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

IDOT Contract Number	62N91
IDOT Job Number	D-91-144-21
Section	2018-100-BR
County	Cook
Proposed Retaining Wall SN	016W2502
Existing Bridge SN	016-0373 and 016-0970 (IL 53 northbound and southbound)
Route	IL 53 (FAP 342)
Feature Crossed	Palatine Road

Illinois Department of Transportation
District 1
Region 1

Gonzalez Project Number 23-1003

March 15, 2024
Rev 0

Prepared for:

Strand Associates, Inc.
1170 South Houbolt Road
Joliet, IL 60431

Prepared by:

Gonzalez Companies, LLC
525 West Main Street, Suite 125
Belleville, IL 62220
www.gonzalezcos.com

Eric J. Glazier, P.E.
eglazier@gonzalezcos.com
618-222-2221

LICENSED PROFESSIONAL ENGINEER
ERIC JOHN GLAZIER
062.070471
OF ILLINOIS

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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 Palatine 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 Palatine Road. The project site is within Cook County, Illinois, and lies within the limits of the Third Principal Meridian (NW ¼, Section 19, T42N, 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 four 1962 borings in the vicinity of the proposed path (Borings B1, B2, B5, and B6) were provided by IDOT and are included in **Appendix B**.

1.2 Existing Conditions

According to the Wall Feasibility study (Strand, 2023), the existing concrete slope-wall is at 2H:1V (2 horizontal to 1 vertical) slope. The proposed cross section of Palatine Road and bridge structures from the 1964 plans are included in **Appendix B**, along with the boring logs from the plans. The 1964 plans indicate the existing piers are supported on shallow foundations and the abutments are supported on concrete piles.

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. The estimated bottom of footing elevation is EL 726. 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**.

2. GENERAL GEOLOGY

The project area is located in northeastern Illinois about 9 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 Palatine Road, bedrock is expected around El. 560, which is about 150 feet below the existing ground surface.

3. FIELD EXPLORATION

3.1 Subsurface Exploration and Testing

3.1.1 Field Investigation

Between May 3 and May 8, 2023, Gonzalez drilled and logged six 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-10	May 3, 2023	55	751.4	42.10977658	88.00311407
GC-11	May 4, 2023	55	747.8	42.10980038	88.00365603
GC-31	May 8, 2023	25	728.2	42.11000629	88.00360484
GC-32	May 8, 2023	25	728.5	42.11000700	88.00331291
GC-33	May 8, 2023	25	728.8	42.11001872	88.00300189
GC-37	May 8, 2023	10	728.5	42.11000700	88.00333800

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

The borings were advanced with a Geoprobe 7822DT and 3126GT drill rigs using hollow stem augers to completion depths ranging from 10 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/technican 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-37, 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), unit weight, 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 692.8).

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 (%)	*22*	8 – 26	19	*44*	12 – 26	19
Rimac Unconfined Compressive Strength (tsf)	*17*	0.4 – 6.4	2.7	*38*	0.4 – 6.0	2.2

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 724, but varies in depth across the project site as a result of previous construction activities. SPT N-values in the fill materials ranged between 3 and 15 blows per foot (bpf) with an average near 8 bpf, indicating medium stiff to stiff cohesive deposits.

3.2.2 Natural Deposits (Glacial)

Observed natural deposits generally consist of cohesive soil (clay and clay loam) that was brown, moist to wet, low plastic, with varying amounts of sand and gravel. Occasional layers of sand were encountered as well. SPT N-values in the natural deposits ranged between 4 and 20 bpf with an average near 13 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-10	Dry	-	37	714.4
GC-11	Dry	-	Dry	-
GC-31	Dry	-	Dry	-
GC-32	Dry	-	Dry	-
GC-33	Dry	-	Dry	-
GC-37	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 2.5 (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 11 bpf and weighted average undrained shear strength (su) of 1.26 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 42.110007, -88.003313.

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	0.141g	0.082g

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

Three alternatives for retaining walls have been considered: cast-in-place (CIP) concrete cantilever (inverted T-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.

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 726. 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 726) 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 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.

5.3 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.

5.4 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	120	30	1800	0.33	3.0	1000	0.005
Natural Deposits (Glacial)	Clay, Clay Loam	125	30	1400	0.33	3.0	1000	0.005

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 724	45	346	82	235
Natural Deposits (Glacial)	Below 724	50	375	83	250
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 fine-grained 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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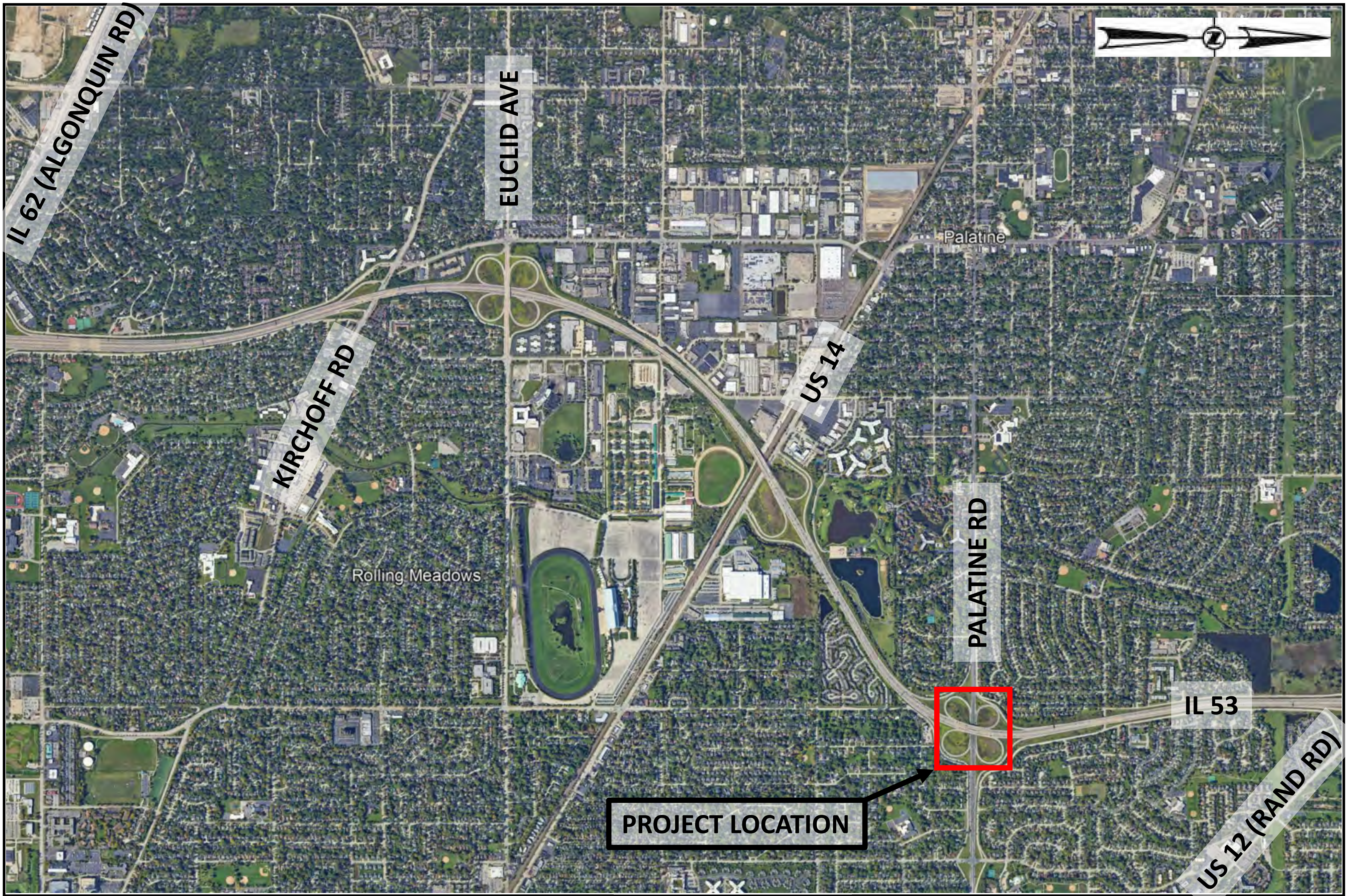
APPENDIX A Project Location Map



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 PALATINE ROAD
PROJECT LOCATION MAP

APPENDIX A

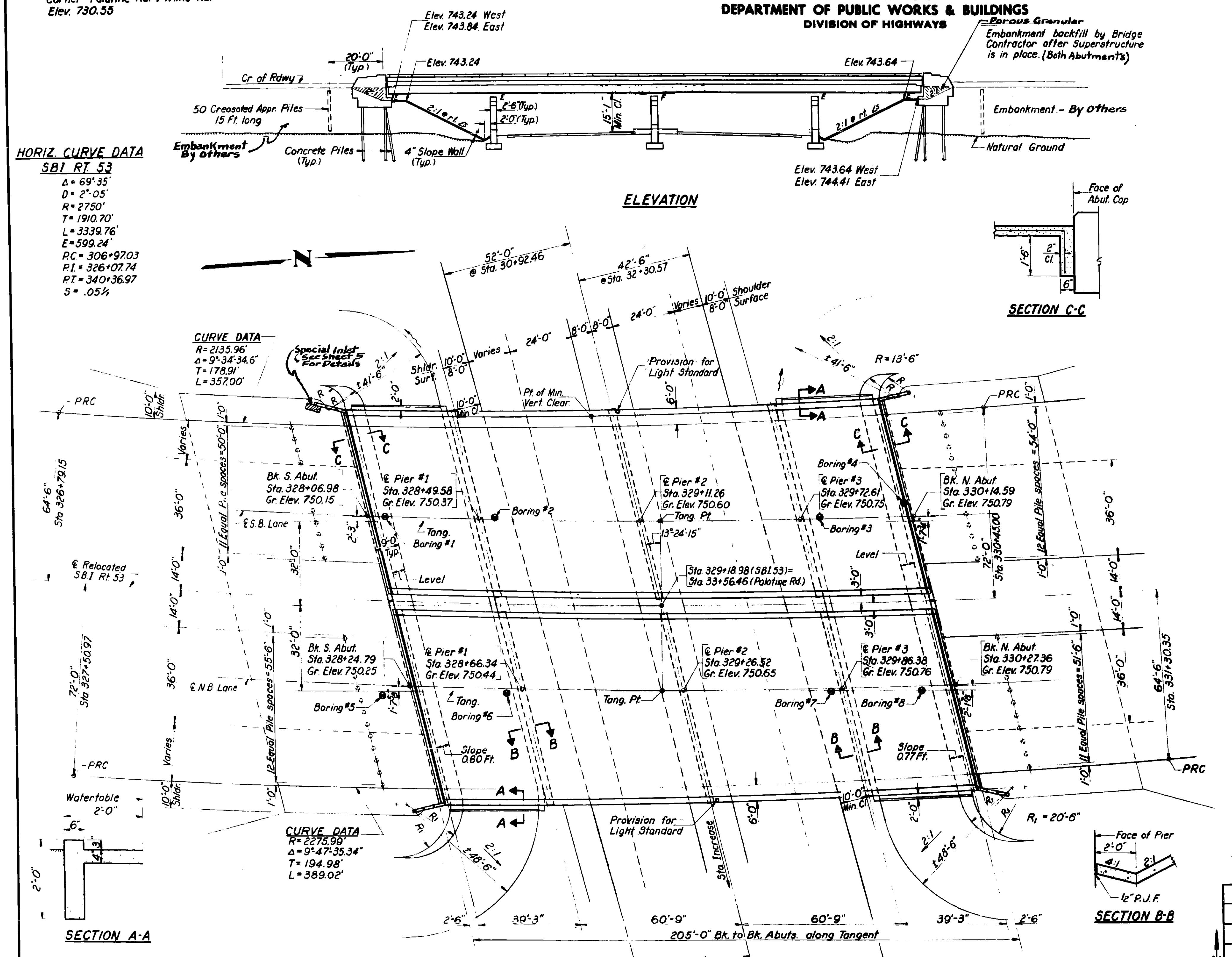
APPENDIX B Pages from 1964 Plans

B.M.: R.R. Spike in E. Face P.P. at N.W. Corner Palatine Rd. & Wilke Rd. Elev. 730.55

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

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A. 61	531-3HB	COOK	29	6
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT U-184(40)		

SHEET NO. 1
22 SHEETS



GENERAL NOTES

Coarse aggregate to be used in parapet handrails and end post must be 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 Specifications.

Slope Wall shall be reinforced with welded wire fabric 6"x6" mesh, weighing 58# per 100 Sq. Ft.

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

Permanent forms will not be permitted in forming the concrete floor.

All structural steel shall conform to A.S.T.M. Specifications Designation A-36.

Rivets ¾"φ, Open Holes 13/16"φ unless otherwise noted.

Anchor bolts shall be set before riveting diaphragms over supports.

Roadway expansion guards shall be assembled in the shop in proper position with the ends in place and shall be left assembled for shop inspection.

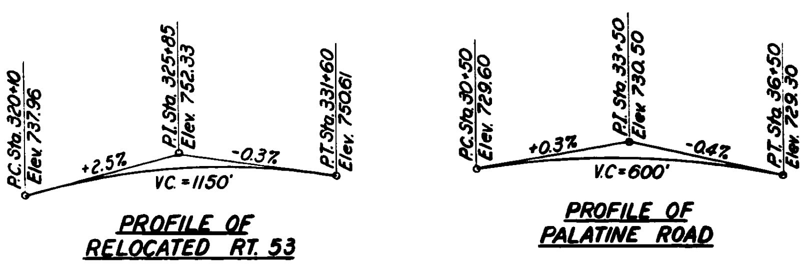
The exposed surfaces of the expansion guards shall be given two shop coats of red lead paint, the contact surfaces shall be given one coat of red lead paint. Anchor studs shall not be painted.

Expansion guards are included in quantity of Structural Steel. Estimated Weight = 37,780 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 one concrete test pile in a permanent location at each abutment as directed by the Engineer before ordering the remainder of piles.

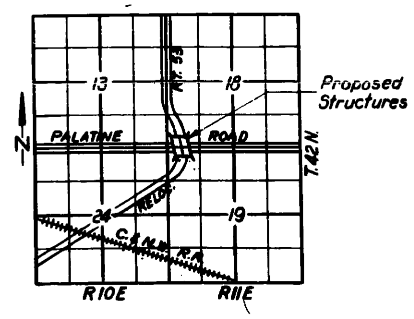
Concrete piles at abutments shall be driven in holes precored through the embankment in accordance with Article 60.9(c) of the Standard Specifications.



TOTAL BILL OF MATERIAL

Item	Unit	Super	Sub	Total
Porous Granular Embankment	Cu. Yds.		300	300
* Class A Excavation for Structures	Cu. Yds.		600	600
Class X Concrete	Cu. Yds.	746.0	804.9	1550.9
Structural Steel	Lbs.	636,420		636,420
Aluminum Handrail	Lin. Ft.	806		806
Reinforcement Bars	Lbs.	239,700	84,450	324,150
Creosoted Piles	Lin. Ft.		750	750.
Concrete Piles	Lin. Ft.		2000	2000
Test Piles (Concrete)	Each		2	2
Name Plates	Each	2		2
Slope Wall (4")	Sq. Yds.		1381	1381
Protective Coat	Sq. Yds.	3560		3560

* Includes excavation for slope wall



DESIGNED	W. L. Perry
CHECKED	R Kowal
DRAWN	J. L. Armstrong
CHECKED	RK.

Revised 4-28-64

July 31 1964
EXAMINED
PASSED
APPROVED

STATION 329+18.98
BUILT 196 BY
STATE OF ILLINOIS
F.A. RT. 61 SEC. 531-3-HB
F.A. PROJ. U-184(40)
LOADING HS20

NAME PLATE LETTERING
See Std. 2113-1

Road Classification (Relocated SBI 53): Class A-1
D.H.V. 6387

DESIGN STRESSES
fc = 1400 psi. Super & Sub
vc = 75 psi. Footing
fs = 20,000 psi. Reinf.
fs = 20,000 psi. Struct. (A-36)
n = 10

LOADING HS 20-44

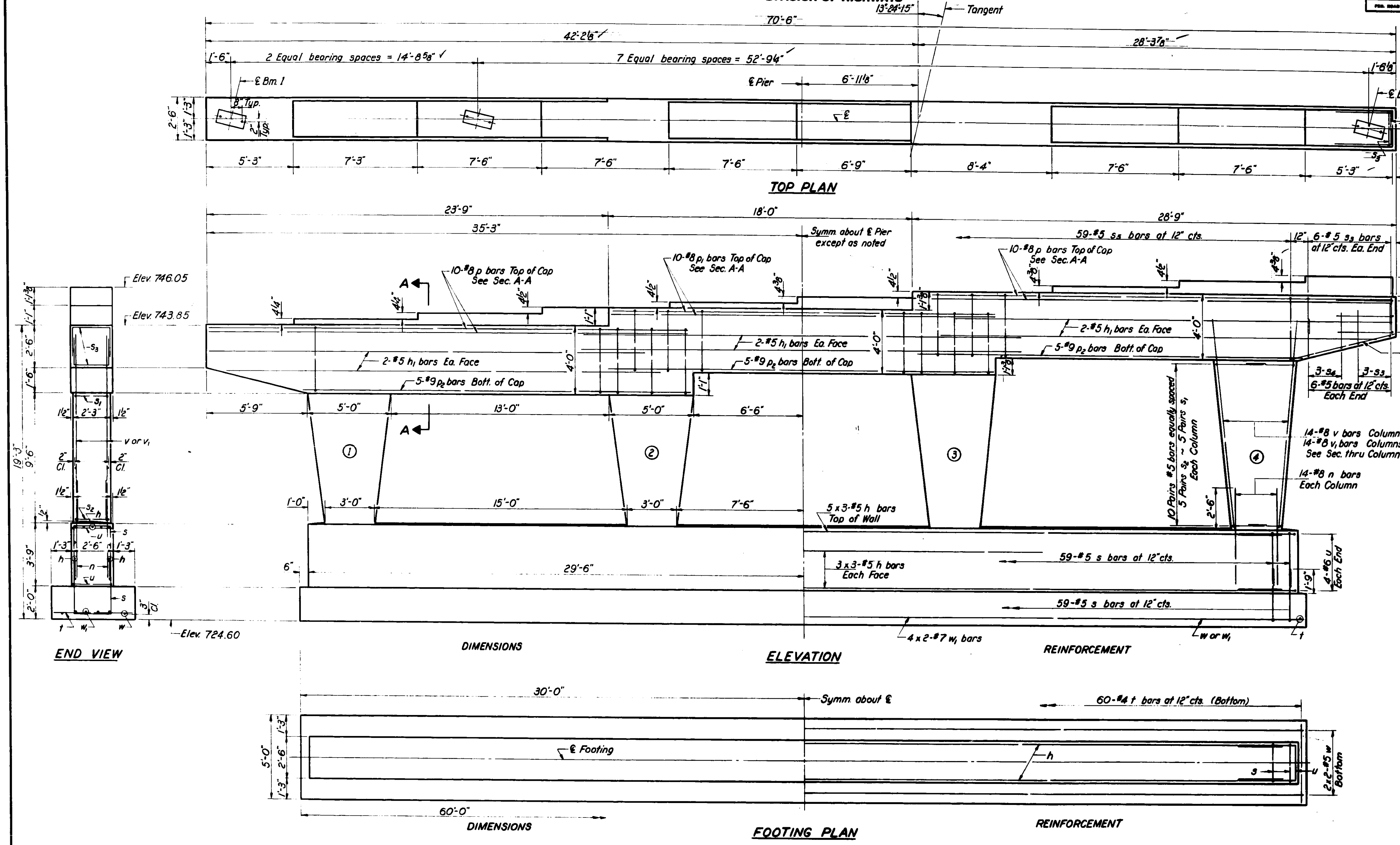
PROJ. U-184(40)
GENERAL PLAN & ELEVATION
RELOCATED S.B.I. RT. 53 (F.A. RT. 61)
OVER PALATINE ROAD
F.A. RT. 61 SEC. 531-3-HB
COOK COUNTY
STA. 329+18.98 (S.B.I. 53)

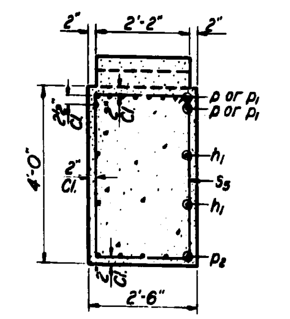
ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
S.B.I. / F.A. 61	531-3HB	COOK	29	16

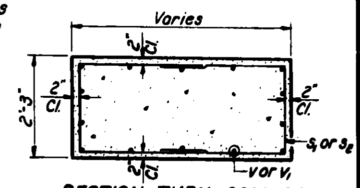
FED. ROAD DIST. NO. 7 | ILLINOIS | FED. AID PROJECT-

SHEET NO. 11
22 SHEETS

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





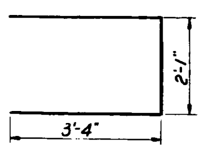


BILL OF MATERIAL

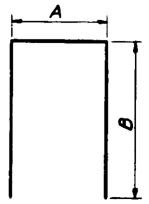
Bar	No.	Size	Length	Shape
h	33	#5	19'-9"	——
h_1	12	#5	26'-0"	——
n	56	#8	6'-0"	——
p	20	#8	28'-6"	——
p_1	10	#8	22'-6"	——
p_2	15	#9	23'-0"	——
p_3	4	#5	6'-0"	——
s	118	#5	9'-2"	⊓
s_1	40	#5	7'-7"	⊓
s_2	40	#5	6'-9"	⊓
s_3	18	#5	6'-6"	⊓
s_4	6	#5	7'-2"	⊓
s_5	59	#5	12'-5"	□
t	60	#4	4'-9"	——
u	14	#6	8'-9"	⊐
v	28	#8	13'-0"	——
v_1	28	#8	14'-3"	——
w	4	#5	30'-6"	——
w_1	8	#7	30'-9"	——
Class X Concrete			Cu. Yds.	85.2
Reinforcement Bars			Lbs.	10,920

DESIGNED	Walter Perry
CHECKED	R Kowert
DRAWN	J. L. Armstrong
CHECKED	RK

JULY 31 1964
EXAMINED W. E. Baumann — ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
PASSED [signature] — ENGINEER
APPROVED U. E. Dluff — CHIEF HIGHWAY ENGINEER



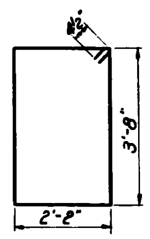
BAR u



BARS s, s_1, s_2, s_3 & s_4

A & B DIMENSIONS

Bar	A	B
s	2'-2"	3'-6"
s_1	1'-11"	2'-10"
s_2	1'-11"	2'-5"
s_3	2'-2"	2'-2"
s_4	2'-2"	2'-6"



BAR s_5

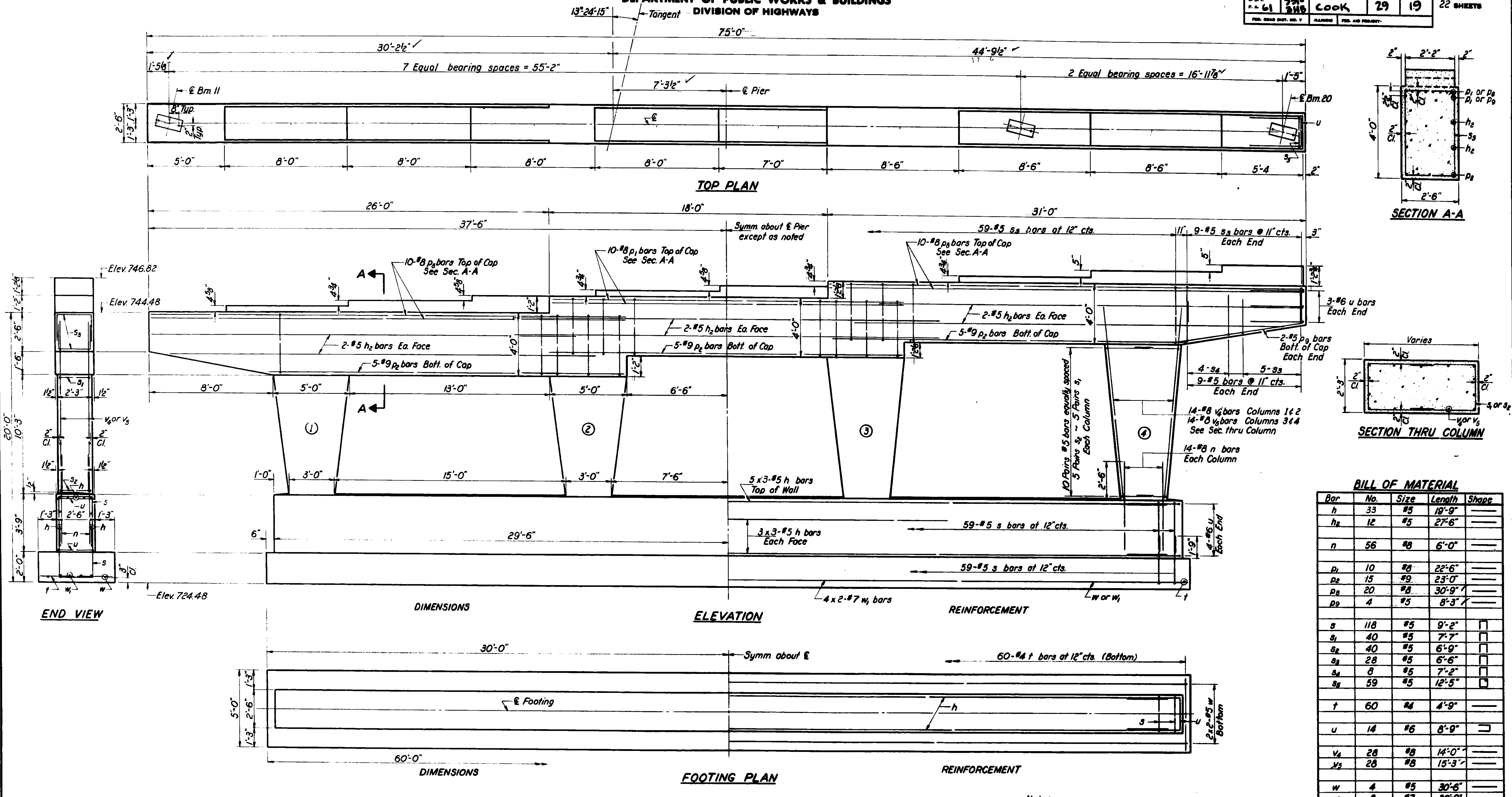
Note:
Space reinforcement in cap to miss anchor bolts.
Min. bar laps = 20 dia. unless otherwise noted.
All edges shall have standard 3/4" chamfers except as noted.
Pour steps monolithically with cap.
Bars indicated thus 20x3-#5 etc. indicates 20 lines of bars with 3 lengths per line.
Max. Soil Pressure = 2.0 T/□'

PIER #1 ~ S. B. LANE
F.A. RT. 61 SEC. 531-3-HB
COOK COUNTY
STA. 329+18.98

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

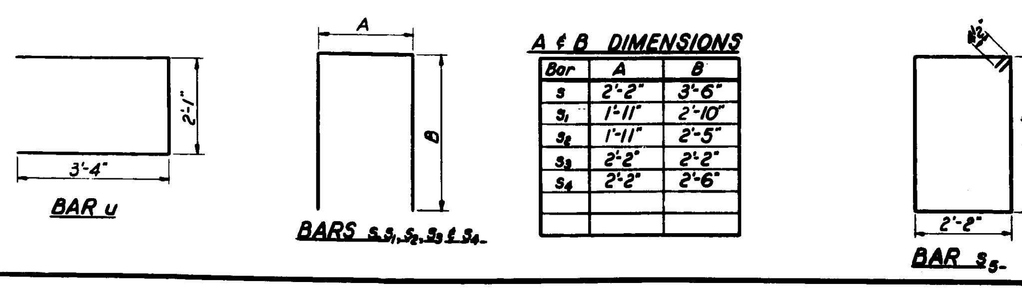
Route No.	Section	County	Total Sheets	Sheet No.
F.A. 61	531-3HB	COOK	29	19

SHEET NO. 14
22 SHEETS



BILL OF MATERIAL

Bar	No.	Size	Length	Shape
h	33	#5	19'-9"	——
h_2	12	#5	27'-6"	——
n	56	#8	6'-0"	——
p_1	10	#8	22'-6"	——
p_2	15	#9	23'-0"	——
p_8	20	#8	30'-9"	——
p_9	4	#5	8'-3"	——
s	118	#5	9'-2"	⊓
s_1	40	#5	7'-7"	⊓
s_2	40	#5	6'-9"	⊓
s_3	28	#5	6'-6"	⊓
s_4	8	#5	7'-2"	⊓
s_5	59	#5	12'-5"	□
t	60	#4	4'-9"	——
u	14	#6	8'-9"	⊐
v_4	28	#8	14'-0"	——
v_5	28	#8	15'-3"	——
w	4	#5	30'-6"	——
w_1	8	#7	30'-9"	——
Class X Concrete			Cu. Yds.	88.7
Reinforcement Bars			Lbs.	11,300



A & B DIMENSIONS

Bar	A	B
s	2'-2"	3'-6"
s_1	1'-11"	2'-10"
s_2	1'-11"	2'-5"
s_3	2'-2"	2'-2"
s_4	2'-2"	2'-6"

Note:
Space reinforcement in cap to miss anchor bolts.
Min. bar laps = 20 dia. unless otherwise noted.
All edges shall have standard ¾" chamfers except as noted.
Pour steps monolithically with cap.
Bars indicated thus 20x3-#5 etc. indicates 20 lines of bars with 3 lengths per line.
Max. Soil Pressure = 2.0 T/□'

DESIGNED Walter Perry
CHECKED R. Kowert
DRAWN J. L. Armstrong
CHECKED RK

JULY 31 1964
EXAMINED W. E. Baumann
ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
PASSED
ENGINEER OF DESIGN
APPROVED V. E. Goff
CHIEF HIGHWAY ENGINEER

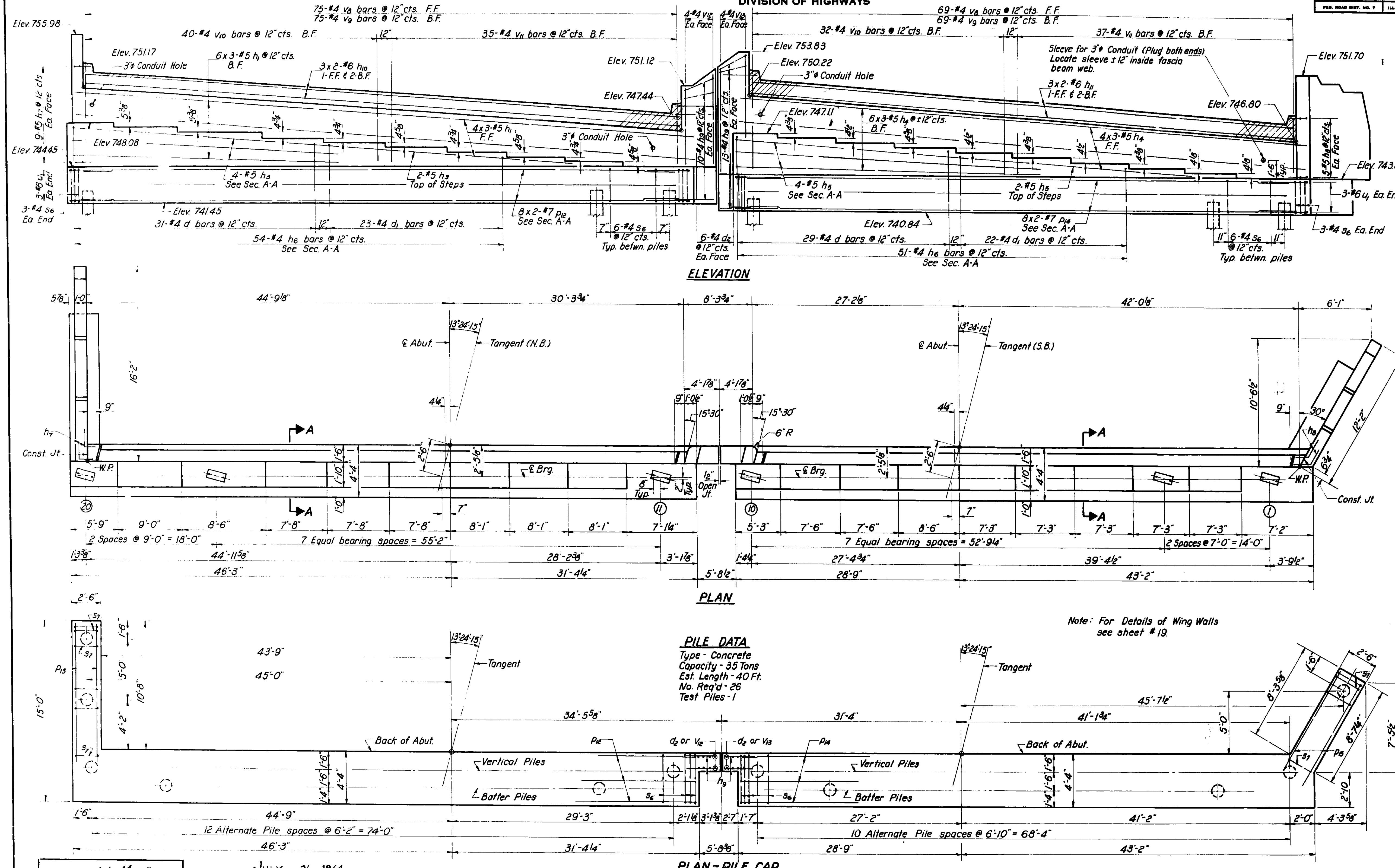
PIER #1 ~ N.B. LANE
F.A. RT. 61 SEC. 531-3-HB
COOK COUNTY
STA. 329+18.98

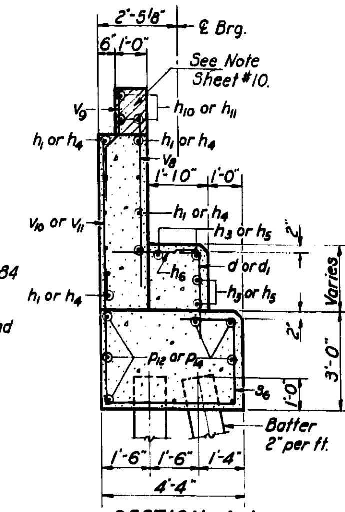
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A. 61	531-3HB	Cook	29	22

FED. ROAD DIST. NO. 7 | ILLINOIS | FED. AID PROJECT-

SHEET NO. 17
22 SHEETS





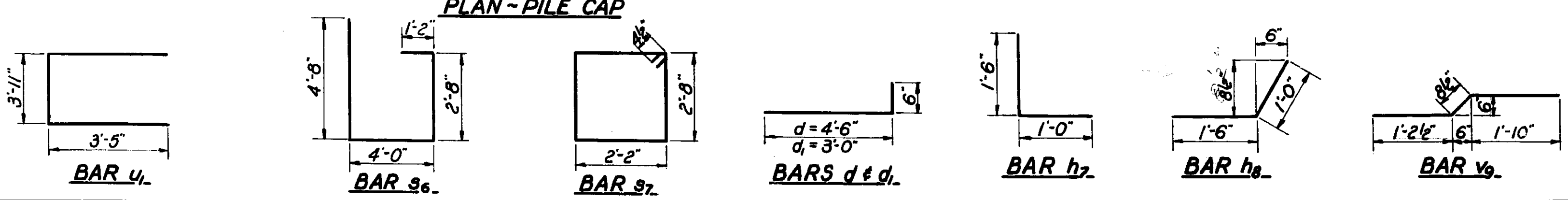
Note: For Details of Wing Walls see sheet #19.

PILE DATA

Type - Concrete
Capacity - 35 Tons
Est. Length - 40 Ft.
No. Req'd - 26
Test Piles - 1

BILL OF MATERIAL

Bar	No.	Size	Length	Shape
d	60	#4	5'-0"	
d_1	45	#4	3'-6"	
d_2	12	#4	5'-3"	
h_1	30	#5	26'-0"	
h_3	6	#5	31'-6"	
h_4	30	#5	24'-9"	
h_5	6	#5	29'-3"	
h_6	107	#4	3'-0"	
h_7	18	#5	2'-6"	
h_8	10	#5	2'-6"	
h_9	46	#4	4'-0"	
h_{10}	6	#6	38'-0"	
h_{11}	6	#6	35'-0"	
h_{12}	2	#4	4'-3"	
h_{13}	2	#4	9'-3"	
h_{14}	6	#4	14'-3"	
h_{15}	14	#4	15'-5"	
h_{16}	2	#4	6'-6"	
h_{17}	6	#4	10'-3"	
h_{18}	6	#4	11'-5"	
p_{12}	16	#7	39'-6"	
p_{13}	6	#7	12'-6"	
p_{14}	16	#7	36'-9"	
p_{15}	6	#7	9'-6"	
s_6	144	#4	12'-6"	
s_7	20	#4	10'-5"	
u_1	12	#6	10'-9"	
v_8	144	#4	3'-9"	
v_9	144	#4	3'-9"	
v_{10}	72	#4	4'-6"	
v_{11}	72	#4	2'-9"	
v_{12}	8	#4	6'-6"	
v_{13}	8	#4	7'-9"	
v_{14}	32	#4	9'-6"	
v_{15}	26	#4	6'-0"	
Class X Concrete			Cu. Yds.	145.9
Reinforcement Bars			Lbs.	9450
Concrete Piles			Lin. Ft.	1040
Test Piles (Concrete)			Each	1



DESIGNED Walter Perry
CHECKED L. Kowal
DRAWN J.L. Armstrong
CHECKED R.K.

July 31 1964
EXAMINED W. E. Baumann — ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
PASSED [signature] — ENGINEER OF DESIGN
APPROVED V. E. Staff — CHIEF HIGHWAY ENGINEER

SOUTH ABUTMENT
F.A. RT. 61 SEC. 531-3-HB
COOK COUNTY
STA. 329+18.98

C4269 750 125 8-63

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A. 61	531-3HB	COOK	29	26
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT-		

SHEET NO. 21
22 SHEETS

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

Boring No. B-1
Station 328 + 13
Offset 33' W of C L of 53
Ground Surface 730.5

	Elevation	N	Qu t/s.f.	w (%)
BLACK ORGANIC CLAY	0			
BROWN & GRAY MOTTLED CLAY		13 14	7.03	S
(CRUMBLEY) BROWN SILTY CLAY	-5	11 17	4.80	S
BROWN CLAY		9 15	6.11	S
(LIVERERY) H 20 Seepage BROWN SANDY SILTY CLAY	-10	8 17	2.47	S
(LIVERERY) BROWN SANDY SILTY CLAY		11 19	1.73	S
GRAY CLAY	-15	6 9	6.91	B
(LIVERERY) H20 GRAY CLAYEY SILT		8 10	1.04	S
LIVERERY GRAY SANDY CLAYEY SILT	-20	8 10	1.04	S
LIVERERY GRAY SANDY SILTY CLAY		8 11	.49	S
LIVERERY) GRAY SANDY CLAYEY SILT	-25	8 12	-	
H20 GRAY SILTY SAND & GRAVEL		14 18		
GRAY SAND & GRAVEL	-30	6 8	-	
GRAY SAND & GRAVEL		6 6		
GRAY SILTY GRITTY CLAY	-35	5 6	1.11	B
GRAY SAND & GRAVEL		5 8	---	
GRAY SAND & GRAVEL	-40	8 17		
GRAY SAND & GRAVEL		13 15	--	
GRAY GRITTY CLAY	-45	8 11	2.91	B
END OF BORING				

Surface Water El.	
Groundwater El. at Completion	10'
After ___ Hours	

Boring No. B-2
Station 328 + 58
Offset 33' W of C L of 53
Ground Surface 730.2

	Elevation	N	Qu t/s.f.	w (%)
BLACK ORGANIC CLAY	0			
BROWN GRAVELLY CLAY		10 11	4.36	S
BROWN CLAY	-5	9 13	6.18	S
BROWN CLAY		13 19	6.98	B
BROWN CLAY	-10	11 18	6.98	B
BROWN CLAY / GRAY CLAY		10 12	3.93 / 2.13	S / B
GRAY CLAY	-15	5 8	2.13	B
GRAY CLAY W/ SHALE INC		5 6	2.33	S
GRAY CLAY W/ VERTICAL SAND SEAM	-20	5 7	1.17	B
GRAY CLAY / GRAY FINE SAND W/H20 Seepage		5 10		
GRAY SILTY FINE SAND	-25	6 9		
GRAY SILTY FINE SAND / GRAY GRITTY SILTY CLAY		5 8	2.13	B
GRAY GRITTY CLAY	-30	6 9	1.17	B
GRAY GRITTY CLAY H 20		7 11	1.50	B
GRAY GRITTY CLAY / GRAY GRAVEL	-35	13 14	1.63	B
GRAY SANDY GRAVEL		13 25	----	
GRAY SANDY GRAVEL	-40	10 11	-------	
END OF BORING				

Surface Water El.	
Groundwater El. at Completion	32½
After ___ Hours	

Boring No. B-3
Station 329 + 77
Offset 33' W of C L of 53
Ground Surface 729.8

	Elevation	N	Qu t/s.f.	w (%)
BLACK ORGANIC CLAY	0			
BROWN CLAY		21 22	10.30	S
BROWN CLAY	-5	18 22	10.30	S
BROWN CLAY		20 28	9.31	B
BROWN CLAY	-10	16 20	6.98	B
BROWN CLAY		11 20	7.76	B
BROWN CLAY	-15	9 17	5.24	B
GRAY CLAY		6 10	2.91	B
(LIVERERY) GRAY SILTY CLAY	-20	7 16	2.68	S
GRAY GRITTY CLAY		4 8	1.63	B
GRAY SILTY CLAY	-25	8 17	3.30 / 4.85	B / B
GRAY SILTY CLAY H 20 / GRAY SAND & GRAVEL		7 15	1.75	F
GRAY SANDY GRAVEL / GRAY CLAY	-30	7 8	2.50	B
LAYER OF SANDY GRAVEL / GRAY GRITTY CLAY		6 10	3.88	B
GRAY GRITTY CLAY	-35	7 15	3.88	B
GRAY GRITTY CLAY		15 22	3.49	B
GRAY GRITTY SILTY CLAY	-40	13 14	3.30	B
END OF BORING				

Surface Water El.	
Groundwater El. at Completion	27½
After ___ Hours	

Boring No. B-4
Station 330 + 13
Offset 33' W of C L of 53
Ground Surface 729.8

Surface Water El.	
Groundwater El. at Completion	23½'
After ___ Hours	

	Elevation	N	Qu t/s.f.	w (%)
BLACK ORGANIC CLAY	0			
BROWN SILTY CLAY		36 40	9.70	S
BROWN CLAY	-5	25 30	9.48	S
BROWN CLAY		13 20	8.29 / 9.80	S / S
BROWN CLAY	-10	14 19	8.66	S
BROWNISH GRAY CLAY		11 21	6.59	B
BROWNISH GRAY CLAY	-15	15 18	4.15 / 6.39	S / S
BROWN TO GRAY CLAY		7 9	2.91	B
GRAY CLAY	-20	2 3	2.52	B
GRAY CLAY TO GRAY SILTY SAND H 20		2 3	.98	B
GRAY GRAVELLY SANDY CLAYEY SILT	-25	3 4	F 2.33	B
GRAY WELL GRADED FINE SAND W/ traces of CLAY & SILT		9 12	-----	
GRAY WELL GRADED FINE SAND / GRAY SILTY CLAY	-30	6 8	.81	B
GRAY SANDY GRAVEL / GRAY GRITTY CLAY		8 10	3.49	B
GRAY GRITTY CLAY	-35	7 11	2.13 / 3.69	B / B
GRAY GRITTY CLAY		11 15	3.88	B
GRAY GRITTY CLAY	-40	10 14	3.88	B
GRAY GRITTY CLAY		10 15	3.88	B
GRAY GRITTY CLAY		15 30	3.10 / 9.70	B / B
END OF BORING				

DESIGNED	Walter Perry
CHECKED	R Kowal
DRAWN	J.L.A.
CHECKED	RK

JULY 31 1964
EXAMINED W.E. Baumann
ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
PASSED
APPROVED

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

BORING DATA
F.A. RT. 61 SEC. 531-3-HB
COOK COUNTY
STA. 329+18.98

FED. ROAD DIST. NO. 7 / ROUTE	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FA 61	531-3HB	COOK	29	27

ILLINOIS | FED. AID PROJECT

SHEET NO. 22
22 SHEETS

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

Boring No. B-5

Station 328 + 13
Offset 33' E of C L of 53
Ground Surface 730.2
Surface Water El. ——
Groundwater El. at Completion 30'
After —— Hours

Elevation	Description	N	Qu t/s.f.	w (%)
0	BLACK ORGANIC CLAY			
	BROWN & GRAY MOTTLED CLAY	7 / 11	6.98	[illegible]
-5	BROWN CLAY	1[illegible] / 16	5.67	S
	BROWN TO GRAY CLAY	17 / 21	6.18 / 7.95	S / S
-10	GRAY CLAY	13 / 17	4.27	B
	GRAY CLAY	7 / 9	2.91	B
-15	GRAY CLAY	5 / 7	2.52	B
	GRAY CLAY	11 / 1[illegible]	2.3[illegible]	B
-20	GRAY CLAY	5 / 7	2.5[illegible]	B
	GRAY GRITTY SILTY CLAY	8 / 11	2.33	B
-25	GRAY SANDY SILTY CLAY	13 / 14	5.02	B
	(LIVERERY) GRAY GRITTY SILTY CLAY	8 / 10	2 Tons	P
-30 (H 20)	GRAY SAND & GRAVEL	9 / 9	----	
	GRAY SAND & GRAVEL	4 / 6	----	
-35	GRAY GRITTY CLAY	5 / 7	1.17	B
	GRAY GRITTY CLAY	7 / 10	2.52	B
-40	GRAY CLAY	7 / 11	2.72	B
	GRAY CLAY	7 / 9	1.50	B
	GRAY GRITTY CLAY / GRAY CLAYEY GRAVEL	26 / 30	2.52	B
	END OF BORING			

Boring No. B-6

Station 328 + 58
Offset 33' E of CL of 53
Ground Surface 730.2
Surface Water El. ——
Groundwater El. at Completion 32½
After —— Hours

Elevation	Description	N	Qu t/s.f.	w (%)
0	BLACK ORGANIC CLAY			
	BROWN CLAY	6 / 9	6.55	S
-5	BROWN CLAY	6 / 7	6.33	S
	BROWN CLAY / BROWN SANDY SILTY CLAY	12 / 16	6.33 / 1.83	S / S
-10	BROWN CLAY	13 / 20	8.15 / 4.95	B / S
	GRAY CLAY	8 / 10	2.52	B
-15	GRAY CLAY	7 / 9	2.13	B
	GRAY CLAY	4 / 7	2.1[illegible]	B
-20	GRAY CLAY	5 / 7	2.52	B
	GRAY GRITTY CLAY	10	2.33	B
-25	GRAY GRITTY CLAY 1/20/64	6 / 11	2.33	B
	GRAY CLAY 1/21/64 / GRAY SANDY SILTY CLAY	13 / 14	1.50 / 2.68	B / S
-30	GRAY FINE SANDY SILTY CLAY	6 / 9	1.59	S
(H 20)	GRAY CLAYEY SAND & GRAVEL	8 / 9	----	
-35	GRAY SAND & GRAVEL	9 / 10	----	
	GRAY SAND & GRAVEL	6 / 7	----	
-40	GRAY GRITTY CLAY	8 / 10	2.52	B
	GRAY GRITTY CLAY	6 / 9	2.52	B
	GRAY GRITTY CLAY	9 / 12	2.52	B
	END OF BORING			

Boring No. B-7

Station 329 + 77
Offset 33' E of C L of 53
Ground Surface 730.2
Surface Water El. ——
Groundwater El. at Completion 27½
After —— Hours

Elevation	Description	N	Qu t/s.f.	w (%)
0	BLACK ORGANIC CLAY			
	CRUMBLEY BROWN SILTY CLAY	21 / 50	6.98	S
-5	CRUMBLEY BROWN SILTY CLAY	17 / 27	8.51	S
	BROWN CLAY	10 / 19	7.76	S
-10	BROWN CLAY	10 / 8	5.77	S
	BROWN CLAY	13 / 14	5.82	B
-15	GRAY CLAY	10 / 10	3.49	B
	GRAY STONEY SANDY CLAY	17 / 17	4.50	S / P
-20	LAYER OF GRAY SAND / GRAY CLAY	7 / 7	2.52	B
	LIVERERY GRAY GRITTY SILTY CLAY	10 / 16	2.13	B
-25	LIVERERY GRAY SILTY CLAY	8 / 10	2.72	B
(H 20)	GRAY WATER BEARING SAND	7 / 6	——	
-30	GRAY SAND / GRAY SILTY CLAY (LIVERERY	7 / 9	1.17	B
	GRAY CLAYEY SANDY GRAVEL	6 / 12	.75	B
-35	GRAY SAND OF GRAVEL	27 / 24	----	
	GRAY GRAVELLEY CLAY	7 / 15	4.50	S / P
-40	GRAY GRAVELLY CLAY	17 / 16	5.24	B
	GRAY STONEY CLAY	16 / 21	3.10	B
	GRAY CLAY / GRAY GRAVELLY CLAY	18 / 30	3.88 / 5.77	B / S
	END OF BORING			

Boring No. B-8

Station 330 + 13
Offset 33' E of C L of 53
Ground Surface 729.2
Surface Water El. ——
Groundwater El. at Completion 25'
After —— Hours

Elevation	Description	N	Qu t/s.f.	w (%)
0	BLACK ORGANIC CLAY			
	BROWN (CRUMBLEY) CLAY			
-5	BROWN (CRUMBLEY) CLAY			
	BROWN CLAY			
-10	BROWN CLAY			
	BROWN CLAY / GRAY CLAY			
-15	GRAY STONEY CLAY			
	GRAY(LIVERERY SILTY CLAY / GRAY CLAY			
-20	GRAY (LIVERERY) SILTY CLAY			
	GRAY(LIVERERY SILTY CLAY TO GRAY CLAY	12 / 17	2.33 / 3.88	B / B
-25 (H 20)	GRAY CLAY TO GRAVEL(LIVERERY) SILTY CLAY TO GRAY SAND	10 / 12	1.30 / .50	B / P
	GRAY(LIVERERY) SILTY CLAY	3 / 3	.50	B
-30	GRAY(LIVERERY)SILTY CLAY TO GRAY SAND TO GRAY CLAY	8 / 10	.98 / 1.30	B / B
	GRAY SANDY GRAVEL	11 / 17	-----	
-35	GRAY SANDY GRAVEL	14 / 19	-----	
	GRAY SANDY, GRAVEL TO GRAY SILTY GRITTY CLAY	9 / 17	5.04	B
-40	GRAY GRITTY CLAY TO GRAY SAND	7 / 14	1.63	B
	GRAY SAND TO GRAY GRAVELLY CLAY	8 / 13	2.33	B
	GRAY GRAVELLY CLAY	14 / 16	1.60	B / P
	END OF BORING			

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

DESIGNED	Walter Perry
CHECKED	R Kornf
DRAWN	J.L.A.
CHECKED	RK.

JULY 31 1964

EXAMINED W. E. Baumann
ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES

PASSED [illegible]
ENGINEER OF DESIGN

APPROVED [illegible]
CHIEF HIGHWAY ENGINEER

BORING DATA
F.A. RT. 61 SEC. 531-3-HB
COOK COUNTY
STA. 329+18.98

APPENDIX C Proposed Cross-Section

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

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

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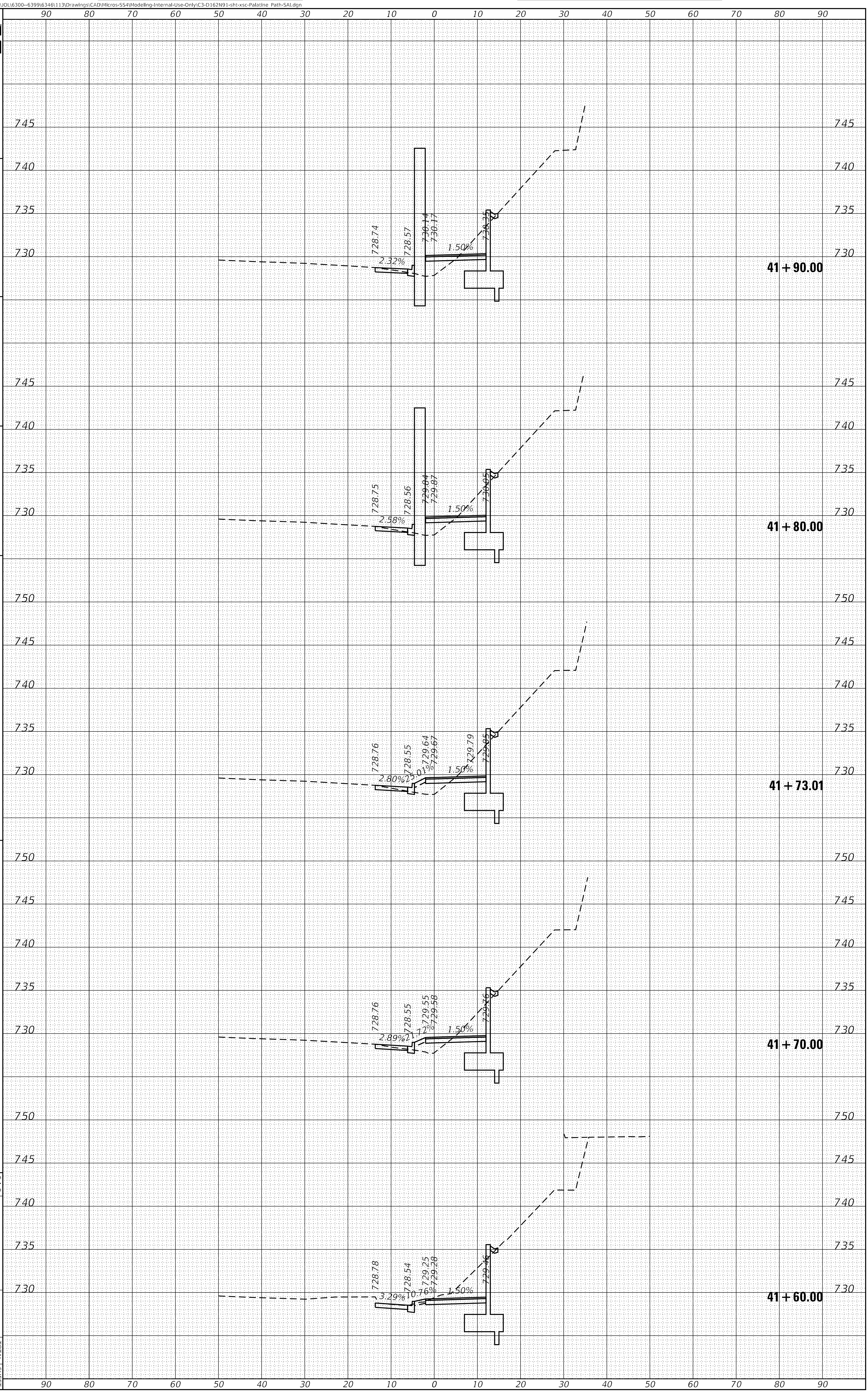

STRAND ASSOCIATES
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = StevenB
PLOT SCALE = 20.0000 ' / in.
PLOT DATE = 11/10/2023

DESIGNED -
DRAWN -
CHECKED -
DATE -

REVISED -
REVISED -
REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PALATINE ROAD MULTI-USE PATH CROSS SECTIONS

SCALE: | SHEET | OF | SHEETS | STA. 41+60 TO STA. 41+90

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	(531) BR 23	COOK	STOTS	

CONTRACT NO. 62W38

ILLINOIS | FED. AID PROJECT

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

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

MODEL: Default
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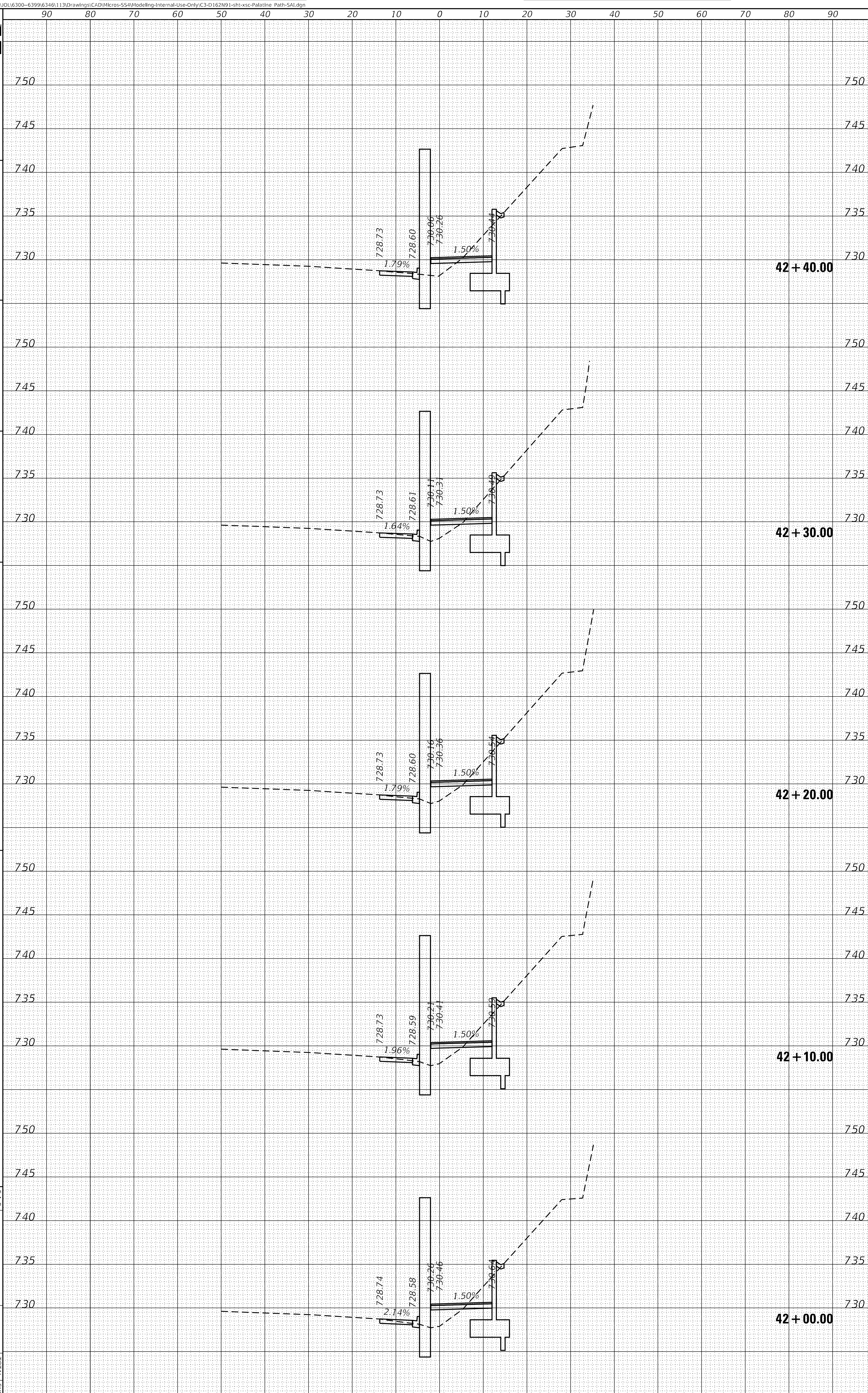


STRAND ASSOCIATES
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

USER NAME = StevenB
PLOT SCALE = 20.0000 ' / in.
PLOT DATE = 11/10/2023

DESIGNED -
DRAWN -
CHECKED -
DATE -

REVISED -
REVISED -
REVISED -
REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PALATINE ROAD MULTI-USE PATH CROSS SECTIONS

SCALE: | SHEET | OF | SHEETS | STA. 42+00 | TO STA.

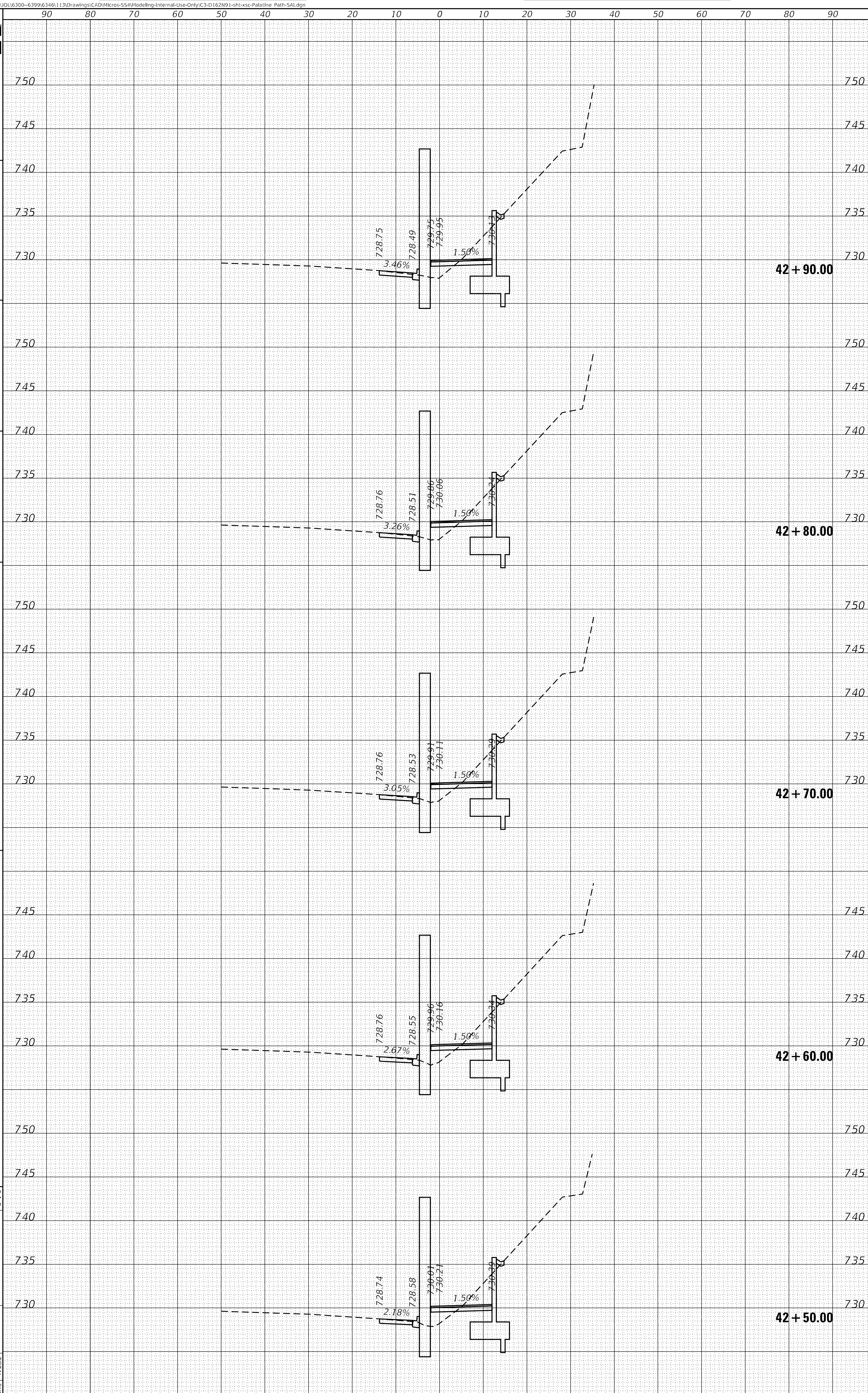
F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	(531) BR 23	COOK	STOTS	

CONTRACT NO. 62W38
ILLINOIS | FED. AID PROJECT

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

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

MODEL: Default
FILE NAME: S:\JOL\6300--6399\6346\113\Drawings\CAD\Micros-SS4\Modelling-Internal-Use-Only\C3-D162N91-sht-xsc-Palatine_Path-SAI.dgn



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

USER NAME = StevenB
PLOT SCALE = 20.0000 ' / in.
PLOT DATE = 11/10/2023

DESIGNED -
DRAWN -
CHECKED -
DATE -

REVISED -
REVISED -
REVISED -
REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PALATINE ROAD MULTI-USE PATH CROSS SECTIONS

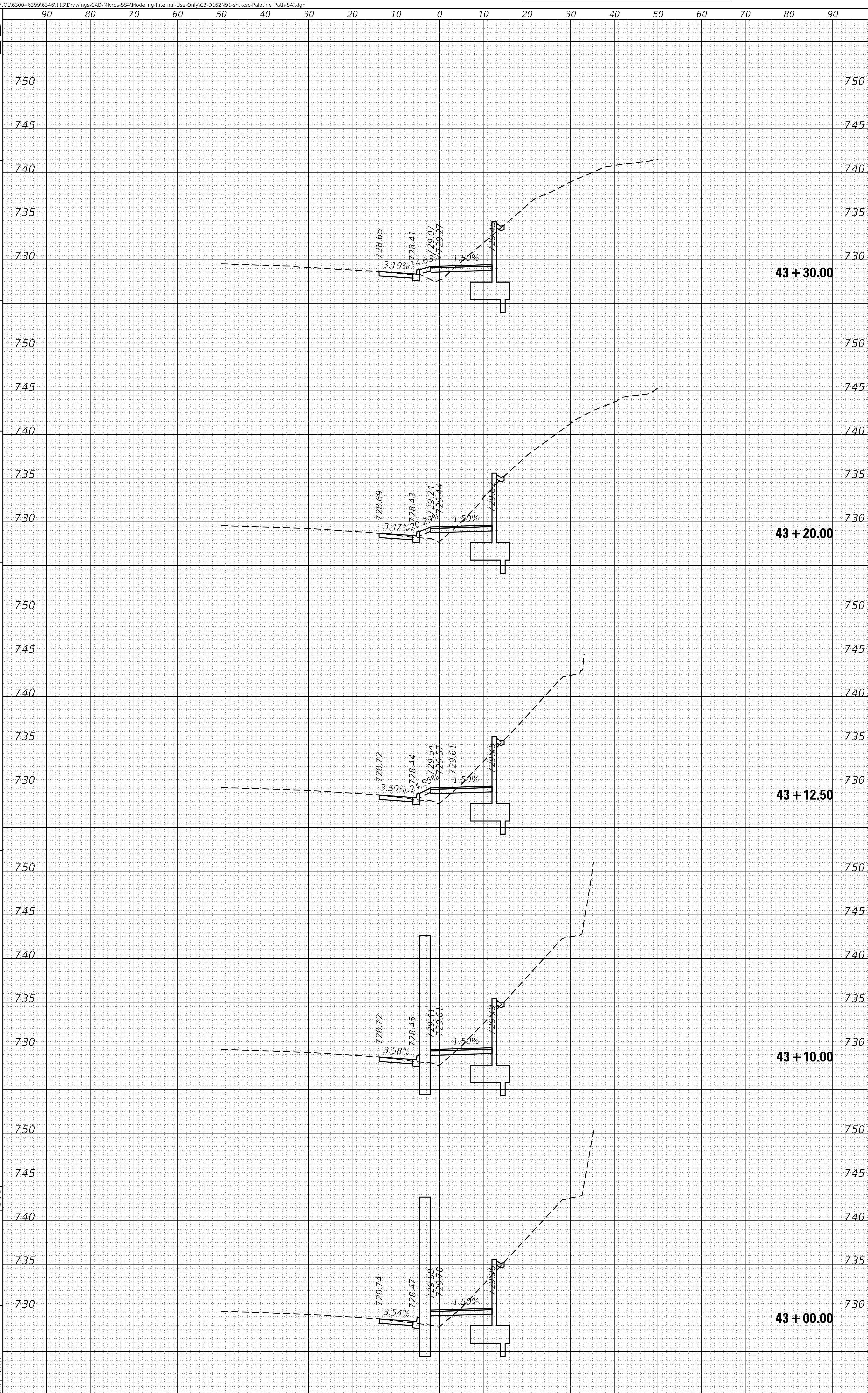
SCALE: SHEET OF SHEETS STA. 42+50.00 TO STA. 42+90.00

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	(531) BR 23	COOK	$TOTS	
		CONTRACT NO. 62W38		
ILLINOIS	FED. AID PROJECT			

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

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

MODEL: Default
FILE NAME: S:\JOL\6300--6399\6346\113\Drawings\CAD\Micros-SS4\Modelling-Internal-Use-Only\C3-D162N91-sht-xsc-Palatine Path-SAI.dgn



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

USER NAME = StevenB
PLOT SCALE = 20.0000 ' / in.
PLOT DATE = 11/10/2023

DESIGNED -
DRAWN -
CHECKED -
DATE -

REVISED -
REVISED -
REVISED -
REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PALATINE ROAD MULTI-USE PATH CROSS SECTIONS

SCALE: SHEET OF SHEETS STA. 43+00 TO STA. 43+30

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342	(531) BR 23	COOK	STOTS	
	ILLINOIS	FED. AID PROJECT	CONTRACT NO. 62W38	

APPENDIX D Boring Location Map

LEGEND KEY:

APPROXIMATE BORING LOCATION

gonzalez

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

APPENDIX E Subsurface Data Profile Plot

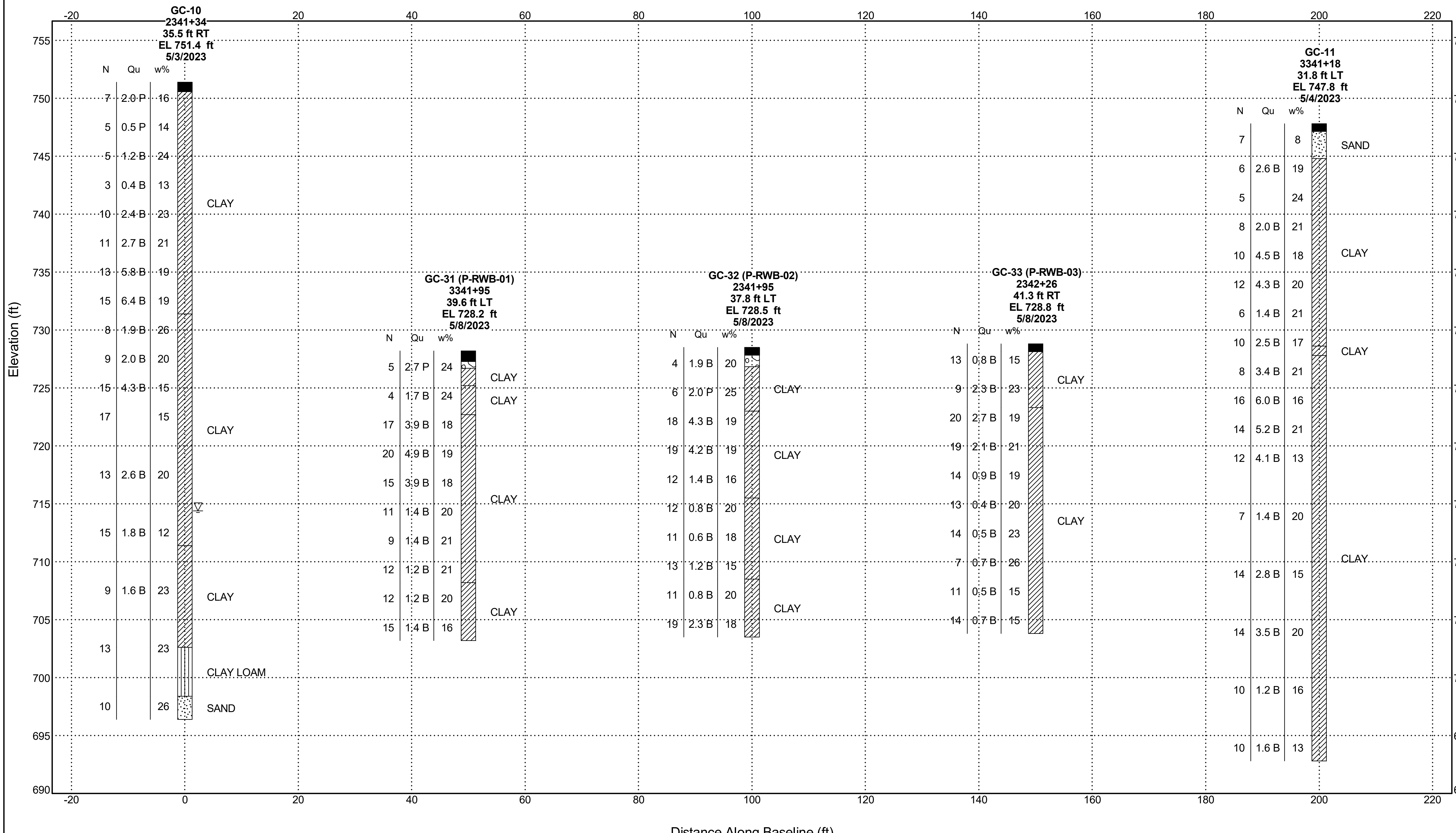
gonzalez COMPANIES, LLC

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

SUBSURFACE PROFILE
IL 53 OVER PALATINE ROAD

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 23/11/14

APPENDIX F Soil Boring Logs

SOIL BORING LOG

Date 23/05/03

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

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 19, **TWP.** 42N, **RNG.** 11E, 3rd **PM**,
Latitude 42.10977658, **Longitude** 88.00311407

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

STRUCT. NO. 016-0373
Station

BORING NO. GC-10
Station 2341+34
Offset 35.5 ft RT
Ground Surface Elev. 751.4 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion 714.4 ft ▽
After Hrs. Filled ft

Description	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
ASPHALT - 10" (750.6)				
Soft to Stiff, Brown, Dry, CLAY, Trace Sand, Trace Gravel		6 4 3	2.0 P	16
3" Course Sand Seam	-5	4 3 2	0.5 P	14
		1 2 3	1.2 B	24
	-10	1 1 2	0.4 B	13
		4 5 5	2.4 B	23
	-15	3 4 7	2.7 B	21
		4 5 8	5.8 B	19
731.4	-20	5 6 9	6.4 B	19

Description	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Moist, CLAY, Trace Gravel		2 4 4	1.9 B	26
	-25	3 4 5	2.0 B	20
		3 6 9	4.3 B	15
	-30	5 8 9		15
Becomes Wet	-35	4 5 8	2.6 B	20
▽				
711.4	-40	6 7 8	1.8 B	12

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 23/05/03

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

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 19, **TWP.** 42N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.10977658, **Longitude** 88.00311407

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

STRUCT. NO. 016-0373
Station

BORING NO. GC-10
Station 2341+34
Offset 35.5 ft RT
Ground Surface Elev. 751.4 ft

Surface Water Elev. ft
Stream Bed Elev. ft

Groundwater Elev.:
First Encounter Dry ft
Upon Completion 714.4 ft ▽
After Hrs. Filled ft

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Wet, CLAY, Trace Gravel			5		
			4	1.6	23
		-45	5	B	
	702.6		5		
Stiff, Brown, Wet, CLAY LOAM, Trace Gravel			5		23
		-50	8		
	698.4				
Loose, Brown, Wet, Fine SAND, Trace Clay, Trace Silt			4		
			5		26
	696.4	-55	5		
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)

BBS, form 137 (Rev. 8-99)

SOIL BORING LOG

Date 23/05/04

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

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 19, **TWP.** 42N, **RNG.** 11E, 3rd **PM**,
Latitude 42.10980038, **Longitude** 88.00365603

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

STRUCT. NO. 016-0970
Station

BORING NO. GC-11
Station 3341+18
Offset 31.8 ft LT
Ground Surface Elev. 747.8 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 (%)
ASPHALT - 8"	747.1				
Loose, Brown, Moist, Coarse SAND			8 4 3		8
	744.8				
Medium Stiff to Stiff, Brown, Moist, CLAY, Trace Gravel		-5	2 3 3	2.6 B	19
			1 1 4		24
		-10	2 3 5	2.0 B	21
			2 4 6	4.5 B	18
		-15	3 5 7	4.3 B	20
Some Organics			2 4 2	1.4 B	21
	728.6				
Stiff, Dark Brown, Moist, CLAY	727.8	-20	4 4 6	2.5 B	17

Description	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Moist, CLAY, Trace Gravel		4 3 5	3.4 B	21
	-25	5 7 9	6.0 B	16
		5 5 9	5.2 B	21
	-30	3 5 7	4.1 B	13
	-35	3 3 4	1.4 B	20
	-40	4 6 8	2.8 B	15

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 23/05/04

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

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 19, **TWP.** 42N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.10980038, **Longitude** 88.00365603

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

STRUCT. NO. 016-0970
Station

BORING NO. GC-11
Station 3341+18
Offset 31.8 ft LT
Ground Surface Elev. 747.8 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 (%)
Stiff, Brown, Moist, CLAY, Trace Gravel *(continued)*					
		-45	4 6 8	3.5 B	20
		-50	2 4 6	1.2 B	16
	692.8	-55	3 4 6	1.6 B	13
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

Page 1 of 1

Date 23/05/08

ROUTE FAP 342 **DESCRIPTION** Palatine Rd **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 19, **TWP.** 42N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.11000629, **Longitude** 88.00360484

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0970
Station

BORING NO. GC-31 (P-RWB-01)
Station 3341+95
Offset 39.6 ft LT
Ground Surface Elev. 728.2 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 (%)
PAVEMENT (ASPHALT OVER CONCRETE) - 11"	727.3				
GRAVEL	726.7		4		
Medium Stiff, Brown, Moist, CLAY			3	2.7	24
			2	P	
	725.2				
Medium Stiff, Brown, Moist, CLAY, Trace Gravel			3		
			2	1.7	24
		-5	2	B	
	722.7				
Stiff, Brown, Moist, CLAY			6		
			7	3.9	18
			10	B	
			5		
			8	4.9	19
		-10	12	B	
			5		
			7	3.9	18
			8	B	
			3		
			5	1.4	20
		-15	6	B	
			3		
			4	1.4	21
			5	B	
			4		
			5	1.2	21
	708.2	-20	7	B	

Description	Elev.	DEPTH (ft)	BLOWS (/6")	UCS Qu (tsf)	MOIST (%)
Stiff, Brown, Moist, CLAY, Trace Gravel			4		
			5	1.2	20
			7	B	
			5		
			6	1.4	16
	703.2	-25	9	B	
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 23/05/08

ROUTE FAP 342 **DESCRIPTION** Palatine Rd **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 19, **TWP.** 42N, **RNG.** 11E, 3rd **PM**,
Latitude 42.11000700, **Longitude** 88.00331291

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0373
Station

BORING NO. GC-32 (P-RWB-02)
Station 2341+95
Offset 37.8 ft LT
Ground Surface Elev. 728.5 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 - 8"	727.8				
GRAVEL	726.8				
Medium Stiff, Brown, Moist, CLAY, Some Gravel			3 1 3	1.9 B	20
		-5	3 3 3	2.0 P	25
Very Stiff, Brown, Moist, CLAY, Some Gravel	723.0		4 7 11	4.3 B	19
		-10	5 8 11	4.2 B	19
			4 5 7	1.4 B	16
Very Stiff, Brown, Moist, CLAY	715.5	-15	6 6 6	0.8 B	20
			4 5 6	0.6 B	18
	708.5	-20	4 6 7	1.2 B	15
Stiff to Very Stiff, Brown, Moist, CLAY, Some Gravel			3 5 6	0.8 B	20
	703.5	-25	5 8 11	2.3 B	18
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)

SOIL BORING LOG

Date 23/05/08

ROUTE FAP 342 **DESCRIPTION** Palatine Rd **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 19, **TWP.** 42N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.11001872, **Longitude** 88.00300189

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0373
Station

BORING NO. GC-33 (P-RWB-03)
Station 2342+26
Offset 41.3 ft RT
Ground Surface Elev. 728.8 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 (%)
ASPHALT - 8"	728.1				
Stiff, Brown, Moist, CLAY			4 6 7	0.8 B	15
		-5	3 5 4	2.3 B	23
	723.3				
Stiff, Brown, Moist, CLAY, Some Gravel			5 8 12	2.7 B	19
		-10	5 8 11	2.1 B	21
			6 6 8	0.9 B	19
		-15	3 6 7	0.4 B	20
			4 5 9	0.5 B	23
		-20	3 3 4	0.7 B	26
Stiff, Brown, Moist, CLAY, Some Gravel *(continued)*			9 5 6	0.5 B	15
	703.8	-25	4 6 8	0.7 B	15
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 23/05/08

ROUTE FAP 342 **DESCRIPTION** Palatine Rd **LOGGED BY** Gonzalez (AL)

SECTION 2018-100-BR **LOCATION** NW 1/4, **SEC.** 19, **TWP.** 42N, **RNG.** 11E, 3rd **PM**, **Latitude** 42.110007, **Longitude** -88.003338

COUNTY Cook **DRILLING METHOD** Hollow Stem Auger (8" O.D., 3.25" I.D.) **HAMMER TYPE** Auto 140 lb HE 91

STRUCT. NO. 016-0373
Station

BORING NO. GC-37 (P-RWB-02 ST)
Station 2341+95
Offset 34.8 ft LT
Ground Surface Elev. 728.5 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, Dry, CLAY, With Sand, With Gravel (A-6) LL=33, PL=19, PI=14 13%Gravel, 13%Sand, 37%Silt, 37%Clay		-5		4.8	18
Stiff, Brown, Dry, CLAY, Some Sand, Some Gravel (A-6) LL=35, PL=20, PI=15 8%Gravel, 9%Sand, 41%Silt, 42%Clay				5.3	18
	718.5	-10		4.2	19
Boring terminated at 10 feet.					
		-15			
		-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

UNCONFINED COMPRESSION TEST

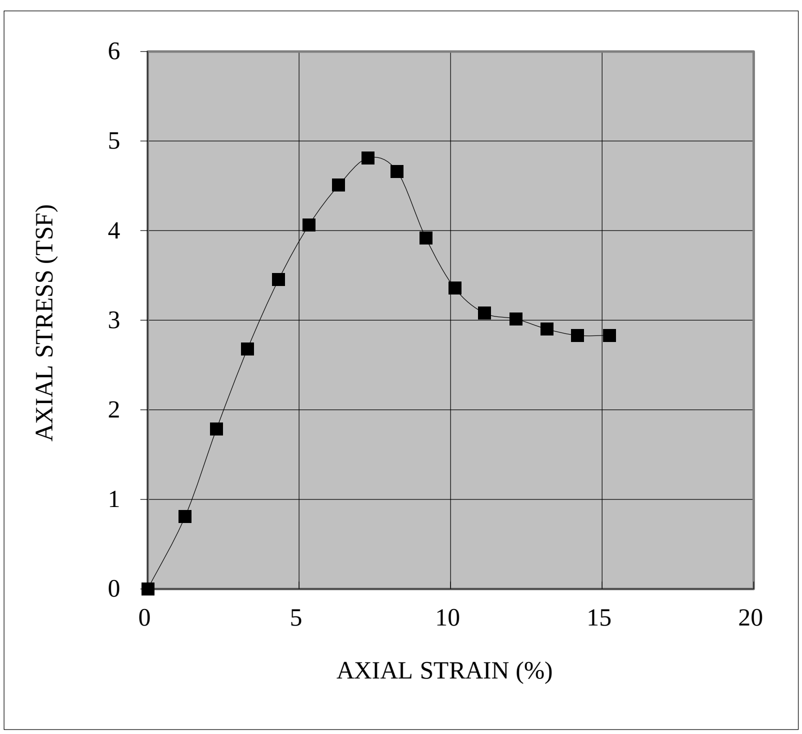
ENGINEERING INC.

Rubino Project No.: G23.027
Project: IL-53 Bridges
Client: Gonzalez Companies, LLC
Date Tested: June 30, 2023
Soil Description: Brown and gray clay, little sand, trace gravel
Boring No.: ~~P-RWB-02~~ ST-2 Shelby Tube
Depth (ft): 9
Remarks: Bulge / shear failure
GC-37

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

Height:	5.68 inches	**Weight (lb):**	2.830
Diameter:	2.86 inches	**Volume (ft^3):**	0.02121
Moisture Content:	18.4%	**Saturation (%):**	98.3
Ht.-Diameter Ratio:	1.98	**Specific Gravity:**	2.73
Unit Weight (pcf):	133.4	**Dry Unit Weight (pcf):**	112.7

READING NUMBER	READING TIME	DEFORM. (in.)	LOAD (lbs)	STRAIN (%)	CORRECTED AREA (in^2)	AXIAL STRESS (tsf)
0	000:00:00	0.01	0.30	0.2	6.46	0.00
1	000:00:30	0.07	73.20	1.2	6.52	0.81
2	000:01:00	0.13	163.70	2.3	6.59	1.79
3	000:01:30	0.19	248.10	3.3	6.66	2.68
4	000:02:00	0.25	322.80	4.3	6.73	3.45
5	000:02:30	0.30	384.00	5.3	6.81	4.06
6	000:03:00	0.36	430.60	6.3	6.88	4.51
7	000:03:30	0.41	464.50	7.3	6.95	4.81
8	000:04:00	0.47	454.80	8.2	7.02	4.66
9	000:04:30	0.52	386.20	9.2	7.09	3.92
10	000:05:00	0.57	334.60	10.1	7.17	3.36
11	000:05:30	0.63	310.00	11.1	7.25	3.08
12	000:06:00	0.69	307.10	12.2	7.34	3.01
13	000:06:30	0.75	299.00	13.2	7.42	2.90
14	000:07:00	0.81	295.20	14.2	7.51	2.83
15	000:07:30	0.87	298.90	15.2	7.60	2.83
Qu =	4.81	tsf		Strain	7.3%	



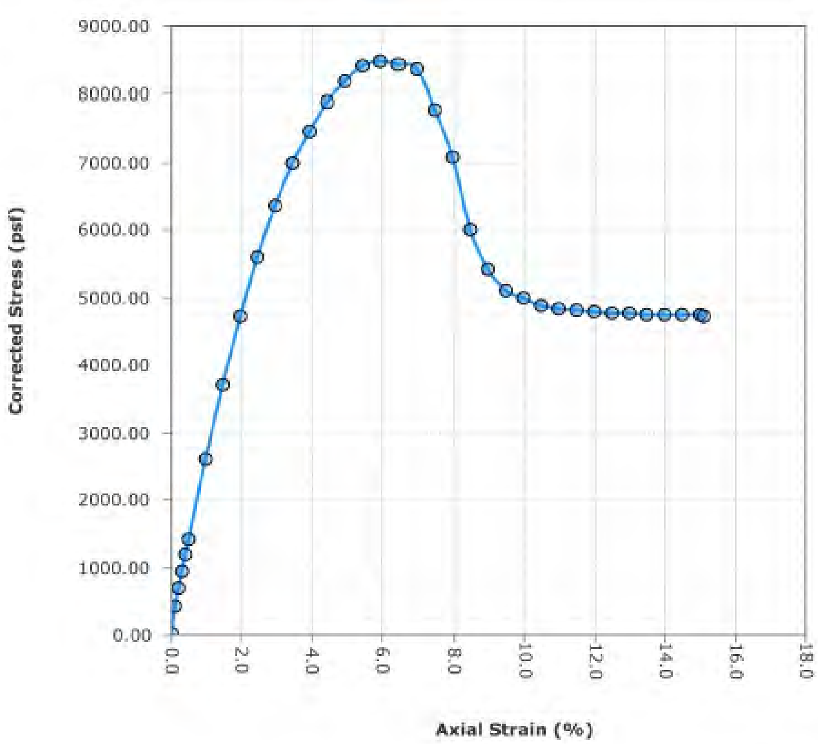
FAILURE SKETCH

FRONT

BACK

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Rubino Project No.:	G23.027	**Strain rate (%/min):**	0.3	**Moisture Content:**	18.6%	**Remarks:**	Undisturbed
Project:	IL-53 Bridges	**Specimen type:**	Intact	**Ht.-Diameter Ratio:**	2.16	**Failure Criterion:**	Max Deviator Stress
Client:	Gonzalez Companies, LLC	**Moisture source:**	Trimmings	**Weight (lb):**	3.08	**Axial Strain at Failure:**	0.059
Date Tested:	6/30/2023	**Test Method:**	AASHTO T296	**Volume (ft³):**	0.0231	**Major Principal Stress at Failure (psf):**	9024
Soil Description:	Brown clay, little sand and gravel	**Specific Gravity:**	2.72*	**Saturation (%):**	95.4	**Minor Principal Stress at Failure (psf):**	576
Boring No.:	~~P-RWB-02~~ ST-1 GC-37	**Height (in):**	6.21	**Dry Unit Weight (pcf):**	111	**Deviator Stress at Fail (psf):**	8448
Depth (ft):	4 - 6	**Diameter (in):**	2.88	**Void Ratio:**	0.53	*Assumed	



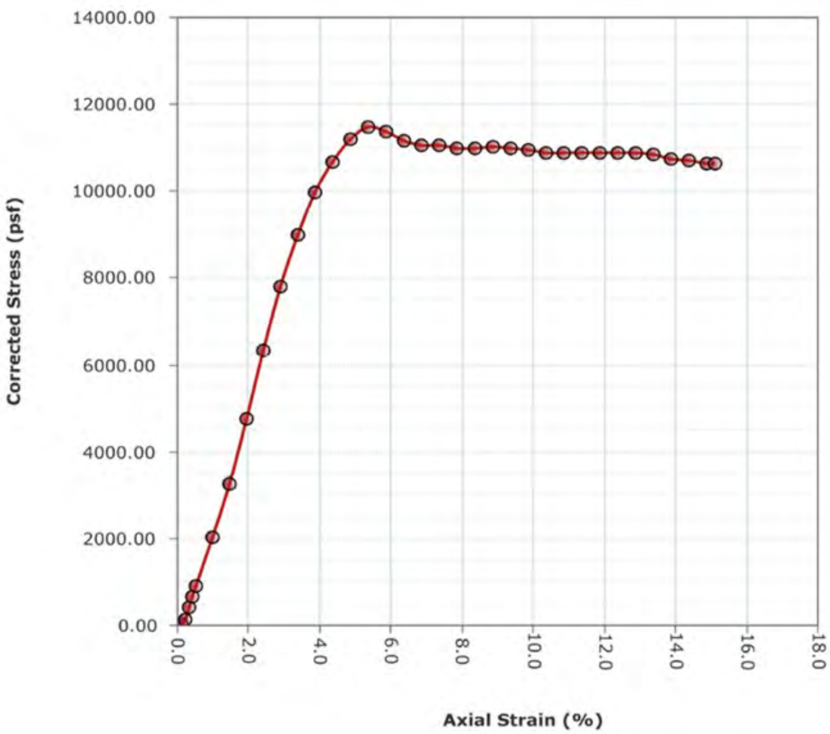
Failure Type: Shear

RUBINO ENGINEERING INC.

425 Shepard Drive, Elgin, Illinois 60123

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Rubino Project No.:	G23.027	**Strain rate (%/min):**	0.3	**Moisture Content:**	17.8%	**Remarks:**	Undisturbed
Project:	IL-53 Bridges	**Specimen type:**	Intact	**Ht.-Diameter Ratio:**	2.07	**Failure Criterion:**	Max Deviator Stress
Client:	Gonzalez Companies, LLC	**Moisture source:**	Trimmings	**Weight (lb):**	3.03	**Axial Strain at Failure:**	5.4%
Date Tested:	6/30/2023	**Test Method:**	AASHTO T296	**Volume (ft³):**	0.0227	**Major Principal Stress at Failure (psf):**	11199
Soil Description:	Brown and gray clay, little sand, trace gravel	**Specific Gravity:**	2.72*	**Saturation (%):**	97.4	**Minor Principal Stress at Failure (psf):**	576
Boring No.:	~~P-RWB-02~~ ST-02 GC-37	**Height (in):**	5.98	**Dry Unit Weight (pcf):**	113.4	**Deviator Stress at Fail (psf):**	10623
Depth (ft):	8 - 10	**Diameter (in):**	2.89	**Void Ratio:**	0.498	*Assumed	

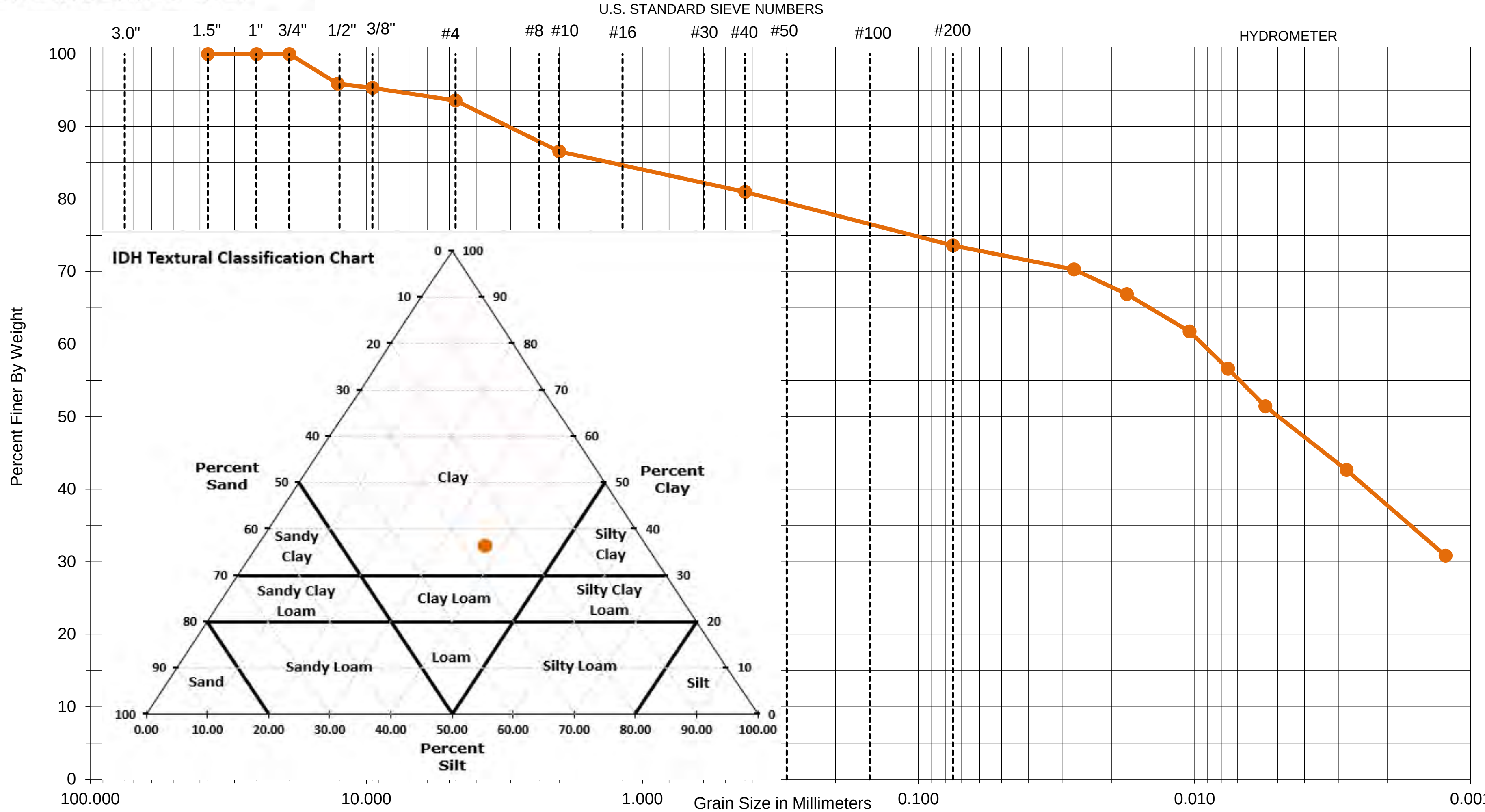


Failure Type: Shear

rubino ENGINEERING INC.

425 Shepard Drive, Elgin, Illinois 60123

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



GC-37

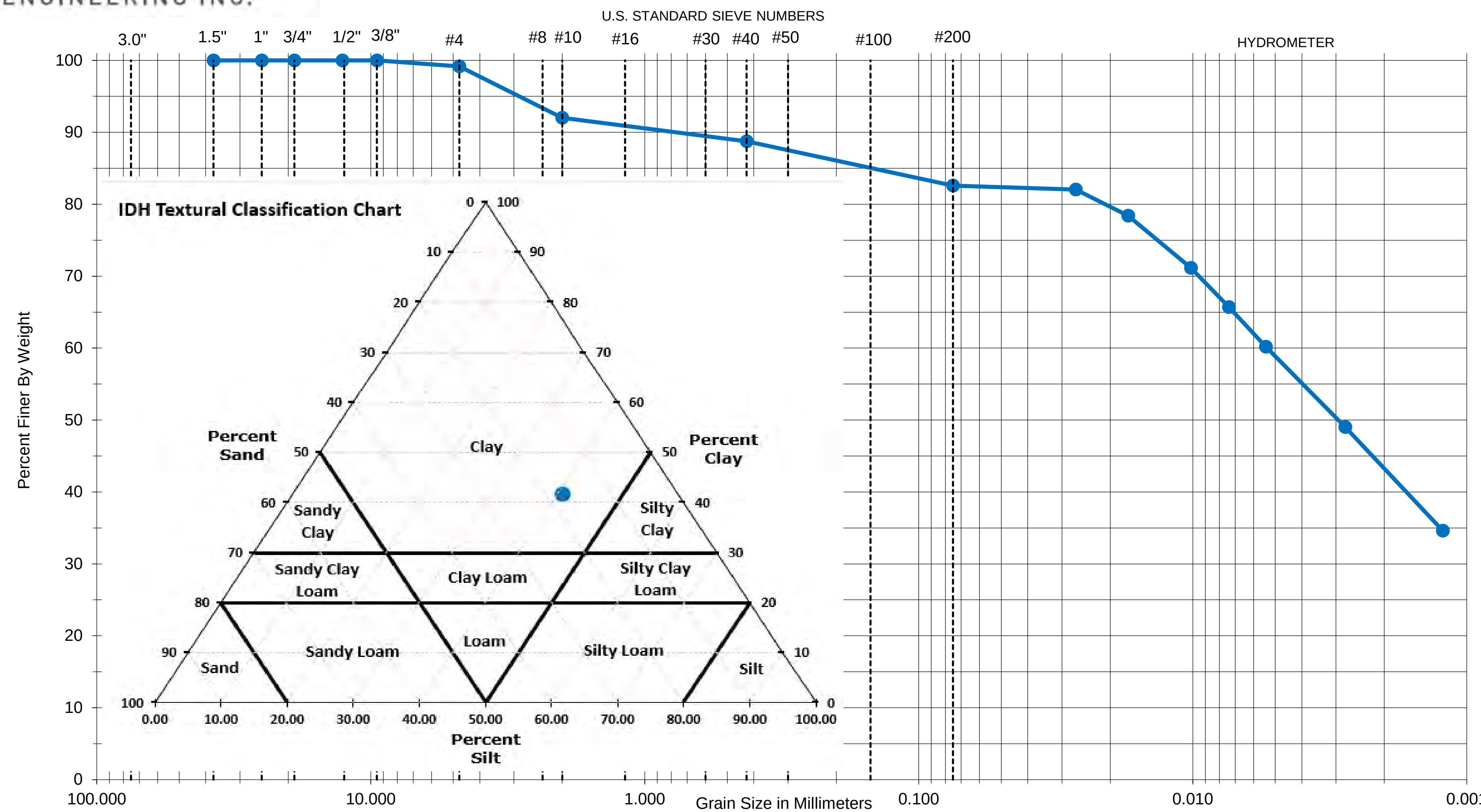
Key	Boring No.	Depth	IDH Textural Classification			Cc	Cu	%Gravel	%Sand	%Silt	%Clay	D60	D30	D10
●	~~P-RWB-02~~ ST-1	4 - 6	CLAY					13.4	13.1	37.0	36.5	0.009		

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)

rubino
ENGINEERING INC.

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



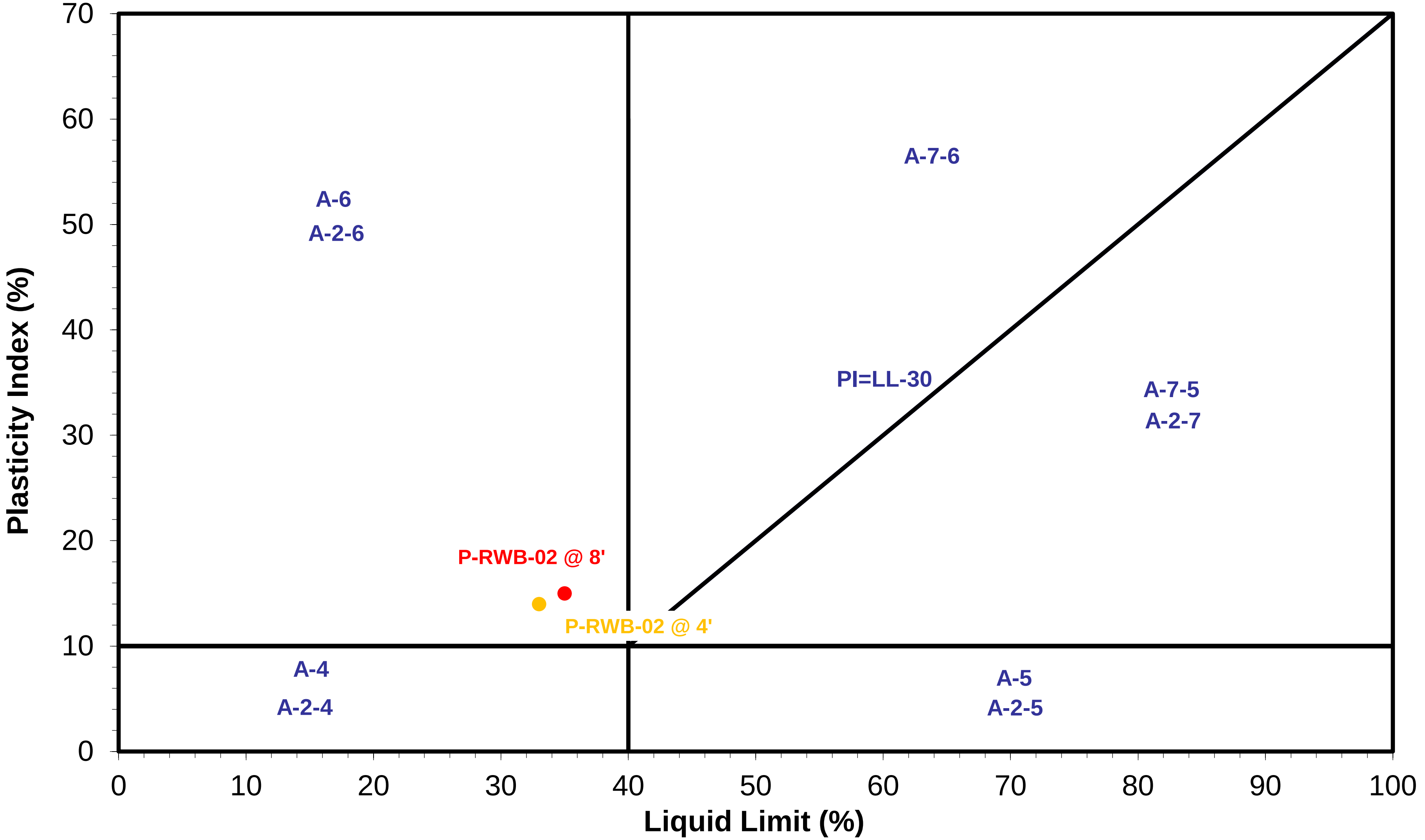
GC-37

Key	Boring No.	Depth	IDH Textural Classification			Cc	Cu	%Gravel	%Sand	%Silt	%Clay	D60	D30	D10
●	~~P-RWB-02~~ ST-2	8 - 10	CLAY					8.0	9.5	40.8	41.8	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)

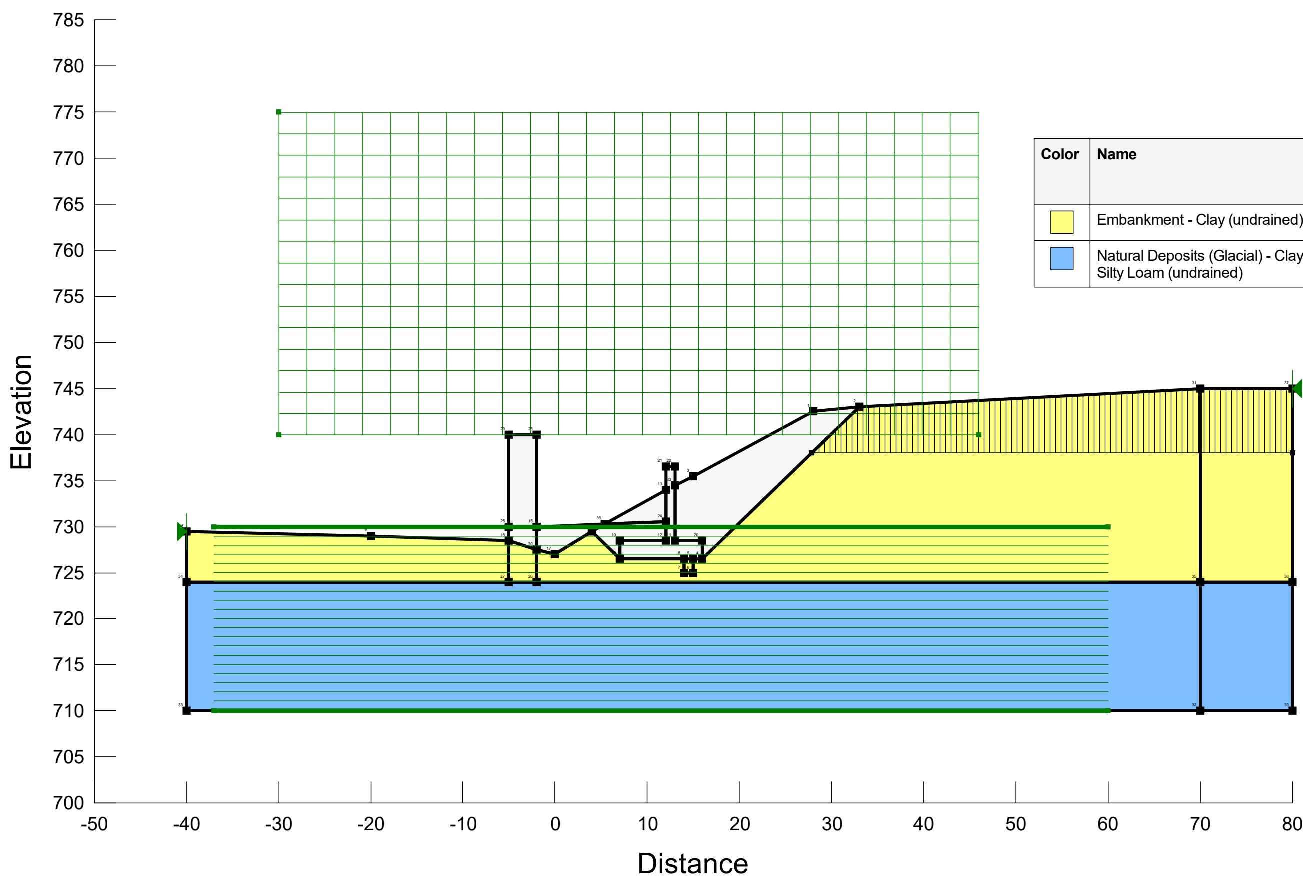
Report of Atterberg Limits Test (AASHTO T89 / AASHTO T90)



Boring #	~~P-RWB-02~~ GC-37 @ 4'	~~P-RWB-02~~ GC-37 @ 8'				
LL	33	35				
PL	19	20				
PI	14	15				

Project: IL-53 Bridges
Location: Rolling Meadows
Client: Gonzalez Companies, LLC
Project #: G23.027

APPENDIX H Slope Stability Analysis



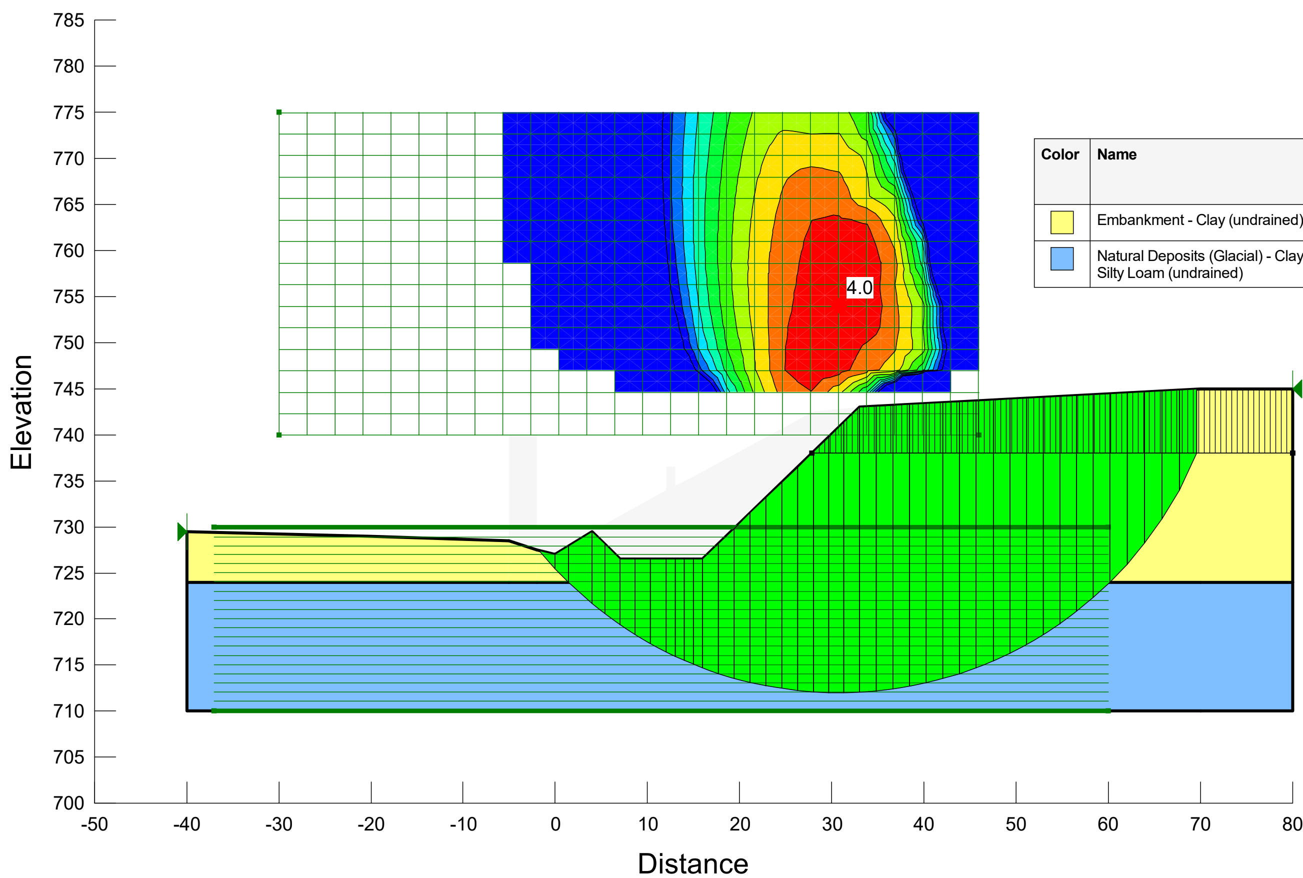
Color	Name	Model	Unit Weight (pcf)	Cohesion (psf)
Yellow	Embankment - Clay (undrained)	Undrained (Phi=0)	120	1,800
Blue	Natural Deposits (Glacial) - Clay, Silty Loam (undrained)	Undrained (Phi=0)	125	1,400

gonzalez

Slope Stability - During Construction - Undrained

IL-53 Palatine Ret Walla.gsz

11/21/2023 1:250



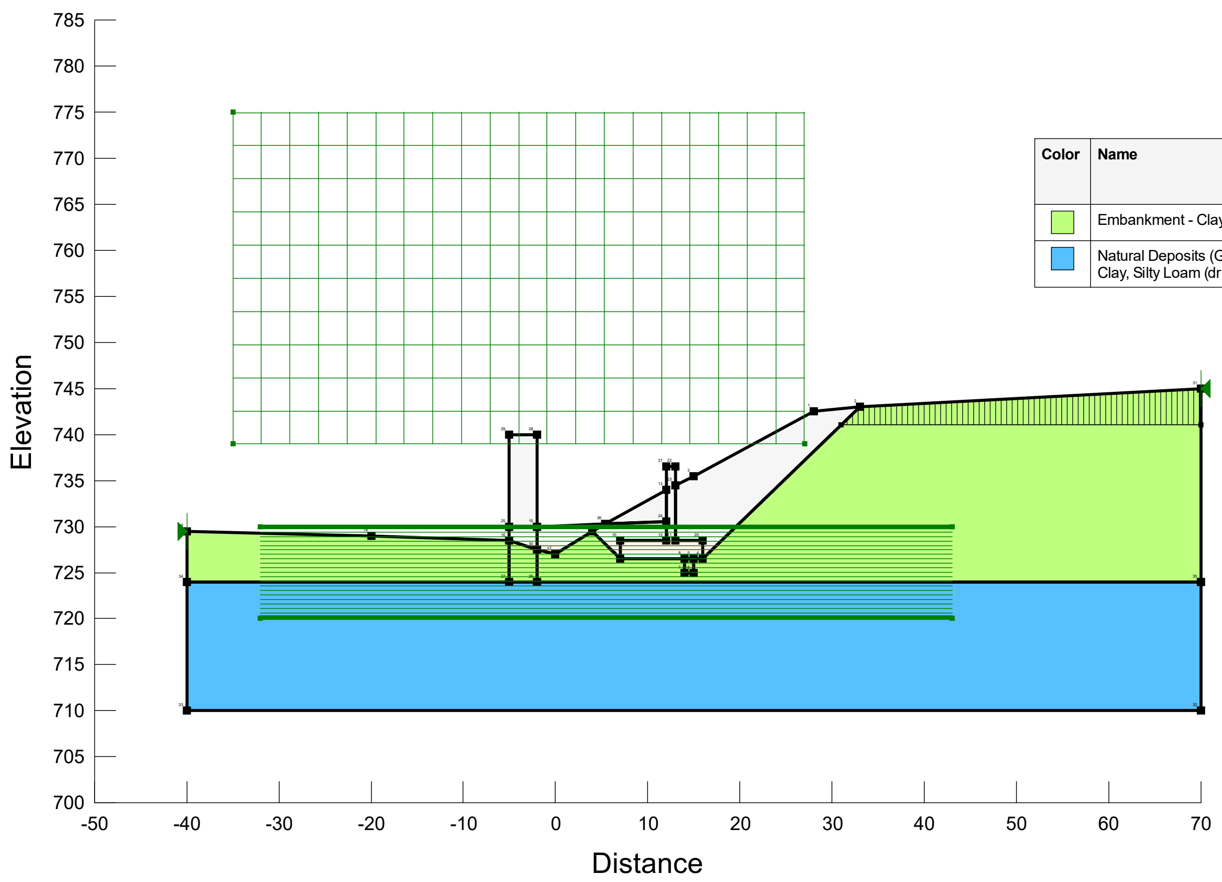
Color	Name	Model	Unit Weight (pcf)	Cohesion (psf)
Yellow	Embankment - Clay (undrained)	Undrained (Phi=0)	120	1,800
Blue	Natural Deposits (Glacial) - Clay, Silty Loam (undrained)	Undrained (Phi=0)	125	1,400

gonzalez

Slope Stability - During Construction - Undrained

IL-53 Palatine Ret Walla.gsz

11/21/2023 1:250



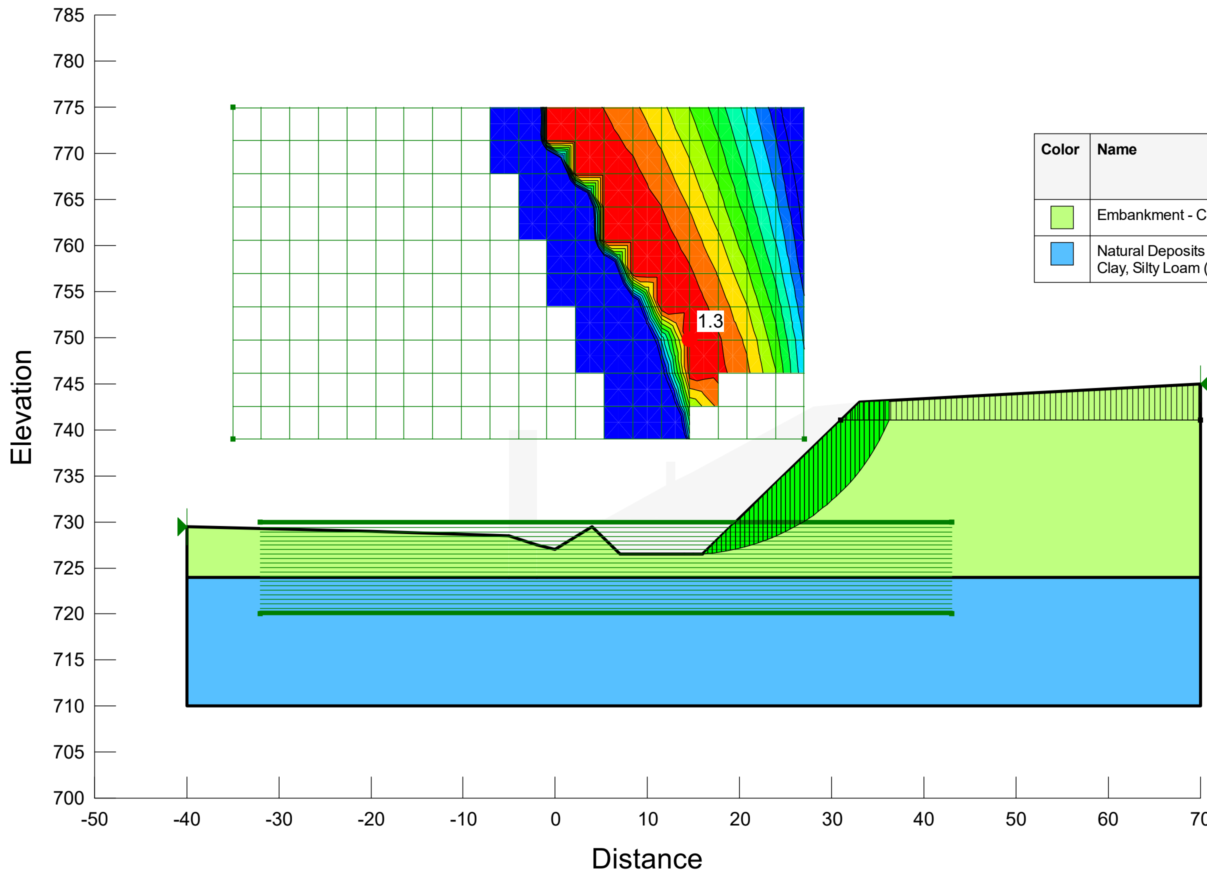
Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Embankment - Clay (drained)	Mohr-Coulomb	120	125	30
	Natural Deposits (Glacial) - Clay, Silty Loam (drained)	Mohr-Coulomb	125	100	30

gonzalez

Slope Stability - During Construction - Drained

IL-53 Palatine Ret Walla.gsz

11/21/2023 1:250



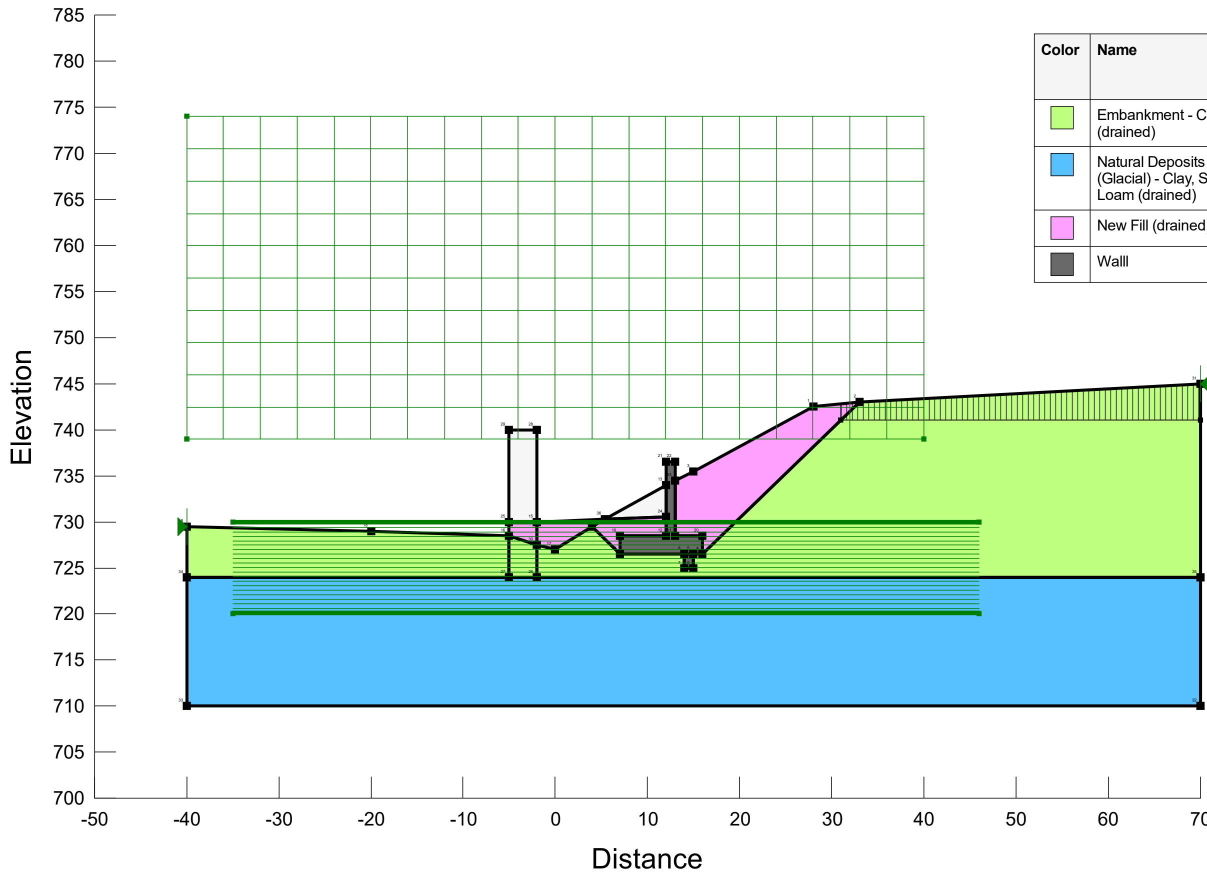
Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Embankment - Clay (drained)	Mohr-Coulomb	120	125	30
	Natural Deposits (Glacial) - Clay, Silty Loam (drained)	Mohr-Coulomb	125	100	30

gonzalez

Slope Stability - During Construction - Drained

IL-53 Palatine Ret Walla.gsz

11/21/2023 1:250



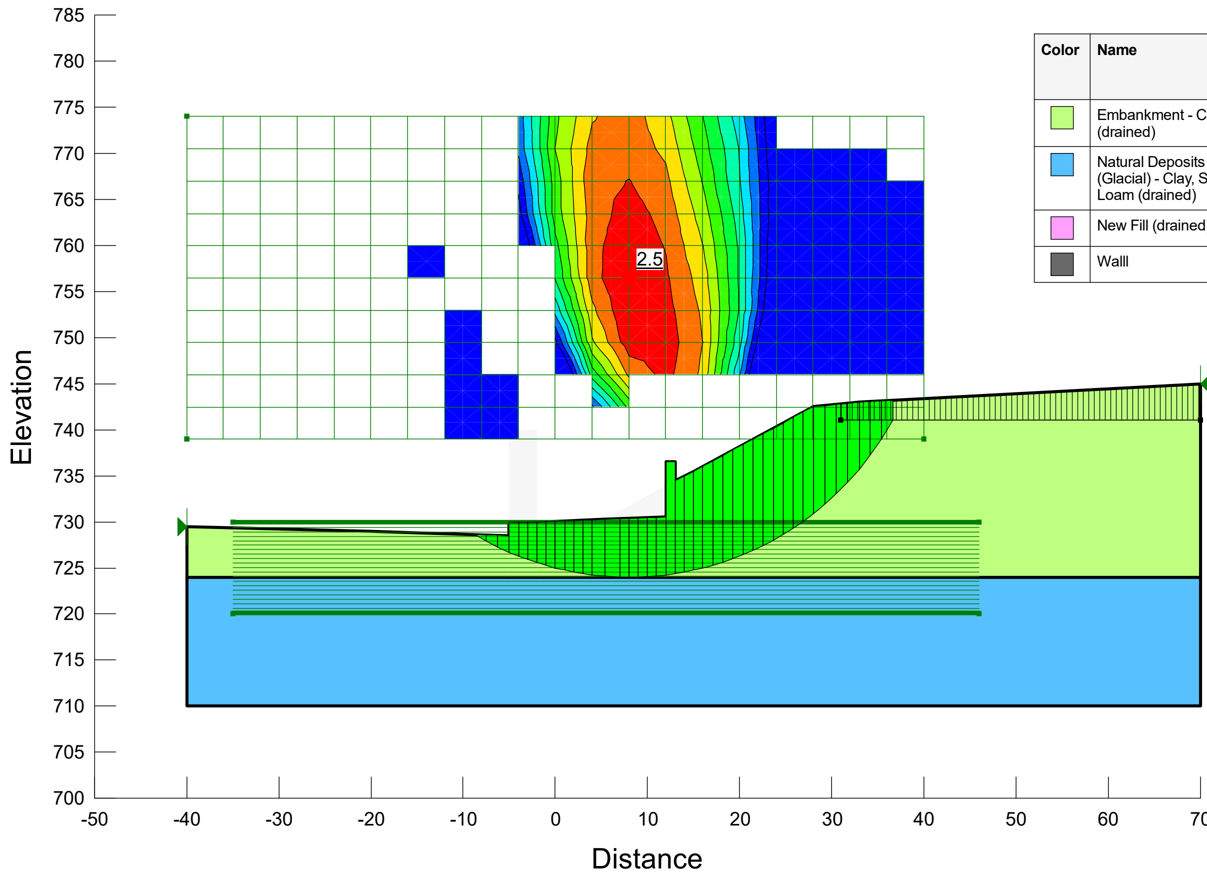
Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Embankment - Clay (drained)	Mohr-Coulomb	120	125	30
	Natural Deposits (Glacial) - Clay, Silty Loam (drained)	Mohr-Coulomb	125	100	30
	New Fill (drained)	Mohr-Coulomb	125	100	32
	Walll	High Strength	150		

gonzalez

Slope Stability - Long Term - Drained

IL-53 Palatine Ret Walla.gsz

11/21/2023 1:250



Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Embankment - Clay (drained)	Mohr-Coulomb	120	125	30
	Natural Deposits (Glacial) - Clay, Silty Loam (drained)	Mohr-Coulomb	125	100	30
	New Fill (drained)	Mohr-Coulomb	125	100	32
	Walll	High Strength	150		

gonzalez

Slope Stability - Long Term - Drained

IL-53 Palatine Ret Walla.gsz

11/21/2023 1:250

APPENDIX I Seismic Analysis

SEISMIC SITE CLASS DETERMINATION

Illinois Department of Transportation

PROJECT TITLE=====IL 53 over Palatine Rd - PTB 203-021 - 62N91

Substructure 1

Base of Substruct. Elev. (or ground surf for bents)	724.5	ft.
Pile or Shaft Dia.		inches
Boring Number	GC-10	
Top of Boring Elev.	751.4	ft.
Approximate Fixity Elev.	724.5	ft.

Individual Site Class Definition:

N (bar): 10 (Blows/ft.) Soil Site Class E
N_{ch} (bar): NA (Blows/ft.) NA
s_u (bar): 1.72 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	748.9	2.50	7	2.00	
	746.4	2.50	5	0.50	
	743.9	2.50	5	1.20	
	741.4	2.50	3	0.40	
	738.9	2.50	10	2.40	
	736.4	2.50	11	2.70	
	733.9	2.50	13	5.80	
	731.4	2.50	15	6.40	B
	728.9	2.50	8	1.90	
	726.4	2.50	9	2.00	
0.6	723.9	2.50	15	4.30	
3.1	721.4	2.50	17	2.60	
8.1	716.4	5.00	13	2.60	
13.1	711.4	5.00	15	1.80	
18.1	706.4	5.00	9	1.60	B
23.1	701.4	5.00	13		B
28.1	696.4	5.00	9	1.60	
33.1	691.4	5.00	9	1.60	
38.1	686.4	5.00	9	1.60	
43.1	681.4	5.00	9	1.60	
48.1	676.4	5.00	9	1.60	
53.1	671.4	5.00	9	1.60	
58.1	666.4	5.00	9	1.60	
63.1	661.4	5.00	9	1.60	
68.1	656.4	5.00	9	1.60	
73.1	651.4	5.00	9	1.60	
78.1	646.4	5.00	9	1.60	
83.1	641.4	5.00	9	1.60	
88.1	636.4	5.00	9	1.60	
93.1	631.4	5.00	9	1.60	
98.1	626.4	5.00	9	1.60	
100.0	624.5	1.90	9	1.60	B

Substructure 2

Base of Substruct. Elev. (or ground surf for bents)	724.5	ft.
Pile or Shaft Dia.		inches
Boring Number	GC-11	
Top of Boring Elev.	747.8	ft.
Approximate Fixity Elev.	724.5	ft.

Individual Site Class Definition:

N (bar): 10 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 1.62 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	745.3	2.50	7		B
	742.8	2.50	6	2.60	
	740.3	2.50	5	2.00	
	737.8	2.50	8	2.00	
	735.3	2.50	10	4.50	
	732.8	2.50	12	4.30	
	730.3	2.50	6	1.40	
	727.8	2.50	10	2.50	B
	725.3	2.50	8	3.40	B
1.7	722.8	2.50	16	6.00	
4.2	720.3	2.50	14	5.20	B
6.7	717.8	2.50	12	4.10	
11.7	712.8	5.00	7	1.40	
16.7	707.8	5.00	14	2.80	
21.7	702.8	5.00	14	3.50	
26.7	697.8	5.00	10	1.20	
31.7	692.8	5.00	10	1.60	
36.7	687.8	5.00	10	1.20	
41.7	682.8	5.00	10	1.20	
46.7	677.8	5.00	10	1.20	
51.7	672.8	5.00	10	1.20	
56.7	667.8	5.00	10	1.20	
61.7	662.8	5.00	10	1.20	
66.7	657.8	5.00	10	1.20	
71.7	652.8	5.00	10	1.20	
76.7	647.8	5.00	10	1.20	
81.7	642.8	5.00	10	1.20	
86.7	637.8	5.00	10	1.20	
91.7	632.8	5.00	10	1.20	
96.7	627.8	5.00	10	1.20	
100.0	624.5	3.30	10	1.20	B

Substructure 3

Base of Substruct. Elev. (or ground surf for bents)	724.5	ft.
Pile or Shaft Dia.		inches
Boring Number	GC-31	
Top of Boring Elev.	728.2	ft.
Approximate Fixity Elev.	724.5	ft.

Individual Site Class Definition:

N (bar): 12 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 1.33 (ksf) Soil Site Class D <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	725.7	2.50	5	2.70	B
1.3	723.2	2.50	4	1.70	B
3.8	720.7	2.50	17	3.90	
6.3	718.2	2.50	20	4.90	
8.8	715.7	2.50	15	3.90	
11.3	713.2	2.50	11	1.40	
13.8	710.7	2.50	9	1.40	
16.3	708.2	2.50	12	1.20	B
18.8	705.7	2.50	12	1.20	
21.3	703.2	2.50	15	1.40	
26.3	698.2	5.00	12	1.20	
31.3	693.2	5.00	12	1.20	
36.3	688.2	5.00	12	1.20	
41.3	683.2	5.00	12	1.20	
46.3	678.2	5.00	12	1.20	
51.3	673.2	5.00	12	1.20	
56.3	668.2	5.00	12	1.20	
61.3	663.2	5.00	12	1.20	
66.3	658.2	5.00	12	1.20	
71.3	653.2	5.00	12	1.20	
76.3	648.2	5.00	12	1.20	
81.3	643.2	5.00	12	1.20	
86.3	638.2	5.00	12	1.20	
91.3	633.2	5.00	12	1.20	
96.3	628.2	5.00	12	1.20	
100.0	624.5	3.70	12	1.20	B

Substructure 4

Base of Substruct. Elev. (or ground surf for bents)	724.5	ft.
Pile or Shaft Dia.		inches
Boring Number	GC-32	
Top of Boring Elev.	742.5	ft.
Approximate Fixity Elev.	724.5	ft.

Individual Site Class Definition:

N (bar): 11 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA
s_u (bar): 0.81 (ksf) Soil Site Class E <----Controls

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	740.0	2.50	4	1.90	B
	737.5	2.50	6	2.00	B
	735.0	2.50	18	4.30	
	732.5	2.50	19	4.20	
	730.0	2.50	12	1.40	B
	727.5	2.50	12	0.80	
	725.0	2.50	11	0.60	
2.0	722.5	2.50	13	1.20	
4.5	720.0	2.50	11	0.80	
7.0	717.5	2.50	19	2.30	
12.0	712.5	5.00	11	0.80	
17.0	707.5	5.00	11	0.80	
22.0	702.5	5.00	11	0.80	
27.0	697.5	5.00	11	0.80	
32.0	692.5	5.00	11	0.80	
37.0	687.5	5.00	11	0.80	
42.0	682.5	5.00	11	0.80	
47.0	677.5	5.00	11	0.80	
52.0	672.5	5.00	11	0.80	
57.0	667.5	5.00	11	0.80	
62.0	662.5	5.00	11	0.80	
67.0	657.5	5.00	11	0.80	
72.0	652.5	5.00	11	0.80	
77.0	647.5	5.00	11	0.80	
82.0	642.5	5.00	11	0.80	
87.0	637.5	5.00	11	0.80	
92.0	632.5	5.00	11	0.80	
97.0	627.5	5.00	11	0.80	
100.0	624.5	3.00	11	0.80	B

Global Site Class Definition: Substructures 1 through 5

N (bar): 11 (Blows/ft.) Soil Site Class E
N_{ch} (bar): (Blows/ft.) NA, H < 0.1*H (Total)
s_u (bar): 1.26 (ksf) Soil Site Class D <----Controls

Illinois Department of Transportation

SEISMIC SITE CLASS DETERMINATION

PROJECT TITLE===== IL 53 over Palatine Rd - PTB 203-021 - 62N91

Substructure 5

Base of Substruct. Elev. (or ground surf for bents)	724.5	ft.
Pile or Shaft Dia.		inches
Boring Number	GC-33	
Top of Boring Elev.	728.8	ft.

Approximate Fixity Elev. 724.5 ft.

Individual Site Class Definition:

N (bar): 14 (Blows/ft.) Soil Site Class E <----Controls

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

s_u (bar): 0.82 (ksf) Soil Site Class E

Seismic Soil Column Depth (ft)	Bot. Of Sample Elevation	Sample Thick. (ft.)	N	Qu (tsf)	Layer Description Boundary
	726.3	2.50	13	0.80	
0.7	723.8	2.50	9	2.30	B
3.2	721.3	2.50	20	2.70	
5.7	718.8	2.50	19	2.10	
8.2	716.3	2.50	14	0.90	
10.7	713.8	2.50	13	0.40	
13.2	711.3	2.50	14	0.50	
15.7	708.8	2.50	7	0.70	
18.2	706.3	2.50	11	0.50	
20.7	703.8	2.50	14	0.70	
25.7	698.8	5.00	14	0.70	
30.7	693.8	5.00	14	0.70	
35.7	688.8	5.00	14	0.70	
40.7	683.8	5.00	14	0.70	
45.7	678.8	5.00	14	0.70	
50.7	673.8	5.00	14	0.70	
55.7	668.8	5.00	14	0.70	
60.7	663.8	5.00	14	0.70	
65.7	658.8	5.00	14	0.70	
70.7	653.8	5.00	14	0.70	
75.7	648.8	5.00	14	0.70	
80.7	643.8	5.00	14	0.70	
85.7	638.8	5.00	14	0.70	
90.7	633.8	5.00	14	0.70	
95.7	628.8	5.00	14	0.70	
100.0	624.5	4.30	14	0.70	B

Substructure 6

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 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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APPENDIX J Wall Feasibility Study

Wall Feasibility Study

REGION:	One
DISTRICT:	One
ROUTE:	Palatine Road FAP 305
COUNTY:	Cook
SECTION NUMBER:	2018-100-BR
JOB NUMBER:	62N91
STRUCTURE NUMBER:	To be Determined
LOCATION:	Palatine Road under IL 53

PREPARED BY:	Strand Associates, Inc.®
PREPARED FOR:	Illinois Department of Transportation
DATE:	February 10, 2023

TABLE OF CONTENTS

ATTACHMENTS:

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 Palatine Road was proposed. This multiuse path is to pass through span 1 of the existing bridge structures at the IL 53 overpass of Palatine Road 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 IL 62 Algonquin 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 016-0373 and 016-0970 (IL 53 northbound and southbound over Palatine Road, respectively) are located towards the northern portion of the IL 53 corridor limits of Illinois Department of Transportation (IDOT) Project Number 62N91. Palatine Road runs east to west and provides for two lanes of traffic in each direction. There is no existing sidewalk or curb located under the structures or along the shoulders.

An existing concrete slope-wall at a two-to-one horizontal to vertical (2H:1V) slope establishes the grade separation between Palatine Road and IL 53. The existing vertical clearance was measured as approximately 15'-8" at Palatine Road. Attachment A contains an overview of the project location. Attachment B presents the existing cross sections of Palatine Road 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 Palatine Road. To construct this multiuse path, an 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 Palatine Road.

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 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 walls 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, yet depending on 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: $241 per square foot (sq ft), $219 per sq ft, and $290 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 a proposed curb line of the Palatine Road 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 the proposed 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, with a bearing pressure of approximately 3.0 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 utilized 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 Palatine Road. 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 Palatine Road more than the other alternatives. Lane closure along Palatine Road 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 proposed curb line of the roadway. The profile of the multiuse path is such that 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 not much located by the clover leaf areas, except for light poles, but they 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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STRAND ASSOCIATES®
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

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	DRAWN - JAS	REVISED -	
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PALATINE ROAD – WFS: ATTACHMENT A
PROPOSED ROADWAY PLAN

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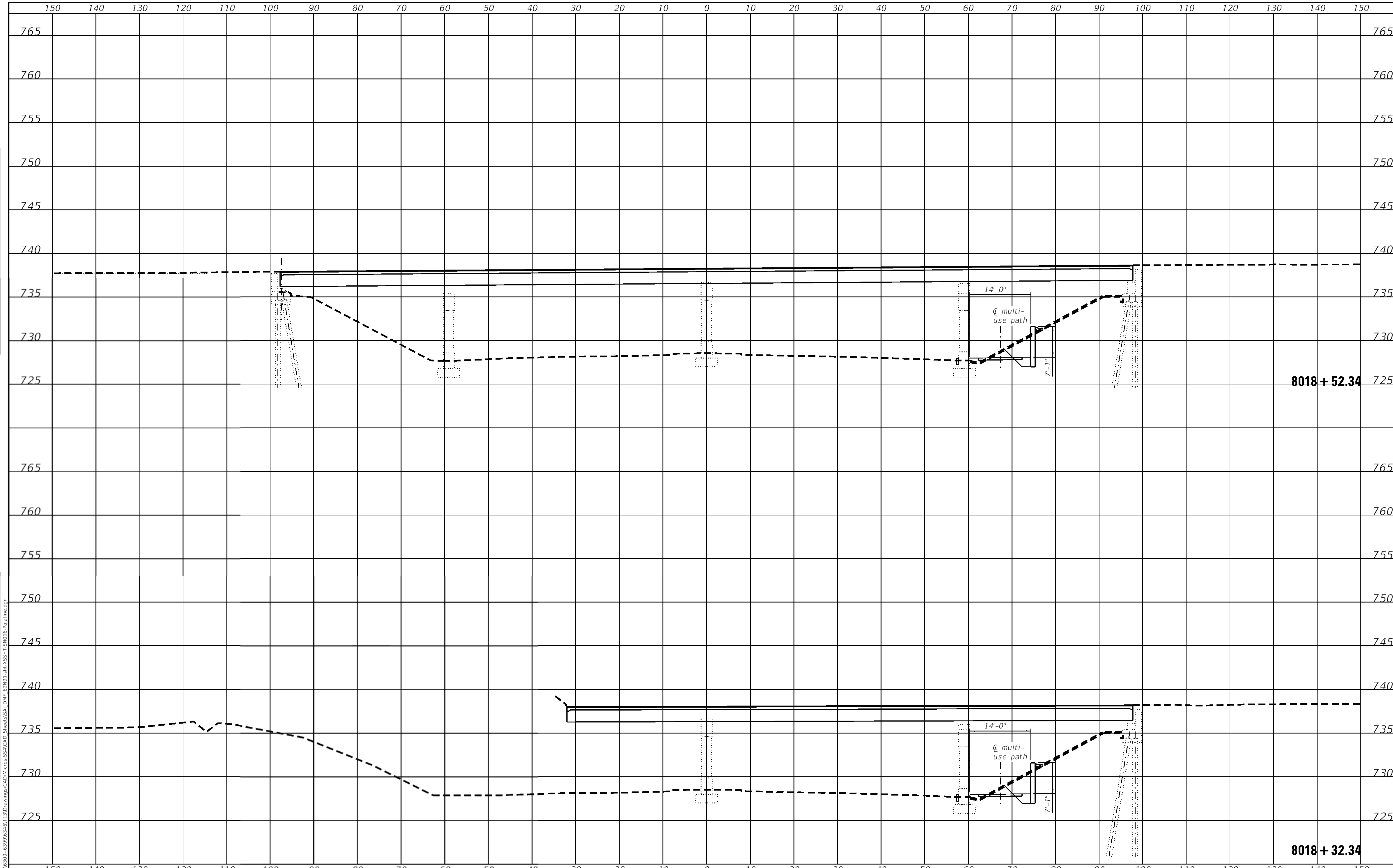
	ILLINOIS	FED. AID PROJECT		

ATTACHMENT B
PROPOSED ROADWAY CROSS SECTIONS



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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PALATINE RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 1 OF 4

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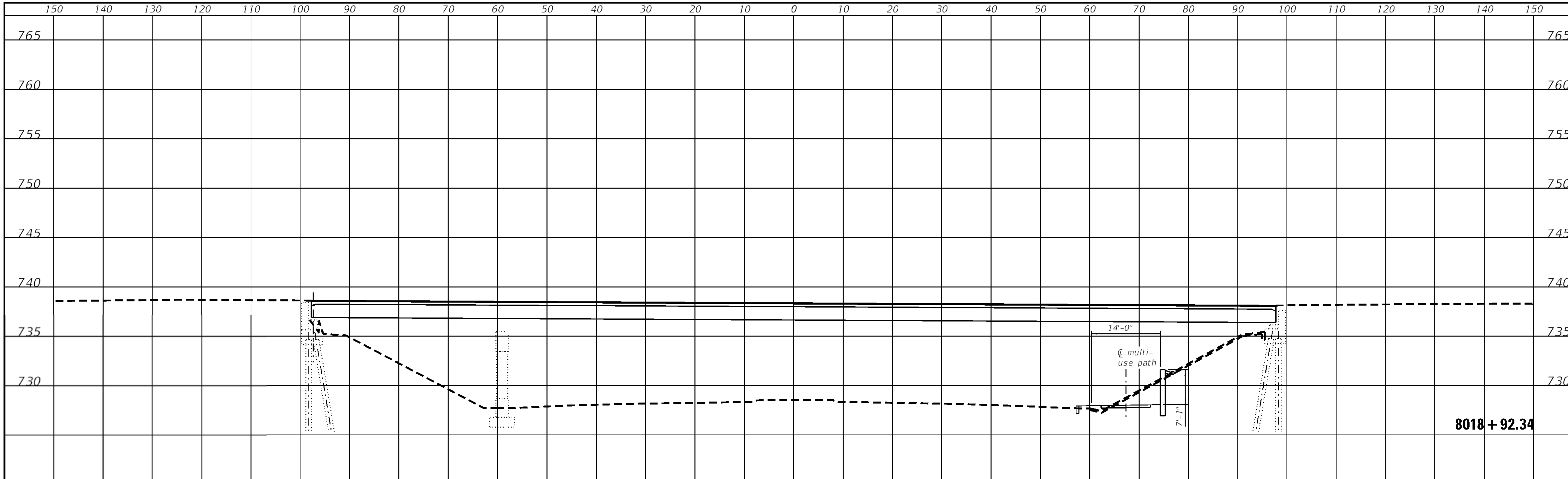
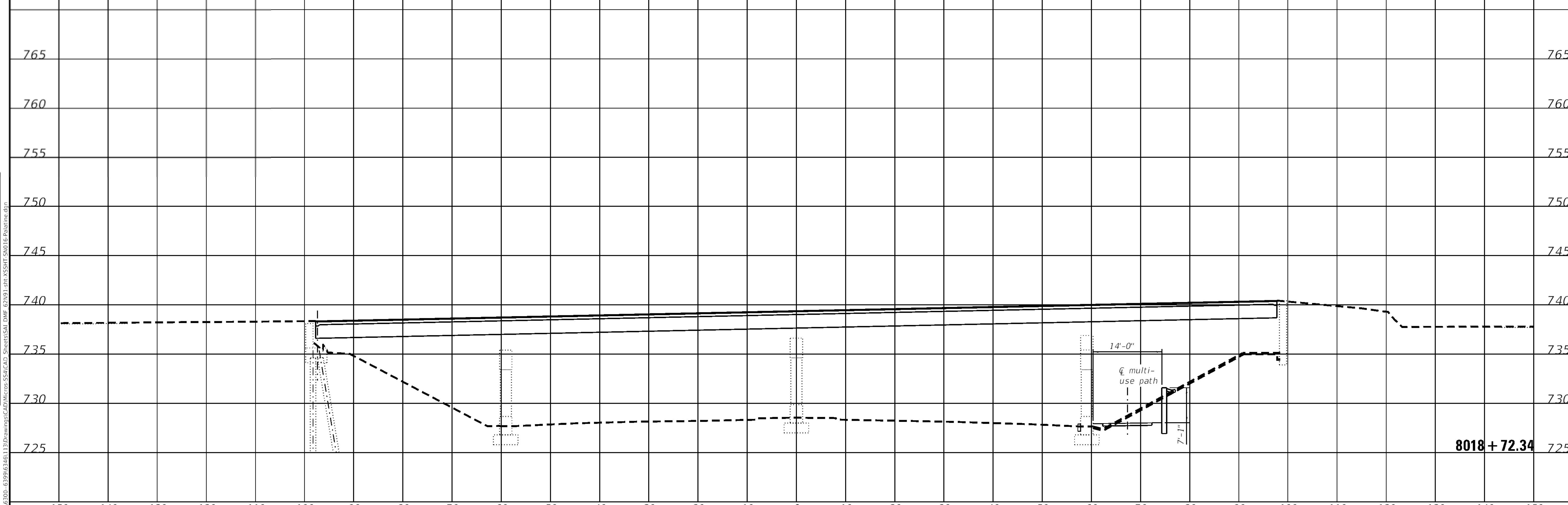
CONTRACT NO.

ILLINOIS | FED. AID PROJECT





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PALATINE RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 2 OF 4

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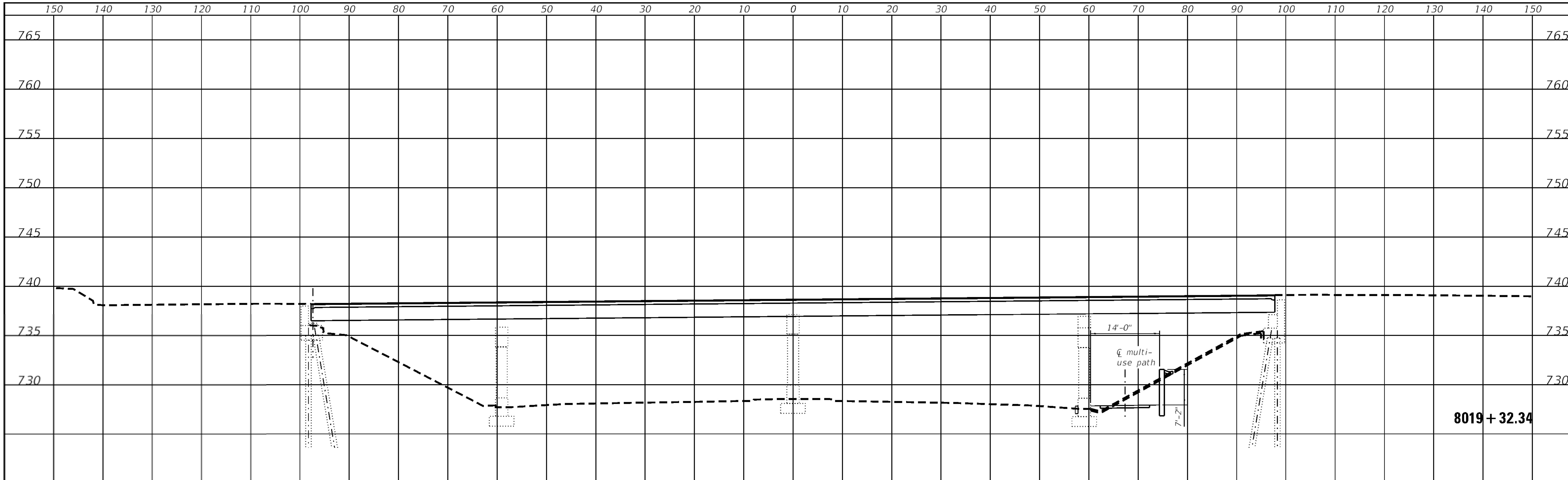

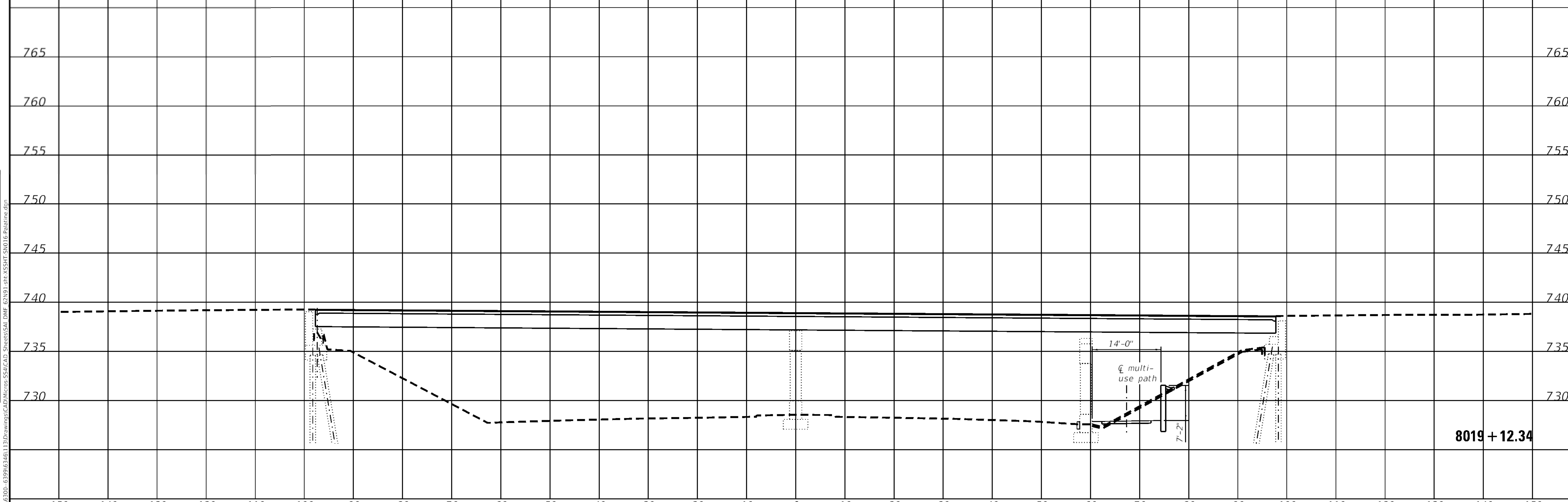

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1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200

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PROPOSED ROADWAY WFS SECTION 3 OF 4

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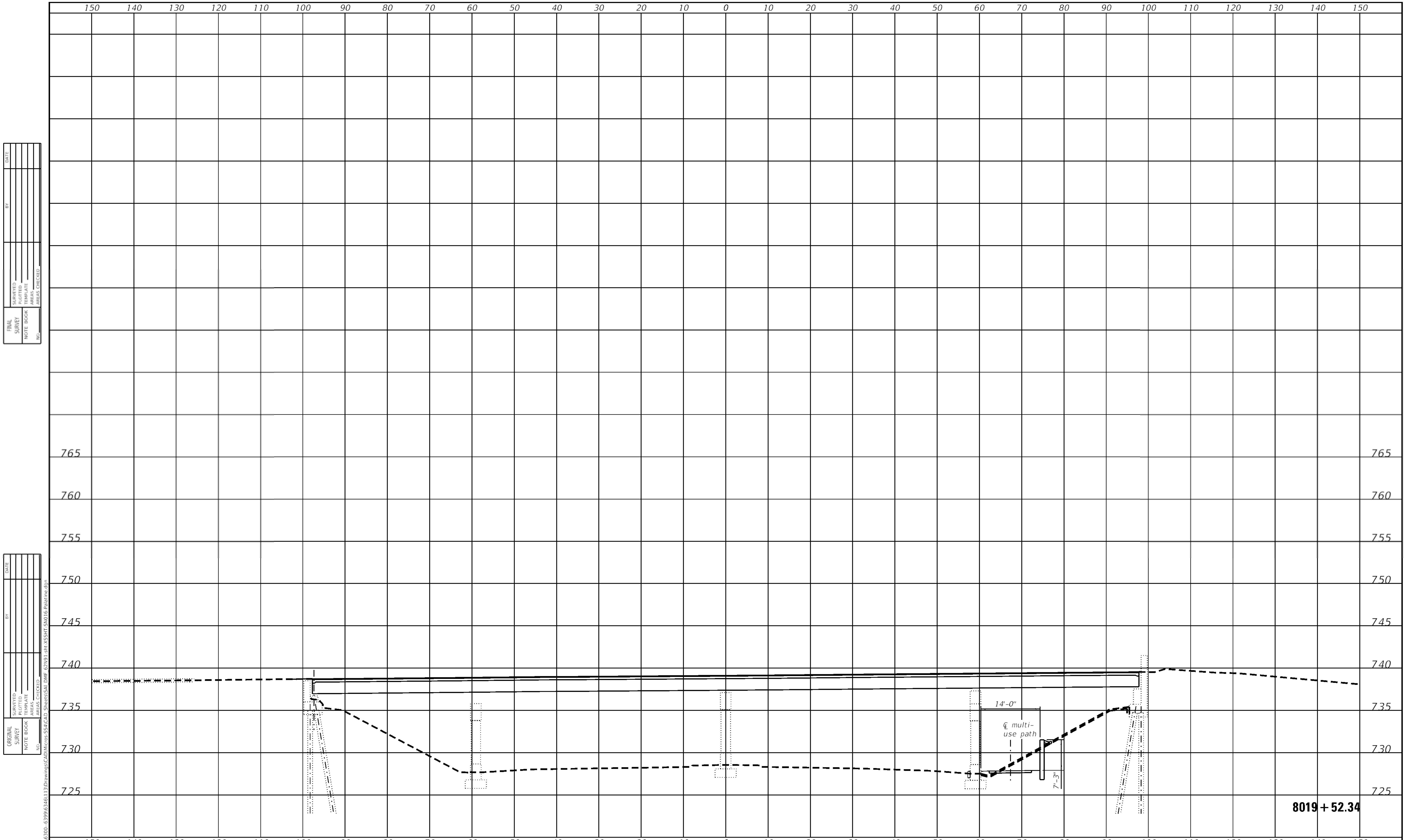

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JOLIET, ILLINOIS 60431
(815) 744-4200

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PALATINE RD. WFS: ATTACHMENT B
PROPOSED ROADWAY WFS SECTION 4 OF 4

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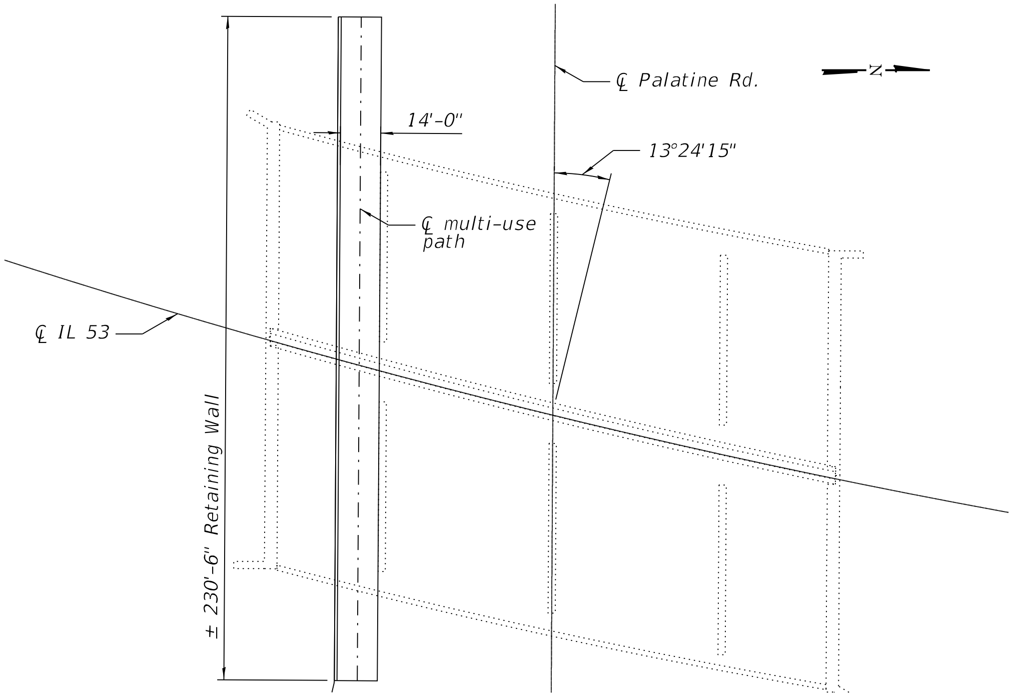
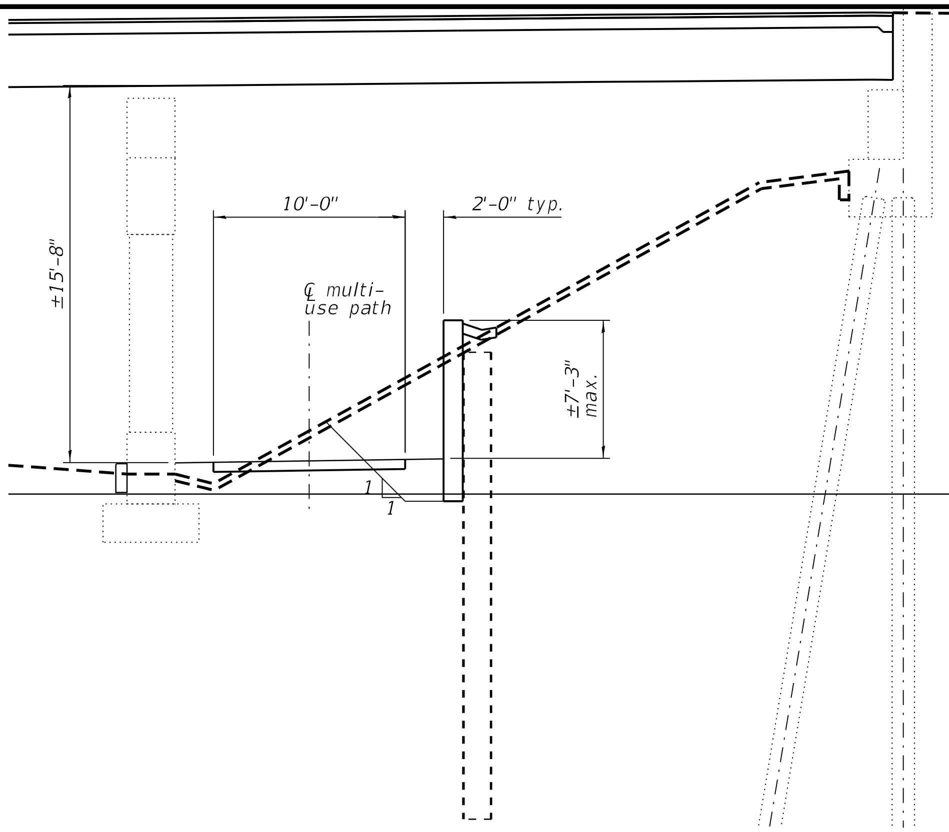
ILLINOIS | FED. AID PROJECT

ATTACHMENT C
PRELIMINARY ALTERNATIVES PLAN AND SECTIONS



PLAN PROPOSED WALL



Notes:

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

SOLDIER PILE AND LAGGING WALL - TYPICAL SECTION

PALATINE RD. PROPOSED S.N. TBD
RETAINING WALL

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION

STRAND ASSOCIATES®

FIGURE NO. 1

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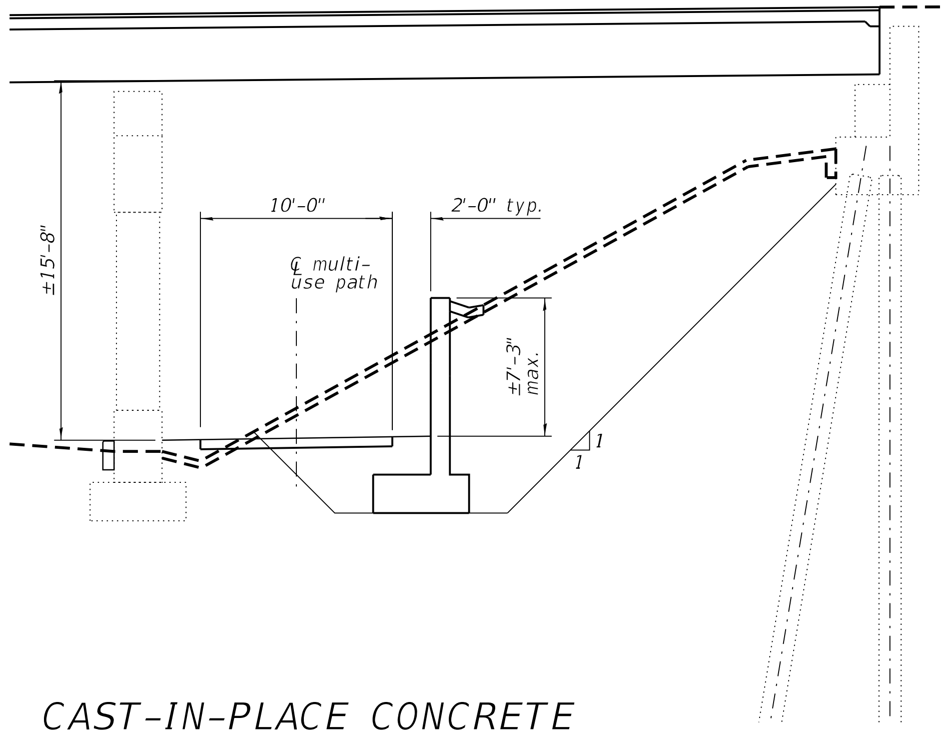

CAST-IN-PLACE CONCRETE INVERTED T-WALL - TYPICAL SECTION

Notes:

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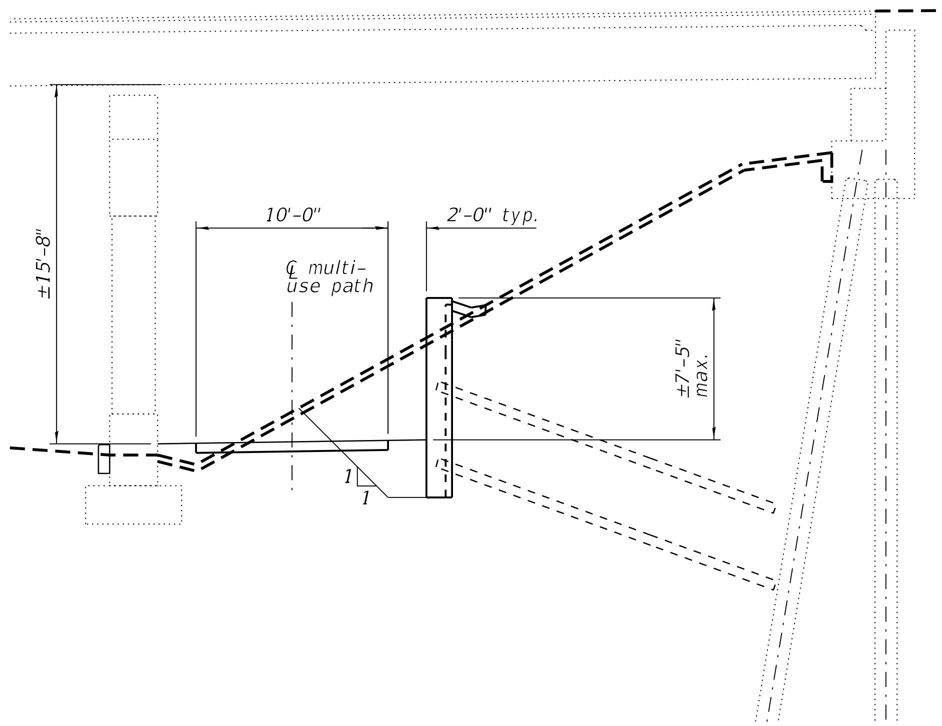

DRILLED SOIL NAIL WALL - TYPICAL SECTION

PALATINE 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
50104650	Slope Wall Removal	340	SQ YD	$ 35.00	$ 11,900.00
50300225	Concrete Structures	78.1	CU YD	$ 1,100.00	$ 85,910.00
50800205	Reinforcement Bars, Epoxy Coated	11,710	POUND	$ 3.25	$ 38,057.50
50200100	Structure Excavation	190	CU YD	$ 30.00	$ 5,700.00
58700300	Concrete Sealer	1,925	SQ FT	$ 2.25	$ 4,331.25
52200020	Temporary Soil Retention System	540	SQ FT	$ 50.00	$ 27,000.00
59100100	Geocomposite Wall Drain	192	SQ YD	$ 30.00	$ 5,760.00
60602800	Concrete Gutter, Type B	233	FOOT	$ 31.00	$ 7,223.00
60146304	Pipe Underdrain for Structures 4”	256	FOOT	$ 28.00	$ 7,168.00
52200100	Furnishing Soldier Piles (HP Section)	600	FOOT	$ 120.00	$ 72,000.00
52200200	Drilled and Setting Soldier Piles (in Soil)	2,944	CU FT	$ 20.00	$ 58,880.00
52200250	Untreated Timber and Lagging	1,471	SQ FT	$ 18.00	$ 26,478.00
50500505	Stud Shear Connectors	198	EACH	$ 4.00	$ 792.00
				Structure Cost Baseline:	$ 351,199.75
Note: Multi-use path cost is not included.				Cost per exposed square feet:	$ 241.00
				Design Contingency for Undeveloped Details:	20%
				Construction Mobilization Costs:	10%
				Contingency and Mobilization Cost:	$ 105,360.00
				Structure Cost with Contingency and Mobilization:	$ 456,559.75
				Escalation Percentage:	4%
				Year of Escalation (Current Year 2023):	2
				Escalation Cost:	$ 37,255.00
				Structure Cost with Escalation:	$ 493,814.75

Opinion of Probable Construction Cost for Alternative 1: $ 494,000 (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
50104650	Slope Wall Removal	710	SQ YD	$ 35.00	$ 24,850.00
52200900	Concrete Structures (Retaining Wall)	161.7	CU YD	$ 850.00	$ 137,445.00
50800205	Reinforcement Bars, Epoxy Coated	24,250	POUND	$ 3.25	$ 78,812.50
50200100	Structure Excavation	1,490	CU YD	$ 30.00	$ 44,700.00
58700300	Concrete Sealer	1,925	SQ FT	$ 2.25	$ 4,331.25
59100100	Geocomposite Wall Drain	187	SQ YD	$ 30.00	$ 5,610.00
60602800	Concrete Gutter, Type B	233	FOOT	$ 31.00	$ 7,223.00
60146304	Pipe Underdrain for Structures 4"	256	FOOT	$ 28.00	$ 7,168.00
58600101	Granular Backfill for Structures	285	CU YD	$ 30.00	$ 8,550.00

Structure Cost Baseline:	$ 318,689.75
Note: Multi-use path cost is not included. Cost per exposed square feet:	$ 219.00
Design Contingency for Undeveloped Details:	20%
Construction Mobilization Costs:	5%
Contingency and Mobilization Cost:	$ 79,672.00
Structure Cost with Contingency and Mobilization:	$ 398,361.75
Escalation Percentage:	4%
Year of Escalation (Current Year 2023):	2
Escalation Cost:	$ 32,506.00
Structure Cost with Escalation:	$ 430,867.75

Opinion of Probable Construction Cost for Alternative 1: $ 431,000 (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	Unrounded Quantity	Quantity	Unit	Unit Cost	Cost
50104650	Slope Wall Removal	345.0493	350	SQ YD	$ 35.00	$ 12,250.00
50200100	Structure Excavation	132.6797	135	CU YD	$ 30.00	$ 4,050.00
58700300	Concrete Sealer	2040.2863	2,041	SQ FT	$ 2.25	$ 4,592.25
59100100	Geocomposite Wall Drain	231.6843	232	SQ YD	$ 30.00	$ 6,960.00
60602800	Concrete Gutter, Type B	232.4452	233	FOOT	$ 31.00	$ 7,207.50
60146304	Pipe Underdrain for Structures 4”	255.8333	256	FOOT	$ 28.00	$ 7,168.00
X0900067	Soil Nailed Retaining Wall	1958.914	1,959	SQ FT	$ 200.00	$ 391,800.00
					Structure Cost Baseline:	$ 434,027.75
Note: Multi-use path cost is not included.					Cost per exposed square feet:	$ 290.00
					Design Contingency for Undeveloped Details:	20%
					Construction Mobilization Costs:	5%
					Contingency and Mobilization Cost:	$ 108,507.00
					Structure Cost with Contingency and Mobilization:	$ 542,534.75
					Escalation Percentage:	4%
					Year of Escalation (Current Year 2023):	2
					Escalation Cost:	$ 44,271.00
					Structure Cost with Escalation:	$ 586,805.75
Opinion of Probable Construction Cost for Alternative 1:			$ 587,000		(2025 Construction Anticipated)	

ATTACHMENT E
HISTORIC SOIL BORING PLAN AND LOGS

MODEL: Plan
FILE NAME: S:\JOL\6300--6399\6346\113\Drawings\CAD\Micro-SS4\CAD_Sheets\D162N91-PALATINE_BORING_WallFeasibilityStudy_SA1.dgn

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

PALATINE_ROAD_–_WFS:_ATTACHMENT_E_
HISTORICAL_SOIL_BORING_PLAN

SCALE: | SHEET 1 OF 3 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
342		COOK	TOT	

CONTRACT NO. 62N91

ILLINOIS | FED. AID PROJECT

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

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A. 61	531-3HB	COOK	29	26

FED. ROAD DIST. NO. 7 · ILLINOIS · FED. AID PROJECT

SHEET NO. 21
22 SHEETS

HB-1

Boring No. B-1
Station 328 + 13
Offset 33' W of C L of 53
Ground Surface 730.5

Description	N	Qu t/s.f.	Type
BLACK ORGANIC CLAY			
BROWN & GRAY MOTTLED CLAY	13 / 14	7.03	S
(CRUMBLY) BROWN SILTY CLAY	11 / 17	4.80	S
BROWN CLAY	9 / 15	8.11	S
(LIVERERY) E 20 Seepage BROWN SANDY SILTY CLAY	8 / 17	2.47	S
(LIVERERY) BROWN SANDY SILTY CLAY	11 / 19	1.73	S
GRAY CLAY	6 / 9	6.91	B
(LIVERERY) E20 GRAY CLAYEY SILT	8 / 10	1.04	S
LIVERERY GRAY SANDY CLAYEY SILT	8 / 10	1.04	S
LIVERERY GRAY SANDY SILTY CLAY	8 / 11	.49	S
LIVERERY) GRAY SANDY CLAYEY SILT	8 / 12		
E20 GRAY SILTY SAND & GRAVEL	14 / 18		
GRAY SAND & GRAVEL	6 / 8	-	
GRAY SAND & GRAVEL	5 / 6		
GRAY SILTY GRITTY CLAY	5 / 6	1.11	B
GRAY SAND & GRAVEL	5 / 8	---	
GRAY SAND & GRAVEL	8 / 17		
GRAY SAND & GRAVEL	13 / 15	--	
GRAY GRITTY CLAY	8 / 11	2.91	B
END OF BORING			

Surface Water El. ———
Groundwater El. at Completion 10'
After —— Hours ———

HB-2

Boring No. B-2
Station 328 + 58
Offset 33' W of C L of 53
Ground Surface 730.2

Description	N	Qu t/s.f.	Type
BLACK ORGANIC CLAY			
BROWN GRAVELLY CLAY	10 / 11	4.55	S
BROWN CLAY	9 / 13	6.18	S
BROWN CLAY	13 / 19	6.98	B
BROWN CLAY	11 / 18	6.98	B
BROWN CLAY / GRAY CLAY	10 / 12	3.93 / 2.13	B / B
GRAY CLAY	5 / 8	2.13	B
GRAY CLAY W/ SHALE INC	5 / 8	2.33	S
GRAY CLAY W/ VERTICAL SAND SEAM	6 / 7	1.17	B
GRAY CLAY / GRAY FINE SAND W/E20 Seepage	5 / 10		
GRAY SILTY FINE SAND	5		
GRAY SILTY FINE SAND / GRAY GRITTY SILTY CLAY	5 / 8	2.13	B
GRAY GRITTY CLAY	6 / 9	1.17	B
GRAY GRITTY CLAY E 20	7 / 11	1.50	B
GRAY GRITTY CLAY / GRAY GRAVEL	[illegible] / 14	3.03	P
GRAY SANDY GRAVEL	13 / 25	---	
GRAY SANDY GRAVEL	10 / 11	------	
END OF BORING			

Surface Water El. ———
Groundwater El. at Completion 32½
After —— Hours ———

Boring No. B-3
Station 329 + 77
Offset 33' W of C L of 53
Ground Surface 729.8

Description	N	Qu t/s.f.	Type
BLACK ORGANIC CLAY			
BROWN CLAY	21 / 22	10.32	S
BROWN CLAY	18 / 22	10.30	S
BROWN CLAY	28 / 28	9.31	B
BROWN CLAY	15 / 20	6.98	B
BROWN CLAY	11 / 20	7.76	B
BROWN CLAY	[illegible] / 7	5.24	B
GRAY CLAY	6 / 10	2.91	B
(LIVERERY) GRAY SILTY CLAY	[illegible] / 6	2.68	S
GRAY GRITTY CLAY	3 / 8	1.63	B
GRAY SILTY CLAY	8 / 7	3.30 / 2.33	B / B
GRAY SILTY CLAY E 20 / GRAY SAND & GRAVEL	7 / 15	1.75	P
GRAY SANDY GRAVEL / GRAY CLAY	7 / 8	2.50	B
LAYER OF SANDY GRAVEL / GRAY GRITTY CLAY	[illegible] / 10	3.88	B
GRAY GRITTY CLAY	9 / 15	3.88	B
GRAY GRITTY CLAY	13 / 16	3.49	B
GRAY GRITTY SILTY CLAY	13 / 14	3.30	B
END OF BORING			

Surface Water El. ———
Groundwater El. at Completion 27½
After —— Hours ———

Boring No. B-4
Station 330 + 13
Offset 33' W of C L of 53
Ground Surface 729.8

Surface Water El. ———
Groundwater El. at Completion 23½'
After —— Hours ———

Description	N	Qu t/s.f.	Type
BLACK ORGANIC CLAY			
BROWN SILTY CLAY	36 / 40	9.7	S
BROWN CLAY	25 / 30	9.48	S
BROWN CLAY	13 / 20	8.29 / 9.80	S / S
BROWN CLAY	14 / 19	8.66	S
BROWNISH GRAY CLAY	11 / 21	6.59	B
BROWNISH GRAY CLAY	15 / 18	4.15 / 6.39	S / S
BROWN TO GRAY CLAY	7 / 9	2.91	B
GRAY CLAY	2 / 3	2.52	B
GRAY CLAY TO GRAY SILTY SAND E 20	2 / 3	.98	B
GRAY GRAVELLY SANDY CLAYEY SILT	3 / 4	P 2.33	B
GRAY WELL GRADED FINE SAND W/ Traces of CLAY & SILT	9 / 12	-----	
GRAY WELL GRADED FINE SAND / GRAY SILTY CLAY	6 / 6	.81	B
GRAY SANDY GRAVEL / GRAY GRITTY CLAY	8 / 10	3.49	B
GRAY GRITTY CLAY	7 / 11	2.13 / 3.69	B / B
GRAY GRITTY CLAY	11 / 15	3.88	B
GRAY GRITTY CLAY	10 / 14	3.88	B
GRAY GRITTY CLAY	10 / 15	3.88	B
GRAY GRITTY CLAY	15 / 30	3.10 / 9.70	B / B
END OF BORING			

DESIGNED Walter Perry
CHECKED R Kowert
DRAWN J.L.A.
CHECKED RK

JULY 31 1964
EXAMINED W.E. Baumann — ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
PASSED [signature] — ENGINEER OF DESIGN
APPROVED V.E. Olaff — CHIEF HIGHWAY ENGINEER

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

FOR REFERENCE ONLY

BORING DATA
F.A. RT. 61 SEC. 531-3-HB
COOK COUNTY
STA. 329+18.98

FED. ROAD DIST. NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FA 61	531-3HB	COOK	29	27

SHEET NO -22
22 SHEETS

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

HB-5

Boring No. B-5
Station 328 + 13
Offset 33' E of C L of 53
Ground Surface 730.2
Surface Water El. ——
Groundwater El. at Completion 30'
After —— Hours

Elevation	Description	N	Qu t/s.f.	w (%)
0	BLACK ORGANIC CLAY			
	BROWN & GRAY MOTTLED CLAY	7 / 11	6.98	[illegible]
-5	BROWN CLAY	1[illegible] / 16	5.67	S
	BROWN TO GRAY CLAY	17 / 23	6.18 / 7.95	S / S
-10	GRAY CLAY	13 / 17	4.27	B
	GRAY CLAY	7 / 9	2.91	B
-15	GRAY CLAY	5 / 7	2.52	B
	GRAY CLAY	11 / 12	2.33	B
-20	GRAY CLAY	5 / 7	2.53	B
	GRAY GRITTY SILTY CLAY	8 / 11	2.33	B
-25	GRAY SANDY SILTY CLAY	13 / 14	5.02	B
	(LIVERERY) GRAY GRITTY SILTY CLAY	8 / 10	2 Ton	P
-30	H 20 GRAY SAND & GRAVEL	9 / 9	----	
	GRAY SAND & GRAVEL	4 / 6	----	
-35	GRAY GRITTY CLAY	5 / 7	1.17	B
	GRAY GRITTY CLAY	7 / 10	2.52	B
-40	GRAY CLAY	7 / 11	2.72	B
	GRAY CLAY	7 / 9	1.50	B
	GRAY GRITTY CLAY / GRAY CLAYEY GRAVEL	26 / 30	2.52	B
	END OF BORING			

HB-6

Boring No. B-6
Station 328 + 58
Offset 33' E of CL of 53
Ground Surface 730.2
Surface Water El. ——
Groundwater El. at Completion 32½
After —— Hours

Elevation	Description	N	Qu t/s.f.	w (%)
0	BLACK ORGANIC CLAY			
	BROWN CLAY	6 / 9	6.55	S
-5	BROWN CLAY	6 / 7	6.33	S
	BROWN CLAY / BROWN SANDY SILTY CLAY	12 / 16	6.33 / 1.87	S / S
-10	BROWN CLAY	13 / 20	8.15 / 4.95	B / S
	GRAY CLAY	8 / 10	2.52	B
-15	GRAY CLAY	7 / 9	2.13	B
	GRAY CLAY	4 / 7	2.14	B
-20	GRAY CLAY	5 / 7	2.52	B
	GRAY GRITTY CLAY	7 / 10	2.33	B
-25	GRAY GRITTY CLAY 1/20/64	6 / 11	2.33	B
	GRAY CLAY 1/21/64 / GRAY SANDY SILTY CLAY	13 / 14	1.30 / 2.68	B / S
-30	GRAY FINE SANDY SILTY CLAY	6 / 9	1.59	S
	H 20 GRAY CLAYEY SAND & GRAVEL	8 / 9	----	
-35	GRAY SAND & GRAVEL	9 / 10	----	
	GRAY SAND & GRAVEL	6 / 7	----	
-40	GRAY GRITTY CLAY	8 / 10	2.52	B
	GRAY GRITTY CLAY	6 / 9	2.52	B
	GRAY GRITTY CLAY	9 / 12	2.52	B
	END OF BORING			

Boring No. B-7
Station 329 + 77
Offset 33' E of C L of 53
Ground Surface 730.2
Surface Water El. ——
Groundwater El. at Completion 27½
After —— Hours

Elevation	Description	N	Qu t/s.f.	w (%)
0	BLACK ORGANIC CLAY			
	CRUMBLEY BROWN SILTY CLAY	21 / 50	6.98	S
-5	CRUMBLEY BROWN SILTY CLAY	17 / 27	8.51	S
	BROWN CLAY	10 / 19	7.76	S
-10	BROWN CLAY	10 / 8	5.77	S
	BROWN CLAY	13 / 14	5.82	B
-15	GRAY CLAY	10 / 10	3.49	B
	GRAY STONEY SANDY CLAY	17 / 17	4.50	S / P
-20	LAYER OF GRAY SAND / GRAY CLAY	7 / 7	2.52	B
	LIVERERY GRAY GRITTY SILTY CLAY	10 / 16	2.13	B
-25	LIVERERY GRAY SILTY CLAY	8 / 10	2.72	B
	H 20 GRAY WATER BEARING SAND	7 / 6	——	
-30	GRAY SAND / GRAY SILTY CLAY (LIVERERY	7 / 9	1.17	B
	GRAY CLAYEY SANDY GRAVEL	6 / 12	.75	B
-35	GRAY SAND OR GRAVEL	27 / 24	----	
	GRAY GRAVELLEY CLAY	7 / 15	4.50	S / P
-40	GRAY GRAVELLY CLAY	17 / 16	5.24	B
	GRAY STONEY CLAY	16 / 21	3.10	B
	GRAY CLAY / GRAY GRAVELLY CLAY	18 / 30	3.88 / 5.77	B / S
	END OF BORING			

Boring No. B-8
Station 330 + 13
Offset 33' E of C L of 53
Ground Surface 729.2
Surface Water El. ——
Groundwater El. at Completion 25'
After —— Hours

Elevation	Description	N	Qu t/s.f.	w (%)
0	BLACK ORGANIC CLAY			
	BROWN (CRUMBLEY) CLAY			
-5	BROWN (CRUMBLEY) CLAY			
	BROWN CLAY			
-10	BROWN CLAY			
	BROWN CLAY / GRAY CLAY			
-15	GRAY STONEY CLAY			
	GRAY(LIVERERY SILTY CLAY / GRAY CLAY			
-20	GRAY (LIVERERY) SILTY CLAY			
	GRAY(LIVERERY SILTY CLAY TO GRAY CLAY	12 / 17	2.33 / 3.88	B / B
-25	H 20 GRAY CLAY TO GRAVEL(LIVERERY) SILTY CLAY TO GRAY SAND	10 / 12	1.30 / .50	B / P
	GRAY(LIVERERY) SILTY CLAY	3 / 3	.50	B
-30	GRAY(LIVERERY)SILTY CLAY TO GRAY SAND TO GRAY CLAY	8 / 10	.98 / 1.30	B / B
	GRAY SANDY GRAVEL	11 / 17	-----	
-35	GRAY SANDY GRAVEL	14 / 19	-----	
	GRAY SANDY, GRAVEL TO GRAY SILTY GRITTY CLAY	9 / 17	5.04	B
-40	GRAY GRITTY CLAY TO GRAY SAND	7 / 14	1.63	B
	GRAY SAND TO GRAY GRAVELLY CLAY	8 / 13	2.33	B
	GRAY GRAVELLY CLAY	14 / 16	1.60	B / P
	END OF BORING			

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

DESIGNED Walter Perry
CHECKED R. Kouf
DRAWN J.L.A.
CHECKED RK.

JULY 31 1964
EXAMINED W.E. Baumann
PASSED E. [illegible]
APPROVED [illegible]

FOR REFERENCE ONLY

BORING DATA
F.A. RT. 61 SEC. 531-3-HB
COOK COUNTY
STA. 329+18.98

MODEL: Default
FILE NAME: S:\JOL\6300--6399\6346\113\Drawings\CAD\Micros-SS4\CAD_Sheets\D162N91-Palatine-historical boring-SAI.dgn
1/25/2023 12:52:05 PM

STRAND ASSOCIATES®
1170 SOUTH HOUBOLT ROAD
JOLIET, ILLINOIS 60431
(815) 744-4200
IDFPR NO. 184-001273

USER NAME =	DESIGNED -	REVISED -
	CHECKED -	REVISED -
PLOT SCALE =	DRAWN -	REVISED -
PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PALATINE ROAD - WFS: ATTACHMENT E
HISTORIC SOIL BORINGS
SHEET 3 OF 3 SHEETS

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

CONTRACT NO.
ILLINOIS | FED. AID PROJECT