Structural Geotechnical Report

Proposed Retaining Wall #4
SN 099-W125
IDOT PTB 198-003
FAI-80 over Des Plaines River Bridge
Will County, Illinois

Prepared for

Illinois Department of Transportation
Contract Number: D-91-204-19

Project Design Engineer Team
WSP USA

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June 4, 2025

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Proposed Retaining Wall #4
FAI-80 over Des Plaines River Bridge
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Dear Mr. Skaleski:

Attached is a copy of the Structural Geotechnical Report for the above referenced project. The report provides a description of the site investigation, site conditions, and foundation and construction recommendations. The site investigation for the proposed retaining wall included advancing fifteen (15) soil borings to depths between 2 and 15 feet and collecting 10-foot rock cores at nine borings.

Should you have any questions or require additional information, please call us at 630-994-2600.

Sincerely,

Rachel Miller, P.E.
Senior Project Engineer

Dawn Edgell, P.E.
Geotechnical Department Manager

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1.0 INTRODUCTION

GSG Consultants, Inc. (GSG) completed a geotechnical investigation for the proposed retaining wall SN 099-W125 as part of the FAI-80 over Des Plaines project in the City of Joliet in Will County, Illinois. The purpose of the investigation was to explore the subsurface conditions, to determine engineering properties of the subsurface soil, and develop design and construction recommendations for the proposed retaining wall. **Exhibit 1** shows the general project location.

Exhibit 1 – Project Location Map
(Source: USGS Topographic Maps, usgs.gov)

1.1 Existing Conditions

It is understood the Ramp C and I-80 westbound alignment will be demolished and reconstructed approximately 140 feet to the north. Retaining Wall #4 will be constructed to support a portion of the new Ramp C embankment and to separate the new ramp from the mainline I-80 roadway. According to the approved GPE dated June 14, 2024, the retaining wall will be in a fill section where the new embankment will be constructed. The western portion of the proposed wall will

be constructed within the area of the existing I-80 interchange with Center Street, and the eastern portion of the wall will be within the neighboring residential area to the north, where new right of way has been obtained. **Exhibits 2a, 2b and 2c** show the existing conditions where the proposed retaining wall will be constructed.

Exhibit 2a – Existing Shelby Street, Looking Northwest

Exhibit 2b – Existing Raynor Avenue, Looking East

Exhibit 2c – Proposed Project Area, Aerial

1.2 Proposed Retaining Wall Information

Based on the GPE drawings provided by WSP, approved June 14, 2024, (see **Appendix A**) and a review of site topography, the proposed wall will be in a fill section along the newly constructed Ramp C embankment. The Ramp C embankment and Retaining Wall #4 will be constructed during the same construction stage. Retaining Wall #4 will have a maximum total wall height of up to approximately 18.7 feet, bearing at 3.5 feet below grade with a maximum exposed height of 15.2 feet. The proposed retaining wall will be approximately 519.4 feet in length and is anticipated to be a MSE wall. **Table 1** presents a summary of the proposed structure.

Table 1 – Retaining Wall Summary

Wall Name	Wall Stations*	Approximate Length (ft)	Maximum Anticipated Wall Height (ft)
Retaining Wall #4	Sta. 9+25.00 to Sta. 14+45.00	519’ 5”	18.7

* Based on Ramp C Stationing

A separate Roadway Geotechnical Report will be prepared for the design and construction recommendations of the new Ramp C embankment.

2.0 SITE SUBSURFACE CONDITIONS

This section describes the subsurface exploration program and laboratory testing program completed as part of this project. The proposed locations and depths of the soil borings were selected in accordance with IDOT requirements and reviewed with WSP based on the provided plans. The borings were completed in the field based on field conditions and accessibility.

2.1 Subsurface Exploration and Laboratory Testing

The site subsurface exploration for the proposed retaining wall structure was conducted between August 18 and October 27, 2022, and between March 20 and April 29, 2025. The investigation included advancing fifteen (15) borings along the proposed alignment to depths between 2.0 and 15.0 feet, including 10-foot rock cores at 9 locations. The borings were terminated upon encountering auger refusal on bedrock. The locations of these soil borings were adjusted in the field as necessary based on existing structures, utilities, and access. Elevations and as-drilled locations for the borings were gathered by GSG's field crew using GPS surveying equipment. The approximate as-drilled locations of the soil borings are shown on the Soil Boring Location Plan & Soil Boring Profile **(Appendix B)**. **Table 2** presents a summary of the borings completed for the proposed retaining wall analysis.

Table 2 – Summary of Subsurface Exploration Borings

Boring ID	Station †	Offset (ft) †	Northing	Easting	Depth (ft)	Surface Elevation (ft)
RWB-28	10+12.02	14.41 RT	1765398.750	1049291.571	14.5*	571.45
RWB-29	10+5.46	25.76 LT	1765358.066	1049290.353	6.0**	571.33
RWB-30	9+23.32	35.99 LT	1765331.474	1049367.913	15.0*	570.69
RWB-32	14+73.32	32.94 LT	1765439.154	1048829.597	14.0*	589.06
RWB-33	14+23.12	32.90 LT	1765429.739	1048878.902	6.0**	587.09
RWB-34	13+52.49	32.57 LT	1765420.090	1048930.975	15.0*	592.09
RWB-35	13+17.68	33.11 LT	1765409.670	1048982.420	8.0**	589.01
RWB-48	11+96.23	39.70 LT	1765380.317	1049100.452	14.0*	579.53
RWB-49	11+65.05	31.80 LT	1765382.202	1049132.564	3.0**	577.90
RWB-50	11+23.60	20.20 LT	1765385.777	1049175.449	15.0*	576.22
RWB-51	10+72.47	46.04 LT	1765350.776	1049220.795	17.0*	574.74
RWB-52	10+28.75	29.50 LT	1765358.781	1049266.855	2.0**	573.43

Boring ID	Station †	Offset (ft) †	Northing	Easting	Depth (ft)	Surface Elevation (ft)
RWB-53	9+75.76	39.37 LT	1765338.961	1049316.513	12.0*	572.70
RWB-54	9+22.71	25.49 LT	1765341.600	1049370.771	2.0**	572.26
RWB-55	8+70.43	24.30 LT	1765338.945	1049421.870	11.5*	571.42

* Depth includes Bedrock Core (10 feet)

** Terminated upon encountering practical auger refusal

† Based on proposed Ramp C Stationing

Copies of the Soil Boring Logs are provided in **Appendix C**.

The soil borings were drilled using truck mounted Diedrich D-50 (hammer efficiency 96%), ATV mounted Diedrich D-50 (hammer efficiency 91%), Mobile B-57 (hammer efficiency 89%), CME-75 (hammer efficiency 79%), and 2025 Diedrich D-50 (hammer efficiency 98%) drill rigs, each equipped with 3¼-inch I.D. hollow stem augers and an automatic hammer. Soil sampling was performed according to AASHTO T 206, "Penetration Test and Split Barrel Sampling of Soils." Soil samples were obtained at 2.5-foot intervals to the boring termination depths or auger refusal on bedrock. Water level measurements were made in each boring when evidence of free groundwater was detected on the drill rods or in the samples. The boreholes were also checked for free water immediately after auger removal, and before filling the open boreholes with soil cuttings and surface patching with asphalt where necessary to match the existing pavement.

GSG's field representative inspected, visually classified and logged the soil samples during the subsurface exploration activities and performed unconfined compressive strength tests on cohesive soil samples using a calibrated Rimac compression tester and a calibrated hand penetrometer in accordance with IDOT procedures and requirements. Representative soil samples were collected from each sample interval and were placed in jars and returned to the laboratory for further testing and evaluation.

2.2 Subsurface Bedrock Conditions

GSG collected rock core runs from nine of the soil borings with the use of either a five-foot or a ten-foot, diamond bit, NX-5 split core barrel during the investigation. The bedrock cores were evaluated in the field for texture, physical condition, recovery percentage, and Rock Quality Designation (RQD). The extracted bedrock cores were visually inspected, classified and the Rock

Quality Designation (RQD) was determined according to ASTM D 6032, "Standard Test Method for Determining Rock Quality Designation (RQD) of Rock Core" and as per the IDOT geotechnical manual by totaling all sections with a length in excess of four inches (4") and dividing it by the total length of the core run. The RQD is given a classification based upon the numeric value as indicated in **Table 3**. Photographs of the rock cores are included with the respective soil borings in **Appendix C**.

Table 3 – Rock Quality Designation Summary

Rock Quality Designation (RQD)	Descriptions
< 25%	Very Poor
25 – 50%	Poor
51 – 75%	Fair
76 – 90%	Good
91 – 100%	Excellent

Table 4 provides the RQD values of the rock cores extracted during the site investigation. Photographs of the cores are included with the boring logs in **Appendix C**.

Table 4 – Rock Core Summary and Classification

Boring Number	Length (ft)	Core Depth (feet)	Type of Rock	RQD (%)	RQD Description	Depth (ft)/ Compressive Strength (psi)
RWB-28	10	4.5 – 14.5	Limestone	42.9	Poor	7.5-8/6,516
RWB-30	10	5.0 – 15.0	Limestone	27.1	Poor	14-14.5/8,417
RWB-32	10	4.0 – 14.0	Limestone	37.0	Poor	12-12.5/5,398
RWB-34	10	5.0 – 15.0	Limestone	34.0	Poor	11-11.5/15,194
RWB-48	10	4.0 – 14.0	Limestone	55.0	Fair	n/a*
RWB-50	10	5.0 – 15.0	Limestone	28.8	Poor	n/a*
RWB-51	10	7.0 – 17.0	Limestone	58.3	Fair	n/a*
RWB-53	10	2.0 – 12.0	Limestone	26.3	Poor	n/a*
RWB-55	10	1.5 – 11.5	Limestone	10.8	Very Poor	n/a*

*Minimum length of sample was not obtained to complete lab testing

2.3 Laboratory Testing Program

All samples were inspected in the laboratory to verify the field classifications. A laboratory testing program was undertaken to characterize and determine engineering properties of the subsurface soils encountered in the area. The following laboratory tests were performed on representative soil and rock samples:

- Moisture content – ASTM D2216 / AASHTO T-265
- Unconfined Compression Strength on Rock – ASTM D2938

The laboratory tests were performed in accordance with test procedures outlined in the most current IDOT Geotechnical Manual, and per ASTM and AASHTO requirements. Based on the laboratory test results, the soils encountered were classified according to the AASHTO classification systems. The results of the laboratory testing program are shown along with the field test results in the Soil Boring Logs **(Appendix C)** and in the Laboratory Results (**Appendix D)**.

2.4 Subsurface Soil Conditions

This section provides a brief description of the soils encountered in the borings performed in the vicinity of the proposed retaining wall. Variations in the general subsurface soil profile were noted during the drilling activities. Detailed descriptions of the subsurface soils are provided in the soil boring logs and are shown graphically in the Boring Location Plan & Soil Boring Profile. The soil boring logs provide specific conditions encountered at each boring location and include soil descriptions, stratifications, penetration resistance, elevations, location of the samples, and laboratory test data. Unless otherwise noted, soil descriptions indicated on boring logs are visual identifications. The stratifications shown on the boring logs represent the conditions only at the actual boring locations and represent the approximate boundary between subsurface materials; however, the actual transition may be gradual.

The surface elevations of the borings ranged between El. 570.7 and 592.1 feet. The borings initially encountered 3 to 12 inches of topsoil; between 3 and 9 inches of asphalt pavement underlain by 3 to 9 inches of aggregate subbase; or 1 inch of asphalt and gravel subbase. Beneath the surficial topsoil and pavement, brown and gray silty clay fill, sand fill, or sandy loam fill materials were generally encountered to depths of 1.5 to 7 feet (El. 567.3 to 590.6 feet). Very dense brown and gray sand, gravel, and sand with gravel materials were then encountered to

depths of 1.5 to 8 feet (El. 567.7 to 587.1 feet), terminating at the surface of bedrock. About 0.5 to 2 feet of weathered rock was observed at boring locations RWB-28, 29, 30, 48, 52, 53, and 54 prior to encountering auger refusal on solid bedrock. Rock cores were then collected from nine of the soil boring locations.

2.5 Groundwater Conditions

Water levels were checked in each boring to determine the general groundwater conditions present at the site and were measured while drilling and after each boring was completed. Groundwater was not encountered during or immediately after drilling at the fifteen boring locations. None of the borings were left open after the completion of drilling.

Based on lack of observed water, it is anticipated that the long-term groundwater level may be at an approximate elevation of 567.3 to 587.1 feet or within the bedrock. Perched water may also be present within the fill materials observed at the surface of the borings. Water level readings were made in the boreholes at times and under conditions shown on the boring logs and stated in the text of this report. However, it should be noted that fluctuations in groundwater level may occur due to variations in the rainfall, other climatic conditions, or other factors not evident at the time measurements were made and reported herein.

3.0 GEOTECHNICAL ANALYSES

This section provides GSG's geotechnical analysis for the design of the proposed retaining wall and embankment based on the results of the field exploration, laboratory testing, and geotechnical analysis. Subsurface conditions between borings may vary from those encountered at the boring locations. If structure locations, loadings, or elevations are changed, we request that GSG be contacted so that we may re-evaluate our recommendations.

3.1 Settlement

Based on the Center Street Ramp C Cross Sections drawings, it is anticipated that up to about 21.5 feet of new fill may be required to construct the new Ramp C embankment between Ramp C Station 9+25.00 to 14+45.00.

Based on the proposed new embankment fill of up to 21.5 feet, an analysis was performed to evaluate the anticipated amount of total settlement in the area behind Retaining Wall #4. The maximum estimated settlement for the proposed retaining wall within the native soils was calculated as shown in **Table 5.** The settlement estimates do not include the settlement within the new embankment fill itself, only the settlement within the existing soils (caused by adding embankment fill). Based on the predominantly granular nature of the native soils below the embankment, it is anticipated that most of the settlement will occur during the construction phase of the project.

Table 5 – Anticipated Embankment Settlement

Assumed Embankment Length Along Wall (ft)	Assumed Embankment Width (ft)	Max. Embankment Height (ft)	Max. Anticipated Settlement (in)	Differential Settlement (in)
519.4	100	21.5	0.84	0.75

3.2 Seismic Parameters

The seismic hazard for the site was analyzed per the IDOT Geotechnical Manual, IDOT Bridge Design Manual, and AASHTO LRFD Bridge Design Specifications. The Seismic Soil Site Class was determined per the requirements of All Geotechnical Manual Users (AGMU) Memo 9.1, Design Guide for Seismic Site Class Determination, and the "Seismic Site Class Determination" Excel

spreadsheet provided by IDOT. A global Site Class Definition was determined for this project, and was found to be Soil Site Class C. The Seismic Performance Zone (SPZ) was determined using Figure 2.3.10-2 in the IDOT Bridge Manual and was found to be Seismic Performance Zone 1.

The AASHTO Seismic Design Parameters program was used to determine the peak ground acceleration coefficient (PGA), and the short (S_{DS}) and long (S_{D1}) period design spectral acceleration coefficients for each of the proposed structures. For this section of the project, the S_{DS} and the S_{D1} were determined using 2020 AASHTO Guide Specifications as shown in **Table 6**. Given the site location and materials encountered, the potential for liquefaction is minimal.

Table 6 – Seismic Parameters

Building Code Reference	PGA	S_{DS}	S_{D1}
2020 AASHTO Guide for LRFD Seismic Bridge Design	0.049g	0.125g	0.068g

4.0 GEOTECHNICAL WALL DESIGN RECOMMENDATIONS

This section provides retaining wall design parameters including recommendations on foundation type, bearing capacity, settlement, and lateral earth pressures. The foundations for the proposed retaining walls must provide sufficient support to resist the dead and live loads, as well as seismic loading.

4.1 Retaining Wall Type Recommendations

It is anticipated that the proposed new Ramp C embankment will be a new fill area. The new Retaining Wall #4 will be constructed along a portion of the Ramp C embankment, between the new ramp and the mainline I-80 roadway. A MSE wall or prefabricated modular gravity wall are feasible options for Wall #4.

Based on the proposed wall height, provided drawings and location of the wall within a fill area, GSG concurs with the design plan to use a MSE wall for Retaining Wall #4. Advantages of the MSE wall include a relatively rapid construction schedule that does not require specialized labor or equipment, provided excavation for the reinforcement is not extensive. This type of retaining wall can accommodate relatively large total and differential settlements without distress, and the reinforcement materials are light and easy to handle.

GSG evaluated the global and external stability, and settlement to determine the suitability of the retaining wall for this section of the project. The wall section should be analyzed to determine that adequate factors of safety are achieved relative to sliding and overturning failure.

4.2 Retaining Wall Design Recommendations

The engineering analyses performed for evaluation of the retaining wall options followed the current AASHTO Load and Resistance Factor Design (LRFD) Methodology as required by IDOT. LRFD methodology incorporates the use of load factors and resistance factors to account for uncertainty in applied loads and load resistance of structure elements separately. The AASHTO LRFD Bridge Design Specifications outline load factors and combinations for various strength, extreme event, service, and fatigue limit states. Section 11, which outlines geotechnical criteria for retaining walls, of the AASHTO Specifications requires the evaluation of bearing resistance failure, lateral sliding, and overturning at the strength limit state and excessive vertical displacement, excessive lateral displacement, and overall stability at the service limit state. The

selected wall should also be evaluated with respect to the collision load. **Table 7** outlines the load factors used in the evaluation of the retaining wall in accordance with AASHTO Specification Tables 3.4.1-1 and 3.4.1-2.

Table 7 - LRFD Load Factors for Retaining Wall Analysis

	Type of Load	Sliding and Eccentricity Strength	Bearing Resistance Strength I	Sliding and Eccentricity Extreme II	Bearing Resistance Extreme II	Settlement Service I
Load Factors for Vertical Loads	Dead Load of Structural Components (DC)	0.90	1.25	1.00	1.00	1.00
	Vertical Earth Pressure Load (EV)	1.00	1.35	1.00	1.00	1.00
	Earth Surcharge Load (ES)		1.50			
	Live Load Surcharge (LS)		1.75		0.50	1.00
Load Factors for Horizontal Loads	Horizontal Earth Pressure Load (EH) Active At-Rest AEP for anchored walls	1.50	 1.50 1.35 1.35	1.00	1.00	1.00
	Earth Surcharge (ES)	1.50	1.50			
	Live Load Surcharge (LS)	1.75	1.75	0.50	0.50	1.00
Load Factor for Vehicular Collision				1.00	1.00	

4.2.1 Lateral Earth Pressures and Loading

The wall should be designed to withstand earth and live lateral earth pressures. The lateral earth pressures on retaining walls depend on the type of wall (i.e., restrained or unrestrained), the type of backfill and the method of placement against the wall, and the magnitude of surcharge weight on the ground surface adjacent to the wall. The active earth pressure coefficient (Ka), and the passive earth pressure coefficient (Kp) were determined in accordance with AASHTO Section 3.11.5.3 and 3.11.5.4. **Table 8** presents the soil design properties for the retaining wall for the anticipated soil types at the site. Additional soil parameters for the site are included in **Appendix F**.

Table 8 – Lateral Soil Parameters

Depth Range, Elevation Range (feet)	Soil Description	Long-term/Drained		
		Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)	At-Rest Earth Pressure Coefficient (K_o)
	New Engineered Clay Fill	0.41	2.46	0.58
	New Engineered Granular Fill	0.33	3.00	0.50
0-19.5 (590-570.5)	Light Brown and Gray Very Dense Sand with Gravel / Gravel with Sand	0.17	5.82	0.29
19.5-20.5 (570.5-569.5)	Light Brown and Gray Very Dense Weathered Limestone	0.18	5.54	0.31
0-2.5 (590-587.5) **RWB-34, RWB-35 only**	Fill Brown and Gray Silty Clay	0.41	2.46	0.58
19.5-22.5 (570.5-567.5) **RWB-29 only**	Fill Brown and Gray Silty Clay	0.41	2.46	0.58
14-17 (576-573) **RWB-49, RWB-50 only**	Fill Dark Brown Silty Clay	0.41	2.46	0.58
13-18 (577-572) **RWB-48, RWB-51 only**	Fill Brown, Gray, and Black Sand / Sandy Loam	0.33	3.00	0.50

.

Although not anticipated, traffic and other surcharge loads should be included in the retaining wall design as applicable. A live load surcharge shall be applied where vehicular load is expected

to act on the surface of the backfill within a distance equal to one-half the wall height behind the back face of the wall in accordance with AASHTO 3.11.6.4. The live load surcharge may be estimated as a uniform horizontal earth pressure due to an equivalent height (H_{eq}) of soil. **Table 9** provides the equivalent heights of soil for vehicular loadings on retaining walls.

Table 9 - Equivalent Height of Soil for Vehicular Loading on Retaining Walls Parallel to Traffic

Retaining Wall Height (ft)	H_{eq} Distance from Wall Back face to Edge of Traffic	
	0 feet	1.0 feet or Further
5	5.0 feet	2.0 feet
10	3.5 feet	2.0 feet
≥20	2.0 feet	2.0 feet

Reference: AASHTO LRFD Table 3.11.6.4-2

The retaining wall design should include a drainage system to allow movement of any water behind the wall and not allow hydrostatic pressures to develop in the active soil wedge behind the wall. This could be accomplished by placing a Geocomposite Wall Drain over the entire length of the back face of the wall connected to a perforated drainpipe and backfilling a minimum of 2 feet of free draining materials, Porous Granular Embankment, as measured laterally from the back of the wall. The size of the perforated pipe should be determined based on hydraulic analyses. The backfill should be placed in accordance with the IDOT SSRBC.

Heavy compaction equipment should not be allowed closer than five (5) feet to the retaining wall to prevent inducing high lateral earth pressures and causing wall yielding and/or other damage. The passive lateral earth pressure coefficient (Kp) from the upper 3.5 feet of level backfill at the toe of the wall should be neglected unless the soil is confined or protected by a concrete slab or well-drained pavement. The passive lateral earth pressure coefficient from the upper 3.5 feet of soil for a descending slope at the wall toe should also be neglected, regardless of any surface protection.

4.3 MSE Wall Bearing Resistance Recommendations

It is anticipated that the MSE wall will bear on new granular engineered fill over suitable, very dense native sand and gravel. Bearing resistance for the retaining wall shall be evaluated at the strength limit state using load factors (See Table 8), and factored bearing resistance. The bearing resistance factor, ϕb, for a MSE wall is 0.65 per AASHTO Table 11.5.7-1. The bearing resistance

shall be checked for the extreme limit state with a resistance factor of 1.0. **Table 10** presents the proposed bearing elevations and recommended bearing resistances of suitable materials to support the wall system.

Table 10 – Recommended Bearing Resistance

Soil Borings	Approx. Station Limits	Approximate Bearing Elevation (feet)	Nominal Resistance (ksf)	Factored Bearing Resistance (ksf)	Bearing Resistance for 1-inch Settlement Service Limit (ksf)	Bearing Resistance for 2-inch Settlement Service Limit (ksf)	Anticipated Bearing Soil
RWB-30, 54, 55	9+25 to 10+00	584.5 – 586.1	19.5	12.7	8.8	12.7	Granular Engineered Fill over Native Very Dense Gravel or Weathered Limestone
RWB-29, 51, 52, 53	10+00 to 11+00	582.7 – 584.2	18.2	11.8	5.7	10.0	Granular Engineered Fill over Sandy Loam Fill, Native Very Dense Gravel, or Weathered Limestone
RWB-48, 49, 50	11+00 to 12+50	581.9 – 585.2	18.2	11.8	11.8	11.8	Granular Engineered Fill over Sand Fill, Weathered Limestone or Limestone
RWB-34 & 35	12+50 to 13+75	587.7 – 597.4	24.7	16.1	14.1	16.1	Granular Engineered Fill over Native Very Dense Gravel or Sand
RWB-32 & 33	13+75 to 14+45	600.1 – 605.2	34.1	22.2	7.6	13.4	Granular Engineered Fill over Native Very Dense Gravel or Sand with Gravel

The minimum depth of the leveling pad should be 3.5 feet below the final exterior grade to alleviate the effects of frost. A MSE reinforcement width of 0.9H (17 feet) was used for bearing and settlement calculations, based on the results of the slope stability analysis discussed in ***Section 4.5***.

4.3.1 Subgrade Undercut Areas

The subgrade soils at bearing grade should be evaluated per the guidelines provided in Section 8.9 of IDOT Geotechnical Manual (2020) for suitability/workability prior to placing any portion of the proposed structures. According to Section 540, IDOT SSRBC (2022) a minimum of 6-inches of porous granular material should be provided as bedding material, which will serve as a working platform.

GSG recommends undercutting any existing silty clay fill soils along the wall alignment. The observed sand fill and sandy loam fill exhibited SPT N-values of greater than 50 bpf and may remain in-place. Undercuts to depths of up to 5.0 feet below existing site grades may be anticipated to reach the very dense native sand and gravel. The undercut depth should be verified in the field during construction and backfilled with compacted granular engineered fill to support the proposed retaining wall. Anticipated undercut depths are presented in **Table 11**.

Table 11 – Recommended Undercuts

Soil Borings	Station Limits	Undercut Depth Below Existing Grade (Elevation, feet)	Approximate Bearing Elevation (feet)*	Comments
RWB-29	10+25 to 9+90	4.0 (567.5)	584.5	Existing unsuitable fill Low strength <1.5 tsf
RWB-34	14+00 to 13+25	1.5 (590.5)	594.5	Existing unsuitable fill Trace roots
RWB-35	13+25 to 12+50	5.0 (584.0)	592.5	Existing unsuitable fill Trace brick debris
RWB-49	11+80 to 11+50	3.0 (575.0)	582.0	Existing unsuitable fill Trace roots
RWB-50	11+50 to 11+00	5.0 (571.0)	582.5	Existing unsuitable fill Trace concrete

* Assumed bearing elevation at about El. 581.9 to El. 605.2 feet based on the GPE drawings

Settlement generally depends on the foundation size and bearing resistance, as well as the strength and compressibility characteristics of the underlying bearing soil.

Undercut areas should be replaced with structural fill in accordance with IDOT Standard Specifications for Road and Bridge Construction. The lateral limit of the structural fill should extend a minimum of 1 foot beyond the edge of the MSE wall leveling pad, then an additional 1 foot laterally for every 2 feet of structural fill depth as depicted in **Exhibit 3**. The structural fill should be placed and compacted to a minimum of 95% of the maximum dry density, as determined by AASHTO T-180: Standard Test Methods for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures (ASTM D1557) in accordance with IDOT standard construction requirements.

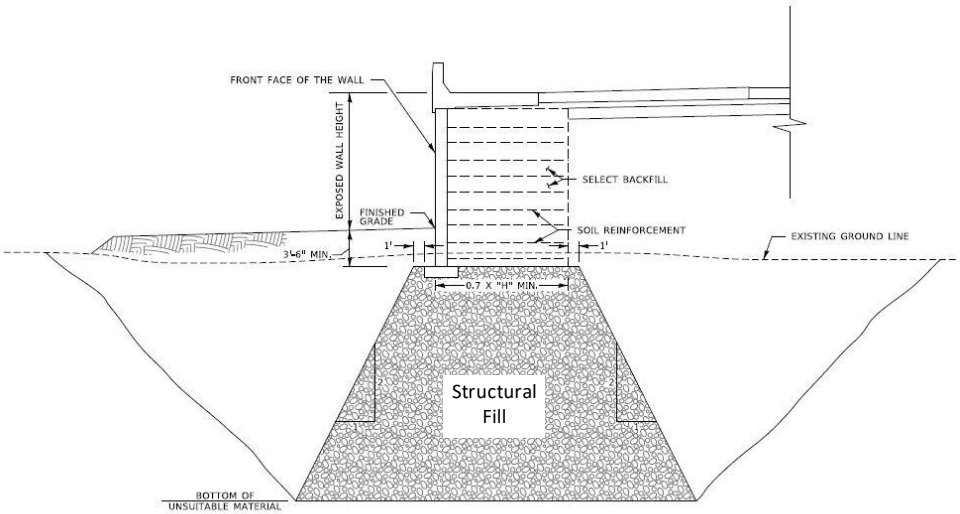


Exhibit 3 - Structural Fill Placement below MSE Wall

4.3.2 Sliding and Overturning Stability

The wall base width should be sufficient to resist sliding. The frictional resistance shall include the friction between granular backfill for the wall and supportive cohesive or granular soils, and the friction between the wall foundation and bearing soils.

The factored resistance against sliding should be calculated using equation 10.6.3.4-1 in the AASHTO LRFD manual. A sliding resistance factor, ϕ, of 1.0 (Table 11.5.7-1) shall be applied to the nominal sliding resistance of soil-on-soil beneath the MSE wall. A maximum frictional coefficient of 0.53 (tan 28 degrees) could be used for determining the sliding resistance for the soil to soil interfaces. The width of the MSE wall (length of the reinforcing) must be wide enough to resist overturning forces. The location of the resultant forces shall be within the middle two-

thirds of the MSE base width. Based on the wall geometry and anticipated loads, the minimum wall base width and soil reinforcement length may extend beyond the minimum values specified in AASHTO Manual Section 11.10.2.1.

4.4 Overall Stability

Based on the drawings provided by WSP, the following parameters in **Table 12** were used to evaluate the overall stability of the wall.

Table 12 – MSE Retaining Wall Description

Maximum height of the retaining wall (H)	18.7 feet
Minimum length of reinforcement 0.7xH (initial assumption)	13.5 feet
Unit weight of the retained soil (embankment)	125 pcf
Unit weight of MSE wall backfill	120 pcf
Assumed embankment width	40 feet
Slope behind embankment	1V:3H
Slope below MSE wall	1V:3.1H down, then 1V:4.1H up

The actual wall width and total height of the wall should be based on structural analysis performed by a Licensed Structural Engineer in the State of Illinois.

4.5 Slope Stability Results

Slide2 is a comprehensive slope stability analysis software used to evaluate the global slope stability of the proposed retaining wall based on the limit equilibrium method. Circular failure analyses were evaluated using the simplified Bishop analysis method for the proposed wall and slope geometries.

A circular analysis was evaluated for both short-term (undrained) and long-term (drained) conditions for the proposed retaining wall. Based on the GPE drawings, the retaining wall will have a maximum height of 18.7 feet. The top of the retaining wall leveling pad is anticipated to be about 3.5 feet below the front face of the wall, at about El. 582.5 feet near station 12+15. The results of the analysis are shown in **Table 13a**.

Table 13a – Stability Analysis Results – 0.7H

Station	Proposed Profile	Failure Type	Factor of Safety	Required Minimum Factor of Safety
12+15	18.7 ft MSE Wall, 0.7H Reinforcement	Circular – Short-Term	1.8	1.5
		Circular – Long-Term	1.4	

Based on the analyses performed, the proposed retaining wall with a reinforcement length of 0.7H (13.5 feet) does not meet the minimum factor of safety of 1.5 for the long-term condition. An increased MSE reinforcement length was modeled to achieve the necessary factor of safety. The results are presented in **Table 13b**.

Table 13b – Stability Analysis Results – 0.9H

Station	Proposed Profile	Failure Type	Factor of Safety	Required Minimum Factor of Safety
12+15	18.7 ft MSE Wall, 0.9H Reinforcement	Circular – Short-Term	1.9	1.5
		Circular – Long-Term	1.5	

Based on the analyses performed, the proposed 18.7-foot-tall retaining wall with a reinforcement length of 0.9H (17 feet) meets the minimum factor of safety of 1.5 for the short- and long-term conditions. Copies of the Slope Stability analysis exhibits are included in **Appendix E**.

5.0 CONSTRUCTION CONSIDERATIONS

All work performed for the proposed project should conform to the requirements in the IDOT Standard Specifications for Road and Bridge Construction (SSRBC) (2022). Any deviation from the requirements in the manuals above should be approved by the design engineer.

5.1 Site Preparation

All trees, pavements, vegetation, landscaping, and surface topsoil should be cleared and removed from the vicinity of the proposed foundations. It is anticipated that several structures may be demolished in the area of the new wall and embankment. Any foundations that will impact construction should also be removed. Where possible, the engineer may require proof-rolling of the subgrade with a 35-ton loaded truck or other pneumatic-tired vehicle of similar size and weight. The purpose of the proof-rolling is to locate soft, weak, or excessively wet soils present at the time of construction. Proof-rolling should be performed during a time of good weather and not while the site is wet, frozen, or severely desiccated. Any unsuitable materials observed during the evaluation and proof-rolling operations should be undercut and replaced with compacted structural fill and/or stabilized in-place. The possible need for, and extent of, undercutting and/or in-place stabilization required can best be determined by the geotechnical engineer at the time of construction. Once the site has been properly prepared, at grade construction may proceed.

Foundation aggregate fill should not be placed upon wet or frozen subgrade soils. If the subgrade or structural fill becomes frozen, desiccated, wet, disturbed, softened, or loose, the affected materials should be scarified, dried and moisture conditioned, and compacted to the full depth of the affected area or the soils should be removed. Rainfall and runoff can soften soils and affect the load bearing capacity of the soils. All water entering foundation excavation should be removed prior to placement backfill materials above the wall bottom.

5.2 Existing Utilities and Structures

Before proceeding with construction, all existing underground utility lines or structures that will interfere with construction should be completely relocated from the proposed construction areas. Where possible, existing utility lines that are to be abandoned in place should be removed and/or plugged with cement grout. All excavations resulting from underground utilities or structure removal activities should be cleaned of loose and disturbed materials, including all

previously placed backfill, and backfilled with suitable fill materials in accordance with the requirements of this section. During the clearing and stripping operations, positive surface drainage should be maintained to prevent the accumulation of water.

5.3 Site Excavation

Site excavations are expected to encounter various types of soils as described in the Subsurface Exploration section of this report. The contractor will be responsible for providing a safe excavation during the construction activities of the project. All excavations should be conducted in accordance with applicable federal, state, and local safety regulations, including, but not limited to the Occupational Safety and Health Administration (OSHA) excavation safety standards. Excavation stability and soil pressures on temporary shoring are dependent on soil conditions, depth of excavations, installation procedures, and the magnitude of any surcharge loads on the ground surface adjacent to the excavation. Excavation near existing structures and underground utilities should be performed with extreme care to avoid undermining existing structures. Excavations should not extend below the level of adjacent existing foundations or utilities unless underpinning or other support is installed. It is the responsibility of the contractor for field determinations of applicable conditions and providing adequate shoring (if needed) for all excavation activities.

5.4 Borrow Material and Compaction Requirements

If borrow material is to be used for onsite construction, it should conform to Section 204 "Borrow and Furnish Excavations" of the IDOT Construction Manual (2021). The fill material should be free of organic matter and debris and should be placed and compacted in accordance with the Construction Manual. Earth-moving operations should be avoided during excessively cold or wet weather to avoid freezing of softening subgrade soils.

Suitable structural fill materials shall be of a nature that will compact and develop stability satisfactory to the geotechnical engineer. Structural fill shall consist of crushed limestone or recycled concrete consistent with IDOT CA-6 gradation or medium plasticity silty clays. Suitable structural fill should meet the IDOT SSRBC requirements.

Should fill be placed during cool, wet seasons, the use of granular fill may be necessary since weather conditions will make compaction of cohesive soils more difficult. If water seepage while excavating and backfilling procedures, or where wet conditions are encountered such that the water cannot be removed with conventional sump and pump procedures, GSG recommends placing open grade stone similar to IDOT CA-7 to stabilize the bottom of the excavation. The CA-7 stone should be placed 12 inches above the water level, in 12-inch lifts, and should be compacted with the use of a heavy smooth drum roller or heavy vibratory plate compactor until stable. The remaining portion of the excavation should be backfilled using approved engineered fill.

GSG recommends that foundation excavations, subgrade preparation, and structural fill placement and compaction be inspected by a GSG geotechnical engineer to verify the type and strength of soil materials present at the site and their conformance with the geotechnical recommendations in this report.

5.5 Groundwater Management

Long term groundwater may be at an approximate elevation of 567.3 to 587.1 feet or deeper, within the bedrock. GSG does not anticipate that groundwater related issues occur during construction activity, however, perched water may be encountered within the existing fill materials. If rainwater run-off or groundwater is accumulated at the base of excavations, the contractor should remove accumulated water using conventional sump pit and pump procedures and maintain a dry and stable excavation. The location of the sump should be determined by the contractor based on field conditions. During earthmoving activities at the site, grading should be performed to ensure that drainage is maintained throughout the construction period. Water should not be allowed to accumulate in the foundation area either during or after construction. Undercut and excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater or surface run-off. Grades should be sloped away from the excavations to minimize runoff from entering.

If water seepage occurs during excavations or where wet conditions are encountered such that the water cannot be removed with conventional sumping, we recommend placing open grade stone similar to IDOT CA-7 to stabilize the bottom of the excavation below the water table. The CA-7 stone should be placed 12 inches above the water table, in 12-inch lifts, and should be

compacted with the use of a heavy smooth drum roller or heavy vibratory plate compactor until stable. The remaining portion of the excavation beneath the footings should be backfilled using approved structural fill.

6.0 LIMITATIONS

This report has been prepared for the exclusive use of the Illinois Department of Transportation (IDOT) and its Design Section Engineer consultant. The recommendations provided in the report are specific to the project described herein and are based on the information obtained at the soil boring locations within the proposed retaining wall area. The analyses have been performed and the recommendations provided in this report are based on subsurface conditions determined at the location of the borings. This report may not reflect all variations that may occur between boring locations or at some other time, the nature and extent of which may not become evident until the time of construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and review the recommendations presented herein.

Appendix A
General Plan and Elevation
(approved June 14, 2024)

Roadway Profile, Cross
Sections Center Street Ramp C

Benchmark:	*Chiseled "x" on top of SE bolt of Fire Hydrant at south ROW of Jasper St. (in front of 640 Jasper St. address), Elev. 585.86.*
Existing Structure:	*None.*
Traffic Control	*WB I-80 traffic to Center St. will be detoured to the west at Larkin Ave.*
Salvage	*None.*

DESIGN STRESSES

FIELD UNITS
f 'c = 3,500 psi
fy = 60,000 psi (Reinforcement)
PRECAST UNITS
f 'c = 4,500 psi

DESIGN SPECIFICATIONS

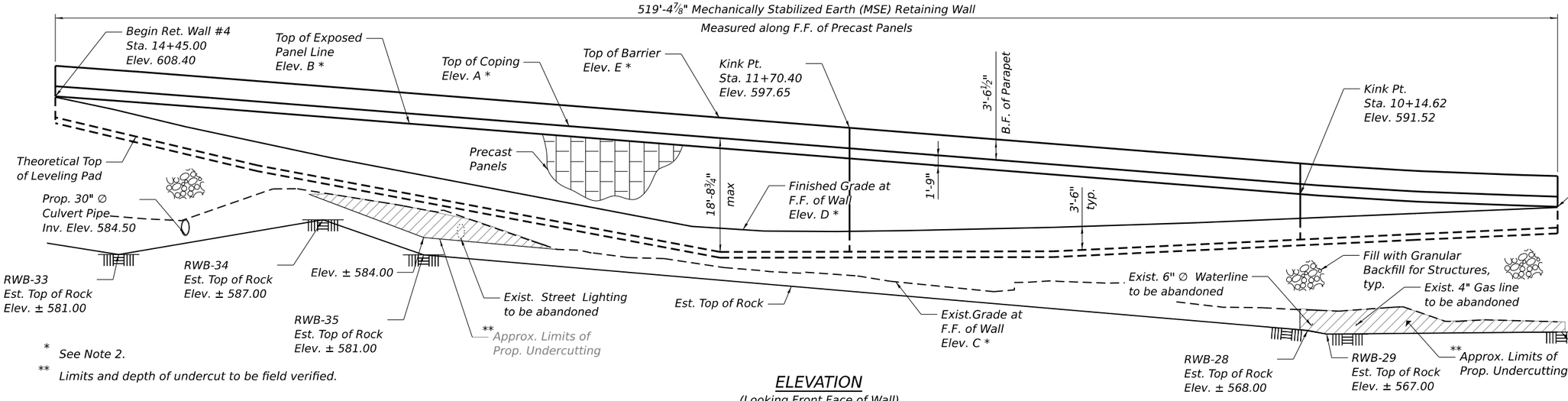
2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

HIGHWAY SPECIFICATION

Center Street Ramp C
Functional Class: Interstate
ADT: 4,550 (2017); 6,220 (2040)
ADTT: 228 (2017); 311 (2040)
DHV: 684 (2040)
Design Speed: 40 m.p.h.
Posted Speed: 40 m.p.h.
1-Way Traffic

LEGEND

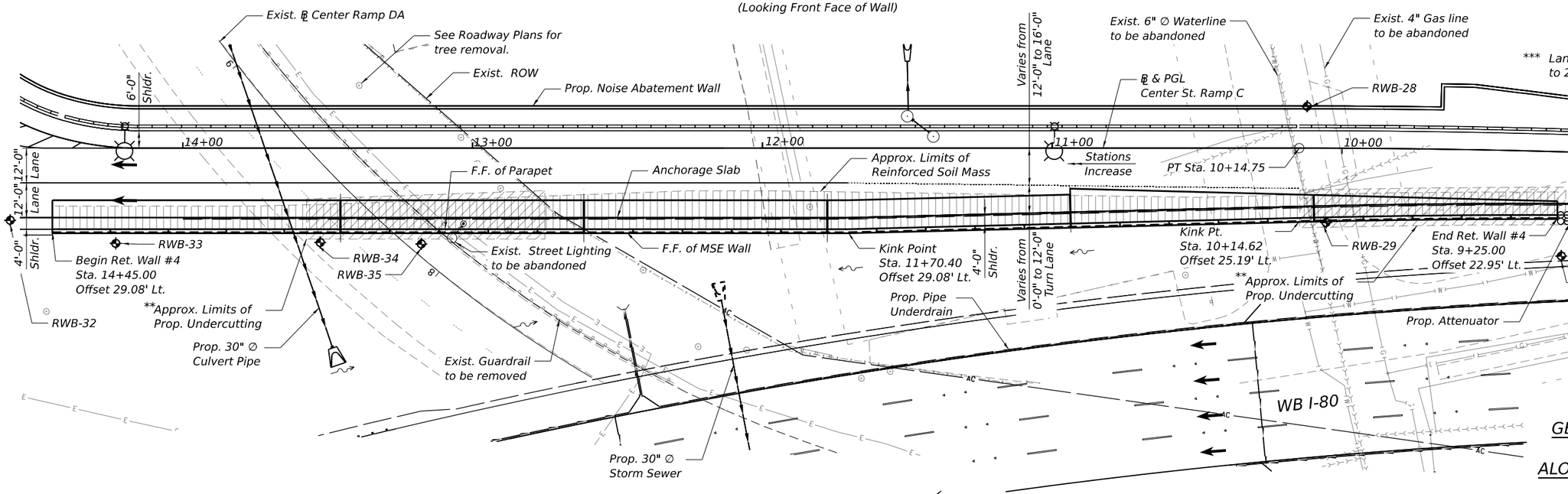
- Exist. Fence
- Exist. Electrical Cable
- Exist. Storm Sewer
- Exist. Watermain
- Exist. Gas line
- Exist. Light Pole
- Prop. Storm Sewer
- Tree
- Soil Boring
- Exist. ROW
- Approx. Limits of Reinforced Soil Mass
- Approx. Limits of Prop. Undercutting
- F.F. Front Face
- B.F. Back Face



* *See Note 2.*
** *Limits and depth of undercut to be field verified.*

ELEVATION

(Looking Front Face of Wall)



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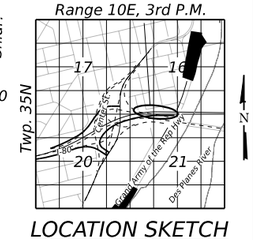

LOCATION SKETCH

NOTES:

1. *Stations and offsets are measured along the ℄ of Center Street to the front face of the precast panels.*
2. *For Table 1- Wall Elevations, Typical Section thru MSE Walls, Profile Grade Lines and Curve Data, See Sheet 2 of 2.*

APPROVED
JUNE 14, 2024
AS A BASIS FOR PREPARATION OF DETAILED PLANS

GENERAL PLAN & ELEVATION RETAINING WALL 4 ALONG CENTER STREET RAMP C F.A.I. ROUTE I-80 SECTION C-91-109-22 WILL COUNTY STA. 9+25.00 TO STA. 14+45.00 STRUCTURE NO. 099-W125

HBM ENGINEERING GROUP, LLC

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SHEET 1 OF 2 SHEETS

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	ILLINOIS	FED. AID PROJECT		

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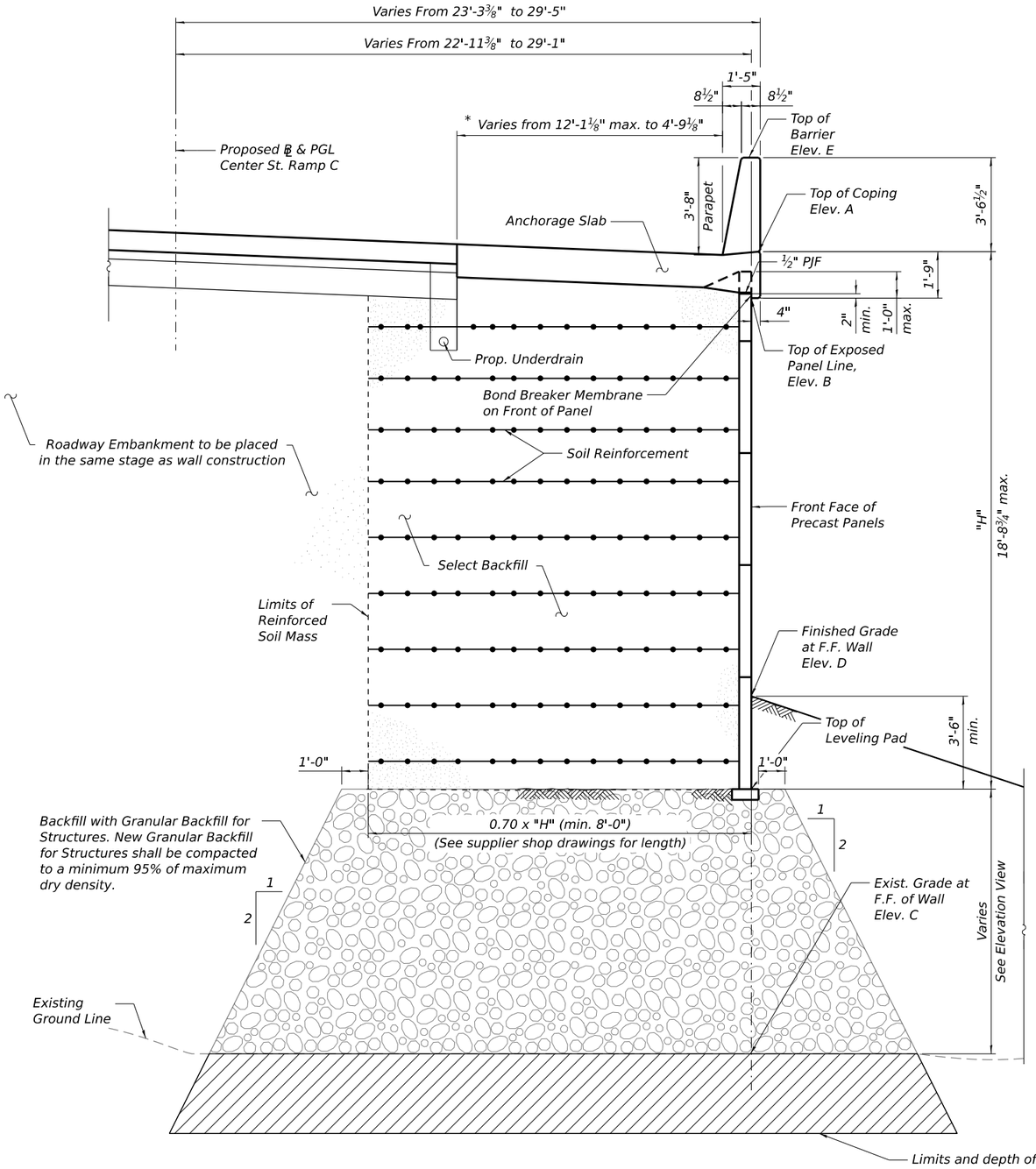


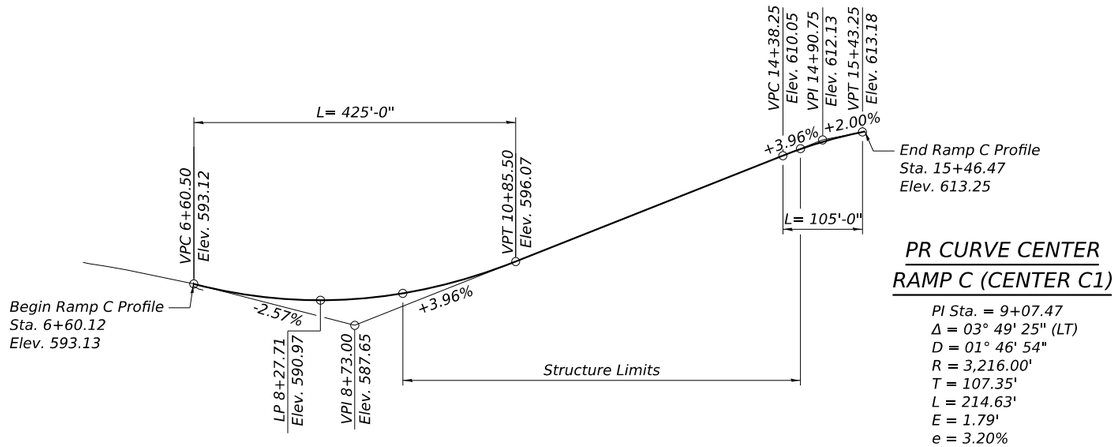
TYPICAL SECTION THRU M.S.E WALL

(Looking North)

* Subject to change in Final Design

TABLE 1- WALL ELEVATIONS

Station	Offset	A Top of C.I.P. Coping	B Top of Exposed Panel Line	C Exist. Grade at FF Wall	D Finished Grade at FF Wall	E Top of Barrier
09+25.00	22.95' LT	591.09	589.34	569.45	589.61	594.63
09+50.00	23.58' LT	591.50	589.75	569.78	589.54	595.04
09+75.00	24.20' LT	592.00	590.25	571.39	588.52	595.54
10+00.00	24.83' LT	592.75	591.00	571.35	587.99	596.29
10+14.62	25.19' LT	593.19	591.44	571.33	587.68	596.73
10+25.00	25.45' LT	593.68	591.93	571.80	587.46	597.22
10+50.00	26.07' LT	594.66	592.91	572.46	586.98	598.20
10+75.00	26.70' LT	595.65	593.90	576.18	586.55	599.19
11+00.00	27.32' LT	596.64	594.89	576.50	586.18	600.18
11+25.00	27.95' LT	597.62	595.87	574.88	585.87	601.16
11+50.00	28.57' LT	598.61	596.86	576.14	585.61	602.15
11+70.40	29.08' LT	599.40	597.65	577.17	585.40	602.94
11+75.00	29.08' LT	599.59	597.84	577.63	585.45	603.13
12+00.00	29.08' LT	600.58	598.83	578.25	585.52	604.12
12+25.00	29.08' LT	601.57	599.82	579.65	586.34	605.11
12+50.00	29.08' LT	602.56	600.81	580.76	588.73	606.10
12+75.00	29.08' LT	603.55	601.80	582.54	591.17	607.09
13+00.00	29.08' LT	604.54	602.79	586.86	593.66	608.08
13+25.00	29.08' LT	605.53	603.78	589.47	595.94	609.07
13+50.00	29.08' LT	606.52	604.77	591.43	598.23	610.06
13+75.00	29.08' LT	607.51	605.76	591.52	600.87	611.05
14+00.00	29.08' LT	608.49	606.74	587.17	603.56	612.03
14+25.00	29.08' LT	609.43	607.68	587.68	606.57	612.97
14+45.00	29.08' LT	610.15	608.40	588.50	608.68	613.69



CENTER-RAMP C PROFILE GRADE

(Along ℄ Roadway)

PR CURVE CENTER RAMP C (CENTER C1)

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D = 01° 46' 54"
R = 3,216.00'
T = 107.35'
L = 214.63'
E = 1.79'
e = 3.20%
T.R. = 64.0'
S.E. RUN = 102.4'
P.C. STA. = 8+00.12
P.T. STA. = 10+14.75

DETAILS
RETAINING WALL 4
ALONG CENTER STREET RAMP C
F.A.I. ROUTE I-80
SECTION C-91-109-22
WILL COUNTY
STA. 9+25.00 TO STA. 14+45.00
STRUCTURE NO. 099-W125

HBM ENGINEERING GROUP, LLC

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DEPARTMENT OF TRANSPORTATION

SHEET 2 OF 2 SHEETS

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		CONTRACT NO. 62R22		
	ILLINOIS	FED. AID PROJECT		

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K = 64.69

VPC 6+60.50
EL 592.88

L = 425.00'
K = 64.69

VPT 10+85.50
EL 595.92

RW#4 PR TOP OF WALL PROFILE

PR PGL CENTER RAMP C

BEGIN RW#4
STA. 9+25

RW#3 PR TOP OF WALL PROFILE

-2.57%

+4.00%

LP 8+26.75
EL 590.75

VPI 8+73.00
EL 587.42

RW#4 PR GROUND PROFILE AT WALL FACE

BEGIN RW#3
STA. 6+05

END RW#3
STA. 7+68

EXISTING GROUND AT B

RW#3 PR GROUND PROFILE AT WALL FACE

620 615 610 605 600 595 590 585 580 575 570 565 560 555 550 545 540 535

592.90 591.99 591.20 590.80 590.79 591.16 591.92 593.07 594.60 596.50 598.50 600.50 602.50 603.50 604.50 590.36 606.50 592.87 608.50

0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00

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WSP USA Inc.
30 N. LASALLE STREET
SUITE 4200
CHICAGO, IL 60602
TEL: (312) 782-8150

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ROADWAY PROFILE
CENTER STREET RAMP C

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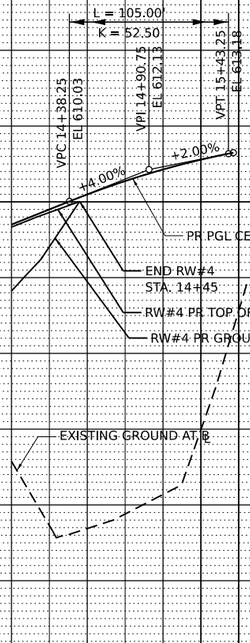

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14+00 15+00

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WSP USA Inc.
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ROADWAY PROFILE
CENTER STREET RAMP C

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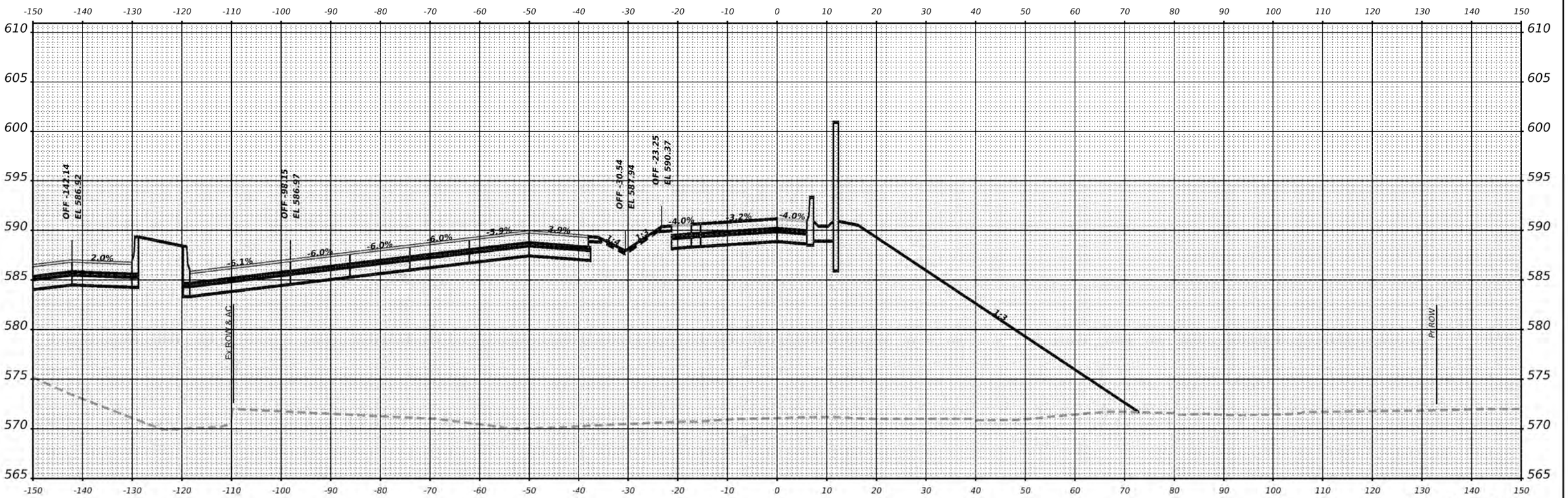

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DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

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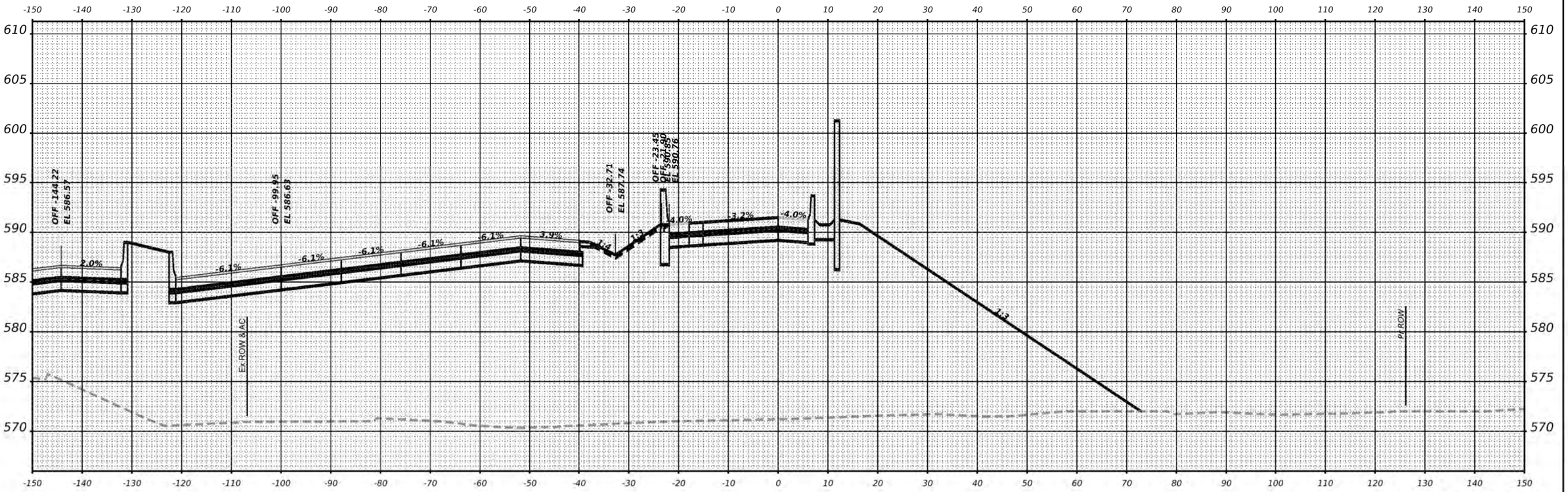

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

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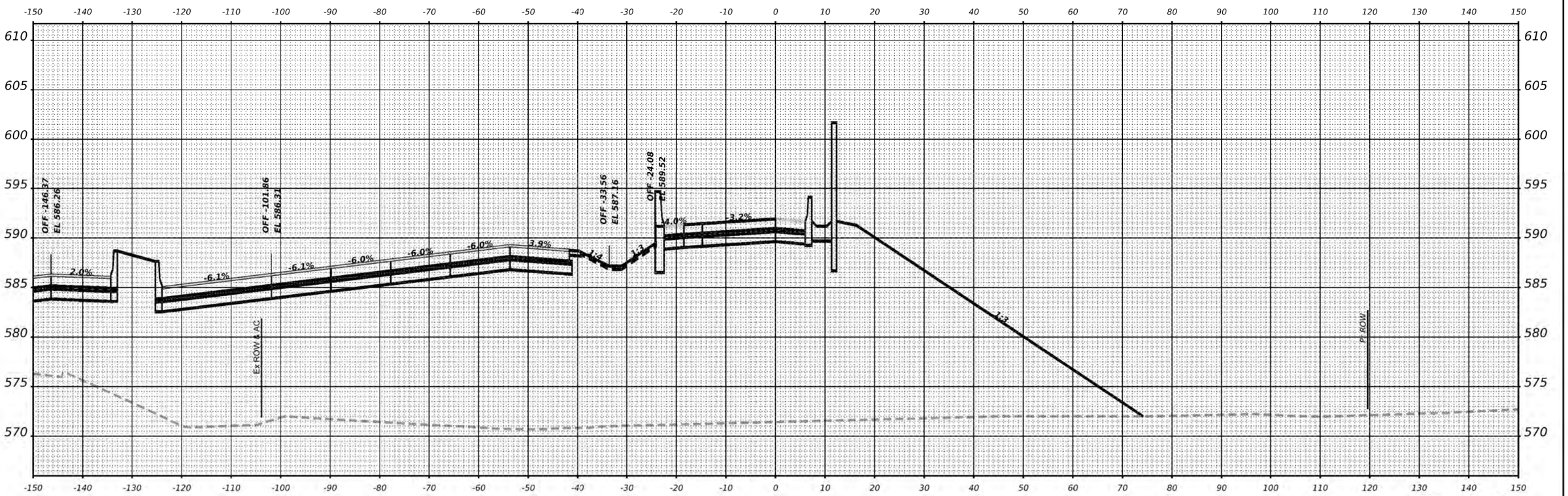
FINAL SURVEY	SURVEYED	BY	DATE
NOTE BOOK	PLOTTED		
NO.	TEMPLATE		
	AREAS		
	AREAS CHECKED		



STA 9+50.00

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	PLOT DATE = 8/16/2022	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

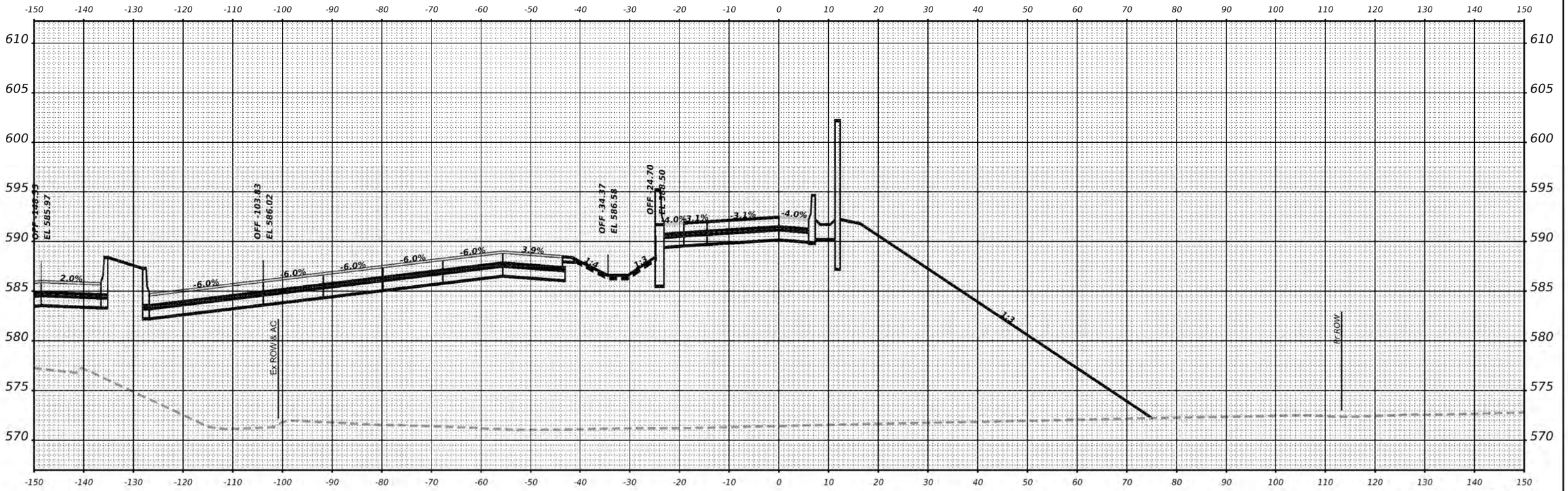
SCALE: SHEET OF SHEETS STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

MODEL: RW4 - 9+50.00 [Sheet]
FILE NAME: D:\RJR22-XS-RW4.dgn

FINAL SURVEY	DATE
NOTE BOOK	BY
NO.	SURVEYED
	PLOTTED
	TEMPLATE
	AREAS
	AREAS CHECKED

ORIGINAL SURVEY	DATE
NOTE BOOK	BY
NO.	SURVEYED
	PLOTTED
	TEMPLATE
	AREAS
	AREAS CHECKED



STA 9+75.00

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PLOT DATE = 8/16/2022	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

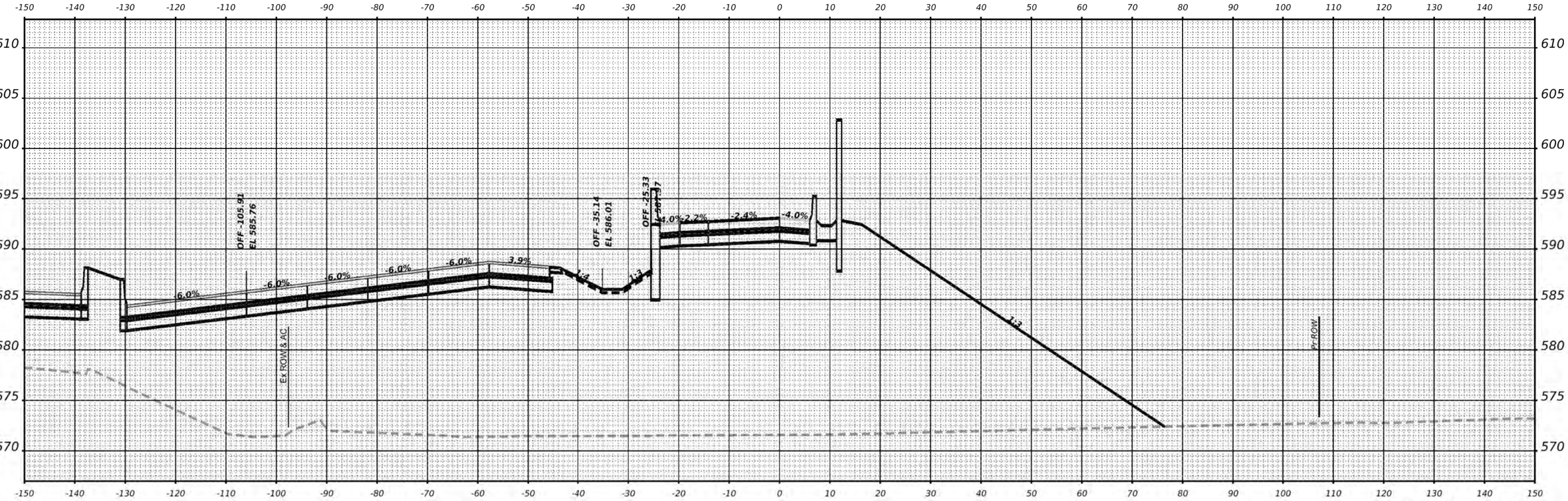
SCALE: | SHEET OF SHEETS | STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
NO.	PLOTTED		
	TEMPLATE		
	AREAS		
	AREAS CHECKED		



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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: ____ SHEET __ OF __ SHEETS STA. _____

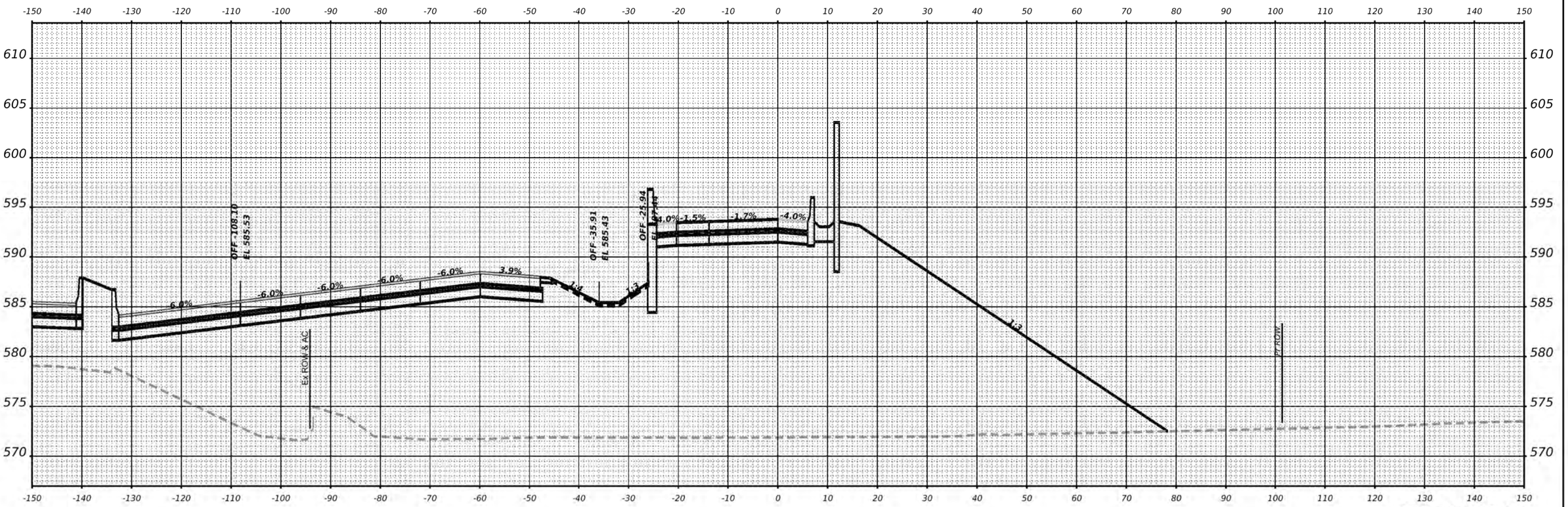
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO. ____

ILLINOIS FED. AID PROJECT

MODEL: RW4 - 10+00.00 [Sheet]
FILE NAME: D:\D\R22-XS-RW4.dgn

FINAL SURVEY	DATE	BY
NOTE BOOK	SURVEYED	
NO.	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	



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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

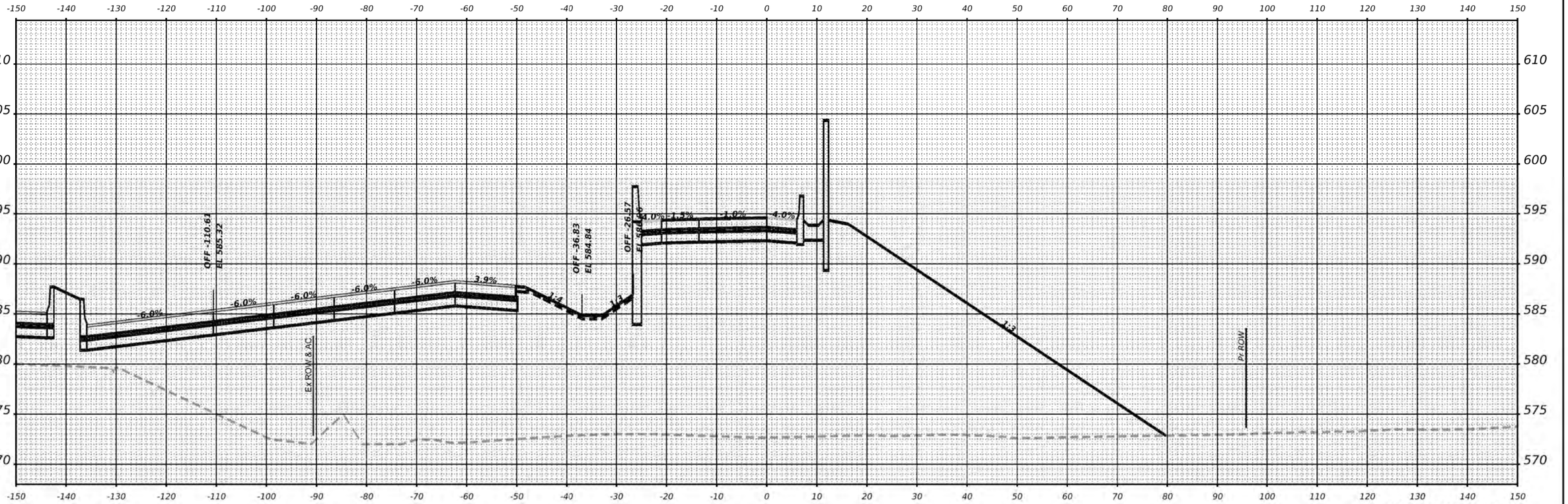
CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: SHEET OF SHEETS STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

MODEL: RW4 10+25.00 [Sheet]
FILE NAME: D:\R22\XS-RW4.dgn

FINAL SURVEY	DATE	BY
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK		
NO.		



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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: SHEET OF SHEETS STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS FED. AID PROJECT

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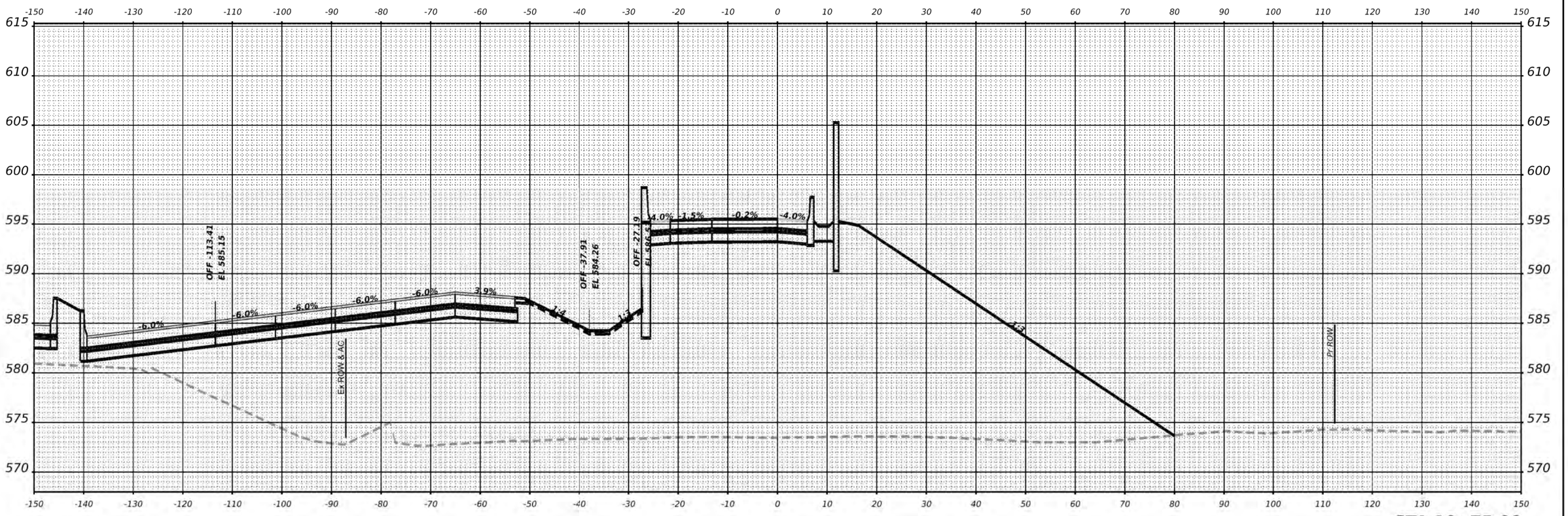

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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: ____ SHEET __ OF __ SHEETS STA. ____

F.A. RTE:	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO. ____

ILLINOIS FED. AID PROJECT

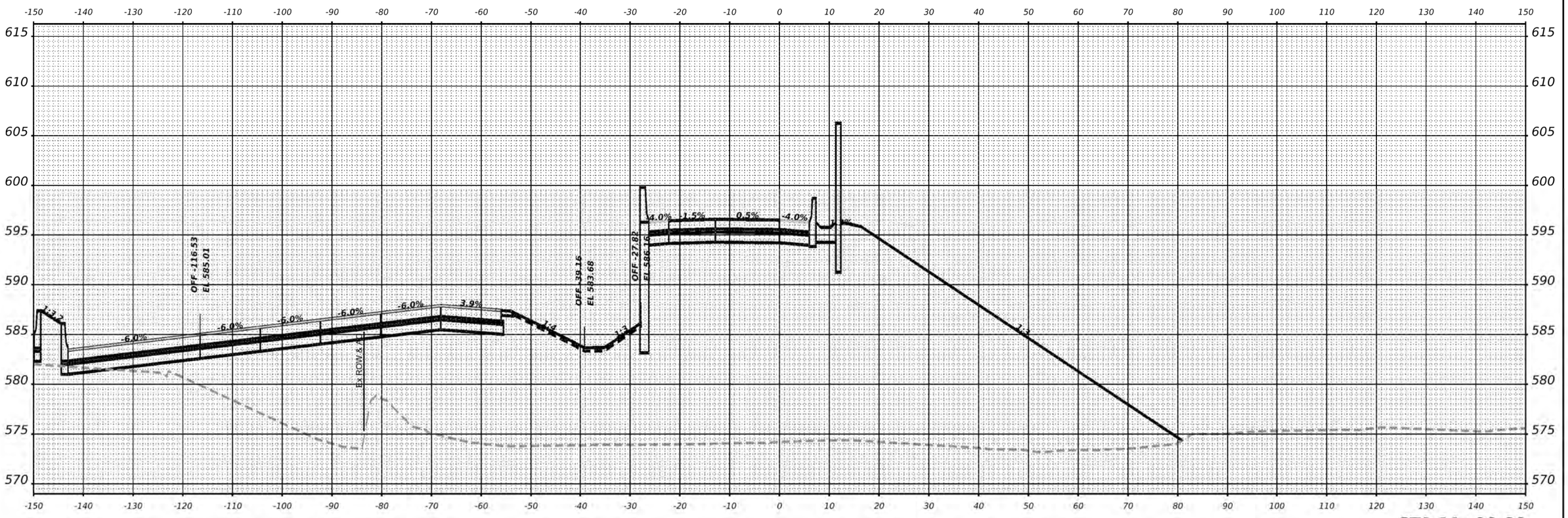
FINAL SURVEY — NOTE BOOK NO. ____ — BY: — DATE: — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED

ORIGINAL SURVEY — NOTE BOOK NO. ____ — BY: — DATE: — SURVEYED — PLOTTED — TEMPLATE — AREAS — AREAS CHECKED

MODEL: RW4 - 10+75.00 [Sheet]
FILE NAME: D:\D2R22-XS-RW4.dgn

FINAL SURVEY	DATE
NOTE BOOK	BY
NO.	SURVEYED
	PLOTTED
	TEMPLATE
	AREAS
	AREAS CHECKED

ORIGINAL SURVEY	DATE
NOTE BOOK	BY
NO.	SURVEYED
	PLOTTED
	TEMPLATE
	AREAS
	AREAS CHECKED



STA 11+00.00

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PLOT DATE: = 8/16/2022	DATE -		REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: | SHEET OF SHEETS | STA.

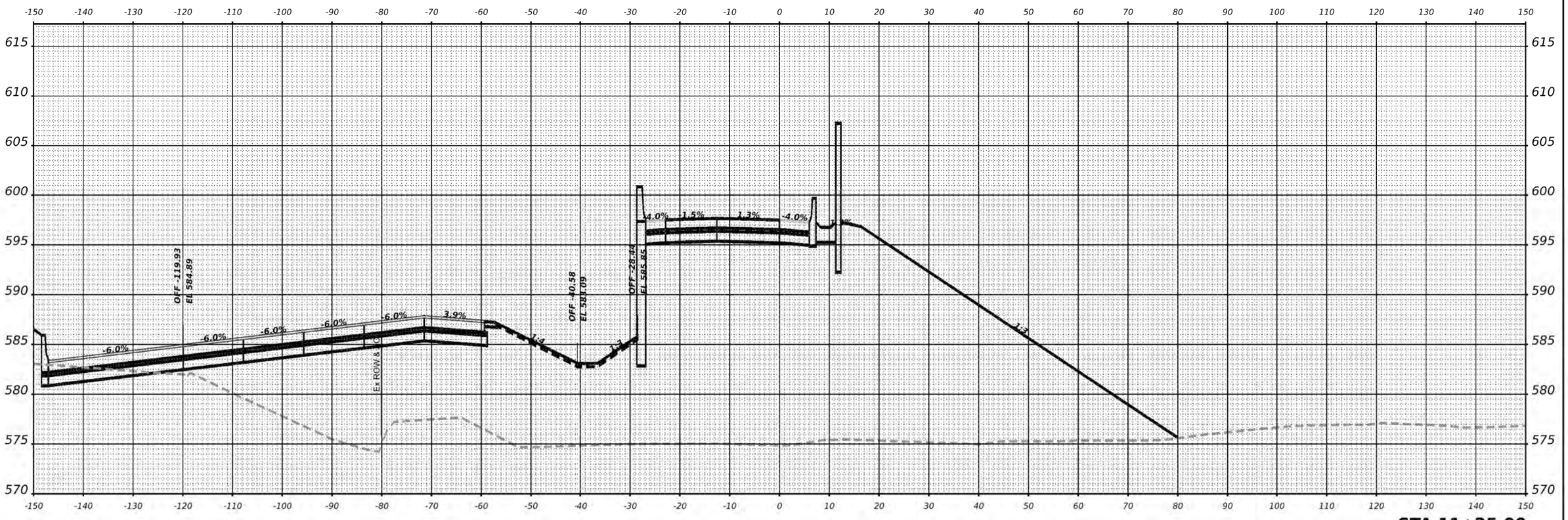
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

MODEL: RW4 - 11+00.00 [Sheet]
FILE NAME: D:\6282\XS-RW4.dgn

FINAL SURVEY	BY	DATE
NOTE BOOK	SURVEYED	
NO.	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	



STA 11+25.00

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PLOT DATE: = 8/16/2022	DATE -		REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: ____ SHEET __ OF __ SHEETS STA. ____

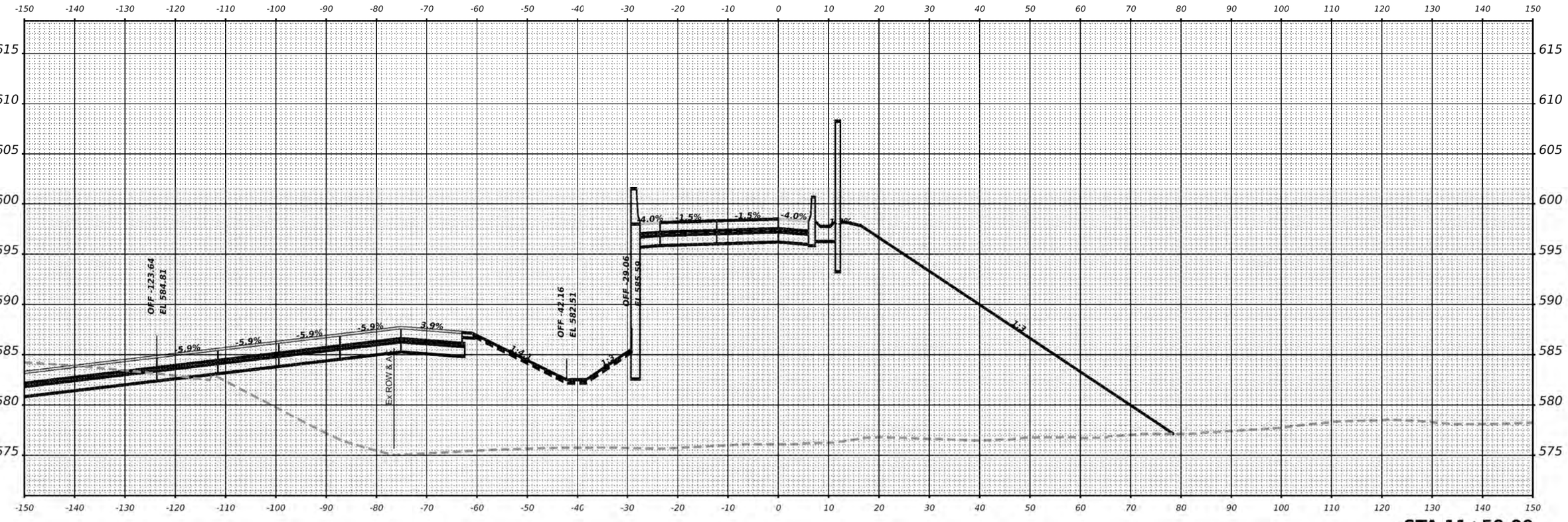
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO. ____

ILLINOIS | FED. AID PROJECT

MODEL: RW4 - 11+25.00 [Sheet]
FILE NAME: D:\62R22\XS-RW4.dgn

FINAL SURVEY	BY	DATE
NOTE BOOK	SURVEYED	
NO.	PLOTTED	
	TEMPLATE	
	AREAS	
	AREAS CHECKED	



STA 11+50.00

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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: ____ SHEET ___ OF ___ SHEETS STA. ____

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO. ____

ILLINOIS FED. AID PROJECT

MODEL: RW4 - 11+50.00 [Sheet]
FILE NAME: D162R22-XS-RW4.dgn

FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
NO.	PLOTTED		
	TEMPLATE		
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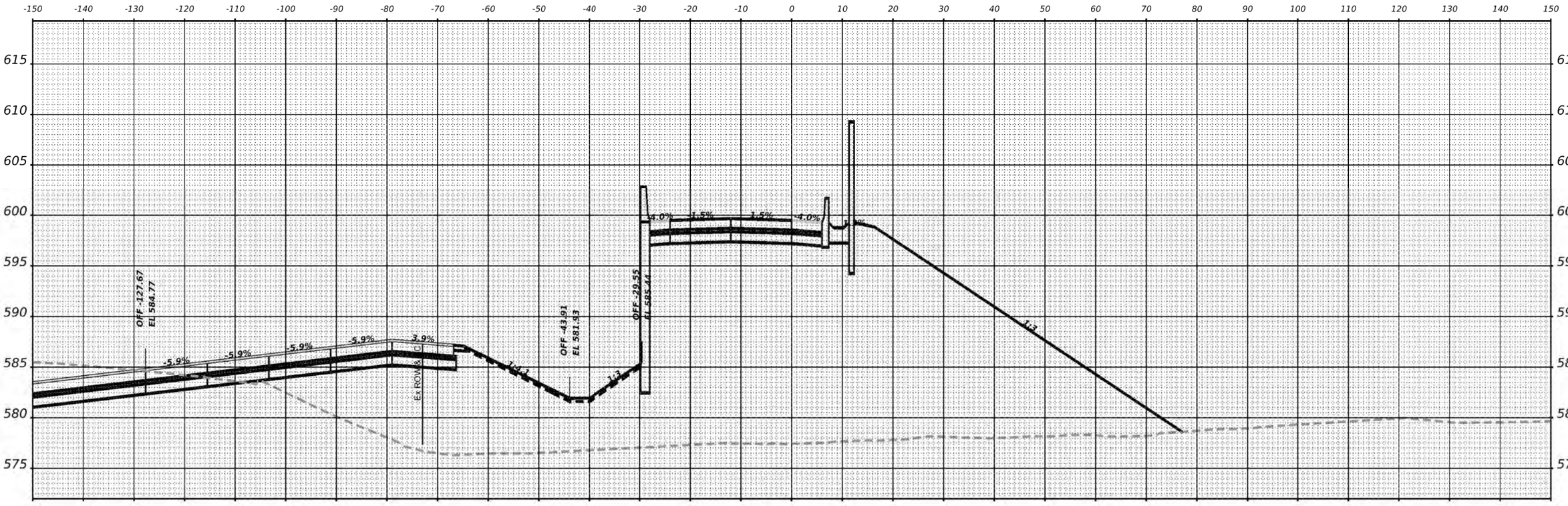
	AREAS CHECKED		



STA 11+75.00

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PLOT DATE = 8/16/2022	DATE -		REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: | SHEET OF SHEETS | STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

MODEL: RW4 - 11+75.00 [Sheet]
FILE NAME: D:\62R22.XS-RW4.dgn

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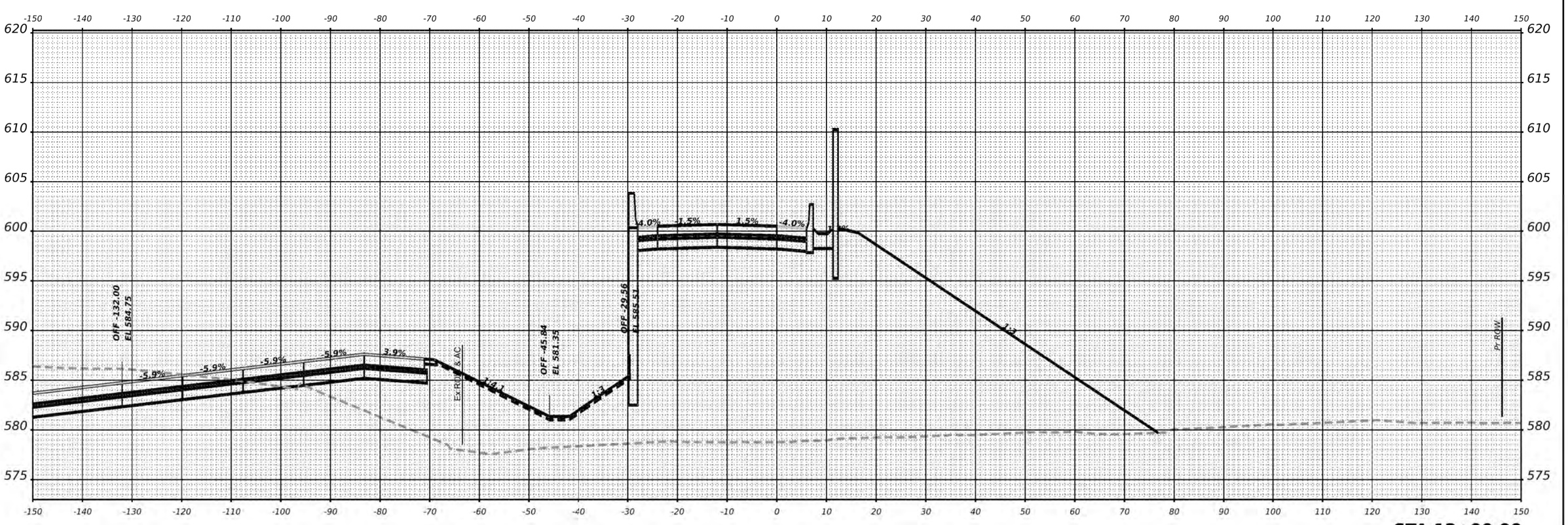
	SURVEYED		
	PLOTTED		
NOTE BOOK	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		



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PLOT DATE = 8/16/2022	DATE -		REVISED -		

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: ____ SHEET __ OF __ SHEETS STA. ____

F.A. RTE:	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

MODEL: RW4 - 12+00.00 [Sheet]
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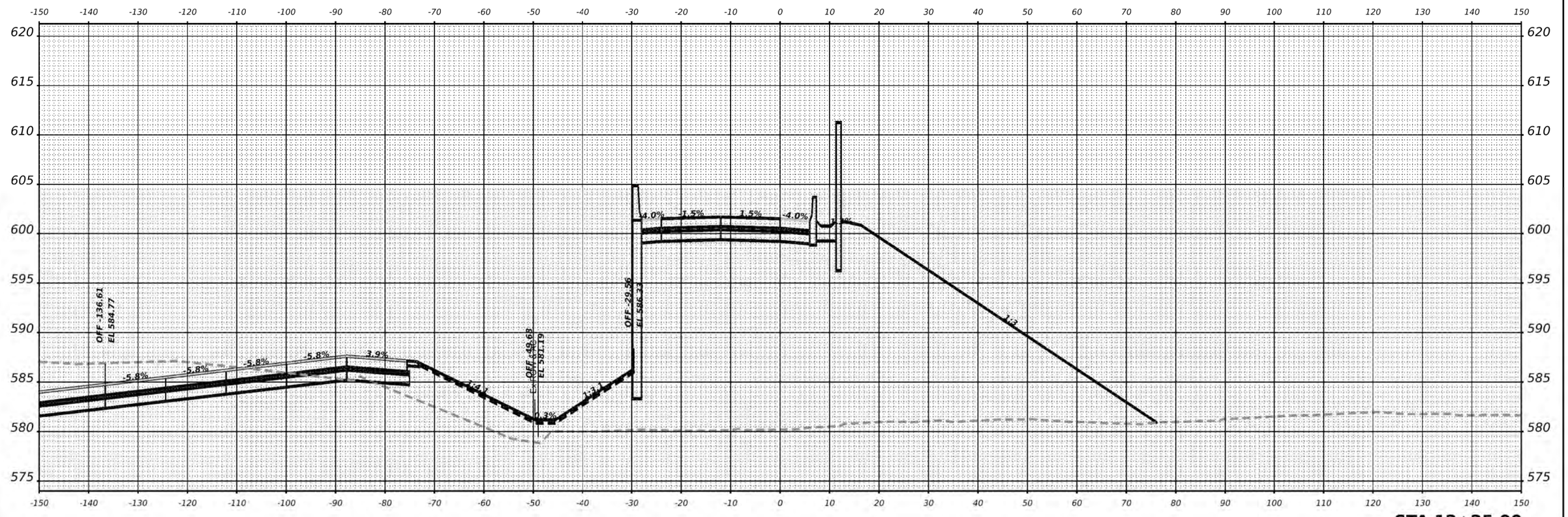
FINAL SURVEY	SURVEYED	BY	DATE
NOTE BOOK	PLOTTED		
NO.	TEMPLATE		
	AREAS		
	AREAS CHECKED		



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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: SHEET OF SHEETS STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS FED. AID PROJECT

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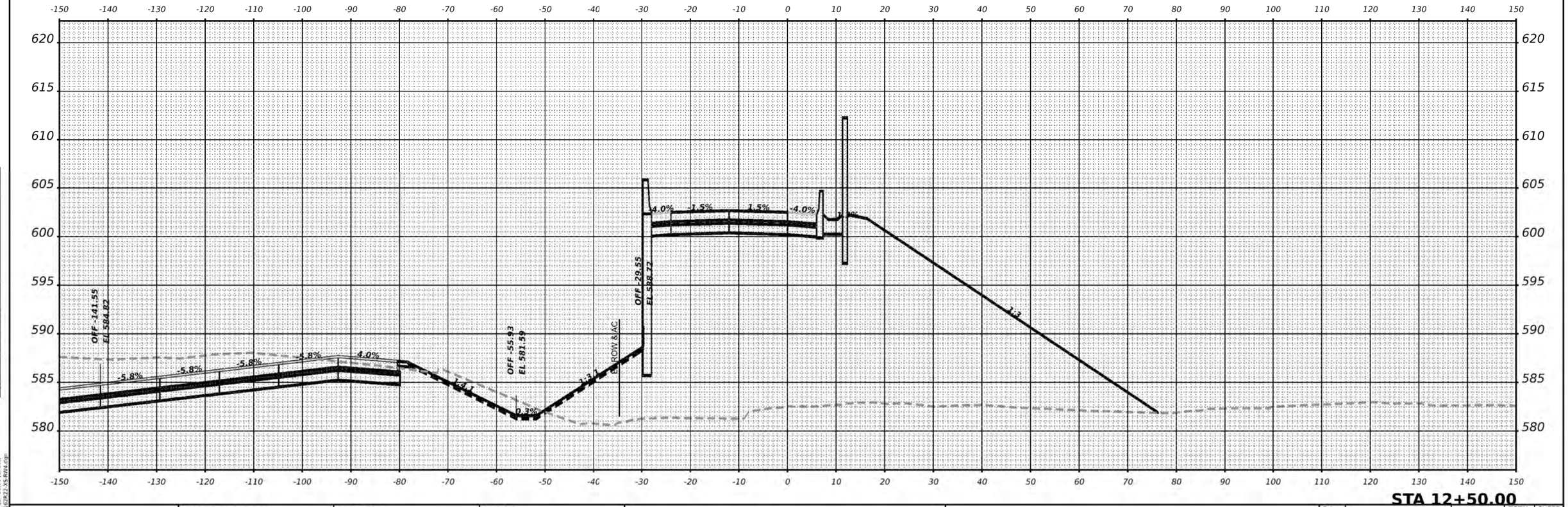

ORIGINAL SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED
BY
DATE

FINAL SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED
BY
DATE

MODEL: RW4 12+50.00 [Sheet]
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PLOT DATE = 8/16/2022	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: SHEET OF SHEETS STA.

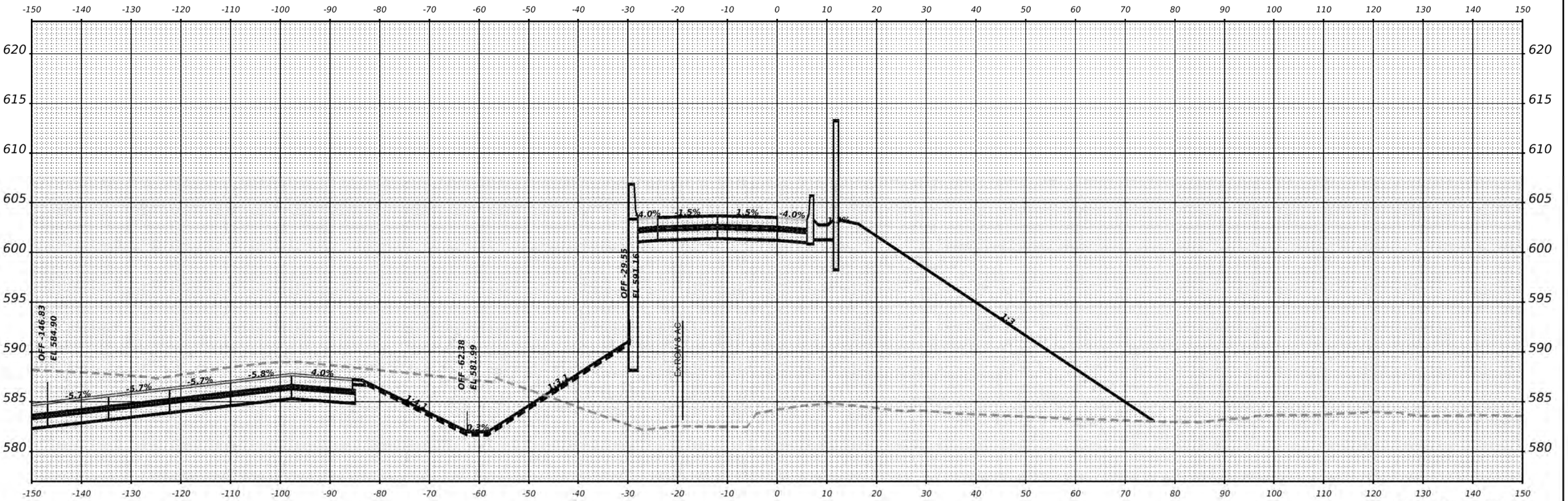
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS FED. AID PROJECT

FINAL SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED
BY
DATE

ORIGINAL SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED
BY
DATE



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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: SHEET OF SHEETS STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS FED. AID PROJECT

MODEL: RW4 12+75.00 [Sheet]
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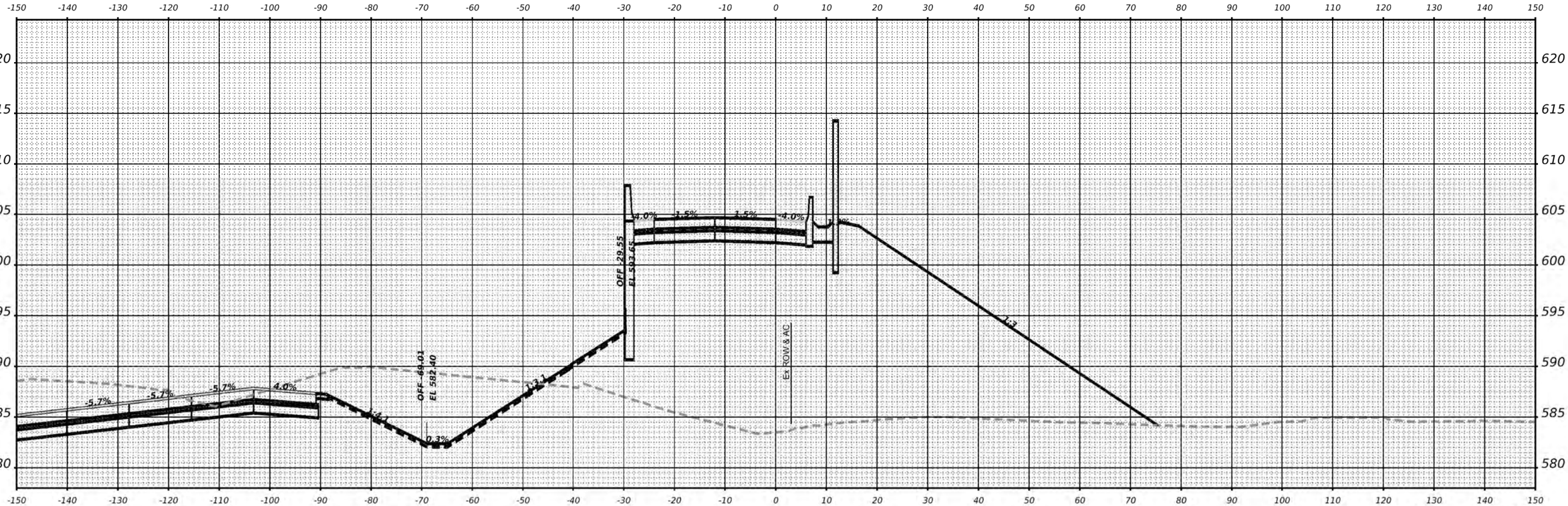
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK		
NO.		



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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: | SHEET OF SHEETS | STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS | FED. AID PROJECT

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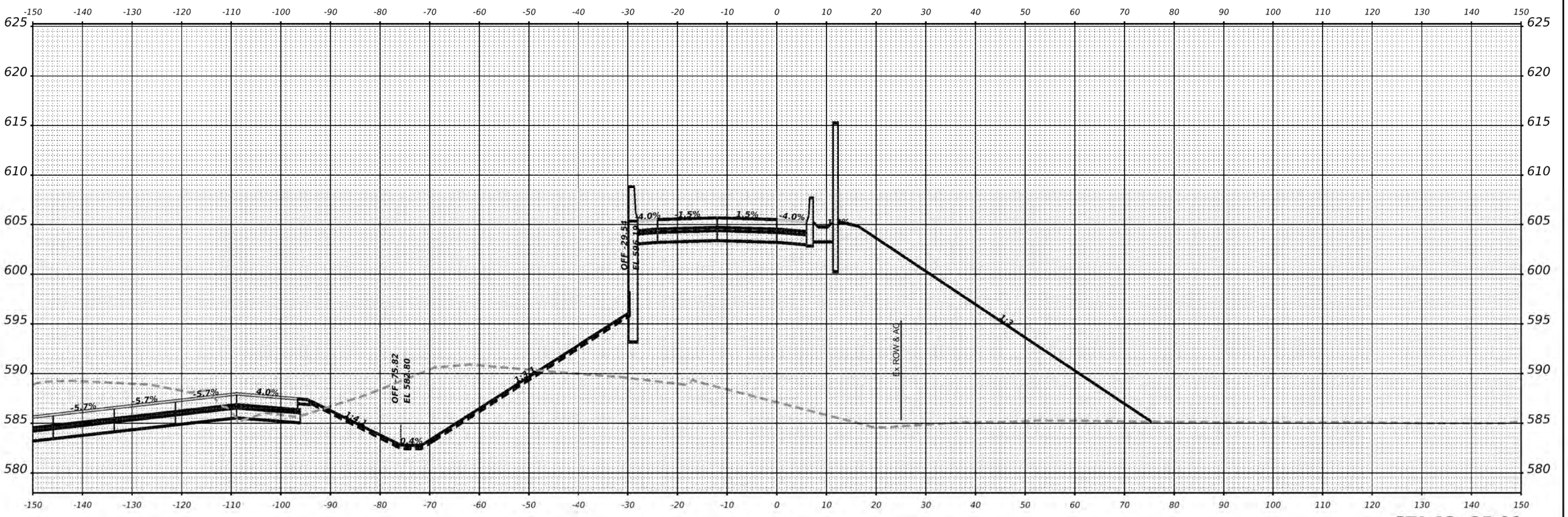

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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: ____ SHEET __ OF __ SHEETS STA. ____

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

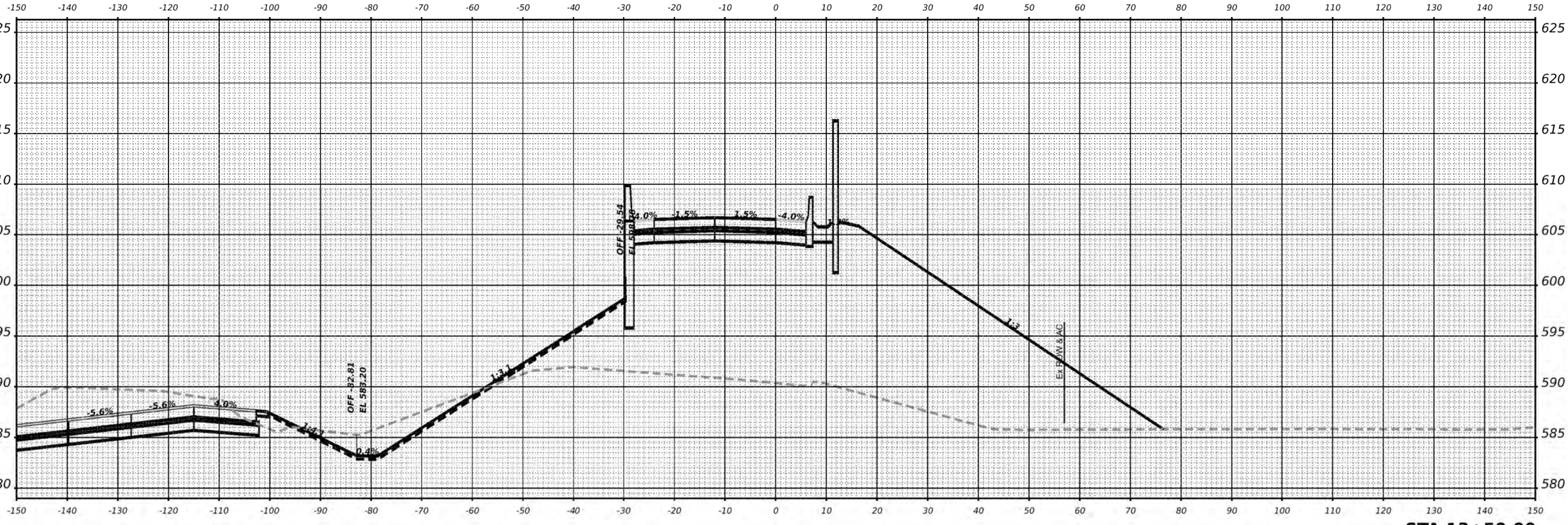
CONTRACT NO. ____

ILLINOIS FED. AID PROJECT

ORIGINAL SURVEY / FINAL SURVEY
NOTE BOOK
NO.
SURVEYED
PLOTTED
TEMPLATE
AREAS
AREAS CHECKED
BY
DATE

MODEL: RW4 - 13+25.00 [Sheet]
FILE NAME: D162P22-XS-RW4.dgn

FINAL SURVEY	DATE
ORIGINAL SURVEY	BY
NOTE BOOK	SURVEYED
NO.	PLOTTED
	TEMPLATE
	AREAS
	AREAS CHECKED



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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: SHEET OF SHEETS STA.

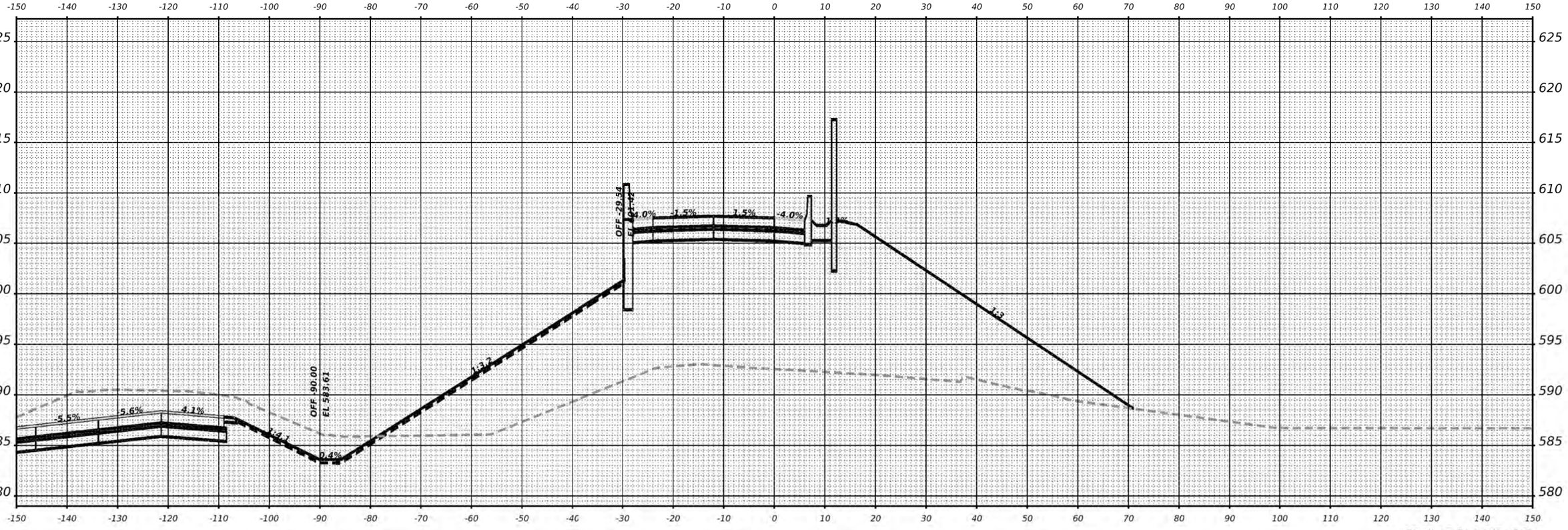
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS FED. AID PROJECT

MODEL: RW4 - 13+50.00 [Sheet]
FILE NAME: D:\62R22\XS-RW4.dgn

FINAL SURVEY	DATE
ORIGINAL SURVEY	BY
NOTE BOOK	SURVEYED
NO.	PLOTTED
	TEMPLATE
	AREAS
	AREAS CHECKED



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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: SHEET OF SHEETS STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS FED. AID PROJECT

MODEL: FIW4 - 13+75.00 [Sheet]
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FINAL SURVEY	DATE	BY
ORIGINAL SURVEY	SURVEYED	
	PLOTTED	
NOTE BOOK	TEMPLATE	
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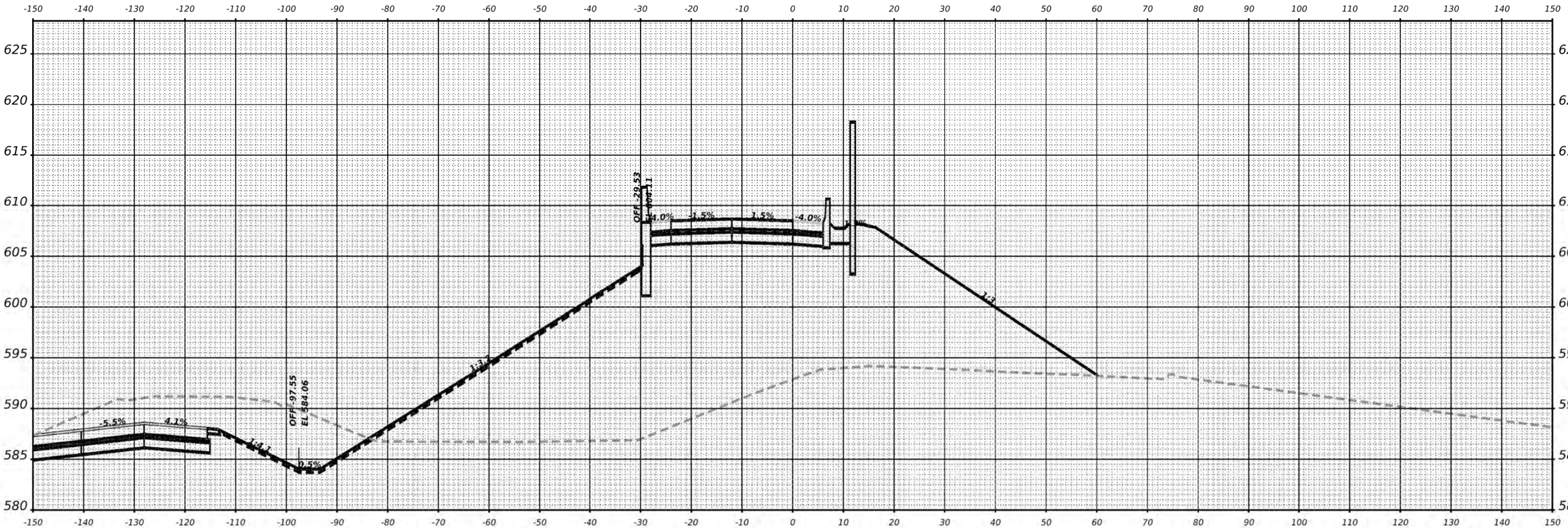
NO.	AREAS CHECKED	



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PLOT DATE = 8/16/2022	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: SHEET OF SHEETS STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS FED. AID PROJECT

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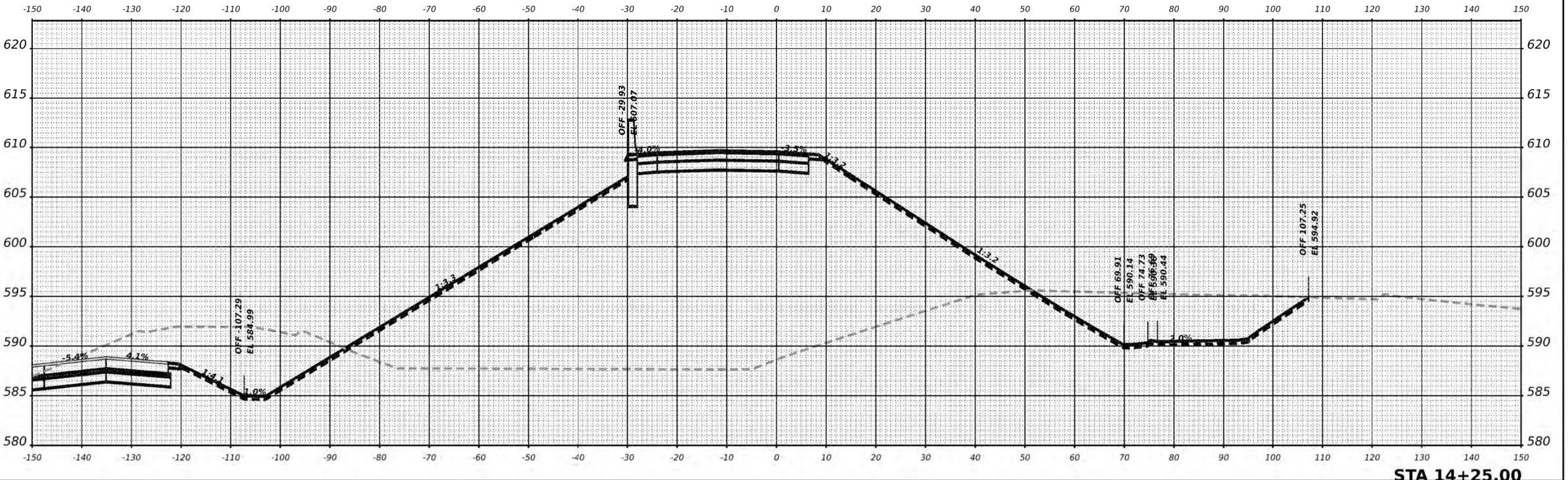
FINAL SURVEY	DATE
NOTE BOOK	BY
NO.	SURVEYED
	PLOTTED
	TEMPLATE
	AREAS
	AREAS CHECKED



STA 14+25.00

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PLOT DATE = 8/16/2022	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: ____ SHEET ___ OF ___ SHEETS STA. ____

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO. ___

ILLINOIS | FED. AID PROJECT

MODEL: RW4 - 14+25.00 [Sheet]
FILE NAME: D16\P22\XS-RW4.dgn

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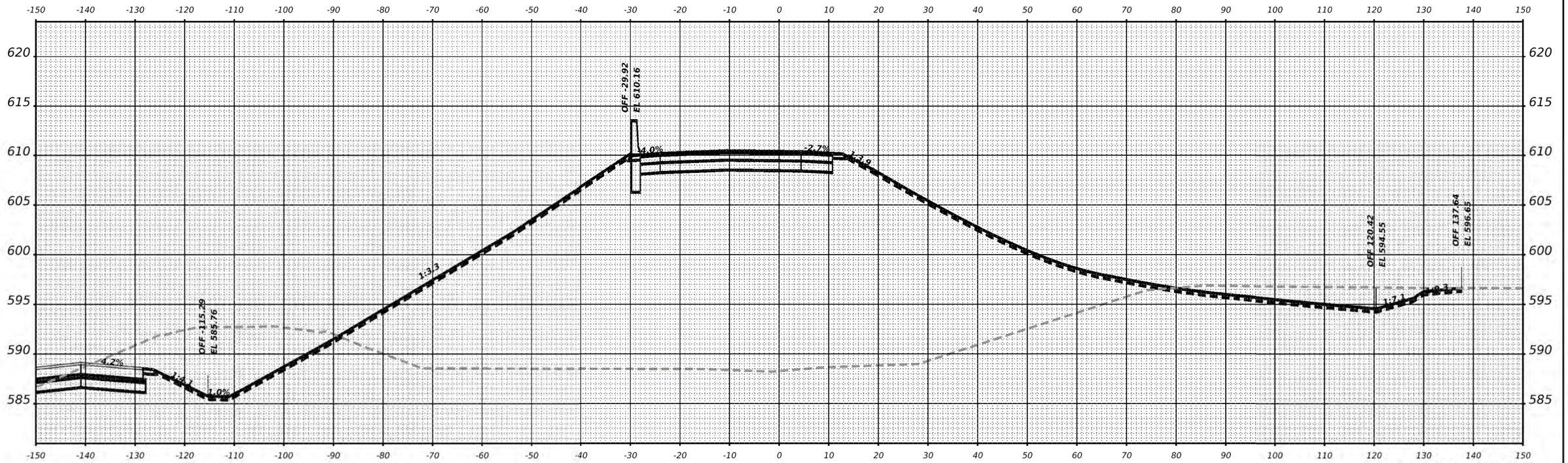
NOTE BOOK	SURVEYED		
NO.	PLOTTED		
	TEMPLATE		
	AREAS		
	AREAS CHECKED		

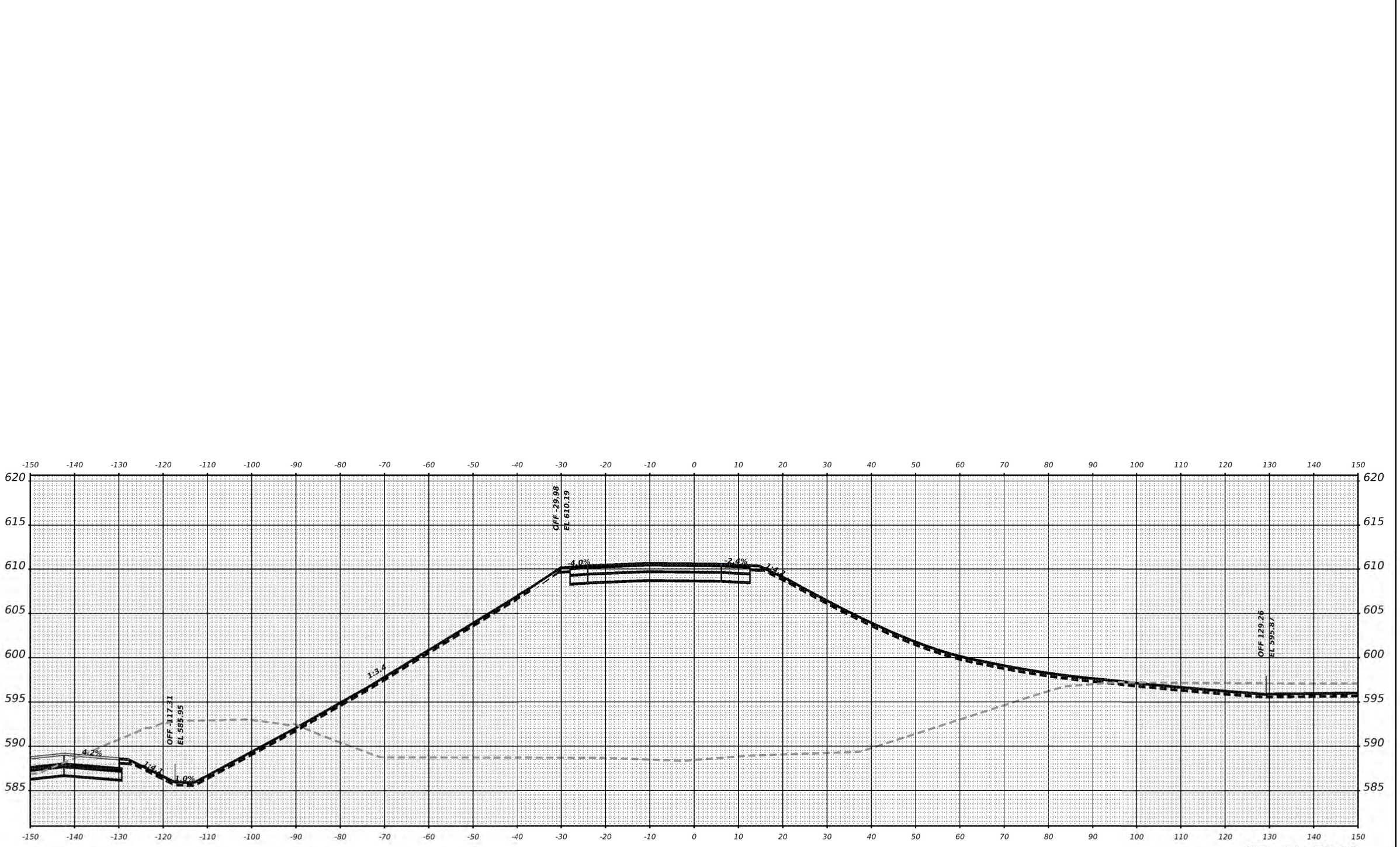


	USER NAME = donahuek1	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	CENTER STREET RAMP C CROSS SECTIONS RETAINING WALL #4
		DRAWN -	REVISED -		
	PLOT SCALE = 0.16666685 ' / in.	CHECKED -	REVISED -		SCALE: _____ SHEET 0 OF __ SHEETS STA. _____
	PLOT DATE = 8/16/2022	DATE -	REVISED -		

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

MODEL: RW4 1 - 14+45.00 [Sheet]
FILE NAME: D:\R22\R22-XS-RW4.dgn

FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
NO.	PLOTTED		
	TEMPLATE		
	AREAS		
	AREAS CHECKED		



STA 14+50.00

USER NAME = donahuek1	DESIGNED -		REVISED -
	DRAWN -		REVISED -
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PLOT DATE = 8/16/2022	DATE -		REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CENTER STREET RAMP C CROSS SECTIONS
RETAINING WALL #4

SCALE: _____ SHEET 4 OF __ SHEETS STA. _____

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

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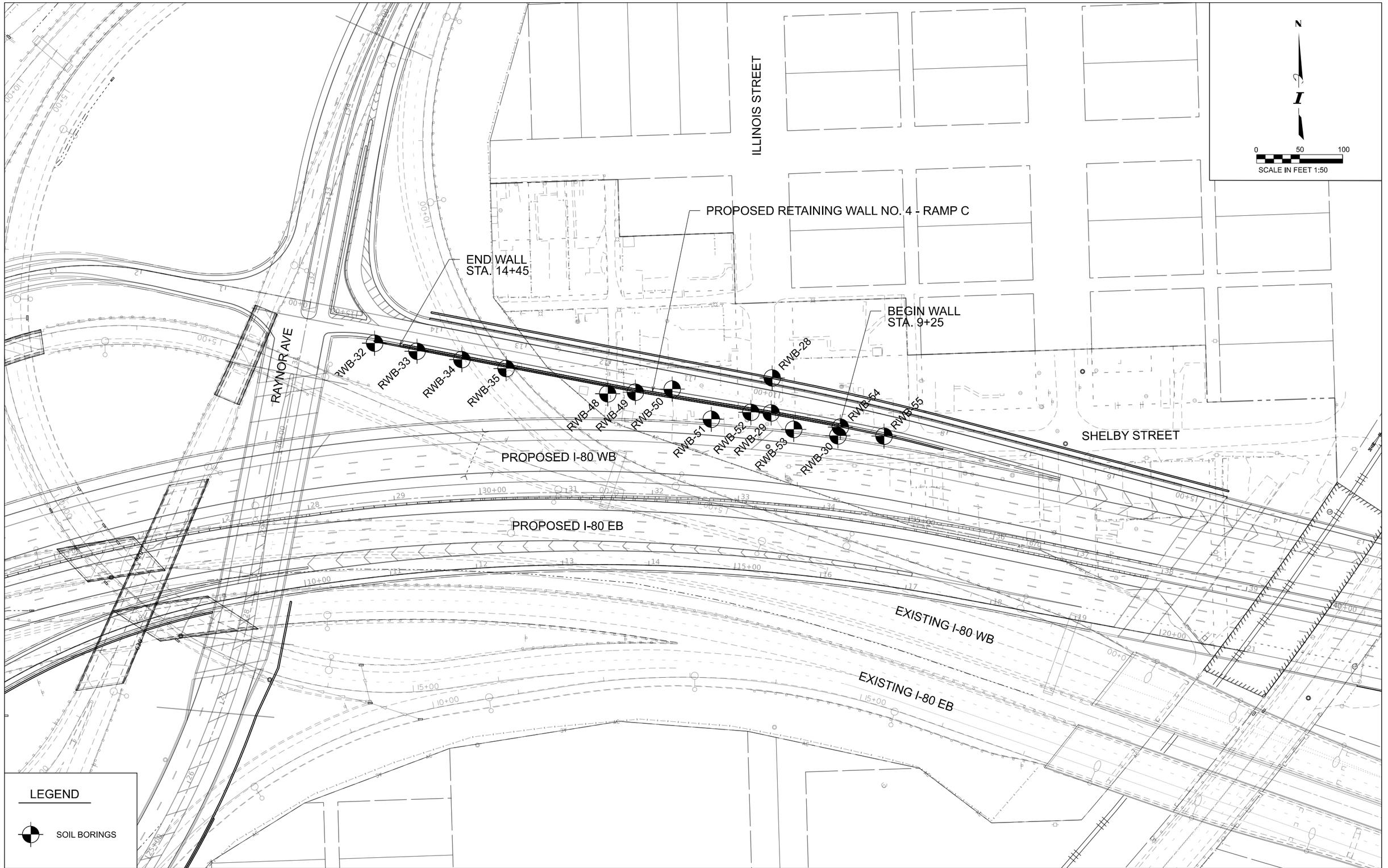
Appendix B

Soil Boring Location Plan and Soil Boring Profile



LEGEND

SOIL BORINGS

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PLOT SCALE = $SCALE$
USER NAME = rnano

GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME = rnano		DESIGNED - RM	
SHEET SIZE = $SHEETSIZE$		DRAWN - NN	
PLOT SCALE = $SCALE$		CHECKED - DE	
PLOT DATE = 6/3/2025		DATE - 05/20/2025	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

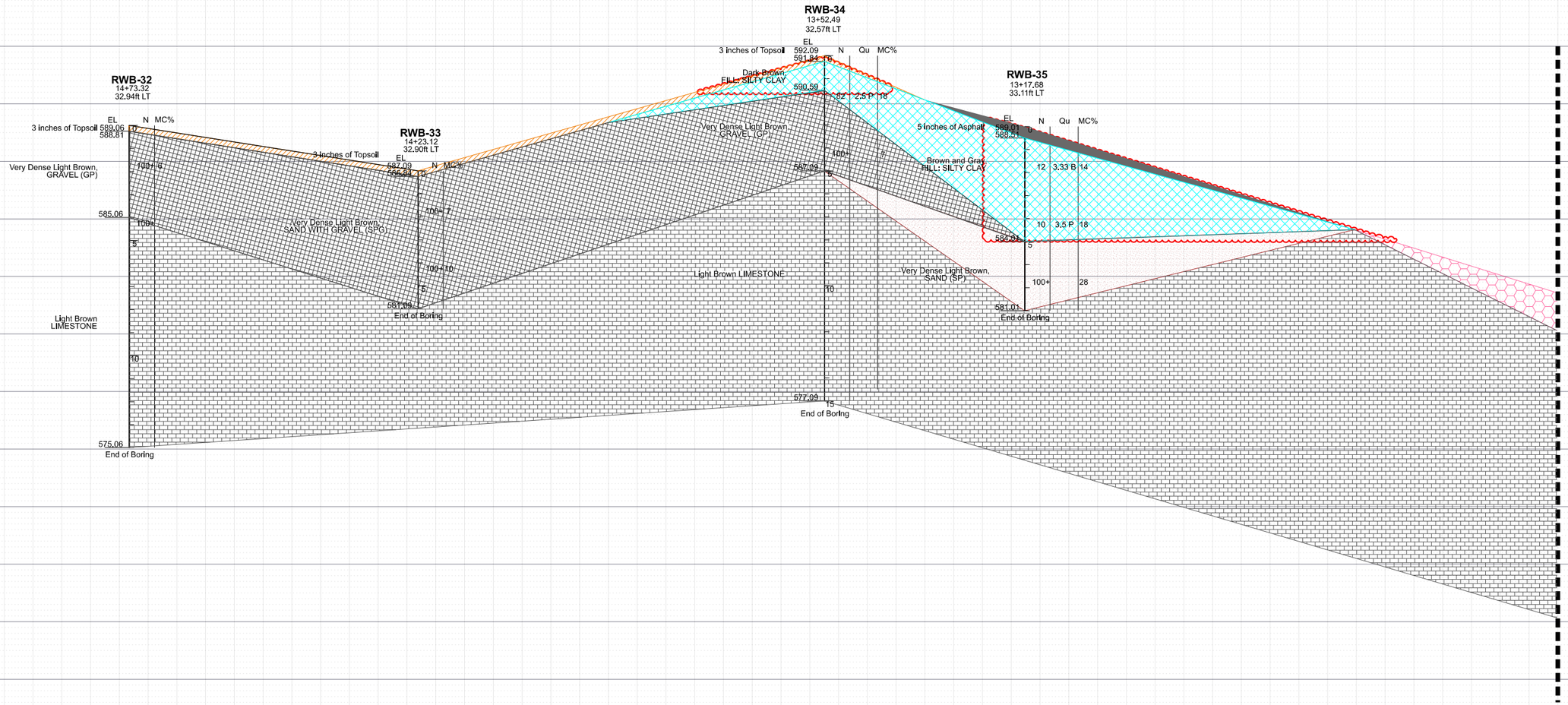
RETAINING WALL NO. 4 - RAMP C
SOIL BORING LOCATION PLAN
JOLIET, ILLINOIS

SCALE: 1:50 | SHEET 1 OF 1 SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	4	1
		CONTRACT NO. PTB-198-003		
	ILLINOIS	FED. AID PROJECT		

LEGEND

PAVEMENT		FILL: SAND / GRAVEL		SANDY CLAY / LOAM		GRAVEL	
BASE COURSE		SILTY CLAY		SILTY SAND / SANDY LOAM		APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFED	
TOPSOIL		SAND		ORGANIC SILTY CLAY			
FILL: CLAY / SILTY CLAY		SILT / SILTY LOAM		BEDROCK			



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USER NAME = nnano

GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= nnano	DESIGNED -	RM
SHEET SIZE	= $SHEETSIZE$	DRAWN -	NN
PLOT SCALE	= $SCALE$	CHECKED -	DE
PLOT DATE	= 6/3/2025	DATE -	05/20/2025

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL NO. 4

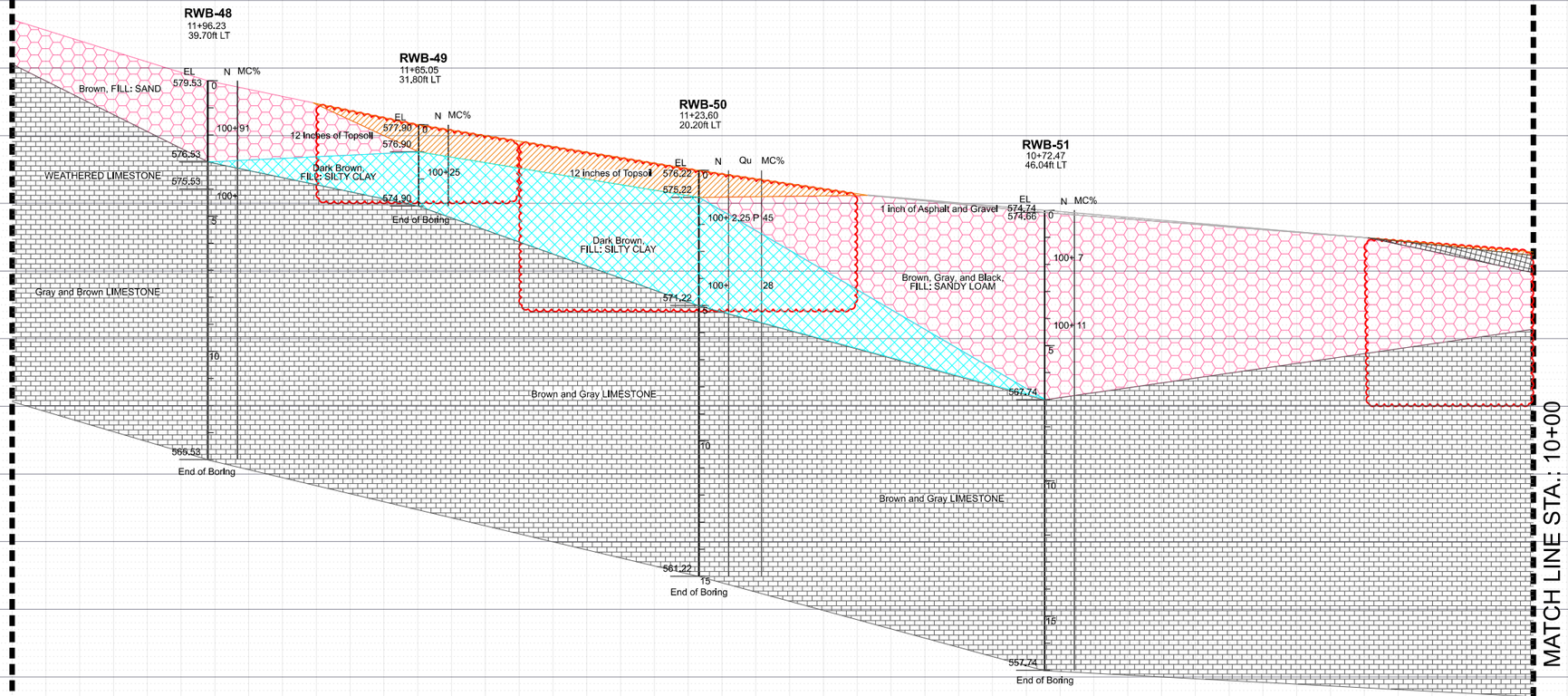
SOIL BORING PROFILE

SCALE: AS NOTED | SHEET 1 OF 3 SHEETS | STA. 14+75 | TO STA. 12+25

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	4	2
		CONTRACT NO. PTB- 198-003		
	ILLINOIS	FED. AID PROJECT		

LEGEND

PAVEMENT	FILL: SAND / GRAVEL	SANDY CLAY / LOAM	GRAVEL
BASE COURSE	SILTY CLAY	SILTY SAND / SANDY LOAM	APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFED
TOPSOIL	SAND	ORGANIC SILTY CLAY	
FILL: CLAY / SILTY CLAY	SILT / SILTY LOAM	BEDROCK	



GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= nnano	DESIGNED	- RM
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PLOT SCALE	= $SCALE$	CHECKED	- DE
PLOT DATE	= 6/3/2025	DATE	- 05/20/2025

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL NO. 4

SOIL BORING PROFILE

SCALE: AS NOTED | SHEET 2 OF 3 SHEETS | STA. 12+25 | TO STA. 10+00

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	4	3
		CONTRACT NO. PTB- 198-003		
	ILLINOIS	FED. AID PROJECT		

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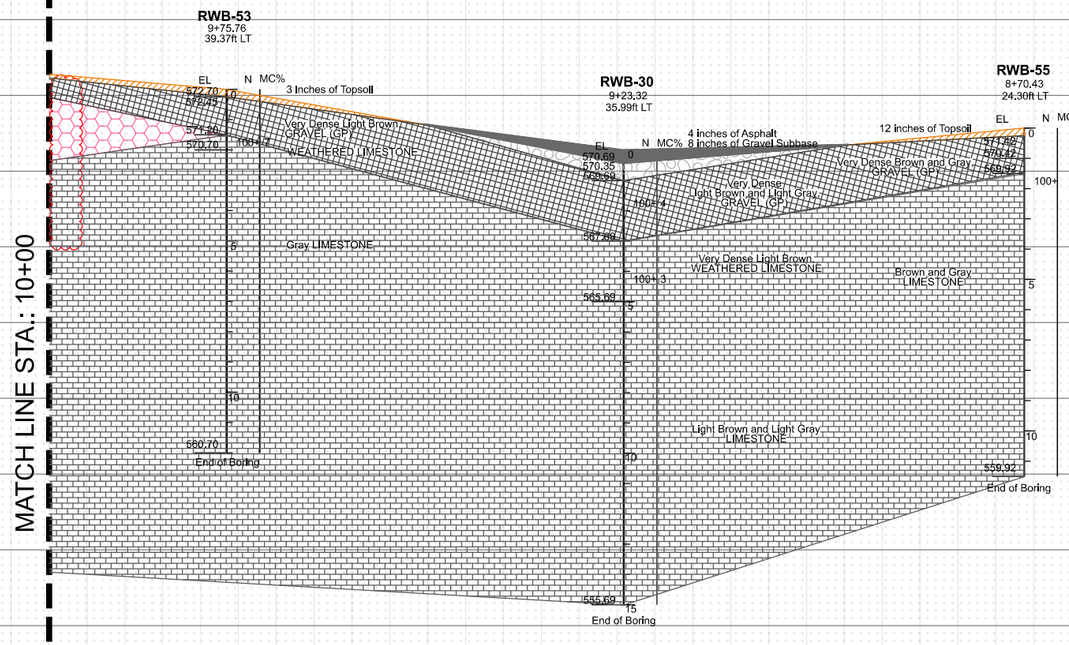
USER NAME = nnano

LEGEND

PAVEMENT		FILL: SAND / GRAVEL		SANDY CLAY / LOAM		GRAVEL	
BASE COURSE		SILTY CLAY		SILTY SAND / SANDY LOAM		APPROXIMATE EXTENT OF PROPOSED UNDERCUT TO BE FIELD VERIFED	
TOPSOIL		SAND		ORGANIC SILTY CLAY			
FILL: CLAY / SILTY CLAY		SILT / SILTY LOAM		BEDROCK			



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GSG CONSULTANTS, INC.
735 E. REMINGTON RD, SCHAUMBURG, IL 60173
TEL: +1630.994.2600 | WWW.GSG-CONSULTANTS.COM

USER NAME	= nnano	DESIGNED -	RM
SHEET SIZE	= $SHEETSIZE$	DRAWN -	NN
PLOT SCALE	= $SCALE$	CHECKED -	DE
PLOT DATE	= 6/4/2025	DATE -	05/20/2025

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

RETAINING WALL NO. 4

SOIL BORING PROFILE

SCALE: AS NOTED | SHEET 3 OF 3 SHEETS | STA. 10+00 | TO STA. 7+50

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		WILL	4	4
		CONTRACT NO. PTB- 198-003		
	ILLINOIS	FED. AID PROJECT		

Appendix C
Soil Boring Logs

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 10/27/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 **LOGGED BY** AA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto

DRILLING METHOD HSA **HAMMER EFF (%)** 89

STRUCT. NO. 099-W125
Station

BORING NO. RWB-28
Station 10+12.0163
Offset 14.41ft RT
Ground Surface Elev. 571.45 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
3 inches of Asphalt	571.20				
9 inches of Aggregate Subbase	570.45				
Very Dense, Light Brown, Moist GRAVEL, with sand (GP)			28 50/2"		5
	567.95				
Light Brown, Moist WEATHERED LIMESTONE			50/2"		
	566.95				
Light Brown and Light Gray LIMESTONE, Slightly Weathered, Moderately to Heavily Fractured, Trace Sand, Trace Vugs Run 1: 4.5' - 14.5' Recovery: 100% RQD: 42.9% (Poor)		-5 -10			
	556.95				
End of Boring		-15 -20			

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

BBS, form 137 (Rev. 8-99)

Retaining Wall #4
RWB-28
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
RWB-28	1	4.5' – 14.5'	100.0	42.9	Poor	6,516	Light Brown and Light Gray Limestone Slightly Weathered, Moderately to Heavily Fractured, Trace Sand, Trace Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 10/19/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 - Ramp C Sta 8+00 **LOGGED BY** AA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 96

STRUCT. NO. 099-W125
Station

BORING NO. RWB-29
Station 10+5.4610
Offset 25.76ft LT
Ground Surface Elev. 571.33 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
9 inches of Asphalt 3 inches of Aggregate Subbase	570.58 570.33				
Dark Brown and Dark Gray, Moist to Very Moist FILL: SILTY CLAY, with sand and gravel			7 18 50/3" 50/5"	0.8 P	26
Gray, Moist WEATHERED LIMESTONE	567.33	-5		0.5 P	16
Auger refusal at 6 feet End of Boring	565.33	-10 -15 -20			

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

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 10/27/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 **LOGGED BY** AA

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 89
Latitude , **Longitude**

STRUCT. NO. 099-W125
Station

BORING NO. RWB-30
Station 9+23.3189
Offset 35.99ft LT
Ground Surface Elev. 570.69 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4 inches of Asphalt	570.35				
8 inches of Gravel Subbase	569.69				
Very Dense Light Brown and Light Gray, Dry GRAVEL, with sand, some silt (GP)			6 23 50/0"		4
	567.69				
Very Dense Light Brown, Dry WEATHERED LIMESTONE			15 50/3"		3
	565.69	-5			
Light Brown and Light Gray LIMESTONE, Slightly to Moderately Weathered, Moderately to Heavily Fractured, Trace Vertical Fractures, Trace Sand, Trace Vugs Run 1: 5' - 15' Recovery: 95% RQD: 27.1% (Poor)		-10			
	555.69	-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)

Retaining Wall #4
RWB-30
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
RWB-30	1	5.0' – 15.0'	95.0	27.1	Poor	8,417	Light Brown and Light Gray Limestone Slightly to Moderately Weathered, Moderately to Heavily Fractured, Trace Vertical Fractures, Trace Sand, Trace Vugs

Illinois Department of Transportation

Division of Highways
GSG Consultants

SOIL BORING LOG

Date 8/19/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Diedrich D-50 ATV **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W125
Station

BORING NO. RWB-32
Station 14+73.3173
Offset 32.94ft LT
Ground Surface Elev. 589.06 ft

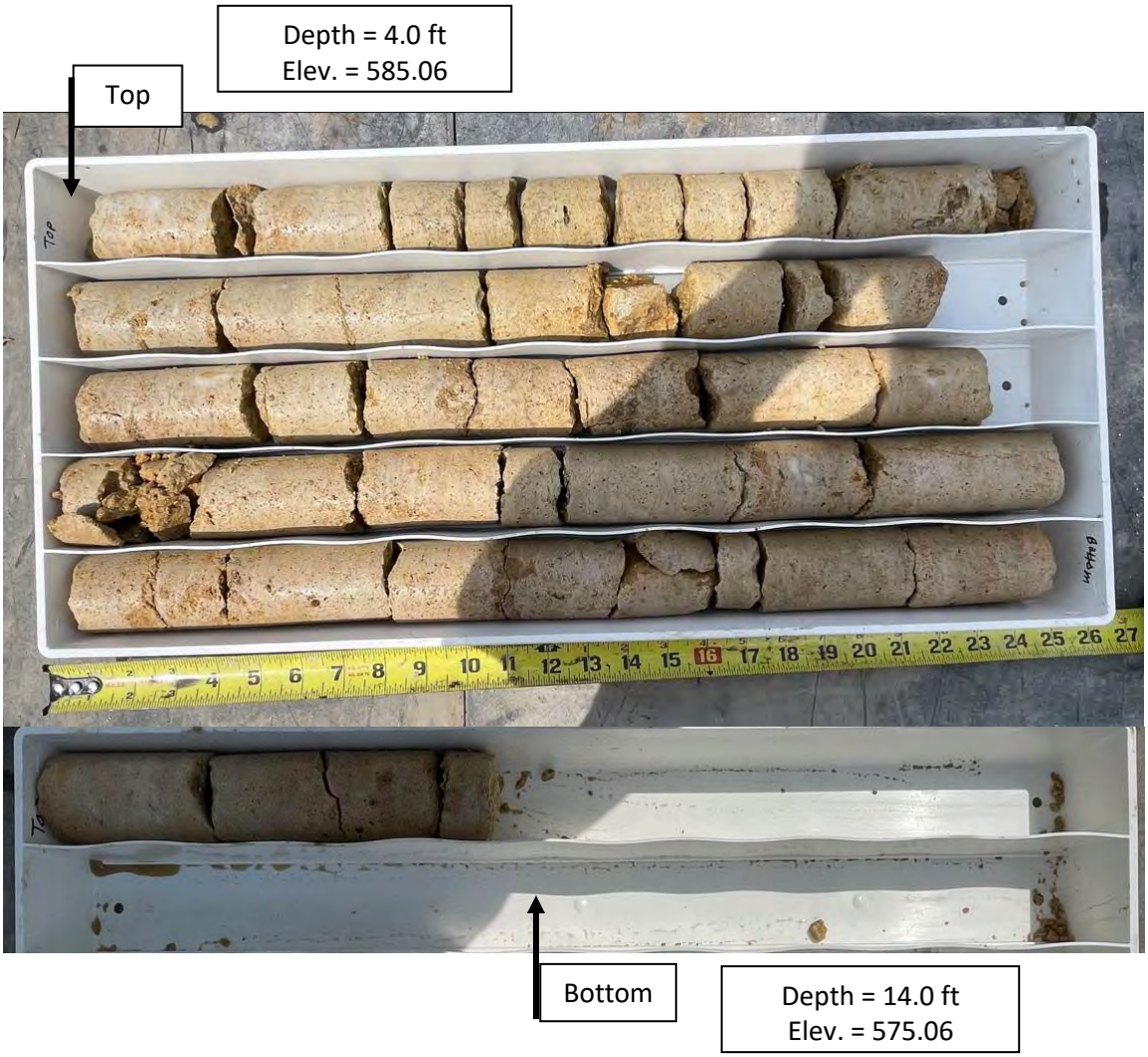
Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ___ **Hrs.** N/A ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
3 inches of Topsoil	588.81				
Very Dense Light Brown, Moist GRAVEL, some sand, some silt, trace clay (GP)			7 50/4"		6
	585.06		50/3"		
Light Brown LIMESTONE, Slightly Weathered, Moderately to Heavily Fractured, Trace Sand, Trace Clay at 7 feet, Some Vugs Run 1: 4' - 14' Recovery: 100% RQD: 37% (Poor)		-5 -10			
	575.06				
End of Boring		-15 -20			

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

Retaining Wall #4
RWB-32
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
RWB-32	1	4.0' – 14.0'	100.0	37.0	Poor	5,398	Light Brown Limestone Slightly Weathered, Moderately to Heavily Fractured, Trace Sand, Trace Clay at 7 feet, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 8/19/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 **LOGGED BY** KA

SECTION C-91-109-22 **LOCATION** , **SEC.** 17, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Diedrich D-50 ATV **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W125
Station

BORING NO. RWB-33
Station 14+23.1214
Offset 32.90ft LT
Ground Surface Elev. 587.09 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After _____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
3 inches of Topsoil 586.84				
Very Dense Light Brown, Moist SAND WITH GRAVEL, some silt, trace clay, trace roots (SPG)	5 9 50/3"		7	
	50/3"			
-5			10	
581.09				
Auger Refusal @ 6 feet End of Boring				
-10				
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 8/25/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Diedrich D-50 ATV **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 91

STRUCT. NO. 099-W125
Station

BORING NO. RWB-34
Station 13+52.4869
Offset 32.57ft LT
Ground Surface Elev. 592.09 ft

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
3 inches of Topsoil	591.84				
Dark Brown, Moist FILL: SILTY CLAY, some gravel, trace roots	590.59		16		
Very Dense Light Brown, Moist to Wet GRAVEL, some silt, little sand (GP)			32 50	2.5 P	18
			50/2"		
	587.09	-5			7
Light Brown LIMESTONE, Moderately to Slightly Weathered, Moderately to Heavily Fractured, Some Vertical Fractures, Trace Sand, Some Vugs Run 1: 5' - 15' Recovery: 100% RQD: 34% (Poor)		-10			
	577.09	-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)

BBS, form 137 (Rev. 8-99)

Retaining Wall #4
RWB-34
Will County, IL

Top

Depth =5.0 ft
Elev. = 587.09

Depth = 15.0 ft
Elev. = 577.09

Bottom

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Compressive Strength (psi)	Description
RWB-34	1	5.0' – 15.0'	100.0	34.0	Poor	15,194	Light Brown Limestone Moderately to Slightly Weathered, Moderately to Heavily Fractured, Some Vertical Fractures, Trace Sand, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 8/18/22

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 **LOGGED BY** DD

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 89

STRUCT. NO. 099-W125
Station

BORING NO. RWB-35
Station 13+17.6762
Offset 33.11ft LT
Ground Surface Elev. 589.01 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5 inches of Asphalt 588.51				
Brown and Gray, Moist FILL: SILTY CLAY, trace gravel, sand, brick		3		
		4 8	3.3 B	14
		4		
		4 6	3.5 P	18
584.01	-5			
Very Dense Light Brown, Wet SAND, trace gravel, trace organics (SP)		4		
		27 50/4"		28
581.01				
Auger Refusal @ 8 feet End of Boring				
	-10			
	-15			
	-20			

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

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/27/25

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 - Ramp C **LOGGED BY** DV

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** CME-75 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 78.8
Latitude , **Longitude**

STRUCT. NO. 099-W125
Station

BORING NO. RWB-48 (Wall 4)
Station 11+96.23
Offset 39.70ft LT
Ground Surface Elev. 579.53 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Brown, Wet FILL: SAND, with gravel			
	8		
	50/3"		91
576.53			
WEATHERED LIMESTONE			
575.53	50/2"		
Auger refusal at 4 feet			
-5			
Gray and Brown LIMESTONE, moderately weathered, slightly to moderately fractured, trace shale Run 1: 4' - 14' Recovery: 95.0% RQD: 55.0% (Fair)			
-10			
565.53			
End of Boring			
-15			
-20			

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

Retaining Wall #4 – Ramp C
Boring Number: RWB-48
Will County, IL

Top

Depth = 4 ft
Elev. = 575.53 ft

Depth = 14 ft
Elev. = 565.53 ft

Bottom

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-48	1	4’-14’	95.0	55.0	Fair	Gray and Brown Limestone Slightly Weathered, Moderately to Heavily Fractured, Trace Shale

Illinois Department of Transportation
Division of Highways
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SOIL BORING LOG

Date 3/21/25

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 - Ramp C **LOGGED BY** AK

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Diedrich D-50 **HAMMER TYPE** Auto

DRILLING METHOD HSA **HAMMER EFF (%)** 97.7

STRUCT. NO. 099-W125
Station

BORING NO. RWB-49 (Wall 4)
Station 11+65.05
Offset 31.80ft LT
Ground Surface Elev. 577.90 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
12 inches of Topsoil				
576.90				
Dark Brown, Moist	50/4"			
FILL: SILTY CLAY, little gravel, trace roots			25	
574.90				
Auger refusal at 3 feet				
End of Boring				
-5				
-10				
-15				
-20				

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

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/21/25

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 - Ramp C **LOGGED BY** AK

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 97.7

STRUCT. NO. 099-W125
Station

BORING NO. RWB-50 (Wall 4)
Station 11+23.60
Offset 20.20ft LT
Ground Surface Elev. 576.22 ft

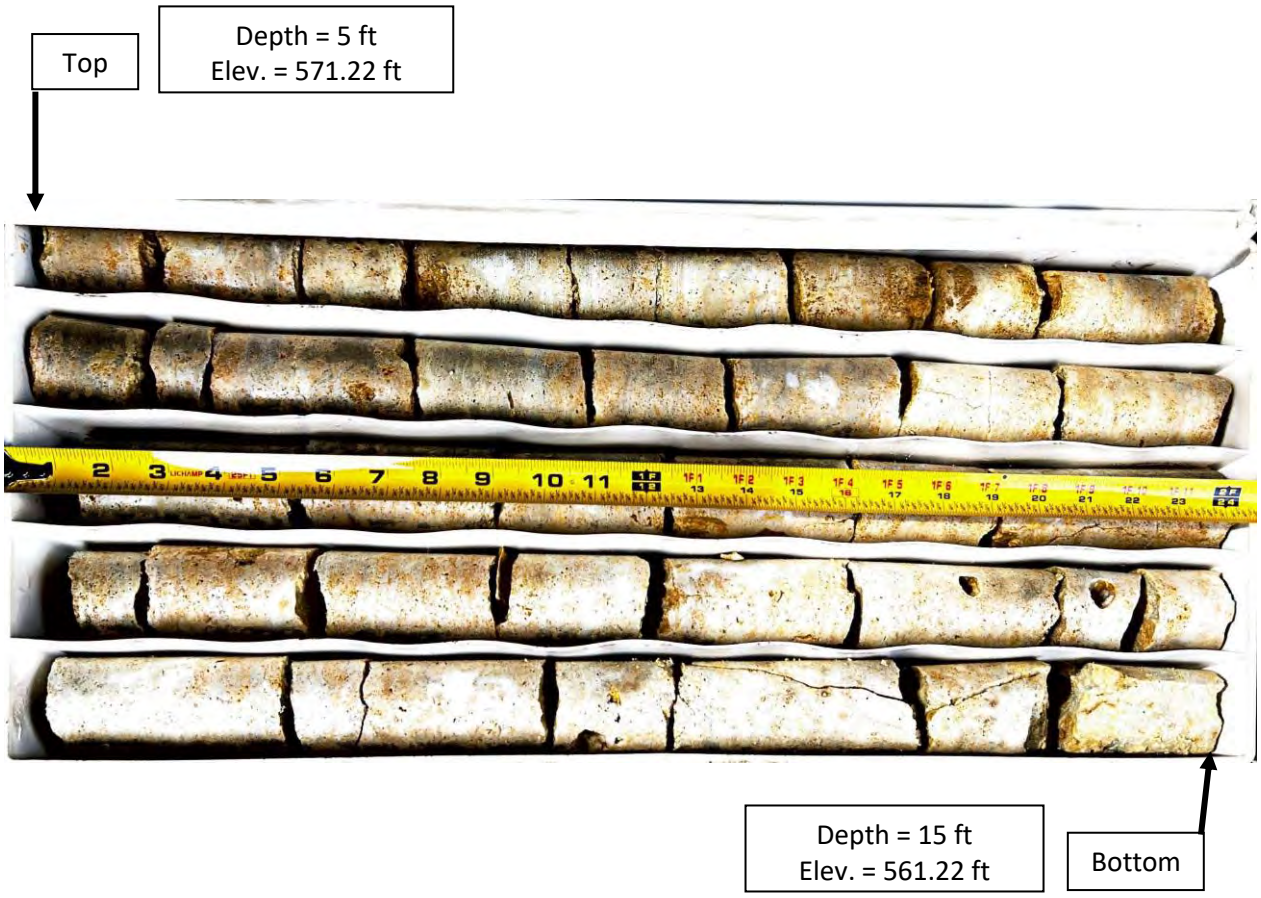
Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After ____ **Hrs.** N/A ft

	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
12 inches of Topsoil				
575.22				
Dark Brown, Very Moist		50/4"		
FILL: SILTY CLAY, with sand, little gravel, trace concrete			2.3 P	45
		50/5"		
				28
571.22	-5			
Auger refusal at 5 feet				
Brown and Gray LIMESTONE, slightly weathered, moderately to heavily fractured, some vugs				
Run 1: 5' - 15' Recovery: 100% RQD: 28.8% (Poor)				
	-10			
561.22	-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)

Retaining Wall #4 – Ramp C
RWB-50
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-50	1	5’ – 15’	100	28.8	Poor	Brown and Gray Limestone Slightly Weathered, Moderately to Heavily Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/21/25

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 - Ramp C **LOGGED BY** AK

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Diedrich D-50 **Latitude** , **Longitude**
DRILLING METHOD HSA **HAMMER TYPE** Auto **HAMMER EFF (%)** 97.7

STRUCT. NO. 099-W125
Station

BORING NO. RWB-51
Station 10+72.47
Offset 46.04ft LT
Ground Surface Elev. 574.74 ft

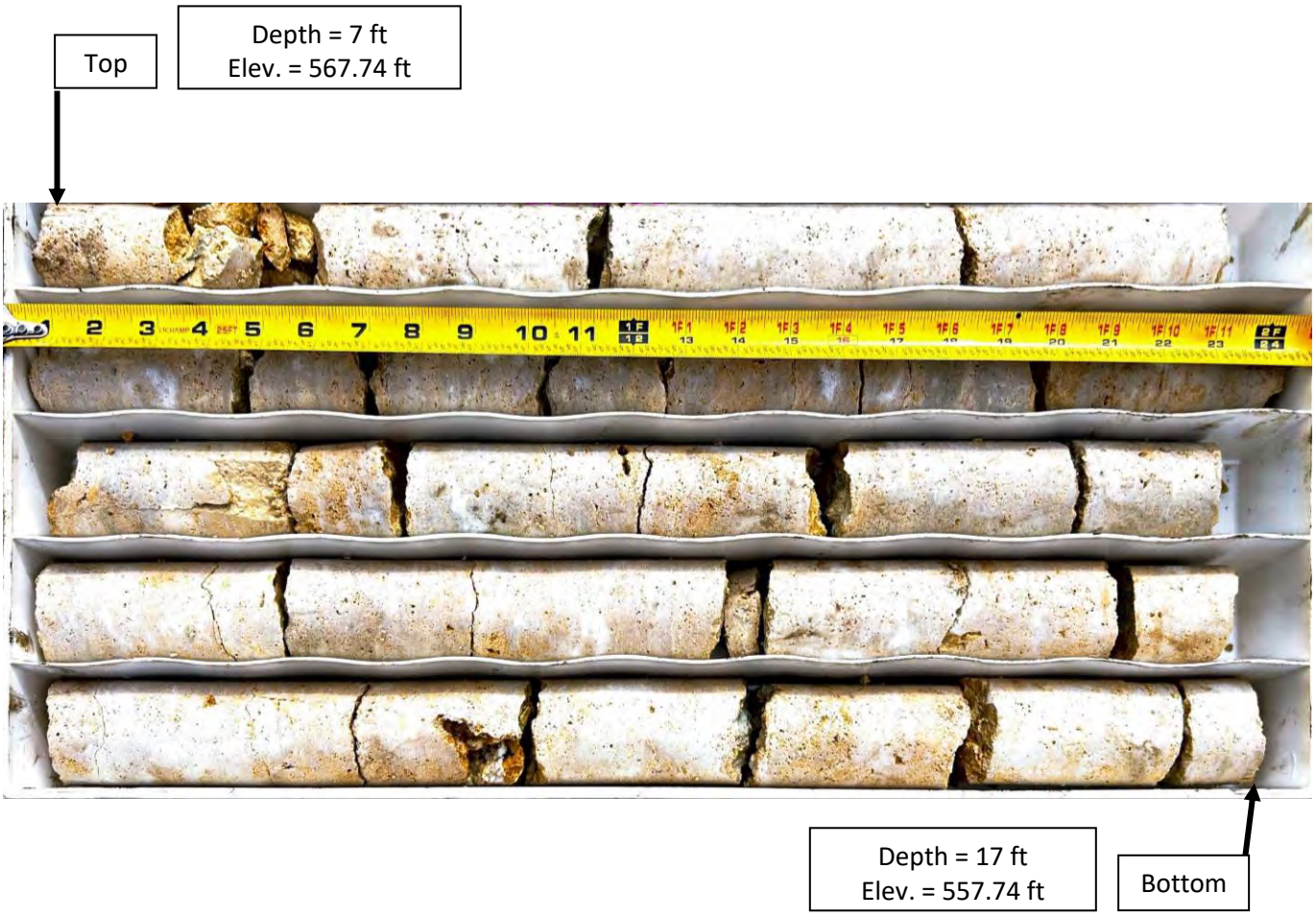
Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion N/A ft
After Hrs. N/A ft

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
1 inch of Asphalt and Gravel 574.66			
Brown, Gray, and Black, Moist FILL: SANDY LOAM, some gravel, trace concrete	50/5"		
			7
	50/5"		
			11
-5			
567.74			
Auger refusal at 7 feet Brown and Gray LIMESTONE, slightly weathered, moderately to heavily fractured, some vugs Run 1: 7' to 17' Recovery: 96.7% RQD: 58.3% (Fair)			
-10			
-15			
557.74			
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)

Retaining Wall #4 – Ramp C
RWB-51
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-51	1	7’ – 17’	96.7	58.3	Fair	Brown and Gray Limestone Slightly Weathered, Moderately to Heavily Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/20/25

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 - Ramp C **LOGGED BY** SB

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto

DRILLING METHOD HSA **HAMMER EFF (%)** 89

STRUCT. NO. 099-W125
Station

BORING NO. RWB-52
Station 10+28.75
Offset 29.50ft LT
Ground Surface Elev. 573.43 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
5 inches of Topsoil	573.01				
Very Dense Light Brown, Moist GRAVEL, with sand (GP)	571.93		50/3"		
WEATHERED LIMESTONE	571.43				
Auger refusal at 2 feet End of Boring		-5 -10 -15 -20			

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

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/20/25

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 - Ramp C **LOGGED BY** SB

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto
DRILLING METHOD HSA **HAMMER EFF (%)** 89
Latitude , **Longitude**

STRUCT. NO. 099-W125
Station

BORING NO. RWB-53
Station 9+75.76
Offset 39.37ft LT
Ground Surface Elev. 572.70 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
3 inches of Topsoil	572.45				
Very Dense Light Brown, Moist GRAVEL, with sand, trace clay (GP)	571.20 570.70		50/5"		7
WEATHERED LIMESTONE					
Auger refusal at 2 feet Gray LIMESTONE, slightly to moderately weathered, moderately to heavily fractured, some vugs Run 1: 2' - 12' Recovery: 100% RQD: 26.3% (Poor)		-5 -10			
	560.70				
End of Boring		-15 -20			

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

Retaining Wall #4 – Ramp C
RWB-53
Will County, IL

Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-53	1	2’ – 12’	100	26.3	Poor	Brown and Gray Limestone Slightly to Moderately Weathered, Moderately to Heavily Fractured, Some Vugs

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 3/20/25

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 - Ramp C **LOGGED BY** SB

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,

Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto

DRILLING METHOD HSA **HAMMER EFF (%)** 89

STRUCT. NO. 099-W125
Station

BORING NO. RWB-54
Station 9+22.71
Offset 25.49ft LT
Ground Surface Elev. 572.26 **ft**

Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After Hrs. N/A **ft**

		DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
4 inches of Topsoil	571.93				
Very Dense Brown, Wet GRAVEL, trace clay, trace roots (GP)	570.76		50/3"		
WEATHERED LIMESTONE	570.26				22
Auger refusal at 2 feet End of Boring					
		-5			
		-10			
		-15			
		-20			

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

Illinois Department of Transportation
Division of Highways
GSG Consultants

SOIL BORING LOG

Date 4/29/25

ROUTE I-80 **DESCRIPTION** Retaining Wall No. 4 - Ramp C **LOGGED BY** DV

SECTION C-91-109-22 **LOCATION** , **SEC.** 16, **TWP.** 35 N, **RNG.** 10 E,
Latitude , **Longitude**

COUNTY Will **DRILLING RIG** Mobile B-57 **HAMMER TYPE** Auto
DRILLING METHOD MUD ROTARY **HAMMER EFF (%)** 89

STRUCT. NO. 099-W125
Station

BORING NO. RWB-55
Station 8+70.43
Offset 24.30ft LT
Ground Surface Elev. 571.42 **ft**

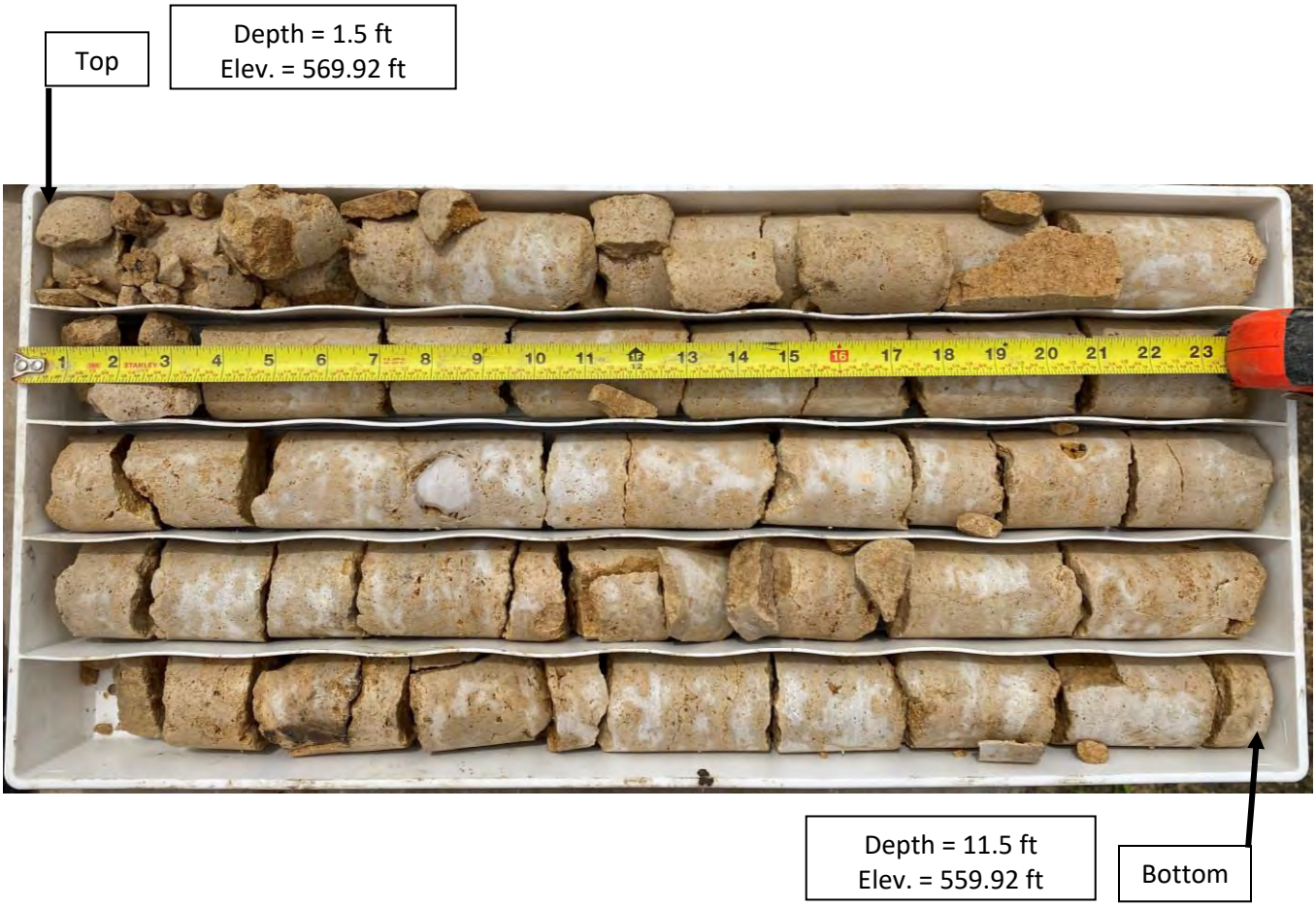
Surface Water Elev. N/A **ft**
Stream Bed Elev. N/A **ft**

Groundwater Elev.:
First Encounter Dry **ft**
Upon Completion N/A **ft**
After ____ **Hrs.** N/A **ft**

DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)	
12 inches of Topsoil				
570.42				
Very Dense	6			
569.92				
Brown and Gray, Moist GRAVEL, with sand (GP)	50/2"			
Auger refusal at 1.5 feet				
Brown and Gray LIMESTONE, slightly to moderately weathered, heavily fractured, some vugs				
-5				
Run 1: 1.5' - 11.5' Recovery: 100% RQD: 10.8% (Very Poor)				
-10				
559.92				
End of Boring				
-15				
-20				

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

Retaining Wall #4 – Ramp C
RWB-55
Will County, IL



Boring No.	Run	Depth (ft)	Recovery (%)	RQD (%)	RQD Classification	Description
RWB-55	1	1.5’ – 11.5’	100	10.8	Very Poor	Brown and Gray Limestone Slightly to Moderately Weathered, Heavily Fractured, Some Vugs

Appendix D
Laboratory Test Results

Order # 955

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	RWB-28			Bulk/Prep	MC/CS
Sample Depth (ft):	7.5-8		Tester:	AJ	Tester: AJ
Lithological Description:	Sandy stone		Date:	11/02/22	Date: 11/02/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical

Appearance (e.g. cracks, shearing, spalling):

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.3520	4.3475	4.3425	4.3473
Diameter, *in.*	1.9860	1.9885	1.9855	1.9867

Specimen Mass, *g*	584.7	Ratio (2.0-2.5)	
Bulk Density, *pcf*	165.3		2.19

Moisture Condition - D2216

Container ID	22
container, *g*	469.2
container + wet rock, *g*	1034.8
container + dry soil, *g*	1019.2
moisture content, *w%*	2.8

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

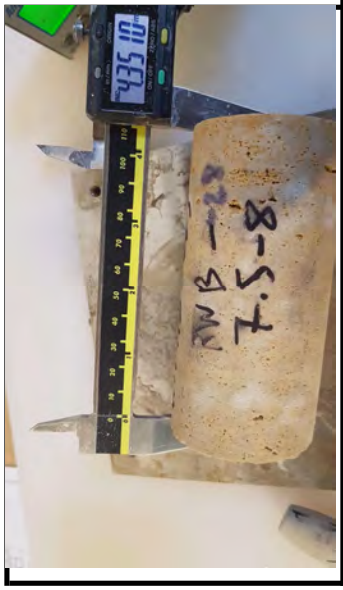
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 24 sec
Load @ Failure, *lbf*	20,200
Uniaxial Compressive Strength, *psi*	6,516

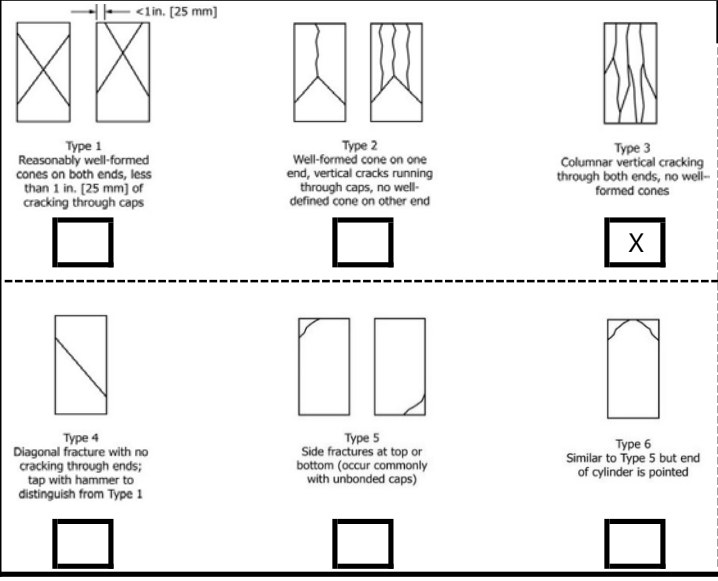
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



After Break (check applicable appearance)



Sketch if Other:

Order # 955

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	RWB-30			Bulk/Prep	MC/CS
Sample Depth (ft):	14-14.5		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	11/02/22	Date: 11/02/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			holes		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.5130	4.5105	4.5110	4.5115
Diameter, *in.*	1.9835	1.9825	1.9845	1.9835

Specimen Mass, *g*	606.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	165.6		2.27

Moisture Condition - D2216

Container ID	24
container, *g*	471.2
container + wet rock, *g*	1071.7
container + dry soil, *g*	1057.1
moisture content, *w%*	2.5

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

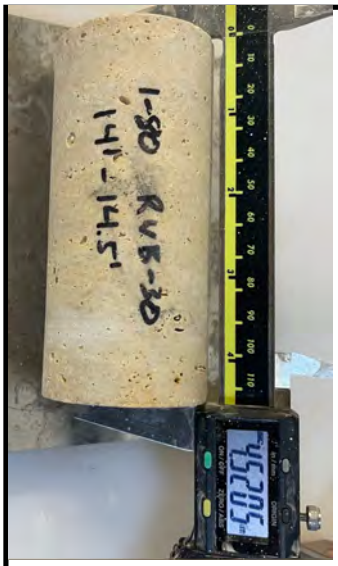
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 47 sec
Load @ Failure, *lbf*	26,009
Uniaxial Compressive Strength, *psi*	8,417

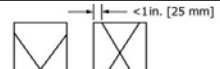
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation

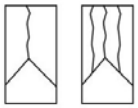


After Break (check applicable appearance)



Type 1
Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps

☐



Type 2
Well-formed cone on one end, vertical cracks running through caps, no well-defined cone on other end

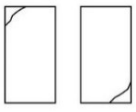
☐

Type 3
Columnar vertical cracking through both ends, no well-formed cones

X

Type 4
Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1

☐



Type 5
Side fractures at top or bottom (occur commonly with unbonded caps)

☐

Type 6
Similar to Type 5 but end of cylinder is pointed

☐

☐ Sketch if Other:

Order # 942

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
735 Remington Road, Schaumburg, IL 60173
Tel: 630.994.2600, www.gsg-consultants.com

Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	RWB-32		Bulk/Prep		MC/CS
Sample Depth (ft):	12-12.5		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	10/26/22	Date: 10/26/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks and holes		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	3.3420	3.3450	3.3455	3.3442
Diameter, *in.*	1.9840	1.9855	1.9860	1.9852

Specimen Mass, *g*	420.0	Ratio (2.0-2.5)	
Bulk Density, *pcf*	154.6	1.68	

Moisture Condition - D2216

Container ID	OREO
container, *g*	226.5
container + wet rock, *g*	646.0
container + dry soil, *g*	642.0
moisture content, *w%*	1.0

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	1 min 8 sec
Load @ Failure, *lbf*	16,708
Uniaxial Compressive Strength, *psi*	5,398

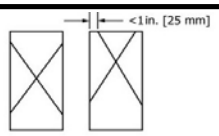
Remarks

Test Speciman non-comformancy with standard D7012 for Lengh to diameter ratio requirements due to lack of available specimens , The results may differ from results obtained from a test specimen that meets the requirements Lengh to diameter ratio.

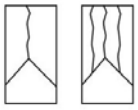
After Preparation

Sketch

After Break (check applicable appearance)



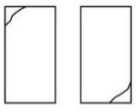
Type 1
Reasonably well-formed cones on both ends, less than 1 in. [25 mm] of cracking through caps
☐



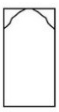
Type 2
Well-formed cone on one end, vertical cracks running through caps, no well-defined cone on other end
☐

Type 3
Columnar vertical cracking through both ends, no well-formed cones
X

Type 4
Diagonal fracture with no cracking through ends; tap with hammer to distinguish from Type 1
☐



Type 5
Side fractures at top or bottom (occur commonly with unbonded caps)
☐



Type 6
Similar to Type 5 but end of cylinder is pointed
☐

☐ Sketch if Other:

Order # 942

Compressive Strength of Rock by ASTM D7012 - Method C

GSG CONSULTANTS, INC.
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Project Name:	WSP_198-003 I-80		Project No:	21-2007	
Boring ID:	RWB-34			Bulk/Prep	MC/CS
Sample Depth (ft):	11-11.5		Tester:	SM	Tester: SM
Lithological Description:	Limestone		Date:	10/26/22	Date: 10/26/22
Formation Name:		Load Direction:	Vertical	Angle Drilled:	Vertical
Appearance (e.g. cracks, shearing, spalling):			cracks		

Bulk Density Determination

	1	2	3	Average
Height, *in.*	4.4840	4.5025	4.4855	4.4907
Diameter, *in.*	1.9835	1.9845	1.9855	1.9845

Specimen Mass, *g*	607.9	Ratio (2.0-2.5)	
Bulk Density, *pcf*	166.8	2.26	

Moisture Condition - D2216

Container ID	BLOOD
container, *g*	226.9
container + wet rock, *g*	758.3
container + dry soil, *g*	746.9
moisture content, *w%*	2.2

Preparation Check	Yes	No	Reason/Readings If No:
Ends Flat within 0.02 mm prior to capping?	X		
Ends perpendicular to side within 0.25 degrees?	X		
Ends parallel to each other within 0.25 degrees?	X		

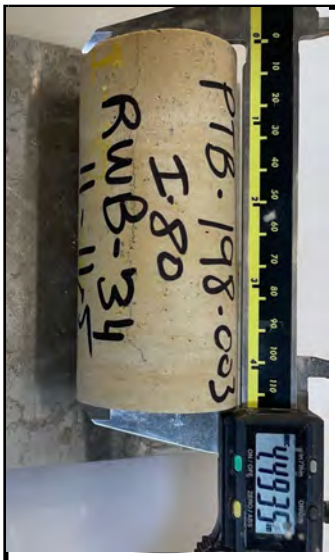
Axial Loading

Seating Load (≤1000 psi)	1000
Rate of Loading (73-145 psi/s)	75
Time to Failure (2-15 min)	3 min 12 sec
Load @ Failure, *lbf*	46,995
Uniaxial Compressive Strength, *psi*	15,194

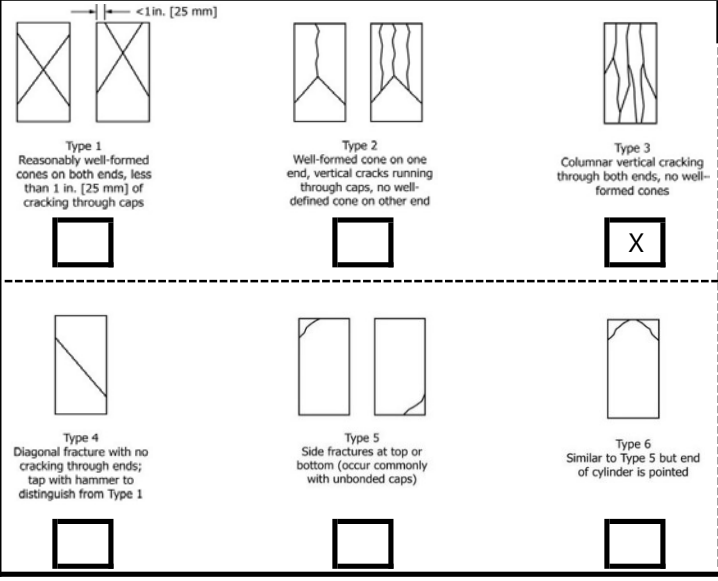
Remarks

Best efforts have been made for the specimen to meet the required tolerances of D4543. See IH3 Procedure for efforts made.

After Preparation



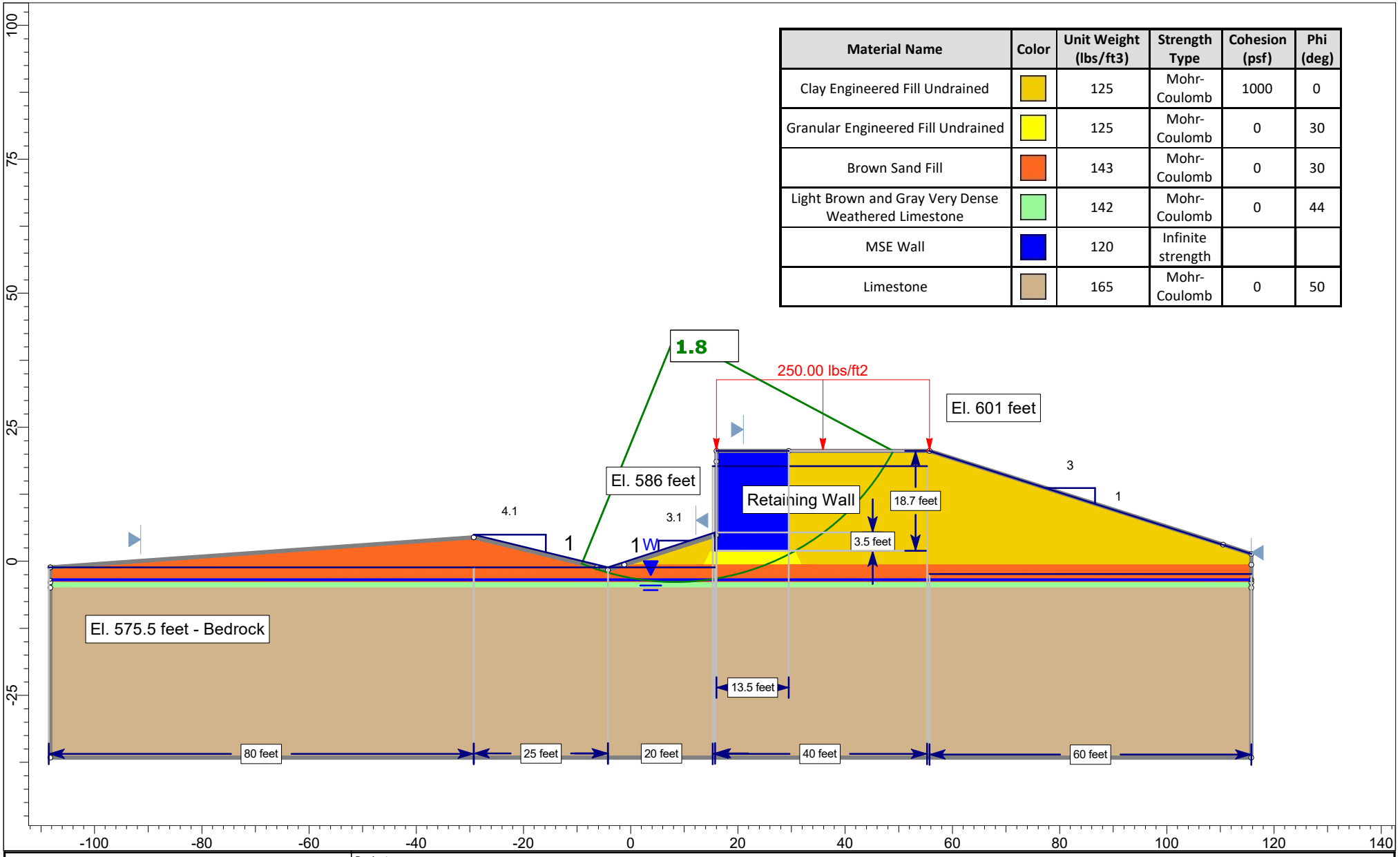
After Break (check applicable appearance)



☐ Sketch if Other:

Appendix E
Slope Stability Analysis Exhibits

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Clay Engineered Fill Undrained		125	Mohr-Coulomb	1000	0
Granular Engineered Fill Undrained		125	Mohr-Coulomb	0	30
Brown Sand Fill		143	Mohr-Coulomb	0	30
Light Brown and Gray Very Dense Weathered Limestone		142	Mohr-Coulomb	0	44
MSE Wall		120	Infinite strength		
Limestone		165	Mohr-Coulomb	0	50



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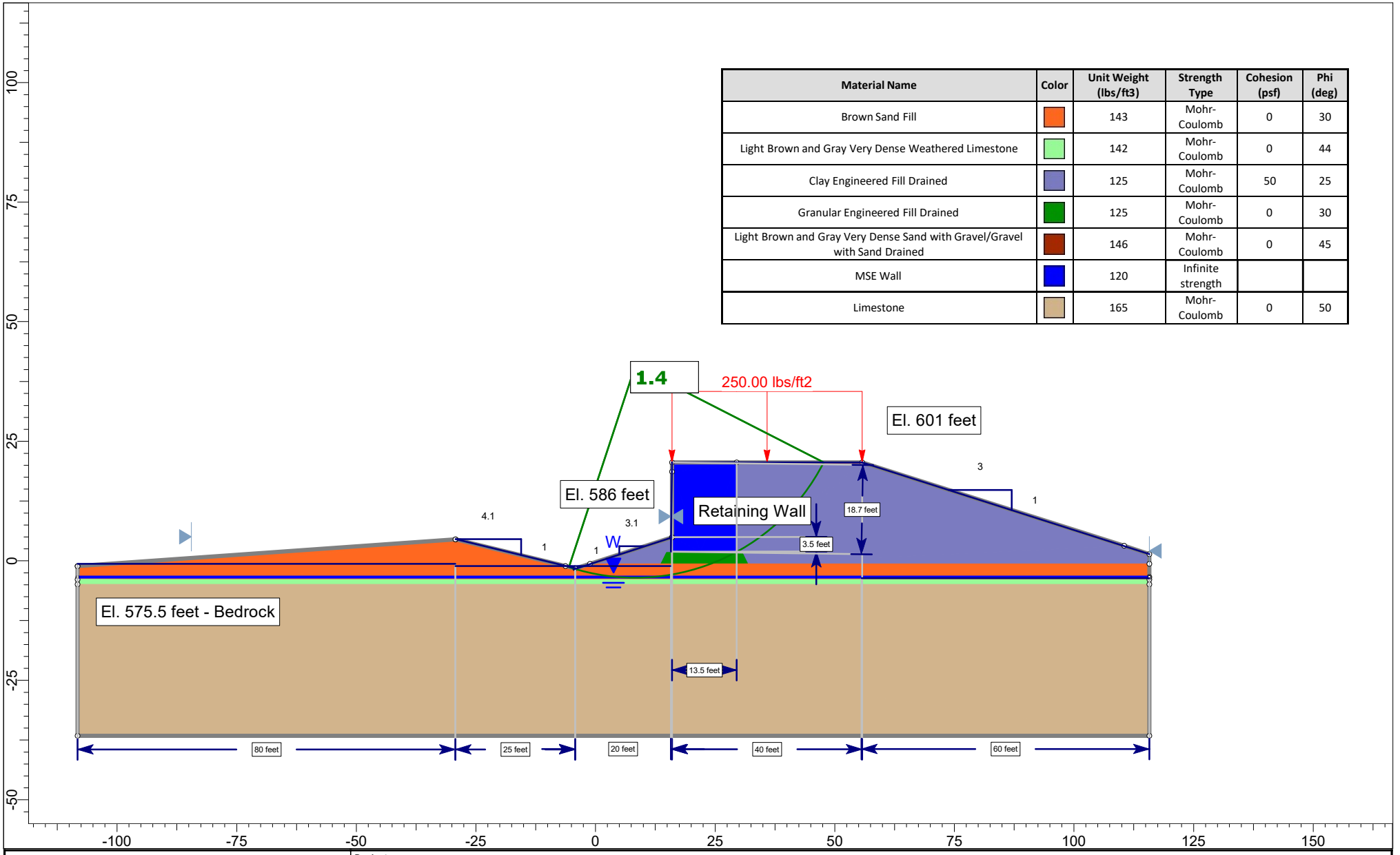
Project	IDOT PTB 198-003 - Retaining Wall #4		
Group	0.7H	Scenario	Short Term Stability - Water El. 577 feet
Drawn By	RM	Company	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	File Name	Retaining Wall #4 0.7H.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Brown Sand Fill		143	Mohr-Coulomb	0	30
Light Brown and Gray Very Dense Weathered Limestone		142	Mohr-Coulomb	0	44
Clay Engineered Fill Drained		125	Mohr-Coulomb	50	25
Granular Engineered Fill Drained		125	Mohr-Coulomb	0	30
Light Brown and Gray Very Dense Sand with Gravel/Gravel with Sand Drained		146	Mohr-Coulomb	0	45
MSE Wall		120	Infinite strength		
Limestone		165	Mohr-Coulomb	0	50



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Date	7/15/2021, 12:22:18 PM	File Name	Retaining Wall #4 0.7H.slmd

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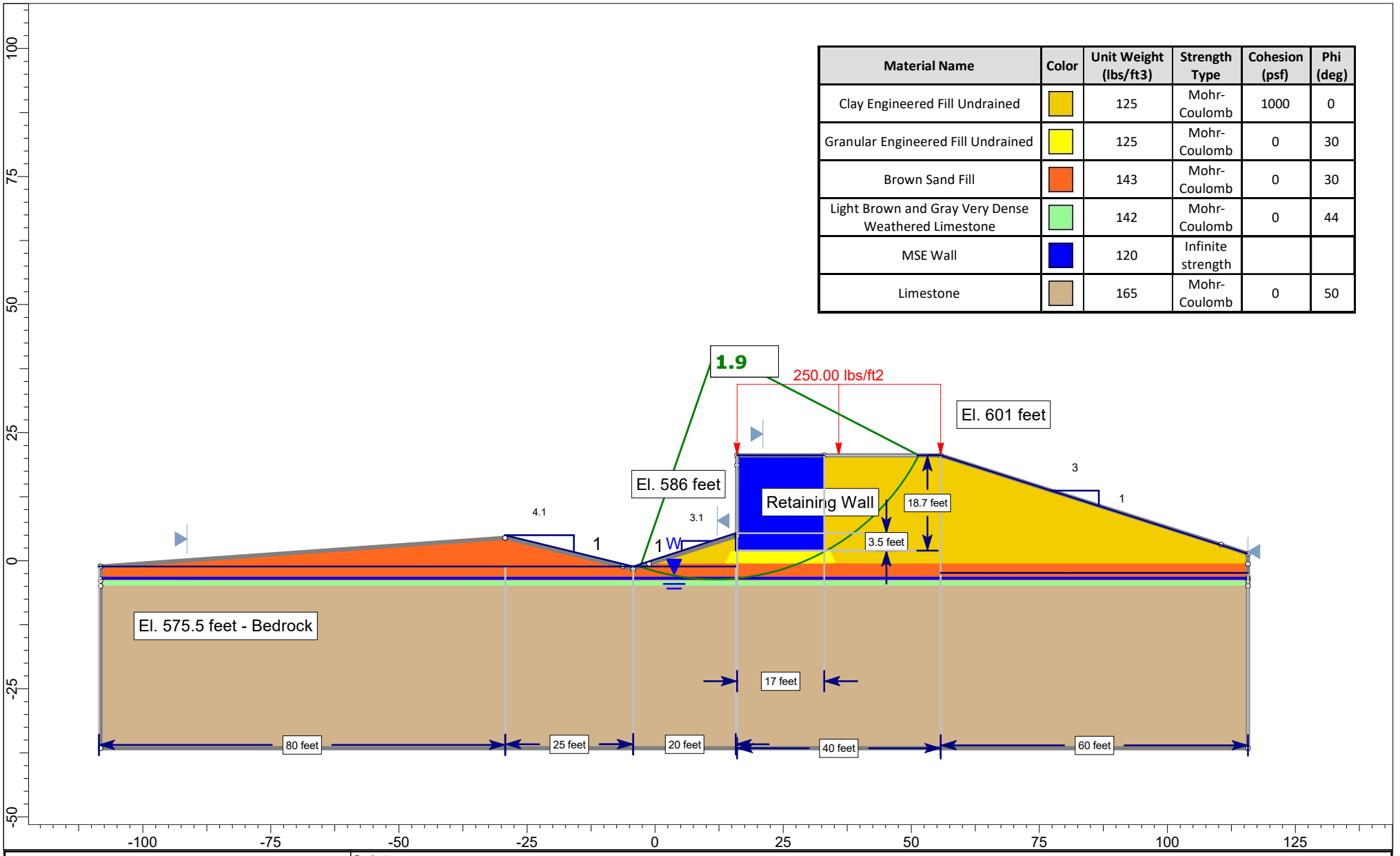
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Clay Engineered Fill Undrained		125	Mohr-Coulomb	1000	0
Granular Engineered Fill Undrained		125	Mohr-Coulomb	0	30
Brown Sand Fill		143	Mohr-Coulomb	0	30
Light Brown and Gray Very Dense Weathered Limestone		142	Mohr-Coulomb	0	44
MSE Wall		120	Infinite strength		
Limestone		165	Mohr-Coulomb	0	50



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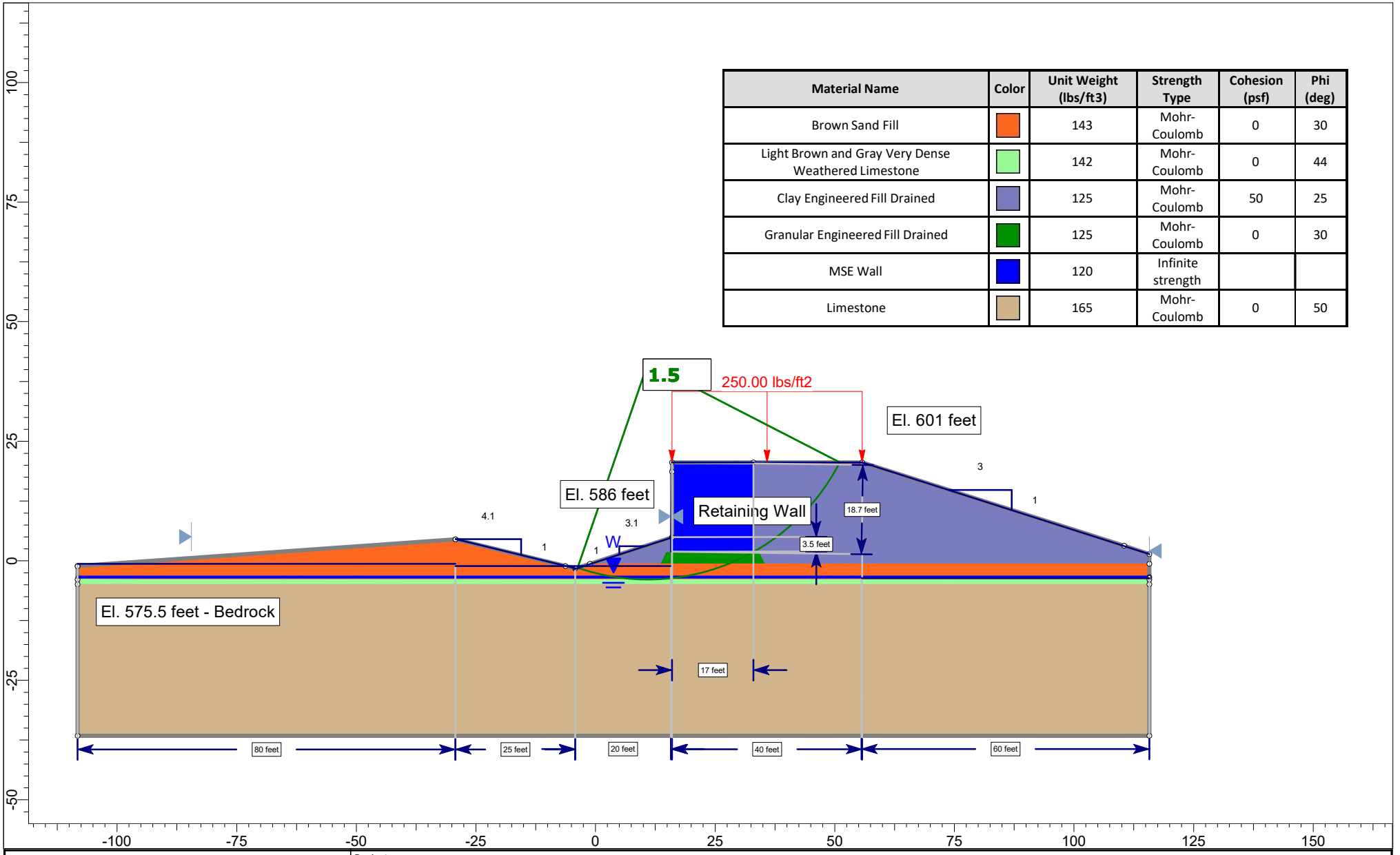
Project	IDOT PTB 198-003 - Retaining Wall #4		
Group	0.9H	Scenario	Short Term Stability - Water El. 577 feet
Drawn By	RM	Company	GSG Consultants, Inc.
Date	7/15/2021, 12:22:18 PM	File Name	Retaining Wall #4 0.8H.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Brown Sand Fill		143	Mohr-Coulomb	0	30
Light Brown and Gray Very Dense Weathered Limestone		142	Mohr-Coulomb	0	44
Clay Engineered Fill Drained		125	Mohr-Coulomb	50	25
Granular Engineered Fill Drained		125	Mohr-Coulomb	0	30
MSE Wall		120	Infinite strength		
Limestone		165	Mohr-Coulomb	0	50



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Appendix F
Summary of Soil Parameters

Table F-1 – Summary of Soil Parameters

Depth / Elevation Range (feet)	Soil Description	In situ Unit Weight γ (pcf)	Undrained		Drained	
			Cohesion c (psf)	Friction Angle ϕ (°)	Cohesion c (psf)	Friction Angle ϕ (°)
	New Engineered Clay Fill	125	1,000	0	50	25
	New Engineered Granular Fill	125	0	30	0	30
0-19.5 (590-570.5)	Light Brown and Gray Very Dense Sand with Gravel / Gravel with Sand	143	0	45	0	45
19.5-20.5 (570.5-569.5)	Light Brown and Gray Very Dense Weathered Limestone	142	0	44	0	44
0-2.5 (590-587.5) **RWB-34, RWB-35**	Fill Brown and Gray Silty Clay	135	3,100	0	310	25
19.5-22.5 (570.5-567.5) **RWB-29 only**	Fill Brown and Gray Silty Clay	125	650	0	65	25
14-17 (576-573) **RWB-49, RWB-50**	Fill Dark Brown Silty Clay	132	2,300	0	230	25
13-18 (577-572) **RWB-48, RWB-51**	Fill Brown, Gray, and Black Sand / Sandy Loam	143	0	30	0	30