Structure Geotechnical Report for Proposed Slope Embankment Retaining Wall for Multi-use Path at IL 53 (FAP 342) over IL 62 (Algonquin Road)

IDOT Contract Number	62N91
IDOT Job Number	D-91-144-21
Section	2018-100-BR
County	Cook
Proposed Retaining Wall SN	016W2501
Existing Bridge SN	016-0378 and 016-2133 (IL 53 northbound and southbound)
Route	IL 53 (FAP 342)
Feature Crossed	IL 62 (Algonquin Road)

Illinois Department of Transportation
District 1
Region 1

Gonzalez Project Number 23-1003

March 15, 2024
Rev 4

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1. PROJECT DESCRIPTION AND SCOPE

1.1 Project Description

Gonzalez Companies, LLC (Gonzalez) performed a geotechnical investigation for the establishment of a multiuse path along IL 62 (Algonquin Road), which will pass between the south abutment and Pier 1 at IL 53. To accommodate the multiuse path's footprint, a portion of the existing slope-wall must be removed and retained. A slope-wall cutback retaining wall is proposed for the IL 53 bridge over IL 62. The project site is within Cook County, Illinois, and lies within the limits of the Third Principal Meridian (NE ¼, Section 7, T41N, R11E). The project location is shown on the Project Location Map in **Appendix A**. This report presents the depth and characteristics of the soils along the proposed improvement and geotechnical recommendations for the proposed project. Logs from two 1962 borings (HB-4 and HB-5) were provided by IDOT.

1.2 Existing Conditions

According to the Wall Feasibility study (Strand, 2023), the existing sidewalk at the location of the proposed multiuse path is 7 feet wide. The existing concrete slope-wall is at 2H:1V (2 horizontal to 1 vertical) slope. The proposed cross section of IL 62 and bridge structures from the 1962 plans are included in **Appendix B**, along with the boring logs from the plans.

1.3 Proposed Improvements

The proposed multiuse path will be 14 feet in width (including 10 ft paved path and two 2 ft shoulders). The existing sidewalk and paved slope will be cut back, creating the need for earth retention. Three alternatives for retaining walls were considered in the Wall Feasibility Study (Strand, 2023): solder pile and lagging wall, cast-in-place (CIP) concrete inverted T-wall, and drilled soil nail wall. The Wall Feasibility Study recommends the CIP inverted T-wall, which would have an estimated bottom of footing elevation of approximately 721. The bridge superstructures are anticipated to be replaced while the substructures will be repaired and rehabilitated for reuse. The basic cross-section of the three alternatives and the recommended wall is included as **Appendix C**. A micropile wall has also been considered as a fourth alternative.

2. GENERAL GEOLOGY

The project area is located in northeastern Illinois about 8 miles northwest of Chicago O'Hare International Airport within the Wheaton Morainal Country within the Great Lake section of the Central Lowland Province. Based on historical borings and publications, the subsurface profile includes interbedded glacial deposits (soft to medium stiff), glacial till (stiff), and bedrock. In the area of IL 53 at IL 62, bedrock is expected around El. 560, which is over 150 feet below the existing ground surface.

3. FIELD EXPLORATION

3.1 Subsurface Exploration and Testing

3.1.1 Field Investigation

Between April 30 and May 11, 2023, Gonzalez drilled and logged five conventional soil borings near the existing bridge. The boring locations are shown on the Boring Plan in **Appendix D** and coordinates are provided in **Table 1**. Ground surface elevations at the boring locations were determined in the field by GPS survey equipment (Virtual Reference Station (VRS) utilizing a Trimble R8 receiver. Gonzalez subcontracted the conventional soil borings to Rubino Engineering, Inc. A Gonzalez geotechnical engineer observed and coordinated the field investigation.

Table 1. Boring Locations and Elevations

Boring ID	Date Drilled	Boring Depth (ft)	Surface Elevation[1] (ft)	Latitude	Longitude
GC-01	April 30, 2023	55	743.3	42.06219532	-88.02767553
GC-02	April 30, 2023	55	743.5	42.06237519	-88.02860531
GC-18	May 9, 2023	25	724.9	42.06261924	-88.02863333
GC-19	May 9, 2023	25	724.8	42.06241951	-88.02763389
GC-20	May 11, 2023	15.5	724.9	42.06251908	-88.02811362

1. **North American Vertical Datum 1983; vertical precision is within 0.1 feet.**

The borings were advanced with a Geoprobe 7822DT drill rig using hollow stem augers to completion depths ranging from 15 to 55 feet below existing ground surface. Borings were terminated at planned termination depths. Soil samples were obtained under the direction of a Gonzalez engineer using a 2-inch outer diameter split spoon sampler driven with an automatic hammer in accordance with the standard penetration test (AASHTO T 206). The samples were logged for soil type and the unconfined compressive strength was determined with a Rimac or pocket penetrometer, as appropriate. Thin-walled 3-inch diameter Shelby tube (AASHTO T 207) samples were obtained in GC-20, in cohesive materials, at select depths. The soil samples were contained in a thin-wall sleeve 30 inches in height. Upon completion, each boring was backfilled with auger cuttings and capped with pavement patch. The Subsurface Data Profile Plot is included as **Appendix E** as a graphical record of the subsurface explorations, and the Soil Boring Logs are included as **Appendix F**.

3.1.2 Laboratory Testing

Soil samples were taken to the laboratory of Gonzalez subcontractor Rubino to determine the moisture content (AASTHO T265), grain size (T88), Atterberg Limits (T89 / T90), Unconfined-Undrained (UU) Triaxial Strength (T296), and Unconfined Compressive Strength (T208) in general accordance with the referenced AASHTO Standards. The results of the laboratory testing are summarized on the boring logs at the corresponding sample depths and in **Appendix G**.

3.2 Subsurface Conditions

The near-surface materials in the project area generally consist of glacial materials overlain by fill placed for the IL 53 embankments. Some variations in subsurface materials between individual borings was observed, and caution should be taken with extrapolating soil properties beyond limits of the investigation. Fill material may vary in depth across the project site as a result of previous construction activities.

Bedrock was not encountered during the field investigation. The deepest boring was advanced to 55 feet below existing ground surface (bottom of boring at EL 688.3).

A summary of fill and naturally-deposited soils encountered during the field exploration are described in the following subsections. The summary results of their associated field and laboratory testing are also included in **Table 2**.

Table 2. Summary of Field and Laboratory Tests

Field/Lab Test	Fill Material			Natural Deposits		
Index/General Properties:	***# tests***	**Range**	**Average**	***# tests***	**Range**	**Average**
Moisture Content (%)	*13*	14 – 21	17	*40*	12 – 32	19
Atterberg Limits (%)				*1*		
Liquid Limit						25
Plastic Limit						21
Plasticity Index						4
Unconsolidated Undrained (UU) Compressive Strength (tsf)				*1*		1.6
Unconfined Compressive Strength (tsf)				*1*		1.8
Rimac Unconfined Compressive Strength (tsf)	*8*	1.3 – 4.1	2.5	*33*	0.2 – 4.5	2.1

3.2.1 Fill Material

Observed fill material consists predominately of clay that was brown, dry to moist, low plastic. Fill material was encountered in all borings to an average elevation of 723, but varies in depth across the project site as a result of previous construction activities. SPT N-values in the fill materials ranged between 4 and 55 blows per foot (bpf) with an average near 15 bpf, indicating medium stiff to stiff cohesive deposits.

3.2.2 Natural Deposits (Glacial)

Observed natural deposits generally consist of cohesive soil (clay and silty loam) that was brown, dry to moist, low plastic, with varying amounts of sand and gravel. Occasional layers of sand and silt were encountered as well. SPT N-values in the natural deposits ranged between 3 and 19 bpf with an average near 11 bpf, indicating a medium stiff to stiff deposit.

3.2.3 Groundwater

Groundwater was encountered in the borings at the time of field exploration at depths/elevations shown in **Table 3**.

Table 3. Groundwater Observations

Boring ID	During Drilling		After Drilling	
	Groundwater Depth (ft)	Groundwater Elevation (ft)	Groundwater Depth (ft)	Groundwater Elevation (ft)
GC-01	Dry	-	48	695.3
GC-02	Dry	-	Dry	-
GC-18	Dry	-	Dry	-
GC-19	Dry	-	Dry	-
GC-20	Dry	-	Dry	-

Delayed groundwater levels were not measured, because the borings were backfilled upon completion due to safety reasons. The values in **Table 3** may not represent the long-term groundwater levels.

4. GEOTECHNICAL EVALUATIONS

4.1 Settlement

No significant settlement was observed by Gonzalez during field work. Gonzalez is not aware of any settlement issues at the structure. It is our understanding that this project will not include additional fill heights, so overall embankment settlement is not expected.

4.2 Global Slope Stability Analysis

Since we do not anticipate changes to the North abutment slopes, the North abutment was not analyzed for global slope stability. The South abutment, however, was analyzed since the slope-wall will be cut back.

Slope stability is influenced by various factors including: (1) the geometry of the soil mass and subsurface materials; (2) the weight of soil materials overlying the failure surface; (3) the shear strength of soils along the failure surface; and (4) the hydrostatic pressure (groundwater levels) present within the landslide mass and along the failure surface.

The stability of a slope is expressed in terms of the factor of safety, FS, which is defined as the ratio of resisting forces to driving forces. At equilibrium, the FS is equal to 1.0, and the driving forces are balanced by the resisting forces. Failure occurs when the driving forces exceed the resisting forces, or a factor of safety less than 1.0. In order to increase the factor of safety above 1.0, you must increase the resisting forces or decrease the driving forces; this reflects a corresponding increase in the stability of the mass. The actual factor of safety may differ from the calculated factor of safety due to variations in soil strengths, subsurface geometry, failure surface location and orientation, groundwater levels, and other factors that are not completely known or understood.

Soil strength values obtained from laboratory testing on Shelby tube samples, field Rimac testing, and published correlations were used in the slope stability analyses. The cross-sections presented in **Appendix C** were used to conduct the slope stability analyses on the proposed profiles. The Drained case was analyzed for the two geometries: the proposed slope with the multiuse path, and during construction for the CIP concrete inverted T-wall. The critical factor of safety was calculated to be approximately 1.8 (post construction geometry) and 1.3 (temporary construction geometry), respectively, for the two drained cases. The slope stability results are included in **Appendix H** of this report.

Water runoff from the reconstructed slope and deck drains should be channeled away from the wall and not allowed to infiltrate the wall backfill.

4.3 Seismic Considerations

Seismic Site Class was determined based on IDOT Design Guide: AGMU Memo 09.1-LRFD Seismic Site Class Definition (2009) and the IDOT spreadsheet BBS 149 “Seismic Site Class Determination” (November 01, 2016). Based on a weighted average N-value of 21 bpf and weighted average undrained shear strength (su) of 1.59 kips per square foot (ksf), the global site soil class is defined as Seismic Site Class D. The results of the seismic site class determination are included in **Appendix I**.

Seismic analysis based IDOT Geotechnical Manual (IDOT, 2020) and the AASHTO Seismic Acceleration Coefficient Map provided by USGS Hazard Design Tool (USGS, 2022) for AASHTO-2009 indicated the Peak Ground Acceleration (PGA) is 0.041g during the earthquake based on the hazard of 7% probability of exceedance in 75 years (an approximate 1000-year return period event). Based on the site coordinates, the mapped MCE (Maximum Considered Earthquake) spectral response accelerations were obtained at 0.2 second (S_{DS}) and 1 second (S_{D1}). The site Seismic Performance Zone (SPZ) was assigned to the site to establish a level of seismic risk which is used for structure design criteria based on Table 3.10.6-1 of the "AASHTO LRFD Bridge Design Specifications" (AASHTO, 2020). The design criteria in **Table 4** were developed using the USGS Hazard Design Tool for AASHTO-2009 for reference coordinates 42.06251908, -88.02811362.

Table 4. Seismic Soil Site Class and Parameters

Seismic Soil Site Class	Seismic Performance Zone (SPZ)	Site-Specific Design Spectral Acceleration Parameters	
		S_{DS}	S_{D1}
D	1	0.145g	0.083g

Note: SPZ 1: $S_{D1} = F_V S_1 \leq 0.15g$

Based on site's seismic performance zone, seismic slope stability and liquefaction analysis are not required.

5. RETAINING WALL RECOMMENDATIONS

Four alternatives for retaining walls have been considered: cast-in-place (CIP) concrete cantilever (inverted T-wall), micropile wall, soldier pile and lagging wall, and soil nail wall. The Wall Feasibility Study (WFS) prepared by the wall designer (Strand 2023) is included as **Appendix J**. The CIP inverted T-wall was the recommended alternative in the WFS. The micropile wall alternative was presented after the publication of the WFS.

5.1 Cast-in-Place Concrete Cantilever Wall (Inverted T-wall)

Cast-in-Place (CIP) concrete cantilever retaining walls are typically used in areas without access/site constraints. The wall is constructed with a footing that extends laterally both in front of and behind the wall. The wall can be designed to resist horizontal loading with or without tie-backs by changing the geometry of the foundation. This type of wall typically requires that the area behind the wall be excavated to facilitate construction or are constructed where new fill embankments are necessary. The advantages of a CIP wall include that it is a conventional system with well-established design procedures and performance characteristics; it is durable; and it has the ability to easily be formed, textured, or colored to meet aesthetic requirements. Disadvantages include a relatively long construction period due to undercutting, excavation, form work, steel placement, and curing of the concrete. This wall system is also sensitive to total and differential settlements.

A shallow spread footing foundation was considered for support at the CIP T-wall with an estimated bottom of footing elevation of approximately 721. The existing embankment and native soils observed in the borings (medium stiff to stiff clay) will support construction of a CIP T-wall. We estimate the foundation soils will have a nominal bearing resistance of 3,500 psf and a factored bearing resistance of 1,925 psf based on a geotechnical resistance factor of 0.55. For footings designed and constructed in accordance with our recommendations, total settlement should be less than 1 inch.

One foot of undercut is recommended below the footing elevation. The undercut should extend 1 foot beyond the horizontal limits of the footing. To improve sliding resistance, a clean gravel backfill is recommended, with an ultimate friction factor of 0.5. If a clean gravel backfill is placed to create a uniform bearing pad, a geotextile filter fabric, such as Mirafi 1100N (or equivalent) should be placed below the clean gravel. For the footings, we recommend the following:

- Minimum footing width of 3 feet.
- Minimum footing depth of 4 feet for frost protection.

- Subgrade and foundation excavations should be evaluated prior to construction by a geotechnical engineer to verify that acceptable materials are exposed and have an acceptable density. If very soft or soft soil is encountered at the bottom of the excavation, we recommend one of the following:
  - Remove the soft soil down to at least medium stiff (i.e., firm) lean cohesive soils and replace with engineered fill.
  - If medium stiff (i.e., firm) clay (CL) or medium dense sand (SP, SC, SM) is not encountered below any encountered soft soil, a graded engineered fill can be used to stabilize the soil subgrade. Graded engineered fill may include the placement of a 2- to 3-foot-thick layer of 6-inch diameter clean rock, followed by a 1-foot-thick layer of 3-inch diameter clean rock that is capped with a 6-inch-thick layer of 1-inch minus gravel (with up to 12 percent fines). A geogrid or geotextile can be used as a separation layer between the soft soil and the largest rock fill.
  - Remove 3 feet of soft soils below the footing elevation (to El 713) and replace with controlled low-strength material (CLSM or flowable fill). The excavation should be limited to a maximum length of 25 feet at one time, and should be backfilled immediately. Excavations backfilled with flowable fill can be made with vertical walls the same width as the planned footing.
- Water should not be allowed to stand in the excavation at any time during footing construction. Small amounts of groundwater seepage are anticipated and can likely be handled by sump pumps or other standard means.
- Footings should be inspected and poured in the same day as they are excavated to protect subgrade materials. Subgrade materials are prone to strength loss, volume change, and increased compressibility with exposure to freezing conditions, moisture, and high temperatures (i.e. drying).

5.2 Micropile Wall

A micropile wall is an earth retention system that uses “small” diameter piles, typically between 6 and 12 inches in diameter, to provide lateral resistance. A micropile is constructed by drilling a borehole (typically using temporary casing), placing steel reinforcement inside, and grouting the hole. Micropile reinforcement may consist of a single reinforcing bar, a group of reinforcing bars, and/or a steel casing. The installation of micropile walls requires the use of specialty equipment to install the piles into the ground. Micropiles can be used in areas with limited overhead site access. Micropiles can be installed vertically or battered to support the proposed wall loads. Micropiles may not be cost effective when unrestricted access is available for the drilled shaft or drilled soldier pile construction. The depth of the micropile is normally estimated to be two times the wall exposed height. Due to the smaller structural section, typically, the spacing for micropiles is significantly less than a traditional soldier pile and lagging wall. Micropiles piles are typically spaced at 2 to 4 foot on center and are faced with cast-in-place or precast concrete panel. Tie backs may be used to provide additional lateral resistance, if required. To provide lateral resistance against the retained soil, the walls can be designed to act as a cantilever or can use tie backs behind the wall. The FHWA Micropile Design and Construction Reference Manual (FHWA NHI-05-039) and AASHTO LRFD Bridge Design manual should be referenced for design methodology.

AASHTO Table C10.9.3.5.2-1 provide typical values for grout-to-grout bond strengths for micropiles in various soil/rock types. Based on the encountered soil (i.e., medium stiff to stiff, low plastic, Clay/Silty Clay and soft to stiff, Loamy mixtures of Silt and Clay, with varying amounts of Sand and Gravel), the estimated nominal grout-to-ground bond strengths of 1.0 to 2.0 ksf can be used depending on the type of micropile used for the wall. The estimated values may vary with actual ground conditions and installation procedures. A geotechnical resistance factor of 0.55 should be considered for LRFD factored micropiles axial capacity as per AASTHO Table 10.5.5.2.5-1. For small diameter mircopiles (outside diameter less than 10 inches), we recommend ignoring tip resistance in soil.

5.3 Soldier Pile and Lagging Wall

Soldier pile and lagging walls are typically used in cut areas where the existing ground surface needs to be maintained during construction or when a near vertical excavation is needed due to site constraints. The walls maintain the existing site conditions with minimal disturbance to existing structures and can be installed relatively quickly in most situations. To provide lateral resistance against the retained soil, the walls can be designed to act as a cantilever or can use tie backs behind the wall. The wall may be constructed with driven steel piles or steel piles placed in drilled holes and backfilled with concrete. Resistance to lateral movement or overturning of the soldier piles is furnished by passive resistance of the soil below the depth of excavation. The depth of the soldier pile is normally estimated to be two times the wall exposed height. Soldier piles are typically spaced at 6 to 10 foot on center and are faced with cast-in-place or precast concrete. The maximum horizontal spacing between anchors is based on allowable individual anchor loads and flexural capacity of individual soldier beams.

Construction soldier piles wall require relatively large equipment with unrestricted vertical and horizontal site access to install the wall system. Given the geometry and close proximity of the existing bridge abutment and utilities the use of tie backs and or deadman anchors are likely not a viable solution. The location and alignment of the wall will need to be reviewed to ensure that the permanent ground anchors do not interfere with existing structures.

5.4 Soil Nail Wall

Soil nails are reinforcing, passive elements that are drilled and grouted sub-horizontally in the ground to support excavations in soil, or in soft and weathered rock to create earth retention system. Soil nail walls are constructed using a “top-down” construction sequence, where the ground is excavated in lifts of limited height. Soil nails and an initial shotcrete facing are installed at each excavation lift to provide support. Subsequently, a final shotcrete or cast-in-place concrete (CIP) facing is installed. Nails are most often installed at a vertical spacing of 4 to 6 ft. The nail vertical spacing is comparable to the typical height of a stable, excavation lift, which is commonly 3 to 5 ft and could be more in some soils. The horizontal spacing of nails is often also in the range of 4 to 6 ft.

Soil conditions (i.e., stiff cohesive soils) are present with a low water table which are conditions favorable for a soil nail design. Construction methodology of soil nail wall allows for the easy adjustments to nail inclination and location can be made when obstructions are encountered, such as boulders, piles or underground utilities. In addition, soil nail wall installation is not as restricted by overhead limitation as in the case of soldier pile installation. A soil nail cut wall system may provide an economical solution for the project. However, the wall designer (Strand) has indicated that the soil nail wall nail lengths would potentially interact with the bridge abutment piles, and for this reason this alternate has been excluded from consideration due to constructability issues and IDOT acceptance.

5.5 Lateral Resistance

The following table is a summary of lateral soil parameters to be used for design of the earth retention structures. Unit weights, friction angles and shear strength parameters were estimated using standard penetration test (SPT) using published correlations for N values results. **Table 5** presents generalized soil parameters to be used based for designs on the laboratory and in-situ testing data.

Table 5. Lateral Earth Pressure Design Parameters

Stratum	Material Type	Total Unit Weight (pcf)	Drained Peak Friction Angle, Ø	Undrained Shear Strength, psf	Active Earth Pressure Coefficient, Ka	Passive Earth Pressure Coefficient, Kp	Soil Modulus, k (pci)	Strain, e50
Embankment Fill	Clay, Silty Clay	125	28	1500	0.36	2.8	500	0.005
Natural Deposits (Glacial)	Clay, Silty Loam	120	30	1800	0.33	3.0	1000	0.006

Note:
Active and passive earth pressure coefficients based on Rankine theory equations with a level ground surface. Designer should consider the influence of sloping backslope and surcharge loading and adjust coefficients as needed.

Allowances should be made for any surcharge loads adjacent to the retaining structure. Proper drainage should be provided behind the walls to reduce development of hydrostatic forces from groundwater. For the long-term active case (permanent case), cohesion in the clay layers should be ignored and the effective stress condition (drained conditions) should be used. For the long-term passive case, the undrained cohesion should be used at undisturbed depths below the frost line (greater than 4 feet below the ground line).

The wall can be designed for Equivalent Fluid Pressures (EFP) as shown in **Table 6**. The passive resistance should be ignored above the frost depth and above any depth of construction disturbance. The Drained Conditions can be utilized for backfill behind the wall, above the bottom elevation of the wall drainage system (clean granular backfill and/or pipe underdrain that daylights).

Table 6. Equivalent Fluid Pressures (pcf)

Stratum	Approximate Elevation (ft)	Drained Conditions		Undrained Conditions	
		Active	Passive	Active	Passive
Embankment Fill (Existing)	Above 723	45	345	85	236
Natural Deposits (Glacial)	Below 723	50	375	82	235
Compacted Granular Backfill (New Gravel)		40	460	82	302
Compacted Fine-grained Backfill (New Clay)		45	345	83	222

Notes:
1. EFP values are unfactored and do not include surcharge loads.
2. New granular backfill is assumed to have a unit weight of 130 pcf and friction angle of 34 degrees.
3. New structural backfill is assumed to have a unit weight of 120 pcf and friction angle of 28 degrees.

6. CONSTRUCTION CONSIDERATIONS

We do not anticipate the need for other special construction monitoring for the earthwork except as normally required by the IDOT Standard Specifications, Special Provisions and Contract Plans. During construction, an experienced geotechnical engineer or soil technician should be retained to perform the following tasks:

- Monitor earthwork operations
- Evaluate the suitability of the soils for subgrade support
- Observe excavation
- Check soil materials, compaction, moisture content, and stability for compliance with project specifications
- Monitor locations and depths of undercuts
- Advise the IDOT Resident Engineer of any conditions not apparent during the subsurface exploration

6.1 Temporary Excavations

All excavations must comply with applicable local, state and federal safety regulations including the current OSHA Excavation and Trench Safety Standards. Construction site safety is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. Temporary excavations should have a slope as required to provide a stable side slope and the potential effect of ground movements upon open roadway and utilities should also be taken into consideration. All temporary cut excavation should be analyzed on an individual basis. In general, we recommend that temporary construction slopes be no steeper than 1 Horizontal to 1 Vertical (1H:1V) and comply with OSHA requirements for Soil Type B.

7. LIMITATIONS

This report is based on Gonzalez Companies' understanding of the project as described and was prepared to provide recommendations for retaining wall construction. The boring logs depict subsurface conditions for the specific locations and dates. Depth to groundwater levels recorded on our boring logs are subject to many variables and may not be indicative of long-term equilibrium conditions. These variables include puncture of perched horizons and inadequate time for equilibration of groundwater pressure.

The analyses and recommendations submitted in this report are based in part upon the subsurface data collected and our experience with similar projects. The nature and extent of variations across the site may not become evident until construction. If variations then become apparent that could affect the proposed project, it may be necessary to re-evaluate some of the recommendations of this report. The recommendations and observations presented in the report assume that significant variations do not occur. Non-uniform conditions, however, often cannot be determined by the procedures described. Such conditions may necessitate additional expenditures to obtain a properly constructed project. We recommend that a contingency fund be budgeted to accommodate such possible expenditures.

8. REFERENCES

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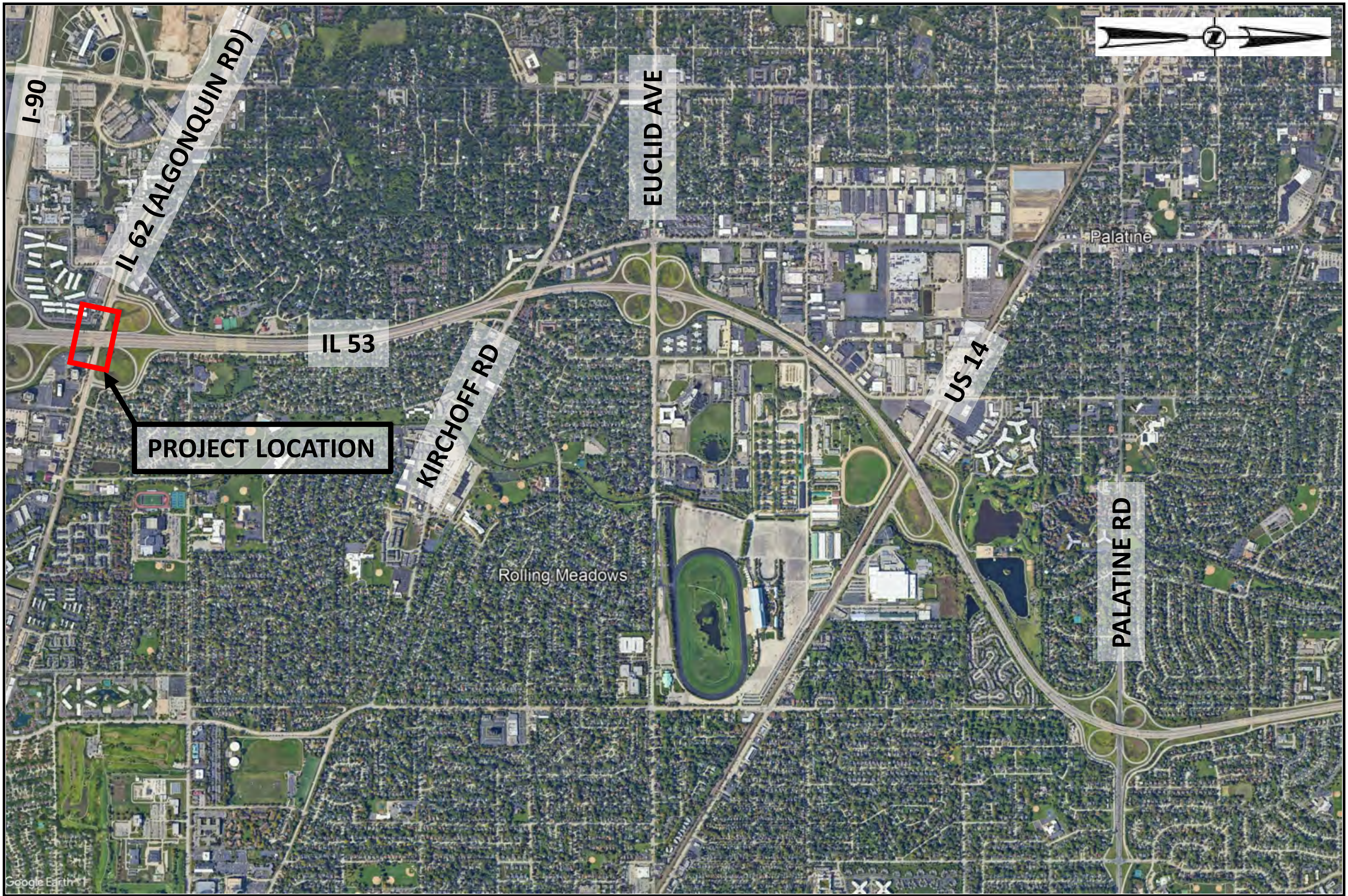
APPENDIX A Project Location Map



LEGEND KEY:

PROJECT LOCATION

gonzalez COMPANIES LLC

ILLINOIS DEPARTMENT OF TRANSPORTATION IL 53 BRIDGES, 62N91, PTB 203-021 COOK COUNTY, IL	PROJECT NO. 23-1003
IL 53 OVER IL 62 (ALGONQUIN RD) PROJECT LOCATION MAP	APPENDIX A

APPENDIX B Pages from 1962 Plans

B.M. R.R spike E. Face of power pole at N.W. corner of Rohlwing Rd (Rt 53) & Algonquin Rd (Rt 62) Elev. 726.02

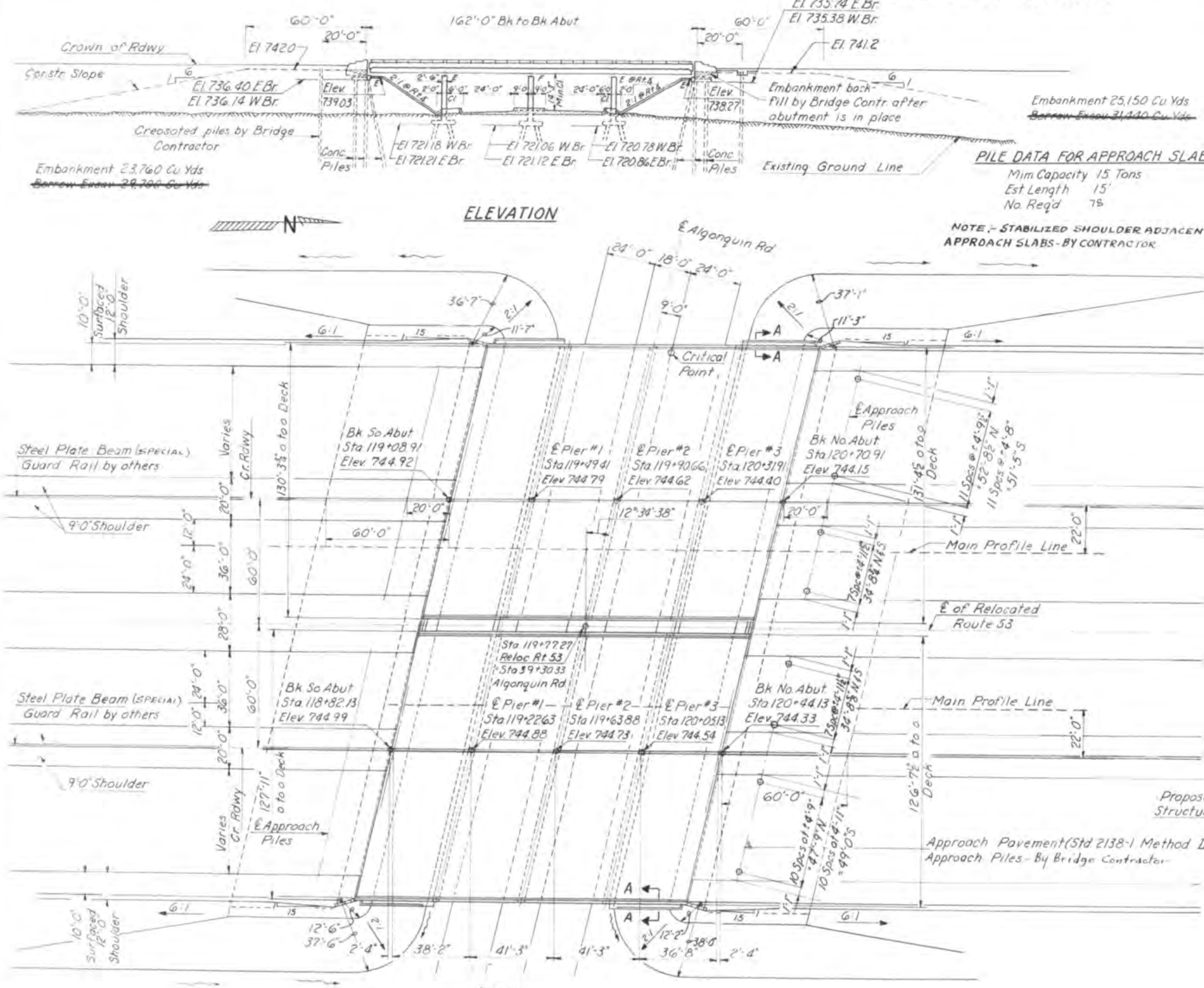
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

Route No.	Section	County	Total Sheets	Sheet No.
F.A. 53 / F.A. 61	531-1-HB-5 / 531-1-HF-5	Cook	36 / 8	13 / 9

SHEET NO. 1

19 SHEETS

Fed. Aid Project U-184(24)



GENERAL NOTES

Coarse aggreate to be used in parapet handrails and end post must be absolutely free of chert, flint, limonite, lignite and soft sandstone.

The concrete floor slab shall be finished in accordance with Article 51.19 of the Standard Specification.

Slope wall shall be reinforced with welded wire fabric 6"×6" mesh, weighing 58# per 100 sq ft.

All reinforcement bars shall be lapped 20 diameters unless otherwise shown.

All structural steel shall conform to ASTM A-36 specification. Rivets ¾"φ, open holes 13/16"φ unless otherwise noted.

Anchor bolts shall be set before riveting diaphragms over supports.

The exposed surfaces of the expansion guard shall be given two shop coats of red lead paint, the contact surfaces shall be given one coat of red lead paint. Anchor studs shall not be painted.

Expansion guards are included in the quantity of structural steel. Estimated weight 14,200 lbs.

Except as otherwise provided, all structural steel shall receive one shop coat of red lead paint and two field coats of aluminum paint. See Article 56.1 to 56.5 inclusive of the Standard Specifications.

The contractor shall drive two concrete test piles in a permanent location (see sheet #24) and two timber test piles in the vicinity of Pier 2 at East and West bridges, as directed by the Engineer before ordering remainder of piles.

Concrete piles at abutments shall be driven in holes precored through the embankment in accordance with Article 60.9(c) of the Standard Specifications.

Permanent forms will not be permitted in forming the superstructure.

STATION 119+77.27
BUILT 196 BY
STATE OF ILLINOIS
SBI RT. 53 SEC. 531-1-HB-5
F.A. PROJ. U-184(24)
LOADING H20-S16 & ALT.

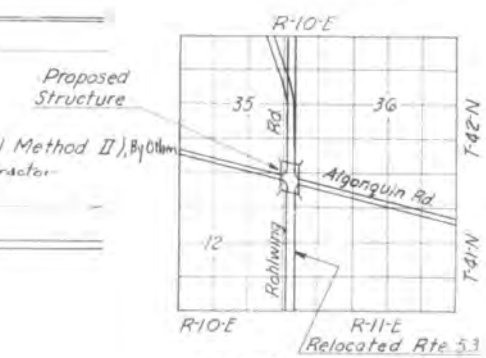
NAME PLATE

See Standard 2113

TOTAL BILL OF MATERIAL (SEC. 531-1-HB-5)

Item	Unit	Super	Sub	Total
Embankment	Cu. Yds.		*48,910	*48,910
Class A Excavation For Structure	Cu. Yds.		1360	1360
Erecting Structural Steel	Lbs.	802,370		802,370
Class X Concrete	Cu. Yds.	1010.7	1551.8	2562.5
Aluminum Handrail	Lin. Ft.	635		635
Reinforcement Bars	Lbs.	304,710	165,880	470,590
Creosoted Piles	Lin. Ft.		8490	8490
Test Piles (timber)	Each		2	2
Concrete Piles	Lin. Ft.		4950	4950
Test Piles (concrete)	Each		2	2
Name Plates	Each		2	2
Slope Wall (4")	Sq. Yds.		3378	3378
Protective Coat	Sq. Yds.	4,720		4720

*Excluding Detour Road and Approach Slab



TOTAL BILL OF MATERIAL (SEC. 531-1-HF-5)

Item	Unit	Super	Sub	Total
Furnishing Structural Steel	Lbs.	802,370		802,370

DESIGN STRESSES

f'c = 1400 psi Super & Sub
vc = 75 psi Footing
fs = 20,000 psi Reinf.
fs = 20,000 psi Struct (A-36)
n = 10
LOADING H20-S16 & ALTER.

DESIGNED	Bechara K. El-Beck
CHECKED	[illegible]
DRAWN	W.E. Dickerson
CHECKED	[illegible]

SEPT. 25 1962

EXAMINED W.E. Baumann — ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
PASSED [illegible] — ENGINEER OF DESIGN
APPROVED R.R. Bartelsmeyer — CHIEF HIGHWAY ENGINEER

PROJ. U-184(24)
GENERAL PLAN & ELEVATION
S.B.I. RT. 53 OVER ALGONQUIN RD.
S.B.I. RT. 53 SEC. 531-1-H(B-F)-5
COOK COUNTY
STA. 119+77.27

Revised timber pile from [illegible]

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.I. 53 / F.A. 61	531-1-HB-5	Cook	36	29

SHEET NO 17 / 29 SHEETS

BRIDGE FOUNDATION BORING LOG (Sh. 1 of 10 Sh.)

Form No. B.D. 137 Rev. 3-60

PROJECT ___ BRIDGE Relocated SBI 53 over Algonquin Road Date Sept. 1962
ROUTE S.B.I. Route 53 Bored By R. Moody
SEC 531-1-HB-5 STA 119+77.27 Checked By G.R.B.
COUNTY Cook
Boring No. 1, Station 120+15, Offset 47' Rt. centerline
Surface Water El. ___ Groundwater El. at Completion ___ After 24 Hours 704.7
Ground Surface 725.7

	Elevation	N	Qu T/s.f.
Sand Fill	721.7		
Stiff gray mottled clay till	718.7	7	1.5 B
Very stiff gray mottled clay till		9	2.0 B
	713.7	15	2.5 Est.
Medium gray silty loam	711.2	17	
Stiff gray clay till		9	1.6 B
	706.2	12	1.6 B
Very stiff gray clay		16	2.8 B
	701.2	13	2.6 B
Loose gray silty loam	698.7	9	
Stiff gray clay till	696.2	10	1.2 B
Very stiff gray clay till	693.7	19	3.1 B
Stiff gray clay till	691.2	11	1.2 B
Very stiff gray clay till	688.7	15	2.3 B
Stiff gray clay till	686.2	11	1.3 B
Very stiff gray clay till		18	2.6 B
		17	2.3 B
	678.7	18	2.8 B
Very dense clayey sand and gravel	676.2	76	
Medium gray sand and gravel	671.7	19	

N – Standard Penetration Test – Blows per foot to drive 2" O.D. Split Spoon Sampler 12" with 140# hammer falling 30"
Qu – Unconfined Compressive Strength – T/sf
w – Water Content – percentage of oven dry weight – %
Type failure: B – Bulge Failure, S – Shear Failure, E – Estimated Value

BRIDGE FOUNDATION BORING LOG (Sh. 3 of 10 Sh.)

Form No. B.D. 137 Rev. 3-60

PROJECT ___ BRIDGE Relocated S.B.I. 53 over Algonquin Road Date Sept. 1962
ROUTE S.B.I. Route 53 Bored By R. Moody
SEC 531-1-HB-5 STA 119+77.27 Checked By G.R.B.
COUNTY Cook
Boring No. 2, Station 120+28, Offset 40' Lt. centerline
Ground Surface 725.7

	Elevation	N	Qu T/s.f.
Sand fill	721.7		
Very stiff gray mottled clay till		13	2.6 S
	716.2	12	2.4 Est.
Hard gray mottled clay till	713.7	25	4.5 B
Very stiff gray clay till	711.2	20	3.2 Est.
Stiff gray clay till		11	1.2 B
		14	1.3 B
	703.7	13	1.3 Est.
Very stiff gray clay till	701.2	15	2.4 B
Medium gray silty loam	698.7	10	
Stiff gray clay till	696.2	12	1.2 B
Hard gray clay till	693.7	35	4.4 B
Very stiff gray clay till	691.2	18	2.6 B
Stiff gray clay till		11	1.6 B
	686.2	10	1.3 B
Very stiff gray clay till		15	2.4 B
		15	2.2 B
	678.7	15	2.0 B
Dense gray very fine sand		47	
	673.7	34	
Medium gray very fine sand	671.7	26	

BRIDGE FOUNDATION BORING LOG (Sh. 5 of 10 Sh.)

Form No. B.D. 137 Rev. 3-60

PROJECT ___ BRIDGE Relocated S.B.I. 53 over Algonquin Road Date Sept. 1962
ROUTE S.B.I. Route 53 Bored By R. Moody
SEC 531-1-HB-5 STA 119+77.27 Checked By G.R.B.
COUNTY Cook
Boring No. 3, Station 120+65, Offset 50' Lt. centerline
Ground Surface 725.7

	Elevation	N	Qu T/s.f.
Sand fill	721.7		
Stiff gray mottled clay till	718.7	12	1.2 S
Very stiff gray mottled clay till		11	2.3 B
	713.7	13	Lost
Medium gray silty loam	711.2	13	
Loose brown fine sand	708.7	9	
Stiff gray clay till	706.2	13	1.1 S
Very stiff gray clay till	703.7	16	2.2 B
		11	1.4 B
Stiff gray clay till	698.7	9	1.3 B
Medium gray silty clay loam	696.2	13	
Very stiff gray clay till		23	3.3 B
	691.2	18	2.3 B
Stiff gray clay till	688.7	14	1.8 B
Very stiff gray clay till		18	2.0 Est.
		18	2.2 B
		26	2.7 B
	678.7	24	2.5
Medium gray sand and sandy clay loam		18	
		19	
Medium gray sand and sandy clay loam	668.7	20	
Very stiff gray pebbly clay till	666.7	28	2.6 B

DESIGNED Abraham K. El-Beck
CHECKED [illegible]
DRAWN Abraham El-Beck
CHECKED M.O.

SEPT 25 1962
EXAMINED W.E. Baumann – Engineer of Bridge and Traffic Structures
PASSED [illegible] – Engineer of Design
APPROVED R.R. Bartelsmeyer – Chief Highway Engineer

BORING DATA
S.B.I. RT. 53 SEC. 531-1-HB-5
COOK COUNTY
STA. 119+77.27

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
S.B.I. 53 F.A. 61	531-1-HB-5	Cook	36	30

SHEET NO. 18
19 SHEETS

Form No. B.D. 137 Rev. 9-60

Sh. 7 of 10 Sh.

BRIDGE FOUNDATION BORING LOG

PROJECT
ROUTE S.B.I. Route 53
SEC 531-1-HB-5
COUNTY Cook
Boring No. 4
Station 119+05
Offset 45' Lt. centerline

BRIDGE Relocated S.B.I. 53 over Algonquin Road
STA 119+77.27

Date Sept. 1962
Bored By R. Moody
Checked By G.R.B.

Surface Water El. ____
Groundwater El. at Completion ____
After ____ Hours ____

Ground Surface 725.7

Description	Bottom Elevation	Depth	N	Qu t/s.f.	w (%)
Gravel sub-grade	723.7	0			
Very stiff gray mottled clay till		-5	18	3.4 S	
	716.2		10	2.0 B	
Medium gray silty loam	713.7	-10	10		
Medium gray very sandy till	711.2		6	0.9 Est.	
Very stiff gray clay till		-15	13	2.1 B	
			18	2.4 B	
	703.7	-20	20	2.6 B	
Stiff gray clay till	701.2		15	1.7 Est.	
Very stiff gray clay till		-25	16	2.6 B	
			12	2.2 B	
	693.7	-30	14	2.0 B	
Stiff gray clay till			15	Lost	
	688.7	-35	13	1.6 B	
Very stiff gray clay till			19	2.3 B	
	683.7	-40	14	2.8 B	
Medium gray sand with some small gravel	681.2		26		
Medium gray fine sand	678.7	-45	18		
Very stiff pebbly gray clay till	676.2		33	3.2 B	
Dense gray sand and gravel	673.7	-5	34		
Medium gray sand and small gravel	671.7		25		

Form No. B.D. 137 Rev. 9-60

Sh. 9 of 10 Sh.

BRIDGE FOUNDATION BORING LOG

PROJECT
ROUTE S.B.I. Route 53
SEC 531-1-HB-5
COUNTY Cook
Boring No. 5
Station 119+20
Offset 60' Rt. centerline

BRIDGE Relocated S.B.I. 53 over Algonquin Road
STA 119+77.26

Date Sept. 1962
Bored By R. Moody
Checked By G.R.B.

Surface Water El. ____
Groundwater El. at Completion ____
After ____ Hours ____

Ground Surface 723.9

Description	Bottom Elevation	Depth	N	Qu t/s.f.	w (%)
Loose sand and gravel	721.9	0			
Very stiff gray clay till		-5	14	2.2 S	
	714.4		16	2.1 B	
Medium gray silty loam	711.9	-10	10		
Medium gray sandy till	709.4		7	0.8 B	
		-15	11	1.4 Est.	
Stiff gray clay till	704.4		16	1.8 B	
Very stiff gray clay till	701.9	-20	15	2.2 B	
Medium gray sandy till	699.4		7	0.7 B	
Very stiff gray clay till	696.9	-25	16	2.2 B	
Stiff gray clay till	694.4		11	1.6 B	
Very stiff gray clay till		-30	11	2.0 B	
			13	2.2 B	
		-35	13	2.2 B	
			14	2.3 B	
		-40	14	2.2 B	
			17	2.5 B	
	676.9	-45	10	Lost	
Medium brown fine sand	674.4		27		
Very stiff gray clay till	671.9	-50	17	2.8 B	
Medium fine sand and gravel			20		

DESIGNED Abraham K. El-Beck
CHECKED [signature]
DRAWN Abraham K. El-Beck
CHECKED M.O.

SEPT 25 1962
EXAMINED W.E. Baumann
ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
PASSED [signature]
ENGINEER OF DESIGN
APPROVED R.R. Bartelsmeyer
CHIEF HIGHWAY ENGINEER

BORING DATA
S.B.I. RT. 53 SEC. 531-1-HB-5
COOK COUNTY
STA 119+77.27

APPENDIX C Proposed Cross-Section

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1/25/2023
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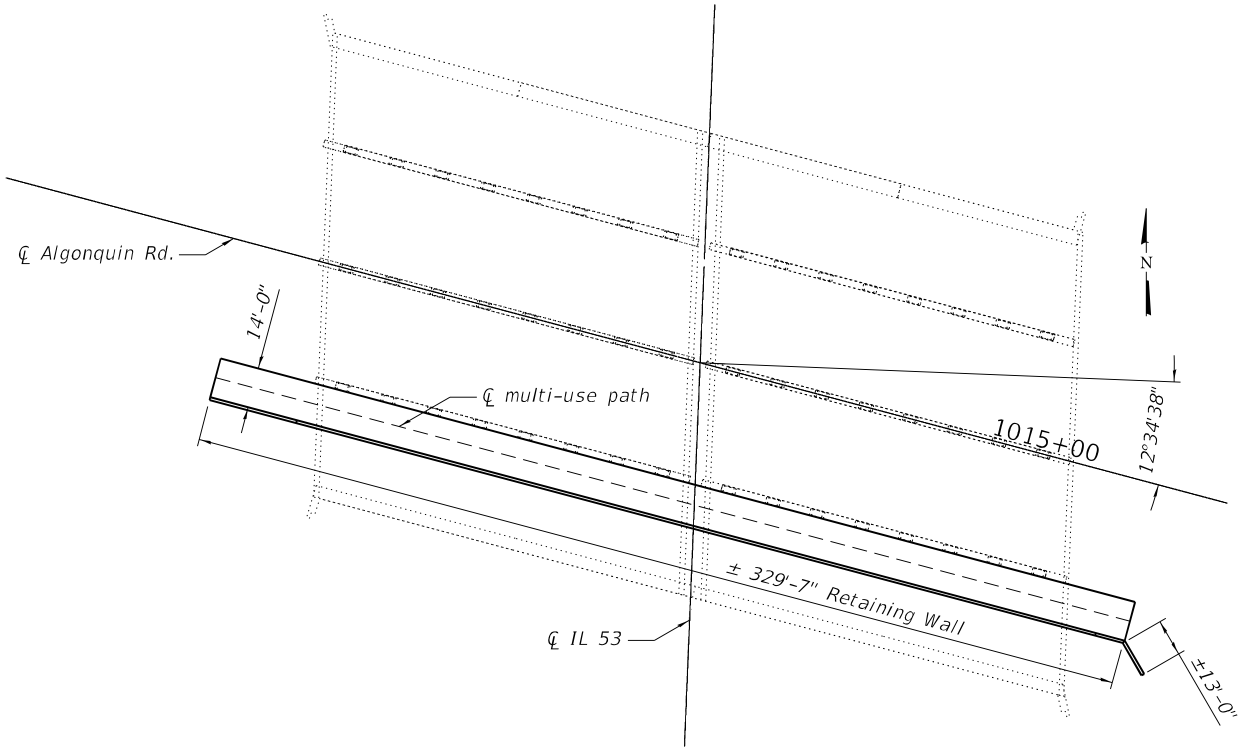
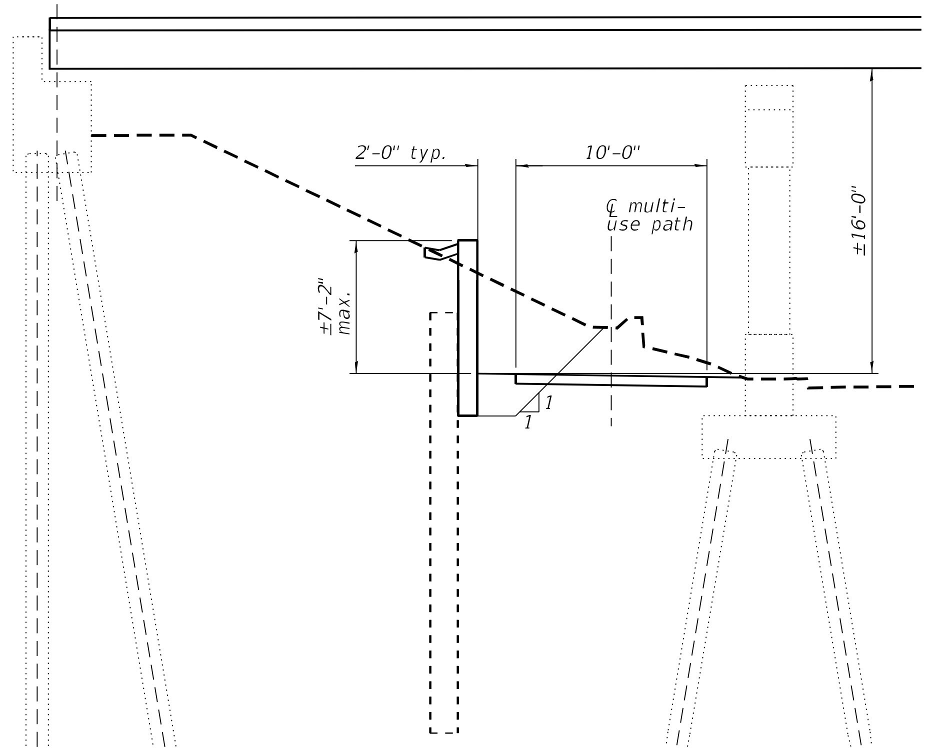
$FILE$



PLAN PROPOSED WALL

Notes:

The horizontal and vertical clearances are subject to refinement in the TSL Phase.



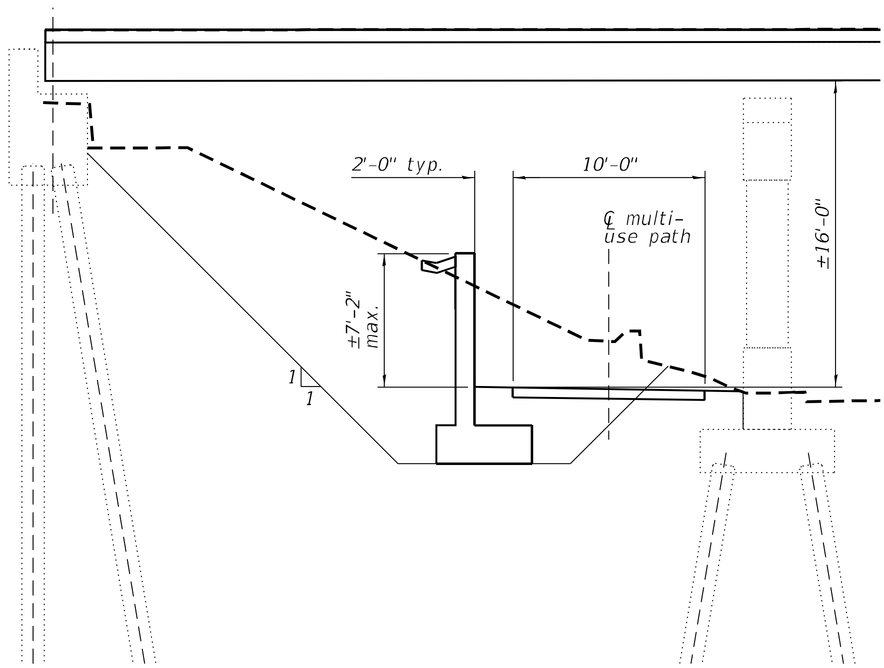
SOLDIER PILE AND LAGGING WALL - TYPICAL SECTION

ALGONQUIN RD. PROPOSED S.N. TBD
RETAINING WALL

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION

STRAND ASSOCIATES®

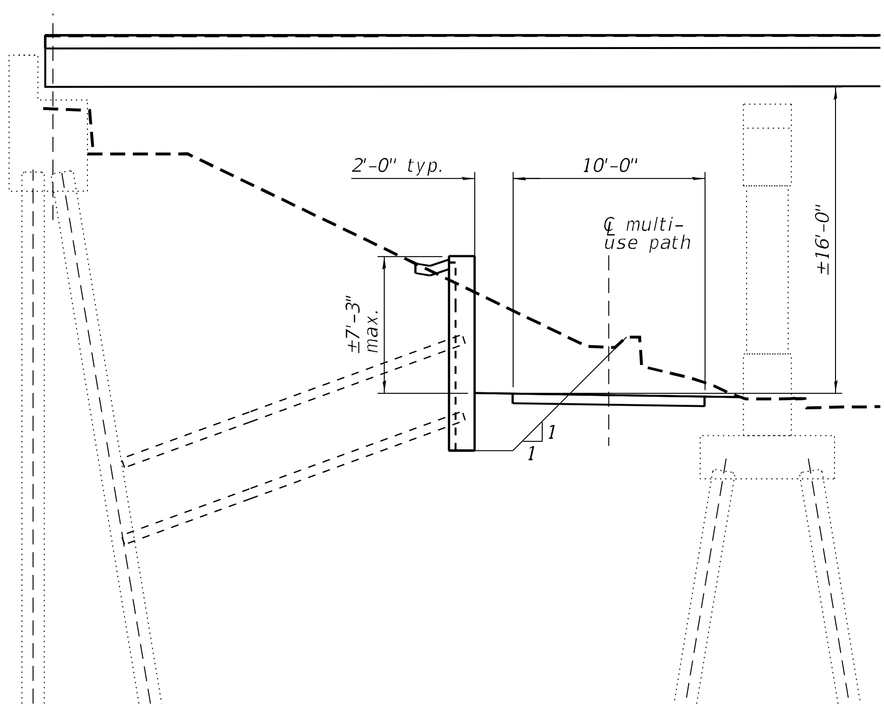
FIGURE NO. 1
JOB # 62N91 IL53



CAST-IN-PLACE CONCRETE INVERTED T-WALL – TYPICAL SECTION

Notes:

The horizontal and vertical clearances are subject to refinement in the TSL Phase.



DRILLED SOIL NAIL WALL – TYPICAL SECTION

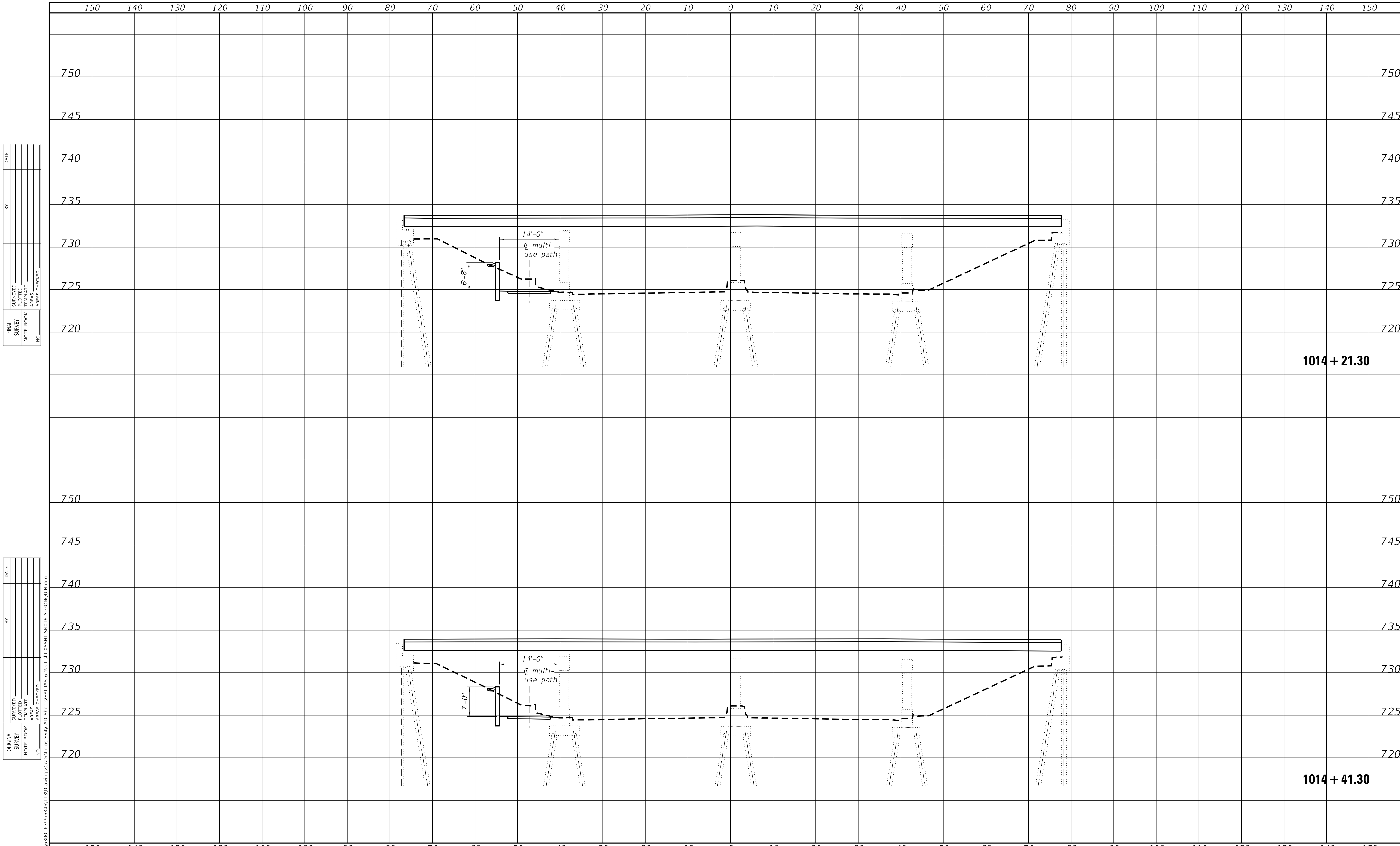
ALGONQUIN RD. PROPOSED S.N. TBD
RETAINING WALL

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION

STRAND ASSOCIATES®

FIGURE NO. 2

JOB # 62N91 IL53



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STRAND ASSOCIATES
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = $USER$	DESIGNED - BRL	REVISED -
	DRAWN - DMF	REVISED -
PLOT SCALE = $SCALE$	CHECKED - NDR	REVISED -
PLOT DATE = 1/26/2023	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ALGONQUIN RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 3 OF 7

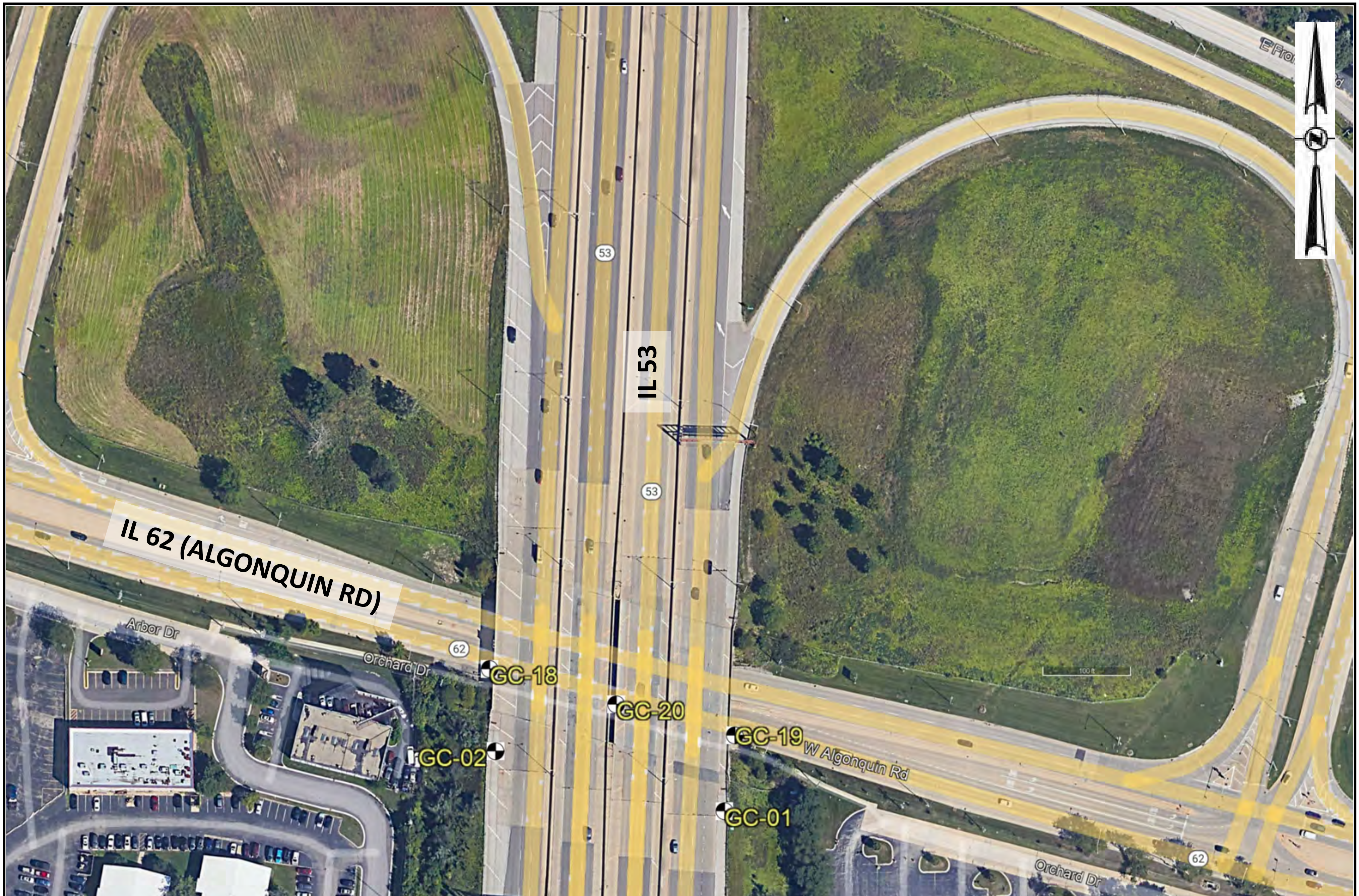
SCALE: ____ SHEET __ OF __ SHEETS STA. 1014+41.30 TO STA. 1014+21.30

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

CONTRACT NO. ____

ILLINOIS FED. AID PROJECT

APPENDIX D Boring Plan



LEGEND KEY:

APPROXIMATE BORING LOCATION

ILLINOIS DEPARTMENT OF TRANSPORTATION IL 53 BRIDGES, 62N91, PTB 203-021 COOK COUNTY, IL	PROJECT NO. 23-1003
IL 53 OVER IL 62 (ALGONQUIN RD) RETAINING WALL BORING LOCATION MAP	APPENDIX D

APPENDIX E Subsurface Data Profile Plot

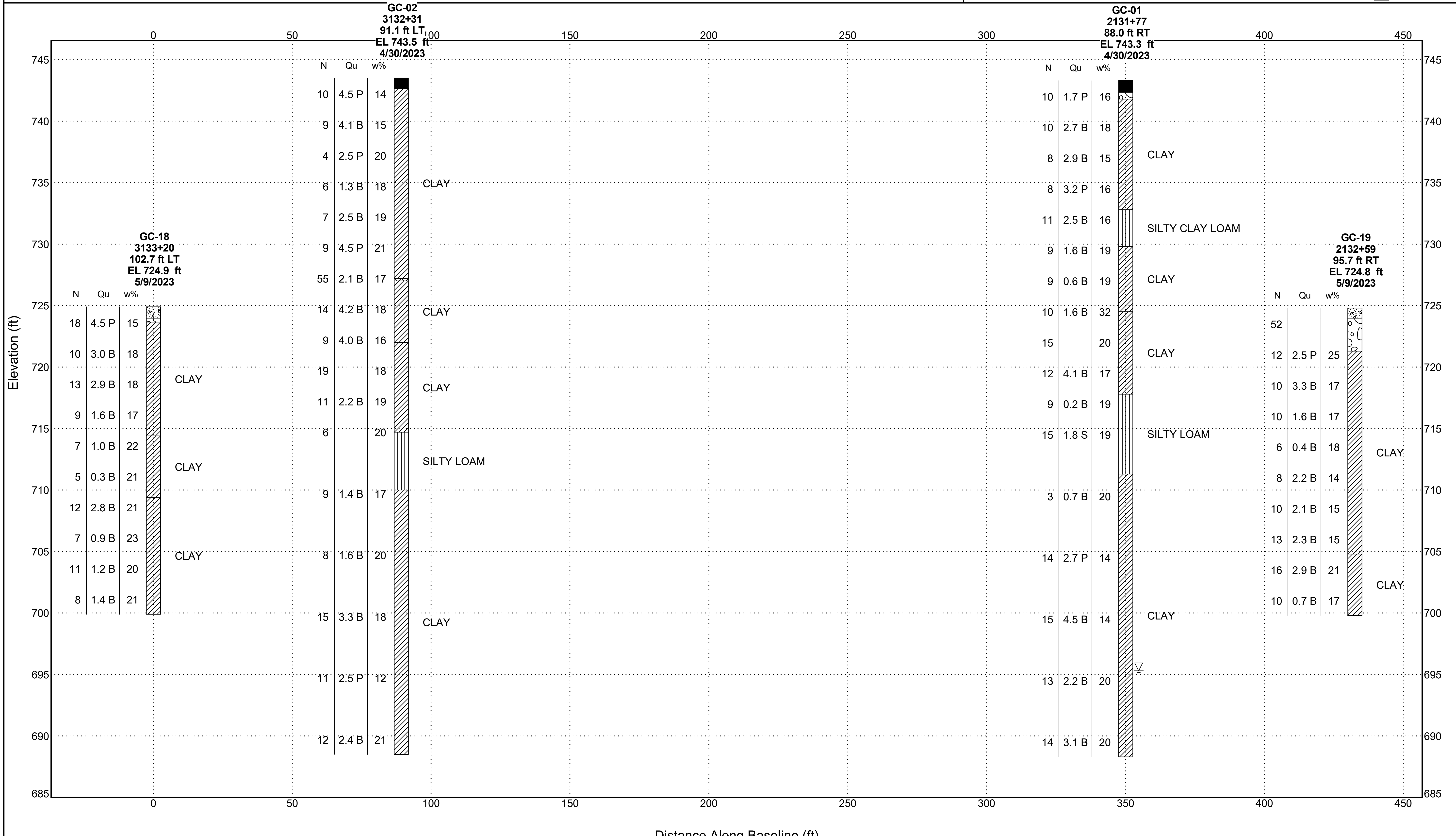
SUBSURFACE PROFILE
IL 53 OVER IL 62 (ALGONQUIN RD)

gonzalez COMPANIES, LLC

ROUTE FAP 342
SECTION 2018-100-BR
COUNTY Cook
PROJECT LOCATION IL 53 from IL 62 (Algonquin Rd) to US 12 (Rand Rd)

LEGEND
EL = Elevation (ft)
D = Depth Below Existing Ground Surface (ft)
N = SPT N-Value (AASHTO T206)
Qu = Unconfined compressive Strength (tsf)
Failure Mode (B= Bulge, S= shear, P= penetrometer)
w% = Moisture Content Percentage

WATER TABLE LEGEND
▼ = First Encountered
▽ = Upon Completion
▼ = After __ hours



ROADWAY PROFILE - BETA 23-1003 IL 53 CHICAGO.GPJ GINT STD US.GDT 07/10/23

APPENDIX F Soil Boring Logs

SOIL BORING LOG

Date 04/30/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over IL 62 (Algonquin Rd) **LOGGED BY** Gonzalez (NRK)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 7, **TWP.** 41N, **RNG.** 11E, 3rd **PM**,
Latitude 42.06219532, **Longitude** 88.02767553

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 105

STRUCT. NO. 016-0378
Station

BORING NO. GC-01
Station 2131+77
Offset 88.0 ft RT
Ground Surface Elev. 743.3 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion 695.3 ft ▽
After ____ **Hrs.** Filled ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
ASPHALT - 11.5"	742.3				
CRUSHED ROCK - 6"	741.8		3		
Stiff, Brown, Dry, CLAY, Some Sand, Trace Gravel			4 6	1.7 P	16
			3 4 6	2.7 B	18
		-5			
			2 4 4	2.9 B	15
			3 4 4	3.2 P	16
		-10			
Stiff, Brown, Dry, SILTY CLAY LOAM, Trace Sand and Gravel	732.8		4 5 6	2.5 B	16
Stiff, Brown, Moist, CLAY, Some Sand, Trace Gravel, Trace Organics	729.8		2 4 5	1.6 B	19
		-15			
LL=31, PL=19, PI=12			3 4 5	0.6 B	19
Stiff, Dark Brown, Moist, CLAY	724.5		2 4 6	1.6 B	32
		-20			

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Dark Brown, Moist, CLAY *(continued)*			9 8 7		20
			3 5 7	4.1 B	17
		-25			
Soft to Stiff, Brown, Wet, SILTY LOAM	717.8		6 4 5	0.2 B	19
with fine to course sand seam			5 6 9	1.8 S	19
		-30			
Soft to Stiff, Brown, Wet, CLAY	711.3		1 1 2	0.7 B	20
		-35			
			4 6 8	2.7 P	14
		-40			

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

SOIL BORING LOG

Date 04/30/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over IL 62 (Algonquin Rd) **LOGGED BY** Gonzalez (NRK)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 7, **TWP.** 41N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.06219532, **Longitude** 88.02767553

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 105

STRUCT. NO. 016-0378
Station
BORING NO. GC-01
Station 2131+77
Offset 88.0 ft RT
Ground Surface Elev. 743.3 ft

Surface Water Elev. ___ ft
Stream Bed Elev. ___ ft
Groundwater Elev.:
First Encounter Dry ft
Upon Completion 695.3 ft ▽
After ___ Hrs. Filled ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Soft to Stiff, Brown, Wet, CLAY *(continued)*					
		-45	4, 6, 9	4.5 B	14
▽					
		-50	3, 5, 8	2.2 B	20
	688.3	-55	4, 5, 9	3.1 B	20
Boring terminated at 55 feet.		-60			

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

gonzalez COMPANIES, LLC

SOIL BORING LOG

Date 04/30/23

ROUTE FAP 342 **DESCRIPTION** IL 53 over IL 62 (Algonquin Rd) **LOGGED BY** Gonzalez (BR)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 7, **TWP.** 41N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.06237519, **Longitude** 88.02860531

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 105

STRUCT. NO. 016-2133
Station

BORING NO. GC-02
Station 3132+31
Offset 91.1 ft LT
Ground Surface Elev. 743.5 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After Hrs. Filled ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
ASPHALT - 10"	742.7				
Medium Stiff to Stiff, Moist, Brown, CLAY, Some Gravel, Trace Sand			10 4 6	4.5 P	14
1" Sand Seam		-5	3 4 5	4.1 B	15
			1 2 2	2.5 P	20
		-10	2 1 5	1.3 B	18
			2 3 4	2.5 B	19
		-15	3 3 6	4.5 P	21
ASPHALT	727.2 727.0		8 46 9	2.1 B	17
Stiff, Brown, Moist, CLAY, Trace Gravel		-20	5 7 7	4.2 B	18

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Moist, CLAY, Trace Gravel *(continued)*	722.0				
Stiff, Brown, Moist, CLAY, Trace Gravel (till)			3 4 5	4.0 B	16
		-25	8 9 10		18
	714.7		4 5 6	2.2 B	19
Soft to Medium Stiff, Brown, Moist, SILTY LOAM, Trace Gravel	710.0	-30	3 3 3		20
Stiff, Brown, Moist, CLAY, Trace Gravel		-35	3 4 5	1.4 B	17
		-40	3 4 4	1.6 B	20

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

gonzalez COMPANIES, LLC

SOIL BORING LOG

Date 04/30/23

ROUTE FAP 342 DESCRIPTION IL 53 over IL 62 (Algonquin Rd) LOGGED BY Gonzalez (BR)

SECTION 2018-100-BR LOCATION NW 1/4, **SEC.** 7, **TWP.** 41N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.06237519, **Longitude** 88.02860531

COUNTY Cook DRILLING METHOD Hollow Stem Auger (8" O.D., 3.25" I.D.) HAMMER TYPE Auto 140 lb HE 105

STRUCT. NO. 016-2133
Station

BORING NO. GC-02
Station 3132+31
Offset 91.1 ft LT
Ground Surface Elev. 743.5 ft

Surface Water Elev. ___ ft
Stream Bed Elev. ___ ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After ___ Hrs. Filled ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Moist, CLAY, Trace Gravel *(continued)*					
		-45	4 6 9	3.3 B	18
		-50	3 4 7	2.5 P	12
	688.5	-55	4 5 7	2.4 B	21
Boring terminated at 55 feet.					
		-60			

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

Page 1 of 1

SOIL BORING LOG

Date 05/09/23

ROUTE FAP 342 **DESCRIPTION** IL 62 (Algonquin Rd) **LOGGED BY** Gonzalez (BR)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 7, **TWP.** 41N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.06261924, **Longitude** 88.02863333

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 105

STRUCT. NO. 016-2133
Station

BORING NO. GC-18
Station 3133+20
Offset 102.7 ft LT
Ground Surface Elev. 724.9 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After Hrs. Filled ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
CONCRETE - 11"	724.0				
GRAVEL - 4"	723.7		34		
Stiff, Brown, Dry to Moist, CLAY, Trace Gravel			8 10	4.5 P	15
		-5	3 5 5	3.0 B	18
			3 5 8	2.9 B	18
	714.4	-10	3 4 5	1.6 B	17
Soft to Medium Stiff, Brown, Moist, CLAY, Trace Gravel			4 3 4	1.0 B	22
	709.4	-15	3 2 3	0.3 B	21
Stiff, Brown, Dry to Moist, CLAY, Trace Gravel			4 5 7	2.8 B	21
		-20	7 3 4	0.9 B	23
Stiff, Brown, Dry to Moist, CLAY, Trace Gravel *(continued)*			4 4 7	1.2 B	20
	699.9	-25	2 4 4	1.4 B	21
Boring terminated at 25 feet.					
		-30			
		-35			
		-40			

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, M-Modified SPT)
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)

SOIL BORING LOG

Date 05/09/23

ROUTE FAP 342 **DESCRIPTION** IL 62 (Algonquin Rd) **LOGGED BY** Gonzalez (BR)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 7, **TWP.** 41N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.06241951, **Longitude** 88.02763389

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 105

STRUCT. NO. 016-0378
Station

BORING NO. GC-19
Station 2132+59
Offset 95.7 ft RT
Ground Surface Elev. 724.8 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After Hrs. Filled ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
CONCRETE - 10"	724.0				
GRAVEL			30 33 19		
	721.3				
Stiff, Brown, Moist, CLAY, Trace Gravel		-5	3 5 7	2.5 P	25
			4 5 5	3.3 B	17
		-10	3 4 6	1.6 B	17
			4 3 3	0.4 B	18
		-15	3 3 5	2.2 B	14
			3 4 6	2.1 B	15
	704.8	-20	4 6 7	2.3 B	15

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Dry, CLAY, Trace Gravel			5 7 9	2.9 B	21
2" Silt Seam	699.8	-25	8 5 5	0.7 B	17
Boring terminated at 25 feet.					
		-30			
		-35			
		-40			

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

Page 1 of 1

SOIL BORING LOG

Date 05/11/23

ROUTE FAP 342 **DESCRIPTION** IL 62 (Algonquin Rd) **LOGGED BY** Gonzalez (BR)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 7, **TWP.** 41N, **RNG.** 11E, 3rd **PM**,
Latitude 42.06251908, **Longitude** 88.02811362

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 105

STRUCT. NO. 016-0378
Station

BORING NO. GC-20
Station 2132+90
Offset 36.1 ft LT
Ground Surface Elev. 724.9 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion Dry ft
After Hrs. Filled ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
		-5			
		-10			
Recovery = 19 in (95%) Moist Unit Wt = 132.4 pcf				1.7 P	15
	712.2				
Stiff, Gray, Moist, SILTY LOAM (A-4), Trace Sand, Trace Gravel 1%Gravel, 4%Sand, 79%Silt, 15%Clay LL=25, PL=21, PI=4				1.6 UU	20
		-15		1.8 UNC	13
	709.4				
Sample ST-1 Recovery = 21.5 in (90%) Moist Unit Wt = 113.1-141.9 pcf					
Boring terminated at 15.5 feet.					
		-20			

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

APPENDIX G Laboratory Test Results

Laboratory Shelby Tube Log

Project No. G23.027

Shelby Tube: GS-20 SS-02

Project Name: IL-53 Bridges

Tube Conditions: No dents

Remarks: UU and UCT tests completed on 8-21 ½ inches

Date Opened: 5/18/2023

Depth: SS-02 13.5-15.5'

Recovery: 21 ½ inches

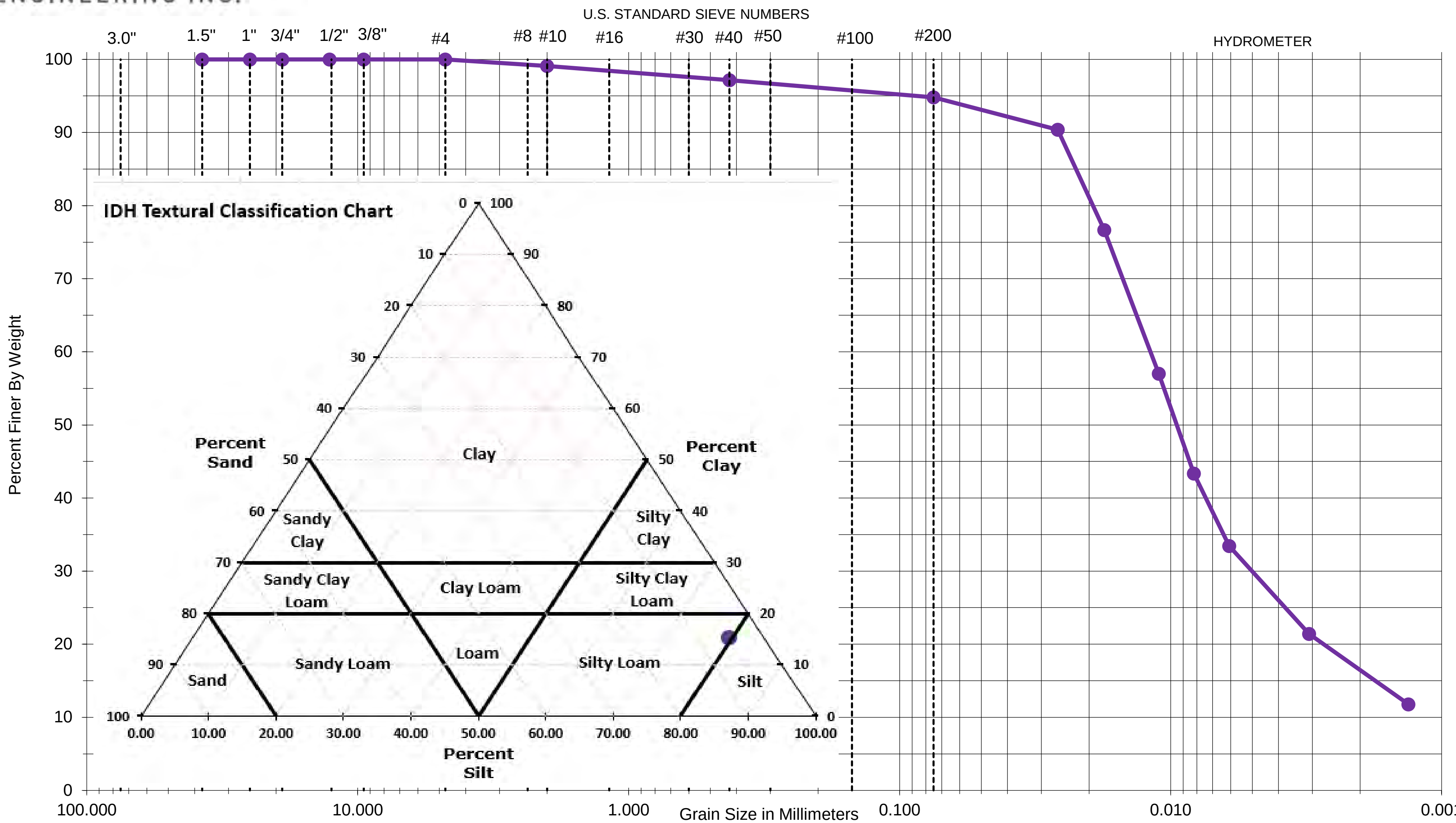
Tube Diameter: 3 inches

Sample Condition: GOOD FAIR POOR DISTURBED

DEPTH (Inches) From/ To	DESCRIPTION OF MATERIAL
0 - 8	Moist gray silty clay, trace sand and gravel Qp=4.0 tsf
8 - 21 ½	Moist gray silty loam, trace sand and gravel Qp=2.75 tsf LL=25% PL=21%

rubino ENGINEERING INC.

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



Key	Boring No.	Depth	IDH Textural Classification			Cc	Cu	%Gravel	%Sand	%Silt	%Clay	D60	D30	D10
●	GS-20	SS-02	SILTY LOAM					0.9	4.4	79.3	15.4	0.012	0.005	

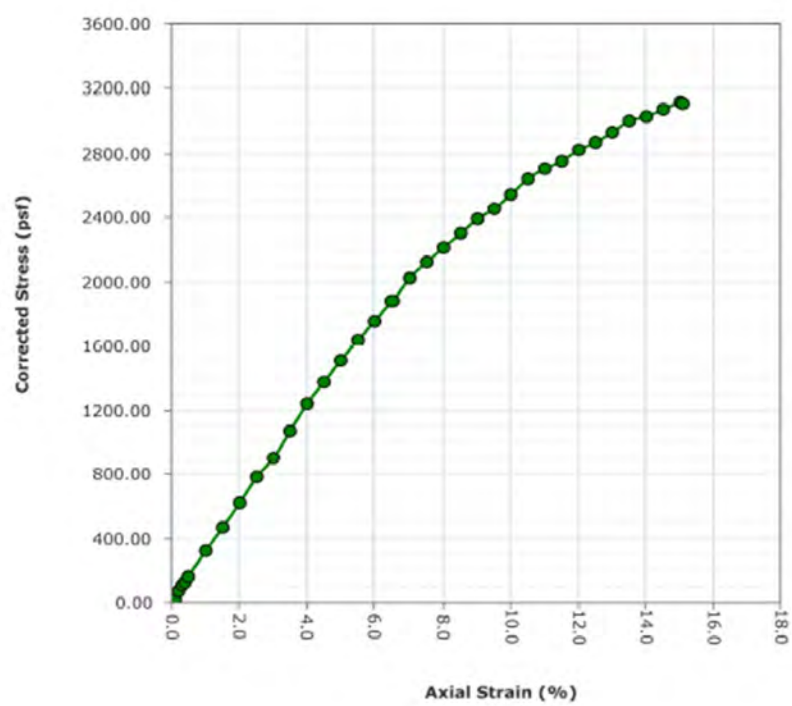
REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL	IL-53 Bridges	File No. G23.027

Rubino Engineering Inc 425 Shepard Drive● Elgin, IL 60123 ● 847-931-1555 ● 847-931-1560 (Fax)

LL=25, PI=4, A-4

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Rubino Project No.:	G23.027	**Strain rate (%/min):**	0.3	**Moisture Content:**	19.8%	**Remarks:**	Undisturbed
Project:	IL-53 Bridges	**Specimen type:**	Intact	**Ht.-Diameter Ratio:**	2.23	**Failure Criterion:**	15% Strain
Client:	Gonzalez Companies, LLC	**Moisture source:**	Trimmings	**Weight (lb):**	3.13	**Axial Strain at Failure:**	15.1%
Date Tested:	6/30/2023	**Test Method:**	AASHTO T296	**Volume (ft³):**	0.0235	**Major Principal Stress at Failure (psf):**	3694
Soil Description:	Gray silty loam, trace sand and gravel	**Specific Gravity:**	2.75*	**Saturation (%):**	99.9	**Minor Principal Stress at Failure (psf):**	576
Boring No.:	GS-20	**Height (in):**	6.36	**Dry Unit Weight (pcf):**	111.1	**Deviator Stress at Fail (psf):**	3118
Depth (ft):	SS-02	**Diameter (in):**	2.85	**Void Ratio:**	0.528	*Assumed	



Failure Type: Bulge

rubino ENGINEERING INC.

425 Shepard Drive, Elgin, Illinois 60123

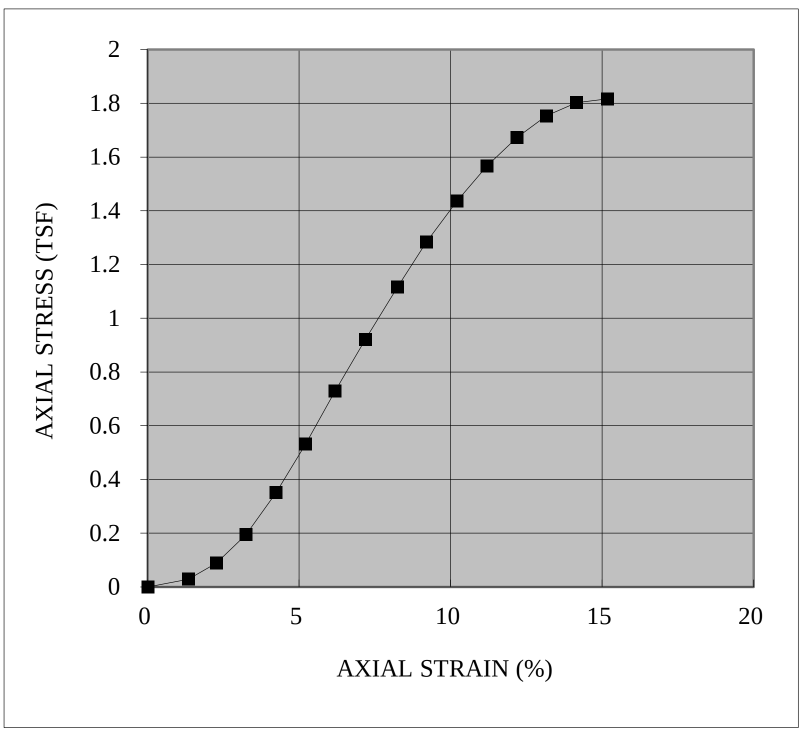
UNCONFINED COMPRESSION TEST

Rubino Project No.: G23.027
Project: IL-53 Bridges
Client: Gonzalez Companies, LLC
Date Tested: June 30, 2023
Soil Description: Gray silty loam, trace sand and gravel
Boring No.: GS-20 SS-02 Shelby Tube
Remarks: Bulge failure

Strain rate (%/min): 2
Specimen type: Intact
Moisture source: Trimmings

Height:	5.66 inches	**Weight (lb):**	3.058
Diameter:	2.89 inches	**Volume (ft^3):**	0.02154
Moisture Content:	12.5%	**Saturation (%):**	98.5
Ht.-Diameter Ratio:	1.96	**Specific Gravity:**	2.72
Unit Weight (pcf):	141.9	**Dry Unit Weight (pcf):**	126.2

READING NUMBER	READING TIME	DEFORM. (in.)	LOAD (lbs)	STRAIN (%)	CORRECTED AREA (in^2)	AXIAL STRESS (tsf)
0	000:00:00	0.03	0.30	0.5	6.58	0.00
1	000:00:30	0.08	2.60	1.3	6.64	0.03
2	000:01:00	0.13	8.20	2.3	6.70	0.09
3	000:01:30	0.18	18.30	3.3	6.77	0.19
4	000:02:00	0.24	33.30	4.2	6.84	0.35
5	000:02:30	0.29	51.00	5.2	6.91	0.53
6	000:03:00	0.35	70.60	6.2	6.98	0.73
7	000:03:30	0.41	90.30	7.2	7.05	0.92
8	000:04:00	0.47	110.60	8.3	7.13	1.12
9	000:04:30	0.52	128.50	9.2	7.21	1.28
10	000:05:00	0.58	145.50	10.2	7.29	1.44
11	000:05:30	0.63	160.50	11.2	7.37	1.57
12	000:06:00	0.69	173.20	12.2	7.45	1.67
13	000:06:30	0.75	183.60	13.2	7.54	1.75
14	000:07:00	0.80	190.90	14.2	7.63	1.80
15	000:07:30	0.86	194.70	15.2	7.72	1.82
Qu =	1.80	tsf		Strain	15.0%	

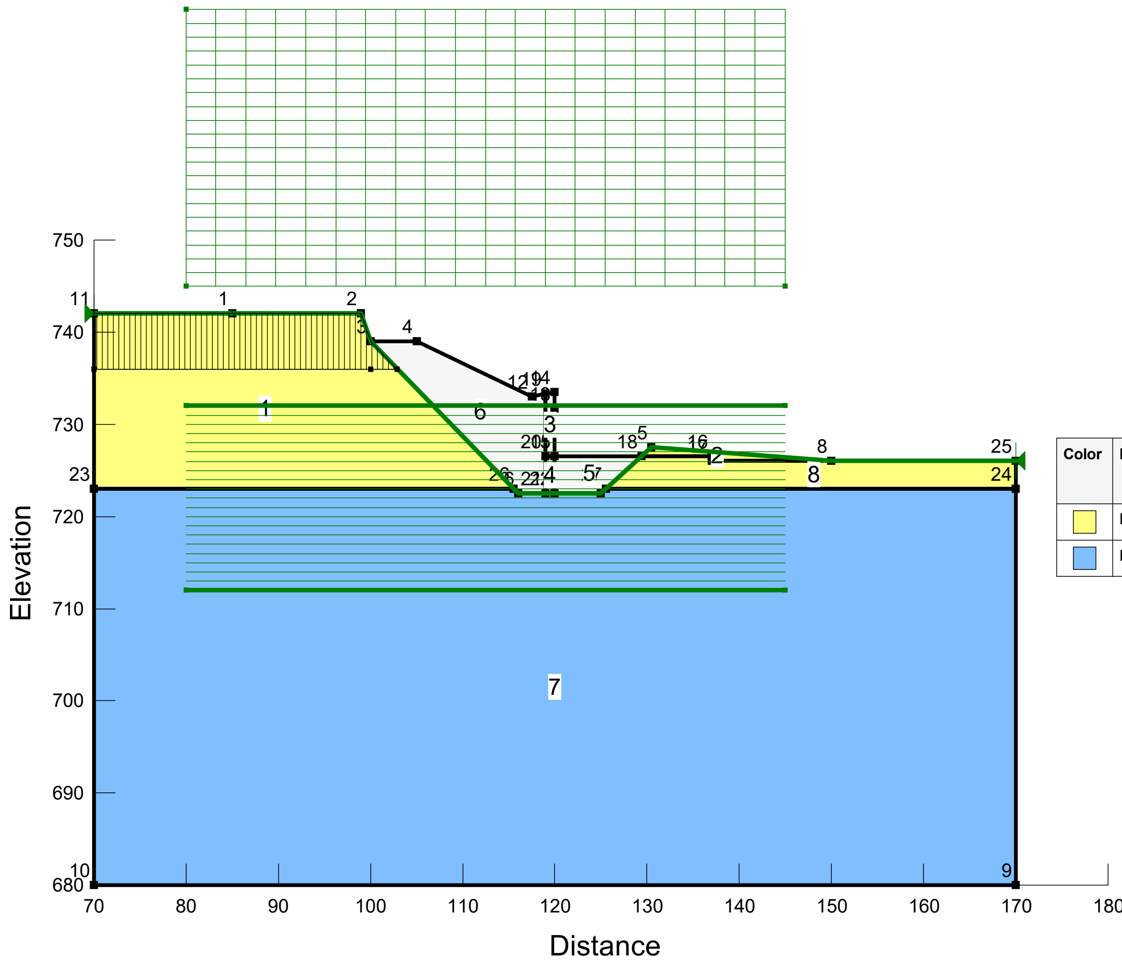


FAILURE SKETCH

FRONT

BACK

APPENDIX H Slope Stability Analysis



Color	Name	Model	Unit Weight (pcf)	Cohesion (psf)
Yellow	Embankment Clay (undrained)	Undrained (Phi=0)	125	1,500
Blue	Foundation Clay (undrained)	Undrained (Phi=0)	120	1,800

gonzalez

Slope Stability - During Construction - Undrained

IL-53 Algonquin Ret WallNK.gsz

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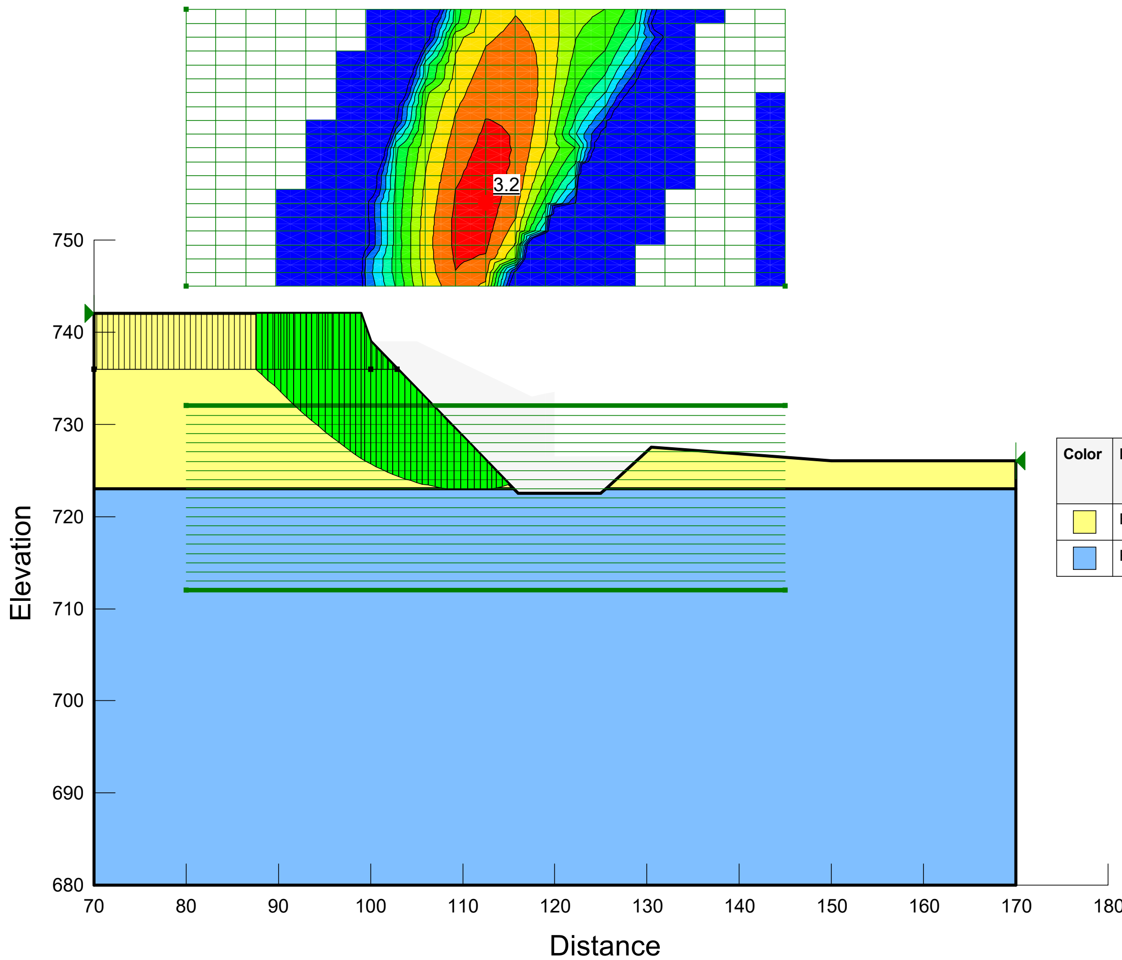

Color	Name	Model	Unit Weight (pcf)	Cohesion (psf)
Yellow	Embankment Clay (undrained)	Undrained (Phi=0)	125	1,500
Blue	Foundation Clay (undrained)	Undrained (Phi=0)	120	1,800

gonzalez

Slope Stability - During Construction - Undrained

IL-53 Algonquin Ret WallNK.gsz

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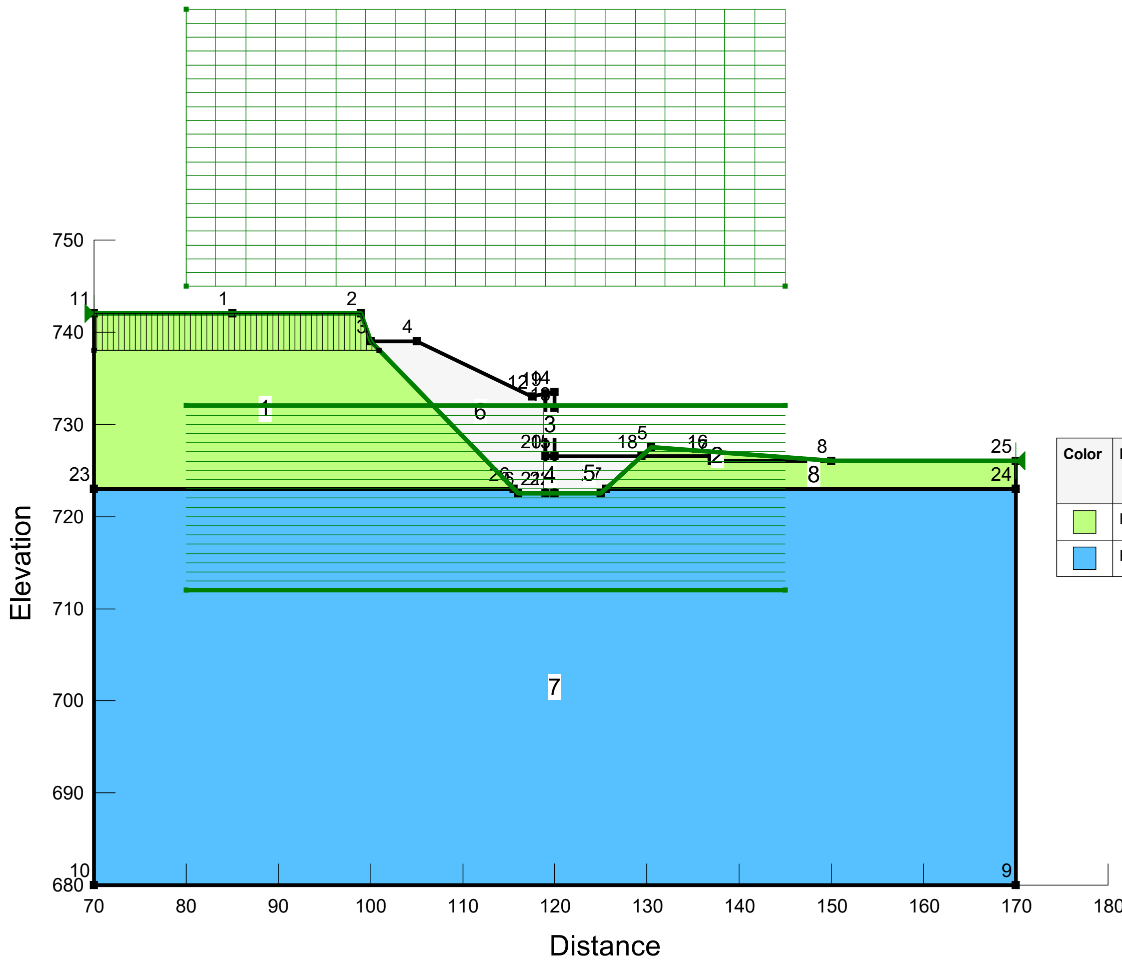


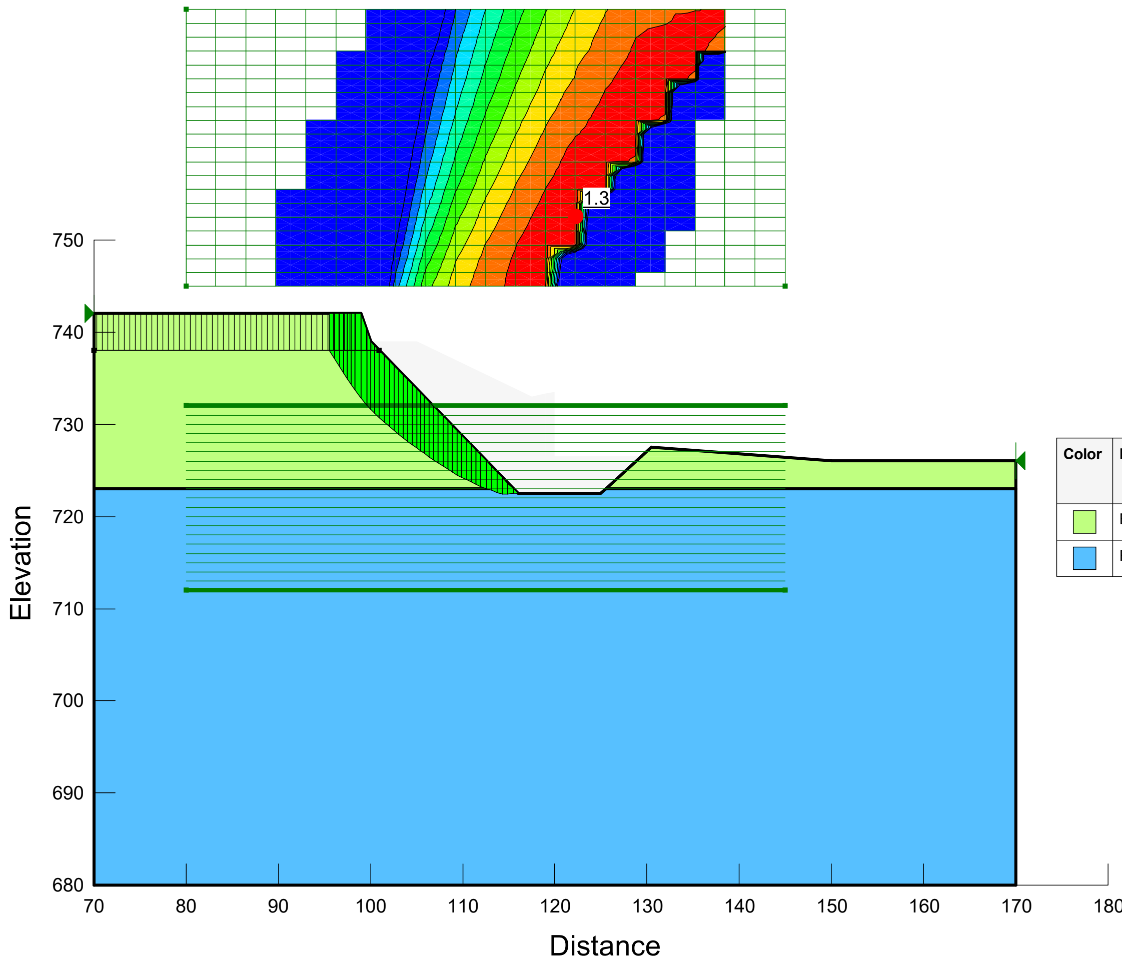
Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Embankment Clay (drained)	Mohr-Coulomb	125	125	28
	Foundation Clay (drained)	Mohr-Coulomb	120	100	30

gonzalez

Slope Stability - During Construction - Drained

IL-53 Algonquin Ret WallNK.gsz

11/06/2023 1:250



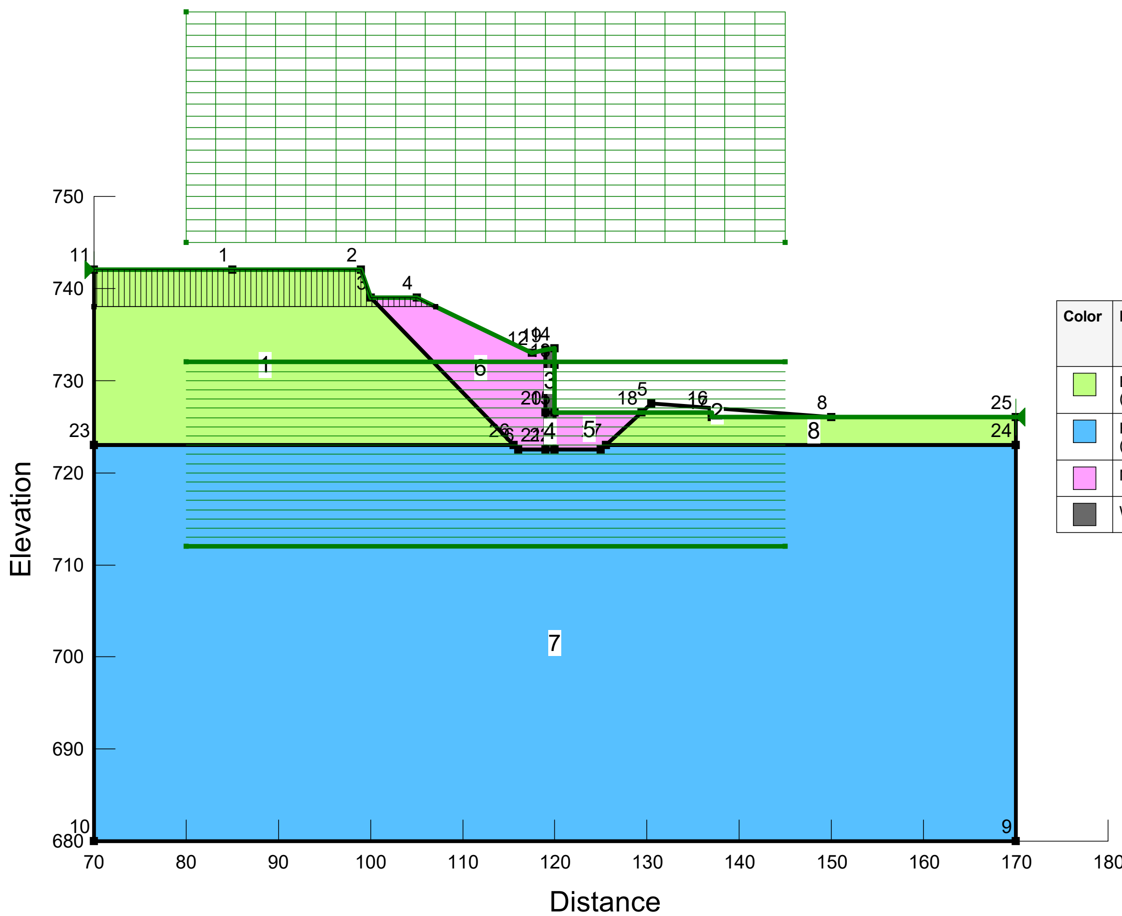
Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Embankment Clay (drained)	Mohr-Coulomb	125	125	28
	Foundation Clay (drained)	Mohr-Coulomb	120	100	30

gonzalez

Slope Stability - During Construction - Drained

IL-53 Algonquin Ret WallNK.gsz

11/06/2023 1:250



Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Embankment Clay (drained)	Mohr-Coulomb	125	125	28
	Foundation Clay (drained)	Mohr-Coulomb	120	100	30
	New Fill (drained)	Mohr-Coulomb	120	100	28
	Walll	High Strength	150		

Slope Stability - Long Term - Drained

IL-53 Algonquin Ret WallNK.gsz

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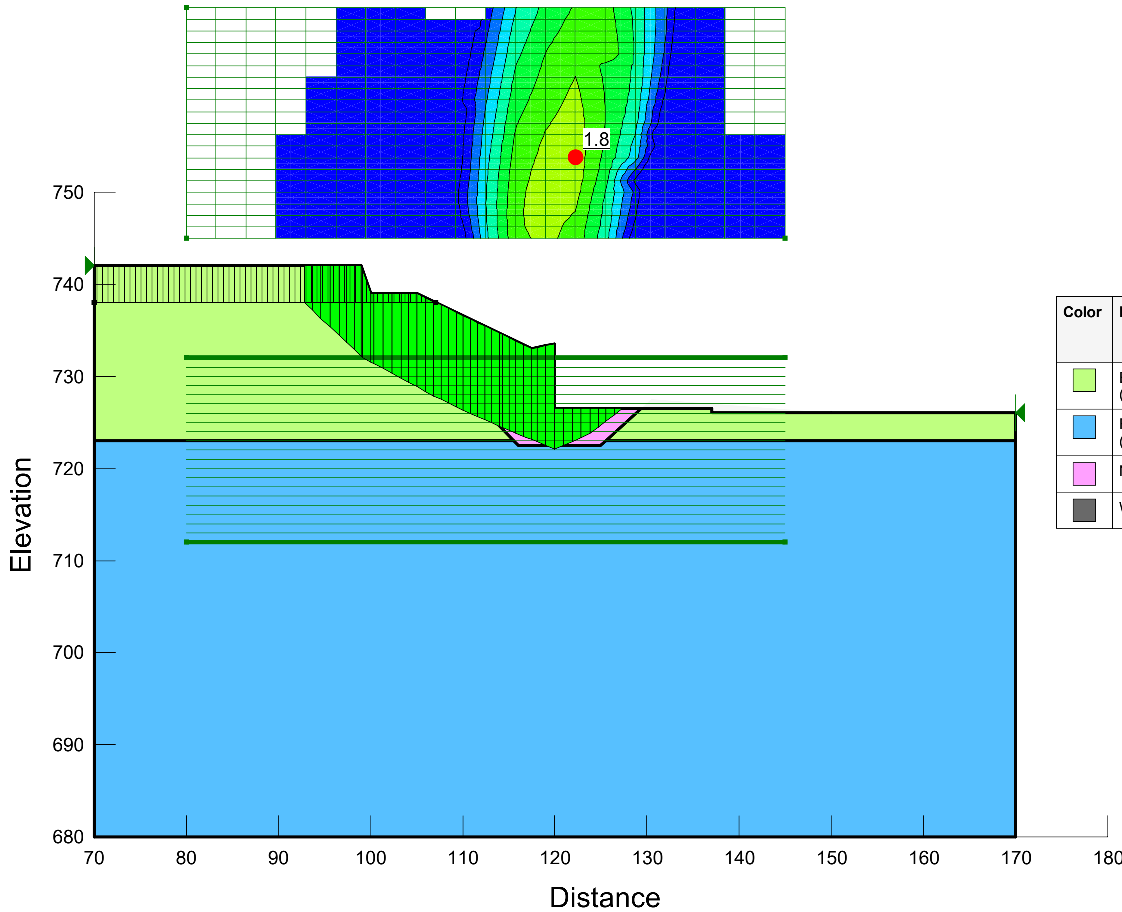

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Embankment Clay (drained)	Mohr-Coulomb	125	125	28
	Foundation Clay (drained)	Mohr-Coulomb	120	100	30
	New Fill (drained)	Mohr-Coulomb	120	100	28
	Walll	High Strength	150		

gonzalez

Slope Stability - Long Term - Drained

IL-53 Algonquin Ret WallNK.gsz

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APPENDIX I Seismic Analysis

SEISMIC SITE CLASS DETERMINATION

Illinois Department of Transportation

PROJECT TITLE===== IL 53 over IL-62 (Algonquin Rd) - PTB 203-021 - 62N91

Substructure 1

Base of Substruct. Elev. (or ground surf for bents)	721	ft.
Pile or Shaft Dia.		inches
Boring Number	B-4	
Top of Boring Elev.	725.7	ft.

Approximate Fixity Elev. 721 ft.

Individual Site Class Definition:

N (bar): 19 (Blows/ft.) Soil Site Class D
N_{ch} (bar): 24 (Blows/ft.) Soil Site Class D <----Controls
s_u (bar): 2.03 (ksf) Soil Site Class C

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	723.7	2.00			B
0.8	720.2	3.50	18	3.40	
4.8	716.2	4.00	10	2.00	B
7.3	713.7	2.50	10		B
9.8	711.2	2.50	6	0.90	B
12.3	708.7	2.50	13	2.10	
14.8	706.2	2.50	18	2.40	
17.3	703.7	2.50	20	2.60	B
19.8	701.2	2.50	15	1.70	B
22.3	698.7	2.50	16	2.60	
24.8	696.2	2.50	12	2.20	
27.3	693.7	2.50	14	2.00	B
29.8	691.2	2.50	15	1.60	
32.3	688.7	2.50	13	1.60	B
34.8	686.2	2.50	19	2.30	
37.3	683.7	2.50	14	2.80	B
39.8	681.2	2.50	26		B
42.3	678.7	2.50	18		B
44.8	676.2	2.50	33	3.20	B
47.3	673.7	2.50	34		B
49.3	671.7	2.00	25		
54.3	666.7	5.00	25		
59.3	661.7	5.00	25		
64.3	656.7	5.00	25		
69.3	651.7	5.00	25		
74.3	646.7	5.00	25		
79.3	641.7	5.00	25		
84.3	636.7	5.00	25		
89.3	631.7	5.00	25		
94.3	626.7	5.00	25		
99.3	621.7	5.00	25		
102.3	618.7	3.00	25		B

Substructure 2

Base of Substruct. Elev. (or ground surf for bents)	721	ft.
Pile or Shaft Dia.		inches
Boring Number	B-5	
Top of Boring Elev.	723.9	ft.

Approximate Fixity Elev. 721 ft.

Individual Site Class Definition:

N (bar): 16 (Blows/ft.) Soil Site Class D
N_{ch} (bar): 19 (Blows/ft.) Soil Site Class D <----Controls
s_u (bar): 1.74 (ksf) Soil Site Class D

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	721.9	2.00			B
3.1	717.9	4.00	14	2.20	
6.6	714.4	3.50	16	2.10	B
9.1	711.9	2.50	10		B
11.6	709.4	2.50	7	0.80	B
14.1	706.9	2.50	11	1.40	
16.6	704.4	2.50	16	1.80	B
19.1	701.9	2.50	15	2.20	B
21.6	699.4	2.50	7	0.70	B
24.1	696.9	2.50	16	2.20	B
26.6	694.4	2.50	11	1.60	B
29.1	691.9	2.50	11	2.00	
31.6	689.4	2.50	13	2.20	
34.1	686.9	2.50	13	2.20	
36.6	684.4	2.50	14	2.30	
39.1	681.9	2.50	14	2.20	
41.6	679.4	2.50	17	2.50	
44.1	676.9	2.50	10	2.50	B
46.6	674.4	2.50	27		B
49.1	671.9	2.50	17	2.80	B
51.1	669.9	2.00	20		
56.1	664.9	5.00	20		
61.1	659.9	5.00	20		
66.1	654.9	5.00	20		
71.1	649.9	5.00	20		
76.1	644.9	5.00	20		
81.1	639.9	5.00	20		
86.1	634.9	5.00	20		
91.1	629.9	5.00	20		
96.1	624.9	5.00	20		
101.1	619.9	5.00	20		
105.8	615.2	4.70	20		B

Substructure 3

Base of Substruct. Elev. (or ground surf for bents)	721	ft.
Pile or Shaft Dia.		inches
Boring Number	GC-01	
Top of Boring Elev.	743.3	ft.

Approximate Fixity Elev. 721 ft.

Individual Site Class Definition:

N (bar): 13 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 2.15 (ksf) Soil Site Class C <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	740.8	2.50	10	1.70	
	738.3	2.50	10	2.70	
	735.8	2.50	8	2.90	
	732.8	3.00	8	3.20	B
	729.8	3.00	11	2.50	B
	727.3	2.50	9	1.60	
	724.5	2.80	9	0.60	B
	722.0	2.50	10	1.60	
1.5	719.5	2.50	16	1.60	
3.2	717.8	1.70	12	4.10	B
5.7	715.3	2.50	9	0.20	
9.7	711.3	4.00	15	1.80	B
12.2	708.8	2.50	3	0.70	
17.2	703.8	5.00	14	2.70	
22.2	698.8	5.00	15	4.50	
27.2	693.8	5.00	13	2.20	
32.7	688.3	5.50	14	3.10	
37.7	683.3	5.00	13	2.20	
42.7	678.3	5.00	13	2.20	
47.7	673.3	5.00	13	2.20	
52.7	668.3	5.00	13	2.20	
57.7	663.3	5.00	13	2.20	
62.7	658.3	5.00	13	2.20	
67.7	653.3	5.00	13	2.20	
72.7	648.3	5.00	13	2.20	
77.7	643.3	5.00	13	2.20	
82.7	638.3	5.00	13	2.20	
87.7	633.3	5.00	13	2.20	
92.7	628.3	5.00	13	2.20	
97.7	623.3	5.00	13	2.20	
100.0	621.0	2.30	13	2.20	B

Substructure 4

Base of Substruct. Elev. (or ground surf for bents)	721	ft.
Pile or Shaft Dia.		inches
Boring Number	GC-02	
Top of Boring Elev.	743.5	ft.

Approximate Fixity Elev. 721 ft.

Individual Site Class Definition:

N (bar): 9 (Blows/ft.) Soil Site Class E
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 1.81 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	741.0	2.50	10	4.50	
	738.5	2.50	9	4.10	
	736.0	2.50	4	2.50	
	733.5	2.50	6	1.30	
	731.0	2.50	7	2.50	
	727.2	3.80	9	4.50	B
	724.7	2.50	9	2.10	
	722.0	2.70	14	4.20	B
1.5	719.5	2.50	9	4.00	
4.0	717.0	2.50	19	2.20	
6.3	714.7	2.30	11	2.20	B
11.0	710.0	4.70	6	0.00	B
12.5	708.5	1.50	9	1.40	
17.5	703.5	5.00	8	1.60	
22.5	698.5	5.00	15	3.30	
27.5	693.5	5.00	11	2.50	
32.5	688.5	5.00	12	2.40	
37.5	683.5	5.00	8	1.60	
42.5	678.5	5.00	8	1.60	
47.5	673.5	5.00	8	1.60	
52.5	668.5	5.00	8	1.60	
57.5	663.5	5.00	8	1.60	
62.5	658.5	5.00	8	1.60	
67.5	653.5	5.00	8	1.60	
72.5	648.5	5.00	8	1.60	
77.5	643.5	5.00	8	1.60	
82.5	638.5	5.00	8	1.60	
87.5	633.5	5.00	8	1.60	
92.5	628.5	5.00	8	1.60	
97.5	623.5	5.00	8	1.60	
100.0	621.0	2.50	8	1.60	B

Global Site Class Definition: Substructures 1 through 6

N (bar): 12 (Blows/ft.) Soil Site Class E
N_{ch} (bar): 21 (Blows/ft.) Soil Site Class D <----Controls
s_u (bar): 1.59 (ksf) Soil Site Class D

Illinois Department of Transportation

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE===== IL 53 over IL-62 (Algonquin Rd) - PTB 203-021 - 62N91

Substructure 5

Base of Substruct. Elev. (or ground surf for bents)	721	ft.
Pile or Shaft Dia.		inches
Boring Number	GC-18	
Top of Boring Elev.	724.9	ft.
Approximate Fixity Elev.	721	ft.

Individual Site Class Definition:

N (bar): 7 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 1.03 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	722.4	2.50	18	4.50	
1.1	719.9	2.50	10	3.00	
3.6	717.4	2.50	13	2.90	
6.6	714.4	3.00	9	1.60	B
9.1	711.9	2.50	7	1.00	
11.6	709.4	2.50	5	0.30	B
14.1	706.9	2.50	12	2.80	
16.6	704.4	2.50	7	0.90	
19.1	701.9	2.50	11	1.20	
21.1	699.9	2.00	6	1.40	
26.1	694.9	5.00	7	0.90	
31.1	689.9	5.00	7	0.90	
36.1	684.9	5.00	7	0.90	
41.1	679.9	5.00	7	0.90	
46.1	674.9	5.00	7	0.90	
51.1	669.9	5.00	7	0.90	
56.1	664.9	5.00	7	0.90	
61.1	659.9	5.00	7	0.90	
66.1	654.9	5.00	7	0.90	
71.1	649.9	5.00	7	0.90	
76.1	644.9	5.00	7	0.90	
81.1	639.9	5.00	7	0.90	
86.1	634.9	5.00	7	0.90	
91.1	629.9	5.00	7	0.90	
96.1	624.9	5.00	7	0.90	
100.0	621.0	3.90	7	0.90	

Substructure 6

Base of Substruct. Elev. (or ground surf for bents)	721	ft.
Pile or Shaft Dia.		inches
Boring Number	GC-19	
Top of Boring Elev.	724.8	ft.
Approximate Fixity Elev.	721	ft.

Individual Site Class Definition:

N (bar): 10 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 1.17 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	721.3	3.50	52		B
2.2	718.8	2.50	12	2.50	
4.7	716.3	2.50	10	3.30	
7.2	713.8	2.50	10	1.60	
9.7	711.3	2.50	6	0.40	
12.2	708.8	2.50	8	2.20	
14.7	706.3	2.50	10	2.10	
17.2	703.8	2.50	13	2.30	
19.7	701.3	2.50	16	2.90	
21.2	699.8	1.50	10	0.70	
26.2	694.8	5.00	10	0.70	
31.2	689.8	5.00	10	0.70	
36.2	684.8	5.00	10	0.70	
41.2	679.8	5.00	10	0.70	
46.2	674.8	5.00	10	0.70	
51.2	669.8	5.00	10	0.70	
56.2	664.8	5.00	10	0.70	
61.2	659.8	5.00	10	0.70	
66.2	654.8	5.00	10	0.70	
71.2	649.8	5.00	10	0.70	
76.2	644.8	5.00	10	0.70	
81.2	639.8	5.00	10	0.70	
86.2	634.8	5.00	10	0.70	
91.2	629.8	5.00	10	0.70	
96.2	624.8	5.00	10	0.70	
100.0	621.0	3.80	10	0.70	B

Substructure 7

Base of Substruct. Elev. (or ground surf for bents)		ft.
Pile or Shaft Dia.		inches
Boring Number		
Top of Boring Elev.		ft.
Approximate Fixity Elev.		ft.

Individual Site Class Definition:

N (bar): (Blows/ft.) NA
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary

Substructure 8

Base of Substruct. Elev. (or ground surf for bents)		ft.
Pile or Shaft Dia.		inches
Boring Number		
Top of Boring Elev.		ft.
Approximate Fixity Elev.		ft.

Individual Site Class Definition:

N (bar): (Blows/ft.) NA
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): (ksf) NA

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary

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Save Copy Collapse All Expand All Filter JSON

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sdc: "A"
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t0: 0.115
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0: 0.15
1: 0.145
6:

APPENDIX J Wall Feasibility Study

Wall Feasibility Study

REGION: One

DISTRICT: One

ROUTE: IL Route 62 (Algonquin Road) FAP 339

COUNTY: Cook

SECTION NUMBER: 2018-100-BR

JOB NUMBER: 62N91

STRUCTURE NUMBER: To be Determined

LOCATION: IL 62 (Algonquin Road) under IL 53

PREPARED BY: Strand Associates, Inc.®

PREPARED FOR: Illinois Department of Transportation

DATE: February 10, 2023

TABLE OF CONTENTS

1. PROJECT BACKGROUND

As part of a Phase I study to improve the condition of multiple structures along Illinois (IL) 53 (FAP 342), the establishment of a multiuse path along IL 62 (Algonquin Road) was proposed. This multiuse path is to pass through span 1 of the existing bridge structures at the IL 53 overpass of IL 62 between the south abutment and Pier 1. To accommodate the multiuse path's footprint, a portion of the existing slope-wall must be removed and retained.

Additional multiuse path improvements are proposed at Palatine Road and United States (US) 12 Rand Road as part of this project. These locations will require a similar solution to retain slope-wall embankment within the path footprint.

2. EXISTING CONDITIONS

Structure Numbers 016-0378 and 016-2133 (IL 53 northbound and southbound over IL 62 Algonquin Road, respectively) are located at the southernmost end of the IL 53 corridor limits of Illinois Department of Transportation (IDOT) Project Number 62N91. IL 62 runs east to west and provides for two lanes of traffic in each direction. There is an approximate 7'-0" existing sidewalk located under the structures in the same location as the proposed multiuse path.

An existing concrete slope-wall at a two-to-one horizontal to vertical (2H:1V) slope establishes the grade separation between IL 62 and IL 53. The existing vertical clearance was measured as approximately 14'-6" at IL 62. Attachment A contains an overview of the project location. Attachment B presents the existing cross sections of IL 62 and existing bridge structures.

3. RECOMMENDED IMPROVEMENT

The proposed multiuse path will run east to west through span 1 of the existing bridge structures at the IL 53 overpass of IL 62. To construct this multiuse path the existing sidewalk and existing paved slope wall will be cut back creating the need for earth retention. This path is to be 14' in width (two 2' shoulders and a 10' paved path) and will pass between the existing south abutments and Pier 1 on the south side of IL 62.

As part of the overall contract corridor improvements, the superstructure of each bridge is anticipated to be replaced while the substructures will be repaired and rehabilitated for reuse.

A. Reason for Retaining Wall

A retaining wall is required to stabilize the abutment embankment removed to accommodate the proposed multiuse path through span 1. Wall construction may be planned concurrently with the replacement of the bridge superstructure or may occur as part of an advanced work contract.

B. Retaining Wall Design Criteria

The retaining wall design will meet standards and criteria set forth in the following manuals: American Association of State Highway and Transportation Officials Load and Factor Design Bridge Specifications 9th Edition (2020), IDOT Bridge Manual (BM) (2023) with applicable All Bridge Designer memorandums. The IDOT Geotechnical Manual (2020) will outline structure geotechnical parameters for design and stability while the Bureau of Design and Environment (BDE) Manual (2022) will establish bicycle and pedestrian accommodations. The following table highlights select criteria used for the development of the Wall Feasibility Study.

Retaining Wall Design Criteria Table

Description	Criteria	Reference
Bicycle and Pedestrian Traffic	Low Volume	Phase I Report Vol. 1 of 4; Table 12-2; BDE 17-2.03(b) Figure 17-2.T.
Multiuse Path Width	10' (minimum), 14' (desirable: 2', 10', and 2')	BDE 17-2.03(b) Figure 2.U
Road Separation	5' from face of curb; 2' vertical clear distance or use Rub Rail	BDE 17-2.03(c); Figure 17-2.W
Road Separation with Barrier	Minimum offset not required when a 3' barrier is provided.	BDE 17-2.KK
Bicycle Railing Height	4'-0", minimum	BDE 17-2.03(d)
Vertical Clearance Under Bridge	8'-0" minimum, 10'-0" desirable	BDE 17-2.03(d)
Drainage–Cross Slope and Superelevation	Recommended 1 to 1.5 percent, 2 percent maximum	BDE 17-2.03(g)
Multiuse Path Approach to Bridge	Match proposed path width; provide clear view through structures	BDE 17-2.03(I)
Slope Wall Cutback Pier to Wall Width	10'-0", minimum	BDE 17-2.03(I) and Figure 17-2.HH
Profile	Maximum 5 percent to match the roadway, 2 percent maximum of path, 1.5 percent is desirable	BDE 17-2.03(h)
Cast-in-Place (CIP) Wall Footing Depth	4'-0"	IDOT BM 2.3.12.2
CIP Wall	28 degrees. Internal friction backfill	IDOT BM 3.11.2
Solider Pile Wall	Coulomb's Earth Coefficients	IDOT BM 3.11.3
Top of Wall Drainage	Type B Gutter	IDOT BM Figures 3.11.2.3-2 and 3.11.3.2.1-1

4. PRELIMINARY ALTERNATIVES CONSIDERED

Three retaining wall alternatives have been considered for earth retention at this grade separation. Descriptions of each alternative are provided in the following. Attachment C provides a conceptual exhibit for each wall alongside a plan layout. All wall types considered have a minimum anticipated service life of 50 years to coincide with the remaining bridge life cycle.

A. Alternative 1–Soldier Pile and Lagging Wall

A soldier pile and lagging retaining wall allows for a top-down construction approach. A pile is driven or drilled into the existing ground from overhead, timber lagging placed between, drainage system, and the earth is excavated at the front face in a top-down manner. Implementation of this system will require a coordinated sequence with the bridge superstructure reconstruction for overhead access. Selection of a top-down construction method has the potential to reduce the earthwork involved in the wall placement but will require temporary shoring between removals of the existing superstructure.

A sheet pile system could also be used in top-down construction but was dropped from consideration because of gravelly soils identified in the historic soil boring logs.

B. Alternative 2–CIP Concrete Inverted T-Wall

A traditional CIP earth retaining wall would be proposed to be placed by means of an open cut excavation through span 1. Removal of the slope wall and soil between the abutment and pier occurs to the required elevation for installation of the retaining wall. Engineered fill is placed behind the retaining wall along with a drainage system.

C. Alternative 3–Drilled Soil Nail Wall

A soil nail wall allows for a top-down construction but offers constructability of low head room, in situations such as this, which separates itself from the bridge construction. As soil nails are installed shotcrete is applied as earthwork is excavated before a final concrete facing is cast. The system needs to have competent soil above the groundwater table. The system is not favorable for design in granular, organic, or cobbly soils. Design life of soil nail walls is 50 to 75 years based on ground corrosion potential.

5. PRELIMINARY ALTERNATIVES COMPARISON

The preliminary alternatives are compared in the following based on the various retaining wall criteria identified in the IDOT BM (2023). Each criteria item is selected to provide comparison of costs and construction methods.

A. Opinion of Construction Cost (OPCC)

For each alternative, an OPCC was generated to reflect the cost. There are pay items that are common across all alternatives; however, some details vary slightly, therefore, all pay items and quantities are reflected in the cost. The multiuse path pay items are not considered in the OPCCs as noted on each. Attachment D provides the base breakdown for each alternative, as well as additions of contingency, mobilization, escalation, and additional cost for remobilization (if applicable) considering the multistage maintenance of traffic (MOT) scheme for the project. Alternatives 1 and 2 are similar in cost, but Alternative 2, the CIP T-wall, is slightly less because it is independent of the MOT. The third alternative is considered cost-prohibitive and was removed from consideration. A direct comparison of the overall base cost to exposed square footage results in the following for Alternatives 1, 2, and 3, respectively: $226 per square foot (sq ft), $217 per sq ft, and $297 per sq ft.

B. Geometrics

The multiuse path's profile and alignment are not established at this time. This will be determined during the Type, Size, and Location (TS&L) Phase. The proposed alignment will follow the curb line of the IL 62 through span 1. The multiuse path has a proposed width of 14' face-to-face of the retaining walls to existing pier. This configuration is for a 10' path and two 2' shoulders. Infills are proposed between the existing pier columns to a height of 4'-6" above the path. A minimum of 10' vertical clearance will be obtained. The path cross slope is proposed as 1.5 percent, draining from the front face of the wall to the back of curb. The geometric criteria are identified in the table of Section 3.

C. Geotechnical

A Structural Geotechnical Report (SGR) has been scoped for this wall, and new borings are considered forthcoming. Historic boring logs were available and can be found within Attachment E. The historic data indicates that the soil is primarily clay, but traces of sandy till with a bearing pressure of around 2.0 tons per sq ft. This data will not capture what was used for the embankment material and the fill under the existing slope-walls. For the purposes of this study, the selected alternatives that were developed are less sensitive to variance in bearing strata.

The additional structural borings required for the preparation of the SGR will be taken to depths and spacing, as recommended by the IDOT Geotechnical Manual. See Attachment E for more information.

D. Structural Feasibility

A solider pile and lagging wall, a CIP concrete inverted T-wall, and drilled soil nail wall were selected as appropriate wall types to meet the specific project demands for soil retention. See Attachment C for reference to the conceptual wall exhibits for each type selected.

1. Alternative 1–Soldier Pile and Lagging Wall

This wall system is adaptable to meet geotechnical parameters at a given site. While a driven soldier pile wall may be feasible, it is recommended that a drilled soldier pile system be considered. This is reflected in the OPCC for Alternative 1. The existing pier and abutment are both pile-supported. To prevent issues with disturbing the existing foundations, augured placement of these piles will create less disturbance to the bearing strata. This alternative will require the removal of the existing bridge superstructure before placement and must be scheduled for completion before placement of new superstructure beams. For OPCC quantity generation a 1/3 exposed, 2/3 embedment was used to determine the length of the drilled soldier pile. The common 8' spacing was used across the wall length. Temporary soil retention is required for retention of slope-wall embankment between stages of the bridge construction.

2. Alternative 2–CIP Inverted T-Wall

To place this type of wall, removal of the entire slope wall and open cut of the embankment is required. This excavation may be feasible while the existing superstructure is still in place. The base of the foundation must be set below a frost depth of 4' from proposed grade. The backfill behind the wall may be lightweight cellular concrete fill to reduce loads on the wall. A shear key can be introduced below the footing to aid in sliding resistance if the driving load is an issue in design.

3. Alternative 3–Drilled Soil Nail Wall

A soil nail wall is commonly used in cut back wall situations. The wall system is most often designated through a performance specification requiring involvement with the construction contractor to complete final design based on a basic plan and elevation layout. Resistance is developed through soil interaction with the drilled and grouted nails that are then mechanically secured to the wall facing. This layout requires a specific grid layout will varying lengths of soil nail. The soil nails are often assumed to have a maximum length of 2.5 times the exposed height of the finished wall. Using this approximation, the final nail position will intersect the plane of resistance of the front battered row of abutment piles. The location of the columns of the existing piers may also interfere with the layout, but placement is possible through the column bays. Adequate clearance from the existing piles and proposed soil nail location must be considered in all layouts.

This type of retaining wall system is most often applied at locations where low overhead clearance is a constraint. The construction of this type of wall may be able to progress as an advance work contract at this location while the existing bridge decks remain in service.

The system also typically requires the presence of cohesive soils in the retained embankment. If the presence of granular soils in the grade separation is discovered during exploratory borings for the drafting of the project SGR, this wall system may no longer be feasible.

E. Aesthetics

To prevent the creation of a hazard to bicycle riders, a smooth finish to all vertical exposed concrete wall surfaces is anticipated. Thus, this item will have no bearing on the wall selection process and is dropped from consideration.

F. MOT

The Phase I Concept MOT scheme identifies four construction stages for IL 53 bridges over IL 62. The soldier pile and lagging wall is dependent on MOT staging and construction schedule of the bridge superstructure replacements as it requires top-down construction. Alternative 2, the CIP inverted T-wall, may be placed while the existing superstructure is still in service if the contractor has the proper excavation equipment available. Alternative 3, soil nail wall, can be placed completely as an advanced work contract, but may impact IL 62 more than the other alternatives. Lane closure along IL 62 will be required for all wall types selected to provide haul away and material delivery under the bridge.

G. Construction Duration

The construction duration of the alternatives identified is critical for Alternative 1, which connects the bridge and retaining wall construction schedules. Alternative 1 needs the bridge superstructure removed for construction. The bridge superstructure replacement cannot proceed without the completion of that wall portion for each stage. Alternative 2 may be able to be constructed independent of the superstructure replacement, but it will depend on the stability of the grade separation embankment and the contractor's available excavation equipment. Alternative 3 may be completely constructed independent of the bridge superstructure MOT and it is possible that the wall can be constructed in a contract before the bridge contract letting.

H. Constructability

The developed alternatives each represent a different method of construction while providing flexibility to address work zone and scheduling constraints. Alternative 1 will need to be scheduled with the bridge work, Alternative 3 can be placed independent of the bridge work, and Alternative 2 could go either way depending on the results of the SGR. All three wall types are structurally common and can be placed without the need of highly specialized or uncommon equipment.

I. Long-Term Maintenance

Each proposed alternative is anticipated to have a similar design life with an exposed reinforced concrete facing requiring similar maintenance.

J. Right-of-Way (ROW)

The three alternatives under the proposed grading limits stay within IDOT ROW. There is no difference across the alternatives that provides an advantage or disadvantage. Adjacent to the proposed retaining wall location, there is existing bridge embankment cone fencing that will be removed.

K. Drainage

Under the criteria established in IDOT BDE Chapter 17, a cross slope of 1.5 percent is proposed for the multiuse path. The drainage at the face of the wall will traverse the path to the curb line of the roadway. The profile of the multiuse path is so the longitudinal grade provides a positive drainage along the length of the wall in a west direction.

Drainage from the slope wall is captured by the Type B gutter at the top of the retaining wall, where it is then conveyed at the top of the wall, along its length, before it empties into a surrounding drainage area or will enter a catch basin. A geocomposite wall drain will be proposed on the wall back face to convey water behind the wall down to the bottom of the face and then daylight out or enter an adjacent storm sewer system.

There is no difference across the alternatives caused by drainage. The outlet drainage structures for the bridge structures will need to be adjusted because of revised grading limits and drainage.

L. Utility

Existing utility relocation is not anticipated as part of this wall construction. There is an existing catch basin on the east and in the general area light poles and traffic signal boxes that are not anticipated to be impacted by excavation to place the wall foundations.

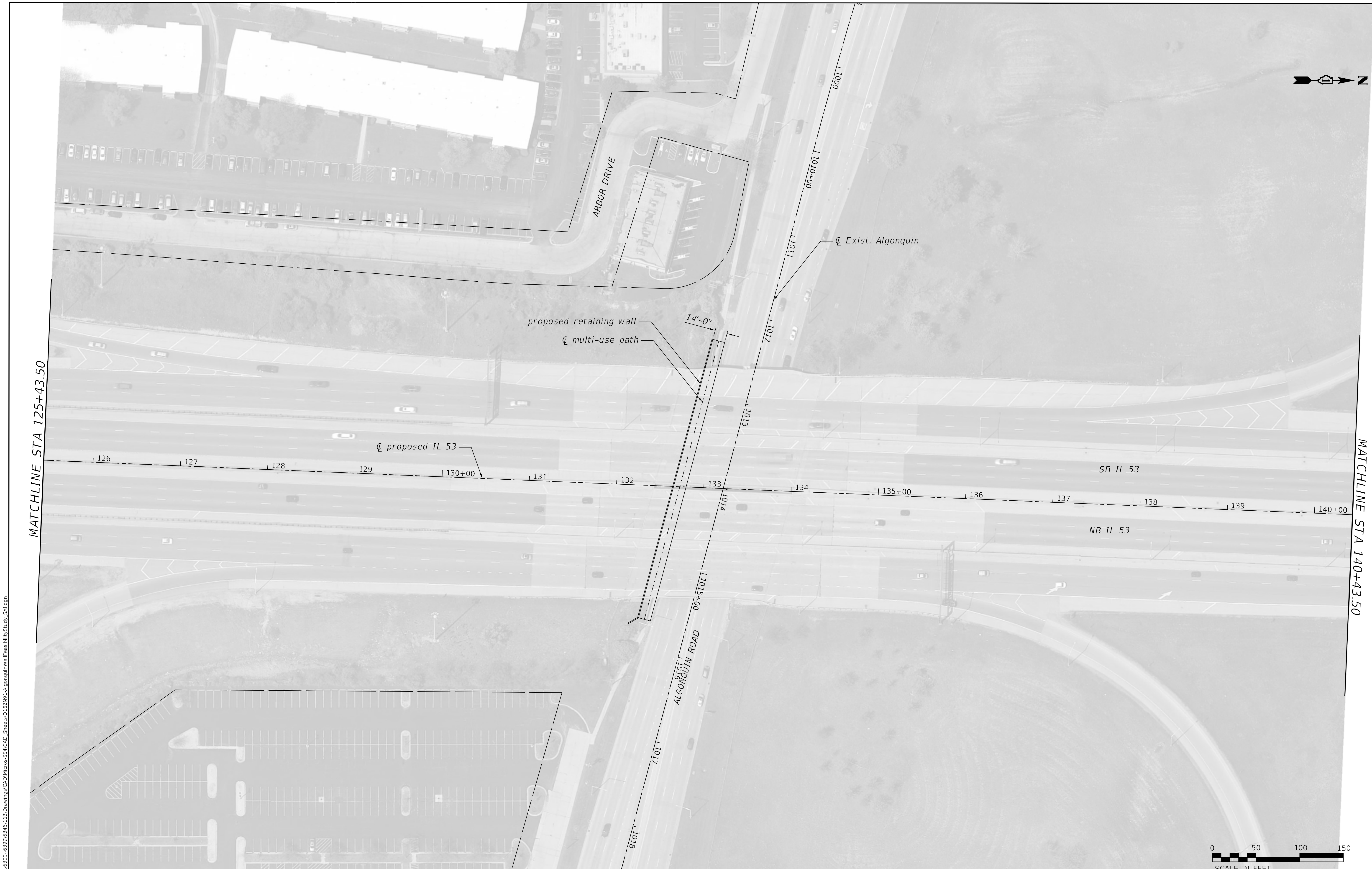
RECOMMENDATION

The IDOT retaining wall selection process is designed to arrive at an appropriate retaining wall solution for the project's identified design constraints. Consideration is given to initial construction cost, constructability, feasibility, schedule and more to arrive at this recommendation.

Under the considerations in this study, it is recommended that Alternative 2, the CIP inverted T-wall, be implemented. This wall alternative provides a cost-effective wall system while allowing the potential for a construction sequence that is independent of the staged bridge superstructure replacement. Selection of this alternative may allow for this work to be completed as part of an advanced construction package.

Based on Strand Associates, Inc.®'s evaluation of the existing and proposed grades with the desired multiuse path configuration, it is anticipated that the exposed height of this retaining wall will exceed the seven feet. A TS&L will be developed with the recommended retaining wall alternative in accordance with the criteria set forth in the IDOT BM Section 2.3.5.5.

ATTACHMENT A
PROPOSED ROADWAY PLAN



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ALGONQUIN ROAD – WFS: ATTACHMENT A
PROPOSED ROADWAY PLAN

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

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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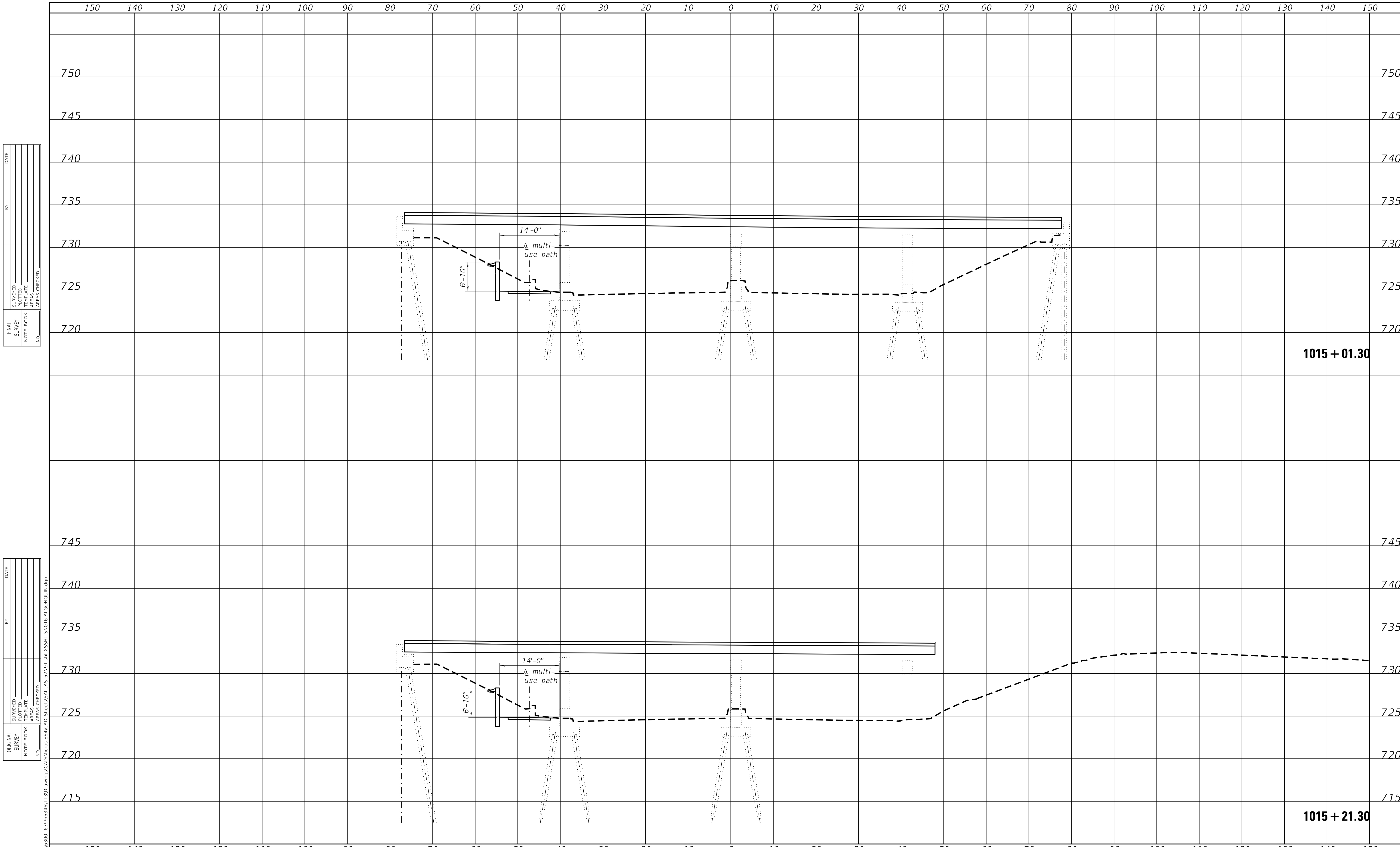
CONTRACT NO. 62N91

ILLINOIS | FED. AID PROJECT

ATTACHMENT B
PROPOSED ROADWAY CROSS SECTIONS



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STRAND ASSOCIATES®
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = $USER$	DESIGNED - BRL	REVISED - ________
	DRAWN - DMF	REVISED - ________
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ALGONQUIN RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 1 OF 7

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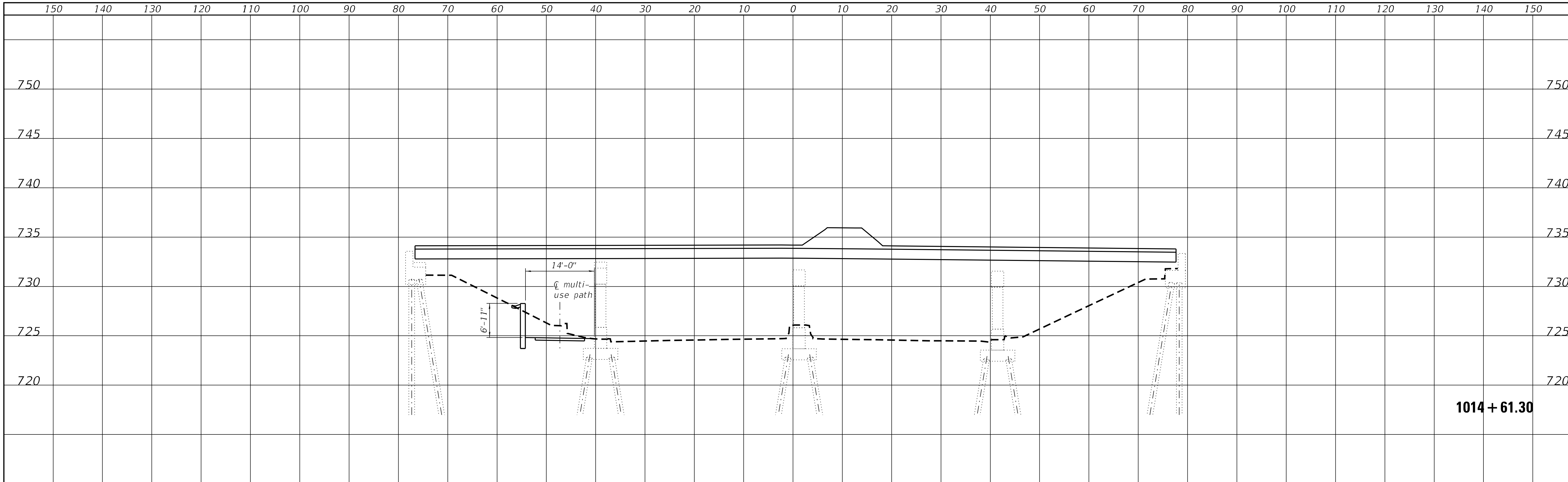
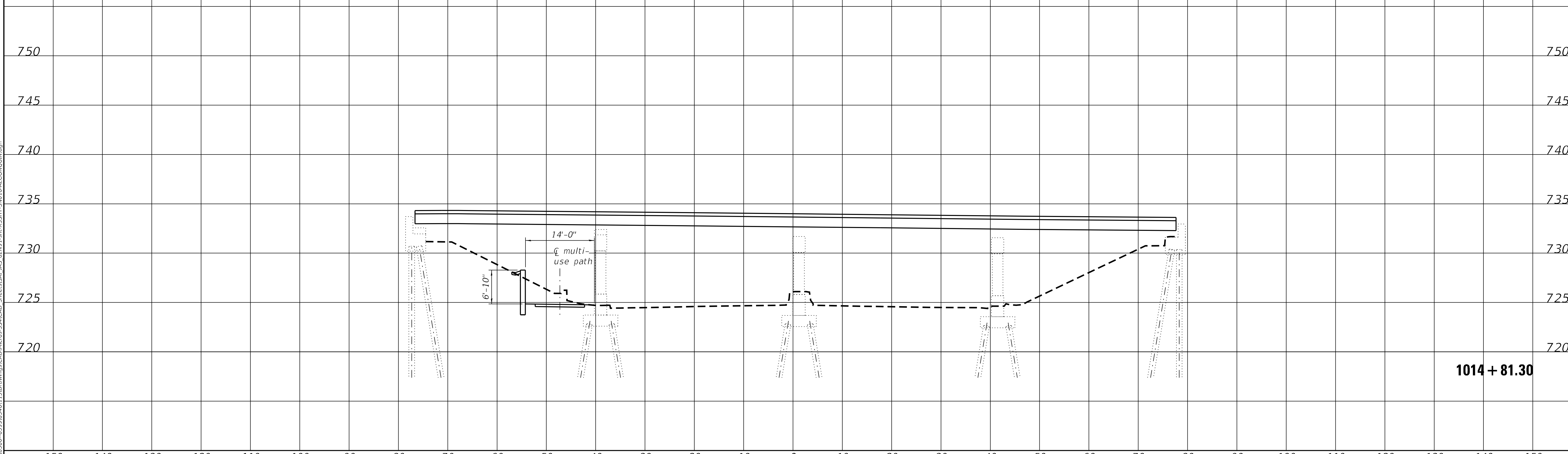
CONTRACT NO. ____

ILLINOIS FED. AID PROJECT





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		DRAWN - DMF	REVISED -		
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F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS	FED. AID PROJECT			

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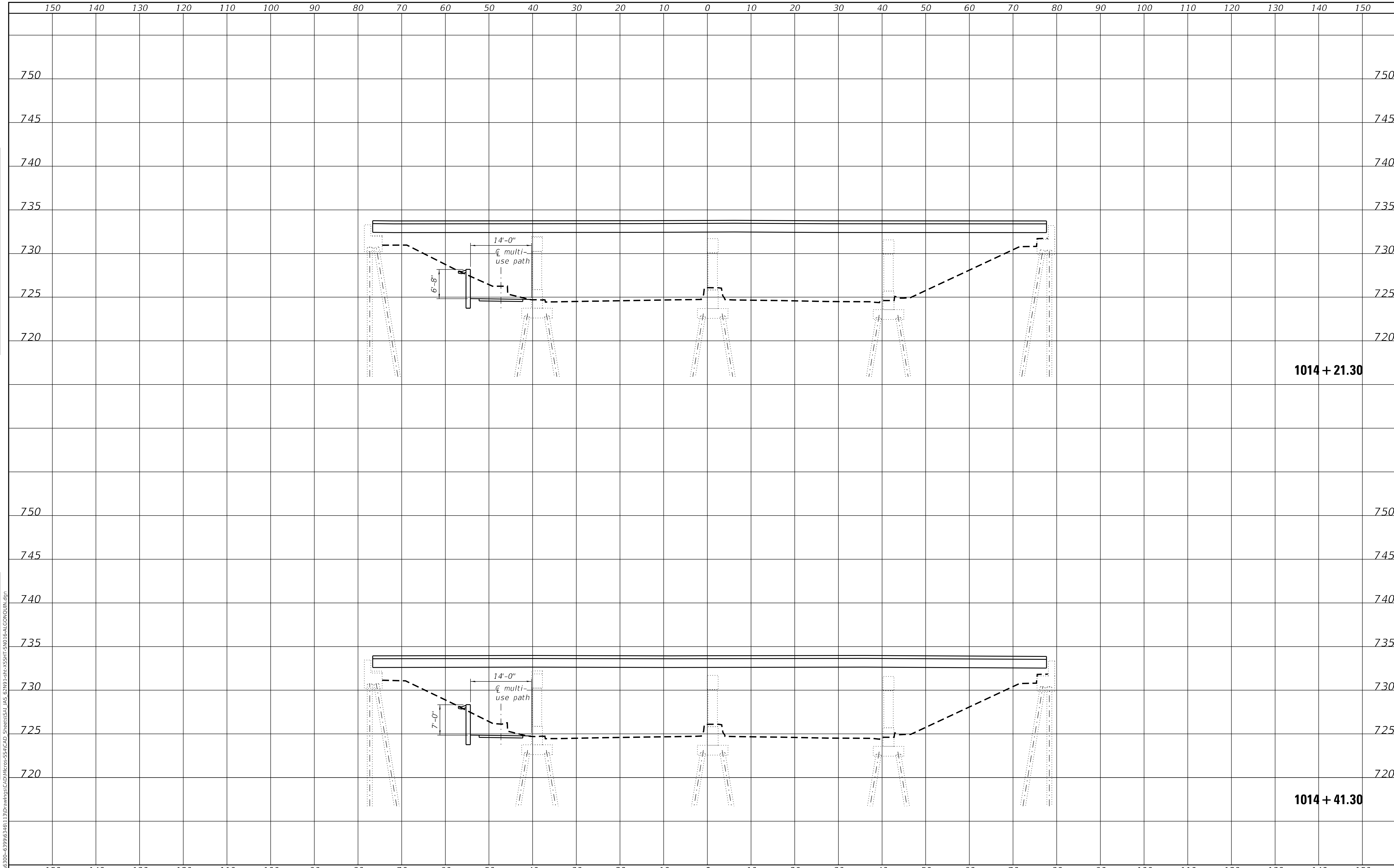

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1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = $USER$	DESIGNED - BRL	REVISED - ________	
	DRAWN - DMF	REVISED - ________	
PLOT SCALE = $SCALE$	CHECKED - NDR	REVISED - ________	
PLOT DATE = 1/26/2023	DATE - ________	REVISED - ________	

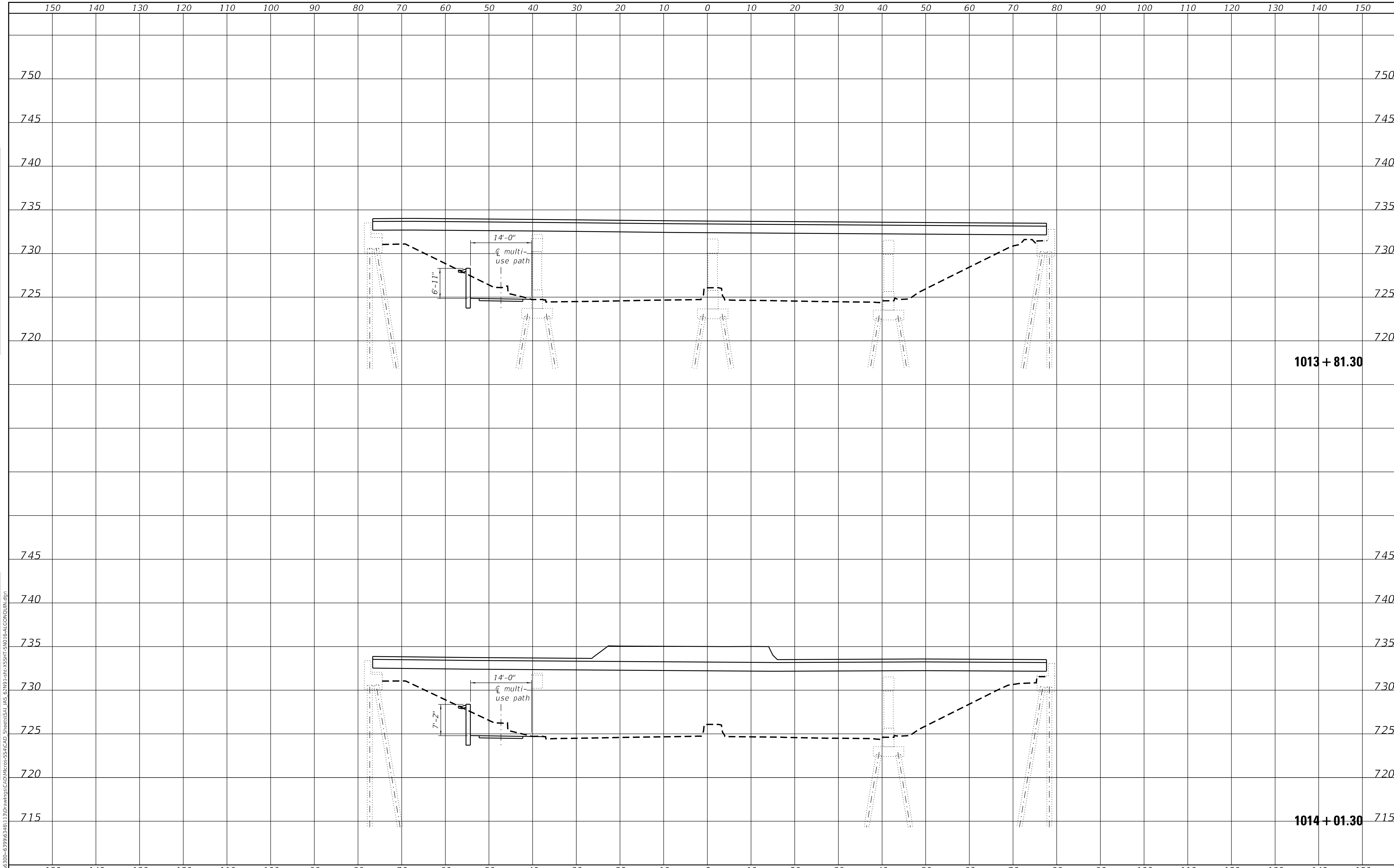
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ALGONQUIN RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 3 OF 7

SCALE: ______ | SHEET __ OF __ SHEETS | STA. 1014+41.30 TO STA. 1014+21.30

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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STRAND ASSOCIATES
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = $USER$	DESIGNED - BRL	REVISED -	
	DRAWN - DMF	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - NDR	REVISED -	
PLOT DATE = 1/26/2023	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

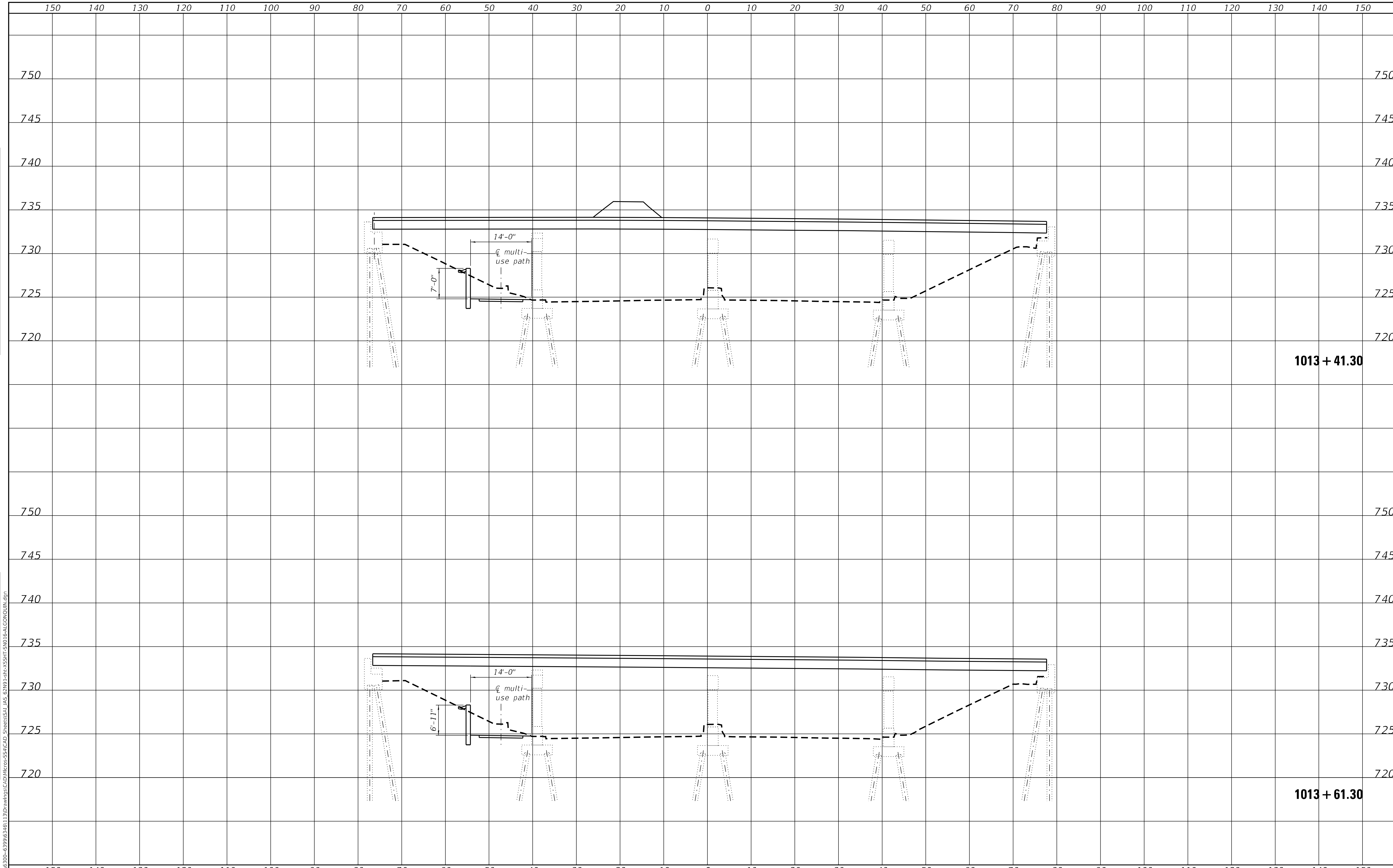
ALGONQUIN RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 4 OF 7

SCALE: ______ SHEET __ OF __ SHEETS STA. 1014+01.30 TO STA. 1013+81.30

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	

MODEL: Default
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JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = $USER$	DESIGNED - BRL	REVISED - ______	
	DRAWN - DMF	REVISED - ______	
PLOT SCALE = $SCALE$	CHECKED - NDR	REVISED - ______	
PLOT DATE = 1/26/2023	DATE - ______	REVISED - ______	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

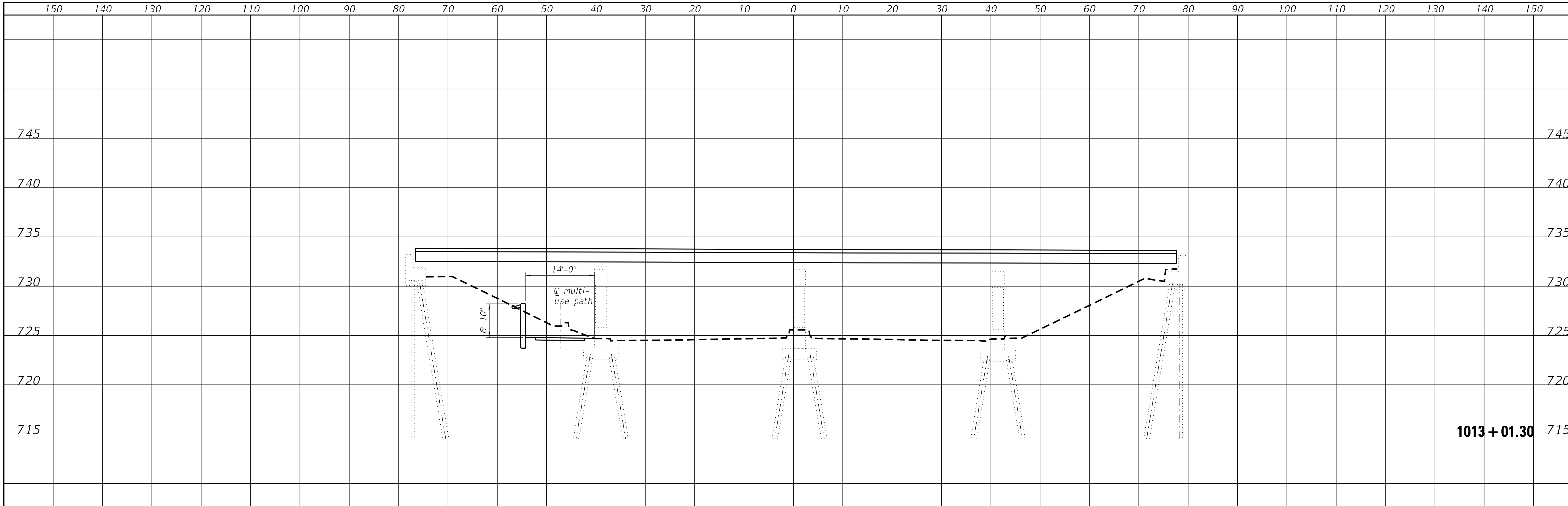
ALGONQUIN RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 5 OF 7

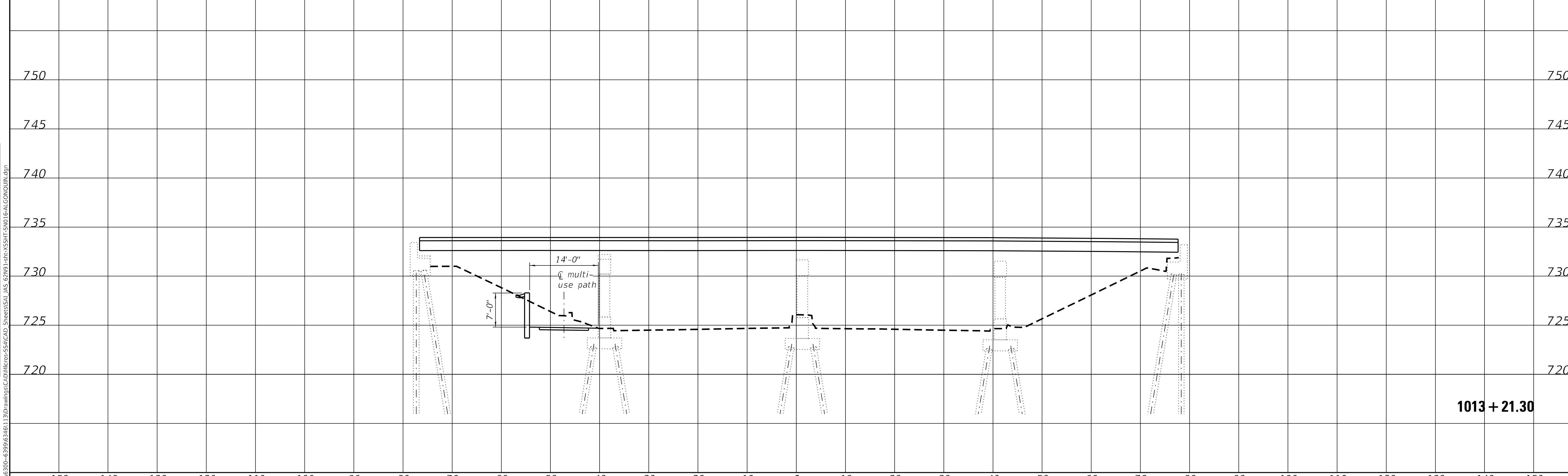
SCALE: ______ | SHEET __ OF __ SHEETS | STA. 1013+61.30 TO STA. 1013+41.30

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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1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = $USER$	DESIGNED - BRL	REVISED -
	DRAWN - DMF	REVISED -
PLOT SCALE = $SCALE$	CHECKED - NDR	REVISED -
PLOT DATE = 1/26/2023	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

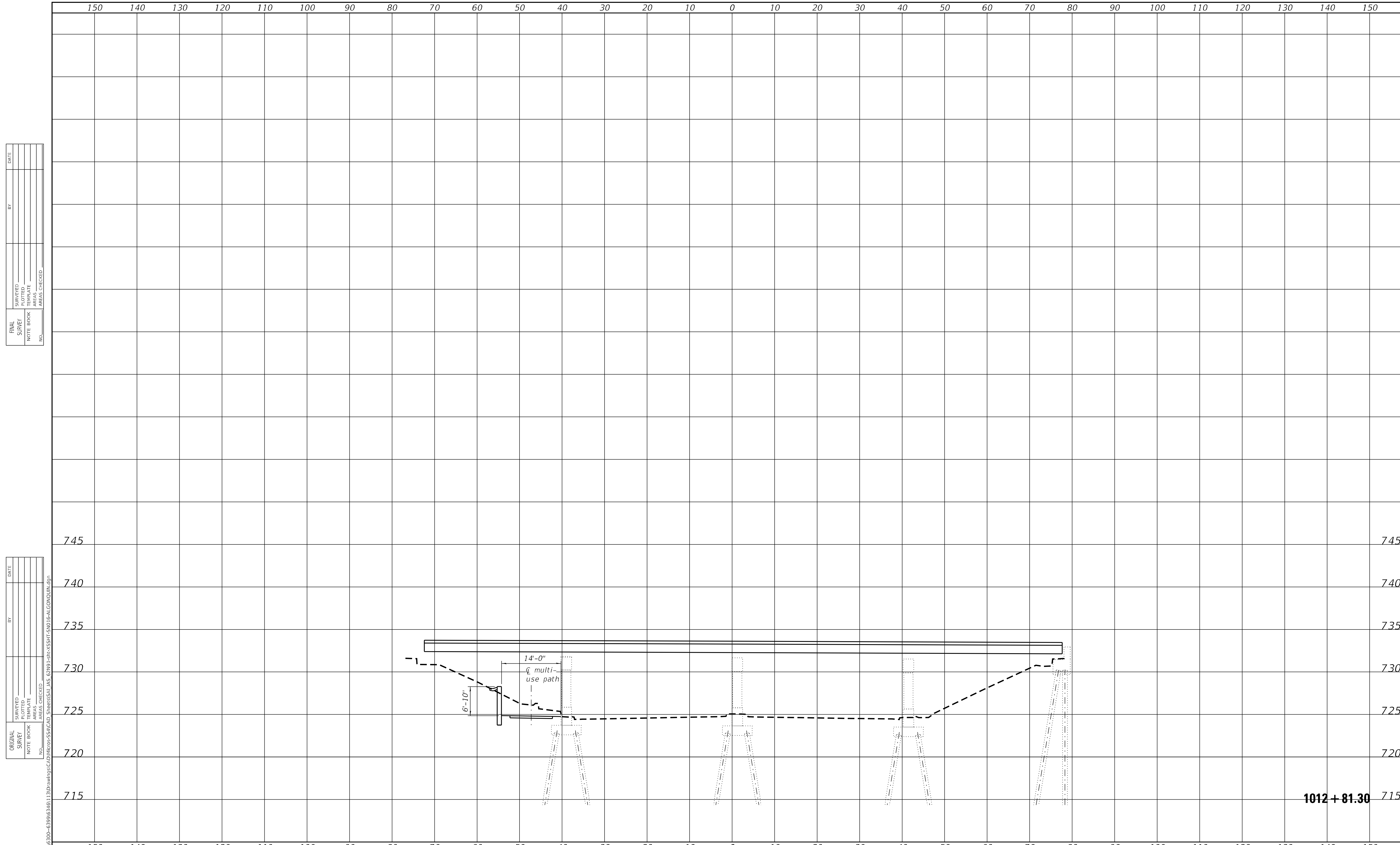
ALGONQUIN RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 6 OF 7

SCALE: ______ SHEET __ OF __ SHEETS STA. 1013+21.30 TO STA. 1013+01.30

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

CONTRACT NO. ____

ILLINOIS FED. AID PROJECT



MODEL: Default

STRAND ASSOCIATES®
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = $USER$	DESIGNED - BRL	REVISED - ________	
	DRAWN - DMF	REVISED - ________	
PLOT SCALE = $SCALE$	CHECKED - NDR	REVISED - ________	
PLOT DATE = 1/26/2023	DATE - ________	REVISED - ________	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ALGONQUIN RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 7 OF 7

SCALE: ______ | SHEET __ OF __ SHEETS | STA. 1012+81.30 TO STA. 1012+81.30

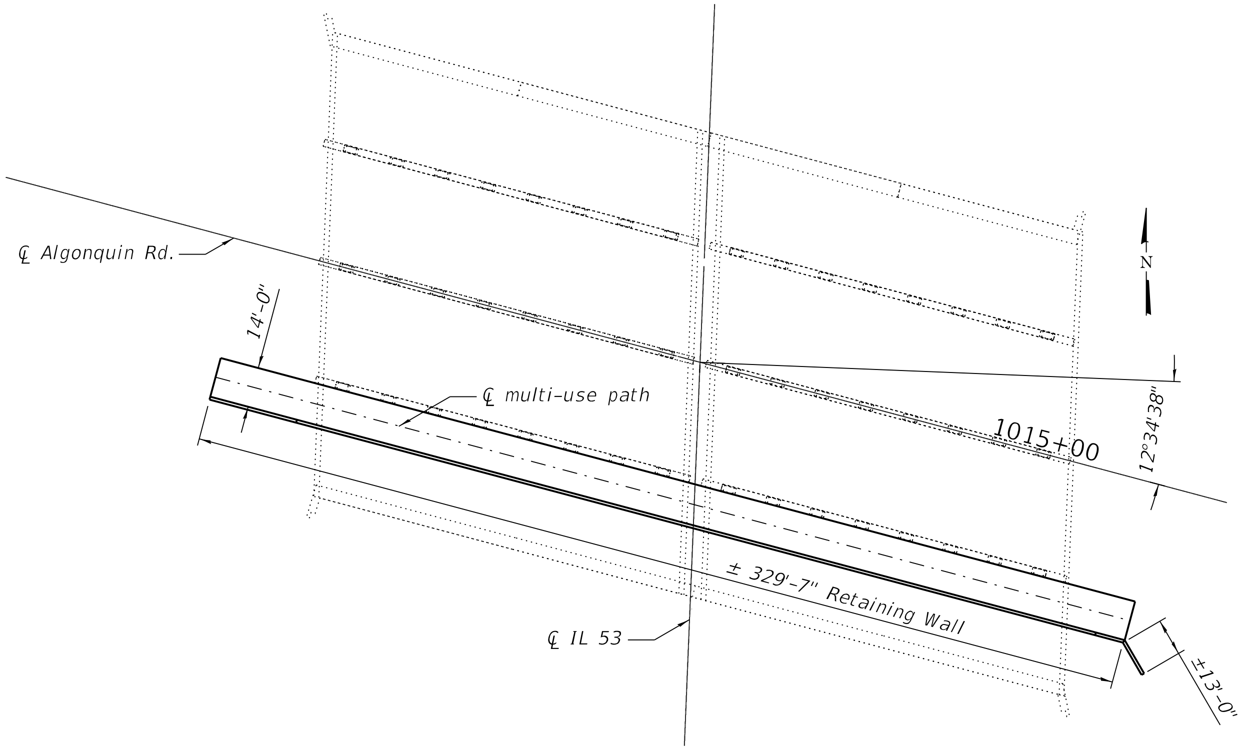
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
___	_______________	_______	___	___

CONTRACT NO. ____

ILLINOIS | FED. AID PROJECT

ATTACHMENT C
PRELIMINARY ALTERNATIVES PLAN AND SECTIONS

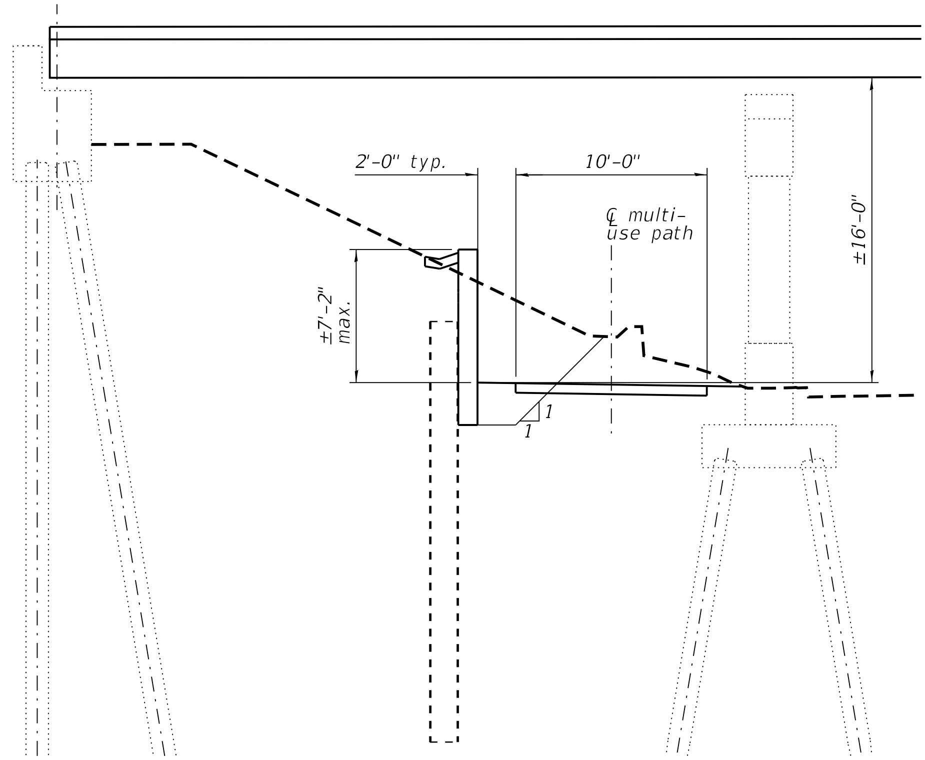
4:02:17 PM 1/25/2023 $USER$ $FILE$



PLAN PROPOSED WALL

Notes:

The horizontal and vertical clearances are subject to refinement in the TSL Phase.



SOLDIER PILE AND LAGGING WALL - TYPICAL SECTION

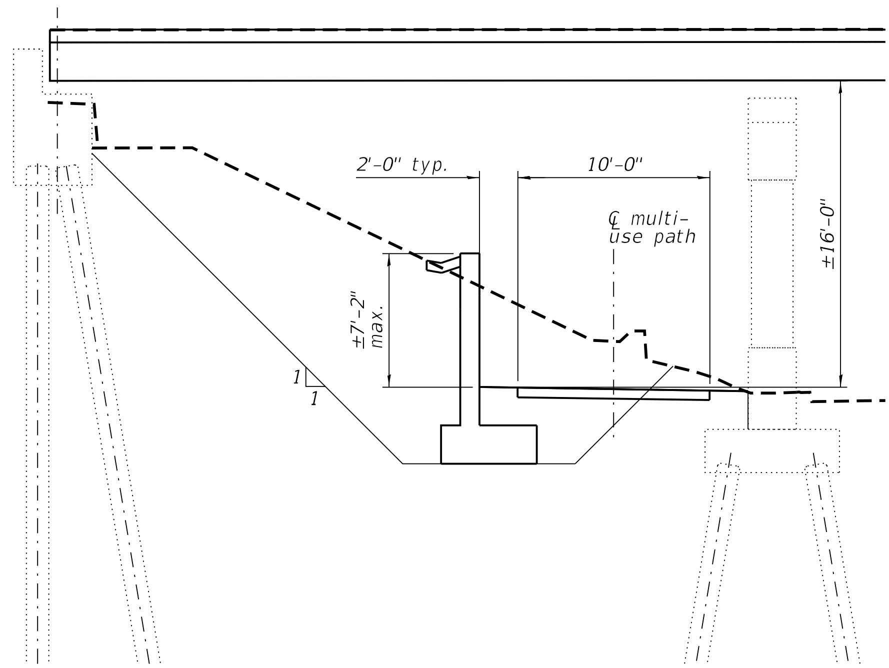
ALGONQUIN RD. PROPOSED S.N. TBD
RETAINING WALL

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION

STRAND ASSOCIATES®

FIGURE NO. 1

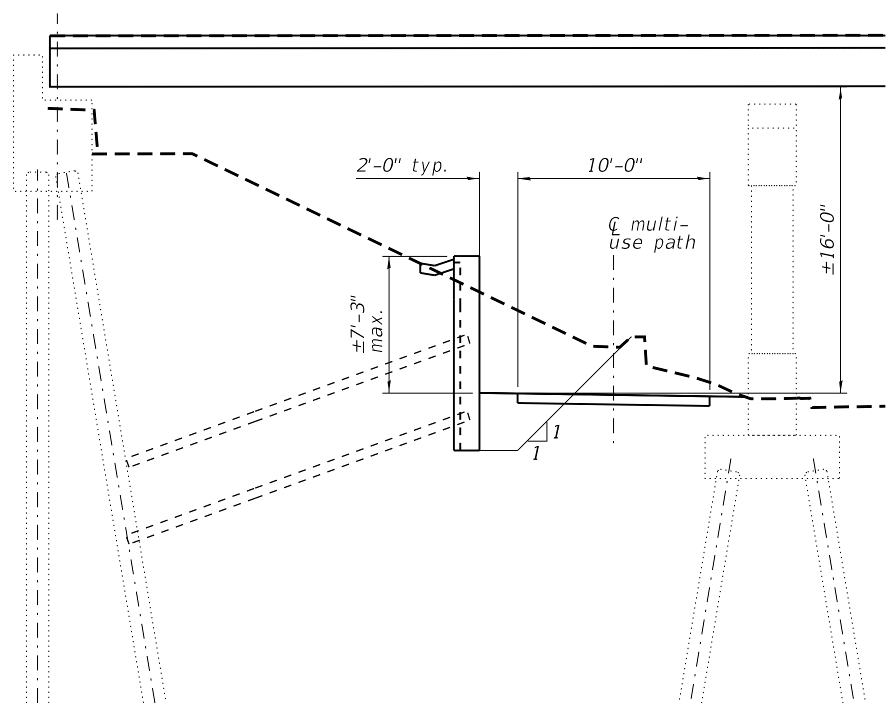
JOB # 62N91 IL53



CAST-IN-PLACE CONCRETE INVERTED T-WALL - TYPICAL SECTION

Notes:

The horizontal and vertical clearances are subject to refinement in the TSL Phase.



DRILLED SOIL NAIL WALL - TYPICAL SECTION

ALGONQUIN RD. PROPOSED S.N. TBD
RETAINING WALL

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION

STRAND ASSOCIATES®

FIGURE NO. 2

JOB # 62N91 IL53

ATTACHMENT D
OPCC

Alternative 1: Soldier Pile and Lagging Wall					
The opinion of probable construction cost (OPCC) is based on the criteria identified in the accompanying Wall Feasability Study. This OPCC for Alternative 1 has the following assumptions: a contingency for undeveloped design details, escalation to the anticipated construction year, and additional cost for mobilization of the multi-stage MOT.					
Pay Item Number	Description	Quantity	Unit	Unit Cost	Cost
44000600	Sidewalk Removal	1,523	SQ FT	$ 2.50	$ 3,807.50
50104650	Slope Wall Removal	450	SQ YD	$ 35.00	$ 15,750.00
50300225	Concrete Structures	110.2	CU YD	$ 1,100.00	$ 121,220.00
50800205	Reinforcement Bars, Epoxy Coated	16,530	POUND	$ 3.25	$ 53,722.50
50200100	Structure Excavation	310	CU YD	$ 30.00	$ 9,300.00
58700300	Concrete Sealer	2,875	SQ FT	$ 2.25	$ 6,468.75
52200020	Temporary Soil Retention System	540	SQ FT	$ 50.00	$ 27,000.00
59100100	Geocomposite Wall Drain	267	SQ YD	$ 30.00	$ 8,010.00
60602800	Concrete Gutter, Type B	345	FOOT	$ 31.00	$ 10,695.00
60146304	Pipe Underdrain for Structures 4”	356	FOOT	$ 28.00	$ 9,968.00
52200100	Furnishing Soldier Piles (HP Section)	837	FOOT	$ 120.00	$ 100,440.00
52200200	Drilled and Setting Soldier Piles (in Soil)	4,109	CU FT	$ 20.00	$ 82,180.00
52200250	Untreated Timber and Lagging	2,403	SQ FT	$ 18.00	$ 43,254.00
50500505	Stud Shear Connectors	340	EACH	$ 4.00	$ 1,360.00
				Structure Cost Baseline:	$ 493,175.75
Note: Multi-use path cost is not included.				Cost per exposed square feet:	$ 226.00
				Design Contingency for Undeveloped Details:	20%
				Construction Mobilization Costs:	10%
				Contingency and Mobilization Cost:	$ 147,953.00
				Structure Cost with Contingency and Mobilization:	$ 641,128.75
				Escalation Percentage:	4%
				Year of Escalation (Current Year 2023):	2
				Escalation Cost:	$ 52,316.00
				Structure Cost with Escalation:	$ 693,444.75
Opinion of Probable Construction Cost for Alternative 1:		$ 693,000		(2025 Construction Anticipated)	

Alternative 2: Cast-in-Place Concrete Inverted T-Wall

The opinion of probable construction cost (OPCC) is based on the criteria identified in the accompanying Wall Feasability Study. This OPCC for Alternative 2 has the following assumptions: a contingency for undeveloped design details, escalation to the anticipated construction year, and additional cost for mobilization.

Pay Item Number	Description	Quantity	Unit	Unit Cost	Cost
44000600	Sidewalk Removal	1,523	SQ FT	$ 2.50	$ 3,807.50
50104650	Slope Wall Removal	1,115	SQ YD	$ 35.00	$ 39,025.00
52200900	Concrete Structures (Retaining Wall)	235.1	CU YD	$ 850.00	$ 199,835.00
50800205	Reinforcement Bars, Epoxy Coated	35,270	POUND	$ 3.25	$ 114,627.50
50200100	Structure Excavation	2,330	CU YD	$ 30.00	$ 69,900.00
58700300	Concrete Sealer	2,875	SQ FT	$ 2.25	$ 6,468.75
59100100	Geocomposite Wall Drain	261	SQ YD	$ 30.00	$ 7,830.00
60602800	Concrete Gutter, Type B	345	FOOT	$ 31.00	$ 10,679.50
60146304	Pipe Underdrain for Structures 4”	356	FOOT	$ 28.00	$ 9,968.00
58600101	Granular Backfill for Structures	350	CU YD	$ 30.00	$ 10,500.00

Structure Cost Baseline: $ 472,641.25

Note: Multi-use path cost is not included.

Cost per exposed square feet: $ 217.00

Design Contingency for Undeveloped Details: 20%
Construction Mobilization Costs: 5%
Contingency and Mobilization Cost: $ 118,160.00

Structure Cost with Contingency and Mobilization: $ 590,801.25

Escalation Percentage: 4%
Year of Escalation (Current Year 2023): 2
Escalation Cost: $ 48,209.00

Structure Cost with Escalation: $ 639,010.25

Opinion of Probable Construction Cost for Alternative 2: $ 639,000 (2025 Construction Anticipated)

Alternative 3: Drilled Soil Nail Wall

The opinion of probable construction cost (OPCC) is based on the criteria identified in the accompanying Wall Feasability Study. This OPCC for Alternative 3 has the following assumptions: a contingency for undeveloped design details, escalation to the anticipated construction year, and additional cost for mobilization.

Pay Item Number	Description	Quantity	Unit	Unit Cost	Cost
44000600	Sidewalk Removal	1,523	SQ FT	$ 2.50	$ 3,807.50
50104650	Slope Wall Removal	465	SQ YD	$ 35.00	$ 16,275.00
50200100	Structure Excavation	200	CU YD	$ 30.00	$ 6,000.00
58700300	Concrete Sealer	3,084	SQ FT	$ 2.25	$ 6,939.00
59100100	Geocomposite Wall Drain	329	SQ YD	$ 30.00	$ 9,870.00
60602800	Concrete Gutter, Type B	345	FOOT	$ 31.00	$ 10,682.60
60146304	Pipe Underdrain for Structures 4”	360	FOOT	$ 27.17	$ 9,781.20
X0900067	Soil Nailed Retaining Wall	2,967	SQ FT	$ 200.00	$ 593,400.00

Structure Cost Baseline: $ 676,573.30

Note: Multi-use path cost is not included. Cost per exposed square feet: $ 297.00

Design Contingency for Undeveloped Details: 20%
Construction Mobilization Costs: 5%
Contingency and Mobilization Cost: $ 169,143.00

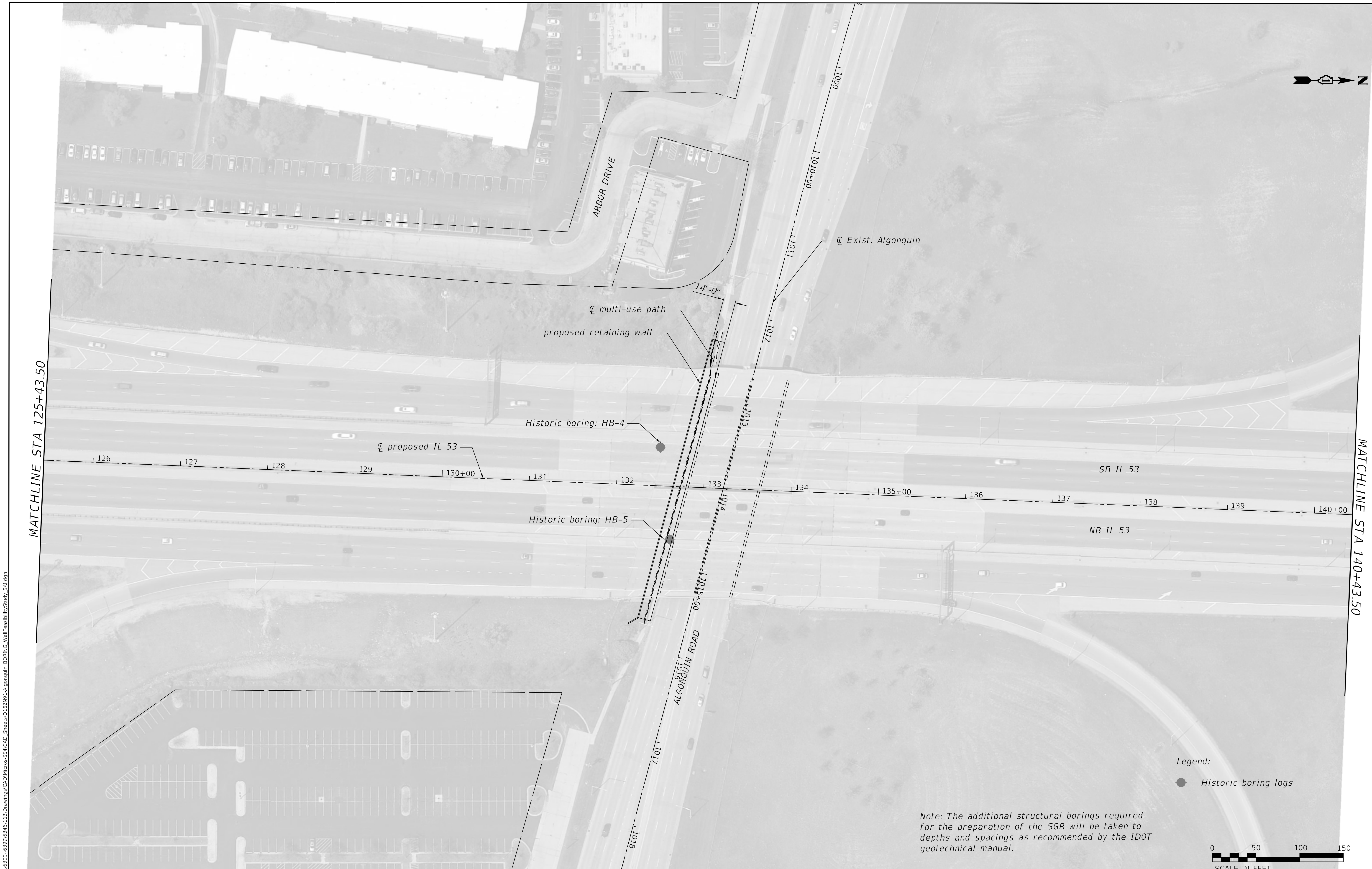
Structure Cost with Contingency and Mobilization: $ 845,716.30

Escalation Percentage: 4%
Year of Escalation (Current Year 2023): 2
Escalation Cost: $ 69,010.00

Structure Cost with Escalation: $ 914,726.30

Opinion of Probable Construction Cost for Alternative 3: $ 915,000 (2025 Construction Anticipated)

ATTACHMENT E
HISTORIC SOIL BORING PLAN AND LOGS



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STRAND ASSOCIATES®
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = $USER$	DESIGNED - BRL	REVISED -	
	DRAWN - JAS	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - NDR	REVISED -	
PLOT DATE = 1/25/2023	DATE - $PLANDATE$	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ALGONQUIN_ROAD_–_WFS:_ATTACHMENT_E_
HISTORICAL_SOIL_BORING_PLAN

SCALE:	SHEET 1 OF 2 SHEETS	STA.	TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342		COOK	TOT	
		CONTRACT NO. 62N91		
	ILLINOIS	FED. AID PROJECT		

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
S.B.I. 53 F.A. 61	531-1-HB-5	Cook	36	30
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT-		

SHEET NO. 18
19 SHEETS

HB-4

Form No. B.D. 137 Rev. 9-60

Sh. 7 of 10 Sh.

BRIDGE FOUNDATION BORING LOG

PROJECT ____
ROUTE S.B.I. Route 53
SEC 531-1-HB-5
COUNTY Cook
Boring No. 4
Station 119+05
Offset 45' Lt. centerline
Ground Surface 725.7

BRIDGE Relocated S.B.I. 53 over Algonquin Road
STA 119+77.27

Date Sept. 1962
Bored By R. Moody
Checked By G.R.B.

Surface Water El. ____
Groundwater El. at Completion ____
After ____ Hours ____

Description	Elevation	Depth	N	Qu t/s.f.	w (%)
Ground Surface	725.7	0			
Gravel sub-grade	723.7				
Very stiff gray mottled clay till		-5	18	3.4 S	
			10	2.0 B	
	716.2	-10			
Medium gray silty loam	713.7		10		
Medium gray very sandy till	711.2		6	0.9 Est.	
Very stiff gray clay till		-15	13	2.1 B	
			18	2.4 B	
		-20	20	2.6 B	
	703.7				
Stiff gray clay till	701.2		15	1.7 Est.	
Very stiff gray clay till		-25	16	2.6 B	
			12	2.2 B	
		-30	14	2.0 B	
	693.7				
Stiff gray clay till			15	Lost	
		-35	13	1.6 B	
	688.7				
Very stiff gray clay till			19	2.3 B	
		-40	14	2.8 B	
	683.7				
Medium gray sand with some small gravel	681.2		26		
Medium gray fine sand	678.7	-45	18		
Very stiff pebbly gray clay till	676.2		33	3.2 B	
Dense gray sand and gravel	673.7	-5	34		
Medium gray sand and small gravel	671.7		25		

HB-5

Form No. B.D. 137 Rev. 9-60

Sh. 9 of 10 Sh.

BRIDGE FOUNDATION BORING LOG

PROJECT ____
ROUTE S.B.I. Route 53
SEC 531-1-HB-5
COUNTY Cook
Boring No. 5
Station 119+20
Offset 60' Rt. centerline
Ground Surface 723.9

BRIDGE Relocated S.B.I. 53 over Algonquin Road
STA 119+77.26

Date Sept. 1962
Bored By R. Moody
Checked By G.R.B.

Surface Water El. ____
Groundwater El. at Completion ____
After ____ Hours ____

Description	Elevation	Depth	N	Qu t/s.f.	w (%)
Ground Surface	723.9	0			
Loose sand and gravel	721.9				
Very stiff gray clay till		-5	14	2.2 S	
			16	2.1 B	
	714.4	-10			
Medium gray silty loam	711.9		10		
Medium gray sandy till	709.4		7	0.8 B	
		-15	11	1.4 Est.	
Stiff gray clay till	704.4		16	1.8 B	
Very stiff gray clay till	701.9	-20	15	2.2 B	
Medium gray sandy till	699.4		7	0.7 B	
Very stiff gray clay till	696.9	-25	16	2.2 B	
Stiff gray clay till	694.4		11	1.6 B	
Very stiff gray clay till		-30	11	2.0 B	
			13	2.2 B	
		-35	13	2.2 B	
			14	2.3 B	
		-40	14	2.2 B	
			17	2.5 B	
		-45	10	Lost	
	676.9				
Medium brown fine sand	674.4		27		
Very stiff gray clay till	671.9	-50	17	2.8 B	
Medium fine sand and gravel			20		

DESIGNED Abraham K. El-Beck
CHECKED [signature]
DRAWN Abraham K. El-Beck
CHECKED M.O.

SEPT 25 1962
EXAMINED W. E. Baumann
ENGINEER OF BRIDGES AND TRAFFIC STRUCTURES
PASSED [signature]
ENGINEER OF DESIGN
APPROVED R.R. Bartelsmeyer
CHIEF HIGHWAY ENGINEER

FOR REFERENCE ONLY

BORING DATA
S.B.I. RT. 53 SEC. 531-1-HB-5
COOK COUNTY
STA 119+77.27

H-E 155 IMPERIAL ®