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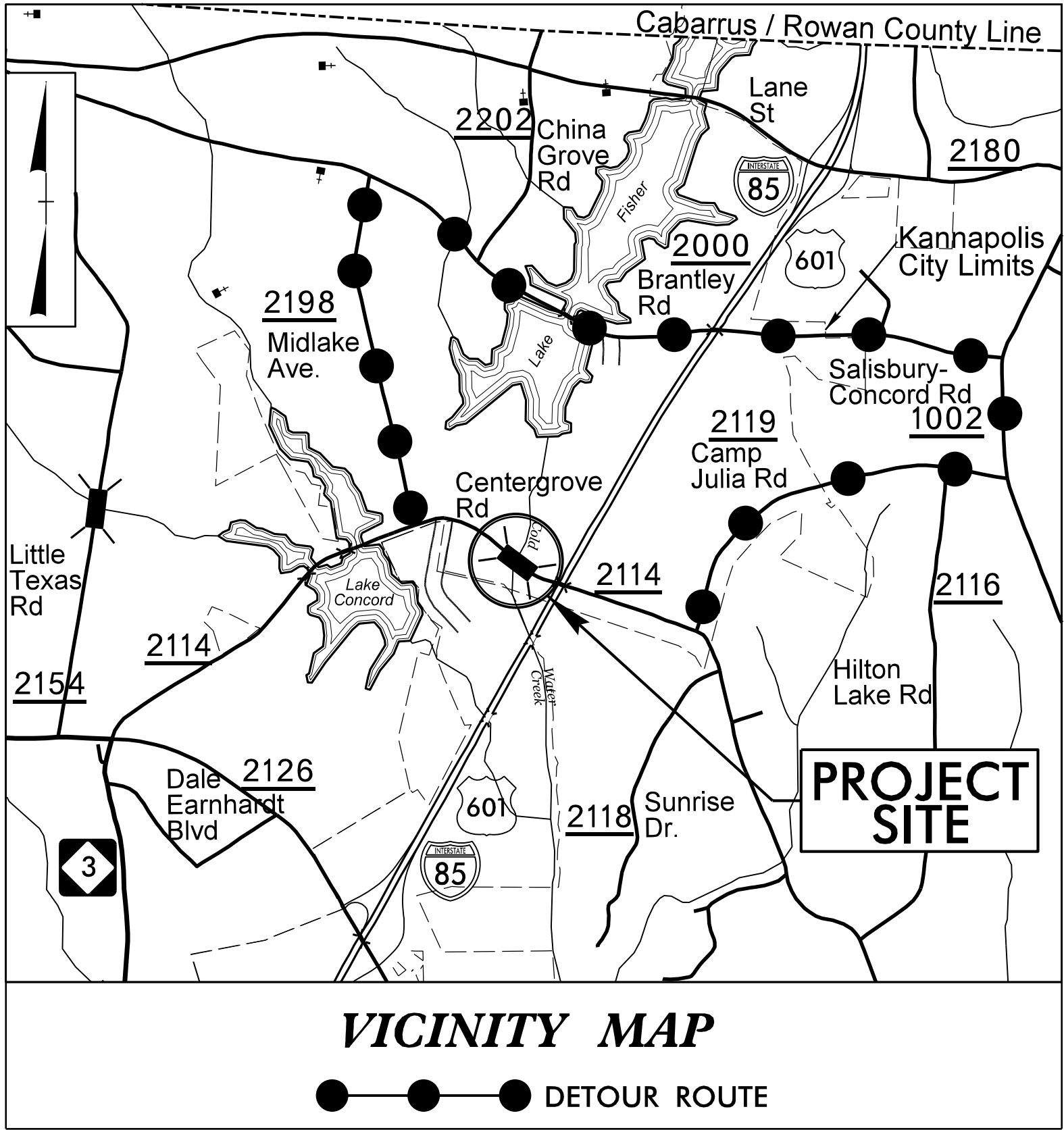
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09.08/99

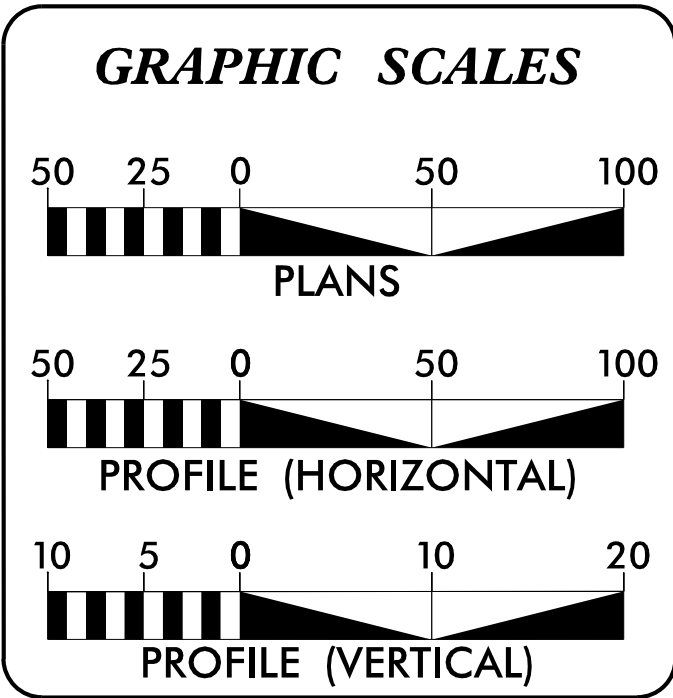
05-JAN-2021 08:51
M:\208\20801945\6 B-5369 structure only\Structures\Drawings\Final\B5369_Rdy_tsh_STRUCTURE.dgn
\$\$\$\$\$SERNAME\$\$\$\$\$

STATE PROJECT: 17BP.10.R.144

CONTRACT: DJ00372





STRUCTURES

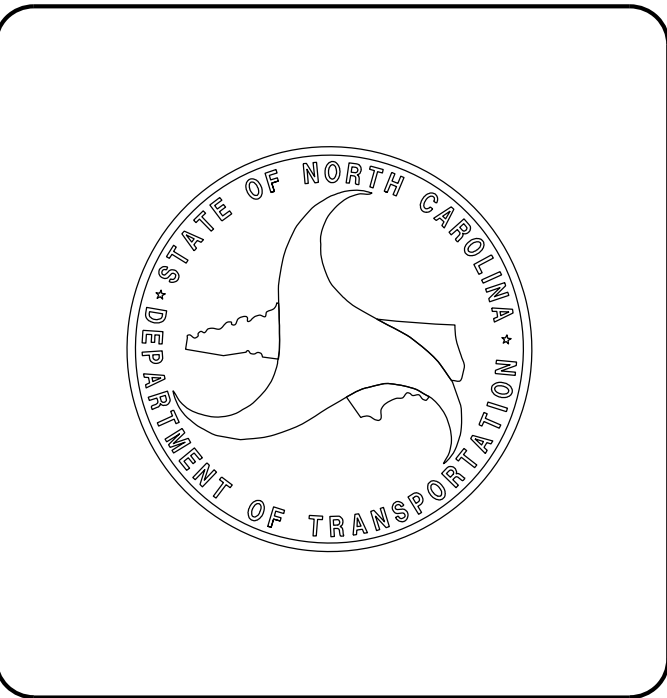


DESIGN DATA	
ADT 2018 =	3,005
ADT 2038 =	3,825
K =	9 %
D =	60 %
T =	5 % *
V =	45 MPH
* (TTST = 1% DUAL = 4%)	
FUNC CLASS = MAJOR COLLECTOR	
SUB-REGIONAL TIER	

PROJECT LENGTH	
LENGTH OF ROADWAY PROJECT 17BP.10.R.144 =	0.153 MILES
LENGTH OF STRUCTURE PROJECT 17BP.10.R.144 =	0.026 MILES
TOTAL LENGTH OF PROJECT 17BP.10.R.144 =	0.179 MILES

Prepared in the Office of:  KCI Associates of N.C., P.A. 4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609 Phone (919) 783-9214 Fax (919) 783-9266 http://www.kci.com	
2018 STANDARD SPECIFICATIONS	
Plans Prepared For: DIVISION OF HIGHWAYS 1000 Birch Ridge Dr. Raleigh NC, 27610	
LETTING DATE: APRIL 21, 2021	
NCDOT CONTACT: GARLAND HAYWOOD, P.E. DIVISION 10 BRIDGE PROGRAM MANAGER	
ELIZABETH R. PHIPPS, P.E. KCI STRUCTURES PROJECT MANAGER	
ROBERT C. LARSON, P.E. KCI STRUCTURES PROJECT ENGINEER	

STRUCTURES ENGINEER	
 2/5/2021 P.E.	

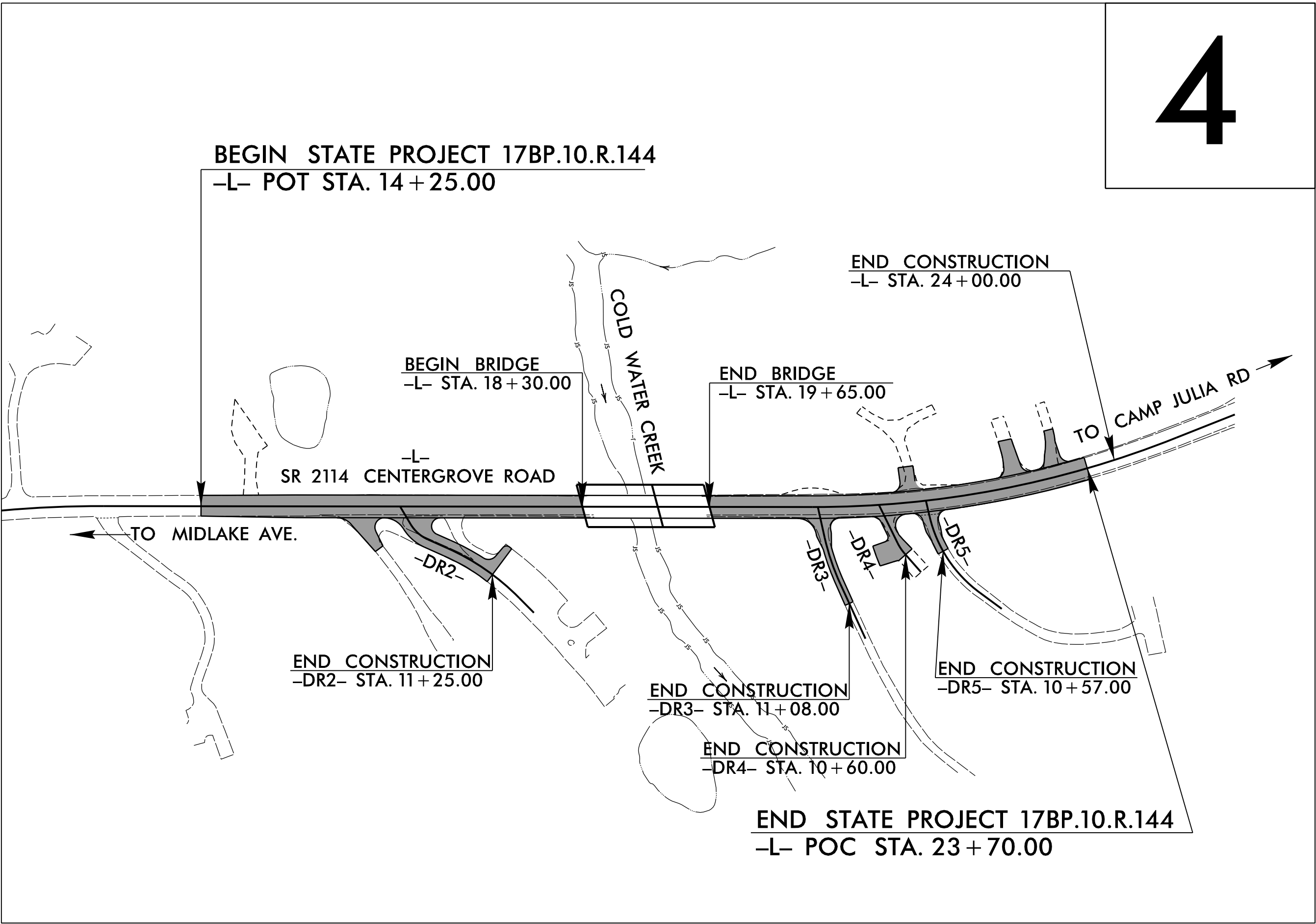


STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

CABARRUS COUNTY

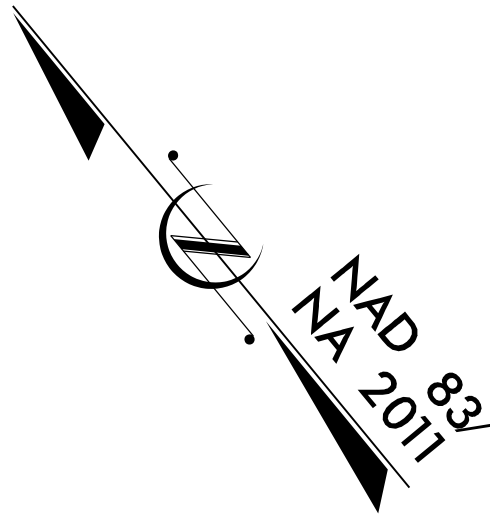
LOCATION: BRIDGE NO. 53 OVER COLD WATER CREEK
ON SR 2114 (CENTERGROVE ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE



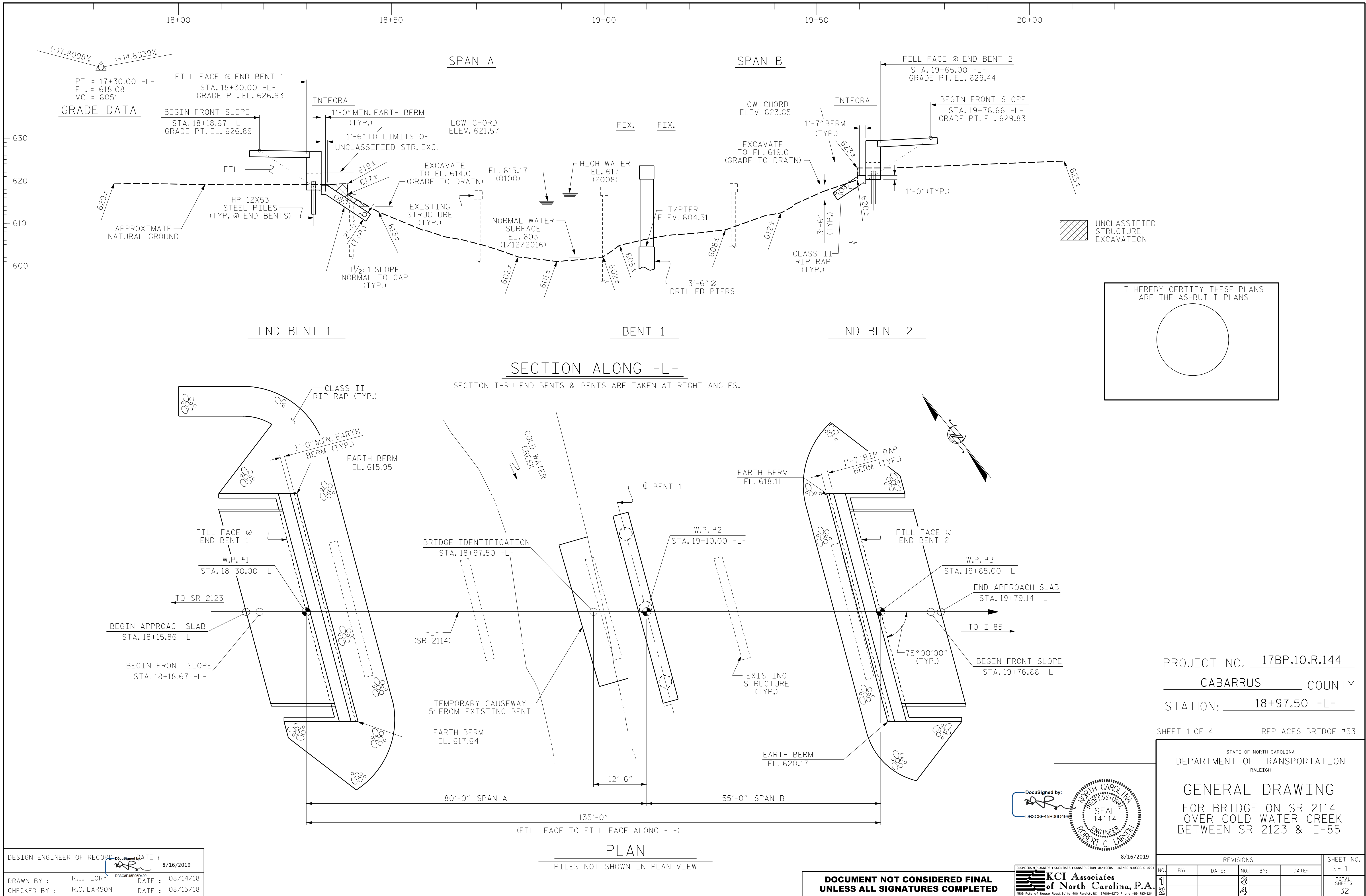
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.10.R.144	1	
STATE PROJ. NO.	P.A. PROJ. NO.	DESCRIPTION	
46084.1.1*	BRSTP-2114(1)	P.E.	
46084.2.1*		RW, UTIL.	
17BP.10.R.144		CONSTR.	

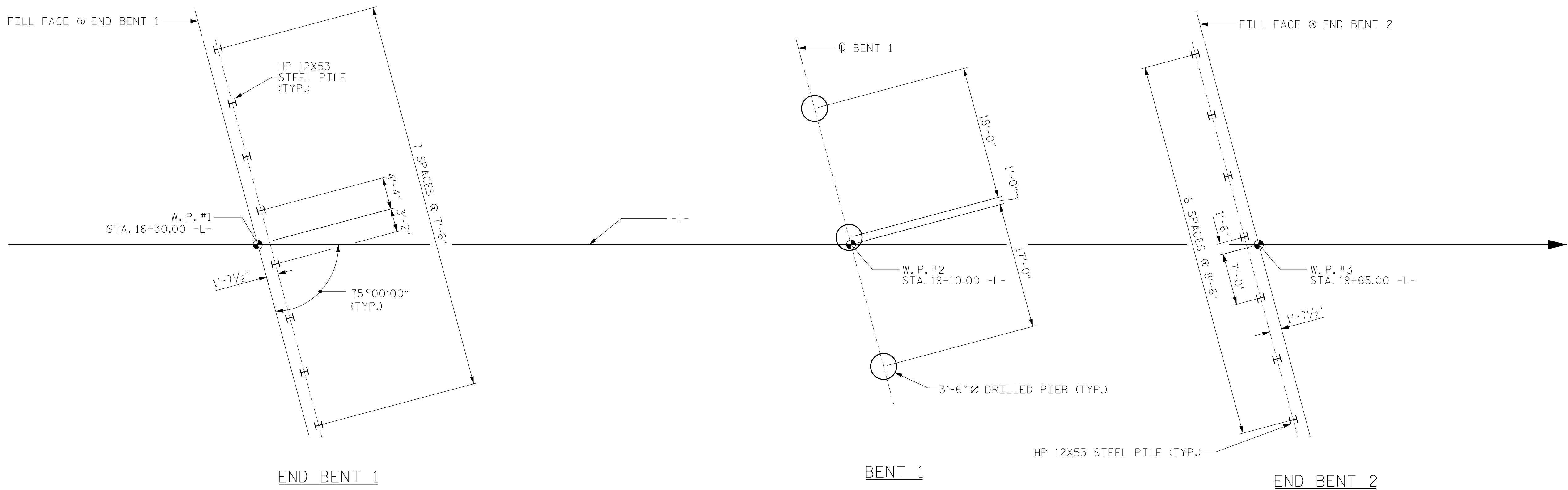
* FORMERLY STIP PROJECT B-5369



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

KCI JOB NO: 25180194516





FOUNDATION LAYOUT

FOUNDATION NOTES

- 1) FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- 2) PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 110 TONS PER PILE.
- 3) DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 183 TONS PER PILE.
- 4) FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- 5) DRILLED PIERS AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 470 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 110 TSF.
- 6) PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT 1. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 599 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.
- 7) INSTALL DRILLED PIERS AT BENT 1 TO A TIP ELEVATION NO HIGHER THAN 587 FEET (LT); 587 FEET (CT); 592 FEET (RT), SATISFY THE REQUIRED TIP RESISTANCE AND HAVE A PENETRATION OF AT LEAST 7 FEET INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.
- 8) THE SCOUR CRITICAL ELEVATION FOR BENT 1 IS 598 FEET. THE SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- 9) CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR THE DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- 10) PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE.
- 11) DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 167 TONS PER PILE.

PROJECT NO. 17BP.10.R.144

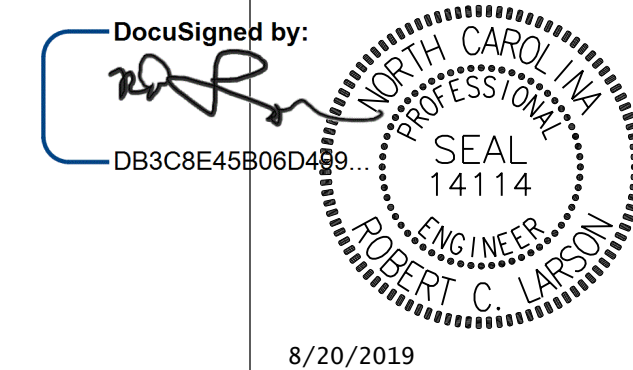
CABARRUS COUNTY

STATION: 18+97.50 -L-

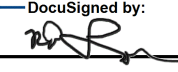
SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FOUNDATION LAYOUT



8/20/2019

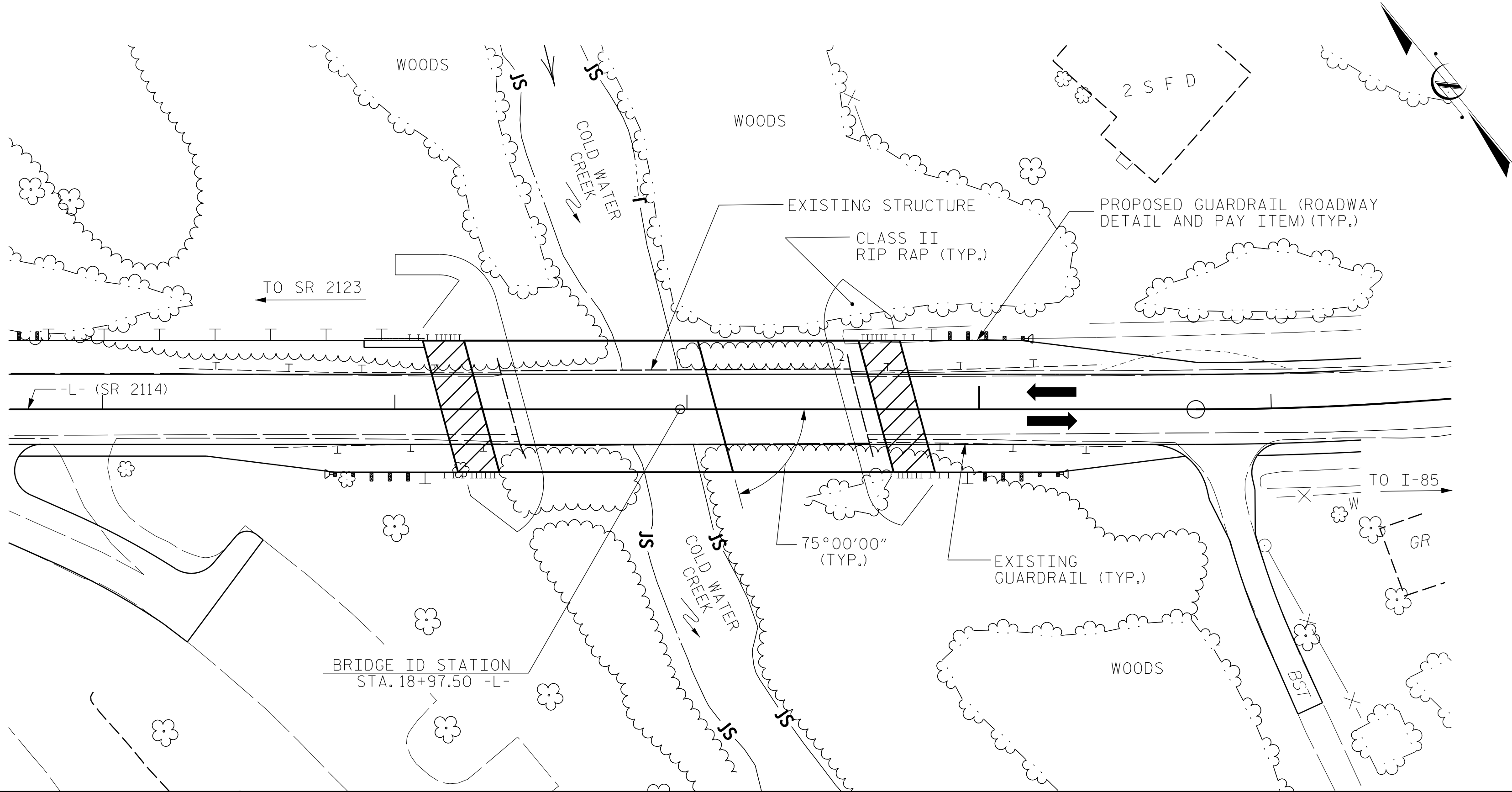
DESIGN ENGINEER OF RECORD :	DATE :
	8/20/2019
DRAWN BY : R.J. FLORY	DATE : 09/26/18
CHECKED BY : R.C. LARSON	DATE : 09/28/18

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**



REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S- 2
1			3			TOTAL SHEETS
2			4			32

BENCHMARK: BM#2 RR SPIKE IN BASE OF POWER POLE 17+66 -L-, 26' RIGHT ELEVATION 618.97 NAVD 88



LOCATION SKETCH

NOTE: FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR SEISMIC PERFORMANCE ZONE 1.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

PRESTRESSED CONCRETE DECK PANELS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTOR'S OPTION AND UPON REMOVAL OF THE CAUSEWAY, THE CLASS II RIP RAP USED IN THE CAUSEWAY MAY BE PLACED AS RIP RAP SLOPE PROTECTION. SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 18+97.50 -L-

NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 18+97.50 -L-".

THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 30 FT EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

THE EXISTING STRUCTURE CONSISTING OF 4 @ 30'± STEEL BEAM SPANS WITH 24'-0" CLEAR ROADWAY WITH STEEL PLANK DECK ON TIMBER PILE/STEEL CAP BENTS AND END BENTS AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, LOAD LIMIT MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

TOTAL BILL OF MATERIAL

TOTAL BILL OF MATERIAL																									
	CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS @ STA. 18+97.50 -L-	REMOVAL OF EXISTING STRUCTURE @ STA. 18+97.50 -L-	ASBESTOS ASSESSMENT	3'-6" DIA. DRILLED PIER IN SOIL	3'-6" DIA. DRILLED PIER NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-6" DIA. DRILLED PIER	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION @ STA 18+97.50 -L-	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS STA. 18+97.50 -L-	REIN-FORCING STEEL	SPIRAL COLUMN REIN-FORCING STEEL	45" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES		HP 12 X 53 STEEL PILES		TWO BAR METAL RAIL	1'-2" X 3'-1 1/2" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS
	LUMP SUM	LUMP SUM	LUMP SUM	LIN.FT.	LIN.FT.	LIN.FT.	EACH	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN.FT.	EACH	NO.	LIN.FT.	LIN.FT.	LIN.FT.	TON	SQ.YDS.	LUMP SUM	
SUPERSTRUCTURE									6424	6770					10	659.17				250.92	262.54			LUMP SUM	
END BENT 1											39.1		5552				8	8	160			170	190		
BENT 1				17.5	30	20	1				30.3		9871	2061											
END BENT 2											39.2		5519				7	7	105			120	135		
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	17.5	30	20	1	LUMP SUM	6424	6770	108.6	LUMP SUM	20,942	2061	10	659.17	15	15	265	250.92	262.54	290	225	LUMP SUM	

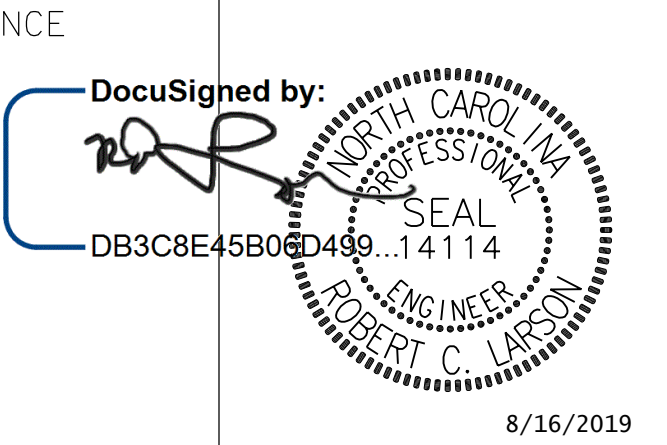
NOTES (CONT'D):

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES."

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.



PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 2114
OVER COLD WATER CREEK
BETWEEN SR 2123 & I-85

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.
1			3			S-3
2			4			TOTAL SHEETS 32

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UNLESS ALL SIGNATURES COMPLETED



KCI JOB NO: 25180194516

DESIGN ENGINEER OF RECORD	DATE : 8/16/2019
DRAWN BY : R.J. FLORY	DATE : 08/25/18
CHECKED BY : R.C. LARSON	DATE : 08/27/18

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ_{DC}	γ_{DW}
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

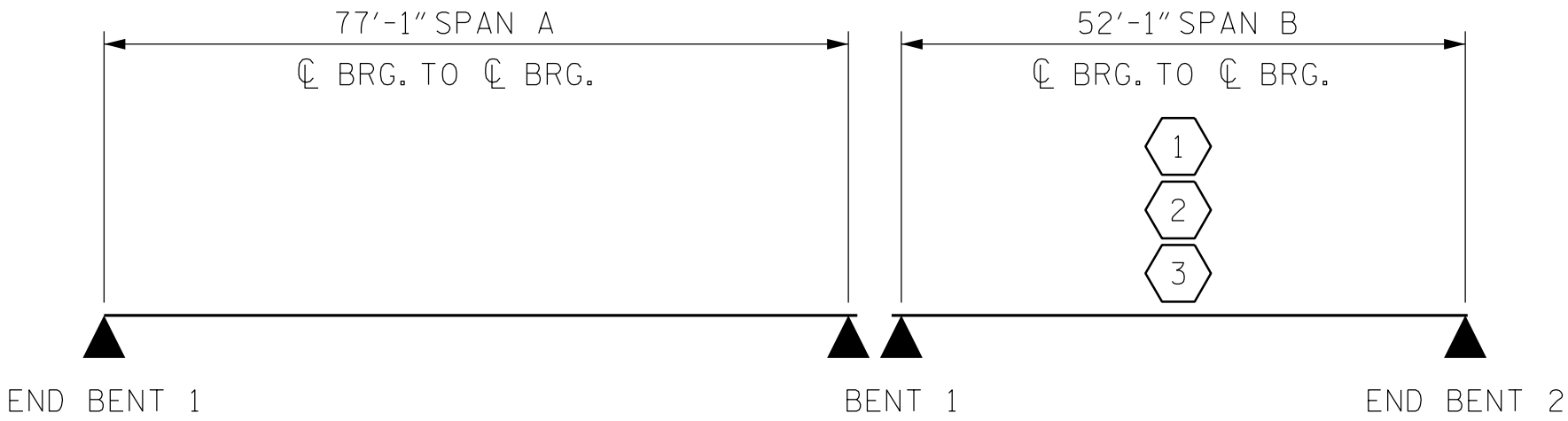
NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.


ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS																							
LEVEL	VEHICLE	WEIGHT (W) (TONS)	<div>CONTROLLING LOAD RATING</div> <div>#</div>	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER	
						LIVE-LOAD FACTORS (γ _{LL})	MOMENT					SHEAR					LIVE-LOAD FACTORS (γ _{LL})	MOMENT					
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION		DISTANCE FROM LEFT END OF SPAN (ft)
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	1	1.05	--	1.75	0.859	1.13	B	I	26.0	1.026	1.08	A	I	7.2	0.80	0.859	1.05	B	I	26.0	
	HL-93 (OPERATING)	N/A		1.43	--	1.35	0.859	1.47	B	I	26.0	1.026	1.43	A	I	7.2	N/A	--	--	--	--	--	
	HS-20 (INVENTORY)	36.000	2	1.31	47.16	1.75	0.859	1.41	B	I	26.0	1.026	1.40	A	I	7.2	0.80	0.859	1.314	B	I	26.0	
	HS-20 (OPERATING)	36.000		1.83	65.88	1.35	0.859	1.83	B	I	26.0	1.026	1.83	A	I	7.2	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		2.73	36.85	1.40	0.859	3.67	B	I	26.0	1.026	4.37	A	I	7.2	0.80	0.859	2.73	B	I	26.0	
		SNGARBS2		2.13	42.60	1.40	0.859	2.86	B	I	26.0	1.026	3.06	A	I	7.2	0.80	0.859	2.13	B	I	26.0	
		SNAGRIS2		2.06	45.32	1.40	0.859	2.77	B	I	26.0	1.026	2.84	A	I	7.2	0.80	0.859	2.06	B	I	26.0	
		SNCOTTS3		1.36	37.06	1.40	0.859	1.83	B	I	26.0	1.026	2.13	A	I	7.2	0.80	0.859	1.36	B	I	26.0	
		SNAGGRS4		1.17	40.86	1.40	0.859	1.58	B	I	26.0	1.026	1.74	A	I	7.2	0.80	0.859	1.17	B	I	26.0	
		SNS5A		1.14	40.52	1.40	0.859	1.54	B	I	26.0	1.026	1.76	A	I	7.2	0.80	0.859	1.14	B	I	26.0	
		SNS6A		1.07	42.74	1.40	0.859	1.43	B	I	26.0	1.026	1.59	A	I	7.2	0.80	0.859	1.07	B	I	26.0	
		SNS7B		1.02	42.84	1.40	0.859	1.37	B	I	26.0	1.026	1.56	A	I	7.2	0.80	0.859	1.02	B	I	26.0	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3		1.30	42.90	1.40	0.859	1.76	B	I	26.0	1.026	1.92	A	I	7.2	0.80	0.859	1.30	B	I	26.0	
		TNT4A		1.32	43.65	1.40	0.859	1.77	B	I	26.0	1.026	1.88	A	I	7.2	0.80	0.859	1.32	B	I	26.0	
		TNT6A		1.09	45.34	1.40	0.859	1.47	B	I	26.0	1.026	1.67	A	I	7.2	0.80	0.859	1.09	B	I	26.0	
		TNT7A		1.11	46.62	1.40	0.859	1.49	B	I	26.0	1.026	1.62	A	I	7.2	0.80	0.859	1.11	B	I	26.0	
		TNT7B		1.15	48.30	1.40	0.859	1.55	B	I	26.0	1.026	1.52	A	I	7.2	0.80	0.859	1.15	B	I	26.0	
		TNAGRIT4		1.09	46.87	1.40	0.859	1.47	B	I	26.0	1.026	1.48	A	I	7.2	0.80	0.859	1.09	B	I	26.0	
TNAGT5A			1.02	45.90	1.40	0.859	1.38	B	I	26.0	1.026	1.47	A	I	7.2	0.80	0.859	1.02	B	I	26.0		
TNAGT5B			3	1.00	45.00	1.40	0.859	1.35	B	I	26.0	1.026	1.40	A	I	7.2	0.80	0.859	1.00	B	I	26.0	

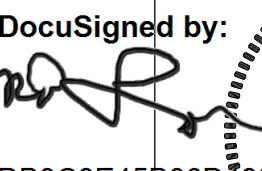
⬡ CONTROLLING LOAD RATING
⬡1 DESIGN LOAD RATING (HL-93)
⬡2 DESIGN LOAD RATING (HS-20)
⬡3 LEGAL LOAD RATING ** ** SEE CHART FOR VEHICLE TYPE
GIRDER LOCATION
I - INTERIOR GIRDER EL - EXTERIOR LEFT GIRDER ER - EXTERIOR RIGHT GIRDER




LRFR SUMMARY

DESIGN ENGINEER OF RECORD:  DATE: 8/16/2019
ASSEMBLED BY: R. C. LARSON DATE: 07/16/19
CHECKED BY: M. C. ARMSTRONG DATE: 07/19/19
DRAWN BY: MAA 1/08 REV. 11/2/08RR MAA/GM
CHECKED BY: GM/DI 2/08 REV. 10/1/11 MAA/GM
REV. 12/17 MAA/THC

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DocuSigned by:

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8/16/2019

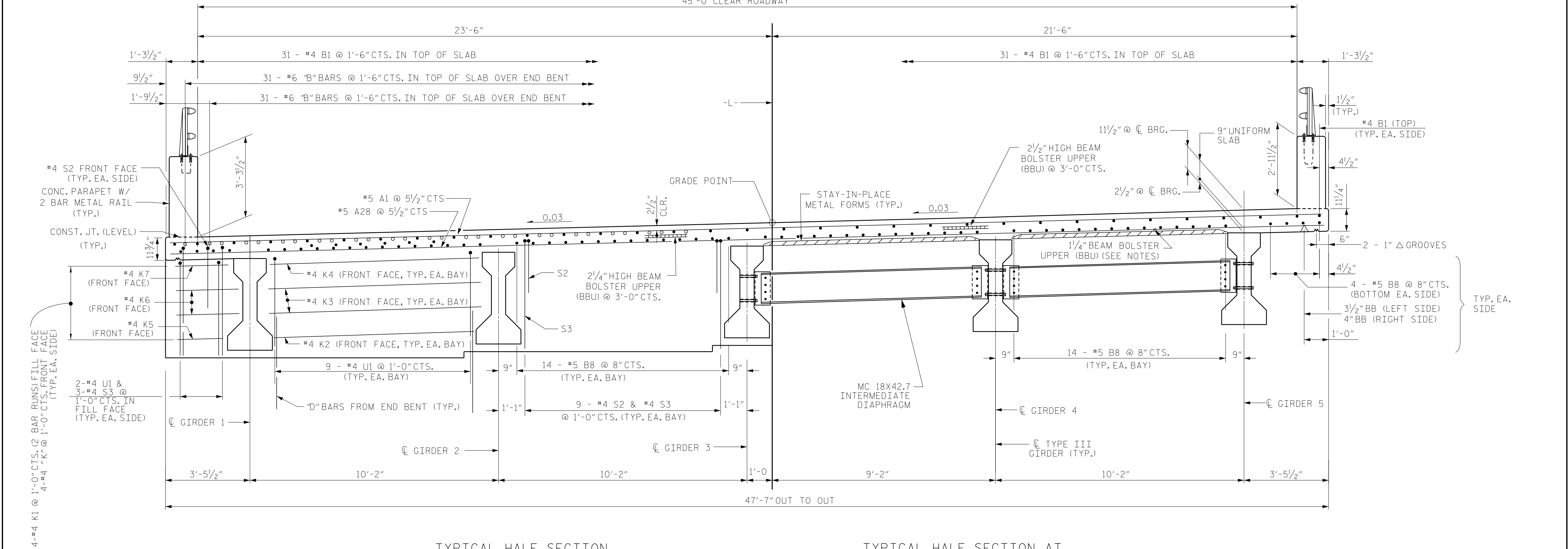
PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH STANDARD LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS (NON-INTERSTATE TRAFFIC)						REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	NO.	BY:	DATE:	NO.	BY:	DATE:	S-4
1			3			4			3			TOTAL SHEETS
2												32

STD. NO. LRFR1

KCI JOB NO: 25180194516



TYPICAL HALF SECTION
AT INTEGRAL END DIAPHRAGM
(END BENTS 1 & 2)

TYPICAL HALF SECTION AT
INTERMEDIATE DIAPHRAGM

- INDICATES CONTINUOUS REINFORCING
- INDICATES ADDITIONAL REINFORCING AT END BENT

TYPICAL SECTION

NOTES

PROVIDE 1 1/4" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2 1/2" ABOVE THE TOP OF THE REMOVABLE FORM.

LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

PREVIOUSLY CAST CONCRETE SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE 2 SPAN UNIT.

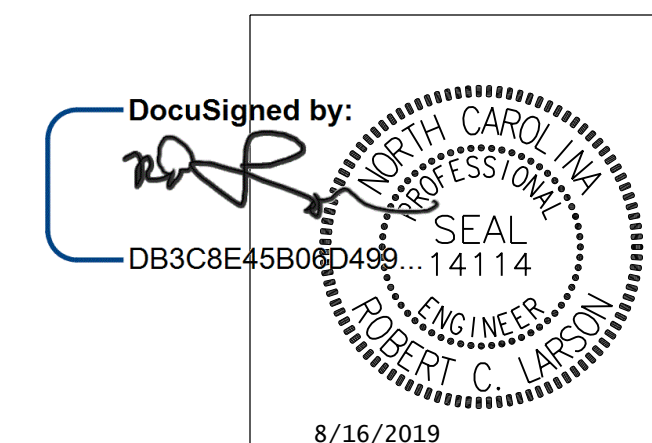
SEE "CONCRETE PARAPET FOR 2 BAR METAL RAIL-DETAILS" FOR ADDITIONAL REINFORCING STEEL EMBEDDED IN SLAB.

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

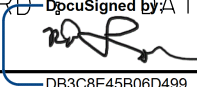
SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION



8/16/2019

DESIGN ENGINEER OF RECORD	DocuSigned by: 	DATE: 8/16/2019
DRAWN BY: R. J. FLORY	DATE: 09/26/18	
CHECKED BY: R. C. LARSON	DATE: 09/28/18	

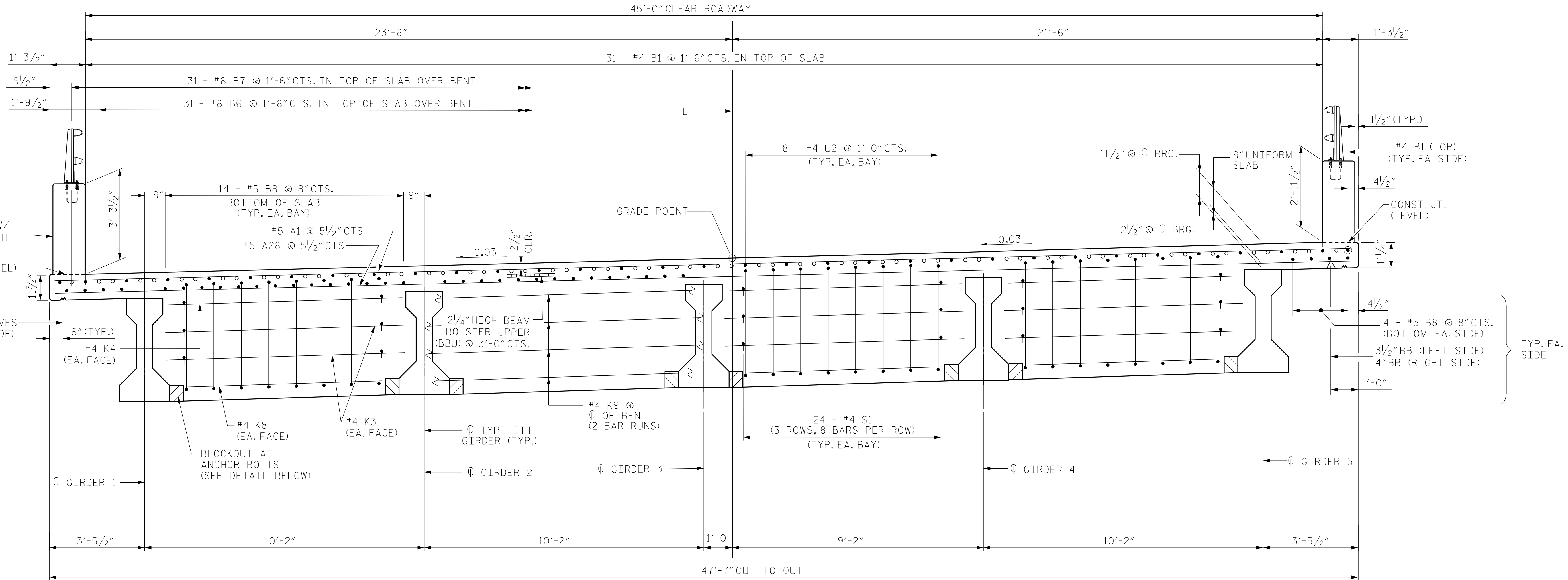
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



REVISIONS						SHEET NO. S- 5
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 32
2			4			

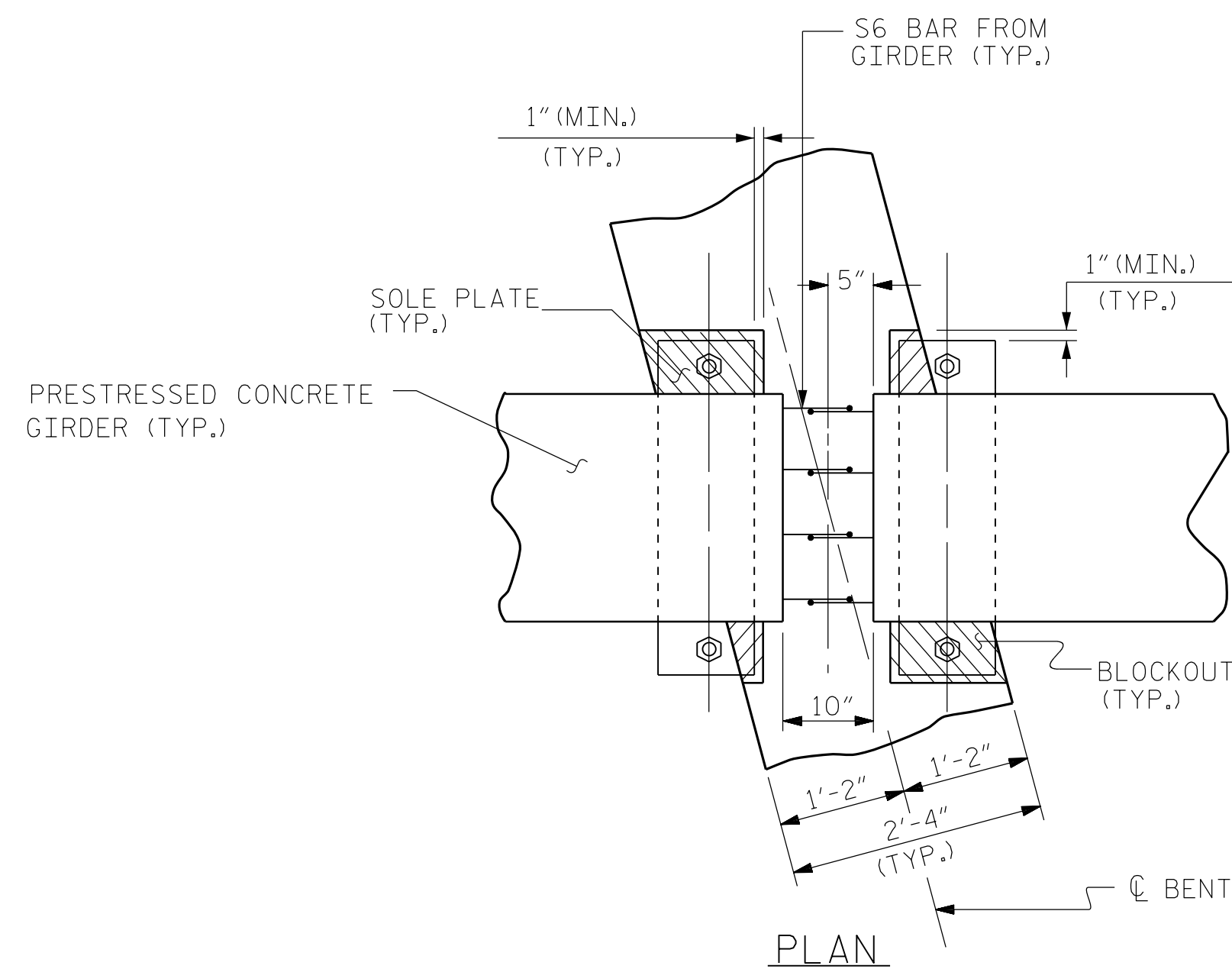
KCI JOB NO: 25180194516

CONC. PARAPET W/
2 BAR METAL RAIL
(TYP.)
CONST. JT. (LEVEL)
2 - 1" Δ GROOVES
(TYP. EACH SIDE)

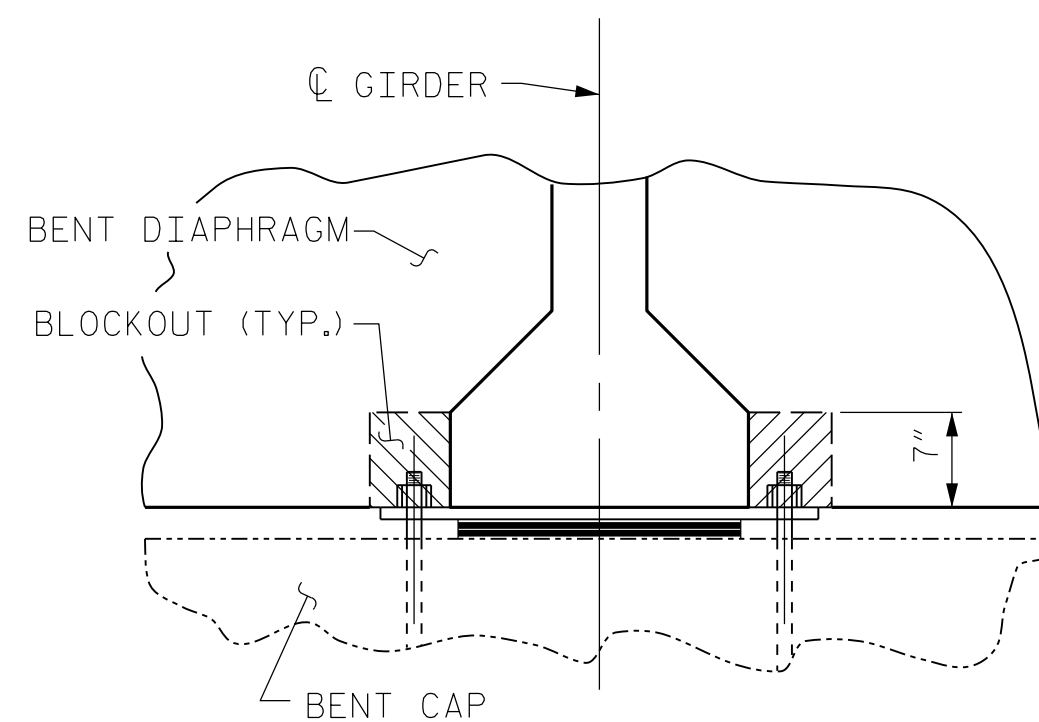


TYPICAL SECTION AT BENT DIAPHRAGM

- INDICATES CONTINUOUS REINFORCING
- INDICATES ADDITIONAL REINFORCING AT BENT



BENT DIAPHRAGM BLOCKOUT DETAIL



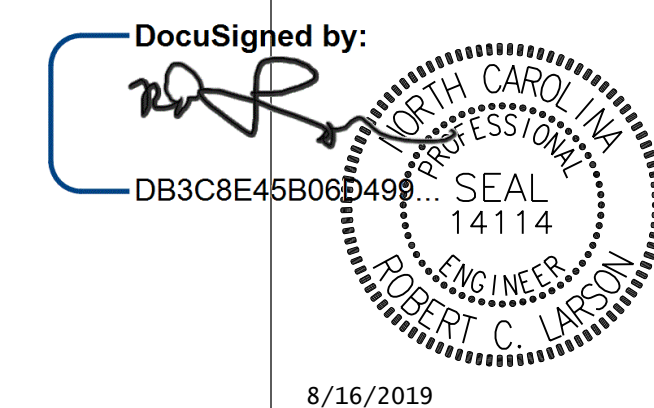
SECTION

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION

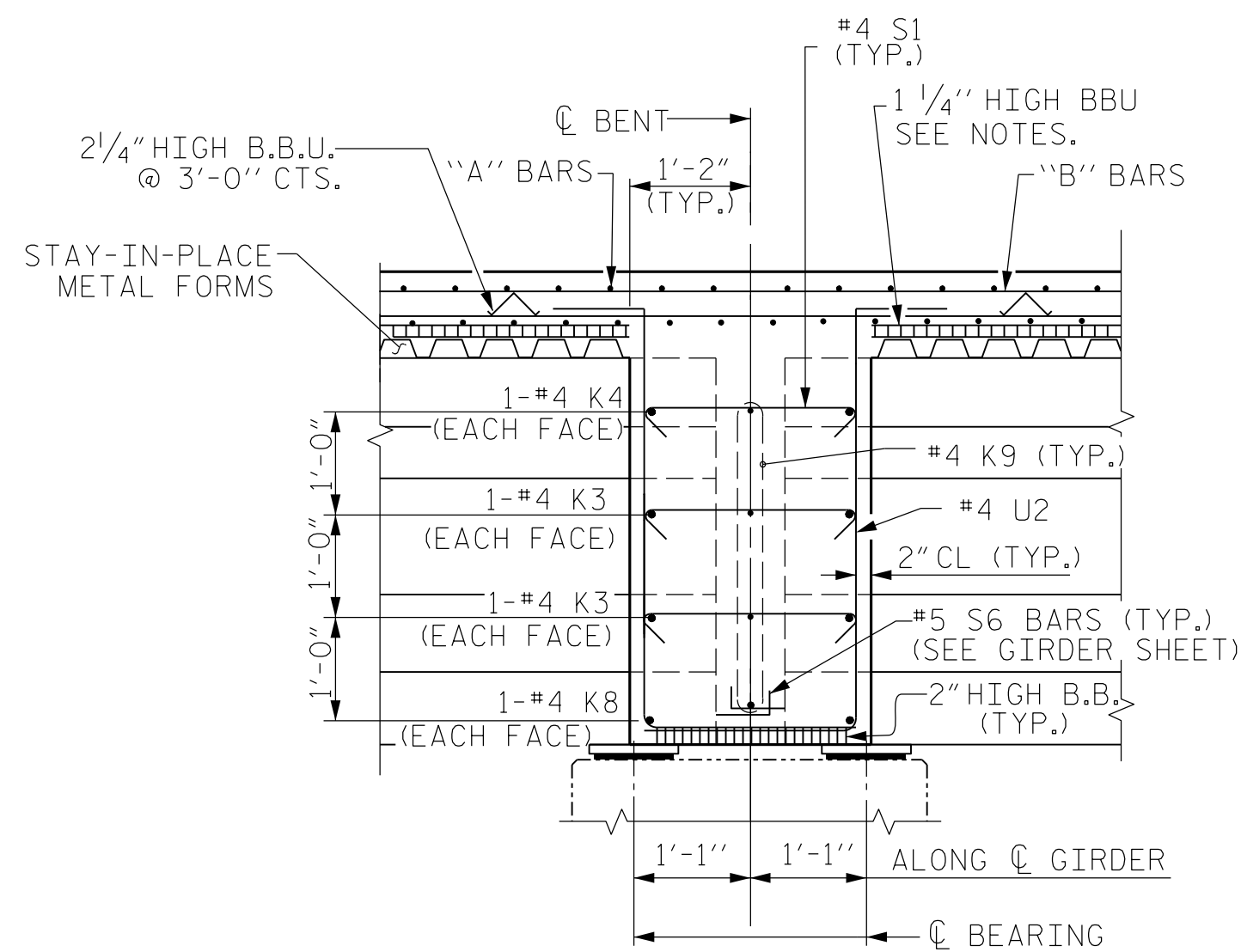


DESIGN ENGINEER OF RECORD DATE : 8/16/2019
DRAWN BY : R. C. LARSON DATE : 09/21/18
CHECKED BY : K. SU DATE : 03/07/19

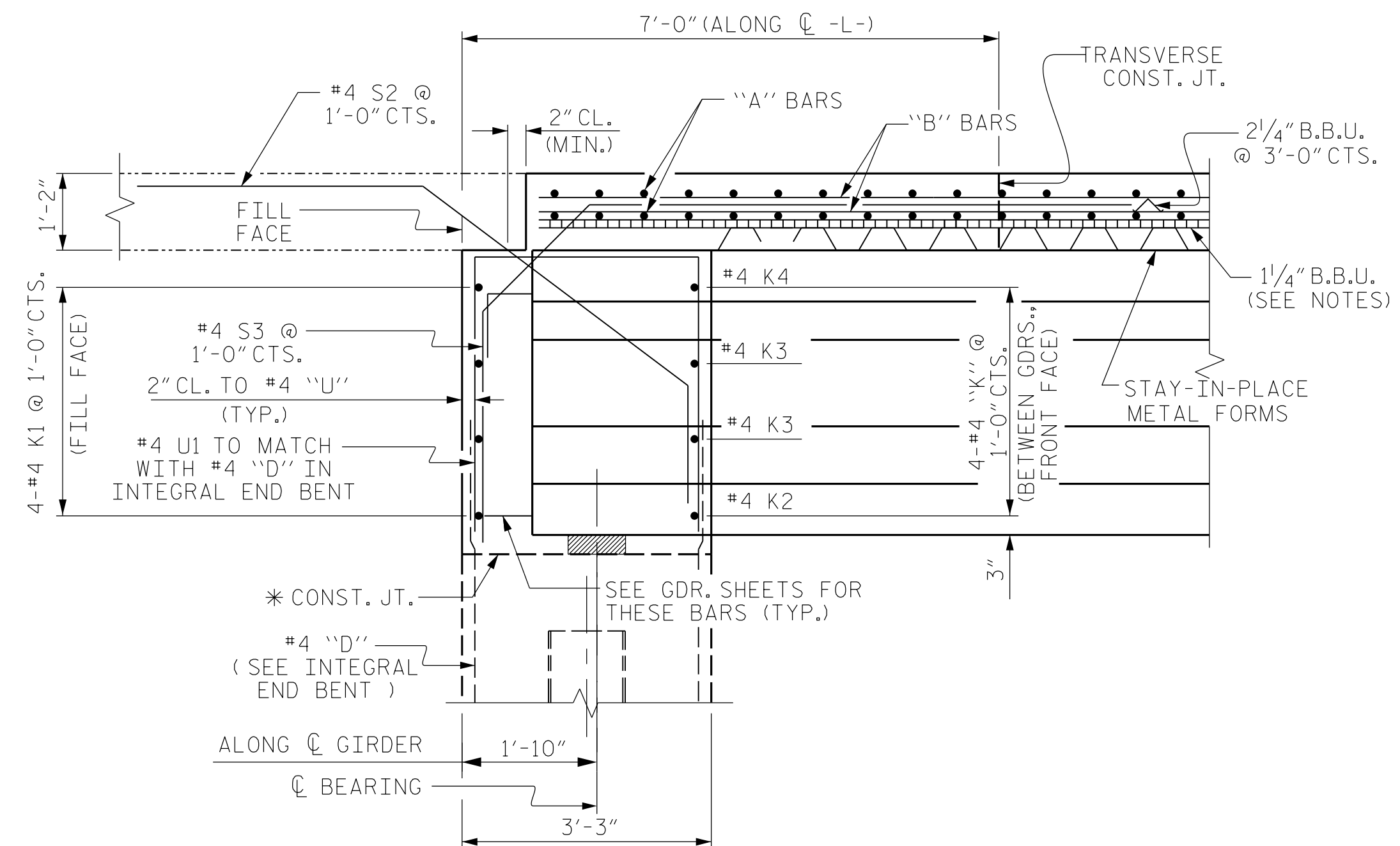
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of North Carolina, P.A.
2505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 785-924

REVISIONS						SHEET NO. S-6
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 32
2			4			

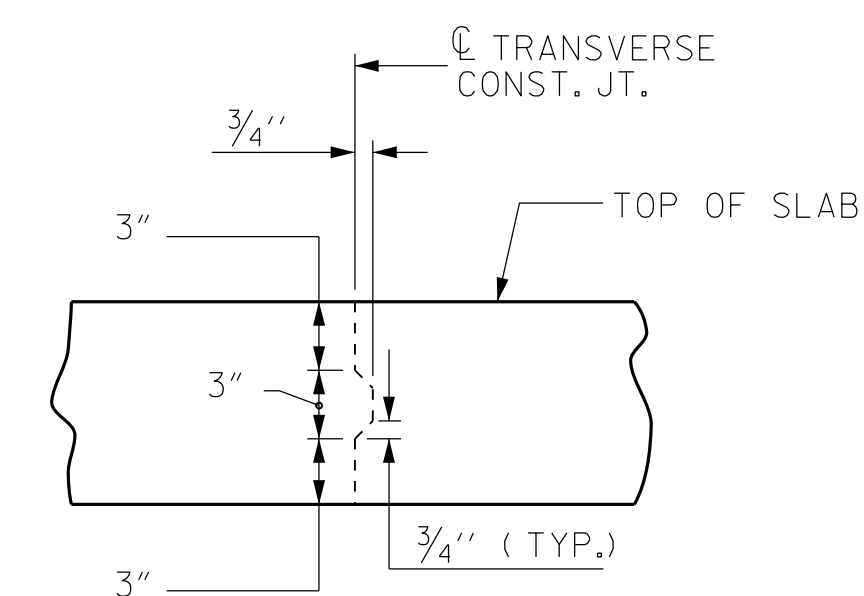


SECTION THRU BENT DIAPHRAGM



* THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BEARING AREAS AND THE AREA OUTSIDE OF THE SUPERSTRUCTURE SHALL BE RAKED TO A DEPTH OF 1/4\".

SECTION THRU INTEGRAL END BENT



TRANSVERSE CONSTRUCTION JOINT DETAIL

NOTE: REINFORCING STEEL IN SLAB NOT SHOWN.
LONGITUDINAL REINFORCING STEEL SHALL BE
CONTINUOUS THRU JOINT

PROJECT NO. 17BP.10.R.144
 CABARRUS COUNTY
STATION: 18+97.50 -L-

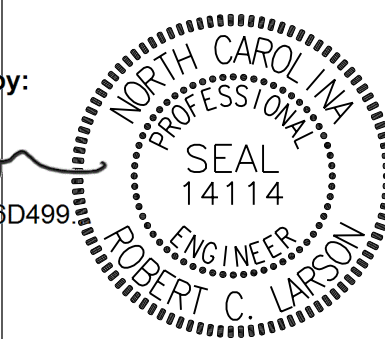
SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION

DocuSigned by:

DB3C8E45B08D499



8/16/2019

DESIGN ENGINEER OF RECORD	DESIGNED BY	DATE
	R. J. FLORY	8/16/2019
DRAWN BY	DATE	
K. SU	04/13/18	
CHECKED BY	DATE	
	03/07/19	

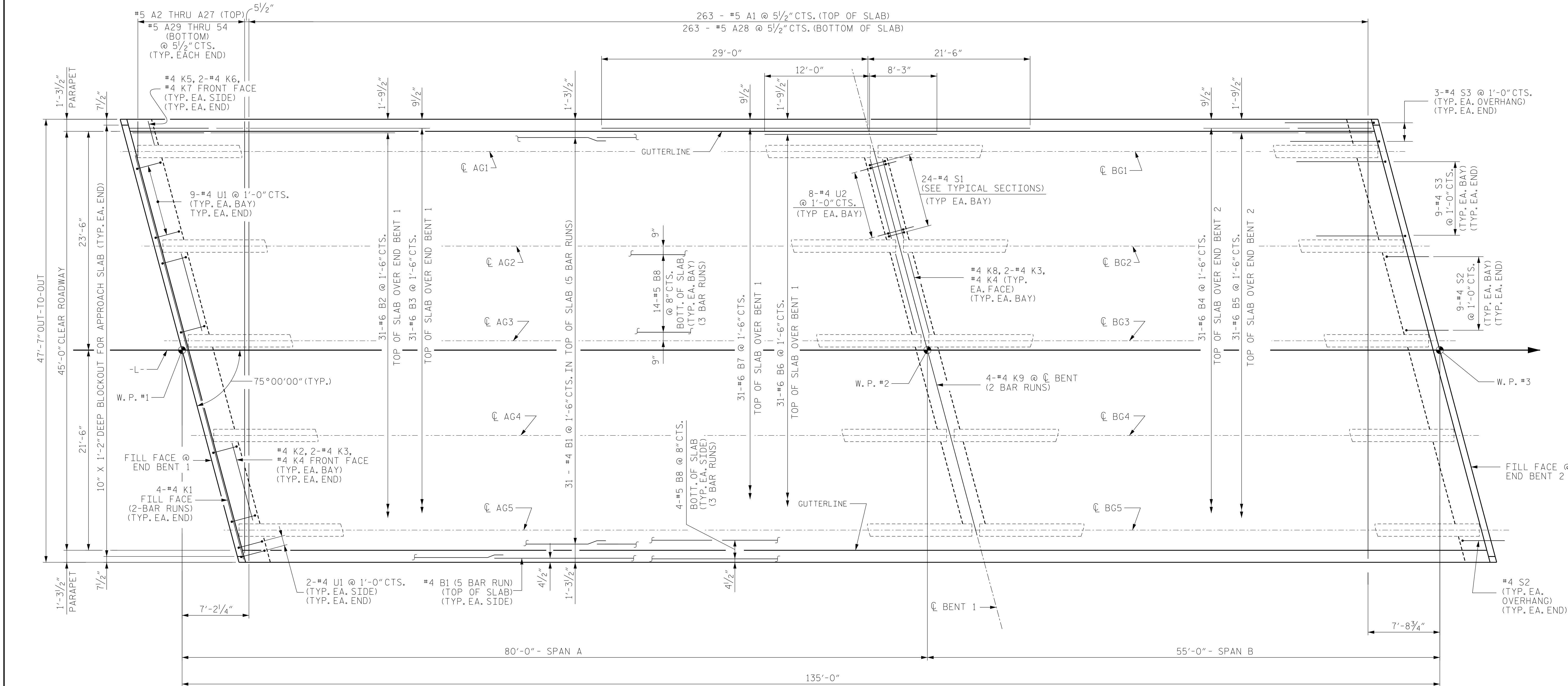
**DOCUMENT NOT CONSIDERED FINAL
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of North Carolina, P.A.
2505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 785-924

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			5- 7
2			4			TOTAL SHEETS 32

KCI JOB NO: 25180194516

KCI JOB NO: 25180194516



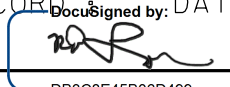
PLAN - SPAN A & B

SEE SUPERSTRUCTURE BILL OF MATERIAL
FOR REINFORCING SPLICE LENGTHS.


PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

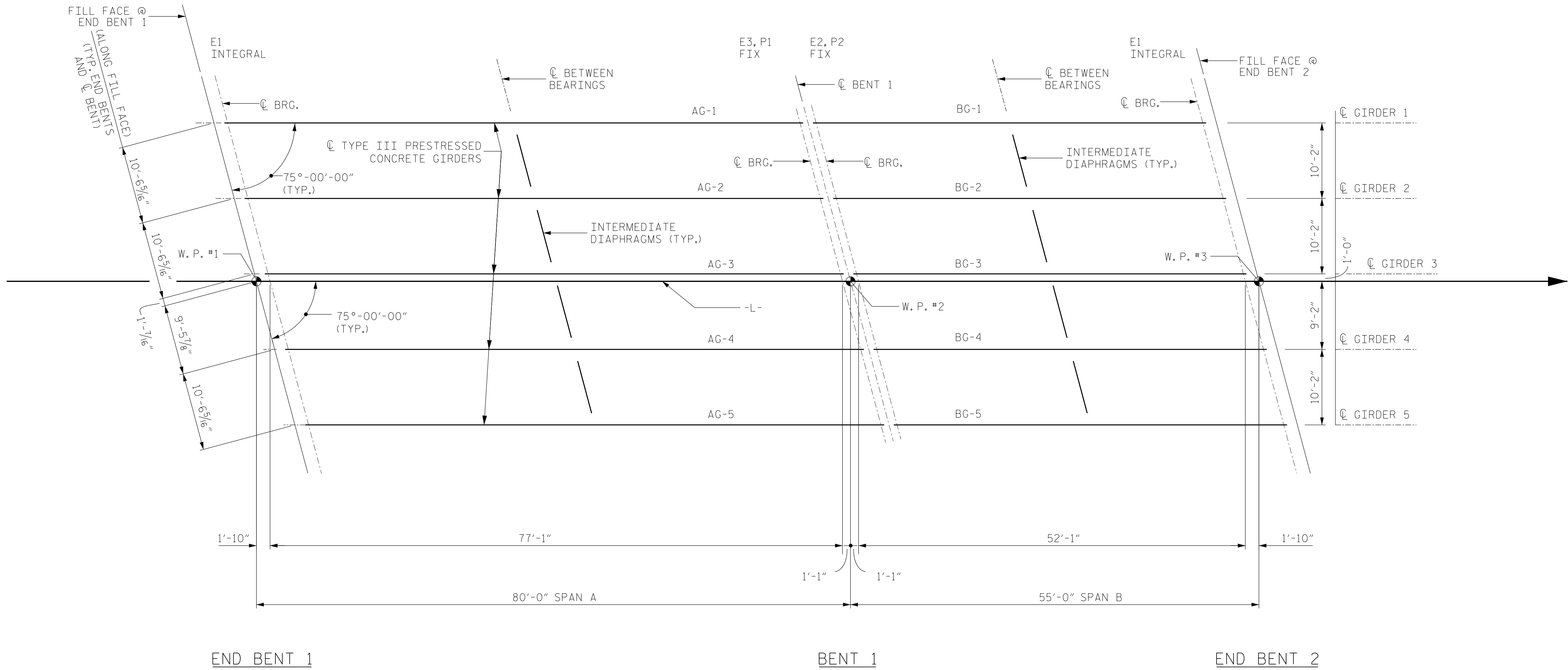
DESIGN ENGINEER OF RECORD	DocuSigned by: 	DATE: 8/16/2019
DRAWN BY: R. C. LARSON	DATE: 09/14/18	
CHECKED BY: K. SU	DATE: 03/08/19	

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DocuSigned by:

DB3C8E45B06D2899
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
ENGINEER
ROBERT C. LARSON
14114
8/16/2019

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KCI Associates
of North Carolina, P.A.
2505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 785-924

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE PLAN OF SPANS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S-8					TOTAL SHEETS 32



GIRDER LAYOUT

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

DESIGN ENGINEER OF RECORD	DATE : 8/19/2019
DRAWN BY : R.J. FLORY	DATE : 9-26-18
CHECKED BY : R.C. LARSON	DATE : 10-01-18

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

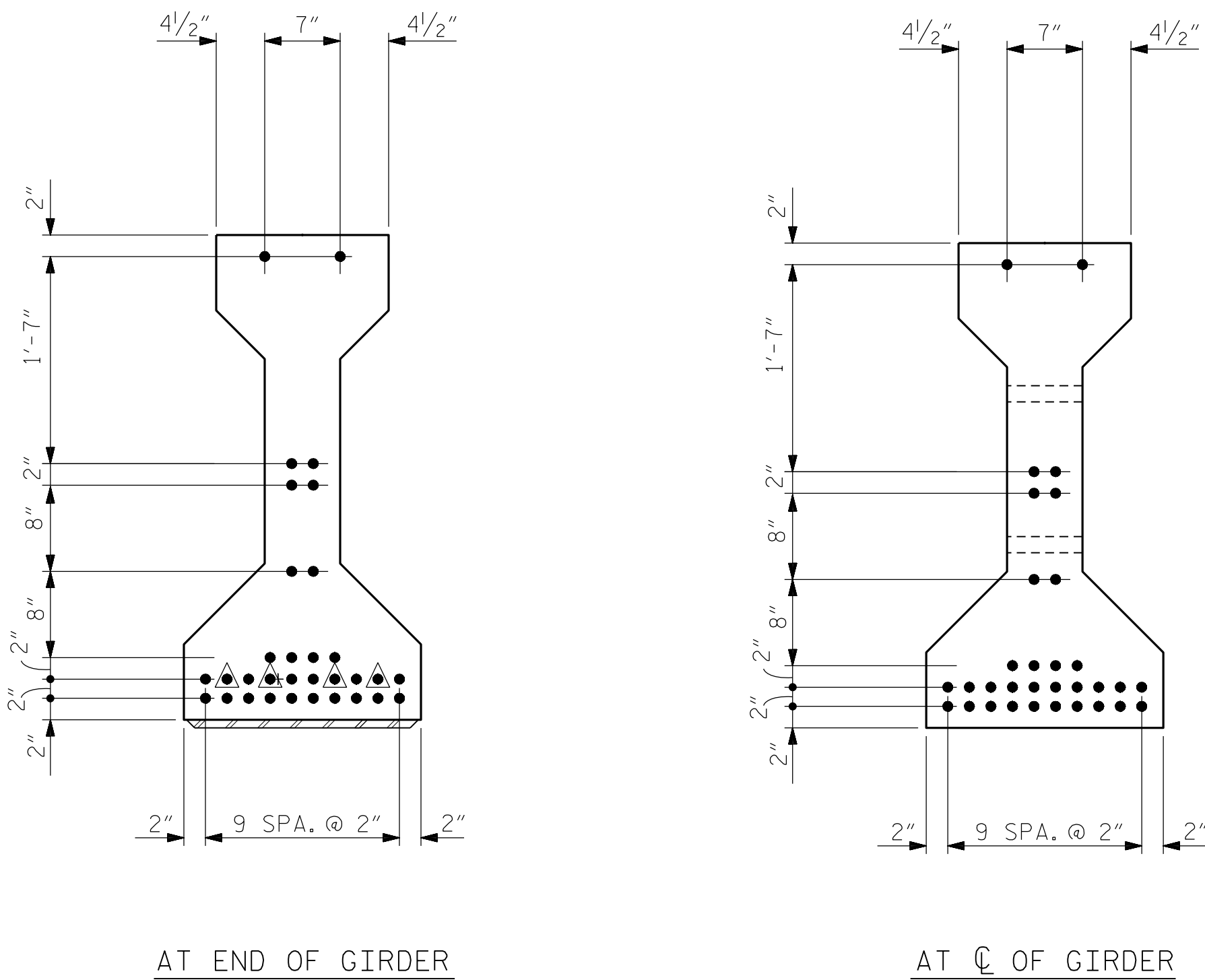
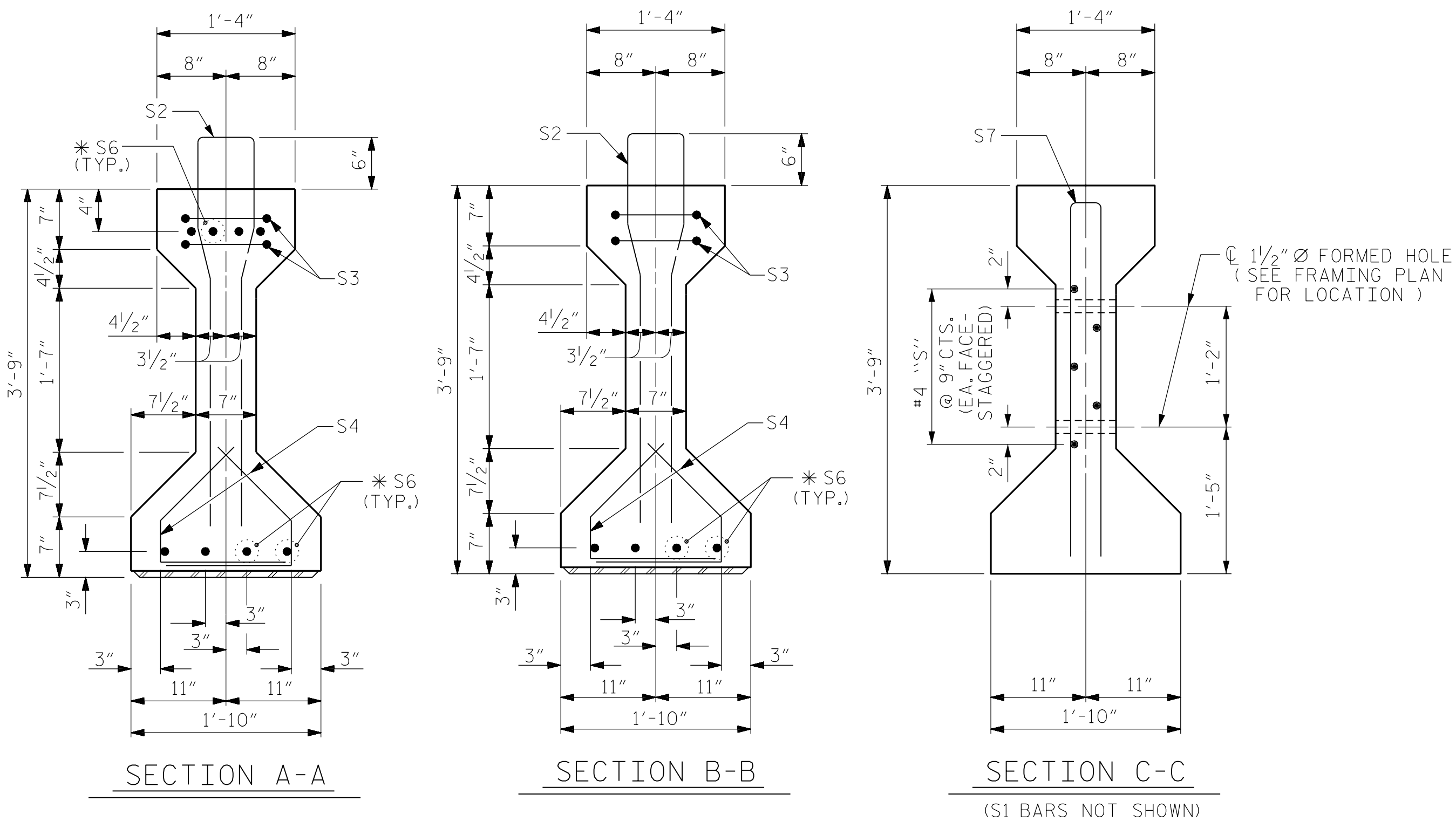
DocuSigned by:
[Signature]
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8/19/2019

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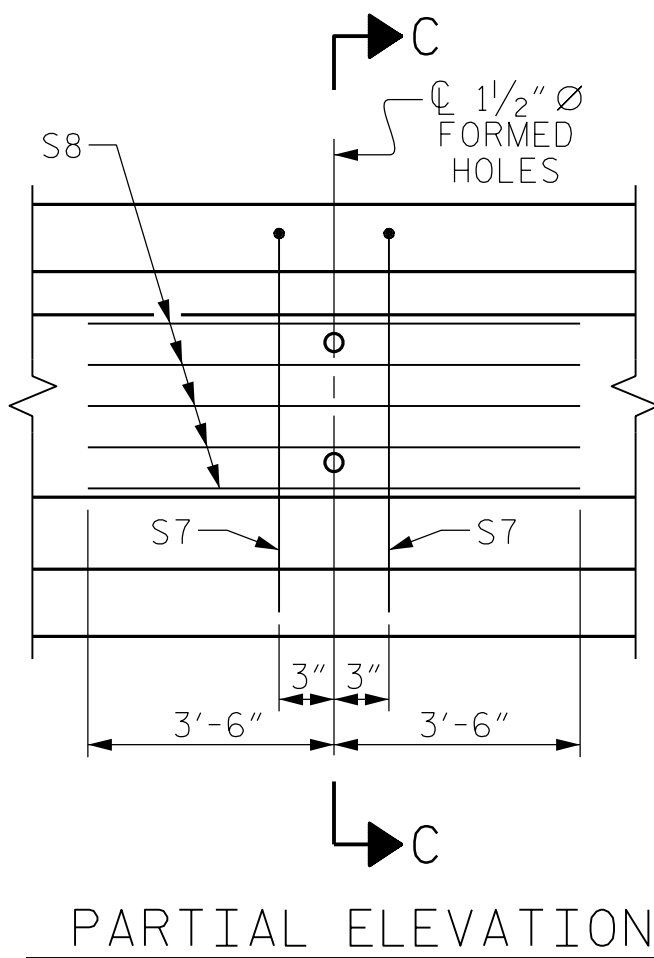
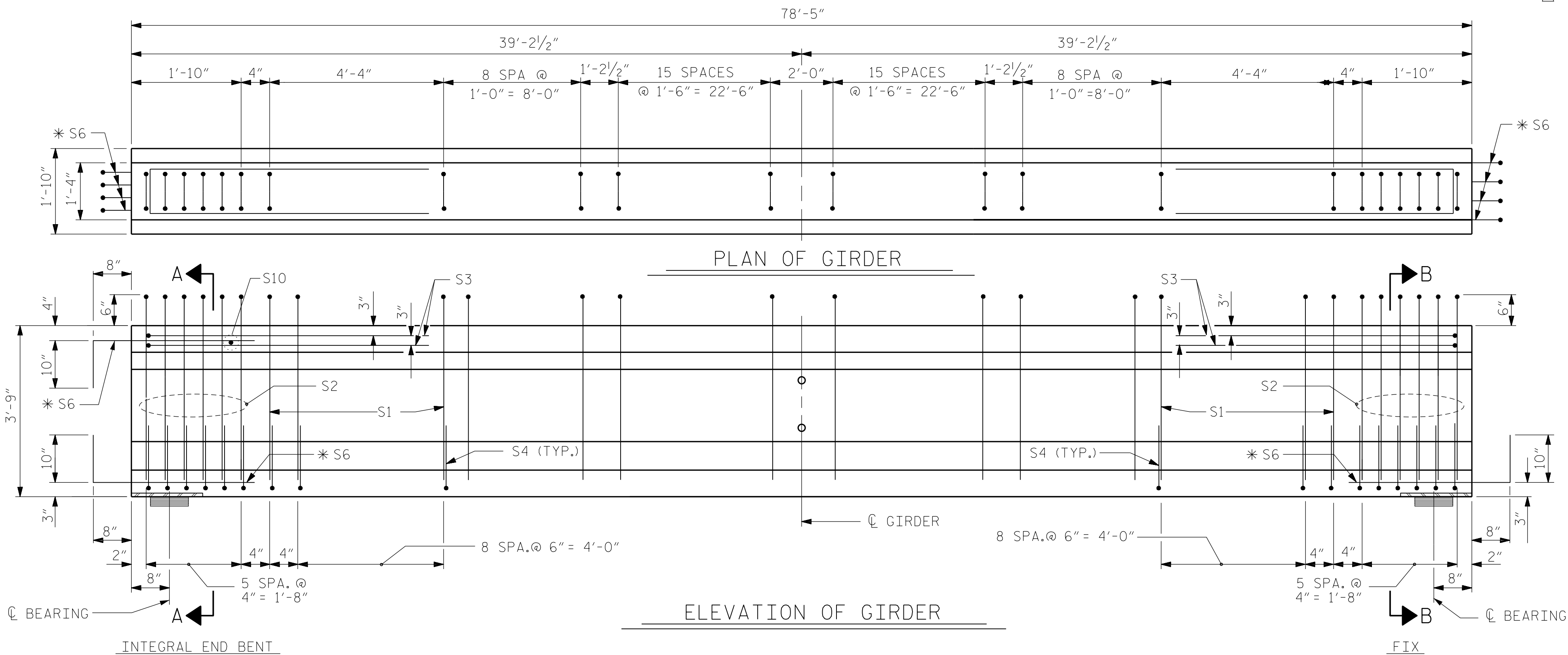
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE GIRDER LAYOUT					
REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
				TOTAL SHEETS	32



▲ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 4'-0" FROM END OF GIRDER. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND



0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

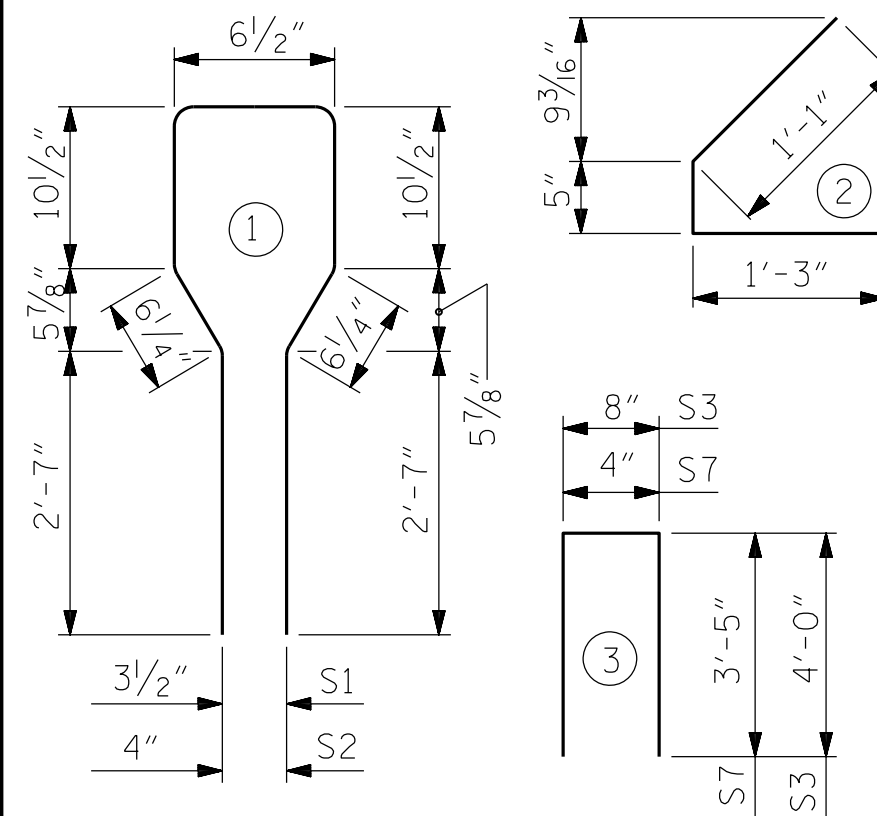
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	68	#4	1	8'-6"	386
S2	12	#6	1	8'-6"	153
S3	4	#4	3	8'-8"	23
S4	64	#4	2	2'-9"	118
*S6	12	#5	STR	3'-8"	46
S7	2	#5	3	7'-2"	15
S8	5	#4	STR	7'-0"	23
S10	1	#3	STR	1'-0"	1

* NOTE: S6 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	9000 PSI CONCRETE	0.6" Ø L. R. STRANDS
	LB.	C.Y.	No.
	765	11.3	32

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	78'-5"	392'-1"

PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
AASHTO TYPE III
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN A

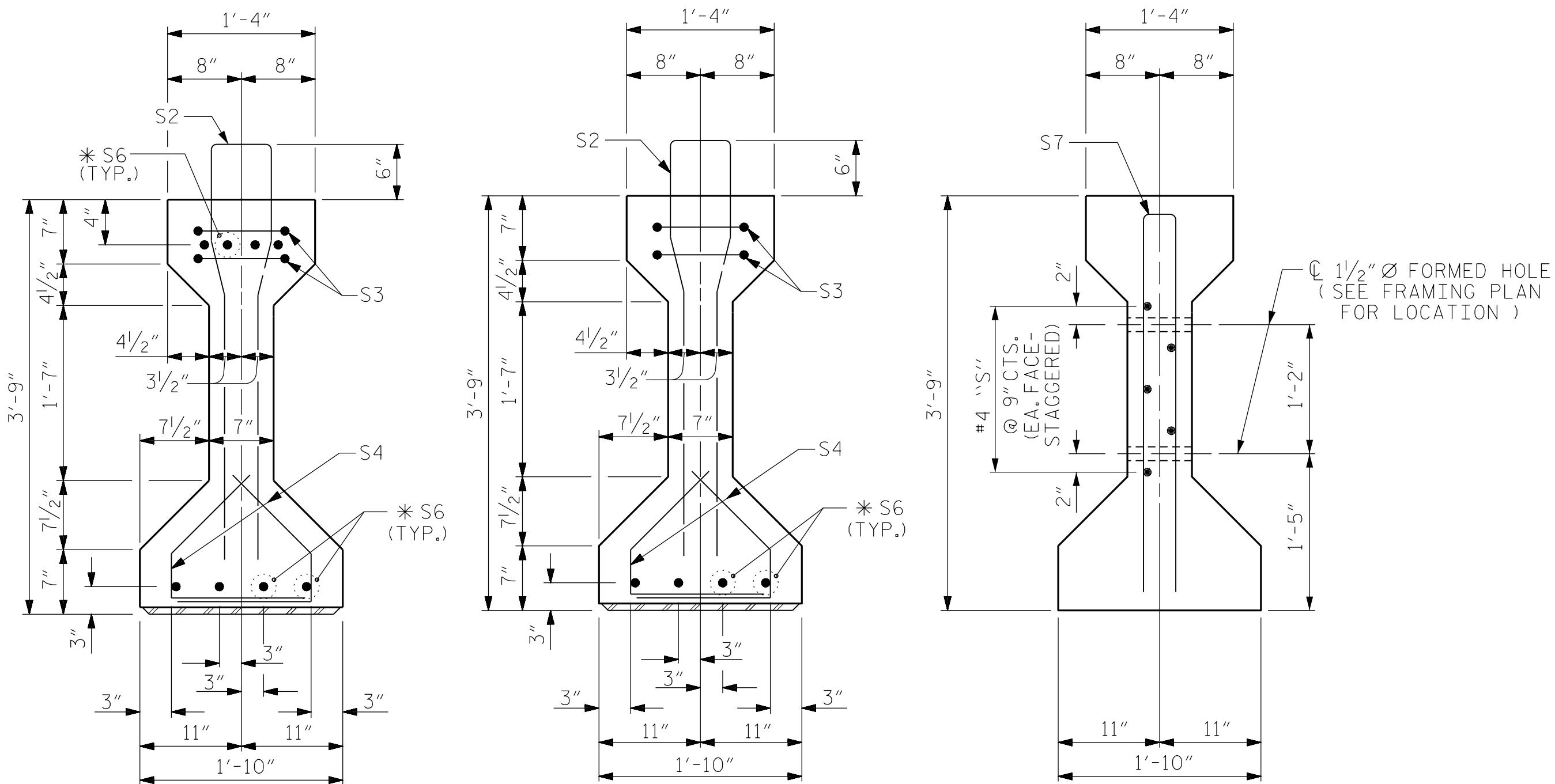
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			32

DESIGN ENGINEER OF RECORD	DocuSigned by: 8/16/2019
ASSEMBLED BY : R. C. LARSON	DATE : 09/14/18
CHECKED BY : R. A. PRUETT	DATE : 10/22/18
DRAWN BY : ELR 8/91	MAA/GM
CHECKED BY : GRP 8/91	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

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STD. NO. PCG5 (Sh+.) 2

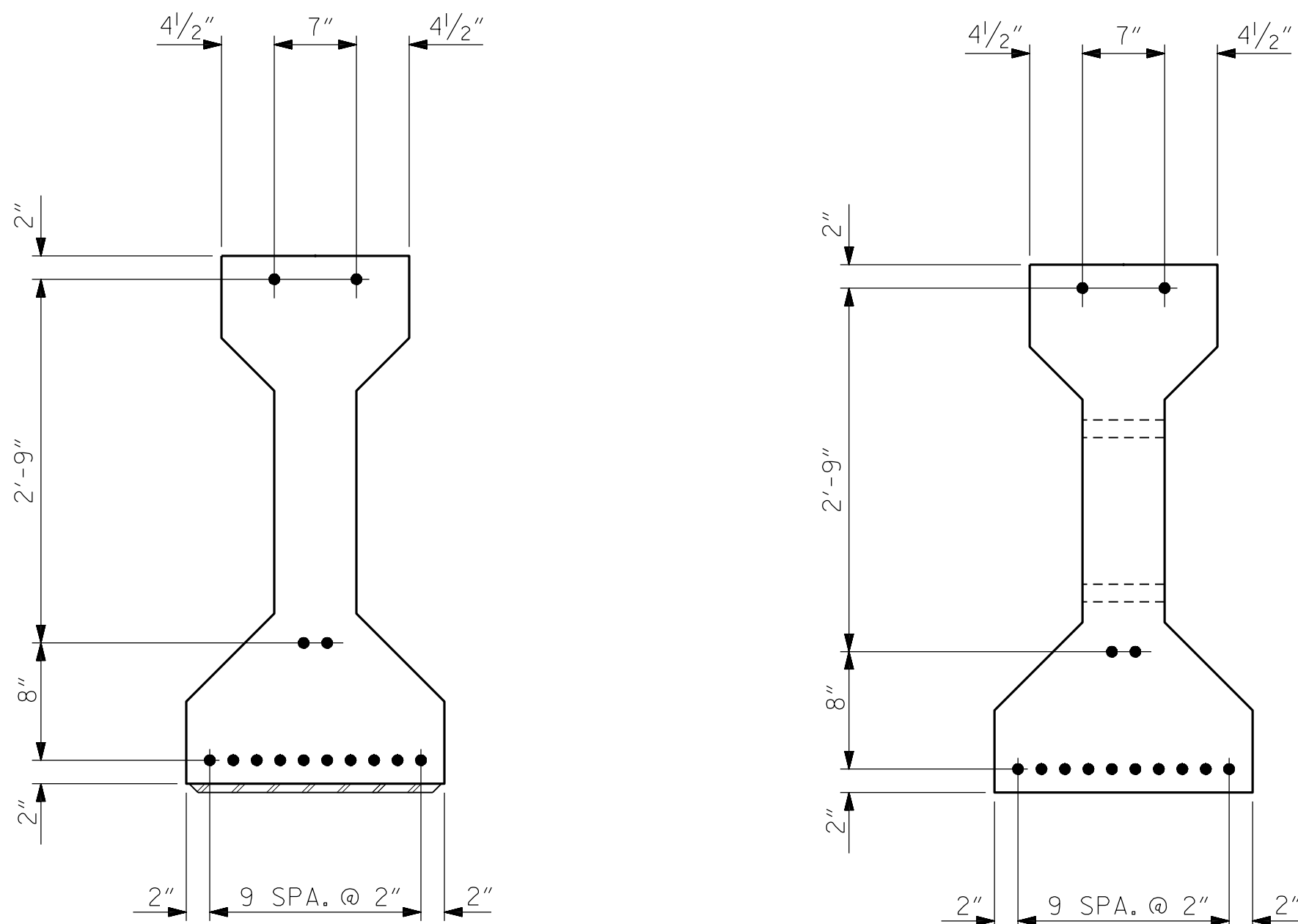


SECTION A-A

SECTION B-B

SECTION C-C

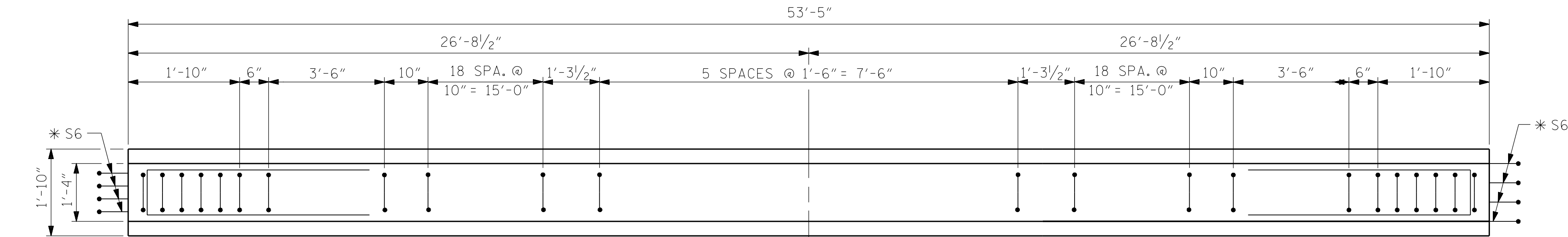
(S1 BARS NOT SHOWN)



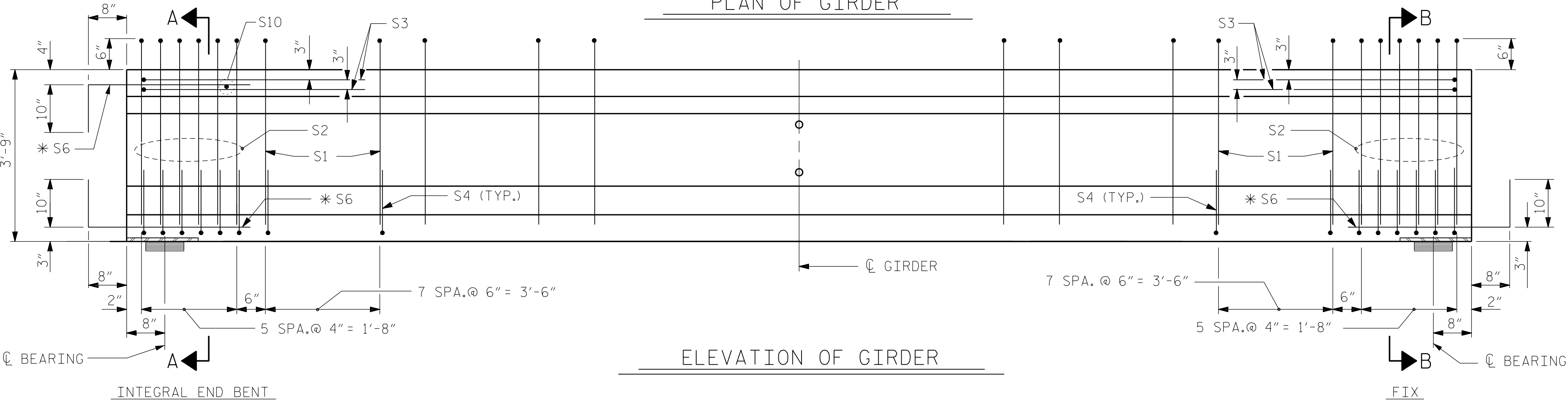
AT END OF GIRDER

AT CL OF GIRDER

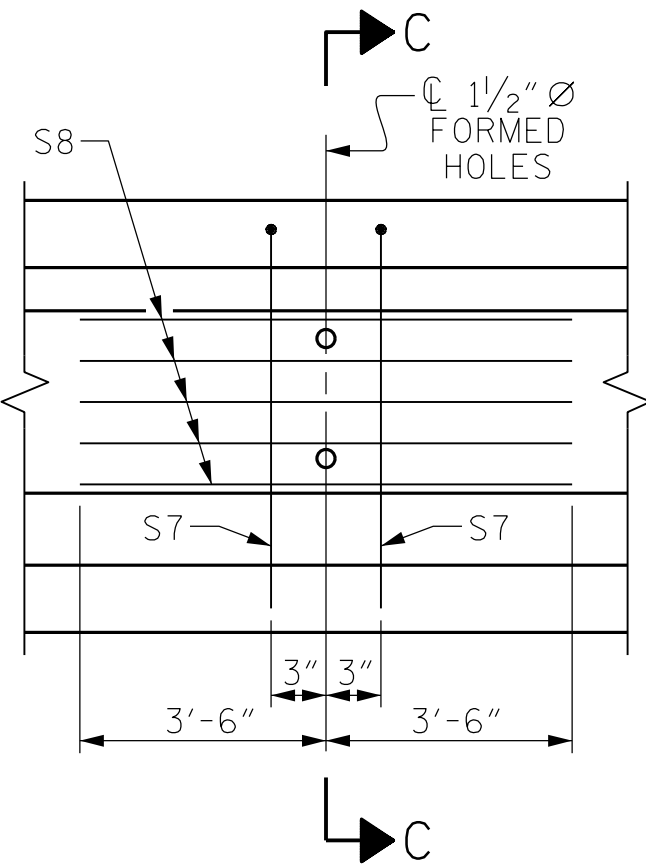
0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER

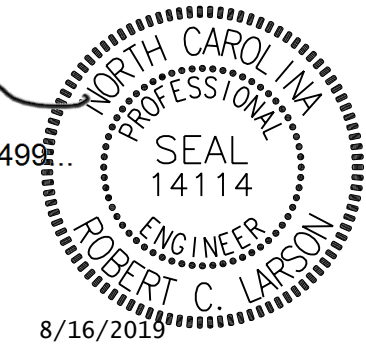


PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS (FOR ALL EXTERIOR GIRDERS AND INTERIOR GIRDERS WITH $70^\circ \leq \text{SKEW} \leq 110^\circ$)

DocuSigned by:

DB3C8E45B06D495



DESIGN ENGINEER OF RECORD:	DATE :
ASSEMBLED BY : R. C. LARSON	DATE : 09/14/18
CHECKED BY : R. A. PRUETT	DATE : 10/22/18
DRAWN BY : ELR 8/91	MAA/GM
CHECKED BY : GRP 8/91	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

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0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

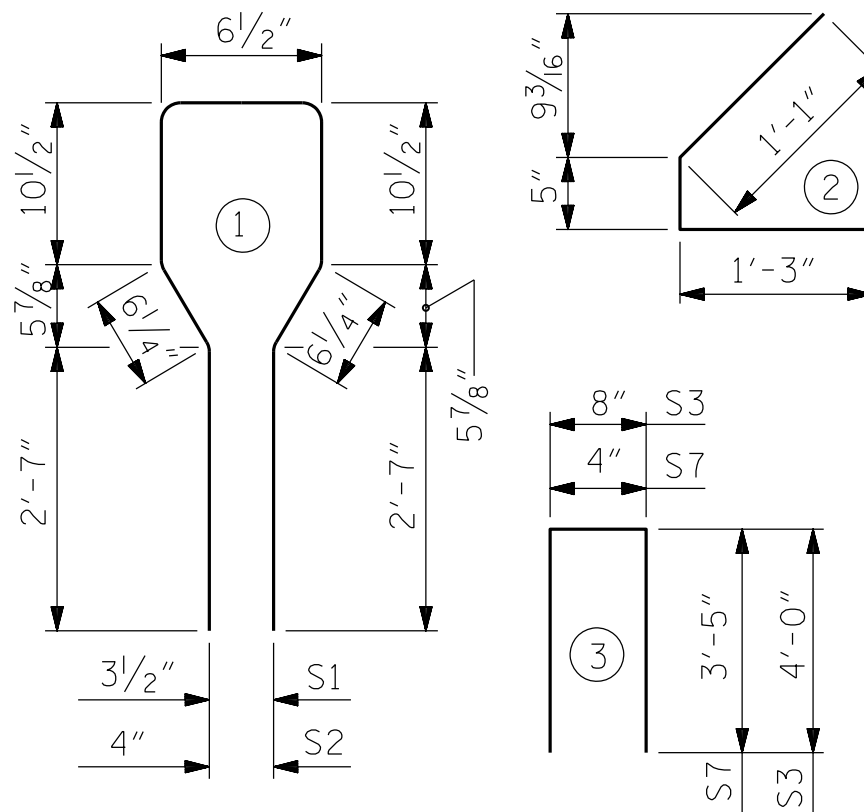
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	60	#4	1	8'-6"	341
S2	12	#6	1	8'-6"	153
S3	4	#4	3	8'-8"	23
S4	56	#4	2	2'-9"	103
* S6	12	#5	STR	3'-8"	46
S7	2	#5	3	7'-2"	15
S8	5	#4	STR	7'-0"	23
S10	1	#3	STR	1'-0"	1

* NOTE: S6 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	5000 PSI CONCRETE	0.6" Ø L. R. STRANDS
	LB.	C.Y.	No.
	705	7.7	14

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	53'-5"	267'-1"

PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
AASHTO TYPE III
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			32

STD. NO. PCG5 (Sh+2)

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL SHALL BE GRADE 60.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

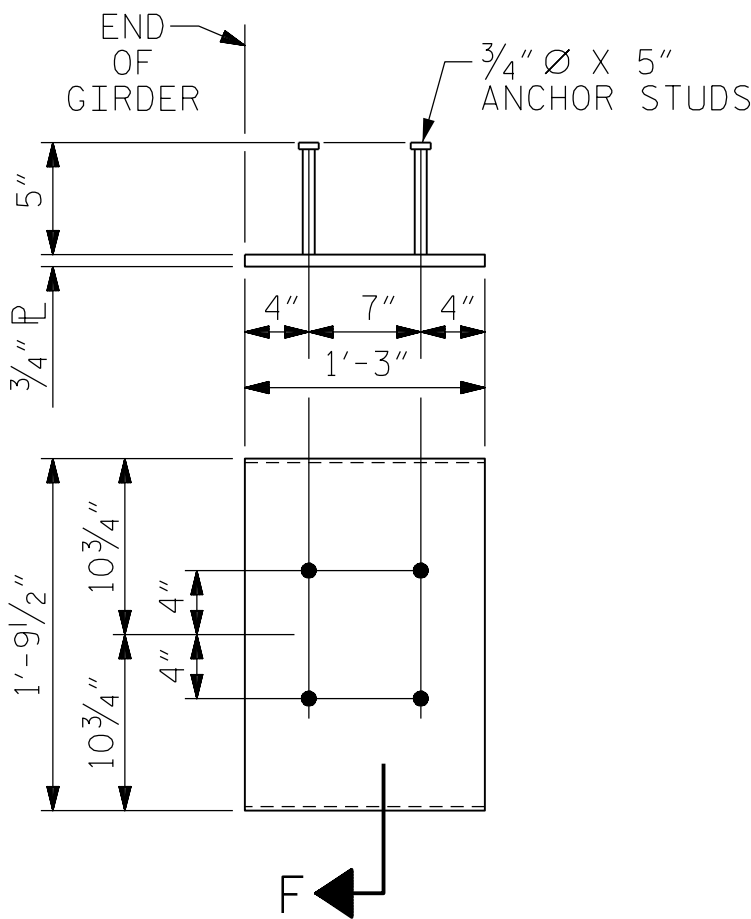
ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

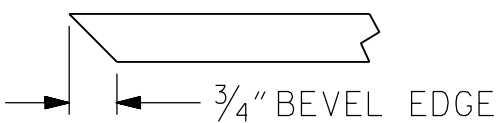
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 7500 psi FOR SPAN A OR 4000 psi FOR SPAN B.

DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".



EMBEDDED PLATE "B-1" DETAILS
FOR AASHTO TYPE III GIRDER
(2 REQ'D PER GIRDER)



SECTION "F"
(SEE NOTES)

DEAD LOAD DEFLECTION TABLE FOR GIRDERS																							
0.6" Ø LOW RELAXATION		SPAN A (INTERIOR)										SPAN A (EXTERIOR)											
TENTH POINTS		0	.1	.2	.3	.4	.5	.6	.7	.8	.9	0	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	0
CAMBER (GIRDER ALONE IN PLACE)		0.000	0.056	0.106	0.145	0.170	0.179	0.170	0.145	0.106	0.056	0.000	0.000	0.056	0.106	0.145	0.170	0.179	0.170	0.145	0.106	0.056	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.		0.000	0.041	0.082	0.113	0.134	0.141	0.134	0.113	0.082	0.041	0.000	0.000	0.036	0.072	0.100	0.117	0.123	0.117	0.100	0.072	0.036	0.000
FINAL CAMBER		0	3/16"	5/16"	3/8"	7/16"	7/16"	7/16"	3/8"	5/16"	3/16"	0	0	1/4"	7/16"	9/16"	5/8"	11/16"	5/8"	9/16"	7/16"	1/4"	0
0.6" Ø LOW RELAXATION		SPAN B (INTERIOR)										SPAN B (EXTERIOR)											
TENTH POINTS		0	.1	.2	.3	.4	.5	.6	.7	.8	.9	0	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	0
CAMBER (GIRDER ALONE IN PLACE)		0.000	0.019	0.035	0.048	0.057	0.059	0.057	0.048	0.035	0.019	0.000	0.000	0.019	0.035	0.048	0.057	0.059	0.057	0.048	0.035	0.019	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.		0.000	0.010	0.020	0.028	0.034	0.035	0.034	0.028	0.020	0.010	0.000	0.000	0.009	0.018	0.025	0.030	0.031	0.030	0.025	0.018	0.009	0.000
FINAL CAMBER		0	1/8"	3/16"	1/4"	1/4"	5/16"	1/4"	1/4"	3/16"	1/8"	0	0	1/8"	3/16"	1/4"	5/16"	5/16"	5/16"	1/4"	3/16"	1/8"	0

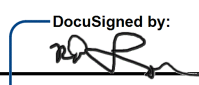
* INCLUDES FUTURE WEARING SURFACE
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER ", WHICH IS GIVEN IN INCHES (FRACTION FORM).


PROJECT NO. 17BP.10.R.144

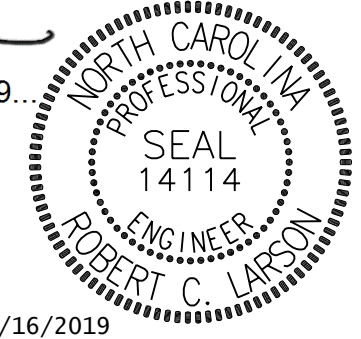
CABARRUS COUNTY

STATION: 18+97.50 -L-

SHEET 3 OF 4

DESIGN ENGINEER OF RECORD:	DATE :
DocuSigned by: 	8/16/2019
ASSEMBLED BY : R. C. LARSON	DATE : 10/03/18
CHECKED BY : R. A. PRUETT	DATE : 10/24/18
DRAWN BY : ELR 11/91	REV. 1/15 MAA/TMG
CHECKED BY : GRP 11/91	REV. 2/15 MAA/TMG
	REV. 12/17 MAA/THC

DocuSigned by:

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8/16/2019

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS 32
2			4			

STD. NO. PCG9

STRUCTURAL STEEL NOTES

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.

TENSION ON THE ASTM A325 BOLTS THROUGH THE CHANNEL MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL 1/4 TURN.

THE PLATES, BENT PLATES, CHANNELS, AND ANGLES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM. THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

GALVANIZE THE HIGH STRENGTH BOLTS, NUTS, WASHERS AND DIRECT TENSION INDICATORS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

USE AN ASTM F436 HARDENED WASHER WITH STANDARD AND SLOTTED HOLES UNDER EACH BOLT HEAD AND NUT.

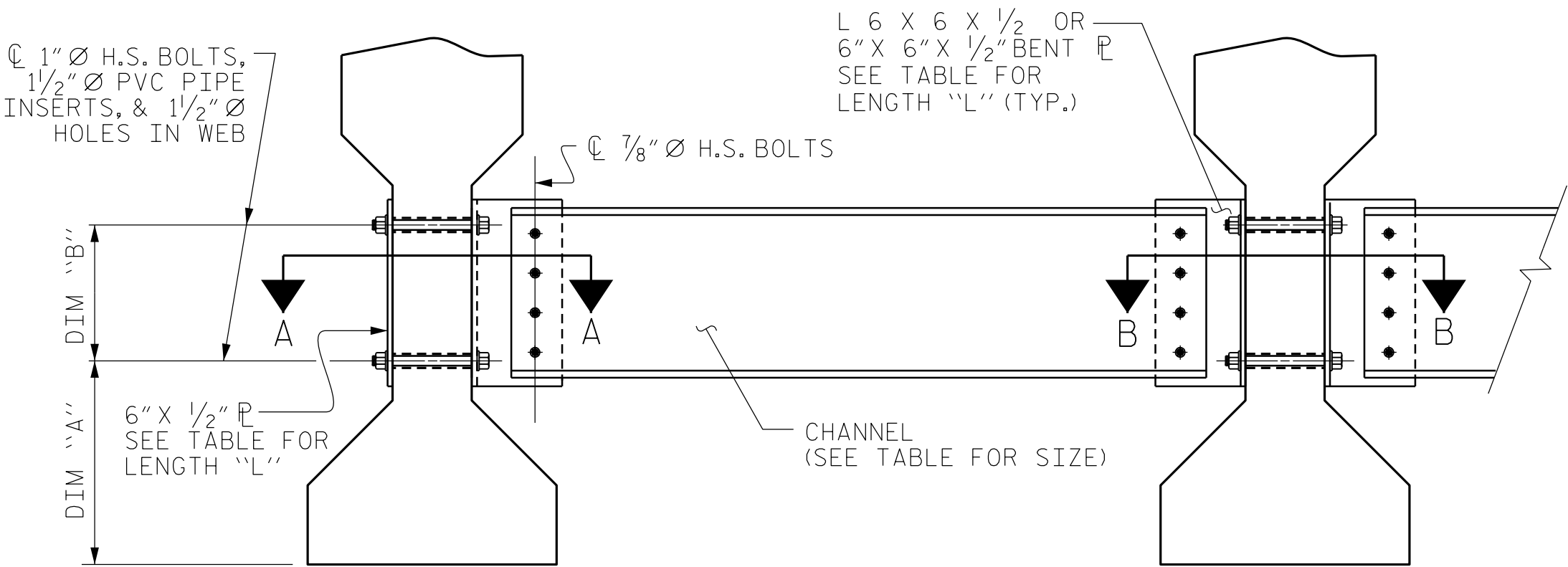
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

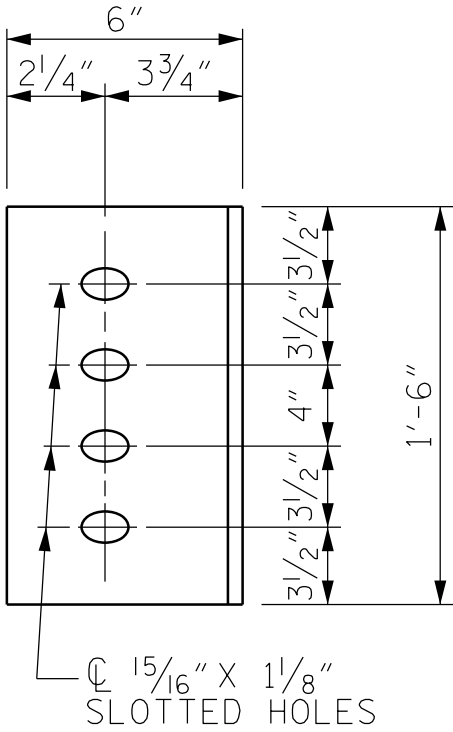
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.



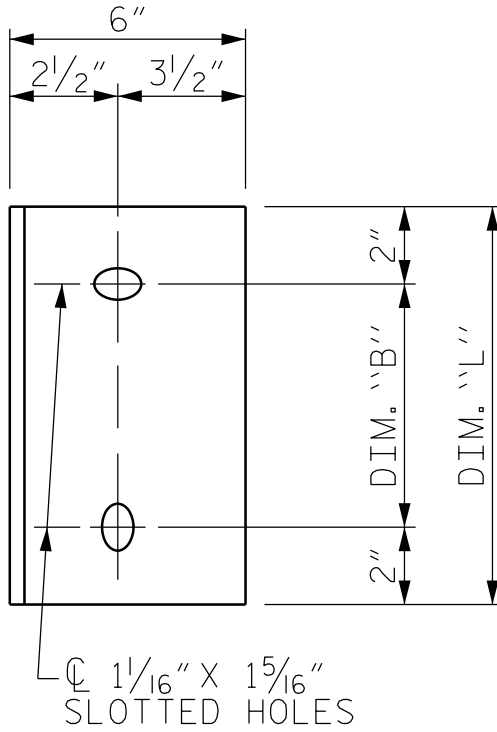
EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM
(TYPE III OR TYPE IV GIRDER SHOWN)



DIAPHRAGM FACE
(TYPE III OR TYPE IV GDR.)



WEB FACE

CONNECTOR PLATE DETAILS

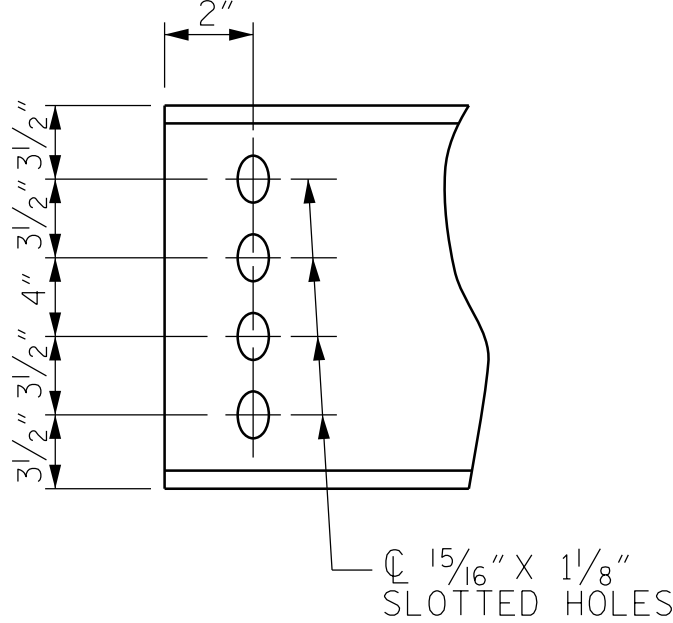
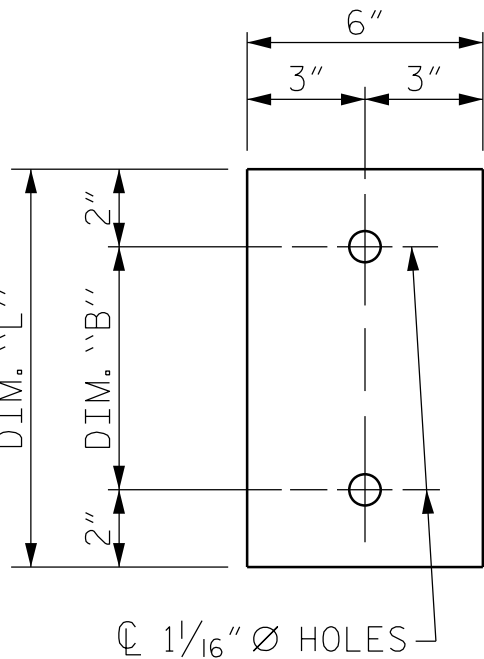
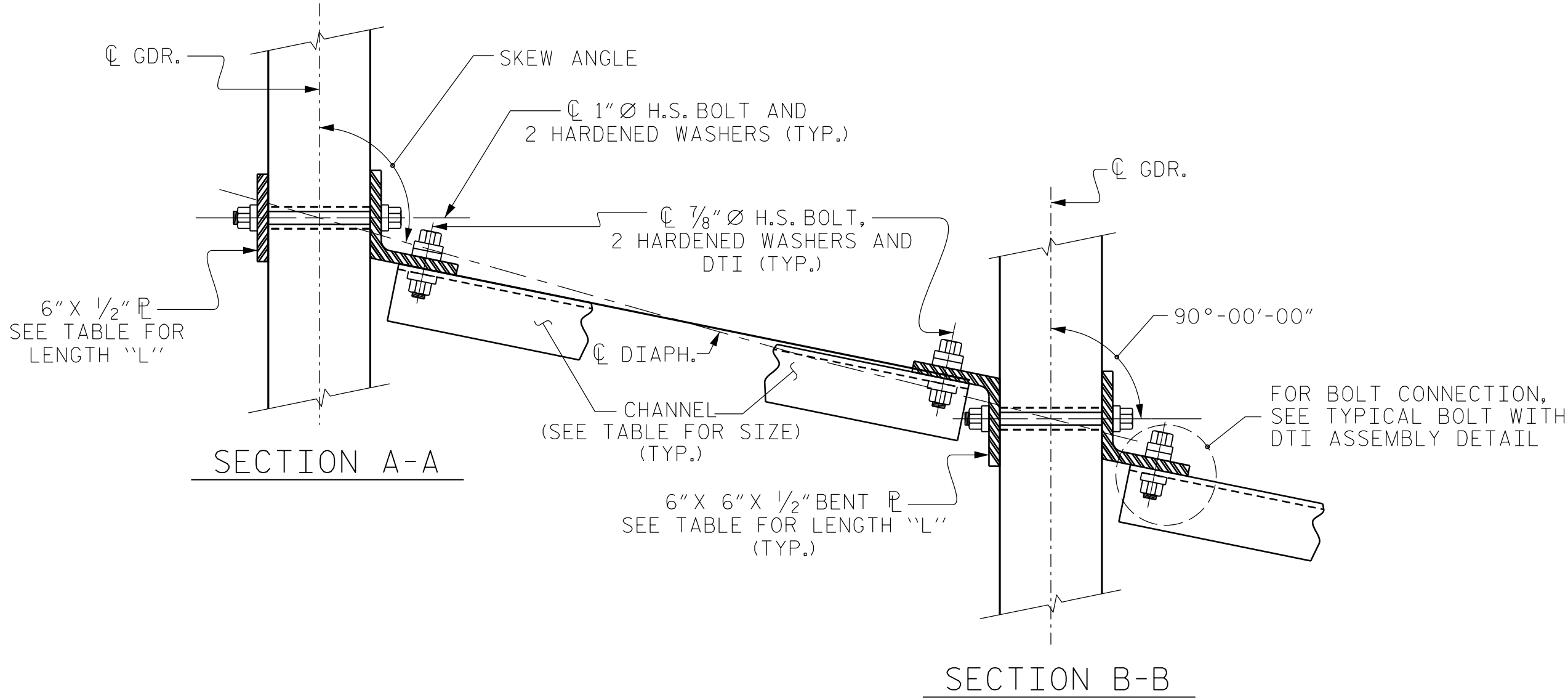
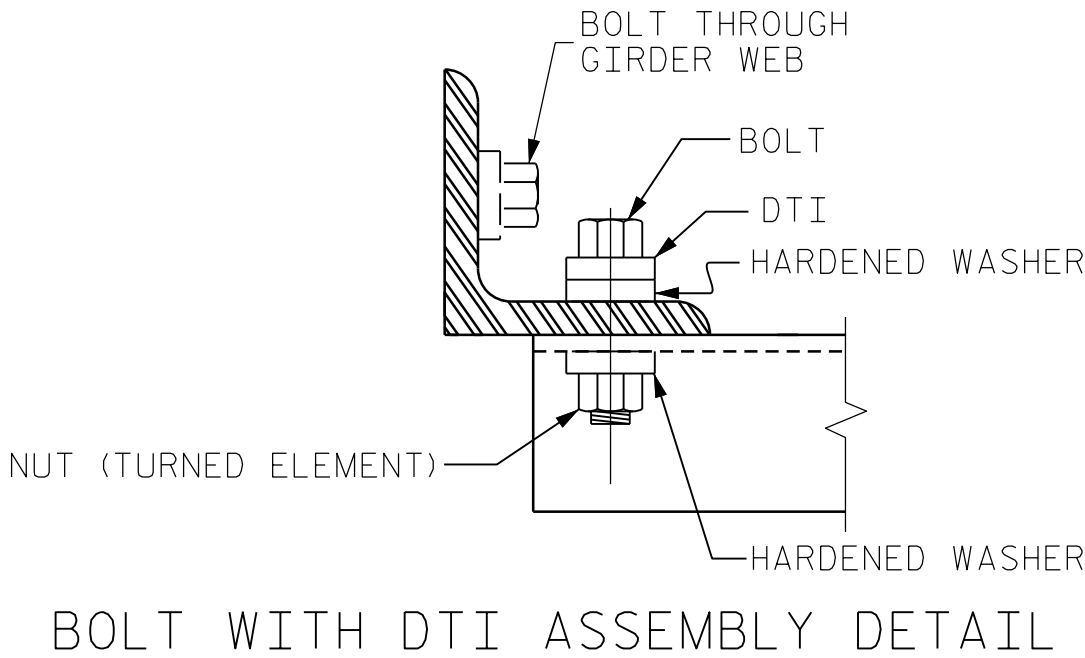


PLATE DETAILS

CHANNEL END
(TYPE III OR TYPE IV GDR.)



CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
III	MC 18 x 42.7	1'-5"	1'-2"	1'-6"

PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

SHEET 4 OF 4


STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
INTERMEDIATE
STEEL DIAPHRAGMS
FOR TYPE II, III, & IV
PRESTRESSED CONCRETE
GIRDERS

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.
S-13

TOTAL
SHEETS
32

DESIGN ENGINEER OF RECORD	DocuSigned by: 	DATE: 8/19/2019
ASSEMBLED BY: R. C. LARSON	CHECKED BY: R. A. PRUETT	DATE: 07/18/18
DRAWN BY: TLA	6/05	REV. 5/1/06RRR KMM/GM
CHECKED BY: VC	6/05	REV. 10/1/11 MAA/GM
		REV. 12/17 MAA/THC

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KCI Associates
of North Carolina, P.A.
4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6210 Phone (919) 783-9241



STD. NO. PCG10

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURIED WITH A SHARP POINTED TOOL.

PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



PLAN VIEW OF ELASTOMERIC BEARING



PLAN VIEW OF ELASTOMERIC BEARING

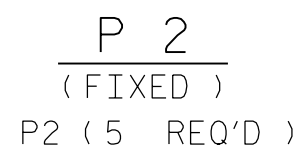
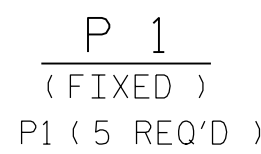


PLAN VIEW OF ELASTOMERIC BEARING



(SHOWING CONTINUOUS BENT)

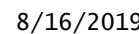
CABARRUS COUNTY



MAXIMUM ALLOWABLE
SERVICE LOADS

D.L.+L.L. (NO IMPACT)	
TYPE II	145 k
TYPE III	205 k
TYPE IV	225 k

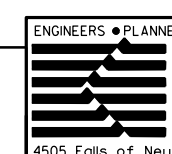
DR3C8E45B06D7



REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14

TOTAL
SHEETS
32


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ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS LICENSE NUMBER: C-0

 **KCI Associates**
of North Carolina, P.A.

4505 East of Nassau Road Suite 400 Raleigh NC 27609-6270 Phone (919) 783-0100

DESIGN ENGINEER OF RECORD		DocuSigned by  R. C. LARSON		DATE :	8/16/2019
ASSEMBLED BY :		R. C. LARSON		DATE :	10/02/2018
CHECKED BY :		R. A. PRUETT		DATE :	10/24/18
DRAWN BY : WJH		8/89	REV. 6/13	AAC/MAA	
CHECKED BY : CRK		8/89	REV. 1/15	MAA/TMG	
			REV. 12/17	MAA/THC	

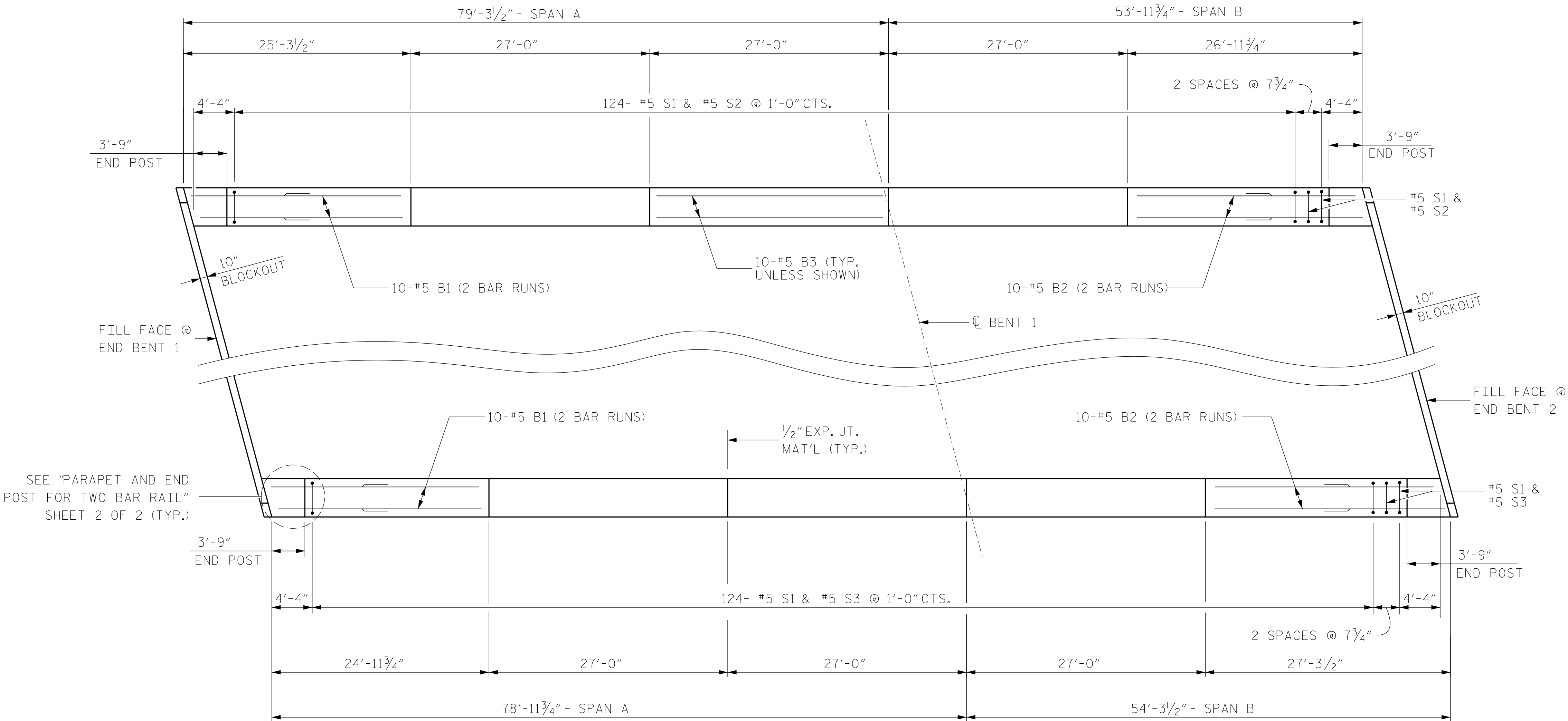
KCI JOB NO: 25180194516

NOTES

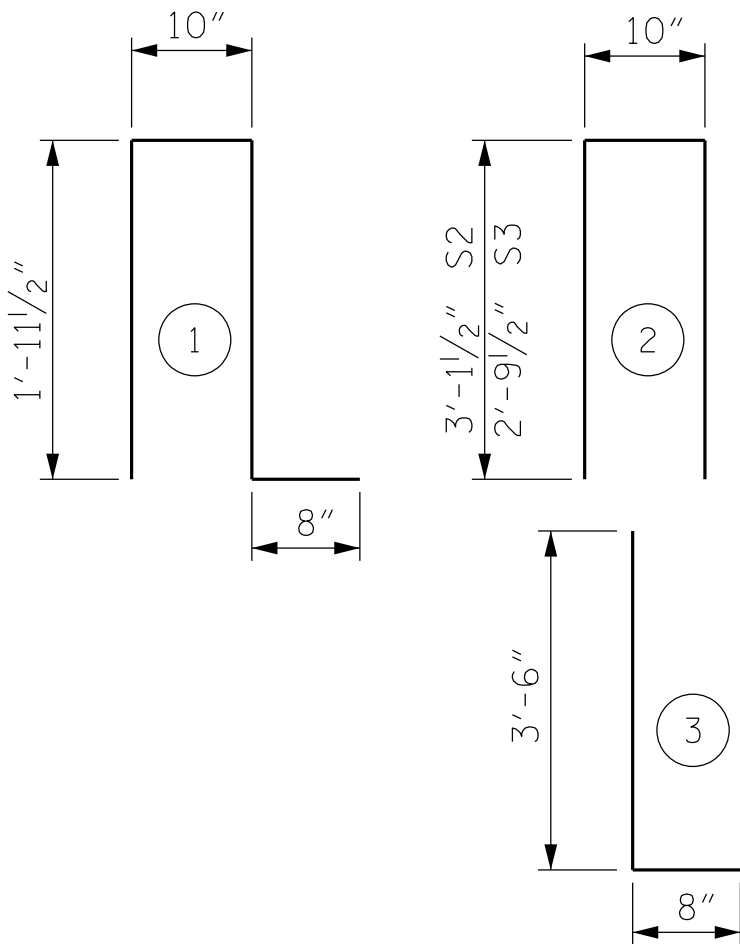
THE PARAPET IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN PARAPET SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.



BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE PARAPET AND FOUR END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	40	#5	STR.	14'-3"	595
* B2	40	#5	STR.	15'-7"	650
* B3	60	#5	STR.	26'-8"	1669
* E1	8	#7	STR.	2'-11"	48
* E2	8	#7	STR.	3'-5"	56
* E3	8	#7	STR.	3'-11"	64
* E4	8	#7	STR.	4'-5"	72
* E5	8	#7	STR.	4'-9"	78
* F1	8	#6	STR.	1'-8"	20
* F2	8	#6	STR.	3'-3"	39
* F3	4	#6	STR.	4'-0"	24
* F5	4	#6	STR.	3'-9"	23
* S1	252	#5	1	5'-5"	1424
* S2	126	#5	2	7'-1"	931
* S3	126	#5	2	6'-5"	843
* S4	32	#5	3	4'-2"	139

* EPOXY COATED REINFORCING STEEL	6675 LBS.
CLASS AA CONCRETE	36.8 CU. YDS.
CONCRETE PARAPET	266.54 LIN. FT.

PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE
PARAPET FOR
2 BAR METAL RAIL

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.

S-15

TOTAL SHEETS

32

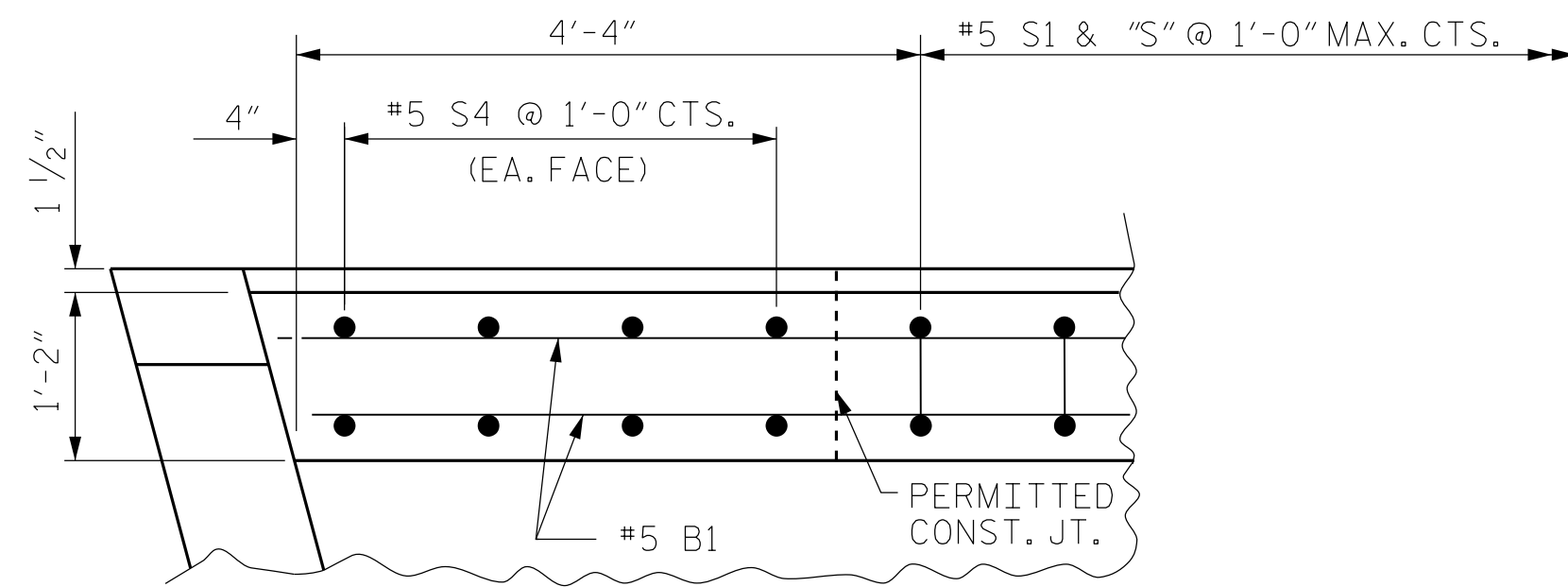
DESIGN ENGINEER OF RECORD	DATE : 8/16/2019
DRAWN BY : R. C. LARSON	DATE : 03/09/18
CHECKED BY : R. A. PRUETT	DATE : 10/25/18

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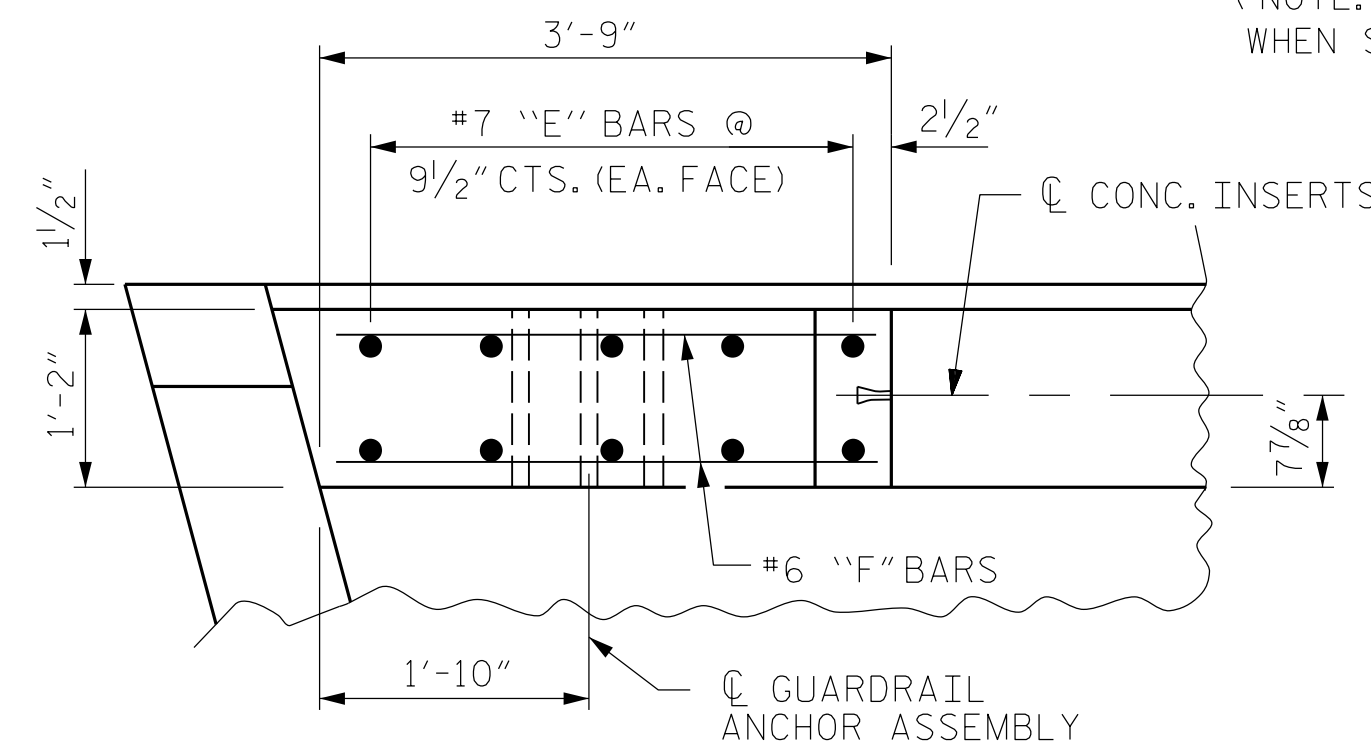
ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS LICENSE NUMBER: C-0764
KCI Associates
of North Carolina, P.A.
2505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 785-924

DocuSigned by:
R. C. LARSON
DB3C8E45B06D99
8/16/2019
NORTH CAROLINA
PROFESSIONAL
SEAL
14114
ENGINEER
ROBERT C. LARSON

KCI JOB NO: 25180194516

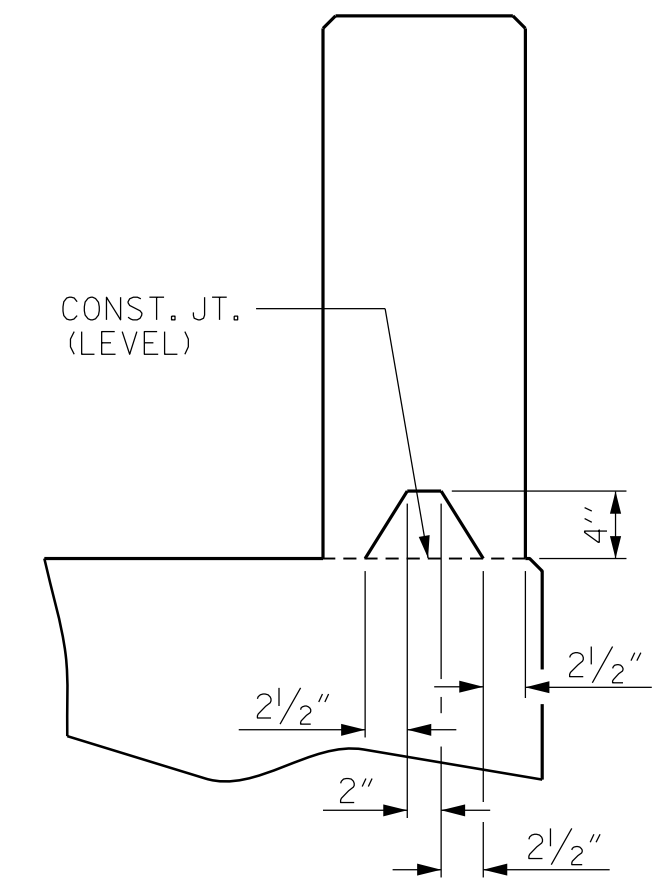
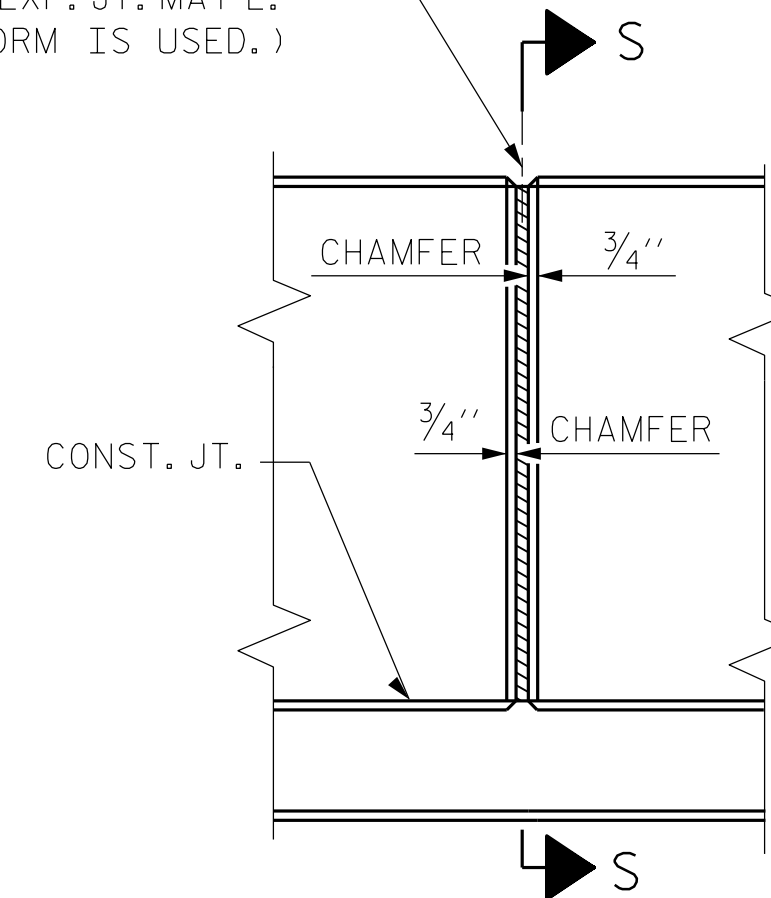


PLAN OF PARAPET



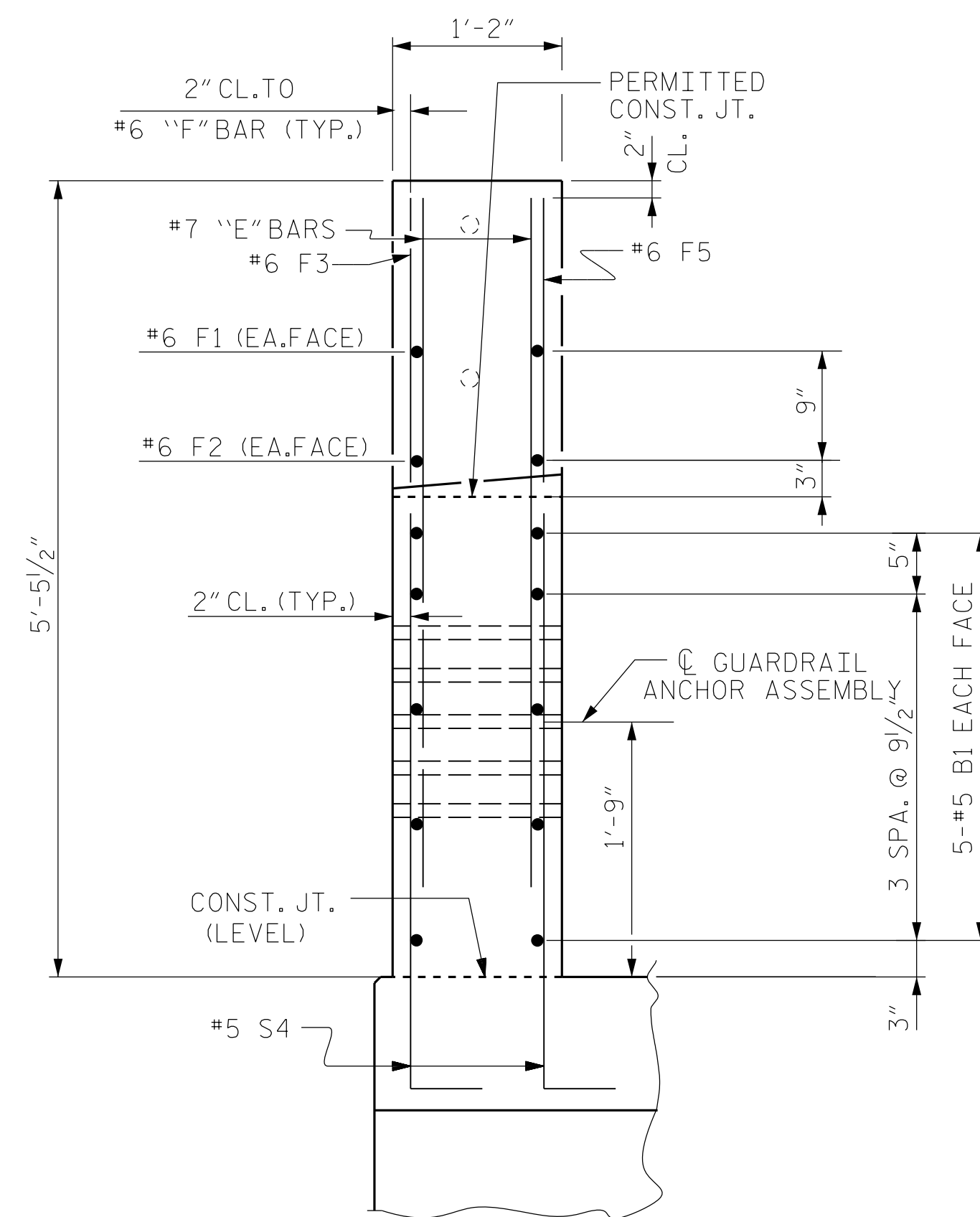
PLAN OF END POST

CL 1/2" EXP. JT. MAT'L HELD IN PLACE WITH GALVANIZED NAILS. (NOTE: OMIT EXP. JT. MAT'L. WHEN SLIP FORM IS USED.)

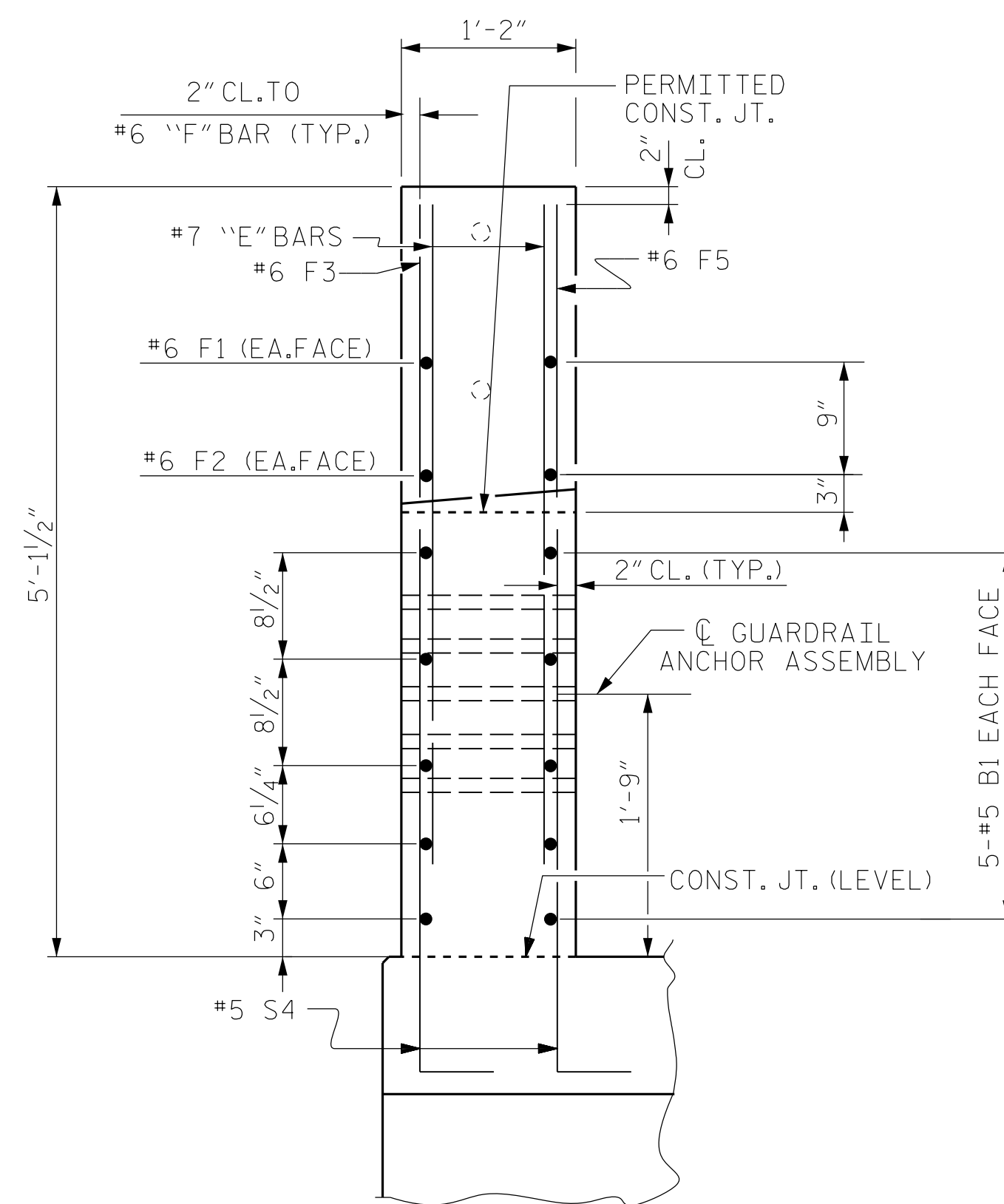


SECTION S-S
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY
WHEN SLIP FORM IS USED)

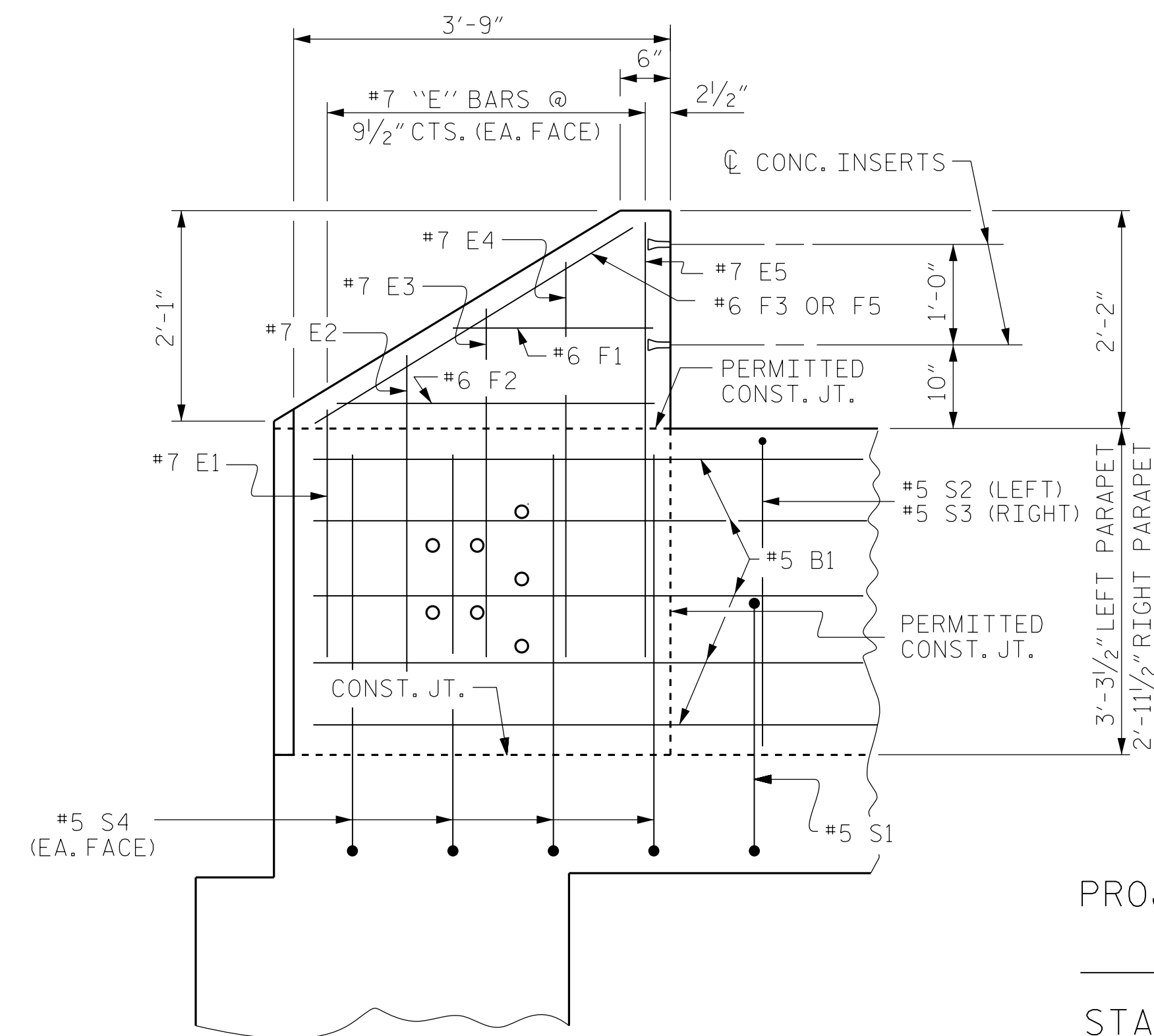
ELEVATION AT EXPANSION JOINTS



END VIEW OF LEFT PARAPET



END VIEW OF RIGHT PARAPET



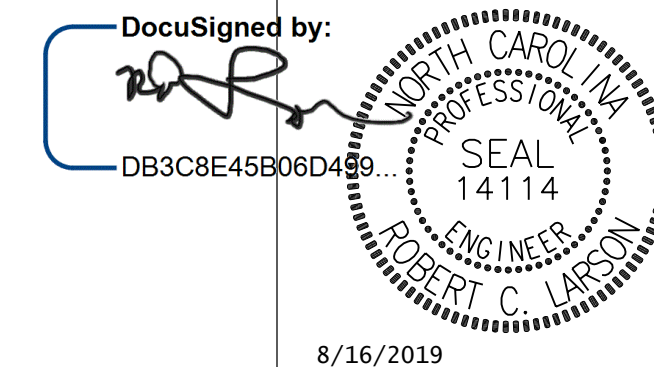
ELEVATION

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE PARAPET
FOR 2 BAR METAL RAIL
DETAILS



8/16/2019

DESIGN ENGINEER OF RECORD DATE: 8/16/2019
DRAWN BY: R. C. LARSON DATE: 09/26/18
CHECKED BY: R. A. PRUETT DATE: 10/26/18

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KCI Associates
of North Carolina, P.A.
2505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 785-924

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			S-16
2			4			
TOTAL SHEETS						32



DETAILS FOR ATTACHING METAL RAIL TO END POST

NOTES

STRUCTURAL CONCRETE INSERT

THE STRUCTURAL CONCRETE INSERT ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1½".
- B. 1 - ¾" Ø X 1½" BOLT WITH WASHER, BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE ¾" Ø X 1½" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)
- C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A ⅝" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

NOTES

METAL RAIL TO END POST CONNECTION

THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:

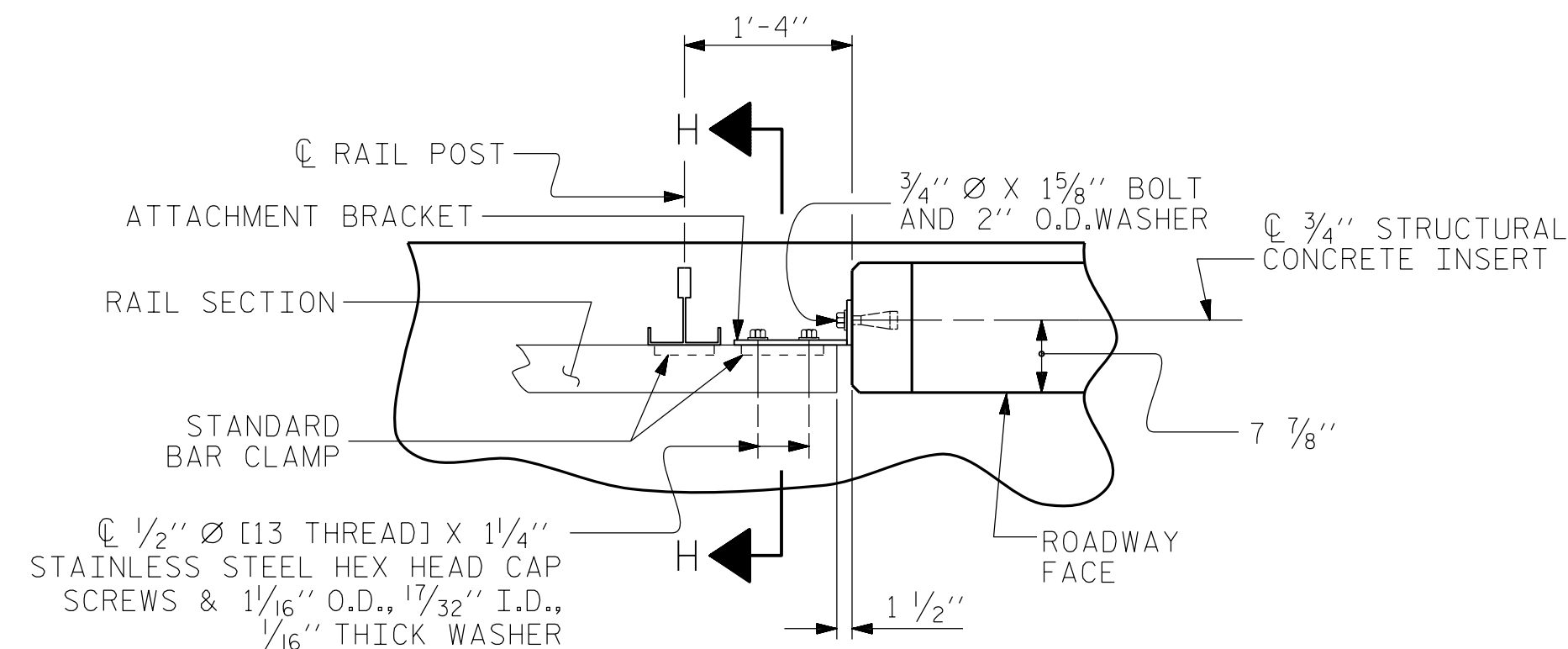
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
- B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4"Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4"Ø X 1 5/8" BOLT SHALL HAVE N.C. THREADS.
- C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.
- D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).
- E. 1/2" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

THE COST OF THE STANDARD CLAMP BARS AND CAP SCREWS USED IN THE METAL RAIL TO END POST CONNECTION SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR LINEAR FEET OF 1 OR 2 BAR METAL RAILS.

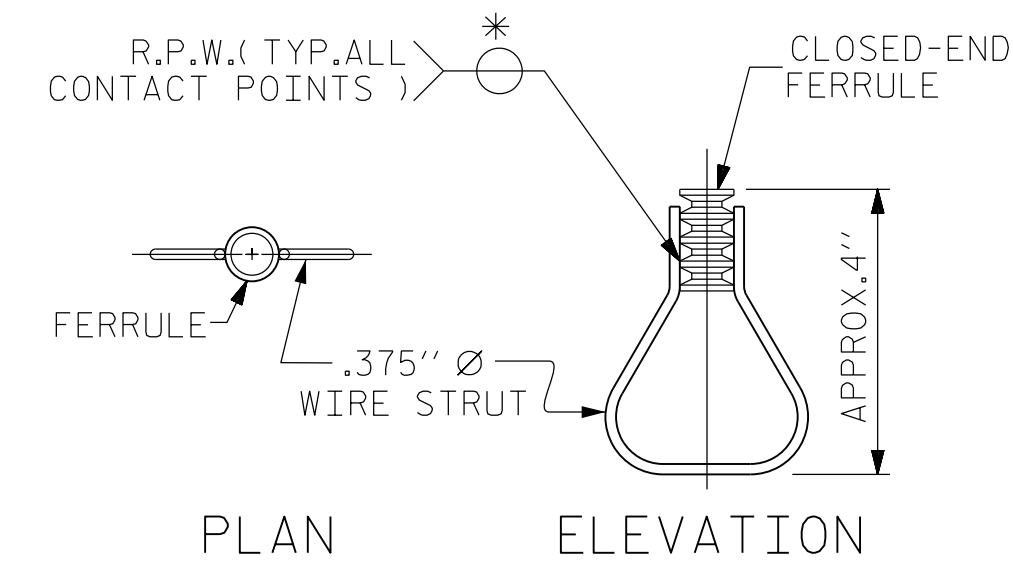
THE 3/4" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE 3/4" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE 1/2" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE $\frac{3}{4}" \times 1\frac{5}{8}"$ BOLT WITH WASHER SHALL BE REPLACED WITH A $\frac{3}{4}" \times 6\frac{1}{2}"$ BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE $\frac{3}{4}" \times 1\frac{5}{8}"$ BOLT SHALL APPLY TO THE $\frac{3}{4}" \times 6\frac{1}{2}"$ BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



PLAN - RAIL AND END POST




STRUCTURAL CONCRETE INSERT

* EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.

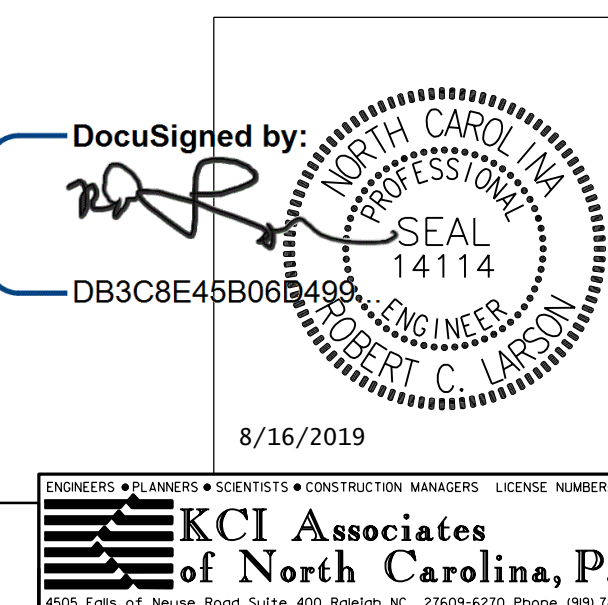
PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

DESIGN ENGINEER OF RECORD		DocuSigned by:  DATE : 8/16/2019	
ASSEMBLED BY : R. C. LARSON		DATE : 09/27/18	
CHECKED BY : R. A. PRUETT		DATE : 10/27/18	
DRAWN BY : FCJ 1/88		REV. 5/1/06 TLA/GM	
CHECKED BY : CRK 3/89		REV. 10/1/11 MAA/GM	
		REV. 12/17 MAA/THC	

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UNLESS ALL SIGNATURES COMPLETED**



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH STANDARD RAIL POST SPACINGS <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> AND <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> END OF RAIL DETAILS FOR ONE OR TWO BAR METAL RAILS						SHEET NO. <div style="font-size: 2em; font-weight: bold;">S-17</div>
REVISIONS						TOTAL SHEETS <div style="font-size: 2em; font-weight: bold;">32</div>
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

STD. NO. BMR2

AT THE CONTRACTOR'S OPTION, METAL RAIL MAY BE EITHER ALUMINUM OR GALVANIZED STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL NOTES AND THE FOLLOWING SPECIFICATIONS FOR THE ALTERNATE MATERIALS; HOWEVER, THE CONTRACTOR WILL BE REQUIRED TO USE THE SAME RAIL MATERIAL ON ALL STRUCTURES ON THE PROJECT FOR WHICH METAL RAIL IS DESIGNATED.

UNLESS OTHERWISE REQUIRED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR HAS THE OPTION TO USE AN ALTERNATE TO THE 2 BAR METAL RAIL. THE ALTERNATE RAIL SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST (APL) UNDER "2 BAR METAL RAIL ALTERNATE". ADJUSTMENTS TO THE CONCRETE PARAPET WILL NOT BE ALLOWED.

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6. MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

THE BASE OF RAIL POSTS, OR ANY OTHER ALUMINUM SURFACE IN CONTACT WITH CONCRETE SHALL BE THOROUGHLY COATED WITH AN ALUMINUM IMPREGNATED CAULKING COMPOUND OF APPROVED QUALITY.

MATERIAL FOR SHIMS TO BE ASTM B209 ALLOY 6061-T6.

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

POST, POST BASES, RAILS, EXPANSION BARS AND CLAMP BARS: AASHTO M270 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111.

RIVETS: RIVETS SHALL MEET THE REQUIREMENTS OF ASTM A502 FOR GRADE 1 RIVETS.

THE CUT ENDS OF GALVANIZE STEEL RAILING, AFTER GRINDING SMOOTH SHALL BE GIVEN TWO COATS OF ZINC RICH PAINT MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATION MIL-P-26915 USAF TYPE 1, OR OF FEDERAL SPECIFICATIONS TT-P-641.

SHIMS: SHIMS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

RAIL CAPS: RAIL CAPS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

RAILING SHALL BE CONTINUOUS FROM END POST TO END POST OF BRIDGE. EACH JOINT IN RAIL LENGTH SHALL BE SPLICED AS DETAILED. PANEL LENGTHS OF RAIL SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE STANDARD NO. BMR2.

CAP SCREWS SHALL BE ASTM F593 ALLOY 305 STAINLESS STEEL, WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.

CERTIFIED MILL REPORTS ARE REQUIRED FOR RAILS AND POSTS. SHOP INSPECTION IS NOT REQUIRED.

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

METHOD OF MEASUREMENT FOR METAL RAILS: FOR LENGTH OF METAL RAILS TO BE PAID FOR, SEE THE STANDARD SPECIFICATIONS.

CURVED RAIL USAGE: WHERE RAILS ARE TO BE USED ON BRIDGES ON HORIZONTAL AND/OR VERTICAL CURVATURE THE CONTRACTOR MAY, AT HIS OPTION, HAVE THE REQUIRED CURVATURE IN THE RAIL FORMED IN THE SHOP OR IN THE FIELD. IN EITHER EVENT, THE RAIL SHALL CONFORM WITHOUT BUCKLING OR KINKING TO THE REQUIRED CURVATURE IN A UNIFORM MANNER ACCEPTABLE TO THE ENGINEER.

TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAINS VISIBLE AFTER RAIL PLACEMENT.

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

MINOR VARIATIONS IN DETAILS OF METAL RAIL WILL BE CONSIDERED. DETAILS OF SUCH VARIATIONS, IF DESIRED, SHALL BE SUBMITTED FOR APPROVAL.

ROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

Technical drawing of a dome-shaped structure. The drawing shows a cross-section of a dome with a hemispherical top and a cylindrical body. The total height is dimensioned as 1.375" (±.005"). The base diameter is dimensioned as .750" and .745".

5 3/4"

7/8"

1"

3 3/4"

4 - .766" Ø HOLES PUNCHED FOR RIVETS

2 1/4"

2"

5 3/4"

2 5/16"

1/4"

NOTE: BASE CAN BE SUPPLIED AS ONE EXTRUSION OR TWO EXTRUSIONS WELDED TOGETHER AS SHOWN.

5/8"

5/32"

2"

2 1/4"

1/2"

7/8"

1/4"

PERMITTED WELD

FRONT ELEVATION


FRONT ELEVATION

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UNLESS ALL SIGNATURES COMPLETED**

CABARRUS COUNTY

SHEET 1 OF 2

STANDARD

DocuSigned by:

DB3C8E45B06C499

NORTH CAROLINA
PROFESSIONAL
SEAL
14114
ENGINEER

8/16/2019

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:
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1			3		
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2			4		
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SHEET NO.

S-18

TOTAL
SUFF

32

STD. NO. BMR3 (SHT 2)

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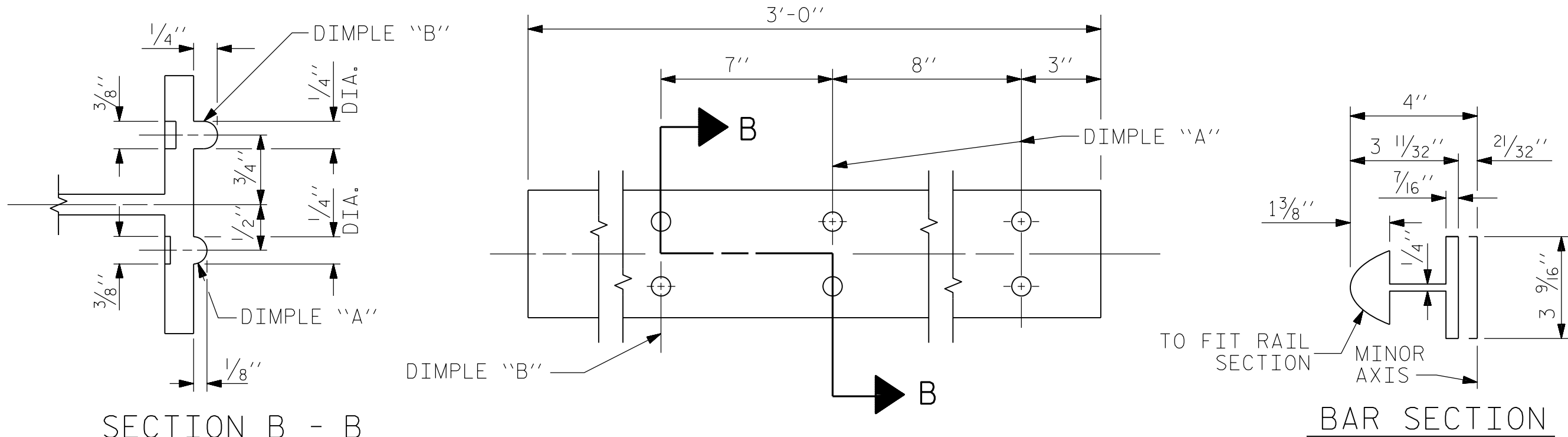
4-BOLT METAL RAIL ANCHOR ASSEMBLY

(46 ASSEMBLIES REQUIRED)

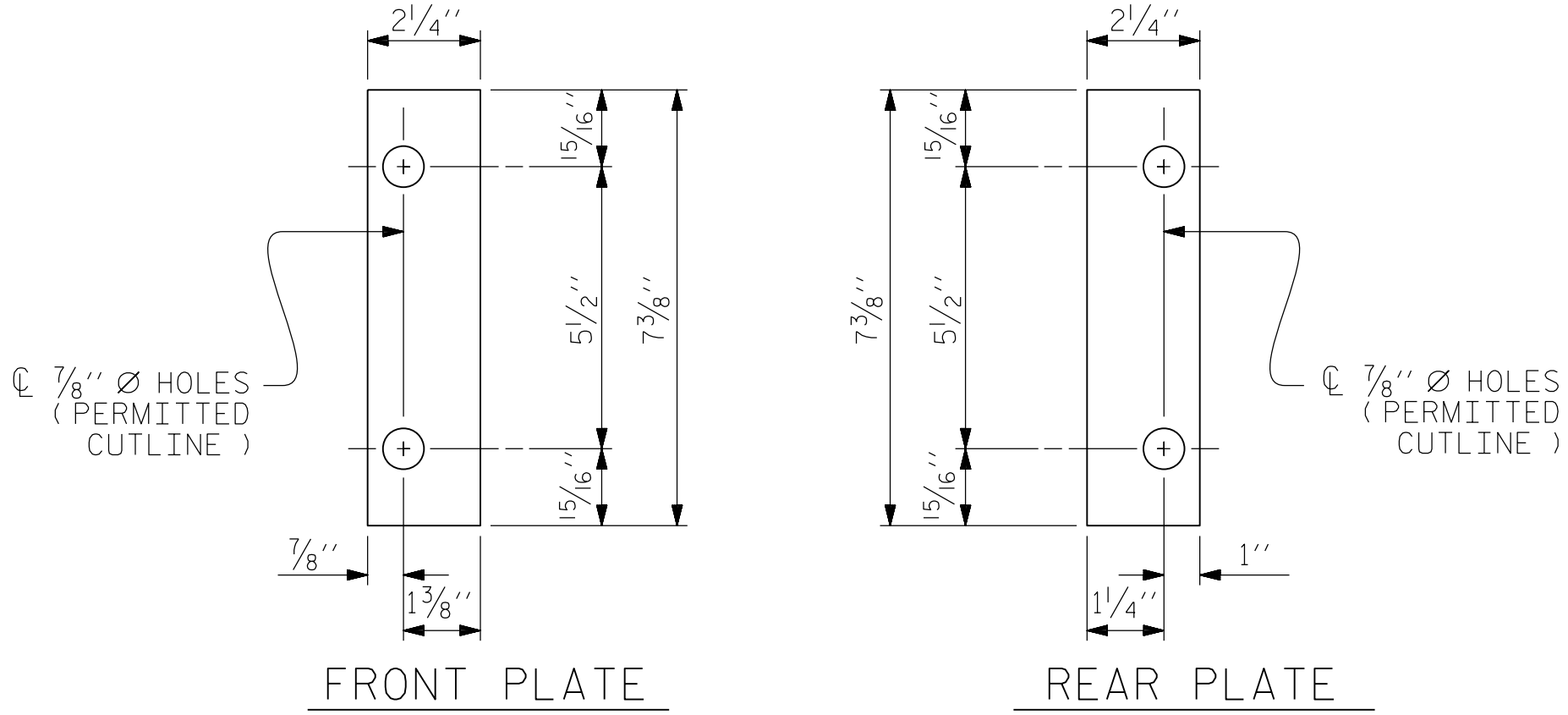
- NOTES
- STRUCTURAL CONCRETE ANCHOR ASSEMBLY
- THE STRUCTURAL CONCRETE ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS :
- FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.
 - 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 2 1/2" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.
 - WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.
 - THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.
 - THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.
 - BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.

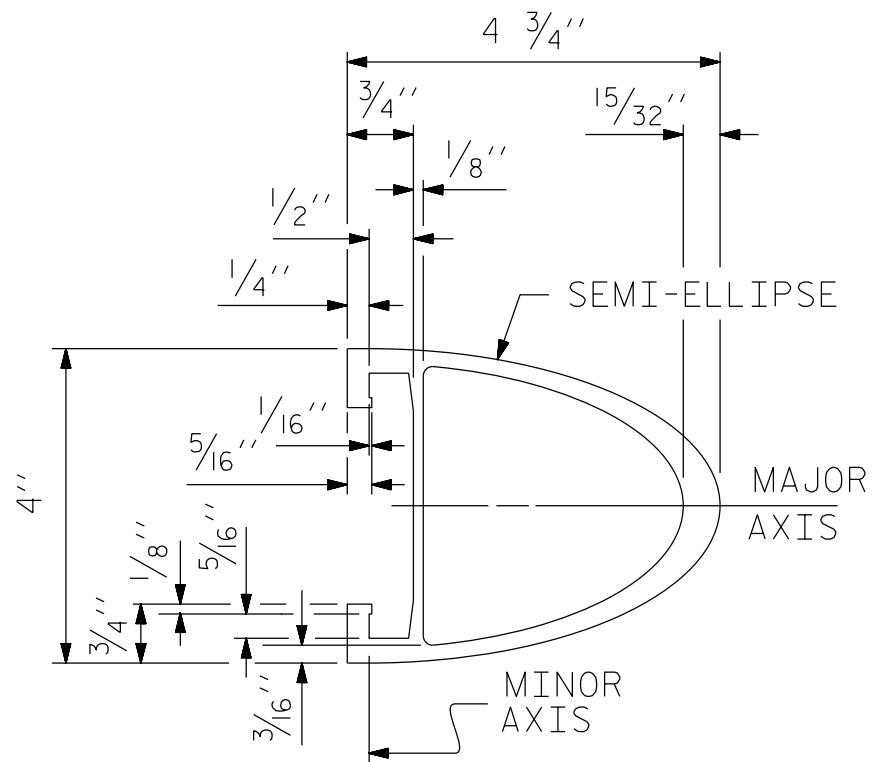


EXPANSION BAR DETAILS

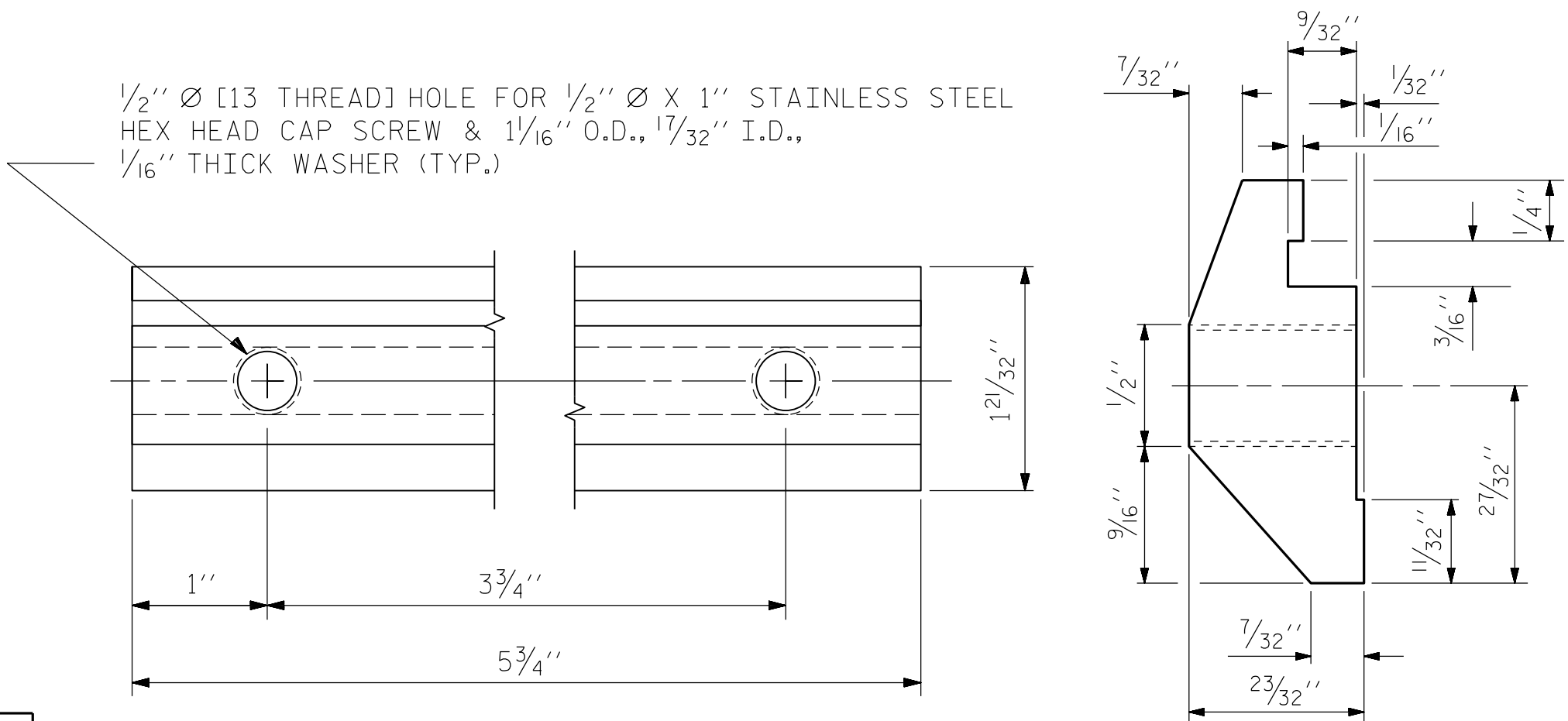


SHIM DETAILS

NOTE :
SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.

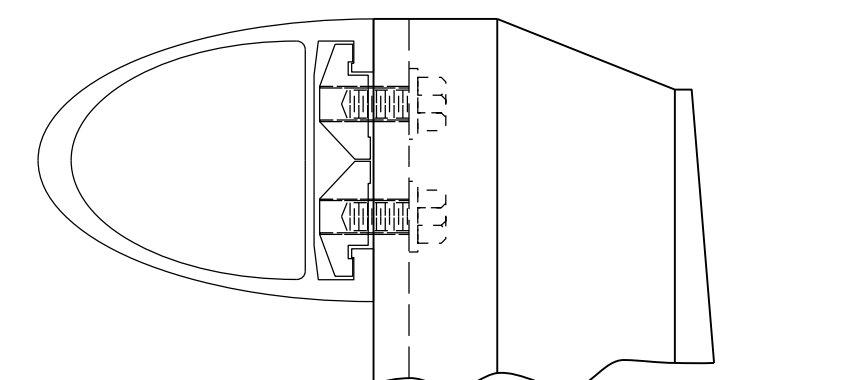


RAIL SECTION



CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY

DESIGN ENGINEER OF RECORD:	DATE :
ASSEMBLED BY : R. C. LARSON	DATE : 09/27/18
CHECKED BY : R. A. PRUETT	DATE : 10/25/18
DRAWN BY : EEM 6/94	REV. 5/1/06R KMM/GM
CHECKED BY : RGW 6/94	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

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UNLESS ALL SIGNATURES COMPLETED

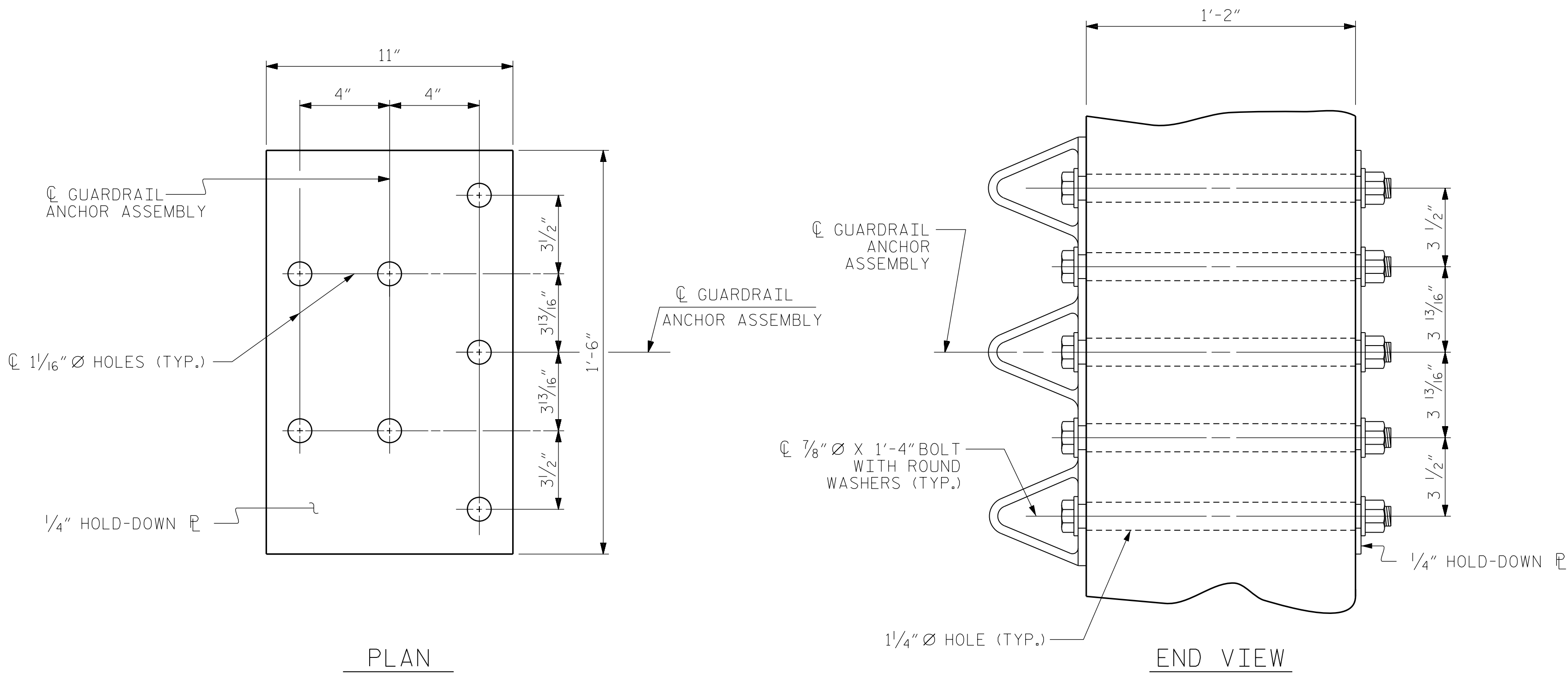
ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS LICENSE NUMBER: C-0164
KCI Associates
of North Carolina, P.A.
4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27603-6270 Phone (919) 783-9204

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD 2 BAR METAL RAIL					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
TOTAL SHEETS				SHEET NO.	
32				S-19	

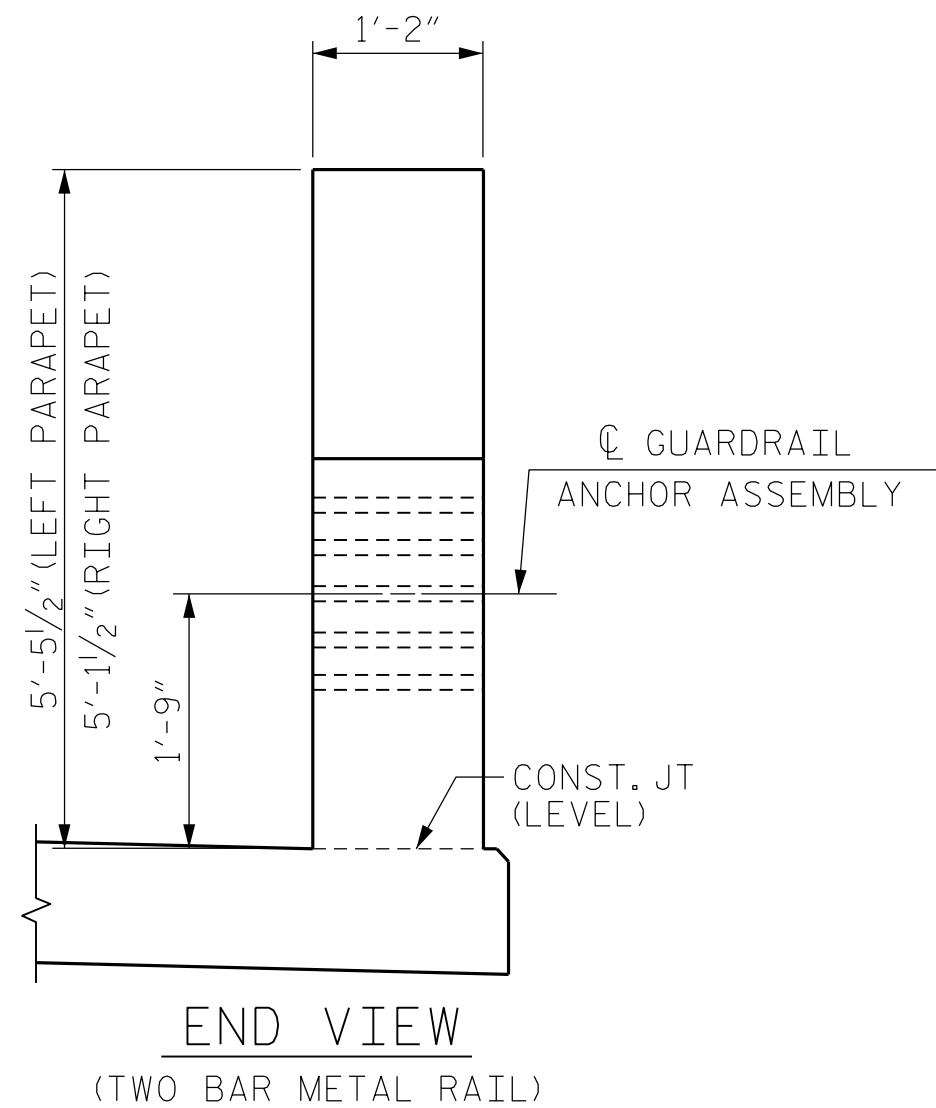
STD. NO. BMR4



PLAN

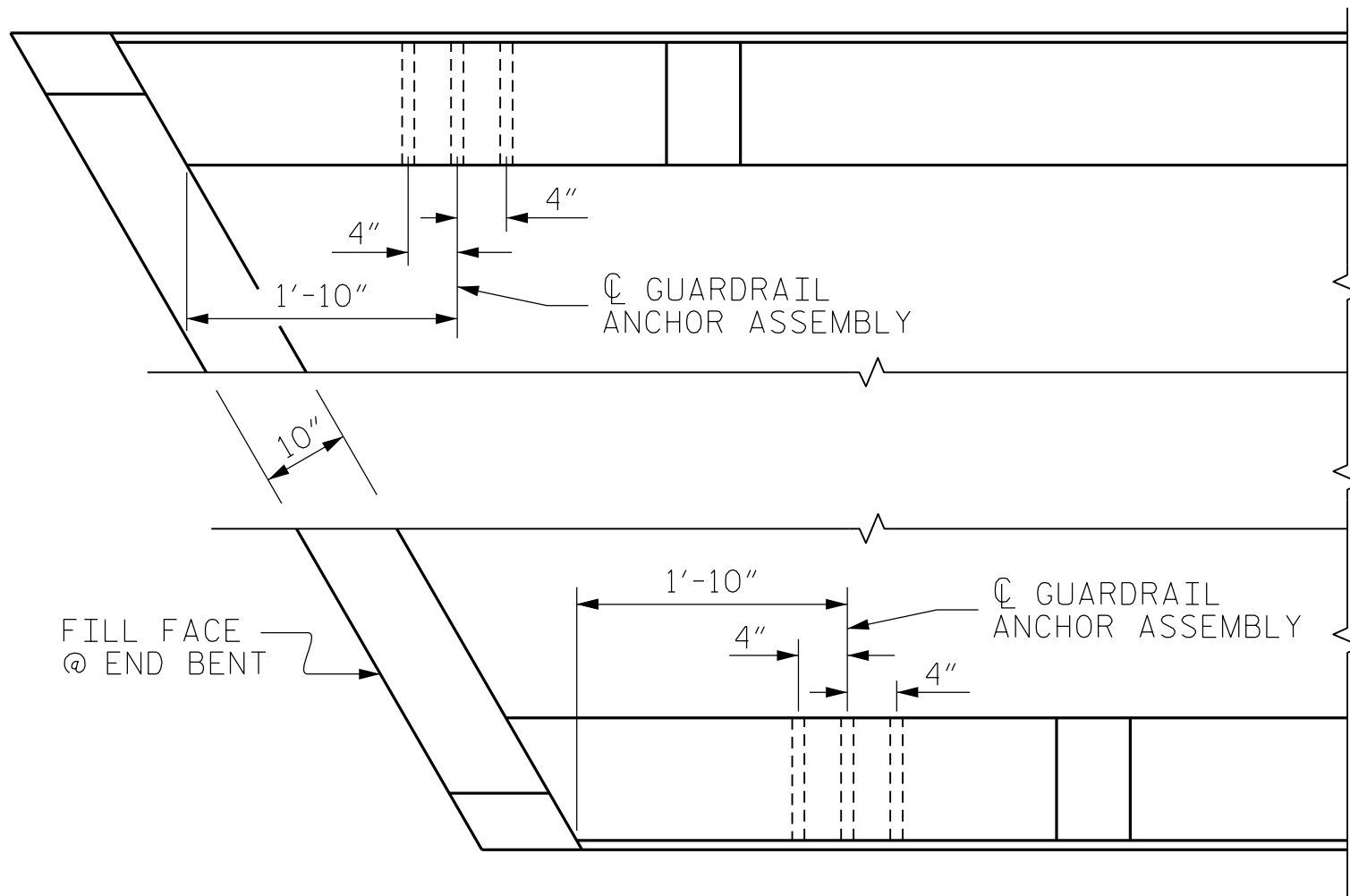
END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS



END VIEW

(TWO BAR METAL RAIL)



PLAN

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 7/8" Ø BOLTS WITH NUTS AND WASHERS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

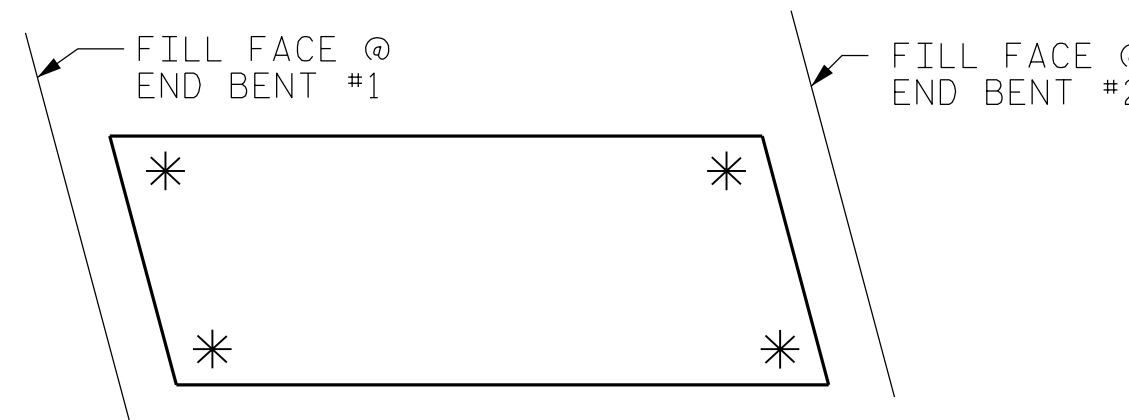
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



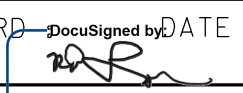
SKETCH SHOWING POINTS OF ATTACHMENT

* LOCATION OF GUARDRAIL ATTACHMENT

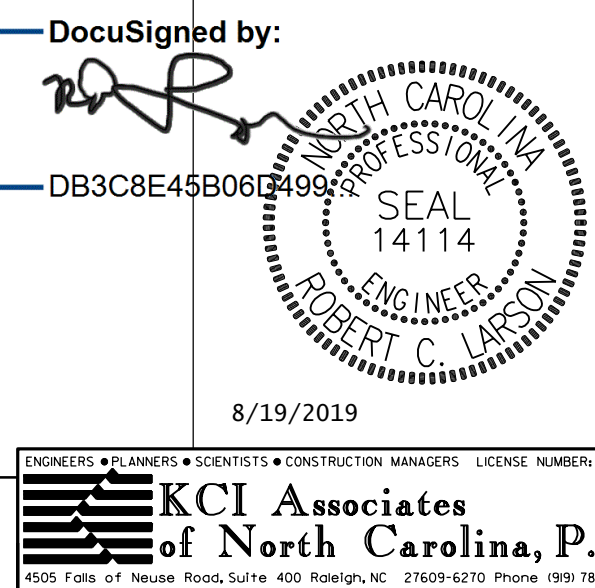
PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

DESIGN ENGINEER OF RECORD	DocuSigned by:  DATE : 8/19/2019
ASSEMBLED BY : R. C. LARSON	DATE : 09/28/18
CHECKED BY : R. A. PRUETT	DATE : 10/26/18
DRAWN BY : MAA 5/10	REV. 6/13 MAA/GM
CHECKED BY : GM 5/10	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

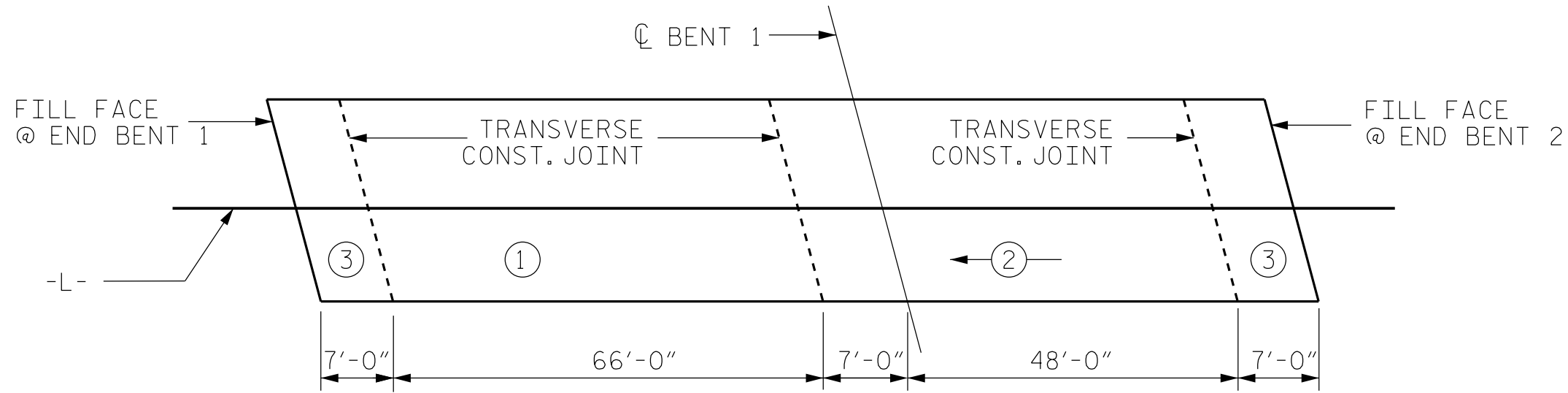
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UNLESS ALL SIGNATURES COMPLETED



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
GUARDRAIL ANCHORAGE
DETAILS
FOR METAL RAILS

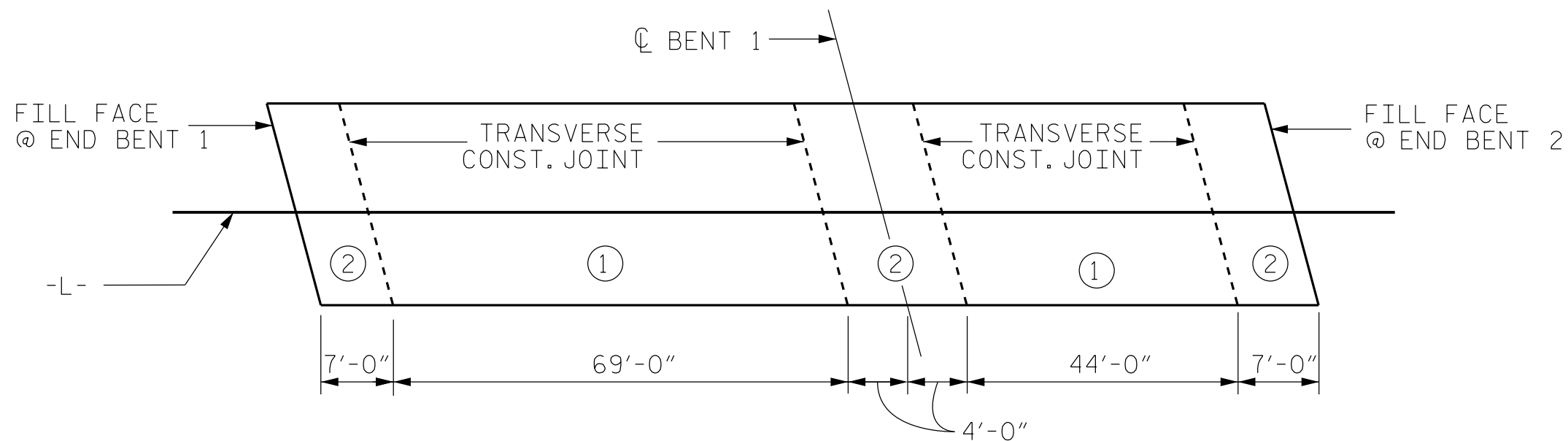
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			32

(SHT 5) STD. NO. GRA3



DECK POURING SEQUENCE

② → INDICATES POUR SEQUENCE AND DIRECTION



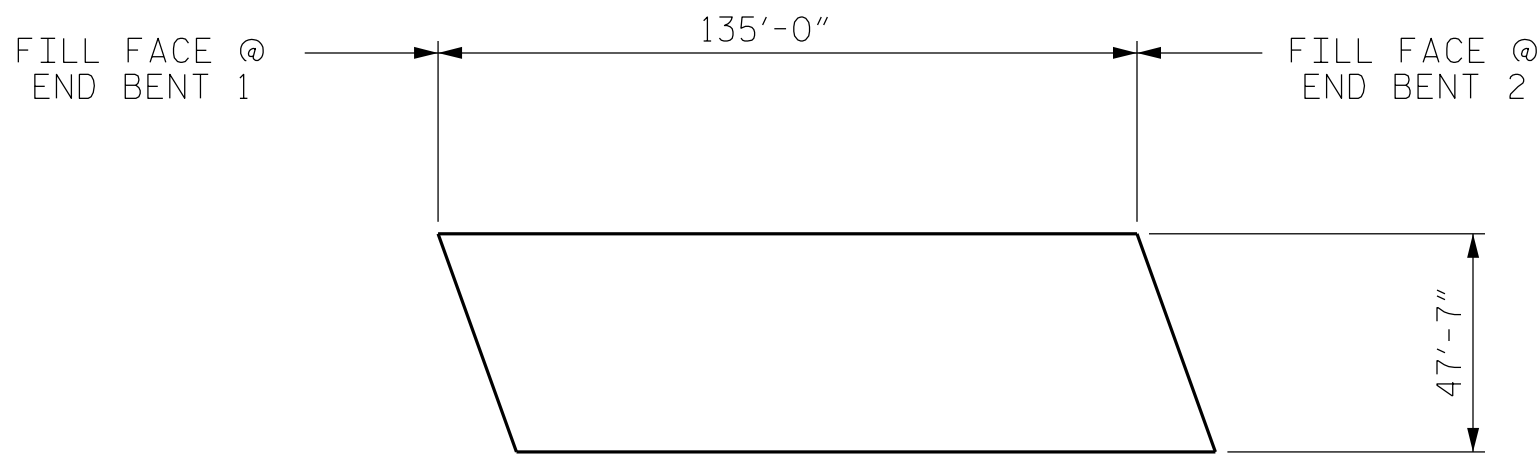
OPTIONAL DECK POURING SEQUENCE

② → INDICATES POUR SEQUENCE AND DIRECTION


NO POUR 2 MAY BE STARTED UNTIL BOTH ADJACENT
POURS 1 HAVE REACHED A MINIMUM STRENGTH OF 3000 PSI.

SUPERSTRUCTURE REINFORCING STEEL
LENGTHS ARE BASED ON THE
FOLLOWING MINIMUM SPLICE LENGTHS

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"
#5	2'-6"	2'-2"	2'-6"	2'-2"	3'-5"
#6	3'-0"	2'-7"	3'-10"	2'-7"	4'-4"
#7	5'-3"	3'-6"			
#8	6'-10"	4'-7"			



LAYOUT FOR COMPUTING AREA
REINFORCED CONCRETE DECK SLAB
(SQ. FT. = 6424)

DESIGN ENGINEER OF RECORD	DocuSigned by: 	DATE :
ASSEMBLED BY : R. C. LARSON	DATE : 9/24/18	
CHECKED BY : R. A. PRUETT	DATE : 10/24/18	
DRAWN BY : JMB 5/87	REV. 5/1/06	TLA/GM
CHECKED BY : SJD 9/87	REV. 10/1/11	MAA/GM
	REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

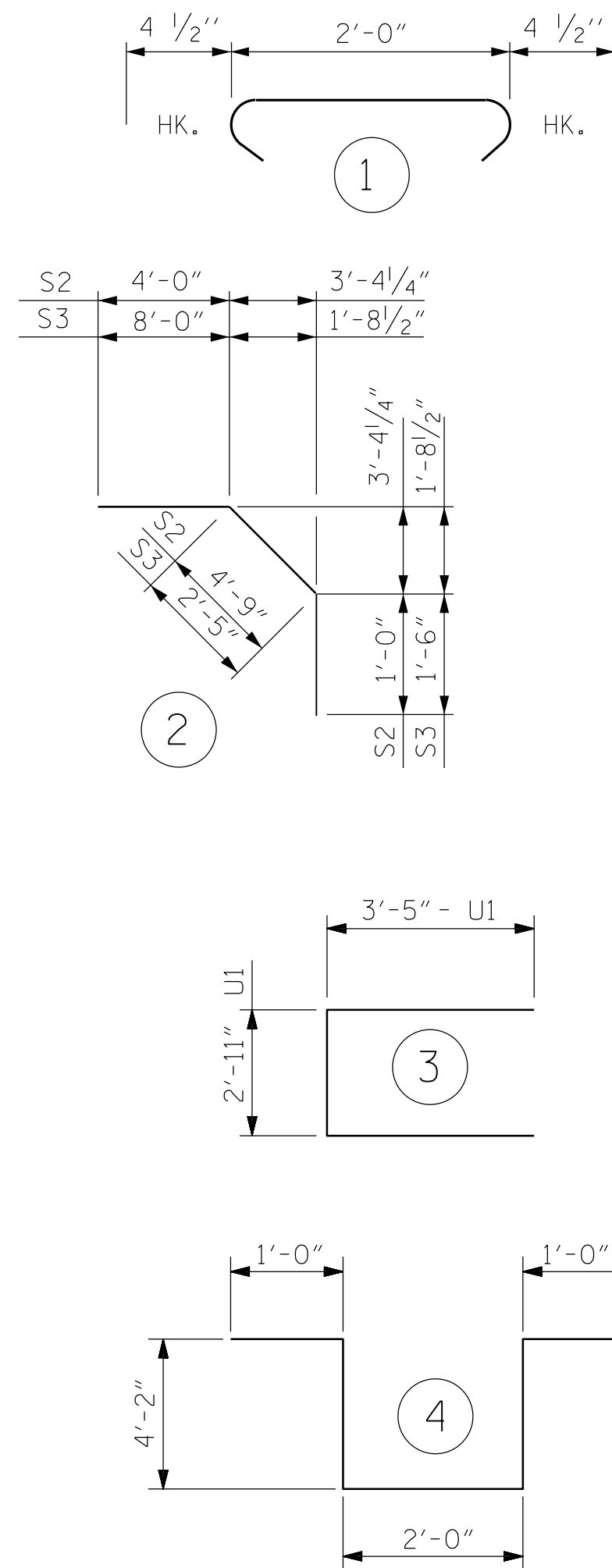
ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS LICENSE NUMBER C-0164
KCI Associates
of North Carolina, P.A.
400 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 783-9204

REVISIONS						SHEET NO. S-21
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 32
2			4			

STD. NO. BOM2

BILL OF MATERIAL											
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	263	5	STR.	47'-3"	12961	A44	2	5	STR.	20'-3"	42
* A2	2	5	STR.	45'-11"	96	A45	2	5	STR.	18'-6"	39
* A3	2	5	STR.	44'-2"	92	A46	2	5	STR.	16'-10"	35
* A4	2	5	STR.	42'-6"	89	A47	2	5	STR.	15'-1"	31
* A5	2	5	STR.	40'-9"	85	A48	2	5	STR.	13'-5"	28
* A6	2	5	STR.	39'-1"	82	A49	2	5	STR.	11'-8"	24
* A7	2	5	STR.	37'-4"	78	A50	2	5	STR.	10'-0"	21
* A8	2	5	STR.	35'-7"	74	A51	2	5	STR.	8'-3"	17
* A9	2	5	STR.	33'-11"	71	A52	2	5	STR.	6'-7"	14
* A10	2	5	STR.	32'-2"	67	A53	2	5	STR.	4'-10"	10
* A11	2	5	STR.	30'-6"	64	A54	2	5	STR.	3'-1"	6
* A12	2	5	STR.	28'-9"	60						
* A13	2	5	STR.	27'-1"	56	* B1	165	4	STR.	28'-3"	3114
* A14	2	5	STR.	25'-4"	53	* B2	31	6	STR.	16'-0"	745
* A15	2	5	STR.	23'-8"	49	* B3	31	6	STR.	17'-0"	792
* A16	2	5	STR.	21'-11"	46	* B4	31	6	STR.	11'-0"	512
* A17	2	5	STR.	20'-3"	42	* B5	31	6	STR.	12'-0"	559
* A18	2	5	STR.	18'-6"	39	* B6	31	6	STR.	20'-3"	943
* A19	2	5	STR.	16'-10"	35	* B7	31	6	STR.	50'-6"	2351
* A20	2	5	STR.	15'-1"	31	B8	192	5	STR.	47'-1"	9429
* A21	2	5	STR.	13'-5"	28						
* A22	2	5	STR.	11'-8"	24	K1	16	4	STR.	25'-7"	273
* A23	2	5	STR.	10'-0"	21	K2	8	4	STR.	8'-3"	44
* A24	2	5	STR.	8'-3"	17	K3	32	4	STR.	9'-7"	205
* A25	2	5	STR.	6'-7"	14	K4	16	4	STR.	8'-9"	94
* A26	2	5	STR.	4'-10"	10	K5	4	4	STR.	2'-3"	6
* A27	2	5	STR.	3'-1"	6	K6	8	4	STR.	3'-1"	16
A28	263	5	STR.	47'-3"	12961	K7	4	4	STR.	2'-6"	7
A29	2	5	STR.	45'-11"	96	K8	8	4	STR.	7'-3"	39
A30	2	5	STR.	44'-2"	92	K9	8	4	STR.	23'-9"	127
A31	2	5	STR.	42'-6"	89						
A32	2	5	STR.	40'-9"	85	S1	96	4	1	2'-9"	176
A33	2	5	STR.	39'-1"	82	* S2	76	4	2	9'-9"	495
A34	2	5	STR.	37'-4"	78	* S3	84	4	2	11'-11"	669
A35	2	5	STR.	35'-7"	74						
A36	2	5	STR.	33'-11"	71	U1	80	4	3	9'-9"	521
A37	2	5	STR.	32'-2"	67	U2	32	4	4	12'-4"	264
A38	2	5	STR.	30'-6"	64						
A39	2	5	STR.	28'-9"	60						
A40	2	5	STR.	27'-1"	56						
A41	2	5	STR.	25'-4"	53						
A42	2	5	STR.	23'-8"	49						
A43	2	5	STR.	21'-11"	46						

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

—SUPERSTRUCTURE BILL OF MATERIAL—			
	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	100.7		
POUR 2	97.0		
POUR 3	62.4		
TOTALS**	260.1	25,491	24,470

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

PROJECT NO. 17BP.10.R.144

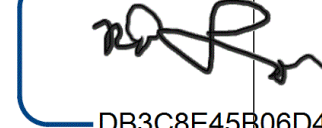
CABARRUS COUNTY

STATION: 18+97.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
SUPERSTRUCTURE
BILL OF MATERIAL

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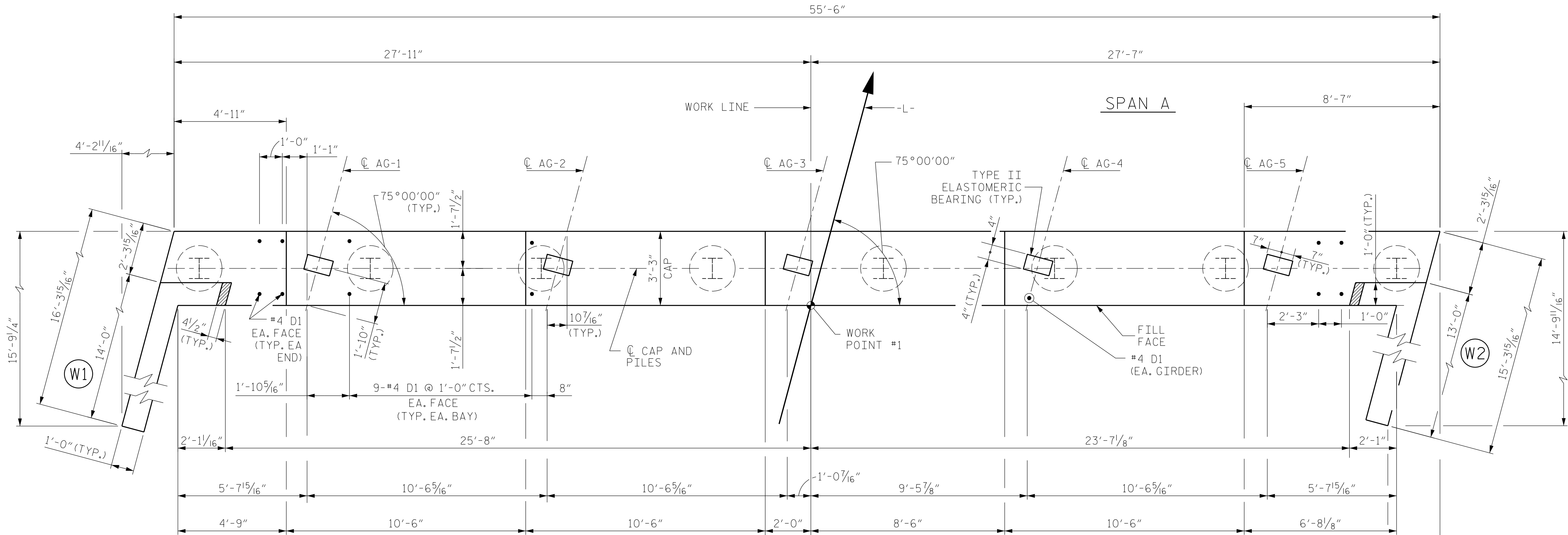


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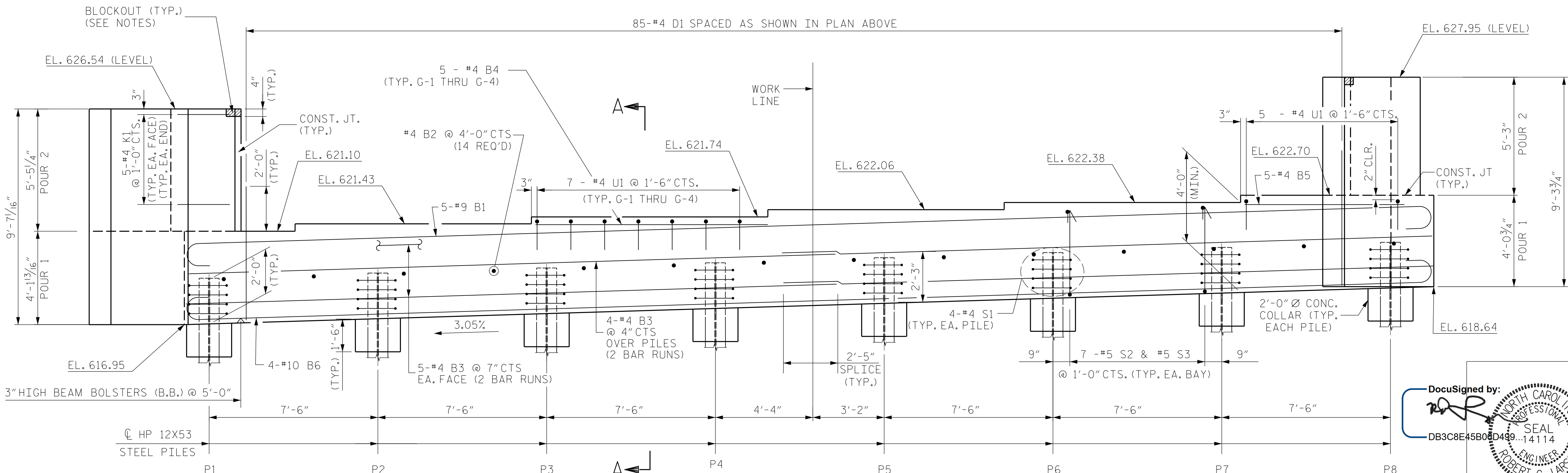
SEAL
14114
ENGINEER
ROBERT C. LARSON

8/19/2019

KCI JOB NO: 25180194516



PLAN OF CAP



ELEVATION

NOTES

- THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BEARING AREAS AND THE AREA OUTSIDE OF THE SUPERSTRUCTURE SHALL BE RAKED TO A DEPTH OF 1/4"
- THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE PARAPET IS CAST IF SLIP FORMING IS USED.
- FOR "TEMPORARY DRAINAGE AT END BENT", SEE END BENT 2.
- FOR SECTION A-A SEE SHEET 3 of 3.

TOP OF PILE ELEVATIONS	
P1	618.98
P2	619.21
P3	619.44
P4	619.67
P5	619.89
P6	620.12
P7	620.36
P8	620.58

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 1

DESIGN ENGINEER OF RECORD : DATE : 8/16/2019
DRAWN BY : R. J. FLORY DATE : 10/14/18
CHECKED BY : R. C. LARSON DATE : 11/13/18

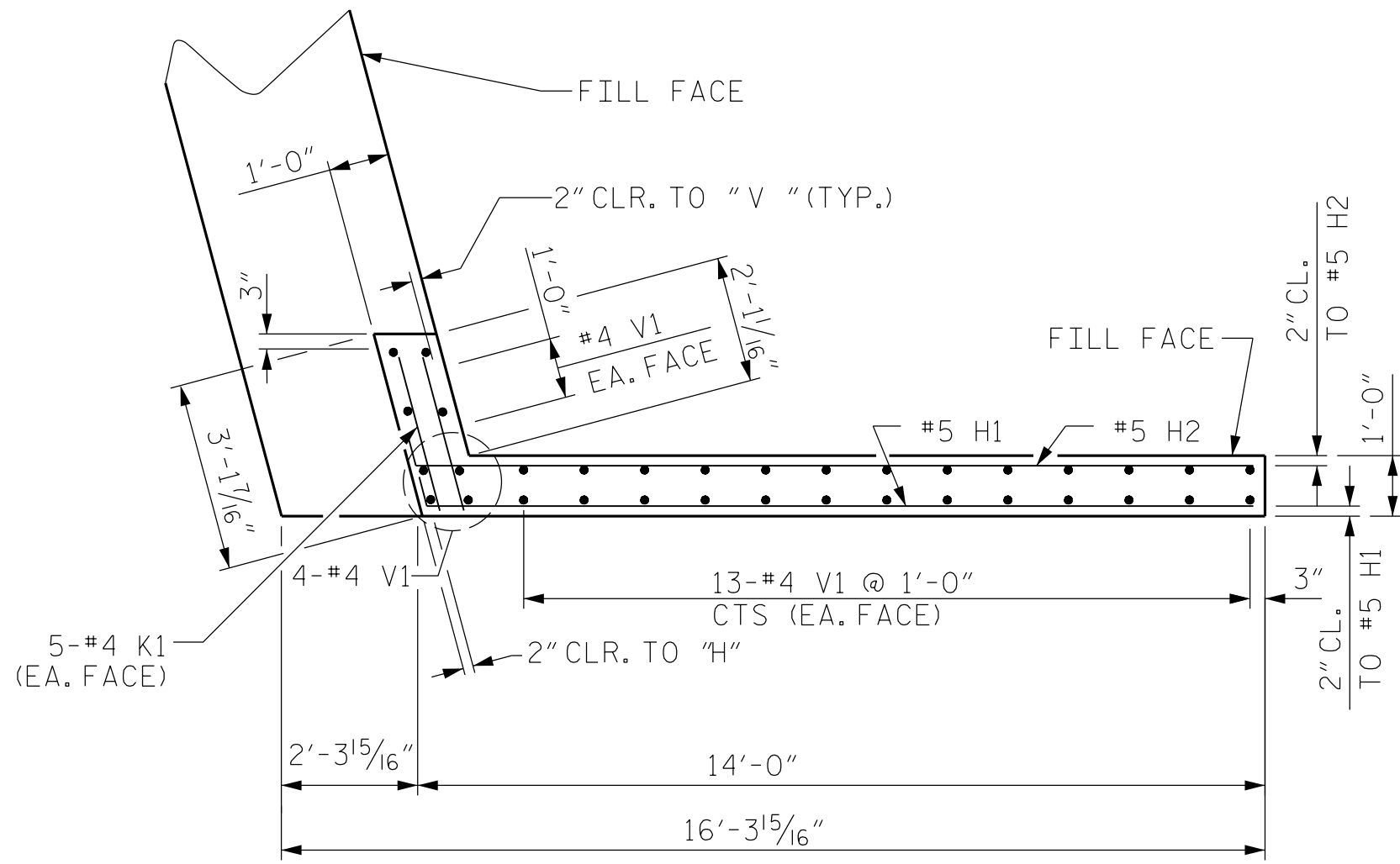
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8/16/2019

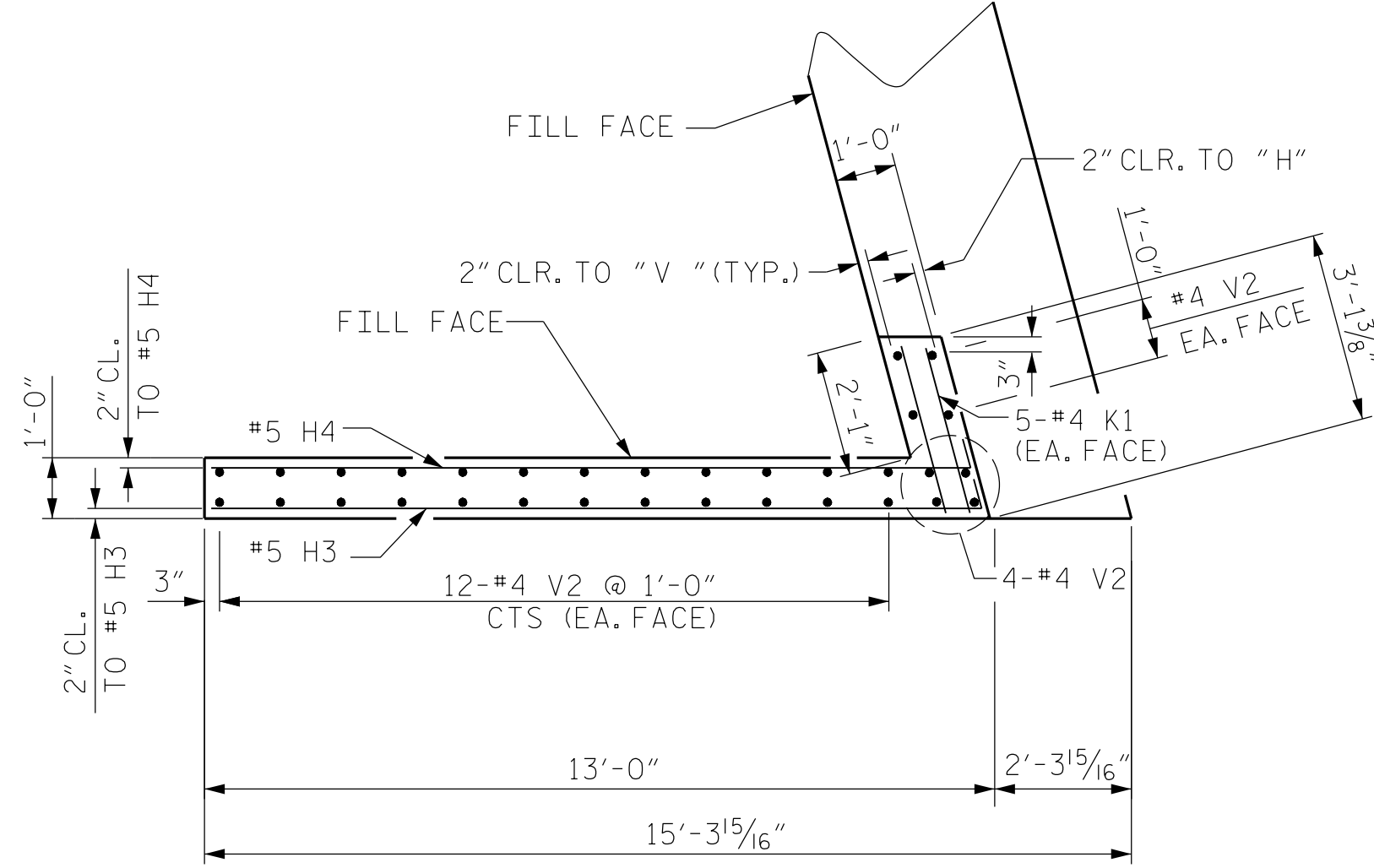
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KCI Associates
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2505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 785-924

REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
				TOTAL SHEETS	32

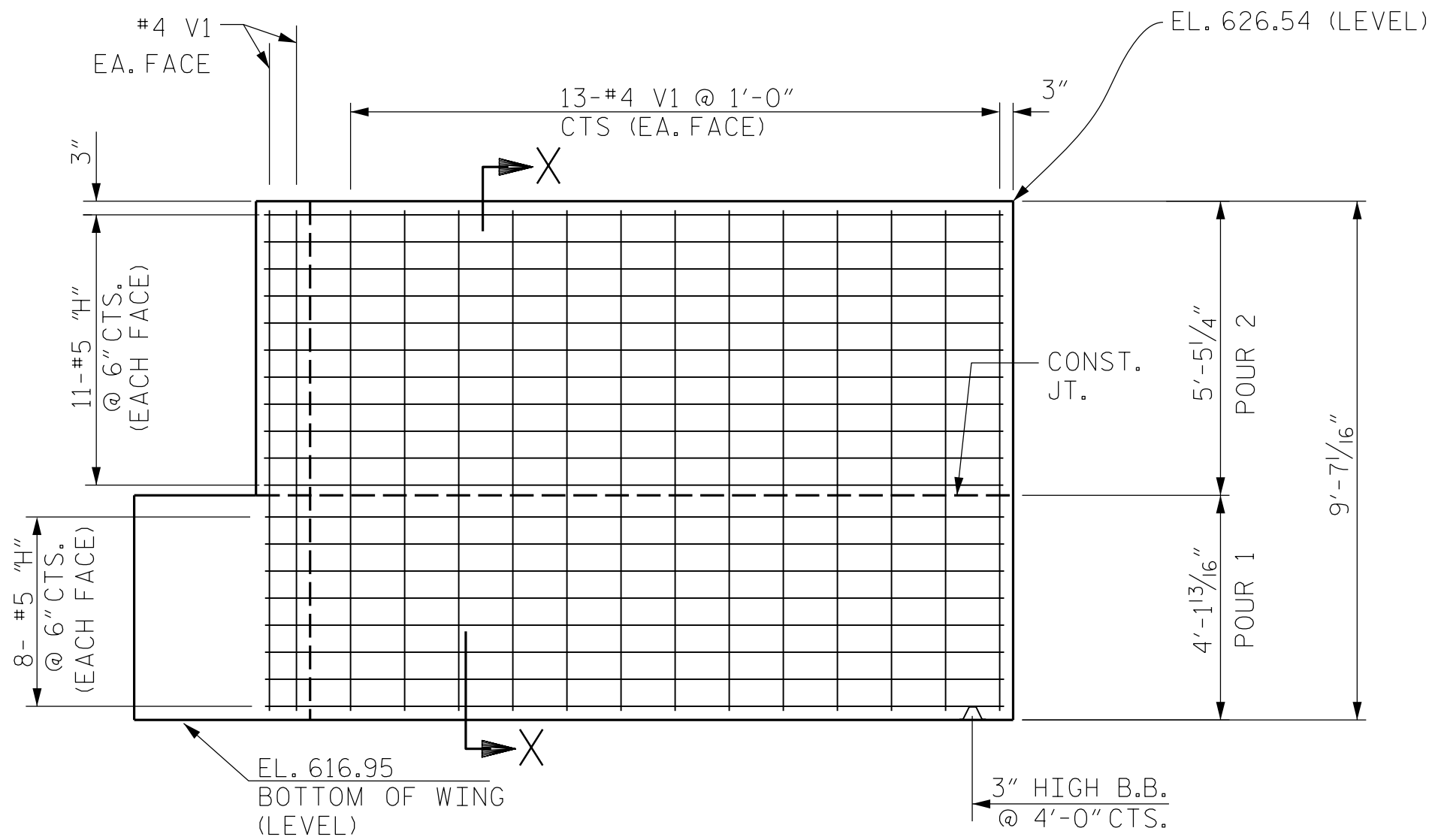
KCI JOB NO: 25180194516



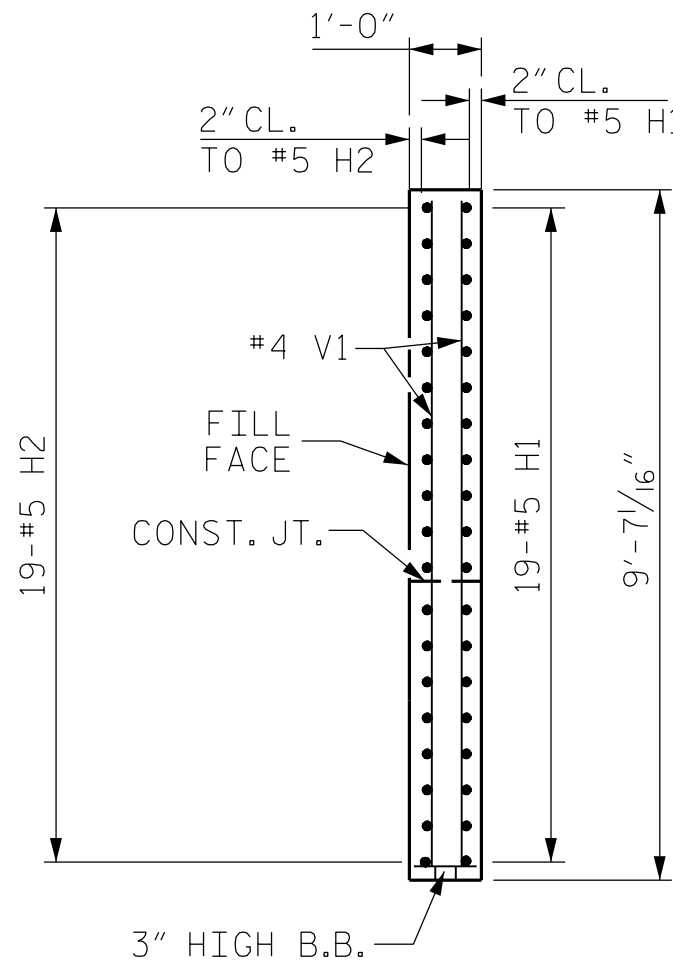
PLAN W1



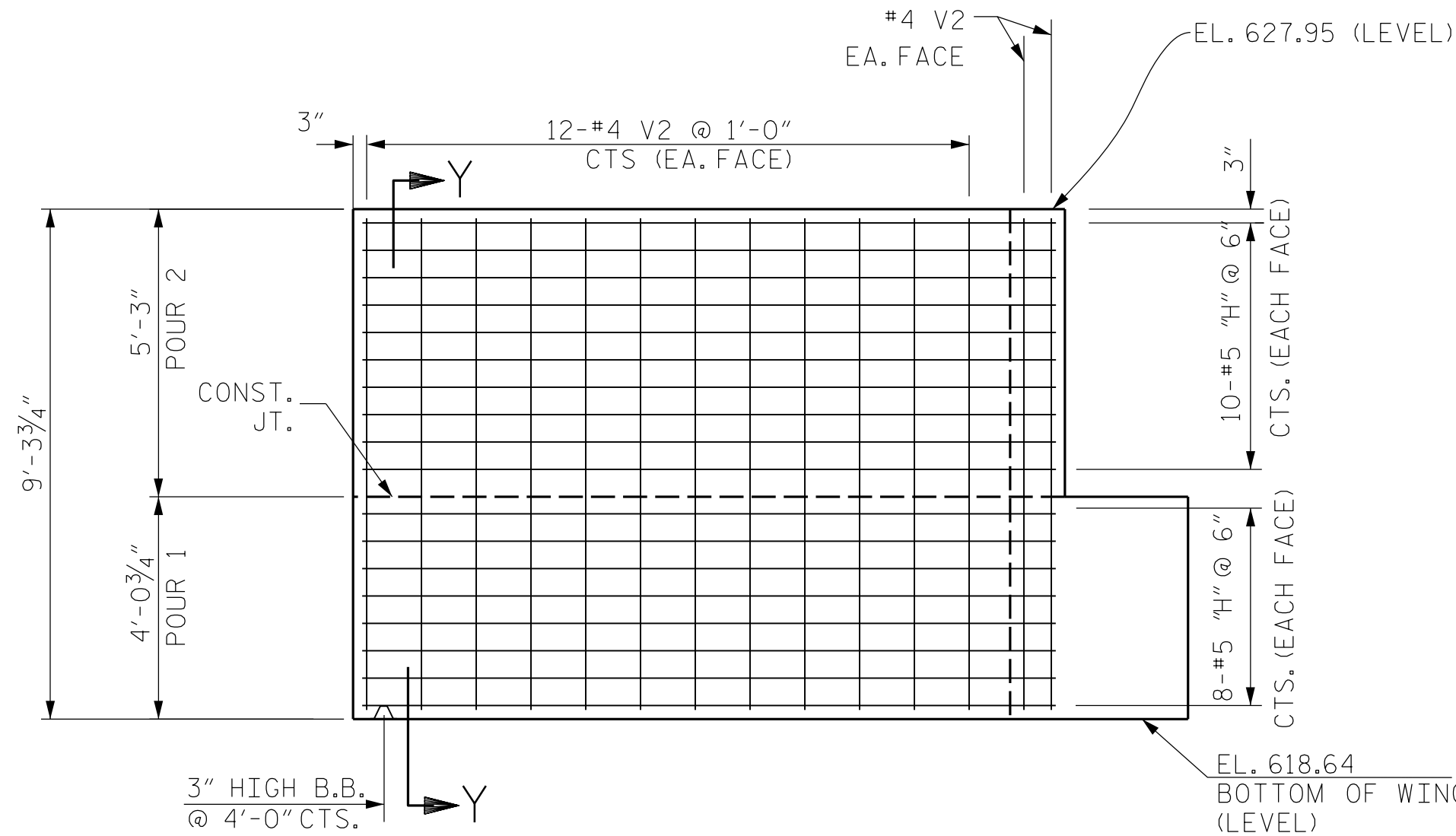
PLAN W2



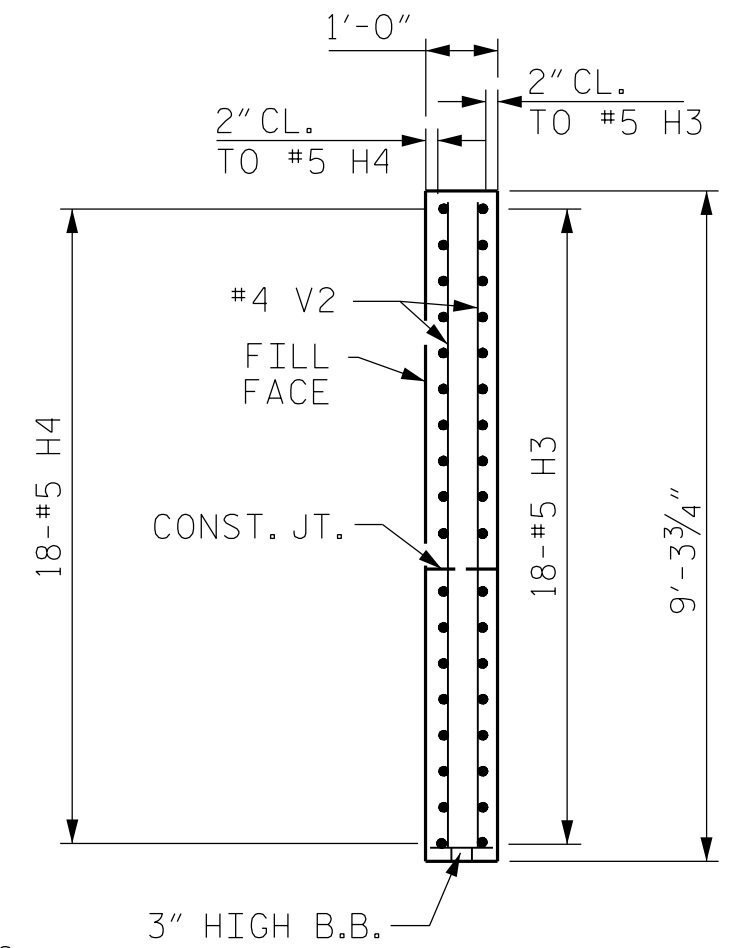
ELEVATION W1



SECTION X-X



ELEVATION W2



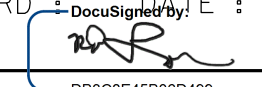
SECTION Y-Y

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 1

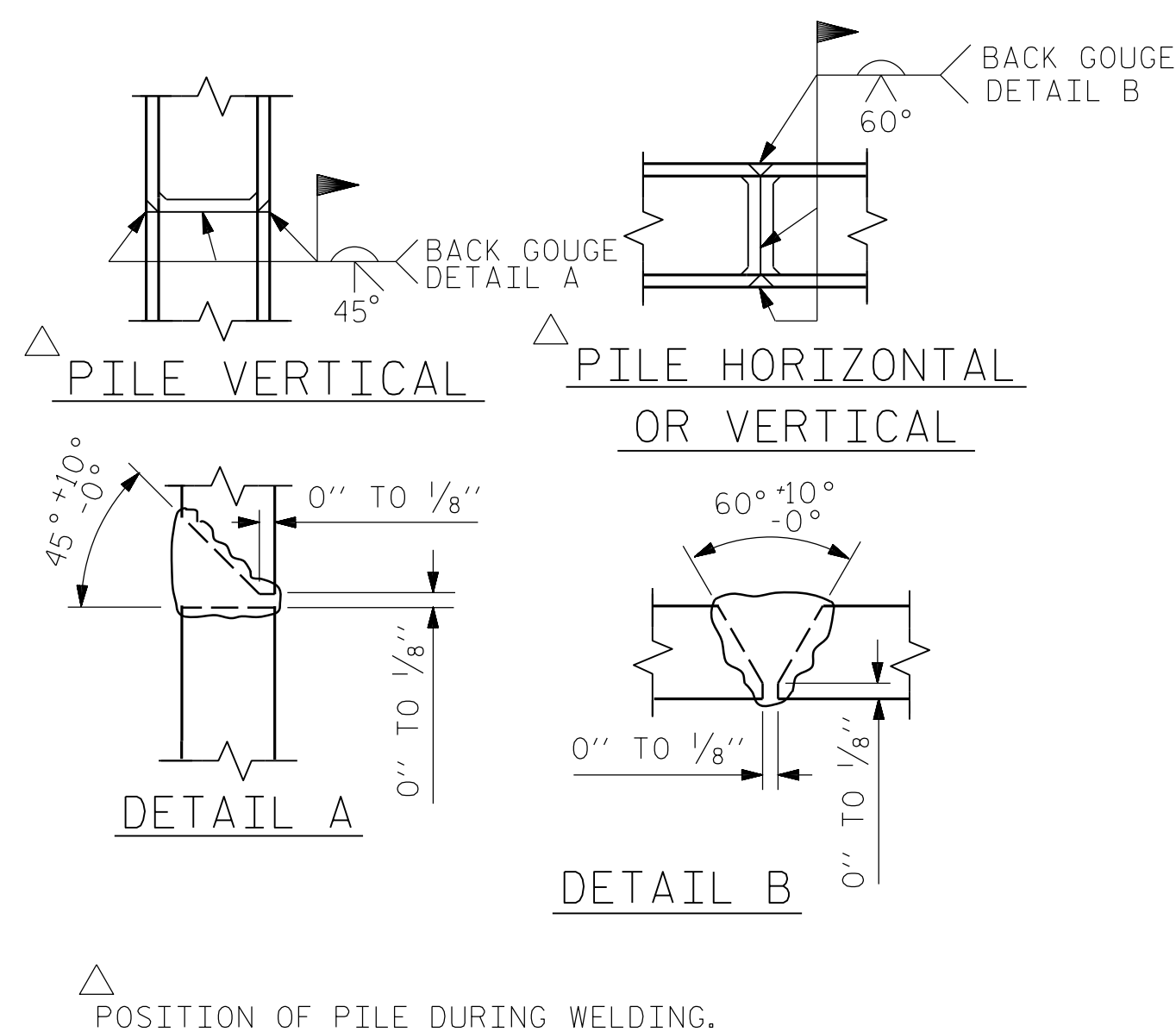
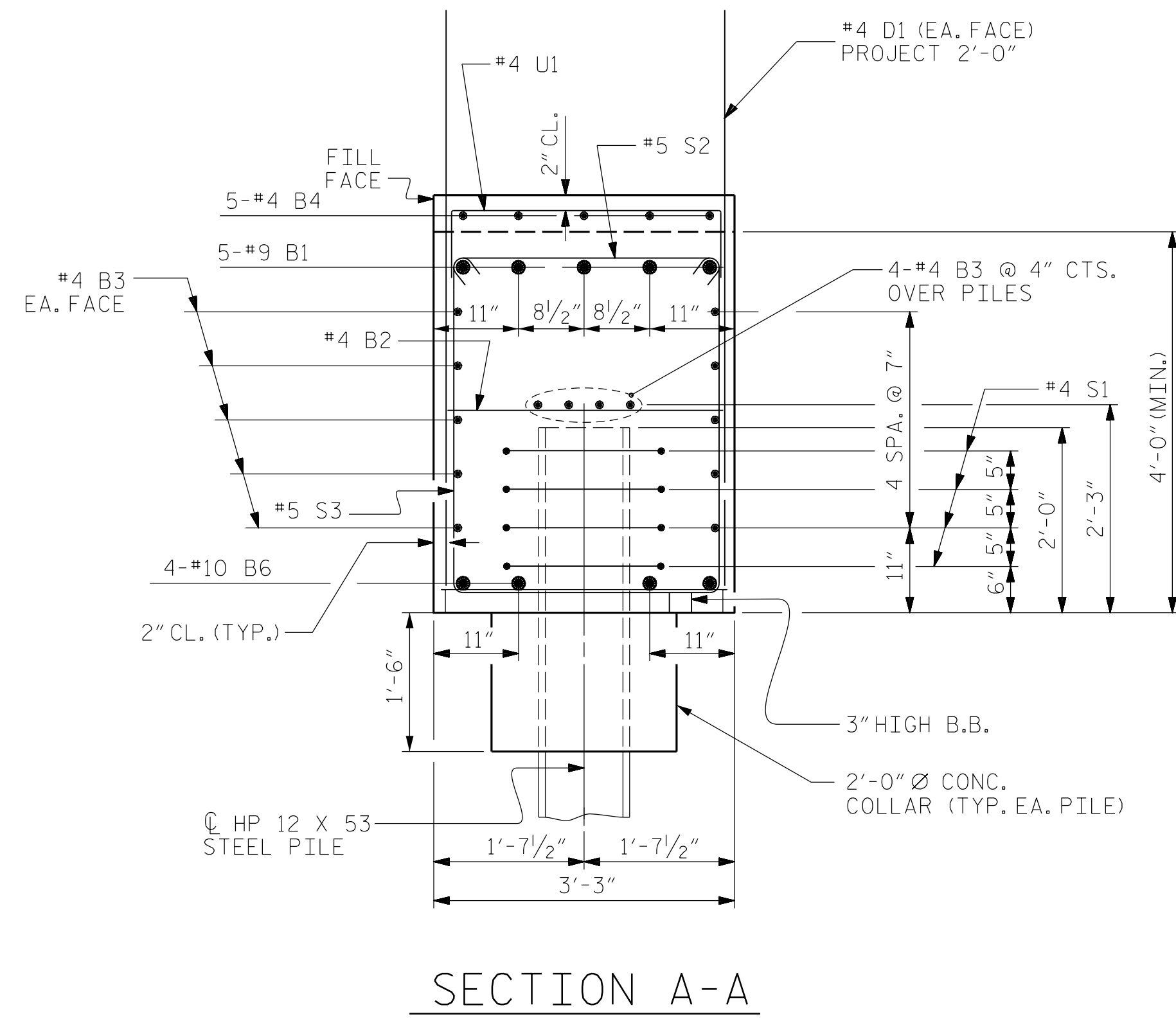
DESIGN ENGINEER OF RECORD:  DATE: 8/16/2019
DRAWN BY: R. J. FLORY DATE: 07/15/19
CHECKED BY: R. C. LARSON DATE: 07/16/19

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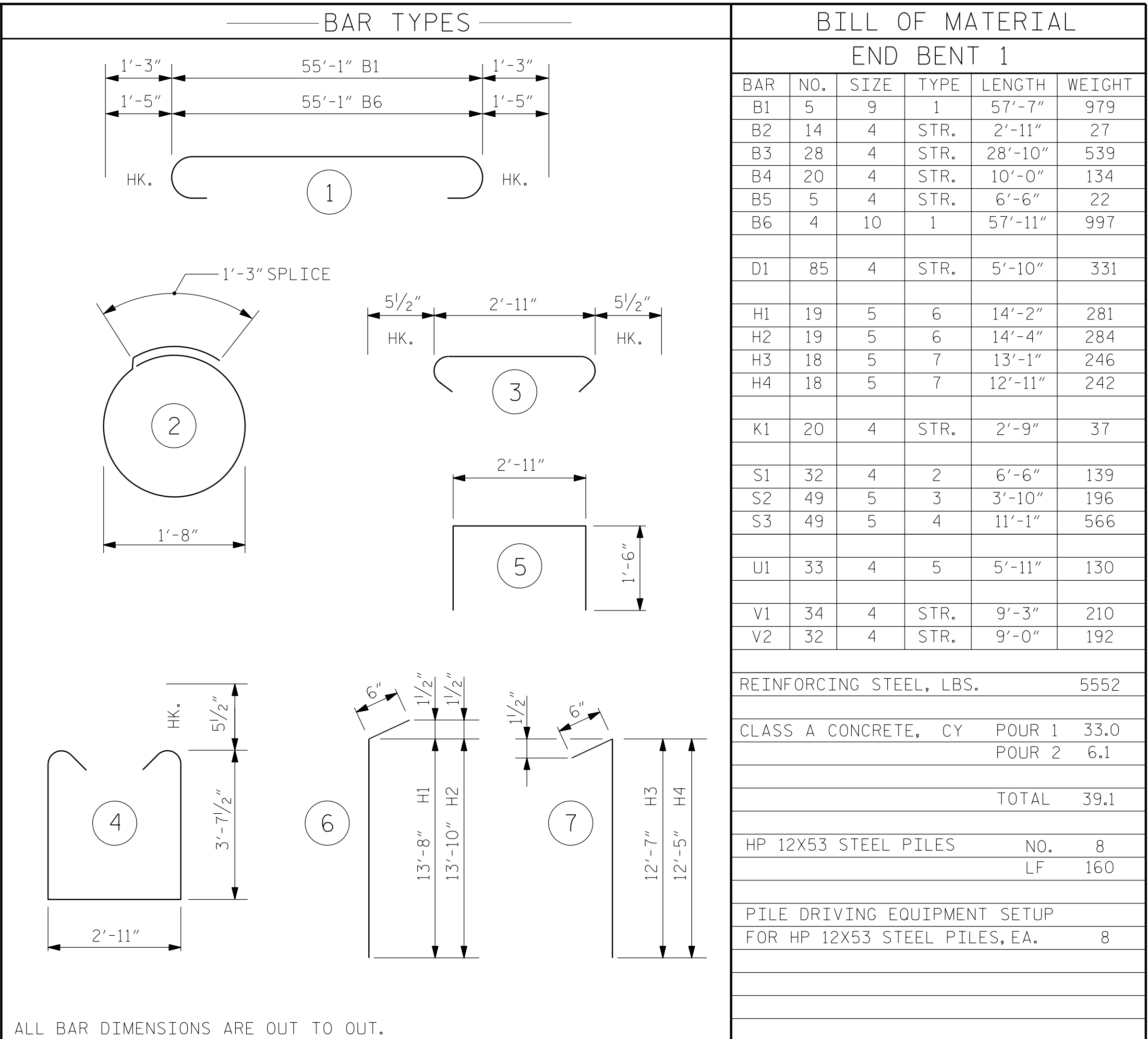
DocuSigned by:

DB3C8E45B06D399
KCI Associates
of North Carolina, P.A.
2505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 785-9244

REVISIONS						SHEET NO. S- 23
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 32
2			4			



PILE SPLICE DETAILS



DESIGN ENGINEER OF RECORD : _____ DATE : 8/16/2019

DocuSigned by : _____
[Signature]

DRAWN BY : R. J. FLORY DATE : 12/12/18

CHECKED BY : R. C. LARSON DATE : 12/13/18

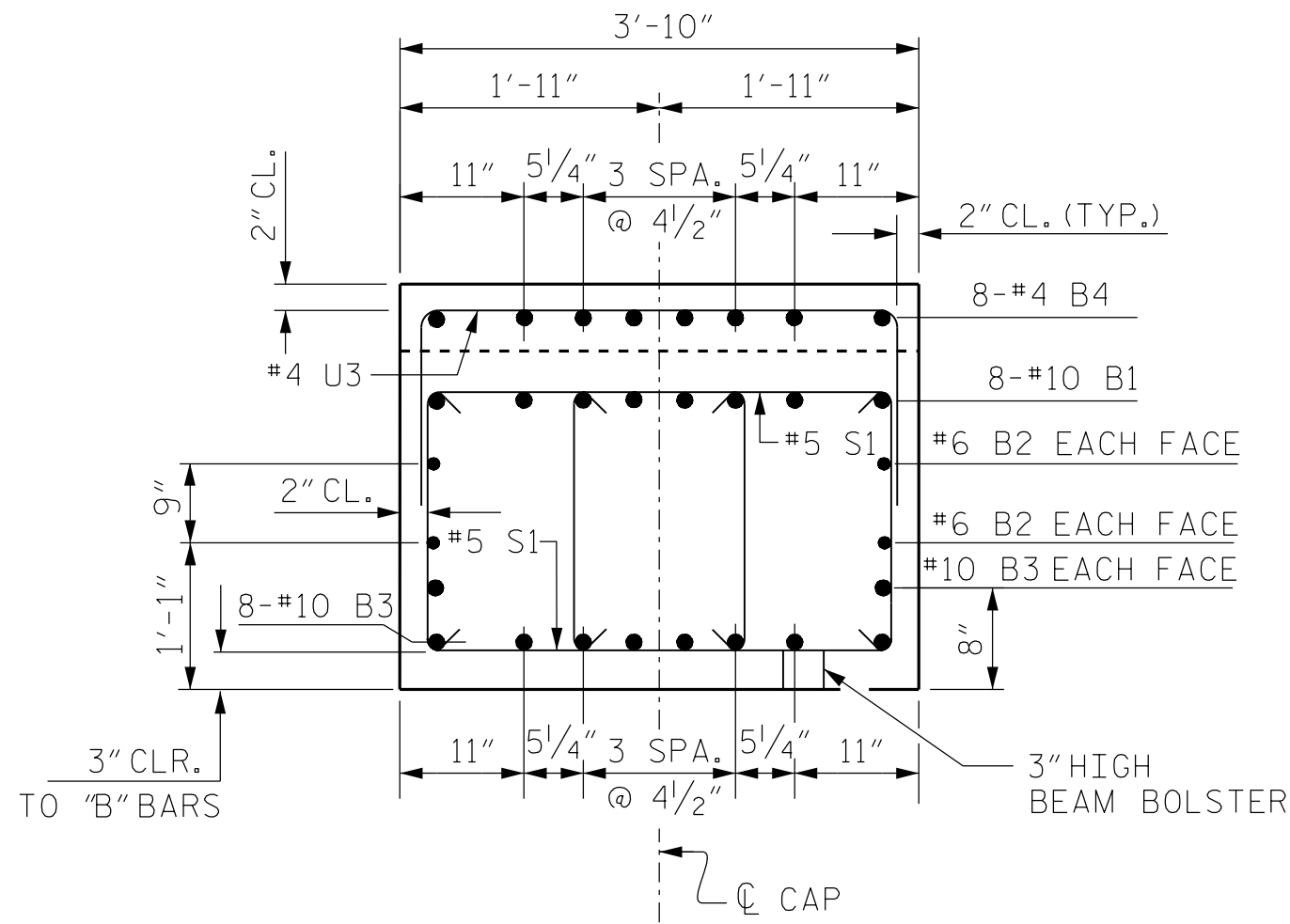
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ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS LICENSE NUMBER: C-0764

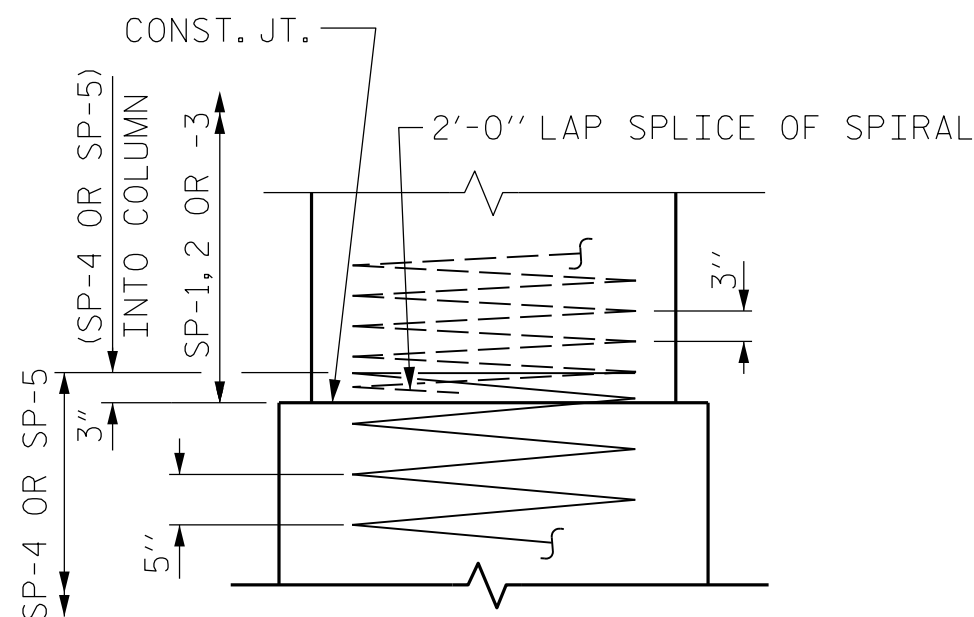
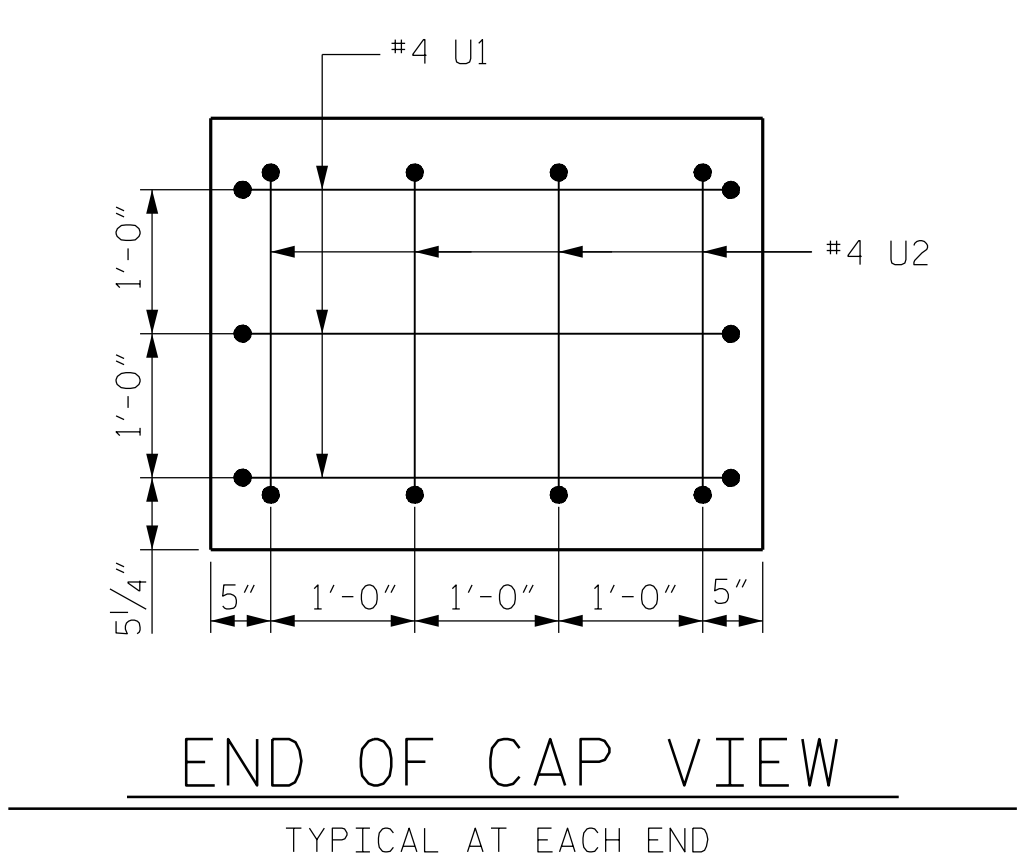
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of North Carolina, P.A.

4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 783-9204

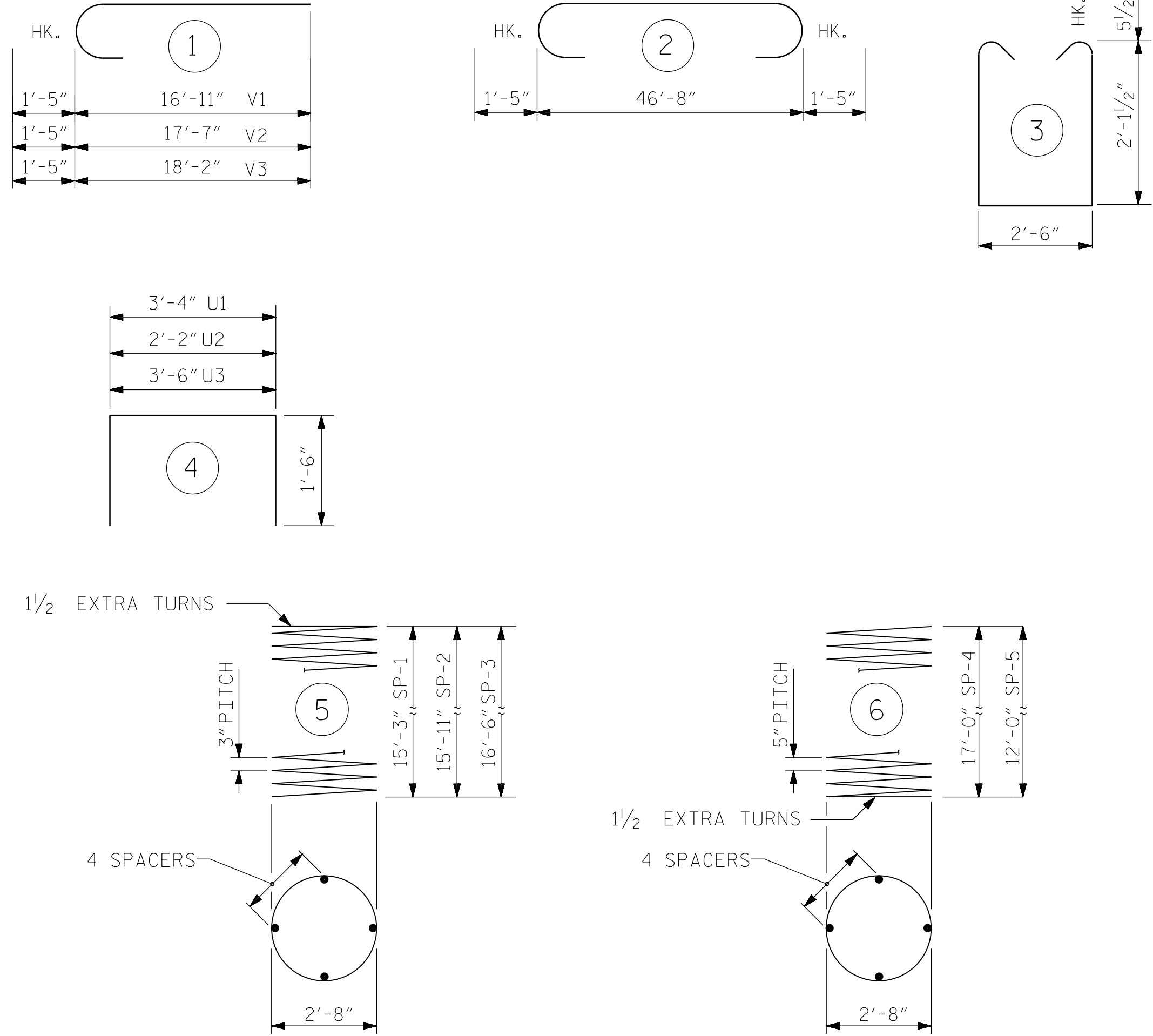
REVISIONS						SHEET NO. S- 24
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 32
2			4			



SECTION A-A

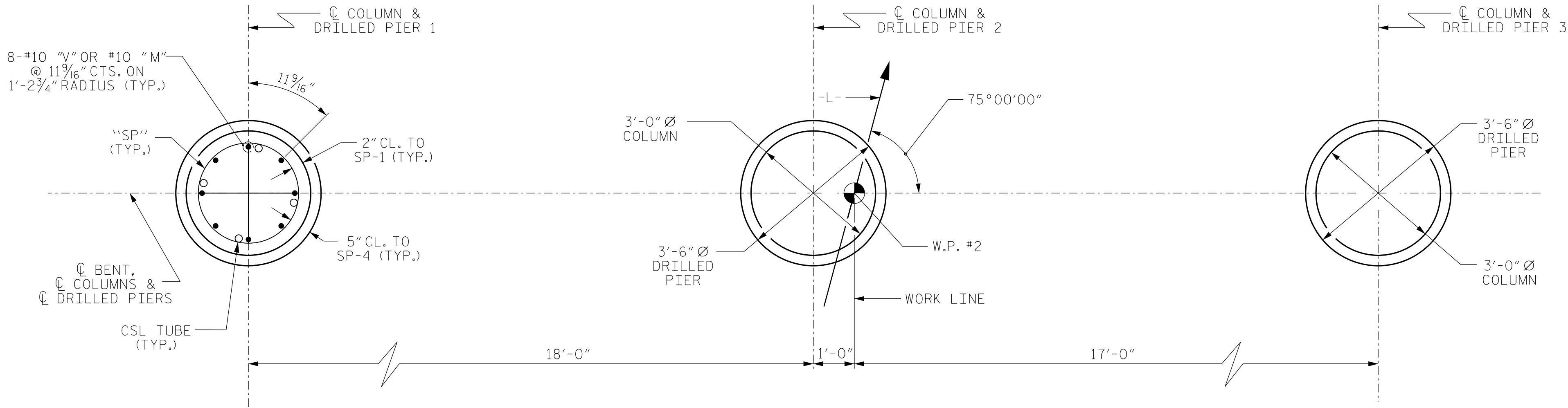


CONSTRUCTION JOINT DETAIL



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL						
BENT 1						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
B1	8	10	2	49'-6"	1704	
B2	4	6	STR.	46'-8"	280	
B3	10	10	STR.	46'-8"	2008	
B4	32	4	STR.	9'-6"	203	
B5	8	4	STR.	4'-3"	23	
M1	16	10	STR.	26'-1"	1796	
M2	8	10	STR.	21'-1"	726	
S1	104	5	3	7'-8"	832	
U1	6	4	4	6'-4"	25	
U2	8	4	4	5'-2"	28	
U3	66	4	4	6'-6"	287	
V1	8	10	1	18'-4"	631	
V2	8	10	1	19'-0"	654	
V3	8	10	1	19'-7"	674	
REINFORCING STEEL (BENT 1)				9871 LBS.		
SP-1	1	*	5	515'-8"	344	
SP-2	1	*	5	537'-8"	359	
SP-3	1	*	5	556'-11"	372	
SP-4	2	**	6	347'-11"	726	
SP-5	1	**	6	249'-2"	260	
SPIRAL COLUMN REINFORCING STEEL:				2061		
* THE "SP" SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.						
** THE "SP" SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.						
CLASS A CONCRETE BREAKDOWN (FOR BENT 1)						
POUR #2 (COLUMNS)					12.3 C.Y.	
POUR #3 (CAP)					18.0 C.Y.	
TOTAL CLASS A CONCRETE					30.3 C.Y.	
DRILLED PIER CONCRETE						
POUR #1 (DRILLED PIERS)					16.9 C.Y.	
3'-6" Ø DRILLED PIER NOT IN SOIL					30 LF	
3'-6" Ø DRILLED PIER IN SOIL					17.5 LF	
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIER					20 LF	
CSL TUBES					210 LF	



PLAN OF DRILLED PIERS & COLUMNS

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 1

REVISIONS

SHEET NO.

S-26

TOTAL SHEETS

32

DESIGN ENGINEER OF RECORD	DATE : 8/16/2019
DRAWN BY : K. SU	DATE : 07/30/18
CHECKED BY : R. C. LARSON	DATE : 07/02/19

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UNLESS ALL SIGNATURES COMPLETED

DocuSigned by:
KCI Associates
of North Carolina, P.A.
8/16/2019

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of North Carolina, P.A.
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THE TOP SURFACE OF THE END BENT CAP
EXCEPT THE BEARING AREAS AND THE AREA
OUTSIDE OF THE SUPERSTRUCTURE SHALL BE
RAKED TO A DEPTH OF 1/4"

FOR "PILE SPLICE DETAILS", SEE END BENT 1.

[illegible][illegible]

TOP OF PILE ELEVATIONS	
P1	621.21
P2	621.52
P3	621.83
P4	622.15
P5	622.47
P6	622.78
P7	623.10

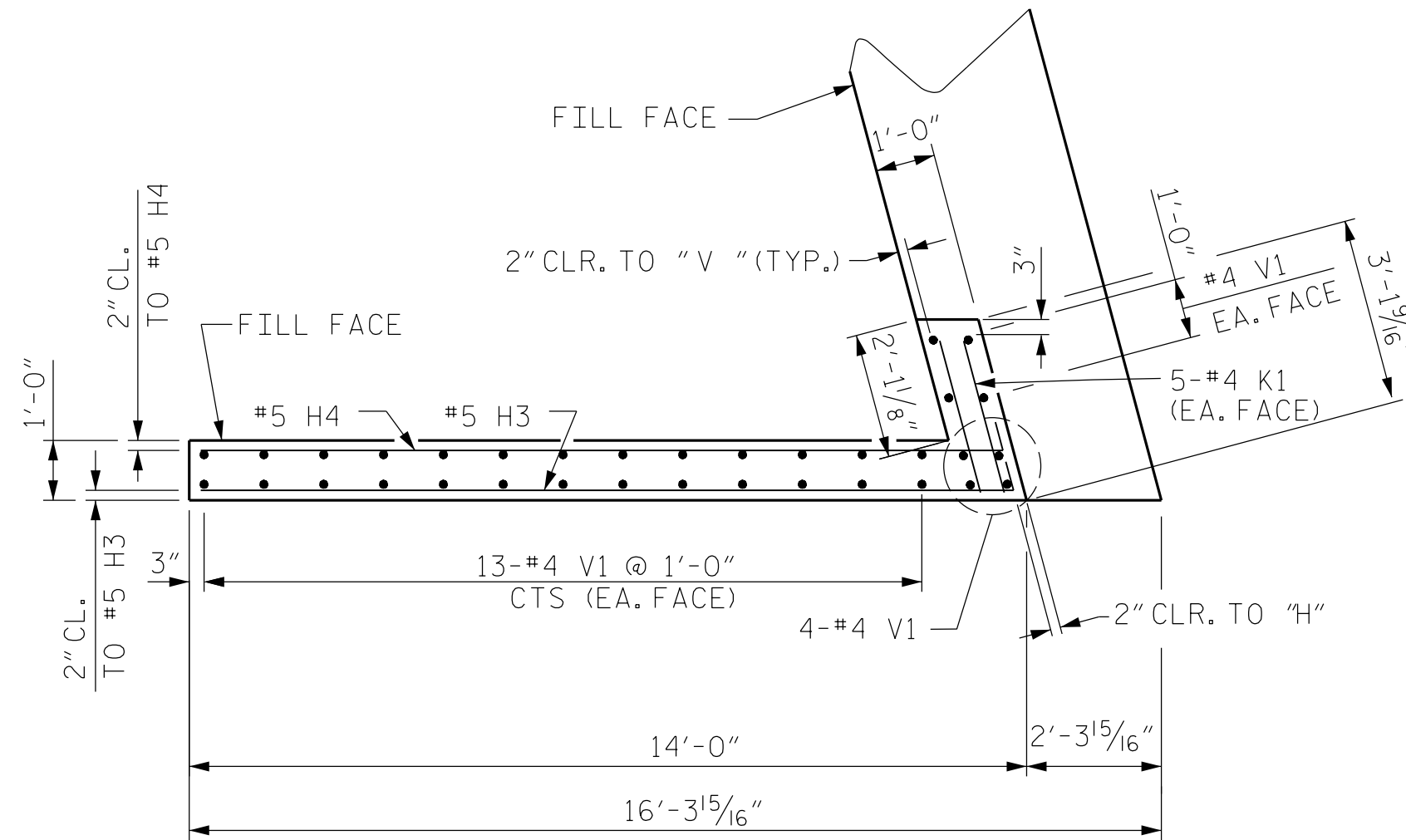
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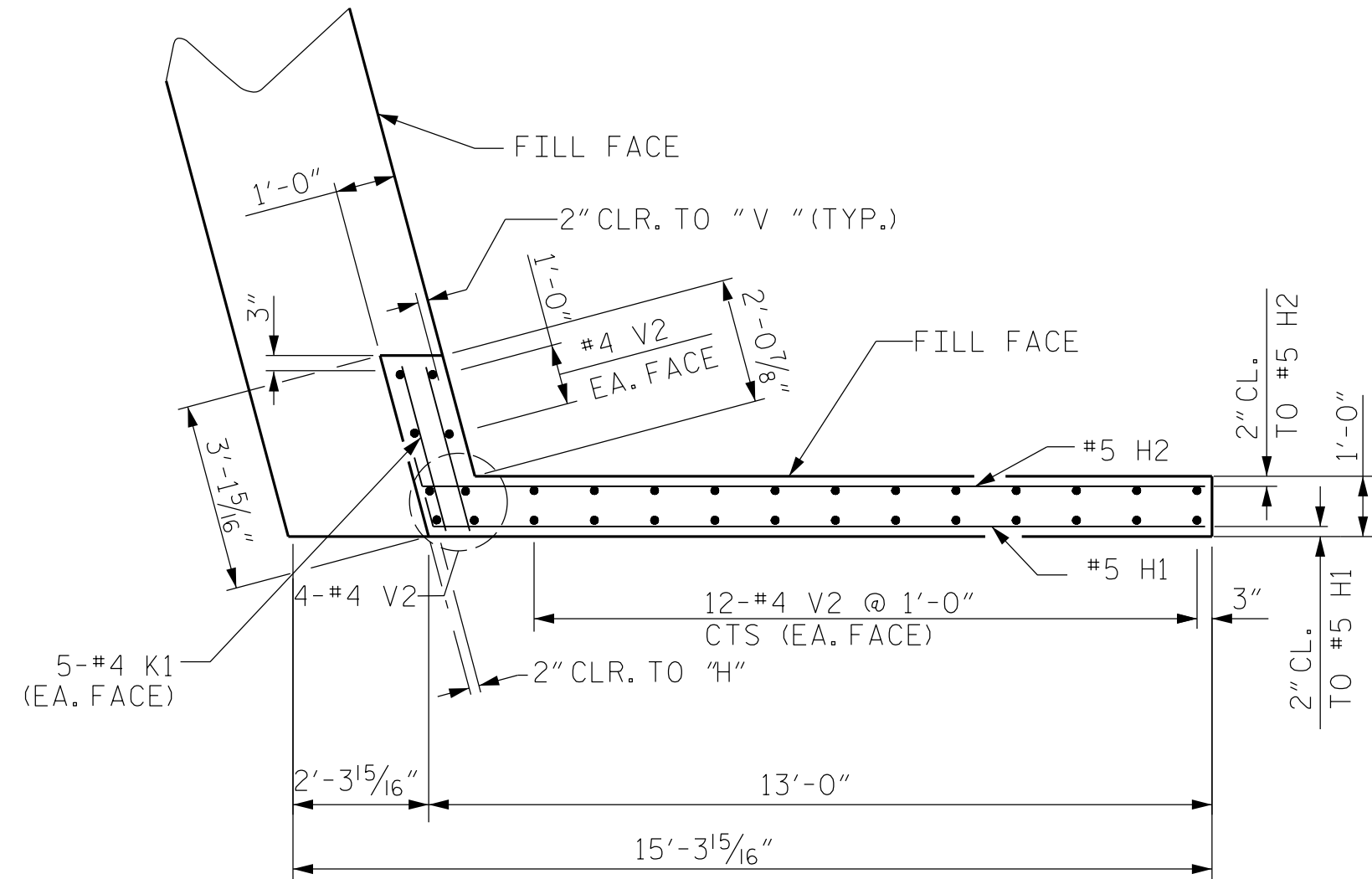
4505 Falls of Neuse Road, Suite 400 Raleigh, NC 27609-6270 Phone (919) 783-9214

REVISIONS						SHEET NO. S- 27
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 32
2			4			

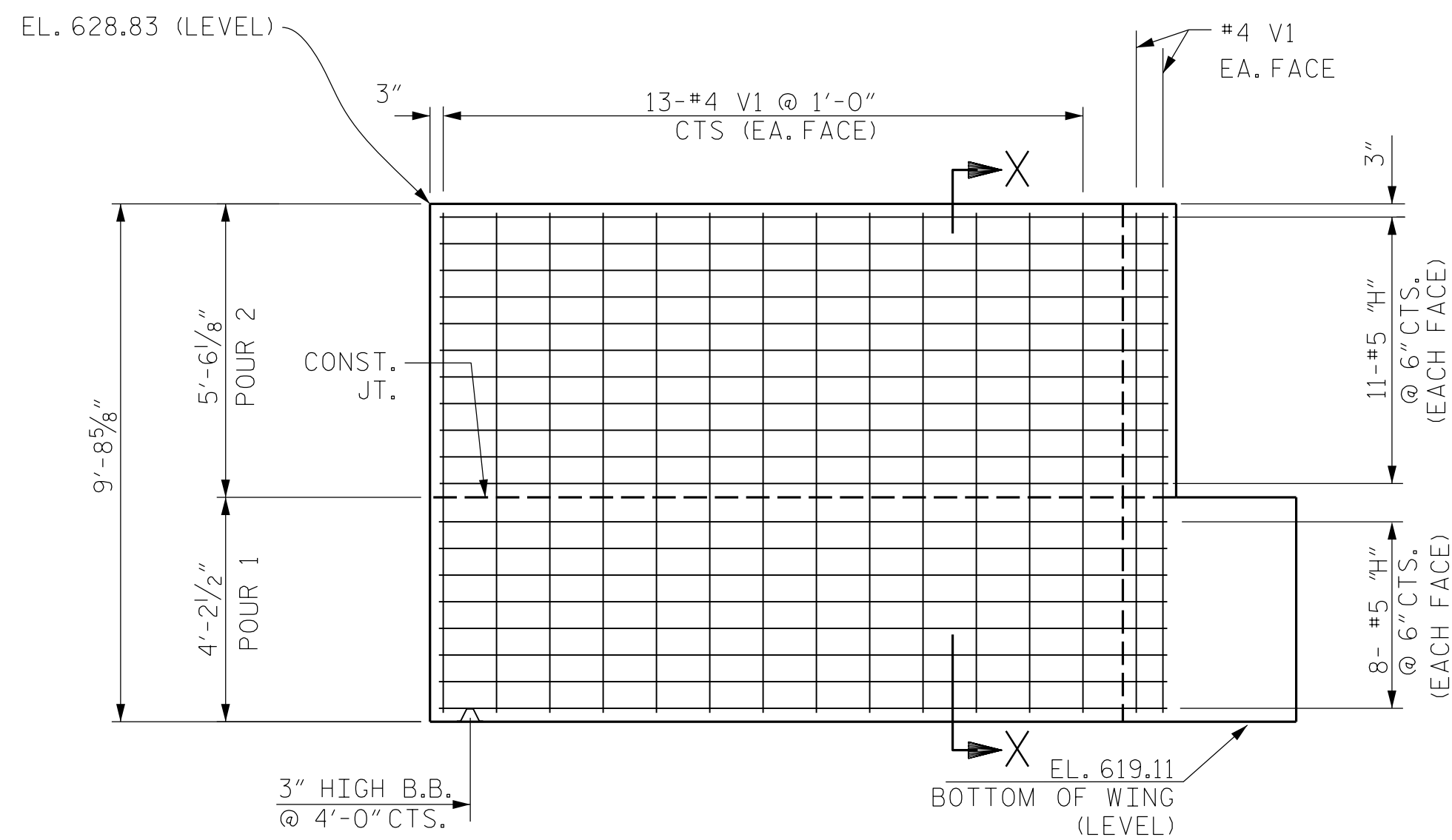
KCI JOB NO: 25180194516



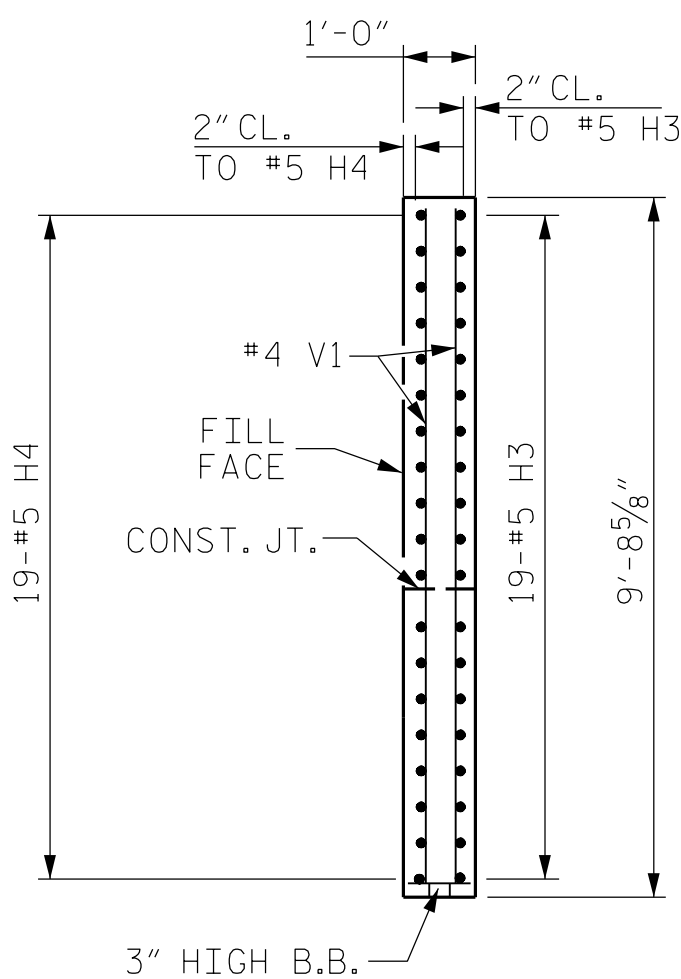
PLAN W1



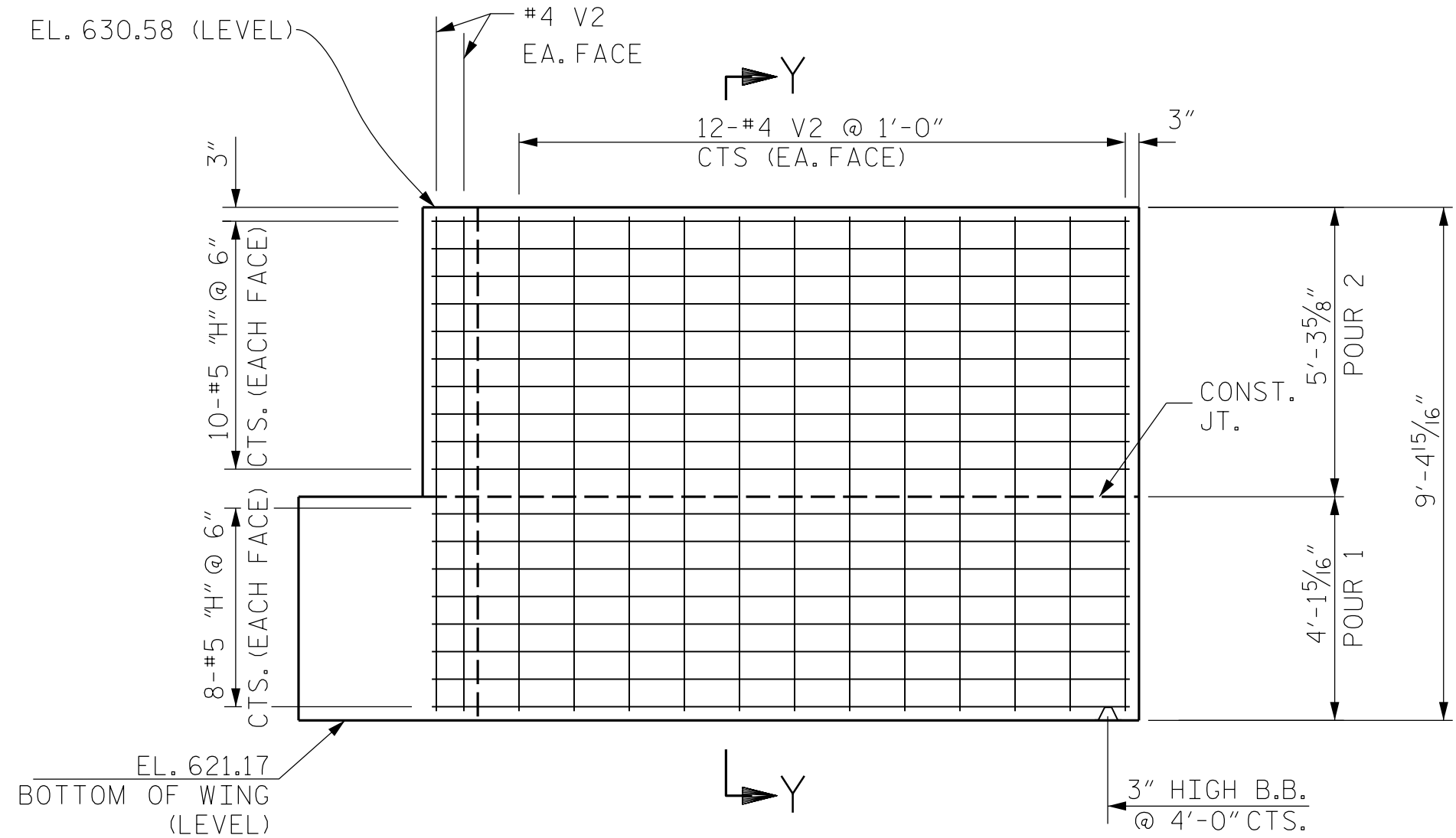
PLAN W2



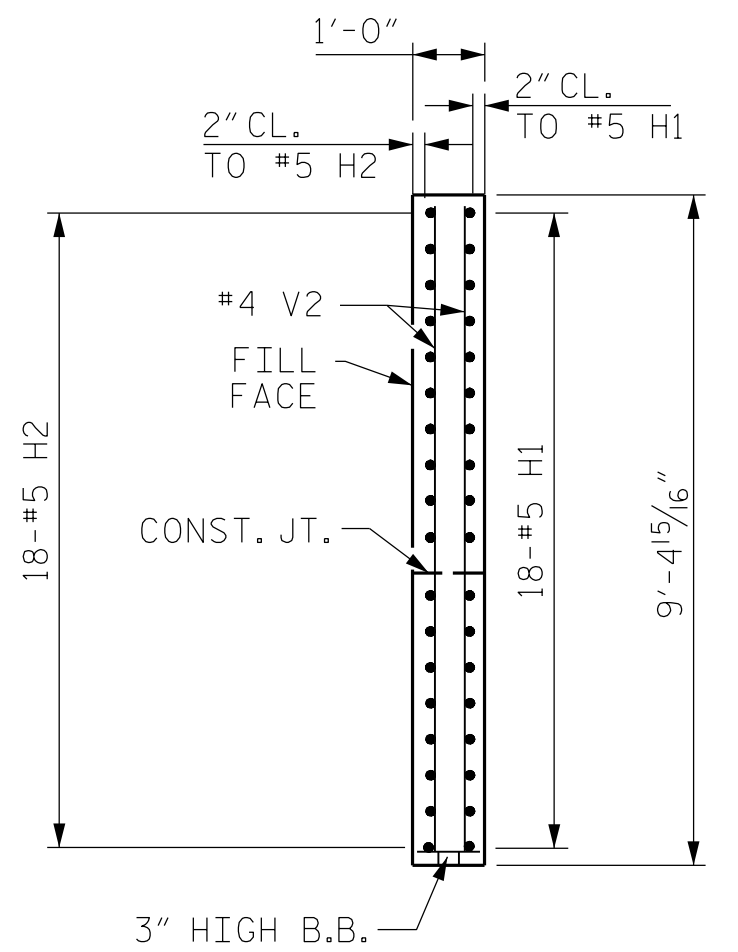
ELEVATION W1



SECTION X-X



ELEVATION W2



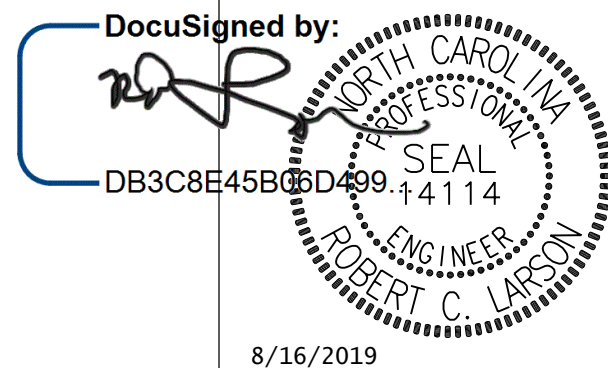
SECTION Y-Y

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2



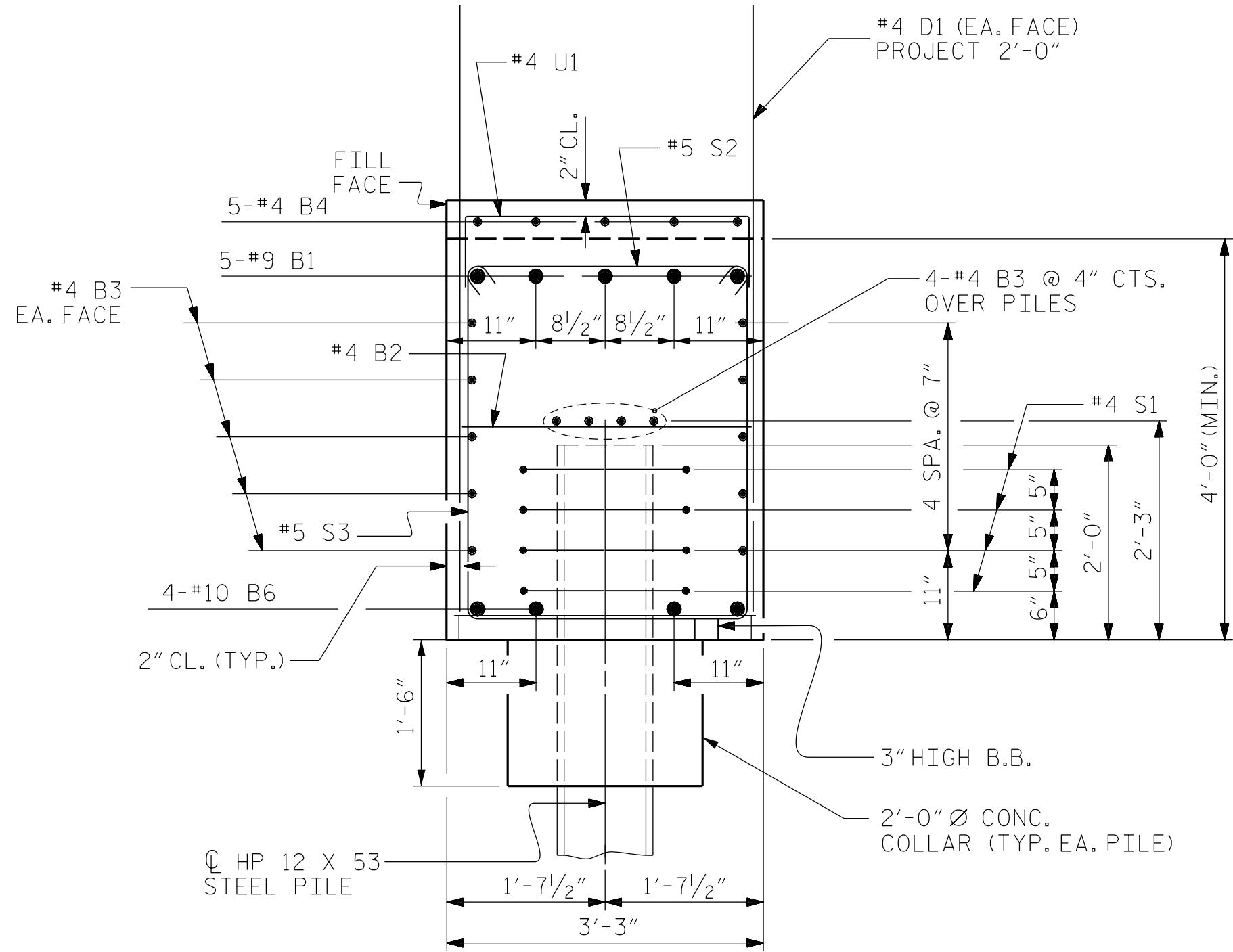
DESIGN ENGINEER OF RECORD: R. J. FLORY
DATE: 8/16/2019
DRAWN BY: R. C. LARSON
DATE: 07/19/19
CHECKED BY: R. C. LARSON
DATE: 07/19/19

DOCUMENT NOT CONSIDERED FINAL
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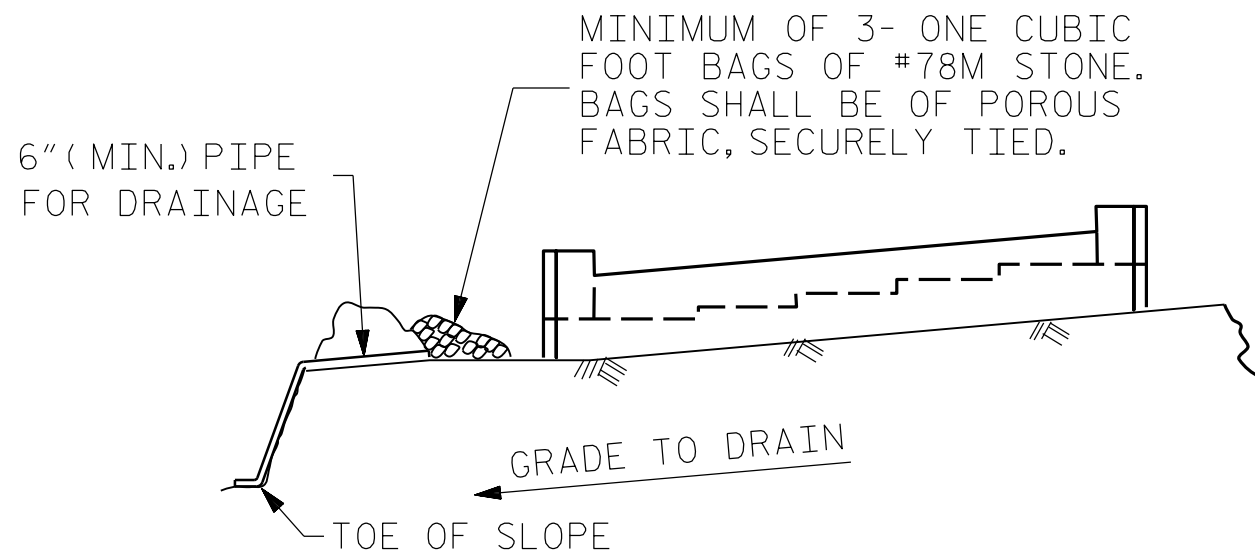
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of North Carolina, P.A.
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			5-28
2			4			TOTAL SHEETS 32

KCI JOB NO: 25180194516



SECTION A-A



BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

BAR TYPES

1'-3"

55'-1" B1

1'-3"

1'-5"

55'-1" B6

1'-5"

HK.

1

HK.

1'-3" SPLICE

5/2"

2'-11"

5/2"

HK.

3

HK.

2'-11"

1'-6"

5

5/2"

3'-7 1/2"

4

2'-11"

6"

1 1/2"

12'-8"

12'-10"

1 1/2"

6

H1

H2

1 1/2"

6"

13'-7"

13'-5"

7

H3

H4

ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	5	9	1	57'-7"	979
B2	14	4	STR.	2'-11"	27
B3	28	4	STR.	28'-10"	539
B4	20	4	STR.	10'-0"	134
B5	5	4	STR.	6'-6"	22
B6	4	10	1	57'-11"	997
D1	85	4	STR.	5'-10"	331
H1	19	5	6	13'-2"	261
H2	19	5	6	13'-4"	264
H3	18	5	7	14'-1"	264
H4	18	5	7	13'-11"	261
K1	20	4	STR.	2'-9"	37
S1	28	4	2	6'-6"	122
S2	48	5	3	3'-10"	192
S3	48	5	4	11'-1"	555
U1	33	4	5	5'-11"	130
V1	34	4	STR.	9'-4"	212
V2	32	4	STR.	9'-0"	192
REINFORCING STEEL, LBS.					5519
CLASS A CONCRETE, CY					POUR 1 33.0
					POUR 2 6.2
TOTAL					39.2
HP 12X53 STEEL PILES					NO. 7
					LF 105
PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES, EA.					7

PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2

DESIGN ENGINEER OF RECORD	DATE : 8/16/2019
DRAWN BY : R. J. FLORY	DATE : 12/12/18
CHECKED BY : R. C. LARSON	DATE : 12/13/18

DocuSigned by:

DB3C8E45B06D799

SEAL

14114

ENGINEER

ROBERT C. LARSON

8/16/2019

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LICENSE NUMBER: C-0764

KCI Associates

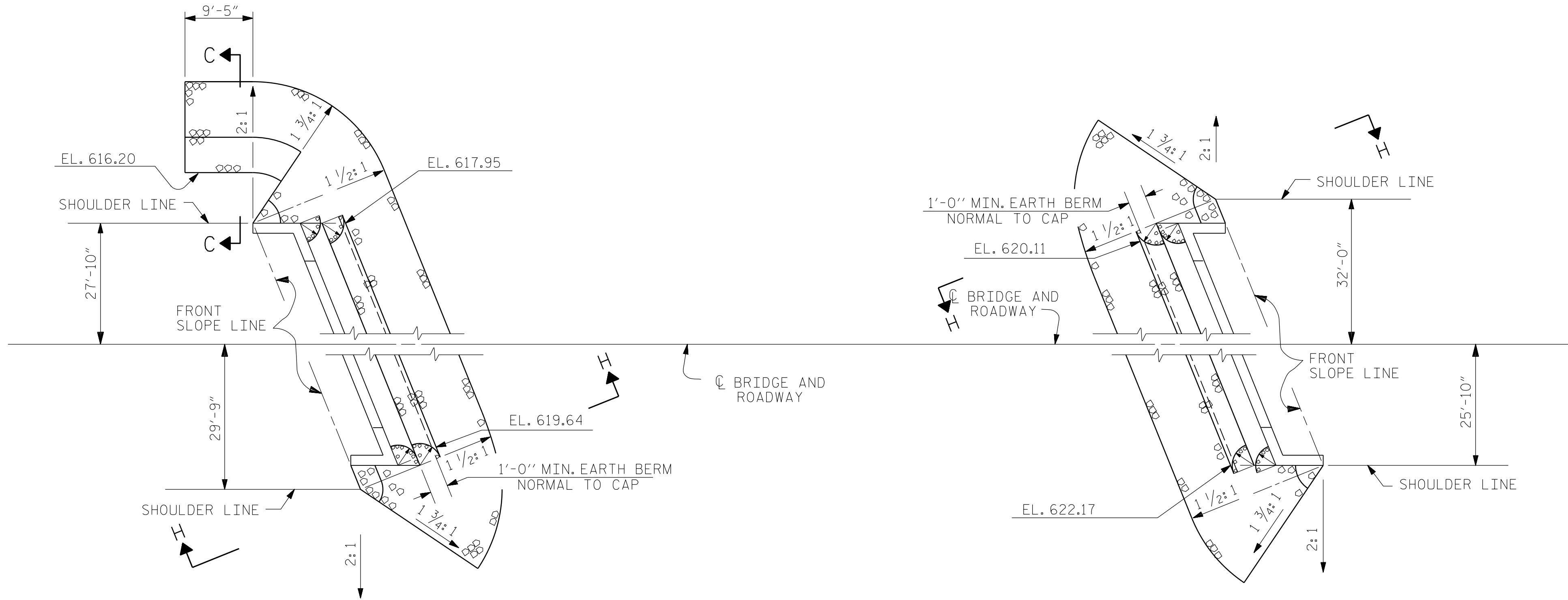
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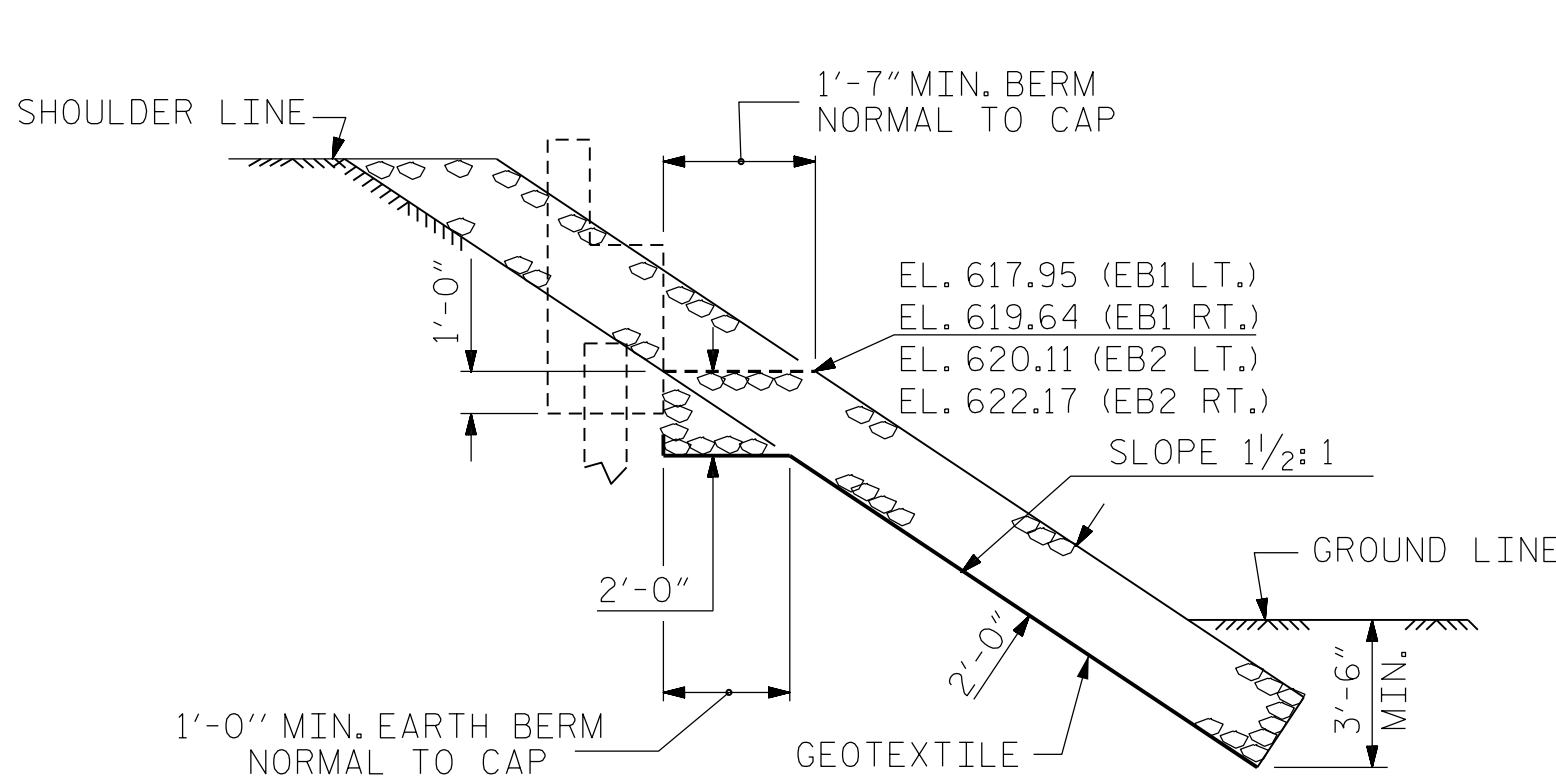
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S- 29
1			3			TOTAL SHEETS
2			4			32

NOTES :
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

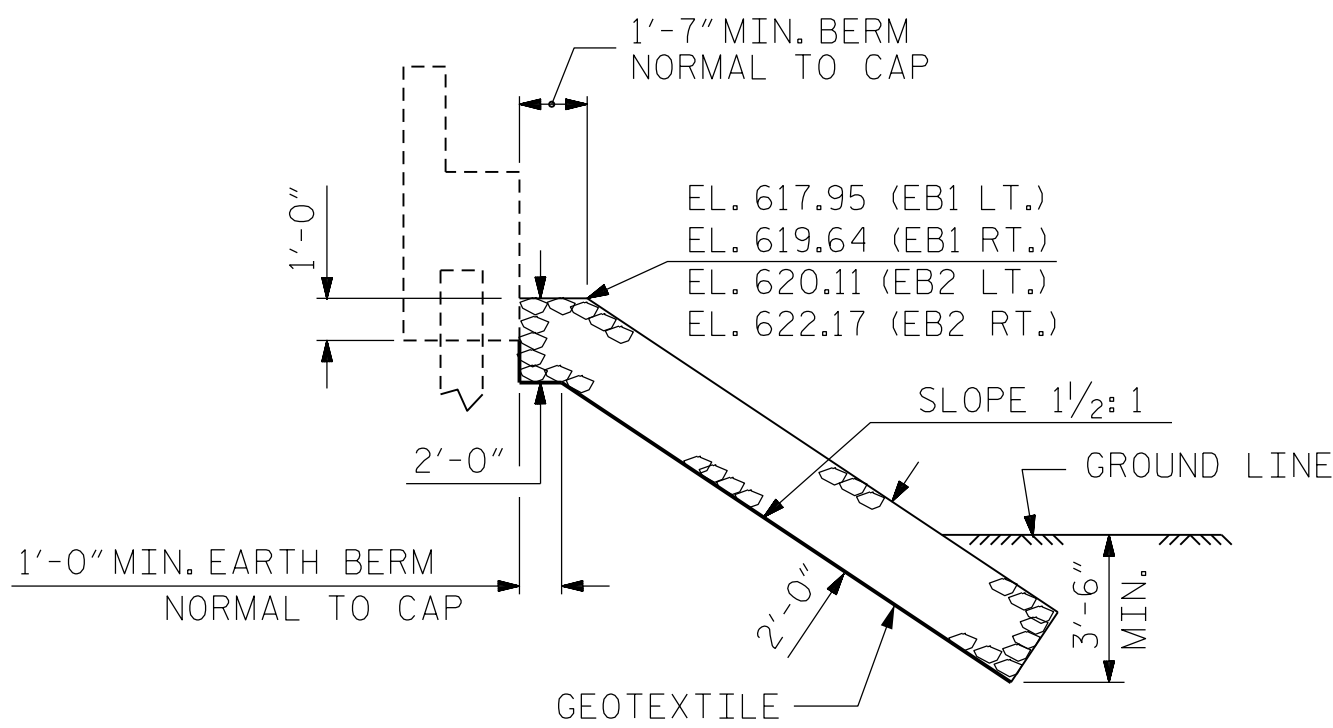


BERM RIP RAPPED

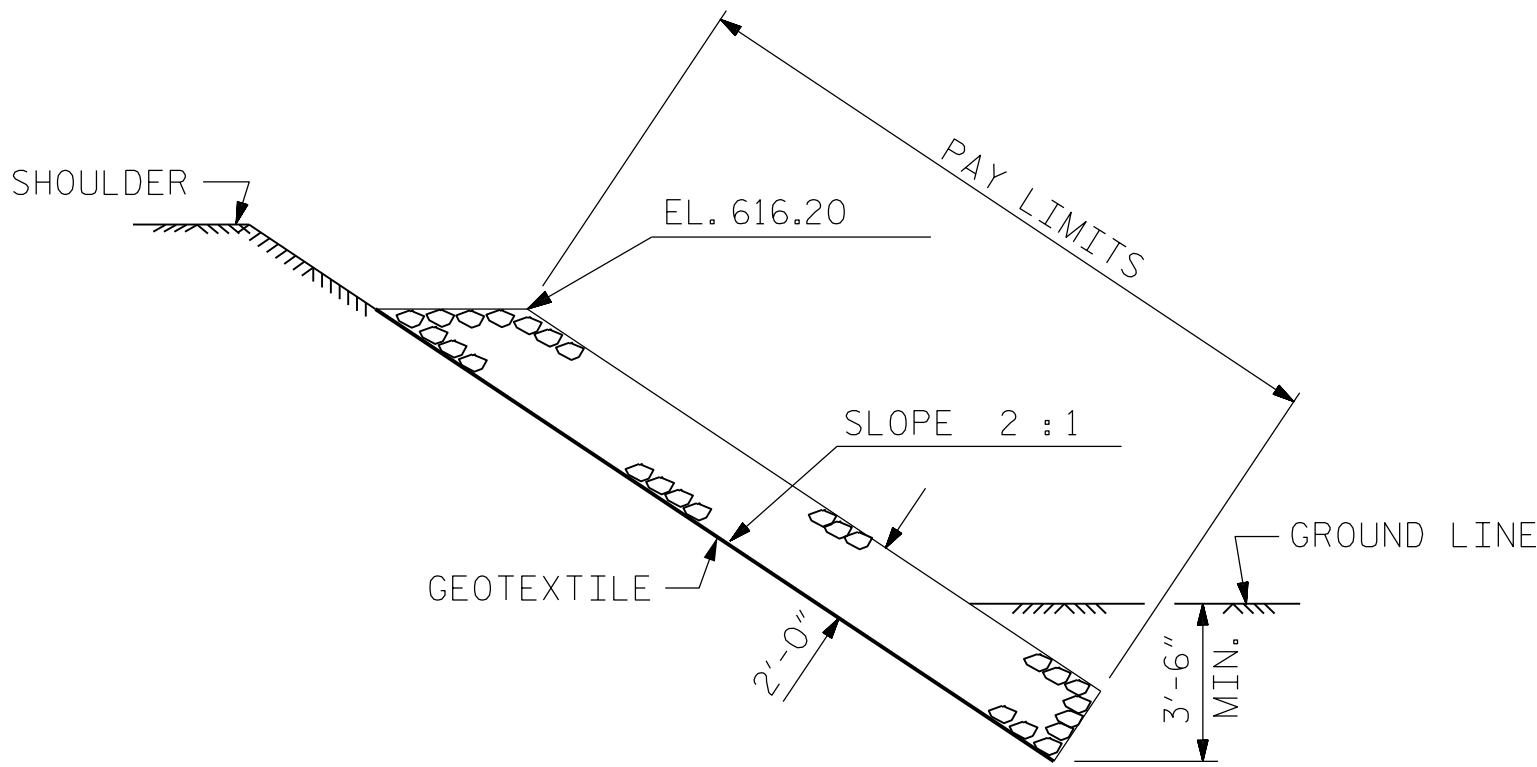
ESTIMATED QUANTITIES		
BRIDGE @ STA. 18+97.50 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	170	190
END BENT 2	120	135



SECTION H-H




SECTION C-C



SECTION C-C

PROJECT NO. 17BP.10.R.144
CABARRUS COUNTY
STATION: 18+97.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
RIP RAP DETAILS

DESIGN ENGINEER OF RECORD	DocuSigned by:  DATE : 8/16/2019
ASSEMBLED BY : R. C. LARSON	DATE : 07/17/19
CHECKED BY : M. C. ARMSTRONG	DATE : 07/19/19
DRAWN BY : REK 1/84	REV. 10/1/11 MAA/GM
CHECKED BY : RDU 1/84	REV. 12/21/11 MAA/GM
	REV. 12/17 MAA/THC

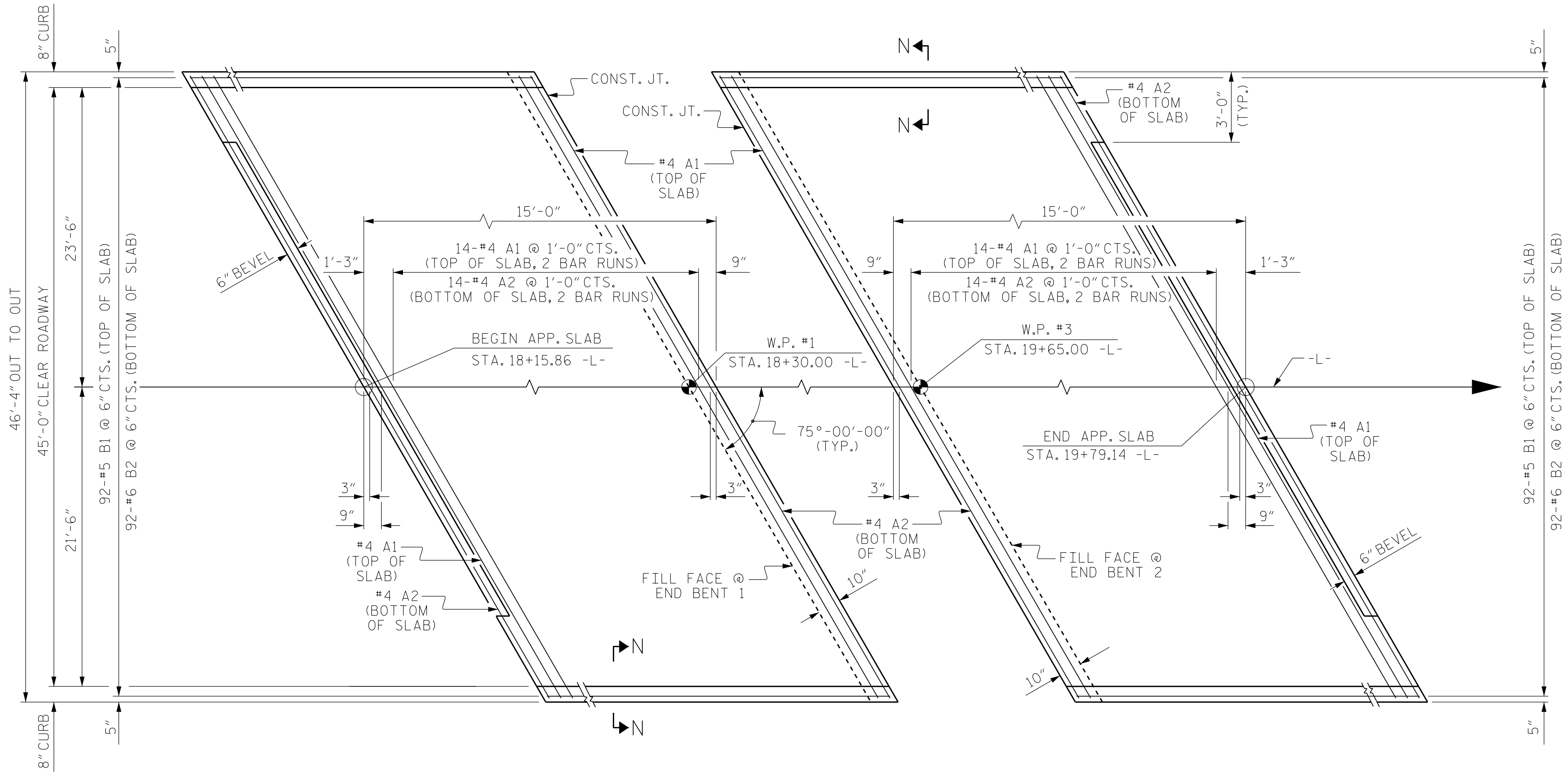
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NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 32
2			4			

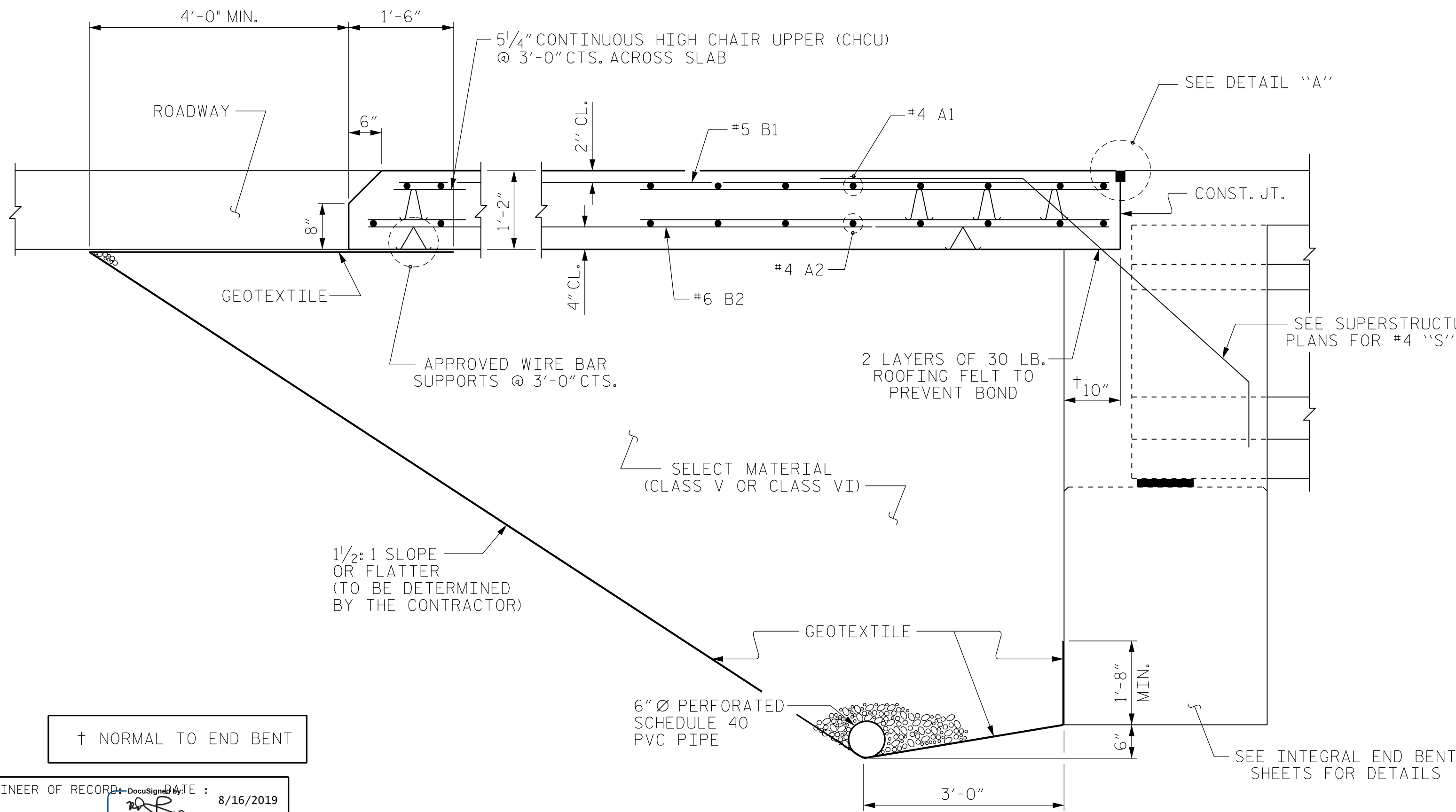
KCI JOB NO: 25180194516



PLAN @ END BENT 1

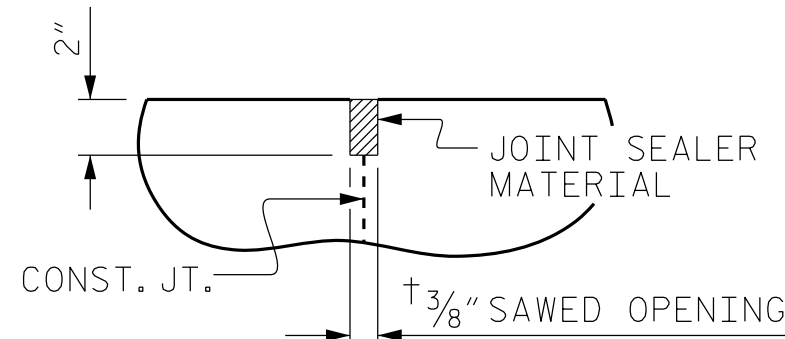
PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

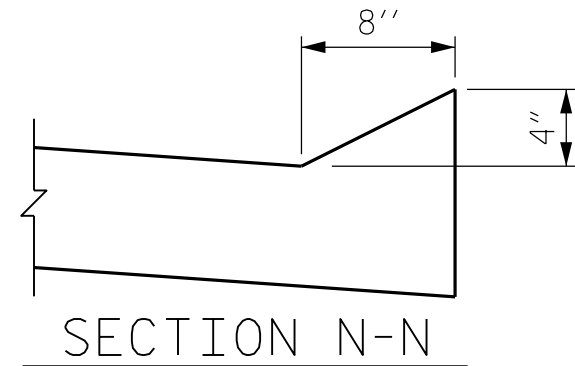
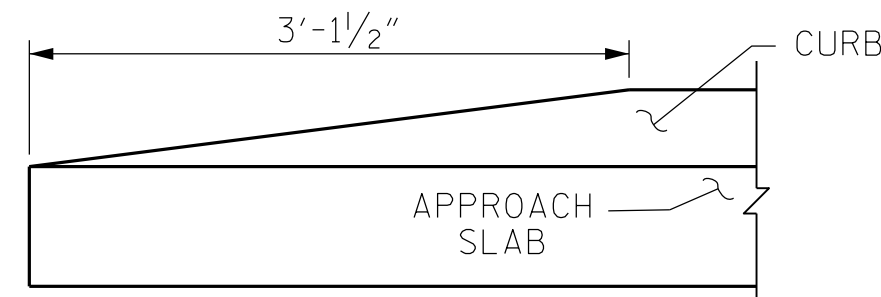


SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)



DETAIL "A"



PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB
FOR INTEGRAL ABUTMENT
WITH FLEXIBLE PAVEMENT

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.
1			3			S- 31
2			4			TOTAL SHEETS 32

(SHT 3a)

STD. NO. BAS3

NOTES

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

BILL OF MATERIAL

FOR ONE APPROACH SLAB
(2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	32	#4	STR	24'-10"	530
A2	32	#4	STR	24'-8"	691
* B1	92	#5	STR	14'-4"	1375
B2	92	#6	STR	14'-7"	2015

REINFORCING STEEL LBS. 2706

* EPOXY COATED REINFORCING STEEL LBS. 1905

CLASS AA CONCRETE C. Y. 30.0

SPLICE LENGTHS

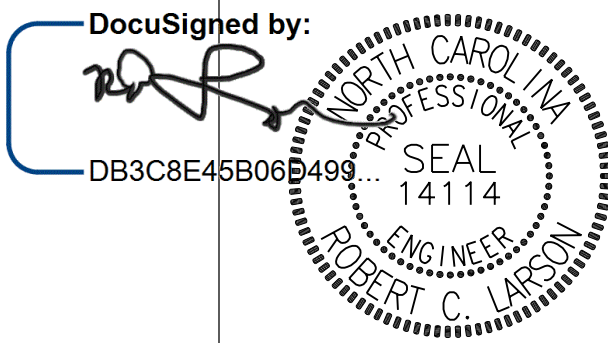
BAR SIZE	EPOXY COATED	UNCOATED
#4	1'-11"	1'-7"
#5	2'-5"	2'-0"
#6	3'-7"	2'-5"

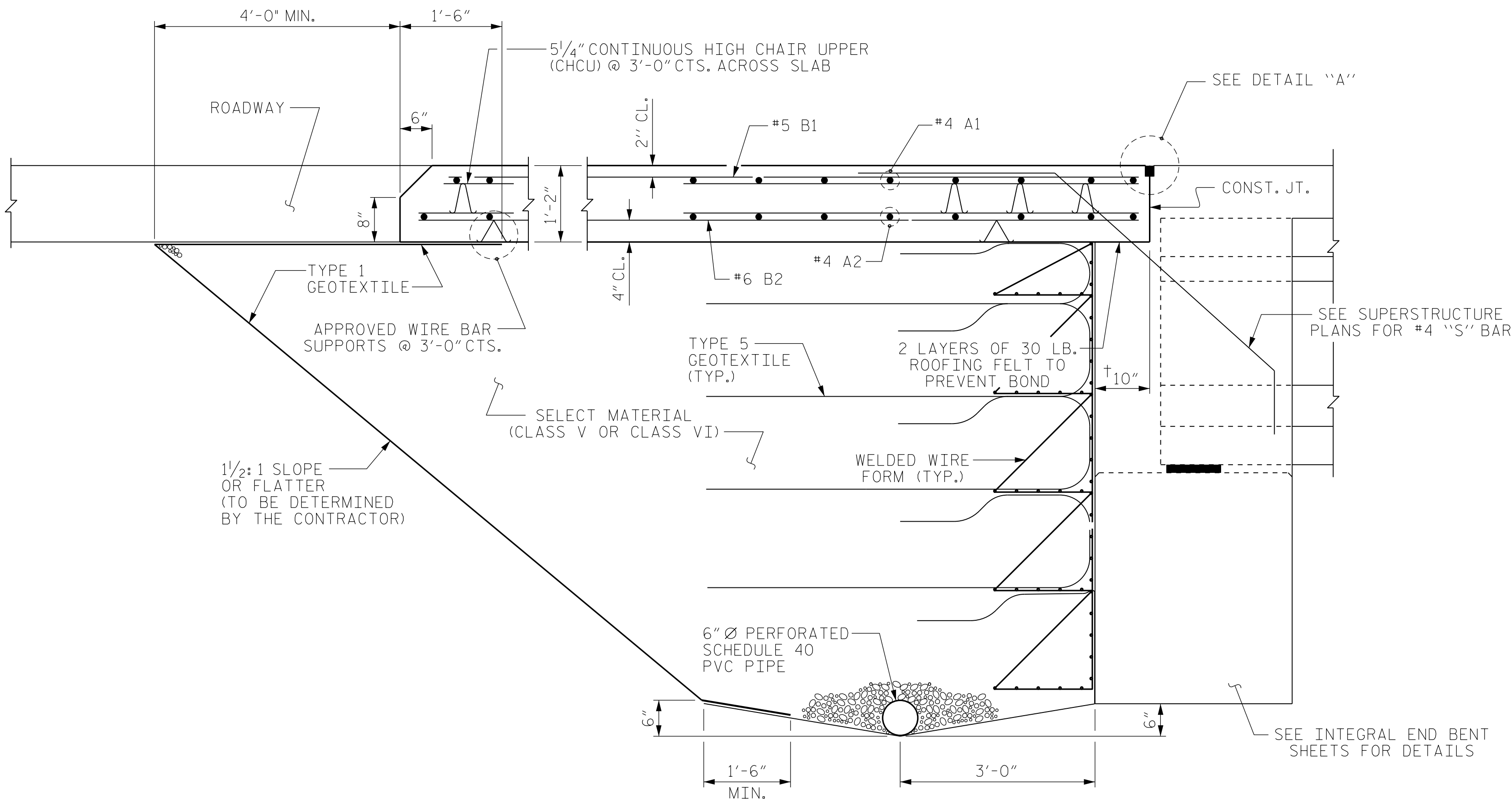
DESIGN ENGINEER OF RECORD	DATE: 8/16/2019
ASSEMBLED BY: R. J. FLORES	DATE: 09/27/18
CHECKED BY: R. C. LARSON	DATE: 10/09/18
DRAWN BY: TLA 10/05	REV. 6/13 MAA/GM
CHECKED BY: GM 5/06	REV. 12/17 MAA/THC
	REV. 06/19 BNB/THC

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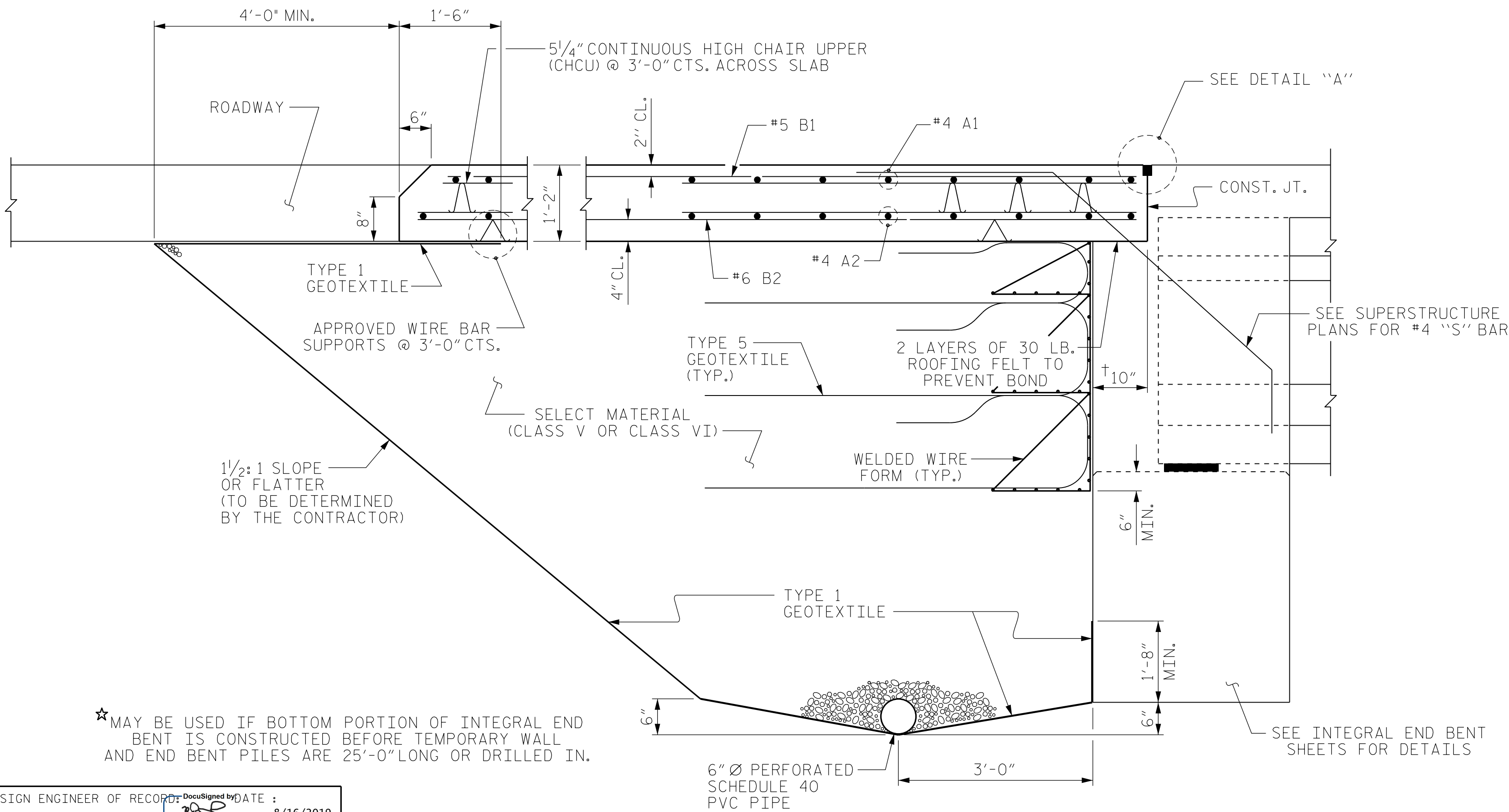
8/16/2019





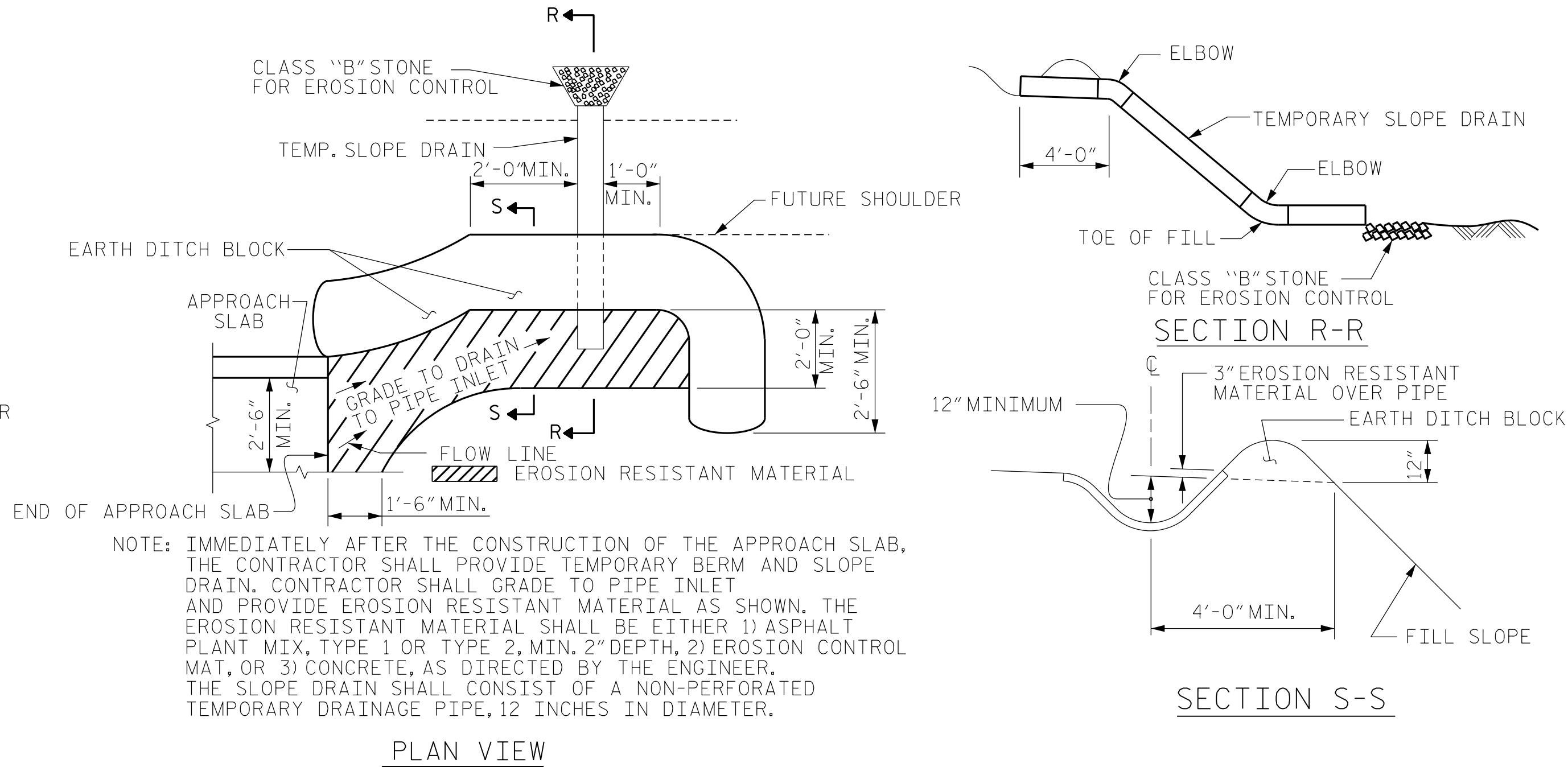
SECTION THRU SLAB

(TYPE A - ALTERNATE APPROACH FILL)



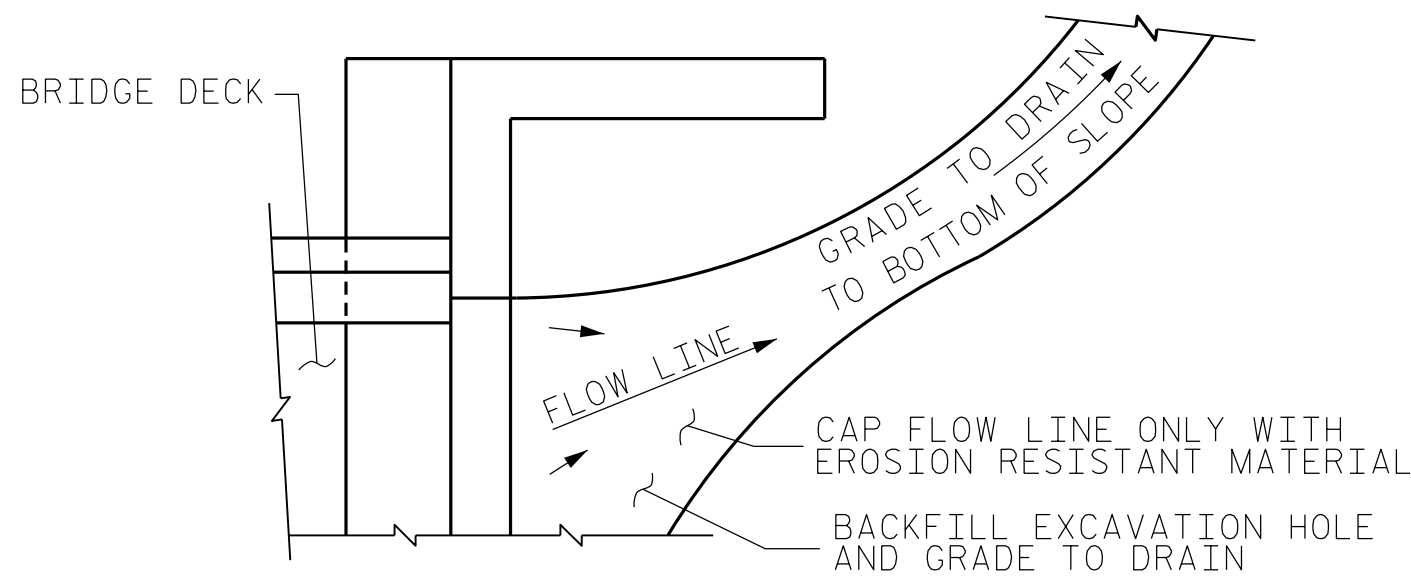
SECTION THRU SLAB

(TYPE A - ALTERNATE APPROACH FILL)



TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

TEMPORARY DRAINAGE DETAIL

NOTES

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

DocuSigned by:

DB3C8E45B06D499...

8/16/2019

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KCI Associates
of North Carolina, P.A.
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PROJECT NO. 17BP.10.R.144

CABARRUS COUNTY

STATION: 18+97.50 -L-


SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
BRIDGE APPROACH
SLAB DETAILS

REVISIONS						SHEET NO. S- 32
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 32
2			4			

STD. NO. BAS5

DESIGN ENGINEER OF RECORD:  DATE: 8/16/2019
ASSEMBLED BY: R. C. LARSON DATE: 10/25/18
CHECKED BY: R. A. PRUETT DATE: 10/27/18
DRAWN BY: TLA 10/05 REV. 12/21/11 MAA/GM
CHECKED BY: GM 5/06 REV. 6/13 MAA/GM
REV. 12/17 MAA/THC