STRUCTURE GEOTECHNICAL REPORT
BARRINGTON ROAD IMPROVEMENTS
RETAINING WALL 1
FROM STATION 75+25 TO STATION 78+00
SECTION 2019-11-W
COOK COUNTY, ILLINOIS

For
Ardmore Roderick
1500 W Carroll Ave., Suite 300
Chicago, IL 60607
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Submitted by
Wang Engineering, Inc.
1145 North Main Street
Lombard, IL 60148

Original Report: July 10, 2024
Revised Report: NA

Technical Report Documentation Page

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6. PTB / Item No. 194/ 001	**7. Existing Structure Number(s)** NA	**8. Proposed Structure Number(s)** TBD
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11. Abstract

As part of the Barrington Road Improvements project, a new retaining wall is proposed along northbound Barrington Road to support a cut into a slope of higher than surrounding area to allow for the proposed roadway widening. The wall will be about 275-foot long, extending from Station 75+25 to Station 78+00. The face of the wall will be constructed about 36.8 feet west of the existing roadway centerline. The wall will have a maximum retained height of 7.1 feet. This report provides geotechnical recommendations for the design and construction of the proposed retaining wall.

Along the proposed wall alignment, beneath the surface, the general lithologic profile includes up to 2 feet of very stiff clay to silty clay followed by very stiff to hard silty clay to silty clay loam and medium dense silty loam. Groundwater was recorded at an elevation of 846 feet.

The proposed retaining wall will retain a cut into the slope of the higher surrounding area. Cut wall types such as a driven sheet pile or soldier pile wall would be more suitable at this location. However, due to the proximity of residential house and potential difficulty of driving in cohesive soils with unconfined compressive strength values of greater than 4.5 tsf, a drilled soldier pile and lagging wall is the most suitable wall type wall at this location. Fill wall types such as Mechanically Stabilized Earth (MSE) or Reinforced Concrete Cantilever (RCC) will not be feasible due limited right of way. However, Precast Modular Block wall could also be considered.

Drilled soldier pile wall shall be designed for both earth pressure and lateral deformation and could be installed by the dry method. For global stability, the pile tip should be established at a minimum 858.9 feet elevation.

For the precast modular block wall, the foundation soils will provide a maximum factored bearing resistance of 5,000 psf based on a geotechnical resistance factor of 0.45 (AASHTO 2020). The wall will have adequate FOS of 1.5 for global stability. The long-term settlements are estimated to be about 1-inch.

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STRUCTURE GEOTECHNICAL REPORT
BARRINGTON ROAD IMPROVEMENTS
RETAINING WALL 1
FROM STATION 75+25 TO STATION 78+00
SECTION 2019-11-W
COOK COUNTY, ILLINOIS
FOR
ARDMORE RODERICK

1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, geotechnical engineering evaluation, and recommendations in support of the design and construction of a new retaining wall along northbound Barrington Road. The retaining wall is located about 100 feet north of the intersection between Barrington Road and Covered Bridge Road. The proposed wall is part of the reconstruction of the 2.0-mile-long Barrington Road between Algonquin Road and Central Road in Cook County, Illinois. 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.

1.1 Proposed Structure

Based on the *Preliminary General Plan and Elevation (GPE)* drawings provided by Ardmore Roderick (Ardmore) on May 16, 2024, Wang Engineering, Inc. A Terracon Company (Wang) understands that the new Retaining Wall 1 will measure about 275-foot in length, extending from Station 75+25 to Station 78+00. The face of the wall will be constructed at about 36.8 feet right offset of the existing Barrington Road centerline. The wall will support the widened portion of the roadway and will have a maximum retained height of 7.1 feet near Station 76+00.

1.2 Existing Structure and Land Use

There is no existing retaining wall. The area is heavily vegetated with a chain link fence along the right of way (ROW). There are roadway ditches and the slopes at slopes at approximately a 2:1(V:H) to the existing ROW. A residential house is located immediately east of wall approximately 10 feet east of ROW.

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 four structure borings, designated as RWB-01, RWB-02, RWB-06, and RWB-07, drilled by Wang in March of 2022 and May of 2024. The borings were drilled from elevations of 856.9 to 871.2 feet to depths of 20.0 feet below ground surface (bgs). The as-drilled boring coordinates were acquired with a mapping-grade GPS unit. Boring elevations, stations, and offsets were provided by Ardmore Roderick. The boring location information is included in the *Boring Logs* (Appendix A) and the as-drilled locations are shown in the *Boring Location Plan* (Exhibit 2).

Truck- and ATV-mounted drilling rigs equipped with hollow stem augers were used to advance and maintain open boreholes. Soil sampling was performed according to AASHTO T 206, "*Penetration Test and Split Barrel Sampling of Soils*." The soil was sampled at 2.5-foot intervals to the end of each borehole. Soil samples collected from each sampling interval were placed in sealed jars and transported to the laboratory for further examination and laboratory testing.

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

Groundwater levels were measured while drilling and at completion of the borings. At each boring location, the boreholes were backfilled upon completion with soil cuttings, and the surface was restored as close as possible to its original condition.

2.2 Laboratory Testing

Soil samples were tested in our laboratory for moisture content (AASHTO T 265). Atterberg limits (AASHTO T 89/90) and particle size (AASHTO T 88) analyses were performed on selected samples. Field visual descriptions of 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 *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). The following sections provide a summary of the soil conditions along the proposed retaining wall alignment. 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 at the vegetated area encountered 10 to 11 inches of silty clay topsoil. Borings RWB-06 and RWB-07 drilled from the roadway revealed 11 inches of asphalt pavement over one inch of gravel base course. In descending order, the general lithologic succession encountered beneath the surface includes: 1) man-made ground (fill); 2) very stiff clay to silty clay; 3) stiff to hard silty clay to silty clay loam; and 4) medium dense gravelly silty loam.

(1) Man-made ground (fill)

Underneath the pavement, Borings RWB-06 and RWB-07 encountered 2 feet of hard, black, brown and gray clay to silty clay fill with unconfined compressive strength (Q_u) values of 2.5 to greater than 4.5 tsf and moisture content values of 14 and 25%.

(2) Very stiff clay to silty clay

At an elevation of 870 feet (1.0-foot bgs), Boring RWB-02 advanced through 2 feet of very stiff, brown, and gray clay to silty clay. This layer has an Q_u value 3.3 tsf and a moisture content values of 22%.

(3) Stiff to hard silty clay to silty clay loam

At elevations of 854 to 868 feet (0.8 to 3.0 feet bgs), the borings revealed stiff to hard, brown to gray silty clay to silty clay loam. This layer has Q_u values of 1.8 to 8.0 tsf and moisture content values of 13 to 20%. Laboratory index testing on samples from this layer revealed Liquid Limit (L_L) values of 31 to 35% and Plastic Limit (P_L) values of 15 to 17%.

(4) Medium dense gravelly silty loam

At an elevation of 846 feet (15 feet bgs), Boring RWB-06 advanced through medium dense, gray, wet gravelly silty loam. This layer has SPT-N values of 16 to 19 blows per foot and moisture content values of 9 to 11%.

3.2 Groundwater Conditions

During drilling, groundwater was encountered at an elevation of 546 feet (15.5 feet bgs) in Boring RWB-06. At completion of drilling, groundwater was not observed. It should be noted that perched water might be encountered in the upper granular fill and the groundwater level might vary with seasonal rainfall patterns and long-term climate fluctuations or be influenced by local site conditions.

4.0 FOUNDATION ANALYSIS AND RECOMMENDATIONS

The proposed Barrington Road Retaining Wall 1 will support a residential home area surrounding the lower section of the Barrington Road. The cut into the existing slope is needed to allow for the added lanes to the Barrington Road. Based on the *GPE* drawing, the wall will have a total length of 275.0-foot with a maximum retained height of 7.1 feet near Station 76+00. The proposed wall is a cut wall.

For cut wall, non-gravity wall types such as a driven sheet pile wall or soldier pile and lagging wall would be appropriate for this location. However, due to proximity of a residential house and potential difficulty of driving in cohesive soils with unconfined compressive strength values of greater than 4.5 tsf, a drilled soldier pile and lagging wall is the most suitable wall type wall at this location. Fill wall types, such as Mechanically Stabilized Earth (MSE) or Reinforced Concrete Cantilever (RCC) walls will not be feasible due to limited right of way behind the wall. However, Precast Modular Block (PMB) could be considered as it will require less space behind the wall than the MSE or RCC wall. However, the final wall type should be selected based on a wall-type study including cost and construction considerations. Recommendations for the design and construction of the potential wall types of soldier pile and lagging wall and PMB wall are discussed in the following sections.

4.1 Seismic Design Considerations

Retaining walls are not typically designed for seismic loading, and as such, seismic design parameters are not provided in this report as per the IDOT *Geotechnical Manual* (2020).

4.2 Soldier Pile and Lagging Wall

A soldier-pile wall type could be considered at this location. Since the wall is very close to residential house and to prevent the noise and vibration of driven piles, the piles should be installed by setting piles within prebored holes with diameters sized in accordance with IDOT criteria. The wall should be designed for both lateral earth pressure and lateral deformation. The embedment depth in moment equilibrium for the wall sections should be designed in accordance with the AASHTO LRFD guidelines (AASHTO 2020).

Generally, overconsolidated clayey soils, such as the very stiff to hard clay to silty clay loam encountered in the borings, will exhibit lower overall shear strength in the long-term condition. However, we recommend performing the lateral earth pressure analysis for both the short-term (undrained) and long-term (drained) conditions using the soil parameters recommended in Tables 1 and 2 in accordance with AASHTO (2020). Elevations provided in the tables are based on the average layer elevations across the soil profile and may vary from one boring location to another. The active and passive earth pressure coefficients are provided for horizontal backfill behind and in front of the wall.

The design of the wall should ignore 3.0 feet of soil in front of the wall measured from the finished ground surface elevation in providing passive pressure due to excavations required for installation of concrete facing, drainage systems, and frost-heave conditions. In developing the design lateral pressure, the pressure due to construction equipment surcharge loads and residential house loads should be added to the lateral earth pressure. Drainage behind the wall should be in accordance with IDOT guidelines (IDOT 2023). The water pressure should be added to the earth pressure if drainage is not provided.

Table 1: Undrained Geotechnical Parameters for Design of Soldier Pile and Lagging Wall

Elevation Range (feet) Soil Description	Unit Weight, γ (pcf)	Undrained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure (Horizontal)	Passive Pressure (Horizontal)
Existing Grade [(1)] to Proposed Grade V Stiff to Hard CLAY to SILTY CLAY LOAM	120	2500	0	1.00	--
Proposed Grade to 855 V Stiff to Hard SILT CLAY to SILTY CLAY LOAM	120	4500	0	1.00	1.00

Elevation Range (feet) Soil Description	Unit Weight, γ (pcf)	Undrained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure (Horizontal)	Passive Pressure (Horizontal)
EL 855 to 846 V Stiff SILTY CLAY to SILTY CLAY LOAM	120	2500	0	1.00	1.00
EL 846 to 842 M Dense GRAVELLY SILTY LOAM	58(2)	0	30	0.33	3.00
EL 842 to 834(3) Stiff SILTY CLAY to SILTY CLAY LOAM	58(2)	1800	0	1.00	1.00

(1) Finished grade at back face of wall; (2) Submerged unit weight; (3) Boring termination depth

Table 2: Drained Geotechnical Parameters for Design of Soldier Pile of Soldier Pile and Lagging Wall

Elevation Range (feet) Soil Description	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active Pressure (Horizontal)	Passive Pressure (Horizontal)
Existing Grade (1) to Proposed Grade V Stiff to Hard CLAY to SILTY CLAY LOAM	120	100	30	0.33	--
Proposed Grade to 855 V Stiff to Hard SILT CLAY to SILTY CLAY LOAM	120	100	31	0.32	3.12
EL 855 to 846 V Stiff SILTY CLAY to SILTY CLAY LOAM	120	100	30	0.33	3.00
EL 846 to 842 M Dense GRAVELLY SILTY LOAM	58(2)	0	30	0.33	3.00
EL 842 to 834(3) Stiff SILTY CLAY to SILTY CLAY LOAM	58(2)	100	30	0.33	3.00

(1) Finished grade at back face of wall; (2) Submerged unit weight; (3) Boring termination depth

The lateral deformation of the wall should be designed for movement and moment fixity at the base of the pile. The residential property and utilities should not be impacted by the lateral movement of the wall. Therefore, the design of the soldier pile wall should establish lateral movement limits. The evaluations should be performed using the recommended soil parameters shown in Table 3, via the p-y curve (COM624) method. Elevations provided in Table 3 are based

on the average layer elevations across the profile and may vary from one boring location to another.

Table 3: Recommended Soil Parameters for Lateral Load Analysis of Soldier Pile and Lagging Wall

Elevation Range (feet) Soil Type (Layer)	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} (%)
Existing Grade (1) to Proposed Grade V Stiff to Hard CLAY to SILTY CLAY LOAM	120	2500	0	1000	0.5
Proposed Grade to 855 V Stiff to Hard SILT CLAY to SILTY CLAY LOAM	120	4500	0	2000	0.4
EL 855 to 846 V Stiff SILTY CLAY to SILTY CLAY LOAM	120	2500	0	1000	0.5
EL 846 to 842 M Dense GRAVELLY SILTY LOAM	58(2)	0	30	60	--
EL 842 to 834(3) Stiff SILTY CLAY to SILTY CLAY LOAM	58(2)	1800	0	500	0.7

(1) Finished grade at back face of wall; (2) Submerged unit weight; (3) Boring termination depth

Based on the soil conditions and cut wall section, we expect minimal settlement along the wall.

4.2.1 Global Stability

The global slope stability of the proposed wall at the highest wall section was analyzed based on the soil profile described in Section 3.1 and the information provided in the cross-sections. We also considered the residential house surcharge pressure of 2000 psf in our analysis. The minimum required factor of safety (FOS) is 1.7 in both short-term (undrained) and long-term (drained) conditions (IDOT 2020) for cut wall. *Slide2* exhibits employing the Bishop Simplified method of analysis are shown in Appendix C. Our analysis indicates that the soldier pile will require a minimum pile tip elevation of 858.9 feet for adequate FOS. However, it should be noted that typically, the lateral earth pressure and deformation analyses will determine the minimum embedment depth for cantilevered pile wall. Therefore, the designer should perform other analysis including lateral earth pressure and deflection analyses to determine the required design pile embedment.

4.3 Precast Modular Block Wall

A precast modular concrete block wall could be considered at this location. The wall design should be in accordance with AASHTO *Prefabricated Modular Walls* (AASHTO 2020) and Article 522.05 of IDOT Standard Specification (IDOT 2022). The precast modular concrete block wall base should be established a minimum of 3.5 feet below the finished grade at the front face of the wall.

Based on the GPE, we estimate top of leveling pad elevations will vary from 865.2 to 853.5 feet. Borings encountered very stiff to hard clay to silty clay loam at the leveling pad elevations. We estimate the foundation soils will provide a maximum factored bearing resistance of 5,000 psf based on a geotechnical resistance factor of 0.45 (AASHTO 2020). Precast modular block walls should be designed based on a geotechnical sliding resistance factor of 0.85 for precast concrete on clayey soils (AASHTO 2020).

Considering unloading and loading effect, we estimate the wall will undergo long-term settlement of about 1.0 inch.

4.3.1 Global Stability

The global slope stability of the PMB wall at the highest wall section was analyzed based on the soil profile described in Section 3.1 and the information provided in the cross-sections. We also considered the residential home behind the wall with a surcharge pressure of 2000 psf in our analysis. The minimum required factor of safety (FOS) is 1.5 in both short-term (undrained) and long-term (drained) conditions (IDOT 2020). *Slide2* exhibits employing the Bishop Simplified method of analysis are shown in Appendix C.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

Vegetation, surface topsoil, and debris should be cleared and stripped where the wall will be placed. If unstable or unsuitable materials are exposed during excavation, they should be removed and replaced with compacted 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 residential property 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.

Groundwater was encountered while drilling at elevation of 546 feet (15.5 feet bgs). For the drilled soldier pile construction, dry installation method can be used. We do not expect the need of special dewatering for the installation of precast modular block wall. 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

Compacted granular or select fill required to attain the final design elevations for precast modular block wall should be in accordance with Article 522.05 and Section 205 of IDOT Standard Specifications (IDOT 2022). Fill material used to attain final design elevations 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 materials must be pre-approved by the Resident Engineer.

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 3. 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 wall are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Ardmore Roderick 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.

Andri A. Kurnia, P.E.
Senior Engineer/Project Manger

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

Nesam S. Balakumaran, P.E.
Project Engineer

REFERENCES

AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (2022) *AASHTO LRFD Bridge Design Specification.* United States Depart of Transportation, Washington, D.C.

ILLINOIS DEPARTMENT OF TRANSPORTATION (2020) *Geotechnical Manual.* IDOT Bureau of Materials and Physical Research, Springfield, IL.

ILLINOIS DEPARTMENT OF TRANSPORTATION (2022) *Standard Specifications for Road and Bridge Construction.* IDOT Division of Highways, Springfield, IL.

ILLINOIS DEPARTMENT OF TRANSPORTATION (2023) *Bridge Manual.* IDOT Division of Highways, Springfield, IL.

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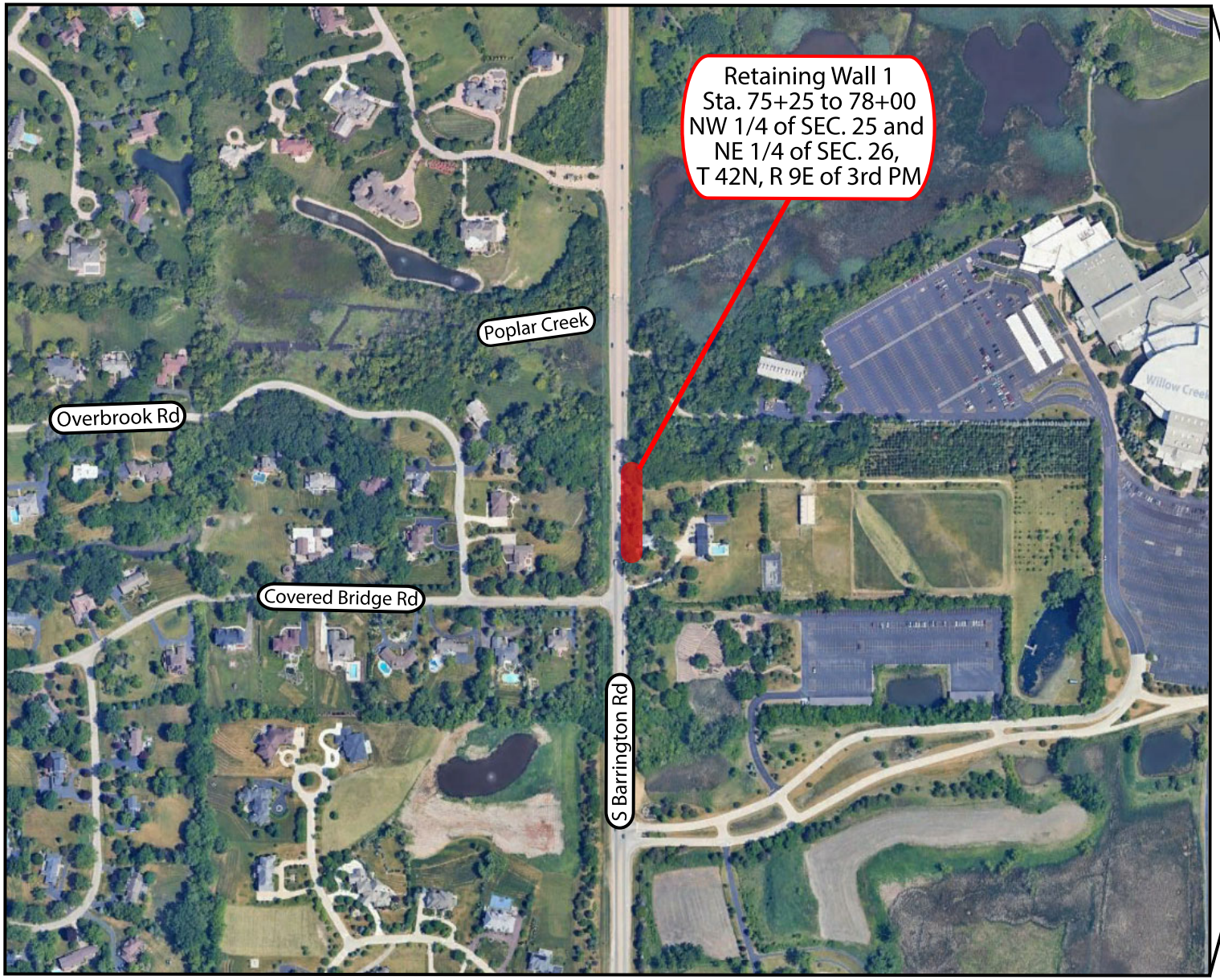
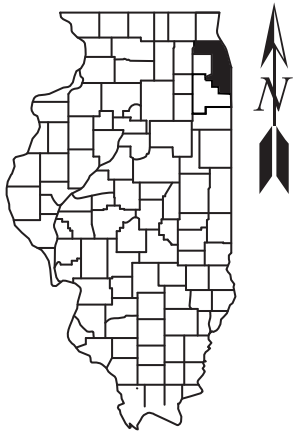
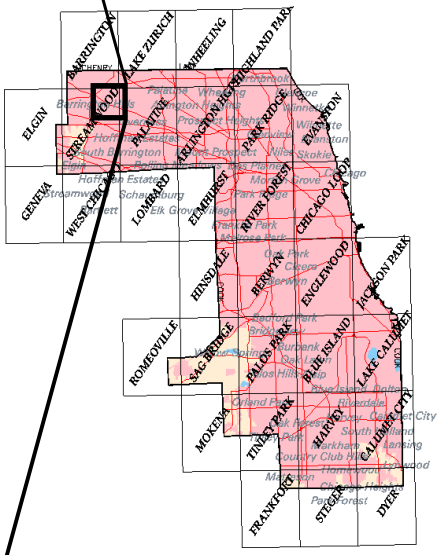
EXHIBITS







Cook County

Legend

Site Locations

Scale

0 500 1000 Feet

SITE LOCATION MAP: BARRINGTON ROAD FROM ALGONQUIN ROAD TO CENTRAL ROAD; RETAINING WALL 1, STA. 75+25 TO 78+00, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: D. You CHECKED BY: A. Kurnia

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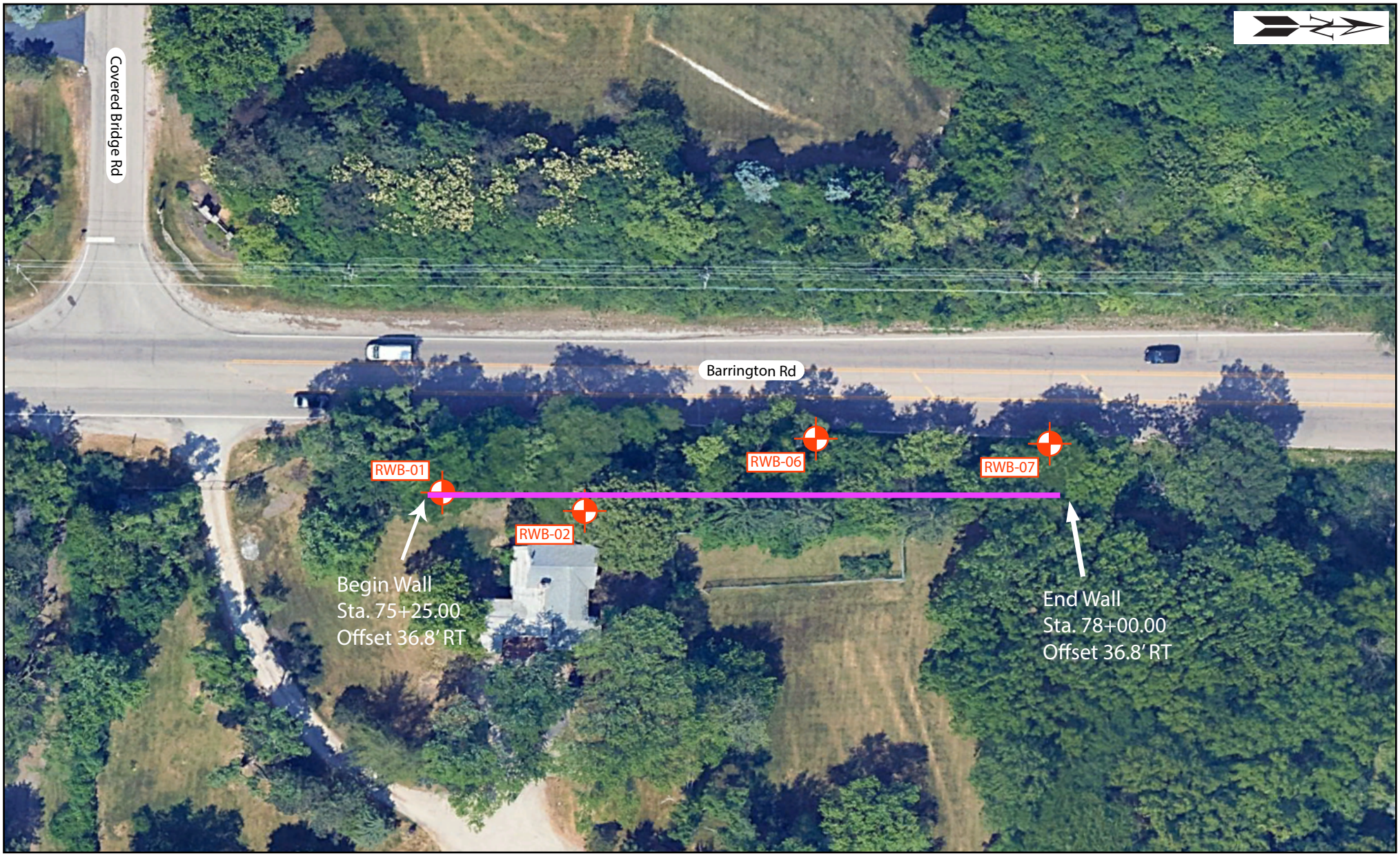
FOR ARDMORE RODERICK

KE225002
1064-01-01



Legend

Retaining Wall Boring

Scale

0 — 100 — 200 feet

BORING LOCATION PLAN: BARRINGTON ROAD FROM ALGONQUIN ROAD TO CENTRAL ROAD; RETAINING WALL 1, STA. 75+25 TO 78+00, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: D. You CHECKED BY: A. Kurnia

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FOR ARDMORE RODERICK

KE225002
1064-01-01

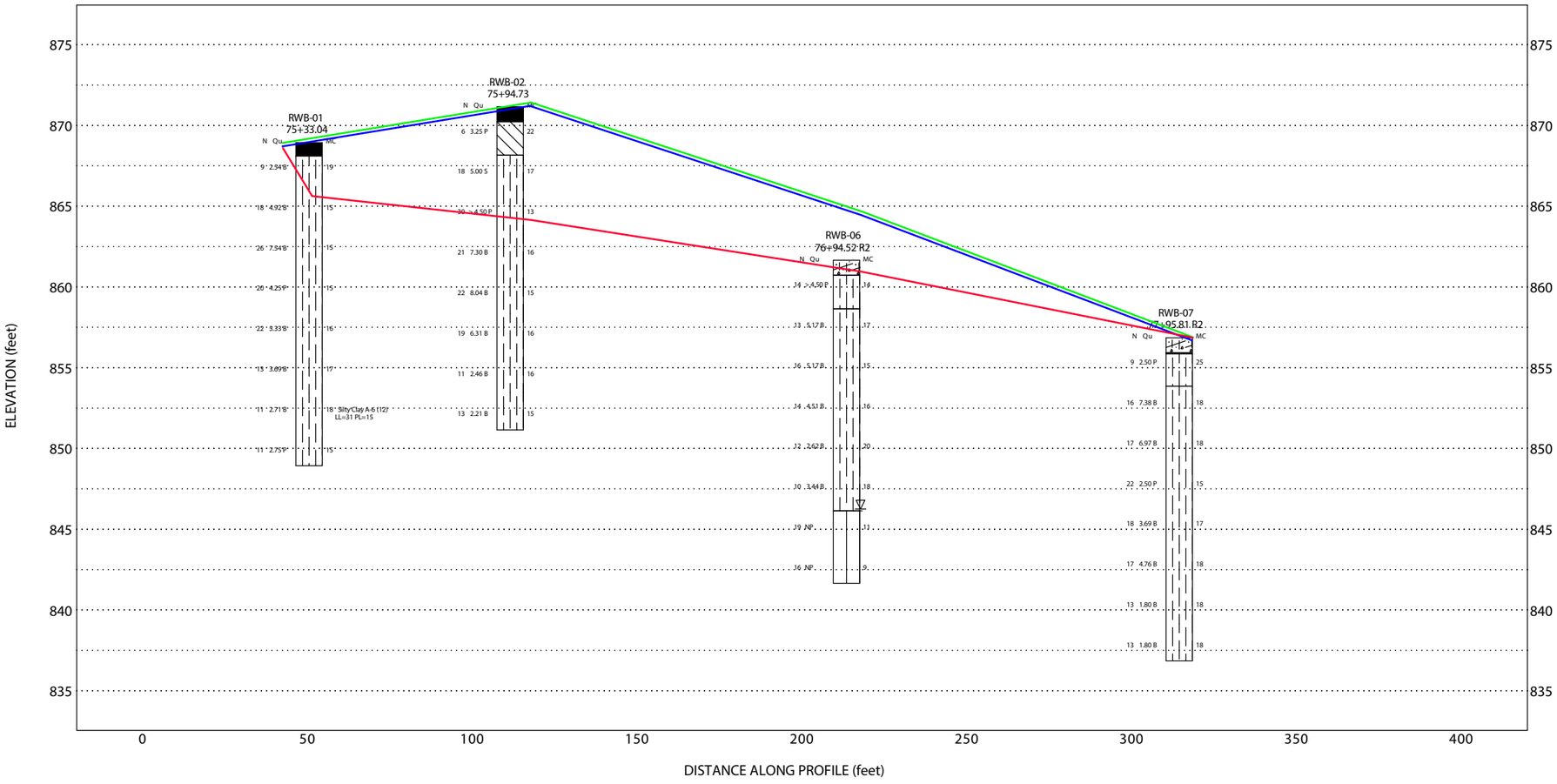
Top of Wall
Existing Grade Behind Wall
Proposed Grade at Front Face of Wall

S

Begin Ret. Wall
Sta. 75+25.00

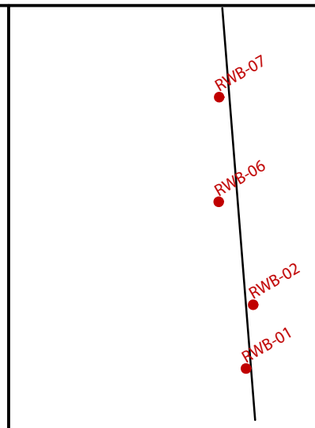
End Ret. Wall
Sta. 78+00.00

N



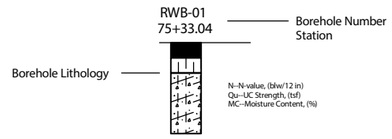
Lithology Graphics

- Topsoil
- IDH Silty Clay, Silty Clay Loam
- IDH Clay
- Pavement
- IDH Silt, Silty Loam
- Gravelly sand, sandy gravel



Site Map Scale 1 inch equals 145 feet

Explanation:



Water Level Reading at time of drilling.

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

0 40

Horizontal Scale (feet)

Vertical Exaggeration: 5x

Wang Engineering, Inc.
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Lombard, IL, 60148

Soil Profile
Retaining Wall 1 from Station 75+25 to 78+00

WEI SINCE 1982

Barrington Rd from Algonquin Rd to Central Rd
Cook County, IL

JOB NUMBER	PLATE NUMBER
1064-01-01	EXHIBIT 3

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APPENDIX A

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BORING LOG RWB-01

WEI Job No.: 1064-01-01

Client **Ardmore Roderick**
Project **Barrington Rd from Algonquin Rd to Central Rd**
Location **Cook County, IL**

Datum: NAVD 88
Elevation: 868.93 ft
North: 1975473.74 ft
East: 1036477.91 ft
Station: 75+33.04
Offset: 35.82 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	868.1	10-inch thick organic SILTY CLAY						
		--TOPSOIL--						
		Very stiff to hard, brown to gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; damp			1	4 4 5	2.54 B	19
		--RDR 2--						
		--trace organic matter--			2	4 7 11	4.92 B	15
			5					
					3	7 11 15	7.54 B	15
		--RDR 2 to 3--						
		--coarse gravel--			4	10 10 10	4.25 P	15
			10					
					5	7 10 12	5.33 B	16
					6	5 6 7	3.69 B	17
			15					
		--L_L(%)=31, P_L(%)=15--			7	4 4 7	2.71 B	18
		--%Gravel=6.8--						
		--%Sand=10.3--						
		--%Silt=52.7--						
		--%Clay=30.2--						
		--A-6 (12)--			8	4 4 7	2.75 P	15
	848.9		20					
		Boring terminated at 20.00 ft						

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling **03-08-2022** Complete Drilling **03-08-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoA[96%]**
Driller **A&C** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **3.25" 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 RWB-02

WEI Job No.: 1064-01-01

Client **Ardmore Roderick**
Project **Barrington Rd from Algonquin Rd to Central Rd**
Location **Cook County, IL**

Datum: NAVD 88
Elevation: 871.15 ft
North: 1975535.46 ft
East: 1036484.81 ft
Station: 75+94.73
Offset: 43.00 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	870.2	11-inch thick SILTY CLAY --TOPSOIL--						
		Very stiff, brown and gray CLAY to SILTY CLAY, trace organic matter; damp --RDR 2--			1	2 2 4	3.25 P	22
	868.2	Very stiff to hard, brown to gray SILTY CLAY to SILTY CLAY LOAM, trace to little gravel ; damp --RDR 2--	5		2	4 9 9	5.00 S	17
					3	17 12 18	> 4.50 P	13
			10		4	7 10 11	7.30 B	16
					5	5 10 12	8.04 B	15
			15		6	16 8 11	6.31 B	16
		--some rig chatter, 15 to 16 ft-- --possible coarse gravel or cobbles--			7	4 5 6	2.46 B	16
					8	3 6 7	2.21 B	15
	851.2	Boring terminated at 20.00 ft	20					

GENERAL NOTES

Begin Drilling **03-08-2022** Complete Drilling **03-08-2022**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoA[96%]**
Driller **A&C** Logger **M. Sadowski** Checked by **C. Marin**
Drilling Method **3.25" 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 RWB-06

WEI Job No.: 1064-01-01

Client **Ardmore Roderick**
Project **Barrington Rd from Algonquin Rd to Central Rd**
Location **Cook County, IL**

Datum: NAVD 88
Elevation: 861.65 ft
North: 1975635.10 ft
East: 1036451.45 ft
Station: 76+94.52 R2
Offset: 10.07 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	860.7	11-inch thick ASPHALT --PAVEMENT--						
		Hard, brown and gray SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--			1	5 7 7	> 4.50 P	14
	858.6	Very stiff to hard, brown to gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; damp --RDR 2--	5		2	4 5 8	5.17 B	17
					3	4 7 9	5.17 B	15
			10		4	3 6 8	4.51 B	16
		--L_L(%)=35, P_L(%)=17-- --%Gravel=2.2-- --%Sand=9.4-- --%Silt=53.0-- --%Clay=35.4-- --A-6 (15)--			5	4 5 7	2.62 B	20
			15		6	5 5 5	3.44 B	18
	846.1	Medium dense, gray, gravelly SILTY LOAM; wet --RDR 2--			7	8 8 11	NP	11
					8	9 8 8	NP	9
	841.6	Boring terminated at 20.00 ft	20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling **05-08-2024** Complete Drilling **05-08-2024**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoT[92%]**
Driller **AG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; Boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **15.50 ft**
At Completion of Drilling ▼ **Dry**
Time After Drilling **NA**
Depth to Water ▼ **NA**

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BORING LOG RWB-07

WEI Job No.: 1064-01-01

Client **Ardmore Roderick**
Project **Barrington Rd from Algonquin Rd to Central Rd**
Location **Cook County, IL**

Datum: NAVD 88
Elevation: 856.85 ft
North: 1975736.40 ft
East: 1036451.88 ft
Station: 77+95.81 R2
Offset: 10.93 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	855.9	11-inch thick ASPHALT --PAVEMENT--						
	855.9	1-inch thick GRAVEL --BASE COURSE--						
		Very stiff, black and brown CLAY, trace gravel and organics; damp			1	3 3 6	2.50 P	25
	853.9	--FILL--						
		Stiff to hard, brown to gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; damp --RDR 2--	5		2	4 6 10	7.38 B	18
					3	4 7 10	6.97 B	18
			10		4	8 9 13	2.50 P	15
					5	6 9 9	3.69 B	17
			15		6	4 7 10	4.76 B	18
					7	5 6 7	1.80 B	18
					8	3 6 7	1.80 B	18
	836.9	Boring terminated at 20.00 ft	20					

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)

GENERAL NOTES

Begin Drilling **05-08-2024** Complete Drilling **05-08-2024**
Drilling Contractor **Wang Testing Services** Drill Rig **21GeoT[92%]**
Driller **AG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" 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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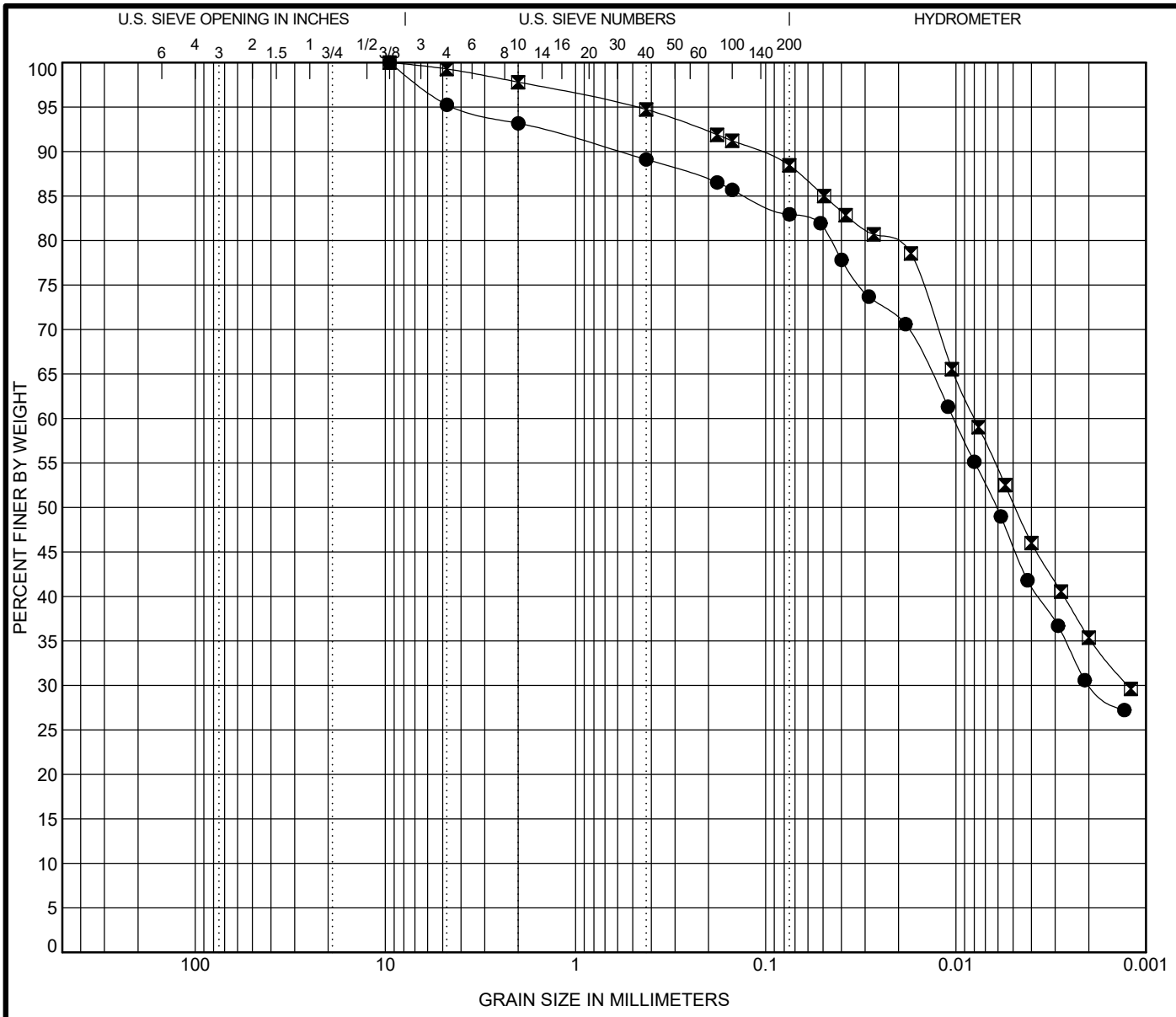
APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	RWB-01#7	16.0 ft	**Silty Clay**	**31**	**15**	**16**		
⊠	RWB-06#5	11.0 ft	**Silty Clay**	**35**	**17**	**18**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	RWB-01#7	16.0 ft	**9.5**	**0.01**	**0.002**		**6.8**	**10.3**	**52.7**	**30.2**
⊠	RWB-06#5	11.0 ft	**9.5**	**0.008**	**0.001**		**2.2**	**9.5**	**53.0**	**35.4**

WEI SINCE 1982
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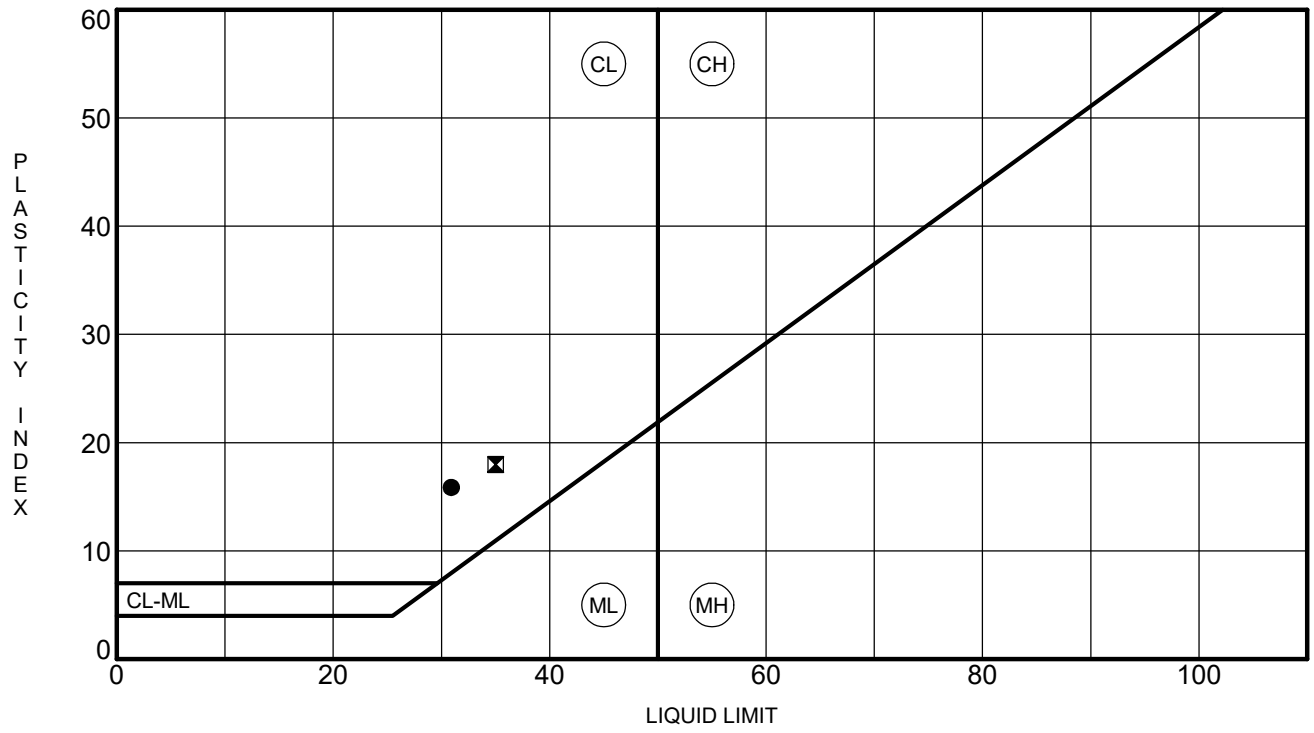
GRAIN SIZE DISTRIBUTION

Project: Barrington Rd from Algonquin Rd to Central Rd

Location: Cook County, IL

Number: 1064-01-01

WEI GRAIN SIZE IDH 10640101.GPJ US LAB.GDT 7/9/24



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**RWB-01#7**	**16.0 ft**	**31**	**15**	**16**	**83**	**Silty Clay**
⊠	**RWB-06#5**	**11.0 ft**	**35**	**17**	**18**	**88**	**Silty Clay**

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ATTERBERG LIMITS' RESULTS

Project: Barrington Rd from Algonquin Rd to Central Rd

Location: Cook County, IL

Number: 1064-01-01

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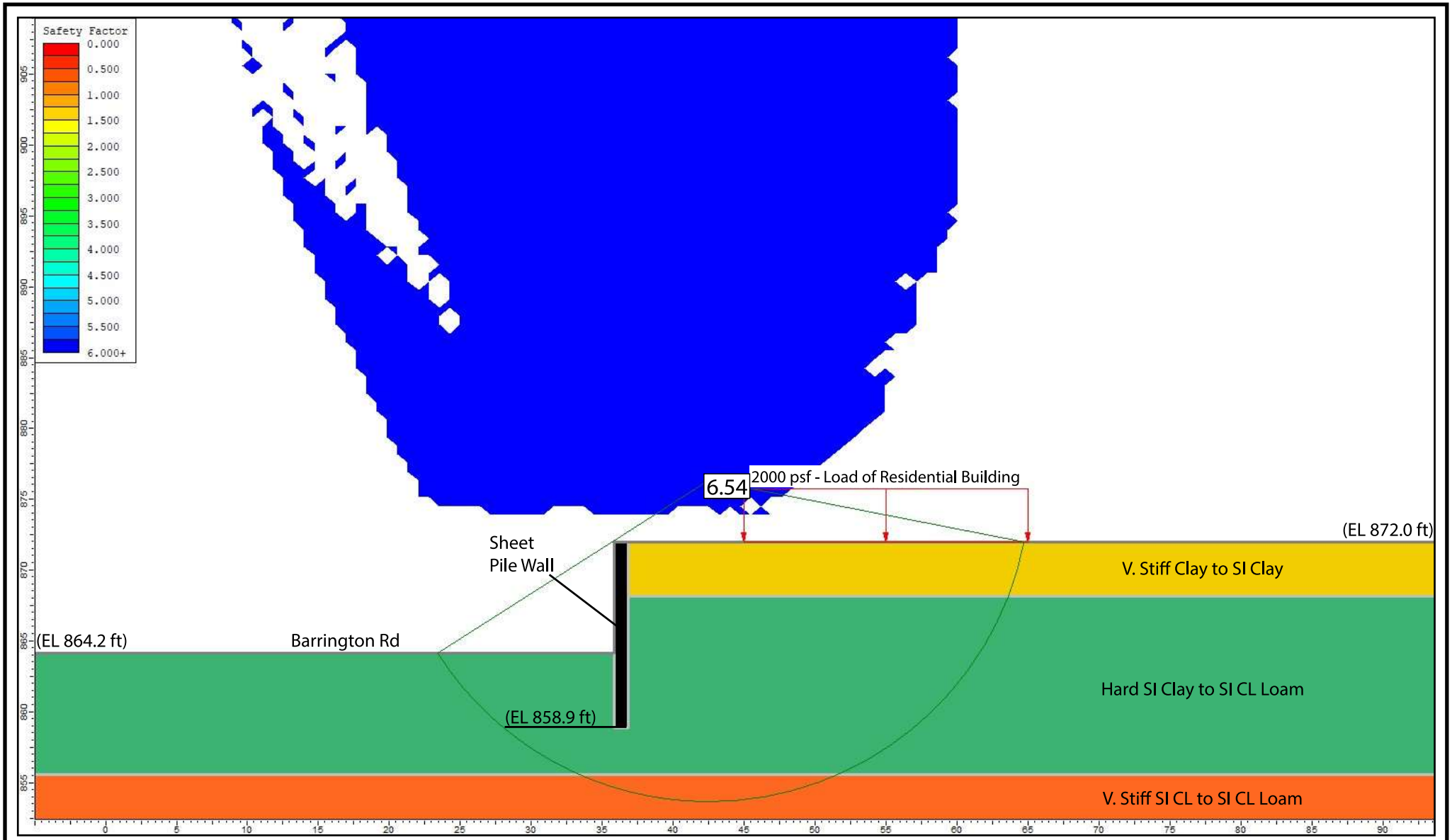
APPENDIX C



Undrained Analysis, Sta.76+00, Soldier Pile Wall, Ref Boring: RWB-01 and RWB-02

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	V. Stiff Clay to SI Clay	120	2900	0
2	Hard SI Clay to SI CL Loam	125	4500	0
3	V. Stiff SI CL to SI CL Loam	120	2300	0

GLOBAL STABILITY: BARRINGTON ROAD FROM ALGONQUIN ROAD TO CENTRAL ROAD; RETAINING WALL 1, STA.75+75.00, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX C-1 | DRAWN BY: D. You | CHECKED BY: N. Balakumaran

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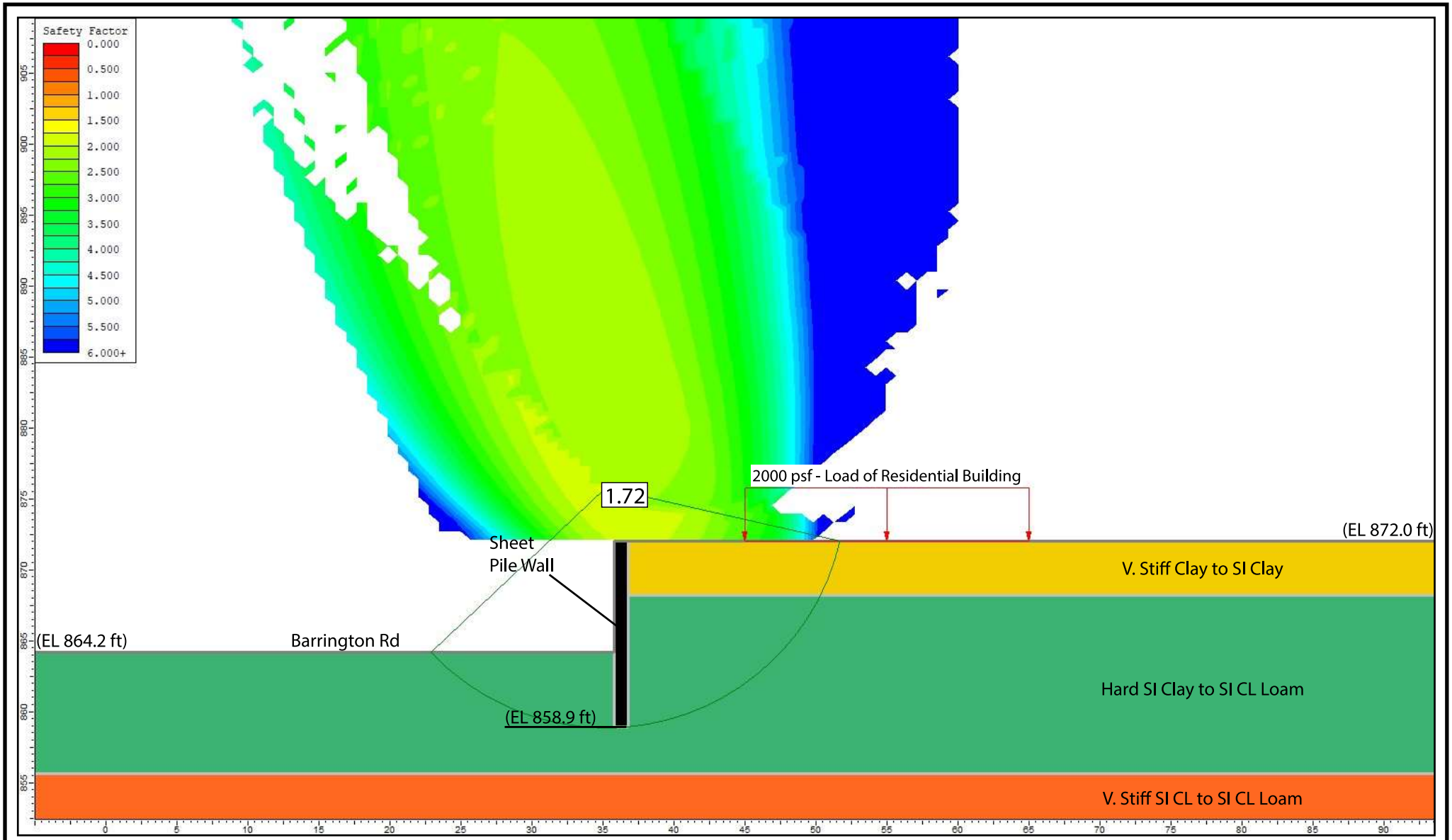
FOR ARDMORE RODERICK | KE225002 1064-01-01



Drained Analysis, Sta.76+00, Soldier Pile Wall, Ref Boring: RWB-01 and RWB-02

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	V. Stiff Clay to SI Clay	120	100	29
2	Hard SI Clay to SI CL Loam	125	100	31
3	V. Stiff SI CL to SI CL Loam	120	100	30

GLOBAL STABILITY: BARRINGTON ROAD FROM ALGONQUIN ROAD TO CENTRAL ROAD; RETAINING WALL 1, STA.75+75.00, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX C-2 | DRAWN BY: D. You | CHECKED BY: N. Balakumaran

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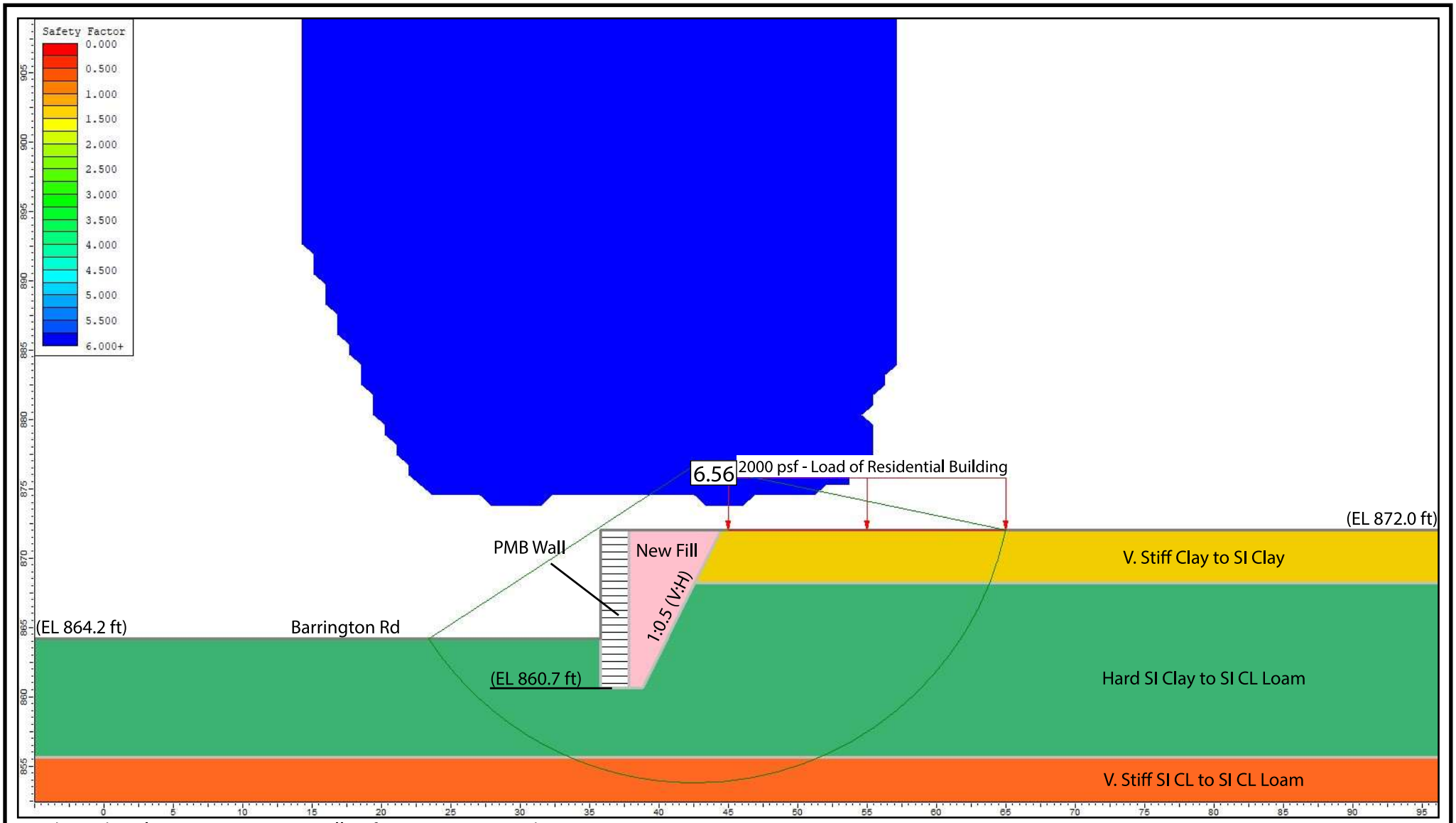
FOR ARDMORE RODERICK | KE225002 1064-01-01



Undrained Analysis, Sta.76+00, PMB Wall, Ref Boring: RWB-01 and RWB-02

Layer ID	Description	Total Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	New Fill	125	0	30
2	V. Stiff Clay to SI Clay	120	2900	0
3	Hard SI Clay to SI CL Loam	125	4500	0
4	V. Stiff SI CL to SI CL Loam	120	2300	0

GLOBAL STABILITY: BARRINGTON ROAD FROM ALGONQUIN ROAD TO CENTRAL ROAD; RETAINING WALL 1, STA.75+75.00, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX C-3 | DRAWN BY: D. You | CHECKED BY: N. Balakumaran

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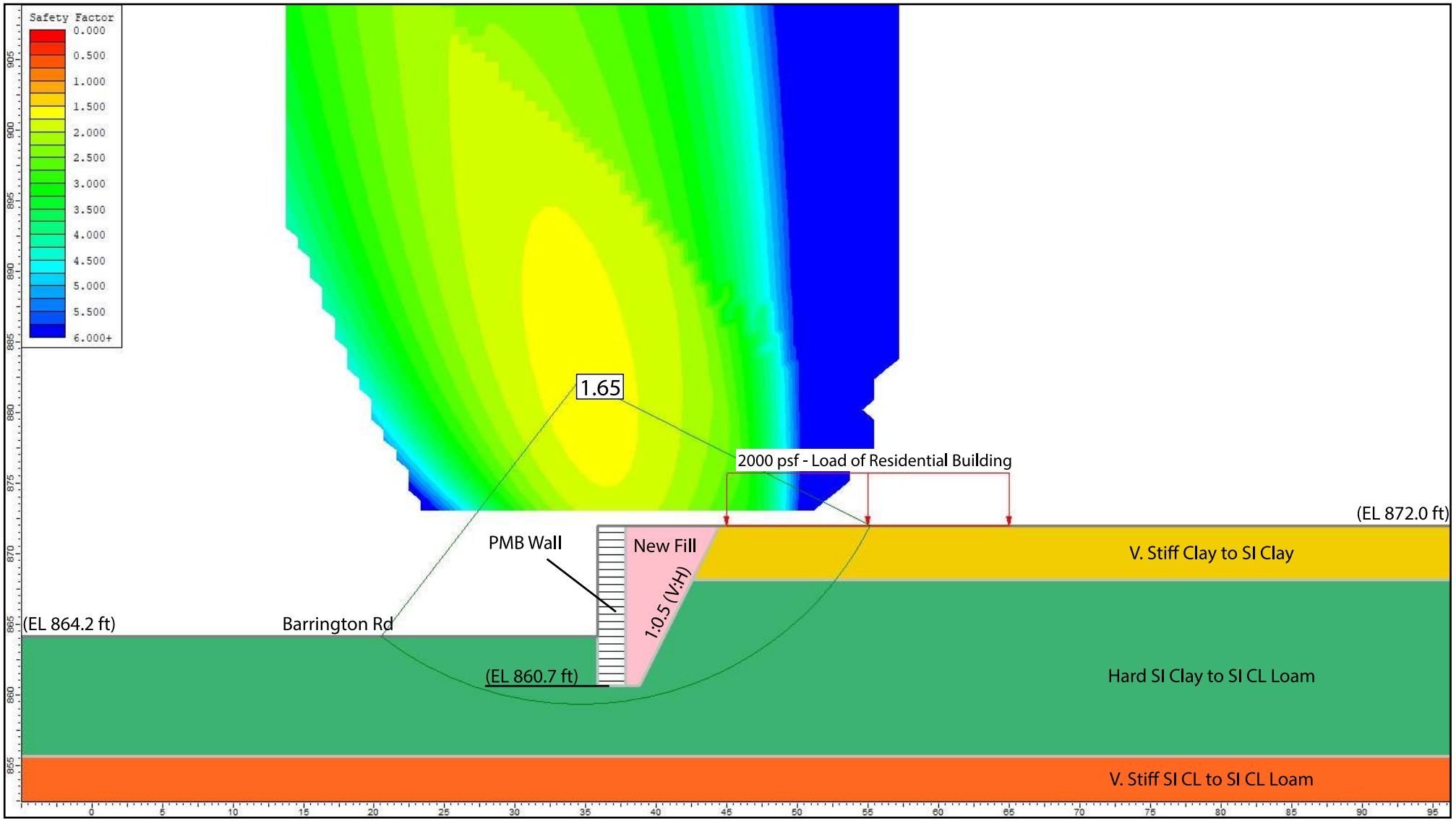
FOR ARDMORE RODERICK | KE225002 1064-01-01



Drained Analysis, Sta.76+00, PMB Wall, Ref Boring: RWB-01 and RWB-02

Layer ID	Description	Total Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	New Fill	125	0	30
2	V. Stiff Clay to SI Clay	120	100	29
3	Hard SI Clay to SI CL Loam	125	100	31
4	V. Stiff SI CL to SI CL Loam	120	100	30

GLOBAL STABILITY: BARRINGTON ROAD FROM ALGONQUIN ROAD TO CENTRAL ROAD; RETAINING WALL 1, STA.75+75.00, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL | APPENDIX C-4 | DRAWN BY: D. You | CHECKED BY: N. Balakumaran

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FOR ARDMORE RODERICK | KE225002 1064-01-01

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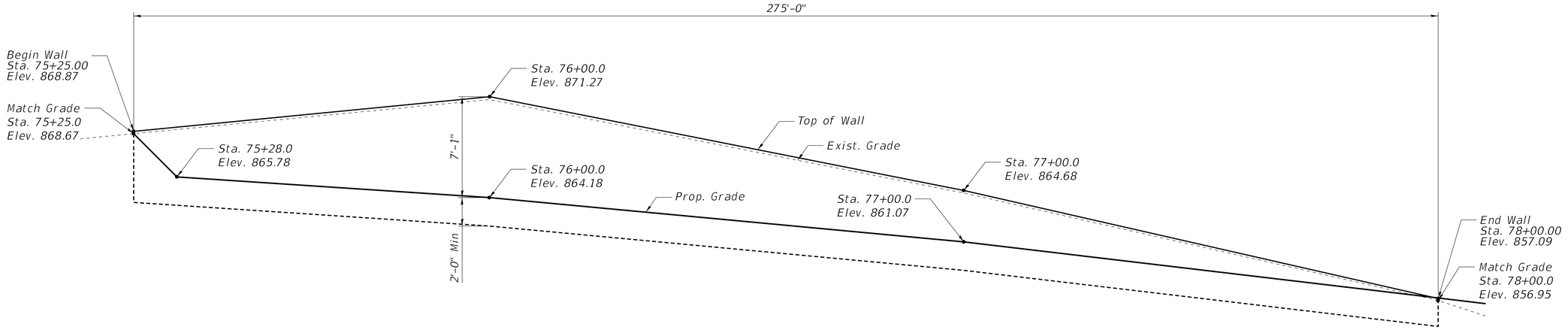
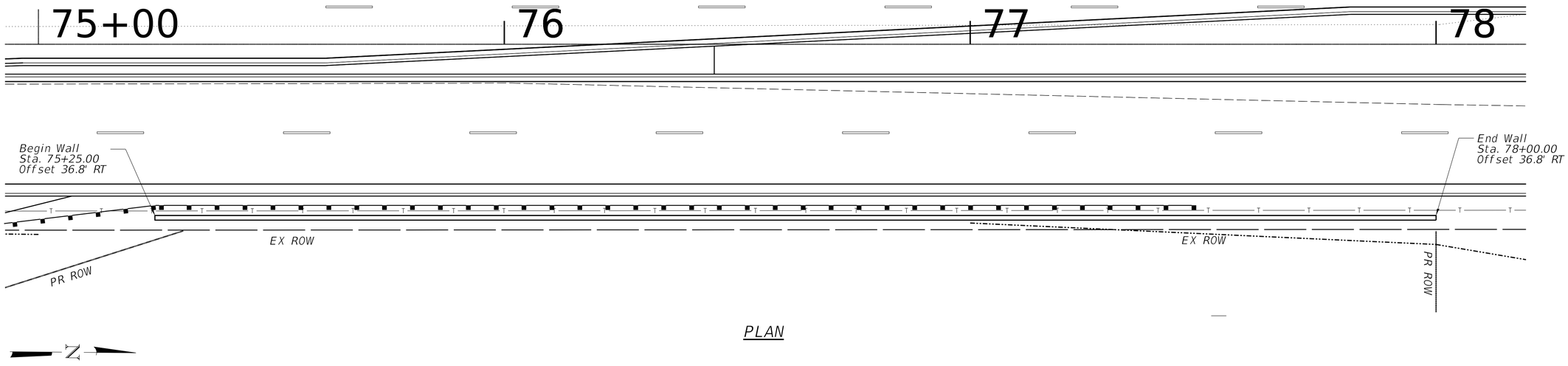
APPENDIX D



ELEVATION



PLAN

RETAINING WALL 1
BARRINGTON ROAD
F.A.P. 362 - SEC. 2019-11-W
COOK COUNTY
STA. 75+25.00 TO STA 78+00.00

MODEL: $MODELNAME$
FILE NAME: $FILE1$

Ardmore Roderick

USER NAME = $USER$	DESIGNED - STB	REVISED -
	DRAWN - JPK	REVISED -
PLOT SCALE = $SCALE$	CHECKED - STB	REVISED -
PLOT DATE = $DATE$	DATE - 5/16/2024	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SCALE: 1" = 12' | SHEET 1 OF 3 SHEETS | STA. | TO STA.

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
362	2019-161-W	COOK	1	1
		CONTRACT NO. 62K33		
	ILLINOIS	FED. AID PROJECT		