Victor L. McDuffee
6/15/2010
11/30/2011

Structure Geotechnical Report

F.A.P. Route 869 (IL Route. 34)
Section 104B-2
Saline County
Job No. D-99-021-10
Contract No. 78166
PTB No. 148-035

F.A.P. 869 (IL Route 34) Over
Unnamed Stream
S.N. 083-0068

June 2010

Prepared for:
Illinois Department of
Transportation, District 9
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Carbondale, Illinois

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Plates and Tables

Plates

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1. Project Description

The proposed project consists of replacing the bridge (S.N. 083-0027) carrying Illinois Route 34 over an unnamed stream adjacent to the Harrisburg Reservoir near Galatia, IL. This report contains geotechnical recommendations for the proposed structure. The scope of work will include demolition of the existing bridge, removing and replacing existing rip rap, and construction of a new bridge. The proposed work will be accomplished in stages to maintain traffic on Route 34 throughout the construction period.

2. Proposed Structure

The proposed structure will be a single span rolled steel beam bridge. The bridge will have a 39'-2" wide deck and a back of abutment to back of abutment span length of 79'-6". The substructure will consist of integral abutments. Both of the new substructure units are located within the existing approach embankments.

The embankments leading up to both abutments will remain nearly unchanged from their current 1V:3H configuration. New 1V:2H spill slopes will be cut in front of the proposed abutments.

3. Existing Structure

The existing structure is a single span PPC deck beam bridge. The bridge has a 33'0" wide deck and a back of abutment to back of abutment span length of 52'-4¼". The closed abutments, which were originally constructed in 1928 and reused for the existing bridge, are supported on untreated timber piles.

Pile driving records indicate that the piles were driven to bearing elevations near the top of the clay shale bedrock. The plans and driving records show capacities of 20 or 30 kips depending on the location of the piles within the structure.

4. Site Investigation

The site of the bridge is approximately 800 ft downstream of the Harrisburg Reservoir Dam's spillway. The embankments crossing the 1,000 feet wide natural floodplain are approximately 8 feet above the prevailing ground surface. Stream bed is about 15 feet below the top of the existing bridge deck.

The existing bridge abutments and approach embankments do not show signs of foundation distress or instability. There is some relatively minor erosion near the abutments due to failure of the riprap slope protection.

IDOT District 9 drilled two borings (1-S and 2-S) in March 2009 at the locations shown on Plate 1. These borings were drilled to sample the material in and below the approach embankments near the abutments. Both borings were drilled at least 10 feet into the bedrock material but no cores were taken. Several split spoon samples of the bedrock were collected.

5. Generalized Subsurface Conditions

The embankments consist of approximately 7 to 12 feet of medium stiff to stiff silty clay loam overlying native soils. The native soil is soft to stiff silty clay loam, silty clay, clay, and clay loam. Hard clay shale is found 40 to 45 feet below the top of embankment.

Groundwater was encountered in both borings. The groundwater elevations measured in the borings were not consistent. At the west abutment, groundwater was measured above the water level in the stream, while groundwater at the east abutment was several feet below the water in the stream.

6. Geotechnical Evaluations

Settlement analyses were not completed since no fill will be added to the existing embankments. It is anticipated that the proposed construction will not cause any significant settlement.

Stability analyses were completed at the most critical location to verify the embankment global factor of safety against slope stability failure. A proposed 1V:2H end slope at the west abutment has a factor of safety of 1.59 under an AASHTO Service I Load Combination. The east abutment and the 1V:3H side slopes would have higher factors of safety due to greater soil strengths and flatter slopes. All slopes meet the minimum static stability requirements listed in the *Geotechnical Manual.*

The bridge is located in the Wabash Valley Seismic Zone and could be subjected to severe seismic loadings. The subsurface profile to a depth of 100 feet consists of approximately 40 feet of very soft to stiff clays over clay shale bedrock. This profile is indicative of Site Class D. Seismic design parameters for a 1,000-year return period earthquake are listed in Table 1. Based on these seismic parameters, the bridge should be assigned to Seismic Performance Zone 3.

Table 1 Seismic Design Parameters

PGA =	0.310	F_{pga} =	1.19	A_S =	0.37
S_S =	0.590	F_a =	1.33	S_{DS} =	0.78
S_1 =	0.150	F_v =	2.20	S_{D1} =	0.33

The clayey soils encountered in the borings are not liquefaction-susceptible. Liquefaction is not a concern at this site.

A pseudo-static seismic stability analyses was performed on the west abutment end slope. The factor of safety is less than 0.78 with a 0.31g horizontal acceleration coefficient. Permanent displacements should be expected during the design earthquake. An estimate of this slope movement was determined by performing a deformation analysis using the methodology from *NCHRP Report 611*. Between 0.1 to 0.3 inches of permanent lateral deformation should be expected during the design earthquake. According to the *Geotechnical Manual*, a permanent deformation of 6 inches or less is considered acceptable performance for a bridge approach embankment.

This bridge will be subject to scour from the unnamed creek. According to the Hydraulic Report, the predicted 100-year and 500-year contraction scour depths are 2.4 and 2.7 feet, respectively, within the channel. The predicted local substructure scour depths are 10.2 and 13.2 feet at both abutments. The abutments may be designed assuming no scour, because they will be armored with riprap.

The Illinois State Geological Survey Map and Directory of Coal Mines for the mined-out coal areas in Illinois indicate that the active Galatia North and New Era mines (ISGS Mine Index 1001) are within one-half mile of the proposed bridge. Both mines are using the checkerboard room and pillar method. The Galatia North mine is extracting coal from the Springfield seam while New Era mine is extracting the higher Herrin seam. In February 2009, the Springfield seam had been mined to within 2,000 feet of the bridge site and the Herrin seam had been mined to within 500 feet of the bridge. At these distances, the mining is not expected to affect the proposed structures. If the mining is continued towards the site, then future impacts are possible.

7. Design Recommendations

New H-piles should be used to support the abutments. Other foundation types would be incompatible with the proposed integral abutments. Table 2 lists factored resistance available, nominal required bearing, and estimated pile lengths for the recommended piles. The pile lengths are estimated based on pile cutoff elevations of 391.85 at the west abutment and 392.43 at the east abutment. The H-piles should be driven to their maximum nominal required bearing with tips embedded in the shale bedrock as shown in Table 2.

Table 2 Pile Design Parameters

Location	Pile Type	Factored Resistance Available (kips) (Strength I-V)	Factored Resistance Available (kips) (Extreme Event)	Geotech. Losses (kips)	Nominal Required Bearing (kips)	Est. Pile Length (ft)
West Abutment	HP 10x57	250	454	0	454	41
	HP 12x53	230	418	0	418	38
	HP 12x63	273	497	0	497	40
	HP 12x74	324	589	0	589	41
	HP 12x84	365	664	0	664	43
	HP 14x73	318	578	0	578	39
	HP 14x89	388	705	0	705	41
	HP 14x102	445	810	0	810	43
	HP 14x117	511	929	0	929	45
East Abutment	HP 10x57	250	454	0	454	44
	HP 12x53	230	418	0	418	41
	HP 12x63	273	497	0	497	42
	HP 12x74	324	589	0	589	44
	HP 12x84	365	664	0	664	45
	HP 14x73	318	578	0	578	42
	HP 14x89	388	705	0	705	44
	HP 14x102	445	810	0	810	45
	HP 14x117	511	929	0	929	47

Due to the uncertainty of H-pile penetration into the shale bedrock, a test pile should be driven at the East Abutment. Data from that test pile and the soil borings may be used to set the final pile length for the West Abutment. Pile shoes are not necessary. Precoring is not required because settlement will be negligible.

The structure designer should evaluate lateral resistance of driven piles based on both soil and structure properties. Soil parameters for generating P-y curves with the LPILE computer program are given in Table 3. The analysis should consider factored axial and factored lateral loads on the piles.

Table 3 LPILE Parameters

Location	Bottom Elevation (ft)	Soil Type	Soil Parameters
West Abutment	392.6	Stiff Clay w/o free water	c = 8.33 psi k = 500 pci γ' = 0.069 pci ε_{50} = 0.007
	390.1	Soft Clay	c = 4.86 psi k = 100 pci γ' = 0.069 pci ε_{50} = 0.010
	387.6	Soft Clay	c = 2.78 psi k = 30 pci γ' = 0.064 pci ε_{50} = 0.020
	385.1	Stiff Clay w/o free water	c = 8.33 psi k = 500 pci γ' = 0.069 pci ε_{50} = 0.007
	380.1	Soft Clay	c = 4.51 psi k = 100 pci γ' = 0.033 pci ε_{50} = 0.010
	377.6	Soft Clay	c = 2.08 psi k = 30 pci γ' = 0.028 pci ε_{50} = 0.020
	360.1	Soft Clay	c = 4.86 psi k = 100 pci γ' = 0.028 pci ε_{50} = 0.010
	356.6	Stiff Clay w/o free water	c = 12.50 psi k = 500 pci γ' = 0.033 pci ε_{50} = 0.007
	355.1	Weak Rock	q_u = 55.60 psi E_r = 5,000 psi γ' = 0.039 pci RQD = 80 % k_{rm} = 0.00005
East Abutment	393.2	Stiff Clay w/o free water	c = 12.50 psi k = 500 pci γ' = 0.069 pci ε_{50} = 0.007
	385.7	Stiff Clay w/o free water	c = 6.71 psi k = 100 pci γ' =0.069 pci ε_{50} = 0.007
	378.2	Soft Clay	c = 2.51 psi k = 30 pci γ' = 0.064 pci ε_{50} = 0.020
	375.7	Stiff Clay w/o free water	c = 8.33 psi k = 500 pci γ' = 0.033 pci ε_{50} = 0.007
	365.7	Soft Clay	c = 3.65 psi k = 100 pci γ' = 0.033 pci ε_{50} = 0.020
	360.7	Stiff Clay w/o free water	c = 7.99 psi k = 500 pci γ' = 0.033 pci ε_{50} = 0.007
	358.2	Soft Clay	c = 5.56 psi k = 100 pci γ' = 0.033 pci ε_{50} = 0.010
	354.2	Stiff Clay w/o free water	c = 12.50 psi k = 500 pci γ' = 0.033 pci ε_{50} = 0.007
	352.7	Weak Rock	q_u = 55.60 psi E_r = 5,000 psi γ' = 0.039 pci RQD = 80 % k_{rm} = 0.00005

The approach slab support should be according to the current IDOT standard. The sleeper slab will bear on the existing approach embankment material. No special subgrade treatment is required.

8. Construction Considerations

Based on the construction staging shown on the TSL drawing, there is insufficient space to lay back an excavation slope between the existing approach grade and the bottom of the proposed abutment. Temporary sheeting will be needed to complete the excavation while maintaining traffic on the existing bridge. The existing embankment and native soils will provide sufficient embedment for cantilever sheeting along the stage construction line. Structural design of the temporary sheeting can be completed using the procedure in the IDOT Bridge Manual.

References

American Association of State Highway and Transportation Officials (2007). *AASHTO LRFD Bridge Design Specifications*, 4th Edition with 2009 Interim Revisions.

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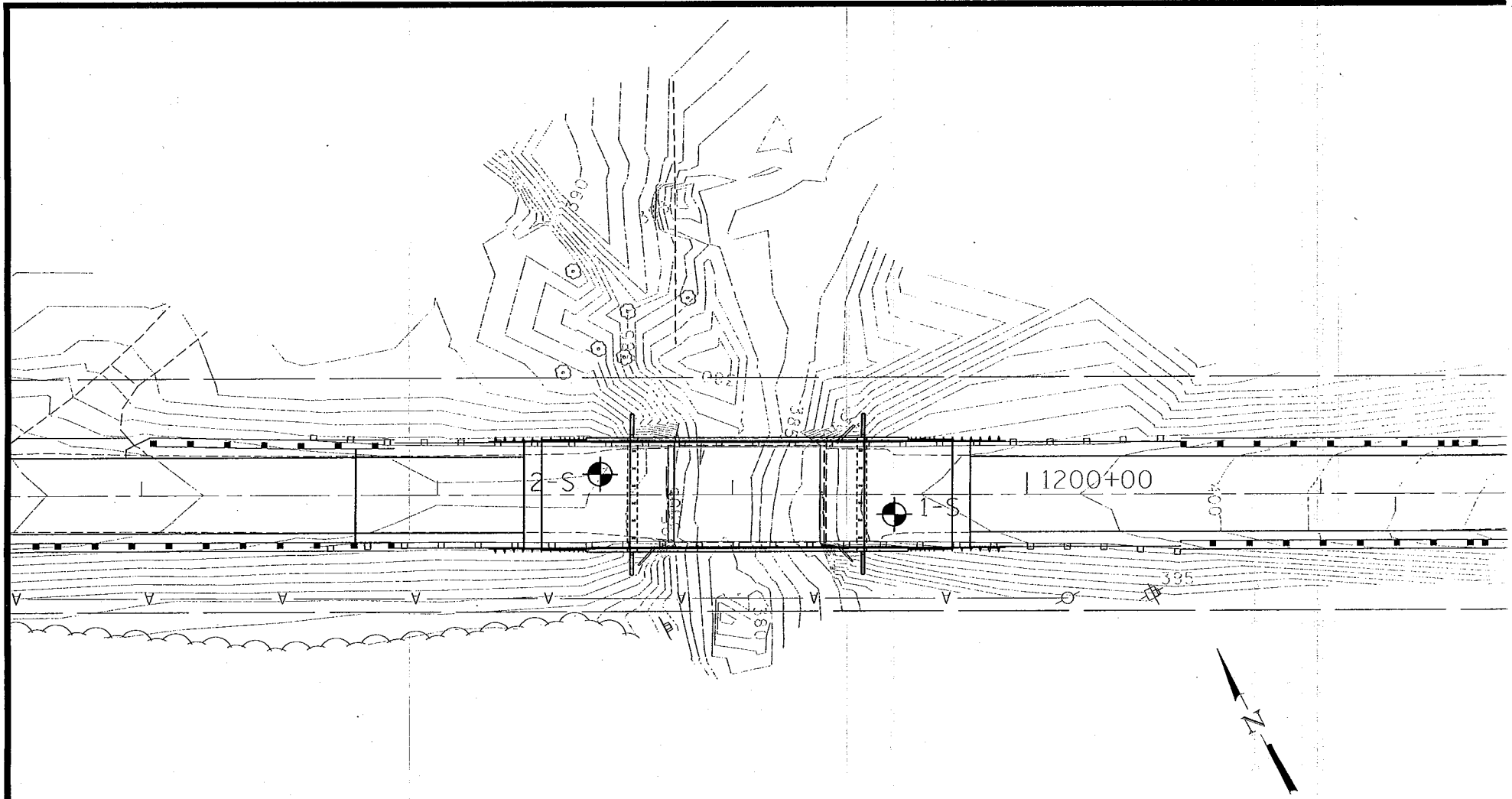


LEGEND

1-S BORING LOCATION

HANSON

BORING LOCATION PLAN

IL ROUTE 34 OVER UNNAMED STREAM
S.N. 083-0068
SALINE COUNTY

08H0131 6/14/10

Appendix

Appendix A - Geotechnical Data

The following data is attached to this report for use by the structure designer.

- Subsurface Data Profile S.N. 083-0068
- 2009 IDOT District 2 Boring Logs
  1-S and 2-S
- Pile Driving Records
- Original Structure (1928) Abutment Plan Sheet
- Slope Stability Analyses

1-S
Sta. 1199+55, 7' RT

	N	Qu	w%	
397.7				Asphalt over Concrete
396.2	8	1.8B	17	Stiff, moist, grey and brown, Silty Clay Loam A-4
393.2	6	1.1S	20	Medium to stiff, moist to very moist, grey, Silt Loam to Silty Clay Loam A-4
	5	0.7S	19	
	4	1.1S	21	
385.7	1	0.4B	23	Soft, very moist, grey mottled brown, Silty Clay Loam A-6
383.2	2	0.4B	22	Soft, very moist, brown mottled grey, Silty Clay Loam A-6
	1	0.3B	21	
378.2 Oh				
377.7	4	1.2B	23	Stiff, moist, brown mottled grey, Silty Clay Loam A-6
375.7 DD	4	0.5B	29	Medium to soft, very moist, brown, Silty Clay A-6
	3	0.6B	30	Medium, very moist, brown, Silty Clay A-6
370.7	3	0.6B	31	Medium, very moist, grey and brown, Silty Clay A7-6
368.2	WH	0.4B	26	Soft, very moist, grey, Silty Clay A-6
365.7	4	1.1B	22	Stiff, moist, grey, Silty Clay A7-6
	4	1.2B	20	
360.7	3	0.8B	24	Medium, moist to very moist, grey, Silty Clay Loam A-4 with Sand Seams
358.2	26	1.8S	14	Very stiff, moist, grey, Clay Loam to Sandy Clay Loam A-4
354.2				
	100/4"			Hard, dry, grey, Clay Shale
352.7				Bottom of hole = 44.8 feet

2-S
Sta. 1198+55, 7' LT

	N	Qu	w%	
397.1				Asphalt over Concrete
395.6	8	1.2S	18	Stiff, moist, brown, Silty Clay Loam A-4
392.6	5	0.7S	23	Medium, moist to very moist, grey, Silty Clay Loam A-4
390.1	1	0.4B	30	Soft, very moist, grey, Silty Clay Loam A-4
387.6	4	1.2B	23	Stiff, moist, grey mottled brown, Silty Clay to Silty Clay Loam A-6
385.1 Oh				
384.1	4	0.7B	22	Medium, moist to very moist, grey mottled brown Silt Loam to Silty Clay Loam A-4
DD	3	0.6B	23	
380.1	2	0.3B	25	Soft, very moist, brown mottled grey, Silty Clay Loam A-4
377.6	2	0.9B	28	Medium, very moist, brown mottled grey, Silty Clay to Silty Clay Loam A-6
	2	0.6B	27	
	1	0.8B	26	
	4	0.8B	26	
367.6	WH	0.4B	29	Soft, very moist, grey, Silty Clay A-6
365.1	1	0.6B	26	Medium, very moist, grey, Clay A7-6
	1	0.8B	30	
360.1	8	1.8S	20	Stiff, moist, grey, Clay Loam to Sandy Clay Loam A-4 with Sand Seams
356.6	19			Hard, damp, grey weathered Clay Shale
355.1				Hard, dry, grey, Clay Shale
	100/1"			
	100/1"			
	100/1"			
342.1				Bottom of hole = 54.6 feet

Notes:
1. Borings were drilled March 10 & 11, 2009.
2. Water surface in creek was Elev. 382.1 during drilling.
3. To convert "N" values to "N60" multiply by 1.25.

SUBSURFACE DATA PROFILE
STRUCTURE NO. 083-0068

PROFESSIONAL DESIGN FIRM LICENSE #184-001084

HANSON
Hanson Professional Services Inc.

JOB NO. 08H0131
DATE 06/14/10
SHEET NO. 1
1 SHEET

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
869	104B-2	SALINE	1	1
		CONTRACT NO. 78166		
FED. ROAD DIST. NO. _	ILLINOIS	FED. AID PROJECT		

District Nine Materials

Boring Log

FAP 8('IL 34) Over Stream — Sheet 1 of 1

Route: FAP 869 (IL 34) Structure Number: 083-0027 Date: 3/10/2009

Section 104B Bored By: Rich Moberly

County: Saline Location: 0.8 mile SE of Galatia Checked By: Rob Graeff

Boring No 1-S
Station 1199+55
Offset 7' Rt CL
Ground Surface 397.7 Ft

Surf Wat Elev: 382.1
Ground Water Elevation
when Drilling 375.7
At Completion 377.7
At: Hrs:

DEPTH	BLOWS	Qu tsf	W%
Asphalt over Concrete			
396.2			
Stiff, moist, grey and brown, Silty Clay Loam A-4	1		
	4	1.8B	17
	4		
393.2			
Medium to stiff, moist to very moist, grey, Silt Loam to Silty Clay Loam A-4	5.0 1		
	3	1.1S	20
	3		
	1		
	2	0.7S	19
	3		
	10.0 1		
	2	1.1S	21
	2		
385.7			
Soft, very moist, grey mottled brown, Silty Clay Loam A-6	WH		
	WH	0.4B	23
	1		
383.2			
Soft, very moist, brown mottled grey, Silty Clay Loam A-6	15.0 WH		
	1	0.4B	22
	1		
	WH		
	WH	0.3B	21
	1		
378.2			
Stiff, moist, brown mottled grey, Silty Clay Loam A-6	20.0 1		
	2	1.2B	23
	2		
375.7			
Medium to soft, very moist, brown, Silty Clay A-6	1		
	2	0.5B	29
	2		
	25.0 1		
Medium, very moist, brown, Silty Clay A-6	1	0.6B	30
	2		
370.7			
Medium, very moist, grey and brown, Silty Clay A7-6	WH		
	1	0.6B	31
	2		
368.2			
Soft, very moist, grey, Silty Clay A-6	30.0 WH		
	WH	0.4B	26
	WH		
365.7			
Stiff, moist, grey, Clay A7-6	1		
	2	1.1B	22
	2		
	35.0 1		
	2	1.2B	20
	2		
360.7			
Medium, moist to very moist, grey, Silty Clay Loam A-4 with Sand Seams	1		
	2	0.8B	24
	1		
358.2			
Very Stiff, moist, grey, Clay Loam to Sandy Clay Loam A-4	40.0 11		
	13	1.8S	14
	13		
354.2			
Hard, dry, grey, Clay Shale			
352.7	45.0 100/ 4"		
Bottom of hole = 44.8 feet			
Free water observed at 22.0 feet			
Elevation referenced to BM @ NE wingwall; Elev.= 395.6 feet			
To convert "N" values to "N60" values multiply by 1.25			
	50.0		

N-Std Pentr Test: 2" OD Sampler,140# Hammer, 30" Fall (Type Fail. B-Bulge S-Shear E-Estimated P-Penetrometer)

District Nine Materials

Boring Log

FAP 8 (IL 34) Over Stream

Sheet 1 of 2

Route: FAP 869 (IL 34) Structure Number: 083-0027 Date: 3/11/2009

Section 104B Bored By: Rich Moberly

County: Saline Location: 0.8 mile SE of Galatia Checked By: Rob Graeff

Boring No 2-S
Station 1198+55
Offset 7' Lt CL
Ground Surface 397.1 Ft

Surf Wat Elev: 382.1
Ground Water Elevation
when Drilling 380.1
At Completion 384.1
At: Hrs:

DEPTH	BLOWS	Qu tsf	W%
Asphalt over Concrete			
395.6			
Stiff, moist, brown, Silty Clay Loam A-4	1		
	4	1.2S	18
	4		
392.6			
Medium, moist to very moist, grey, Silty Clay Loam A-4	5.0 1		
	2	0.7S	23
	3		
390.1			
Soft, very moist, grey, Silty Clay Loam A-4	WH		
	WH	0.4B	30
	1		
387.6			
Stiff, moist, grey mottled brown, Silty Clay to Silty Clay Loam A-6	10.0 1		
	2	1.2B	23
	2		
385.1			
Medium, moist to very moist, grey mottled brown, Silt Loam to Silty Clay Loam A-4	1		
	2	0.7B	22
	2		
	15.0 WH		
	1	0.6B	23
	2		
380.1			
Soft, very moist, brown mottled grey, Silty Clay Loam A-4	WH		
	1	0.3B	25
	1		
377.6			
Medium, very moist, brown mottled grey, Silty Clay to Silty Clay Loam A-6	20.0 1		
	1	0.9B	28
	1		
	WH		
	1	0.6B	27
	1		
	25.0 WH		

DEPTH	BLOWS	Qu tsf	W%
Medium, very moist, brown mottled grey, Silty Clay to Silty Clay Loam A-6	WH	0.8B	26
	1		
	1		
	2	0.8B	26
	2		
367.6			
Soft, very moist, grey, Silty Clay A-6	30.0 WH		
	WH	0.4B	29
	WH		
365.1			
Medium, very moist, grey, Clay A7-6	WH		
	WH	0.6B	26
	1		
	35.0 WH		
	WH	0.8B	30
	1		
360.1			
Stiff, moist, grey, Clay Loam to Sandy Clay Loam A-4 with Sand Seams	1		
	2	1.8S	20
	6		
	40.0 2		
356.6	8		
Hard, damp, grey weathered Clay Shale	11		
355.1			
Hard, dry, grey, Clay Shale			
	45.0 100/1"		
	50.0 100/1"		

N-Std Pentr Test: 2" OD Sampler,140# Hammer, 30" Fall (Type Fail. B-Bulge S-Shear E-Estimated P-Penetrometer)

Route: FAP 869 (IL 34)
Section: 104B
County: Saline

Date: 3/11/2009

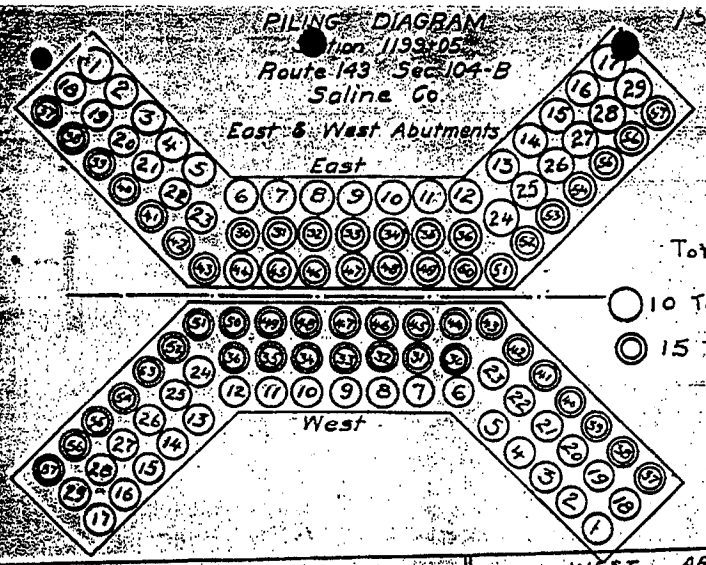
Boring No: 2-S
Station: 1198+55
Offset: 7' Lt CL
Ground Surface: 397.1 Ft

	DEPTH	BLOWS	Qu tsf	W%	DEPTH	BLOWS	Qu tsf	W%
Hard, dry, grey, Clay Shale								
342.1	55.0	100/1"			80.0			
Bottom of hole = 54.6 feet								
Free water observed at 17.0 feet								
Elevation referenced to BM @ NE wingwall; Elev.= 395.6 feet								
To convert "N" values to "N60" values multiply by 1.25	60.0				85.0			
	65.0				90.0			
	70.0				95.0			
	75.0				100.0			

N-Std Pentr Test: 2" OD Sampler,140# Hammer, 30" Fall (Type Fail. B-Bulge S-Shear E-Estimated P-Penetrometer)

PILING DIAGRAM

Section 1193-05
Route 143 Sec 104-B
Saline Co.
East & West Abutments



Total E.&W. Abmts.

○ 10 Ton = 1076 ft.

◎ 15 Ton = 1141 ft.

083-0027

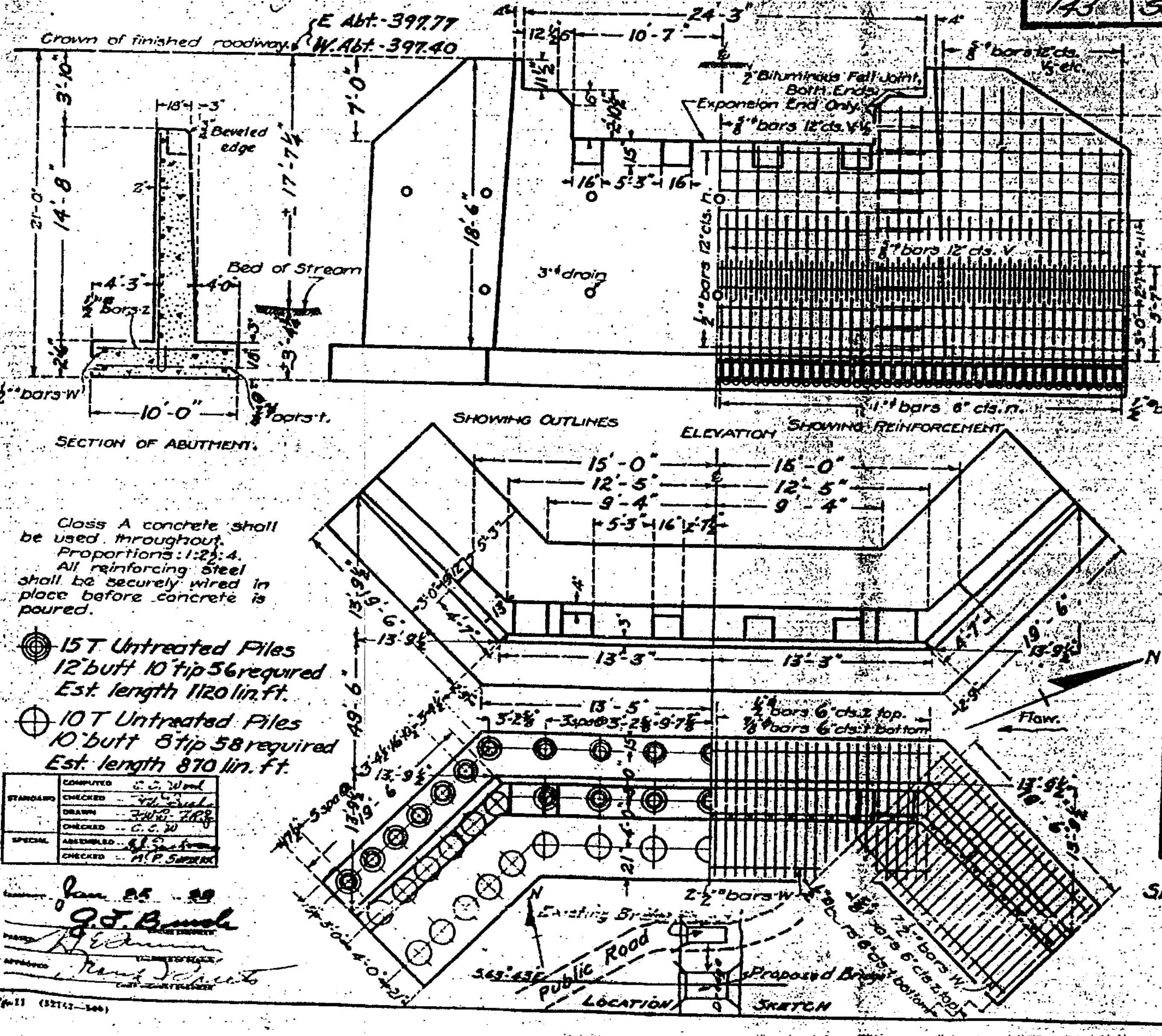
EAST ABUTMENT					WEST ABUTMENT				
Piling No.	Total Length	Cut Off	Net Length 10 Ton	Net Length 15 Ton	Piling No.	Total Length	Cut Off	Net Length 10 Ton	Net Length 15 Ton
1	18'-6"	0'-11"	18'-7"		1	19'-0"	6"	18'-6"	
2	19'-4"	0'-3"	19'-1"		2	19'-0"	6"	18'-6"	
3	19'-6"	0'-6"	19'-0"		3	19'-0"	0"	19'-0"	
4	19'-7"	1'-2"	18'-5"		4	19'-0"	0	19'-0"	
5	19'-6"	1'-3"	18'-3"		5	19'-3"	3"	19'-0"	
6	19'-5"	0	19'-5"		6	19'-0"	4"	18'-8"	
7	19'-5"	1'-0"	18'-5"		7	19'-0"	6"	18'-6"	
8	19'-4"	1'-0"	18'-4"		8	19'-4"	4"	19'-0"	
9	19'-4"	7"	18'-9"		9	19'-2"	2"	19'-0"	
10	19'-9"	3"	19'-6"		10	19'-0"	3"	18'-9"	
11	19'-2"	1'-3"	17'-11"		11	19'-0"	4"	18'-8"	
12	19'-3"	9"	18'-6"		12	19'-4"	4"	19'-0"	
13	19'-4"	10"	18'-6"		13	19'-0"	4"	18'-8"	
14	19'-6"	2'-1"	17'-5"		14	19'-2"	8"	18'-6"	
15	19'-3"	2'-3"	17'-0"		15	19'-5"	5"	19'-0"	
16	19'-4"	2'-5"	16'-11"		16	19'-2"	2"	19'-0"	
17	19'-3"	1'-7"	17'-8"		17	19'-4"	1'-4"	18'-0"	
18	19'-2"	1'-7"	17'-7"		18	19'-0"	6"	18'-6"	
19	18'-3"	1'-2"	18'-1"		19	19'-0"	1'-0"	18'-0"	
20	19'-7"	1'-3"	18'-4"		20	19'-4"	4"	19'-0"	
21	19'-4"	0	19'-4"		21	19'-0"	4"	18'-8"	
22	19'-3"	0	19'-3"		22	19'-0"	6"	18'-6"	
23	19'-5"	1'-0"	18'-5"		23	19'-0"	1'-0"	18'-0"	
24	19'-4"	2'-1"	17'-3"		24	25'-4"	3'-10"	21'-6"	
25	19'-3"	0-10"	18'-7"		25	25'-8"	4'-0"	21'-8"	
26	19'-3"	3'-7"	15'-8"		26	25'-4"	6'-2"	19'-2"	
27	19'-3"	2'-0"	17'-3"		27	25'-0"	7'-0"	18'-0"	
28	19'-2"	2'-1"	17'-1"		28	25'-3"	6'-0"	19'-3"	
29	19'-6"	1'-10"	17'-8"		29	25'-6"	4'-6"	21'-0"	
30	22'-3"	0'-10"		21'-5"	30	22'-0"	1'-0"		21'-0"
31	22'-1"	0		22'-1"	31	22'-0"	8"		21'-4"
32	22'-4"	2'-10"		19'-6"	32	22'-0"	1'-0"		21'-0"
33	22'-5"	1'-1"		21'-4"	33	22'-4"	4"		22'-0"
34	22'-4"	3'-4"		19'-0"	34	22'-0"	1'-0"		21'-0"
35	22'-2"	1'-0"		21'-2"	35	22'-0"	6"		21'-6"
36	22'-5"	1'-10"		20'-5"	36	21'-0"	2'-0"		19'-0"
37	22'-6"	3'-5"		19'-1"	37	22'-0"	1'-0"		21'-0"
38	22'-4"	3'-1"		19'-3"	38	22'-0"	1'-0"		21'-0"
39	22'-3"	5'-0"		17'-3"	39	22'-0"	8"		21'-4"
40	22'-4"	4'-3"		18'-1"	40	22'-0"	8"		21'-4"
41	22'-3"	4'-2"		18'-3"	41	22'-0"	6"		21'-6"
42	22'-7"	4'-0"		18'-7"	42	22'-0"	6"		21'-6"
43	22'-3"	4'-2"		18'-1"	43	22'-0"	6"		21'-6"
44	22'-3"	1'-3"		21'-2"	44	22'-0"	4"		21'-8"
45	22'-4"	1'-5"		21'-2"	45	22'-0"	2'-6"		19'-6"
46	22'-8"	2'-2"		20'-6"	46	22'-0"	6"		21'-6"
47	22'-11"	1'-5"		21'-6"	47	22'-3"	3"		22'-0"
48	22'-3"	1'-0"		21'-3"	48	22'-6"	6"		22'-0"
49	22'-7"	0'-10"		21'-9"	49	22'-4"	10"		21'-6"
50	22'-3"	1'-6"		20'-9"	50	22'-0"	1'-0"		21'-0"
51	22'-8"	3'-2"		19'-0"	51	22'-0"	8"		21'-4"
52	22'-1"	2'-11"		19'-2"	52	22'-0"	1'-0"		21'-0"
53	22'-3"	2'-11"		19'-4"	53	22'-0"	4"		21'-8"
54	22'-4"	4'-6"		17'-10"	54	22'-0"	2'-0"		20'-0"
55	22'-2"	4'-10"		17'-4"	55	22'-0"	8"		21'-4"
56	22'-5"	4'-6"		17'-9"	56	22'-0"	2'-0"		20'-0"
57	19'-6"	1'-4"		18'-0"	57	22'-0"	6"		21'-6"
TOTAL			525'-0"	543'-0"	NET TOTAL			350'-0"	372'-0"

B.M. 2 Spikes in 30" Willow 350' Rt. of Sta. 1200+30 Elev. 393.91
Existing structure. Steel Pony Truss 48 span 12' rdy. Not to be removed.

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS

R. C. ABUTMENTS FOR DECK GIRDER BRIDGE
HEIGHT OVER ALL 21 FEET

BOND ISSUE ROUTE NO.	COUNTY	SEC.	TOTAL SHEETS	SHEET NO.
143	Saline	104B	57	54



Class A concrete shall be used throughout. Proportions: 1:2½:4. All reinforcing steel shall be securely wired in place before concrete is poured.

15 T Untreated Piles 12" butt 10" tip 56 required Est. length 1120 lin. ft.

10 T Untreated Piles 10" butt 8" tip 58 required Est. length 870 lin. ft.

BILL OF MATERIAL.

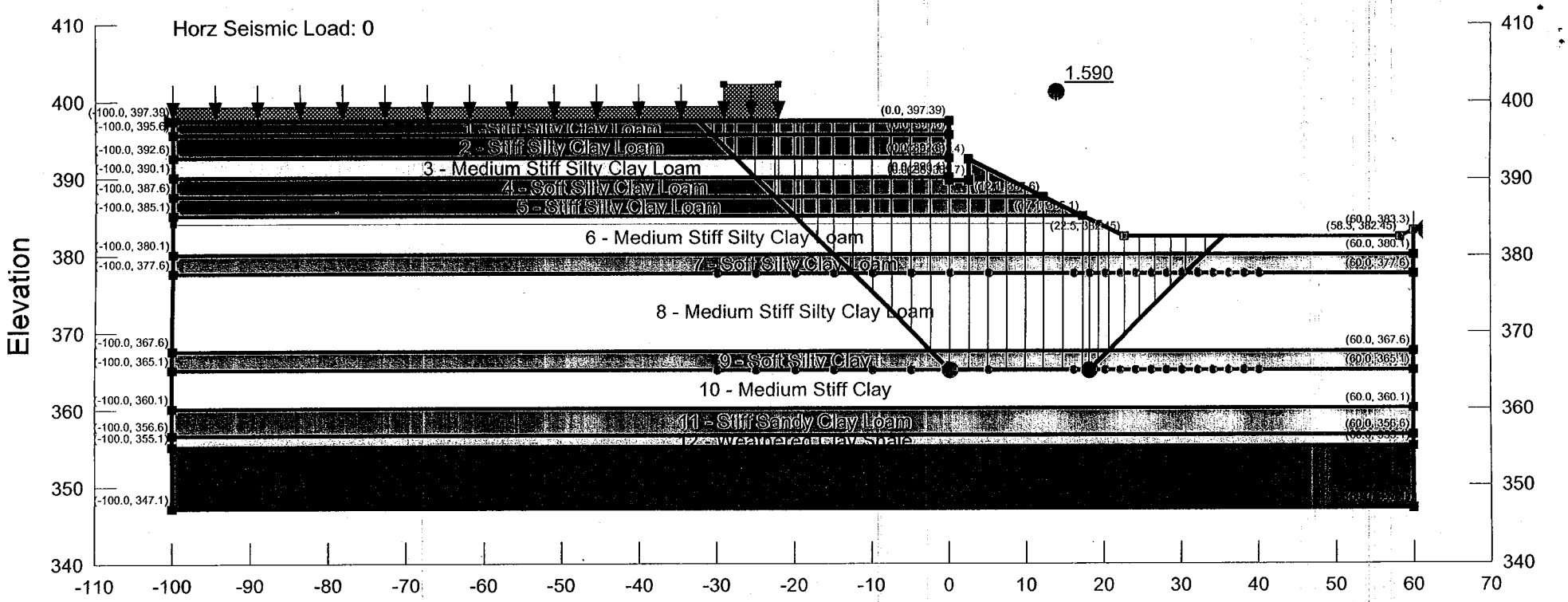
Bars	No.	Size	Length
V	126	⅝"	[illegible]
V1	44	"	11'-6"
V2	8	"	13'-6"
V3	24	"	14'-6"
V4	12	"	13'-0"
V5	12	"	11'-6"
V6	16	"	10'-0"
h	30	½"	[illegible]
h1	52	"	21'-0"
h2	6	"	14'-0"
h3	4	"	11'-6"
n	252	1"	9'-9"
t	110	[illegible]	[illegible]
h	180	[illegible]	[illegible]
z	100	[illegible]	[illegible]
z1	152	[illegible]	9'-9"
[illegible]	12	[illegible]	4'-6"
[illegible]	4	[illegible]	7'-2"
W	6	½"	27'-0"
W1	16	"	23'-0"
Reinforcing Steel Lbs.			17,120
Concrete Cu. Yds.			222.4

S.B.I. ROUTE 143 SEC. 104B
SALINE COUNTY
STA. 1199+05

STANDARD	COMPUTED	C. C. Wood
	CHECKED	[illegible]
	DRAWN	[illegible]
	CHECKED	C. C. W.
SPECIAL	ASSEMBLED	[illegible]
	CHECKED	M. P. Sapper

Jan 25 19
G. F. Burch

1156.



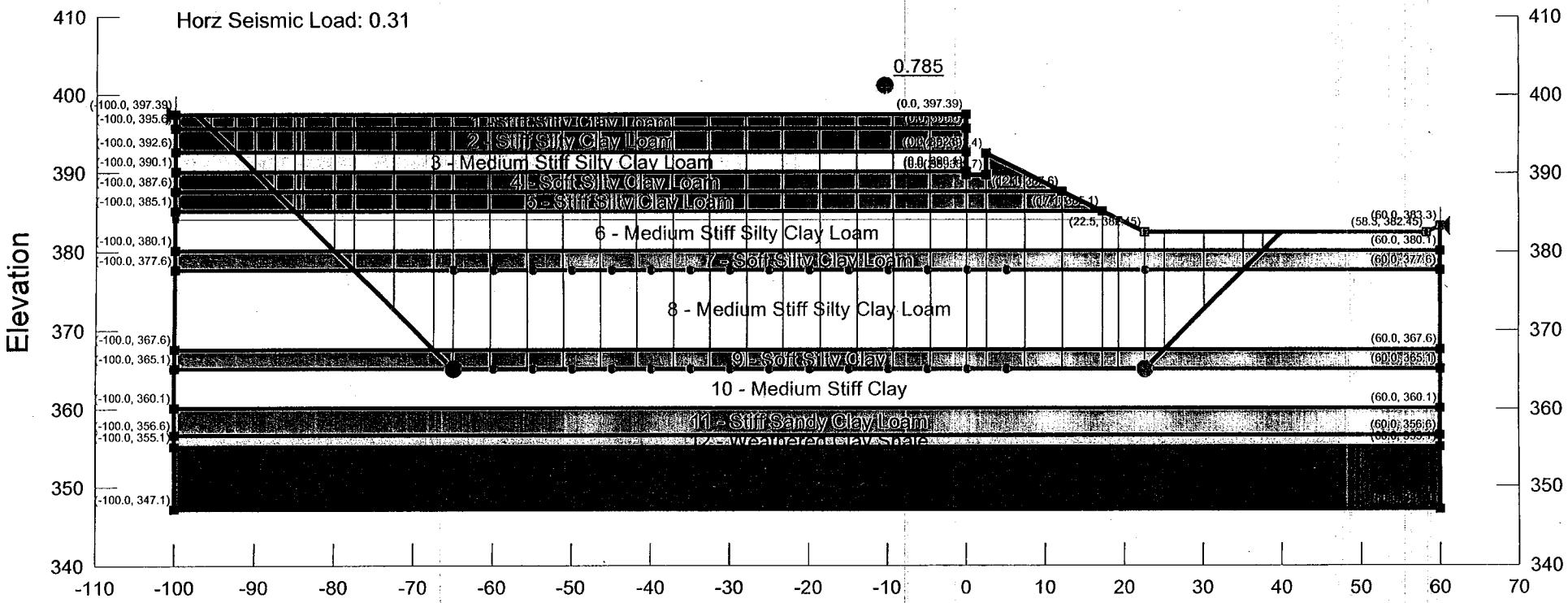
Material Properties

Name: 1 -Stiff Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 1200 psf Phi: 0 °
Name: 2 - Stiff Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 1200 psf Phi: 0 °
Name: 3 - Medium Stiff Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 700 psf Phi: 0 °
Name: 4 - Soft Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion: 400 psf Phi: 0 °
Name: 5 - Stiff Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 1200 psf Phi: 0 °
Name: 6 - Medium Stiff Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 650 psf Phi: 0 °
Name: 7 - Soft Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion: 300 psf Phi: 0 °
Name: 8 - Medium Stiff Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 700 psf Phi: 0 °
Name: 9 - Soft Silty Clay Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion: 400 psf Phi: 0 °
Name: 10 - Medium Stiff Clay Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 700 psf Phi: 0 °
Name: 11 - Stiff Sandy Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 1800 psf Phi: 0 °
Name: 12 - Weathered Clay Shale Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion: 1800 psf Phi: 0 °
Name: 13 - Hard Clay Shale Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion: 5000 psf Phi: 0 °

West Abutment End Slope
Undrained - Wedge
File Name: West Abutment End Slope.gsz
Last Edited By: Victor Mcduffee
Date: 6/8/2010 4:22:59 PM

STRUCTURE NO. 083-0068
IL ROUTE 34 OVER UNNAMED STREAM
ILLINOIS DEPARTMENT OF TRANSPORTATION
SALINE COUNTY, ILLINOIS

HANSON



Material Properties

Name: 1 -Stiff Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 1200 psf Phi: 0 °
Name: 2 - Stiff Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 1200 psf Phi: 0 °
Name: 3 - Medium Stiff Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 700 psf Phi: 0 °
Name: 4 - Soft Silty Clay Loam Model: Mohr-Coulomb Unit Weight: 110 pcf Cohesion: 400 psf Phi: 0 °
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West Abutment End Slope
Seismic Analysis - Wedge
File Name: West Abutment End Slope.gsz
Last Edited By: Victor Mcduffee
Date: 6/8/2010 4:22:59 PM

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IL ROUTE 34 OVER UNNAMED STREAM
ILLINOIS DEPARTMENT OF TRANSPORTATION
SALINE COUNTY, ILLINOIS

HANSON