

**STRUCTURE GEOTECHNICAL
REPORT**

Waldron Road F.A.U. 6184 over I-57 FAI - 57

Proposed S.N. 046-0153

F.A.U. ROUTE 6184
SECTION (46-3)6HBR
KANKAKEE COUNTY, ILLINOIS
JOB NO. P-93-014-10
CONTRACT NO. 66863
PTB 159/20
KEG NO. 11-1017.00

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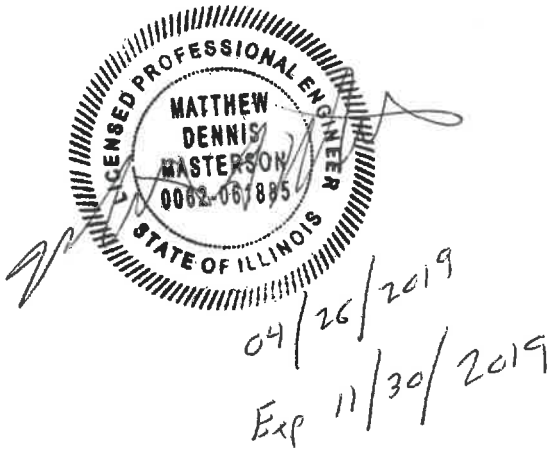


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EXHIBITS

- Exhibit A – Location Map
- Exhibit B – Type, Size, and Location Plan (TS&L)
- Exhibit C – Boring Logs
- Exhibit D – Subsurface Profile
- Exhibit E – SLOPE- W Slope Stability Analysis
- Exhibit F – IDOT Drilled Shaft Axial Capacity Spreadsheets

1.0 Project Description and Proposed Structure Information

1.1 Introduction

The geotechnical study summarized in this report was performed for the proposed structure replacement for Waldron Road over I-57 and the associated retaining walls in Kankakee 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 a complete replacement of an existing four- span structure with a new two- span structure located at Waldron Road over I-57, including construction of two retaining walls parallel to the outer lanes of I-57 in Kankakee County, Illinois. The general location of the structure is shown on Exhibit A, USGS Topographic Location Map. The site lies within the limits of the Second Principal Meridian, (T. 30N R. 13W Section 4) within the Kankakee Plain of the Till Plains section of the Central Lowland Province.

1.3 Existing Structure

The existing structure was originally constructed in 1953. The existing structure measures 234 ft. - 5.75 in. back- to- back of abutments, and has an out- to- out width of 32 ft. - 3 in. The two outside spans measure 50 ft. - 7 in., while the two inside spans measure 63 ft. - 3 in. The structure is skewed 54° - 5' right advance. The superstructure is a 7 in. reinforced concrete deck, supported by five, non- composite, continuous wide flange steel beams. The bridge rail is a post style curb mounted system with three horizontal pipes. Railing is mounted to an eight inch curb, set back 1 ft. - 10.5 in. from the vertical face of the curb. Newer curb mounted rail is flush with the face of the curb. The abutments consist of a beam bearing cap that is supported by 7 ft. concrete columns/posts, with continuous 6 ft. wide spread footings on rock. The three piers are concrete beam bearing caps that are supported by 5 rectangle concrete columns, which are supported by a crashwall on an 8 ft. wide spread footing on rock.

1.4 Proposed Bridge Information

The proposed structure is a two- span structure, with retaining walls near the pile supported abutments. The proposed structure measures 271 ft. - 7.25 in. back- to- back of abutments with 30 ft. - 0 in. bridge approach slabs on both side. The out- to- out width is 44 ft. - 9 in. The two spans measure 129 ft. - 10 in. from centerline- to- centerline of bearing. The structure will have a right- advanced skew at 35° - 53' - 30".

2.0 Site Investigation, Subsurface Exploration, and Generalized Subsurface Conditions

The site investigation plan was developed and performed by IDOT and KEG. A site visit was not performed by a KEG representative to observe all or part of the borings, or to make site observations relative to current conditions of the structure or immediate surroundings, including the soil samples retained during drilling.

Seventeen (17) Standard Penetration Test (SPT) borings were completed for this structure and walls. Seven (7) SPT borings, designated BH 56, BH 57, BH 59, BH 68, BH 69, BH 71, and BH 101 were drilled between March 27, 2010 and February 28, 2014. Ten (10) additional borings were drilled between September 7, 2017 and December 21, 2017. The borings are summarized

by structure in Table 2.1 - Boring Summary and are shown on Exhibit B, Type, Size, and Location plan (TS&L), as provided by Lochmueller Group. Detailed information regarding the nature and thickness of the soils encountered and the results of the field sampling and laboratory testing are shown on Exhibit C, Boring Logs. A soil profile can be found under Exhibit D, Subsurface Profile.

Table 2.1 - Boring Summary

Boring	Structure	Station	Offset	Ground Surface Elevation
BH 101	North Abutment	229+13.97	82.1 RT	657.19
B 219	North Abutment	229+18.36	87.5 RT	657.30
BH 56	Retaining Wall A	227+83.54	32.6 RT	633.35
BH 57	Retaining Wall A	228+63.37	32.6 RT	633.60
BH 59	Retaining Wall A	230+91.82	36.1 RT	632.79
B 221	Retaining Wall A	235+00.78	44.1 RT	630.55
B 222	Retaining Wall A	233+55.44	46.2 RT	630.64
B 223	Retaining Wall A	232+07.62	33.5 RT	632.47
B 224	Retaining Wall A	227+30.00	148.0 RT	650.69
B 225	Retaining Wall A	225+99.00	121.0 RT	646.82
B 226	Retaining Wall A	224+53.00	123.0 RT	664.59
BH 68	Center Pier	230+00.99	9.2 LT	632.86
BH 69	Center Pier	231+04.30	2.2 LT	632.74
B 218	Center Pier	231+25.20	8.0 LT	632.57
B 220	Retaining Wall B	232+54.00	48.0 LT	634.83
BH 71	South Abutment	232+11.23	148.3 LT	647.42
B 217	South Abutment	232+12.99	133.4 LT	648.76

2.1 Subsurface Conditions

Boring BH 101 was drilled near the North Abutment and consisted of bituminous sand and gravel, and silty clay loam fill from ground surface (El. 657.19) to El. 654.69. A very stiff to hard silty loam/silty clay loam till fill with rock and concrete debris followed to El. 648.69. The driving resistance (N- values) for this material ranged from 9 to 11 blows per foot (bpf), with an unconfined compressive strength (Qu) value of 3.5 tsf, and moisture contents from 18 to 23 percent. A small layer of hard silty clay/silty clay loam followed to El. 647.19, with an N-value of 13 bpf, a Qu value of 4.3 tsf, and a moisture content of 22 percent. A hard silty clay loam till followed to El. 642.19, with N- values between 21 to 26 bpf, a Qu value of 8.2 tsf, and moisture contents from 17 to 19 percent. A very stiff silty loam till with silt layers followed to El. 637.69, with an N-value of 9 bpf, a Qu value of 3.0 tsf, and moisture contents from 18 to 20 percent. A hard silty clay/silty clay loam till followed to El. 632.19, with N- values between 12 and 13 bpf, Qu values from 4.0 to 4.6 tsf, and moisture contents from 19 to 22 percent. A hard silty clay loam till with large gravel pieces followed until auger refusal and boring termination at El. 629.69, with an N-value of 20 bpf, a Qu value of 4.0 tsf, and a moisture content of 12 percent. A dolostone surface was assumed to be encountered near the auger refusal depth, with an N-value of 100 blows per 1- inch and no recovery of sample.

Boring B 219 was located near the North Abutment and was not documented through the overburden to auger refusal at El. 624.80. Rock core was obtained below auger refusal in three 5- foot runs to a termination elevation of El. 609.80. The bedrock consisted of dense limestone with shale seams in the upper five feet with an RQD of 28 and Recovery of 97 percent. The dense limestone with tight horizontal fracturing then continued for the last two 5- foot runs to termination

at El. 609.80. The RQD of the last two runs of rock core ranged from 55 to 83 and Recovery was 100 percent. Rock unconfined compression strengths of the dense limestone ranged from 732.4 to 1359.7 tsf.

Boring BH 56 was drilled near Retaining Wall A and consisted of bituminous shoulder and silty clay loam till fill from ground surface (El. 633.35) to El. 630.9. A hard silty clay loam till followed to El. 628.9, with a N-value of 19 bpf, a Q_u of >4.5 tsf, and a moisture content of 12 percent. Dense limestone followed to boring termination at El. 628.1, with an N-value of 100 blows per 3 inches and a moisture content of six percent.

Boring BH 57 was drilled near Retaining Wall A and consisted of bituminous shoulder and fill sand from ground surface (El. 633.60) to El. 631.10. A loose fill sand and concrete pieces of fill followed until boring termination at El. 629.60, with an N-value of 8 bpf and a moisture content of 16 percent. The boring was terminated due to hitting an unknown trench.

Boring BH 59 was drilled near Retaining Wall A and consisted of bituminous shoulder and weathered limestone/silt from ground surface (El. 632.79) to El. 630.29. A partially weathered limestone followed until boring termination at El. 629.71, with an N-value of 100 blows per 1 inch and a moisture content of seven percent.

Boring B 221 was drilled near Retaining Wall A and was not documented through the overburden to El. 628.55. From this elevation, the rock was augerable an additional 24- inches before encountering auger refusal at El. 626.55. Rock core was obtained below auger refusal in two 5-foot runs to a termination elevation of El. 616.55. The bedrock consisted of dense limestone with horizontal and vertical fractures and loose to tight joints. The RQD of the rock core ranged from 8 to 13 and Recovery was 92 to 100 percent. Rock unconfined compression strengths of the limestone ranged from 611.3 to 741.9 tsf.

Boring B 222 was drilled near Retaining Wall A and was not documented through the overburden to El. 628.64. From this elevation, the rock was augerable an additional 24- inches before encountering auger refusal at El. 626.64. Rock core was obtained below auger refusal in two 5-foot runs to a termination elevation of El. 616.64. The bedrock consisted of dense limestone with horizontal fractures and tight joints. The RQD of the rock core ranged from 13 to 75 and Recovery was 97 to 100 percent. Rock unconfined compression strengths of the limestone ranged from 734.6 to 832.1 tsf.

Boring B 223 was drilled near Retaining Wall A and was not documented through the overburden to auger refusal at El. 629.47. Rock core was obtained below auger refusal in two 5- foot runs to a termination elevation of El. 619.47. The bedrock consisted of dense limestone with some horizontal fractures. The RQD of the rock core was 37 and Recovery was 83 to 100 percent. Rock unconfined compression strengths of the limestone ranged from 585.6 to 872.1 tsf.

Boring B 224 was drilled near Retaining Wall A and consisted of 18- inches of topsoil with silty loam and timber from the ground surface to El. 649.19. Below the topsoil, hard silty clay was encountered to El. 642.69, with N- values of 24 to 35 bpf, pocket penetrometer readings of 4.5 tsf and moisture contents of 14 to 18 percent. Below the hard silty clay, hard silty clay till was encountered to El. 640.19, with an N-value of 31, pocket penetrometer value of 4.5 tsf and moisture content of 15 percent. Below the hard silty clay till, stiff clay till with trace gravel was encountered to El. 626.19. N- values of the clay were 12 to 20 bpf, with Q_u 's of 2.5 to 7 tsf and moisture contents of 12 to 21 percent. Below the stiff clay till, fractured and very weathered dolostone was encountered to auger refusal at El. 620.69. N –values of the weathered dolostone ranged from 50 blows per ¼ inch to 85 blows per inch and moisture contents were 4 to 5 percent.

Rock core was obtained below auger refusal in one 10- foot core run to termination at El. 610.69. The rock consisted of dolostone with shale partings with RQDs of 0 to 13 and Recovery of 100 percent. Rock unconfined compression strengths of the dolostone ranged from 235.0 to 796.0 tsf.

Boring B 225 was drilled near Retaining Wall A and consisted of very stiff to hard clay till with trace gravel to El. 626.82. N- values of the clay were 7 to 28 bpf, with Q_u 's of 2.1 to 3.7 tsf and moisture contents of 10 to 23 percent. Below the clay till, fractured and very weathered rock was encountered to auger refusal at El. 615.82. N –values of the weathered rock ranged from 50 blows per ¼ inch to 100 blows per inch and moisture contents were 6 to 13 percent. A rock core was obtained below auger refusal in one 10- foot core run to termination at El. 605.82. The rock consisted of dolostone with thin joints and shale partings with an RQD of 37 and Recovery of 98 percent. Rock unconfined compression strengths of the dolostone ranged from 182.0 to 463.0 tsf.

Boring B 226 was drilled near Retaining Wall A and consisted of 12- inches of topsoil with silty clay from the ground surface to El. 663.59. Below the topsoil, silty clay/silty clay till was encountered to El. 649.09, with N- values of 11 to 27 bpf, Q_u 's and penetrometers ranged from 2.7 to 6.4 tsf with moisture contents of 14 to 23 percent. The soils were very stiff to hard. Below the silty clay, stiff clay and clay till was encountered to El. 624.09, with an N- values of 10 to 27, pocket Q_u values of 2.3 to 5 tsf and moisture contents of 18 to 22 percent. The clay was very stiff. The clay till was hard. Below the clay till, dolostone was encountered to auger refusal at El. 624.09. N –values of the dolostone were 54 blows per inch. A rock core was obtained below auger refusal in one 10- foot core run to termination at El. 612.59. The rock consisted of dolostone with shale partings with an RQD of 30 and Recovery of 100 percent. Rock unconfined compression strengths of the dolostone ranged from 265.0 to 807.0 tsf.

Boring BH 68 was drilled near the Pier and consisted of bituminous shoulder and fill sand/gravel from ground surface (El. 632.86) to El. 630.36. A weathered dolomite followed to boring termination at El. 630.19, with an N-value of 100 blows per 2- inches.

Boring BH 69 was drilled near the Pier and consisted of bituminous shoulder and weathered and reworked dolomite from ground surface (El. 632.74) to El. 630.24. A weathered dolomite followed until auger refusal and boring termination at El. 629.24, with an N-value of 100 blows per four inches and a moisture content of seven percent.

Boring B 218 was drilled near the Pier and was not documented through the overburden to El. 630.07. From this elevation, the rock was augerable an additional 30- inches before encountering auger refusal at El. 627.57. Rock core was obtained below auger refusal in three 5- foot runs to a termination elevation of El. 612.57. The bedrock consisted of dense limestone with horizontal fractures and loose joints in the upper five feet with an RQD of 26 and Recovery of 95 percent. The dense limestone with tight joints and horizontal fracturing then continued for the last two 5- foot runs to termination at El. 612.57. The RQD of the last two runs of rock core ranged from 45 to 87 and Recovery was 100 percent. Rock unconfined compression strengths of the limestone ranged from 535.5 to 1453.7 tsf.

Boring B 220 was drilled near Retaining Wall B and consisted of 6- inches of topsoil from the ground surface to El. 634.33. Below the topsoil, silty sandy gravel with clay was encountered to El. 630.33, with an N-value of 67 bpf and moisture content of 11 percent. Below the gravel, weathered fractured dolostone was encountered and was augerable to a refusal depth of El. 626.33. An N-value of 50 blows per 2- inches of penetration was recorded at the top of the weathered dolostone, with a moisture content of 8 percent. Rock core was obtained below auger refusal in one 10- foot core run to termination at El. 616.33. The rock consisted of dolostone with

an RQD of 68 and Recovery of 100 percent. Rock unconfined compression strengths of the dolostone ranged from 358.0 to 543.0 tsf.

Boring BH 71 was drilled near the South Abutment and consisted of shoulder stone and silty clay loam fill from ground surface (El. 647.42) to El. 644.92. A hard silty clay loam till fill followed to El. 639.92, with N- values ranging from 5 to 9 bpf, a Q_u value of 4.0 tsf, and moisture contents between 13 to 17 percent. A stiff to very stiff silty clay/silty clay loam followed to El. 637.92, with an N-value of 4 bpf, a Q_u value of 2.0 tsf, and a moisture content of 20 percent. A stiff to very stiff silty clay loam till followed to El. 634.92, with an N-value of 4 bpf, a Q_u value of 1.5 tsf, and a moisture content of 26 percent. A weathered and reworked dolomite surface followed until El. 632.42, with an N-value of 27 bpf and a moisture content of 9 percent. A dense dolomite followed until auger refusal and boring termination at El. 632.17, with an N-value of 100 blows per three inches.

Boring B 217 was drilled near the South Abutment and was not documented through the overburden to auger refusal at El. 632.76. Rock core was obtained below auger refusal in three 5- foot runs to a termination elevation of El. 617.76. The bedrock consisted of highly horizontally fractured and seam- filled weathered shale in the upper five feet with an RQD of 0 and Recovery of 90 percent. Dolostone with horizontal fracturing and loose joints then continued for the second run to El. 622.76. The RQD was 48 and Recovery was 90 percent. The last run consisted of limestone with some horizontal fracturing and vertical fracturing to termination at El. 617.76. The RQD was 22 and Recovery was 100 percent. Rock unconfined compression strengths of the dolostone ranged from 655.0 to 798.9 tsf. Rock unconfined compression strengths of the limestone ranged from 691.3 to 875.5 tsf.

2.2 Groundwater

Groundwater was not encountered in any of the borings. Without extended periods of observation, measurement of true groundwater levels may not be possible. It should be further noted that the groundwater level is subject to seasonal and climatic variations.

3.0 Geotechnical Evaluations

3.1 Settlement

Based on the cross- sections provided for Waldron Road near the approaches to the North and South abutments, it is our understanding additional fill will be placed for raising and widening of the bridge cones. Fill depths of 1 to 3 feet will be added to raise and expand the cones. Therefore, settlement calculations were reviewed utilizing Borings BH 71 and B 224 near the North and South abutments, respectively. Based on the calculations, it is estimated the existing embankments will experience minimal settlements of less than 0.25 inches on each approach to the structure.

3.2 Slope Stability

The proposed construction will include retaining walls parallel to this section of the I- 57 corridor passing under the proposed bridge. Retaining Walls A and B, both have maximum heights of less than 22 feet. The retaining walls are proposed to have 1 Vertical to 3 Horizontal (1V:3H) slopes from the top of the walls to the existing grades. Slope stability analyses were performed near points of high wall elevation for each proposed wall or for locations with combinations of wall(s) and cut slope above the wall(s). SLOPE- W was used to analyze each case, along with the respective undrained soil properties near each wall or slope; and the wall and slope geometrics. Due to subtle elevation differences, borings were combined in some cases near each area

analyzed to develop the complete soil and rock stratigraphy profile for modeling purposes. In general, borings BH 71, BH 101, B 217, B- 219, B 220, and B 224, were all used to generate the profiles.

The end- of- construction (Undrained Condition) was analyzed for each wall and slope. A critical factor of safety (FOS) was calculated for each profile. According to current standards of practice, the target FOS is 1.5 for end- of- construction (Undrained Condition) for retaining wall stability and 1.7 for cut- slope stability based on field testing boring results.

In order to model the end- of- construction condition, undrained soil parameters were used with an internal friction angle of 0 degrees assumed for cohesive soils.

The Modified Bishop Method, which generates circular- arc failure surfaces, was used to calculate the critical failure surfaces and FOS for the analyzed conditions. The FOS obtained in the analysis are shown in Table 3.2. SLOPE- W program output from this analysis can be found in Exhibit E, SLOPE- W Slope Stability Analysis.

Table 3.2 - Slope Stability Critical FOS

Location	Station	Reference Boring(s)	Undrained Condition FOS
Wall A	17+50 RT	BH 101, B 219	9.1
Wall A	229+00 RT	B 224	6.8
Wall B	21+50 LT	BH 71, B 217	2.9
Wall B	230+50 LT	BH 71, B 217	4.4
Wall B	232+50 LT	BH 71, B 220	7.4

The results of the analysis, as provided in Table 3.2, indicate an acceptable FOS for the retaining walls and cut- slopes as currently proposed.

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 C.

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 Soil Site Class C, are summarized below.

Table 3.3 - Summary of Seismic Parameters

Parameter	Value
Soil Site Class	C
Spectral Response Acceleration, 0.2 Sec, S_{DS}	0.125 g (Site Class C)
Spectral Response Acceleration, 1.0 Sec, S_{D1}	0.073 g (Site Class C)
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- 1 in the IDOT Bridge Manual, the Soil Site Class C, and Figure 2.3.10- 2 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 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.

4.0 Foundation Evaluations and Design Recommendations

4.1 General Feasibility

Due to the depths to bedrock and anticipated foundation loads, shallow foundations, driven piles or drilled shafts appear applicable for support of the bridge substructures, including wing- walls. Drilled soldier piles appear applicable for construction of the retaining walls. AASHTO LRFD Bridge Design Specifications Section 10.4.6.4 was utilized for shallow foundation recommendations and the Modified IDOT Static Method of Estimating Pile Length and the IDOT Drilled Shaft Axial Capacity in Limestone or Dolomite spreadsheet, as provided by IDOT BBS Foundations and Geotechnical Unit, were used to estimate the capacities of the driven piles or drilled shafts end bearing in competent bedrock.

Based on the plans provided by ABNA, we understand that Retaining Wall A will run along the I- 57 southbound shoulder from approximate Station 227+50.00 to Station 237+50.00, passing under the proposed bridge. Retaining Wall B will run along the I- 57 northbound shoulder from approximate Station 230+50.00 to Station 233+50.00. The soldier pile wall design shall be in accordance with the AASHTO LRFD Bridge Design Specifications. Our recommendations are summarized below.

The preliminary design loads, as provided by ABNA Engineering, Inc. (ABNA) are provided in Table 4.1.

Table 4.1 - Preliminary Design Loads

Substructure Unit	Factored Reactions (kips)
Abutments	1868.0
Pier	6150.0

Based off of the subsurface exploration, competent limestone and/or dolomite bedrock is generally encountered below elevation El. 625.0.

4.2 Shallow Foundations

The foundation supporting the proposed structures must provide sufficient support to resist dead, live, wind and collision loads, along with seismic loading. Based on the encountered subsurface conditions and the information available to date, the use of shallow foundations at the center pier bearing on limestone or dolostone is a viable foundation alternative. The factored load for the center pier was 6150.0 kips, as indicated in Table 4.1 above.

Boring logs B 68, B 69, and B 218 indicates competent dolostone/limestone material ranges from El. 630.0 to El. 627.5, with unconfined compressive strengths ranging from 535 tsf to 1,450 tsf. Based on AASHTO LRFD Bridge Design Specifications Section 10.6.2.6, Table C 10.6.2.6.1- 1, and the unconfined compressive strength tests performed on representative samples of limestone from Boring B 218, we recommend a bearing resistance of 70 ksf (35 tsf) at the service limit state for footings bearing in the competent limestone.

4.3 Pile Supported Foundations

The foundations supporting the proposed bridge must provide sufficient support to resist dead, live, and wind loads, including seismic loadings. Based on the encountered subsurface conditions, the Modified IDOT Static Method of Estimating Pile Length provided by IDOT BBS Foundations and Geotechnical Unit, and the information available to date, KEG recommends using H- piles at the abutment locations. The Modified IDOT Static Method uses the LRFD Pile Design Guide Procedure to estimate the pile lengths.

The loads were provided by ABNA. The abutments will each experience anticipated vertical factored loads of 1868 kips. The estimated pile lengths for the pile types considered are shown in Table 4.3. The Nominal Required Bearing (RN) represents the resistance the pile will experience during driving, and will assist the contractor in selecting a proper hammer size. The Factored Resistance Available (RF) documents the net long- term axial factored pile capacity available at the top of the pile to support factored substructure loadings.

Downdrag, scour, and liquefaction have not been considered at the abutment locations.

Table 4.3 - Estimated Pile Lengths for North and South Abutments

Pile Type	Location	R _n Nominal Bearing (kips)	R _F Factored Resistance Available (LRFD) (kips)	Estimated Pile Length (ft.)	Assumed Pile Cut-off Elevation (ft.)
10 x 42	North Abutment	335	184	22	649.9
	South Abutment	335	184	16	644.9
12 x 53	North Abutment	418	230	22	649.9
	South Abutment	418	230	16	644.9
12 x 63	North Abutment	497	273	22	649.9
	South Abutment	497	273	16	644.9
14 x 73	North Abutment	578	318	22	649.9
	South Abutment	578	318	16	644.9
14 x 89	North Abutment	705	388	23	649.9
	South Abutment	705	388	17	644.9

In general, based on the boring logs, driving conditions are anticipated to change where the soil stratigraphy changes from cohesive soils into weathered limestone or dolostone bedrock, prior to competent bedrock. Therefore, pile shoes are recommended. In addition, a test pile should be considered at each abutment due to the results of the additional 2018 borings indicating that the thickness of the weathered bedrock zones are highly variable across the structure alignment and could vary from 3 to 8 feet of highly weathered bedrock, in addition to the current estimated top of rock elevation differences at each abutment.

4.4 Lateral Pile Response

Generally, the geotechnical engineer provides soil parameters to the structural engineer for use with an L- Pile program or other approved software for the lateral or displacement analysis of the foundations. Table 4.4 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 for estimation of parameters.

Table 4.4 - Soil Parameters for Lateral Pile Load Analysis

Boring	Elev. At Bottom of Layer	(pcf)	Short- term		Long- term		K (pci)	N	Assumed % fines < #200	ε ₅₀
			c'	Φ (degrees)	c'	Φ (degrees)				
BH- 101 North Abutment	654.69	125	1500	0	100	26	500	N/A	70	0.007
	648.69	120	3500	0	100	26	1000	10	70	0.005
	647.19	120	4300	0	100	26	2000	13	70	0.005
	642.19	120	8200	0	100	26	2000	24	70	0.004
	637.69	115	3000	0	100	28	1000	9	65	0.005
	632.19	120	4300	0	100	26	2000	13	70	0.005
	629.69	120	4000	0	100	26	2000	20	70	0.005
BH- 71 South Abutment	644.92	125	1500	0	100	26	500	N/A	70	0.007
	639.92	120	4000	0	100	26	2000	7	70	0.005
	637.92	120	2000	0	100	26	500	4	70	0.007
	634.92	120	1500	0	100	26	500	4	70	0.007
B 217	627.76	135	N/A	30	N/A	30	N/A	N/A	N/A	N/A
	617.76	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A
B 218	627.50	135	N/A	30	N/A	30	N/A	N/A	N/A	N/A
	612.57	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A
B 219	609.80	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A
B 220	630.33	125	5000	0	250	28	2000	67	70	0.005
	626.33	135	N/A	30	N/A	30	N/A	N/A	N/A	N/A
	616.33	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A
B 221	624.55	135	N/A	30	N/A	30	N/A	N/A	N/A	N/A
	616.55	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A
B 222	626.64	135	N/A	30	N/A	30	N/A	N/A	N/A	N/A
	616.64	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A
B- 223	619.47	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A
B 224	640.19	120	4500	0	250	26	2000	25	70	.005
	626.19	125	5200	0	250	30	2000	14	80	.004
	619.19	135	N/A	30	N/A	30	N/A	N/A	N/A	N/A
	610.69	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A
B 225	626.82	125	2500	0	100	26	1000	10	80	.004
	615.82	135	N/A	30	N/A	30	N/A	N/A	N/A	N/A
	605.82	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A
B 226	628.09	125	2500	0	100	26	1000	10	80	.004
	622.59	135	N/A	30	N/A	30	N/A	N/A	N/A	N/A
	612.59	150	N/A	45	N/A	45	N/A	N/A	N/A	N/A

4.5 Drilled Shaft Foundations

Based on the subsurface exploration, competent limestone and/or dolostone bedrock are generally encountered below elevation El. 627.0. Table 4.5 below lists Top of Rock and Top of Competent Rock, based off exploration and laboratory testing.

Table 4.5 - Estimated Bedrock Elevations

Substructure Unit	Reference Boring(s)	Top of Rock Depth- bgs (Ft)	Top of Rock Elevation (Ft)	Top of Competent Rock Elevation (Ft)
North Abutment	B 219	32.5	624.8	624.8
Pier	B 218	2.5	630.0	627.5
South Abutment	B 217	16	632.7	627.7

Recommendations for drilled shafts with sockets extending various depths into the underlying limestone or dolostone, developing capacity from tip or side resistance, are provided for support of the abutments. The provided capacities are based on boring information as summarized in Table 4.5 above, laboratory unconfined compressive strength tests performed on rock core samples from Borings B 217, B 218, and B 219 and utilizing the IDOT Drilled Shaft Axial Capacity in Limestone or Dolomite spreadsheet as provided by IDOT BBS Foundations and Geotechnical Unit. LRFD Resistance Factors of 0.55 for side resistance or 0.5 for tip resistance are incorporated into the factored capacities, respectively.

Tables 4.5.1 thru 4.5.4 - Drilled Shaft Axial Capacity below contain a summary of Factored Shaft Resistances available for various shaft diameters based on socket depths into the underlying limestone or dolostone for each abutment. IDOT Drilled Axial Capacity Input sheets and Design Tables are included in Exhibit F, for additional information.

Table 4.5.1 - Estimated Drilled Shaft Axial Capacity for 36- inch Diameter Shaft

Substructure Unit	Socket Depth (ft.)	Nominal Shaft Resistance Available (kips)	Factored Shaft Resistance Available (kips)	Nominal Shaft Resistance Available (kips)	Factored Shaft Resistance Available (kips)	Tip Elevation (ft.)
		TIP	TIP	SIDE	SIDE	
North Abutment B 219	2	2513	1257	--	--	622.8
	4	2762	1381	--	--	620.8
	5	21748	10874	--	--	619.8
South Abutment B 217	1	1781	890	--	--	626.7
	3	1847	924	--	--	624.7
	5	--	--	591	325	622.7

Table 4.5.2 - Estimated Drilled Shaft Axial Capacity for 42- inch Diameter Shaft

Substructure Unit	Socket Depth (ft.)	Nominal Shaft Resistance Available (kips)	Factored Shaft Resistance Available (kips)	Nominal Shaft Resistance Available (kips)	Factored Shaft Resistance Available (kips)	Tip Elevation (ft.)
		TIP	TIP	SIDE	SIDE	
North Abutment B 219	2	3449	1725	--	--	622.8
	4	3698	1849	--	--	620.8
	5	3893	1947	--	--	619.8
South Abutment B 217	1	2453	1227	--	--	626.7
	3	2479	1239	--	--	624.7
	5	--	--	689	379	622.7

Table 4.5.3 - Estimated Drilled Shaft Axial Capacity for 48- inch Diameter Shaft

Substructure Unit	Socket Depth (ft.)	Nominal Shaft Resistance Available (kips)	Factored Shaft Resistance Available (kips)	Nominal Shaft Resistance Available (kips)	Factored Shaft Resistance Available (kips)	Tip Elevation (ft.)
		TIP	TIP	SIDE	SIDE	
North Abutment B 219	2	4533	2266	--	--	622.8
	4	4845	2422	--	--	620.8
	5	5074	2537	--	--	619.8
South Abutment B 217	1	3162	1581	--	--	626.7
	3	--	--	473	260	624.7
	5	--	--	788	433	622.7

Table 4.5.4 - Estimated Drilled Shaft Axial Capacity for 60- inch Diameter Shaft

Substructure Unit	Socket Depth (ft.)	Nominal Shaft Resistance Available (kips)	Factored Shaft Resistance Available (kips)	Nominal Shaft Resistance Available (kips)	Factored Shaft Resistance Available (kips)	Tip Elevation (ft.)
		TIP	TIP	SIDE	SIDE	
North Abutment B 219	2	7090	3545	--	--	622.8
	4	7412	3706	--	--	620.8
	5	7521	3761	--	--	619.8
South Abutment B 217	1	--	--	197	108	626.7
	3	--	--	591	325	624.7
	5	--	--	985	542	622.7

Minimum center- to- center spacing of three times the shaft diameter is recommended. Shafts will also need to be designed for lateral loads, which may control socket embedment lengths using the L- Pile factors given in Table 4.4, above.

4.6 Wall Design Parameters

The soil and rock parameters presented in Table 4.6 below, are recommended to be used for the design of Walls A and B. These parameters were calculated according to the AASHTO LRFD Bridge Design Specifications and based on soil properties from Borings BH 71, BH 101, B 224, B 225, and B 225.

Table 4.6 - Parameters for Soldier Pile Walls

Cohesive Soils											
Scenario	Θ (deg)	β (deg)	Φ (deg)	δ (deg)	γ (pcf)	S_u (psf)	K_a	K_o	K_p	K (pci)	ϵ_{50}
Interim Condition	90	18.4	0	0	125	3,250	1	1	1	1000	0.005
Permanent Condition	90	18.4	30	26	125	250	0.33	0.50	3.0	n/a	n/a
Bedrock											
Scenario	Θ (deg)	β (deg)	Φ (deg)	δ (deg)	γ (pcf)	S_u (psf)	K_a	K_o	K_p	K (pci)	ϵ_{50}
Permanent Condition	90	0	40	26	150	536,000	n/a	n/a	8,626	n/a	0.001

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 Sheet piling and Soil Retention

Temporary sheet piling will be required at the abutments during construction, as staged construction is anticipated for this project. The *IDOT Temporary Sheet Piling Design Guide and Charts* indicate that a Cantilevered Sheet Piling System is not feasible for the anticipated required retained heights due to the shallow depths of bedrock, as indicated above in Table 4.5, Estimated Bedrock Elevations.

A Temporary Soil Retention System will be required at each abutment. The Contractor will be required to obtain an Illinois- licensed structural engineer to seal the design of the Temporary Soil Retention System.

5.3 Site and Soil Conditions

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

5.4 Foundation Construction

Conventional pile- driving and drilled shaft equipment, along with methodologies, should be assumed.

Prior to construction, a JULIE locate shall be conducted to determine if any underground utilities are present in the area of the proposed structure. IDOT shall also be contacted to locate any private utilities. 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 boring logs can be found in Exhibit C. The Subsurface Profile can be found in Exhibit D.

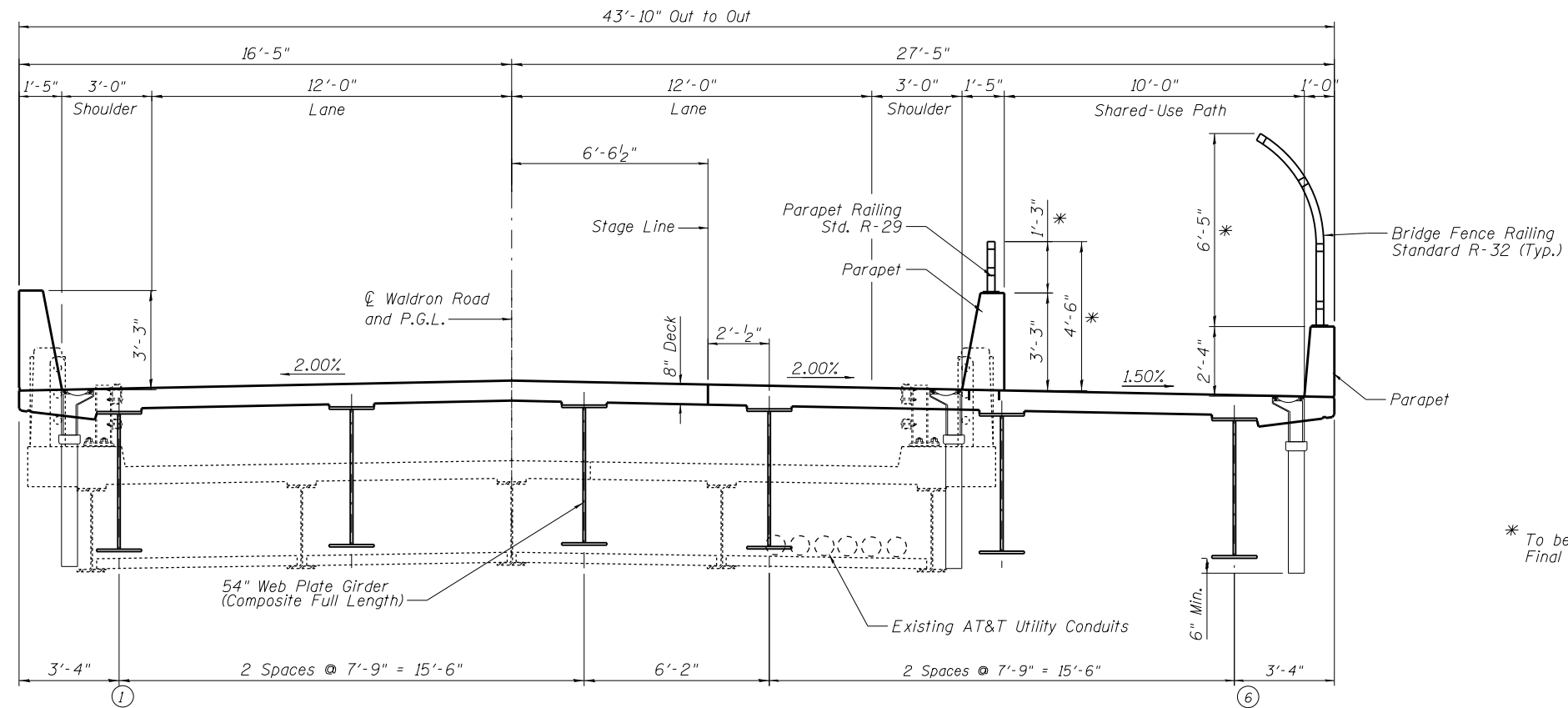
8.0 Limitations

The recommendations provided herein are for the exclusive use of Lochmueller Group, ABNA, and IDOT. They are specific only to the project described and are based on the subsurface information obtained by IDOT at seventeen boring locations within the bridge area between 2010 and 2017, 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
LOCATION MAP

EXHIBIT B
TYPE, SIZE, AND LOCATION PLAN (TS&L)



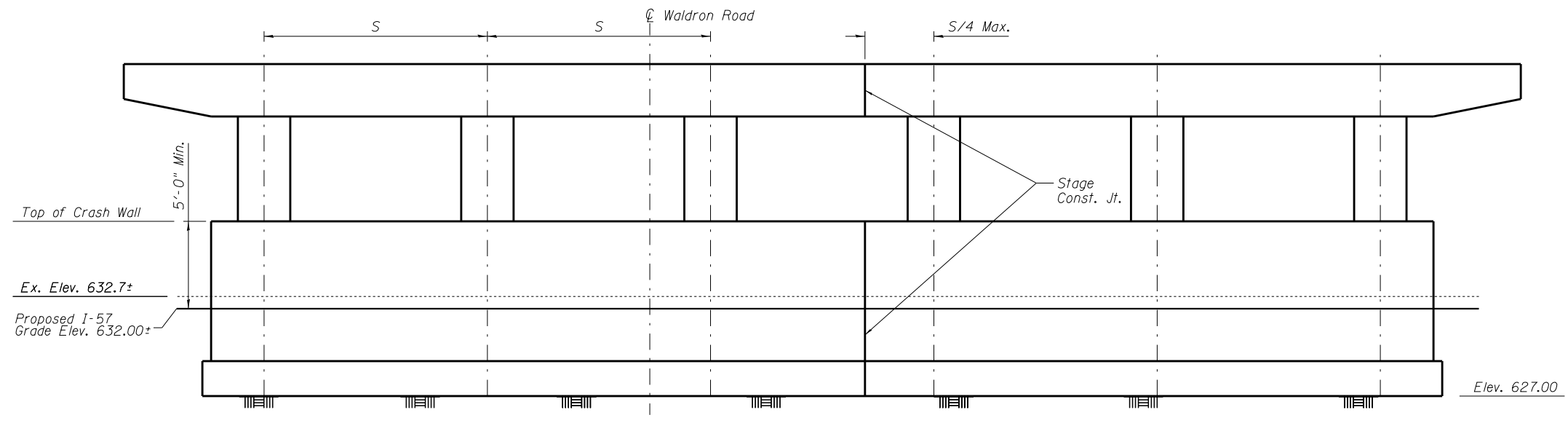
* To be Determined during Final Design.

TYPICAL CROSS SECTION
Looking South East

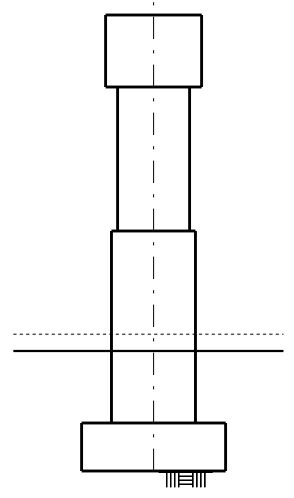
WALDRON ROAD F.A.U. 6184
OVER I-57 FAI-57
SEC. 139HBR-6
KANKAKEE COUNTY
STATION 230+47.96
STRUCTURE NO. 046-0153

DESIGNED	RT	REVISED	8/26/2019
CHECKED	SEA	REVISED	
DRAWN	JJE	REVISED	
CHECKED	SEA	REVISED	

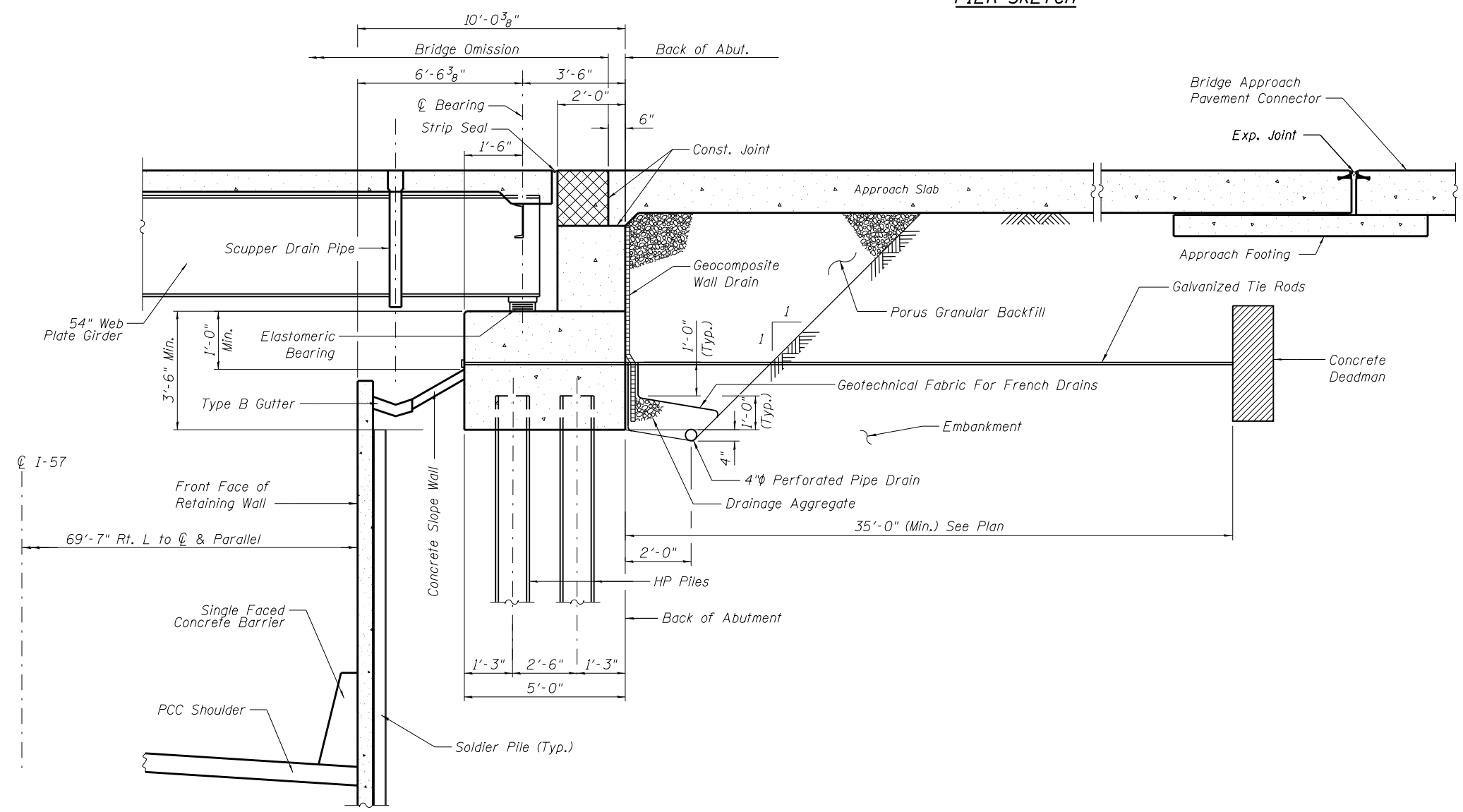
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6184	139HBR-6	KANKAKEE	9	2
STA. TO STA.	CONTRACT NO. 66863			
FED. ROAD DIST. NO.	ILLINOIS FED. AID PROJECT			



PIER SKETCH



PIER SECTION



SECTION THRU ABUTMENT
(Horiz. dim. @ Rt. L's)

WALDRON ROAD F.A.U. 6184
OVER I-57 FAI-57
SEC. 139HBR-6
KANKAKEE COUNTY
STATION 230+47.96
STRUCTURE NO. 046-0153

ABNA
DESIGN FIRM REG. 184.002117

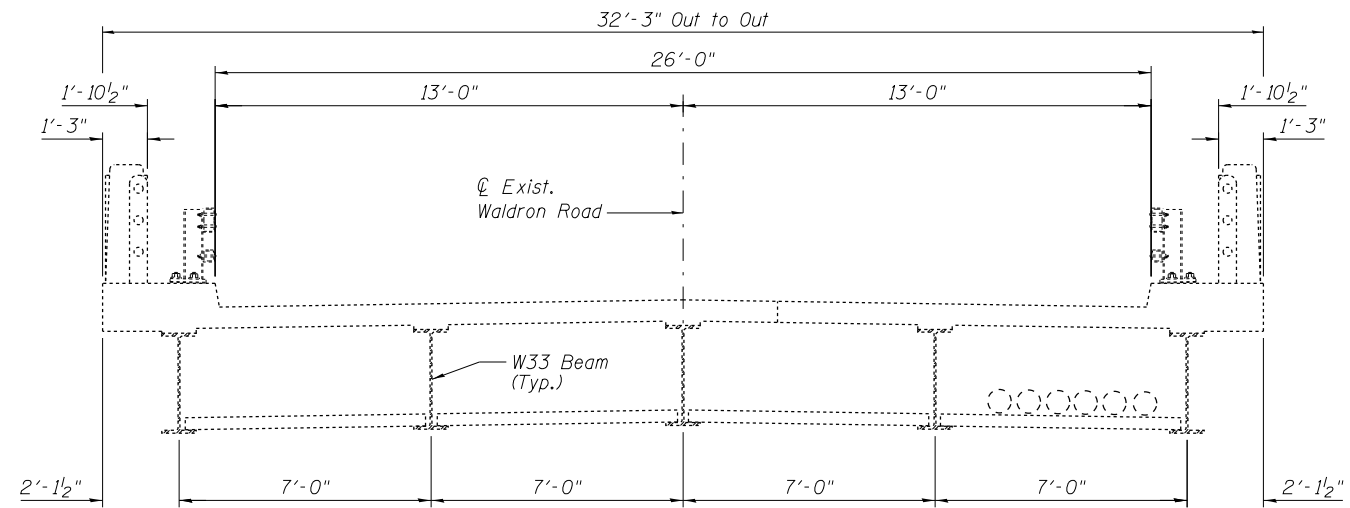
9901 S. Western Ave.
Chicago, IL 60643
Ph. 773-881-4788
F: 773.239.3728

DESIGNED	RT	REVISED	8/26/2019
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DRAWN	MBJ	REVISED	
CHECKED	SEA	REVISED	

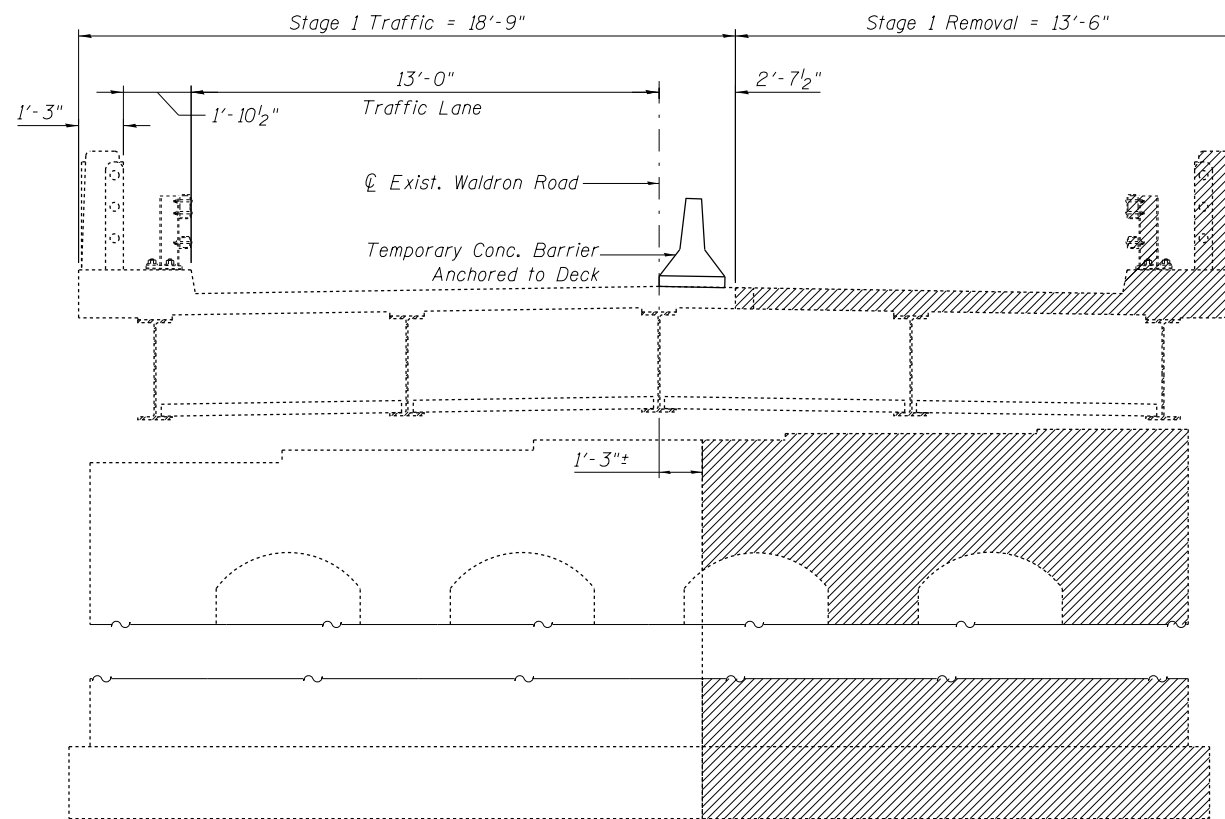
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 3 OF 9 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
6184	139HBR-6	KANKAKEE	9	3
STA. TO STA.	CONTRACT NO. 66863			
FED. ROAD DIST. NO.	ILLINOIS FED. AID PROJECT			



EXISTING STRUCTURE
Looking South East



STAGE 1 DEMOLITION
Looking South East

STAGING NOTES

- 1) Install Temporary Traffic Signals.
- 2) Limit Stage 1 Traffic to East Side of Roadway
- 3) Conduct Stage 1 Removal

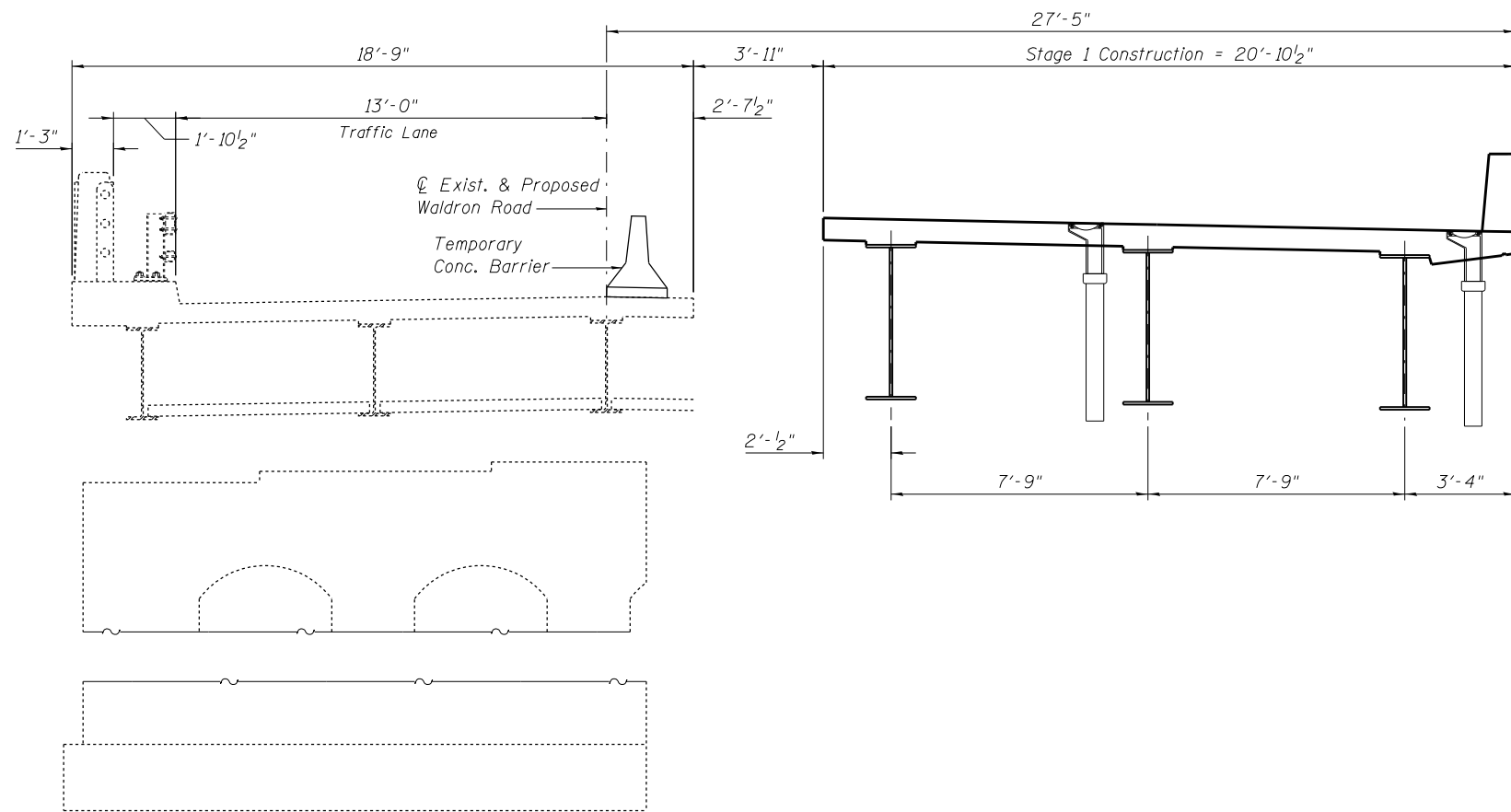
LEGEND



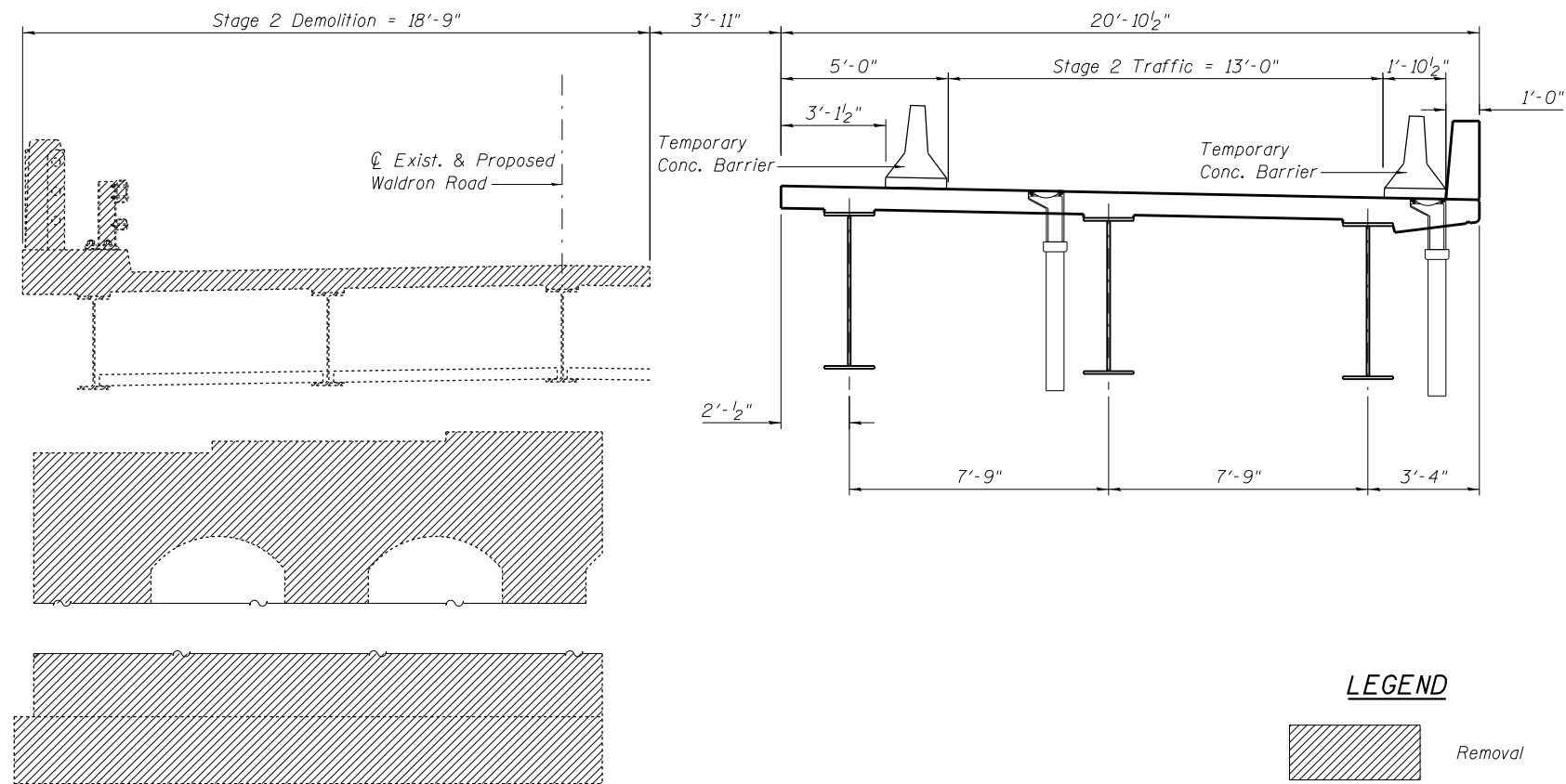
**WALDRON ROAD F.A.U. 6184
OVER I-57 FAI-57
SEC. 139HBR-6
KANKAKEE COUNTY
STATION 230+47.96
STRUCTURE NO. 046-0153**

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DRAWN	JJE	REVISED	
CHECKED	SEA	REVISED	

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
6184	139HBR-6	KANKAKEE	9	4
STA.	TO STA.	CONTRACT NO. 66863		
FED. ROAD DIST. NO.	ILLINOIS	FED. AID PROJECT		



STAGE 1 CONSTRUCTION
Looking South East



STAGE 2 DEMOLITION
Looking South East

STAGING NOTES

- 1) Construct Stage 1.
- 2) Limit Stage 2 Traffic to West Side of Roadway..
- 3) Conduct Stage 2 Removal

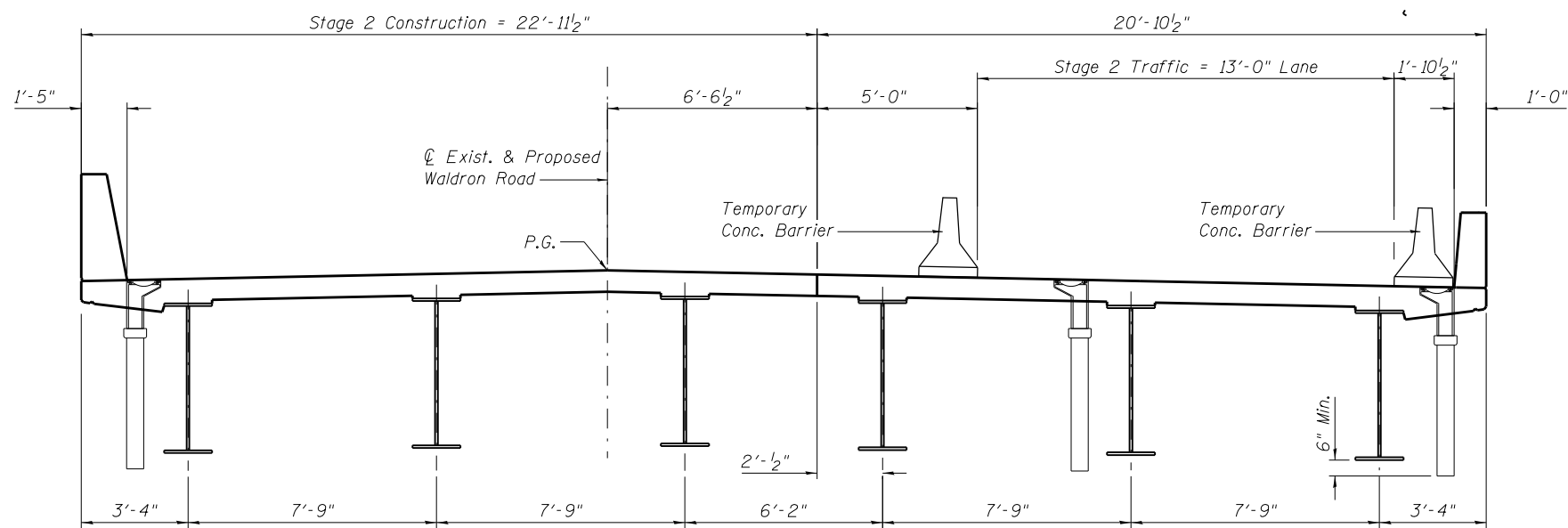
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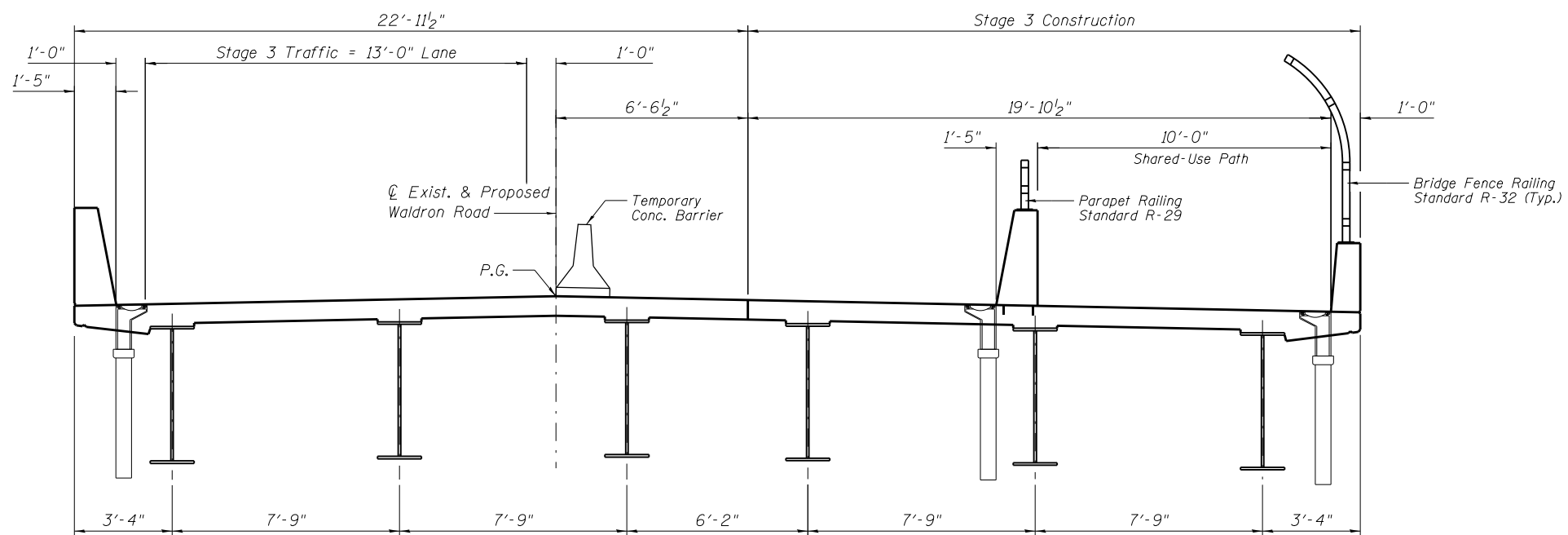
WALDRON ROAD F.A.U. 6184
OVER I-57 FAI-57
SEC. 139HBR-6
KANKAKEE COUNTY
STATION 230+47.96
STRUCTURE NO. 046-0153

DESIGNED	RT	REVISED	8/26/2019
CHECKED	SEA	REVISED	
DRAWN	JJE	REVISED	
CHECKED	SEA	REVISED	

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
6184	139HBR-6	KANKAKEE	9	5
STA.	TO STA.	CONTRACT NO. 66863		
FED. ROAD DIST. NO.		ILLINOIS FED. AID PROJECT		



STAGE 2 CONSTRUCTION
Looking South East



STAGE 3 CONSTRUCTION
Looking South East

STAGING NOTES

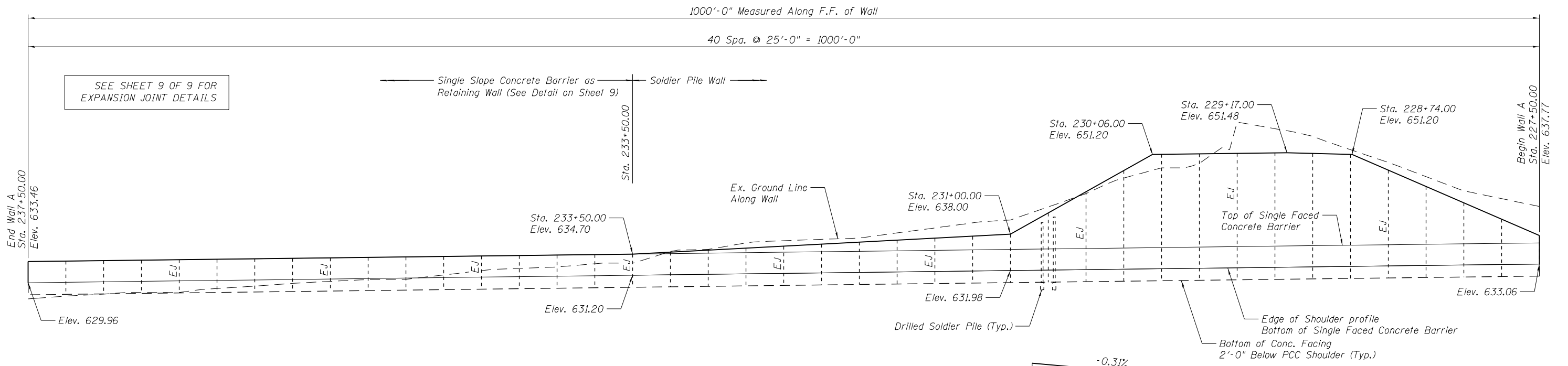
- 1) Move Traffic for Stage 3 to Left Side of Roadway
- 2) Install Separation Barrier & Bridge Fence Railing to Exterior Parapet.

WALDRON ROAD F.A.U. 6184
OVER I-57 FAI-57
SEC. 139HBR-6
KANKAKEE COUNTY
STATION 230+47.96
STRUCTURE NO. 046-0153

DESIGNED	RT	REVISED	8/26/2019
CHECKED	SEA	REVISED	
DRAWN	JJE	REVISED	
CHECKED	SEA	REVISED	

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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STA. TO STA.	CONTRACT NO. 66863			
FED. ROAD DIST. NO.	ILLINOIS FED. AID PROJECT			

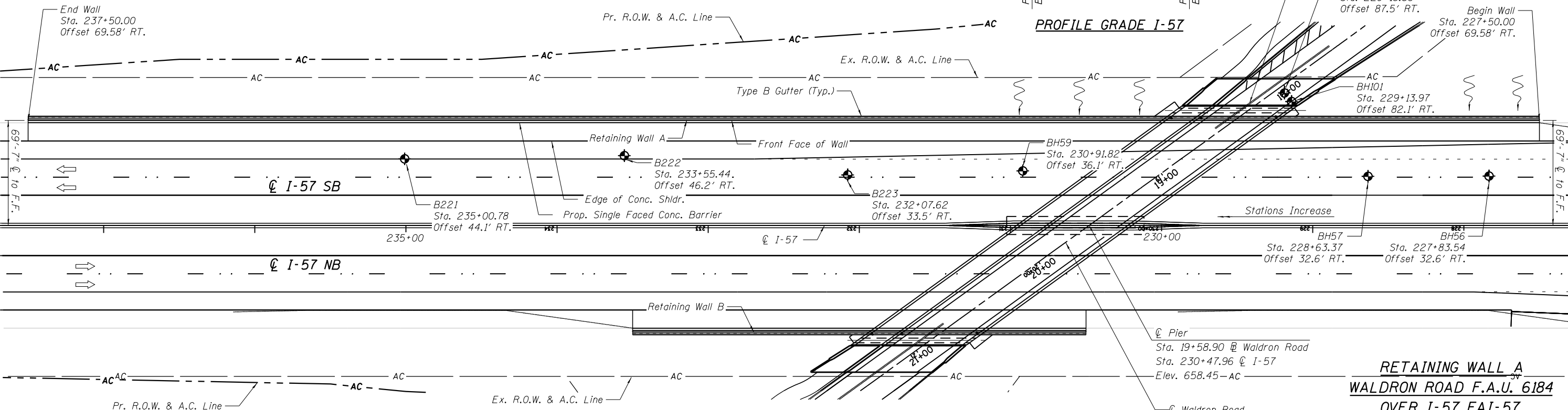
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Note

Drilled Soldier Pile W Shape Typical. Pile Section, Tip Elevations to be Determined in Final Design.

ELEVATION - RETAINING WALL A
(Looking West at Front Face of Wall)



PLAN - RETAINING WALL A

RETAINING WALL A
WALDRON ROAD F.A.U. 6184
OVER I-57 FAI-57
SEC. 139HBR-6
KANKAKEE COUNTY
STATION 227+50.00 TO 237+50.00
STRUCTURE NO. 046-0153

LEGEND

Soil Boring Location

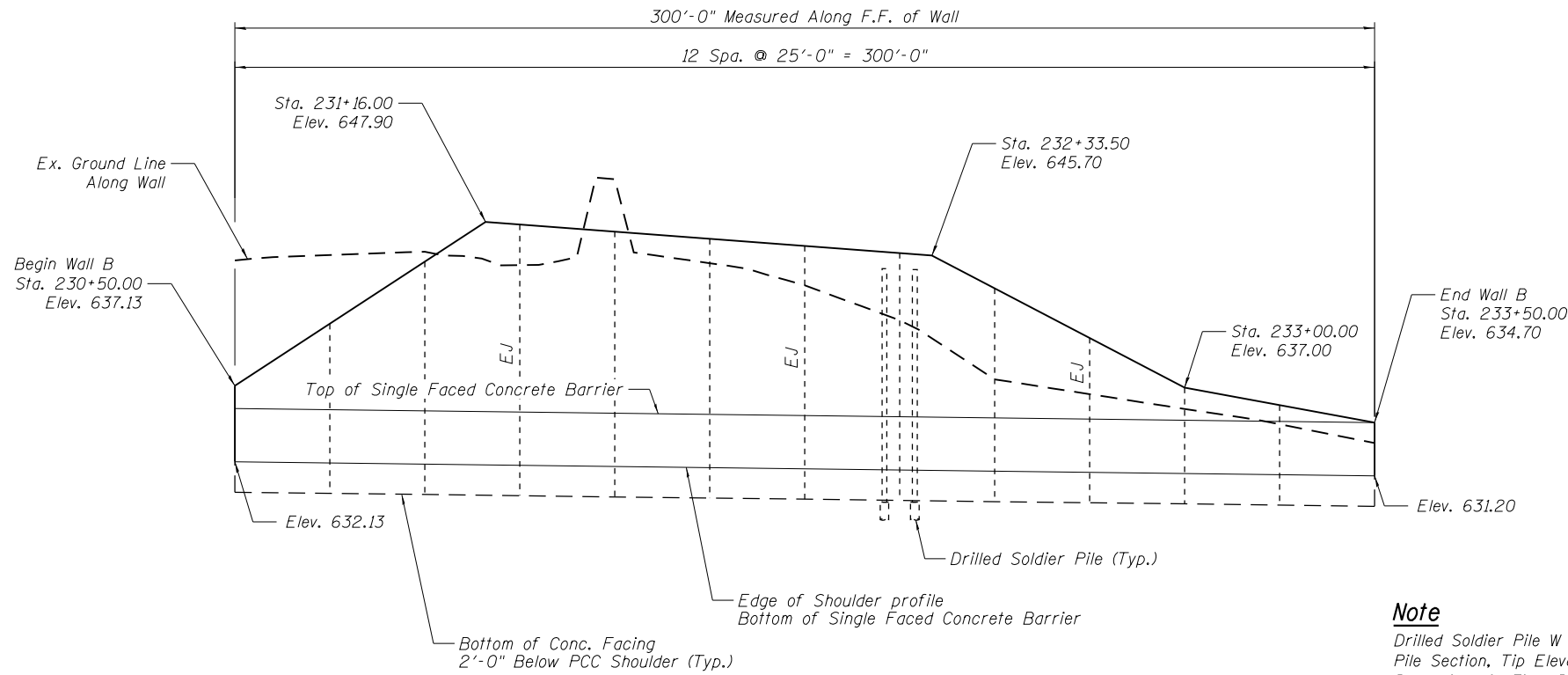
ABNA
 DESIGN FIRM REG. 184.002117
 9901 S. Western Ave.
 Chicago, IL 60643
 Ph. 773-881-4788
 F: 773.239.3728

DESIGNED	RT	REVISED	8/26/2019
CHECKED	SEA	REVISED	
DRAWN	MBJ	REVISED	
CHECKED	SEA	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

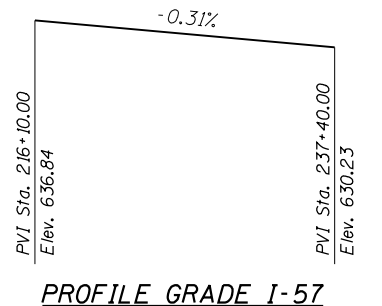
SHEET NO. 7 OF 9 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT				

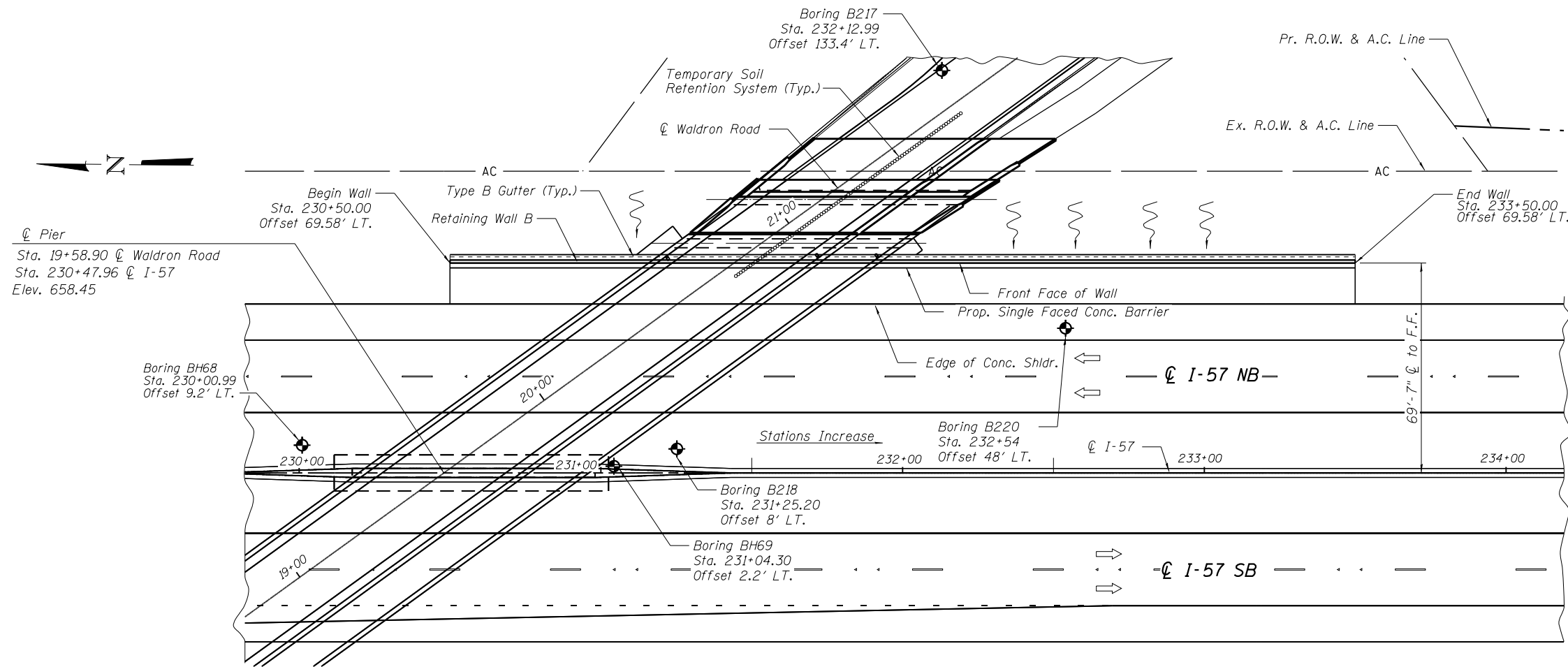


Note
 Drilled Soldier Pile W Shape Typical.
 Pile Section, Tip Elevations to be
 Determined in Final Design.

ELEVATION - RETAINING WALL B
 (Looking East at Front Face of Wall)



PROFILE GRADE I-57



PLAN - RETAINING WALL B

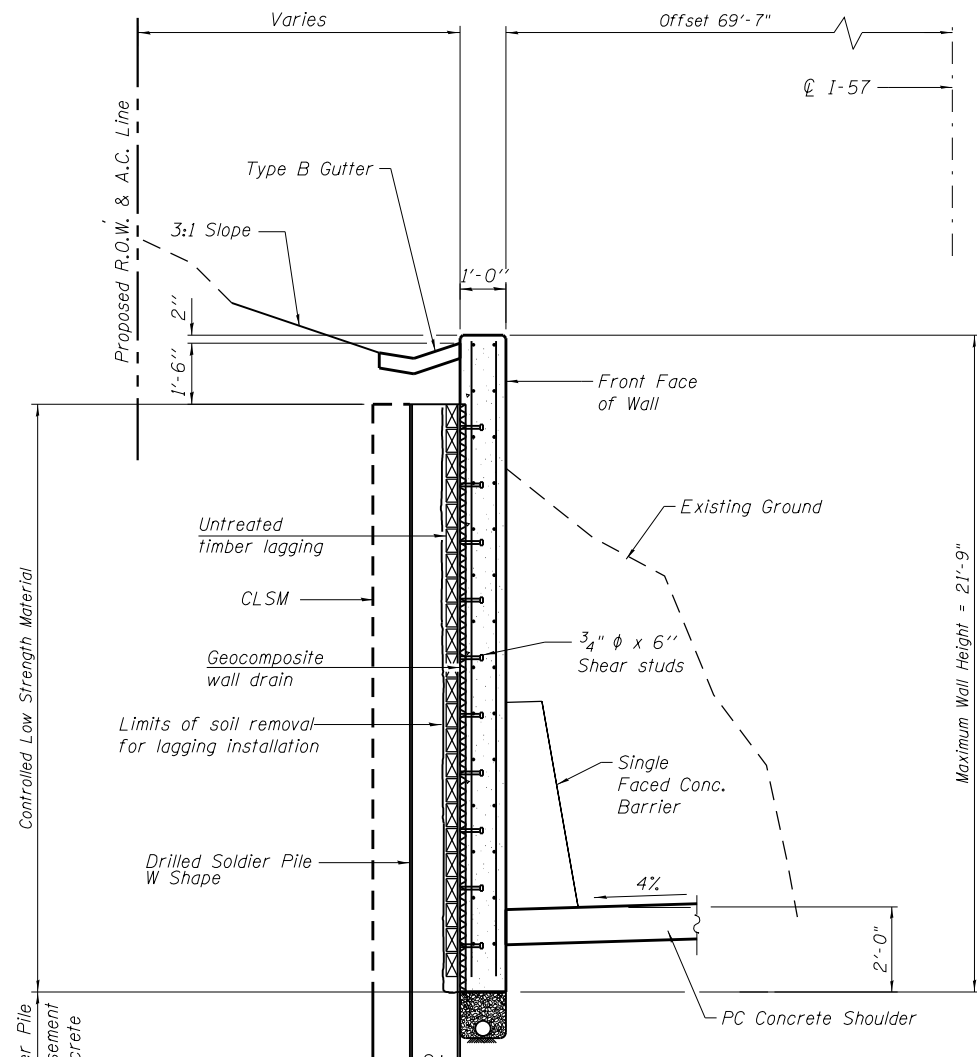
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Soil Boring Location

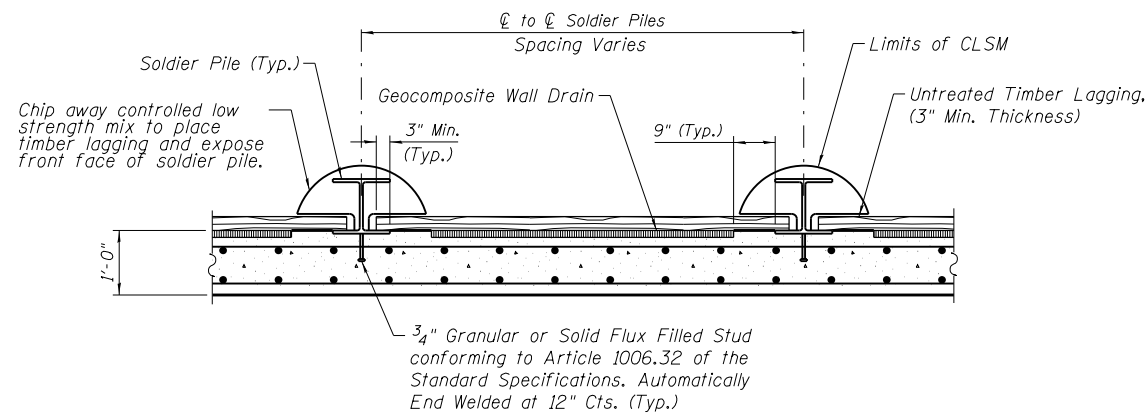
RETAINING WALL B
WALDRON ROAD F.A.U. 6184
OVER I-57 FAI-57
SEC. 139HBR-6
KANKAKEE COUNTY
STATION 230+50.00 TO 233+50.00
STRUCTURE NO. 046-0153

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DRAWN	MBJ	REVISED	
CHECKED	SEA	REVISED	

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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STA. TO STA.	CONTRACT NO. 66863			
FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT				

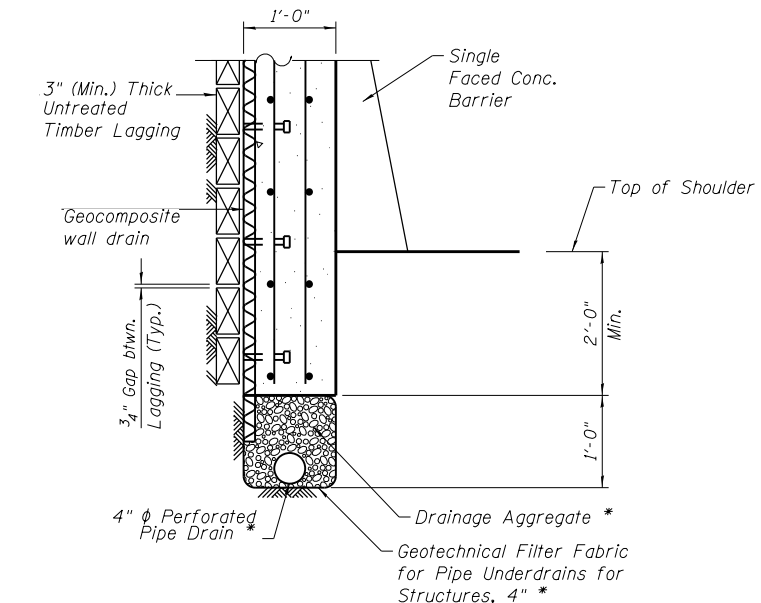


VERTICAL SECTION THRU DRILLED SOLDIER PILE WALL WITH TYPE "B" GUTTER



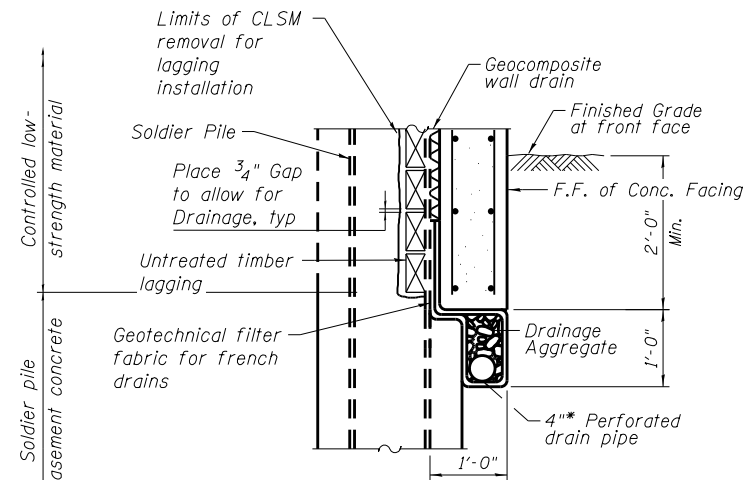
HORIZONTAL SECTION THRU SOLDIER PILE WALL

The Contractor is responsible for the design and performance of the lagging using no less than a 3 in. nominal rough-sawn thickness and timber with a minimum allowable bending stress of 1000 psi.

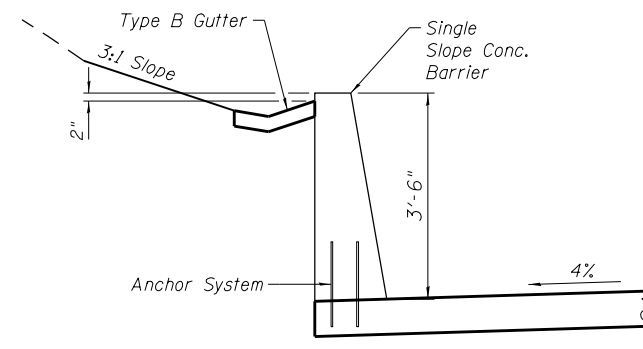


PIPE UNDERDRAIN DETAIL

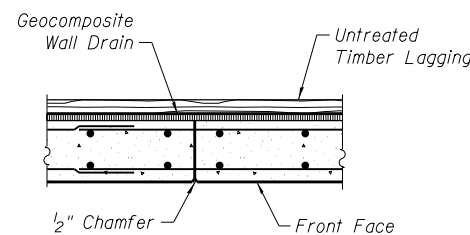
* Included in the cost of Pipe Underdrains for Structures



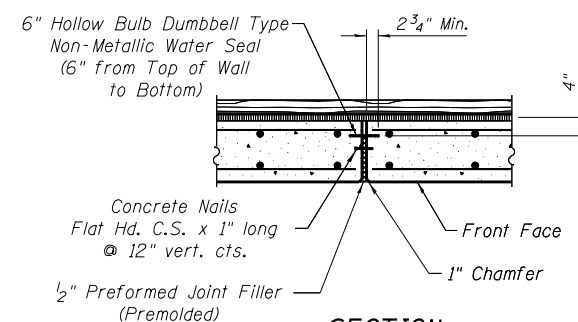
PIPE UNDERDRAIN DETAIL AT SOLDIER PILE



SINGLE SLOPE CONCRETE BARRIER AS RETAINING WALL



SECTION (Construction Joint)



SECTION (Expansion Joint)

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION

SHEET NO. 9 OF 9 SHEETS

WALDRON ROAD F.A.U. 6184 OVER I-57 FAI-57 SEC. 139HBR-6 KANKAKEE COUNTY STATION 230+47.96 STRUCTURE NO. 046-0153

DESIGNED	RT	REVISED	8/26/2019
CHECKED	SEA	REVISED	
DRAWN	JJE	REVISED	
CHECKED	SEA	REVISED	

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
6184	139HBR-6	KANKAKEE	9	9
STA. TO STA.	CONTRACT NO. 66863			
FED. ROAD DIST. NO.	ILLINOIS	FED. AID PROJECT		

EXHIBIT C
BORING LOGS



SOIL BORING LOG

ROUTE I-57 (FAI 57) DESCRIPTION Waldron Road over I-57, 3.4 miles North of US 45/52 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.108625, Longitude -87.83535

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. <u>046-0080 (Exist.)</u>	D E P T H	B L O W S	U C S Qu	M O I S T	Surface Water Elev. _____ ft
Station <u>230+53.99 (Exist.)</u>					Stream Bed Elev. _____ ft
BORING NO. <u>BH 57 (West Wall)</u>	ft (ft)	(/6")	(tsf)	(%)	Groundwater Elev.: _____
Station <u>228+63.37</u>					First Encounter <u>Dry</u> ft
Offset <u>32.6 ft Rt.</u>					Upon Completion <u>Dry</u> ft
Ground Surface Elev. <u>633.60</u>					After _____ Hrs. _____ ft

Augered Bituminous Shoulder, Brown Fill Sand					
631.10					
Loose Brown Fill Sand, Concrete Pieces - Fill		3		16	
629.60		4			
Note: Stopped Boring at 4' due to unknown trench - moved twice and still in trench. No JULIE markings in area.		4			
-5					
End of Boring					
-10					
-15					
-20					

SOIL BORING I-57 & IL 17 INTERCHANGE.GPJ IL_DOT.GDT 11/12/14



SOIL BORING LOG

ROUTE I-57 (FAI 57) DESCRIPTION Waldron Road over I-57, 3.4 miles North of US 45/52 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.108251, Longitude -87.835183

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. 046-0080 (Exist.)
Station 230+53.99 (Exist.)

BORING NO. BH 68 (Pier)
Station 230+00.99
Offset 9.2 ft Lt.
Ground Surface Elev. 632.86 ft

DEPTH H S	B L O W S	U C S Qu	M O I S T
(ft)	(/6")	(tsf)	(%)

Surface Water Elev. _____ ft
Stream Bed Elev. _____ ft
Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After _____ Hrs. _____ ft

Augered Bituminous Shoulder & Brown Fill Sand/Gravel

630.36

Dense Weathered Dolomite

630.19

100/2"

End of Boring

-5

-10

-15

-20

SOIL BORING I-57 & IL 17 INTERCHANGE.GPJ IL_DOT.GDT 11/12/14

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



SOIL BORING LOG

ROUTE I-57 (FAI 57) DESCRIPTION Waldron Road over I-57, 3.4 miles North of US 45/52 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.107967, Longitude -87.835197

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. <u>046-0080 (Exist.)</u>	D E P T H	B L O W S	U C S Qu	M O I S T	Surface Water Elev. _____ ft
Station <u>230+53.99 (Exist.)</u>					Stream Bed Elev. _____ ft
BORING NO. <u>BH 69 (Pier)</u>	ft (ft)	(/6")	(tsf)	(%)	Groundwater Elev.: _____
Station <u>231+04.30</u>					First Encounter <u>Dry</u> ft
Offset <u>2.2 ft Lt.</u>					Upon Completion <u>Dry</u> ft
Ground Surface Elev. <u>632.74</u>					After _____ Hrs. _____ ft

Augered Bituminous Shoulder & Tan Weathered & Reworked Dolomite					
630.24					
Dense Tan Weathered Dolomite	100/4"			7	
629.24					
Auger Refusal @ 3.5' End of Boring					
-5					
-10					
-15					
-20					

SOIL BORING I-57 & IL 17 INTERCHANGE.GPJ IL_DOT.GDT 11/12/14



SOIL BORING LOG

ROUTE I-57 (FAI 57) DESCRIPTION Waldron Road over I-57, 3.4 miles North of US 45/52 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.107686, Longitude -87.834655

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. <u>046-0080 (Exist.)</u>	D E P T H	B L O W S	U C S Qu	M O I S T	Surface Water Elev. _____ ft
Station <u>230+53.99 (Exist.)</u>					Stream Bed Elev. _____ ft
BORING NO. <u>BH 71 (E. Abut.)</u>	ft (ft)	(/6")	(tsf)	(%)	Groundwater Elev.: _____
Station <u>232+11.23</u>					First Encounter <u>Dry</u> ft
Offset <u>148.3 ft Lt.</u>					Upon Completion <u>Dry</u> ft
Ground Surface Elev. <u>647.42</u>					After _____ Hrs. _____ ft

Augered Shoulder Stone, Brown Silty Clay Loam Fill	644.92				
Hard Brown Silty Clay Loam Till Fill	3	4	4.0	13	
		5	P		
Stiff to Very Stiff Brown Silty Clay/Silty Clay Loam	-5	3			
		2	4.0	17	
		3	P		
Stiff to Very Stiff Brown Silty Clay/Silty Clay Loam	639.92	2			
		2	2.0	20	
Stiff to Very Stiff Brown Silty Clay Loam Till	637.92	2			
		2	1.5	26	
Weathered & Reworked Dolomite Surface	634.92	30			
		15		9	
Dense Tan/Orange Dolomite	632.42				
		632.17	100/3"		
Auger Refusal End of Boring	-20				

SOIL BORING I-57 & IL 17 INTERCHANGE.GPJ_IL_DOT.GDT 11/12/14

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)

SN 046-0080, Waldron Road over I-57, S. Abut.

(46-3)R, HBK, 5HBR, 6HBR

FAI 57 (IL 57), Kankakee County

Boring B-217, Box 1 of 2

Station 232+12.99, 133.4 ft. Lt.

Ground Surface Elev. = 648.76

Top of Core = 16 ft. (632.76)

Bottom of Core = 26 ft. (622.76)

Date of Core is 9/8/17

9-8-17

I-57 Waldron Rd S. Abut.

Boring # B217

Depth 16' to 26'

Box 1 of 2

Cone Pen #1
16



09/28/2017

ROCK CORE WORK	
SN	
CONTRACT	66863
ROUTE	I-57
COUNTY	Kankakee
SAMPLE NUMBER	1
SAMPLE DEPTH	FEET 21.22
SAMPLE LOCATION	FEET 0
SAMPLE MASS	GRAMS 412.36
TOP METER A	INCH 1.87
TOP METER B	INCH 1.87
BOTTOM METER A	INCH 1.87
BOTTOM METER B	INCH 1.87
STORAGE METER	INCH
AREA	SQ IN
WIDTH A	INCH
LENGTH B	INCH

SN 046-0080, Waldron Road over I-57, S. Abut.

(46-3)R, HBK, 5HBR, 6HBR

FAI 57 (IL 57), Kankakee County

Boring B-217, Box 2 of 2

Station 232+12.99, 133.4 ft. Lt.

Ground Surface Elev. = 648.76

Top of Core = 26 ft. (622.76)

Bottom of Core = 31 ft. (617.76)

Date of Core is 9/8/17

9-8-17

I-57 Waldron Rd S. Abut

Boring # B217

Depth 26' to 31'

Box 2 of 2

Core Run #3

SAMPLE # 6

SAMPLE 7

09/28/2017

SN		RO
CONTRACT 66863		
ROUTE I-57		
COUNTY Kankakee		
SAMPLE NUMBER		
SAMPLE DEPTH	FEET	
SAMPLE ELEVATION	FEET	
SAMPLE MASS	GRAM	
TOP DIAMETER A	IN	
TOP DIAMETER B		
BOTTOM		



SOIL BORING LOG

ROUTE I-57 (FAI 57) DESCRIPTION Waldron Road over I-57, 3.4 miles North of US 45/52 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.107926, Longitude -87.835174

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. <u>046-0080 (EX)</u>	D E P T H	B L O W S	U C S Qu	M O I S T	Surface Water Elev. _____ ft
Station <u>230+53.99 (EX)</u>					Stream Bed Elev. _____ ft
BORING NO. <u>B 218 (Pier)</u>	ft (ft)	(/6")	(tsf)	(%)	Groundwater Elev.: _____ ft
Station <u>231+25.20</u>					First Encounter _____ ft
Offset <u>8.0 ft Lt.</u>					Upon Completion _____ ft
Ground Surface Elev. <u>632.57</u>					After _____ Hrs. _____ ft

Augered Material - Not Documented					
630.07					
Augered Approximately 30" into Rock Before Starting Core					
627.57 -5					
Borehole continued with rock coring.					
-10					
-15					
-20					

SOIL BORING I-57 & IL 17 INTERCHANGE.GPJ_IL_DOT.GDT 2/5/18

SN 046-0080, Waldron Road over I-57, Pier

(46-3)R, HBK, 5HBR, 6HBR

FAI 57 (IL 57), Kankakee County

Boring B-218, Box 1 of 2

Station 231+25.20, 8.0 ft. Lt.

Ground Surface Elev. = 632.57

Top of Core = 5 ft. (627.57)

Bottom of Core = 15 ft. (617.57)

Date of Core is 10/4/17

I-57 Waldron Rd (Center Pier)

Boring: B218

Depth 5 Ft to 10 Ft

Box 1 of 2

10-4-17

Peri

SAMPLE #1



SAMPLE #3

10/19/2017

SN 046-0080, Waldron Road over I-57, Pier

(46-3)R, HBK, 5HBR, 6HBR

FAI 57 (IL 57), Kankakee County

Boring B-218, Box 2 of 2

Station 231+25.20, 8.0 ft. Lt.

Ground Surface Elev. = 632.57

Top of Core = 15 ft. (617.57)

Bottom of Core = 20 ft. (612.57)

Date of Core is 10/4/17

I-57 Waldron Rd (Center Pier)

Boring # B218

Depth 15 Ft to 20 Ft

Box 2 of 2

10-4-17

cut core 2 15'
core #3.15'

SAMPLE

SAMPLE

SAMPLE

SAMPLE

SAMPLE

SAMPLE

SAMPLE

SAMPLE

10/19/2017



SN 046-0080, Waldron Road over I-57, N. Abut.

(46-3)R, HBK, 5HBR, 6HBR

FAI 57 (IL 57), Kankakee County

Boring B-219, Box 1 of 2

Station 229+18.36, 87.5 ft. Rt.

Ground Surface Elev. = 657.30

Top of Core = 32.5 ft. (624.80)

Bottom of Core = 41.5 ft. (615.80)

Date of Core is 9/7/17

9-7-17
I.57 Waldron Rd N. Abut
Boring # B219
Depth 32.5' to 41.5'
Box 1 of 2

Core
32.5



09/28/2017

SN	CONTRACT 68863
	ROUTE 1-57
	COUNTY KAN
SAMPLE NUMBER	
SAMPLE DEPTH	
SAMPLE ELEVATION	
SAMPLE NO	
TOP DIAMETER	
TOP DIAMETER	
BOTTOM DIAMETER	
BOTTOM DIAMETER	

SN 046-0080, Waldron Road over I-57, N. Abut.

(46-3)R, HBK, 5HBR, 6HBR

FAI 57 (IL 57), Kankakee County

Boring B-219, Box 2 of 2

Station 229+18.36, 87.5 ft. Rt.

Ground Surface Elev. = 657.30

Top of Core = 41.5 ft. (615.80)

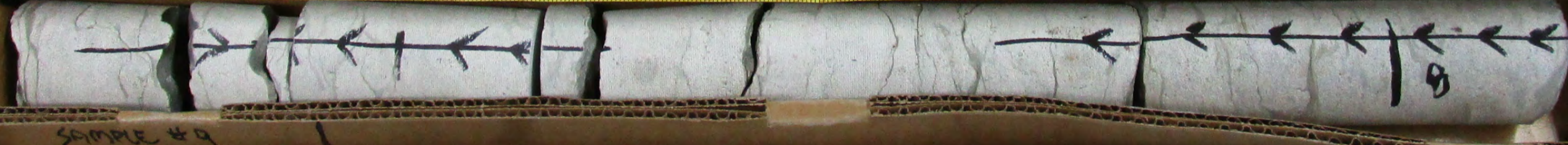
Bottom of Core = 47.5 ft. (609.80)

Date of Core is 9/7/17

9-7-17
I-57 Waldron Rd N. Abut.
Boring # B219
Depth 41.5' to 47.5'
Box 2 of 2

41.5

47.5



SAMPLE #9



SAMPLE #10



47.5 end core 3

09/28/2017

ROCK CORE WORKSHEET	
SN	
CONTRACT #	66863
ROUTE	I-57
COUNTY	San Diego
SAMPLE NUMBER	10
SAMPLE DEPTH	FEET 40.85
SAMPLE ELEVATION	FEET 0
SAMPLE MASS	GRAMS 484.2
TOP DIAMETER A	INCH 1.80
TOP DIAMETER B	INCH 1.80
BOTTOM DIAMETER A	INCH
BOTTOM DIAMETER B	INCH
AVERAGE DIAMETER	INCH
AREA	SQ IN
LENGTH A	INCH
LENGTH B	INCH



3705 Progress Blvd
Peru, IL 61354
815 780-8486

ROCK CORE LOG

Solutions You Can Build On

Date 12/21/17

ROUTE FAI 57 DESCRIPTION Retaining wall east of I-57, south of Waldron Road LOGGED BY TMR

SECTION (46-3)R,HBK,5HBR,6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.107577, Longitude -87.835013

COUNTY Kankakee CORING METHOD Wireline

STRUCT. NO. _____ CORING BARREL TYPE & SIZE NQ
Station _____
Core Diameter 2 in
BORING NO. B-220 Top of Rock Elev. 630.33 ft
Station 232+54 Begin Core Elev. 626.33 ft
Offset 48.0 ft Lt.
Ground Surface Elev. 634.83 ft

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
626.33	1	100	68	1.65	543.0
-10					
623.33					
622.33					
					489.0
-15					
					358.0
616.33					398.0
-20					
-25					

Gray Dolostone
Brown Dolostone
Gray Dolostone, Crystal solution void @ 12.66' 3/4" W x 1/2" H
End of Boring

ROCK CORE I-57 RETAINING WALLS.GPJ IL_DOT.GDT 2/1/18

Color pictures of the cores Yes No

Cores will be stored for examination until _____

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

FAI 57 (IL 57)

(46-3)R, HBR, 5HBR, 6HBR

Kankakee County

Boring B-220, Box 1 of 1

Station 232+50, 52 ft. Lt.

Ground Surface Elev. =631.04 ft.

Top of Core = 8.5 ft. (622.54 ft.)

Bot. of Core = 18.5 ft. (612.54 ft.)

Date of Core is 12/21/17

FAI 57 (IL 57)

(46-3)R, HBR, 5HBR, 6HBR

Kankakee County

Boring B-220, Box 1 of 1

Station 232+50, 52 ft. Lt.

Ground Surface Elev. =631.04 ft.

Top of Core = 8.5 ft. (622.54 ft.)

Bot. of Core = 18.5 ft. (612.54 ft.)

Date of Core is 12/21/17





Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation

SOIL BORING LOG

Date 9/25/17

ROUTE I-57 (FAI 57) DESCRIPTION Retaining Wall South of Waldron Road over I-57 on West side of I-57 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.106892, Longitude -87.835321

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. _____ Station _____	D E P T H H	B L O W S S	U C S Qu	M O I S T T	Surface Water Elev. _____ ft
					Stream Bed Elev. _____ ft
BORING NO. <u>B 221</u> Station <u>235+00.78</u> Offset <u>44.1 ft Rt.</u>					Groundwater Elev.: _____
Ground Surface Elev. <u>630.55</u> ft					First Encounter _____ ft Upon Completion _____ ft After _____ Hrs. _____ ft

Augered Material - Not Documented					
628.55					
Rock encountered @ approximately 2' and Augered to 4'					
626.55					
Borehole continued with rock coring.	-5				
	-10				
	-15				
	-20				

SOIL BORING I-57 & IL 17 INTERCHANGE.GPJ_IL_DOT.GDT 2/5/18



Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation

ROCK CORE LOG

ROUTE I-57 (FAI 57) DESCRIPTION Retaining Wall South of Waldron Road over I-57 on West side of I-57 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.106892, Longitude -87.835321

COUNTY Kankakee CORING METHOD Split Barrel Wire Line

STRUCT. NO. _____	CORING BARREL TYPE & SIZE <u>N W/L 2</u>	D E P T H (ft)	C O R E (#)	R E C O V E R Y (%)	R · Q · D · (%)	C O R E T I M E (min/ft)	S T R E N G T H (tsf)
Station _____	Core Diameter <u>1.9</u> in						
BORING NO. <u>B 221</u>	Top of Rock Elev. <u>628.55</u> ft						
Station <u>235+00.78</u>	Begin Core Elev. <u>626.55</u> ft						
Offset <u>44.1 ft Rt.</u>							
Ground Surface Elev. <u>630.55</u> ft							

Dense Gray & Tan Limestone with some Vertical Fracturing - Loose Joints	626.55	1	92	8	2.2	711.5
	-5					
	624.55					
Dense Gray Limestone with Horizontal Fracturing & Loose Joints, some Joint Faces Oxidized Tan						
	621.55					
Dense Gray Limestone, Tight Joints and Numerous Vertical Fractures		2	100	13	2.4	611.3
	-10					
	616.55					741.9
End of Boring						
	-15					
	-20					

ROCK CORE I-57 & IL 17 INTERCHANGE.GPJ IL_DOT.GDT 2/5/18

Color pictures of the cores Yes
 Cores will be stored for examination until Construction Complete
 The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)
 BBS, form 138 (Rev. 8-99)

Retaining Wall South of Waldron Road

(46-3)R, HBK, 5HBR, 6HBR

FAI 57 (IL 57), Kankakee County

Boring B-221, Box 1 of 1

Station 235+00.78, 44.1 ft. Rt.

Ground Surface Elev. = 630.55

Top of Core = 4 ft. (626.55)

Bottom of Core = 14 ft. (616.55)

Date of Core is 9/25/17

9-25-17
Waldron Rd Ret. Wall
Boring # B221
Depth 4' to 14'
Box 1 of 1

flint



09/28/2017

DIAMETER	FEET	INCH
SAMPLE MASS	GRAMS	
TOP DIAMETER A	INCH	
TOP DIAMETER B	INCH	
BOTTOM DIAMETER A	INCH	
BOTTOM DIAMETER B	INCH	
AVERAGE DIAMETER	INCH	
AREA	SQ. INCH	
LENGTH A	INCH	
LENGTH B	INCH	
AVERAGE LENGTH	INCH	
LENGTH / DIAMETER RATIO		
LENGTH / DIAMETER RATIO		
DIAMETER CORRECTION		



SOIL BORING LOG

ROUTE I-57 (FAI 57) DESCRIPTION Retaining Wall South of Waldron Road over I-57 on West side of I-57 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.10729, Longitude -87.835345

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. _____ Station _____	D E P T H H	B L O W S S	U C S Qu	M O I S T T	Surface Water Elev. _____ ft
					Stream Bed Elev. _____ ft
BORING NO. <u>B 222</u> Station <u>233+55.44</u> Offset <u>46.2 ft Rt.</u>					Groundwater Elev.: _____
Ground Surface Elev. <u>630.64</u> ft					First Encounter _____ ft Upon Completion _____ ft After _____ Hrs. _____ ft

Augered Material - Not Documented					
628.64					
Rock encountered @ approximately 2' and Augered to 4'					
626.64					
Borehole continued with rock coring.	-5				
	-10				
	-15				
	-20				

SOIL BORING I-57 & IL 17 INTERCHANGE.GPJ_IL_DOT.GDT 2/5/18

Retaining Wall South of Waldron Road

(46-3)R, HBK, 5HBR, 6HBR

FAI 57 (IL 57), Kankakee County

Boring B-222, Box 1 of 1

Station 233+55.44, 46.2 ft. Rt.

Ground Surface Elev. = 630.64

Top of Core = 4 ft. (626.64)

Bottom of Core = 14 ft. (616.64)

Date of Core is 9/25/17

9-25-17
Waldron Rd Ret. Wall
Boring # B222
Depth 4' to 14'
Box 1 of 1

4.5 ft #1

SAMPLE # 1



SAMPLE # 2

SAMPLE # 3

SAMPLE # 4

SAMPLE # 5

SAMPLE # 6

09/28/2017

CONTRACT 66863	
ROUTE I-57	
COUNTY Kankakee	
SAMPLE NUMBER	
SAMPLE DEPTH	FEET
SAMPLE ELEVATION	
SAMPLE MASS	
TOP DIAMETER A	
TOP DIAMETER B	
BOTTOM DIAMETER	
BOTTOM DIAMETER	
DIAMETER AVE	
DIAMETER	



Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation

SOIL BORING LOG

Date 9/13/17

ROUTE I-57 (FAI 57) DESCRIPTION Retaining Wall South of Waldron Road over I-57 on West side of I-57 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.107697, Longitude -87.835316

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. _____ Station _____	D E P T H H	B L O W S S	U C S Qu	M O I S T T	Surface Water Elev. _____ ft
					Stream Bed Elev. _____ ft
BORING NO. <u>B 223</u> Station <u>232+07.62</u> Offset <u>33.5 ft Rt.</u>					Groundwater Elev.: _____
Ground Surface Elev. <u>632.47</u> ft					First Encounter _____ ft Upon Completion _____ ft After _____ Hrs. _____ ft

Augered Material - Not Documented					
629.47					
Borehole continued with rock coring.					
	-5				
	-10				
	-15				
	-20				

SOIL BORING I-57 & IL 17 INTERCHANGE.GPJ_IL_DOT.GDT 2/5/18



Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation

ROCK CORE LOG

Date 9/13/17

ROUTE I-57 (FAI 57) DESCRIPTION Retaining Wall South of Waldron Road over I-57 on West side of I-57 LOGGED BY Larry Myers

SECTION (46-3)R, HBK, 5HBR, 6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.107697, Longitude -87.835316

COUNTY Kankakee CORING METHOD Split Barrel Wire Line

STRUCT. NO. _____	CORING BARREL TYPE & SIZE <u>N W/L 2</u>	D E P T H (ft)	C O R E (#)	R E C O V E R Y (%)	R · Q · D · (%)	C O R E T I M E (min/ft)	S T R E N G T H (tsf)
Station _____	Core Diameter <u>1.9</u> in						
BORING NO. <u>B 223</u>	Top of Rock Elev. <u>629.47</u> ft						
Station <u>232+07.62</u>	Begin Core Elev. <u>629.47</u> ft						
Offset <u>33.5 ft Rt.</u>							
Ground Surface Elev. <u>632.47</u> ft							

Tan to Gray Limestone with some Horizontal Fracturing, Joint Faces Oxidized Tan Color	629.47	1	83	37	2.6	744.9
						585.6
						807.1
	624.47					
Gray Limestone with some Horizontal Fracturing, Joint Faces Oxidized Tan Color		2	100	37	2.8	872.1
						803.2
						771.2
	619.47					746.6
End of Boring						

ROCK CORE I-57 & IL 17 INTERCHANGE.GPJ IL_DOT.GDT 2/5/18

Color pictures of the cores Yes
 Cores will be stored for examination until Construction Complete
 The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)
 BBS, form 138 (Rev. 8-99)

Retaining Wall South of Waldron Road

(46-3)R, HBK, 5HBR, 6HBR

FAI 57 (IL 57), Kankakee County

Boring B-223, Box 1 of 1

Station 232+07.62, 33.5 ft. Rt.

Ground Surface Elev. = 632.47

Top of Core = 3 ft. (629.47)

Bottom of Core = 13 ft. (619.47)

Date of Core is 9/13/17

I-57 Kankakee Ret. Wall

B223

Box 1 of 1

Depth 3' to 13'



09/28/2017



3705 Progress Blvd
Peru, IL 61354
815 780-8486

SOIL BORING LOG

Solutions You Can Build On

Date 12/18/17

ROUTE FAI 57 DESCRIPTION Retaining wall west of I-57, south of K B & S Railroad Crossing LOGGED BY TLM

SECTION (46-3)R,HBK,5HBR,6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.108997, Longitude -87.835784

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. Station	DEPTH H S	BLOW S Qu	UCS Qu	MOIST S T	Surface Water Elev. _____ ft	Stream Bed Elev. _____ ft	GROUNDWATER ELEV.: First Encounter _____ dry ft	Upon Completion _____ dry ft	After _____ Hrs. _____ ft	DEPTH H S	BLOW S Qu	UCS Qu	MOIST S T
	(ft)	(/6")	(tsf)	(%)						(ft)	(/6")	(tsf)	(%)
Brown Topsoil, Silty Loam Timber Soil, moist 649.19	4					629.19				3			
Hard brown & gray Silty Clay, dry	10 14	4.5 P	18							6 8	2.5 B	12	
	7									4.5 P			
	11 18	4.5 P	16			626.19				6 18 94	5.2 B	5	
645.19	-5					-25	Fractured and very weathered brown & gray Dolostone						
Hard brown Silty Clay, dry	9									85/1"			
	15 20	4.5 P	14									5	
642.69													
Hard brown & dark gray Silty Clay Till	7									50/.25*			
	12 19	4.5 P	15			620.69				-30			4
640.19	-10						Borehole continued with rock coring.						
Hard gray Clay, trace fine gravel	5												
	9 11	7.0 B	18										
	5												
	5 9	4.7 B	17										
635.19	-15					-35							
Very stiff gray Clay	3												
	5 8	3.1 B	19										
	3												
	5 7	2.9 B	21										
	-20					-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)

FAI 57 (IL 57)

(46-3)R, HBR, 5HBR, 6HBR

Kankakee County

Boring B-224, Box 1 of 1

Station 228+00, 120 ft. Rt.

Ground Surface Elev. = 656.00 ft.

Top of Core = 30 ft. (626.00 ft.)

Bot. of Core = 40 ft. (616.00 ft.)

Date of Core is 12/18/17

FAI 57 (IL 57)

(46-3)R, HBR, 5HBR, 6HBR

Kankakee County

Boring B-224, Box 1 of 1

Station 228+00, 120 ft. Rt.

Ground Surface Elev. = 656.00 ft.

Top of Core = 30 ft. (626.00 ft.)

Bot. of Core = 40 ft. (616.00 ft.)

Date of Core is 12/18/17





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SOIL BORING LOG

Solutions You Can Build On

Date 12/18/17

ROUTE FAI 57 DESCRIPTION Retaining wall west of I-57, south of K B & S Railroad Crossing LOGGED BY TLM

SECTION (46-3)R,HBK,5HBR,6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.109359, Longitude -87.835702

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. Station	DEPTH H S	BLOW S Qu	UCS Qu	MOIST S T	Surface Water Elev. _____ ft	Stream Bed Elev. _____ ft	GROUNDWATER ELEV.:	DEPTH H S	BLOW S Qu	UCS Qu	MOIST S T
BORING NO. B-225 Station 225+99 Offset 121.0 ft Rt. Ground Surface Elev. 646.82 ft	(ft)	(/6")	(tsf)	(%)			First Encounter _____ dry ft	(ft)	(/6")	(tsf)	(%)
							Upon Completion _____ dry ft				
							After _____ Hrs. _____ ft				
Very stiff gray Clay with occasional pieces of gravel, moist						Weathered rock, no recovery					
		4						50/.25"			13
		5	3.7	17							
		7	B								
		3						100/1"			
Very stiff gray Clay, moist						No recovery					9
		5	2.9	18							
		-5	B				621.82	-25			
		3							100/1.25"		6
Very stiff gray Clay, moist						White/gray Dolostone augered up					
		3									
		3	2.5	19							
		4	B								
		2									
Very stiff gray Clay, moist											
		4	2.5	22							
		-10	B								
		3									
Very stiff Sandy Clay Loam with gravel pieces, moist						Borehole continued with rock coring.					
		5	2.1	23							
		6	B								
		3									
Hard gray Clay with .5" layers of fine sand at 3" intervals, moist											
		5	2.7	22							
		-15	B								
		9									
Very stiff gray Clay, moist											
		17	3.5	10							
		11	B								
		8									
Very stiff gray Clay, moist											
		10	4.0	14							
		-20	P								
		15									

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



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ROCK CORE LOG

Solutions You Can Build On

Date 12/18/17

ROUTE FAI 57 DESCRIPTION Retaining wall west of I-57, south of K B & S Railroad Crossing LOGGED BY TLM

SECTION (46-3)R,HBK,5HBR,6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.109359, Longitude -87.835702

COUNTY Kankakee CORING METHOD Wireline

STRUCT. NO. _____ CORING BARREL TYPE & SIZE NQ
Station _____
Core Diameter 2 in
BORING NO. B-225 Top of Rock Elev. 615.82 ft
Station 225+99 Begin Core Elev. 615.82 ft
Offset 121.0 ft Rt.
Ground Surface Elev. 646.82 ft

DESCRIPTION	DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray thin jointed Dolostone with thin Shale partings	615.82	1	98	37	1.2	253.0
						182.0
Light brown Dolostone	608.82					
Gray thin jointed Dolostone with thin Shale partings. Small void (Kerst) at 7.25' down, void is 1" wide x .5" tall & .5" deep. The crystals in the void are evident on the back of the core.	608.32					
End of Boring	605.82					463.0

ROCK CORE I-57 RETAINING WALLS.GPJ IL_DOT.GDT 2/1/18

Color pictures of the cores Yes No

Cores will be stored for examination until _____

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

FAI 57 (IL 57)

(46-3)R, HBR, 5HBR, 6HBR

Kankakee County

Boring B-225, Box 1 of 1

Station 226+10, 117 ft. Rt.

Ground Surface Elev. = 653.00 ft.

Top of Core = 31 ft. (622.00 ft.)

Bot. of Core = 41 ft. (612.00 ft.)

Date of Core is 12/18/17

FAI 57 (IL 57)

(46-3)R, HBR, 5HBR, 6HBR

Kankakee County

Boring B-225, Box 1 of 1

Station 226+10, 117 ft. Rt.

Ground Surface Elev. = 653.00 ft.

Top of Core = 31 ft. (622.00 ft.)

Bot. of Core = 41 ft. (612.00 ft.)

Date of Core is 12/18/17





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SOIL BORING LOG

Solutions You Can Build On

Date 12/19/17

ROUTE FAI 57 DESCRIPTION Retaining wall west of I-57, south of K B & S Railroad Crossing LOGGED BY TMR

SECTION (46-3)R,HBK,5HBR,6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.109759, Longitude -87.835725

COUNTY Kankakee DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME Automatic

STRUCT. NO. _____ Station _____	<table border="1"> <tr> <td>D</td> <td>B</td> <td>U</td> <td>M</td> <td rowspan="4"> Surface Water Elev. _____ ft Stream Bed Elev. _____ ft Groundwater Elev.: First Encounter _____ dry ft Upon Completion _____ dry ft After _____ Hrs. _____ ft </td> </tr> <tr> <td>E</td> <td>L</td> <td>C</td> <td>O</td> </tr> <tr> <td>P</td> <td>O</td> <td>S</td> <td>I</td> </tr> <tr> <td>T</td> <td>W</td> <td>S</td> <td>S</td> </tr> </table>	D	B	U	M	Surface Water Elev. _____ ft Stream Bed Elev. _____ ft Groundwater Elev.: First Encounter _____ dry ft Upon Completion _____ dry ft After _____ Hrs. _____ ft	E	L	C	O	P	O	S	I	T	W	S	S
D		B	U	M	Surface Water Elev. _____ ft Stream Bed Elev. _____ ft Groundwater Elev.: First Encounter _____ dry ft Upon Completion _____ dry ft After _____ Hrs. _____ ft													
E		L	C	O														
P		O	S	I														
T	W	S	S															
BORING NO. <u>B-226</u> Station <u>224+53</u> Offset <u>123.0 ft Rt.</u>																		
Ground Surface Elev. <u>664.59</u> ft																		

DEPTH (ft)	BLOWS (/6")	UCS (tsf)	MOIST (%)
624.09	54/1"		
Gray Dolostone w/frequent and thin Shale partings			
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)



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ROCK CORE LOG

Solutions You Can Build On

Date 12/19/17

ROUTE FAI 57 DESCRIPTION Retaining wall west of I-57, south of K B & S Railroad Crossing LOGGED BY TMR

SECTION (46-3)R,HBK,5HBR,6HBR LOCATION SE 1/4, SEC. 4, TWP. 30N, RNG. 13W, 2nd PM, Latitude 41.109759, Longitude -87.835725

COUNTY Kankakee CORING METHOD Wireline

STRUCT. NO. _____	CORING BARREL TYPE & SIZE <u>NQ</u>	D E P T H (ft)	C O R E (#)	R E C O V E R Y (%)	R Q D (%)	C O R E T I M E (min/ft)	S T R E N G T H (tsf)
Station _____	Core Diameter <u>2</u> in						
BORING NO. <u>B-226</u>	Top of Rock Elev. <u>624.09</u> ft						
Station <u>224+53</u>	Begin Core Elev. <u>622.59</u> ft						
Offset <u>123.0 ft Rt.</u>							
Ground Surface Elev. <u>664.59</u> ft							

Gray Dolostone w/frequent and thin Shale partings (continued)	1	100	30	1.58	
				1.4	265.0
				1.58	807.0
Brown Dolostone with open joints with gouge < 2 mm (1/32") A crystal line void (0.5" x 0.5") exists at 9.5'	613.09				
Gray Dolostone	612.59				
End of Boring					

ROCK CORE I-57 RETAINING WALLS.GPJ IL_DOT.GDT 2/1/18

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)

FAI 57 (IL 57)

(46-3)R, HBR, 5HBR, 6HBR

Kankakee County

Boring B-226, Box 1 of 1

Station 224+10, 115 ft. Lt.

Ground Surface Elev. = 663.20 ft.

Top of Core = 42 ft. (621.20 ft.)

Bot. of Core = 52 ft. (611.20 ft.)

Date of Core is 12/19/17

FAI 57 (IL 57)

(46-3)R, HBR, 5HBR, 6HBR

Kankakee County

Boring B-226, Box 1 of 1

Station 224+10, 115 ft. Lt.

Ground Surface Elev. = 663.20 ft.

Top of Core = 42 ft. (621.20 ft.)

Bot. of Core = 52 ft. (611.20 ft.)

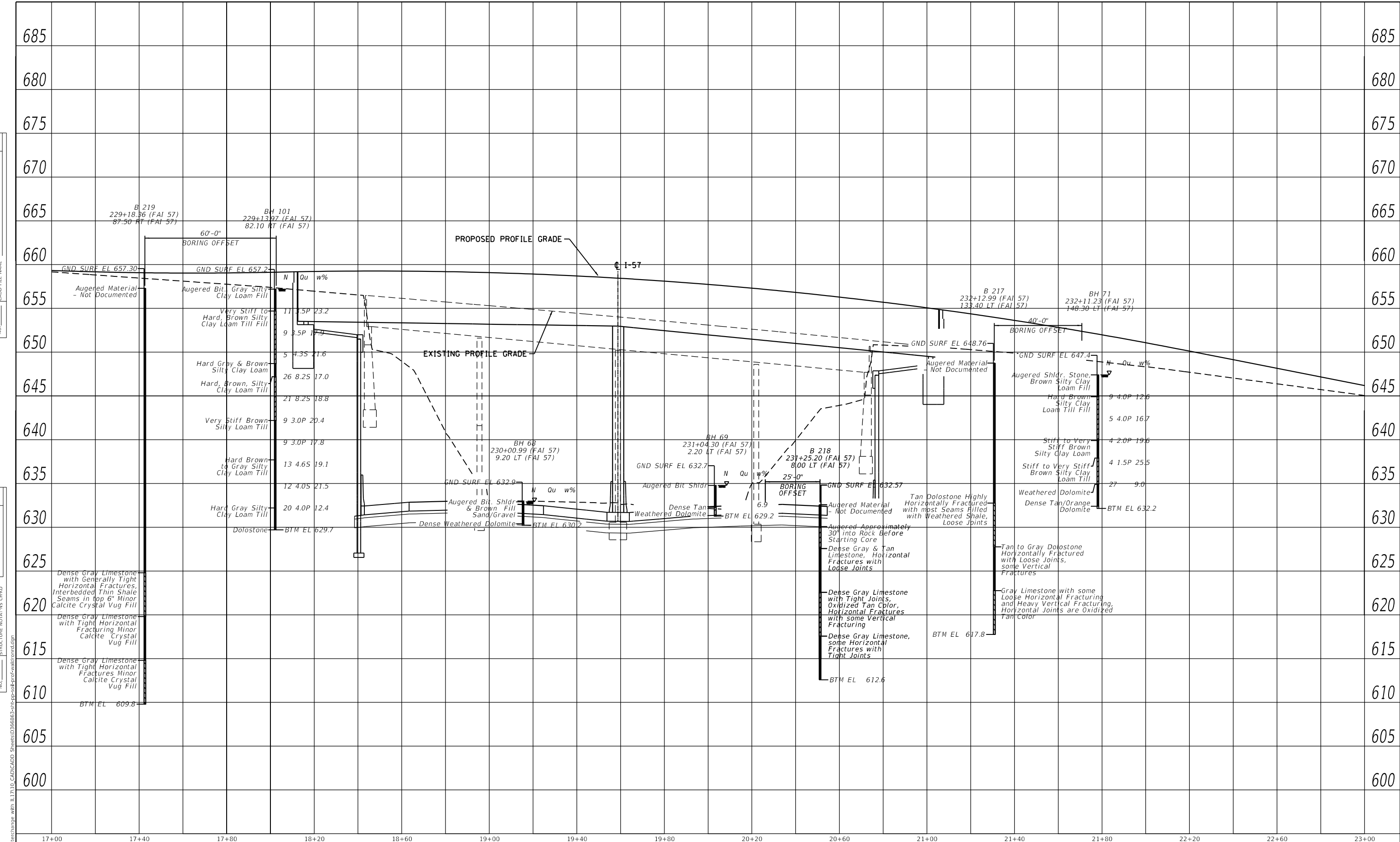
Date of Core is 12/19/17



EXHIBIT D
SUBSURFACE PROFILE

DATE	
BY	
SURVEYED	
PLOTTED	
ALIGNMENT CHECKED	
NOTE BOOK NO.	
CADD FILE NAME	

DATE	
BY	
SURVEYED	
PLOTTED	
GRADES CHECKED	
NOTE BOOK NO.	
STRUCTURE NOTATIONS CHANGED	



MODEL: PP_57_4
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	DRAWN -	REVISED -
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PLOT DATE = 6/15/2018	DATE -	REVISED -

**STATE OF ILLINOIS
 DEPARTMENT OF TRANSPORTATION**

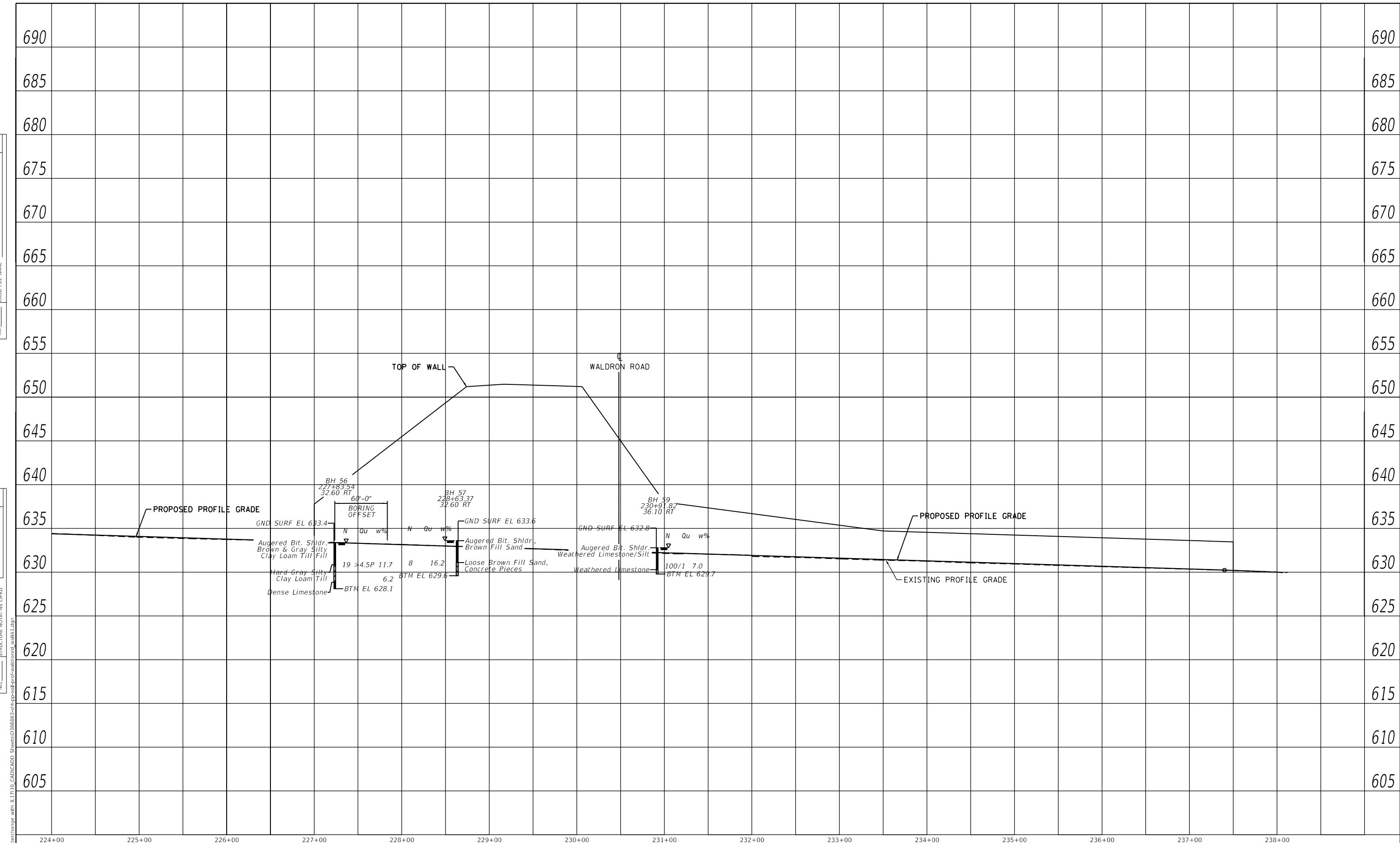
**WALDRON ROAD OVER FAI 57
 SOIL BORING PROFILE**

SCALE: SHEET OF SHEETS STA. TO STA.

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
6184	139-HB-1-HF-1	KANKAKEE		
CONTRACT NO. 66863				
ILLINOIS FED. AID PROJECT				

PLAN	SURVEYED	DATE
	PLOTTED	
	ALIGNMENT CHECKED	
	NOTE BOOK	
	NO.	
	CADD FILE NAME	

PROFILE	SURVEYED	DATE
	PLOTTED	
	GRADES CHECKED	
	NOTE BOOK	
	NO.	
	STRUCTURE NOTATION	



MODEL: PL_57_4
FILE NAME: P:\11-1017-157 Interchange with I17\10-CADD\CADD Sheets\139-HB-1-HF-1-WallA.dgn

USER NAME = bbb	DESIGNED -	REVISED -
	DRAWN -	REVISED -
PLOT SCALE = 100.0000' / in.	CHECKED -	REVISED -
PLOT DATE = 6/15/2018	DATE -	REVISED -

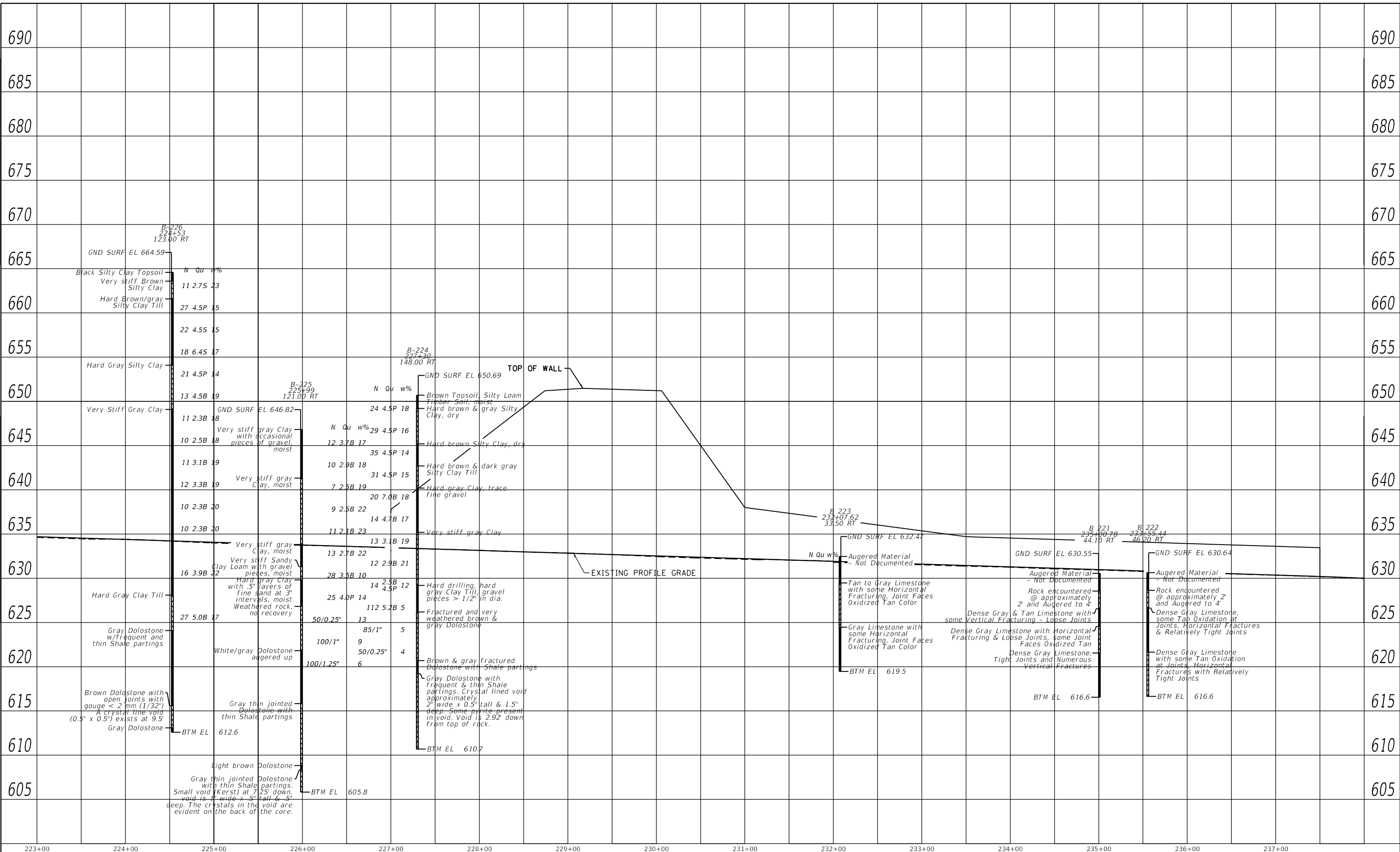
**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

WALDRON ROAD OVER FAI 57 - WALL A			
SOIL BORING PROFILE			
SCALE:	SHEET	OF SHEETS	STA. TO STA.

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
6184	139-HB-1-HF-1	KANKAKEE		
CONTRACT NO. 66863				
ILLINOIS FED. AID PROJECT				

PLAN	SURVEYED	DATE
	PLOTTED	
	ALIGNED	
	CHECKED	
	FILE NAME	
	NO.	
	BY	
	DATE	

PROFILE	SURVEYED	DATE
	PLOTTED	
	GRADES CHECKED	
	STRUCTURE NOTATIONS CHECKED	
	NO.	
	BY	
	DATE	



MODEL: PL_57_4
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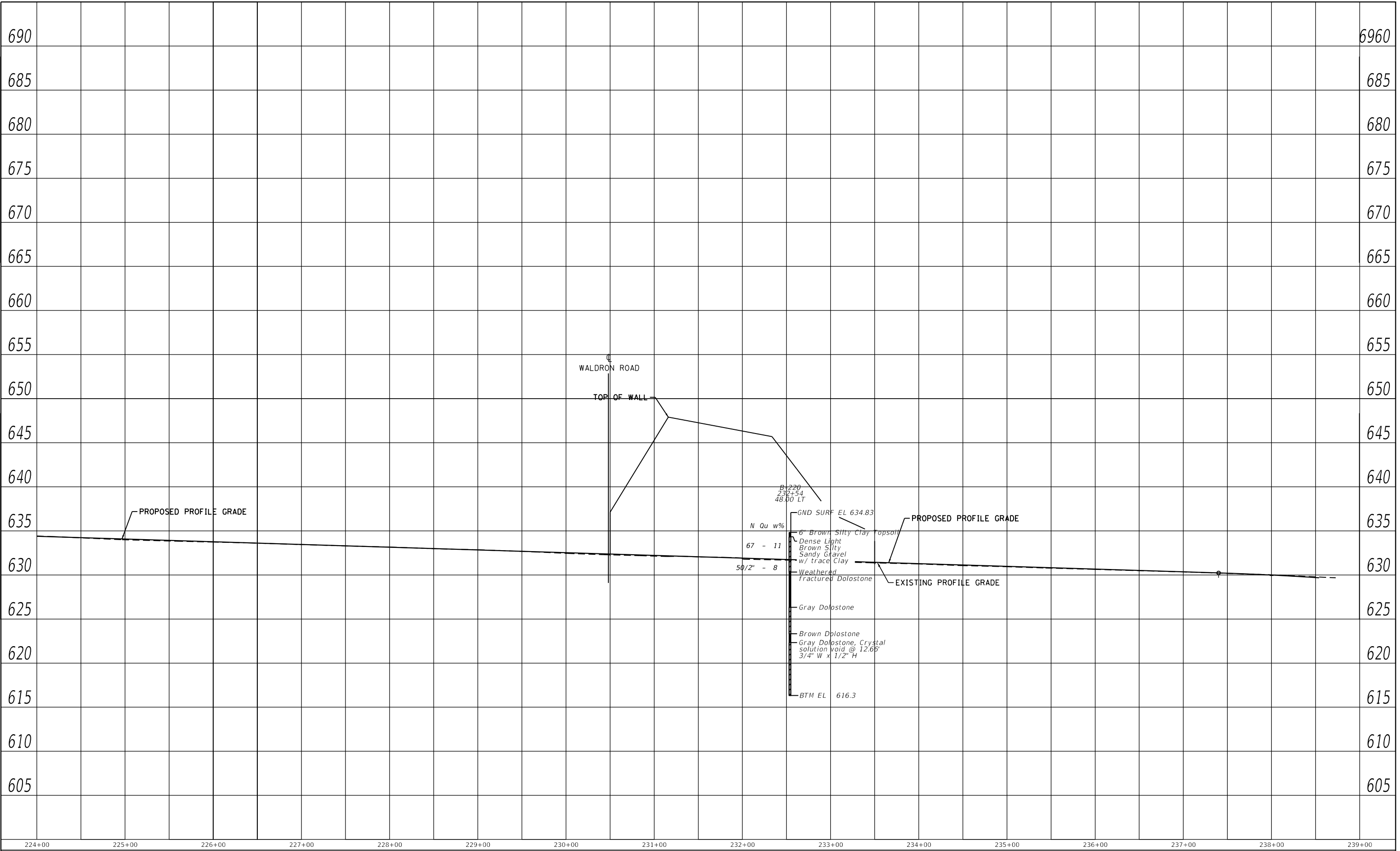
USER NAME = bbb	DESIGNED -	REVISED -
	DRAWN -	REVISED -
PLOT SCALE = 100.0000' / in.	CHECKED -	REVISED -
PLOT DATE = 6/15/2018	DATE -	REVISED -

**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

**WALDRON ROAD OVER FAI 57 - WALL A
SOIL BORING PROFILE**

SCALE: SHEET OF SHEETS STA. TO STA.

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
6184	139-HB-1-HF-1	KANKAKEE		
CONTRACT NO. 66863				
ILLINOIS FED. AID PROJECT				



PLAN		SURVEYED		DATE	
NOTE BOOK NO. _____		PLOTTED		BY _____	
		ALIGNMENT CHECKED			
		E/CAD FILE NAME			

PROFILE		SURVEYED		DATE	
NOTE BOOK NO. _____		PLOTTED		BY _____	
		GRADES CHECKED			
		STRUCTURE NOTATIONS CHECKED			

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USER NAME = bbb	DESIGNED -	REVISED -
PLOT SCALE = 100.0000' / in.	DRAWN -	REVISED -
PLOT DATE = 6/15/2018	CHECKED -	REVISED -
	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

WALDRON ROAD OVER FAI 57 - WALL B
SOIL BORING PROFILE

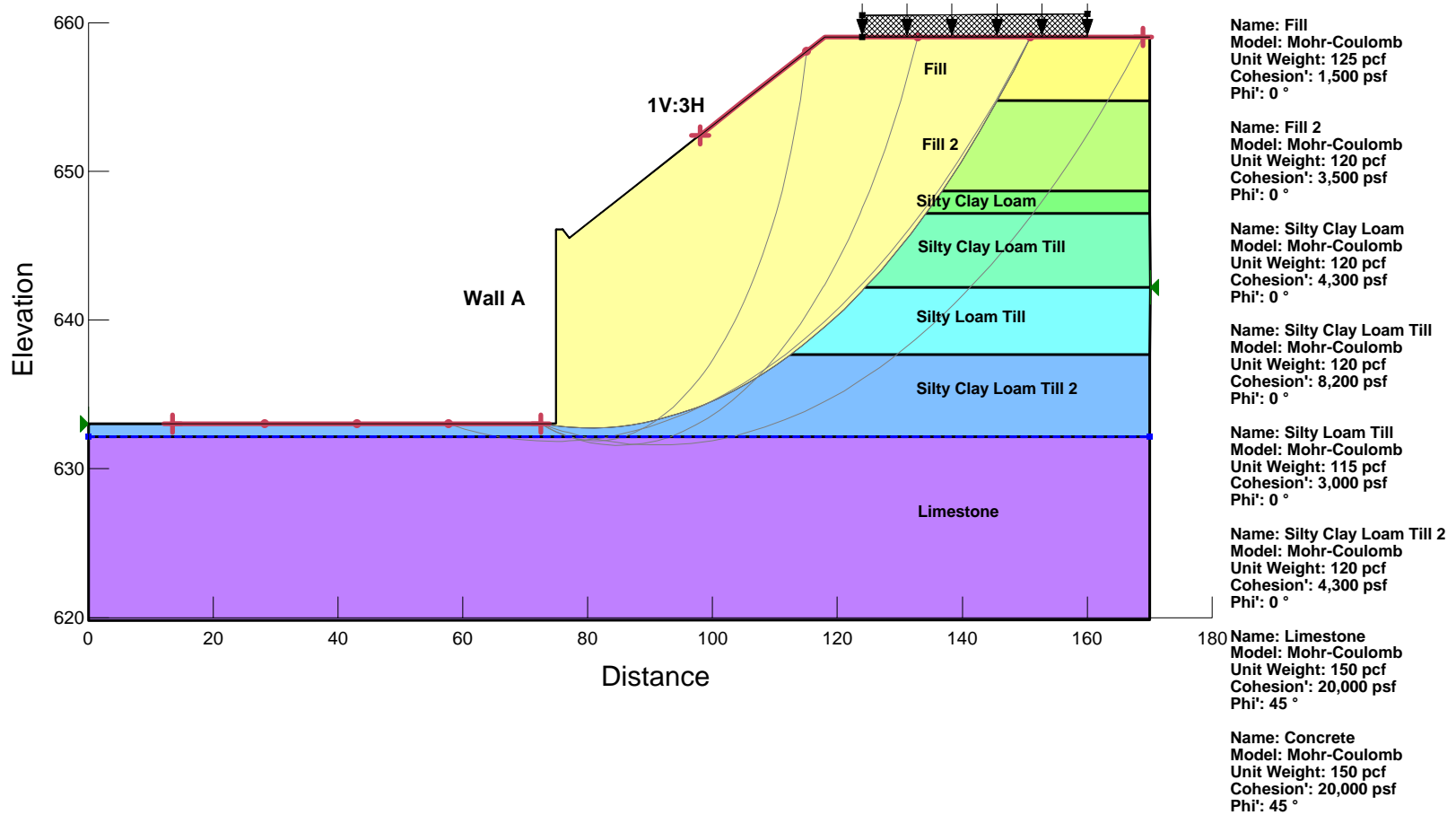
SCALE: SHEET OF SHEETS STA. TO STA.

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
6184	139-HB-1-HF-1	KANKAKEE		
CONTRACT NO. 66863				
ILLINOIS FED. AID PROJECT				

EXHIBIT E
SLOPE/W SLOPE STABILITY ANALYSIS

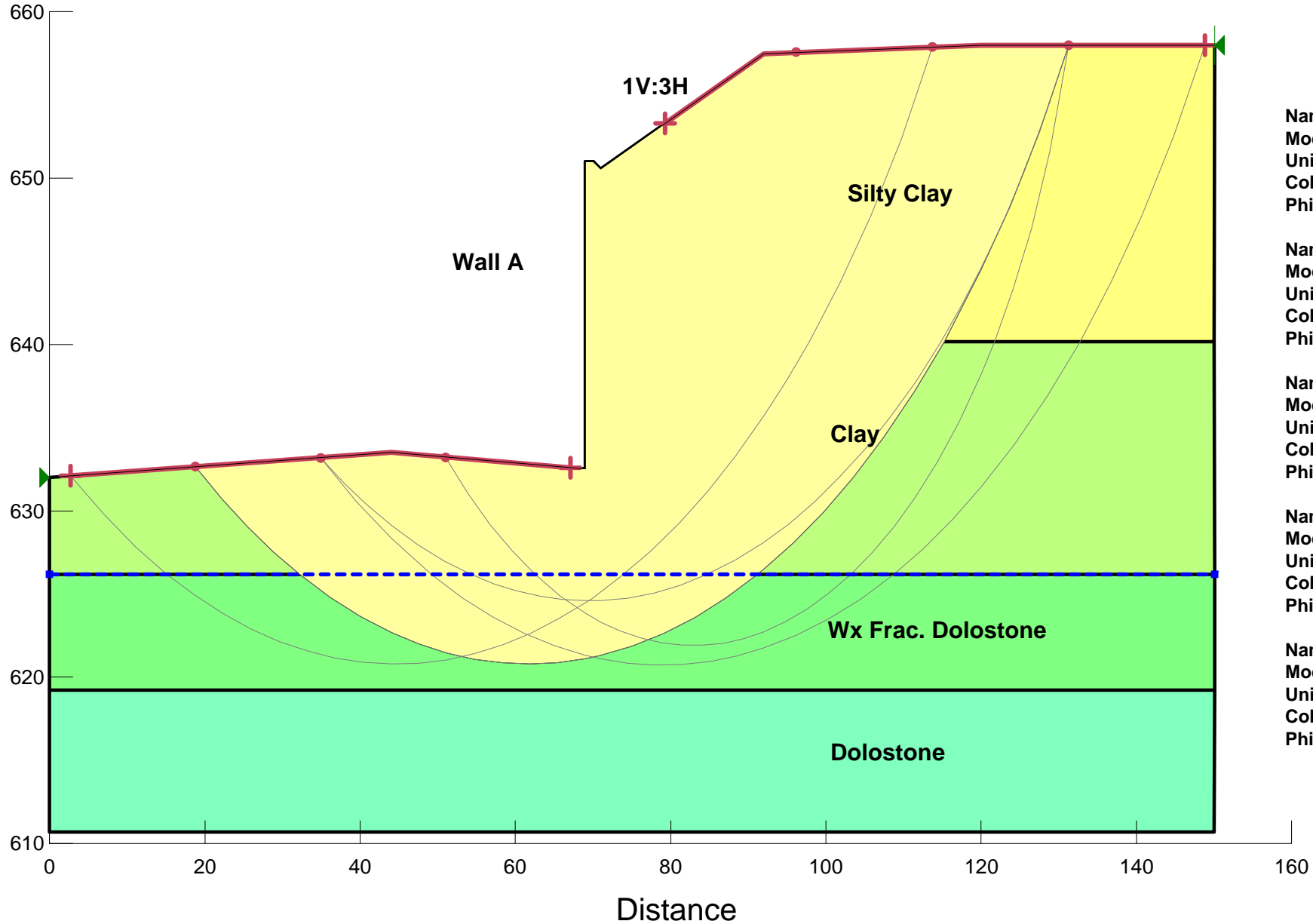
**Waldron Road over I-57
Station 17+50 Wall A
End of Construction (Undrained Condition)**

9.1



**Waldron Road over I-57
Sta. 229+00 Wall A
End of Construction (Undrained Condition)**

6.8



Name: Silty Clay
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 4,500 psf
Phi: 0 °

Name: Clay
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion: 5,200 psf
Phi: 0 °

Name: Wx Frac. Dolostone
Model: Mohr-Coulomb
Unit Weight: 135 pcf
Cohesion: 0 psf
Phi: 30 °

Name: Dolostone
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 20,000 psf
Phi: 45 °

Name: Concrete
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 20,000 psf
Phi: 45 °

**Waldron Road over I-57
Sta. 21+50 Wall B
End of Construction (Undrained Condition)**

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

**Name: Fill
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion': 1,500 psf
Phi': 0 °**

**Name: Fill 2
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 4,000 psf
Phi': 0 °**

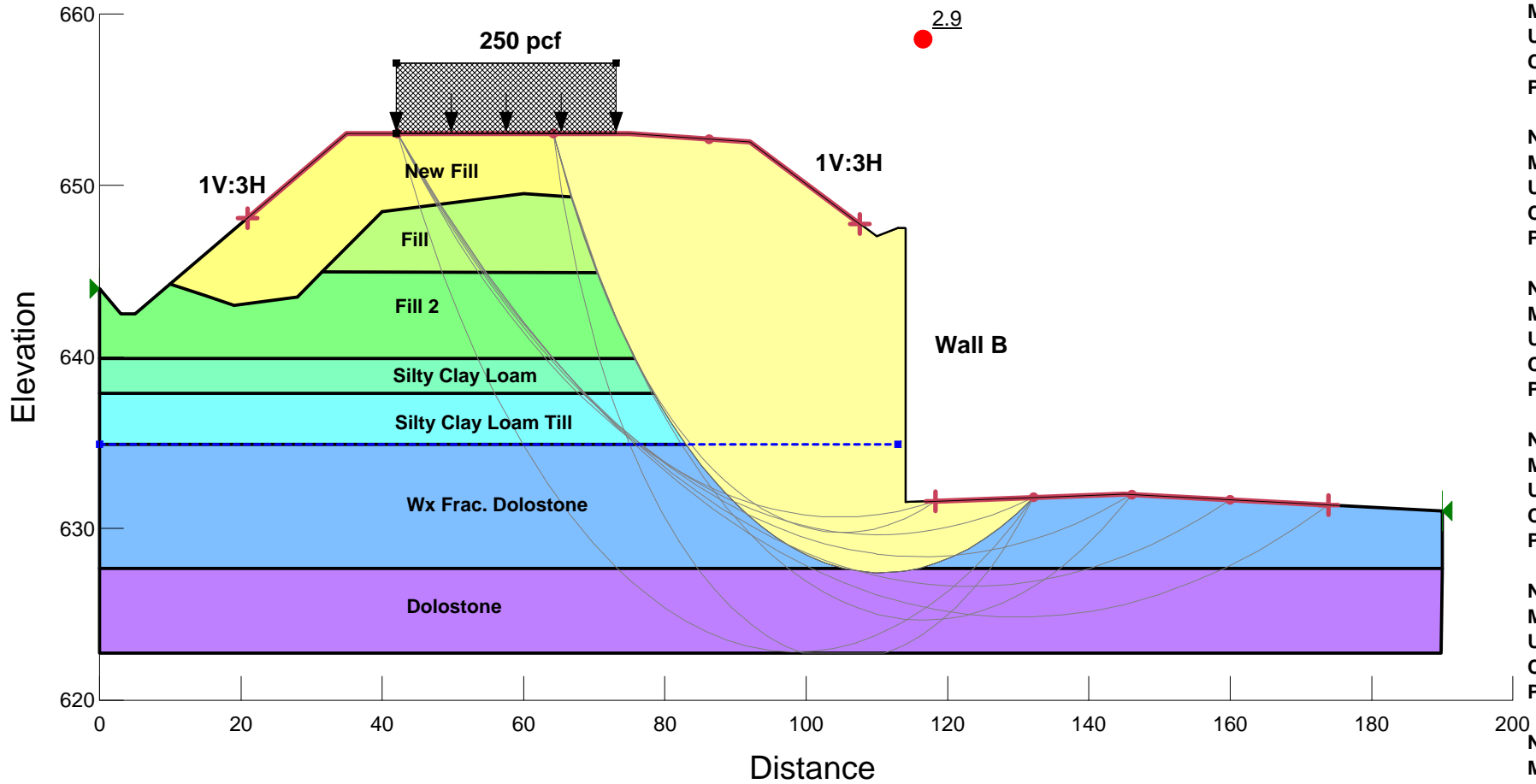
**Name: Silty Clay Loam
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 2,000 psf
Phi': 0 °**

**Name: Silty Clay Loam Till
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 1,500 psf
Phi': 0 °**

**Name: Wx Frac. Dolostone
Model: Mohr-Coulomb
Unit Weight: 135 pcf
Cohesion': 0 psf
Phi': 30 °**

**Name: Dolostone
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion': 0 psf
Phi': 45 °**

**Name: Concrete
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion': 20,000 psf
Phi': 45 °**



**Waldron Road over I-57
Sta. 230+50 Wall B
End of Construction (Undrained Condition)**

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

Name: Fill 2
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 4,000 psf
Phi': 0 °
Piezometric Line: 1

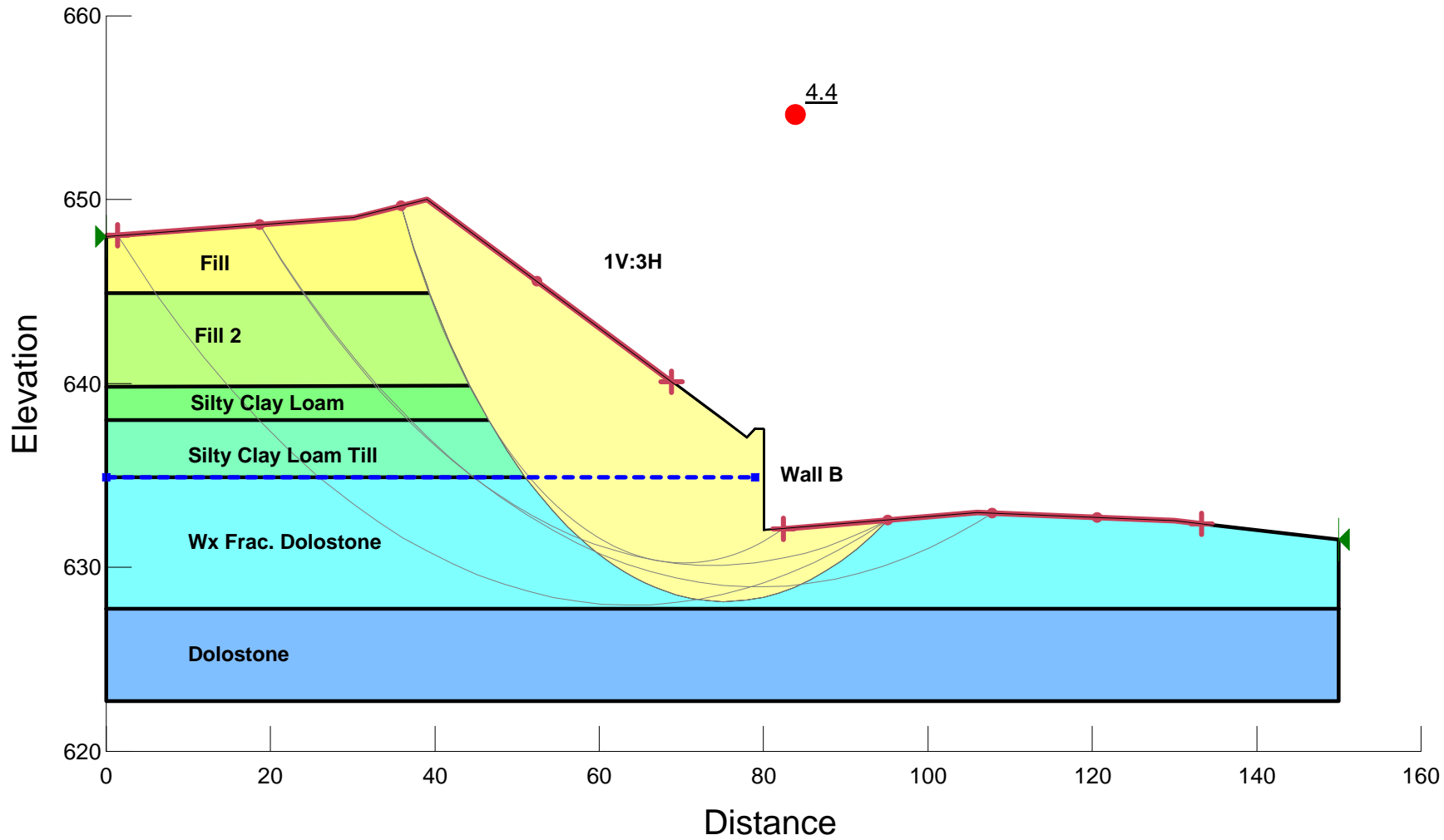
Name: Silty Clay Loam
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 2,000 psf
Phi': 0 °
Piezometric Line: 1

Name: Silty Clay Loam Till
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion': 1,500 psf
Phi': 0 °
Piezometric Line: 1

Name: Wx Frac. Dolostone
Model: Mohr-Coulomb
Unit Weight: 135 pcf
Cohesion': 0 psf
Phi': 30 °
Piezometric Line: 1

Name: Dolostone
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion': 20,000 psf
Phi': 45 °
Piezometric Line: 1

Name: Concrete
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion': 20,000 psf
Phi': 45 °
Piezometric Line: 1



**Waldron Road over I-57
Sta. 232+50 Wall B
End of Construction (Undrained Condition)**

Name: Fill
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion: 1,500 psf
Phi: 0 °

Name: Fill 2
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 4,000 psf
Phi: 0 °

Name: Silty Clay Loam
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 2,000 psf
Phi: 0 °

Name: Silty Clay Loam Till
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 1,500 psf
Phi: 0 °

Name: Silty Sandy Gravel
Model: Mohr-Coulomb
Unit Weight: 125 pcf
Cohesion: 5,000 psf
Phi: 0 °

Name: Wx Frac. Dolostone
Model: Mohr-Coulomb
Unit Weight: 135 pcf
Cohesion: 0 psf
Phi: 30 °

Name: Dolostone
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 20,000 psf
Phi: 45 °

Name: Concrete
Model: Mohr-Coulomb
Unit Weight: 150 pcf
Cohesion: 20,000 psf
Phi: 45 °

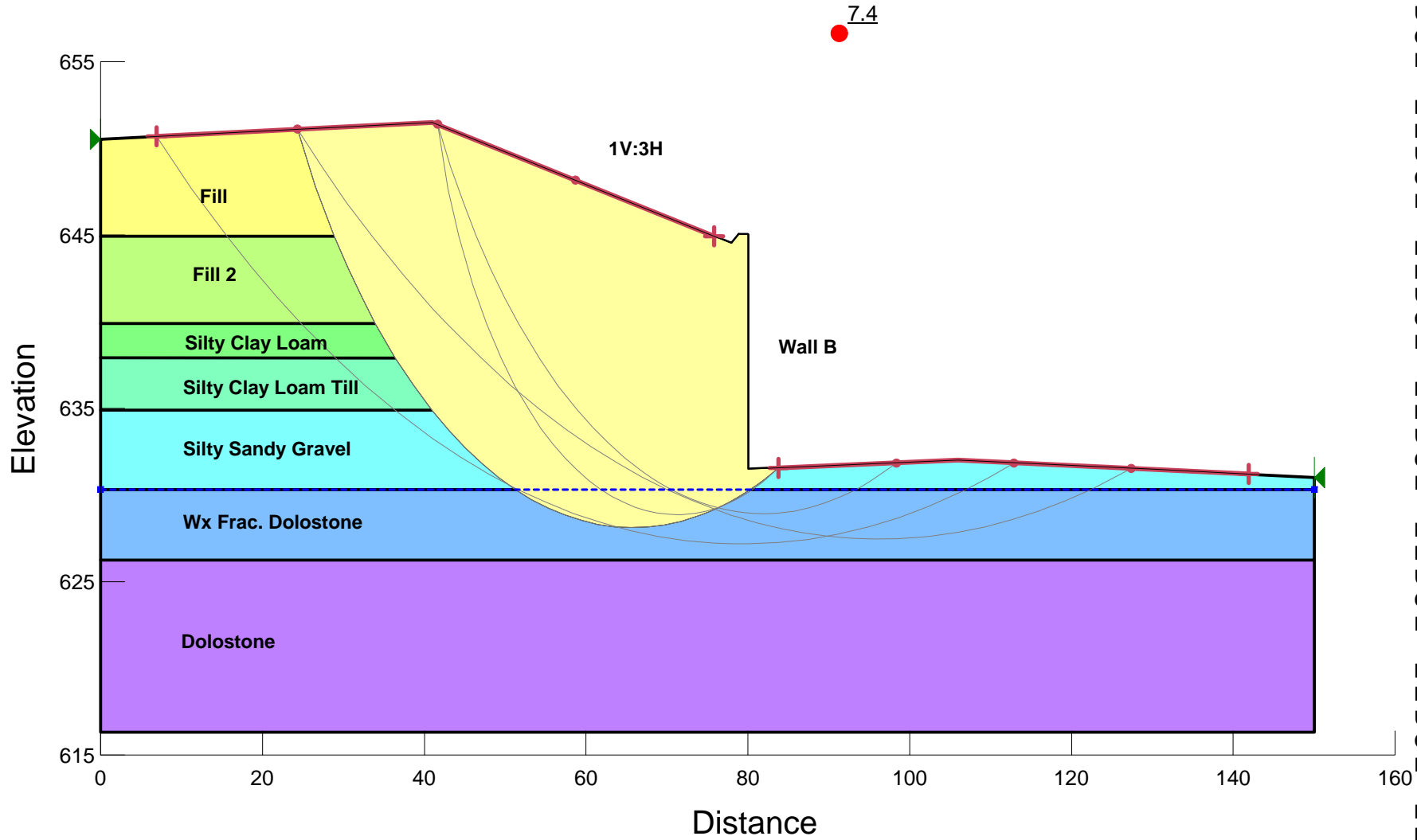


EXHIBIT F

IDOT DRILLED SHAFT AXIAL CAPACITY SPREADSHEETS



**DRILLED SHAFT AXIAL CAPACITY IN ROCK -
DOLOMITE, LIMESTONE, SANDSTONE, AND HARD SHALE**

STRUCTURE ===== SN 046-0153
 SUBSTRUCTURE & REFERENCE BORING ===== N. Abutment - Boring #219
 GROUND SURFACE ELEVATION ===== 657.30 FT
 GROUND WATER ELEVATION ===== 0.00 FT
 ESTIMATED TOP OF ROCK ELEVATION ===== 624.80 FT
 DRILLED SHAFT DIAMETER IN ROCK ===== 36 IN.
 FACTORED AXIAL LOAD ===== 1868 KIPS
 DRILLED SHAFT CONCRETE STRENGTH, f'c ===== 3.5 KSI

FOUNDATION REDUNDANCY ===== REDUNDANT

SOCKET DEPTH (FT)	TIP ELEV. (FT)	LAYER THICK. (FT)	UNCONFINED COMPRESSIVE STRENGTH (q _u) (KSF)	ROCK TYPE	GSI	ROCK CONDITION	RQD (%)	JOINT TYPE	ROCK INTACT OR TIGHTLY JOINTED?	SIDE RESISTANCE						AVG. q _u W/IN 2 - SHAFT DIA. (KSF)	TIP RESISTANCE			COMBINED SIDE & TIP RESISTANCE					
										NOM. RESIST. (KIPS)	Σ NOM. RESIST. (KIPS)	Σ FACT. RESIST. (KIPS)	SETTLEMENT				NOM. RESIST. (KIPS)	FACT. RESIST. (KIPS)	SETTL. w _{Rn} (IN.)	R _p /R _n	NOM. RESIST. (KIPS)	FACT. RESIST. (KIPS)	SETTLEMENT		
													Q _{C1} (KIPS)	w _{C1} (IN.)	w _{Rn} (IN.)								Q _{C1} (KIPS)	w _{C1} (IN.)	w _{Rn} (IN.)
2.00	622.80	2.00	895.0	Dolomite	40	Fractured	28	Closed	No	196	196	108	227	0.068	-0.026	1073.8	2513	1257	0.890	0.44	349	184	423	0.070	0.046
4.00	620.80	2.00	822.0	Dolomite	40	Fractured	28	Closed	No	196	392	216	447	0.116	0.027	1185.2	2762	1381	0.727	0.40	658	349	919	0.124	0.065
5.00	619.80	1.00	732.0	Dolomite	40	Fractured	28	Closed	No	98	491	270	550	0.130	0.050	1230.7	21748	10874	4.775	0.46	908	479	1215	0.143	0.087
6.00	618.80	1.00	1359.0	Dolomite	60	Fractured	55	Closed	Yes	133	623	343	713	0.125	0.047	1203.8	21273	10637	4.728	0.33	925	494	1359	0.140	0.066
8.00	616.80	2.00	1354.0	Dolomite	60	Normal	55	Closed	Yes	616	1239	682	1057	0.131	0.222	1087.0	19209	9604	4.402	0.38	2012	1068	1738	0.150	0.192
10.00	614.80	2.00	1156.0	Dolomite	60	Normal	55	Closed	Yes	616	1856	1021	1388	0.140	0.307										
11.00	613.80	1.00	1005.0	Dolomite	60	Normal	83	Closed	Yes	308	2164	1190	1546	0.145	0.339										
13.00	611.80	2.00	1198.0	Dolomite	60	Normal	83	Closed	Yes	616	2780	1529	1917	0.160	0.378										
15.00	609.80	2.00	809.0	Dolomite	60	Normal	83	Closed	Yes	616	3396	1868	2221	0.171	0.426										



**DRILLED SHAFT AXIAL CAPACITY IN ROCK
DOLOMITE, LIMESTONE, SANDSTONE,
AND HARD SHALE**

Drilled Shaft Design Table for N. Abutment - Boring #219

Estimated Top of Rock Elevation: 624.80

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SOCKET DEPTH (FT)	TIP ELEV. (FT)	NOMINAL SHAFT RESIST. (KIPS)	FACTORED SHAFT RESIST. (KIPS)	RESIST. METHOD	SETTLEMENT DATA		
					Q _{C1} (KIPS)	W _{C1} (IN.)	W _{Rn} (IN.)
36 in. Diameter Drilled Shaft							
2	622.8	2513	1257	TIP	--	--	0.890
4	620.8	2762	1381	TIP	--	--	0.727
5	619.8	21748	10874	TIP	--	--	4.775
6	618.8	21273	10637	TIP	--	--	4.728
8	616.8	19209	9604	TIP	--	--	4.402
10	614.8	1856	1021	SIDE	1388	0.140	0.307
11	613.8	2164	1190	SIDE	1546	0.145	0.339
13	611.8	2780	1529	SIDE	1917	0.160	0.378
15	609.8	3396	1868	SIDE	2221	0.171	0.426
42 in. Diameter Drilled Shaft							
2	622.8	3449	1725	TIP	--	--	1.000
4	620.8	3698	1849	TIP	--	--	0.814
5	619.8	3893	1947	TIP	--	--	0.742
6	618.8	28936	14468	TIP	--	--	5.439
8	616.8	25190	12595	TIP	--	--	4.863
10	614.8	2165	1191	SIDE	1594	0.148	0.349
11	613.8	2524	1388	SIDE	1772	0.152	0.386
13	611.8	3243	1784	SIDE	2187	0.167	0.429
15	609.8	3962	2179	SIDE	2525	0.176	0.482
48 in. Diameter Drilled Shaft							
2	622.8	4533	2266	TIP	--	--	1.091
4	620.8	4845	2422	TIP	--	--	0.908
5	619.8	5074	2537	TIP	--	--	0.816
6	618.8	10195	5098	TIP	--	--	1.660
8	616.8	1653	909	SIDE	1383	0.147	0.278
10	614.8	2474	1361	SIDE	1801	0.155	0.390
11	613.8	2885	1587	SIDE	1999	0.159	0.432
13	611.8	3706	2039	SIDE	2458	0.173	0.480
15	609.8	4528	2490	SIDE	2830	0.182	0.539
60 in. Diameter Drilled Shaft							
2	622.8	7090	3545	TIP	--	--	1.250
4	620.8	7412	3706	TIP	--	--	1.040
5	619.8	7521	3761	TIP	--	--	0.984
6	618.8	1039	571	SIDE	1169	0.151	0.042
8	616.8	2066	1136	SIDE	1709	0.159	0.331
10	614.8	3093	1701	SIDE	2216	0.169	0.469
11	613.8	3606	1983	SIDE	2453	0.173	0.521
13	611.8	4633	2548	SIDE	3002	0.186	0.580
15	609.8	5660	3113	SIDE	3441	0.194	0.652



DRILLED SHAFT AXIAL CAPACITY IN ROCK -
DOLOMITE, LIMESTONE, SANDSTONE, AND HARD SHALE

STRUCTURE ===== SN 046-0153
 SUBSTRUCTURE & REFERENCE BORING ===== S. Abutment - Boring #217
 GROUND SURFACE ELEVATION ===== 648.70 FT
 GROUND WATER ELEVATION ===== 0.00 FT
 ESTIMATED TOP OF ROCK ELEVATION ===== 627.70 FT
 DRILLED SHAFT DIAMETER IN ROCK ===== 36 IN.
 FACTORED AXIAL LOAD ===== 1868 KIPS
 DRILLED SHAFT CONCRETE STRENGTH, f'c ===== 3.5 KSI

FOUNDATION REDUNDANCY ===== REDUNDANT

SOCKET DEPTH (FT)	TIP ELEV. (FT)	LAYER THICK. (FT)	UNCONFINED COMPRESSIVE STRENGTH (q _u) (KSF)	ROCK TYPE	GSI	ROCK CONDITION	RQD (%)	JOINT TYPE	ROCK INTACT OR TIGHTLY JOINTED?	SIDE RESISTANCE						AVG. q _u W/IN 2 - SHAFT DIA. (KSF)	TIP RESISTANCE				COMBINED SIDE & TIP RESISTANCE					
										NOM. RESIST. (KIPS)	Σ NOM. RESIST. (KIPS)	Σ FACT. RESIST. (KIPS)	SETTLEMENT				NOM. RESIST. (KIPS)	FACT. RESIST. (KIPS)	SETTL. w _{Rn} (IN.)	R _p /R _n	NOM. RESIST. (KIPS)	FACT. RESIST. (KIPS)	SETTLEMENT			
													Q _{C1} (KIPS)	w _{C1} (IN.)	w _{Rn} (IN.)								Q _{C1} (KIPS)	w _{C1} (IN.)	w _{Rn} (IN.)	
1.00	626.70	1.00	711.0	Dolomite	40	Fractured	48	Closed	No	118	118	65	97	0.016	0.155	788.0	1781	890	0.900	0.75	472	242	129	0.017	0.178	
3.00	624.70	2.00	762.0	Dolomite	40	Fractured	48	Closed	No	236	354	195	303	0.086	0.206	795.0	1847	924	0.955	0.53	752	394	475	0.088	0.203	
5.00	622.70	2.00	727.0	Dolomite	40	Fractured	48	Closed	No	236	591	325	506	0.120	0.243											
6.00	621.70	1.00	875.0	Dolomite	40	Fractured	22	Closed	No	92	683	376	623	0.136	0.208											
8.00	619.70	2.00	875.0	Dolomite	40	Normal	22	Closed	No	616	1299	714	860	0.163	0.561											
10.00	617.70	2.00	691.0	Dolomite	40	Normal	22	Closed	No	616	1915	1053	1067	0.181	0.815											

Drilled Shaft Design Table for S. Abutment - Boring #217
Estimated Top of Rock Elevation: 627.70

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SOCKET DEPTH (FT)	TIP ELEV. (FT)	NOMINAL SHAFT RESIST. (KIPS)	FACTORED SHAFT RESIST. (KIPS)	RESIST. METHOD	SETTLEMENT DATA		
					Q _{C1} (KIPS)	W _{C1} (IN.)	W _{Rn} (IN.)
36 in. Diameter Drilled Shaft							
1	626.7	1781	890	TIP	--	--	0.900
3	624.7	1847	924	TIP	--	--	0.955
5	622.7	591	325	SIDE	506	0.120	0.243
6	621.7	683	376	SIDE	623	0.136	0.208
8	619.7	1299	714	SIDE	860	0.163	0.561
10	617.7	1915	1053	SIDE	1067	0.181	0.815
42 in. Diameter Drilled Shaft							
1	626.7	2453	1227	TIP	--	--	1.071
3	624.7	2479	1239	TIP	--	--	1.095
5	622.7	689	379	SIDE	589	0.127	0.272
6	621.7	797	438	SIDE	724	0.145	0.232
8	619.7	1515	834	SIDE	998	0.175	0.639
10	617.7	2234	1229	SIDE	1236	0.194	0.932
48 in. Diameter Drilled Shaft							
1	626.7	3162	1581	TIP	--	--	1.207
3	624.7	473	260	SIDE	402	0.090	0.250
5	622.7	788	433	SIDE	671	0.133	0.300
6	621.7	910	501	SIDE	825	0.153	0.255
8	619.7	1732	953	SIDE	1136	0.185	0.715
10	617.7	2554	1404	SIDE	1405	0.206	1.047
60 in. Diameter Drilled Shaft							
1	626.7	197	108	SIDE	0	0.000	0.200
3	624.7	591	325	SIDE	502	0.089	0.287
5	622.7	985	542	SIDE	836	0.142	0.351
6	621.7	1138	626	SIDE	1026	0.165	0.296
8	619.7	2165	1191	SIDE	1411	0.204	0.863
10	617.7	3192	1756	SIDE	1744	0.228	1.272