STRUCTURE GEOTECHNICAL REPORT
PAULINA STREET BRIDGE OVER
INTERSTATE 290 AND THE CTA
SN 016-0098
CHICAGO, COOK COUNTY, ILLINOIS

For

Collins Engineers

550 West Jackson Blvd., Suite 1200

Chicago, IL. 60661

Submitted by

Wang Engineering, Inc.

1145 North Main Street

Lombard, IL 60148

Original Report: June 1, 2024
Revised Report: January 20, 2025

Technical Report Documentation Page

1. Title and Subtitle Structure Geotechnical Report Paulina Street Bridge over Interstate 290 and the CTA		**2. Original Date:** July 1, 2024 **Revised Date:** January 20, 2025 **3. Report Type** ☒ SGR ☐ RGR ☐ Draft ☐ Final ☒ Revised
4. Route / Section / County/ District/ Region FAI 290/ n.a./ Cook/ 1/ 1		**5. Contract No. / IDOT Job No.** NA
6. PTB / Item No. NA	**7. Existing Structure Number(s)** 016-0098	**8. Proposed Structure Number(s)** 016-0098
9. Prepared by Wang Engineering, Inc. A Terracon Company. 1145 N Main Street Lombard, IL 60148	**Contributor(s)** Author: Ehab Shaheen, Ph.D, P.E. QC/QA: Corina T. Farez, PE, PG PM: Mickey Snider, PE	**Contact** (630) 953-9928 ext. 1027 msnider@wangeng.com
10. Prepared for Collins Engineers 550 West Jackson Blvd., Suite 1200 Chicago, IL. 60661	**Contact** Ewa Mroczek, P.E., S.E.	**Contact Information** (312) 236-5414 emroczek@collinsengr.com

11. Abstract

The existing deck and steel beams along Paulina Street bridge over Interstate 290 will be removed and replaced and the existing vaulted abutments will remain and will be backfilled to the top. Evaluations indicate the existing abutment piles cannot support additional lateral pressure or increased settlement loading from conventional fill materials. Therefore, to reduce the lateral pressure on the back of the abutment walls and decrease foundation soil settlements the abutment vaults should be filled to the top with lightweight cellular concrete. We understand the existing approach pile bents will be removed and a standard IDOT 30-foot approach slab with the sleeper slab will be constructed. The main-span piers will remain with reconstructed bearing seats. The four-span bridge will have a back-to-back of abutment length of 274.9 feet and will have an out-to-out widths of 88.3 feet. This report provides geotechnical recommendations for the design of the proposed improvements.

The lithological succession encountered during the subsurface exploration revealed medium stiff to hard silty clay to silty clay loam embankment fill extending down to an elevation of about 585 to 590 feet. Beneath the fill, borings encountered very soft to very stiff silty clay followed by hard silty clay loam to very dense silt to silty loam. At elevation between 495.8 and 508.3 feet, the borings encountered refusal at the top of bedrock. Rock coring noted good quality dolostone bedrock. Groundwater was observed while drilling at an elevation of 523.3 feet within the silty loam.

We estimate the new approach slab will apply a maximum service bearing pressure of 550 psf. The lightweight concrete cellular fill should be Class I or II with a maximum density of 35 pcf and will have a maximum bearing resistance of 1,500 psf. Under the new loads from the cellular concrete, the slab and granular subbase, we estimate total settlements of about 1.0 inch.

12. Path to archived file

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Wang Engineering
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STRUCTURE GEOTECHNICAL REPORT
PAULINA STREET BRIDGE OVER INTERSTATE 290 AND THE CTA
CHICAGO, COOK COUNTY, ILLINOIS
SN 016-0098
FOR
COLLINS ENGINEERS

1.0 INTRODUCTION

This report presents the results of our subsurface investigation, laboratory testing, geotechnical evaluations, and recommendations to support the design of the proposed improvements along Paulina Street Bridge over Interstate 290 (I-290) in Chicago, Cook County, Illinois. A *Site Location Map* is presented as Exhibit 1.

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

1.1 Existing and Proposed Structure

Based on the *General Plan and Elevation (GPE)* drawing attached as Appendix B and provided by Collins Engineers, Wang Engineering, Inc. (Wang) understands that the existing 1954 bridge is a four-span, non-composite, continuous wide flange steel beam structure with concrete closed vaulted wall abutments and three reinforced concrete multi-column piers all supported on metal shell cast-in-place concrete piles.

The existing four span deck and steel beams along Paulina Street Bridge over Interstate 290 will be removed and replaced with shallower beams to increase vertical clearance over I-290. The existing bridge has vaulted abutments that will remain in place; however, the proposed work includes removing the pile bents supporting the existing approach slabs, filling the vaults behind the abutments to the base of the proposed pavement and approach slabs, and construct the typical 30 feet approach slab with the typical IDOT approach sleeper slab. The piers will remain with reconstructed bearing seats. The new bridge deck will have a back-to-back of abutment length of 274.9 feet and will have an out-to-out width of 88.3 feet. The profile grade along Paulina Street will remain the same.

2.0 INVESTIGATION METHODS

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

2.1 Field Investigation

The subsurface investigation consisted of three structure borings, designated as PAU-01 to PAU-03, drilled by Wang in May and June 2024. The borings were drilled at elevations of 592.6 to 602.8 feet and were advanced to depths of 69.3 to 104.5 feet bgs. The as-drilled northings, eastings, and elevations were acquired by Wang with a mapping-grade GPS unit. Boring location data are presented in the *Boring Logs* (Appendix A) and the locations are shown in the *Boring Location Plan* (Exhibit 2).

A truck-mounted drilling rig, equipped with hollow stem augers and mud rotary equipment, was used to advance and maintain open boreholes. Soil sampling was performed according to AASHTO T206, "*Penetration Test and Split Barrel Sampling of Soils*." The soil was sampled at 2.5-foot intervals to a depth of 30.0 feet bgs and at 5-foot intervals thereafter to the boring termination depths. Soil samples collected from each interval were placed in sealed jars and transferred to the laboratory for further examination and testing. The bedrock was cored at the boring location in a 10-foot run with an NWD4-sized core barrel.

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

Groundwater observations were made in boreholes during and at end of drilling operations. Boreholes were grouted upon completion and, where necessary, the pavement surface was restored as much as possible to its original condition.

2.2 Laboratory Testing

Soil samples were tested in the laboratory for moisture content. Field visual descriptions of the soil samples were verified in the laboratory and the tested samples were classified in accordance with the IDH Soil Classification System. Laboratory test results are shown in the *Boring Logs* (Appendix A).

3.0 INVESTIGATION RESULTS

Detailed descriptions of the soil conditions encountered during the subsurface investigation are presented in the attached *Boring Logs* (Appendix A) and in the *Soil Profile* (Exhibit 3). Please note that strata contact lines represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in horizontal and vertical directions.

3.1 Lithological Profile

Along the surface of Paulina Street, the borings encountered a 2- to 3-inch-thick asphalt overlay on top of 5.5- to 12-inch-thick concrete and an aggregate base. In descending order, the general lithologic succession encountered beneath the surface includes: 1) man-made ground (fill); 2) very soft to medium stiff silty clay; 3) very stiff silty clay; 4) hard silty clay loam to very dense silt to silty loam; and 5) Strong, good quality dolostone.

1) Man-made ground (fill)

Beneath the pavement, the borings revealed an embankment consisting of medium stiff to hard silty clay to silty clay loam fill extending down to an elevation of about 585 to 590 feet. The cohesive fill has unconfined compressive strength (Q_u) values of 0.5 to 4.5 tsf and moisture content values of 4 to 21%.

2) Very soft to soft silty clay

Beneath the fill, the borings encountered a very soft to soft silty clay extending down to an elevation of about 554 to 566 feet. The cohesive fill has unconfined compressive strength (Qu) values of 0.16 to 0.41 tsf and moisture content values of 20 to 28%.

3) Very stiff silty clay

Beneath the soft clay, the borings advanced very stiff, gray silty clay with Q_u values of 1.5 to 4.0 and moisture contents of 17 to 26%. This soil unit continues to elevations of about 539 to 548 feet.

4) Hard silty clay loam to very dense silt to silty loam

At elevations of 539 to 548 feet, the borings advanced through hard silty clay loam. This unit has unconfined compressive strength (Q_u) values of 2.8 to 8.5 tsf; N-value of 50 blows per foot of penetration and moisture content values of 8 to 23%.

5) Dolostone Bedrock

At elevations of 495.8 and 508.3 feet, the borings encountered refusal at the top of bedrock. Bedrock coring at Boring PAU-03 recovered strong, light and dark gray, good quality dolostone. The dolostone has a Rock Quality Designation (RQD) of 90% and a recovery of 96%.

3.2 Groundwater Conditions

Groundwater was not observed while drilling in any of the borings. We estimate that groundwater on site is deep-seated and will not impact the proposed improvement. It should be noted, however, that fluctuations in groundwater level may occur due to variations in the rainfall, other climatic conditions, or other factors not evident at the time measurements were made and reported herein.

4.0 ANALYSIS AND RECOMMENDATIONS

Geotechnical evaluations and recommendations for the proposed improvements are included in the following sections. The existing profile grade along Paulina Street will not be significantly altered. The designed plan is to replace the existing, pile-bent supported approach slabs by filling the existing vault area and placing typical IDOT 30-feet long approach slabs. Thus, the existing void spaces within the vaults and behind the abutments are proposed to be backfilled. However, evaluations estimate the existing abutment piles cannot support the additional lateral soil pressure and the proposed settlement of the very soft to soft silty clay will induce additional vertical loads on the piles. To reduce the lateral loading and limit the proposed foundation soil settlements we recommend filling the vaults with Class I or Class II lightweight cellular concrete with a maximum density of 35 pcf.

4.1 Seismic Design Considerations

The seismic hazard for the site was evaluated in accordance with IDOT (2020) and AASHTO (2022). The Seismic Soil Site Class was determined per the requirements of *All Geotechnical Manual Users* (AGMU) Memo 9.1, *Design Guide for Seismic Site Class Determination*, and the accompanying spreadsheet. A global Site Class Definition was determined for this project, and was found to be Soil Site Class D. The project location belongs to the Seismic Performance Zone 1. The seismic spectral acceleration parameters recommended for design in accordance with the *AASHTO LRFD Bridge Design Specification*s (AASHTO 2020) are summarized in Table 3. According to the IDOT *Bridge Manual* (IDOT 2023), liquefaction analysis is not required for structures located in Seismic Performance Zone 1.

Table 1: Recommended Seismic Design Parameters

Spectral Acceleration Period (sec)	Spectral Acceleration Coefficient[1)] (% g)	Site Factors	Design Spectrum for Site Class D (% g)
0.0	PGA= 4.2	F_{pga}= 1.6	**A_s= 6.7**
0.2	S_s= 9.0	F_a= 1.6	**S_{DS}= 14.5**
1.0	S_1= 3.6	F_v= 2.4	**S_{D1}= 8.6**

1) Spectral acceleration coefficients based on Site Class D

2) Site Class D Spectrum to be included on plans; $A_s = PGA*F_{pga}$; $S_{DS}= S_s*F_a$; $S_{D1}= S_1*F_v$

4.2 Approach Slab and New Embankments

Wang has evaluated the bearing capacity and potential settlement of the approach slabs and vault fill. The existing pavement elevation along Paulina Street is approximately 592 to 602 feet.

4.2.1 Bearing Capacity

Based on the information provided, we understand new approach slabs will be supported on lightweight cellular concrete fill. We estimate the new approach slabs will apply a maximum service bearing pressure of 550 psf, which includes an 18-inch-thick approach slab, 6-inches of subbase and 250 psf live load surcharge. According to the cellular concrete manufacturer, the lightweight concrete cellular fill has a maximum bearing resistance of 1,500 psf (https://www.texasce.org/tce-news/lightweight-cellular-concrete-2/.)

4.2.2 Approach Slab and New Embankment Settlement

The vault areas behind the existing abutments should be filled with lightweight cellular concrete from the existing surface to the base elevations of the proposed approach slabs. The existing granular fill within the abutments can remain. Constructing the new embankment with approximately 15 feet of lightweight material will reduce the load transferred to the bottom of the embankment and the lateral loading on the existing abutment walls. We estimate the 18-inch-thick slab, 6-inch-thick subbase, 15-foot-thick cellular concrete of 35 pcf unit weight, and live load of 250 psf, will induce an approach slab settlement of about 1 inch.

4.2.4 Lateral Design Pressure

The lateral earth pressure on the existing abutment walls induced by the 35 pcf maximum density

lightweight cellular concrete should be evaluated for the walls in the short-term (undrained) and long-term (drained) conditions using the soil parameters recommended in Tables 2 and 3. Additional lateral surcharge pressures of 250 psf should be included in the analysis (AASHTO 2020).

Table 2: Undrained Geotechnical Parameters for Wall Design

Soil Type (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Active Pressure Coefficient, K_a (Horizontal)	Passive Pressure Coefficient, K_p (Horizontal)
Lightweight Concrete Fill EL 598 to 575.4 feet	35	0	35(1)	0.27	3.69
Existing Granular Fill EL 575.4 to 570 feet	120	0	30	0.33	3.00
V Soft to Soft Silty Clay EL 570 to 554 feet	110	320	0	1.00	1.00
V Stiff Silty Clay EL 554 to 540 feet	120	2,500	0	1.00	1.00
Hard Silty Clay Loam EL 540 to 525 feet	125	5,000	0	1.00	1.00
V Dense Silt to Silty Loam EL 525 to 500 feet	63 (submerged)	0	36	0.26	3.85

1) Based on results determined from direct shear test (Tiwari et al., 2017)

Table 3: Drained Geotechnical Parameters for Wall Design

Soil Type (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Active Pressure Coefficient, K_a (Horizontal)	Passive Pressure Coefficient, K_p (Horizontal)
Lightweight Concrete Fill EL 598 to 575.4 feet	35	0	35(1)	0.27	3.69
Existing Granular Fill EL 575.4 to 570 feet	120	0	30	0.33	3.00
V Soft to Soft Silty Clay EL 570 to 554 feet	110	50	26	0.39	2.56
V Stiff Silty Clay EL 554 to 540 feet	120	100	30	0.33	3.00
Hard Silty Clay Loam EL 540 to 525 feet	125	100	31	0.32	3.12
V Dense Silt to Silty Loam EL 525 to 500 feet	63 (submerged)	0	36	0.26	3.85

1) Based on results determined from direct shear test (Tiwari et al., 2017)

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Site Preparation

Pavement and debris should be cleared and stripped where the structure and structural fill will be placed. The exposed subgrade should be observed and evaluated by a qualified engineer. If unstable or unsuitable materials are exposed during excavation, they should be removed and replaced with compacted structural fill as described in Section 5.2.

5.2 Excavation, Dewatering, and Utilities

Excavations should be performed in accordance with local, state, and federal regulations including current OSHA regulations. The potential effect of ground movements upon nearby utilities should be considered during construction. Temporary excavations should be sloped at no steeper than 1:2 (V:H). Excavated material should not be stockpiled immediately adjacent to the top of slopes, nor should equipment be allowed to operate too closely to open excavations.

Groundwater was not observed while drilling in any of the borings. The groundwater will not affect the proposed improvements.

5.3 Filling and Backfilling

Fill material used to attain final design elevations outside of the lightweight cellular concrete sections should be pre-approved, compacted, cohesive or granular soil conforming to IDOT Section 205, *Embankment* (2022). The fill material should be free of organic matter and debris and should be placed in lifts and compacted according to the standard. Backfill material must be preapproved by the Resident Engineer and should be placed and compacted in accordance with the specification (IDOT 2022).

The lightweight cellular concrete placed behind the existing vaults should be Class I or Class II in accordance with IDOT Guide Bridge Special Provision (GBSP) No. 87, *Lightweight Cellular Concrete Fill* (2016). The fill should be mixed and installed in accordance with the GBSP.

5.4 Earthwork Operations

The required earthwork can be accomplished with conventional construction equipment. Moisture and traffic will cause deterioration of exposed subgrade soils. Precautions should be taken by the Contractor to prevent water erosion of the exposed subgrade. A compacted subgrade will minimize

water runoff erosion.

Earth moving operations should be scheduled to not coincide with excessive cold or wet weather (early spring, late fall or winter). Any soil allowed to freeze or soften due to the standing water should be removed. Wet weather can cause problems with subgrade compaction.

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

6.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on the boring logs and in Exhibit 2. This report does not reflect any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. In the event that any changes in the design and/or location of the structure are planned, we should be timely informed so that our recommendations can be adjusted accordingly.

It has been a pleasure to assist Collins Engineers and the Illinois Department of Transportation on this project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

Wang Engineering, Inc. (A Terracon Company)

Ehab Shaheen, Ph.D, P.E.
Senior Geotechnical Engineer

Mickey Snider, P.E.
Senior Geotechnical Engineer

REFERENCES

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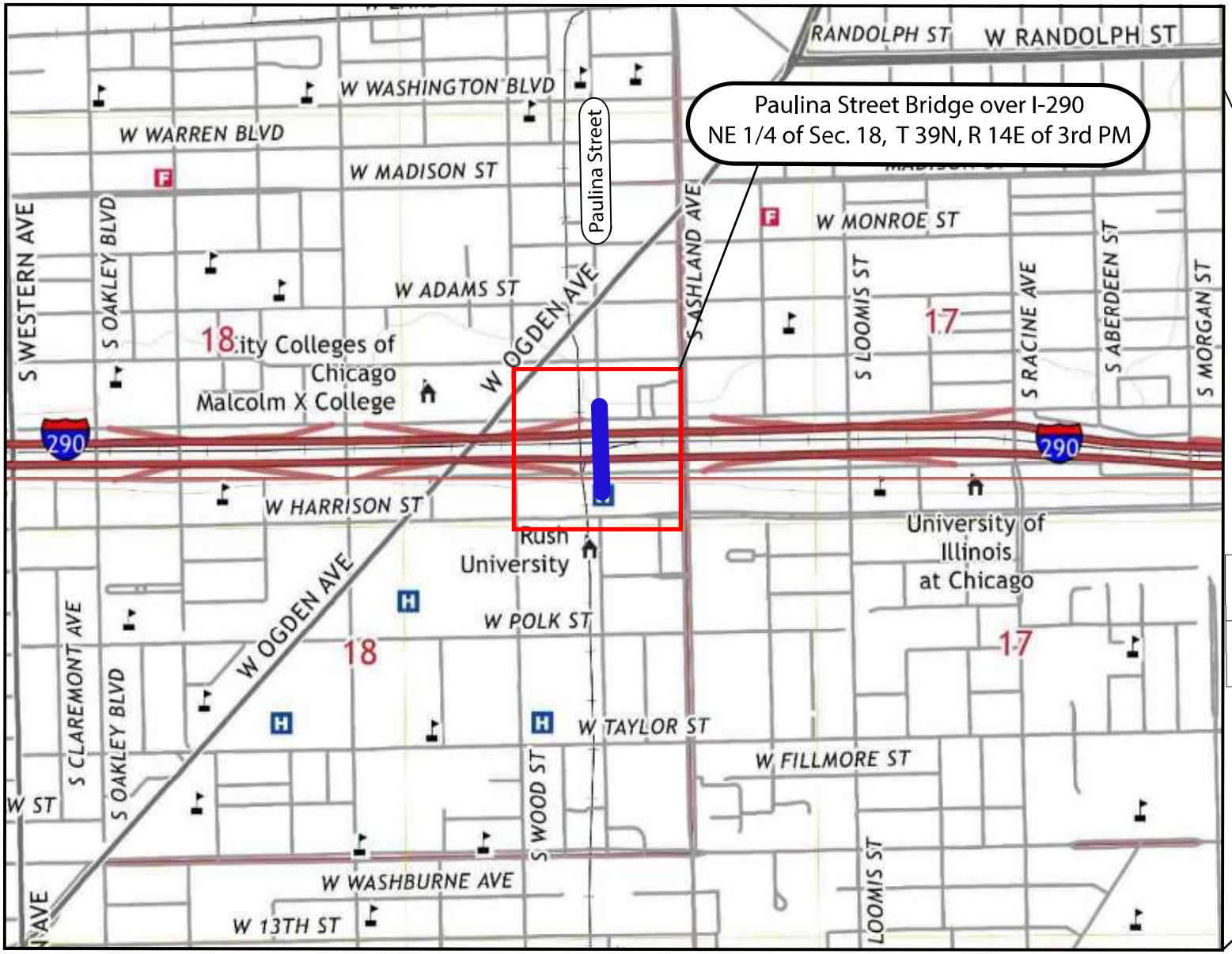
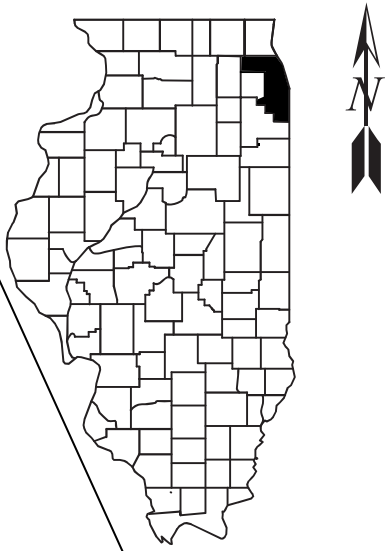
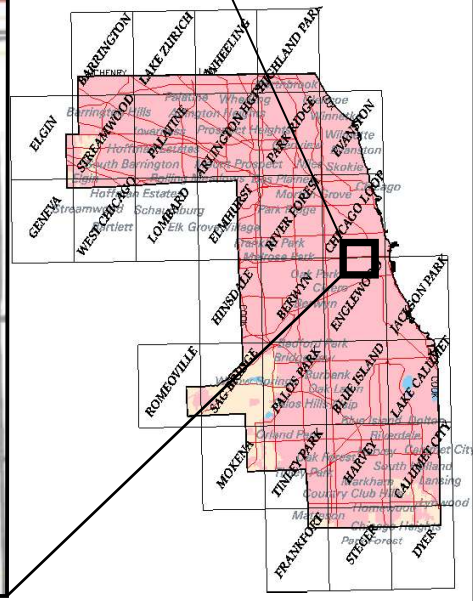
EXHIBITS







Cook County

0 0.5 1.0 Miles

SITE LOCATION MAP: PAULINA STREET AND SACRAMENTO BOULEVARD OVER I-290, CHICAGO, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 1

DRAWN BY: J. Bensen
CHECKED BY: M. Snider

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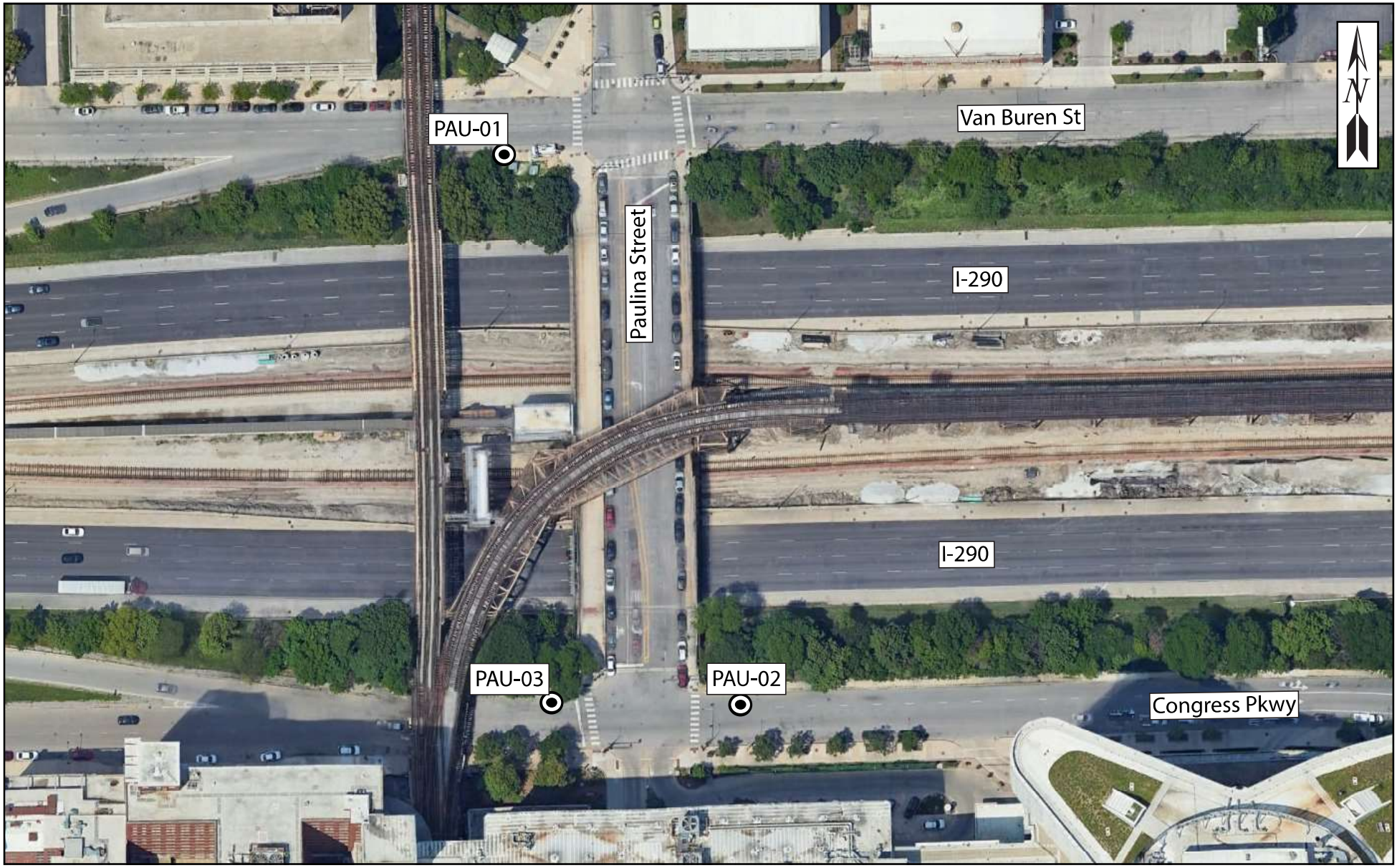
FOR COLLINS ENGINEERS

KE235325



Legend

Soil Borings

0 200 400 Feet

BORING LOCATION PLAN: PAULINA STREET AND SACRAMENTO BOULEVARD OVER I-290, CHICAGO, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2	DRAWN BY: J. Bensen CHECKED BY: M. Snider

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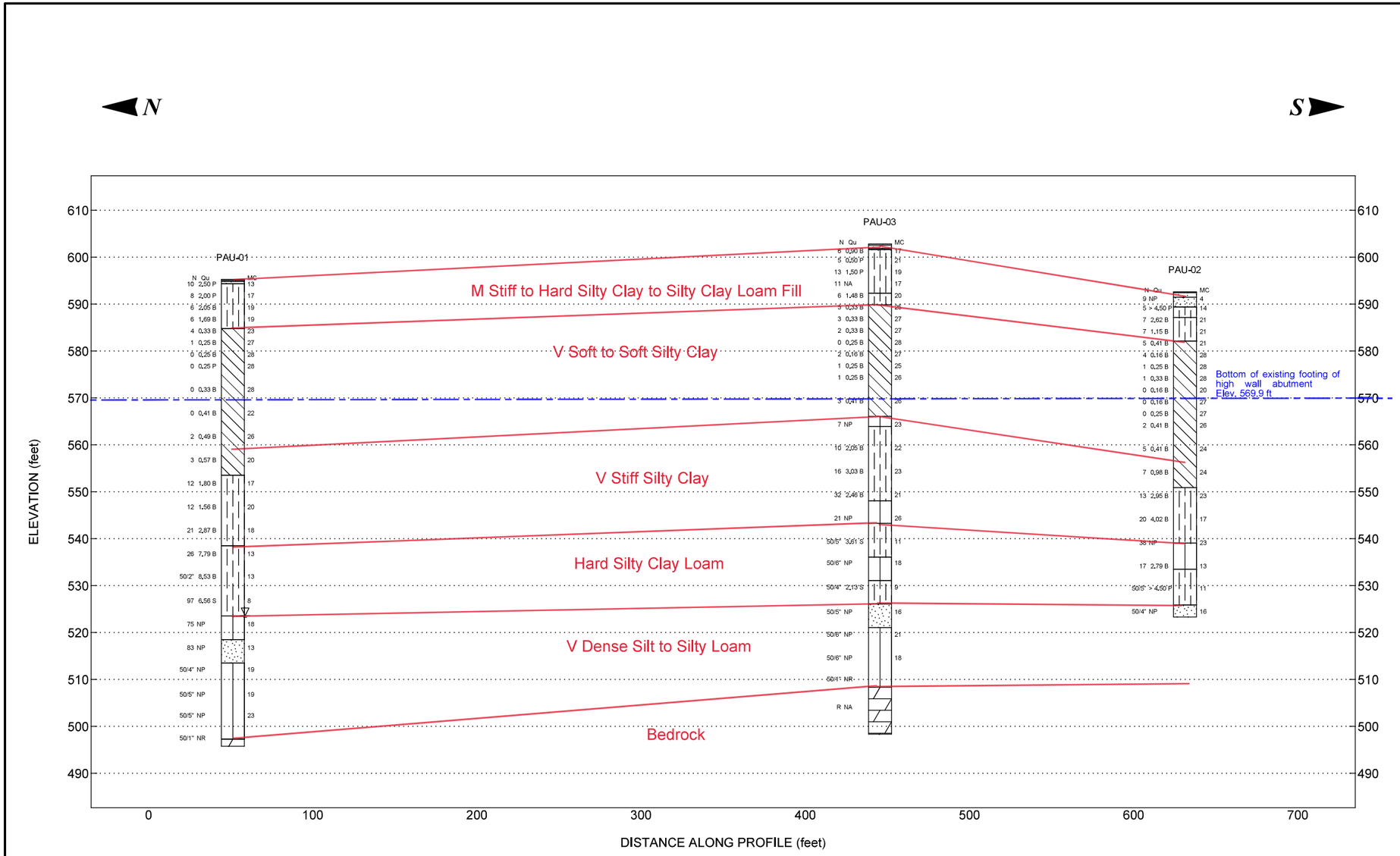
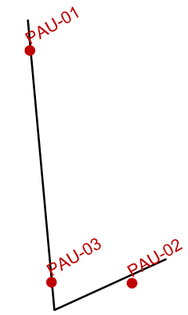


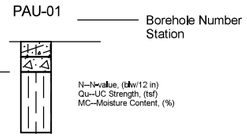
Lithology Graphics

- Pavement
- Crushed stone
- Concrete
- IDH Silty Clay, Silty Clay Loam
- IDH Clay
- IDH Silt, Silty Loam
- IDH Sand, Sandy Loam
- Dolomite or Dolomitic Limestone



Site Map Scale 1 inch equals 255 feet

Explanation:



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

Vertical Exaggeration: 3x

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Subsurface Data Profile
Paulina Street Bridge over I-290

WEI SINCE 1982

Paulina Street and Sacramento Blvd over Interstate 290
Chicago, Cook County, IL

JOB NUMBER	PLATE NUMBER
KE235325	EXHIBIT 3

WEI 11X17 KE235325.GPJ WANGENG.GDT 6/19/24

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APPENDIX A

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BORING LOG PAU-01

WEI Job No.: KE235325

Client: **Collins Engineers**
Project: **Paulina Street and Sacramento Blvd over Interstate 290**
Location: **Chicago, Cook County, IL**

Datum: NAVD88
Elevation: 595.26 ft
North: 1898199.16 ft
East: 1165040.73 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT (blw/6 in) RQD (%)	Qu (tsf)	Moisture Content (%)
	595.1	2.5-inch thick ASPHALT						
	594.8	3-inch thick, brown SANDY GRAVEL						
	594.3	5.5-inch thick CONCRETE --PAVEMENT--						
		Stiff to very stiff, brown, gray and black SILTY CLAY LOAM to SILTY CLAY, trace gravel --FILL-- --RDR 2--	5		1	12 5 5	2.50 P	13
					2	3 4 4	2.00 P	17
					3	2 2 4	2.05 B	19
			10		4	2 3 3	1.69 B	19
	584.8	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel --RDR 1--			5	1 2 2	0.33 B	23
			15		6	0 0 1	0.25 B	27
					7	0 0 0	0.25 B	28
			20		8	0 0 0	0.25 P	28
			25		9	0 0 0	0.33 B	28
			30		10	0 0 0	0.41 B	22
			35		11	0 0 2	0.49 B	26
			40		12	0 0 3	0.57 B	20
	553.5	Stiff to very stiff, gray SILTY CLAY, trace gravel --RDR 2--						
			45		13	3 5 7	1.80 B	17
			50		14	3 5 7	1.56 B	20

GENERAL NOTES

Begin Drilling: **05-22-2024** Complete Drilling: **05-22-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20CME55T[81%]**
Driller: **RH&JD** Logger: **F. Bozga** Checked by: **J. Bensen**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Dry to 10'**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

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

WANGENGINC KE235325.GPJ WANGENG.GDT 6/25/24

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BORING LOG PAU-01

WEI Job No.: KE235325

Client: **Collins Engineers**
Project: **Paulina Street and Sacramento Blvd over Interstate 290**
Location: **Chicago, Cook County, IL**

Datum: NAVD88
Elevation: 595.26 ft
North: 1898199.16 ft
East: 1165040.73 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT (blw/6 in) RQD (%)	Qu (tsf)	Moisture Content (%)
			55		15	5 10 11	2.87 B	18
	538.5	Hard, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel --RDR 2--						
			60		16	5 10 16	7.79 B	13
			65		17	15 22 50/2"	8.53 B	13
		--rig chatter; possible cobbles--						
			70		18	26 48 49	6.56 S	8
	523.5	Very dense, gray SILTY LOAM, trace gravel; wet --RDR 2--						
			75		19	36 37 38	NP	18
	518.5	--rig chatter; possible cobbles-- Very dense, gray, fine to medium SAND; wet --RDR 3-4--	80		20	21 43 40	NP	13
	513.5	Very dense, gray SILTY LOAM; saturated --RDR 2--	85		21	36 50/4"	NP	19
			90		22	42 47 50/5"	NP	19
			95		23	50/5"	NP	23
	497.3	Possible BEDROCK --RDR 5--			24	50/1"	NR	
	495.8	--slow auger advancement--	100					
		Boring terminated at 99.50 ft						

GENERAL NOTES

Begin Drilling: **05-22-2024** Complete Drilling: **05-22-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20CME55T[81%]**
Driller: **RH&JD** Logger: **F. Bozga** Checked by: **J. Bensen**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Dry to 10'**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

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

WANGENGINC KE235325.GPJ WANGENG.GDT 6/25/24

Wang Engineering
wangeng@wangeng.com
1145 N Main Street
Lombard, IL 60148
Telephone: (630) 953-9928
Fax:

BORING LOG PAU-02

WEI Job No.: KE235325

Client: **Collins Engineers**
Project: **Paulina Street and Sacramento Blvd over Interstate 290**
Location: **Chicago, Cook County, IL**

Datum: NAVD88
Elevation: 592.63 ft
North: 1897805.11 ft
East: 1165213.66 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT (blw/6 in) RQD (%)	Qu (tsf)	Moisture Content (%)
	592.5	2-inch thick ASPHALT						
	591.5	12-inch thick CONCRETE --PAVEMENT-- Loose, brown and white, fine SAND, trace gravel; damp			1	4 5 4	NP	4
	589.4	--FILL-- Hard, brown SILTY CLAY LOAM, little to some gravel; moist	5		2	13 3 2	> 4.50 P	14
	587.1	--1 inch asphalt on bottom of sample-- --FILL-- Stiff to very stiff, brown and gray SILTY CLAY, trace gravel; moist --FILL-- --RDR 2--			3	2 3 4	2.62 B	21
			10		4	3 3 4	1.15 B	21
	582.1	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel; moist --RDR 2--			5	2 2 3	0.41 B	21
			15		6	0 2 2	0.16 B	28
					7	0 0 1	0.25 B	28
			20		8	0 0 1	0.33 B	28
					9	0 0 0	0.16 B	20
			25		10	0 0 0	0.16 B	27
			30		11	0 0 0	0.25 B	27
					12	0 1 1	0.41 B	26
			35		13	0 2 3	0.41 B	24
	550.9	Very stiff to hard, gray SILTY CLAY, trace gravel; moist --RDR 2--						
			40		14	2 3 4	0.98 B	24
			45		15	5 6 7	2.95 B	23
			50		16	6 7 13	4.02 B	17

GENERAL NOTES

Begin Drilling: **06-05-2024** Complete Drilling: **06-05-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20CME55T[81%]**
Driller: **KS&GT** Logger: **A. Scifers** Checked by: **J. Bensen**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Dry to 10'**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

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

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BORING LOG PAU-02

WEI Job No.: KE235325

Client: **Collins Engineers**
Project: **Paulina Street and Sacramento Blvd over Interstate 290**
Location: **Chicago, Cook County, IL**

Datum: NAVD88
Elevation: 592.63 ft
North: 1897805.11 ft
East: 1165213.66 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT (blw/6 in) RQD (%)	Qu (tsf)	Moisture Content (%)
	539.0							
		Medium dense to dense, gray SILTY LOAM, trace gravel; moist	55		17	13 14 24	NP	23
		--RDR 2--						
	533.5							
		Very stiff to hard, gray SILTY CLAY LOAM to SILTY LOAM, little gravel; moist	60		18	10 6 11	2.79 B	13
		--RDR 2-3--						
		--slow drilling from 58.5' to 63.5'--						
			65		19	44 50/5"	> 4.50 P	11
	525.9							
		--slow drilling and some chatter from 63.5' to 68.5'--						
		Very dense, gray SANDY LOAM, trace gravel; moist						
	523.3	--RDR 4--			20	37 50/4"	NP	16
		Boring terminated at 69.33 ft	70					
			75					

GENERAL NOTES

Begin Drilling: **06-05-2024** Complete Drilling: **06-05-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20CME55T[81%]**
Driller: **KS&GT** Logger: **A. Scifers** Checked by: **J. Bensen**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Dry to 10'**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

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

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BORING LOG PAU-03

WEI Job No.: KE235325

Client: **Collins Engineers**
Project: **Paulina Street and Sacramento Blvd over Interstate 290**
Location: **Chicago, Cook County, IL**

Datum: NAVD88
Elevation: 602.83 ft
North: 1897806.69 ft
East: 1165077.27 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT (blw/6 in) RQD (%)	Qu (tsf)	Moisture Content (%)
	602.6	3-inch thick ASPHALT						
	601.8	9-inch thick CONCRETE						
	601.6	--PAVEMENT--						
		3-inch thick GRAVEL --BASE COURSE--						
		Medium stiff to stiff, black, brown, and gray SILTY CLAY, trace gravel; moist --FILL-- --moved 2' north due to unknown concrete structure, possilble storm sewer about 3 ft bgs--			1	2 3 3	0.90 B	17
					2	3 2 3	0.50 P	21
			5		3	5 6 7	1.50 P	19
					4	5 5 6	NA	17
			10					
	592.3	Stiff, gray SILTY CLAY, trace gravel; moist --RDR 2-- --<1-inch thick sand seam--			5	2 3 3	1.48 B	20
	589.8	Very soft to soft, gray CLAY to SILTY CLAY, trace gravel; moist --RDR 2--			6	2 2 1	0.33 B	25
			15		7	0 1 2	0.33 B	27
					8	0 1 1	0.33 B	27
			20		9	0 0 0	0.25 B	28
					10	0 1 1	0.16 B	27
			25					
					11	0 0 1	0.25 B	25
			30		12	0 0 1	0.25 B	26
					13	0 1 2	0.41 B	26
	566.1	Loose, gray SILT; moist to wet --RDR 2--	35					
	563.9	Very stiff, gray SILTY CLAY to CLAY, trace gravel; moist --RDR 2--			14	5 4 3	NP	23
			40		15	6 4 6	2.05 B	22
			45					
					16	5 7 9	3.03 B	23
			50					

GENERAL NOTES

Begin Drilling: **06-04-2024** Complete Drilling: **06-05-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20CME55T[81%]**
Driller: **KS&GT** Logger: **A. Scifers** Checked by: **J. Bensen**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Dry to 10'**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

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

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BORING LOG PAU-03

WEI Job No.: KE235325

Client: **Collins Engineers**
Project: **Paulina Street and Sacramento Blvd over Interstate 290**
Location: **Chicago, Cook County, IL**

Datum: NAVD88
Elevation: 602.83 ft
North: 1897806.69 ft
East: 1165077.27 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT (blw/6 in) RQD (%)	Qu (tsf)	Moisture Content (%)
	548.1	Medium dense, gray SILT; moist to wet --RDR 2--	55		17	6 11 21	2.46 B	21
	543.2	Very stiff, gray SILTY CLAY LOAM to SILTY LOAM, trace gravel; moist --RDR 3-- --slow drilling from 58.5' to 63.5'--	60		18	9 10 11	NP	26
			65		19	24 38 50/5"	3.61 S	11
	536.1	--slow drilling from 63.5' to 68.5'-- Very dense, gray SILTY LOAM, little gravel; moist --RDR 3--	70		20	50/6"	NP	18
	531.1	--slow drilling and moderate chatter from 68.5' to 73.5'-- Very stiff, gray SILTY CLAY LOAM to SILTY LOAM, little gravel; moist --RDR 3-4--	75		21	38 50/4"	2.13 S	9
	526.1	--slow drilling from 73.5' to 78.5'-- Very dense, gray, fine SAND, trace gravel; wet --RDR 3--	80		22	39 50 50/5"	NP	16
	521.1	Very dense, gray SILTY LOAM, trace gravel; moist --RDR 2--	85		23	34 50/6"	NP	21
			90		24	38 50/6"	NP	18
	508.3	Strong, light gray and dark gray, good quality, DOLOSTONE; closely spaced, slightly to moderately weathered, horizontal and oblique joints, with 0.05-0.2 inch opening, slightly rough to rough walls, and >0.2 inch thick clay infill. --Run 1: 94.5 to 104.5 feet-- --Recovery: 96%--	95 100		25 1	50/1" 90%	NR	

GENERAL NOTES

Begin Drilling: **06-04-2024** Complete Drilling: **06-05-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20CME55T[81%]**
Driller: **KS&GT** Logger: **A. Scifers** Checked by: **J. Bensen**
Drilling Method: **2.25" ID HSA to 10', mud rotary thereafter; backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Dry to 10'**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

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Fax:

BORING LOG PAU-03

WEI Job No.: KE235325

Client: **Collins Engineers**
Project: **Paulina Street and Sacramento Blvd over Interstate 290**
Location: **Chicago, Cook County, IL**

Datum: NAVD88
Elevation: 602.83 ft
North: 1897806.69 ft
East: 1165077.27 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT (blw/6 in) RQD (%)	Qu (tsf)	Moisture Content (%)
		--RQD: 90%--						
	498.3	Boring terminated at 104.50 ft	105					
			110					
			115					
			120					
			125					

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

GENERAL NOTES

Begin Drilling: **06-04-2024** Complete Drilling: **06-05-2024**
Drilling Contractor: **Wang Testing Services** Drill Rig: **20CME55T[81%]**
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WATER LEVEL DATA

While Drilling: **Dry to 10'**
At Completion of Drilling: **MUD**
Time After Drilling: **NA**
Depth to Water: **NA**

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WANGENGINC KE235325.GPJ WANGENG.GDT 6/25/24

Run #1

0 6 inches

Boring PAU-03:
Run #1, 94.5 to 104.5 feet, RECOVERY=96%, RQD=90%

BEDROCK CORE PHOTOS: PAULINA STREET AND SACRAMENTO BOULEVARD OVER I-290, CHICAGO, COOK COUNTY, ILLINOIS

SCALE: GRAPHICAL	APPENDIX A	DRAWN BY: J. Bensen CHECKED BY: M. Snider

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FOR COLLINS ENGINEERS | KE235325

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APPENDIX B

Bench Mark: Chiseled "X" on the southwest corner of Paulina Street and Van Buren Street, Sta. 404+20.42, Elev. 593.29.

Existing Structure: SN. 016-0098 was originally built in 1954 as F.A. Route 131, Sections 3-B-5 and 3-F-5. The north approach slab was constructed in 1958 as F.A.I. Route 1, Section 2527-108.1. The structure consists of a four span non-composite continuous wide flange steel beam bridge with concrete vaulted abutments and three reinforced concrete multi-column piers all supported on metal shell cast in place concrete piles. The concrete deck, in all spans, is 5¾" thick and includes a 3¾" thick concrete overlay. The structure has no skew and an overall length of 274'-10⅞" from back to back of abutments. The out-to-out width of the structure is 88'-4". Permanent protective shield was added over all I-290 traffic lanes in 2016 under Section 2015-058I.

Traffic Control: Traffic to be maintained using staged construction. During Stage I no access to the CTA Blue Line Station will be provided. Commuters will be detoured to Western Ave. and Ogden Ave. Stations.

Salvage: Aluminum handrails, bridge fence railing, light poles, mast arms, and luminaires.

DESIGN SPECIFICATIONS

(New Construction)
2020 AASHTO LRFD Bridge Design Specifications, 9th Edition

LOADING HL-93

Allow 25#/sq. ft. for future wearing surface.
LL+IM Deflection = L/1,000

DESIGN STRESSES

FIELD UNITS
(NEW CONSTRUCTION)

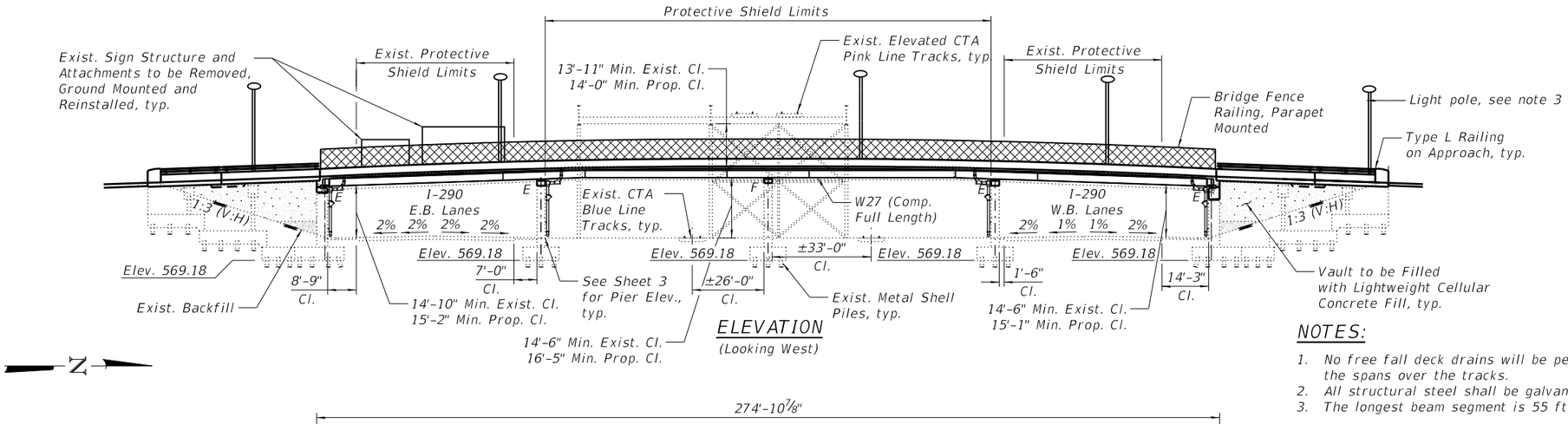
f'c = 4,000 psi (Superstructure Concrete)
f'c = 3,500 psi (Substructure Concrete)
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50) (See note 2)

FIELD UNITS
(EXISTING CONSTRUCTION)

f'c = 3,500 psi (Substructure Concrete)
fy = 40,000 psi (Reinforcement)

SCOPE OF WORK:

1. Utilities to be temporarily relocated.
2. Remove and replace existing concrete deck, W36 steel beam superstructure, expansion joints, and bearings.
3. Remove existing vaulted approach superstructure and approach slabs.
4. Fill existing vaulted abutment and reconstruct the abutment to semi-integral.
5. Construct concrete seat extensions for new elastomeric bearings on abutments and Piers 1 and 3 and for new fixed bearings on Pier 2.
6. Construct proposed W27 steel beam superstructure with 8" concrete deck and approach slabs.
7. Rebuild CTA headhouse connection and reinstall existing CTA station railing.
8. Formed concrete repair and epoxy crack sealing on substructure units.
9. Remove, store and reinstall sign structures.
10. Graffiti removal.
11. Apply concrete sealant to existing abutments and piers adjacent to I-290.



ELEVATION
(Looking West)

NOTES:

1. No free fall deck drains will be permitted in the spans over the tracks.
2. All structural steel shall be galvanized.
3. The longest beam segment is 55 ft.

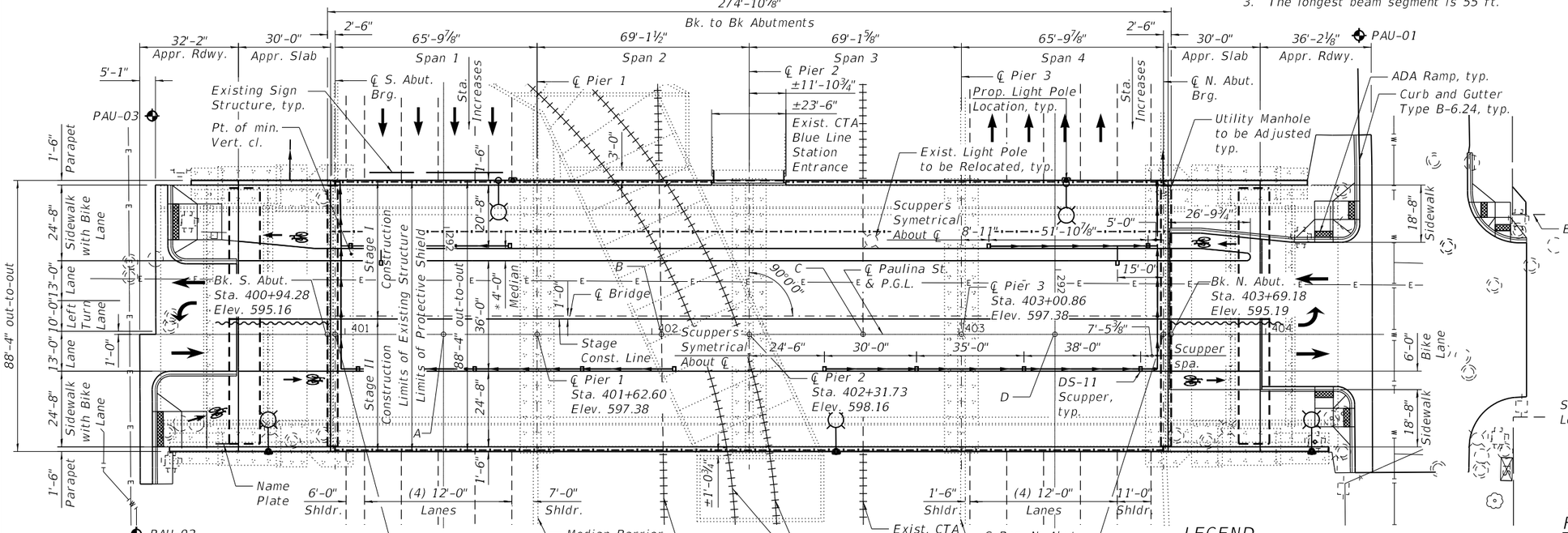
SEISMIC DATA

Seismic Performance Zone (SPZ) = 1
Design Spectral Acceleration at 1.0 sec. (SD1) = 0.08g
Design Spectral Acceleration at 0.2 sec. (SDS) = 0.15g
Soil Site Class = D

HIGHWAY CLASSIFICATION

F.A.I. Rte. 290 – (I-290)
Functional Class: Interstate
ADT: 172,800 (2023); 160,994 (2046)
ADTT: 6,912 (2023); 6,440 (2046)
DHV: 16,099 (2046)
Design Speed: 55 m.p.h.
Posted Speed: 55 m.p.h.
2-Way Traffic
Directional Distribution: 55 (E.B.) : 45 (W.B.)

F.A.U. Rte. 2856 – (Paulina St.)
Functional Class: Major Collector
ADT: 3,450 (2022); 4,500 (2040)
ADTT: 104 (2022); 135 (2040)
DHV: 450 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
2-Way Traffic
Directional Distribution: 50:50



PLAN
* Constructed in Stage III.

Point	Sta. at Paulina St.	Sta. at Intersecting Align.
A	401+32.09	292+34.85 (I-290 EB)
B	402+03.09	601+75.10 (CTA)
C	402+68.81	501+57.99 (CTA)
D	403+31.33	292+21.03 (I-290 WB)

LEGEND

- Pr. Storm Sewer
- Watermain
- Electric
- Aerial Lines
- TSRS
- Light pole
- Fire Hydrant
- Utility Structure
- Soil Boring

Range 14E, 3rd P.M.

LOCATION SKETCH

Structure Location

GENERAL PLAN AND ELEVATION
PAULINA ST. OVER F.A.I. RTE. 290 (EISENHOWER EXPRESSWAY) & CTA
F.A.U. 2856 – SECTION 2019-191-B-R
COOK COUNTY
STATION 402+31.73
STRUCTURE NO. 016-0098

COLLINS ENGINEERS INC.

USER NAME =	DESIGNED - MR	REVISED -	
	CHECKED - EKM	REVISED -	
PLOT SCALE =	DRAWN - DR	REVISED -	
PLOT DATE =	CHECKED - EKM	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN AND ELEVATION
STRUCTURE NO. 016-0098
SHEET S-1 OF S-4 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
2856	2019-191-B-R	COOK	4	1
		CONTRACT NO. 62K64		
		ILLINOIS	FED. AID PROJECT	

MODEL: Default
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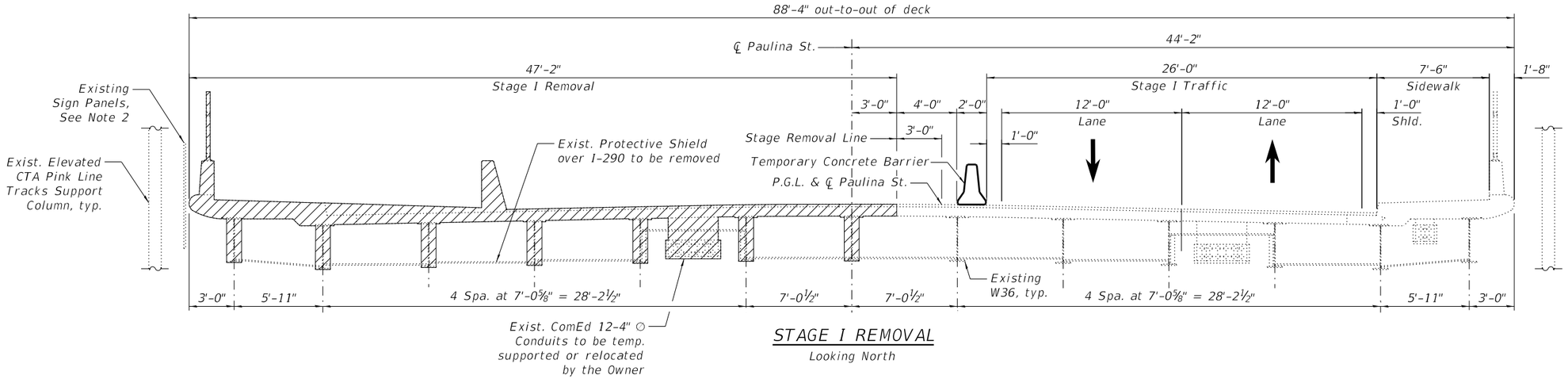
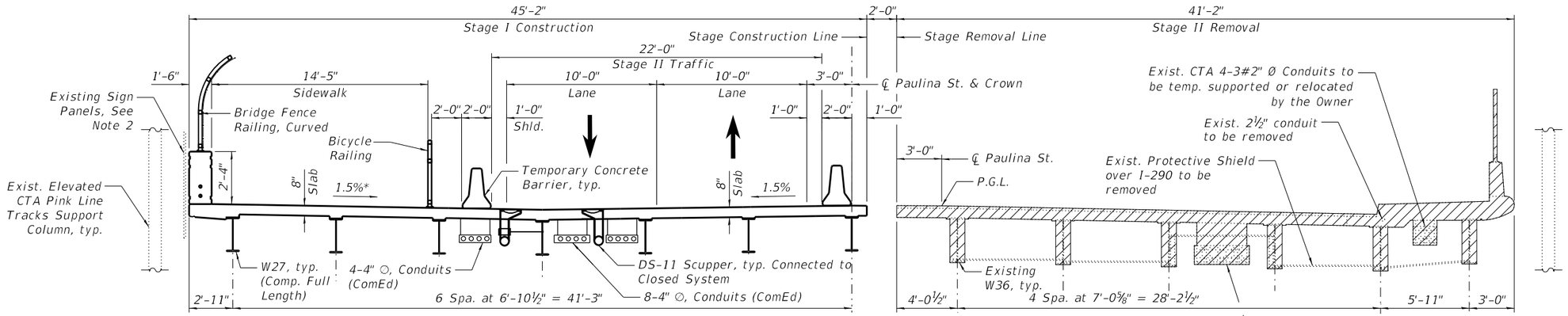


STAGE I REMOVAL

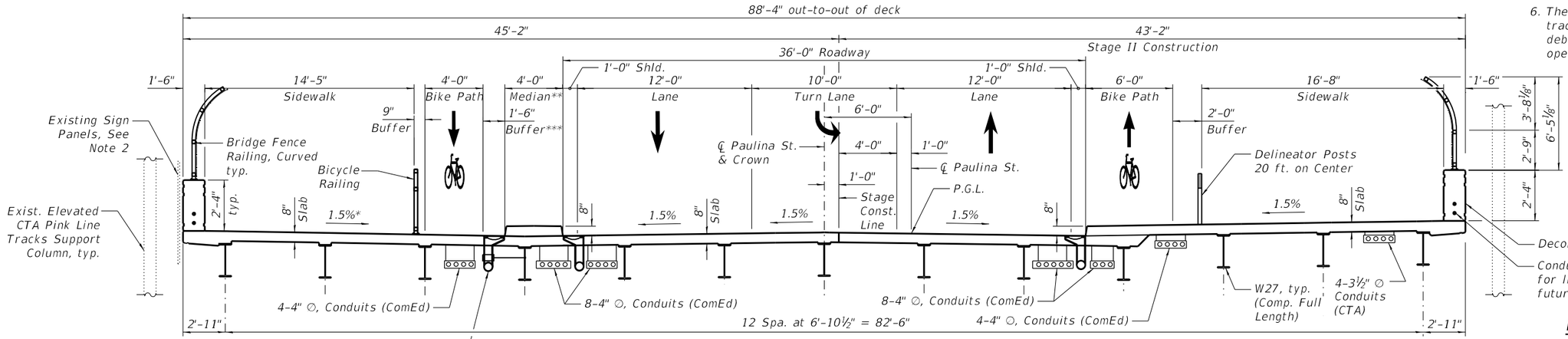
Looking North



* Slope at CTA station entrance to vary to match existing entrance elevation.

STAGE I CONSTRUCTION AND STAGE II REMOVAL

Looking North



STAGE I CONSTRUCTION AND FINAL CROSS SECTION

Looking North

** Median to be constructed in stage III.

*** 1'-6" Buffer to clear scuppers.

NOTES:

1. Stage III construction for west median not shown. Stage III traffic to be shifted to the east with one (1) SB lane and one (1) NB lane with temporary concrete barrier for protection to be maintained.
2. Existing sign panels attached to superstructure to be removed, stored, and reinstalled.
3. All existing utilities between girders will be supported or relocated by the Owner to provide uninterrupted service during construction.
4. Existing permanent protective shield to be removed. Cost included with "Protective Shield (Permanent) Removal".
5. Removal of existing railing, joints, bearings, light posts, and all other appurtenances is included with "Removal of Existing Superstructures".
6. The Contractor shall protect the CTA tracks and I-290 traffic from falling debris during removal and construction operation.

LEGEND:

Removal Limits

MODEL: Default
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1/19/2025 12:28:50 PM

COLLINS ENGINEERS INC.

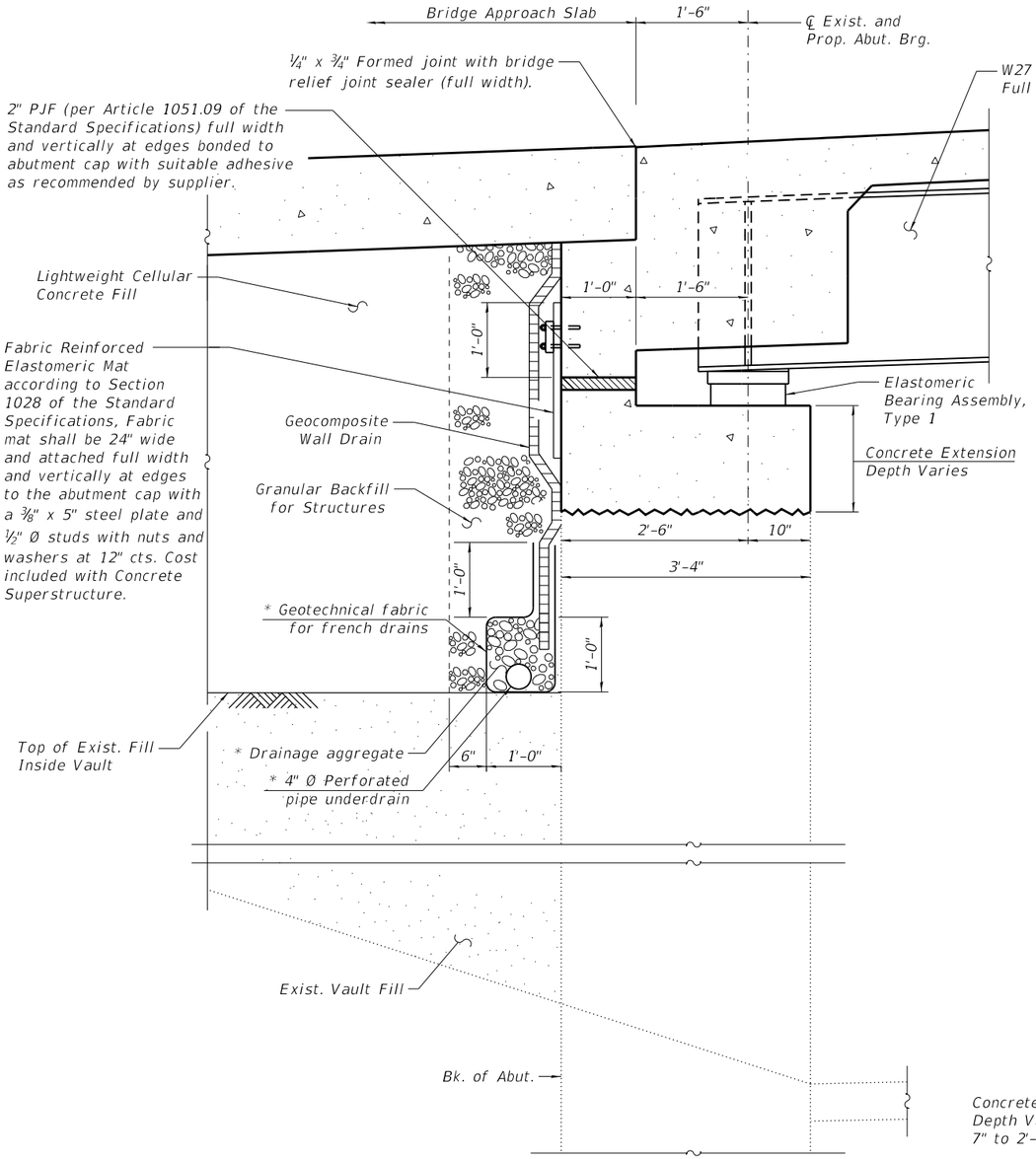
USER NAME =	DESIGNED - MR	REVISED -	
	CHECKED - EKM	REVISED -	
PLOT SCALE =	DRAWN - DR	REVISED -	
PLOT DATE =	CHECKED - EKM	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CONSTRUCTION STAGING
STRUCTURE NO. 016-0098

SHEET S-2 OF S-4 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
2856	2019-191-B-R	COOK	4	2
		CONTRACT NO. 62K64		
	ILLINOIS	FED. AID PROJECT		

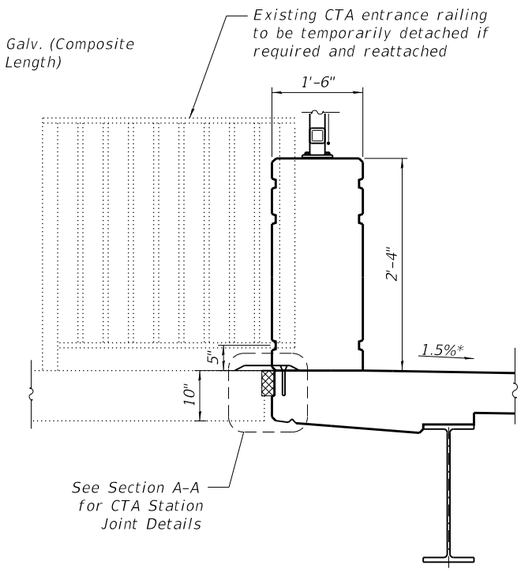


SECTION THRU SEMI-INTEGRAL ABUTMENT

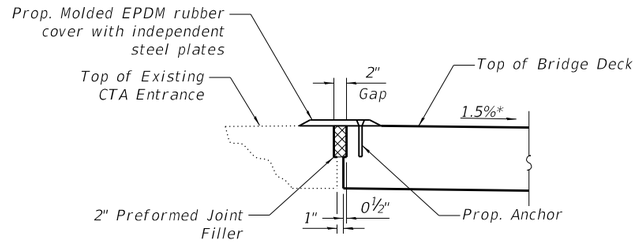
(Horiz. dim. at Rt. ℄'s)

*Included in the cost of Pipe Underdrains for Structures. (See Special Provisions)

Note:
All drainage system components shall extend to 2'-0" from the end of each wingwall except an outlet pipe shall extend until intersecting with the side slopes. The pipes shall drain into concrete headwalls. (See Article 601.05 of the Standard Specifications and Highway Standard 601101).

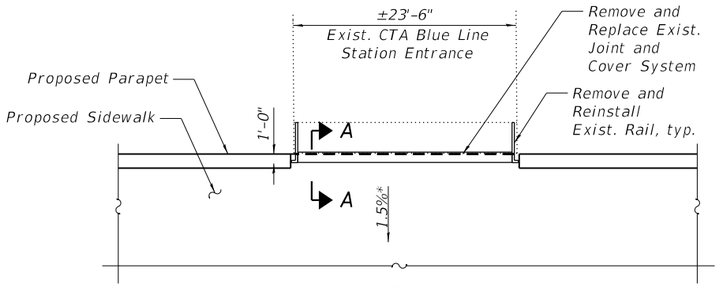


SECTION THRU CTA ENTRANCE



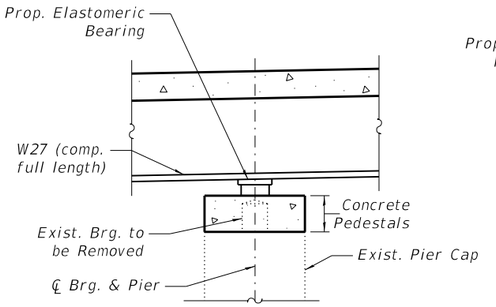
SECTION A-A
AT CTA STATION JOINT

(Contractor to submit to CTA for review and approval prior to Construction.)

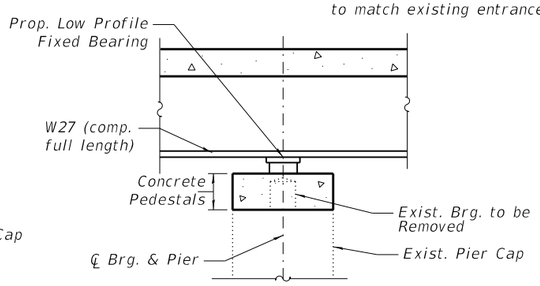


CTA ENTRANCE PLAN VIEW

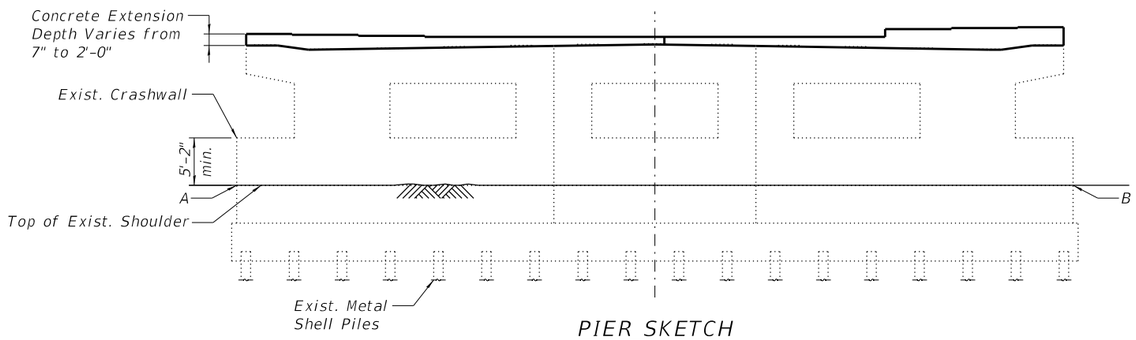
* Adjust the slope at CTA station entrance to match existing entrance elevation.



SECTION THRU PIERS 1 & 3



SECTION THRU PIER 2



PIER SKETCH

(Looking North)
Pier 1 shown, Piers 2 & 3 similar

Point	Pier No.	Elevation
A	1	576.92
A	2	576.95
B	1	576.45
B	2	576.49

Note: Pier 3 elevations are not available

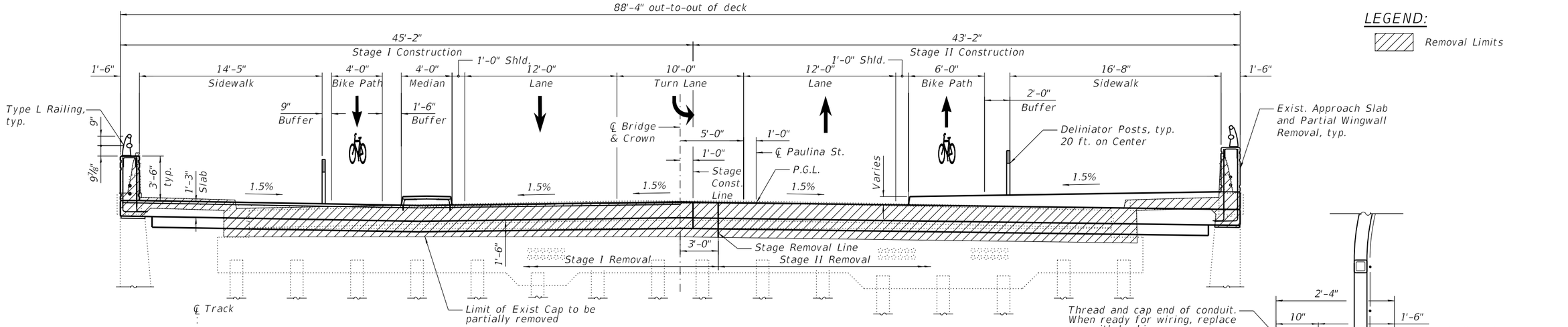
COLLINS ENGINEERS INC.

USER NAME =	DESIGNED - MR	REVISED -	
	CHECKED - EKM	REVISED -	
PLOT SCALE =	DRAWN - DR	REVISED -	
PLOT DATE =	CHECKED - EKM	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

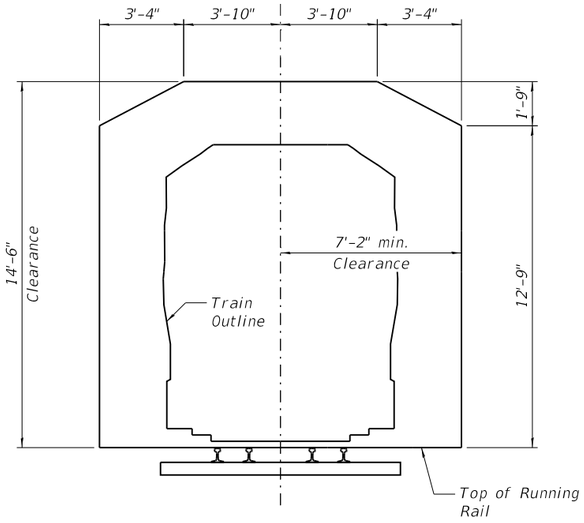
DETAILS
STRUCTURE NO. 016-0098
SHEET S-3 OF S-4 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
2856	2019-191-B-R	COOK	4	3
		CONTRACT NO. 62K64		
	ILLINOIS	FED. AID PROJECT		

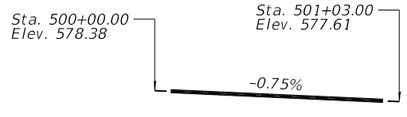


APPROACH SPAN TYPICAL CROSS SECTION

(Looking North, Showing Bent)



CTA TRAIN CLEARANCE DIAGRAM

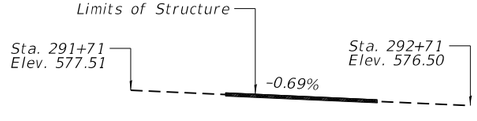


EXIST. WB BLUE LINE CTA TRACKS PROFILE GRADE

(Along WB CTA Tracks Alignment)

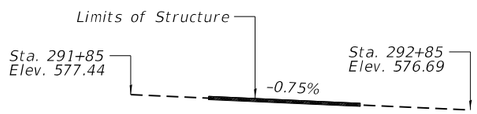
EXIST. EB BLUE LINE CTA TRACKS PROFILE GRADE

(Along EB CTA Tracks Alignment)



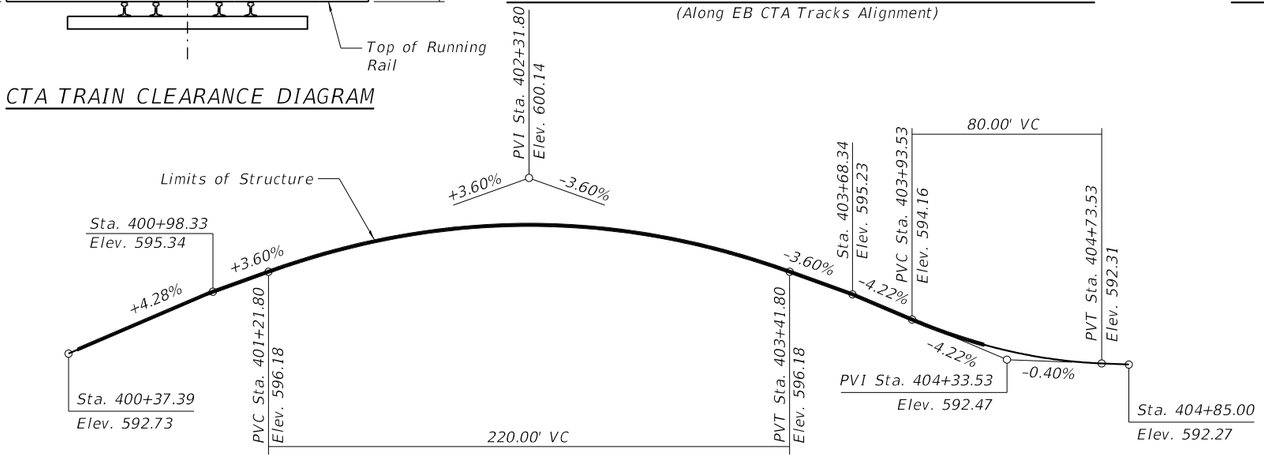
EXIST. WB I-290 PROFILE GRADE

(Along WB I-290 Alignment)



EXIST. EB I-290 PROFILE GRADE

(Along EB I-290 Alignment)

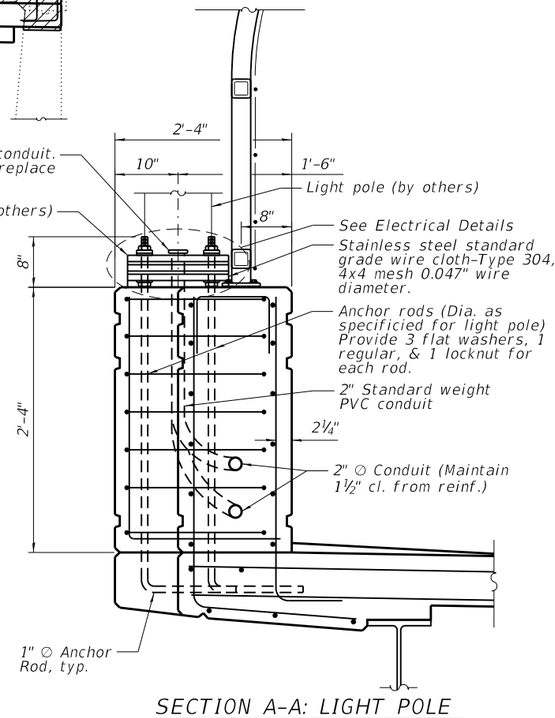


PAULINA STREET PROFILE GRADE

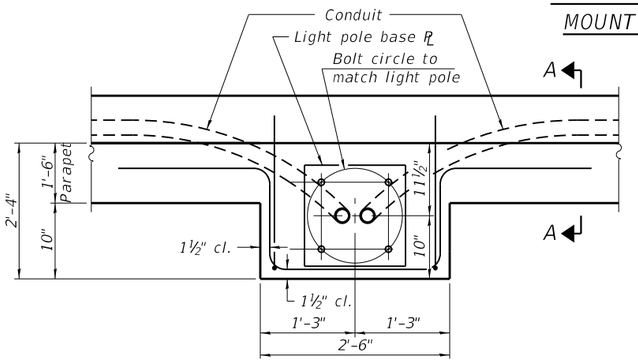
Along ℄ Paulina St.
See sheet S-1 for PGL location

LEGEND:

Removal Limits



SECTION A-A: LIGHT POLE MOUNTED ON CONCRETE PARAPET



LIGHT POLE MOUNTED ON CONCRETE PARAPET - PLAN

MODEL: Default
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1/19/2025 12:28:57 PM

COLLINS ENGINEERS INC.

USER NAME =	DESIGNED - MR	REVISED -	
	CHECKED - EKM	REVISED -	
PLOT SCALE =	DRAWN - DR	REVISED -	
PLOT DATE =	CHECKED - EKM	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

APPROACH SLAB DETAILS
STRUCTURE NO. 016-0098
SHEET S-4 OF S-4 SHEETS

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
2856	2019-191-B-R	COOK	4	4
		CONTRACT NO. 62K64		
		ILLINOIS	FED. AID PROJECT	