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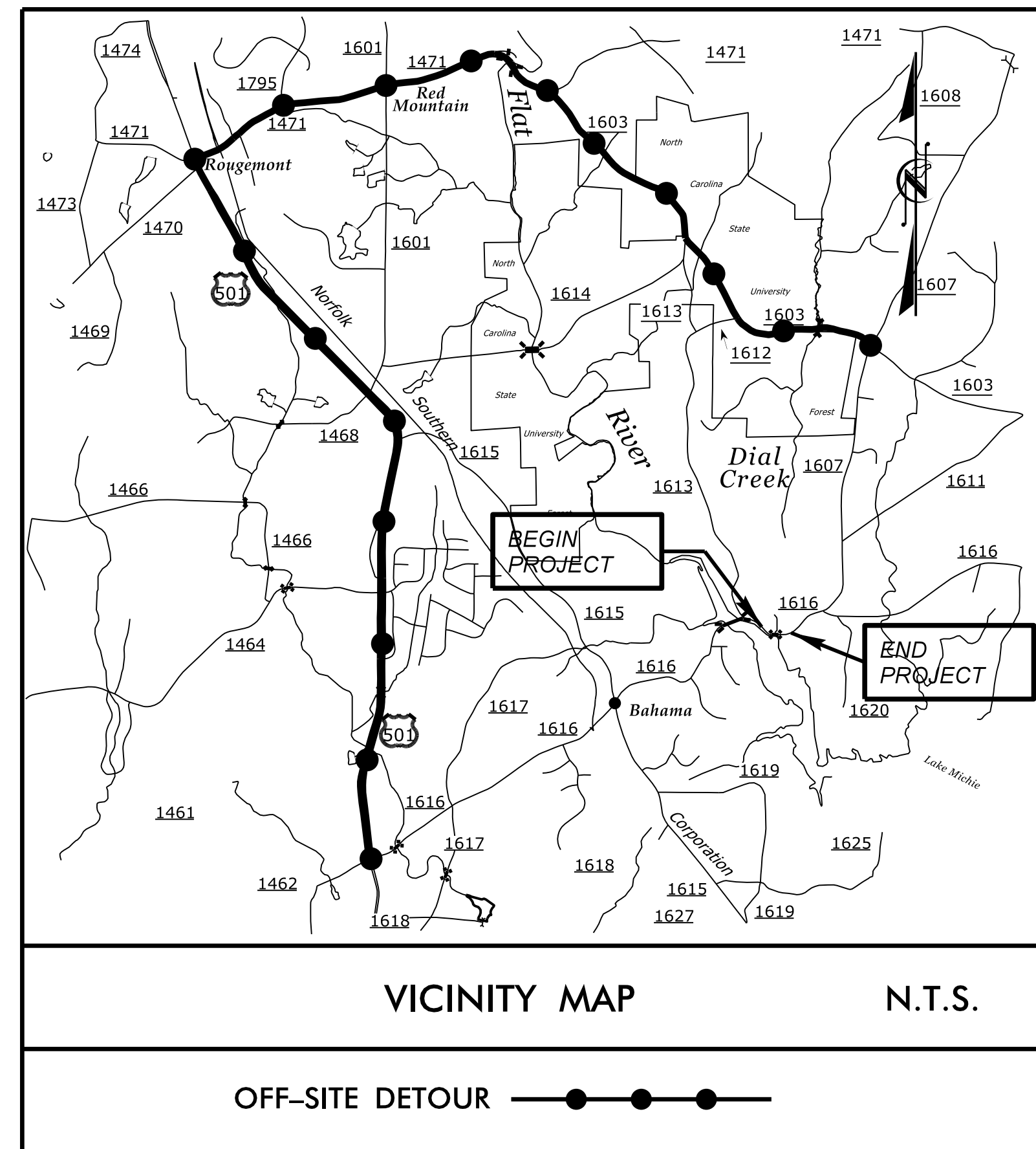
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TIP PROJECT: B-4943

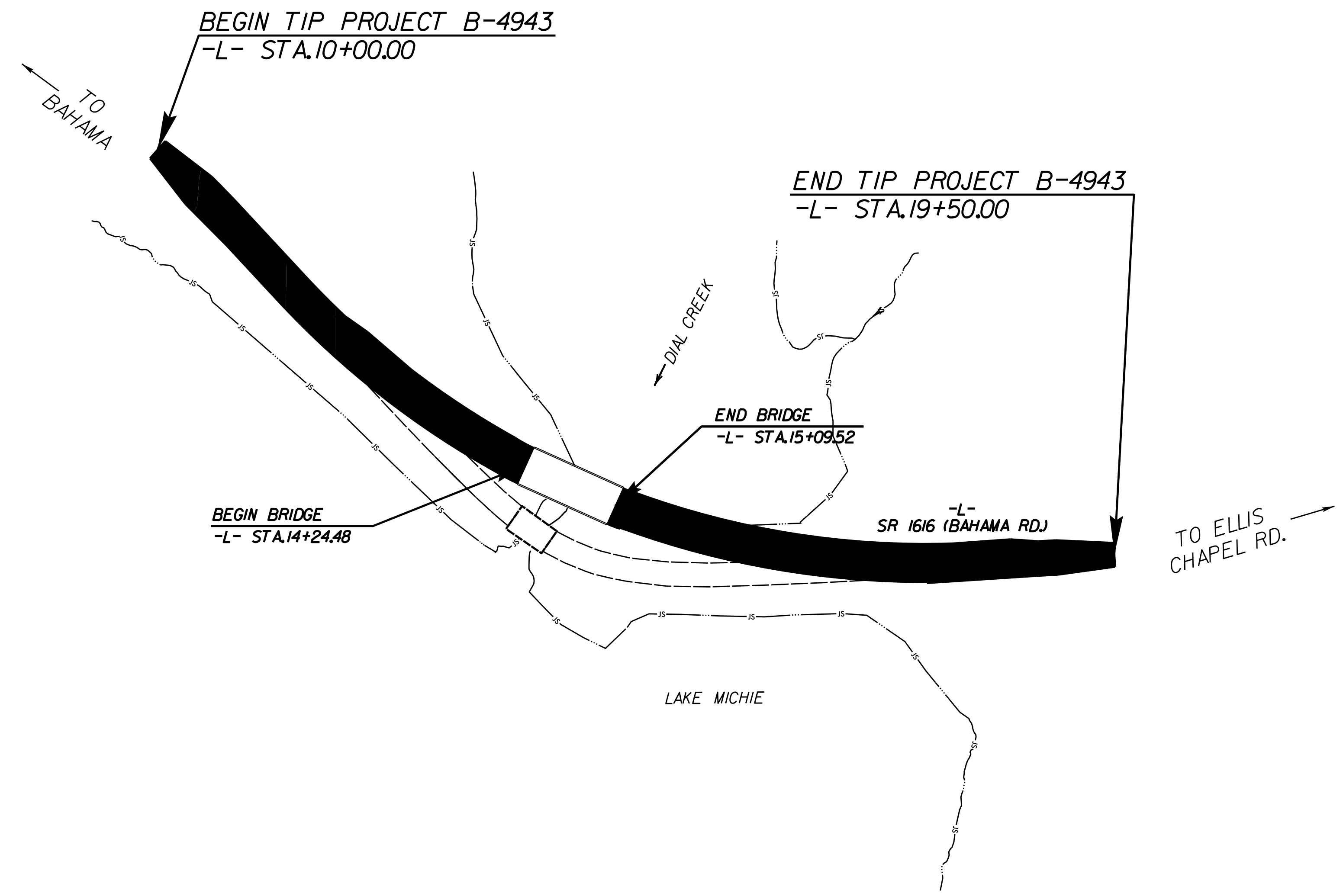
CONTRACT: 203987

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4943	1	
STATE PROJ. NO.	P.A. PROJ. NO.	DESCRIPTION	
40110.1.1	BRZ-1616(10)	P.E.	
40110.2.1	BRZ-1616(10)	ROW & UTILITY	
40110.3.1	BRZ-1616(10)	CONSTRUCTION	

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
DURHAM COUNTY



**LOCATION: BRIDGE NO. 20 OVER DIAL CREEK
ON SR 1616 (BAHAMA RD.)**
TYPE OF WORK: GRADING, DRAINAGE, PAVING AND STRUCTURE



STRUCTURE

DESIGN DATA
 ADT (2017) = 2,738 VPD
 ADT (2037) = 3,585 VPD
 K = 10 %
 D = 85 %
 T = 6 % **
 * V = 40 MPH
 ** (TTST 1 %, DUAL 5 %)
 FUNC CLASS=RURAL MINOR COLLECTOR
 SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4943 = 0.163 mi
 LENGTH STRUCTURE TIP PROJECT B-4943 = 0.017 mi

TOTAL LENGTH TIP PROJECT B-4943 = 0.180 mi

Prepared In the Office of:
DIVISION OF HIGHWAYS
 STRUCTURES MANAGEMENT UNIT
 1000 BIRCH RIDGE DR.
 RALEIGH, N.C. 27610

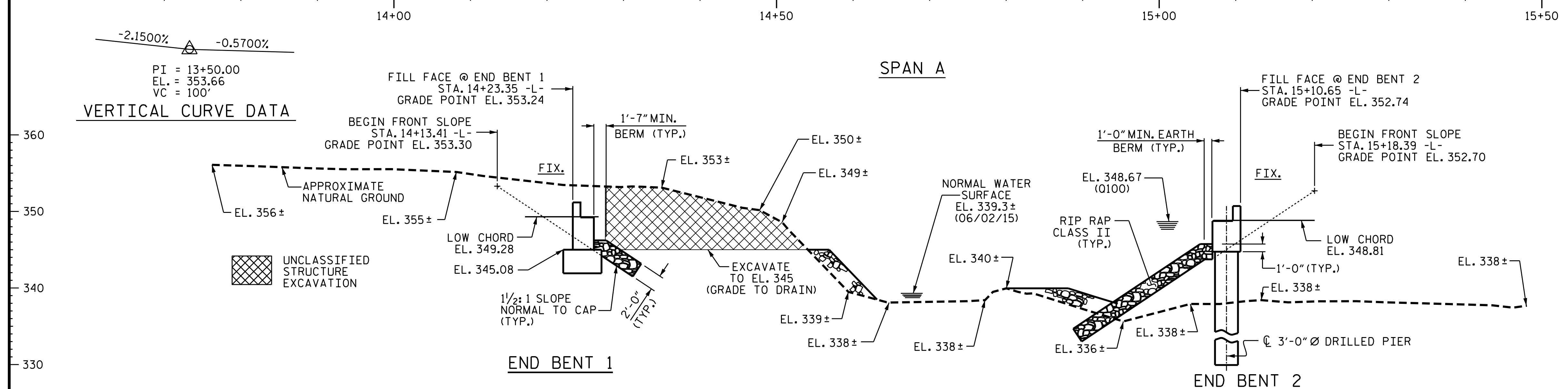
2018 STANDARD SPECIFICATIONS

LETTING DATE :
 JANUARY 16, 2018

G. W. DICKEY, P.E.
PROJECT ENGINEER

K. W. ALFORD, P.E.
PROJECT DESIGN ENGINEER

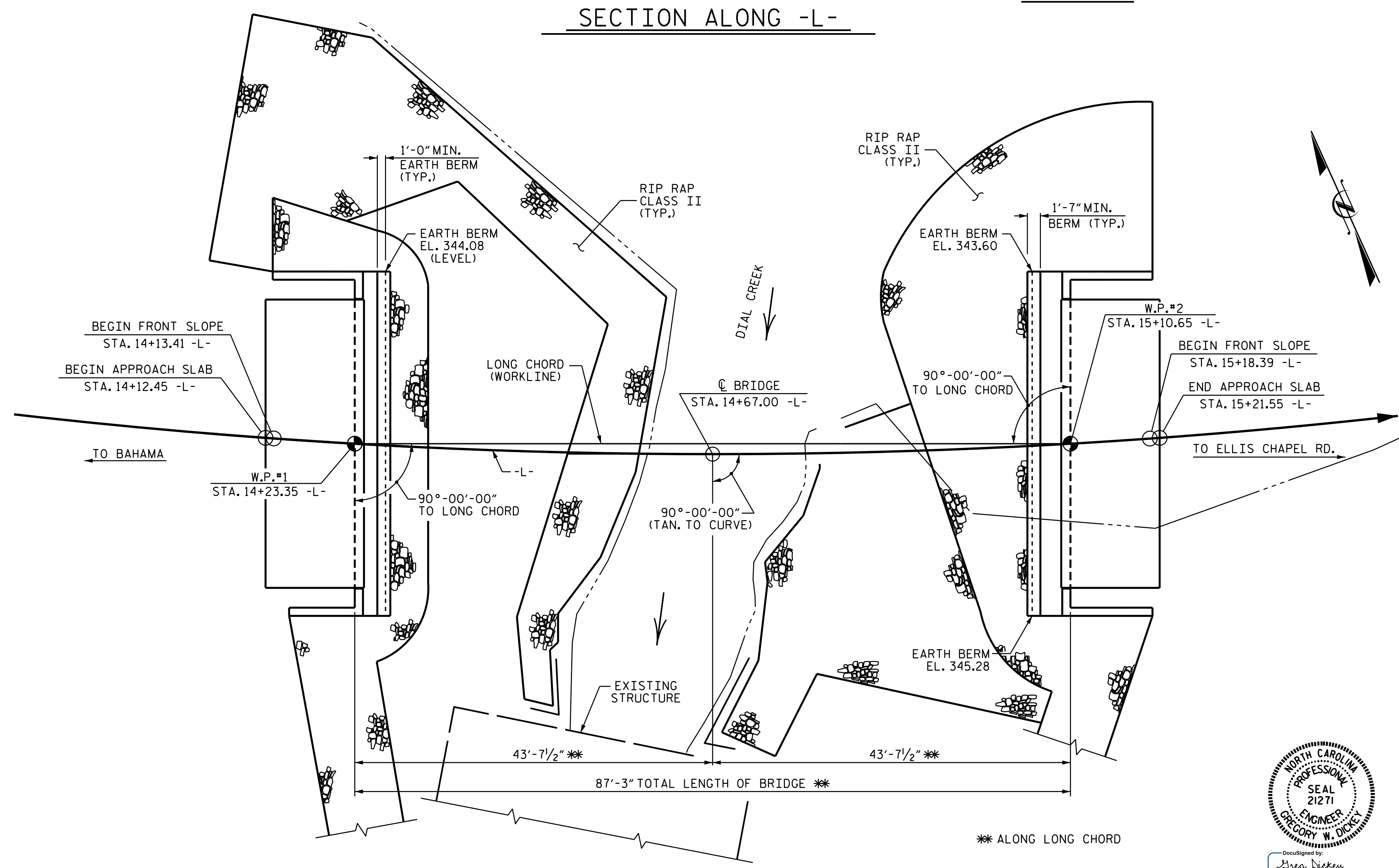
VERTICAL CURVE DATA
 PI = 13+50.00
 EL. = 353.66
 VC = 100'
 -2.1500% -0.5700%



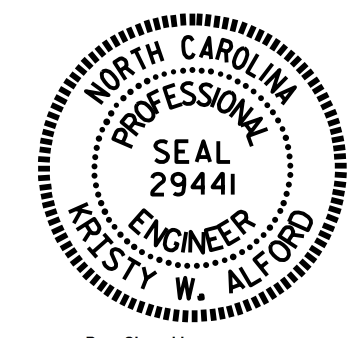
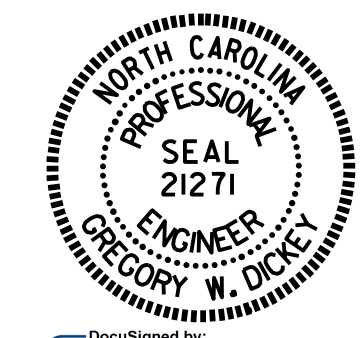
HORIZONTAL CURVE DATA
 P.I. STA. = 15+20.36
 $\Delta = 50^{\circ}-18'-52.0''$ (LT.)
 L = 658.61'
 T = 352.24'
 R = 750.00'
 SE = 4%

HYDRAULIC DATA
 DESIGN DISCHARGE = 1,400 CFS
 FREQUENCY OF DESIGN FLOOD = 25 YRS.
 DESIGN HIGH WATER ELEVATION = 346.7
 DRAINAGE AREA = 4.97 SQ. MI.
 BASE DISCHARGE (Q100) = 2,000 CFS
 BASE HIGH WATER ELEVATION = 348.67

OVERTOPPING FLOOD DATA
 OVERTOPPING DISCHARGE = 4,349 CFS
 FREQUENCY OF OVERTOPPING FLOOD = 500+ YRS.
 OVERTOPPING FLOOD ELEVATION = 352.91 *
 * SAG STA. 15+74 -L-



PLAN
 FOOTING AND DRILLED PIERS NOT SHOWN FOR CLARITY



DocuSigned by:
 Gregory W. Dickey
 884E46BCE6B486
 1/3/2018

DocuSigned by:
 Kelsey W. Alford
 F2458389306F40E...
 1/3/2018

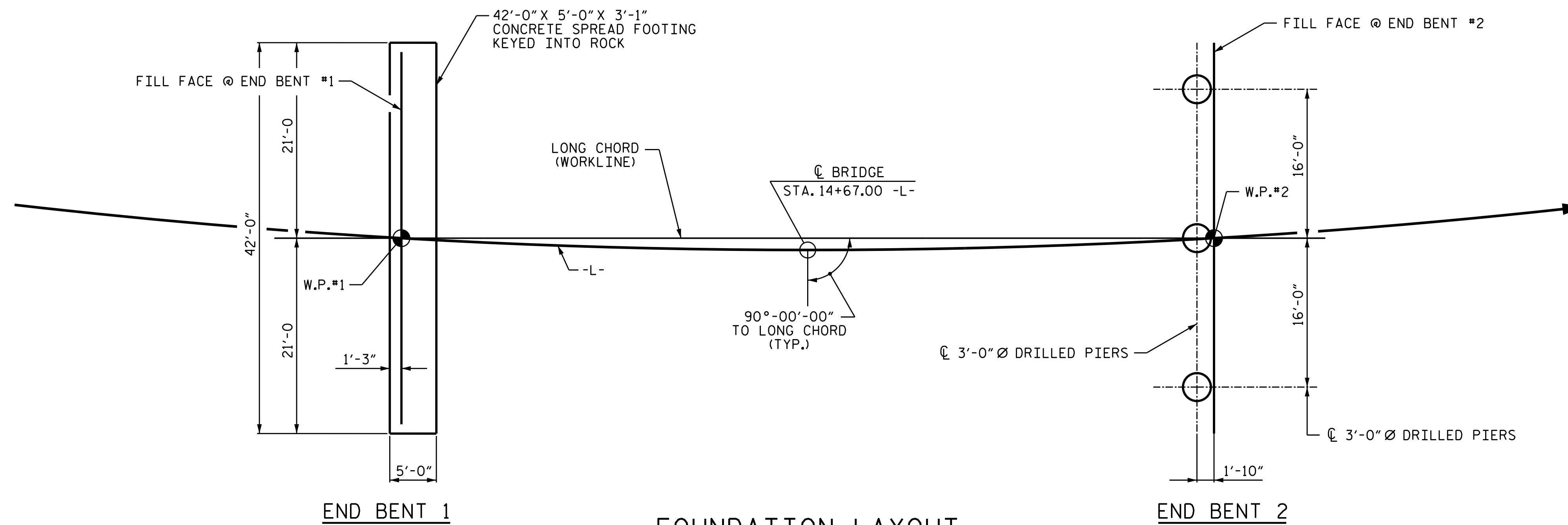
PROJECT NO. B-4943
 DURHAM COUNTY
 STATION: 14+67.00 -L-
 SHEET 1 OF 3 REPLACES BRIDGE NO. 20

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
GENERAL DRAWING
 BRIDGE OVER DIAL CREEK
 ON SR 1616 BETWEEN
 SR 1613 & SR 1607

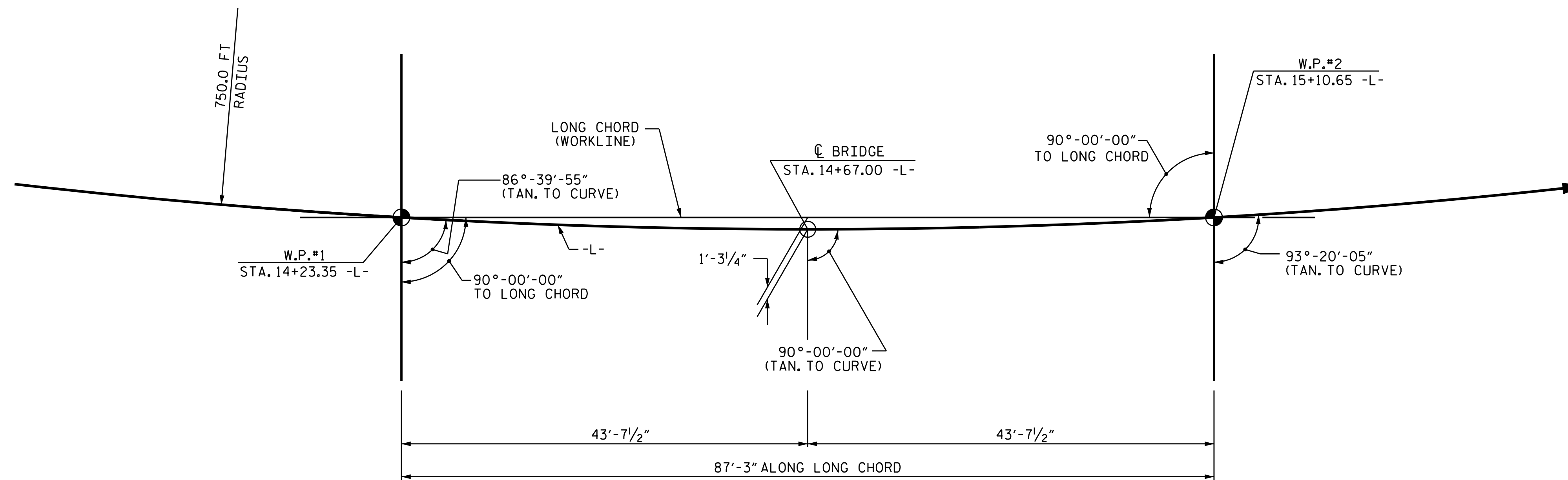
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-1
1			3			TOTAL SHEETS
2			4			19

DRAWN BY : R. L. CHESSON DATE : 2017MAR03
 CHECKED BY : J. D. HAWK DATE : 3/14/17

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

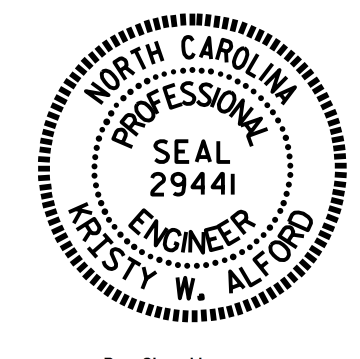


FOUNDATION LAYOUT
 DIMENSIONS LOCATING DRILLED PIERS ARE TO THE CENTERLINE AT BOTTOM OF CAP.



LONG CHORD LAYOUT
 NOTE: THE EFFECTS OF THE HORIZONTAL CURVE SHALL BE NEGLECTED IN THE CONSTRUCTION OF THIS BRIDGE. BRIDGE TO BE BUILT ALONG THE LONG CHORD BETWEEN THE WORK POINTS AT THE FILL FACES.

PROJECT NO. B-4943
DURHAM COUNTY
 STATION: 14+67.00 -L-
 SHEET 2 OF 3



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

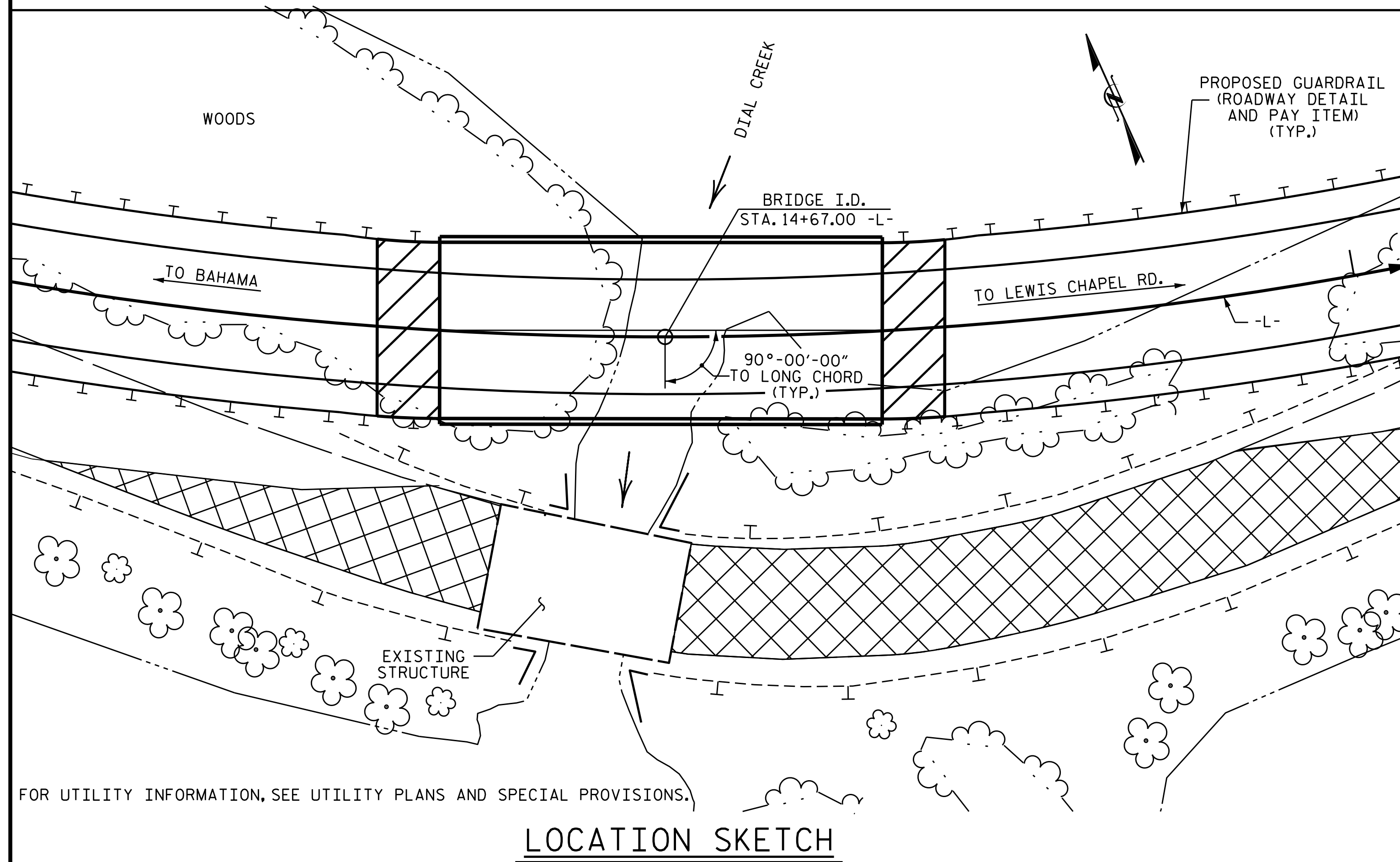
GENERAL DRAWING
 BRIDGE OVER DIAL CREEK
 ON SR 1616 BETWEEN
 SR 1613 & SR 1607

DRAWN BY : R. L. CHESSON DATE : 2017FEB28
 CHECKED BY : J. D. HAWK DATE : 3/14/17

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			19

BM #50: RR SPIKE IN 18" GUM TREE STA. 13+15 -L-, 37.5' RT. EL. = 351.65



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES :

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
- THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
- THE EXISTING STRUCTURE CONSISTING OF 1-27'-4 1/2" SPAN WITH A CLEAR ROADWAY WIDTH OF 24'-7" ON A TIMBER FLOOR WITH STEEL I-BEAMS ON REINFORCED CONCRETE ABUTMENT END BENTS AND STEEL CAPS WITH STEEL PILE CRUTCH BENTS AND LOCATED 20' DOWNSTREAM FROM THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING CONCRETE ABUTMENTS AND WING WALLS SHALL BE RETAINED BELOW ELEVATION 345.5 (END BENT 1) AND ELEVATION 346.0 (END BENT 2). THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.
- 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 MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-1 SHALL BE EXCAVATED FOR A DISTANCE OF 30.0 FT. LEFT AND 55.0 FT. RIGHT OF CENTERLINE ROADWAY AT END BENT 1 AND AT EXISTING END BENT 2 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 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.
- THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES."
- THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPliced WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPlice OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
- 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 BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 14+67.00 -L-."
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- THE SPREAD FOOTINGS AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 5 TSF. CHECK FIELD CONDITIONS FOR THE REQUIRED RESISTANCE OF 11 TSF JUST BEFORE PLACING CONCRETE.
- CARRY IN SPREAD FOOTINGS AT END BENT NO. 1 AT LEAST 12" INTO ROCK WITH MINIMUM THICKNESS AS SHOWN ON THE PLANS.
- FOR BLASTING ADJACENT TO HIGHWAY STRUCTURES, SEE ARTICLE 410-9 OF THE STANDARD SPECIFICATIONS.
- FOR DRILLED PIERS, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 411 OF THE STANDARD SPECIFICATIONS.
- DRILLED PIERS AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 395 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 100 TSF.
- PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT END BENT NO. 2. DO NOT EXTEND PERMANENT CASTINGS BELOW ELEVATION 327 FT. WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
- INSTALL DRILLED PIERS AT END BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 322 FT WITH THE REQUIRED TIP RESISTANCE.
- DO NOT USE SLURRY CONSTRUCTION FOR DRILLED PIERS AT END BENT NO. 2.
- SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- CSL TUBES AND TESTING ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- OBSERVE A TWO MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT, END BENT AND REINFORCED BRIDGE APPROACH FILL, IF APPLICABLE, BEFORE BEGINNING APPROACH SLAB CONSTRUCTION AT END BENT NO. 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SPECIAL PROVISIONS.
- FOR ASBESTOS ASSESSMENT FOR DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

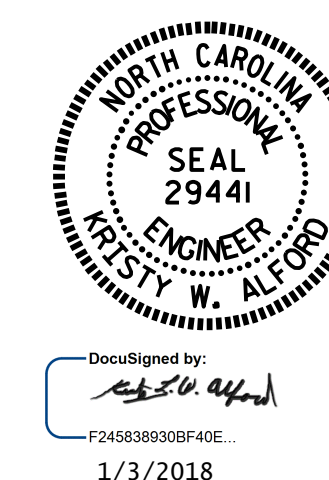
	REMOVAL OF EXISTING STRUCTURE	FOUNDATION EXCAVATION FOR END BENT	3'-0" Ø DRILLED PIER IN SOIL	3'-0" Ø DRILLED PIER NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-0" Ø DRILLED PIER	SID INSPECTION	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CONCRETE WEARING SURFACE	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL
	LUMP SUM	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EACH	EACH	LUMP SUM	CU. YDS.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.
SUPERSTRUCTURE									2,875.8	3,298		LUMP SUM		
END BENT No. 1		LUMP SUM									54.4		6,835	
END BENT No. 2			46.3	24.0	55.3	1					31.9		9,288	1,223
TOTAL	LUMP SUM	LUMP SUM	46.3	24.0	55.3	1	1	LUMP SUM	2,875.8	3,298	86.3	LUMP SUM	16,123	1,223

TOTAL BILL OF MATERIAL

	VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 2'-9" PRESTRESSED CONCRETE BOX BEAMS	ASBESTOS ASSESSMENT
	LIN. FT.	TONS	SO. YDS.	LUMP SUM	No. LIN. FT.	LUMP SUM
SUPERSTRUCTURE	170.0			LUMP SUM	12 1,020.00	LUMP SUM
END BENT No. 1		340	380			
END BENT No. 2		615	685			
TOTAL	170.0	955	1,065	LUMP SUM	12 1,020.00	LUMP SUM

DRAWN BY : R. L. CHESSON DATE : 2017MAR03
 CHECKED BY : J. D. HAWK DATE : 3/14/17

03-JAN-2018 08:44
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 kaiford



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PROJECT NO. B-4943
 DURHAM COUNTY
 STATION: 14+67.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

GENERAL DRAWING

BRIDGE OVER DIAL CREEK
 ON SR 1616 BETWEEN
 SR 1613 & SR 1607

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-3
1			3			TOTAL SHEETS
2			4			19

LOAD AND RESISTANCE FACTOR RATING (LRFD) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LOAD FACTORS:

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						LIVELOAD FACTORS	MOMENT					SHEAR					LIVELOAD FACTORS	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(Inv)	N/A	1	1.401	--	1.75	0.273	1.73	A	EL	41.75	0.497	1.54	A	EL	8.35	0.80	0.273	1.40	A	EL	41.75		
	HL-93(0pr)	N/A	--	1.994	--	1.35	0.273	2.25	A	EL	41.75	0.497	1.99	A	EL	8.35	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	1.882	67.762	1.75	0.273	2.33	A	EL	41.75	0.497	1.99	A	EL	8.35	0.80	0.273	1.88	A	EL	41.75		
	HS-20(0pr)	36.000	--	2.584	93.027	1.35	0.273	3.02	A	EL	41.75	0.497	2.58	A	EL	8.35	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	4.355	58.789	1.40	0.273	6.74	A	EL	41.75	0.497	6.03	A	EL	8.35	0.80	0.273	4.35	A	EL	41.75	
		SNGARBS2	20.000	--	3.199	63.989	1.40	0.273	4.95	A	EL	41.75	0.497	4.26	A	EL	8.35	0.80	0.273	3.20	A	EL	41.75	
		SNAGRIS2	22.000	--	3.011	66.245	1.40	0.273	4.66	A	EL	41.75	0.497	3.94	A	EL	8.35	0.80	0.273	3.01	A	EL	41.75	
		SNCOTTS3	27.250	--	2.166	59.016	1.40	0.273	3.35	A	EL	41.75	0.497	3.01	A	EL	8.35	0.80	0.273	2.17	A	EL	41.75	
		SNAGGRS4	34.925	--	1.792	62.595	1.40	0.273	2.77	A	EL	41.75	0.497	2.47	A	EL	8.35	0.80	0.273	1.79	A	EL	41.75	
		SNS5A	35.550	--	1.754	62.349	1.40	0.273	2.71	A	EL	41.75	0.497	2.49	A	EL	8.35	0.80	0.273	1.75	A	EL	41.75	
		SNS6A	39.950	--	1.602	63.995	1.40	0.273	2.48	A	EL	41.75	0.497	2.27	A	EL	8.35	0.80	0.273	1.60	A	EL	41.75	
	SNS7B	42.000	--	1.525	64.059	1.40	0.273	2.36	A	EL	41.75	0.497	2.22	A	EL	8.35	0.80	0.273	1.53	A	EL	41.75		
	TTST	TNAGRIT3	33.000	--	1.951	64.392	1.40	0.273	3.02	A	EL	41.75	0.497	2.70	A	EL	8.35	0.80	0.273	1.95	A	EL	41.75	
		TNT4A	33.075	--	1.958	64.758	1.40	0.273	3.03	A	EL	41.75	0.497	2.64	A	EL	8.35	0.80	0.273	1.96	A	EL	41.75	
		TNT6A	41.600	--	1.594	66.309	1.40	0.273	2.47	A	EL	41.75	0.497	2.34	A	EL	8.35	0.80	0.273	1.59	A	EL	41.75	
		TNT7A	42.000	--	1.598	67.128	1.40	0.273	2.47	A	EL	41.75	0.497	2.30	A	EL	8.35	0.80	0.273	1.60	A	EL	41.75	
		TNT7B	42.000	--	1.645	69.070	1.40	0.273	2.54	A	EL	41.75	0.497	2.17	A	EL	8.35	0.80	0.273	1.64	A	EL	41.75	
		TNAGRIT4	43.000	--	1.571	67.556	1.40	0.273	2.43	A	EL	41.75	0.497	2.11	A	EL	8.35	0.80	0.273	1.57	A	EL	41.75	
TNAGT5A		45.000	--	1.484	66.800	1.40	0.273	2.30	A	EL	41.75	0.497	2.08	A	EL	8.35	0.80	0.273	1.48	A	EL	41.75		
TNAGT5B	45.000	3	1.469	66.118	1.40	0.273	2.27	A	EL	41.75	0.497	2.00	A	EL	8.35	0.80	0.273	1.47	A	EL	41.75			

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.

CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

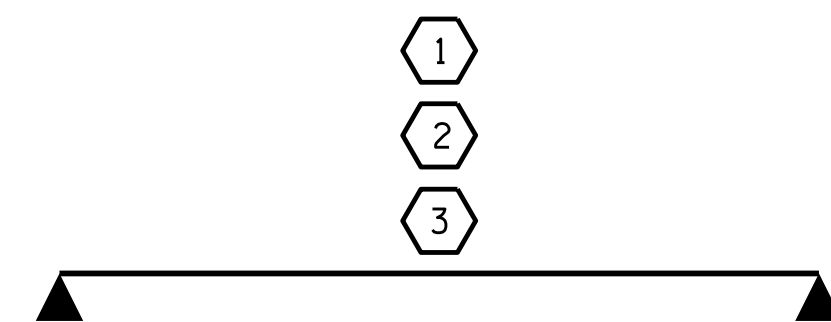
2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

PROJECT NO. B-4943
DURHAM COUNTY
 STATION: 14+67.00 -L-



DocuSigned by:
 F24583893BF4DE
 5/23/2017

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD LRFR SUMMARY FOR 85' BOX BEAM UNIT 90° SKEW (NON-INTERSTATE TRAFFIC)					
REVISIONS					SHEET NO. S-4
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
TOTAL SHEETS 19					

ASSEMBLED BY : R. L. CHESSON DATE : 2016 DEC
 CHECKED BY : J. D. HAWK DATE : 3/14/17
 DRAWN BY : TMG II/II
 CHECKED BY : AAC II/II

DOCUMENT NOT CONSIDERED
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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 CAST WITH THE BOX BEAM SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE BOX BEAMS.

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2 1/2" Ø DOWEL HOLES AT FIXED ENDS OF BOX BEAM SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

THE BACKER RODS SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE BOX BEAM UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6000 PSI.

ALL REINFORCING STEEL IN VERTICAL CONCRETE BARRIER RAILS SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE BOX BEAM UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO BOX BEAM UNIT ENDS.

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

THE LOCATION OF THE VOID DRAINS MAY BE SHIFTED SLIGHTLY WHERE NECESSARY TO CLEAR PRESTRESSING STRANDS OR TRANSVERSE REINFORCING STEEL.

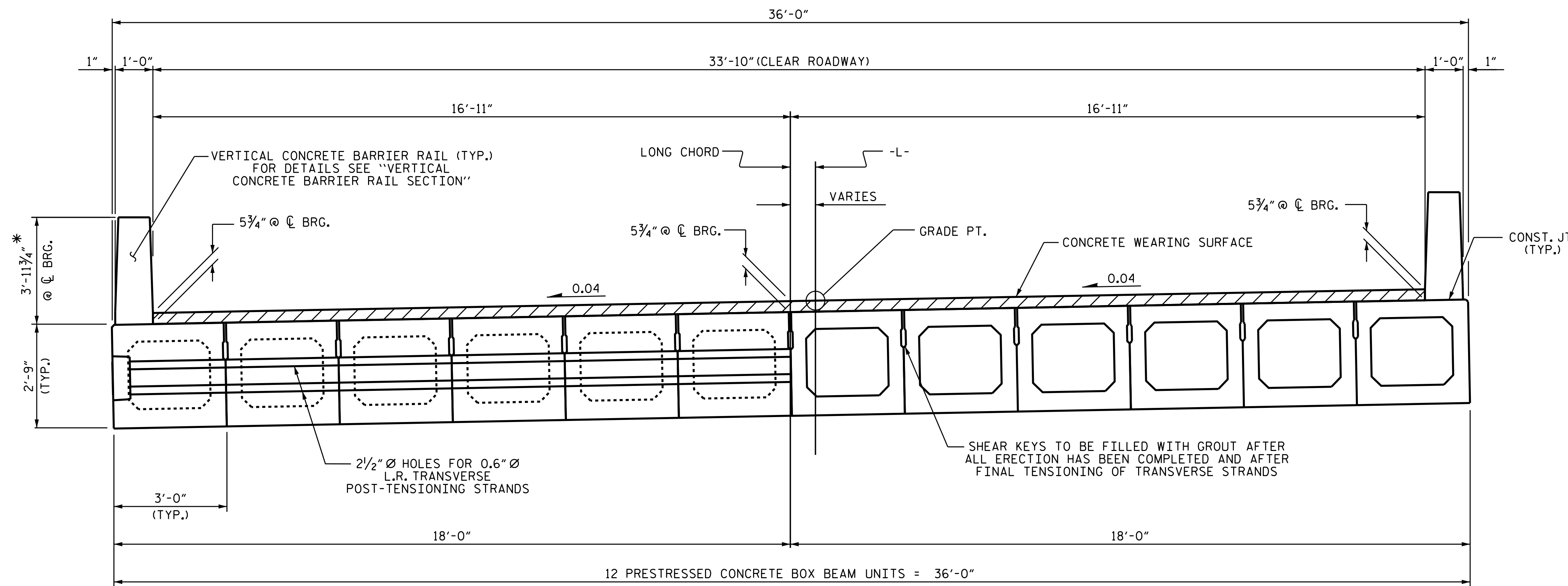
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.



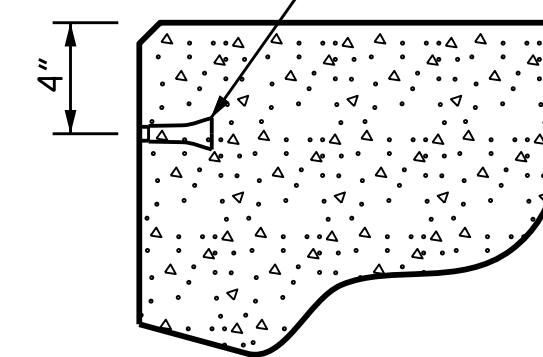
HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

HALF SECTION
THROUGH VOIDS

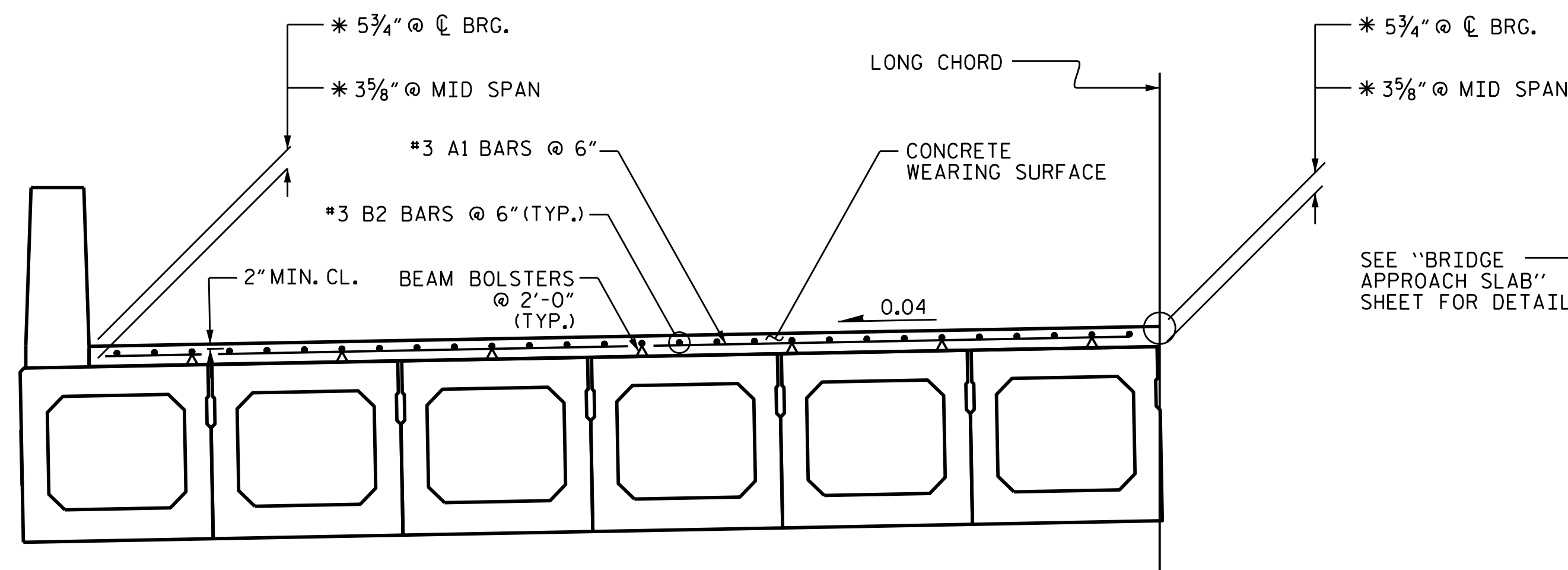
TYPICAL SECTION

* THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND CONCRETE THICKNESS, SEE THE "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.

PERMITTED THREADED INSERT CAST IN OUTSIDE FACE OF EXTERIOR UNIT AND RECESSED 3/8" SIZE TO BE DETERMINED BY CONTRACTOR.

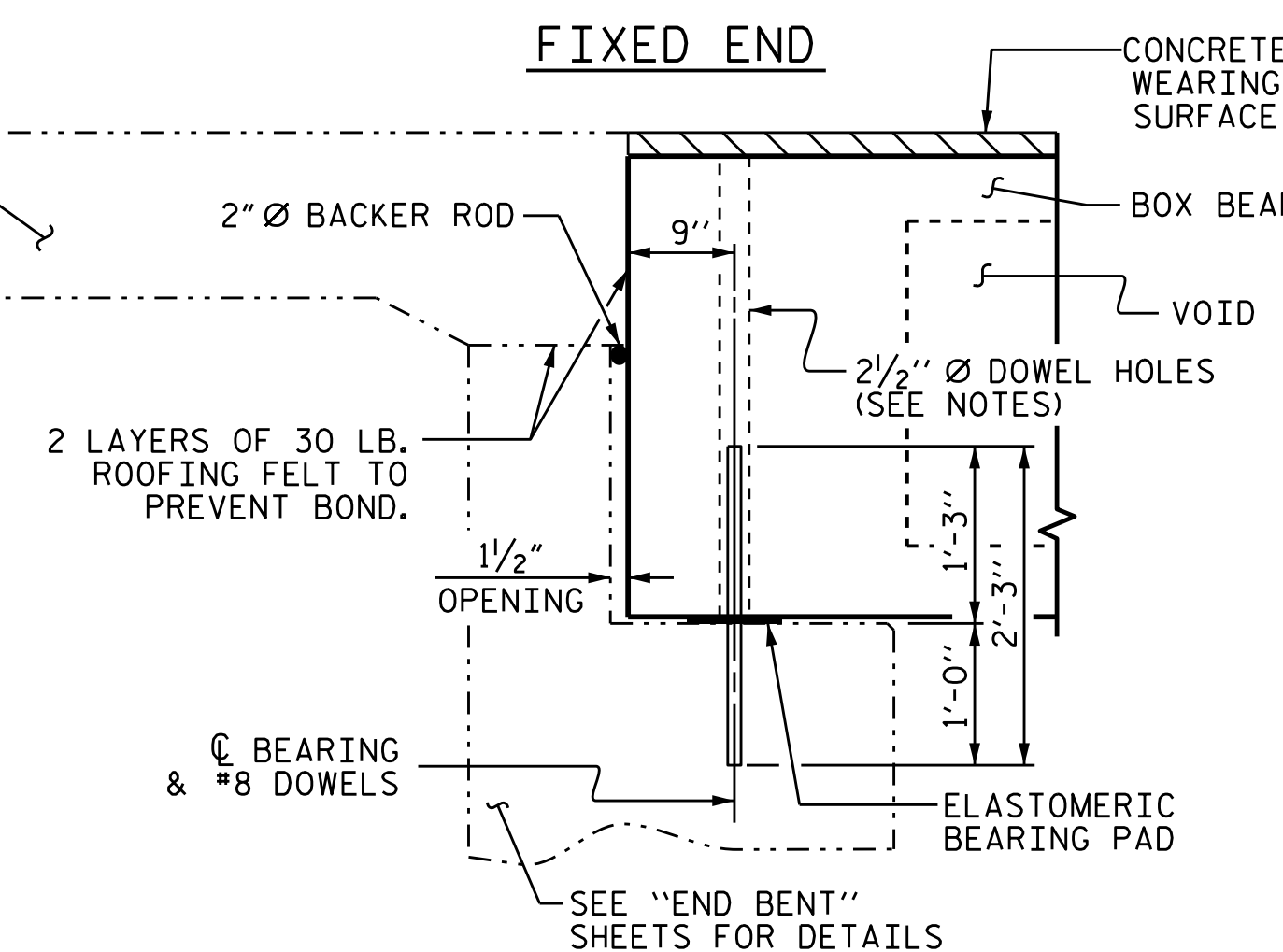


THREADED INSERT DETAIL



HALF SECTION REINFORCING FOR CONCRETE WEARING SURFACE

(SEE "REINFORCING FOR CONCRETE WEARING SURFACE" SHEET)
* BASED ON PREDICTED FINAL CAMBER AND THEORETICAL GRADE LINE ELEVATIONS



SECTION AT END BENT

PROJECT NO. B-4943
DURHAM COUNTY
STATION: 14+67.00 -L-

SHEET 1 OF 6



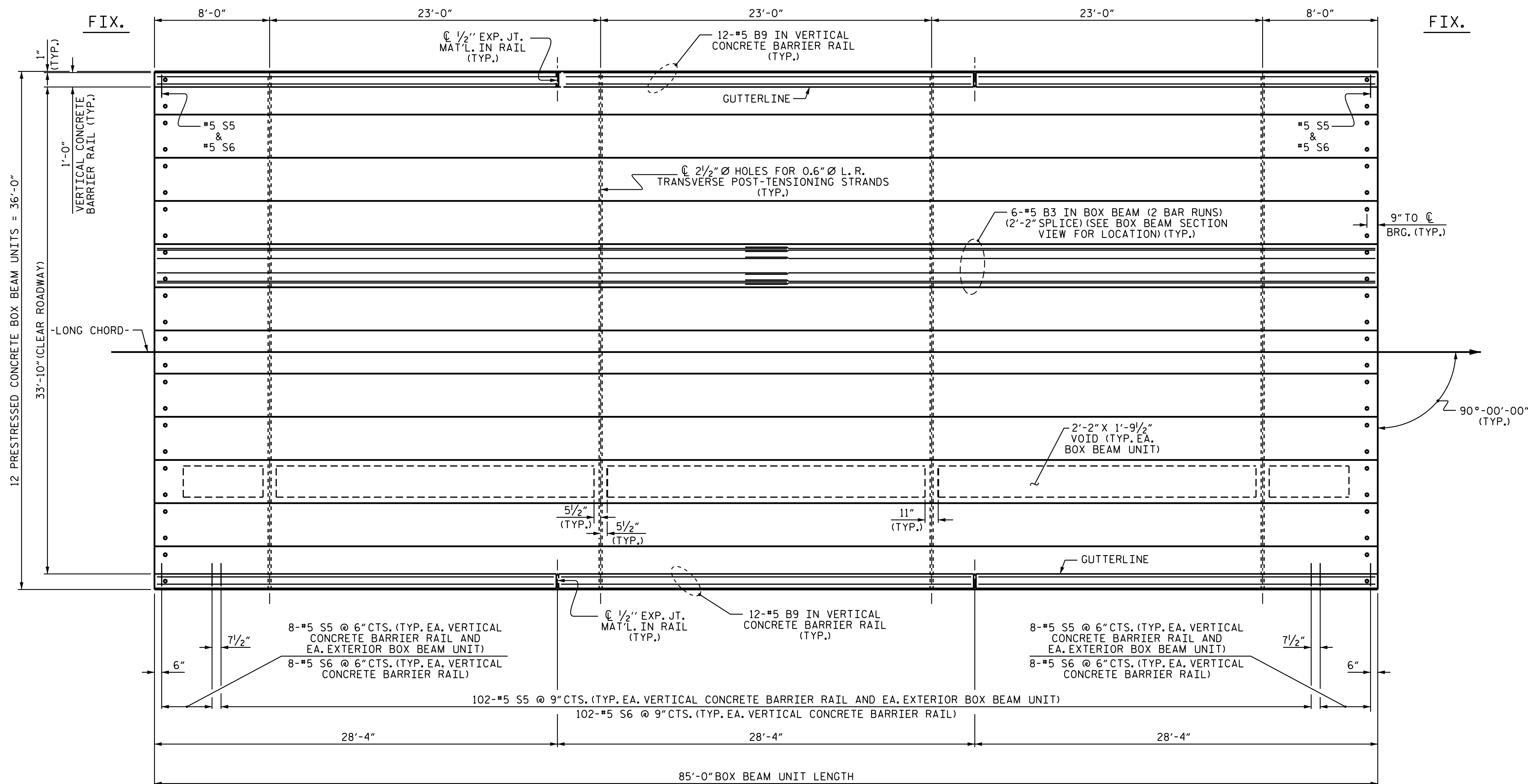
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
3'-0" X 2'-9"
PRESTRESSED CONCRETE
BOX BEAM UNIT

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5	
1			3			TOTAL SHEETS 19	
2			4				

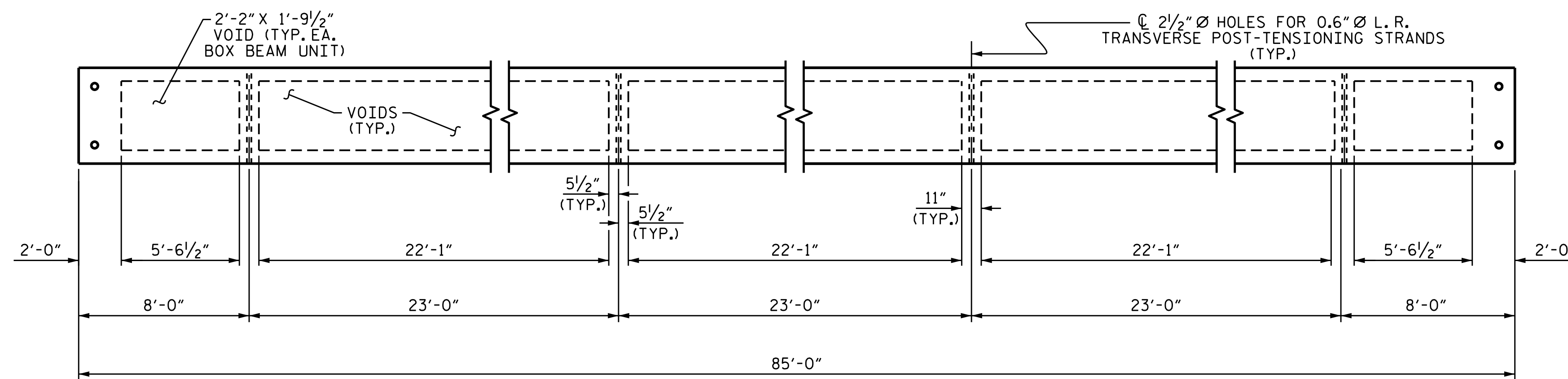
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : R. L. CHESSON DATE : 2017MAR01
CHECKED BY : J. D. HAWK DATE : 3/14/17
DRAWN BY : DGE 8/II
CHECKED BY : TMG II/II

REV. 9/14 MAA/TMG



PLAN OF UNIT



DIAPHRAGM AND VOID LAYOUT

PROJECT NO. B-4943
DURHAM COUNTY
 STATION: 14+67.00 -L-
 SHEET 2 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

PLAN OF SPAN "A"

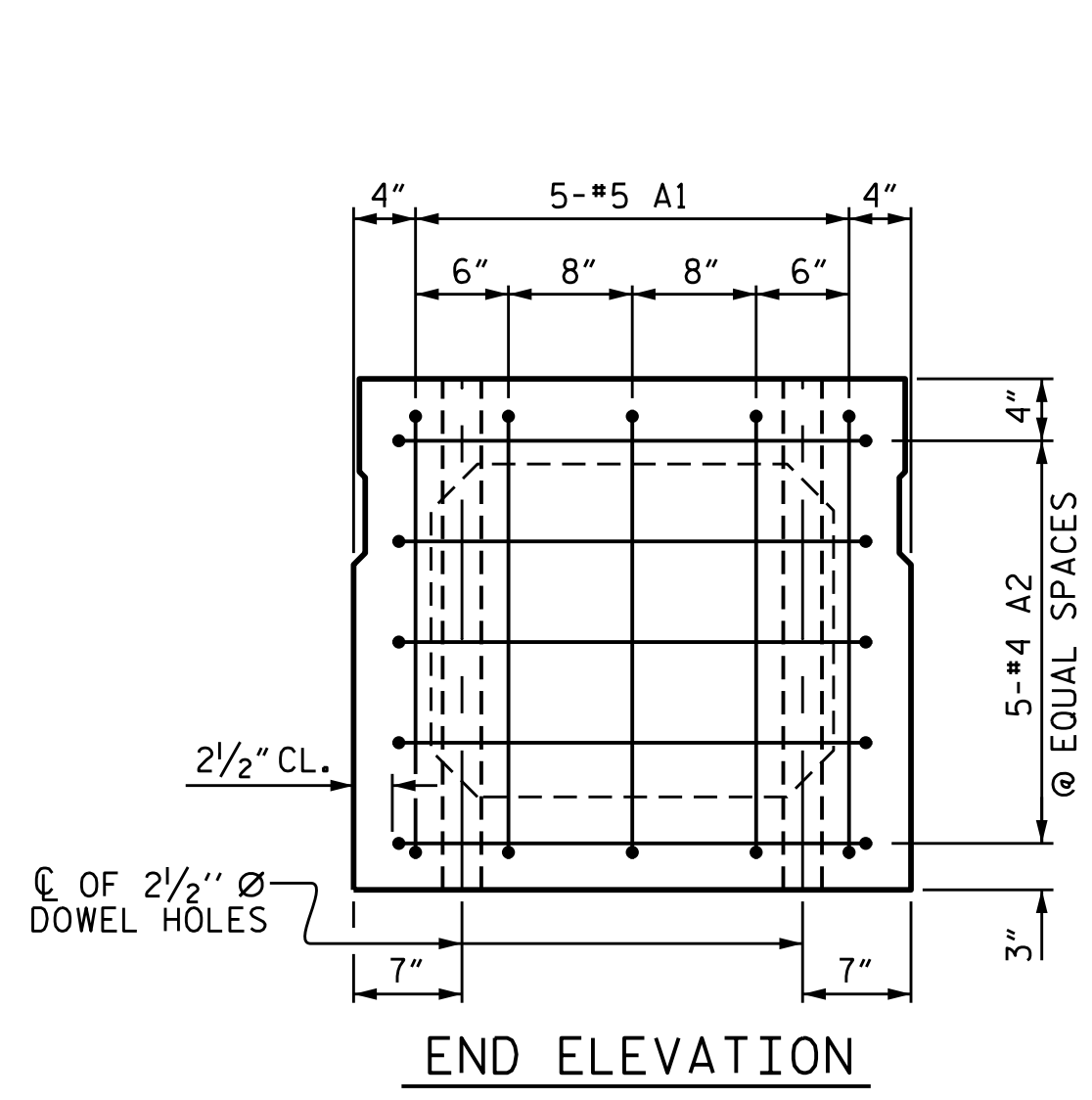


DocuSigned by:
 F2458393BF40E
 5/23/2017

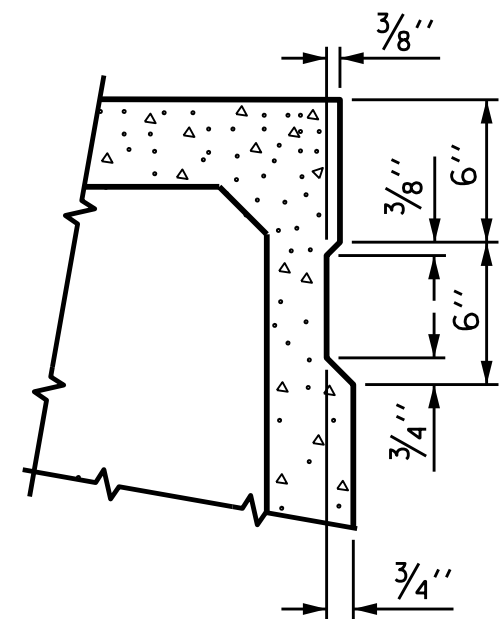
ASSEMBLED BY : R. L. CHESSON DATE : 2016 DEC
 CHECKED BY : J. D. HAWK DATE : 3/14/17
 DRAWN BY : DGE 8/11 REV. 8/14 MAA/TMG
 CHECKED BY : TMG 11/11

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS 19
2			4			

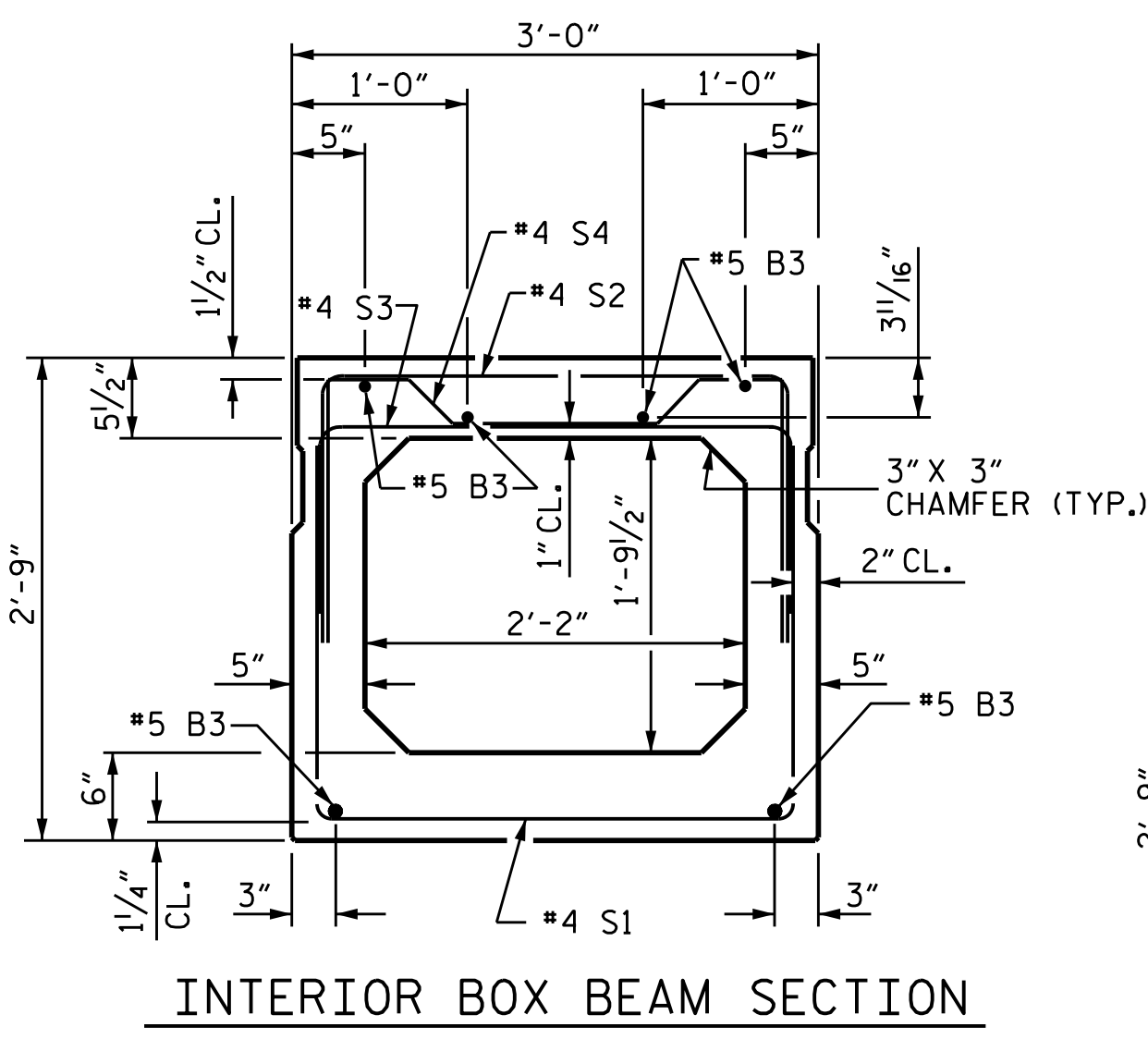


END ELEVATION
SHOWING PLACEMENT OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES.
(INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION. STRAND LAYOUT NOT SHOWN.)

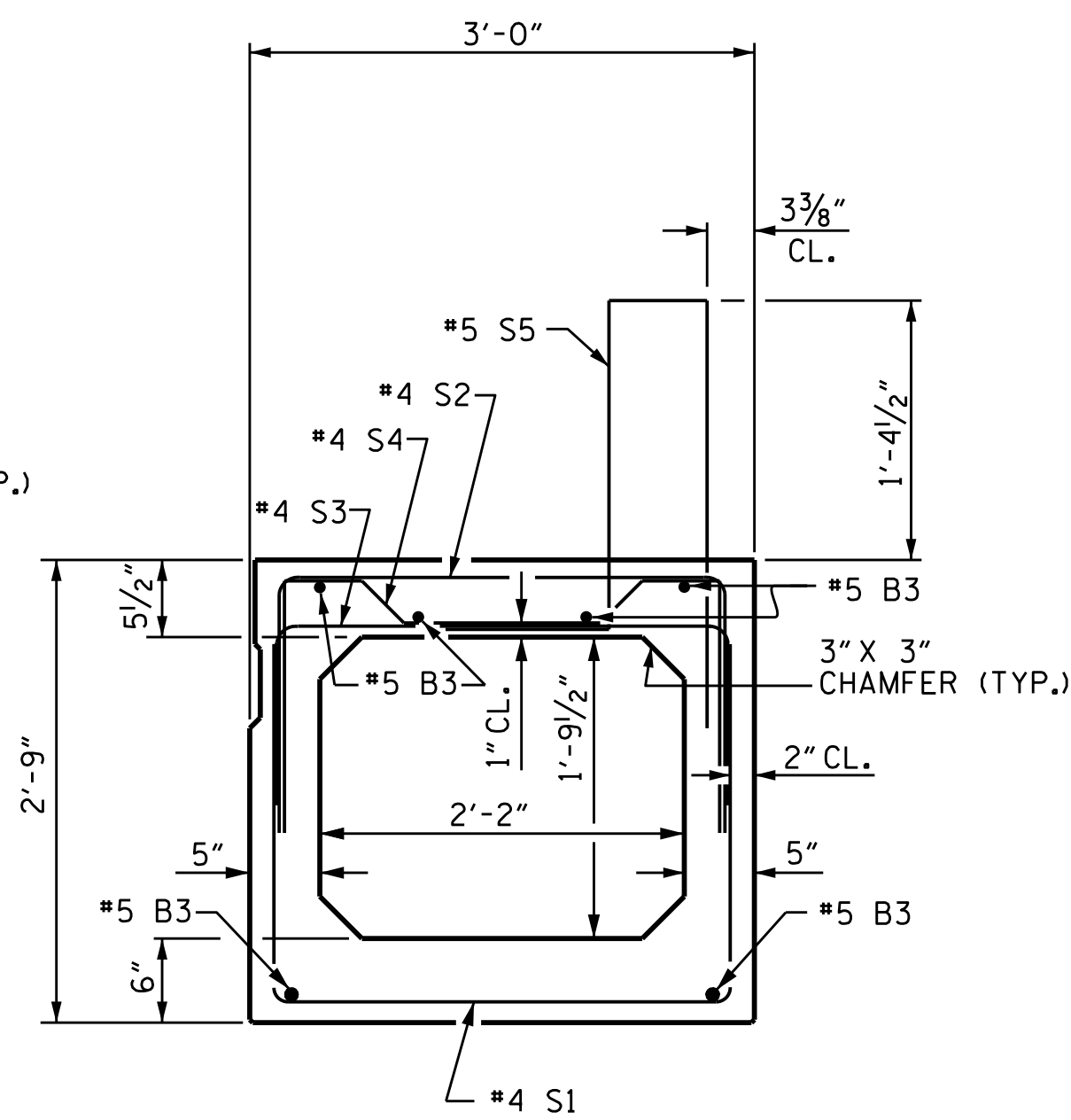


SHEAR KEY DETAIL

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.

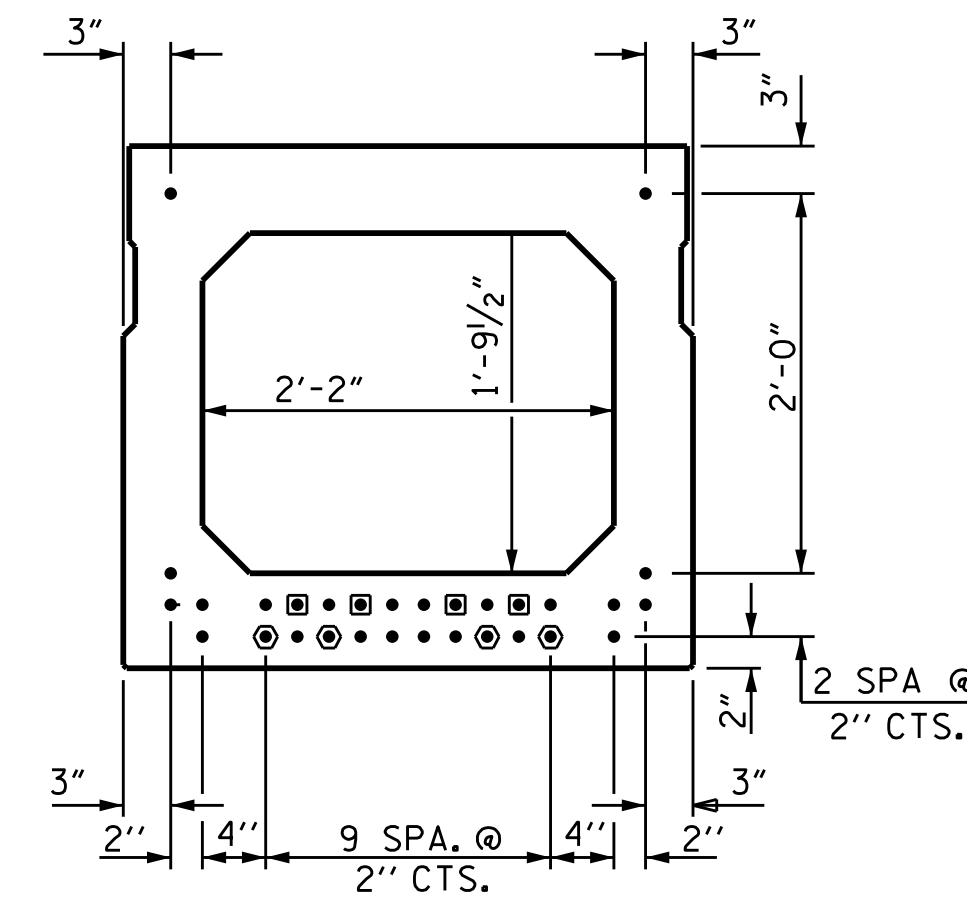


INTERIOR BOX BEAM SECTION
(STRAND LAYOUT NOT SHOWN)



EXTERIOR BOX BEAM SECTION
(STRAND LAYOUT NOT SHOWN)

0.6" Ø LOW RELAXATION STRAND LAYOUT



TYPICAL STRAND LOCATION
(30 STRANDS REQUIRED)

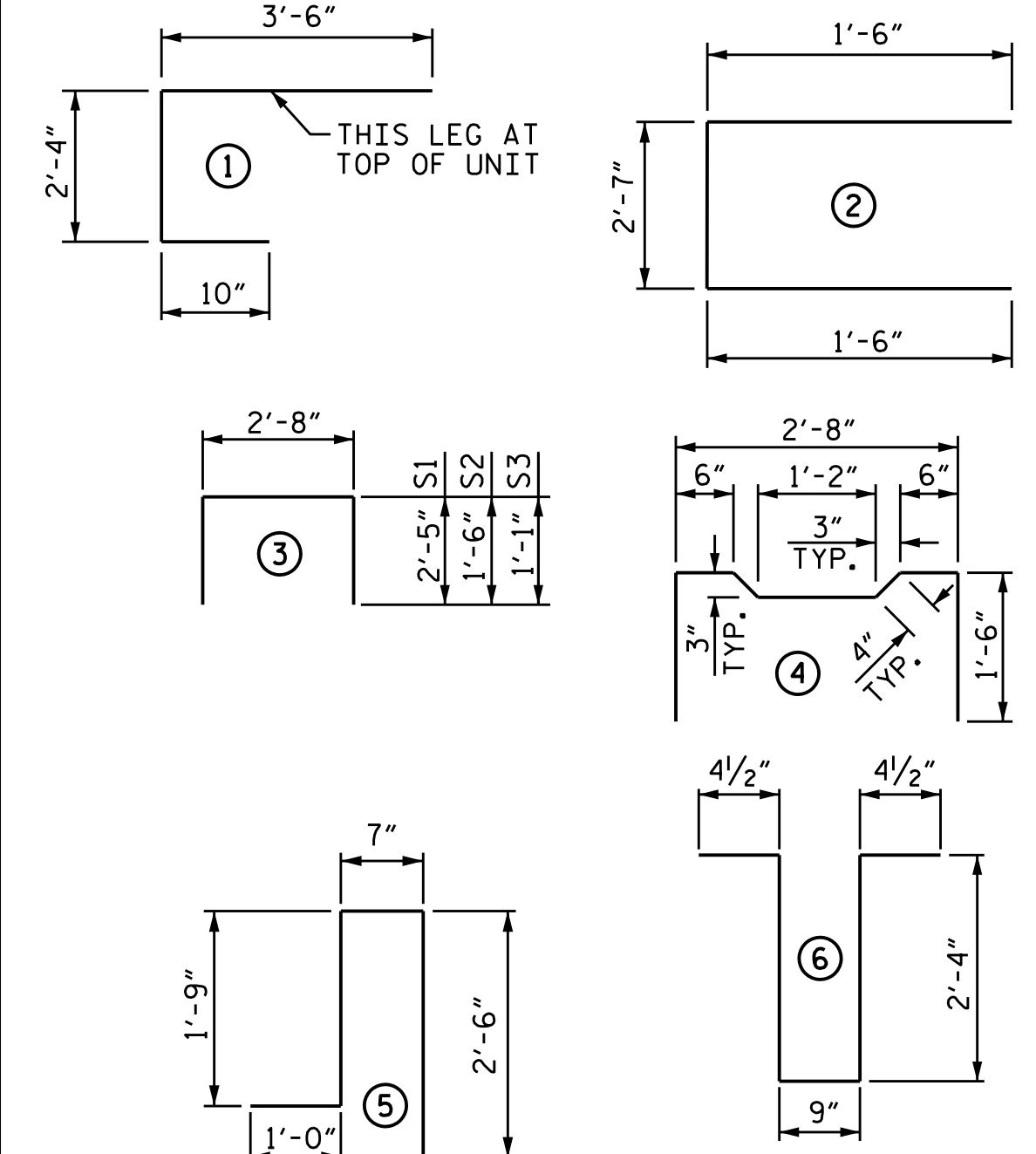
DEBONDING LEGEND

- FULLY BONDED STRANDS
- ◐ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ◑ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

BOND SHALL BE BROKEN ON STRANDS AS SHOWN FOR THE SPECIFIED LENGTH FROM EACH END OF THE BOX BEAM. SEE STANDARD SPECIFICATIONS ARTICLE 1078-7.

GRADE 270 STRANDS	
	0.6" Ø L.R.
AREA (SQUARE INCHES)	0.217
ULTIMATE STRENGTH (LBS. PER STRAND)	58,600
APPLIED PRESTRESS (LBS. PER STRAND)	43,950

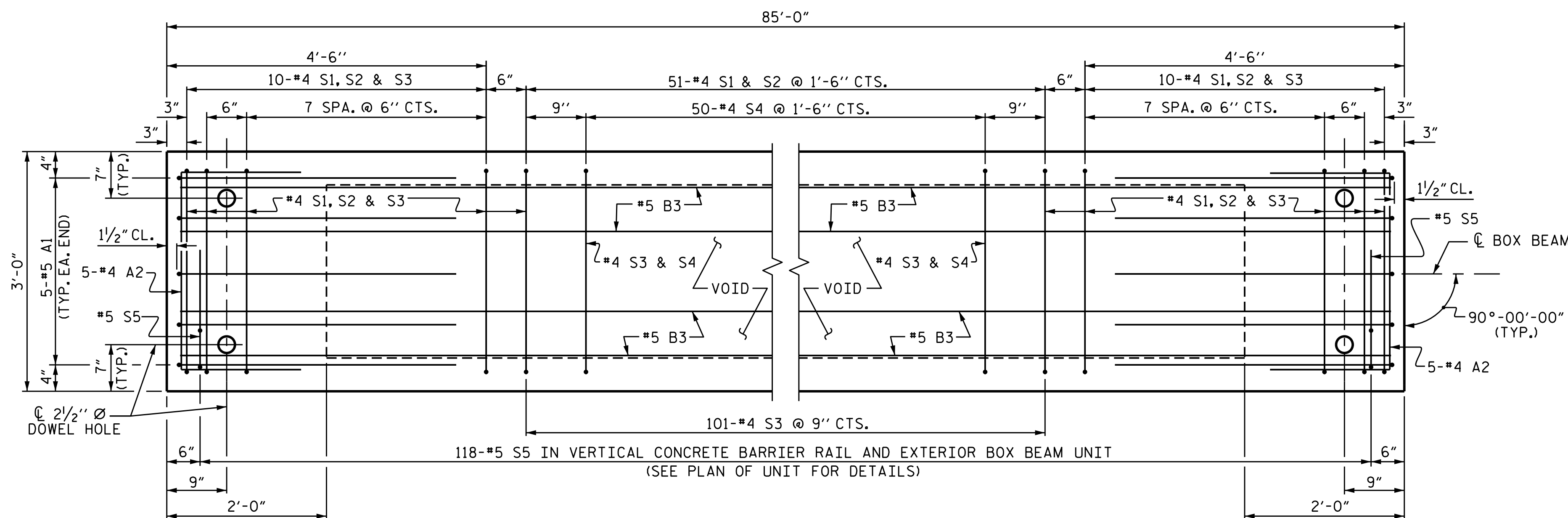
BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE BOX BEAM SECTION

BAR	NUMBER	SIZE	TYPE	EXTERIOR UNIT		INTERIOR UNIT	
				LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	1	6'-8"	70	6'-8"	70
A2	34	#4	2	5'-7"	127	5'-7"	127
B3	12	#5	STR	43'-5"	543	43'-5"	543
K1	12	#4	6	6'-2"	49	6'-2"	49
K2	8	#4	STR	2'-7"	14	2'-7"	14
S1	71	#4	3	7'-6"	356	7'-6"	356
S2	71	#4	3	5'-8"	269	5'-8"	269
S3	121	#4	3	4'-10"	391	4'-10"	391
S4	50	#4	4	5'-10"	195	5'-10"	195
* S5	118	#5	5	5'-10"	718	--	--
REINFORCING STEEL				2014	LBS.	2014	LBS.
* EPOXY COATED REINF. STEEL				718	LBS.		
8000 P.S.I. CONCRETE				15.1	CU. YDS.	15.0	CU. YDS.
0.6" Ø L.R. STRANDS				No. 30		No. 30	



PLAN OF BOX BEAM

EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS.
FOR LOCATION OF DIAPHRAGMS, SEE "PLAN OF UNIT".
FOR THREADED INSERTS, SEE "THREADED INSERT DETAIL".
FOR REINFORCING STEEL IN DIAPHRAGMS, SEE "DOUBLE DIAPHRAGM DETAILS".

PROJECT NO. B-4943
DURHAM COUNTY
STATION: 14+67.00 -L-
SHEET 3 OF 6

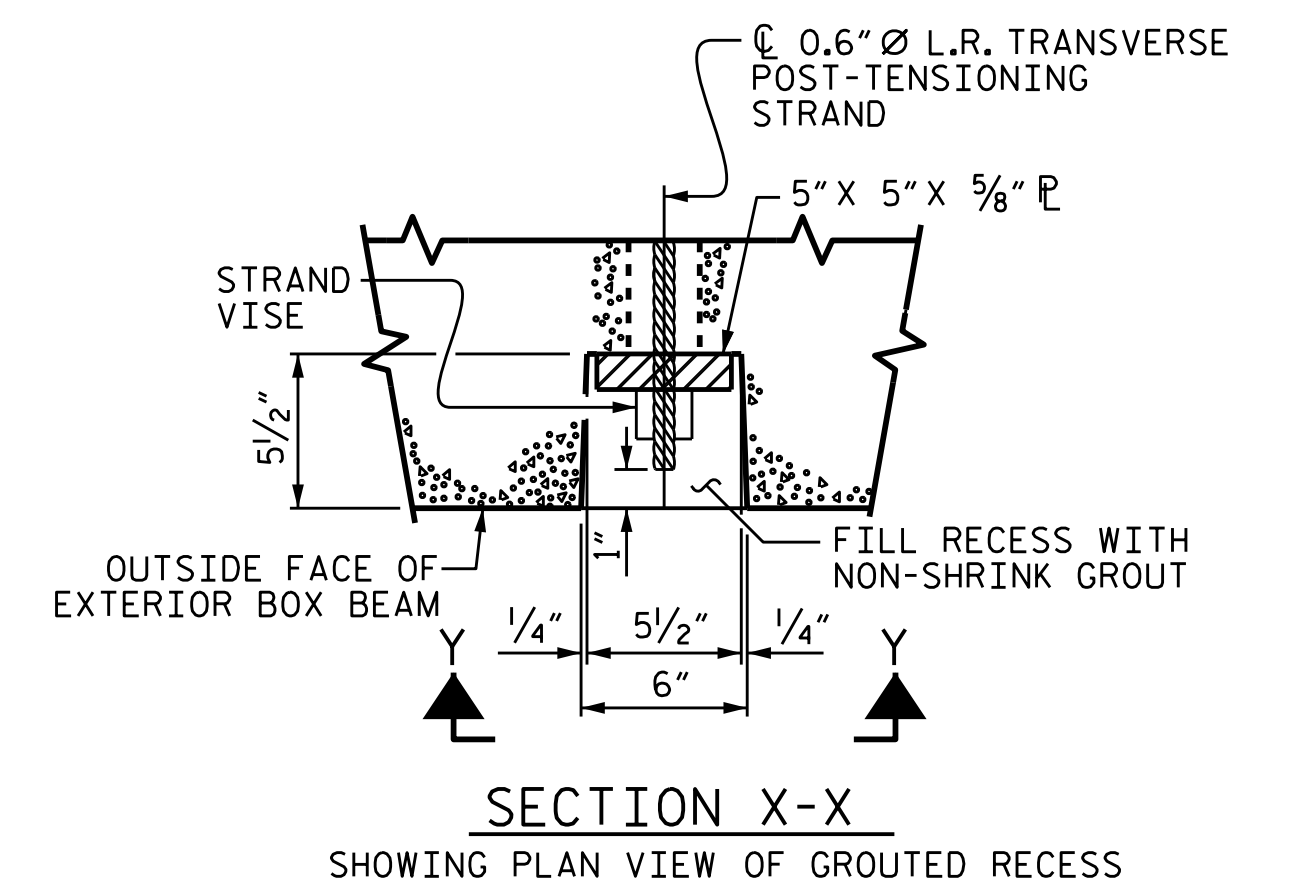
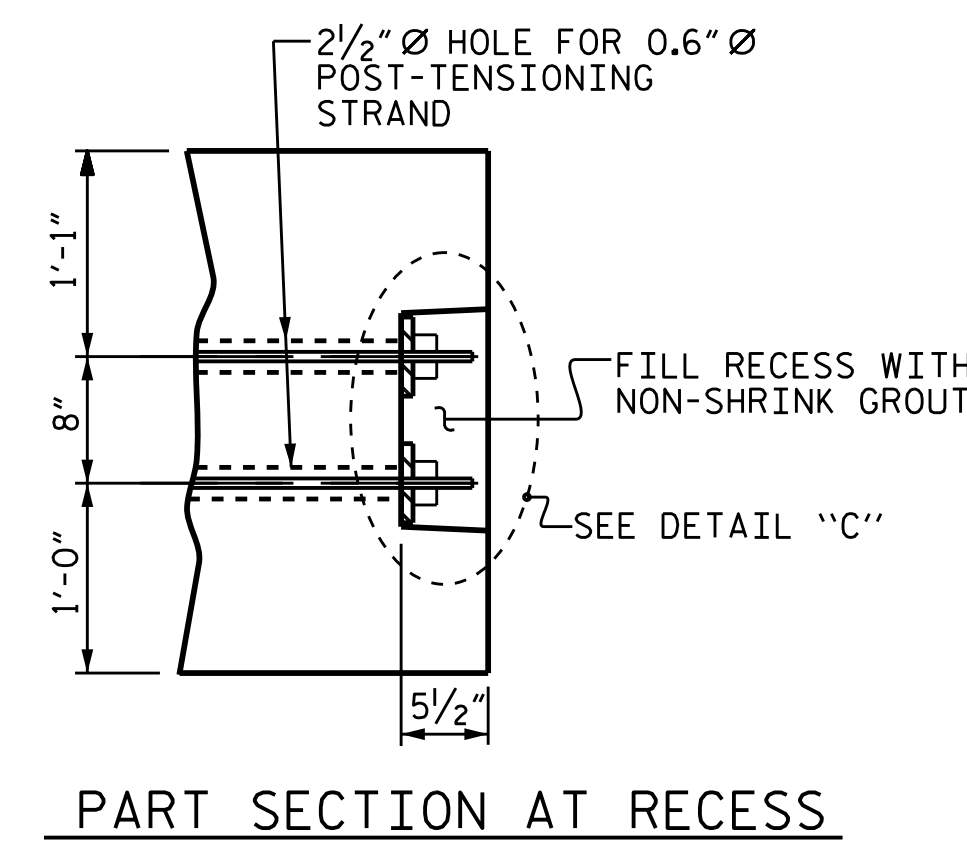
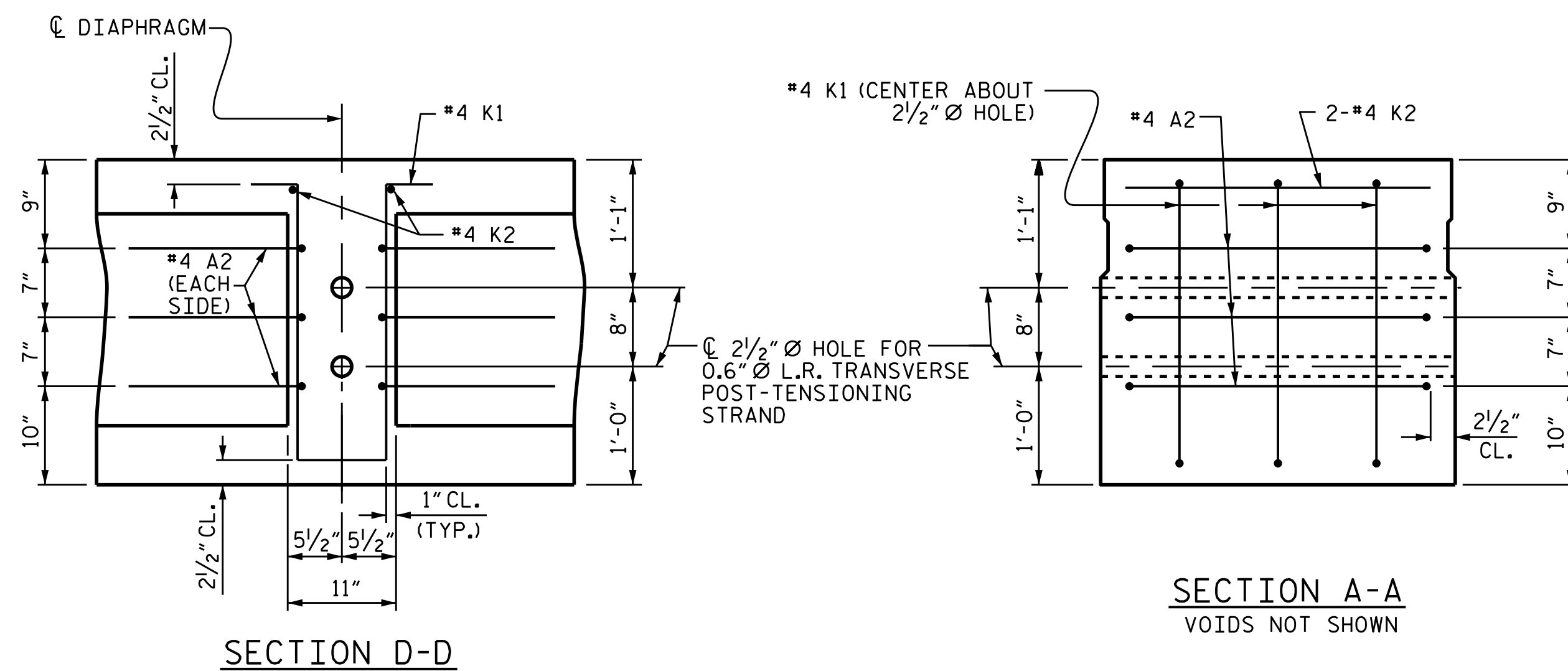
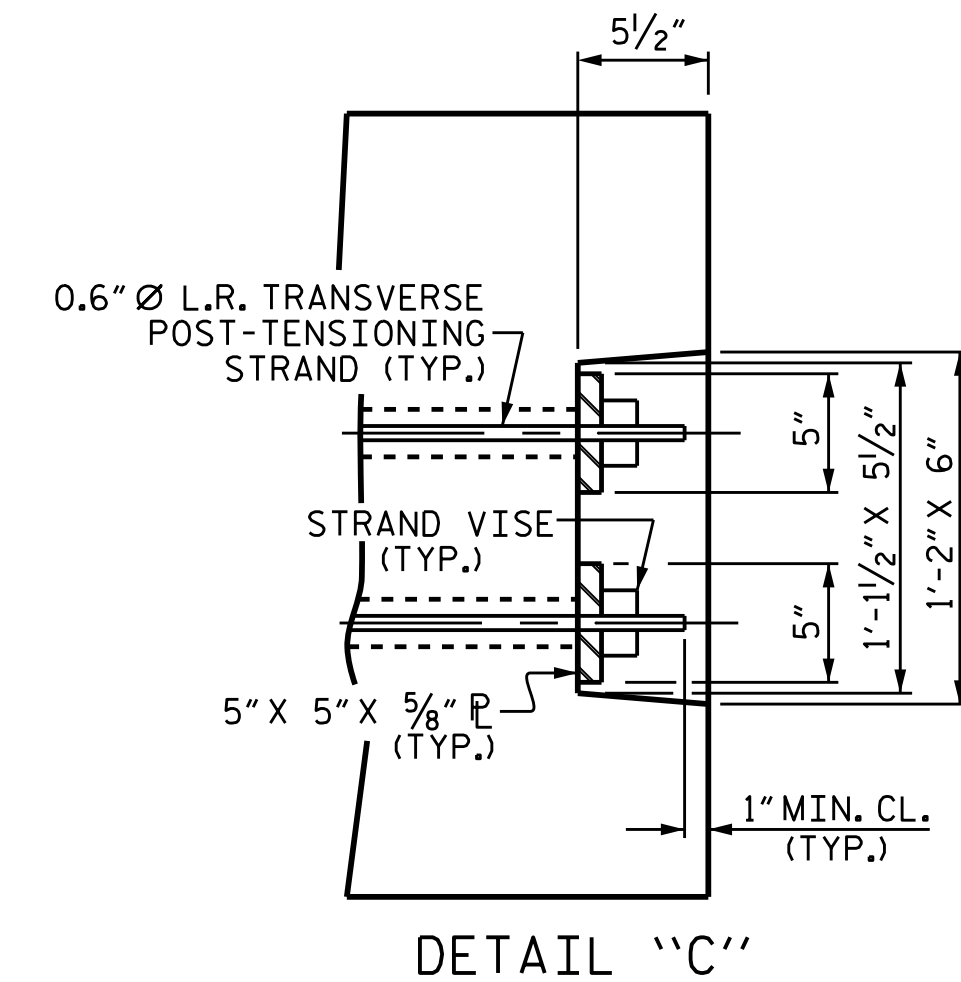
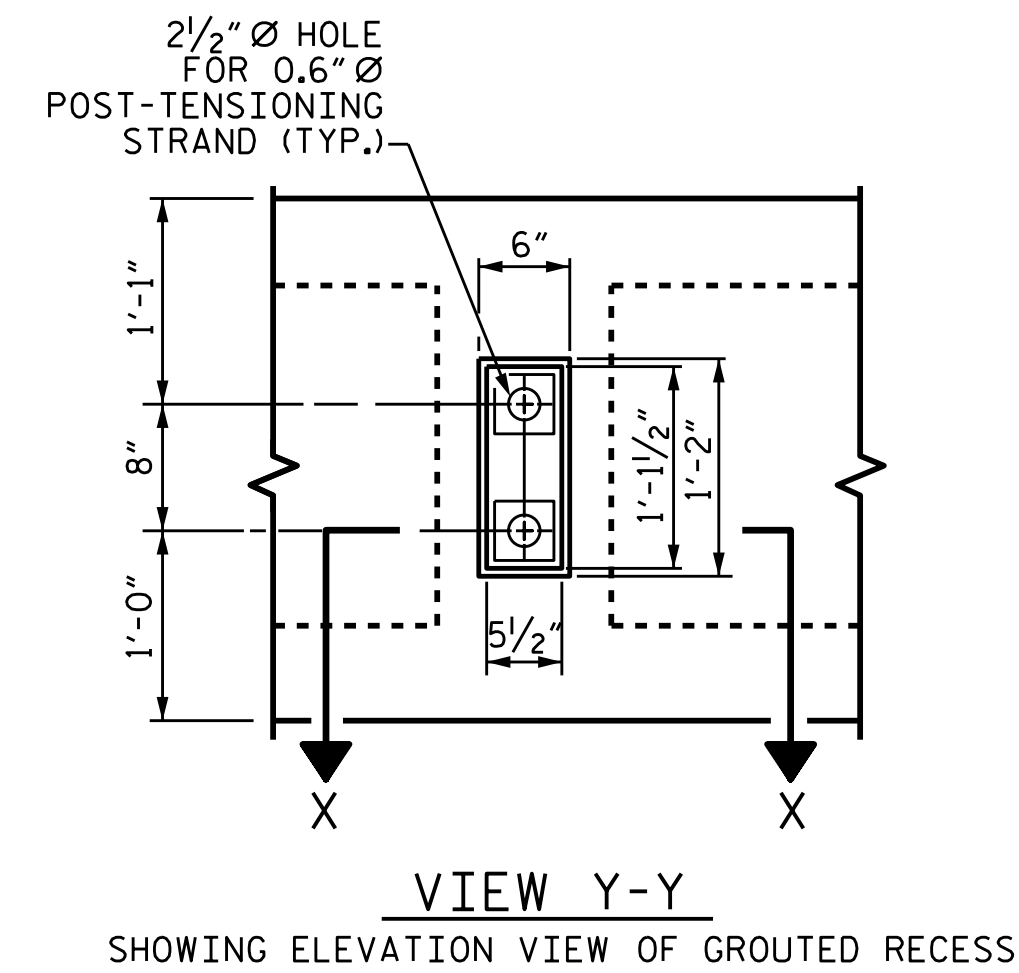
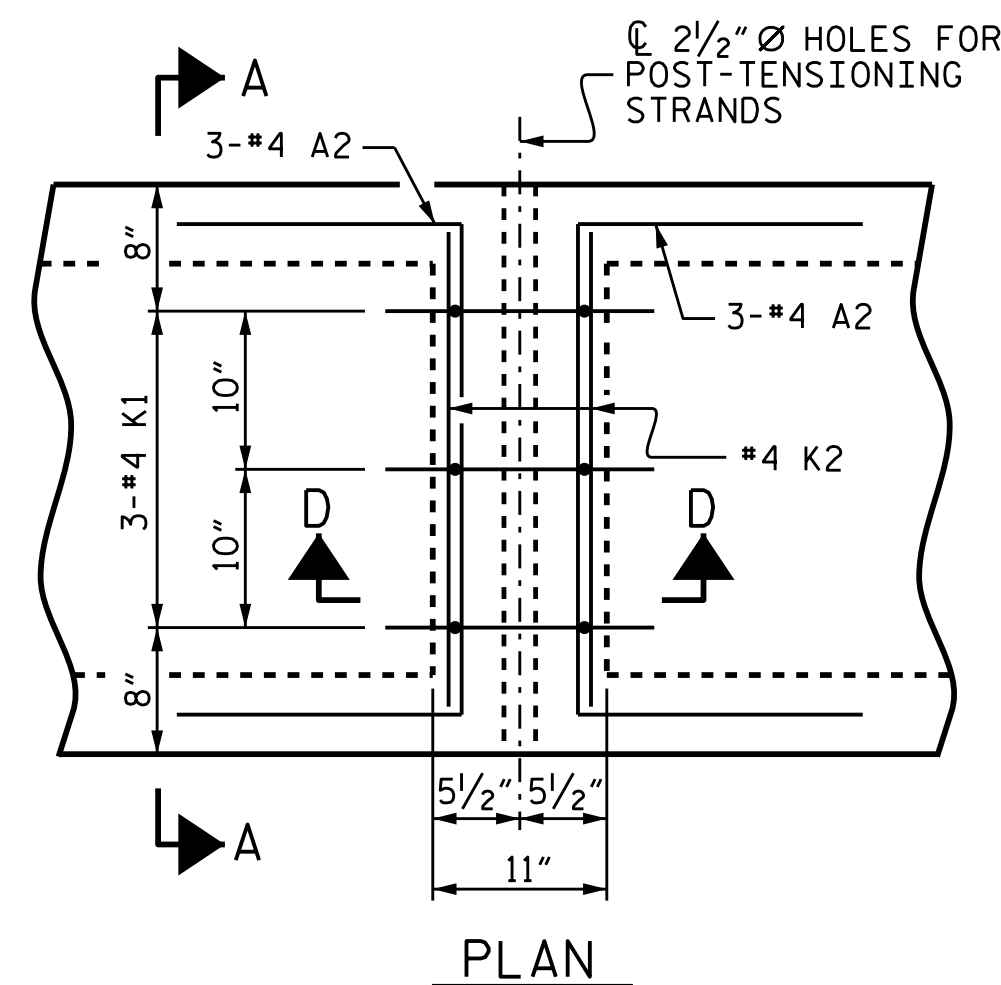


STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
3'-0" X 2'-9"
PRESTRESSED CONCRETE
BOX BEAM UNIT
SPAN "A"

NO.	BY:	DATE:	REVISIONS			SHEET NO. S-7
			NO.	BY:	DATE:	
1			3			TOTAL SHEETS 19
2			4			

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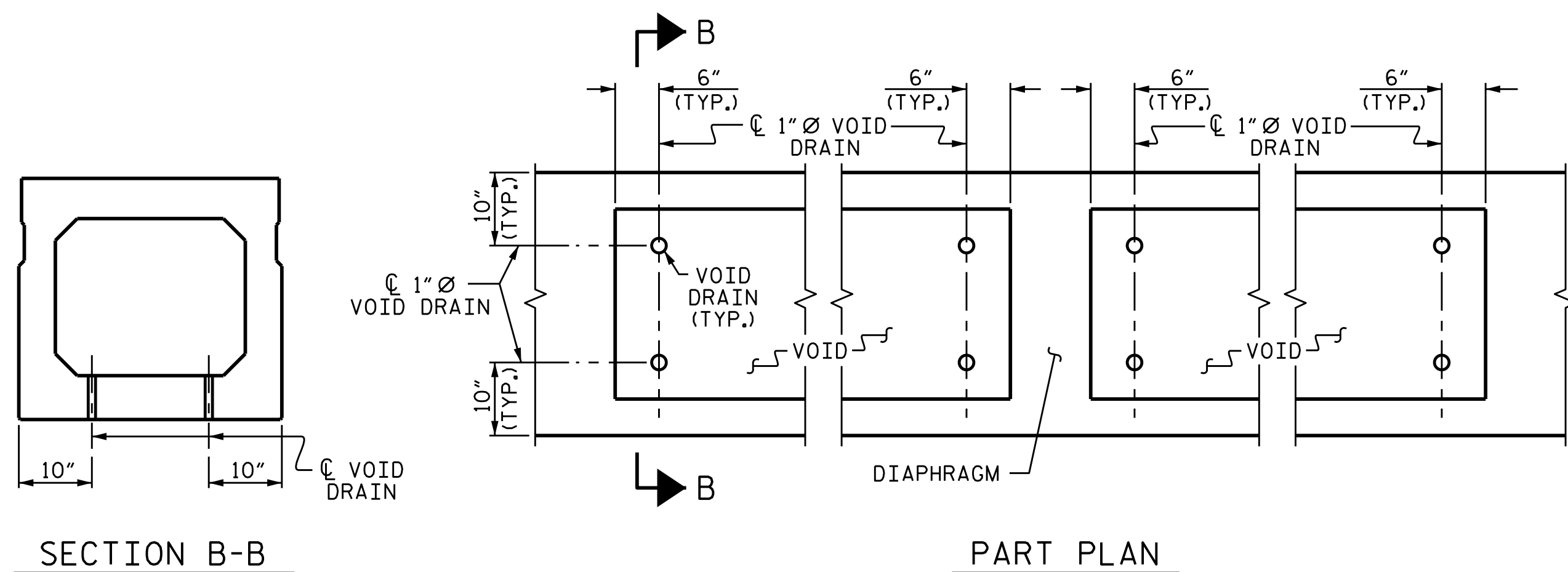
ASSEMBLED BY : R. L. CHESSON DATE : 2017MAR02
CHECKED BY : J. D. HAWK DATE : 3/14/17
DRAWN BY : DGE 10/11 REV. 9/14 MAA/TMG
CHECKED BY : TMG 11/11



DOUBLE DIAPHRAGM DETAILS

#4 "S" BARS NOT SHOWN. #4 "S" BARS MAY BE SHIFTED SLIGHTLY TO CLEAR 2 1/2" Ø HOLE.

ROUTED RECESS DETAIL AT END OF POST-TENSIONED STRANDS OF EXTERIOR BOX BEAM



VOID DRAIN DETAILS
(DIMENSIONS SHOWN ARE TYPICAL FOR EACH VOID)

DEAD LOAD DEFLECTION AND CAMBER	
85' & 90' BOX BEAM UNIT (NC & SE)	3'-0" x 2'-9" 0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2 3/4" ↑
DEFLECTION DUE TO RAILS	1/4" ↓
DEFLECTION DUE TO CONCRETE WEARING SURFACE	** 3/8" ↓
FINAL CAMBER	2 1/8" ↑

** DOES NOT INCLUDE FUTURE WEARING SURFACE

PROJECT NO. B-4943
DURHAM COUNTY
 STATION: 14+67.00 -L-
 SHEET 4 OF 6

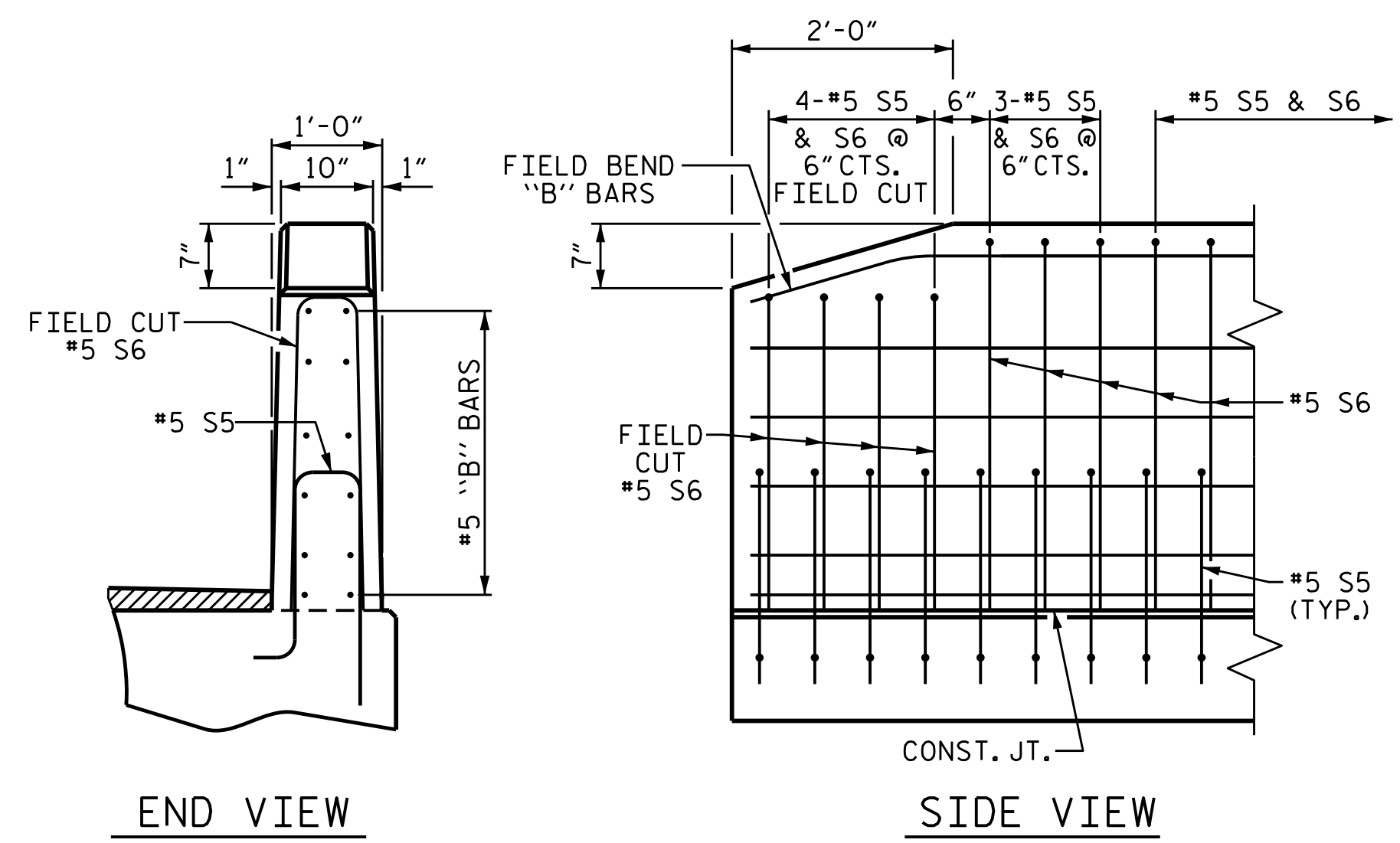
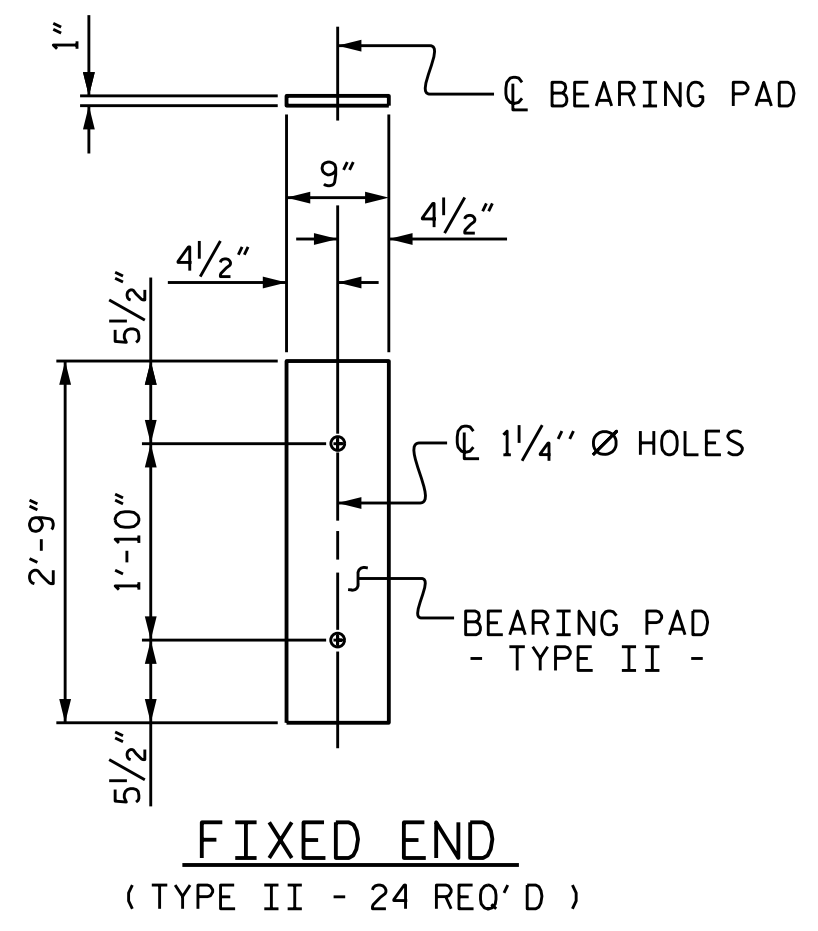


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 3'-0" X 2'-9"
 PRESTRESSED CONCRETE
 BOX BEAM UNIT

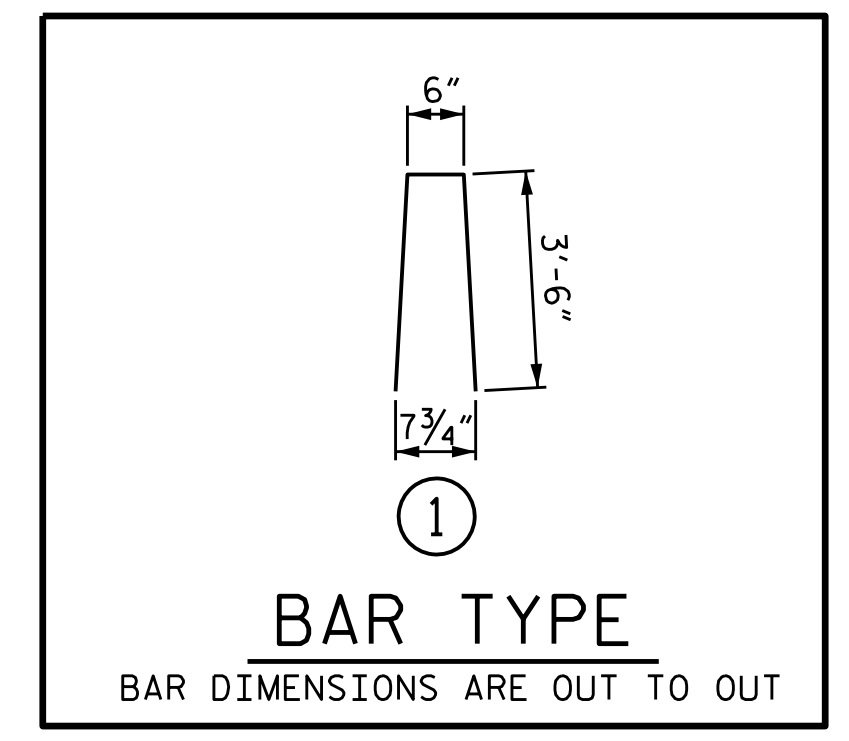
ASSEMBLED BY : R. L. CHESSON DATE : 2017FEB28
 CHECKED BY : J. D. HAWK DATE : 3/14/17
 DRAWN BY : DGE 10/11 REV. 8/14 MAA/TMG
 CHECKED BY : TMG 11/11

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REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8	
1			3			TOTAL SHEETS 19	
2			4				



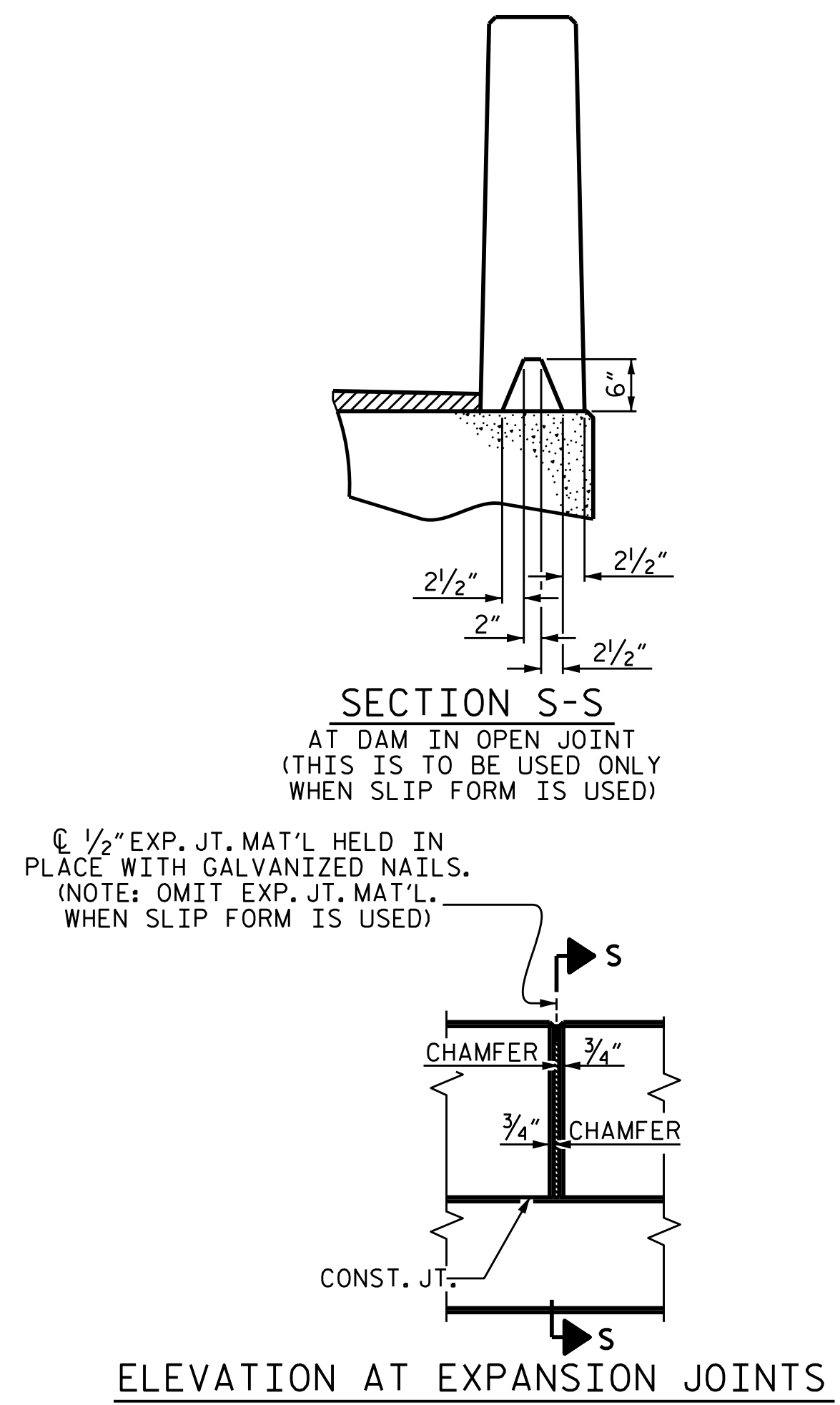
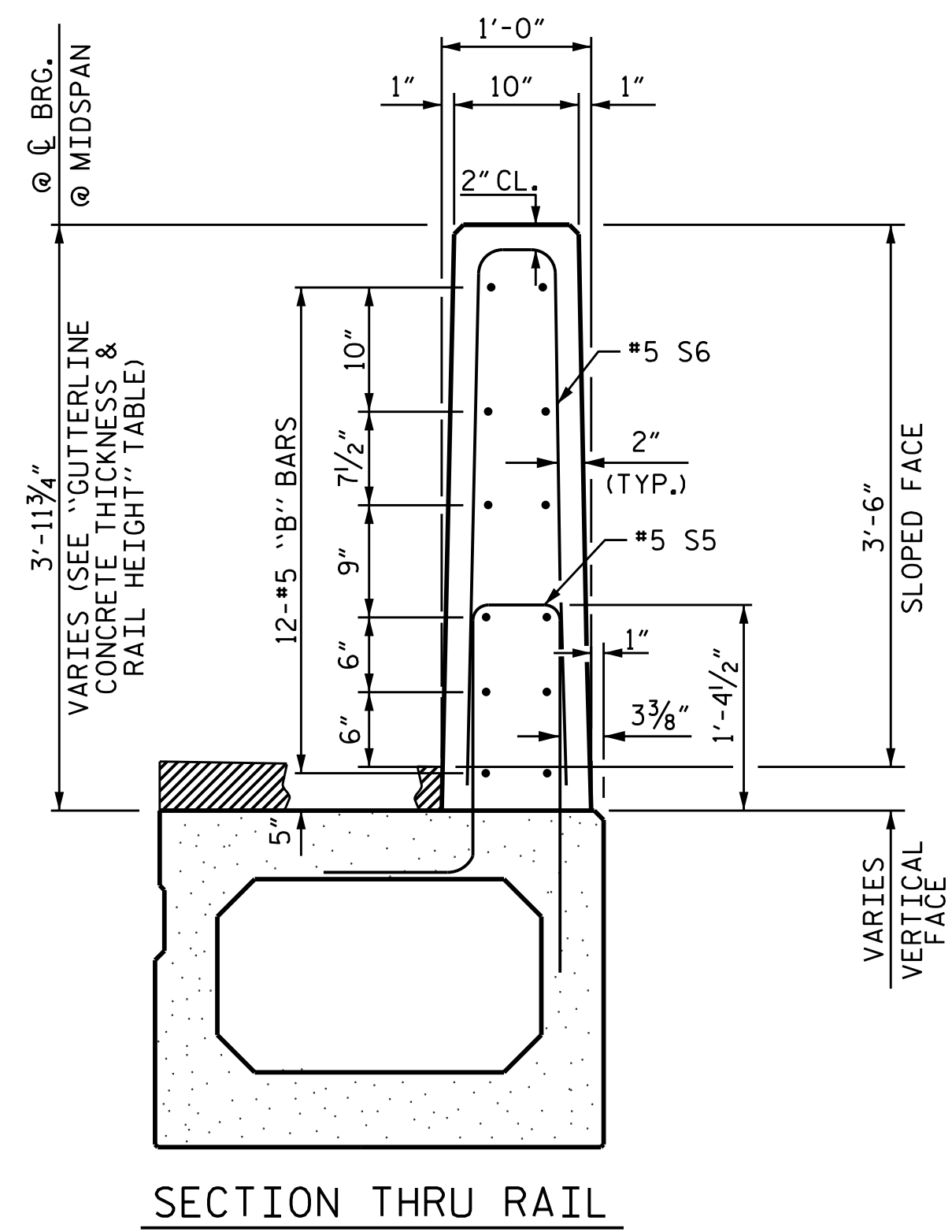
BOX BEAM UNITS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
EXTERIOR B.B.	2	85'-0"	170'-0"
INTERIOR B.B.	10	85'-0"	850'-0"
TOTAL	12		1020'-0"



ELASTOMERIC BEARING DETAILS
ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

END OF RAIL DETAILS

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL					
BAR	BARS PER PAIR OF EXTERIOR UNITS	SIZE	TYPE	LENGTH	WEIGHT
	85' UNIT				
* B9	72	#5	STR	27'-11"	2096
* S6	236	#5	1	7'-6"	1846
* EPOXY COATED REINFORCING STEEL				LBS.	3942
CLASS AA CONCRETE				CU.YDS.	23.2
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.	170.0



GUTTERLINE CONCRETE THICKNESS & RAIL HEIGHT		
	CONCRETE OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
85' UNITS	3 5/8"	3'-9 5/8"

VERTICAL CONCRETE BARRIER RAIL DETAILS

PROJECT NO. B-4943
DURHAM COUNTY
 STATION: 14+67.00 -L-
 SHEET 5 OF 6



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

3'-0" X 2'-9"
 PRESTRESSED CONCRETE
 BOX BEAM UNIT

ASSEMBLED BY : R. L. CHESSON	DATE : 2016 DEC
CHECKED BY : J. D. HAWK	DATE : 3/14/17
DRAWN BY : DGE 10/11	REV. 4/15
CHECKED BY : TMG 11/11	MAA/TMG

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS 19
2			4			

NOTES

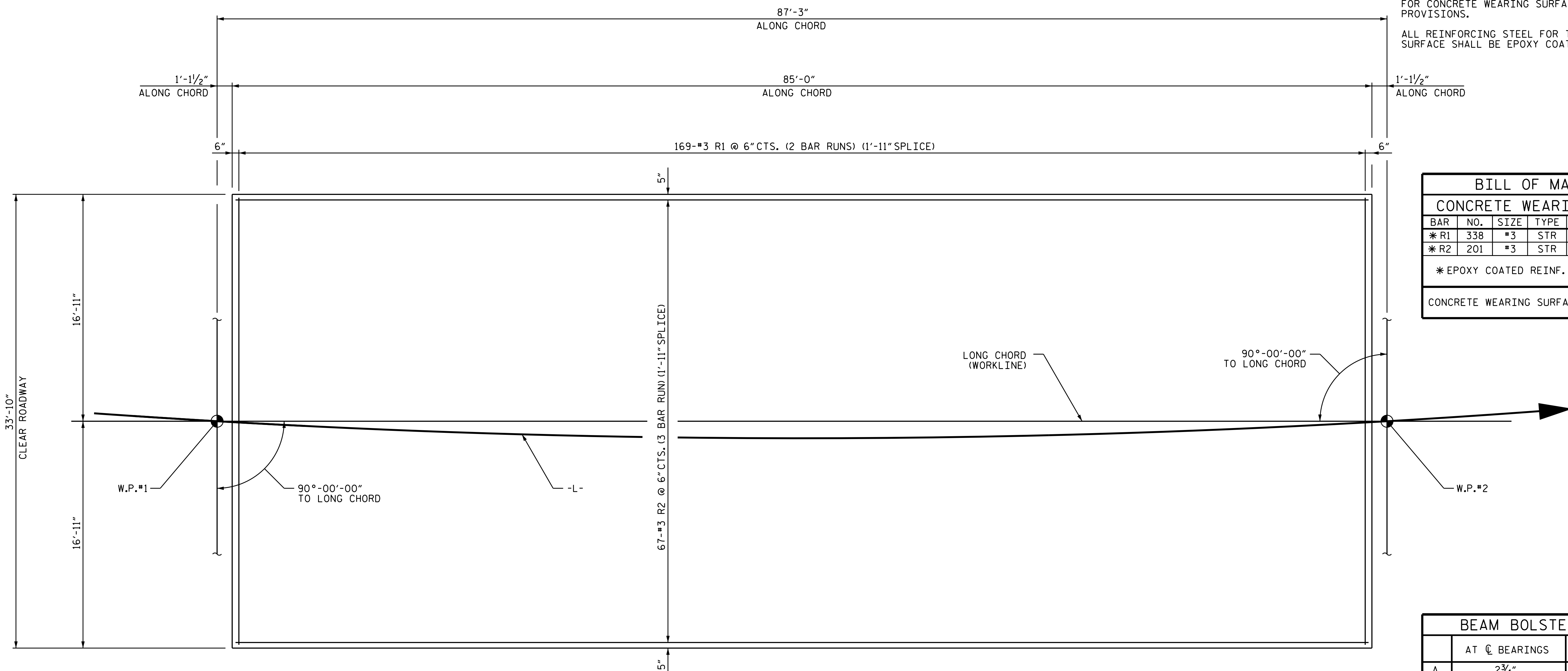
PLACEMENT OF THE CONCRETE OVERLAY SHALL OCCUR AFTER CASTING THE CONCRETE RAIL.

THE COST OF THE #3 BARS, CAST WITH THE CONCRETE WEARING SURFACE, SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CONCRETE WEARING SURFACE.

FOR CONCRETE WEARING SURFACE, SEE SPECIAL PROVISIONS.

ALL REINFORCING STEEL FOR THE CONCRETE WEARING SURFACE SHALL BE EPOXY COATED.

BILL OF MATERIAL					
CONCRETE WEARING SURFACE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*R1	338	#3	STR	17'-9"	2,256
*R2	201	#3	STR	29'-6"	2,229
* EPOXY COATED REINF. STEEL = 4,485 LBS.					
CONCRETE WEARING SURFACE = 2,875.8 SQ. FT.					



PLAN

BEAM BOLSTER HEIGHT		
	AT \odot BEARINGS	AT MID-SPAN
A	2 3/4"	3/4"

GROOVING BRIDGE FLOORS	
	(SQ. FT.)
APPROACH SLABS	687
BRIDGE DECK	2,611
TOTAL	3,298

PROJECT NO. B-4943
DURHAM COUNTY
 STATION: 14+67.00 -L-

SHEET 6 OF 6



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
CONCRETE WEARING SURFACE DETAILS

DRAWN BY : R. L. CHESSON DATE : 2017MAR01
 CHECKED BY : J. D. HAWK DATE : 3/14/17
 DESIGN ENGINEER OF RECORD: R. L. CHESSON DATE : 4/17/2017

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REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10	
1			3			TOTAL SHEETS	19
2			4				

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.)

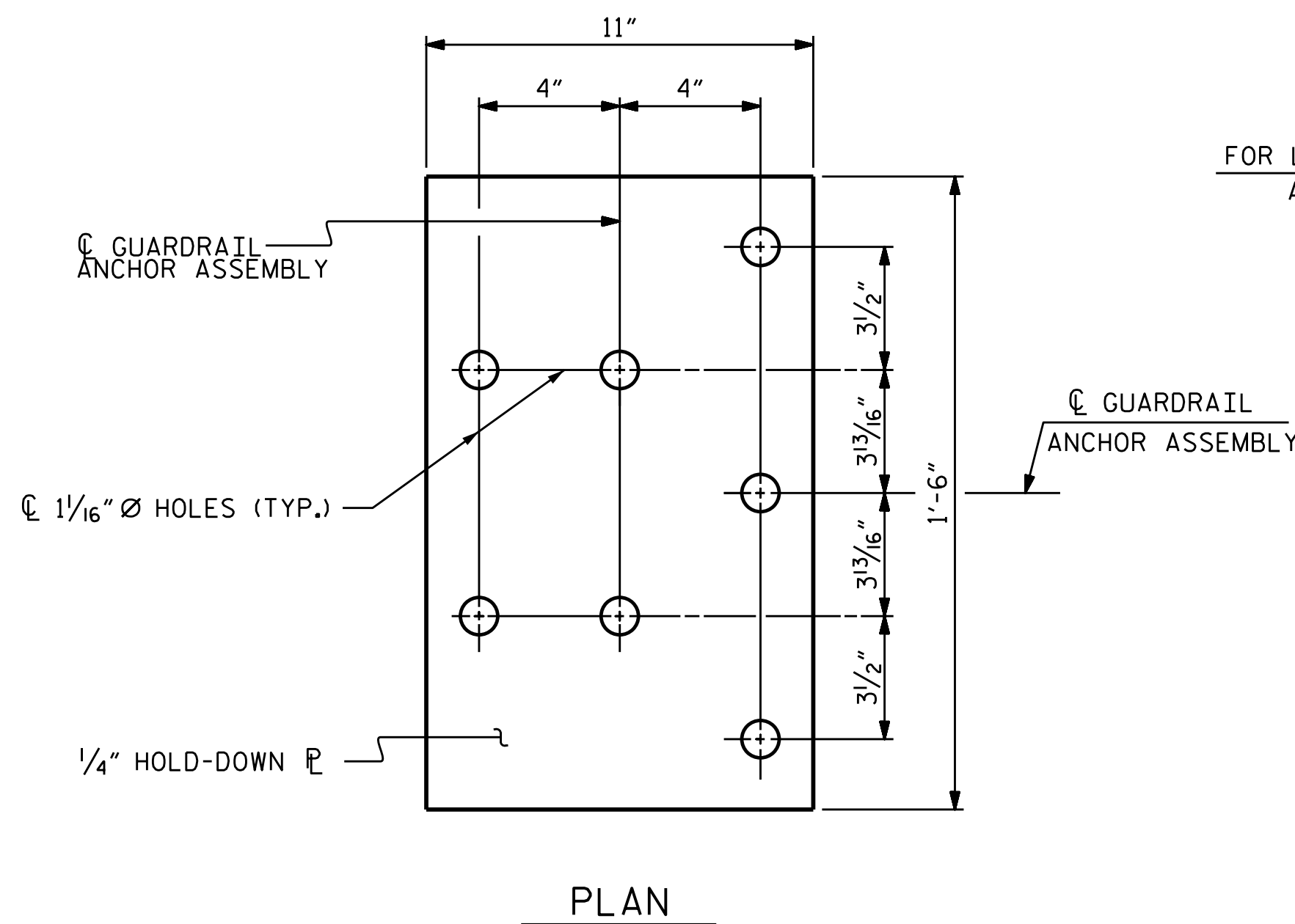
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

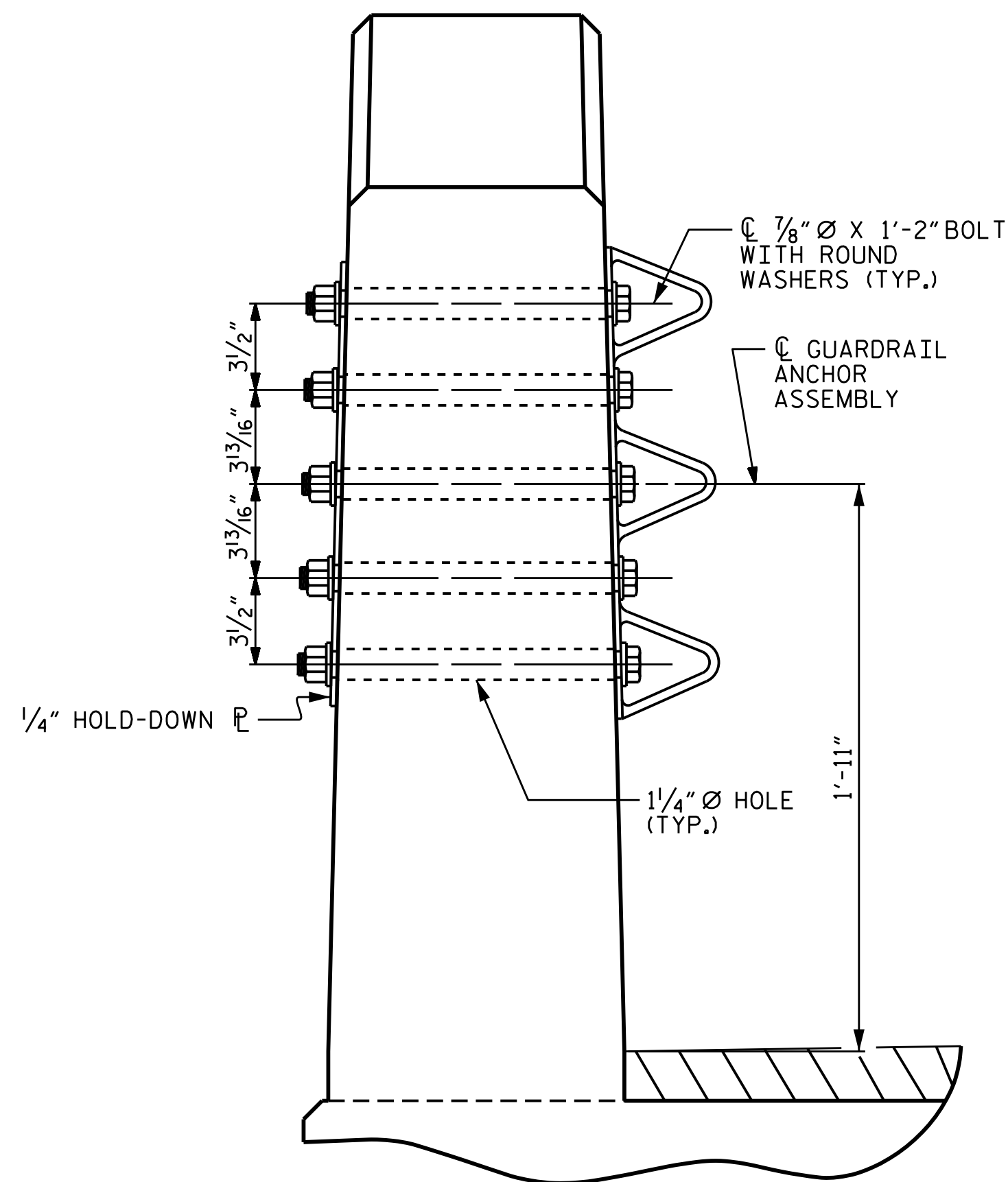
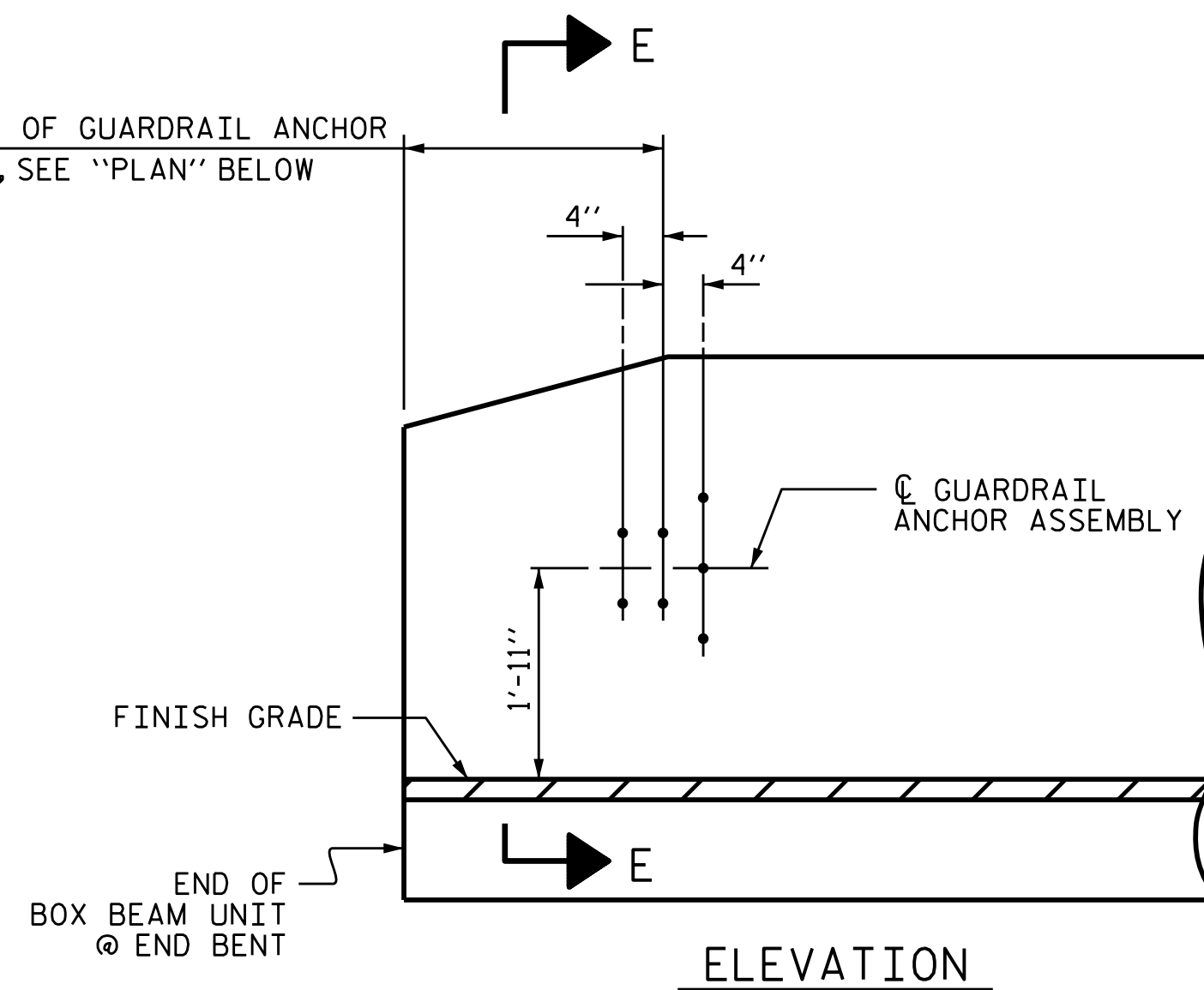
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR VERTICAL CONCRETE BARRIER RAIL.

THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE VERTICAL CONCRETE BARRIER RAIL TO CLEAR ASSEMBLY BOLTS.

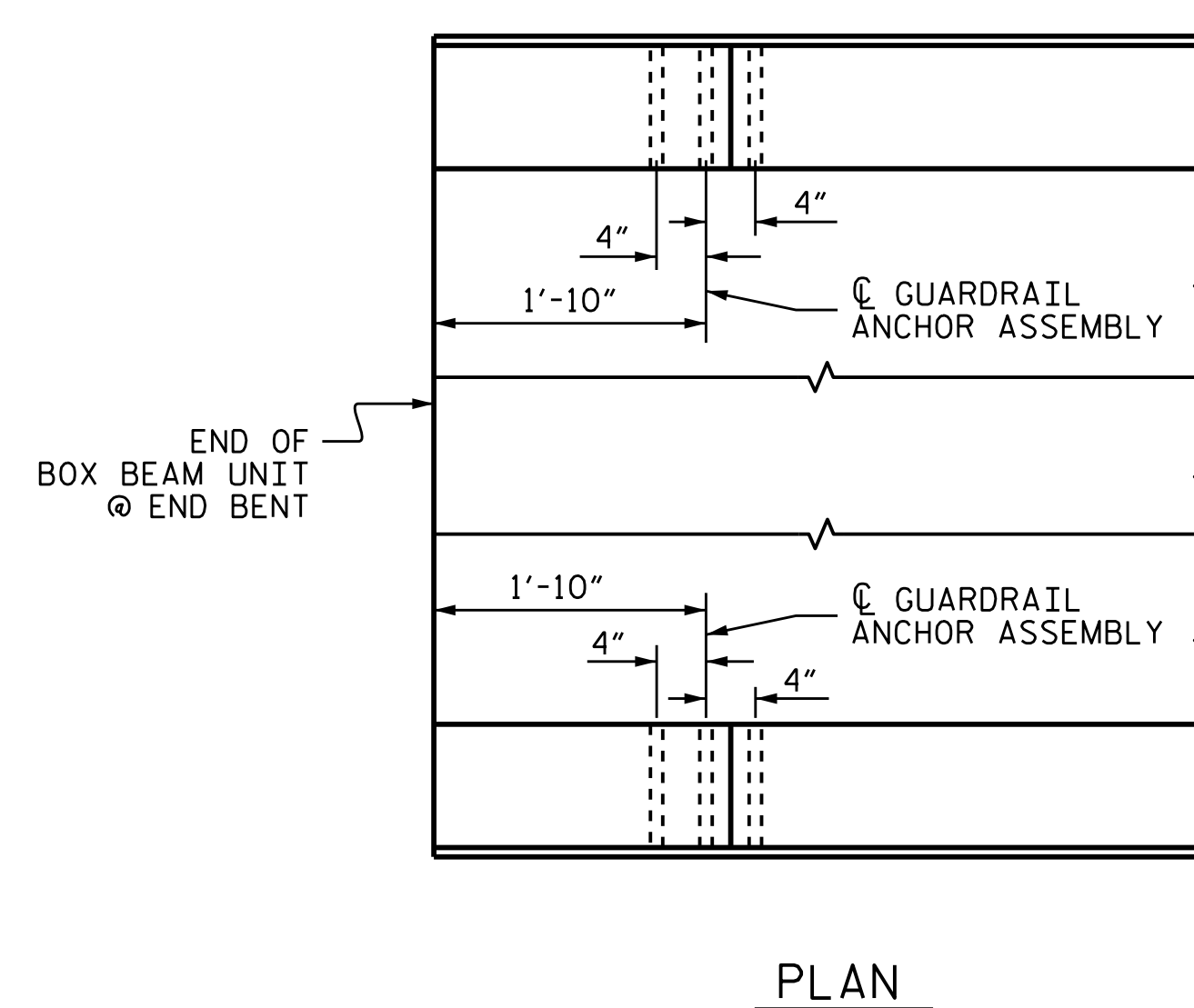
THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



FOR LOCATION OF GUARDRAIL ANCHOR ASSEMBLY, SEE "PLAN" BELOW



SECTION E-E
GUARDRAIL ANCHOR ASSEMBLY DETAILS



LOCATION OF ANCHORS FOR GUARDRAIL

END BENT #1 SHOWN, END BENT #2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENT

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-4943
DURHAM COUNTY
 STATION: 14+67.00 -L-



DocuSigned by:
 F24583893BF4DE
 5/23/2017

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 GUARDRAIL ANCHORAGE
 DETAILS
 FOR VERTICAL CONCRETE
 BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			19

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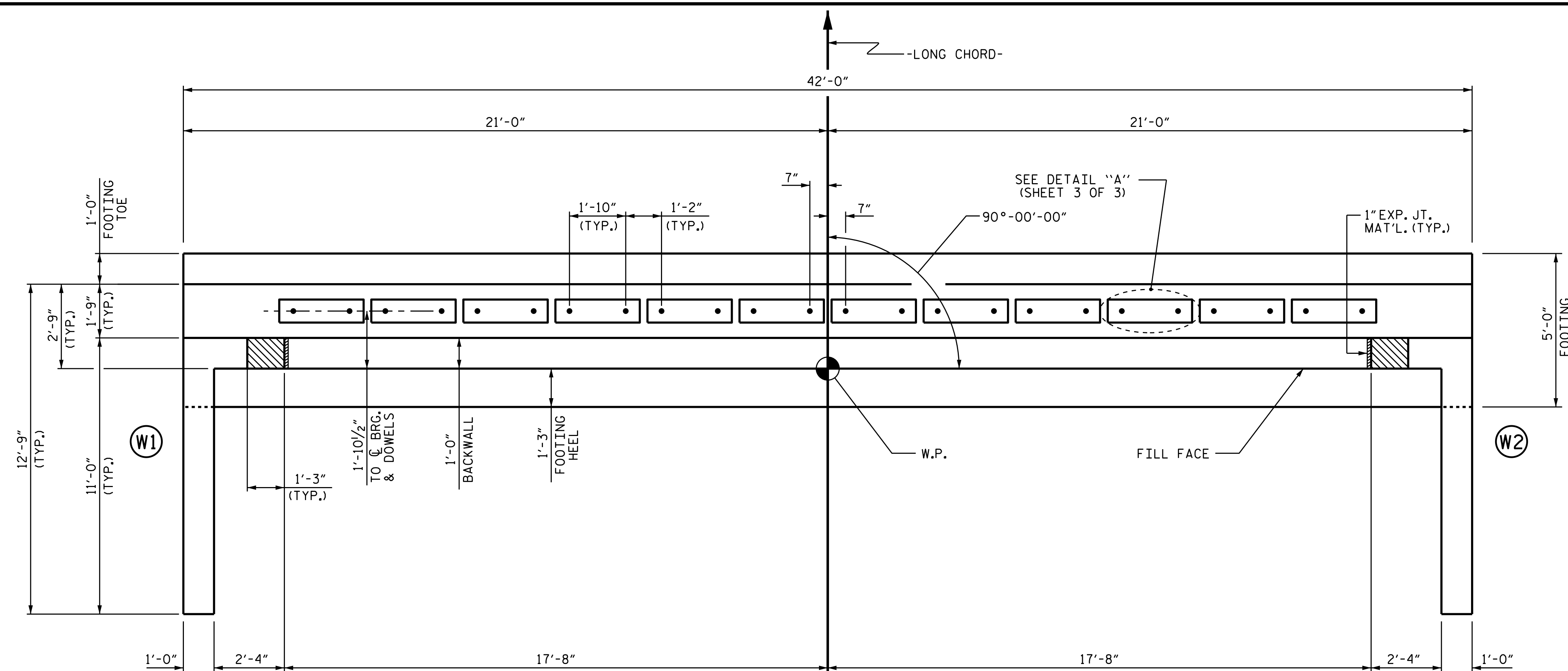
ASSEMBLED BY : R. L. CHESSON	DATE : 2017MAR02
CHECKED BY : J. D. HAWK	DATE : 3/14/17
DRAWN BY : MAA 5/10	REV. 12/5/11
CHECKED BY : GM 5/10	REV. 6/13
	REV. 1/15
	MAA/GM
	MAA/GM
	MAA/TMG

NOTES

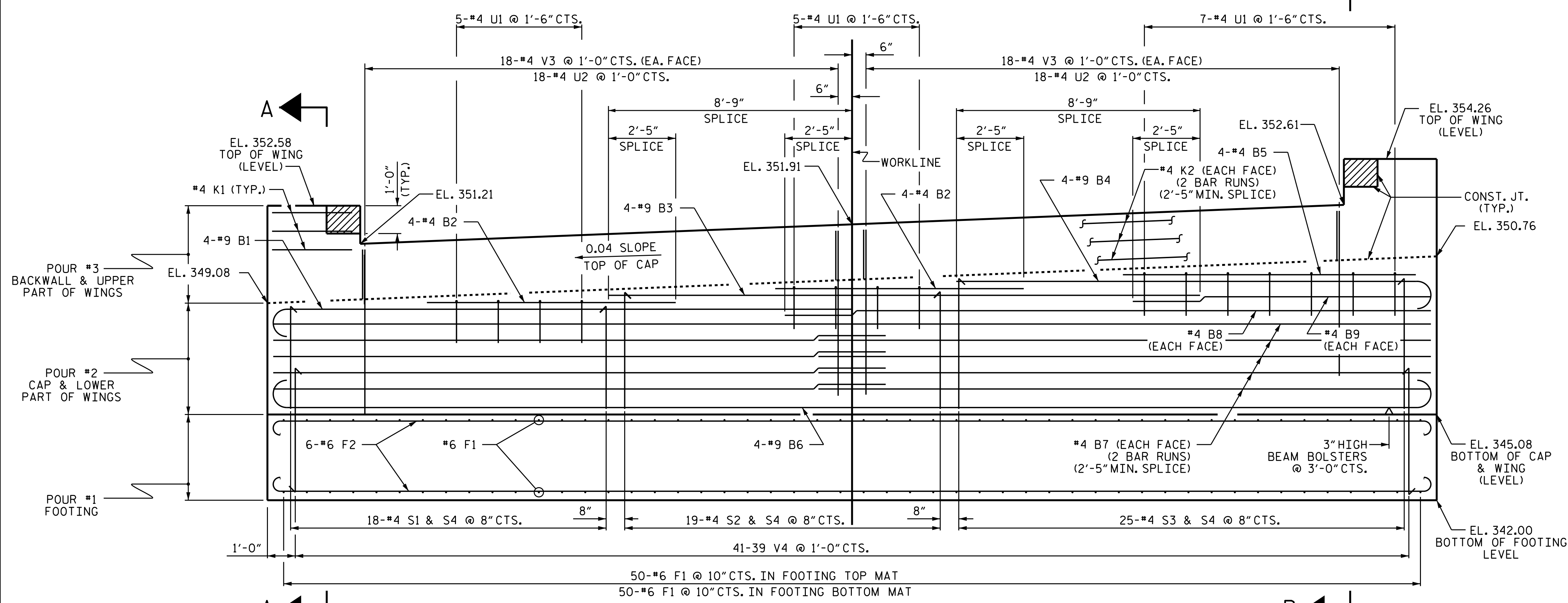
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR WING DETAILS, SEE SHEET 2 OF 3.



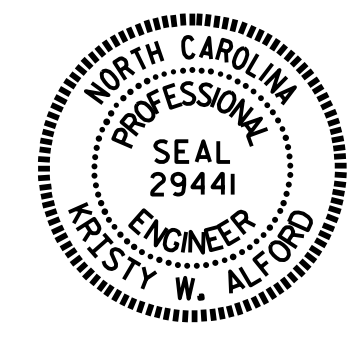
PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 3 OF 3.

DRAWN BY : R. L. CHESSON DATE : 2/27/17
 CHECKED BY : J. D. HAWK DATE : 3/22/17
 DESIGN ENGINEER OF RECORD : R. L. CHESSON DATE : 4/17/17



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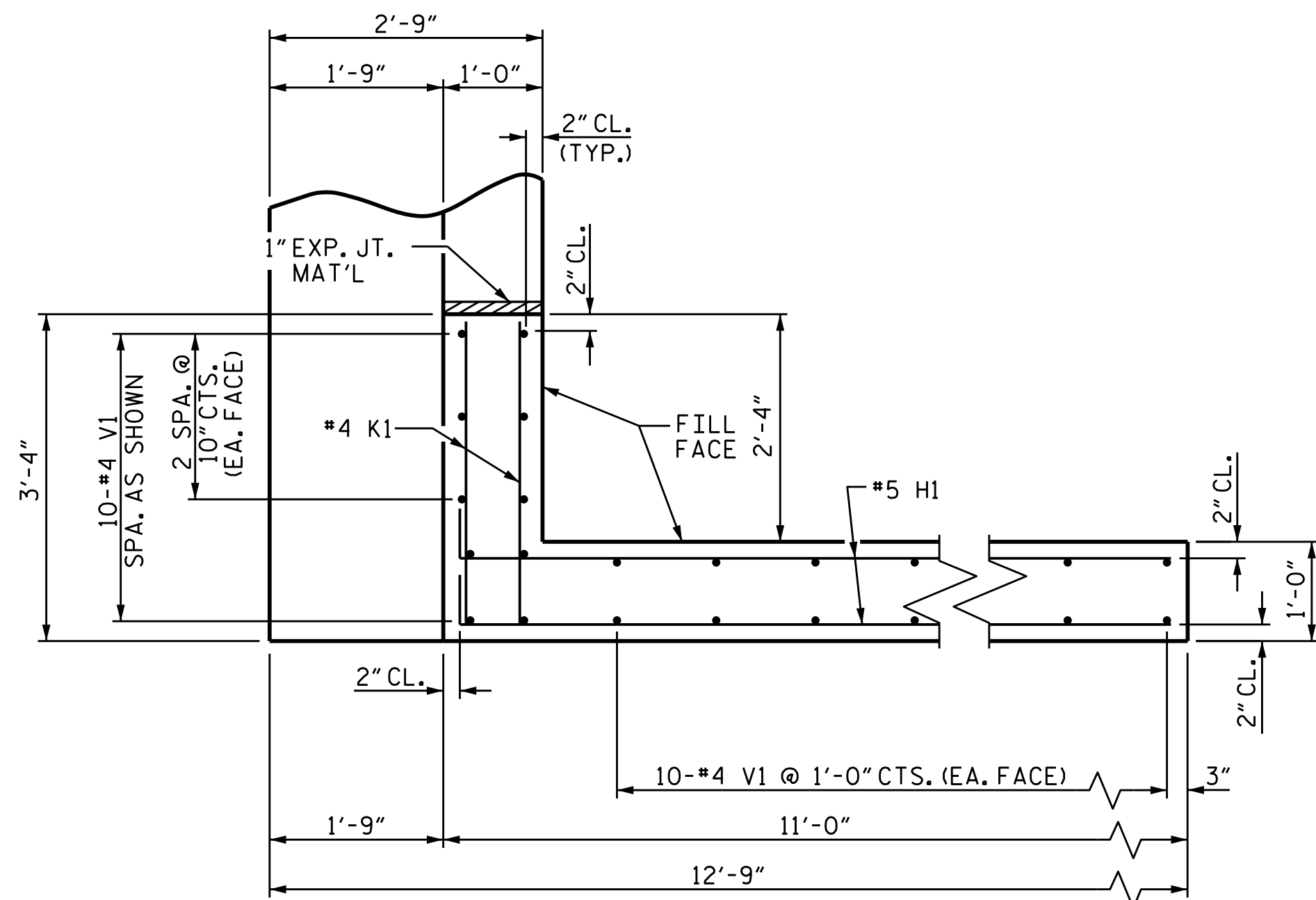
PROJECT NO. B-4943
 DURHAM COUNTY
 STATION: 14+67.00 -L-

SHEET 1 OF 3

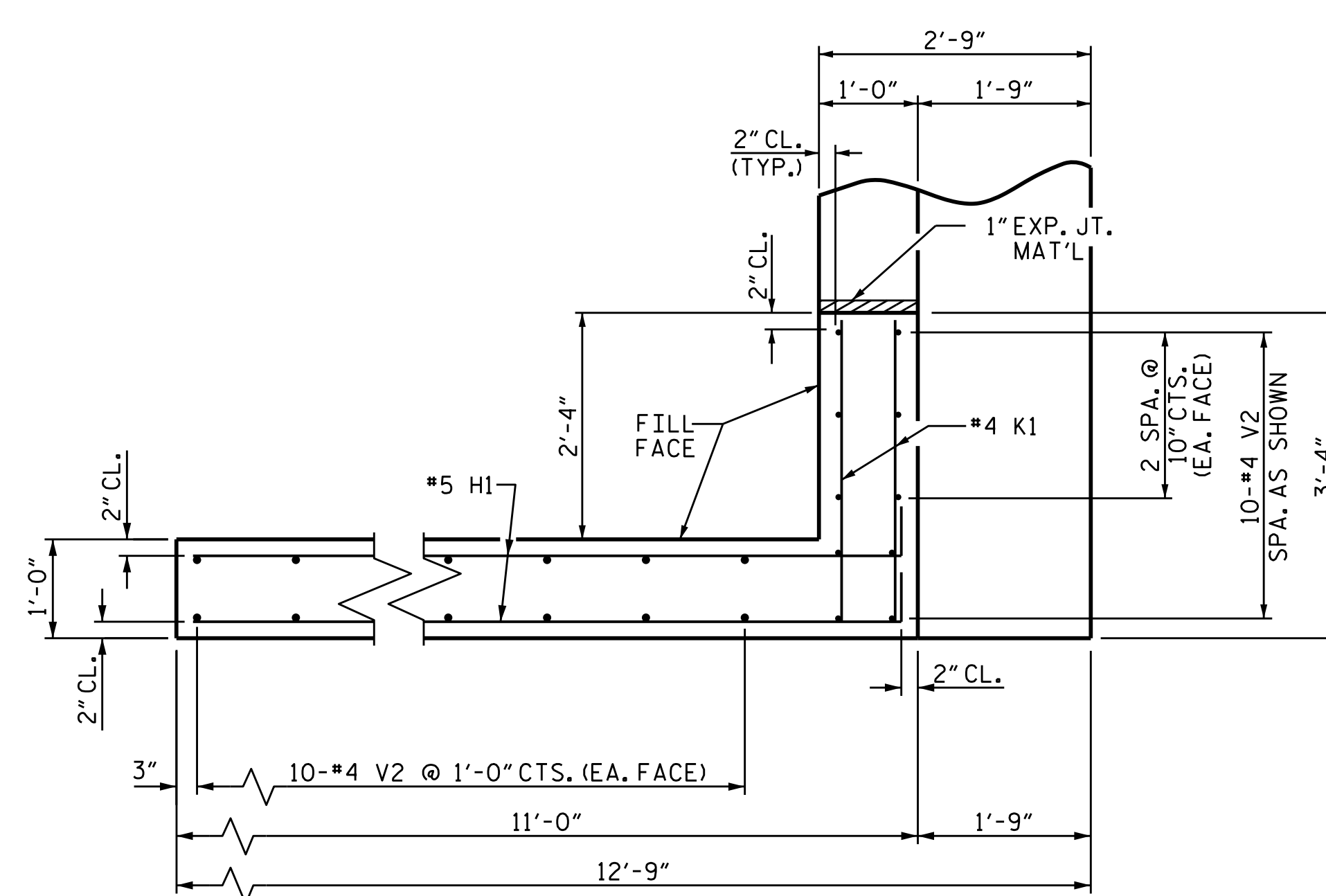
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE
END BENT No. 1

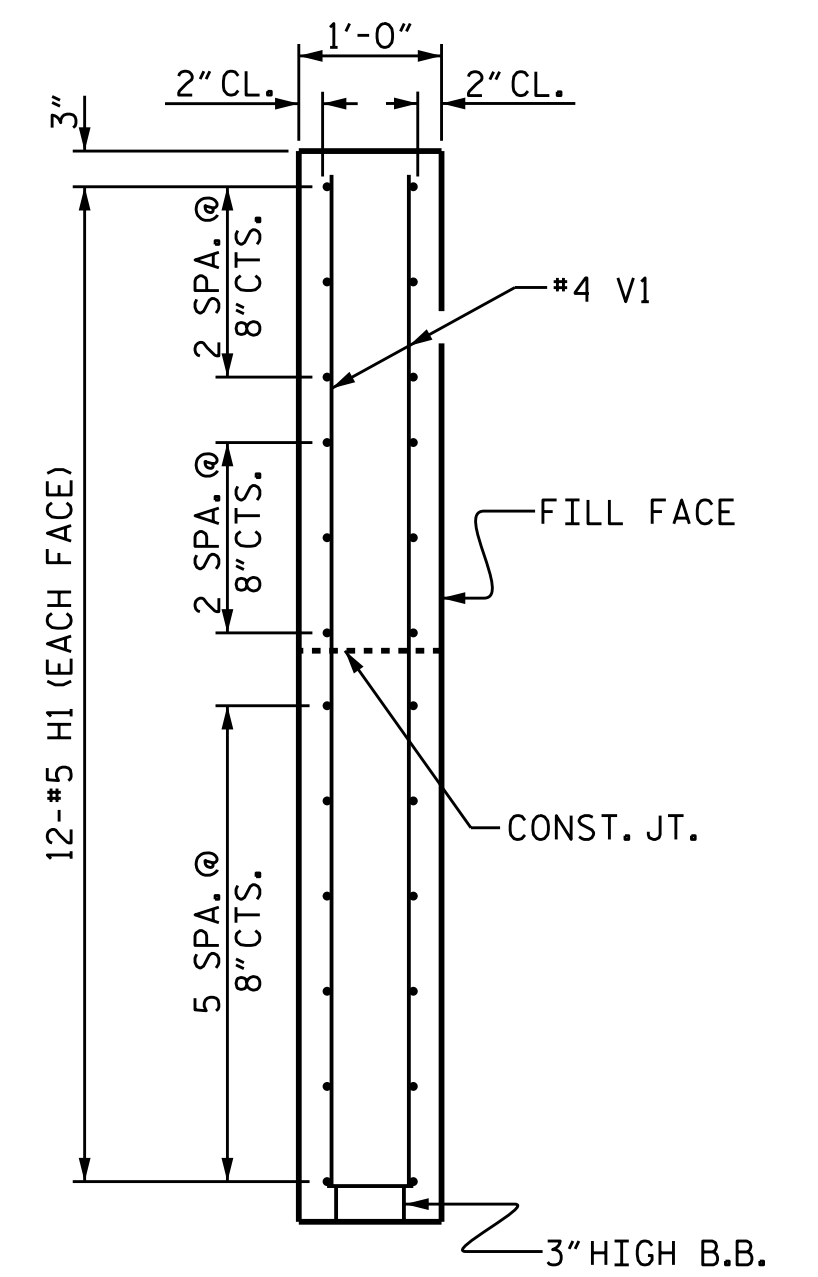
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12	
1			3			TOTAL SHEETS 19	
2			4				



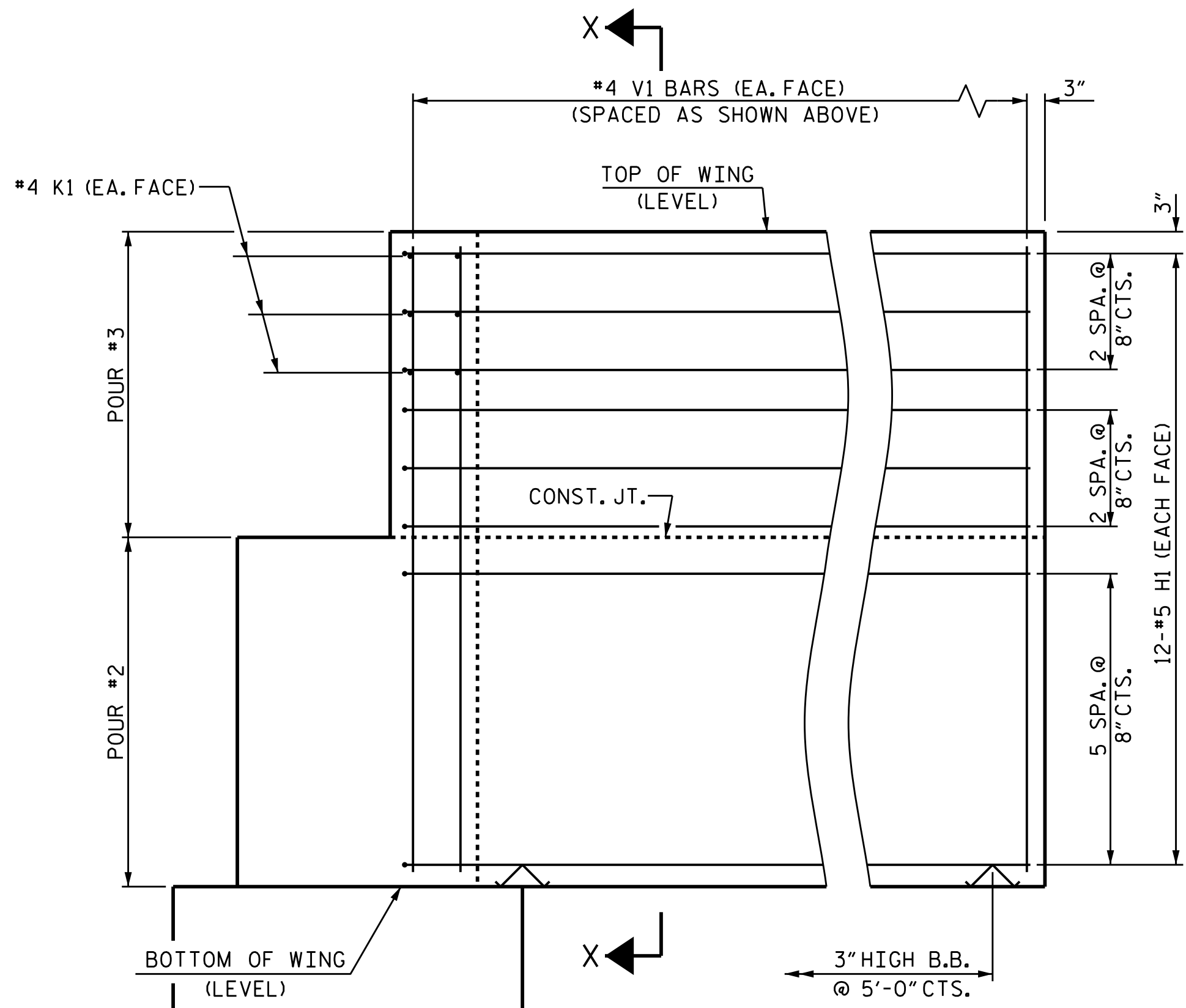
PLAN OF WING (W1)



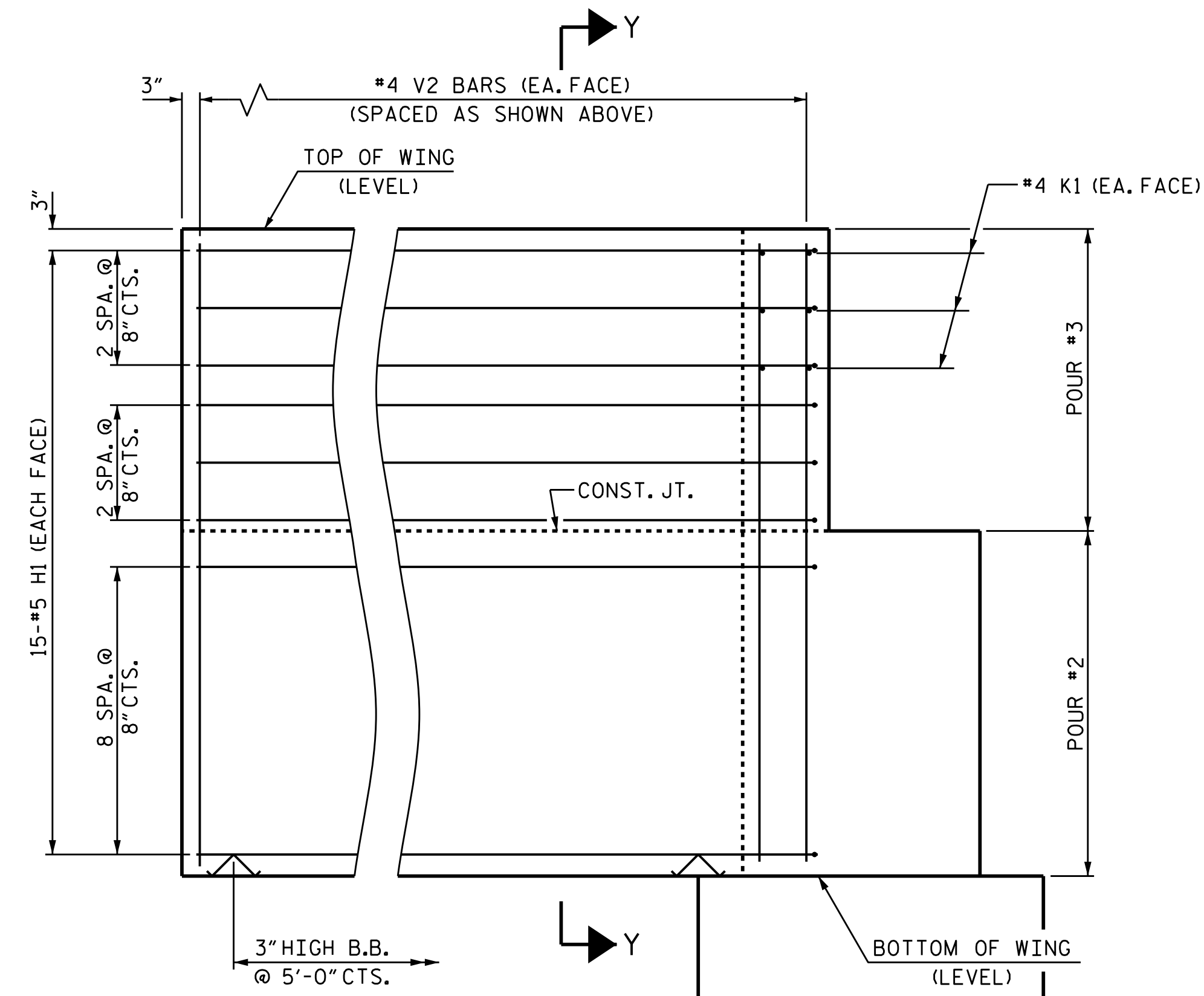
PLAN OF WING (W2)



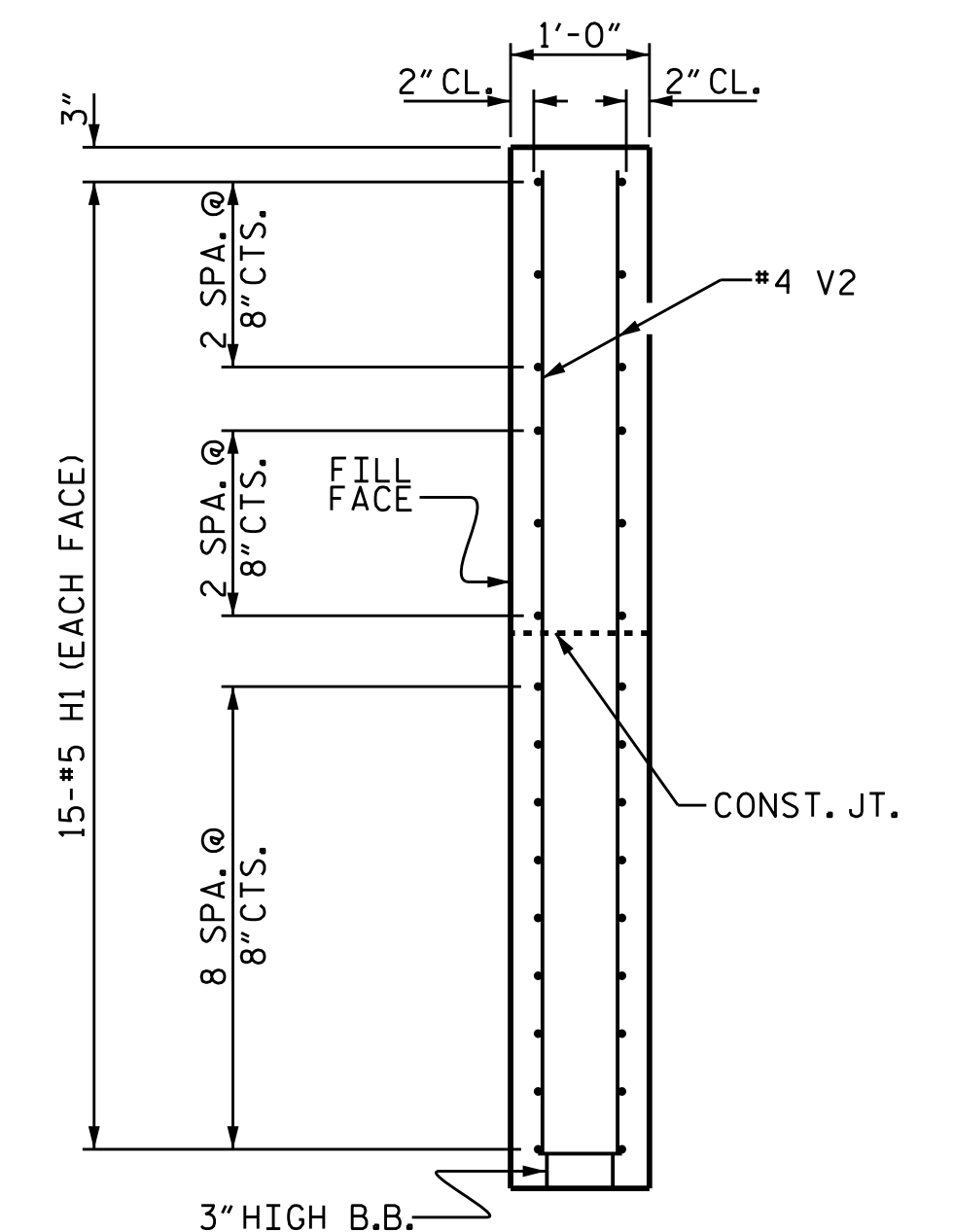
SECTION X-X



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)



SECTION Y-Y

WING DETAILS

PROJECT NO. B-4943
 DURHAM COUNTY
 STATION: 14+67.00 -L-

SHEET 2 OF 3



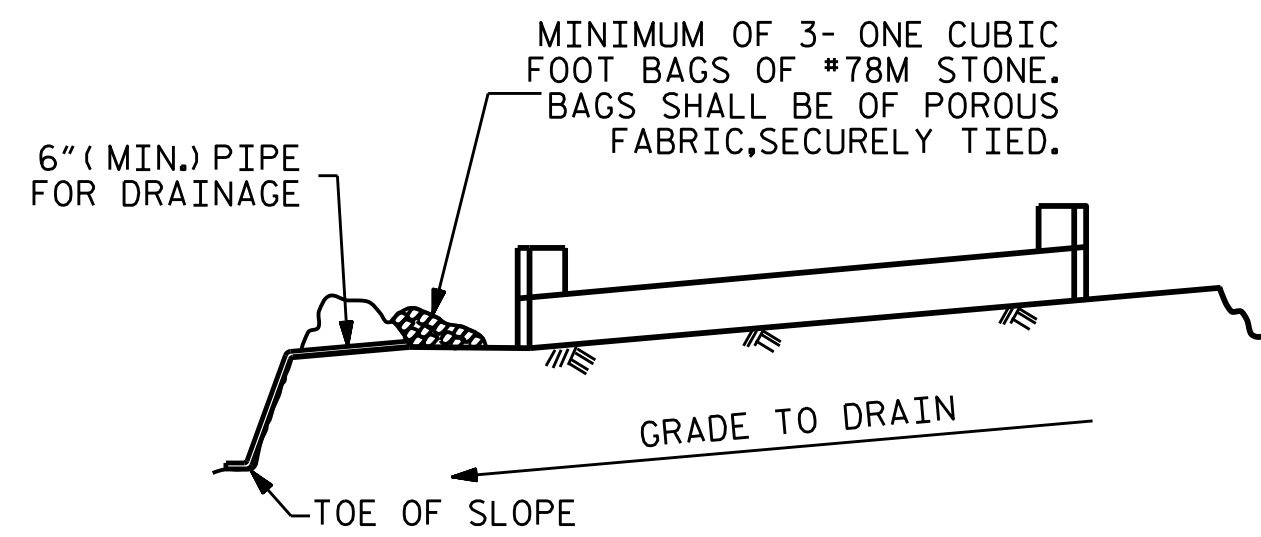
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUBSTRUCTURE
 END BENT No. 1
 WING DETAILS

ASSEMBLED BY : R. L. CHESSON	DATE : 2/28/17
CHECKED BY : J. D. HAWK	DATE : 3/22/17
DRAWN BY : WJH 12/11	REV. 4/15
CHECKED BY : AAC 12/11	MAA/TMG

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13	
1			3			TOTAL SHEETS 19	
2			4				

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 jshawk

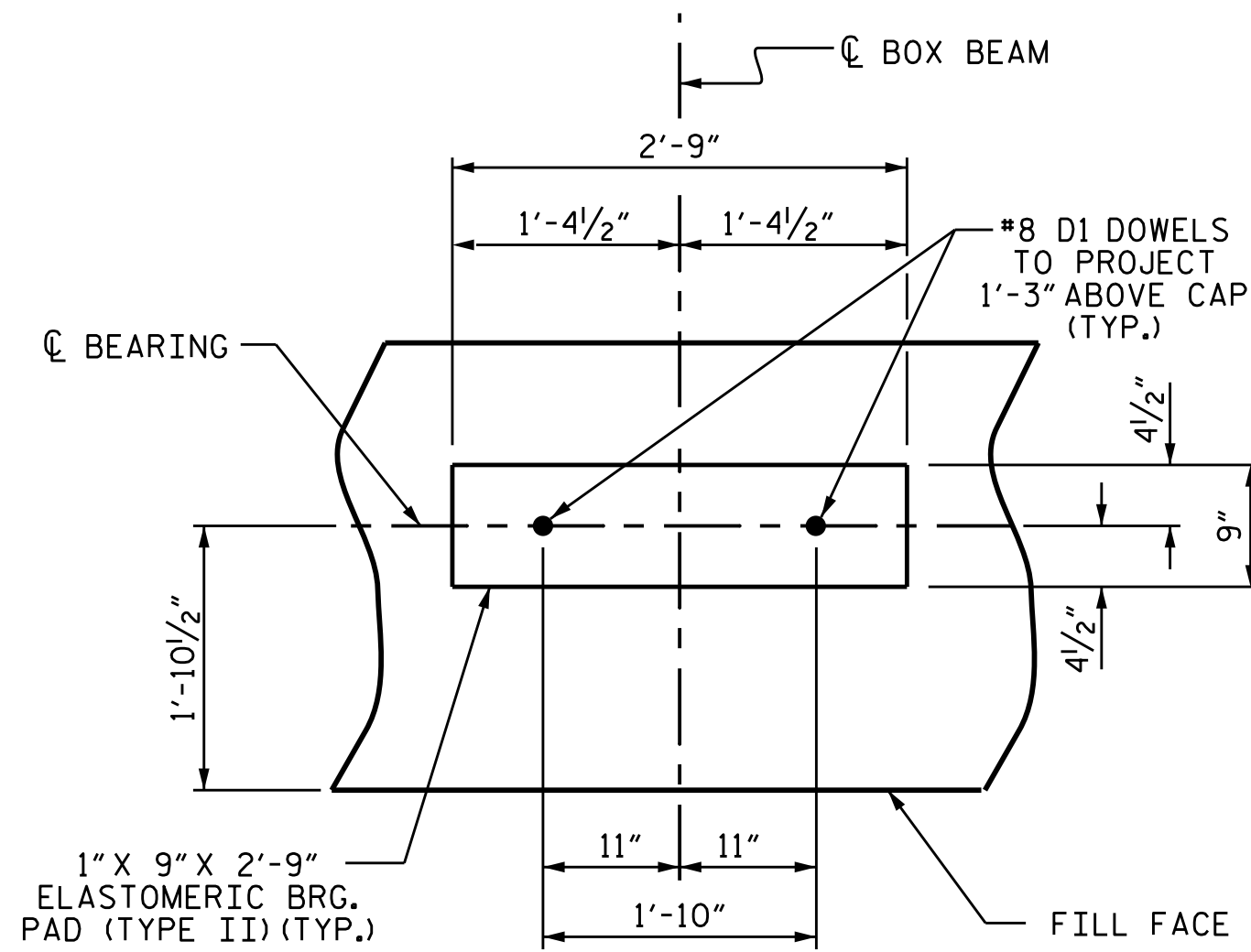


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

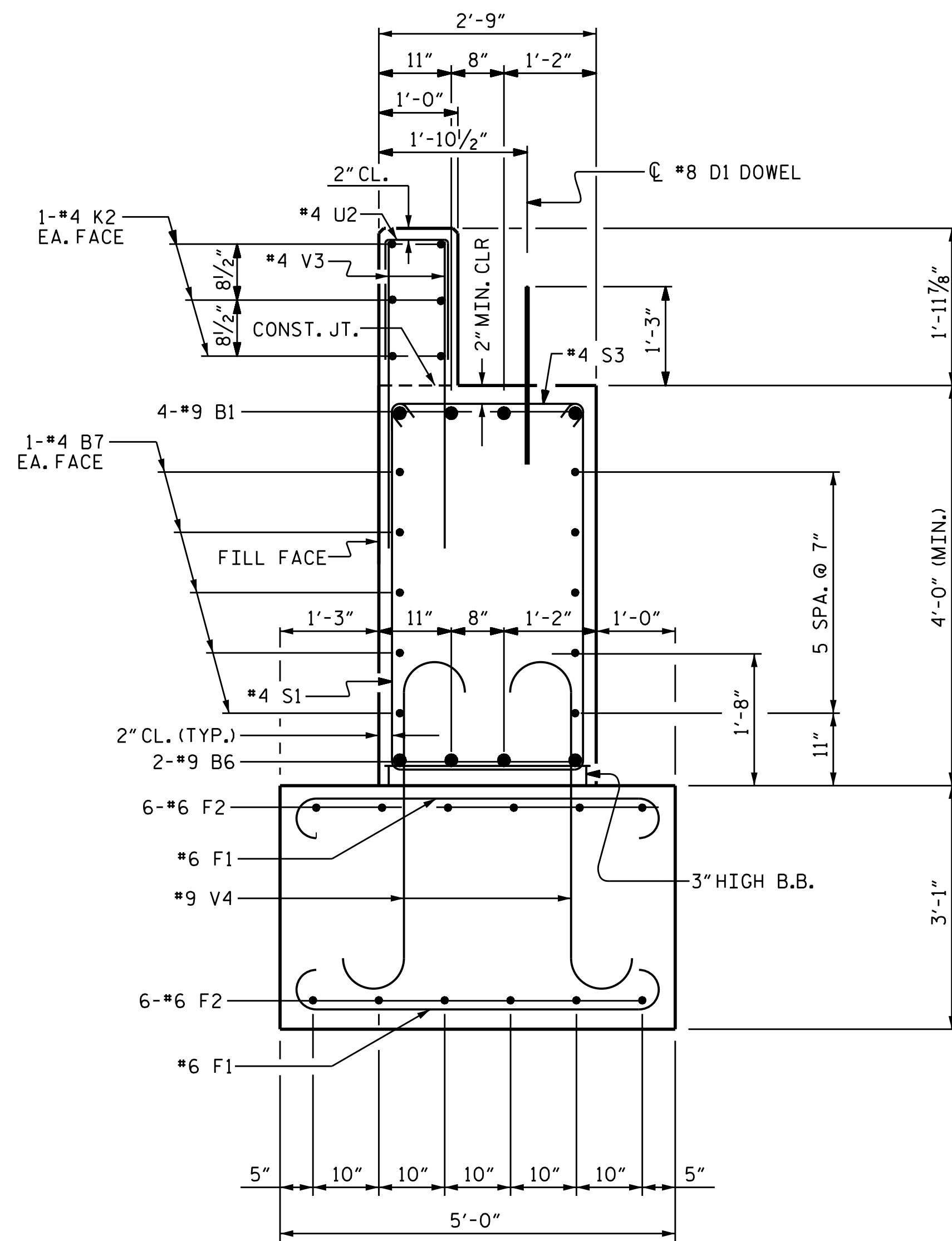
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

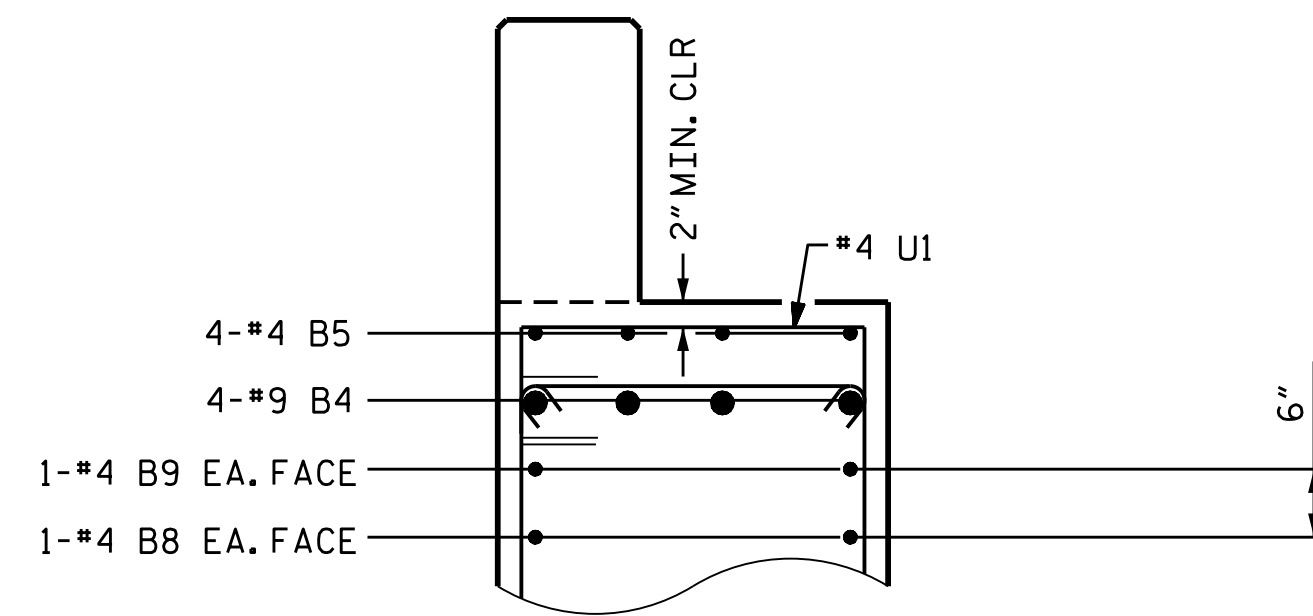


DETAIL "A"

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)

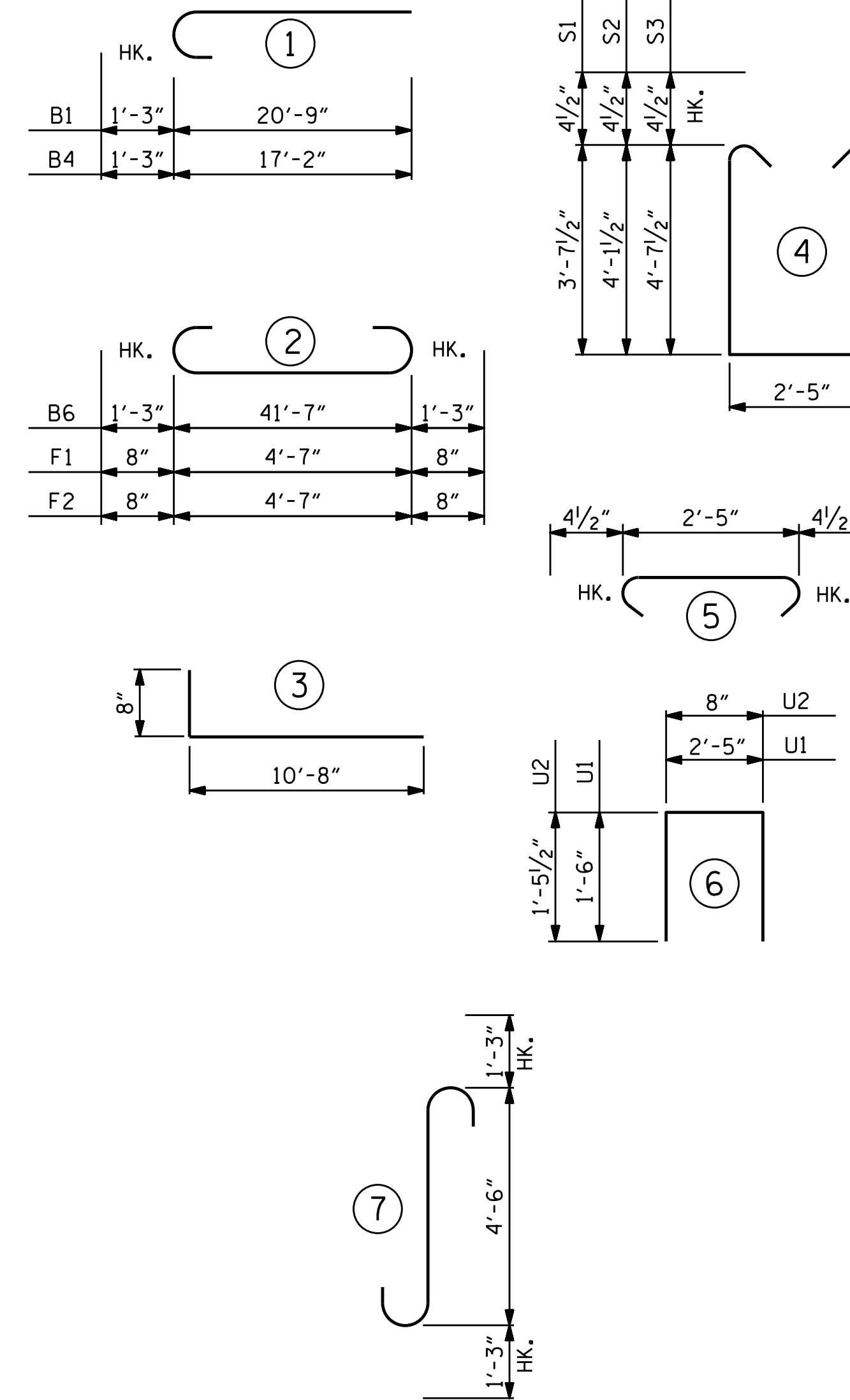


SECTION A-A



PARTIAL SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT No. 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#9	1	22'-0"	299
B2	8	#4	STR	9'-0"	48
B3	4	#9	STR	21'-3"	289
B4	4	#9	1	18'-5"	250
B5	4	#4	STR	10'-6"	28
B6	4	#9	2	44'-1"	600
B7	20	#4	STR	22'-0"	294
B8	2	#4	STR	23'-3"	31
B9	2	#4	STR	10'-9"	14
D1	24	#8	STR	2'-3"	144
F1	100	#6	2	5'-11"	889
F2	12	#6	2	42'-11"	774
H1	54	#5	3	11'-4"	638
K1	12	#4	STR	2'-11"	23
K2	12	#4	STR	22'-1"	177
S1	18	#4	4	10'-5"	125
S2	19	#4	4	11'-5"	145
S3	25	#4	4	12'-5"	207
S4	62	#4	5	3'-2"	131
U1	17	#4	6	5'-5"	62
U2	36	#4	6	3'-7"	86
V1	30	#4	STR	7'-2"	144
V2	30	#4	STR	8'-10"	177
V3	72	#4	STR	5'-11"	284
V4	41	#9	7	7'-0"	976

REINFORCING STEEL 6,835 LBS.

CLASS A CONCRETE BREAKDOWN

POUR #1 FOOTING	24.0 C.Y.
POUR #2 CAP & LOWER PART OF WINGS	24.3 C.Y.
POUR #3 BACKWALL & UPPER PART OF WINGS	6.1 C.Y.
TOTAL CLASS A CONCRETE	54.4 C.Y.

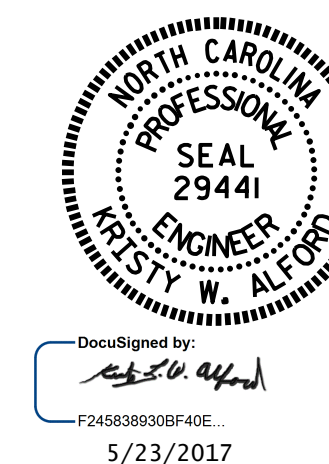
FOUNDATION EXCAVATION AT END BENT = LUMP SUM

PROJECT NO. B-4943

DURHAM COUNTY

STATION: 14+67.00 -L-

SHEET 3 OF 3



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT No. 1
DETAILS

DRAWN BY : R. L. CHESSON DATE : 3/2/17
CHECKED BY : J. D. HAWK DATE : 3/22/17
DESIGN ENGINEER OF RECORD: R. L. CHESSON DATE : 4/17/17

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SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			19

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

HOOKS ON "M" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

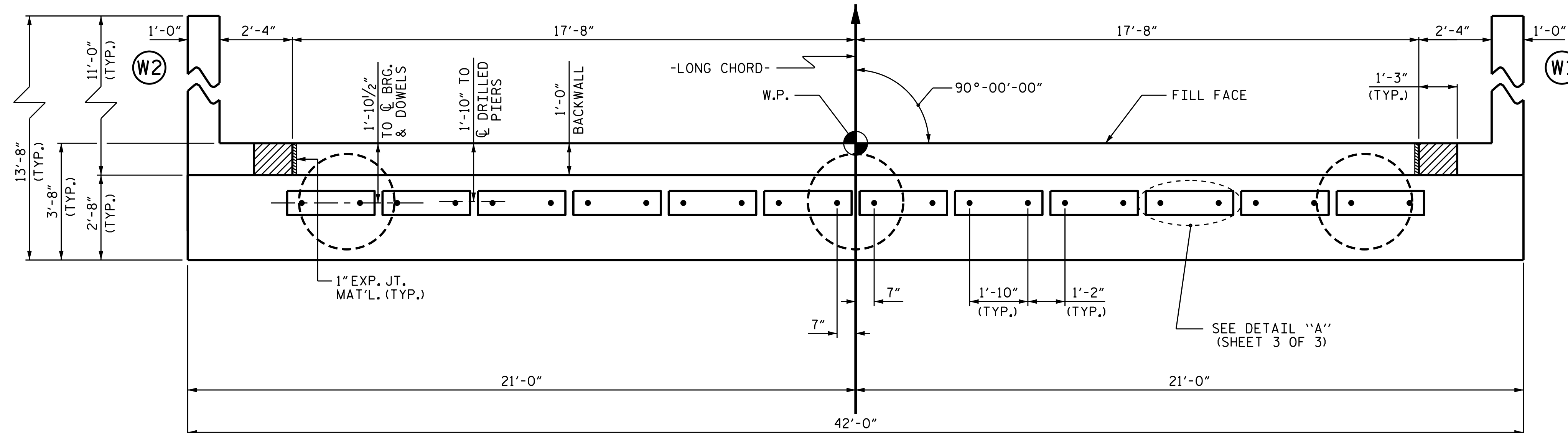
FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

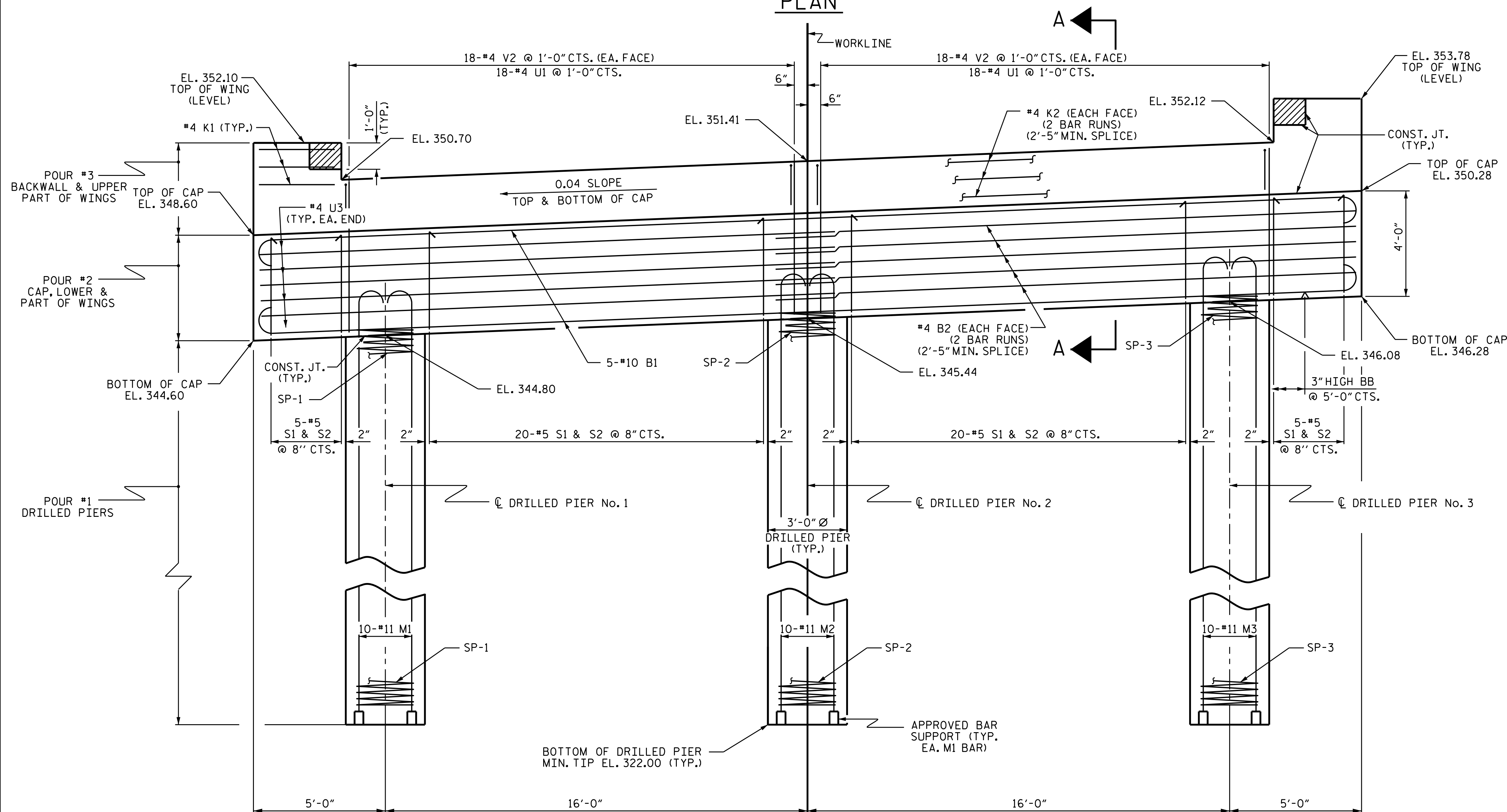
THE CONCRETE IN THE SHADED AREA OF THE WINGS SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST, IF SLIP FORMING IS USED.

FOR WING DETAILS, SEE SHEET 2 OF 3.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3'-0" EXTRA LENGTH.



PLAN



ELEVATION

PROJECT NO. B-4943
 DURHAM COUNTY
 STATION: 14+67.00 -L-
 SHEET 1 OF 3

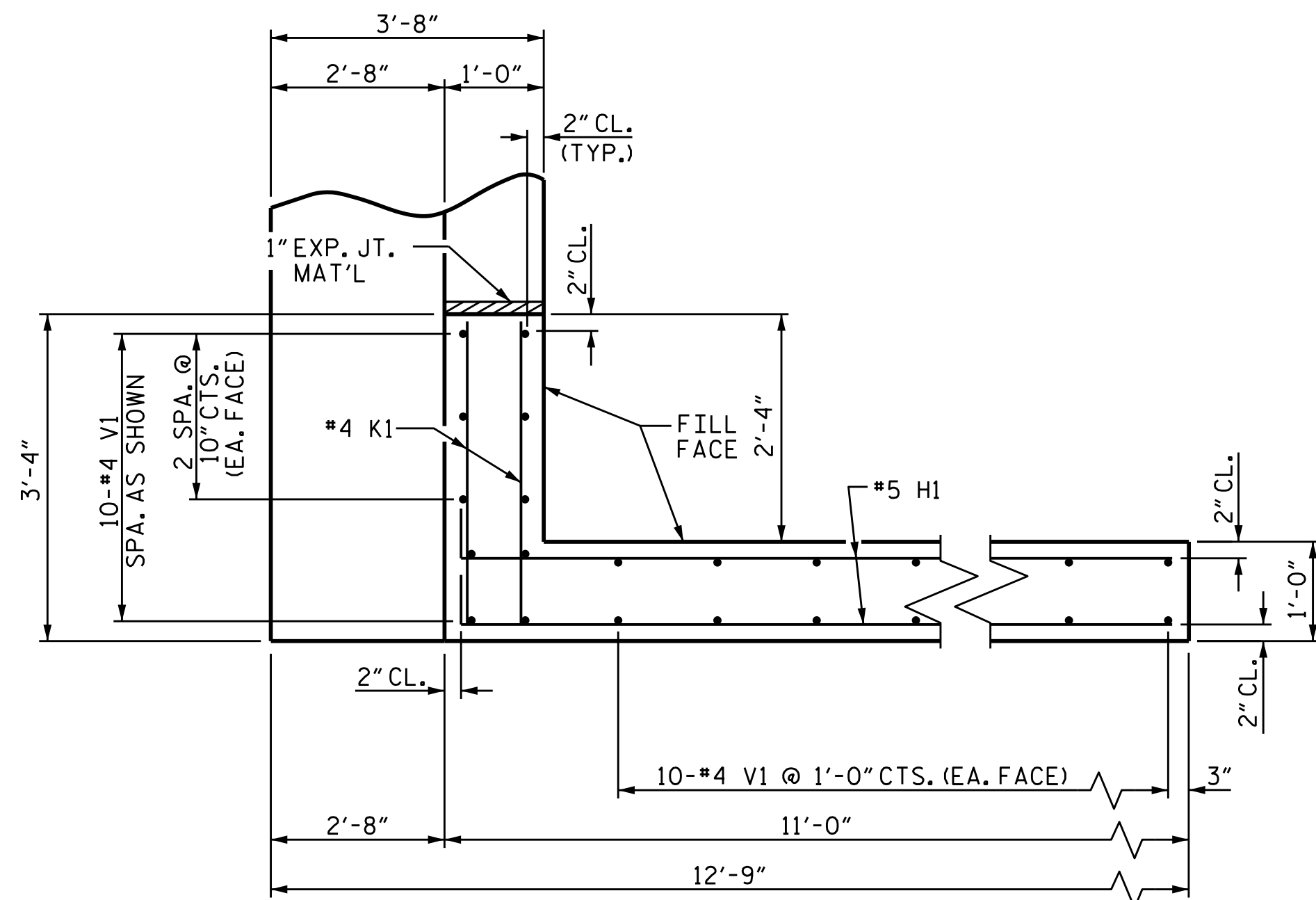


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUBSTRUCTURE
 END BENT No. 2

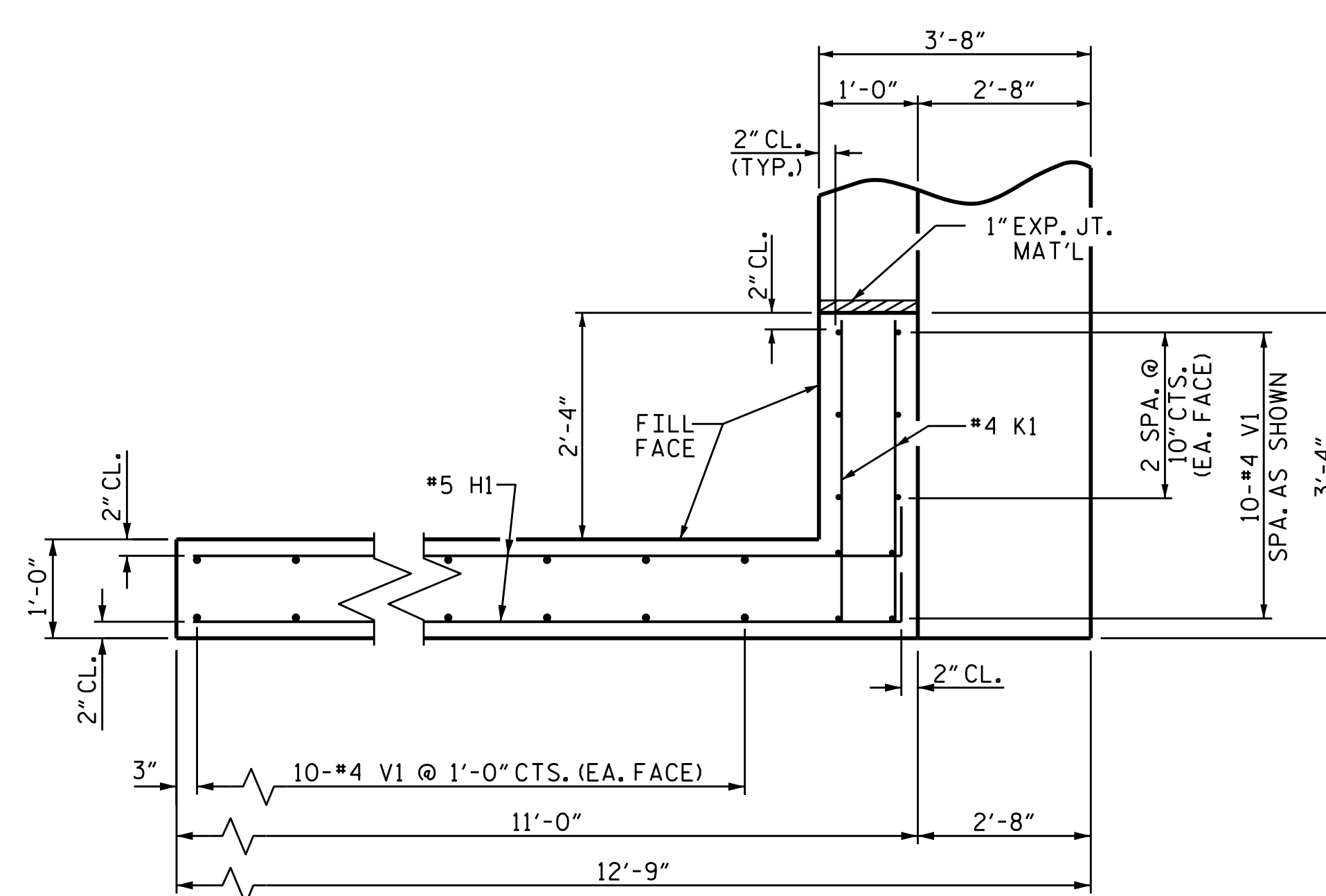
DRAWN BY: R.L. CHESSON DATE: 3/6/17
 CHECKED BY: J.D. HAWK DATE: 3/22/17
 DESIGN ENGINEER OF RECORD: R.L. CHESSON DATE: 4/17/17

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15	
1			3			TOTAL SHEETS 19	
2			4				

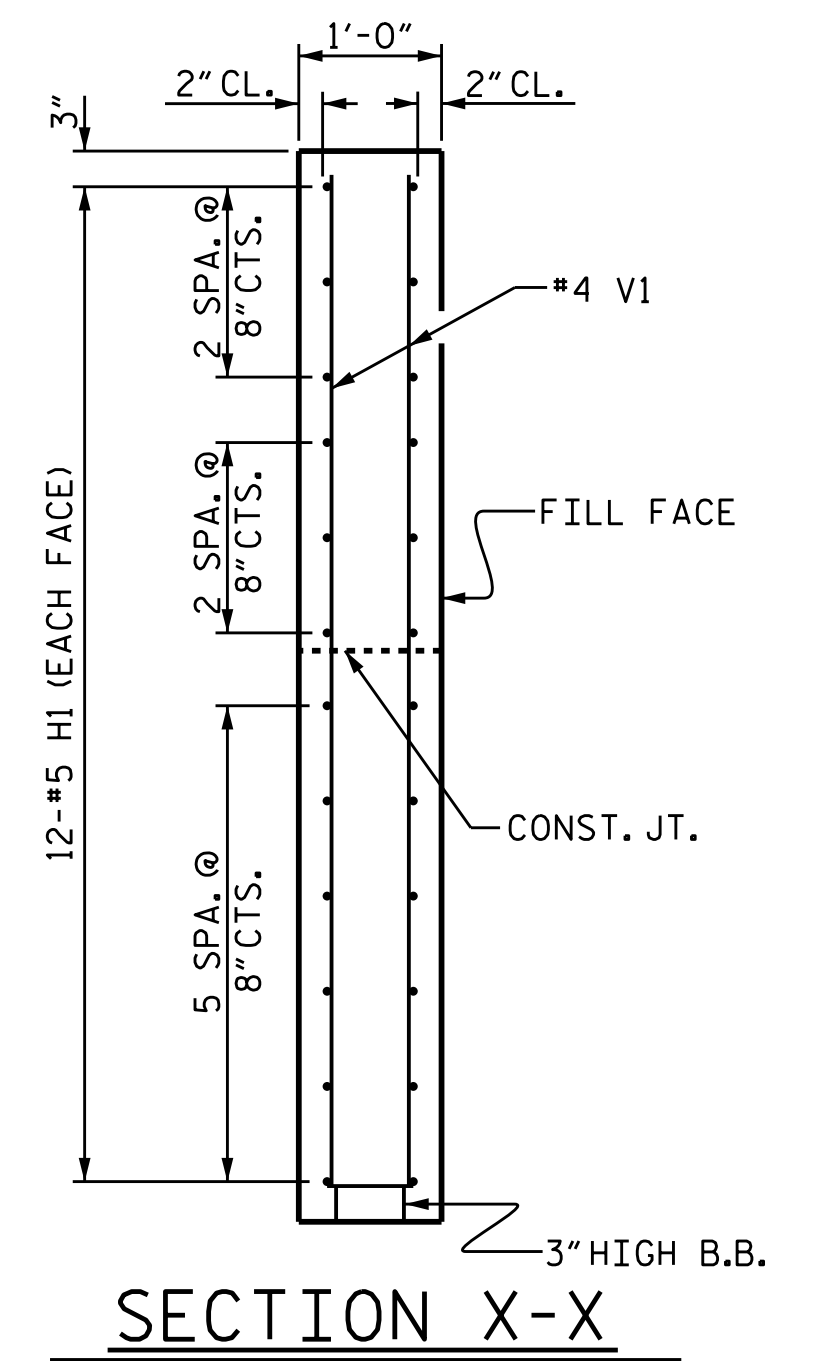
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



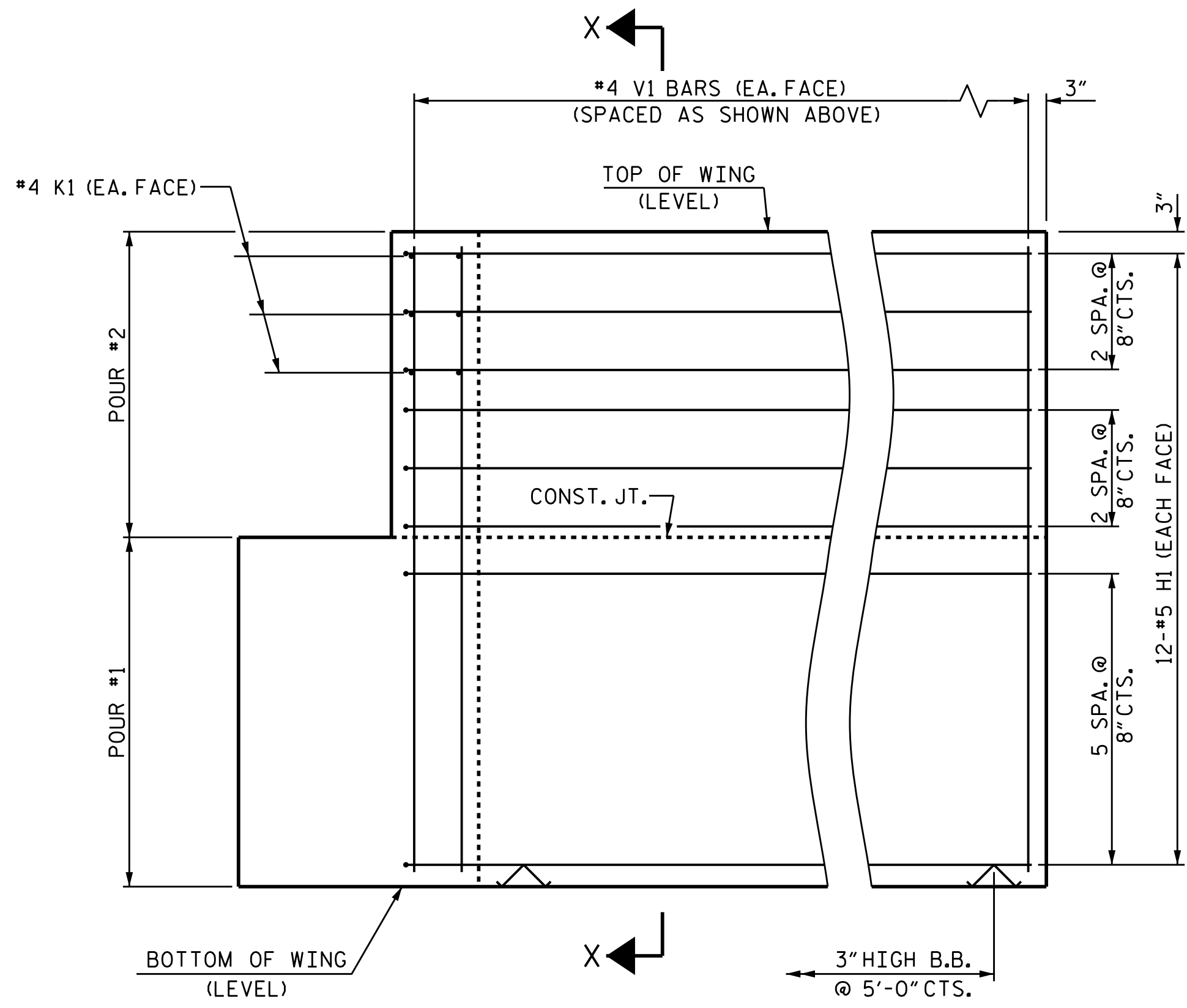
PLAN OF WING (W1)



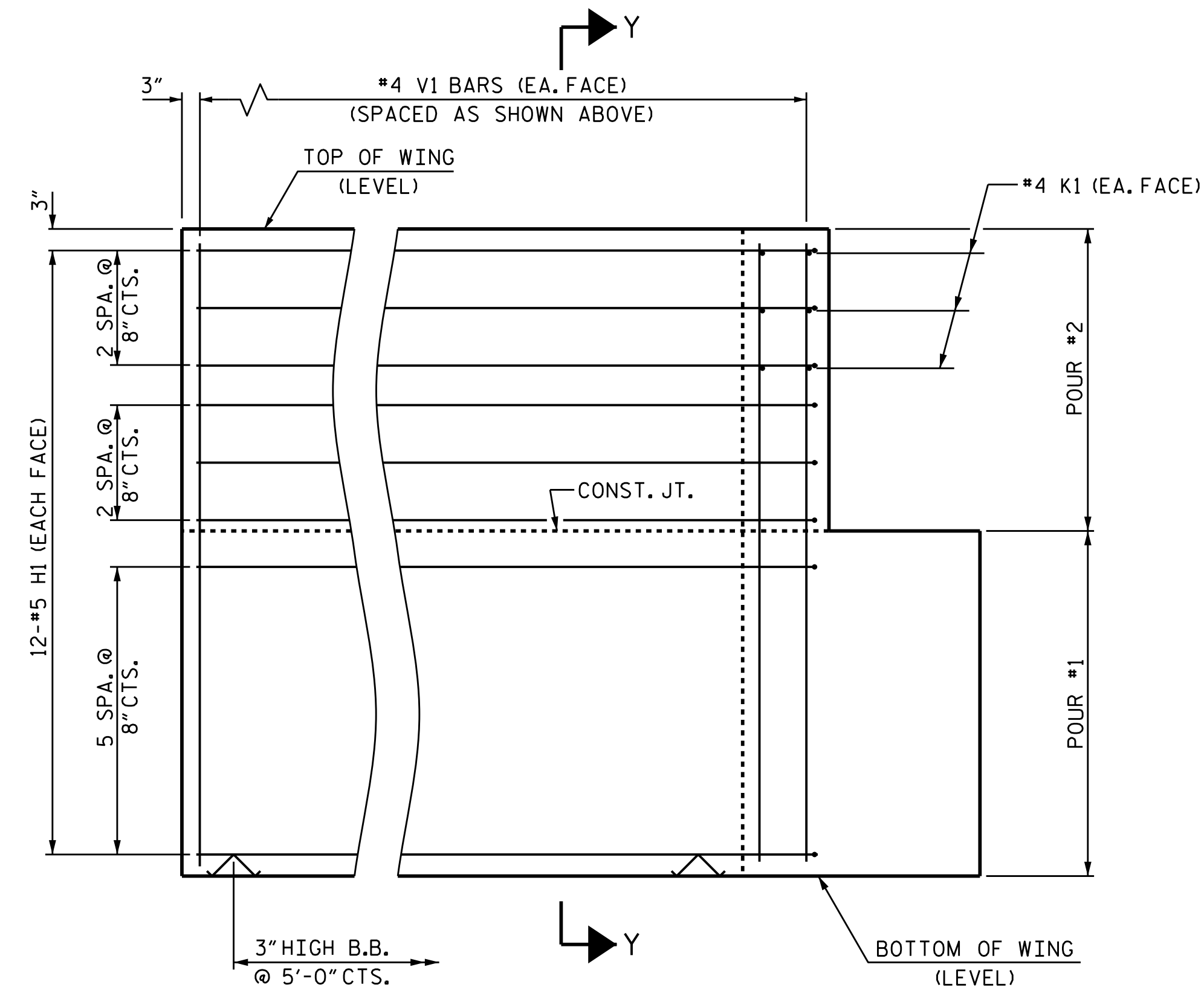
PLAN OF WING (W2)



SECTION X-X

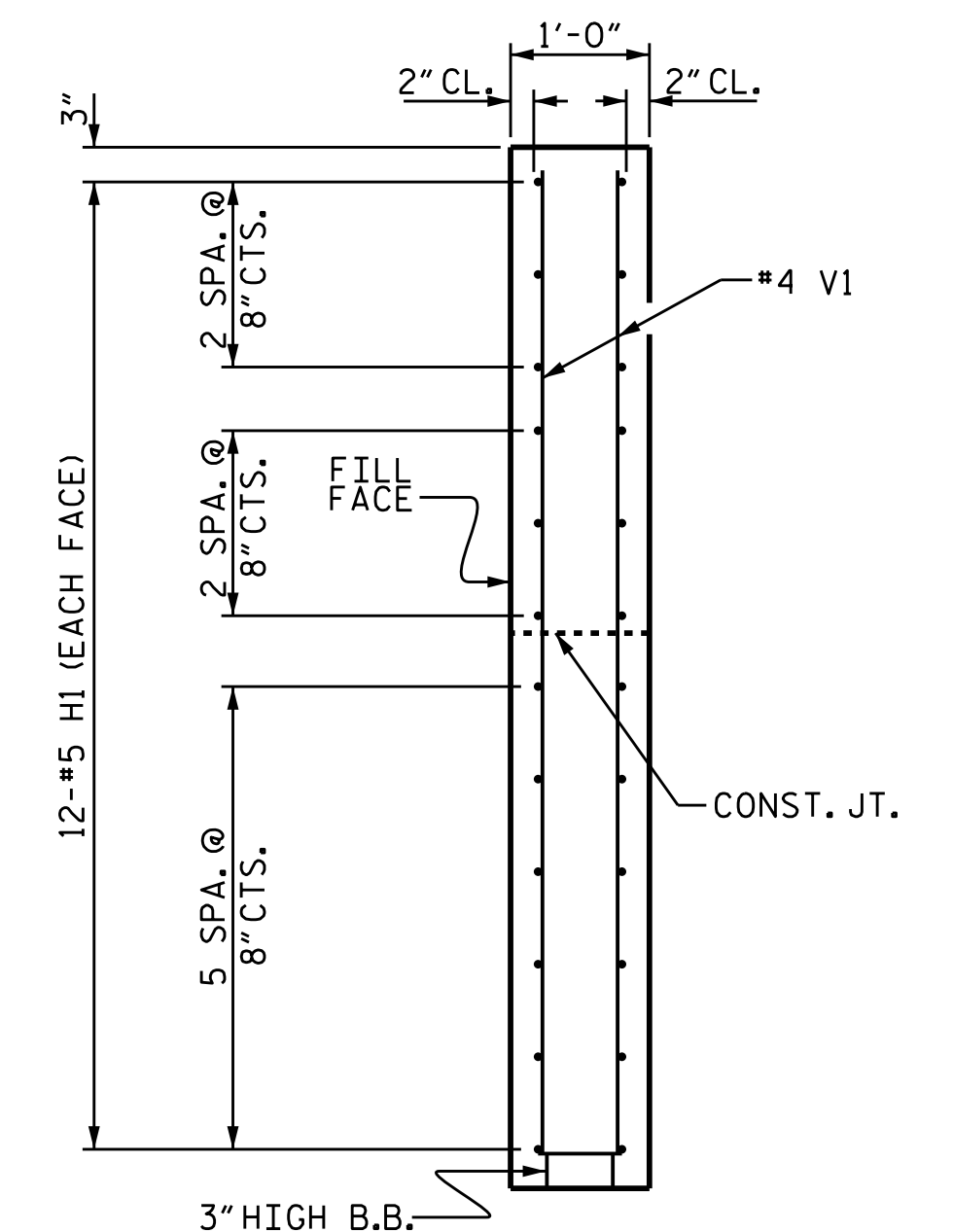


ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS



SECTION Y-Y

PROJECT NO. B-4943
 DURHAM COUNTY
 STATION: 14+67.00 -L-

SHEET 2 OF 3



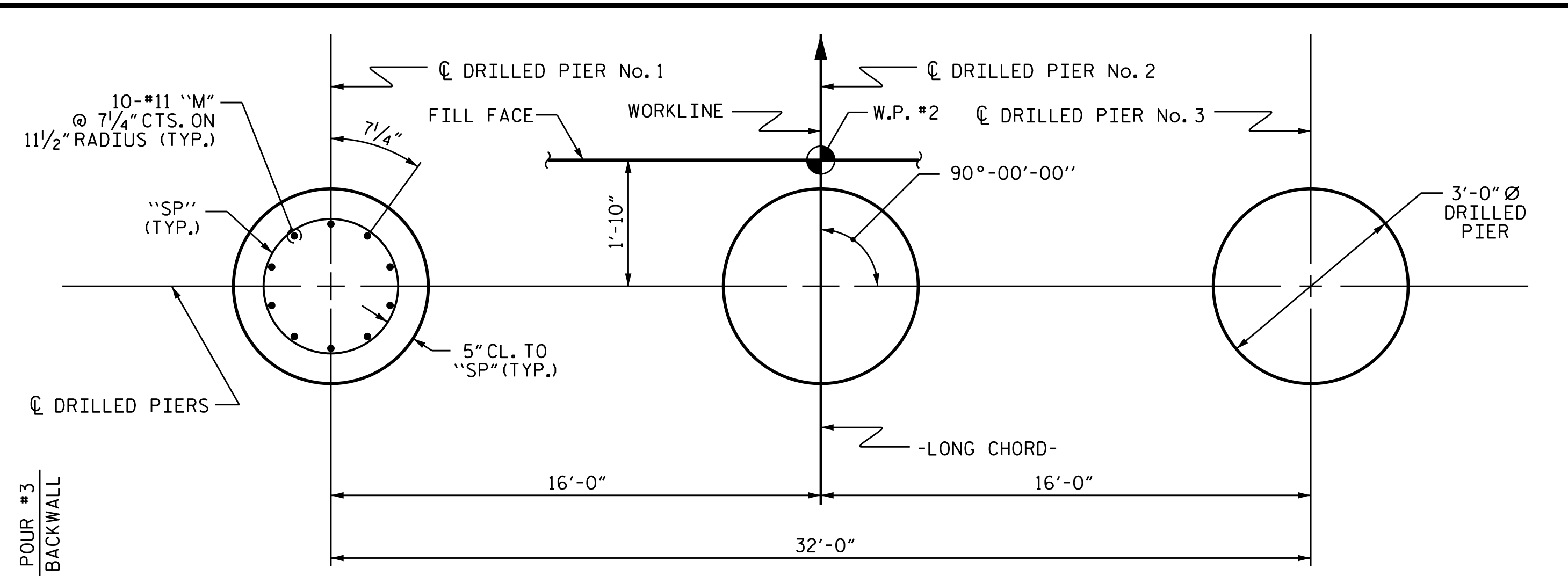
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SUBSTRUCTURE
 END BENT No. 2
 WING DETAILS

ASSEMBLED BY : R.L. CHESSON	DATE : 3/2/17
CHECKED BY : J.D. HAWK	DATE : 3/22/17
DRAWN BY : WJH 12/11	REV. 4/15
CHECKED BY : AAC 12/11	MAA/TMG

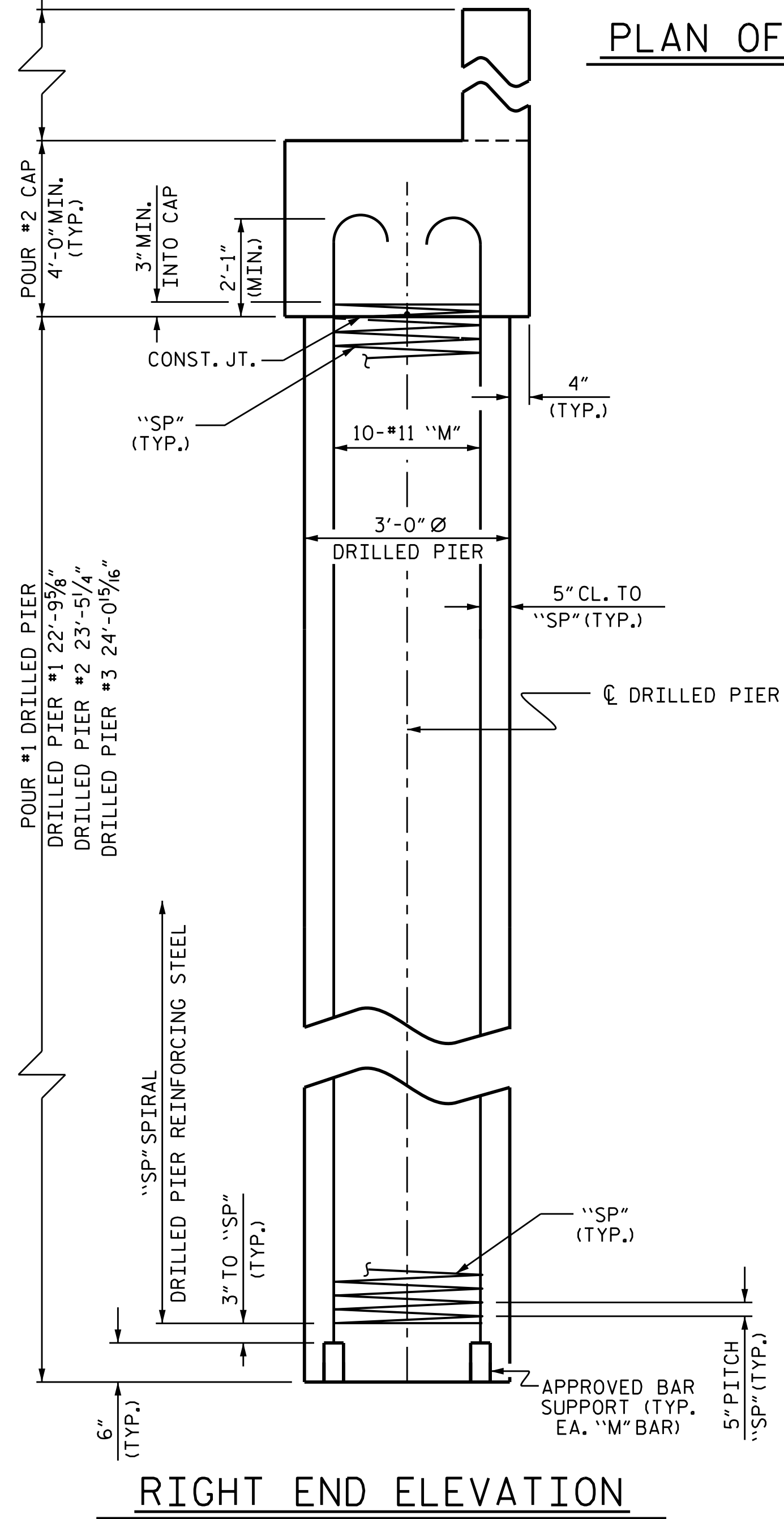
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REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16	
1			3			TOTAL SHEETS 19	
2			4				

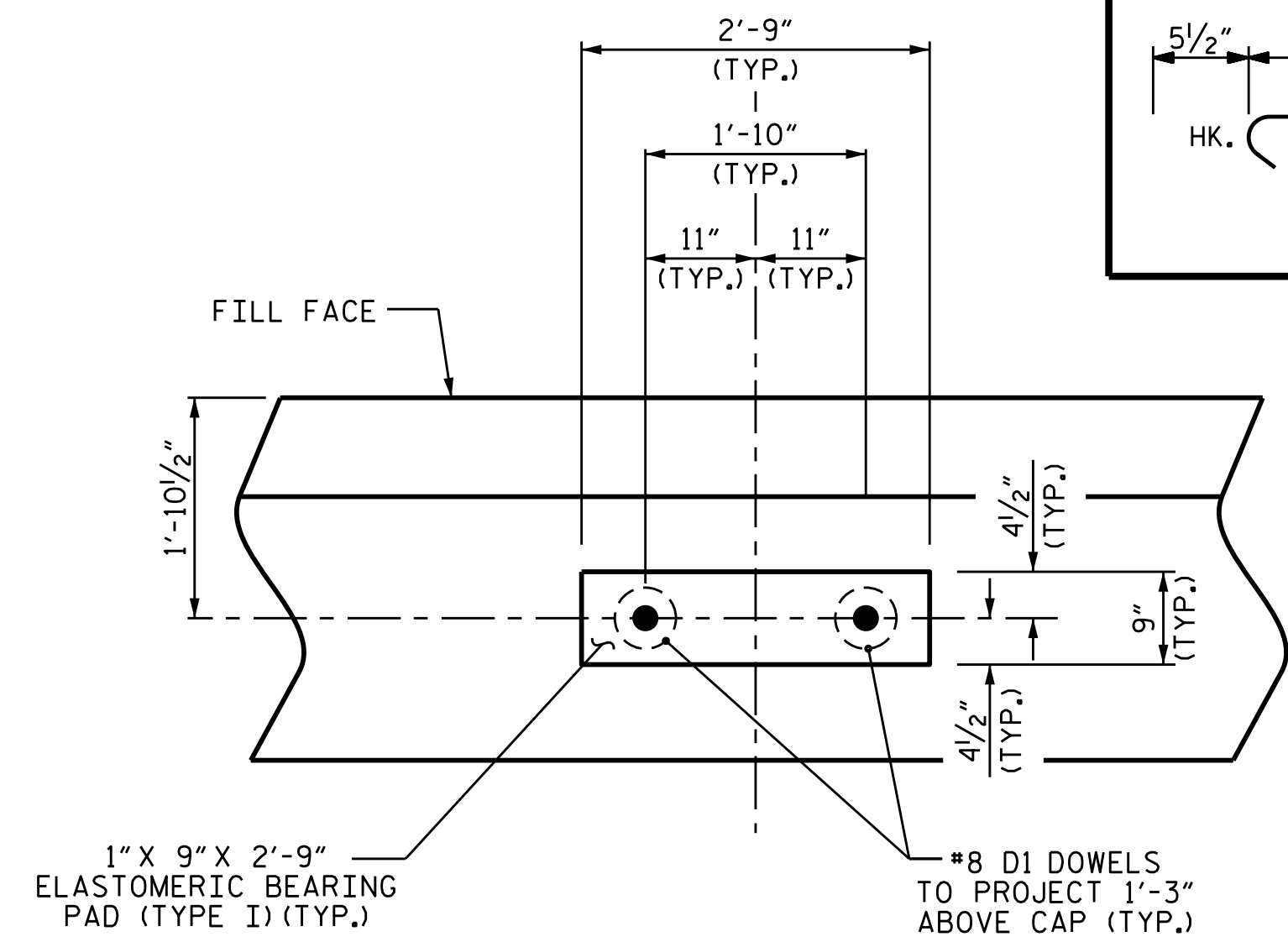
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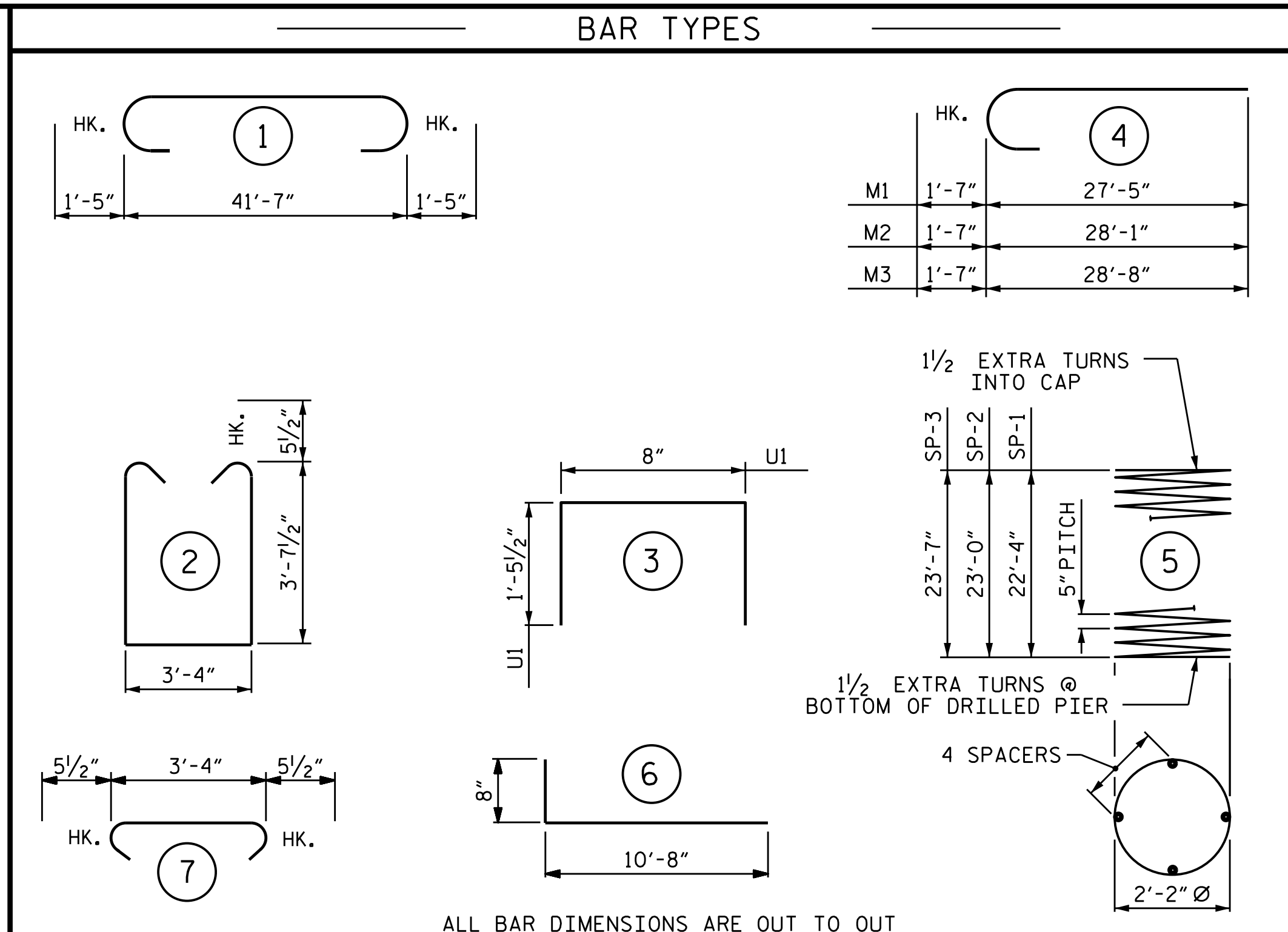
PLAN OF DRILLED PIERS



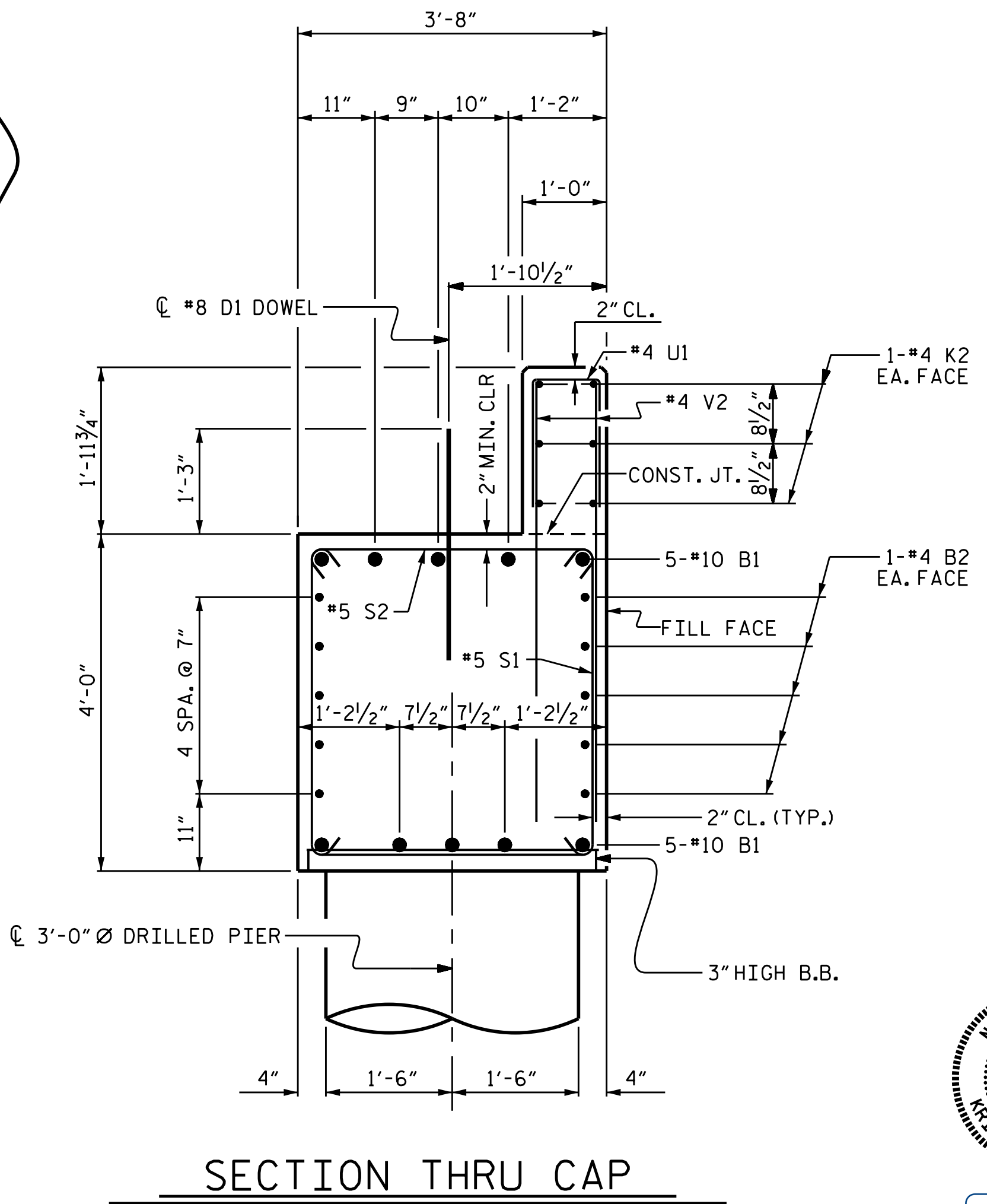
RIGHT END ELEVATION



DETAIL "A"
(DIMENSIONS ARE TYPICAL EACH BEARING)



ALL BAR DIMENSIONS ARE OUT TO OUT



SECTION THRU CAP

BILL OF MATERIAL

END BENT #2

BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#10	1	44'-5"	1,911
B2	20	#4	STR	22'-0"	294
D1	24	#8	STR	2'-3"	144
H1	48	#5	6	11'-4"	567
K1	12	#4	STR	2'-11"	23
K2	12	#4	STR	22'-1"	177
M1	10	#11	4	29'-0"	1,541
M2	10	#11	4	29'-8"	1,576
M3	10	#11	4	30'-3"	1,607
S1	50	#5	2	11'-6"	600
S2	50	#5	7	4'-3"	222
U1	36	#4	3	3'-7"	86
V1	60	#4	STR	7'-2"	287
V2	72	#4	STR	5'-3"	253

REINFORCING STEEL 9,288 LBS.

BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
SP-1	1	*	5	379'-7"	396
SP-2	1	*	5	393'-0"	410
SP-3	1	*	5	399'-8"	417

SPIRAL COLUMN REINFORCING STEEL 1,223 LBS.

* THE SP-1, SP-2 & SP-3 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN

POUR #2: CAP & LOWER PART OF WINGS	25.8 C.Y.
POUR #3: BACKWALL & UPPER PART OF WINGS	6.1 C.Y.
TOTAL CLASS A CONCRETE	31.9 C.Y.

DRILLED PIERS

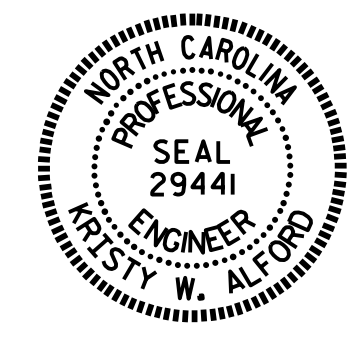
DRILLED PIER CONCRETE POUR #1: 3 DRILLED PIERS	18.4 C.Y.
3'-0" Ø DRILLED PIER NOT IN SOIL	24.0 LIN. FT.
3'-0" Ø DRILLED PIER IN SOIL	46.3 LIN. FT.
PERMANENT STEEL CASING FOR 3'-0" Ø DRILLED PIER	55.3 LIN. FT.
CSL TUBES	299.3 LIN. FT.

PROJECT NO. B-4943
 DURHAM COUNTY
 STATION: 14+67.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE
 END BENT No. 2



DRAWN BY: R.L. CHESSON DATE: 3/2/17
 CHECKED BY: J.D. HAWK DATE: 3/22/17
 DESIGN ENGINEER OF RECORD: R.L. CHESSON DATE: 4/17/17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17	
1			3			TOTAL SHEETS 19	
2			4				

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, 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 4" 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.

FOR APPROACH SLAB GROOVING QUANTITIES, SEE "CONCRETE WEARING SURFACE DETAILS" SHEET.

BILL OF MATERIAL

APPROACH SLAB AT EB #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	26	#4	STR	18'-6"	321
A2	26	#4	STR	18'-4"	318
*B1	70	#5	STR	11'-2"	815
B2	70	#6	STR	11'-8"	1227

REINFORCING STEEL	LBS.	1545
*EPOXY COATED REINFORCING STEEL	LBS.	1136

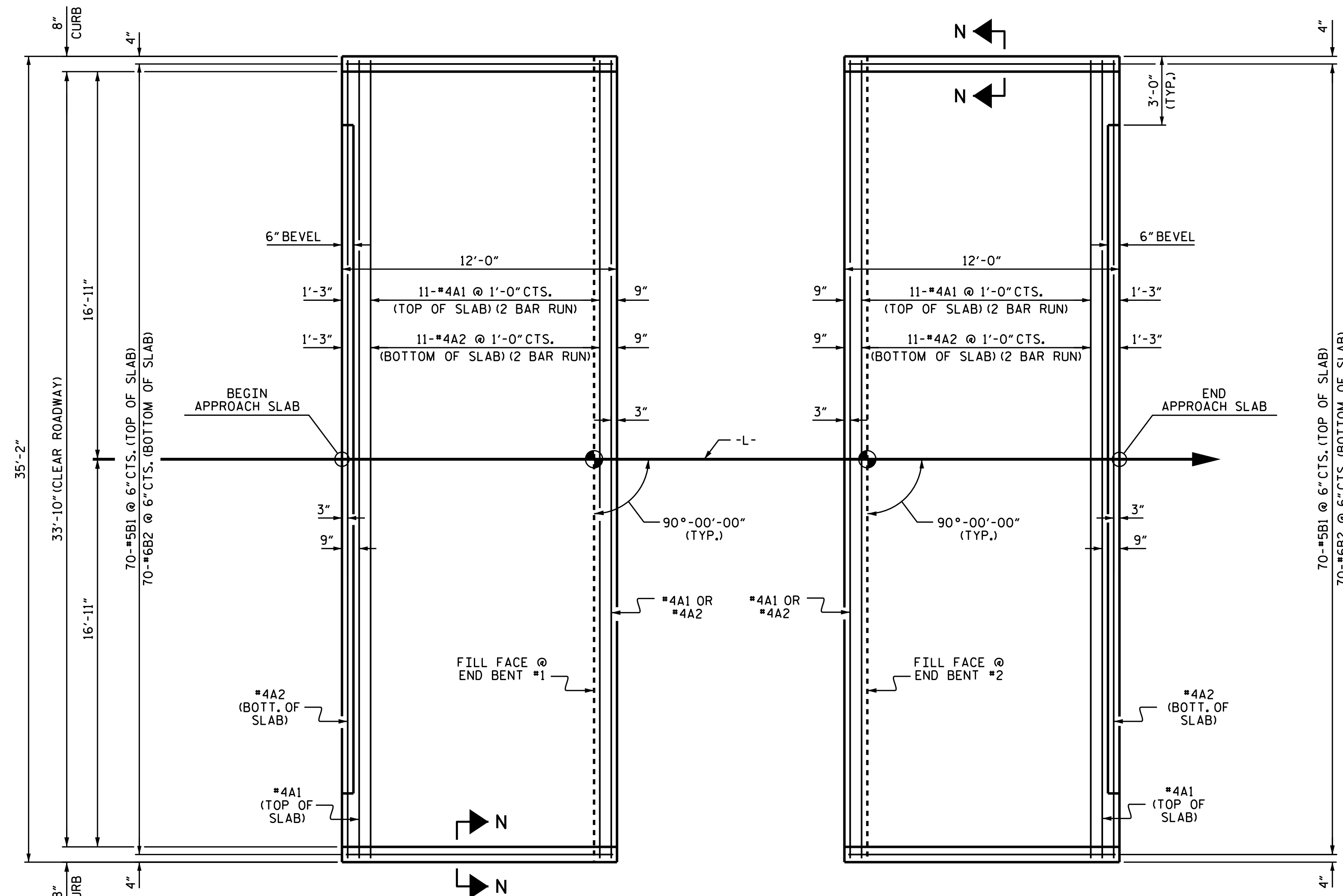
CLASS AA CONCRETE	C. Y.	18.6
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APPROACH SLAB AT EB #2

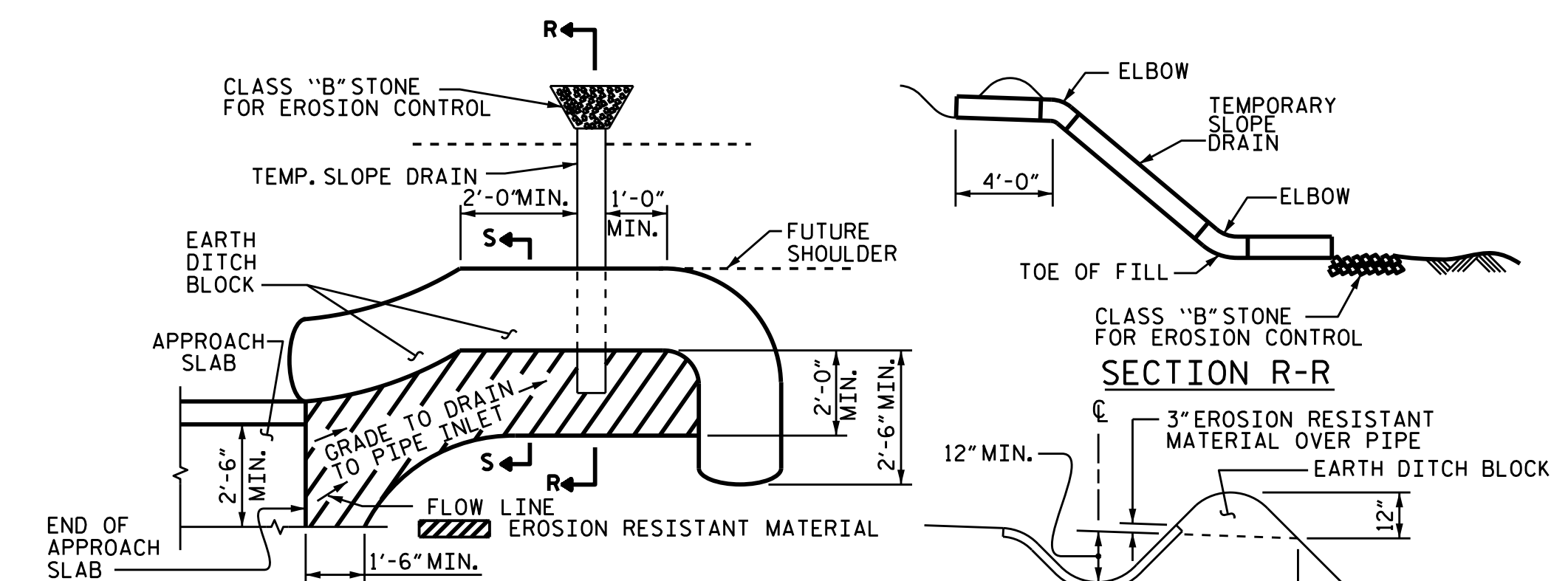
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	26	#4	STR	18'-6"	321
A2	26	#4	STR	18'-4"	318
*B1	70	#5	STR	11'-2"	815
B2	70	#6	STR	11'-8"	1227

REINFORCING STEEL	LBS.	1545
*EPOXY COATED REINFORCING STEEL	LBS.	1136

CLASS AA CONCRETE	C. Y.	18.6
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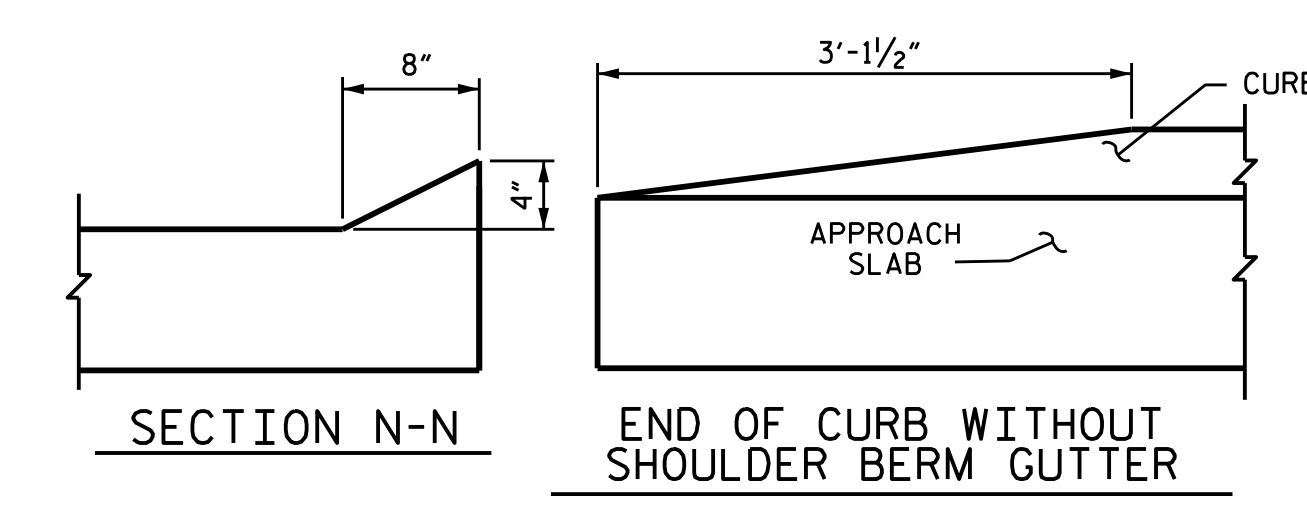


PLAN @ END BENT #1 **PLAN @ END BENT #2**
DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

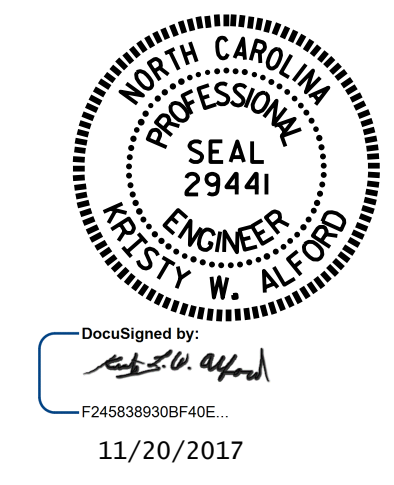
TEMPORARY BERM AND SLOPE DRAIN DETAILS
(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



CURB DETAILS

SPLICE LENGTHS

BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"



DocuSigned by:
F245838906F40E...
11/20/2017

PROJECT NO. B-4943
DURHAM COUNTY
STATION: 14+67.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
BRIDGE APPROACH SLAB
FOR PRESTRESSED CONCRETE
BOX BEAM UNIT
(SUB-REGIONAL TIER)
90° SKEW

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19	
1			3			TOTAL SHEETS	
2			4			19	

ASSEMBLED BY : R. L. CHESSON DATE : 3/3/17
CHECKED BY : J. D. HAWK DATE : 3/22/17
DRAWN BY : MAA 11/11
CHECKED BY : AAC 11/11
REV. 9-15 MAA/TMG

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	- - - - -	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	- - - - -	SEE PLANS
IMPACT ALLOWANCE	- - - - -	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	- -	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	- -	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	- -	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION - GRADE 60	- - -	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	- - - - -	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	- - - - -	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR UNTREATED EXTREME FIBER STRESS	- - -	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	- - - - -	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	- - - - -	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED $\frac{3}{4}$ " WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO $1\frac{1}{2}$ " RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A $\frac{1}{4}$ " FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A $\frac{1}{4}$ " RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE $\frac{1}{8}$ " \emptyset SHEAR STUDS FOR THE $\frac{3}{4}$ " \emptyset STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - $\frac{1}{8}$ " \emptyset STUDS FOR 4 - $\frac{3}{4}$ " \emptyset STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF $\frac{1}{8}$ " \emptyset STUDS ALONG THE BEAM AS SHOWN FOR $\frac{3}{4}$ " \emptyset STUDS BASED ON THE RATIO OF 3 - $\frac{1}{8}$ " \emptyset STUDS FOR 4 - $\frac{3}{4}$ " \emptyset STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST $\frac{3}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY $\frac{1}{16}$ " INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINIS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

ENGLISH

JANUARY, 1990

STD. NO. SN