	30.5	***102.5***				102	27	0	29	25
655.10	2.30	2.60			18.3	30.5	***123.1***				123	27	0	40	27
652.60	2.50	2.80			20.9	32.8	***144.0***				144	27	0	52	29
650.10	2.50	2.80			20.9	32.8	***167.2***				167	27	0	65	32
647.60	2.50	3.00			21.9	35.2	***174.2***				174	27	0	69	34
645.10	2.50		4	Very Fine Silty Sand	2.9	20.2	***194.4***				194	27	0	80	37
642.60	2.50	3.20	9		23.0	37.5	***224.4***				224	27	0	96	39
640.10	2.50	3.80	11		26.1	44.6	***252.9***				253	27	0	112	42
637.60	2.50	4.00	15		27.2	46.9	***389.6***				390	27	0	187	44
635.10	2.50		31	Very Fine Silty Sand	22.5	156.5	***538.3***				~~538~~	~~27~~	~~0~~	~~269~~	~~47~~
632.60	2.50		42	Sandy Gravel	73.5	282.6	***611.9***				~~612~~	~~27~~	~~0~~	~~309~~	~~49~~
630.10	2.50		42	Sandy Gravel	73.5	282.6	***569.4***				~~569~~	~~27~~	~~0~~	~~286~~	~~52~~
628.60	1.50		33	Hard Till		166.6									

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 2 (N.B.)
REFERENCE BORING ========== 4 (S Median)
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 682.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 665.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ===== Scour
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 658.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 940 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 43.50 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ====== 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 172.87 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 64.83 KIPS

PILE TYPE AND SIZE ========== Metal Shell 14"Φ w/.312" walls
Pile Perimeter========== 3.665 FT.
Pile End Bearing Area========== 1.069 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
570 KIPS	**538** KIPS	**269** KIPS	**47** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL SIDE RESIST. (KIPS)	NOMINAL END BRG. RESIST. (KIPS)	NOMINAL TOTAL RESIST. (KIPS)				NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
665.10	0.70	3.00			6.1		***39.0***				39	3	0	18	17
662.60	2.50	2.80			20.9	32.8	***63.4***				63	15	0	20	19
660.10	2.50	3.10	10		22.5	36.3	***82.3***				82	27	0	18	22
657.60	2.50	2.80			20.9	32.8	***100.9***				101	27	0	28	24
657.40	0.20	2.60			1.6	30.5	***102.5***				102	27	0	29	25
655.10	2.30	2.60			18.3	30.5	***123.1***				123	27	0	40	27
652.60	2.50	2.80			20.9	32.8	***144.0***				144	27	0	52	29
650.10	2.50	2.80			20.9	32.8	***167.2***				167	27	0	65	32
647.60	2.50	3.00			21.9	35.2	***174.2***				174	27	0	69	34
645.10	2.50		4	Very Fine Silty Sand	2.9	20.2	***194.4***				194	27	0	80	37
642.60	2.50	3.20	9		23.0	37.5	***224.4***				224	27	0	96	39
640.10	2.50	3.80	11		26.1	44.6	***252.9***				253	27	0	112	42
637.60	2.50	4.00	15		27.2	46.9	***389.6***				390	27	0	187	44
635.10	2.50		31	Very Fine Silty Sand	22.5	156.5	***538.3***				538	27	0	269	47
632.60	2.50		42	Sandy Gravel	73.5	282.6	***611.9***				~~612~~	~~27~~	~~0~~	~~309~~	~~49~~
630.10	2.50		42	Sandy Gravel	73.5	282.6	***569.4***				569	27	0	286	52
628.60	1.50		33	Hard Till		166.6									

From: Ferguson, Steven P
To: michelle.lipinski@rubinoeng.com; Anthony Tomaras
Cc: Smith, Brian D.; Brown, Jeremy J.
Subject: FW: I-57 over Louis Creek
Date: Wednesday, March 29, 2023 4:26:40 PM

Michelle and Anthony,

Forwarding you the loadings for SN 038-0151/-0152 I-57 over Louis Creek for your SGR preparations. This work is being prepared under Work order #18.

I am cc: ing Brian Smith who has been working for me for over ten years. I am planning on retiring from IDOT next month at the end of April 2023, and Brian will be assuming my responsibilities as the acting Bridge & Hydraulic engineer. All submittals and coordination will need to go to him and Jeremy Brown starting May 1.

Any questions, please let me know.

Thanks,
Steve

From: Joe Havel <jhavel@efkmoen.com>
Sent: Wednesday, March 29, 2023 3:48 PM
To: Ferguson, Steven P <Steven.Ferguson@illinois.gov>
Subject: [External] I-57 over Louis Creek

Steve,

Below are loads for the SGR:

	Abutments	Piers
Service (kip)	460	700
Strength (kip)	630	940

Survey was delayed by weather and snow so anticipate submitting the TS&L 3rd week of April. We anticipate making up the time on next submittal.

Joe Havel, P.E.
EFK Moen
Northern Illinois Regional Manager
Office: **312-396-4065 ext 315**
311 S. Wacker Dr, Ste. 460, Chicago, IL 60606
jhavel@efkmoen.com | www.efkmoen.com

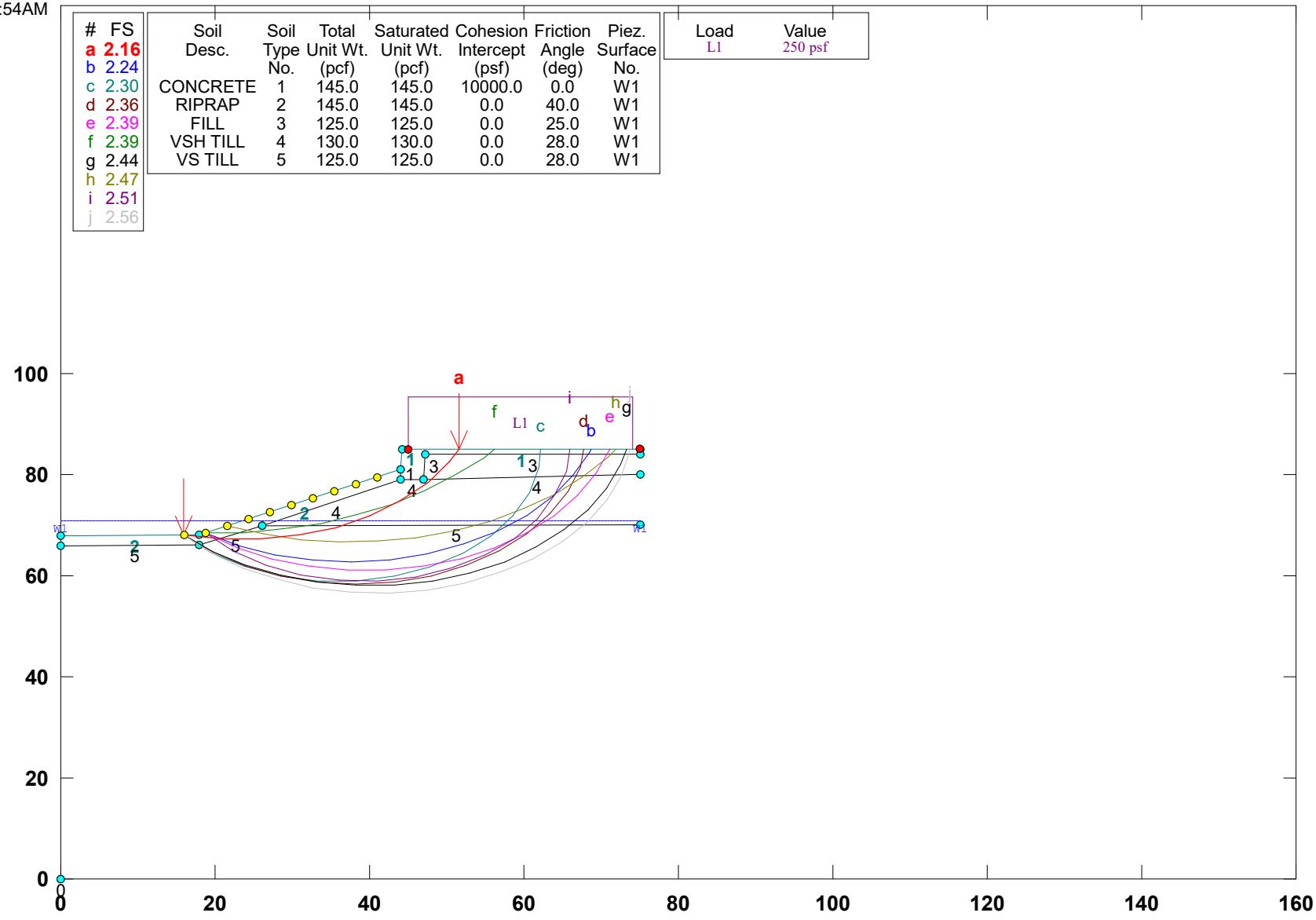
WO 18 IDOT PTB 197-022 I-57 Iroquois County (DRAINED)

y:\rubino eng projects\2022 geo projects\g22.258 wo 18 idot ptb 197-022 i-57 over louis creek, iroquois cty, district 3\report\g22.258 wo 18.pl2 Run By: Username 6/7/2023 10:54AM

#	FS
a	2.16
b	2.24
c	2.30
d	2.36
e	2.39
f	2.39
g	2.44
h	2.47
i	2.51
j	2.56

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CONCRETE	1	145.0	145.0	10000.0	0.0	W1
RIPRAP	2	145.0	145.0	0.0	40.0	W1
FILL	3	125.0	125.0	0.0	25.0	W1
VSH TILL	4	130.0	130.0	0.0	28.0	W1
VS TILL	5	125.0	125.0	0.0	28.0	W1

Load	Value
L1	250 psf



PCSTABL5M/si FSmin=2.16

Safety Factors Are Calculated By The Modified Bishop Method

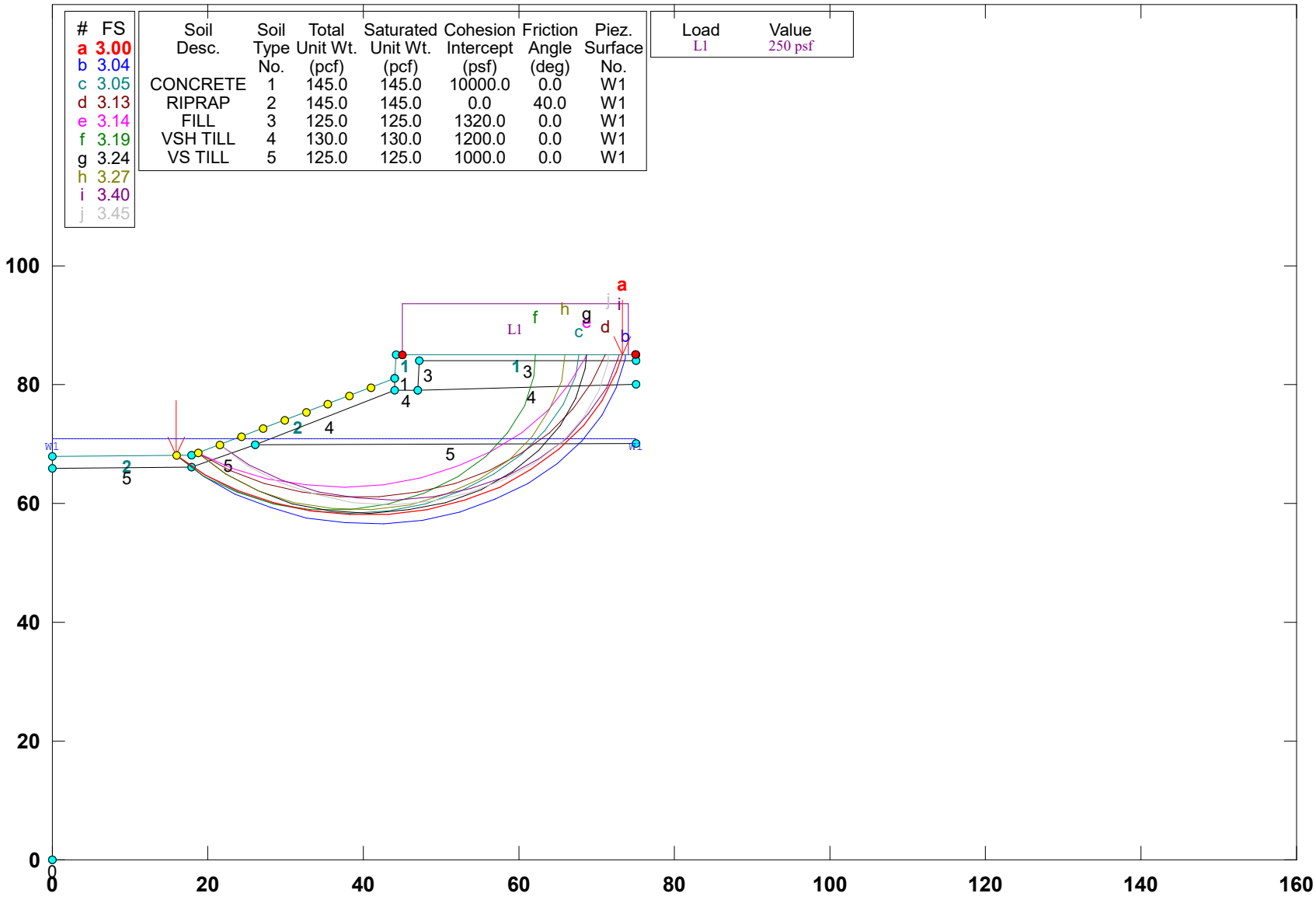
WO 18 IDOT PTB 197-022 I-57 Iroquois County (UNDRAINED)

y:\rubino eng projects\2022 geo projects\g22.258 wo 18 idot ptb 197-022 i-57 over louis creek, iroquois cty, district 3\report\g22.258 wo 18.pl2 Run By: Username 6/7/2023 10:50AM

#	FS
a	3.00
b	3.04
c	3.05
d	3.13
e	3.14
f	3.19
g	3.24
h	3.27
i	3.40
j	3.45

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CONCRETE	1	145.0	145.0	10000.0	0.0	W1
RIPRAP	2	145.0	145.0	0.0	40.0	W1
FILL	3	125.0	125.0	1320.0	0.0	W1
VSH TILL	4	130.0	130.0	1200.0	0.0	W1
VS TILL	5	125.0	125.0	1000.0	0.0	W1

Load	Value
L1	250 psf



PCSTABL5M/si FSmin=3.00

Safety Factors Are Calculated By The Modified Bishop Method