STRUCTURE GEOTECHNICAL REPORT

F.A.S. Route 1388 (IL 8) over
Burlington Northern Santa Fe Railroad

Existing S.N. 072-0049
Proposed S.N. 072-0248

F.A.S. Route 1388
SECTION (Z-1VB)BR-2
PEORIA COUNTY, ILLINOIS
JOB No. P-94-009-08
PTB #150-026
CONTRACT NO. 68799
KEG NO. 09-0007.01

09/11/2018

Exp 11/30/2019

Authored By:
Matthew D. Masterson, P.E.
208 East Main Street, Suite 100
Belleville, IL 62220
(618) 233-5877
mmasterson@kaskaskiaeng.com

Prepared for:
Lochmueller Group
1928 SrA Bradley R. Smith Drive
Troy, IL 62294

September 11, 2018

Kaskaskia
Engineering Group, LLC

EXECUTIVE SUMMARY

F.A.S. Route 1388 (IL 8) over Burlington Northern Santa Fe Railroad
Section (Z-1VB) BR-2
Peoria County, Illinois
Job No. P-94-009-08
PTB 150/026
Contract No. 68799
Proposed Structure No. 072-0248

The new structure is a three-span bridge located east of the intersection of IL 8 and Kickapoo-Edwards Road in Peoria County, Illinois. The purpose of this report is to present design and construction recommendations for the proposed structure.

The proposed structure will be relocated to the south of the existing alignment. Up to 40 ft. of fill will be required for the west approach and abutment and 15 ft. of fill will be required for the east approach and abutment. Due to the combination of soft soils and fill heights, settlement up to approximately 12-inches is anticipated. Wick drains are recommended to decrease the time rate of settlement.

The results of the slope stability analysis reveals unacceptable factors of safety (FOS) will exist at the West Abutment and at the west approach embankment side-slopes. This area of instability coincides with the approximate location of the original Kickapoo Creek channel, which was re-aligned as part of the original bridge construction in 1936. Due to the stability concerns at these locations, stability improvement measures are recommended.

IDOT District 4 has developed a District Remediation Plan to address the settlement and slope stability issues of the new approach embankments with wick drains only. Per the District's review, removal and replacement of the natural soils below the approach embankments is not feasible, due to cost and the potential high groundwater table. The District Remediation Plan includes supplementing the existing subsurface data and calculations in this Structure Geotechnical Report (SGR) to show that consolidation should increase the strength of the foundation soils during construction of the new embankments, such that the required FOS for slope stability will be achieved. During construction, the minimum FOS will be controlled through instrumentation monitoring and a controlled rate of embankment construction.

The approach embankment to the east abutment will be placed over an existing fill that supports a commercial structure. Placement and compaction of the existing fill is undocumented. A subsurface investigation of the existing fill by drilling was attempted but was not completed due to its rubble composition. The owner of the commercial structure currently on the property stated that in the 1970's the fill was brought on-site and is mostly composed of large slabs of reinforced concrete pavement. The fill is estimated to be 15 to 18 ft. thick. This corresponds with the 17 ft. difference in ground surface elevation between borings B-9 and B-11; B-9 is located at the base of the fill and B-11 is located on top of the fill. Because of the unknown properties of the rubble fill and the proposed height of new fill, KEG recommends the rubble fill be removed and replaced with structural fill in accordance with the District Remediation Plan for the east abutment and approach embankment which limits the removal and disposal of unsuitable material to the area of rubble fill (broken concrete pavement), located between the commercial structure and proposed east abutment.

TABLE OF CONTENTS

TABLES

Page

EXHIBITS

1.0 Project Description and Proposed Structure Information

1.1 Introduction

The geotechnical study summarized in this report was performed for the proposed structure at IL 8 over the Burling Northern Santa Fe (BNSF) Railroad in Peoria County, Illinois. The purpose of this report is to present design and construction recommendations for the proposed structure.

1.2 Project Description

The project consists of construction of a new three-span bridge (SN 072-0248) located at IL 8 over the BNSF Railroad including the west and east approach embankments. The new approach embankments will include approximately 1,400 lineal feet of new embankment construction, with maximum fill heights of approximately 41 ft. for the west approach and 15 ft. for the east approach. The project is located east of the intersection of IL 8 and Kickapoo-Edwards Road. The general location of the structure is shown on a USGS Topographic Location Map, Exhibit A. The site lies within the limits of the Fourth Principal Meridian (T. 9N R. 7E, Section 19) within the Galesburg Plain of the Till Plains section of the Central Lowland Province.

1.3 Proposed Bridge Information

The proposed structure will consist of one, three-span structure built on a 45 degree skew with an approximately 58 degree skew with the railroad tracks. The structure will have a 42 ft. – 10 in. out-to-out width. The centerline of the structure at Sta. 142+72.71(F.A.S. Rte 1388) will intersect the BNSF Railroad south track at Sta. 15+29.91. The centerline of the structure at 143+01.92 (F.A.S. Rte 1388) will intersect the BNSF Railroad north track at Sta. 15+55.70. Pile-supported Integral abutments and piers are proposed for the substructures.

The proposed structure will measure 353 ft.-5½ inches, measured along the centerline of IL 8, from back to back of abutments, and will support two, 12-ft. lanes with 8-ft. outside shoulders. Further substructure details will be based on the findings of this SGR.

1.4 Existing Bridge Information

The existing structure (SN 072-0049) was built in 1936 and reconstructed in 1981. The existing structure consists of five approach spans to the west, one main span truss, and two approach spans to the east. The approach spans are continuous steel wide flange I-beams with a 7.5 in. composite reinforced concrete slab. The main span truss is a through-truss consisting of riveted connections and a stinger floor beam system. The spans measure 47 ft 1.5 in., 46 ft., 46 ft., 46 ft., 46 ft. 4.5 in., 112 ft. 3 in., 46 ft. 4.5 in., and 47 ft. 1.5 in., respectively. The out-to-out width is 34 ft. with a 29 ft. bidirectional roadway, 4 ft. 3 in. sidewalk, and 9 in. curb. The back-to-back abutment length is 437 ft. 3 in. The abutments are reinforced concrete spill through abutments supported on spread footings. The piers consist of multi-column piers supported by concrete footings. All substructure units are supported by timber piles except for the east abutment and Piers 6 and 7.

2.0 Site Investigation, Subsurface Exploration, and Generalized Subsurface Conditions

The site investigation plan was developed by Kaskaskia Engineering Group, LLC (KEG) in coordination with the Illinois Department of Transportation (IDOT). A representative of KEG conducted a site visit, observed the drilling operations, and logged the subsurface conditions.

Seventeen (17) standard penetration test (SPT) borings, designated B-1 through B-16, including a Boring B-5A, were drilled between June 3rd and June 17th, 2013. The stations, offsets, and the ground surface elevations of the borings are listed in Table 2.1. Detailed information regarding the nature and thickness of the soils encountered and the results of the field sampling and laboratory testing are shown on the Boring Logs, Exhibit C. The boring locations and a soil profile can be found under Boring Plan and Soil Profile, Exhibit D.

Table 2.1 – Boring Stations and Offsets

Designation	Stationing	Offset from Proposed Centerline	Surface Elevation (ft.)
B-1	129+23.91	31.4 RT	497.4
B-2	131+04.75	33.2 RT	497.5
B-3	134+30.32	9.5 RT	496.3
B-4	137+33.33	25.6 LT	494.8
B-5	140+12.25	0.2 RT	494.9
B-5A	139+97.26	0.7 LT	494.9
B-6	140+89.25	4.0 LT	500.3
B-7	142+26.12	36.1 RT	497.8
B-8	143+52.08	43.9 LT	509.7
B-9	144+36.45	19.1 RT	508.3
B-10	144+85.25	36.0 LT	525.2
B-11	145+02.25	11.9 RT	524.9
B-12	145+62.25	30.0 RT	525.2
B-13	145+92.84	29.9 LT	522.8
B-14	149+15.27	36.5 RT	503.5
B-15	152+19.51	50.7 RT	499.3
B-16	155+67.94	40.9 RT	498.7

2.1 Subsurface Conditions

Specific topsoil thicknesses were not noted during the field exploration. It is estimated that 12-inches or less of topsoil is present throughout the project site.

Borings B-1 through B-5 and B-5A were advanced to depths ranging from 13 to 38.5 ft. Boring B-5 was advanced by rock coring from 22.5 to 32.5 ft. The borings encountered layers of loam, sand, and shale. The driving resistances (N-values) of the loam soils ranged from 0 to 8 blows per foot (bpf). The unconfined compressive strengths (Q_u) ranged from less than 0.25 to 1.2 tons per square foot (tsf) and the moisture content varied from 26 to 47 percent. The N-values of the sand varied from 0 to 52 bpf with moisture contents ranging from 15 to 30 percent. Shale was encountered in borings B-2 through B-5 with an approximate average top El. of 473 ft and an unconfined compression strength of 37.6 tsf.

Borings B-6 through B-9 were drilled near the proposed abutments and piers. They were advanced to depths ranging from 28 to 42.2 ft. The borings encountered layers of loam, clay,

sand, shaley clay, clayey shale and shale. The N-values of the overburden soils ranged from 2 to 24 bpf. The Qu values ranged from less than 0.25 to greater than 4.5 tsf. The moisture contents ranged from 8 to 32 percent. Below the overburden soils, clayey shale was encountered with N-values ranging from 10 to 100 bpf and greater than 50 blows per inch of penetration. The Qu values (ranging from 2.2 {at B-8}) were greater than 4.5 tsf and the moisture contents were 10 to 25 percent. Borings B-6 and B-8 terminated in clayey shale. The clayey shales transitioned into shale in borings B-7 and B-9. The shales were moderately soft to moderately hard and calcareous. Boring B-7 was advanced by rock coring from 42.2 to 54.2 ft. Boring B-9 was advanced by rock coring from 33.8 to 44.6 ft. Rock core recovery of the shales ranged from 97 to 100 percent. The RQDs ranged from 62 to 100. The shales had compressive strengths ranging from 6.4 to 186.3 tsf.

Borings B-10 through B-13 were drilled around the existing commercial structure property to analyze the existing fill around the structure. Borings B-11 and B-12 were terminated at a depth of 10 ft. and 5 ft., respectively, in rubble fill. Both B-11 and B-12 encountered concrete rubble fill inter-mixed with clay and sand. The concrete rubble could not be sufficiently penetrated by either boring to underlying natural soils. Based on the surrounding natural topography and discussions with the property owner regarding the fill materials, the rubble fill is estimated to be 15 to 18 ft. thick.

Borings B-10 and B-13 encountered layers of sand fill, underlain by natural soils consisting of loams, silty clay, clay, shaley clay and clayey shale similar to the natural stratigraphy of borings B-10 and B-13. The sand fill had N-values ranging from 4 to 12 bpf with moisture contents varying from 4 to 25 percent. The loamy soils, silty clays, clays and shaley clays had N-values ranging from 3 to 52 bpf with Q_u values ranging from 0.3 to 3.0 tsf. The moisture content varied from 17 to 31 percent. Below these soils, clayey shale was encountered in both borings with an approximate average top El. of 477 ft. N-values ranged from 30 to 100 blows per inch of penetration. The Qu values were 1.8 to 3.4 tsf and the moisture contents were 12 to 15 percent. Trace amounts of coal were encountered in boring B-13 at approximate El. 484.0 ft.

Borings B-14 through B-16 were advanced to depths ranging from 12.5 to 22.5 ft. All borings encountered layers of loams and sand. The loamy soil with varying amounts of clay, silt, and sand, had N-values ranging from 0 to 6 bpf, Q_u values ranging from less than 0.25 to 1.4 tsf, and moisture contents varying from 18 to 32 percent. The sand layer had N-values ranging from 0 to 8 bpf and moisture contents ranging from 14 to 25 percent.

2.2 Bedrock

Table 2.2 shows the elevations for top of shale and the termination of the boring or rock core for borings that encountered shale. The bedrock encountered was predominately shale from first encounter to the termination of the boring or rock core.

Table 2.2 – Top of Shale Elevations

Boring	Top of Shale Elevation (ft.)	Termination of Boring or Rock Core Elevation (ft.)
B-2	472.0	459.0
B-3	470.8	458.3
B-4	474.8	469.8
B-5	475.9	462.3
B-6	486.8	472.3
B-7	483.8	443.6
B-8	489.2	471.2
B-9	482.3	463.7
B-10	479.2	465.2
B-13	475.3	462.8

2.3 Groundwater

Groundwater elevations are listed in Table 2.3. Groundwater elevations were recorded at first encounter while drilling as well as after completion of the boring.

Table 2.3 – Groundwater Elevations

Boring	1st Encounter Elevation (ft.)	Upon Completion Elevation (ft.)	Extended Reading Elevation (ft.)
B-1	486.4	495.4	--
B-2	491.5	494.0	--
B-3	490.8	--	--
B-4	486.3	494.8	--
B-5	494.9	494.9	--
B-5A	491.9	494.9	--
B-6	489.3	497.3	497.3 after 24 Hrs
B-7	484.8	494.3	--
B-8	501.7	--	--
B-9	497.3	--	501.8 after 16 Hrs
B-10	502.2	--	--
B-13	506.8	--	--
B-14	492.5	--	--
B-15	488.3	--	--

It should be noted that groundwater level is subject to seasonal and climatic variations. In addition, without extended periods of observation, measurement of true groundwater levels may not be possible.

3.0 Geotechnical Evaluations

3.1 Settlement

The proposed structure will be placed on a new alignment. The resulting new roadbed and embankments will place a significant additional load on the existing soil profile.

Settlement analysis was performed using stratigraphy from borings B-4, B-5, B-6, B-9, and B-14, consolidation test parameters from laboratory testing and empirical correlations, and dimensions of the proposed approach embankments obtained from the TS&L included in Exhibit B. The results of the settlement analysis are summarized in Table 3.1.

The installment of wick drains are recommended to decrease the time rate of settlement. A 5 ft. triangular spacing for the wick drains was assumed in the time rate calculations. Wick drains are recommended to be used under the entire west approach embankment, and under the east approach embankment to station 150+00.

Table 3.1 Settlement

Location	Settlement (in.)	Time Rate (Months)		w/ 5' Wick Drain Pattern (Months)		Approximate Settlement (inches)		
		T_{50}	T_{90}	T_{50}	T_{90}	After 1 Month	After 2 Month	After 6 Month
Sta. 134+25	4.0	3.5	15	0.6	2.6	1.1	1.5	2.6
Sta. 137+50	12.0	7	29.5	1.5	6.5	1.8	3.2	5.5
Sta. 140+00	11.0	4.5	18.7	0.4	1.6	2.6	3.7	6.6
West Abut.	5.0	2.2	9	0.4	1.6	1.7	2.4	4.0
East Abut.	3.2	2	8.3	0.8	3.2	1.1	1.6	2.6
Sta. 149+00	7.6	17	71	0.9	3.9	0.75	0.8	2.3
Sta. 152+00	2.0	4.3	18	0.9	3.9	0.5	0.7	1.2

IDOT District 4 has developed a District Remediation Plan to address the settlement with wick drains and controlled embankment construction. Prior to embankment construction, the placement and monitoring of settlement plates are recommended. Additional settlement monitoring during construction will be per the District Remediation Plan.

3.2 Slope Stability

The product of the proposed construction will be new embankments at the abutment and approach locations. The proposed abutments will have end slopes of 1 Vertical to 2 Horizontal (1V:2H). The proposed approach embankments will have side slopes of 1 Vertical to 3 Horizontal (1V:3H). The stability of all slopes were analyzed using SLOPE/W. The soil strength properties were obtained from the corresponding lab tests for borings B-4, B-5, B-6, B-9, and B-14. Slopes were modeled at Stations 139+00, 140+00, both abutment locations, and Station 149+00. Three conditions were modeled for each: end-of-construction, long-term, and a design seismic event. A minimum factor of safety (FOS) was calculated for each condition. According to current standard of practice, the target FOS is 1.5 for end-of-construction (E-O-C) and long-term (L-T), and 1.0 for the design seismic event.

In order to model the E-O-C condition, undrained soil strength parameters were used for cohesive soils. This assumes a friction angle of 0 degrees. Drained strength parameters for cohesive soils assumed friction angles ranging from 26 to 33 degrees, with a reduced value for cohesion. These strength values were used to model the L-T and seismic cases, where excess pore water pressure from construction has dissipated. For the structural fill, assumed to consist of clay and silty clay, a nominal cohesion of 1,500 psf was used for undrained strength. For drained strengths, a nominal friction angle of 26 degrees was used, with a reduced cohesion of 50 to 250 psf.

The Bishop method was used to calculate circular-arc failure surfaces. The FOS obtained in the analyses are summarized in Table 3.2. SLOPE/W program output from individual analyses can be found in Exhibit E.

Due to the nature of the soft clays encountered in borings B-5 and B-6, and an anticipated fill height of 41 ft. for the proposed west approach embankment, unacceptable Factors Of Safety exist for the embankment side-slopes at Sta. 140+00 and the West abutment end-slope. The soft clays that extend from the ground surface to approximately 13 ft. (B-5 El. 482.0) and 8 ft. (B-6 El. 492.0) below the surface coincide with the approximate location of the original Kickapoo Creek channel. KEG's observation during the drilling operations was that the original Kickapoo Creek channel extended approximately from Station 139+50 to the proposed west abutment.

To remediate this condition, KEG modeled removal and replacement of the soft clay layer. Removal and replacement is not feasible per the District's review, due to cost and the potential high groundwater table in the vicinity of the proposed approach embankments. The District Remediation Plan includes supplementing the existing subsurface data and calculations in this SGR to show that consolidation should increase the strength of the foundation soils during construction of the new embankments, such that the required FOS for slope stability will be achieved. During construction, the minimum FOS will be controlled through instrumentation monitoring and a controlled rate of embankment construction. Therefore, based on the District's approach, we modeled the embankments with improved properties for the underlying soils similar to the properties of new embankment structural fill soils. For this configuration, minimum FOS of 1.5 were calculated for the E-O-C case and L-T case, and a minimum FOS of 1.3 calculated for the Seismic analysis.

All results are summarized below in Table 3.2 – Slope Stability Critical FOS. Specific details of the analyses are available in Slope/W Slope Stability Analysis – Exhibit E.

Table 3.2 – Slope Stability Critical FOS

Location	Bishop		
	End-of-Construction	Long-Term	Seismic
Sta.139+00 Side-Slope (1V:3H)	1.8	1.7	1.4
Sta. 140+00 Side-Slope (1V:3H)	1.1	1.6	1.4
Sta. 140+00 Side-Slope (1V:3H) **District Remediation Plan Improvement**	1.6	1.7	1.4
Sta. 141+00 Bridge Cone Side-Slope (1V:2H)	1.4	1.4	1.3
Sta. 141+00 Bridge Cone Side-Slope (1V:2H) **District Remediation Plan Improvement**	1.5	1.5	1.4
West Abut. End-Slope (1V:2H)	1.2	1.5	1.3
West Abut. End-Slope (1V:2H) **District Remediation Plan Improvement**	1.6	1.5	1.3
East Abut. End-Slope (1V:2H)	2.6	1.5	1.6
Sta. 145+00 Bridge Cone Side-Slope (1V:2H)	1.4	1.4	1.3
Sta. 145+00 Bridge Cone Side-Slope (1V:2H) **District Remediation Plan Improvement**	1.5	1.5	1.4
Sta. 148+00 Side-Slope (1V:3H)	2.8	2.4	2.1

3.3 Seismic Considerations

The determination of Seismic Site Class was based on the method described by IDOT AGMU Memo 09.1 - Seismic Site Class Definition and the IDOT-provided spreadsheet titled, “Seismic Site Class Determination”. Using these resources, the controlling global site class for this project is Soil Site Class D.

Additional seismic parameters were calculated for use in design of the structure and evaluation of liquefaction potential. The USGS published information and mapping (http://earthquake.usgs.gov/), including software directly applicable to the AASHTO Guide Specifications for LRFD Seismic Bridge Design, was used to develop the parameters for the project site location. The values, based on a 1000-Year Return Period with a Probability of Exceedance (PE) of 7 percent in 75 years and the Soil Site Class D, are summarized below.

Table 3.3 – Summary of Seismic Parameters

Parameter	Value
Soil Site Class	D
Spectral Response Acceleration, 0.2 Sec, S_{DS}	0.171g(Site Class D)
Spectral Response Acceleration, 1.0 Sec, S_{D1}	0.110g (Site Class D)
Seismic Performance Zone	1

As indicated in the table above, the Seismic Performance Zone is 1, based on S_{D1} and Table 3.15.2 in the IDOT Bridge Manual, the Soil Site Class D, and Figure 2.3.10-3 in the IDOT Bridge Manual.

3.4 Scour

The proposed structure will not cross a river or other tributary; therefore, scour is not an issue.

3.5 Mining Activity

According to the Illinois State Geological Survey (ISGS) website, extensive coal mining has been performed throughout the general vicinity of the site. According to the Peoria County, Illinois Coal Mines and Underground Industrial Mines Map, dated August 25, 2017, obtained from the ISGS website (http://www.isgs.illinois.edu/maps-data-pub/coal-maps.shtml), coal mining occurred approximately 450 ft. north of the site, but not on the site itself, as shown in the ISGS Mine Map, Exhibit F. However, the listed disclaimer indicates locations of some features on the mine maps may be offset by 500 ft. or more due to errors in the original source maps, the compilation process, digitizing, or a combination of these factors. As such, it is possible that portions of the site could be undermined.

Undocumented mining is reported to have occurred along the sides of hills where the coal layers are exposed or present at shallow depths. No such mines were observed during the site visit or field exploration. Exhibit F lists the designations for the mines in the immediate vicinity of the site. The closest mine appears to be 3069, the Patton Mine, operated by the Patton (Lee) Coal Company from 1934 to 1941, which was during the time the original bridge was constructed. The Springfield Seam was mined by the modified room and pillar (MRP) method, and the mine type was Slope. It should be noted that the 1935 bridge plans showed an area of mine refuse near the west end of the alignment. While it may not indicate mining directly on the site, it indicates nearby mining, likely via hillside entries or shallow shafts.

In consideration of the mine map disclaimer, it is possible that the site is at least partially undermined. However, the existing bridge does not appear to be affected by any mining activity. Trace amounts of coal were observed in boring B-13 at approximate El 483 ft. No significant coal deposits were encountered during drilling.

3.6 Liquefaction

A liquefaction analysis is not required to be performed since the project is in a Seismic Performance Zone 1 as per IDOT Bridge Manual and AGMU Memo 10.1 - Liquefaction Analysis. Liquefaction was not considered as a reduction for the pile design capacity or other foundation considerations included herein.

4.1 General Feasibility

The IDOT Static Method of Estimating Pile Length provided by IDOT BBS Foundations and Geotechnical Unit was used to determine the design length of the piles. Based on the boring logs, the depth to bedrock, and the results of the pile design analysis, H-piles may be a feasible option for support of the proposed substructures.

4.2 Pile-Supported Foundations

The foundations supporting the proposed bridge must provide sufficient support to resist dead and live loads, including seismic loadings. The IDOT Static Method uses the LRFD Pile Design Guide Procedure to estimate the pile lengths (IDOT Static Method of Estimating Pile Length, Exhibit G).

The preliminary factored design reactions, as provided by Lochmueller Group are provided in Table 4.2.

Table 4.2 – Preliminary Design Loads

Substructure Unit	Factored Reactions (kips)
Abutments	1,402
Piers	4,074

The estimated pile lengths for the pile types considered are shown in Tables 4.2.1 – 4.2.5 below. The Nominal Required Bearing (R_N) represents the resistance the pile will experience during driving, and will assist the contractor in selecting a proper hammer size. The Factored Resistance Available (R_F) documents the net long-term axial factored pile capacity available at the top of the pile to support factored substructure loadings.

As shown in Pile Length/Pile Type, Exhibit G, down-drag was considered at the abutment locations. If settlement is not allowed to finish at either abutment prior to driving of the piles, then down drag shall be considered in the value of R_F at the east and west abutments.

Table 4.2.1 – Estimated Pile Lengths for HP 12 x 74 Steel H-Piles

Substructure Unit	Nominal Required Bearing, R_N (kips)	Factored Resistance Available (LRFD), R_F (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
West Abutment – W/ Down-Drag	427	110	47	530.0
	477	138	48	530.0
	528	166	49	530.0
	589	193	50	530.0
West Abutment – No Down-Drag	427	235	47	530.0
	477	263	48	530.0
	528	290	49	530.0
	589	324	50	530.0
West Abutment – Pre Core	402	221	48	530.0
	452	249	49	530.0
	503	277	50	530.0
	589	324	51	530.0
Pier 1	423	233	21	499.5
	474	261	22	499.5
	524	288	23	499.5
	589	324	24	499.5
Pier 2	424	233	24	504.5
	474	261	25	504.5
	525	289	26	504.5
	589	324	27	504.5
East Abutment – W/ Down-Drag	392	101	48	527.0
	442	129	49	527.0
	493	157	50	527.0
	589	185	51	527.0
East Abutment – No Down-Drag	392	216	48	527.0
	442	243	49	527.0
	493	271	50	527.0
	589	324	51	527.0
East Abutment – Pre Core	474	261	51	527.0
	525	289	52	527.0
	575	316	53	527.0
	589	324	54	527.0

Table 4.2.2 – Estimated Pile Lengths for HP 12 x 84 Steel H-Piles

Substructure Unit	Nominal Required Bearing, R_N (kips)	Factored Resistance Available (LRFD), R_F (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
West Abutment – W/ Down-Drag	485	140	48	530.0
	536	169	49	530.0
	587	197	50	530.0
	664	225	51	530.0
West Abutment – No Down-Drag	485	267	48	530.0
	536	295	49	530.0
	587	323	50	530.0
	664	365	51	530.0
West Abutment – Pre Core	511	281	50	530.0
	562	309	51	530.0
	613	337	52	530.0
	664	365	53	530.0
Pier 1	481	265	22	499.5
	532	293	23	499.5
	583	321	24	499.5
	664	365	25	499.5
Pier 2	482	265	25	504.5
	533	293	26	504.5
	584	321	27	504.5
	664	365	28	504.5
East Abutment – W/ Down-Drag	500	160	50	527.0
	552	188	51	527.0
	603	216	52	527.0
	664	244	53	527.0
East Abutment – No Down-Drag	500	275	50	527.0
	552	303	51	527.0
	603	331	52	527.0
	664	365	53	527.0
East Abutment – Pre Core	533	293	52	527.0
	584	321	53	527.0
	635	349	54	527.0
	664	365	55	527.0

Table 4.2.3 – Estimated Pile Lengths for HP 14 x 73 Steel H-Piles

Substructure Unit	Nominal Required Bearing, R_N (kips)	Factored Resistance Available (LRFD), R_F (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
West Abutment – W/ Down-Drag	360	53	45	530.0
	447	101	46	530.0
	519	141	47	530.0
	578	173	48	530.0
West Abutment – No Down-Drag	360	198	45	530.0
	447	246	46	530.0
	519	286	47	530.0
	578	318	48	530.0
West Abutment – Pre Core	317	174	46	530.0
	404	222	47	530.0
	490	270	48	530.0
	578	318	49	530.0
Pier 1	354	195	19	499.5
	441	243	20	499.5
	515	283	21	499.5
	578	318	22	499.5
Pier 2	355	195	22	504.5
	442	243	23	504.5
	515	283	24	504.5
	578	318	25	504.5
East Abutment – W/ Down-Drag	300	32	46	527.0
	387	80	47	527.0
	473	128	48	527.0
	578	163	49	527.0
East Abutment – No Down-Drag	300	165	46	527.0
	387	213	47	527.0
	473	260	48	527.0
	578	318	49	527.0
East Abutment – Pre Core	354	195	48	527.0
	441	243	49	527.0
	515	283	50	527.0
	578	318	51	527.0

Table 4.2.4 – Estimated Pile Lengths for HP 14 x 89 Steel H-Piles

Substructure Unit	Nominal Required Bearing, R_N (kips)	Factored Resistance Available (LRFD), R_F (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
West Abutment – W/ Down-Drag	527	143	47	530.0
	586	176	48	530.0
	645	208	49	530.0
	705	241	50	530.0
West Abutment – No Down-Drag	527	290	47	530.0
	586	322	48	530.0
	645	355	49	530.0
	705	388	50	530.0
West Abutment – Pre Core	497	273	48	530.0
	556	306	49	530.0
	616	339	50	530.0
	705	388	51	530.0
Pier 1	522	287	21	499.5
	582	320	22	499.5
	641	352	23	499.5
	705	388	24	499.5
Pier 2	523	288	24	504.5
	582	320	25	504.5
	641	353	26	504.5
	705	388	27	504.5
East Abutment – W/ Down-Drag	481	131	48	527.0
	544	166	49	527.0
	604	198	50	527.0
	705	231	51	527.0
East Abutment – No Down-Drag	481	265	48	527.0
	544	299	49	527.0
	604	332	50	527.0
	705	388	51	527.0
East Abutment – Pre Core	523	287	50	527.0
	582	320	51	527.0
	641	353	52	527.0
	705	388	53	527.0

Table 4.2.5 – Estimated Pile Lengths for HP 14 x 102 Steel H-Piles

Substructure Unit	Nominal Required Bearing, R_N (kips)	Factored Resistance Available (LRFD), R_F (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
West Abutment – W/ Down-Drag	594	179	48	530.0
	654	212	49	530.0
	713	245	50	530.0
	810	277	51	530.0
West Abutment – No Down-Drag	594	327	48	530.0
	654	359	49	530.0
	713	392	50	530.0
	810	446	51	530.0
West Abutment – Pre Core	624	343	50	530.0
	684	376	51	530.0
	743	409	52	530.0
	810	446	53	530.0
Pier 1	590	324	22	499.5
	649	357	23	499.5
	709	390	24	499.5
	810	446	25	499.5
Pier 2	590	324	25	504.5
	650	357	26	504.5
	710	390	27	504.5
	810	446	28	504.5
East Abutment – W/ Down-Drag	612	201	50	527.0
	672	234	51	527.0
	731	267	52	527.0
	810	300	53	527.0
East Abutment – No Down-Drag	612	337	50	527.0
	672	369	51	527.0
	731	402	52	527.0
	810	446	53	527.0
East Abutment – Pre Core	590	324	51	527.0
	650	357	52	527.0
	709	390	53	527.0
	810	446	54	527.0

Table 4.2.6 – Estimated Pile Lengths for HP 14 x 117 Steel H-Piles

Substructure Unit	Nominal Required Bearing, R_N (kips)	Factored Resistance Available (LRFD), R_F (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
West Abutment – W/ Down-Drag	723	248	50	530.0
	783	281	51	530.0
	844	315	52	530.0
	929	348	53	530.0
West Abutment – No Down-Drag	723	397	50	530.0
	783	431	51	530.0
	844	464	52	530.0
	929	511	53	530.0
West Abutment – Pre Core	693	381	51	530.0
	753	414	52	530.0
	814	447	53	530.0
	929	511	54	530.0
Pier 1	718	395	24	499.5
	779	428	25	499.5
	839	462	26	499.5
	929	511	27	499.5
Pier 2	719	395	27	504.5
	779	429	28	504.5
	840	462	29	504.5
	929	511	30	504.5
East Abutment – W/ Down-Drag	741	271	52	527.0
	801	304	53	527.0
	862	337	54	527.0
	929	371	55	527.0
East Abutment – No Down-Drag	741	408	52	527.0
	801	441	53	527.0
	862	474	54	527.0
	929	511	55	527.0
East Abutment – Pre Core	779	429	54	527.0
	840	462	55	527.0
	900	495	56	527.0
	929	511	57	527.0

KEG recommends a test pile at the west abutment location. A test pile is performed prior to production driving so that actual, on-site field data can be gathered to further evaluate pile- driving requirements for the project. This also is the manner in which the contractor's proposed equipment methodologies identified in their Pile Installation Plan can be assessed.

4.3 Lateral Pile Response

Generally, the geotechnical engineer provides soil parameters to the structural engineer so that an L-Pile program or other approved software can be used for the lateral or displacement analysis of the foundations. Table 4.3 is included for the structural engineer's use in evaluating lateral pile response. The values were estimated based on the descriptions as listed on the boring logs. No specific hydrometer analyses were performed on the site soils.

Table 4.3 – Soil Parameters for Lateral Pile Load Analysis

Boring	Elev. at Bottom of Layer (ft.)	γ (pcf)	Short Term		Long Term		N	Assumed % fines < #200	K (pci)	ε_{50}
			Φ (deg.)	c (psf)	Φ (deg.)	c (psf)				
B-6 (West Abut.)	500.3	125	0	1500	26	250	10	65	500	0.007
	491.8	125	0	800	26	50	3	75	100	0.010
	486.8	125	0	2400	12	50	20	90	1000	0.005
	472.3	130	0	5000	0	5000	78	90	2000	0.005
B-7 (Pier 1)	497.8	125	0	1500	26	250	10	65	500	0.007
	483.8	125	0	800	26	50	5	65	500	0.007
	479.8	125	0	3000	0	3000	100	90	1000	0.005
	455.6	130	0	3500	0	3500	100	90	1000	0.005
	454.0	125	0	3000	0	3000	100	90	1000	0.005
	443.6	130	0	6400	0	6400	100	90	2000	0.004
B-8 (Pier 2)	509.7	125	0	1500	26	250	10	65	500	0.007
	501.7	125	0	1000	26	50	4	65	100	0.007
	499.2	115	33	0	33	0	7	10	20	n/a
	496.7	120	0	500	26	50	3	75	30	0.020
	493.7	115	33	0	33	0	16	35	60	n/a
	489.2	125	0	1700	0	1700	12	60	500	0.007
	483.7	125	0	1800	0	1800	13	90	500	0.007
	471.2	130	0	5250	0	5250	100	90	2000	0.005
B-9 (East Abut.)	508.1	125	0	1500	26	250	10	65	500	0.007
	500.3	125	0	1200	26	50	9	65	500	0.007
	492.8	115	33	0	33	0	5	30	20	n/a
	488.3	125	0	650	26	50	2	75	100	0.010
	482.3	125	0	1900	0	1900	17	90	500	0.007
	463.7	130	0	7000	0	7000	100	90	2000	0.004

4.4 Existing Fill Recommendations

The approach embankment to the East Abutment will be placed over existing fill that supports a commercial structure at approximate station 145+00. Placement and compaction of the existing fill is undocumented. A subsurface investigation of the existing fill was attempted but was not possible due to the nature of the fill. The owner of the commercial structure, Mr. Tom Wilson of Wilson Auto Body, stated that in the 1970's the fill was brought on-site for the commercial structure, and that it consists of large slabs of reinforced concrete pavement. He estimates the fill to be 15 to 18 ft. thick, which corresponds with the approximate 17 ft. difference in ground surface elevation between borings B-9 and B-11, located at the base and top of the fill, respectively.

Because of the unknown properties of the rubble fill, which would underlie new fill of approximately 9 ft., it is recommended that the existing fill be removed and replaced with structural fill. The approximate extents of the existing fill can be seen in Existing Fill Pad Location Map and Existing Fill Pad Photos – Exhibit H. The District Remediation Plan for the east abutment and approach embankment limits the removal and disposal of unsuitable material to the area of rubble fill (broken concrete pavement) encountered.

5.0 Construction Considerations

5.1 Construction Activities

Construction activities should be performed in accordance with the current IDOT Standard Specifications for Road and Bridge Construction and any pertinent Special Provisions or Policies.

5.2 Temporary Sheeting and Soil Retention

Temporary shoring is a possibility for the installation of the proposed Pier substructures and demolition of existing Pier 5 and Pier 6 of the truss bridge. Surcharge loading, due to the adjacent railroad tracks should be considered during the design of the shoring systems at these locations.

The average N-value for the assumed embedment depths of 25 ft., is generally 4 bpf. The *IDOT Temporary Sheet Piling Design Guide and Charts* indicate that a Cantilevered Sheet Piling System would be acceptable for retained heights up to 12 ft., near the piers.

Hard shale is generally assumed to be at approximate El. 475 ft. The charts indicate a maximum retained height of 16 ft. is available only if an embedment of 32 ft. is achieved. If the retained height exceeds 16 ft., the design charts will no longer be feasible.

In KEG's opinion, sheeting can be installed with standard vibratory methods to approximate El. 475 ft.; below these elevations, the sheeting may require a driven installation method. If the required embedment depths extend below these elevations and the contractor determines that a driven method is not feasible, a soil retention system will be required. An Illinois-licensed structural engineer is required to seal the design of the temporary soil retention system, if deemed necessary.

5.3 Site and Soil Conditions

Should any bridge or embankment design considerations assumed by either IDOT or KEG change, KEG should be contacted to determine if the recommendations stated in this report still apply.

See Section 205 – Embankment, of the *Standard Specifications of Road and Bridge Construction* for specific information on embankment construction.

5.4 Foundation Construction

Conventional pile-driving equipment and methodologies should be assumed. Protective tips should be provided for the piles.

A JULIE locate shall be conducted to determine if any underground utilities are present in the area of the proposed structure prior to construction. If utilities become a problem during construction, the appropriate owner shall be contacted immediately.

6.0 Computations

Computations and analyses for special circumstances, if any, are included as exhibits. Please refer to each section of the report for reference to the exhibit containing any such calculations or analysis used.

7.0 Geotechnical Data

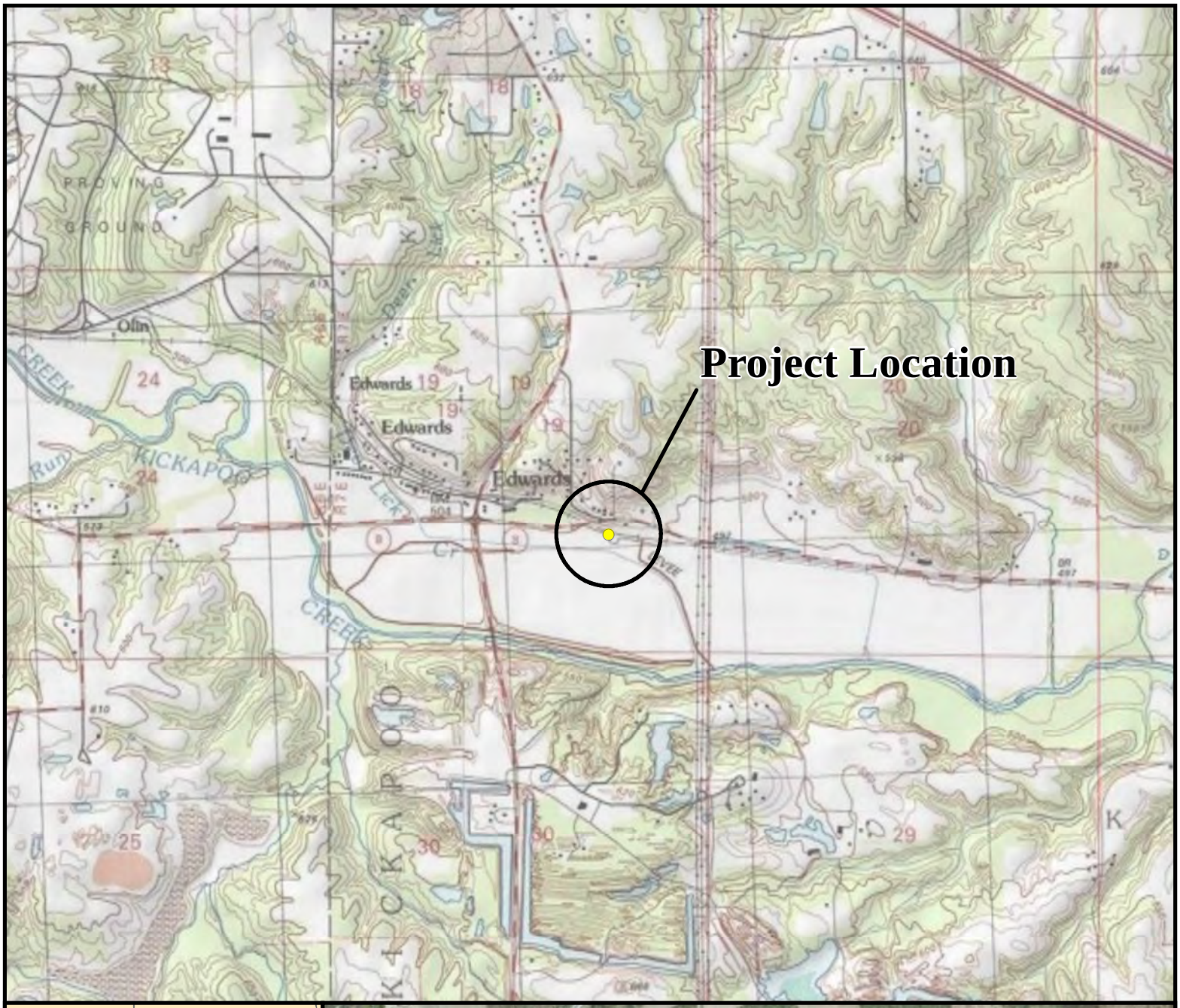
Soil borings can be found in Exhibit C. The Subsurface Profile can be found in Exhibit D.

8.0 Limitations

The recommendations provided herein are for the exclusive use of Lochmueller Group and IDOT. They are specific only to the project described and are based on the subsurface information obtained at seventeen boring locations within the structure area, KEG's understanding of the project as described herein, and geotechnical engineering practice consistent with the standard of care. No other warranty is expressed or implied. KEG should be contacted if conditions encountered during construction are not consistent with those described.

Exhibit A

USGS Topographic Location Map



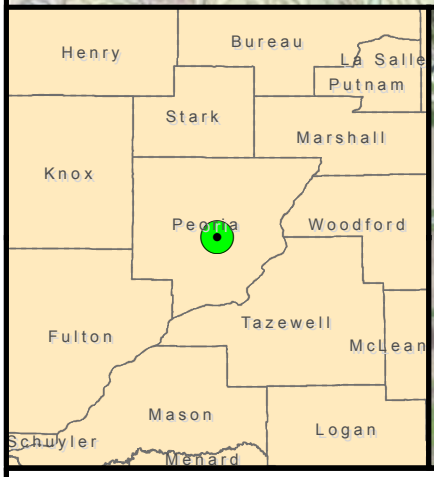


Exhibit A
Location Map
IL 8 over BNSF R.R.
Peoria County, Illinois

N

0 500 1,000
Feet

Designed By: ASC
Drawn By: ASC
Checked By: MDM
Date: 03/22/18
Project #: 09-0007.01

Kaskaskia Engineering Group, LLC

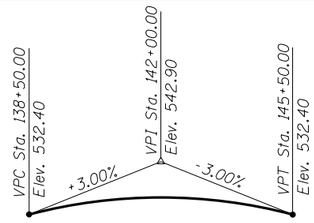
Exhibit B

Type, Size, and Location Plan (TS&L)

Benchmark: Chiseled square on the top/back of curb at N.E. corner of SN 072-0049. Elev. 535.468.

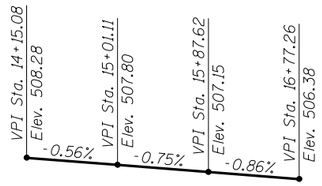
Existing Structure: SN 072-0049 was built in 1936 as SA Route 11, Section Z-1-V-B and Z-1-V-C and Reconstructed in 1981 as F.A.S. Route 384, Section (Z-IV)BR-1. The structure consists of five approach spans to the west, one mainspan truss and two approach spans to the east. The approach spans are continuous steel wide flange I-beams with a 7½ inch composite reinforced concrete slab. The main span truss is a through-truss consisting of riveted connections and a stringer floor beam system. The spans measure 47'-1½", 46', 46', 46', 46'-4½", 112'-3", 46'-4½" and 47'-1½" respectively. The out-to-out width is 34'-0" with a 29'-0" bidirectional roadway, 4'-3" sidewalk and 9" curb. The back to back of abutments length is 437'-3". The abutments are reinforced concrete spill throughs supported on spread footings. The piers consist of multi-column piers supported by concrete footings. All substructure units are supported by timber piles except for the east abutment, pier 6 and pier 7. The new structure will be on a new alignment. Existing structure to be removed after new structure is completed and open to traffic. Traffic to be maintained on the existing structure during construction.

No Salvage.

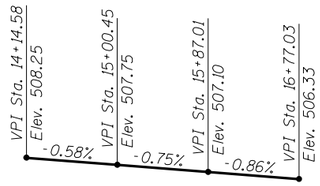


Length of V.C. = 700.00'

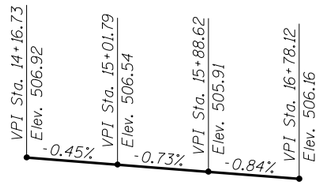
PROFILE GRADE
(Relocated F.A.S. 1388)



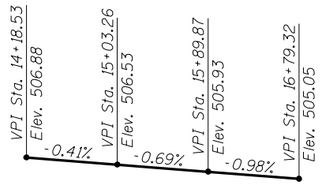
BNSF SOUTH TRACK PROFILE GRADE
(Top of rail along South rail)



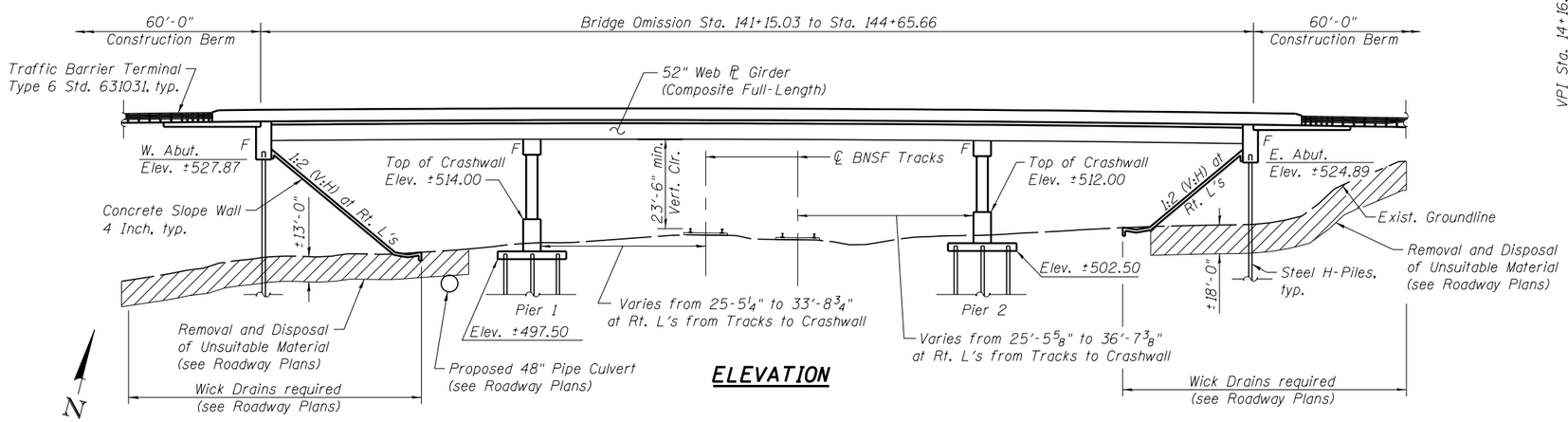
BNSF SOUTH TRACK PROFILE GRADE
(Top of rail along North rail)



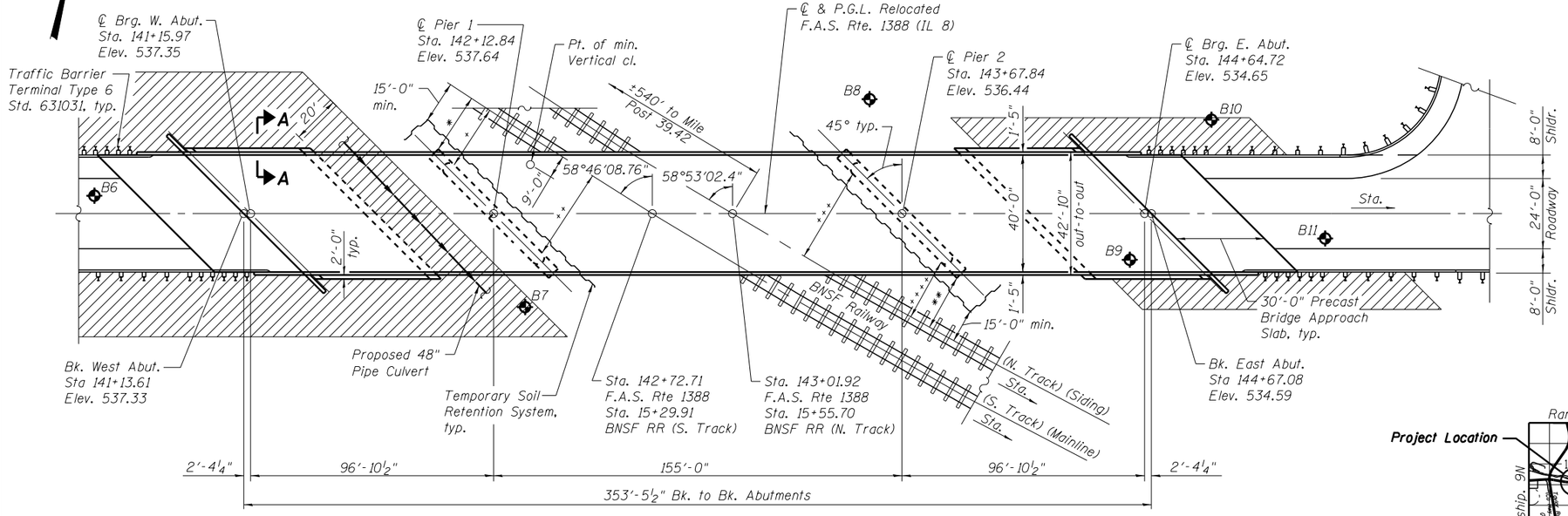
BNSF NORTH TRACK PROFILE GRADE
(Top of rail along South rail)



BNSF NORTH TRACK PROFILE GRADE
(Top of rail along North rail)



ELEVATION



PLAN

* ±23-10¼" from ℄ Tracks to Pier Cap at Rt. L's to Tracks
** ±23-4" from ℄ Tracks to Pier Cap at Rt. L's to Tracks
\+ 25'-5¼" from ℄ Tracks to face of Pier Crashwall at Rt. L's to Tracks
\++ 33'-8¾" from ℄ Tracks to face of Pier Crashwall at Rt. L's to Tracks
\+++ 36'-7⅜" from ℄ Tracks to face of Pier Crashwall at Rt. L's to Tracks
\++++ 25'-5⅝" from ℄ Tracks to face of Pier Crashwall at Rt. L's to Tracks

Notes:
See sheet 2 of 3 for Section A-A.
See sheet 3 of 3 for location of existing structure to be removed.
No freefall deck floor drains will be permitted in the span over the tracks or within 10 ft. of cross arms of a railroad pole line.

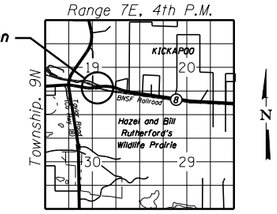
HIGHWAY CLASSIFICATION
FAS Route 1388 (IL 8)
Functional Class: Rural Major Collector
ADT: 2400 (2013); 2549 (2032)
ADTT: 96 (2013); 102 (2032)
DHV: 240
Design Speed: 45 m.p.h.
Posted Speed: 40-45 m.p.h.
Two-Way Traffic
Directional Distribution: 50:50

SEISMIC DATA
Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.110
Design Spectral Acceleration at 0.2 sec. (S_{DS}) =0.171
Soil Site Class = D

LOADING HL-93
Allow 50#/sq. ft. for future wearing surface.

DESIGN SPECIFICATIONS
2017 AASHTO LRFD Bridge Design Specifications, 8th Edition

DESIGN STRESSES
FIELD UNITS
f'c = 3,500 psi
f'c = 4,000 psi (Superstructure Concrete)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50)



LOCATION SKETCH

GENERAL PLAN
FAS 1388 (IL 8) OVER BNSF RR
SECTION (Z-1VB)BR-2
PEORIA COUNTY
STATION 142+72.71
SN 072-0248

S:\Projects\408-00240\BD - IL 8 Over BNRR\Bridges\dgn\2018-02-19_TSL_I55_Span072\20249-0368799-TSL-001.dgn

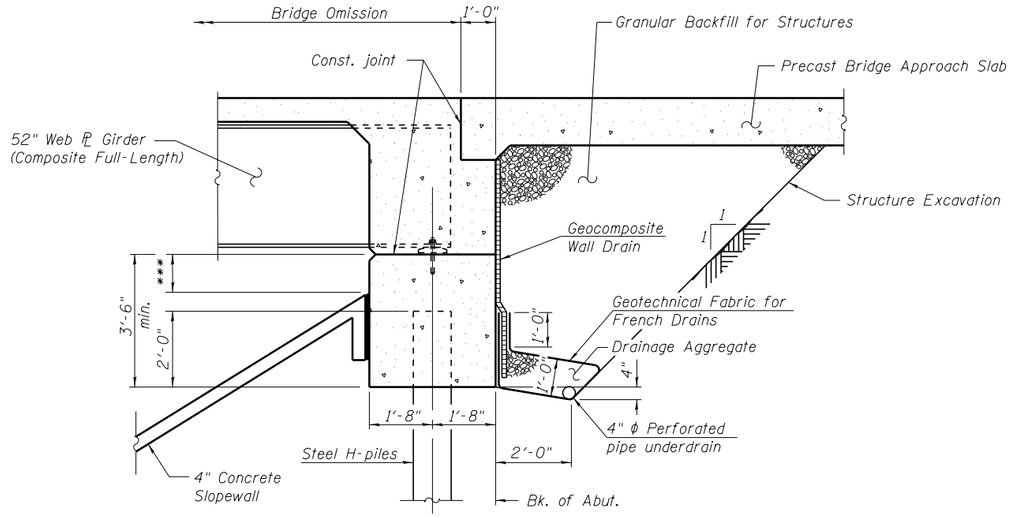
LOCHMUELLER GROUP
1928 SxA Bradley R. Smith Drive
Troy, IL 62294
PHONE: 618.667.1600

USER NAME = bselbel	DESIGNED - ACS	REVISED
Illinois Design Firm Number 184.001670	CHECKED - JRG	REVISED
PLOT SCALE =	DRAWN - WJS	REVISED
PLOT DATE = 9/5/2018 12:58:16 PM	CHECKED - ACS	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 3 SHEETS

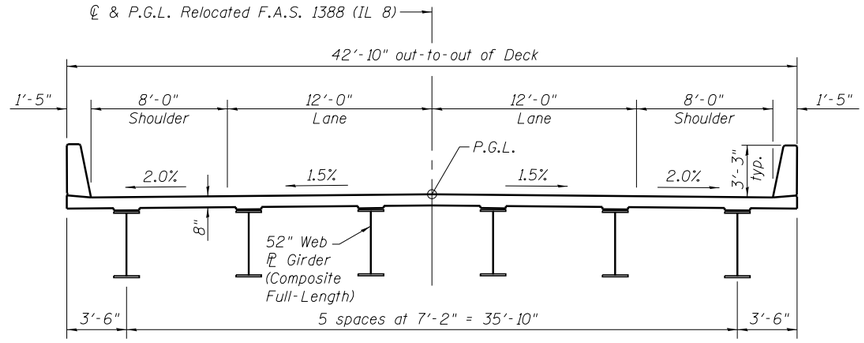
F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA	158	75
		CONTRACT NO. 68799		
	ILLINOIS FED. AID PROJECT			



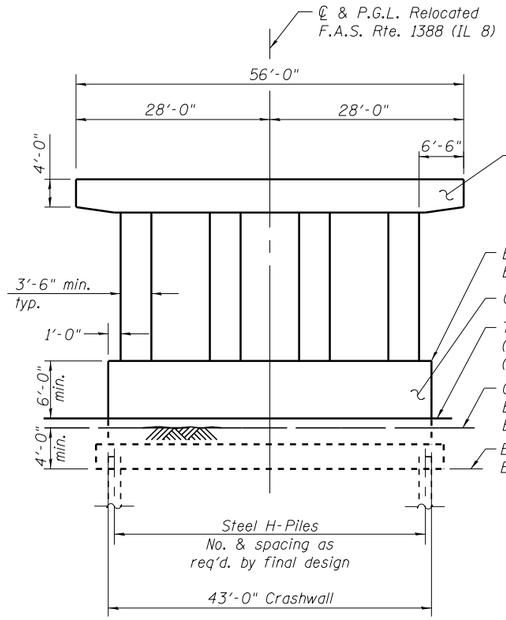
SECTION THRU INTEGRAL ABUTMENT

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

*** 1'-0" min. and 2'-0" max.



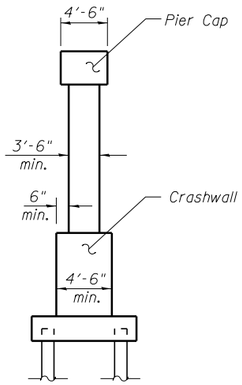
CROSS SECTION



PIER SKETCH

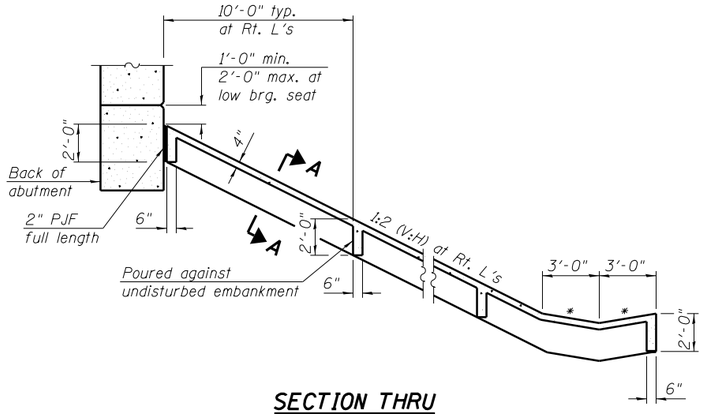
(dimensions shown along skew)

** Elevations taken at locations which are at minimum horizontal distances as shown in Elevation View. See sheet 1 of 3.



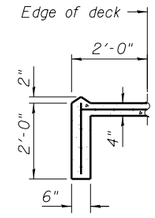
PIER SIDEVIEW

Note: General Dimensions of Pier are subject to refinement during final design.



SECTION THRU CONCRETE SLOPEWALL

* 1:6 (V:H)



SECTION A-A

DETAILS
FAS 1388 (IL 8) OVER BNSF RR
SECTION (Z-1VB)BR-2
PEORIA COUNTY
STATION 142+72.71
SN 072-0248

S:\Projects\408.0024.080 - IL 8 Over BNRR\Bridges\dgn\2018-02-19_TSL_155_Sam072024B-D368799-TSL-002.dgn

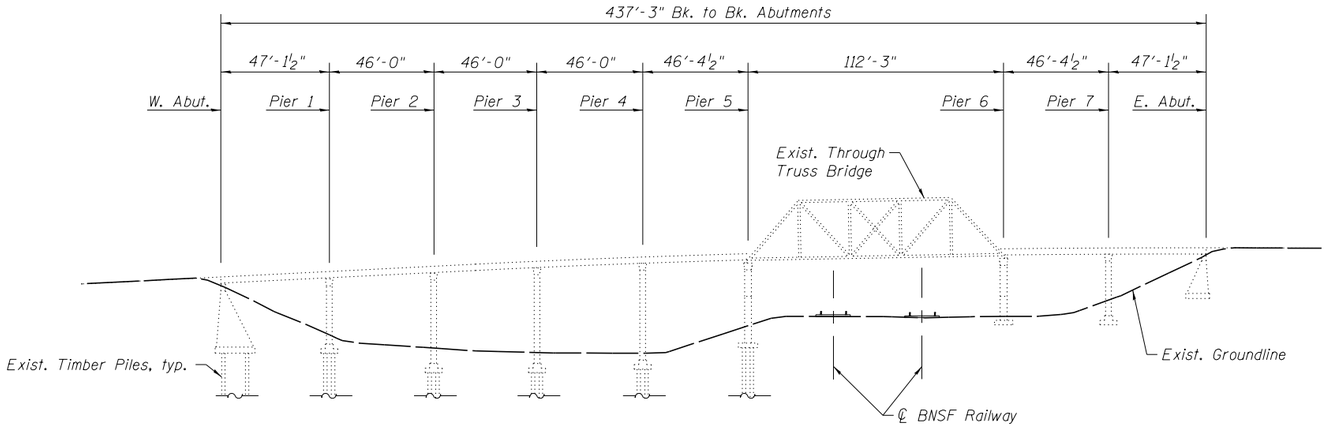
LOCHMUELLER GROUP
1928 S.A. Bradley Dr. Smith Drive
Troy, IL 62294
PHONE: 618.667.1400

USER NAME = bselbel	DESIGNED - ACS	REVISED	
Illinois Design Firm Number 184.001670	CHECKED - JRG	REVISED	
PLOT SCALE =	DRAWN - WJS	REVISED	
PLOT DATE = 9/5/2018 12:57:57 PM	CHECKED - ACS	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

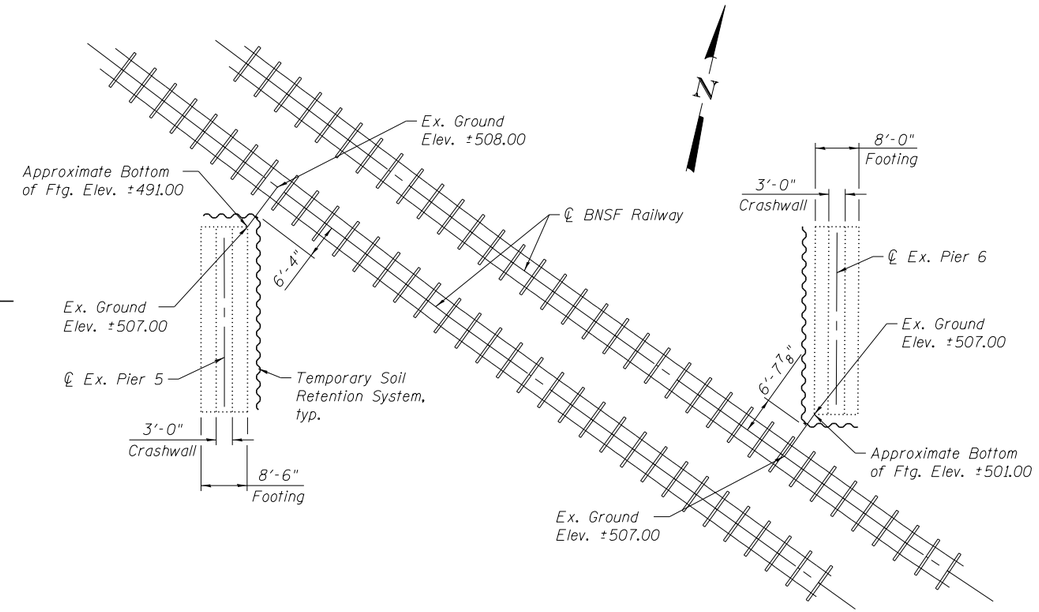
SHEET NO. 2 OF 3 SHEETS

F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA	158	76
		CONTRACT NO. 68799		
	ILLINOIS FED. AID PROJECT			

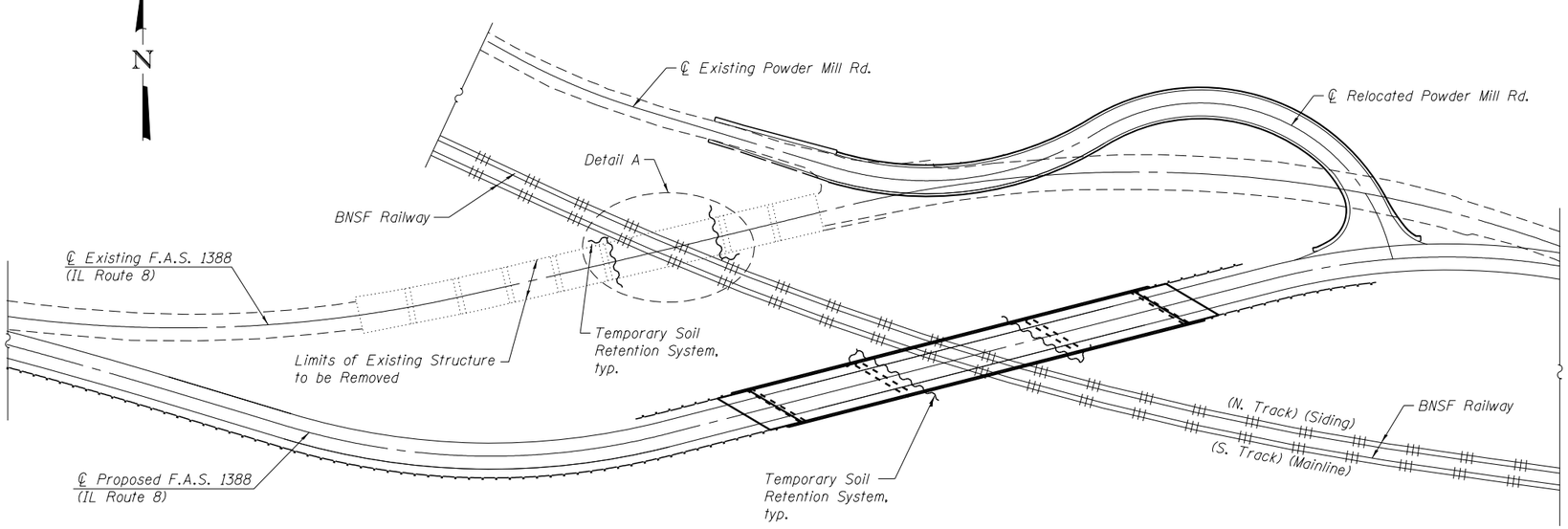


EXISTING BRIDGE ELEVATION

(Looking Northwest)



DETAIL A



LOCATION SKETCH

(showing temporary shoring)

Notes:

Existing Piers 5 & 6 shall be removed to at least 3 feet below the top of rail. The remaining existing structure shall be removed to at least one foot below the proposed ground surface, according to Article 501.04 of the Standard Specifications.

Limits and Schedule of Removal of the existing through truss bridge and piers adjacent to the BNSF Railway shall be coordinated with the Railway.

DETAILS
FAS 1388 (IL 8) OVER BNSF RR
SECTION (Z-1VB)BR-2
PEORIA COUNTY
STATION 142+72.71
SN 072-0248

LOCHMUELLER GROUP
1928 So A Bradley Pl, Smith Drive
Troy, IL 62294
PHONE: 618.667.1400

USER NAME = bselbel	DESIGNED - ACS	REVISED
Illinois Design Firm Number 184.001670	CHECKED - JRG	REVISED
PLOT SCALE =	DRAWN - WJS	REVISED
PLOT DATE = 9/5/2018 12:57:34 PM	CHECKED - ACS	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 3 OF 3 SHEETS

F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA	158	77
		CONTRACT NO. 68799		
	ILLINOIS	FED. AID PROJECT		

S:\Projects\408-0024\OBD - IL 8 Over BNRR\Bridges\dgn\2018-02-19_TSL_155_Sam072024810368799-TSL-003.dgn

Exhibit C

Boring Logs

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/17/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-1
Station 129+23.91
Offset 31.40ft RT
Ground Surface Elev. 497.4 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 486.4 ft ▼
Upon Completion 495.4 ft ▽
After Hrs. - ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
TOPSOIL				
SILTY CLAY LOAM: Gray, moist, soft		WOH		
	▽	WOH 3	0.8 B	27
Becomes medium stiff, trace fine sand		3		
		4 4	3.3 P	29
	-5			
Becomes soft, trace organics		1		
		2 1	0.3 B	37
18/24" Recovery				
			<0.3 P	
	-10			
486.93				
SILTY CLAY LOAM: Gray, wet, very soft, with fine sand	▼	WOH		
		WOH WOH		29
484.43				
SAND: Gray, fine to medium, wet, very loose		WOH		
		1 1		
	-15			
Becomes brown and gray, fine to coarse, loose, trace fine gravel		WOH		
		3 4		
		3		
		3 3		
End of Boring 477.43	-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)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/13/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA/Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-2
Station 131+04.75
Offset 33.20ft RT
Ground Surface Elev. 497.5 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 491.5 ft ▼
Upon Completion 494.0 ft ▽
After Hrs. - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL
	1			SILTY CLAY LOAM: Brown, moist, soft
	2	1.0	28	
	2	B		
494.50				
				CLAY LOAM: Brown and gray, moist, soft, with organics, trace fine sand ▽
	1			
	1	0.5	27	
-5	2	P		
491.50 ▼				
	WOH			SILTY LOAM: Gray, wet, very soft
	WOH	0.1	38	
	WOH	B		
487.50 -10				
				Switched to Mud Rotary at 10 feet.
	WOH			SILTY CLAY LOAM: Gray, wet, very soft, trace organics and fine sand
	WOH	<0.3	40	
	WOH	P		
	WOH			
	WOH	<0.3	34	
-15	WOH	P		
482.00				
	WOH			SANDY LOAM: Gray, wet, very loose, sand is fine to medium
	2		26	
	1			
479.00				
	WOH			SAND: Brown and gray, fine to coarse, medium dense, trace fine gravel
	2		25	
-20	12			

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SAND: Brown and gray, fine to coarse, medium dense, trace fine gravel *(continued)*
	3			
	11		11	Becomes brown, with fine to coarse gravel
	16			
	13			
	23		28	Becomes gray and brown, fine to medium, very dense, no gravel
-25	29			
472.00				
	11			CLAYEY SHALE: Dark gray, wet, hard
	50/5"	>4.5	13	
		P		
	40			
	50/4"	>4.5	15	
-30		P		
	50/5"	>4.5	14	
		P		
-35				
	38			
	50/5"	>4.5	17	
		P		
End of Boring 459.00				
-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

SOIL BORING LOG

Date 6/13/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA/Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-3
Station 134+30.32
Offset 9.50ft RT
Ground Surface Elev. 496.3 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 490.8 ft ▼
Upon Completion - ft
After Hrs. - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL
	WOH			SILTY CLAY LOAM: Gray and brown, moist, very soft
	WOH	0.6	32	
	2	B		
	WOH			Becomes soft
	1	0.4	34	
-5	2	B		
				▼ Recovery = 22/24"
		<0.3		
		P		
488.30				
	WOH			Switched to Mud Auger at 8 feet.
				SANDY LOAM: Gray, wet, very loose, sand is fine to medium
	1		30	
-10	1			
	WOH			Becomes brown
	WOH		26	
	1			
482.80				
	1			SAND: Brown and gray, fine to coarse, loose, with fine to coarse gravel
	2		20	
-15	3			
	1			Becomes very loose, trace organics
	1		16	
	1			
	3			Becomes loose, no organics
	3		15	
476.30	3			
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	2			Becomes medium dense, trace organics
	5		19	
	10			
	2			Becomes fine to medium, no gravel and organics
	4		21	
-25	11			
470.80				
	12			CLAYEY SHALE: Gray, wet, hard
	21	>4.5	14	
	50/3"	P		
	42			
	50/2"	>4.5	13	
-30		P		
				Switched to Mud Rotary at 30 feet.
	50/5"	>4.5	15	
		P		
-35				
	50/5"		15	End of Boring 458.30
-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

SOIL BORING LOG

Date 6/12/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA/Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-4
Station 137+33.33
Offset 25.60ft LT
Ground Surface Elev. 494.8 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 486.3 ft
Upon Completion 494.8 ft
After Hrs. - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL
	1			SILTY CLAY: Brown, moist, soft
	1	1.2	35	
	3	B		
491.33				
	1			SILTY CLAY LOAM: Brown, moist, very soft
	1	0.5	35	
-5	1	B		
				Unconsolidated-Undrained Strength test preformed
		<0.3		One Dimensional Consolidation test preformed
486.83		P		
	WOH			SAND: Brown and gray, fine to medium, moist, very loose
	WOH		21	Becomes wet, very loose
-10	WOH			
				Switched to Mud Auger at 10 feet.
	WOH			Becomes brown
	WOH		23	
	1			
	1			
	WOH		15	
-15	2			
				Switched to Mud Rotary at 15 feet.
	WOH			
477.83	1	2.7	24	
	4	B		SHALEY CLAY: Gray, wet, medium stiff
	4			Becomes very stiff
	9	2.8	21	
474.83 -20	18	B		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				CLAYEY SHALE: Dark gray, wet, hard
	50/3"	>4.5	13	
		P		
	41			
	50/3"		15	
469.83 -25				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)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/11/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-5
Station 140+12.25
Offset 0.20ft RT
Ground Surface Elev. 494.9 ft

Surface Water Elev. 494.9 ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 494.9 ft
Upon Completion 494.9 ft
After Hrs. - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL
	1			SILTY CLAY: Brown, wet, soft
	1 2	0.8 P	35	
				Recovery = 16/24"
		0.3 P		
-5				
488.85				
	WOH			SILTY CLAY LOAM: Gray, wet, very soft, trace organics
	WOH WOH	0.2 B	47	
486.85				
	WOH			SILTY LOAM: Gray, wet, very soft, trace organics
	WOH WOH	<0.3 P	36	
-10				
483.85				
		<0.3 P		CLAY LOAM: Brown Recovery = 21/24" Unconsolidated-Undrained Strength test preformed One Dimensional Consolidation test preformed
481.85	1			
	2 2		23	SAND: Gray, fine to medium, wet, very loose
-15				
				Switched to Mud Rotary at 15 feet. Becomes fine to coarse
	WOH			
	WOH 1		24	
475.85	9			
	16 22	3.7 S	17	CLAYEY SHALE: Gray, wet, moderately soft
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				CLAYEY SHALE: Gray, wet, moderately soft *(continued)*
	12			
	14	5.9	15	
472.35	50/5"	S		
	50/4"			Borehole continued with rock coring
-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

ROCK CORE LOG

Date 6/11/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **CORING METHOD** Split Barrel

STRUCT. NO. 072-0248
Station

BORING NO. B-5
Station 140+12.25
Offset 0.20ft RT
Ground Surface Elev. 494.9 **ft**

CORING BARREL TYPE & SIZE NX
Core Diameter in
Top of Rock Elev. 472.35 **ft**
Begin Core Elev. 472.35 **ft**

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
SHALE: Gray, wet, moderately soft	472.35	1	100	84	3.1	
	-25	2	99	99	3.2	37.6
2" Cherty shale						
1" Siltstone, gray-brown, 1" verticle fracture						
	-30	3	100	100	3.4	
Becomes dark gray, wet, moderately soft, calcareous						
End of Boring	462.35					
	-35					
	-40					

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

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/12/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-5A
Station 139+97.26
Offset 0.70ft LT
Ground Surface Elev. 494.9 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 491.9 ft
Upon Completion 494.9 ft
After Hrs. - ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
TOPSOIL, Grass 493.85				
Recovery = 22/24"			<0.3 P	
CLAY: Gray				
Recovery = 17/24" Unconsolidated-Undrained Strength test preformed One Dimensional Consolidation test preformed	-5		<0.3 P	
Recovery = 16/24"			<0.3 P	
Recovery = 18/24"			<0.3 P	
No recovery	-10			
Recovery = 24/24"			<0.3 P	
End of Boring 481.85				
	-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)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/11/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-6
Station 140+89.25
Offset 4.00ft LT
Ground Surface Elev. 500.3 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 489.3 ft
Upon Completion 497.3 ft
After Hrs. 497.3 ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL
	1			SILTY CLAY LOAM: Gray, moist, soft, trace organics
	2	0.2	32	
	2	B		
496.84				
	1			LOAM: Brown, moist, very soft, sand is fine
	1	<0.3	21	
-5	1	P		
494.34				
	WOH			CLAY: Gray and brown, soft, trace fine sand and organics
	1	0.4	25	
	2	B		
491.84				
	3			SHALEY CLAY: Brown, moist, stiff
	6	1.8	16	
-10	9	S		
	10			Becomes gray, wet, very stiff
	11	>4.5	15	
	13	P		
486.84				
	7			CLAYEY SHALE: Gray, wet, hard
	13	>4.5	15	
-15	17	P		
	16			Becomes moist
	21	>4.5	15	
	23	P		
	20			
	35	>4.5	12	
480.34 -20	46	P		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	18			
	36		11	
	57			
	23			Becomes wet
	77/4"		16	
-25				
	80		12	
	50/3"		14	
472.34				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)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/17/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-7
Station 142+26.12
Offset 36.10ft RT
Ground Surface Elev. 497.8 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 484.8 ft
Upon Completion 494.3 ft
After Hrs. - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL
	1			SILTY LOAM: Dark brown, moist, soft, trace fine sand and organics
	2	0.7	32	
	2	B		
494.80				
				CLAY: Dark brown, moist, medium stiff, trace fine to medium sand
	1			
	3	1.4	19	
-5	4	B		
491.80				
	2			SILTY CLAY LOAM: Brown, moist, medium stiff
	2	0.8	27	
	3	B		
489.80				
	1			LOAM: Brown, moist, medium stiff, sand is fine
	2	0.5	27	
-10	3	B		
486.80				
	1			SANDY CLAY LOAM: Brown, moist, loose, sand is fine to coarse
	2		18	
	4			
				▼
483.80	3			
	11	>4.5	19	CLAYEY SHALE: Gray, wet, hard
-15	23	P		
	6			
	57	>4.5	13	
	43/4"	P		
	50/5"	>4.5	16	
		P		
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				CLAYEY SHALE: Gray, wet, hard *(continued)*
	48			
	52/3"	>4.5	13	
		P		
	45			
	55/2"	>4.5	15	
-25		P		
	13			Becomes wet, stiff
	13	3.5	14	
	10	P		
	40			Becomes hard
	60/1"	>4.5	13	
-30		P		
			13	
	50/5"	>4.5		
		P		
	32			
	50/5"		10	
-35				
	36			
	50/3"		12	
-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

SOIL BORING LOG

Date 6/17/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-7
Station 142+26.12
Offset 36.10ft RT
Ground Surface Elev. 497.8 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 484.8 ft
Upon Completion 494.3 ft
After Hrs. - ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
CLAYEY SHALE: Gray, wet, hard *(continued)*				
Becomes wet, hard, some chert	455.60	50/2"		10
Borehole continued with rock coring				
	-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)

Illinois Department of Transportation
Division of Highways

ROCK CORE LOG

Date 6/17/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **CORING METHOD** Split Barrel

STRUCT. NO. 072-0248
Station

BORING NO. B-7
Station 142+26.12
Offset 36.10ft RT
Ground Surface Elev. 497.8 **ft**

CORING BARREL TYPE & SIZE NX
Core Diameter in
Top of Rock Elev. 455.60 **ft**
Begin Core Elev. 455.60 **ft**

		DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
CLAYEY SHALE: Gray, wet, moderately soft	455.60		1	75	0	3	
	453.97						
SHALE: Gray, wet, moderately soft		-45	2	100	62	2.8	
2" Limestone		-50	3	100	72	2.6	6.4
2" Limestone							
End of Boring	443.60						
		-55					
		-60					

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

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/4/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-8
Station 143+52.08
Offset 43.90ft LT
Ground Surface Elev. 509.7 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 501.7 ft ▼
Upon Completion - ft
After Hrs. - ft

Material Description	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
TOPSOIL				
CLAY LOAM: Brown, moist, medium stiff, trace organics, trace fine to medium sand		2		
		3	2.3	13
		2	P	
Becomes dark brown, soft, trace fine gravel		2		
		2	0.2	15
	-5	2	B	
Becomes gray		1		
		2	0.5	30
		1	B	
501.71 ▼				
SAND: Gray, fine, wet, loose				24
	-10			
499.21				
SILTY LOAM: Gray, wet, soft, trace gray hard shale		1		
		1	0.5	26
		2	B	
496.71				
SANDY LOAM: Brown and gray, wet, medium dense, sand is fine to coarse, trace fine gravel		5		
		8		17
	-15	8		
493.71				
LOAM: Gray, wet, medium dense, sand is fine to coarse		7		
		9		14
		8		
491.71				
CLAY LOAM: Gray, wet, meidum stiff, some organics, sand is fine to coarse		4		
		4	1.3	15
	-20	3	P	
489.21				
CLAYEY SHALE: Gray, wet, stiff, with organics		1		
		4	2.2	24
		6	B	
Becomes very stiff		2		
		5	4..0	25
	-25	11	P	
Becomes dark gray, moist, hard		15		
		40		11
		60/5"		
Becomes wet		19		
		38	>4.5	11
	-30	64	P	
		100/5"	>4.5	16
			P	
	-35			
		38		
		62/3"		14
End of Boring 471.21	-40			

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

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/5/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-9
Station 144+36.45
Offset 19.1 ft RT
Ground Surface Elev. 508.30 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 497.3 ft ▼
Upon Completion - ft
After 16 **Hrs.** 501.8 ft ▽

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
508.1				2" ASPHALTIC CONCRETE
	7			LOAM: Brown, moist, stiff, sand is fine
	10	1.5	8	
	5	P		
504.8				
	1			CLAY: Brown, medium stiff, trace fine sand
	3	1.1	15	
-5	3	B		
	1			
▽				
	2	1.0	18	
	3	B		
500.3				
	2			SAND: Brown, fine to coarse, moist, loose
	5		16	
	2			
-10				
497.3 ▼				
	2			SANDY LOAM: Gray, wet, loose, sand is medium to coarse
	3		20	
	2			
	1			Becomes very loose
	WOH		20	
-15	2			
492.8				
	WOH			CLAY: Gray, moist, very soft, trace organics and fine to medium sand
	WOH	0.3	21	
	2	B		
				Recovery = 21/24"
		1.0		
488.3 -20		P		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				SHALEY CLAY: Brown and gray, moist, stiff
	5			
	7	5.6	20	
	8	B		
	4			Becomes brown, gray and green very stiff
	8	3.8	21	
-25	11	B		
				Becomes dark gray, wet, hard
482.3				
	12			CLAYEY SHALE: Dark gray, moist, hard
	32		19	
	55			
	20			
	29	>4.5	11	
	50/5"	P		
-30				
474.8				
474.5	50/3"		8	SHALE: Gray
				Borehole continued with rock coring.
-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

ROCK CORE LOG

Date 6/5/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **CORING METHOD** Split Barrel

STRUCT. NO. 072-0248
Station

BORING NO. B-9
Station 144+36.45
Offset 19.10ft RT
Ground Surface Elev. 508.3 ft

CORING BARREL TYPE & SIZE NX
Core Diameter in
Top of Rock Elev. 474.50 ft
Begin Core Elev. 474.50 ft

	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
SHALE: Gray, moderately hard	474.50	1	89	72		
	-35	2	97	91	3.4	
Becomes calcareous	-40	3	100	100	2	186.3
End of Boring	463.70					
	-45					
	-50					

Color pictures of the cores Yes
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

SOIL BORING LOG

Date 6/6/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-10
Station 144+85.25
Offset 36.00ft LT
Ground Surface Elev. 525.2 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 502.2 ft ▼
Upon Completion - ft
After Hrs. - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL
	3			SANDY CLAY LOAM: Brown, moist, loose, sand is fine to medium (Fill)
	4		14	
	3			
	2			
	2		14	
-5	2			
519.67				
	2			SILTY LOAM: Light brown, moist, medium stiff (Fill)
	3	1.0	20	
	5	B		
517.17				
	4			SANDY LOAM: Light brown, moist, loose, sand is fine
	4		17	
-10	4			
514.17				
	4			SAND: Brown, fine, moist, loose
	3		8	
	3			
	3			Becomes medium dense
	5		20	
-15	7			
	4			Becomes gray, loose, gasoline odor
	5		4	
	5			
	2			Becomes fine to medium
	3		6	
505.17	3			
-20				

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
	2			Becomes black, very strong gasoline odor
	2		25	
	3			
502.17 ▼				
	1			SILTY LOAM: Gray, wet, soft
	1	0.3	31	
-25	2	P		
	2			Becomes medium stiff
	2	1.1	27	
	3	B		
496.67				
	WOH			SHALEY CLAY: Gray, wet, soft, trace coarse sand, with fine to coarse gravel
	3	0.8	17	
-30	4	B		
				Switched to Mud Rotary at 30 feet.
491.67				
	2			SILTY CLAY: Gray, wet, medium stiff, trace fine sand
	2	0.6	22	
-35	2	B		
	3			
	2	0.5	24	
-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)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/6/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-10
Station 144+85.25
Offset 36.00ft LT
Ground Surface Elev. 525.2 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 502.2 ft ▼
Upon Completion - ft
After Hrs. - ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SILTY CLAY: Gray, wet, medium stiff, trace fine sand *(continued)*				
483.17				
SHALEY CLAY: Gray, wet, hard		10		
		21		17
	-45	31		
479.17				
CLAYEY SHALE: Dark gray, wet, hard		100		15
	-50			
		100/5"		19
	-55			
		50/1"		20
End of Boring 465.17	-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

SOIL BORING LOG

Date 6/6/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-11
Station 145+02.25
Offset 11.90ft RT
Ground Surface Elev. 524.9 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 (%)
TOPSOIL				
CLAY: Brown, moist, soft, trace fine sand (Fill)		1		
		1 2	0.5 P	13
521.41				
LOAM: Brown, moist, very loose, sand is fine to medium (Fill)		1		
		1 1		17
	-5			
518.91				
Concrete fragments, loose (Fill)		3		
		4 3		8
		17		
		16 8		10
End of Boring 514.91	-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)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/7/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-12
Station 145+62.25
Offset 30.00ft RT
Ground Surface Elev. 525.2 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 (%)
TOPSOIL				
SAND: Brown and gray, fine to medium, moist, loose, trace organics, (Fill)		4		
		3		16
		3		
Concrete fragments				
Becomes fine to coarse, trace fine gravel and clay		2		
		3		14
End of Boring 520.22	-5	6		
	-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)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/3/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA/Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-13
Station 145+92.84
Offset 29.90ft LT
Ground Surface Elev. 522.8 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 506.8 ft ▼
Upon Completion - ft
After Hrs. - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL
	3			SAND: Brown, fine to medium, moist, loose (Fill)
	4 5		7	
	3			
	3 3		15	
-5				
	2			
	2 3		6	
	3			
	2 3		4	
-10				
	3			
	4 5		5	
	2			
	3 3		5	
-15				
▼	2			
	3 3		21	
504.27				
	2			LOAM: Gray, wet, medium dense, sand is fine
	3 3	0.3 P	27	
502.77 -20				
				SILTY LOAM: Gray, wet, soft
	WOH			
	1 2	0.3 B	29	
499.77				
	1			SILTY CLAY LOAM: Gray, wet, medium stiff
	2 3	0.9 B	28	
-25				
	WOH			Becomes moist, soft
	2 2	0.6 B	28	
494.27				
	2			SILTY CLAY: Gray, moist, medium stiff
	3 4	1.3 B	28	
-30				
				Switched to Mud Rotary at 13 feet.
489.27				
	3			CLAY: Gray, wet, stiff, trace fine to medium sand
	4 7	2.0 B	25	
-35				
	3			Trace coal
	5 8	3.0 B	18	
482.77 -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

SOIL BORING LOG

Date 6/3/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA/Mud Rotary **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-13
Station 145+92.84
Offset 29.90ft LT
Ground Surface Elev. 522.8 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 506.8 ft ▼
Upon Completion - ft
After Hrs. - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
SHALEY CLAY: Gray, brown, green, wet, stiff			
	4		
	5	2.6	22
-45	9	B	
475.27			
CLAYEY SHALE: Dark gray, wet, hard			
	65		
	35/2"	1.8 S	15
-50			
	100/5"		13
-55			
	70		
	30/1"	3.4 B	12
End of Boring 462.77			
-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

SOIL BORING LOG

Date 6/5/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-14
Station 149+15.27
Offset 36.50ft RT
Ground Surface Elev. 503.5 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 492.5 ft ▼
Upon Completion - ft
After Hrs. - ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				TOPSOIL
	WOH			SILTY LOAM: Brown, moist, very soft, trace fine sand
	WOH	0.4	19	
	WOH	B		
500.04				
	1			CLAY: Brown, moist, medium stiff
	3	0.8	18	
-5	3	B		
497.54				
	WOH			SILTY CLAY LOAM: Brown, moist, very soft
	WOH	0.3	26	
	WOH	B		
				Recovery = 24/24"
		<0.3		
-10		P		
492.54 ▼				
	1			Switched to Mud Rotary at 11 feet.
	1		24	LOAM: Brown, wet, very loose, sand is fine
	1			
490.04				
	1			SANDY LOAM: Brown, wet, very loose, sand is fine to medium
	2		22	
-15	2			
488.04				
	WOH			SAND: Brown, fine to medium, wet, very loose
	1		25	
	1			
485.54				
	WOH			SILTY CLAY LOAM: Brown, wet, soft, trace fine sand
	1	1.0	25	Unconsolidated-Undrained Strength test preformed
483.54 -20	2	P		

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	Description
				One Dimensional Consolidation test preformed
	1			
	3	1.7	24	SILTY CLAY: Gray, wet, medium stiff
	4	B		
481.04				End of Boring
-25				
-30				
-35				
-40				

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

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/5/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-15
Station 152+19.51
Offset 50.70ft RT
Ground Surface Elev. 499.3 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter 488.3 ft ▼
Upon Completion - ft
After Hrs. - ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
TOPSOIL				
SILTY LOAM: Dark brown, moist, medium stiff, trace roots		2		
		3 3	1.4 B	24
495.81				
SILTY CLAY LOAM: Brown, moist, soft		2		
		2 2	0.4 B	32
	-5			
Recovery = 20/24"				
			0.3 P	
490.81				
LOAM: Brown, moist, soft, sand is fine		1		
		1 2	0.3 B	25
	-10			
488.31 ▼				
Switched to Mud Rotary at 11 feet.		1		
SAND: Brown, fine to medium, wet, very loose		WOH 1		
Becomes fine to coarse		WOH		
		WOH WOH		
	-15			
Becomes fine to coarse, wet, loose		1		
		2 4		
Becomes medium to coarse, trace fine gravel		5		
		3 5		
End of Boring 479.31	-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)

Illinois Department of Transportation
Division of Highways

SOIL BORING LOG

Date 6/5/13

ROUTE Illinois Route 8 (F.A.S. 1388) **DESCRIPTION** IL 8 over BNSF Railroad **LOGGED BY** KEG

SECTION (Z-1VB)BR-2 **LOCATION** Peoria, Illinois

COUNTY Peoria **DRILLING METHOD** HSA **HAMMER TYPE** Automatic

STRUCT. NO. 072-0248
Station

BORING NO. B-16
Station 155+67.94
Offset 40.90ft RT
Ground Surface Elev. 498.7 ft

Surface Water Elev. ft
Stream Bed Elev. ft

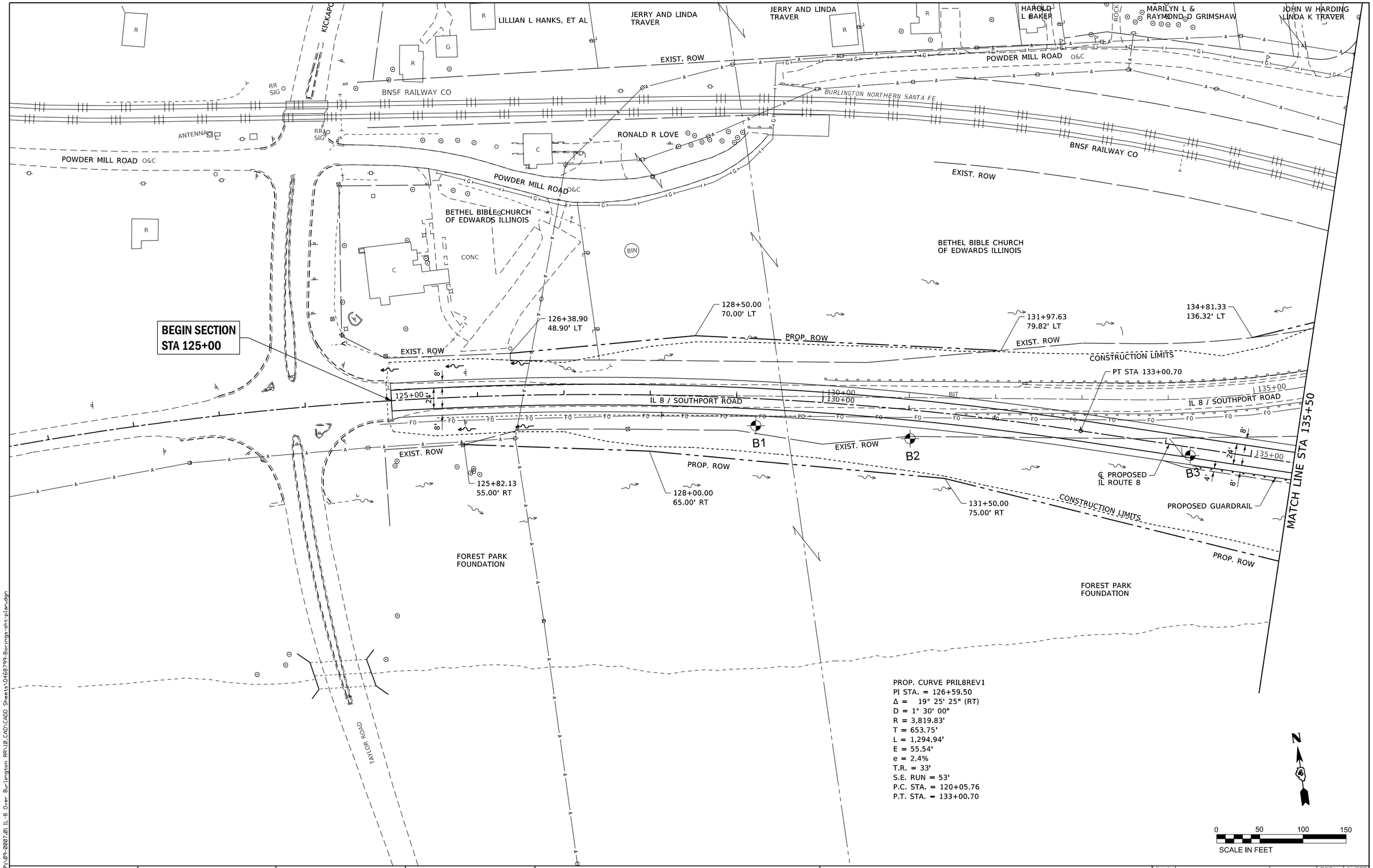
Groundwater Elev.:
First Encounter - ft
Upon Completion - ft
After Hrs. - ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
TOPSOIL 497.67				
SAND: Brown, fine to medium, moist, loose, trace fine gravel		2		
		2 3		14
495.67				
SILTY CLAY: Black, moist, soft, some organics		1		
		1 2	1.0 P	32
	-5			
493.17				
SILTY CLAY LOAM: Brown, moist, very soft, trace fine sand		WOH		
		1 1	<0.3 P	24
		WOH		
		1 1	<0.3 P	24
	-10			
487.67				
SILTY CLAY: Brown, moist, very soft		WOH		
		WOH WOH	<0.3 P	28
End of Boring 486.17				
	-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)

Exhibit D

Boring Plan and Soil Profile



FILE NAME: P:\09-2007.01 IL-8 Over Burlington RR\10.CAD\CADD Sheets\D468799-Borings-sht-plan.dgn

Kaskaskia Engineering Group, LLC
PROFESSIONAL ENGINEERING CORPORATION
Illinois Professional Design Firm
Professional Engineering Group
LICENSE NO. 184.004773
30-2005266

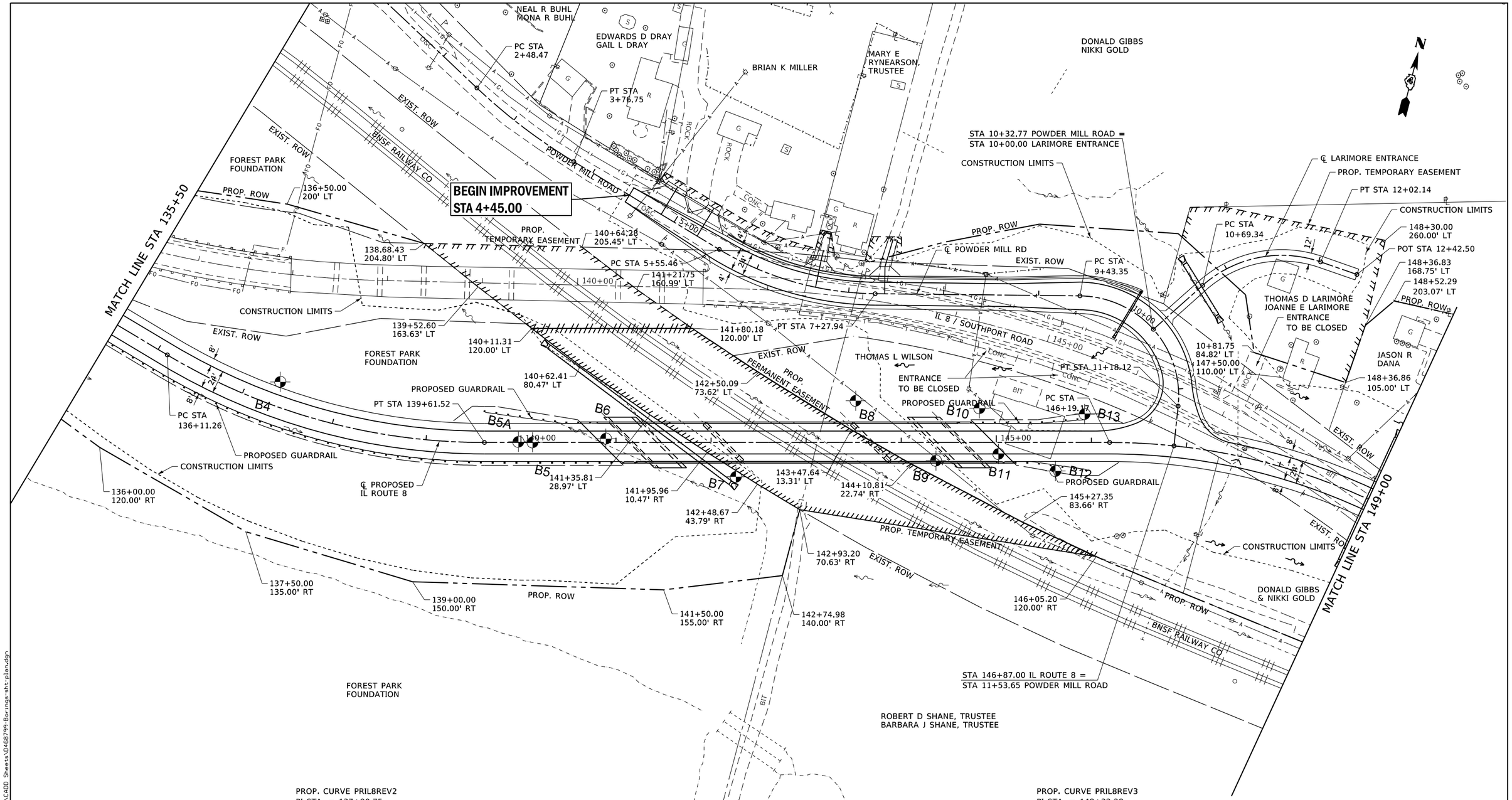
USER NAME = bbb	DESIGNED - CRG	REVISED -	
MODEL NAME = 01 Plan	DRAWN - BB	REVISED -	
PLOT SCALE = 100.0000 ' / In.	CHECKED - MDM	REVISED -	
PLOT DATE = 3/22/2018	DATE - MARCH 2018	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORING PLAN AND SOIL PROFILE
IL ROUTE 8

SCALE: 1"=50' | SHEET 1 OF SHEETS | STA 121+50 TO STA 135+50

F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA		0
		CONTRACT NO. 68799		
	ILLINOIS	FED. AID PROJECT		



PROP. CURVE PRIL8REV2
PI STA. = 137+90.75
Δ = 30° 52' 26" (LT)
D = 8° 48' 53"
R = 650.00'
T = 179.49'
L = 350.25'
E = 24.33'
e = 6.0%
T.R. = 33'
S.E. RUN = 133'
P.C. STA. = 136+11.26
P.T. STA. = 139+61.52

PROP. CURVE PRIL8REV3
PI STA. = 148+32.28
Δ = 36° 18' 13" (RT)
D = 8° 48' 53"
R = 650.00'
T = 213.10'
L = 411.85'
E = 34.04'
e = 6.0%
T.R. = 33'
S.E. RUN = 133'
P.C. STA. = 146+19.17
P.T. STA. = 150+31.02

FILE NAME: P:\03-2007.20 IL-8 Over Burlington RR\10.CADCADD Sheets\0468799-Borings-sht-plan.dgn

Kaskaskia Engineering Group, LLC
PROFESSIONAL REGISTRATIONS: Illinois Professional Design Firm 184.004773; Professional Engineering Survey 35-2005266

USER NAME = bbb	DESIGNED - CRG	REVISED -	
MODEL NAME = 02 Plan	DRAWN - BB	REVISED -	
PLOT SCALE = 100.0000 ' / In.	CHECKED - MDM	REVISED -	
PLOT DATE = 3/22/2018	DATE - MARCH 2018	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORING PLAN AND SOIL PROFILE
IL ROUTE 8

SCALE: 1"=50' | SHEET 2 OF SHEETS | STA 135+50 TO STA 149+00

F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA		0
		CONTRACT NO. 68799		
	ILLINOIS	FED. AID PROJECT		

PROP. CURVE PRIL8REV4
PI STA. = 155+72.74
Δ = 14° 02' 06" (LT)
D = 1° 53' 05"
R = 3,040.00'
T = 374.21'
L = 744.67'
E = 22.95'
e = 3.8%
T.R. = 38'
S.E. RUN = 97'
P.C. STA. = 151+98.53
P.T. STA. = 159+43.20

149+52.52
232.49' LT

DEPARTMENT OF NATURAL RESOURCES
STATE OF ILLINOIS

PROP. ROW

JASON R
DANA

CONC

WELL

R

149+68.07
110.00' LT

PROP. ROW

CONSTRUCTION LIMITS

ROCK

ENTRANCE
TO BE CLOSED

MATCH LINE STA 149+00

155+00.00
65.00' LT

PROP. ROW

158+50.00
60.00' LT

PT STA 159+43.20

EXIST. ROW

CONSTRUCTION LIMITS

161+00.00
40.00' LT

160+50.00
55.00' LT

**END SECTION
STA 160+70**

PC STA 151+98.53

℄ PROPOSED
IL ROUTE 8

EXIST. ROW

150+00

155+00

160+00

IL 8 / SOUTHPORT ROAD

PT STA 150+31.02

B14

B15

B16

EXIST. ROW

PROP. PERMANENT EASEMENT

BNSF RAILWAY CO

161+00.00
15.00' RT

161+00.00
35.00' RT

159+50.00
35.09' RT

158+60.00
48.00' RT

157+90.00
39.09' RT

156+00.00
55.00' RT

158+00.00
50.00' RT

153+81.86
67.83' RT

DONALD GIBBS
& NIKKI GOLD

CONSTRUCTION LIMITS

BIT

PROP. ROW

BURLINGTON NORTHERN SANTA FE

BNSF RAILWAY CO

EXIST. ROW

CONSTRUCTION LIMITS

ROBERT D SHANE, TRUSTEE
BARBARA J SHANE, TRUSTEE

N

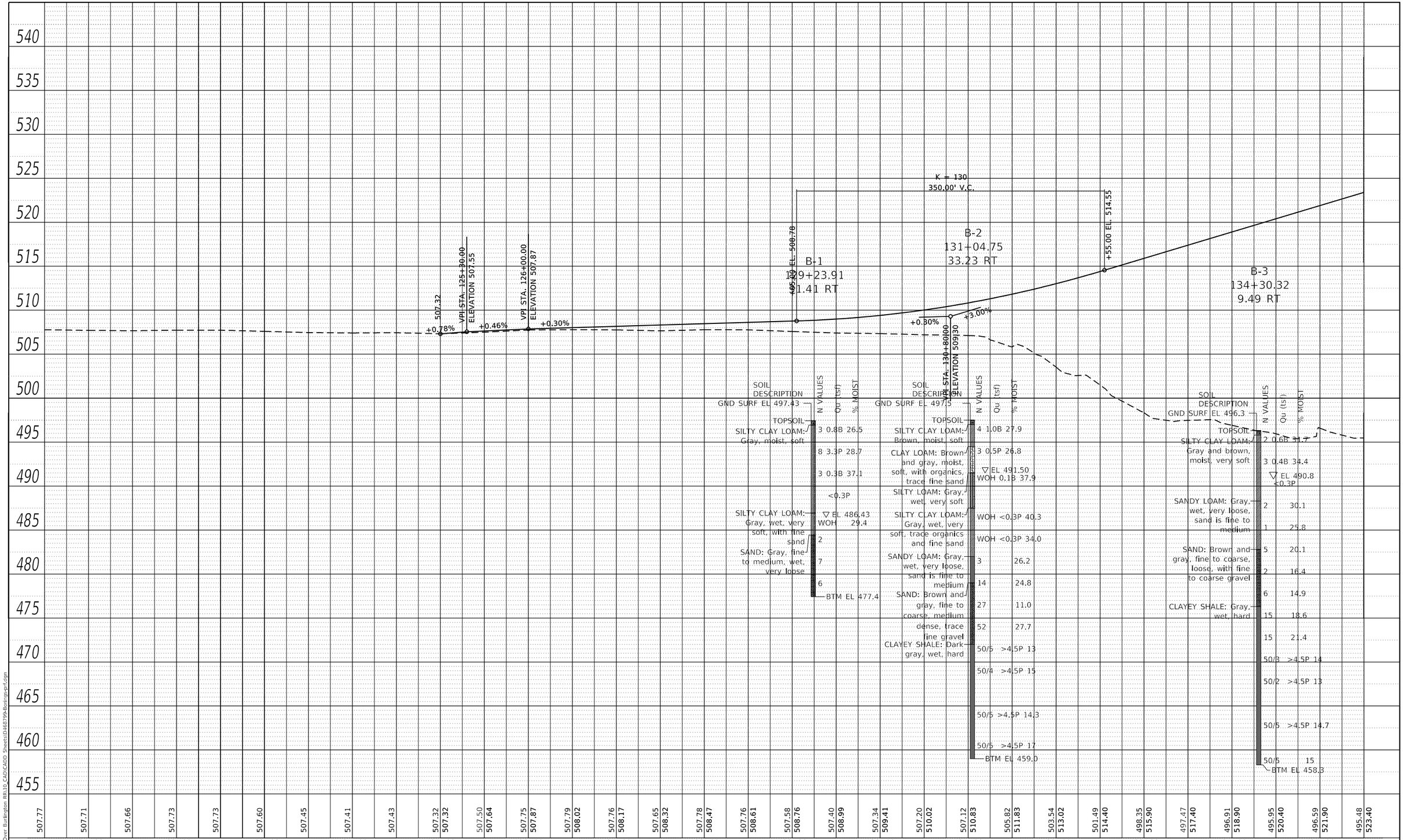
0 50 100 150
SCALE IN FEET

FILE NAME: P:\09-0007.20 IL-8 Over Burlington RR\10.CAD\CADD Sheets\0468799-Borings-sht-plan.dgn

Kaskaskia Engineering Group, LLC
PROFESSIONAL ENGINEERING SERVICES
Illinois Professional Design Firm 184.004773
Professional Engineering Group 20-2092260

USER NAME = bbb	DESIGNED - CRG	REVISED -	**STATE OF ILLINOIS**	**BORING PLAN AND SOIL PROFILE**
MODEL NAME = 03 Plan	DRAWN - BB	REVISED -	**DEPARTMENT OF TRANSPORTATION**	**IL ROUTE 8**
PLOT SCALE = 100.0000 ' / In.	CHECKED - MDM	REVISED -		SCALE: 1"=50' | SHEET 3 OF SHEETS | STA 149+00 TO STA 163+50
PLOT DATE = 3/22/2018	DATE - MARCH 2018	REVISED -		

F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA		0
		CONTRACT NO. 68799		
	ILLINOIS	FED. AID PROJECT		



PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CAUD FILE NAME
NOTE BOOK
NO.
BY
DATE

PROFILE
SURVEYED
PLOTTED
DRAWN
CHECKED
B.M. NOTED
STRUCTURE NOTATIONS CHKD
NOTE BOOK
NO.
BY
DATE

MODEL: Default
FILE NAME: P:\09-0007.01 IL-8 Over Burlington RR\10_CAD/CADD Sheets\D468799-Borings-prf.dgn

Kaskaskia Engineering Group, LLC
200 East Main Street, Suite 109
Belleville, Illinois 62220
618.355.3377 phone
618.355.3977 fax
www.kaskaskiaeng.com
PROFESSIONAL REGISTRATIONS — LICENSE NO.
Illinois Professional Design Firm — 184.004772
Professional Engineering Survey — 35-3505565

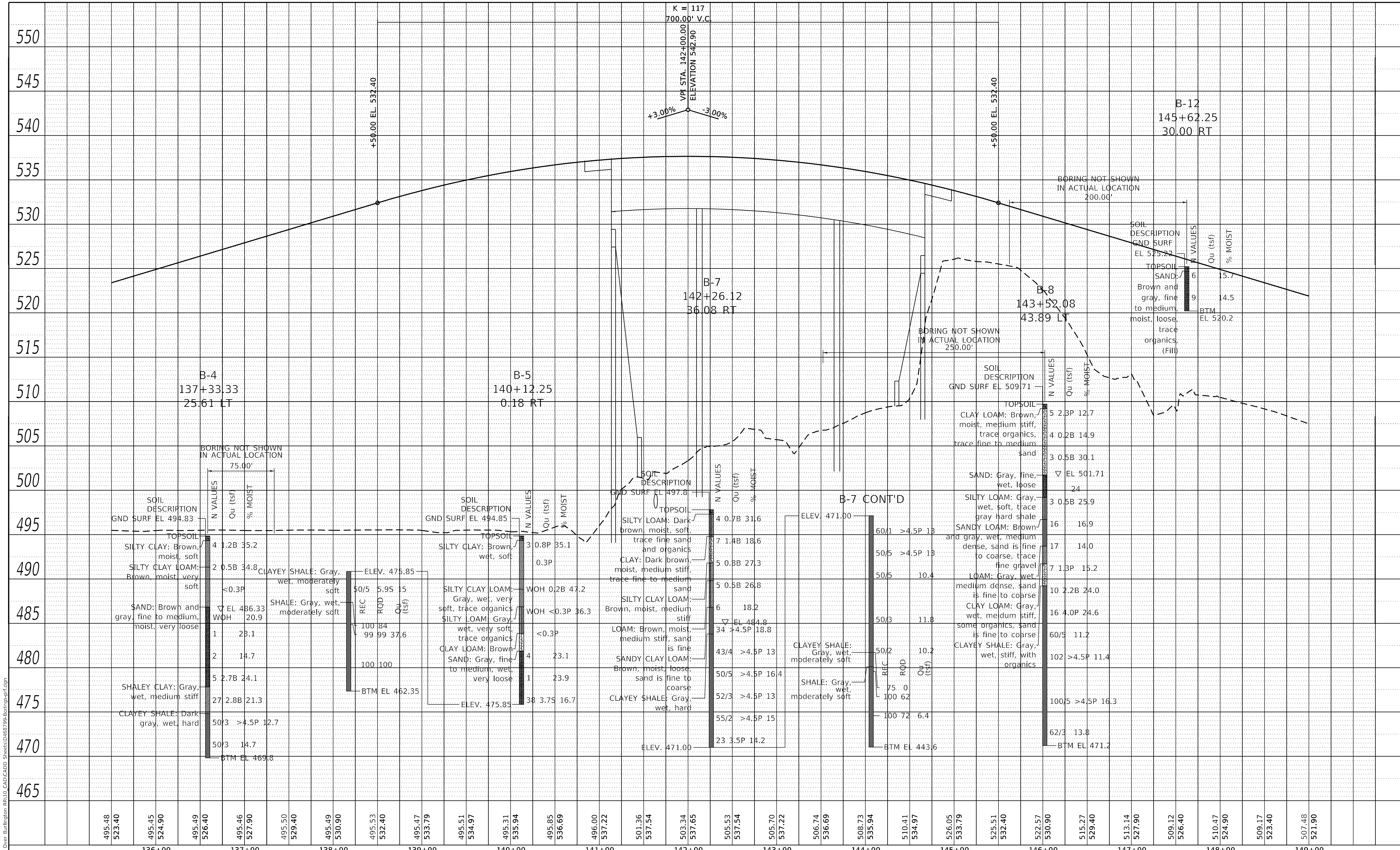
USER NAME = bbb	DESIGNED - CRG	REVISED -	
	DRAWN - BB	REVISED -	
PLOT SCALE = 100.000 ' / in.	CHECKED - MDM	REVISED -	
PLOT DATE = 3/22/2018	DATE - MARCH 2018	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORING PLAN AND SOIL PROFILE
IL ROUTE 8

SCALE: | SHEET OF SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA		
		CONTRACT NO. 68799		
	ILLINOIS FED. AID PROJECT			



PLAN	SURVEYED	PLOTTED	ALIGNMENT CHECKED	RT. OF WAY CHECKED	CADD FILE NAME
NOTE BOOK NO.____	BY	DATE			

PROFILE	SURVEYED	PLOTTED	GRADES CHECKED	B.M. NOTED	STRUCTURE NOTAT'NS CH'KD
NOTE BOOK NO.____	BY	DATE			

MODEL: Default
FILE NAME: P:\09-0007.01 IL-8 Over Burlington RR\10_CAD\CADD Sheets\D468799-Borings-prf.dgn

Kaskaskia Engineering Group, LLC

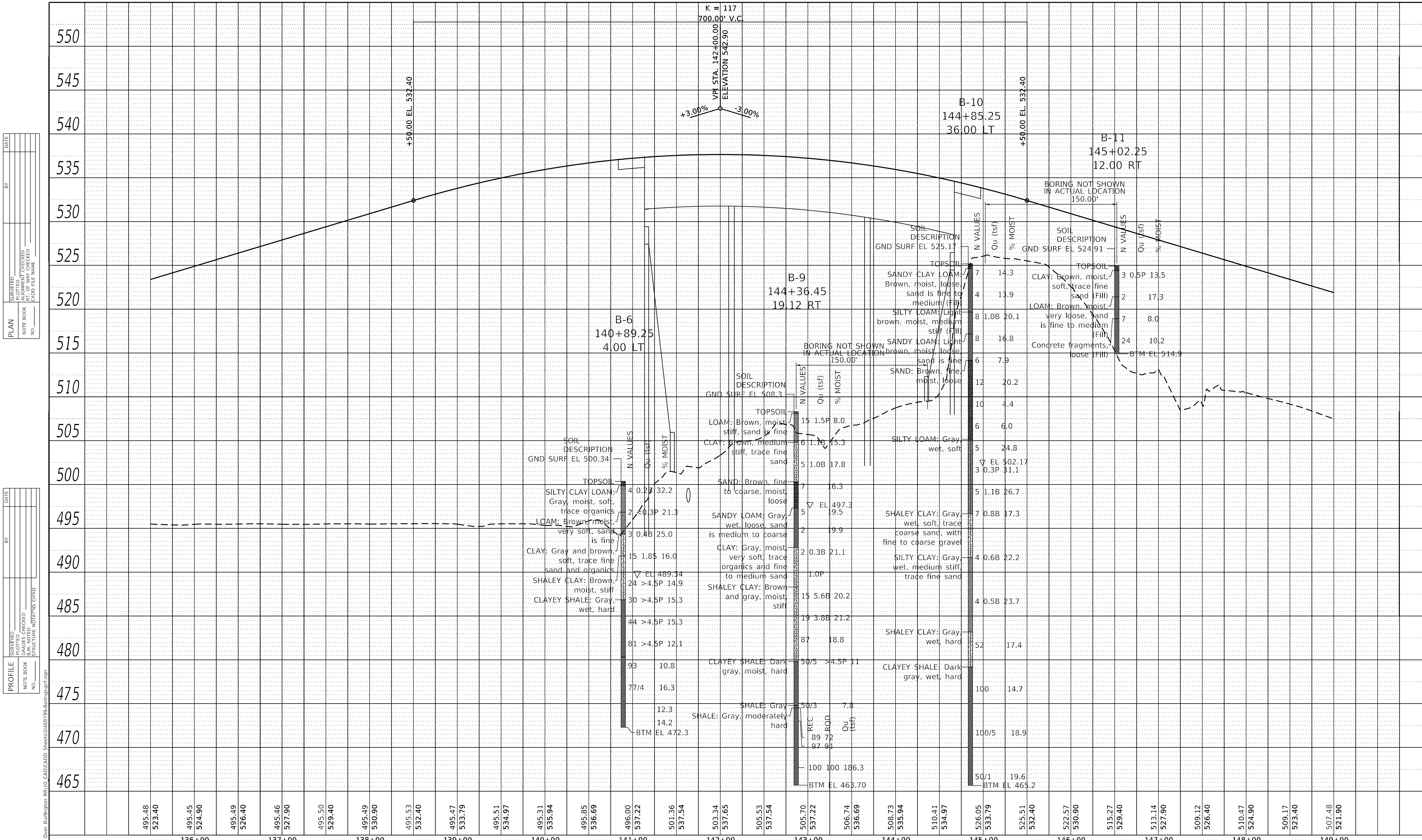
USER NAME = bbb	DESIGNED - CRG	REVISED -
	DRAWN - BB	REVISED -
PLOT SCALE = 100.000 ' / in.	CHECKED - MDM	REVISED -
PLOT DATE = 3/22/2018	DATE - MARCH 2018	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORING PLAN AND SOIL PROFILE
IL ROUTE 8

SCALE: SHEET OF SHEETS STA. TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA		
		CONTRACT NO. 68799		
	ILLINOIS	FED. AID PROJECT		



MODEL: Default
FILE NAME: P:\09-0007.01 IL-8 Over Burlington RR\10_CAD\CADD Sheets\D468799-Borings-prf.dgn

Kaskaskia Engineering Group, LLC

USER NAME = bbb	DESIGNED - CRG	REVISED -	
	DRAWN - BB	REVISED -	
PLOT SCALE = 100.000 ' / in.	CHECKED - MDM	REVISED -	
PLOT DATE = 3/22/2018	DATE - MARCH 2018	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

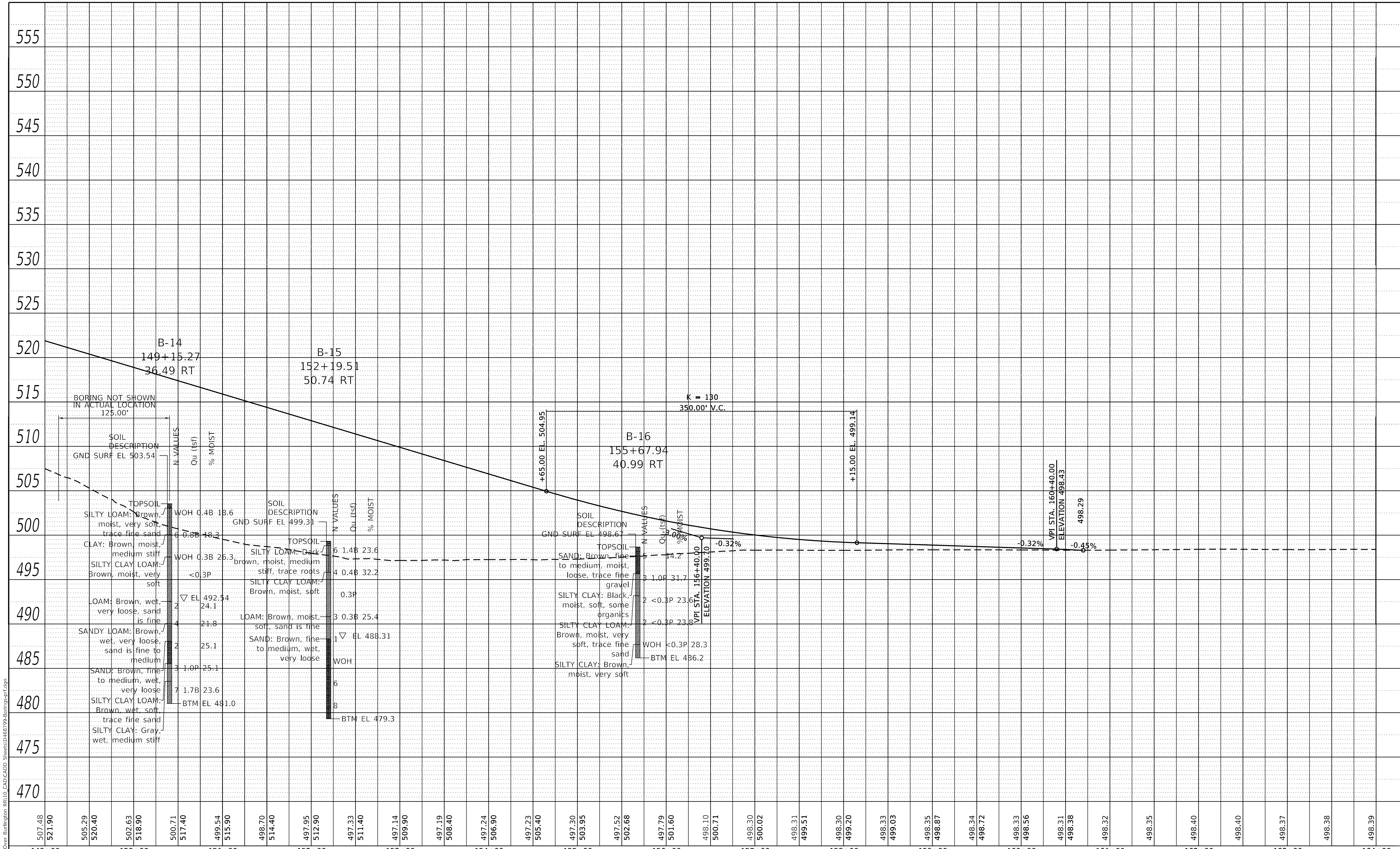
BORING PLAN AND SOIL PROFILE
IL ROUTE 8

SCALE: | SHEET OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA		

CONTRACT NO. 68799

ILLINOIS | FED. AID PROJECT



PLAN	NOTE BOOK	NO.	SURVEYED	PLOTTED	ALIGNMENT CHECKED	R.T. OF WAY CHECKED	CADD FILE NAME	BY	DATE

PROFILE	NOTE BOOK	NO.	SURVEYED	PLOTTED	GRADES CHECKED	B.M. NOTED	STRUCTURE NOTATN'S CHKD	BY	DATE

MODEL: Default
FILE NAME: P:\09-0007.01 IL-8 Over Burlington RR\10_CAD\CADD Sheets\D468799-Borings-prf.dgn

Kaskaskia Engineering Group, LLC

USER NAME = bbb	DESIGNED - CRG	REVISED -	
	DRAWN - BB	REVISED -	
PLOT SCALE = 100.000 ' / in.	CHECKED - MDM	REVISED -	
PLOT DATE = 3/22/2018	DATE - MARCH 2018	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

BORING PLAN AND SOIL PROFILE
IL ROUTE 8

SCALE: | SHEET | OF | SHEETS | STA. | TO STA.

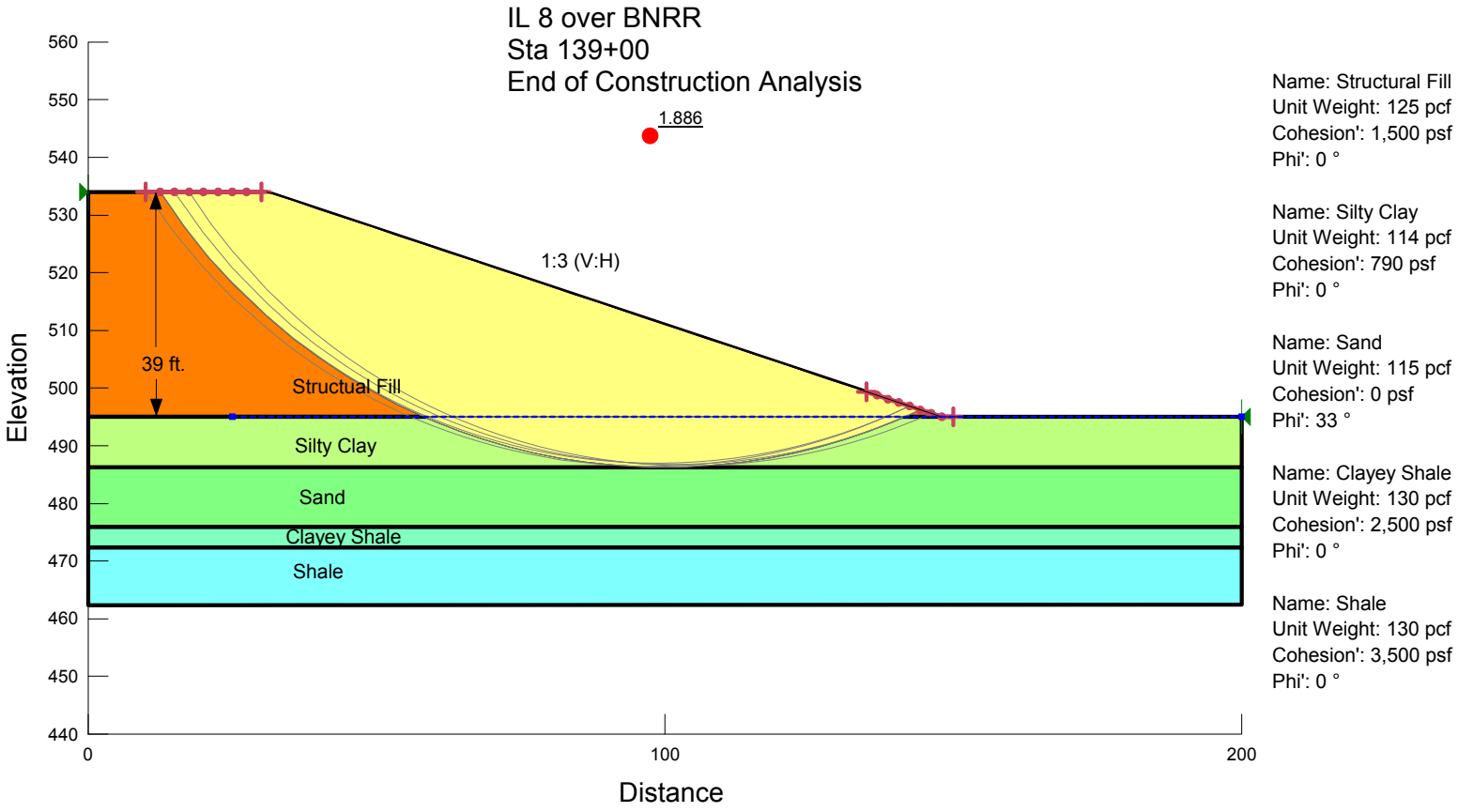
F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
1388	(Z-1VB)BR-2	PEORIA		

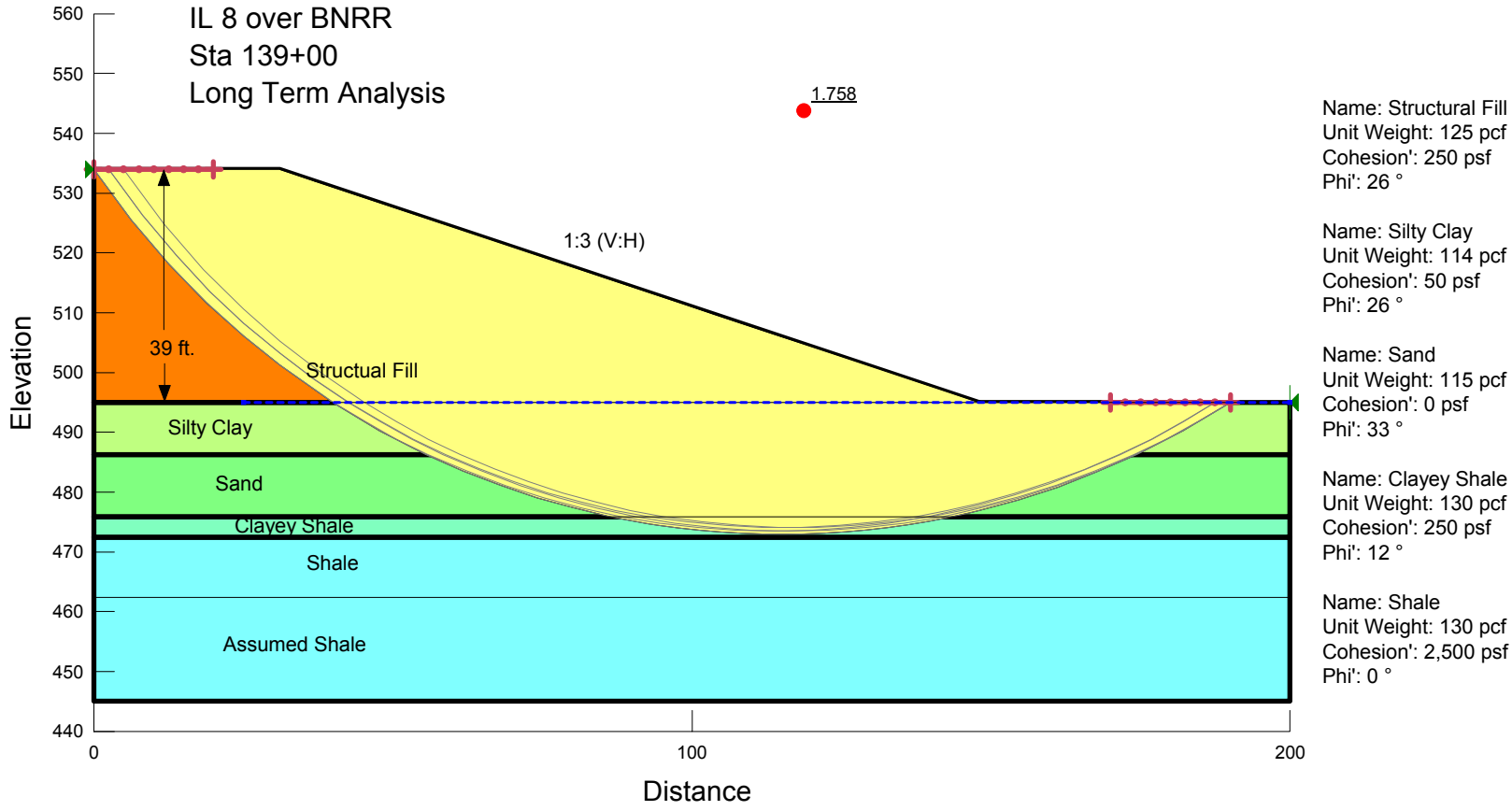
CONTRACT NO. 68799

ILLINOIS | FED. AID PROJECT

Exhibit E

SLOPE/W Slope Stability Analysis


IL 8 over BNRR
Sta 139+00
End of Construction Analysis
1.886
1:3 (V:H)
39 ft.
Structual Fill
Silty Clay
Sand
Clayey Shale
Shale
Elevation
Distance
560
550
540
530
520
510
500
490
480
470
460
450
440
0
100
200
Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °
Name: Silty Clay
Unit Weight: 114 pcf
Cohesion': 790 psf
Phi': 0 °
Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Name: Clayey Shale
Unit Weight: 130 pcf
Cohesion': 2,500 psf
Phi': 0 °
Name: Shale
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °



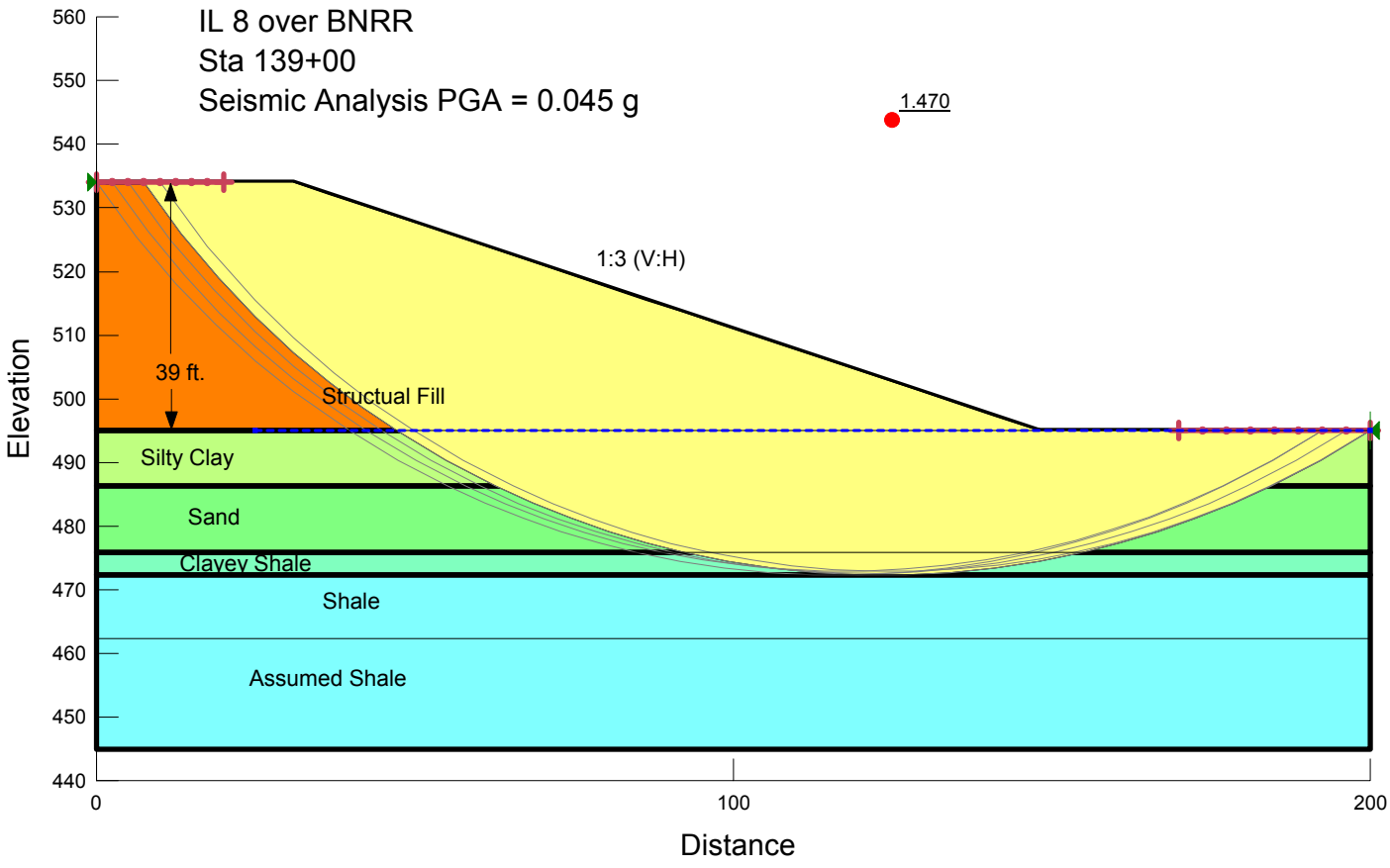
Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °

Name: Silty Clay
Unit Weight: 114 pcf
Cohesion': 50 psf
Phi': 26 °

Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °

Name: Clayey Shale
Unit Weight: 130 pcf
Cohesion': 250 psf
Phi': 12 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 2,500 psf
Phi': 0 °



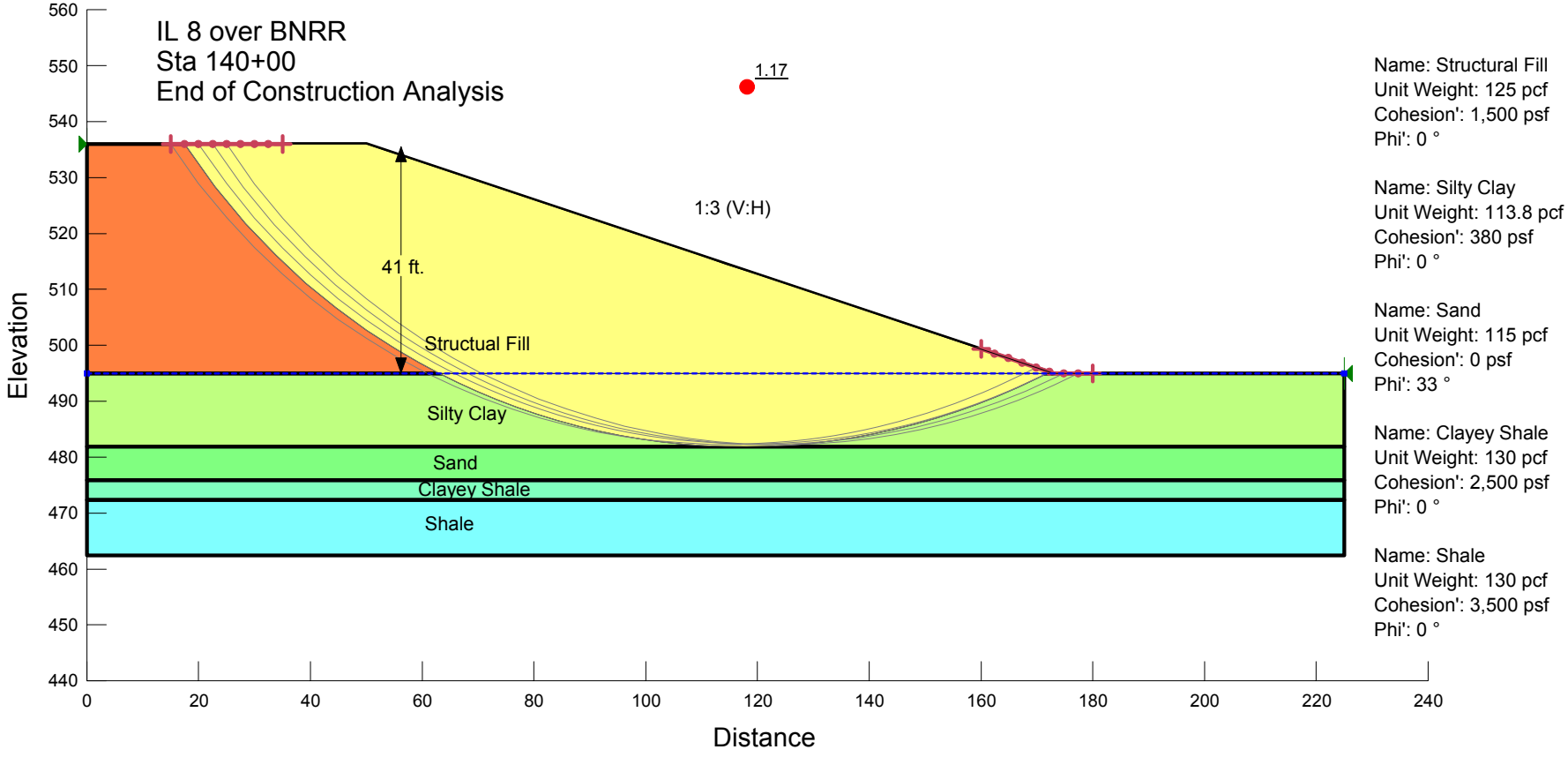
Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °

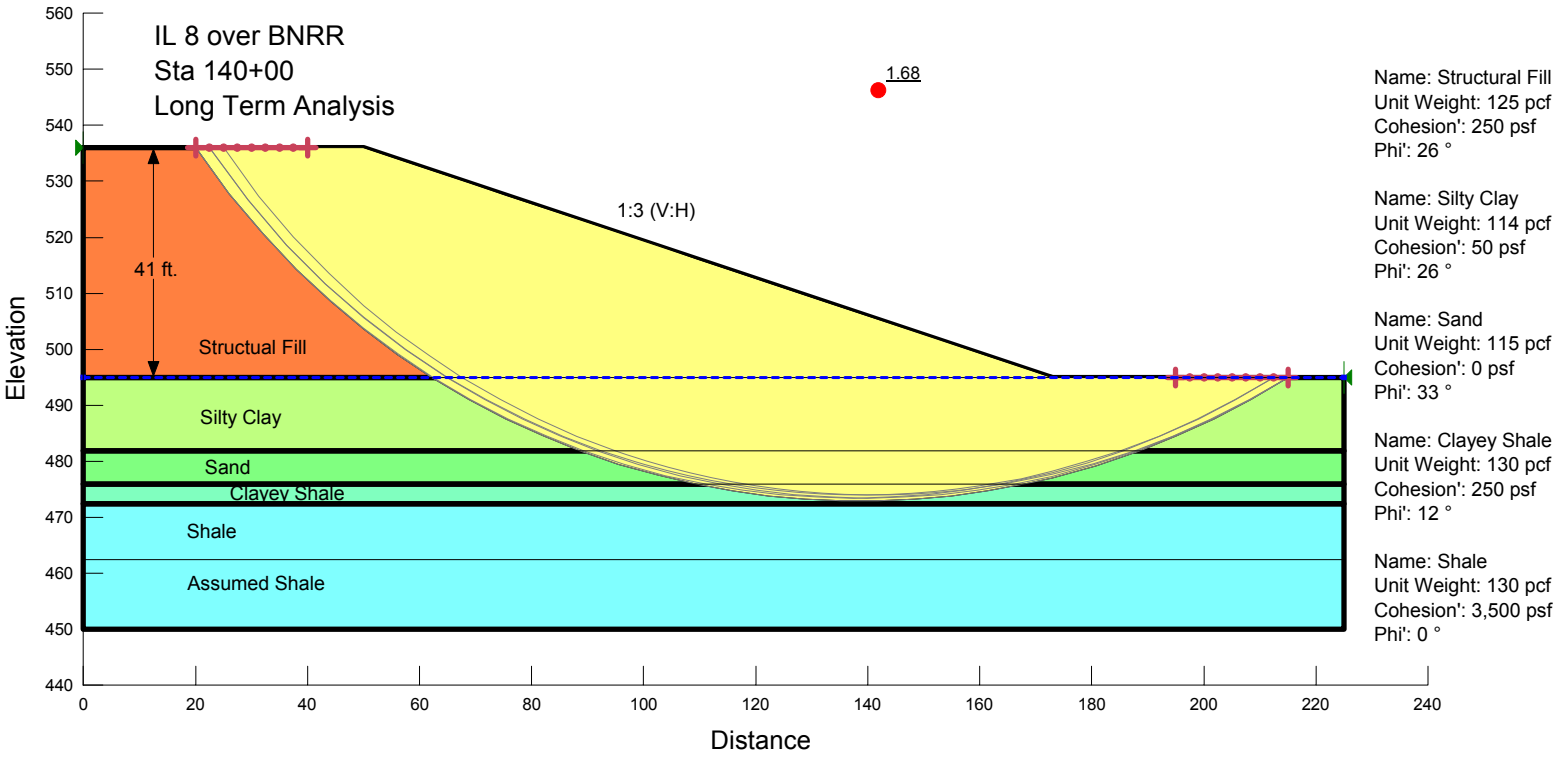
Name: Silty Clay
Unit Weight: 114 pcf
Cohesion': 50 psf
Phi': 26 °

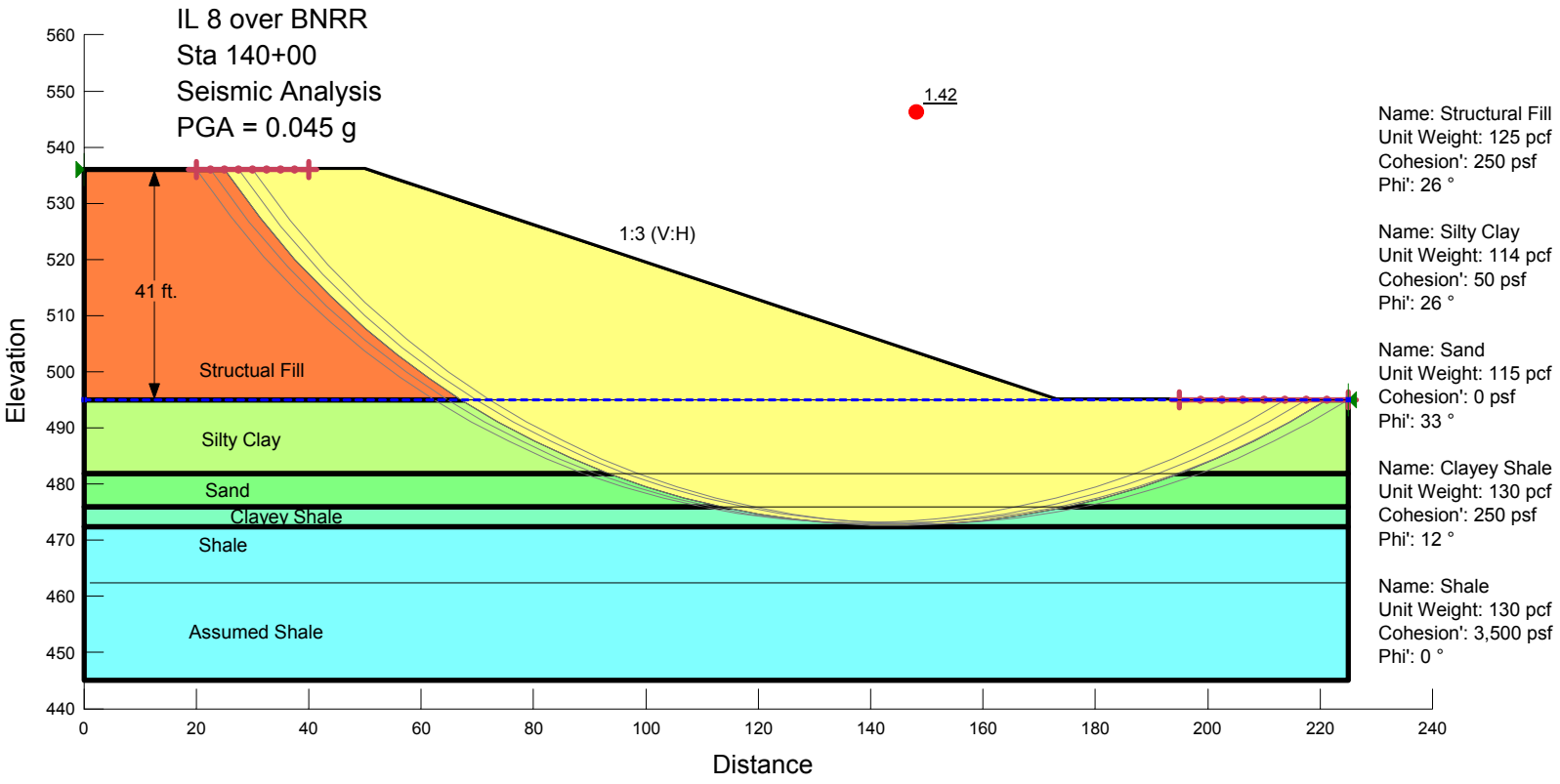
Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °

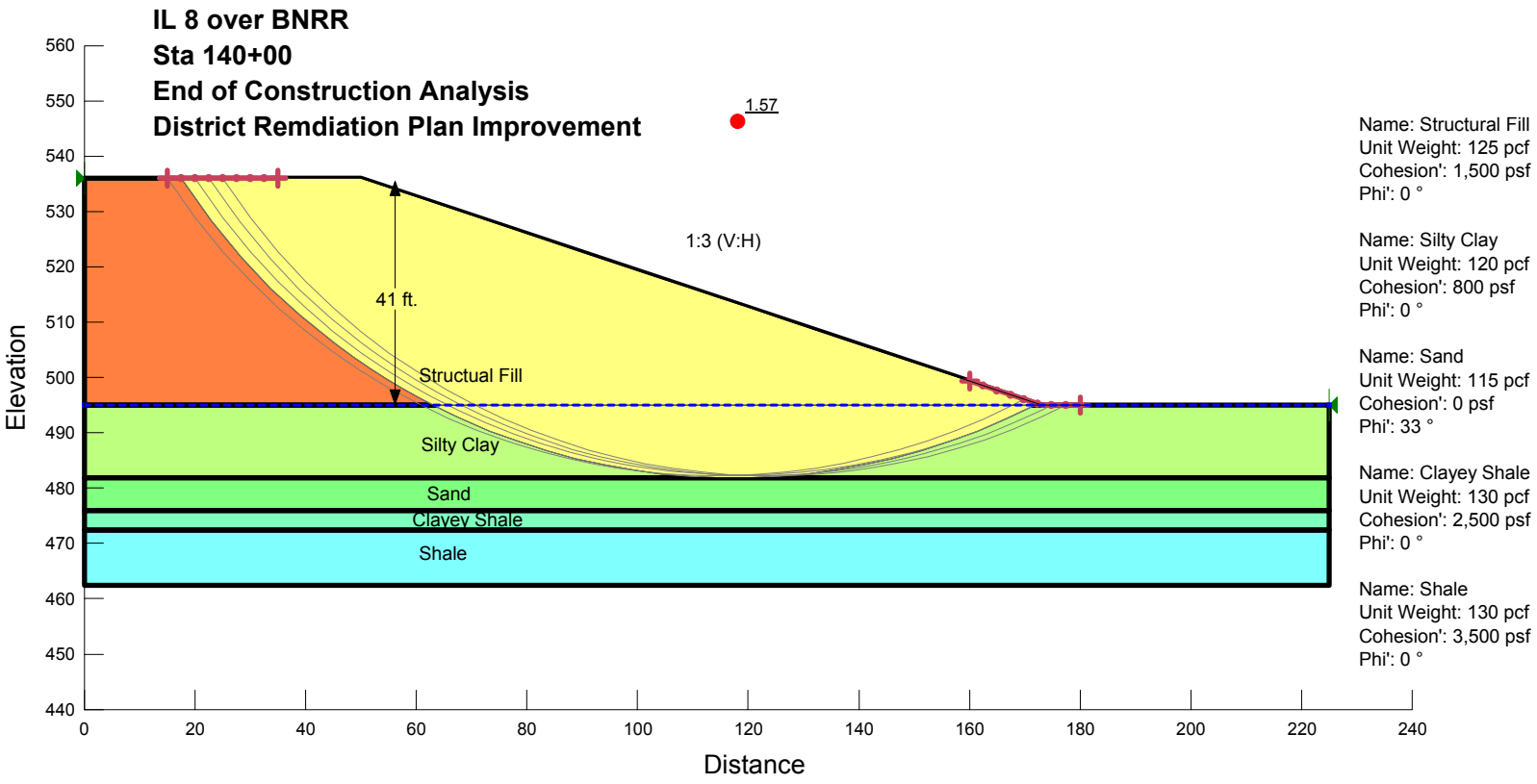
Name: Clayey Shale
Unit Weight: 130 pcf
Cohesion': 250 psf
Phi': 12 °

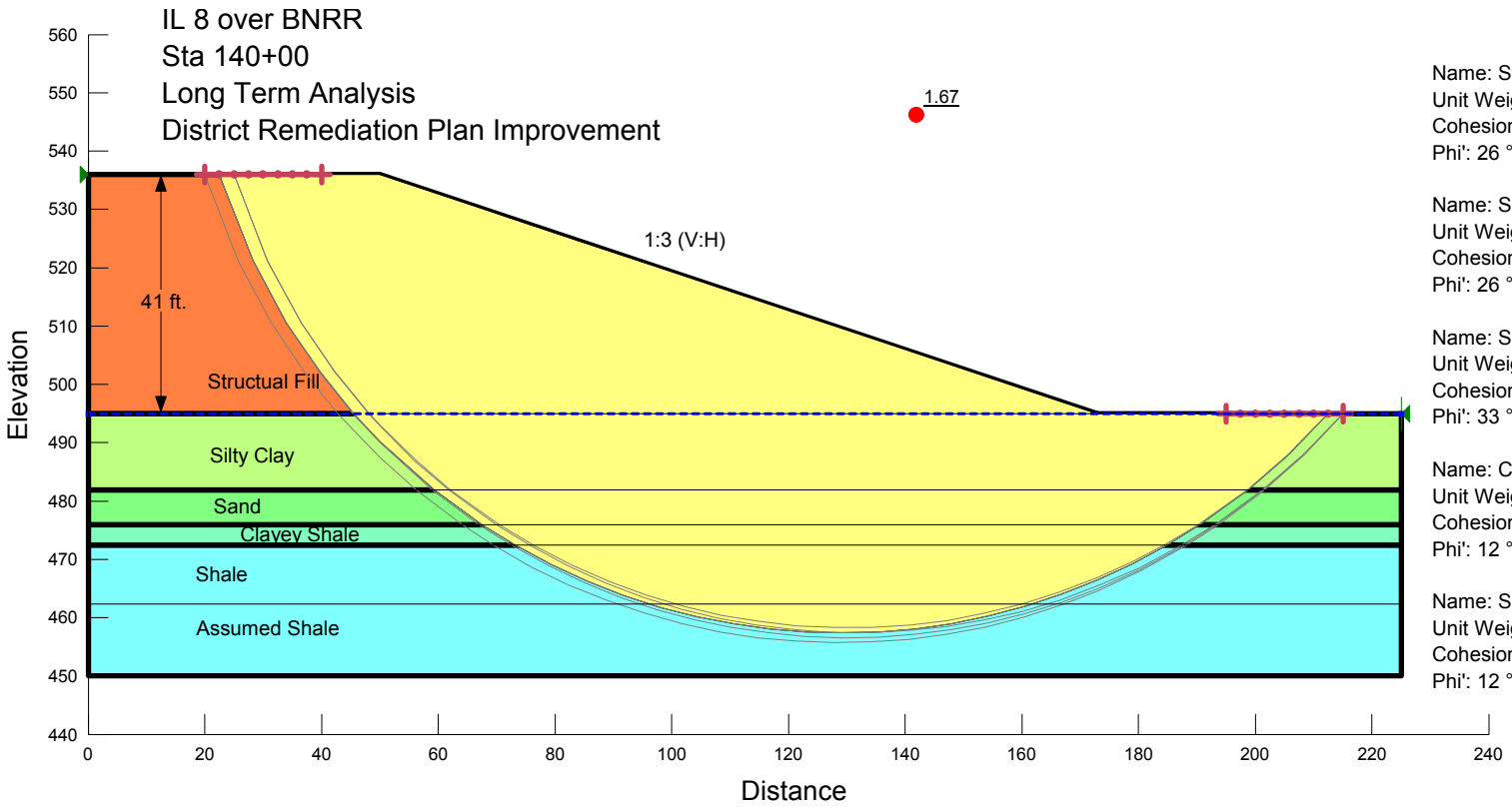
Name: Shale
Unit Weight: 130 pcf
Cohesion': 2,500 psf
Phi': 0 °

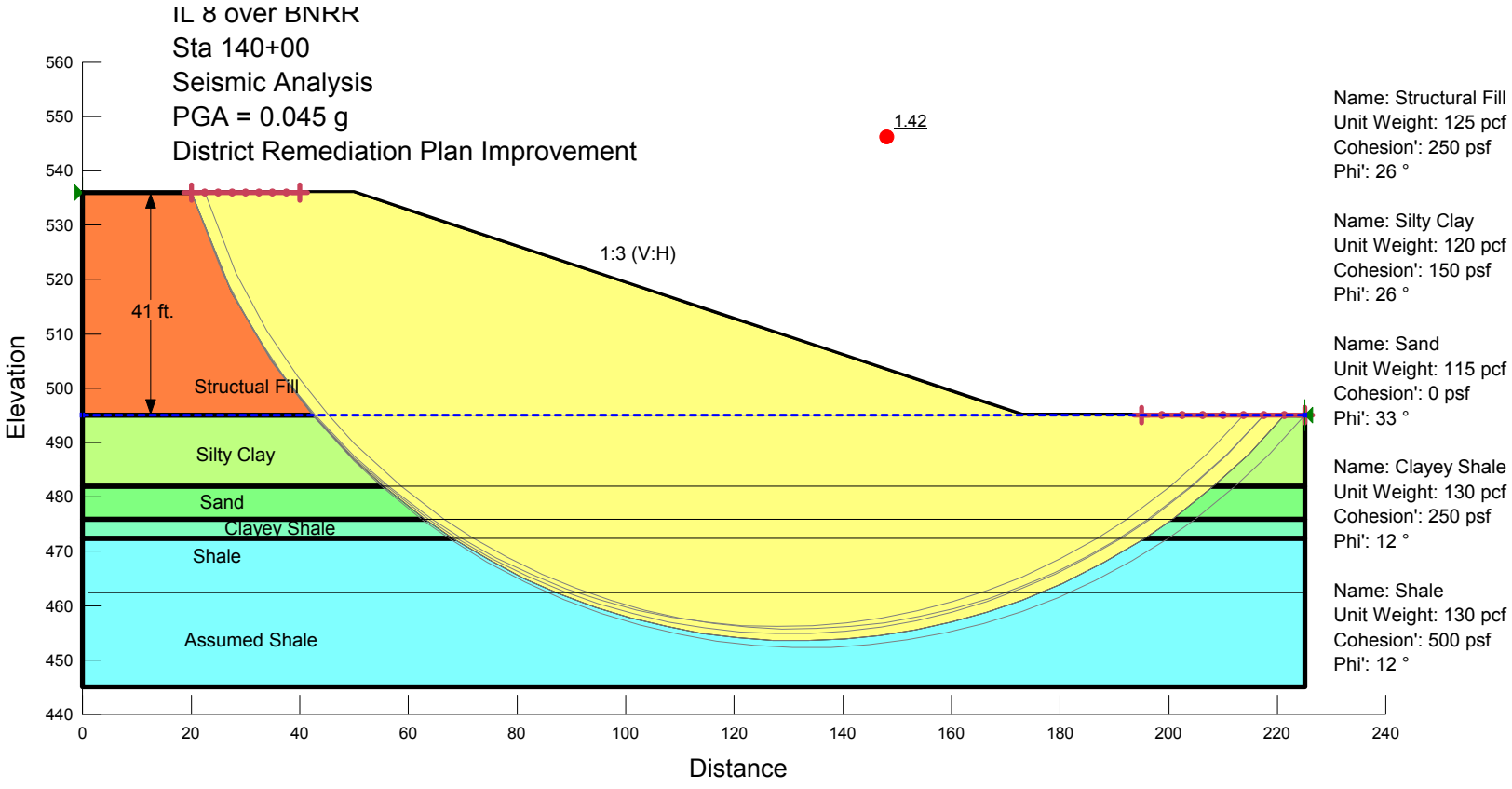

IL 8 over BNRR
Sta 140+00
End of Construction Analysis
1.17
1:3 (V:H)
41 ft.
Structual Fill
Silty Clay
Sand
Clayey Shale
Shale
Elevation
Distance
560
550
540
530
520
510
500
490
480
470
460
450
440
0
20
40
60
80
100
120
140
160
180
200
220
240
Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °
Name: Silty Clay
Unit Weight: 113.8 pcf
Cohesion': 380 psf
Phi': 0 °
Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Name: Clayey Shale
Unit Weight: 130 pcf
Cohesion': 2,500 psf
Phi': 0 °
Name: Shale
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °


IL 8 over BNRR
Sta 140+00
Long Term Analysis
1.68
1:3 (V:H)
41 ft.
Structual Fill
Silty Clay
Sand
Clayey Shale
Shale
Assumed Shale
Elevation
Distance
560
550
540
530
520
510
500
490
480
470
460
450
440
0
20
40
60
80
100
120
140
160
180
200
220
240
Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Name: Silty Clay
Unit Weight: 114 pcf
Cohesion': 50 psf
Phi': 26 °
Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Name: Clayey Shale
Unit Weight: 130 pcf
Cohesion': 250 psf
Phi': 12 °
Name: Shale
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °

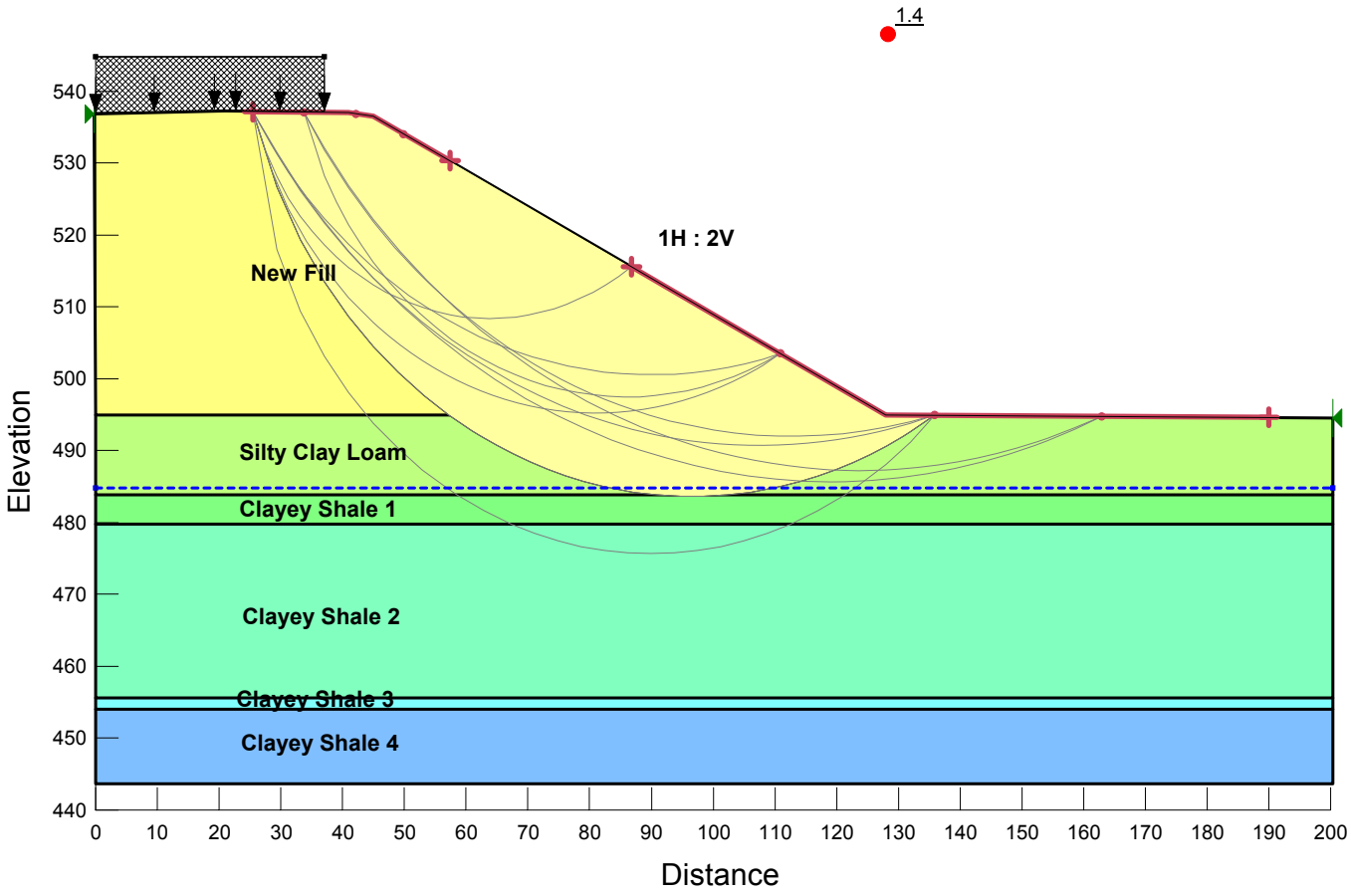

IL 8 over BNRR
Sta 140+00
Seismic Analysis
PGA = 0.045 g
1.42
1:3 (V:H)
41 ft.
Structual Fill
Silty Clay
Sand
Clayey Shale
Shale
Assumed Shale
Elevation
Distance
560
550
540
530
520
510
500
490
480
470
460
450
440
0
20
40
60
80
100
120
140
160
180
200
220
240
Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Name: Silty Clay
Unit Weight: 114 pcf
Cohesion': 50 psf
Phi': 26 °
Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Name: Clayey Shale
Unit Weight: 130 pcf
Cohesion': 250 psf
Phi': 12 °
Name: Shale
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °


IL 8 over BNRR
Sta 140+00
End of Construction Analysis
District Remdiation Plan Improvement
1.57
1:3 (V:H)
41 ft.
Structual Fill
Silty Clay
Sand
Clayey Shale
Shale
Elevation
Distance
560
550
540
530
520
510
500
490
480
470
460
450
440
0
20
40
60
80
100
120
140
160
180
200
220
240
Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °
Name: Silty Clay
Unit Weight: 120 pcf
Cohesion': 800 psf
Phi': 0 °
Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Name: Clayey Shale
Unit Weight: 130 pcf
Cohesion': 2,500 psf
Phi': 0 °
Name: Shale
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °


IL 8 over BNRR
Sta 140+00
Long Term Analysis
District Remediation Plan Improvement
1.67
1:3 (V:H)
41 ft.
Structual Fill
Silty Clay
Sand
Clayey Shale
Shale
Assumed Shale
Elevation
Distance
560
550
540
530
520
510
500
490
480
470
460
450
440
0
20
40
60
80
100
120
140
160
180
200
220
240
Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Name: Silty Clay
Unit Weight: 120 pcf
Cohesion': 150 psf
Phi': 26 °
Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Name: Clayey Shale
Unit Weight: 130 pcf
Cohesion': 250 psf
Phi': 12 °
Name: Shale
Unit Weight: 130 pcf
Cohesion': 500 psf
Phi': 12 °


IL 8 over BNRR
Sta 140+00
Seismic Analysis
PGA = 0.045 g
District Remediation Plan Improvement
1.42
1:3 (V:H)
41 ft.
Structual Fill
Silty Clay
Sand
Clayey Shale
Shale
Assumed Shale
Elevation
Distance
560
550
540
530
520
510
500
490
480
470
460
450
440
0
20
40
60
80
100
120
140
160
180
200
220
240
Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Name: Silty Clay
Unit Weight: 120 pcf
Cohesion': 150 psf
Phi': 26 °
Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Name: Clayey Shale
Unit Weight: 130 pcf
Cohesion': 250 psf
Phi': 12 °
Name: Shale
Unit Weight: 130 pcf
Cohesion': 500 psf
Phi': 12 °

IL 8 over BNRR
Station 141+00 2:1 Bridge Cone Slope
End-of-Construction (Undrained)



Name: Silty Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 800 psf
Phi': 0 °
Piezometric Line: 1

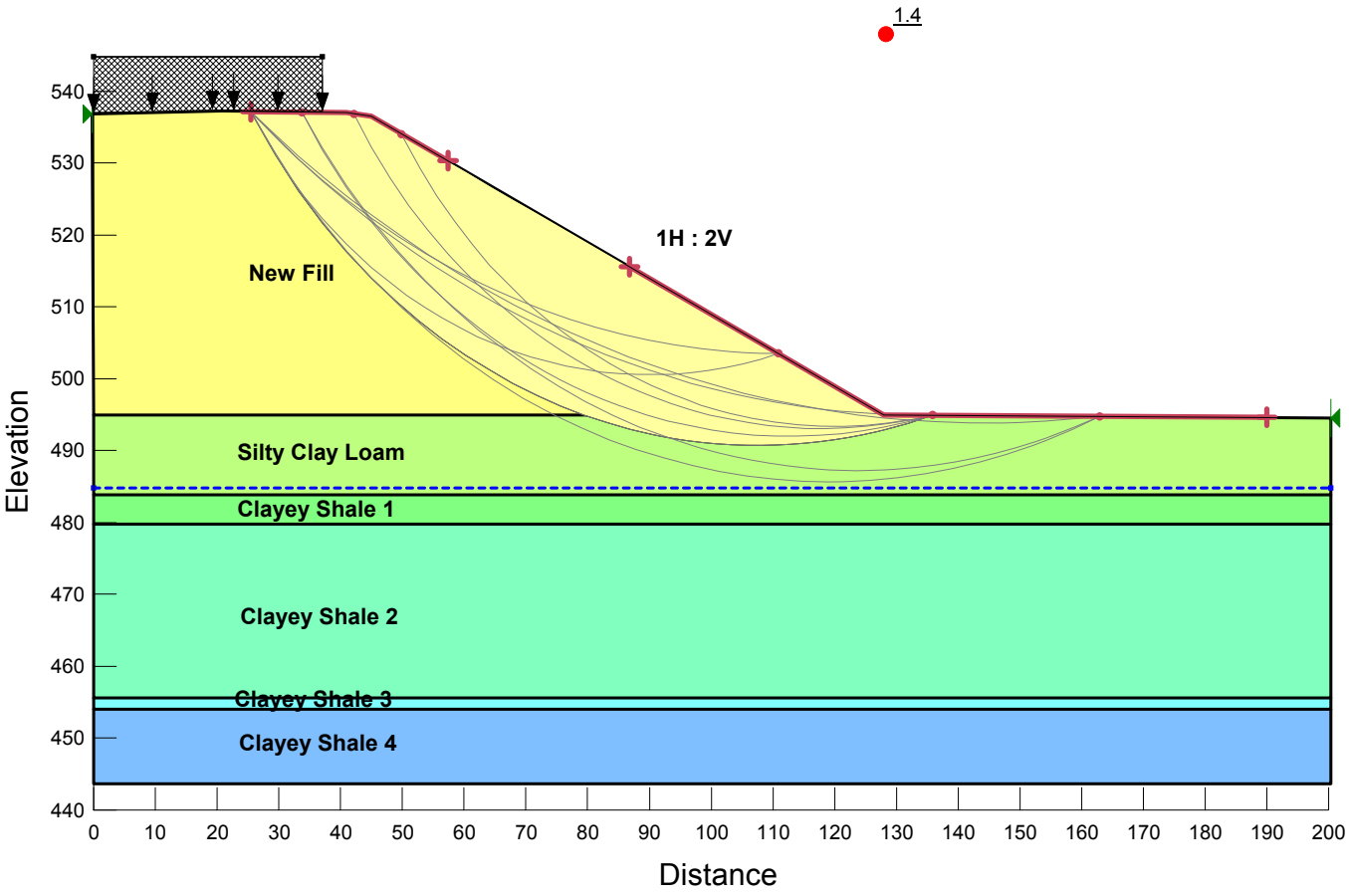
Name: Clayey Shale 1
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 2
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 3
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 4
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 6,400 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 141+00 2:1 Bridge Cone Slope
Long Term (Drained)



Name: Silty Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °
Piezometric Line: 1

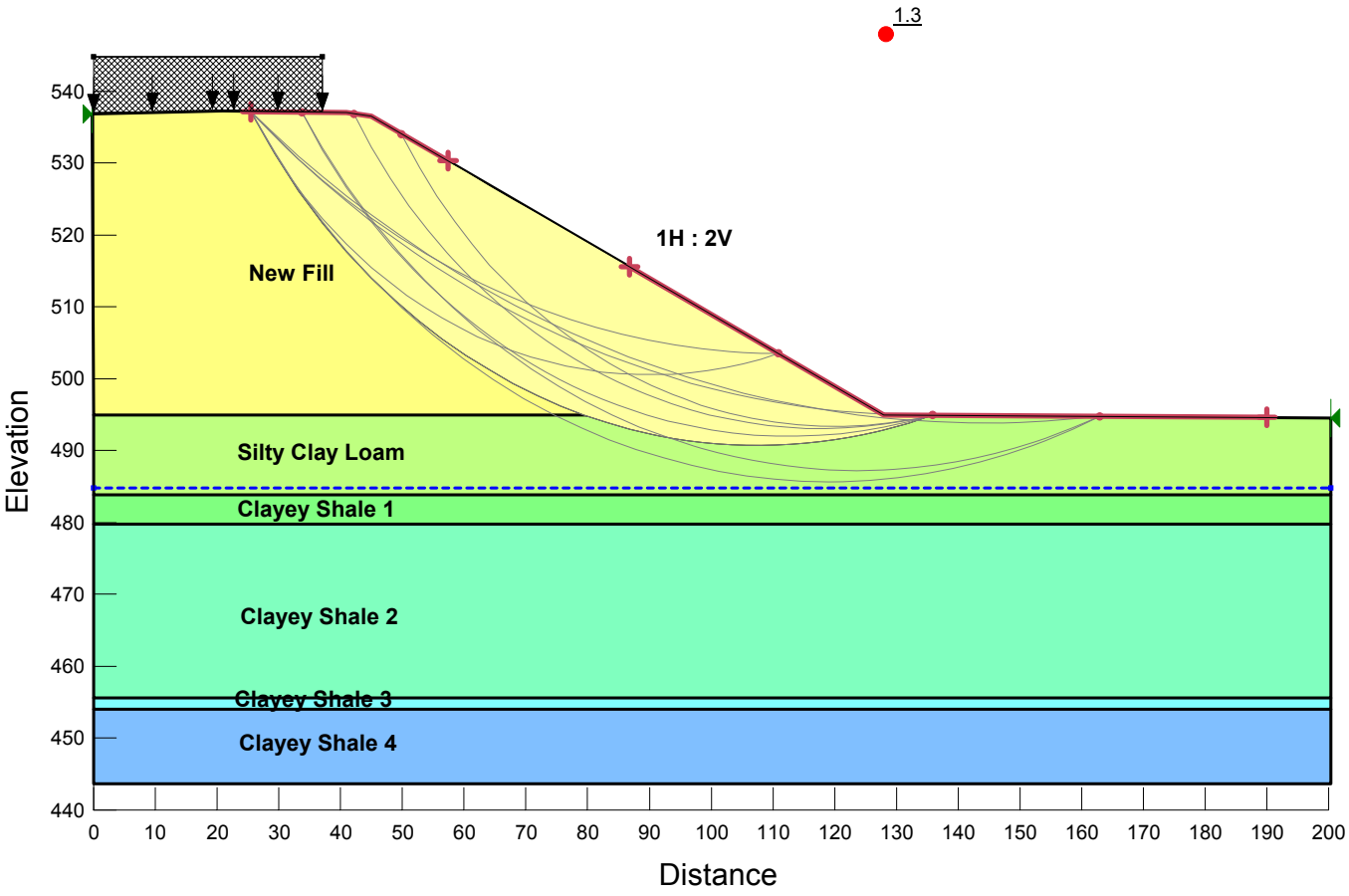
Name: Clayey Shale 1
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 2
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 3
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 4
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 6,400 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 141+00 2:1 Bridge Cone Slope
Seismic PGA = 0.045g



Name: Silty Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °
Piezometric Line: 1

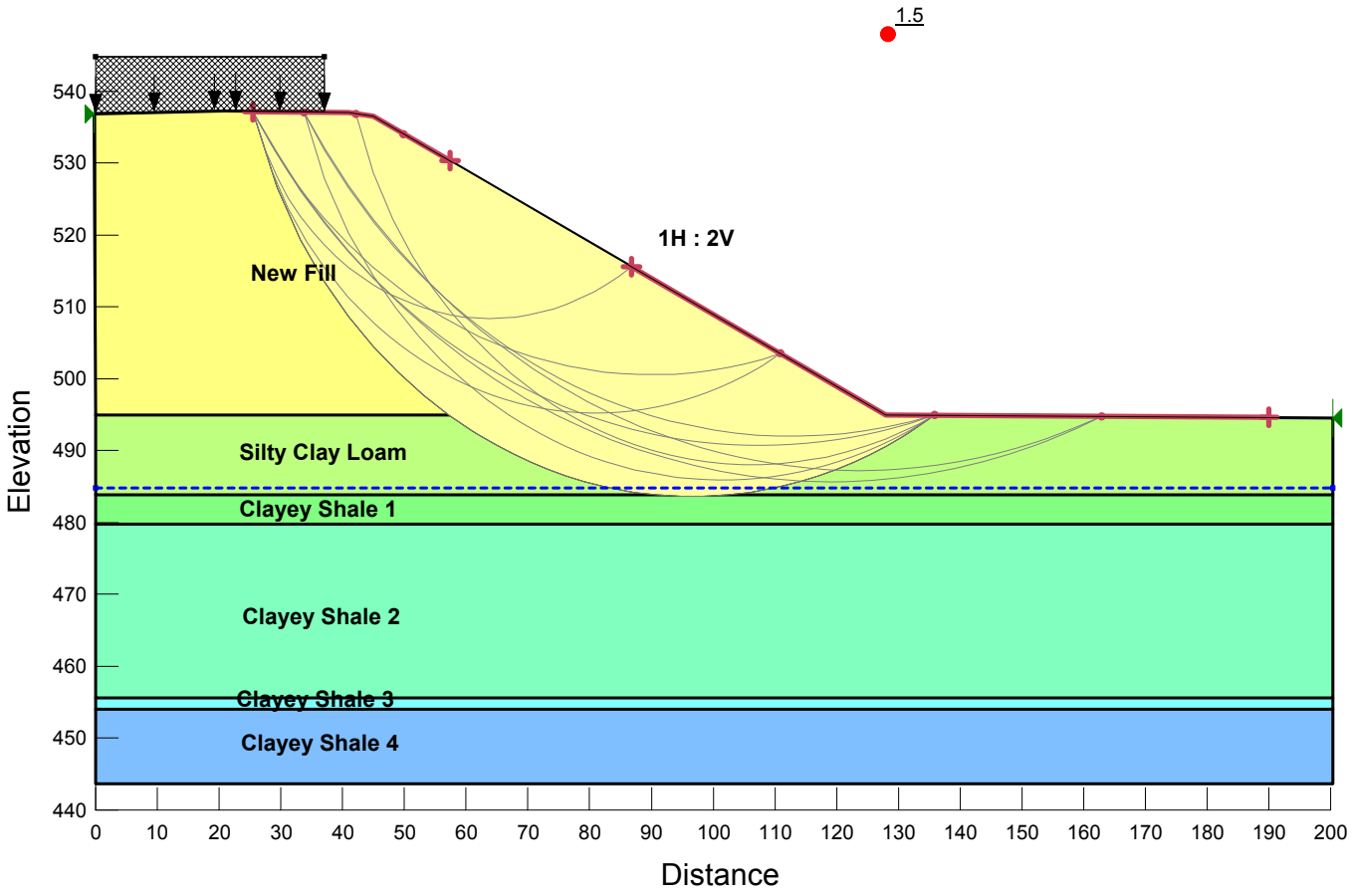
Name: Clayey Shale 1
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 2
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 3
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 4
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 6,400 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 141+00 2:1 Bridge Cone Slope
End-of-Construction (Undrained)
District Remediation Plan



Name: Silty Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,000 psf
Phi': 0 °
Piezometric Line: 1

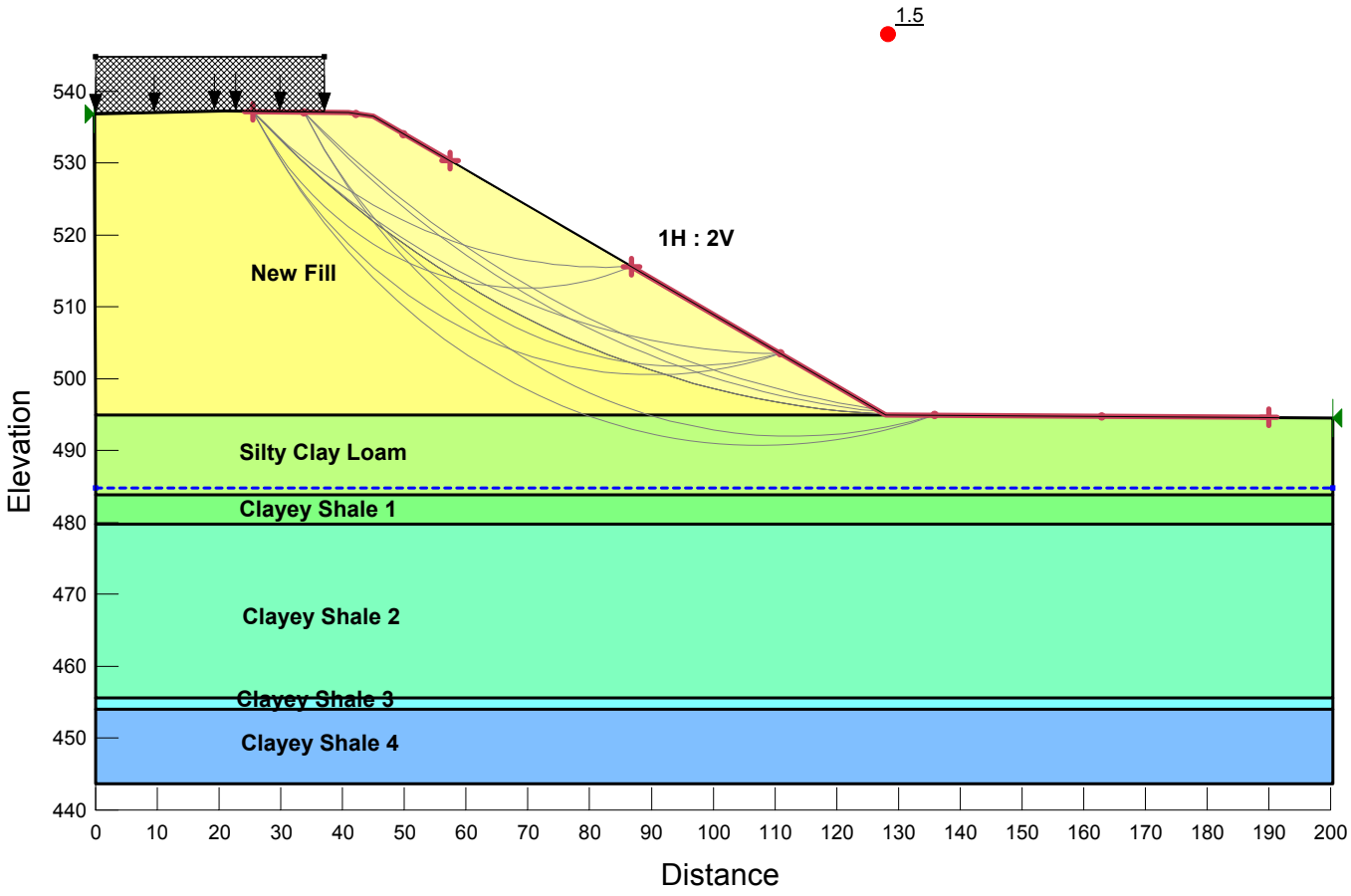
Name: Clayey Shale 1
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 2
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 3
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 4
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 6,400 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 141+00 2:1 Bridge Cone Slope
Long Term (Drained)
District Remediation Plan



Name: Silty Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Piezometric Line: 1

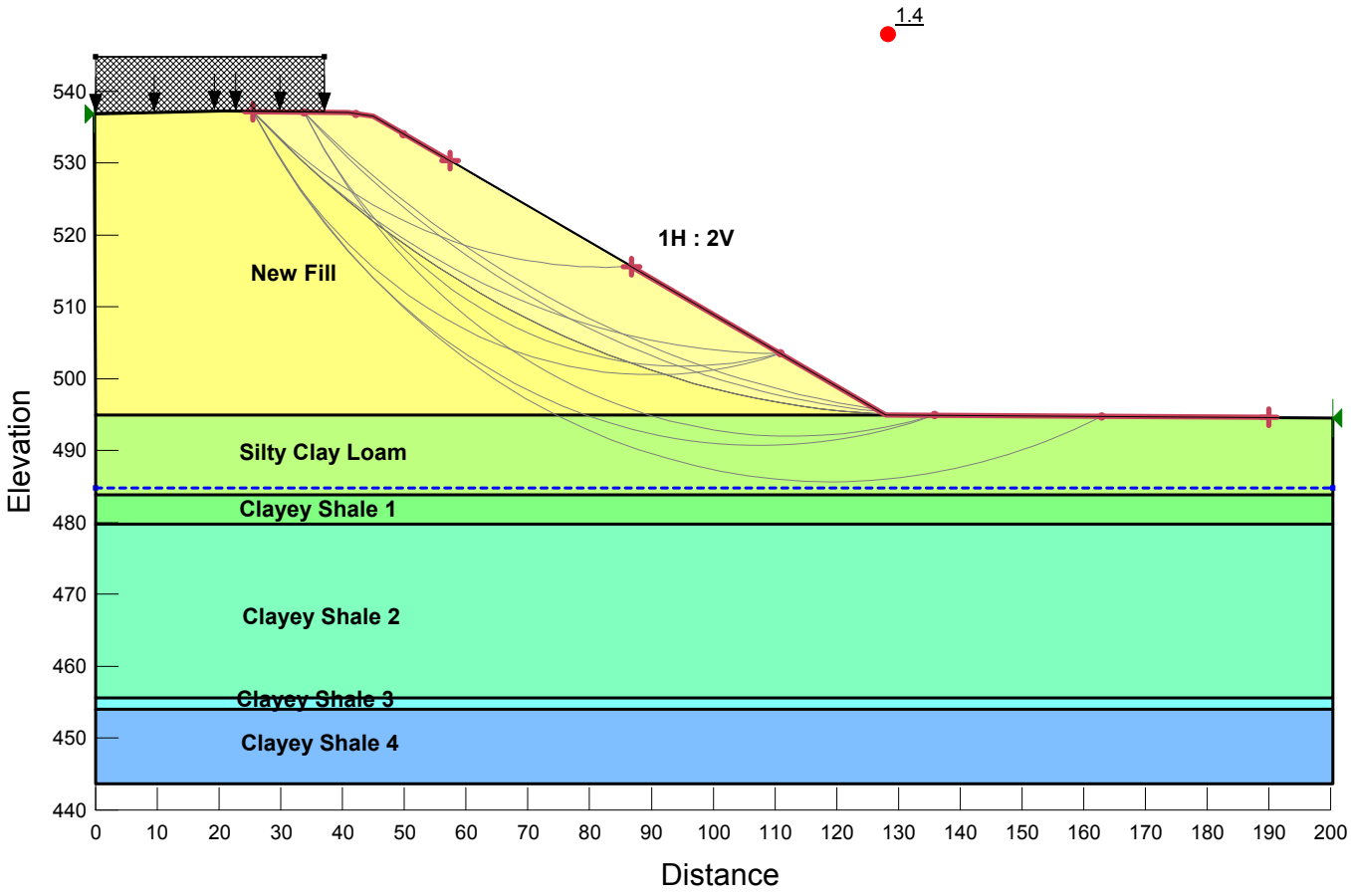
Name: Clayey Shale 1
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 2
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 3
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 4
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 6,400 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 141+00 2:1 Bridge Cone Slope
Seismic PGA = 0.045g
District Remediation Plan



Name: Silty Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Piezometric Line: 1

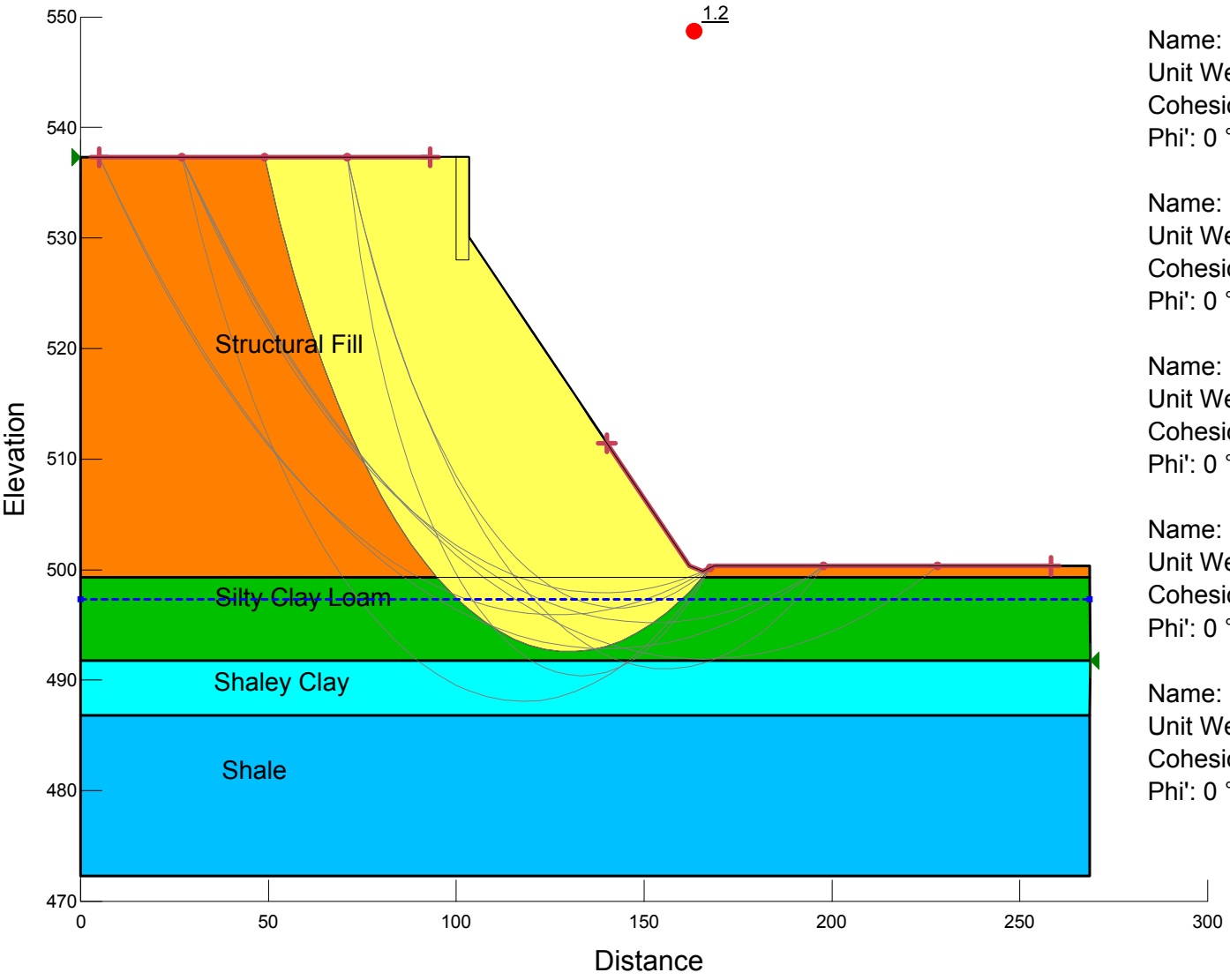
Name: Clayey Shale 1
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 2
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 3,500 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 3
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 3,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale 4
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 6,400 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
West Abutment
End of Construction Analysis



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °

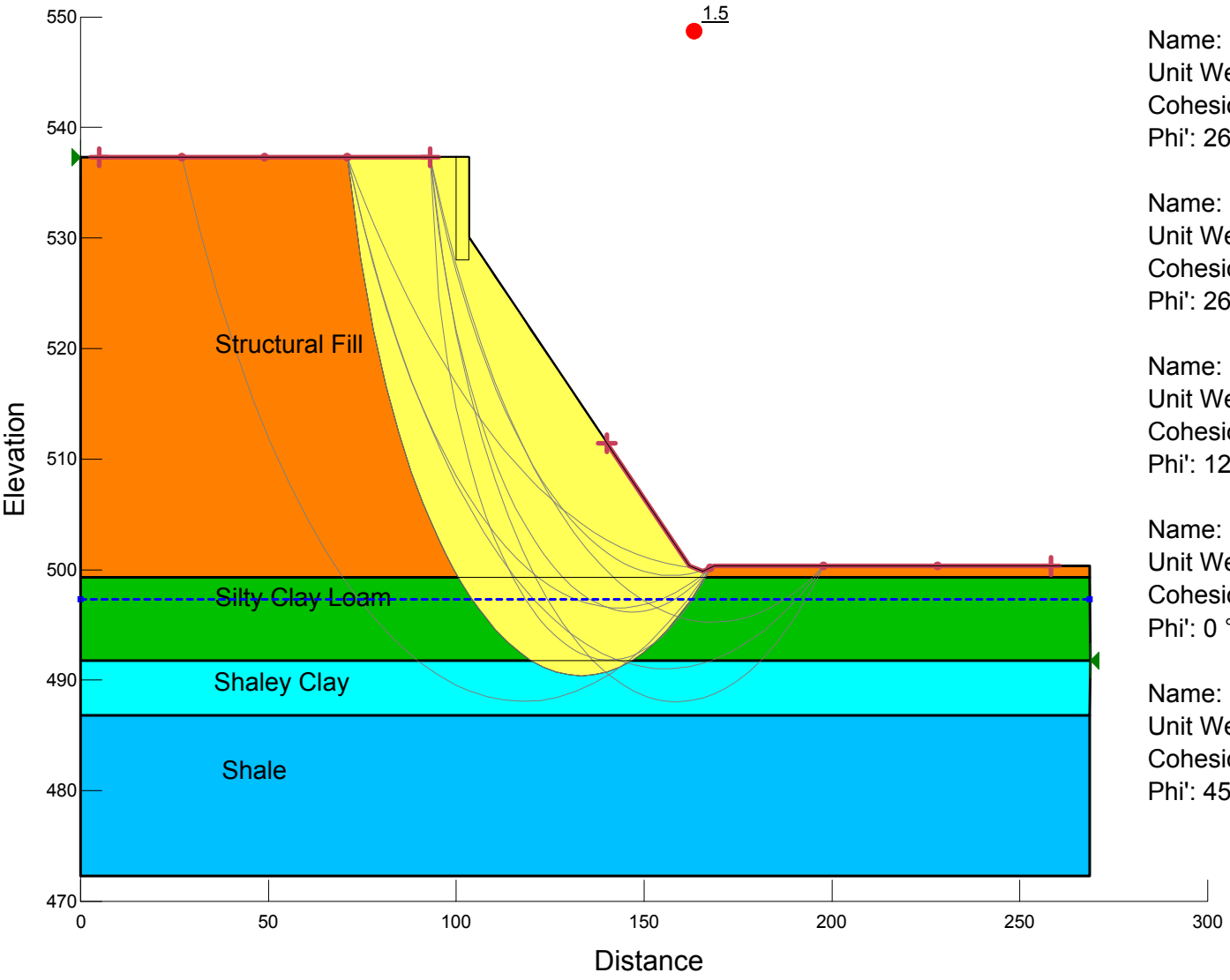
Name: Silty Clay Loam
Unit Weight: 125 pcf
Cohesion': 300 psf
Phi': 0 °

Name: Shaley Clay
Unit Weight: 125 pcf
Cohesion': 1,800 psf
Phi': 0 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 5,000 psf
Phi': 0 °

Name: Concrete
Unit Weight: 150 pcf
Cohesion': 5,000 psf
Phi': 0 °

IL 8 over BNRR
West Abutment
Long Term Analysis



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °

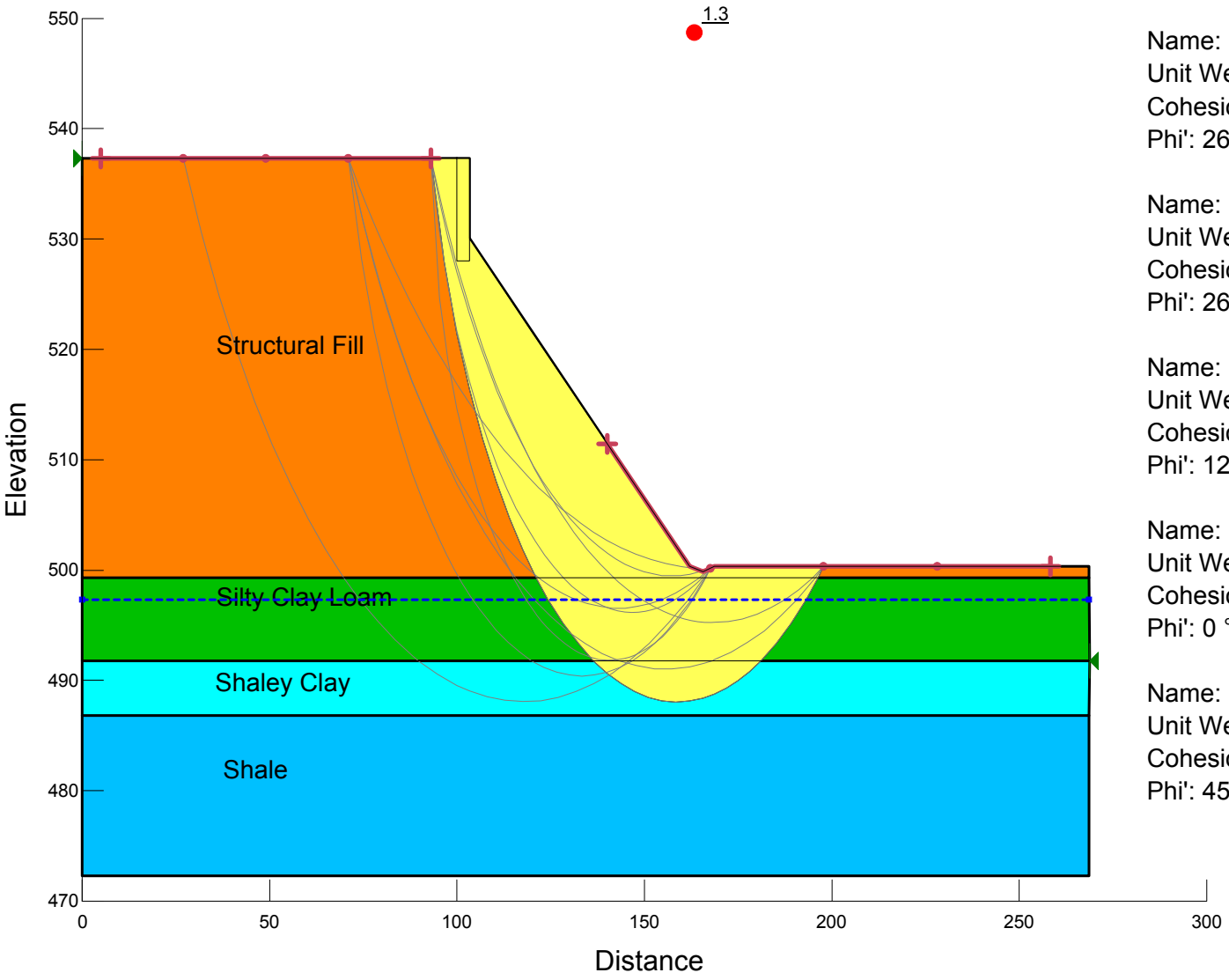
Name: Silty Clay Loam
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °

Name: Shaley Clay
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 12 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 5,000 psf
Phi': 0 °

Name: Concrete
Unit Weight: 150 pcf
Cohesion': 5,000 psf
Phi': 45 °

IL 8 over BNRR
West Abutment
Seismic Analysis
PGA = 0.045 g



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °

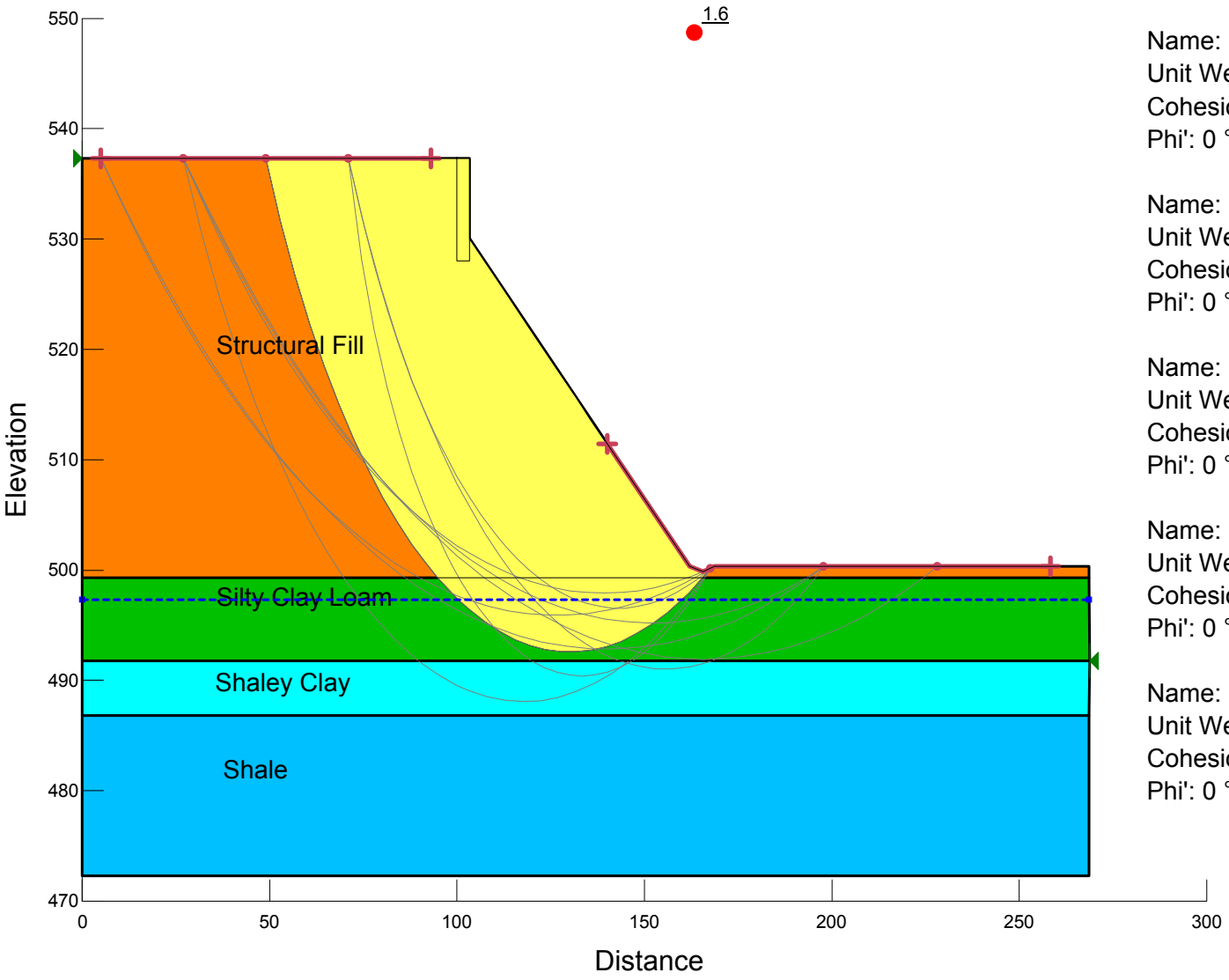
Name: Silty Clay Loam
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °

Name: Shaley Clay
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 12 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 5,000 psf
Phi': 0 °

Name: Concrete
Unit Weight: 150 pcf
Cohesion': 5,000 psf
Phi': 45 °

IL 8 over BNRR
West Abutment
End of Construction Analysis
District Remediation Plan Improvement



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °

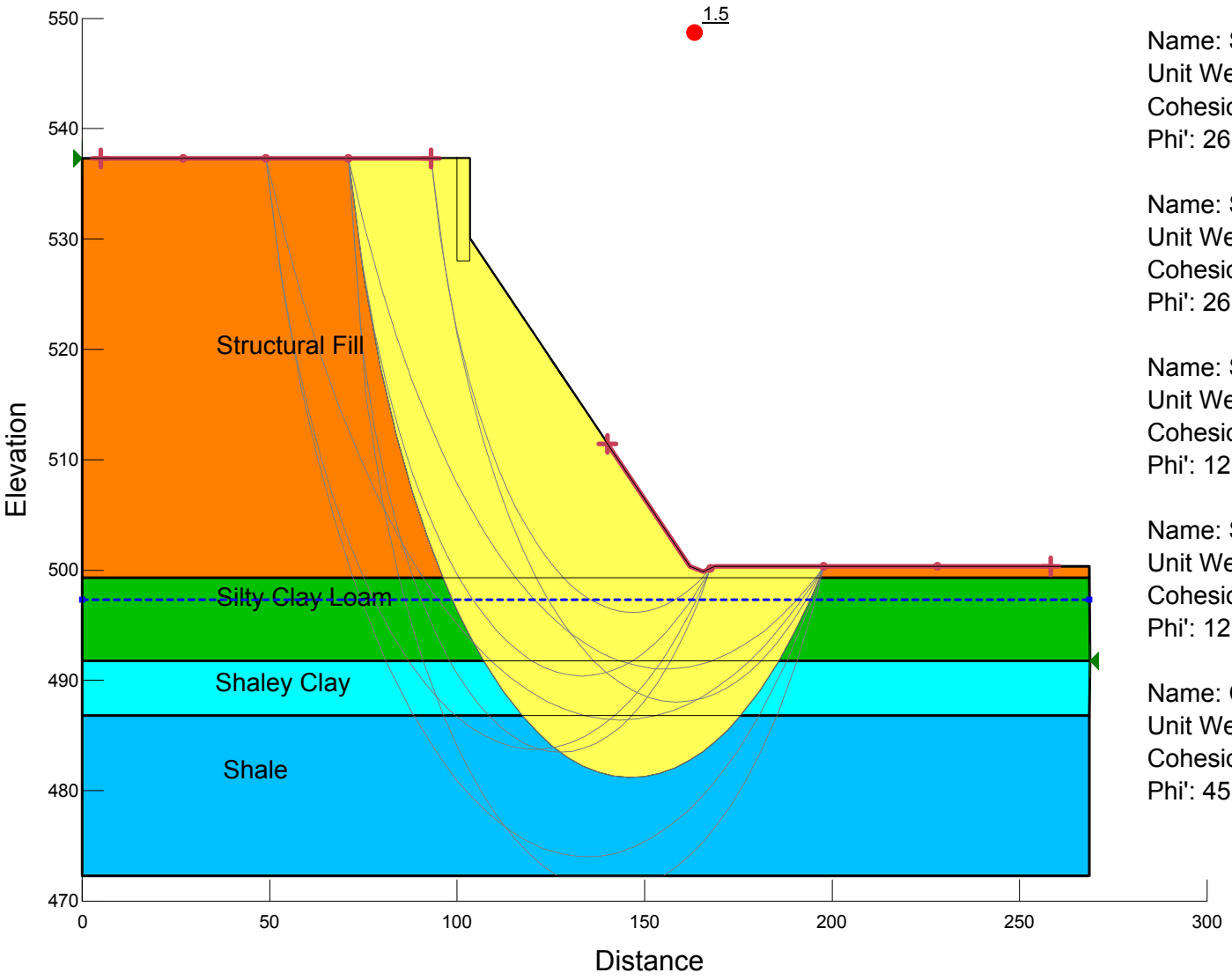
Name: Silty Clay Loam
Unit Weight: 125 pcf
Cohesion': 800 psf
Phi': 0 °

Name: Shaley Clay
Unit Weight: 125 pcf
Cohesion': 1,800 psf
Phi': 0 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 5,000 psf
Phi': 0 °

Name: Concrete
Unit Weight: 150 pcf
Cohesion': 5,000 psf
Phi': 0 °

IL 8 over BNRR
West Abutment
Long Term Analysis
District Remediation Plan Improvement



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °

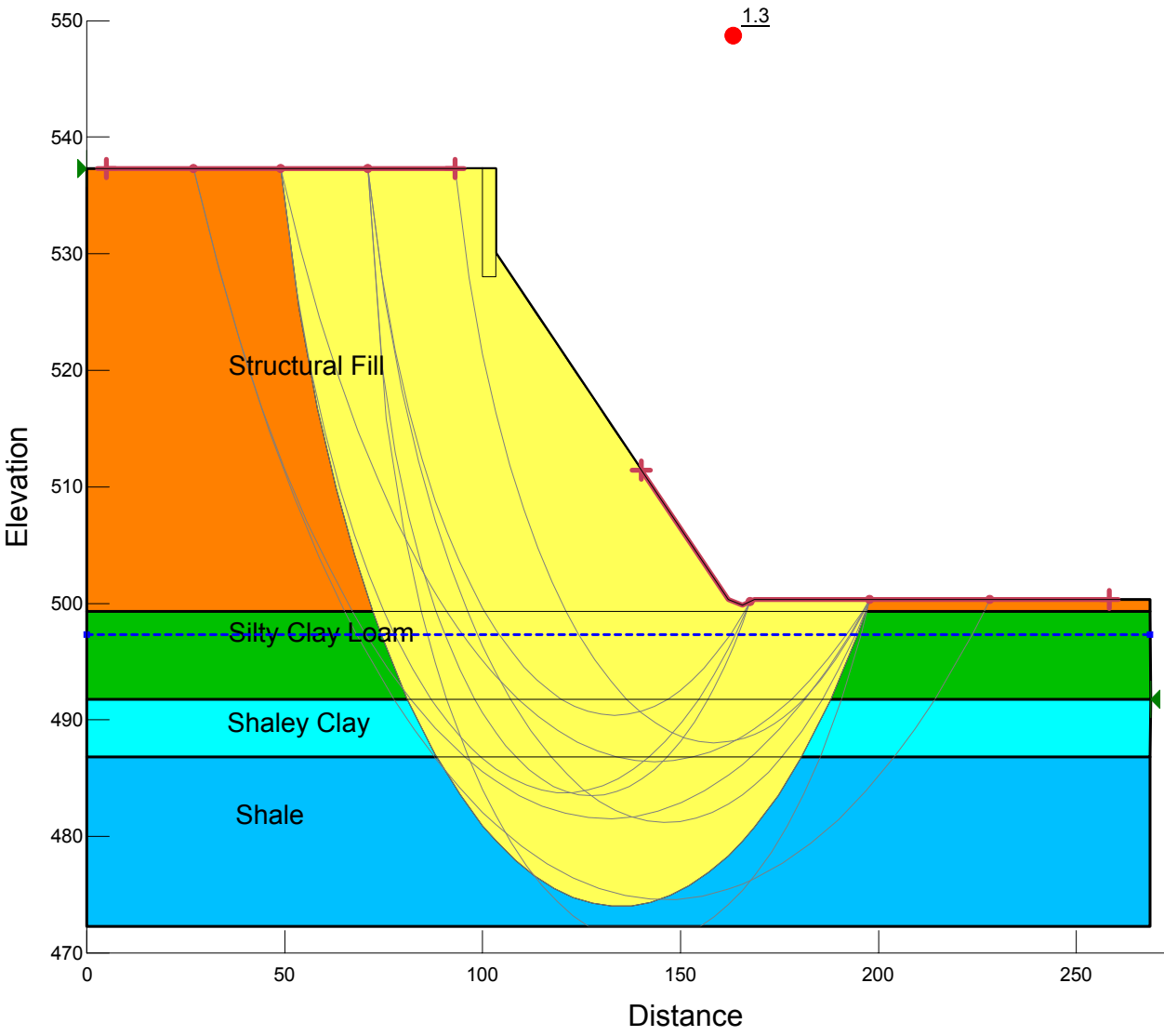
Name: Silty Clay Loam
Unit Weight: 125 pcf
Cohesion': 150 psf
Phi': 26 °

Name: Shaley Clay
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 12 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 500 psf
Phi': 12 °

Name: Concrete
Unit Weight: 150 pcf
Cohesion': 5,000 psf
Phi': 45 °

IL 8 over BNRR
West Abutment
Seismic Analysis
PGA = 0.045 g
District Remediation Plan Improvement



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °

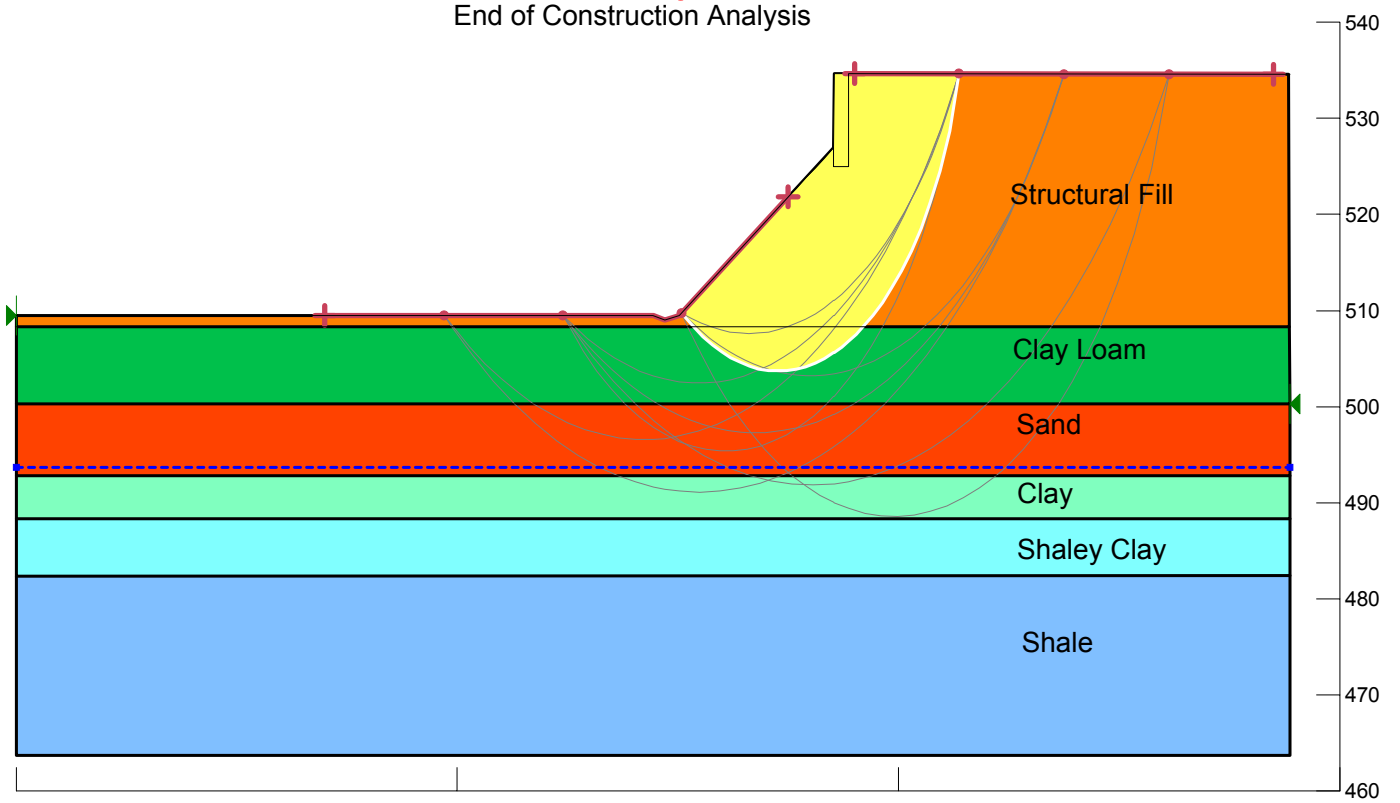
Name: Silty Clay Loam
Unit Weight: 125 pcf
Cohesion': 150 psf
Phi': 26 °

Name: Shaley Clay
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 12 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 500 psf
Phi': 12 °

Name: Concrete
Unit Weight: 150 pcf
Cohesion': 5,000 psf
Phi': 45 °

IL 8 over BNRR
East Abutment 2.6
End of Construction Analysis



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °

Name: Clay Loam
Unit Weight: 125 pcf
Cohesion': 1,100 psf
Phi': 0 °

Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °

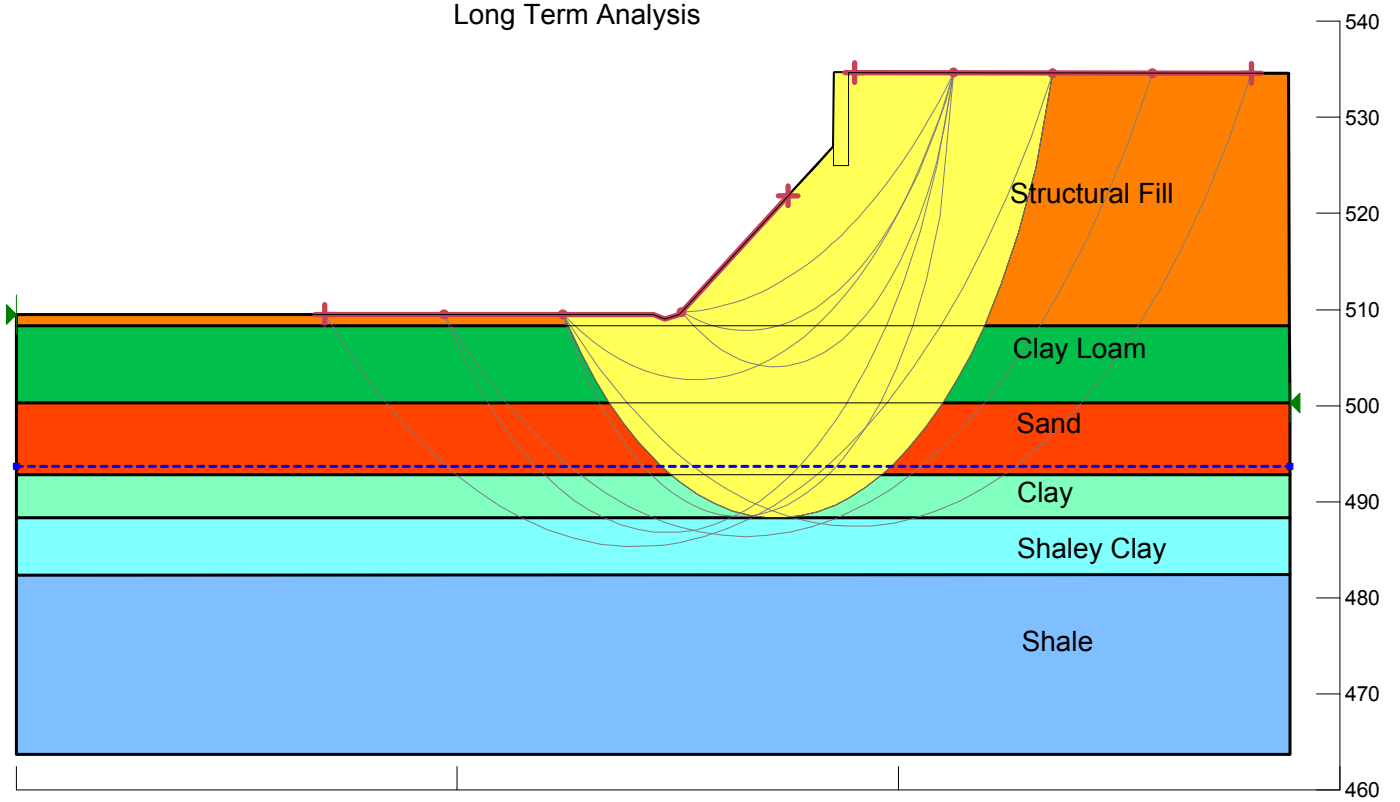
Name: Clay
Unit Weight: 125 pcf
Cohesion': 650 psf
Phi': 0 °

Name: Shaley Clay
Unit Weight: 130 pcf
Cohesion': 4,700 psf
Phi': 0 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 5,000 psf
Phi': 0 °

Name: Concrete
Unit Weight: 150 pcf
Cohesion': 5,000 psf
Phi': 0 °

IL 8 over BNRR
East Abutment 1.5
Long Term Analysis



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °

Name: Clay Loam
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °

Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °

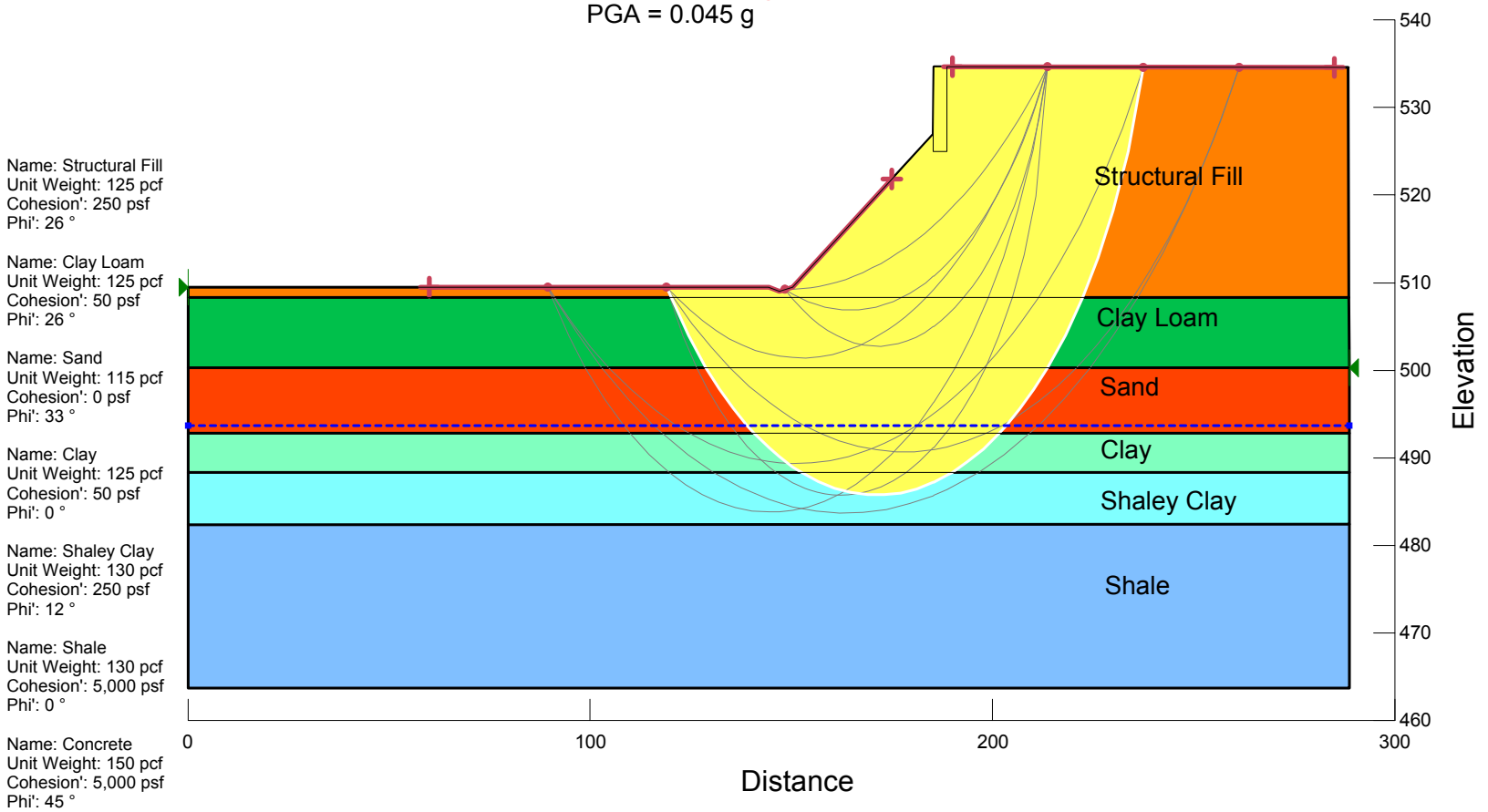
Name: Clay
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 0 °

Name: Shaley Clay
Unit Weight: 130 pcf
Cohesion': 250 psf
Phi': 12 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 5,000 psf
Phi': 0 °

Name: Concrete
Unit Weight: 150 pcf
Cohesion': 5,000 psf
Phi': 45 °

IL 8 over BNRR
East Abutment
Seismic Analysis 1.6
PGA = 0.045 g



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °

Name: Clay Loam
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °

Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °

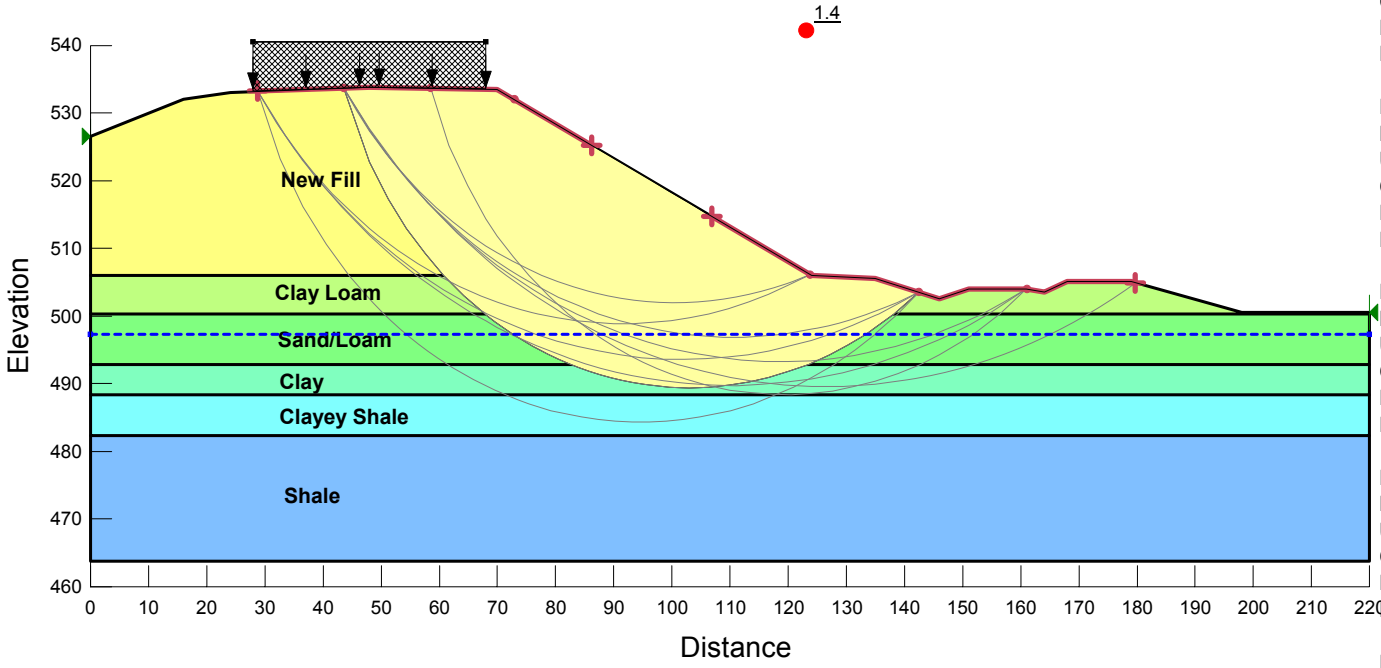
Name: Clay
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 0 °

Name: Shaley Clay
Unit Weight: 130 pcf
Cohesion': 250 psf
Phi': 12 °

Name: Shale
Unit Weight: 130 pcf
Cohesion': 5,000 psf
Phi': 0 °

Name: Concrete
Unit Weight: 150 pcf
Cohesion': 5,000 psf
Phi': 45 °

IL 8 over BNRR
Station 145+00 2:1 Bridge Cone Slope
End-of-Construction (Undrained)



Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °
Piezometric Line: 1

Name: Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,200 psf
Phi': 0 °
Piezometric Line: 1

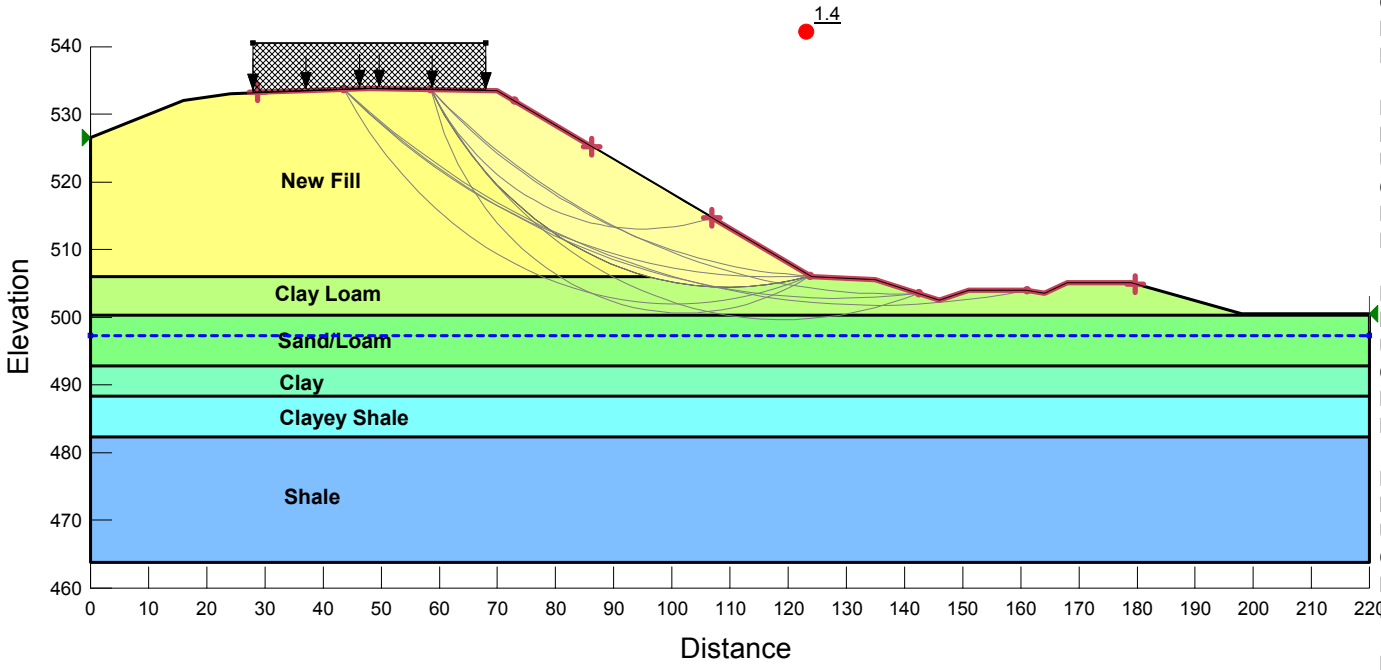
Name: Sand/Loam
Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Piezometric Line: 1

Name: Clay
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 650 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,900 psf
Phi': 0 °
Piezometric Line: 1

Name: Shale
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 7,000 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 145+00 2:1 Bridge Cone Slope
Long Term (Drained)



Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Piezometric Line: 1

Name: Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °
Piezometric Line: 1

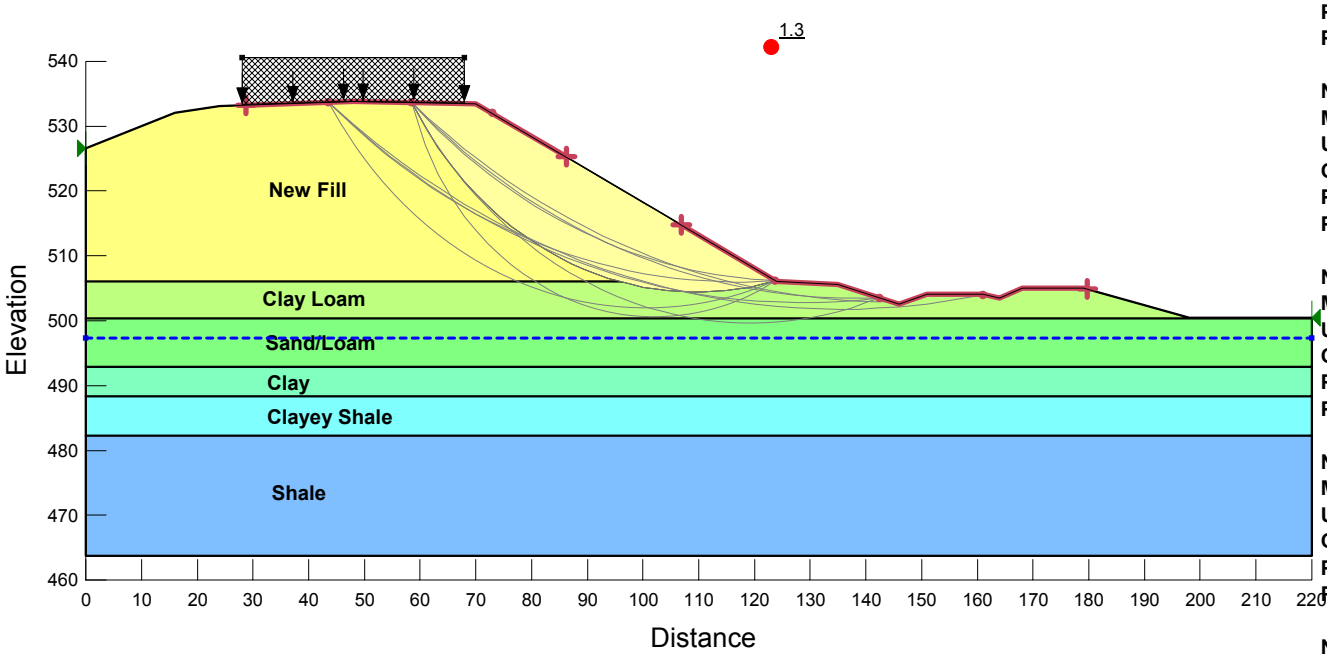
Name: Sand/Loam
Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Piezometric Line: 1

Name: Clay
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °
Piezometric Line: 1

Name: Clayey Shale
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,900 psf
Phi': 0 °
Piezometric Line: 1

Name: Shale
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 7,000 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 145+00 2:1 Bridge Cone Slope
Seismic PGA = 0.045



Cohesion': 250 psf
Phi': 26 °
Piezometric Line: 1

Name: Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °
Piezometric Line: 1

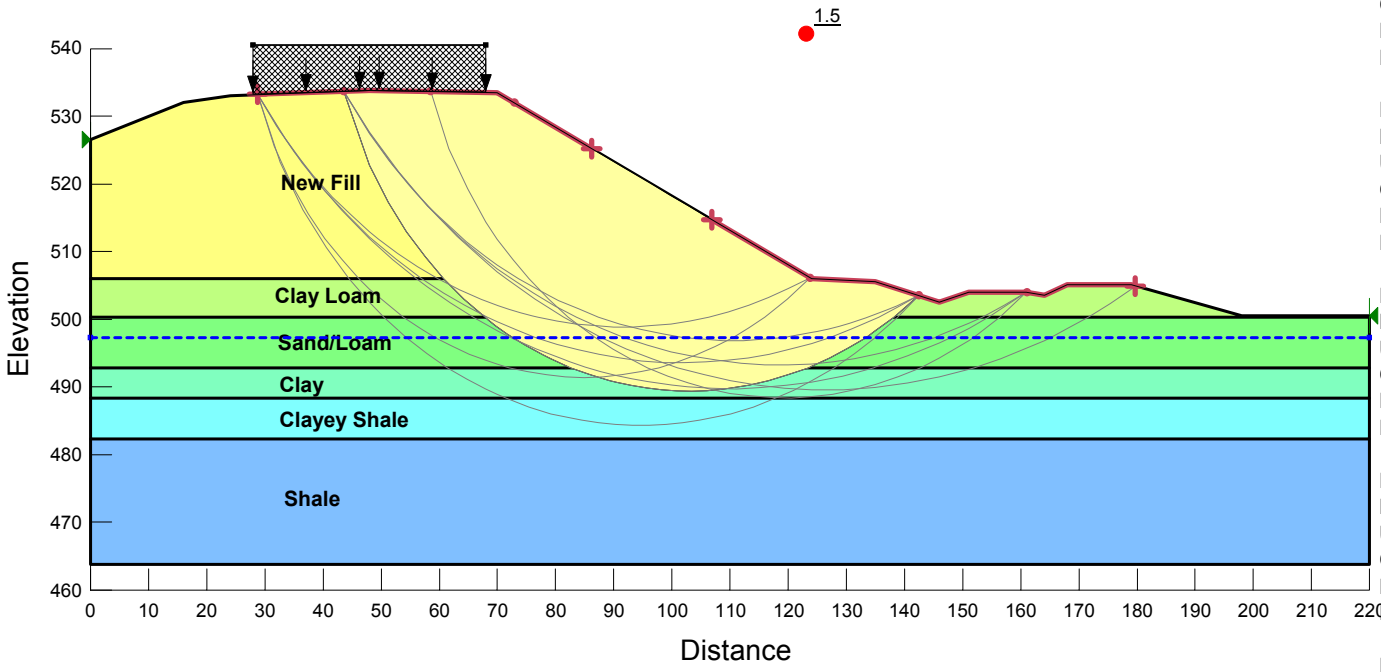
Name: Sand/Loam
Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Piezometric Line: 1

Name: Clay
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °
Piezometric Line: 1

Name: Clayey Shale
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,900 psf
Phi': 0 °
Piezometric Line: 1

Name: Shale
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 7,000 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 145+00 2:1 Bridge Cone Slope
End-of-Construction (Undrained)
District Remediation Plan



Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °
Piezometric Line: 1

Name: Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °
Piezometric Line: 1

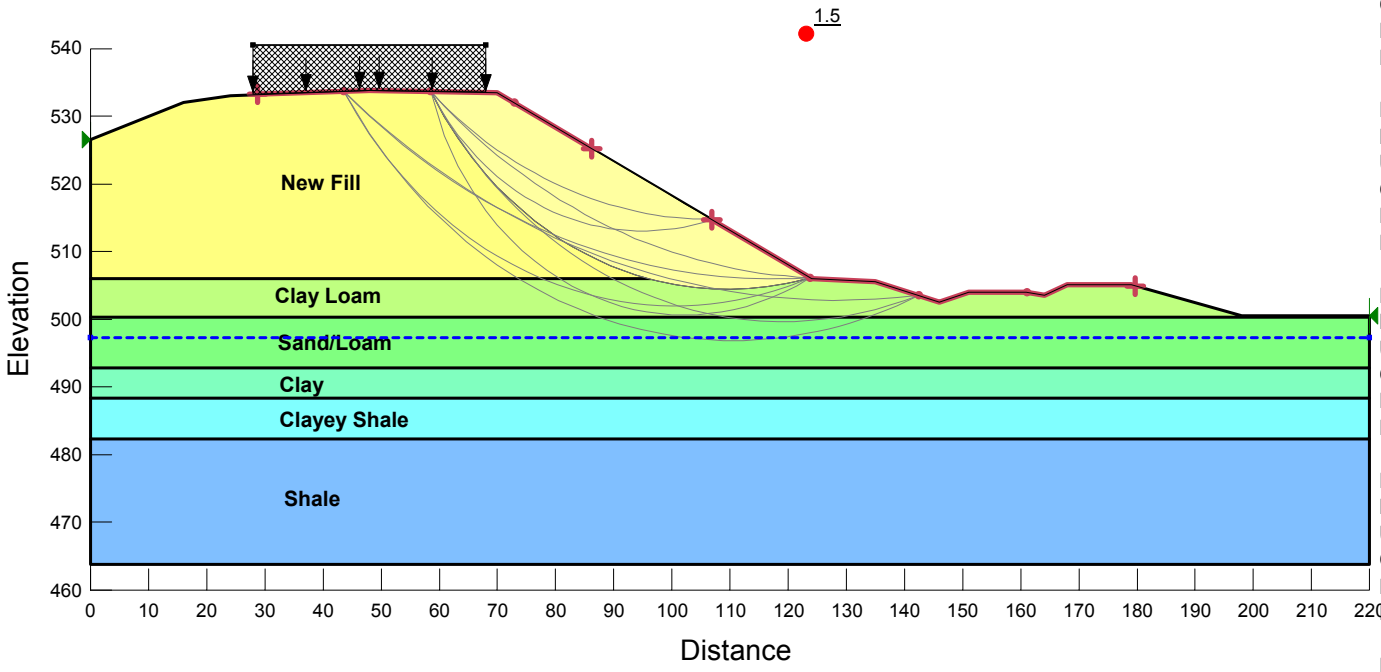
Name: Sand/Loam
Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Piezometric Line: 1

Name: Clay
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 650 psf
Phi': 0 °
Piezometric Line: 1

Name: Clayey Shale
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,900 psf
Phi': 0 °
Piezometric Line: 1

Name: Shale
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 7,000 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 145+00 2:1 Bridge Cone Slope
Long Term (Drained)
District Remediation Plan



Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Piezometric Line: 1

Name: Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Piezometric Line: 1

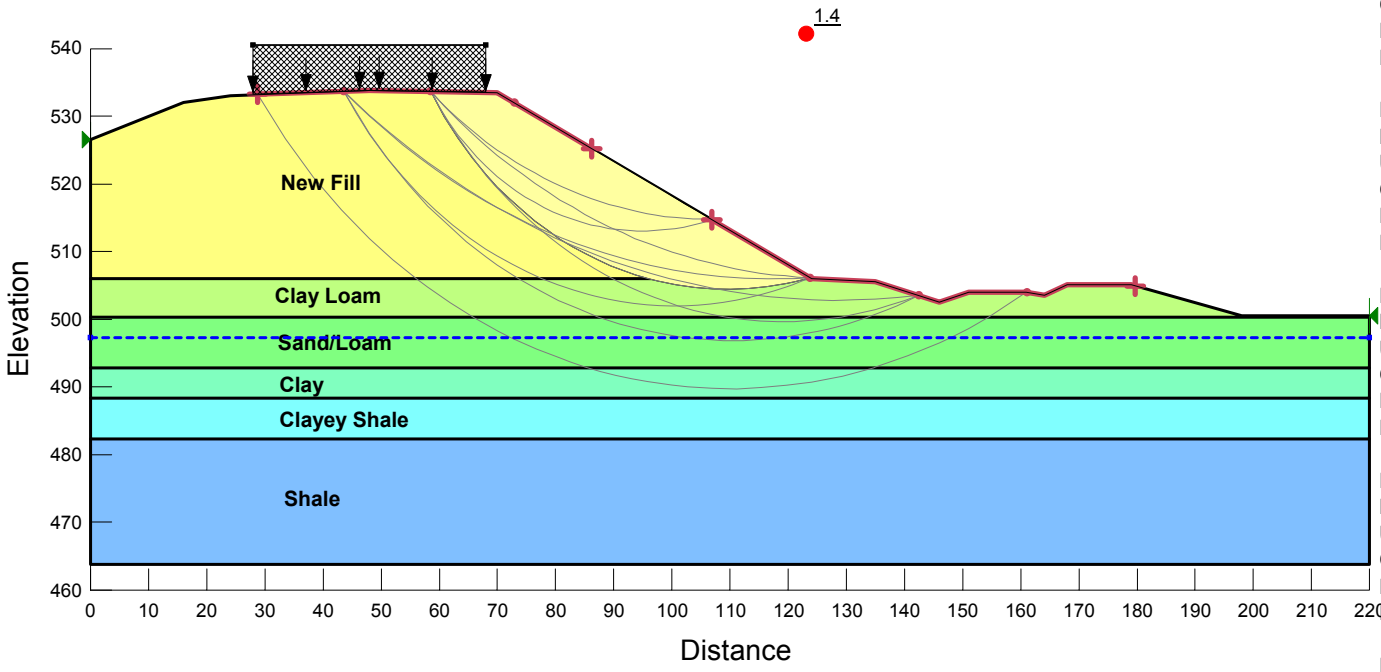
Name: Sand/Loam
Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Piezometric Line: 1

Name: Clay
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °
Piezometric Line: 1

Name: Clayey Shale
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,900 psf
Phi': 0 °
Piezometric Line: 1

Name: Shale
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 7,000 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Station 145+00 2:1 Bridge Cone Slope
Seismic PGA = 0.045
District Remediation Plan



Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Piezometric Line: 1

Name: Clay Loam
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °
Piezometric Line: 1

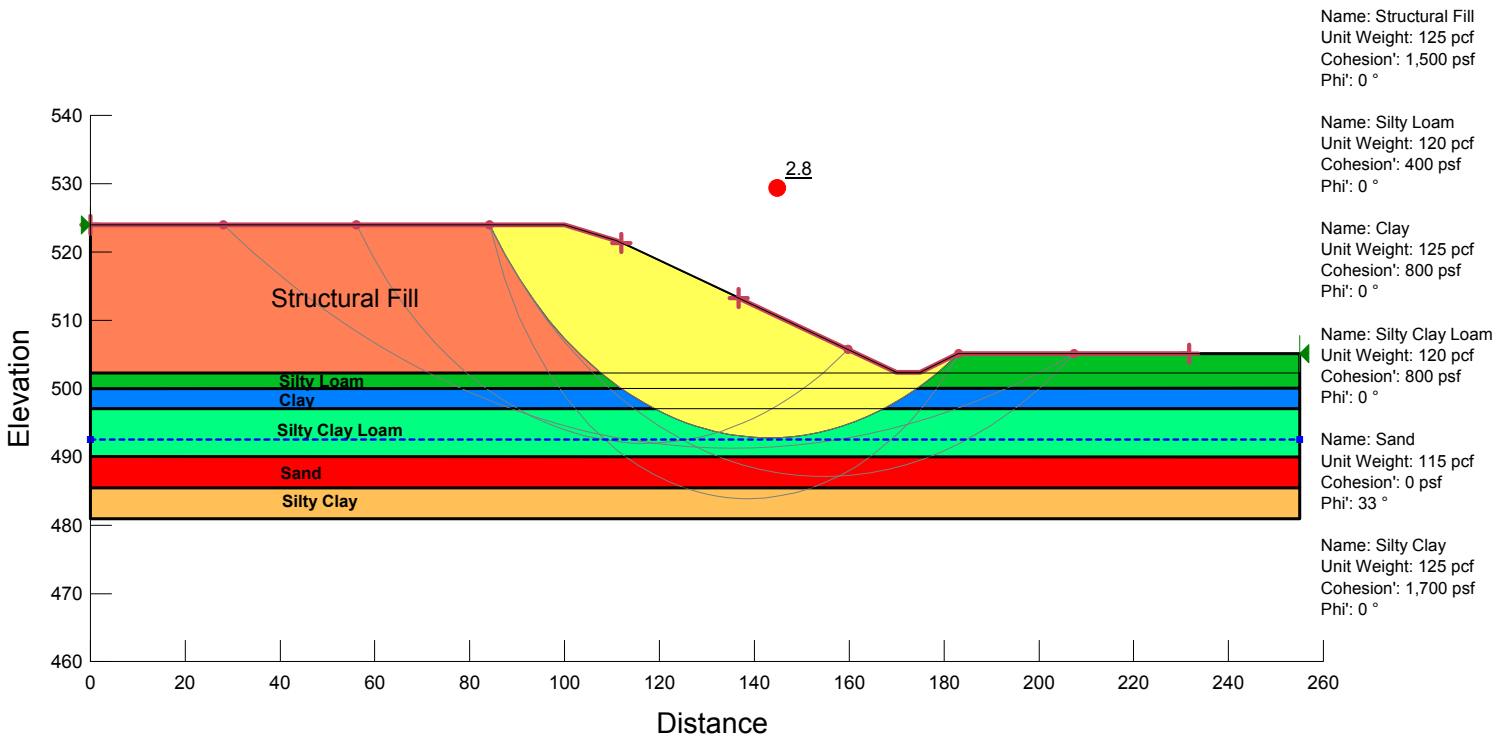
Name: Sand/Loam
Model: Mohr-Coulomb
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °
Piezometric Line: 1

Name: Clay
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 50 psf
Phi': 26 °
Piezometric Line: 1

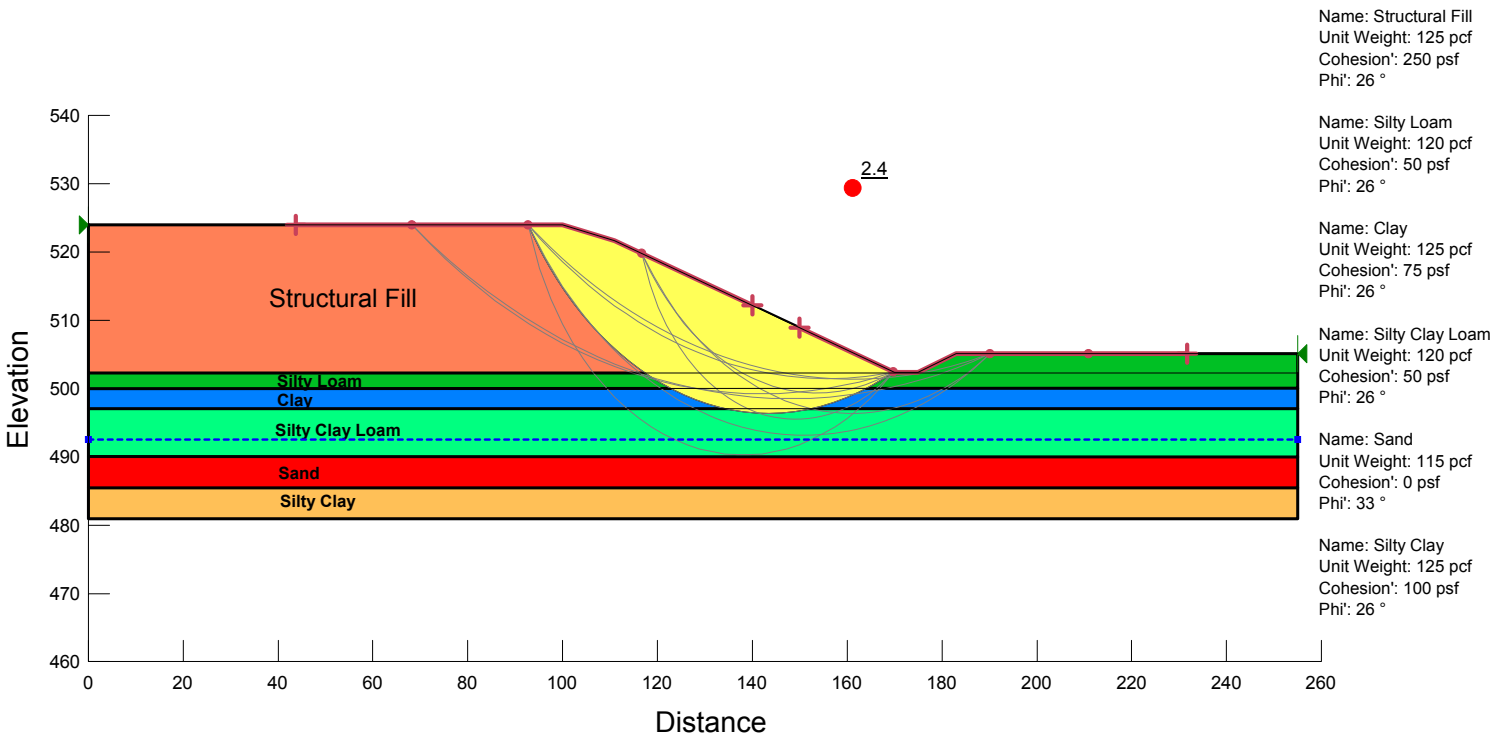
Name: Clayey Shale
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,900 psf
Phi': 0 °
Piezometric Line: 1

Name: Shale
Model: Mohr-Coulomb
Unit Weight: 130 pcf
Cohesion': 7,000 psf
Phi': 0 °
Piezometric Line: 1

IL 8 over BNRR
Sta 148+00
End of Construction Analysis



IL 8 over BNRR
Sta 148+00
Long Term Analysis



Name: Structural Fill
Unit Weight: 125 pcf
Cohesion': 250 psf
Phi': 26 °

Name: Silty Loam
Unit Weight: 120 pcf
Cohesion': 50 psf
Phi': 26 °

Name: Clay
Unit Weight: 125 pcf
Cohesion': 75 psf
Phi': 26 °

Name: Silty Clay Loam
Unit Weight: 120 pcf
Cohesion': 50 psf
Phi': 26 °

Name: Sand
Unit Weight: 115 pcf
Cohesion': 0 psf
Phi': 33 °

Name: Silty Clay
Unit Weight: 125 pcf
Cohesion': 100 psf
Phi': 26 °

IL 8 over BNRR
Sta 148+00
Seismic Analysis
PGA = 0.045 g

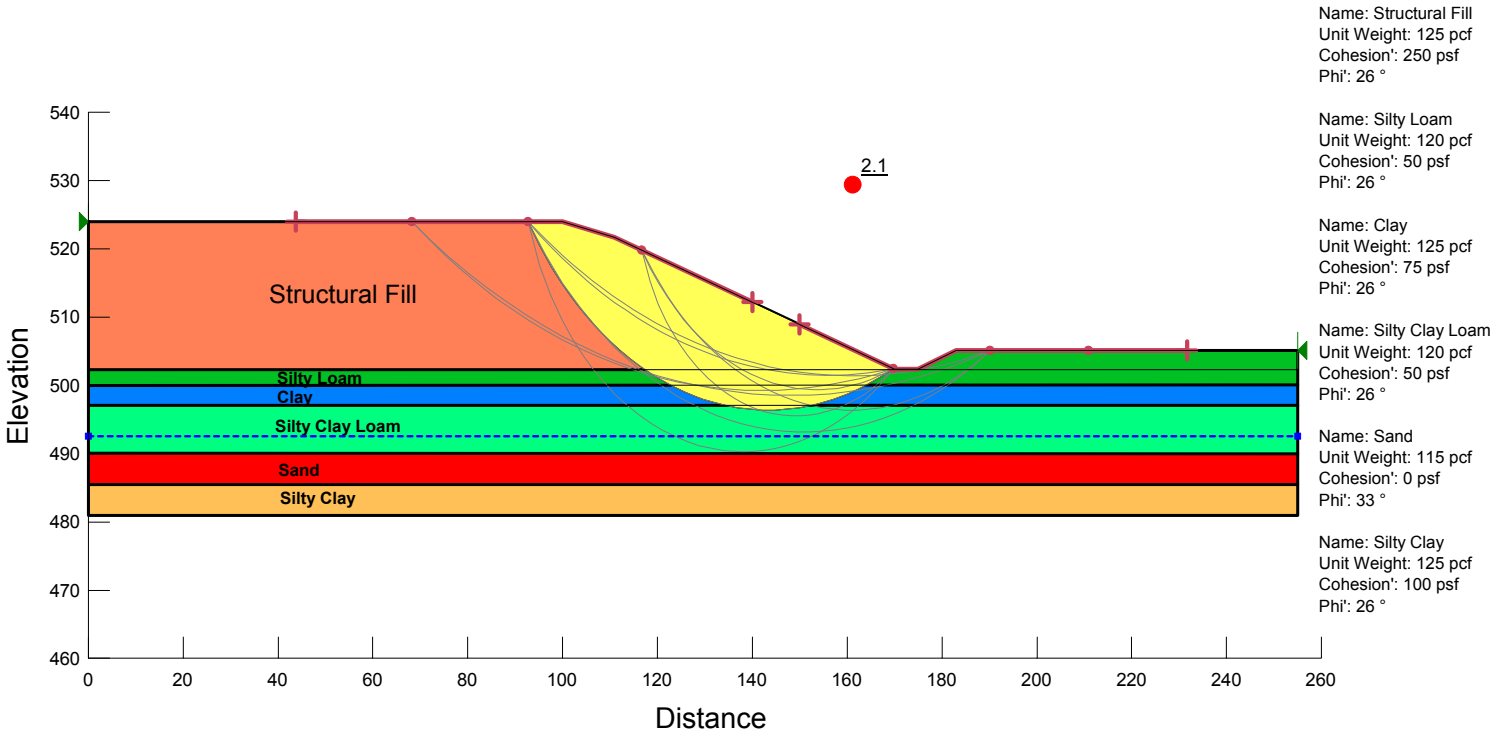


Exhibit F

Illinois State Geological Survey Mine Map

ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE

ILLINOIS

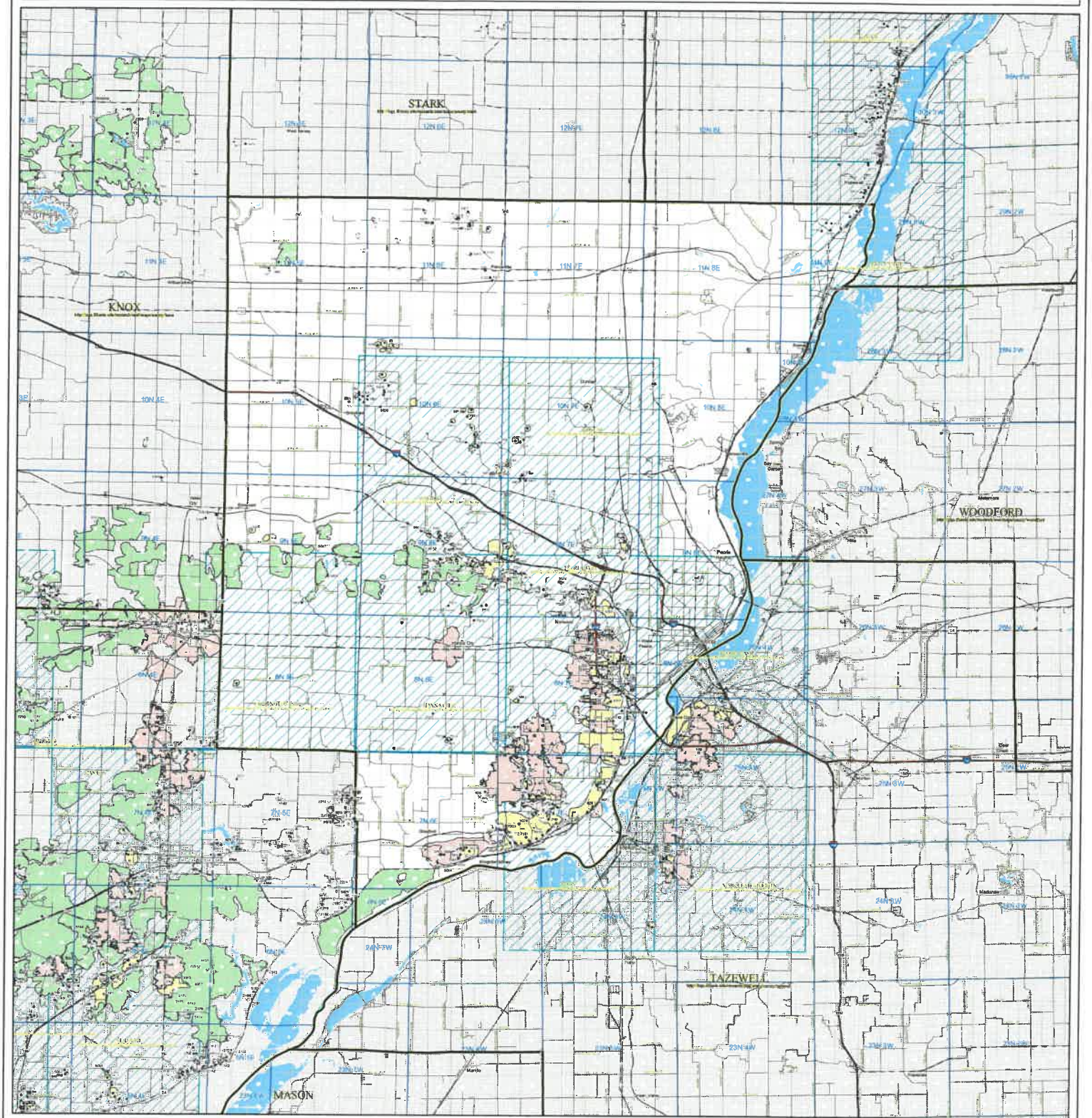
For further information contact:
Prairie Research Institute
Illinois State Geological Survey
University of Illinois at Urbana-Champaign
615 East Peabody Drive
Champaign, Illinois 61820-6964
(217) 333-4747
http://www.isgs.illinois.edu

Coal Mines and Industrial Mineral Mines
PEORIA
County

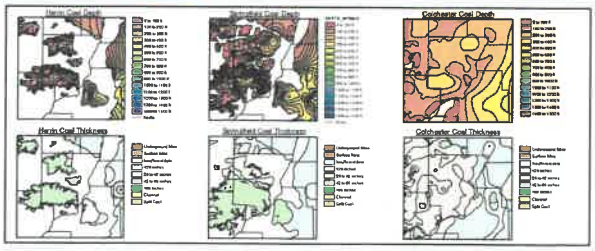
County Coal Map Series
ISGS Coal Section
Map construction: August 25, 2017

This product is under review and may not meet the standards of the Illinois State Geological Survey.

County coal maps and select quadrangle maps available as downloadable PDF files at: http://www.isgs.illinois.edu



1:100,000



- County
- Township
- Section
- Quadrangle study (Available on Website)
- Lake or river
- Coal mine - active
- Underground coal mine - abandoned
- Surface coal mine - abandoned
- Indefinite underground coal mine boundary - abandoned
- Underground industrial mine and surrounding buffer region
- 951, 951 Coal mine index number (polygon label, point label)
- Opening type unknown
- Uncertain location
- Active surface tipple
- Abandoned surface tipple
- Active shaft
- Abandoned shaft
- Active slope
- Abandoned slope
- Active drift
- Abandoned drift
- Underground industrial mine entrance or general location

Map Explanation

This map accompanies the coal mine directory for this county. Please consult the directory for an explanation of the coal mine information shown on this map. Buffer regions for industrial mineral mines were incorporated into this map due to limited information regarding these mines. The size of the buffer region is dependent on the uncertainty or inaccuracy of the mine location. For more information regarding industrial mineral mines please contact the ISGS Industrial Minerals Section.

The maps and digital files used for this study were compiled from data obtained from a variety of public and private sources and have varying degrees of completeness and accuracy. They present reasonable interpretations of the geology of the area and are based on available data. These data were compiled and digitized at a scale of 1:62,500. Locations of some features may be offset by 500 feet or more due to errors in the original source maps, the compilation process, digitizing, or a combination of these factors.

These data are not intended for use in site-specific screening or decision-making. Data included in this map are suitable for use at a scale of 1:100,000.

Disclaimer

The Illinois State Geological Survey and the University of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this data set and accept no liability for the consequences of decisions made by others on the basis of the information presented here.

Exhibit G

Pile Length/Pile Type

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== West Abutment
REFERENCE BORING ========== B-6
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 530.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 525.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== DD
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 491.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1402 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 34.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 329.88 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 123.71 KIPS

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
705 KIPS	**704** KIPS	**241** KIPS	**50** FT.

PILE TYPE AND SIZE ========== Steel HP 14 X 89
Plugged Pile Perimeter========== 4.750 FT. Unplugged Pile Perimeter========== 7.033 FT.
Plugged Pile End Bearing Area========== 1.409 SQFT. Unplugged Pile End Bearing Area========= 0.181 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
500.30	24.70	1.00	8		83.4		***93.9***	123.4		124.8	94	46	92	-86	30
496.80	3.50		4	Very Fine Silty Sand	1.0	10.5	***89.7***	1.5	1.4	125.6	90	46	93	-90	33
494.30	2.50		2	Very Fine Silty Sand	0.4	5.3	***92.7***	0.5	0.7	126.5	93	47	93	-89	36
491.80	2.50	0.40	3		3.8	7.9	***124.1***	5.6	1.0	135.7	124	49	98	-78	38
489.30	2.50	1.80	15		12.9	35.5	***137.0***	19.1	4.6	154.8	137	49	98	-71	41
486.80	2.50	1.80	24		12.9	35.5	289.9	19.1	4.6	***191.9***	192	49	98	-41	43
485.80	1.00			Shale	59.2	175.5	349.0	87.6	22.6	***279.5***	280	49	98	7	44.2
484.80	1.00			Shale	59.2	175.5	408.2	87.6	22.6	***367.2***	367	49	98	56	45.2
483.80	1.00			Shale	59.2	175.5	467.4	87.6	22.6	***454.8***	455	49	98	104	46.2
482.80	1.00			Shale	59.2	175.5	***526.5***	87.6	22.6	542.4	527	49	98	143	47.2
481.80	1.00			Shale	59.2	175.5	***585.7***	87.6	22.6	630.0	586	49	98	176	48.2
480.80	1.00			Shale	59.2	175.5	***644.9***	87.6	22.6	717.6	645	49	98	208	49.2
479.80	1.00			Shale	59.2	175.5	***704.1***	87.6	22.6	805.2	704	49	98	241	50.2
478.80	1.00			Shale	59.2	175.5	***763.2***	87.6	22.6	892.8	~~763~~	~~49~~	~~98~~	~~273~~	~~51.2~~
477.80	1.00			Shale	59.2	175.5	***822.4***	87.6	22.6	980.5	~~822~~	~~49~~	~~98~~	~~306~~	~~52.2~~
476.80	1.00			Shale	59.2	175.5	***881.6***	87.6	22.6	1068.1	~~882~~	~~49~~	~~98~~	~~339~~	~~53.2~~
475.80	1.00			Shale	59.2	175.5	***940.7***	87.6	22.6	1155.7	~~941~~	~~49~~	~~98~~	~~371~~	~~54.2~~
474.80	1.00			Shale	59.2	175.5	***999.9***	87.6	22.6	1243.3	~~1000~~	~~49~~	~~98~~	~~404~~	~~55.2~~
473.80	1.00			Shale	59.2	175.5	***1059.1***	87.6	22.6	1330.9	~~1059~~	~~49~~	~~98~~	~~436~~	~~56.2~~
472.80	1.00			Shale	59.2	175.5	***1118.3***	87.6	22.6	1418.5	~~1118~~	~~49~~	~~98~~	~~469~~	~~57.2~~
472.30	0.50			Shale	29.6	175.5	***1147.8***	43.8	22.6	1462.3	~~1148~~	~~49~~	~~98~~	~~485~~	~~57.7~~
471.80	0.50			Shale		175.5			22.6						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== West Abutment
REFERENCE BORING ========== B-6
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 530.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 525.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 491.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1402 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 34.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 329.88 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 123.71 KIPS

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
705 KIPS	**704** KIPS	**387** KIPS	**50** FT.

PILE TYPE AND SIZE ========== Steel HP 14 X 89
Plugged Pile Perimeter========== 4.750 FT. Unplugged Pile Perimeter========== 7.033 FT.
Plugged Pile End Bearing Area========== 1.409 SQFT. Unplugged Pile End Bearing Area========= 0.181 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
500.30	24.70	1.00	8		83.4		***93.9***	123.4		124.8	94	0	0	52	30
496.80	3.50		4	Very Fine Silty Sand	1.0	10.5	***89.7***	1.5	1.4	125.6	90	0	0	49	33
494.30	2.50		2	Very Fine Silty Sand	0.4	5.3	***92.7***	0.5	0.7	126.5	93	0	0	51	36
491.80	2.50	0.40	3		3.8	7.9	***124.1***	5.6	1.0	135.7	124	0	0	68	38
489.30	2.50	1.80	15		12.9	35.5	***137.0***	19.1	4.6	154.8	137	0	0	75	41
486.80	2.50	1.80	24		12.9	35.5	289.9	19.1	4.6	***191.9***	192	0	0	106	43
485.80	1.00			Shale	59.2	175.5	349.0	87.6	22.6	***279.5***	280	0	0	154	44.2
484.80	1.00			Shale	59.2	175.5	408.2	87.6	22.6	***367.2***	367	0	0	202	45.2
483.80	1.00			Shale	59.2	175.5	467.4	87.6	22.6	***454.8***	455	0	0	250	46.2
482.80	1.00			Shale	59.2	175.5	***526.5***	87.6	22.6	542.4	527	0	0	290	47.2
481.80	1.00			Shale	59.2	175.5	***585.7***	87.6	22.6	630.0	586	0	0	322	48.2
480.80	1.00			Shale	59.2	175.5	***644.9***	87.6	22.6	717.6	645	0	0	355	49.2
479.80	1.00			Shale	59.2	175.5	***704.1***	87.6	22.6	805.2	704	0	0	387	50.2
478.80	1.00			Shale	59.2	175.5	***763.2***	87.6	22.6	892.8	~~763~~	~~0~~	~~0~~	~~420~~	~~51.2~~
477.80	1.00			Shale	59.2	175.5	***822.4***	87.6	22.6	980.5	~~822~~	~~0~~	~~0~~	~~452~~	~~52.2~~
476.80	1.00			Shale	59.2	175.5	***881.6***	87.6	22.6	1068.1	~~882~~	~~0~~	~~0~~	~~485~~	~~53.2~~
475.80	1.00			Shale	59.2	175.5	***940.7***	87.6	22.6	1155.7	~~941~~	~~0~~	~~0~~	~~517~~	~~54.2~~
474.80	1.00			Shale	59.2	175.5	***999.9***	87.6	22.6	1243.3	~~1000~~	~~0~~	~~0~~	~~550~~	~~55.2~~
473.80	1.00			Shale	59.2	175.5	***1059.1***	87.6	22.6	1330.9	~~1059~~	~~0~~	~~0~~	~~582~~	~~56.2~~
472.80	1.00			Shale	59.2	175.5	***1118.3***	87.6	22.6	1418.5	~~1118~~	~~0~~	~~0~~	~~615~~	~~57.2~~
472.30	0.50			Shale	29.6	175.5	***1147.8***	43.8	22.6	1462.3	~~1148~~	~~0~~	~~0~~	~~631~~	~~57.7~~
471.80	0.50			Shale		175.5			22.6						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== West Abutment - Pre Core
REFERENCE BORING ========== B-6
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 530.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 491.80 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 491.80 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1402 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 34.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 329.88 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 123.71 KIPS

PILE TYPE AND SIZE ========== Steel HP 14 X 89
Plugged Pile Perimeter========== 4.750 FT. Unplugged Pile Perimeter========== 7.033 FT.
Plugged Pile End Bearing Area========== 1.409 SQFT. Unplugged Pile End Bearing Area========= 0.181 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
705 KIPS	**675** KIPS	**371** KIPS	**51** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
489.30	2.50	1.80	15		12.9		48.5	19.1		***23.7***	24	0	0	13	41
486.80	2.50	1.80	24		12.9	35.5	201.3	19.1	4.6	***60.8***	61	0	0	33	43
485.80	1.00			Shale	59.2	175.5	260.5	87.6	22.6	***148.4***	148	0	0	82	44.2
484.80	1.00			Shale	59.2	175.5	319.7	87.6	22.6	***236.1***	236	0	0	130	45.2
483.80	1.00			Shale	59.2	175.5	378.8	87.6	22.6	***323.7***	324	0	0	178	46.2
482.80	1.00			Shale	59.2	175.5	438.0	87.6	22.6	***411.3***	411	0	0	226	47.2
481.80	1.00			Shale	59.2	175.5	***497.2***	87.6	22.6	498.9	497	0	0	273	48.2
480.80	1.00			Shale	59.2	175.5	***556.3***	87.6	22.6	586.5	556	0	0	306	49.2
479.80	1.00			Shale	59.2	175.5	***615.5***	87.6	22.6	674.1	616	0	0	339	50.2
478.80	1.00			Shale	59.2	175.5	***674.7***	87.6	22.6	761.8	675	0	0	371	51.2
477.80	1.00			Shale	59.2	175.5	***733.9***	87.6	22.6	849.4	~~734~~	~~0~~	~~0~~	~~404~~	~~52.2~~
476.80	1.00			Shale	59.2	175.5	***793.0***	87.6	22.6	937.0	~~793~~	~~0~~	~~0~~	~~436~~	~~53.2~~
475.80	1.00			Shale	59.2	175.5	***852.2***	87.6	22.6	1024.6	~~852~~	~~0~~	~~0~~	~~469~~	~~54.2~~
474.80	1.00			Shale	59.2	175.5	***911.4***	87.6	22.6	1112.2	~~911~~	~~0~~	~~0~~	~~501~~	~~55.2~~
473.80	1.00			Shale	59.2	175.5	***970.5***	87.6	22.6	1199.8	~~971~~	~~0~~	~~0~~	~~534~~	~~56.2~~
472.80	1.00			Shale	59.2	175.5	***1029.7***	87.6	22.6	1287.4	~~1030~~	~~0~~	~~0~~	~~566~~	~~57.2~~
472.30	0.50			Shale	29.6	175.5	***1059.3***	43.8	22.6	1331.2	~~1059~~	~~0~~	~~0~~	~~583~~	~~57.7~~
471.80	0.50			Shale	29.6	175.5	***1088.9***	43.8	22.6	1375.1	~~1089~~	~~0~~	~~0~~	~~599~~	~~58.2~~
470.80	1.00			Shale	59.2	175.5	***1148.1***	87.6	22.6	1462.7	~~1148~~	~~0~~	~~0~~	~~631~~	~~59.2~~
469.80	1.00			Shale	59.2	175.5	***1207.2***	87.6	22.6	1550.3	~~1207~~	~~0~~	~~0~~	~~664~~	~~60.2~~
469.30	0.50			Shale	29.6	175.5	***1236.8***	43.8	22.6	1594.1	~~1237~~	~~0~~	~~0~~	~~680~~	~~60.7~~
468.80	0.50			Shale		175.5			22.6						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 1
REFERENCE BORING ========== B-7
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 499.50 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 496.50 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 4074 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 45.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 3
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 241.42 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 90.53 KIPS

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
705 KIPS	**700** KIPS	**385** KIPS	**24** FT.

PILE TYPE AND SIZE ========== Steel HP 14 X 89
Plugged Pile Perimeter========== 4.750 FT. Unplugged Pile Perimeter========== 7.033 FT.
Plugged Pile End Bearing Area========== 1.409 SQFT. Unplugged Pile End Bearing Area========= 0.181 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
494.80	1.70		4	Very Fine Silty Sand	0.5		28.1	0.7		***4.3***	4	0	0	2	5
491.80	3.00	1.40	7		13.1	27.6	29.4	19.4	3.6	***22.1***	22	0	0	12	8
489.80	2.00	0.80	5		5.6	15.8	32.3	8.3	2.0	***30.1***	30	0	0	17	10
486.80	3.00		5	Very Fine Silty Sand	1.1	13.2	36.1	1.6	1.7	***32.1***	32	0	0	18	13
484.30	2.50		6	Very Fine Silty Sand	1.1	15.8	196.9	1.6	2.0	***54.3***	54	0	0	30	15
483.80	0.50			Shale	29.6	175.5	226.5	43.8	22.6	***98.1***	98	0	0	54	15.7
482.80	1.00			Shale	59.2	175.5	285.6	87.6	22.6	***185.7***	186	0	0	102	16.7
481.80	1.00			Shale	59.2	175.5	344.8	87.6	22.6	***273.3***	273	0	0	150	17.7
480.80	1.00			Shale	59.2	175.5	404.0	87.6	22.6	***360.9***	361	0	0	199	18.7
479.80	1.00			Shale	59.2	175.5	463.2	87.6	22.6	***448.5***	449	0	0	247	19.7
478.80	1.00			Shale	59.2	175.5	***522.3***	87.6	22.6	536.2	522	0	0	287	20.7
477.80	1.00			Shale	59.2	175.5	***581.5***	87.6	22.6	623.8	582	0	0	320	21.7
476.80	1.00			Shale	59.2	175.5	***640.7***	87.6	22.6	711.4	641	0	0	352	22.7
475.80	1.00			Shale	59.2	175.5	***699.8***	87.6	22.6	799.0	700	0	0	385	23.7
474.80	1.00			Shale	59.2	175.5	***759.0***	87.6	22.6	886.6	~~759~~	~~0~~	~~0~~	~~417~~	~~24.7~~
473.80	1.00			Shale	59.2	175.5	***818.2***	87.6	22.6	974.2	~~818~~	~~0~~	~~0~~	~~450~~	~~25.7~~
472.80	1.00			Shale	59.2	175.5	***877.4***	87.6	22.6	1061.8	~~877~~	~~0~~	~~0~~	~~483~~	~~26.7~~
471.80	1.00			Shale	59.2	175.5	***936.5***	87.6	22.6	1149.5	~~937~~	~~0~~	~~0~~	~~515~~	~~27.7~~
470.80	1.00			Shale	59.2	175.5	***995.7***	87.6	22.6	1237.1	~~996~~	~~0~~	~~0~~	~~548~~	~~28.7~~
469.80	1.00			Shale	59.2	175.5	***1054.9***	87.6	22.6	1324.7	~~1055~~	~~0~~	~~0~~	~~580~~	~~29.7~~
468.80	1.00			Shale	59.2	175.5	***1114.0***	87.6	22.6	1412.3	~~1114~~	~~0~~	~~0~~	~~613~~	~~30.7~~
467.80	1.00			Shale	59.2	175.5	***1173.2***	87.6	22.6	1499.9	~~1173~~	~~0~~	~~0~~	~~645~~	~~31.7~~
466.80	1.00			Shale	59.2	175.5	***1232.4***	87.6	22.6	1587.5	~~1232~~	~~0~~	~~0~~	~~678~~	~~32.7~~
465.80	1.00			Shale	59.2	175.5	***1291.6***	87.6	22.6	1675.2	~~1292~~	~~0~~	~~0~~	~~710~~	~~33.7~~
464.80	1.00			Shale	59.2	175.5	***1350.7***	87.6	22.6	1762.8	~~1351~~	~~0~~	~~0~~	~~743~~	~~34.7~~
463.80	1.00			Shale	59.2	175.5	***1409.9***	87.6	22.6	1850.4	~~1410~~	~~0~~	~~0~~	~~775~~	~~35.7~~
462.80	1.00			Shale	59.2	175.5	***1469.1***	87.6	22.6	1938.0	~~1469~~	~~0~~	~~0~~	~~808~~	~~36.7~~
461.80	1.00			Shale	59.2	175.5	***1528.2***	87.6	22.6	2025.6	~~1528~~	~~0~~	~~0~~	~~841~~	~~37.7~~
460.80	1.00			Shale	59.2	175.5	***1587.4***	87.6	22.6	2113.2	~~1587~~	~~0~~	~~0~~	~~873~~	~~38.7~~
459.80	1.00			Shale	59.2	175.5	***1646.6***	87.6	22.6	2200.8	~~1647~~	~~0~~	~~0~~	~~906~~	~~39.7~~
458.80	1.00			Shale	59.2	175.5	***1705.8***	87.6	22.6	2288.5	~~1706~~	~~0~~	~~0~~	~~938~~	~~40.7~~
457.80	1.00			Shale	59.2	175.5	***1764.9***	87.6	22.6	2376.1	~~1765~~	~~0~~	~~0~~	~~971~~	~~41.7~~
456.80	1.00			Shale	59.2	175.5	***1824.1***	87.6	22.6	2463.7	~~1824~~	~~0~~	~~0~~	~~1003~~	~~42.7~~
455.80	1.00			Shale	59.2	175.5	***1883.3***	87.6	22.6	2551.3	~~1883~~	~~0~~	~~0~~	~~1036~~	~~43.7~~
454.80	1.00			Shale	59.2	175.5	***1942.4***	87.6	22.6	2638.9	~~1942~~	~~0~~	~~0~~	~~1068~~	~~44.7~~
453.80	1.00			Shale	59.2	175.5	***2001.6***	87.6	22.6	2726.5	~~2002~~	~~0~~	~~0~~	~~1101~~	~~45.7~~
452.80	1.00			Shale	59.2	175.5	***2060.8***	87.6	22.6	2814.2	~~2061~~	~~0~~	~~0~~	~~1133~~	~~46.7~~
451.80	1.00			Shale		175.5			22.6						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== Pier 2
REFERENCE BORING ========== B-8
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 504.50 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 494.50 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 4074 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 45.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 3
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 241.42 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 90.53 KIPS

PILE TYPE AND SIZE ========== Steel HP 14 X 89
Plugged Pile Perimeter========== 4.750 FT. Unplugged Pile Perimeter========== 7.033 FT.
Plugged Pile End Bearing Area========== 1.409 SQFT. Unplugged Pile End Bearing Area========= 0.181 SQFT.

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
705 KIPS	**700** KIPS	**385** KIPS	**27** FT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
493.70	0.80		16	Very Fine Silty Sand	0.9		26.6	1.4		***4.7***	5	0	0	3	11
491.20	2.50	1.30	7		10.3	25.7	54.7	15.3	3.3	***22.3***	22	0	0	12	13
488.20	3.00	2.20	10		17.6	43.4	107.9	26.1	5.6	***53.0***	53	0	0	29	16
485.70	2.50	4.00	16		22.5	79.0	226.9	33.3	10.2	***98.7***	99	0	0	54	19
484.70	1.00			Shale	59.2	175.5	286.1	87.6	22.6	***186.3***	186	0	0	102	19.8
483.70	1.00			Shale	59.2	175.5	345.2	87.6	22.6	***273.9***	274	0	0	151	20.8
482.70	1.00			Shale	59.2	175.5	404.4	87.6	22.6	***361.6***	362	0	0	199	21.8
481.70	1.00			Shale	59.2	175.5	463.6	87.6	22.6	***449.2***	449	0	0	247	22.8
480.70	1.00			Shale	59.2	175.5	***522.8***	87.6	22.6	536.8	523	0	0	288	23.8
479.70	1.00			Shale	59.2	175.5	***581.9***	87.6	22.6	624.4	582	0	0	320	24.8
478.70	1.00			Shale	59.2	175.5	***641.1***	87.6	22.6	712.0	641	0	0	353	25.8
477.70	1.00			Shale	59.2	175.5	***700.3***	87.6	22.6	799.6	700	0	0	385	26.8
476.70	1.00			Shale	59.2	175.5	***759.4***	87.6	22.6	887.3	~~759~~	~~0~~	~~0~~	~~418~~	~~27.8~~
475.70	1.00			Shale	59.2	175.5	***818.6***	87.6	22.6	974.9	~~819~~	~~0~~	~~0~~	~~450~~	~~28.8~~
474.70	1.00			Shale	59.2	175.5	***877.8***	87.6	22.6	1062.5	~~878~~	~~0~~	~~0~~	~~483~~	~~29.8~~
473.70	1.00			Shale	59.2	175.5	***937.0***	87.6	22.6	1150.1	~~937~~	~~0~~	~~0~~	~~515~~	~~30.8~~
472.70	1.00			Shale	59.2	175.5	***996.1***	87.6	22.6	1237.7	~~996~~	~~0~~	~~0~~	~~548~~	~~31.8~~
471.70	1.00			Shale	59.2	175.5	***1055.3***	87.6	22.6	1325.3	~~1055~~	~~0~~	~~0~~	~~580~~	~~32.8~~
471.20	0.50			Shale	29.6	175.5	***1084.9***	43.8	22.6	1369.1	~~1085~~	~~0~~	~~0~~	~~597~~	~~33.3~~
470.20	1.00			Shale	59.2	175.5	***1144.1***	87.6	22.6	1456.8	~~1144~~	~~0~~	~~0~~	~~629~~	~~34.3~~
469.20	1.00			Shale	59.2	175.5	***1203.2***	87.6	22.6	1544.4	~~1203~~	~~0~~	~~0~~	~~662~~	~~35.3~~
468.20	1.00			Shale	59.2	175.5	***1262.4***	87.6	22.6	1632.0	~~1262~~	~~0~~	~~0~~	~~694~~	~~36.3~~
467.20	1.00			Shale	59.2	175.5	***1321.6***	87.6	22.6	1719.6	~~1322~~	~~0~~	~~0~~	~~727~~	~~37.3~~
466.20	1.00			Shale	59.2	175.5	***1380.7***	87.6	22.6	1807.2	~~1381~~	~~0~~	~~0~~	~~759~~	~~38.3~~
465.20	1.00			Shale	59.2	175.5	***1439.9***	87.6	22.6	1894.8	~~1440~~	~~0~~	~~0~~	~~792~~	~~39.3~~
464.20	1.00			Shale	59.2	175.5	***1499.1***	87.6	22.6	1982.4	~~1499~~	~~0~~	~~0~~	~~825~~	~~40.3~~
463.20	1.00			Shale	59.2	175.5	***1558.3***	87.6	22.6	2070.1	~~1558~~	~~0~~	~~0~~	~~857~~	~~41.3~~
462.20	1.00			Shale	59.2	175.5	***1617.4***	87.6	22.6	2157.7	~~1617~~	~~0~~	~~0~~	~~890~~	~~42.3~~
461.20	1.00			Shale	59.2	175.5	***1676.6***	87.6	22.6	2245.3	~~1677~~	~~0~~	~~0~~	~~922~~	~~43.3~~
460.20	1.00			Shale	59.2	175.5	***1735.8***	87.6	22.6	2332.9	~~1736~~	~~0~~	~~0~~	~~955~~	~~44.3~~
459.20	1.00			Shale	59.2	175.5	***1794.9***	87.6	22.6	2420.5	~~1795~~	~~0~~	~~0~~	~~987~~	~~45.3~~
458.20	1.00			Shale	59.2	175.5	***1854.1***	87.6	22.6	2508.1	~~1854~~	~~0~~	~~0~~	~~1020~~	~~46.3~~
457.20	1.00			Shale	59.2	175.5	***1913.3***	87.6	22.6	2595.8	~~1913~~	~~0~~	~~0~~	~~1052~~	~~47.3~~
456.20	1.00			Shale	59.2	175.5	***1972.5***	87.6	22.6	2683.4	~~1972~~	~~0~~	~~0~~	~~1085~~	~~48.3~~
455.20	1.00			Shale	59.2	175.5	***2031.6***	87.6	22.6	2771.0	~~2032~~	~~0~~	~~0~~	~~1117~~	~~49.3~~
454.20	1.00			Shale	59.2	175.5	***2090.8***	87.6	22.6	2858.6	~~2091~~	~~0~~	~~0~~	~~1150~~	~~50.3~~
453.20	1.00			Shale	59.2	175.5	***2150.0***	87.6	22.6	2946.2	~~2150~~	~~0~~	~~0~~	~~1182~~	~~51.3~~
452.20	1.00			Shale		175.5			22.6						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== East Abutment
REFERENCE BORING ========== B-9
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 527.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 522.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== DD
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 487.30 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1402 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 34.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 329.88 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 123.71 KIPS

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
705 KIPS	**663** KIPS	**231** KIPS	**51** FT.

PILE TYPE AND SIZE ========== Steel HP 14 X 89
Plugged Pile Perimeter========== 4.750 FT. Unplugged Pile Perimeter========== 7.033 FT.
Plugged Pile End Bearing Area========== 1.409 SQFT. Unplugged Pile End Bearing Area========= 0.181 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
508.30	13.70	1.00	8		46.2		85.7	68.5		***73.5***	74	25	51	-36	19
504.80	3.50		15	Very Fine Silty Sand	3.9	39.5	***69.9***	5.7	5.1	76.8	70	28	55	-44	22
500.30	4.50	1.00	5		15.2	19.7	***89.9***	22.5	2.5	99.9	90	36	72	-58	27
497.30	3.00		7	Fine Sand	1.7	24.6	***74.9***	2.5	3.2	100.2	75	37	74	-70	30
492.80	4.50		3	Very Fine Silty Sand	1.0	7.9	***73.9***	1.5	1.0	101.5	74	37	75	-72	34
490.30	2.50	0.30	2		2.9	5.9	***90.6***	4.3	0.8	107.5	91	39	78	-67	37
487.30	3.00	1.00			10.1	19.7	191.6	15.0	2.5	***134.2***	134	45	89	-60	40
484.30	3.00	5.60	15		29.6	110.6	185.7	43.9	14.2	***173.5***	173	45	89	-38	43
481.80	2.50	3.80	19		21.6	75.0	307.8	32.0	9.7	***218.5***	218	45	89	-14	45
480.80	1.00			Shale	59.2	175.5	366.9	87.6	22.6	***306.1***	306	45	89	34	46.2
479.80	1.00			Shale	59.2	175.5	426.1	87.6	22.6	***393.7***	394	45	89	83	47.2
478.80	1.00			Shale	59.2	175.5	485.3	87.6	22.6	***481.3***	481	45	89	131	48.2
477.80	1.00			Shale	59.2	175.5	***544.5***	87.6	22.6	568.9	544	45	89	166	49.2
476.80	1.00			Shale	59.2	175.5	***603.6***	87.6	22.6	656.5	604	45	89	198	50.2
475.80	1.00			Shale	59.2	175.5	***662.8***	87.6	22.6	744.1	663	45	89	231	51.2
474.80	1.00			Shale	59.2	175.5	***722.0***	87.6	22.6	831.8	~~722~~	~~45~~	~~89~~	~~263~~	~~52.2~~
473.80	1.00			Shale	59.2	175.5	***781.1***	87.6	22.6	919.4	~~781~~	~~45~~	~~89~~	~~296~~	~~53.2~~
472.80	1.00			Shale	59.2	175.5	***840.3***	87.6	22.6	1007.0	~~840~~	~~45~~	~~89~~	~~328~~	~~54.2~~
471.80	1.00			Shale	59.2	175.5	***899.5***	87.6	22.6	1094.6	~~899~~	~~45~~	~~89~~	~~361~~	~~55.2~~
470.80	1.00			Shale	59.2	175.5	***958.7***	87.6	22.6	1182.2	~~959~~	~~45~~	~~89~~	~~393~~	~~56.2~~
469.80	1.00			Shale	59.2	175.5	***1017.8***	87.6	22.6	1269.8	~~1018~~	~~45~~	~~89~~	~~426~~	~~57.2~~
468.80	1.00			Shale	59.2	175.5	***1077.0***	87.6	22.6	1357.5	~~1077~~	~~45~~	~~89~~	~~458~~	~~58.2~~
467.80	1.00			Shale	59.2	175.5	***1136.2***	87.6	22.6	1445.1	~~1136~~	~~45~~	~~89~~	~~491~~	~~59.2~~
466.80	1.00			Shale	59.2	175.5	***1195.3***	87.6	22.6	1532.7	~~1195~~	~~45~~	~~89~~	~~524~~	~~60.2~~
465.80	1.00			Shale	59.2	175.5	***1254.5***	87.6	22.6	1620.3	~~1255~~	~~45~~	~~89~~	~~556~~	~~61.2~~
464.80	1.00			Shale	59.2	175.5	***1313.7***	87.6	22.6	1707.9	~~1314~~	~~45~~	~~89~~	~~589~~	~~62.2~~
463.80	1.00			Shale	59.2	175.5	***1372.9***	87.6	22.6	1795.5	~~1373~~	~~45~~	~~89~~	~~621~~	~~63.2~~
463.70	0.10			Shale	5.9	175.5	***1203.3***	8.8	22.6	1781.7	~~1203~~	~~45~~	~~89~~	~~528~~	~~63.3~~
463.20	0.50					0.0			0.0						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== East Abutment
REFERENCE BORING ========== B-9
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 527.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 522.00 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 487.30 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1402 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 34.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 329.88 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 123.71 KIPS

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
705 KIPS	**663** KIPS	**365** KIPS	**51** FT.

PILE TYPE AND SIZE ========== Steel HP 14 X 89
Plugged Pile Perimeter========== 4.750 FT. Unplugged Pile Perimeter========== 7.033 FT.
Plugged Pile End Bearing Area========== 1.409 SQFT. Unplugged Pile End Bearing Area========= 0.181 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
508.30	13.70	1.00	8		46.2		85.7	68.5		***73.5***	74	0	0	40	19
504.80	3.50		15	Very Fine Silty Sand	3.9	39.5	***69.9***	5.7	5.1	76.8	70	0	0	38	22
500.30	4.50	1.00	5		15.2	19.7	***89.9***	22.5	2.5	99.9	90	0	0	49	27
497.30	3.00		7	Fine Sand	1.7	24.6	***74.9***	2.5	3.2	100.2	75	0	0	41	30
492.80	4.50		3	Very Fine Silty Sand	1.0	7.9	***73.9***	1.5	1.0	101.5	74	0	0	41	34
490.30	2.50	0.30	2		2.9	5.9	***90.6***	4.3	0.8	107.5	91	0	0	50	37
487.30	3.00	1.00			10.1	19.7	191.6	15.0	2.5	***134.2***	134	0	0	74	40
484.30	3.00	5.60	15		29.6	110.6	185.7	43.9	14.2	***173.5***	173	0	0	95	43
481.80	2.50	3.80	19		21.6	75.0	307.8	32.0	9.7	***218.5***	218	0	0	120	45
480.80	1.00			Shale	59.2	175.5	366.9	87.6	22.6	***306.1***	306	0	0	168	46.2
479.80	1.00			Shale	59.2	175.5	426.1	87.6	22.6	***393.7***	394	0	0	217	47.2
478.80	1.00			Shale	59.2	175.5	485.3	87.6	22.6	***481.3***	481	0	0	265	48.2
477.80	1.00			Shale	59.2	175.5	***544.5***	87.6	22.6	568.9	544	0	0	299	49.2
476.80	1.00			Shale	59.2	175.5	***603.6***	87.6	22.6	656.5	604	0	0	332	50.2
475.80	1.00			Shale	59.2	175.5	***662.8***	87.6	22.6	744.1	663	0	0	365	51.2
474.80	1.00			Shale	59.2	175.5	***722.0***	87.6	22.6	831.8	~~722~~	~~0~~	~~0~~	~~397~~	~~52.2~~
473.80	1.00			Shale	59.2	175.5	***781.1***	87.6	22.6	919.4	~~781~~	~~0~~	~~0~~	~~430~~	~~53.2~~
472.80	1.00			Shale	59.2	175.5	***840.3***	87.6	22.6	1007.0	~~840~~	~~0~~	~~0~~	~~462~~	~~54.2~~
471.80	1.00			Shale	59.2	175.5	***899.5***	87.6	22.6	1094.6	~~899~~	~~0~~	~~0~~	~~495~~	~~55.2~~
470.80	1.00			Shale	59.2	175.5	***958.7***	87.6	22.6	1182.2	~~959~~	~~0~~	~~0~~	~~527~~	~~56.2~~
469.80	1.00			Shale	59.2	175.5	***1017.8***	87.6	22.6	1269.8	~~1018~~	~~0~~	~~0~~	~~560~~	~~57.2~~
468.80	1.00			Shale	59.2	175.5	***1077.0***	87.6	22.6	1357.5	~~1077~~	~~0~~	~~0~~	~~592~~	~~58.2~~
467.80	1.00			Shale	59.2	175.5	***1136.2***	87.6	22.6	1445.1	~~1136~~	~~0~~	~~0~~	~~625~~	~~59.2~~
466.80	1.00			Shale	59.2	175.5	***1195.3***	87.6	22.6	1532.7	~~1195~~	~~0~~	~~0~~	~~657~~	~~60.2~~
465.80	1.00			Shale	59.2	175.5	***1254.5***	87.6	22.6	1620.3	~~1255~~	~~0~~	~~0~~	~~690~~	~~61.2~~
464.80	1.00			Shale	59.2	175.5	***1313.7***	87.6	22.6	1707.9	~~1314~~	~~0~~	~~0~~	~~723~~	~~62.2~~
463.80	1.00			Shale	59.2	175.5	***1372.9***	87.6	22.6	1795.5	~~1373~~	~~0~~	~~0~~	~~755~~	~~63.2~~
463.70	0.10			Shale	5.9	175.5	***1203.3***	8.8	22.6	1781.7	~~1203~~	~~0~~	~~0~~	~~662~~	~~63.3~~
463.20	0.50					0.0			0.0						

Illinois Department of Transportation

IDOT STATIC METHOD OF ESTIMATING PILE LENGTH

SUBSTRUCTURE========== East Abutment - Pre Core
REFERENCE BORING ========== B-9
LRFD or ASD or SEISMIC ========== LRFD
PILE CUTOFF ELEV. ========== 527.00 ft
GROUND SURFACE ELEV. AGAINST PILE DURING DRIVING = 487.30 ft
GEOTECHNICAL LOSS TYPE (None, Scour, Liquef., DD) ====== None
BOTTOM ELEV. OF SCOUR, LIQUEF., or DD ========== 487.30 ft
TOP ELEV. OF LIQUEF. (so layers above apply DD) ========== ft

TOTAL FACTORED SUBSTRUCTURE LOAD ========== 1402 kips
TOTAL LENGTH OF SUBSTRUCTURE (along skew)========== 34.00 ft
NUMBER OF ROWS OF PILES PER SUBSTRUCTURE ======= 1
Approx. Factored Loading Applied per pile at 8 ft. Cts ========== 329.88 KIPS
Approx. Factored Loading Applied per pile at 3 ft. Cts ========== 123.71 KIPS

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

Maximum Nominal Req'd Bearing of Pile	Maximum Nominal Req.d Bearing of Boring	Maximum Factored Resistance Available in Boring	Maximum Pile Driveable Length in Boring
705 KIPS	**700** KIPS	**385** KIPS	**53** FT.

PILE TYPE AND SIZE ========== Steel HP 14 X 89
Plugged Pile Perimeter========== 4.750 FT. Unplugged Pile Perimeter========== 7.033 FT.
Plugged Pile End Bearing Area========== 1.409 SQFT. Unplugged Pile End Bearing Area========= 0.181 SQFT.

BOT. OF LAYER ELEV. (FT.)	LAYER THICK. (FT.)	UNCONF. COMPR. STRENGTH (TSF.)	S.P.T. N VALUE (BLOWS)	GRANULAR OR ROCK LAYER DESCRIPTION	NOMINAL PLUGGED SIDE RESIST. (KIPS)	NOMINAL PLUGGED END BRG. RESIST. (KIPS)	NOMINAL PLUGGED TOTAL RESIST. (KIPS)	NOMINAL UNPLUG'D SIDE RESIST. (KIPS)	NOMINAL UNPLUG'D END BRG. RESIST. (KIPS)	NOMINAL UNPLUG'D TOTAL RESIST. (KIPS)	NOMINAL REQ'D BEARING (KIPS)	FACTORED GEOTECH. LOSS FROM SCOUR or DD (KIPS)	FACTORED GEOTECH. LOSS LOAD FROM DD (KIPS)	FACTORED RESISTANCE AVAILABLE (KIPS)	ESTIMATED PILE LENGTH (FT.)
484.30	3.00	5.60	15		29.6		104.6	43.9		***53.5***	54	0	0	29	43
481.80	2.50	3.80	19		21.6	75.0	226.8	32.0	9.7	***98.5***	98	0	0	54	45
480.80	1.00			Shale	59.2	175.5	285.9	87.6	22.6	***186.1***	186	0	0	102	46.2
479.80	1.00			Shale	59.2	175.5	345.1	87.6	22.6	***273.7***	274	0	0	151	47.2
478.80	1.00			Shale	59.2	175.5	404.3	87.6	22.6	***361.3***	361	0	0	199	48.2
477.80	1.00			Shale	59.2	175.5	463.4	87.6	22.6	***449.0***	449	0	0	247	49.2
476.80	1.00			Shale	59.2	175.5	***522.6***	87.6	22.6	536.6	523	0	0	287	50.2
475.80	1.00			Shale	59.2	175.5	***581.8***	87.6	22.6	624.2	582	0	0	320	51.2
474.80	1.00			Shale	59.2	175.5	***641.0***	87.6	22.6	711.8	641	0	0	353	52.2
473.80	1.00			Shale	59.2	175.5	***700.1***	87.6	22.6	799.4	700	0	0	385	53.2
472.80	1.00			Shale	59.2	175.5	***759.3***	87.6	22.6	887.0	~~759~~	~~0~~	~~0~~	~~418~~	~~54.2~~
471.80	1.00			Shale	59.2	175.5	***818.5***	87.6	22.6	974.6	~~818~~	~~0~~	~~0~~	~~450~~	~~55.2~~
470.80	1.00			Shale	59.2	175.5	***877.6***	87.6	22.6	1062.3	~~878~~	~~0~~	~~0~~	~~483~~	~~56.2~~
469.80	1.00			Shale	59.2	175.5	***936.8***	87.6	22.6	1149.9	~~937~~	~~0~~	~~0~~	~~515~~	~~57.2~~
468.80	1.00			Shale	59.2	175.5	***996.0***	87.6	22.6	1237.5	~~996~~	~~0~~	~~0~~	~~548~~	~~58.2~~
467.80	1.00			Shale	59.2	175.5	***1055.2***	87.6	22.6	1325.1	~~1055~~	~~0~~	~~0~~	~~580~~	~~59.2~~
466.80	1.00			Shale	59.2	175.5	***1114.3***	87.6	22.6	1412.7	~~1114~~	~~0~~	~~0~~	~~613~~	~~60.2~~
465.80	1.00			Shale	59.2	175.5	***1173.5***	87.6	22.6	1500.3	~~1173~~	~~0~~	~~0~~	~~645~~	~~61.2~~
464.80	1.00			Shale	59.2	175.5	***1232.7***	87.6	22.6	1588.0	~~1233~~	~~0~~	~~0~~	~~678~~	~~62.2~~
463.80	1.00			Shale	59.2	175.5	***1291.8***	87.6	22.6	1675.6	~~1292~~	~~0~~	~~0~~	~~711~~	~~63.2~~
463.70	0.10			Shale	5.9	175.5	***1297.8***	8.8	22.6	1684.3	~~1298~~	~~0~~	~~0~~	~~714~~	~~63.3~~
462.70	1.00			Shale	59.2	175.5	***1356.9***	87.6	22.6	1771.9	~~1357~~	~~0~~	~~0~~	~~746~~	~~64.3~~
461.70	1.00			Shale	59.2	175.5	***1416.1***	87.6	22.6	1859.6	~~1416~~	~~0~~	~~0~~	~~779~~	~~65.3~~
460.70	1.00			Shale	59.2	175.5	***1475.3***	87.6	22.6	1947.2	~~1475~~	~~0~~	~~0~~	~~811~~	~~66.3~~
459.70	1.00			Shale	59.2	175.5	***1534.4***	87.6	22.6	2034.8	~~1534~~	~~0~~	~~0~~	~~844~~	~~67.3~~
458.70	1.00			Shale	59.2	175.5	***1593.6***	87.6	22.6	2122.4	~~1594~~	~~0~~	~~0~~	~~876~~	~~68.3~~
457.70	1.00			Shale	59.2	175.5	***1652.8***	87.6	22.6	2210.0	~~1653~~	~~0~~	~~0~~	~~909~~	~~69.3~~
457.60	0.10			Shale	5.9	175.5	***1483.2***	8.8	22.6	2196.2	~~1483~~	~~0~~	~~0~~	~~816~~	~~69.4~~
457.10	0.50					0.0			0.0						

Exhibit H

Existing Fill Pad Location Map

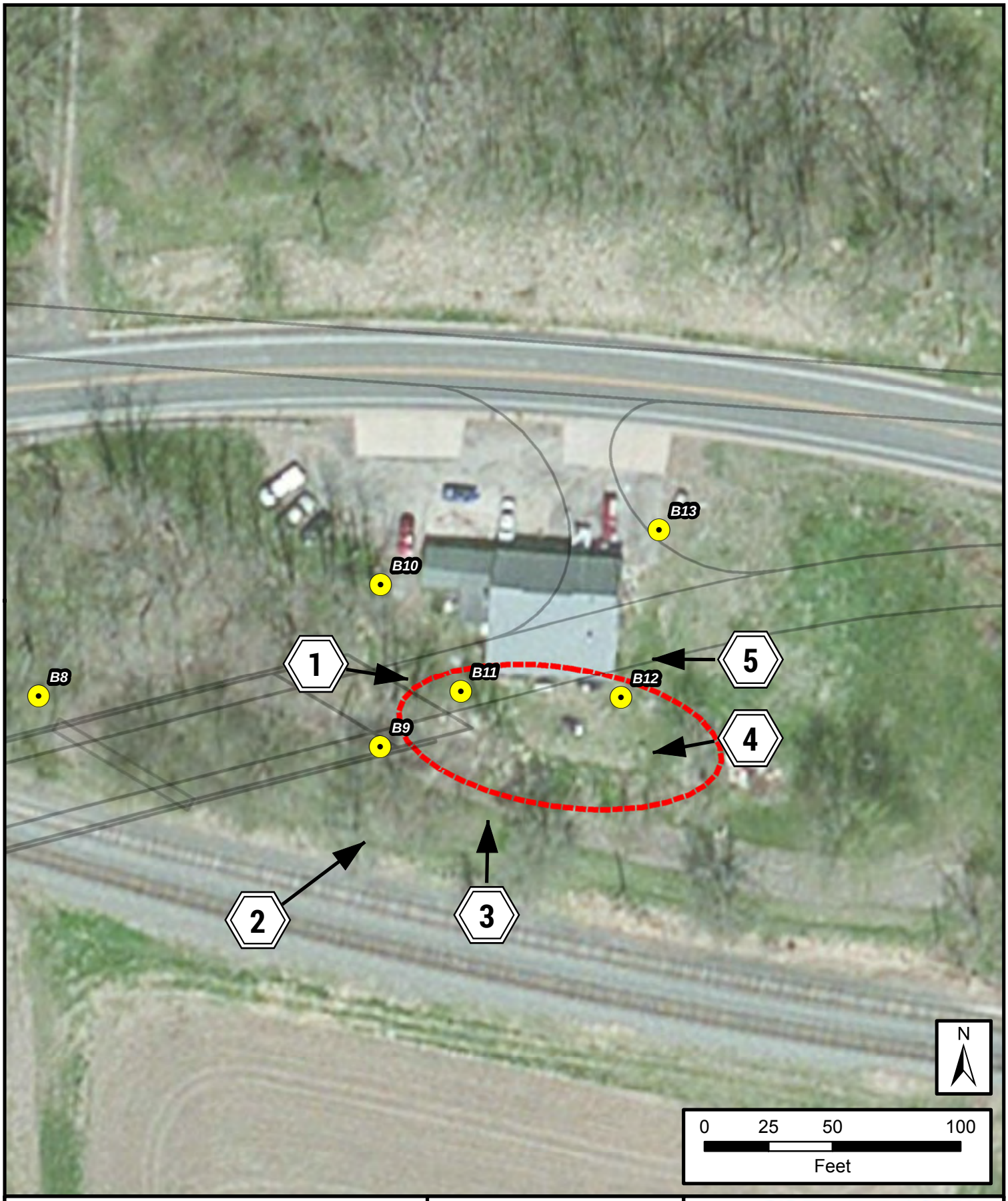


Exhibit H
Existing Fill Pad
IL 8 over BNSF R.R.
Peoria County, Illinois

Legend

- Borings
- Alignment
- Existing Fill Pad
- Photo Number

Kaskaskia Engineering Group, LLC
208 East Main Street, Suite 100
Belleville, Illinois 62220
618.233.5877 phone
618.233.5977 fax
www.kaskaskiaeng.com

IL 8 Over BNSF – Existing Fill Pad Photos

Photo #1

Photo #2

Photo #3

Photo #4

Photo #5