Illinois Department of Transportation

Abbreviated Structure Geotechnical Report

Original Report Date: 5/9/14	Proposed SN: 050-0257	Route:	US 34, FAP 587
Revised Date: 7-7-14	Existing SN: 050-0189	Section:	(20)BR
Geotechnical Engineer: Terry McCleary of McCleary Engineering		County:	LaSalle
Structural Engineer: Lori Sommer of Zroka Engineering PC		Contract:	66853

Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing): **Single span structure, 80.67 ft. in total length from back to back of abutments. The superstructure will be a concrete deck on steel beams and supported by integral abutments with no piers. The factored loadings are estimated to be near 1438 kips and the foundation width was estimated to be near 49 ft. Please refer to the draft TSL drawing for a more accurate picture of what is to be constructed. The recommended foundation is a driven Metal Shell piling or H-piling. See the attached piling discussion.**

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): **Four borings exist for this structure, two from 1980 and two from 2009. In general, all the borings show similar soil stratification and the 2009 east abutment boring (B-2) is representative of the other borings and is therefore described here. This boring showed soft clay soils down to an approximate depth of 15 ft. where a hard Silty Clay Loam (TILL) was encountered. This soil continues to an approximate depth of 42 ft. where the soils switch to a dense fine Sand to coarse Gravel with N-values as high as 42. This material continues to an approximate depth of 54 ft. where the hard Silty Clay Loam (TILL) was encountered again. The borings ended in this hard TILL material. See the attached boring logs and profile for more detailed descriptions of the subsurface conditions. Each of the existing abutments rest on two rows of driven metal shell piling. The lengths and capacities are shown in the attached pile driving data sheets attached to this abbreviated SGR. At this time I see no need for additional investigation.**

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: **At the time of this report it is my understanding that less than 1.0 ft. of fill will be placed behind the abutments. This fill will likely be in the form of HMA mixtures and aggregate base course. No settlement is expected. Any settlement from the fill placed as widening for the sidewalk is estimated to be minor and will have no effect on the performances of the bridge. No ground improvement beyond normal construction practices is expected at this site therefore no further testing or analysis is proposed at this time.**

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. **Minimal grade change is expected. The end slope on the stream side of the abutment will remain a 1:2(V:H) slope with a slope height near 10 ft. The short term FOS is estimated to be 4.51. We estimate the long term FOS to be 1.53. These factors of safety were estimated using the commercially available software SLIDE 6.0. No further analysis, testing or ground improvement is expected for this project.**

Indicate at each substructure, the 100-year and 500-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. **No scour was accounted for at the abutments per IDOT policy. The bottom of the west abutment elevation is 720.28 ft. and the bottom of the east abutment is 720.28 ft. These are considered the depth of scour elevations. There are no piers planned for his structure.**

Determining the seismic soil site class, the seismic performance zone, the 0.2 and 1.0 second design spectral accelerations and indicate if the soils are liquefiable. **This site has is in a seismic performance zone, SPZ=1 and has a seismic soil site class of "C", an SDs = 0.120 and an SD1=0.066. Because of the SPZ a liquefaction analysis was not performed.**

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 skin friction and end bearing values shall be indicated when drilled shafts are proposed. **See attached discussion of pile length analysis and estimated pile design table.**
Calculate the estimated water surface elevation and determine the need for cofferdam(s) and seal coat: **There will be no need for a cofferdam as there will be no in stream pier work. However, a diversion of the stream may be needed to install the proposed riprap slope protection. This may be accomplished by temporarily redirecting the channel from one side of the channel to the other with an earthen levee or corrugated metal pipe.**
Assess the need for sheeting/soil retention versus using a temporary construction slope and provide recommendation for the most feasible option. **At this time the author anticipates the structure to be constructed under staged road conditions therefore sheet piling will be needed at a stage line. It may be difficult to drive sheet piling below 711.00 ft. If sheet piling will need to be driven deeper than this it may be appropriate to use the Temporary Soil Retention pay item.**

Piling Discussion

Pile Length Analysis for 050-0257:

In 1980 two abutment borings were taken to design the foundations of the existing structure, SN050-0189. In October of 2009, two additional abutment borings were taken. There is a stark difference in the estimated unconfined compressive strengths between the two sets of borings. The 2009 borings show strengths nearly two times that of the 1980 borings. The pile driving data for the existing structure seem to correlate with the 1980 borings and for that reason the 1980 borings were not rejected simply because newer data was available.

The SGR author performed analysis based on 1) the average of the data from the 2009 and the 1980 borings, 2) the data from the 1980 borings and, 3) the data from the 2009 borings. Pile length tables for all three analyses are included in this report. The attached driving data shows that metal shell piles were driven at this site in 1981. The benefit of using metal shell piles is that they should drive much shorter than the H-piles shown in Table 1. H-piles can be driven to support higher loads but will be driven much deeper than the metal shell piles therefore could increase the cost of the project. It may be necessary to increase the number of metal shell pile to support the same abutment loadings as supported with H-pile. The author recommends using a 14 inch Metal Shell pile with wall thickness of 0.312 inches from the pile length table using the soil data averaged between the 1980 and 2009 boring logs, Table 1. The author believes the other two sets of pile length tables are valuable information and were included in this abbreviated report for discussion purposes during the review process.

To obtain the data to complete the pile length tables the boring data was extended beyond the actual boring depth by inserting the result of averaging the last three data points of the actual log. For argument sake, if the 1980 logs are used, the author recommends a metal shell pile is used as the H-piles extend well below the actual logs. There is some risk of driving the piling to depths beyond the data shown in the logs. If the 2009 logs are used solely or if they are averaged with the 1980 logs either a 14”metal shell or an H-pile may be used but an H-pile is recommended for the higher loads. In the pile length tables the last row for each pile size is for the Maximum Nominal Required Bearing of the pile. In some of these tables the reader can see a dramatic jump in the required bearing with a small change in depth. This can be an indicator of possible over stressing of the pile during construction if driven to the maximum required bearing.

Per ABD 12.3, the MS 12 are allowed however because there is a chance the stronger soils shown in the IDOT borings from 2009 exist, we recommend using only MS14 piling of the metal shell family of piles or any of the HP piles listed in the table that fit the anticipated loading. Assumptions include: Bottom of Abutment elevation = 720.0 ft.; no geotechnical losses accounted for; and a 2.0 ft. pile embedment into the abutment is presumed. The preliminary factored loadings for this structure were estimated to be 1438 kips per abutment. Driving beyond the end of the boring involves an inherent risk for the owner. At least one test pile per foundation unit is recommended for this project.

It appears that the piling from the new east abutment could conflict with the battered piling of the existing east abutment. The existing piling may remain however the new piling will need to be spaced appropriately to miss them. The estimated pile length for an MS 14 with a Nominal Required Bearing of 160 kips if the minimum pile spacing is used is 17 ft. for the east abutment and 18 ft. for the west abutment. The estimated pile length for an MS14 pile with a Nominal Required Bearing of 425 kips if the maximum pile spacing is used is 37 ft. for the east abutment and 52 ft. for the west abutment.

Draft TSL Drawing

BENCHMARK: Top of concrete R.O.W. marker at southeast corner of Rte. 34 and E. 4th Rd. Sta. ±57+00, 90' Rt., El. 730.086

EXISTING STRUCTURE: Structure number 050-0189 was originally constructed in 1981 as FA Route 587 (US 34) Section (20.20X) RW & RS, BR. It is a single span precast, prestressed concrete deck beam bridge on open pile bent abutments. The length of the structure is 69'-0" from back to back of the abutments. The clear width is 40'-0" face to face of the railing.

Existing structure to be removed and replaced. One lane of traffic to be maintained by stage construction.

No salvage.

LOADING HL-93

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

DESIGN SPECIFICATIONS

2012 AASHTO LRFD Bridge Design Specifications with 2013 Interims

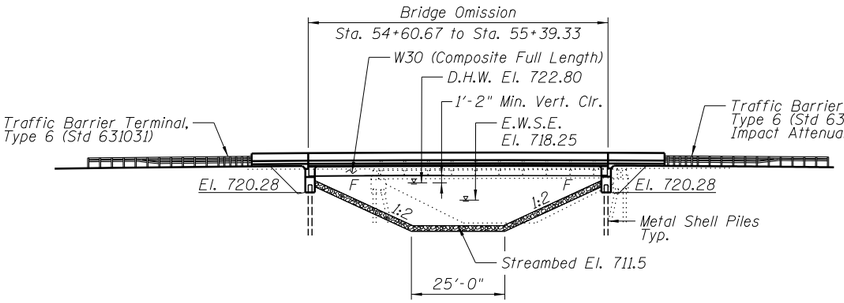
DESIGN STRESSES

FIELD UNITS

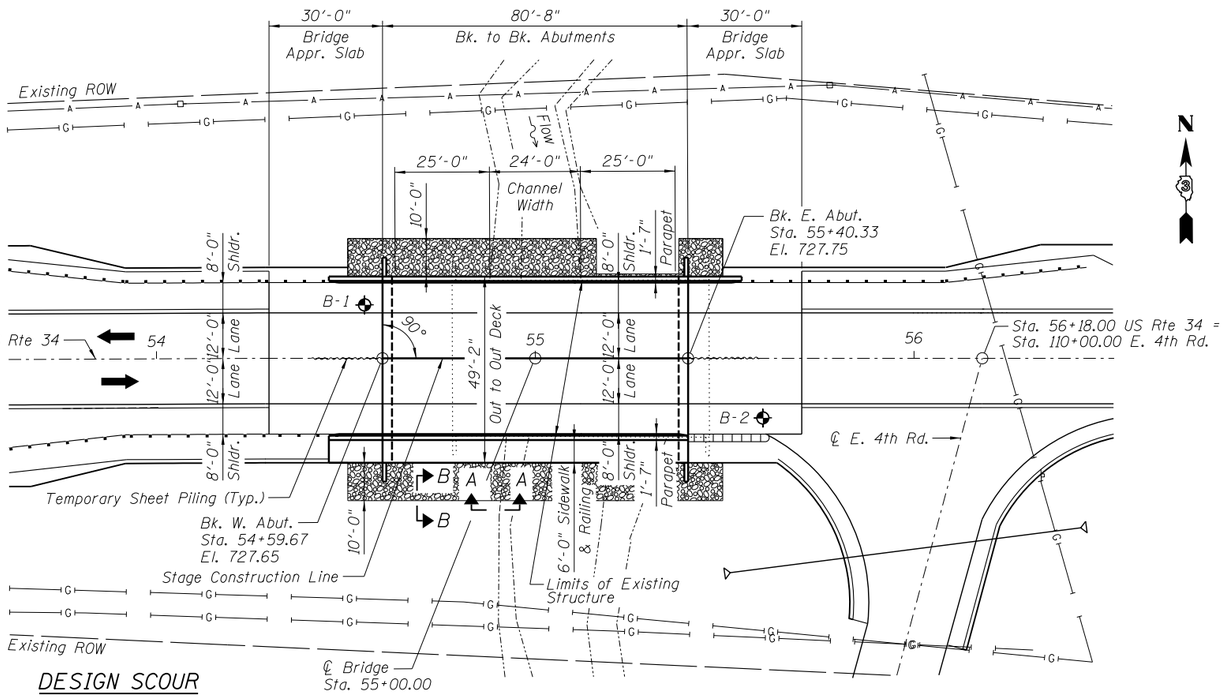
f'_c = 3,500 psi
f_y = 60,000 psi (reinforcement)
f_y = 50,000 psi (M270 Grade 50W)

SEISMIC DATA

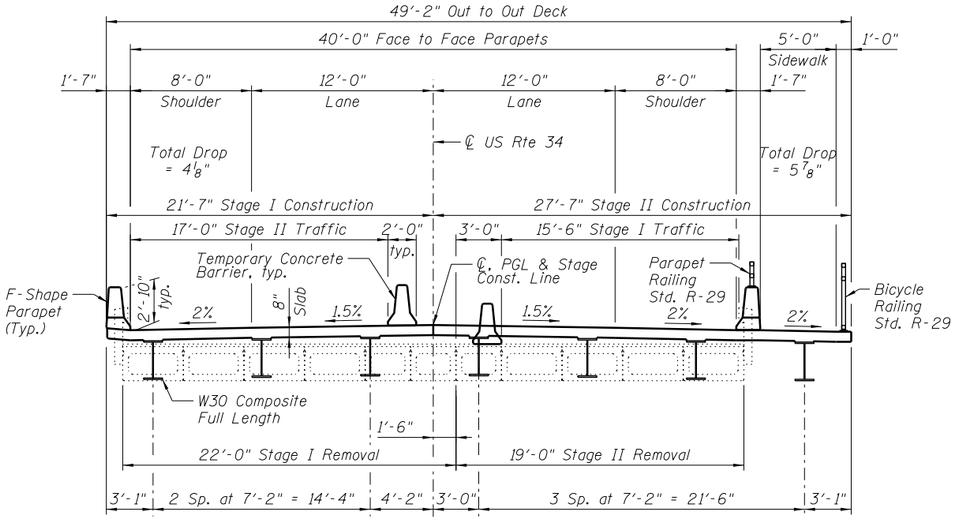
Seismic Performance Zone (SPZ) = __
Design Spectral Acceleration @ 1.0 sec (SD1) = ____
Design Spectral Acceleration @ 0.2 sec (SDS) = ____
Soil Site Class = _



ELEVATION

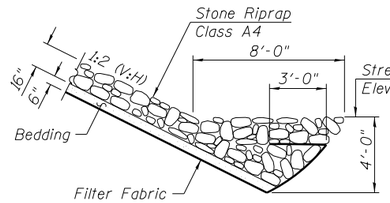


PLAN

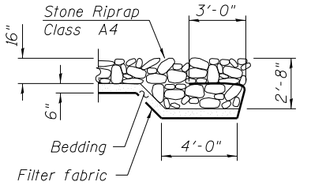


CROSS SECTION

(Looking East)



SECTION A-A



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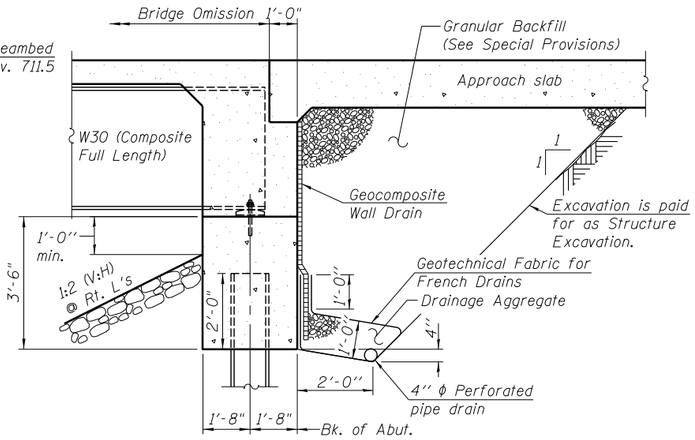


SECTION THRU INTEGRAL ABUTMENT

(Horiz. dim. @ Rt. L's)

DESIGN SCOUR ELEVATION TABLE

W. Abut.	E. Abut.
720.3	720.3

HIGHWAY CLASSIFICATION

Route: FAP 587 (US Rte 34)
Functional Class: Urban Other Principal Arterial
ADT: 7000 (2011), 9800 (2031)
DHV = 680 (2031)
ADTT = 12%
Design Speed: 45 mph
Posted Speed: 45 mph
Directional Distribution: 50/50
Two Way Traffic

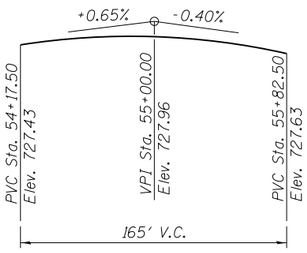
WATERWAY INFORMATION

Drainage Area = 9.1 sq. mi.

Exist. Low Grade Elev. = 726.36 @ Sta. 54+40
Prop. Low Grade Elev. = 726.39 @ Sta. 53+50

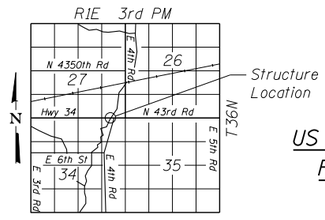
Flood	Freq. Yr.	Q C.F.S.	Opening Sq. Ft. Exist.	Opening Sq. Ft. Prop.	Nat. H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	10	1730	361	414	721.8	0.5	0.6	722.3	722.4
Hydraulic Design	50	2890	425	480	722.8	1.1	0.9	724.0	723.8
Base	100	3420	450	506	723.2	1.5	1.1	724.7	724.4
Scour Design	200	3995	473	531	723.6	2.0	1.4	725.6	725.0
Ex. Overtopping	423	4571	490	555	724.0	2.6	1.6	726.6	725.6
Max. Calc.	500	4740	490	562	724.1	2.7	1.6	726.8	725.7

10-Year Velocity through Existing Bridge = 5.0 fps
10-Year Velocity through Proposed Bridge = 5.6 fps



PROFILE GRADE

(along ℄ US Route 34)



LOCATION SKETCH

GENERAL PLAN
US 34 OVER LITTLE VERMILION RIVER
FAP 587 (US 34) SECTION (20) BR
LA SALLE COUNTY
STA. 55+00.00
STRUCTURE NO. 050-0257

FILE NAME = ...\050-0257_66853_TSL.dgn

Zroka Engineering, P.C.
4216 North Hermitage
Chicago, IL 60613

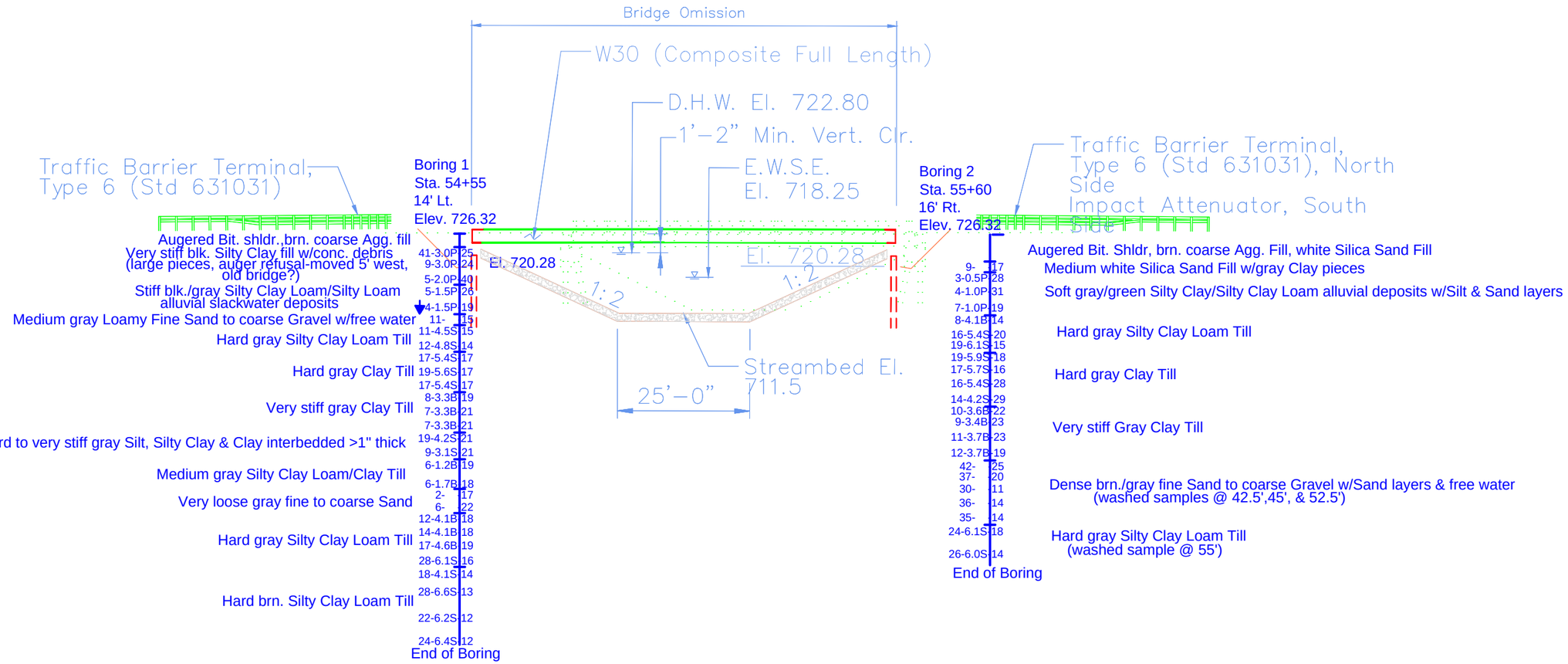
USER NAME = SAW	DESIGNED - LAS	REVISED -
	CHECKED - DAZ	REVISED -
PLOT SCALE = 480:0.0000 '=' / ft.	DRAWN - SAW	REVISED -
PLOT DATE = 3/20/2014	CHECKED - LAS	REVISED -

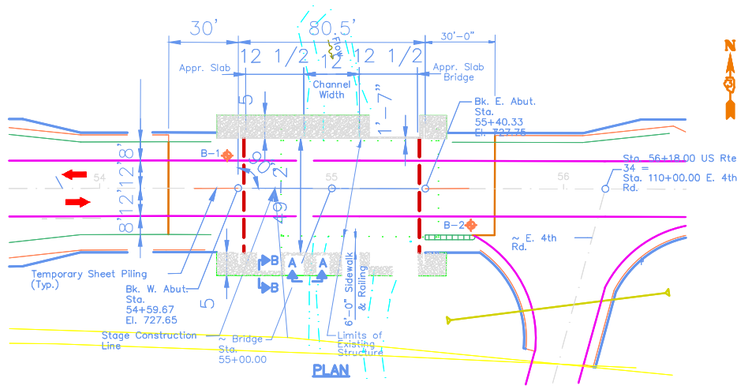
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN
STRUCTURE NO. 050-0257
SHEET NO. 1 OF 1 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
587	(20) BR	LA SALLE		
		CONTRACT NO. 66853		
	ILLINOIS FED. AID PROJECT			

Soil Profile





McCleary Engineering	Designed by:	Date:	U.S. 34 Bridge East of Mendota	Route	Section	County
	Drawn by: MLL	Date: 3/27/14		US 34		LaSalle
	Checked by:	Date:	Scale =_____ Sheet 1 of 1	Sta. _____ to Sta._____	Bridge number: 050-0189	

Pile Length Tables

Table 1: PILE LENGTH TABLES USING SOIL DATA AVERAGED BETWEEN THE 1980 BORINGS AND 2009 BORINGS

West Abutment, Using Data Averaged between Boring B-1 (2009) and Boring B-1 (1980)				East Abutment, Using Data Averaged between Boring B-2 (2009) and Boring B-2 (1980)		
Nominal Required Bearing (KIPS)	Factored Resistance Available (KIPS)	Estimated Pile Length (Ft.)		Nominal Required Bearing (KIPS)	Factored Resistance Available (KIPS)	Estimated Pile Length (Ft.)
MS 12 with 0.25" wall				MS 12 with 0.25"		
161	89	20		164	90	20
219	120	30		202	111	25
273	150	40		238	131	30
305	168	45		274	151	35
353	194	50		353	194	37
MS 14 with 0.25" wall				MS 14 with 0.25" wall		
198	109	20		198	109	20
259	143	30		282	155	30
320	176	40		305	168	33
361	199	45		325	178	35
413	227	50		413	227	37
MS 14 with 0.312" wall				MS 14 with 0.312" wall		
320	176	40		198	109	20
361	199	45		282	155	30
408	224	50		305	168	33
442	243	55		325	178	35
513	282	63		513	282	37
HP 10x42				HP 10x42		
186	102	40		233	128	38
237	130	50		267	147	45
270	148	60		257	142	50
305	168	65		292	161	55
335	184	71		335	184	60
HP 12x53				HP 12x53		
225	124	40		294	161	38
296	163	50		336	185	45
329	181	60		319	175	50
403	222	70		360	198	55
418	230	73		418	230	63
HP 12x63				HP 12x63		
299	165	50		340	187	45
332	183	60		322	177	50
407	224	70		364	200	55
467	257	80		401	221	60
497	273	84		497	273	73
HP 14x73				HP 14x73		
268	147	40		258	142	30
368	202	55		371	204	40
396	218	60		390	214	50
521	287	75		483	266	60
578	318	84		578	318	70
HP 14x89				HP 14x89		
271	149	40		376	207	40
372	205	55		395	217	50
401	220	60		489	269	60
528	290	75		579	319	70
705	Well below end of boring			705	Well below end of boring	

*Soil Data for depths below the end of the 1980 borings were taken from the 2009 borings. The soil data below the 1980 boring was restricted to Qu's no higher than 4.0 tsf in efforts to limit the effects of the 2009 boring data.

Table 2: PILE LENGTH TABLES USING SOIL DATA from Borings taken in 2009

West Abutment, Using Boring B-1 (2009)				East Abutment, Using Boring B-2 (2009)		
Nominal Required Bearing (KIPS)	Factored Resistance Available (KIPS)	Estimated Pile Length (Ft.)		Nominal Required Bearing (KIPS)	Factored Resistance Available (KIPS)	Estimated Pile Length (Ft.)
MS 12 with 0.25" wall				MS 12 with 0.25"		
250	138	30		171	94	20
293	161	35		209	115	25
312	172	41		248	137	30
341	188	45		302	166	36
353	194	48		353	194	37
MS 14 with 0.25" wall				MS 14 with 0.25" wall		
298	164	30		209	115	20
347	191	35		251	138	25
367	202	41		295	162	30
404	222	45		359	197	36
413	227	47		413	227	37
MS 14 with 0.312" wall				MS 14 with 0.312" wall		
298	164	30		209	115	20
347	191	35		251	138	25
367	202	41		295	162	30
404	222	45		359	197	36
513	283	54		513	283	37
HP 10x42				HP 10x42		
177	98	30		246	135	40
213	117	41		269	148	45
262	144	50		275	151	50
314	173	55		314	173	56
335	185	59		335	185	59*
HP 12x53				HP 12x53		
221	122	30		308	170	40
260	143	41		339	187	45
324	178	50		345	190	50
391	215	55		392	215	56
418	229	59		418	229	59*
HP 12x63				HP 12x63		
223	123	30		312	171	40
262	144	41		343	189	45
327	180	50		348	192	50
388	213	58		396	218	56
497	273	67		497	273	68*
HP 14x73				HP 14x73		
272	149	30		320	176	35
313	172	41		381	210	40
396	218	50		427	235	50
468	257	58		482	265	56
578	318	66		578	318	66*
HP 14x89				HP 14x89		
317	174	41		324	178	35
401	221	50		387	213	40
551	303	61		433	238	50
645	355	71		489	269	56
705	387	77*		705	387	80*

*Below the bottom of the boring data.

Table 2: PILE LENGTH TABLES USING SOIL DATA from Borings taken in 1980

West Abutment, Using Boring B-1 (1980)				East Abutment, Using Boring B-2 (1980)		
Nominal Required Bearing (KIPS)	Factored Resistance Available (KIPS)	Estimated Pile Length (Ft.)		Nominal Required Bearing (KIPS)	Factored Resistance Available (KIPS)	Estimated Pile Length (Ft.)
MS 12 with 0.25" wall				MS 12 with 0.25"		
188	104	31		198	109	31
223	123	36		229	126	36
347	191	41		267	147	42
287	158	50		296	163	48*
353	194	51		353	194	58*
MS 14 with 0.25" wall				MS 14 with 0.25" wall		
265	146	36		271	149	36
427	235	41**		315	173	42
363	200	45		349	192	48*
338	186	50		382	210	53*
413	227	51		413	227	58*
MS 14 with 0.312" wall				MS 14 with 0.312" wall		
265	146	36		271	149	36
427	235	41		315	173	42
363	200	45		349	192	48*
338	186	50		416	229	58*
513	283	51		513	283	72*
HP 12x53				HP 12x53		
331	182	80*		229	126	43
339	187	85*		276	152	53*
348	191	90*		322	177	63*
356	196	95*		368	202	73*
418	229	>100*		418	229	84*
HP 12x63				HP 12x63		
334	184	80*		255	140	48*
343	189	85*		301	166	58*
351	193	90*		348	191	68*
360	198	95*		395	217	78*
497	Well below bottom of boring			497	Well below bottom of boring	
HP 14x73				HP 14x73		
276	152	50		252	138	38
356	196	55		305	168	48*
367	202	60*		360	198	58*
397	218	75*		415	228	68*
578	Well below bottom of boring			578	Well below bottom of boring	
HP 14x89				HP 14x89		
280	154	50		284	156	42
361	198	55		309	170	48*
372	205	60*		337	185	53*
402	221	75*		392	215	63*
705	Well below bottom of boring			705	Well below bottom of boring	

*Below the bottom of the boring data.

Complete Pile Length Output Using Boring Data Averaged Between 1980 and 2009 Logs

Pile Design Table for West abut. utilizing Boring #1 (Ave. of 1980 & 2009)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
161	89	20
172	94	23
195	107	25
204	112	28
219	120	30
236	130	33
Metal Shell 12"Φ w/.25" walls		
161	89	20
172	94	23
195	107	25
204	112	28
219	120	30
236	130	33
261	143	35
273	150	38
273	150	40
284	156	43
305	168	45
Metal Shell 14"Φ w/.25" walls		
165	91	18
198	109	20
207	114	23
234	129	25
242	133	28
259	143	30
279	154	33
310	171	35
320	176	40
333	183	43
361	199	45
Metal Shell 14"Φ w/.312" walls		
165	91	18
198	109	20
207	114	23
234	129	25
242	133	28
259	143	30
279	154	33
310	171	35
320	176	40
333	183	43
361	199	45
Steel HP 8 X 36		
157	86	45
186	102	50
200	110	55
213	117	58
217	120	60
233	128	63
244	134	65
254	140	68
265	146	70
275	151	73
285	157	75
Steel HP 10 X 42		
156	86	30
167	92	33
186	102	40
187	103	43
194	107	45
237	130	50
249	137	55
266	147	58
270	148	60
291	160	63
305	168	65
316	174	68
329	181	70

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 57		
159	87	30
171	94	33
189	104	40
191	105	43
198	109	45
242	133	50
254	140	55
272	150	58
275	151	60
298	164	63
312	171	65
323	178	68
337	185	70
349	192	73
362	199	75
374	206	78
387	213	80
400	220	83
413	227	85
426	234	88
439	241	90
452	248	93
Steel HP 12 X 53		
165	91	23
181	99	28
192	106	30
207	114	33
225	124	40
226	124	43
236	130	45
296	163	50
304	167	55
327	180	58
329	181	60
358	197	63
374	206	65
388	213	68
403	222	70
417	230	73
Steel HP 12 X 63		
141	77	20
168	93	23
182	100	28
194	107	30
209	115	33
227	125	40
228	125	43
238	131	45
299	165	50
307	169	55
330	182	58
332	183	60
361	199	63
378	208	65
391	215	68
407	224	70
421	232	73
436	240	75
452	248	78
467	257	80
482	265	83
Steel HP 12 X 74		
143	79	20
170	94	23
185	102	28
197	108	30
212	117	33
230	126	40
231	127	43
241	133	45
304	167	50
311	171	55
335	184	58
336	185	60
366	201	63
383	211	65
397	218	68
413	227	70
427	235	73
442	243	75
458	252	78
473	260	80
489	269	83
504	277	85
520	286	88
535	294	90
551	303	93
Steel HP 12 X 84		
146	80	20
172	95	23
188	103	28
200	110	30
215	118	33
232	128	40
234	128	43
244	134	45
309	170	50
316	174	55
340	187	58
341	188	60
371	204	63
388	214	65
402	221	68
418	230	70
433	238	73
448	247	75
464	255	78
480	264	80
496	273	83
511	281	85
527	290	88
543	298	90
558	307	93

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 14 X 73		
130	71	18
167	92	20
199	110	23
221	122	28
235	129	30
253	139	33
268	147	40
269	148	43
283	156	45
366	201	50
368	202	55
396	218	60
434	239	63
453	249	65
469	258	68
487	268	70
503	277	73
521	287	75
539	297	78
557	307	80
575	316	83
Steel HP 14 X 89		
133	73	18
171	94	20
203	112	23
224	123	28
238	131	30
256	141	33
271	149	40
272	149	43
286	157	45
371	204	50
372	205	55
401	220	60
439	242	63
459	252	65
474	261	68
493	271	70
509	280	73
528	290	75
546	300	78
564	310	80
582	320	83
600	330	85
618	340	88
637	350	90
655	360	93
Steel HP 14 X 102		
136	75	18
174	95	20
205	113	23
227	125	28
241	132	30
259	142	33
274	151	40
274	151	43
289	159	45
376	207	50
376	207	55
405	223	60
445	245	63
464	255	65
480	264	68
499	274	70
515	283	73
534	294	75
552	304	78
571	314	80
589	324	83
607	334	85
626	344	88
644	354	90
662	364	93
Steel HP 14 X 117		
140	77	18
177	98	20
209	115	23
230	126	28
244	134	30
262	144	33
277	152	40
277	153	43
292	161	45
381	209	55
410	225	60
450	247	63
470	258	65
486	267	68
505	277	70
521	287	73
540	297	75
559	307	78
577	317	80
596	328	83
614	338	85
633	348	88
651	358	90
670	368	93
Precast 14"x 14"		
162	89	15
210	115	18
252	139	20
264	145	23
Timber Pile		
147	81	23

Pile Design Table for east abut. utilizing Boring #2 (Ave. of 1980 & 2009)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
164	90	20
186	102	23
202	111	25
220	121	28
238	131	30
249	137	32
Metal Shell 12"Φ w/.25" walls		
164	90	20
186	102	23
202	111	25
220	121	28
238	131	30
249	137	32
257	141	33
268	148	34
274	151	35
285	157	37
Metal Shell 14"Φ w/.25" walls		
144	79	15
176	97	18
198	109	20
223	123	23
240	132	25
262	144	28
282	155	30
295	162	32
305	168	33
318	175	34
325	178	35
337	185	37
Metal Shell 14"Φ w/.312" walls		
144	79	15
176	97	18
198	109	20
223	123	23
240	132	25
262	144	28
282	155	30
295	162	32
305	168	33
318	175	34
325	178	35
337	185	37
Steel HP 8 X 36		
160	88	37
182	100	38
187	103	40
196	108	41
199	110	44
204	112	46
205	112	50
220	121	53
233	128	55
245	135	58
258	142	60
271	149	63
284	156	65
Steel HP 10 X 42		
158	87	28
169	93	30
177	97	32
183	101	33
191	105	34
194	107	35
201	111	37
233	128	38
239	131	40
252	138	41
254	140	44
257	142	50
276	152	53
292	161	55
307	169	58
323	178	60

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 57		
162	89	28
173	95	30
181	99	32
187	103	33
195	107	34
198	109	35
205	113	37
239	131	38
245	134	40
258	142	41
260	143	44
263	145	50
282	155	53
298	164	55
314	173	58
330	182	60
346	190	63
362	199	65
378	208	68
394	217	70
410	226	73
Steel HP 12 X 53		
157	87	20
175	96	23
183	100	25
197	108	28
210	116	30
219	120	32
227	125	33
236	130	34
239	132	35
248	136	37
294	161	38
299	165	40
317	174	41
318	175	44
319	175	50
341	188	53
360	198	55
379	208	58
398	219	60
416	229	63
Steel HP 12 X 63		
160	88	20
177	98	23
185	101	25
199	109	28
212	117	30
221	122	32
229	126	33
238	131	34
242	133	35
250	138	37
297	163	38
303	166	40
321	176	41
322	177	44
322	177	50
345	190	53
364	200	55
383	210	58
401	221	60
420	231	63
439	242	65
458	252	68
477	263	70
496	273	73
Steel HP 12 X 74		
163	90	20
180	99	23
187	103	25
202	111	28
215	119	30
224	123	32
233	128	33
242	133	34
245	135	35
254	140	37
301	166	38
307	169	40
326	179	41
327	180	50
350	192	53
369	203	55
388	213	58
407	224	60
426	235	63
446	245	65
465	256	68
484	266	70
503	277	73
Steel HP 12 X 84		
165	91	20
183	101	23
190	105	25
205	113	28
219	120	30
228	125	32
236	130	33
245	135	34
249	137	35
258	142	37
306	168	38
312	172	40
331	182	41
331	182	50
355	195	53
374	206	55
394	216	58
413	227	60
432	238	63
452	249	65
471	259	68
491	270	70
510	281	73

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 14 X 73		
156	86	18
190	105	20
219	121	23
226	124	25
242	133	28
258	142	30
268	147	32
278	153	33
289	159	34
292	161	35
302	166	37
365	201	38
371	204	40
390	214	50
416	229	53
439	241	55
461	254	58
483	266	60
505	278	63
528	290	65
550	303	68
572	315	70
Steel HP 14 X 89		
159	87	18
194	107	20
223	122	23
229	126	25
245	135	28
261	144	30
271	149	32
281	155	33
292	161	34
296	163	35
306	168	37
370	204	38
376	207	40
395	217	50
422	232	53
444	244	55
467	257	58
489	269	60
512	281	63
534	294	65
557	306	68
579	319	70
602	331	73
Steel HP 14 X 102		
161	89	18
196	108	20
226	124	23
232	127	25
248	137	28
264	145	30
275	151	32
285	157	33
296	163	34
299	165	35
310	170	37
375	206	38
381	209	40
400	220	50
427	235	53
450	247	55
472	260	58
495	272	60
518	285	63
541	297	65
563	310	68
586	322	70
609	335	73
Steel HP 14 X 117		
165	91	18
199	110	20
229	126	23
235	129	25
251	138	28
268	147	30
278	153	32
289	159	33
300	165	34
303	167	35
314	173	37
380	209	38
386	212	40
405	223	50
432	238	53
455	250	55
478	263	58
501	276	60
524	288	63
547	301	65
570	314	68
593	326	70
616	339	73
Precast 14"x 14"		
149	82	13
183	101	15
225	124	18
252	139	20
Timber Pile		
141	78	20

Complete Pile Length Output Using Boring Data from 1980 Logs

Pile Design Table for west abut. utilizing Boring #1 (1980)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
154	85	23
172	95	26
178	98	28
188	104	31
202	111	33
223	123	36
233	128	38
Metal Shell 12"Φ w/.25" walls		
154	85	23
172	95	26
178	98	28
188	104	31
202	111	33
223	123	36
233	128	38
276	152	48
282	155	49
287	158	50
292	161	51
Metal Shell 14"Φ w/.25" walls		
127	70	16
169	93	18
178	98	21
185	102	23
205	113	26
210	116	28
222	122	31
238	131	33
265	146	36
275	151	38
Metal Shell 14"Φ w/.312" walls		
127	70	16
169	93	18
178	98	21
185	102	23
205	113	26
210	116	28
222	122	31
238	131	33
265	146	36
275	151	38
326	179	48
332	182	49
338	186	50
344	189	51
Steel HP 8 X 36		
153	84	51
177	97	52
178	98	53
179	98	54
180	99	55
181	99	55
186	103	60
192	106	65
198	109	70
204	112	75
210	115	80
215	118	85
221	122	90
227	125	95
Steel HP 10 X 42		
163	90	38
176	97	43
177	97	44
178	98	45
178	98	46
180	99	48
183	101	49
187	103	50
190	105	51
225	124	52
227	125	53
228	125	54
229	126	55
230	127	55
237	130	60
244	134	65
251	138	70
258	142	75
265	146	80
273	150	85
280	154	90
287	158	95

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 57		
164	90	36
167	92	38
180	99	43
181	99	44
182	100	45
182	100	46
183	101	48
187	103	49
191	105	50
194	107	51
231	127	52
232	128	53
233	128	54
235	129	55
236	130	55
243	134	60
250	138	65
257	141	70
264	145	75
272	149	80
279	153	85
286	157	90
293	161	95
Steel HP 12 X 53		
161	88	31
173	95	33
199	109	36
200	110	38
216	119	43
217	119	44
218	120	45
219	120	46
220	121	48
224	123	49
229	126	50
233	128	51
282	155	52
284	156	53
286	157	54
287	158	55
288	159	55
297	163	60
305	168	65
314	173	70
322	177	75
331	182	80
339	187	85
348	191	90
356	196	95
Steel HP 12 X 63		
162	89	31
175	96	33
201	110	36
202	111	38
218	120	43
219	120	44
220	121	45
221	121	46
222	122	48
226	125	49
231	127	50
235	129	51
285	157	52
287	158	53
289	159	54
290	160	55
291	160	55
300	165	60
308	170	65
317	174	70
326	179	75
334	184	80
343	189	85
351	193	90
360	198	95
Steel HP 12 X 74		
164	90	31
178	98	33
204	112	36
205	113	38
221	122	43
222	122	44
223	123	45
224	123	46
225	124	48
230	126	49
234	129	50
238	131	51
290	159	52
291	160	53
293	161	54
295	162	55
296	163	55
305	167	60
313	172	65
322	177	70
331	182	75
339	187	80
348	191	85
357	196	90
365	201	95
Steel HP 12 X 84		
160	88	28
167	92	31
180	99	33
207	114	36
208	114	38
224	123	43
225	124	44
226	124	45
227	125	46
228	126	48
233	128	49
237	130	50
242	133	51
294	162	52
296	163	53
298	164	54
300	165	55
300	165	55
309	170	60
318	175	65
327	180	70
336	185	75
344	189	80
353	194	85
362	199	90
371	204	95

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 14 X 73		
155	85	21
182	100	23
187	103	28
194	107	31
210	116	33
243	133	38
261	144	43
262	144	44
264	145	45
264	145	46
266	146	48
271	149	49
276	152	50
281	155	51
350	192	52
352	193	53
354	195	54
356	196	55
357	196	55
367	202	60
377	207	65
387	213	70
397	218	75
407	224	80
417	229	85
427	235	90
437	241	95
Steel HP 14 X 89		
159	87	21
184	101	23
189	104	28
197	108	31
213	117	33
246	135	38
265	146	43
265	146	44
267	147	45
268	147	46
269	148	48
275	151	49
280	154	50
285	157	51
354	195	52
357	196	53
359	197	54
361	198	55
362	199	55
372	205	60
382	210	65
392	216	70
402	221	75
413	227	80
423	233	85
433	238	90
443	244	95
Steel HP 14 X 102		
161	89	21
187	103	23
191	105	28
199	109	31
215	119	33
249	137	38
268	147	43
269	148	44
270	148	45
271	149	46
273	150	48
278	153	49
283	156	50
288	159	51
359	198	52
361	199	53
363	200	54
365	201	55
367	202	55
377	207	60
387	213	65
397	219	70
408	224	75
418	230	80
428	236	85
439	241	90
449	247	95
Steel HP 14 X 117		
164	90	21
190	104	23
194	107	28
201	111	31
218	120	33
252	138	38
271	149	43
272	149	44
273	150	45
274	151	46
276	152	48
281	155	49
286	157	50
292	160	51
364	200	52
366	201	53
368	203	54
370	204	55
371	204	55
382	210	60
392	216	65
403	221	70
413	227	75
423	233	80
434	239	85
444	244	90
455	250	95
Precast 14"x 14"		
162	89	16
215	118	18
226	124	21
236	130	23
261	144	26
Timber Pile		
137	75	23

Pile Design Table for east abut. utilizing Boring #2 (1980)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
154	85	23
167	92	26
181	99	28
198	109	31
213	117	33
229	126	36
241	133	38
Metal Shell 12"Φ w/.25" walls		
154	85	23
167	92	26
181	99	28
198	109	31
213	117	33
229	126	36
241	133	38
267	147	42
268	147	43
296	163	48
325	179	53
Metal Shell 14"Φ w/.25" walls		
143	79	18
173	95	21
184	101	23
198	109	26
214	118	28
235	129	31
253	139	33
271	149	36
285	157	38
315	173	42
315	173	43
349	192	48
382	210	53
Metal Shell 14"Φ w/.312" walls		
143	79	18
173	95	21
184	101	23
198	109	26
214	118	28
235	129	31
253	139	33
271	149	36
285	157	38
315	173	42
315	173	43
349	192	48
382	210	53
416	229	58
449	247	63
482	265	68
Steel HP 8 X 36		
166	91	48
181	100	53
197	108	58
213	117	63
228	126	68
244	134	73
260	143	78
275	151	83
Steel HP 10 X 42		
162	89	36
169	93	38
187	103	43
206	113	48
225	124	53
245	135	58
264	145	63
283	156	68
302	166	73
321	177	78

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 57		
166	91	36
173	95	38
191	105	43
211	116	48
230	127	53
250	137	58
269	148	63
289	159	68
309	170	73
328	180	78
348	191	83
367	202	88
387	213	93
407	224	98
426	234	103
446	245	108
Steel HP 12 X 53		
159	87	28
175	96	31
188	103	33
201	110	36
208	114	38
229	126	43
253	139	48
276	152	53
299	164	58
322	177	63
345	190	68
368	202	73
391	215	78
414	228	83
Steel HP 12 X 63		
160	88	28
177	97	31
190	104	33
202	111	36
210	115	38
232	127	43
255	140	48
278	153	53
301	166	58
325	179	63
348	191	68
371	204	73
395	217	78
418	230	83
441	243	88
464	255	93
488	268	98
Steel HP 12 X 74		
162	89	28
180	99	31
193	106	33
205	113	36
213	117	38
235	129	43
258	142	48
282	155	53
306	168	58
329	181	63
353	194	68
376	207	73
400	220	78
423	233	83
447	246	88
471	259	93
494	272	98
518	285	103
541	298	108
565	311	113
588	324	118
Steel HP 12 X 84		
165	91	28
182	100	31
195	107	33
208	115	36
216	119	38
238	131	43
262	144	48
286	157	53
310	170	58
334	183	63
357	197	68
381	210	73
405	223	78
429	236	83
453	249	88
477	262	93
501	275	98
524	288	103
548	302	108
572	315	113
596	328	118
620	341	123
644	354	128

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 14 X 73		
141	78	18
168	92	21
173	95	23
182	100	26
194	106	28
215	118	31
230	126	33
245	134	36
252	138	38
278	153	43
305	168	48
333	183	53
360	198	58
387	213	63
415	228	68
442	243	73
469	258	78
497	273	83
524	288	88
551	303	93
Steel HP 14 X 89		
144	79	18
171	94	21
175	96	23
184	101	26
196	108	28
217	120	31
232	128	33
248	136	36
255	140	38
281	155	43
309	170	48
337	185	53
364	200	58
392	215	63
419	231	68
447	246	73
475	261	78
502	276	83
530	292	88
558	307	93
585	322	98
613	337	103
641	352	108
668	368	113
696	383	118
Steel HP 14 X 102		
145	80	18
173	95	21
177	98	23
187	103	26
199	109	28
220	121	31
235	129	33
251	138	36
258	142	38
285	157	43
313	172	48
340	187	53
368	203	58
396	218	63
424	233	68
452	249	73
480	264	78
508	279	83
536	295	88
564	310	93
592	326	98
620	341	103
648	356	108
676	372	113
704	387	118
732	402	123
760	418	128
787	433	133
Steel HP 14 X 117		
147	81	18
175	96	21
180	99	23
189	104	26
201	111	28
223	123	31
238	131	33
254	140	36
261	144	38
288	158	43
316	174	48
344	189	53
373	205	58
401	221	63
429	236	68
457	252	73
486	267	78
514	283	83
542	298	88
570	314	93
599	329	98
627	345	103
655	360	108
683	376	113
711	391	118
740	407	123
768	422	128
796	438	133
824	453	138
853	469	143
Precast 14"x 14"		
166	92	16
182	100	18
220	121	21
234	129	23
252	139	26
Timber Pile		
141	78	23

Complete Pile Length Output Using Boring Data from 2009 Logs

Pile Design Table for west abut. utilizing Boring #1 (2009)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
152	83	18
179	98	20
203	111	23
210	116	25
230	127	28
250	138	30
Metal Shell 12"Φ w/.25" walls		
152	83	18
179	98	20
203	111	23
210	116	25
230	127	28
250	138	30
278	153	33
293	161	35
296	163	38
312	172	41
320	176	43
341	188	45
351	193	48
Metal Shell 14"Φ w/.25" walls		
149	82	15
186	102	18
218	120	20
245	135	23
251	138	25
274	151	28
298	164	30
332	182	33
347	191	35
347	191	38
367	202	41
376	207	43
404	222	45
Metal Shell 14"Φ w/.312" walls		
149	82	15
186	102	18
218	120	20
245	135	23
251	138	25
274	151	28
298	164	30
332	182	33
347	191	35
347	191	38
367	202	41
376	207	43
404	222	45
417	229	48
445	245	50
478	263	53
Steel HP 8 X 36		
162	89	38
170	94	43
175	96	45
195	107	48
208	114	50
224	123	53
248	136	55
249	137	58
280	154	61
Steel HP 10 X 42		
164	90	28
177	98	30
200	110	33
200	110	38
209	115	43
216	119	45
246	135	48
262	144	50
282	155	53
312	172	58

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 57		
154	85	25
168	92	28
182	100	30
204	112	38
213	117	43
220	121	45
251	138	48
268	147	50
289	159	53
319	175	58
363	200	61
381	209	63
394	217	66
412	226	68
431	237	71
441	242	72
Steel HP 12 X 53		
157	87	20
187	103	23
188	104	25
205	113	28
221	122	30
243	134	38
252	139	43
262	144	45
305	168	48
324	178	50
350	193	53
384	211	58
Steel HP 12 X 63		
161	89	20
190	105	25
207	114	28
223	123	30
246	135	38
254	140	43
264	145	45
308	169	48
327	180	50
354	194	53
388	213	58
446	245	61
467	257	63
482	265	66
Steel HP 12 X 74		
163	90	20
193	106	25
210	116	28
227	125	30
249	137	38
257	142	43
268	147	45
312	172	48
332	183	50
359	197	53
394	217	58
453	249	61
474	261	63
489	269	66
511	281	68
534	294	71
546	300	72
562	309	74
579	319	76
Steel HP 12 X 84		
166	91	20
196	108	23
196	108	25
213	117	28
230	127	30
252	139	38
261	143	43
271	149	45
317	174	48
337	185	50
364	200	53
399	220	58
460	253	61
481	265	63
497	273	66
518	285	68
542	298	71
553	304	72
571	314	74
588	323	76
605	333	78
622	342	80
639	351	82
656	361	84

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 14 X 73		
154	85	18
191	105	20
226	125	23
233	128	25
252	139	28
272	149	30
292	161	38
300	165	43
314	172	45
374	205	48
396	218	50
429	236	53
468	257	58
543	299	61
568	312	63
Steel HP 14 X 89		
158	87	18
195	107	20
231	127	23
236	130	25
256	141	28
275	151	30
295	162	38
303	167	43
317	174	45
378	208	48
401	221	50
434	239	53
474	260	58
551	303	61
575	316	63
592	326	66
617	339	68
645	355	71
658	362	72
678	373	74
698	384	76
Steel HP 14 X 102		
160	88	18
197	109	20
234	128	23
240	132	25
259	143	28
279	153	30
299	164	38
306	168	43
321	176	45
383	211	48
406	224	50
440	242	53
479	264	58
558	307	61
583	320	63
600	330	66
624	343	68
653	359	71
666	367	72
686	378	74
706	388	76
726	399	78
746	410	80
766	421	82
786	432	84
806	443	86
Steel HP 14 X 117		
164	90	18
201	111	20
238	131	23
243	134	25
263	144	28
283	155	30
302	166	38
309	170	43
324	178	45
388	213	48
412	226	50
445	245	53
485	267	58
565	311	61
590	325	63
607	334	66
632	348	68
662	364	71
675	371	72
695	382	74
715	393	76
735	404	78
755	415	80
776	427	82
796	438	84
816	449	86
836	460	88
Precast 14"x 14"		
147	81	13
190	104	15
237	130	18
Timber Pile		
147	81	20

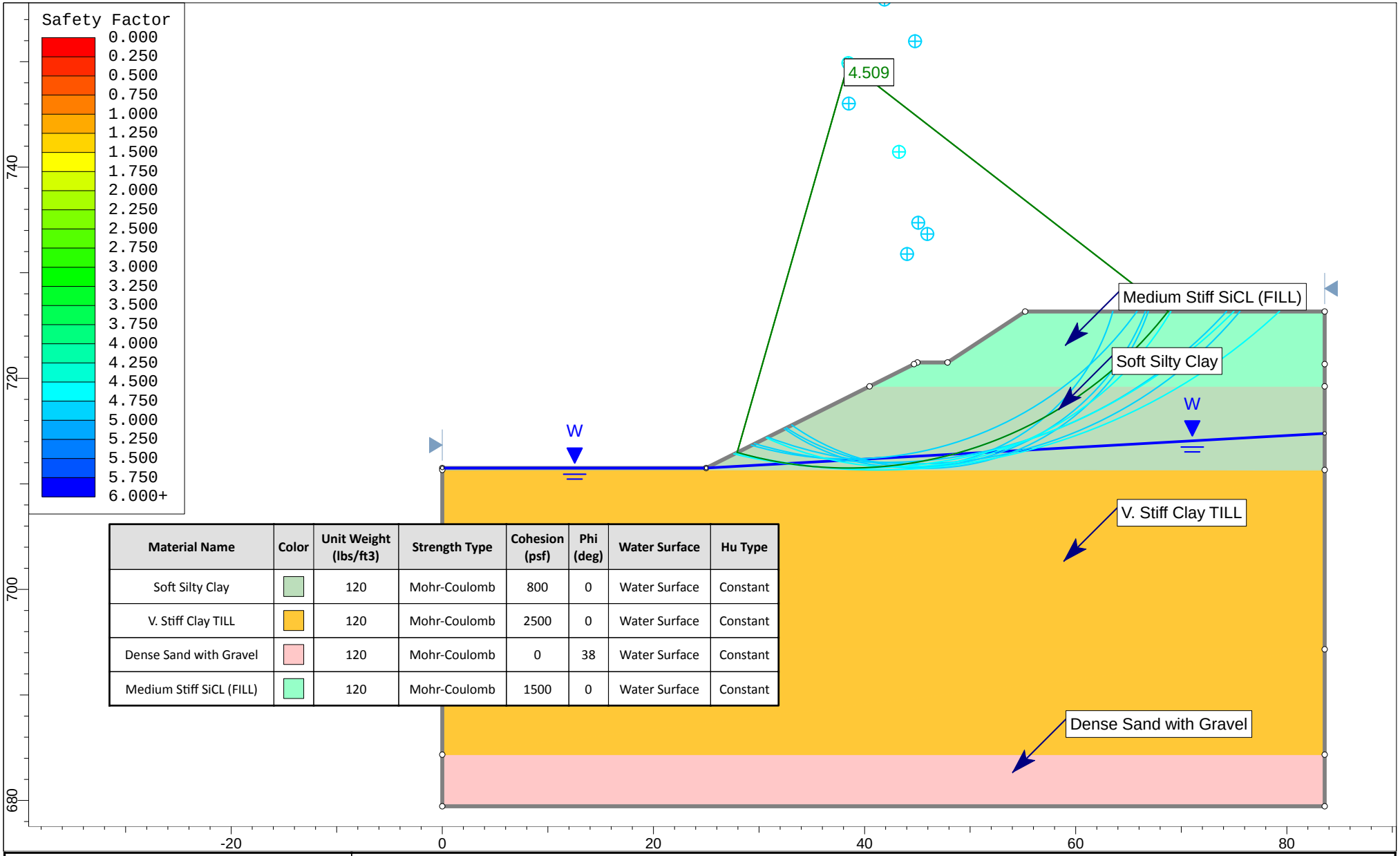
Pile Design Table for east abut. utilizing Boring #2 (2009)

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Metal Shell 12"Φ w/.179" walls		
147	81	18
171	94	20
194	107	23
209	115	25
229	126	28
248	137	30
Metal Shell 12"Φ w/.25" walls		
147	81	18
171	94	20
194	107	23
209	115	25
229	126	28
248	137	30
271	149	33
280	154	34
293	161	35
302	166	36
Metal Shell 14"Φ w/.25" walls		
154	85	15
182	100	18
209	115	20
236	130	23
251	138	25
273	150	28
295	162	30
323	178	33
333	183	34
349	192	35
359	197	36
Metal Shell 14"Φ w/.312" walls		
154	85	15
182	100	18
209	115	20
236	130	23
251	138	25
273	150	28
295	162	30
323	178	33
333	183	34
349	192	35
359	197	36
Steel HP 8 X 36		
166	91	35
171	94	36
193	106	40
202	111	41
203	112	43
205	113	46
213	117	48
214	118	49
216	119	50
232	128	53
247	136	56
255	140	57
269	148	60
283	156	62
Steel HP 10 X 42		
166	91	28
178	98	30
195	107	33
201	110	34
210	115	35
216	119	36
246	135	40
258	142	41
260	143	43
260	143	46
273	150	48
273	150	49
275	151	50
295	162	53
314	173	56
323	178	57

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 10 X 57		
159	87	25
170	93	28
182	100	30
199	110	33
205	113	34
215	118	35
221	121	36
252	139	40
264	145	41
266	146	46
279	154	48
280	154	49
282	155	50
302	166	53
321	177	56
331	182	57
348	191	60
366	201	62
383	211	65
401	220	67
418	230	70
436	240	72
453	249	75
Steel HP 12 X 53		
151	83	20
180	99	23
196	108	25
208	114	28
222	122	30
243	134	33
250	137	34
261	143	35
268	147	36
308	170	40
325	179	46
342	188	48
343	188	49
345	190	50
368	202	53
392	215	56
403	221	57
Steel HP 12 X 63		
154	85	20
184	101	23
198	109	25
210	115	28
224	123	30
245	135	33
252	139	34
263	145	35
270	149	36
312	171	40
328	180	46
346	190	48
346	190	49
348	192	50
372	205	53
396	218	56
407	224	57
427	235	60
448	246	62
469	258	65
490	269	67
Steel HP 12 X 74		
157	86	20
187	103	23
202	111	25
213	117	28
228	125	30
249	137	33
256	141	34
267	147	35
274	151	36
316	174	40
333	183	46
352	193	48
352	193	49
354	195	50
378	208	53
402	221	56
413	227	57
434	239	60
455	250	62
476	262	65
497	273	67
518	285	70
539	296	72
560	308	75
Steel HP 12 X 84		
159	88	20
189	104	23
205	113	25
216	119	28
231	127	30
253	139	33
260	143	34
271	149	35
278	153	36
321	177	40
338	186	46
357	196	48
357	196	49
359	198	50
383	211	53
408	224	56
419	230	57
440	242	60
462	254	62
483	266	65
504	277	67
525	289	70
547	301	72
568	312	75

Nominal Required Bearing (Kips)	Factored Resistance Available (Kips)	Estimated Pile Length (Ft.)
Steel HP 14 X 73		
147	81	18
183	100	20
218	120	23
245	135	25
257	141	28
273	150	30
299	164	33
307	169	34
320	176	35
328	181	36
381	210	40
401	220	46
425	234	49
427	235	50
454	250	53
482	265	56
495	272	57
520	286	60
544	299	62
568	313	65
Steel HP 14 X 89		
151	83	18
187	103	20
223	122	23
249	137	25
260	143	28
277	152	30
303	167	33
311	171	34
324	178	35
333	183	36
387	213	40
406	223	46
431	237	49
433	238	50
460	253	53
489	269	56
502	276	57
526	290	60
551	303	62
576	317	65
600	330	67
625	344	70
650	357	72
675	371	75
Steel HP 14 X 102		
153	84	18
190	104	20
225	124	23
252	139	25
264	145	28
281	154	30
307	169	33
315	173	34
328	181	35
337	185	36
392	215	40
412	226	46
436	240	49
438	241	50
466	257	53
495	272	56
508	280	57
533	293	60
558	307	62
583	321	65
608	334	67
633	348	70
658	362	72
683	376	75
Steel HP 14 X 117		
157	86	18
193	106	20
229	126	23
256	141	25
267	147	28
284	156	30
311	171	33
319	176	34
332	183	35
341	188	36
397	218	40
417	229	46
442	243	49
444	244	50
473	260	53
502	276	56
515	283	57
540	297	60
565	311	62
591	325	65
616	339	67
641	353	70
666	366	72
691	380	75
Precast 14"x 14"		
148	82	13
197	108	15
232	127	18
Timber Pile		
139	76	20

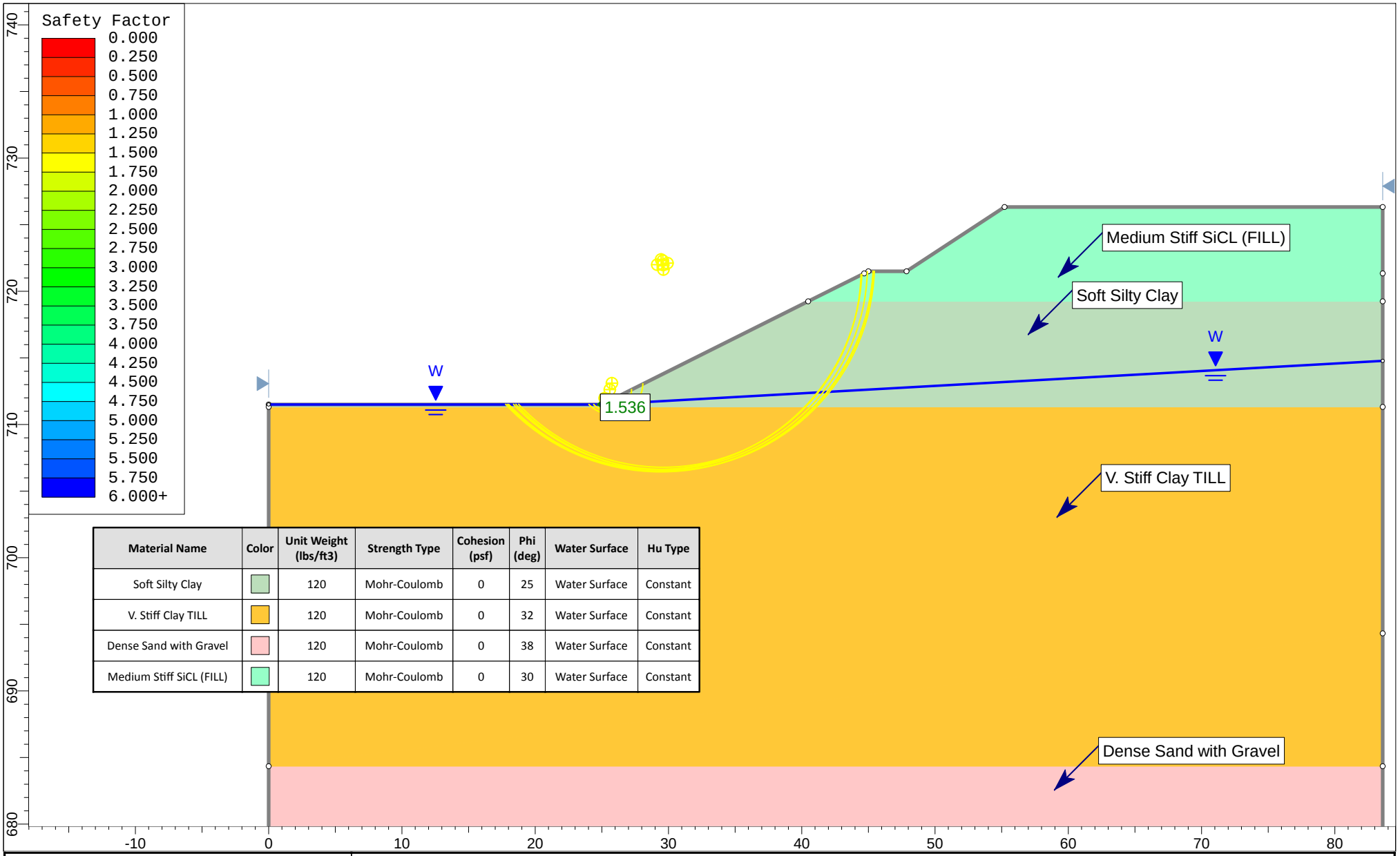
Slope Stability Results



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Soft Silty Clay		120	Mohr-Coulomb	800	0	Water Surface	Constant
V. Stiff Clay TILL		120	Mohr-Coulomb	2500	0	Water Surface	Constant
Dense Sand with Gravel		120	Mohr-Coulomb	0	38	Water Surface	Constant
Medium Stiff SiCL (FILL)		120	Mohr-Coulomb	1500	0	Water Surface	Constant

SLIDEINTERPRET 6.025

Project	US 34 over Vermilion River in Mendota, SN050-0257
Analysis Description	Bishop Undrained Conditions (Short Term)
Drawn By	TLM
Company	McCleary Engineering
Date	4/16/2014, 11:16:54 AM
File Name	East Abutment Short Term.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Soft Silty Clay		120	Mohr-Coulomb	0	25	Water Surface	Constant
V. Stiff Clay TILL		120	Mohr-Coulomb	0	32	Water Surface	Constant
Dense Sand with Gravel		120	Mohr-Coulomb	0	38	Water Surface	Constant
Medium Stiff SiCL (FILL)		120	Mohr-Coulomb	0	30	Water Surface	Constant

SLIDEINTERPRET 6.025

Project	US 34 over Vermilion River in Mendota, SN050-0257		
Analysis Description	Bishop Drained Conditions (Long Term)		
Drawn By	TLM	*Company*	McCleary Engineering
Date	4/16/2014, 11:16:54 AM	*File Name*	East Abutment Long Term.slim

Seismic Site Class Determination

SEISMIC SITE CLASS DETERMINATION

I.D.O.T. BBS FOUNDATIONS AND GEOTECHNICAL UNIT

Modified on 12/10/10

PROJECT TITLE=====

Substructure 1

Base of Substruct. Elev. (or ground surf for bents)	720.28	ft.
Pile or Shaft Dia.	12	inches
Boring Number	West B-1 exist	
Top of Boring Elev.	726.32	ft.
Approximate Fixity Elev.	714.28	ft.

Individual Site Class Definition:

N (bar): 13 (Blows/ft.) Soil Site Class E
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 3.84 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	723.8	2.50			B
	721.8	2.00			
	719.3	2.50	9	3.00	
	716.8	2.50	5	2.00	B
	714.3	2.50	5	1.50	
3.0	711.3	3.00	4	1.50	B
5.0	709.3	2.00	11		B
7.5	706.8	2.50	11	4.50	
10.0	704.3	2.50	12	4.80	B
12.5	701.8	2.50	17	5.40	
15.0	699.3	2.50	19	5.60	
17.5	696.8	2.50	17	5.40	B
20.0	694.3	2.50	8	3.30	
22.5	691.8	2.50	7	3.30	
25.0	689.3	2.50	7	3.30	B
27.5	686.8	2.50	19	4.20	
30.0	684.3	2.50	9	3.10	B
33.0	681.3	3.00	6	1.20	
35.5	678.8	2.50	6	1.70	B
37.5	676.8	2.00	2		
40.0	674.3	2.50	6		B
42.5	671.8	2.50	12	4.10	
45.0	669.3	2.50	14	4.10	
47.5	666.8	2.50	17	4.60	
50.0	664.3	2.50	28	6.10	B
53.0	661.3	3.00	18	4.10	
56.0	658.3	3.00	28	6.60	
60.0	654.3	4.00	22	6.20	
64.5	649.8	4.50	24	6.40	B
100.0	614.3	35.50	24	6.40	B

Substructure 2

Base of Substruct. Elev. (or ground surf for bents)	720.28	ft.
Pile or Shaft Dia.	12	inches
Boring Number	east B-2 exist	
Top of Boring Elev.	726.32	ft.
Approximate Fixity Elev.	714.28	ft.

Individual Site Class Definition:

N (bar): 20 (Blows/ft.) Soil Site Class D
N_{ch} (bar): 36 (Blows/ft.) Soil Site Class D <----Controls
s_u (bar): 4.21 (ksf) Soil Site Class C

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	721.3	5.00			B
	719.3	2.00	9		B
	716.8	2.50	3	0.50	
	714.3	2.50	4	1.00	
3.0	711.3	3.00	7	1.00	B
5.0	709.3	2.00	8	4.10	
7.5	706.8	2.50	16	5.40	
10.0	704.3	2.50	19	6.10	B
12.5	701.8	2.50	19	5.90	
15.0	699.3	2.50	17	5.70	
17.5	696.8	2.50	16	5.40	
20.0	694.3	2.50	14	4.20	B
22.5	691.8	2.50	10	3.60	
25.0	689.3	2.50	9	3.40	
27.5	686.8	2.50	11	3.70	
30.0	684.3	2.50	12	3.70	B
32.5	681.8	2.50	42		
35.0	679.3	2.50	37		
37.5	676.8	2.50	30		
40.0	674.3	2.50	36		
42.0	672.3	2.00	35		B
45.0	669.3	3.00	24	6.10	
47.5	666.8	2.50	26	6.00	
50.0	664.3	2.50	24	6.20	B
100.0	614.3	50.00	25	6.05	B

Substructure 3

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

Individual Site Class Definition:

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

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

Substructure 4

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

Individual Site Class Definition:

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

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

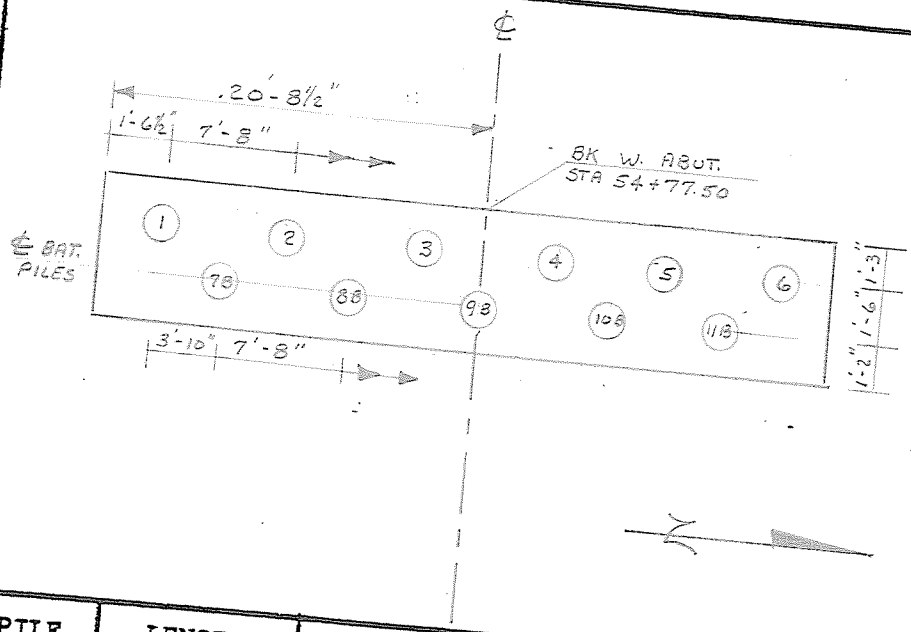
Global Site Class Definition: Substructures 1 through 2

N (bar): 17 (Blows/ft.) Soil Site Class D
N_{ch} (bar): (Blows/ft.) NA, H < 0.1*H (Total)
s_u (bar): 4.02 (ksf) Soil Site Class C <----Controls

1981 Pile Driving Data

PILING DIACRAM

050-0189



PILE NO	LENGTH FURNISHED	LENGTH CUT OFF	LENGTH IN STRUCTURE	BEARING
1	64.0'	20.2'	43.8'	57.97
2	64.0'	18.3'	45.7'	59.58
3	64.0'	12.4'	51.6'	55.00
4	64.0'	9.2	54.8'	50.55
5	64.0'	8.4'	55.6'	51.07
6	TEST PILE (SEE SD 757 IN CORRESPON. FILE)			
7B	64.0'	18.4'	45.6'	55.47
8B	64.0'	17.1'	46.9'	54.76
9B	64.0'	8.0'	56.0'	55.47
10B	64.0'	7.8'	56.2'	49.88
11B	64.0'	17.6'	46.4'	53.76
AL	640.0'	137.4	502.6	

INDICATES BATTER

BY JH DATE 8-8-81
CHKD. BY TJ DATE 11-19-81
SHEET NO. 1 OF 2

ROUTE FA 587 (US 34)
SECTION (20, 20X) R, W, RS, BR
PROJECT BR-F-F-587 (3)
COUNTY LA SALLE (099)
JOB NO. C-93-038-81
LOCATION WEST ABUT ℄ STA 54+77.50

TYPE PILE METAL SHELL
WEIGHT _____ LBS.

HAMMER DATA:
TYPE DELMAG D-12
RAM WEIGHT 2750 LBS.
STROKE VAR. (4'-7') FT.

STROKES/MIN. 50-60
BATTER COEF. 0.97 %

FORMULA USED:

$$P \frac{2WH}{S+0.1}$$

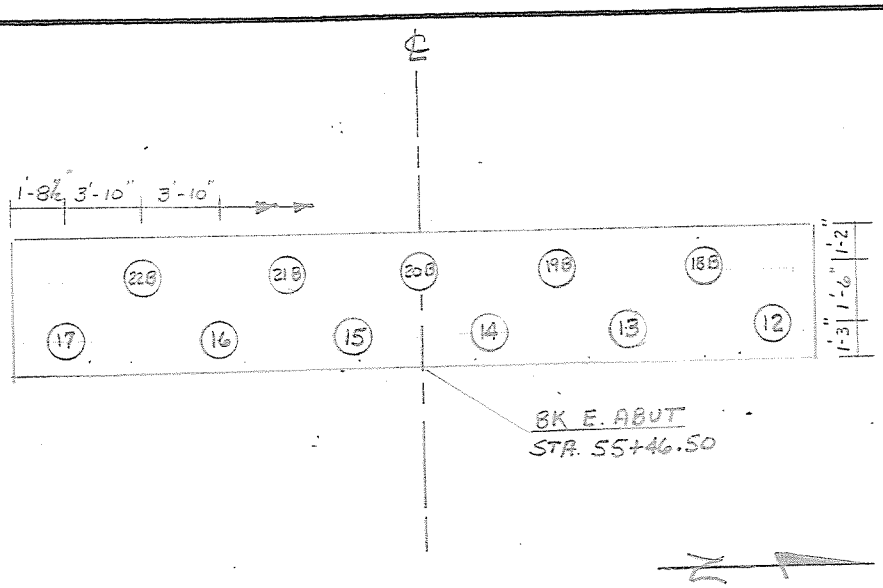
REQ. BEAR 45 TONS
PLAN LENGTH 47.0' LF.
ORDERED LENGTH 64.0' LF.
SEE LETTER DATED 9/21/81

PAY QUANTITIES:
FURNISHING 640 LF.
DRIVING 502.6 LF.

REMARKS:

COPY TO THUNMANN 4-4-83

PILING DIAGRAM



BY JH DATE 8-8-81

CHKD. BY T.J DATE 11-19-81

SHEET NO. 2 OF 2

ROUTE FA 587 (US34)

SECTION (20, 20K) R, W, RS, BR

PROJECT BR-F-F-587 (3)

COUNTY LA SALLE (099)

JOB NO. C-93-038-81

LOCATION EAST ABUT. ℄

STA. 55+46.50

TYPE PILE METAL SHELL

WEIGHT _____ LBS.

PILE NO	LENGTH FURNISHED	LENGTH CUT OFF	LENGTH IN STRUCTURE	BEARING
12	58'	15.0'	43.0'	50.31
13	58'	15.5'	42.5'	51.07
14	58'	16.0'	42.0'	54.76
15	58'	18.0'	40.0'	54.04
16	58'	19.0'	39.0'	54.76
17	58'	19.3'	38.7'	54.04
18B	58'	13.1'	44.9'	48.75
19B	58'	14.5'	43.5'	47.96
20B	58'	15.3'	42.7'	56.87
21B	58'	18.0'	40.0'	54.04
22B	58'	18.3'	39.7	54.76
TOTAL	638.0	182.0	456.0	

HAMMER DATA:

TYPE DELMAG D-12

RAM WEIGHT 2750 LBS.

STROKE VAR. (4'-7') FT.

STROKES/MIN. 50-60

BATTER COEF. 0.97 %

FORMULA USED:

$$P \frac{2WH}{S+0.1}$$

REQ. BEAR 35 TONS

PLAN LENGTH 38 LF.

ORDERED LENGTH 58 LF.

SEE LETTER DATED 9/21/81

PAY QUANTITIES:

FURNISHING 638.0 LF.

DRIVING 456.0 LF.

REMARKS: _____

B INDICATES BATTER

1980 Boring Logs

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 4/10/80

ROUTE FAP 587 (US 34) **DESCRIPTION** US 34 over Little Vermilion River, 2.2 miles East of IL 251 **LOGGED BY** W. Pearce

SECTION (20)BR **LOCATION** NE 1/4, **SEC.** 34, **TWP.** 36N, **RNG.** 1E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 050-0189
Station 55+12

BORING NO. 1 (1980) (W. Abut.)
Station 54+89
Offset 13.0 ft Rt.
Ground Surface Elev. 723.50 ft

Surface Water Elev. 708.20 ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 711.5 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Medium Dark Brown Sand & Gravel Shoulder - Auger Sample
722.50				
				Stiff Mottled Dark Brown to Yellow/Brown Silty Clay
	2			
	1 2	1.3 P	21	
719.00				
-5				Soft Brown to Dark Gray Silty Loam to Silty Clay Loam - Strong Organic Smell
	2			
	2 4	0.3 P	32	
	2			
	2 3	0.5 B	39	
714.00				
-10				Medium Black Silty Clay - Very Strong Organic Odor - Wood Fragments
	1			
	2 7	0.8 S	55	
711.50 ▽				
				Very Stiff Light Brown Silty Clay Loam Till - First encountered water at 12.0'
	3			
	5 7	2.5 B	14	
709.00				
-15				Stiff Light Gray Silty Loam Till
	4			
	5 7	1.9 B	12	
706.50				
				Hard Gray/Brown Clay Loam Till
	7			
	9 15	5.8 B	12	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	8			Hard Gray/Brown Clay Loam Till *(continued)*
	10 15	6.8 B	15	
				* No Recovery
	8			
	11 15	*		
699.00				
-25				Very Stiff Gray Brown Silty Clay Till
	6			
	9 12	3.1 B	17	
	6			
	8 10	2.9 B	19	
694.00				
-30				Stiff Gray/Brown Silty Clay Till - Slightly Stratified
	4			
	5 7	1.5 B	20	
	3			
	4 5	1.3 B	22	
-35				
	3			
	4 6	1.6 B	21	
686.50				
				Very Stiff Gray Clay - Possibly a Lake Deposit
	4			
	6 9	2.7 B	27	
684.00				
-40				Stiff Gray/Brown Silty Clay Till

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

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 4/10/80

ROUTE FAP 587 (US 34) **DESCRIPTION** US 34 over Little Vermilion River, 2.2 miles East of IL 251 **LOGGED BY** W. Pearce

SECTION (20)BR **LOCATION** NE 1/4, **SEC.** 34, **TWP.** 36N, **RNG.** 1E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 050-0189
Station 55+12

BORING NO. 1 (1980) (W. Abut.)
Station 54+89
Offset 13.0 ft Rt.
Ground Surface Elev. 723.50 ft

Surface Water Elev. 708.20 ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 711.5 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Gray/Brown Silty Clay Till *(continued)*		4		
		6	1.8	26
		8	B	
681.00				
Medium Brown Gravel		4		
		10	**	
679.50		13		
Medium Clean Gray Sand	-45			
** Sand in Augers - Could not Continue. Boring was continued on 4/22/1980			No Sample	
674.50			No Sample	
Dense Gray Very Fine Sand to Silt	-50			
		21		
		28	1.8	22
		30	P	
670.50		13		21
Hard Gray Silty Loam Till		17		
		21	5.9	16
			S	
	-55			
		10		
		17	5.4	16
667.00		21	B	
End of Boring	-60			

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

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 4/11/80

ROUTE FAP 587 (US 34) **DESCRIPTION** US 34 over Little Vermilion River, 2.2 miles East of IL 251 **LOGGED BY** W. Pearce

SECTION (20)BR **LOCATION** SE 1/4, **SEC.** 27, **TWP.** 36N, **RNG.** 1E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 050-0189
Station 55+12

BORING NO. 2 (1980) (E. Abut.)
Station 55+53
Offset 13.0 ft Lt.
Ground Surface Elev. 723.50 ft

Surface Water Elev. 708.20 ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Black & Yellow/Brown Silty Clay Loam (Fill)		2		
		2 4	1.5 P	22
719.00				
Medium Yellow/Brown & Black Silty Clay Loam with Gravel and some Sand (not natural)	-5	3		
		3 2	0.8 B	17
* No Recovery		7		
		2 4	*	
714.00				
Very Stiff Brown Silty Clay Loam Till	-10	4		
		5 6	2.5 B	14
711.50				
Very Stiff Gray Silty Clay Loam Till		4		
		6 8	2.7 B	15
708.50	-15			
Medium Gray Fine Sand to Silt in Silty Loam Till		7		
		9 9	2.5 P	13
706.50				
Very Stiff Gray Silty Clay Loam Till to Silty Loam Till with Layers of Fine Sand & Silt		6		
		6 7	3.9 S	11
	-20			
Very Stiff Gray Silty Clay Loam Till to Silty Loam Till with Layers of Fine Sand & Silt *(continued)*		6		
		5 5	2.7 B	13
701.50				
Very Stiff Gray Silty Clay Till		4		
		7 10	3.5 B	18
	-25			
		11		
		7 9	2.3 B	18
* No Recovery		3		
		6 7	*	
694.00				
Stiff Gray Silty Clay Till with Silt Layer 3" @ 31.4'	-30	5		
		6 7	1.9 B	16
691.50				
Very Stiff Gray Silty Clay Till		4		
		5 8	2.3 B	18
	-35			
		3		
		5 7	2.3 B	21
		3		
		5 8	2.3 B	21
684.00				
Stiff Gray Silty Clay Till	-40			

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

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 4/11/80

ROUTE FAP 587 (US 34) **DESCRIPTION** US 34 over Little Vermilion River, 2.2 miles East of IL 251 **LOGGED BY** W. Pearce

SECTION (20)BR **LOCATION** SE 1/4, **SEC.** 27, **TWP.** 36N, **RNG.** 1E, 3rd **PM**,
Latitude , **Longitude**

COUNTY LaSalle **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 050-0189
Station 55+12

BORING NO. 2 (1980) (E. Abut.)
Station 55+53
Offset 13.0 ft Lt.
Ground Surface Elev. 723.50 ft

Surface Water Elev. 708.20 ft
Stream Bed Elev. ft

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

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Gray Silty Clay Till *(continued)*			3		
			6	1.9	21
			7	B	
			5		
	680.00		7	2.3	19
Medium Gray Fine to Coarse Clean Sand & Gravel	679.50		15	B	14
End of Boring		-45			
		-50			
		-55			
		-60			

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

2009 Boring Logs

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 10/13/09

ROUTE FAP 587 (US 34) **DESCRIPTION** US 34 over Little Vermilion River, 2.2 miles East of IL 251 **LOGGED BY** L. Myers

SECTION (20)BR **LOCATION** SE 1/4, **SEC.** 27, **TWP.** 36N, **RNG.** 1E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 050-0189 (Exist.)
Station 55+12

BORING NO. 1 (W. Abut.)
Station 54+55
Offset 14.0 ft Lt.
Ground Surface Elev. 726.32 ft

Surface Water Elev. 713.88 ft
Stream Bed Elev. 712.72 ft

Groundwater Elev.:
First Encounter 711.3 ft ▼
Upon Completion 714.3 ft ▽
After ____ **Hrs.** ____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				Augered Bituminous Shoulder, Brown Coarse Aggregate Fill
723.82				
	3			Very Stiff Black Silty Clay Fill with Concrete Debris (Large pieces, Auger refusal - moved 5' west) (Old Bridge?)
	41	3.0 P	25	
-5				
	3			
	4 5	3.0 P	24	
	1			
	2 3	2.0 P	40	
716.82				
-10				Stiff Black & Gray Silty Clay Loam/Silty Loam Alluvial Slackwater Deposits
	1			
	2 3	1.5 P	26	
▽				
	2			
	2 2	1.5 P	19	
711.32 ▼ -15				
	1			Medium Gray Loamy Fine Sand to Coarse Gravel with Free Water
	5 6		15	
709.32				
	4			Hard Gray Silty Clay Loam Till
	5 6	4.5 S	15	
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
	4			Hard Gray Silty Clay Loam Till *(continued)*
	5 7	4.8 S	14	
704.32				
	5			Hard Gray Clay Till
	7 10	5.4 S	17	
-25				
	5			
	8 11	5.6 S	17	
	5			
	7 10	5.4 S	17	
696.82				
-30				Very Stiff Gray Clay Till
	3			
	3 5	3.3 B	19	
	2			
	3 4	3.3 B	21	
-35				
	2			
	3 4	3.3 B	21	
689.32				
	7			Hard to Very Stiff Gray Silt, Silty Clay & Clay Interbedded > 1' thick
	9 10	4.2 S	21	
-40				

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

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 10/13/09

ROUTE FAP 587 (US 34) **DESCRIPTION** US 34 over Little Vermilion River, 2.2 miles East of IL 251 **LOGGED BY** L. Myers

SECTION (20)BR **LOCATION** SE 1/4, **SEC.** 27, **TWP.** 36N, **RNG.** 1E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 050-0189 (Exist.)
Station 55+12

BORING NO. 1 (W. Abut.)
Station 54+55
Offset 14.0 ft Lt.
Ground Surface Elev. 726.32 ft

Surface Water Elev. 713.88 ft
Stream Bed Elev. 712.72 ft

Groundwater Elev.:
First Encounter 711.3 ft ▼
Upon Completion 714.3 ft ▽
After ____ **Hrs.** ____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
	3			Hard to Very Stiff Gray Silt, Silty Clay & Clay Interbedded > 1' thick *(continued)*
	4 5	3.1 S	21	
684.32				
	2			Medium Gray Silty Clay Loam/Clay Till
	2 4	1.2 B	19	
-45				
	2			
	2 4	1.7 B	18	
678.82				
	wh			Very Loose Gray Fine to Coarse Sand
	wh 2		17	
-50				
	2			
	2 4		22	
674.32				
	3			Hard Gray Silty Clay Loam Till
	5 7	4.1 B	18	
-55				
	4			
	6 8	4.1 B	18	
	6			
	8 9	4.6 S	19	
-60				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
	7			Hard Gray Silty Clay Loam Till *(continued)*
	12 16	6.1 S	16	
664.32				
	6			Hard Brown Silty Clay Loam Till
	8 10	4.1 S	14	
-65				
	7			
	12 16	6.6 S	13	
-70				
	7			
	8 14	6.2 S	12	
-75				
	8			
	8 16	6.4 S	12	
649.82				
				End of Boring
-80				

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

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 10/14/09

ROUTE FAP 587 (US 34) **DESCRIPTION** US 34 over Little Vermilion River, 2.2 miles East of IL 251 **LOGGED BY** L. Myers

SECTION (20)BR **LOCATION** NE 1/4, **SEC.** 34, **TWP.** 36N, **RNG.** 1E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 050-0189 (Exist.)
Station 55+12

BORING NO. 2 (E. Abut.)
Station 55+60
Offset 16.0 ft Rt.
Ground Surface Elev. 726.32 ft

Surface Water Elev. 713.88 ft
Stream Bed Elev. 711.92 ft

Groundwater Elev.:
First Encounter 711.3 ft ▼
Upon Completion 686.3 ft ▽
After ____ **Hrs.** ____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material
				Augered Bituminous Shoulder, Brown Coarse Agregate Fill, White Silica Sand Fill
721.32 -5	5			
	5 4		17	Medium White Silica Sand Fill with some Gray Clay Pieces
719.32				
	1			Soft Gray/Green Silty Clay/Silty Clay Loam Alluvial Deposits with Silt & Sand Layers
	1 2	0.5 P	28	
-10	2			
	2 2	1.0 P	31	
	1			
	4 3	1.0 P	19	
711.32 ▼ -15	1			
				Hard Gray Silty Clay Loam Till
	4 4	4.1 B	14	
	5			
	7 9	5.4 S	20	
-20				
				Hard Gray Silty Clay Loam Till *(continued)*
	6			
	8 11	6.1 S	15	
704.32				
				Hard Gray Clay Till
	7			
	8 11	5.9 S	18	
-25	6			
	8 9	5.7 S	16	
	5			
	7 9	5.4 S	28	
-30	4			
	6 8	4.2 S	29	
694.32				
	4			Very Stiff Gray Clay Till
	4 6	3.6 B	22	
-35	3			
	4 5	3.4 B	23	
	4			
	5 6	3.7 B	23	
▽ -40				

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

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 10/14/09

ROUTE FAP 587 (US 34) **DESCRIPTION** US 34 over Little Vermilion River, 2.2 miles East of IL 251 **LOGGED BY** L. Myers

SECTION (20)BR **LOCATION** NE 1/4, **SEC.** 34, **TWP.** 36N, **RNG.** 1E, 3rd **PM**,
Latitude , **Longitude**

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

STRUCT. NO. 050-0189 (Exist.)
Station 55+12

BORING NO. 2 (E. Abut.)
Station 55+60
Offset 16.0 ft Rt.
Ground Surface Elev. 726.32 ft

Surface Water Elev. 713.88 ft
Stream Bed Elev. 711.92 ft

Groundwater Elev.:
First Encounter 711.3 ft ▼
Upon Completion 686.3 ft ▽
After ____ **Hrs.** ____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	3			Very Stiff Gray Clay Till *(continued)*
	5 7	3.7 B	19	
684.32				
	10			Dense Brown/Gray Fine Sand to Coarse Gravel with Sand Layers & Free Water (Washed samples @ 42.5', 45', & 52.5')
	18 24		25	
-45				
	10			
	16 21		20	
	9			
	15 15		11	
-50				
	10			
	16 20		14	
	9			
	15 20		14	
672.32				
				Hard Gray Silty Clay Loam Till (Washed sample @ 55')
-55				
	8			
	10 14	6.1 S	18	
	8			
	11 15	6.0 S	14	
-60				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	9			Hard Gray Silty Clay Loam Till (Washed sample @ 55') *(continued)*
	10 14	6.2 S	20	
664.82				
				End of Boring
-65				
-70				
-75				
-80				

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