ROADWAY GEOTECHNICAL REPORT

ILLINOIS 89 OVER THE ILLINOIS RIVER

FAP 698 (IL 89)
Section (1) BR
P-93-013-11
D-93-063-14
C-93-027-11
Contract 66A69
Bureau and Putnam Counties

Illinois Department of Transportation

Region 2, District 3

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LIST OF REVISIONS:

PAGE 1: UPDATED COVER SHEET WITH NEW DATE AND LIST OF REVISIONS.
PAGE 214: ADDED TABLE 6B TO ATTACHMENT A OF APPENDIX O.
PAGE 268: ADDED TABLE 6B TO ATTACHMENT A OF APPENDIX P.
PAGE 315-319: ADDED REVISED SPECIAL PROVISION FOR WICK DRAINS.
PAGE 330-332: ADDED REVISED SPECIAL PROVISION FOR SURCHARGE.

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LIST OF APPENDICIES

I. GENERAL INFORMATION

A. Project Location, Description, and Scope

A location map is provided in Appendix A.

The project is located on IL 89 over the Illinois River in Hall Township, Section 3 of T15N, R11E, 4th Principal Meridian, Bureau County, Illinois and in Granville Township, Section 23 of T33N, R1W, 3rd Principal Meridian, Putnam County, Illinois.

The proposed improvement includes the following:

- Reconstruction and realignment of IL 89 from STA 133+76.91 to STA 183+00.00;
- Realignment of the Spring Valley Boat Club entrance from STA 500+00 to STA 513+65.50;
- Construction of SN 078-0047 (proposed) to replace SN 078-0006 (existing), which carries IL 89 over the Illinois River.

The proposed improvement to IL 89 will provide a two lane typical section with shoulders and open ditch drainage. A shared use path will be constructed from STA 133+76.91 to STA 140+50.

The existing embankment centerline will be realigned up to 46 feet east of the existing centerline and the proposed profile will be approximately 13 feet higher than the existing profile. Embankment will be up to 28 feet high and over 200 feet wide in some areas.

Proposed typical sections are included in Appendix B.

Proposed plan and profile sheets, including the soil profile, are included in Appendix C.

A Structure Geotechnical Report has been prepared for SN 078-0047.

B. Pavement Design

The proposed pavement consists of 9 inches of jointed PCC with tied PCC curb and gutter and 12 inches of aggregate subgrade improvement.

C. Soils

The soils within the project limits generally consist of loam, clay loam, and sandy loam. Many of the soils have unconfined compressive strengths less than 1 ton per square foot and SPT blow counts less than 2.

D. Bedrock

The bedrock underlying this project is from the Pennsylvanian System. The elevation of the bedrock ranges from 399.9 feet at the north end of the project (Boring LB-07) to 378.8 feet at the south end of the project (Boring LB-06).

At the north limit of this project is SN 006-0164, which was constructed in 2008. The soils borings for this structure are included in Appendix D. These soils borings indicate the presence of limestone and shale at various elevations throughout the site, as indicated in Table 1. This information indicates a bedrock surface that slopes down towards the Illinois River.

Station	Offset	Boring Number	Ground Surface Elevation	Depth to Top of Rock	Top of Rock Elevation	Rock Type
	Feet		Feet	Feet	Feet	
31+00	20 RT	5	469.95	3.0	466.95	Limestone
31+18	21.8 RT	7	470.32	2.0	468.32	Limestone on Shale
31+56	25.8 LT	6	468.42	3.5	464.92	Limestone on Shale
31+75	21 RT	4	467.93	5.0	462.93	Shale on Limestone
32+58	25 RT	3	464.36	21.5	442.86	Shale on Limestone
33+37	24 RT	2	463.47	27.0	436.47	Limestone
33+92	25 RT	1	462.73	36.0	426.73	Limestone on Shale

Table 1: SN 006-0164 Soil Borings

The underlying bedrock is not anticipated to impact the construction of the roadway, sewers, culverts and similar appurtenances.

II. SOIL INVESTIGATIONS

A. Field investigation

A subsurface investigation was executed to determine the depth and characteristics of the soils along the proposed improvement. Various methods were used to determine subsurface conditions including SPT, MSPT (Modified SPT), rock coring, Rimac testing, and Shelby tubes. Some borings for the structure were performed by a consultant (McCleary Engineering) at locations that could not be accessed with IDOT's truck mounted equipment. A summary of all soil borings is provided in Table 2.

Soil borings for the roadway are shown on the plan sheets in Appendix C and are included in Appendix E. Soil boring logs for SN 078-0047 are included in Appendix F. Soil boring logs for SN 078-2005, which is located at the south end of this project, are included in Appendix G.

Boring Number	Station (Proposed Alignment)	Offset (Feet)	Boring Type	Boring Performed By	Rock Encountered	Rock Elevation (Feet)
LB-05	137+00	14 LT	Soil Profile	IDOT	None	N/A
LB-04	141+00	4 RT	Soil Profile	IDOT	None	N/A
LB-07	144+88	1 RT	Soil Profile	IDOT	Shale	399.94
02 (2014)	148+31	37 RT	Bridge	IDOT	None	N/A
05 (2013)	148+87	49 LT	Bridge	IDOT	Shale	396.19
05-ST (2013)	148+87	49 LT	Bridge	IDOT	None	N/A
06 (2013)	149+95	0	Bridge	IDOT	Shale	392.87
101C	150+71 (Pier #1)	0.5 RT	Rock Core	McCleary Eng	Shale	391.50
101M	150+72.0 (Pier #1)	6.5 LT	Bridge	McCleary Eng	Shale	391.25
03C (2014)	150+89	3 RT	Rock Core	IDOT	Shale	390.40
03M (2014)	150+90	0	Bridge	IDOT	Shale	390.40
02 (2011)	151+31	64 RT	Bridge	IDOT	Shale	385.28
B-7	152+33	18.54 LT	Bridge	McCleary Eng	Shale	400.43
102M	152+51.15 (Pier #2)	9.99 LT	Bridge	McCleary Eng	Shale	397.00
102C	152+60.99 (Pier #2)	3.77 LT	Rock Core	McCleary Eng	Shale	404.20
103C	155+10.04 (Pier #3)	6.19 RT	Rock Core	McCleary Eng	Shale	394.94
103M	155+19.38 (Pier #3)	2.95 LT	Bridge	McCleary Eng	Shale	395.65
B-8	155+33	11.94 LT	Bridge	McCleary Eng	Shale	398.91
104M	158+78.37 (Pier #4)	16 RT	Bridge	McCleary Eng	Shale	394.35
104C	158+79.88 (Pier #4)	6.43 LT	Rock Core	McCleary Eng	Shale	394.35
B-9	159+36	15.19 LT	Bridge	McCleary Eng	Shale	398.05
01 (2011)	161+18	84 LT	Bridge	IDOT	Shale	398.27
105C	161+52.78 (Pier #5)	0	Rock Core	McCleary Eng	Shale	400.54
105M	161+52.78 (Pier #5)	6.5 RT	Bridge	McCleary Eng	Shale	401.54
01 (2013)	162+10	83 LT	Bridge	IDOT	Shale	400.27
106C	163+03.11 (Pier #6)	0	Rock Core	McCleary Eng	Shale	400.50
106M	163+03.11 (Pier #6)	6 RT	Bridge	McCleary Eng	Shale	399.50
02 (2013)	163+50	62 LT	Bridge	IDOT	Shale	392.09
107C	165+10 (Pier #7)	8 RT	Rock Core	McCleary Eng	Shale	394.50
107M	165+11 (Pier #7)	12.5 RT	Bridge	McCleary Eng	Shale	402.55
107C (Aborted)	165+16 (Pier #7)	5 RT	Rock Core	McCleary Eng	Shale	397.82
03 (2013)	165+35	63 LT	Bridge	IDOT	Shale	394.33
04 (2013)	166+63	55 LT	Bridge	IDOT	Shale	390.83
04-ST (2013)	166+63	55 LT	Bridge	IDOT	None	N/A
01 (2014)	167+20	38 RT	Bridge	IDOT	None	N/A
LB-06	170+00	50 LT	Soil Profile	IDOT	Shale	378.75
LB-03	173+00	3 RT	Soil Profile	IDOT	None	N/A
LB-11	174+50	138 LT	Soil Profile	IDOT	None	N/A
LB-02	176+00	10 LT	Soil Profile	IDOT	None	N/A
LB-10	177+00	150 LT	Soil Profile	IDOT	None	N/A
LB-01	179+00	15 LT	Soil Profile	IDOT	None	N/A

Table 2: Soil Boring Summary

B. Laboratory Testing and Classification of Soils

For the roadway borings, laboratory testing consisted of Atterberg Limits, grain size analysis, and moisture content. The soil samples were classified in accordance with the IDOT textural classification chart and the AASHTO engineering designations with group indices were determined. The grain size distribution with Atterberg Limits is included in Appendix H. The IDH Textural Classification Chart is included in Appendix I.

Shelby tubes were obtained at the north and south abutments and were tested by BMPR for consolidation and strength parameters. These test results are included in Appendix J.

C. Groundwater Conditions

The year 2012 had precipitation which was significantly below the historical average, while 2013 was wetter than normal. Complete precipitation data for Peru, Illinois is provided in Table 3. Variations in groundwater elevation caused by precipitation are not expected to be significant.

D. Existing Pavement Conditions

The existing pavement is generally in good condition. Cores of the existing pavement were taken in 2012 and did not show any signs of excessive deterioration that would prevent use of the pavement for stage construction traffic. Information on the pavement cores is in Appendix K.

E. Existing Embankment Conditions

The area from STA 33+47 to STA 34+50 experienced extensive settlement after construction of SN 006-0164, which carries IL 89 over the CSX Railroad. This settlement has required one resurfacing of the roadway and multiple attempts to correct the profile by grinding the roadway. The south abutment for the new bridge (SN 006-0164) is located approximately 100 feet north of the south abutment for the old bridge, which necessitated the placement of embankment approximately 29 feet high. The embankment was placed in four phases:

- Phase 1: Place embankment under the existing bridge to up to the highest elevation where construction equipment could have access.
- Phase 2: Winter shutdown period.
- Phase 3: Remove the southbound lane of IL 89 and complete the southbound embankment.
- Phase 4: Remove the northbound lane of IL 89 and complete the northbound embankment.

This embankment caused consolidation of the underlying soils. Even though settlement platforms were used to monitor settlement during construction and pavement was not constructed until a suitable rate of settlement was attained, extensive settlement continued to occur after the pavement was constructed and the road was opened to traffic. A copy of the settlement platform data for the south approach is included in Appendix L. This data indicates total settlement of 15 inches in the northbound lanes. In November 2014, the settlement of the abutment slopewall was measured to be approximately 3 inches, which occurred after construction was completed. Recommendations for treatment of the existing slopes and embankments are included in Section III.

Month	Year	Actual Precipitation	Normal Precipitation	Departure from Normal	Cumulative Actual Precipitation	Cumulative Normal Precipitation
		inch	inch	inch	inch	inch
January	2011	0.83	1.52	-0.7	0.83	1.52
February	2011	2.81	1.59	1.2	3.64	3.11
March	2011	1.92	2.68	-0.8	5.56	5.79
April	2011	4.74	3.38	1.4	10.31	9.17
May	2011	6.43	4.46	2.0	16.73	13.63
June	2011	5.81	3.82	2.0	22.54	17.45
July	2011	2.98	4.47	-1.5	25.52	21.92
August	2011	4.12	4.17	0.0	29.65	26.09
September	2011	3.17	3.33	-0.2	32.81	29.42
October	2011	1.31	3.09	-1.8	34.12	32.51
November	2011	5.28	3.07	2.2	39.40	35.58
December	2011	2.38	2.36	0.0	41.78	37.94
January	2012	1.00	1.52	-0.5	42.78	39.46
February	2012	1.58	1.59	0.0	44.36	41.05
March	2012	1.65	2.68	-1.0	46.01	43.73
April	2012	2.52	3.38	-0.9	48.54	47.11
May	2012	3.89	4.46	-0.6	52.43	51.57
June	2012	2.85	3.82	-1.0	55.28	55.39
July	2012	1.57	4.47	-2.9	56.85	59.86
August	2012	3.37	4.17	-0.8	60.22	64.03
September	2012	3.20	3.33	-0.1	63.43	67.36
October	2012	3.99	3.09	0.9	67.42	70.45
November	2012	0.30	3.07	-2.8	67.72	73.52
December	2012	1.55	2.36	-0.8	69.27	75.88
January	2013	3.76	1.52	2.2	73.03	77.4
February	2013	2.79	1.59	1.2	75.82	78.99
March	2013	0.68	2.68	-2.0	76.50	81.67
April	2013	8.45	3.38	5.1	84.95	85.05
May	2013	6.00	4.46	1.5	90.94	89.51
June	2013	2.27	3.82	-1.6	93.21	93.33
July	2013	1.63	4.47	-2.8	94.85	97.8
August	2013	3.17	4.17	-1.0	98.02	101.97
September	2013	2.10	3.33	-1.2	100.12	105.3
October	2013	3.59	3.09	0.5	103.71	108.39
November	2013	1.85	3.07	-1.2	105.56	111.46
December	2013	0.81	2.36	-1.5	106.37	113.82
January	2014	0.35	1.52	-1.2	106.72	115.34
February	2014	1.26	1.59	-0.3	107.99	116.93
March	2014	1.47	2.68	-1.2	109.46	119.61
April	2014	3.54	3.38	0.2	113.00	122.99
May	2014	2.70	4.46	-1.8	115.70	127.45
June	2014	4.83	3.82	1.0	120.53	131.27
July	2014	1.04	4.47	-3.4	121.57	135.74
TOTAL		121.57	135.74	-14.2	121.57	135.74

Table 3: Precipitation Summary

III. ANALYSIS AND RECOMMENDATIONS

A. Embankment

The material to be used for the embankments is not known at this time; however the following requirements must be met:

1. Moisture content shall be between 80% and 110% of the proctor optimum moisture determined by Illinois Modified AASHTO T 99.
2. Immediate Bearing Value greater than 4.0 determined by Illinois Test Procedure 501 or Illinois Test Procedure 502.
3. Liquid Limit less than 50 determined by AASHTO T 89.
4. Plasticity Index greater than 12.0 determined by AASHTO T 90.
5. Silt and fine sand content less than 65% determined by AASHTO T 88.

Material not meeting requirements 3, 4, or 5 above shall be restricted to the core of the embankment and must be covered with a minimum of thirty-six inches of material meeting these requirements. In addition, if a granular material is used to construct the embankment, drainage must be included to prevent excessive moisture from being held within the granular material. Drainage must be included to drain the select fill used for any temporary retaining walls.

A special provision for embankment is included in Appendix M.

B. Frost Susceptible Soils

The soils within the proposed improvement were checked for their potential to be frost susceptible using the criteria outlined in the IDOT Geotechnical Manual (1999 edition). Although there are some frost susceptible soils present within the project limits, these soils will be covered by an adequate depth of embankment, which minimizes the risk of detrimental frost action. No action is needed to remediate frost susceptible soils.

C. Subgrade Support Rating and Illinois Bearing Ratio

For the purpose of pavement design, a Subgrade Support Rating of poor is recommended for all existing subgrade soils. The SSR charts with data points plotted are in Appendix N. Based on Table 4-1 of the IDOT Geotechnical Manual (1999 edition), the Illinois Bearing Ratio for the existing project soils can be estimated as 3.

The source of the new embankment material is not known at this time, so a Subgrade Support Rating of poor is recommended for all new embankment materials.

D. Improved Subgrade Layer

An improved subgrade consisting of 12 inches of Aggregate Subgrade Improvement is proposed for this project. During construction the District Geotechnical Engineer should be contacted to inspect the subgrade and determine if additional depth of improved subgrade is warranted.

E. Subsurface Drainage

Because Aggregate Subgrade Improvement is proposed for this project, underdrains are necessary. District 3 special provision 6E, “Pipe Underdrains 4” (Modified)” should be included in the contract special provisions. Outlet pipes for pipe underdrains should discharge at the bottom of the slope.

F. Subgrade Replacement

Based on the soil borings and existing pavement condition, subgrade replacement within the limits of the existing pavement is not anticipated.

G. Settlement, Slope Stability, and Ground Improvement

Settlement and slope stability analyses were performed by IDOT’s Bureau of Materials and Physical Research. The results of these analyses are presented as BMPR Analysis Memorandums in Appendix O and Appendix P for the north and south approaches, respectively.

1. Settlement

The settlement amounts and time were compared to what was observed at SN 006-0164, located just north of the project limits, and are reasonable when compared to the measured settlement at this nearby structure.

The time needed for the settlement to be complete enough for roadway construction exceeds what can be allowed during the construction process. In addition, the amount of differential settlement across the open lanes of traffic exceeds what is reasonable for a roadway open to traffic. Therefore, ground improvement is necessary and is discussed in the section titled “Ground Improvement.” Even if ground improvement is used, settlement is expected to occur across the existing IL 89 pavement. A special provision will be developed to include in the plans to address this settlement during construction.

Pavement should not be constructed until after 90 percent of settlement is complete, T_{90}, and the estimated settlement remaining is a maximum of 1.0 inches.

2. Slope Stability

The side slopes do not have an adequate factor of safety against slope failure. Therefore, ground improvement is necessary and is discussed in the section titled “Ground Improvement.” In addition, piezometers are necessary to monitor pore pressures during embankment construction. If the pore pressures exceed the allowable pore pressure, a waiting period must occur to allow the pore pressures to dissipate before continuing with embankment construction. These details are discussed in the section titled “Settlement and Slope Monitoring.”

3. Ground Improvement

Ground improvement is needed to accelerate the settlement process and increase the FOS against slope failure. Both prefabricated vertical wick drains and aggregate columns are suitable options for ground improvement. Both methods will accelerate settlement and allow for faster dissipation of pore pressure. In addition, aggregate columns will reduce the amount of settlement. Wick drains are less expensive, however the methods used for ground improvement should be chosen based on whether or not the amount of settlement needs to be reduced near the proposed bridge abutments and the cost effectiveness of using one or both methods. Special provisions for wick drains and aggregate columns are provided in Appendix Q and Appendix R, respectively.

Surcharges may also be used to reduce the differential settlement across the proposed lanes. Information on surcharges can be found in Appendix O and Appendix P. A special provision for surcharges is provided in Appendix S.

H. Settlement and Slope Monitoring

Both settlement platforms and piezometers should be used to monitor the settlement during construction.

Settlement platforms should be installed at the locations indicated in Table 4. These locations are based on the recommendations in Appendix O and Appendix P. The District 3 detail “Settlement Platforms” (Detail 204-1) must be included in the plans.

STATION	OFFSET (Feet)
143+00	20 LT
148+50	20 LT
167+50	20 LT

Table 4: Settlement Platform Locations

Piezometers are needed to monitor the pore pressures throughout the embankment construction and settlement processes and should be installed at the locations indicated in Table 5. These locations are based on the recommendations in Appendix O and Appendix P. Additional information on the maximum allowable pore pressures during construction are in Appendix O and Appendix P. A special provision for the piezometers is included in Appendix T.

STATION	OFFSET (Feet)	ELEVATION (Feet)
148+50	50 LT	415.6
167+50	30 LT	430.6

Table 5: Piezometer Locations

Slope inclinometers are needed to monitor the slopes for movement during construction. The slope inclinometers should be installed at the locations indicated in Table 6. These locations are based on the recommendations in Appendix O and Appendix P. A special provision for the slope inclinometers is included in Appendix U.

STATION	OFFSET (Feet)
148+50	130 RT
148+50	70 LT
167+50	70 LT

Table 6: Slope Inclinometer Locations

I. Adjacent Structures

The adequacy of the existing abutments needs to be evaluated by the structural engineer to determine the effects settlement will have on the existing abutments and foundations.

J. Surface Drainage

Constructing curb and gutter at the edge of pavement is recommended to minimize surface erosion of the slopes and minimize future slope maintenance issues by controlling stormwater runoff. Since the proposed embankment side slopes are 1:2 (V:H), they are more likely to experience erosion than the flatter slopes used at many other bridges.

K. Construction Staging

Temporary Mechanically Stabilized Earth Walls (TMSE Walls) are proposed to facilitate keeping the roadway open to traffic during construction. These walls appear to be feasible, however when specific locations for the walls are determined they need to evaluated for settlement and stability.

L. Side Slopes and Pavement near SN 006-0164

The existing embankment slopes from STA 133+47 to STA 134+75 should be graded, re-seeded, and covered with an erosion control blanket to eliminate existing scarps, eroded areas, and low spots. This will help to prevent excessive erosion of the embankment.

The existing pavement should be resurfaced up to STA 133+77 and the south bridge approach pavement should be removed and replaced.

M. Geotechnical Reports

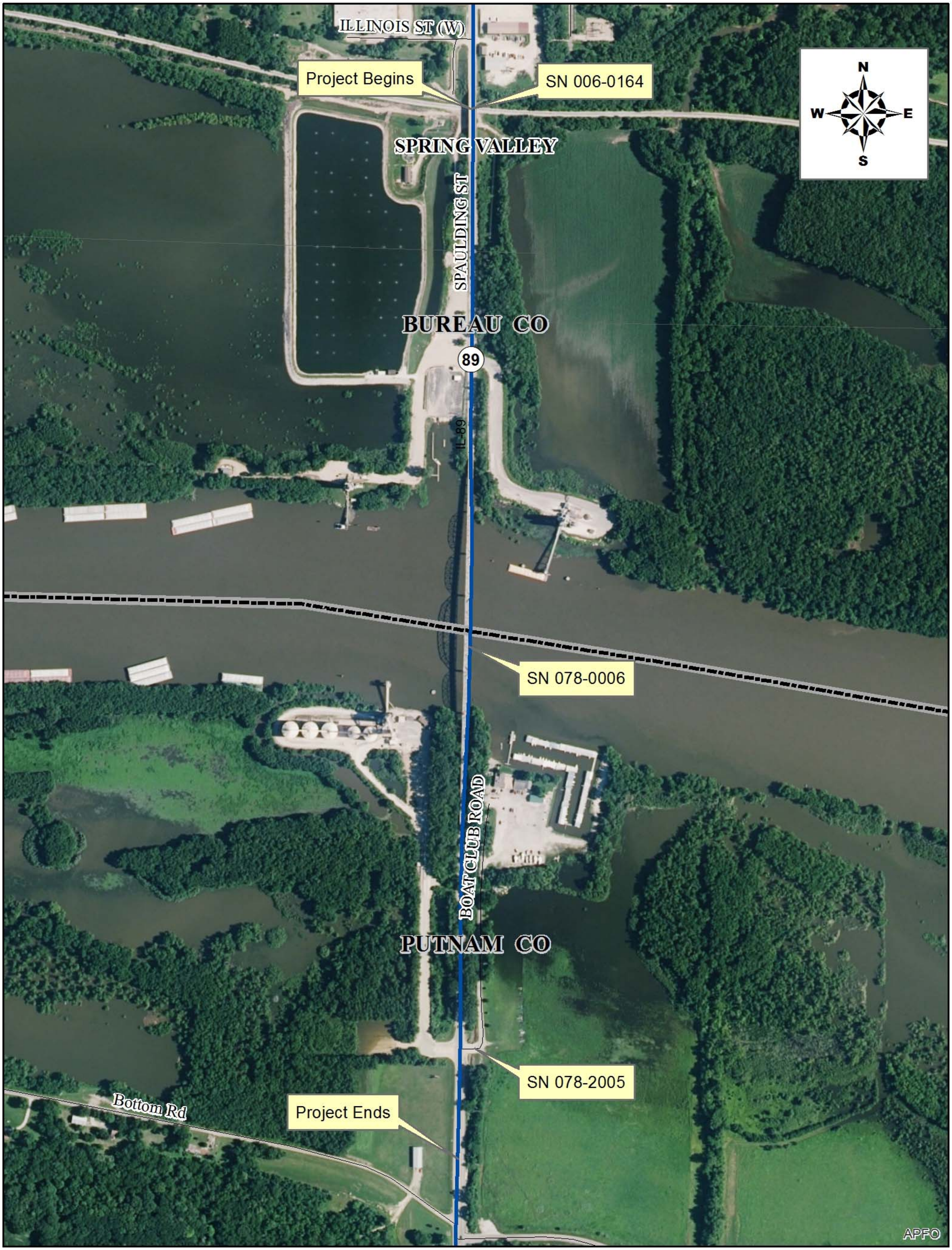
The Roadway Geotechnical Report and the Structure Geotechnical Report for this project should be made available to the contractor. A special provision for this is included in Appendix V.

IV. FURTHER INFORMATION

If there are any questions about this report or any additional information is required, please contact the District Geotechnical Engineer.

APPENDIX

A


ILLINOIS ST (W)
Project Begins
SN 006-0164
N
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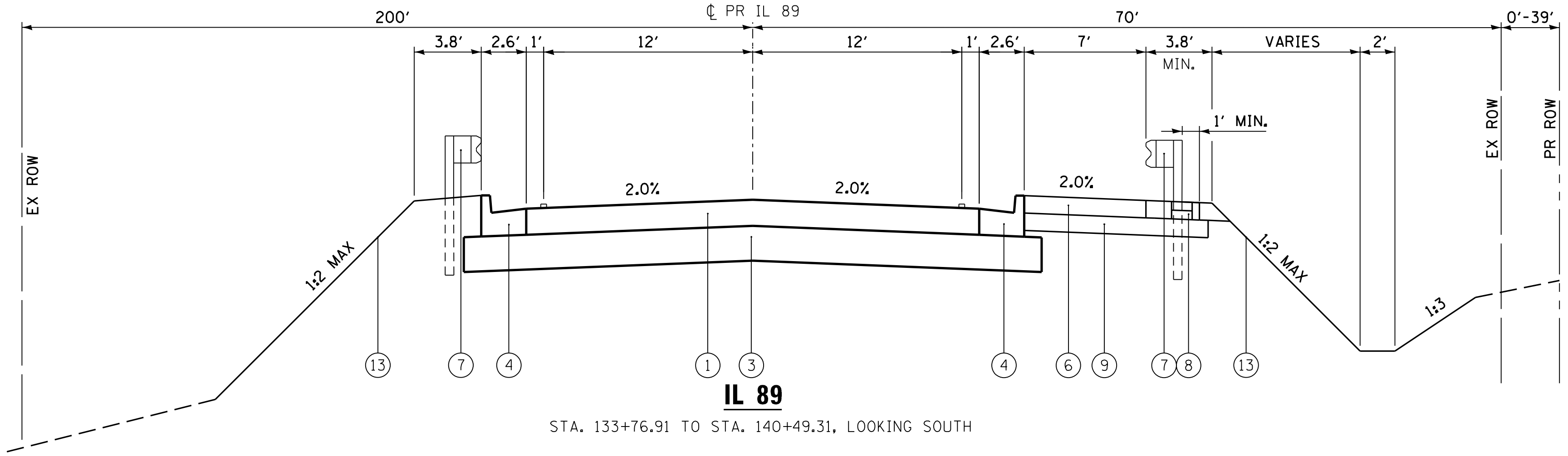
E
S
SPRING VALLEY
SPAULDING ST
BUREAU CO
89
IL-89
SN 078-0006
BOAT CLUB ROAD
PUTNAM CO
SN 078-2005
Bottom Rd
Project Ends
APFO

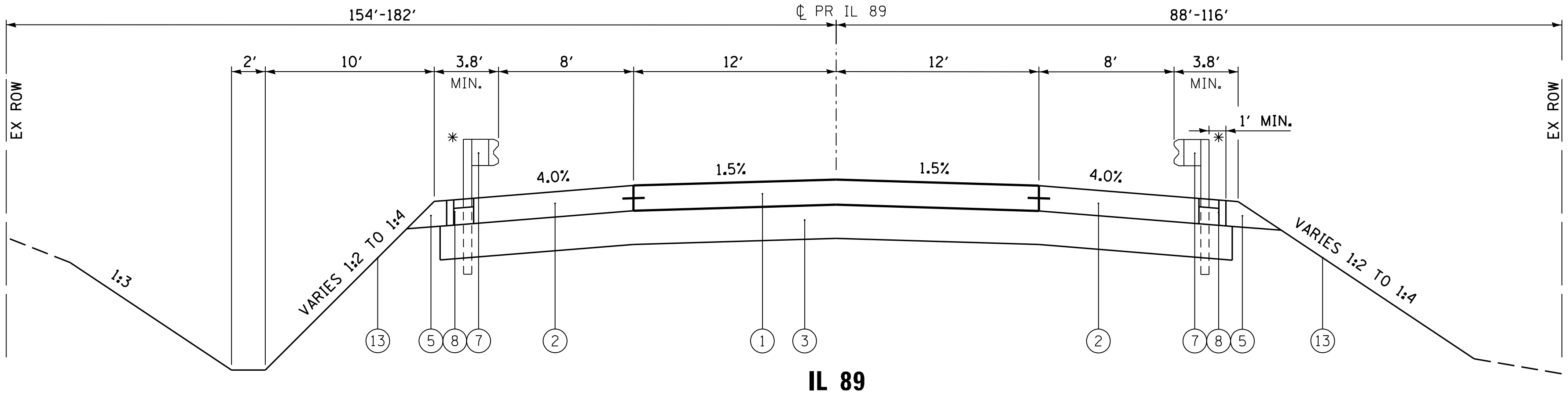
APPENDIX

B



IL 89

STA. 133+76.91 TO STA. 140+49.31, LOOKING SOUTH



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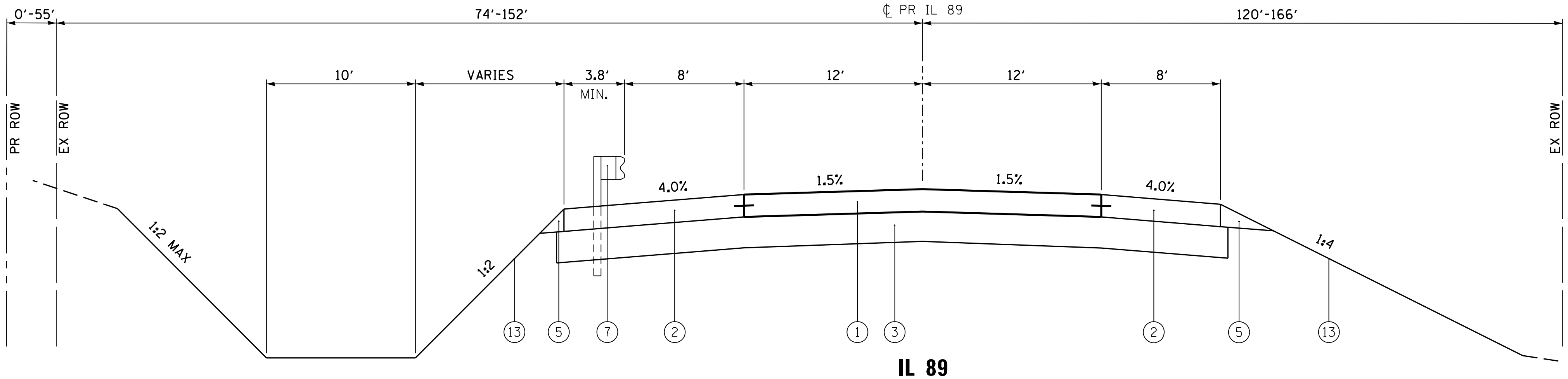


IL 89

STA. 166+65.91 TO STA. 183+00.00, LOOKING SOUTH

LEGEND:

①	PORTLAND CEMENT CONCRETE PAVEMENT 9'' (JOINTED)
②	PORTLAND CEMENT CONCRETE SHOULDERS 9''
③	AGGREGATE SUBGRADE IMPROVEMENT 12''
④	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.24
⑤	AGGREGATE SHOULDERS, TYPE B, 6''
⑥	PORTLAND CEMENT CONCRETE SIDEWALK, 6 INCH
⑦	STEEL PLATE BEAM GUARDRAIL, TYPE A, 6 FOOT POSTS
⑧	HOT-MIX ASPHALT STABILIZATION 6'' AT STEEL PLATE BEAM GUARD RAIL
⑨	AGGREGATE BASE COURSE, TYPE B, 6''
⑩	HOT MIX ASPHALT SURFACE COURSE, MIX ''D'', N50, 2''
⑪	HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N50, 2 1/4''
⑫	AGGREGATE BASE COURSE, TYPE B, 8''
⑬	GROUND LINE

* NOTE: GUARDRAIL IS PROPOSED AT LOCATIONS WHERE THE PROPOSED FRONT SLOPE IS 1:3 OR STEEPER.

PAVEMENT DESIGN IL–89

STRUCTURAL DESIGN TRAFFIC: Year 2026

PV = 6,001 SU = 333 SU = 333

ROAD CLASSIFICATION CLASS II

PERCENT OF STRUCTURAL DESIGN TRAFFIC IN DESIGN LANE:

P = 50% S = 50% M = 50%

TRAFFIC FACTOR: Actual TF = 2.35 AC Type = N/A

Minimum TF = 4.59

PG GRADE: Binder = N/A Surface = N/A

SUBGRADE SUPPORT RATING:

SSR = POOR

FILE NAME =	USER NAME = rparks	DESIGNED RJP	REVISED -
...\D366A69-sht-Pr_Typ_IL89_01.dgn		DRAWN TMB	REVISED -
	PLOT SCALE = NTS	CHECKED JNR	REVISED -
$MODELNAME$	PLOT DATE = 2/26/2015	DATE 2/27/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

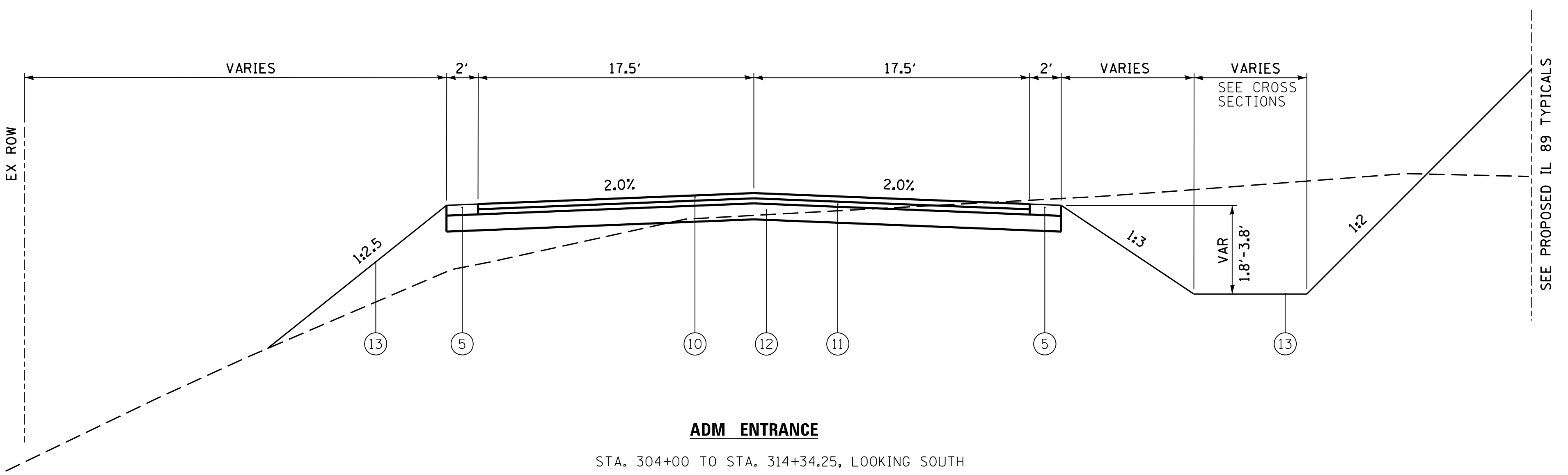
PROPOSED TYPICAL SECTIONS
IL 89

SCALE: NTS SHEET 1 OF 4 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
698	1 (BR)	PUTNAM/BUREAU	235	18

CONTRACT NO. 66A69

ILLINOIS FED. AID PROJECT

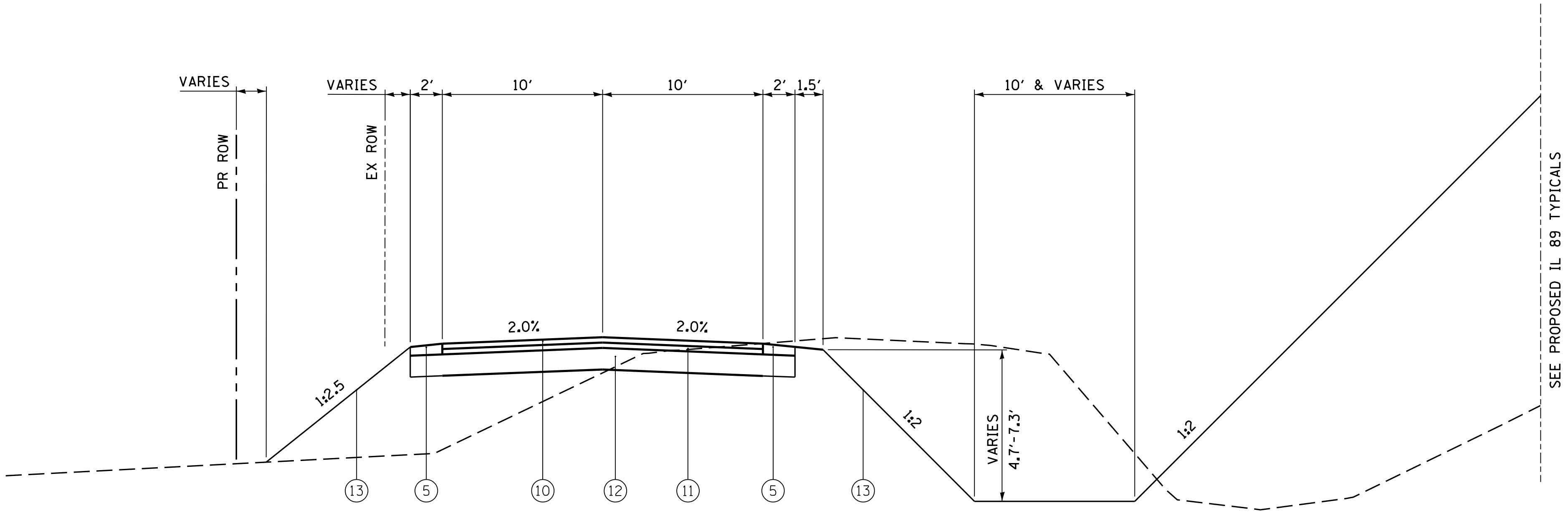


ADM ENTRANCE

STA. 304+00 TO STA. 314+34.25, LOOKING SOUTH

LEGEND:

① PORTLAND CEMENT CONCRETE PAVEMENT 9'' (JOINTED)
② PORTLAND CEMENT CONCRETE SHOULDERS 9''
③ AGGREGATE SUBGRADE IMPROVEMENT 12''
④ COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.24
⑤ AGGREGATE SHOULDERS, TYPE B, 6''
⑥ PORTLAND CEMENT CONCRETE SIDEWALK, 6 INCH
⑦ STEEL PLATE BEAM GUARDRAIL, TYPE A, 6 FOOT POSTS
⑧ HOT-MIX ASPHALT STABILIZATION 6'' AT STEEL PLATE BEAM GUARD RAIL
⑨ AGGREGATE BASE COURSE, TYPE B, 6''
⑩ HOT MIX ASPHALT SURFACE COURSE, MIX ''D'', N50, 2''
⑪ HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N50, 2 1/4''
⑫ AGGREGATE BASE COURSE, TYPE B, 8''
⑬ GROUND LINE



SPRING VALLEY BOAT CLUB

STA. 500+00.00 TO STA. 513+65.50, LOOKING SOUTH

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PLOT DATE = 2/26/2015

DESIGNED RJP
DRAWN TMB
CHECKED JNR
DATE 2/27/2015

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PROPOSED TYPICAL SECTIONS
ADM and SVBC ENTRANCE

SCALE: NTS
SHEET 3 OF 4 SHEETS
STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
698	1 (BR)	PUTNAM/BUREAU	235	19

CONTRACT NO. 66A69
ILLINOIS FED. AID PROJECT

APPENDIX

C

PLAN
NOTE BOOK
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ALIGNMENT CHECKED
R/T OF WAY CHECKED
CADD FILE NAME
BY
DATE

PROFILE
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SURVEYED
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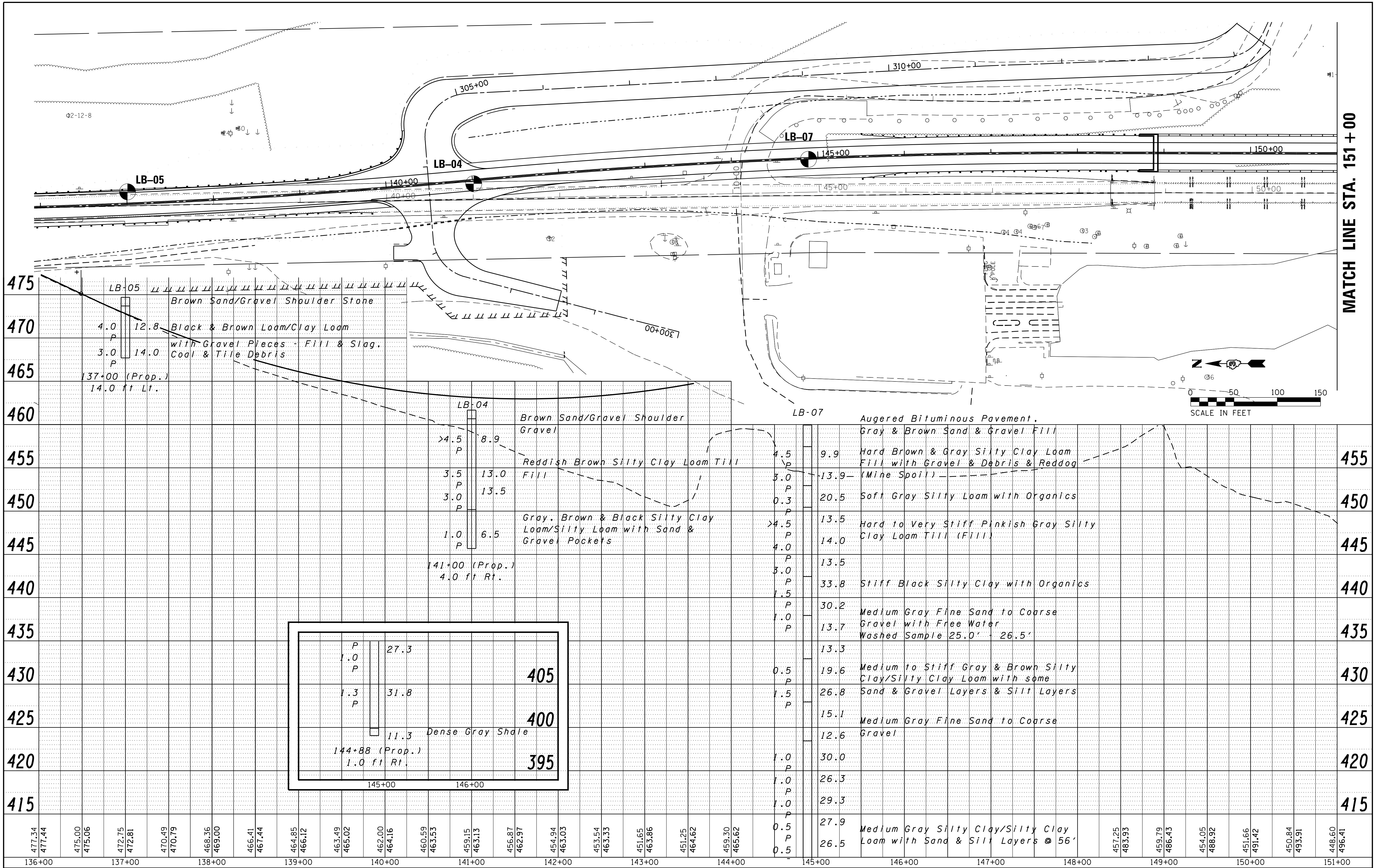
GRADES CHECKED
S.A. NOTED
STRUCTURE NOTAT'NS CH'KD
BY
DATE



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PLOT DATE = 12/17/2013

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORLOGS – IL 89 – SN. 078–0006

SCALE: SHEET NO. OF SHEETS STA. 136+00 TO STA. 151+00

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
698	(1)BR	*		

*BUREAU - PUTNAM
CONTRACT NO. 66A69
ILLINOIS FED. AID PROJECT

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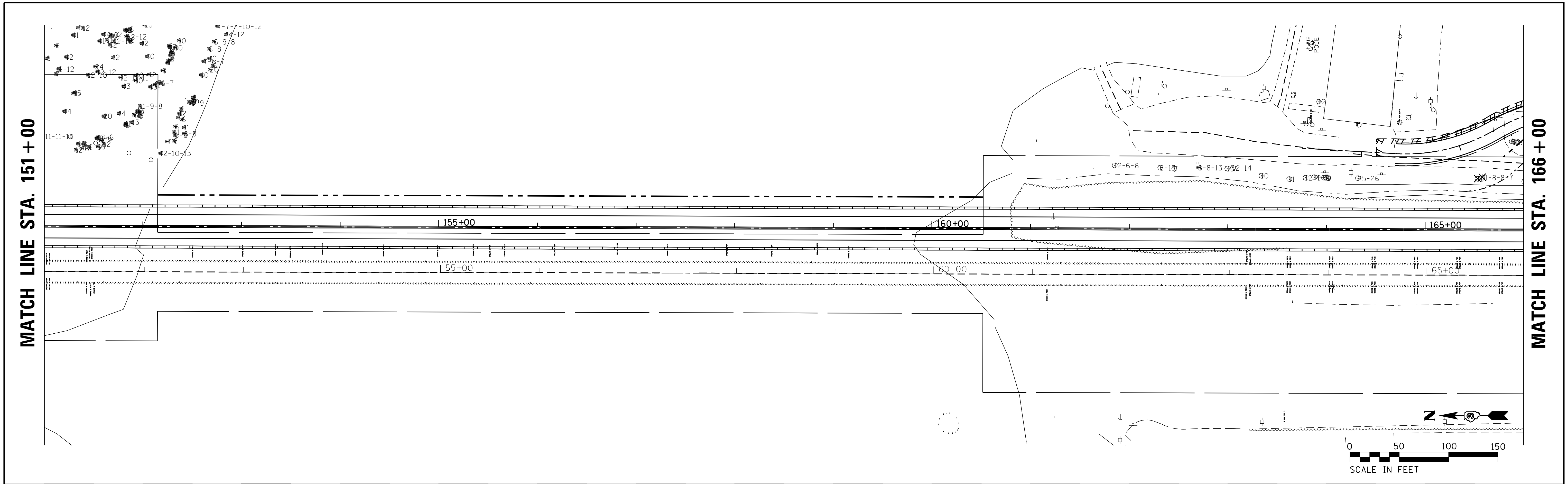

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GRADES CHECKED
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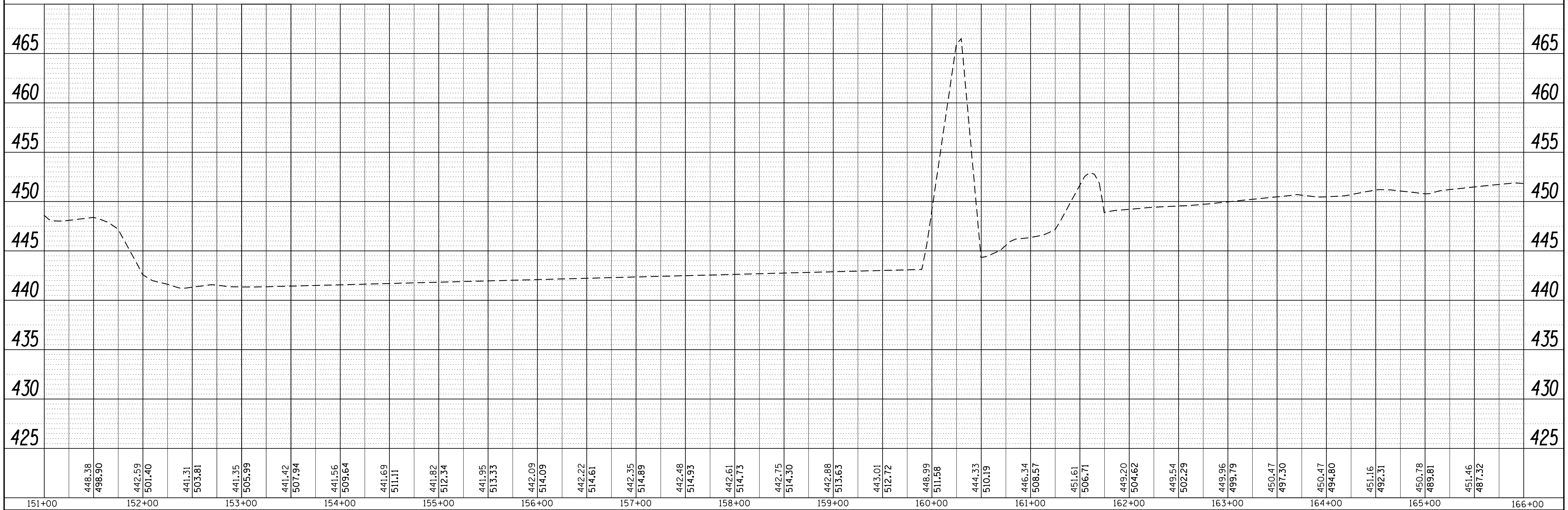
BY
DATE



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PLOT DATE = 12/17/2013

DESIGNED -
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REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORLOGS – IL 89 – SN. 078–0006

SCALE: SHEET OF SHEETS STA. 151+00 TO STA. 166+00

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
698	(1)BR	*		

* BUREAU - PUTNAM
CONTRACT NO. 66A69
ILLINOIS FED. AID PROJECT

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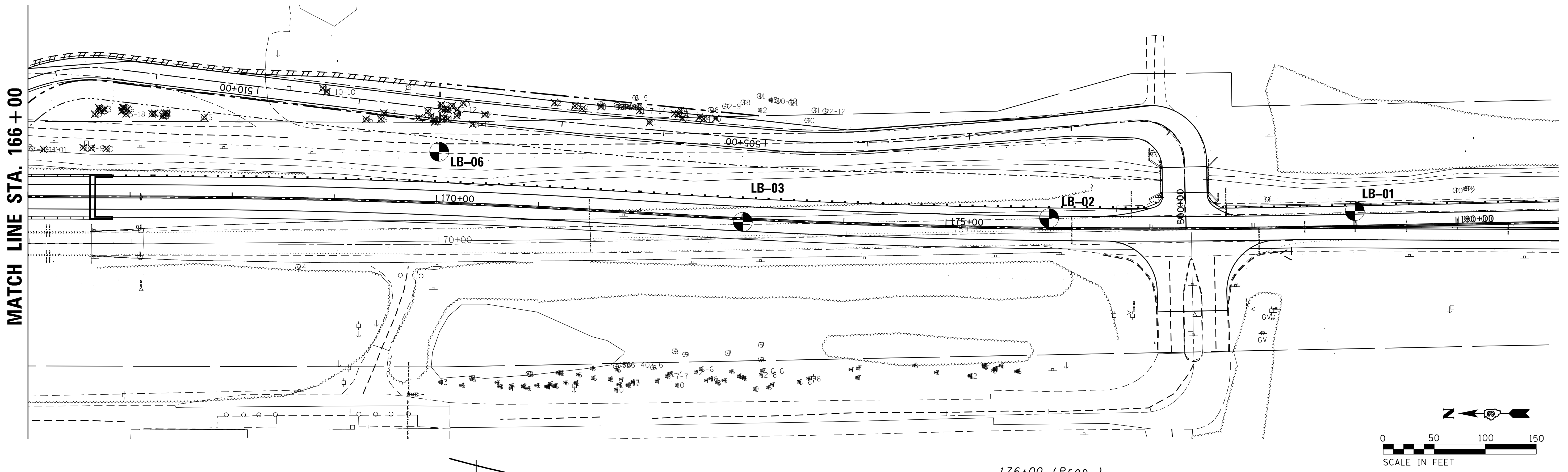

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NOTE BOOK NO.
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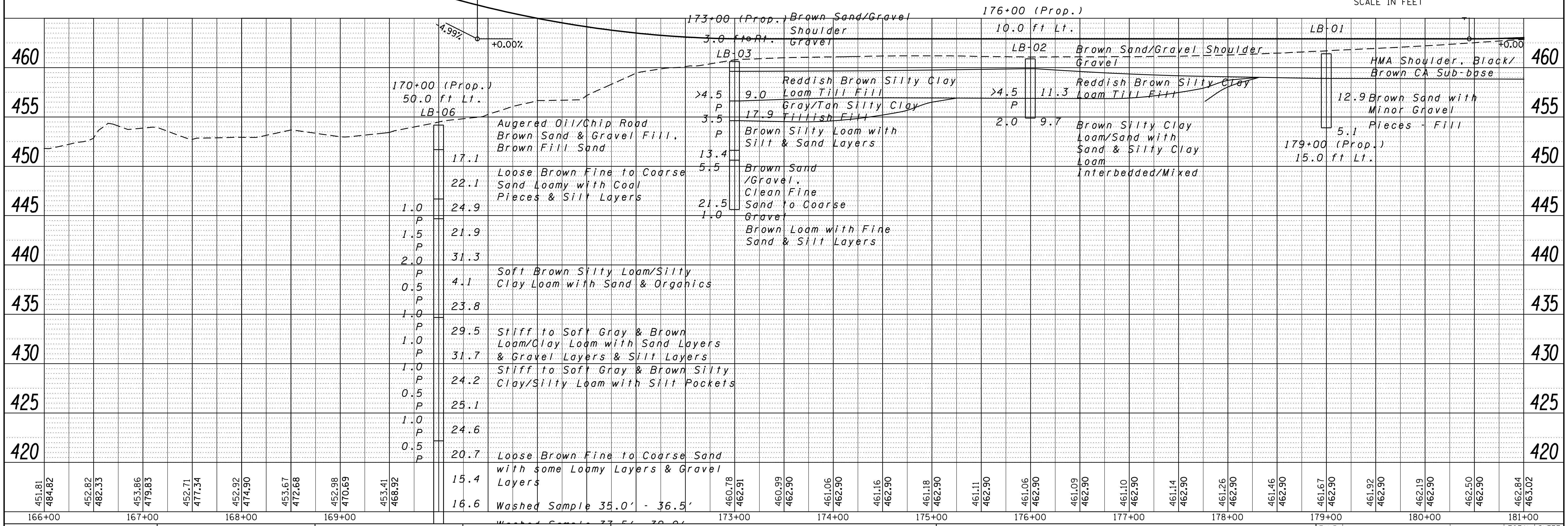

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	PLOT DATE = 12/17/2013	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORLOGS - IL 89 - SN. 078-0006

SCALE: SHEET OF SHEETS STA. 166+00 TO STA. 181+00

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
698	(1)BR	*		
* BUREAU - PUTNAM		CONTRACT NO. 66A69		
	ILLINOIS FED. AID PROJECT			

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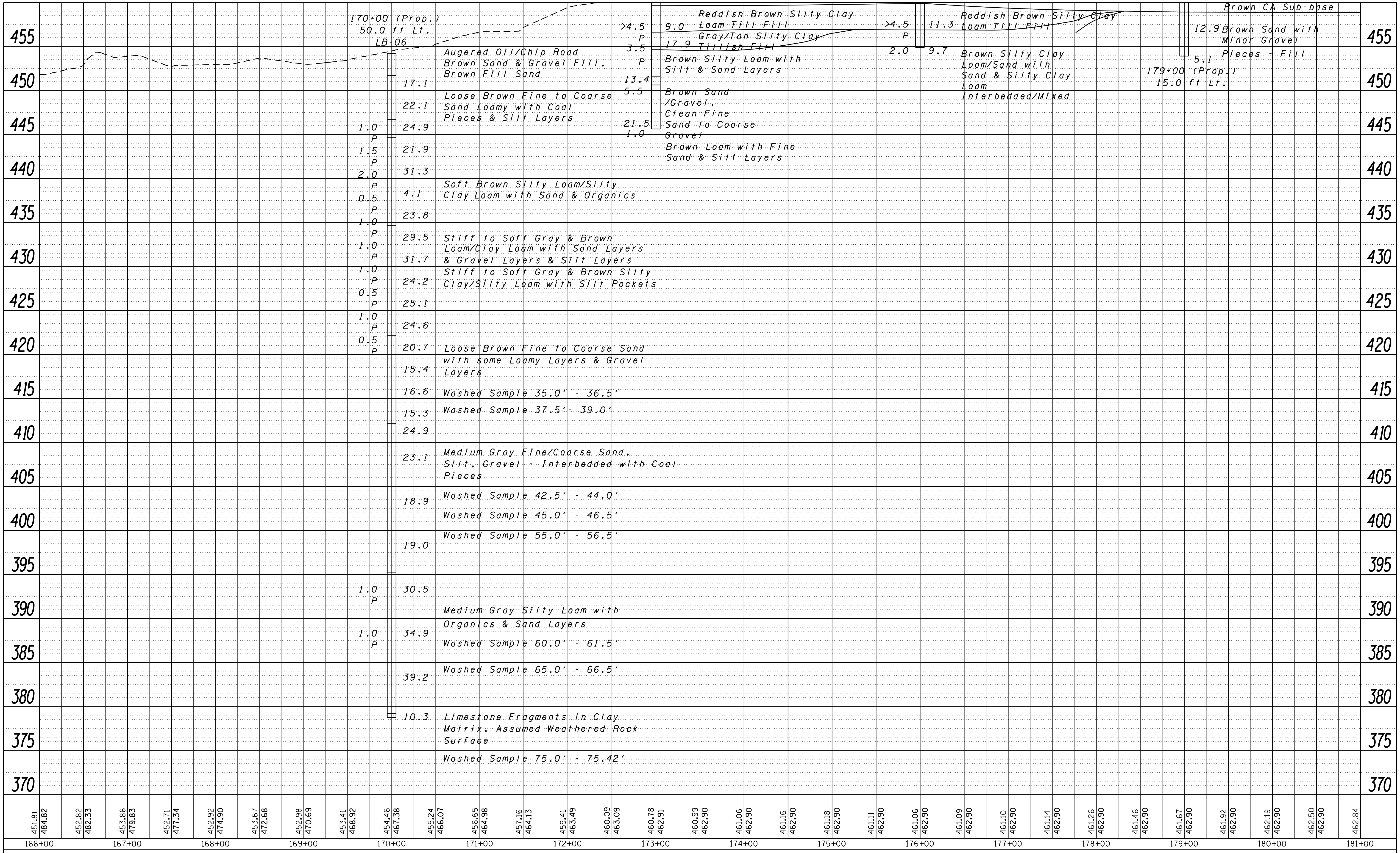

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PLOT DATE = 12/17/2013

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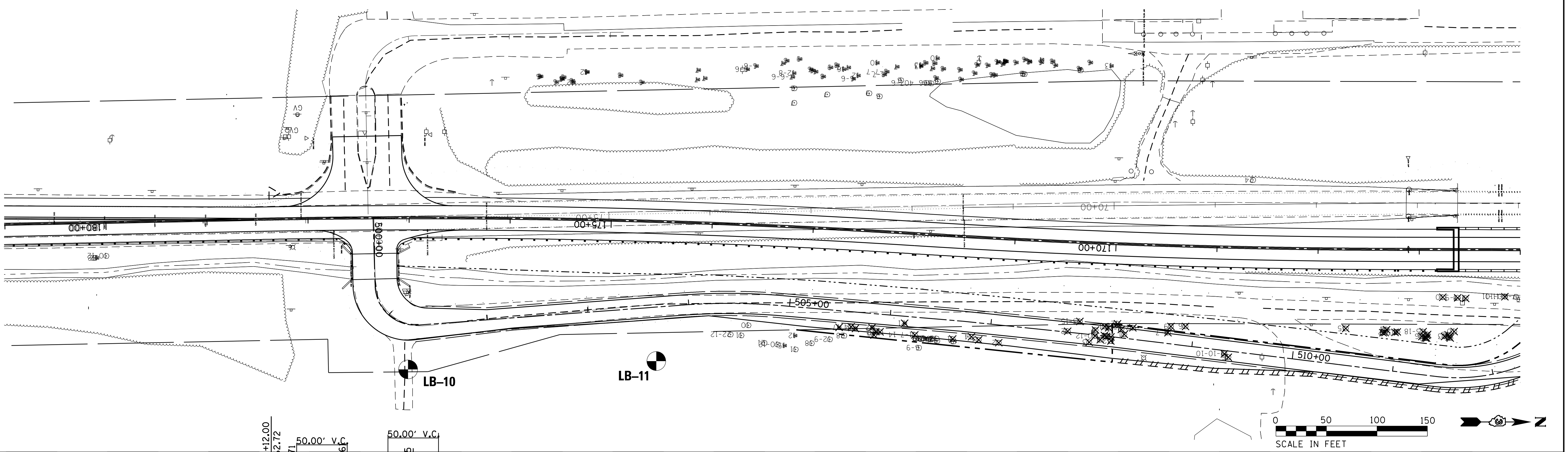
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

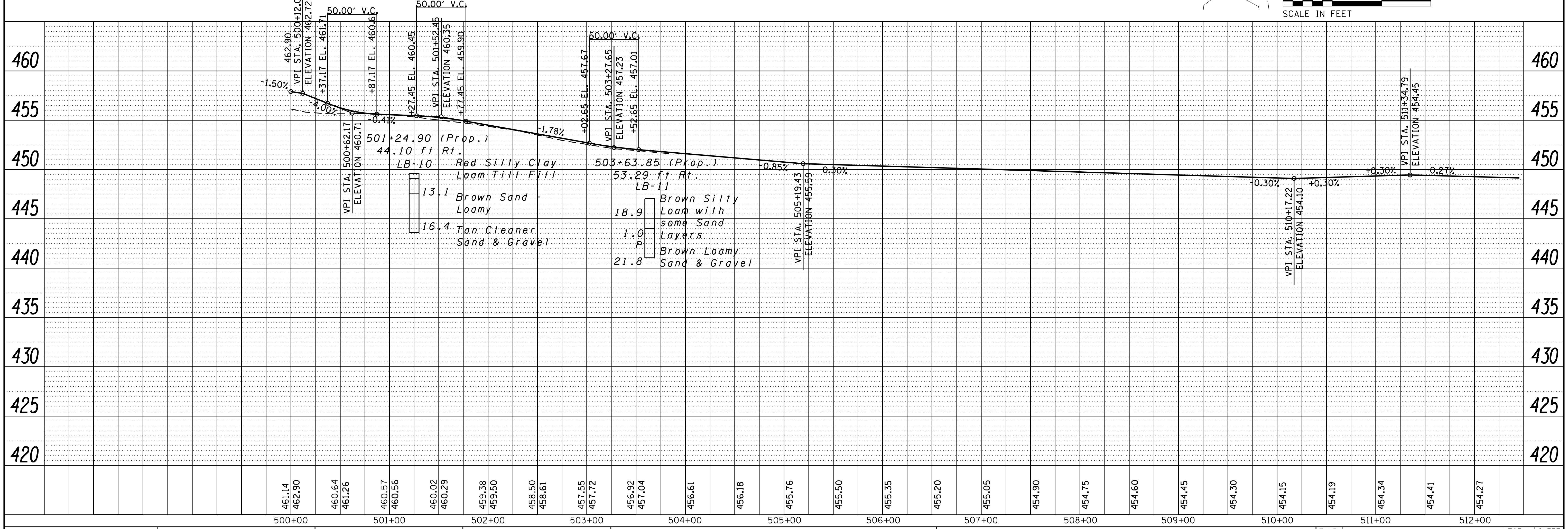
BORLOGS - IL 89 - SN. 078-0006

SCALE: SHEET OF SHEETS STA. 166+00 TO STA.181+00

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
698	(1)BR	*		
*	BUREAU - PUTNAM	CONTRACT NO. 66A69		

ILLINOIS FED. AID PROJECT





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BY
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	PLOT DATE = 12/17/2013	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORLOGS – BOAT CLUB ENTRANCE – SN. 078–0006

SCALE: SHEET OF SHEETS STA. 500+00 TO STA. 512+00

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
698	(1)BR	*		
	* BUREAU - PUTNAM	CONTRACT NO. 66A69		
	ILLINOIS FED. AID PROJECT			

APPENDIX

D

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 1 **of** 1

Date 6/7/05

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** K. Whittington

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** , **Longitude**

COUNTY Bureau **CORING METHOD**

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.)
Station 32+11.77

CORING BARREL TYPE & SIZE

Core Diameter 2 **in**
Top of Rock Elev. 464.42 **ft**
Begin Core Elev. 464.42 **ft**

BORING NO. 6 (Pier 1)
Station 31+56
Offset 25.8 ft Lt
Ground Surface Elev. 468.42 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Light Gray Limestone with Numerous Gray Calcareous Clay Filled Fractures at 1.5"-3" Intervals	464.42 462.62	-5	1	90	71		70.3 8.7
Thinly Bedded Argillaceous Limestone / Calcareous Shale. Bedding 3mm thickness	462.42						
Dense, somewhat Blocky Dark Gray Calcareous Clay with Limestone Pebbles Throughout. Probably Reworked Clay Shale or Claystone. Sample is damp throughout.							5.4 5.8 3.9 2.5
		-10	2	93	87		0.7 4.6
At 10.8' a Shear Failure Plane is Evident From Coring	456.92						1.9
Light Gray Brecciated and Fractured Argillaceous Limestone. (Broken Limestone in Gray Claystone Matrix) Subsequently Fractured with Calcareous Clay Fillings.	454.42						6.2 50.3 107.1 183.8 19.7
Gray Clay Shale	453.82		3	83	71		
Gray and Dark Gray Argillaceous, Micritic Limestone	452.42	-15					8.6 1042.6 1019.3
Gray Calcareous Shale to Gray Claystone with Minor amounts of Limestone Pebbles	451.72						973.7
Light Gray Argillaceous Limestone with Clay and Pyrite Filled Fractures	450.92						272.6
Black and Dark Gray Blocky Clay Stone (Damp)	449.92						
Not Recorded	449.42						
End of Boring		-20					

Color pictures of the cores
Cores will be stored for examination until
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 1 **of** 1

Date 6/14/05

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** K. Whittington

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** , **Longitude**

COUNTY Bureau **CORING METHOD**

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.) **CORING BARREL TYPE & SIZE**
Station 32+11.77

Core Diameter 2 **in**
Top of Rock Elev. 466.32 **ft**
Begin Core Elev. 466.32 **ft**

BORING NO. 7 (North Abut.)
Station 31+18
Offset 21.8 ft Rt
Ground Surface Elev. 470.32 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Light Gray Limestone with Numerous Clay Filled Fractures at 1.5"-3" Separation	466.32		1	90	63		
		-5					
	462.82						
Dark Gray & Black Weathered Shale with Limestone Pebbles and Thin Limestone Layers. Secondary Clay Filled Fractures, Small Coal & Pyrite Fragments	462.12						39.0
Dark Gray, Blocky Calcareous Clay with Included Limestone Pebbles. (Weathered and Reworked Shale or Claystone?)							3.9
			2	98	92		
		-10					2.2 4.1 3.1
							1.9
	457.22						
Light Gray, Brecciated, Argillaceous Limestone in Matrix of Calcareous Clay							
			3	98	85		
	455.22	-15					313.9
Gray Weathered & Reworked Calcareous Shale with Included Limestone Pebbles	454.82						
Light to Medium Gray Argillaceous Limestone							1176.8
	453.52						663.7
Gray Calcareous Shale (Upper 4" Includes Limestone Pebbles)							1243.7
	452.52						
Light Gray Argillaceous Limestone. Fossils Present							
	451.72						327.0
Gray Mix of Argillaceous Limestone Pebbles and Gray Clay Shale, Fragmented Brachiopod Fossils, Coal Fragments and Pyrite present.	451.52 451.32						
Black and Dark Gray Claystone		-20					
End of Boring							

Color pictures of the cores __________
Cores will be stored for examination until __________
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 of 2

Date 1/14/03

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** Larry Myers

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** , **Longitude**

COUNTY Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** AUTOMATIC

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.)
Station 32+11.77

BORING NO. 1 (Prop. Embk.)
Station 33+92
Offset 25.0 ft RT
Ground Surface Elev. 462.73 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 447.2 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Brown Sandy Clay Loam & Concrete Debris (Fill) 461.23				
Stiff Brown Sandy Loam with Gravel & Concrete Debris (Fill) 459.23		9 7 11	1.5 P	9
Medium Brown Clay Loam with Gravel (Fill) 456.23	-5	5 4 6	0.6 B	27
Medium Brown Sandy Loam with Gravel & Coal Slag Debris (Fill) 454.23		13 13 8	1.0 P	14
Stiff Brown Sandy Clay Loam with Gravel (Fill)	-10	3 3 5	1.5 P	18
450.73		3 4	1.5 P	11
Medium Black Clay Loam with Coal Slag Pieces (Fill)		5	0.5 P	35
	-15	4 3 3	1.0 P	31
▽				
		2 2 3	0.5 S	36
	-20	1 3	0.7	31

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Black Clay Loam with Coal Slag Pieces (Fill) *(continued)*		3	S	
439.23		2 3 4	0.7 B	31
Very Soft Brown Silty Loam	-25	1 3 2	0.2 B	29
434.23		3 8 7	0.4 B	27
Medium Brown Silty Loam 431.73	-30	3 13 6	0.7 B	23
Medium Brown Sandy Loam 429.23		5 3 3	1.0 P	20
Brown Loamy Gravel & Sand 426.73	-35	12 20 10		9
Top of Rock Dense Brown & Gray Silty Loam & Highly Weathered Limestone Patoka Formation Pennsylvanian System 424.23		96 103/5"		7
Dense Gray Highly Weathered Shale	-40	75 100/1"	6.2	13

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 006-0110.GPJ IL_DOT.GDT 4/8/15

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 of 2

Date 1/14/03

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** Larry Myers

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** , **Longitude**

COUNTY Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** AUTOMATIC

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.)
Station 32+11.77

BORING NO. 1 (Prop. Embk.)
Station 33+92
Offset 25.0 ft RT
Ground Surface Elev. 462.73 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 447.2 ft ▽
After Hrs. ft

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Dense Gray Highly Weathered Shale *(continued)* 421.73			S	
Dense Gray Calcareous Shale		150/4"		
				10
		74		
	-45	100/5"		10
		150/5"		
	-50			
408.23		120/5"		6
End of Boring	-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)

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 1

Date 1/21/03

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** Larry Myers

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** , **Longitude**

COUNTY Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** AUTOMATIC

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.)
Station 32+11.77

BORING NO. 2 (South Abut.)
Station 33+37
Offset 24.0 ft RT
Ground Surface Elev. 463.47 **ft**

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 448.0 ft ▽
After Hrs. ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Brown Sand & Gravel Roadbed					
	461.47				
Brown Sandy Clay Loam with Gravel & Concrete Debris (Fill)			10		
			8		7
			7		
		-5	8		
			8	*	
			16		
* No Recovery due to Rock in shoe					
			10		
			9	*	
			6		
	453.97				
Very Stiff Brown Sandy Clay		-10	5		
			5	2.5	21
			5	P	
			2		
			4	**	
** No Recovery			4		
	449.47				
Stiff Black Sandy Loam with Limestone Pieces		-15	3		
▽			3	1.5	27
			7	P	
** No Recovery			1		
	445.47		2	**	
Stiff Brown Sandy Clay Loam			2		
		-20	4		

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Brown Sandy Clay Loam *(continued)*			5	1.0	24
	442.47		5	P	
Very Stiff Brown Clay Loam with Gravel & Weathered Limestone Pieces			7		
			8	2.5	21
			4	P	
		-25	6		
			7		10
			23		
	436.47				
Top of Rock	435.97		110/5"		8
Dense Gray Weathered Limestone	434.97				
Not Recorded					
Auger refusal at 28.5' End of Boring		-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 006-0110.GPJ IL_DOT.GDT 4/8/15

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 1

Date 1/13/03

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** Larry Myers

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude , Longitude**

COUNTY Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** AUTOMATIC

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.)
Station 32+11.77

BORING NO. 3 (Pier 2)
Station 32+58
Offset 25.0 ft RT
Ground Surface Elev. 464.36 **ft**

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Augered Brown Sandy Clay Loam & Gravel (Fill)				
462.86				
Hard Brown Sandy Clay Loam with Gravel & Concrete Debris (Possibly Fill)		7		
		3		7
		3		
		4		
	-5	17	4.0	16
		5	P	
		7		
		6		5
		4		
		4		
	-10	4	>4.5	19
		8	P	
452.36		7	>4.5	14
Hard Brown Clay Loam Till		10	P	
		15		17
450.86				
Very Stiff Brown & Gray Clay Till		7		
	-15	8	3.0	22
		11	S	
		6		
		8	3.6	20
		14	S	
		7		
	-20	14	6.4	16

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

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

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Very Stiff Brown & Gray Clay Till *(continued)*		23	S	
442.86				
Top of Rock Very Stiff Red & Gray Weathered Shale (Clay)		12		
		20	3.0	13
		25	S	
440.86				
Hard Greenish Gray Weathered Shale		12		
	-25	24	10.4	13
		41	S	
		12		
436.86		28	5.5	10
Dense Gray Limestone		100/3"	S	
434.86		150/4"		4
Not Recorded	-30			
433.86				
Auger Refusal at 30.5' End of Boring				
	-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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 1

Date 1/16/03

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** Larry Myers

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude , Longitude**

COUNTY Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** AUTOMATIC

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.)
Station 32+11.77

BORING NO. 4 (Pier 1)
Station 31+75
Offset 21.0 ft RT
Ground Surface Elev. 467.93 ft

Surface Water Elev. ______ ft
Stream Bed Elev. ______ ft

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

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Augered Medium Brown Sandy Loam with Concrete Debris & Gravel			9		
			8	0.5	8
			7	P	
	462.93	-5			
Top of Rock Gray Highly Weathered and Reworked Shale (Silty Clay) with Limestone Pieces			17		
			22		6
			10		
	459.93		8		
Hard Gray Weathered Shale			14	*	
			25		
* No Recovery		-10			
			8		
			15	>4.5	16
	456.43		17	P	
Dense Gray Limestone					
	454.93		100/3"		7
End of Boring					
		-15			
		-20			

SOIL BORING 006-0110.GPJ IL_DOT.GDT 4/8/15

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

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Date 1/16/03

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** Larry Myers

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** , **Longitude**

COUNTY Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** AUTOMATIC

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.)
Station 32+11.77

BORING NO. 5 (North Abut.)
Station 31+00
Offset 20.0 ft RT
Ground Surface Elev. 469.95 ft

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

Groundwater Elev.:
First Encounter ____ ft
Upon Completion None ft
After ____ **Hrs.** ____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Black Silty Loam with Concrete Debris 466.95				
Top of Rock Hard Fossiliferous Limestone 465.45				
End of Boring	-5			
	-10			
	-15			
	-20			

SOIL BORING 006-0110.GPJ IL_DOT.GDT 4/8/15

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
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IDOT

SOIL BORING LOG

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Date 6/7/05

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** K. Whittington

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** , **Longitude**

COUNTY Bureau **DRILLING METHOD** **HAMMER TYPE**

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.)
Station 32+11.77

BORING NO. 6 (Pier 1)
Station 31+56
Offset 25.8 ft Lt
Ground Surface Elev. 468.42 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Brown Sandy Loam, Concrete Debris, Rock Fill				
464.92				
drilled 6" into Bedrock 464.42				
Borehole continued with rock coring.	-5			
	-10			
	-15			
	-20			

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)

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IDOT

SOIL BORING LOG

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Date 6/14/05

ROUTE FAP 698 (IL89) **DESCRIPTION** IL 89 over C.S.X. Railroad, 0.60 miles South of US 6 at Spring Valley **LOGGED BY** K. Whittington

SECTION 1VBR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** , **Longitude**

COUNTY Bureau **DRILLING METHOD** ______ **HAMMER TYPE** ______

STRUCT. NO. 006-0164 (Prop.) 006-0110 (Exist.)
Station 32+11.77

BORING NO. 7 (North Abut.)
Station 31+18
Offset 21.8 ft Rt
Ground Surface Elev. 470.32 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ___ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Not Sampled Drilled to Rock @ 2'. 468.32				
Hard Brown/Gray Fossiliferous Limestone 466.32				
Borehole continued with rock coring.	-5			
	-10			
	-15			
	-20			

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)

APPENDIX

E

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SOIL BORING LOG

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Date 6/18/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Sample 1) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** NW 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W, **Latitude** 41.306032, **Longitude** -89.199758

COUNTY Putnam, Bureau **DRILLING METHOD** Push **HAMMER TYPE** CME Automatic

STRUCT. NO. ____
Station ____

BORING NO. LB-01
Station 179+00 (Prop.)
Offset 15.0 ft Lt.
Ground Surface Elev. 461.39 ft

Surface Water Elev. ____ 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 (%)
HMA Shoulder, Black/Brown CA Sub-base	458.89				
Brown Sand with Minor Gravel Pieces - Fill					13
		-5			
	453.89				
End of Boring					5
		-10			
		-15			
		-20			

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 078-0006.GPJ IL_DOT.GDT 4/3/15

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SOIL BORING LOG

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Date 6/18/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Samples 2 & 3) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** NW 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W, **Latitude** 41.306868, **Longitude** -89.199773

COUNTY Putnam, Bureau **DRILLING METHOD** Push **HAMMER TYPE** CME Automatic

STRUCT. NO. ____
Station ____

BORING NO. LB-02
Station 176+00 (Prop.)
Offset 10.0 ft Lt.
Ground Surface Elev. 460.87 **ft**

Surface Water Elev. ____ **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 (%)**
Brown Sand/Gravel Shoulder Gravel	459.87				
Reddish Brown Silty Clay Loam Till Fill				>4.5 P	11
	456.87				
Brown Silty Clay Loam/Sand with Sand & Silty Clay Loam Interbedded/Mixed		-5			
	454.87				
End of Boring				2.0 P	10
		-10			
		-15			
		-20			

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 078-0006.GPJ IL_DOT.GDT 4/3/15

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SOIL BORING LOG

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Date 6/18/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Samples 4,5,6 & 7) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** NW 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W,
Latitude 41.307704, **Longitude** -89.199797

COUNTY Putnam, Bureau **DRILLING METHOD** Push **HAMMER TYPE** CME Automatic

STRUCT. NO.
Station

BORING NO. LB-03
Station 173+00 (Prop.)
Offset 3.0 ft Rt.
Ground Surface Elev. 460.61 **ft**

Surface Water Elev. **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 (%)**
Brown Sand/Gravel Shoulder Gravel	459.61				
Reddish Brown Silty Clay Loam Till Fill	456.61			>4.5 P	9
Gray/Tan Silty Clay Tillish Fill	454.61	-5		3.5 P	18
Brown Silty Loam with Silt & Sand Layers	451.61				
Brown Sand/Gravel, Clean Fine Sand to Coarse Gravel	450.61	-10			13
Brown Loam with Fine Sand & Silt Layers					6
	445.61	-15		1.0 P	22
End of Boring		-20			

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)

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SOIL BORING LOG

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Date 6/18/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Samples 8 & 9) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E,
Latitude 41.316562, **Longitude** -89.199677

COUNTY Putnam, Bureau **DRILLING METHOD** Push **HAMMER TYPE** CME Automatic

STRUCT. NO. ______
Station ______

BORING NO. LB-04
Station 141+00 (Prop.)
Offset 4.0 ft Rt.
Ground Surface Elev. 461.67 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter 450.2 **ft** ▼
Upon Completion ______ **ft**
After ____ **Hrs.** ______ **ft**

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Brown Sand/Gravel Shoulder Gravel	460.67				
Reddish Brown Silty Clay Loam Till Fill					
				>4.5 P	9
		-5			
				3.5 P	13
				3.0 P	14
		-10			
	450.17▼				
Gray, Brown & Black Silty Clay Loam/Silty Loam with Sand & Gravel Pockets					
				1.0 P	7
		-15			
	445.67				
End of Boring					
		-20			

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)

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IDOT

SOIL BORING LOG

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Date 6/18/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Sample 10) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** NE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, **Latitude** 41.317582, **Longitude** -89.199698

COUNTY Putnam, Bureau **DRILLING METHOD** Push **HAMMER TYPE** CME Automatic

STRUCT. NO. ____________
Station ____________

BORING NO. LB-05
Station 137+00 (Prop.)
Offset 14.0 ft Lt.
Ground Surface Elev. 474.70 **ft**

Surface Water Elev. ______ **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 (%)**
Brown Sand/Gravel Shoulder Stone 473.70				
Black & Brown Loam/Clay Loam with Gravel Pieces - Fill & Slag, Coal & Tile Debris				
			4.0 P	13
	-5			
			3.0 P	14
467.70				
End of Boring				
	-10			
	-15			
	-20			

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)

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SOIL BORING LOG

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Date 6/19/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Existing Boat Club Road) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** NW 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W, **Latitude** 41.308536, **Longitude** -89.199452

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. ____
Station ____

BORING NO. LB-06
Station 170+00 (Prop.)
Offset 50.0 ft Lt.
Ground Surface Elev. 454.17 ft

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

Groundwater Elev.:
First Encounter 447.7 ft ▼
Upon Completion 436.2 ft ▽
After ____ **Hrs.** ____ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Oil/Chip Road, Brown Sand & Gravel Fill, Brown Fill Sand				
451.67				
Loose Brown Fine to Coarse Sand - Loamy with Coal Pieces & Silt Layers		4 2 2		17
	-5			
wh = Weight of Hammer		3 2 2		22
▼				
446.67				
Soft Brown Silty Loam/Silty Clay Loam with Sand & Organics		1 wh 3	1.0 P	25
444.67				
Stiff to Soft Gray & Brown Loam/Clay Loam with Sand Layers & Gravel Layers & Silt Layers	-10	3 4 4	1.5 P	22
		2 3 3	2.0 P	31
	-15	1 wh 1	0.5 P	4
▽		wh wh 1	1.0 P	24
434.67				
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff to Soft Gray & Brown Silty Clay/Silty Loam with Silt Pockets *(continued)*		1 wh wh	1.0 P	30
		1 1 wh	1.0 P	32
	-25	wh wh wh	0.5 P	24
		wh wh 2	1.0 P	25
	-30	wh wh wh	0.5 P	25
422.17				
Loose Brown Fine to Coarse Sand with some Loamy Layers & Gravel Layers		wh 2 1		21
Washed Sample 35.0' - 36.5'	-35	5 2 2		15
Washed Sample 37.5'- 39.0'		6 3 3		17
	-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)

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IDOT

SOIL BORING LOG

Date 6/19/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Existing Boat Club Road) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** NW 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W,
Latitude 41.308536, **Longitude** -89.199452

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. ______
Station ______

BORING NO. LB-06
Station 170+00 (Prop.)
Offset 50.0 ft Lt.
Ground Surface Elev. 454.17 ft

Surface Water Elev. ______ ft
Stream Bed Elev. ______ ft

Groundwater Elev.:
First Encounter 447.7 ft ▼
Upon Completion 436.2 ft ▽
After ___ **Hrs.** ______ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Loose Brown Fine to Coarse Sand with some Loamy Layers & Gravel Layers *(continued)*		8 4 5		15
412.17				
Medium Gray Fine/Coarse Sand, Silt, Gravel - Interbedded with Coal Pieces Washed Sample 42.5' - 44.0'		6 5 6		25
Washed Sample 45.0' - 46.5'	-45	5 7 7		23
	-50	6 7 10		19
Washed Sample 55.0' - 56.5'	-55	6 9 14		19
395.17				
	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Gray Silty Loam with Organics & Sand Layers Washed Sample 60.0' - 61.5' *(continued)*		4 2 3	1.0 P	31
Washed Sample 65.0' - 66.5'	-65	3 2 3	1.0 P	35
	-70	5 2 3		39
379.17	-75			
378.75 Limestone Fragments in Clay Matrix, Assumed Weathered Rock Surface Washed Sample 75.0' - 75.42'		100/5"		10
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)

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SOIL BORING LOG

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Date 6/20/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Existing ADM Entrance) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E,
Latitude 41.315509, **Longitude** -89.199612

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO.
Station

BORING NO. LB-07
Station 144+88 (Prop.)
Offset 1.0 ft Rt.
Ground Surface Elev. 459.94 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 439.4 ft ▼
Upon Completion 445.9 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Bituminous Pavement, Gray & Brown Sand & Gravel Fill				
457.44				
Hard Brown & Gray Silty Clay Loam Fill with Gravel & Debris & Reddog (Mine Spoil)		5		
		4	4.5	10
		4	P	
	-5	2		
		2	3.0	14
		2	P	
452.94				
Soft Gray Silty Loam with Organics		1		
		1	0.3	21
		2	P	
450.44				
Hard to Very Stiff Pinkish Gray Silty Clay Loam Till (Fill?)	-10	3		
		4	>4.5	14
		5	P	
		4		
		3	4.0	14
▽		4	P	
wh = Weight of Hammer	-15	1		
		3	3.0	14
		3	P	
442.44				
Stiff Black Silty Clay with Organics		2		
		3	1.5	34
		3	P	
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Black Silty Clay with Organics *(continued)* ▼		wh		
		2	1.0	30
		3	P	
437.94				
Medium Gray Fine Sand to Coarse Gravel with Free Water		4		
		5		14
		6		
Washed Sample 25.0' - 26.5'	-25	3		
		5		13
		6		
432.94				
Medium to Stiff Gray & Brown Silty Clay/Silty Clay Loam with some Sand & Gravel Layers & Silt Layers		3		
		3	0.5	20
		3	P	
	-30	2		
		3	1.5	27
		3	P	
427.94				
Medium Gray Fine Sand to Coarse Gravel		4		
		5		15
		5		
	-35	5		
		5		13
423.44		5		
Medium Gray Silty Clay/Silty Clay Loam with Sand & Silt Layers @ 56'		2		
		1	1.0	30
		1	P	
	-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 078-0006.GPJ IL_DOT.GDT 4/3/15

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SOIL BORING LOG

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Date 6/20/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Existing ADM Entrance) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E,
Latitude 41.315509, **Longitude** -89.199612

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO.
Station

BORING NO. LB-07
Station 144+88 (Prop.)
Offset 1.0 ft Rt.
Ground Surface Elev. 459.94 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 439.4 ft ▼
Upon Completion 445.9 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Gray Silty Clay/Silty Clay Loam with Sand & Silt Layers @ 56' *(continued)*		wh 1 2	1.0 P	26
		wh 2 3	1.0 P	29
	-45			
		wh wh wh	0.5 P	28
		wh wh 1	0.5 P	27
	-50			
		wh 1 3	1.0 P	27
	-55			
		1 3 2	1.3 P	32
399.94	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dense Gray Shale		50 100/4"		11
399.11				
End of Boring				
	-65			
	-70			
	-75			
	-80			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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)

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SOIL BORING LOG

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Date 6/18/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Sample 11) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** NW 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W,
Latitude 41.306595, **Longitude** -89.199164

COUNTY Putnam, Bureau **DRILLING METHOD** Push **HAMMER TYPE** CME Automatic

STRUCT. NO. ____________
Station ____________

BORING NO. LB-10
Station 177+00 (Prop.)
Offset 150.0 ft Lt.
Ground Surface Elev. 454.61 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter 450.6 **ft** ▼
Upon Completion ______ **ft**
After ___ **Hrs.** ______ **ft**

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Red Silty Clay Loam Till Fill	454.11				
Brown Sand - Loamy					
	452.61				13
Tan Cleaner Sand & Gravel					
	▼				
		-5			
					16
	448.61				
End of Boring					
		-10			
		-15			
		-20			

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)

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SOIL BORING LOG

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Date 6/18/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** (Samples 12 & 13) **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** NW 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W, **Latitude** 41.307418, **Longitude** -89.199246

COUNTY Putnam, Bureau **DRILLING METHOD** Push **HAMMER TYPE** CME Automatic

STRUCT. NO.
Station

BORING NO. LB-11
Station 174+50 (Prop.)
Offset 138.0 ft Lt.
Ground Surface Elev. 452.05 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 448.1 ft ▼
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Brown Silty Loam with some Sand Layers				
449.05				
Brown Loamy Sand & Gravel			1.0 P	19
▼				
	-5			
446.05				
End of Boring				22
	-10			
	-15			
	-20			

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 078-0006.GPJ IL_DOT.GDT 4/3/15

APPENDIX

F

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 2

Date 7/26/11

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310883, **Longitude** -89.199315

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 01 (2011)
Station 161+18
Offset 84.0 ft Lt.
Ground Surface Elev. 445.77 ft

Surface Water Elev. 442.08 ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 440.8 ft ▼
Upon Completion 443.8 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Brown Sand, Gravel & Brown Silty Clay (River Mud)				
▽ 443.27				
Loose Brown Fine to Coarse Sand - Loamy Layers		2		
		2		17
		3		
441.27				
Loose Gray Fine to Coarse Sand with Black Organic Layers ▼	-5			
		2		
		2		23
		2		
Washed Sample 7.5' - 9.0'		2		
		3		21
		2		
435.77	-10			
Very Soft Black/Dark Gray Silty Clay/Silt/Fine Sand Layers with High Organic Content		1		
		WH	0.0	59
		WH	P	
		WH		
		WH	0.0	47
		WH	P	
	-15			
		WH		
		WH	0.0	38
429.27		1	P	
Very Loose Dark Gray Fine to Coarse Sand, Silt, Silty Clay with High Organics		1		
		WH		45
		1		
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Loose Dark Gray Fine to Coarse Sand, Silt, Silty Clay with High Organics *(continued)*		WH		
		WH		42
		1		
Washed Sample 22.5' - 24.0'		3		
		1		29
		2		
421.27				
Loose Black/Gray Fine to Coarse Sand with Coal Pieces & Organics	-25	1		
Washed Sample 25.0' - 26.5'		2		23
		3		
Washed Sample 27.5' - 29.0'		3		
		2		30
		3		
	-30			
Washed Sample 30.0' - 31.5'		1		
		2		33
		3		
Washed Sample 32.5' - 34.0'		2		
		2		20
		3		
	-35			
Washed Sample 35.0' - 36.5'		1		
		2		30
		2		
Washed Sample 37.5' - 39.0'		2		
		2		16
		2		
	-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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 2

Date 7/26/11

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310883, **Longitude** -89.199315

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 01 (2011)
Station 161+18
Offset 84.0 ft Lt.
Ground Surface Elev. 445.77 **ft**

Surface Water Elev. 442.08 **ft**
Stream Bed Elev. **ft**

Groundwater Elev.:
First Encounter 440.8 **ft** ▼
Upon Completion 443.8 **ft** ▽
After **Hrs.** **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Loose Black/Gray Fine to Coarse Sand with Coal Pieces & Organics *(continued)* Washed Sample 40.0' to 41.5'		2 3 5		27
403.27				
Soft Gray Silty Clay with Silt Layers & Clay Layers Washed Sample 42.5' - 44.0'		WH 1 WH	1.0 P	39
	-45			
Washed Sample 45.0' - 46.5'		WH WH WH	1.0 P	46
398.27				
Dense Gray Micaceous Shale - Weathered & Reworked Surface		61		
397.60		100/2"		9
WH - Weight of Hammer				
End of Boring				
	-50			
	-55			
	-60			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 8/2/11

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313708, **Longitude** -89.199845

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 02 (2011)
Station 151+31
Offset 64.0 ft Rt.
Ground Surface Elev. 444.28 ft

Surface Water Elev. 442.09 ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 432.3 ft ▼
Upon Completion 434.3 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Brown Silty Clay Loam Fill & Concrete Debris Fill				
440.28				
Stiff Brown & Gray Silty Clay/Silty Clay Loam Fill	-5	2 2 2	1.5 P	25
		2 1 2	1.5 P	23
436.28				
Soft to Medium Stiff Gray Silty Loam & Silt Layers - Organics	▽ -10	WH 2 1	0.5 P	25
	▼	2 1 2	0.5 P	26
430.78				
Stiff Brown Silty Clay Loam Till with Sand Pockets & Silt Pockets	-15	2 3 4	2.0 P	29
		3 2 4	2.0 P	29
	-20	2 2	1.5	30

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Brown Silty Clay Loam Till with Sand Pockets & Silt Pockets *(continued)*		2	P	
		2 1 2	1.5 P	30
420.28				
Stiff Gray & Brown Silty Clay with Silt Layers	-25	2 3 2	2.0 P	26
		1 2 3	2.0 P	28
416.28				
Soft Gray Loam with Silt & Sand Layers	-30	WH WH WH	0.0 P	26
413.28				
Loose Gray Fine to Coarse Sand with High Organics, Silt & Clay Layers - Minor Gravel Layers		2 1 2		22
	-35	2 2 1		52
		3 2 2		21
405.78				
	-40	5 7		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)

BBS, form 137 (Rev. 8-99)

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 2

Date 8/2/11

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313708, **Longitude** -89.199845

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 02 (2011)
Station 151+31
Offset 64.0 ft Rt.
Ground Surface Elev. 444.28 ft

Surface Water Elev. 442.09 ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 432.3 ft ▼
Upon Completion 434.3 ft ▽
After Hrs. ft

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Loose Gray Fine to Coarse Sand with Layers of Fine/Coarse Gravel Washed Samples 39.0' - 40.5' *(continued)*		3		
		6		
		4		23
401.28		2		
Stiff Gray Silty Loam with Silt Layers		2		
	-45	1	1.5	33
		1	P	
398.28				
Soft to Medium Gray to Dark Gray Silty Clay with Clay & Silt Pockets Washed Samples 51.5' - 55.5'		WH		
		WH	0.5	34
		2	P	
		WH		
	-50	WH	0.5	31
		1	P	
		WH		
		WH	0.3	37
		WH	P	
		WH		
	-55	WH	0.3	39
		WH	P	
		1		
		WH	0.5	33
		1	P	
385.28				
Dense Dark Gray Blocky Shale		41		
384.36	-60	100/5"		13

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
WH - Weight of Hammer				
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)

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

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Date 12/5/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**,
Latitude , **Longitude**

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. B-7
Station 152+33
Offset 18.5 ft Lt.
Ground Surface Elev. 441.43 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 437.9 ft ▼
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dark Gray Silty Clay with Organics		1 1 0	0.5 P	42
438.93				
Brown/Gray Silty Clay, Trace Sand ▼	-5	1 2 2	0.25 P 0.58 B	25
434.93				
Brown Clay		2 3 3	0.75 P 0.97 B	30
433.43				
Brown Clay with Organics and Shells and Trace Sand	-10	2 2 2	1.00 P 0.78 B	31
		1 1 2	0.50 P 0.41 B	29
	-15	3 4 5	1.50 P 1.16 B	29
425.93				
Brown/Gray Silty Clay		3 4 5	1.50 P 1.12 B	28
422.43				
Gray Silty Clay	-20	WH 1 1	0.3 P	25

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray Silty Clay *(continued)*				
419.43				
Gray Silty Clay Loam	-25	1 2 2	0.75 P 0.27 B	29
414.43				
Gray Medium to Coarse Sand & Gravel	-30	3 7 12		14
410.43				
Gray Silty Clay Loam	-35	2 5 6	0.25 P 0.66 B	33
1/2" of recovery from 38.5' to 40.0'. Attempted another sample from 41.0' to 42.5'.	-40	WH 1 1		

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 12/5/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**,
Latitude , **Longitude**

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. B-7
Station 152+33
Offset 18.5 ft Lt.
Ground Surface Elev. 441.43 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 437.9 ft ▼
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray Silty Clay Loam *(continued)* 400.43				
First encounter Gray Shale @ 41'		100/6"		
Gray Shale, thinly bedded			3.1 S	15
	-45	80		
1 1/2" layer of Weak Cemented Hard Shale at 45.5'. Piece of Limestone in sample.		80 60/2"	3.3 S	12
	-50	20		
Dark Gray Shale, thinly bedded, Friable 388.43		65 75/4"	1.1 S	18
Dark Gray Clayey Shale, thinly bedded Piece of Limestone at top of sample.	-55	20		
383.93		53/1.5"	1.8 B	20
Dark Gray Clayey Shale, thinly bedded (friable)	-60	40		

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dark Gray Clayey Shale, thinly bedded (friable) *(continued)*		105/5"	1.9 S	18
	-65	100/6"		
			0.5 S	19
	-70	110/6"		
			0.8 S	19
	-75	110/4"		
			4.0 P	21
The bottom 3 inches of this sample was Very Dark Gray to Black Shale 361.43	-80	130/6"		

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

Page 3 **of** 3

Date 12/5/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**,
Latitude , **Longitude**

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. B-7
Station 152+33
Offset 18.5 ft Lt.
Ground Surface Elev. 441.43 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 437.9 ft ▼
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Dark Gray to Black Shale, Very Friable, thinly bedded				20
358.43				
Coal				
356.93				
Gray very thinly bedded Shale, Very Friable	-85	30		
		100/5"	2.3 S	20
351.43	-90	110/6"		
End of Boring			0.4 S	14
	-95			
	-100			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

Page 1 **of** 3

Date 12/5/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM,**
Latitude , Longitude

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. B-8
Station 155+33
Offset 11.9 ft Lt.
Ground Surface Elev. 444.91 **ft**

Surface Water Elev. 440.20 **ft**
Stream Bed Elev. 419.91 **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ____ **Hrs.** ______ **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Deck of Barge					
Note: Ground Surface Elevation is Deck of Barge Elevation					
	440.20	-5			
River Water					
		-10			
		-15			
		-20			

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
River Water *(continued)*					
	419.91	-25			
Gray Medium to Coarse Sand			2		
			2		21
			7		
			5		
			6		16
	416.91		2	0.1	
Gray Clayey Fine Sand with Shells				E	
	415.91		2		
Coarse Sand to Fine Gravel			1		24
		-30	1		14
	412.91				
Gray Clay					
			WH		
			WH	0.4	32
		-35	WH	B	
	408.91				
Gray Silty Clay with Trace Organics			WH		
			WH	0.3	33
			WH	B	
	405.91		1		
Gray Fine to Coarse Sand with Trace Silt			2		22
		-40	3		

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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 LOG

Date 12/5/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**,
Latitude , **Longitude**

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. B-8
Station 155+33
Offset 11.9 ft Lt.
Ground Surface Elev. 444.91 **ft**

Surface Water Elev. 440.20 **ft**
Stream Bed Elev. 419.91 **ft**

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray Fine to Coarse Sand with Trace Silt *(continued)*				
403.41		4		
Gray Silty Clay		1 1	0.3 B	37
400.91		WH		
Gray Organic Silty Clay with Shells and some Silt	-45	WH WH	0.4 B	38
398.91				
Gray Weathered Shale Very Clayey and thinly bedded		50		
		12 50/4"	0.3 B	15
	-50			
		18		
		47 80	4.5 S	18
	-55			
		21		
		38 75	4.5 B	19
385.91				
	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dark Gray & Gray Shale in alternating thinly bedded layers, very friable *(continued)*		100/6"		
			6.8 S	12
379.91	-65			
Dark Gray Clayey Shale, thinly bedded		103/6"		
			3.1 S	13
	-70			
		105/6"		
			6.6 S	13
	-75			
* This Qu is for the Shale immediately above the coal. 368.66		75/3"		
Coal			>4.5 P*	28
364.91	-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)

SOIL BORING LOG

Date 12/5/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** , **Longitude**

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. B-8
Station 155+33
Offset 11.9 ft Lt.
Ground Surface Elev. 444.91 **ft**

Surface Water Elev. 440.20 **ft**
Stream Bed Elev. 419.91 **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ___ **Hrs.** ______ **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray Clayey Shale, thinly bedded			28 30 52	2.9 S	14
	359.91	-85			
Light Gray Clayey Shale, thin beds, very friable			100/5"	2.0 S	11
	356.41				
Dense Light Gray Shale		-90	50 50/4"	>4.5 P	14
		-95			
Sample at 96' was too broken up to obtain Rimac sample.	347.91		100/5"	3.0 P	17
End of Boring		-100			

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

Page 1 **of** 2

Date 12/3/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**,
Latitude 41.311333, **Longitude** -89.199678

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. B-9
Station 159+36
Offset 15.2 ft Lt.
Ground Surface Elev. 441.05 **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray Medium to Coarse Sand & Gravel ▽▼				
		2		
		3		15
		2		
437.55				
Gray Fine to Medium Sand, Trace Gravel		7		
		5		17
	-5	5		
435.55				
Gray Medium to Coarse Sand		4		
		3		16
		2		
432.05		1		
Dark Gray Silty Fine Sand		1		30
	-10	3		
430.55				
Gray Silty Sand & Gravel		7		
		5		16
		4		
428.05				
Gray Sand & Gravel		3		
		5		14
	-15	6		
425.55				
Gray Silty Fine Sand, Trace Gravel		6		
		4		25
		3		
423.05				
Dark Gray Very Soft Silty Clay with Fine Sand		1		
		1	<0.25	46
421.05	-20	WH	P	

Surface Water Elev. ______ ft
Stream Bed Elev. ______ ft

Groundwater Elev.:
First Encounter 440.6 ft▼
Upon Completion 440.6 ft▽
After ____ **Hrs.** ______ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dark Gray Very Soft Silty Clay, Trace Fine Sand				
		WH		
		1	0.1	54
	-25	1	B	
413.55				
Dark Gray Very Soft Sandy Clay		1		
		1	0.1	41
	-30	1	S	
408.55				
Gray Clayey Sand				
407.05		1		
Gray Fine to Medium Sand		3		26
	-35	5		
402.05		1		
Gray Clayey Fine Sand		2	0.1	42
	-40	1	B	

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 2

Date 12/3/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**,
Latitude 41.311333, **Longitude** -89.199678

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. B-9
Station 159+36
Offset 15.2 ft Lt.
Ground Surface Elev. 441.05 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 440.6 ft ▼
Upon Completion 440.6 ft ▽
After Hrs. ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray Clayey Fine Sand *(continued)*	398.05				
Gray Clayey Shale with Shells			24 48 75	3.9 S	20
		-45			
		-50	10 40 88	7.0 S	56
Dark Gray Very Weathered, Reworked Clayey Shale. Qu = 2.0 tsf estimated by pocket penetrometer.	386.55		85 60/2"	2.8 S	13
		-55			
Borehole continued with rock coring.					
		-60			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 2

Date 3/27/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310604, **Longitude** -89.19932

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 01 (2013)
Station 162+10
Offset 83.0 ft Lt.
Ground Surface Elev. 450.27 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter 429.3 **ft** ▼
Upon Completion 441.3 **ft** ▽
After ____ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Tar/Chip Road, Brown CA Gravel Fill 447.77				
Very Stiff Brown Sandy Clay Loam Fill 446.27		3 6 6	2.0 P	13
Loose Very Soft Brown Fine to Coarse Sand with Minor Gravel & Black Loam Layers with Organics (Alluvial Backwater Deposits)	-5	3 2 1		34
442.77				
Very Soft Black Clay Loam with High Organics & Silt Layers (Alluvial Backwater Deposits) ▽		1 WH 1	0.0 P	28
	-10	WH WH WH	0.0 P	33
		WH WH WH	0.0 P	38
	-15	WH 1 2	0.5 P	40
		WH WH 1	0.5 P	40
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Soft Black Clay Loam with High Organics & Silt Layers (Alluvial Backwater Deposits) *(continued)* ▼ 427.77		WH WH 1	0.5 P	52
Loose Gray Fine Sand to Fine Gravel - Lots of Shell Fragments & Coal Pieces - Free Water		WH 1 4	0.5 P	36
Washed Sample 25.0' - 26.5'	-25	4 4 5		18
		3 2 2		28
Washed Sample 30.0' - 31.5'	-30	4 2 2		24
		3 2 2		31
Washed Sample 35.0' - 36.5'	-35	4 3 2		17
Washed Sample 37.5' - 39.0'		4 4 2		22
	-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 3/27/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**,
Latitude 41.310604, **Longitude** -89.19932

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 01 (2013)
Station 162+10
Offset 83.0 ft Lt.
Ground Surface Elev. 450.27 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter 429.3 **ft** ▼
Upon Completion 441.3 **ft** ▽
After ____ **Hrs.** ______ **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Loose Gray Fine Sand to Fine Gravel - Lots of Shell Fragments & Coal Pieces - Free Water *(continued)* Washed Sample 40.0' - 41.5'			4 3 2		16
Washed Sample 42.5' - 44.0'			5 4 3		20
		-45			
Washed Sample 45.0' - 46.5'			6 4 5		20
Washed Sample 47.5' - 49.0'			6 3 4		17
	400.27	-50			
Dense Gray Micaceous Shale Washed Sample 50.0' - 51.5'			14 21 50		13
WH = Weight of Hammer					
		-55			
	394.35		65 100/5"		15
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

Page 1 **of** 2

Date 3/28/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.31023, **Longitude** -89.199376

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 02 (2013)
Station 163+50
Offset 62.0 ft Lt.
Ground Surface Elev. 452.09 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 442.1 ft ▼
Upon Completion 444.1 ft ▽
After Hrs. ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Oil/Chip Road, Brown CA Gravel Fill	449.59				
Very Stiff Black Silty Clay Loam with Sand & Gravel Layers - Fill			5 5 5	3.5 P	11
	447.09	-5			
Soft Black/Dark Gray Loam/Clay Loam with Sand & Silt Layers/Seams (Alluvial Backwater Deposits)			2 1 2	0.5 P	25
▽			1 2 1	0.8 P	30
	442.59				
Soft to Very Soft Grayish Brown Loam/Clay Loam with Silt Pockets & Fine Sand Layers	▼	-10	WH WH 1	0.5 P	37
			WH WH WH	0.0 P	33
		-15	WH WH WH	0.0 P	36
			WH WH WH	0.0 P	32
		-20			

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft to Very Soft Grayish Brown Loam/Clay Loam with Silt Pockets & Fine Sand Layers *(continued)*			1 WH WH	0.0 P	29
	430.09				
Loose Brown Fine Sand/Silt with Some Silt Layers & Sand Layers			WH WH WH		27
		-25	1 WH WH		26
			1 1 1		26
	422.59				
Loose Gray Fine to Coarse Sand with Minor Fine Gravel		-30	4 5 6		24
Washed Sample 32.5' - 34.0'			4 5 6		20
Washed Sample 35.0' - 36.5'		-35	4 4 6		20
Washed Sample 37.5' - 39.0'			4 5 4		19
		-40			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

Page 2 **of** 2

Date 3/28/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.31023, **Longitude** -89.199376

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 02 (2013)
Station 163+50
Offset 62.0 ft Lt.
Ground Surface Elev. 452.09 ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Loose Gray Fine to Coarse Sand with Minor Fine Gravel *(continued)*		4		
		4		21
Washed Sample 40.0' - 41.5'		4		
Washed Sample 42.5' - 44.0'		4		
		4		19
		5		
	-45			
Washed Sample 45.0' - 46.5'		4		
		4		20
		4		
Washed Sample 47.5' - 49.0'		4		
		4		21
		5		
402.59				
Soft Gray Silty Clay/Silty Clay Loam with Shell & Coal Pieces	-50			
Washed Sample 50.0' - 51.5'		2		
		2	0.8	45
		2	P	
Washed Sample 52.5' - 54.0'		1		
		2	0.5	31
		1	P	
	-55			
Washed Sample 55.0' - 56.5'		2		
		1	0.5	31
		1	P	
		2		
		2	0.5	29
		2	P	
392.09	-60			

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 442.1 **ft** ▼
Upon Completion 444.1 **ft** ▽
After **Hrs.** **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dense Gray Clay Shale		27		
		55		14
WH = Weight of Hammer 390.59		80		
End of Boring				
	-65			
	-70			
	-75			
	-80			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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)

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IDOT

SOIL BORING LOG

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Date 3/29/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309721, **Longitude** -89.199432

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 03 (2013)
Station 165+35
Offset 63.0 ft Lt.
Ground Surface Elev. 453.33 ft

Surface Water Elev. ______ ft
Stream Bed Elev. ______ ft

Groundwater Elev.:
First Encounter 432.3 ft ▼
Upon Completion 438.3 ft ▽
After ____ **Hrs.** ______ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Oil/Chip Road & Brown CA Fill				
450.83				
Dense Brown Sand/Gravel Fill with some Soft Sandy Loam Layers		18 16 21		6
	-5	3 2 2	1.0 P	20
		2 1 1	0.5 P	21
443.83				
Stiff Dark Gray Silty Clay with Organics - Alluvial	-10	1 2 3	1.5 P	35
		3 3 2	1.5 P	36
438.83				
Very Soft Brown & Gray Silty Clay ▽	-15	WH WH WH	0.0 P	34
		WH WH WH	0.0 P	31
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Soft Brown & Gray Silty Clay *(continued)* ▼		WH WH WH	0.0 P	34
		WH WH WH	0.0 P	36
	-25	WH WH WH	0.0 P	32
		WH WH WH	0.0 P	32
423.33	-30			
Loose Brown Fine to Coarse Sand with Minor Fine Gravel		2 4 2		25
Washed Sample 32.5' - 34.0'		3 4 4		20
Washed Sample 35.0' - 36.5'	-35	3 4 5		21
413.33	-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)

Illinois Department of Transportation
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IDOT

SOIL BORING LOG

Page 2 of 2

Date 3/29/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309721, **Longitude** -89.199432

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 03 (2013)
Station 165+35
Offset 63.0 ft Lt.
Ground Surface Elev. 453.33 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 432.3 ft ▼
Upon Completion 438.3 ft ▽
After Hrs. ft

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Medium Brown Fine to Coarse Sand with Fine to Coarse Gravel Washed Sample 40.0' - 41.5'		3 5 5		20
Washed Sample 45.0' - 46.5'	-45	4 5 7		16
Washed Sample 50.0' - 51.5'	-50	5 8 8		13
Washed Sample 55.0' - 56.5'	-55	5 6 7		14
394.33				
Dense Gray Clay Shale	-60			

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Dense Gray Clay Shale *(continued)* Washed Sample 60.0' - 60.67'	392.66	54 100/2"		13
WH = Weight of Hammer				
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)

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SOIL BORING LOG

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Date 4/2/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309327, **Longitude** -89.199454

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 04 (2013)
Station 166+63
Offset 55.0 ft Lt.
Ground Surface Elev. 453.33 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter 443.3 **ft** ▼
Upon Completion 443.3 **ft** ▽
After ___ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Oil/Chip Road, Brown Sand & Gravel Fill				
450.83				
Medium to Soft Brown Sand & Gravel Fill with Layers of Loam Fill, Some Larger Rocks		10 9 6		10
	-5	2 1 1		27
		WH 3 2		15
443.33 ▽▼	-10			
Soft Dark Gray/Blackish Silty Clay Loam/Silty Clay with Organics & Free Water		2 1 1	0.5 P	33
		1 WH 3	1.0 P	37
	-15	1 2 3	1.0 P	35
436.33				
Soft Gray & Brown Silty Clay/Clay Loam		WH 1 1	0.5 P	33
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft Gray & Brown Silty Clay/Clay Loam *(continued)*		WH WH 1	0.5 P	32
		WH WH WH	0.0 P	32
	-25	WH WH WH	0.0 P	26
425.83				
Loose Brown Fine Sand to Coarse Gravel with Loamy Layers		4 5 3		23
	-30			
Washed Sample 30.0' - 31.5'		7 6 3		12
Washed Sample 32.5' - 34.0'		3 4 5		25
	-35			
Washed Sample 35.0' - 36.5'		2 2 2		26
415.83				
Soft Silty Loam/Silty Clay Loam with Organics & Silt Pockets		1 1 1	0.5 P	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)

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Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 2

Date 4/2/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309327, **Longitude** -89.199454

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 04 (2013)
Station 166+63
Offset 55.0 ft Lt.
Ground Surface Elev. 453.33 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter 443.3 **ft**▼
Upon Completion 443.3 **ft**▽
After ____ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft Silty Loam/Silty Clay Loam with Organics & Silt Pockets *(continued)*		1 2 1	0.5 P	37
		1 WH 1	0.5 P	33
408.33	-45			
Loose to Medium Gray Fine to Coarse Sand with some Fine to Coarse Gravel		5 6 6		18
	-50			
Washed Sample 50.0' - 51.5'		3 5 7		19
	-55			
Washed Sample 55.0' - 56.5'		5 6 4		19
395.33				
Loose Gray Fine Sand & Silt - Bedded				
	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Loose Gray Fine Sand & Silt - Bedded *(continued)* Washed Sample 60.0' - 61.5'		1 1 1		31
390.83				
Dense Gray Shale				
	-65			
Washed Sample 65.0' - 65.9'		60 100/5"		11
387.41				
WH = Weight of Hammer				
End of Boring				
	-70			
	-75			
	-80			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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)

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SOIL BORING LOG

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Date 7/17/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** Shelby Tube Samples from Proposed South Abutment **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309327, **Longitude** -89.199454

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 04-ST (2013)
Station 166+63
Offset 55.0 ft Lt.
Ground Surface Elev. 453.33 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ___ **Hrs.** ______ **ft**

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Augered Material - No Samples Taken This Boring Corresponds to Boring #4 (2013)				
	-5			
443.33	-10			
Tube #1 Pushed 27.5" Recovered 27.5" 440.83				
Tube #2 Pushed 27.5" Recovered 22" 438.33	-15			
Tube #3 Pushed 27.5" Recovered 23" 435.83				
Tube #4 Pushed 27.5" Recovered 27.5" 433.33	-20			

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Tube #5 Pushed 27.5" Recovered 17" 430.83				
Tube #6 Pushed 27.5" No Recovery 428.33	-25			
Tube #7 Pushed 27.5" No Recovery 425.83				
Augered Material - No Samples Taken				
	-30			
	-35			
Tubes 8, 9 & 10 were done on 7/18/2013 415.83				
Tube #8 Pushed 27.5" Recovered 26.5" 413.33	-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 078-0006.GPJ IL_DOT.GDT 4/3/15

Illinois Department of Transportation

Division of Highways
IDOT

SOIL BORING LOG

Page 2 of 2

Date 7/17/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** Shelby Tube Samples from Proposed South Abutment **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309327, **Longitude** -89.199454

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 04-ST (2013)
Station 166+63
Offset 55.0 ft Lt.
Ground Surface Elev. 453.33 **ft**

Surface Water Elev. ft
Stream Bed Elev. ft

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

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Tube #9 Pushed 27.5" No Recovery	410.83				
Tube #10 Pushed 27.5" Recovered 14" Hard to Push Bottom 6"	408.33	-45			
End of Boring					
		-50			
		-55			
		-60			

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 2

Date 4/3/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.314332, **Longitude** -89.199392

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 05 (2013)
Station 148+87
Offset 49.0 ft Lt.
Ground Surface Elev. 460.19 ft

Surface Water Elev. ______ ft
Stream Bed Elev. ______ ft

Groundwater Elev.:
First Encounter 440.2 ft ▼
Upon Completion 442.2 ft ▽
After ___ **Hrs.** ______ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered HMA, Sand & Gravel, Concrete Debris Fill				
457.69				
Hard to Very Stiff Brown Silty Clay Loam Till, Brown Sand & Gravel, Concrete Pieces Fill		6 8 14	4.0 P	9
	-5	3 3 7	4.5 P	10
453.19				
Hard Brown Silty Clay Loam Till Fill		5 7 6	4.5 P	11
	-10	3 5 7	>4.5 P	13
		4 5 6	>4.5 P	11
445.19	-15			
Loose Loamy Fine Sand to Coarse Gravel		3 2 2		12
443.19				
Soft Black Silty Clay with Silt & Sand Seams & Organics ▽		1 1 1	0.5 P	41
	▼ -20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft Black Silty Clay with Silt & Sand Seams & Organics *(continued)*		1 1 2	1.0 P	40
437.69				
Stiff to Very Stiff Brown & Gray Silty Clay with Minor Silty Loam & Silt Layers		WH 1 3	1.5 P	23
	-25	1 3 5	2.0 B	24
		3 3 3	2.3 B	27
	-30	2 2 2	1.5 P	27
428.19				
Soft to Very Stiff Dark Gray Silty Clay with Layers of Silty Clay Loam		2 1 1	1.0 P	29
	-35	WH WH 2	1.5 P	31
Washed Sample 37.5' - 39.0'		WH WH 1	0.3 P	33
	-40			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 2

Date 4/3/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**,
Latitude 41.314332, **Longitude** -89.199392

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 05 (2013)
Station 148+87
Offset 49.0 ft Lt.
Ground Surface Elev. 460.19 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 440.2 ft ▼
Upon Completion 442.2 ft ▽
After _____ **Hrs.** ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft to Very Stiff Dark Gray Silty Clay with Layers of Silty Clay Loam *(continued)* Washed Sample 40.0' - 41.5'		WH WH WH	0.3 P	28
418.19				
Soft to Stiff Gray Silty Clay with Some Organics & Silty Loam Layers		WH WH WH	0.3 P	30
	-45	WH WH 1	0.3 P	31
	-50	WH WH WH	0.3 P	29
	-55	2 2 2	1.5 P	31
	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft to Stiff Gray Silty Clay with Some Organics & Silty Loam Layers *(continued)*		WH WH 2	0.5 P	32
396.19				
Dense Gray Shale - Blocky WH = Weight of Hammer	-65	62 100/2"		11
394.52				
End of Boring				
	-70			
	-75			
	-80			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

Page 1 **of** 2

Date 7/22/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** Shelby Tube Samples from Proposed North Abutment **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.314332, **Longitude** -89.199392

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 05-ST (2013)
Station 148+87
Offset 49.0 ft Lt.
Ground Surface Elev. 460.19 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Material - No Samples Taken This Boring Corresponds to Boring #5 (2013)	452.69	-5			
Tube #11 Pushed 27.5" Recovered 27.5"	450.19	-10			
Tube #12 Pushed 27.5" Recovered 25"	447.69				
Tube #13 Pushed 27.5" Recovered 25"	445.19	-15			
Tube #14 Pushed 27.5" No Recovery	442.69				
Tube #15 Pushed 27.5" No Recovery	440.19	-20			

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Tube #16 Pushed 27.5" Recovered 25"	437.69				
Tube #17 Pushed 27.5" Recovered 23"	435.19	-25			
Tube #18 Pushed 27.5" Recovered 20"	432.69				
Tube #19 Pushed 27.5" Recovered 27.5" Tubes 20 thru 28 were done on 7/23/2013	430.19	-30			
Tube #20 Pushed 27.5" Recovered 27.5"	427.69				
Tube #21 Pushed 27.5" No Recovery	425.19	-35			
Tube #22 Pushed 27.5" Recovered 27.5"	422.69				
Tube #23 Pushed 27.5" Recovered 25"	420.19	-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

Page 2 **of** 2

Date 7/22/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** Shelby Tube Samples from Proposed North Abutment **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.314332, **Longitude** -89.199392

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 05-ST (2013)
Station 148+87
Offset 49.0 ft Lt.
Ground Surface Elev. 460.19 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ___ **Hrs.** ______ **ft**

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Tube #24 Pushed 27.5" Recovered 27.5"	417.69				
Augered Material - No Samples Taken	415.19	-45			
Tube #25 Pushed 27.5" No Recovery	412.69				
Augered Material - No Samples Taken	410.19	-50			
Tube #26 Pushed 27.5" Recovered 24"	407.69				
Augered Material - No Samples Taken	405.19	-55			
Tube #27 Pushed 27.5" Recovered 12"	402.69				
Augered Material - No Samples Taken	400.19	-60			

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Tube #28 Pushed 27.5" No Recovery	397.69				
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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 4/4/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313968, **Longitude** -89.199572

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 06 (2013)
Station 149+95
Offset 0.0 ft
Ground Surface Elev. 452.87 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter 440.9 **ft** ▼
Upon Completion 442.9 **ft** ▽
After ___ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Black, Brown, Gray Silty Clay Loam with some Reddog Fill & Large Concrete Debris				
450.37				
Stiff Brown Silty Loam, with Sand & Silt Seams & High Organics - Fill		3 3 2	1.5 P	14
	-5			
		2 2 2	1.0 P	34
445.87				
Stiff to Very Stiff Black Silty Clay Loam with Sand & Silt Seams - Fill		2 2 3	2.0 P	24
442.87 ▽	-10			
Stiff Black to Dark Gray Silty Clay Loam with Silty Loam & Silt Layers and High Organics		1 2 3	1.0 P	26
▼ 440.37				
Soft to Stiff Brown & Gray Silty Clay Loam with Layers of Silty Loam & Silt		1 1 1	0.5 P	27
	-15			
		1 2 3	1.5 P	26
		1 1 3	1.5 P	26
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft to Stiff Brown & Gray Silty Clay Loam with Layers of Silty Loam & Silt *(continued)*		2 2 2	1.5 P	28
		1 2 2	1.0 P	25
	-25			
		1 2 3	1.0 P	27
		1 2 2	1.0 P	27
422.87	-30			
Medium to Stiff Gray Silty Clay Loam/Silty Loam with Silt Layers		WH WH 1	0.5 P	25
		WH WH WH	0.3 P	28
	-35			
		WH WH WH	0.3 P	31
		WH WH WH	0.0 P	30
413.37				
	-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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 2

Date 4/4/13

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**,
Latitude 41.313968, **Longitude** -89.199572

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 06 (2013)
Station 149+95
Offset 0.0 ft
Ground Surface Elev. 452.87 ft

Surface Water Elev. ______ ft
Stream Bed Elev. ______ ft

Groundwater Elev.:
First Encounter 440.9 ft ▼
Upon Completion 442.9 ft ▽
After ____ **Hrs.** ______ ft

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Loose Gray Fine Sand to Medium Gravel - Loamy *(continued)*		3 3 1		19
Washed Sample 45.0' - 46.5'	-45	2 2 2		13
405.87				
Soft Gray Silty Clay Loam with Silt Layers & Organics				
	-50	WH WH WH	0.3 P	25
	-55	WH WH WH	0.3 P	34
392.87	-60			

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Dense Gray Blocky Clay Shale		18 28 46		16
wh = Weight of Hammer				
391.37				
End of Boring				
	-65			
	-70			
	-75			
	-80			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 4/7/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309235, **Longitude** -89.199817

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 01 (2014)
Station 167+20
Offset 38.0 ft Rt.
Ground Surface Elev. 467.37 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 449.4 ft ▼
Upon Completion 449.4 ft ▽
After Hrs. ft

Description	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Cored Bituminous & Concrete Pavement, Augered Gravel Fill & Brown Silty Clay Loam Till Fill				
464.87				
Very Stiff to Stiff Light Brown Silty Clay Loam Till Fill		3 3 4	2.5 P	13
	-5	3 2 3	2.0 P	16
		3 3 3	2.5 P	14
	-10	2 3 3	1.6 B	18
		2 2 4	1.5 P	14
452.87				
Hard Light Brown Silty Clay Loam Till Fill	-15	3 4 5	4.0 P	11
449.87				
Loose Dark Gray & Black Bedded Sand, Gravel, Silt, Silty Clay Alluvial Deposits with Organics	▽▼	4 3 3		16
	-20			
Loose Dark Gray & Black Bedded Sand, Gravel, Silt, Silty Clay Alluvial Deposits with Organics *(continued)*		WH 1 3		22
		2 3 4		30
442.87				
Very Stiff Dark Gray Silty Clay/Silty Clay Loam with Organics and some Layers of Sand & Gravel	-25	3 4 5	2.7 B	32
		WH 4 4	2.1 B	26
	-30	4 4 5	3.1 B	32
435.37				
Very Stiff Gray & Brown Silty Clay with Silt Pockets		4 4 4	2.4 B	29
	-35	1 4 4	2.7 B	31
		2 4 5	2.4 B	30
428.37				
Stiff Greenish Gray Silty Clay Loam with Organics	-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 4/7/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309235, **Longitude** -89.199817

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 01 (2014)
Station 167+20
Offset 38.0 ft Rt.
Ground Surface Elev. 467.37 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter 449.4 **ft** ▼
Upon Completion 449.4 **ft** ▽
After ____ **Hrs.** ______ **ft**

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Stiff Greenish Gray Silty Clay Loam with Organics *(continued)*		2		
		2	1.5	30
425.87		3	P	
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)

BBS, form 137 (Rev. 8-99)

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 2

Date 4/7/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.314404, **Longitude** -89.199717

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 02 (2014)
Station 148+31
Offset 37.0 ft Rt.
Ground Surface Elev. 471.36 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 449.4 ft ▼
Upon Completion 451.4 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Cored Bituminous & Concrete Pavement, Augered Brown Silty Clay Loam Fill				
468.86				
Very Stiff Reddish Brown Silty Clay Loam Till Fill		3 2 3	2.5 P	15
	-5	1 2 3	2.0 P	12
		2 3 4	2.5 P	11
	-10	3 4 7	3.8 B	12
459.36				
Very Stiff Light Brown Silty Clay Loam Till Fill		3 3 5	3.1 B	13
	-15	2 3 4	3.1 B	13
		2 3 4	3.4 B	14
▽	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Stiff Light Brown Silty Clay Loam Till Fill *(continued)*		1 2 4	2.7 B	13
449.36▼				
Loose Black & Brown Silty Loam, Silt, Sand, Gravel - Alluvial Deposits - Bedded		2 3 4		15
446.36	-25			
Very Stiff Dark Gray/Black Silty Clay with Organics		1 4 5	3.5 B	24
		3 3 5	3.4 B	28
	-30	2 3 5	3.2 B	30
		2 3 4	2.4 B	29
436.86	-35			
Stiff to Very Stiff Brown & Gray Silty Clay/Silty Clay Loam		2 2 2	2.0 P	25
		2 3 4	2.1 B	30
	-40			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

Page 2 **of** 2

Date 4/7/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.314404, **Longitude** -89.199717

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 02 (2014)
Station 148+31
Offset 37.0 ft Rt.
Ground Surface Elev. 471.36 **ft**

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 449.4 **ft** ▼
Upon Completion 451.4 **ft** ▽
After Hrs. **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff to Very Stiff Brown & Gray		3		
Silty Clay/Silty Clay Loam		4	2.4	27
(continued) 429.86		4	B	
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)

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 3

Date 8/20/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313703, **Longitude** -89.199592

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 03M (2014)
Station 150+90
Offset 0.0 ft
Ground Surface Elev. 447.90 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter 437.9 **ft** ▼
Upon Completion 437.9 **ft** ▽
After ___ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Augered Brown / Black Silty Clay Loam, Brown Fine Sand to Coarse Gravel Fill				
445.40				
Hard Black & Brown Silty Clay Loam with Heavy Gravel Pieces - Fill		7 6 7	>4.5 P	13
442.90	-5			
Stiff Black & Brown Silty Loam, Silty Clay, Sand Interbedded - Alluvial Backwater Deposits - High Organics		4 3 2	2.0 P	19
WH = Weight of Hammer		1 2 2	2.0 P	27
438.40				
Stiff Gray & Brown Silty Clay with Shell Fragments	▽▼ -10	WH WH 2	1.5 P	26
		2 1 2	1.7 S	26
	-15	3 2 3	1.7 S	30
		2 1 2	1.3 S	28
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Gray & Brown Silty Clay with Shell Fragments *(continued)*		WH 2 2	2.0 P	11
Loamy Sand & Gravel Layers at 21'		3 2 2	1.9 S	28
	-25	2 2 2	1.7 S	26
420.90				
Stiff Gray Silty Clay with Shell Fragments & Layers of Sand, Silt, Loam		WH 2 2	1.3 B	29
	-30	WH WH 2	1.0 P	27
		WH 3 6		28
413.90				
Medium Gray Fine Sand to Medium Gravel	-35	5 5 5		17
Washed Sample 37.5' to 39.0'		5 7 8		12
407.90	-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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Date 8/20/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**,
Latitude 41.313703, **Longitude** -89.199592

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 03M (2014)
Station 150+90
Offset 0.0 ft
Ground Surface Elev. 447.90 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 437.9 ft ▼
Upon Completion 437.9 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Gray Silty Clay / Silty Clay Loam with Shell Fragments and Minor Silt Layers		1 1 1	1.5 P	39
		WH WH 2	1.1 B	37
	-45	WH 1 2	1.1 B	31
		2 2 3	1.3 B	29
	-50	WH 2 2	1.1 B	32
		WH WH 2	1.1 B	36
	-55	WH WH 2	1.0 B	32
390.40				
Hard Gray Shale with some Minor Silt Seams and Gravel Pieces Inclusion		25 40 75	>4.5 P	14
	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Hard Gray Shale with some Minor Silt Seams and Gravel Pieces Inclusion *(continued)* Modified Standard Penetration Test used from 60.0 ft to end of boring. Results are on a separate log sheet.				15
				14
	-65			16
				14
	-70			11
				9
	-75			12
				12
	-80			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 3 **of** 3

Date 8/20/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313703, **Longitude** -89.199592

COUNTY Putnam, Bureau **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE** CME Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 03M (2014)
Station 150+90
Offset 0.0 ft
Ground Surface Elev. 447.90 ft

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

Groundwater Elev.:
First Encounter 437.9 ft ▼
Upon Completion 437.9 ft ▽
After ____ **Hrs.** ____ ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Hard Gray Shale with some Minor Silt Seams and Gravel Pieces Inclusion *(continued)*					8
					7
	362.90	-85			
Black Coal	362.82				
End of Boring					17
		-90			
		-95			
		-100			

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
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SOIL BORING LOG

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Date 5/8/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313733, **Longitude** -89.199615

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 101M (Pier #1)
Station 150+72.0
Offset 6.5 ft Lt.
Ground Surface Elev. 449.25 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion ft
After 4 **Hrs.** 445.3 ft ▽

	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Loose Red Brown Sandy Clay Fill					
	447.75		8		
Brown Silty Clay with pieces of Limestone up to 3/4" in size			7	0.5	18
			4	P	
	446.25			2.5	
Brown Silty Clay				P	
▽			4		
	444.75		3	1.0	24
Gray / Brown Silty Clay		-5	4	B	
	443.75				
Brown Gravelly Clay			1		
			1		32
			1		
	441.25				
Gray Gravelly Clay			1		
			2		31
		-10	2		
	438.75				
Gray Silty Clay			1		
			1	0.3	30
			1	B	
Brown / Gray high PI Clay			1		
			2	1.4	27
		-15	3	B	
			1		
			2	1.0	35
			3	B	
	431.25				
Brown Clay, Trace Sand			1		
	429.75		2	1.2	33
Brown Clay with Gravel		-20	2	B	

	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
	428.75				
Brown Clay with Sand			1		
			2	1.2	32
			3	B	
			1		
	424.75		2	1.2	35
Gray Clay		-25	2	B	
			1		
	422.25		1	0.2	30
Gray Clayey Fine Sand			2	B	
	420.25		1		
Gray Sandy Clay with 2" Sand Seam			1	0.2	32
		-30	2	B	
			5		
			2	0.3	40
		-35	2	P	
	412.25				
Gray Silty Clay with Trace of Very Fine Sand and some Shells			2		
			2	0.6	40
	409.25	-40	2	B	

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)

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 3

Date 5/8/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313733, **Longitude** -89.199615

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 101M (Pier #1)
Station 150+72.0
Offset 6.5 ft Lt.
Ground Surface Elev. 449.25 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After 4 **Hrs.** 445.3 **ft** ▽

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Soft Gray Silty Clay with Very Fine Sand				
		1		
	-45	1 2	0.4 B	35
402.25				
Loose Gray Clayey Sand with Trace Gravel				
		1		
	-50	1 2		41
397.75				
Very Soft Gray Silty Clay Material in shoe was very stiff				
		1		
	-55	1 2	0.4 B	40
Modified Standard Penetration Test used from 58.5 ft to end of boring. Results are on a separate log sheet.				
391.25				
Medium Dense Gray Argillaceous Shale - Weathered				
	-60			19

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Dense Gray Argillaceous Shale - Weathered *(continued)*				
387.25				
Medium Dense Gray Argillaceous Shale - Weathered				
	-65		5.1 S	17
382.25				
Very Dense Gray Argillaceous Shale				
	-70			16
377.25				
Very Dense Dark Gray Argillaceous Shale with Silt Partings				
	-75			24
372.25				
Very Dense Gray Argillaceous Shale with some Sand Particles				
369.25	-80			35

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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
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SOIL BORING LOG

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Date 5/8/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313733, **Longitude** -89.199615

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 101M (Pier #1)
Station 150+72.0
Offset 6.5 ft Lt.
Ground Surface Elev. 449.25 **ft**

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

Groundwater Elev.:
First Encounter ____ **ft**
Upon Completion ____ **ft**
After 4 **Hrs.** 445.3 **ft** ▽

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Black Friable Coal					
					48
		-85			
	362.25				
Dense Gray Argillaceous Shale with Limestone Interclasts					
					16
		-90			
	357.25				
Very Dense Gray Argillaceous Shale with Limestone Interclasts					
					14
		-95			
	352.25				
Very Dense Gray Silty Shale with Limestone Interclasts					
					11
	349.25	-100			

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Dense Gray Argillaceous Shale with Silt Partings and Limestone Interclasts					
					16
		-105			
					15
		-110			
	335.65				
Hammer Broke End of Boring					20
		-115			
		-120			

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)

SOIL BORING LOG

Date 5/22/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3132738, **Longitude** -89.1996264

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 102M (Pier #2)
Station 152+51.15
Offset 10.0 ft Lt.
Ground Surface Elev. 453.00 **ft**

Surface Water Elev. 448.00 **ft**
Stream Bed Elev. 441.00 **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ____ **Hrs.** ______ **ft**

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Barge Deck Ground Surface Elevation = Barge Deck Elevation				
448.00	-5			
River Water				
	-10			
441.00				
Stream Bed Not Sampled				
	-15			
	-20			

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Stream Bed Not Sampled *(continued)*				
	-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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 3

Date 5/22/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3132738, **Longitude** -89.1996264

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 102M (Pier #2)
Station 152+51.15
Offset 10.0 ft Lt.
Ground Surface Elev. 453.00 ft

Surface Water Elev. 448.00 ft
Stream Bed Elev. 441.00 ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stream Bed Not Sampled *(continued)*				
	-45			
	-50			
	-55			
Possible Cobble or Boulder at 55' Top of Shale 397.00				
Gray Argillaceous Shale (Pennsylvanian)				
Modified Standard Penetration Test used from 58.5 ft to end of boring. Results are on a separate				16
	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
log sheet. Gray Argillaceous Shale (Pennsylvanian) *(continued)*				
				13
	-65			
				15
	-70			
381.50				
Dark Gray Argillaceous Shale				
				14
	-75			
				12
	-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)

BBS, form 137 (Rev. 8-99)

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SOIL BORING LOG

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Date 5/22/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3132738, **Longitude** -89.1996264

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 102M (Pier #2)
Station 152+51.15
Offset 10.0 ft Lt.
Ground Surface Elev. 453.00 **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dark Gray Argillaceous Shale *(continued)*				
	-85			14
	-90			13
361.00				
Coal				
	-95			32
356.00				
Gray Argillaceous Shale with some Silt size particles				
	-100			14

Surface Water Elev. 448.00 **ft**
Stream Bed Elev. 441.00 **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After _____ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray Argillaceous Shale with some Silt size particles *(continued)*				
	-105			12
346.00				
Light Gray Silty Clayey Shale				
	-110			14
341.50				
Very Dense Sandy Shale (Micaceous)				
338.00	-115			8
End of Boring				
	-120			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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)

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SOIL BORING LOG

Page 1 **of** 3

Date 5/21/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3125453, **Longitude** -89.1996188

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 103M (Pier #3)
Station 155+19.38
Offset 3.0 ft Lt.
Ground Surface Elev. 453.15 **ft**

Surface Water Elev. 448.35 **ft**
Stream Bed Elev. 423.15 **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ______ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Barge Deck Ground Surface Elevation = Barge Deck Elevation				
448.35	-5			
River water				
	-10			
	-15			
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
River water *(continued)*				
	-25			
423.15	-30			
Stream Bed Not Sampled				
	-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 LOG

Date 5/21/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3125453, **Longitude** -89.1996188

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 103M (Pier #3)
Station 155+19.38
Offset 3.0 ft Lt.
Ground Surface Elev. 453.15 **ft**

Surface Water Elev. 448.35 **ft**
Stream Bed Elev. 423.15 **ft**

Groundwater Elev.:
First Encounter ____ **ft**
Upon Completion ____ **ft**
After ____ **Hrs.** ____ **ft**

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Stream Bed Not Sampled *(continued)*				
	-45			
	-50			
399.65				
Soft Gray Sandy Clay with Shells		WH		
	-55			41
Top of Shale 395.65				
	-60			18

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Gray Argillaceous Shale (Pennsylvanian) Modified Standard Penetration Test used from 58.5 ft to end of boring. Results are on a separate log sheet. *(continued)*				
	-65		5.1 S	20
386.15				
Dark Gray Argillaceous Shale (Pennsylvanian)				
	-70		5.5 S	15
	-75		6.6 S	15
	-80			13

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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

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Date 5/21/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3125453, **Longitude** -89.1996188

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 103M (Pier #3)
Station 155+19.38
Offset 3.0 ft Lt.
Ground Surface Elev. 453.15 **ft**

Surface Water Elev. 448.35 **ft**
Stream Bed Elev. 423.15 **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ____ **Hrs.** ______ **ft**

	DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Dark Gray Argillaceous Shale (Pennsylvanian) *(continued)*				
	-85		>11.5 S	14
Approximately 1" thick layer of Black Shale, Possibly Coal at 89'	-90			20
361.65				
Gray Silty Clayey Shale Note: Casing broke with the movement of the barge. Sand filled the bottom 15 ft to 20 ft of borehole. Stopped boring at 95 ft.				
358.15	-95			16
End of Boring				
	-100			

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 LOG

Page 1 **of** 3

Date 5/28/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.3115511, **Longitude** -89.199651

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 104M (Pier #4)
Station 158+78.37
Offset 16.0 ft Rt.
Ground Surface Elev. 449.35 **ft**

Surface Water Elev. 444.25 **ft**
Stream Bed Elev. 435.35 **ft**

Groundwater Elev.:
First Encounter ____ **ft**
Upon Completion ____ **ft**
After ____ **Hrs.** ____ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Barge Deck Ground Surface Elevation = Barge Deck Elevation				
444.25	-5			
River Water				
	-10			
435.35				
Stream Bed Not Sampled	-15			
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stream Bed Not Sampled *(continued)*				
	-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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 3

Date 5/28/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.3115511, **Longitude** -89.199651

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 104M (Pier #4)
Station 158+78.37
Offset 16.0 ft Rt.
Ground Surface Elev. 449.35 ft

Surface Water Elev. 444.25 ft
Stream Bed Elev. 435.35 ft

Groundwater Elev.:
First Encounter ____ ft
Upon Completion ____ ft
After ____ **Hrs.** ____ ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stream Bed Not Sampled *(continued)*					
		-45			
		-50			
	395.85				
River Muck, Gray Silty Clay			WH	0.1 B	16
	394.35	-55			
Modified Standard Penetration Test used from 53.5 ft to end of boring. Results are on a separate log sheet.					
Weathered Gray Shale					
		-60		3.0 B	16

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Weathered Gray Shale *(continued)*					
	387.35				
Dark Gray Shale (Friable)					
		-65		3.9 S	7
		-70		6.9 S	2
		-75			8
	371.35				
		-80			19

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

Page 3 **of** 3

Date 5/28/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.3115511, **Longitude** -89.199651

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 104M (Pier #4)
Station 158+78.37
Offset 16.0 ft Rt.
Ground Surface Elev. 449.35 ft

Surface Water Elev. 444.25 ft
Stream Bed Elev. 435.35 ft

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

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Black Coal with Brown Powdery Substance, possibly Iron. Elevations of Black Coal with Brown Powdery Substance are estimated from Sample 6 of 104M and core samples from 104C. *(continued)*	367.35				
Dark Gray Shale (Friable)					11
		-85			
	362.35				
Light Gray Shale, Argillaceous with Silt, Micaceous					7
		-90			
					12
		-95			
	352.35				
Light Gray Silty Shale					9
		-100			

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Light Gray Silty Shale *(continued)*					12
		-105			
	342.85				
Gray Argillaceous Shale with Silt sized particles					10
		-110			
	338.35				
Light Gray Silty Shale					9
	334.35	-115			
End of Boring					
		-120			

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

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Date 5/5/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310784, **Longitude** -89.19965

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 105M (Pier #5)
Station 161+52.78
Offset 6.5 ft Rt.
Ground Surface Elev. 448.54 ft

Surface Water Elev. ______ ft
Stream Bed Elev. ______ ft

Groundwater Elev.:
First Encounter ______ ft
Upon Completion 442.5 ft ▽
After ___ **Hrs.** ______ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft Brown Clay Loam with Organics		1		
		2	0.8	28
		4	P	
Loose Brown Clayey Sand		4		
		3		26
	-5	3		
443.04				
Soft Brown Silty Clay with Organics with 2" Sand Seam ▽		1		
441.54		1	0.2	37
Brown Gray Silty Fine Sand with Organics		1	B	
440.54				
Loose Black Silty Fine Sand		3		
439.04		2		26
Loose Brown Gravel (Rounded)	-10	1		
438.04				
Very Loose Gray Clayey Fine Sand with Shells		WH		
		WH		38
		WH		
		WH		
		1		9
	-15	WH		
		WH		
		WH		43
		1		
430.54				
Very Loose Fine to Medium Sand, Trace Clay		1		
		1		34
	-20	1		

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Loose Fine to Medium Sand, Trace Clay *(continued)*		2		
426.54		2		34
Gray Clayey Fine Sand		4		
425.54				
Loose Gray Medium Sand		2		
424.04		2		24
Loose Black Sand with Shells and pieces of Coal	-25	4		
		2		
		1		26
		2		
420.54				
Medium Dense Gray Medium Sand with Shells		3		
		5		21
	-30	5		
		6		
		6		25
	-35	6		
		2		
		4		22
	-40	5		

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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 LOG

Page 2 **of** 3

Date 5/5/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310784, **Longitude** -89.19965

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 105M (Pier #5)
Station 161+52.78
Offset 6.5 ft Rt.
Ground Surface Elev. 448.54 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 442.5 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Dense Gray Medium Sand with Shells *(continued)*				
406.54				
Gray Clay with 1/4" to 3/4" Limestone pieces		55/4"		26
	-45			
Very Hard Drilling to 47', Believe this to be Limestone Layer 401.54				
Weathered Gray Shale (Very Sandy)		37 50/3"		14
399.04				
Weathered Gray Argillaceous Shale - Pennsylvanian	-50			
Modified Standard Penetration Test used from 53.5 ft to end of boring. Results are on a separate log sheet.	-55			15
391.54				
Dark Gray Argillaceous Shale - Pennsylvanian	-60		7.9 S	17

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dark Gray Argillaceous Shale - Pennsylvanian *(continued)*				
Gray Argillaceous Shale - Slightly Micaceous	-65		4.6 S	14
381.54				
Dark Gray Argillaceous Shale	-70		4.8 S	13
376.54				
Gray Argillaceous Shale	-75		7.1 S	15
371.54				
Dark Gray to Black Argillaceous Shale	-80		8.5 S	16

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

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Date 5/5/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310784, **Longitude** -89.19965

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 105M (Pier #5)
Station 161+52.78
Offset 6.5 ft Rt.
Ground Surface Elev. 448.54 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 442.5 ft ▽
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dark Gray to Black Argillaceous Shale *(continued)*				
366.54				
Gray Argillaceous Shale (Difficult to cut sample due to Limestone Interclasts)				17
	-85			
361.54				
Gray Silty Argillaceous Shale - Slightly Micaceous				12
	-90			
356.54				
Gray Silty Sandy Shale - Micaceous				16
	-95			
351.54				
Gray Argillaceous Shale with Silt between beds				13
	-100			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray Argillaceous Shale with Silt between beds *(continued)*				21
	-105			
Gray Silty Shale with less than or equal to 1" thick Layers or Seams of Very Sandy Shale. Classifying this as Shale because of the thin beds.				14
	-110			
Gray Silty Shale with thin beds of Limestone				17
333.54	-115			
End of Boring				
	-120			

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)

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Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 3

Date 5/1/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**,
Latitude 41.310369, **Longitude** -89.199741

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 106M (Pier #6)
Station 163+03.11
Offset 6.0 ft Rt.
Ground Surface Elev. 450.50 ft

Surface Water Elev. ______ ft
Stream Bed Elev. ______ ft

Groundwater Elev.:
First Encounter ______ ft
Upon Completion 444.0 ft ▽
After ___ **Hrs.** ______ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft Brown Sandy Clay		2 3 2	1.0 P	35
448.00				
Brown Silty Clay with Organics	-5	2 2 4	1.1 B	26
445.00				
Medium Dense Brown Coarse Sand ▽		4 7 7		15
442.50				
Wet Silty Sand & Gravel	-10	4 3 2		17
440.00				
Loose Dark Gray Clayey Fine Sand		3 1 1		43
437.50				
Soft Gray Clay	-15	1 1 2	0.4 B	47
435.00				
Soft Gray Sandy Clay with Shells		WH 1 1	0.1 B	42
	-20	WH 1 1	0.2 B	34
430.50				

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft Gray Sandy Clay with Layers of Fine Sand with Shells		1 1 1	0.4 B	28
427.00				
Loose Gray Clayey Fine Sand with Shells & Organics	-25	2 1 1		42
		2 4 4		27
423.50				
Loose Gray Fine to Medium Sand with Pieces of Wood (Decayed)	-30	3 4 5		23
	-35	2 3 5		29
412.00				
Medium Dense Fine to Medium Sand with Pieces of Coal	-40	3 6 6		24

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

BBS, form 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 2 **of** 3

Date 5/1/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310369, **Longitude** -89.199741

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 106M (Pier #6)
Station 163+03.11
Offset 6.0 ft Rt.
Ground Surface Elev. 450.50 ft

Surface Water Elev. ______ ft
Stream Bed Elev. ______ ft

Groundwater Elev.:
First Encounter ______ ft
Upon Completion 444.0 ft ▽
After ___ **Hrs.** ______ ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Dense Fine to Medium Sand with Coal Pieces				
		9 10 6		15
	-45			
402.50				
Very Stiff to Hard Gray Clay				
	-50			
399.50				19
Dense Gray Pennsylvanian Shale (Argillaceous) with Silt. Sand grains not readily evident. Feels and looks waxy Modified Standard Penetration Test used from 50.0 ft to end of boring. Results are on a separate log sheet.				
	-55			
			4.8 S	15
	-60		6.3 S	19

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
389.00				
Very Dense Gray Pennsylvanian Shale (Argillaceous) with trace Fine Black Sand, Very Friable. Could not test in Rimac.				19
	-65			
			6.7 S	14
	-70			
378.50				
Very Friable & Very Dense Pennsylvanian Shale (Argillaceous). Could not test in Rimac because sample broke.				13
	-75			
371.50				
Coal (Very Friable)				38
370.50	-80			

SOIL BORING 078-0006.GPJ IL_DOT.GDT 4/3/15

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 5/1/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310369, **Longitude** -89.199741

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 106M (Pier #6)
Station 163+03.11
Offset 6.0 ft Rt.
Ground Surface Elev. 450.50 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter ft
Upon Completion 444.0 ft ▽
After Hrs. ft

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Coal	367.00				
Under Clay 6"	366.50				
Very Dense Gray Shale (Argillaceous)		-85		2.7 B	18
Pea size Limestone pieces Interclast in with the Argillaceous Gray Shale		-90			12
No Recovery - MSPT test resulted in only 0.05' of penetration. Suspect a Limestone inclusion but could not confirm without sample.		-95			
Very Dense Pennsylvanian Shale, Silty to Fine Sand particles, less Clay than above		-100			12

		DEPTH (ft)	**BLOWS (/6")**	**UCS Qu (tsf)**	**MOIST (%)**
Very Dense Pennsylvanian Shale, Sandy and Slightly Micaceous		-105			16
	340.50	-110			16
End of Boring		-115			
		-120			

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 2/12/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**,
Latitude 41.309811, **Longitude** -89.19968

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 107C (Aborted) (Pier #7)
Station 165+16
Offset 5.0 ft Rt.
Ground Surface Elev. 451.32 **ft**

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Not Sampled				
	-5			
	-10			
	-15			
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Not Sampled *(continued)*				
	-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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

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Date 2/12/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**,
Latitude 41.309811, **Longitude** -89.19968

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 107C (Aborted) (Pier #7)
Station 165+16
Offset 5.0 ft Rt.
Ground Surface Elev. 451.32 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Not Sampled *(continued)*				
407.82				
Loose Gray Sand & Gravel		7		
		4		13
	-45	3		
404.32				
Harder Drilling - feels like we are in Soft Shale. Advancing approximately 5' to see if drilling gets harder.				
	-50			
397.82				
Dense Weathered Shale		14		
		22	>4.5	19
	-55	37	P	
2/13/2014				
Hard Drilling - Set Casings at 57' 394.32				
While reaming hole, noticed an obstruction approximately 5' above bottom of casing. Pulled casing and moved to an 8' offset from centerline stake. While pulling casing, we found that the bottom casing sheared in two and	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
a portion of casing remains in the borehole. 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)

Illinois Department of Transportation
Division of Highways
IDOT

SOIL BORING LOG

Page 1 **of** 3

Date 2/20/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309798, **Longitude** -89.199685

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 107M (Pier #7)
Station 165+11
Offset 12.5 ft Rt.
Ground Surface Elev. 451.55 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff Brown Silty Clay		2		
		3	2.0	31
449.30		3	P	
Loose Brown Clayey Sand with Organics, Alluvial Deposit with signs of Forestation		2		
		2		20
	-5	2		
			0.3	
		1	P	
444.55		1	0.2	34
Very Soft to Soft Dark Gray to Black Silty Clay		1	B	
		1		
		1	0.3	38
	-10	1	B	
441.05				
Very Soft Gray Silty Clay		1		
		1	0.2	33
		1	B	
438.05				
Very Soft Brown Silty Clay with Fine Sand		WH		
		WH	0.2	32
	-15	WH	B	
		WH		
		WH	0.3	34
		WH	B	
		WH		
		WH	0.1	38
431.55	-20	WH	B	

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Soft Gray Sandy Clay		WH		
		WH	0.2	36
		WH	B	
428.55				
Medium Stiff Gray Silty Clay with 2" Sand Seams		1		
		2	0.6	37
	-25	4	B	
426.05				
Loose Brown Medium Sand		2		
		3		23
		5		
		3		
422.05		6		24
Loose Brown Medium to Coarse Sand	-30	3		
419.55				
Loose Gray Medium Sand with a trace of Clay		3		
		3		27
	-35	4		
415.05				
Medium Dense Gray Medium to Coarse Sand with a trace of Gravel		7		
		9		16
411.55	-40	6		

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

Page 2 **of** 3

Date 2/20/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309798, **Longitude** -89.199685

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 107M (Pier #7)
Station 165+11
Offset 12.5 ft Rt.
Ground Surface Elev. 451.55 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ___ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Medium Dense Gray Medium to Coarse Sand with a trace of Fine Gravel				
		11		
		8		17
	-45	8		
402.55		1		
Gray Very Weathered Shale		12	2.1	13
	-50	26	S	
- Resumed Boring on February 21, 2014		24		
		39	4.5+/-	15
	-55	55	P	
394.55				
Gray Very Dense Argillaceous Shale Modified Standard Penetration Test used from 58.5 Ft to end of boring. Results are on a separate log sheet.				16
	-60			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Gray Very Dense Argillaceous Shale Modified Standard Penetration Test used from 58.5 Ft to end of boring. Results are on a separate log sheet. *(continued)*				
			5.5	19
	-65		S	
382.55				
Dark Gray Very Dense Friable Thinly Bedded Argillaceous Shale				16
	-70			
			6.1	12
	-75		S	
				15
	-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
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SOIL BORING LOG

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Date 2/20/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309798, **Longitude** -89.199685

COUNTY Putnam, Bureau **DRILLING METHOD** Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 107M (Pier #7)
Station 165+11
Offset 12.5 ft Rt.
Ground Surface Elev. 451.55 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. ______ **ft**

Groundwater Elev.:
First Encounter ______ **ft**
Upon Completion ______ **ft**
After ____ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Dark Gray Very Dense Friable Thinly Bedded Argillaceous Shale *(continued)*				
368.55				
Black Friable Coal				47
	-85			
363.55				
Gray Dense Argillaceous Shale			>4.5 P	16
	-90			
359.55				
Gray Very Dense Slightly Micaceous Shale with Limestone Inclusions			>4.5 P	11
	-95			
354.55				
Light Gray Very Dense Slightly Micaceous Shale			>4.5 P	17
	-100			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Light Gray Very Dense Slightly Micaceous Shale *(continued)*				
				15
	-105			
				13
	-110			
				13
	-115			
332.76				13
End of Boring				
	-120			

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 078-0006.GPJ IL_DOT.GDT 4/3/15

Illinois Department of Transportation

Modified SPT Log

Route: IL 89 (FAP 698) Structure No.: 078-0006 (Exist.) 078-0047 (Prop.) Date: 5/8/14 Page: 1 of 1

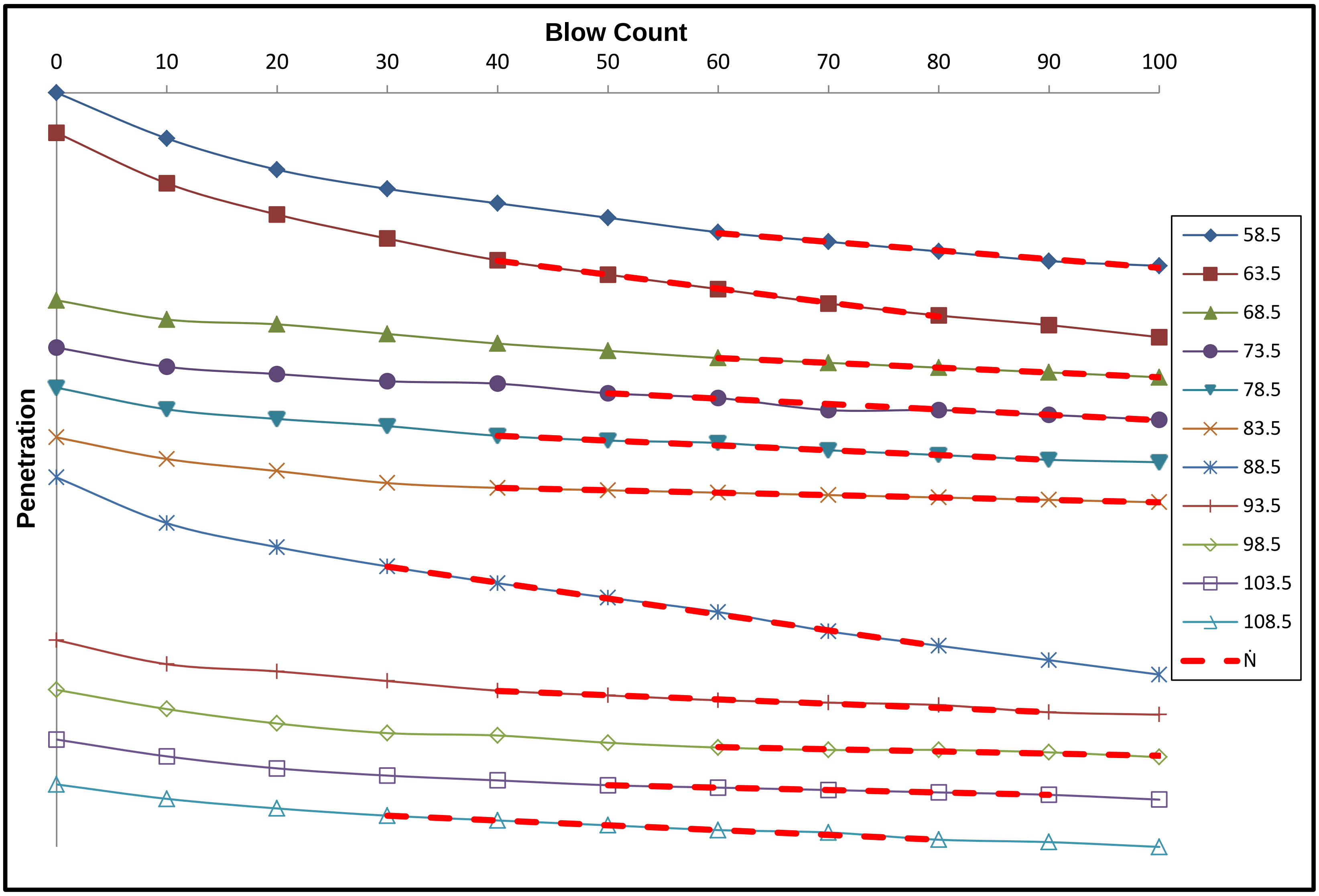
Section: (1) BR Description: Illinois 89 over Illinois River at Spring Valley

County: Putnam / Bureau Logged by: TLM Sampler Tube Length: 30 in.

Boring No.: 101 M (Pier #1) Station: 150+72 Offset: 6.5' LT Latitude: 41.313733 Longitude: -89.199615

	Measured Rod Length **(ft)**	Blows where exposed rod length is measured (blows) 0	10	20	30	40	50	60	70	80	90	100	Ṅ (bpf)	q_u (ksf)	Young's Modulus (ksi)
Test Elevation	58.50	2.62	2.43	2.3	2.22	2.16	2.1	***2.04***	***2***	***1.96***	***1.92***	***1.9***	277.8	19.6	4.37
	63.50	2.8	2.59	2.46	2.36	***2.27***	***2.21***	***2.15***	***2.09***	***2.04***	2	1.95	172.4	11.5	2.63
	68.50	2.82	2.74	2.72	2.68	2.64	2.61	***2.58***	***2.56***	***2.54***	***2.52***	***2.5***	500.0	37.9	8.89
	73.50	2.8	2.72	2.69	2.66	2.65	***2.61***	***2.59***	2.54	***2.54***	***2.52***	***2.5***	445.6	33.4	7.67
	78.50	2.75	2.66	2.62	2.59	***2.55***	***2.53***	2.52	***2.49***	***2.47***	***2.45***	2.44	500.0	37.9	8.89
	83.50	2.83	2.74	2.69	2.64	***2.62***	***2.61***	***2.6***	***2.59***	***2.58***	2.57	***2.56***	1000	82.5	24.73
	88.50	2.7	2.51	2.41	***2.33***	***2.26***	***2.2***	2.14	***2.06***	***2***	1.94	1.88	150.9	9.9	2.30
	93.50	2.79	2.69	2.66	2.62	***2.58***	***2.56***	***2.54***	***2.53***	2.52	***2.49***	2.48	569.2	43.9	10.64
	98.50	2.62	2.54	2.48	2.44	2.43	2.4	***2.38***	***2.37***	***2.37***	***2.36***	***2.34***	1111	92.8	29.42
	103.50	2.75	2.68	2.63	2.6	2.58	***2.56***	***2.55***	***2.54***	***2.53***	***2.52***	2.5	1000	82.5	24.73
	108.50	2.73	2.67	2.63	***2.6***	***2.58***	***2.56***	***2.54***	2.53	***2.5***	2.49	2.47	500.0	37.9	8.89

Note: "***Values***" indicates data used to calculate **Ṅ**.



Illinois Department of Transportation

Modified SPT Log

Route: IL 89 (FAP 698) Structure No.: 078-0006 (Exist.) 078-0047 (Prop.) Date: 5/22/14 Page: 1 of 1

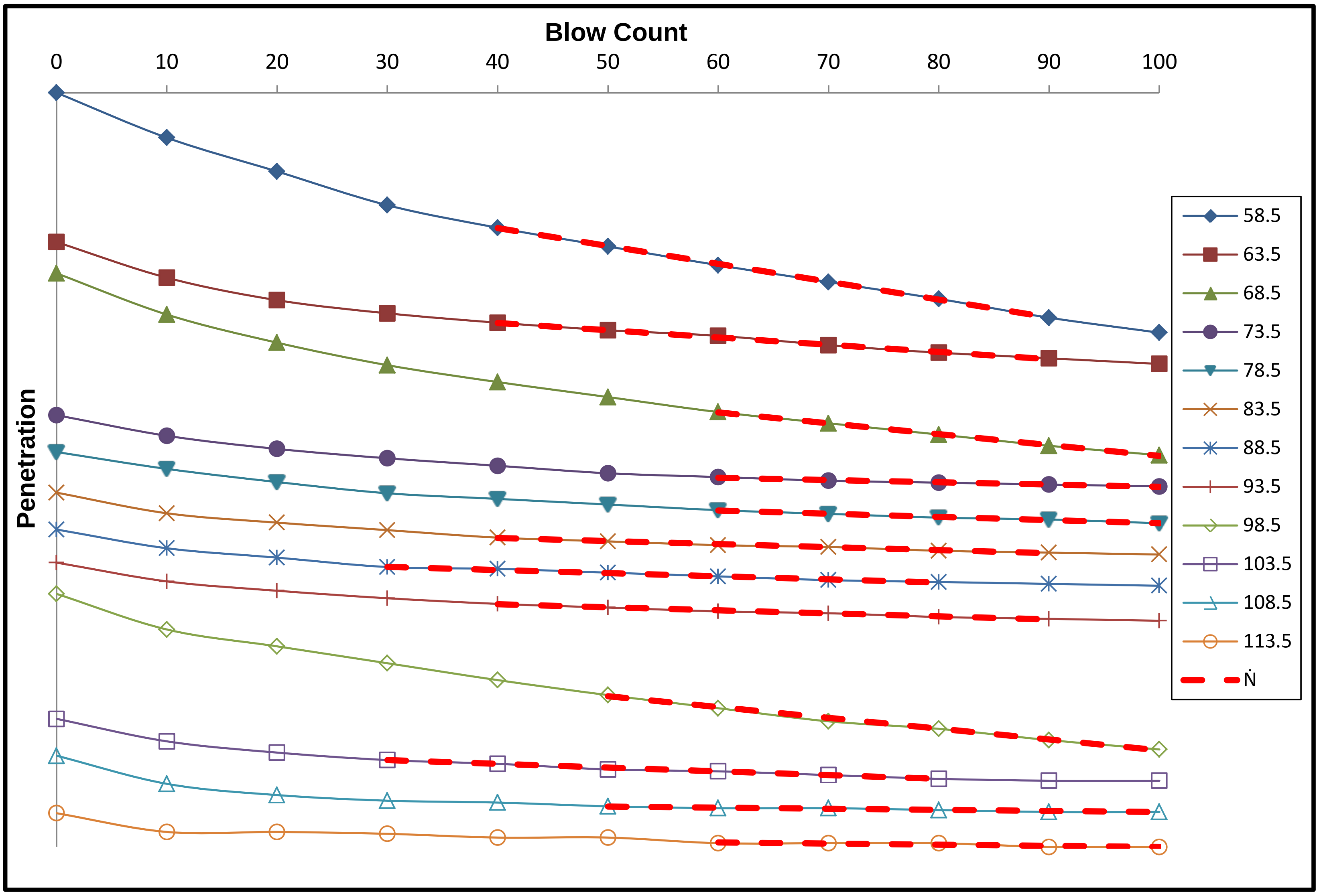
Section: (1)BR Description: Illinois River Bridge at Spring Valley

County: Bureau / Putnam Logged by: TLM Sampler Tube Length: 30 in.

Boring No.: 102 M (Pier #2) Station: 152+51.15 Offset: 10' LT Latitude: 41.3132738 Longitude: -89.1996264

	Measured Rod Length (ft)	Blows where exposed rod length is measured (blows) 0	10	20	30	40	50	60	70	80	90	100	Ṅ (bpf)	q_u (ksf)	Young's Modulus (ksi)
Test Elevation	58.50	3.24	3	2.82	2.64	***2.52***	***2.42***	2.32	***2.23***	***2.14***	***2.04***	1.96	104.9	6.6	1.57
	63.50	3.28	3.09	2.97	2.9	***2.85***	***2.81***	2.78	***2.73***	***2.69***	***2.66***	2.63	259.0	18.2	4.07
	68.50	3.28	3.06	2.91	2.79	2.7	2.62	***2.54***	***2.48***	***2.42***	***2.36***	***2.31***	172.4	11.5	2.63
	73.50	3.27	3.16	3.09	3.04	3	2.96	***2.94***	***2.92***	***2.91***	***2.9***	***2.89***	833.3	67.2	18.60
	78.50	3.29	3.2	3.13	3.07	3.04	3.01	***2.98***	***2.96***	***2.94***	***2.93***	***2.91***	588.2	45.5	11.13
	83.50	2.9	2.79	2.74	2.7	***2.66***	***2.64***	2.62	***2.61***	***2.59***	***2.58***	2.57	618.7	48.2	11.97
	88.50	2.92	2.82	2.77	***2.72***	2.71	***2.69***	***2.67***	***2.65***	***2.64***	2.63	2.62	601.6	46.7	11.50
	93.50	2.95	2.85	2.8	2.76	***2.73***	***2.71***	2.69	***2.68***	***2.66***	***2.65***	2.64	618.7	48.2	11.97
	98.50	2.99	2.8	2.71	2.62	2.53	***2.45***	***2.38***	2.31	***2.27***	***2.21***	***2.16***	173.4	11.6	2.66
	103.50	3	2.88	2.82	***2.78***	***2.76***	2.73	***2.72***	***2.7***	***2.68***	2.67	2.67	500.0	37.9	8.89
	108.50	3	2.85	2.79	2.76	2.75	***2.73***	***2.72***	***2.72***	***2.71***	2.7	***2.7***	1721	151.5	102.38
	113.50	3.06	2.96	2.96	2.95	2.93	2.93	***2.9***	***2.9***	***2.9***	***2.88***	***2.88***	1667	146.1	88.34

Note: "***Values***" indicates data used to calculate **Ṅ**.



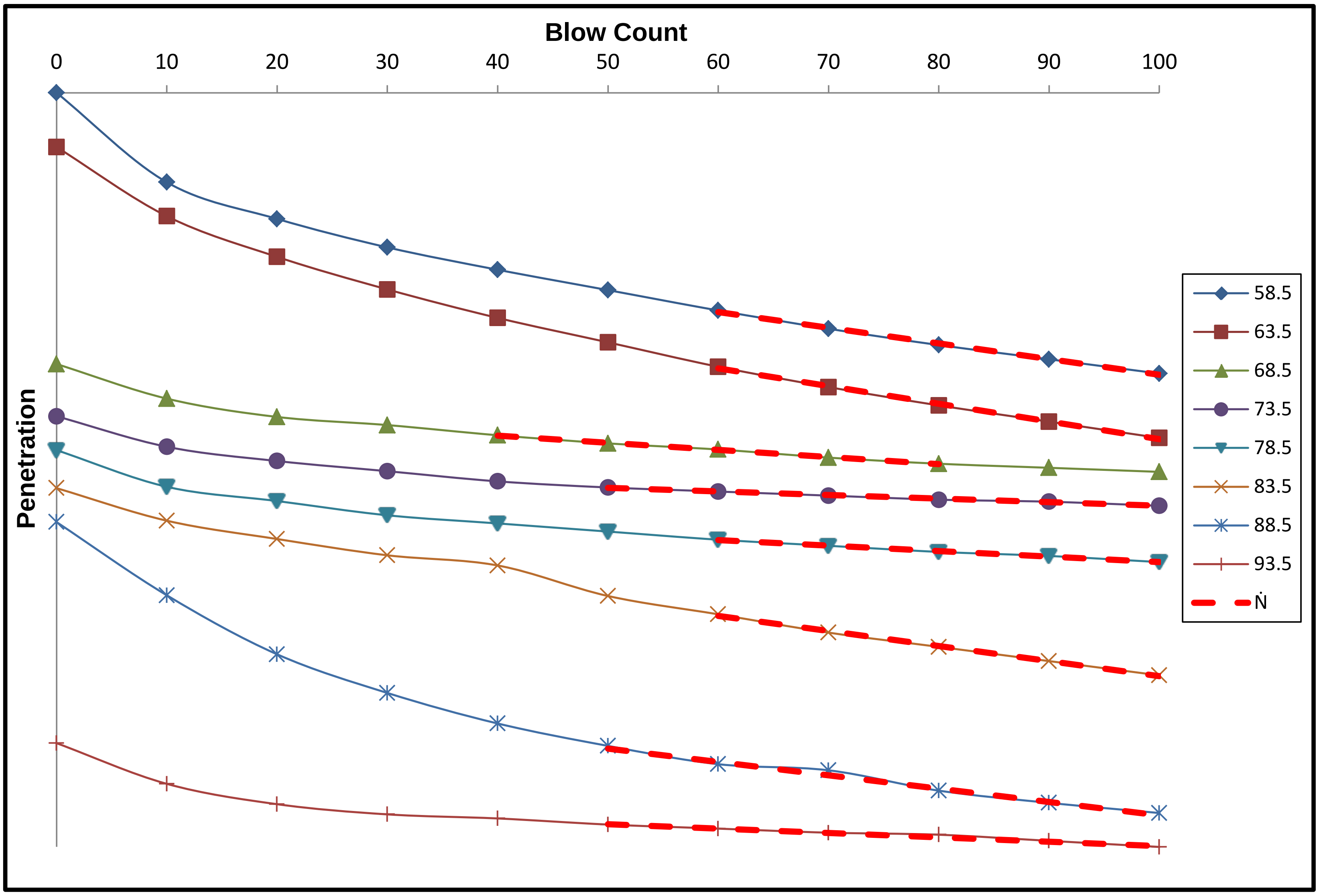
Modified SPT Log

Illinois Department of Transportation

Route: IL 89 (FAP 698) Structure No.: 078-0006 (Exist.) 078-0047 (Prop.) Date: 5/21/14 Page: 1 of 1
Section: (1) BR Description: Illinois 89 over Illinois River at Spring Valley
County: Putnam / Bureau Logged by: TLM Sampler Tube Length: 30 in.
Boring No.: 103 M (Pier #3) Station: 155+19.3 Offset: 3' LT Latitude: 41.3125453 Longitude: -89.1996188

	Measured Rod Length (ft)	Blows where exposed rod length is measured (blows)											Ṅ (bpf)	q_u (ksf)	Young's Modulus (ksi)
		0	10	20	30	40	50	60	70	80	90	100			
Test Elevation	58.50	3.2	2.76	2.58	2.44	2.33	2.23	***2.13***	***2.04***	***1.96***	***1.89***	***1.82***	129.9	8.4	1.96
	63.50	3.32	2.98	2.78	2.62	2.48	2.36	***2.24***	***2.14***	***2.05***	***1.97***	***1.89***	114.9	7.3	1.73
	68.50	3.14	2.97	2.88	2.84	***2.79***	***2.75***	***2.72***	***2.68***	***2.65***	2.63	2.61	285.7	20.3	4.53
	73.50	3.11	2.96	2.89	2.84	2.79	***2.76***	***2.74***	***2.72***	2.7	***2.69***	***2.67***	569.5	43.9	10.64
	78.50	3.28	3.1	3.03	2.96	2.92	2.88	***2.84***	***2.81***	***2.78***	***2.76***	***2.73***	370.4	27.1	6.09
	83.50	3.26	3.1	3.01	2.93	2.88	2.73	***2.64***	***2.55***	***2.48***	***2.41***	***2.34***	135.1	8.8	2.05
	88.50	3.08	2.72	2.43	2.24	2.09	***1.98***	***1.89***	1.86	***1.76***	***1.7***	***1.65***	152.5	10.0	2.31
	93.50	3.27	3.07	2.97	2.92	2.9	***2.87***	***2.85***	***2.83***	2.82	***2.79***	***2.76***	464.9	35.0	8.09

Note: "***Values***" indicates data used to calculate Ṅ.



Illinois Department of Transportation

Modified SPT Log

Route: IL 89 (FAP 698) Structure No.: 078-0006 (Exist.) 078-0047 (Prop.) Date: 5/28/14 Page: 1 of 1

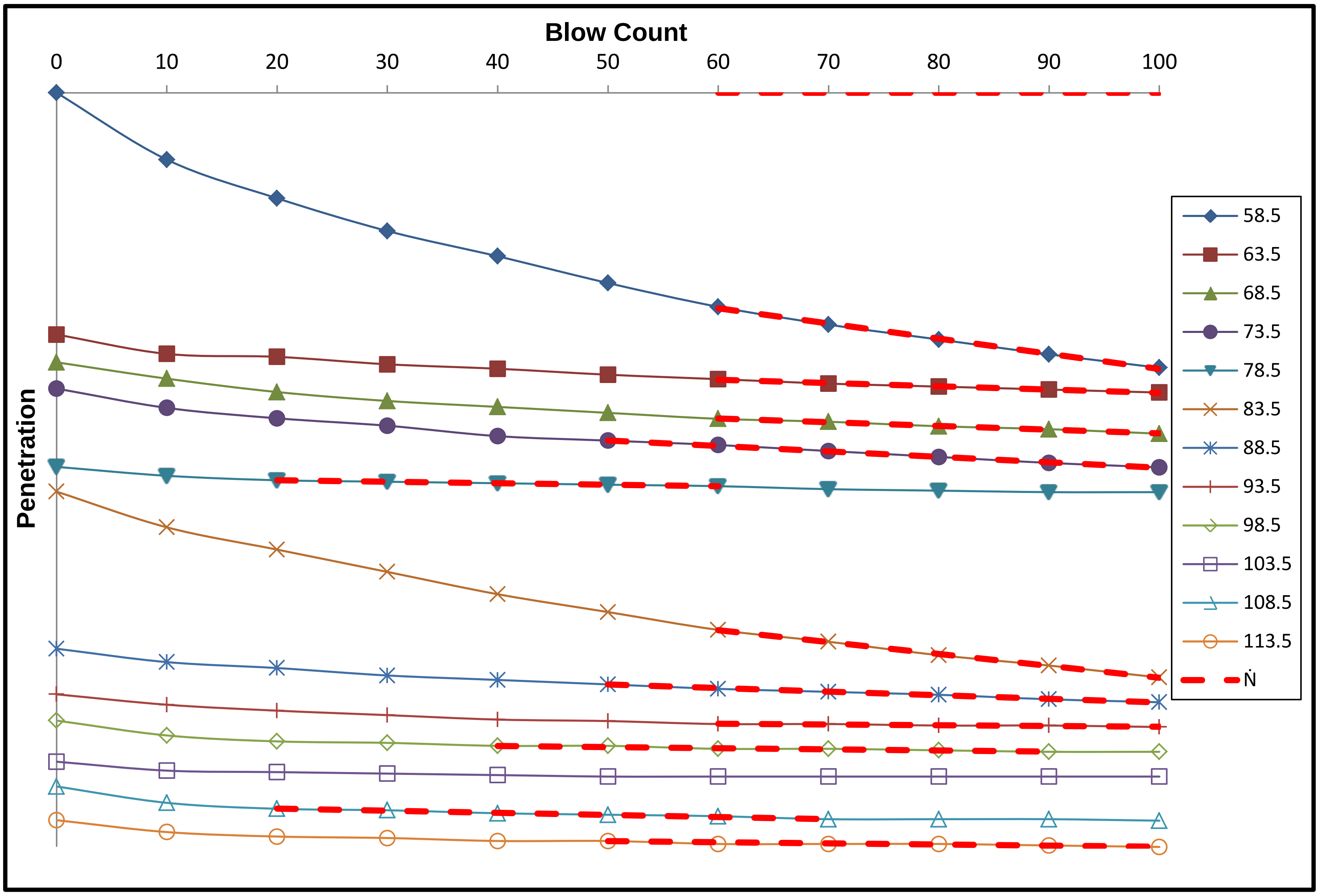
Section: (1) BR Description: Illinois 89 over Illinois River at Spring Valley

County: Putnam / Bureau Logged by: TLM Sampler Tube Length: 30 in.

Boring No.: 104 M (Pier #4) Station: 158+28.37 Offset: 16' RT Latitude: 41.3115511 Longitude: -89.199651

	Measured Rod Length (ft)	Blows where exposed rod length is measured (blows)											Ṅ (bpf)	q_u (ksf)	Young's Modulus (ksi)
		0	10	20	30	40	50	60	70	80	90	100			
Test Elevation	58.50	2.78	2.33	2.07	1.85	1.68	1.5	***1.34***	***1.22***	***1.12***	***1.02***	***0.93***	98.0	6.1	1.46
	63.50	2.73	2.6	2.58	2.53	2.5	2.46	***2.43***	***2.4***	***2.38***	***2.36***	***2.34***	454.5	34.1	7.85
	68.50	2.88	2.77	2.68	2.62	2.58	2.54	***2.5***	***2.48***	***2.45***	***2.43***	***2.4***	400.0	29.6	6.70
	73.50	2.9	2.77	2.7	2.65	2.58	***2.55***	2.52	***2.48***	***2.44***	***2.4***	***2.37***	273.1	19.3	4.31
	78.50	2.85	2.79	***2.76***	***2.75***	***2.74***	***2.73***	***2.72***	2.7	2.69	2.68	2.68	1000	82.5	24.73
	83.50	2.89	2.65	2.5	2.35	2.2	2.08	***1.96***	***1.88***	***1.79***	***1.72***	***1.64***	125.0	8.0	1.89
	88.50	2.98	2.89	2.85	2.8	2.77	***2.74***	2.71	***2.69***	***2.67***	***2.64***	***2.62***	413.4	30.7	6.97
	93.50	2.92	2.85	2.81	2.78	2.75	2.74	***2.72***	***2.72***	***2.71***	***2.71***	***2.7***	2000	179.2	230.31
	98.50	2.98	2.88	2.84	2.83	***2.81***	2.81	***2.79***	***2.79***	***2.78***	***2.77***	2.77	1321	112.7	41.47
	103.50	3.01	2.95	2.94	2.93	2.92	2.91	***2.91***	***2.91***	***2.91***	***2.91***	***2.91***	####	####	#DIV/0!
	108.50	3.06	2.95	***2.91***	***2.9***	***2.88***	***2.87***	2.86	***2.84***	2.84	2.84	2.83	704.8	55.7	14.46
	113.50	3.12	3.04	3.01	3	2.98	***2.98***	2.96	***2.96***	***2.96***	***2.95***	***2.94***	1321	112.7	41.47

Note: "***Values***" indicates data used to calculate **Ṅ**.



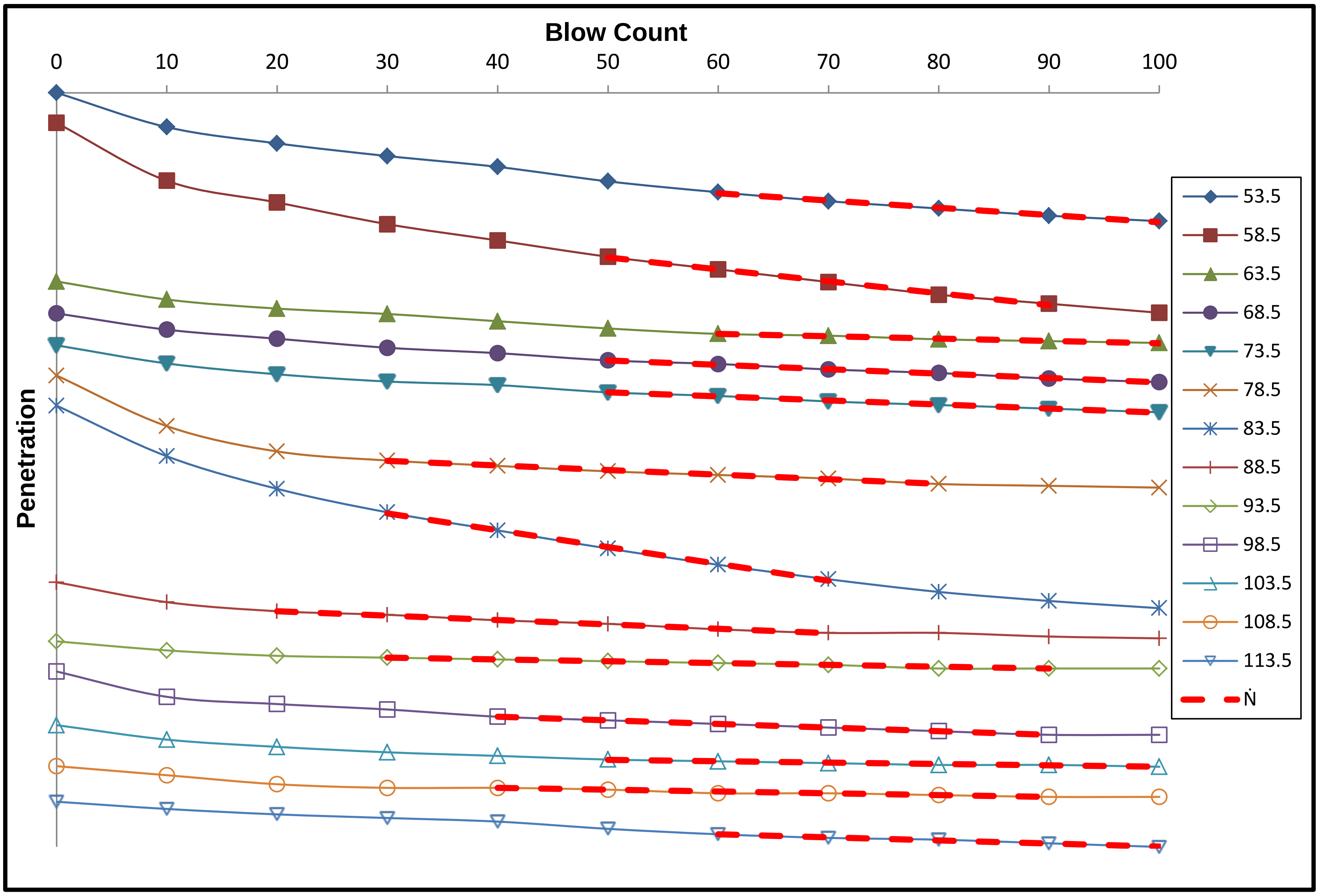
Illinois Department of Transportation

Modified SPT Log

Route: IL 89 (FAP 698) Structure No.: 078-0006 (Exist.) 078-0047 (Prop.) Date: 5/6/14 Page: 1 of 1
Section: (1) BR Description: Illinois 89 over Illinois River at Spring Valley
County: Putnam / Bureau Logged by: TLM Sampler Tube Length: 30 in.
Boring No.: 105 M (Pier #5) Station: 161+52.78 Offset: 6.5' RT Latitude: 41.310784 Longitude: -89.19965

	Measured Rod Length (ft)	Blows where exposed rod length is measured (blows)											Ṅ (bpf)	q_u (ksf)	Young's Modulus (ksi)
		0	10	20	30	40	50	60	70	80	90	100			
Test Elevation	53.50	2.54	2.35	2.26	2.19	2.13	2.05	***1.99***	***1.94***	***1.9***	***1.86***	***1.83***	250.0	17.5	3.92
	58.50	2.53	2.21	2.09	1.97	1.88	***1.79***	***1.72***	***1.65***	***1.58***	***1.53***	1.48	151.5	10.0	2.30
	63.50	2.55	2.45	2.4	2.37	2.33	2.29	***2.26***	***2.25***	***2.23***	***2.22***	***2.21***	769.2	61.5	16.50
	68.50	2.57	2.48	2.43	2.38	2.35	***2.31***	2.29	***2.26***	***2.24***	***2.21***	***2.19***	413.4	30.7	6.97
	73.50	2.56	2.46	2.4	2.36	2.34	***2.3***	***2.28***	2.25	***2.23***	***2.21***	***2.19***	445.6	33.4	7.67
	78.50	2.46	2.18	2.04	***1.99***	***1.96***	1.93	***1.91***	***1.89***	***1.86***	1.85	1.84	394.5	29.1	6.57
	83.50	2.52	2.24	2.06	***1.93***	***1.83***	***1.73***	***1.64***	***1.56***	1.49	1.44	1.4	107.5	6.8	1.61
	88.50	2.51	2.4	***2.35***	2.33	***2.3***	***2.28***	***2.25***	***2.23***	2.23	2.21	2.2	413.4	30.7	6.97
	93.50	2.51	2.46	2.43	***2.42***	***2.41***	***2.4***	***2.39***	***2.38***	2.36	***2.36***	2.36	1000	82.5	24.73
	98.50	2.55	2.41	2.37	2.34	***2.3***	***2.28***	2.26	***2.24***	***2.22***	***2.2***	2.2	500.0	37.9	8.89
	103.50	2.45	2.37	2.33	2.3	2.28	***2.26***	***2.25***	***2.24***	2.23	***2.23***	***2.22***	1323	112.8	41.55
	108.50	2.57	2.52	2.47	2.45	***2.45***	***2.44***	2.42	***2.42***	***2.41***	***2.4***	2.4	1000	82.5	24.73
	113.50	3.38	3.34	3.31	3.29	3.27	3.23	***3.2***	***3.18***	***3.17***	***3.15***	***3.13***	588.2	45.5	11.13

Note: "***Values***" indicates data used to calculate Ṅ.



Illinois Department of Transportation

Modified SPT Log

Route: IL 89 (FAP 698) Structure No.: 078-0006 (Exist.) 078-0047 (Prop.) Date: 5/2/14 Page: 1 of 1

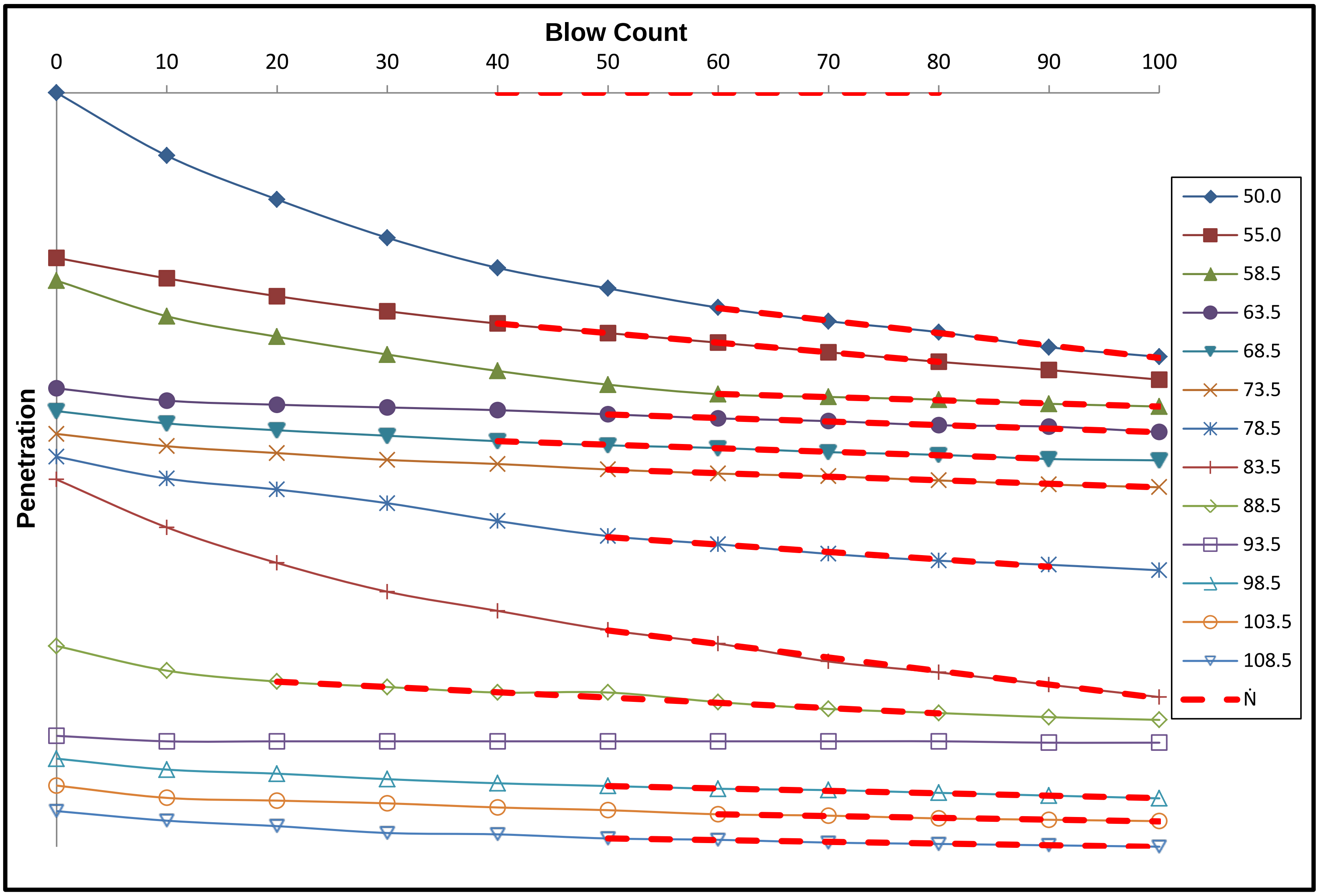
Section: (1) BR Description: Illinois 89 over Illinois River at Spring Valley

County: Putnam / Bureau Logged by: TLM Sampler Tube Length: 30 in.

Boring No.: 106 M (Pier #6) Station: 163+03.11 Offset: 6' RT Latitude: 41.310369 Longitude: -89.199741

Test Elevation Measured Rod Length (ft)	Blows where exposed rod length is measured (blows)											Ṅ	q_u	Young's Modulus
	0	10	20	30	40	50	60	70	80	90	100	(bpf)	(ksf)	(ksi)
50.00	2	1.54	1.22	0.94	0.72	0.57	***0.43***	***0.33***	***0.25***	***0.14***	***0.07***	109.9	7.0	1.65
55.00	2.47	2.32	2.19	2.08	***1.99***	***1.92***	***1.85***	***1.78***	***1.71***	1.65	1.58	142.9	9.3	2.17
58.50	2.21	1.95	1.8	1.67	1.55	1.45	***1.38***	***1.36***	***1.34***	***1.31***	***1.29***	434.8	32.4	7.41
63.50	2.16	2.07	2.04	2.02	2	***1.97***	***1.94***	***1.92***	***1.89***	1.88	***1.84***	387.4	28.5	6.43
68.50	2.15	2.06	2.01	1.97	***1.93***	1.9	***1.88***	***1.85***	***1.83***	***1.8***	1.79	387.4	28.5	6.43
73.50	2.17	2.08	2.03	1.98	1.95	***1.91***	***1.88***	***1.86***	***1.83***	1.8	***1.78***	387.4	28.5	6.43
78.50	2.12	1.96	1.88	1.78	1.65	***1.54***	***1.48***	***1.41***	***1.36***	***1.33***	1.29	185.2	12.5	2.85
83.50	2.3	1.95	1.69	1.48	1.34	***1.2***	***1.1***	0.97	***0.89***	***0.8***	***0.71***	101.2	6.3	1.51
88.50	2.3	2.12	***2.04***	***2***	***1.96***	1.96	***1.89***	***1.84***	***1.81***	1.78	1.76	259.3	18.2	4.07
93.50	2.32	2.28	2.28	2.28	***2.28***	***2.28***	***2.28***	***2.28***	***2.28***	2.27	2.27	####	####	#DIV/0!
98.50	2.45	2.37	2.34	2.3	2.27	***2.25***	***2.23***	2.22	***2.2***	***2.18***	***2.16***	569.5	43.9	10.64
103.50	1.85	1.76	1.74	1.72	1.69	1.67	***1.64***	***1.63***	***1.61***	***1.6***	***1.59***	769.2	61.5	16.50
108.50	2.25	2.18	2.14	2.09	2.08	***2.05***	***2.04***	2.02	***2.01***	***2***	***1.99***	803.7	64.6	17.63

Note: "***Values***" indicates data used to calculate **Ṅ**.

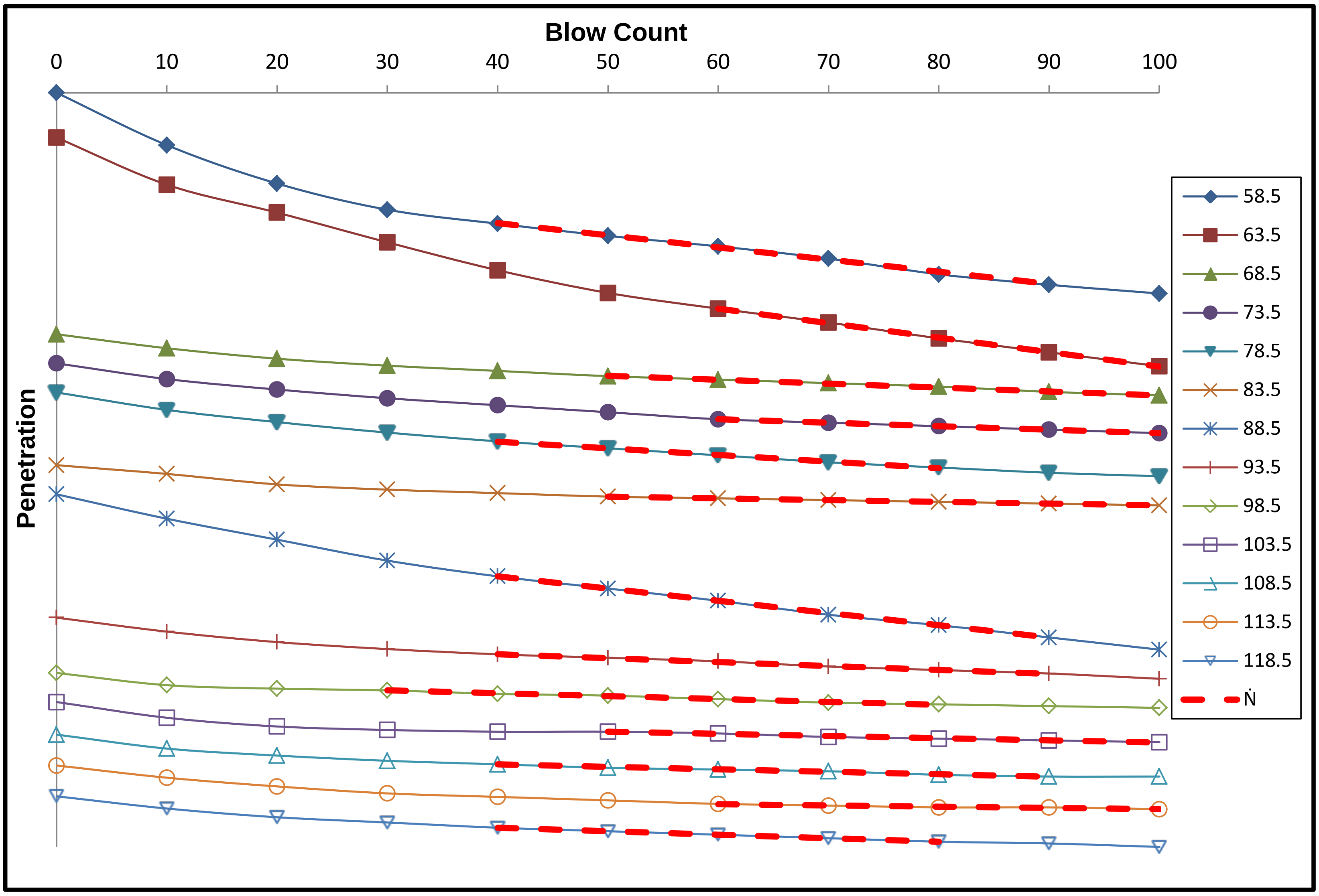


Modified SPT Log

Route: IL 89 (FAP 698) Structure No.: 078-0006 (Exist.) 078-0047 (Prop.) Date: 2/21/14 Page: 1 of 1
Section: (1) BR Description: Illinois 89 over Illinois River at Spring Valley
County: Putnam / Bureau Logged by: TLM Sampler Tube Length: 30 in.
Boring No.: 107 M (Pier #7) Station: 165+11 Offset: 12' RT Latitude: 41.309798 Longitude: -89.199685

Test Elevation	**Measured Rod Length (ft)**	Blows where exposed rod length is measured (blows)											$\dot{N}$ (bpf)	q_u (ksf)	Young's Modulus (ksi)
		0	10	20	30	40	50	60	70	80	90	100			
	58.50	2.4	2.1	1.88	1.73	***1.65***	***1.58***	***1.52***	***1.45***	1.36	***1.3***	1.25	143.7	9.4	2.18
	63.50	2.33	2.06	1.9	1.73	1.57	1.44	***1.35***	***1.27***	***1.18***	***1.1***	***1.02***	120.5	7.7	1.81
	68.50	2.34	2.26	2.2	2.16	2.13	***2.1***	***2.08***	***2.06***	2.04	***2.01***	***1.99***	445.6	33.4	7.67
	73.50	2.33	2.24	2.18	2.13	2.09	2.05	***2.01***	***1.99***	***1.97***	***1.95***	***1.93***	500.0	37.9	8.89
	78.50	2.33	2.23	2.16	2.1	***2.05***	***2.01***	***1.97***	***1.93***	***1.9***	1.87	1.85	263.2	18.5	4.13
	83.50	2.33	2.28	2.22	2.19	2.17	***2.15***	2.14	***2.13***	***2.12***	***2.11***	***2.1***	1000	82.5	24.73
	88.50	2.29	2.15	2.03	1.91	***1.82***	***1.75***	***1.68***	1.6	***1.54***	***1.47***	1.4	142.9	9.3	2.17
	93.50	2.37	2.29	2.23	2.19	***2.16***	***2.14***	2.12	***2.09***	***2.07***	***2.05***	2.02	445.6	33.4	7.67
	98.50	2.38	2.31	2.29	***2.28***	2.26	***2.25***	***2.23***	***2.21***	***2.2***	2.19	2.18	601.6	46.7	11.50
	103.50	2.35	2.26	2.21	2.19	2.18	***2.18***	***2.17***	2.15	***2.14***	***2.13***	***2.12***	803.7	64.6	17.63
	108.50	2.33	2.25	2.21	2.18	***2.16***	2.14	***2.13***	***2.12***	***2.1***	***2.09***	2.09	704.8	55.7	14.46
	113.50	2.37	2.3	2.25	2.21	2.19	2.17	***2.15***	***2.14***	***2.13***	***2.13***	***2.12***	1429	123.0	50.80
	118.50	2.33	2.26	2.21	2.18	***2.15***	***2.13***	***2.11***	***2.09***	***2.07***	2.06	2.04	500.0	37.9	8.89

Note: "***Values***" indicates data used to calculate **$\dot{N}$**.



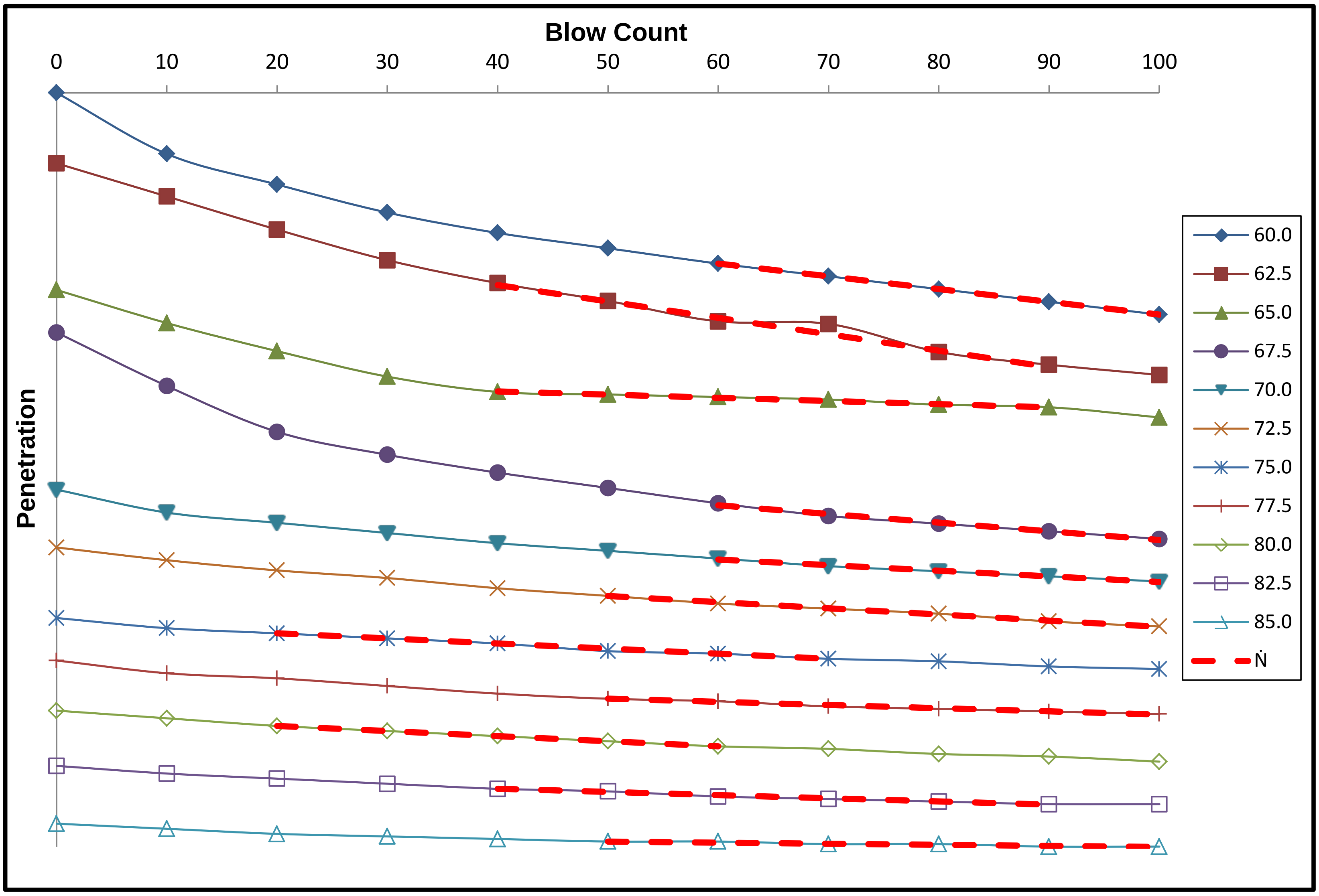
Illinois Department
of Transportation

Modified SPT Log

Route: IL 89 (FAP 698) Structure No.: 078-0006 (Exist.) 078-0047 (Prop.) Date: 8/20/14 Page: 1 of 1
Section: (1) BR Description: Illinois 89 over Illinois River at Spring Valley
County: Putnam / Bureau Logged by: TLM Sampler Tube Length: 30 in.
Boring No.: 3M (2014) Station: 150+90 Offset: 0 Latitude: 41.313703 Longitude: -89.199592

	Measured Rod Length (ft)	Blows where exposed rod length is measured (blows)											Ṅ (bpf)	q_u (ksf)	Young's Modulus (ksi)
		0	10	20	30	40	50	60	70	80	90	100			
Test Elevation	60.00	4.62	4.38	4.26	4.15	4.07	4.01	***3.95***	***3.9***	***3.85***	***3.8***	***3.75***	200.0	13.6	3.08
	62.50	2.42	2.29	2.16	2.04	***1.95***	***1.88***	***1.8***	1.79	***1.68***	***1.63***	1.59	155.5	10.3	2.38
	65.00	4.73	4.6	4.49	4.39	***4.33***	***4.32***	***4.31***	4.3	***4.28***	***4.27***	4.23	803.7	64.6	17.63
	67.50	2.43	2.22	2.04	1.95	1.88	1.82	***1.76***	***1.71***	***1.68***	***1.65***	***1.62***	294.1	20.9	4.66
	70.00	4.77	4.68	4.64	4.6	4.56	4.53	***4.5***	***4.47***	***4.45***	***4.43***	***4.41***	454.5	34.1	7.85
	72.50	2.74	2.69	2.65	2.62	2.58	***2.55***	2.52	***2.5***	***2.48***	***2.45***	***2.43***	413.4	30.7	6.97
	75.00	4.46	4.42	***4.4***	***4.38***	***4.36***	4.33	***4.32***	***4.3***	4.29	4.27	4.26	500.0	37.9	8.89
	77.50	2.75	2.7	2.68	2.65	2.62	***2.6***	***2.59***	2.57	***2.56***	***2.55***	***2.54***	803.7	64.6	17.63
	80.00	4.48	4.45	***4.42***	***4.4***	***4.38***	***4.36***	***4.34***	4.33	4.31	4.3	4.28	500.0	37.9	8.89
	82.50	2.76	2.73	2.71	2.69	***2.67***	***2.66***	2.64	***2.63***	***2.62***	***2.61***	2.61	803.7	64.6	17.63
	85.00	4.49	4.47	4.45	4.44	4.43	***4.42***	4.42	***4.41***	***4.41***	***4.4***	***4.4***	2387	218.5	714.22

Note: "***Values***" indicates data used to calculate **Ṅ**.



Illinois Department of Transportation

Division of Highways
IDOT

ROCK CORE LOG

Page 1 **of** 3

Date 12/3/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.311333, **Longitude** -89.199678

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Barrel, NX

Core Diameter 2 **in**
Top of Rock Elev. 398.05 **ft**
Begin Core Elev. 387.05 **ft**

BORING NO. B-9
Station 159+36
Offset 15.2 ft Lt.
Ground Surface Elev. 441.05 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Clayey Shale with Shells *(continued)*	386.55		1	97	24	2.3	
Dark Gray Very Weathered, Reworked Clayey Shale.	386.22	-55					
Qu = 2.0 tsf estimated by pocket penetrometer.	386.05						
Hard Light Gray Shale *	385.22						
Dark Gray Very Weathered, Reworked Blocky Gray Clayey Shale. * Qu >4.5 tsf estimated by pocket penetrometer.	384.51						
	384.05						
Dark Gray Clayey Shale (strength specimen) Thinly Bedded. * Qu >4.5 tsf estimated by pocket penetrometer.			2	96	67	5	
Very Hard Light Gray Shale (sample too short to test) *	383.05						
Dark Gray Thinly Bedded Clayey Shale. * Qu >4.5 tsf estimated by pocket penetrometer.	382.80						
Gray Very Hard Shale							4.1
Dark Gray Thinly Bedded Clay Shale *	381.05	-60					7.8
Gray Thinly Bedded Clayey (argillaceous) Shale *	377.30		3	92	39	6.57	3.5
Very Dark Gray Firm Clayey Shale *	375.47	-65					
Dark Gray Firm Shaly Clay	374.80						
Dark Gray Soft Shaly Clay - high PI	374.05						
Dark Gray Soft to Stiff Clay	372.72		4	90	23	6	
Dark Gray Thinly Bedded Shale *	371.63						1.7
Dark Gray to Black Shale/Coal *	369.05	-70					3.4
Dark Gray to Black Shale/Coal *	368.38		5	100	17	10.7	
Gray Shale *							2.2

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 2 **of** 3

Date 12/3/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.311333, **Longitude** -89.199678

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Barrel, NX

Core Diameter 2 in
Top of Rock Elev. 398.05 ft
Begin Core Elev. 387.05 ft

BORING NO. B-9
Station 159+36
Offset 15.2 ft Lt.
Ground Surface Elev. 441.05 ft

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Shale * *(continued)* 366.05	-75					
Gray Shale Sample swelled in barrel and had to be dug out. No sample for strength testing. 363.05		6	100	19	6.7	
12/05/12 Gray Shale* 358.05	-80	7	100	58		1.7 143.3 42.5 106.6 79.9 11.5
Gray Shale Thinly Bedded * 353.05	-85	8	100	60		190.8 49.0 29.5 34.6 25.2
Gray Shale, Thinly Bedded * 348.05	-90	9	100	21		198.0 77.0
Gray Shale Thinly Bedded (Sandy with Thin Silt & Clay Seams) *		10	100	30		

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

ROCK CORE LOG

Date 12/3/12

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.311333, **Longitude** -89.199678

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Barrel, NX

Core Diameter 2 in
Top of Rock Elev. 398.05 ft
Begin Core Elev. 387.05 ft

BORING NO. B-9
Station 159+36
Offset 15.2 ft Lt.
Ground Surface Elev. 441.05 ft

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Shale Thinly Bedded (Sandy with Thin Silt & Clay Seams) * *(continued)*	-95					370.1 82.8 54.0
343.05						
Gray Shale Thinly Bedded, Less Sandy then run 10 but has Thin Silted Clay Seams *		11	100	0		
	-100					
* Where core broke at bedding planes, the breaks are slightly undulating and planes are relatively smooth. Where core broke during drilling process (not across bedding planes), the breaks are rough and non-planar.						
338.05						
End of Boring						
	-105					
	-110					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 1 **of** 1

Date 8/28/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** Larry Myers

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313696, **Longitude** -89.199595

COUNTY Putnam, Bureau **CORING METHOD** Split Barrel Wire Line

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE N W/L 2

Core Diameter 1.9 **in**
Top of Rock Elev. 390.40 **ft**
Begin Core Elev. 389.90 **ft**

BORING NO. 03C (2014)
Station 150+89
Offset 3.0 ft Rt.
Ground Surface Elev. 447.90 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Thinly Bedded Argillaceous Shale	386.90	-60	1	98	95	3.4	10.7 24.0 14.0
Gray Shale	384.90						11.2 10.0
Gray Thinly Bedded Argillaceous Shale Small Limestone Gravel Pieces at 64.5'	379.90	-65	2	100	100	3.8	13.1 10.9 9.4 13.3 12.0
Dark Gray Calcareous Shale with Minor Pyrite Inclusions and Numerous Limestone Stringers up to 3" thick	374.90	-70	3	98	83	5	15.5 43.6 57.7 40.8 36.0
Dark Gray Thinly bedded Argillaceous Shale with Limestone Stringers	372.90	-75	4	95	70	3.8	
Dark Gray Calcareous Shale with Minor Pyrite Inclusions	369.90						52.0 50.9 58.1

End of Boring

Color pictures of the cores Yes

Cores will be stored for examination until Construction Complete

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 1 **of** 4

Date 5/7/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313741, **Longitude** -89.199642

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 391.50 **ft**
Begin Core Elev. 391.34 **ft**

BORING NO. 101C (Pier #1)
Station 150+71
Offset 0.5 ft Rt.
Ground Surface Elev. 449.34 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Very Soft Gray Very Weathered Shale			1	79	64	1.22	
		-60					
							17.0
							12.9
							12.3
	384.34	-65					
Dense Gray Argillaceous Shale - Micaceous			2	100	70	1.87	
							12.3
		-70					
			3	96	87	1.1	
							40.9
							39.5
Approximately 2" thick Limestone Stringer at 71.5' & 75'							
		-75					
							49.9

ROCK CORE 078-0006.GPJ IL_DOT.GDT 4/3/15

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

ROCK CORE LOG

Page 2 **of** 4

Date 5/7/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313741, **Longitude** -89.199642

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 391.50 **ft**
Begin Core Elev. 391.34 **ft**

BORING NO. 101C (Pier #1)
Station 150+71
Offset 0.5 ft Rt.
Ground Surface Elev. 449.34 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Dense Gray Argillaceous Shale - Micaceous *(continued)*							63.7
Gray Argillaceous Shale	369.34	-80					
Dense Gray Silty Shale			4	100	54	0.98	
							34.2
							59.2
	365.34						
Dense Dark Gray Argillaceous Shale							16.8
	364.34	-85					
Coal						1.07	
							145.3
	360.14						
Under Clay		-90					
			5	98	65	2.01	
							1.8
							4.2
	354.34	-95					
Gray Argillaceous Shale with Limestone Inclusions (Stringers) approximately 2" thick and spaced approximately 18" apart						1.71	20.6
							22.1

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 5/7/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313741, **Longitude** -89.199642

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 391.50 **ft**
Begin Core Elev. 391.34 **ft**

BORING NO. 101C (Pier #1)
Station 150+71
Offset 0.5 ft Rt.
Ground Surface Elev. 449.34 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Argillaceous Shale with Limestone Inclusions (Stringers) approximately 2" thick and spaced approximately 18" apart *(continued)*							
		-100					16.0
	348.84		6	100	99	1.45	
Very Dense Gray Argillaceous Shale with Limestone Interclasts							
							11.2
							191.9
							148.6
		-105					
						1.13	
							69.6
							66.8
		-110					
			7	100	95	1.15	
							55.7
							69.7
	335.34						
Very Dense Gray Sandy Shale with Limestone Stringer between 118.9' & 119.1'							74.5
		-115					
						1.11	
							77.9
							102.6

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

ROCK CORE 078-0006.GPJ IL_DOT.GDT 4/3/15

ROCK CORE LOG

Date 5/7/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.313741, **Longitude** -89.199642

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 391.50 **ft**
Begin Core Elev. 391.34 **ft**

BORING NO. 101C (Pier #1)
Station 150+71
Offset 0.5 ft Rt.
Ground Surface Elev. 449.34 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Very Dense Gray Sandy Shale with Limestone Stringer between 118.9' & 119.1' *(continued)*						80.0
329.34	-120					
End of Boring						
	-125					
	-130					
	-135					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 1 **of** 3

Date 5/22/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3132738, **Longitude** -89.1996264

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 404.20 **ft**
Begin Core Elev. 404.20 **ft**

BORING NO. 102C (Pier #2)
Station 152+60.99
Offset 3.8 ft Lt.
Ground Surface Elev. 453.20 **ft**

	DEPTH (ft)	**CORE (#)**	**RECOVERY (%)**	**R.Q.D. (%)**	**CORE TIME (min/ft)**	**STRENGTH (tsf)**
Fractured Limestone Stringers in Gray Shale Formation Ground Surface Elevation = Barge Deck Elevation Shale Stringer as thick as 10" washed away during coring 400.70	-50	1	41	10	3.19	
Gray Shale with Hard Fractured Limestone Stringers. Shale washed or wore away during coring operation. 392.20	-55 -60	2	7	0	2.4	
5/23/2014 Gray Argillaceous Shale Note: No time was recorded for Core Run #3		3	100	100		23.9 19.0
	-65	4	91	78	1.54 1.65	26.9 25.7 17.4

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 5/22/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3132738, **Longitude** -89.1996264

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.) **CORING BARREL TYPE & SIZE** Solid Double Barrel, NWD-4
Station 157+02.28 (Prop.)

Core Diameter 2 **in**
Top of Rock Elev. 404.20 **ft**
Begin Core Elev. 404.20 **ft**

BORING NO. 102C (Pier #2)
Station 152+60.99
Offset 3.8 ft Lt.
Ground Surface Elev. 453.20 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
5/23/2014 Gray Argillaceous Shale	-70					
Note: No time was recorded for Core Run #3 *(continued)*						
						13.6
		5	89	73	1.55	
	-75					46.3
						48.7
						49.9
						78.2
					1.36	
	-80					
						73.7
Note: No time was recorded for Core Run #6		6	100	74		
	-85					
						61.0
						72.8
364.20						

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 5/22/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3132738, **Longitude** -89.1996264

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 102C (Pier #2)
Station 152+60.99
Offset 3.8 ft Lt.
Ground Surface Elev. 453.20 ft

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 in
Top of Rock Elev. 404.20 ft
Begin Core Elev. 404.20 ft

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Black Shale	363.95						
Coal		-90					84.3
			7	100	58	1.43	
	359.20						
Gray Underclay		-95					9.4
							17.3
	355.40						
Gray Argillaceous Shale with Limestone Interclasts		-100					
			8	100	74	1.28	3.5
		-105					
	346.50						
Very Dense Light Gray Shale							170.1
	345.20						
Light Gray Argillaceous Shale with Limestone Interclasts	344.85						
End of Boring							

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 1 **of** 3

Date 5/23/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3125453, **Longitude** -89.1996188

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 394.94 **ft**
Begin Core Elev. 389.44 **ft**

BORING NO. 103C (Pier #3)
Station 155+10.04
Offset 6.2 ft Rt.
Ground Surface Elev. 452.44 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Very Weathered Shale with Limestone Stringer. Shale is Argillaceous, Blocky and Broken into many pieces. With such low recovery and the condition of the core sample it is impossible to say what depth the Limestone Stringer exists. The thickness of the Limestone is < 2".		1	40	0	2.83	
Ground Surface Elevation = Barge Deck Elevation	-65					
	-70					
379.44						
Gray Argillaceous Shale, less Weathering than run #1, with Limestone Stringers and Interclasts.		2	99	84	1.73	
						25.6
	-75					
						28.2 30.6
						29.2
	-80					
						40.4

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 5/23/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**, **Latitude** 41.3125453, **Longitude** -89.1996188

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 394.94 **ft**
Begin Core Elev. 389.44 **ft**

BORING NO. 103C (Pier #3)
Station 155+10.04
Offset 6.2 ft Rt.
Ground Surface Elev. 452.44 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
	368.94		3	54	9	2.22	
Coal	365.44	-85					
Very Stiff to Hard Gray Under Clay	364.44						
The locations of the Coal and Under Clay are estimated due to the poor recovery but it is believed the material in this area was washed away during drilling.	360.44	-90					
Gray Argillaceous Shale to Claystone with Limestone Interclasts	358.44		4	100	0	3	
Gray Sandy Shale with Limestone Interclasts to Thin Limestone Stringers, very little material in joints	350.44	-95 -100	5	100	83	1.32 1.2	108.1 10.3 40.5 36.4 55.8
Dense Gray Shale with Limestone Interclasts, Micaceous			6	100	86	1.19	

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 5/23/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** SE 1/4, **SEC.** 3, **TWP.** 15N, **RNG.** 11E, 4th **PM**,
Latitude 41.3125453, **Longitude** -89.1996188

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 394.94 **ft**
Begin Core Elev. 389.44 **ft**

BORING NO. 103C (Pier #3)
Station 155+10.04
Offset 6.2 ft Rt.
Ground Surface Elev. 452.44 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Dense Gray Shale with Limestone Interclasts, Micaceous *(continued)*						23.0
	-105					42.9
344.44						69.8
Very Sandy Shale, Micaceous. Very little material in joints. Very near Sandstone but divides in thin chips.						83.7
	-110					89.2
		7	100	73	1.2	
						75.7
337.44	-115					
Dense Light Gray Shale, Silty						48.9
						64.2
	-120					36.9
330.44						
End of Boring						

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

ROCK CORE LOG

Date 5/28/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.3116003, **Longitude** -89.1997082

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 394.35 **ft**
Begin Core Elev. 390.19 **ft**

BORING NO. 104C (Pier #4)
Station 158+79.88
Offset 6.4 ft Lt.
Ground Surface Elev. 450.19 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Weathered Argillaceous Shale		1	100	36	1.78	
Ground Surface Elevation = Barge Deck Elevation						
						8.9
384.99	-65					7.1
Dark Gray Weathered Argillaceous Shale		2	100	93	1.82	
						54.9
382.19						
Dark Gray Argillaceous Shale						46.8
	-70					
					1.6	42.0
						47.2
	-75					45.8
		3	98	50	1.02	30.1
						22.1
370.49	-80					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 2 of 4

Date 5/28/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.3116003, **Longitude** -89.1997082

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 104C (Pier #4)
Station 158+79.88
Offset 6.4 ft Lt.
Ground Surface Elev. 450.19 ft

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 in
Top of Rock Elev. 394.35 ft
Begin Core Elev. 390.19 ft

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Coal *(continued)*						11.1
						97.4
365.89						
Light Gray Under Clay	-85					
364.89						
Light Gray Claystone		4	96	70	1.44	
						4.7
						8.2
360.19	-90					
Light Gray Claystone with Limestone Interclasts					1.23	5.6
358.19						
Light Gray Sandy Shale, Micaceous						16.1
						34.5
	-95					
		5	100	77	0.87	
						164.5
						51.3
	-100					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 5/28/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.3116003, **Longitude** -89.1997082

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 394.35 **ft**
Begin Core Elev. 390.19 **ft**

BORING NO. 104C (Pier #4)
Station 158+79.88
Offset 6.4 ft Lt.
Ground Surface Elev. 450.19 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Light Gray Sandy Shale, Micaceous *(continued)*					0.91	17.7
346.19						
Gray Sandy Shale (Has appearence of Sandstone but splits into thin chips) Limestone Stringers @ 104.2' to 105.3'						150.9
	-105					60.2
		6	100	81	0.9	
At 106.5' the strength of the specimen exceeded the capacity of the loading frame.						
Note: 20 ft of steel casing was left in the bore hole. It separated from the rest and could not be retrieved. It is estimated to be 1 +/- ft below the streambed to 20 +/- ft below the streambed.						43.1
341.19						
Gray Sandy to Silty Shale	-110					
					0.95	57.4
						70.6
						58.7
335.19	-115					
Gray Silty Shale		7	96	70	1.2	
						55.2
332.44						
Limestone Stringer						35.4
331.69						
Dark Gray to Black Argillaceous Shale						166.4
	-120					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 5/28/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.3116003, **Longitude** -89.1997082

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 in
Top of Rock Elev. 394.35 ft
Begin Core Elev. 390.19 ft

BORING NO. 104C (Pier #4)
Station 158+79.88
Offset 6.4 ft Lt.
Ground Surface Elev. 450.19 ft

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
329.69						
End of Boring						
	-125					
	-130					
	-135					
	-140					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 1 of 4

Date 5/5/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310788, **Longitude** -89.199623

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 400.54 **ft**
Begin Core Elev. 393.54 **ft**

BORING NO. 105C (Pier #5)
Station 161+52.78
Offset 0.0 ft
Ground Surface Elev. 448.54 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Soft Gray Shale, Dense Gray Fine to Medium Sand washed into barrel		1	10	10	3.39	
389.04						
Gray Shale, (Argillaceous)	-60					
Note: Encountered very hard piece of Shale that either was at the top of the run and prevented the Shale from entering the barrel or at the bottom of the run and the Shale in the barrel washed away during coring.		2	2	0	2.7	
383.54	-65					
Gray Shale (Argillaceous) with 2" thick Limestone Stringers at 67.5' and 69.3' depths		3	95	91	1.1	
						38.0
						43.3
	-70				1.1	44.6
						47.1
373.54	-75					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 5/5/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310788, **Longitude** -89.199623

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 400.54 **ft**
Begin Core Elev. 393.54 **ft**

BORING NO. 105C (Pier #5)
Station 161+52.78
Offset 0.0 ft
Ground Surface Elev. 448.54 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Shale, Slightly Micaceous with Pyritic Interclasts			4	100	69	1	
							58.4
							52.0
		-80					
	368.04					1.1	27.3
Coal							
							89.2
	364.44						7.8
Dark Gray Under Clay							
	363.54	-85					
Limestone Stringer			5	100	88	1.5	149.4
	362.84						
Gray Claystone with Limestone Interclasts							
							2.2
		-90					
						2.1	5.8
							3.4
Limestone Stringer at 94.5' to 95'	353.54	-95					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 5/5/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310788, **Longitude** -89.199623

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 400.54 **ft**
Begin Core Elev. 393.54 **ft**

BORING NO. 105C (Pier #5)
Station 161+52.78
Offset 0.0 ft
Ground Surface Elev. 448.54 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Limestone	352.64		6	100	91	1.2	183.2
Gray Shale	350.34						
Limestone	349.94						101.2
Gray Shale	343.54	-100 -105					31.3 40.6 67.6
Gray Sandy Shale (Joints approximately 2mm)	342.04		7	97	59	1.1	
Limestone (Joints < 1mm)	340.54						
Gray Sandy Shale, Micaceous	339.54						29.0
Gray Sandy Shale, Micaceous with thin Limestone Partings	333.54	-110 -115					29.0 62.6

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 4 **of** 4

Date 5/5/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.310788, **Longitude** -89.199623

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 105C (Pier #5)
Station 161+52.78
Offset 0.0 ft
Ground Surface Elev. 448.54 **ft**

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 400.54 **ft**
Begin Core Elev. 393.54 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Sandy Shale	332.54		8	100	57	1.1	
Gray Shale Argillaceous	332.34						
Limestone Stringer	332.14						64.8
Gray Shale Argillaceous							199.2
		-120					101.2
	326.79						
Limestone Stringer	326.54						67.5
Black Clayey Shale with approximately 2" Layer of Coal	325.04						
Gray Shale Argillaceous	323.54	-125					
End of Boring							
		-130					
		-135					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 1 **of** 4

Date 4/30/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.31038, **Longitude** -89.199685

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 106C (Pier #6)
Station 163+03.11
Offset 0.0 ft
Ground Surface Elev. 450.50 **ft**

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 400.50 **ft**
Begin Core Elev. 400.50 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Clay to Shale (Argillaceous) 398.00		1	15	0	1.59	
Gray Shale (Argillaceous)	-55					
	-60	2	83	60	1.57	13.1 12.0 8.7 9.6 9.8
	-65	3	88	80	1.96	8.9 10.1
	-70	4	100	94	1.66	29.1 38.9 43.2 41.0

ROCK CORE 078-0006.GPJ IL_DOT.GDT 4/3/15

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

ROCK CORE LOG

Date 4/30/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.31038, **Longitude** -89.199685

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

BORING NO. 106C (Pier #6)
Station 163+03.11
Offset 0.0 ft
Ground Surface Elev. 450.50 ft

Core Diameter 2 in
Top of Rock Elev. 400.50 ft
Begin Core Elev. 400.50 ft

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
						1.59	
							31.4
							53.0
							25.6
		-75					33.0
Gray Shale (Argillaceous but Slightly Sandy)			5	89	76	1.61	48.5
							17.7
							16.1
							8.0
							8.0
							5.8
	370.50	-80					
Coal			6	96	23	1.22	
	366.50						65.3
Under Clay 6"	366.00						
Soft (Possibly still the underclay) Gray Shale (Argillaceous)		-85					
Core # 7-9 occurred on May 1, 2014.			7	98	74	2.07	
Dense Gray Shale (Argillaceous)							
Sample stuck in core barrel. Many breaks in the sample occurred during removal from the core barrel.							
							2.7
		-90					2.8

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 4/30/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.31038, **Longitude** -89.199685

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 400.50 **ft**
Begin Core Elev. 400.50 **ft**

BORING NO. 106C (Pier #6)
Station 163+03.11
Offset 0.0 ft
Ground Surface Elev. 450.50 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Dense Dark Gray Clay to Claystone, Possible Underclay (Argillaceous) 357.70					1.81	2.7
Gray Very Dense Sandy & Silty Shale (Possible Sandstone with very fine grains - Not likely the St. Peter Sandstone formation.) At 94.0' and 94.8' the strength of the specimen exeeded the capacity of the loading frame. 355.50	-95					
Dense Gray Sandy Silty Shale 347.50	-100	8	99	92	1.14	154.7 8.8 48.2 10.4 24.5 16.1 19.7
Dense Clay to Claystone, Thin bedding planes indicative of Shale are not present. Sample breaks unevenly across the core. 346.50						43.0
Dense Gray Sandy Silty Shale 345.50	-105					22.2
Dense Gray Sandy Silty Shale Limestone Inclusions @ 108' & 109'	-110	9	100	83	1.2	45.8 88.9 79.9

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

ROCK CORE LOG

Page 4 **of** 4

Date 4/30/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.31038, **Longitude** -89.199685

COUNTY Putnam, Bureau **CORING METHOD** Wire Line

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Solid Double Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 400.50 **ft**
Begin Core Elev. 400.50 **ft**

BORING NO. 106C (Pier #6)
Station 163+03.11
Offset 0.0 ft
Ground Surface Elev. 450.50 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
340.10						
End of Boring						
	-115					
	-120					
	-125					
	-130					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 2/18/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309811, **Longitude** -89.199693

COUNTY Putnam, Bureau **CORING METHOD** Standard

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Split Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 394.50 **ft**
Begin Core Elev. 392.00 **ft**

BORING NO. 107C (Pier #7)
Station 165+10
Offset 8.0 ft Rt.
Ground Surface Elev. 451.50 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray Very Weathered Shale	392.00	-60	1	84	63	4	
	390.00						
Gray Dense Weathered Shale							9.3
		-65	2	92	62	3.6	
	386.00						
Dark Gray Dense Weathered Shale	384.00						
Dark Gray Very Dense Weathered Shale	383.87						
Dark Gray Dense Weathered Shale	383.00						
Dark Gray Very Dense Weathered Shale	382.79						13.7
Dark Gray Dense Weathered Shale	382.00						
Dark Gray Dense Weathered Friable Shale		-70	3	98	8	3.9	
							7.9
		-75					
			4	81	65	2.7	7.9
	372.00						

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 2/18/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**,
Latitude 41.309811, **Longitude** -89.199693

COUNTY Putnam, Bureau **CORING METHOD** Standard

STRUCT. NO. 078-0047 (Prop.)
078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Split Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 394.50 **ft**
Begin Core Elev. 392.00 **ft**

BORING NO. 107C (Pier #7)
Station 165+10
Offset 8.0 ft Rt.
Ground Surface Elev. 451.50 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
The top 2' of Run 4 was Lost. Dark Gray Dense Shale 367.90	-80					
Black Coal 363.15	-85					9.2
Dark Gray Underclay 362.00		5	100	30	5.5	
Dense Gray Argillaceous Shale - Friable 361.00	-90					
Dense Gray Shale to Claystone - Core Runs 5-9 performed February 19, 2014						4.0
352.00	-95	6	100	69	4.5	225.3

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)
BBS, form 138 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Page 3 **of** 4

Date 2/18/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309811, **Longitude** -89.199693

COUNTY Putnam, Bureau **CORING METHOD** Standard

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

CORING BARREL TYPE & SIZE Split Barrel, NWD-4

Core Diameter 2 **in**
Top of Rock Elev. 394.50 **ft**
Begin Core Elev. 392.00 **ft**

BORING NO. 107C (Pier #7)
Station 165+10
Offset 8.0 ft Rt.
Ground Surface Elev. 451.50 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Very Dense Gray Slightly Micaceous Shale with Limestone Stringers & Interclasts	-100	7	100	100	2.8	
						58.4
	-105	8	84	66	3.4	
Very Dense Gray Shale						
						84.1
	-110	9	100	75	2.5	
339.50						
Gray Dense Fractured Sandstone						
338.30						
Very Dense Gray Shale with thin layers of higher Sand content to Sandstone (layers less than 1")						49.1
	-115					
332.70						130.7
Dense Dark Gray Shale (Argillaceous)						

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)
BBS, form 138 (Rev. 8-99)

ROCK CORE 078-0006.GPJ IL_DOT.GDT 4/3/15

Illinois Department of Transportation
Division of Highways
IDOT

ROCK CORE LOG

Date 2/18/14

ROUTE IL 89 (FAP 698) **DESCRIPTION** IL 89 over Illinois River at Spring Valley **LOGGED BY** TLM

SECTION (1)BR **LOCATION** West 1/2, **SEC.** 23, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** 41.309811, **Longitude** -89.199693

COUNTY Putnam, Bureau **CORING METHOD** Standard

STRUCT. NO. 078-0047 (Prop.) 078-0006 (Exist.)
Station 157+02.28 (Prop.)

BORING NO. 107C (Pier #7)
Station 165+10
Offset 8.0 ft Rt.
Ground Surface Elev. 451.50 ft

CORING BARREL TYPE & SIZE Split Barrel, NWD-4

Core Diameter 2 in
Top of Rock Elev. 394.50 ft
Begin Core Elev. 392.00 ft

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
End of Boring 331.80	-120					
	-125					
	-130					
	-135					

Color pictures of the cores Yes
Cores will be stored for examination until Construction Complete
The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

APPENDIX

G

Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation, District 3

SOIL BORING LOG

Page 1 **of** 1

Date 12/2/96

ROUTE IL 89 **DESCRIPTION** 078-C801 Existing Boat Club Entrance over a Creek **LOGGED BY** K. Whittington

SECTION 2-BR&2B-1 **LOCATION** NW 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** , **Longitude**

COUNTY Putnam **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 078-2005 (Prop.) 078-C801 (Exist.)
Station 15+55 (Prop.)

BORING NO. 1 (E. Abut.)
Station 15+78
Offset 24.0 ft Rt.*
Ground Surface Elev. 458.47 **ft**

Surface Water Elev. ______ **ft**
Stream Bed Elev. 453.22 **ft**

Groundwater Elev.:
First Encounter 447.5 **ft** ▼
Upon Completion ______ **ft**
After ___ **Hrs.** ______ **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Brown Sand & Gravel Fill				
455.97				
Loose Brown Sand & Gravel		2		
454.97		3		13
Very Soft Brown Silty Loam to Sandy Loam		2	<0.2	17
			P	
	-5			
		1		
		2	<0.2	18
		2	P	
451.47				
Very Soft Brown Silty Clay Loam				
		1		
		2	<0.2	24
		2	P	
	-10			
		1		
447.47 ▼		1	0.1	20
Loose Brown Sand & Gravel * 3 Blows / 22 inches		1*	P	20
446.47				
Very Soft Brown Silty Loam				
		wh		
wh = weight of hammer		1	0.1	24
		1	P	
	-15			
		wh		
		1	0.1	25
		1	P	
441.47				
		3		
		5		16
		8		
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Free Water		3		
		3		15
Loose Brown Sand & Gravel		8		
* During Design, the Boat Club Entrance was relocated further North. Therefore the offset from Centerline of the Boat Club Entrance increased from that shown on the original logs. *(continued)*				
	-25			
		5		
		2		
431.97		-		
End of Boring				
	-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 LOG

Page 1 **of** 2

Date 1/8/97

ROUTE IL 89 **DESCRIPTION** 078-C801 Existing Boat Club Entrance over a Creek **LOGGED BY** K. Whittington

SECTION 2-BR&2B-1 **LOCATION** NE 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** , **Longitude**

COUNTY Putnam **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 078-2005 (Prop.)
078-C801 (Exist.)
Station 15+55 (Prop.)

BORING NO. 2 (W. Abut.)
Station 15+19
Offset 23.0 ft Rt*
Ground Surface Elev. 461.16 ft

Surface Water Elev. ft
Stream Bed Elev. 453.22 ft

Groundwater Elev.:
First Encounter 446.2 ft ▼
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Shoulder Gravel & Brown Loam				
458.66				
Medium Brown Loam to Sandy Loam Fill		3		
		2	0.9	16
457.16		2	P	
Loose Brown Sand & Gravel				
	-5			
		2		
455.16		2		5
Soft to Medium Brown Loam		2	0.5	16
			P	
		1		
		1	0.5	16
		2	S	
451.66				
Loose Sand & Gravel	-10			
		4		
		5		7
449.66		4		
Very Soft Brown Loam with Gravel Pebbles & Wet Sand Layers				
		1		
		1	0.3	20
		2	S	
	▼ -15			
		1		
		2	0.1	26
		1	P	
444.16				
Very Soft Brown Silty Loam to Loam		wh		
wh = weight of hammer		wh	0.1	23
		wh	B	
	-20			

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Soft Brown Silty Loam to Loam		wh		
		wh	0.1	22
wh = weight of hammer *(continued)*		wh	B	
438.16		wh		22
Loose Sand & Coarse Gravel		9		
		4		14
Free Water				
	-25			
		4		
* During Design, the Boat Club Entrance was relocated further North. Therefore the offset from Centerline of the Boat Club Entrance increased from that shown on the original logs.		4		
		4		
		-		
		1/12"		19
		1		
431.66				
Loose Brown Silt	-30			
		2		
		5		22
429.66		5		
Medium Brown Sand & Coarse Angular Gravel				
		6		
		10		11
		8		
	-35			
		4		
		4		14
		2		
424.16				
Very Soft Gray Silt		wh		
wh = weight of hammer		wh		27
		2		
421.66				
	-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
Illinois Department of Transportation, District 3

SOIL BORING LOG

Date 1/8/97

ROUTE IL 89 **DESCRIPTION** 078-C801 Existing Boat Club Entrance over a Creek **LOGGED BY** K. Whittington

SECTION 2-BR&2B-1 **LOCATION** NE 1/4, **SEC.** 26, **TWP.** 33N, **RNG.** 1W, 3rd **PM**, **Latitude** , **Longitude**

COUNTY Putnam **DRILLING METHOD** Hollow Stem Auger **HAMMER TYPE**

STRUCT. NO. 078-2005 (Prop.) 078-C801 (Exist.)
Station 15+55 (Prop.)

BORING NO. 2 (W. Abut.)
Station 15+19
Offset 23.0 ft Rt*
Ground Surface Elev. 461.16 **ft**

Surface Water Elev. ft
Stream Bed Elev. 453.22 ft

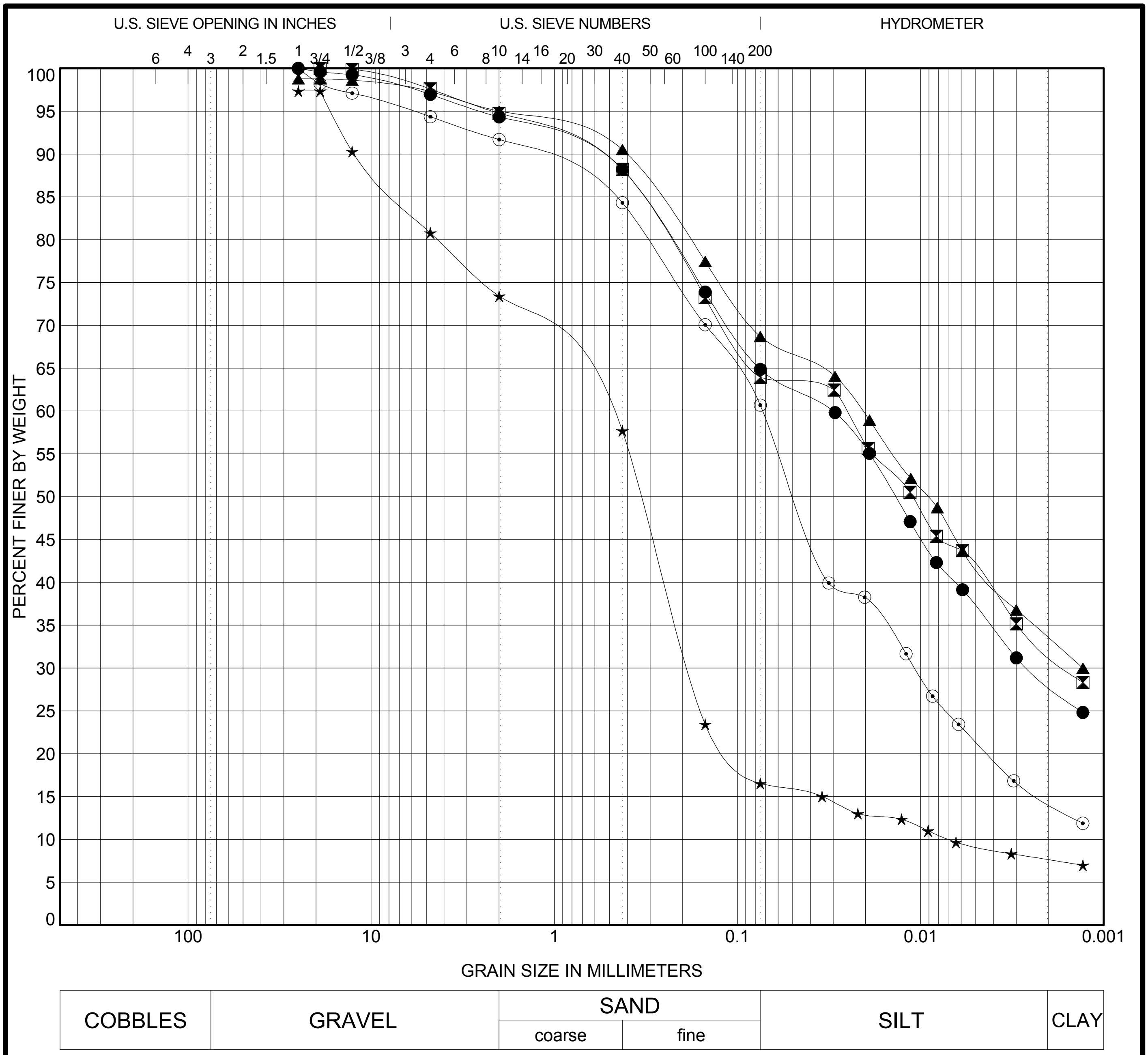
Groundwater Elev.:
First Encounter 446.2 ft ▼
Upon Completion ft
After Hrs. ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Very Soft Gray Silt to Fine Sand with some Clay wh = weight of hammer *(continued)*		1 2 1	<0.1 P	22
	-45	wh wh wh	<0.1 P	23
414.16				
Medium Sand to Coarse Gravel	-50	5 8 15		
409.66				
End of Boring	-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)

APPENDIX

H



Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	**01 (2014)**	**5.00**	**A-6 (4) CLAY LOAM**	**23.8**	**12.5**	**11.3**		
⧗	**02 (2014)**	**2.50**	**A-4 (3) CLAY**	**21.3**	**12.1**	**9.2**		
▲	**02 (2014)**	**12.00**	**A-6 (5) CLAY**	**25.2**	**13.6**	**11.6**		
★	**LB-01**	**2.50**	**SAND**				**8.98**	**76.17**
⊙	**LB-02**	**1.00**	**A-4 (2) LOAM**	**20.8**	**12.4**	**8.4**		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**01 (2014)**	**5.00**	**25**	**0.03**	**0.003**		**5.7**	**29.5**	**36.8**	**28.1**
⧗	**02 (2014)**	**2.50**	**19**	**0.025**	**0.002**		**5.2**	**30.8**	**32.1**	**31.8**
▲	**02 (2014)**	**12.00**	**25**	**0.021**	**0.001**		**3.8**	**26.3**	**35.2**	**33.5**
★	**LB-01**	**2.50**	**25**	**0.533**	**0.183**	**0.007**	**23.9**	**56.9**	**8.9**	**7.6**
⊙	**LB-02**	**1.00**	**25**	**0.073**	**0.011**		**8.3**	**31.0**	**46.4**	**14.3**

Illinois Department of Transportation

Division of Highways
IDOT

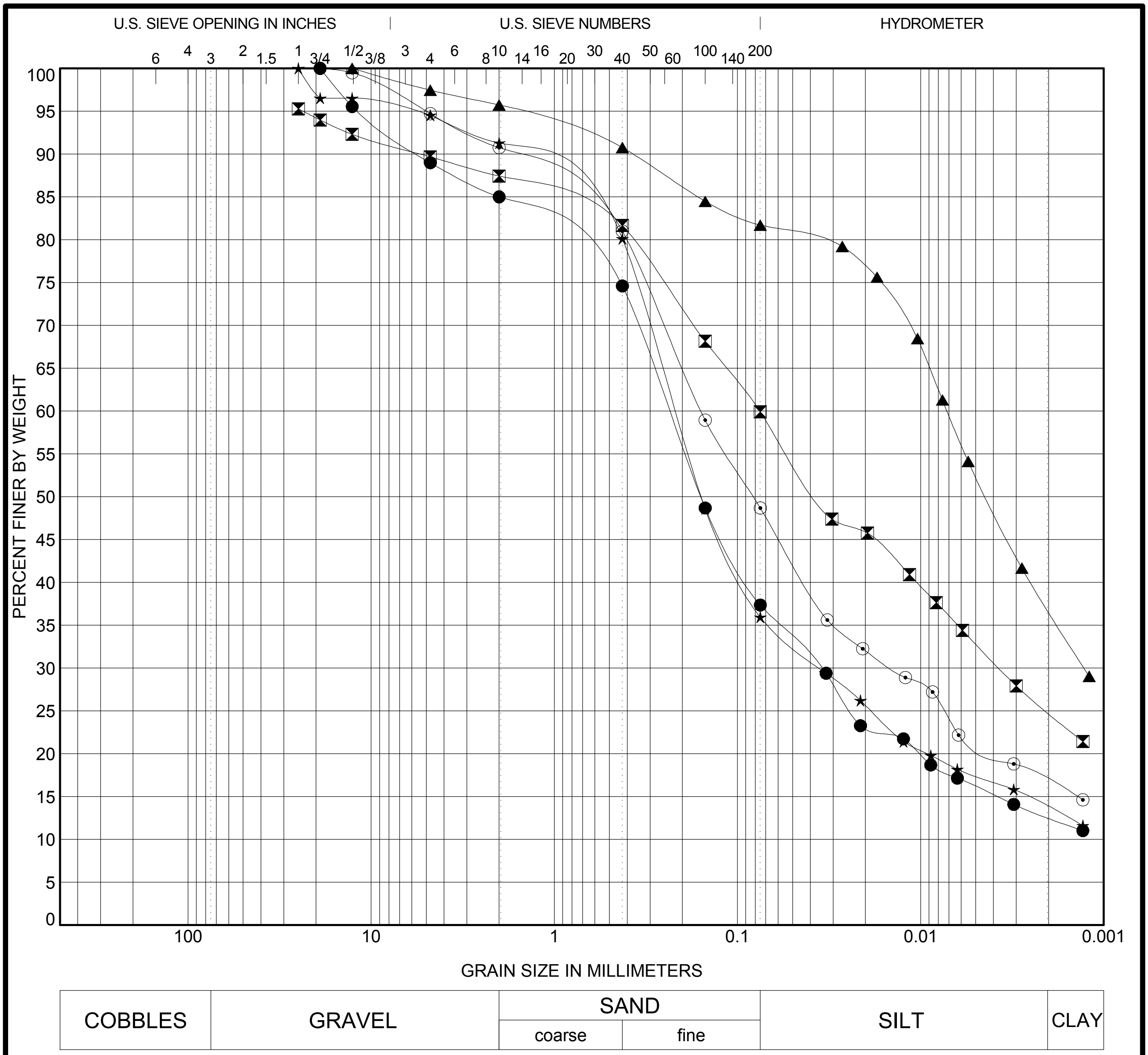
IDH GRAIN SIZE DISTRIBUTION

Route: IL 89 (FAP 698)

Section: (1)BR

County: Putnam, Bureau

GRAIN SIZE IDH 3-18-11 078-0006.GPJ IL_DOT.GDT 4/8/15



	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**LB-02**	**4.00**	**A-4 (0) SANDY LOAM**	**17.1**	**14.9**	**2.2**		
⧗	**LB-03**	**1.00**	**A-4 (1) CLAY LOAM**	**19.3**	**12.1**	**7.2**		
▲	**LB-03**	**4.00**	**A-6 (14) CLAY**	**34.8**	**16.8**	**18.0**		
★	**LB-03**	**6.00**	**A-4 (0) SANDY LOAM**	**16.7**	**15.9**	**0.8**		
⊙	**LB-03**	**10.00**	**A-4 (0) SANDY LOAM**	**21.5**	**15.7**	**5.8**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LB-02**	**4.00**	**19**	**0.236**	**0.035**		**15.0**	**47.6**	**24.8**	**12.5**
⧗	**LB-03**	**1.00**	**25**	**0.076**	**0.004**		**7.9**	**27.5**	**35.1**	**24.8**
▲	**LB-03**	**4.00**	**12.7**	**0.007**	**0.001**		**4.3**	**14.0**	**45.1**	**36.6**
★	**LB-03**	**6.00**	**25**	**0.219**	**0.036**		**8.7**	**55.3**	**22.2**	**13.7**
⊙	**LB-03**	**10.00**	**19**	**0.158**	**0.014**		**9.3**	**42.1**	**32.0**	**16.7**

Illinois Department of Transportation

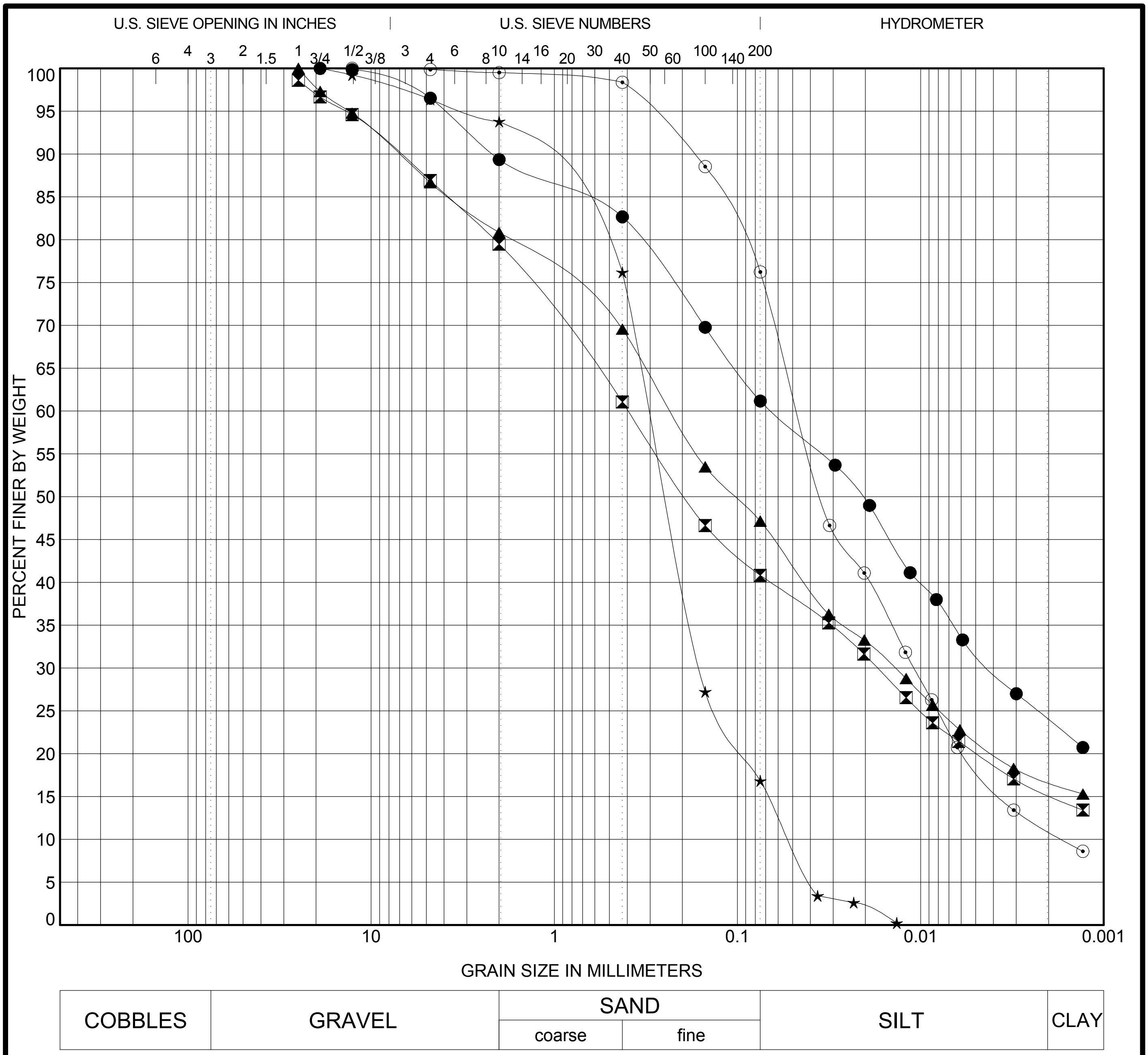
Division of Highways
IDOT

IDH GRAIN SIZE DISTRIBUTION

Route: IL 89 (FAP 698)

Section: (1)BR

County: Putnam, Bureau



Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	**LB-04**	**1.00**	**A-4 (1) CLAY LOAM**	**19.3**	**12.4**	**6.9**		
⧗	**LB-04**	**11.50**	**A-4 (0) SANDY LOAM**	**24.4**	**15.1**	**9.3**		
▲	**LB-05**	**1.00**	**A-4 (1) SANDY LOAM**	**27.7**	**18.7**	**9.0**		
★	**LB-06**	**2.50**	**SAND**				**1.62**	**5.79**
⊙	**LB-06**	**25.00**	**A-4 (5) SILTY LOAM**	**22.7**	**13.5**	**9.2**	**1.51**	**27.82**

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LB-04**	**1.00**	**19**	**0.065**	**0.004**		**10.6**	**28.2**	**37.2**	**24.0**
⧗	**LB-04**	**11.50**	**25**	**0.394**	**0.017**		**19.1**	**38.7**	**25.6**	**15.2**
▲	**LB-05**	**1.00**	**25**	**0.229**	**0.014**		**19.2**	**33.7**	**30.4**	**16.8**
★	**LB-06**	**2.50**	**19**	**0.301**	**0.159**	**0.052**	**6.2**	**77.0**		
⊙	**LB-06**	**25.00**	**12.7**	**0.047**	**0.011**	**0.002**	**0.5**	**23.3**	**65.2**	**11.0**

Illinois Department of Transportation

Division of Highways
IDOT

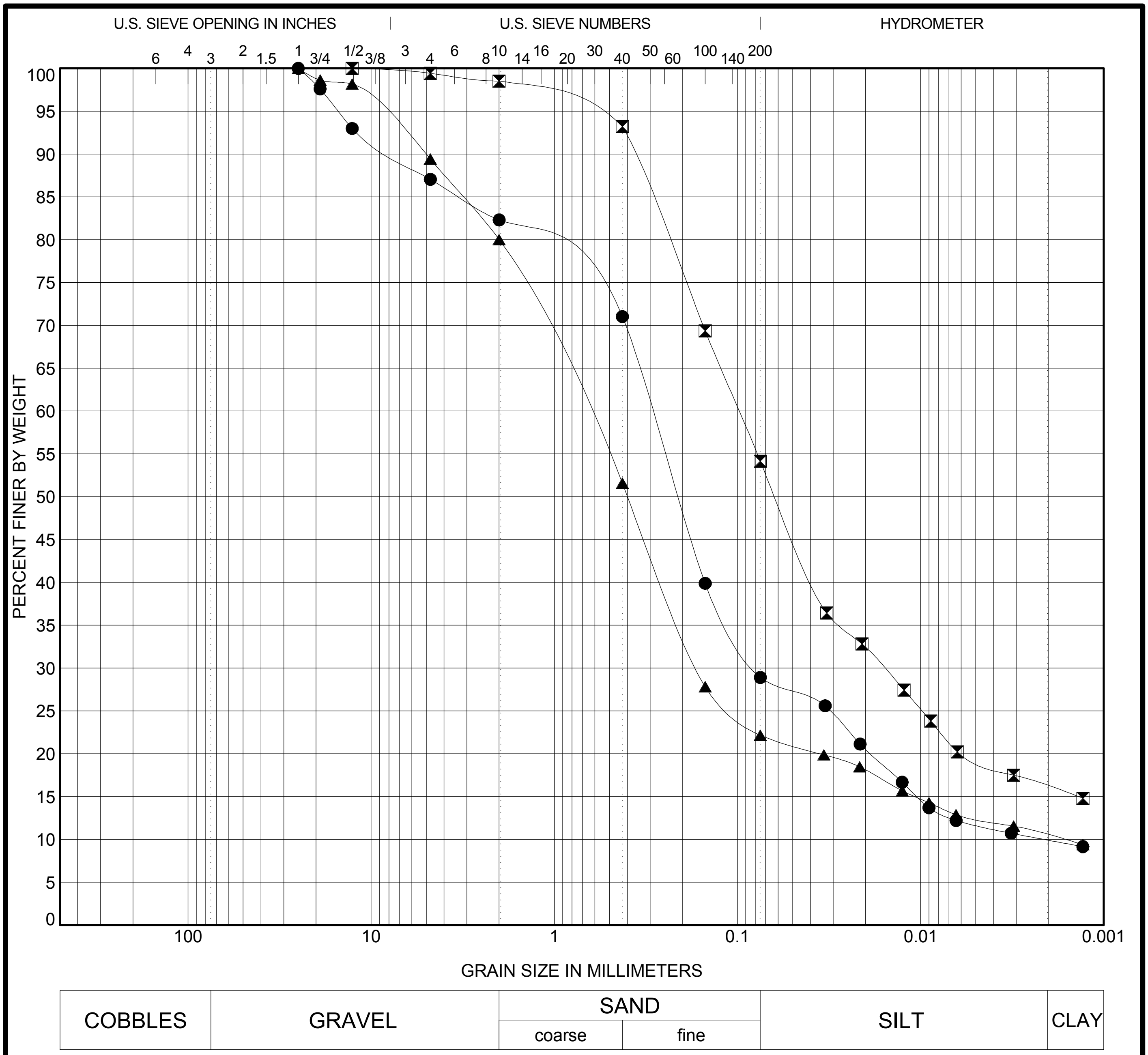
IDH GRAIN SIZE DISTRIBUTION

Route: IL 89 (FAP 698)

Section: (1)BR

County: Putnam, Bureau

GRAIN SIZE IDH 3-18-11 078-0006.GPJ IL DOT.GDT 4/8/15



Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	**LB-10**	**0.50**	**A-2-4 (0) SANDY LOAM**	**14.9**	**14.1**	**0.8**	**10.37**	**138.59**
⧗	**LB-11**	**0.00**	**A-4 (0) LOAM**	**19.9**	**16.3**	**3.6**		
▲	**LB-11**	**3.00**	**A-2-4 (0) SANDY LOAM**	**15.5**	**14.9**	**0.6**	**24.25**	**402.19**

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**LB-10**	**0.50**	**25**	**0.294**	**0.08**	**0.002**	**17.7**	**53.4**	**19.0**	**9.9**
⧗	**LB-11**	**0.00**	**12.7**	**0.098**	**0.016**		**1.5**	**44.4**	**38.0**	**16.1**
▲	**LB-11**	**3.00**	**25**	**0.672**	**0.165**	**0.002**	**20.0**	**57.9**	**11.7**	**10.4**

Illinois Department of Transportation

Division of Highways
IDOT

IDH GRAIN SIZE DISTRIBUTION

Route: IL 89 (FAP 698)

Section: (1)BR

County: Putnam, Bureau

GRAIN SIZE IDH 3-18-11 078-0006.GPJ IL DOT.GDT 4/8/15

APPENDIX

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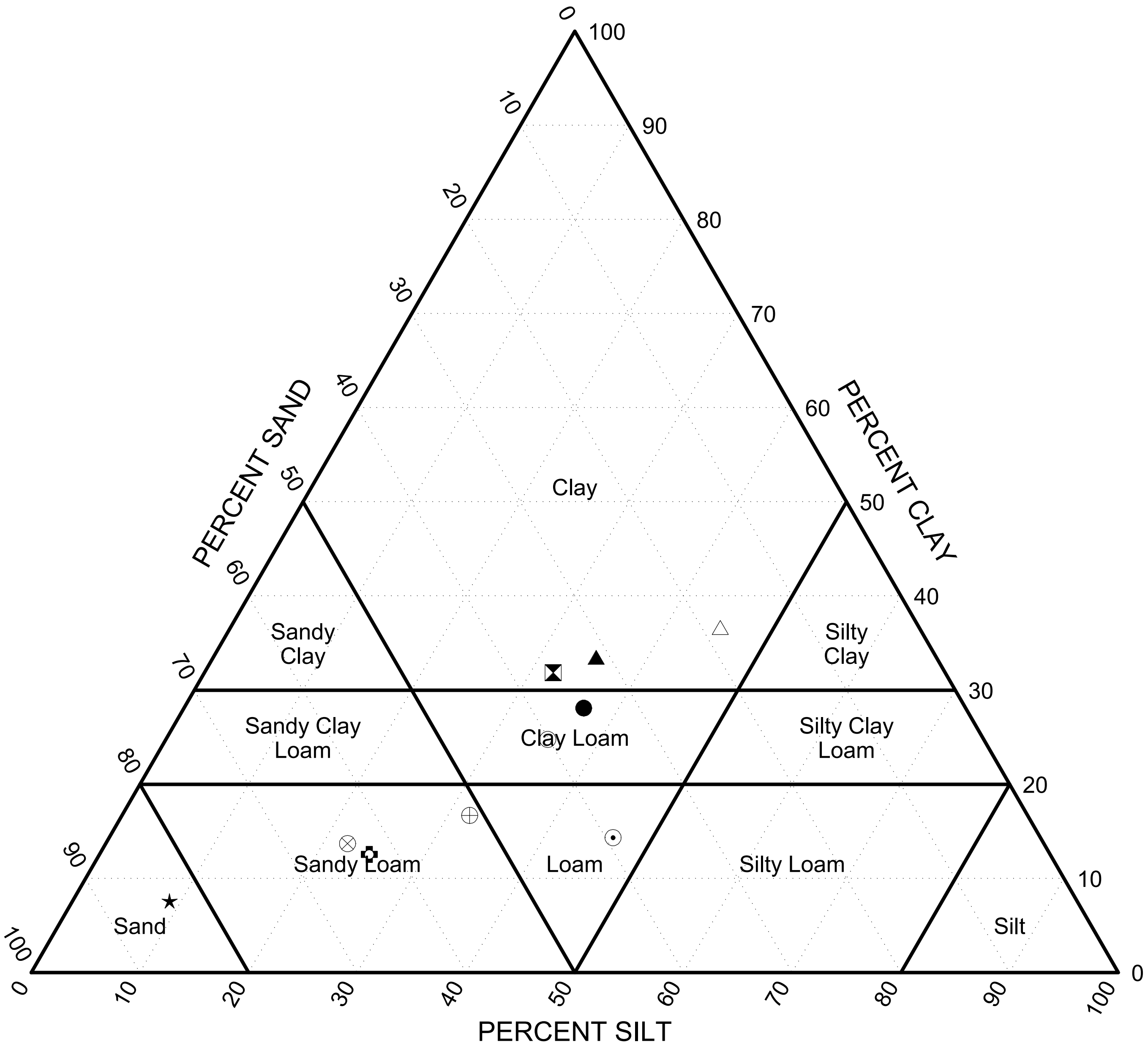


	Borehole	Station	Offset	Depth (ft)	Classification
●	**01 (2014)**	**167+20**	**38.00 ft Rt.**	**5.00**	**A-6 (4) CLAY LOAM**
⧗	**02 (2014)**	**148+31**	**37.00 ft Rt.**	**2.50**	**A-4 (3) CLAY**
▲	**02 (2014)**	**148+31**	**37.00 ft Rt.**	**12.00**	**A-6 (5) CLAY**
★	**LB-01**	**179+00 (Prop.)**	**15.00 ft Lt.**	**2.50**	**SAND**
⊙	**LB-02**	**176+00 (Prop.)**	**10.00 ft Lt.**	**1.00**	**A-4 (2) LOAM**
✤	**LB-02**	**176+00 (Prop.)**	**10.00 ft Lt.**	**4.00**	**A-4 (0) SANDY LOAM**
○	**LB-03**	**173+00 (Prop.)**	**3.00 ft Rt.**	**1.00**	**A-4 (1) CLAY LOAM**
△	**LB-03**	**173+00 (Prop.)**	**3.00 ft Rt.**	**4.00**	**A-6 (14) CLAY**
⊗	**LB-03**	**173+00 (Prop.)**	**3.00 ft Rt.**	**6.00**	**A-4 (0) SANDY LOAM**
⊕	**LB-03**	**173+00 (Prop.)**	**3.00 ft Rt.**	**10.00**	**A-4 (0) SANDY LOAM**

Illinois Department of Transportation
Division of Highways
IDOT

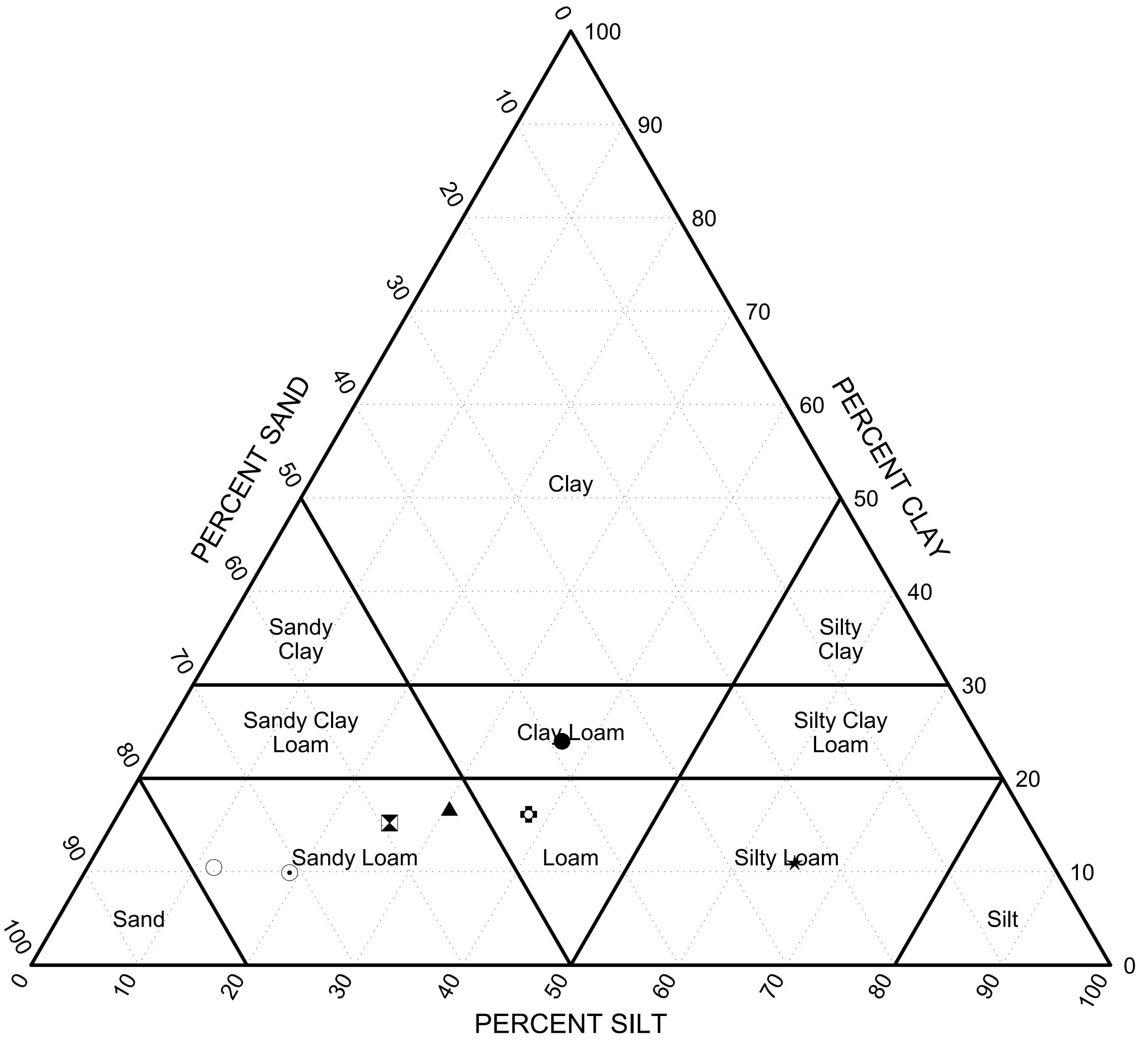
IDH Textural Classification Chart

Route: IL 89 (FAP 698)

Section: (1)BR

County: Putnam, Bureau

TEXTURAL CLASSIFICATION 078-0006.GPJ IL_DOT.GDT 4/8/15



	Borehole	Station	Offset	Depth (ft)	Classification
●	**LB-04**	**141+00 (Prop.)**	**4.00 ft Rt.**	**1.00**	**A-4 (1) CLAY LOAM**
⧗	**LB-04**	**141+00 (Prop.)**	**4.00 ft Rt.**	**11.50**	**A-4 (0) SANDY LOAM**
▲	**LB-05**	**137+00 (Prop.)**	**14.00 ft Lt.**	**1.00**	**A-4 (1) SANDY LOAM**
★	**LB-06**	**170+00 (Prop.)**	**50.00 ft Lt.**	**25.00**	**A-4 (5) SILTY LOAM**
⊙	**LB-10**	**177+00 (Prop.)**	**150.00 ft Lt.**	**0.50**	**A-2-4 (0) SANDY LOAM**
✪	**LB-11**	**174+50 (Prop.)**	**138.00 ft Lt.**	**0.00**	**A-4 (0) LOAM**
○	**LB-11**	**174+50 (Prop.)**	**138.00 ft Lt.**	**3.00**	**A-2-4 (0) SANDY LOAM**

TEXTURAL CLASSIFICATION 078-0006.GPJ IL DOT.GDT 4/8/15

Illinois Department of Transportation

Division of Highways
IDOT

IDH Textural Classification Chart

Route: IL 89 (FAP 698)

Section: (1)BR

County: Putnam, Bureau

APPENDIX

J

Illinois Department
of Transportation

Shelby Tube Test Results

Boring No.: 5-ST N. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 1 of 4
Station: 148+87 (PR)
Section: (1) BR
Ground Surface Elev.: 460.2 ft.
Date: March 4, 2014
Offset: 49 ft. Lt.
County: Bureau
Begin Sampling Depth: 452.7 ft.
Job No.: P-93-013-11
Latitude: 41.314332° N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 442.2 ft.
Soils Lab Project No.: 13004
Longitude: 89.199392° W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)	Soil Type, Description and Observations
	0.0	460.2								Ground Surface – elev. 460.2 ft.
	↓	↓	---	---	---					Augered – 7.5 ft. to elev. 452.7 ft. – Not Sampled
	↓	↓	---	---	---					↓
	7.5	452.7	---	---	---					↓
1-1	7.8	452.4	---	12.0	123.9					Brown Clay Till fill
1-2	8.4	451.8	---	10.1	117.2					Same, top ¼, to Brown coarse Sandy Loam
1-3	9.1	451.1	0.09	15.2	117.3					Brown coarse Sandy Loam, top ½, to Gray Clay-Loam Till w/ wood pockets
1-4	9.7	450.5	UUTx	10.7	124.8	608	22.5	580	29.9	Brown Clay Till fill
2-1	10.6	449.6	0.42	12.5	124.5					Brown Sandy Clay-Loam, top ¼, to Brown Clay Till fill
2-2	11.3	448.9	cons	13.1	126.4					Brown Clay Till fill
2-3	11.9	448.3	1.49	11.1	134.1					Same
2-4	12.5	447.7	---	---	---					No Recovery
3-1	13.1	447.1	1.49	13.3	128.1					Brown Clay Loam Till fill
3-2	13.8	446.4	1.26	12.2	130.8					Same
3-3	14.4	445.8	0.33	9.0	131.5					Same, top ½, to Brown coarse Sandy Loam w/ gravel
3-4	15.0	445.2	---	---	---					No Recovery
	↓	↓	---	---	---					Tubes Pushed – 5 ft. to elev. 440.2 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	20.0	440.2	---	---	---					↓
4-1	20.6	439.6	0.93	48.0	104.6					Black Silty Clay w/ isolated wood pockets and hair roots
4-2	21.3	438.9	UUTx	31.6	117.2	824	2.1	534	19.9	Dark Gray Silty Clay w/ Silty Loam pockets – small stones bottom 1/3
4-3	21.9	438.3	cons	27.0	111.9					Dark Gray Silty Clay w/ Silty Loam lenses

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c' and Φ' column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

Illinois Department of Transportation

Shelby Tube Test Results

Boring No.: 5-ST N. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 2 of 4
Station: 148+87 (PR)
Section: (1) BR
Ground Surface Elev.: 460.2 ft.
Date: March 4, 2014
Offset: 49 ft. Lt.
County: Bureau
Begin Sampling Depth: 452.7 ft.
Job No.: P-93-013-11
Latitude: 41.314332° N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 442.2 ft.
Soils Lab Project No.: 13004
Longitude: 89.199392° W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c’ (psf)	Φ’ (deg)	Soil Type, Description and Observations
4-4	22.5	437.7	---	---	---					No Recovery
5-1	23.1	437.1	0.50	29.2	116.9					Black Silty Clay, top ½, to Gray Silty Clay-Loam w/ Silty Loam pockets
5-2	23.8	436.4	UUTx	24.4	123.6	511	4.5	364	25.9	Gray Silty Clay-Loam w/ oxidized Silty Loam pockets
5-3	24.4	435.8	cons	25.2	120.8					Gray Silty Clay-Loam w/ ox. SiL pockets – Dark Gray SiC pocket – small shells
5-4	25.0	435.2	---	---	---					No Recovery
6-1	25.3	434.9	---	23.5	---					Brown Silty Clay w/ Sand pockets, top ½, to Brown Silty Loam
6-2	25.9	434.3	0.47	27.0	121.8					Gray Silty Clay w/ Silt pockets and oxidized areas
6-3	26.6	433.6	0.49	28.1	120.2					Same
6-4	27.5	432.7	---	---	---					No Recovery
7-1	27.8	432.4	---	26.7	122.0					Brown Silty Clay w/ oxidized pockets
7-2	28.4	431.8	1.06	26.3	123.1					Same
7-3	29.1	431.1	1.10	26.6	121.8					Brown Silty Clay w/ Silty Loam pockets and oxidized Silt pockets
7-4	29.7	430.5	1.30	26.5	123.9					Same
8-1	30.3	429.9	---	28.4	122.0					Brown-Gray Silty Clay w/ small stones – oxidized pockets
8-2	30.9	429.3	cons	26.8	123.8					Gray Silty Clay – crumbly structure
8-3	31.6	428.6	UUTx	21.2	127.7	523	2.3	347	20.2	Same, top ¾, to Gray Silty Clay-Loam w/ SaCL pockets and small stones
8-4	32.2	428.0	0.54	24.1	123.4					Gray Silty Clay w/ Sand and Sandy Loam pockets – small stones
	↓	↓	---	---	---					Tube Pushed – 2.5 ft. to elev. 425.2 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	35.0	425.2	---	---	---					↓
9-1	35.3	424.9	---	23.4	124.5					Blue-Gray clayey Silty Loam
9-2	35.9	424.3	0.53	28.8	120.5					Blue-Gray Silty Clay w/ Sand pockets and lenses

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c’ and Φ’ column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

Shelby Tube Test Results

Boring No.: 5-ST N. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 3 of 4
Station: 148+87 (PR)
Section: (1) BR
Ground Surface Elev.: 460.2 ft.
Date: March 4, 2014
Offset: 49 ft. Lt.
County: Bureau
Begin Sampling Depth: 452.7 ft.
Job No.: P-93-013-11
Latitude: 41.314332° N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 442.2 ft.
Soils Lab Project No.: 13004
Longitude: 89.199392° W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)	Soil Type, Description and Observations
9-3	36.6	423.6	0.86	33.3	117.8					Blue-Gray Silty Clay
9-4	37.1	423.1	0.76	27.7	120.4					Same
10-1	38.1	422.1	0.62	27.1	122.4					Gray Silty Clay-Loam
10-2	38.8	421.4	0.57	25.2	122.7					Gray clayey Silty Loam w/ isolated Sand pockets
10-3	39.4	420.8	cons	26.8	122.1					Gray clayey Silty Loam
10-4	40.0	420.2	---	---	---					No Recovery
11-1	40.3	419.9	---	27.4	120.8					Gray clayey Silty Loam w/ oxidized areas
11-2	40.9	419.3	UUTx	28.6	120.3	321	1.9	126	38.5	Gray clayey Silty Loam
11-3	41.6	418.6	0.48	31.4	118.5					Gray Silty Clay-Loam w/ Silty Loam lenses – isolated calcareous pockets
11-4	42.2	418.0	0.76	32.2	114.9					Gray Silty Clay w/ isolated and oxidized Silty Loam pockets
	↓	↓	---	---	---					Augered 2.5 ft. to elev. 415.2 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	45.0	415.2	---	---	---					↓
	↓	↓	---	---	---					Tube Pushed – 2.5 ft. to elev. 412.7 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	47.5	412.7	---	---	---					↓
	↓	↓	---	---	---					Augered – 2.5 ft. to elev. 410.2 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	50.0	410.2	---	---	---					↓
12-1	50.6	409.6	0.70	27.1	121.7					Gray Silty Clay-Loam w/ Silty Loam seams and lenses

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c' and Φ' column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

Illinois Department of Transportation

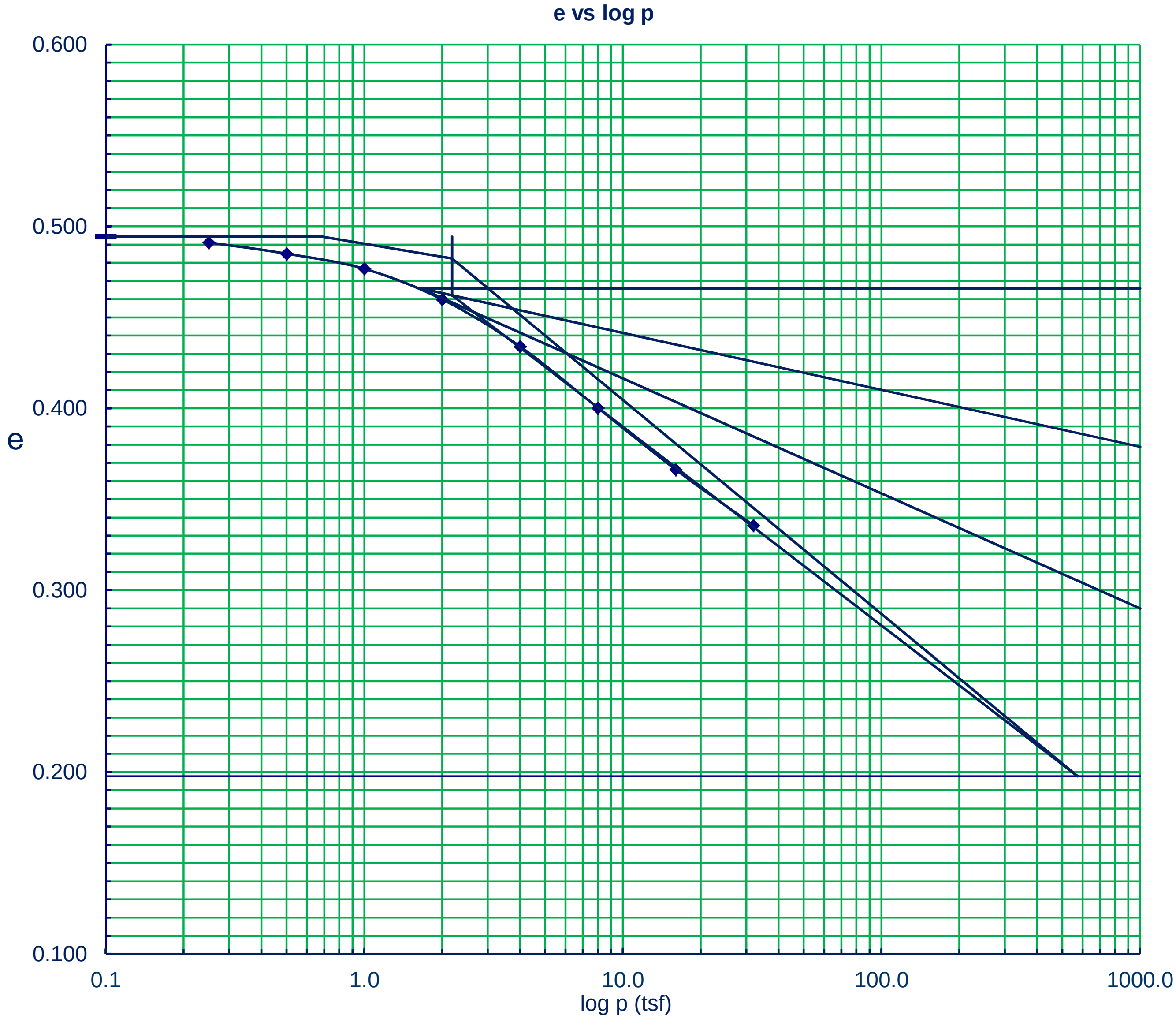
Shelby Tube Test Results

Boring No.: 5-ST N. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 4 of 4
Station: 148+87 (PR)
Section: (1) BR
Ground Surface Elev.: 460.2 ft.
Date: March 4, 2014
Offset: 49 ft. Lt.
County: Bureau
Begin Sampling Depth: 452.7 ft.
Job No.: P-93-013-11
Latitude: 41.314332° N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 442.2 ft.
Soils Lab Project No.: 13004
Longitude: 89.199392° W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c’ (psf)	Φ’ (deg)	Soil Type, Description and Observations
12-2	51.3	408.9	cons	27.1	122.2					Gray Silty Clay w/ oxidized Silty Loam pockets , top 2/3 to Gray Silty Loam
12-3	51.9	408.3	UUTx	27.8	121.0	720	2.7	288	40.0	Gray Silty Clay-Loam w/ oxidized Silty Loam pockets
12-4	52.5	407.7	---	---	---					No Recovery
	↓	↓	---	---	---					Augered – 2.5 ft. to elev. 405.2 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	55.0	405.2	---	---	---					↓
13-1	55.3	404.9	---	40.5	---					Gray Silty Clay w/ organic lenses
13-2	55.9	404.3	UUTx	32.9	114.1	873	2.3	720	15.1	Gray Silty Clay w/ Silty Loam pockets and lenses – organic specks
13-3	56.6	403.6	---	---	---					No Recovery
13-4	57.5	402.7	---	---	---					No Recovery
	↓	↓	---	---	---					Augered – 2.5 ft. to elev. 400.2 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	60.0	400.2	---	---	---					↓
	↓	↓	---	---	---					Tube Pushed – 2.5 ft. to elev. 397.7 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	62.5	397.7	---	---	---					↓
										End of Shelby Tube Boring

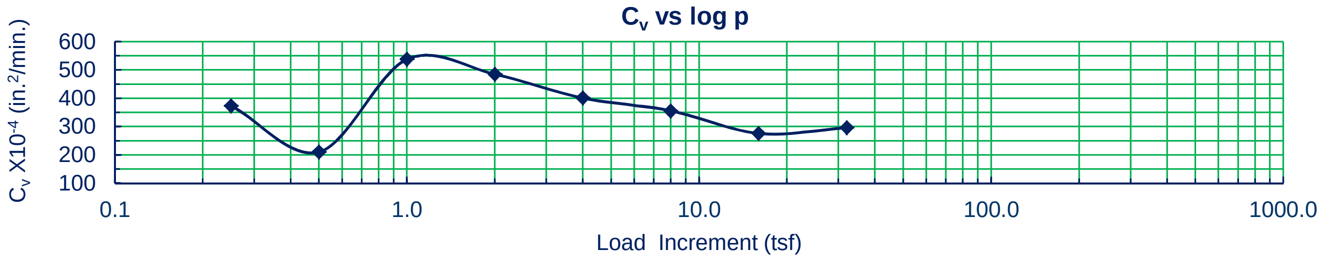
The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c’ and Φ’ column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

District	3	Lab Project Number	13004
County	Bureau	Sample Number	2-2
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL



Layer 1

p_0 = 0.689 tsf p_c = 2.182 tsf c_r = 0.024 c_c = 0.118 e_o = 0.494



Lab Project 13004

Layer 1 Worksheet

Sample Number	2-2	Boring Station	148+87
Machine Number	1	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve square root

e calculations curve square root

e Calculations

Increment	Increment duration min.	Loading tsf	Ht. inches	MD inches	Adjusted ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} $in.^2/min$
Seating load	N/A	0.025	0.7500	0.0000	0.7500	60.3	1.494	0.494	
1	400	0.250	0.7478	0.0006	0.7484	60.2	1.491	0.491	374
2	5225	0.500	0.7444	0.0009	0.7453	60.0	1.485	0.485	211
3	400	1.000	0.7397	0.0014	0.7411	59.6	1.477	0.477	538
4	960	2.000	0.7306	0.0021	0.7327	58.9	1.460	0.460	485
5	400	4.000	0.7167	0.0030	0.7197	57.9	1.434	0.434	401
6	960	8.000	0.6985	0.0042	0.7027	56.5	1.400	0.400	356
7	400	16.000	0.6797	0.0060	0.6857	55.2	1.366	0.366	276
8	400	32.000	0.6613	0.0090	0.6703	53.9	1.336	0.336	296
Final reading	N/A	32.000	0.6574	0.0090	0.6664	53.6	1.328	0.328	

Lab Sample Test Results

Tare	76.6	gr.
Wet+Tare	205.2	gr.
Cons+Tare	202.4	gr.
Dry+Tare	189.1	gr.
W_s	112.6	gr.
$W_w = V_w$	16.1	cm^3
V_s	40.4	cm^3

	Initial	Final
Moisture content	14.3	11.8
Dry Unit Wt.	116.5	131.1

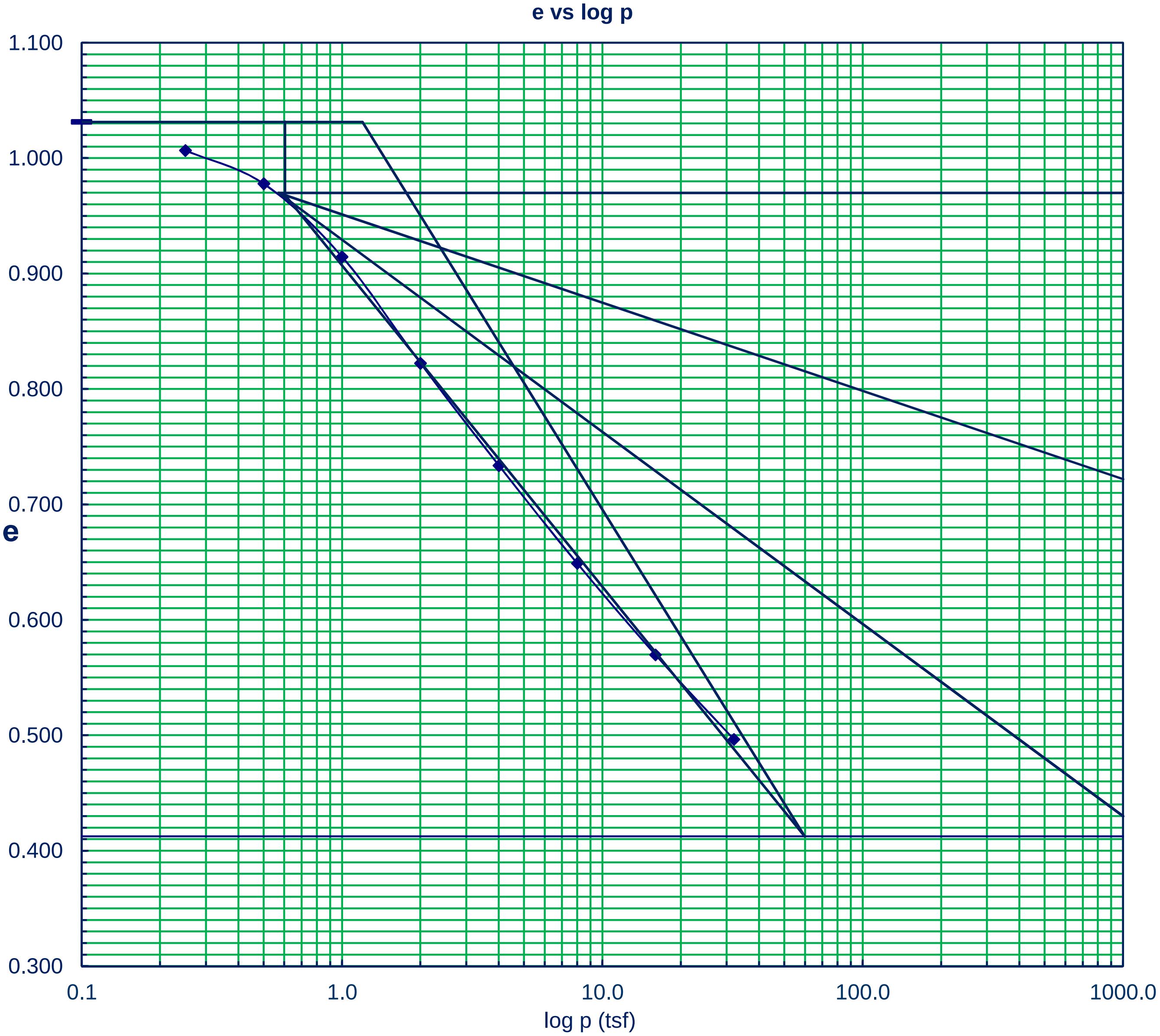
Lab Test Procedures

Test Method	T 216 B
Sample Condition	inundated
Inundation pressure	.025 tsf
Test Preparation	Trimmed with cutting shoe

Lab Comments:

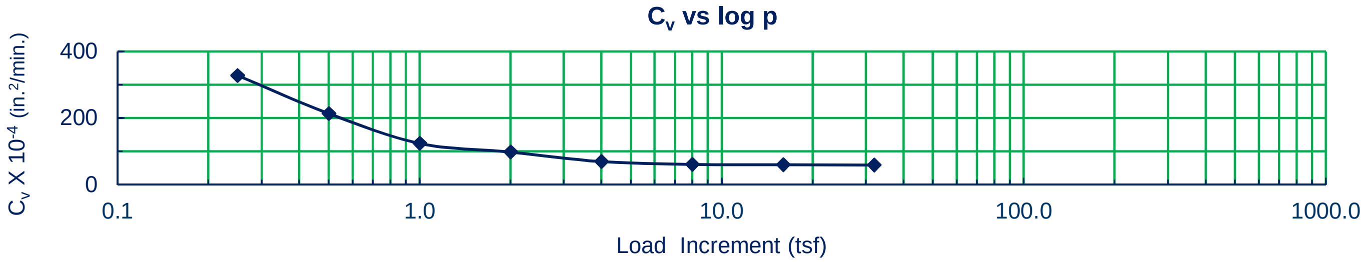
COMMENTS:

District	3	Lab Project Number	13004
County	Bureau	Sample Number	4-3
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL



Layer 3

p_0 = 1.196 tsf p_c = 1.196 tsf c_r = N/A c_c = 0.364 e_o = 1.031



Lab Project 13004

Layer 3 Worksheet

Sample Number	4-3	Boring Station	148+87
Machine Number	2	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve log

e calculations curve log

e Calculations

Increment	Increment duration (min.)	Increment load (tsf)	Height (inches)	Machine deflection (inches)	Adjusted height (inches)	V (cm^3)	V/V_s	e V/V_s-1	C_v X 10^{-4} (in^2/min.)
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.031	1.031	
1	400	0.250	0.7400	0.0009	0.7409	59.6	2.007	1.007	328
2	5225	0.500	0.7288	0.0014	0.7302	58.7	1.978	0.978	214
3	400	1.000	0.7048	0.0021	0.7069	56.9	1.915	0.915	124
4	960	2.000	0.6698	0.0030	0.6728	54.1	1.822	0.822	98
5	400	4.000	0.6360	0.0041	0.6401	51.5	1.734	0.734	69
6	960	8.000	0.6031	0.0057	0.6088	49.0	1.649	0.649	61
7	400	16.000	0.5715	0.0080	0.5795	46.6	1.570	0.570	60
8	400	32.000	0.5412	0.0113	0.5525	44.4	1.497	0.497	59
Final		32.000	0.6574	0.0113	0.6687	44.0	1.482	0.482	

Lab Sample Test Results

Tare	76.2	gr.
Wet+Tare	184.0	gr.
Cons+Tare	172.2	gr.
Dry+Tare	157.9	gr.
W_s	81.7	gr.
$W_w = V_w$	26.1	cm^3
V_s	29.7	cm^3

	Initial	Final
Moisture content	31.9	17.5
Dry Unit Wt.	84.6	115.9

Lab Test Procedures

Test Method: T 216 B

Sample Condition: inundated

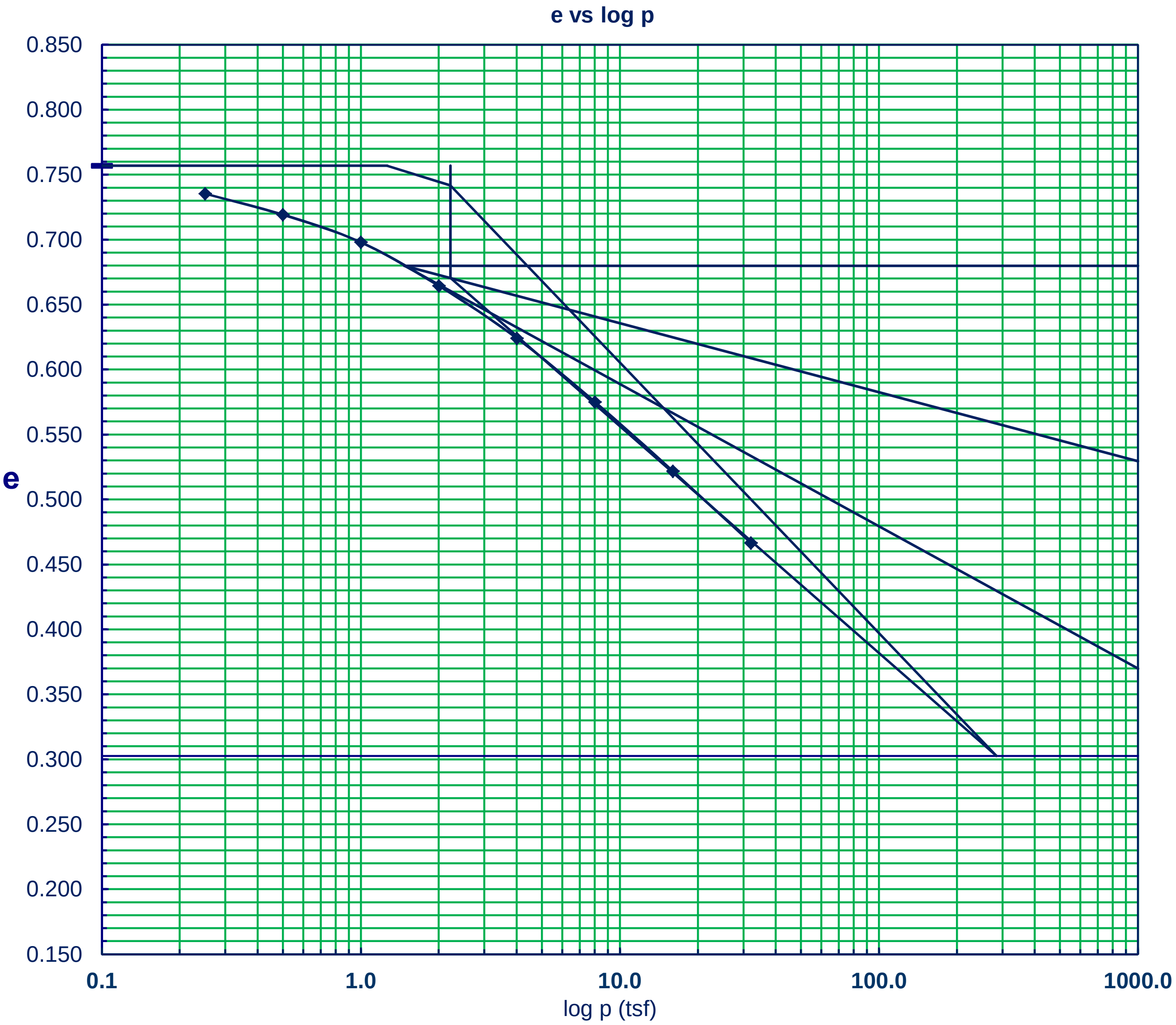
Inundated Pressure: .025 tsf

Test Preparation: Trimmed with cutting shoe

Lab Comments:

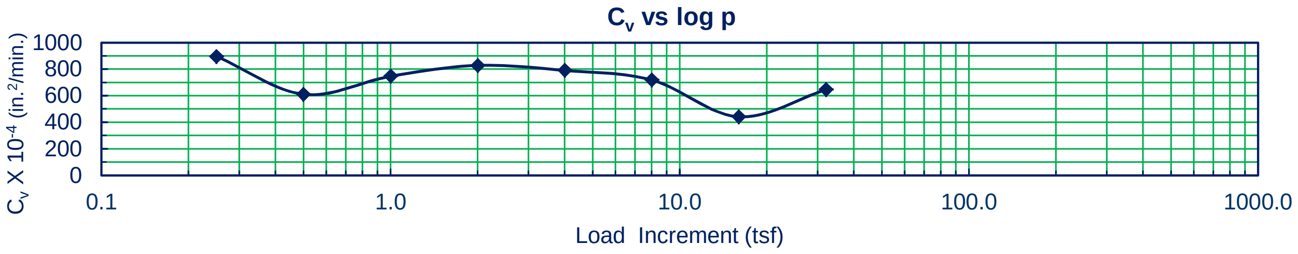
COMMENTS:

District	3	Lab Project Number	13004	
County	Bureau	Sample Number	5-3	
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.	
Section	(1) BR	Boring Station	148+87	
Job Number	P-93-013-11	Boring Offset	49	ft left CL



Layer 4

p_0 = 1.263 tsf p_c = 2.217 tsf c_r = 0.062 c_c = 0.208 e_o = 0.757



Lab Project 13004

Layer 4 Worksheet

Sample Number	5-3	Boring Station	148+87
Machine Number	3	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve square root

e calculations curve square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	1.757	0.757	
1	400	0.250	0.7405	0.0003	0.7408	59.6	1.735	0.735	896
2	5225	0.500	0.7333	0.0006	0.7339	59.0	1.719	0.719	611
3	400	1.000	0.7239	0.0010	0.7249	58.3	1.698	0.698	747
4	960	2.000	0.7089	0.0016	0.7105	57.2	1.664	0.664	829
5	400	4.000	0.6908	0.0025	0.6933	55.8	1.624	0.624	790
6	960	8.000	0.6687	0.0037	0.6724	54.1	1.575	0.575	718
7	400	16.000	0.6441	0.0056	0.6497	52.3	1.522	0.522	442
8	400	32.000	0.6171	0.0090	0.6261	50.4	1.467	0.467	646
Final		32.000	0.6574	0.0090	0.6664	50.1	1.460	0.460	

Lab Sample Test Results

Tare	75.6	gr.
Wet+Tare	191.5	gr.
Cons+Tare	185.8	gr.
Dry+Tare	170.0	gr.
W_s	94.3	gr.
$W_w = V_w$	21.6	cm^3
V_s	34.3	cm^3

	Initial	Final
Moisture content	22.9	16.8
Dry Unit Wt.	97.6	117.4

Lab Test Procedures

Test Method: T 216 B

Sample Condition: inundated

Inundated Pressure: .025 tsf tsf

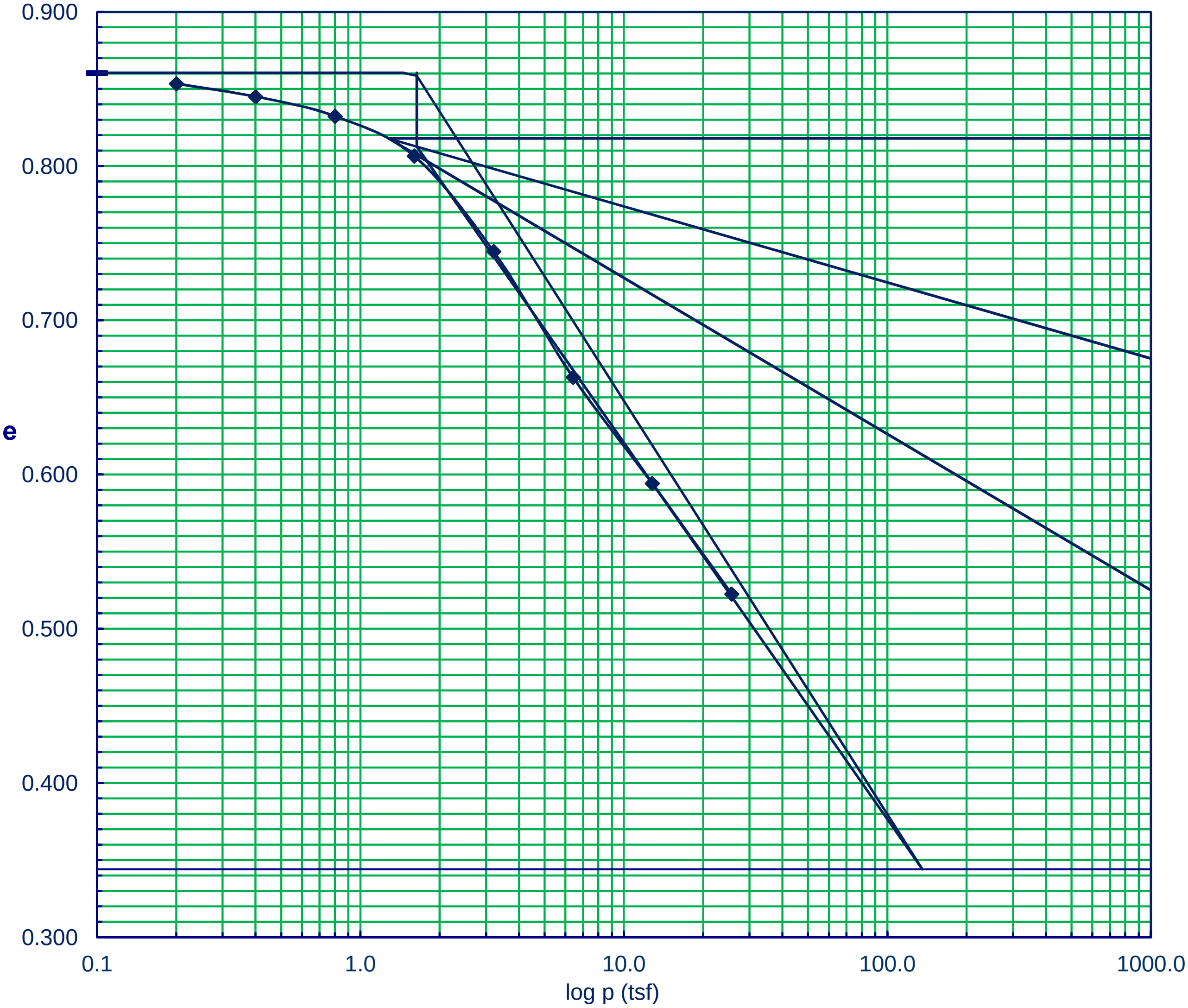
Test Preparation: Trimmed with cutting shoe

Lab Comments:

COMMENTS:

District	3	Lab Project Number	13004
County	Bureau	Sample Number	8-2
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL

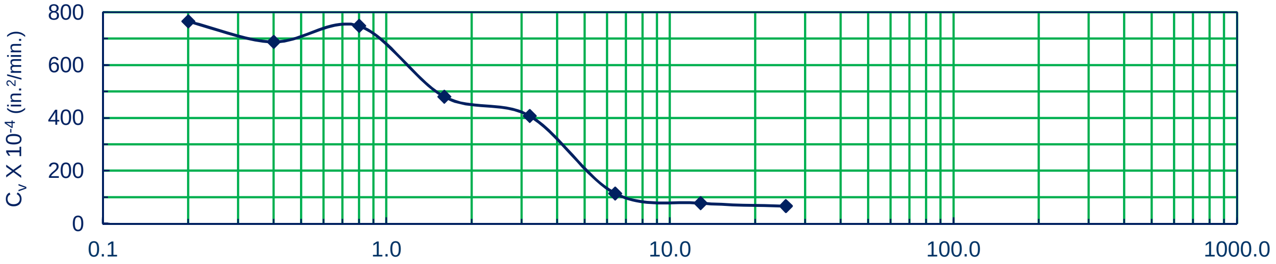
e vs log p



Layer 5

p_0 = 1.458 tsf p_c = 1.634 tsf c_r = 0.035 c_c = 0.268 e_o = 0.860

C_v vs log p



Lab Project **13004**

Layer 5 Worksheet

Sample Number	8-2	Boring Station	148+87
Machine Number	4	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	1.860	0.860	
1	400	0.200	0.7465	0.0007	0.7472	60.1	1.854	0.854	765
2	5225	0.400	0.7426	0.0012	0.7438	59.8	1.845	0.845	688
3	400	0.800	0.7369	0.0018	0.7387	59.4	1.832	0.832	749
4	960	1.600	0.7258	0.0025	0.7283	58.6	1.807	0.807	480
5	400	3.200	0.7000	0.0033	0.7033	56.6	1.745	0.745	408
6	960	6.400	0.6661	0.0044	0.6705	53.9	1.663	0.663	115
7	400	12.800	0.6367	0.0060	0.6427	51.7	1.594	0.594	78
8	400	25.600	0.6054	0.0084	0.6138	49.4	1.523	0.523	66
Final		25.600	0.6574	0.0084	0.6658	48.8	1.506	0.506	

Lab Sample Test Results

Tare	76.4	gr.
Wet+Tare	192.4	gr.
Cons+Tare	184.3	gr.
Dry+Tare	167.8	gr.
W_s	91.4	gr.
$W_w = V_w$	24.6	cm^3
V_s	32.4	cm^3

	Initial	Final
Moisture content	26.9	18.0
Dry Unit Wt.	94.6	116.8

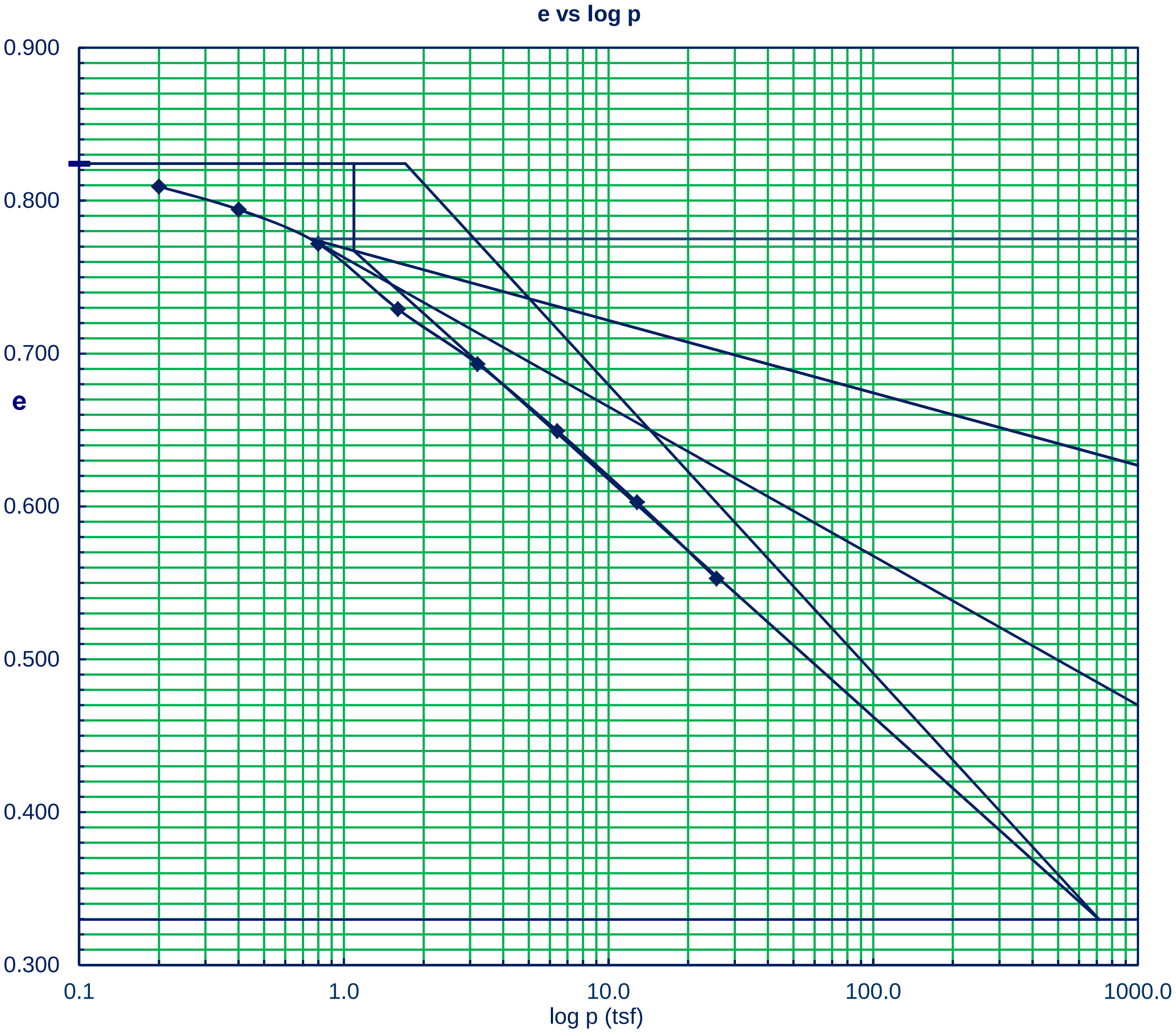
Lab Test Procedures

Test Method:	T 216 B
Sample Condition:	inundated
Inundated Pressure:	.025 tsf
Test Preparation:	Trimmed with cutting shoe

Lab Comments:

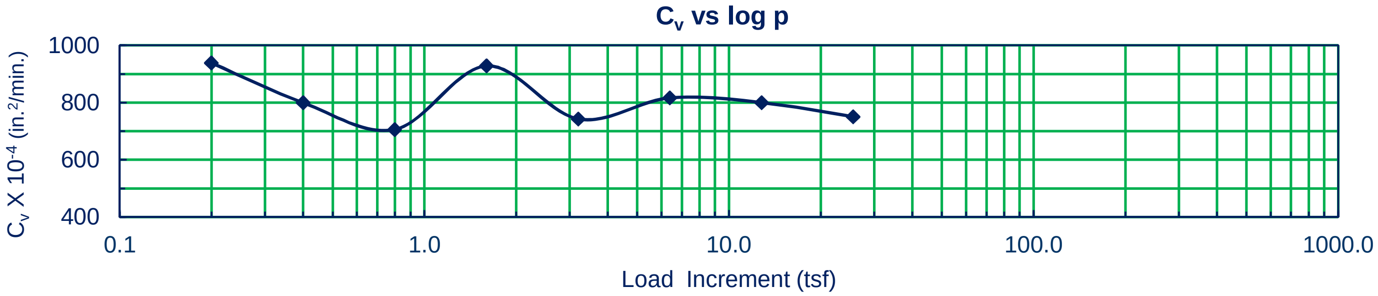
COMMENTS:

District	3	Lab Project Number	13004
County	Bureau	Sample Number	10-3
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL



Layer 6

p_0 = 1.707 tsf p_c = 1.707 tsf c_r = N/A c_c = 0.189 e_o = 0.824



Lab Project **13004**

Layer 6 Worksheet

Sample Number	10-3	Boring Station	148+87
Machine Number	5	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	$C_v \times 10^{-4}$ in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	1.824	0.824	
1	400	0.200	0.7433	0.0006	0.7439	59.8	1.809	0.809	939
2	5225	0.400	0.7364	0.0012	0.7376	59.3	1.794	0.794	799
3	400	0.800	0.7265	0.0020	0.7285	58.6	1.772	0.772	706
4	960	1.600	0.7080	0.0029	0.7109	57.2	1.729	0.729	928
5	400	3.200	0.6921	0.0040	0.6961	56.0	1.693	0.693	743
6	960	6.400	0.6727	0.0054	0.6781	54.5	1.649	0.649	817
7	400	12.800	0.6519	0.0071	0.6590	53.0	1.603	0.603	800
8	400	25.600	0.6288	0.0096	0.6384	51.4	1.553	0.553	751
Final		25.600	0.6574	0.0096	0.6670	50.9	1.539	0.539	

Lab Sample Test Results

Tare	76.3	gr.
Wet+Tare	193.5	gr.
Cons+Tare	186.3	gr.
Dry+Tare	168.5	gr.
W_s	92.2	gr.
$W_w = V_w$	25.0	cm^3
V_s	33.1	cm^3

	Initial	Final
Moisture content	27.1	19.3
Dry Unit Wt.	95.4	113.0

Lab Test Procedures

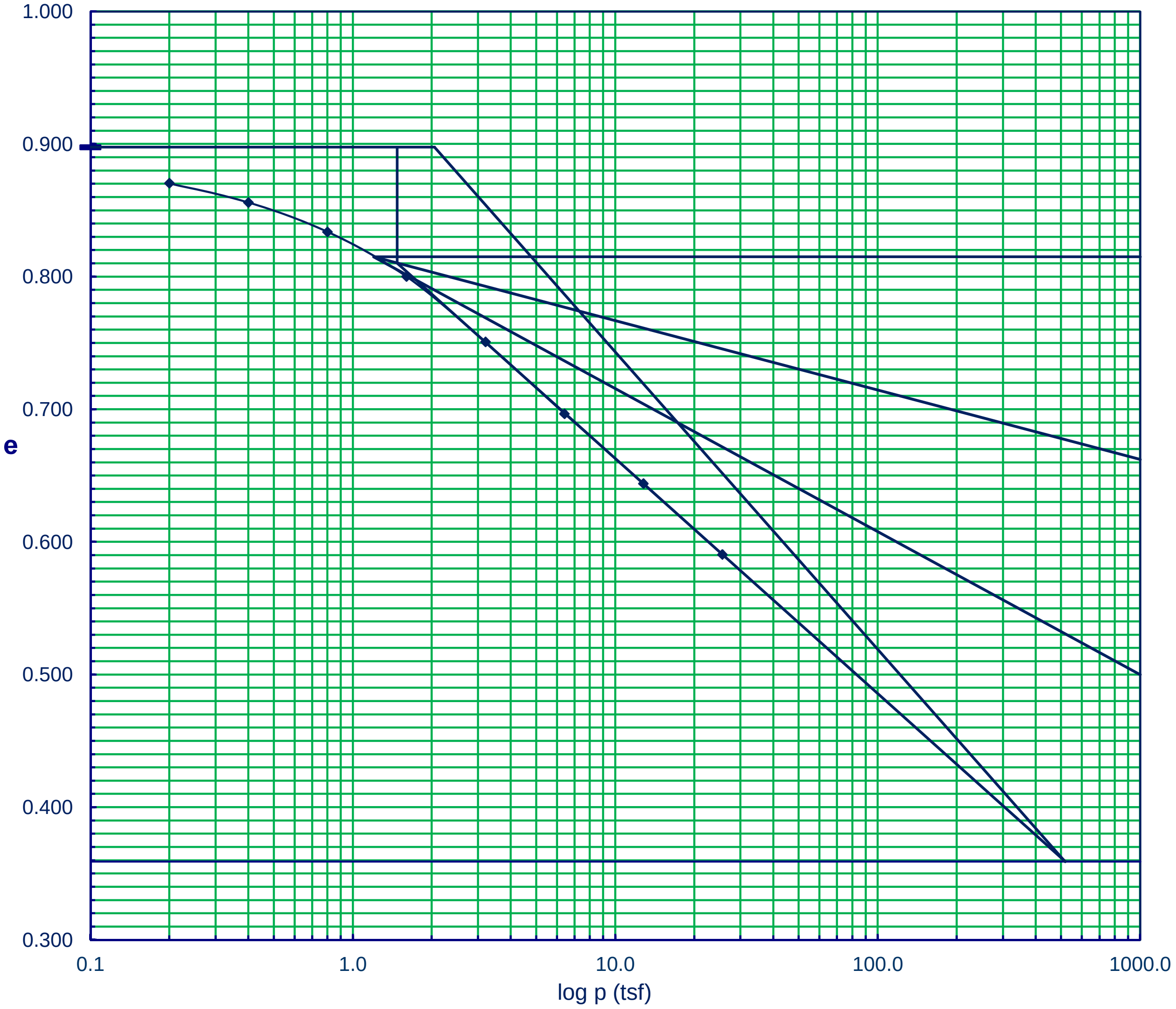
Test Method:	T 216 B
Sample Condition:	inundated
Inundated Pressure:	.025 tsf
Test Preparation:	Trimmed with cutting shoe

Lab Comments:

COMMENTS:

District	3	Lab Project Number	13004
County	Bureau	Sample Number	12-2
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL

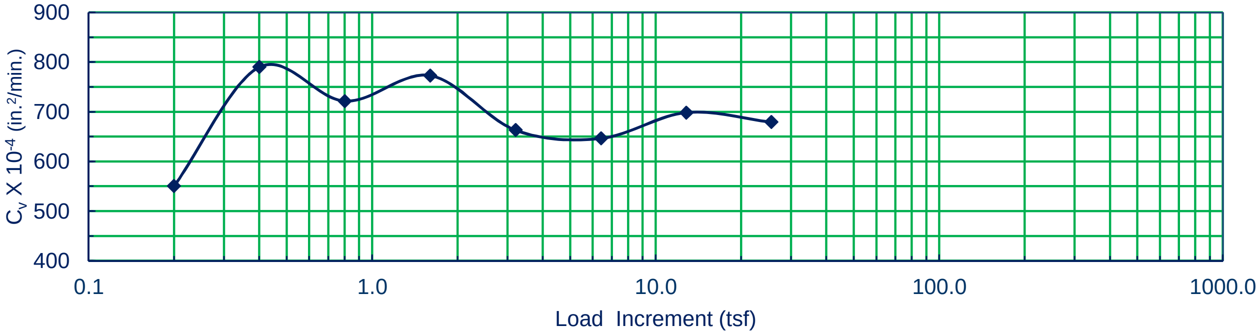
e vs log p



Layer 7

p_0 = 2.048 tsf p_c = 2.048 tsf c_r = N/A c_c = 0.224 e_o = 0.898

C_v vs log p



Lab Project 13004

Layer 1 Worksheet

Sample Number	12-2	Boring Station	148+87
Machine Number	6	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial			0.7500	0.0000	0.7500	60.3	1.898	0.898	
1	400	0.200	0.7385	0.0007	0.7392	59.5	1.870	0.870	551
2	5225	0.400	0.7323	0.0012	0.7335	59.0	1.856	0.856	790
3	400	0.800	0.7231	0.0017	0.7248	58.3	1.834	0.834	722
4	960	1.600	0.7091	0.0023	0.7114	57.2	1.800	0.800	773
5	400	3.200	0.6888	0.0032	0.6920	55.7	1.751	0.751	663
6	960	6.400	0.6662	0.0044	0.6706	53.9	1.697	0.697	647
7	400	12.800	0.6435	0.0063	0.6498	52.3	1.644	0.644	699
8	400	25.600	0.6193	0.0093	0.6286	50.6	1.590	0.590	679
Final		25.600	0.6574	0.0093	0.6667	50.0	1.574	0.574	

Lab Sample Test Results

Tare	76.3	gr.
Wet+Tare	190.6	gr.
Cons+Tare	184.2	gr.
Dry+Tare	166.0	gr.
W_s	89.6	gr.
$W_w = V_w$	24.7	cm^3
V_s	31.8	cm^3
	Initial	Final
Moisture content	27.5	20.4
Dry Unit Wt.		111.8

Lab Test Procedures

Test Method:

Sample Condition:

Inundated Pressure:

Test Preparation:

Lab Comments:

COMMENTS:

Illinois Department of Transportation

Shelby Tube Test Results

Boring No.: 4-ST (2013) S. Abut.   Route: FAP 698 (IL 89)   Tube Length/Diameter: 30-in / 3-in.   Page: 1 of 2
Station: 166+63 (PR)   Section: (1) BR   Ground Surface Elev.: 453.33 ft.   Date: 11/21/2013
Offset: 55 ft. Lt.   County: Putnam   Begin Sampling Depth: 443.33 ft.   Job No.: P-93-013-11
Latitude: 41.309327º N   Structure No.: 078-0006 (exist.)   Ground Water Elev.: 443.3 ft.   Soils Lab Project No.: 13003
Longitude: 89.199454º W   Contract No.: 66A69   Drilled by: Larry Meyers   Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)	Soil Type, Description and Observations
	0.0	453.3	---	---	---					Augered – 10 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	10.0	443.3	---	---	---					↓
1-1	10.3	443.0	---	17.0	---					Brown Sand
1-2	10.9	442.4	UUTx	13.7	129.7	0	32.9	74	37.0	Brown coarse Sand w/ gravel – isolated Silty Loam layer
1-3	11.6	441.7	0.16	25.5	116.3					Brown Sand w/ gravel, top 1/4, to Gray Silty Loam w/ isolated gravel
1-4	12.2	441.1	cons	33.3	114.5					Alternating fine layers of Gray Silty Clay, SiCL and SiL – isolated Silt lenses
2-1	12.9	440.4	---	16.7	131.8					Brown Sand w/ gravel to Gray Silty Clay-Loam
2-2	13.5	439.8	0.67	37.8	111.2					Dark Gray Silty Clay
2-3	14.2	439.1	0.88	32.8	114.0					Same
2-4	15.0	438.3	---	---	---					No Recovery
3-1	15.6	437.7	0.70	34.2	115.8					Dark Gray Silty Clay w/ Silty Loam pockets
3-2	16.2	437.1	cons	31.6	117.2					Dark Gray Silty Clay w/ oxidized Silty Loam pockets – isolated wood debris
3-3	16.9	436.4	UUTx	28.6	117.0	780	0.4	664	8.9	Gray Silty Clay w/ oxidized Silty Loam pockets
3-4	17.5	435.8	---	---	---					No Recovery
4-1	17.8	435.5	---	34.4	116.3					Gray Silty Clay w/ oxidized Silty Loam pockets
4-2	18.4	434.9	0.37	30.7	117.2					Gray Silty Clay w/ oxidized Silty Loam pockets – crumbly structure
4-3	19.0	434.3	0.47	32.5	117.1					Same
4-4	19.6	433.7	0.55	32.5	118.9					Gray Silty Clay w/ oxidized Silty Loam pockets
5-1	20.6	432.7	cons	33.0	117.3					Gray Silty Clay w/ oxidized Silty Loam pockets – Sandy Loam lenses
5-2	21.2	432.1	UUTX	32.9	118.0	432	0.3	142	33.4	Gray Silty Clay w/ oxidized Silty Loam pockets – crumbly structure
5-3	21.9	431.4	---	---	---					No Recovery

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c' and Φ' column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

Illinois Department of Transportation

Shelby Tube Test Results

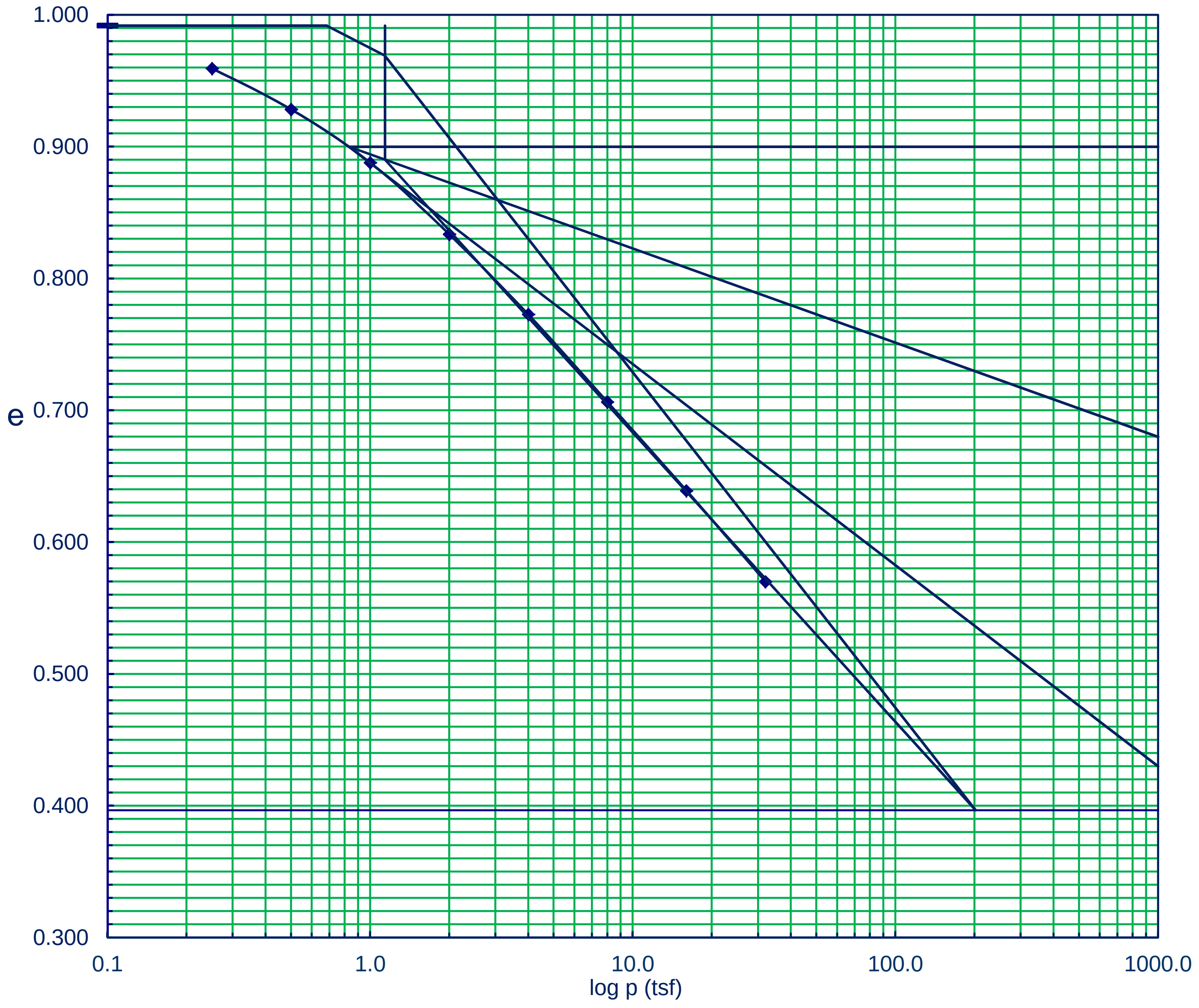
Boring No.: 4-ST (2013) S. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 2 of 2
Station: 166+63 PR
Section: (1) BR
Ground Surface Elev.: 453.33 ft.
Date: 11/21/2013
Offset: 55 ft. Lt.
County: Putnam
Begin Sampling Depth: 443.33 ft.
Job No.: P-93-013-11
Latitude: 41.309327º N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 443.3 ft.
Soils Lab Project No.: 13003
Longitude: 89.199454º W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)	Soil Type, Description and Observations
5-4	22.5	430.8	---	---	---					No Recovery
	↓	453.3	---	---	---					Tubes Pushed – 5 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	27.5	425.8	---	---	---					↓
	↓	↓	---	---	---					Augered – 10 ft, - Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	37.5	415.8	---	---	---					↓
6-1	37.8	415.5	---	27.1	---					Gray Silty Clay-Loam w/ Sandy Loam pockets, to Dark Gray SiL w/ organics
6-2	38.4	414.9	UUTx	35.1	112.3	265	0.7	140	25.7	Dark Gray Silty Loam w/ Loam & Sandy Loam pockets – organics & wood debris
6-3	39.0	414.3	cons	39.8	116.7					Dark Gray SiL w/ Sand layers & lenses, to Gray SiL w/ organics – calcar. matrl.
6-4	39.6	413.7	UUTx	37.7	111.5	829	0.0	829	0.0	Dark Gray SiL w/ SaL lenses – organics, iso. wood debris, calcareous material
	↓	↓								Tube Pushed – 2.5 ft. – No Recovery
	↓	↓								↓
	↓	↓								↓
	42.5	410.8								↓
7-1	42.9	410.4	cons	34.4	---					Dark Gray Silty Loam w/ Sand lenses top 1/4 - organics
7-2	43.5	409.8	UUTx	34.4	113.8	462	1.5	235	24.0	Dark Gray Silty Loam – Sand lenses bottom 1/3
7-3	44.2	409.1	---	---	---					No Recovery
7-4	45.0	408.3	---	---	---					No Recovery
										End of Shelby tube boring

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c' and Φ' column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

District	3	Lab Project Number	13003
County	Putnam	Sample Number	1-4
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL

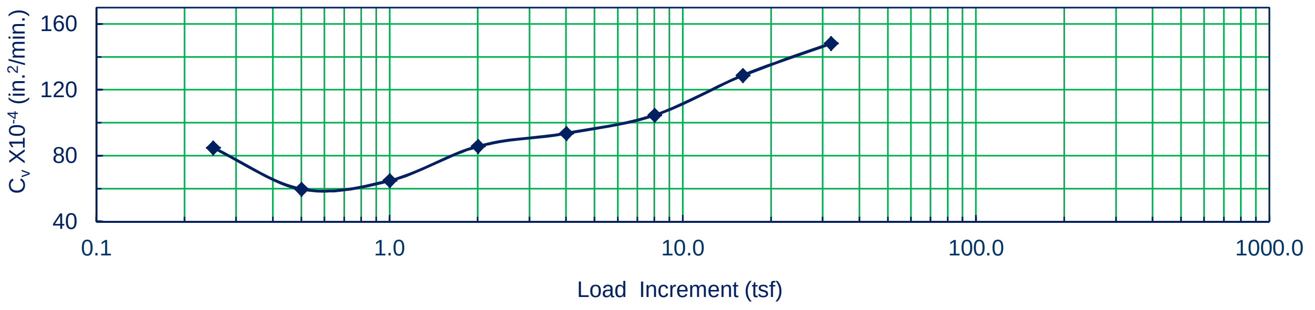
e vs log p



Layer 1

p_0 = 0.684 tsf p_c = 1.138 tsf c_r = 0.103 c_c = 0.254 e_o = 0.992

C_v vs log p



Lab Project 13003

Layer 1 Worksheet

Sample Number	1-4	Boring Station	166+63
Machine Number	1	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve log

e calculations curve log

e Calculations

Increment	Increment duration min.	Loading tsf	Ht. inches	MD inches	Adjusted ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} $in.^2/min$
Seating load	N/A	0.025	0.7500	0.0000	0.7500	60.3	1.992	0.992	
1	400	0.250	0.7372	0.0006	0.7378	59.3	1.959	0.959	85
2	920	0.500	0.7252	0.0009	0.7261	58.4	1.928	0.928	60
3	400	1.000	0.7095	0.0014	0.7109	57.2	1.888	0.888	65
4	995	2.000	0.6883	0.0021	0.6904	55.5	1.834	0.834	86
5	400	4.000	0.6645	0.0030	0.6675	53.7	1.773	0.773	94
6	1000	8.000	0.6383	0.0042	0.6425	51.7	1.706	0.706	105
7	400	16.000	0.6112	0.0060	0.6172	49.6	1.639	0.639	129
8	3845	32.000	0.5822	0.0090	0.5912	47.6	1.570	0.570	148
Final reading	N/A	32.000	0.5751	0.0090	0.5841	47.0	1.551	0.551	

Lab Sample Test Results

Tare	76.6	gr.
Wet+Tare	188.9	gr.
Cons+Tare	177.9	gr.
Dry+Tare	161.2	gr.
W_s	84.6	gr.
$W_w = V_w$	27.7	cm^3
V_s	30.3	cm^3

	Initial	Final
Moisture content	32.8	19.7
Dry Unit Wt.	87.5	112.4

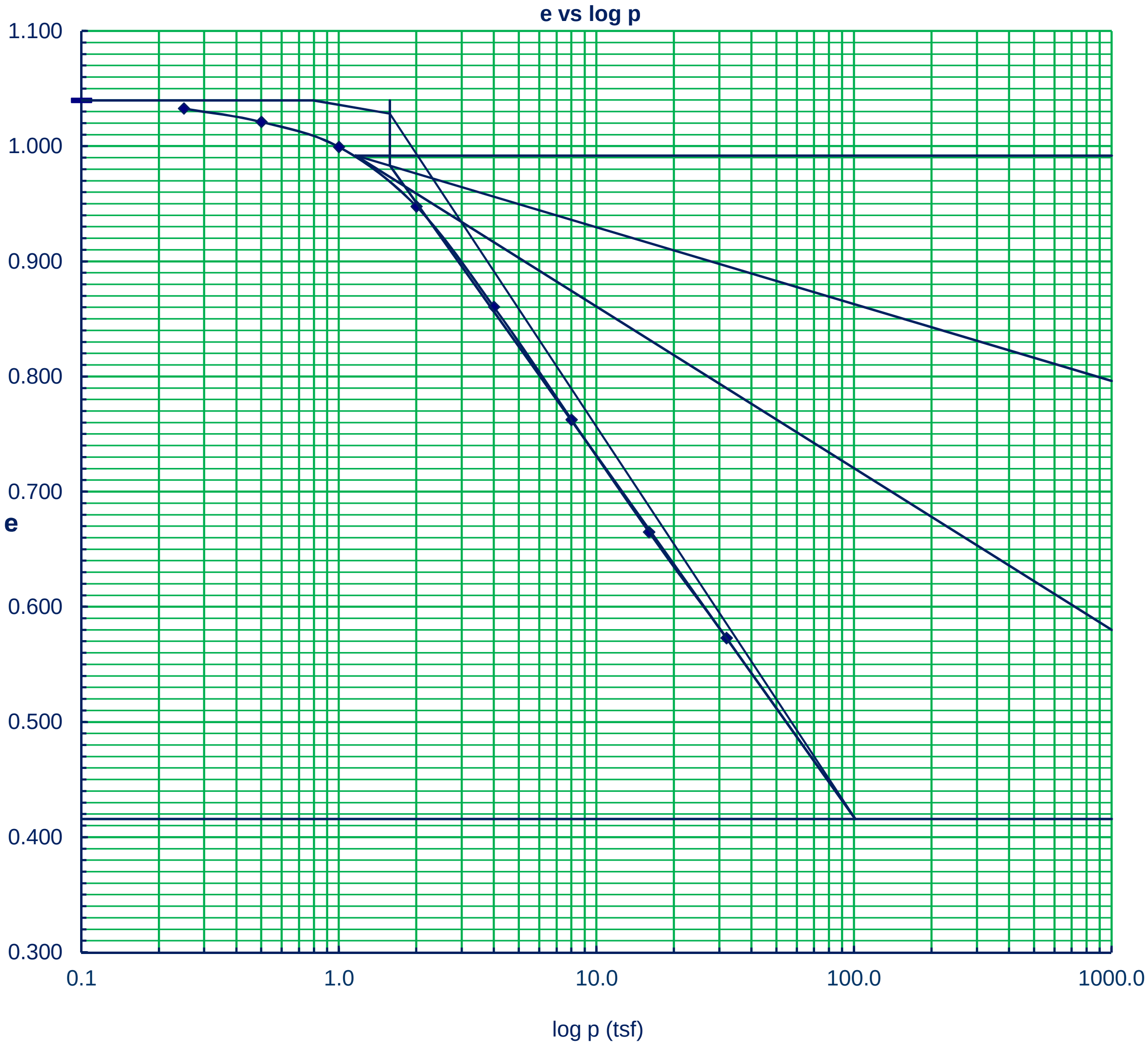
Lab Test Procedures

Test Method	T 216 B
Sample Condition	inundated
Inundation pressure	.025 tsf
Test Preparation	Tested directly in ring from ring-lined sampler

Lab Comments:

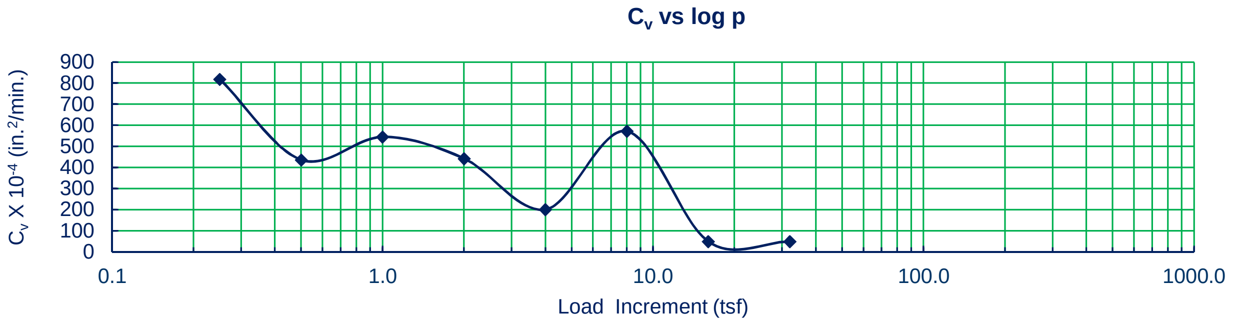
COMMENTS:

District	3	Lab Project Number	13003
County	Putnam	Sample Number	3-2
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL



Layer 2

p_0 = 0.794 tsf p_c = 1.577 tsf c_r = 0.039 c_c = 0.339 e_o = 1.040



Lab Project 13003

Layer 2 Worksheet

Sample Number	3-2	Boring Station	166+63
Machine Number	2	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V$_s$	e V/V$_s$-1	C_v X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.040	1.040	
1	400	0.250	0.7465	0.0009	0.7474	60.1	2.033	1.033	819
2	920	0.500	0.7417	0.0014	0.7431	59.8	2.021	1.021	437
3	400	1.000	0.7330	0.0021	0.7351	59.1	1.999	0.999	546
4	995	2.000	0.7131	0.0030	0.7161	57.6	1.948	0.948	443
5	400	4.000	0.6799	0.0041	0.6840	55.0	1.860	0.860	202
6	1000	8.000	0.6423	0.0057	0.6480	52.1	1.763	0.763	573
7	400	16.000	0.6041	0.0080	0.6121	49.2	1.665	0.665	49
8	3845	32.000	0.5670	0.0113	0.5783	46.5	1.573	0.573	50
Final		32.000	0.5751	0.0113	0.5864	45.7	1.544	0.544	

Lab Sample Test Results

Tare	76.2	gr.
Wet+Tare	185.8	gr.
Cons+Tare	175.1	gr.
Dry+Tare	159.0	gr.
W_s	82.8	gr.
$W_w = V_w$	26.7	cm^3
V_s	29.6	cm^3

	Initial	Final
Moisture content	32.3	19.7
Dry Unit Wt.	85.7	112.4

Lab Test Procedures

Test Method: T 216 B

Sample Condition: inundated

Inundation Pressure: .025 tsf

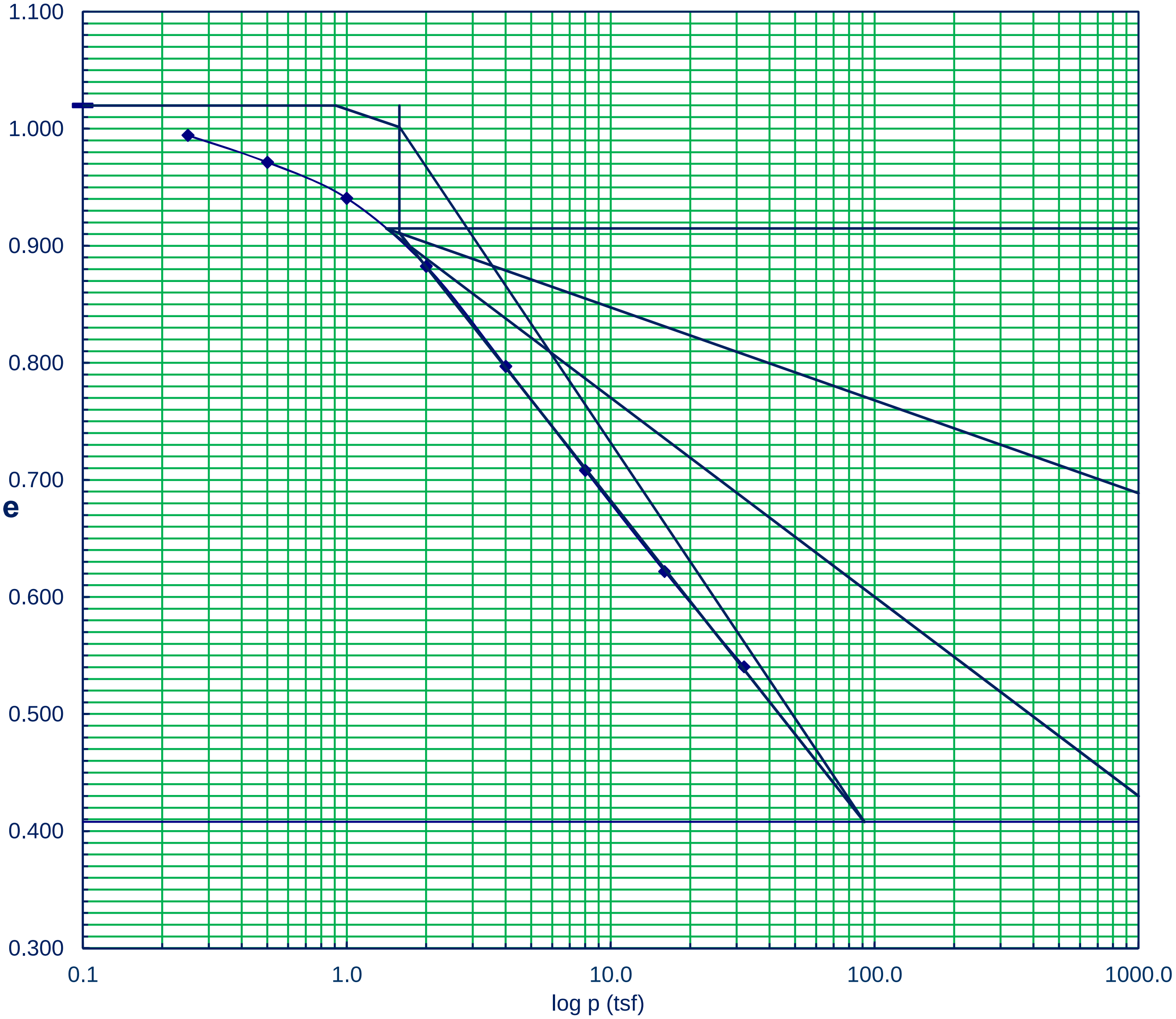
Test Preparation: Tested directly in ring from ring-lined sampler

Lab Comments:

COMMENTS:

District	3	Lab Project Number	13003
County	Putnam	Sample Number	5-1
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL

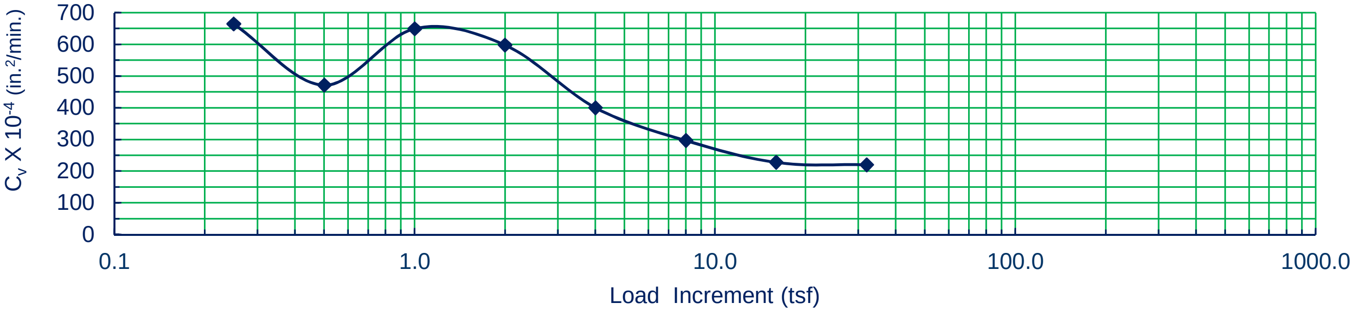
e vs log p



Layer 3

p_0 = 0.908 tsf p_c = 1.584 tsf c_r = 0.076 c_c = 0.337 e_o = 1.020

C_v vs log p



Lab Project 13003

Layer 3 Worksheet

Sample Number	5-1	Boring Station	166+63
Machine Number	3	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment duration (min.)	Increment load (tsf)	Height (inches)	Machine deflection (inches)	Adjusted height (inches)	V (cm^3)	V/V_s	e V/V_s-1	C_v X 10^{-4} (in^2/min.)
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.020	1.020	
1	400	0.250	0.7402	0.0003	0.7405	59.6	1.994	0.994	664
2	920	0.500	0.7314	0.0006	0.7320	58.9	1.971	0.971	472
3	400	1.000	0.7196	0.0010	0.7206	58.0	1.941	0.941	650
4	995	2.000	0.6974	0.0016	0.6990	56.2	1.883	0.883	598
5	400	4.000	0.6648	0.0025	0.6673	53.7	1.797	0.797	400
6	1000	8.000	0.6306	0.0037	0.6343	51.0	1.708	0.708	297
7	400	16.000	0.5966	0.0056	0.6022	48.4	1.622	0.622	228
8	3845	32.000	0.5629	0.0090	0.5719	46.0	1.540	0.540	220
Final		32.000	0.5751	0.0090	0.5841	45.1	1.511	0.511	

Lab Sample Test Results

Tare	75.6	gr.
Wet+Tare	187.7	gr.
Cons+Tare	175.0	gr.
Dry+Tare	159.7	gr.
W_s	84.1	gr.
$W_w = V_w$	27.9	cm^3
V_s	29.9	cm^3

	Initial	Final
Moisture content	33.2	18.1
Dry Unit Wt.	87.0	116.4

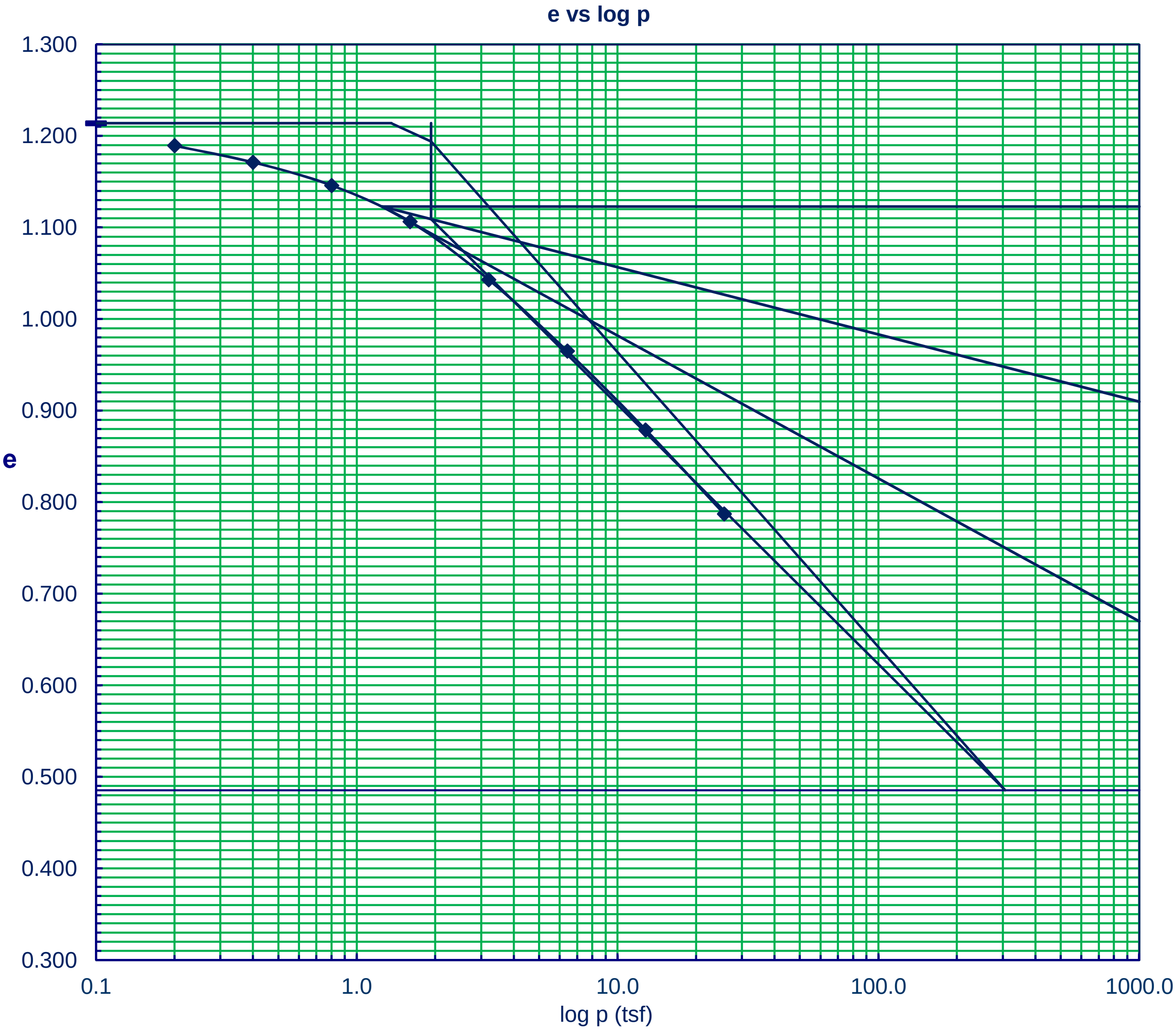
Lab Test Procedures

Test Method:	T 216 B
Sample Condition:	inundated
Inundated Pressure:	.025 tsf
Test Preparation:	Tested directly in ring from ring-lined sampler

Lab Comments:

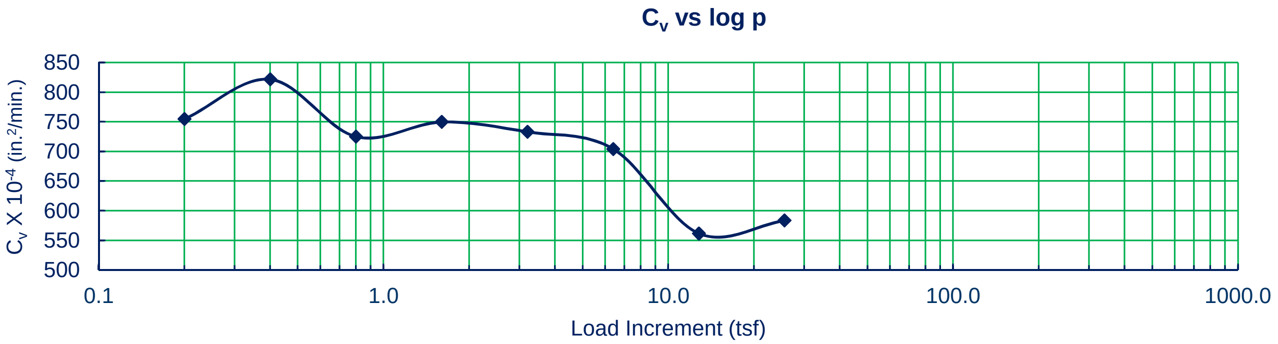
COMMENTS:

District	3	Lab Project Number	13003
County	Putnam	Sample Number	6-3
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL



Layer 5

p_0 = 1.356 tsf p_c = 1.925 tsf c_r = 0.132 c_c = 0.322 e_o = 1.214



Lab Project **13003**

Layer 5 Worksheet

Sample Number	6-3	Boring Station	166+63
Machine Number	4	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.214	1.214	
1	0	0.200	0.7410	0.0007	0.7417	59.7	2.189	1.189	755
2	0	0.400	0.7343	0.0012	0.7355	59.2	2.171	1.171	822
3	0	0.800	0.7252	0.0018	0.7270	58.5	2.146	1.146	725
4	0	1.600	0.7111	0.0025	0.7136	57.4	2.106	1.106	750
5	0	3.200	0.6888	0.0033	0.6921	55.7	2.043	1.043	733
6	0	6.400	0.6613	0.0044	0.6657	53.5	1.965	0.965	704
7	0	12.800	0.6306	0.0060	0.6366	51.2	1.879	0.879	562
8	0	25.600	0.5971	0.0084	0.6055	48.7	1.787	0.787	584
Final		25.600	0.5751	0.0084	0.5835	47.7	1.750	0.750	

Lab Sample Test Results

Tare	76.4	gr.
Wet+Tare	182.6	gr.
Cons+Tare	173.1	gr.
Dry+Tare	152.6	gr.
W_s	76.2	gr.
$W_w = V_w$	29.9	cm^3
V_s	27.2	cm^3
	Initial	Final
Moisture content	39.3	26.8
Dry Unit Wt.	78.8	99.7

Lab Test Procedures

Test Method: T 216 B

Sample Condition: inundated

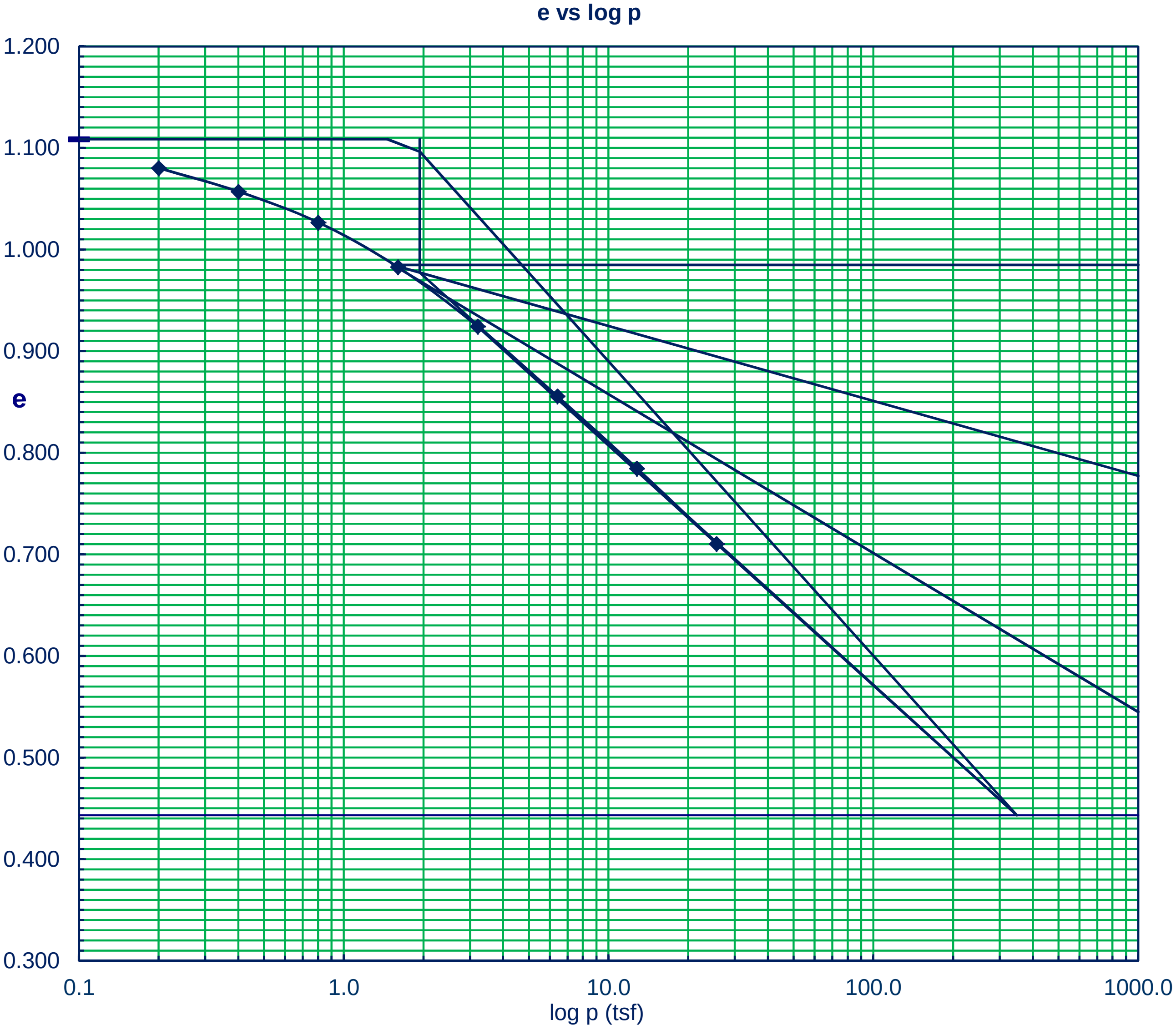
Inundated Pressure: .025 tsf

Test Preparation: Tested directly in ring from ring-lined sampler

Lab Comments:

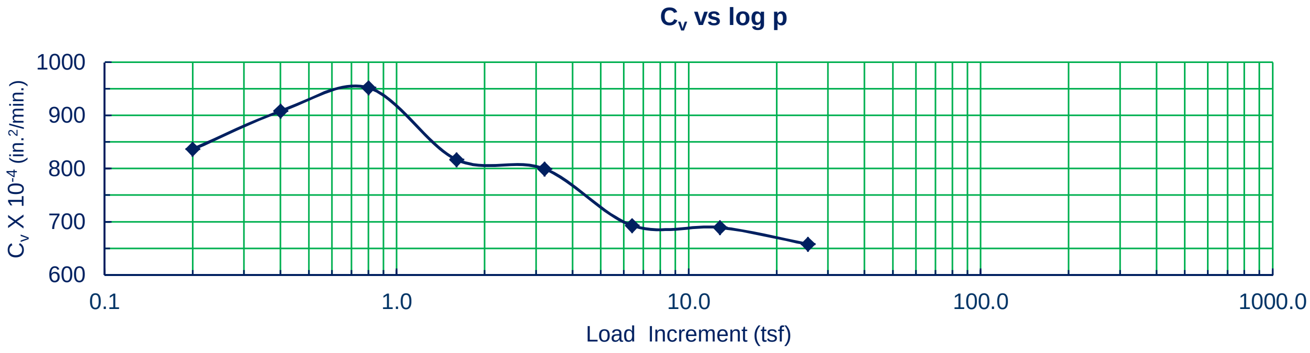
COMMENTS:

District	3	Lab Project Number	13003
County	Putnam	Sample Number	7-1
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL



Layer 6

p_0 = 1.459 tsf p_c = 1.939 tsf c_r = 0.101 c_c = 0.290 e_o = 1.109



Lab Project **13003**

Layer 6 Worksheet

Sample Number	7-1	Boring Station	166+63
Machine Number	5	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.109	1.109	
1	400	0.200	0.7393	0.0006	0.7399	59.5	2.080	1.080	837
2	920	0.400	0.7305	0.0012	0.7317	58.9	2.057	1.057	908
3	400	0.800	0.7189	0.0020	0.7209	58.0	2.027	1.027	952
4	995	1.600	0.7024	0.0029	0.7053	56.7	1.983	0.983	817
5	400	3.200	0.6805	0.0040	0.6845	55.1	1.924	0.924	800
6	1000	6.400	0.6546	0.0054	0.6600	53.1	1.856	0.856	693
7	400	12.800	0.6277	0.0071	0.6348	51.1	1.785	0.785	689
8	3845	25.600	0.5987	0.0096	0.6083	48.9	1.710	0.710	658
Final		25.600	0.5751	0.0096	0.5847	48.0	1.679	0.679	

Lab Sample Test Results

Tare	76.3	gr.
Wet+Tare	184.3	gr.
Cons+Tare	174.5	gr.
Dry+Tare	155.1	gr.
W_s	78.8	gr.
$W_w = V_w$	29.2	cm^3
V_s	28.6	cm^3

	Initial	Final
Moisture content	37.1	24.7
Dry Unit Wt.	81.5	102.4

Lab Test Procedures

Test Method:	T 216 B
Sample Condition:	inundated
Inundated Pressure:	.025 tsf
Test Preparation:	Tested directly in ring from ring-lined sampler

Lab Comments:

COMMENTS:

APPENDIX

K

Illinois Department of Transportation

Memorandum

To: Dave Broviak Attn: Ted Fultz
From: Wayne L. Phillips By: Mike Short
Subject: Pavement Cores *
Date: May 11, 2012

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* FAP Route 698 (IL 89)
Section (1)BR
Bureau & Putnam Counties
File #2100 Contract #66A69 D3#1366

Attached are the descriptions and pictures for the 6 cores taken. The intent of the cores is to determine the existing pavement material's thickness and condition. Cores were taken in the outside shoulders.

Core #1	**S.B. Driving Lane, 7' o/s C.L, STA. 37+00 RT = STA. 20+00 LT**
Lift #1	1 ½" HMA Surface Course – Fair Condition – No Cracks – Many Voids
Lift #2	1" HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #3	1 ¼" HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #4	1 ¾" HMA Surface Course – Good Condition – No Cracks – Some Voids
Lift #5	2" HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #6	2" HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #7	1 ¼" HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #8	2" HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #9	2 ¼" HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #10	Rotten Concrete – Could Not Be Recovered

Core #2	**N.B. Driving Lane, 5' o/s C.L., STA. 42+00 LT = STA. 15+00 RT**
Lift #1	¾" HMA Surface Course – Fair Condition – No Cracks – No Voids
Lift #2	1 ½" HMA Binder Course – Fair Condition – No Cracks – Some Voids
Lift #3	½" HMA Surface Course – Fair Condition – No Cracks – Some Voids
Lift #4	1 ½" HMA Surface Course – Good Condition – No Cracks – Some Voids
Lift #5	6 ½" PCC Course – Poor Condition – Many Cracks – Some Voids

Core #3	**S.B. Driving Lane, 6' o/s C.L., STA. 47+00 RT = STA. 10+00 LT**
Lift #1	1" HMA Surface Course – Fair Condition – No Cracks – Some Voids
Lift #2	¾" HMA Surface Course – Fair Condition – No Cracks – Some Voids
Lift #3	1 ½" HMA Binder Course – Good Condition – No Cracks – No Voids
Lift #4	2" HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #5	1" HMA Surface Course – Good Condition – No Cracks – No Voids
Lift #6	1" HMA Surface Course – Good Condition – No Cracks – No Voids
Lift #7	½" HMA Surface Course – Good Condition – No Cracks – No Voids
Lift #8	7" PCC Course – Fair Condition – Some Cracks – Some Voids

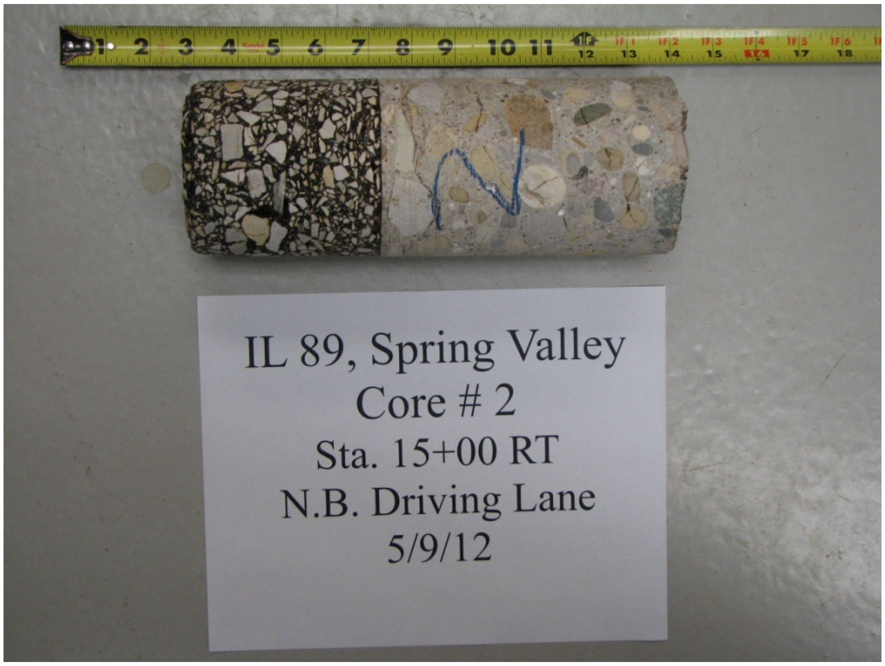
Core #4	**N.B. Driving Lane, 6’ o/s C.L., STA. 67+70 LT = STA. 1+00 LT**
Lift #1	1 ¼” HMA Surface Course – Fair Condition – No Cracks – Many Voids
Lift #2	1 ¼” HMA Surface Course – Fair Condition – No Cracks – Some Voids
Lift #3	1” HMA Surface Course – Fair Condition – No Cracks – Some Voids
Lift #4	1 ¼” HMA Surface Course – Fair Condition – No Cracks – Some Voids
Lift #5	½” HMA Surface Course – Fair Condition – No Cracks – Many Voids
Lift #6	1 ½” HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #7	1 ¼” HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #8	1 ¼” HMA Binder Course – Good Condition – No Cracks – No Voids
Lift #9	¾” HMA Surface Course – Good Condition – No Cracks – No Voids
Lift #10	1 ¼” HMA Surface Course – Good Condition – No Cracks – No Voids
Lift #11	6 ¾” PCC Course – Good Condition – No Cracks – Some Voids

Core #5	**S.B. Driving Lane, 6’ o/s C.L., STA. 73+10 RT = STA. 6+00 RT**
Lift #1	1 ¼” HMA Surface Course – Fair Condition – No Cracks – Many Voids
Lift #2	1” HMA Surface Course – Fair Condition – No Cracks – Some Voids
Lift #3	1” HMA Surface Course – Fair Condition – No Cracks – Some Voids
Lift #4	1 ¼” HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #5	1 ¾” HMA Binder Course – Good Condition – No Cracks – No Voids
Lift #6	1” HMA Surface Course – Good Condition – No Cracks – No Voids
Lift #7	¾” HMA Surface Course – Good Condition – No Cracks – No Voids
Lift #8	1” HMA Surface Course – Good Condition – No Cracks – No Voids
Lift #9	7” PCC Course – Fair Condition – Some Cracks – Some Voids

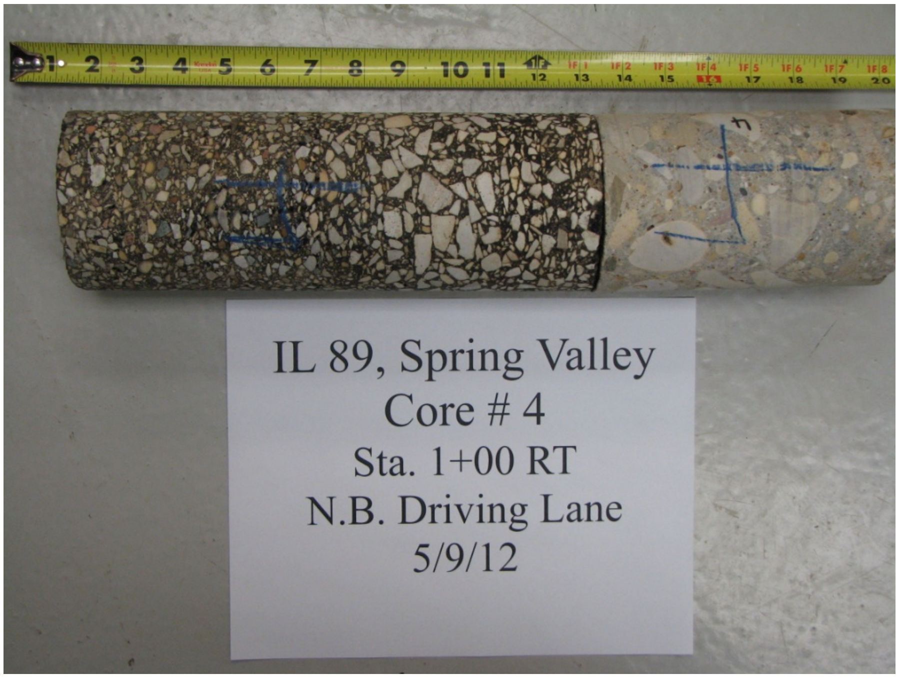
Core #6	**N.B. Driving Lane, Center of Driving Lane, STA. 83+10 LT = STA. 16+00 LT**
Lift #1	1 ¼” HMA Surface Course – Fair Condition – No Cracks – Many Voids
Lift #2	1 ½” HMA Surface Course – Good Condition – No Cracks – Some Voids
Lift #3	¾” HMA Binder Course – Good Condition – No Cracks – No Voids
Lift #4	1 ¼” HMA Binder Course – Good Condition – No Cracks – Some Voids
Lift #5	1 ¼” HMA Surface Course – Good Condition – No Cracks – No Voids
Lift #6	7 ¼” PCC Course – Fair Condition – Some Cracks – Some Voids

JK:bd\Soils\Pavement Cores Spring Valley Bridge


IL 89, Spring Valley
Core # 1
Sta. 20+00 LT
S.B. Driving Lane
5/9/12


IL 89, Spring Valley
Core # 2
Sta. 15+00 RT
N.B. Driving Lane
5/9/12


IL 89, Spring Valley
Core # 3
Sta. 10+00 LT
S.B. Driving Lane
5/9/12

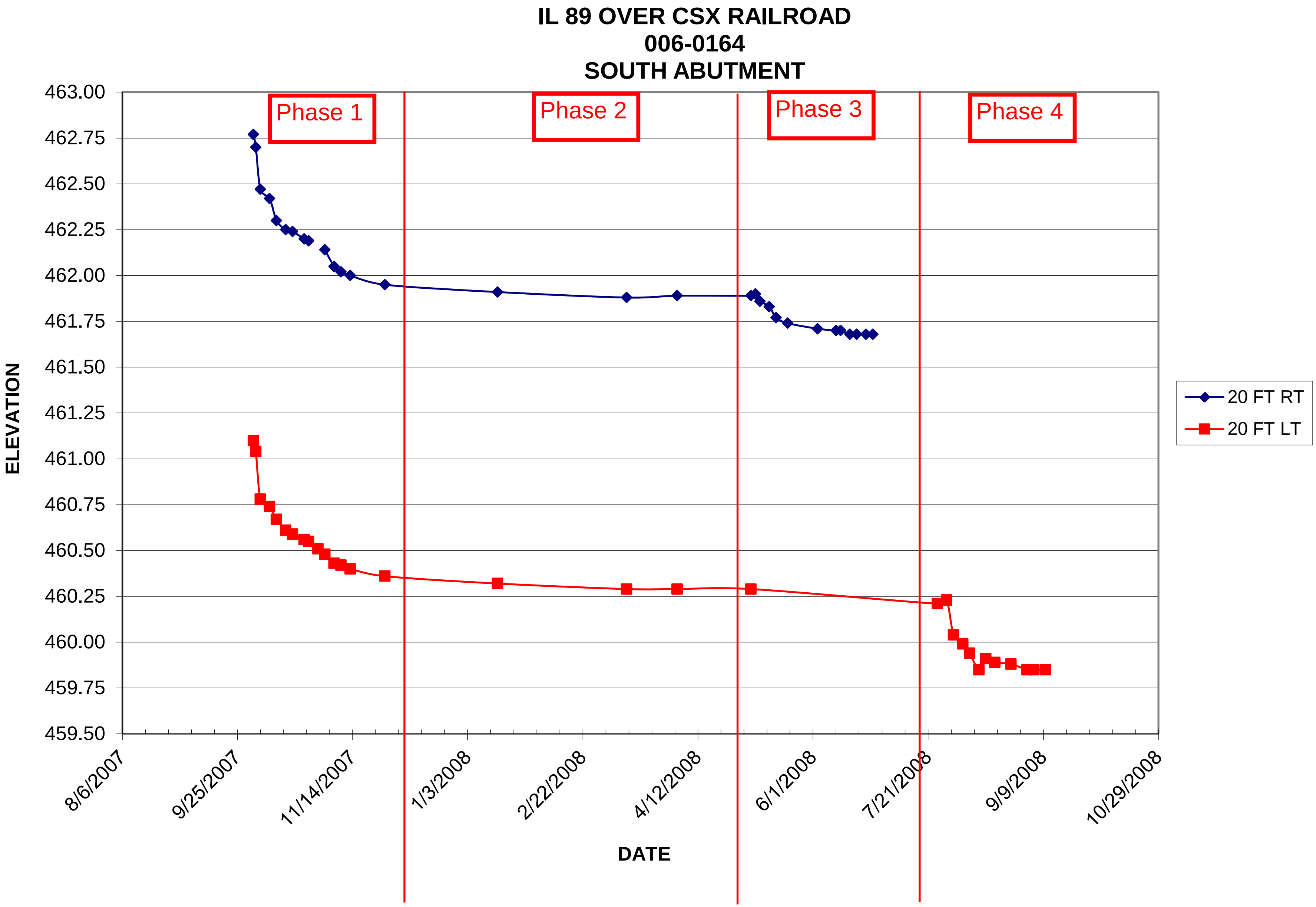

IL 89, Spring Valley
Core # 4
Sta. 1+00 RT
N.B. Driving Lane
5/9/12


IL 89, Spring Valley
Core # 5
Sta. 6+00 LT
S.B. Driving Lane
5/9/12


IL 89, Spring Valley
Core # 6
Sta. 16+00 RT
N.B. Driving Lane
5/9/12

APPENDIX

L


IL 89 OVER CSX RAILROAD
006-0164
SOUTH ABUTMENT
Phase 1
Phase 2
Phase 3
Phase 4
ELEVATION
463.00
462.75
462.50
462.25
462.00
461.75
461.50
461.25
461.00
460.75
460.50
460.25
460.00
459.75
459.50
8/6/2007
9/25/2007
11/14/2007
1/3/2008
2/22/2008
4/12/2008
6/1/2008
7/21/2008
9/9/2008
10/29/2008
DATE
20 FT RT
20 FT LT

APPENDIX

M

EMBANKMENT

Revised 5-7-2015

Embankments shall be constructed according to Sections 202, 204 and 205 of the Standard Specifications and as required, or modified, in this Special Provision.

When embankments are to be constructed on hillsides or existing slopes, steps shall be keyed into the existing slope by stepping and benching as directed by the Engineer.

All material proposed for use in embankment construction shall be approved by the Engineer. In addition to the requirements of Section 204, soils exhibiting the following properties shall not be allowed:

> Liquid Limit (AASHTO T 89) greater than 60.

Soils exhibiting the following properties shall be restricted to the interior of the embankment:

> Less than 35% passing the #200 sieve.
> Liquid Limit (AASHTO T 89) greater than 50 but less than 60.
> Plasticity Index (AASHTO T 90) less than 12.

These restricted soils shall be encapsulated by a minimum of three (3) feet of unrestricted soil as directed by the Engineer. The thickness of encapsulation shall not include topsoil. The Engineer may restrict or prohibit the use of materials other than those identified above, which exhibit potential for significant erosion or excessive volume change.

Geotechnical instrumentation (settlement plates, piezometers, and inclinometers) shall be installed prior to embankment and surcharge construction for the purpose of monitoring the rate and amount settlement. Installation specifications and locations for the geotechnical instrumentation are provided under their respective special provisions.

The moisture content of all embankment shall not exceed 110% of the optimum moisture determined according to AASHTO T 99 (Method C). If the Engineer determines the embankment lifts are unstable after achieving the required density, the Contractor shall reprocess and compact the unstable material as directed by the Engineer. The Engineer may reduce the allowable moisture content to correct or prevent stability problems during embankment construction.

All embankment lifts shall provide a minimum Immediate Bearing Value (IBV) of 4.0 when tested by the Engineer according to Illinois Testing Procedure 501 or 502. Any embankment lift not providing the minimum required IBV shall be removed and replaced, modified, and/or re-processed, to provide an IBV of 4.0.

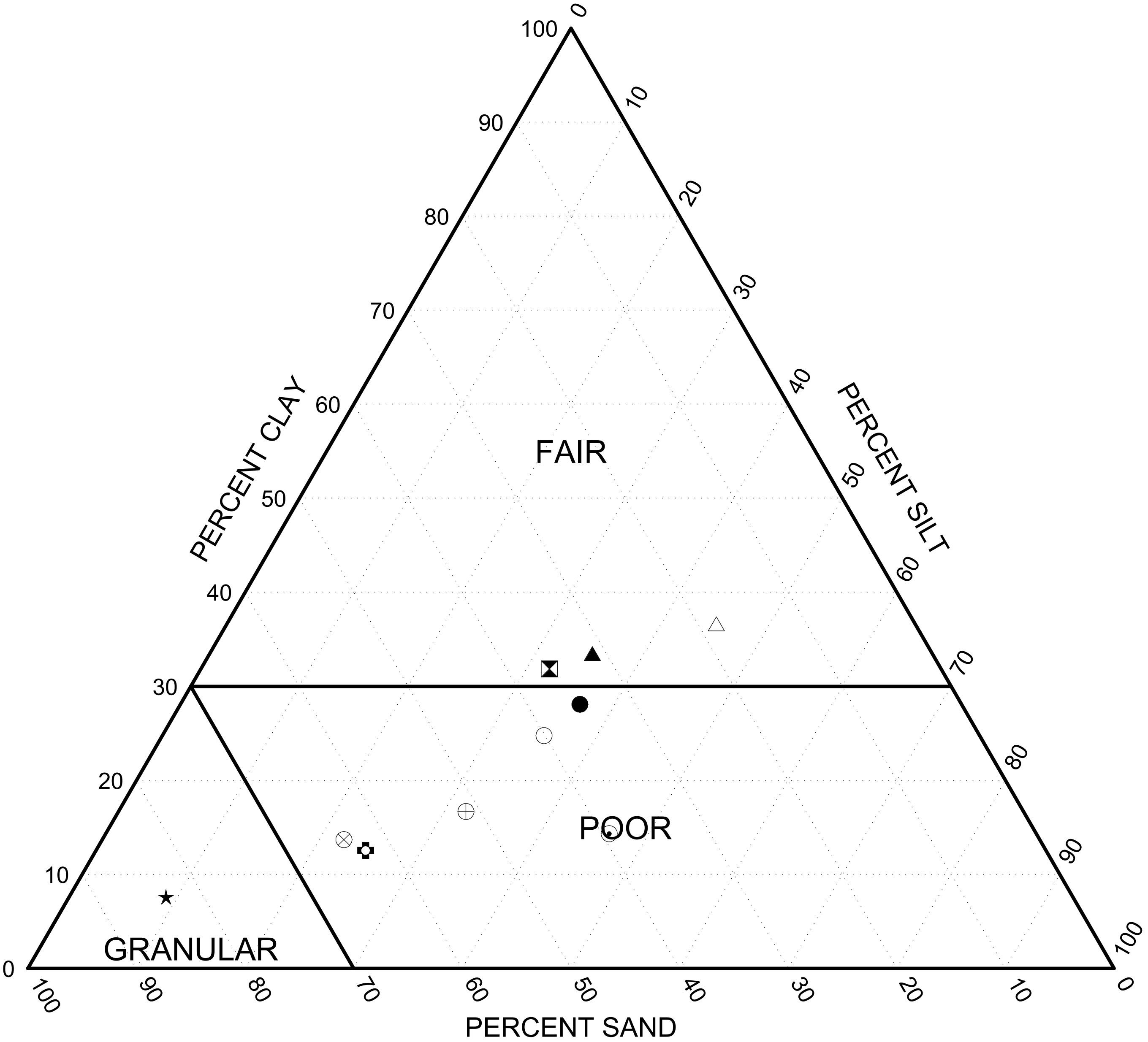
The rate of placement of the embankment material shall be time-phased based on the settlement plate and piezometer, and slope inclinometer readings to maintain stability and a minimum factor of safety. If any signs of instability are observed during placement of the embankment, they shall be immediately reported to the Engineer and all material placement shall be halted. Material placement may be resumed upon the approval of the Engineer. The Contractor shall remove previously placed embankment material to the limits directed by the Engineer, when necessary to achieve stability of the embankment.

Refer to plan details and the special provision titled “Piezometers” for monitoring and excess groundwater pore pressure limits.

This work will not be paid for separately, but shall be considered included in the unit prices for Earth Excavation, Borrow, and/or Furnished Excavation as included in the project.

APPENDIX

N



	Borehole	Station	Offset	Depth (ft)	Classification
●	01 (2014)	167+20	38.00 ft Rt.	5.00	A-6 (4) CLAY LOAM
⧗	02 (2014)	148+31	37.00 ft Rt.	2.50	A-4 (3) CLAY
▲	02 (2014)	148+31	37.00 ft Rt.	12.00	A-6 (5) CLAY
★	LB-01	179+00 (Prop.)	15.00 ft Lt.	2.50	SAND
⊙	LB-02	176+00 (Prop.)	10.00 ft Lt.	1.00	A-4 (2) LOAM
✜	LB-02	176+00 (Prop.)	10.00 ft Lt.	4.00	A-4 (0) SANDY LOAM
○	LB-03	173+00 (Prop.)	3.00 ft Rt.	1.00	A-4 (1) CLAY LOAM
△	LB-03	173+00 (Prop.)	3.00 ft Rt.	4.00	A-6 (14) CLAY
⊗	LB-03	173+00 (Prop.)	3.00 ft Rt.	6.00	A-4 (0) SANDY LOAM
⊕	LB-03	173+00 (Prop.)	3.00 ft Rt.	10.00	A-4 (0) SANDY LOAM

Illinois Department of Transportation

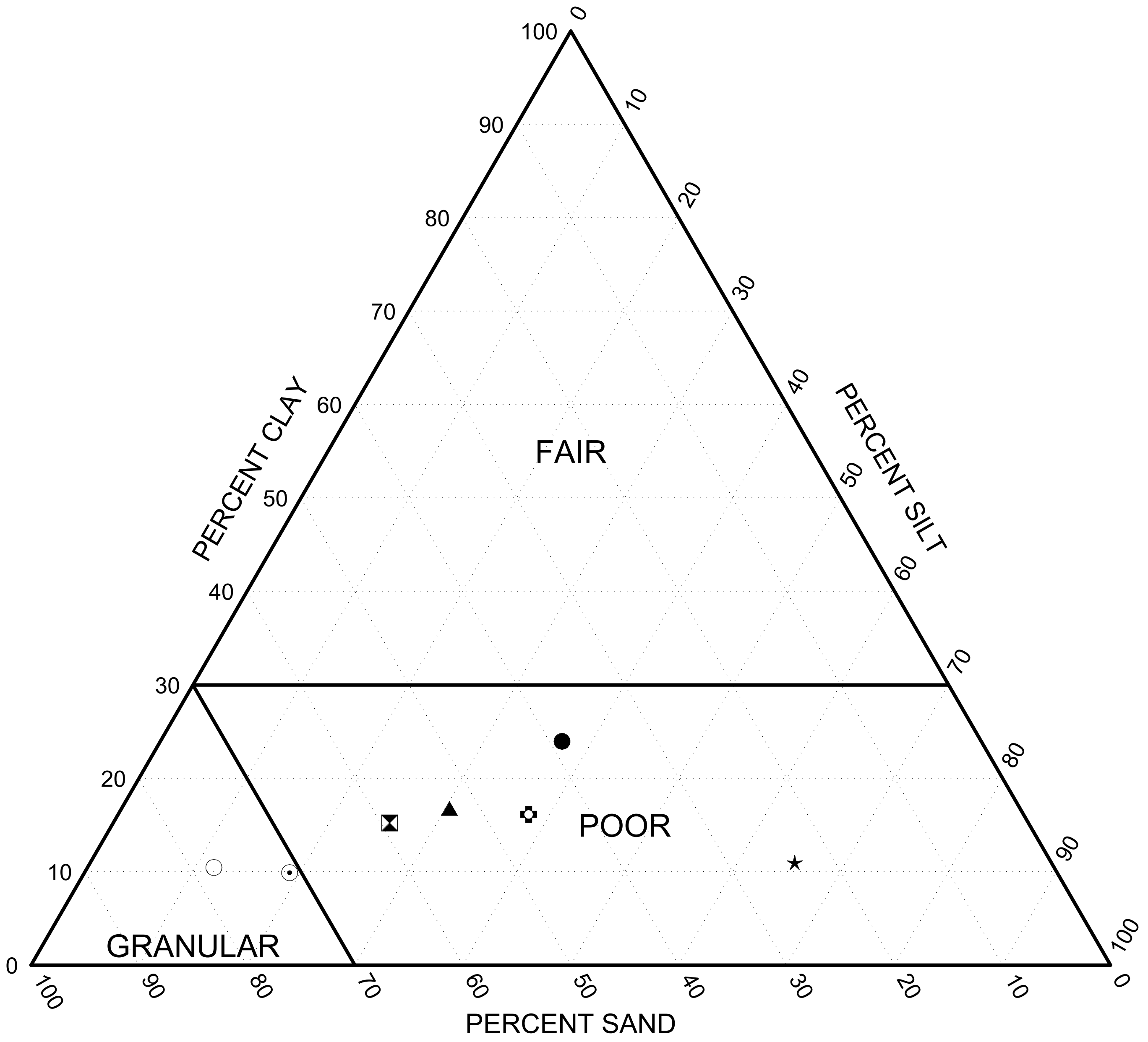
Division of Highways
IDOT

SUBGRADE SUPPORT RATING

Route: IL 89 (FAP 698)

Section: (1)BR

County: Putnam, Bureau



	Borehole	Station	Offset	Depth (ft)	Classification
●	**LB-04**	**141+00 (Prop.)**	**4.00 ft Rt.**	**1.00**	**A-4 (1) CLAY LOAM**
⧗	**LB-04**	**141+00 (Prop.)**	**4.00 ft Rt.**	**11.50**	**A-4 (0) SANDY LOAM**
▲	**LB-05**	**137+00 (Prop.)**	**14.00 ft Lt.**	**1.00**	**A-4 (1) SANDY LOAM**
★	**LB-06**	**170+00 (Prop.)**	**50.00 ft Lt.**	**25.00**	**A-4 (5) SILTY LOAM**
⊙	**LB-10**	**177+00 (Prop.)**	**150.00 ft Lt.**	**0.50**	**A-2-4 (0) SANDY LOAM**
✤	**LB-11**	**174+50 (Prop.)**	**138.00 ft Lt.**	**0.00**	**A-4 (0) LOAM**
○	**LB-11**	**174+50 (Prop.)**	**138.00 ft Lt.**	**3.00**	**A-2-4 (0) SANDY LOAM**

Illinois Department of Transportation

Division of Highways
IDOT

SUBGRADE SUPPORT RATING

Route: IL 89 (FAP 698)

Section: (1)BR

County: Putnam, Bureau

SUBGRADE SUPPORT RATINGS 078-0006.GPJ IL_DOT.GDT 4/8/15

APPENDIX

O

Illinois Department of Transportation

Memorandum

To: Paul Loete Attn: James Threadgill / Michael Short
From: Laura R. Mlacnik By: Matthew Mueller
Subject: Slope Stability / Settlement Analysis (North Approach)
Date: April 24, 2015

Route: FAP 698 (IL 89)
Section: (1)BR
County: Bureau
Job No.: P-93-013-11
BMPR Lab No.: 13004
SN: 078-0006 (EX)/078-0047 (PR)

The Bureau of Materials and Physical Research (BMPR) Geotechnical Sub-unit has conducted laboratory testing, settlement analyses and slope stability analyses as requested by District 3 for the above referenced project around Station 148+50 (PR). The laboratory test results for Boring 5-ST (2013) are presented in Attachment B on the Shelby Tube Test Results forms and the consolidation test results summaries.

Design assumptions, embankment profiles, soil layering, and soil strength parameters were based on the laboratory test results from Boring 5-ST (2013), boring log data from Boring 5 (2013), the preliminary cross section at Station 148+00 (PR), the preliminary proposed centerline profile, and phone discussions with the District 3 Geotechnical Unit. A groundwater elevation of about 442.2 ft. and an embankment fill unit weight of 125 lbs/ft^3 were assumed for the settlement and slope stability analyses.

Several construction stages were evaluated in the slope stability and settlement analyses for both the left and right side of the embankment. The cross section in Figure 1 of Attachment A shows the various construction stages used for the settlement and slope stability analyses. Stage 1a consisted of construction of the proposed fill to match the height of the existing embankment at about elevation 472.5 ft. Stage 1b consisted of construction on top of the Stage 1a to the final embankment height of about 484.3 ft. with an assumed MSE wall at about 24 ft. right of the proposed centerline for maintenance of traffic on the existing alignment. A surcharge option is provided for Stage 1b to address differential settlements anticipated from placement of the Stage 2 fill material. Stage 2 places fill on the proposed right side slope over the existing alignment to complete the embankment construction.

Settlement

Tables 1, 2, and 3 in Attachment A summarize the results of the settlement analyses. (Additional details of the settlement analyses are provided in Attachment C for reference.) Surcharge and wick drain treatment options were also analyzed and are summarized in Tables 4, 5, and 6 of Attachment A. A comparison of estimated primary settlement verses time for untreated, surcharge, and wick drain treatment options is also provided in Figures 2a and 2b of Attachment A, where Figure 2b is a close up of Figure 2a for better viewing of the wick drain curves.

Table 2 of Attachment A summarizes the estimated differential settlement across the proposed and existing embankments at Station 148+50 for the various construction stages. Consideration should be given to the following:

- Approximately 1.8 to 6.4 inches of settlement are estimated across the existing driving lanes from the Stage 1a and 1b embankment construction at Station 148+50. For maintenance of traffic during the construction, **it is recommended that the existing north bridge abutment be evaluated for the effects of down drag forces resulting from this settlement**.

- Approximately 0.7 inches of differential settlement is estimated across the proposed driving lanes from the Stage 2 fill placement at Station 148+50. This would occur after traffic was shifted to the proposed alignment. To reduce this settlement to about less than ½ inch near the bridge abutment, a surcharge option in Stage 1b is provided. Refer to Table 4 of Attachment A for the recommended surcharge treatment limits. **If a surcharge is not utilized to mitigate this settlement, it is recommended that the proposed north bridge abutment be evaluated for effects of resulting down drag forces.**

Wick drains should be used to reduce the time required for primary settlement and reduce the buildup of excess groundwater pore pressure during the embankment construction. The wick drains should be extended from the top of a granular drainage layer to bottom of the lowest cohesive soil layer at an approximate elevation of 396.2 feet. The wick drains should be installed from the assumed stage line at about 24 ft. right of the proposed centerline to the midpoint of the left side slope. This may require either stepping and benching the existing side slope or installing temporary shoring or sheet pile at the stage line. A positive drainage outlet is also required for the granular drainage layer. This can be either provided by either an underdrain system or by daylighting the drainage layer at the side of the embankment with fabric and riprap for erosion protection. Figure 1 of Attachment A shows a diagram of a typical wick drain and drainage layer configuration. Table 5 of Attachment A summarizes the recommended treatment limits for wick drains, and Table 6 of Attachment A provides spacing options.

Since the existing bridge abutment may need further evaluation for the effects of down drag forces resulting from the settlement estimated across the existing driving lanes from the Stage 1a and 1b embankment construction, the District requested additional settlement estimates for future consideration in the feasibility of using aggregate column ground improvement as an option in reducing settlement and development of down drag force. Estimated settlements beneath the proposed fill treated with aggregate columns are dependent on the stress concentration that is developed within the aggregate columns; however, the amount of stress concentration development is difficult to estimate in the design phase. As such, a range of typical stress concentration factors and area replacement ratios are used to provide a range estimated of settlement. Table 7 of Attachment A summarizes a range of estimated settlements at Sta. 148+50, 10 ft. left of the proposed centerline for a stress concentration range of 3 to 5 and an area replacement ratio range of about 0.23 to 0.31. Cumulative estimated settlements of the upper and lower bounds of this study range are also shown graphically in Figure 4 of Attachment A near the assumed stage construction line at Sta. 148+50, 20 ft. right of the proposed centerline. The estimated settlements shown in Figure 4 cumulate from the bottom to the top of the consolidating layers. If this option is considered, the estimated treatment limits of the aggregate columns should extend from the assumed stage line at about 24 ft. right of the proposed centerline to the midpoint of the left side slope, and within 50 feet of the existing bridge abutment in either direction along mainline. Additionally, use of a granular base drainage layer with a positive drainage outlet will be necessary to facilitate drainage during the consolidation process.

Slope Stability

Table 8 of Attachment A summarizes the results of the slope stability analyses. Tables 10 and 11 of Attachment A summarize the soil data used for the slope stability analyses, and figures detailing the configuration for these analyses are attached for reference. **To maintain a minimum factor of safety of 1.3 during construction, the rate of fill placement may need to be adjusted to control the development of excess groundwater pore pressures for fill placed above about elevation 472.5 ft.** A piezometer should be installed to monitor pore pressures, and an adjacent settlement monitoring platform should also be installed between about 8 ft. and 24 ft. left of the proposed centerline at Station 148+50. Table 9 of Attachment A summarizes the piezometer location and maximum allowable pore pressure data. If the pore pressures approach the maximum allowable shown in Table 9 of Attachment A, stop fill placement to allow the pore pressures to dissipate sufficiently before placing additional fill. If additional monitoring is desired, and inclinometer may also be installed around Sta. 148+50 near the toe of the proposed embankment, extending about 5 ft. into the shale bedrock.

If you have any questions or need further assistance, please contact Heather Shoup at (217)785-9972 or Paul S. Guthrie at (217)524-0633 of the BMPR Geotechnical Sub-Unit.

cc: Heather Shoup
Kurt Shmuck

Attachments

ATTACHMENT A

FIGURES AND TABLES

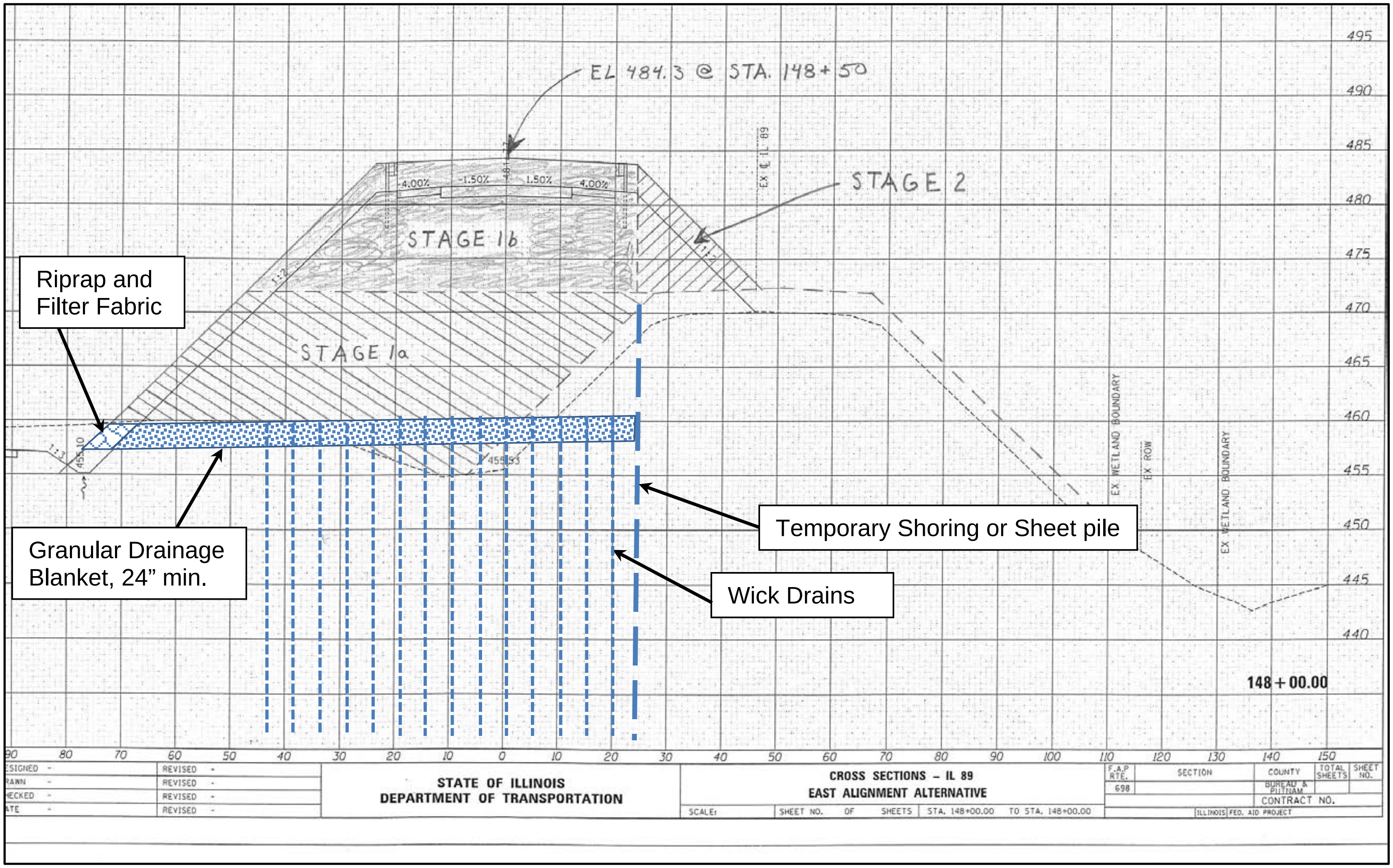
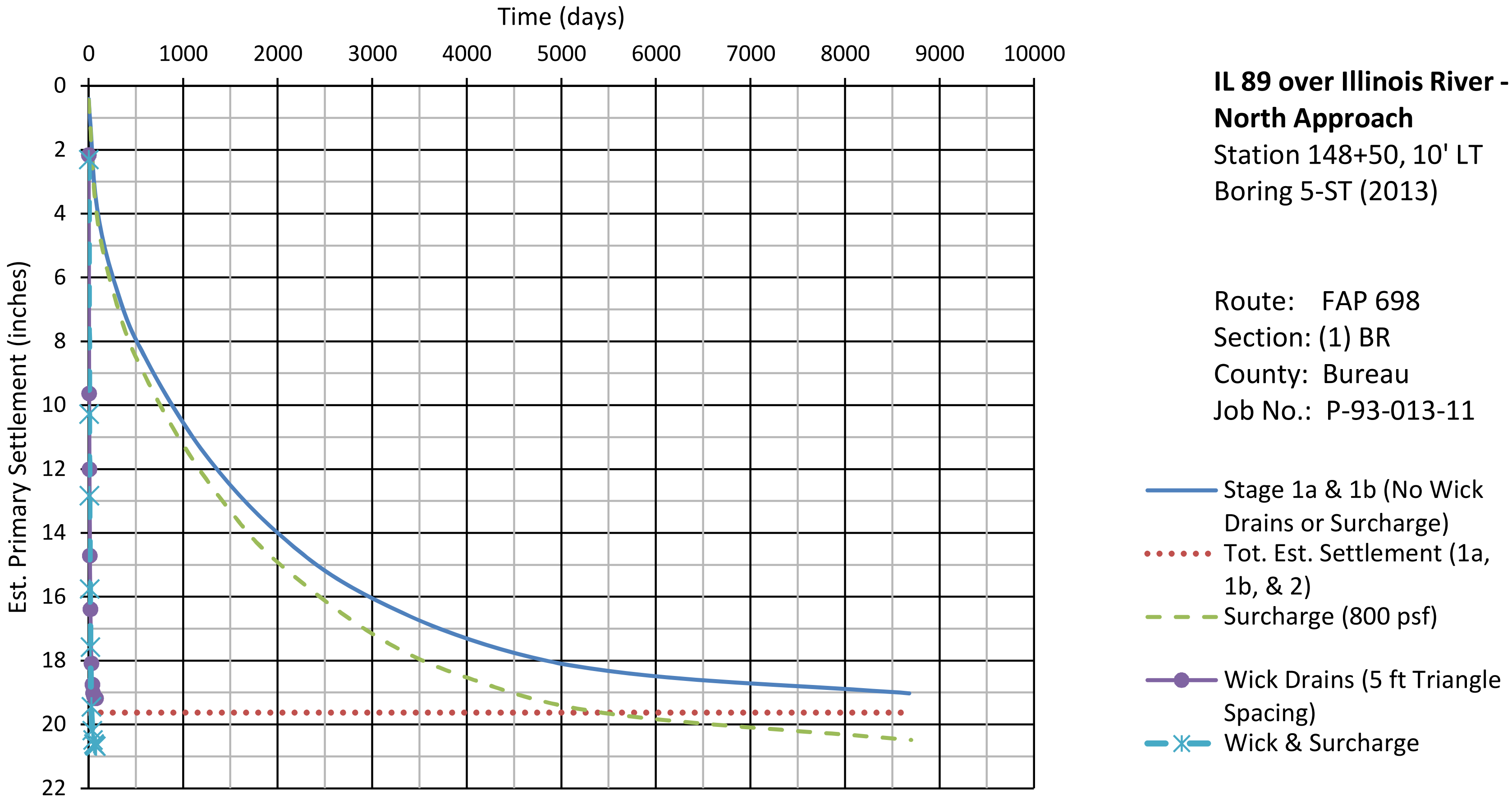


Figure 1. Anticipated construction stages and diagram for wick drain options.

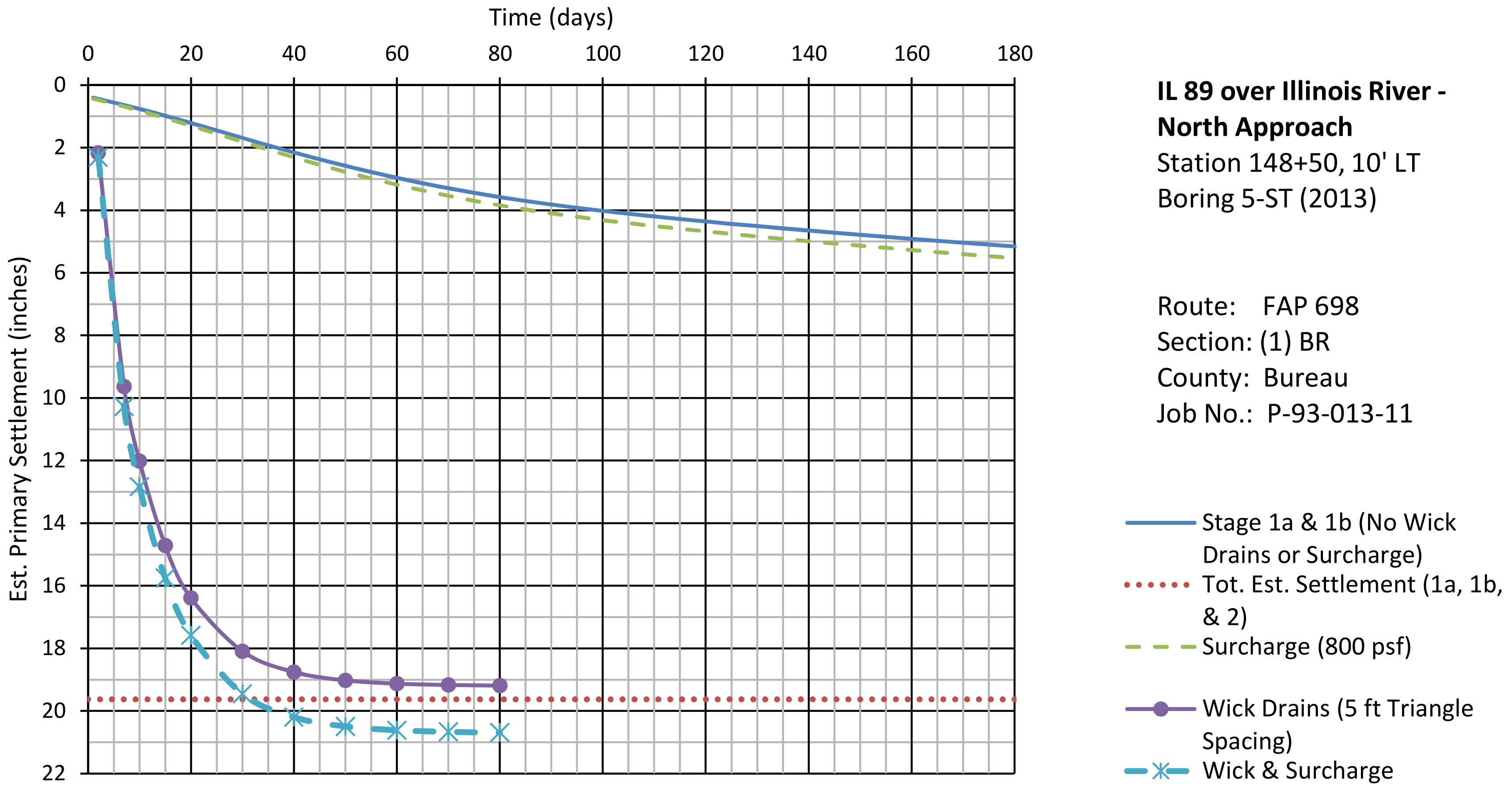
Figure 2a. Estimated Settlement verses Time



IL 89 over Illinois River - North Approach
Station 148+50, 10' LT
Boring 5-ST (2013)

Route: FAP 698
Section: (1) BR
County: Bureau
Job No.: P-93-013-11

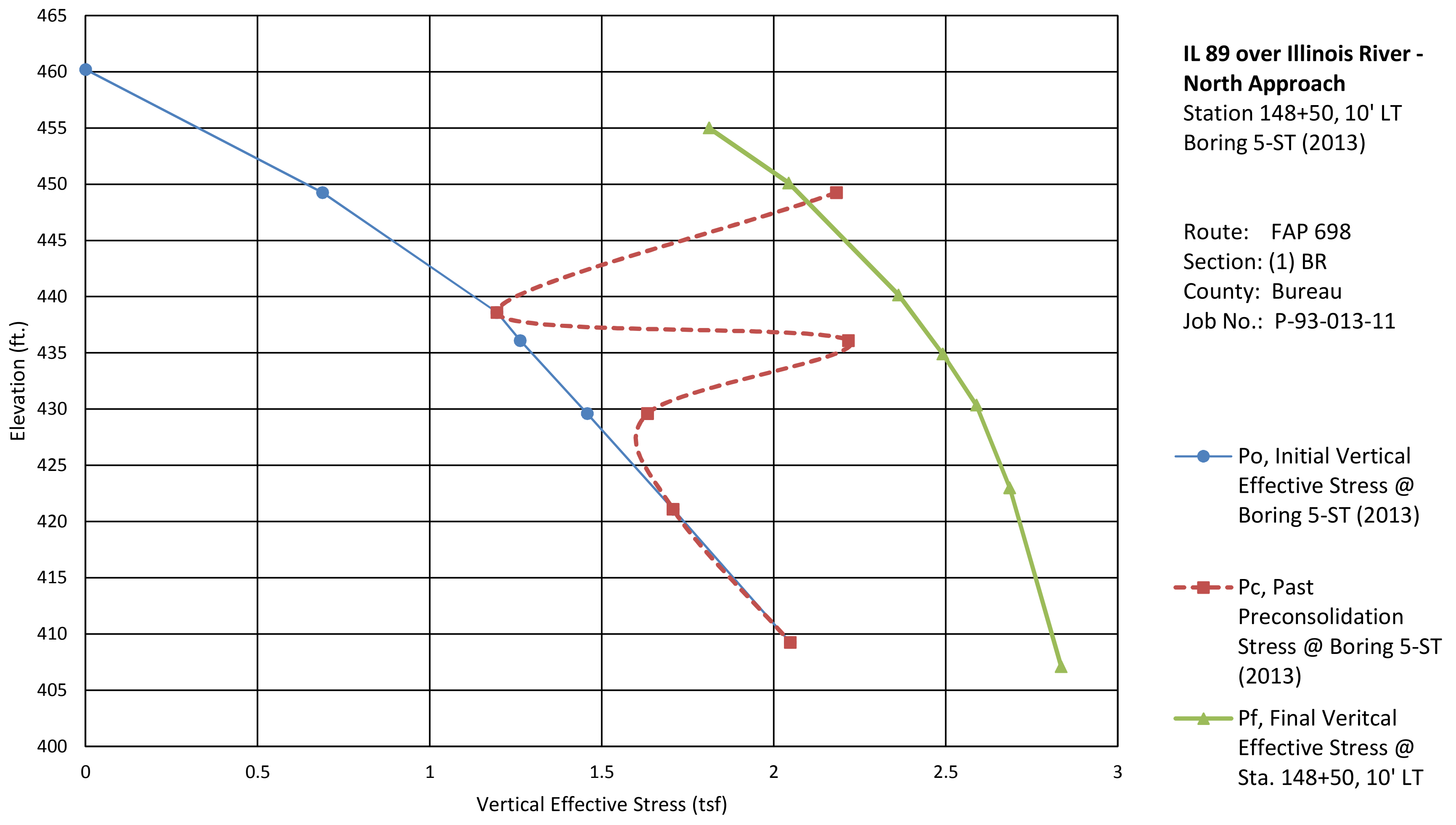
Figure 2b. Estimated Settlement verses Time



IL 89 over Illinois River - North Approach
Station 148+50, 10' LT
Boring 5-ST (2013)

Route: FAP 698
Section: (1) BR
County: Bureau
Job No.: P-93-013-11

Figure 3. Vertical Effective Stress vs. Elevation



IL 89 over Illinois River - North Approach
Station 148+50, 10' LT
Boring 5-ST (2013)

Route: FAP 698
Section: (1) BR
County: Bureau
Job No.: P-93-013-11

Figure 4. Estimated Cumulative Settlement at Depth

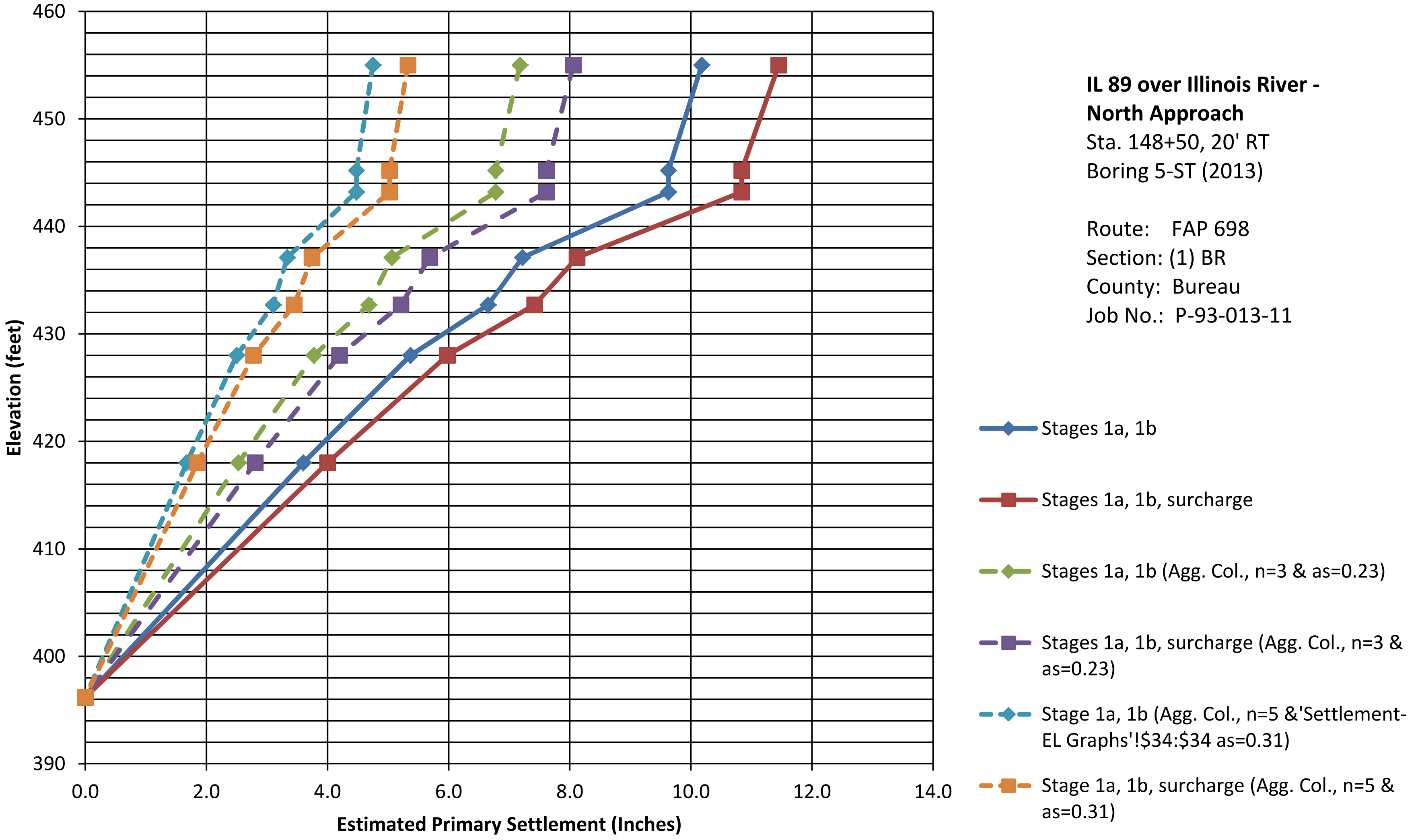


Table 1. Settlement Analysis Summary for Station 148+50, 10 ft. LT
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

Location of Analyses and Assumptions	**Top Elev. of Consolidating Layers (feet)**	**Bottom Elev. of Consolidating Layers (feet)**	**Total Est. Primary Settlement (inches)**	**Est. Time to 50% Settlement (t_{50}) (months)**	**Est. Time to 90% Settlement (t_{90}) (months)**	**Drainage Condition**
Stage 1a: 17.5 ft of fill to match height of existing embankment	455.0	396.2	13.6	27.7	119.2	Double (1)/ Single (3-7)
Stage 1b: Additional 11.5 ft. of fill over Stage 1a fill with assumed temp. MSE wall at 24 ft. RT stage line.	455.0	396.2	5.6	30.3	130.5	Double (1)/ Single (3-7)
Stage 2: 11.5 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	455.0	396.2	0.4	31.7	136.3	Double (1)/ Single (3-7)
Total for Stage 1a, 1b, and 2:			**19.6**			
Stage 1b (surcharge option): 550 psf surcharge with the Stage 1b fill.	455.0	396.2	1.5	29.1	125.2	Double (1)/ Single (3-7)
Total for Stage 1a, 1b, and 1b (surcharge):			20.7			

Notes: The existing ground line was assumed to be 455.0 ft. There were 6 consolidating layers in the analyses. All consolidation test e vs. log p curves were correctible. The t_{50} and t_{90} times were based on log of time curves for layer 3 (Sample 4-3) and square root of time curves for the other layers. Settlement of the existing embankment fill is also assumed to be negligible.

Table 2. Differential Settlement Summary for Station 148+50
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

	Offset from Proposed Center Line					
Location of Analyses and Assumptions		**10 ft. LT**	**20 ft. RT (PR RT SHLD)**	**30 ft. RT (EX LT SHLD)**	**46 ft. RT (EX Centerline)**	**62 ft. RT (EX RT SHLD)**
Stage 1a: 17.5 ft of fill to match height of existing embankment	(inches)	13.6	5.8	3.1	1.3	0.7
Stage 1b: Additional 11.5 ft. of fill over Stage 1a fill with assumed temp. MSE wall at 24 ft. RT stage line.	(inches)	5.6	4.3	3.3	1.8	1.1
Stage 2: 11.5 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	(inches)	0.4	1.1	1.3	1.1	0.6
Total for Stage 1a, 1b, and 2:	**(inches)**	**19.6**	**11.2**	**7.7**	**4.2**	**2.4**
Total for Stage 1a and 1b:	(inches)	19.2	10.1	6.4	3.1	1.8
Stage 1b (surcharge option): 550 psf surcharge with the Stage 1b fill.	(inches)	1.5	1.3	1.1	0.7	0.5
Total for Stage 1a, 1b, and 1b (surcharge):	(inches)	20.7	11.4	7.5	3.8	2.3

Table 3. Differential Settlement Summary
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

	Offset from Proposed Center Line		
Location of Analyses and Assumptions		**10 ft. LT**	**20 ft. RT (PR RT SHLD)**
Station 142+00			
Stage 1a and 1b: 13.9 ft of fill	(inches)	8.9	2.1
Stage 2: 3.9 ft. tall fill to complete RT shoulder and side slope (if no surcharge in Stage 1b).	(inches)	0.3	0.5
Total for Stage 1a, 1b, and 2:	**(inches)**	9.2	2.6
Station 145+00			
Stage 1a and 1b: 13.3 ft of fill	(inches)	9.4	5.5
Stage 2: 7.8 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	(inches)	0.5	1.3
Total for Stage 1a, 1b, and 2:	**(inches)**	9.9	6.8
Station 146+00			
Stage 1a and 1b: 16.9 ft of fill	(inches)	11.6	6.7
Stage 2: 8.9 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	(inches)	0.6	1.6
Total for Stage 1a, 1b, and 2:	**(inches)**	**12.2**	**8.3**
Station 147+00			
Stage 1a and 1b: 21.5 ft of fill	(inches)	14.4	8.8
Stage 2: 10.5 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	(inches)	0.5	1.4
Total for Stage 1a, 1b, and 2:	**(inches)**	**14.9**	**10.2**

Table 4. Differential Primary Settlement Surcharge Treatment Option Recommendations
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

Location (length)	Surcharge Pressure (1)	Treatment Width	Concerns
Sta. 148+00 to Back of Proposed Bridge Abutment	550 psf	Entire top width of the Stage 1b fill.	Differential Settlement from Stage 2 fill.

Note 1: Embankment fill height is assumed to be at the top of finished grade. If embankment fill is placed to a lower elevation to accommodate aggregate base layers and pavement, adjust (increase) the surcharge to an equivalent load of the finished grade.

Table 5. Wick Drain Option Treatment Recommendations
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

Location (length)	Depth	Spacing	Treatment Width	Concerns
Sta. 140+50 to Midpoint of Proposed Bridge End Slope (1)	Top of drainage layer to about elevation 396.2 ft. (2)	(See Table 6.)	24 ft. RT of PR CL to midpoint or proposed LT side slope.	Decrease buildup of pore pressure for slope stability and decrease time to t_{90} settlement.

Note 1: Omit proposed entrance at RT Sta. 144+00.

Note 2: The granular drainage layer should be at least 24 inches thick from Sta. 140+50 to 146+00 and 36 inches thick from Station 146+00 to the midpoint of the proposed bridge end slope.

Table 6. Treatment Option Summary for Estimated Time of Primary Settlement for Station 148+50, 10 ft. LT
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

Location of Analyses and Assumptions	**Total Est. Primary Settlement (3) (inches)**	**Estimated Primary Settlement Time (1,3)**							
		No Wick Drains		**Wick Drains (2) (5 ft Triangular)**		**Wick Drains (2) (7.5 ft Triangular)**		**Wick Drains (2) (10 ft Triangular)**	
		t_{50} (days)	**t_{90} (days)**	**t_{50} (days)**	**t_{90} (days)**	**t_{50} (days)**	**t_{90} (days)**	**t_{50} (days)**	**t_{90} (days)**
Stage 1a + 1b:	19.2	802	4131	7	25	18	61	32	114
Total for Stage 1a, 1b, and 1b (550 psf surcharge):	20.7	823	4101	8	25	18	62	33	116

Note 1: t_{50} and t_{90} are the estimated times to complete 50% and 90% of the settlement, respectively.

Note 2: The radial coefficient of consolidation, c_r, is assumed the same as the vertical coefficient, c_v, with no smear for the wick drain calculations.

Note 3: The existing ground line is assumed to be 455.0 ft. There were 6 consolidating layers in the analyses. All consolidation test e vs. log p curves were correctible. The t_{50} and t_{90} times are based on log of time curves for layer 3 (Sample 4-3) and square root of time curves for the other layers.

TABLE 6(B) WAS ADDED TO THIS REPORT ON 8-24-2015.

Table 6(b). Treatment Option Summary for Estimated Time of Primary Settlement for Station 148+50, 10 ft. LT
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

Location of Analyses and Assumptions	Total Est. Primary Settlement $^{(3)}$ (inches)	Estimated Primary Settlement Time $^{(1,3)}$							
		No Wick Drains		Wick Drains $^{(2)}$ (5 ft Triangular)		Wick Drains $^{(2)}$ (7.5 ft Triangular)		Wick Drains $^{(2)}$ (10 ft Triangular)	
		t_{95} (days)	t_{98} (days)	t_{95} (days)	t_{98} (days)	t_{95} (days)	t_{98} (days)	t_{95} (days)	t_{98} (days)
Stage 1a + 1b:	19.2	5335	7144	32	42	80	105	150	198
Total for Stage 1a, 1b, and 1b (550 psf surcharge):	20.7	5518	7391	33	43	81	107	152	201

Note 1: t_{95} and t_{98} are the estimated times to complete 95% and 98% of the settlement, respectively.

Note 2: The radial coefficient of consolidation, c_r, is assumed the same as the vertical coefficient, c_v, with no smear for the wick drain calculations.

Note 3: The existing ground line is assumed to be 455.0 ft. There were 6 consolidating layers in the analyses. All consolidation test e vs. log p curves were correctible. The t_{95} and t_{98} times are based on log of time curves for layer 3 (Sample 4-3) and square root of time curves for the other layers.

Table 7. Aggregate Column Settlement Analyses Summary for Station 148+50, 10 ft. LT
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

Location of Analyses and Assumptions	Stress Concentration Factor, n = 3 (1,2)			Stress Concentration Factor, n = 5 (1,2)		
	Total Est. Primary Settlement (inches)	Est. Time to 50% Settlement (t_{50}) (days)	Est. Time to 90% Settlement (t_{90}) (days)	Total Est. Primary Settlement (inches)	Est. Time to 50% Settlement (t_{50}) (days)	Est. Time to 90% Settlement (t_{90}) (days)
Area Replacement Ratio, a_s = 0.23						
Stage 1a and 1b:	13.9	3	9	10.7	3	9
Stage 2: (if no surcharge in Stage 1b).	0.3			0.2		
Total for Stage 1a, 1b, and 2:	**14.2**			**10.9**		
Stage 1b (surcharge option):	1.0	3	9	0.7	3	9
Total for Stage 1a, 1b, and 1b (sur.):	14.9			11.4		
Area Replacement Ratio, a_s = 0.31						
Stage 1a and 1b:	12.6	3	9	9.3	3	9
Stage 2: (if no surcharge in Stage 1b).	0.2			0.2		
Total for Stage 1a, 1b, and 2:	**12.8**			**9.5**		
Stage 1b (surcharge option):	0.9	3	9	0.6	3	9
Total for Stage 1a, 1b, and 1b (sur.):	13.5			9.9		

Note 1: Aggregate columns are assumed to extend from the existing ground line (assumed to be elevation 455.0 ft.) to the bottom of the consolidating layers at elevation 396.2 ft. The equilibrium method is used for the settlement calculations. The assumed area replacement ratios of 0.23 and 0.31 are for 36 inch and 42 inch diameter aggregate columns placed on 6 ft. center to center spacing, respectively. A smear effect of about 10% the column diameter is also assumed for the settlement time calculations.

Note 2: There were 6 consolidating layers in the analyses. All consolidation test e vs. log p curves were correctible. The t_{50} and t_{90} times were based on log of time curves for layer 3 (Sample 4-3) and square root of time curves for the other layers. Layer 1 is assumed to be double drained and the remaining layers are assumed to be single drained in the vertical direction. Settlement of the existing embankment fill is also assumed to be negligible.

Table 8. Slope Stability Analysis Summary for Station 148+50
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

Location of Analyses and Assumptions (2)	Embank. Height (feet)	Slope (H:V)	Critical Failure Surface Elev. (feet)	Failure Surface Circular/ Block	FOS (Bishop simplified Method)	Seismic (1)		
						Critical Failure Surface Elev. (feet)	Failure Surface Circular/ Block	FOS (Janbu simplified Method)
Undrained Total Stress (Short Term) (3)								
Stage 1a: Left side	17.5	2:1	411.2	Circular	1.330	417.5	Circular	0.888
Stage 1b: Left side	29.3	2:1	413.1	Circular	0.944 (4)	–	–	–
Stage 1b (Surcharge): Left side, 550 psf surcharge	29.3	2:1	413.1	Circular	0.887 (4)	–	–	–
Stage 2: Left side	29.3	2:1	413.1	Circular	0.947 (4)	–	–	–
Stage 1a: Right side	17.5	2:1	410.4	Circular	0.869 (5)	–	–	–
Stage 2: Right side	29.3	2:1	411.8	Circular	0.735 (5)	–	–	–
Drained Effective Stress (Long Term) (3)								
Stage 2: Left side	29.3	2:1	453.3	Circular	2.441	421.6	Circular	1.702
Stage 2: Right side	29.3	2:1	425.8	Circular	1.955	422.9	Circular	1.343

Note 1: A peak horizontal ground acceleration of 0.099 was used for the seismic analyses.

Note 2: Details of the assumed temporary shoring or MSE wall system design shown in Stage 1b and 1b (Surcharge) are anticipated to be determined during the construction phase; and as such, the global stability was not possible to be evaluated as part of these analyses. The cross section at station 148+00 and preliminary profile was used for the existing ground surface elevations. Both Janbu simplified and Bishop simplified methods were performed for circular failure.

Note 3: Soil strength parameters used for Undrained Total Stress (short term condition) and Drained Effective Stress (long term condition) are shown in Tables 10 and 11, respectively.

Note 4: To maintain a minimum factor of safety of 1.3 during construction, monitor pore pressures for fill heights above about elevation 472.5 ft. If the pore pressures approach the maximum allowable shown in Table 9, stop fill placement to allow the pore pressures dissipate sufficiently before placing additional fill.

Note 5: Increase in effective stress and excess pore pressure is minor, and should not activate the undrained condition.

Table 9. Recommended Piezometer Location and Data
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Borings 5 (2013) and 5-ST (2013), Station 148+87 (PR)

Location Number	**Station**	**Offset**	**Nearest Boring**	**Approximate Elevation (ft.)(1)**	**Est. Initial Reading (psf)(3)**	**Est. Max. Allowable Reading(2) (psf)**			
						17.5 ft. (fill height)	**22.5 ft. (fill height)**	**29.3 ft. (fill height)**	**29.3 ft. fill + 550 psf surcharge**
1	148+50	50 ft. LT	5-ST (2013)	415.6	1660	2392 (Ru = 0.39)(4)	2350 (Ru = 0.37)(4)	2320 (Ru = 0.35)(4)	2310 (Ru = 0.35)(4)

Note 1: Piezometers should be founded in soft clay layers. See nearest boring for additional subsurface stratigraphy details.
Note 2: Values maintain minimum FS of 1.3 using short term values.
Note 3: Based on groundwater elevation of 442.2 ft.
Note 4: Ru = u/σ_v = Pore Pressure / Total Vertical Stress.

Table 10: Slope Stability Undrained Total Stress Analysis (Short Term)
Material Properties Summary
Program: Slide version 5.044 by Rocscience, Inc.
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Station 148+87 (PR), Borings 5-ST (2013) and 5 (2013), North Abutment

Material Name	Strength Type	Unit Weight (lb/ft^3)	Cohesion Type	Cohesion (psf)	Friction Angle	Water Surface	Custom Hu value	Layer Top Elev. (ft)
Material 1 (New Fill)	Undrained	125	Constant	1000	–	None	–	Varies (Proposed Embankment)
Material 2	Undrained	125.9	Constant	605	–	None	–	Varies (Ground Surface)
Material 3	Drained	105	–	0	28°	Water Table	1	445.2
Material 4	Undrained	112.7	Constant	820	–	None	–	443.2
Material 5	Undrained	121.6	Constant	510	–	None	–	437.1
Material 6	Undrained	123.5	Constant	520	–	None	–	432.7
Material 7	Undrained	120.4	Constant	320	–	None	–	421.0
Material 8	Undrained	121.6	Constant	720	–	None	–	410.2
Material 9	Undrained	114.1	Constant	870	–	None	–	405.2
Material 10 Shale	Undrained	120.0	Constant	2000 (assumed)	–	None	–	396.2
Material 11 (Ex. Fill)	Undrained	125.0	Constant	1000	–	None	–	Varies (Existing Embankment)

Table 11: Slope Stability Drained Effective Stress Analysis (Long Term)
Material Properties Summary
Program: Slide version 5.044 by Rocscience, Inc.
Route FAP 698 (IL 89), Section (1)BR, Bureau County
Job No. P-93-013-11
Station 148+87 (PR), Borings 5-ST (2013) and 5 (2013), North Abutment

Material Name	Strength Type	Unit Weight (lb/ft^3)	Cohesion Type	Cohesion (psf)	Friction Angle	Water Surface	Custom Hu value	Layer Top Elev. (ft)
Material 1 (New Fill)	Undrained	125	Constant	1000	–	None	–	Varies (Proposed Embankment)
Material 2	Drained	125.9	–	580	29.9°	Water Table	1	Varies (Ground Surface)
Material 3	Drained	105	–	0	28°	Water Table	1	445.2
Material 4	Drained	112.7	–	530	19.9°	Water Table	1	443.2
Material 5	Drained	121.6	–	360	25.9°	Water Table	1	437.1
Material 6	Drained	123.5	–	345	20.2°	Water Table	1	432.7
Material 7	Drained	120.4	–	125	38.5°	Water Table	1	421.0
Material 8	Drained	121.6	–	285	40.0°	Water Table	1	410.2
Material 9	Drained	114.1	–	720	15.1°	Water Table	1	405.2
Material 10 Shale	Undrained	120.0	Constant	2000 (assumed)	–	None	–	396.2
Material 11 (Ex. Fill)	Undrained	125.0	Constant	1000	–	None	–	Varies (Existing Embankment)

ATTACHMENT B

LABORATORY TEST RESULTS

Illinois Department of Transportation

Shelby Tube Test Results

Boring No.: 5-ST N. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 1 of 4
Station: 148+87 (PR)
Section: (1) BR
Ground Surface Elev.: 460.2 ft.
Date: March 4, 2014
Offset: 49 ft. Lt.
County: Bureau
Begin Sampling Depth: 452.7 ft.
Job No.: P-93-013-11
Latitude: 41.314332° N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 442.2 ft.
Soils Lab Project No.: 13004
Longitude: 89.199392° W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)	Soil Type, Description and Observations
	0.0	460.2								Ground Surface – elev. 460.2 ft.
	↓	↓	---	---	---					Augered – 7.5 ft. to elev. 452.7 ft. – Not Sampled
	↓	↓	---	---	---					↓
	7.5	452.7	---	---	---					↓
1-1	7.8	452.4	---	12.0	123.9					Brown Clay Till fill
1-2	8.4	451.8	---	10.1	117.2					Same, top ¼, to Brown coarse Sandy Loam
1-3	9.1	451.1	0.09	15.2	117.3					Brown coarse Sandy Loam, top ½, to Gray Clay-Loam Till w/ wood pockets
1-4	9.7	450.5	UUTx	10.7	124.8	608	22.5	580	29.9	Brown Clay Till fill
2-1	10.6	449.6	0.42	12.5	124.5					Brown Sandy Clay-Loam, top ¼, to Brown Clay Till fill
2-2	11.3	448.9	cons	13.1	126.4					Brown Clay Till fill
2-3	11.9	448.3	1.49	11.1	134.1					Same
2-4	12.5	447.7	---	---	---					No Recovery
3-1	13.1	447.1	1.49	13.3	128.1					Brown Clay Loam Till fill
3-2	13.8	446.4	1.26	12.2	130.8					Same
3-3	14.4	445.8	0.33	9.0	131.5					Same, top ½, to Brown coarse Sandy Loam w/ gravel
3-4	15.0	445.2	---	---	---					No Recovery
	↓	↓	---	---	---					Tubes Pushed – 5 ft. to elev. 440.2 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	20.0	440.2	---	---	---					↓
4-1	20.6	439.6	0.93	48.0	104.6					Black Silty Clay w/ isolated wood pockets and hair roots
4-2	21.3	438.9	UUTx	31.6	117.2	824	2.1	534	19.9	Dark Gray Silty Clay w/ Silty Loam pockets – small stones bottom 1/3
4-3	21.9	438.3	cons	27.0	111.9					Dark Gray Silty Clay w/ Silty Loam lenses

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c' and Φ' column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

Illinois Department of Transportation

Shelby Tube Test Results

Boring No.: 5-ST N. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 2 of 4
Station: 148+87 (PR)
Section: (1) BR
Ground Surface Elev.: 460.2 ft.
Date: March 4, 2014
Offset: 49 ft. Lt.
County: Bureau
Begin Sampling Depth: 452.7 ft.
Job No.: P-93-013-11
Latitude: 41.314332° N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 442.2 ft.
Soils Lab Project No.: 13004
Longitude: 89.199392° W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c’ (psf)	Φ’ (deg)	Soil Type, Description and Observations
4-4	22.5	437.7	---	---	---					No Recovery
5-1	23.1	437.1	0.50	29.2	116.9					Black Silty Clay, top ½, to Gray Silty Clay-Loam w/ Silty Loam pockets
5-2	23.8	436.4	UUTx	24.4	123.6	511	4.5	364	25.9	Gray Silty Clay-Loam w/ oxidized Silty Loam pockets
5-3	24.4	435.8	cons	25.2	120.8					Gray Silty Clay-Loam w/ ox. SiL pockets – Dark Gray SiC pocket – small shells
5-4	25.0	435.2	---	---	---					No Recovery
6-1	25.3	434.9	---	23.5	---					Brown Silty Clay w/ Sand pockets, top ½, to Brown Silty Loam
6-2	25.9	434.3	0.47	27.0	121.8					Gray Silty Clay w/ Silt pockets and oxidized areas
6-3	26.6	433.6	0.49	28.1	120.2					Same
6-4	27.5	432.7	---	---	---					No Recovery
7-1	27.8	432.4	---	26.7	122.0					Brown Silty Clay w/ oxidized pockets
7-2	28.4	431.8	1.06	26.3	123.1					Same
7-3	29.1	431.1	1.10	26.6	121.8					Brown Silty Clay w/ Silty Loam pockets and oxidized Silt pockets
7-4	29.7	430.5	1.30	26.5	123.9					Same
8-1	30.3	429.9	---	28.4	122.0					Brown-Gray Silty Clay w/ small stones – oxidized pockets
8-2	30.9	429.3	cons	26.8	123.8					Gray Silty Clay – crumbly structure
8-3	31.6	428.6	UUTx	21.2	127.7	523	2.3	347	20.2	Same, top ¾, to Gray Silty Clay-Loam w/ SaCL pockets and small stones
8-4	32.2	428.0	0.54	24.1	123.4					Gray Silty Clay w/ Sand and Sandy Loam pockets – small stones
	↓	↓	---	---	---					Tube Pushed – 2.5 ft. to elev. 425.2 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	35.0	425.2	---	---	---					↓
9-1	35.3	424.9	---	23.4	124.5					Blue-Gray clayey Silty Loam
9-2	35.9	424.3	0.53	28.8	120.5					Blue-Gray Silty Clay w/ Sand pockets and lenses

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c’ and Φ’ column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

Illinois Department
of Transportation

Shelby Tube Test Results

Boring No.: 5-ST N. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 3 of 4
Station: 148+87 (PR)
Section: (1) BR
Ground Surface Elev.: 460.2 ft.
Date: March 4, 2014
Offset: 49 ft. Lt.
County: Bureau
Begin Sampling Depth: 452.7 ft.
Job No.: P-93-013-11
Latitude: 41.314332° N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 442.2 ft.
Soils Lab Project No.: 13004
Longitude: 89.199392° W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c’ (psf)	Φ’ (deg)	Soil Type, Description and Observations
9-3	36.6	423.6	0.86	33.3	117.8					Blue-Gray Silty Clay
9-4	37.1	423.1	0.76	27.7	120.4					Same
10-1	38.1	422.1	0.62	27.1	122.4					Gray Silty Clay-Loam
10-2	38.8	421.4	0.57	25.2	122.7					Gray clayey Silty Loam w/ isolated Sand pockets
10-3	39.4	420.8	cons	26.8	122.1					Gray clayey Silty Loam
10-4	40.0	420.2	---	---	---					No Recovery
11-1	40.3	419.9	---	27.4	120.8					Gray clayey Silty Loam w/ oxidized areas
11-2	40.9	419.3	UUTx	28.6	120.3	321	1.9	126	38.5	Gray clayey Silty Loam
11-3	41.6	418.6	0.48	31.4	118.5					Gray Silty Clay-Loam w/ Silty Loam lenses – isolated calcareous pockets
11-4	42.2	418.0	0.76	32.2	114.9					Gray Silty Clay w/ isolated and oxidized Silty Loam pockets
	↓	↓	---	---	---					Augered 2.5 ft. to elev. 415.2 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	45.0	415.2	---	---	---					↓
	↓	↓	---	---	---					Tube Pushed – 2.5 ft. to elev. 412.7 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	47.5	412.7	---	---	---					↓
	↓	↓	---	---	---					Augered – 2.5 ft. to elev. 410.2 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	50.0	410.2	---	---	---					↓
12-1	50.6	409.6	0.70	27.1	121.7					Gray Silty Clay-Loam w/ Silty Loam seams and lenses

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c’ and Φ’ column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

Illinois Department
of Transportation

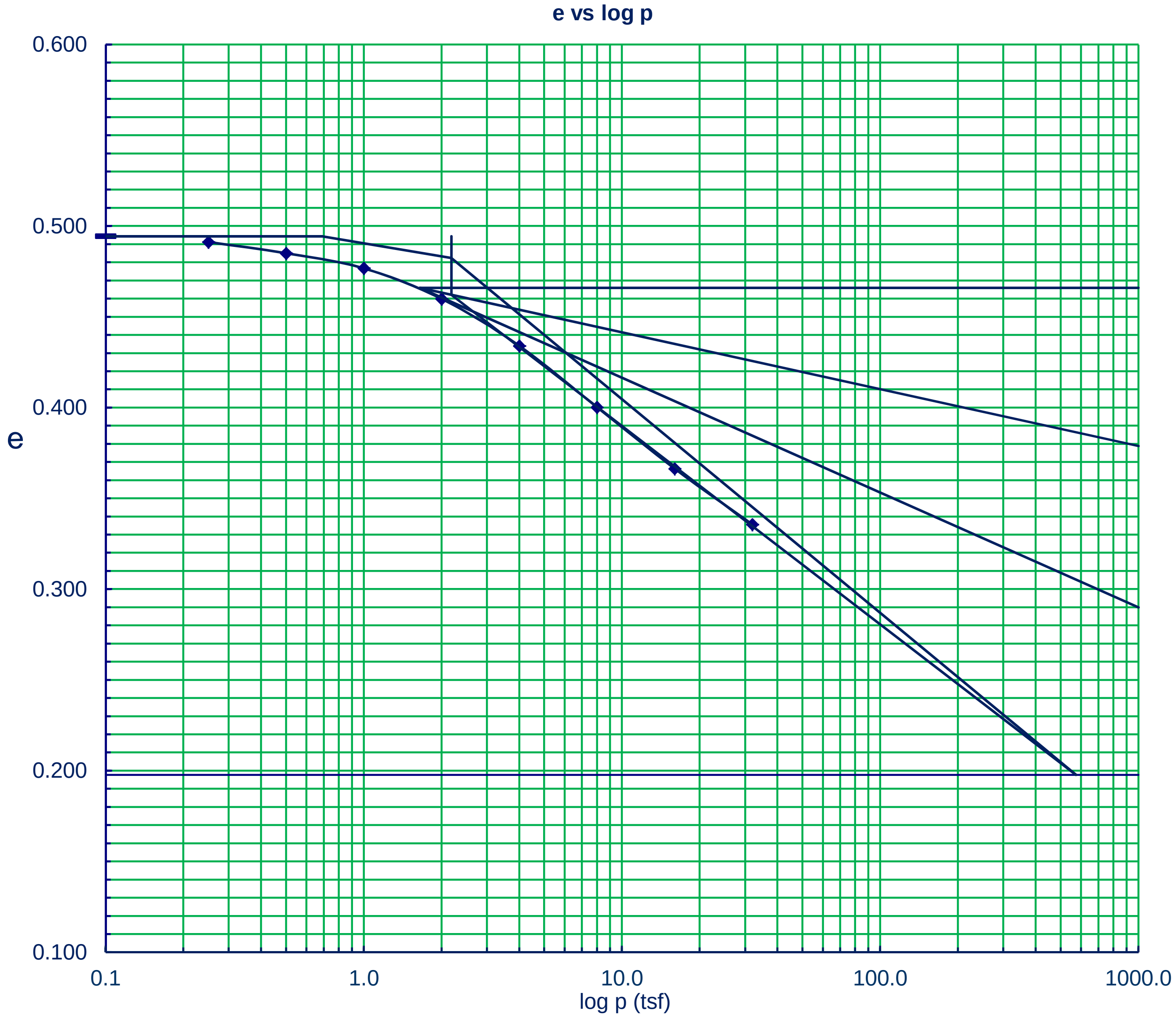
Shelby Tube Test Results

Boring No.: 5-ST N. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 4 of 4
Station: 148+87 (PR)
Section: (1) BR
Ground Surface Elev.: 460.2 ft.
Date: March 4, 2014
Offset: 49 ft. Lt.
County: Bureau
Begin Sampling Depth: 452.7 ft.
Job No.: P-93-013-11
Latitude: 41.314332° N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 442.2 ft.
Soils Lab Project No.: 13004
Longitude: 89.199392° W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c' (psf)	Φ' (deg)	Soil Type, Description and Observations
12-2	51.3	408.9	cons	27.1	122.2					Gray Silty Clay w/ oxidized Silty Loam pockets , top 2/3 to Gray Silty Loam
12-3	51.9	408.3	UUTx	27.8	121.0	720	2.7	288	40.0	Gray Silty Clay-Loam w/ oxidized Silty Loam pockets
12-4	52.5	407.7	---	---	---					No Recovery
	↓	↓	---	---	---					Augered – 2.5 ft. to elev. 405.2 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	55.0	405.2	---	---	---					↓
13-1	55.3	404.9	---	40.5	---					Gray Silty Clay w/ organic lenses
13-2	55.9	404.3	UUTx	32.9	114.1	873	2.3	720	15.1	Gray Silty Clay w/ Silty Loam pockets and lenses – organic specks
13-3	56.6	403.6	---	---	---					No Recovery
13-4	57.5	402.7	---	---	---					No Recovery
	↓	↓	---	---	---					Augered – 2.5 ft. to elev. 400.2 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	60.0	400.2	---	---	---					↓
	↓	↓	---	---	---					Tube Pushed – 2.5 ft. to elev. 397.7 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	62.5	397.7	---	---	---					↓
										End of Shelby Tube Boring

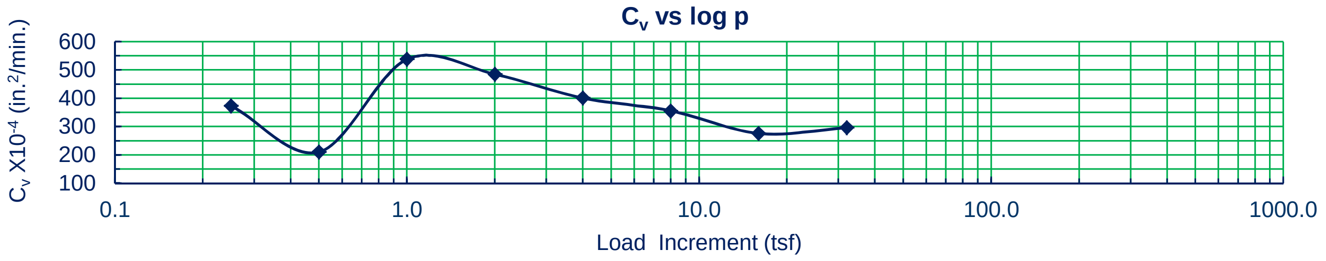
The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c' and Φ' column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

District	3	Lab Project Number	13004
County	Bureau	Sample Number	2-2
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL



Layer 1

p_0 = 0.689 tsf p_c = 2.182 tsf c_r = 0.024 c_c = 0.118 e_o = 0.494



Lab Project **13004**

Layer 1 Worksheet

Page 2/2

Sample Number	2-2	Boring Station	148+87
Machine Number	1	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment duration min.	Loading tsf	Ht. inches	MD inches	Adjusted ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in.^{2}/min
Seating load	N/A	0.025	0.7500	0.0000	0.7500	60.3	1.494	0.494	
1	400	0.250	0.7478	0.0006	0.7484	60.2	1.491	0.491	374
2	5225	0.500	0.7444	0.0009	0.7453	60.0	1.485	0.485	211
3	400	1.000	0.7397	0.0014	0.7411	59.6	1.477	0.477	538
4	960	2.000	0.7306	0.0021	0.7327	58.9	1.460	0.460	485
5	400	4.000	0.7167	0.0030	0.7197	57.9	1.434	0.434	401
6	960	8.000	0.6985	0.0042	0.7027	56.5	1.400	0.400	356
7	400	16.000	0.6797	0.0060	0.6857	55.2	1.366	0.366	276
8	400	32.000	0.6613	0.0090	0.6703	53.9	1.336	0.336	296
Final reading	N/A	32.000	0.6574	0.0090	0.6664	53.6	1.328	0.328	

Lab Sample Test Results

Tare	76.6	gr.
Wet+Tare	205.2	gr.
Cons+Tare	202.4	gr.
Dry+Tare	189.1	gr.
W_s	112.6	gr.
$W_w = V_w$	16.1	cm^3
V_s	40.4	cm^3
	Initial	Final
Moisture content	14.3	11.8
Dry Unit Wt.	116.5	131.1

Lab Test Procedures

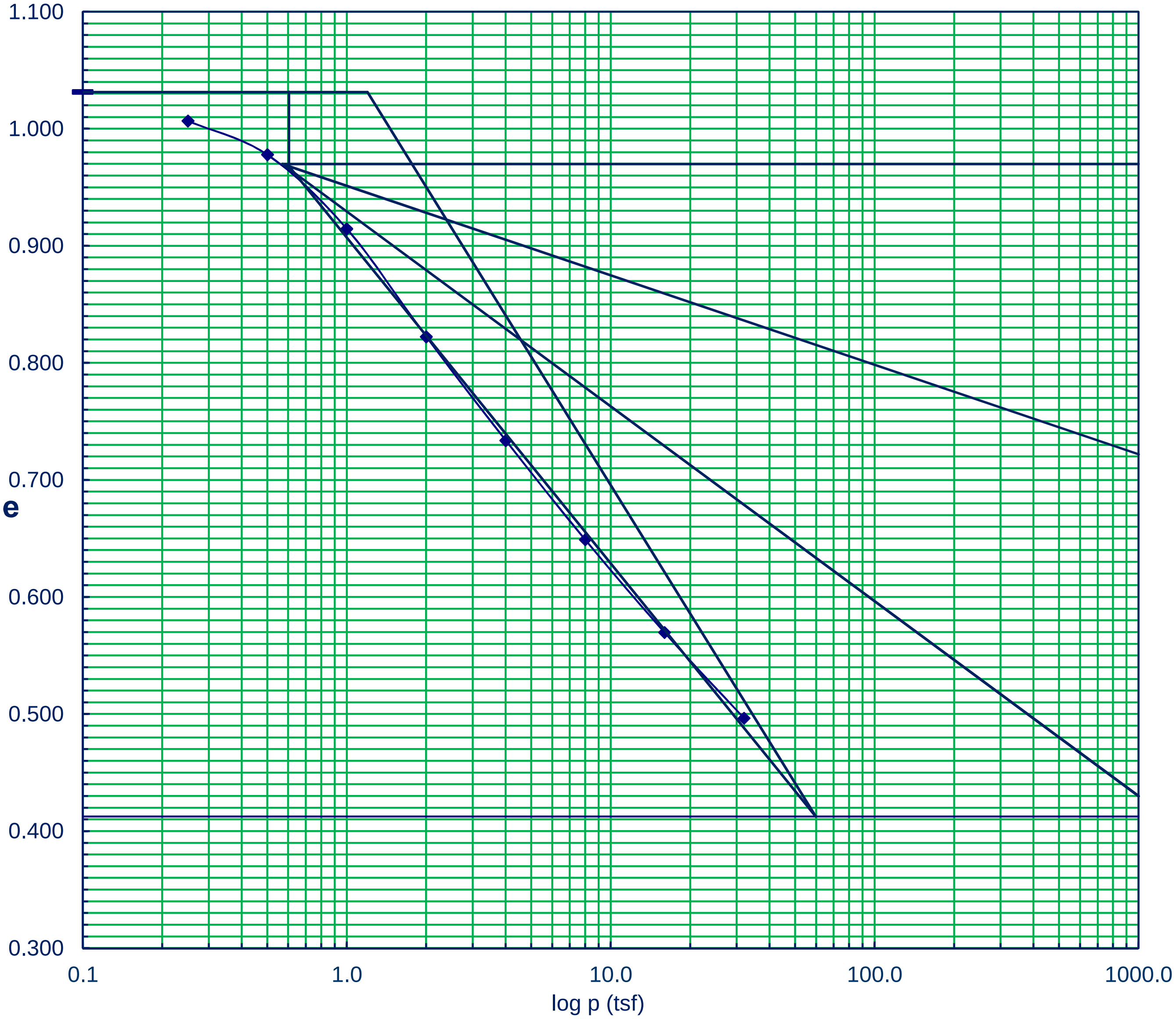
Test Method	T 216 B
Sample Condition	inundated
Inundation pressure	.025 tsf
Test Preparation	Trimmed with cutting shoe

Lab Comments:

COMMENTS:

District	3	Lab Project Number	13004
County	Bureau	Sample Number	4-3
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL

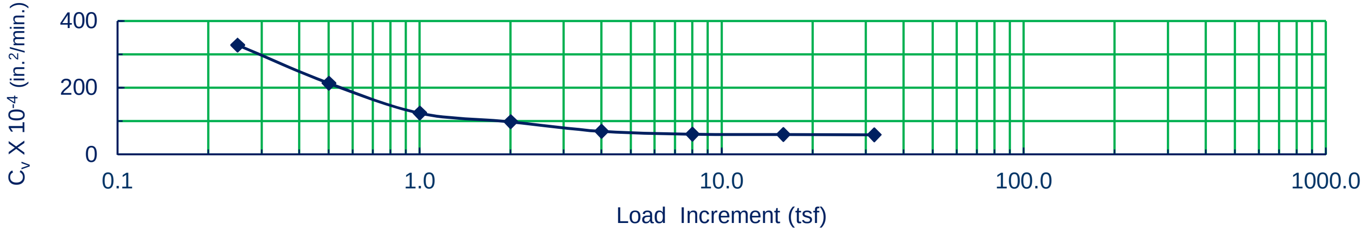
e vs log p



Layer 3

p_0 = 1.196 tsf p_c = 1.196 tsf c_r = N/A c_c = 0.364 e_o = 1.031

C_v vs log p



Lab Project **13004**

Layer 3 Worksheet

Sample Number	4-3	Boring Station	148+87
Machine Number	2	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	log	e calculations curve	log

e Calculations

Increment	Increment duration (min.)	Increment load (tsf)	Height (inches)	Machine deflection (inches)	Adjusted height (inches)	V (cm^3)	V/V_s	e V/V_s-1	C_v X 10^{-4} (in^2/min.)
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.031	1.031	
1	400	0.250	0.7400	0.0009	0.7409	59.6	2.007	1.007	328
2	5225	0.500	0.7288	0.0014	0.7302	58.7	1.978	0.978	214
3	400	1.000	0.7048	0.0021	0.7069	56.9	1.915	0.915	124
4	960	2.000	0.6698	0.0030	0.6728	54.1	1.822	0.822	98
5	400	4.000	0.6360	0.0041	0.6401	51.5	1.734	0.734	69
6	960	8.000	0.6031	0.0057	0.6088	49.0	1.649	0.649	61
7	400	16.000	0.5715	0.0080	0.5795	46.6	1.570	0.570	60
8	400	32.000	0.5412	0.0113	0.5525	44.4	1.497	0.497	59
Final		32.000	0.6574	0.0113	0.6687	44.0	1.482	0.482	

Lab Sample Test Results

Tare	76.2	gr.
Wet+Tare	184.0	gr.
Cons+Tare	172.2	gr.
Dry+Tare	157.9	gr.
W_s	81.7	gr.
$W_w = V_w$	26.1	cm^3
V_s	29.7	cm^3
	Initial	Final
Moisture content	31.9	17.5
Dry Unit Wt.	84.6	115.9

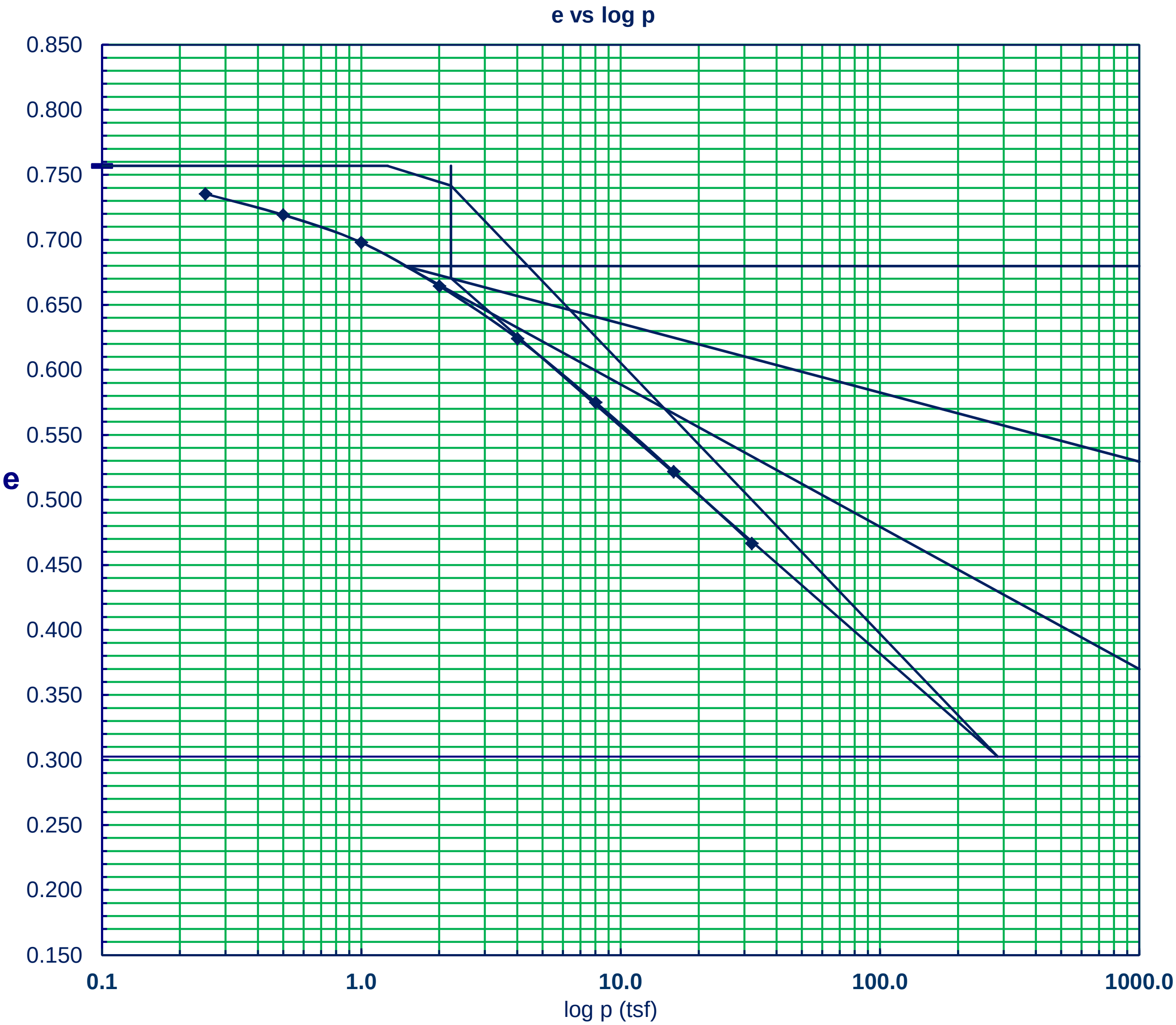
Lab Test Procedures

Test Method:	T 216 B
Sample Condition:	inundated
Inundated Pressure:	.025 tsf
Test Preparation:	Trimmed with cutting shoe

Lab Comments:

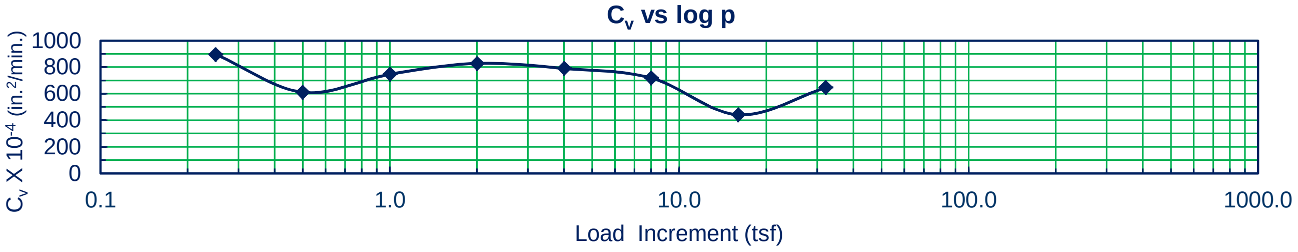
COMMENTS:

District	3	Lab Project Number	13004
County	Bureau	Sample Number	5-3
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL



Layer 4

p_0 = 1.263 tsf p_c = 2.217 tsf c_r = 0.062 c_c = 0.208 e_o = 0.757



Lab Project 13004

Layer 4 Worksheet

Sample Number	5-3	Boring Station	148+87
Machine Number	3	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	1.757	0.757	
1	400	0.250	0.7405	0.0003	0.7408	59.6	1.735	0.735	896
2	5225	0.500	0.7333	0.0006	0.7339	59.0	1.719	0.719	611
3	400	1.000	0.7239	0.0010	0.7249	58.3	1.698	0.698	747
4	960	2.000	0.7089	0.0016	0.7105	57.2	1.664	0.664	829
5	400	4.000	0.6908	0.0025	0.6933	55.8	1.624	0.624	790
6	960	8.000	0.6687	0.0037	0.6724	54.1	1.575	0.575	718
7	400	16.000	0.6441	0.0056	0.6497	52.3	1.522	0.522	442
8	400	32.000	0.6171	0.0090	0.6261	50.4	1.467	0.467	646
Final		32.000	0.6574	0.0090	0.6664	50.1	1.460	0.460	

Lab Sample Test Results

Tare	75.6	gr.
Wet+Tare	191.5	gr.
Cons+Tare	185.8	gr.
Dry+Tare	170.0	gr.
W_s	94.3	gr.
$W_w = V_w$	21.6	cm^3
V_s	34.3	cm^3

	Initial	Final
Moisture content	22.9	16.8
Dry Unit Wt.	97.6	117.4

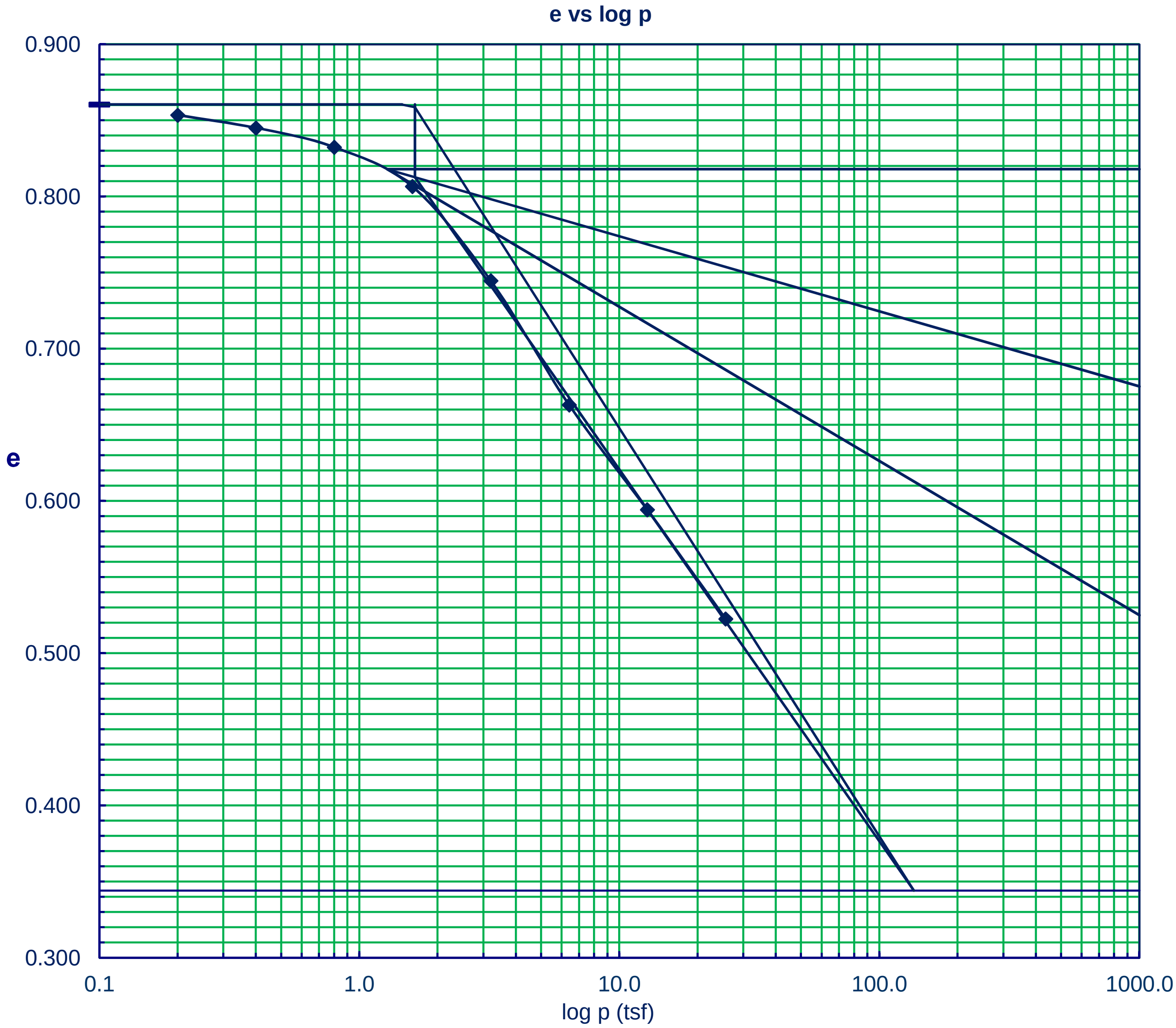
Lab Test Procedures

Test Method:	T 216 B
Sample Condition:	inundated
Inundated Pressure:	.025 tsf tsf
Test Preparation:	Trimmed with cutting shoe

Lab Comments:

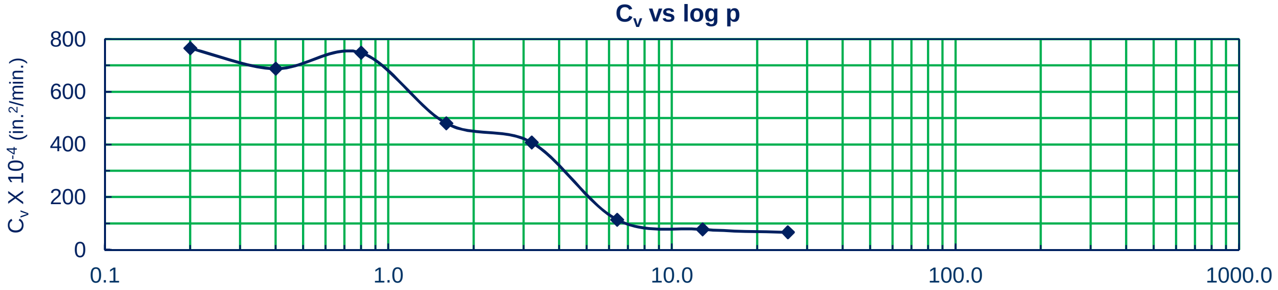
COMMENTS:

District	3	Lab Project Number	13004
County	Bureau	Sample Number	8-2
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL



Layer 5

p_0 = 1.458 tsf p_c = 1.634 tsf c_r = 0.035 c_c = 0.268 e_o = 0.860



Lab Project **13004**

Layer 5 Worksheet

Sample Number	8-2	Boring Station	148+87
Machine Number	4	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V$_s$	e V/V$_s$-1	C$_v$ X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	1.860	0.860	
1	400	0.200	0.7465	0.0007	0.7472	60.1	1.854	0.854	765
2	5225	0.400	0.7426	0.0012	0.7438	59.8	1.845	0.845	688
3	400	0.800	0.7369	0.0018	0.7387	59.4	1.832	0.832	749
4	960	1.600	0.7258	0.0025	0.7283	58.6	1.807	0.807	480
5	400	3.200	0.7000	0.0033	0.7033	56.6	1.745	0.745	408
6	960	6.400	0.6661	0.0044	0.6705	53.9	1.663	0.663	115
7	400	12.800	0.6367	0.0060	0.6427	51.7	1.594	0.594	78
8	400	25.600	0.6054	0.0084	0.6138	49.4	1.523	0.523	66
Final		25.600	0.6574	0.0084	0.6658	48.8	1.506	0.506	

Lab Sample Test Results

Tare	76.4	gr.
Wet+Tare	192.4	gr.
Cons+Tare	184.3	gr.
Dry+Tare	167.8	gr.
W_s	91.4	gr.
$W_w = V_w$	24.6	cm^3
V_s	32.4	cm^3

	Initial	Final
Moisture content	26.9	18.0
Dry Unit Wt.	94.6	116.8

Lab Test Procedures

Test Method: T 216 B

Sample Condition: inundated

Inundated Pressure: .025 tsf

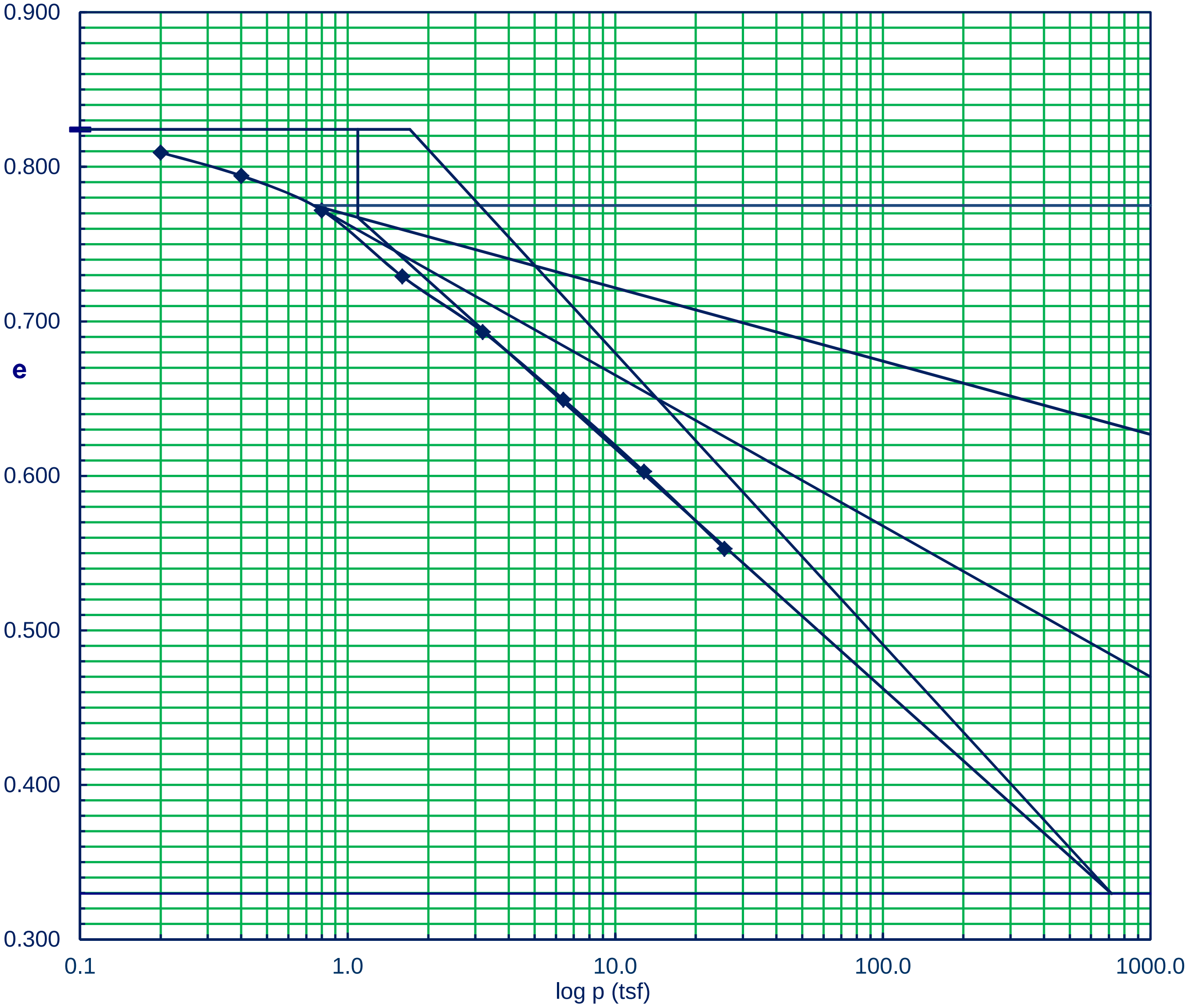
Test Preparation: Trimmed with cutting shoe

Lab Comments:

COMMENTS:

District	3	Lab Project Number	13004
County	Bureau	Sample Number	10-3
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.
Section	(1) BR	Boring Station	148+87
Job Number	P-93-013-11	Boring Offset	49 ft left CL

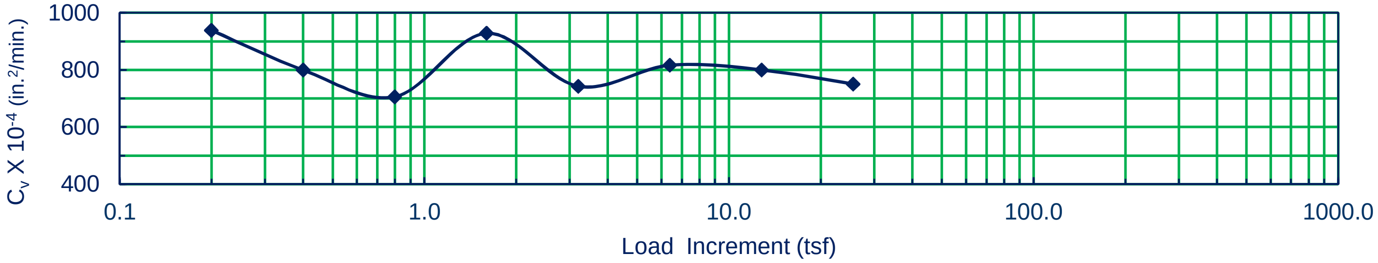
e vs log p



Layer 6

p_0 = 1.707 tsf p_c = 1.707 tsf c_r = N/A c_c = 0.189 e_o = 0.824

C_v vs log p



Lab Project 13004

Layer 6 Worksheet

Sample Number	10-3	Boring Station	148+87
Machine Number	5	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve square root

e calculations curve square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	$C_v \times 10^{-4}$ in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	1.824	0.824	
1	400	0.200	0.7433	0.0006	0.7439	59.8	1.809	0.809	939
2	5225	0.400	0.7364	0.0012	0.7376	59.3	1.794	0.794	799
3	400	0.800	0.7265	0.0020	0.7285	58.6	1.772	0.772	706
4	960	1.600	0.7080	0.0029	0.7109	57.2	1.729	0.729	928
5	400	3.200	0.6921	0.0040	0.6961	56.0	1.693	0.693	743
6	960	6.400	0.6727	0.0054	0.6781	54.5	1.649	0.649	817
7	400	12.800	0.6519	0.0071	0.6590	53.0	1.603	0.603	800
8	400	25.600	0.6288	0.0096	0.6384	51.4	1.553	0.553	751
Final		25.600	0.6574	0.0096	0.6670	50.9	1.539	0.539	

Lab Sample Test Results

Tare	76.3	gr.
Wet+Tare	193.5	gr.
Cons+Tare	186.3	gr.
Dry+Tare	168.5	gr.
W_s	92.2	gr.
$W_w = V_w$	25.0	cm^3
V_s	33.1	cm^3
	Initial	Final
Moisture content	27.1	19.3
Dry Unit Wt.	95.4	113.0

Lab Test Procedures

Test Method: T 216 B

Sample Condition: inundated

Inundated Pressure: .025 tsf

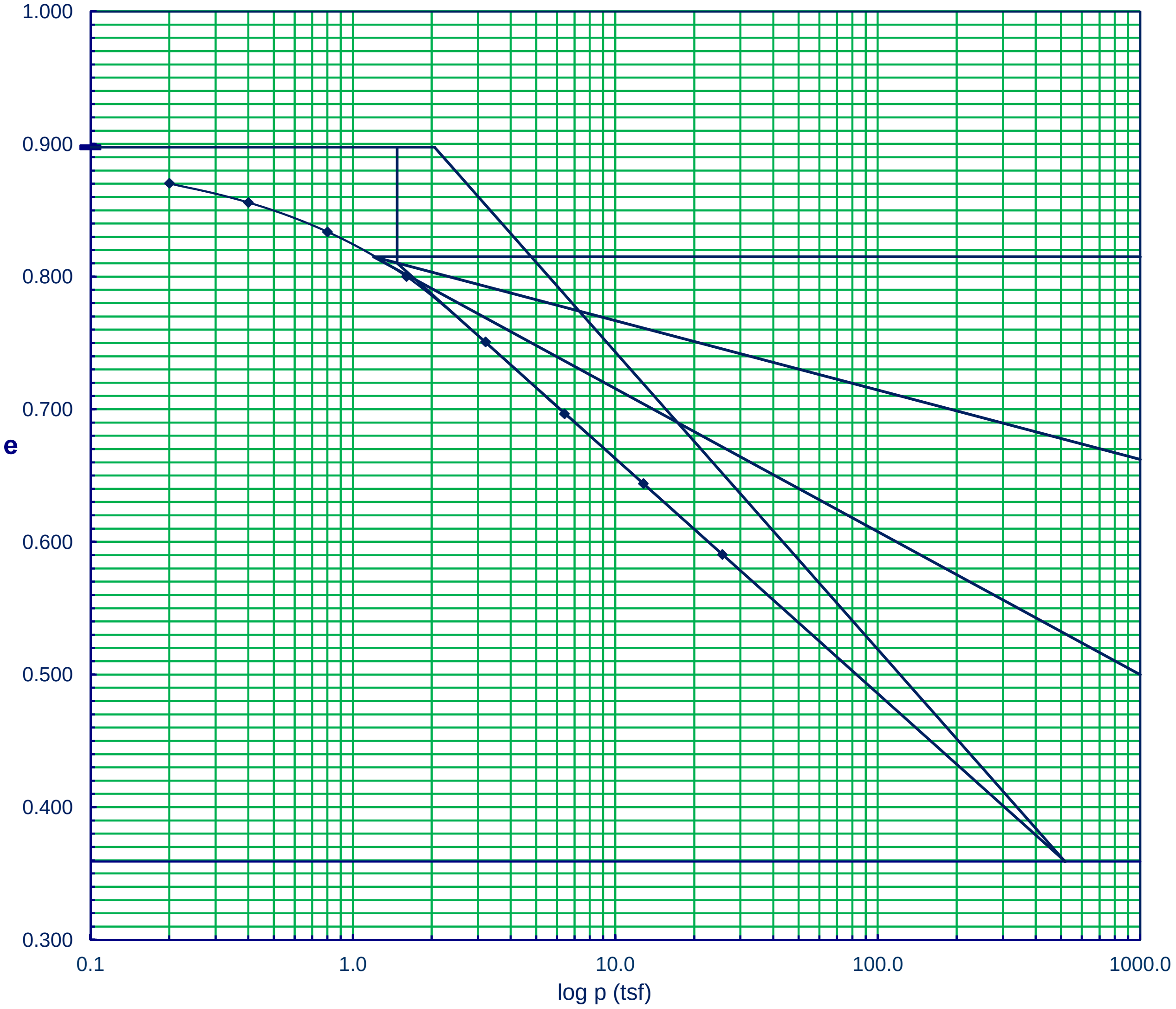
Test Preparation: Trimmed with cutting shoe

Lab Comments:

COMMENTS:

District	3	Lab Project Number	13004	
County	Bureau	Sample Number	12-2	
Route	FAP 698 (IL 89)	Boring ID	5-ST N. Abut.	
Section	(1) BR	Boring Station	148+87	
Job Number	P-93-013-11	Boring Offset	49	ft left CL

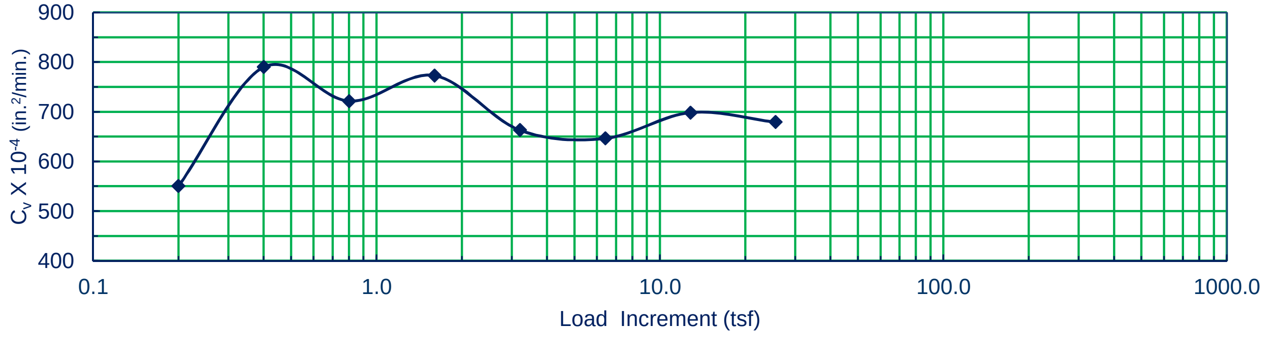
e vs log p



Layer 7

p_0 = 2.048 tsf p_c = 2.048 tsf c_r = N/A c_c = 0.224 e_o = 0.898

C_v vs log p



Lab Project 13004

Layer 1 Worksheet

Sample Number	12-2	Boring Station	148+87
Machine Number	6	Boring Offset	49 ft left CL
District	3	Boring ID	5-ST N. Abut.
County	Bureau	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial			0.7500	0.0000	0.7500	60.3	1.898	0.898	
1	400	0.200	0.7385	0.0007	0.7392	59.5	1.870	0.870	551
2	5225	0.400	0.7323	0.0012	0.7335	59.0	1.856	0.856	790
3	400	0.800	0.7231	0.0017	0.7248	58.3	1.834	0.834	722
4	960	1.600	0.7091	0.0023	0.7114	57.2	1.800	0.800	773
5	400	3.200	0.6888	0.0032	0.6920	55.7	1.751	0.751	663
6	960	6.400	0.6662	0.0044	0.6706	53.9	1.697	0.697	647
7	400	12.800	0.6435	0.0063	0.6498	52.3	1.644	0.644	699
8	400	25.600	0.6193	0.0093	0.6286	50.6	1.590	0.590	679
Final		25.600	0.6574	0.0093	0.6667	50.0	1.574	0.574	

Lab Sample Test Results

Tare	76.3	gr.
Wet+Tare	190.6	gr.
Cons+Tare	184.2	gr.
Dry+Tare	166.0	gr.
W_s	89.6	gr.
$W_w = V_w$	24.7	cm^3
V_s	31.8	cm^3
	Initial	Final
Moisture content	27.5	20.4
Dry Unit Wt.		111.8

Lab Test Procedures

Test Method:

Sample Condition:

Inundated Pressure:

Test Preparation:

Lab Comments:

COMMENTS:

ATTACHMENT C

SETTLEMENT ANALYSIS REPORTS

ILLINOIS DEPARTMENT OF TRANSPORTATION
BMPR Geotechnical Sub-Unit

Settlement Analysis Report

District	3	BMPR lab number	13004
County	Bureau	Boring ID	5-ST N. Abut.
Route	FAP 698 (IL 89)	Boring Station	148+87
Section	(1) BR	Boring Offset	49.0 ft left CL
Job Number	P-93-013-11	G.S.E. at boring	460.2 ft
Structure Number	078-0006 (existing)	G.S.E. for analyses	455.0 ft
Contract number	66A69	G.W.E. at boring	442.2 ft

Settlement analysis results: **Stage 1a**

Soil layer	Sample number	Layer height (ft.)	Bottom of layer elev. (ft.)	Settlement (inches)	t_{50} (months)	t_{90} (months)	Drainage condition
1	2-2	9.8	445.2	1.2	0.3	1.3	double
2		2.0	443.2				
3	4-3	6.1	437.1	4.3	30.3	130.5	single
4	5-3	4.4	432.7	0.5			
5	8-2	4.7	428.0	1.0			
6	10-3	10.0	418.0	2.4			
7	12-2	21.8	396.2	4.1			
Total Settlement, t_{50}* & t_{90}*				13.6	27.7	119.2	

* (t_{50} & t_{90} are weighted averages)

Settlement analysis results

Soil layer	P_o (tsf)	P_f (tsf)	P_c (tsf)
1	0.316	1.402	0.118
2	0.710	1.759	
3	0.899	1.914	1.196
4	1.078	2.045	2.217
5	1.244	2.169	1.000
6	1.502	2.360	1.707
7	2.020	2.745	2.048

COMMENTS:

1.) Settlement amount is calculated for Sta. 148+50, 10 ft. left of the proposed centerline (near the center of the maximum fill height).
2.) Stage 1a places fill (17.5 ft.) to match height of existing embankment.

ILLINOIS DEPARTMENT OF TRANSPORTATION
BMPR Geotechnical Sub-Unit

Settlement Analysis Report

District	3	BMPR lab number	13004
County	Bureau	Boring ID	5-ST N. Abut.
Route	FAP 698 (IL 89)	Boring Station	148+87
Section	(1) BR	Boring Offset	49.0 ft left CL
Job Number	P-93-013-11	G.S.E. at boring	460.2 ft
Structure Number	078-0006 (existing)	G.S.E. for analyses	455.0 ft
Contract number	66A69	G.W.E. at boring	442.2 ft

Settlement analysis results: **Stage 1b**

Soil layer	Sample number	Layer height (ft.)	Bottom of layer elev. (ft.)	Settlement (inches)	t_{50} (months)	t_{90} (months)	Drainage condition
1	2-2	9.8	445.2	0.3	0.3	1.4	double
2		2.0	443.2				
3	4-3	6.1	437.1	1.4	32.0	137.7	single
4	5-3	4.4	432.7	0.6			
5	8-2	4.7	428.0	0.7			
6	10-3	10.0	418.0	0.9			
7	12-2	21.8	396.2	1.7			
Total Settlement, t_{50}* & t_{90}*				5.6	30.3	130.5	

* (t_{50} & t_{90} are weighted averages)

Settlement analysis results

Soil layer	P_o (tsf)	P_f (tsf)	P_c (tsf)
1	1.402	2.031	0.118
2	1.759	2.344	
3	1.914	2.468	1.196
4	2.045	2.561	2.217
5	2.169	2.654	1.000
6	2.360	2.799	1.707
7	2.745	3.106	2.048

COMMENTS:

1.) Settlement amount is calculated for Sta. 148+50, 10 ft. left of the proposed centerline (near the center of the maximum fill height).
2.) Stage 1b places additional fill (11.5 ft.) to proposed grade (elev. 484.3 ft.) with assumed temporary soil retention system or temporary MSE wall at an assumed stage line offset at 24 ft. RT for maintenance of traffic.

ILLINOIS DEPARTMENT OF TRANSPORTATION
BMPR Geotechnical Sub-Unit

Settlement Analysis Report

District	3	BMPR lab number	13004
County	Bureau	Boring ID	5-ST N. Abut.
Route	FAP 698 (IL 89)	Boring Station	148+87
Section	(1) BR	Boring Offset	49.0 ft left CL
Job Number	P-93-013-11	G.S.E. at boring	460.2 ft
Structure Number	078-0006 (existing)	G.S.E. for analyses	455.0 ft
Contract number	66A69	G.W.E. at boring	442.2 ft

Settlement analysis results: **Stage 1b (Surcharge)**

Soil layer	Sample number	Layer height (ft.)	Bottom of layer elev. (ft.)	Settlement (inches)	t_{50} (months)	t_{90} (months)	Drainage condition
1	2-2	9.8	445.2	0.2	0.3	1.4	double
2		2.0	443.2				
3	4-3	6.1	437.1	0.3	33.1	142.6	single
4	5-3	4.4	432.7	0.1			
5	8-2	4.7	428.0	0.2			
6	10-3	10.0	418.0	0.2			
7	12-2	21.8	396.2	0.4			
Total Settlement, t_{50}* & t_{90}*				1.5	29.1	125.2	

* (t_{50} & t_{90} are weighted averages)

Settlement analysis results

Soil layer	P_o (tsf)	P_f (tsf)	P_c (tsf)
1	2.031	2.209	0.118
2	2.344	2.506	
3	2.468	2.620	1.196
4	2.561	2.702	2.217
5	2.654	2.787	1.000
6	2.799	2.920	1.707
7	3.106	3.206	2.048

COMMENTS:

1.) Settlement amount is calculated for Sta. 148+50, 10 ft. left of the proposed centerline (near the center of the maximum fill height).
2.) Stage 1b (Surcharge) is an option to place an additional 550 psf surcharge to reduce differential settlement to < 0.5 inches across the proposed alignment from placement of the Stage 2 fill.

ILLINOIS DEPARTMENT OF TRANSPORTATION
BMPR Geotechnical Sub-Unit

Settlement Analysis Report

District	3	BMPR lab number	13004
County	Bureau	Boring ID	5-ST N. Abut.
Route	FAP 698 (IL 89)	Boring Station	148+87
Section	(1) BR	Boring Offset	49.0 ft left CL
Job Number	P-93-013-11	G.S.E. at boring	460.2 ft
Structure Number	078-0006 (existing)	G.S.E. for analyses	455.0 ft
Contract number	66A69	G.W.E. at boring	442.2 ft

Settlement analysis results: **Stage 2 (without Surcharge Option)**

Soil layer	Sample number	Layer height (ft.)	Bottom of layer elev. (ft.)	Settlement (inches)	t_{50} (months)	t_{90} (months)	Drainage condition
1	2-2	9.8	445.2	0.0	0.3	1.4	double
2		2.0	443.2				
3	4-3	6.1	437.1	0.1	32.1	138.1	single
4	5-3	4.4	432.7	0.0			
5	8-2	4.7	428.0	0.0			
6	10-3	10.0	418.0	0.1			
7	12-2	21.8	396.2	0.2			
Total Settlement, t_{50}* & t_{90}*				0.4	31.7	136.3	

* (t_{50} & t_{90} are weighted averages)

Settlement analysis results

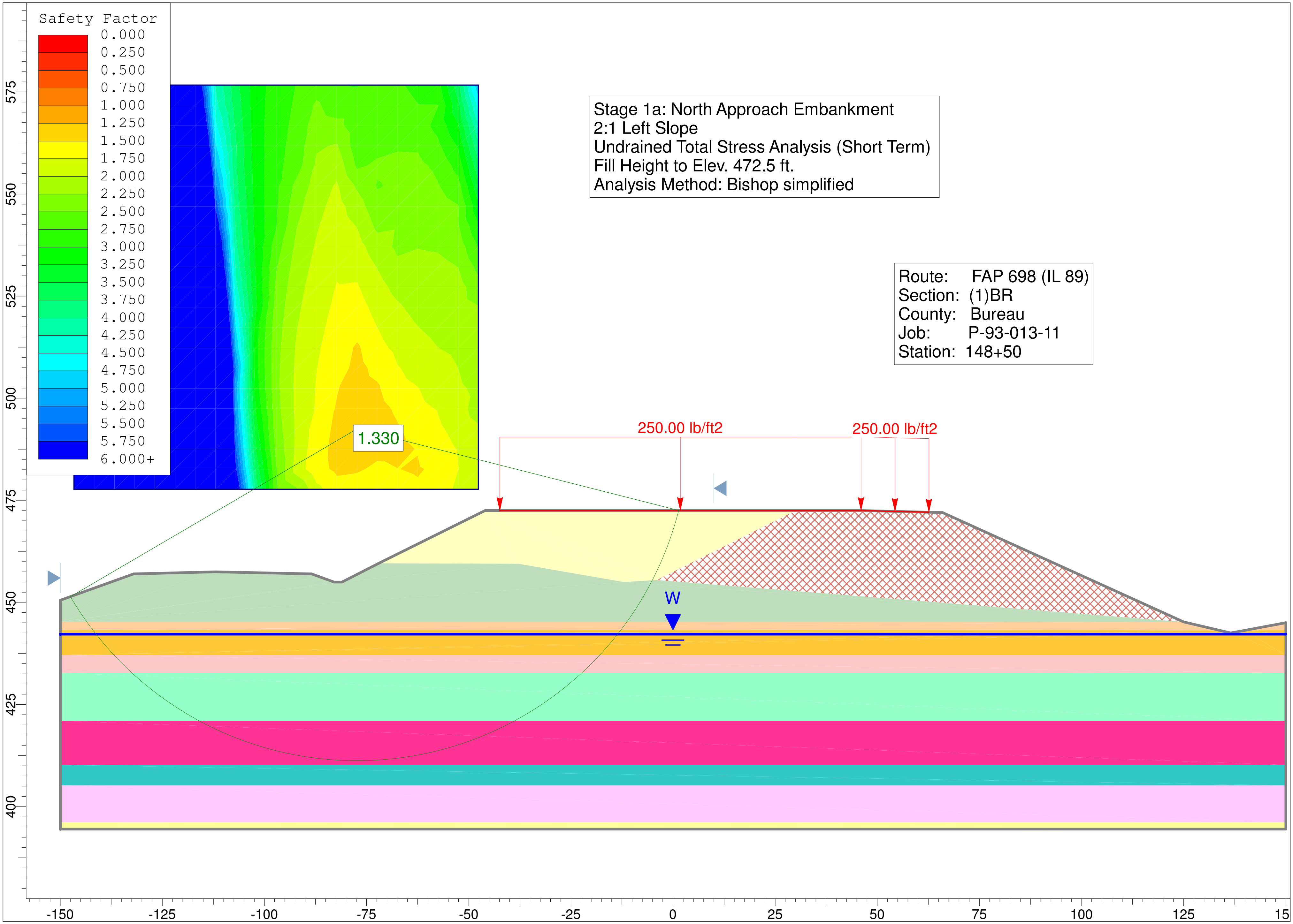
Soil layer	P_o (tsf)	P_f (tsf)	P_c (tsf)
1	2.031	2.044	0.118
2	2.344	2.363	
3	2.468	2.491	1.196
4	2.561	2.589	2.217
5	2.654	2.686	1.000
6	2.799	2.835	1.707
7	3.106	3.145	2.048

COMMENTS:

1.) Settlement amount is calculated for Sta. 148+50, 10 ft. left of the proposed centerline (near the center of the maximum fill height).
2.) Stage 2 places fill (11.5 ft.) on the RT side slope.

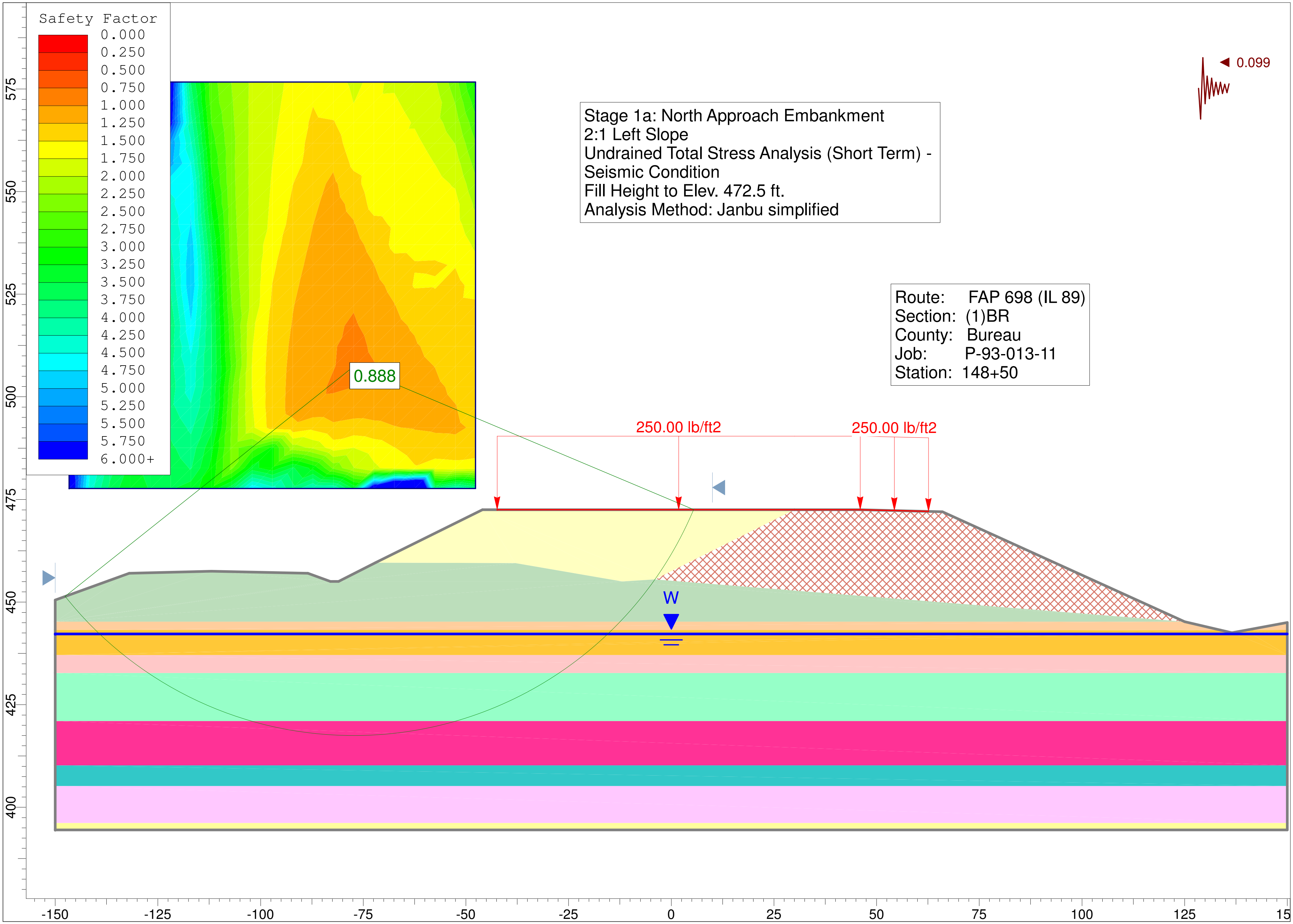
ATTACHMENT D

SLOPE STABILITY
OUTPUT FIGURES



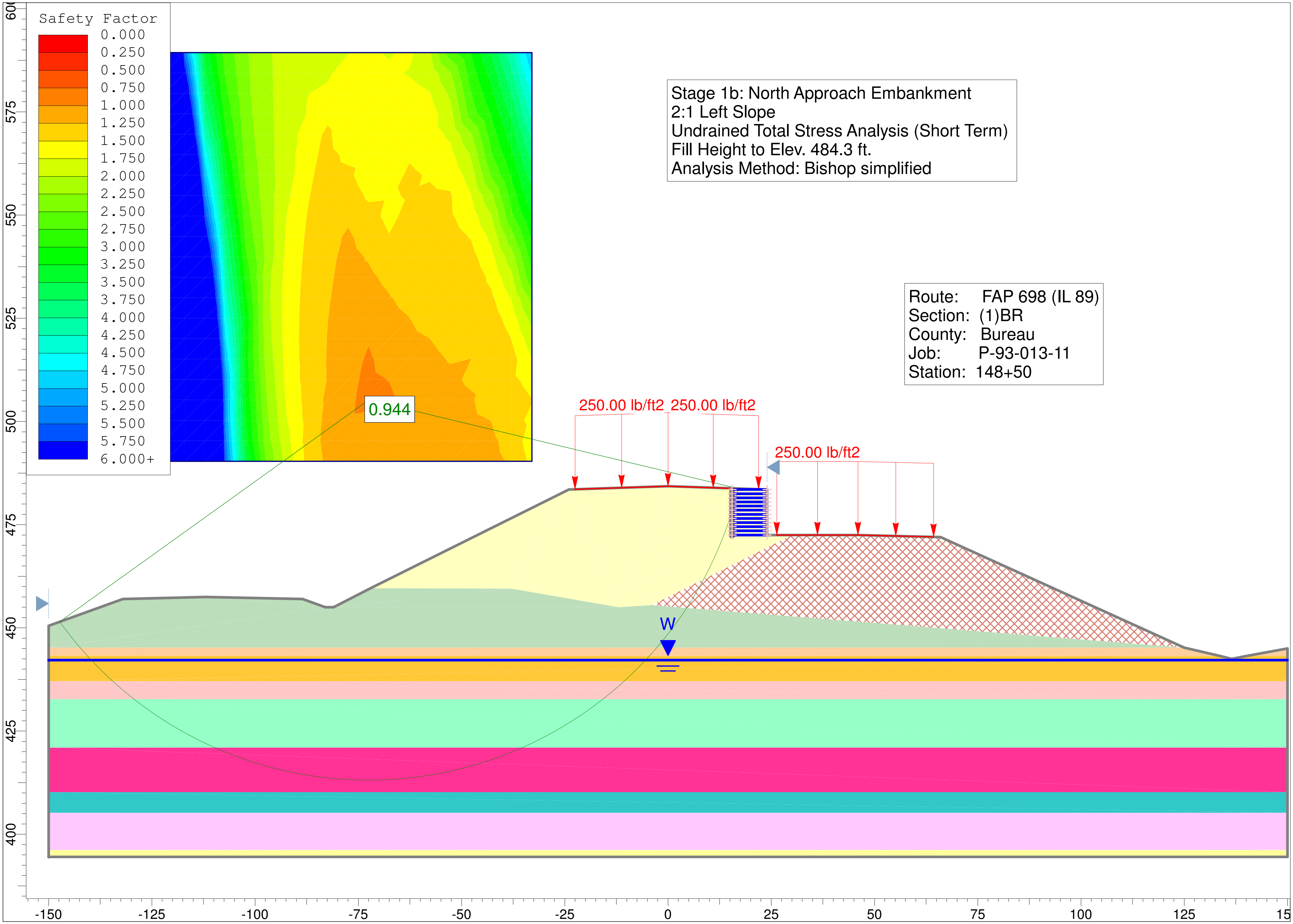
Stage 1a: North Approach Embankment
2:1 Left Slope
Undrained Total Stress Analysis (Short Term)
Fill Height to Elev. 472.5 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Bureau
Job: P-93-013-11
Station: 148+50



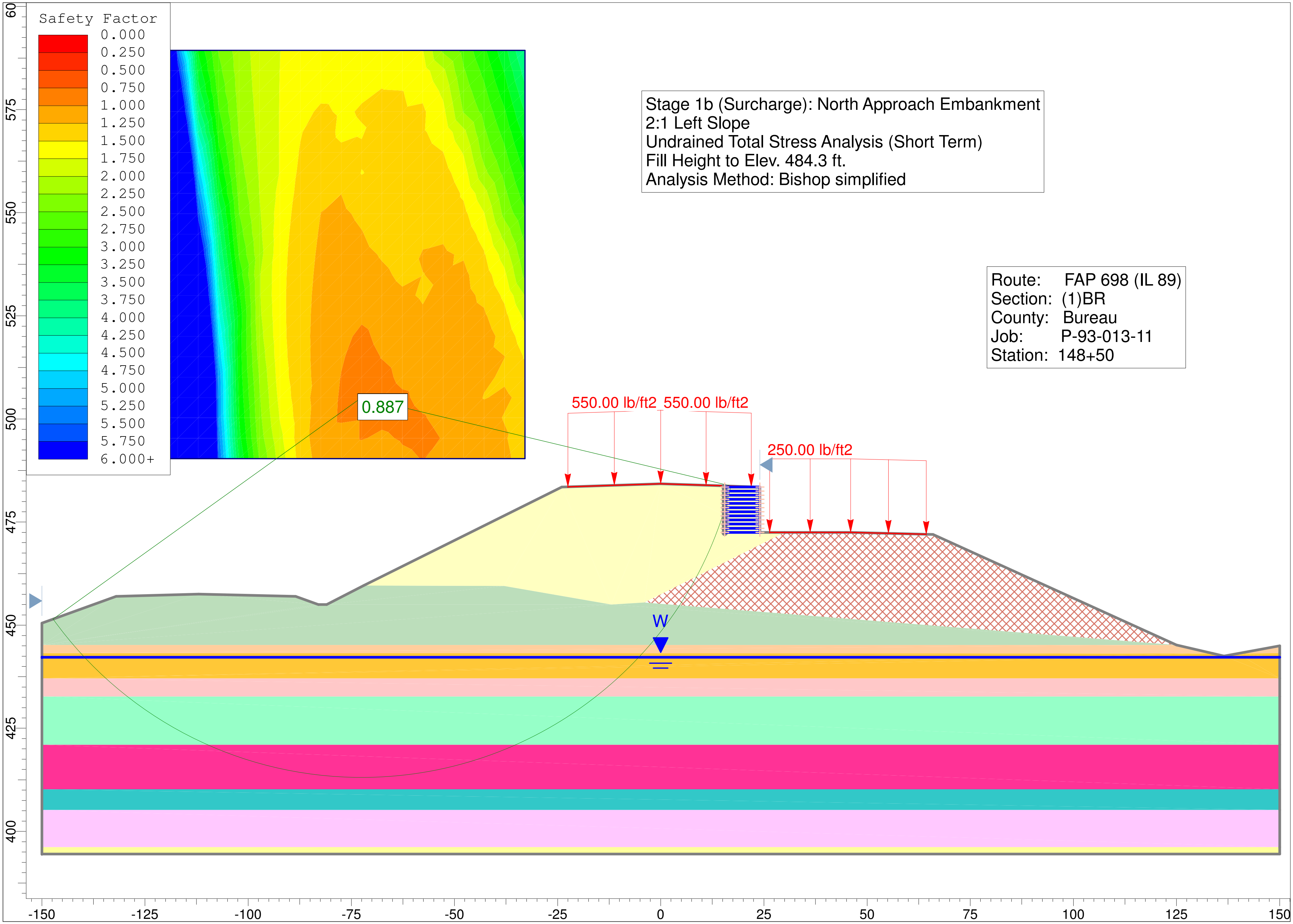
Stage 1a: North Approach Embankment
2:1 Left Slope
Undrained Total Stress Analysis (Short Term) - Seismic Condition
Fill Height to Elev. 472.5 ft.
Analysis Method: Janbu simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Bureau
Job: P-93-013-11
Station: 148+50

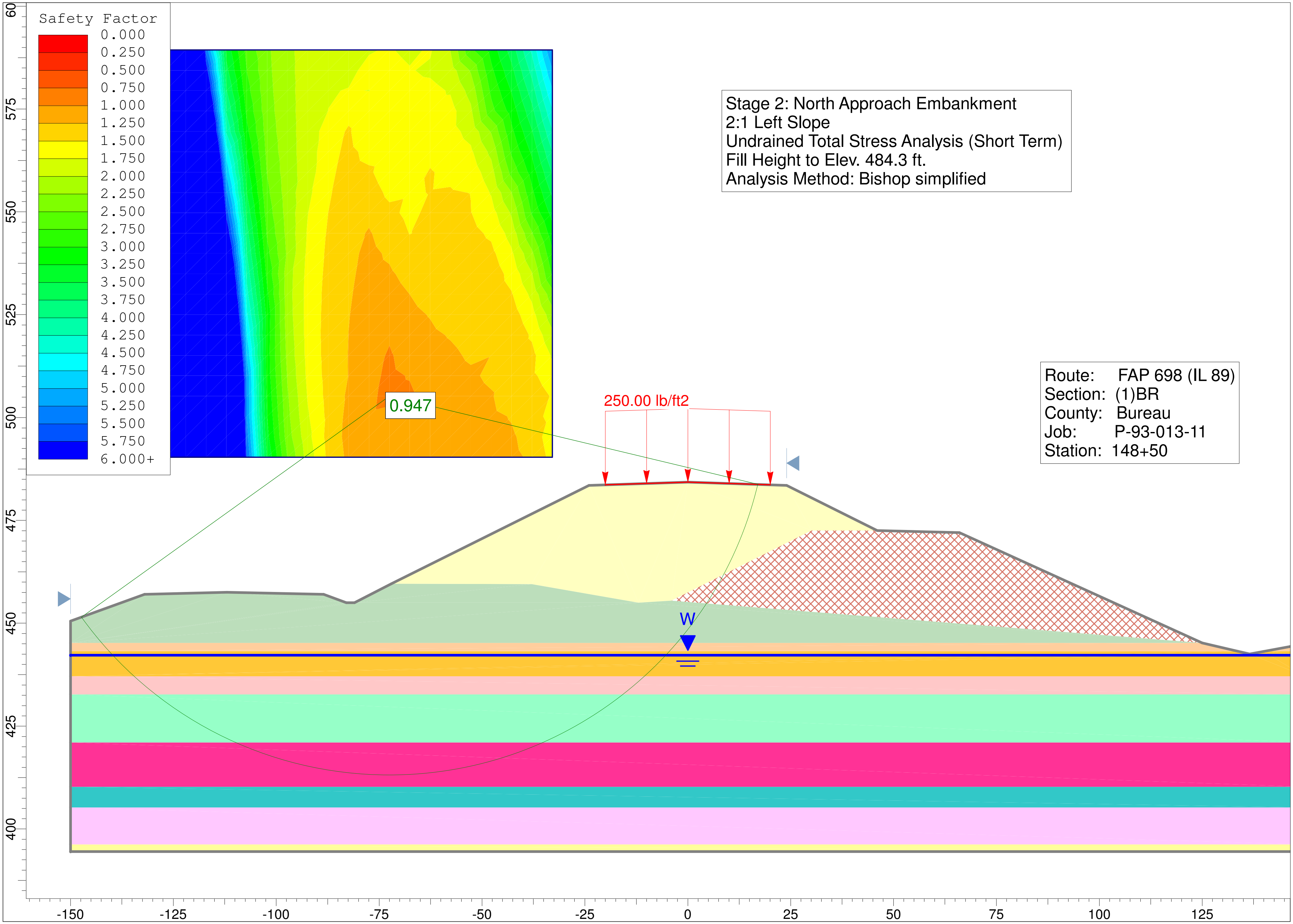


Stage 1b: North Approach Embankment
2:1 Left Slope
Undrained Total Stress Analysis (Short Term)
Fill Height to Elev. 484.3 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Bureau
Job: P-93-013-11
Station: 148+50

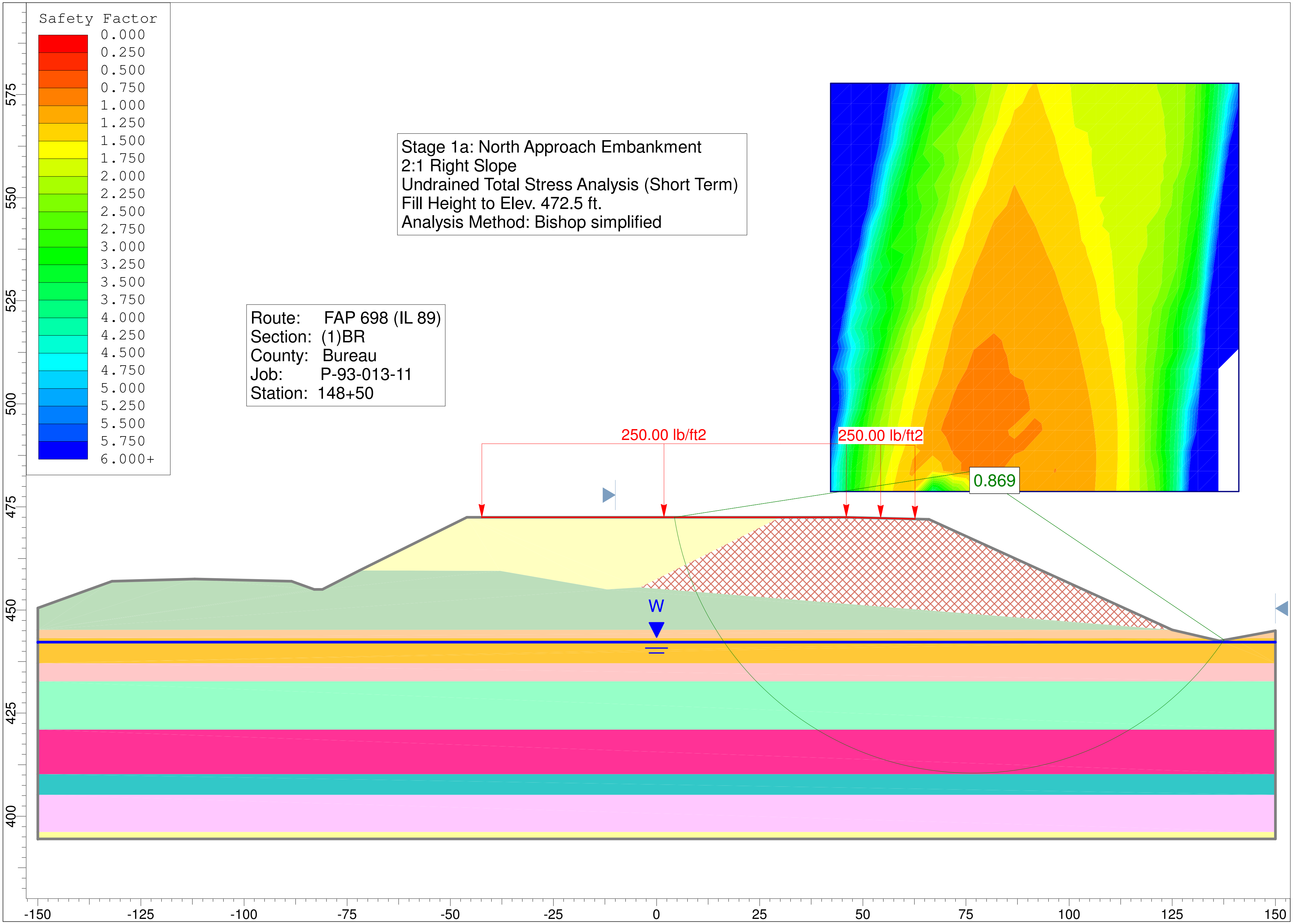

Stage 1b (Surcharge): North Approach Embankment
2:1 Left Slope
Undrained Total Stress Analysis (Short Term)
Fill Height to Elev. 484.3 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Bureau
Job: P-93-013-11
Station: 148+50



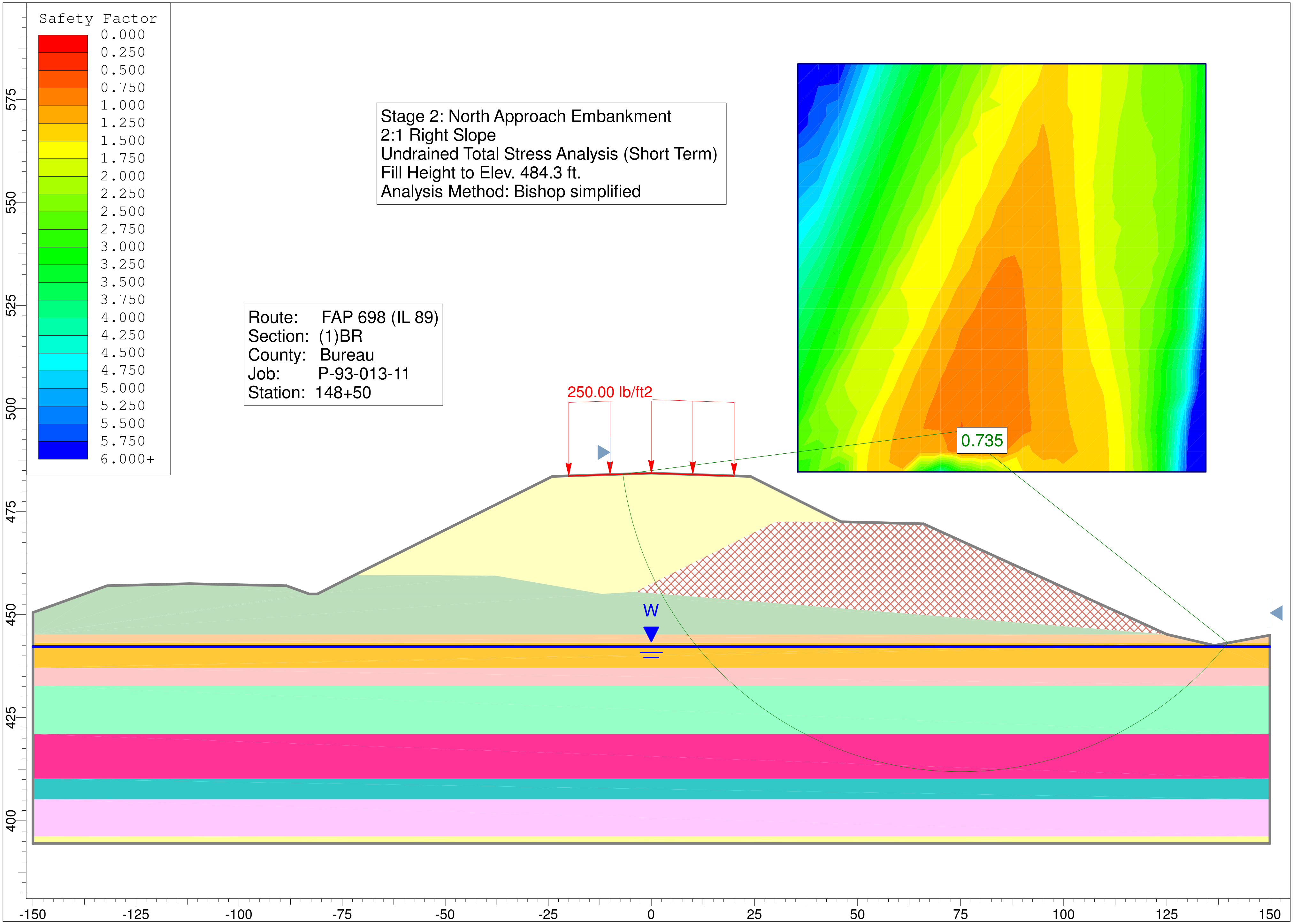
Stage 2: North Approach Embankment
2:1 Left Slope
Undrained Total Stress Analysis (Short Term)
Fill Height to Elev. 484.3 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Bureau
Job: P-93-013-11
Station: 148+50



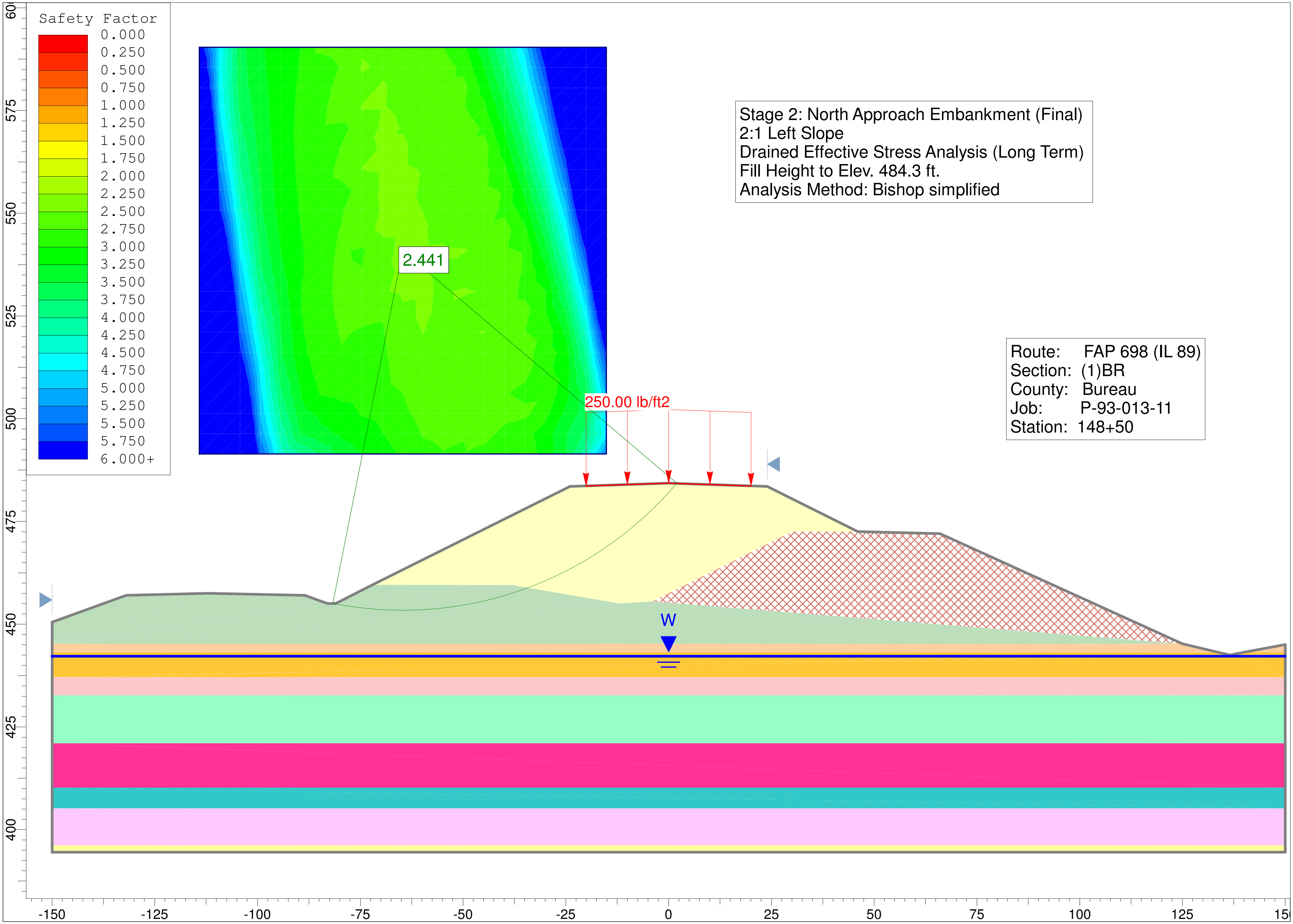
Stage 1a: North Approach Embankment
2:1 Right Slope
Undrained Total Stress Analysis (Short Term)
Fill Height to Elev. 472.5 ft.
Analysis Method: Bishop simplified

Route:	FAP 698 (IL 89)
Section:	(1)BR
County:	Bureau
Job:	P-93-013-11
Station:	148+50



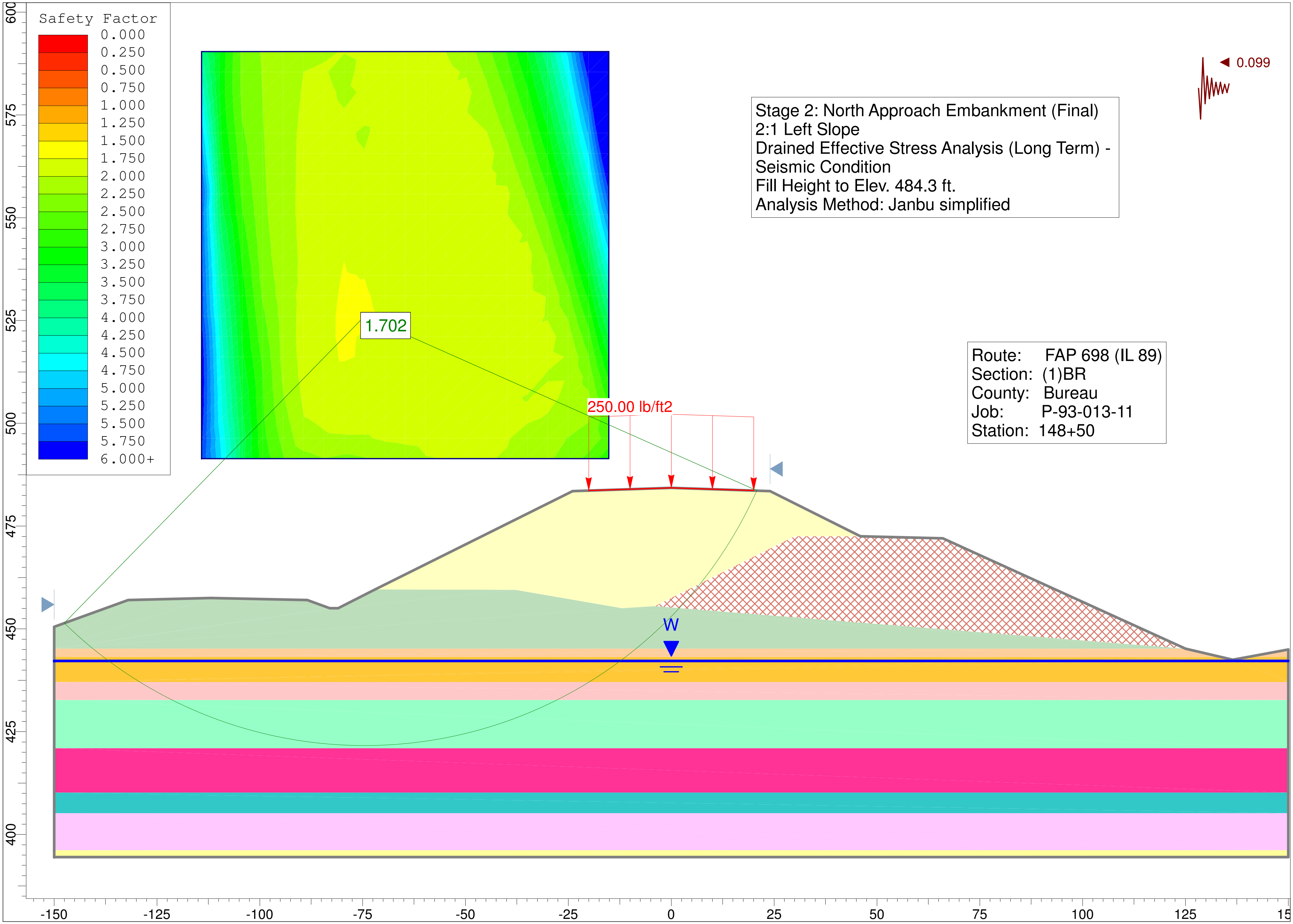
Stage 2: North Approach Embankment
2:1 Right Slope
Undrained Total Stress Analysis (Short Term)
Fill Height to Elev. 484.3 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Bureau
Job: P-93-013-11
Station: 148+50



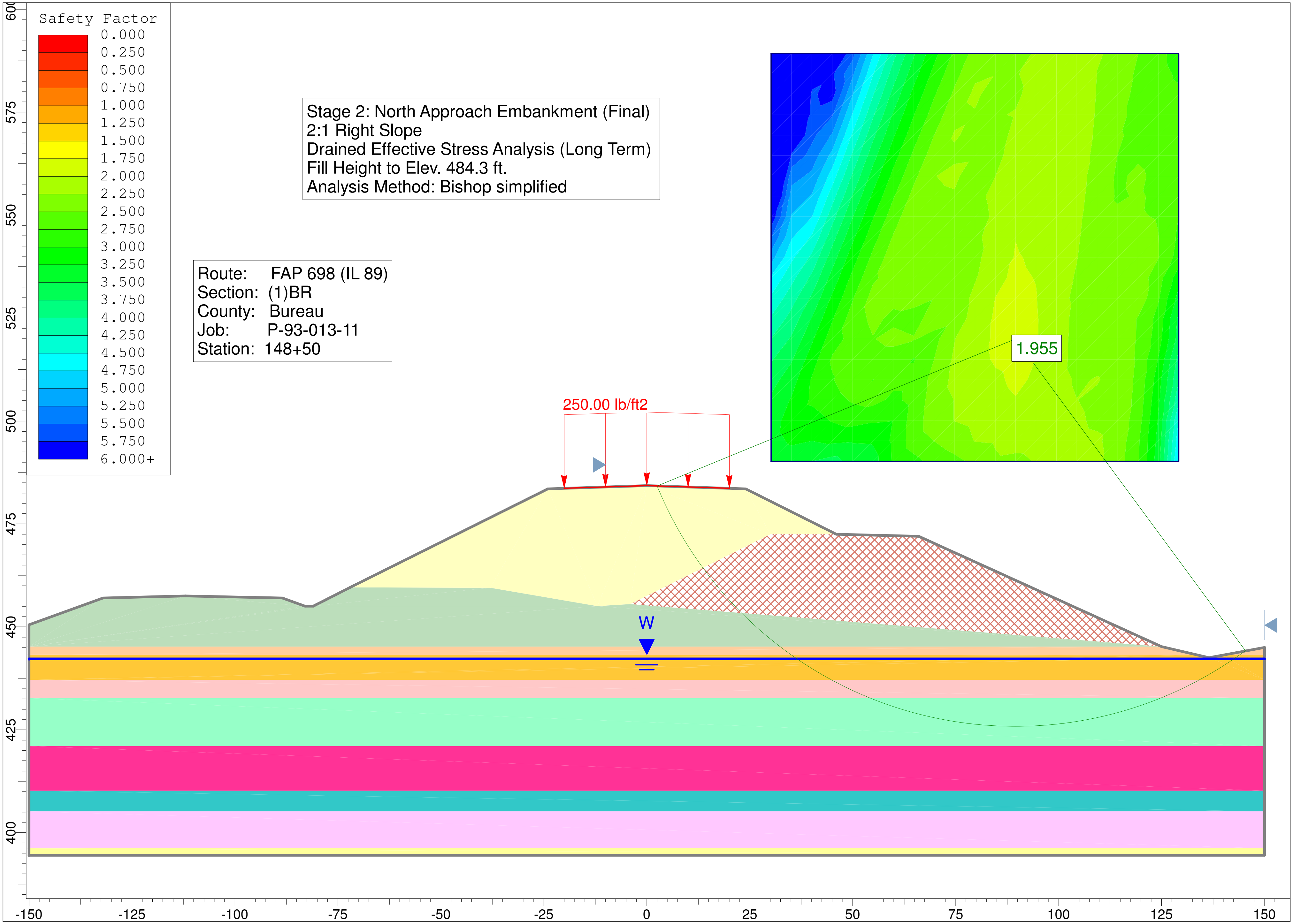
Stage 2: North Approach Embankment (Final)
2:1 Left Slope
Drained Effective Stress Analysis (Long Term)
Fill Height to Elev. 484.3 ft.
Analysis Method: Bishop simplified

Route:	FAP 698 (IL 89)
Section:	(1)BR
County:	Bureau
Job:	P-93-013-11
Station:	148+50



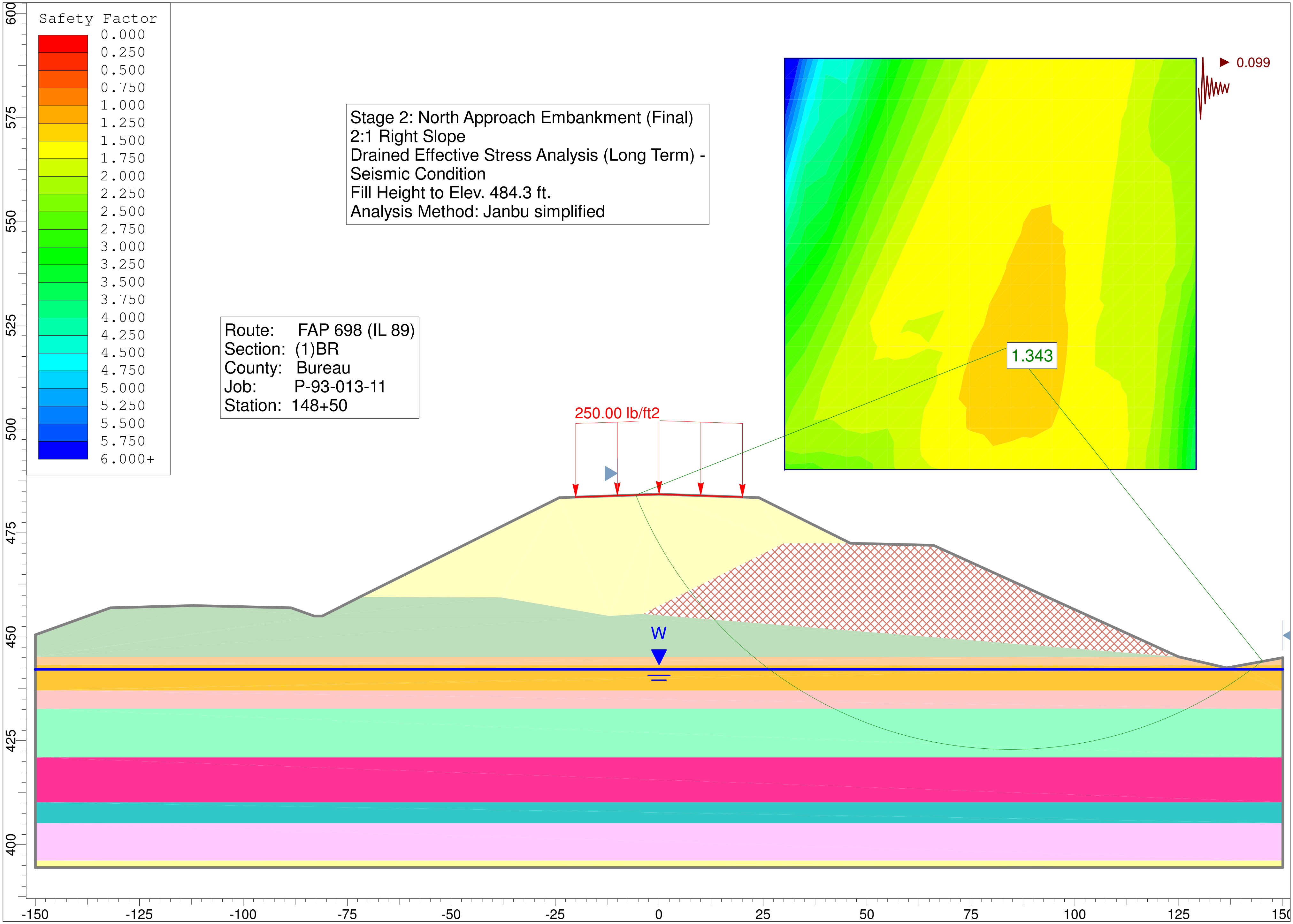
Stage 2: North Approach Embankment (Final)
2:1 Left Slope
Drained Effective Stress Analysis (Long Term) -
Seismic Condition
Fill Height to Elev. 484.3 ft.
Analysis Method: Janbu simplified

Route:	FAP 698 (IL 89)
Section:	(1)BR
County:	Bureau
Job:	P-93-013-11
Station:	148+50



Stage 2: North Approach Embankment (Final)
2:1 Right Slope
Drained Effective Stress Analysis (Long Term)
Fill Height to Elev. 484.3 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Bureau
Job: P-93-013-11
Station: 148+50



Stage 2: North Approach Embankment (Final)
2:1 Right Slope
Drained Effective Stress Analysis (Long Term) -
Seismic Condition
Fill Height to Elev. 484.3 ft.
Analysis Method: Janbu simplified

Route:	FAP 698 (IL 89)
Section:	(1)BR
County:	Bureau
Job:	P-93-013-11
Station:	148+50

APPENDIX

P

Illinois Department of Transportation

Memorandum

To: Paul Loete Attn: James Threadgill / Michael Short
From: Laura R. Mlacnik By: Matthew Mueller
Subject: Slope Stability / Settlement Analysis (South Approach)
Date: April 24, 2015

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job No.: P-93-013-11
BMPR Lab No.: 13003
SN: 078-0006 (EX)/078-0047 (PR)

The Bureau of Materials and Physical Research (BMPR) Geotechnical Sub-unit has conducted laboratory testing, settlement analyses and slope stability analyses as requested by District 3 for the above referenced project around Station 167+50 (PR). The laboratory test results for Boring 4-ST (2013) are presented in Attachment B on the Shelby Tube Test Results forms and the consolidation test results summaries.

Design assumptions, embankment profiles, soil layering, and soil strength parameters were based on the laboratory test results from Boring 4-ST (2013), boring log data from Boring 4 (2013), the preliminary cross section at Station 168+00 (PR), the preliminary proposed centerline profile, and phone discussions with the District 3 Geotechnical Unit. A groundwater elevation of about 443.3 ft. and an embankment fill unit weight of 125 lbs/ft^3 were assumed for the settlement and slope stability analyses.

Several construction stages were evaluated in the slope stability and settlement analyses for both the left and right side of the embankment. The cross section in Figure 1 of Attachment A shows the various construction stages used for the settlement and slope stability analyses. Stage 1a places the proposed fill to match the height of the existing embankment at about elevation 466.0 ft. Stage 1b places fill on top of the Stage 1a to the final embankment height of about 476.6 ft. with an assumed MSE wall at about 20 ft. right of the proposed centerline for maintenance of traffic on the existing alignment. A surcharge option is provided for Stage 1b to address differential settlements anticipated from placement of the Stage 2 fill material. Stage 2 places fill on the proposed right side slope over the existing alignment to complete the embankment construction:

Settlement

Tables 1, 2, and 3 in Attachment A summarize the results of the settlement analyses. (Additional details of the settlement analyses are provided in Attachment C for reference.) Surcharge and wick drain treatment options were also analyzed and are summarized in Tables 4, 5, and 6 of Attachment A. A comparison of estimated primary settlement verses time for untreated, surcharge, and wick drain treatment options is also provided in Figure 2 of Attachment A.

Table 2 of Attachment A summarizes the estimated differential settlement across the proposed and existing embankments at Station 167+50 for the various construction stages. Consideration should be given to the following:

- Approximately 0.3 to 2.7 inches of settlement are estimated across the existing driving lanes from the Stage 1a and 1b embankment construction at Station 167+50. For maintenance of traffic during the construction, **it is recommended that the existing south bridge abutment be evaluated for the effects of down drag forces resulting from this settlement.**

- Approximately 1.9 inches of differential settlement is estimated across the proposed driving lanes from the Stage 2 fill placement at Station 167+50. This would occur after traffic was shifted to the proposed alignment. To reduce this settlement to about ½ inch near the bridge abutment, a surcharge option in Stage 1b is provided. Refer to Table 4 of Attachment A for the recommended surcharge treatment limits. **If a surcharge is not utilized to mitigate this settlement, it is recommended that the proposed south bridge abutment be evaluated for effects of resulting down drag forces.**

If wick drains are selected to reduce the time required for primary settlement, they should be extended from the top of a granular drainage layer to bottom of the lowest cohesive soil layer at an approximate elevation of 408.3 feet. The wick drains should be installed from the assumed stage line at about 20 ft. right of the proposed centerline to the midpoint of the left side slope. This may require either stepping and benching the existing side slope or installing temporary shoring or sheet pile at the stage line. A positive drainage outlet is also required for the granular drainage layer. This can be either provided by either an underdrain system or by daylighting the drainage layer at the side of the embankment with fabric and riprap for erosion protection. Figure 1 of Attachment A shows a diagram of a typical wick drain and drainage layer configuration. Table 5 of Attachment A summarizes the recommended treatment limits for wick drains, and Table 6 of Attachment A provides spacing options.

Since the existing bridge abutment may need further evaluation for the effects of down drag forces resulting from the settlement estimated across the existing driving lanes from the Stage 1a and 1b embankment construction, the District requested additional settlement estimates for future consideration in the feasibility of using aggregate column ground improvement as an option in reducing settlement and development of down drag force. Estimated settlements beneath the proposed fill treated with aggregate columns are dependent on the stress concentration that is developed within the aggregate columns; however, the amount of stress concentration development is difficult to estimate in the design phase. As such, a range of typical stress concentration factors and area replacement ratios are used to provide a range estimated of settlement. Table 7 of Attachment A summarizes a range of estimated settlements at Sta. 167+50, 12 ft. left of the proposed centerline for a stress concentration range of 3 to 5 and an area replacement ratio range of about 0.23 to 0.31. Cumulative estimated settlements of the upper and lower bounds of this study range are also shown graphically in Figure 4 of Attachment A near the assumed stage construction line at Sta. 167+50, 20 ft. right of the proposed centerline. The estimated settlements shown in Figure 4 cumulate from the bottom to the top of the consolidating layers. If this option is considered, the estimated treatment limits of the aggregate columns should extend from the assumed stage line at about 20 ft. right of the proposed centerline to the midpoint of the left side slope, and within 50 feet of the existing bridge abutment in either direction along mainline. Additionally, use of a granular base drainage layer with a positive drainage outlet will be necessary to facilitate drainage during the consolidation process.

Slope Stability

Table 8 of Attachment A summarizes the results of the slope stability analyses. Tables 10 and 11 of Attachment A summarize the soil data used for the slope stability analyses, and figures detailing the configuration for these analyses are attached for reference. **To maintain a minimum factor of safety of 1.3 during construction, the rate of fill placement may need to be adjusted to control the development of excess groundwater pore pressures for fill placed above about elevation 470.3 ft.** A piezometer should be installed to monitor pore pressures, and an adjacent settlement monitoring platform should also be installed between about 12 ft. and 24 ft. left of the proposed centerline at Station 167+50. Table 9 of Attachment A summarizes the piezometer location and maximum allowable pore pressure data. If the pore pressures approach the maximum allowable shown in Table 9 of Attachment A, stop fill placement to allow the pore pressures dissipate sufficiently before placing additional fill. If additional monitoring is desired, an inclinometer may also be installed around Sta. 167 + 50 near the toe of the proposed embankment extending about 5 ft. into the shale bedrock.

If you have any questions or need further assistance, please contact Heather Shoup at (217)785-9972 or Paul S. Guthrie at (217)524-0633 of the BMPR Geotechnical Sub-Unit.

cc: Heather Shoup
Kurt Shmuck
Attachments

ATTACHMENT A

FIGURES AND TABLES

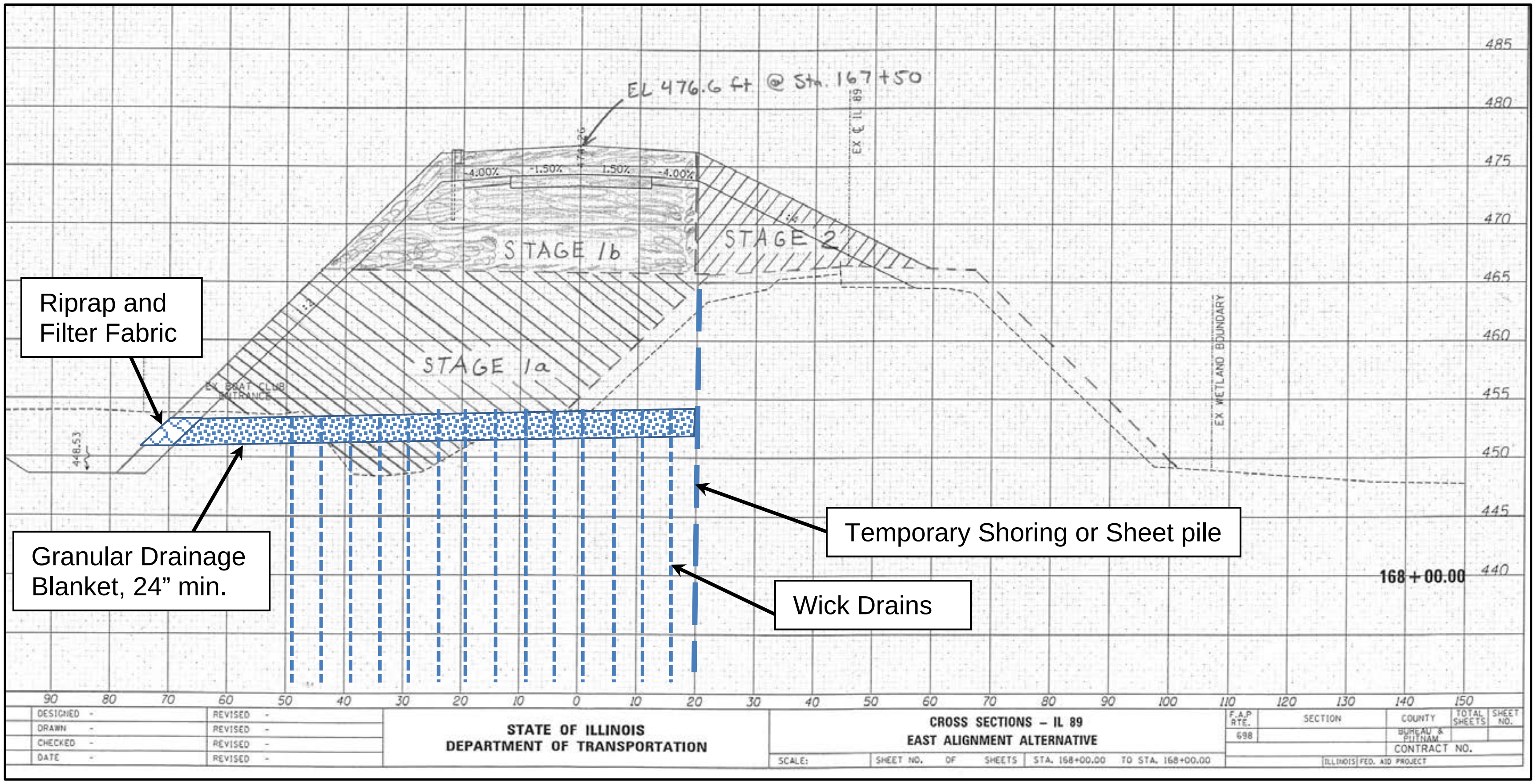
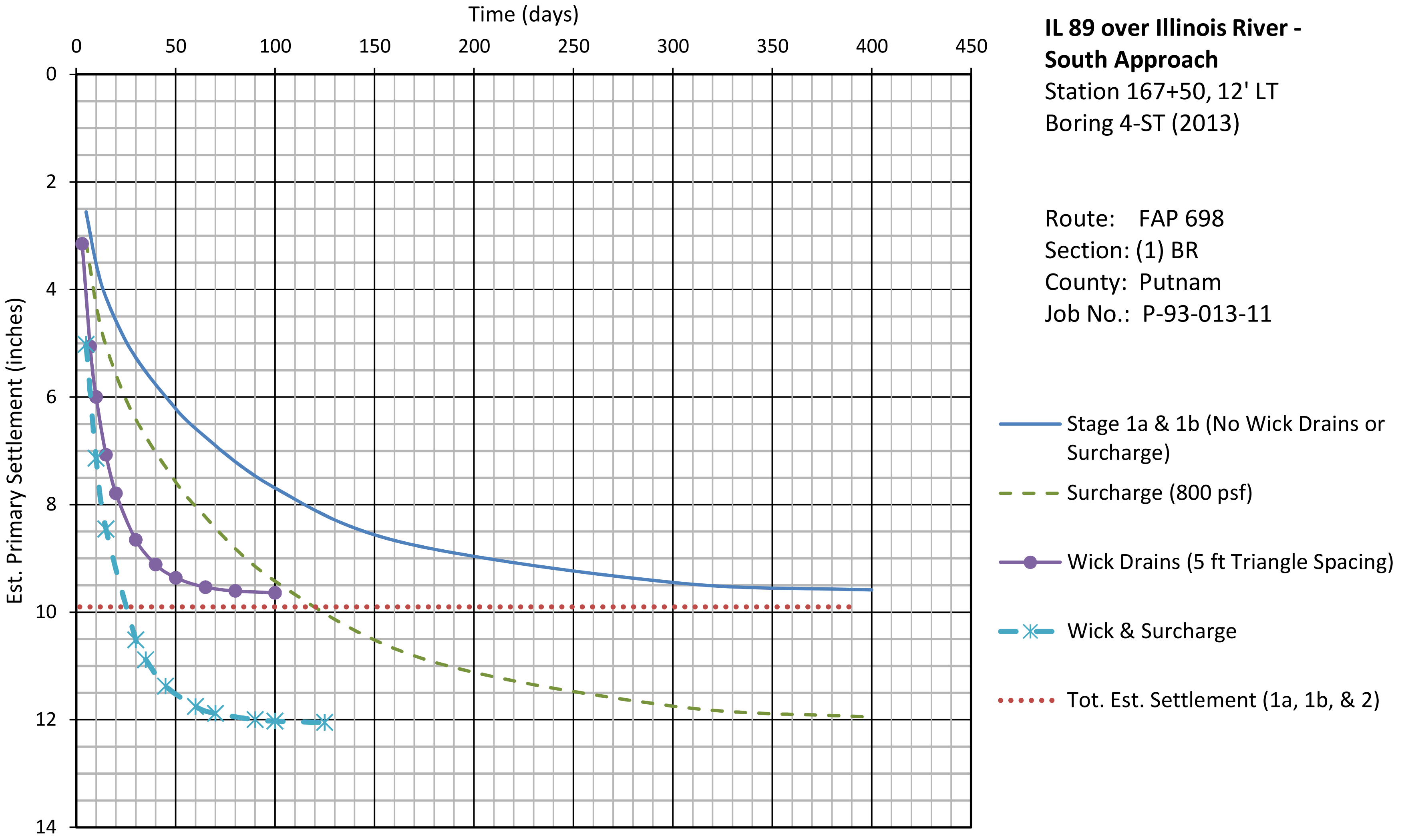


Figure 1. Anticipated construction stages and diagram for wick drain options.

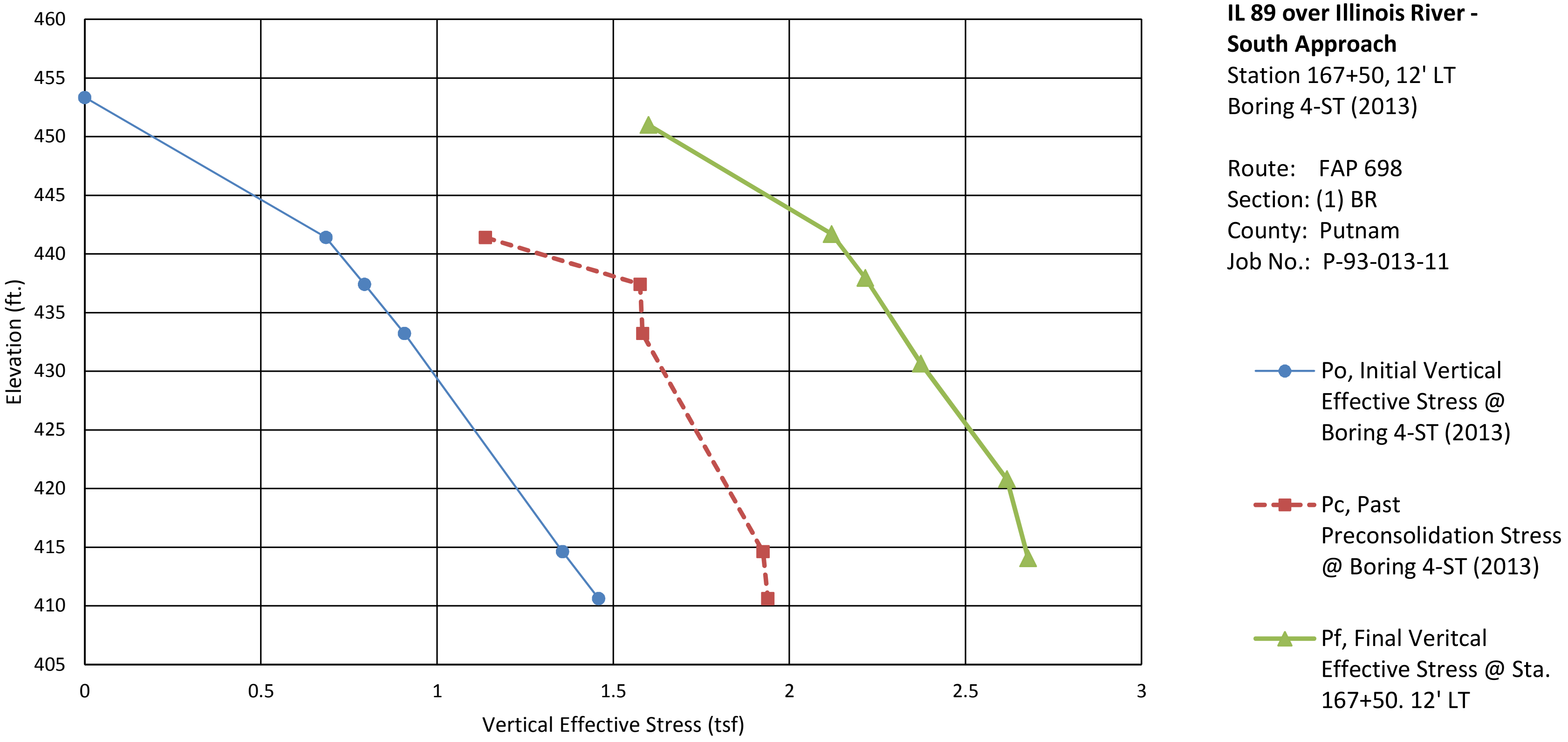
Figure 2. Estimated Settlement verses Time



IL 89 over Illinois River - South Approach
Station 167+50, 12' LT
Boring 4-ST (2013)

Route: FAP 698
Section: (1) BR
County: Putnam
Job No.: P-93-013-11

Figure 3. Vertical Effective Stress vs Elevation



IL 89 over Illinois River - South Approach
Station 167+50, 12' LT
Boring 4-ST (2013)

Route: FAP 698
Section: (1) BR
County: Putnam
Job No.: P-93-013-11

Figure 4. Estimated Cumulative Settlement at Depth

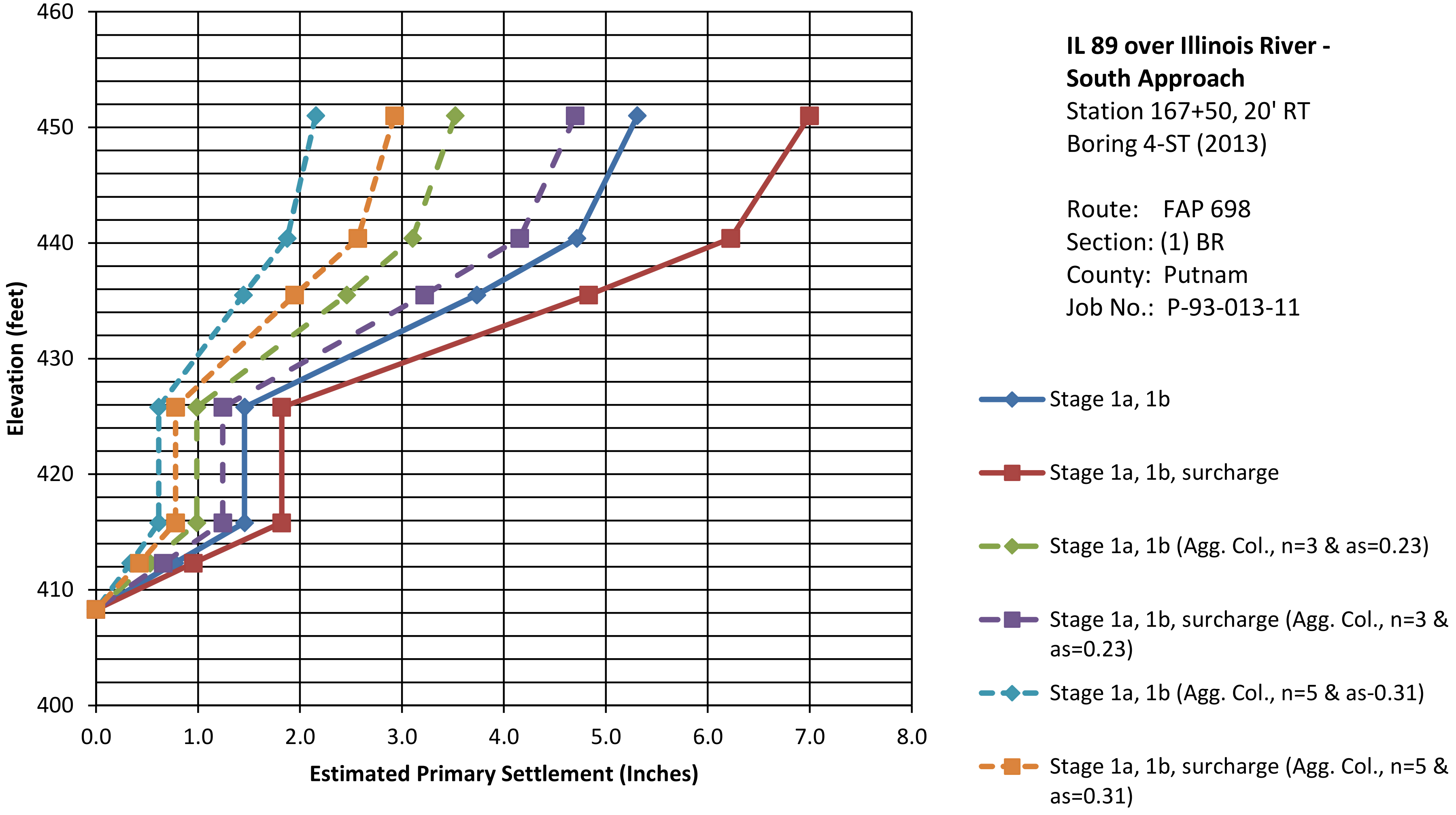


Table 1. Settlement Analysis Summary for Station 167+50, 12 ft. LT
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

Location of Analyses and Assumptions	**Top Elev. of Consolidating Layers (feet)**	**Bottom Elev. of Consolidating Layers (feet)**	**Total Est. Primary Settlement (inches)**	**Est. Time to 50% Settlement (t_{50}) (months)**	**Est. Time to 90% Settlement (t_{90}) (months)**	**Drainage Condition**
Stage 1a: 14 ft of fill to match height of existing embankment	443.0	408.3	3.8	1.0	4.4	Double
Stage 1b: Additional 11.3 ft. of fill over Stage 1a fill with assumed temp. MSE wall at 20 ft. RT stage line.	443.0	408.3	5.9	1.2	5.1	Double
Stage 2: 11.3 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	443.0	408.3	0.2	0.7	2.9	Double
Total for Stage 1a, 1b, and 2:			**9.9**			
Stage 1a + 1b (Partial): Additional 5.3 ft. of fill over Stage 1a fill with assumed temp. MSE wall at 20 ft. RT stage line.	443.0	408.3	2.9	1.1	4.9	Double
Total for Stage 1a + 1b (Partial):			6.7			
Stage 1b (surcharge option): 800 psf surcharge with the Stage 1b fill.	443.0	408.3	2.4	1.3	5.4	Double
Total for Stage 1a, 1b, and 1b (surcharge):			12.1			

Notes: The existing ground line was assumed to be 451.0 ft. There were 5 consolidating layers in the analyses. All consolidation test e vs. log p curves were correctible. The t_{50} and t_{90} times were based on log of time curves for layer 1 (Sample 1-4) and square root of time curves for the other layers. Settlement of the existing embankment fill is also assumed to be negligible.

Table 2. Differential Settlement Summary for Station 167+50
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

	Offset from Proposed Center Line					
Location of Analyses and Assumptions		**12 ft. LT**	**20 ft. RT (PR RT SHLD)**	**30 ft. RT (EX LT SHLD)**	**46 ft. RT (EX Centerline)**	**62 ft. RT (EX RT SHLD)**
Stage 1a: 14 ft of fill to match height of existing embankment	(inches)	3.8	1.8	1.1	0.4	0.1
Stage 1b: Additional 11.3 ft. of fill over Stage 1a fill with assumed temp. MSE wall at 20 ft. RT stage line.	(inches)	5.9	3.5	1.6	0.5	0.2
Stage 2: 11.3 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	(inches)	0.2	2.1	2.9	2.5	0.7
Total for Stage 1a, 1b, and 2:	**(inches)**	**9.9**	**7.4**	**5.6**	**3.4**	**1.0**
Total for Stage 1a and 1b:	(inches)	9.7	5.3	2.7	0.9	0.3
Stage 1b (surcharge option): 800 psf surcharge with the Stage 1b fill.	(inches)	2.4	1.7	0.8	0.3	0.1
Total for Stage 1a, 1b, and 1b (surcharge):	(inches)	12.1	7.0	3.5	1.2	0.4

Table 3. Differential Settlement Summary
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

	Offset from Proposed Center Line		
Location of Analyses and Assumptions		**12 ft. LT**	**20 ft. RT (PR RT SHLD)**
Station 169+00			
Stage 1a and 1b: 19.3 ft of fill	(inches)	6.7	3.5
Stage 2: 8.5 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	(inches)	0.1	1.6
Total for Stage 1a, 1b, and 2:	**(inches)**	6.8	5.1
Station 169+00 (Surcharge)			
Stage 1b (surcharge option): 400 psf surcharge with the Stage 1b fill.	(inches)	1.4	0.9
Total for Stage 1a, 1b, and 1b (surcharge):	(inches)	8.2	6.0
Station 170+00			
Stage 1a and 1b: 16 ft of fill	(inches)	5.1	3.4
Stage 2: 3 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	(inches)	0.1	1.0
Total for Stage 1a, 1b, and 2:	**(inches)**	**5.2**	**4.4**
Station 171+00			
Stage 1a and 1b: 14 ft of fill	(inches)	4.1	2.6
Stage 2: 3 ft. tall triangle-shaped wedge fill to complete RT side slope (if no surcharge in Stage 1b).	(inches)	0.0	0.5
Total for Stage 1a, 1b, and 2:	**(inches)**	**4.1**	**3.1**

Table 4. Differential Primary Settlement Surcharge Treatment Option Recommendations
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

Location (length)	Surcharge Pressure (1)	Treatment Width	Concerns
Back of Proposed Bridge Abutment to Sta. 168+50	800 psf	Entire top width of the Stage 1b fill.	Differential Settlement from Stage 2 fill.
Sta. 168+50 to Sta. 170+00 (2)	Decrease uniformly from 800 psf at Sta. 168+50 to 100 psf at Sta. 170+00	Entire top width of the Stage 1b fill.	Differential Settlement from Stage 2 fill.

Note 1: Embankment fill height is assumed to be at the top of finished grade. If embankment fill is placed to a lower elevation to accommodate aggregate base layers and pavement, adjust (increase) the surcharge to an equivalent load of the finished grade.

Note 2: Option to transition differential settlement from less than 0.5 inch at Sta. 168+50 to less than 1 inch at Sta. 170+00.

Table 5. Wick Drain Option Treatment Recommendations
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

Location (length)	Depth	Spacing	Treatment Width	Concerns
Midpoint of Proposed Bridge End Slope to Sta. 171+00	Top of drainage layer to about elevation 408.3 ft. (1)	(See Table 6.)	20 ft. RT of PR CL to midpoint or proposed LT side slope.	Option to decrease time to t_{90} settlement.

Note 1: The granular drainage layer should be at least 24 inches thick.

Table 6. Treatment Option Summary for Estimated Time of Primary Settlement for Station 167+50, 12 ft. LT
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

Location of Analyses and Assumptions	Total Est. Primary Settlement (3) (inches)	Estimated Primary Settlement Time (1,3)							
		No Wick Drains		Wick Drains (2) (5 ft Triangular)		Wick Drains (2) (7.5 ft Triangular)		Wick Drains (2) (10 ft Triangular)	
		t_{50} (days)	t_{90} (days)	t_{50} (days)	t_{90} (days)	t_{50} (days)	t_{90} (days)	t_{50} (days)	t_{90} (days)
Stage 1a + 1b:	9.7	23	163	7	31	11	62	15	89
Total for Stage 1a, 1b, and 1b (800 psf surcharge):	12.1	25	174	7	35	13	69	16	98

Note 1: t_{50} and t_{90} are the estimated times to complete 50% and 90% of the settlement, respectively.

Note 2: The radial coefficient of consolidation, c_r, is assumed the same as the vertical coefficient, c_v, with no smear for the wick drain calculations.

Note 3: The existing ground line is assumed to be 451.0 ft. There were 5 consolidating layers in the analyses. All consolidation test e vs. log p curves were correctible. The t_{50} and t_{90} times are based on log of time curves for layer 1 (Sample 1-4) and square root of time curves for the other layers.

BMPR Lab No.: 13003 (South Approach)

TABLE 6(B) WAS ADDED TO THIS REPORT ON 8-24-2015.

Table 6(b). Treatment Option Summary for Estimated Time of Primary Settlement for Station 167+50, 12 ft. LT
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

Location of Analyses and Assumptions	**Total Est. Primary Settlement $^{(3)}$ (inches)**	**Estimated Primary Settlement Time $^{(1,3)}$**							
		No Wick Drains		**Wick Drains $^{(2)}$ (5 ft Triangular)**		**Wick Drains $^{(2)}$ (7.5 ft Triangular)**		**Wick Drains $^{(2)}$ (10 ft Triangular)**	
		t_{96} (days)	**t_{99} (days)**	**t_{96} (days)**	**t_{99} (days)**	**t_{96} (days)**	**t_{99} (days)**	**t_{96} (days)**	**t_{99} (days)**
Stage 1a + 1b:	9.7	245	367	46	69	92	138	132	199
Total for Stage 1a, 1b, and 1b (800 psf surcharge):	12.1	260	390	52	78	103	154	145	219

Note 1: t_{96} and t_{99} are the estimated times to complete 96% and 99% of the settlement, respectively.

Note 2: The radial coefficient of consolidation, c_r, is assumed the same as the vertical coefficient, c_v, with no smear for the wick drain calculations.

Note 3: The existing ground line is assumed to be 451.0 ft. There were 5 consolidating layers in the analyses. All consolidation test e vs. log p curves were correctible. The t_{96} and t_{99} times are based on log of time curves for layer 1 (Sample 1-4) and square root of time curves for the other layers.

Table 7. Aggregate Column Settlement Analyses Summary for Station 167+50, 12 ft. LT
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11

Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

Location of Analyses and Assumptions	**Stress Concentration Factor, n = 3 (1,2)**			**Stress Concentration Factor, n = 5 (1,2)**		
	Total Est. Primary Settlement (inches)	**Est. Time to 50% Settlement (t_{50}) (days)**	**Est. Time to 90% Settlement (t_{90}) (days)**	**Total Est. Primary Settlement (inches)**	**Est. Time to 50% Settlement (t_{50}) (days)**	**Est. Time to 90% Settlement (t_{90}) (days)**
Area Replacement Ratio, a_s = 0.23						
Stage 1a and 1b:	6.4	3	13	5.1	3	13
Stage 2: (if no surcharge in Stage 1b).	0.1			0.1		
Total for Stage 1a, 1b, and 2:	**6.5**			**5.2**		
Stage 1b (surcharge option):	1.7	4	14	1.3	4	14
Total for Stage 1a, 1b, and 1b (sur.):	8.1			6.4		
Area Replacement Ratio, a_s = 0.31						
Stage 1a and 1b:	5.8	3	13	4.3	3	13
Stage 2: (if no surcharge in Stage 1b).	0.1			0.1		
Total for Stage 1a, 1b, and 2:	**5.9**			**4.4**		
Stage 1b (surcharge option):	1.5	4	14	1.1	4	14
Total for Stage 1a, 1b, and 1b (sur.):	7.3			5.4		

Note 1: Aggregate columns are assumed to extend from the existing ground line (assumed to be elevation 451.0 ft.) to the bottom of the consolidating layers at elevation 408.3 ft. The equilibrium method is used for the settlement calculations. The assumed area replacement ratios of 0.23 and 0.31 are for 36 inch and 42 inch diameter aggregate columns placed on 6 ft. center to center spacing, respectively. A smear effect of about 10% the column diameter is also assumed for the settlement time calculations.

Note 2: There were 5 consolidating layers in the analyses. All consolidation test e vs. log p curves were correctible. The t_{50} and t_{90} times were based on log of time curves for layer 1 (Sample 1-4) and square root of time curves for the other layers. All consolidating layers are assumed to be double drained in the vertical direction. Settlement of the existing embankment fill is also assumed to be negligible.

Table 8. Slope Stability Analysis Summary for Station 167+50

Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

Location of Analyses and Assumptions (2)	Embank. Height (feet)	Slope (H:V)	Critical Failure Surface Elev. (feet)	Failure Surface Circular/ Block	FOS (Bishop simplified Method)	Seismic (1)		
						Critical Failure Surface Elev. (feet)	Failure Surface Circular/ Block	FOS (Janbu simplified Method)
Undrained Total Stress (Short Term) (3)								
Stage 1a: Left side	14.0	2:1	425.8	Circular	1.557	426.0	Circular	1.061
Stage 1b (partial): Left side	19.3	2:1	426.5	Circular	1.301 (4)	426.5	Circular	0.998
Stage 1b: Left side	25.3	2:1	426.3	Circular	1.150 (4)	–	–	–
Stage 1b (Surcharge): Left side, 800 psf surcharge	25.3	2:1	426.3	Circular	1.033 (4)	–	–	–
Stage 2: Left side	25.3	2:1	425.9	Circular	1.122 (4)	–	–	–
Stage 1b: Right side	25.3	4:1	426.0	Circular	1.347	426.1	Circular	0.947
Stage 1b (Sur.): Right side	25.3	4:1	425.9	Circular	1.224 (4)	–	–	–
Stage 2: Right side	25.3	4:1	426.0	Circular	1.306	426.0	Circular	0.956
Drained Effective Stress (Long Term) (3)								
Stage 2: Left side	25.3	2:1	444.4	Circular	1.796	436.0	Circular	1.349
Stage 2: Right side	25.3	4:1	435.7	Circular	2.180	435.5	Circular	1.497

Note 1: A peak horizontal ground acceleration of 0.099 was used for the seismic analyses.

Note 2: A partial fill height to about elevation 470.3 ft for Stage 1a is included since it corresponds with the minimum allowable factor of safety. Details of the assumed temporary shoring or MSE wall system design shown in Stage 1b and 1b (Surcharge) are anticipated to be determined during the construction phase; and as such, the global stability was not possible to be evaluated as part of these analyses. The cross section at station 168+00 and preliminary profile was used for the existing ground surface elevations. Both Janbu simplified and Bishop simplified methods were performed for circular failure.

Note 3: Soil strength parameters used for Undrained Total Stress (short term condition) and Drained Effective Stress (long term condition) are shown in Tables 10 and 11, respectively.

Note 4: To maintain a minimum factor of safety of 1.3 during construction, monitor pore pressures for fill heights above about elevation 470.3 ft. If the pore pressures approach the maximum allowable shown in Table 9, stop fill placement to allow the pore pressures dissipate sufficiently before placing additional fill.

Note 5: Increase in effective stress and excess pore pressure is minor, and should not activate the undrained condition.

Table 9. Recommended Piezometer Location and Data
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Borings 4 (2013) and 4-ST (2013), Station 166+63 (PR)

Location Number	Station	Offset	Nearest Boring	Approximate Elevation (ft.) (1)	Est. Initial Reading (psf)(3)	Est. Max. Allowable Reading(2) (psf)		
						19.3 ft. (fill height)	25.3 ft. (fill height)	25.3 ft. fill + 800 psf surcharge
1	167+50	30 ft. LT	4-ST (2013)	430.6	792	1925 (Ru = 0.43)(4)	1812 (Ru = 0.36)(4)	1762 (Ru = 0.34)(4)

Note 1: Piezometers should be founded in soft clay layers. See nearest boring for additional subsurface stratigraphy details.
Note 2: Values maintain minimum FS of 1.3 using short term values.
Note 3: Based on groundwater elevation of 443.3 ft.
Note 4: Ru = u/σ_v = Pore Pressure / Total Vertical Stress.

Table 10: Slope Stability Undrained Total Stress Analysis (Short Term)
Material Properties Summary
Program: Slide version 5.044 by Rocscience, Inc.
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Station 166+63 (PR), Borings 4-ST (2013) and 4 (2013), South Abutment

Material Name	Strength Type	Unit Weight (lb/ft^3)	Cohesion Type	Cohesion (psf)	Friction Angle	Water Surface	Custom Hu value	Layer Top Elev. (ft)
Material 1 (New Fill)	Undrained	125	Constant	1000	–	None	–	Varies (Proposed Embankment)
Material 2	Drained	125	–	0	30°	Water Table	1	Varies (Ground Surface)
Material 3	Drained	129.7	–	0	37°	Water Table	1	443.0
Material 4	Undrained	115.3	Constant	780	–	None	–	442.4
Material 5	Undrained	117.7	Constant	430	–	None	–	435.5
Material 6	Drained	105.0	–	0	30°	Water Table	1	425.8
Material 7	Undrained	112.3	Constant	265	–	None	–	415.8
Material 8	Undrained	114.1	Constant	830	–	None	–	414.9
Material 9	Undrained	113.8	Constant	460	–	None	–	412.3
Material 10	Drained	110.0	–	0	31°	Water Table	1	408.3
Material 11	Drained	100.0	–	0	26°	Water Table	1	395.3
Material 12 Shale	Undrained	120.0	Constant	2000 (assumed)	–	None	–	390.8
Material 13 (Ex. Fill)	Undrained	125.0	Constant	1000	–	None	–	Varies (Existing Embankment)

Table 11: Slope Stability Drained Effective Stress Analysis (Long Term)
Material Properties Summary
Program: Slide version 5.044 by Rocscience, Inc.
Route FAP 698 (IL 89), Section (1)BR, Putnam County
Job No. P-93-013-11
Station 166+63 (PR), Borings 4-ST (2013) and 4 (2013), South Abutment

Material Name	Strength Type	Unit Weight (lb/ft^3)	Cohesion Type	Cohesion (psf)	Friction Angle	Water Surface	Custom Hu value	Layer Top Elev. (ft)
Material 1 (New Fill)	Undrained	125	Constant	1000	–	None	–	Varies (Proposed Embankment)
Material 2	Drained	125	–	0	30°	Water Table	1	Varies (Ground Surface)
Material 3	Drained	123.1	–	0	37°	Water Table	1	443.0
Material 4	Drained	115.3	–	660	8.9°	Water Table	1	440.4
Material 5	Drained	117.7	–	140	33.4°	Water Table	1	435.5
Material 6	Drained	105.0	–	0	30°	Water Table	1	425.8
Material 7	Drained	112.3	–	140	25.7°	Water Table	1	415.8
Material 8	Drained	114.1	–	830	0°	Water Table	1	414.9
Material 9	Drained	113.8	–	235	24°	Water Table	1	412.3
Material 10	Drained	110.0	–	0	31°	Water Table	1	408.3
Material 11	Drained	100.0	–	0	26°	Water Table	1	395.3
Material 12 Shale	Undrained	120.0	Constant	2000 (assumed)	–	None	–	390.8
Material 13 (Ex. Fill)	Undrained	125.0	Constant	1000	–	None	–	Varies (Existing Embankment)

ATTACHMENT B

LABORATORY TEST RESULTS

Illinois Department of Transportation

Shelby Tube Test Results

Boring No.: 4-ST (2013) S. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 1 of 2
Station: 166+63 (PR)
Section: (1) BR
Ground Surface Elev.: 453.33 ft.
Date: 11/21/2013
Offset: 55 ft. Lt.
County: Putnam
Begin Sampling Depth: 443.33 ft.
Job No.: P-93-013-11
Latitude: 41.309327º N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 443.3 ft.
Soils Lab Project No.: 13003
Longitude: 89.199454º W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c’ (psf)	Φ’ (deg)	Soil Type, Description and Observations
	0.0	453.3	---	---	---					Augered – 10 ft. – Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	10.0	443.3	---	---	---					↓
1-1	10.3	443.0	---	17.0	---					Brown Sand
1-2	10.9	442.4	UUTx	13.7	129.7	0	32.9	74	37.0	Brown coarse Sand w/ gravel – isolated Silty Loam layer
1-3	11.6	441.7	0.16	25.5	116.3					Brown Sand w/ gravel, top 1/4, to Gray Silty Loam w/ isolated gravel
1-4	12.2	441.1	cons	33.3	114.5					Alternating fine layers of Gray Silty Clay, SiCL and SiL – isolated Silt lenses
2-1	12.9	440.4	---	16.7	131.8					Brown Sand w/ gravel to Gray Silty Clay-Loam
2-2	13.5	439.8	0.67	37.8	111.2					Dark Gray Silty Clay
2-3	14.2	439.1	0.88	32.8	114.0					Same
2-4	15.0	438.3	---	---	---					No Recovery
3-1	15.6	437.7	0.70	34.2	115.8					Dark Gray Silty Clay w/ Silty Loam pockets
3-2	16.2	437.1	cons	31.6	117.2					Dark Gray Silty Clay w/ oxidized Silty Loam pockets – isolated wood debris
3-3	16.9	436.4	UUTx	28.6	117.0	780	0.4	664	8.9	Gray Silty Clay w/ oxidized Silty Loam pockets
3-4	17.5	435.8	---	---	---					No Recovery
4-1	17.8	435.5	---	34.4	116.3					Gray Silty Clay w/ oxidized Silty Loam pockets
4-2	18.4	434.9	0.37	30.7	117.2					Gray Silty Clay w/ oxidized Silty Loam pockets – crumbly structure
4-3	19.0	434.3	0.47	32.5	117.1					Same
4-4	19.6	433.7	0.55	32.5	118.9					Gray Silty Clay w/ oxidized Silty Loam pockets
5-1	20.6	432.7	cons	33.0	117.3					Gray Silty Clay w/ oxidized Silty Loam pockets – Sandy Loam lenses
5-2	21.2	432.1	UUTX	32.9	118.0	432	0.3	142	33.4	Gray Silty Clay w/ oxidized Silty Loam pockets – crumbly structure
5-3	21.9	431.4	---	---	---					No Recovery

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c’ and Φ’ column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

Illinois Department of Transportation

Shelby Tube Test Results

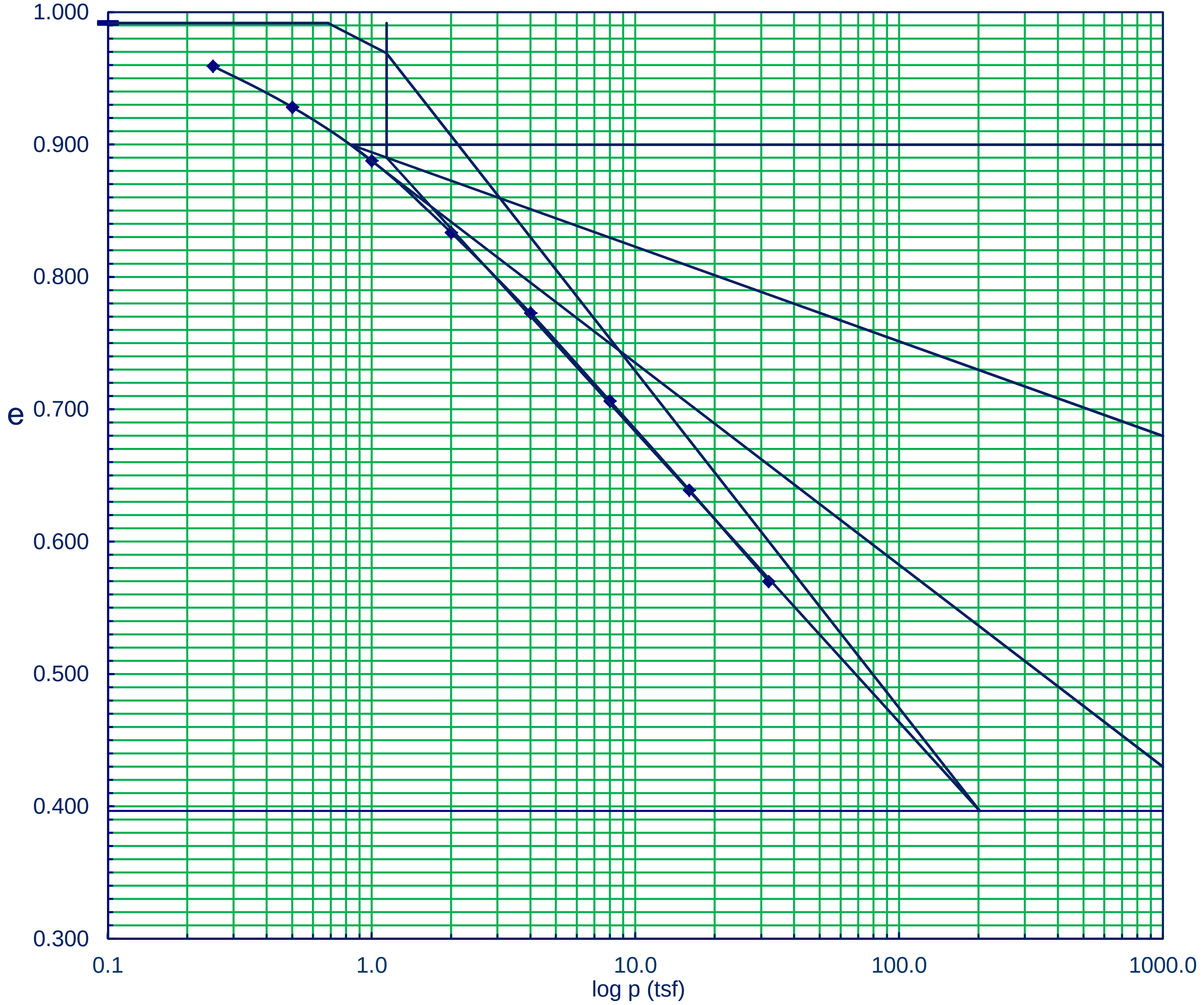
Boring No.: 4-ST (2013) S. Abut.
Route: FAP 698 (IL 89)
Tube Length/Diameter: 30-in / 3-in.
Page: 2 of 2
Station: 166+63 PR
Section: (1) BR
Ground Surface Elev.: 453.33 ft.
Date: 11/21/2013
Offset: 55 ft. Lt.
County: Putnam
Begin Sampling Depth: 443.33 ft.
Job No.: P-93-013-11
Latitude: 41.309327º N
Structure No.: 078-0006 (exist.)
Ground Water Elev.: 443.3 ft.
Soils Lab Project No.: 13003
Longitude: 89.199454º W
Contract No.: 66A69
Drilled by: Larry Meyers
Prepared by: Kurt Schmuck

Sample No.	Depth (ft)	Elev. (ft)	Qu (tsf)	Moist. (%)	Unit Wt. (pcf)	c (psf)	Φ (deg)	c’ (psf)	Φ’ (deg)	Soil Type, Description and Observations
5-4	22.5	430.8	---	---	---					No Recovery
	↓	453.3	---	---	---					Tubes Pushed – 5 ft. – No Recovery
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	27.5	425.8	---	---	---					↓
	↓	↓	---	---	---					Augered – 10 ft, - Not Sampled
	↓	↓	---	---	---					↓
	↓	↓	---	---	---					↓
	37.5	415.8	---	---	---					↓
6-1	37.8	415.5	---	27.1	---					Gray Silty Clay-Loam w/ Sandy Loam pockets, to Dark Gray SiL w/ organics
6-2	38.4	414.9	UUTx	35.1	112.3	265	0.7	140	25.7	Dark Gray Silty Loam w/ Loam & Sandy Loam pockets – organics & wood debris
6-3	39.0	414.3	cons	39.8	116.7					Dark Gray SiL w/ Sand layers & lenses, to Gray SiL w/ organics – calcar. matrl.
6-4	39.6	413.7	UUTx	37.7	111.5	829	0.0	829	0.0	Dark Gray SiL w/ SaL lenses – organics, iso. wood debris, calcareous material
	↓	↓								Tube Pushed – 2.5 ft. – No Recovery
	↓	↓								↓
	↓	↓								↓
	42.5	410.8								↓
7-1	42.9	410.4	cons	34.4	---					Dark Gray Silty Loam w/ Sand lenses top 1/4 - organics
7-2	43.5	409.8	UUTx	34.4	113.8	462	1.5	235	24.0	Dark Gray Silty Loam – Sand lenses bottom 1/3
7-3	44.2	409.1	---	---	---					No Recovery
7-4	45.0	408.3	---	---	---					No Recovery
										End of Shelby tube boring

The Unit Wt. column represents the Moist Unit Weight.
The Qu column represents the Unconfined Compressive Strength using AASHTO T 208.
The c and Φ column represents cohesion and friction angle for total stress using AASHTO T 296 (unconsolidated-undrained triaxial testing).
The c’ and Φ’ column represents cohesion and friction angle for effective stress using either AASHTO T 297 (consolidated-undrained triaxial testing), or AASHTO T 296 with pore pressure measurement.

District	3	Lab Project Number	13003
County	Putnam	Sample Number	1-4
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL

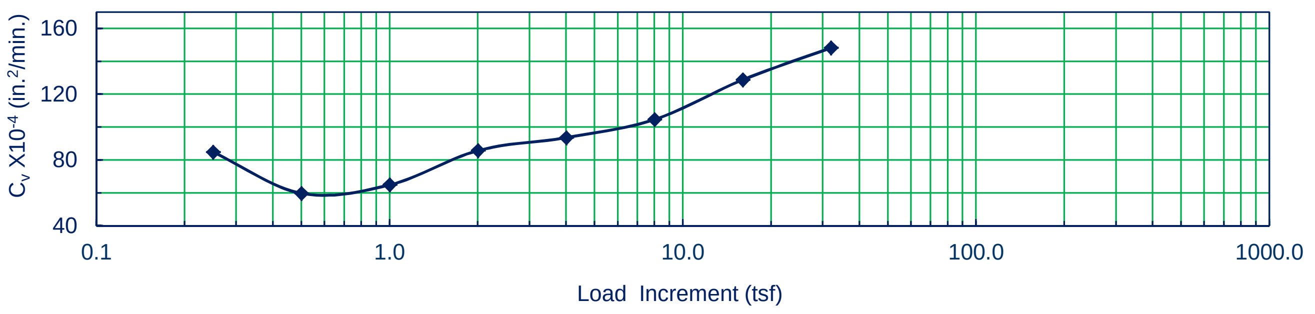
e vs log p



Layer 1

p_0 = 0.684 tsf p_c = 1.138 tsf c_r = 0.103 c_c = 0.254 e_o = 0.992

C_v vs log p



Lab Project 13003

Layer 1 Worksheet

Sample Number	1-4	Boring Station	166+63
Machine Number	1	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	log	e calculations curve	log

e Calculations

Increment	Increment duration min.	Loading tsf	Ht. inches	MD inches	Adjusted ht. inches	V cm^3	V/V_s	e V/V_s-1	$C_v \times 10^{-4}$ $in.^2/min$
Seating load	N/A	0.025	0.7500	0.0000	0.7500	60.3	1.992	0.992	
1	400	0.250	0.7372	0.0006	0.7378	59.3	1.959	0.959	85
2	920	0.500	0.7252	0.0009	0.7261	58.4	1.928	0.928	60
3	400	1.000	0.7095	0.0014	0.7109	57.2	1.888	0.888	65
4	995	2.000	0.6883	0.0021	0.6904	55.5	1.834	0.834	86
5	400	4.000	0.6645	0.0030	0.6675	53.7	1.773	0.773	94
6	1000	8.000	0.6383	0.0042	0.6425	51.7	1.706	0.706	105
7	400	16.000	0.6112	0.0060	0.6172	49.6	1.639	0.639	129
8	3845	32.000	0.5822	0.0090	0.5912	47.6	1.570	0.570	148
Final reading	N/A	32.000	0.5751	0.0090	0.5841	47.0	1.551	0.551	

Lab Sample Test Results

Tare	76.6	gr.
Wet+Tare	188.9	gr.
Cons+Tare	177.9	gr.
Dry+Tare	161.2	gr.
W_s	84.6	gr.
$W_w = V_w$	27.7	cm^3
V_s	30.3	cm^3

	Initial	Final
Moisture content	32.8	19.7
Dry Unit Wt.	87.5	112.4

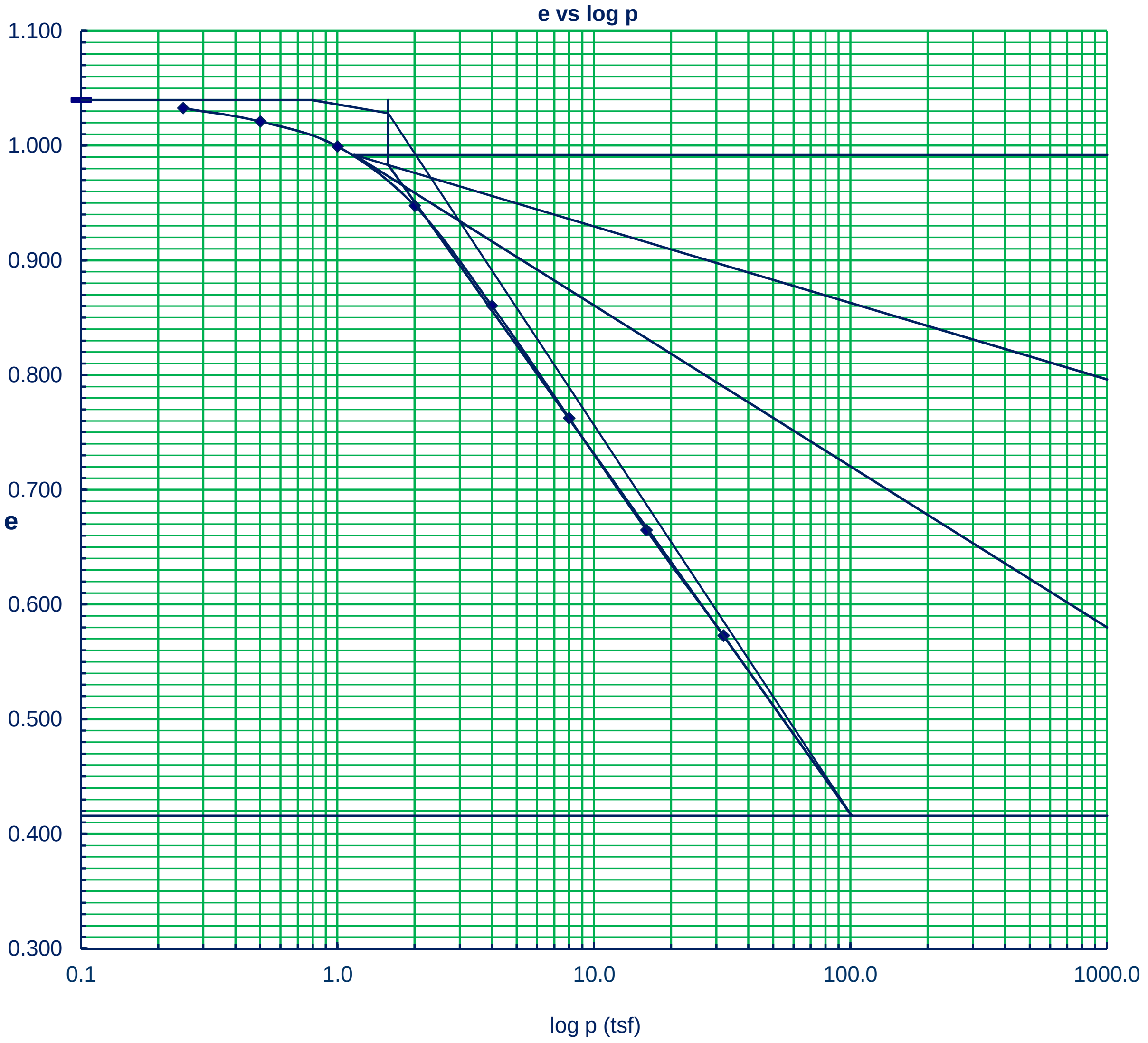
Lab Test Procedures

Test Method	T 216 B
Sample Condition	inundated
Inundation pressure	.025 tsf
Test Preparation	Tested directly in ring from ring-lined sampler

Lab Comments:

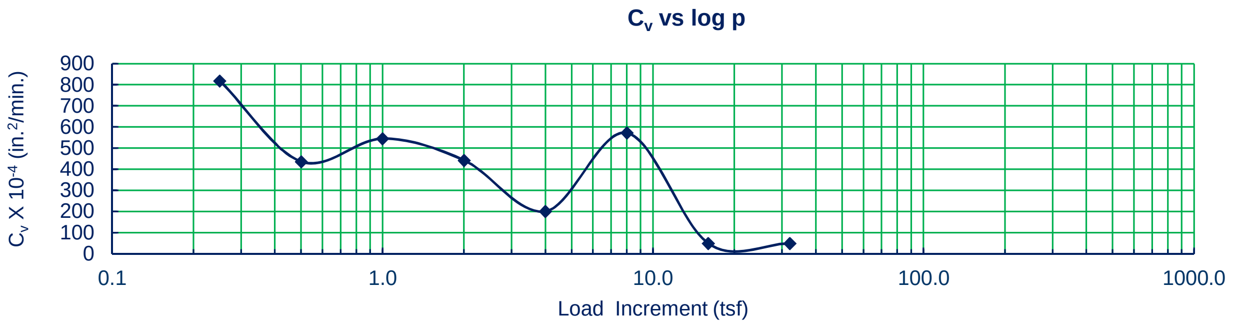
COMMENTS:

District	3	Lab Project Number	13003
County	Putnam	Sample Number	3-2
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL



Layer 2

p_0 = 0.794 tsf p_c = 1.577 tsf c_r = 0.039 c_c = 0.339 e_o = 1.040



Lab Project **13003**

Layer 2 Worksheet

Sample Number	3-2	Boring Station	166+63
Machine Number	2	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve square root

e calculations curve square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.040	1.040	
1	400	0.250	0.7465	0.0009	0.7474	60.1	2.033	1.033	819
2	920	0.500	0.7417	0.0014	0.7431	59.8	2.021	1.021	437
3	400	1.000	0.7330	0.0021	0.7351	59.1	1.999	0.999	546
4	995	2.000	0.7131	0.0030	0.7161	57.6	1.948	0.948	443
5	400	4.000	0.6799	0.0041	0.6840	55.0	1.860	0.860	202
6	1000	8.000	0.6423	0.0057	0.6480	52.1	1.763	0.763	573
7	400	16.000	0.6041	0.0080	0.6121	49.2	1.665	0.665	49
8	3845	32.000	0.5670	0.0113	0.5783	46.5	1.573	0.573	50
Final		32.000	0.5751	0.0113	0.5864	45.7	1.544	0.544	

Lab Sample Test Results

Tare	76.2	gr.
Wet+Tare	185.8	gr.
Cons+Tare	175.1	gr.
Dry+Tare	159.0	gr.
W_s	82.8	gr.
$W_w = V_w$	26.7	cm^3
V_s	29.6	cm^3

	Initial	Final
Moisture content	32.3	19.7
Dry Unit Wt.	85.7	112.4

Lab Test Procedures

Test Method: T 216 B

Sample Condition: inundated

Inundation Pressure: .025 tsf

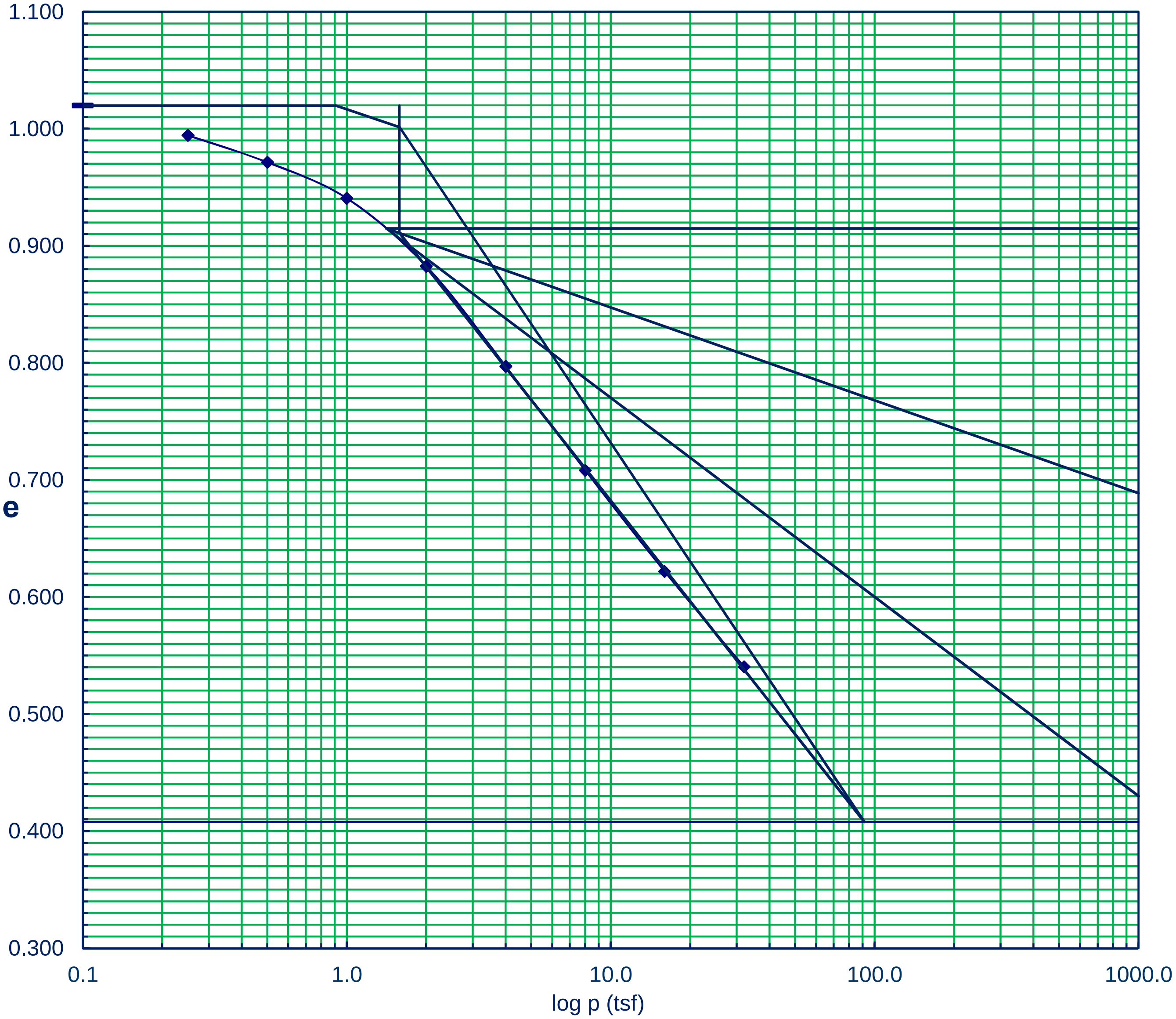
Test Preparation: Tested directly in ring from ring-lined sampler

Lab Comments:

COMMENTS:

District	3	Lab Project Number	13003
County	Putnam	Sample Number	5-1
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL

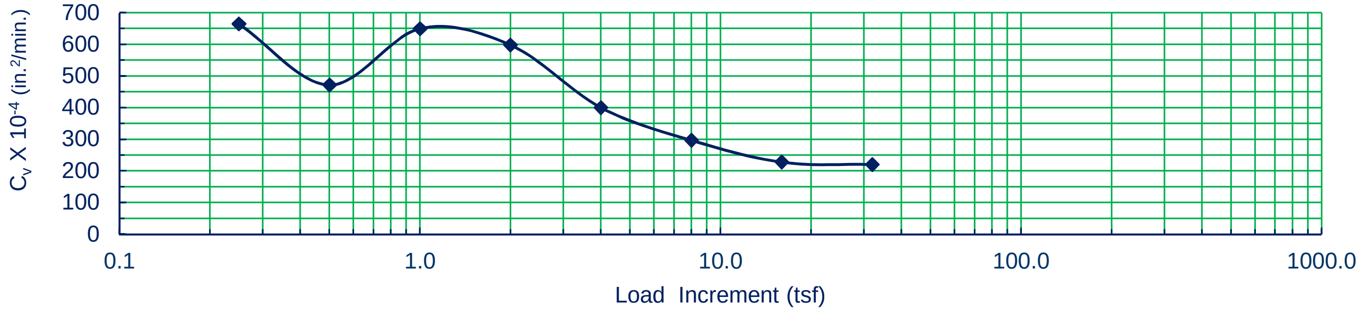
e vs log p



Layer 3

p_0 = 0.908 tsf p_c = 1.584 tsf c_r = 0.076 c_c = 0.337 e_o = 1.020

C_v vs log p



Lab Project 13003

Layer 3 Worksheet

Sample Number	5-1	Boring Station	166+63
Machine Number	3	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment duration (min.)	Increment load (tsf)	Height (inches)	Machine deflection (inches)	Adjusted height (inches)	V (cm^3)	V/V_s	e V/V_s-1	C_v X 10^{-4} (in^2/min.)
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.020	1.020	
1	400	0.250	0.7402	0.0003	0.7405	59.6	1.994	0.994	664
2	920	0.500	0.7314	0.0006	0.7320	58.9	1.971	0.971	472
3	400	1.000	0.7196	0.0010	0.7206	58.0	1.941	0.941	650
4	995	2.000	0.6974	0.0016	0.6990	56.2	1.883	0.883	598
5	400	4.000	0.6648	0.0025	0.6673	53.7	1.797	0.797	400
6	1000	8.000	0.6306	0.0037	0.6343	51.0	1.708	0.708	297
7	400	16.000	0.5966	0.0056	0.6022	48.4	1.622	0.622	228
8	3845	32.000	0.5629	0.0090	0.5719	46.0	1.540	0.540	220
Final		32.000	0.5751	0.0090	0.5841	45.1	1.511	0.511	

Lab Sample Test Results

Tare	75.6	gr.
Wet+Tare	187.7	gr.
Cons+Tare	175.0	gr.
Dry+Tare	159.7	gr.
W_s	84.1	gr.
$W_w = V_w$	27.9	cm^3
V_s	29.9	cm^3

	Initial	Final
Moisture content	33.2	18.1
Dry Unit Wt.	87.0	116.4

Lab Test Procedures

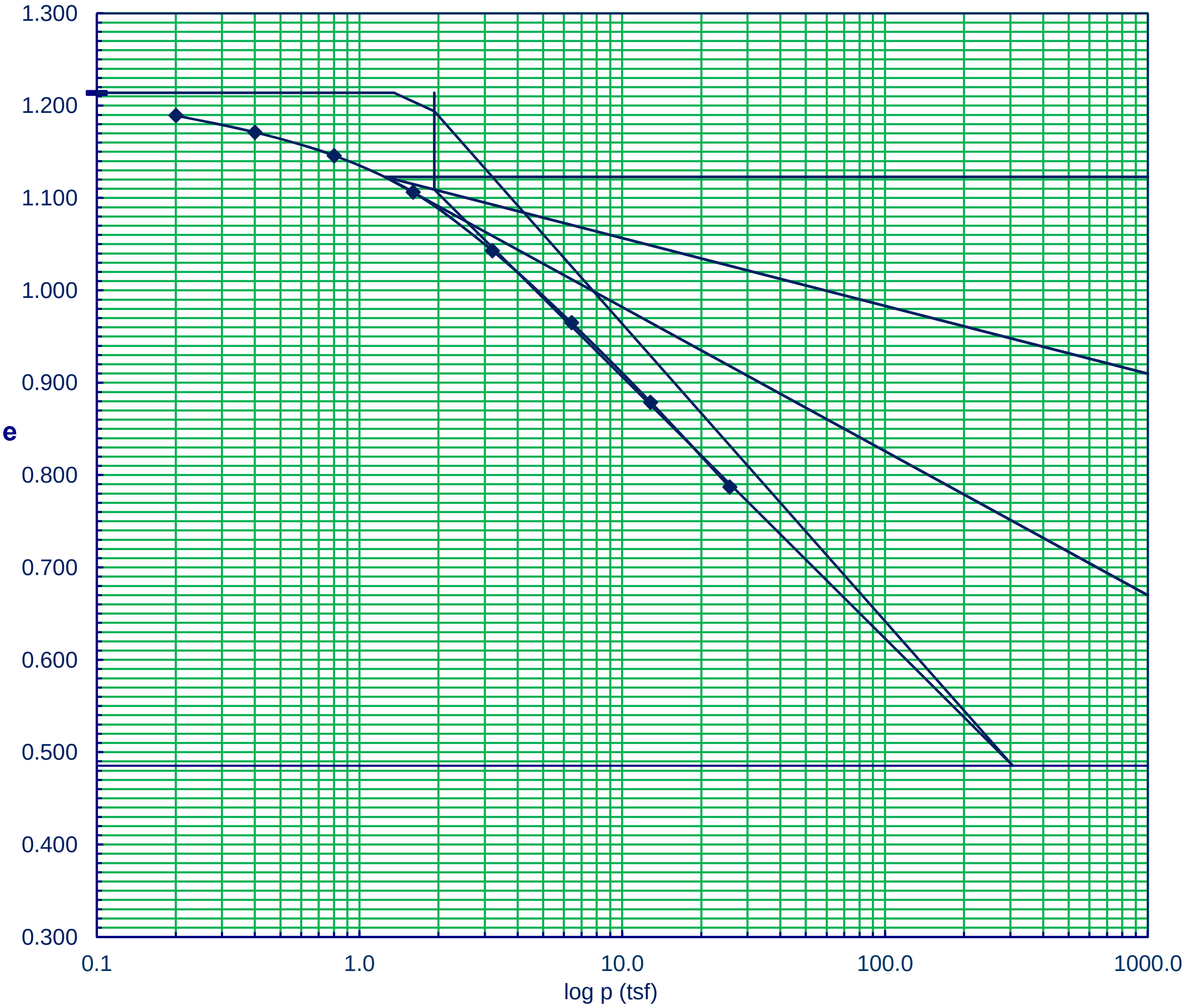
Test Method:	T 216 B
Sample Condition:	inundated
Inundated Pressure:	.025 tsf
Test Preparation:	Tested directly in ring from ring-lined sampler

Lab Comments:

COMMENTS:

District	3	Lab Project Number	13003
County	Putnam	Sample Number	6-3
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL

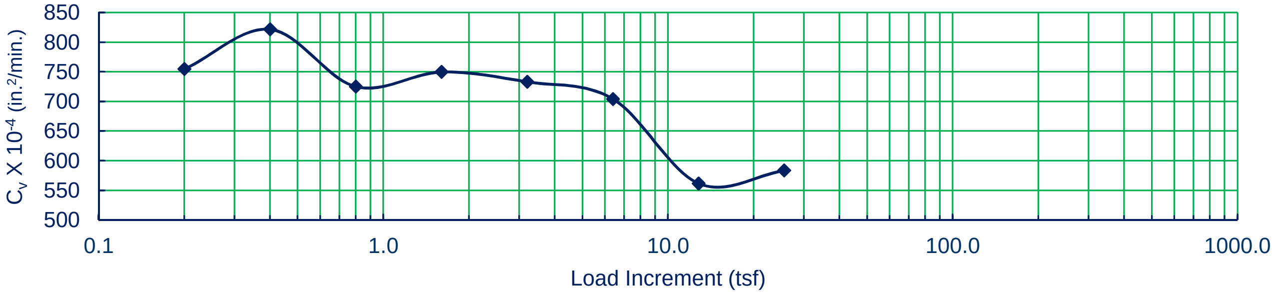
e vs log p



Layer 5

p_0 = 1.356 tsf p_c = 1.925 tsf c_r = 0.132 c_c = 0.322 e_o = 1.214

C_v vs log p



Lab Project **13003**

Layer 5 Worksheet

Sample Number	6-3	Boring Station	166+63
Machine Number	4	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root	e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.214	1.214	
1	0	0.200	0.7410	0.0007	0.7417	59.7	2.189	1.189	755
2	0	0.400	0.7343	0.0012	0.7355	59.2	2.171	1.171	822
3	0	0.800	0.7252	0.0018	0.7270	58.5	2.146	1.146	725
4	0	1.600	0.7111	0.0025	0.7136	57.4	2.106	1.106	750
5	0	3.200	0.6888	0.0033	0.6921	55.7	2.043	1.043	733
6	0	6.400	0.6613	0.0044	0.6657	53.5	1.965	0.965	704
7	0	12.800	0.6306	0.0060	0.6366	51.2	1.879	0.879	562
8	0	25.600	0.5971	0.0084	0.6055	48.7	1.787	0.787	584
Final		25.600	0.5751	0.0084	0.5835	47.7	1.750	0.750	

Lab Sample Test Results

Tare	76.4	gr.
Wet+Tare	182.6	gr.
Cons+Tare	173.1	gr.
Dry+Tare	152.6	gr.
W_s	76.2	gr.
$W_w = V_w$	29.9	cm^3
V_s	27.2	cm^3

	Initial	Final
Moisture content	39.3	26.8
Dry Unit Wt.	78.8	99.7

Lab Test Procedures

Test Method: T 216 B

Sample Condition: inundated

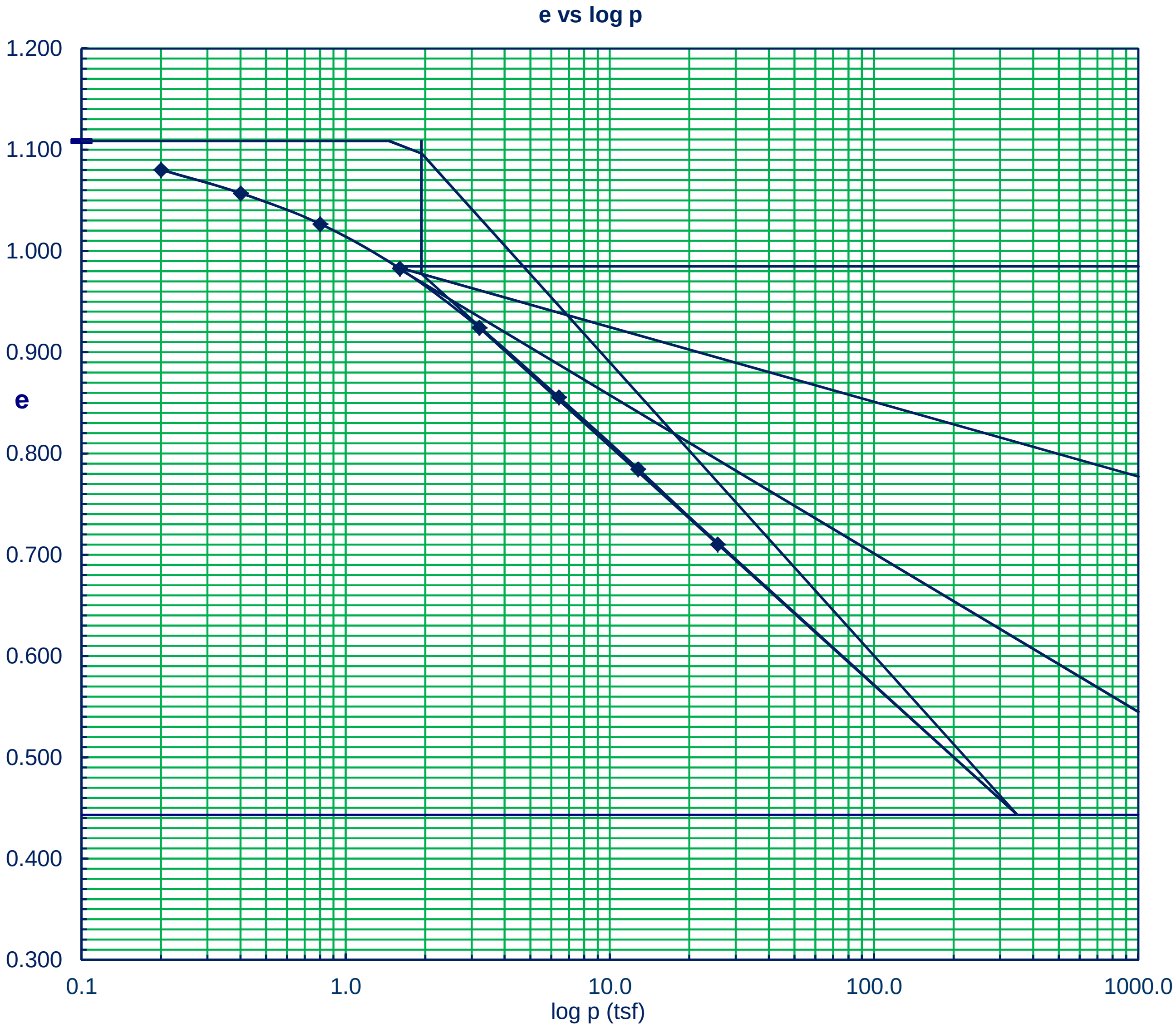
Inundated Pressure: .025 tsf

Test Preparation: Tested directly in ring from ring-lined sampler

Lab Comments:

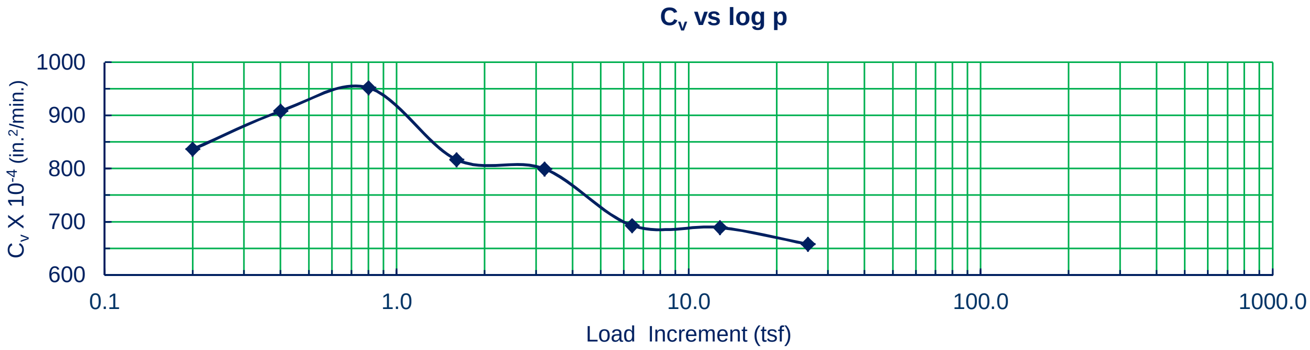
COMMENTS:

District	3	Lab Project Number	13003
County	Putnam	Sample Number	7-1
Route	FAP 698 (IL 89)	Boring ID	4-ST (2013)
Section	(1) BR	Boring Station	166+63
Job Number	P-93-013-11	Boring Offset	55 ft left CL



Layer 6

p_0 = 1.459 tsf p_c = 1.939 tsf c_r = 0.101 c_c = 0.290 e_o = 1.109



Lab Project 13003

Layer 6 Worksheet

Sample Number	7-1	Boring Station	166+63
Machine Number	5	Boring Offset	55 ft left CL
District	3	Boring ID	4-ST (2013)
County	Putnam	Job Number	P-93-013-11
Route	FAP 698 (IL 89)	Structure Number	078-0006 (existing)
Section	(1) BR	Contract number	66A69

C_v calculations curve	square root

e calculations curve	square root

e Calculations

Increment	Increment Duration min.	Loading tsf	Ht. inches	MD inches	Adjusted Ht. inches	V cm^3	V/V_s	e V/V_s-1	C_v X 10^{-4} in^2/min
Initial		0.025	0.7500	0.0000	0.7500	60.3	2.109	1.109	
1	400	0.200	0.7393	0.0006	0.7399	59.5	2.080	1.080	837
2	920	0.400	0.7305	0.0012	0.7317	58.9	2.057	1.057	908
3	400	0.800	0.7189	0.0020	0.7209	58.0	2.027	1.027	952
4	995	1.600	0.7024	0.0029	0.7053	56.7	1.983	0.983	817
5	400	3.200	0.6805	0.0040	0.6845	55.1	1.924	0.924	800
6	1000	6.400	0.6546	0.0054	0.6600	53.1	1.856	0.856	693
7	400	12.800	0.6277	0.0071	0.6348	51.1	1.785	0.785	689
8	3845	25.600	0.5987	0.0096	0.6083	48.9	1.710	0.710	658
Final		25.600	0.5751	0.0096	0.5847	48.0	1.679	0.679	

Lab Sample Test Results

Tare	76.3	gr.
Wet+Tare	184.3	gr.
Cons+Tare	174.5	gr.
Dry+Tare	155.1	gr.
W_s	78.8	gr.
$W_w = V_w$	29.2	cm^3
V_s	28.6	cm^3

	Initial	Final
Moisture content	37.1	24.7
Dry Unit Wt.	81.5	102.4

Lab Test Procedures

Test Method: T 216 B

Sample Condition: inundated

Inundated Pressure: .025 tsf

Test Preparation: Tested directly in ring from ring-lined sampler

Lab Comments:

COMMENTS:

ATTACHMENT C

SETTLEMENT ANALYSIS REPORTS

ILLINOIS DEPARTMENT OF TRANSPORTATION
BMPR Geotechnical Sub-unit

Settlement Analysis Report

District:	3	BMPR lab number:	13003
County:	Putnam	Boring Number:	4-ST (2013)
Route:	FAP 698 (IL 89)	Boring Station:	166+63
Section:	(1) BR	Boring Offset:	55.0 ft left CL
Job Number:	P-93-013-11	G.S.E. at boring:	453.3 ft
Structure Number:	078-0006 (existing)	G.S.E. for analyses:	451.0 ft
Contract Number:	66A69	G.W.E. at boring:	443.3 ft

Settlement analysis results: **Stage 1a**

Soil layer	Sample number	Layer height (ft.)	Bottom of layer elev. (ft.)	Settlement (inches)	t_{50} (months)	t_{90} (months)	Drainage condition
1	1-4	2.6	440.4	0.9	1.4	5.9	double
2	3-2	4.9	435.5	0.4			
3	5-1	9.7	425.8	1.5			
4		10.0	415.8	0.0			
5	6-3	3.5	412.3	0.5	0.1	0.5	double
6	7-1	4.0	408.3	0.5			
Total Settlement, t_{50}*, & t_{90}*				3.8	1.0	4.4	

* (t_{50} & t_{90} are weighted averages)

Settlement analysis data

Soil layer	P_o (tsf)	P_f (tsf)	P_c (tsf)
1	0.568	1.426	1.138
2	0.700	1.538	1.577
3	0.951	1.737	1.584
4	1.250	1.955	
5	1.430	2.083	1.925
6	1.539	2.164	1.939

COMMENTS:

1.) Settlement amount is calculated for Sta. 167+50, 12 ft. left of the proposed centerline (near the center of the maximum fill height).

2.) Stage 1a places fill (14 ft.) to match height of existing embankment.

ILLINOIS DEPARTMENT OF TRANSPORTATION
BMPR Geotechnical Sub-unit

Settlement Analysis Report

District:	3	BMPR lab number:	13003
County:	Putnam	Boring Number:	4-ST (2013)
Route:	FAP 698 (IL 89)	Boring Station:	166+63
Section:	(1) BR	Boring Offset:	55.0 ft left CL
Job Number:	P-93-013-11	G.S.E. at boring:	453.3 ft
Structure Number:	078-0006 (existing)	G.S.E. for analyses:	451.0 ft
Contract Number:	66A69	G.W.E. at boring:	443.3 ft

Settlement analysis results: **Stage 1b**

Soil layer	Sample number	Layer height (ft.)	Bottom of layer elev. (ft.)	Settlement (inches)	t_{50} (months)	t_{90} (months)	Drainage condition
1	1-4	2.6	440.4	0.7	1.4	6.2	double
2	3-2	4.9	435.5	1.5			
3	5-1	9.7	425.8	2.6			
4		10.0	415.8	0.0			
5	6-3	3.5	412.3	0.6	0.1	0.5	double
6	7-1	4.0	408.3	0.6			
Total Settlement, t_{50}*, & t_{90}*				5.9	1.2	5.1	

* (t_{50} & t_{90} are weighted averages)

Settlement analysis data

Soil layer	P_o (tsf)	P_f (tsf)	P_c (tsf)
1	1.426	2.117	1.138
2	1.538	2.210	1.577
3	1.737	2.358	1.584
4	1.955	2.497	
5	2.083	2.574	1.925
6	2.164	2.630	1.939

COMMENTS:

1.) Settlement amount is calculated for Sta. 167+50, 12 ft. left of the proposed centerline (near the center of the maximum fill height).

2.) Stage 1b places additional fill (11.3 ft.) to proposed grade (elev. 476.3 ft.) with assumed temporary soil retention system or temporary MSE wall at an assumed stage line offset at 20 ft. RT for maintenance of traffic.

ILLINOIS DEPARTMENT OF TRANSPORTATION
BMPR Geotechnical Sub-unit

Settlement Analysis Report

District:	3	BMPR lab number:	13003
County:	Putnam	Boring Number:	4-ST (2013)
Route:	FAP 698 (IL 89)	Boring Station:	166+63
Section:	(1) BR	Boring Offset:	55.0 ft left CL
Job Number:	P-93-013-11	G.S.E. at boring:	453.3 ft
Structure Number:	078-0006 (existing)	G.S.E. for analyses:	451.0 ft
Contract Number:	66A69	G.W.E. at boring:	443.3 ft

Settlement analysis results: **Stage 1b (Surcharge)**

Soil layer	Sample number	Layer height (ft.)	Bottom of layer elev. (ft.)	Settlement (inches)	t_{50} (months)	t_{90} (months)	Drainage condition
1	1-4	2.6	440.4	0.3	1.5	6.6	double
2	3-2	4.9	435.5	0.6			
3	5-1	9.7	425.8	1.0			
4		10.0	415.8	0.0			
5	6-3	3.5	412.3	0.2	0.1	0.5	double
6	7-1	4.0	408.3	0.2			
Total Settlement, t_{50}*, & t_{90}*				2.4	1.3	5.4	

* (t_{50} & t_{90} are weighted averages)

Settlement analysis data

Soil layer	P_o (tsf)	P_f (tsf)	P_c (tsf)
1	2.117	2.493	1.138
2	2.210	2.564	1.577
3	2.358	2.667	1.584
4	2.497	2.756	
5	2.574	2.805	1.925
6	2.630	2.847	1.939

COMMENTS:

1.) Settlement amount is calculated for Sta. 167+50, 12 ft. left of proposed centerline (near the center of the maximum fill height).

2.) Stage 1b (Surcharge) is an option to place an additional 800 psf surcharge to reduce differential settlement to < 0.5 inches across the proposed alignment from placement of the Stage 2 fill.

ILLINOIS DEPARTMENT OF TRANSPORTATION
BMPR Geotechnical Sub-unit

Settlement Analysis Report

District:	3	BMPR lab number:	13003
County:	Putnam	Boring Number:	4-ST (2013)
Route:	FAP 698 (IL 89)	Boring Station:	166+63
Section:	(1) BR	Boring Offset:	55.0 ft left CL
Job Number:	P-93-013-11	G.S.E. at boring:	453.3 ft
Structure Number:	078-0006 (existing)	G.S.E. for analyses:	451.0 ft
Contract Number:	66A69	G.W.E. at boring:	443.3 ft

Settlement analysis results: **Stage 2 (if no surcharge is used).**

Soil layer	Sample number	Layer height (ft.)	Bottom of layer elev. (ft.)	Settlement (inches)	t_{50} (months)	t_{90} (months)	Drainage condition
1	1-4	2.6	440.4	0.0	1.4	6.2	double
2	3-2	4.9	435.5	0.0			
3	5-1	9.7	425.8	0.1			
4		10.0	415.8	0.0			
5	6-3	3.5	412.3	0.0	0.1	0.5	double
6	7-1	4.0	408.3	0.1			
Total Settlement, t_{50}*, & t_{90}*				0.2	0.7	2.9	

* (t_{50} & t_{90} are weighted averages)

Settlement analysis data

Soil layer	P_o (tsf)	P_f (tsf)	P_c (tsf)
1	2.117	2.120	1.138
2	2.210	2.216	1.577
3	2.358	2.374	1.584
4	2.497	2.531	
5	2.574	2.618	1.925
6	2.630	2.678	1.939

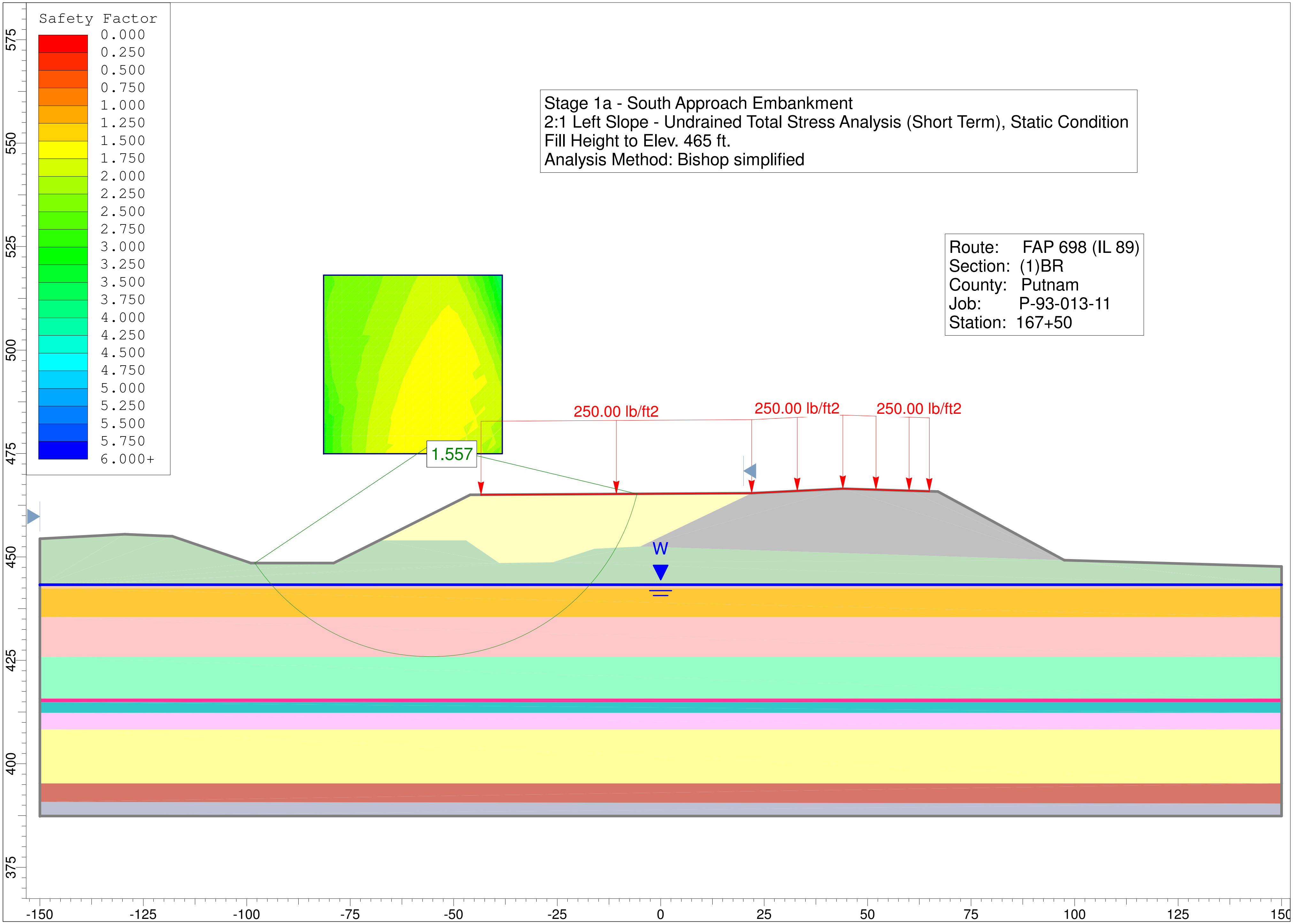
COMMENTS:

1.) Settlement amount is calculated for Sta. 167+50, 12 ft. left of the proposed centerline (near the center of the maximum fill height).

2.) Stage 2 places a triangle-shaped wedge fill (11.3 ft. high) from an assumed stage line at 20 ft. RT over the existing embankment to complete the proposed right side slope.

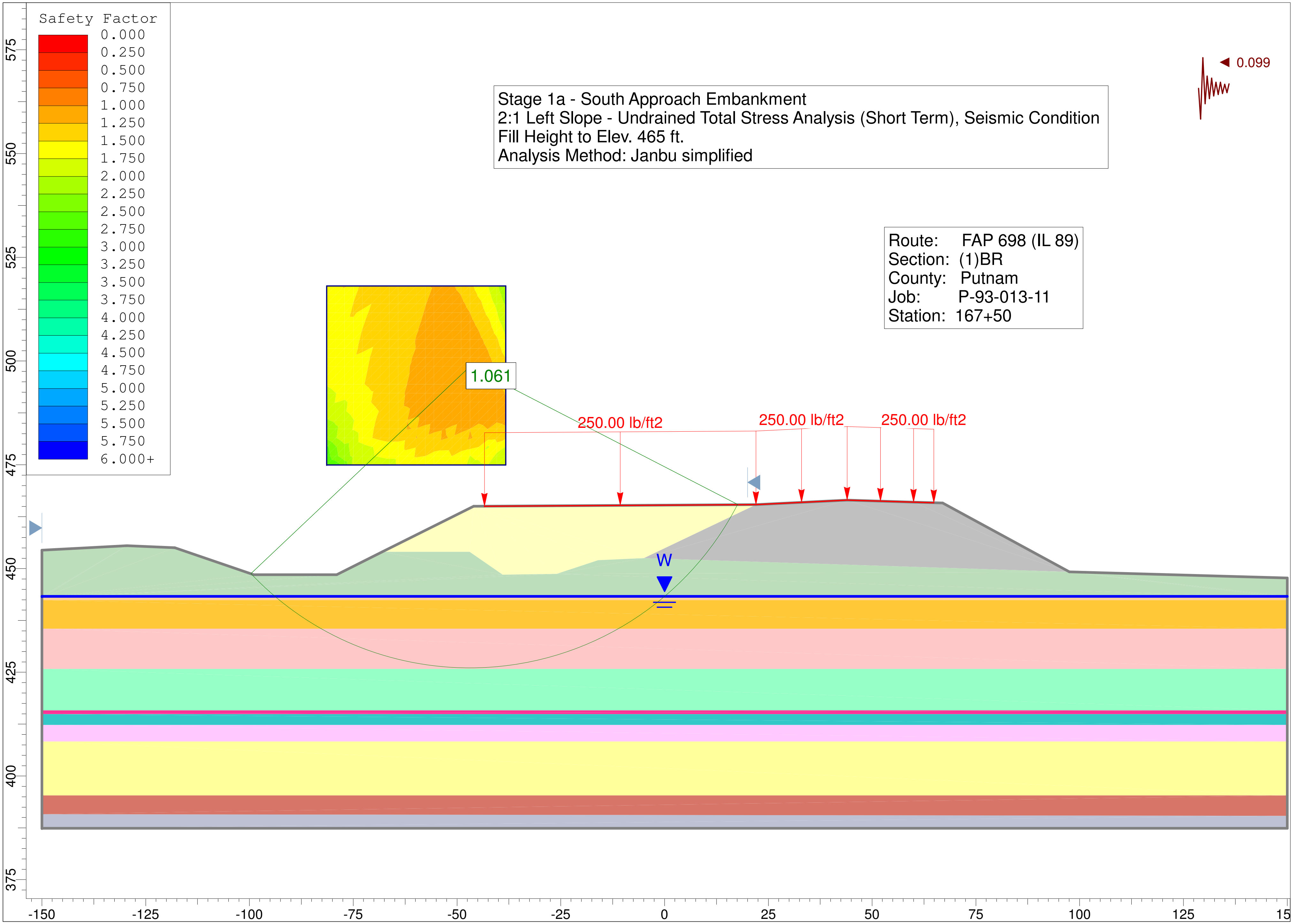
ATTACHMENT D

SLOPE STABILITY
OUTPUT FIGURES



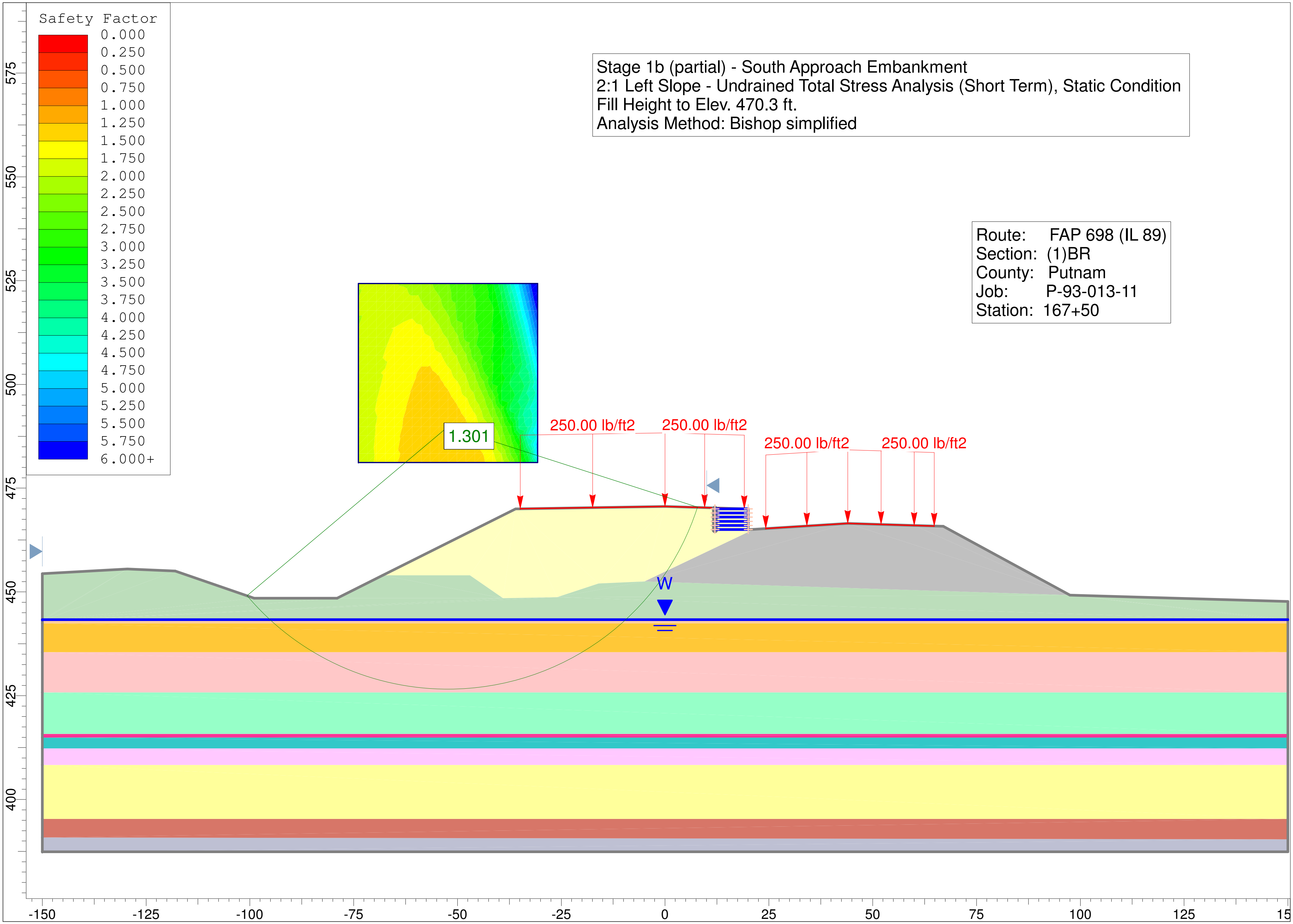
Stage 1a - South Approach Embankment
2:1 Left Slope - Undrained Total Stress Analysis (Short Term), Static Condition
Fill Height to Elev. 465 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



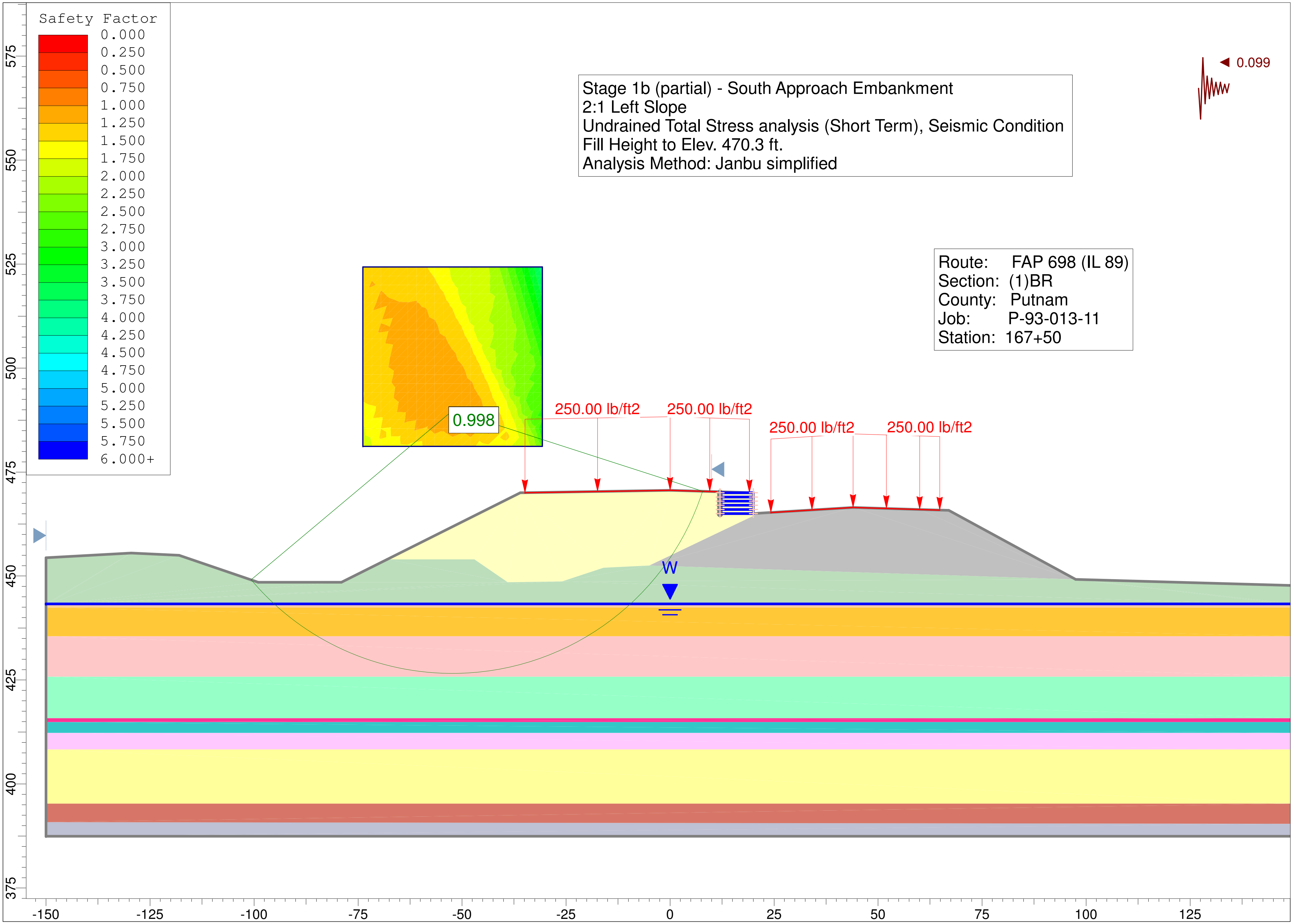
Stage 1a - South Approach Embankment
2:1 Left Slope - Undrained Total Stress Analysis (Short Term), Seismic Condition
Fill Height to Elev. 465 ft.
Analysis Method: Janbu simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



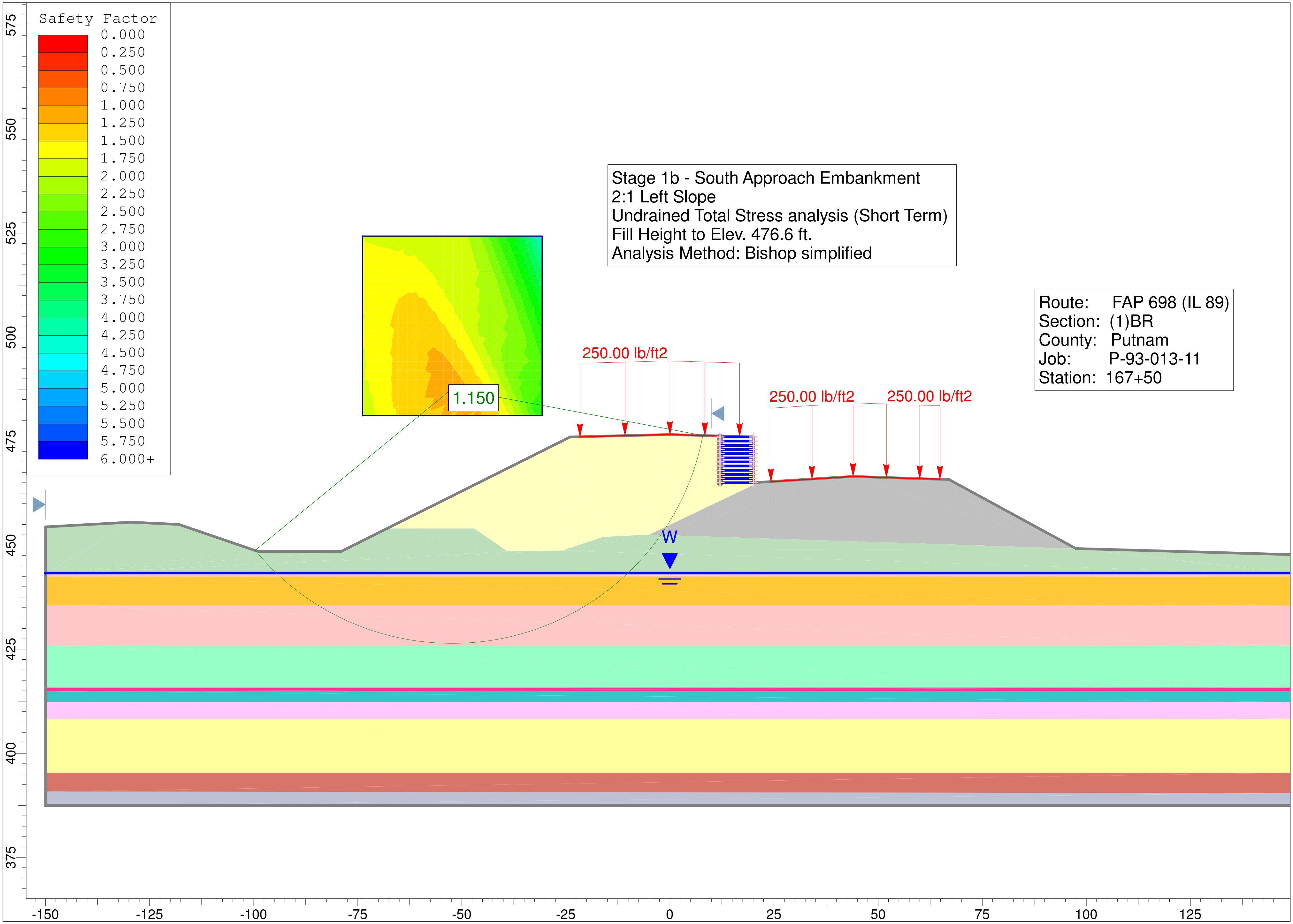
Stage 1b (partial) - South Approach Embankment
2:1 Left Slope - Undrained Total Stress Analysis (Short Term), Static Condition
Fill Height to Elev. 470.3 ft.
Analysis Method: Bishop simplified

Route:	FAP 698 (IL 89)
Section:	(1)BR
County:	Putnam
Job:	P-93-013-11
Station:	167+50



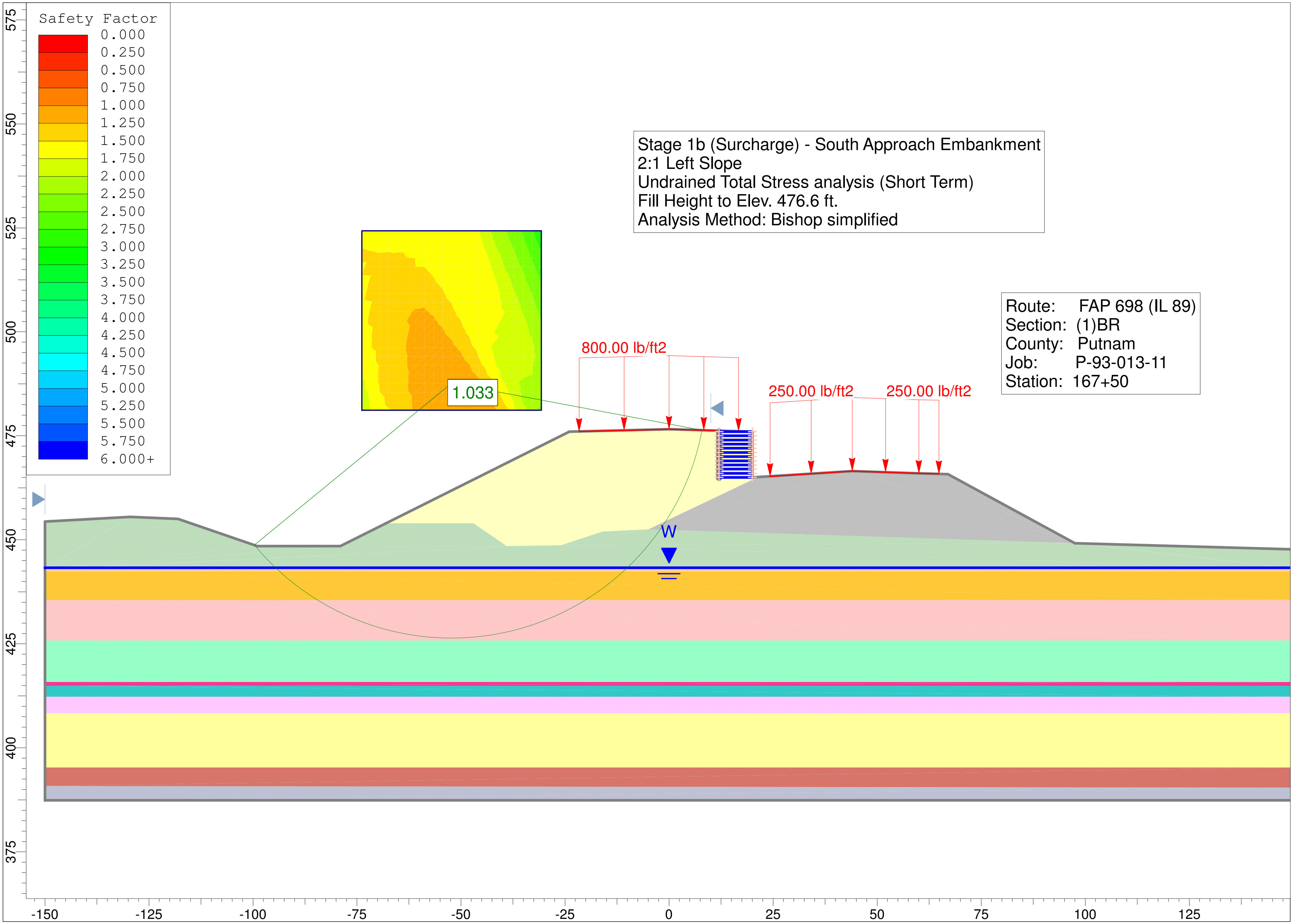
Stage 1b (partial) - South Approach Embankment
2:1 Left Slope
Undrained Total Stress analysis (Short Term), Seismic Condition
Fill Height to Elev. 470.3 ft.
Analysis Method: Janbu simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



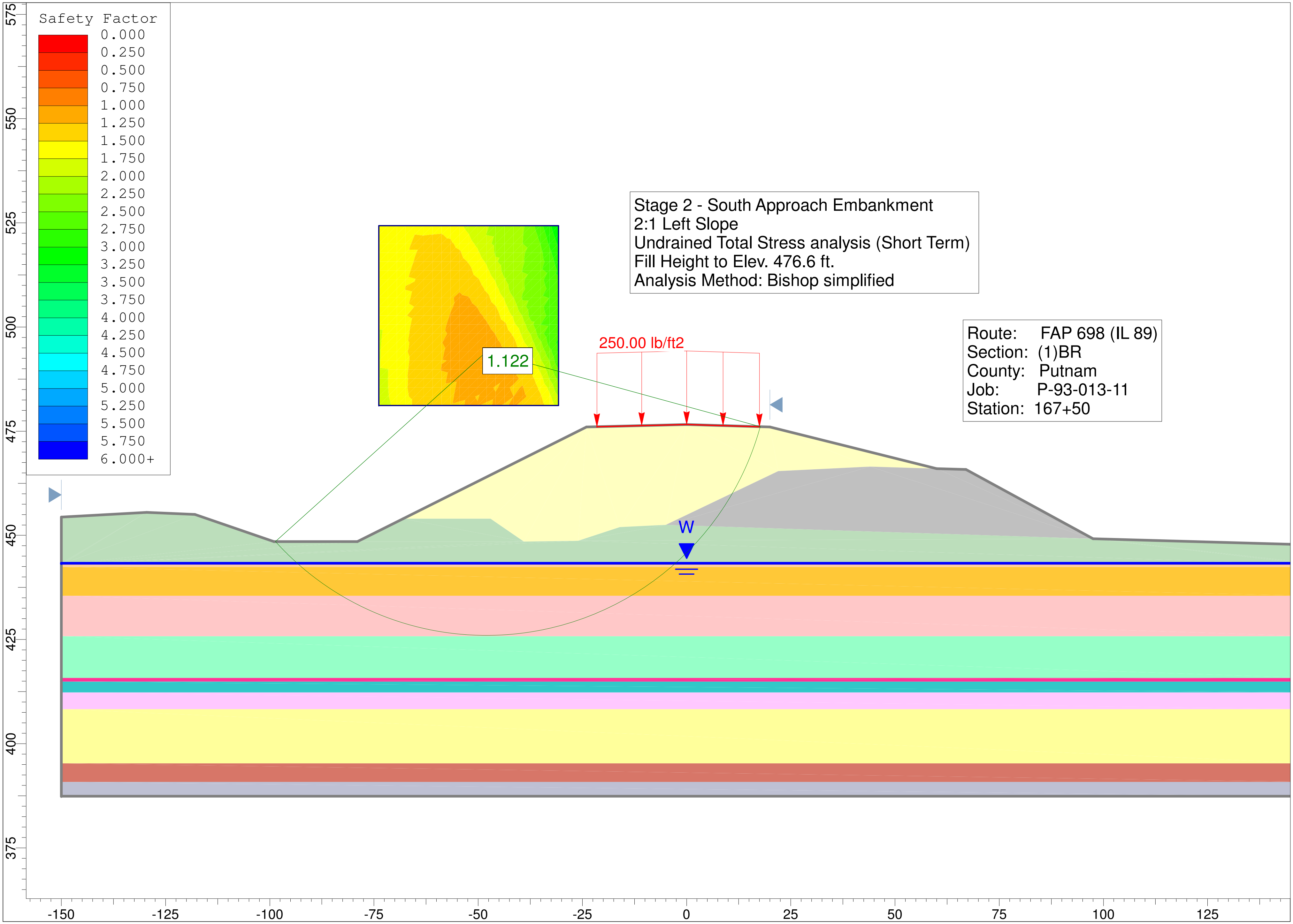
Stage 1b - South Approach Embankment
2:1 Left Slope
Undrained Total Stress analysis (Short Term)
Fill Height to Elev. 476.6 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



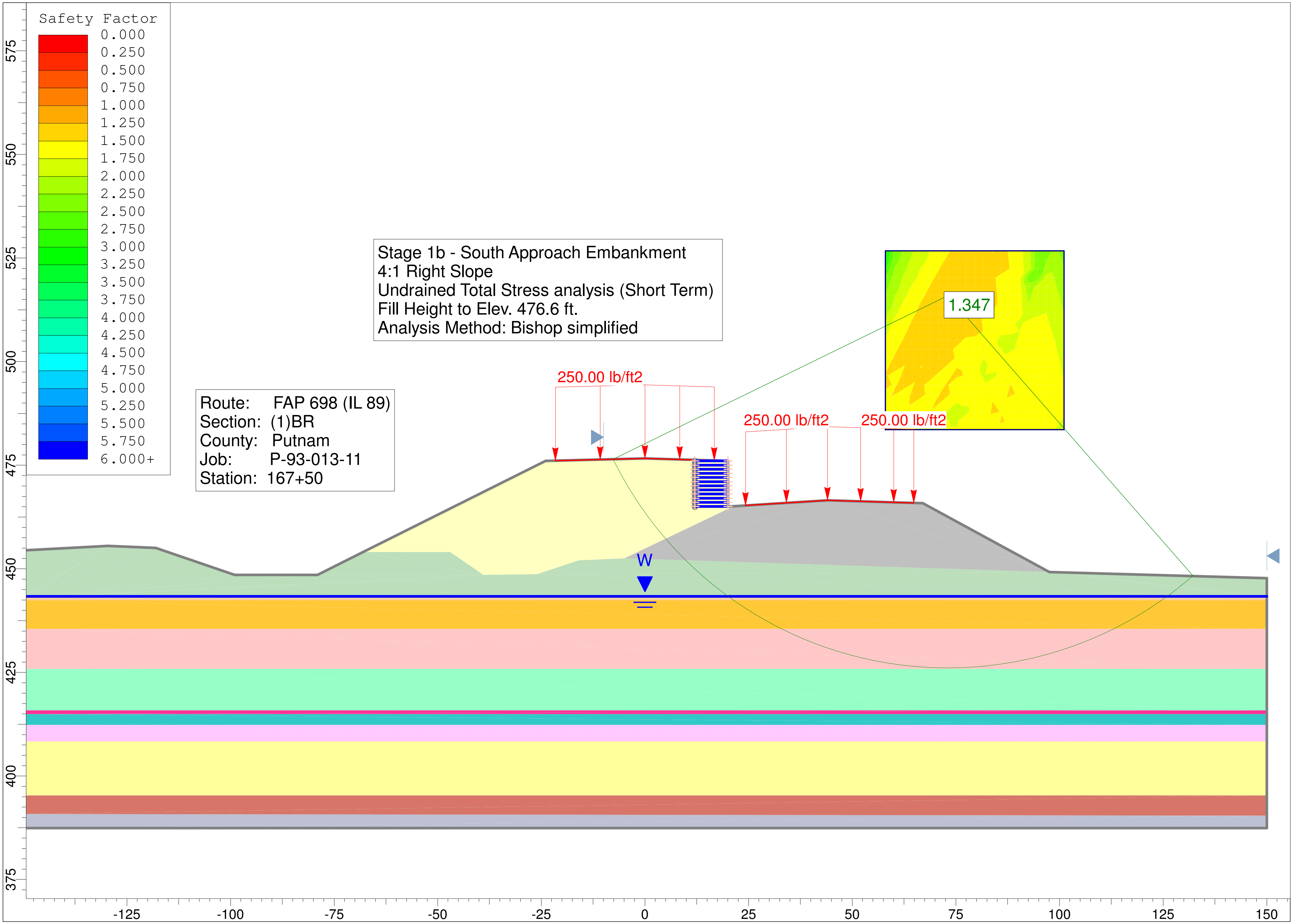
Stage 1b (Surcharge) - South Approach Embankment
2:1 Left Slope
Undrained Total Stress analysis (Short Term)
Fill Height to Elev. 476.6 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



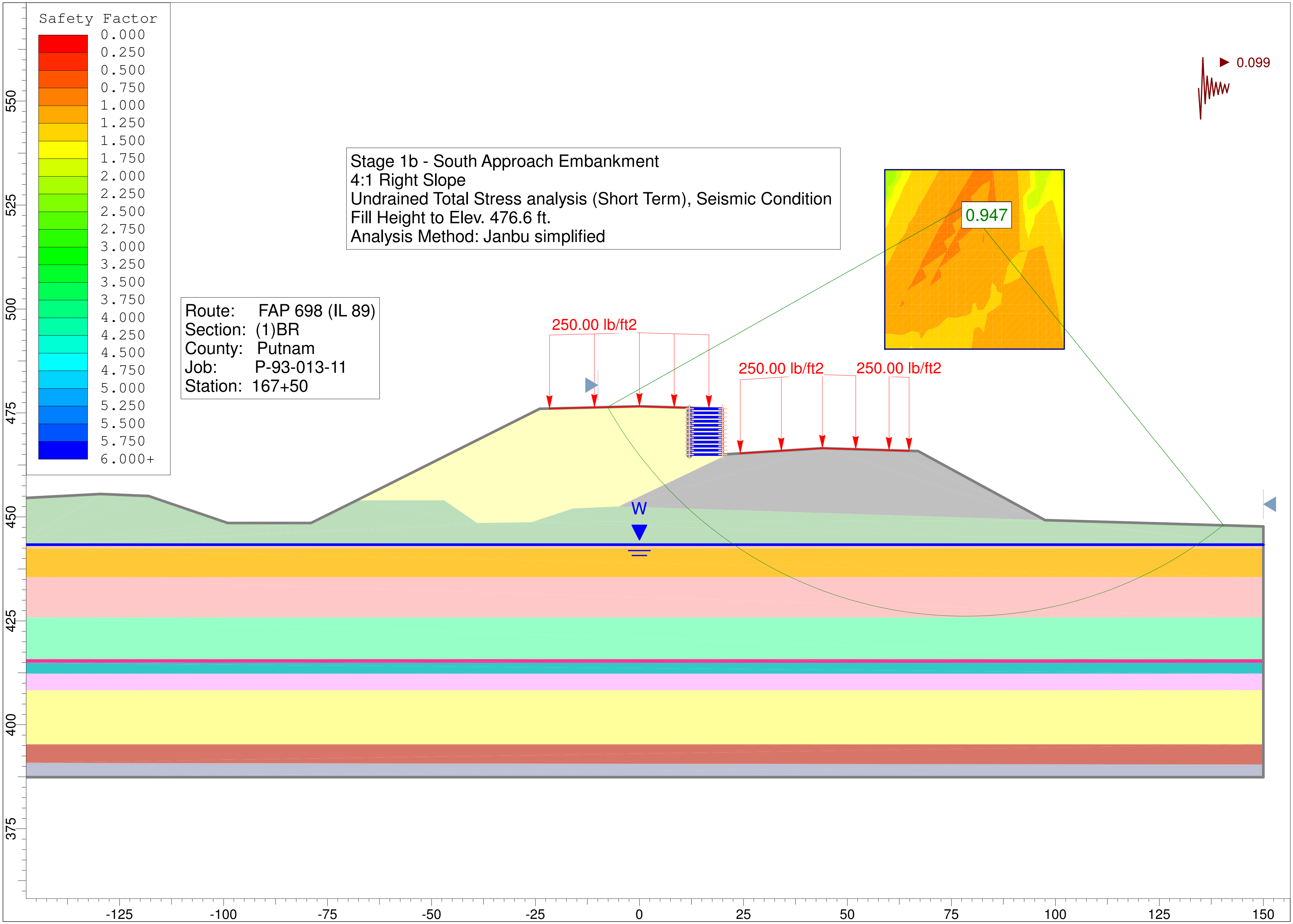
Stage 2 - South Approach Embankment
2:1 Left Slope
Undrained Total Stress analysis (Short Term)
Fill Height to Elev. 476.6 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



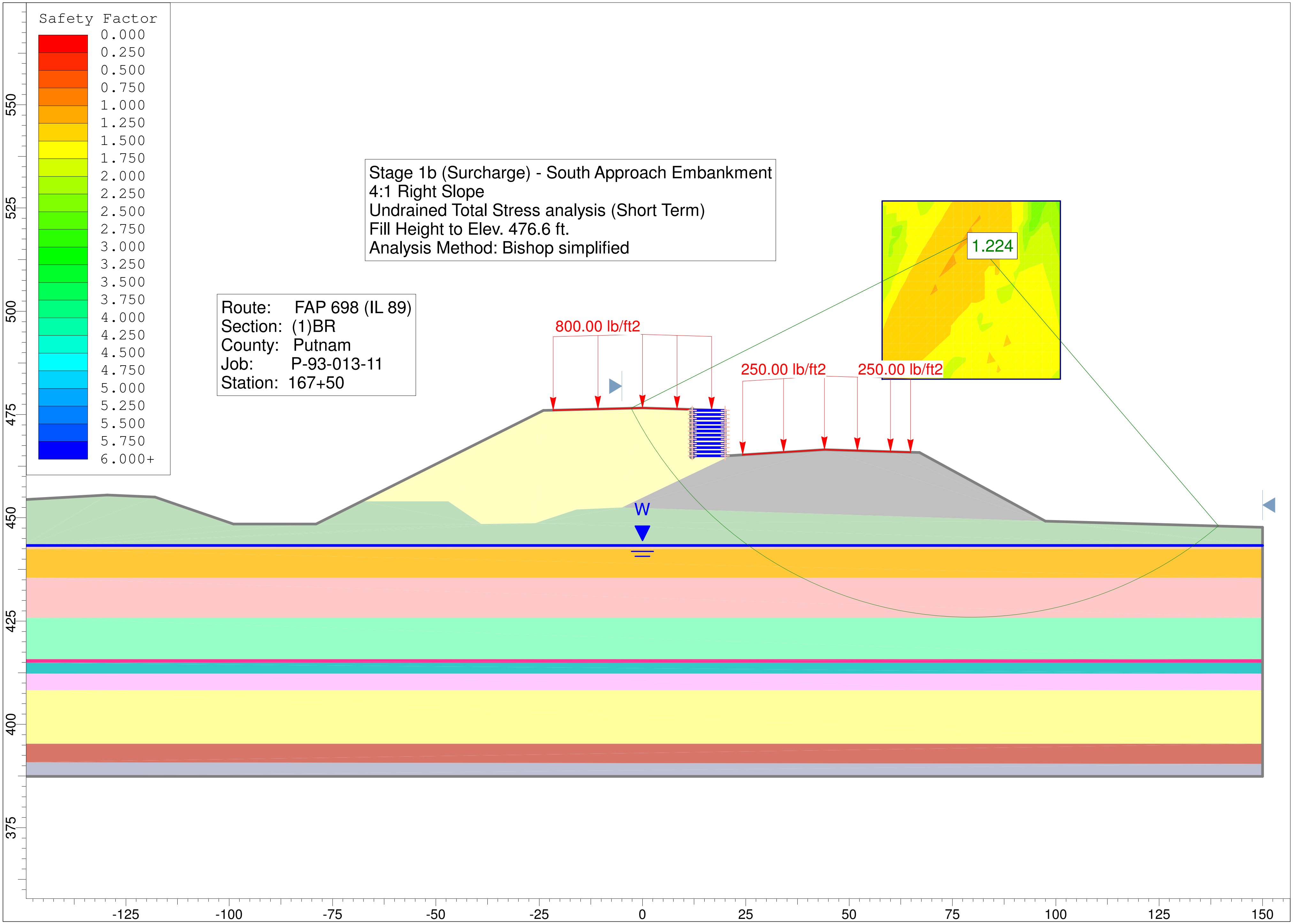
Stage 1b - South Approach Embankment
4:1 Right Slope
Undrained Total Stress analysis (Short Term)
Fill Height to Elev. 476.6 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



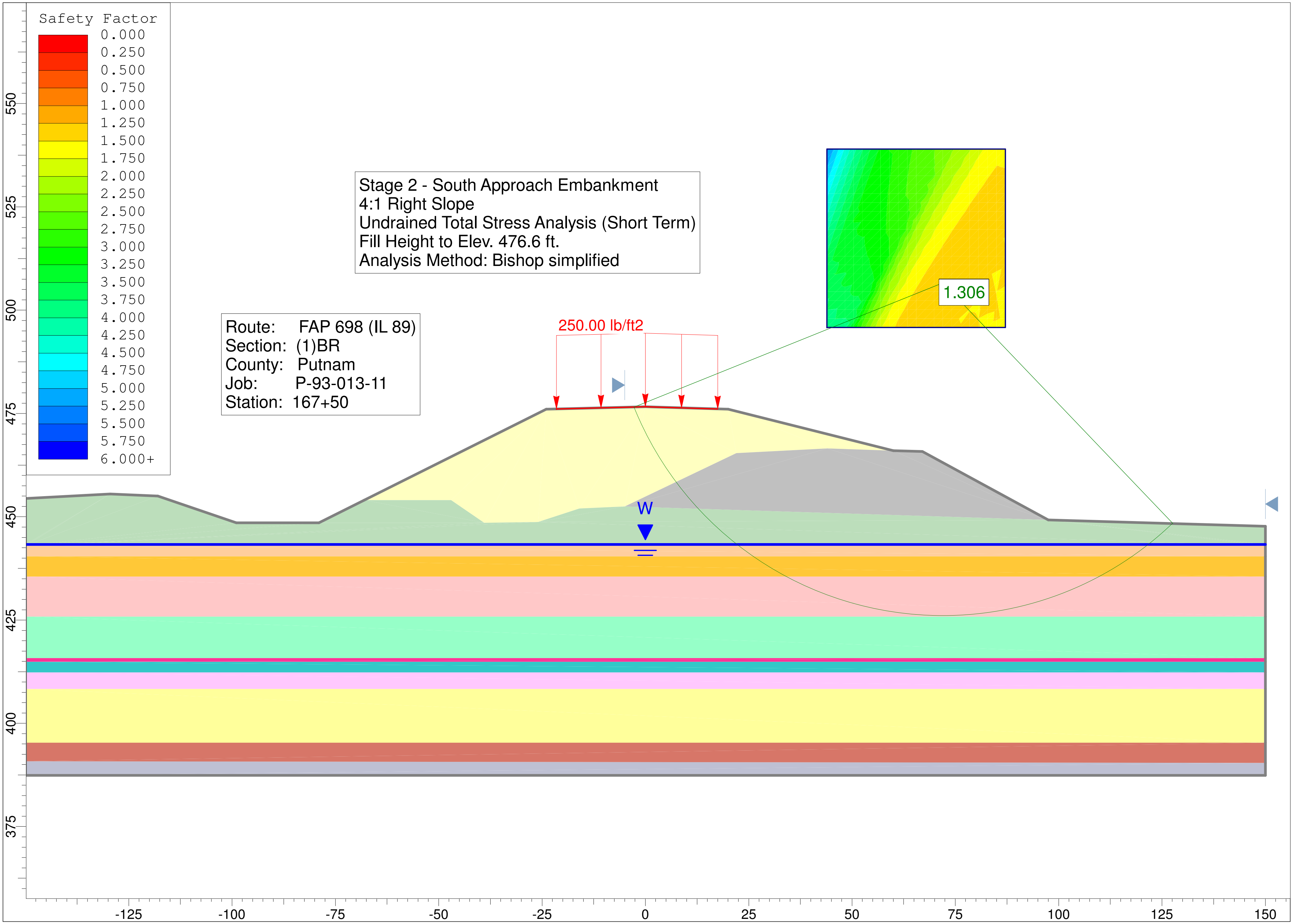
Stage 1b - South Approach Embankment
4:1 Right Slope
Undrained Total Stress analysis (Short Term), Seismic Condition
Fill Height to Elev. 476.6 ft.
Analysis Method: Janbu simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



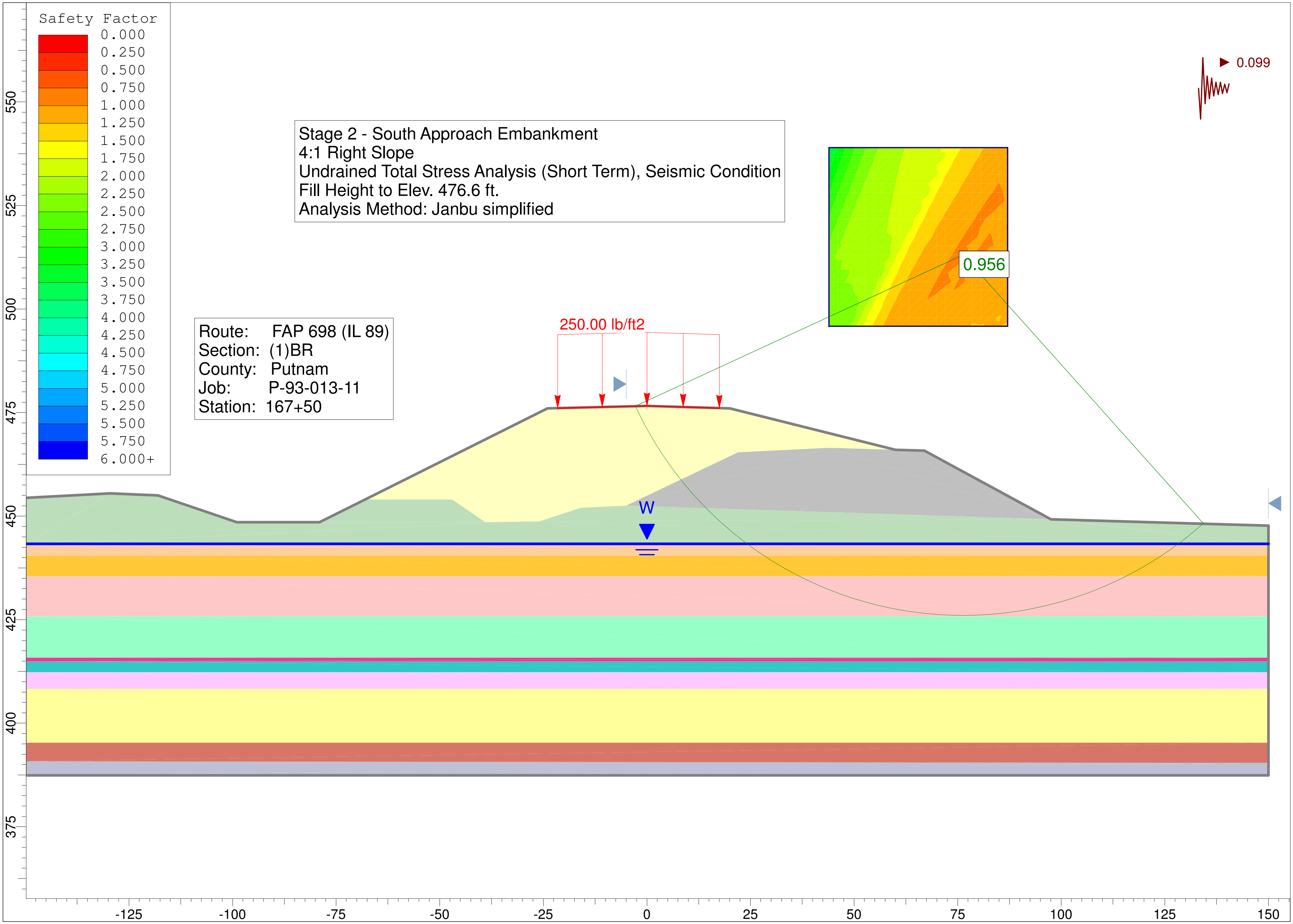
Stage 1b (Surcharge) - South Approach Embankment
4:1 Right Slope
Undrained Total Stress analysis (Short Term)
Fill Height to Elev. 476.6 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



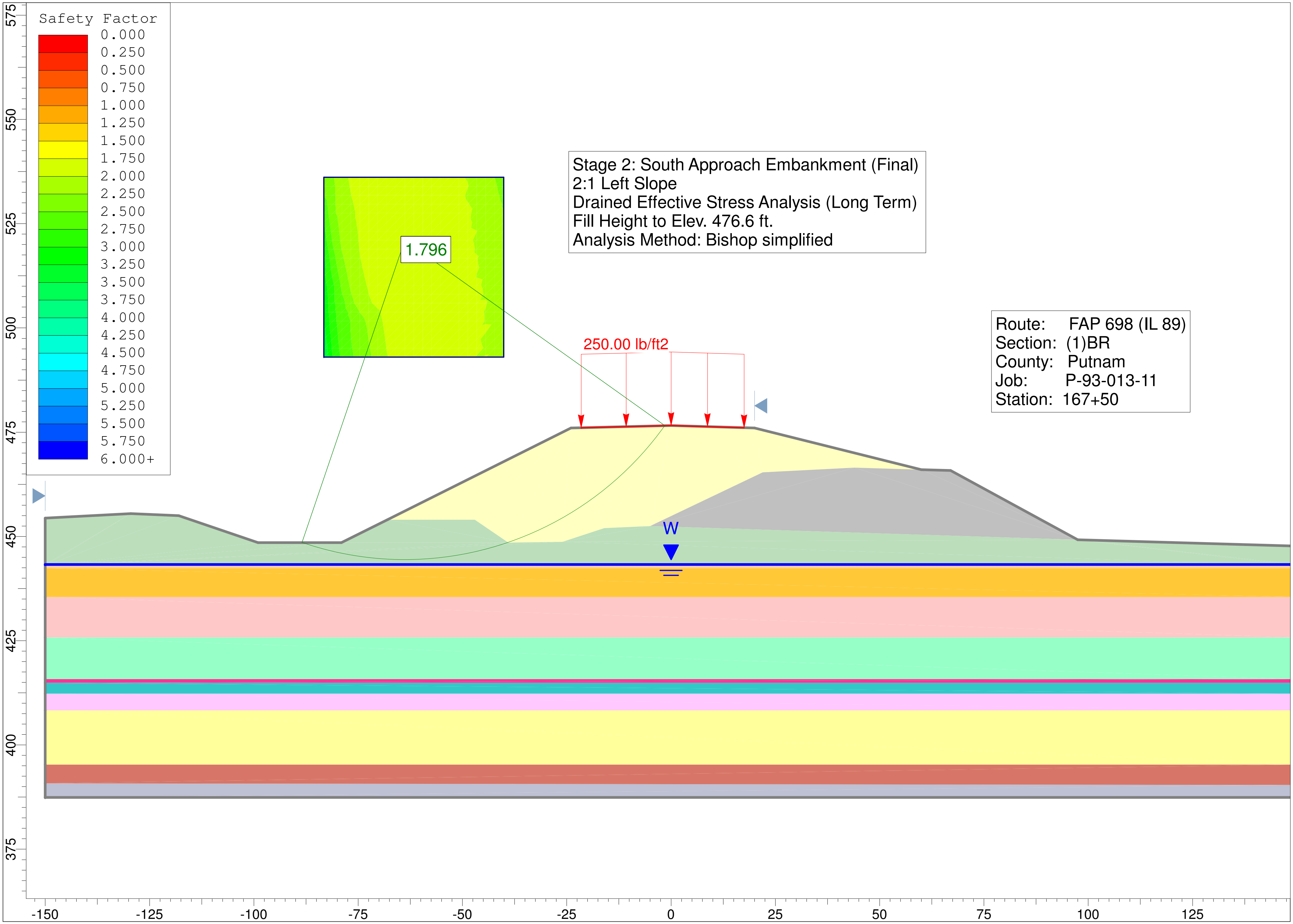
Stage 2 - South Approach Embankment
4:1 Right Slope
Undrained Total Stress Analysis (Short Term)
Fill Height to Elev. 476.6 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



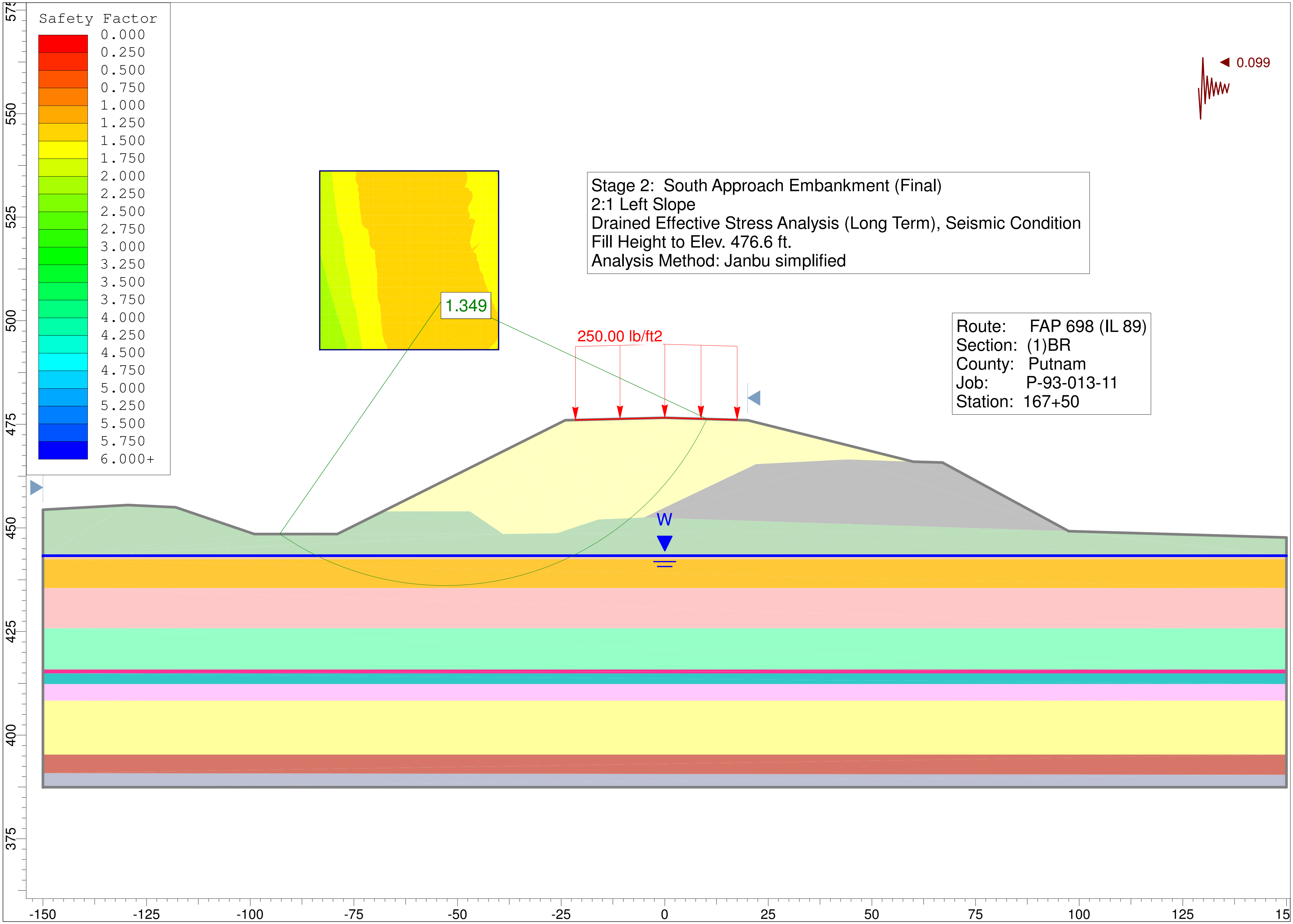
Stage 2 - South Approach Embankment
4:1 Right Slope
Undrained Total Stress Analysis (Short Term), Seismic Condition
Fill Height to Elev. 476.6 ft.
Analysis Method: Janbu simplified

Route:	FAP 698 (IL 89)
Section:	(1)BR
County:	Putnam
Job:	P-93-013-11
Station:	167+50



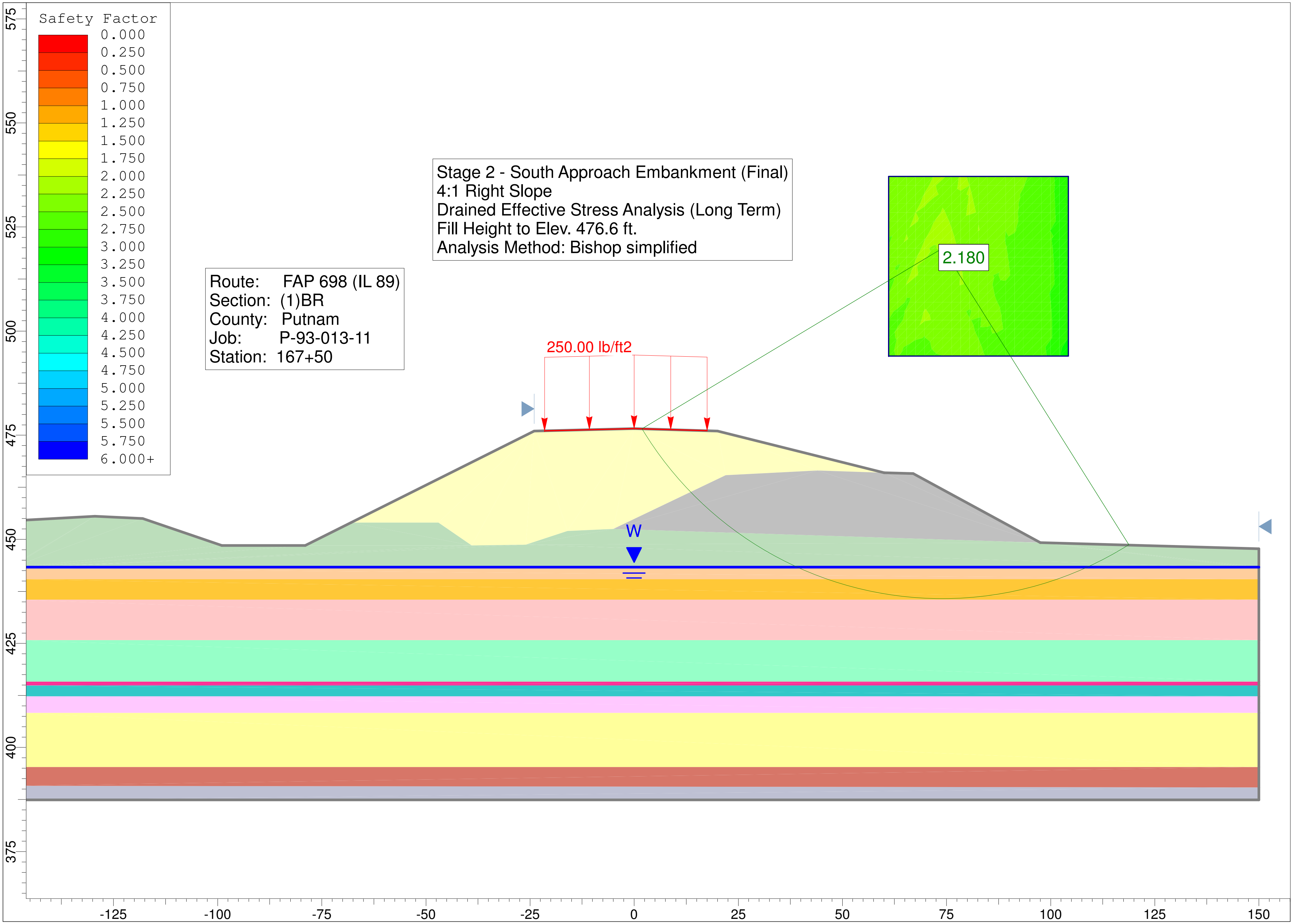
Stage 2: South Approach Embankment (Final)
2:1 Left Slope
Drained Effective Stress Analysis (Long Term)
Fill Height to Elev. 476.6 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



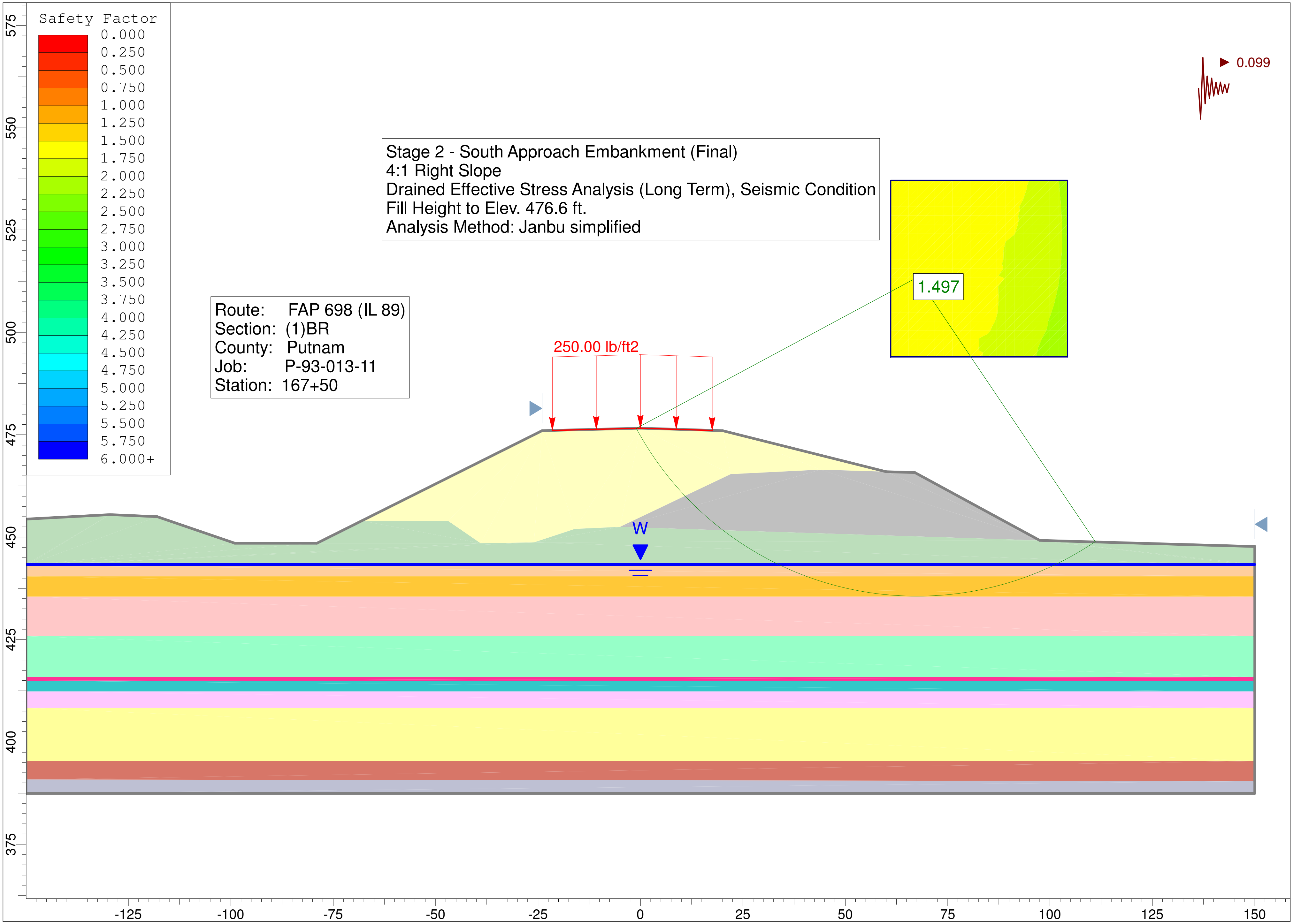
Stage 2: South Approach Embankment (Final)
2:1 Left Slope
Drained Effective Stress Analysis (Long Term), Seismic Condition
Fill Height to Elev. 476.6 ft.
Analysis Method: Janbu simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



Stage 2 - South Approach Embankment (Final)
4:1 Right Slope
Drained Effective Stress Analysis (Long Term)
Fill Height to Elev. 476.6 ft.
Analysis Method: Bishop simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50



Stage 2 - South Approach Embankment (Final)
4:1 Right Slope
Drained Effective Stress Analysis (Long Term), Seismic Condition
Fill Height to Elev. 476.6 ft.
Analysis Method: Janbu simplified

Route: FAP 698 (IL 89)
Section: (1)BR
County: Putnam
Job: P-93-013-11
Station: 167+50

APPENDIX

Q

WICK DRAINS
REVISED 5-7-2015

THIS SPECIFICATION HAS BEEN UPDATED. THE VERSION DATED 7-10-2015 IS THE FINAL VERSION.

Description. This work shall consist of all labor, materials, equipment and services necessary to complete the wick drain installation according to the details and dimensions shown on the plans, this specification, and as directed by the Engineer.

Submittals.

(a) Within two weeks of the preconstruction meeting, the Contractor shall submit to the Engineer for review and approval:

  (1) Details of the equipment, sequence and method of installation.

  (2) Wick drain samples indicating the source of the proposed materials.

  (3) List of at least three projects of similar magnitude and installation where the same wick drain has been installed including details on prior performance on these projects.

  (4) Manufacturer's literature documenting the physical and mechanical properties of the wick drain, including a letter of certification from manufacturer documenting test results indicating that materials meet material specification requirements.

(b) Four weeks prior to installation, the Contractor shall submit to the Engineer wick drain detailed drawings. The detailed plan drawing shall indicate wick drain layout and spacing; each vertical wick drain location tied to roadway baseline and wick drain limits shown on the plans; each horizontal wick drain location and limits and location of outlet; and top and bottom elevation of each wick drain.

(c) Two weeks prior to installation, the Contractor shall submit to the Engineer purchase certificate which documents the type and physical characteristics of the wick drain to be used and documents that the materials meet testing requirements specified.

(d) At the end of each working day, the Contractor shall supply to the Engineer a summary of the wick drains installed that day. The summary shall include drain types, locations, and length (to nearest 4 inches) of wick drain installed at each location.

Quality Assurance.

(a) Prior to the installation of wick drains within the designated areas, the Contractor shall demonstrate that his equipment, method and materials produce a satisfactory installation in accordance with these specifications. For this purpose, the Contractor shall install six trial wick drains totaling approximately 200 linear feet at locations designated by the Engineer. Payment will be made at the bid price per linear foot (meter) for wick drains. Payment will not be made for installing unsatisfactory trial wicks.

(b) Approval by the Engineer of the method and equipment to install the trial wicks shall not necessarily constitute acceptance of the method for the remainder of the project. If, at any time, the Engineer considers that the method of installation does not produce a satisfactory wick, the Contractor shall alter his method and/or equipment as necessary to comply with these specifications.

(c) The Contractor shall provide the Engineer with suitable means of making a linear determination of the quantity of wick material used in each wick location. During installation of the wick drain, the Contractor shall provide suitable means of determining the depth of the wick drains at any given time.

(d) Wick drain materials shall be labeled or tagged in such a manner that the information for sample identification and other quality control purposes can be read from the label. As a minimum, each roll shall be identified by the manufacturer as to lot or control numbers, individual roll number, date of manufacture, manufacturer and product identification of the jacket and core.

Materials. The materials used for the construction of wick drains shall satisfy the following requirements:

(a) Wick drains shall be of newly-manufactured materials and shall consist of a core enclosed in or integrated with a jacket. The jacket shall allow free passage of pore water to the core without loss of soil material or piping. The core shall provide continuous vertical drainage.

(b) The wick drains shall be a prefabricated band-shaped drain with an aspect ratio (width divided by thickness) not exceeding 50.

(c) The jacket material:

(1) Shall be a synthetic non-woven geotextile capable of resisting all bending, punching and tensile forces imposed during installation and during the design life of the wick drain.

(2) Shall not be subject to localized damage (e.g., punching through the filter by sand/gravel particles).

(3) Shall be sufficiently rigid to withstand lateral earth pressures due to embedment and surcharge so that the vertical flow capacity through the core will not be adversely affected.

(4) Shall be sufficiently flexible to bend smoothly during installation and induced consolidation settlement without damage.

(5) Shall not undergo cracking and peeling during installation of the wick drain.

(6) Shall have the following material properties:

Test Property	Test Method	(Minimum Value)*
Grab Tensile Strength	ASTM D4632	80 lbs.
Trapezoidal Tear	ASTM D4533	25 lbs.
Puncture Strength	ASTM D4833	50 lbs.
Mullen Burst Strength	ASTM D3786	130 psi

* The jacket material shall be tested in saturated and dry conditions. These requirements apply to the lower of the two tested conditions.

These criteria must be demonstrated by manufacturer's test results and letter of certification.

(d) The core shall be a continuous plastic material fabricated to promote drainage along the axis of the vertical wick drain.

(e) The assembled wick drain:

(1) Shall have mechanical properties (strength and modulus) equal to or greater than those specified for the component jacket and core.

(2) Shall be resistant against wet rot, mildew, bacterial action, insects, salts in solution in the groundwater, acids, alkalis, solvents, and any other significant ingredients in the site groundwater.

(3) Shall be of the same type throughout the project.

(4) Shall have a minimum equivalent diameter of 2.1 inches. The equivalent diameter shall be defined as:

$d_W = (a+b)/2$
d_W = equivalent diameter
a = width of a band shaped drain
b = thickness of a band shaped drain

Protection of Materials. During shipment and storage, the wick drain shall be wrapped in heavy paper, burlap or similar heavy duty protective covering. The wick drain shall be protected from sunlight, mud, dirt, dust, debris and other detrimental substances during shipping and on-site storage.

Construction. Wick drains shall be installed with approved modern equipment, which will cause a minimum of disturbance of the subsoil during the installation operation. The wick installation rig shall utilize either vibratory methods or a static push. Installation shall be in accordance with the following procedure.

(a) The drainage wick shall be installed using a mandrel or sleeve that is continuously vibrated or statically pushed into the soil. The sleeve shall protect the wick material from tears, cuts, and abrasion during installation, and shall be retracted after each drainage wick is installed. The sleeve shall be rhombic or rectangular in shape, and of cross sectional area not to exceed 10 square inches. To minimize disturbance to the subsoil, the sleeve shall not be advanced into the subsoil using impact methods. In no case will alternate raising or lowering of the mandrel during advancement be permitted. Raising of the mandrel will only be permitted after completion of a wick drain installation.

(b) Wick drains shall be staked out by the Contractor. The locations of the wick drains shall not vary by more than 6 inches from the locations indicated on the drawings, as specified, or as directed by the Engineer. The equipment must be carefully checked for plumbness prior to advancing each wick, and must not deviate more than one inch per five feet from the vertical. Wick drains that are out of their proper location by more than 6 inches or wick drains that are damaged in construction, or wick drains that are improperly completed will be abandoned in place and no compensation will be allowed for any material furnished or for work performed on such wicks.

(c) Wick drains shall completely penetrate the compressible soft to stiff clay strata at the site and shall terminate below the elevation shown in the plans.

(d) The Engineer may vary the depths, spacing, or the number of wick drains to be installed, and may revise the plan limits for this work, as necessary.

(e) Splices or connections of wick drain material shall be done by stapling in a workmanlike manner and so as to insure structural and hydraulic continuity of the wick drain. The jacket and core shall be overlapped a minimum of 6 inches at any splice. A maximum of one splice per drain installed will be permitted, unless otherwise directed by the Engineer.

(f) The Contractor is permitted to use augering or other methods to loosen stiff upper soils and/or granular fill prior to installation of the wick drains. If predrilling or other methods are used to open an installation hole, the annulus must be filled with sand after installation of the wick drains. No additional compensation will be made for augering or loosening of soils.

(g) Where obstructions are encountered below the working surface, which cannot easily be removed or penetrated using normal and accepted procedures, the Contractor shall complete the wick drain from the elevation of the obstruction to the working surface and notify the Engineer in writing within four hours.

(h) When horizontal drains are used, the vertical wick drain shall be wrapped around horizontal drain and stapled as specified above.

Method of Measurement. Wick drains will be measured for payment in foot (meters) in place for the length of wick drain measured from the middle of the sand drainage blanket to the tip elevation, (vertical and horizontal) complete and in place. Wick drains that are out of their proper location by more than 6 inches or wick drains that are damaged in construction, or wick drains that are improperly completed will not be measured for payment, and no compensation will be allowed for any material furnished or for work performed on such wick drains.

Basis of Payment. This work will be paid for at the contract unit price per foot for WICK DRAINS. The prices shall be full compensation for the cost of furnishing the full length of wick drain material, installing the wick drains, altering of the equipment and methods of installation in order to produce the required end result and shall also include the cost of furnishing all tools, materials, labor, equipment, services and all other costs necessary to complete the required work. No direct payment will be made for unacceptable wick drains or for any delays or expenses incurred through change necessitated by improper or unacceptable material or equipment, but the costs of such shall be included in the Unit Prices bid for this work. No additional compensation will be allowed for the cost of constructing any work platform to provide stability for the wick drain installation equipment and to allow movement of the wick drain installation equipment across the site.

SAND DRAINAGE BLANKET

THIS SPECIFICATION HAS BEEN UPDATED. THE VERSION DATED 7-10-2015 IS THE FINAL VERSION.

This work shall consist of furnishing and constructing sand drainage blanket to form a horizontal drainage layer between the proposed embankment and the existing or prepared ground surface.

Materials. The drainage blanket shall be sand according to Article 1003.01of the Standard Specifications. The gradation shall be FA 1, FA 2, FA 6 or FA 20 except that the percentage passing the No. 200 (75 micron) sieve shall be a maximum of 4 percent. The fine aggregate shall be Class A Quality.

The source of the fine aggregate and gradation test results shall be provided to the Engineer a minimum of 60 days prior to placement of the fine aggregate.

Construction Requirements. The sand drainage blanket shall be constructed to the thickness and within the lines and grades shown on the plans. Sand may be placed by end dumping or other approved method, and spread uniformly over the site to the neat lines shown on the plans. The sand shall be compacted to a minimum of 90% of the standard laboratory density as determined by Illinois Modified AASHTO T 99.

Prior to placement of the embankment, the sand drainage blanket shall be reshaped if necessary to conform to the lines shown on the plans.

If the equipment used for construction of the vertical wick drains cannot be supported directly on the sand drainage blanket without displacing the underlying soils, the Contractor may be permitted to place a small portion of the embankment material to be used as a working platform for installing the vertical wick drains as directed by the Engineer.

Method of Measurement. The sand drainage blanket will be measured in length width and depth of sand blanket placed and the volume computed in cubic yards. No allowance will be made for any sand placed outside the lines as specified herein or as directed by the Engineer.

Basis of Payment. The sand drainage blanket will be paid for as plan quantity at the contract unit price per cubic yard for SAND DRAINAGE BLANKET. No additional payment will be made for additional sand placed because of settlement.

THE SPECIAL PROVISIONS FOR WICK DRAINS AND SAND DRAINAGE BLANKET (REVISED 7-10-2015) WERE ADDED TO THIS REPORT ON 8-24-2015.

WICK DRAINS

REVISED 7-10-2015

Description. This work shall consist of all labor, materials, equipment and services necessary to complete the wick drain installation according to the details and dimensions shown on the plans, this specification, and as directed by the Engineer.

Submittals.

(a) Within two weeks of the preconstruction meeting, the Contractor shall submit to the Engineer for review and approval:

(1) Details of the equipment, sequence and method of installation.

(2) Wick drain samples indicating the source of the proposed materials.

(3) List of at least three projects of similar magnitude and installation where the same wick drain has been installed including details on prior performance on these projects.

(4) Manufacturer's literature documenting the physical and mechanical properties of the wick drain, including a letter of certification from manufacturer documenting test results indicating that materials meet material specification requirements.

(b) Four weeks prior to installation, the Contractor shall submit to the Engineer wick drain detailed drawings. The detailed plan drawing shall indicate wick drain layout and spacing; each vertical wick drain location tied to roadway baseline and wick drain limits shown on the plans; each horizontal wick drain location and limits and location of outlet; and top and bottom elevation of each wick drain.

(c) Two weeks prior to installation, the Contractor shall submit to the Engineer purchase certificate which documents the type and physical characteristics of the wick drain to be used and documents that the materials meet testing requirements specified.

(d) At the end of each working day, the Contractor shall supply to the Engineer a summary of the wick drains installed that day. The summary shall include drain types, locations, and length (to nearest 4 inches) of wick drain installed at each location.

Quality Assurance.

(a) Prior to the installation of wick drains within the designated areas, the Contractor shall demonstrate that his equipment, method and materials produce a satisfactory installation in accordance with these specifications. For this purpose, the Contractor shall install six trial wick drains totaling approximately 200 linear feet at locations designated by the Engineer. Payment will be made at the bid price per linear foot (meter) for wick drains. Payment will not be made for installing unsatisfactory trial wicks.

(b) Approval by the Engineer of the method and equipment to install the trial wicks shall not necessarily constitute acceptance of the method for the remainder of the project. If, at any time, the Engineer considers that the method of installation does not produce a satisfactory wick, the Contractor shall alter his method and/or equipment as necessary to comply with these specifications.

(c) The Contractor shall provide the Engineer with suitable means of making a linear determination of the quantity of wick material used in each wick location. During installation of the wick drain, the Contractor shall provide suitable means of determining the depth of the wick drains at any given time.

(d) Wick drain materials shall be labeled or tagged in such a manner that the information for sample identification and other quality control purposes can be read from the label. As a minimum, each roll shall be identified by the manufacturer as to lot or control numbers, individual roll number, date of manufacture, manufacturer and product identification of the jacket and core.

Materials. The materials used for the construction of wick drains shall satisfy the following requirements:

- (a) Wick drains shall be of newly-manufactured materials and shall consist of a core enclosed in or integrated with a jacket. The jacket shall allow free passage of pore water to the core without loss of soil material or piping. The core shall provide continuous vertical drainage.
- (b) The wick drains shall be a prefabricated band-shaped drain with an aspect ratio (width divided by thickness) not exceeding 50.
- (c) The jacket material:
  - (1) Shall be a synthetic non-woven geotextile capable of resisting all bending, punching and tensile forces imposed during installation and during the design life of the wick drain.
  - (2) Shall not be subject to localized damage (e.g., punching through the filter by sand/gravel particles).
  - (3) Shall be sufficiently rigid to withstand lateral earth pressures due to embedment and surcharge so that the vertical flow capacity through the core will not be adversely affected.
  - (4) Shall be sufficiently flexible to bend smoothly during installation and induced consolidation settlement without damage.
  - (5) Shall not undergo cracking and peeling during installation of the wick drain.
  - (6) Shall have the following material properties:

Test Property	Test Method	(Minimum Value)*
Grab Tensile Strength	ASTM D4632	80 lbs.
Trapezoidal Tear	ASTM D4533	25 lbs.
Puncture Strength	ASTM D4833	50 lbs.
Mullen Burst Strength	ASTM D3786	130 psi

* The jacket material shall be tested in saturated and dry conditions. These requirements apply to the lower of the two tested conditions.

These criteria must be demonstrated by manufacturer's test results and letter of certification.

- (d) The core shall be a continuous plastic material fabricated to promote drainage along the axis of the vertical wick drain.
- (e) The assembled wick drain:
  - (1) Shall have mechanical properties (strength and modulus) equal to or greater than those specified for the component jacket and core.
  - (2) Shall be resistant against wet rot, mildew, bacterial action, insects, salts in solution in the groundwater, acids, alkalis, solvents, and any other significant ingredients in the site groundwater.
  - (3) Shall be of the same type throughout the project.
  - (4) Shall have a minimum equivalent diameter of 2.1 inches. The equivalent diameter shall be defined as:

$d_W = (a+b)/2$
d_W = equivalent diameter
a = width of a band shaped drain
b = thickness of a band shaped drain

Protection of Materials. During shipment and storage, the wick drain shall be wrapped in heavy paper, burlap or similar heavy duty protective covering. The wick drain shall be protected from sunlight, mud, dirt, dust, debris and other detrimental substances during shipping and on-site storage.

Construction. Wick drains shall be installed with approved modern equipment, which will cause a minimum of disturbance of the subsoil during the installation operation. The wick installation rig shall utilize either vibratory methods or a static push. Installation shall be in accordance with the following procedure.

(a) The drainage wick shall be installed using a mandrel or sleeve that is continuously vibrated or statically pushed into the soil. The sleeve shall protect the wick material from tears, cuts, and abrasion during installation, and shall be retracted after each drainage wick is installed. The sleeve shall be rhombic or rectangular in shape, and of cross sectional area not to exceed 10 square inches. To minimize disturbance to the subsoil, the sleeve shall not be advanced into the subsoil using impact methods. In no case will alternate raising or lowering of the mandrel during advancement be permitted. Raising of the mandrel will only be permitted after completion of a wick drain installation.

(b) Wick drains shall be staked out by the Contractor. The locations of the wick drains shall not vary by more than 6 inches from the locations indicated on the drawings, as specified, or as directed by the Engineer. The equipment must be carefully checked for plumbness prior to advancing each wick, and must not deviate more than one inch per five feet from the vertical. Wick drains that are out of their proper location by more than 6 inches or wick drains that are damaged in construction, or wick drains that are improperly completed will be abandoned in place and no compensation will be allowed for any material furnished or for work performed on such wicks.

(c) Wick drains shall completely penetrate the compressible soft to stiff clay strata at the site and shall terminate below the elevation shown in the plans.

(d) The Engineer may vary the depths, spacing, or the number of wick drains to be installed, and may revise the plan limits for this work, as necessary.

(e) Splices or connections of wick drain material shall be done by stapling in a workmanlike manner and so as to insure structural and hydraulic continuity of the wick drain. The jacket and core shall be overlapped a minimum of 6 inches at any splice. A maximum of one splice per drain installed will be permitted, unless otherwise directed by the Engineer.

(f) The Contractor is permitted to use augering or other methods to loosen stiff upper soils and/or granular fill prior to installation of the wick drains. If predrilling or other methods are used to open an installation hole, the annulus must be filled with sand after installation of the wick drains. No additional compensation will be made for augering or loosening of soils.

(g) Where obstructions are encountered below the working surface, which cannot easily be removed or penetrated using normal and accepted procedures, the Contractor shall complete the wick drain from the elevation of the obstruction to the working surface and notify the Engineer in writing within four hours.

(h) When horizontal drains are used, the vertical wick drain shall be wrapped around horizontal drain and stapled as specified above.

Method of Measurement. Wick drains will be measured for payment in foot (meters) in place for the length of wick drain measured from the middle of the sand drainage blanket to the tip elevation, (vertical and horizontal) complete and in place. Wick drains that are out of their proper location by more than 6 inches or wick drains that are damaged in construction, or wick drains that are improperly completed will not be measured for payment, and no compensation will be allowed for any material furnished or for work performed on such wick drains.

Basis of Payment. This work will be paid for at the contract unit price per foot for WICK DRAINS. The prices shall be full compensation for the cost of furnishing the full length of wick drain material, installing the wick drains, altering of the equipment and methods of installation in order to produce the required end result and shall also include the cost of furnishing all tools, materials, labor, equipment, services and all other costs necessary to complete the required work. No direct payment will be made for unacceptable wick drains or for any delays or expenses incurred through change necessitated by improper or unacceptable material or equipment, but the costs of such shall be included in the Unit Prices bid for this work. No additional compensation will be allowed for the cost of constructing any work platform to provide stability for the wick drain installation equipment and to allow movement of the wick drain installation equipment across the site.

SAND DRAINAGE BLANKET

This work shall consist of furnishing and constructing sand drainage blanket to form a horizontal drainage layer between the proposed embankment and the existing or prepared ground surface and constructing drainage blanket protection according to the plans.

Materials. The drainage blanket shall be sand according to Article 1003.01of the Standard Specifications. The gradation shall be FA 1, FA 2, FA 6 or FA 20 except that the percentage passing the No. 200 (75 micron) sieve shall be a maximum of 4 percent. The fine aggregate shall be Class A Quality.

The source of the fine aggregate and gradation test results shall be provided to the Engineer a minimum of 60 days prior to placement of the fine aggregate.

The riprap used for the drainage blanket protection shall be riprap according to Article 1005.01 of the Standard Specifications. The gradation shall be RR 1 and RR 3, as shown on the plans. The riprap shall be Class A Quality.

The filter fabric shall be according to Article 1080.03 of the Standard Specifications. The physical properties shall meet the requirements of Gradation 4 & 5 of Article 1080.03 of the Standard Specifications.

Construction Requirements. The sand drainage blanket shall be constructed to the thickness and within the lines and grades shown on the plans. The sand drainage blanket shall be constructed with sufficient slope so that water can drain out of the embankment throughout the settlement process. Sand may be placed by end dumping or other approved method, and spread uniformly over the site to the neat lines shown on the plans. The sand shall be compacted to a minimum of 90% of the standard laboratory density as determined by Illinois Modified AASHTO T 99.

The drainage blanket protection shall be constructed according to the plans.

Prior to placement of the embankment, the sand drainage blanket shall be reshaped if necessary to conform to the lines shown on the plans.

If the equipment used for construction of the vertical wick drains cannot be supported directly on the sand drainage blanket without displacing the underlying soils, the Contractor may be permitted to place a small portion of the embankment material to be used as a working platform for installing the vertical wick drains as directed by the Engineer.

Method of Measurement. The sand drainage blanket will be measured by the length, width, and depth of sand blanket placed, including the drainage blanket protection, and the volume computed in cubic yards. No allowance will be made for any sand placed outside the lines as specified herein or as directed by the Engineer.

Filter fabric will be measured for payment in place and the area computed in square yards (square meters).

Basis of Payment. The sand drainage blanket will be paid for at the contract unit price per cubic yard for SAND DRAINAGE BLANKET. No additional payment will be made for additional sand placed because of settlement.

Filter fabric will be paid for according to Article 282.09 of the Standard Specifications.

APPENDIX

R

AGGREGATE COLUMN GROUND IMPROVEMENT (District 3)

Effective: January 15, 2009
Revised: May 7, 2015

Description. This work shall consist of furnishing design calculations, shop drawings, materials, and labor necessary to construct aggregate column ground improvements, over the approximate horizontal limits below the footing, wall, or embankment as specified on the contract plans, or as modified by the Contractor's approved design.

Submittals. No later than thirty (30) days prior to beginning work, the Contractor shall submit to the Engineer for approval the following information:

(a) Evidence of the selected subcontractor's successful installation of their aggregate column system on five projects under similar site conditions using the same installation technique. The documentation to be submitted shall include a description of the project, aggregate column installation technique, soil conditions and name and phone number of contracting authority.

(b) Evidence that the proposed project superintendent for the ground improvement installation has a minimum of three years of method specific experience.

(c) Shop Drawings sealed by an Illinois Licensed Professional Engineer showing aggregate column horizontal limits, locations, pattern, spacing, diameters, top and bottom elevations, and identification numbers. The thickness, aggregate gradation, and plan dimensions of the aggregate drainage layer shall be shown in addition to any other details needed to describe the work.

(d) A description of the equipment, installation technique and construction procedures to be used, including a plan to address any water or spoils.

(e) The source and gradation of the aggregate proposed for the aggregate columns.

(f) Design computations, sealed by an Illinois Licensed Professional Engineer, demonstrating the proposed ground improvement plan satisfies the minimum global stability, settlement, and bearing capacity performance requirements stated in the Contract Plans and those contained in this Special Provision.

(g) The proposed verification program methods to monitor and verify the aggregate column installation is satisfying the design and performance requirements. Also required is a sample of the daily report form to be used by the Contractor to document the adequacy of that day's work.

Materials. The aggregate used in the columns shall be Class A quality crushed stone satisfying the requirements of Section 1004 of the Standard Specifications. The aggregate for any drainage layer specified in the plans shall be a combination of one or more of the following gradations, FA1, FA2, CA5, CA7, CA8, CA11, or CA13 thru 15, according to Sections 1003 and 1004 of the Standard Specifications. Any fine or coarse aggregate requested by the Contractor to be used as either a drainage layer or working platform shall be Class B quality and approved by the Engineer.

Design Criteria. The subcontractor selected shall provide an aggregate column ground improvement plan with shop drawings, and design computations, using an Allowable Stress Design that meets the following performance requirements:

(a) A factor of safety of 1.5 against global slope stability failure, for both the long term and short term condition.

(b) A factor of safety of 2.5 against equivalent uniform service bearing pressure failure.

(c) Settlement after completing pavement construction not to exceed 1 inch (25 mm).

The design shall use short term strength parameters for the soil, obtained from the soil boring logs and any geotechnical laboratory testing data provided in the Contract Plans and specifications for stability and bearing capacity analyses. Settlement shall be assessed using appropriate soil parameters. Any additional subsurface information needed to design the aggregate columns shall be the responsibility of the Contractor.

Construction. The construction procedures shall be determined by the aggregate column installer and submitted for approval with the shop drawings. The following are the minimum requirements that the Contactor will be expected to follow unless otherwise approved in the shop drawings submittal.

(a) The site shall be graded as needed for proper installation of the aggregate column system. Any grading and excavation below the improvement limits shown on the plans shall be incidental to aggregate column installation.

(b) A granular base drainage layer shall be constructed.

(c) The aggregate column material shall be placed in a manner that allows measurement of the tonnage or quantity of aggregate placed down the hole.

(d) Columns shall be installed in a sequence that will minimize ground heave. Any heaving shall be re-compacted or excavated as directed by the Engineer prior to wall or embankment construction and be considered incidental to aggregate column ground improvement.

(e) The Contractor shall provide a full-time qualified representative to verify all installation procedures and provide the verification program.

(f) Disposal of any spoils generated shall be according to Article 202.03.

(g) If an obstruction is encountered that cannot be penetrated with reasonable effort, the Contractor shall construct the element from the depth of obstruction to its design top elevation. Depending on the depth of the completed column, column location, and design requirements, the Engineer may require the construction of a replacement aggregate column at an adjacent location. Construction of additional columns will be considered extra work and paid for according to Article 109.04.

(h) Specific Requirements for Vibrator Compacted Aggregate Columns:

i. Vibrator compacted aggregate columns shall be constructed with a down-hole vibrator, probe and follower tubes of sufficient size to install the columns to the diameter and bottom elevation(s) shown on the approved shop drawings. Preboring is permitted if approved as part of the shop drawing submittal.

ii. The probe and follower tubes shall have visible markings at one foot increments to enable measurement of penetration and re-penetration depths.

iii. Provide methods for supplying to the tip of the probe a sufficient quantity of air or water to widen the probe hole to allow adequate space for aggregate placement around the probe.

iv. The vibrator shall be withdrawn in 12 to 36 inch (300 to 900 mm) increments, to allow placement of the aggregate.

v. Lift thickness shall not exceed 4 ft (1.2 m). After penetration to the treatment depth, slowly retrieve the vibrator in 12 to 18 inch (300 to 450 mm) increments to allow aggregate placement.

vi. Compact the aggregate in each lift by re-penetrating it as needed with the vibrating probe to densify and force the aggregate radially into the surrounding soil. Re-penetrate the aggregate in each increment a sufficient number of times to construct the columns as specified in the approved shop drawings and to meet the verification program requirements.

(i) Specific Requirements for Tamper Compacted (Rammed) Aggregate Columns:

i. Tamper compacted (rammed) aggregate columns shall be installed by either drilling or displacement methods, capable of constructing columns to the diameters and bottom elevation(s) shown on the approved shop drawings.

ii. If temporary casing is needed to limit the sloughing of subsurface soils, the casing should be inserted to at least 2 ft (600 mm) beyond any sloughing strata. Upon extraction, the bottom of the casing shall be maintained at not more than 2 feet (600 mm) above the level of aggregate.

iii. Aggregate placement shall closely follow the excavation of each column. The aggregate shall be placed in 1 to 2 ft (300 to 600 mm) thick lifts. Each lift should be rammed with a high-energy impact tamper as specified in the approved shop drawings and to meet the verification program requirements.

Construction Tolerances. The aggregate columns shall be constructed to the following tolerances:

(a) The horizontal limits and center of each constructed aggregate column shall be within 8 inches (190 mm) of the location specified on the approved the shop drawings.

(b) The axis of the constructed aggregate columns shall not be inclined more than 1.67 percent from vertical.

(c) The installed diameter of any aggregate column shall not be more than 10 percent below the effective diameter indicated on the approved shop drawings.

(d) The average effective diameter of any group of 50 consecutively installed aggregate columns shall not be less than the effective diameter indicated on approved shop drawings.

(e) The top of the aggregate column ground improvement shall be located within 8 inches (200 mm) of the top elevation shown on the approved shop drawings. When supporting MSE walls, the top elevation may need to be adjusted to the base of the MSE reinforced mass elevation as shown on the approved MSE shop drawings.

(f) Except where obstructions, hard or very dense soils are encountered, the aggregate column shall be advanced to at least the treatment depth elevation shown on the approved Shop Drawings.

Any aggregate column installation not meeting the above stated tolerances, or otherwise deemed unsatisfactory by the Engineer, may require installation of a replacement aggregate column(s) at the discretion of the Engineer and at the Contractor's expense. The Contractor shall submit to the Engineer revised plans and procedures to bring installations in those areas into tolerance.

Verification Program. The Contractor shall develop and maintain a monitoring and documentation procedure during the installation of all aggregate columns to verify they satisfy the design and performance requirements. The Contractor shall provide qualified personnel to continuously observe and record the required data. The program shall include, as a minimum, the following:

(a) Quality control procedures to allow verification that each aggregate column is being installed according to the designer's specifications and the requirements in this Special Provision. This will typically include observations of items such as electrical current or hydraulic pressure, number of high-energy impact tamps, aggregate quantity, etc. that must be obtained to achieve the performance requirements.

(b) Monitoring methods to evaluate the performance of the global aggregate column ground improvement system after construction of the overlying embankment or wall shall include settlement plates, inclinometers, and piezometers. Other instrumentation may also be necessary.

(c) Proposed means and methods for verification that the installed aggregate columns meet the strength and/or stiffness criteria required by the design. This may include modulus or load tests on individual elements and/or groups, soil borings, and other methods.

(d) A daily report form shall be completed by the Contactor and provided to the Engineer to document the work performed each day and the adequacy of each aggregate column. The form shall be signed by the Contractor's qualified personnel and include as a minimum the following:

i. Aggregate columns installed (identified by location

number). ii. Date constructed.

iii. Elevation of top and bottom of each aggregate

column. iv. Average lift thickness.

v. Results of quality control testing such as average power consumption or tamping energy obtained during aggregate column installation.

vi. Jetting pressure (air or water) if applicable.

vii. Description of soil and groundwater conditions.

viii. Details of obstructions, delays and any unusual issues.

ix. Amount of water used per aggregate column if applicable.

x. Estimated weight or volume of aggregate backfill placed in each

column. xi. Average installed diameter of each column.

Method of Measurement. This work will be measured in units of each of aggregate column ground improvement at the location designated on the plans. Each location shall be the contiguous area of ground improved by the aggregate column ground improvement. Individual aggregate columns will not be measured for payment.

Any temporary casing, excavation, disposal of water or spoils, drainage layers or working platforms will not be paid for separately, but shall be considered to be included with this work.

Settlement platforms will not be measured for payment. Slope inclinometers and piezometers will be measured for payment according to their respective special provisions.

Basis of Payment. This work will be paid at the contract price per each for AGGREGATE COLUMN GROUND IMPROVEMENT.

APPENDIX

S

SURCHARGE

Revised 5-7-15

THIS SPECIFICATION HAS BEEN UPDATED. THE VERSION DATED 6-10-2015 IS THE FINAL VERSION.

Description. This work shall consist of placing a surcharge on top of the proposed embankment prior to abutment and pavement construction according to the details and dimensions shown on the plans, this specification, and as directed by the Engineer. A summary of the surcharge is presented in the following table.

Location (length)	**Treatment Width**	**Surcharge Pressure** $^{(1)}$	**Estimated Surcharge Duration After Construction, t_{90} (days)**
Sta. 148+00 to Back of Proposed North Bridge Abutment	Entire top width of the Stage 1b fill.	800 psf	(Need to fill in t_{90} times. Depends on wick drain spacing)
Back of Proposed South Bridge Abutment to Sta. 168+50	Entire top width of the Stage 1b fill.	1050 psf	(Need to fill in t_{90} times. Depends on wick drain spacing)
Sta. 168+50 to Sta. 170+00	Entire top width of the Stage 1b fill.	Decrease uniformly from 1050 psf at Sta. 168+50 to 350 psf at Sta. 170+00	(Need to fill in t_{90} times. Depends on wick drain spacing)
Note 1: Surcharge shall be placed prior to construction of subgrade, subbase, and pavement.			

The estimated primary settlement is shown in the following table.

Location of Analyses and Assumptions	Sta. 148+50, 10 ft. LT (inches)	Sta. 167+50, 12 ft. LT (inches)
Stage 1a: Fill to match height of existing embankment	13.6	3.8
Stage 1b: Additional fill over Stage 1a fill with assumed temporary MSE wall at 20 ft. RT.	5.6	5.9
Stage 1b (surcharge): surcharge.	1.5	2.4
Total for Stage 1a, 1b, and 1b (surcharge):	20.7	12.1

Submittals. A detailed surcharge plan shall be submitted to the Engineer for review and approval no later than 30 days prior to surcharge construction and shall include each of the following items:

(1) The material to be used for the surcharge.
(2) The unit weight of the material to be used for the surcharge. If a material requiring densification during placement is selected, compaction criteria needed to achieve the unit weight shall be included.
(3) Drawings showing the placement of the surcharge material include plan, profile, and typical section views.
(4) Method of placing the surcharge material.
(5) Method of quality control to ensure the required surcharge pressure is achieved, if necessary.
(6) Removal and disposal plan for the surcharge material.

Materials. Materials shall be any material approved by the Engineer that uniformly applies the required surcharge pressure over the surcharge area shown on the plans.

Design Criteria. The surcharge configuration shall meet the minimum specified surcharge pressure over the specified locations and shall be stable during the surcharge period as well as during the placement and removal operations.

Construction. The surcharge material shall be placed as shown on the Contractor’s surcharge plan. The rate of placement of the surcharge material shall be time-phased based on the settlement plate, slope inclinometer, and piezometer readings to maintain slope stability and a minimum factor of safety. If any signs of slope instability are observed during placement of the surcharge, they shall be immediately reported to the Engineer and all surcharge placement shall be halted. Surcharge placement may be resumed upon the approval of the Engineer. The Contractor shall remove previously placed surcharge material to the limits directed by the Engineer, when necessary to achieve stability of the embankment.

The surcharge shall at no time exceed the specified pressure without prior approval of the Engineer. The Contractor shall stockpile material or place excess load on top of the embankment.

The surcharge shall remain in place until the time for 90 percent of estimated primary settlement has elapsed and the estimated remaining settlement is a maximum of 0.5 inch.

No portion of the surcharge shall be removed until permission is given by the Engineer. The surcharge material shall be removed and disposed of as shown on the Contractor’s surcharge plan.

Method of Measurement. This work will be measured for payment and the area computed in square yards (square meters) of surface area covered by the surcharge. Surcharge placed outside the designated limits as shown on the plans or as directed by the Engineer will not be measured for payment.

Basis of Payment. This work will be paid for at the contract unit price per square yard (square meter) for SURCHARGE.

SURCHARGE

Revised 6-10-2015

THE SPECIAL PROVISION FOR SURCHARGE (REVISED 6-10-2015) WAS ADDED TO THIS REPORT ON 8-24-2015.

Description. This work shall consist of placing a surcharge on top of the proposed embankment prior to abutment and pavement construction according to the details and dimensions shown on the plans, this specification, and as directed by the Engineer. A summary of the surcharge is presented in the following table.

Location (length)	**Treatment Width**	**Surcharge Pressure** (1)	**Minimum Surcharge Duration**(2) **(days)**
Sta. 148+00 to Back of Proposed North Bridge Abutment	Entire top width of the Stage 1b fill.	800 psf	107
Back of Proposed South Bridge Abutment to Sta. 168+50	Entire top width of the Stage 1b fill.	1050 psf	154
Sta. 168+50 to Sta. 170+00	Entire top width of the Stage 1b fill.	Decrease uniformly from 1050 psf at Sta. 168+50 to 350 psf at Sta. 170+00	154

Note 1: Surcharge shall be placed prior to construction of subgrade, subbase, and pavement.

Note 2: Surcharge duration is based on wick drains with a 7.5 foot triangular spacing pattern. The duration will be adjusted by the Engineer in the event that a different wick drain configuration is used.

The estimated primary settlement is shown in the following table.

Location of Analyses and Assumptions	Sta. 148+50, 10 ft. LT (inches)	Sta. 167+50, 12 ft. LT (inches)
Stage 1a: Fill to match height of existing embankment	13.6	3.8
Stage 1b: Additional fill over Stage 1a fill with assumed temporary MSE wall at 20 ft. RT.	5.6	5.9
Stage 1b (surcharge): surcharge.	1.5	2.4
Total for Stage 1a, 1b, and 1b (surcharge):	20.7	12.1

Submittals. A detailed surcharge plan shall be submitted to the Engineer for review and approval no later than 30 days prior to surcharge construction and shall include each of the following items:

(1) The material to be used for the surcharge.
(2) The unit weight of the material to be used for the surcharge. If a material requiring densification during placement is selected, compaction criteria needed to achieve the unit weight shall be included.
(3) Drawings showing the placement of the surcharge material include plan, profile, and typical section views.
(4) Method of placing the surcharge material.
(5) Method of quality control to ensure the required surcharge pressure is achieved, if necessary.
(6) Removal and disposal plan for the surcharge material.

Materials. Materials shall be any material approved by the Engineer that uniformly applies the required surcharge pressure over the surcharge area shown on the plans.

Design Criteria. The surcharge configuration shall meet the minimum specified surcharge pressure over the specified locations and shall be stable during the surcharge period as well as during the placement and removal operations.

Construction. The surcharge material shall be placed as shown on the Contractor’s surcharge plan. The rate of placement of the surcharge material shall be time-phased based on the settlement plate, slope inclinometer, and piezometer readings to maintain slope stability and a minimum factor of safety. If any signs of slope instability are observed during placement of the surcharge, they shall be immediately reported to the Engineer and all surcharge placement shall be halted. Surcharge placement may be resumed upon the approval of the Engineer. The Contractor shall remove previously placed surcharge material to the limits directed by the Engineer, when necessary to achieve stability of the embankment.

The surcharge shall at no time exceed the specified pressure without prior approval of the Engineer. The Contractor shall stockpile material or place excess load on top of the embankment.

The surcharge shall remain in place until the Minimum Surcharge Duration has elapsed and the estimated remaining settlement is a maximum of 0.4 inch.

No portion of the surcharge shall be removed until permission is given by the Engineer. The surcharge material shall be removed and disposed of as shown on the Contractor’s surcharge plan. Piling for the bridge abutments and the pavement subgrade shall not be constructed until after the surcharge is removed.

Method of Measurement. This work will be measured for payment and the area computed in square yards (square meters) of surface area covered by the surcharge. Surcharge placed outside the designated limits as shown on the plans or as directed by the Engineer will not be measured for payment.

Basis of Payment. This work will be paid for at the contract unit price per square yard (square meter) for SURCHARGE.

APPENDIX

T

PIEZOMETERS

Revised 5-6-2015

Description. This work shall consist of furnishing, installing, and maintaining piezometers.

Materials. Piezometers shall be the vibrating wire type with a self-contained battery. Piezometers shall include an automatic data collection and storage capability that will allow data to be downloaded to a laptop computer. Technical data and catalog cuts shall be provided to the Engineer for review and approval no later than 45 days prior to installation of the piezometers.

Qualifications. The company installing the piezometers shall be included on the IDOT Prequalified Engineering Consultant List for the category "Geotechnical Services – Subsurface Explorations."

Construction. Piezometers shall be installed at the locations and elevations indicated on the plans. Piezometers shall be inspected prior to installation according to ASTM D7764. Piezometers shall be installed according to AASHTO T 252.

Piezometers shall be installed and working properly at least 14 days prior to the beginning of embankment construction.

Training on proper collection of the piezometer data shall be provided to the Engineer.

Piezometers shall be protected from damage and maintained until the completion of the project.

If pore pressures exceed the values shown in the plans, construction of the embankment shall stop until pore pressures dissipate. Construction of embankment may resume upon approval of the Engineer after pore pressures are less than the values shown in the plans.

Final grading and shaping of the embankment and pavement construction shall not occur until the measured pore pressures are equal to the pore pressures measured before embankment construction.

Method of Measurement. Piezometers will be measured for payment as each.

Basis of Payment. This work will be paid for at the contract unit price per each for PIEZOMETER.

APPENDIX

U

SLOPE INCLINOMETERS

Revised 5-7-2015

Description. This work shall consist of furnishing, installing, and maintaining slope inclinometers and providing all necessary measuring equipment and computer software to the Engineer. The Engineer will conduct measurements of the slope inclinometers.

Materials. Materials, equipment, and computer software shall be according to AASHTO R 45 and as specified herein.

The inclinometer materials, equipment and software manufactured by Durham Geo Slope Indicator Inc., Mukilteo, WA; Geokon Inc., Lebanon, NH; RST Instruments, Ltd, Maple Ridge, British Columbia, Canada; or equivalent shall be acceptable. Inclinometer equipment shall include suitable carrying cases to protect the equipment from damage. Computer software shall include data collection, storage, analysis, and printing capabilities.

Guide Casing shall be large diameter (3.34 inch, 85 mm) to facilitate long-term monitoring. Couplings shall be sealed to prevent grout intrusion. A sufficient number of telescoping couplings or sections shall be used throughout the length of the guide casing assembly to permit the guide casing to adjust to compression (settlement) of the surrounding materials.

Hole covers and/or other protective devices shall be installed to provide long term access to the inclinometer.

Technical data and catalog cuts shall be provided to the Engineer for review and approval no later than 45 days prior to installation of the inclinometer guide casing.

The grout placed in the annular space between the inclinometer guide casing and the borehole shall mimic the shear strength of the in situ material. The grout mix shall include Portland cement, bentonite, and water. To mimic soft soils at the site, the grout mix ratio shall consist of 94 pounds of Portland Cement, 75 gallons of water, and approximately 40 pounds of bentonite. The mix consistency shall be controlled by adding the bentonite to the cement/water mixture and adjusting the bentonite quantity to control the consistency so it is thick enough that the solids do not separate and thin enough to be pumped.

Qualifications. The company installing the slope inclinometers shall be on the IDOT Prequalified Engineering Consultant List for the category “Geotechnical Services – Subsurface Explorations.”

Construction. Slope inclinometers shall be installed according to AASHTO R 45 and as specified herein at the locations and depths as specified in the plans or as determined by the Engineer.

The guide casing shall be installed in a pre-drilled hole. Field logs of the drilling shall be recorded and submitted to the Engineer upon completion of the drilling. The inclinometer guide casing shall extend a minimum of 3 feet into rock. The installer may be required to perform split-spoon or rock core sampling as directed by the Engineer during the drilling to verify that the hole is terminating into rock.

Telescoping sections or couplings shall be installed in the fully extended position. The guide casing groove orientation shall be perpendicular to the direction of potential movement or as specified by the Engineer. After installation, the guide casing groove spiral shall not exceed one degree per 10 feet of length, the orientation of the grooves at the top of the guide casing shall be within 10 degrees of the planned orientation. Correct guide casing groove orientation shall be maintained throughout installation. Once installed, the guide casing shall not be rotated to align the grooves. The guide casing shall be fully plumb and no tilting in any direction shall be allowed, and no part of the guide casing shall deviate from vertical by more than 4 percent of the depth to that part.

The annular space between the inclinometer guide casing and the borehole shall be backfilled with cement grout. The grout shall be pipe injected starting from 6 to 12 inches above the bottom of the drill hole. The grout may be poured around the guide casing from the ground surface once the grout placement in the hole is within 3 feet of the ground surface. To minimize compression of the telescoping couplings/sections and “snaking” movement of the guide casing during grouting, counteracting buoyance forces by holding the guide casing down from the top of the guide casing shall not be permitted. The guide casing shall be held down at the bottom by inserting steel pipe or drill rods in the guide casing, bottom anchors, or filling the guide casing with water to counteract buoyance forces.

After completion of installation, a post-installation acceptance test shall be performed to verify that there is no grout in the inclinometer guide casing, that groove orientation and verticality are correct, and that the inclinometer probe tracks correctly in all four orientations. Groove alignment shall be checked with a spiral probe as directed by the Engineer. The post installation acceptance test will be verified by the Engineer. In the event of any failed post installation acceptance test, the Contractor shall install another inclinometer at a location approved by the Engineer.

After completion of installation, the as-built horizontal position (station and offset) shall be determined to an accuracy of ± 0.03 foot, and the elevation of the top of the inclinometer guide casing shall be determined to an accuracy of ± 0.01 foot. The point selected to determine horizontal position shall be marked on the guide casing and indicated on the installation record sheet.

Slope inclinometers shall be installed and working properly at least 14 days prior to the beginning of embankment construction.

Training on proper collection of the slope inclinometer data shall be provided to the Engineer.

Inclinometers shall be protected from damage and maintained so they can continue to be used after completion of this project.

If the slope inclinometer data indicates movement of the slope, construction of the embankment shall stop until the pore pressures measured by the piezometers dissipate.

Construction of embankment may resume upon the approval of the Engineer after the movement slows and pore pressures are less than the values shown in the plans.

At the completion of the project, the slope inclinometers shall be left in place, capped with a locking cover that allows future access to the inclinometer, and the measuring equipment and computer software shall become the property of the Engineer for long-term monitoring.

Method of Measurement. Slope inclinometers will be measured for payment as each. Measuring equipment and computer software will not be paid for separately, but shall be considered included in the unit prices for the slope inclinometers.   Slope inclinometers that fail the post-installation acceptance test will not be measured for payment.

Basis of Payment. This work will be paid for at the contract unit price per each for SLOPE INCLINOMETER.

APPENDIX

V

Geotechnical Reports

Revised 4-15-2015

A Roadway Geotechnical Report and a Structure Geotechnical Report have been prepared for this project. Copies can be obtained by contacting Mike Short, District Geotechnical Engineer, at 1-815-433-7085 or Michael.Short@Illinois.gov.