Illinois Department of Transportation

Memorandum

To:	Fawad Aqueel	Attn:	Veselin Velichkov
From:	Stephen Jones	By:	Giancarlo Gierbolini
Subject:	Structure Geotechnical Report*		
Date:	February 8, 2024		

*Route:	FAU 2503 (Illinois Route 25)
Location:	north of Illinois Route 64
County:	Kane
Section:	NA
Contract:	62T09

Enclosed is the Structure Geotechnical Report (SGR) prepared by IDOT District One Geotechnical Unit's consultant, Wang Engineering, dated February 8, 2024, for the above-referenced project. The report provides geotechnical recommendations for the proposed improvements to Illinois Route 25 (IL 25) north of the crossing with IL 64 in Kane County.

The proposed improvements include the replacement of a section of the existing retaining wall located on the east side of the roadway. The existing retaining wall has a maximum height of 12 feet and consists of a shallow bearing, cast in place T-wall. A section of the existing wall, approximately 100 feet long has failed and will be replaced with a new wall.

The report provides the results of the field investigation, laboratory test results, and analysis and recommendations pertaining to the proposed improvements.

If you have any questions regarding this report, please contact Robert Claussen, P.E. at (847)705-4735 or Giancarlo Gierbolini, P.E. at (847) 705-4003.

Cc: IDOT Soils Engineer

STRUCTURE GEOTECHNICAL REPORT
RETAINING WALL IMPROVEMENTS ALONG
NORTHBOUND NORTH 5TH AVENUE
ILLINOIS ROUTE 25
STATION 9+28.15 TO 11+23.80
ST. CHARLES, KANE COUNTY, ILLINOIS

For

IDOT District One

201 West Center Court

Schaumburg, IL 60196

Submitted by

Wang Engineering, Inc., A Terracon Company

1145 North Main Street

Lombard, IL 60148

Original Report: February 8, 2024
Revised Report: NA

Technical Report Documentation Page

1. Title and Subtitle Structure Geotechnical Report IL Route 25 Retaining Wall Improvements		**2. Original Date:** February 8, 2024 **Revised Date:** NA **3. Report Type** ☒ SGR ☐ RGR ☒ Draft ☐ Final ☐ Revised
4. Route / Section / County 106 / NA / Kane		**5. IDOT Contract** 62T10
6. PTB / Item No. NA / NA	**7. Existing Structure Number(s)** NA	**8. Proposed Structure Number(s)** NA
9. Prepared by Wang Engineering, Inc. 1145 N Main Street Lombard, IL 60148	**Contributor(s)** Authors: Nesam S. Balakumaran, PE (WI) Mohammed Kothawala, PE, DGE QC/QA: Corina T. Farez, PE, PG PM: Mohammed Kothawala, PE, DGE	**Contact** (630) 785-9928 ext. 1036 mkothawala@wangeng.com
10. Prepared for IDOT District One 201 West Center Court Schaumburg, IL, 60196	**Design Engineer** Robert Claussen, P.E. (IDOT District One) S.M. (Kaz) Kazi, PE, SE (Delta Engineering Group, LLC)	**Contacts** (847) 705-4735 Robert.Claussen@illinois.gov (312) 291-6565 smkazi@deg-america.com

11. Abstract

Existing T-type retaining wall along northbound 5th Avenue/IL Route 25 has experienced a complete crack and horizontal translation in 2 out of 4 wall segments. The existing wall is about 272.0-foot long, extending from Station 9+28.15 to Station 11+23.80 and has a maximum total height of 11.5 feet. The proposed improvements include backfill and drainage along the wall, Segment 2 full replacement, and Segment 3 stem replacement. This report provides geotechnical recommendations for the design and construction of proposed retaining wall repairs.

Beneath the surface, the general lithologic profile includes up to 10 feet of cohesive fill followed by stiff to hard silty clay to silty clay loam. Deeper foundation soils include loose to dense silt to sandy gravel interbedded with stiff to hard silty clay. Groundwater was encountered at elevations of 723 to 724 feet or 23 to 25.5 feet below grade.

For the foundation soil beneath the existing wall Segment 2, we estimate a maximum factored bearing resistance of 4,900 psf based on a geotechnical resistance factor of 0.55 (AASHTO 2020). The Segment 2 will have adequate FOS of 1.5 for global stability. The long-term settlement is estimated to be about 0.5 inches.

The proposed improvements will likely involve excavation of up to 12.0 feet behind the wall. Due to the presence of hard clayey soils with Q_u values greater than 4.5 tsf, we estimate temporary sheet piling designed using the charts included in the *IDOT Design Guide-Simplified Temporary Sheet Piling Design Charts* will not be feasible and we recommend the pay item, Temporary Soil Retention System for shoring.

Backfill and drainage improvement materials must be according to *IDOT Standard Specifications, Section 586, Granular Backfill for Structures* (IDOT 2022).

12. Path to archived file

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Wang Engineering
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STRUCTURE GEOTECHNICAL REPORT
RETAINING WALL IMPROVEMENTS ALONG
NORTHBOUND NORTH 5TH AVENUE
ILLINOIS ROUTE 25
STATION 9+30.18 TO 11+23.80
ST. CHARLES, KANE COUNTY, ILLINOIS
FOR
IDOT DISTRICT ONE

1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, geotechnical evaluations, and recommendations in support of the design and construction of the proposed improvements to an existing retaining wall along northbound North 5th Avenue, IL Route 25 (IL 25) in St. Charles, Kane County, Illinois. On the USGS *Lake Geneva Quadrangle 7.5 Minute Series* map, the project site is located in the SE¼ of Section 27, Tier 39 N, Range 9 E of the Third Principal Meridian. A *Site Location Map* is presented as Exhibit 1.

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

1.1 Existing Structure and Ground Conditions

Based on the *General Plan and Elevation* (GPE) drawing provided by Delta Engineering Group, LLC. (Delta), the existing retaining wall was constructed in 1968 as a cast-in-place concrete T-type wall. The existing wall is approximately 272-foot long parallel to the IL 25 alignment and consists of 4 segments separated by expansion joints. The wall retains the IL 25 roadway embankment and sidewalk. The residential property has three 8 to 36-inch diameter tall trees in the proximity of Segments 1 and 2.

As per Gannett Fleming drawings dated August 16, 2023, we understand Segment 2 experienced a crack through stem and a horizontal translation of 37.5 inches. In addition, the wall horizontal translation was also observed between Segments 3 and 4 expansion joints.

1.2 Proposed Improvements

Based on the *GPE* drawing dated January 29, 2024, Wang Engineering Inc., a Terracon Company (Wang) understands proposed retaining wall repairs include backfill and drainage improvements to all four wall segments and stem and/or foundation improvements to Segments 2 and 3. The details of each segment improvements are provided below:

- Segment 1 is 52′-10″ long and will remain in place. The designer proposes granular backfill and drainage improvements behind the wall;
- Segment 2 is 50′ long and has experienced major crack and translation. The designer proposes two improvement options. One option is to replace the footing and stem and provide new drainage and granular backfill behind the wall. If the footing is found to be in good conditions during the construction, the second option will only call for stem replacement with new drainage and granular backfill behind the wall;
- Segment 3 is 50′ long and has a staircase to enter the residential property from the roadway sidewalk. The proposed improvement includes stem replacement with granular backfill and drainage improvements;
- Segment 4 is 50′ long. The proposed improvement includes granular backfill and drainage improvements.

To complete the proposed wall repairs, a temporary soil retention system (TSRS) will be required. As per GPE, the TSRS will remain in place after completing the retaining wall improvements.

2.0 METHODS OF INVESTIGATION

The following sections outline the subsurface and laboratory investigations performed by Wang.

2.1 Field Investigation

The subsurface investigation consisted of two retaining wall borings, designated as RWB-01 to RWB-02 and three hand auger borings, designated as HA-01 to HA-03, drilled by Wang on January 25 and 26, 2024. Borings RWB-01 and RWB-02 were drilled from sidewalk near Segments 2 and 3, respectively. Hand auger borings HA-01 to HA-03 were drilled 4 to 6 feet away from Segment 2 at the wall front face. The borings were drilled from elevations of 740.3 to 748.4 feet and were advanced to depths of 5.5 to 40.0 feet below ground surface (bgs). The as-drilled northings and eastings were acquired with a mapping-grade GPS unit. Elevations were provided by Delta. Boring location data are

presented in the *Boring Logs* (Appendix A) and the as-drilled boring locations are shown in the *Boring Location Plan* (Exhibit 2).

A truck-mounted drilling rig, equipped with hollow stem augers, was used to advance and maintain open boreholes. Soil sampling was performed according to AASHTO T206, *"Penetration Test and Split Barrel Sampling of Soils."* The soil in the retaining wall borings was sampled at 2.5-foot intervals to 30 feet and 5 feet intervals thereafter. Jackhammer drive Geoprobe samplers were used to continuously sample the soil in the hand auger borings. Soil samples collected from each sampling interval were placed in sealed jars and transported to the laboratory in Lombard, Illinois, for further examination and testing.

Field boring logs, prepared and maintained by a Wang field engineer, included lithological descriptions, visual-manual soil (IDH Textural) classifications, results of Rimac and pocket penetrometer unconfined compressive strength tests, and results of Standard Penetration Tests (SPT) recorded as blows per 6 inches of penetration.

Groundwater levels were measured while drilling and at completion of each of the borings. For safety considerations, each borehole was backfilled upon completion with soil cuttings and/or bentonite chips, and surface was restored as close as possible to its original condition.

2.2 Laboratory Testing

Soil samples were tested in the laboratory for moisture content (AASHTO T265). Laboratory unit weight tests were performed on selected clayey soil samples. Field visual descriptions of the soil samples were verified in the laboratory and index tested soils were classified according to the IDH Soil Classification System. The laboratory test results are shown in the *Boring Logs* (Appendix A) and in the *Laboratory Test Results* (Appendix B).

3.0 INVESTIGATION RESULTS

Detailed descriptions of the soil conditions encountered during the subsurface investigation are presented in the attached *Boring Logs* (Appendix A) and in the *Soil Profile* (Exhibit 3). 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.

3.1 Lithological Profile

At the surface, Borings RWB-01 and RWB-02 drilled on the sidewalk encountered 4 inches of concrete over gravelly loam and gravelly clay loam base. Hand auger borings advanced at front face of the wall encountered 6 to 12 inches of silty clay topsoil. In descending order, the general lithologic succession encountered beneath the sidewalk pavement or topsoil includes: 1) man-made ground (fill); 2) very stiff to hard silty clay to clay loam; and 3) loose to dense silt to sandy gravel.

1) Man-made ground (fill)

Beneath the surface, the borings advanced through up to 10 feet of medium stiff to very stiff, brown to black silty clay. This layer is characterized by unconfined compressive strength (Q_u) values of 0.5 to 3.5 tsf and moisture content values of 13 to 26%.

2) Stiff to hard silty clay to silty clay loam

At elevations of 729.1 to 737.8 feet, the borings augured through up to 6 feet of stiff to hard, brown silty clay to silty clay loam. This soil unit has Q_u values of 1.0 to 7.2 tsf and moisture content values of 13 to 15%.

3) Loose to dense silt to sandy gravel

At elevations of 730.4 to 731.4 feet, the borings encountered loose to dense, brow to gray silt to sandy gravel interbedded with stiff to hard silty clay. This granular unit has SPT values of 5 to 46 blows per foot and moisture content values of 3 to 18%. The interbedded silty clay has Qu values of 1.2 to 6.1 tsf with moisture content values of 12 to 23%

3.2 Groundwater Conditions

Groundwater was encountered while drilling at elevations of 723 to 724 feet (23 to 25.5 feet bgs) in Borings RWB-01 and RWB-02. At the completion of drilling, the groundwater level was observed at elevations of 710 to 716 feet (32 to 37 feet bgs). It should be noted that groundwater levels might change with seasonal rainfall patterns and long-term climate fluctuations or may be influenced by local site conditions.

4.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

The condition of the existing footing is unknown for the Segment 2 wall. It is possible that the footing may have been also distorted. We recommend removing exiting footing and stem completely and construct a new segment as per Option 1 shown on GPE sheets 2 of 3 ated January 29, 2024.

Recommendations for the design and construction of the proposed Segment 2 are discussed in the following sections.

Segment 2 will be also constructed as a T-type wall to match with the other segments. A T-type wall foundation should be established at a minimum depth of 4.0 feet below the finished grade at the front face of the wall (IDOT 2022). Based on the existing drawings of original IL 25 construction in 1968, we estimate the bottom of existing footing for Segment 2 is at approximate elevation 737.8 feet. We recommend the new footing should be established at the same elevation as exiting footing. We also recommend providing a layer of compacted 6 inches of crushed stone CA-6 gradation bellow the footing base by over excavating soil. The CA-6 layer should extend 1-foot outside the foundation layout. The subgrade at the base of excavation should be tested by Dynamic Cone Penetrometer (DCP) to determine adequacy for the bearing resistance. Following the foundation soils improvement, Segment 2 foundation soils will have a maximum factored bearing resistance of 4,900 ksf based on a maximum nominal bearing resistance of 9,000 ksf using resistance factor of 0.55 (AASHTO 2020). The long-term settlement is estimated to be about 0.5 inches. The footing size should be checked to resist sliding and overturning.

The estimated friction angle between the Segment 2 concrete base and the CA-6 aggregate is 26°, and the corresponding nominal friction coefficient is 0.48. Gravity retaining walls are designed based on an AASTHO geotechnical sliding resistance factor of 1.0.

We recommend a linearly increasing unfactored equivalent fluid pressure of 40 pcf per foot of depth below grade behind the wall with drainable backfill considering unit weight of 120 pcf and internal friction of 30 degree. We recommend providing drainage and backfill behind the wall as per IDOT 2023 Bridge Manual, Figure 3.11.2.3-2 since pipe underdrain will be provided. Drainable backfill should be *Granular Backfill for Structures* as per Section 586 of IDOT Standard Specifications. *Geocomposite Wall Drain* should be as per Section 591 of IDOT Standard Specifications.

4.1 Global Stability

The global stability of the Segment 2 wall was analyzed based on the soil profile encountered in HA-02 and RWB-01, and the information provided in the *GPE*. The analysis will be updated as needed once final cross-sections are received. The minimum required FOS for both short (undrained) and long-term (drained) conditions is 1.5 (IDOT 2020). Our analysis indicates that the wall has adequate FOS. *Slide2* exhibits employing the Bishop Simplified method of analysis are shown in Appendix C.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

Trees, surface topsoil, pavement, and debris should be cleared and stripped where the Segment 2 foundations will be placed. If unstable or unsuitable materials are exposed during excavation, they should be removed and replaced with compacted granular fill as described in Section 5.3.

5.2 Excavation, Dewatering, and Utilities

Excavations should be performed in accordance with local, state, and federal regulations. The potential effect of ground movements upon nearby structures, roadways, and utilities should be considered during construction. Excavations for the construction of the wall should be sloped at no steeper than 1:2 (V: H). Any slope that cannot be graded at 1:2 (V:H) should be properly shored.

The proposed improvements will likely involve excavation of up to 12.0 feet behind the wall and stem and foundation demolition along Segment 2. Temporary support system will be required since the ground cannot be sloped at 1:2 (V:H). Due to the presence of hard clayey soils with Q_u values greater than 4.5 tsf, we estimate temporary sheet piling, designed using the charts included in the *IDOT Design Guide-Simplified Temporary Sheet Piling Design Charts* will not be feasible and we recommend the pay item, *Temporary Soil Retention System* for shoring. If the temporary soil retention system is left in place following the proposed retaining wall improvements, we recommend cut the top of the TSRS about 2-foot below proposed roadway subgrade level.

Groundwater was encountered while drilling and at the completion of drilling at elevations of 710 to 724 feet, about 4 to 18 feet below the Segment 2 footing level. Therefore, we do not anticipate special dewatering efforts. Water that does accumulate in open excavations by seepage or runoff should be immediately removed by sump pump. Any soils allowed to soften under standing water should be removed and replaced with compacted fill as described in Section 5.3.

5.3 Filling and Backfilling

Fill material used to attain final design elevations (except backfill for drainage behind the wall and below the footings) should be pre-approved, compacted, cohesive or granular soil conforming to Section 204, *Borrow and Furnished Excavation* (IDOT 2022). The fill material should be free of organic matter and debris and should be placed in lifts and compacted according to Section 205, *Embankment* (IDOT 2022). Backfill improvement materials must be according to Section 586, *Granular Backfill for Structures* (IDOT 2022).

5.4 Earthwork Operations

The required earthwork can be accomplished with conventional construction equipment. Moisture and traffic will cause deterioration of exposed subgrade soils. Precautions should be taken by the Contractor to prevent water erosion of the exposed subgrade. A compacted subgrade will minimize water runoff erosion. Earth moving operations should be scheduled to not coincide with excessive cold or wet weather (early spring, late fall or winter). Any soil allowed to freeze or soften due to the standing water should be removed.

Wet weather can cause problems with subgrade compaction. It is recommended that an experienced geotechnical engineer be retained to inspect the exposed subgrade, monitor earthwork operations, and provide material inspection services during the construction phase of this project.

6.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on 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 structure repairs are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist the IDOT District One on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.

Mohammed Kothawala, P.E., D.GE.
Project Manager/Senior Engineer

Nesam Balakumaran, P.E. (WI)
Project Geotechnical Engineer

Corina T. Farez, P.E., P.G.
QC/QA Reviewer

REFERENCES

AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (2020) "*AASHTO LRFD Bridge Design Specifications*" United States Depart of Transportation, Washington, D.C.

IDOT (2023) *Bridge Manual.* Illinois Department of Transportation.

IDOT (2022) *Standard Specifications for Road and Bridge Construction.* Illinois Department of Transportation.

IDOT (2020) *Geotechnical Manual.* Illinois Department of Transportation.

Wang Engineering

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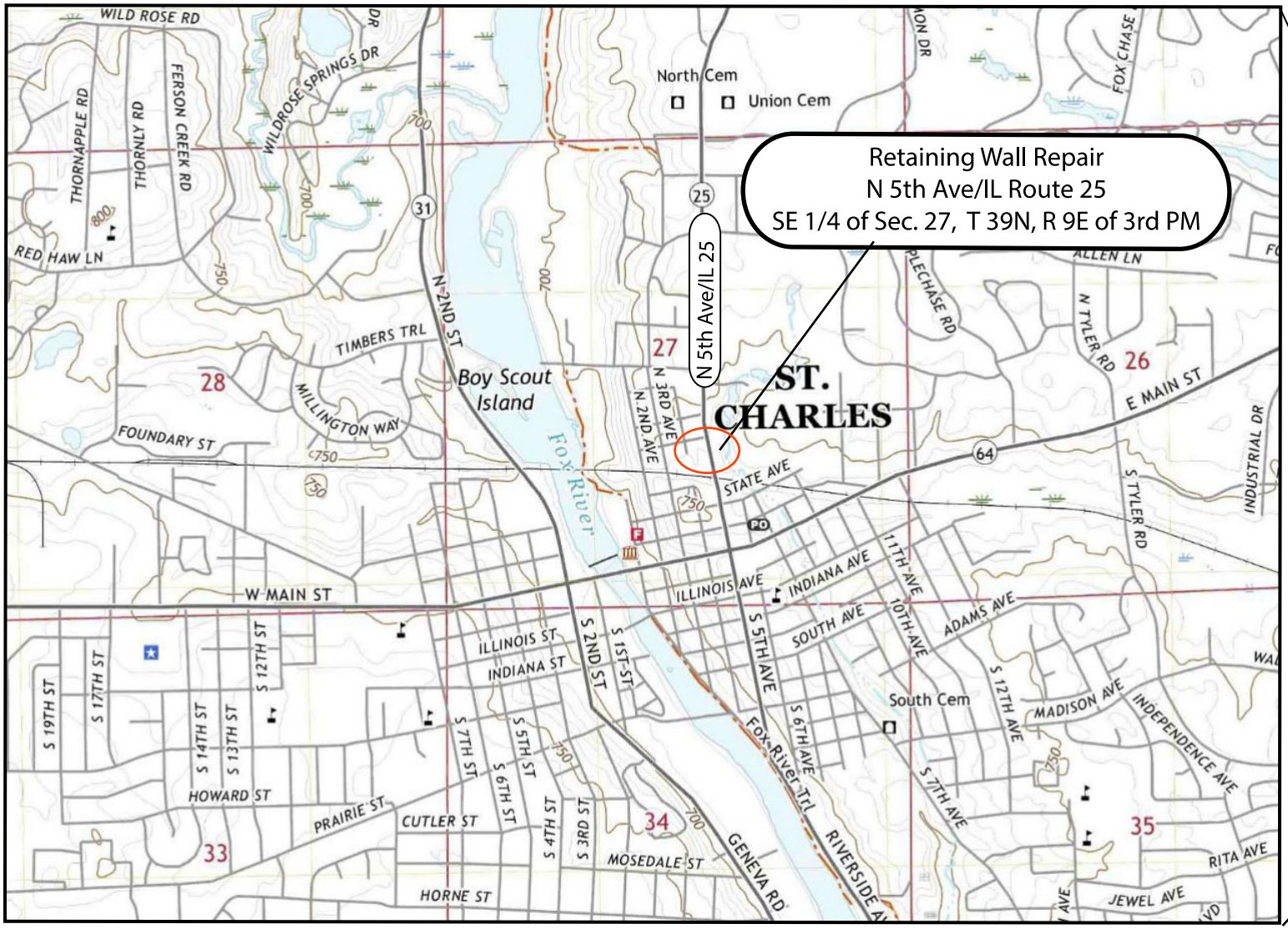
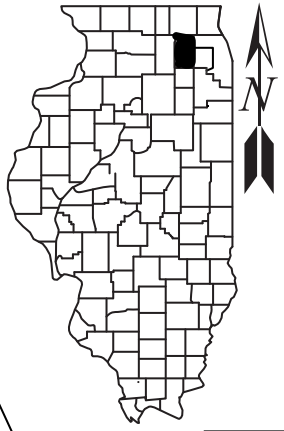
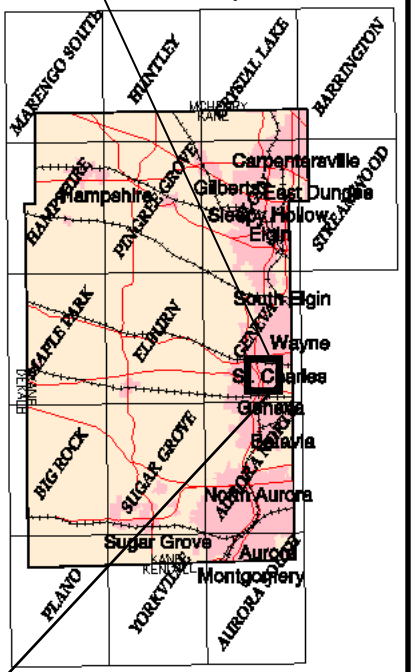
EXHIBITS







Kane County

Scale

0 0.5 1.0 Miles

SITE LOCATION MAP: RETAINING WALL REPAIR, N 5TH AVENUE/ IL ROUTE 25
ST. CHARLES, KANE COUNTY, IL

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: N. Balakumaran CHECKED BY: M. Kothawala

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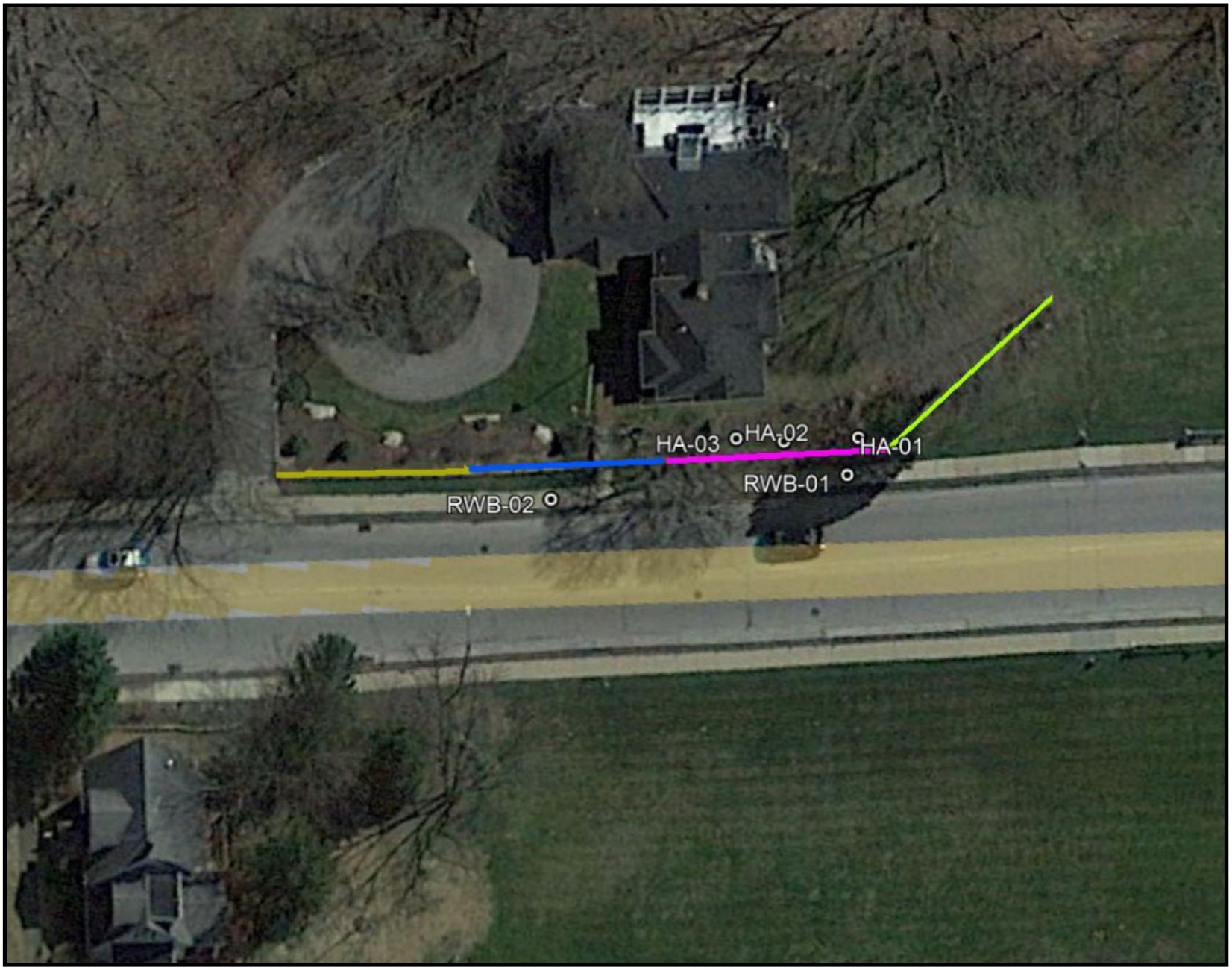
FOR IDOT DISTRICT ONE	KE235460



Legend

Boring Location

0 50 100 Feet

BORING LOCATION PLAN: RETAINING WALL REPAIR, N 5TH AVENUE/ IL ROUTE 25
ST. CHARLES, KANE COUNTY, IL

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: N. Balakumaran CHECKED BY M. Kothawala

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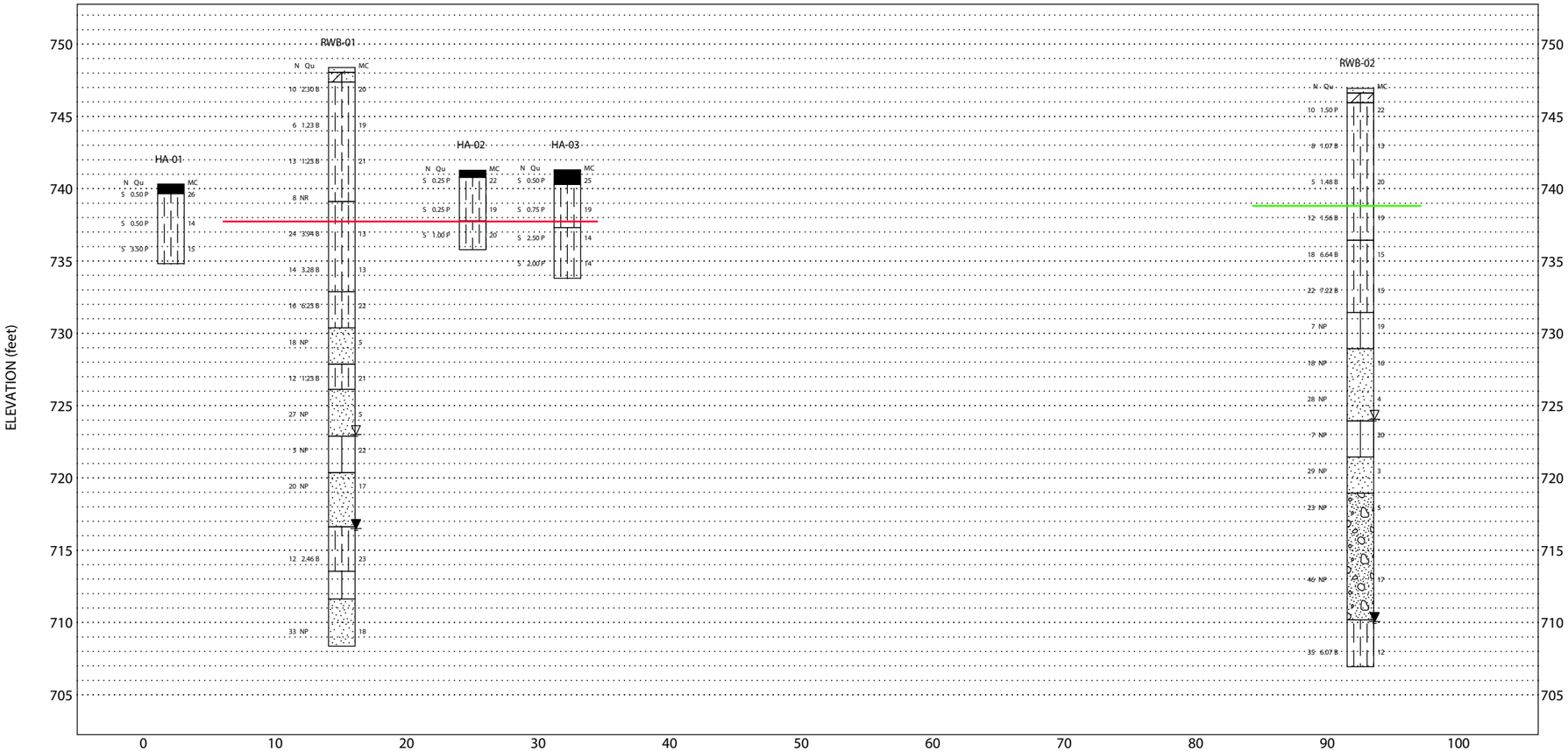
FOR IDOT District One | KE235460

Existing Segment 2 Footing Base Elevation

Existing Segment 3 Footing Base Elevation

◄ S

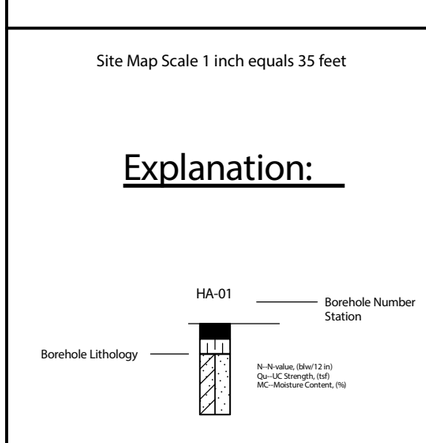
N ►



Lithology Graphics

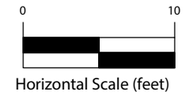
- Topsoil
- IDH Silty Clay, Silty Clay Loam
- Concrete
- IDH Loam
- IDH Sand, Sandy Loam
- IDH Silt, Silty Loam
- IDH Clay Loam
- Gravelly sand, sandy gravel

Explanation:



Water Level Reading at time of drilling.

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



Vertical Exaggeration: 1x

Wang Engineering, Inc.
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Soil Profile
IL Route 25 Retaining Wall Repair

WEI SINCE 1982

IL 25 Retaining Wall Repair
Kane County, IL

JOB NUMBER	PLATE NUMBER
KE235460	EXHIBIT 3

WEI 11X17 KE235460.GPJ WANGENG.GDT 2/1/24

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APPENDIX A

Wang Engineering
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BORING LOG HA-01

WEI Job No.: KE235460

Client: **IDOT District 1**
Project: **IL 25 Retaining Wall Repair**
Location: **Kane County, IL**

Datum: NAVD 88
Elevation: 740.32 ft
North: 1912471.50 ft
East: 990770.70 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	739.7	8-inch thick, brown SILTY CLAY --TOPSOIL--						
		Medium stiff to very stiff, dark brown and brown SILTY CLAY LOAM, liitle to some gravel --FILL--			1	PUSH	0.50 P	26
					2	PUSH	0.50 P	14
			5		3	PUSH	3.50 P	15
	734.8	--PROBE REFUSAL-- Boring terminated at 5.50 ft						
			10					
			15					
			20					

GENERAL NOTES

Begin Drilling: **01-25-2024** Complete Drilling: **01-25-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **K&G** Logger: **F. Bozga** Checked by: **J. Bensen**
Drilling Method: **1" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Dry**
At Completion of Drilling: **Dry**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC KE235460.GPJ WANGENG.GDT 2/1/24

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BORING LOG HA-02

WEI Job No.: KE235460

Client: **IDOT District 1**
Project: **IL 25 Retaining Wall Repair**
Location: **Kane County, IL**

Datum: NAVD 88
Elevation: 741.28 ft
North: 1912481.84 ft
East: 990766.33 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	740.8	6-inch thick SILTY CLAY --TOPSOIL--						
		Soft, dark brown SILTY CLAY, trace gravel --FILL--			1	PUSH	0.25 P	22
					2	PUSH	0.25 P	19
	737.8	Stiff, brown SILTY CLAY LOAM, little gravel	5		3	PUSH	1.00 P	20
	735.8	--PROBE REFUSAL-- Boring terminated at 5.50 ft	10					
			15					
			20					

GENERAL NOTES

Begin Drilling: **01-25-2024** Complete Drilling: **01-25-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **K&G** Logger: **F. Bozga** Checked by: **J. Bensen**
Drilling Method: **1" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Dry**
At Completion of Drilling: **Dry**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG HA-03

WEI Job No.: KE235460

Client: **IDOT District 1**
Project: **IL 25 Retaining Wall Repair**
Location: **Kane County, IL**

Datum: NAVD 88
Elevation: 741.31 ft
North: 1912488.22 ft
East: 990763.84 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	740.3	12-inch thick, dark brown SILTY CLAY --TOPSOIL--			1	PUSH	0.50 P	25
		Medium stiff, dark brown to brown SILTY CLAY LOAM, little grvael --FILL--			2	PUSH	0.75 P	19
	737.3	Very stiff, brown SILTY CLAY LOAM, trace gravel	5		3	PUSH	2.50 P	14
					4	PUSH	2.00 P	14
	733.8	--PROBE REFUSAL-- Boring terminated at 7.50 ft	10					
			15					
			20					

GENERAL NOTES

Begin Drilling: **01-26-2024** Complete Drilling: **01-26-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **K&G** Logger: **F. Bozga** Checked by: **J. Bensen**
Drilling Method: **1" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Dry**
At Completion of Drilling: **Dry**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC KE235460.GPJ WANGENG.GDT 2/1/24

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BORING LOG RWB-01

WEI Job No.: KE235460

Client: **IDOT District 1**
Project: **IL 25 Retaining Wall Repair**
Location: **Kane County, IL**

Datum: NAVD 88
Elevation: 748.37 ft
North: 1912475.21 ft
East: 990758.11 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	748.0	4-inch thick CONCRETE --SIDEWALK PAVEMENT--						
	747.4	8-inch thick, brown Gravelly LOAM --BASE COURSE--						
		Stiff to very stiff, brown SILTY CLAY, trace gravel --FILL-- --RDR 2--			1	2 5 5	2.30 B	20
			5		2	2 2 4	1.23 B	19
					3	4 5 8	1.23 B	21
	739.1				4	2 4 4	NR	
		Very stiff, brown SILTY CLAY LOAM, trace to little gravel --RDR 2--	10		5	9 11 13	3.94 B	13
		--losing mud rotary liquid; possible gravel and cobbles--						
			15		6	3 6 8	3.28 B	13
	732.9	Hard, brown SILTY CLAY, trace gravel --RDR 2--			7	3 7 9	6.23 B	22
	730.4	Medium dense, brown, fine SAND; damp --RDR 2--			8	3 5 13	NP	5
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	727.9	Stiff, brown SILTY CLAY --RDR 2--			9	3 4 8	1.23 B	21
	726.1	Medium dense, brown, fine SAND; damp --RDR 2--			10	9 14 13	NP	5
	722.9	Loose, brown SILT; wet --RDR 1--	25		11	2 2 3	NP	22
	720.4	Medium dense, brown, medium SAND; wet --RDR 2--	30		12	10 9 11	NP	17
	716.6	Very stiff, brown and gray SILTY CLAY --RDR 2--			13	3 4 8	2.46 B	23
	713.5	Gray SILT; wet --RDR 2--	35					
	711.6	Dense, brown, medium SAND; wet			14	8 16 17	NP	18
	708.4	Boring terminated at 40.00 ft	40					

GENERAL NOTES

Begin Drilling: **01-25-2024** Complete Drilling: **01-26-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20D25A [83%]**
Driller: **K&G** Logger: **F. Bozga** Checked by: **J. Bensen**
Drilling Method: **2.25" ID HSA to 10ft; mud rotary thereafter; backfilled upon completion**

WATER LEVEL DATA

While Drilling: **25.50 ft**
At Completion of Drilling: **32.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC KE235460.GPJ WANGENG.GDT 2/1/24

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BORING LOG RWB-02

WEI Job No.: KE235460

Client: **IDOT District 1**
Project: **IL 25 Retaining Wall Repair**
Location: **Kane County, IL**

Datum: NAVD 88
Elevation: 746.94 ft
North: 1912543.18 ft
East: 990740.47 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	746.6	4-inch thick CONCRETE						
		--SIDEWALK PAVEMENT--						
	745.9	Brown, Gravelly CLAY LOAM, trace gravel						
		--BASE COURSE--						
		Stiff, brown, gray, and black SILTY CLAY, trace gravel						
		--FILL--						
		--RDR 2--						
			5					
			10					
	736.4	Hard, brown SILTY CLAY LOAM, trace gravel						
		--RDR 2--						
			15					
	731.4	Loose, brown SILT; moist						
		--RDR 1--						
	728.9	Medium dense, brown, fine SAND; damp to moist						
		--RDR 2--						
			20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	723.9	Loose, brown SILT; wet						
		--RDR 1--						
			25					
	721.4	Medium dense, brown, medium to coarse SAND; damp						
		--RDR 2--						
	718.9	Medium dense to dense, brown SANDY GRAVEL to Gravelly SAND; damp to wet						
		--RDR 2--						
			30					
			35					
	710.2	Hard, pinkish-gray SILTY CLAY LOAM, trace gravel						
		--RDR 2--						
	706.9	Boring terminated at 40.00 ft	40					

Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
1	5 6 4	1.50 P	22
2	5 3 5	1.07 B	13
3	2 2 3	1.48 B	20
4	2 4 8	1.56 B	19
5	4 8 10	6.64 B	15
6	4 8 14	7.22 B	15
7	2 3 4	NP	19
8	3 7 11	NP	16
9	7 13 15	NP	4
10	2 3 4	NP	20
11	9 11 18	NP	3
12	15 13 10	NP	5
13	16 22 24	NP	17
14	10 14 21	6.07 B	12

GENERAL NOTES

Begin Drilling: **01-26-2024** Complete Drilling: **01-26-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20CME55T[81%]**
Driller: **K&G** Logger: **F. Bozga** Checked by: **J. Bensen**
Drilling Method: **3.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **23.00 ft**
At Completion of Drilling: **37.00 ft**
Time After Drilling: **NA**
Depth to Water: **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

WANGENGINC KE235460.GPJ WANGENG.GDT 2/1/24

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APPENDIX B

DENSITY-UNIT WEIGHT DETERMINATION

D 7263

Client: IDOT District 1
Project: IL 25 Retaining Wall Repair
WEI Job No: KE235460

Analyst name: MC
Test date: 1/31/2024

Water content determination	**RWB-01 SS#7 (16-17.5ft)**	**RWB-01 SS#13 (33.5-35ft)**	**RWB-02 SS#5 (11-12.5ft)**	**RWB-02 SS#6 (13.5-15ft)**
Mass of tare and wet soil (g) W_w =	141.71	162.86	138.41	178.53
Mass of tare and dry soil (g) W_d =	117.91	135.02	122.24	156.85
Mass of tare (g) W_t =	11.17	11.30	11.18	11.12
Water content w =	**22%**	**23%**	**15%**	**15%**

Density–Unit Weight				
Diameter measurements (in) D_1 =	1.416	1.403	1.373	1.373
D_2 =	1.430	1.402	1.384	1.386
D_3 =	1.435	1.411	1.404	1.363
Average **diameter** (in) D =	1.427	1.405	1.387	1.374
Height measurements (in) H_1 =	2.371	2.784	2.402	3.110
H_2 =	2.368	2.786	2.405	3.117
H_3 =	2.369	2.804	2.381	3.117
Average **height** (in) H =	2.369	2.791	2.396	3.115
Total **weight** (g) W =	130.540	151.560	127.230	167.410
Bulk Unit Weight (pcf) g =	**131.26**	**133.38**	**133.91**	**138.12**
Dry Unit Weight (pcf) g_d =	**107.33**	**108.88**	**116.89**	**120.23**

Prepared by: ______________ Date: 2/5/2024

Checked by: ______________ Date: 2/5/2024

DENSITY-UNIT WEIGHT DETERMINATION

D 7263

Client: **IDOT District 1**
Project: **IL 25 Retaining Wall Repair**
WEI Job No: **KE235460**

Analyst name: **MC**
Test date: **1/31/2024**

Water content determination	**RWB-02 SS#14 (38.5-40ft)**			
Mass of tare and wet soil (g) W_w =	160.10			
Mass of tare and dry soil (g) W_d =	145.93			
Mass of tare (g) W_t =	11.26			
Water content w =	**11%**			

Density--Unit Weight				
Diameter measurements (in) D_1 =	1.392			
D_2 =	1.375			
D_3 =	1.398			
Average **diameter** (in) D =	1.388			
Height measurements (in) H_1 =	2.638			
H_2 =	2.636			
H_3 =	2.635			
Average **height** (in) H =	2.636			
Total **weight** (g) W =	148.840			
Bulk Unit Weight (pcf) g =	**142.10**			
Dry Unit Weight (pcf) g_d =	**128.57**			

Prepared by: [signature] Date: 2/5/2024

Checked by: [signature] Date: 2/5/2024

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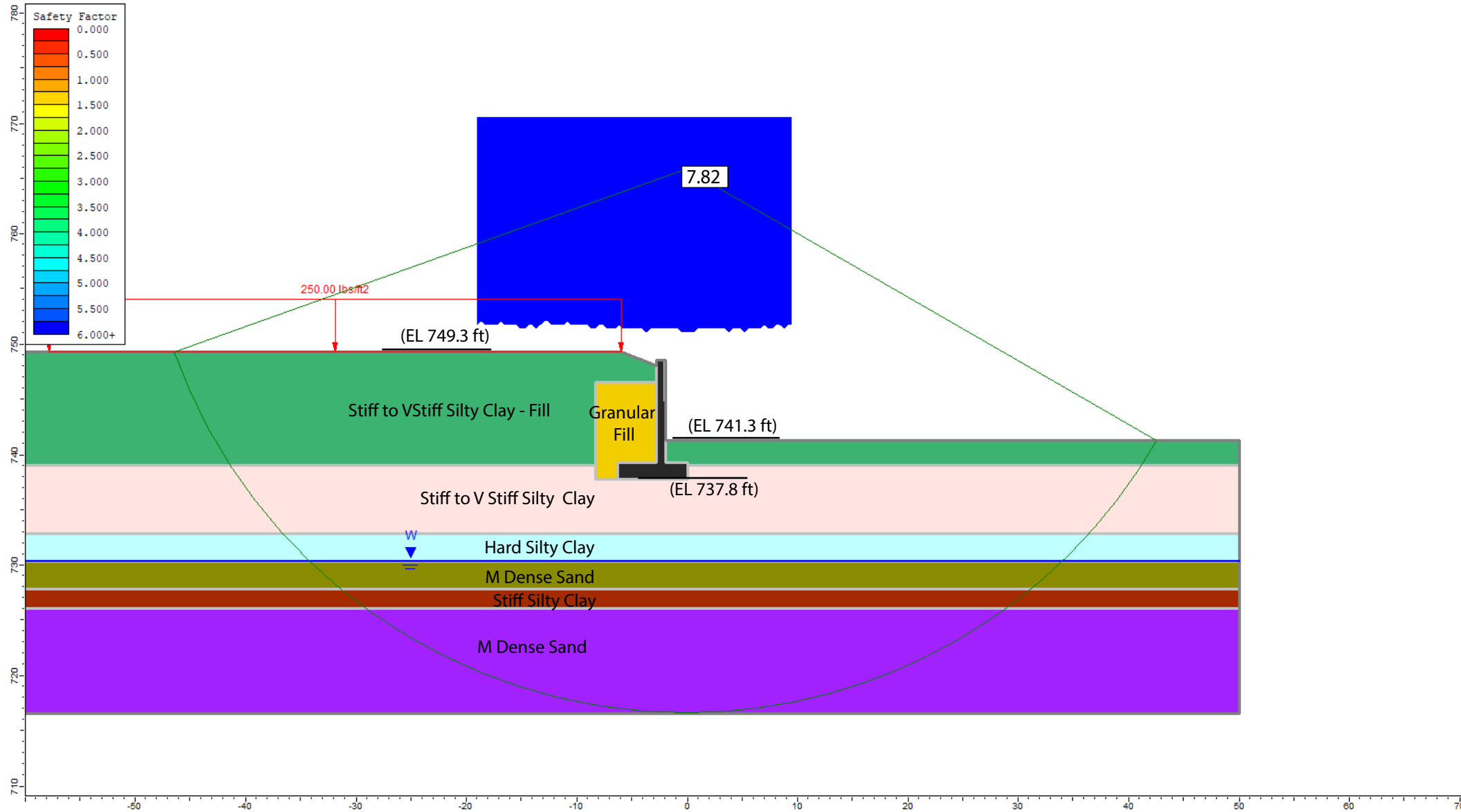
APPENDIX C



Undrained Analysis, Segment 2, Ref Borings: HA-02 and RWB-01

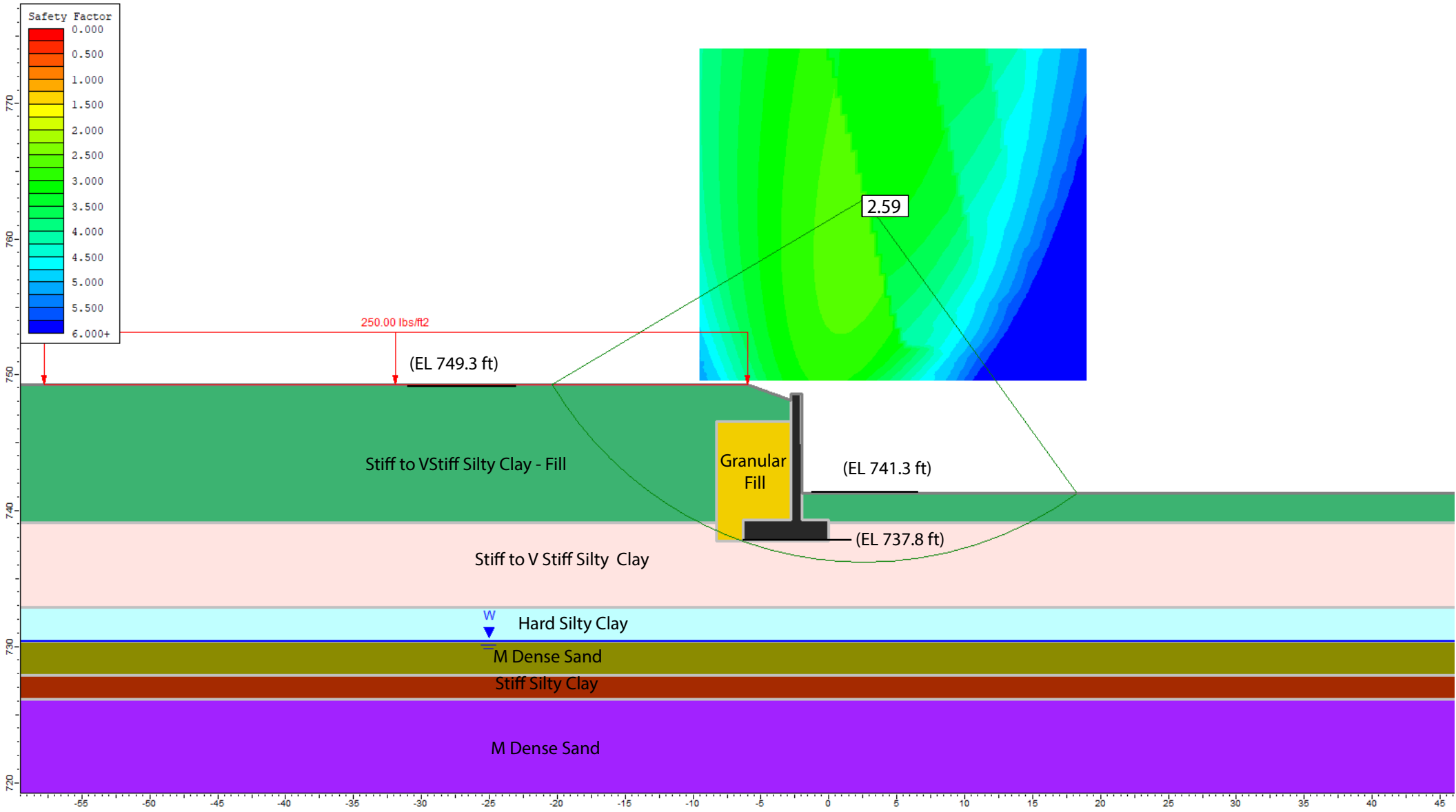
Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	Granular Fill	125	0	32
2	Stiff to V Stiff Silty Clay - Fill	120	1300	0
3	V Stiff Lean Clay Loam	120	2700	0
4	Hard Silty Clay	120	4500	0
5	M Dense Sand	120	0	30
6	Stiff Silty Clay	120	1200	0
7	M Dense Sand	120	0	30

GLOBAL STABILITY: IL ROUTE 25 RETAINING WALL IMPROVEMENTS,
ST. CHARLES, KANE COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX C-1 | DRAWN BY: N. BALAKUMARAN
CHECKED BY: M. Kothawala

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

FOR IDOT DISTRICT ONE | KE235460



Drained Analysis, Segment 2, Ref Borings: HA-02 and RWB-01

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	Granular Fill	125	0	32
2	Stiff to V Stiff Silty Clay - Fill	120	100	30
3	V Stiff Lean Clay Loam	120	100	30
4	Hard Silty Clay	120	110	31
5	M Dense Sand	120	0	30
6	Stiff Silty Clay	120	100	30
7	M Dense Sand	120	0	30

GLOBAL STABILITY: IL ROUTE 25 RETAINING WALL IMPROVEMENTS, ST. CHARLES, KANE COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX C-2 | DRAWN BY: N. BALAKUMARAN CHECKED BY: M. Kothawala

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FOR IDOT DISTRICT ONE | KE235460

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APPENDIX D

Bench Mark: Square cut in N. end of Bridge wall ±200' S. of broken Retaining Wall El. 755.16. "X" in Southwest W. side IL 25 ±300' S. of Park Ave. opposite of broken Retaining Wall El. 747.05,

Existing Structure:
The retaining wall was constructed in 1968 under F.A.S. Route 106, 39 Ext. R-VB, Section 32-CS and is a cast-in-place concrete T-wall and approximately 272 feet long which is parallel with the IL Route 25 alignment, compromised of 4 segments which are separated by expansion joints. The wall retains the IL Route 25 embankment and the side adjacent to a residential property located at 404 North 5th Avenue, St. Charles, IL 60174. A permanent construction easement of eight (8) feet wide into residential property is noted in the Agreement recorded with Kane County.

Traffic is to be maintained utilizing staged construction. The road shall remain open to at least one lane of traffic in each direction at all times.

Salvage: No Salvage

Notes:
1. Upon excavation the footing of segment 2 wall must be evaluated for its condition. If the footing is in good shape then replace the stem only as detailed in the cross section as option 2 on sheet 2. If the the footing is damaged then replace the footing and stem wall as detailed in the cross section as option 1 on sheet 2.

2. Since the staircase is in good condition, replace only the adjacent portions of stem wall leaving 10'-0" of the existing stem wall.

CURVE DATA

EXIST. CURVE IL25_E_3
PI STA. = 14+05.19
Δ = 11° 09' 41" (RT)
D = 5° 27' 11"
R = 1,050.71'
T = 102.67'
L = 204.68'
E = 5.00'
e = _____
T.R. = _____
S.E. RUN = _____
P.C. STA. = 13+02.53
P.T. STA. = 15+07.21

HIGHWAY CLASSIFICATION

Rte. – Rte.
Functional Class:
ADT: (20); (20)
ADTT: (20); (20)
DHV:
Design Speed: m.p.h.
Posted Speed: m.p.h.
-Way Traffic
Directional Distribution:

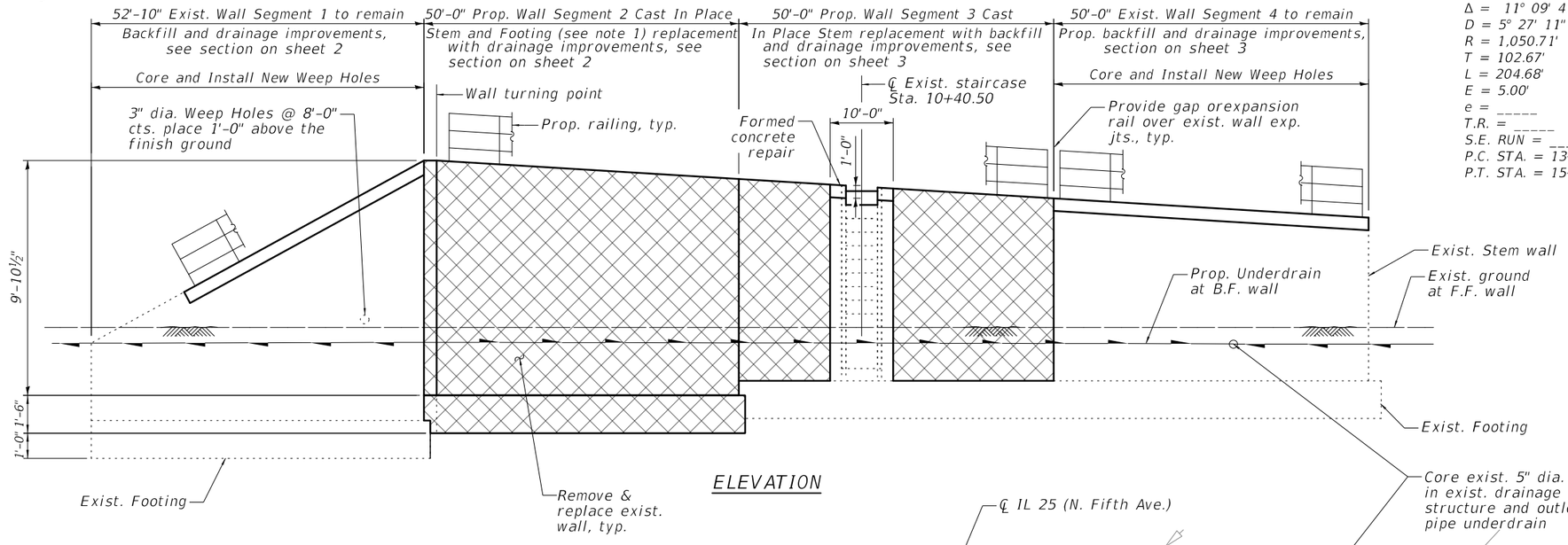
DESIGN SPECIFICATIONS

2020 AASHTO LRFD Bridge Design Specifications, 19th Edition

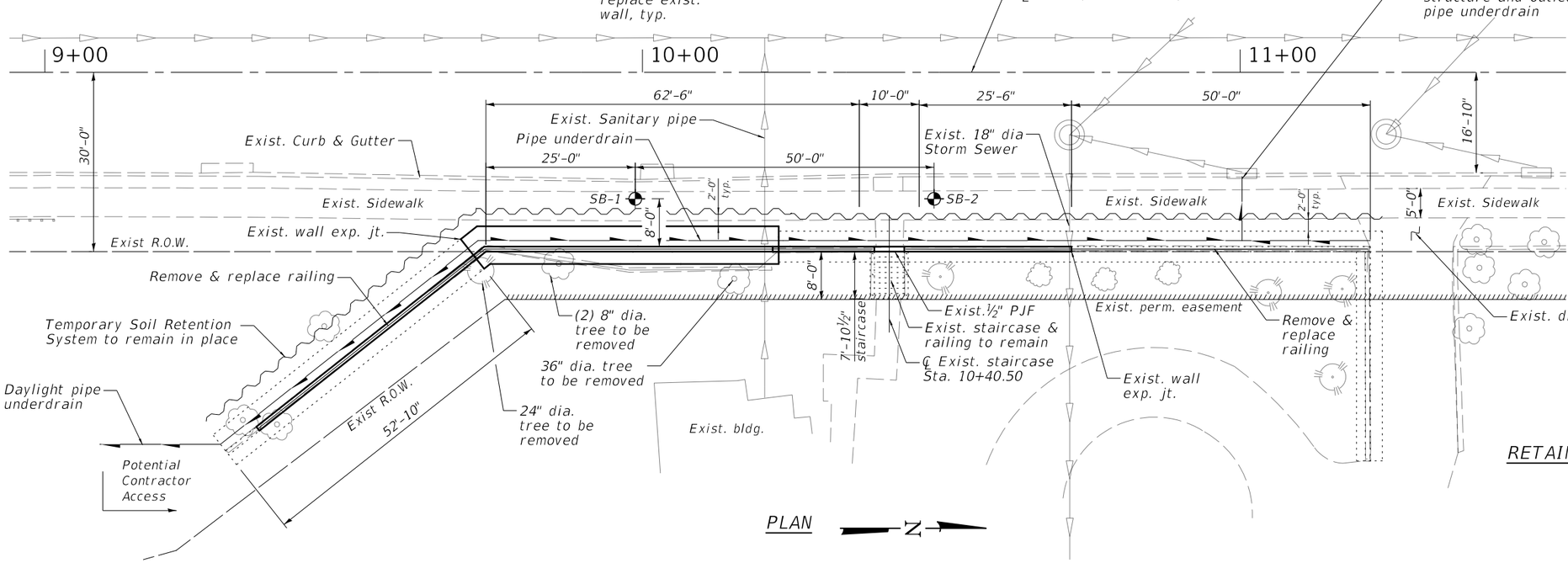
DESIGN STRESSES

FIELD UNITS

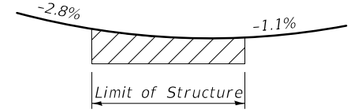
f'c = 3,500 psi (Substructure)
fy = 60,000 psi (Reinforcement)



ELEVATION

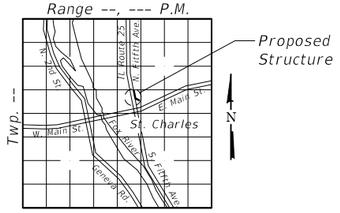


PLAN



PROFILE GRADE

(Along Sidewalk reconstruction)



LOCATION SKETCH

GENERAL PLAN & ELEVATION
RETAINING WALL ALONG NB NORTH FIFTH AVE.
ILLINOIS ROUTE 25
(SECTION _____)
KANE COUNTY
STATION 9+28.15 TO 11+23.80

MODEL: $MODELNAME$
FILE NAME: $FILE$

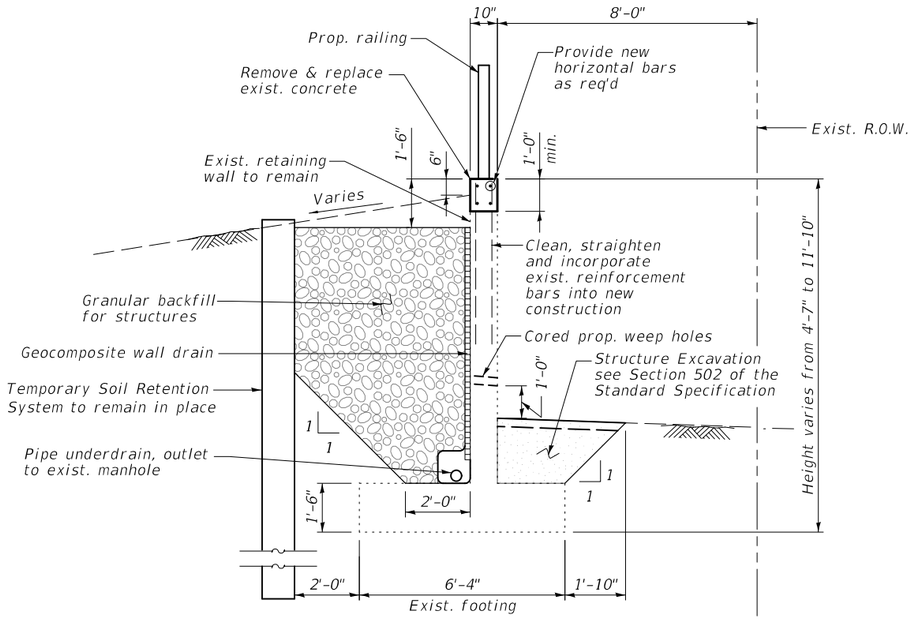
DELTA ENGINEERING GROUP, LLC
CONSULTING ENGINEERS, CONSTRUCTION MANAGERS, SURVEYORS
111 W. JACKSON BLVD. SUITE 910
CHICAGO, IL 60604
T 312.377.7700, F 312.427 6145

USER NAME = $USER$	DESIGNED - NS	REVISED -
	DRAWN - RM	REVISED -
PLOT SCALE = $SCALE$	CHECKED - SMK	REVISED -
PLOT DATE = $DATE$	DATE - 01/29/2024	REVISED -

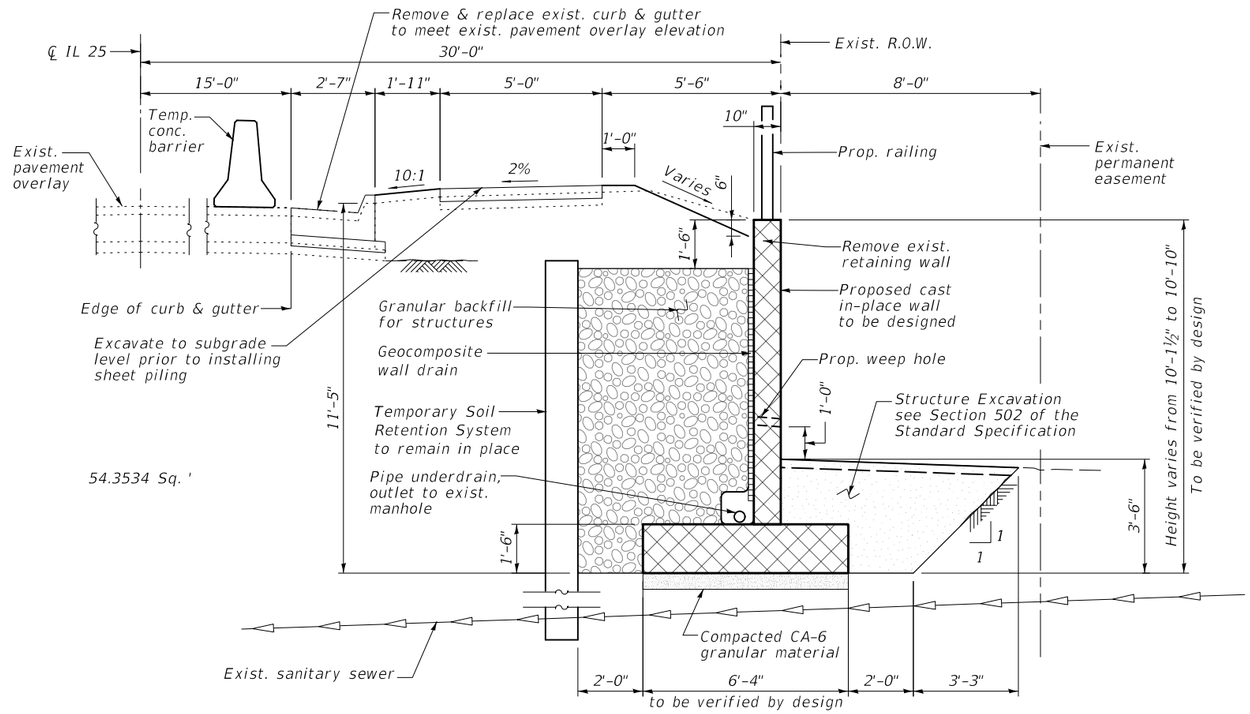
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

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

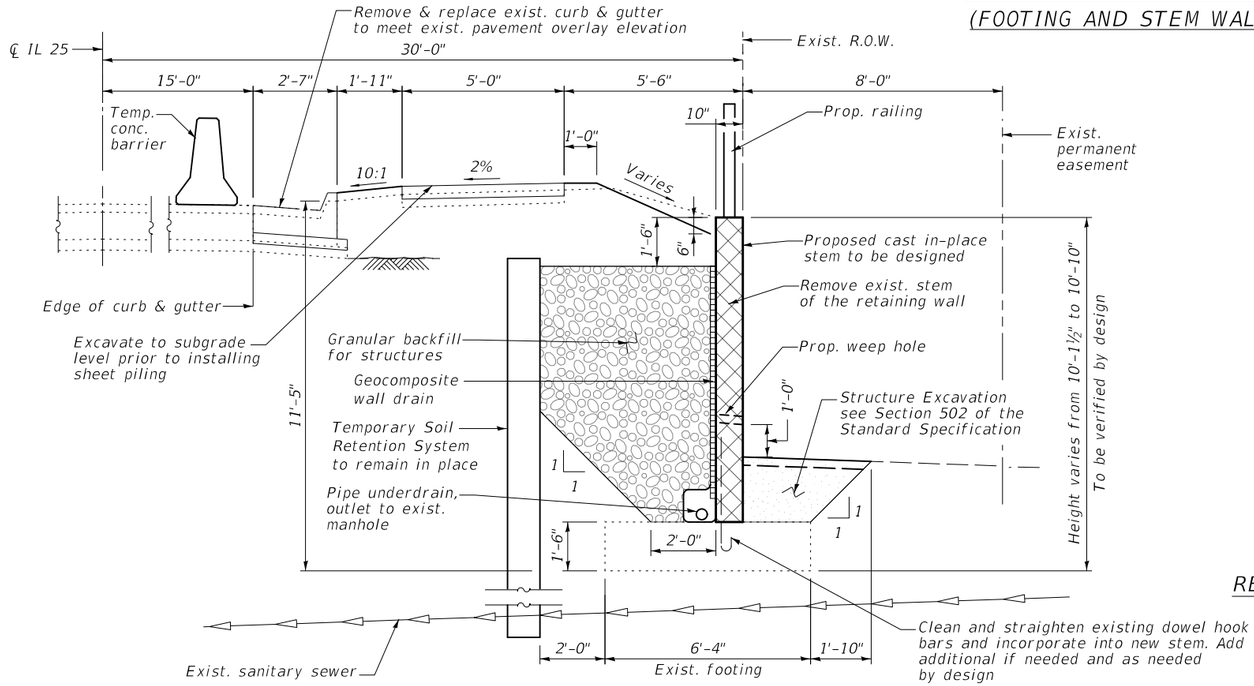
F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
106		KANE	3	1
		CONTRACT NO. 62T10		
	ILLINOIS	FED. AID PROJECT		



SEGMENT 1 SECTION THRU WALL
(DRAINAGE IMPROVEMENTS AND GRANULAR BACKFILL)



SEGMENT 2 SECTION THRU WALL OPTION 1
(FOOTING AND STEM WALL REPLACEMENT)



SEGMENT 2 SECTION THRU WALL OPTION 2
(STEM WALL REPLACEMENT)

LEGEND:

Existing Concrete Removal

DETAILS
RETAINING WALL ALONG NB NORTH FIFTH AVE.
ILLINOIS ROUTE 25
(SECTION _____)
KANE COUNTY
STATION 9+30.18 TO 11+23.80

MODEL: $MODELNAMES
FILE NAME: $FILE$

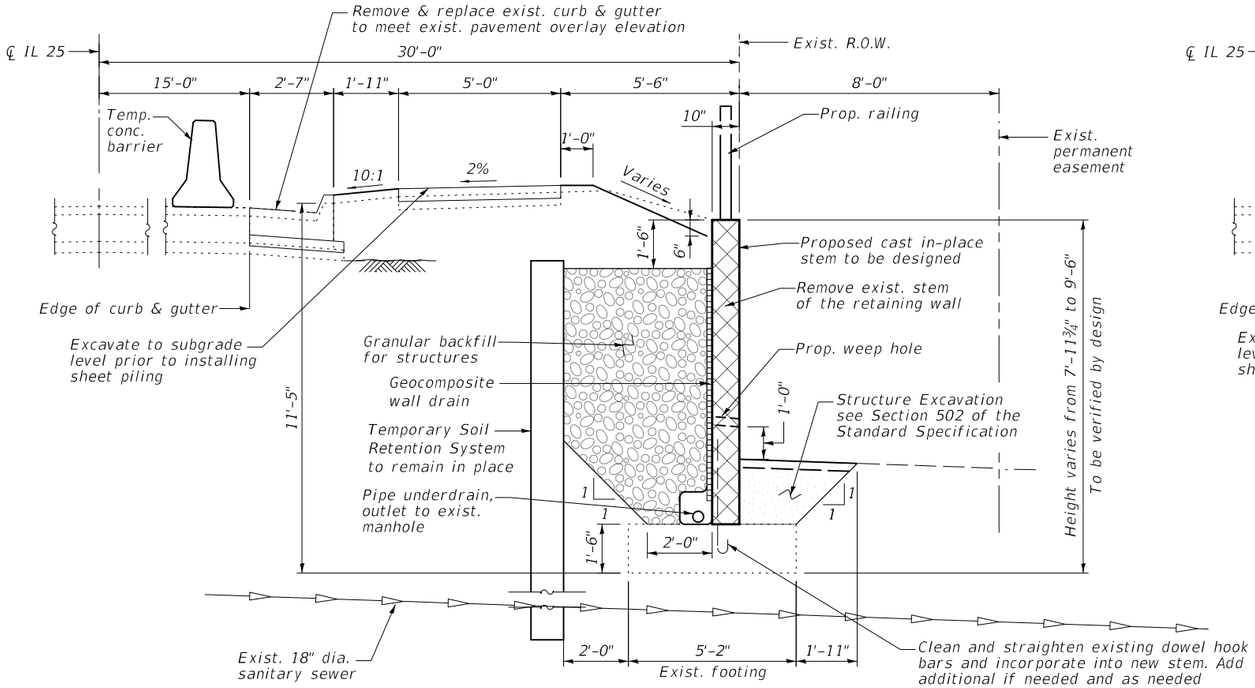
DELTA ENGINEERING GROUP, LLC
CONSULTING ENGINEERS, CONSTRUCTION MANAGERS, SURVEYORS
111 W JACKSON BLVD, SUITE 910
CHICAGO, IL 60604
T 312.377.7700, F 312.427 6145

USER NAME = $USER$	DESIGNED - NS	REVISED - _____	
	DRAWN - RM	REVISED - _____	
PLOT SCALE = $SCALE$	CHECKED - SMK	REVISED - _____	
PLOT DATE = $DATE$	DATE - 01/29/2024	REVISED - _____	

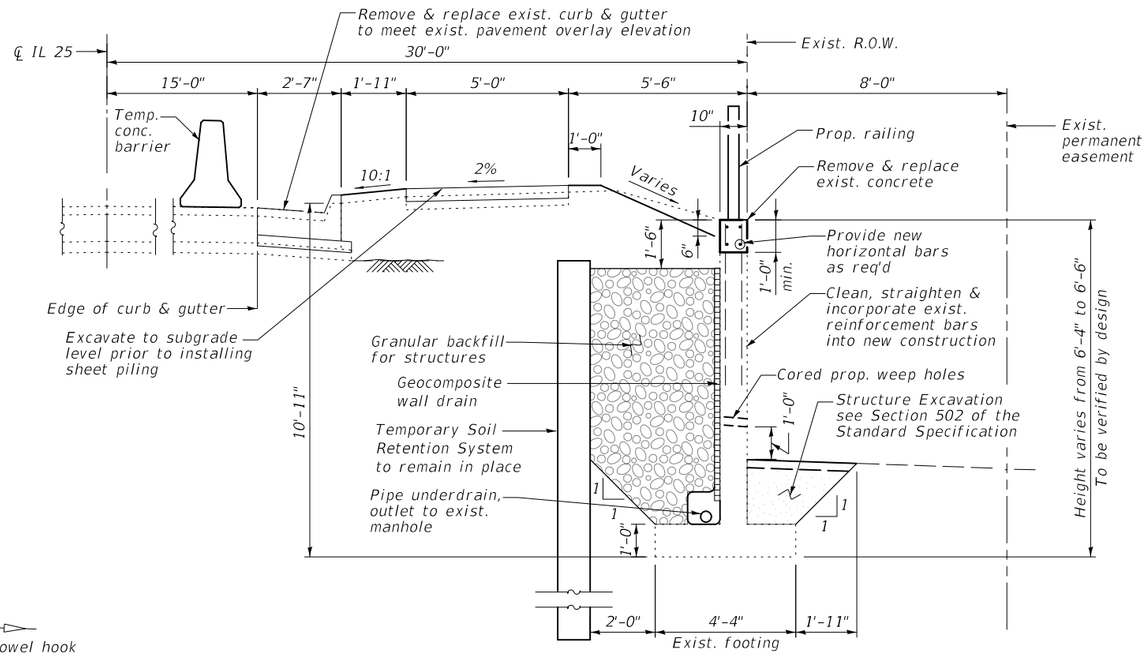
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

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

F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
106		KANE	3	2
		CONTRACT NO. 62T10		
	ILLINOIS	FED. AID PROJECT		



SEGMENT 3 SECTION THRU WALL
(STEM WALL REPLACEMENT)



SEGMENT 4 SECTION THRU WALL
(DRAINAGE IMPROVEMENTS AND GRANULAR BACKFILL)

LEGEND:

Existing Concrete Removal

DETAILS
RETAINING WALL ALONG NB NORTH FIFTH AVE.
ILLINOIS ROUTE 25
(SECTION _____)
KANE COUNTY
STATION 9+30.18 TO 11+23.80

MODEL: $MODELNAME$
FILE NAME: $FILE$

DELTA ENGINEERING GROUP, LLC
CONSULTING ENGINEERS, CONSTRUCTION MANAGERS, SURVEYORS
111 W JACKSON BLVD, SUITE 910
CHICAGO, IL 60604
T 312.377.7700, F 312.427.6145

USER NAME = $USER$	DESIGNED - NS	REVISED - _____	
	DRAWN - RM	REVISED - _____	
PLOT SCALE = $SCALE$	CHECKED - SMK	REVISED - _____	
PLOT DATE = $DATE$	DATE - 01/29/2024	REVISED - _____	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

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

F.A.S. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
106		KANE	3	3
		CONTRACT NO. 62T10		
		ILLINOIS	FED. AID PROJECT	