Illinois Department of Transportation

Abbreviated Structure Geotechnical Report

Original Report Date: 9/10/17 **Proposed SN:** 053-2582 **Route:** FAI-55 (I-55)
Revised Date: 11-2-17 **Existing SN:** 053-0126&0127 **Section:** (53-5)R&I
Geotechnical Engineer: Terry McCleary of McCleary Engineering **County:** Livingston
Structural Engineer: Vincent Tabor, Lin Engineering **Contract:** 66B64

Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing): The existing bridges are twin 2 span structures (northbound and southbound), 148.83 ft. back to back of abutments. SN 046-0126 is the southbound structure and SN 046-0127 is the northbound structure. The existing stub abutments are supported on two rows of steel H-piles. There is no skew. The proposed improvements include the removal of both structures, lowing of the profile grade and replacing them with a single 14 ft. x 10 ft. box culvert. Factored loadings are calculated to be 3000 ksf at the bottom of the bottom slab. Please refer to the attached TS&L drawing for further details.

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): As mentioned above the existing plans show the piers and abutments are supported by driven H-piles. The 1970 and 2017 borings both show shale, but at differing elevations. The 1970 borings show the Shale to be near the elevation of 622.0 ft. The 2017 borings show auger refusal in the realm of 634.0 ft. This auger refusal could have been on a boulder described in the lithology above the refusal elevation.

The 1970 borings are approximately 12 ft. deeper than the 2017 borings. The 1970 borings show 3.5 ft. of stiff clay soils over very stiff to hard clay till with occasional pockets of very dense gravel within the till layers over a green to blue/green shale.

The four 2017 borings show a varying soils profile. Boring 01 shows 2.5 ft. of black silty clay loam fill over 2.5 ft. of very stiff brown silty clay loam over loose very loamy fine sand to coarse gravel to cobbles/boulders. Boring 02 shows 2.5 ft. black silty clay loam fill over 5 ft. of very stiff brown and gray silty clay loam fill with cobbles and boulders. The boring was stopped at 7.5 ft. with auger refusal. Boring 03 did not sample the soils, but rather was advanced to a depth of 9.5 ft. with auger refusal. Boring 04 shows 2.5 ft. of black silty clay loam fill over 2 ft. of very stiff silty clay loam fill over 7.5 ft. of stiff to very stiff silty clay loam till fill with large limestone gravel pieces to cobbles/boulders. This boring ended with auger refusal at a depth of 12 ft.

Please see the attached boring logs for a more detailed description of the soils encountered.

Provide the location and maximum height of any new soil fill or magnitude of footing bearing pressure. Estimate the amount and time of the expected settlement. Indicate if further testing, analysis, and/or ground improvement/treatment is necessary: The area surrounding the bridges is very flat with no hydraulic issues; the proposed design will require the placement of as much as 19 ft. of new fill adjacent to the proposed box with approximately 9 ft. of new fill above the proposed box. Using two separate combinations of borings, the first being boring 2 (2017) with boring 7 (1970) and the second combination using boring 2 (1970) with boring 4 (2017), both with and without the culvert. As much as 0.78 inches of settlement is expected using boring 2 with boring 7 adjacent to the box culvert structure where the fill is its highest. Using the same loading, but with boring 2 and boring 4 together the resulting settlement is estimated to be 0.70 inches. To estimate the settlement under the culvert the thickness of the fill was reduced to 9 ft. in the analysis. The estimated settlement is 0.52 inches and 0.48 inches, respectively. A differential settlement as much as 0.3 inches may be expected. These amounts of settlement are typically not large enough to be a concern for a cast in place box culvert.

A more extensive analysis could be performed and the settlement amounts refined, however that would require shelby tube samples for consolidation testing. However, because of the rocky nature and in many places the soils density, the successful collection of shelby tube samples is unlikely. The rudimentary analysis performed is an estimation because of the shallow depths of the borings and assumptions needed to complete the analysis. With the lack of necessary laboratory test results, a more detailed analysis could not be performed. Since the soils moisture contents and unconfined compressive strengths were provided in the boring logs, the IDOT spreadsheet for the calculation of settlement for cohesive soils was used. The proposed fill material should be placed in accordance with article 205 of the standard specifications and be benched into the existing embankments.

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: With the lowering of the profile grade, the height of the side slopes will be significantly reduced. The proposed slopes beyond the wing walls, but inside the area of new fill were analyzed using the commercial software, Slide 6.0, using the Bishop Method. The slopes from the edge of shoulder to the headwall are to be a 1:6 (V:H) and 1:2 (V:H) from the head wall out to the tip of the wing wall. The resulting FOS is 6.6 for the undrained (Short Term) condition, which is much greater than the desired 1.5, therefore no further testing or analysis 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: Scour will not be an issue at this site as it does not cross a waterway, but rather is a pedestrian/bike path on the alignment of a past railroad bed.

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: This structure is a buried structure. Per Section 2.3.10 of the Departments Bridge Manual seismic data is not needed for most walls or buried structures.

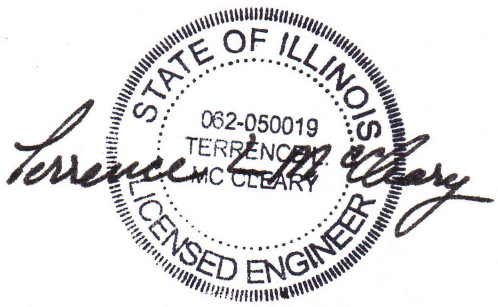
Confirm feasibility of the proposed foundation or wall type and provide design parameters. Attach a pile design table indicating feasible pile types, various nominal required bearings, factored resistances available and corresponding estimated lengths at locations where piles will be used. Provide factored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

The fill height and size of structure currently allows for the use of horizontal cantilever wingwalls. Using the methodology shown in Chapter 4 of the Department's Culvert Manual, the unfactored loads on the proposed 16 ft. long wingwalls are estimated to be; P_A = 825 lbs/ft. at the tallest point of the wingwall, P_B = 462 lbs/ft. at the shortest point of the wall with a moment of 102 k-ft. These walls are expected to be designed using this same manual.

Calculate the estimated water surface elevation and determine the need for cofferdams (type 1 or 2), and seal coat: Neither cofferdams nor seal coats will be needed at this site as the project does not involve any in-stream work.

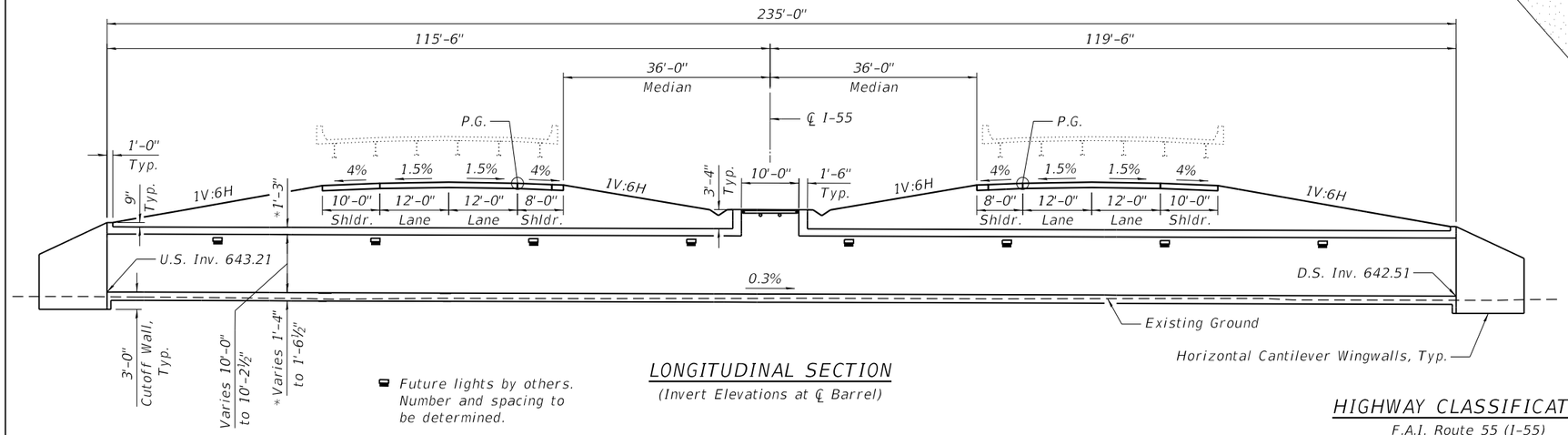
Assess the need for sheeting or soil retention or temporary construction slope and provide recommendation for other construction concerns: This project will be constructed using staged Traffic Control with crossovers, dictating the need for soil retention at a stage line in the median. The bedrock is relatively shallow and may not allow the required embedment depth for sheet pile walls. The use of the pay item for a "Temporary Soil Retention System" is recommended. Since this is a fill condition, the use of a Temporary MSE Wall or a Temporary Geotextile Wall is recommended.

Prepared by McCleary Engineering
terry@mcclearyengineering.com
office – 815-780-8486



Benchmark: BM 83 – Chiseled "□" on top of Southeast wingwall, S.N. 053-0126, Southbound I-55, Elev. 672.14.

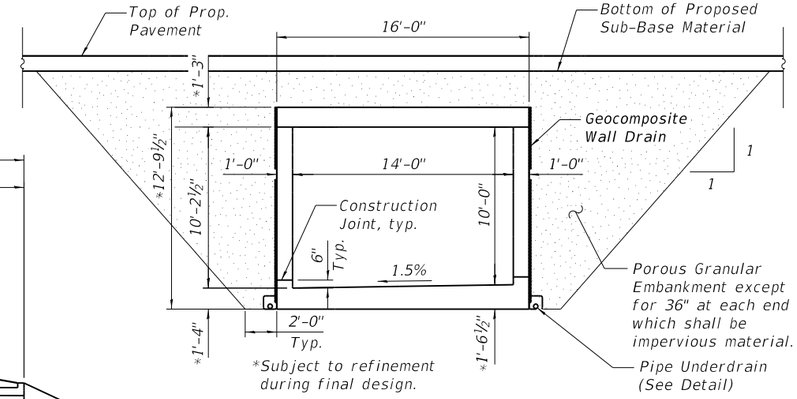
Existing Structure: S.N. 053-0126 & 053-0127 were built in 1973 as F.A.I. 55, Section 53-5VB-1 at Sta. 136+65.28. Existing structures are 3-span continuous bridges with W30 steel beams, stub abutments and multi-column piers. 148'-10" bk to bk. abutments, 42'-0" out to out deck with no skew. Both existing structures will be removed and replaced with a shared use path culvert. The culvert will be constructed in its entirety, followed by removal of the existing structures and construction of the roadway by halves using crossovers in order to maintain one lane of traffic in each direction.
No Salvage.
Precast alternate is not allowed.



Future lights by others. Number and spacing to be determined.

LONGITUDINAL SECTION

(Invert Elevations at ℄ Barrel)



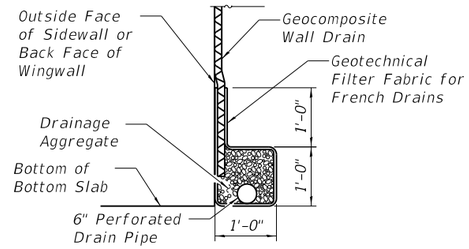
*Subject to refinement during final design.

SECTION THRU BARREL

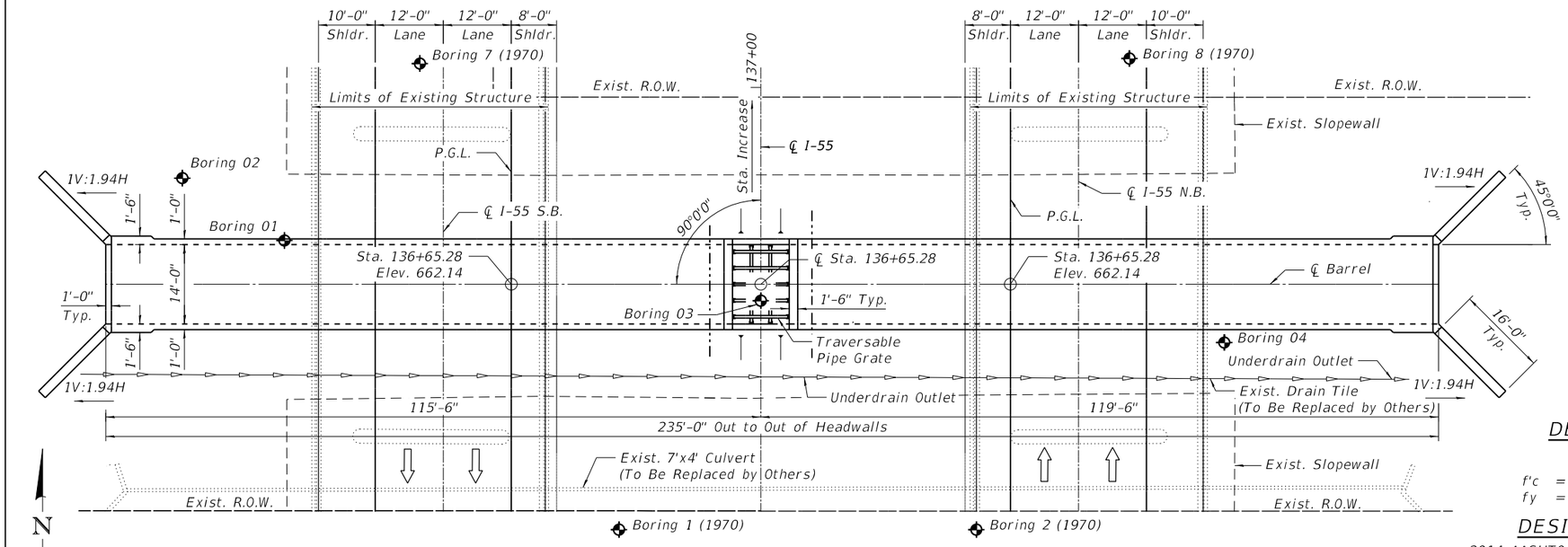
(Looking West)

HIGHWAY CLASSIFICATION

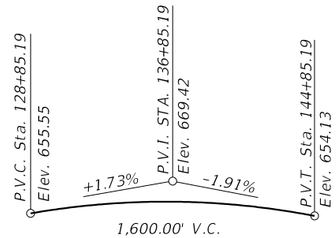
F.A.I. Route 55 (I-55)
Functional Class: Interstate
ADT: 22,973 (2019), 27,300 (2039)
DHV: 2,184 (2039)
ADTT: 8,190 (2039)
Design Speed: 75 mph
Posted Speed: 70 mph
Two-Way Traffic
Directional Distribution 50:50



PIPE UNDERDRAIN DETAIL

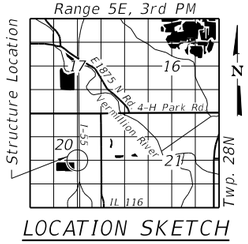


PLAN



PROFILE GRADE

(Along inside E.O.P.)



LOCATION SKETCH

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi
fy = 60,000 psi (reinforcement)

DESIGN SPECIFICATIONS

2014 AASHTO LRFD Bridge Design Specifications
7th Edition with 2015 & 2016 interims

LOADING HL-93

Allow 50#/sq. ft. for Future Wearing Surface

GENERAL PLAN AND ELEVATION
I-55 OVER ABANDONED R.R.
F.A.I. 55 SEC. (53-5)R&I
LIVINGSTON COUNTY
STATION 136+65.28
S.N. 053-2582

LIN ENGINEERING, LTD.
Consulting Engineers
Springfield, Illinois

	DESIGNED - VPT	REVISED -	
	CHECKED - MTH	REVISED -	
PLOT TIME = 4:19:55 PM	DRAWN - CGY	REVISED -	
PLOT DATE = 11/8/2017	CHECKED - VPT	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
55	(53-5)R&I	LIVINGSTON		
		CONTRACT NO. 66B64		
	ILLINOIS FED. AID PROJECT			

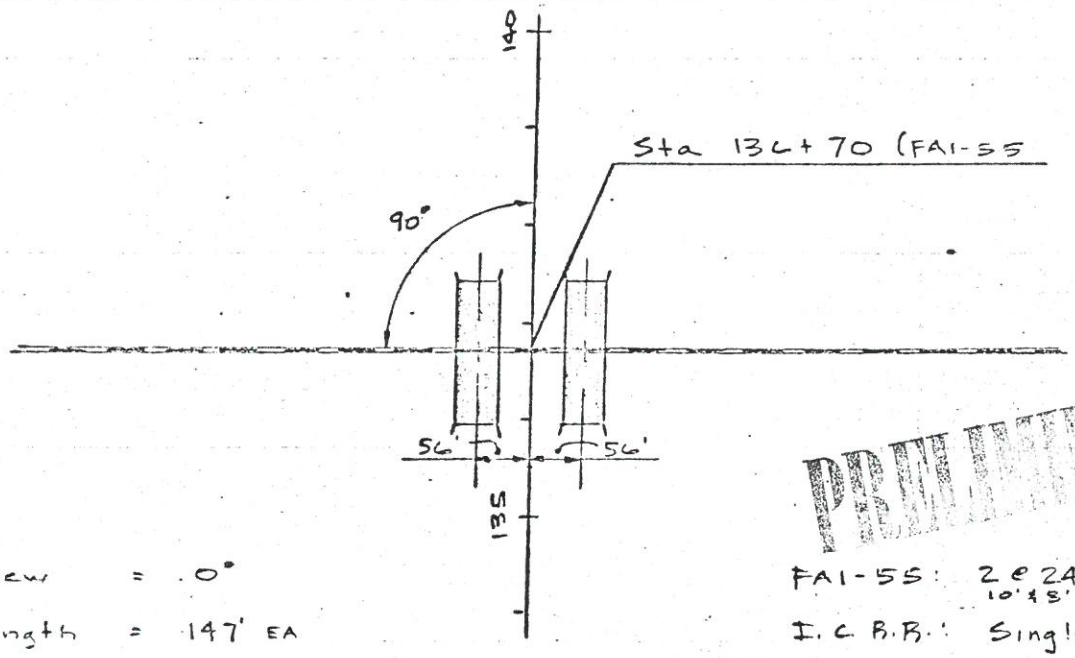
HOMER L. CHASTAIN & ASSOCIATES
Consulting Engineers
Decatur, Illinois

SUBJECT FAI-55 53-5VB-1
PROJECT NO. 2126

PREP. BY D.S. DATE 2-70
CHKD BY _____ DATE _____
SHEET NO. 2 OF 10

Structure Data - FAI-55 over I. C. R. R.

53-5VB



PRELIMINARY

Skew = .0°

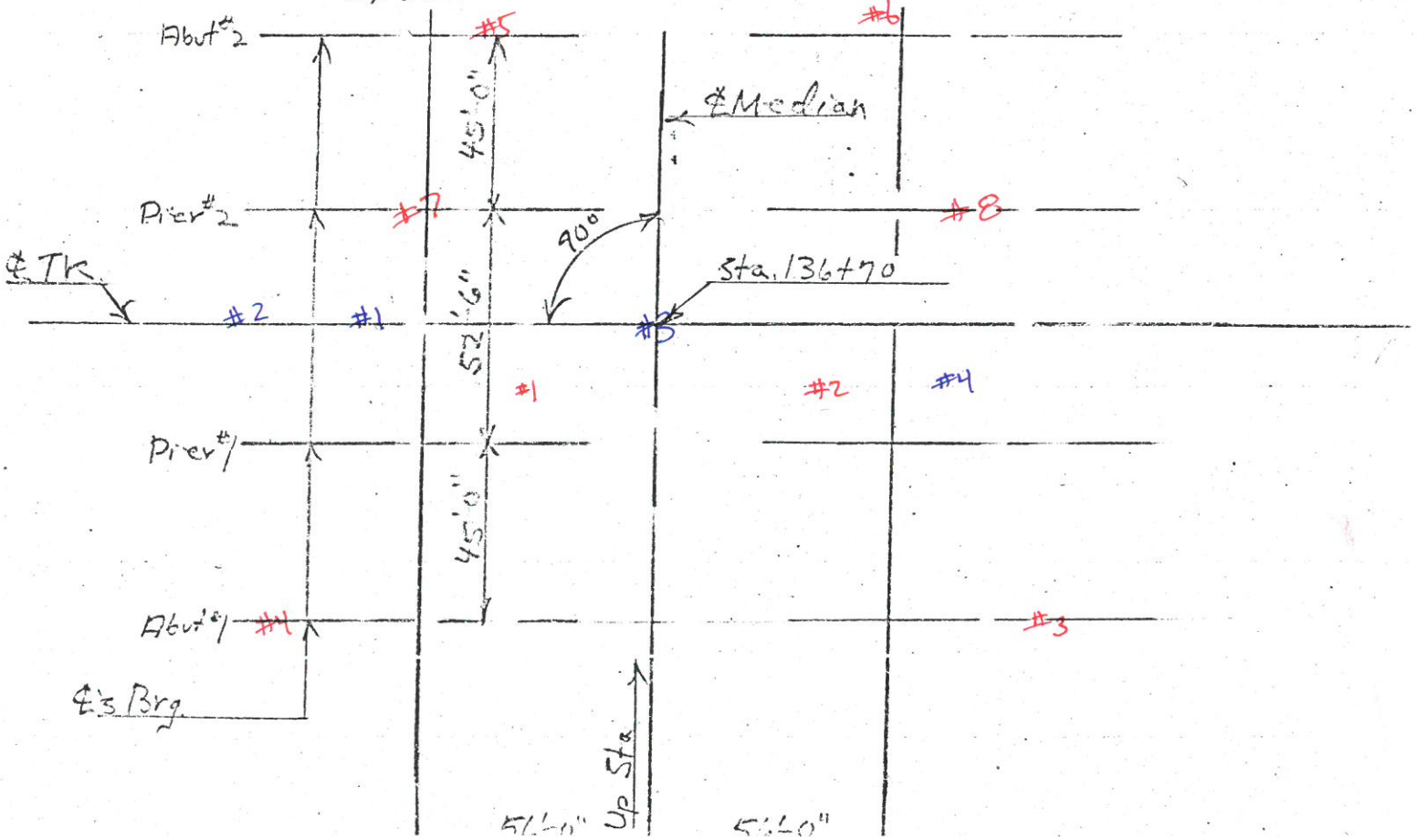
Length = 147' EA

Width = 44' EA

Deck Area = 6,468 ♯ x 2 Structures
= 12,936 ♯

FAI-55: 2 @ 24' w/ 8'3" Median
10'+8' Shldrs

I. C. R. R.: Single track



Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation

SOIL BORING LOG

Date 4/28/70

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** J. Safranski

SECTION 53-5VB-1 **LOCATION** SW 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude , **Longitude**

COUNTY Livingston **DRILLING METHOD** _____ **HAMMER TYPE** _____

STRUCT. NO. 053-0126/0127
Station 136+65.28

BORING NO. 1
Station 136+22
Offset 25.0 ft Lt.
Ground Surface Elev. 641.48 ft

Surface Water Elev. None ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter _____ ft
Upon Completion Dry ft
After 26 **Hrs.** 636.5 ft ▽

Material	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Yellow - Brown Clay to Clay Till, Slight amount of Organic Material present		3		
		4 4	1.8 P	25
	637.98			
Hard Tan to Brown Clay Till		7		
	▽-5	11 14	4.5 S	15
	635.48			
Very Dense Yellow - Brown to Gray Gravel and Fine Sand, same Clay Till present		94		
		39 26		8
		17		
	-10	32 17		7
2" Layer of Limestone at 10.5'	630.48			
Very Stiff Gray - Blue Clay to Clay Till		10		
		17 27	3.9 S	13
	627.98			
Very Stiff Brick Red to Blue Clay Till		17		
	-15	16 26	3.9 S	11
		15		
		19 24	4.6 S	12
	622.98			
Very Stiff Green to Purple Clay, seems to be a Reworked Shale		9		
	-20	14	3.2	11

Material	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Stiff Green to Purple Clay, seems to be a Reworked Shale *(continued)*		23	S	
	619.48	70		
Rock - Blue to Green Shale	619.44	100/0.5"		6
End of Boring				
	-25			
	-30			
	-35			
	-40			

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 5/24/17

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 4/28/70

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** J. Safranski

SECTION 53-5VB-1 **LOCATION** SE 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude , **Longitude**

COUNTY Livingston **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 053-0126/0127
Station 136+65.28

BORING NO. 2
Station 136+22
Offset 38.0 ft Rt.
Ground Surface Elev. 641.26 ft

Surface Water Elev. None ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion Dry ft
After 22 **Hrs.** 636.3 ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
				Stiff Yellow - Brown to Tan Clay Till, Very Slightly Stratified
	3			
	3 3	1.2 B	22	
	5			
-5	6 30	1.6 B	15	
635.26				
				Hard Light Yellow - Brown Clay Till
	6			
	12 20	4.1 B	13	Small Sandstone Pebbles at 8.0'
632.76				
				Very Stiff Green to Brown Clay Till Some Organic Materials at 9.0'
	6			
-10	11 11	3.1 B	17	
	7			
	13 18	4.5 P	13	
627.76				
				Very Stiff Brick Red to Green Clay Till
	9			
-15	14 21	3.5 S	11	
	16			
	22 22	4.2 S	12	
	8			
621.68				
-20	90	4.0	10	Rock - Green Reworked? Shale

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Material Description
	150/1"	P		End of Boring
-25				
-30				
-35				
-40				

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

BBS, form 137 (Rev. 8-99)

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 5/24/17

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation

SOIL BORING LOG

Date 4/29/70

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** J. Safranski

SECTION 53-5VB-1 **LOCATION** SE 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude , **Longitude**

COUNTY Livingston **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 053-0126/0127
Station 136+65.28

BORING NO. 3
Station 135+99
Offset 78.0 ft Rt.
Ground Surface Elev. 641.42 ft

Surface Water Elev. None ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion Dry ft
After 3 **Hrs.** 632.4 ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Stiff Yellow - Brown Clay Till
	4			
	4 6	1.6 B	24	
	3			
-5	6 6	0.9 B	23	Small Pebbles of Limestone at 4.5'
				635.42
				Very Stiff Light Yellow to Gray Clay Till, Slightly Stratified
	5			
	6 9	2.3 B	20	
	5			
-10	8 11	1.8 S	20	
				630.42
				Very Stiff Gray - Green Clay Till, Well Stratified
	7			
	15 19	3.7 S	14	
				627.92
				Hard Brick Red to Gray - Green Clay Till
	11			
-15	24 31	4.4 S	13	
	19			
	27 51	4.5 P	12	Might be a Reworked Shale at 17.0'
				622.92
				Stiff Red to Green Reworked Shale or Clay
	9			
-20	18	1.7	11	

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	26	S		Stiff Red to Green Reworked Shale or Clay *(continued)*
				619.92
	100/2"			Rock - Green Shale 619.75
				End of Boring
-25				
-30				
-35				
-40				

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 5/24/17

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 4/29/70

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** J. Safranski

SECTION 53-5VB-1 **LOCATION** SW 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude , **Longitude**

COUNTY Livingston **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 053-0126/0127
Station 136+65.28

BORING NO. 4
Station 135+99
Offset 78.0 ft Lt.
Ground Surface Elev. 642.22 ft

Surface Water Elev. None ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Yellow - Brown Clay to Clay Till		3		
		5 6	1.9 B	25
638.72				
Very Stiff Yellow - Brown Clay Till, Stratified		2		
	-5	2 3	2.5 P	17
636.22				
Very Dense Yellow - Brown to Gray Gravel		120/0.5"		
At 7.0', Hit Large Gravel Layer - No Recovery				
633.72				
Very Stiff Black - Brown to Gray Clay Till		7		
	-10	9 9	2.6 S	15
631.22				
Hard Gray - Green to Tan Clay Till, Stratified		10		
		18 26	4.2 S	17
628.72				
Very Stiff Brick Red to Green Clay Till		9		
	-15	18 28	3.7 S	16
		12		
		24 39	4.2 S	
		20		
	-20	70		

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
621.78		70/5"		
Rock - Green to Blue - Green Shale 621.72		100/0.25"		
End of Boring				
	-25			
	-30			
	-35			
	-40			

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

BBS, form 137 (Rev. 8-99)

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 5/24/17

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation

SOIL BORING LOG

Date 5/8/70

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** J. Safranski

SECTION 53-5VB-1 **LOCATION** NW 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude , **Longitude**

COUNTY Livingston **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 053-0126/0127
Station 136+65.28

BORING NO. 5
Station 137+40
Offset 42.0 ft Lt.
Ground Surface Elev. 640.92 ft

Surface Water Elev. None ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Yellow - Brown Clay Till		3		
		5 5	1.5 P	20
		7		
	-5	10 11	1.0 P	15
634.92				
Very Stiff Lemon - Yellow to Gray - Green Clay Till, Slightly Stratified		6		
		10 18	3.3 B	14
		10		
	-10	11 14	3.1 S	12
		26		
4" thick layer of Limestone at 12.0'		24 19		6
627.42				
Very Stiff Gray - Green Clay Till, Well Stratified		7		
	-15	11 15	3.5 S	12
624.17		150/3"		
Rock - Green Shale, Very Soft End of Boring				
	-20			

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 5/24/17

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 5/8/70

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** J. Safranski

SECTION 53-5VB-1 **LOCATION** NE 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude , **Longitude**

COUNTY Livingston **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 053-0126/0127
Station 136+65.28

BORING NO. 6
Station 137+40
Offset 42.0 ft Rt.
Ground Surface Elev. 640.98 ft

Surface Water Elev. None ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 639.0 ft ▼
Upon Completion ft
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	3			Medium Yellow - Brown Clay
▼	3			
	3	0.9	19	
	3	B		
637.48				
	2			Medium Yellow - Brown Clay Till
-5	6	0.9	12	
	9	B		
634.98				
	9			Very Stiff Gray - Green Clay Till
	9	2.9	14	Small Silt Seams present
	17	S		
	9			
-10	11	3.3	11	
	15	S		
	9			
	15	4.1	15	
	26	B		
	9			
-15	28	4.8	13	
	40	S		
624.48				
	75/9"			Stiff Green to Brick Red Clay Till,
623.71	100/0.25"	1.8	14	Slightly Stratified
		S		Rock - Blue to Green Shale
				End of Boring
-20				

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 5/24/17

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 5/18/70

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** J. Safranski

SECTION 53-5VB-1 **LOCATION** NW 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude , **Longitude**

COUNTY Livingston **DRILLING METHOD** _____ **HAMMER TYPE** _____

STRUCT. NO. 053-0126/0127
Station 136+65.28

BORING NO. 7
Station 137+06
Offset 59.0 ft Lt.
Ground Surface Elev. 640.78 ft

Surface Water Elev. None ft
Stream Bed Elev. _____ ft

Groundwater Elev.:
First Encounter 638.8 ft
Upon Completion _____ ft
After 18 **Hrs.** 639.8 ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Stiff Yellow - Brown Clay Till Silt Seams present
	4			
	5 8	1.4 B	23	
	3			
-5	5 7	0.6 B	16	
634.78				
	9			Stiff Black - Brown Silty Clay Till, Very High in Organic Material
	9 15	1.2 S	12	
632.28				
	34			Very Stiff Gray to Green - Blue Clay Till
-10	23 181	3.7 S	13	2" thick Shale Layer at 10.0'
	13			
	25 47	3.5 S	12	
627.28				
	12			Very Stiff Gray Clay Till, Slightly Stratified
-15	13 12	3.3 S	15	
624.78				
	8			Very Stiff Blue - Green Clay Till, Well Stratified
	16	2.5	14	
622.78	100/4"	S		
	100/0.5"			Very Dense Gray Shale (Rock Core)
620.78 -20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Very Dense Light Gray Limestone with Alternating Thin Layers of Shale (Rock Core) Total Recovery of Rock Core = 18 inches out of 60 inches of Core
617.78	100/0.25"			
				End of Boring
-25				
-30				
-35				
-40				

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

BBS, form 137 (Rev. 8-99)

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 5/24/17

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation

SOIL BORING LOG

Date 5/21/70

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** J. Safranski

SECTION 53-5VB-1 **LOCATION** NE 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude , **Longitude**

COUNTY Livingston **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 053-0126/0127
Station 136+65.28

BORING NO. 8
Station 137+06
Offset 65.0 ft Rt.
Ground Surface Elev. 640.38 ft

Surface Water Elev. None ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 638.4 ft ▼
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Yellow - Brown Clay Till				
	▼	4		
		5 7	1.4 B	23
		4		
	-5	3 7	1.3 P	20
1" Thick Layer of Limestone at 5.0'				
634.38				
Very Soft Yellow - Brown to Brown Clay Loam		7		
		10 20	0.2 B	12
631.88				
Very Stiff Gray - Green Clay Till		8		
	-10	9 11	3.7 B	14
629.38				
Very Stiff Gray Clay Till, Very Well Stratified		11		
		17 32	2.5 B	18
626.88				
Very Stiff Brick Red to Brown Clay Till, Slightly Stratified		15		
	-15	25 32	3.7 S	12
624.38				
Very Stiff Green Clay, Well Stratified		19		
622.88		62	3.1	13
Rock - Blue to Green Shale 622.46		79/4" 100/1"	S	
End of Boring				
	-20			

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 5/24/17

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 6/1/17

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over Abandonded I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** Larry Myers

SECTION (53-5)R&I **LOCATION** NW 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude 40.880764, **Longitude** -88.671625

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

STRUCT. NO. 053-2582 (P) 053-0126/0127 (E)
Station 136+65.28

BORING NO. 01
Station 136+73
Offset 84.0 ft Lt.
Ground Surface Elev. 642.50 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 635.0 ft ▼
Upon Completion 638.0 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Augered Brown Sand & Gravel Fill, Black Silty Clay Loam Fill
640.00				
	3			Very Stiff Brown Silty Clay Loam
	4 5	3.1 B	25	
637.50 ▽ -5				
	3			Loose Very Loamy Fine Sand to Coarse Gravel - Cobble / Boulders
	2 3		19	felt @ 9'
				Auger Refusal @ 9' on Limestone Cobble / Boulder - Potential Railroad Fill
▼	7			
	6 8			
-10				
632.17	100/4"		2	
				End of Boring
-15				
-20				

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 6/27/17

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 6/1/17

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over Abandonded I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** Larry Myers

SECTION (53-5)R&I **LOCATION** NW 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude 40.880772, **Longitude** -88.67186

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

STRUCT. NO. 053-2582 (P) 053-0126/0127 (E)
Station 136+65.28

BORING NO. 02
Station 136+84
Offset 102.0 ft Lt.
Ground Surface Elev. 641.93 ft

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

Groundwater Elev.:
First Encounter Dry ft
Upon Completion 634.9 ft ▽
After _____ **Hrs.** _____ ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Augered Black Silty Clay Loam Fill
639.43				
	4			Very Stiff Brown & Gray Silty Clay Loam Fill
	4 5	3.0 P	25	Heavy Limestone Gravel, Boulders, Cobbles (Fill?) @7'
-5				
	3			
	3 4		21	
▽ 634.43				
	100/5"		0	Auger Refusal @ 7.5'
				End of Boring
-10				
-15				
-20				

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 6/27/17

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 6/1/17

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over Abandonded I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** Larry Myers

SECTION (53-5)R&I **LOCATION** NW 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude 40.880724, **Longitude** -88.671482

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

STRUCT. NO. 053-2582 (P) 053-0126/0127 (E)
Station 136+65.28

BORING NO. 03
Station 136+65
Offset 0.0 ft Centerline
Ground Surface Elev. 642.76 ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)

Surface Water Elev. ft
Stream Bed Elev. ft

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

Augered Material, No Samples

-5

Auger Refusal @ 9.5' on Limestone Fill 633.26

-10

End of Boring

-15

-20

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 6/27/17

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 6/1/17

ROUTE FAI-55 (I-55) **DESCRIPTION** I-55 over Abandonded I.C. Railroad, 0.5 miles North of IL 116 **LOGGED BY** Larry Myers

SECTION (53-5)R&I **LOCATION** SE 1/4, **SEC.** 20, **TWP.** 28N, **RNG.** 5E, 3rd **PM**,
Latitude 40.880728, **Longitude** -88.67115

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

STRUCT. NO. 053-2582 (P) 053-0126/0127 (E)
Station 136+65.28

BORING NO. 04
Station 136+55
Offset 85.0 ft Rt.
Ground Surface Elev. 642.53 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion 630.5 ft ▽
After Hrs. ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				Augered Brown Sand & Gravel Fill and Black Silty Clay Loam Fill
640.03				
	3			Very Stiff Brown Silty Clay Loam Fill
	4 5	2.5 P	27	
638.03				
-5				Very Stiff to Stiff Gray Silty Clay Loam Till Fill with Large Limestone Gravel Pieces @ 8' up to Cobbles / Boulders
	3			
	3 3	2.0 P	21	
	3			
	22 21		5	
-10				
	12			
	10 10	3.5 P	9	
630.53 ▽				
	41			Auger Refusal @ 12'
	100/3"		2	End of Boring
-15				
-20				

SOIL BORING 053-0126, 0127.GPJ IL_DOT.GDT 6/27/17

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)

COHESIVE SOIL SETTLEMENT ESTIMATE

LOCATION AND BORING USED ==== West End/Boring #2 (2017) and #7 (1970) WITH CULVERT
TYPE OF SURCHARGE ========== 1 (1=2:1 bridge cone, 2=continuous embank., 3=rectangular surch.)
DEPTH TO WATER TABLE (below top of existing embankment) == 7 FT

NEW EMBANKMENT:
- NEW EMBANKMENT FILL UNIT WEIGHT ========== 120 PCF
- NEW EMBANKMENT FILL HEIGHT ========== 19 FT
- PROPOSED WIDTH AT TOP ========== 156 FT
- PROPOSED WIDTH AT BOTTOM ========== 250 FT (which is a 2.5:1 slope)

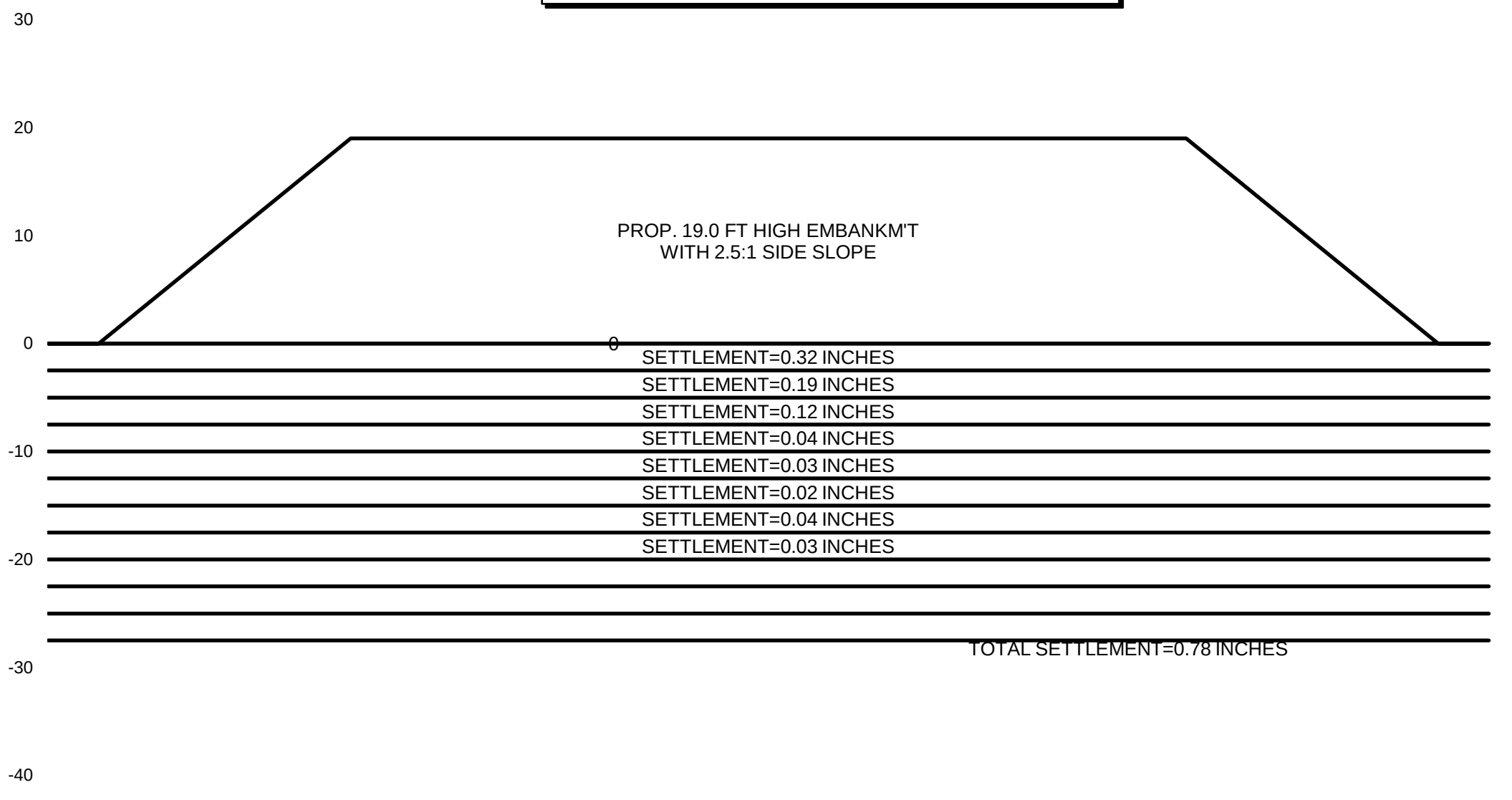
EXISTING EMBANKMENT (IF ANY):
- EXISTING EMBANKMENT UNIT WEIGHT ========== 120 PCF
- EXISTING EMBANKMENT HEIGHT ========== 0 FT
- EXISTING WIDTH AT TOP ========== 0 FT
- EXISTING WIDTH AT BASE ========== 0 FT (which is a 0.0:1 slope)

ASSUMPTIONS:
- Soil Deposit is Normally Consolidated
- Cohesive Layers are Saturated
- Soils have a Low Sensitivity
- Liquid Limit (LL)=Moist. Content (MC%)
- Initial Void Ratio (Eo)=2.7*(MC%)/100
- Comp. Index (Cc)=0.009*(LL-10)
- Neglecting Granular & Secondary Settlem't

LAYER THICK (FT)	*TOTAL UNIT WT. (PCF)*	*UNCONF. COMP. STRENGTH (Qu) (TSF)*	*MOIST. CONTENT (%)*	*EXISTING PRESSURE (KSF)*	*PRESSURE INCREASE (KSF)*	*INITIAL VOID RATIO*	*COMPRESSION INDEX (Cc)*	*Qu CORRECTION FACTOR*	*LAYER SETTLEMENT (IN.)*
2.5	120	2.00	25	0.150	2.256	0.675	0.135	0.111	**0.32**
2.5	120	3.00	25	0.450	2.209	0.675	0.135	0.100	**0.19**
2.5	120	2.00	21	0.750	2.162	0.567	0.099	0.111	**0.12**
2.5	120	1.20	12	0.941	2.115	0.324	0.018	0.171	**0.04**
2.5	120	3.70	13	1.085	2.070	0.351	0.027	0.100	**0.03**
2.5	120	3.50	12	1.229	2.027	0.324	0.018	0.100	**0.02**
2.5	120	3.30	15	1.373	1.985	0.405	0.045	0.100	**0.04**
2.5	120	2.50	14	1.517	1.944	0.378	0.036	0.100	**0.03**
2.5	120	5.00	7	1.661	1.905	0.189	0.000	0.100	**0.00**
2.5	120	5.00	7	1.805	1.868	0.189	0.000	0.100	**0.00**
2.5	120	5.00	7	1.949	1.833	0.189	0.000	0.100	**0.00**

TOTAL SETTLEMENT UNDER CENTER OF BRIDGE CONE = 0.78 IN.

EMBANKMENT AND SOIL PROFILE



COHESIVE SOIL SETTLEMENT ESTIMATE

LOCATION AND BORING USED ==== West End/Boring #2 (2017) and #7 (1970) WITHOUT CULVERT
TYPE OF SURCHARGE ========== 1 (1=2:1 bridge cone, 2=continuous embank., 3=rectangular surch.)
DEPTH TO WATER TABLE (below top of existing embankment) == 7 FT

NEW EMBANKMENT:
- NEW EMBANKMENT FILL UNIT WEIGHT ========== 120 PCF
- NEW EMBANKMENT FILL HEIGHT ========== 9 FT
- PROPOSED WIDTH AT TOP ========== 156 FT
- PROPOSED WIDTH AT BOTTOM ========== 250 FT (which is a 5.2:1 slope)

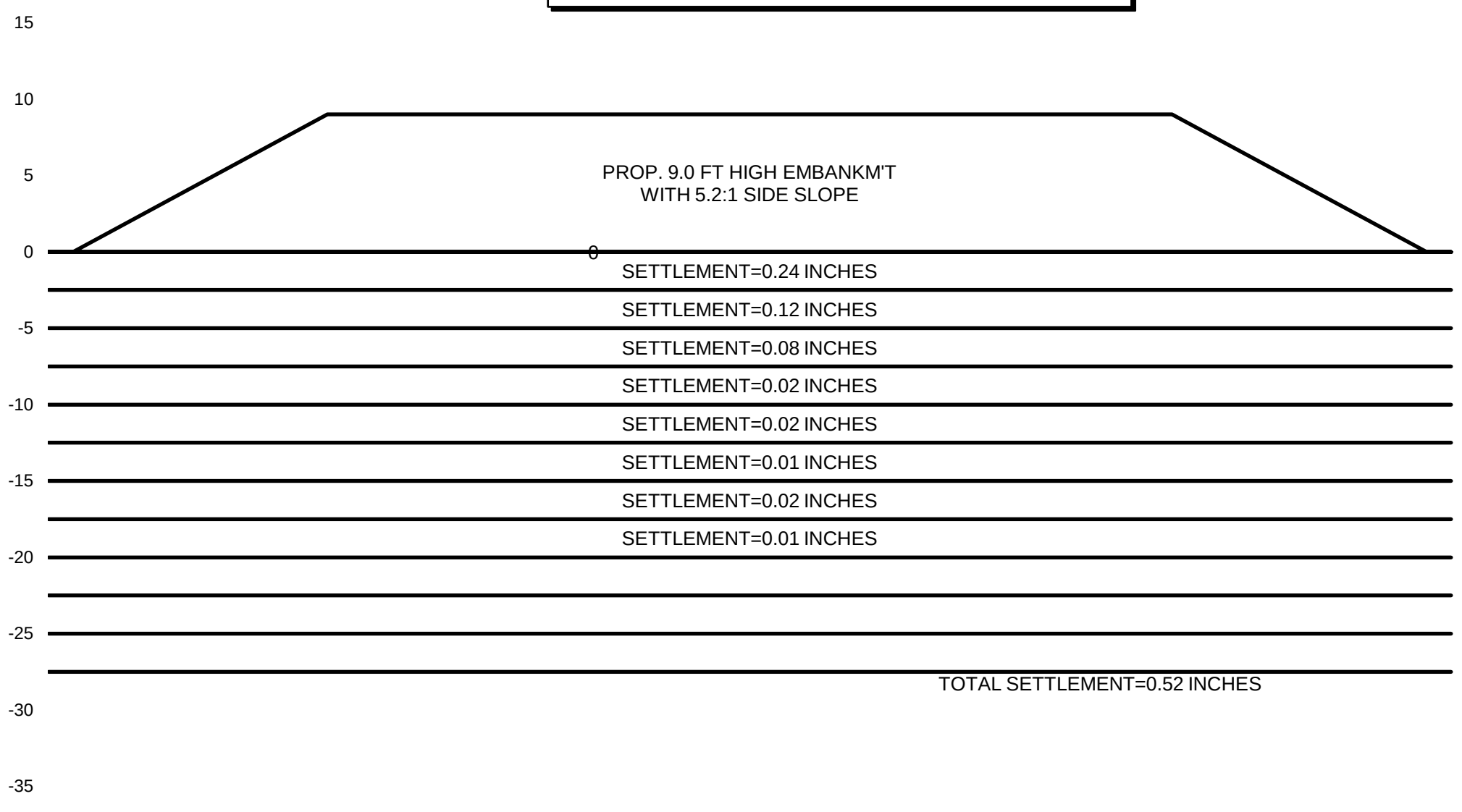
EXISTING EMBANKMENT (IF ANY):
- EXISTING EMBANKMENT UNIT WEIGHT ========== 120 PCF
- EXISTING EMBANKMENT HEIGHT ========== 0 FT
- EXISTING WIDTH AT TOP ========== 0 FT
- EXISTING WIDTH AT BASE ========== 0 FT (which is a 0.0:1 slope)

ASSUMPTIONS:
- Soil Deposit is Normally Consolidated
- Cohesive Layers are Saturated
- Soils have a Low Sensitivity
- Liquid Limit (LL)=Moist. Content (MC%)
- Initial Void Ratio (Eo)=2.7*(MC%)/100
- Comp. Index (Cc)=0.009*(LL-10)
- Neglecting Granular & Secondary Settlem't

LAYER THICK (FT)	*TOTAL UNIT WT. (PCF)*	*UNCONF. COMP. STRENGTH (Qu) (TSF)*	*MOIST. CONTENT (%)*	*EXISTING PRESSURE (KSF)*	*PRESSURE INCREASE (KSF)*	*INITIAL VOID RATIO*	*COMPRESSION INDEX (Cc)*	*Qu CORRECTION FACTOR*	*LAYER SETTLEMENT (IN.)*
2.5	120	2.00	25	0.150	1.056	0.675	0.135	0.111	**0.24**
2.5	120	3.00	25	0.450	1.009	0.675	0.135	0.100	**0.12**
2.5	120	2.00	21	0.750	0.965	0.567	0.099	0.111	**0.08**
2.5	120	1.20	12	0.941	0.924	0.324	0.018	0.171	**0.02**
2.5	120	3.70	13	1.085	0.888	0.351	0.027	0.100	**0.02**
2.5	120	3.50	12	1.229	0.855	0.324	0.018	0.100	**0.01**
2.5	120	3.30	15	1.373	0.827	0.405	0.045	0.100	**0.02**
2.5	120	2.50	14	1.517	0.801	0.378	0.036	0.100	**0.01**
2.5	120	5.00	7	1.661	0.779	0.189	0.000	0.100	**0.00**
2.5	120	5.00	7	1.805	0.760	0.189	0.000	0.100	**0.00**
2.5	120	5.00	7	1.949	0.743	0.189	0.000	0.100	**0.00**

TOTAL SETTLEMENT UNDER CENTER OF BRIDGE CONE = 0.52 IN.

EMBANKMENT AND SOIL PROFILE



COHESIVE SOIL SETTLEMENT ESTIMATE

LOCATION AND BORING USED ==== West End/Boring #4 and 2 WITH CULVERT
TYPE OF SURCHARGE ========== 1 (1=2:1 bridge cone, 2=continuous embank., 3=rectangular surch.)
DEPTH TO WATER TABLE (below top of existing embankment) == 7 FT

NEW EMBANKMENT:
- NEW EMBANKMENT FILL UNIT WEIGHT ========== 120 PCF
- NEW EMBANKMENT FILL HEIGHT ========== 19 FT
- PROPOSED WIDTH AT TOP ========== 156 FT
- PROPOSED WIDTH AT BOTTOM ========== 250 FT (which is a 2.5:1 slope)

EXISTING EMBANKMENT (IF ANY):
- EXISTING EMBANKMENT UNIT WEIGHT ========== 120 PCF
- EXISTING EMBANKMENT HEIGHT ========== 0 FT
- EXISTING WIDTH AT TOP ========== 0 FT
- EXISTING WIDTH AT BASE ========== 0 FT (which is a 0.0:1 slope)

ASSUMPTIONS:
- Soil Deposit is Normally Consolidated
- Cohesive Layers are Saturated
- Soils have a Low Sensitivity
- Liquid Limit (LL)=Moist. Content (MC%)
- Initial Void Ratio (Eo)=2.7*(MC%)/100
- Comp. Index (Cc)=0.009*(LL-10)
- Neglecting Granular & Secondary Settlem't

LAYER THICK (FT)	*TOTAL UNIT WT. (PCF)*	*UNCONF. COMP. STRENGTH (Qu) (TSF)*	*MOIST. CONTENT (%)*	*EXISTING PRESSURE (KSF)*	*PRESSURE INCREASE (KSF)*	*INITIAL VOID RATIO*	*COMPRESSION INDEX (Cc)*	*Qu CORRECTION FACTOR*	*LAYER SETTLEMENT (IN.)*
2.5	120	2.00	25	0.150	2.256	0.675	0.135	0.111	**0.32**
2.5	120	2.50	27	0.450	2.209	0.729	0.153	0.100	**0.20**
2.5	120	2.00	21	0.750	2.162	0.567	0.099	0.111	**0.12**
2.5	120	3.50	5	0.941	2.115	0.135	0.000	0.100	**0.00**
2.5	120	3.50	9	1.085	2.070	0.243	0.000	0.100	**0.00**
2.5	120	4.50	13	1.229	2.027	0.351	0.027	0.100	**0.03**
2.5	120	3.50	11	1.373	1.985	0.297	0.009	0.100	**0.01**
2.5	120	4.20	12	1.517	1.944	0.324	0.018	0.100	**0.01**
2.5	120	4.00	10	1.661	1.905	0.270	0.000	0.100	**0.00**
2.5	120	4.00	10	1.805	1.868	0.270	0.000	0.100	**0.00**
2.5	120	5.00	7	1.949	1.833	0.189	0.000	0.100	**0.00**

TOTAL SETTLEMENT UNDER CENTER OF BRIDGE CONE = 0.70 IN.

EMBANKMENT AND SOIL PROFILE

COHESIVE SOIL SETTLEMENT ESTIMATE

LOCATION AND BORING USED ==== West End/Boring #4 and 2 WITHOUT CULVERT
TYPE OF SURCHARGE ========== 1 (1=2:1 bridge cone, 2=continuous embank., 3=rectangular surch.)
DEPTH TO WATER TABLE (below top of existing embankment) == 7 FT

NEW EMBANKMENT:
- NEW EMBANKMENT FILL UNIT WEIGHT ========== 120 PCF
- NEW EMBANKMENT FILL HEIGHT ========== 9 FT
- PROPOSED WIDTH AT TOP ========== 156 FT
- PROPOSED WIDTH AT BOTTOM ========== 250 FT (which is a 5.2:1 slope)

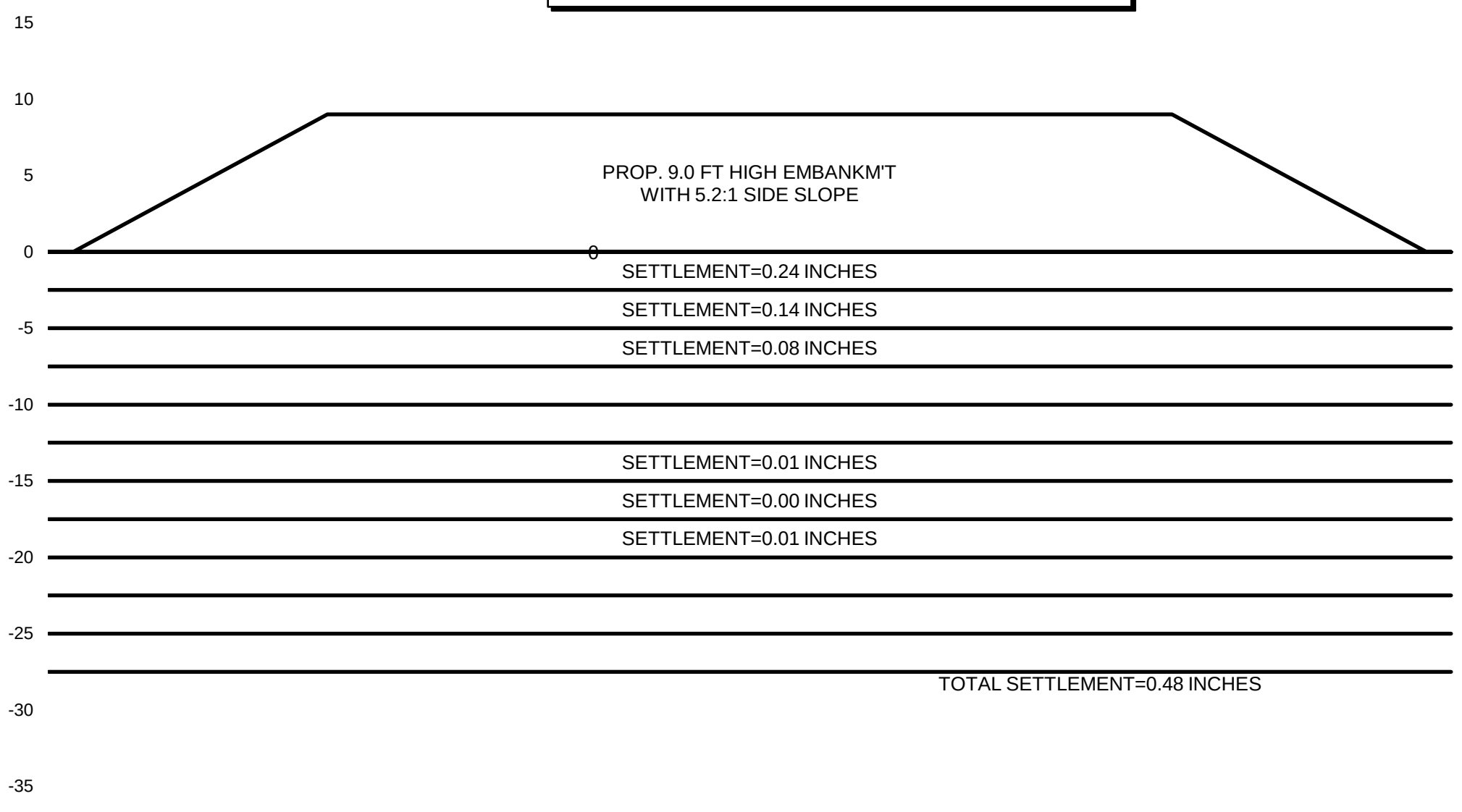
EXISTING EMBANKMENT (IF ANY):
- EXISTING EMBANKMENT UNIT WEIGHT ========== 120 PCF
- EXISTING EMBANKMENT HEIGHT ========== 0 FT
- EXISTING WIDTH AT TOP ========== 0 FT
- EXISTING WIDTH AT BASE ========== 0 FT (which is a 0.0:1 slope)

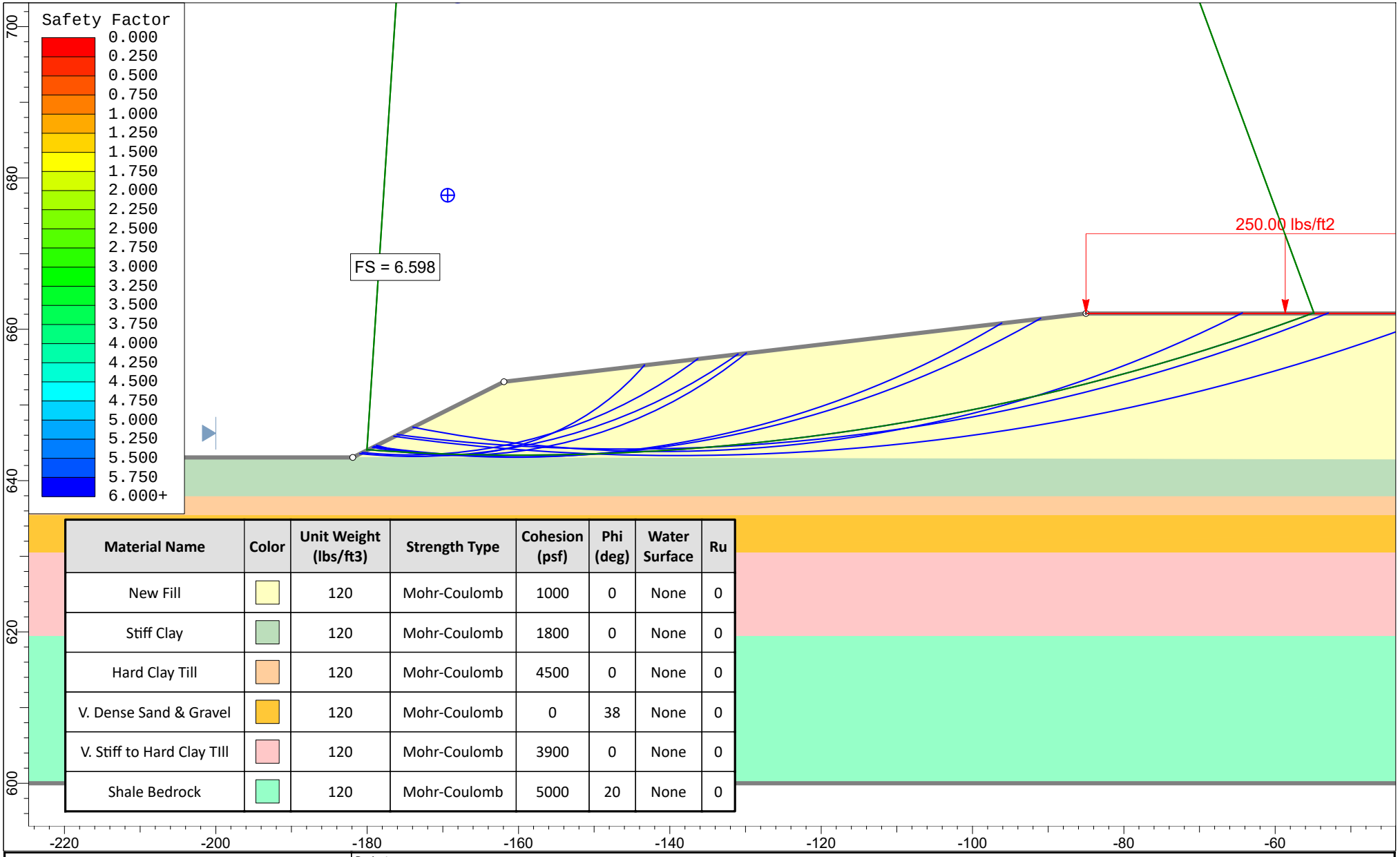
ASSUMPTIONS:
- Soil Deposit is Normally Consolidated
- Cohesive Layers are Saturated
- Soils have a Low Sensitivity
- Liquid Limit (LL)=Moist. Content (MC%)
- Initial Void Ratio (Eo)=2.7*(MC%)/100
- Comp. Index (Cc)=0.009*(LL-10)
- Neglecting Granular & Secondary Settlem't

LAYER THICK (FT)	*TOTAL UNIT WT. (PCF)*	*UNCONF. COMP. STRENGTH (Qu) (TSF)*	*MOIST. CONTENT (%)*	*EXISTING PRESSURE (KSF)*	*PRESSURE INCREASE (KSF)*	*INITIAL VOID RATIO*	*COMPRESSION INDEX (Cc)*	*Qu CORRECTION FACTOR*	*LAYER SETTLEMENT (IN.)*
2.5	120	2.00	25	0.150	1.056	0.675	0.135	0.111	**0.24**
2.5	120	2.50	27	0.450	1.009	0.729	0.153	0.100	**0.14**
2.5	120	2.00	21	0.750	0.965	0.567	0.099	0.111	**0.08**
2.5	120	3.50	5	0.941	0.924	0.135	0.000	0.100	**0.00**
2.5	120	3.50	9	1.085	0.888	0.243	0.000	0.100	**0.00**
2.5	120	4.50	13	1.229	0.855	0.351	0.027	0.100	**0.01**
2.5	120	3.50	11	1.373	0.827	0.297	0.009	0.100	**0.00**
2.5	120	4.20	12	1.517	0.801	0.324	0.018	0.100	**0.01**
2.5	120	4.00	10	1.661	0.779	0.270	0.000	0.100	**0.00**
2.5	120	4.00	10	1.805	0.760	0.270	0.000	0.100	**0.00**
2.5	120	5.00	7	1.949	0.743	0.189	0.000	0.100	**0.00**

TOTAL SETTLEMENT UNDER CENTER OF BRIDGE CONE = 0.48 IN.

EMBANKMENT AND SOIL PROFILE





Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
New Fill		120	Mohr-Coulomb	1000	0	None	0
Stiff Clay		120	Mohr-Coulomb	1800	0	None	0
Hard Clay Till		120	Mohr-Coulomb	4500	0	None	0
V. Dense Sand & Gravel		120	Mohr-Coulomb	0	38	None	0
V. Stiff to Hard Clay TIll		120	Mohr-Coulomb	3900	0	None	0
Shale Bedrock		120	Mohr-Coulomb	5000	20	None	0

rocscience

SLIDEINTERPRET 6.039

Project	Slope Stability Analysis of SN053-2582		
Analysis Description	Short Term (Undrained) Analysis - Bishop		
Drawn By	Terry McCleary	Scale 1:210	Company McCleary Engineering
Date	8/3/2017		File Name 053-2582 Without Culvert.slim