STRUCTURE GEOTECHNICAL REPORT
38TH AVENUE AND ILLINOIS ROUTE 5
RETAINING WALL (FAP 595)
SN 081-P004, SECTION (142-1, 142)R
IDOT P-92-097-10, PTB 157/ITEM 025
ROCK ISLAND COUNTY, ILLINOIS

for

Wills Burke Kelsey Associates, Inc.

116 West Main Street, Suite 201

St. Charles, IL 60174

(815) 744-4200

submitted by

Wang Engineering, Inc.

1145 North Main Street

Lombard, IL 60148

(630) 953-9928

Original Report: July 8, 2013

Revised Report: September 9, 2013

Technical Report Documentation Page

1. Title and Subtitle Structure Geotechnical Report, 38th Avenue Retaining Wall Station 63+20 to Station 70+50		**2. Report Date** September 9, 2013 **3. Report Type** ☒ SGR ☐ RGR ☐ Draft ☐ Final ☒ Revised
4. Route / Section / County Coaltown Road/ 142-R / Rock Island		**5. IDOT Job / Contract No.** P-92-097-10
6. PTB / Item No. 157/025 Work Order 15	**7. Existing Structure Number(s)**	**8. Proposed Structure Number(s)** SN 081-P004
9. Prepared by Wang Engineering, Inc. 1145 N Main Street Lombard, IL 60148	**Contributor(s)** Author: Mickey Snider, P.E. QC/QA: Jerry W.H. Wang, PhD, P.E. PM: Liviu Iordache, P.G.	**Contact Information** (630) 953-9928 ext 27 MSnider@wangeng.com
10. Prepared for Wills Burke Kelsey Associates 116 W Main Street, Ste 201 St. Charles, IL 60174	**Contact** Andy Underwager, S.E., P.E.	**Contact Phone Number** (630) 443-7755

11. Abstract

The following report provides recommendations for the design and construction of a new retaining wall along 38th Avenue, east of 53rd Street and north of John Deere Road, in Rock Island County. The plans call for ditch cuts along the north side of John Deere Road that will require the installation of the wall. We recommend a soldier pile and lagging wall.

The foundation soils, shown in boring logs provided by IDOT, consist of medium stiff to stiff silty clay loam overlying very stiff to hard shale. The shale identified in the borings does not have the density, strength, or moisture of sound bedrock and we recommend modeling this layer as a clayey soil.

The proposed wall will be constructed between Stations 63+20 and 70+50, will be offset about 28 feet south of the proposed 38th Avenue centerline, and will have a maximum exposed height of about 10 feet. The wall will sit at approximately the mid-slope of the embankment separating 38th Avenue from John Deere Road, and should be designed to retain about 3.5 to 4.0 feet of new fill material with the remainder of wall supporting the medium stiff to stiff silty clay loam. The wall will be supported by soldier piles drilled through the silty clay loam and into the very stiff shale underneath.

We estimate HP14x89 soldier piles, spaced at 6 to 8 feet on-center (depending on the final height of the wall) will have a factor of safety greater than 1.5 in lateral earth pressure design and will undergo a lateral movement of about 0.5 inch at the top of the wall. The wall, however, will require more length to achieve deflection and moment fixity than is provided by the boring logs. We recommend a boring be advanced along the alignment to locate the top of sound bedrock prior to final design to avoid a change from soil to bedrock excavation quantities during construction. The wall has an adequate 3.1 to 1.6 FOS against global instability.

12. Path to archived file

S:\Netprojects\4120406\Reports\RPT_Wang_MLS_4120406CoaltownRWS_20130701.pdf

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Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
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STRUCTURE GEOTECHNICAL REPORT
38th AVENUE AND ILLINOIS ROUTE 5
RETAINING WALL (FAP 595)
STATION 63+20 TO STATION 70+50
SN 081-P004, SECTION (142-1, 142)R
IDOT P-92-097-10, PTB 157/ITEM 025
ROCK ISLAND COUNTY, ILLINOIS
FOR
WILLS BURKE KELSEY ASSOCIATES

1.0 INTRODUCTION

This report presents the results of the Wang Engineering, Inc. (Wang) geotechnical evaluations and recommendations for the design and construction of a retaining wall along 38th Avenue, also referred to as Coaltown Road, east of 53rd Street in Moline, Rock Island County, Illinois. A *Site Location Map* is presented as Exhibit 1.

Based on information and drawings provided by Wills Burke Kelsey Associates (WBK) and Ciorba Group (Ciorba), Wang Engineering, Inc. (Wang) understands several portions of 38th Avenue will be reconstructed and widened as part of the John Deere Road Improvement project. Due to an increase in the profile grade and cuts into the existing slope between 38th Avenue and John Deere Road, the higher-elevation portion of 38th Avenue between Stations 63+20 and 70+50 will require a retaining wall for support. The retaining wall will have an exposed height of about 4 to 12 feet and will be offset 28 feet right of the proposed centerline.

The purpose of our investigation was to characterize the site soil and groundwater conditions, perform geotechnical analyses, and provide recommendations for the design and construction of the new retaining wall.

2.0 SITE CONDITIONS AND GEOLOGICAL SETTING

On the USGS *Coal Valley Quadrangle 7.5 Minute Series* map, the project area is located in the NW ¼ of Section 14, Tier 17 N, Range 1 W of the Fourth Principal Meridian.

The following review of published geologic data, with emphasis on factors that might influence the design and construction of the proposed engineering works, is meant to place the project area within a geological framework and confirm the dependability and consistency of the present subsurface investigation results. For the study of the regional geologic framework, Wang considered northwestern Illinois in general and Rock Island County in particular.

2.1 Physiography

The Rock Island County is part of the northern Galesburg Plain physiographic section. The project is located 0.8 mile north of the Rock River. The Rock River has a well-developed floodplain which extends approximately a mile along its valley. The river drains west into the Mississippi River. The general topography slopes southwestward, with the proposed roadway at the base of an existing bluff. The surface elevation varies from about 630 to 565.0 feet, NAVD88.

2.2 Surficial Cover

The surficial cover is the result of glacial activity, and it rests unconformably over Paleozoic bedrock. Along the site, the glacial deposits consist primarily of clayey Kellerville Till that form a massive mound in the area between the Mississippi River to the north and the Rock River to the south. The drift cover along the bluff measures about 25 feet or less in thickness.

2.3 Bedrock

In north Rock Island County, the surficial cover rests unconformably on top of Pennsylvanian and Devonian-age shale, sandstone, and limestone (Kolata and Nimz 2010). The borings drilled during the current investigation reached the top of very weak, clayey shale about 11 feet bgs.

The subsurface investigation results fit into the local geologic context. The borings drilled in the project area revealed the native deposits consist of glacial Kellerville Till overlaying Upper Devonian shale.

3.0 METHODS OF INVESTIGATION

The following sections outline the subsurface and laboratory investigations.

3.1 Subsurface Investigations

The subsurface investigation along the proposed retaining wall alignment consisted of seven soil borings, designated as B-1 through B-7, drilled by IDOT in July 2011. The borings were drilled along

the south side of 38th Avenue from elevations of 596.3 to 598.0 feet to depths of 16 feet bgs. Stations, offsets and elevations were provided on the boring logs; northings and eastings were taken from design drawings provided by Ciorba. The as-drilled boring locations are shown in the *Boring Location Plan* (Exhibit 2) and the *Boring Logs* are attached in Appendix A.

The boring logs provided by IDOT include lithological descriptions, results of unconfined compressive strength testing on cohesive soils, and Standard Penetration Test (SPT) results recorded as blows per 6 inches of penetration.

Groundwater observations at the completion of drilling are recorded on the boring logs.

3.2 Laboratory Testing

The borings show laboratory test results for moisture content (Appendix A).

4.0 RESULTS OF FIELD AND LABORATORY INVESTIGATIONS

Descriptions of the soil and groundwater conditions encountered during the subsurface investigations are shown in the attached *Boring Logs* (Appendix A). Please note that strata contact lines represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in horizontal and vertical directions.

4.1 Soil Conditions

Beneath approximately 24-inch thick shoulder aggregate, the general lithologic succession recorded in the borings includes: 1) medium stiff to very stiff silty clay loam to silty clay; and 2) very stiff to hard shale.

1) Medium stiff to very stiff silty clay loam to silty clay

Immediately beneath the aggregate, the borings encountered 11 to 16 feet of medium stiff to very stiff, brown silty clay loam with occasional silt lenses and gravel. The silty clay loam has unconfined compressive strength (Q_u) values of 0.6 to 3.3 tsf and moisture content values of 13 to 28%.

2) Very stiff to hard shale

At elevations of 585 to 584 feet, the borings advanced through very stiff to hard, gray shale

continuing to the termination depths of the borings. While the borings visually identify this material as shale, it has relatively low Q_u values of 2.2 to 4.5 tsf and high moisture content values of 16 to 30% versus what would be expected from a rock formation. The SPT N-values for the shale range from 10 to 29 blows per foot, indicating the density of the material is such that it can easily be drilled and excavated with conventional equipment. We estimate this layer should be treated as soil for the purposes of design and construction.

4.2 Groundwater Conditions

The boreholes were recorded as dry during and at the completion of drilling in the borings.

5.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

Geotechnical evaluations and recommendations for the design and construction of the retaining wall between Stations 63+20 and 70+50, offset 28 feet right of the 38th Avenue centerline are included in the following sections. From the drawings provided by Ciorba, we estimate the retaining wall will have an exposed height of about 4 to 12 feet and straight backfill behind. The wall will be installed at approximately the mid-slope of the existing separation between 38th Avenue and John Deere Road. Considering the relatively weak nature of the silty clay loam that will be supported behind, we estimate a drilled soldier pile and lagging wall is the most appropriate wall type. We estimate a mechanically-stabilized earth (MSE) wall will require relatively large and impractical shored temporary excavations adjacent to 38th Avenue, as well as present a number of additional utility conflicts.

Wang recommends constructing a soldier pile and lagging wall along the mid-slope between Stations 63+20 and 70+50. Above the finished groundline, the wall will support up to 3.5 feet of new fill material overlying the medium stiff and stiff silty clay loam with an average Q_u value of about 0.8 tsf. Below the groundline, the wall will be supported by approximately 6 to 8 feet of medium stiff to stiff silty clay loam with an average Q_u value of about 1.2 tsf, followed by very stiff shale with an average Q_u value of about 3.2 tsf. We recommend installing the soldier piles within precored holes grouted with concrete up the groundline. The soil conditions below the groundline are considered good for the support of drilled soldier piles and we estimate the spacing will be about 6 to 8 feet at the highest wall sections.

The wall should be designed for both earth pressure equilibrium, including a minimum factor of safety (FOS) of 1.5, and for a lateral pile deformation less than 0.5 inch. Generally, to the AASHTO

LRFD *Bridge Design Specifications* (AASHTO, 2012) requires estimating the lateral pressures on permanent flexible walls using the effective stress method of analysis and the drained (long-term) strength parameters of the soils; The recommended drained parameters are included in Table 1. The pressure coefficients should represent the final slope behind the wall, which we estimate will be flat based on the most current cross sections provided in June 2013; if a slope is proposed behind the wall, the evaluations should be adjusted based on the appropriate pressure coefficients.

Table 1: Geotechnical Design Parameters for Drained Earth Pressure Analysis

Soil Description	Unit Weight (pcf)	Drained Shear Strength (Effective Stress)		Active Pressure Coefficient	Passive Pressure Coefficient
		Cohesion (psf)	Friction Angle (°)	K_A	K_P
M Stiff to Stiff SILTY CLAY LOAM	120	0	28	0.36	2.77
V Stiff to Hard SHALE	125	0	32	0.31	3.26

In addition to the lateral earth pressure soldier pile design, we recommend checking the design for lateral pile deformation and maximum moment capacity. If the soldier piles are socketed into the weak shale they may result in relatively short pile lengths; these lengths should be checked for maximum lateral displacements, maximum moments, and pile tip fixity. Geotechnical parameters for the analysis of laterally loaded soldier piles via the p-y curve method are included in Table 2. The analysis of maximum moments should also include a traffic surcharge of 250 psf behind the wall.

Table 2: Recommended Soil and Rock Parameters for Lateral Load Analysis

Soil Type	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
M Stiff to Stiff SILTY CLAY LOAM	120	800	0	700	0.8
V Stiff to Hard SHALE	125	3500	0	2000	0.4

Preliminary analyses of the retaining wall along the proposed alignment have been performed for 10-feet of exposed wall height supported by HP14x89 soldier piles installed within 24 inch diameter boreholes. We estimate 0.5-inches of lateral deformation at the top of the wall based on free-head pile conditions; however, the soldier piles require approximately 30 to 35 feet of total length (20 to 25 feet of embedment) to achieve pile tip deflection and moment fixity. This embedment depth puts the pile tip at an elevation of about 570 to 565 feet, which is about 10 to 15 feet below the termination depths of the borings. It should be noted that sound shale bedrock requiring a rock drilling and excavation quantity may be close to the termination depths of the borings based on other nearby investigations. If possible, we recommend drilling one additional boring along the proposed retaining wall alignment to assess the top of sound bedrock prior to final design.

The global stability of the proposed wall was analyzed based on the soil profile described in Section 4.1 and the information provided in the drawings. The minimum required FOS for both short and long-term conditions is 1.5 (IDOT, 2012). *Slide v5.0* evaluation exhibits are shown in Appendix B. Wang estimates the wall has an FOS of 3.1 (Appendix B-1) in undrained (short-term) and an FOS of 1.6 (Appendix B-2) in drained loading. The FOS meets the minimum requirement.

6.0 CONSTRUCTION CONSIDERATIONS

Excavations should be performed in accordance with local, state, and federal regulations. The potential effect of ground movements upon nearby utilities within the slope should be considered during construction. Wang has not performed a utility clearance along the wall, therefore the Contractor should ensure than all utilities are located and marked prior to construction. The subsurface investigation encountered primarily cohesive soils, so groundwater control should not be a concern. If precipitation or perched water is allowed to enter excavations, it should be immediately removed via sump-pump. Any soil allowed to soften in standing water should be removed and replaced with structural fill material.

The proposed soldier pile and lagging walls are primarily cut walls, and a minor amount of backfill material will be required. To backfill the wall, we recommend porous granular material in accordance with the IDOT Special Provision, *Granular Backfill for Structures* (IDOT 2012). Backfill material should be placed and compacted in accordance with the Special Provision. The walls should have a geocomposite drainage system along the back of the concrete facing to prevent the build-up of

hydrostatic pressure. Backfill materials should be approved by the Resident Engineer.

A number of utilities along 38th Avenue and John Deere Road may be impacted during the wall construction. A proposed, 54-inch diameter storm sewer will be installed perpendicular to the wall at approximately Station 66+00 prior to construction of the wall. The soldier piles will need to be spaced around this utility; at a spacing of 8 to 10 feet on center, avoiding the location of a 54-inch diameter utility should not pose a concern. If additional spacing between soldier piles is needed, we recommend increasing the size of the piles. There are also a number of existing utilities within the embankment, behind the proposed location of the soldier piles. We estimate the existing sanitary sewer and water main will not be impacted by the installation of the wall assuming the lateral deformation is limited to 0.5 inch or less. The existing gas main, however, is in conflict with the wall location and will require removal and relocation.

7.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown in the boring logs and in Exhibit 2. This report does not reflect any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. In the event that any changes in the design and/or location of the retaining wall are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Wells Burke Kelsey Associates and the Illinois Department of Transportation on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.

Mickey L. Snider, P.E.
Senior Geotechnical Engineer

Jerry W.H. Wang, PhD., P.E.
QA/QC Reviewer

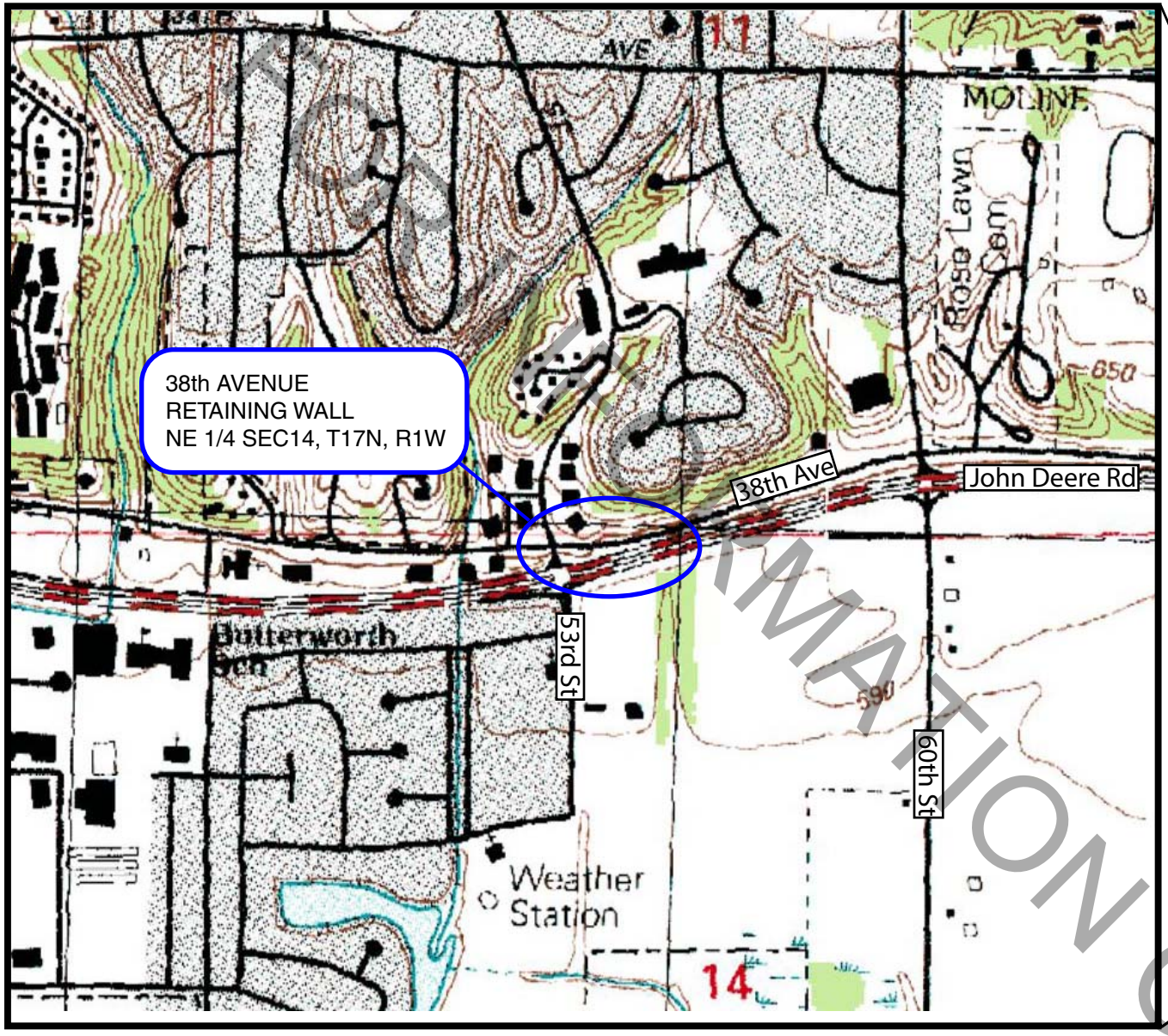
REFERENCES

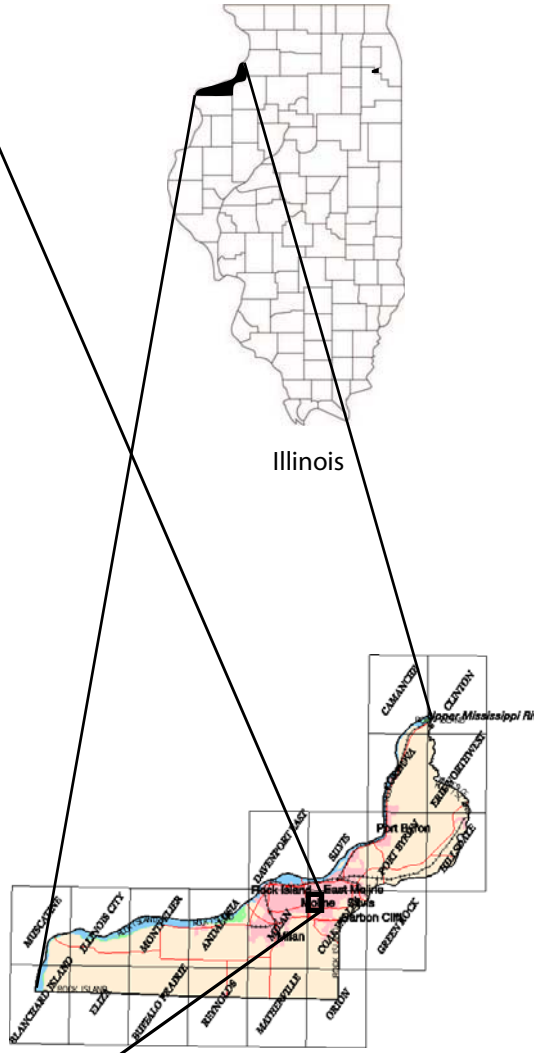
AASHTO (2012) LRFD Bridge Design Specifications: Washington, D.C., American Association of State Highway and Transportation Officials.

IDOT (2012a) Bridge Manual, Illinois Department of Transportation.

IDOT (2012b) Standard Specifications for Road and Bridge Construction, Illinois Department of Transportation, 1098 p.

EXHIBITS





0.0 0.1 0.2 0.3 0.4 0.5 Miles

SITE LOCATION MAP: 38TH AVENUE RETAINING WALL ALONG JOHN DEERE ROAD, ROCK ISLAND, ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 1

DRAWN BY: C. MARIN
CHECKED BY: L. IORDACHE

Wang Engineering
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Lombard, IL 60148
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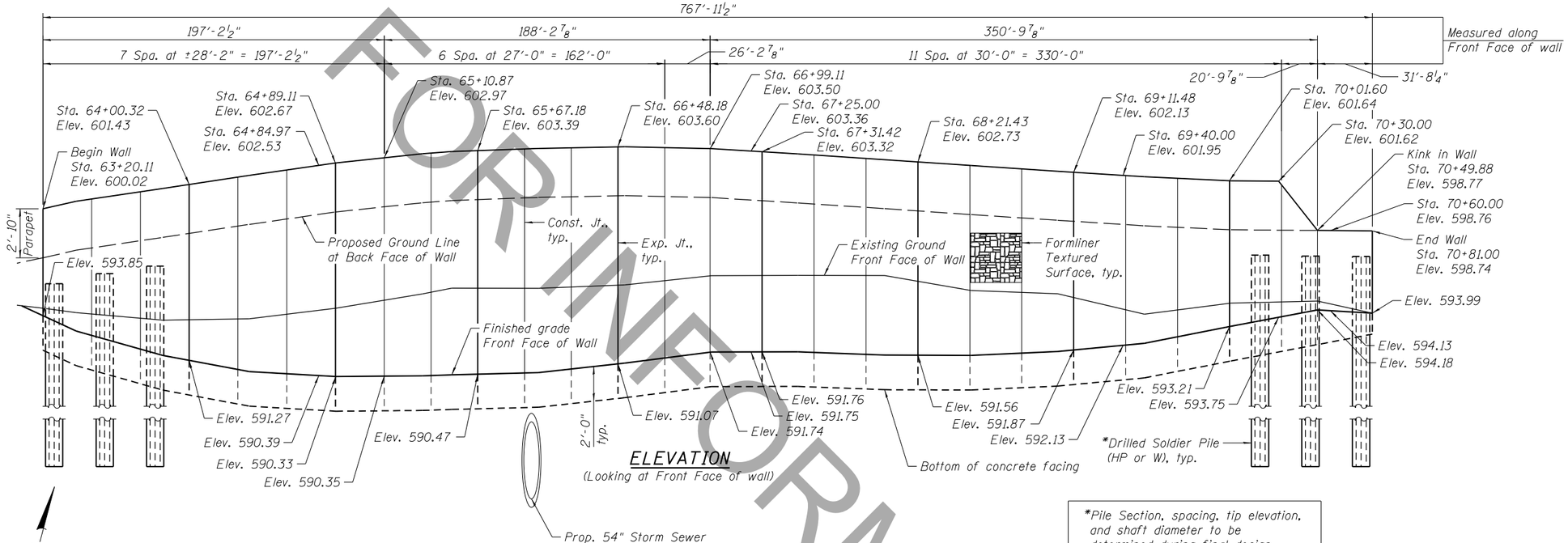
FOR WILLS BURKE KELSEY ASSOCIATES

412-04-06

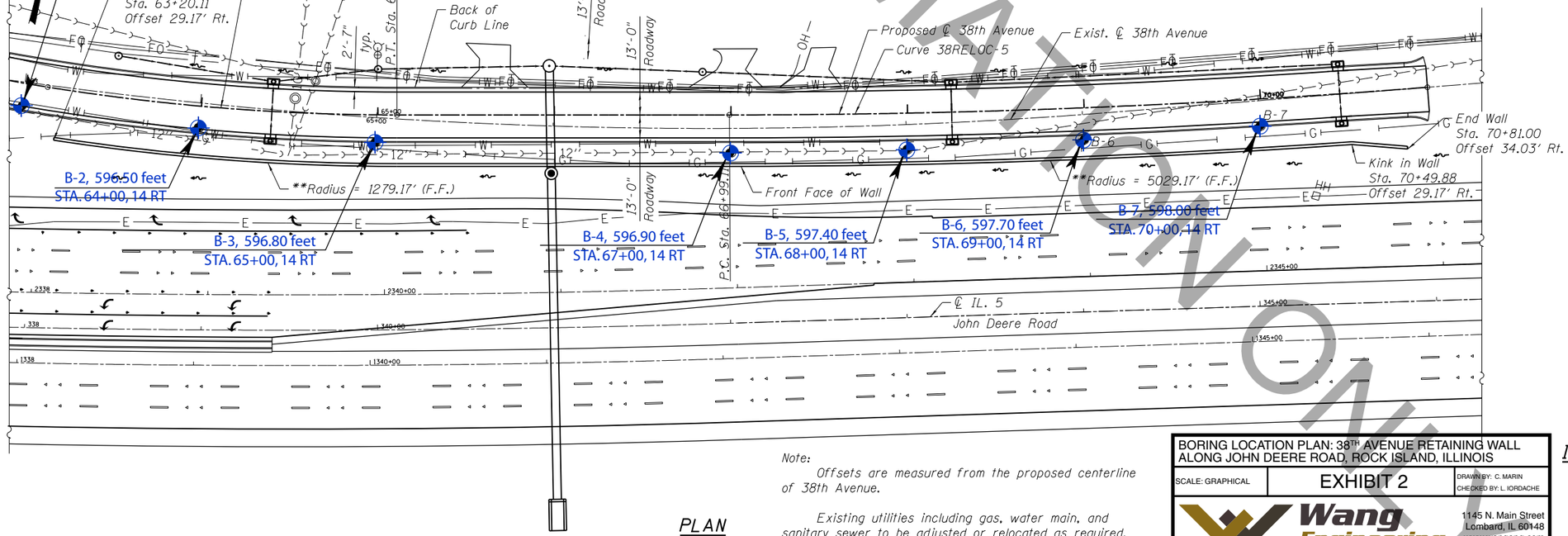
Bench Mark: "X" cut in NW corner of traffic signal foundation.
Sta. 334+45.00, 63.99' Lt. Elev. 590.71
Exist. Structure: None



ELEVATION
(Looking at Front Face of wall)

*Pile Section, spacing, tip elevation, and shaft diameter to be determined during final design.

**Wall to be built along straight chords between construction joints



PLAN

Note:
Offsets are measured from the proposed centerline of 38th Avenue.

Existing utilities including gas, water main, and sanitary sewer to be adjusted or relocated as required.

F.F. = Front Face of wall.

DESIGN SPECIFICATIONS

2012 AASHTO LRFD Bridge Design Specifications, 6th Edition with 2013 Interims

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)
fy = 36,000 psi (M270 Grade 36)

HIGHWAY CLASSIFICATION

Route: 38th Avenue (Coaltown Road)
Functional Class: Two-Way Collector
ADT: 5,550 (2013); 7,450 (2033)
DHV: 745 (2033)
ADTT: 5%
Design Speed: 40 m.p.h.
Posted Speed: 40 m.p.h.

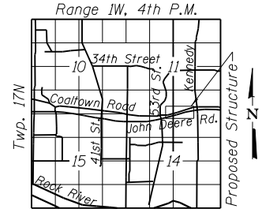
Route: FAP 595 (IL 5-John Deere Road)
Functional Class: Other Principal Arterial
ADT: 39,700 (2013); 53,450 (2033)
DHV: 5,345 (2033)
ADTT: 5.5%
Design Speed: 60 m.p.h.
Posted Speed: 45 m.p.h.

CURVE DATA

(Curve 38RELOC-4)
P.I. Sta. = 63+13.97
Δ = 18° 12' 18" (LT)
D = 4° 35' 01"
R = 1,250.00'
T = 200.27'
L = 397.17'
E = 15.94'
P.C. Sta. = 61+13.70
P.T. Sta. = 65+10.87

CURVE DATA

(Curve 38RELOC-5)
P.I. Sta. = 68+97.07
Δ = 4° 32' 05" (LT)
D = 1° 08' 45"
R = 5,000.00'
T = 197.97'
L = 395.73'
E = 3.92'
P.C. Sta. = 66+99.11
P.T. Sta. = 70+94.83



LOCATION SKETCH

BORING LOCATION PLAN: 38TH AVENUE RETAINING WALL ALONG JOHN DEERE ROAD, ROCK ISLAND, ILLINOIS

SCALE: GRAPHICAL | EXHIBIT 2 | DRAWN BY: C. MARIN CHECKED BY: L. IORDACHE

Wang Engineering
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Lombard, IL 60148
www.wangeng.com

FOR WILLS BURKE KELSEY ASSOCIATES | 412-04-06

GENERAL PLAN & ELEVATION
ILLINOIS ROUTE 5 - JOHN DEERE ROAD
F.A.P. 595 - SECTION (142-1, 142)R
ROCK ISLAND COUNTY
STATION 63+20.11 TO 70+81.00
STRUCTURE NO. 081-Pxxx

WILLS BURKE KELSEY ASSOCIATES LTD.
116 West Main Street, Suite 201
St. Charles, Illinois 60174

USER NAME = sunderwager	DESIGNED - HLF	REVISED -	
	CHECKED - AEU	REVISED -	
PLOT SCALE =	DRAWN - HLF	REVISED -	
PLOT DATE = 7/22/2013	CHECKED - AEU	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 2 SHEETS

FAP RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
595	(142-1, 142)R	ROCK ISLAND	____	____
		CONTRACT NO. 64H83		
	ILLINOIS	FED. AID PROJECT		

FILE NAME = W:\Projects\2018\180120 PTB 157\25\cadd\Structural\Dgn\WO #15 Coaltown Road Retaining Wall\081Pxxx-64H83-001-TSL.dgn

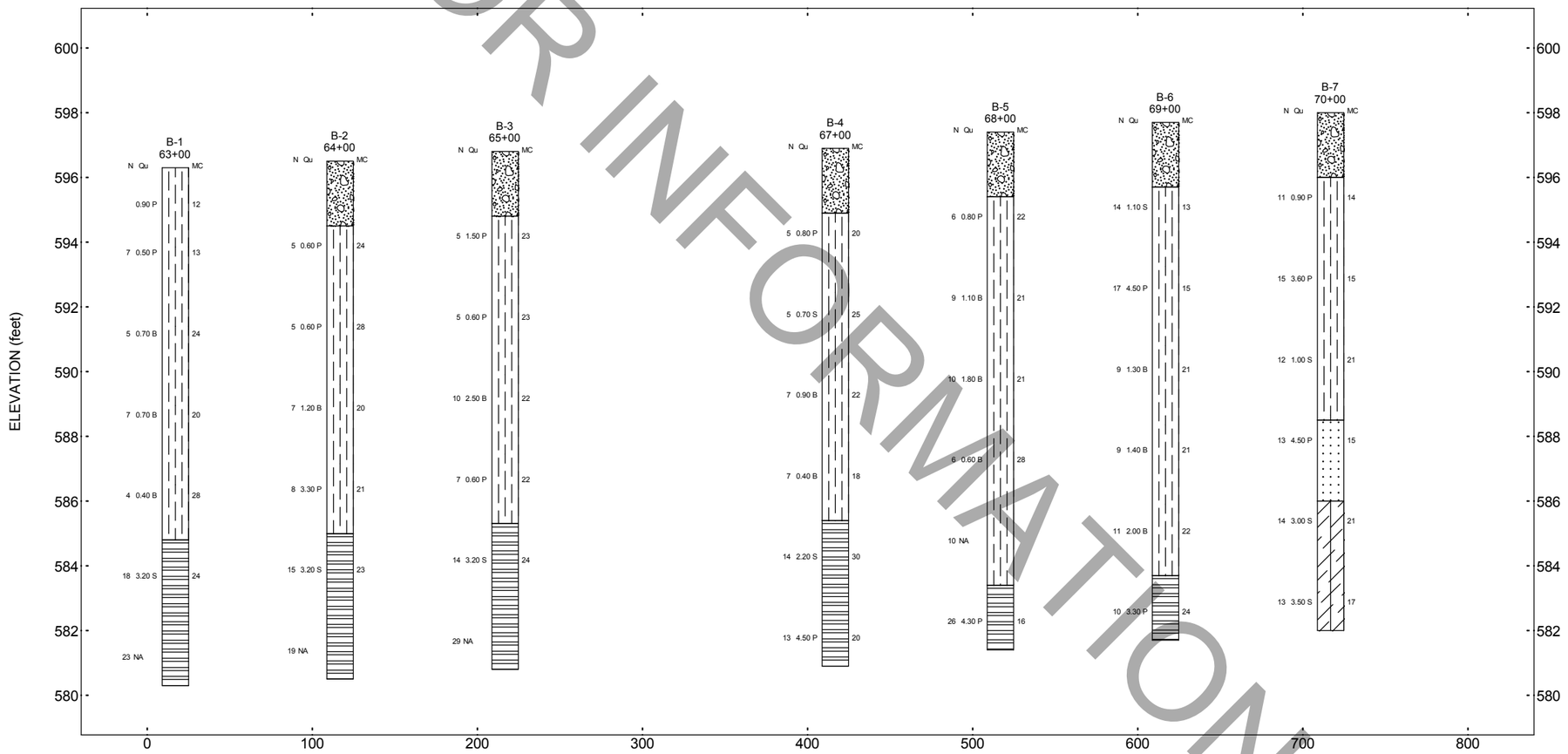
W

A

E

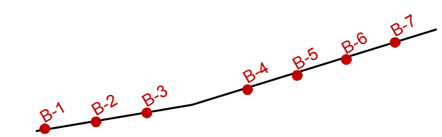
A'

N



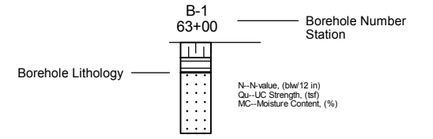
Lithology Graphics

- IDH Silty Clay, Silty Clay Loam
- Shale
- Gravelly sand, sandy gravel
- Sandstone
- IDH Clay Loam



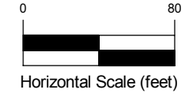
Site Map Scale 1 inch equals 295 feet

Explanation:



Water Level Reading at time of drilling.

Water Level Reading 24-hr after drilling or at end of drilling



Horizontal Scale (feet)

Vertical Exaggeration: 19.5x

Wang Engineering, Inc.
1145 N Main Street
Lombard, IL 60148

Soil Profile A-A'
Station 63+20 to Station 70+50

WEI SINCE 1982

38th Avenue Retaining Wall
Sections 11 and 14, T17N, R1w of 4th PM

JOB NUMBER	PLATE NUMBER
412-04-06	EXHIBIT 3

WEI 11X17 412040 6_B1_B7.GPJ WANGENG.GDT 7/8/13

APPENDIX A

Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 7/11/11

ROUTE FAP 595 DESCRIPTION D92-004-06 Proposed retaining wall on 38th Avenue, E. of 53rd Street LOGGED BY W. Garza

SECTION 142-R LOCATION S. Moline Twp. - 11 S 1/2, SEC., TWP. 17N, RNG. 1W

COUNTY Rock Island DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-45 Automatic

STRUCT. NO. -
Station

BORING NO. B-1
Station 63+00
Offset 13.50ft Rt CL
Ground Surface Elev. 596.30 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
MEDIUM brown SILTY CLAY LOAM			0.9 P	12.0
	594.30	1		
MEDIUM brown LOAM		5	0.5 P	13.0
	592.80	2		
MEDIUM brown SILTY CLAY LOAM	-5	1		
		2	0.7 B	24.0
	590.30	3		
MEDIUM light brown SILTY CLAY LOAM		1		
		2	0.7 B	20.0
	587.80	5		
SOFT light gray SILTY LOAM	-10	1		
		1	0.4 B	28.0
	584.80	3		
VERY STIFF gray SHALE		5		
		7	3.2 S	24.0
	582.80	11		
gray SHALE	-15	8		
		8		
	580.30	15		
End of Boring	-20			

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

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 7/11/11

ROUTE FAP 595 DESCRIPTION D92-004-06 Proposed retaining wall on 38th Avenue, E. of 53rd Street LOGGED BY W. Garza

SECTION 142-R LOCATION S. Moline Twp. - 11 S 1/2, SEC., TWP. 17N, RNG. 1W

COUNTY Rock Island DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-45 Automatic

STRUCT. NO. -
Station

BORING NO. B-2
Station 64+00
Offset 14.00ft Rt CL
Ground Surface Elev. 596.50 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Shoulder Rock				
	594.50			
MEDIUM brown LOAM		4		
		2	0.6	24.0
	593.00	3	P	
MEDIUM brown SILTY CLAY LOAM	-5	2		
		2	0.6	28.0
	590.50	3	P	
STIFF brown SILTY CLAY LOAM		0		
		3	1.2	20.0
	588.00	4	B	
VERY STIFF light gray CLAY	-10	1		
		3	3.3	21.0
		5	P	
	585.00			
VERY STIFF gray SHALE		4		
		5	3.2	23.0
	583.00	10	S	
MEDIUM gray SHALE	-15	9		
		9		
	580.50	10		
End of Boring				
	-20			

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

Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 7/11/11

ROUTE FAP 595 DESCRIPTION D92-004-06 Proposed retaining wall on 38th Avenue, E. of 53rd Street LOGGED BY W. Garza

SECTION 142-R LOCATION S. Moline Twp. - 11 S 1/2, SEC., TWP. 17N, RNG. 1W

COUNTY Rock Island DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-45 Automatic

STRUCT. NO. -
Station

BORING NO. B-3
Station 65+00
Offset 14.00ft Rt CL
Ground Surface Elev. 596.80 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Shoulder Rock				
594.80				
STIFF brown SILTY CLAY LOAM		3		
		2	1.5	23.0
593.30		3	P	
MEDIUM brown SILTY CLAY LOAM	-5	2		
		2	0.6	23.0
590.80		3	P	
VERY STIFF brown CLAY LOAM		1		
		4	2.5	22.0
588.30		6	B	
MEDIUM tan SILTY LOAM with SAND lens	-10	3		
		3	0.6	22.0
		4	P	
585.30				
VERY STIFF gray SHALE		4		
		5	3.2	24.0
583.30		9	S	
MEDIUM gray SHALE	-15	8		
		13		
580.80		16		
End of Boring	-20			

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

BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 7/11/11

ROUTE FAP 595 DESCRIPTION D92-004-06 Proposed retaining wall on 38th Avenue, E. of 53rd Street LOGGED BY W. Garza

SECTION 142-R LOCATION S. Moline Twp. - 11 S 1/2, SEC., TWP. 17N, RNG. 1W

COUNTY Rock Island DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-45 Automatic

STRUCT. NO. -
Station

BORING NO. B-4
Station 67+00
Offset 14.00ft Rt CL
Ground Surface Elev. 596.90 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Shoulder Rock				
	594.90			
MEDIUM brown LOAM		3		
		2	0.8	20.0
	593.40	3	P	
MEDIUM brown SILTY LOAM	-5	1		
		2	0.7	25.0
	590.90	3	S	
MEDIUM brown SILTY CLAY LOAM		2		
		3	0.9	22.0
	588.40	4	B	
SOFT tan SANDY LOAM with GRAVEL	-10	3		
		3	0.4	18.0
		4	B	
	585.40			
VERY STIFF tan CLAY LOAM SHALE		4		
		6	2.2	30.0
	583.40	8	S	
MEDIUM/HARD gray SHALE	-15	5		
		6	4.5	20.0
	580.90	7	P	
End of Boring				
	-20			

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

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 7/12/11

ROUTE FAP 595 DESCRIPTION D92-004-06 Proposed retaining wall on 38th Avenue, E. of 53rd Street LOGGED BY W. Garza

SECTION 142-R LOCATION S. Moline Twp. - 11 S 1/2, SEC., TWP. 17N, RNG. 1W

COUNTY Rock Island DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-45 Automatic

STRUCT. NO. -
Station

BORING NO. B-5
Station 68+00
Offset 14.00ft Rt CL
Ground Surface Elev. 597.40 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Shoulder Rock				
595.40				
MEDIUM brown SILTY CLAY LOAM		3		
		2	0.8	22.0
593.90		4	P	
STIFF brown SILTY CLAY LOAM	-5	2		
		4	1.1	21.0
591.40		5	B	
STIFF brown SILTY CLAY LOAM		3		
		4	1.8	21.0
588.90		6	B	
MEDIUM brown/tan SILTY CLAY LOAM with SILT lens	-10	2		
		2	0.6	28.0
586.40		4	B	
No Recovery		6		
		3		
583.40		7		
HARD gray SHALE	-15	6		
		10	4.3	16.0
581.40		16	P	
End of Boring	-20			

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

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 7/12/11

ROUTE FAP 595 DESCRIPTION D92-004-06 Proposed retaining wall on 38th Avenue, E. of 53rd Street LOGGED BY W. Garza

SECTION 142-R LOCATION S. Moline Twp. - 11 S 1/2, SEC., TWP. 17N, RNG. 1W

COUNTY Rock Island DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-45 Automatic

STRUCT. NO. -
Station

BORING NO. B-6
Station 69+00
Offset 14.00ft Rt CL
Ground Surface Elev. 597.70 ft

Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Shoulder Rock				
	595.70			
STIFF brown SILTY CLAY LOAM		2		
		5	1.1	13.0
	594.20	9	S	
HARD brown SILTY CLAY LOAM	-5	7		
		8	4.5	15.0
	591.70	9	P	
STIFF brown SILTY CLAY LOAM		2		
		3	1.3	21.0
	589.20	6	B	
STIFF brown LOAM with SILT lens	-10	2		
		5	1.4	21.0
	586.70	4	B	
VERY STIFF light gray SILTY CLAY		2		
		4	2.0	22.0
		7	B	
	583.70			
VERY STIFF gray SHALE	-15	4		
		4	3.3	24.0
	581.70	6	P	
End of Boring				
	-20			

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

Illinois Department of Transportation
Division of Highways
Illinois Department of Transportation/D-2

SOIL BORING LOG

Date 7/12/11

ROUTE FAP 595 DESCRIPTION D92-004-06 Proposed retaining wall on 38th Avenue, E. of 53rd Street LOGGED BY W. Garza

SECTION 142-R LOCATION S. Moline Twp. - 11 S 1/2, SEC., TWP. 17N, RNG. 1W

COUNTY Rock Island DRILLING METHOD Hollow Stem Auger HAMMER TYPE CME-45 Automatic

STRUCT. NO. -
Station

BORING NO. B-7
Station 70+00
Offset 14.00ft Rt CL
Ground Surface Elev. 598.00 ft

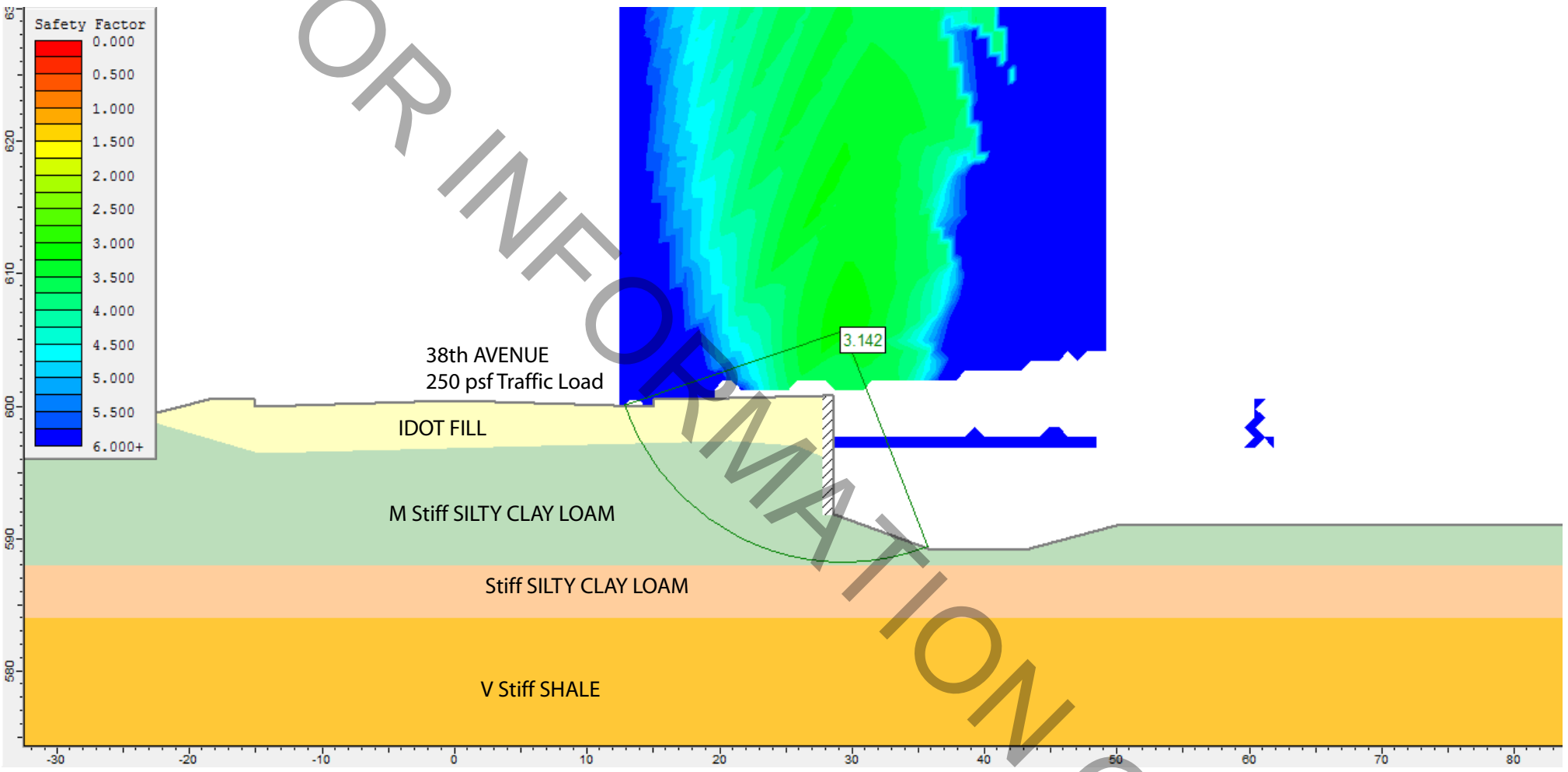
Surface Water Elev. ft
Stream Bed Elev. ft

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

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Shoulder Rock				
	596.00			
MEDIUM brown LOAM		2		
		4	0.9	14.0
	594.50	7	P	
VERY STIFF brown LOAM	-5	8		
		8	3.6	15.0
	592.00	7	P	
STIFF brown SILTY CLAY LOAM		3		
		5	1.0	21.0
	589.50	7	S	
HARD tan SAND lens with SANDSTONE	-10	4		
		5	4.5	15.0
	587.00	8	P	
VERY STIFF light gray CLAY LOAM		4		
		5	3.0	21.0
	584.50	9	S	
VERY STIFF light gray CLAY	-15	5		
		5	3.5	17.0
	582.00	8	S	
End of Boring				
	-20			

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

APPENDIX B



Undrained Analysis, Station 66+50, Ref Borings B-3, B-4, and B-5

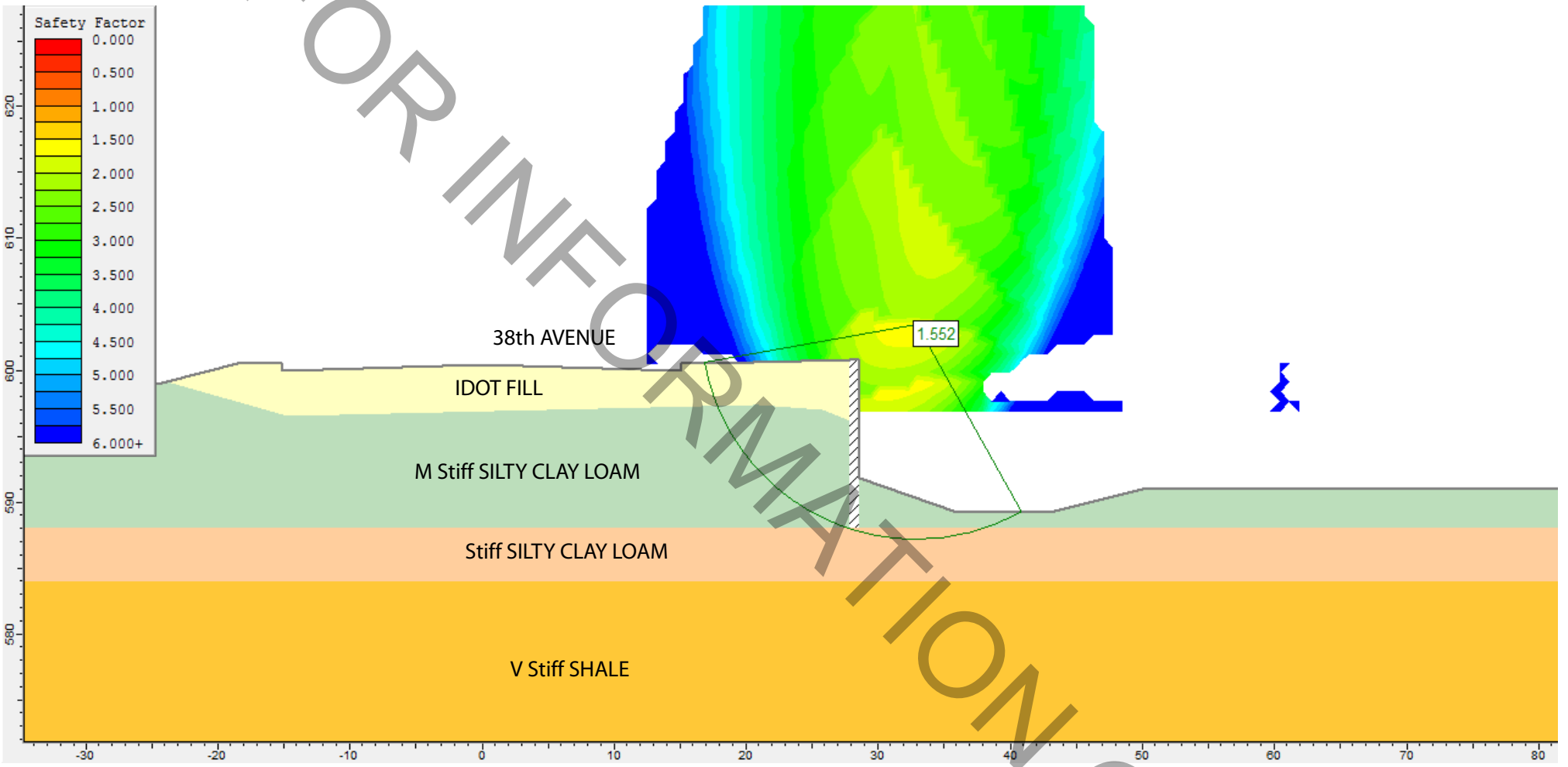
Layer ID	Description	Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	IDOT FILL	125	1000	0
2	M Stiff SI CL LOAM	120	800	0
3	Stiff SI CL LOAM	120	1200	0
4	V Stiff SHALE	125	3500	0

GLOBAL STABILITY ANALYSIS: 38TH AVENUE RETAINING WALL ALONG JOHN DEERE ROAD, ROCK ISLAND, ILLINOIS

SCALE: AS SHOWN | APPENDIX B-1 | DRAWN BY: MLS CHECKED BY: LMI

Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR WILLS BURKE KELSEY ASSOCIATES | 412-04-06



Drained Analysis, Station 66+50, Ref Borings B-3, B-4, and B-5

Layer ID	Description	Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	IDOT FILL	125	100	30
2	M Stiff SI CL LOAM	120	0	28
3	Stiff SI CL LOAM	120	100	30
4	V Stiff SHALE	125	100	32

GLOBAL STABILITY ANALYSIS: 38TH AVENUE RETAINING WALL ALONG JOHN DEERE ROAD, ROCK ISLAND, ILLINOIS

SCALE: AS SHOWN | APPENDIX B-2 | DRAWN BY: MLS CHECKED BY: LMI

Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR WILLS BURKE KELSEY ASSOCIATES | 412-04-06