Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

Geotechnical Memorandum

To: Mr. Amish T. Bhatt, S.E, P.E., AECOM
From: Met Seyhun, P.E., Sr. Geotechnical Engineer/Project Manager
Date: July 11, 2019
Subject: Retaining Wall 32 along NB Washington Exit Ramp, SN 016-1821
F.A.I RTE. 90/94 (Kennedy Expressway), Station 8680+65.00 to 8683+00.00
Section 2015-019R, IDOT Contract No. 62A76
Project: Jane Byrne (Circle) Interchange Reconstruction – Cook County, Illinois
Wang No: 1100-04-01

INTRODUCTION

This memorandum presents the results of our geotechnical subsurface investigation, laboratory testing, engineering analyses, and recommendations for the proposed retaining wall, designated as SN016-1821 (Retaining Wall 32) in the City of Chicago, Cook County, Illinois. On the USGS *Chicago Loop Quadrangle 7.5 Minute Series* map, the investigated area is located in the NW¼ of Section 16 of Tier 39 N, Range 14 E of the Third Principal Meridian. A *Site Location Map* is presented as Exhibit 1.

Based on the Type, Size, and Location (TSL) plan dated June 26, 2019 provided by TranSystems Corporation (TranSystems), Wang Engineering, Inc. (Wang) understands the proposed Retaining Wall 32 will be a drilled soldier pile wall type to support the northbound (NB) Washington Street Exit Ramp. The 235.4-foot long wall will begin at Station 8680+65.00 with an offset of 12.38 feet right and end at Station 8683+00.00 with an offset of 2.00 feet right. The wall will have a Kink point at Station 8682+00 and a maximum retained height of 6.3 feet. The TSL plan is included in Appendix D.

SUBSURFACE INVESTIGATION AND LABORATORY TESTING

Between June and October 2014, Wang performed three structure borings, designated as 32-RWB-01 through 32-RWB-03 and 32-RWB-03B, one shelby tube boring, designated as 32-ST-01. Boring 32-RWB-03 was attempted twice due to obstruction. To supplement our investigation, we considered nearby structure Boring 33-RWB-01drilled in June 2014. We also considered vane shear test Boring VST-03 located about 290 feet south of the Madison Street Bridge. The borings were advanced from elevations 577.40 to 593.21 feet to depths of 8.5 to 65.0 below the ground surface (bgs). The as-drilled boring locations were surveyed by Dynasty Group, Inc. and station and offset

for each boring were provided by AECOM. The as-drilled boring location data are presented in the *Boring Logs* (Appendix A) and as-drilled boring locations are shown in the *Boring Location Plan* (Exhibit 2).

Truck-mounted drilling rigs, equipped with hollow stem augers were used to advance and maintain an open borehole to 9.5 to 11 feet depths after that mud rotary was used to the boring termination depth. Soil sampling was performed according to AASHTO T206 "*Penetration Test and Split Barrel Sampling of Soils*." The soil was sampled at 2.5 to 5-foot intervals to boring termination depths. Vane shear tests were performed in undisturbed and remolded conditions using calibrated RocTest vane shear equipment.

Field boring logs prepared and maintained by a Wang geologist, include lithological descriptions, visual-manual soil 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. The SPT N value, shown on the *Subsurface Soil Data Profile* (Exhibit 3) is the sum of the second and third blows per 6 inches. The soils were described and classified according to the Illinois Division of Highways (IDH) Textural Classification system.

The soil samples were tested in the laboratory for moisture content (AASHTO T265). Atterberg limits (AASHTO T89/T90) and particle size analyses (AASHTO T88) tests were performed on selected soil samples representing the main soil layers encountered during the investigation. Shelby tube samples from Borings 32-RWB-03B and 32-ST-01 were tested for unconfined compressive strength (T208), triaxial unconsolidated undrained compression (T296), and one-dimensional consolidation (T216). Field visual descriptions of the soil samples were verified in the laboratory. Laboratory test results are shown in the *Boring Logs* (Appendix A), in the *Soil Profile* (Exhibit 3), and in the *Laboratory Test Results* (Appendix B).

RESULTS OF FIELD AND LABORATORY INVESTIGATIONS

Detailed descriptions of the soil conditions encountered during our subsurface investigation are presented in the attached Boring Logs (Appendix A), and the borings locations are shown in the Boring Location Plan (Exhibit 2).

Surface and Soil Conditions

At the surface, the borings encountered 4-to 12-inch thick asphalt over 8-to 14-inch thick concrete followed by crushed stone aggregate base.

Beneath the surface, the borings encountered 2 to 10 feet of fill materials. The fill consists of medium stiff to very stiff silty clay to silty clay loam with unconfined compressive strength (Qu) values of 0.5 to 2.3 tsf and very dense sandy gravel with N values of 44 to over 50 blows per foot.

Below the fill at elevations of 573 to 583 feet (3 to 10 feet bgs), the borings encountered up to 36 feet of very soft to medium stiff clay to silty clay (Chicago Blue Clay) with Q_u values of 0.08 to 0.82 tsf and moisture content values of 21 to 31%. Laboratory unconsolidated undrained triaxial tests show shear strength values of 288 to 720 psf. Laboratory index testing on samples from this layer showed liquid limit (L_L) values of 32 to 39% and plastic limit (P_L) values of 15 to 18%. In-situ undisturbed vane shear strengths obtained in Borings 32-RWB-01 and VST-03 between elevations 574 and 542 feet ranged from 370 to 1680 psf.

Beneath the clay to silty clay, the borings encountered stiff to very stiff silty clay to silty clay loam extending to the boring termination depths.

Groundwater Conditions

Borings were observed to be dry during drilling or after drilling within the 9.5 to 11 bgs. After that the mud rotary drilling was used and groundwater on deeper levels could not be observed. Groundwater may be perched within the granular fill layers. Water-bearing silt and gravel layers may also be present at deeper levels.

A Piezometer 30-PZ-01 was installed for the nearby structure about 550 feet south of the proposed retaining wall 32 on November 21, 2014 and monitored until March 2017. The screen was placed with the top and bottom elevations at 503.7 and 493.7 feet (89.5 to 99.5 feet bgs), respectively within granular layers above bedrock. Piezometer readings show an average water table elevation of 545.8 feet indicating under hydrostatic pressure within the granular deposit encountered on top of the bedrock.

Although the groundwater was not observed within upper fill layers, we anticipate perched water may be encountered during times of heavy precipitation. Therefore, the design and construction of the wall should consider the perched water between 588 and 581 feet elevations within the fill layers.

ANALYSIS AND RECOMMENDATIONS

We recommend drilled soldier piles should be designed for both lateral earth pressure and lateral deformation. The embedment depth in moment equilibrium for the wall section should be designed in accordance with the LRFD guidelines (AASHTO 2017). Generally, overconsolidated clayey soils, such as the stiff to very stiff clays and very dense silty loam will exhibit lower overall shear strength in the long-term condition; normally-consolidated clayey soils, however, such as the very soft to medium stiff clay to silty clay (Chicago blue clay) will likely exhibit significantly lower shear strength in the short-term condition. Therefore, the lateral earth pressure analysis should be performed for walls in both the short-term (undrained) and long-term (drained) condition using the soil parameters shown in Tables 1 and 2.

The design of the wall should ignore 3 feet of soil in front of the wall measured from the finished ground surface elevation in providing passive pressure due to excavation required for installation

of concrete facing, drainage system and frost-heave condition. In developing the design lateral pressure, the lateral pressure due to construction equipment surcharge load should be added to the lateral earth pressure. Drainage behind the wall and underdrain should be as per IDOT Bridge Manual (IDOT 2012). The water pressure should be added to the earth pressure if drainage is not provided. The potential foundation pressure/load from the existing building on the proposed wall should be considered in design of the wall.

Table 1: Undrained Geotechnical Parameters for Design of Drilled Soldier Pile Wall
Reference Borings: 32-RWB-01, 32-RWB-02, 32-ST-01, 33-RWB-01, and VST-03

Soil Description (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active[(1)] Pressure	Passive Pressure
V Stiff SILTY CLAY LOAM FILL Surface to EL 580 feet	120	2000	0	1.00	1.00
V Soft to Soft CLAY to SILTY CLAY EL 580 to 565 feet	110	400	0	1.00	1.00
Soft to M Stiff CLAY to SILTY CLAY EL 565 to 552 feet	110	600	0	1.00	1.00
Soft to M Stiff CLAY to SILTY CLAY EL 552 to 546 feet	115	930	0	1.00	1.00
Stiff SILTY CLAY to SILTY CLAY LOAM EL 546 to 531 feet	120	1500	0	1.00	1.00
V Stiff CLAY to SILTY CLAY EL 531 to 516 feet	120	2500	0	1.00	1.00
V Dense SILTY LOAM EL 516 to 512 feet	125	0	36	0.32	3.85

(1) Active earth pressure coefficient for 1:3 (V:H) back slope

Table 2: Drained Geotechnical Parameters for Design of Drilled Soldier Pile Wall
Reference Borings: 32-RWB-01, 32-RWB-02, 32-ST-01, 33-RWB-01, and VST-03

Soil Description (Layer)	Unit Weight, γ (pcf)	Drained Shear Strength Properties		Earth Pressure Coefficients	
		Cohesion (psf)	Friction Angle (°)	Active[(1)] Pressure	Passive Pressure
V Stiff SILTY CLAY LOAM FILL Surface to EL 580 feet	120	100	30	0.42	--
V Soft to Soft CLAY to SILTY CLAY EL 580 to 565 feet	110	0	27	0.49	2.66
Soft to M Stiff CLAY to SILTY CLAY EL 565 to 552 feet	110	0	27	0.49	2.66
Soft to M Stiff CLAY to SILTY CLAY EL 552 to 546 feet	115	0	28	0.47	2.77
Stiff SILTY CLAY to SILTY CLAY LOAM EL 546 to 531 feet	120	80	29	0.44	2.88
V Stiff CLAY to SILTY CLAY EL 531 to 516 feet	120	100	30	0.42	3.00
V Dense SILTY LOAM EL 516 to 512 feet	125	0	36	0.32	2.66

[(1)] Active earth pressure coefficient for 1:3 (V:H) back slope

Design considerations should include deflection control at the top of the wall. The lateral deformation of the wall should be designed using the parameters shown in Table 3 using the p-y curve (COMP624) method.

Table 3: Recommended Parameters for Lateral Load Analysis of Drilled Soldier Pile Wall
Reference Borings: 32-RWB-01, 32-RWB-02, 32-ST-01, 33-RWB-01, and VST-03

Soil Type (Layer)	Unit Weight, γ (pcf)	Undrained Shear Strength, c_u (psf)	Estimated Friction Angle, Φ (°)	Estimated Lateral Soil Modulus Parameter, k (pci)	Estimated Soil Strain Parameter, ε_{50} (%)
V Stiff SILTY CLAY LOAM FILL Surface to EL 580 feet	120	2000	0	500	0.8
V Soft to Soft CLAY to SILTY CLAY EL 580 to 565 feet	110	400	0	50	1.0
Soft to M Stiff CLAY to SILTY CLAY EL 565 to 552 feet	110	600	0	80	1.0
Soft to M Stiff CLAY to SILTY CLAY EL 552 to 546 feet	115	930	0	100	1.0
Stiff SILTY CLAY to SILTY CLAY LOAM EL 546 to 531 feet	120	1500	0	500	0.7
V Stiff CLAY to SILTY CLAY EL 531 to 516 feet	120	2500	0	1000	0.5
V Dense SILTY LOAM EL 516 to 512 feet	125	0	36	120	--

Global Stability

Global stability analysis was performed at Station 8681+75.00 for the maximum wall retained height of about 6.7 feet. Analysis was performed with *SLIDE Version 6* computer software. The minimum required FOS is 1.5 (IDOT 2015). With a 4-foot of the soldier pile embedment, the minimum factor of safety (FOS) calculated were 1.68 (Appendix C-1) for the undrained condition and 1.77 (Appendix C-2) for the drained condition. Results of global stability analyses are presented in Appendix C. The designer should perform the lateral load analyses using earth pressure diagram and allowable deflection to determine the final embedment depth.

CONSTRUCTION CONSIDERATIONS

Groundwater level measurements were made in the borings at the time of drilling and monitor in piezometer 30-PZ-01. The granular fill soils may exhibit perched groundwater conditions. These layers may be intercepted during shallow excavations. Seepage water that does accumulate in open excavations above groundwater level can be removed using the sump pump method. Intermittent water-bearing layers may also present at deeper levels within the proposed drilled piles.

The soft soil layer with Q_u less than 0.5 tsf (500 psf cohesion) is prone to squeeze if left open for long period of time. Therefore, to minimize the squeeze potential, casing should be provided. Due to high squeeze potential, the following note should appear on the final plans:

'Due to the squeeze potential of the clay soils, the use of temporary casing will be required to properly construct the shafts. Casing may be pulled or remain in place, as determined by the Contractor at no cost to the Department.'

The wall should be constructed as per IDOT Standard Specifications and the current special provisions developed by IDOT for construction of drilled soldier pile wall.

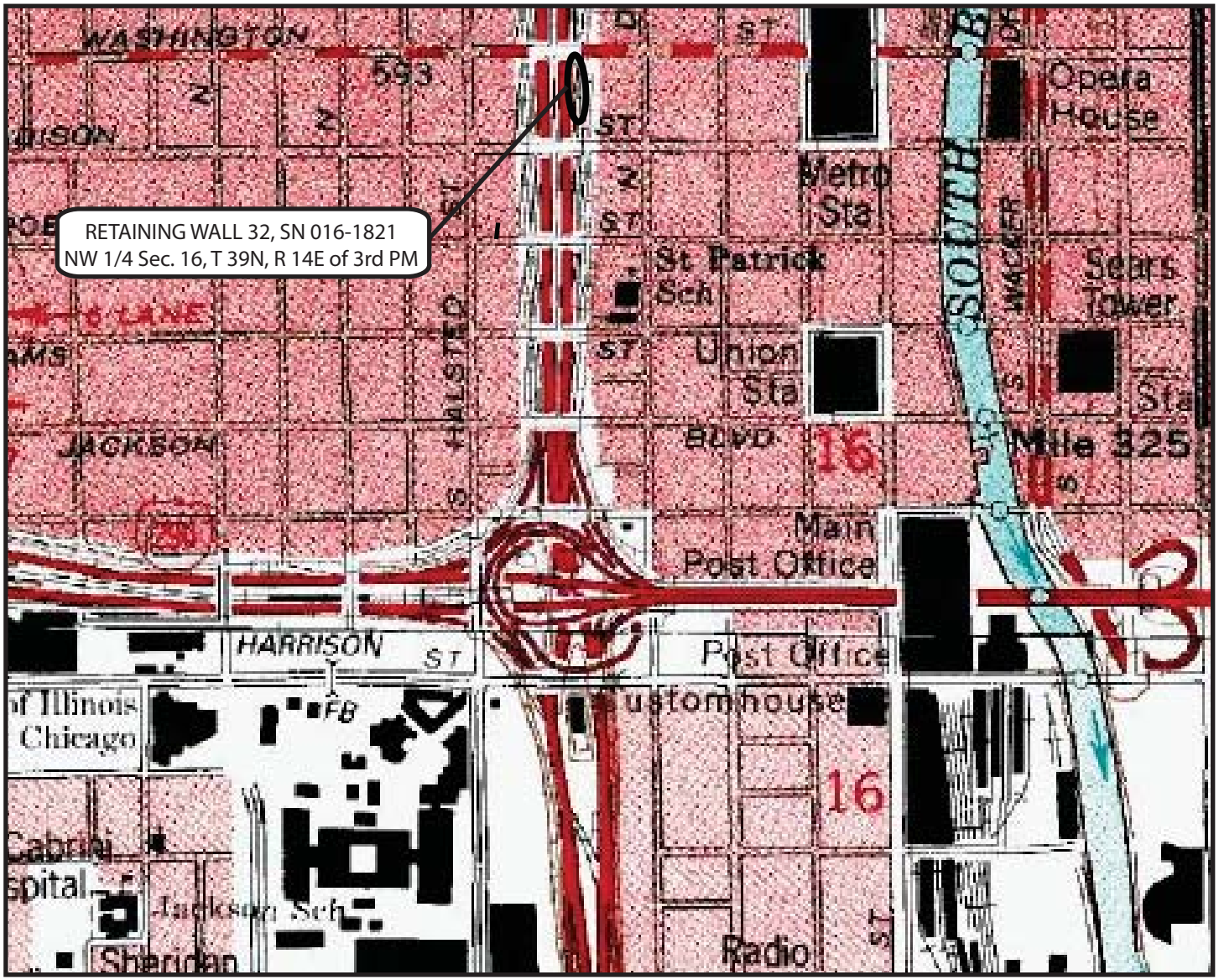
During shaft construction, the existing building and walls should be monitored for movement. Survey points should be established to monitor horizontal and vertical movements.

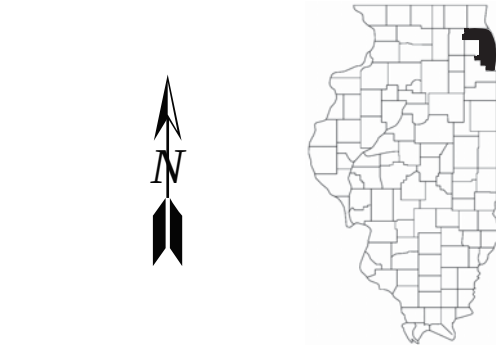
Attachments:

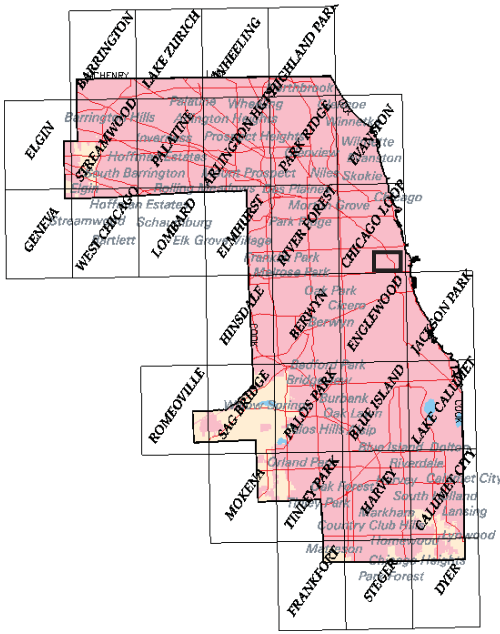
Exhibit 1 - Site Location Map
Exhibit 2 - Boring Location Plan
Exhibit 3 – Subsurface Soil Profile
Appendix A - Boring Logs
Appendix B - Laboratory Testing
Appendix C - Slope Stability Analyses
Appendix D - TSL plan and In-Progress Cross-Sections

Copy To: Corina Farez, Wang Engineering

EXHIBITS







Cook County

0 0.25 0.5 Mile

SITE LOCATION MAP: CIRCLE INTERCHANGE RECONSTRUCTION
RETAINING WALL 32, SN 016-1821, COOK COUNTY

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: NSB CHECKED BY: MWS

Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR AECOM	1100-04-01

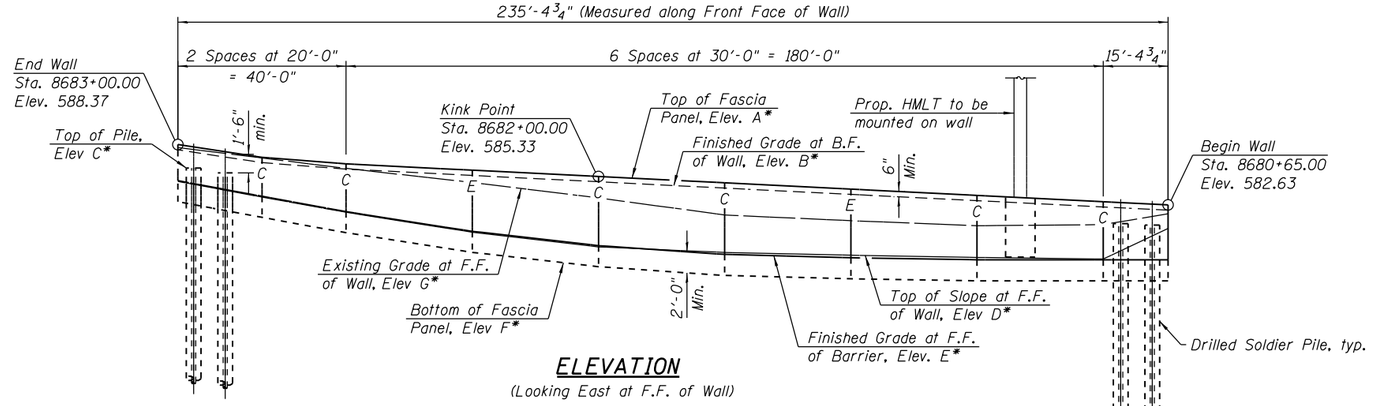
Bench Mark: Set "X" on northwest corner of handhole along east edge of SB I-90/94 20 feet north of Madison Street. Elev. 596.13.

Existing Structure: None

Traffic on NB Washington Exit Ramp will be detoured during construction.

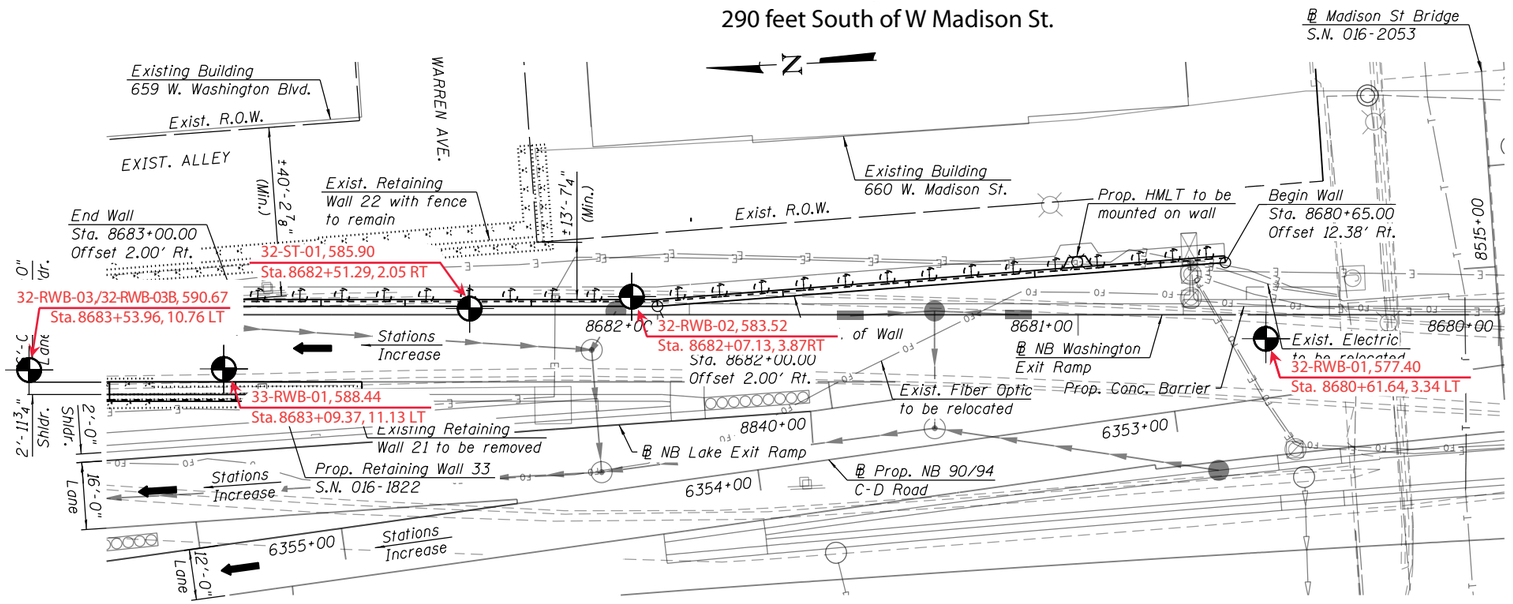
No Salvage.

Notes:
1.) Wall offsets are measured from the ℄ of NB Washington Exit Ramp to the front face of cast-in-place fascia panels.
2.) C denotes construction joint.
3.) E denotes expansion joint.
4.) F.F. denotes Front Face.
5.) B.F. denotes Back Face.
6.) Soldier pile section, shaft diameter, spacing, and tip elevation to be determined during final design.
6.) Proposed drainage information shown is conceptual and will be determined during final design.



ELEVATION
(Looking East at F.F. of Wall)

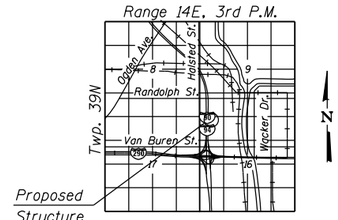
* For elevations, see Table 1 on Sheet 2 of 2.



PLAN

HIGHWAY CLASSIFICATION

NB Washington Exit Ramp
Functional Class: Interstate
ADT: 3,500 (2012); 4,000 (2040)
ADTT: 0 (2012); 0 (2040)
DHV: 430 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%



LOCATION SKETCH

DESIGN SPECIFICATIONS

2017 AASHTO LRFD Bridge Design Specifications 8th Edition

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)

SOLDIER PILES

fy = 50,000 psi (AASHTO M270 Gr. 50)

LEGEND:

Combined Sewer		Soil Boring	
Electric	E E	Existing Catch Basin	
Ex. Storm Sewer		Proposed Catch Basin	
Prop. Storm Sewer		Existing Manhole	
Ex. Fiber Optic	FO FO	Proposed Manhole	
Ex. Telephone	T	Proposed Inlet	
Ex. ITS Cable			

GENERAL PLAN
RETAINING WALL 32 ALONG NB WASHINGTON EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2015-019R
COOK COUNTY
STATION 8680+65.00 TO STATION 8683+00.00
STRUCTURE NO. 016-1821

BORING LOCATION PLAN: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 32 ALONG NB WASHINGTON EXIT RAMP SN. 016-1821, COOK COUNTY, IL

SCALE: GRAPHICAL | EXHIBIT 2 | DRAWN BY: RKC | CHECKED BY: N. Balakumaran

Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR AECOM | 1100-04-01

TranSystems

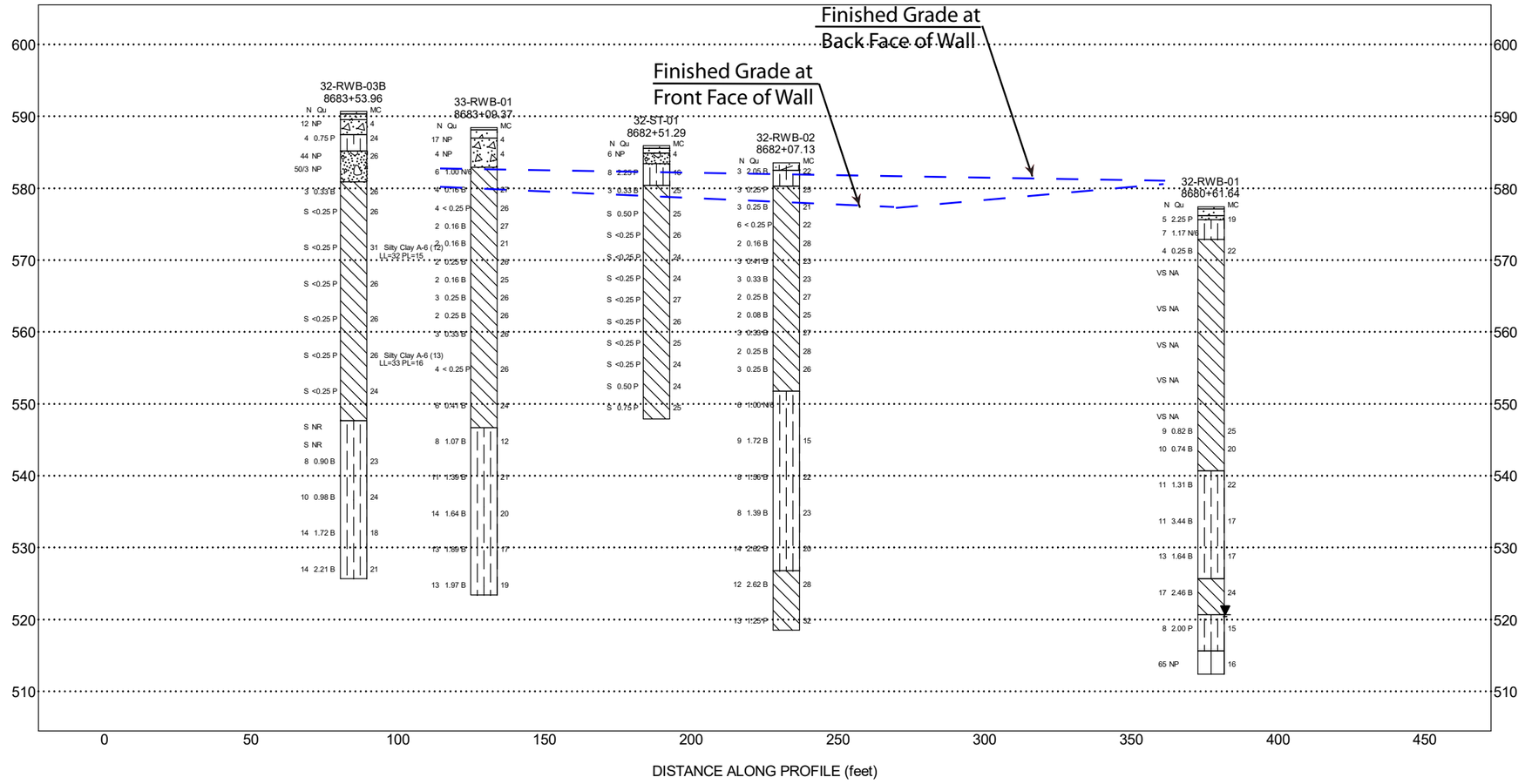
USER NAME = wjcolletti	DESIGNED - WJC	REVISED -
	CHECKED - MDS	REVISED -
PLOT SCALE = 36.0000 ' / in.	DRAWN - JM	REVISED -
PLOT DATE = 6/26/2019	CHECKED - WJC/MDS	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 2 SHEETS

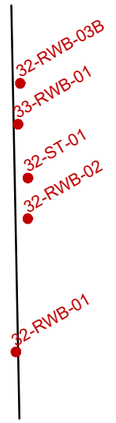
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2015-019R	COOK	2	1
		CONTRACT NO. 62A76		
		ILLINOIS FED. AID PROJECT		

3:25:06 PM - pw:\AECOM-NA-AWS.gecomonline.local:AECOM_0502_NA\Documents\01 Americas\Transportation\60269938 Circle\Phase_IN\000_CAD\008_Structure\Structure_016-1821\TSL\Sheets\016821-62A76-SHT-TSL-001.dgn



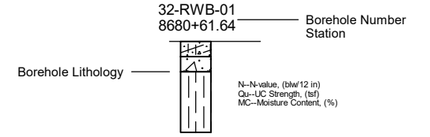
Lithology Graphics

Pavement
Concrete
Crushed stone
IDH Silty Clay, Silty Clay Loam
IDH Clay
IDH Silt, Silty Loam
Gravelly sand, sandy gravel



Site Map Scale 1 inch equals 165 feet

Explanation:



Water Level Reading at time of drilling.

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

0 45

Horizontal Scale (feet)

Vertical Exaggeration: 2.5x

Wang Engineering, Inc.
1145 N. Main Street
Lombard/IL/60148

Subsurface Soil Data Profile
Retaining Wall 32, SN 016-1821

WEI SINCE 1982

Jane Byrne Interchange
Section 17, T39N, R14E of 3rd PM

JOB NUMBER	PLATE NUMBER
1100-04-01	EXHIBIT 3

WEI 11X17 1100401.GPJ BEARING-TRIAL.GDT 7/10/19

APPENDIX A

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 32-RWB-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.40 ft
North: 1900327.19 ft
East: 1171617.41 ft
Station: 8680+61.64
Offset: 3.3374 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	577.1	4-inch thick, ASPHALT --PAVEMENT--						
	576.2	11-inch thick, CONCRETE --PAVEMENT--						
	575.7	CRUSHED STONE --BASE COURSE--			1	3 2 3	2.25 P	19
		Stiff, gray SILTY CLAY, trace gravel and brick fragments --FILL--			2	3 3 4	1.17 N/6	
	572.9	Soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel	5		3	1 2 2	0.25 B	22
		--In-Situ Vane Shear, 9.5 feet-- --$S_{u\ undis}$ = 725.2 psf-- --$S_{u\ remold}$ = 440.3 psf-- --Sensitivity = 1.65--	10		1	VS		
		--In-Situ Vane Shear, 14.5 feet-- --$S_{u\ undis}$ = 699.3 psf-- --$S_{u\ remold}$ = 362.6 psf-- --Sensitivity = 1.93--	15		2	VS		
		--In-Situ Vane Shear, 19.5 feet-- --$S_{u\ undis}$ = 802.9 psf--	20		3			
		--$S_{u\ remold}$ = 440.3 psf-- --Sensitivity = 1.82--				VS		
		--In-Situ Vane Shear, 24.5 feet-- --$S_{u\ undis}$ = 984.2 psf-- --$S_{u\ remold}$ = 466.2 psf-- --Sensitivity = 2.11--	25		4	VS		
		--In-Situ Vane Shear, 29.5 feet-- --$S_{u\ undis}$ = 1450.4 psf-- --$S_{u\ remold}$ = 751.1 psf-- --Sensitivity = 1.93--	30		5	VS		
					4	4 4 5	0.82 B	25
			35		5	3 4 6	0.74 B	20
	540.7	Stiff to very stiff, gray SILTY CLAY, trace gravel						
			40		6	3 5 6	1.31 B	22

GENERAL NOTES

Begin Drilling: **07-02-2014** Complete Drilling: **07-02-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 9.5', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 32-RWB-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 577.40 ft
North: 1900327.19 ft
East: 1171617.41 ft
Station: 8680+61.64
Offset: 3.3374 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--Interbedded SILT--	45		7	5 6 5	3.44 B	17
			50		8	4 6 7	1.64 B	17
	525.7	Very stiff, gray CLAY, trace gravel						
			55		9	5 6 11	2.46 B	24
	520.7	Very stiff, gray SILTY CLAY LOAM						
		--Interbedded SILT and SAND, saturated--	60		10	3 4 4	2.00 P	15
	515.7	Very dense, gray SILTY LOAM, trace gravel --Wet--						
	512.4	Boring terminated at 65.00 ft	65		11	22 28 37	NP	16
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling: **07-02-2014** Complete Drilling: **07-02-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 9.5', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 32-RWB-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 583.52 ft
North: 1900472.26 ft
East: 1171630.21 ft
Station: 8682+07.13
Offset: 3.8668 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	582.5	12-inch thick ASPHALT --PAVEMENT--						
		Very stiff, brown and gray SILTY CLAY LOAM, trace gravel --FILL--			1	3 1 2	2.05 B	22
	580.3	Very soft to medium stiff, gray CLAY to SILTY CLAY, trace gravel			2	2 2 1	0.25 P	25
			5		3	2 2 1	0.25 B	21
			10		4	2 3 3	< 0.25 P	22
					5	1 1 1	0.16 B	28
			15		6	1 1 2	0.41 B	23
					7	1 1 2	0.33 B	23
			20		8	1 1 1	0.25 B	27
			25		9	1 1 1	0.08 B	25
					10	1 1 2	0.33 B	27
					11	1 1 1	0.25 B	28
			30		12	0 1 2	0.25 B	26
	551.8	Stiff to very stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel						
			35		13	2 3 3	1.00 N/6	
			40		14	3 4 5	1.72 B	15

GENERAL NOTES

Begin Drilling: **06-26-2014** Complete Drilling: **06-26-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 32-RWB-02

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 583.52 ft
North: 1900472.26 ft
East: 1171630.21 ft
Station: 8682+07.13
Offset: 3.8668 RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	526.8	Stiff to very stiff, gray CLAY, trace gravel	45		15	3 4 4	1.56 B	22
			50		16	4 3 5	1.39 B	23
			55		17	5 6 8	2.62 B	20
			60		18	5 6 6	2.62 B	28
	518.5	Boring terminated at 65.00 ft	65		19	5 6 7	1.25 P	32
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling: **06-26-2014** Complete Drilling: **06-26-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **A. Happel** Checked by: **C. Marin**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 32-RWB-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 590.67 ft
North: 1900619.59 ft
East: 1171621.95 ft
Station: 8683+53.96
Offset: 10.7621 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	590.3	4.5-inch thick ASPHALT --PAVEMENT--						
	589.5	9.5-inch thick CONCRETE --PAVEMENT--						
		Loose, brown and white CRUSHED STONE --BASE COURSE--			1	6 8 3	NP	7
	587.4	Medium stiff, brown SILTY CLAY, trace gravel and brick fragments --FILL--	5		2	3 3 4	0.50 P	22
					3	3 3 9	0.57 B	24
		--Obstruction at 8.5 feet--						
	582.2	Boring terminated at 8.50 ft	10					
			15					
			20					

GENERAL NOTES

Begin Drilling: **06-30-2014** Complete Drilling: **06-30-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **DRY**
At Completion of Drilling: **DRY**
Time After Drilling: **NA**
Depth to Water: **NA**

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

WANGENGINC 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 32-RWB-03B

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 590.67 ft
North: 1900619.59 ft
East: 1171621.95 ft
Station: 8683+53.96
Offset: 10.7621 LT

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
590.4	4-inch thick ASPHALT --PAVEMENT--						
589.5	10-inch thick CONCRETE --PAVEMENT--						
	Medium dense, light brown and white CRUSHED STONE --BASE COURSE--			1	7 7 5	NP	4
587.4	Medium stiff, brown SILTY CLAY LOAM, little gravel and brick fragments --FILL--	5		2	2 2 2	0.75 P	24
585.2	Dense to very dense, dark brown SANDY GRAVEL, some cinders and brick fragments --FILL--			3	14 7 37	NP	26
				4	50/3	NP	
580.9	Very soft to soft, gray CLAY to SILTY CLAY, trace gravel	10		5	1 1 2	0.33 B	26
		15		1	PUSH	<0.25 P	26
	L_L(%)=32, P_L(%)=15-- --%Gravel=2.3-- --%Sand=18.0-- --%Silt=49.2--	20		2	PUS	<0.25	31
	--%Clay=30.4-- --A-6 (12)--	25		3	PUSH	<0.25 P	26
		30		4	PUSH	<0.25 P	26
	L_L(%)=33, P_L(%)=16-- --%Gravel=3.2-- --%Sand=13.8-- --%Silt=49.0-- --%Clay=34.0-- --A-6 (13)--	35		5	PUSH	<0.25 P	26
		40		6	PUS	<0.25	24

GENERAL NOTES

Begin Drilling: **07-01-2014** Complete Drilling: **07-01-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" IDA HSA to 11', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 32-RWB-03B

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 590.67 ft
North: 1900619.59 ft
East: 1171621.95 ft
Station: 8683+53.96
Offset: 10.7621 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	547.7	Medium stiff to very stiff, gray SILTY CLAY, trace gravel						
						H	P	
			45		7	PUSH	NR	
					8	PUSH	NR	
			50		6	3 3 5	0.90 B	23
			55		7	4 4 6	0.98 B	24
			60		8	4 7 7	1.72 B	18
	525.7	Boring terminated at 65.00 ft	65		9	7 5 9	2.21 B	21
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling: **07-01-2014** Complete Drilling: **07-01-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" IDA HSA to 11', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 32-ST-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 585.90 ft
North: 1900516.46 ft
East: 1171630.30 ft
Station: 8682+51.29
Offset: 2.0492' RT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	585.6	4-inch thick, ASPHALT --PAVEMENT--						
	584.9	8-inch thick, CONCRETE --PAVEMENT--						
		Loose, gray GRAVELLY SAND --BASE COURSE--			1	4 4 2	NP	4
	583.4	Very stiff, brown and gray SILTY CLAY LOAM, trace gravel --FILL--	5		2	3 4 4	2.25 P	16
	580.4	Soft, gray CLAY to SILTY CLAY, trace gravel			3	1 1 2	0.33 B	25
		--UU test-- --Shear Strength(C_U)=288 psf--	10		1	PUSH	0.50 P	25
					2	PUSH	<0.25 P	26
		--UU test-- --Shear Strength(C_U)=576 psf--	15		3	PUSH	<0.25 P	24
			20		4	PUSH	<0.25 P	24
		--C_c = 0.212, OCR=1.03--	25		5	PUSH	<0.25 P	27
					6	PUSH	<0.25 P	26
		--UU test-- --Shear Strength(C_U)=576 psf--			7	PUSH	<0.25 P	25
			30		8	PUSH	<0.25 P	24
		--UU test-- --Shear Strength(C_U)=720 psf--			9	PUSH	0.50 P	24
			35		10	PUSH	0.75 P	25
	547.9	Boring terminated at 38.00 ft	40					

GENERAL NOTES

Begin Drilling: **10-20-2014** Complete Drilling: **10-20-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **P&P** Logger: **F. Bozga** Checked by: **GLM (-coord, lab)**
Drilling Method: **3.25" IDA HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 33-RWB-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 588.44 ft
North: 1900575.06 ft
East: 1171619.65 ft
Station: 8683+09.37
Offset: 11.1322 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	588.1	4-inch thick ASPHALT --PAVEMENT--						
	586.9	14-inch thick CONCRETE --PAVEMENT--						
		Loose to medium dense, brown and white CRUSHED STONE --BASE COURSE--			1	10 9 8	NP	4
			5		2	4 2 2	NP	4
	582.9	Very soft to soft, gray CLAY to SILTY CLAY, trace gravel			3	2 3 3	1.00 N/6	
			10		4	1 2 2	0.16 B	27
					5	4 3 1	< 0.25 P	26
			15		6	1 1 1	0.16 B	27
					7	1 1 1	0.16 B	21
			20		8	1 1 1	0.25 B	26
			25		9	1 1 1	0.16 B	25
					10	1 1 2	0.25 B	26
					11	1 1 1	0.25 B	26
			30		12	1 1 2	0.33 B	26
			35		13	1 2 2	< 0.25 P	26
			40		14	2 3 3	0.41 B	24

GENERAL NOTES

Begin Drilling: **06-29-2014** Complete Drilling: **06-29-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG 33-RWB-01

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 588.44 ft
North: 1900575.06 ft
East: 1171619.65 ft
Station: 8683+09.37
Offset: 11.1322 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	546.7	Stiff, gray SILTY CLAY to SILTY CLAY LOAM, trace gravel						
			45		15	3 4 4	1.07 B	12
			50		16	3 5 6	1.39 B	21
			55		17	5 7 7	1.64 B	20
			60		18	3 5 8	1.89 B	17
	523.4	Boring terminated at 65.00 ft	65		19	4 6 7	1.97 B	19
			70					
			75					
			80					

GENERAL NOTES

Begin Drilling: **06-29-2014** Complete Drilling: **06-29-2014**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **N&K** Logger: **D. Kolpacki** Checked by: **C. Marin**
Drilling Method: **2.25" HSA, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/11/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG VST-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.21 ft
North: 1899985.05 ft
East: 1171693.33 ft
Station: 8415+53.90
Offset: 182.276 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	592.9	ASPHALT						
		--PAVEMENT--						
		Medium dense, brown gravelly coarse SAND						
		--FILL--						
			5		1	5 7 7	NP	6
	586.5							
		Medium stiff, brown and gray SILTY CLAY LOAM						
			10		2	3 2 2	0.75 P	26
	580.2							
		Soft, gray SILTY CLAY						
			15		3	3 2 2	NR	
					4	1 1 1	0.25 P	23
	575.0							
		--In-Situ Vane Shear, 19.5 feet--	20		1			

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--$S_{u\ undis}$ = 425.9 psf-- --$S_{u\ remold}$ = 371.3 psf-- --Sensitivity = 1.1--				VS		
		--In-Situ Vane Shear, 22.0 feet-- --$S_{u\ undis}$ = 371.3 psf-- --$S_{u\ remold}$ = 305.8 psf-- --Sensitivity = 1.2--			2	VS		
		--In-Situ Vane Shear, 24.5 feet--	25		3	VS		
		--$S_{u\ undis}$ = 382.2 psf-- --$S_{u\ remold}$ = 316.7 psf-- --Sensitivity = 1.2--						
		--In-Situ Vane Shear, 27.0 feet-- --$S_{u\ undis}$ = 393.1 psf-- --$S_{u\ remold}$ = 338.5 psf-- --Sensitivity = 1.2--			4	VS		
		--In-Situ Vane Shear, 29.5 feet--	30		5	VS		
		--$S_{u\ undis}$ = 622.5 psf-- --$S_{u\ remold}$ = 371.3 psf-- --Sensitivity = 1.7--						
		--In-Situ Vane Shear, 32.0 feet-- --$S_{u\ undis}$ = 535.1 psf-- --$S_{u\ remold}$ = 327.6 psf-- --Sensitivity = 1.6--			6	VS		
		--In-Situ Vane Shear, 34.5 feet--	35		7	VS		
		--$S_{u\ undis}$ = 535.1 psf-- --$S_{u\ remold}$ = 393.1 psf-- --Sensitivity = 1.4--						
		--In-Situ Vane Shear, 37.0 feet-- --$S_{u\ undis}$ = 655.2 psf-- --$S_{u\ remold}$ = 404.1 psf-- --Sensitivity = 1.6--			8	VS		
		--In-Situ Vane Shear, 39.5 feet--	40		9			

GENERAL NOTES

Begin Drilling: **12-02-2015** Complete Drilling: **12-02-2015**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&N** Logger: **F. Bozga** Checked by: **A. Kurnia**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/3/19

Wang Engineering
wangeng@wangeng.com
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

BORING LOG VST-03

WEI Job No.: 1100-04-01

Client: **AECOM**
Project: **Jane Byrne Interchange**
Location: **Section 17, T39N, R14E of 3rd PM**

Datum: NAVD 88
Elevation: 593.21 ft
North: 1899985.05 ft
East: 1171693.33 ft
Station: 8415+53.90
Offset: 182.276 LT

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type / recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--$S_{u\ undis}$ = 622.5 psf--				VS		
		--$S_{u\ remold}$ = 382.2 psf--						
		--Sensitivity = 1.6--						
		--In-Situ Vane Shear, 42.0 feet--			10	VS		
		--$S_{u\ undis}$ = 851.8 psf--						
		--$S_{u\ remold}$ = 458.7 psf--						
		--Sensitivity = 1.9--						
		--In-Situ Vane Shear, 44.5 feet--	45		11	VS		
		--$S_{u\ undis}$ = 928.3 psf--						
		--$S_{u\ remold}$ = 600.6 psf--						
		--Sensitivity = 1.5--						
		--In-Situ Vane Shear, 47.0 feet--			12	VS		
		--$S_{u\ undis}$ = 1266.8 psf--						
		--$S_{u\ remold}$ = 633.4 psf--						
		--Sensitivity = 2.0--						
			50					
	541.7	--In-Situ Vane Shear, 51.0 feet--			13	VS		
		--$S_{u\ undis}$ = 1681.8 psf--						
		--$S_{u\ remold}$ = 1266.8 psf--						
		--Sensitivity = 1.3--						
		Boring terminated at 51.50 ft						
			55					
			60					

GENERAL NOTES

Begin Drilling: **12-02-2015** Complete Drilling: **12-02-2015**
Drilling Contractor: **Wang Testing Services** Drill Rig:
Driller: **R&N** Logger: **F. Bozga** Checked by: **A. Kurnia**
Drilling Method: **2.25" HSA to 10', mud rotary thereafter, boring backfilled upon completion**

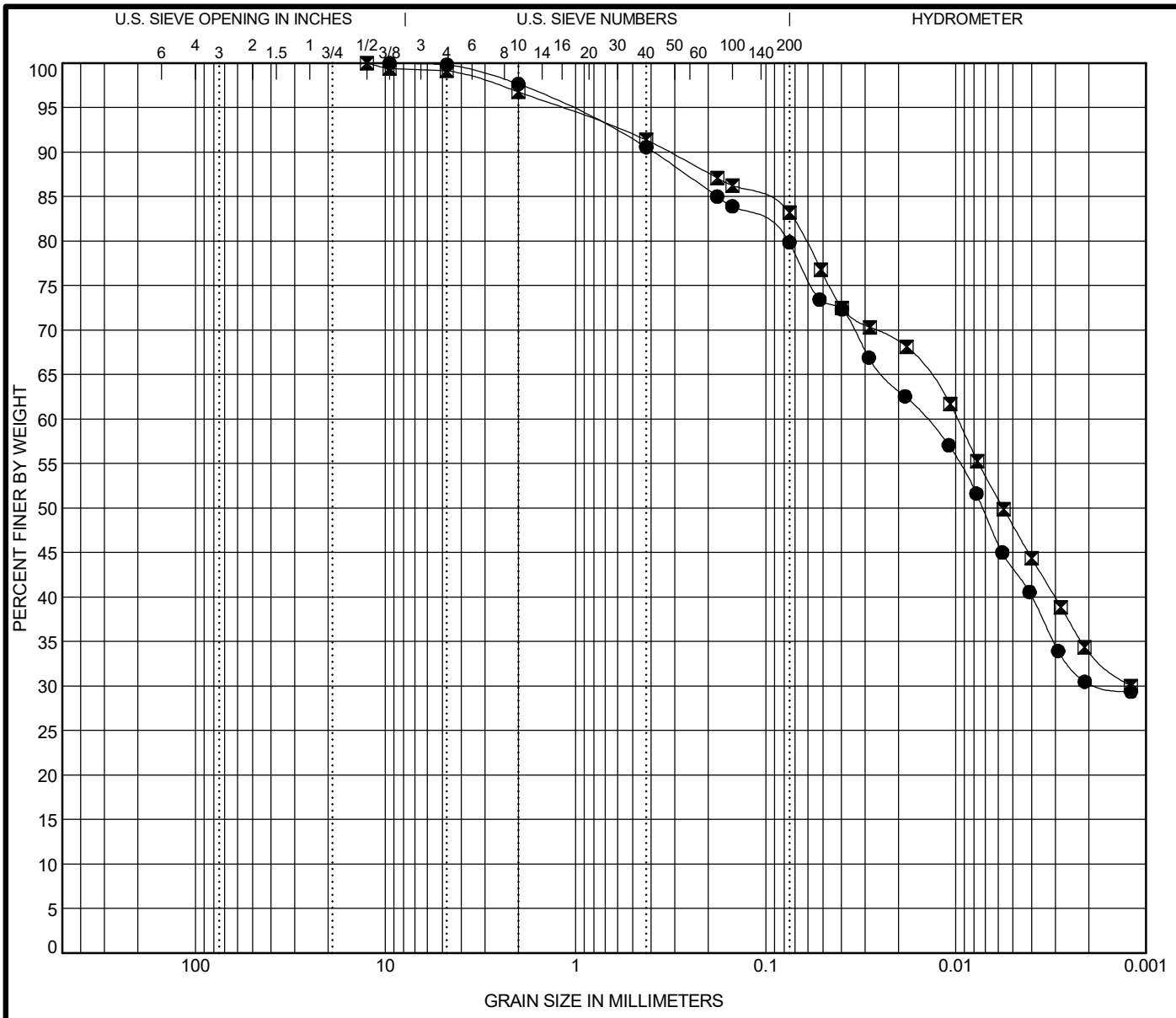
WATER LEVEL DATA

While Drilling: **Rotary wash**
At Completion of Drilling: **mud in the borehole**
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 11000401.GPJ WANGENG.GDT 7/3/19

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	32-RWB-03B#2	18.5 ft	**Silty Clay**	**32**	**15**	**17**		
⊠	32-RWB-03B#5	33.5 ft	**Silty Clay**	**33**	**16**	**17**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	32-RWB-03B#2	18.5 ft	**9.5**	**0.014**	**0.002**		**2.3**	**18.0**	**49.2**	**30.4**
⊠	32-RWB-03B#5	33.5 ft	**12.5**	**0.01**			**3.2**	**13.8**	**49.0**	**34.0**

Wang Engineering, Inc.
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

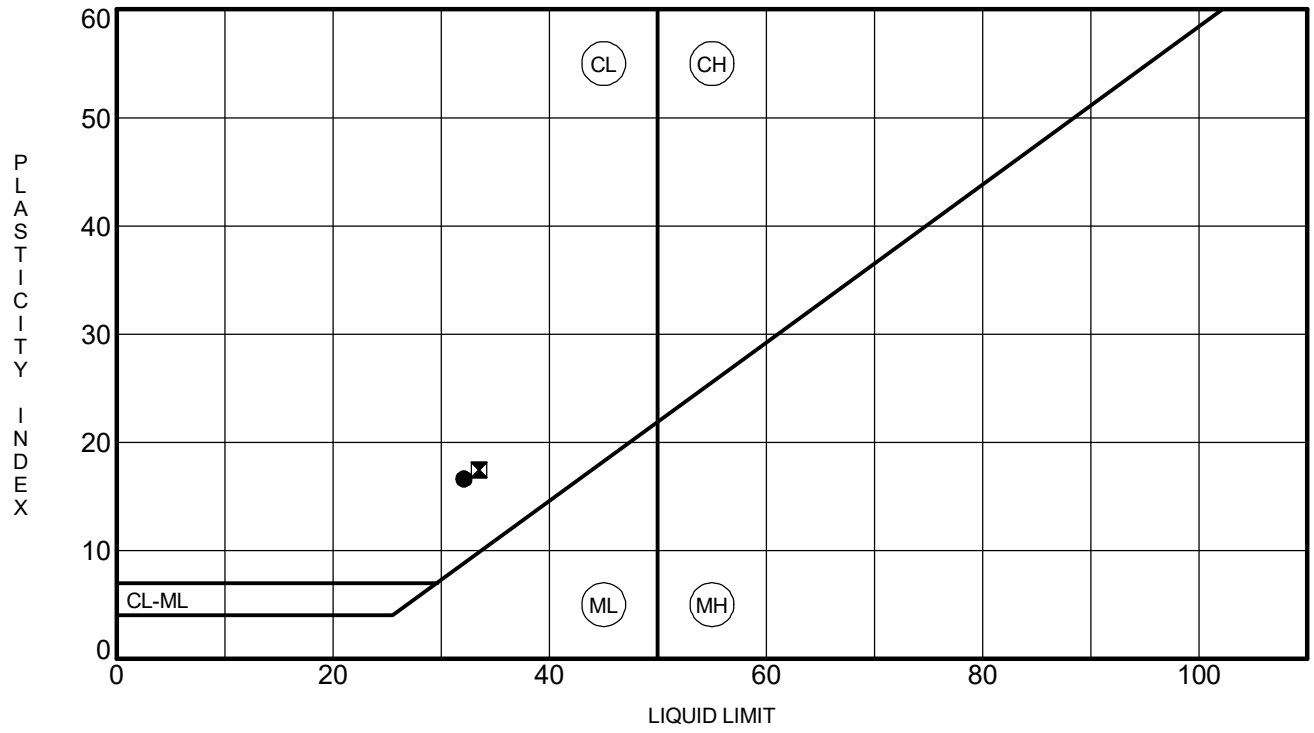
GRAIN SIZE DISTRIBUTION

Project: Jane Byrne Interchange

Location: Section 17, T39N, R14E of 3rd PM

Number: 1100-04-01

WEI GRAIN SIZE IDH 11000401.GPJ US LAB.GDT 7/5/19



Specimen Identification		LL	PL	PI	Fines	IDH Classification
● 32-RWB-03B#2	18.5 ft	32	15	17	80	Silty Clay
⊠ 32-RWB-03B#5	33.5 ft	33	16	17	83	Silty Clay

WEI SINCE 1982
Wang Engineering, Inc.
1145 N. Main Street
Lombard/IL/60148
Telephone: 6309539928
Fax: 6309539938

ATTERBERG LIMITS' RESULTS

Project: Jane Byrne Interchange

Location: Section 17, T39N, R14E of 3rd PM

Number: 1100-04-01

WEI ATTERBERG LIMITS IDH 11000401.GPJ US LAB.GDT 7/5/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

ONE-DIMENSIONAL CONSOLIDATION TEST
AASHTO T 216 / ASTM D 2435

Project: Circle Interchange
Client: AECOM
Soil Sample ID: Boring 32-ST-01, ST#5, 21' to 23'
Sample Description: Gray CLAY with trace gravel (CL)

Tested by: M. Snider
Prepared by: M. Snider
Test date: 11/12/2014
WEI: 1100-04-01

Initial sample height =	1.004 in	Ring diameter =	2.495 in
Initial sample mass =	163.12 g	Ring mass =	109.98 g
Initial water content =	26.04%	Initial sample and ring mass =	273.10 g
Initial dry unit weight =	100.46 pcf	Tare mass =	78.78 g
Initial void ratio =	0.727	Final ring and sample mass =	264.82 g
Initial degree of saturation =	99.60%	Mass of wet sample and tare =	233.29 g
		Mass of dry sample and tare =	208.20 g
Final sample mass =	154.51 g	Initial dial reading =	0.01000 in
Final dry sample mass =	129.42 g	Final dial reading =	0.13864 in
Final water content =	19.39%	LL=	n.a. %
Final dry unit weight =	115.22 pcf	PL=	n.a. %
Final void ratio =	0.506	% Sand=	n.a. %
Final degree of saturation =	100.00%	% Silt=	n.a. %
Estimated specific gravity =	2.78	% Clay=	n.a. %
		In-Situ Vertical Effective Stress =	1800 psf

Compression and Swelling Indices

Compression index C_c =	0.177	**Preconsolidation pressure,s_C**	
Field corrected C_c =	0.212	Casagrande Method =	1845 psf
Swelling index C_s =	0.047	**Over-Consolidation Ratio (OCR) =**	1.03

Load number	Vertical stress	Dial reading	System deflection	Vertical strain	Void ratio	C_v	Cae	Elapsed time
	psf	in	in	%		ft^2/day	%	min
1	100.0	0.01281	0.00010	0.29	0.722	N/A	N/A	480
2	200.0	0.01671	0.00023	0.69	0.715	0.0614	0.06	1500
3	500.0	0.02694	0.00058	1.74	0.697	0.0675	0.14	3240
4	1000.0	0.03953	0.00090	3.03	0.674	0.0593	0.29	480
5	2000.0	0.06019	0.00135	5.13	0.638	0.0676	0.26	975
6	4000.0	0.08451	0.00193	7.61	0.595	0.0680	0.38	1740
7	8000.0	0.11304	0.00253	10.52	0.545	0.0948	0.39	1140
8	16000.0	0.14412	0.00324	13.68	0.491	0.1122	0.42	480
9	32000.0	0.17428	0.00413	16.77	0.437	0.1456	0.37	915
10	8000.0	0.17178	0.00295	16.41	0.443	N/A	N/A	480
11	2000.0	0.15710	0.00198	14.85	0.470	N/A	N/A	1335
11	500.0	0.14057	0.00123	13.13	0.500	N/A	N/A	3270

Prepared by: _____ Date: _____

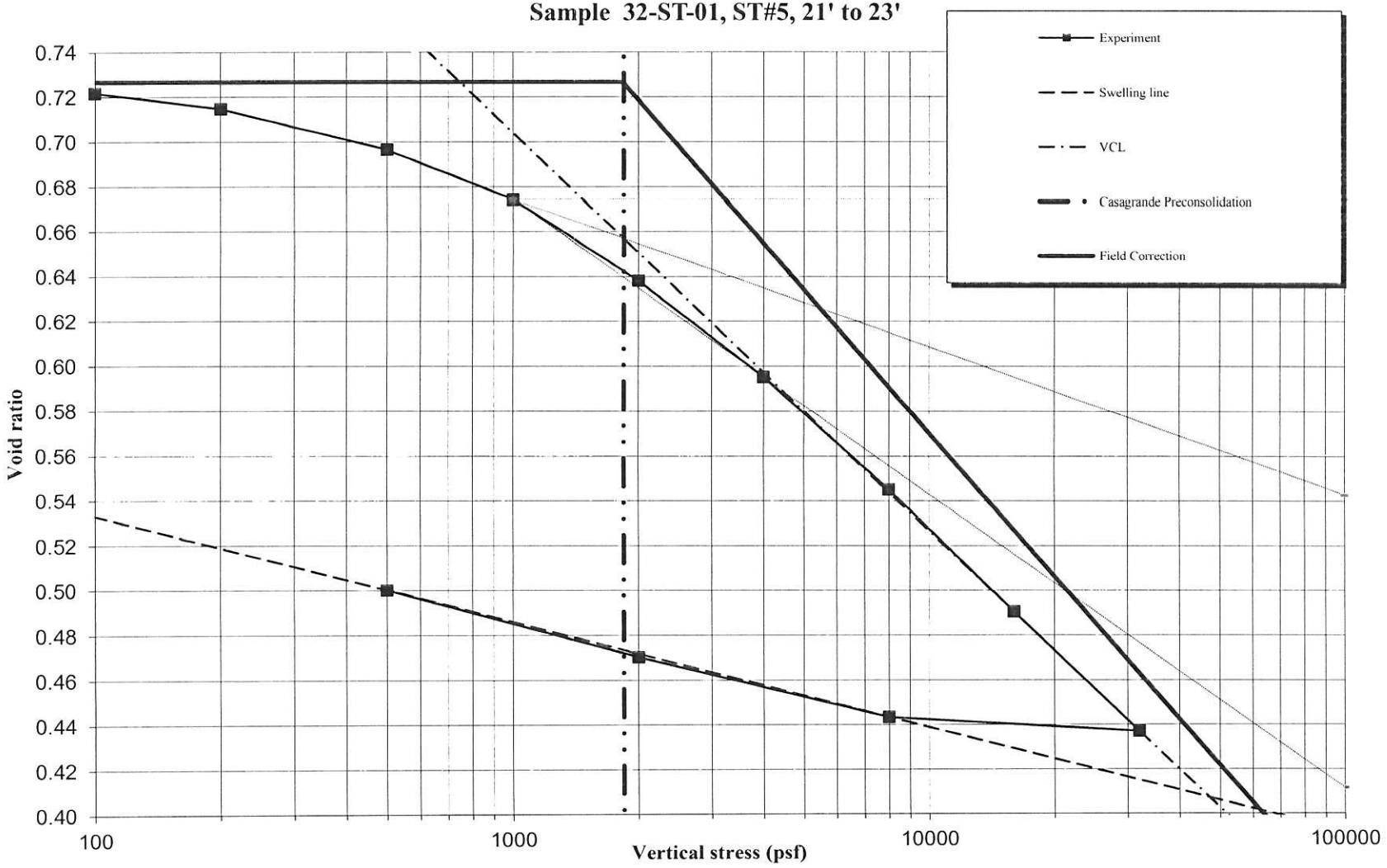
Checked by: LL Date: 4/5/19

AASHTO R18

Wang Engineering
1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

CONSOLIDATION CURVE

Sample 32-ST-01, ST#5, 21' to 23'

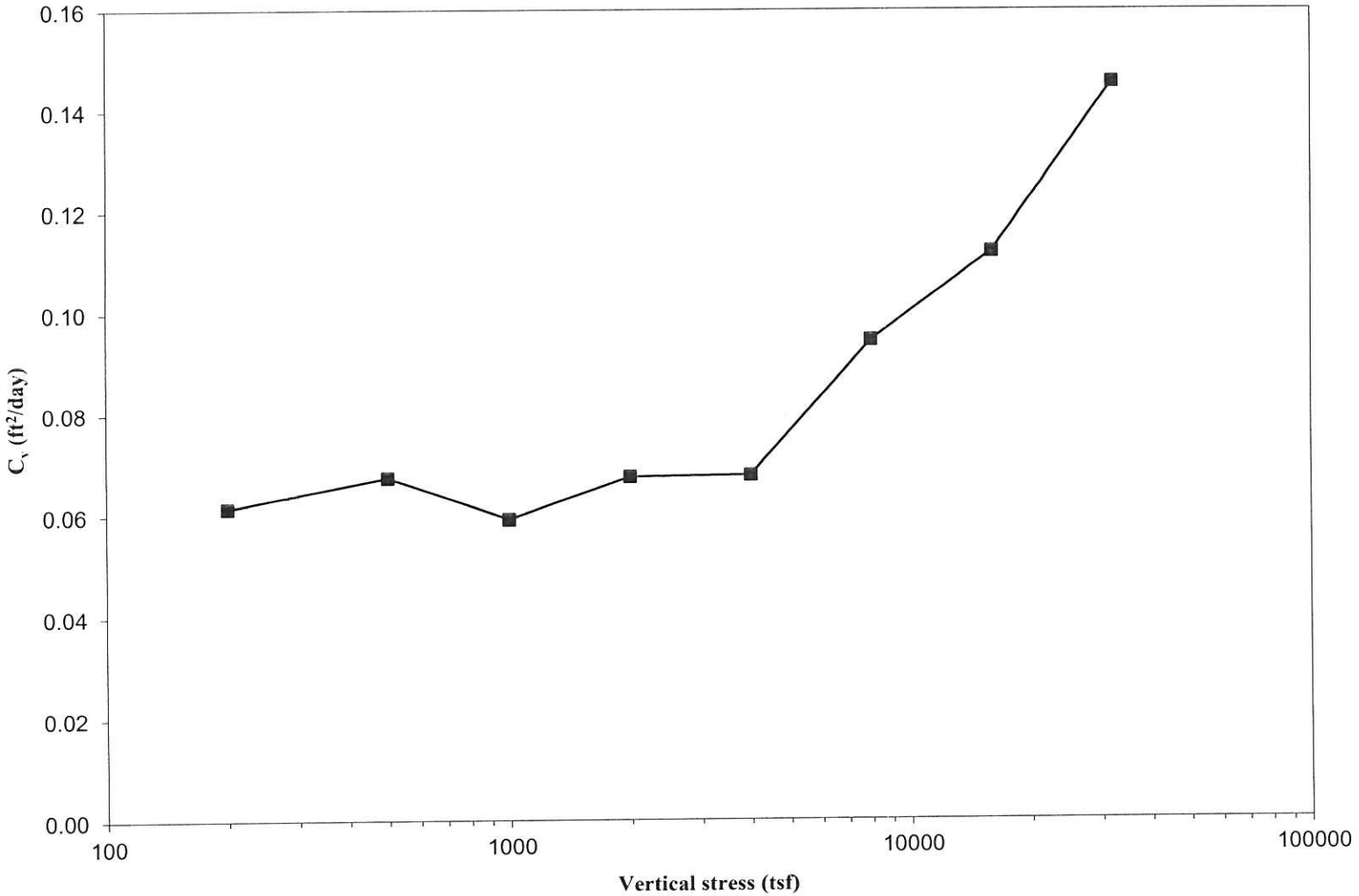


AASHTO R18

Wang Engineering
1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

CONSOLIDATION COEFFICIENT (C_v) vs. VERTICAL STRESS

Sample 32-ST-01, ST#5, 21' to 23'



AASHTO R18

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

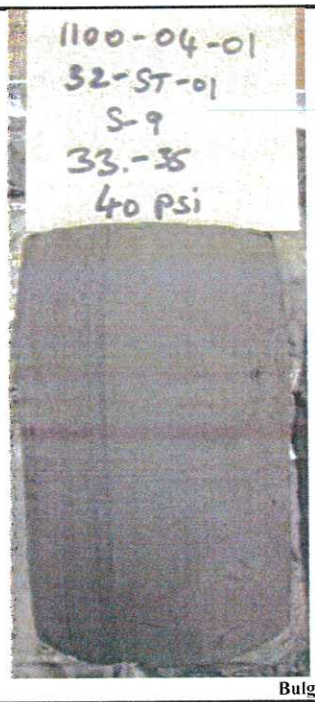
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST#9 (33.0-35.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/12/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.78 in	Initial water content w =	23.77%
Initial diameter d_0 =	2.86 in	Initial unit weight γ_w =	128.93 pcf
Initial area A_0 =	6.41 in^2	Initial dry unit weight γ_d =	104.17 pcf
Mass of wet sample and tare M_t =	1269.25 g	Initial void ratio e_0 =	0.665
Mass of dry sample and tare M_d =	1028.20 g	Initial degree of saturation S_r =	99%
Mass of tare M_t =	14.15 g		
Mass of sample Ms=	1255.10 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	40.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.02		

Deviator stress at failure $D\sigma_f$ = 0.95 tsf
Major principal stress at failure σ_1 = 3.83 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	1.38	0.03	0.21
0.01	2.40	0.12	0.37
0.01	2.28	0.21	0.36
0.02	6.35	0.30	0.99
0.02	16.32	0.39	2.53
0.03	21.14	0.49	3.28
0.03	24.36	0.59	3.78
0.04	27.25	0.69	4.22
0.05	30.17	0.79	4.67
0.05	32.81	0.88	5.07
0.08	41.95	1.37	6.45
0.11	50.08	1.84	7.67
0.13	56.36	2.32	8.58
0.16	60.35	2.79	9.15
0.19	63.30	3.29	9.55
0.22	65.89	3.78	9.88
0.25	68.65	4.27	10.25
0.28	71.22	4.76	10.58
0.30	73.43	5.25	10.85
0.33	76.58	5.72	11.26
0.36	79.19	6.19	11.58
0.39	80.27	6.67	11.68
0.41	80.98	7.14	11.72
0.44	82.73	7.61	11.92
0.47	84.35	8.09	12.09
0.50	85.68	8.61	12.21
0.52	88.57	9.08	12.56
0.55	90.59	9.54	12.78
0.61	90.42	10.50	12.62
0.66	93.38	11.46	12.89
0.72	96.40	12.44	13.16
0.78	97.98	13.42	13.23
0.83	99.08	14.38	13.23



Bulge Failure

Prepared by: _____ Date: _____

Checked by: AL Date: 4/5/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST#9 (33.0-35.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/12/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.77 in	Initial water content w =	23.91%
Initial diameter d_0 =	2.83 in	Initial unit weight γ_w =	130.39 pcf
Initial area A_0 =	6.27 in^2	Initial dry unit weight γ_d =	105.23 pcf
Mass of wet sample and tare M_t =	1252.74 g	Initial void ratio e_0 =	0.649
Mass of dry sample and tare M_d =	1013.70 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	14.14 g		
Mass of sample Ms=	1238.60 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	20.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.04		

Deviator stress at failure $D\sigma_f$ = 0.90 tsf
Major principal stress at failure σ_1 = 2.34 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	0.91	0.05	0.14
0.01	0.65	0.14	0.10
0.01	4.34	0.23	0.69
0.02	13.28	0.32	2.11
0.02	16.83	0.42	2.67
0.03	18.72	0.52	2.97
0.04	20.29	0.62	3.22
0.04	21.84	0.72	3.46
0.05	23.26	0.81	3.68
0.05	24.78	0.90	3.92
0.08	31.85	1.39	5.01
0.11	37.28	1.86	5.83
0.13	42.26	2.33	6.58
0.16	46.64	2.80	7.23
0.19	50.69	3.29	7.82
0.22	53.67	3.78	8.23
0.25	56.66	4.28	8.65
0.28	59.97	4.78	9.10
0.30	62.45	5.28	9.43
0.33	65.14	5.76	9.79
0.36	67.90	6.24	10.15
0.39	69.98	6.73	10.41
0.42	71.25	7.22	10.54
0.44	73.07	7.69	10.75
0.47	75.26	8.18	11.02
0.50	76.77	8.70	11.17
0.53	78.71	9.17	11.40
0.56	80.80	9.63	11.64
0.61	82.53	10.60	11.76
0.67	85.48	11.56	12.05
0.72	87.51	12.52	12.21
0.78	90.47	13.50	12.48
0.84	91.32	14.47	12.45

Bulge Failure

Prepared by: _____ Date: _____

Checked by: LL Date: 4/5/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST# 9 (33.0-35.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/11/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.69 in	Initial water content w =	24.78%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	128.11 pcf
Initial area A_0 =	6.39 in^2	Initial dry unit weight γ_d =	102.67 pcf
Mass of wet sample and tare M_t =	1235.66 g	Initial void ratio e_0 =	0.690
Mass of dry sample and tare M_d =	993.00 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	13.66 g		
Mass of sample Ms=	1222.00 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	10.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	1.99		

Deviator stress at failure $D\sigma_f$ = 0.64 tsf
Major principal stress at failure σ_1 = 1.36 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	8.82	0.08	1.38
0.01	12.28	0.17	1.92
0.01	14.80	0.26	2.31
0.02	17.03	0.35	2.65
0.03	19.17	0.45	2.99
0.03	21.32	0.55	3.32
0.04	23.50	0.65	3.65
0.04	25.66	0.74	3.99
0.05	28.07	0.84	4.35
0.05	30.09	0.93	4.66
0.08	38.03	1.43	5.87
0.11	44.49	1.91	6.83
0.14	48.80	2.39	7.45
0.16	51.49	2.87	7.82
0.19	52.03	3.37	7.87
0.22	53.73	3.87	8.08
0.25	55.59	4.37	8.32
0.28	56.63	4.87	8.43
0.30	58.17	5.36	8.61
0.33	59.53	5.83	8.77
0.36	60.09	6.30	8.81
0.39	59.07	6.78	8.61
0.41	59.03	7.26	8.57
0.44	60.59	7.74	8.75
0.47	60.62	8.23	8.70
0.50	61.12	8.76	8.73
0.52	62.47	9.23	8.87
0.55	61.85	9.70	8.74
0.61	60.64	10.68	8.47
0.66	61.48	11.65	8.50
0.72	62.59	12.63	8.56
0.77	60.06	13.62	8.12
0.83	60.11	14.59	8.03

Bulge Failure

Prepared by: _____ Date: _____

Checked by: AA Date: 4/5/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST# 7 (27.0-29.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/15/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.77 in	Initial water content w =	25.44%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	127.75 pcf
Initial area A_0 =	6.37 in^2	Initial dry unit weight γ_d =	101.84 pcf
Mass of wet sample and tare M_t =	1417.03 g	Initial void ratio e_0 =	0.703
Mass of dry sample and tare M_d =	1167.30 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	185.63 g		
Mass of sample Ms=	1231.40 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	40.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.03		

Deviator stress at failure $D\sigma_f$ = 0.55 tsf
Major principal stress at failure σ_1 = 3.43 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.01	5.20	0.09	0.82
0.01	10.58	0.19	1.66
0.02	13.08	0.28	2.05
0.02	14.62	0.38	2.29
0.03	15.83	0.48	2.47
0.03	16.95	0.59	2.65
0.04	17.98	0.68	2.80
0.04	19.01	0.78	2.96
0.05	20.04	0.88	3.12
0.06	20.96	0.98	3.26
0.08	25.01	1.47	3.87
0.11	28.37	1.95	4.37
0.14	32.51	2.43	4.98
0.17	34.45	2.91	5.25
0.20	36.22	3.39	5.49
0.22	38.20	3.87	5.77
0.25	40.07	4.37	6.02
0.28	41.37	4.85	6.18
0.31	43.29	5.33	6.44
0.33	45.50	5.79	6.73
0.36	46.02	6.25	6.77
0.39	46.29	6.72	6.78
0.41	47.50	7.19	6.92
0.44	48.78	7.68	7.07
0.47	48.77	8.16	7.03
0.50	50.72	8.68	7.27
0.53	52.28	9.15	7.46
0.56	52.09	9.62	7.39
0.61	52.32	10.59	7.35
0.67	53.21	11.59	7.39
0.72	56.12	12.55	7.71
0.78	54.97	13.51	7.47
0.83	56.46	14.47	7.58

Bulge Failure

Prepared by: _____ Date: _____

Checked by: LL Date: 4/5/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST# 7 (27.0-29.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/15/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.76 in	Initial water content w =	25.10%
Initial diameter d_0 =	2.87 in	Initial unit weight γ_w =	126.60 pcf
Initial area A_0 =	6.46 in^2	Initial dry unit weight γ_d =	101.19 pcf
Mass of wet sample and tare M_t =	1423.57 g	Initial void ratio e_0 =	0.714
Mass of dry sample and tare M_d =	1175.50 g	Initial degree of saturation S_r =	98%
Mass of tare M_t =	187.37 g		
Mass of sample Ms=	1236.20 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	20.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.01		

Deviator stress at failure $D\sigma_f$ = 0.56 tsf
Major principal stress at failure σ_1 = 2.00 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	4.61	0.07	0.71
0.01	10.49	0.16	1.62
0.01	14.38	0.25	2.22
0.02	16.89	0.34	2.60
0.03	18.66	0.44	2.87
0.03	19.98	0.54	3.07
0.04	21.25	0.64	3.27
0.04	22.43	0.74	3.44
0.05	23.56	0.83	3.61
0.05	24.68	0.93	3.78
0.08	29.50	1.43	4.50
0.11	33.45	1.91	5.08
0.14	37.06	2.39	5.60
0.17	40.06	2.88	6.02
0.19	42.33	3.37	6.33
0.22	44.10	3.86	6.56
0.25	45.32	4.34	6.71
0.28	47.20	4.82	6.95
0.31	48.13	5.30	7.05
0.33	49.40	5.77	7.20
0.36	50.95	6.23	7.39
0.39	51.64	6.72	7.45
0.41	51.88	7.19	7.45
0.44	52.14	7.65	7.45
0.47	53.20	8.14	7.56
0.50	53.41	8.66	7.55
0.53	54.14	9.13	7.61
0.55	55.51	9.60	7.76
0.61	55.27	10.58	7.64
0.67	56.16	11.56	7.68
0.72	56.72	12.53	7.67
0.78	57.70	13.50	7.72
0.83	57.46	14.45	7.60

Bulge Failure

Prepared by: _____ Date: _____

Checked by: LL Date: 4/5/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

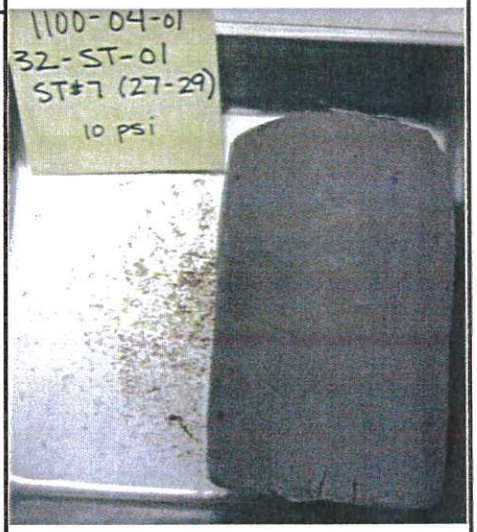
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST# 7 (27.0-29.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/15/2014
Sample description: Gray SILTY CLAY

Initial height h_0 =	5.69 in	Initial water content w =	25.58%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	128.12 pcf
Initial area A_0 =	6.39 in^2	Initial dry unit weight γ_d =	102.02 pcf
Mass of wet sample and tare M_t =	1384.03 g	Initial void ratio e_0 =	0.700
Mass of dry sample and tare M_d =	1135.30 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	162.93 g		
Mass of sample Ms=	1221.10 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	10.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	1.99		

Deviator stress at failure $D\sigma_f$ = 0.50 tsf
Major principal stress at failure σ_1 = 1.22 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	6.34	0.04	0.99
0.01	12.01	0.13	1.88
0.01	13.50	0.23	2.11
0.02	14.59	0.32	2.28
0.02	15.67	0.41	2.44
0.03	16.62	0.51	2.59
0.04	17.47	0.62	2.72
0.04	18.52	0.72	2.88
0.05	19.63	0.82	3.05
0.05	20.79	0.92	3.23
0.08	23.56	1.42	3.64
0.11	27.19	1.91	4.18
0.14	30.67	2.40	4.69
0.16	32.78	2.89	4.99
0.19	34.01	3.38	5.15
0.22	35.96	3.86	5.41
0.25	37.47	4.37	5.61
0.28	38.83	4.86	5.79
0.30	40.07	5.35	5.94
0.33	42.25	5.83	6.23
0.36	43.14	6.30	6.33
0.39	43.57	6.78	6.36
0.41	45.12	7.25	6.55
0.44	44.97	7.74	6.50
0.47	45.70	8.22	6.57
0.50	46.39	8.76	6.63
0.53	47.71	9.23	6.78
0.55	48.22	9.71	6.82
0.61	49.24	10.67	6.89
0.66	49.31	11.67	6.82
0.72	50.76	12.67	6.94
0.78	51.32	13.64	6.94
0.83	51.26	14.62	6.85



Bulge Failure

Prepared by: _____ Date: _____

Checked by: AL Date: 4/5/17

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

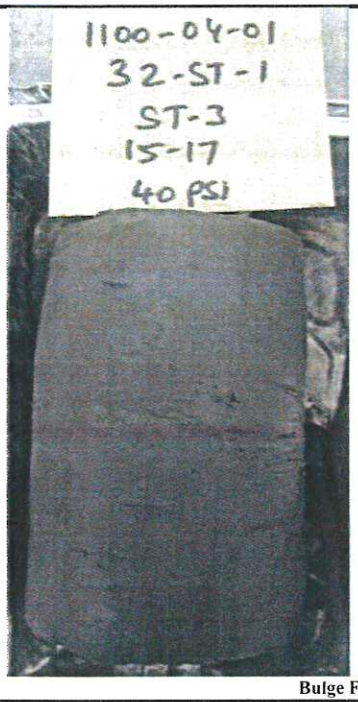
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST# 3 (15.0-17.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/10/2014
Sample description: Gray CLAY

Initial height h_0 =	5.77 in	Initial water content w =	25.86%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	126.60 pcf
Initial area A_0 =	6.39 in^2	Initial dry unit weight γ_d =	100.59 pcf
Mass of wet sample and tare M_t =	1238.40 g	Initial void ratio e_0 =	0.725
Mass of dry sample and tare M_d =	986.70 g	Initial degree of saturation S_r =	99%
Mass of tare M_t =	13.30 g		
Mass of sample Ms=	1225.10 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	40.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.02		

Deviator stress at failure $D\sigma_f$ = 0.35 tsf
Major principal stress at failure σ_1 = 3.23 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.01	1.03	0.11	0.16
0.01	2.80	0.20	0.44
0.02	4.17	0.30	0.65
0.02	5.38	0.39	0.84
0.03	6.20	0.49	0.96
0.03	6.67	0.58	1.04
0.04	7.18	0.68	1.12
0.04	7.64	0.78	1.18
0.05	8.23	0.87	1.28
0.06	8.94	0.97	1.38
0.08	11.75	1.44	1.81
0.11	13.73	1.91	2.11
0.14	15.09	2.39	2.30
0.17	15.45	2.88	2.35
0.19	16.60	3.37	2.51
0.22	18.06	3.88	2.71
0.25	19.22	4.38	2.87
0.28	20.64	4.87	3.07
0.31	22.82	5.35	3.38
0.34	23.71	5.82	3.49
0.36	23.73	6.31	3.48
0.39	24.33	6.78	3.55
0.42	25.39	7.27	3.68
0.45	26.21	7.76	3.78
0.47	27.36	8.23	3.93
0.50	29.55	8.75	4.22
0.53	30.26	9.22	4.30
0.56	29.74	9.69	4.20
0.61	31.18	10.65	4.36
0.67	32.60	11.63	4.51
0.73	35.13	12.60	4.80
0.78	34.60	13.58	4.68
0.81	35.37	13.97	4.76



Bulge Failure

Prepared by: _____ Date: _____

Checked by: AL Date: 4/5/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

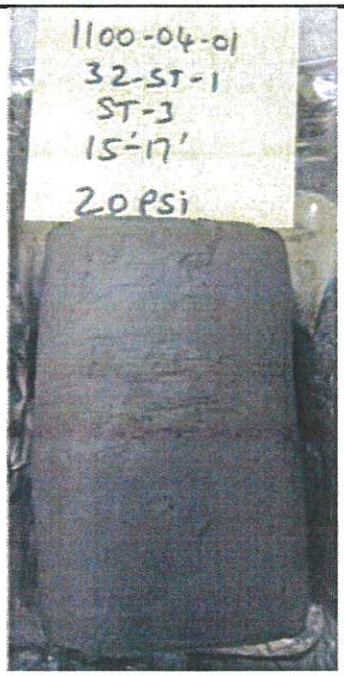
Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST# 3 (15.0-17.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/10/2014
Sample description: Gray CLAY

Initial height h_0 =	5.79 in	Initial water content w =	24.37%
Initial diameter d_0 =	2.83 in	Initial unit weight γ_w =	129.41 pcf
Initial area A_0 =	6.31 in^2	Initial dry unit weight γ_d =	104.05 pcf
Mass of wet sample and tare M_t =	1255.48 g	Initial void ratio e_0 =	0.667
Mass of dry sample and tare M_d =	1012.10 g	Initial degree of saturation S_r =	100%
Mass of tare M_t =	13.48 g		
Mass of sample Ms=	1242.00 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	20.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.04		

Deviator stress at failure $D\sigma_f$ = 0.52 tsf
Major principal stress at failure σ_1 = 1.96 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	4.10	0.07	0.65
0.01	6.12	0.16	0.97
0.01	7.61	0.25	1.20
0.02	8.62	0.34	1.36
0.03	9.42	0.44	1.49
0.03	10.13	0.54	1.60
0.04	10.84	0.64	1.71
0.04	11.55	0.74	1.82
0.05	12.20	0.83	1.92
0.05	12.85	0.93	2.02
0.08	15.77	1.41	2.46
0.11	18.33	1.86	2.85
0.14	20.96	2.33	3.24
0.16	23.17	2.80	3.57
0.19	24.83	3.28	3.81
0.22	26.87	3.76	4.10
0.25	28.91	4.27	4.39
0.28	30.79	4.76	4.65
0.30	32.71	5.26	4.91
0.33	34.86	5.74	5.21
0.36	36.10	6.22	5.36
0.39	37.43	6.70	5.53
0.42	38.92	7.17	5.73
0.44	40.36	7.67	5.90
0.47	41.72	8.15	6.07
0.50	43.26	8.67	6.26
0.53	45.14	9.14	6.50
0.56	45.85	9.60	6.57
0.61	47.59	10.54	6.75
0.67	49.67	11.52	6.96
0.72	52.12	12.47	7.23
0.78	52.97	13.43	7.27



Bulge Failure

Prepared by: _____ Date: _____

Checked by: AL Date: 4/15/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST# 3 (15.0-17.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/10/2014
Sample description: Gray CLAY

Initial height h_0 =	5.84 in	Initial water content w =	24.98%
Initial diameter d_0 =	2.87 in	Initial unit weight γ_w =	125.23 pcf
Initial area A_0 =	6.48 in^2	Initial dry unit weight γ_d =	100.20 pcf
Mass of wet sample and tare M_t =	1257.66 g	Initial void ratio e_0 =	0.731
Mass of dry sample and tare M_d =	1009.10 g	Initial degree of saturation S_r =	95%
Mass of tare M_t =	14.16 g		
Mass of sample Ms=	1243.50 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	10.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.03		

Deviator stress at failure $D\sigma_f$ = 0.60 tsf
Major principal stress at failure σ_1 = 1.32 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	3.93	0.05	0.61
0.01	5.97	0.14	0.92
0.01	6.70	0.23	1.03
0.02	7.37	0.33	1.13
0.02	8.11	0.42	1.25
0.03	8.65	0.51	1.33
0.04	9.18	0.61	1.41
0.04	9.88	0.71	1.51
0.05	11.05	0.81	1.69
0.05	12.07	0.90	1.85
0.08	15.00	1.38	2.28
0.11	18.60	1.85	2.82
0.14	21.34	2.32	3.22
0.16	23.82	2.79	3.57
0.19	25.57	3.28	3.82
0.22	27.58	3.77	4.10
0.25	30.11	4.26	4.45
0.28	32.26	4.76	4.74
0.31	34.87	5.24	5.10
0.33	37.53	5.71	5.46
0.36	39.66	6.18	5.74
0.39	40.78	6.65	5.87
0.42	42.04	7.12	6.02
0.44	44.31	7.60	6.32
0.47	46.08	8.08	6.54
0.50	48.45	8.59	6.83
0.53	50.95	9.05	7.15
0.56	52.53	9.52	7.33
0.61	53.64	10.47	7.41
0.67	57.16	11.43	7.81
0.72	61.27	12.39	8.28
0.78	62.45	13.37	8.35

Bulge Failure

Prepared by: _____ Date: _____

Checked by: AL Date: 4/5/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST# 1 (9.0-11.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/10/2014
Sample description: Gray CLAY

Initial height h_0 =	5.79 in	Initial water content w =	25.10%
Initial diameter d_0 =	2.87 in	Initial unit weight γ_w =	124.88 pcf
Initial area A_0 =	6.45 in^2	Initial dry unit weight γ_d =	99.82 pcf
Mass of wet sample and tare M_t =	1236.99 g	Initial void ratio e_0 =	0.738
Mass of dry sample and tare M_d =	991.50 g	Initial degree of saturation S_r =	95%
Mass of tare M_t =	13.59 g		
Mass of sample Ms=	1223.40 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	30.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.02		

Deviator stress at failure $D\sigma_f$ = 0.43 tsf
Major principal stress at failure σ_1 = 2.59 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	1.65	0.00	0.26
0.01	4.14	0.09	0.64
0.01	6.09	0.19	0.94
0.02	7.27	0.28	1.12
0.02	8.26	0.37	1.28
0.03	9.03	0.47	1.39
0.03	9.72	0.56	1.50
0.04	10.33	0.66	1.59
0.04	10.90	0.76	1.68
0.05	11.45	0.85	1.76
0.08	14.20	1.33	2.17
0.10	16.68	1.80	2.54
0.13	19.34	2.27	2.93
0.16	21.32	2.74	3.22
0.19	22.62	3.23	3.39
0.22	24.19	3.72	3.61
0.24	26.10	4.22	3.88
0.27	27.91	4.72	4.12
0.30	29.64	5.21	4.36
0.33	31.30	5.69	4.58
0.36	32.68	6.16	4.75
0.38	33.01	6.65	4.78
0.41	33.78	7.12	4.86
0.44	35.08	7.60	5.03
0.47	36.19	8.09	5.16
0.50	37.59	8.61	5.33
0.53	38.94	9.07	5.49
0.55	40.36	9.54	5.66
0.61	40.07	10.49	5.56
0.66	41.80	11.45	5.74
0.72	43.90	12.41	5.96
0.77	44.35	13.39	5.96
0.83	45.41	14.37	6.03

Bulge Failure

Prepared by: _____ Date: _____

Checked by: AL Date: 1/15/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

AASHTO T 296 / ASTM D 2850-95

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-ST-01, ST# 1 (9.0-11.0ft)
Type/Condition: ST/Undisturbed

Analyst name: M. de los Reyes
Date received: 10/20/2014
Test date: 12/10/2014
Sample description: Gray CLAY

Initial height h_0 =	5.74 in	Initial water content w =	25.45%
Initial diameter d_0 =	2.85 in	Initial unit weight γ_w =	127.07 pcf
Initial area A_0 =	6.39 in^2	Initial dry unit weight γ_d =	101.29 pcf
Mass of wet sample and tare M_t =	1237.06 g	Initial void ratio e_0 =	0.713
Mass of dry sample and tare M_d =	988.80 g	Initial degree of saturation S_r =	99%
Mass of tare M_t =	13.26 g		
Mass of sample Ms=	1223.80 g	Liquid Limit (%):	NA
Estimated specific gravity G_s =	2.78	Plastic Limit (%):	NA
Cell confining pressure σ_3 =	15.0 psi	Sand(%):	NA
Rate of strain =	1 %/min	Silt(%):	NA
Proving Ring Factor =	1.000	Clay(%):	NA
Height to diameter ratio =	2.01		

Deviator stress at failure $D\sigma_f$ = 0.31 tsf
Major principal stress at failure σ_1 = 1.39 tsf

Axial Displacement (in) Δh	Axial Force (lbs) F	Axial Strain (%) e	Deviator Stress (psi) $\sigma_1-\sigma_3$
0.00	0.00	0.00	0.00
0.00	2.69	0.05	0.42
0.01	3.89	0.14	0.61
0.01	5.01	0.23	0.78
0.02	5.82	0.32	0.91
0.02	6.46	0.41	1.01
0.03	7.03	0.51	1.09
0.04	7.53	0.61	1.17
0.04	7.98	0.73	1.24
0.05	8.44	0.83	1.31
0.05	9.06	0.92	1.40
0.08	10.98	1.39	1.69
0.11	13.07	1.86	2.01
0.13	14.83	2.34	2.27
0.16	15.62	2.82	2.38
0.19	16.39	3.31	2.48
0.22	17.53	3.79	2.64
0.25	18.98	4.31	2.84
0.28	20.01	4.81	2.98
0.30	21.05	5.31	3.12
0.33	22.61	5.79	3.33
0.36	23.11	6.27	3.39
0.39	23.36	6.75	3.41
0.41	24.10	7.22	3.50
0.44	25.16	7.71	3.63
0.47	25.95	8.20	3.73
0.50	26.92	8.73	3.84
0.53	28.10	9.20	3.99
0.56	28.17	9.67	3.98
0.61	28.70	10.61	4.01
0.67	30.12	11.60	4.17
0.72	31.71	12.57	4.34
0.78	31.41	13.55	4.25
0.83	32.33	14.54	4.32

Bulge Failure

Prepared by: _____ Date: _____

Checked by: LL Date: 1/5/19

Wang Engineering

1145 North Main Street
Lombard, Illinois 60148
Phone (630) 953-9928
www.wangeng.com

UNCONFINED COMPRESSIVE STRENGTH of COHESIVE SOIL

(AASHTO T 208 / ASTM D 2166)

Project: Circle Interchange
Client: AECOM
WEI Job No.: 1100-04-01
Soil Sample ID: 32-RWB-03, ST#3 (23.5-25.0ft)
Type/Condition: ST/undisturbed
Liquid Limit (%): NA
Plastic Limit (%): NA

Analyst name: A. Mohammed
Date received: 7/1/2014
Test date: 10/6/2014
Sample description: Gray Silty Clay trace Gravel

Sand(%): NA
Silt(%): NA
Clay(%): NA

Average initial height h_0 = 5.99 in
Average initial diameter d_0 = 2.86 in
Height to diameter ratio= 2.10
Mass of wet sample = 1289.90 g
Mass of dry sample and tare = 1048.80 g
Mass of tare = 13.49 g
Specific gravity = 2.76 (estimated)

Initial water content w = 24.59% (specimen)
Initial unit weight g = 127.98 pcf
Initial dry unit weight g_d = 102.72 pcf
Initial void ratio e_0 = 0.68
Initial degree of saturation S_r = 100%
Average Rate of Strain= 1%/min
Unconfined compressive strength q_u = 0.50 tsf
Shear Strength= 0.25 tsf

Displacement (in) Δh	Force (lbs) F	Strain (%) e	Stress (tsf) s
0.00	0.00	0.00	0.00
0.03	7.26	0.50	0.08
0.06	13.48	1.00	0.15
0.09	17.63	1.50	0.20
0.12	22.81	2.00	0.25
0.15	26.96	2.50	0.30
0.18	31.11	3.00	0.34
0.21	33.18	3.50	0.36
0.24	35.26	4.00	0.38
0.27	37.33	4.50	0.40
0.30	39.41	5.01	0.42
0.35	41.48	5.84	0.44
0.40	43.55	6.67	0.46
0.45	45.63	7.51	0.47
0.50	47.70	8.34	0.49
0.55	48.74	9.18	0.50
0.60	49.78	10.01	0.50
0.65	49.78	10.84	0.50
0.70	50.81	11.68	0.50
0.80	51.85	13.35	0.50
0.90	51.85	15.02	0.50

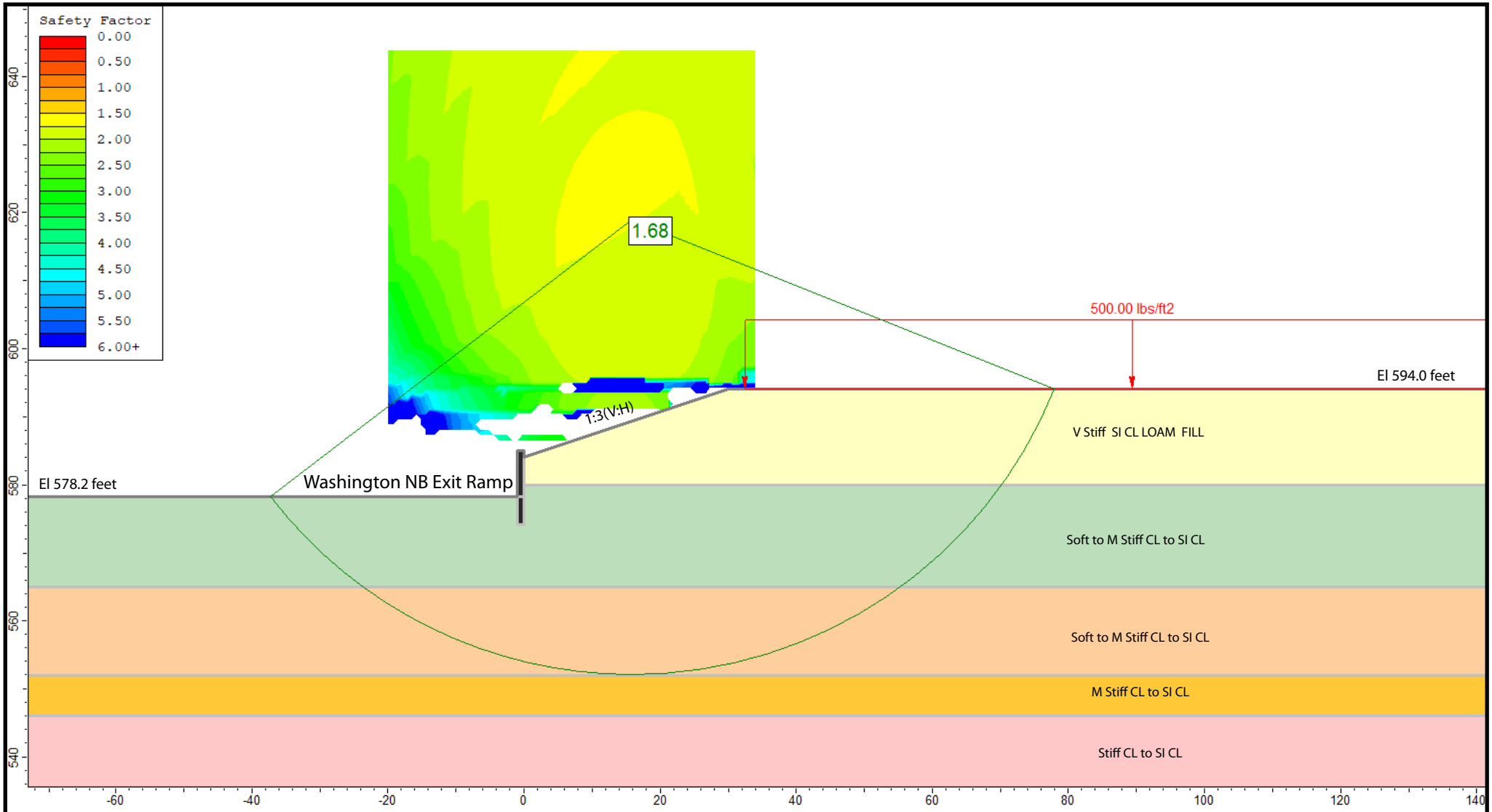
NOTES:

Prepared by: _____ Date: _____

Checked by: AL Date: 4/5/19

AASHTO R18

APPENDIX C



Undrained Analysis for S-P Wall at Station 8681+75, Ref Borings 32-RWB-02, 32-ST-01, and VST-03

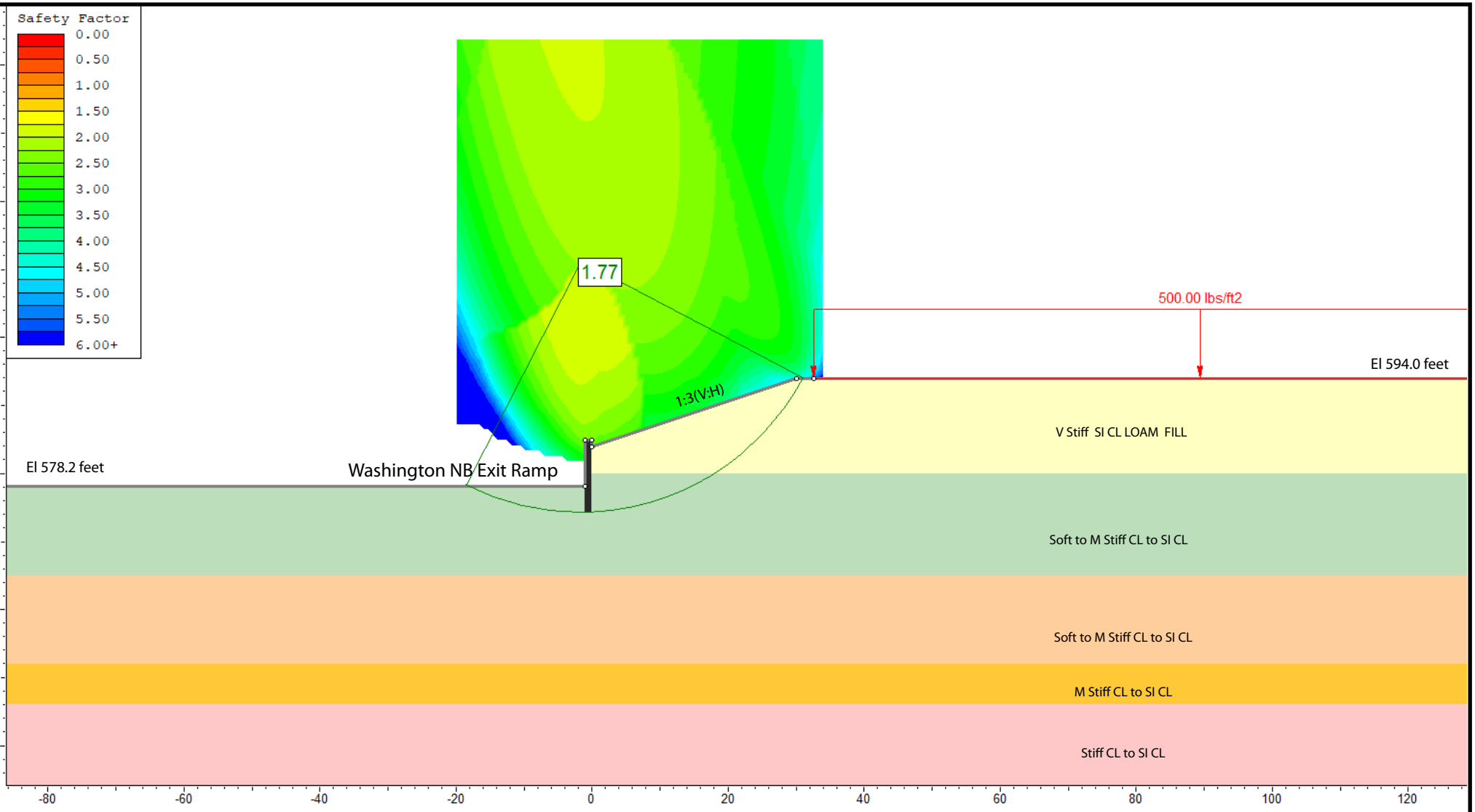
Layer ID	Description	Unit Weight (pcf)	Undrained Cohesion (psf)	Undrained Friction Angle (degrees)
1	V Stiff SI CL LOAM FILL	120	2000	0
2	V Soft to Soft CL to SI CL	110	400	0
3	Soft to M Stiff CL to SI CL	110	600	0
4	Soft to M Stiff CL to SI CL	115	930	0
5	Stiff SI CL to SI CL LOAM	120	1500	0
6	V Stiff CL to SI CL	120	2500	0

GLOBAL STABILITY ANALYSIS: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 32, SN 016-1821, CHICAGO, IL

SCALE: GRAPHICAL | APPENDIX C-1 | DRAWN BY: NSB CHECKED BY: MWS

Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR AECOM | 1100-04-01



Drained Analysis for S-P Wall at Station 8681+75, Ref Borings 32-RWB-02, 32-ST-01, and VST-03

Layer ID	Description	Unit Weight (pcf)	Drained Cohesion (psf)	Drained Friction Angle (degrees)
1	V Stiff SI CL LOAM FILL	120	100	30
2	V Soft to Soft CL to SI CL	110	0	27
3	Soft to M Stiff CL to SI CL	110	0	27
4	Soft to M Stiff CL to SI CL	115	0	28
5	Stiff SI CL to SI CL LOAM	120	80	29
6	V Stiff CL to SI CL	120	100	30

GLOBAL STABILITY ANALYSIS: CIRCLE INTERCHANGE RECONSTRUCTION, RETAINING WALL 32, SN 016-1821, CHICAGO, IL

SCALE: GRAPHICAL | APPENDIX C-2 | DRAWN BY: NSB CHECKED BY: MWS

Wang Engineering
1145 N. Main Street
Lombard, IL 60148
www.wangeng.com

FOR AECOM | 1100-04-01

APPENDIX D

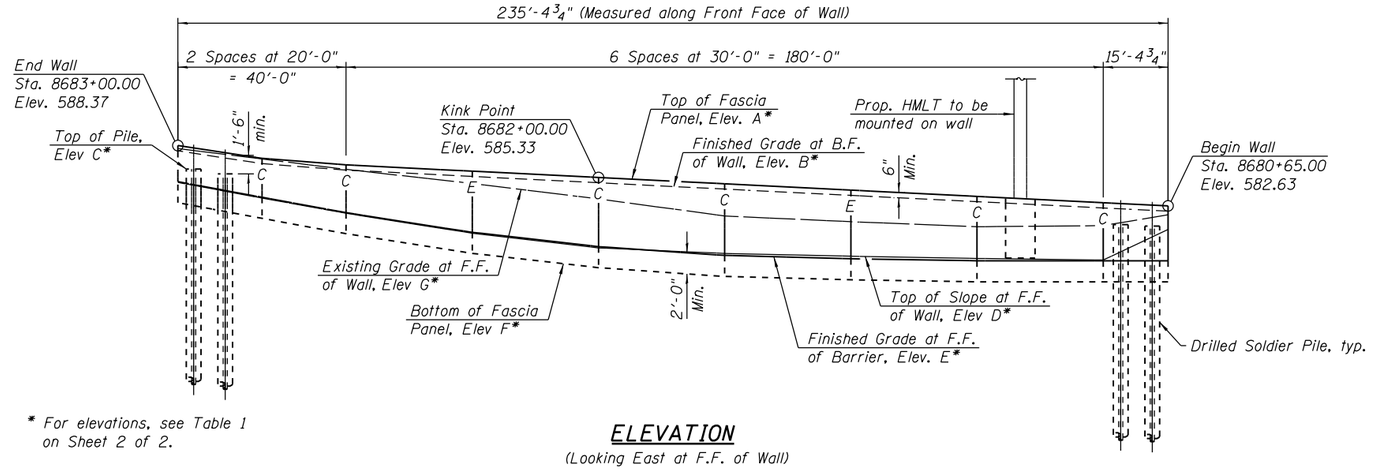
Bench Mark: Set "X" on northwest corner of handhole along east edge of SB I-90/94 20 feet north of Madison Street. Elev. 596.13.

Existing Structure: None

Traffic on NB Washington Exit Ramp will be detoured during construction.

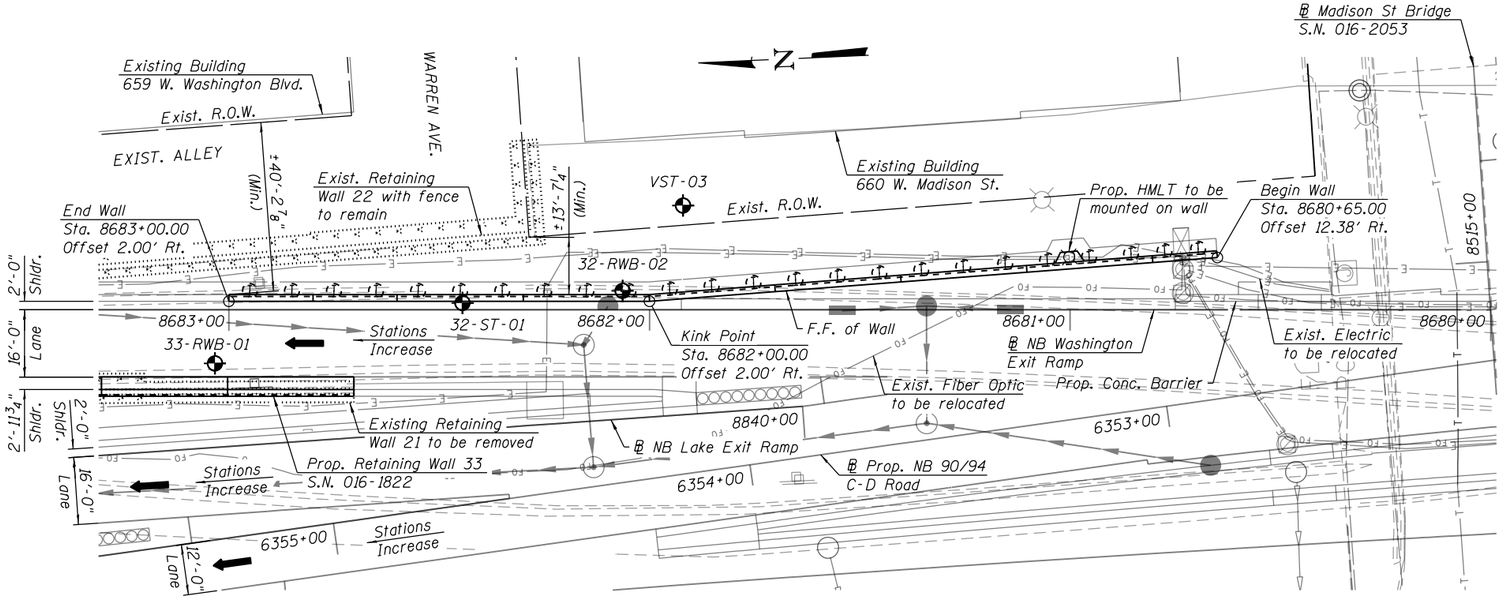
No Salvage.

Notes:
1.) Wall offsets are measured from the ℄ of NB Washington Exit Ramp to the front face of cast-in-place fascia panels.
2.) C denotes construction joint.
3.) E denotes expansion joint.
4.) F.F. denotes Front Face.
5.) B.F. denotes Back Face.
6.) Soldier pile section, shaft diameter, spacing, and tip elevation to be determined during final design.
6.) Proposed drainage information shown is conceptual and will be determined during final design.

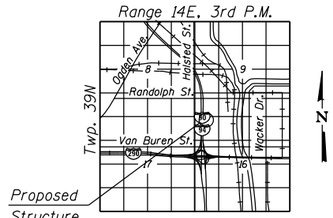


* For elevations, see Table 1 on Sheet 2 of 2.

ELEVATION
(Looking East at F.F. of Wall)



PLAN



LOCATION SKETCH

HIGHWAY CLASSIFICATION

NB Washington Exit Ramp
Functional Class: Interstate
ADT: 3,500 (2012); 4,000 (2040)
ADTT: 0 (2012); 0 (2040)
DHV: 430 (2040)
Design Speed: 30 m.p.h.
Posted Speed: 30 m.p.h.
One-Way Traffic
Directional Distribution: 100%

DESIGN SPECIFICATIONS

2017 AASHTO LRFD Bridge Design Specifications 8th Edition

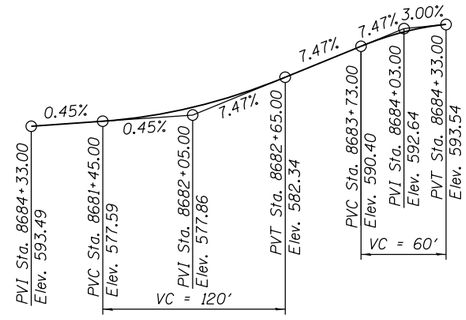
DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)

SOLDIER PILES

fy = 50,000 psi (AASHTO M270 Gr. 50)



PROFILE GRADE
(℄ NB Washington Exit Ramp)

LEGEND:

Combined Sewer		Soil Boring	
Electric	E E	Existing Catch Basin	
Ex. Storm Sewer		Proposed Catch Basin	
Prop. Storm Sewer		Existing Manhole	
Ex. Fiber Optic	FO FO	Proposed Manhole	
Ex. Telephone	T	Proposed Inlet	
Ex. ITS Cable			

GENERAL PLAN
RETAINING WALL 32 ALONG NB WASHINGTON EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2015-019R
COOK COUNTY
STATION 8680+65.00 TO STATION 8683+00.00
STRUCTURE NO. 016-1821

USER NAME = wjcolletti	DESIGNED - WJC	REVISED -	
	CHECKED - MDS	REVISED -	
PLOT SCALE = 36.0000 ' / in.	DRAWN - JM	REVISED -	
PLOT DATE = 6/26/2019	CHECKED - WJC/MDS	REVISED -	

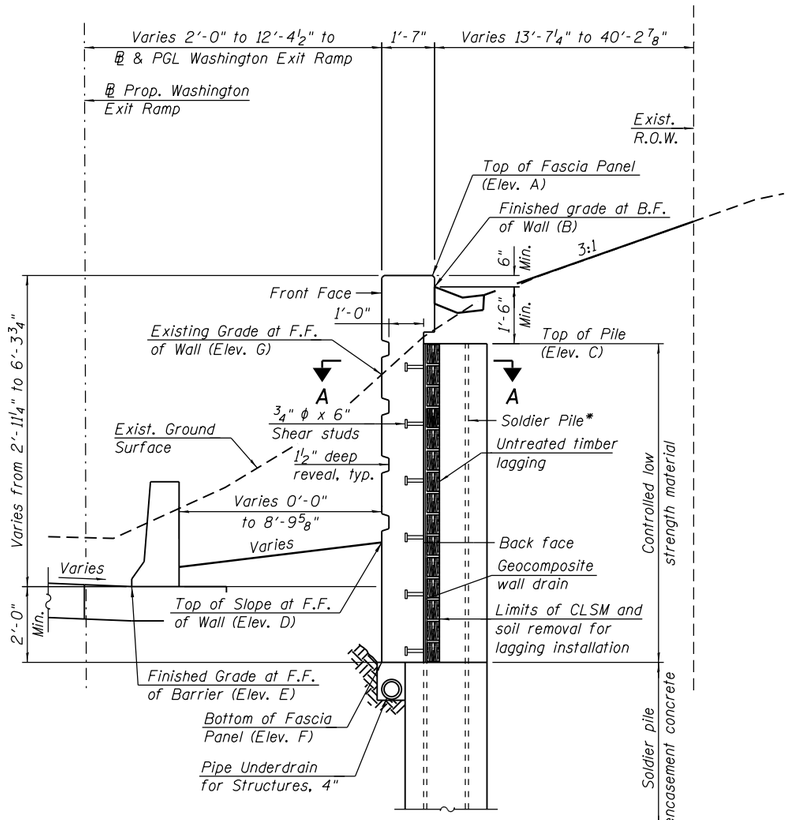
TranSystems

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SHEET NO. 1 OF 2 SHEETS

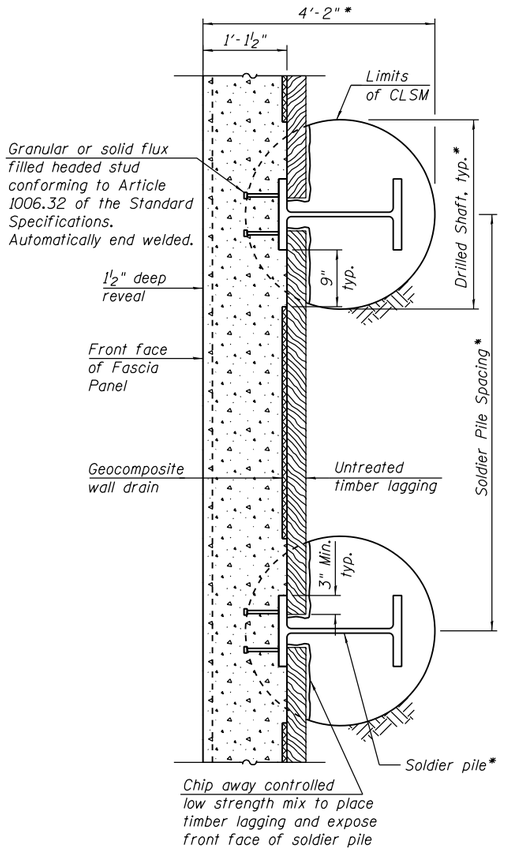
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2015-019R	COOK	2	1
		CONTRACT NO. 62A76		
	ILLINOIS FED. AID PROJECT			

3:25:06 PM - Dw:\\AECOM-NA-AWS\aecomonline.local\AECOM.DSO2.NA\Documents\01 Americas\Transportation\60269938 Circle\Phase_IN\000_CAD\008_Structure\Structure_016-1821\TSL\Sheets\016821-62A76-SHT-TSL-001.dgn



TYPICAL CROSS SECTION

(Looking Upstation)

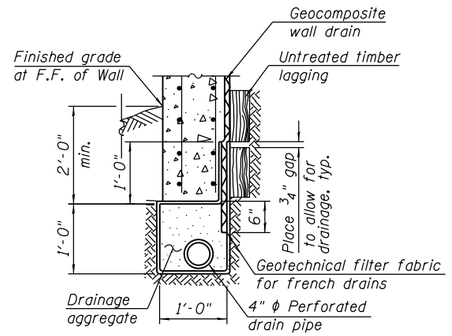


SECTION A-A

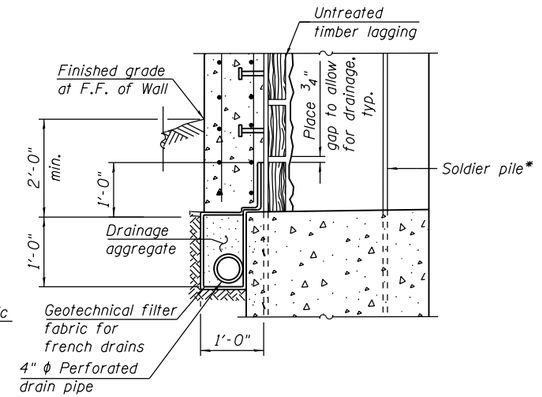
TABLE 1 - WALL ELEVATIONS

Station	Offset	Elevation A	Elevation B	Elevation C	Elevation D	Elevation E	Elevation F	Elevation G
8680+65.00	12.38' Rt.	582.63	582.13	580.63	580.39	577.42	575.42	581.79
8680+80.35	11.20' Rt.	582.94	582.44	580.94	577.49	577.42	575.42	580.76
8681+10.27	8.90' Rt.	583.54	583.04	581.54	577.63	577.42	575.42	580.65
8681+40.18	6.60' Rt.	584.14	583.64	582.14	577.85	577.61	575.61	581.13
8681+70.09	4.30' Rt.	584.74	584.24	582.74	578.12	577.93	575.93	581.68
8682+00.00	2.00' Rt.	585.33	584.83	583.33	578.64	578.76	576.76	583.30
8682+30.00	2.00' Rt.	585.93	585.43	583.93	580.04	580.12	578.12	584.77
8682+60.00	2.00' Rt.	586.54	586.04	584.54	581.93	581.99	579.99	586.11
8682+80.00	2.00' Rt.	587.16	586.66	585.16	583.38	583.46	581.46	587.10
8683+00.00	2.00' Rt.	588.37	587.87	586.37	584.87	584.93	582.93	588.09

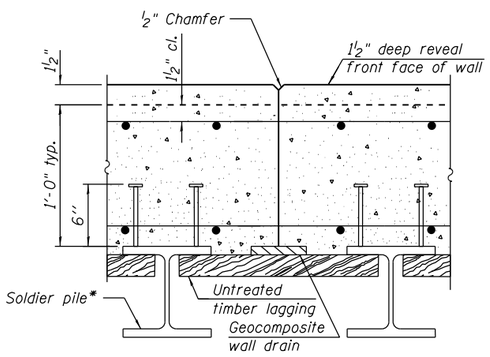
Elevation A - Top of Fascia Panel
Elevation B - Finished Grade at B.F. of Wall
Elevation C - Top of Pile
Elevation D - Top of Slope at F.F. of Wall
Elevation E - Finished Grade at F.F. of Barrier
Elevation F - Bottom of Fascia Panel
Elevation G - Existing Grade at F.F. of Wall



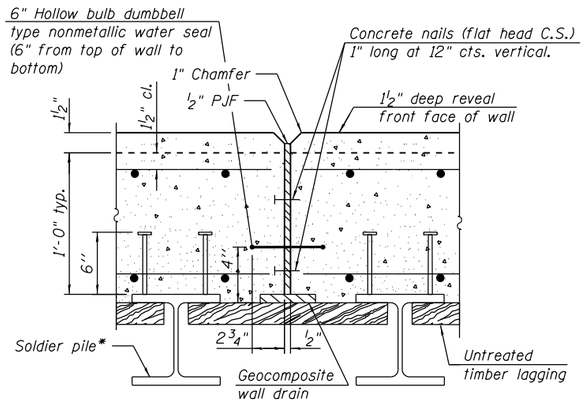
PIPE UNDERDRAIN DETAIL BETWEEN SOLDIER PILES



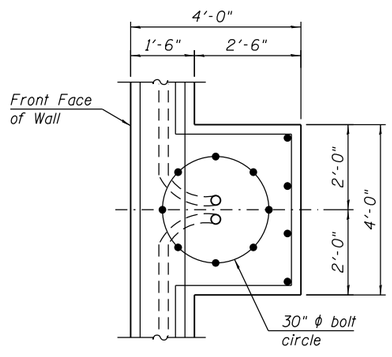
PIPE UNDERDRAIN DETAIL AT SOLDIER PILE



CONSTRUCTION JOINT DETAILS



EXPANSION JOINT DETAILS



DETAIL AT HMLT

* Soldier Pile section, shaft diameter, spacing, and tip elevation to be determined during final design.

LEGEND:

B.F. - denotes Back Face.
F.F. - denotes Front Face.

CROSS SECTION AND DETAILS
RETAINING WALL 32 ALONG NB WASHINGTON EXIT RAMP
F.A.I. RTE. 90/94 (KENNEDY EXPRESSWAY)
SECTION 2015-019R
COOK COUNTY
STATION 8680+65.00 TO STATION 8683+00.00
STRUCTURE NO. 016-1821

USER NAME = wjcolletti	DESIGNED - WJC	REVISED -	
	CHECKED - MDS	REVISED -	
PLOT SCALE = 0.17 ' / in.	DRAWN - JM	REVISED -	
PLOT DATE = 6/26/2019	CHECKED - WJC/MDS	REVISED -	

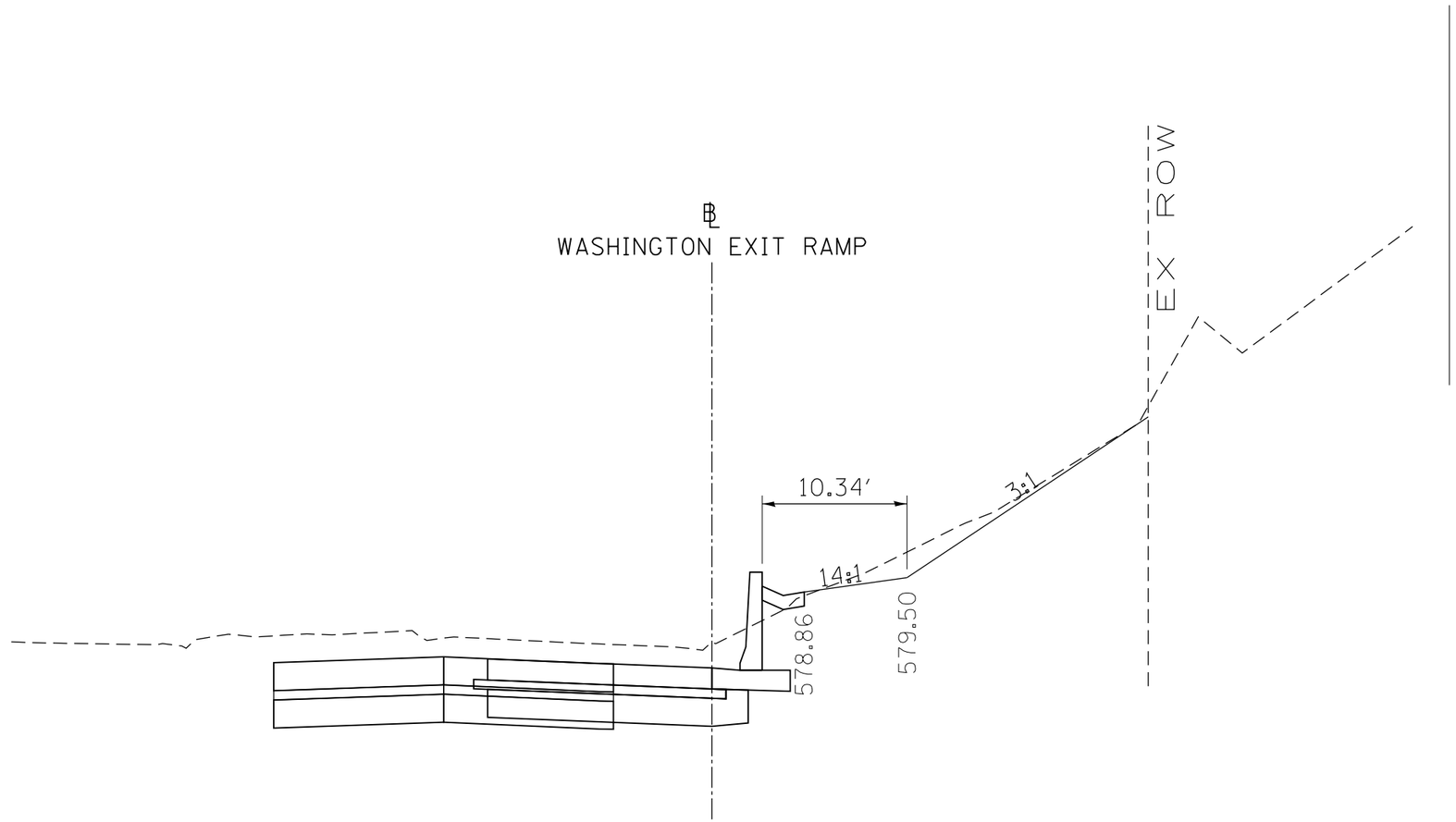
TranSystems

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

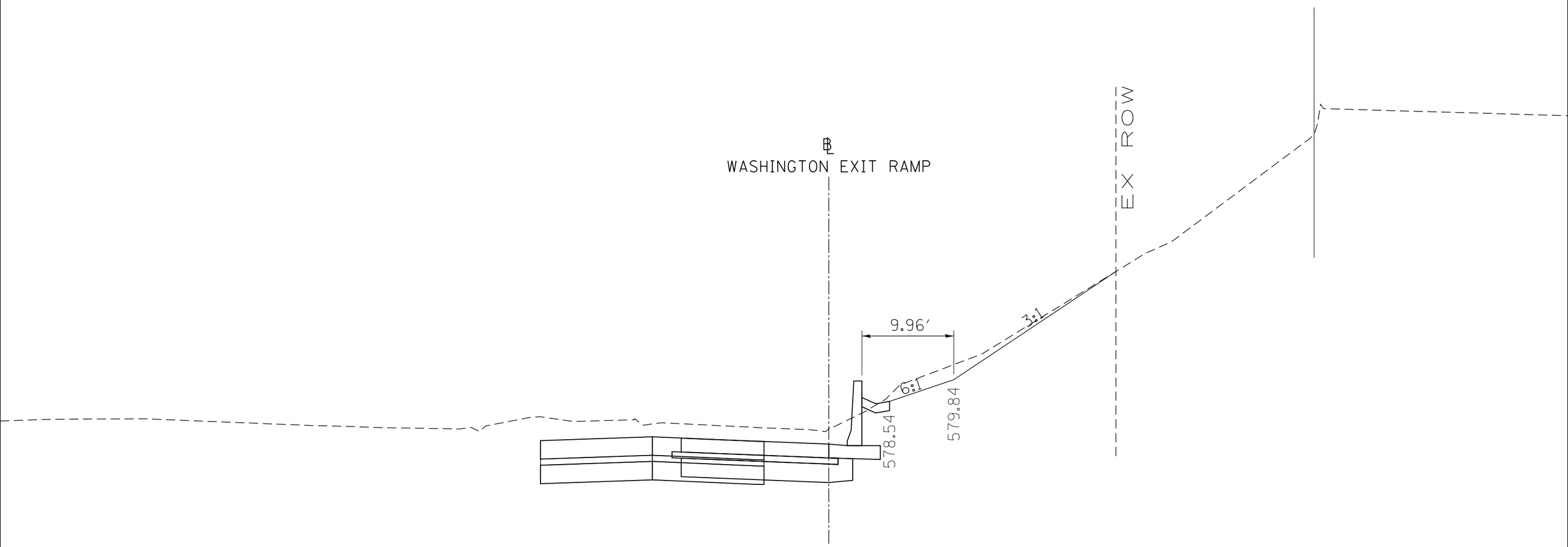
SHEET NO. 2 OF 2 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
90/94	2015-019R	COOK	2	2
		CONTRACT NO. 62A76		
		ILLINOIS FED. AID PROJECT		

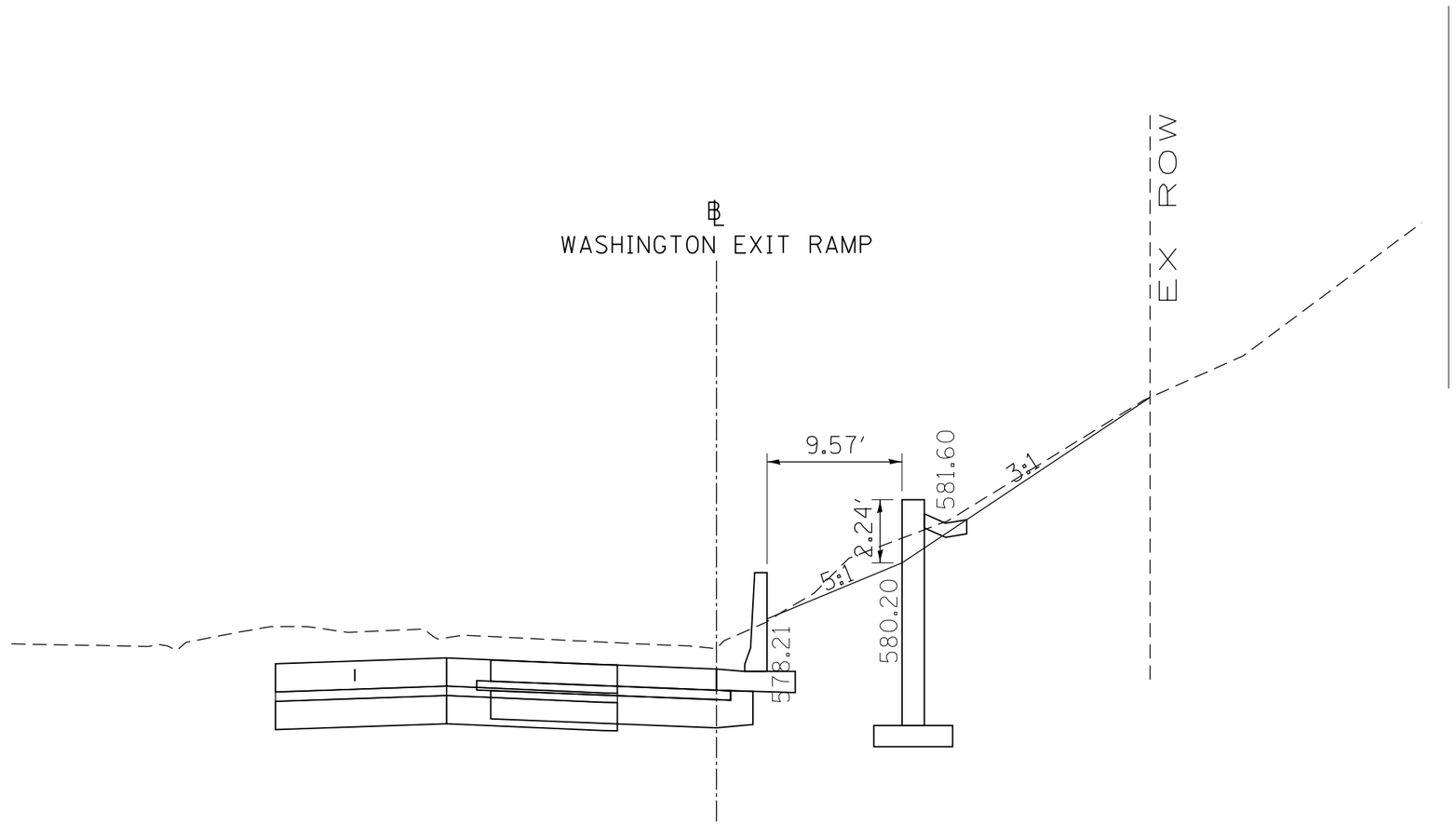
3:29:14 PM - Dwn:\\AECOM-NA-AWS\aecomonline_local\AECOM.DS02.NA\Documents\01 Americas\Transportation\60269938 Circle\Phase_IN\000_CAD\008_Structural\Structural\Structure_016-1821\TSL\Sheets\016821-62A76-SHT-TSL-002.dgn



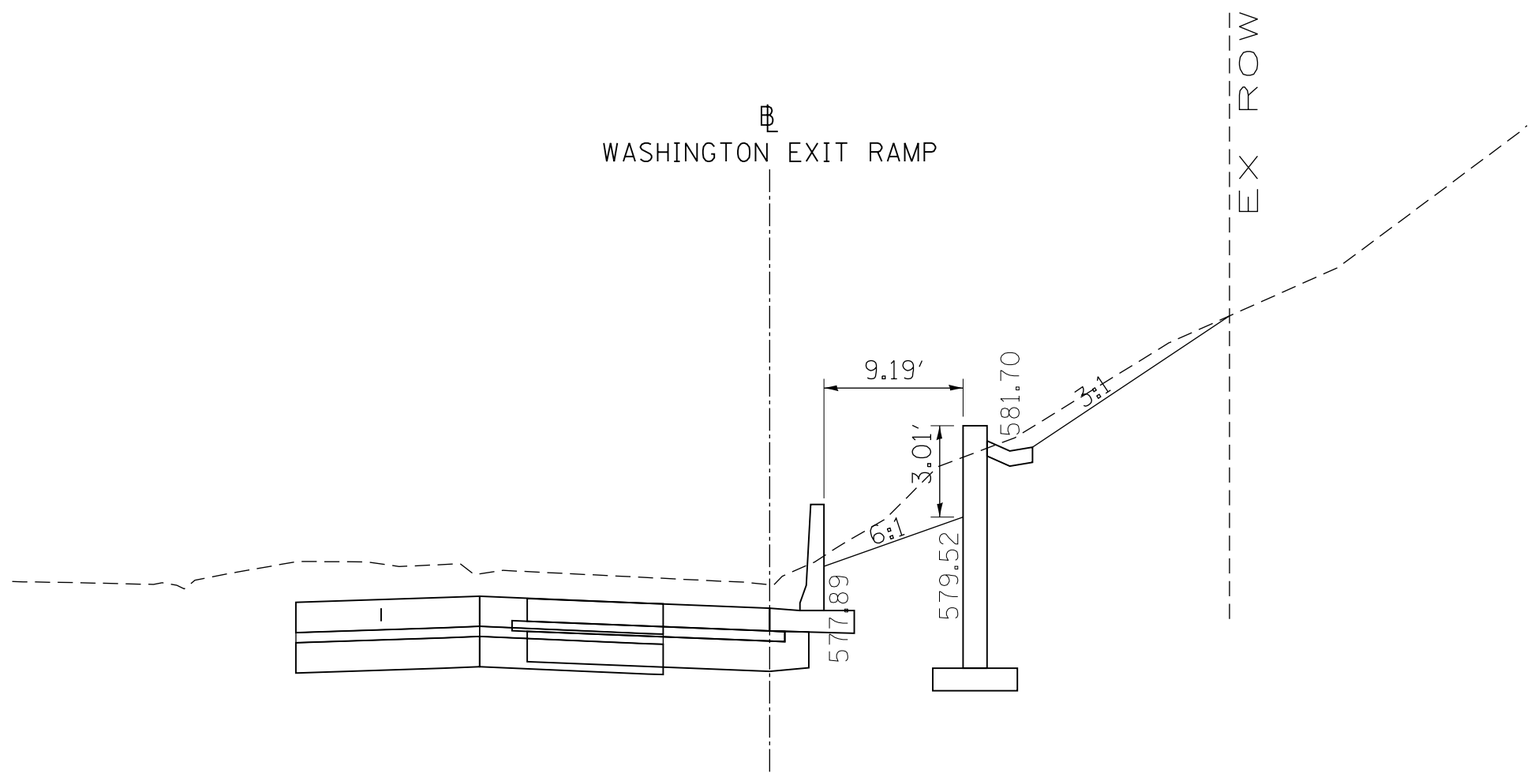
PR ℄ WASHINGTON EXIT RAMP
STA 8680+45.00



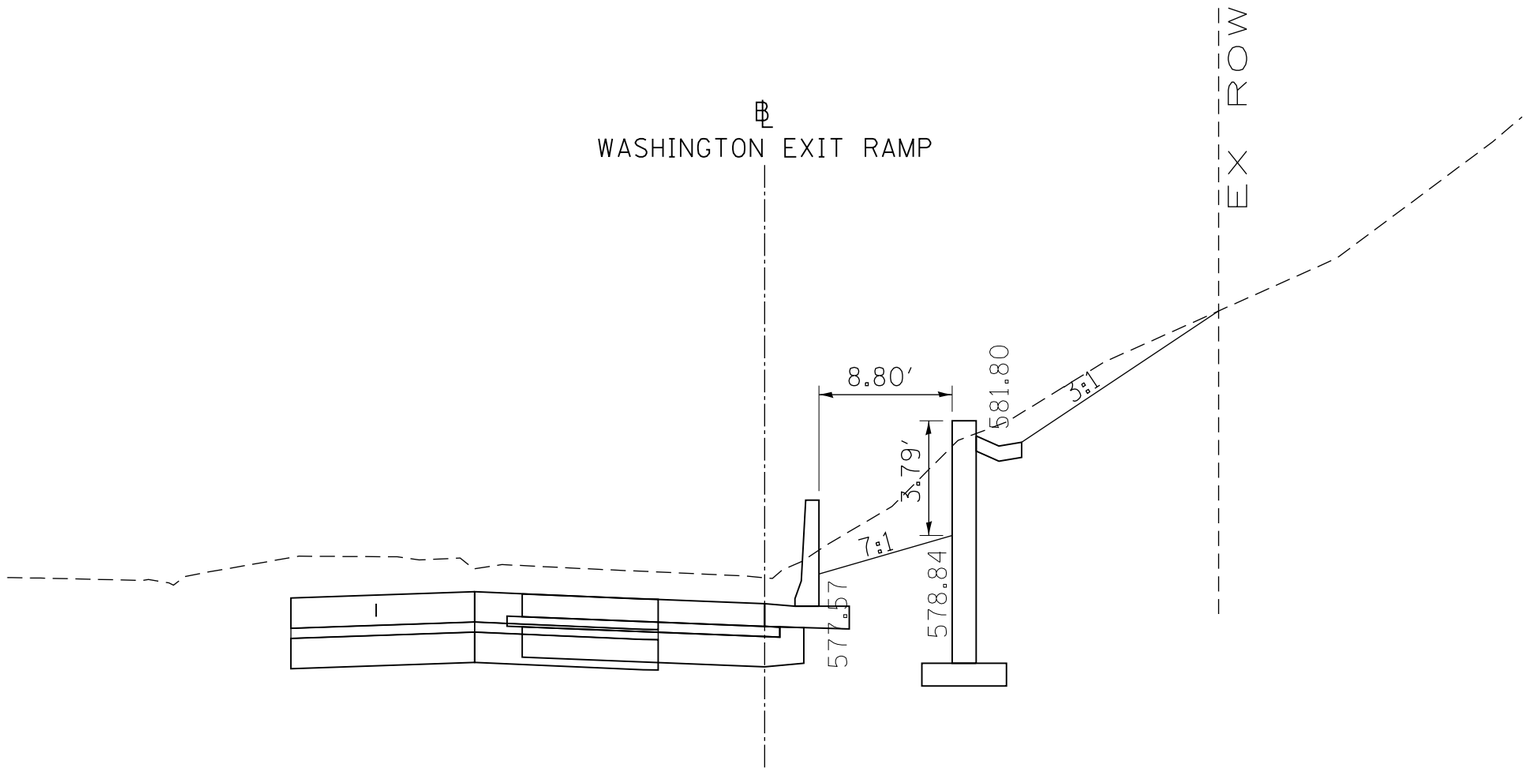
PR ℄ WASHINGTON EXIT RAMP
STA 8680+50.00



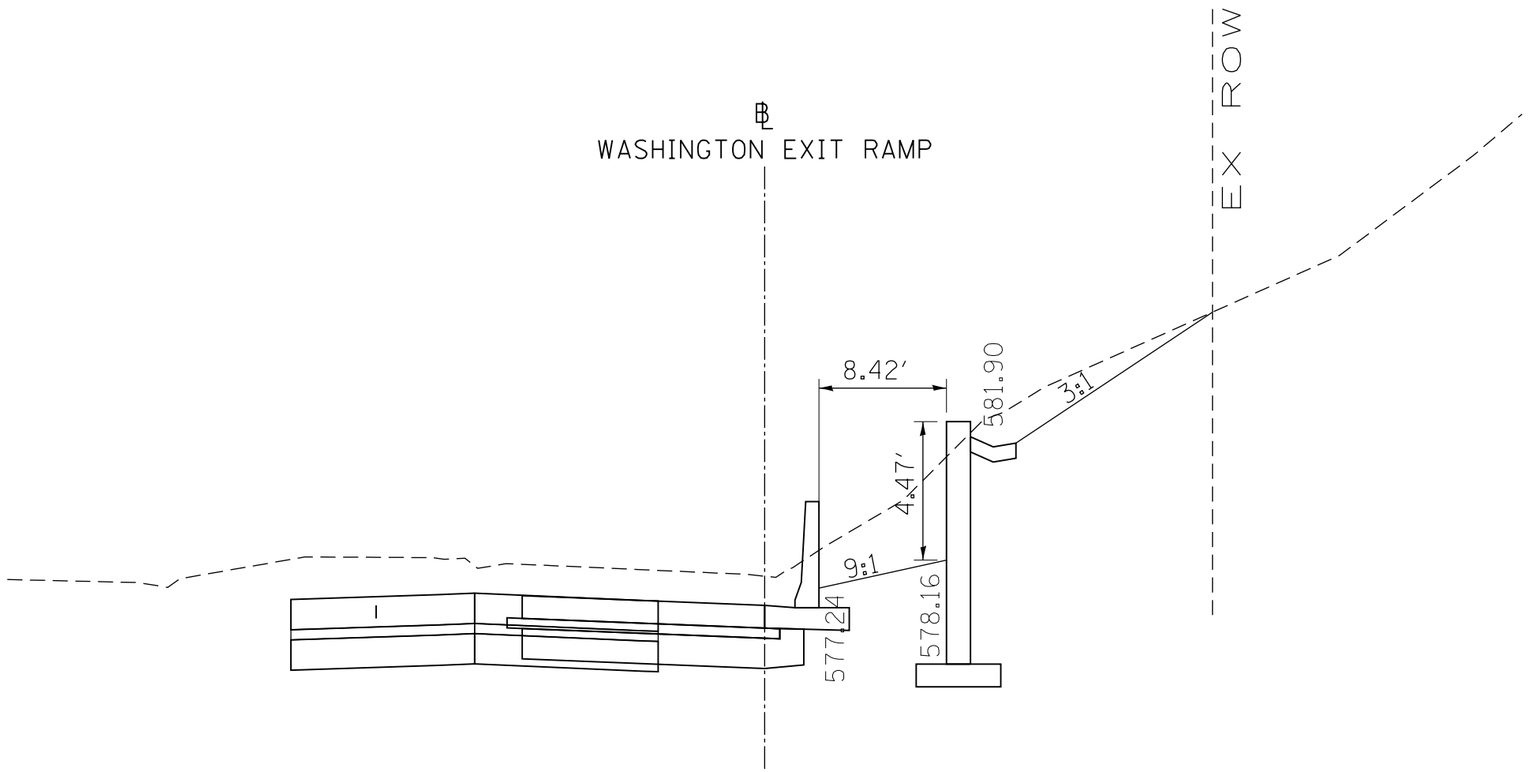
PR ℄ WASHINGTON EXIT RAMP
STA 8680+55.00



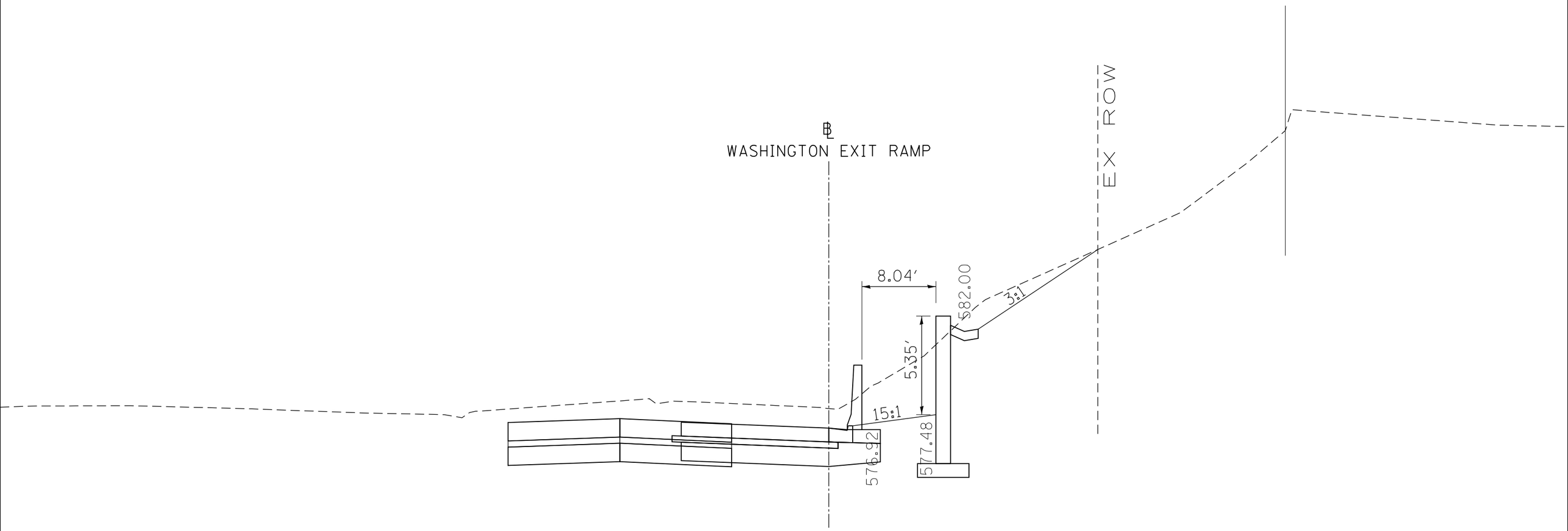
PR ℄ WASHINGTON EXIT RAMP
STA 8680+60.00



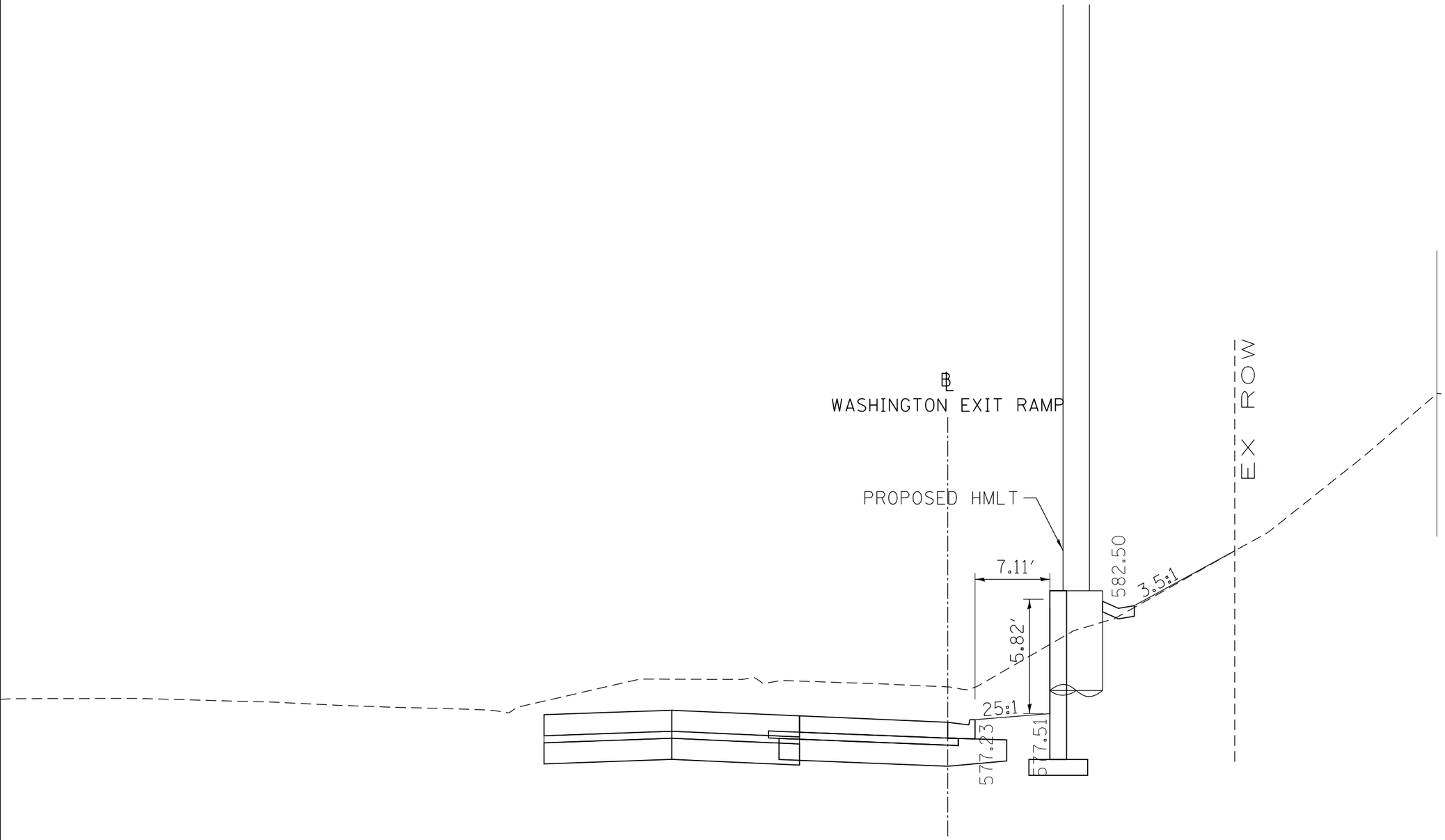
PR ℄ WASHINGTON EXIT RAMP
STA 8680+65.00



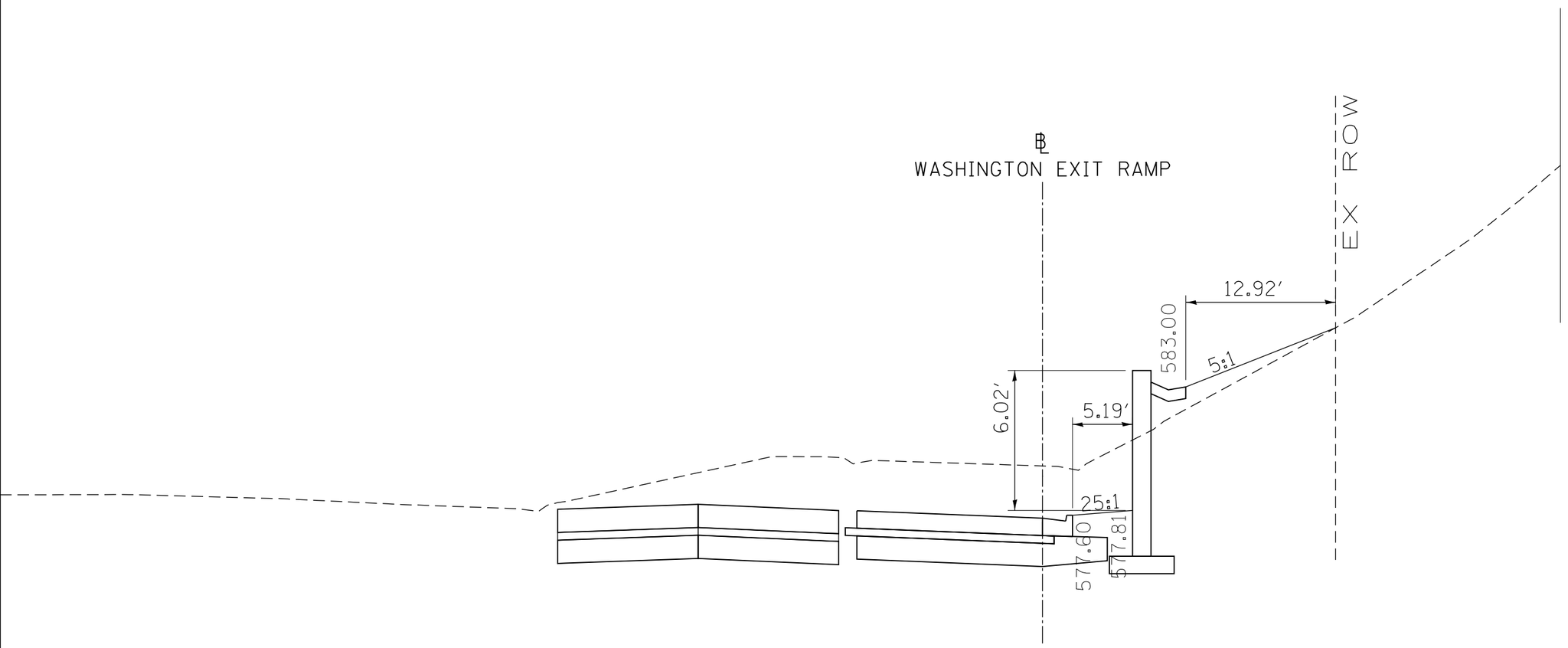
PR ℄ WASHINGTON EXIT RAMP
STA 8680+70.00



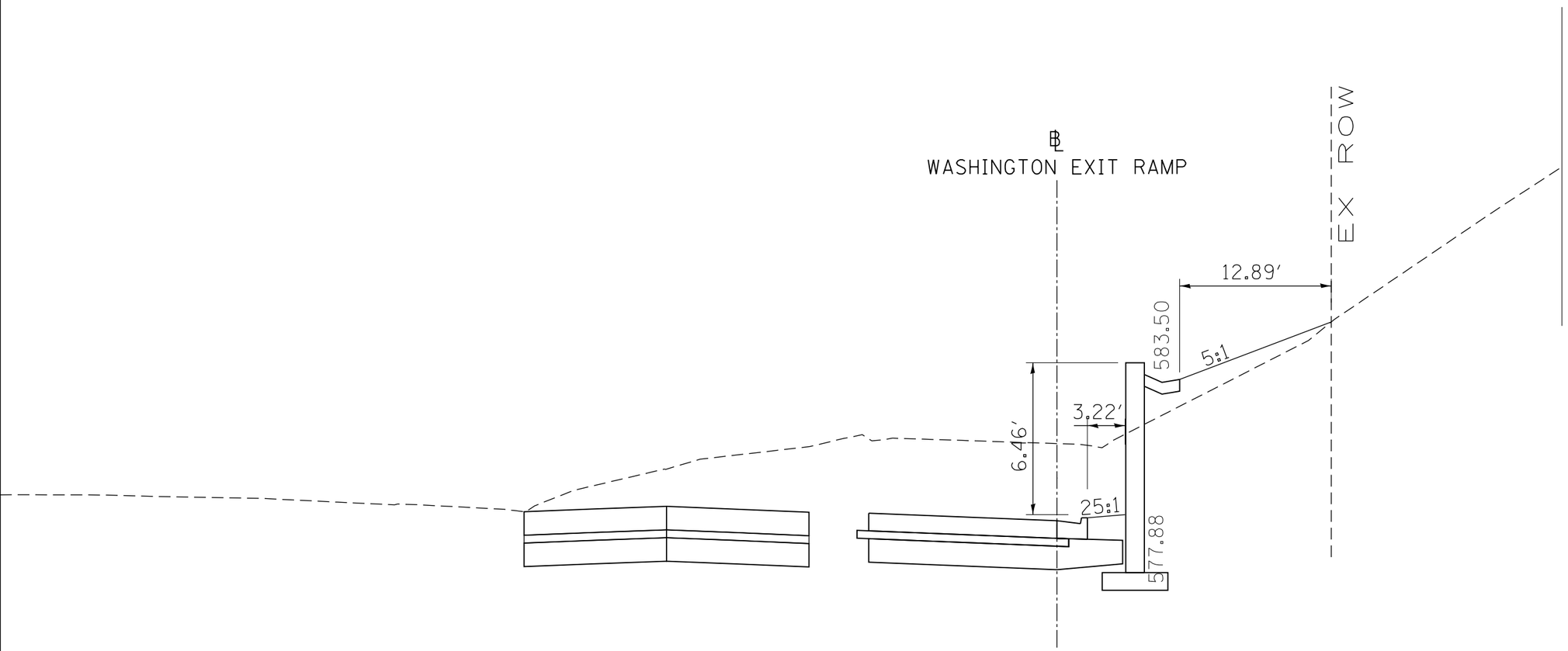
PR ℄ WASHINGTON EXIT RAMP
STA 8680+75.00



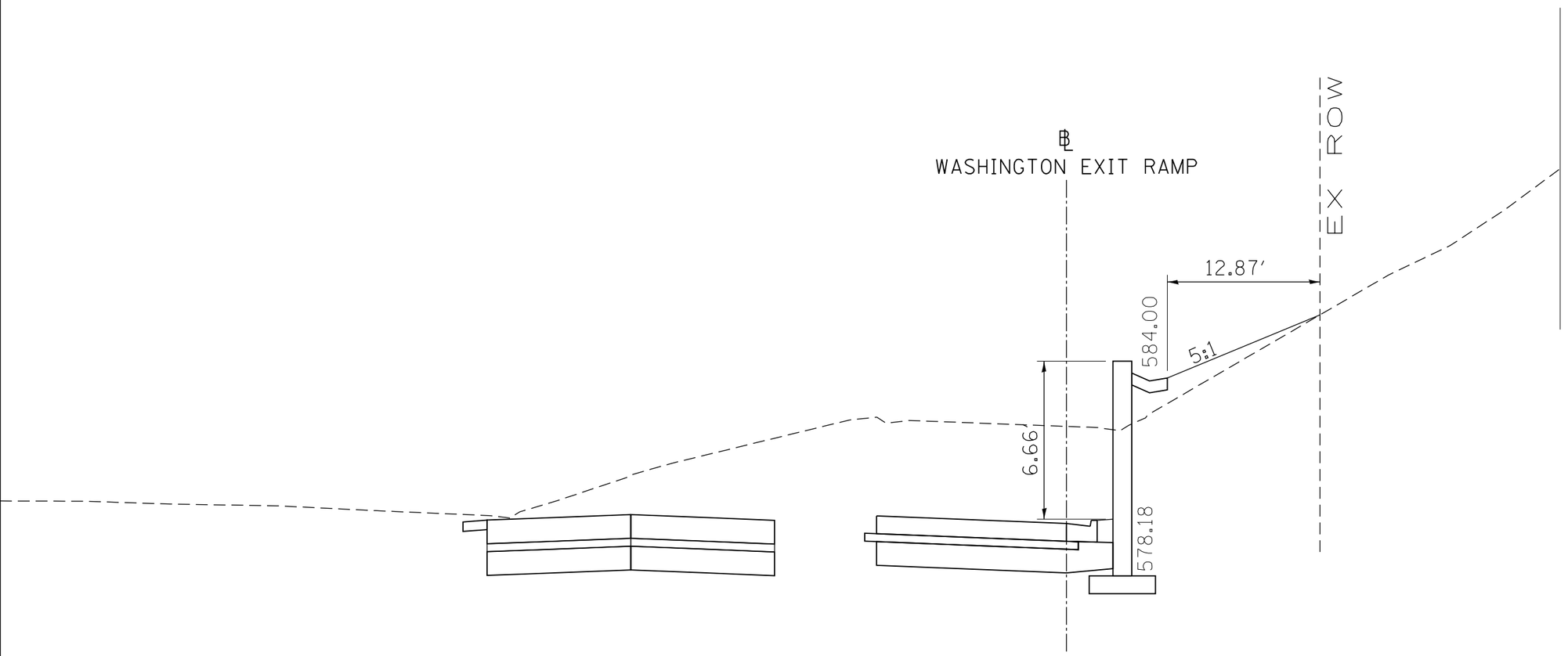
PR ℄ WASHINGTON EXIT RAMP
STA 8681+00.00



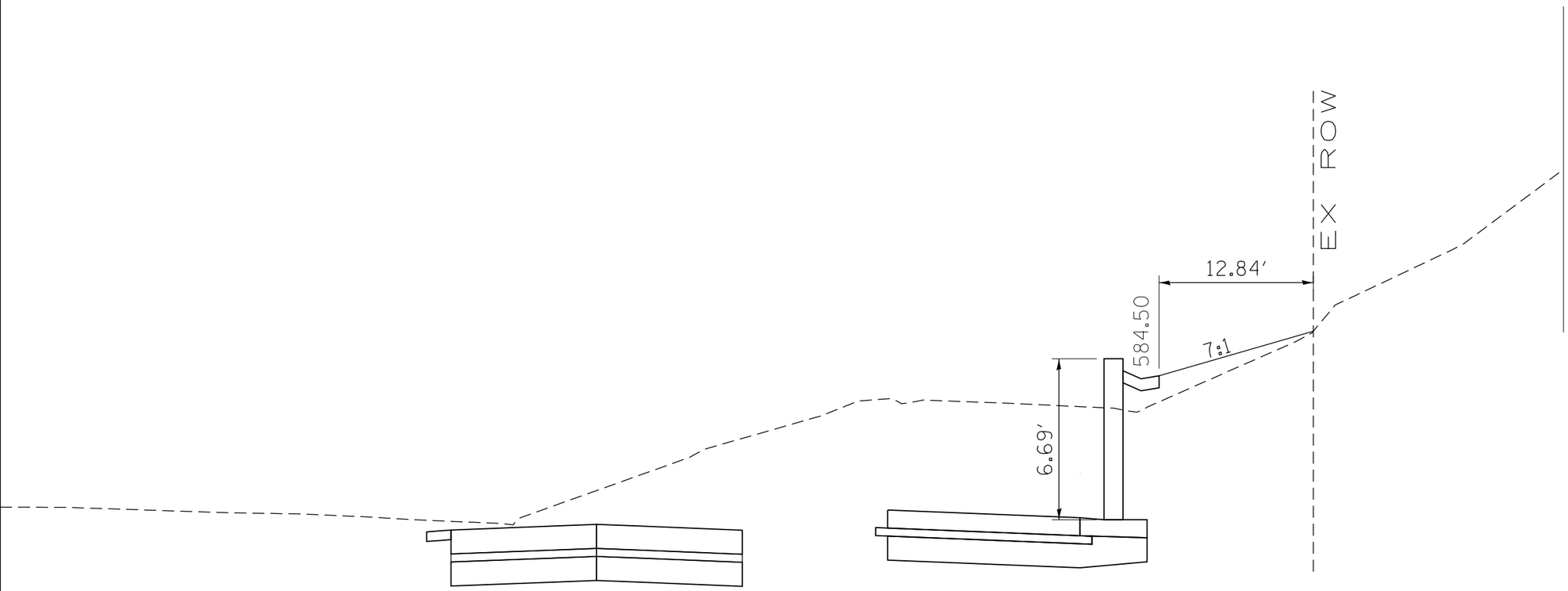
PR ℄ WASHINGTON EXIT RAMP
STA 8681+25.00



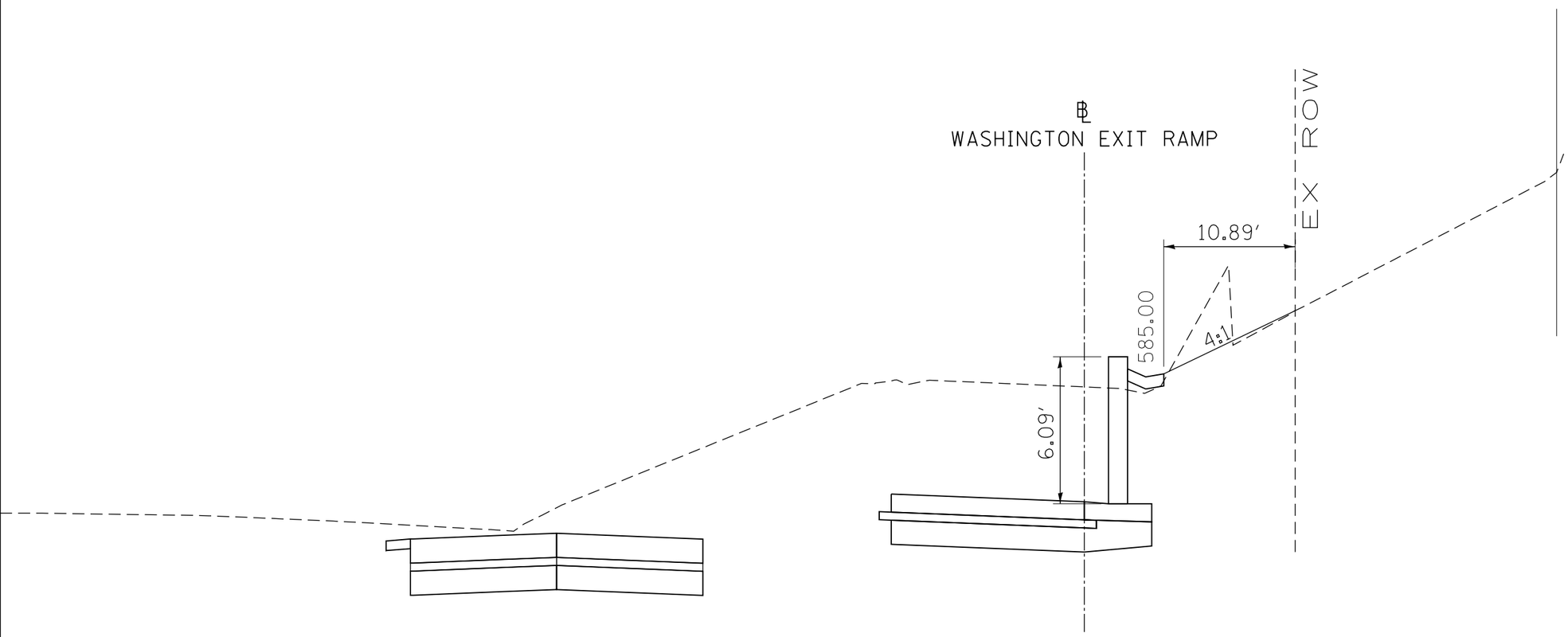
PR ℄ WASHINGTON EXIT RAMP
STA 8681+50.00



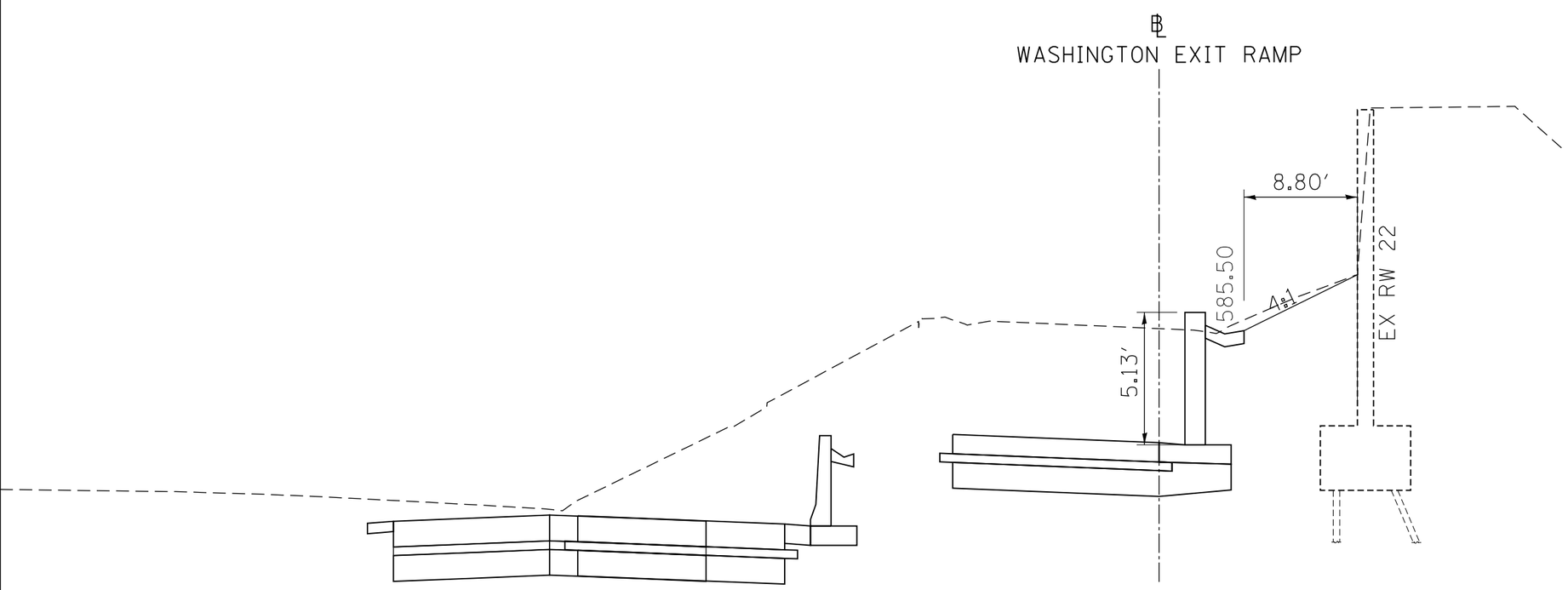
PR ℄ WASHINGTON EXIT RAMP
STA 8681+75.00



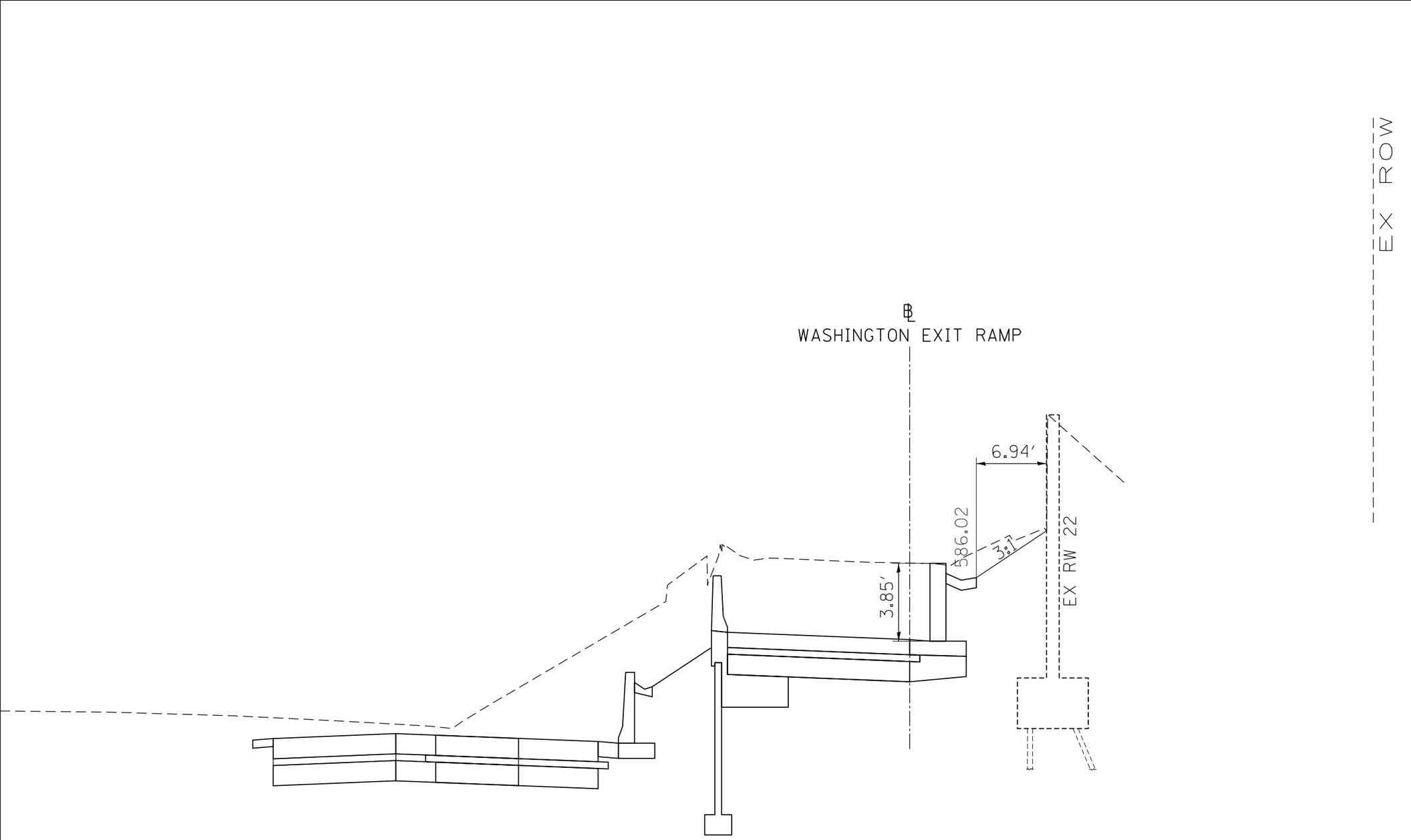
PR ℄ WASHINGTON EXIT RAMP
STA 8682+00.00



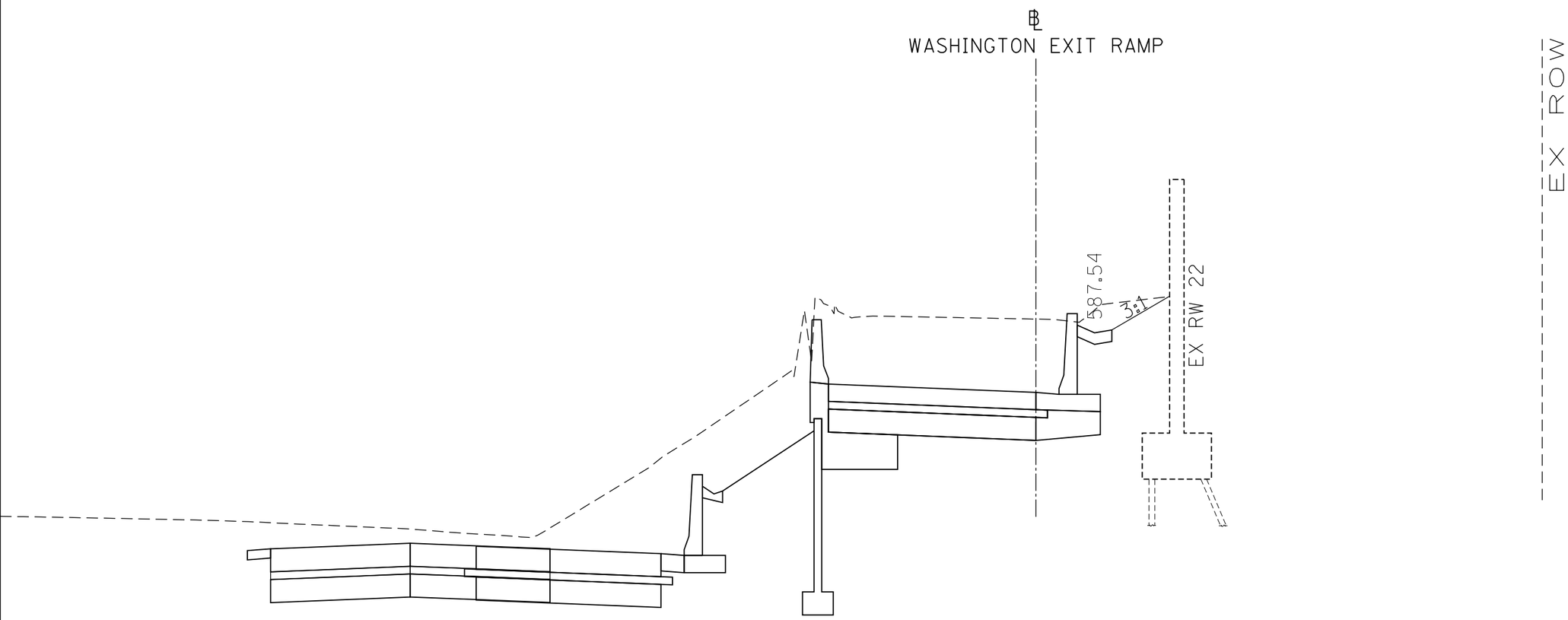
PR ℄ WASHINGTON EXIT RAMP
STA 8682+25.00



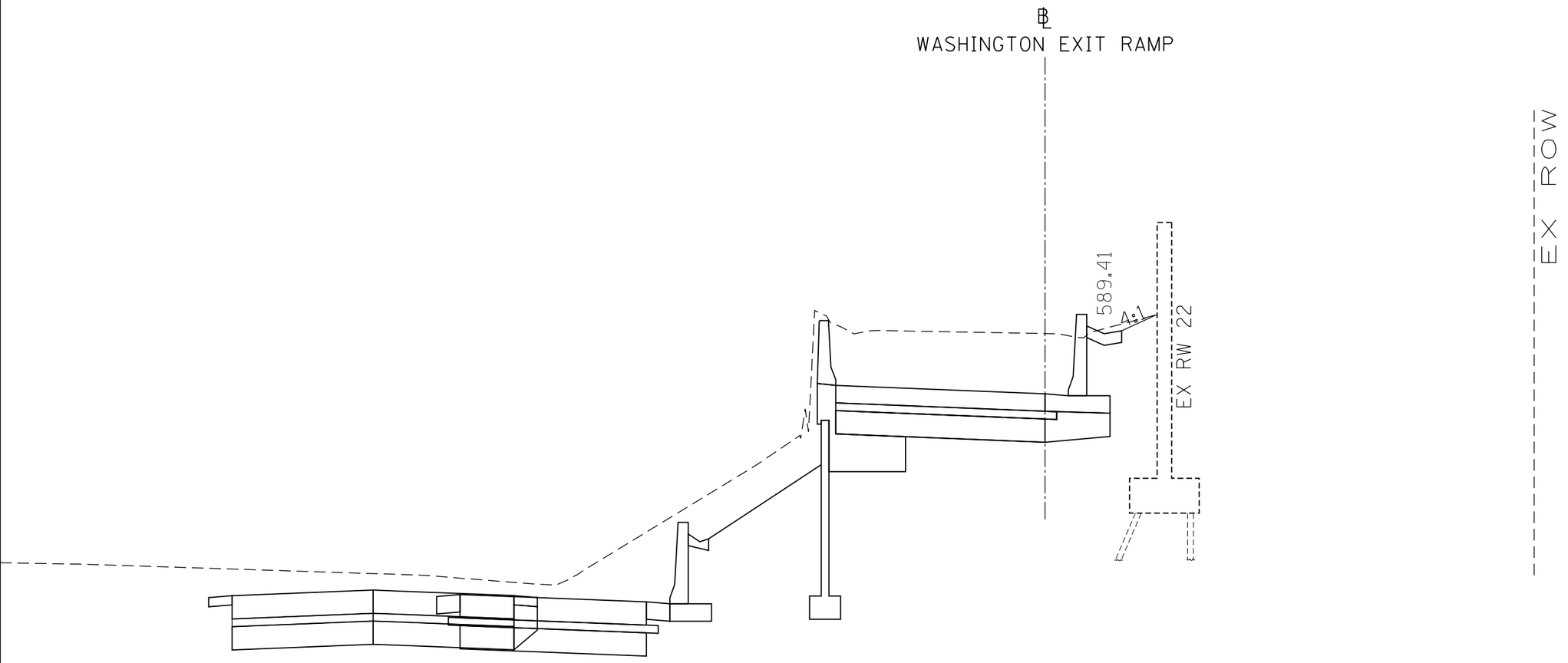
PR ℄ WASHINGTON EXIT RAMP
STA 8682+50.00



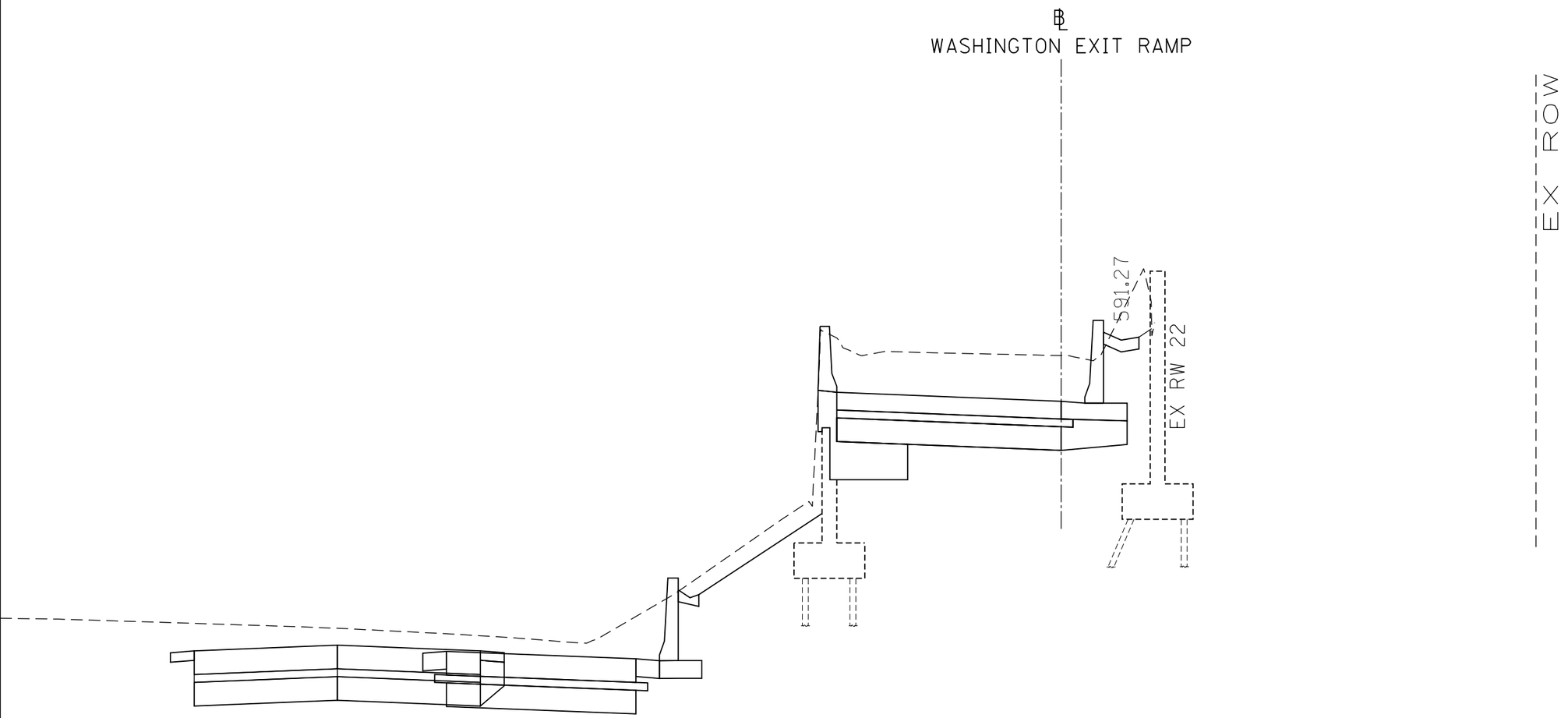
PR ℄ WASHINGTON EXIT RAMP
STA 8682+75.00



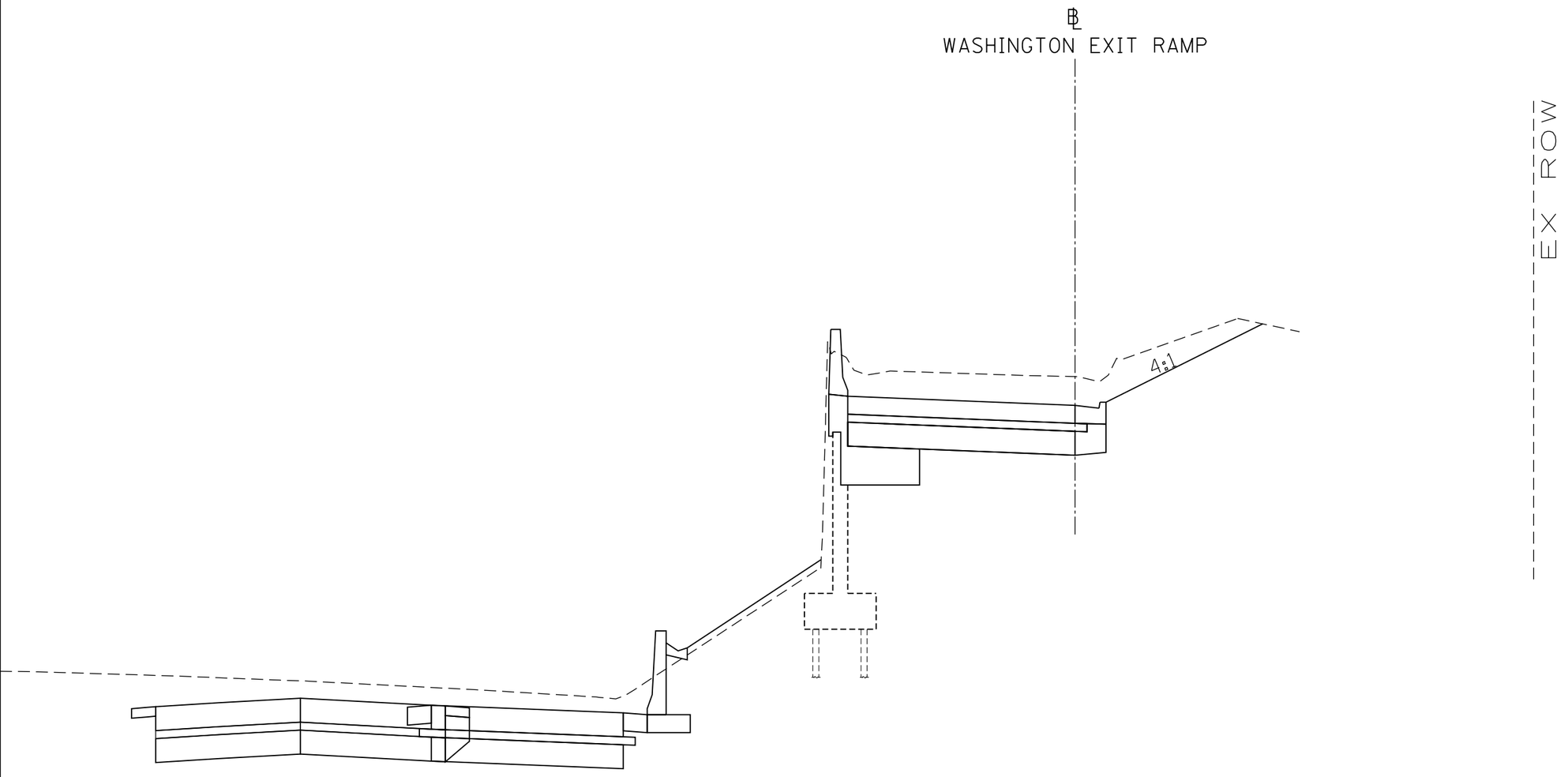
PR ℄ WASHINGTON EXIT RAMP
STA 8683+00.00



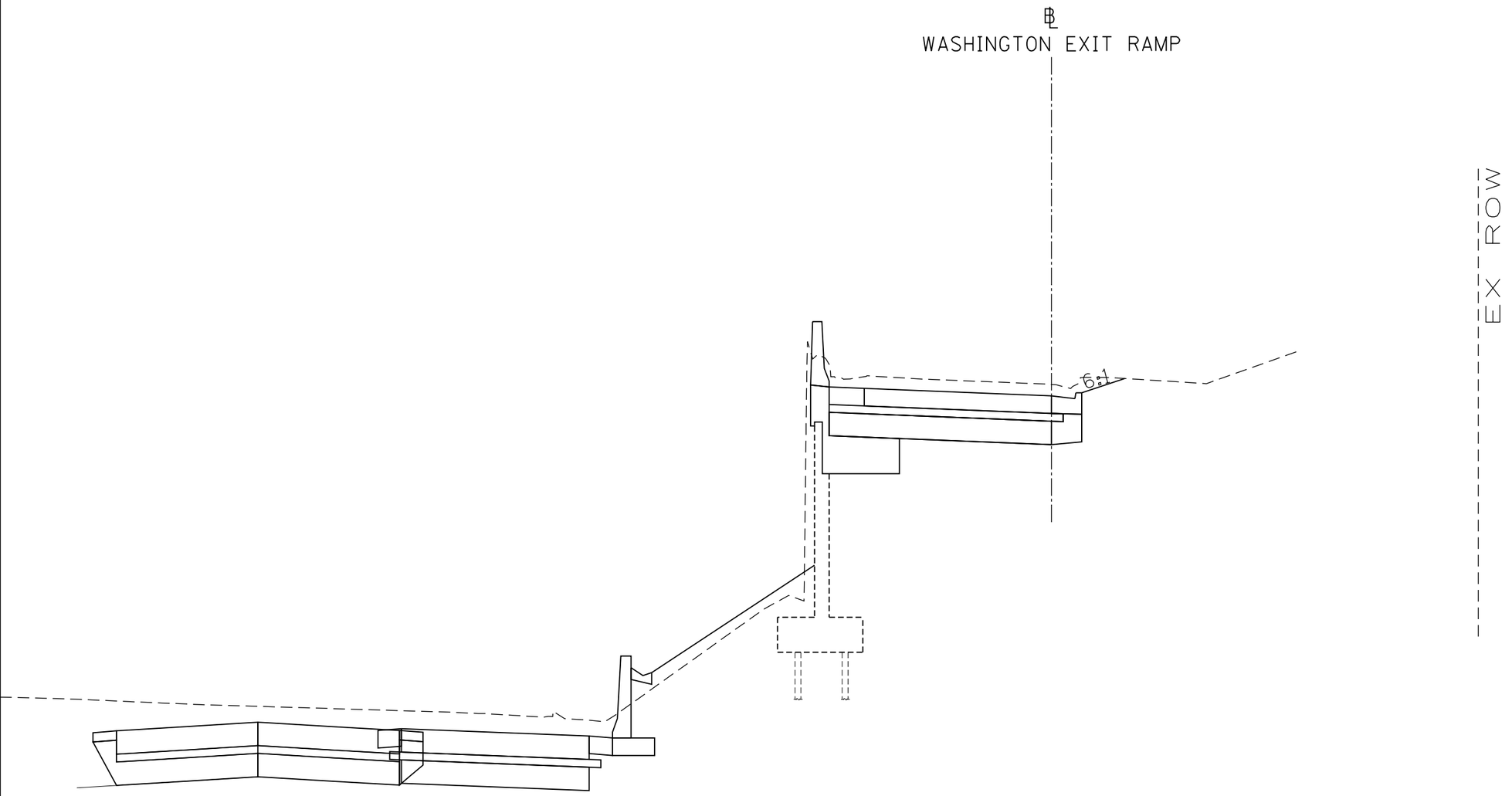
PR ℄ WASHINGTON EXIT RAMP
STA 8683+25.00



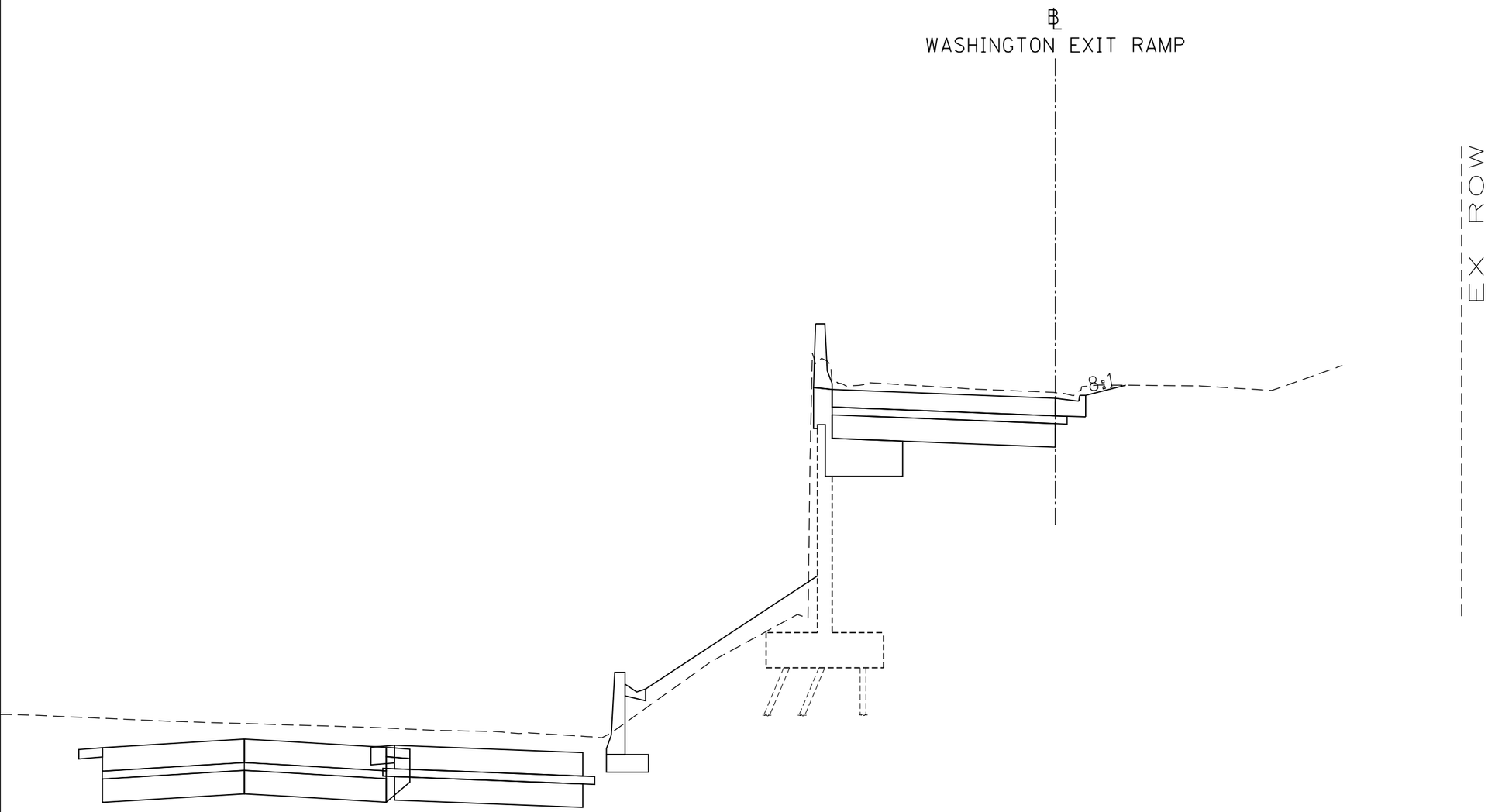
PR ℄ WASHINGTON EXIT RAMP
STA 8683+50.00



PR ℄ WASHINGTON EXIT RAMP
STA 8683+75.00



PR ℄ WASHINGTON EXIT RAMP
STA 8684+00.00



PR ℄ WASHINGTON EXIT RAMP
STA 8684+10.22