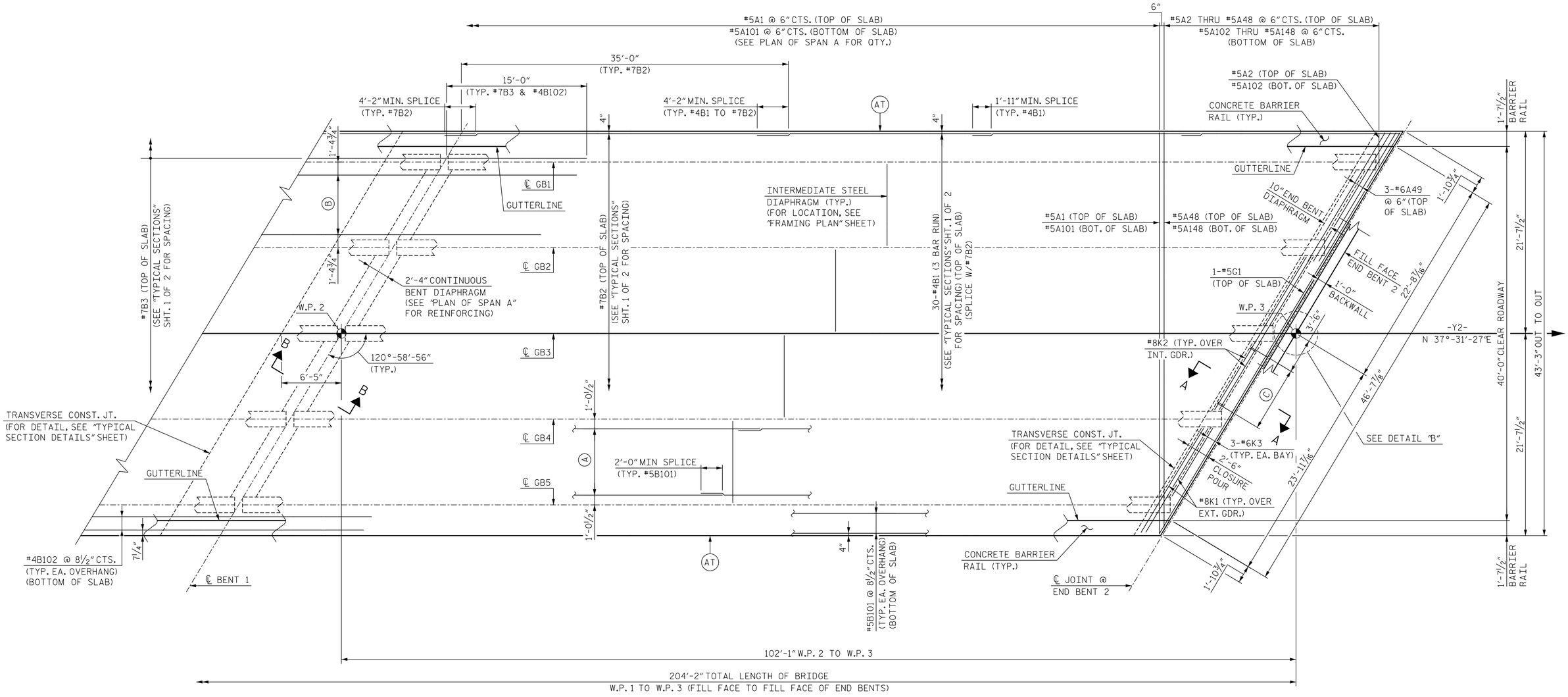
This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.
This file or an individual page shall not be considered a certified document.



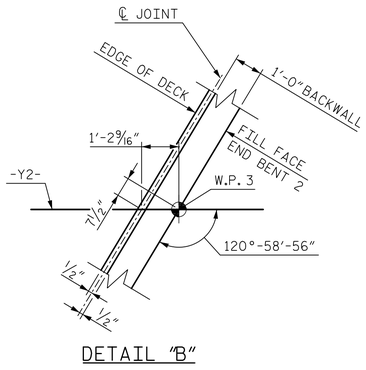
PLAN OF SPAN B

(A) #5B101 @ 8½" CTS.
(SEE PLAN OF SPAN A)
(TYP. EACH BAY)
(BOTTOM OF SLAB)

(B) #4B102 @ 8½" CTS.
(SEE PLAN OF SPAN A)
(TYP. EACH BAY)
(BOTTOM OF SLAB)

(C) 8-#5S1 & 8-#4S2
@ 1'-0" CTS. = 7'-0"
(TYP. EACH BAY)

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT



DETAIL "B"

NOTE:

FOR NOTES, SEE "PLAN OF SPAN A" SHEET.

FOR SECTION VIEWS, SEE "TYPICAL SECTION DETAILS" SHEET.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD
Signed by: Richard R. Greenfield

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: STA. 21+33.13 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN B

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 8

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-8
1			3			TOTAL SHEETS
2			4			30

6/7/2019
...\403_015_I4400BB_SMU_S02_008_440217.dgn

FRAMING PLAN

NOTES:

ALL DIMENSIONS ARE MEASURED ALONG ℄ GIRDER UNLESS NOTED OTHERWISE.

FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS" SHEET.

FOR GIRDER ELEVATIONS AND DETAILS, SEE "AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD" SHEET.

"EXP." DENOTES EXPANSION BEARING ASSEMBLY.

"FIX." DENOTES FIXED BEARING ASSEMBLY.

"E" DENOTES ELASTOMERIC BEARING PAD MARK.

"P" DENOTES STEEL SOLE PLATE MARK.

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: STA. 21+33.13 -Y2-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 3/21/2019 RICHARD R. GREENFIELD

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	C. TOMPKINS	DATE	11/18
CHECKED BY	C. SUTARIA	DATE	12/18
DESIGN ENGINEER OF RECORD	R. GREENFIELD	DATE	3/19

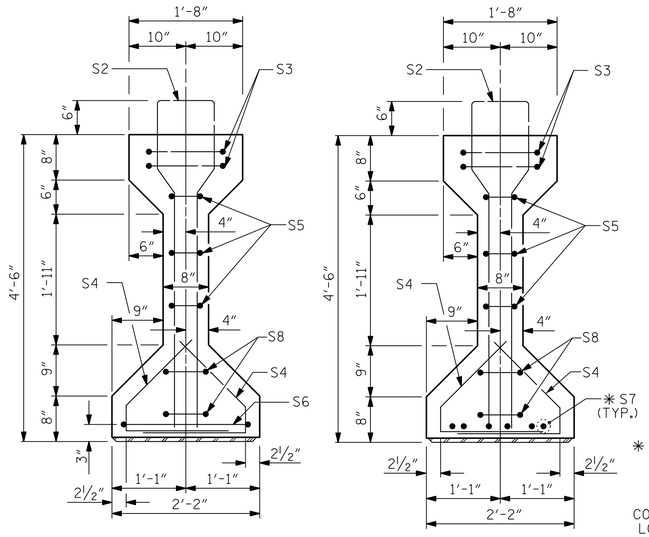
DWG. NO. 9

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S3-9
TOTAL SHEETS 30

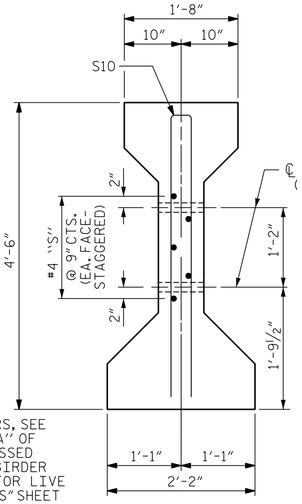
3/21/2019
...1403_017_I4400BB_SMU_FP_009_440217.dgn



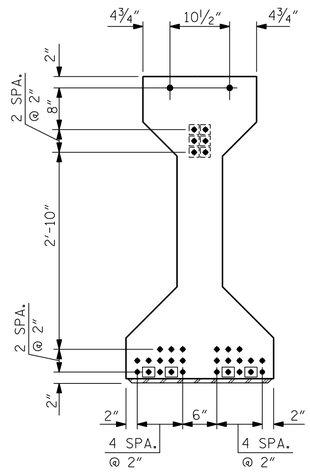
SECTION A-A

SECTION B-B

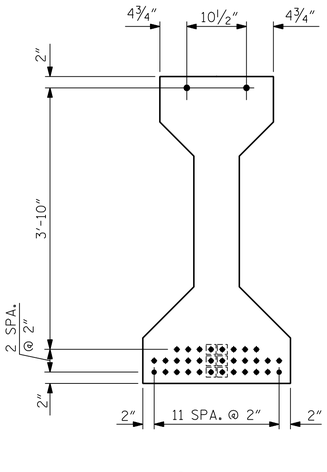
✳ FOR S7 BARS, SEE DETAIL "A" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET



SECTION C-C
(S1 BARS NOT SHOWN)



AT END OF GIRDER

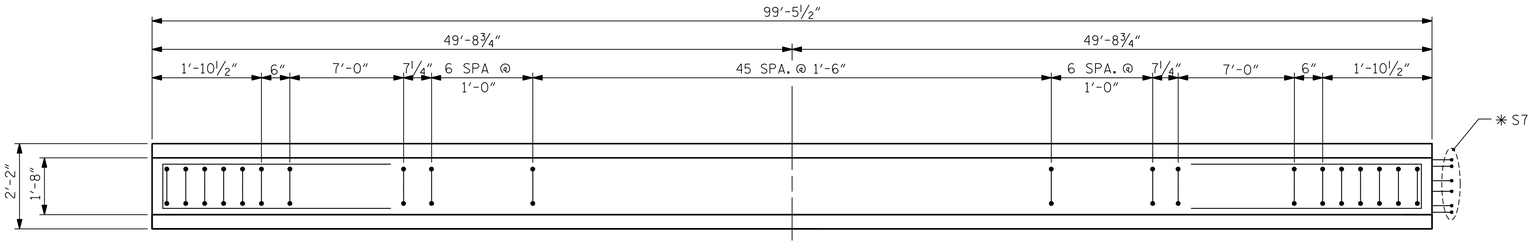


AT ℄ OF GIRDER

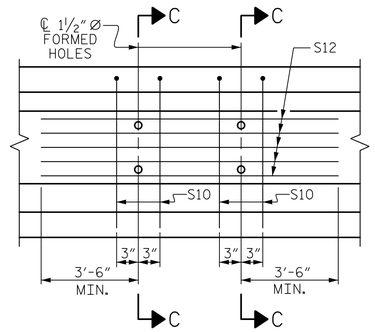
0.6"Ø LOW RELAXATION STRAND LAYOUT

DEBONDING LEGEND

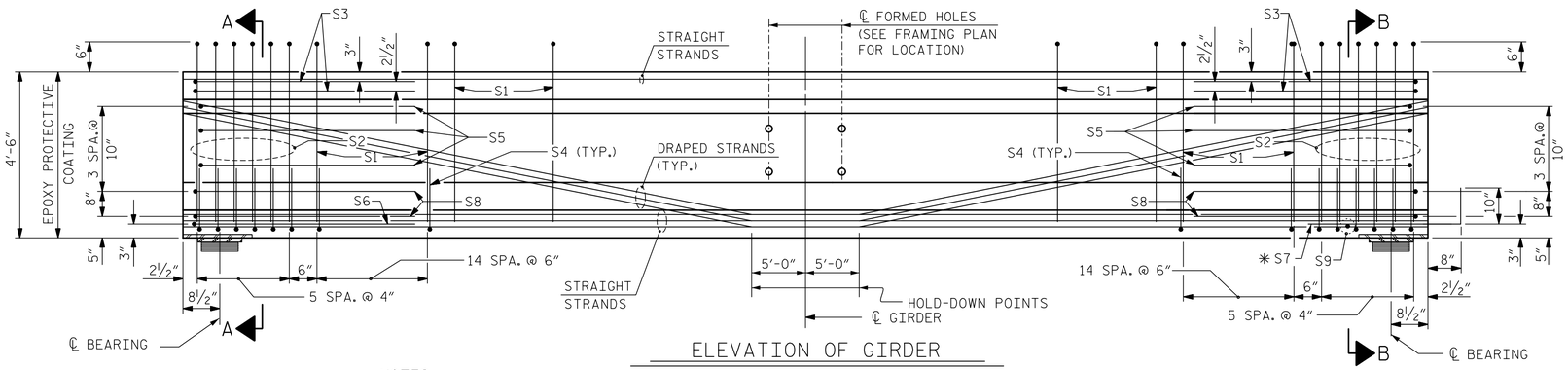
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- DRAPED STRANDS



PLAN OF GIRDER



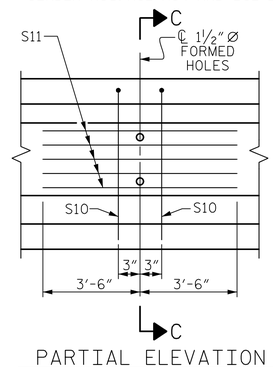
PARTIAL ELEVATION
SHOWING INTERMEDIATE DIAPHRAGM
REINFORCING STEEL FOR
GIRDER Nos. AG2-AG4 AND BG2-BG4



ELEVATION OF GIRDER
(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

NON-INTEGRAL END BENT
(END BENT 1 @ SPAN A)
(END BENT 2 @ SPAN B)

CONTINUOUS BENT
(BENT 1 @ SPAN A AND SPAN B)



PARTIAL ELEVATION
SHOWING INTERMEDIATE DIAPHRAGM
REINFORCING STEEL FOR GIRDER Nos. AG1, AG5, BG1 AND BG5

NOTES:

THE UPLIFT FORCE DUE TO DRAPED STRANDS IS 20.63 KIPS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6,000 PSI.

GIRDER CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 8,000 PSI AT THE AGE OF 28 DAYS.

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

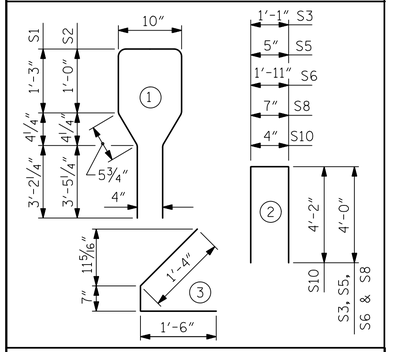
REINFORCING STEEL FOR ONE GIRDER

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	88	#4	1	10'-8"	627
	S2	12	#6	1	10'-8"	192
	S3	4	#4	2	9'-1"	24
	S4	84	#4	3	3'-5"	192
	S5	6	#4	2	8'-5"	34
	S6	1	#4	2	9'-11"	7
	✳S7	6	#5	STR	3'-8"	23
	S8	4	#4	2	8'-7"	23
	S9	1	#3	STR	1'-10"	1
EXTERIOR GDR.	S10	2	#5	2	8'-8"	18
INTERIOR GDR.	S10	4	#5	2	8'-8"	36
	S11	5	#4	STR	7'-0"	23
	S12	5	#4	STR	12'-7"	42

✳ NOTE: S7 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 LB.	8,000 PSI CONCRETE C.Y.	0.6" Ø L. R. STRANDS No.
EXTERIOR	1,206	20.2	34
INTERIOR	1,224	20.2	34

GIRDERS REQUIRED

SPAN	NUMBER	LENGTH	TOTAL LENGTH
A	5	99'-5½"	497.29'
B	5	99'-5½"	497.29'

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPANS A AND B

Digitally Signed by: Richard R. Greenfield
NORTH CAROLINA PROFESSIONAL SEAL 47718 ENGINEER RICHARD R. GREENFIELD
3/21/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

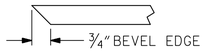
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY O. MOHAMMED DATE 10/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 10

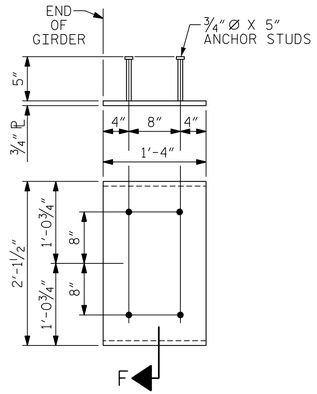
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-10
1			3			TOTAL SHEETS
2			4			30

3/21/2019
...\403_09\I4400BB_SMU_C01_010_440217.dgn



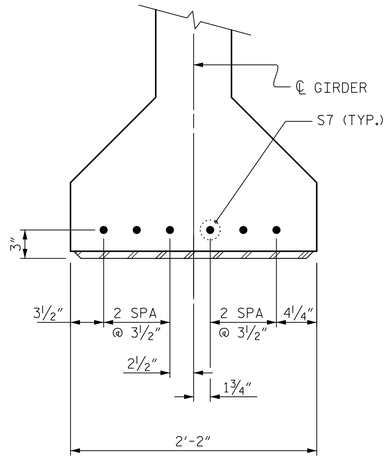
SECTION "F"

(SEE NOTES)



EMBEDDED PLATE "B-1" DETAILS

(2 REQ'D PER GIRDER)



DETAIL "A"

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.

APPLY EPOXY PROTECTIVE COATING TO END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

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.

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 ¼".

WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICES SHALL BE WITHIN 6" OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN ½" OF THE THEORETICAL LOCATION SHOWN.

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 2 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 3/21/2019 RICHARD R. GREENFIELD

Digitally signed by R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY O. MOHAMMED DATE 10/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 11

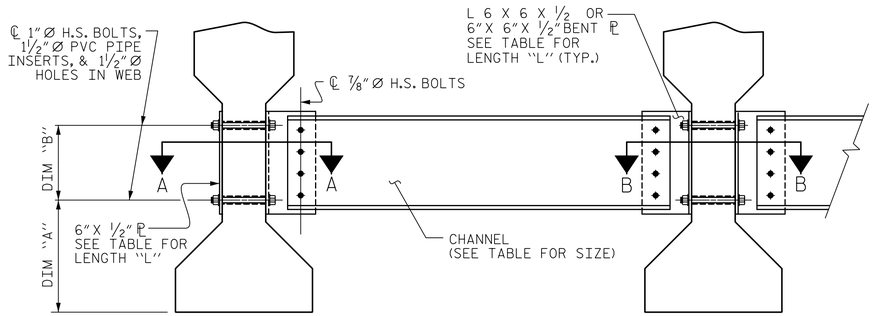
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

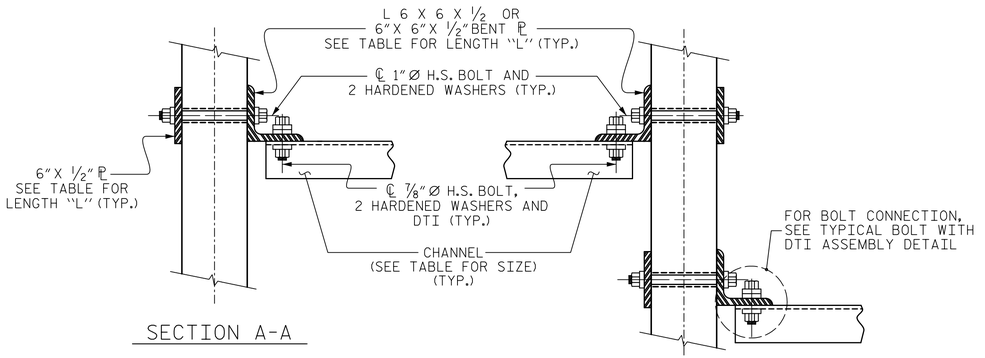
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-11
1			3			TOTAL SHEETS
2			4			30

3/21/2019
...\403-021.I4400BB_SMU_002_01.440217.dgn



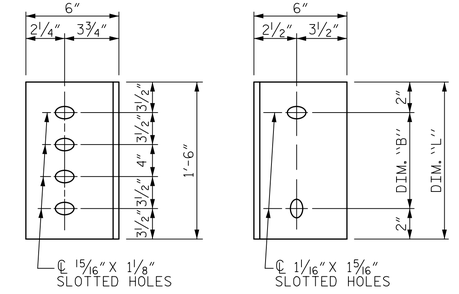
EXTERIOR GIRDER INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



SECTION A-A SECTION B-B

CONNECTION DETAILS



DIAPHRAGM FACE WEB FACE

CONNECTOR PLATE DETAILS

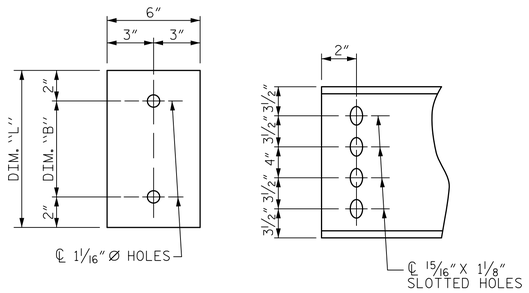
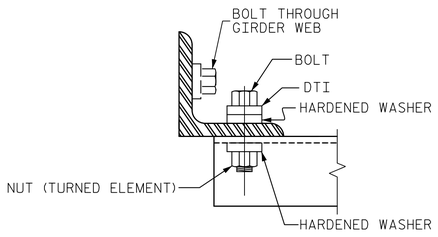


PLATE DETAILS CHANNEL END



BOLT WITH DTI ASSEMBLY DETAIL

STRUCTURAL STEEL NOTES

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

TENSION ON THE ASTM F3125 A325 TYPE 1 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 ¼ 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 ¼"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.

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
IV	MC 18 x 42.7	1'-9½"	1'-2"	1'-6"

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 3/21/2019 ENGINEER RICHARD R. GREENFIELD

Digitally signed by: R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

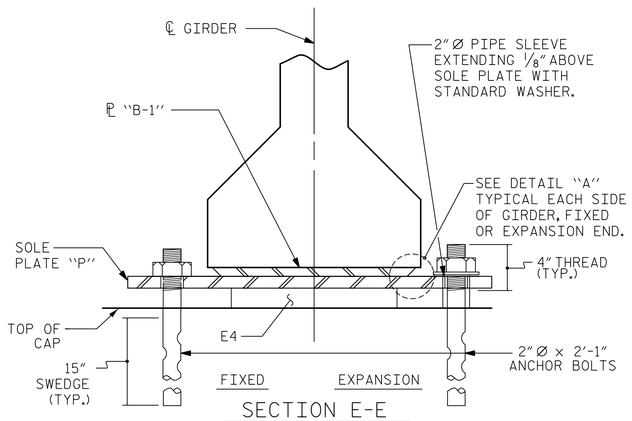
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY L. DICKENS DATE 10/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

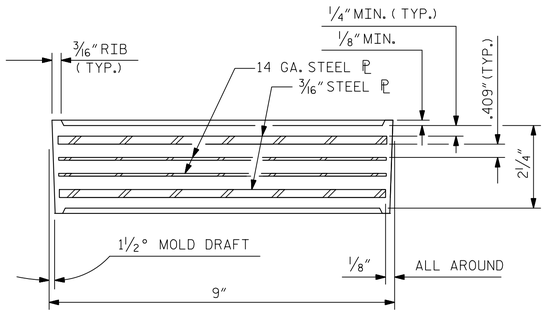
DWG. NO. 12

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-12
1			3			TOTAL SHEETS
2			4			30

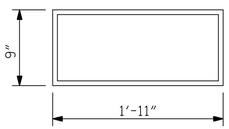
3/21/2019
...\403_023_I4400BB_SMU_C03_012_440217.dgn



SECTION E-E



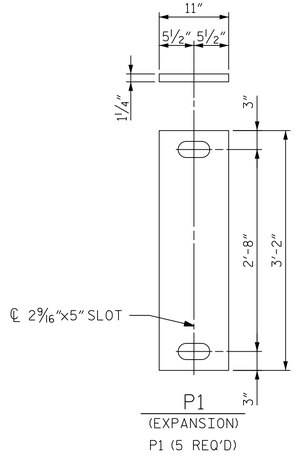
TYPICAL SECTION OF ELASTOMERIC BEARINGS



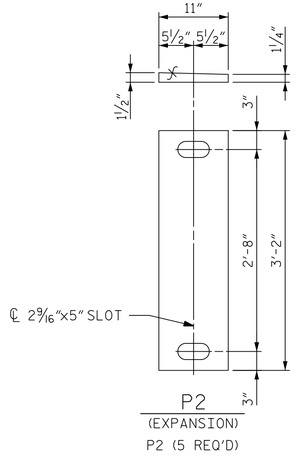
E4 (20 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

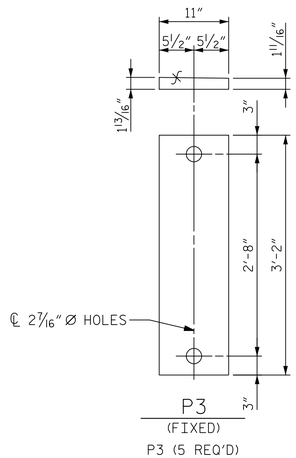
TYPE V



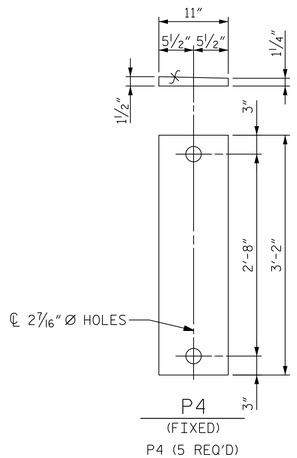
P1 (5 REQ'D)



P2 (5 REQ'D)

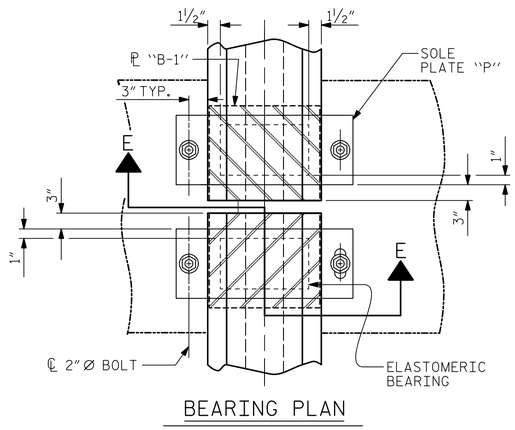


P3 (5 REQ'D)

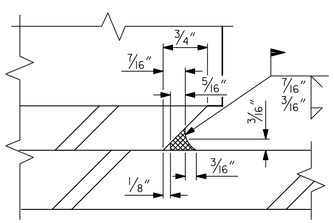


P4 (5 REQ'D)

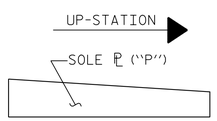
SOLE PLATE DETAILS ("P")



BEARING PLAN



DETAIL "A"



SOLE ℄ PLACEMENT DETAIL

NOTES

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 BURRED WITH A SHARP POINTED TOOL.

THE 2" Ø PIPE SLEEVE SHALL BE CUT FROM SCHEDULE 40 PVC PLASTIC PIPE. THE PVC PLASTIC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

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.

SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

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. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

FOR BEARING AND SOLE PLATE LOCATIONS, SEE "FRAMING PLAN" SHEET

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE V	365 k

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 3/21/2019 — Signed by: R. Greenfield

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 11/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 13

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-13
1			3			TOTAL SHEETS
2			4			30

3/21/2019
...\403_025_I4400BB_SMU_BG_013_440217.dgn

DEAD LOAD DEFLECTION TABLE FOR SPAN A											
0.6"Ø LOW RELAXATION STRANDS	GIRDERS 1 AND 5										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.061	0.114	0.157	0.183	0.193	0.183	0.157	0.114	0.061	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.042	0.083	0.114	0.134	0.140	0.132	0.111	0.079	0.040	0.000
FINAL CAMBER ↑	0	1/4	3/8	1/2	9/16	5/8	5/8	9/16	7/16	1/4	0

DEAD LOAD DEFLECTION TABLE FOR SPAN A											
0.6"Ø LOW RELAXATION STRANDS	GIRDERS 2 THRU 4										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.061	0.114	0.157	0.183	0.193	0.183	0.157	0.114	0.061	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.047	0.092	0.127	0.149	0.156	0.148	0.124	0.089	0.045	0.000
FINAL CAMBER ↑	0	3/16	1/4	3/8	7/16	7/16	7/16	3/8	5/16	3/16	0

DEAD LOAD DEFLECTION TABLE FOR SPAN B											
0.6"Ø LOW RELAXATION STRANDS	GIRDERS 1 AND 5										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.061	0.114	0.157	0.183	0.193	0.183	0.157	0.114	0.061	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.040	0.079	0.111	0.132	0.140	0.134	0.114	0.083	0.042	0.000
FINAL CAMBER ↑	0	1/4	7/16	9/16	5/8	5/8	9/16	1/2	3/8	1/4	0

DEAD LOAD DEFLECTION TABLE FOR SPAN B											
0.6"Ø LOW RELAXATION STRANDS	GIRDERS 2 THRU 4										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.061	0.114	0.157	0.183	0.193	0.183	0.157	0.114	0.061	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.045	0.089	0.124	0.148	0.156	0.149	0.127	0.092	0.047	0.000
FINAL CAMBER ↑	0	3/16	5/16	3/8	7/16	7/16	7/16	3/8	1/4	3/16	0

✳ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD. DOES NOT INCLUDE WEIGHT OF FORM LINER.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. I-4400BB

HENDERSON **COUNTY**

STATION: STA. 21+33.13 -Y2-

Digitally signed by: Richard R. Greenfield
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
GIRDER
DEAD LOAD DEFLECTIONS AND CAMBER

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

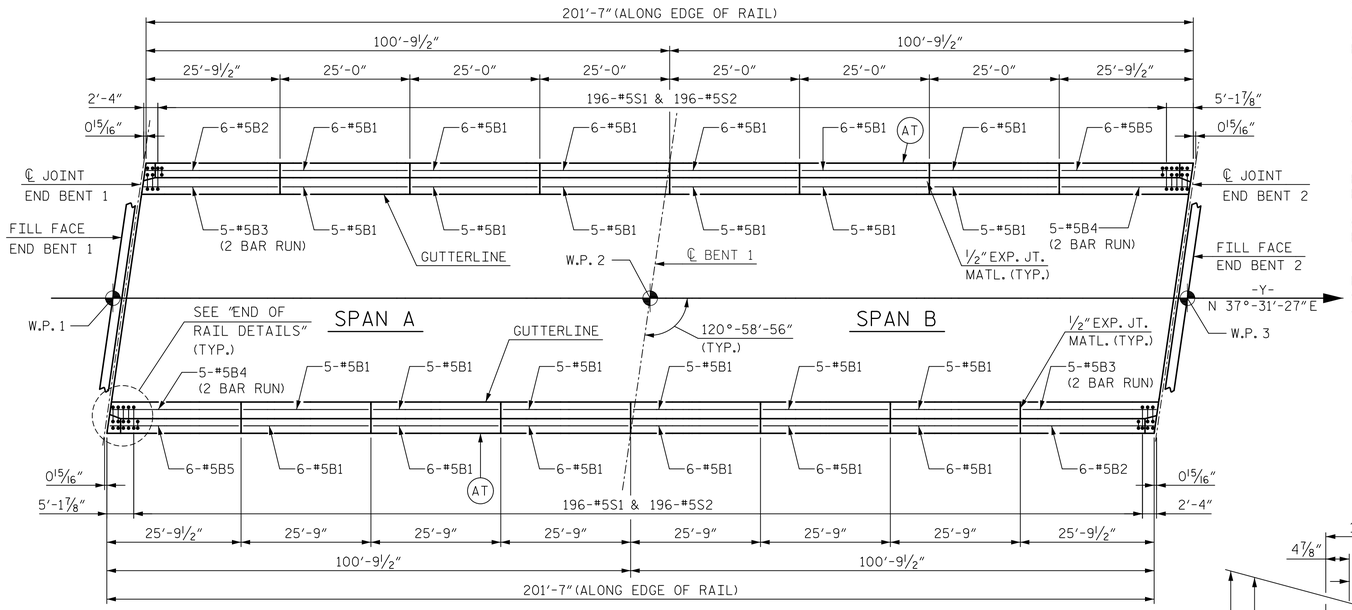
DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY L. DICKENS DATE 10/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 14

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-14
1			3			TOTAL SHEETS
2			4			30

6/7/2019
...\403_027_I4400BB_SMU_DL01_014_440217.dgn



PLAN OF BARRIER RAIL

NOTES

THE BARRIER RAIL 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.

WHEN FOAM JOINT SEAL IS REQUIRED, THE JOINT IN THE DECK SHALL BE SAWED PRIOR TO THE CASTING OF BARRIER RAIL.

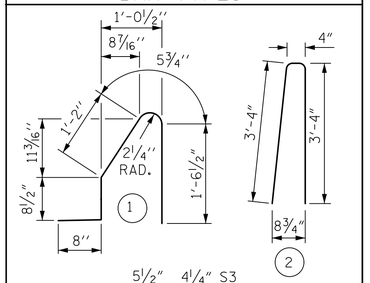
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

THE #5S1 AND #5S2 MAY BE SHIFTED SLIGHTLY AS REQUIRED TO PROVIDE 2" MINIMUM CONCRETE AT THE ½ INCH EXPANSION JOINT IN THE BARRIER RAIL.

THE #5 S3, S4, S5 AND S6 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE #5 S3, S4, S5 AND S6 BARS IS 18.6 KIPS. FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL OTHER THAN FACES WITH ARCHITECTURAL TREATMENT AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE 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.

BAR TYPES



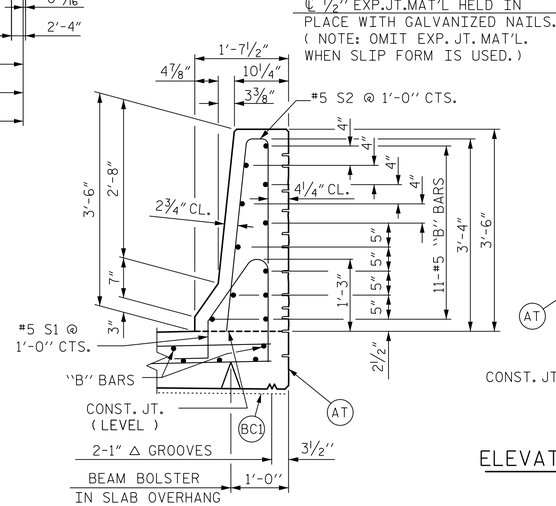
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

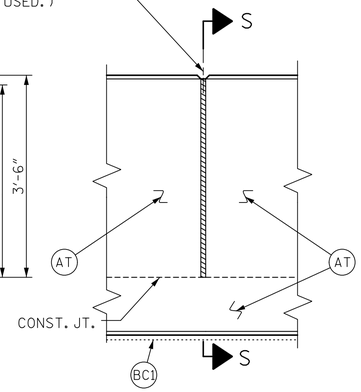
FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ S1	392	#5	1	4'-6¾"	1,865
✳ S2	392	#5	2	7'-0"	2,862
✳ S3	4	#5	3	4'-2"	17
✳ S4	4	#5	STR	4'-0"	17
✳ S5	8	#5	3	3'-5"	29
✳ S6	8	#5	STR	3'-3"	27
✳ B1	132	#5	STR	24'-8"	3,396
✳ B2	12	#5	STR	25'-7"	320
✳ B3	20	#5	STR	14'-10"	309
✳ B4	20	#5	STR	14'-4"	299
✳ B5	12	#5	STR	25'-3"	316

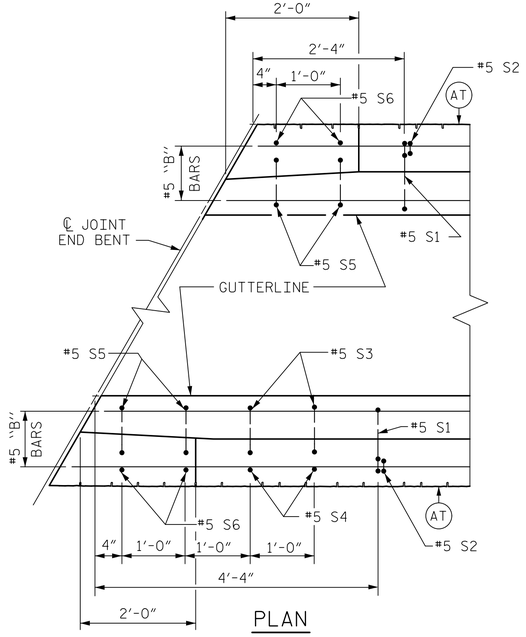
✳ EPOXY COATED REINFORCING STEEL	LBS.	9,457
CLASS AA CONCRETE	CU. YDS.	61.3
CONCRETE BARRIER RAIL	LIN. FT.	403.2
ARCHITECTURAL CONCRETE SURFACE TREATMENT	1,403.4	SQ. FT.



SECTION THRU RAIL



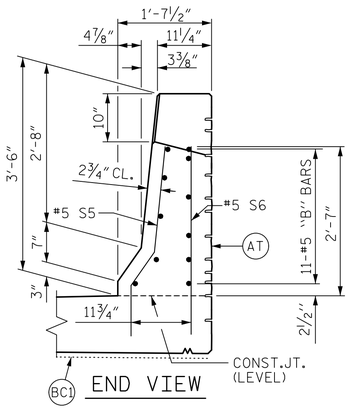
ELEVATION AT EXPANSION JOINTS



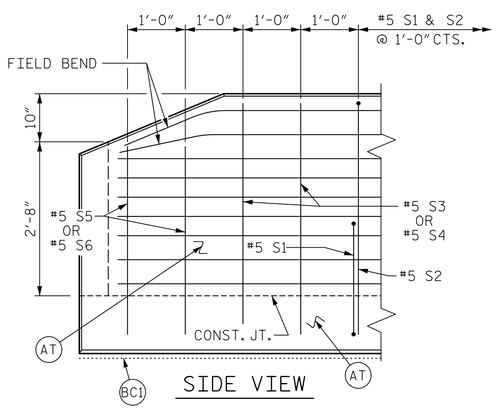
PLAN

AT LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

BC1 LIMITS OF BRIDGE COATING (LIGHT GRAY)



END VIEW



SIDE VIEW

BARRIER RAIL DETAILS

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

Digitally signed by Richard R. Greenfield
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

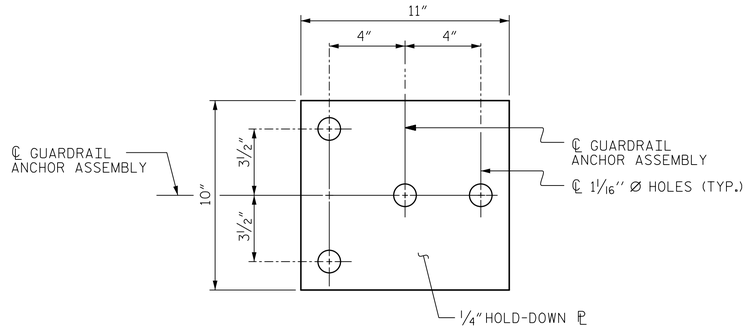
DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 15

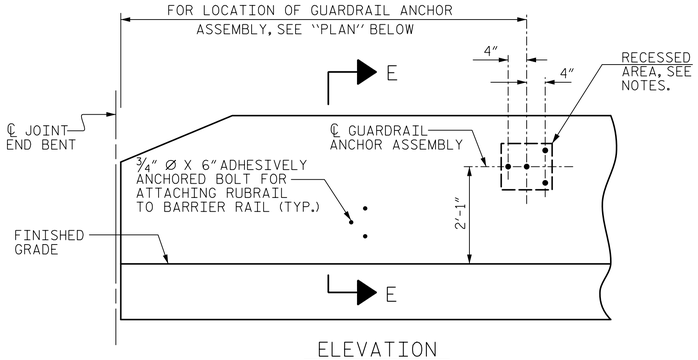
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-15
1			3			TOTAL SHEETS
2			4			30

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

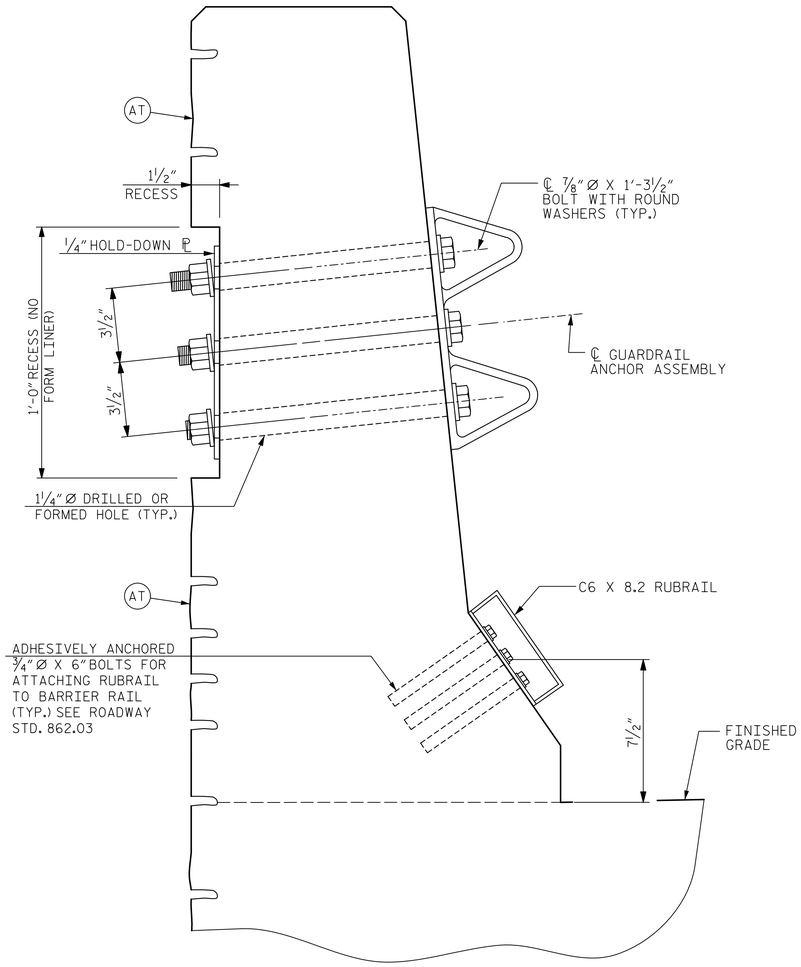
6/7/2019
...\403.029.I4400BB_SMU_BR01_015_440217.dgn



PLAN



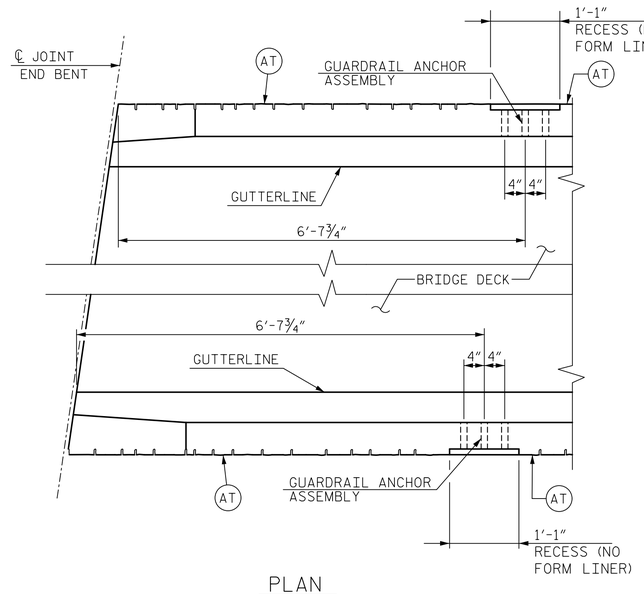
ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT



PLAN

END BENT 1 SHOWN, END BENT 2 SIMILAR.

LOCATION OF ANCHORS FOR GUARDRAIL

NOTES

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

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.

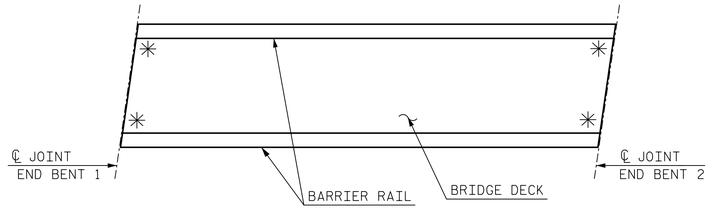
AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

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

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.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4″ Ø X 6″ BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4″ Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.

RECESSED AREA BELOW HOLD DOWN PLATE SHALL BE FINISHED SMOOTH TO ALLOW FOR COMPLETE SEATING OF PLATE AGAINST BACK OF CONCRETE BARRIER.



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY (4 REQUIRED)

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 RICHARD R. GREENFIELD — Digitally signed by: Richard R. Greenfield

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 16

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-16
1			3			TOTAL SHEETS
2			4			30

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\403_03\I4400BB_SMU_GROI_016_440217.dgn

REINFORCING BAR SCHEDULE

EPOXY COATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A1	351	5	STR.	42′-8″	15,620
A2	2	5	STR.	3′-11″	8
A3	2	5	STR.	4′-9″	10
A4	2	5	STR.	5′-7″	12
A5	2	5	STR.	6′-5″	13
A6	2	5	STR.	7′-3″	15
A7	2	5	STR.	8′-1″	17
A8	2	5	STR.	8′-11″	19
A9	2	5	STR.	9′-9″	20
A10	2	5	STR.	10′-7″	22
A11	2	5	STR.	11′-5″	24
A12	2	5	STR.	12′-3″	26
A13	2	5	STR.	13′-1″	27
A14	2	5	STR.	13′-11″	29
A15	2	5	STR.	14′-9″	31
A16	2	5	STR.	15′-7″	33
A17	2	5	STR.	16′-5″	34
A18	2	5	STR.	17′-3″	36
A19	2	5	STR.	18′-1″	38
A20	2	5	STR.	18′-11″	39
A21	2	5	STR.	19′-9″	41
A22	2	5	STR.	20′-7″	43
A23	2	5	STR.	21′-5″	45
A24	2	5	STR.	22′-3″	46
A25	2	5	STR.	23′-1″	48
A26	2	5	STR.	23′-11″	50
A27	2	5	STR.	24′-9″	52
A28	2	5	STR.	25′-7″	53
A29	2	5	STR.	26′-5″	55
A30	2	5	STR.	27′-3″	57
A31	2	5	STR.	28′-1″	59
A32	2	5	STR.	28′-11″	60
A33	2	5	STR.	29′-9″	62

REINFORCING BAR SCHEDULE

EPOXY COATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A34	2	5	STR.	30′-7″	64
A35	2	5	STR.	31′-5″	66
A36	2	5	STR.	32′-3″	67
A37	2	5	STR.	33′-1″	69
A38	2	5	STR.	33′-11″	71
A39	2	5	STR.	34′-9″	72
A40	2	5	STR.	35′-7″	74
A41	2	5	STR.	36′-5″	76
A42	2	5	STR.	37′-3″	78
A43	2	5	STR.	38′-1″	79
A44	2	5	STR.	38′-11″	81
A45	2	5	STR.	39′-9″	83
A46	2	5	STR.	40′-7″	85
A47	2	5	STR.	41′-5″	86
A48	2	5	STR.	41′-3″	86
A49	6	6	STR.	15′-10″	143
B1	180	4	STR.	24′-11″	2,996
B2	60	7	STR.	36′-8″	4,497
B3	58	5	STR.	30′-0″	1,815
G1	2	5	STR.	49′-9″	104
K1	8	8	1	15′-9″	336
K2	12	8	2	24′-8″	790
S1	64	5	3	5′-11″	395
S2	64	4	4	4′-2½″	180
U1	24	4	2	13′-4″	214
U2	8	4	2	11′-4″	61
EPOXY COATED REINFORCING STEEL TOTAL:					29,412

REINFORCING BAR SCHEDULE

UNCOATED

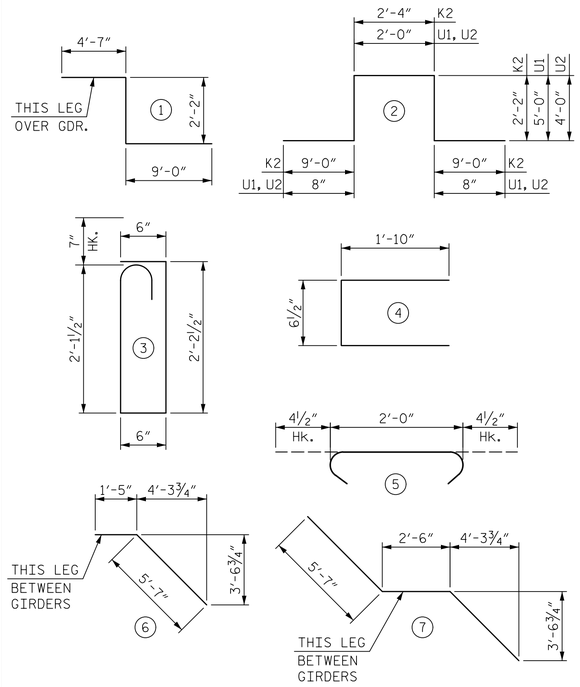
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A101	351	5	STR.	42′-8″	15,620
A102	2	5	STR.	3′-11″	8
A103	2	5	STR.	4′-9″	10
A104	2	5	STR.	5′-7″	12
A105	2	5	STR.	6′-5″	13
A106	2	5	STR.	7′-3″	15
A107	2	5	STR.	8′-1″	17
A108	2	5	STR.	8′-11″	19
A109	2	5	STR.	9′-9″	20
A110	2	5	STR.	10′-7″	22
A111	2	5	STR.	11′-5″	24
A112	2	5	STR.	12′-3″	26
A113	2	5	STR.	13′-1″	27
A114	2	5	STR.	13′-11″	29
A115	2	5	STR.	14′-9″	31
A116	2	5	STR.	15′-7″	33
A117	2	5	STR.	16′-5″	34
A118	2	5	STR.	17′-3″	36
A119	2	5	STR.	18′-1″	38
A120	2	5	STR.	18′-11″	39
A121	2	5	STR.	19′-9″	41
A122	2	5	STR.	20′-7″	43
A123	2	5	STR.	21′-5″	45
A124	2	5	STR.	22′-3″	46
A125	2	5	STR.	23′-1″	48
A126	2	5	STR.	23′-11″	50
A127	2	5	STR.	24′-9″	52
A128	2	5	STR.	25′-7″	53
A129	2	5	STR.	26′-5″	55
A130	2	5	STR.	27′-3″	57
A131	2	5	STR.	28′-1″	59
A132	2	5	STR.	28′-11″	60
A133	2	5	STR.	29′-9″	62

REINFORCING BAR SCHEDULE

UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A134	2	5	STR.	30′-7″	64
A135	2	5	STR.	31′-5″	66
A136	2	5	STR.	32′-3″	67
A137	2	5	STR.	33′-1″	69
A138	2	5	STR.	33′-11″	71
A139	2	5	STR.	34′-9″	72
A140	2	5	STR.	35′-7″	74
A141	2	5	STR.	36′-5″	76
A142	2	5	STR.	37′-3″	78
A143	2	5	STR.	38′-1″	79
A144	2	5	STR.	38′-11″	81
A145	2	5	STR.	39′-9″	83
A146	2	5	STR.	40′-7″	85
A147	2	5	STR.	41′-5″	86
A148	2	5	STR.	41′-3″	86
B101	208	5	STR.	51′-10″	11,245
B102	46	4	STR.	30′-0″	922
K3	24	6	STR.	8′-8″	312
K4	8	4	STR.	8′-0″	43
K5	8	4	STR.	8′-9″	47
K6	16	4	STR.	9′-7″	102
K7	8	4	STR.	8′-5″	45
K8	6	4	STR.	22′-9″	91
K9	4	4	6	7′-0″	19
K10	6	4	7	13′-8″	55
S3	120	4	5	2′-9″	220
UNCOATED REINFORCING STEEL TOTAL:					30,982

BAR TYPES



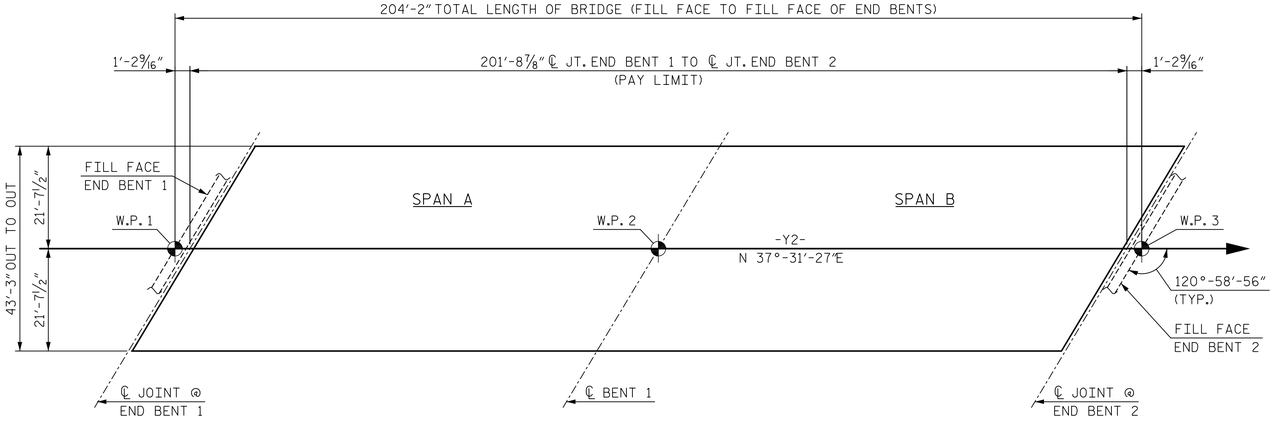
ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	128.4	30,982	29,412
POUR 2	161.1		
TOTALS**	289.5	30,982	29,412

ARCHITECTURAL CONCRETE SURFACE TREATMENT		
EDGE OF DECK:	361.2	SQ. FT.
BARRIER RAIL:	1,403.4	SQ. FT.
TOTAL:	1,764.6	SQ. FT.
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	991.2	SQ. FT.
APPLICATION OF BRIDGE COATING (DARK GRAY)	2,858.2	SQ. FT.

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 8,725)

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	1′-11″	1′-7″	2′-0″	1′-8″	2′-9″
#5	2′-5″	2′-0″	2′-5″	2′-0″	3′-5″
#6	2′-10″		3′-7″	2′-5″	
#7	4′-2″				

GROOVING BRIDGE FLOORS

APPROACH SLABS	2,000	SQ.FT.
BRIDGE DECK	8,070	SQ.FT.
TOTAL	10,070	SQ.FT.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

Electronically signed by: Richard R. Greenfield
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY L. DICKENS DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 17

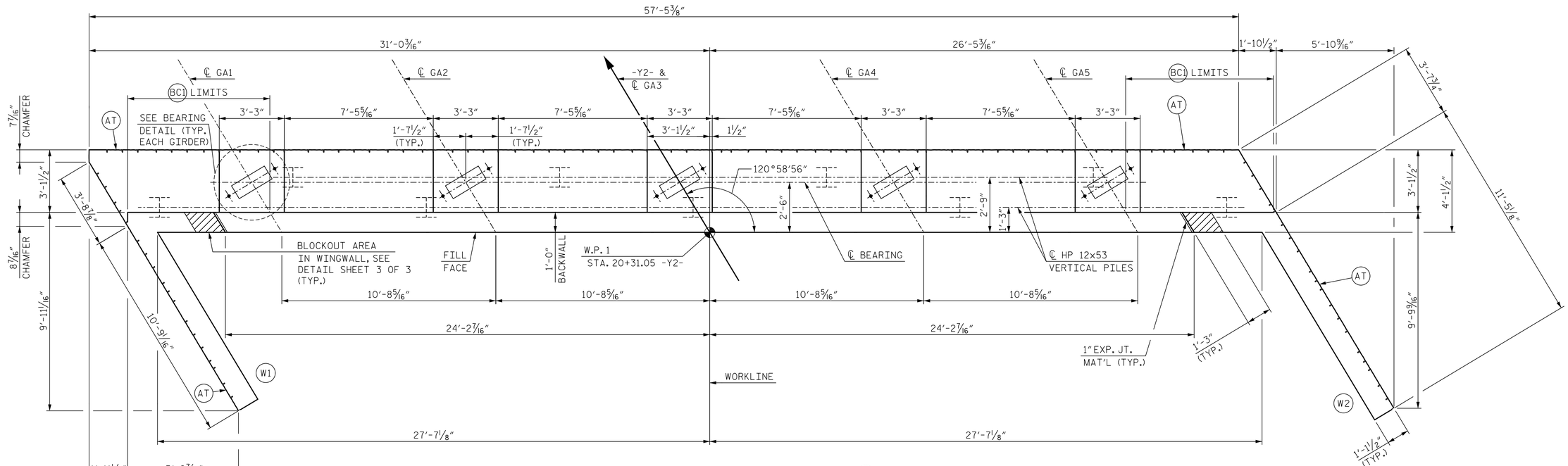
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-17
1			3			TOTAL SHEETS
2			4			30

6/7/2019
...\403_033_I4400BB_SMU_BM01_017_4402I7.dgn

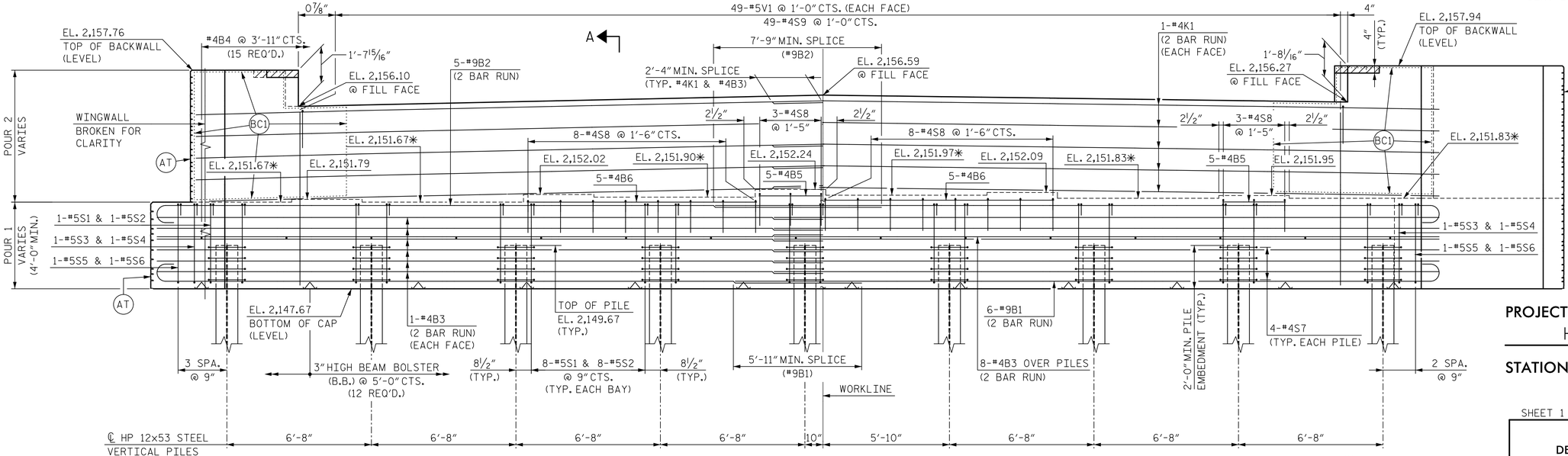


PLAN

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

*SEE SHEET 2 OF 3 FOR LOCATIONS OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS.



ELEVATION

NOTES:

FOR BEARING DETAIL, SEE SHEET 3 OF 3.

FOR NOTES AND PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

FOR WINGWALL DETAILS AND SECTION A-A, SEE SHEET 2 OF 3.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

Digitally signed by: Richard R. Greenfield
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

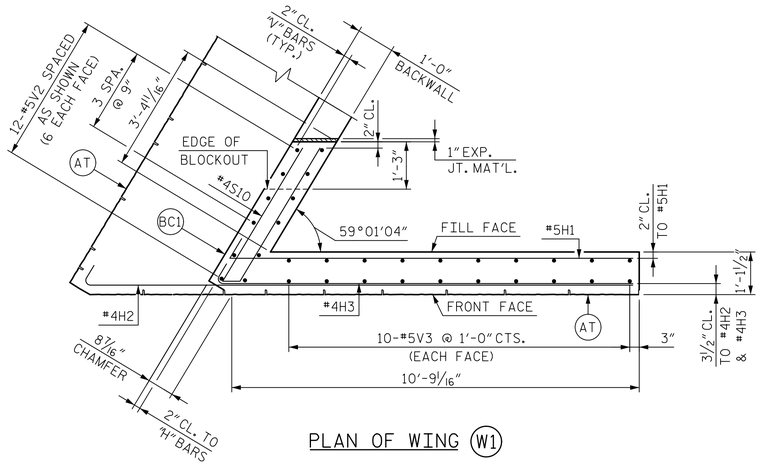
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY J. SLOAT DATE 12/18
CHECKED BY R. GREENFIELD DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

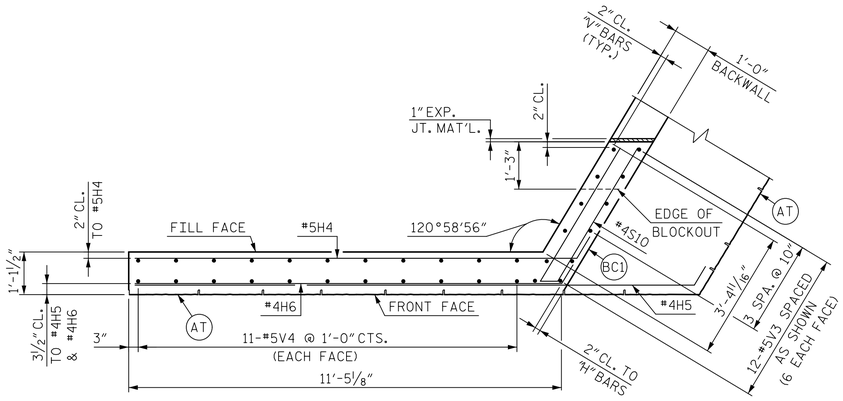
DWG. NO. 18

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-18
1			3			TOTAL SHEETS
2			4			30

6/7/2019
...\403_035_I4400BB_SMU_E01_018_440217.dgn



PLAN OF WING (W1)

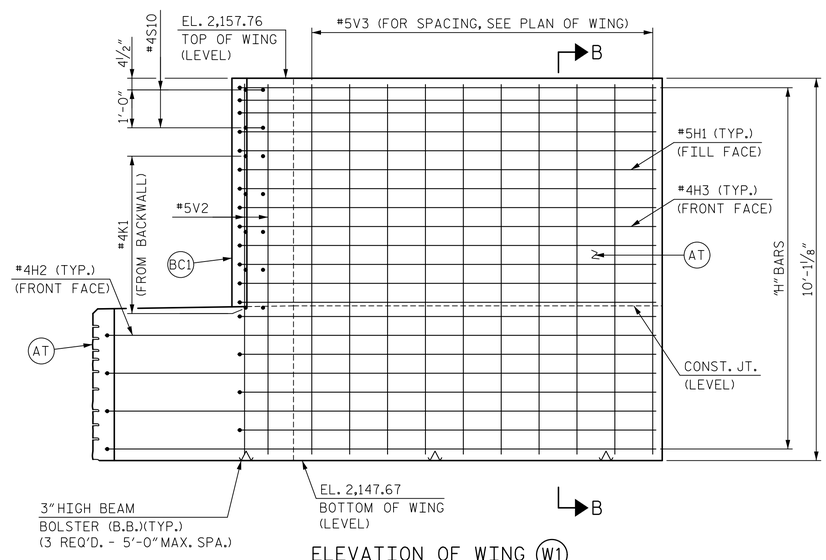


PLAN OF WING (W2)

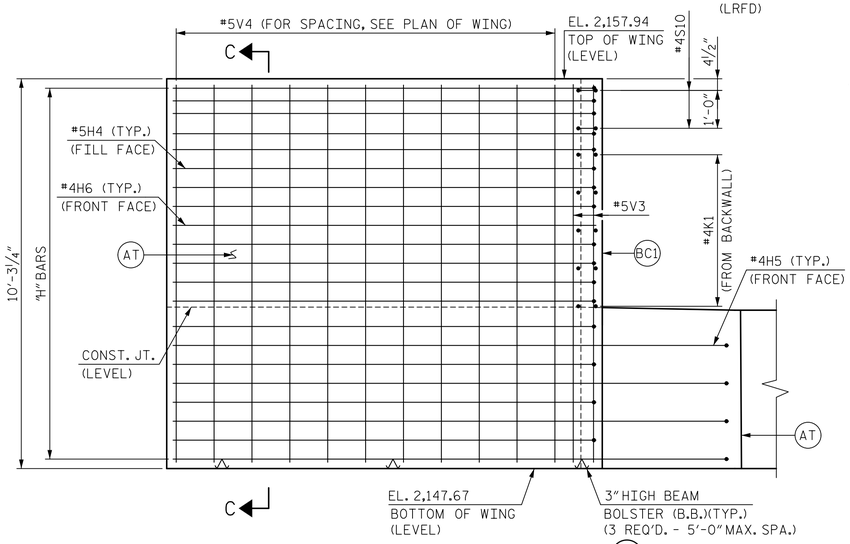
NOTES:

FOR NOTES, SEE SHEET 3 OF 3.

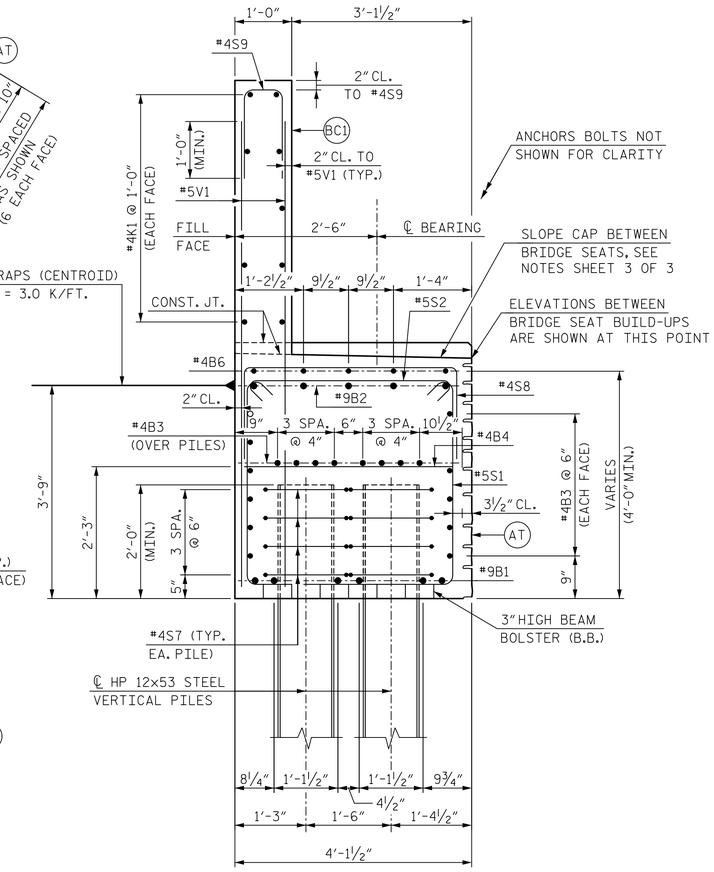
FOR BLOCKOUT IN WINGWALL, SEE SHEET 3 OF 3.



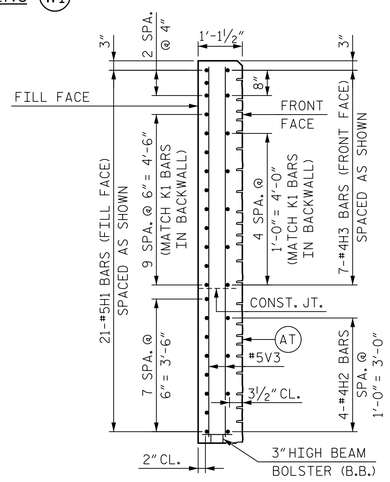
ELEVATION OF WING (W1)



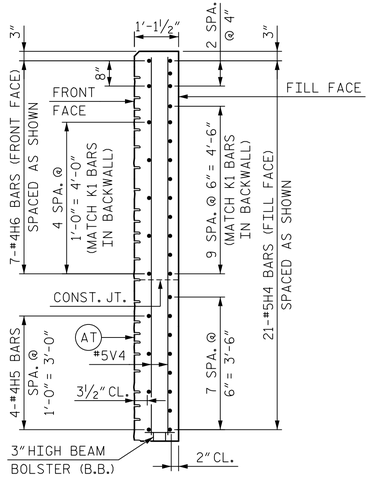
ELEVATION OF WING (W2)



SECTION A-A



SECTION B-B



SECTION C-C

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

Digitally signed by: R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

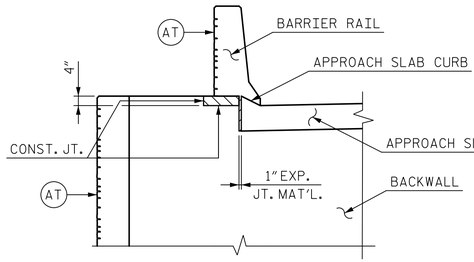
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	J. SLOAT	DATE 12/18
CHECKED BY	R. GREENFIELD	DATE 1/19
DESIGN ENGINEER OF RECORD	R. GREENFIELD	DATE 3/19

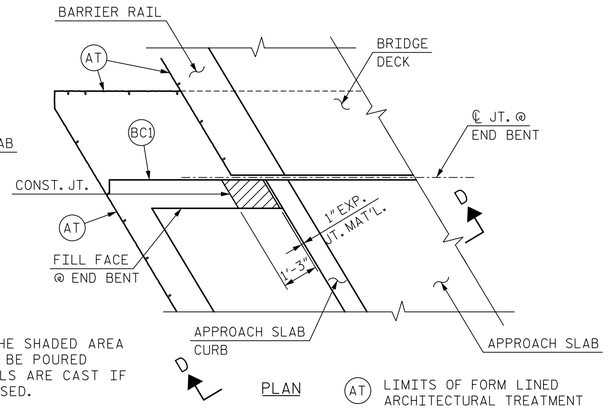
DWG. NO. 19

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-19
1			3			TOTAL SHEETS
2			4			30

6/7/2019
\403_037_I4400BB_SMU_E02_019_440217.dgn



SECTION D-D



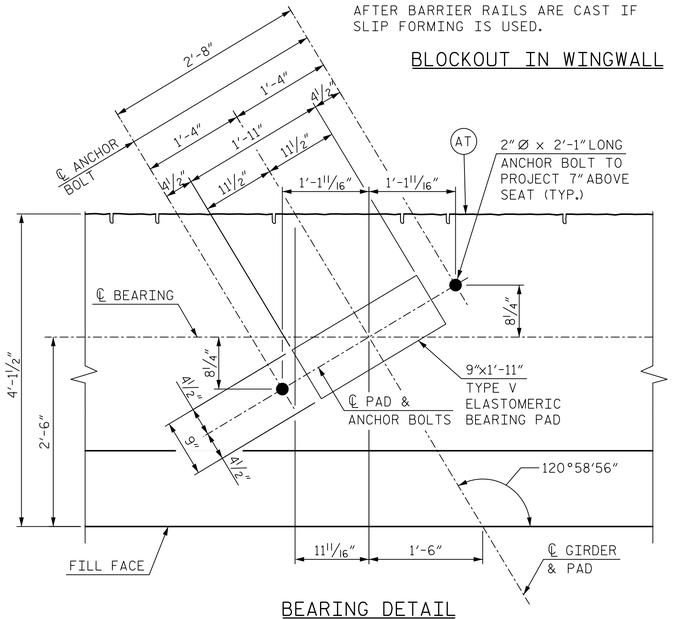
PLAN

NOTE:
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

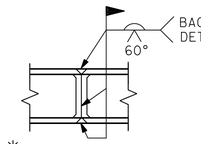
BLOCKOUT IN WINGWALL

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

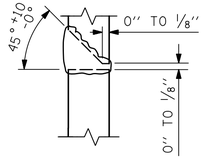
(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)



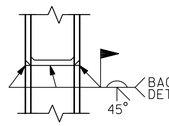
BEARING DETAIL



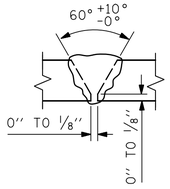
*PILE HORIZONTAL OR VERTICAL



DETAIL "A"



*PILE VERTICAL

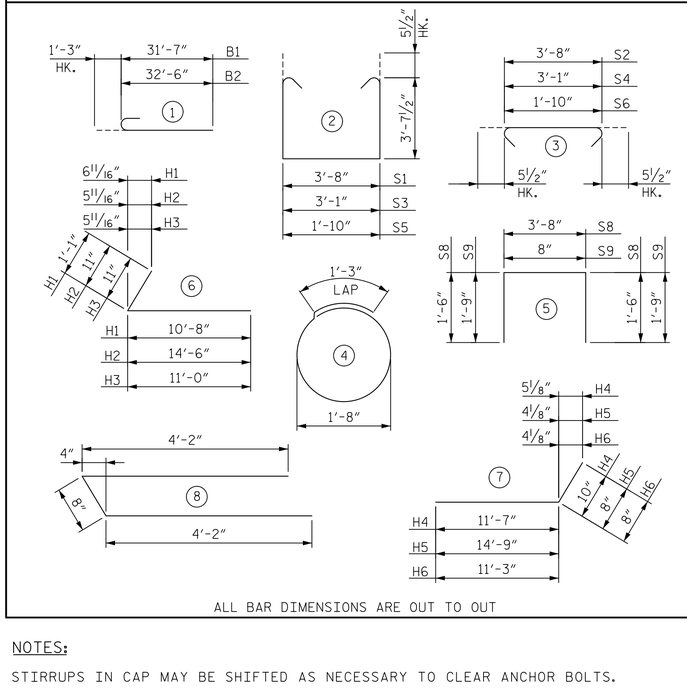


DETAIL "B"

* POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

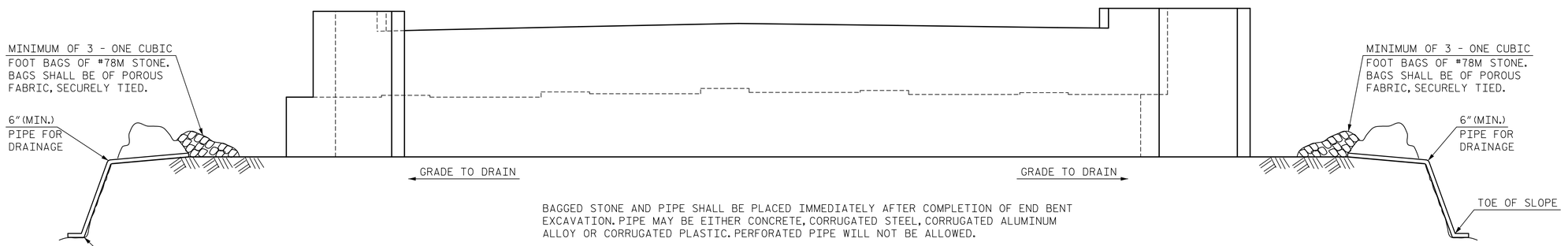
BILL OF MATERIAL

UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	9	1	32'-10"	1,340
B2	10	9	1	33'-9"	1,148
B3	40	4	STR	29'-9"	795
B4	15	4	STR	3'-8"	37
B5	10	4	STR	2'-11"	19
B6	10	4	STR	10'-7"	71
H1	21	5	6	11'-9"	257
H2	4	4	6	15'-5"	41
H3	7	4	6	11'-11"	56
H4	21	5	7	12'-5"	272
H5	4	4	7	15'-5"	41
H6	7	4	7	11'-11"	56
K1	20	4	STR	29'-9"	397
S1	65	5	2	11'-10"	802
S2	65	5	3	4'-7"	311
S3	2	5	2	11'-3"	23
S4	2	5	3	4'-0"	8
S5	2	5	2	10'-0"	21
S6	2	5	3	2'-9"	6
S7	36	4	4	6'-6"	156
S8	22	4	5	6'-8"	98
S9	49	4	5	4'-2"	136
S10	4	4	8	9'-0"	24
V1	98	5	STR	8'-0"	818
V2	12	5	STR	9'-6"	119
V3	32	5	STR	9'-8"	323
V4	22	5	STR	9'-10"	226

QUANTITIES

REINFORCING STEEL	LBS.	7,601
CLASS "A" CONCRETE BREAKDOWN		
POUR 1 - CAP & BOT. OF WINGS	CU. YDS.	41.0
POUR 2 - TOP OF WINGS & BACKWALL	CU. YDS.	15.3
TOTAL	CU. YDS.	56.3
HP 12x53 STEEL PILES	NO.	9
	LIN. FT.	360
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	499.8
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	SQ. FT.	81.5



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 FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT 1

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 RICHARD R. GREENFIELD

Digitally signed by: Richard R. Greenfield

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

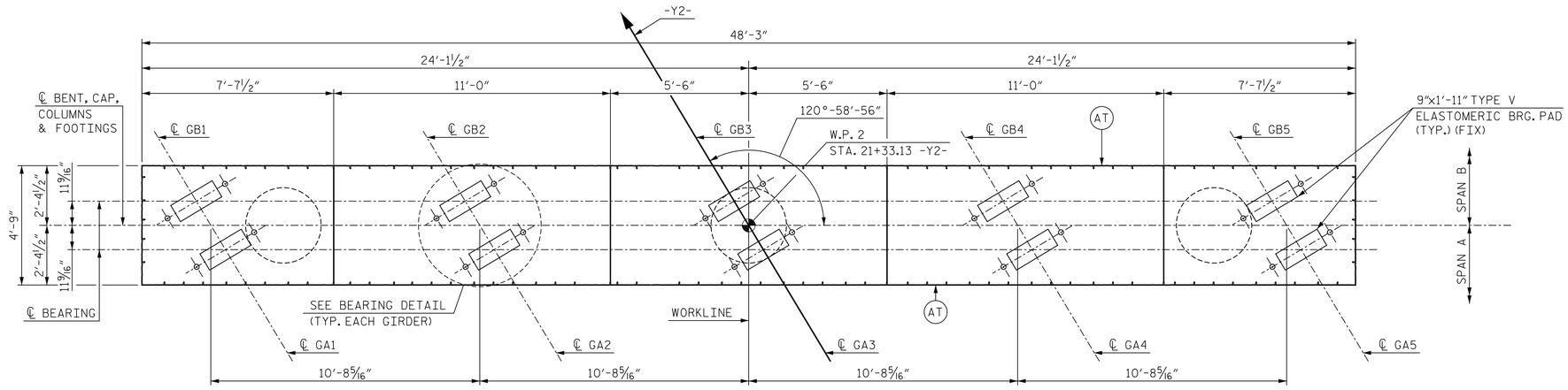
DRAWN BY J. SLOAT DATE 12/18
CHECKED BY R. GREENFIELD DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 20

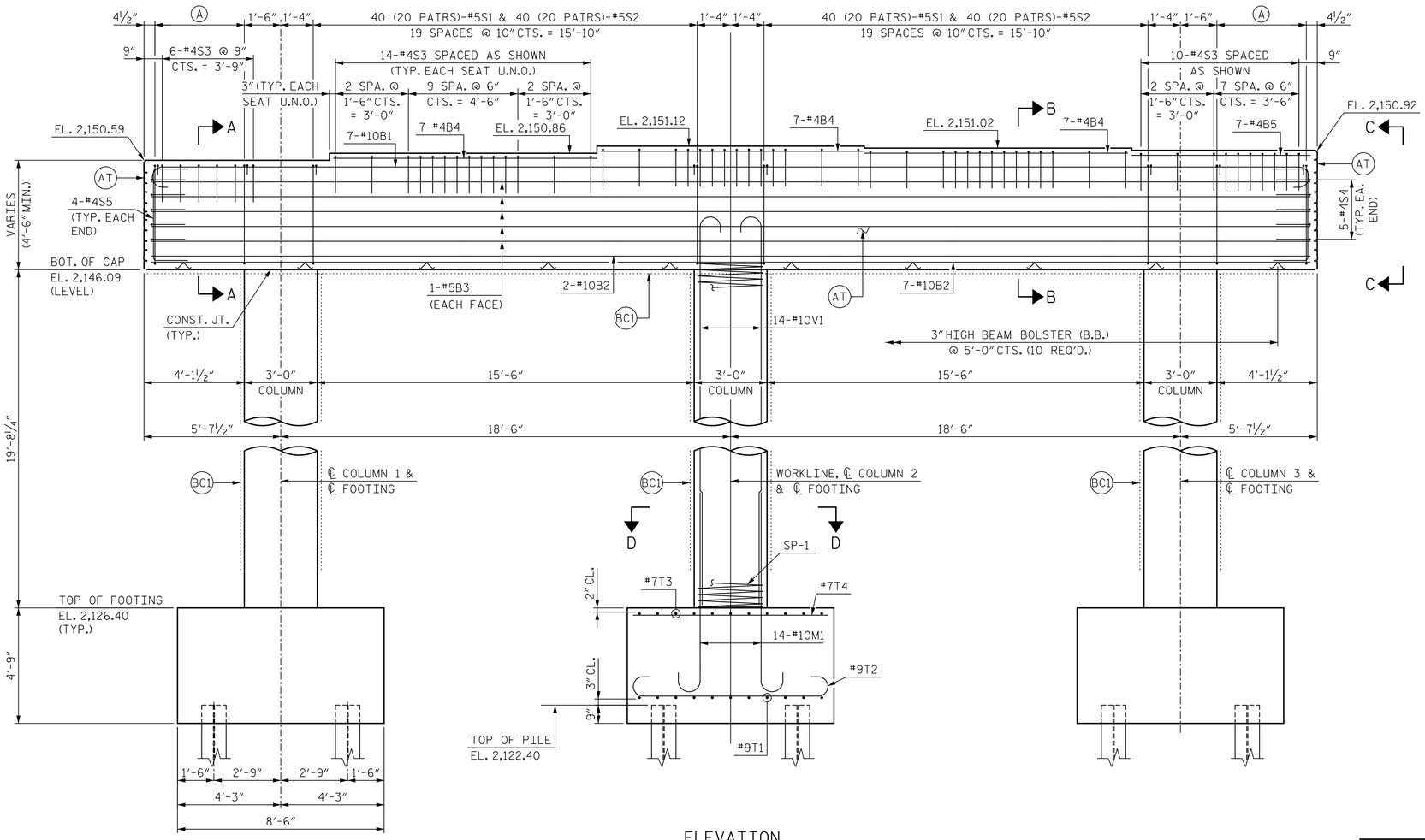
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-20
1			3			TOTAL SHEETS
2			4			30

6/7/2019
...\403.039.I4400BB.SMU.E03.020.44021f.dgn



PLAN



ELEVATION

(FOOTING/COLUMN REINFORCING AND DIMENSIONS ARE TYPICAL FOR EACH FOOTING/COLUMN.)

(A) 12 (6 PAIRS)-#5S1 & 12 (6 PAIRS)-#5S2 5 SPACES @ 9"CTS. = 3'-9"

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

NOTES:

FOR NOTES, SEE SHEET 3 OF 3.

FOR SECTION VIEWS, SEE SHEET 3 OF 3.

FOR FOOTING PLAN, SEE SHEET 2 OF 3.

FOR BEARING DETAIL, SEE SHEET 2 OF 3.

FOR END VIEW, SEE SHEET 2 OF 3.

LIMITS OF BRIDGE COATING SHALL EXTEND A MINIMUM OF 1 FT BELOW THE PROPOSED GROUND LINE.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

Digitally signed by: R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

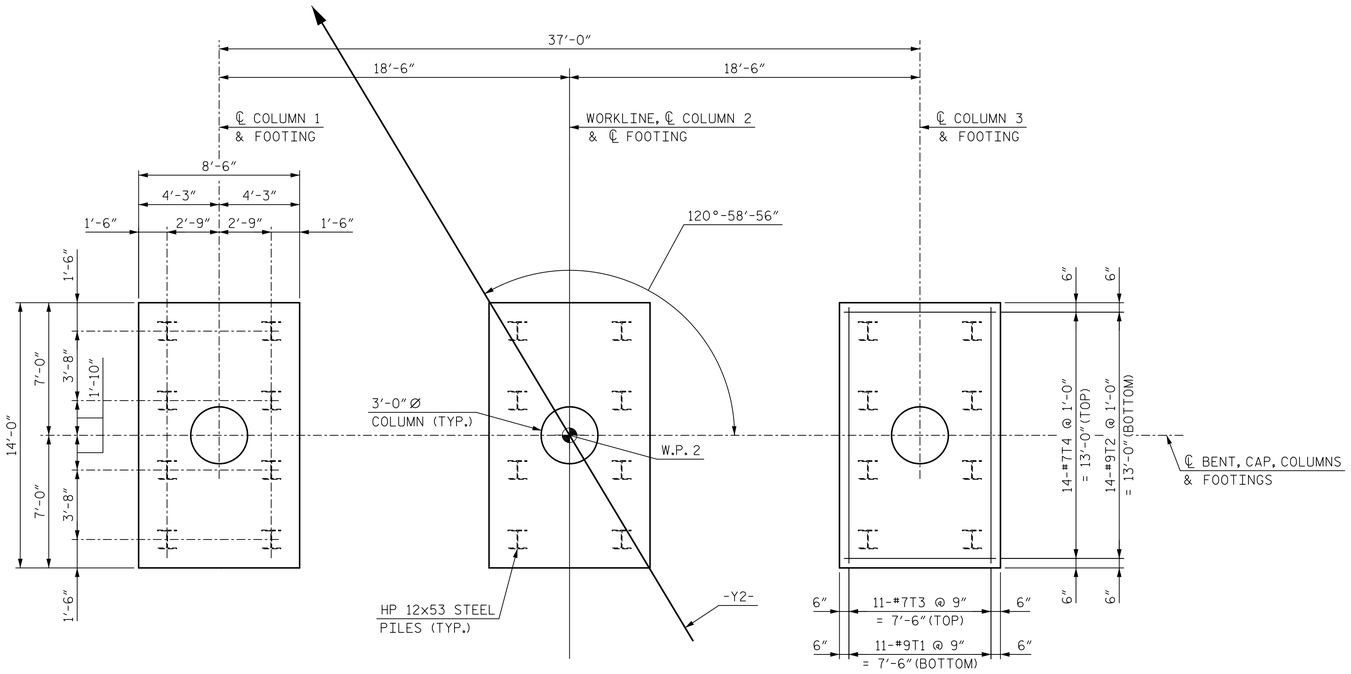
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 2/19
CHECKED BY A. WAGNER DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 21

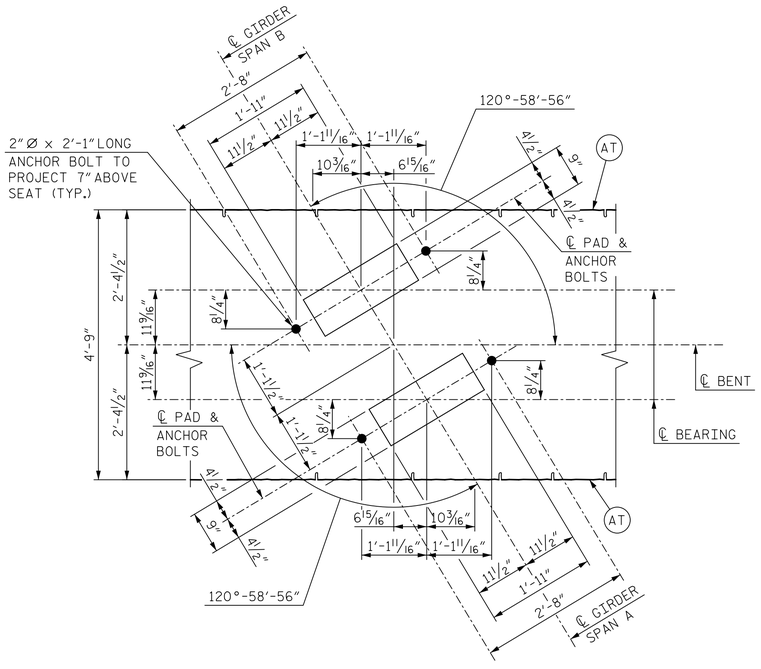
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-21
1			3			TOTAL SHEETS
2			4			30

6/7/2019
::\403_04\I4400BB_SMU_B01_02_440217.dgn



FOOTING PLAN

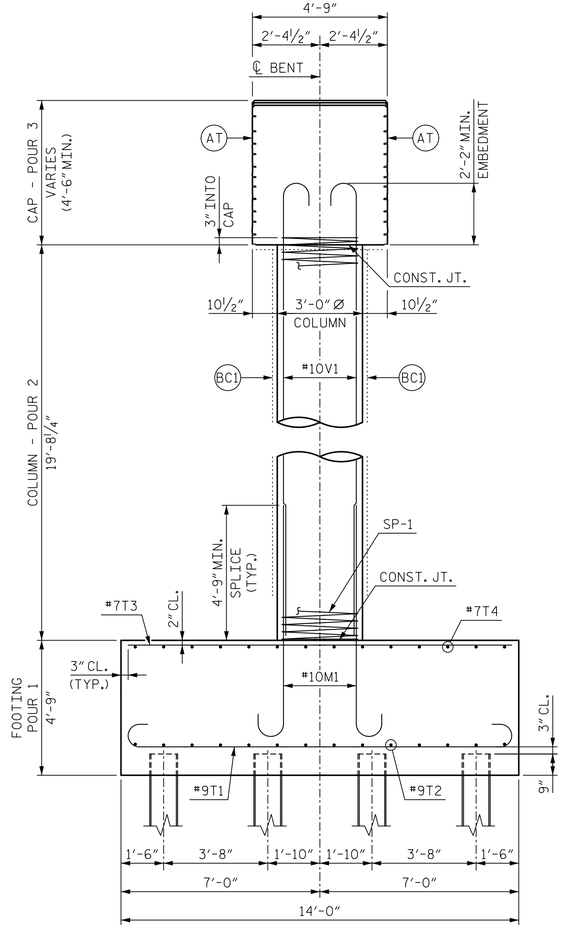
(FOOTING REINFORCING AND DIMENSIONS ARE TYPICAL FOR EACH FOOTING)



BEARING DETAIL

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)



END VIEW

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

NOTE:

FOR NOTES, SEE SHEET 3 OF 3.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

Signed by: Richard R. Greenfield

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1 DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

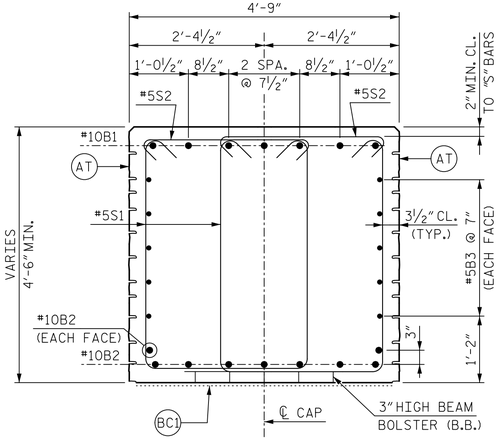
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 2/19
CHECKED BY A. WAGNER DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

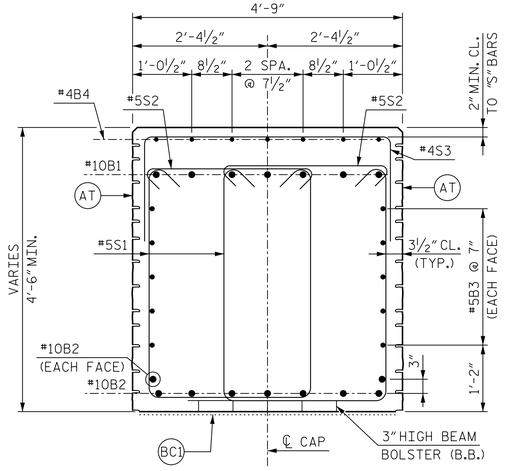
DWG. NO. 22

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-22
1			3			TOTAL SHEETS
2			4			30

6/7/2019
...\403.043.I4400BB_SMU.B02.022_440217.dgn



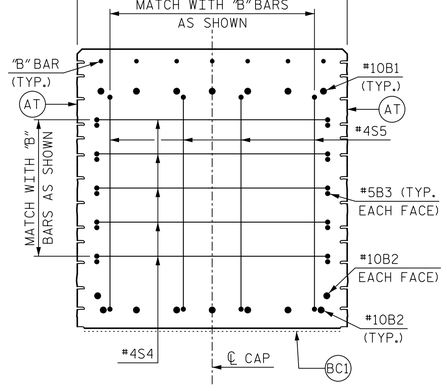
SECTION A-A



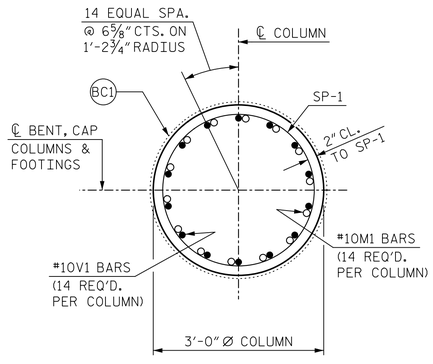
SECTION B-B

AT LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

BC1 LIMITS OF BRIDGE COATING (LIGHT GRAY)

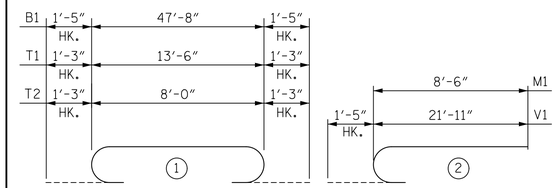


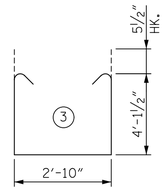
SECTION C-C

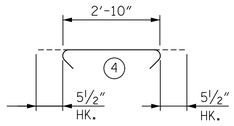


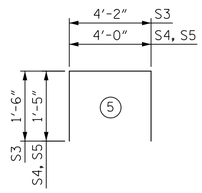
SECTION D-D

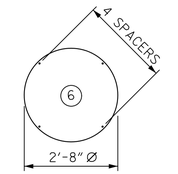
BAR TYPES

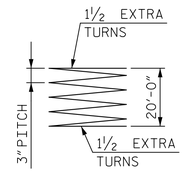












ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
B1	7	10	1	50′-6″	1,521
B2	9	10	STR.	47′-8″	1,846
B3	10	5	STR.	47′-8″	497
B4	21	4	STR.	10′-8″	150
B5	7	4	STR.	7′-4″	34
M1	42	10	2	9′-11″	1,792
S1	104	5	3	12′-0″	1,302
S2	104	5	4	3′-9″	407
S3	58	4	5	7′-2″	278
S4	10	4	5	6′-10″	46
S5	8	4	5	6′-10″	37
T1	33	9	1	16′-0″	1,795
T2	42	9	1	10′-6″	1,499
T3	33	7	STR.	13′-6″	911
T4	42	7	STR.	8′-0″	687
V1	42	10	2	23′-4″	4,217
SP-1	3	✳	6	684′-9″	1,372

QUANTITIES

REINFORCING STEEL	LBS.	17,019
SPIRAL COLUMN REINFORCING STEEL	LBS.	1,372
CLASS "A" CONCRETE BREAKDOWN		
FOOTING POUR 1	CU. YDS.	62.8
COLUMNS POUR 2	CU. YDS.	15.5
CAP POUR 3	CU. YDS.	41.0
TOTAL	CU. YDS.	119.3
STEEL PILE POINTS	EA.	24
PREDRILLING FOR PILES	LIN. FT.	272
HP 12x53 STEEL PILES	NO.	24
	LIN. FT.	680
FOUNDATION EXCAVATION	LUMP SUM	LUMP SUM
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	510.7
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	SQ. FT.	736.4

✳ THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

FOR PILE SPLICE DETAILS, SEE "SUBSTRUCTURE END BENT 1 DETAILS" SHEET 3 OF 3.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 RICHARD R. GREENFIELD

Designed by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 2/19
CHECKED BY A. WAGNER DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 23

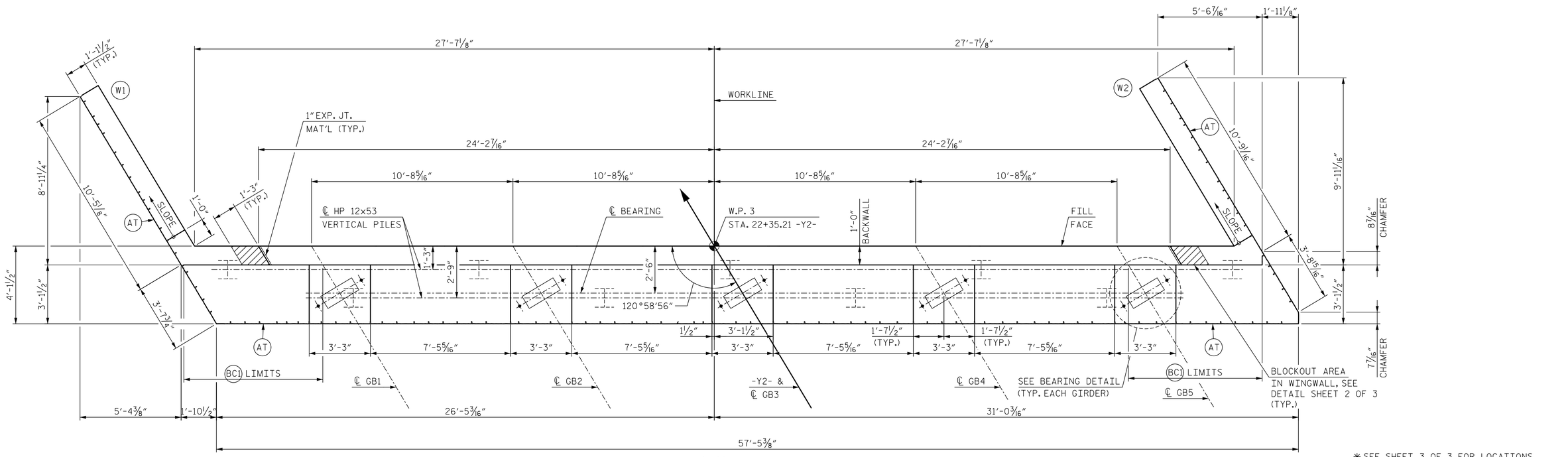
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-23
1			3			TOTAL SHEETS
2			4			30

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

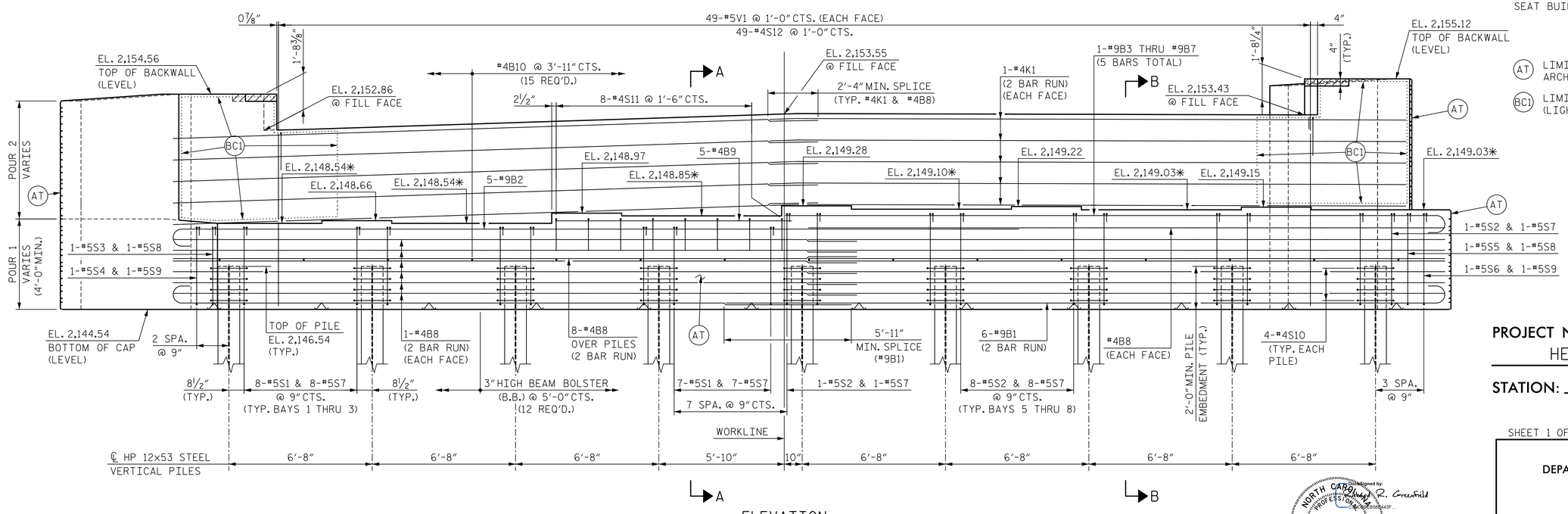
BENT 1 DETAILS

6/7/2019
...\403_045_I4400BB_SMU_B03_023_4402IT.dgn



PLAN

✳ SEE SHEET 3 OF 3 FOR LOCATIONS OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS.



ELEVATION

NOTES:

FOR WINGWALL DETAILS AND BEARING DETAIL, SEE SHEET 2 OF 3.

FOR SECTIONS A-A & B-B, SEE SHEET 3 OF 3.

FOR NOTES AND PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

Digitally signed by: R. R. Greenfield

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

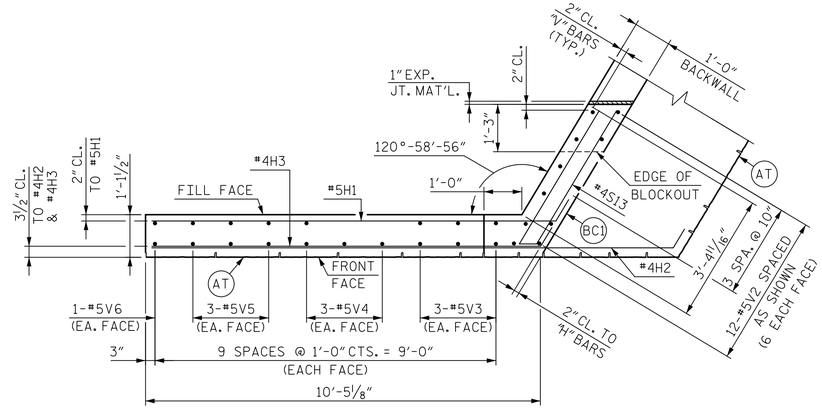
DRAWN BY A. WAGNER DATE 1/19
CHECKED BY R. GREENFIELD DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 24

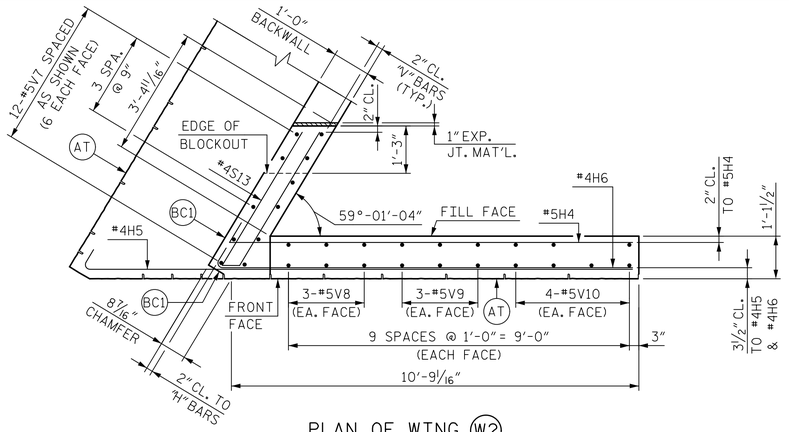
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-24
1			3			TOTAL SHEETS
2			4			30

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

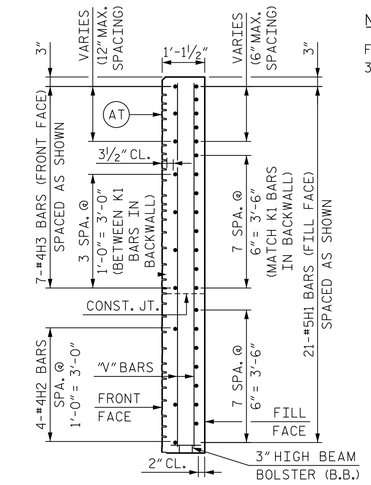
6/7/2019
...\403_047_I4400BB_SMU_E04_024_440227.dgn



PLAN OF WING (W1)



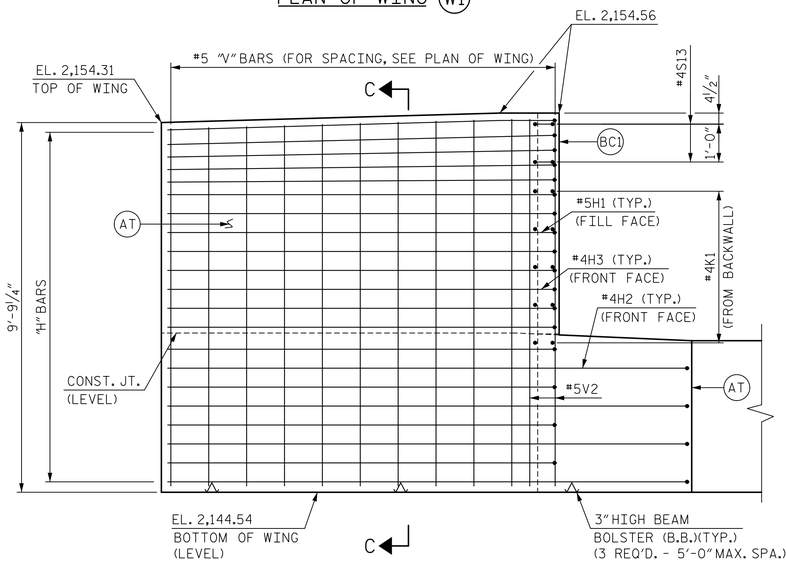
PLAN OF WING (W2)



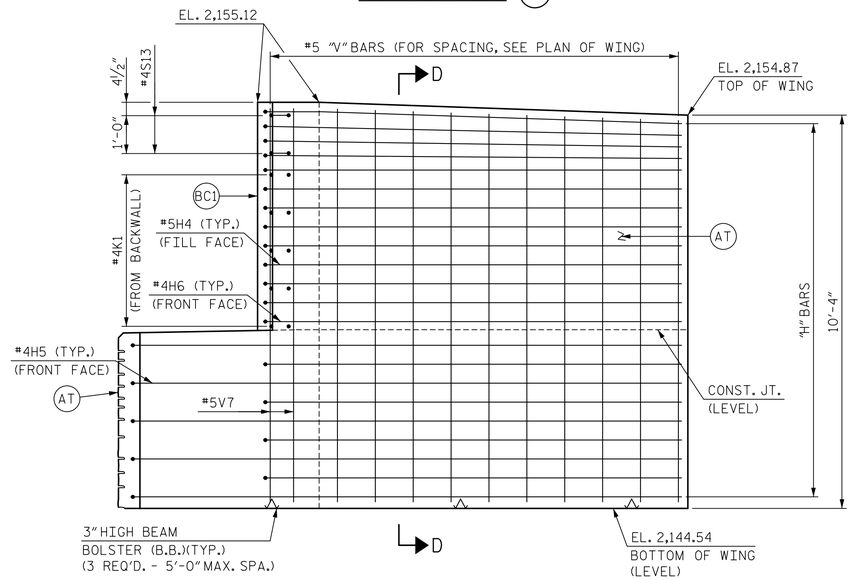
SECTION C-C

NOTES:

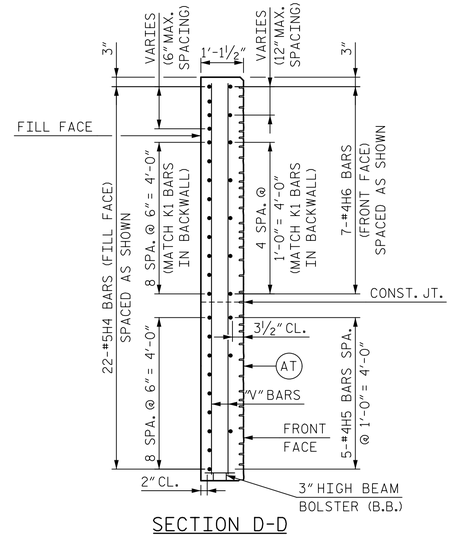
FOR NOTES, SEE SHEET 3 OF 3.



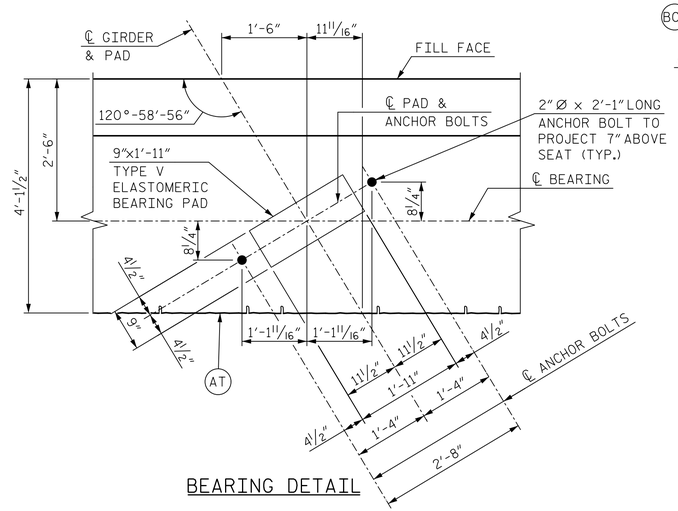
ELEVATION OF WING (W1)



ELEVATION OF WING (W2)



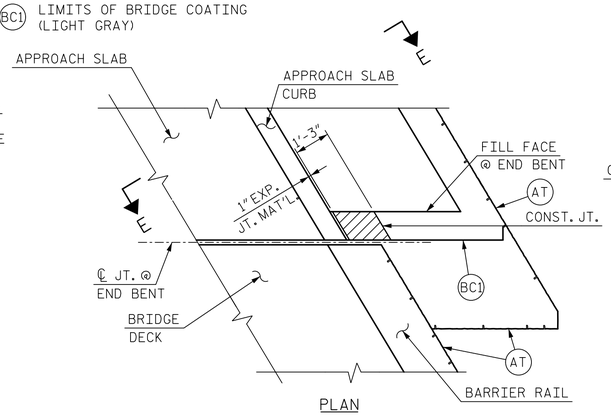
SECTION D-D



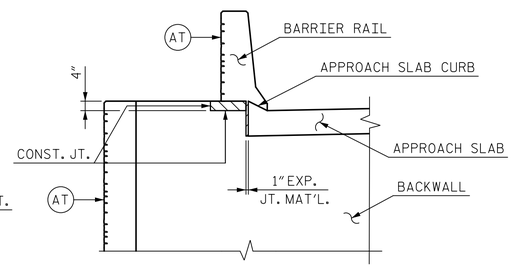
BEARING DETAIL

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)



PLAN



SECTION D-D

BLOCKOUT IN WINGWALL

NOTE:
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

STATE OF NORTH CAROLINA
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD
Digitally signed by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 1/19
CHECKED BY R. GREENFIELD DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 25

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: STA. 21+33.13 -Y2-

SHEET 2 OF 3

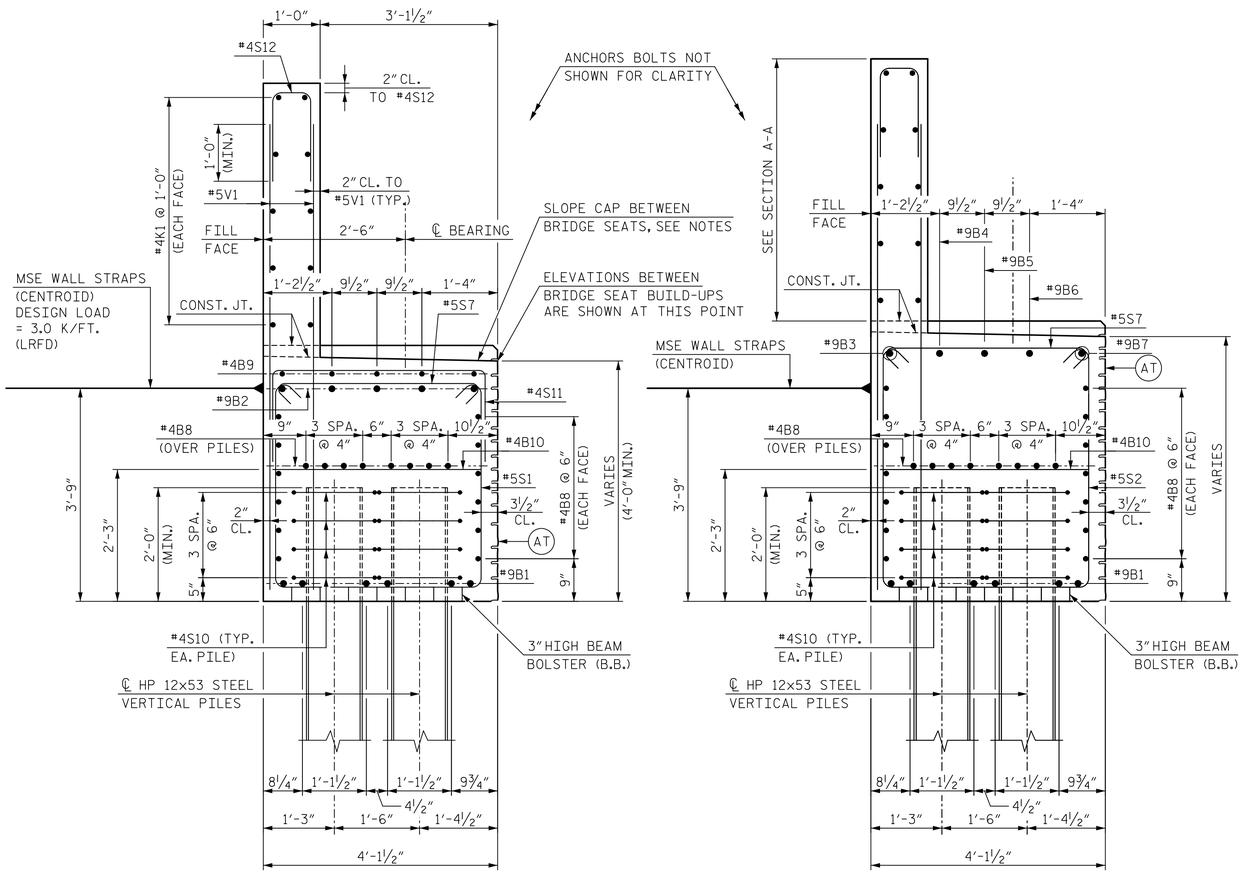
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-25
1			3			TOTAL SHEETS
2			4			30

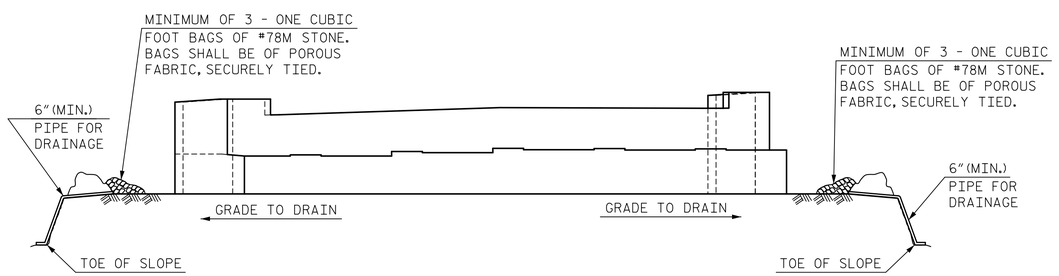
6/7/2019
...\403-049_I4400BB_SMU_E05_025_44021.dgn



SECTION A-A

SECTION B-B

Ⓐⓣ LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

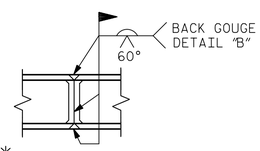


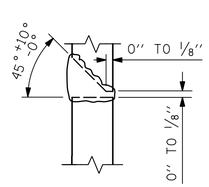
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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 FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT 2

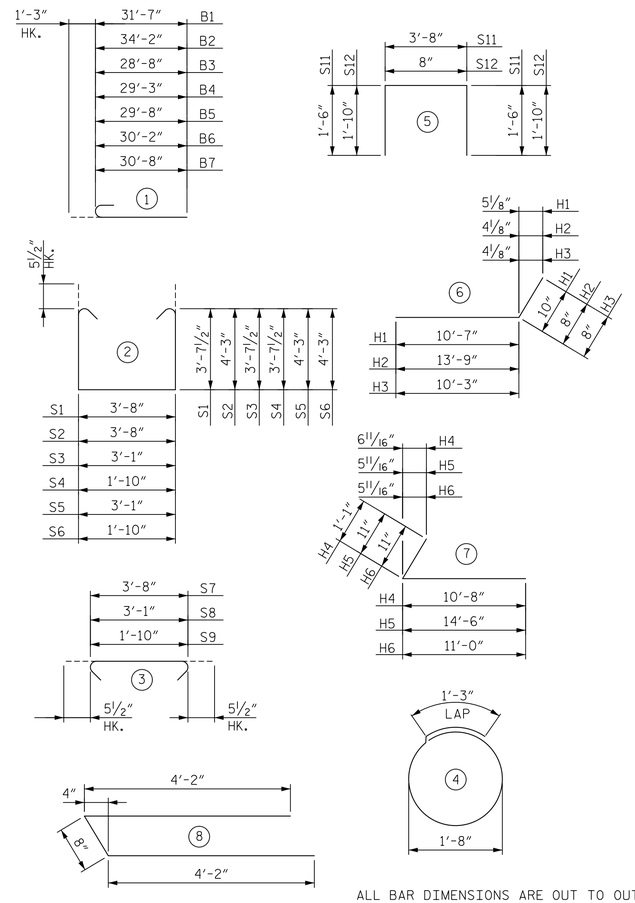




* POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	9	1	32'-10"	1,340
B2	5	9	1	35'-5"	602
B3	1	9	1	29'-11"	102
B4	1	9	1	30'-6"	104
B5	1	9	1	30'-11"	105
B6	1	9	1	31'-5"	107
B7	1	9	1	31'-11"	109
B8	42	4	STR	29'-9"	835
B9	5	4	STR	10'-9"	36
B10	15	4	STR	3'-8"	37
H1	21	5	6	11'-5"	250
H2	4	4	6	14'-5"	39
H3	7	4	6	10'-11"	51
H4	22	5	7	11'-9"	270
H5	5	4	7	15'-5"	51
H6	7	4	7	11'-11"	56
K1	20	4	STR	29'-9"	397
S1	31	5	2	11'-10"	383
S2	34	5	2	13'-1"	464
S3	1	5	2	11'-3"	12
S4	1	5	2	10'-0"	10
S5	1	5	2	12'-6"	13
S6	1	5	2	11'-3"	12
S7	65	5	3	4'-7"	311
S8	2	5	3	4'-0"	8
S9	2	5	3	2'-9"	6
S10	36	4	4	6'-6"	156
S11	8	4	5	6'-8"	36
S12	49	4	5	4'-4"	142
S13	4	4	8	9'-0"	24
V1	98	5	STR	8'-0"	818
V2	12	5	STR	9'-6"	119
V3	6	5	STR	9'-7"	60
V4	6	5	STR	9'-6"	59
V5	6	5	STR	9'-5"	59
V6	2	5	STR	9'-4"	19
V7	12	5	STR	10'-0"	125
V8	6	5	STR	10'-1"	63
V9	6	5	STR	10'-0"	63
V10	8	5	STR	9'-11"	83

QUANTITIES

REINFORCING STEEL	LBS.	7,536
CLASS "A" CONCRETE BREAKDOWN		
POUR 1 - CAP & BOT. OF WINGS	CU. YDS.	42.4
POUR 2 - TOP OF WINGS & BACKWALL	CU. YDS.	14.7
TOTAL	CU. YDS.	57.1
HP 12x53 STEEL PILES	NO.	9
	LIN. FT.	585
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	501.3
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	SQ. FT.	81.2

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

Signed by: Richard R. Greenfield

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

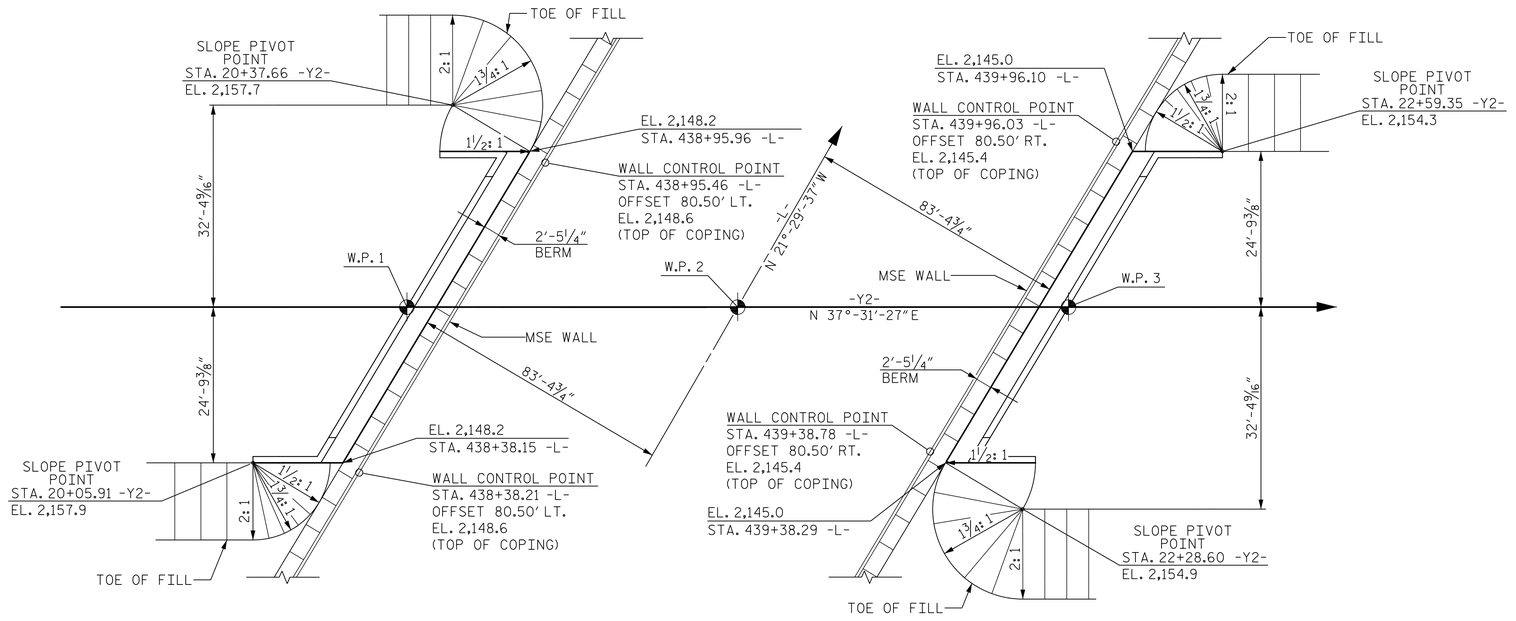
DRAWN BY A. WAGNER DATE 1/19
CHECKED BY R. GREENFIELD DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 26

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-26
1			3			TOTAL SHEETS
2			4			30

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\403_05\I4400BB_SMU_E06_026_44021f.dgn



END BENT 1 — END BENT 2

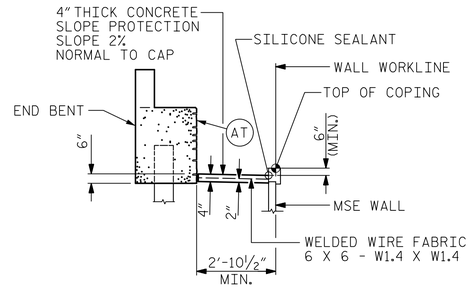
(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

NOTE:

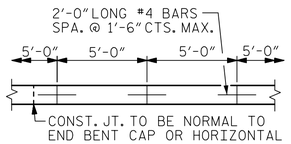
SLOPE PROTECTION SHALL CONSIST OF 4'' POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS ''B''. THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60'' WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE ''POURING DETAIL'' WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE ''OPTIONAL POURING DETAIL'' WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

BRIDGE @ STA. 21+33.12 -Y2- STA. 439+17.12 -L-	4 INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	72	239
END BENT 2	70	233

✳ QUANTITY SHOWN IS BASED ON 5' POURS.

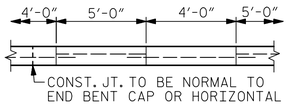


SECTION C-C



STRIP WIDTHS MAY VARY IN CURVED PORTION.

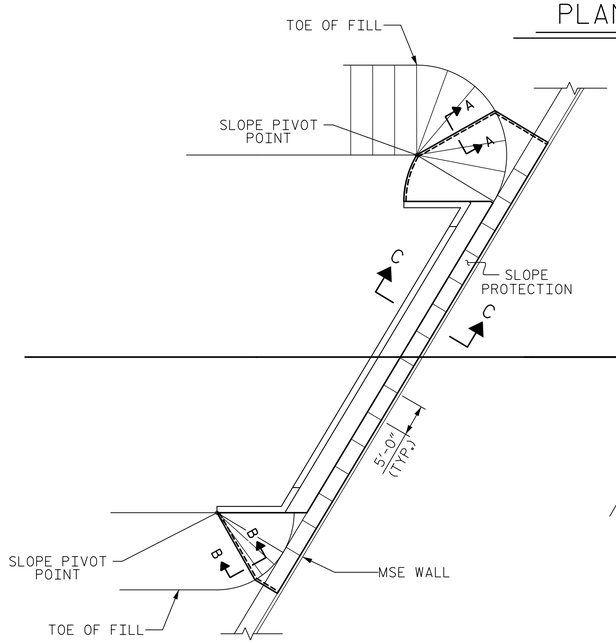
POURING DETAIL



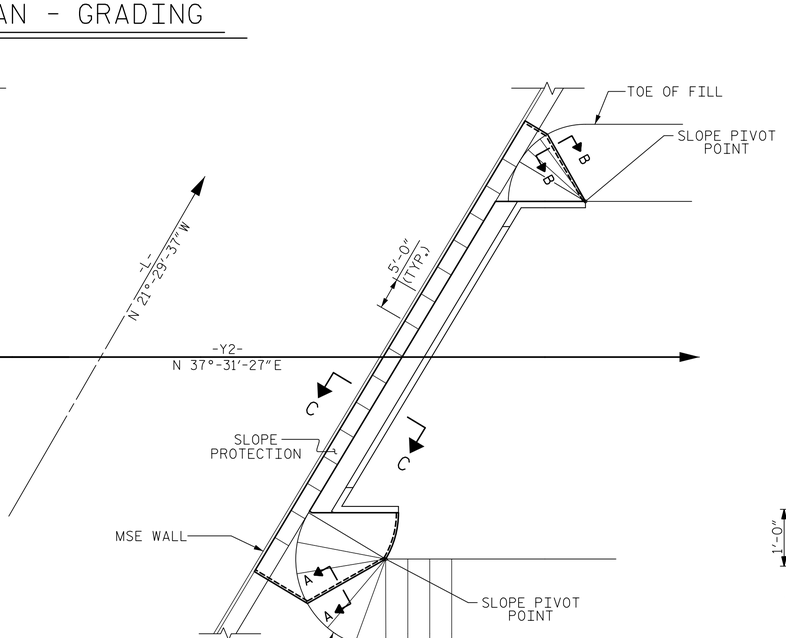
POUR A 4'-0'' STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL

PLAN - GRADING

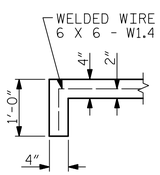


END BENT 1

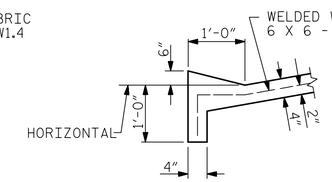


END BENT 2

PLAN - CONCRETE PLACEMENT



SECTION A-A



SECTION B-B

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 RICHARD R. GREENFIELD

Digitally signed by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB

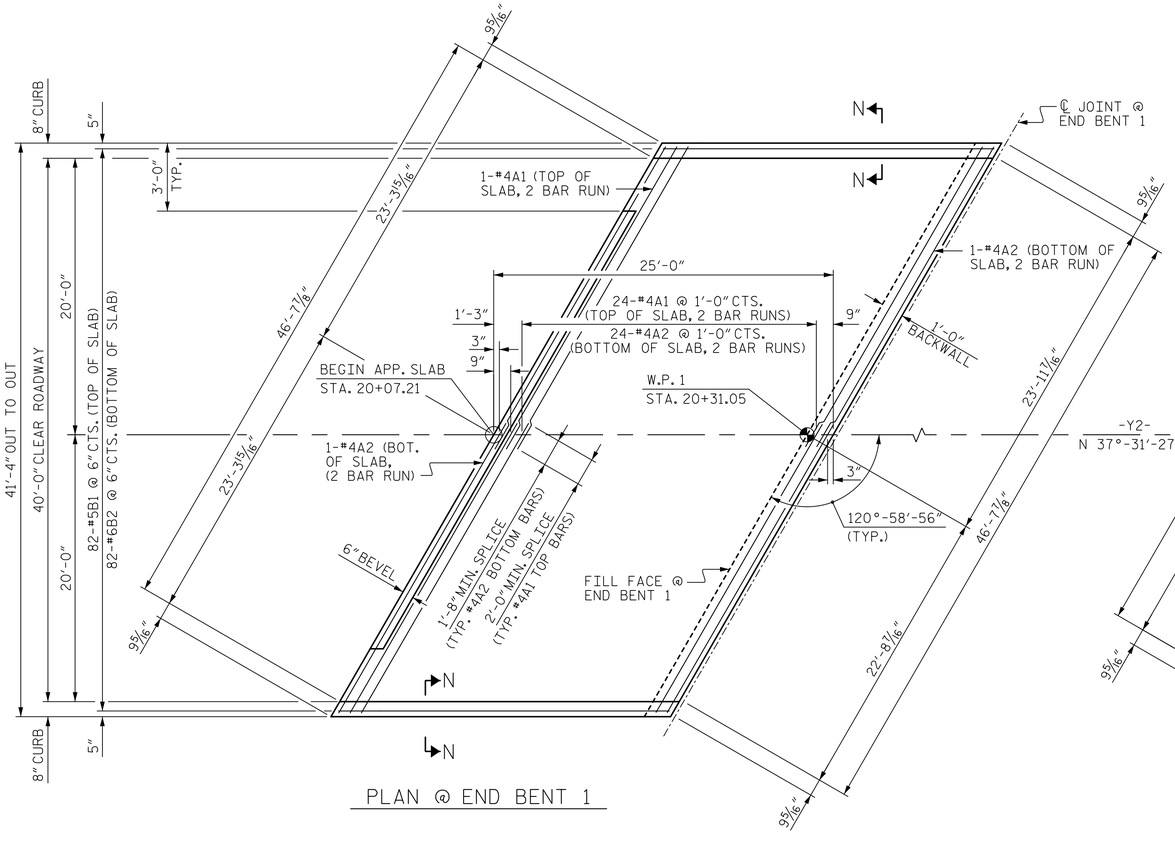
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY R. GREENFIELD DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 27

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-27
1			3			TOTAL SHEETS
2			4			30

6/7/2019
...\403_053_I4400BB_SMU_SP01_027_4402IT.dgn



NOTES:

FOR SECTION N-N, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 3.

FOR APPROACH SLAB BILL OF MATERIAL, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 3.

FOR SECTION THROUGH SLAB, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 3.

Electronically signed by: Richard R. Greenfield
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 3/21/2019 ENGINEER RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 28

PROJECT NO. I-4400BB
HENDERSON **COUNTY**
STATION: STA. 21+33.13 -Y2-

SHEET 1 OF 3

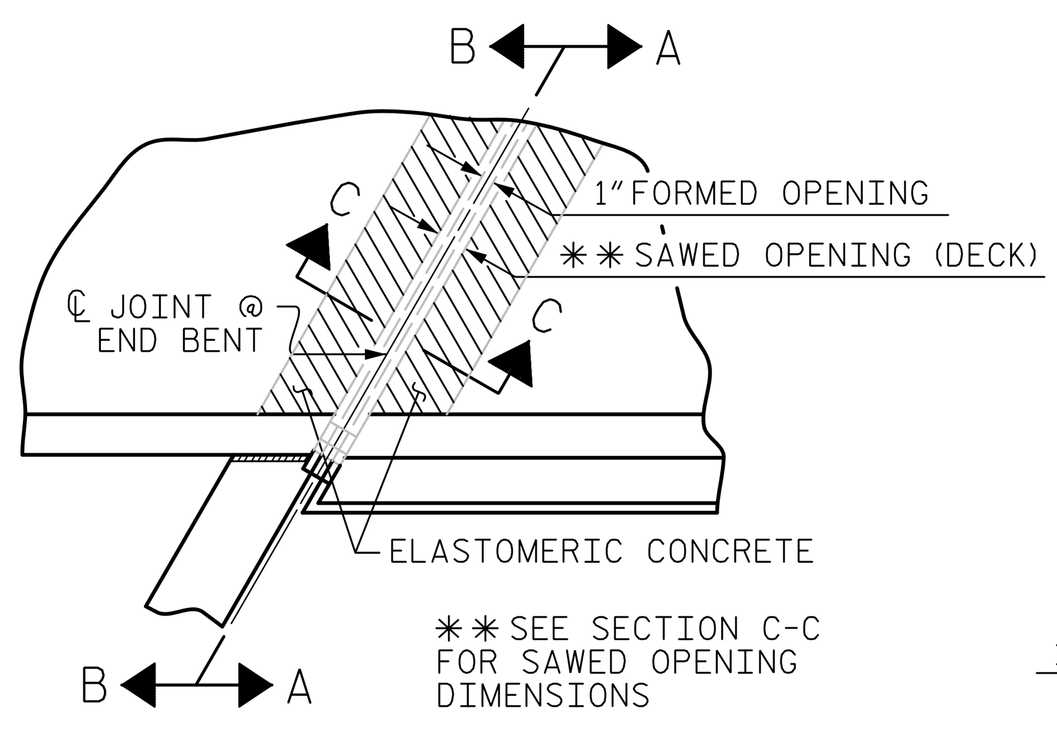
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

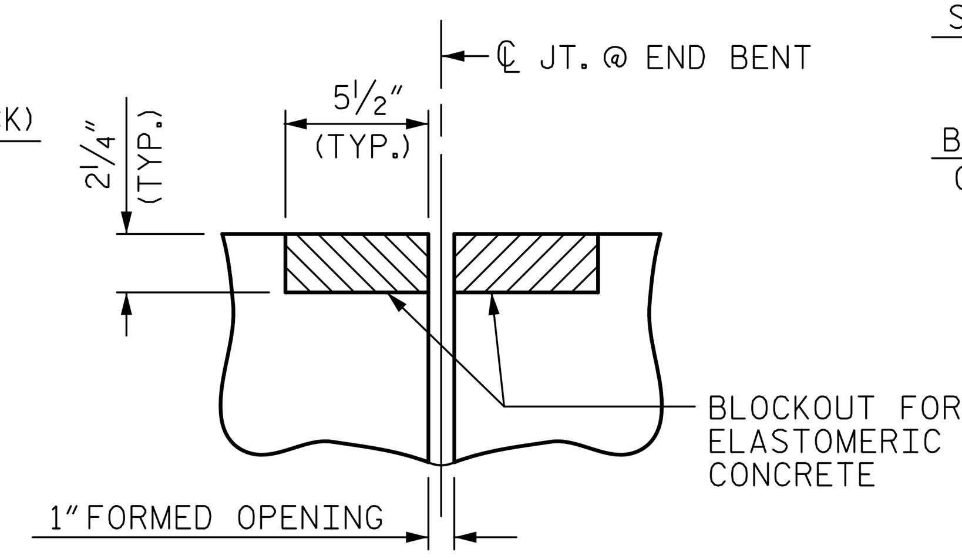
BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S3-28
1			3			TOTAL SHEETS
2			4			30

3/21/2019
...\403_055_I4400BB_SMU_ASOI_028_4402IT.dgn

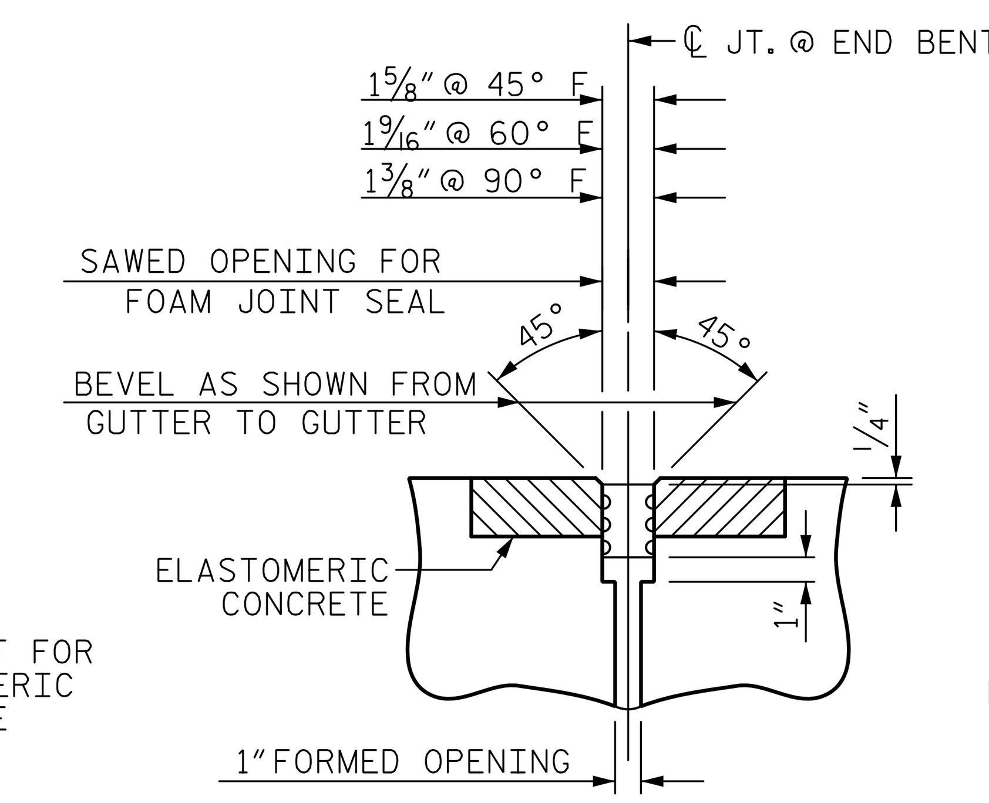


PLAN



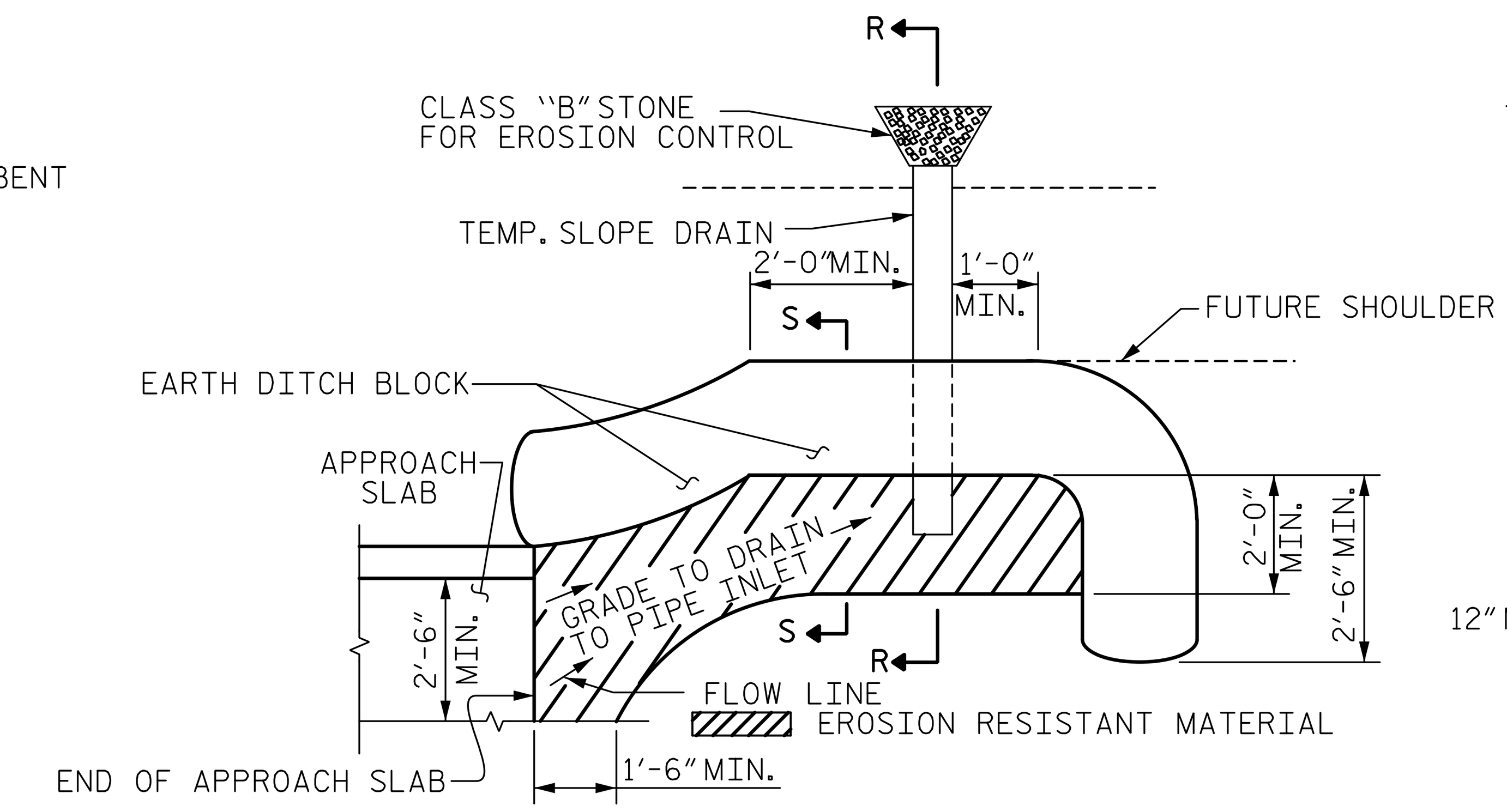
SECTION C-C

FOAM JOINT SEAL (PRE-SAWED ELASTOMERIC CONCRETE DIMENSIONS)



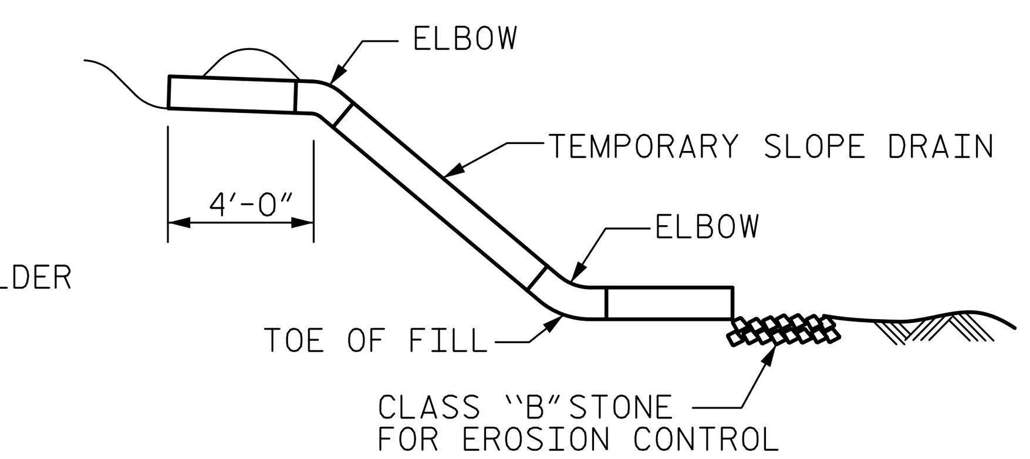
SECTION C-C

FOAM JOINT SEAL

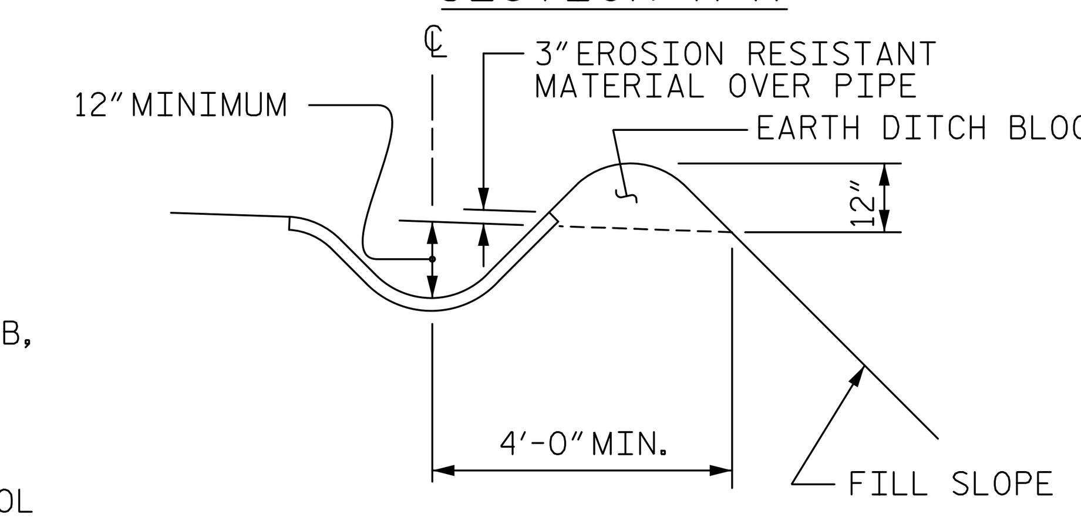


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 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.

PLAN VIEW



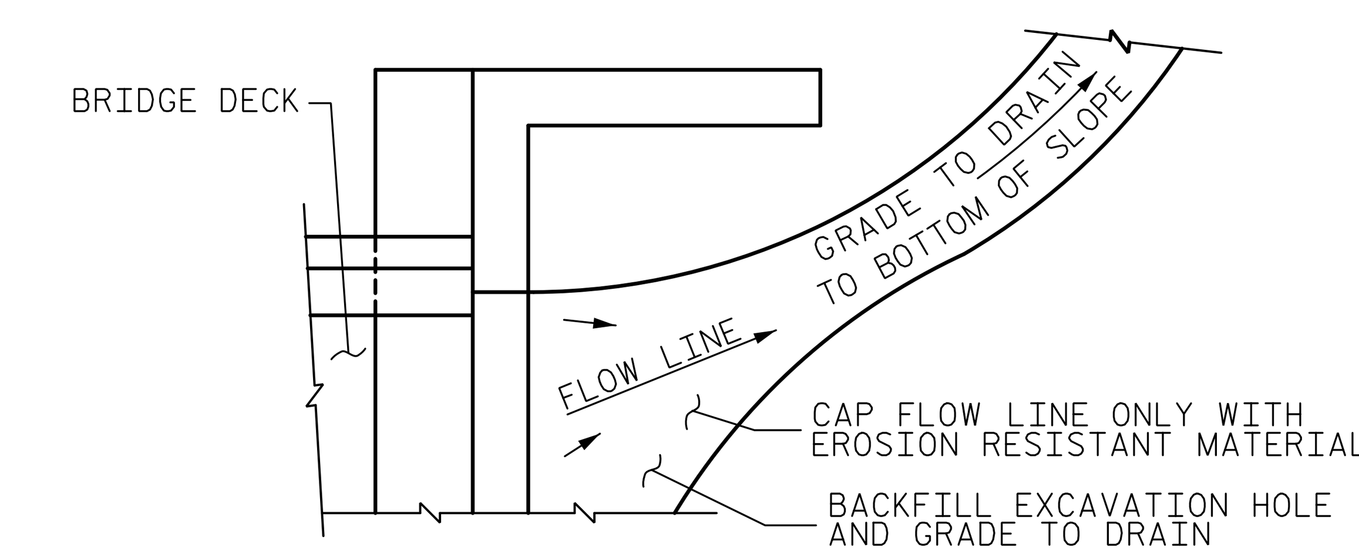
SECTION R-R



SECTION S-S

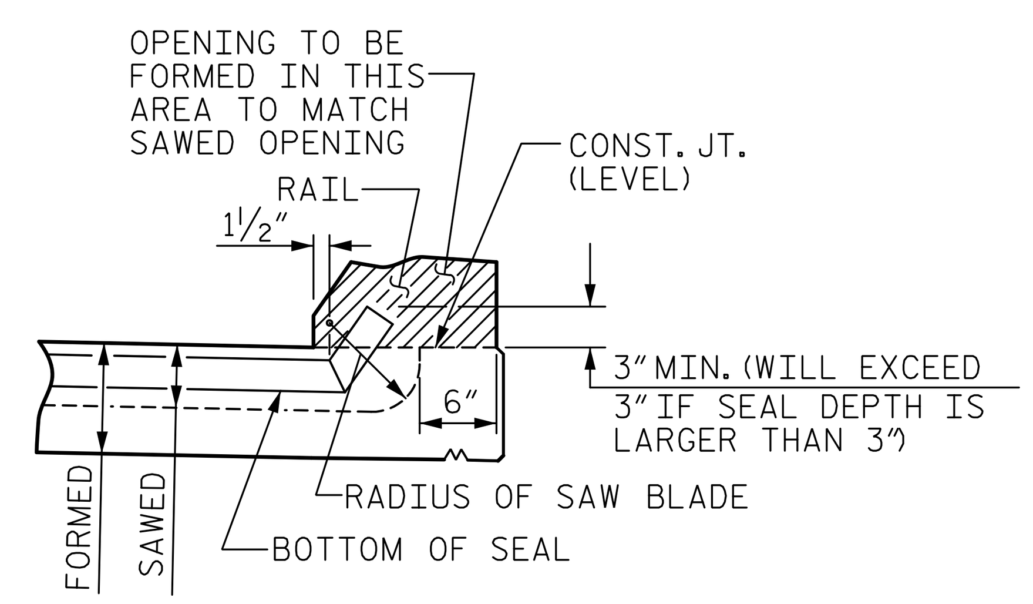
TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

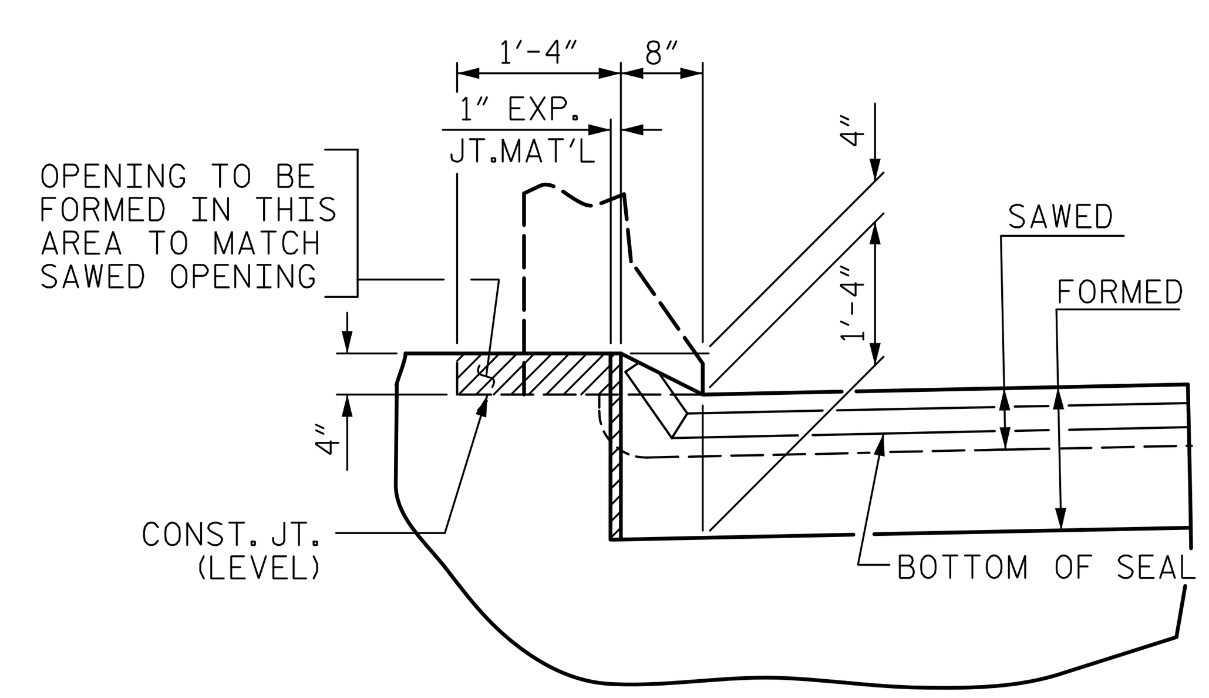


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL



SECTION A-A



SECTION B-B

JOINT SEAL DETAILS @ END BENT

FOAM JOINT SEAL TO BE CUT, HEAT WELDED AND TURNED UP PARALLEL TO SLOPED FACE OF THE BARRIER RAIL.

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL.

ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	8.0
2	8.0
TOTAL	16.0

* BASED ON THE MINIMUM BLOCKOUT SHOWN.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: STA. 21+33.13 -Y2-

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 3/21/2019 RICHARD R. GREENFIELD

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY L. DICKENS DATE 11/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 3/19

DWG. NO. 30

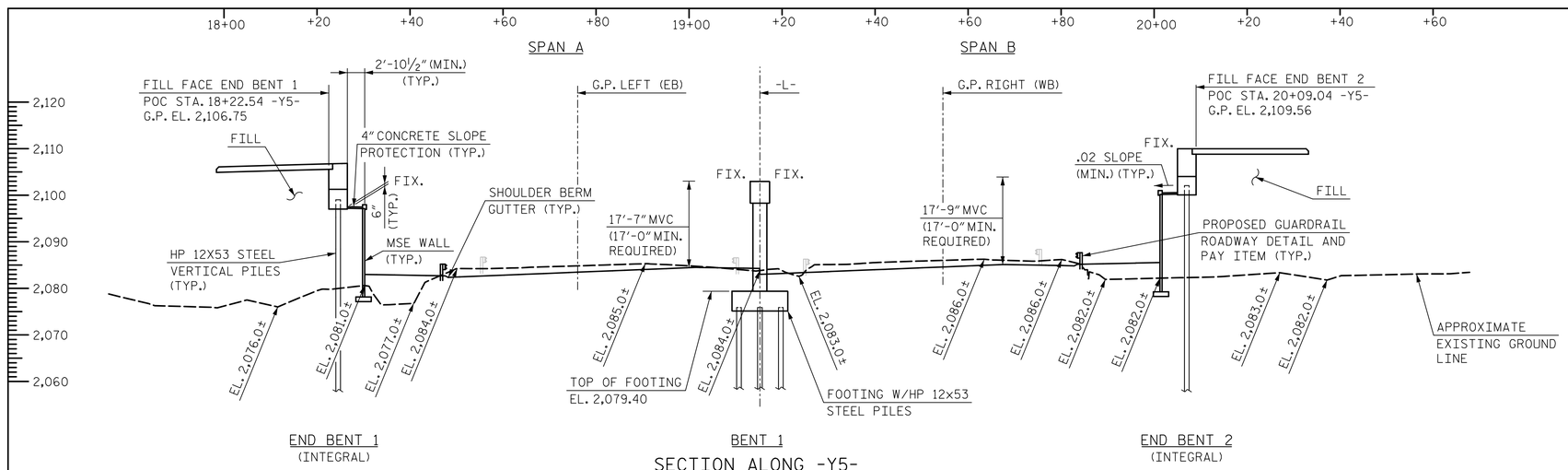
REVISIONS							
NO.	BY	DATE	NO.	BY	DATE		
1			3				
2			4				

SHEET NO. S3-30
TOTAL SHEETS 30

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

3/21/2019
...1403_059_I4400BB_SMU_AS03_030_440217.dgn

F.A. PROJECT NO. NHP-0026(015)

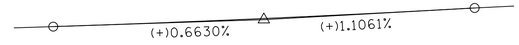


SECTION ALONG -Y5-

(END BENTS AND BENT ON SECTION AT RIGHT ANGLES TO END BENTS AND BENT)

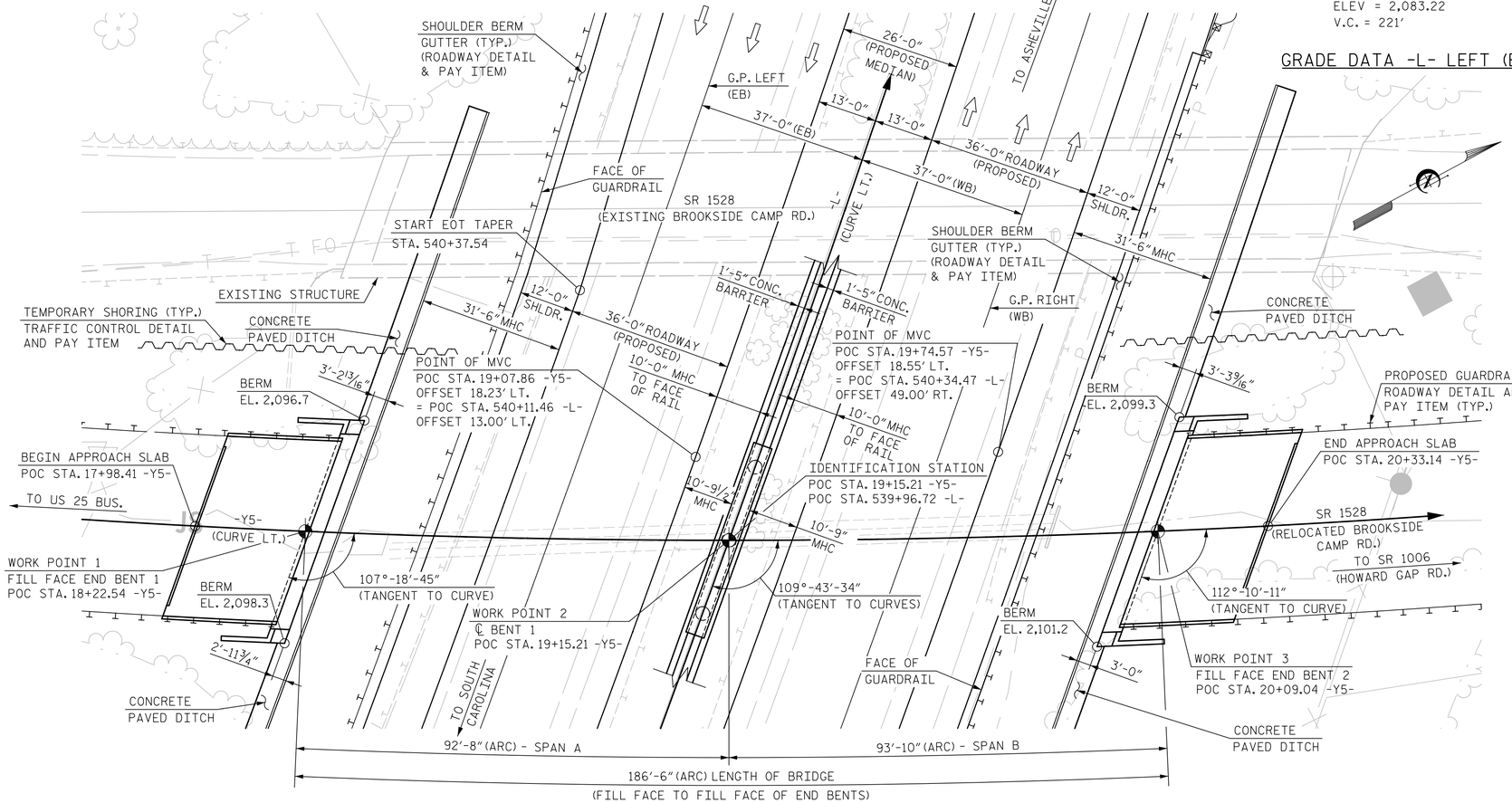
PI STA. = 539+85.00
ELEV = 2,083.22
V.C. = 221'

GRADE DATA -L- LEFT (EB)



PI STA. = 540+50.00
ELEV = 2,084.82
V.C. = 225'

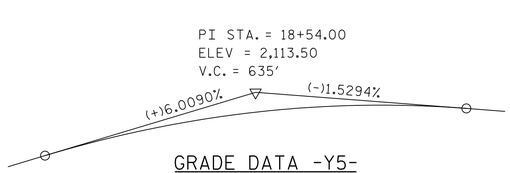
GRADE DATA -L- RIGHT (WB)



PLAN

PILES NOT SHOWN FOR CLARITY.

END BENTS AND BENT ARE PARALLEL.



PI STA. = 18+54.00
ELEV = 2,113.50
V.C. = 635'

GRADE DATA -Y5-

CURVE DATA -Y5-

PI STA. = 19+26.36
Δ = 10°-30'-27" (LT)
D = 2°-36'-16"
L = 403.46'
T = 202.30'
R = 2,200.00'
SE = 0.040

CURVE DATA -L-

PI STA. = 545+39.54
Δ = 14°-10'-43" (LT)
D = 1°-00'-00"
L = 1,417.87'
T = 712.58'
R = 5,729.58'
SE = 0.040

NOTES:

FOR GENERAL NOTES, SEE SHEET 4 OF 4.

MVC = MIN. VERTICAL CLEARANCE
MHC = MIN. HORIZONTAL CLEARANCE

FUTURE MVC OF 17'-0" IS AT POC STA. 20+00.41 -Y5-
OFFSET 18.25' LT. = POC STA. 540+43.36 -L-
OFFSET 73.00' RT.

EXISTING PAVEMENT MVC OF 16'-8" IS AT POC STA. 18+97.46 -Y5-
OFFSET 18.39' LT. = POC STA. 540+08.20 -L- OFFSET 22.79' LT.

EXISTING PAVEMENT MVC OF 16'-8" IS AT POC STA. 19+70.54 -Y5-
OFFSET 18.57' LT. = POC STA. 540+33.08 -L- OFFSET 45.26' RT.

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 19+15.21 -Y5-
POC STA. 539+96.72 -L-

SHEET 1 OF 4 REPLACES BRIDGE NO. 221

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING BRIDGE ON SR 1528 (BROOKSIDE CAMP ROAD) OVER I-26 BETWEEN US 25 BUS. AND SR 1006

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 RICHARD R. GREENFIELD

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

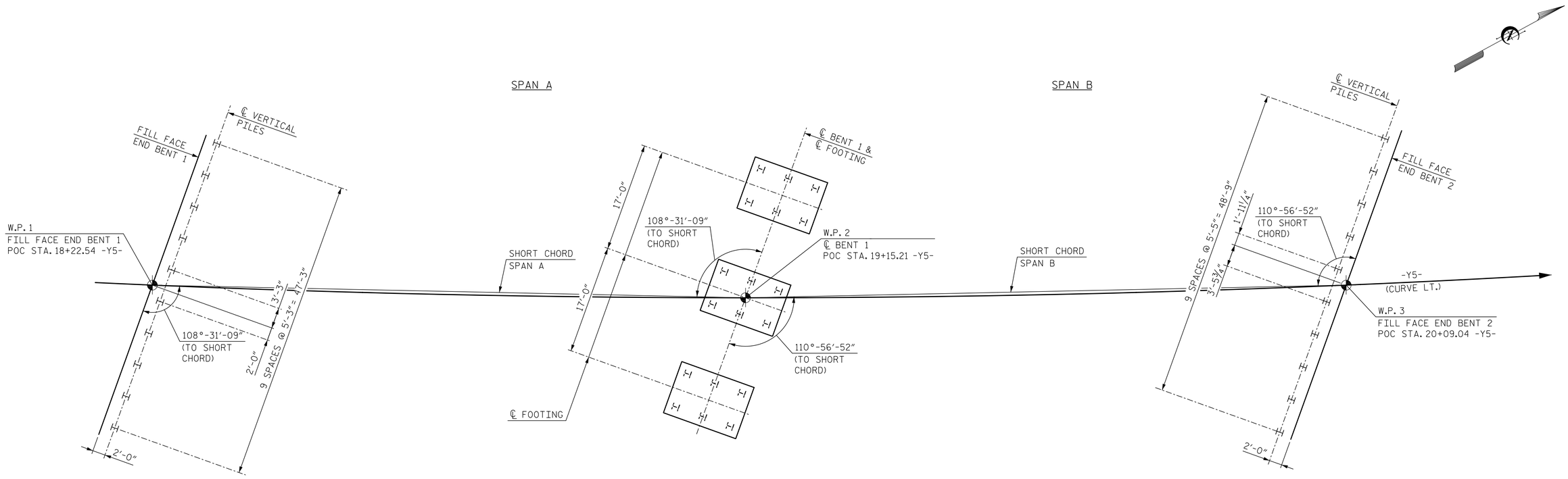
DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY C. SUTARIA DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 1

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-1
1			3			TOTAL SHEETS
2			4			31

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\404.00\i4400BB_SMU.G00.I00_44022i.dgn



END BENT 1 | BENT 1 | END BENT 2

FOUNDATION LAYOUT

FOUNDATION NOTES:

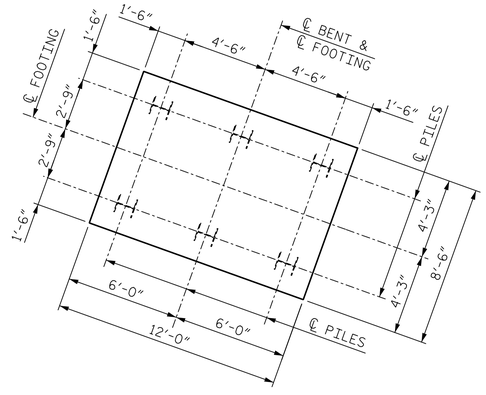
FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT 1 AND END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 95 TONS PER PILE.

DRIVE PILES AT END BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 158 TONS PER PILE.

PILES AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.

DRIVE PILES AT BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 208 TONS PER PILE.



TYPICAL FOOTING LAYOUT
BENT 1

NOTES:

ALL DIMENSIONS ARE PARALLEL OR NORMAL TO ℄ BENTS AND FILL FACES.

ALL END BENT PILES ARE HP 12x53 STEEL PILES.

ALL BENT PILES ARE HP 12X53 STEEL PILES.

FOR FOUNDATION ELEVATIONS AND DETAILS, SEE BENT AND END BENT DETAILS.

ALL PILE DIMENSIONS ARE TO ℄ OF PILES.

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 19+15.21 -Y5-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 4/1/2019 ENGINEER RICHARD R. GREENFIELD
Signed by: R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 2/19
CHECKED BY A. WAGNER DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 2

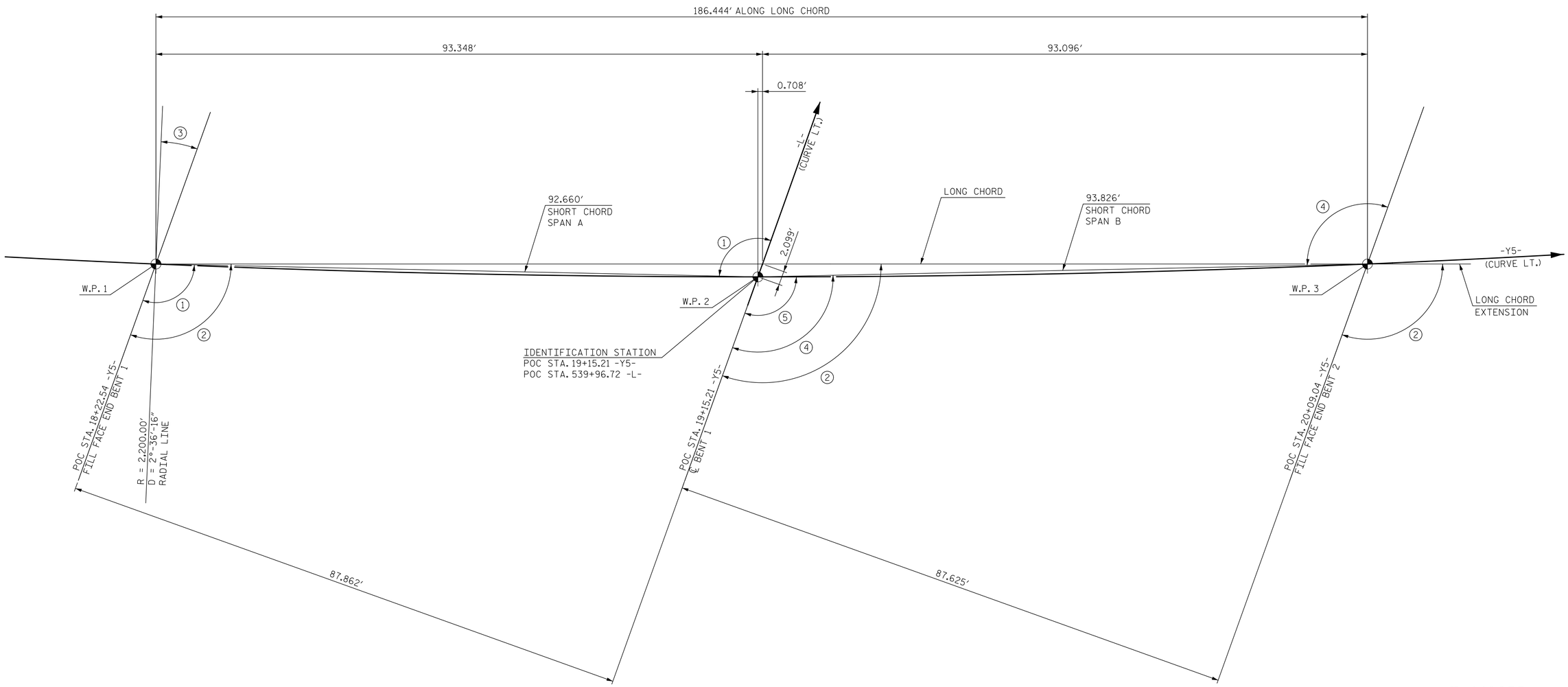
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-2
1			3			TOTAL SHEETS
2			4			31

4/1/2019
...\404_003_I4400BB_SMU_GD02_002_44022d.dgn



① 108°-31'-09" (TO SHORT CHORD)
② 109°-44'-28" (TO LONG CHORD)
③ 17°-18'-45"
④ 110°-56'-52" (TO SHORT CHORD)
⑤ 109°-43'-34" (TANGENT TO CURVES)

LONG CHORD LAYOUT

NOTE: ALL BENTS ARE PARALLEL

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LONG CHORD LAYOUT

NORTH CAROLINA PROFESSIONAL SEAL 47718 ENGINEER RICHARD R. GREENFIELD

DocuSigned by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

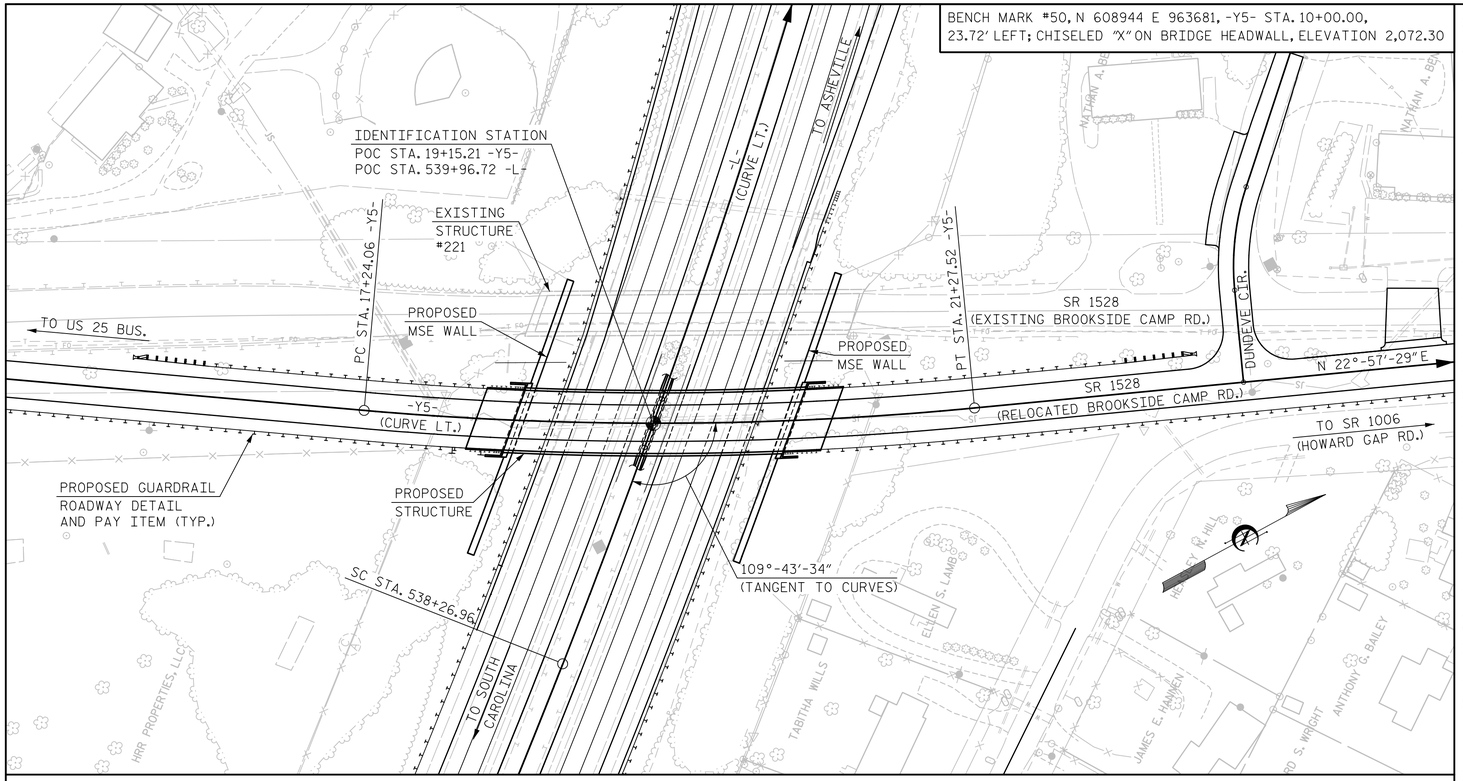
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 3

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-3
1			3			TOTAL SHEETS
2			4			31

4/1/2019
...\404_005_I4400BB_SMU_GD03_003_44022I.dgn



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE AT STATION 19+15.21 -Y5-	ASBESTOS ASSESSMENT	FOUNDATION EXCAVATION FOR BENT 1, AT STATION 19+15.21 -Y5-	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS, STATION 19+15.21 -Y5-	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL
	LUMP SUM	LUMP SUM	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.
SUPERSTRUCTURE	———	———	———	7,990	9,389	———	LUMP SUM	———	———
END BENT 1	———	———	———	———	———	43.3	———	5,695	———
BENT 1	———	———	LUMP SUM	———	———	96.9	———	13,336	1,321
END BENT 2	———	———	———	———	———	45.1	———	5,950	———
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	7,990	9,389	185.3	LUMP SUM	24,981	1,321

TOTAL BILL OF MATERIAL

	54" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	HP 12x53 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	ARCHITECTURAL CONCRETE SURFACE TREATMENT	APPLICATION OF BRIDGE COATING
	NO.	L.F.	EACH	NO.	L.F.	L.F.	SQ. YD.	LUMP SUM	SQ. FT.	LUMP SUM
SUPERSTRUCTURE	10	914.09	———	—	———	369.46	———	LUMP SUM	1,675	LUMP SUM
END BENT 1	—	———	10	10	700	———	62	———	508	———
BENT 1	—	———	18	18	720	———	———	———	454	LUMP SUM
END BENT 2	—	———	10	10	600	———	69	———	531	———
TOTAL	10	914.09	38	38	2,020	369.46	131	LUMP SUM	3,168	LUMP SUM

SAMPLE BAR REPLACEMENT	
SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE:

SAMPLE BAR REPLACEMENT LENGTHS BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND fy = 60ksi. BAR LENGTHS IN THIS TABLE ARE A GUIDE. THE ENGINEER SHALL APPROVE FINAL LENGTHS BASED ON THE TYPE AND LOCATION OF SAMPLE BAR.

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC 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.

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 SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

THE ELEVATIONS AND CLEARANCES SHOWN ON THE PLANS AT THE POINTS OF MINIMUM VERTICAL CLEARANCE ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE ELEVATIONS ON THE EXISTING PAVEMENT AND CHECK THE CLEARANCE. REPORT ANY VARIATIONS TO THE ENGINEER. ANY PLAN REVISIONS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM VERTICAL CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.

FOR MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE, 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. THE SKEWED END CONDITIONS ARE SUCH THAT THE USE OF 4' WIDE PRESTRESSED CONCRETE DECK PANELS IS NOT POSSIBLE; USE OF 8' WIDE PRESTRESSED CONCRETE DECK PANELS IS NECESSARY.

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

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 BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 19+15.21 -Y5-".

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.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

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.

AFTER SERVING AS A TEMPORARY STRUCTURE, THE EXISTING STRUCTURE CONSISTING OF 4 SPANS AT 36'-8", 61'-6", 61'-6" AND 40'-11" WITH REINFORCED CONCRETE DECK; ON 4 LINES OF 36" STEEL I-BEAMS WITH A CLEAR ROADWAY WIDTH OF 24'-0"; ON REINFORCED CONCRETE END BENTS WITH PILE FOOTINGS AND REINFORCED CONCRETE POST AND BEAM BENTS WITH PILE FOOTINGS, LOCATED ADJACENT TO THE PROPOSED STRUCTURE SITE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF 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.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

FOR ARCHITECTURAL CONCRETE SURFACE TREATMENT, SEE SPECIAL PROVISIONS.

FOR APPLICATION OF BRIDGE COATING SEE SPECIAL PROVISIONS.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 ENGINEER RICHARD R. GREENFIELD 6/7/2019

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH AND TOTAL BILL OF MATERIAL

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 2/19
CHECKED BY C. SUTARIA DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 4

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-4
1			3			TOTAL SHEETS
2			4			31

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\404_007_I4400BB_SMU_GD04_004_44021d.dgn

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

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
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	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)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.08	--	1.75	0.80	1.39	B	ER	45.3	0.96	1.08	B	I	63.7	0.80	0.75	1.10	B	I	45.3	
		HL-93 (OPERATING)	N/A	--	1.67	--	1.35	0.80	1.81	B	ER	45.3	0.96	1.67	B	I	72.9	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	(2)	1.51	54.4	1.75	0.80	1.91	B	ER	45.3	0.96	1.64	B	I	72.9	0.80	0.75	1.51	B	I	45.3	
		HS-20 (OPERATING)	36.000	--	2.17	78.1	1.35	0.80	2.48	B	ER	45.3	0.96	2.17	B	I	72.9	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	--	3.56	48.1	1.40	0.80	5.64	B	ER	45.3	0.96	5.31	B	I	72.9	0.80	0.75	3.56	B	I	45.3	
		SNGARBS2	20.000	--	2.58	51.6	1.40	0.80	4.09	B	ER	45.3	0.96	3.70	B	I	72.9	0.80	0.75	2.58	B	I	45.3	
		SNAGRIS2	22.000	--	2.41	53.0	1.40	0.80	3.81	B	ER	45.3	0.96	3.42	B	I	72.9	0.80	0.75	2.41	B	I	45.3	
		SNCOTTS3	27.250	--	1.75	47.7	1.40	0.80	2.78	B	ER	45.3	0.96	2.57	B	I	72.9	0.80	0.75	1.75	B	I	45.3	
		SNAGGRS4	34.925	--	1.44	50.3	1.40	0.80	2.29	B	ER	45.3	0.96	2.09	B	I	72.9	0.80	0.75	1.44	B	I	45.3	
		SNS5A	35.550	--	1.41	50.1	1.40	0.80	2.24	B	ER	45.3	0.96	2.11	B	I	72.9	0.80	0.75	1.41	B	I	45.3	
		SNS6A	39.950	--	1.29	51.5	1.40	0.80	2.04	B	ER	45.3	0.96	1.90	B	I	72.9	0.80	0.75	1.29	B	I	45.3	
		SNS7B	42.000	--	1.23	51.7	1.40	0.80	1.94	B	ER	45.3	0.96	1.86	B	I	72.9	0.80	0.75/0.80	1.23	B	I/ER	45.3	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	--	1.57	51.8	1.40	0.80	2.49	B	ER	45.3	0.96	2.30	B	I	72.9	0.80	0.75	1.57	B	I	45.3	
		TNT4A	33.075	--	1.57	51.9	1.40	0.80	2.49	B	ER	45.3	0.96	2.24	B	I	72.9	0.80	0.75	1.57	B	I	45.3	
		TNT6A	41.600	--	1.28	53.2	1.40	0.80	2.02	B	ER	45.3	0.96	1.97	B	I	72.9	0.80	0.75/0.80	1.28	B	I/ER	45.3	
		TNT7A	42.000	--	1.28	53.8	1.40	0.80	2.03	B	ER	45.3	0.96	1.93	B	I	72.9	0.80	0.75	1.28	B	I	45.3	
		TNT7B	42.000	--	1.31	55.0	1.40	0.80	2.07	B	ER	45.3	0.96	1.82	B	I	72.9	0.80	0.75	1.31	B	I	45.3	
		TNAGRIT4	43.000	--	1.26	54.2	1.40	0.80	1.99	B	ER	45.3	0.96	1.76	B	I	72.9	0.80	0.75/0.80	1.26	B	I/ER	45.3	
		TNAGT5A	45.000	--	1.19	53.6	1.40	0.80	1.88	B	ER	45.3	0.96	1.74	B	I	72.9	0.80	0.75/0.80	1.19	B	I/ER	45.3	
		TNAGT5B	45.000	(3)	1.18	53.1	1.40	0.80	1.87	B	ER	45.3	0.96	1.66	B	I	72.9	0.80	0.75/0.80	1.18	B	I/ER	45.3	

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.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

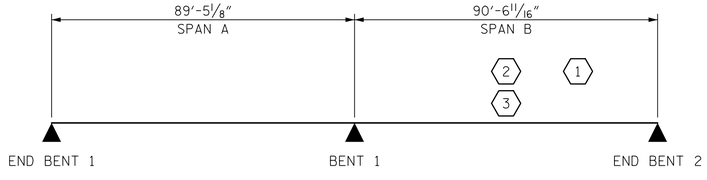
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

NOTE: SPAN LENGTHS PROVIDED ARE BEARING TO BEARING LENGTHS

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

Digitally signed by: Richard R. Greenfield
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 4/1/2019 ENGINEER RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

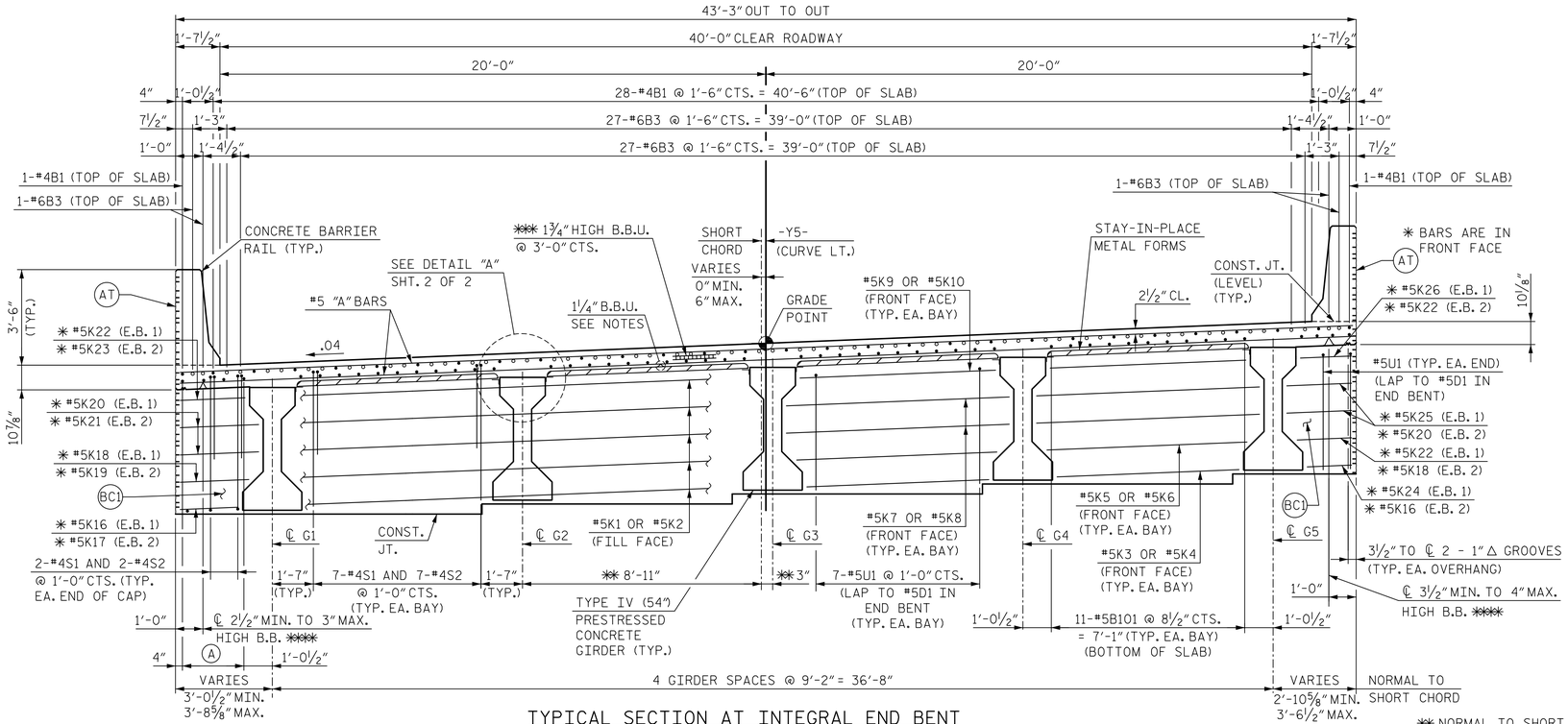
STANDARD

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

(NON-INTERSTATE TRAFFIC)

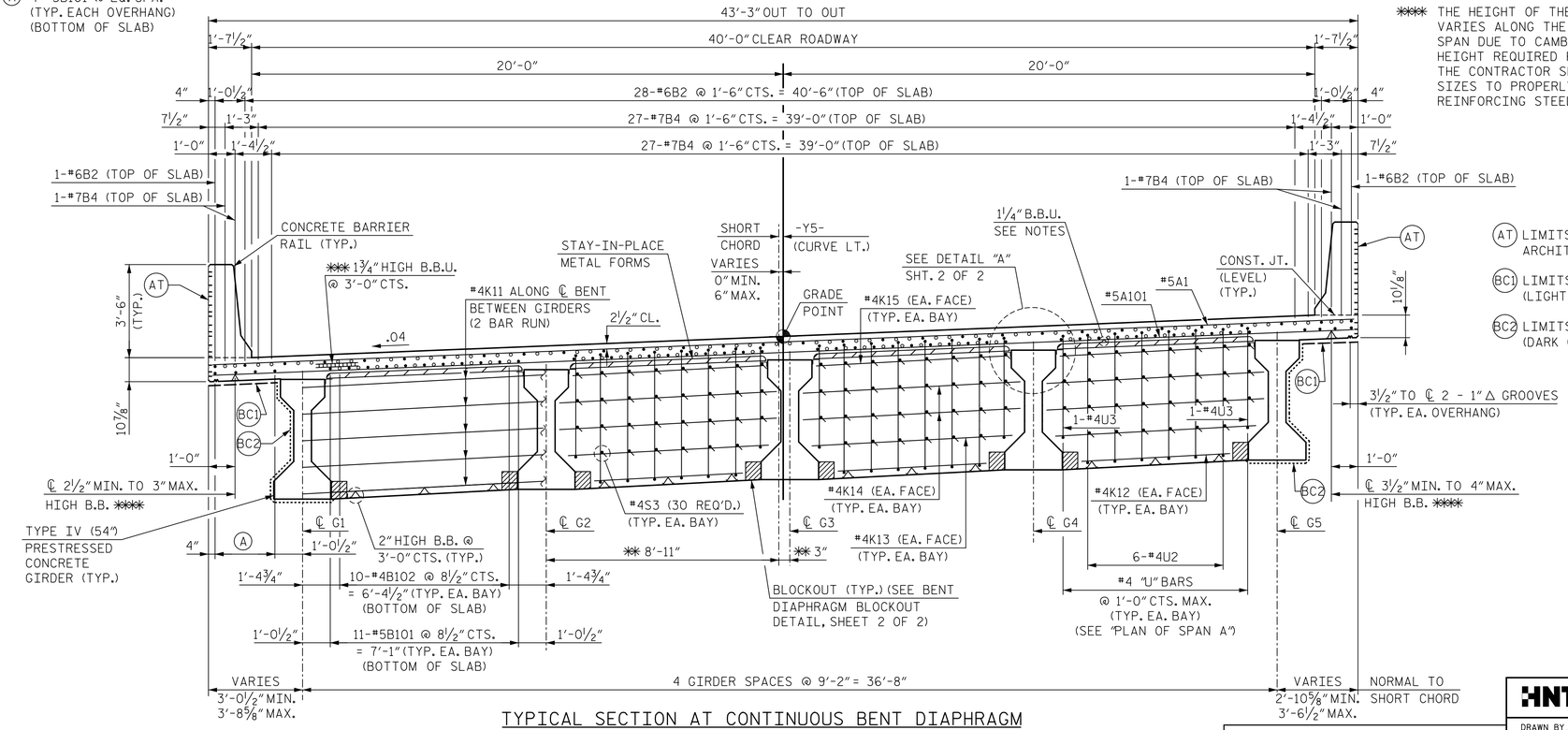
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-5
1			3			TOTAL SHEETS
2			4			31

4/1/2019
...\404_009_I4400BB_SMU_0005_005_44022I.dgn



TYPICAL SECTION AT INTEGRAL END BENT

(A) 4-#5B101 @ EQ. SPA. (TYP. EACH OVERHANG) (BOTTOM OF SLAB)



TYPICAL SECTION AT CONTINUOUS BENT DIAPHRAGM

** NORMAL TO SHORT CHORD

**** THE HEIGHT OF THE BEAM BOLSTER VARIES ALONG THE LENGTH OF THE SPAN DUE TO CAMBER AND THE VARYING HEIGHT REQUIRED FOR THE BUILDUP. THE CONTRACTOR SHALL HAVE SUFFICIENT SIZES TO PROPERLY SUPPORT THE REINFORCING STEEL.

NOTES:

ALL HORIZONTAL DIMENSIONS SHOWN NORMAL (RADIAL) TO -Y5- UNLESS NOTED OTHERWISE.

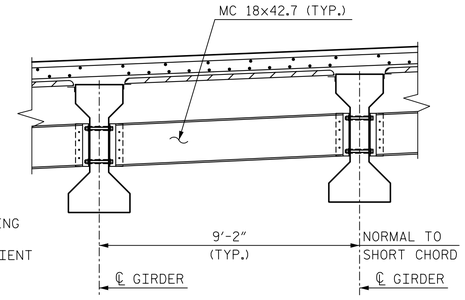
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (CHCM) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

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

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

BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENTH OF 3,000 PSI.

NO CHAMFER IS REQUIRED ON CORNERS OF GIRDER BUILDUPS.



PART SECTION AT INTERMEDIATE DIAPHRAGM

(FOR DETAILS OF DIAPHRAGM, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS")

*** TO MAINTAIN PROPER LOCATION OF "A" BARS IN TOP OF SLAB, B.B.U. DEPTH MUST VARY IN UNIT AS THE MAXIMUM SIZE OF THE "B" BARS IN THE TOP OF SLAB VARIES. A 2" B.B.U. SHALL BE USED WHERE ONLY #4 "B" BARS ARE PRESENT. WHERE #6 OR #7 "B" BARS ARE PRESENT, A 1¾" B.B.U. SHALL BE USED.

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

(BC2) LIMITS OF BRIDGE COATING (DARK GRAY)

"B" BAR KEY

- CONTINUOUS BAR RUN SEE PLAN OF SPAN SHEETS.
- NON-CONTINUOUS BAR RUN FOR NEGATIVE MOMENT REGIONS, SEE PLAN OF SPAN SHEETS.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTIONS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

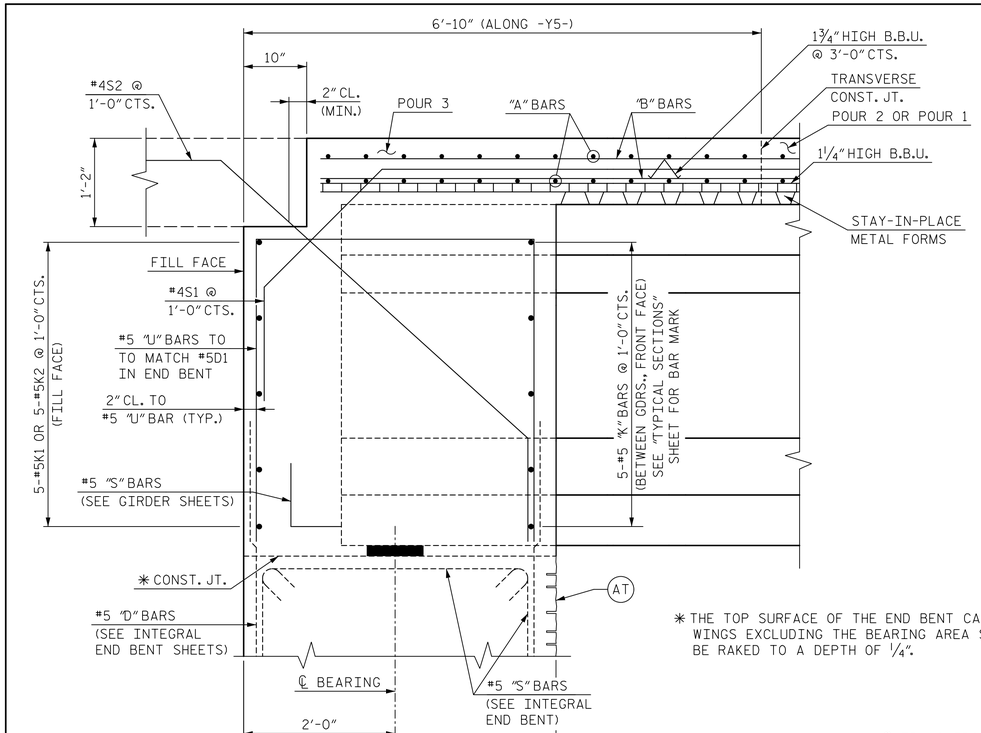
DRAWN BY C. TOMPKINS DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 6

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-6
1			3			TOTAL SHEETS
2			4			31

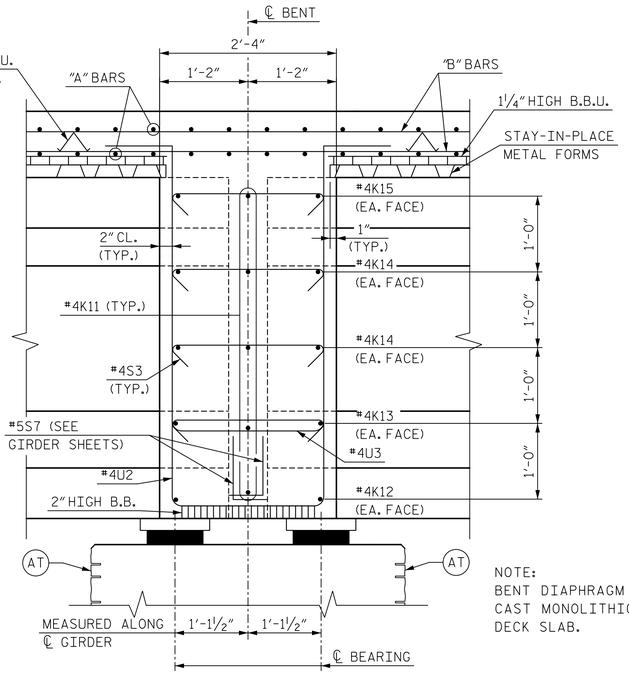
6/7/2019
...1404_DIII_I4400BB_SMU_TS01_006_44022d.dgn



SECTION A-A

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

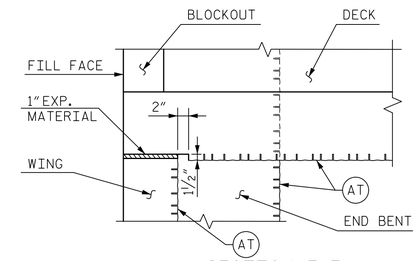
✳ THE TOP SURFACE OF THE END BENT CAP AND WINGS EXCLUDING THE BEARING AREA SHALL BE RAKED TO A DEPTH OF 1/4".



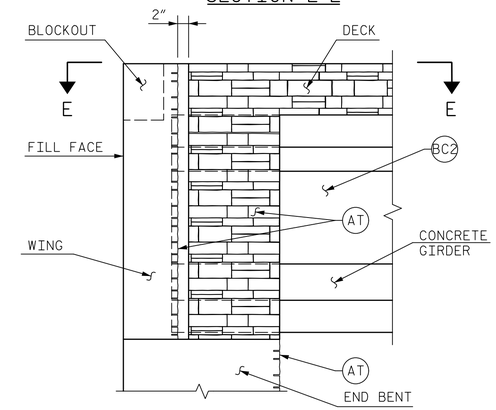
SECTION B-B

SECTION NORMAL THRU BENT 1 DIAPHRAGM

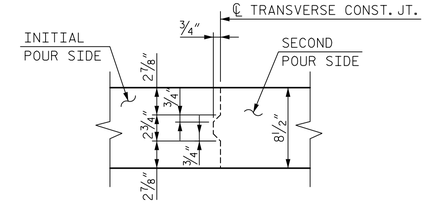
NOTE:
BENT DIAPHRAGM SHALL BE CAST MONOLITHICALLY WITH DECK SLAB.



SECTION E-E



SECTION D-D

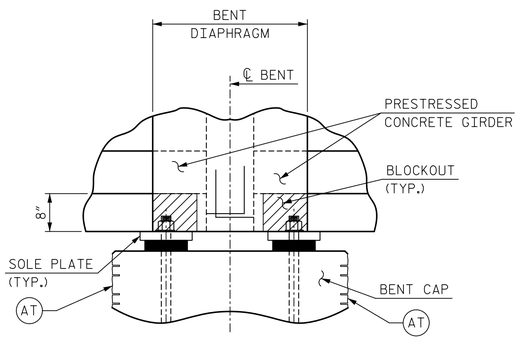


TRANSVERSE CONSTRUCTION JOINT DETAIL

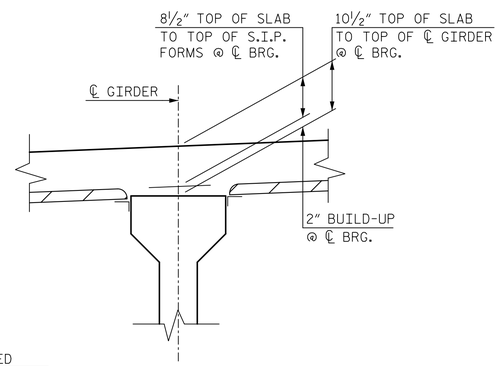
REINFORCING STEEL IN SLAB NOT SHOWN. REINFORCING STEEL SHALL BE CONTINUOUS THROUGH JOINT.

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

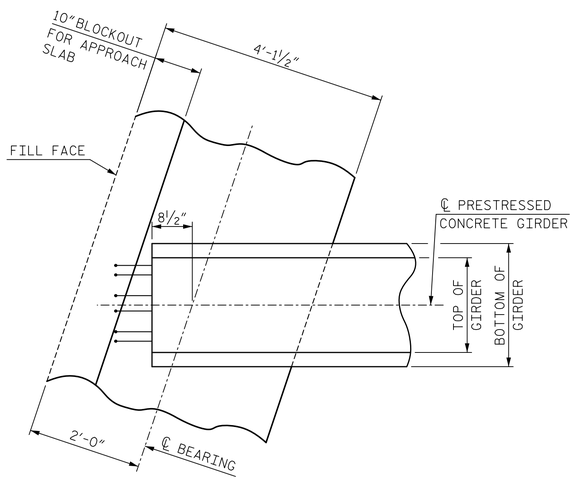
(BC2) LIMITS OF BRIDGE COATING (DARK GRAY)



SECTION C-C

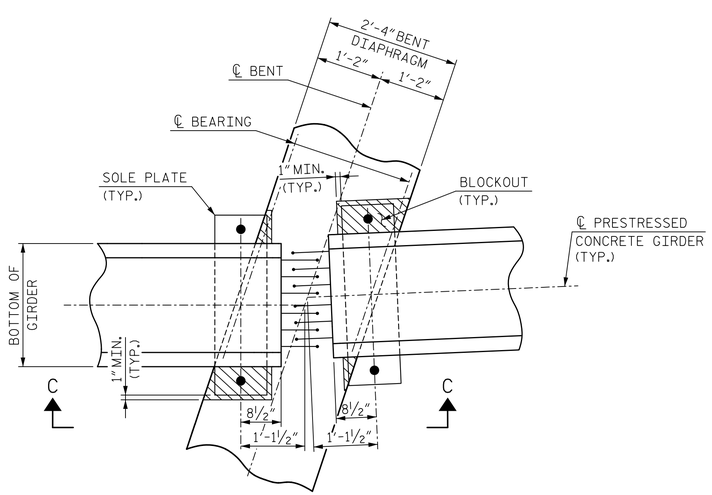


DETAIL "A"



PLAN OF GIRDER AT INTEGRAL END BENT 1

(END BENT 2 SIMILAR)



BENT DIAPHRAGM BLOCKOUT DETAIL

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

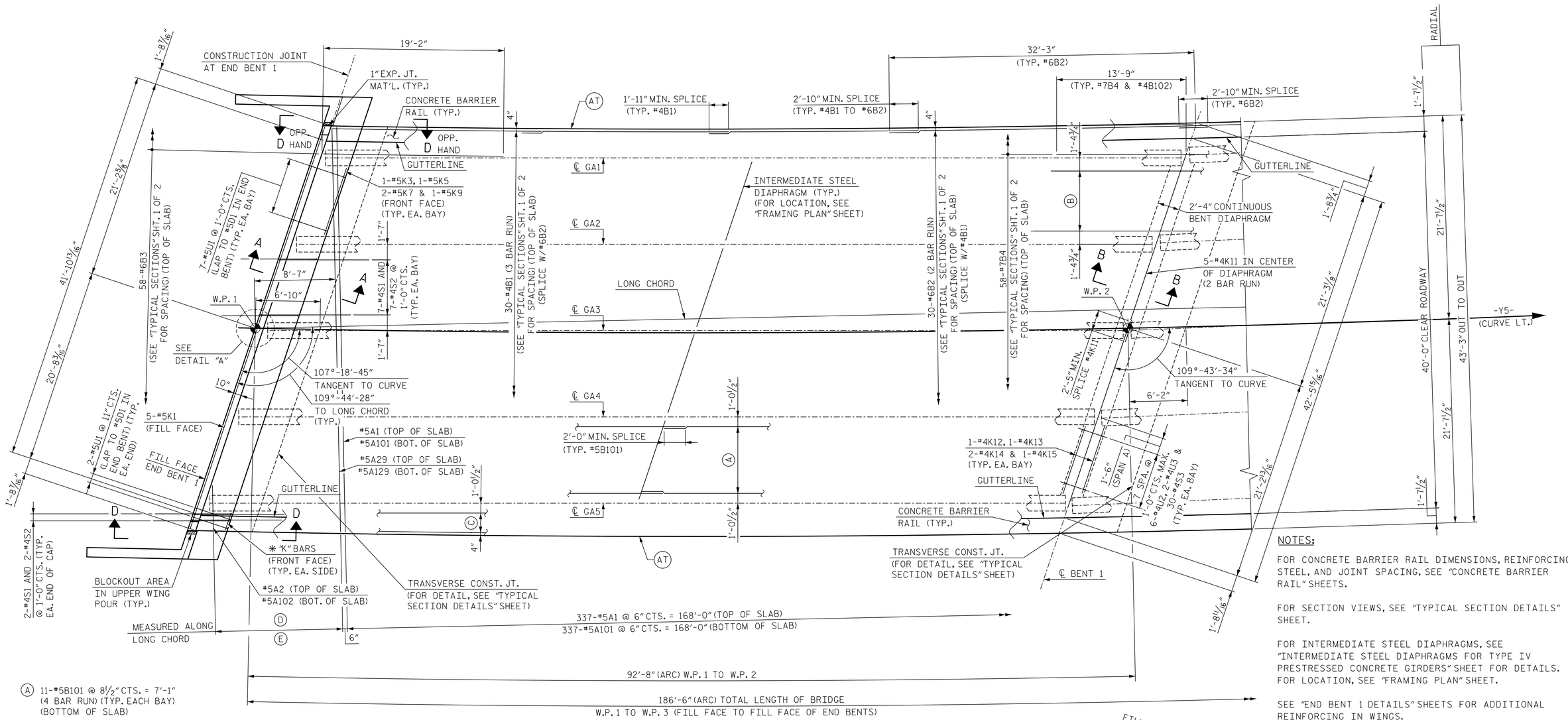
DRAWN BY C. TOMPKINS DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 7

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-7
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404.03_I4400BB_SMU_TS02_007_44022.dgn



(A) 11-#5B101 @ 8½" CTS. = 7'-1" (4 BAR RUN) (TYP. EACH BAY) (BOTTOM OF SLAB)

(B) 10-#4B102 @ 8½" CTS. = 6'-4½" (TYP. EACH BAY) (BOTTOM OF SLAB)

(C) 4-#5B101 @ EQUAL SPACES (4 BAR RUN) (TYP. EACH OVERHANG) (BOTTOM OF SLAB)

(D) #5A2 THRU #5A29 @ 6" CTS. (TOP OF SLAB)

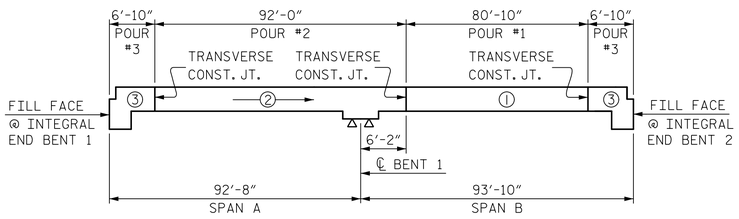
(E) #5A102 THRU #5A129 @ 6" CTS. (BOTTOM OF SLAB)

✱ SEE "TYPICAL SECTIONS" SHEET FOR BAR MARK.

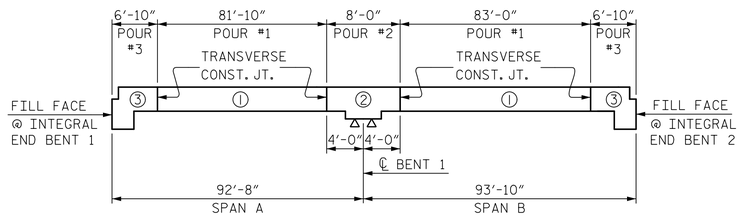
(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

PLAN OF SPAN A

NOTE: POUR ② CANNOT BE STARTED UNTIL BOTH ADJACENT ① POURS REACH A MINIMUM OF 3000 PSI.

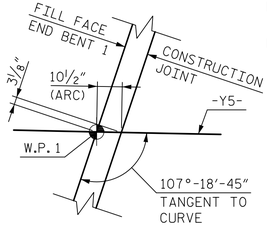


POURING SEQUENCE



OPTIONAL POURING SEQUENCE

NOTE: ALL DIMENSIONS FOR POURING SEQUENCE AND OPTIONAL POURING SEQUENCE ARE ALONG -Y5-.



DETAIL "A"

NOTES:

FOR CONCRETE BARRIER RAIL DIMENSIONS, REINFORCING STEEL, AND JOINT SPACING, SEE "CONCRETE BARRIER RAIL" SHEETS.

FOR SECTION VIEWS, SEE "TYPICAL SECTION DETAILS" SHEET.

FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS" SHEET FOR DETAILS. FOR LOCATION, SEE "FRAMING PLAN" SHEET.

SEE "END BENT 1 DETAILS" SHEETS FOR ADDITIONAL REINFORCING IN WINGS.

FOR EDGE OF SLAB ARC OFFSETS, SEE SHEET 3 OF 3.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN A

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD ENGINEER
Richard R. Greenfield
6/7/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

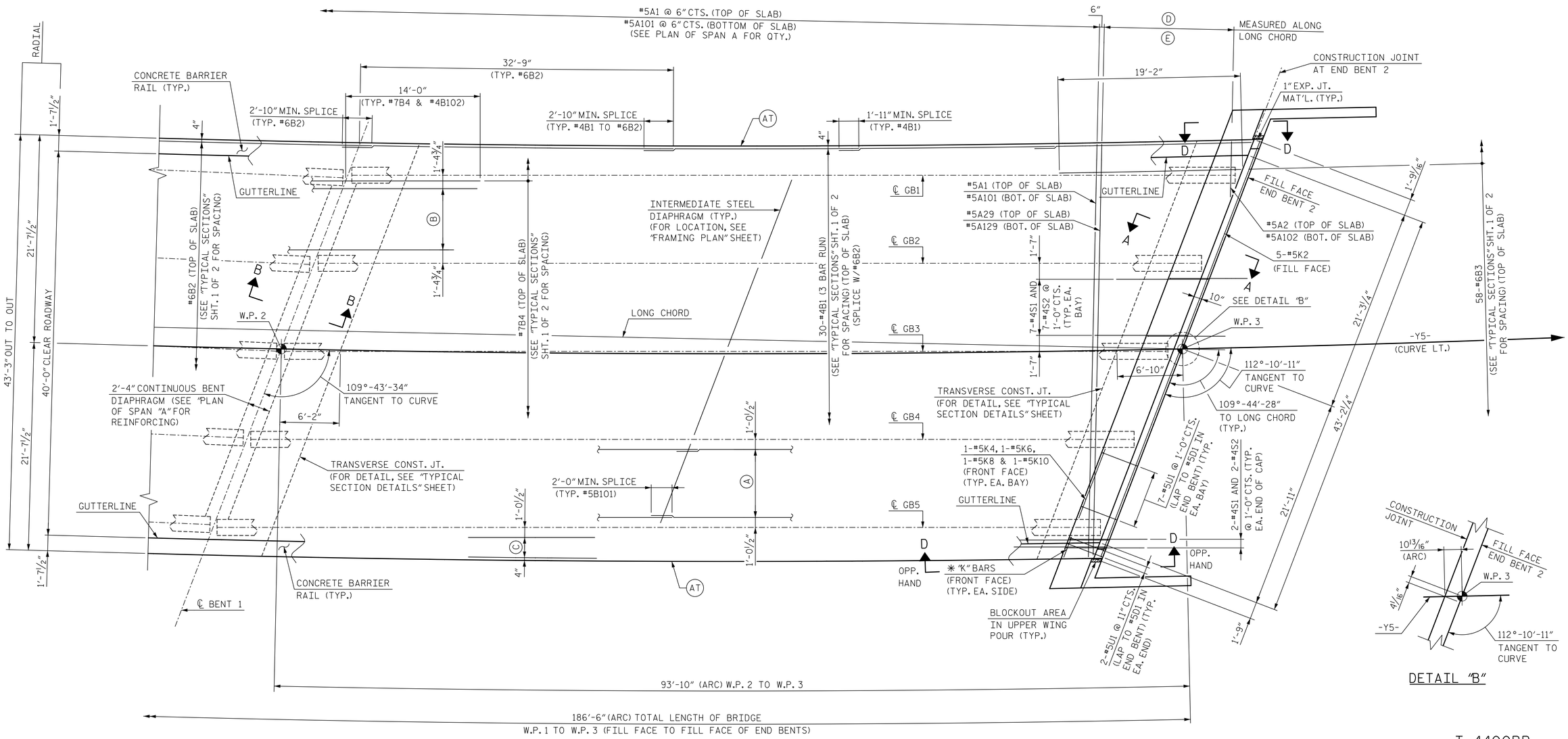
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 8

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-8
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404.05.i4400BB_SMU_S01_008_44022i.dgn



DETAIL "B"

PLAN OF SPAN B

Ⓐ #5B101 @ 8½" CTS.
(SEE PLAN OF SPAN A)
(TYP. EACH BAY) (BOTTOM OF SLAB)

Ⓑ #4B102 @ 8½" CTS.
(SEE PLAN OF SPAN A)
(TYP. EACH BAY) (BOTTOM OF SLAB)

Ⓒ #5B101 @ EQUAL SPACES
(SEE PLAN OF SPAN A)
(TYP. EACH OVERHANG)
(BOTTOM OF SLAB)

Ⓓ #5A2 THRU #5A29
@ 6" CTS. (TOP OF SLAB)

Ⓔ #5A102 THRU #5A129
@ 6" CTS. (BOTTOM OF SLAB)

✳ SEE "TYPICAL SECTIONS" SHEET FOR BAR MARK.

Ⓐⓣ LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

NOTES:

FOR NOTES, SEE "PLAN OF SPAN A" SHEET.

FOR SECTION VIEWS, SEE "TYPICAL SECTION DETAILS" SHEET.

SEE "END BENT 2 DETAILS" SHEETS FOR ADDITIONAL REINFORCING IN WINGS.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47118 RICHARD R. GREENFIELD 6/7/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 9

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 19+15.21 -Y5-

SHEET 2 OF 3

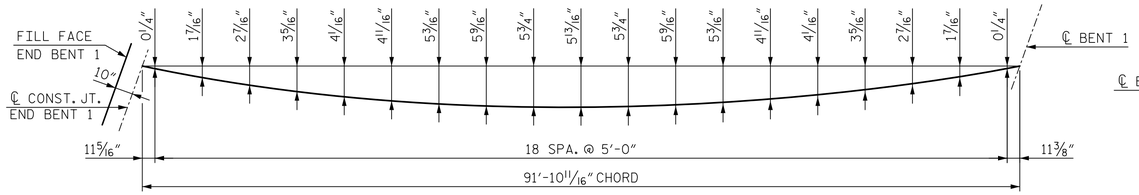
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

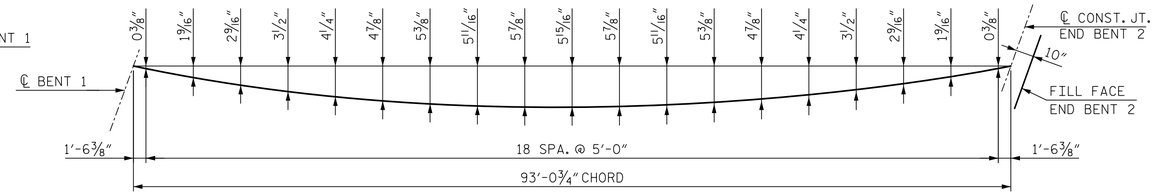
PLAN OF SPAN B

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-9
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404_017_I4400BB_SMU_S02_009_44022d.dgn



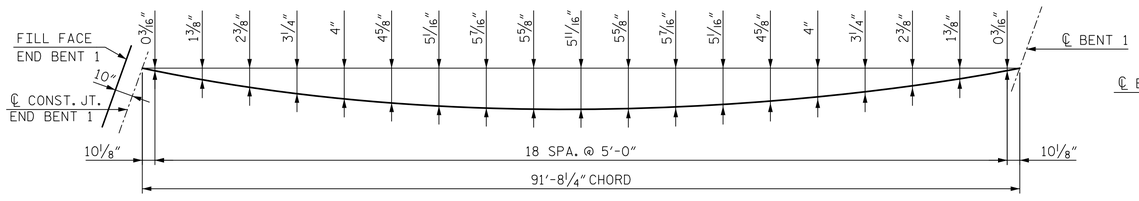
SPAN A



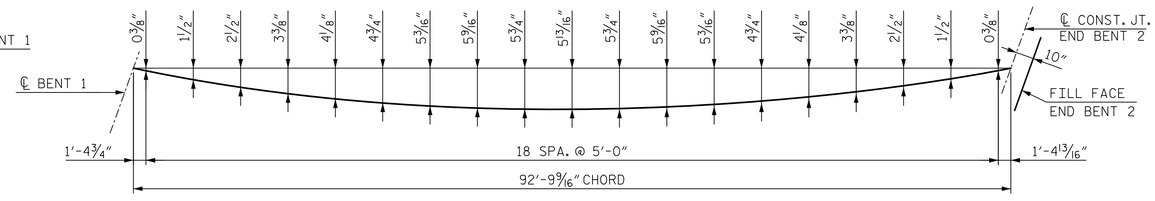
SPAN B

LEFT EDGE OF SLAB

(R = 2178′-4 1/2″)



SPAN A



SPAN B

RIGHT EDGE OF SLAB

(R = 2221′-7 1/2″)

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ARC OFFSETS

Digitally signed by: Richard R. Greenfield
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 4/1/2019 ENGINEER RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

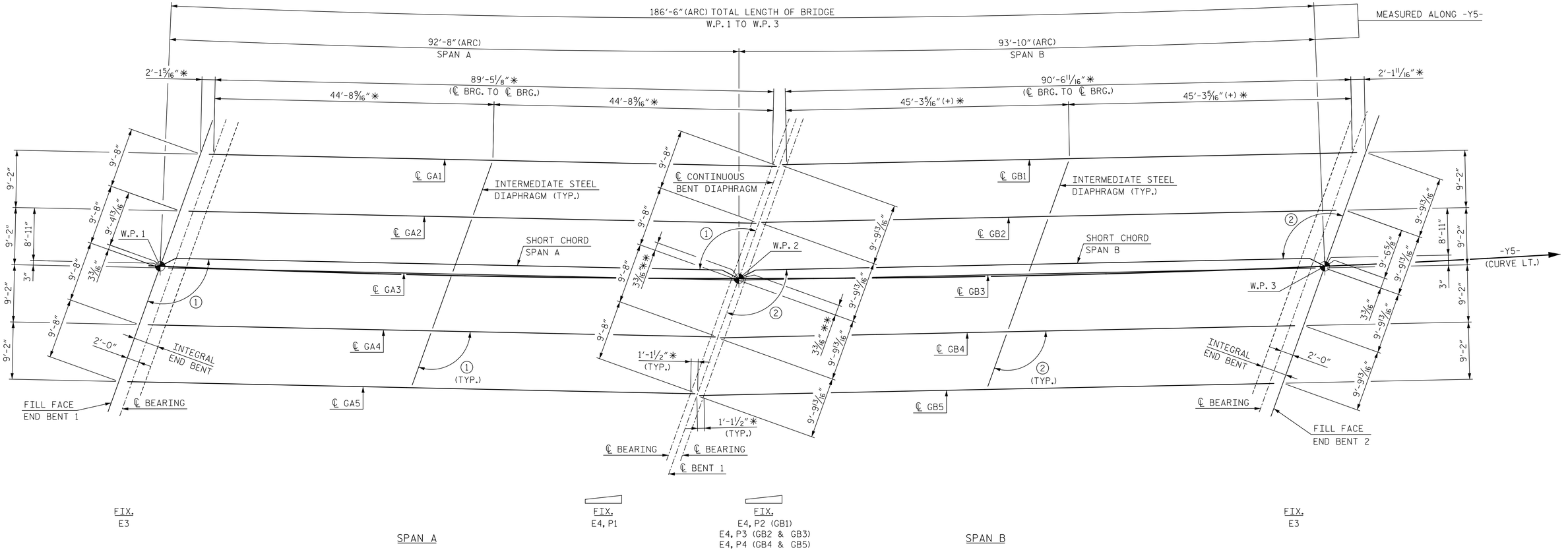
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	A. WAGNER	DATE	12/18
CHECKED BY	R. GREENFIELD	DATE	12/18
DESIGN ENGINEER OF RECORD	R. GREENFIELD	DATE	4/19

DWG. NO. 10

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-10
1			3			TOTAL SHEETS
2			4			31

4/1/2019
...\404_019_I4400BB_SMU_S03_010_44022d.dgn



FIX.
E3

SPAN A

FIX.
E4, P1

FIX.
E4, P2 (GB1)
E4, P3 (GB2 & GB3)
E4, P4 (GB4 & GB5)

SPAN B

FIX.
E3

FRAMING PLAN

① 108°-31'-09"(TO SHORT CHORD)
② 110°-56'-52"(TO SHORT CHORD)

NOTES:

FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS" SHEET.

FOR GIRDER ELEVATIONS AND DETAILS, SEE "AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD" SHEET.

GIRDERS ARE SET PARALLEL TO THE SHORT CHORD.

* MEASURED ALONG ℄ GIRDER.

** ℄ GIRDER TO SHORT CHORD ALONG ℄ BENT 1.

"FIX." DENOTES FIXED BEARING ASSEMBLY.

"E" DENOTES ELASTOMERIC BEARING PAD MARK.

"P" DENOTES STEEL SOLE PLATE MARK.

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 19+15.21 -Y5-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 4/1/2019 ENGINEER RICHARD R. GREENFIELD
Signed by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19
DWG. NO. 11

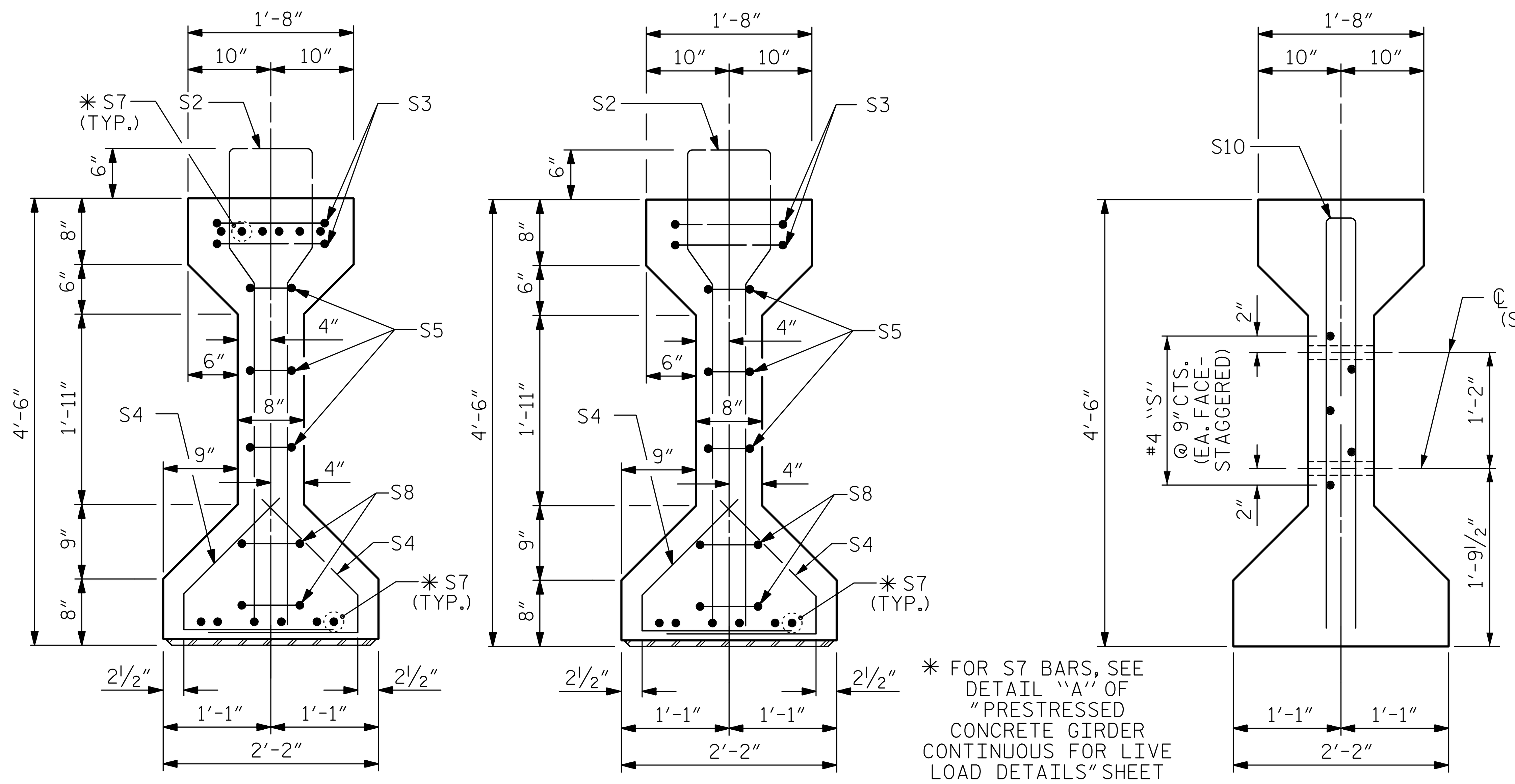
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-11
1			3			TOTAL SHEETS
2			4			31

4/1/2019
...\404_02\I4400BB_SMU_FP_01I_44022I.dgn



* FOR S7 BARS, SEE DETAIL "A" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET

SECTION A-A

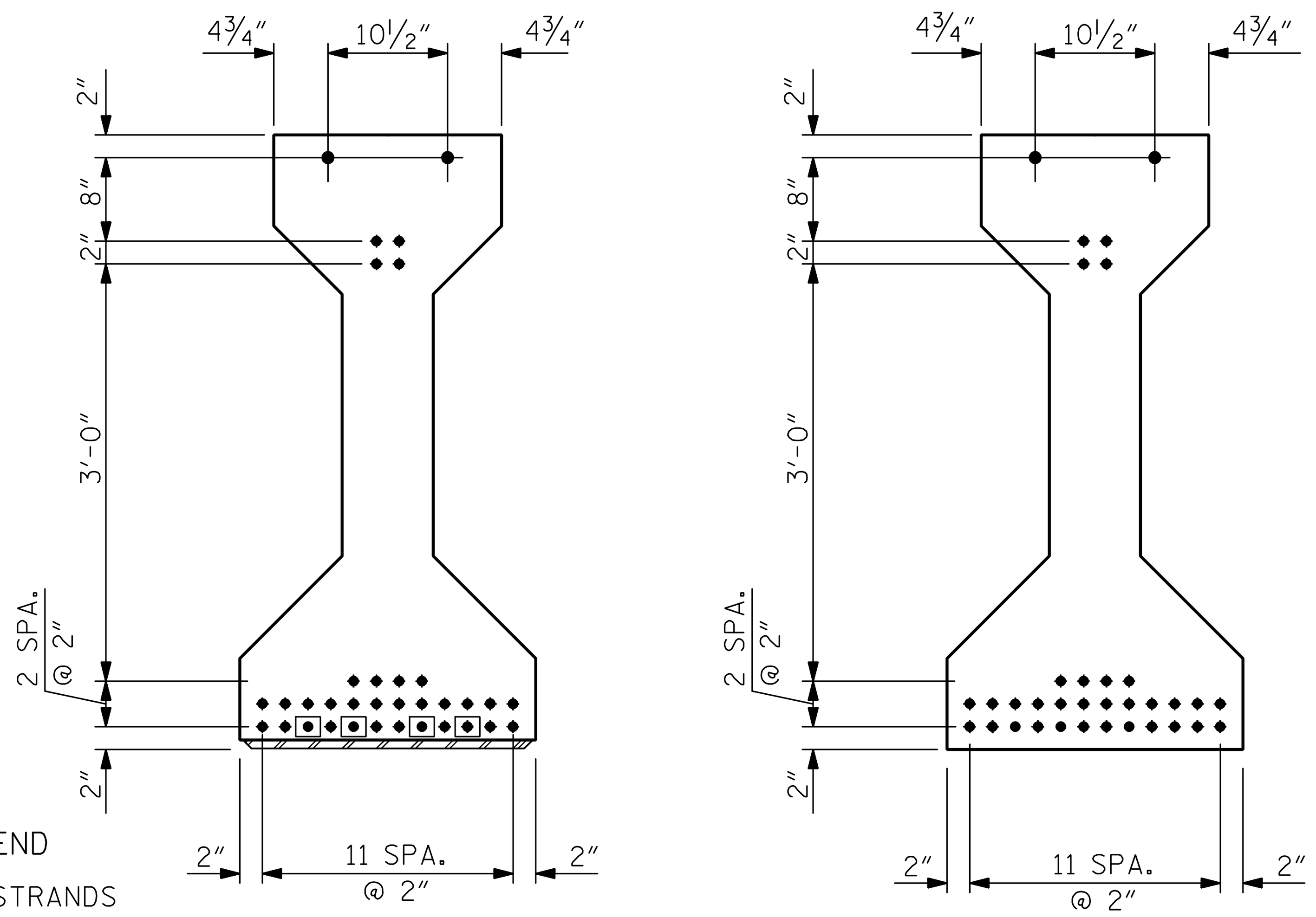
SECTION B-B

SECTION C-C

(S1 BARS NOT SHOWN)

DEBONDING LEGEND

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



AT END OF GIRDER — AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

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

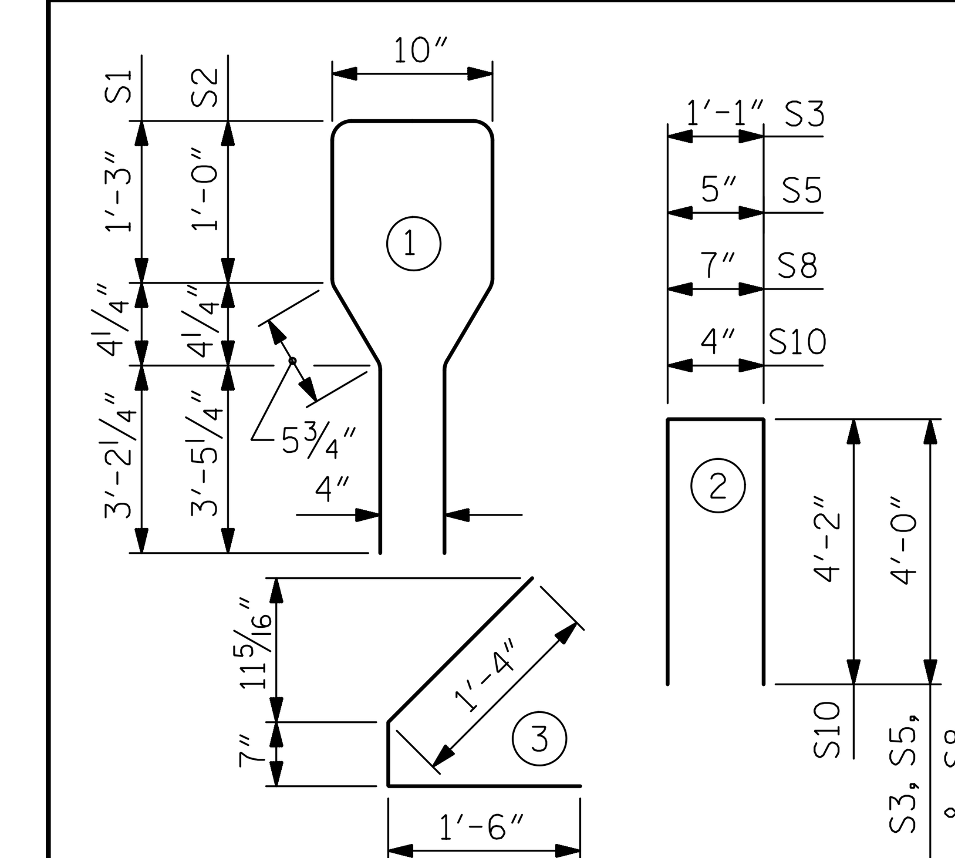
REINFORCING STEEL FOR ONE GIRDER

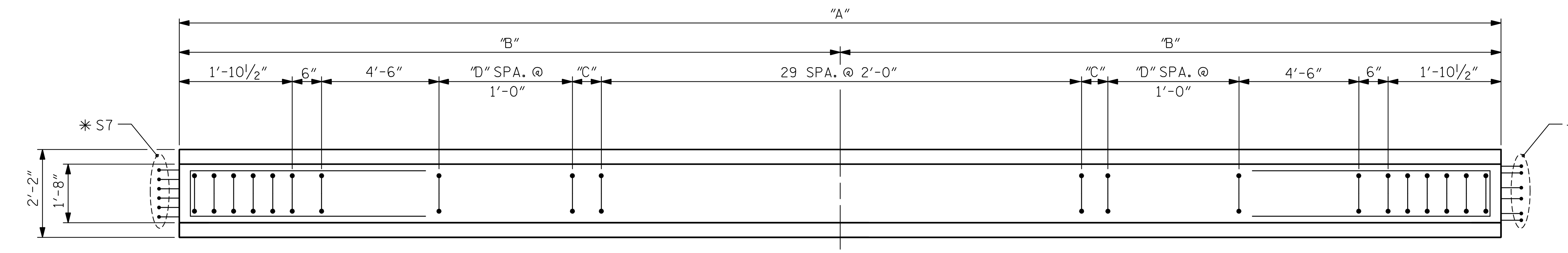
	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
GA1-GA5	S1	66	#4	1	10'-8"	470
GB1-GB5	S1	68	#4	1	10'-8"	485
	S2	12	#6	1	10'-8"	192
	S3	4	#4	2	9'-1"	24
	S4	64	#4	3	3'-5"	146
	S5	6	#4	2	8'-5"	34
	* S7	18	#5	STR	3'-8"	69
	S8	4	#4	2	8'-7"	23
	S9	2	#3	STR	1'-10"	1
	S10	2	#5	2	8'-8"	18
	S11	5	#4	STR	7'-0"	23
	S13	1	#3	STR	1'-4"	1

* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

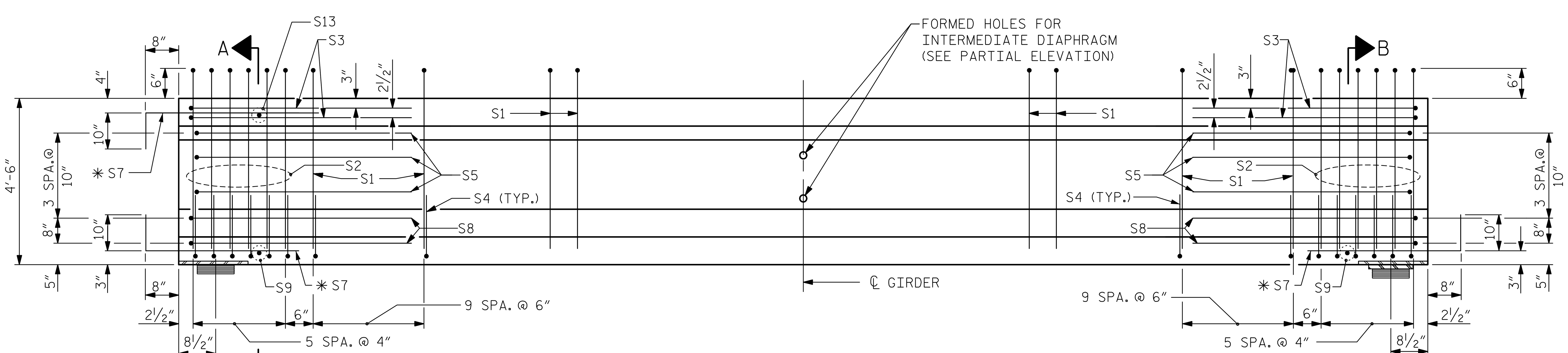
BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT





PLAN OF GIRDER



INTEGRAL END BENT

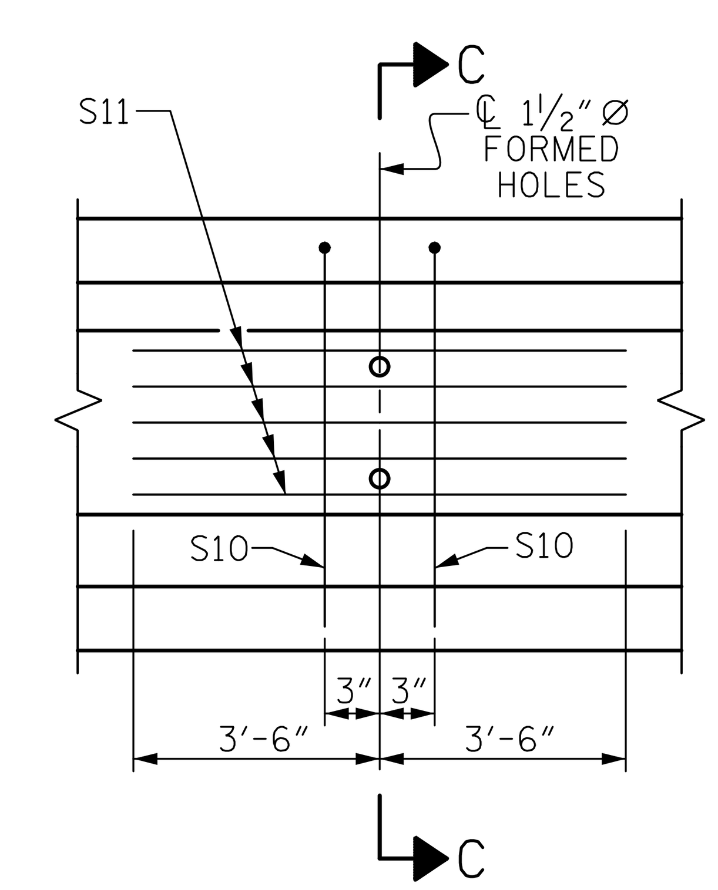
(END BENT 1 @ SPAN A)
(END BENT 2 @ SPAN B)

ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

CONTINUOUS BENT

(BENT 1 @ SPAN A AND SPAN B)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN A GDR.	** 1,001	18.4	34
SPAN B GDR.	** 1,016	18.7	34

GIRDERS REQUIRED

SPAN	NUMBER	LENGTH	TOTAL LENGTH
A	5	90'-10 1/8"	454.22'
B	5	91'-11 11/16"	459.87'

GIRDER DIMENSION TABLE

GIRDERS	"A"	"B"	"C"	"D"
GA1-GA5	90'-10 1/8"	45'-5 1/16"	1'-6 9/16"	8
GB1-GB5	91'-11 11/16"	45'-11 13/16"(+)	1'-1 5/16"(+)	9

NOTE:

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6,000 PSI.

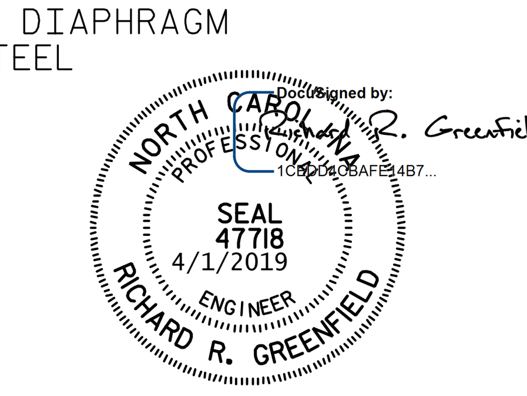
GIRDER CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 8,000 PSI AT THE AGE OF 28 DAYS.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 1 OF 3



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPANS A AND B

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 11/18
CHECKED BY A. WAGNER DATE 11/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

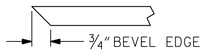
DWG. NO. 12

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

SHEET NO. S4-12

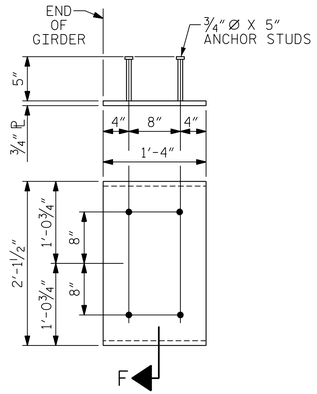
TOTAL SHEETS 31

4/1/2019
...1404.023_I4400BB_SMU_GOI_012_44022I.dgn



SECTION "F"

(SEE NOTES)



EMBEDDED PLATE "B-1" DETAILS

(2 REQ'D PER GIRDER)

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.

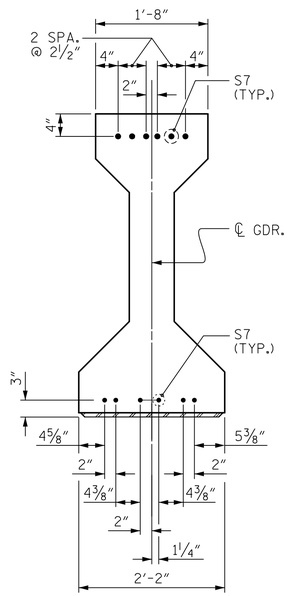
ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

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.

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

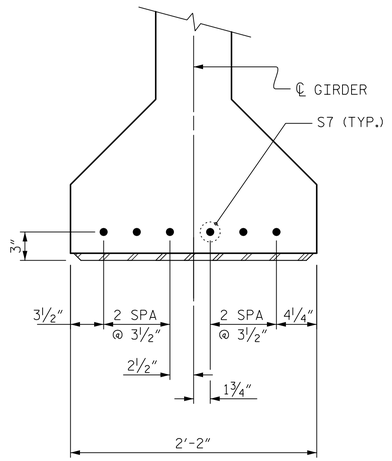
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF ¼".

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.



DETAIL "A"

(AT INTEGRAL END BENT)



DETAIL "A"

(AT BENT)

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

Designed by: R. Greenfield

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 4/1/2019 ENGINEER RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

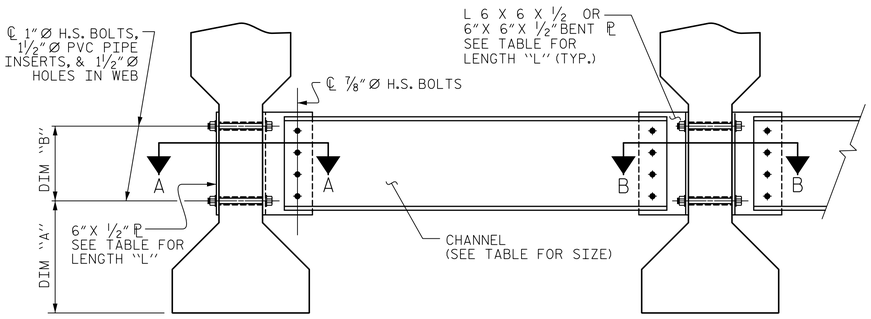
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 11/18
CHECKED BY A. WAGNER DATE 11/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 13

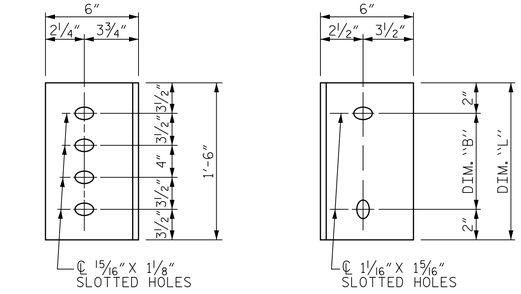
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-13
1			3			TOTAL SHEETS
2			4			31

4/1/2019
...\404_025_I4400BB_SMU_002_013_44022I.dgn



EXTERIOR GIRDER INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE WEB FACE

CONNECTOR PLATE DETAILS

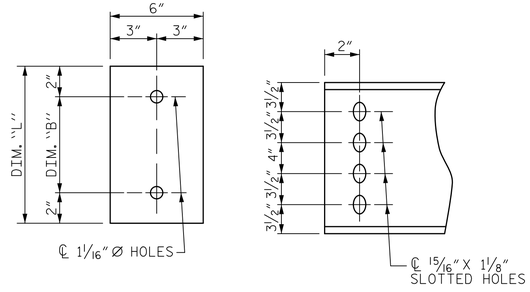
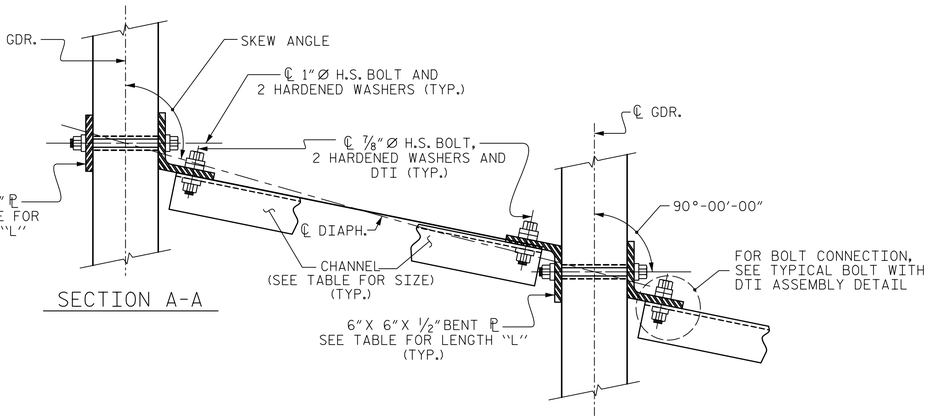
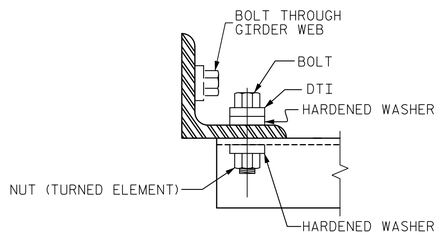


PLATE DETAILS CHANNEL END



CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

STRUCTURAL STEEL NOTES

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

TENSION ON THE ASTM F3125 A325 TYPE 1 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 ¼ 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 ¼"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.

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
IV	MC 18 x 42.7	1'-9½"	1'-2"	1'-6"

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 4/1/2019 ENGINEER RICHARD R. GREENFIELD

Digitally signed by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY O. MOHAMMED DATE 10/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

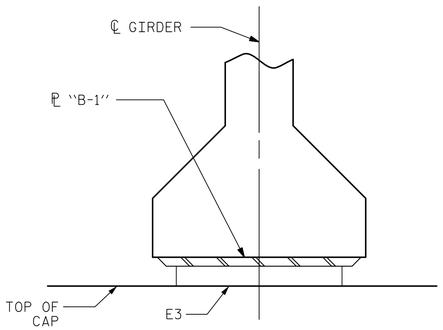
DWG. NO. 14

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

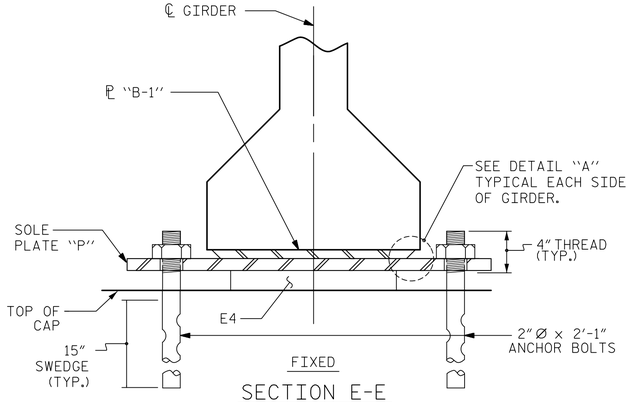
STANDARD INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-14
1			3			TOTAL SHEETS
2			4			31

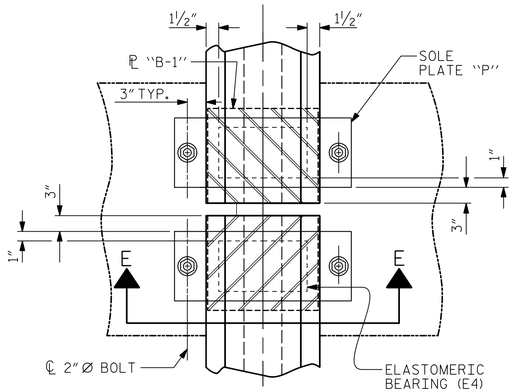
4/1/2019
...\404_027_I4400BB_SMU_G03_014_44022I.dgn



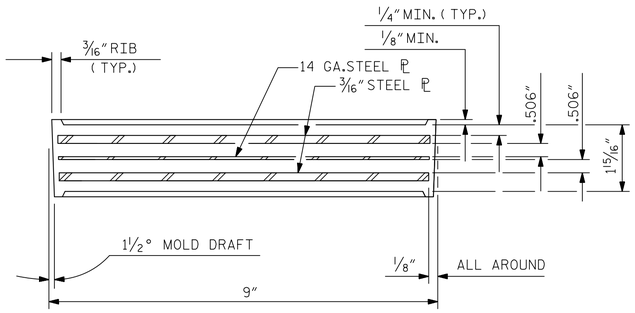
SECTION D-D



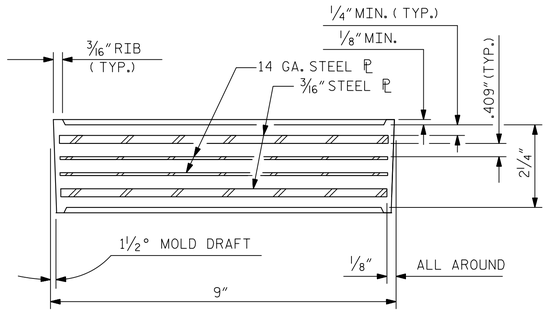
SECTION E-E



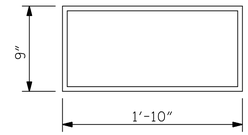
PLAN VIEW AT BENT



TYPICAL SECTION OF ELASTOMERIC BEARINGS



TYPICAL SECTION OF ELASTOMERIC BEARINGS

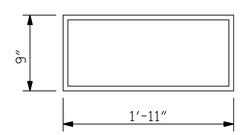


E3 (10 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV

(END BENTS 1 & 2)

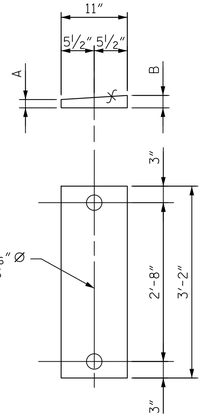


E4 (10 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

(BENT 1)

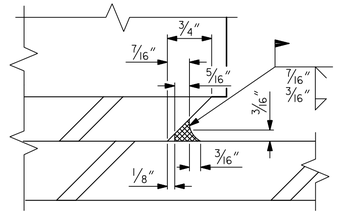


FIXED BRG. SOLE PLATE

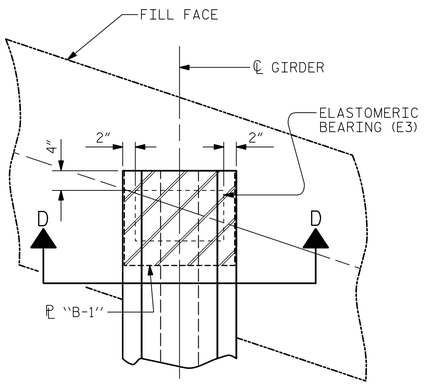
(10 REQ'D)
(SEE TABLE FOR MARK)

SOLE PLATE DETAILS ("P")

(BENT 1)



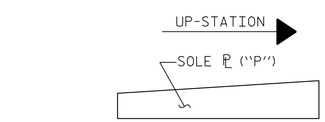
DETAIL "A"



TYPICAL PLAN @ END BENT

TABLE OF SOLE PLATE VARIABLES							
BENT	SPAN BACK	SPAN AHEAD	GIRDERS	A	B	MARK	REQ'D
B1	A		GA1-GA5	1¼"	1½"	P1	5
		B	GB1	1½"	1⅝"	P2	1
		B	GB2-GB3	1⅝"	1¾"	P3	2
		B	GB4-GB5	1¾"	1⅞"	P4	2

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE V	365 k



SOLE ℄ PLACEMENT DETAIL

NOTES

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF ½ TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

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.

SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

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. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

Richard R. Greenfield

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/14/2019 RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 15

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-15
1			3			TOTAL SHEETS
2			4			31

6/14/2019
...\404_029_I4400BB_SMU_BG_015_44022I.dgn

DEAD LOAD DEFLECTION TABLE FOR SPAN A											
0.6"Ø LOW RELAXATION STRANDS	GIRDER 1										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.044	0.084	0.115	0.134	0.141	0.134	0.115	0.084	0.044	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.031	0.061	0.084	0.099	0.105	.100	0.085	0.061	0.031	0.000
FINAL CAMBER ↑	0	1/8	1/4	3/8	7/16	7/16	7/16	3/8	1/4	1/8	0

DEAD LOAD DEFLECTION TABLE FOR SPAN A											
0.6"Ø LOW RELAXATION STRANDS	GIRDERS 2 THRU 4										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.044	0.084	0.115	0.134	0.141	0.134	0.115	0.084	0.044	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.034	0.068	0.094	0.111	0.117	0.111	0.095	0.068	0.035	0.000
FINAL CAMBER ↑	0	1/8	3/16	1/4	1/4	5/16	1/4	1/4	3/16	1/8	0

DEAD LOAD DEFLECTION TABLE FOR SPAN A											
0.6"Ø LOW RELAXATION STRANDS	GIRDER 5										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.044	0.084	0.115	0.134	0.141	0.134	0.115	0.084	0.044	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.032	0.063	0.088	0.103	0.109	0.104	0.088	0.064	0.033	0.000
FINAL CAMBER ↑	0	1/8	1/4	5/16	3/8	3/8	3/8	5/16	1/4	1/8	0

DEAD LOAD DEFLECTION TABLE FOR SPAN B											
0.6"Ø LOW RELAXATION STRANDS	GIRDER 1										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.044	0.084	0.115	0.135	0.141	0.135	0.115	0.084	0.044	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.033	0.064	0.089	0.105	0.110	0.105	0.089	0.064	0.032	0.000
FINAL CAMBER ↑	0	1/8	1/4	5/16	3/8	3/8	3/8	5/16	1/4	1/8	0

DEAD LOAD DEFLECTION TABLE FOR SPAN B											
0.6"Ø LOW RELAXATION STRANDS	GIRDERS 2 THRU 4										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.044	0.084	0.115	0.135	0.141	0.135	0.115	0.084	0.044	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.037	0.072	0.100	0.117	0.123	0.117	0.099	0.072	0.036	0.000
FINAL CAMBER ↑	0	1/16	1/8	3/16	3/16	3/16	3/16	3/16	1/8	1/8	0

DEAD LOAD DEFLECTION TABLE FOR SPAN B											
0.6"Ø LOW RELAXATION STRANDS	GIRDER 5										
TENTH POINTS	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.044	0.084	0.115	0.135	0.141	0.135	0.115	0.084	0.044	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.034	0.067	0.093	0.109	0.115	0.109	0.092	0.067	0.034	0.000
FINAL CAMBER ↑	0	1/8	3/16	1/4	5/16	5/16	5/16	1/4	3/16	1/8	0

✳ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD. DOES NOT INCLUDE WEIGHT OF FORM LINER.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 6/7/2019

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
GIRDER
DEAD LOAD DEFLECTIONS AND CAMBER

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

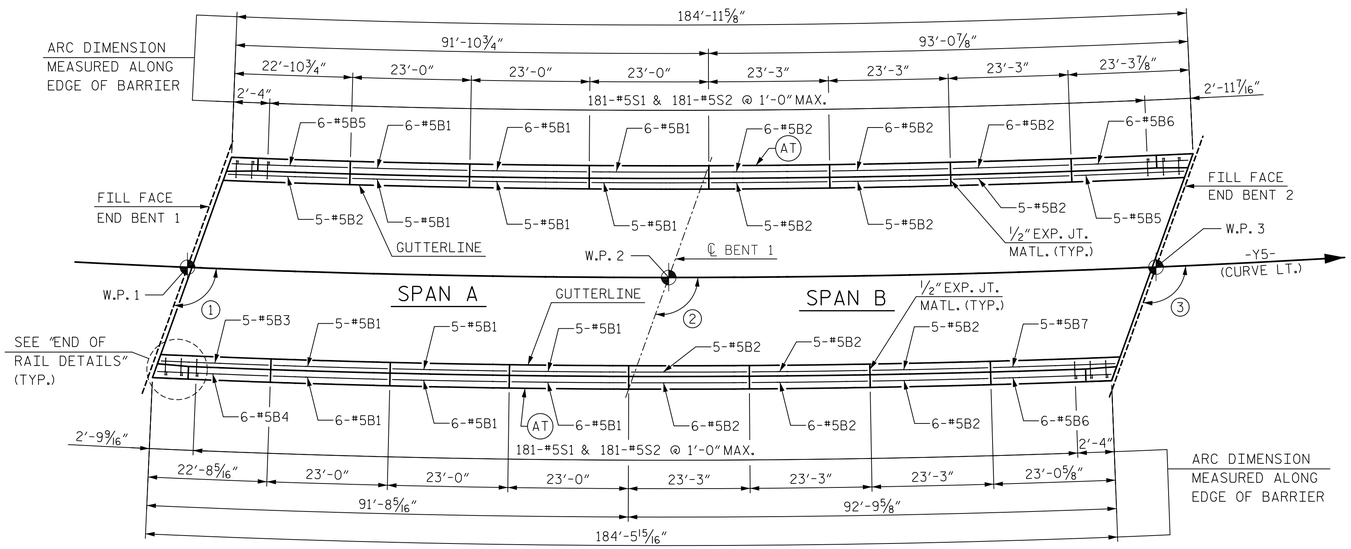
DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 16

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-16
1			3			TOTAL SHEETS
2			4			31

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\404_03\i4400BB_SMU_DL_016_44022d.dgn



PLAN OF BARRIER RAIL

① 107°-18'-45" (TANGENT TO CURVE)
② 109°-43'-34" (TANGENT TO CURVE)
③ 112°-10'-11" (TANGENT TO CURVE)

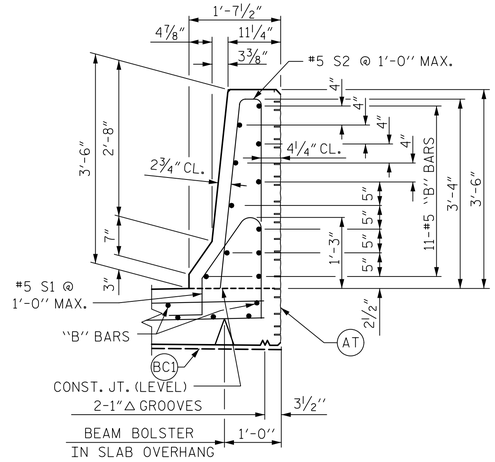
NOTES

THE BARRIER RAIL 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.

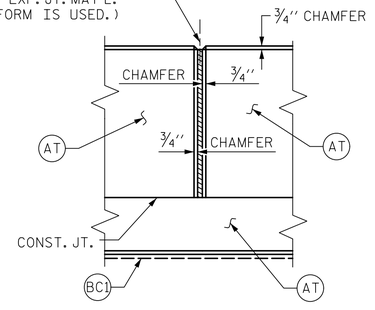
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

THE #5S1 AND #5S2 BARS MAY BE SHIFTED SLIGHTLY AS REQUIRED TO PROVIDE 2" MINIMUM CONCRETE COVER AT THE ½" EXPANSION JOINTS IN THE BARRIER RAIL.

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL OTHER THAN FACES WITH ARCHITECTURAL TREATMENT AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE 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.



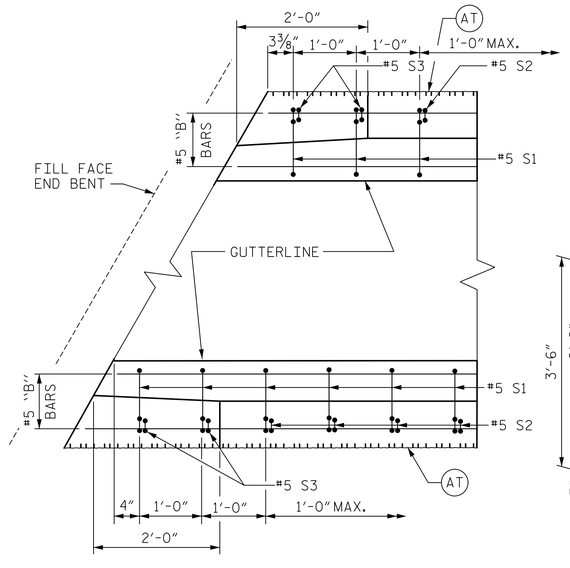
SECTION THRU RAIL



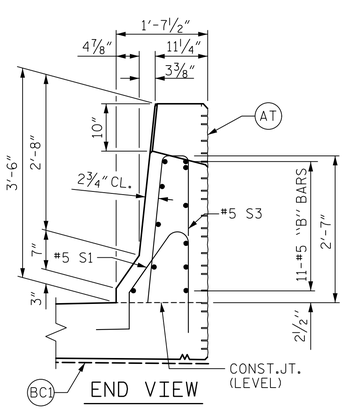
ELEVATION AT EXPANSION JOINTS

AT LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

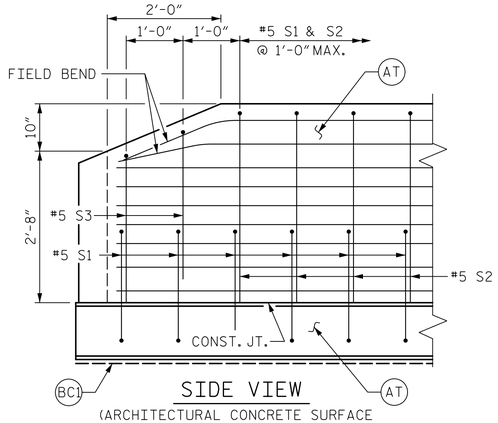
BC1 LIMITS OF BRIDGE COATING (LIGHT GRAY)



PLAN



END VIEW



SIDE VIEW

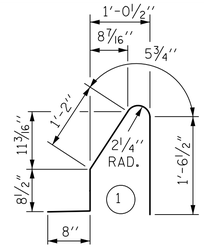
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

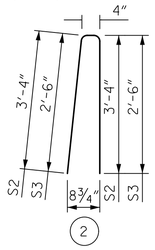
BARRIER RAIL DETAILS

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

END OF RAIL DETAILS

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* S1	370	#5	1	4'-6¾"	1,671
* S2	362	#5	2	7'-0"	2,643
* S3	8	#5	2	5'-4"	45
* B1	66	#5	STR	22'-8"	1,560
* B2	71	#5	STR	22'-11"	1,697
* B3	5	#5	STR	21'-10"	114
* B4	6	#5	STR	22'-4"	140
* B5	11	#5	STR	22'-6"	258
* B6	12	#5	STR	22'-10"	286
* B7	5	#5	STR	23'-1"	120

* EPOXY COATED REINFORCING STEEL	LBS.	8,534
CLASS AA CONCRETE	CU. YDS.	56.2
CONCRETE BARRIER RAIL	LIN. FT.	369.46
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	1,290

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 Richard R. Greenfield 6/7/2019 ENGINEER RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

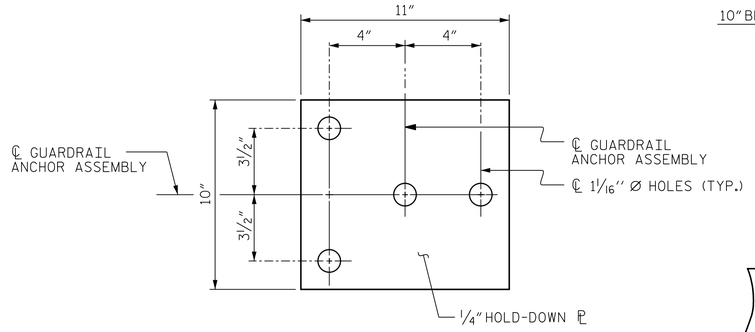
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

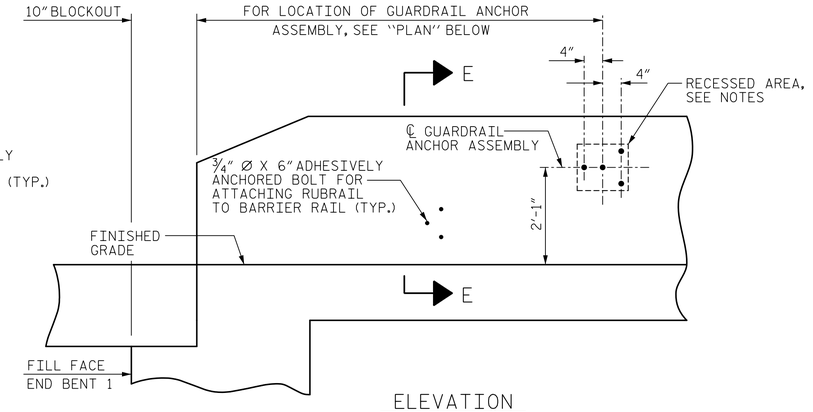
DWG. NO. 17

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-17
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404.033.I4400BB_SMU_BR_017_44022Id.dgn

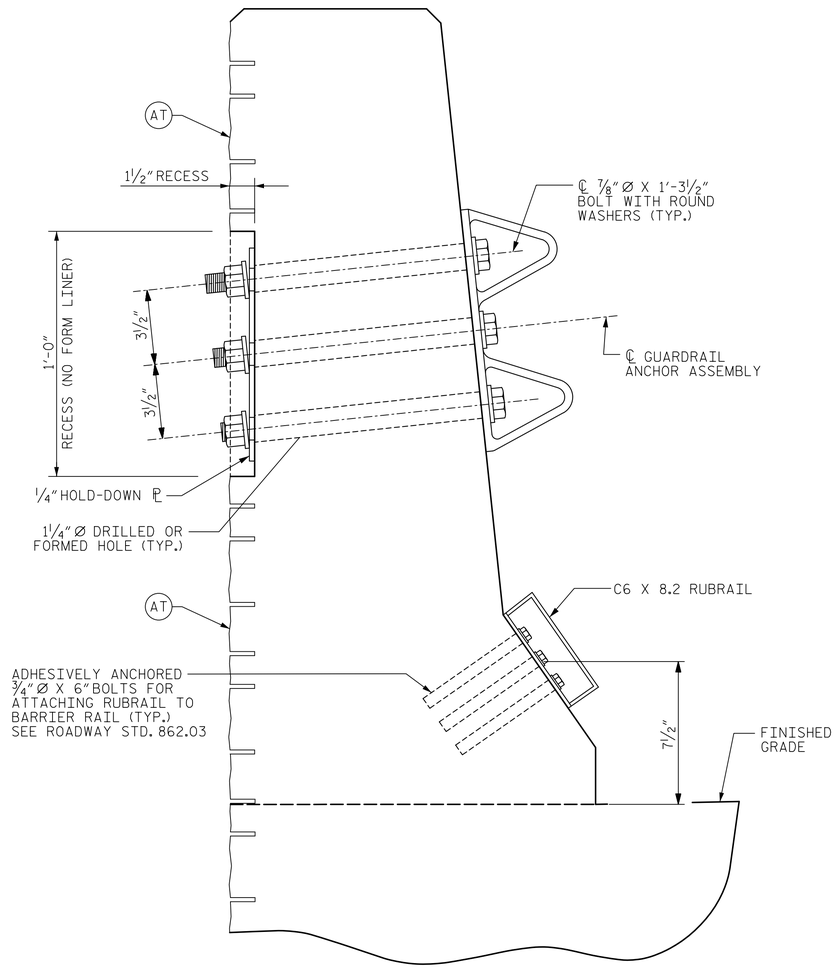


PLAN



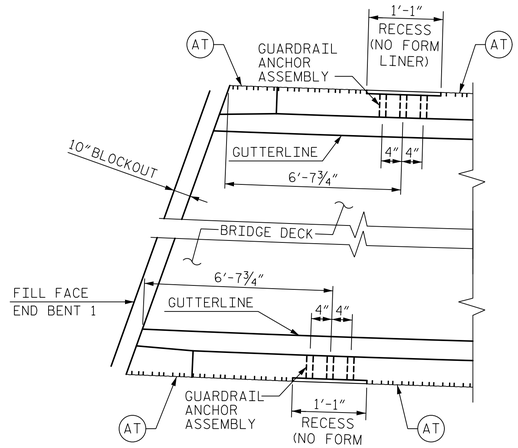
ELEVATION

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

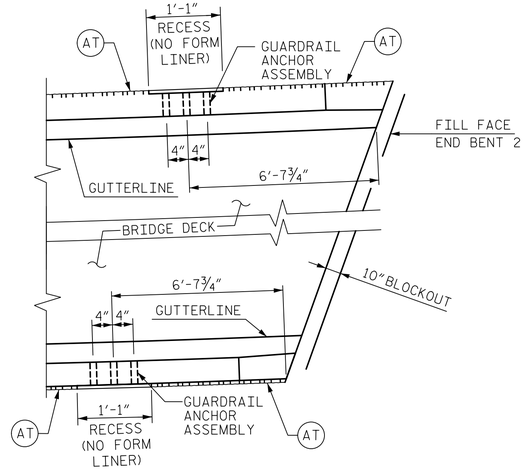


SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN AT END BENT 1



PLAN AT END BENT 2

LOCATION OF ANCHORS FOR GUARDRAIL

NOTES

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

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.

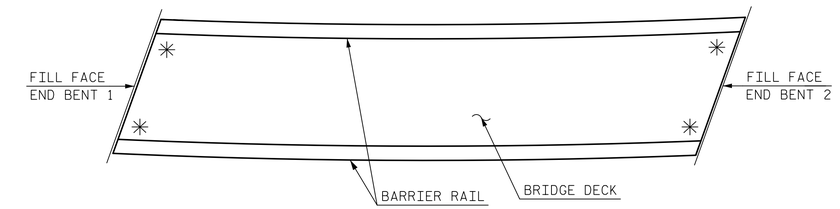
AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

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

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.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4″ Ø X 6″ BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4″ Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.

RECESSED AREA BELOW HOLD DOWN PLATE SHALL BE FINISHED SMOOTH TO ALLOW FOR COMPLETE SEATING OF PLATE AGAINST BACK OF CONCRETE BARRIER.



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY (4 REQUIRED)

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 6/7/2019 ENGINEER RICHARD R. GREENFIELD

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 18

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-18
1			3			TOTAL SHEETS
2			4			31

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\404.035_I4400BB_SMU_GR_018_44022.dgn

REINFORCING BAR SCHEDULE

EPOXY COATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A1	337	5	STR.	42′-8″	14,997
A2	2	5	STR.	4′-5″	9
A3	2	5	STR.	5′-10″	12
A4	2	5	STR.	7′-3″	15
A5	2	5	STR.	8′-8″	18
A6	2	5	STR.	10′-1″	21
A7	2	5	STR.	11′-6″	24
A8	2	5	STR.	12′-11″	27
A9	2	5	STR.	14′-4″	30
A10	2	5	STR.	15′-9″	33
A11	2	5	STR.	17′-2″	36
A12	2	5	STR.	18′-7″	39
A13	2	5	STR.	20′-0″	42
A14	2	5	STR.	21′-5″	45
A15	2	5	STR.	22′-10″	48
A16	2	5	STR.	24′-3″	51
A17	2	5	STR.	25′-8″	54
A18	2	5	STR.	27′-1″	56
A19	2	5	STR.	28′-6″	59
A20	2	5	STR.	29′-11″	62
A21	2	5	STR.	31′-4″	65
A22	2	5	STR.	32′-9″	68
A23	2	5	STR.	34′-2″	71
A24	2	5	STR.	35′-7″	74
A25	2	5	STR.	37′-0″	77
A26	2	5	STR.	38′-5″	80
A27	2	5	STR.	39′-10″	83
A28	2	5	STR.	41′-3″	86
A29	2	5	STR.	42′-8″	89
B1	180	4	STR.	22′-1″	2,655
B2	60	6	STR.	33′-11″	3,057
B3	116	6	STR	19′-0″	3,310
B4	58	7	STR.	27′-9″	3,290
S1	64	4	1	11′-11″	509
S2	64	4	1	11′-4″	485
U2	24	4	2	13′-4″	214
U3	8	4	2	11′-4″	61
EPOXY COATED REINFORCING STEEL TOTAL:					29,952

REINFORCING BAR SCHEDULE

UNCOATED

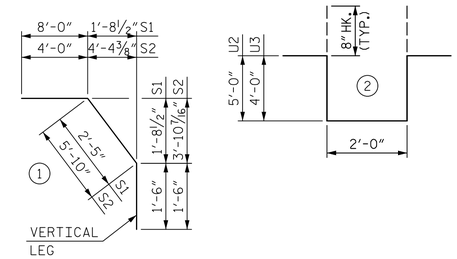
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A101	337	5	STR.	42′-8″	14,997
A102	2	5	STR.	4′-5″	9
A103	2	5	STR.	5′-10″	12
A104	2	5	STR.	7′-3″	15
A105	2	5	STR.	8′-8″	18
A106	2	5	STR.	10′-1″	21
A107	2	5	STR.	11′-6″	24
A108	2	5	STR.	12′-11″	27
A109	2	5	STR.	14′-4″	30
A110	2	5	STR.	15′-9″	33
A111	2	5	STR.	17′-2″	36
A112	2	5	STR.	18′-7″	39
A113	2	5	STR.	20′-0″	42
A114	2	5	STR.	21′-5″	45
A115	2	5	STR.	22′-10″	48
A116	2	5	STR.	24′-3″	51
A117	2	5	STR.	25′-8″	54
A118	2	5	STR.	27′-1″	56
A119	2	5	STR.	28′-6″	59
A120	2	5	STR.	29′-11″	62
A121	2	5	STR.	31′-4″	65
A122	2	5	STR.	32′-9″	68
A123	2	5	STR.	34′-2″	71
A124	2	5	STR.	35′-7″	74
A125	2	5	STR.	37′-0″	77
A126	2	5	STR.	38′-5″	80
A127	2	5	STR.	39′-10″	83
A128	2	5	STR.	41′-3″	86
A129	2	5	STR.	42′-8″	89
B101	208	5	STR.	47′-9″	10,359
B102	40	4	STR.	27′-9″	741

REINFORCING BAR SCHEDULE

UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
K1	5	5	STR.	44′-8″	233
K2	5	5	STR.	46′-1″	240
K3	4	5	STR.	7′-0″	29
K4	4	5	STR.	7′-1″	30
K5	4	5	STR.	7′-7″	32
K6	4	5	STR.	7′-8″	32
K7	8	5	STR.	8′-7″	72
K8	8	5	STR.	8′-9″	73
K9	4	5	STR.	7′-6″	31
K10	4	5	STR.	7′-8″	32
K11	10	4	STR.	21′-1″	141
K12	8	4	STR.	6′-3″	33
K13	8	4	STR.	8′-0″	43
K14	16	4	STR.	8′-11″	95
K15	8	4	STR.	7′-6″	40
K16	2	5	STR.	1′-10″	4
K17	1	5	STR.	2′-2″	2
K18	2	5	STR.	2′-4″	5
K19	1	5	STR.	2′-10″	3
K20	4	5	STR.	2′-7″	11
K21	2	5	STR.	3′-0″	6
K22	3	5	STR.	2′-1″	7
K23	1	5	STR.	2′-6″	3
K24	1	5	STR.	1′-5″	1
K25	2	5	STR.	2′-3″	5
K26	1	5	STR.	1′-9″	2
S3	120	4	3	2′-9″	220
U1	64	5	4	12′-0″	801
UNCOATED REINFORCING STEEL TOTAL:					29,697

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

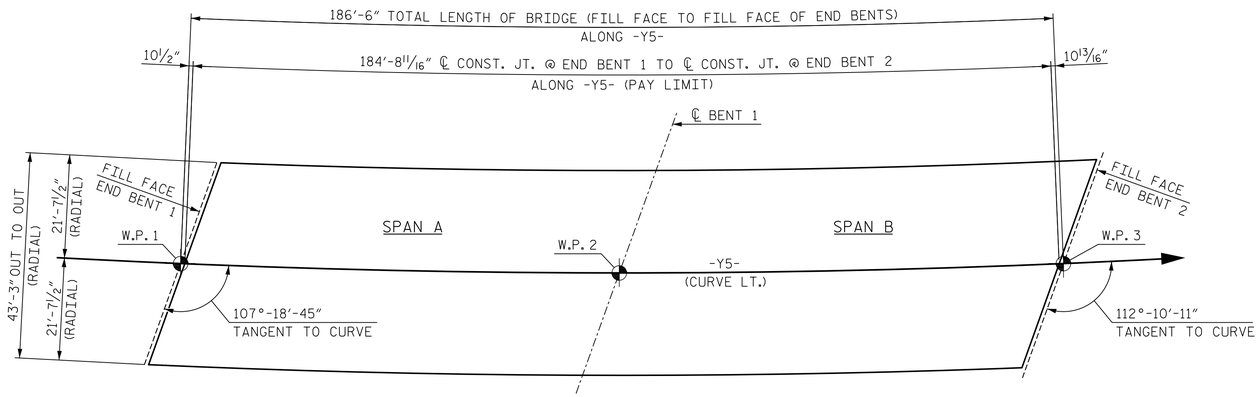
SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	106.2	29,796	30,050
POUR 2	135.4		
POUR 3	72.4		
TOTALS**	314.0	29,796	30,050

ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	385
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	SQ. FT.	879
APPLICATION OF BRIDGE COATING (DARK GRAY)	SQ. FT.	2,572

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

NOTE: QUANTITIES INCLUDE THE CONCRETE AND REINFORCING STEEL FOR THE UPPER PORTION OF THE INTEGRAL END BENTS.



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 7,990)

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	1′-11″	1′-7″	2′-0″	1′-8″	2′-9″
#5	2′-5″	2′-0″	2′-5″	2′-0″	3′-5″
#6	2′-10″		3′-7″	2′-5″	
#7	4′-2″				

GROOVING BRIDGE FLOORS

APPROACH SLABS	2,000	SQ.FT.
BRIDGE DECK	7,389	SQ.FT.
TOTAL	9,389	SQ.FT.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 10/7/2019 ENGINEER

Richard R. Greenfield

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 19

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-19
1			3			TOTAL SHEETS
2			4			31

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\404.037_I4400BB_SMU_BM_019_44022I.dgn

TOP OF PILE ELEVATIONS	
P1	2,098.30
P2	2,098.45
P3	2,098.61
P4	2,098.77
P5	2,098.93
P6	2,099.08
P7	2,099.24
P8	2,099.40
P9	2,099.56
P10	2,099.71

NOTES:

FOR SECTION VIEWS, SEE SHEET 3 OF 3.

FOR WINGWALL DETAILS, SEE SHEET 2 OF 3.

FOR ADDITIONAL NOTES, SEE SHEET 2 OF 3.

FOR PILE SPLICE DETAILS, SEE SHEET 2 OF 3.

PLAN

(A) 5-#5S1 & 5-#5S2 @ 1′-0″ CTS. = 4′-0″ (TYP. EA. BAY)

(B) 3-#5D2 @ 11″ CTS. = 1′-10″ (BEHIND GIRDER)

ELEVATION
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

BEARING DETAIL

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 12/18
CHECKED BY R. GREENFIELD DATE 3/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

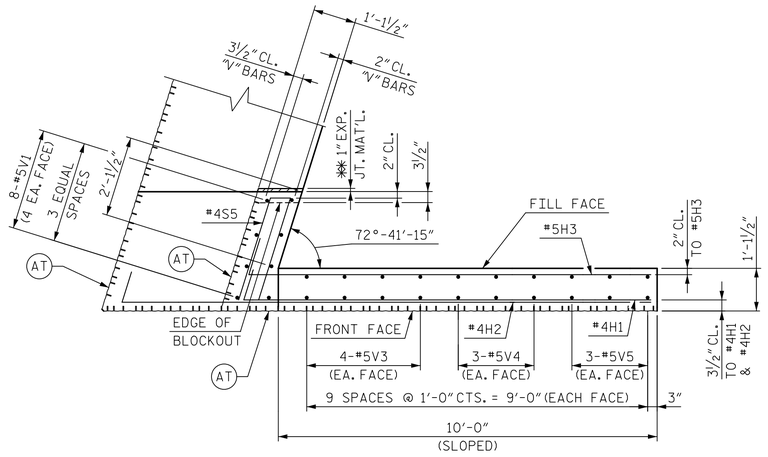
DWG. NO. 20

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-20
1			3			TOTAL SHEETS
2			4			31

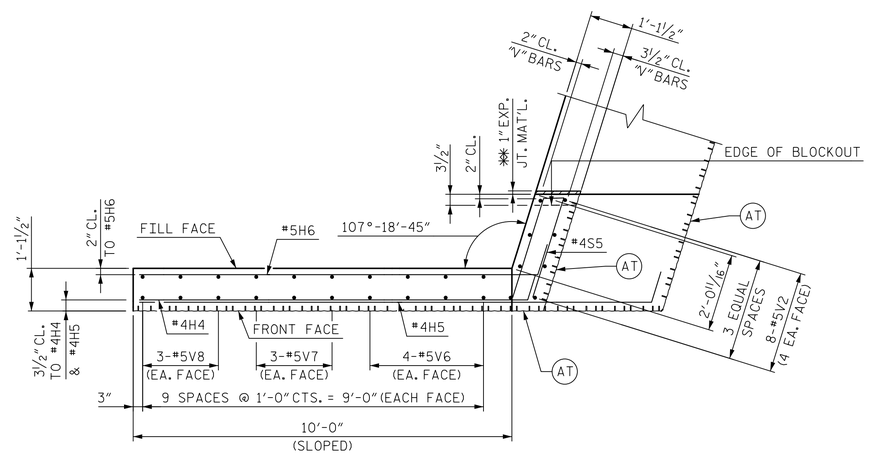
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47118 ENGINEER RICHARD R. GREENFIELD
Richard R. Greenfield
6/7/2019

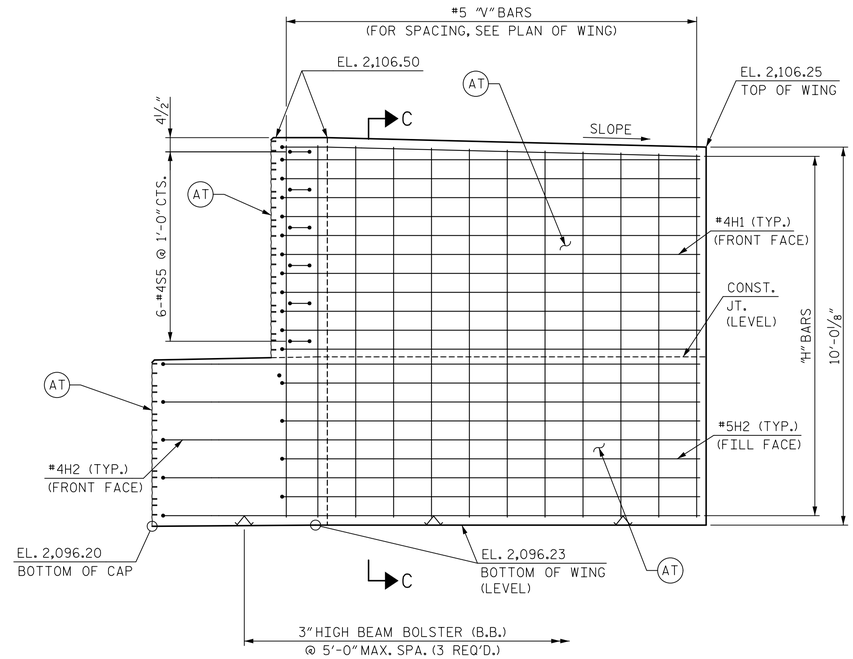
6/7/2019
...\404_039_I4400BB_SMU_E01_020_44022d.dgn



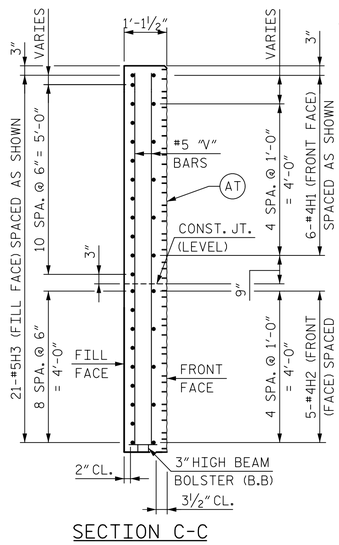
PLAN OF WING (W1)



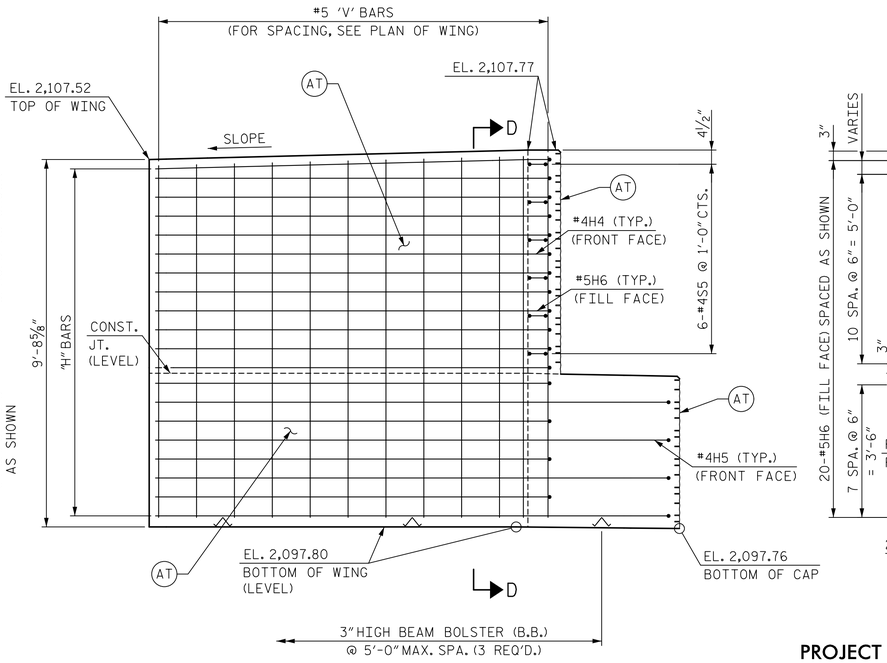
PLAN OF WING (W2)



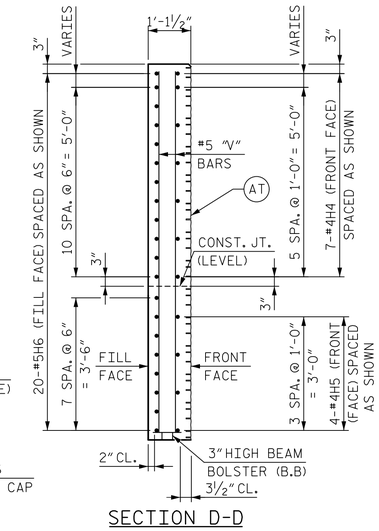
ELEVATION OF WING (W1)
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)



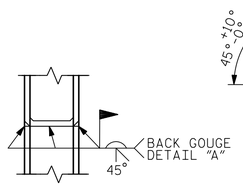
SECTION C-C



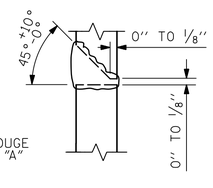
ELEVATION OF WING (W2)
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)



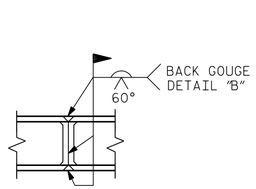
SECTION D-D



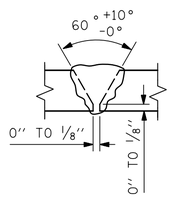
* PILE VERTICAL



DETAIL "A"



* PILE HORIZONTAL OR VERTICAL



DETAIL "B"

* POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

NOTES:

THE TOP SURFACE OF THE END BENT AND WINGS, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼".

THE END BENT DIAPHRAGM SHALL BE POURED MONOLITHICALLY WITH THE SUPERSTRUCTURE. CONCRETE AND REINFORCING STEEL QUANTITIES ARE INCLUDED IN THE SUPERSTRUCTURE BILL OF MATERIALS. FOR DETAILS, SEE SUPERSTRUCTURE SHEETS.

** 1" EXP. JT. MAT'L. BETWEEN END BENT DIAPHRAGM AND WING.

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 6/7/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 12/18
CHECKED BY R. GREENFIELD DATE 3/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 21

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 19+15.21 -Y5-

SHEET 2 OF 3

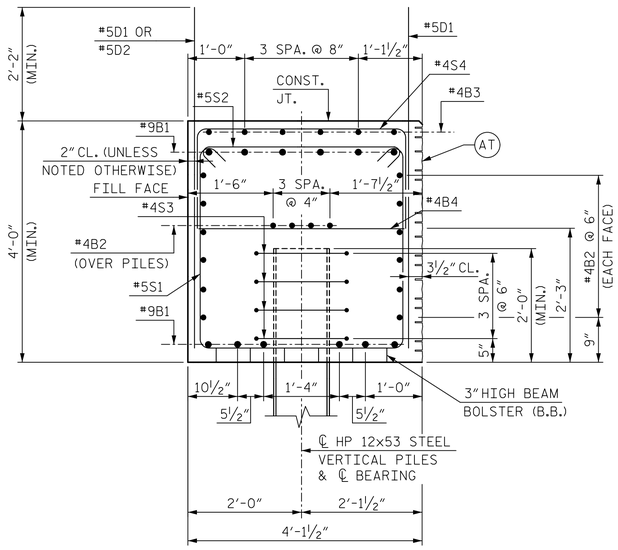
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

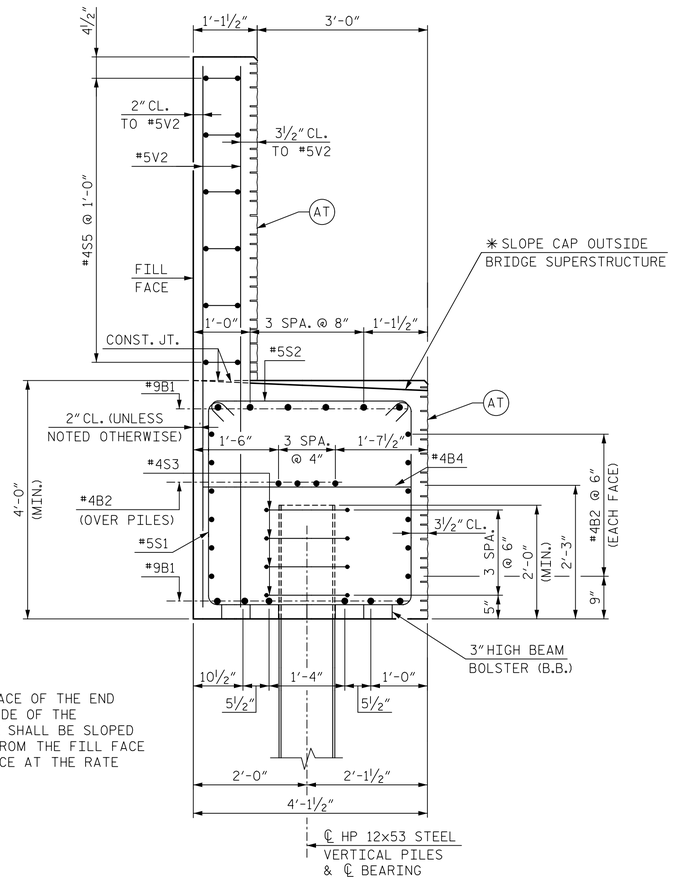
END BENT 1 DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-21
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404_04\I4400BB_SMU_E02_02I_44022I.dgn



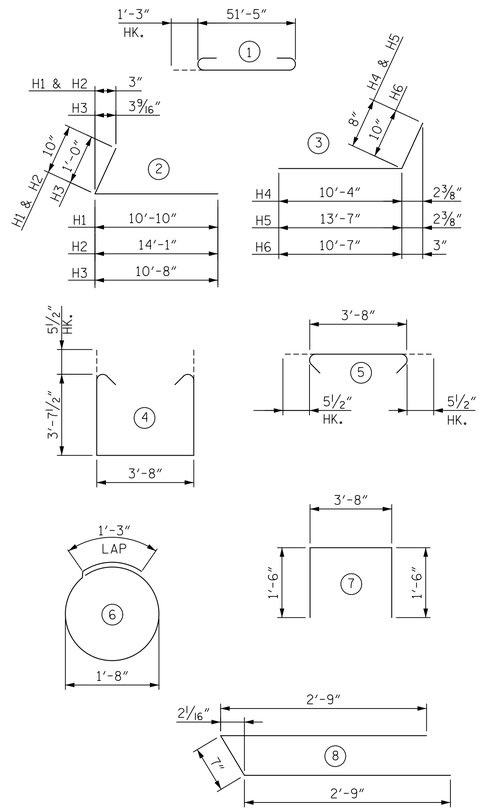
SECTION A-A



SECTION B-B

✳ THE TOP SURFACE OF THE END BENT CAP OUTSIDE OF THE SUPERSTRUCTURE SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

UNCOATED

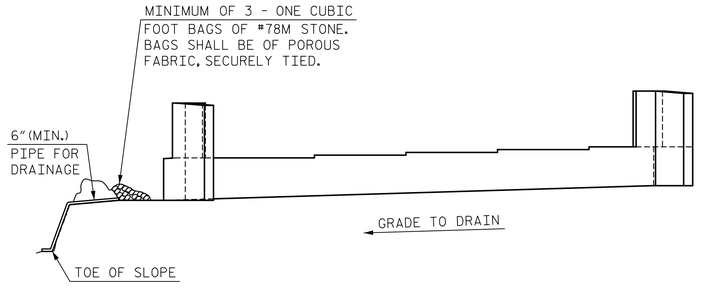
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
B1	12	9	1	53'-11"	2,200
B2	32	4	STR.	26'-11"	575
B3	6	4	STR.	4'-0"	16
B4	13	4	STR.	3'-8"	32
D1	64	5	STR.	6'-6"	434
D2	15	5	STR.	8'-2"	128
H1	6	4	2	11'-8"	47
H2	5	4	2	14'-11"	50
H3	21	5	2	11'-8"	256
H4	7	4	3	11'-0"	51
H5	4	4	3	14'-3"	38
H6	20	5	3	11'-5"	238
S1	49	5	4	11'-10"	605
S2	49	5	5	4'-7"	234
S3	40	4	6	6'-6"	174
S4	3	4	7	6'-8"	13
S5	12	4	8	6'-1"	49
V1	8	5	STR.	9'-8"	81
V2	8	5	STR.	9'-4"	78
V3	8	5	STR.	9'-9"	81
V4	6	5	STR.	9'-8"	60
V5	6	5	STR.	9'-7"	60
V6	8	5	STR.	9'-5"	79
V7	6	5	STR.	9'-4"	58
V8	6	5	STR.	9'-3"	58

QUANTITIES

REINFORCING STEEL	LBS.	5,695
CLASS "A" CONCRETE BREAKDOWN		
POUR 1 - CAP & BOT. OF WINGS	CU. YDS.	36.9
POUR 2 - TOP OF WINGS	CU. YDS.	6.4
TOTAL	CU. YDS.	43.3
PILE DRIVING EQUIPMENT SETUP		
FOR HP 12x53 STEEL PILES	EACH	10
HP 12x53 STEEL PILES	NO.	10
	LIN. FT.	700
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	508

NOTE:

FOR NOTES, SEE SHEET 2 OF 3.

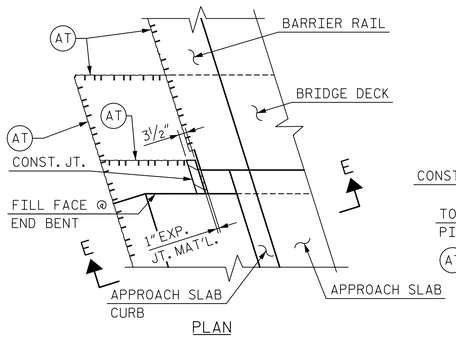


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

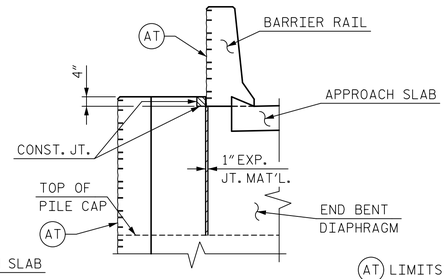
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

TEMPORARY DRAINAGE AT END BENT 1



PLAN



SECTION E-E

AT LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

BLOCKOUT IN WINGWALL

(SEE SECTIONS D-D AND E-E ON "TYPICAL SECTION DETAILS" SHEET FOR LIMITS OF ARCHITECTURAL CONCRETE SURFACE TREATMENT ON SIDE OF END BENT DIAPHRAGM)

NOTE:
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 10/7/2019 Richard R. Greenfield

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

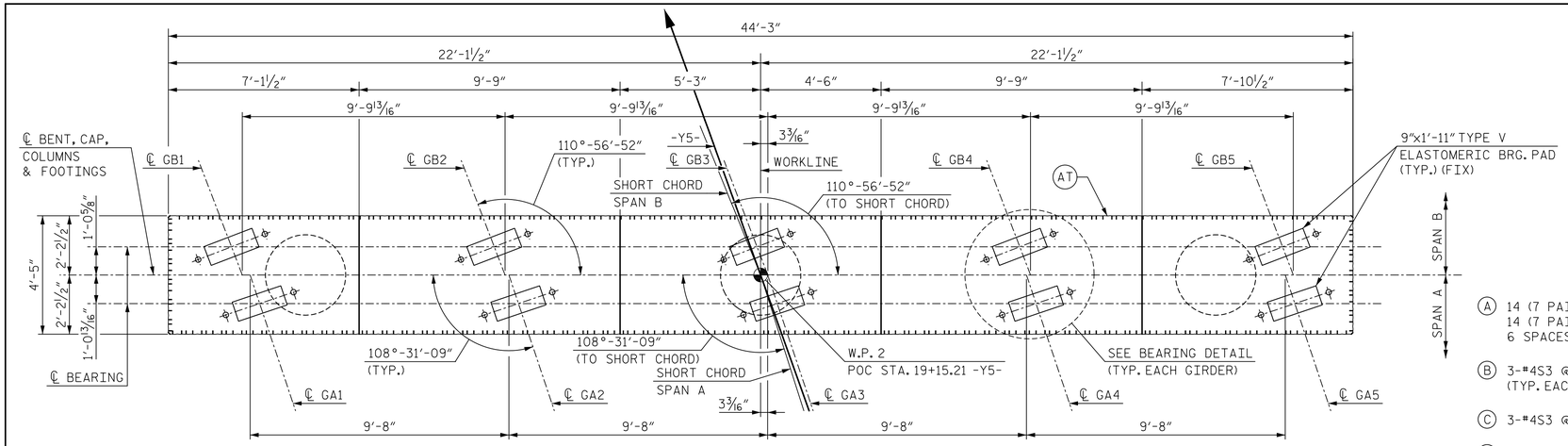
DRAWN BY C. TOMPKINS DATE 12/18
CHECKED BY R. GREENFIELD DATE 3/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 22

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-22
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404_043_I4400BB_SMU_E03_022_44022I.dgn



PLAN

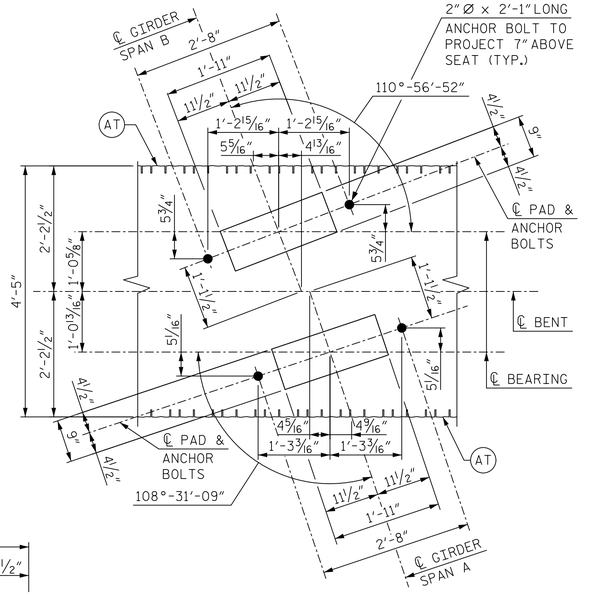
(A) 14 (7 PAIRS)-#5S1 & 14 (7 PAIRS)-#5S2 6 SPACES @ 6" CTS. = 3'-0"

(B) 3-#4S3 @ 1'-6" CTS. = 3'-0" (TYP. EACH SEAT U.N.O.)

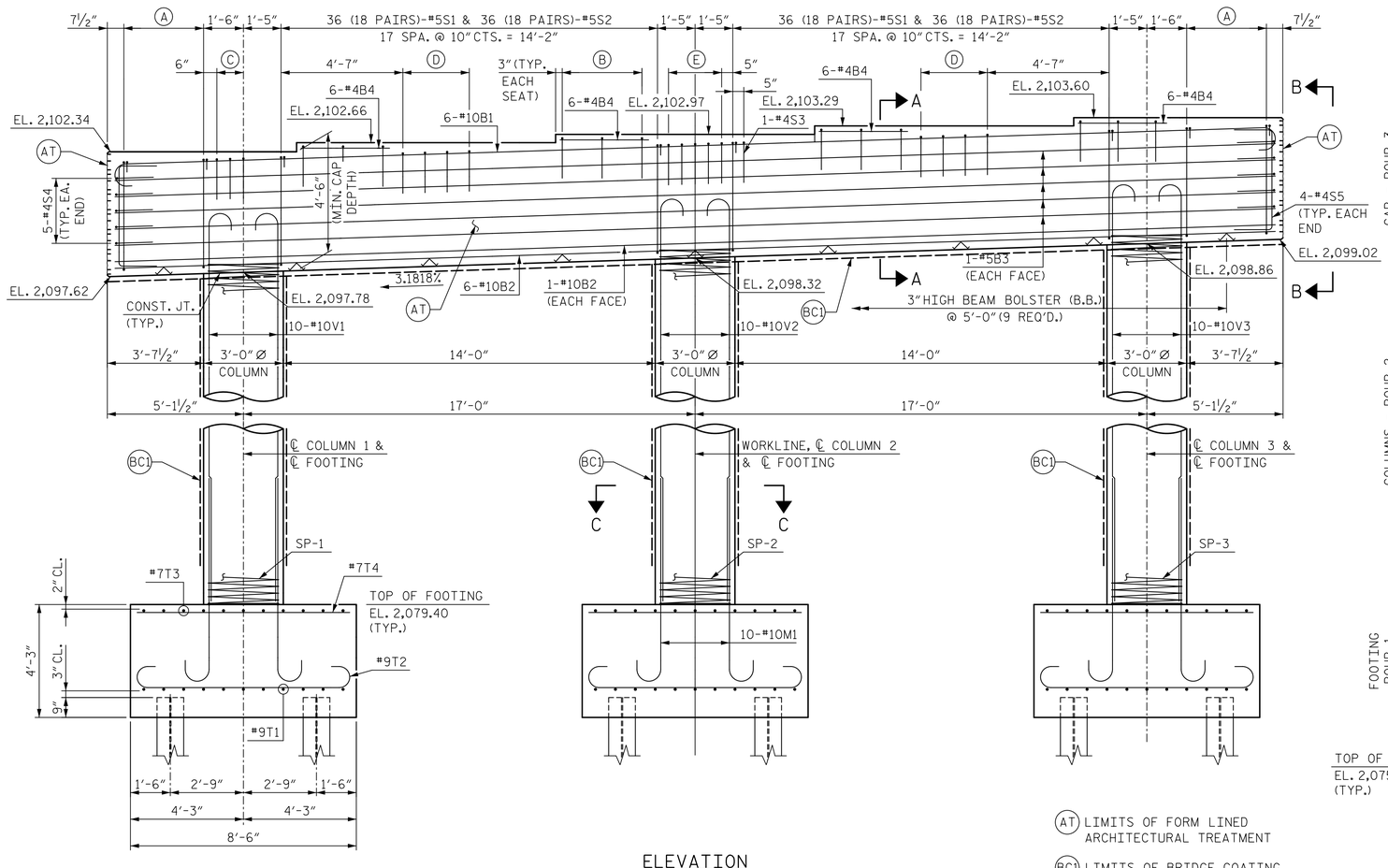
(C) 3-#4S3 @ 6" CTS. = 1'-0"

(D) 4-#4S3 @ 10" CTS. = 2'-6" (SPACED BTWN. #5S1 & #5S2))

(E) 5-#4S3 @ 6" CTS. = 2'-0"



BEARING DETAIL



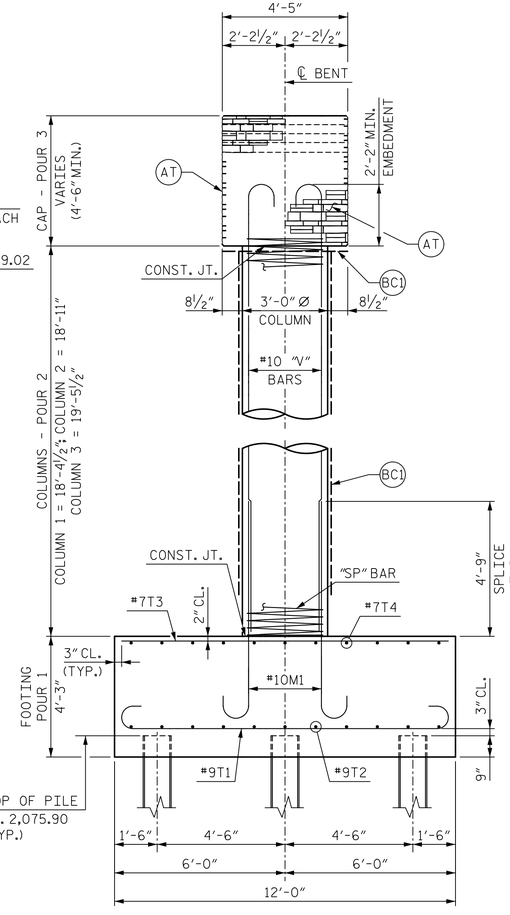
ELEVATION

(FOOTING REINFORCING AND DIMENSIONS ARE TYPICAL FOR EACH FOOTING.)

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)



END VIEW

NOTES:

FOR NOTES, SEE SHEET 2 OF 2.

FOR FOOTING PLAN, SEE SHEET 2 OF 2.

FOR SECTION VIEWS, SEE SHEET 2 OF 2.

U.N.O. DENOTES UNLESS NOTED OTHERWISE.

LIMITS OF BRIDGE COATING SHALL EXTEND A MINIMUM OF 1 FT BELOW THE PROPOSED GROUND LINE.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 6/7/2019 ENGINEER

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

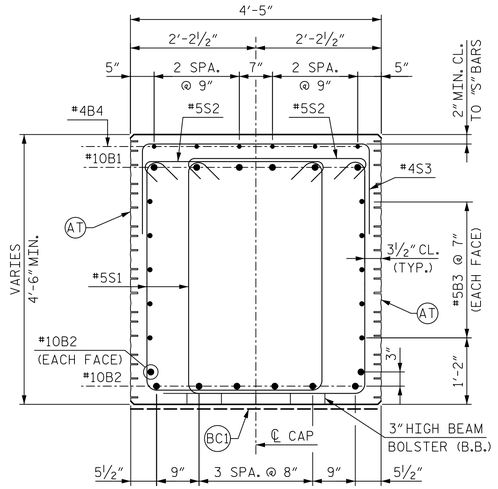
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY A. WAGNER DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

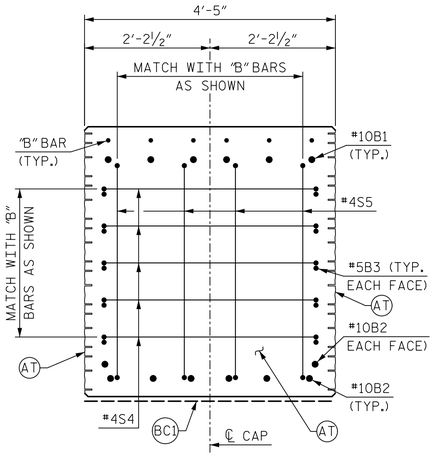
DWG. NO. 23

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-23
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404_045_I4400BB_SMU_BOL_023_44022I.dgn



SECTION A-A

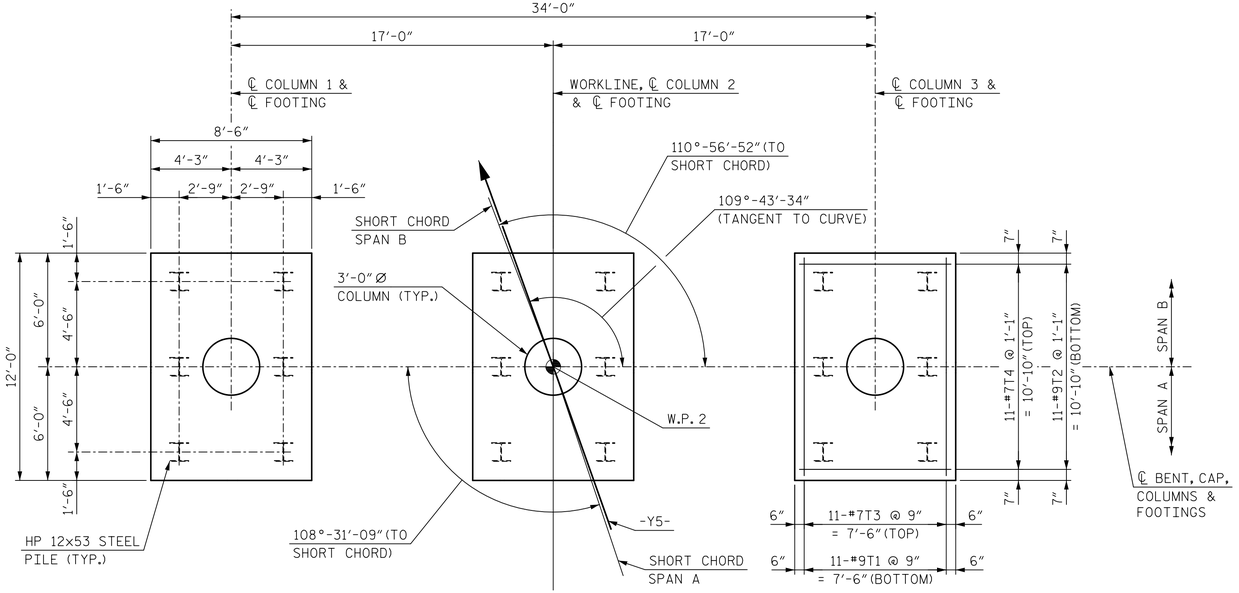


SECTION B-B

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

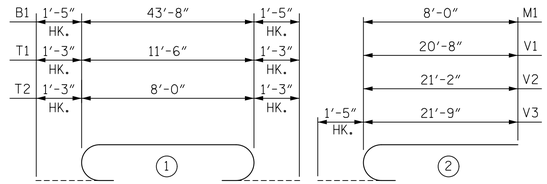
(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

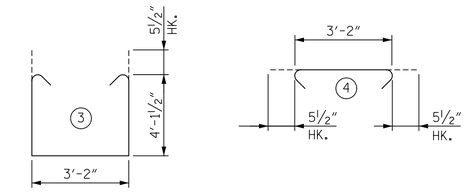


FOOTING PLAN

(FOOTING REINFORCING AND DIMENSIONS ARE TYPICAL FOR EACH FOOTING)

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

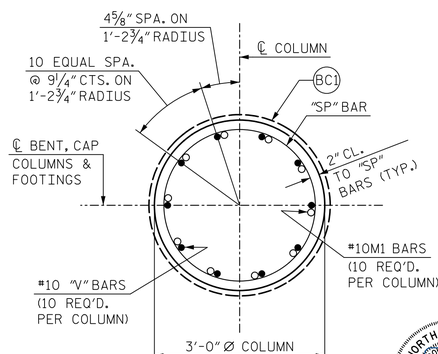
UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
B1	6	10	1	46′-6″	1,201
B2	8	10	STR.	43′-8″	1,503
B3	10	5	STR.	43′-8″	455
B4	24	4	STR.	3′-4″	53
M1	30	10	2	9′-5″	1,216
S1	100	5	3	12′-4″	1,286
S2	100	5	4	4′-1″	426
S3	29	4	5	6′-10″	132
S4	10	4	5	6′-6″	43
S5	8	4	5	6′-10″	37
T1	33	9	1	14′-0″	1,571
T2	33	9	1	10′-6″	1,178
T3	33	7	STR.	11′-6″	776
T4	33	7	STR.	8′-0″	540
V1	10	10	2	22′-1″	950
V2	10	10	2	22′-7″	972
V3	10	10	2	23′-2″	997
SP-1	1	✳	6	640′-9″	428
SP-2	1	✳	6	660′-0″	441
SP-3	1	✳	6	676′-6″	452

QUANTITIES

REINFORCING STEEL	LBS.	13,336
SPIRAL COLUMN REINFORCING STEEL	LBS.	1,321
CLASS "A" CONCRETE BREAKDOWN		
FOOTING POUR 1	CU. YDS.	48.2
COLUMNS POUR 2	CU. YDS.	14.9
CAP POUR 3	CU. YDS.	33.8
TOTAL	CU. YDS.	96.9
PILE DRIVING EQUIPMENT SETUP		
FOR HP 12x53 STEEL PILES	EACH	18
HP 12x53 STEEL PILES	NO.	18
	LIN. FT.	720
FOUNDATION EXCAVATION	LUMP SUM	LUMP SUM
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	454
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	SQ. FT.	703

✳ THE SP SPIRAL REINFORCING STEEL SHALL BE W20 OR D20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.



SECTION C-C

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

FOR PILE SPLICE DETAILS, SEE "SUBSTRUCTURE END BENT 1 DETAILS" SHEET 3 OF 3.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1 DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47118 Richard R. Greenfield 6/7/2019 ENGINEER RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

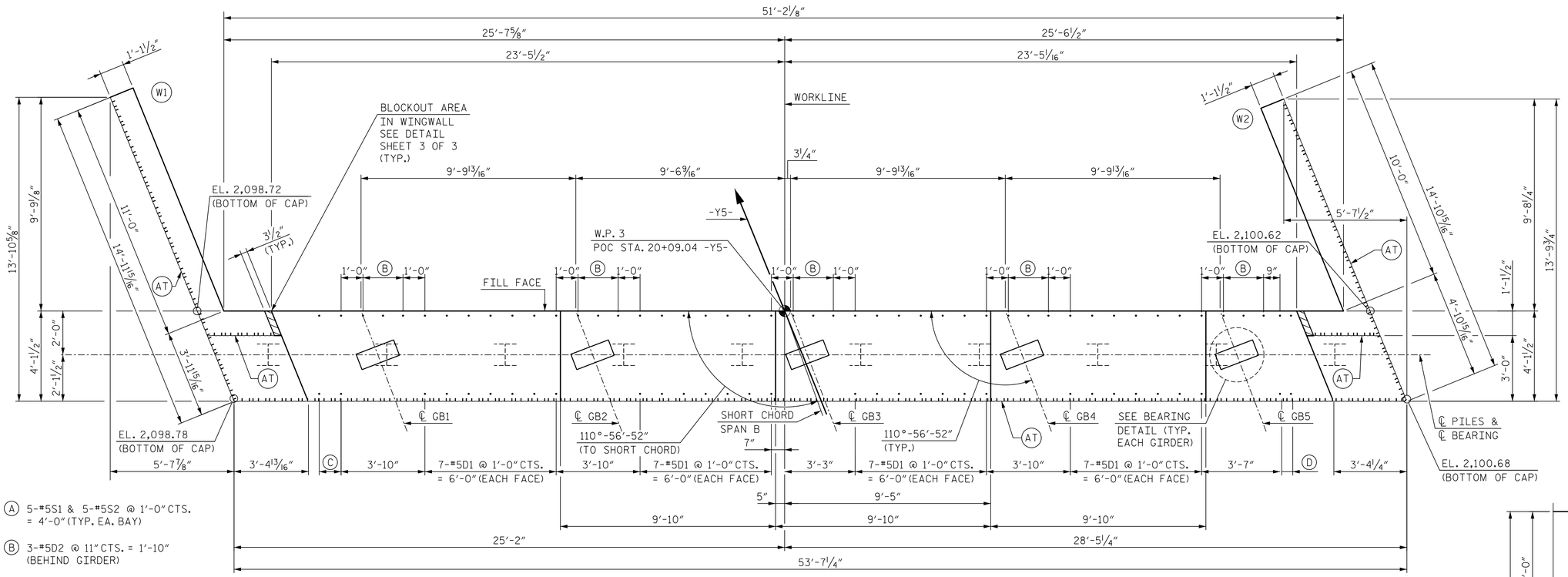
DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY A. WAGNER DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 24

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-24
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404_047_I4400BB_SMU_B02_024_44022cl.dgn

TOP OF PILE ELEVATIONS	
P1	2,100.83
P2	2,101.02
P3	2,101.22
P4	2,101.41
P5	2,101.60
P6	2,101.80
P7	2,101.99
P8	2,102.19
P9	2,102.38
P10	2,102.57



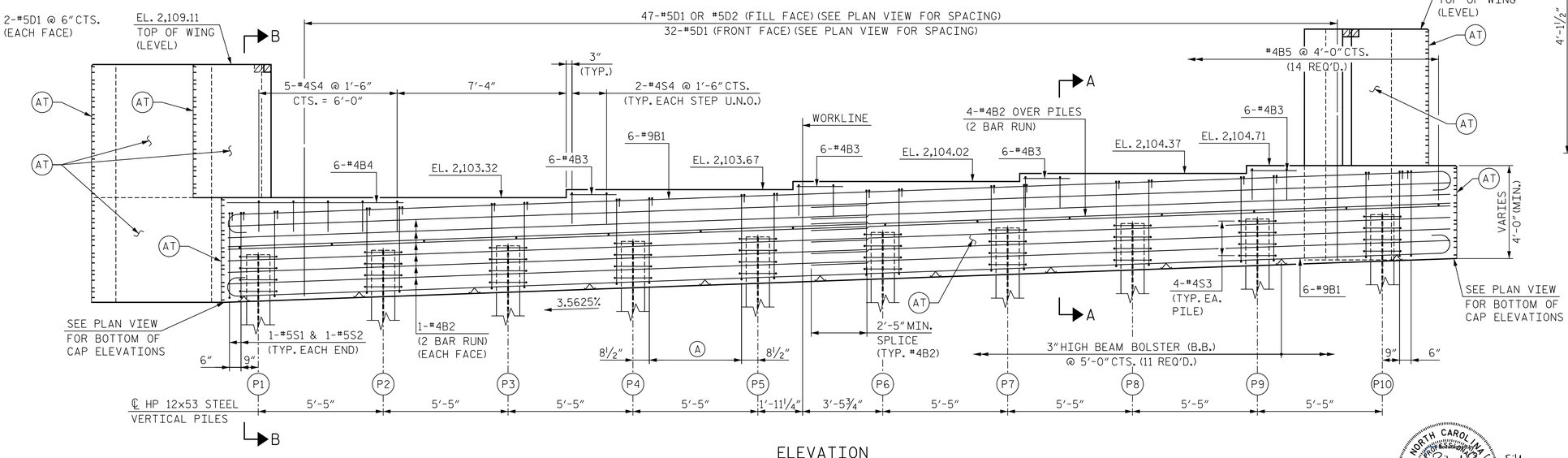
Ⓐ 5-#5S1 & 5-#5S2 @ 1′-0″ CTS. = 4′-0″(TYP. EA. BAY)

Ⓑ 3-#5D2 @ 11″ CTS. = 1′-10″ (BEHIND GIRDER)

Ⓒ 2-#5D1 @ 1′-0″ CTS. (EACH FACE)

Ⓓ 2-#5D1 @ 6″ CTS. (EACH FACE)

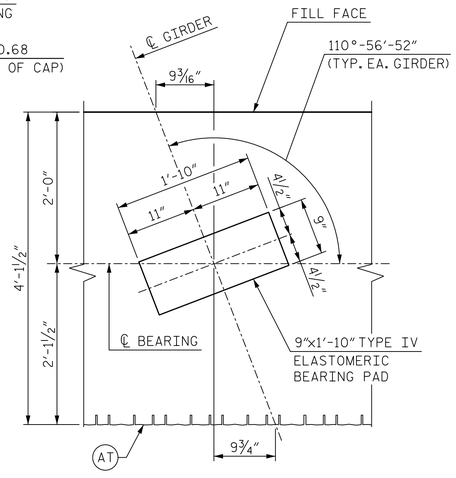
PLAN



ELEVATION

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

Ⓐⓣ LIMITS OF FORM LINED ARCHITECTURAL TREATMENT



BEARING DETAIL

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

NOTES:

FOR SECTION VIEWS, SEE SHEET 3 OF 3.

FOR WINGWALL DETAILS, SEE SHEET 2 OF 3.

FOR ADDITIONAL NOTES, SEE SHEET 2 OF 3.

U.N.O. DENOTES UNLESS NOTED OTHERWISE.

FOR PILE SPLICE DETAILS, SEE SHEET 2 OF 3.

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY R. GREENFIELD DATE 3/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 25

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-25
1			3			TOTAL SHEETS
2			4			31

SHEET 1 OF 3

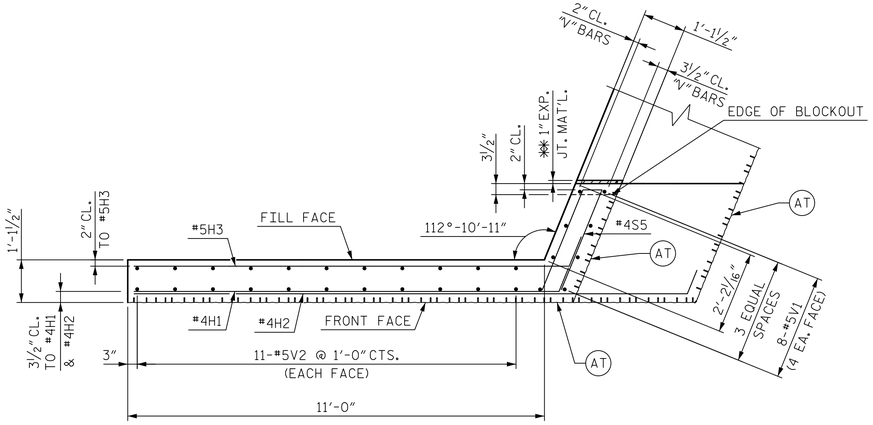
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

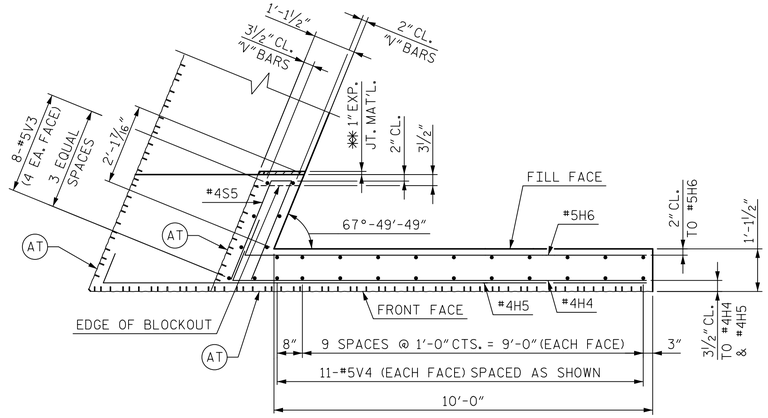
END BENT 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 6/7/2019

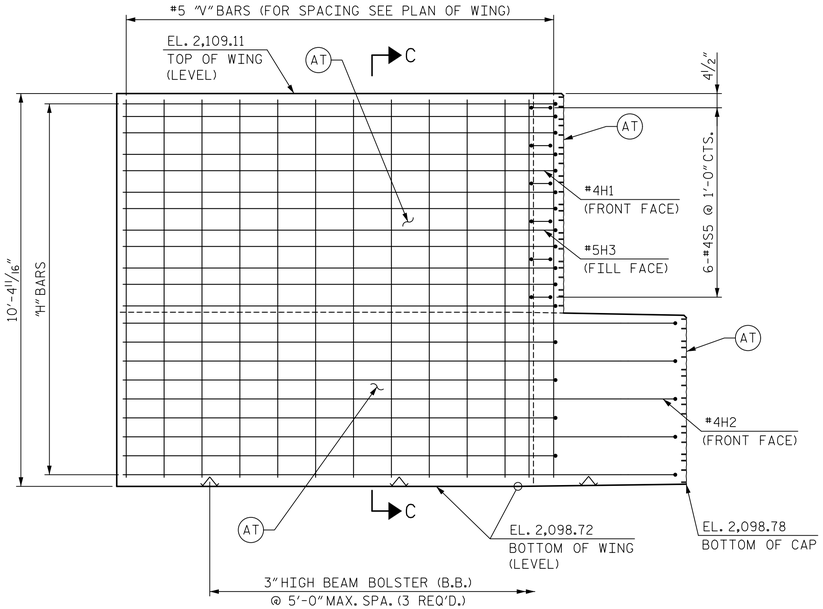
6/7/2019
...\404_049_I4400BB_SMU_E04_025_44022I.dgn



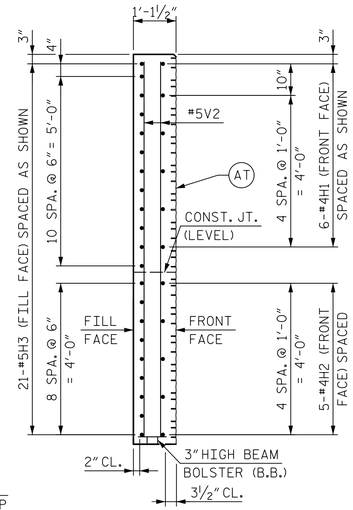
PLAN OF WING (W1)



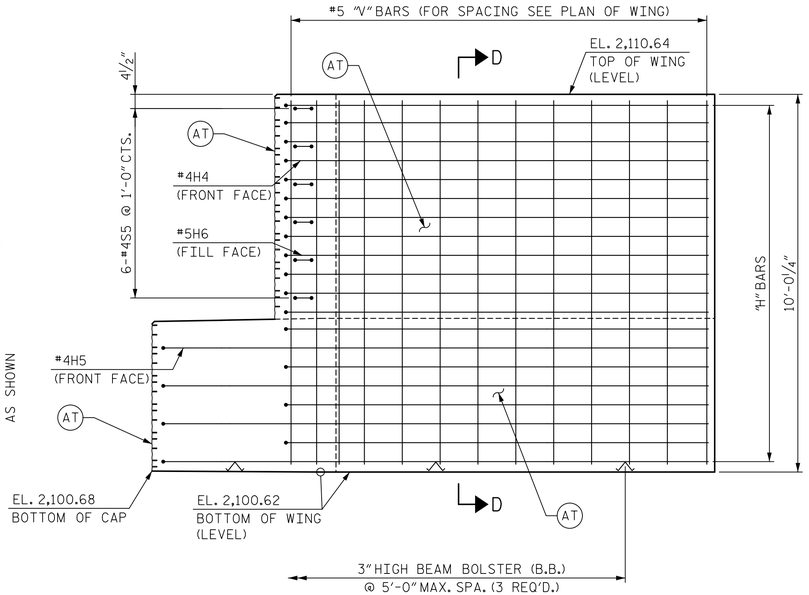
PLAN OF WING (W2)



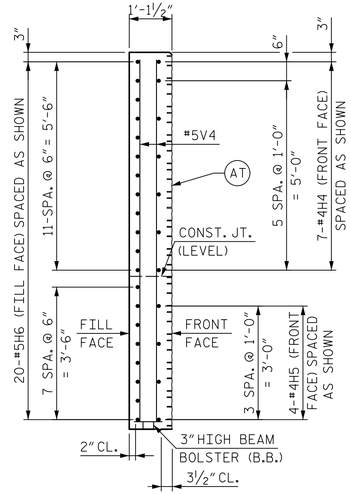
ELEVATION OF WING (W1)
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)



SECTION C-C



ELEVATION OF WING (W2)
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)



SECTION D-D

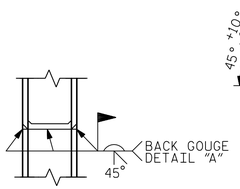
NOTES:

THE TOP SURFACE OF THE END BENT AND WINGS, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼".

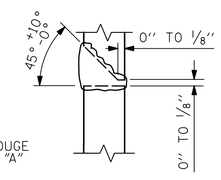
THE END BENT DIAPHRAGM SHALL BE POURED MONOLITHICALLY WITH THE SUPERSTRUCTURE. CONCRETE AND REINFORCING STEEL QUANTITIES ARE INCLUDED IN THE SUPERSTRUCTURE BILL OF MATERIALS. FOR DETAILS, SEE SUPERSTRUCTURE SHEETS.

✱✱ 1" EXP. JT. MAT'L. BETWEEN END BENT DIAPHRAGM AND WING.

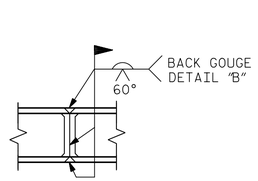
(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT



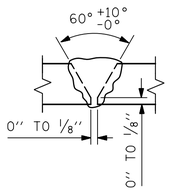
✱ PILE VERTICAL



DETAIL "A"



✱ PILE HORIZONTAL OR VERTICAL



DETAIL "B"

✱ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	C. TOMPKINS	DATE 1/19
CHECKED BY	R. GREENFIELD	DATE 3/19
DESIGN ENGINEER OF RECORD	R. GREENFIELD	DATE 4/19

DWG. NO. 26

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

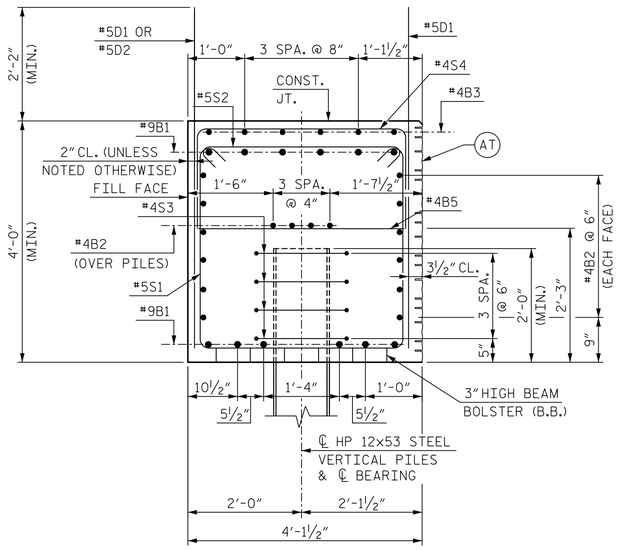
SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

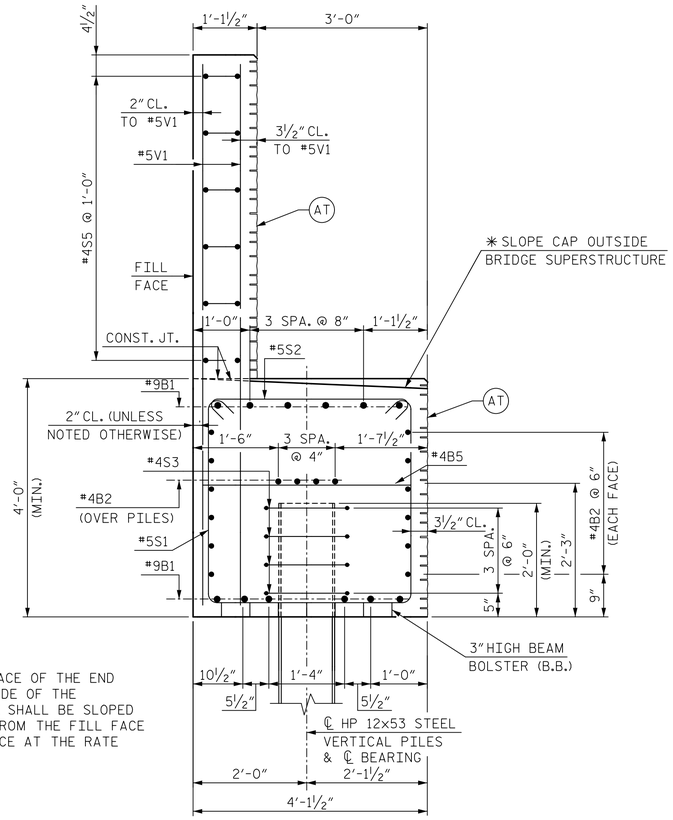
SUBSTRUCTURE

END BENT 2 DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-26
1			3			TOTAL SHEETS
2			4			31



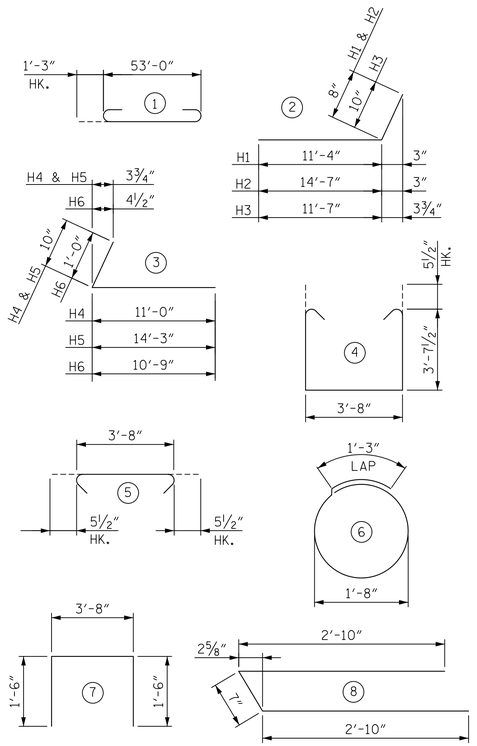
SECTION A-A



✳ THE TOP SURFACE OF THE END BENT CAP OUTSIDE OF THE SUPERSTRUCTURE SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

UNCOATED

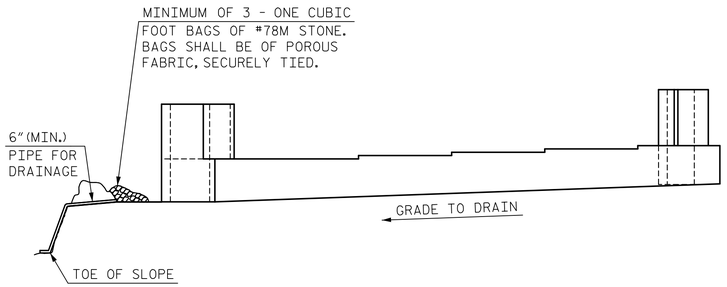
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
B1	12	9	1	55'-6"	2,264
B2	32	4	STR.	27'-9"	593
B3	24	4	STR.	2'-0"	32
B4	6	4	STR.	6'-4"	25
B5	14	4	STR.	3'-8"	34
D1	64	5	STR.	6'-6"	434
D2	15	5	STR.	8'-2"	128
H1	6	4	2	12'-0"	48
H2	5	4	2	15'-3"	51
H3	21	5	2	12'-5"	272
H4	7	4	3	11'-10"	55
H5	4	4	3	15'-1"	40
H6	20	5	3	11'-9"	245
S1	49	5	4	11'-10"	605
S2	49	5	5	4'-7"	234
S3	40	4	6	6'-6"	174
S4	13	4	7	6'-8"	58
S5	12	4	8	6'-3"	50
V1	8	5	STR.	9'-9"	81
V2	22	5	STR.	9'-11"	228
V3	8	5	STR.	9'-5"	79
V4	22	5	STR.	9'-7"	220

QUANTITIES

REINFORCING STEEL	LBS.	5,950
CLASS "A" CONCRETE BREAKDOWN		
POUR 1 - CAP & BOT. OF WINGS	CU. YDS.	38.4
POUR 2 - TOP OF WINGS	CU. YDS.	6.7
TOTAL	CU. YDS.	45.1
PILE DRIVING EQUIPMENT SETUP		
FOR HP 12x53 STEEL PILES	EACH	10
HP 12x53 STEEL PILES	NO.	10
	LIN. FT.	600
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	531

NOTE:

FOR NOTES, SEE SHEET 2 OF 3.

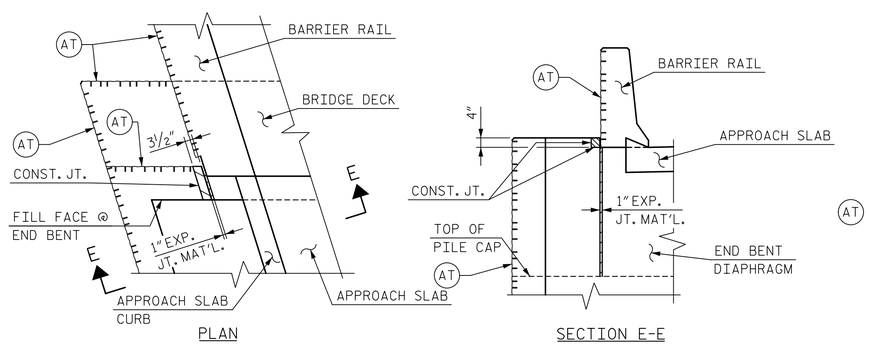


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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 FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT 2



BLOCKOUT IN WINGWALL

(SEE SECTIONS D-D AND E-E ON "TYPICAL SECTION DETAILS" SHEET FOR LIMITS OF ARCHITECTURAL CONCRETE SURFACE TREATMENT ON SIDE OF END BENT DIAPHRAGM)

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

NOTE:
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47118 ENGINEER RICHARD R. GREENFIELD — Richard R. Greenfield — 6/7/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY R. GREENFIELD DATE 3/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 27

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 19+15.21 -Y5-

SHEET 3 OF 3

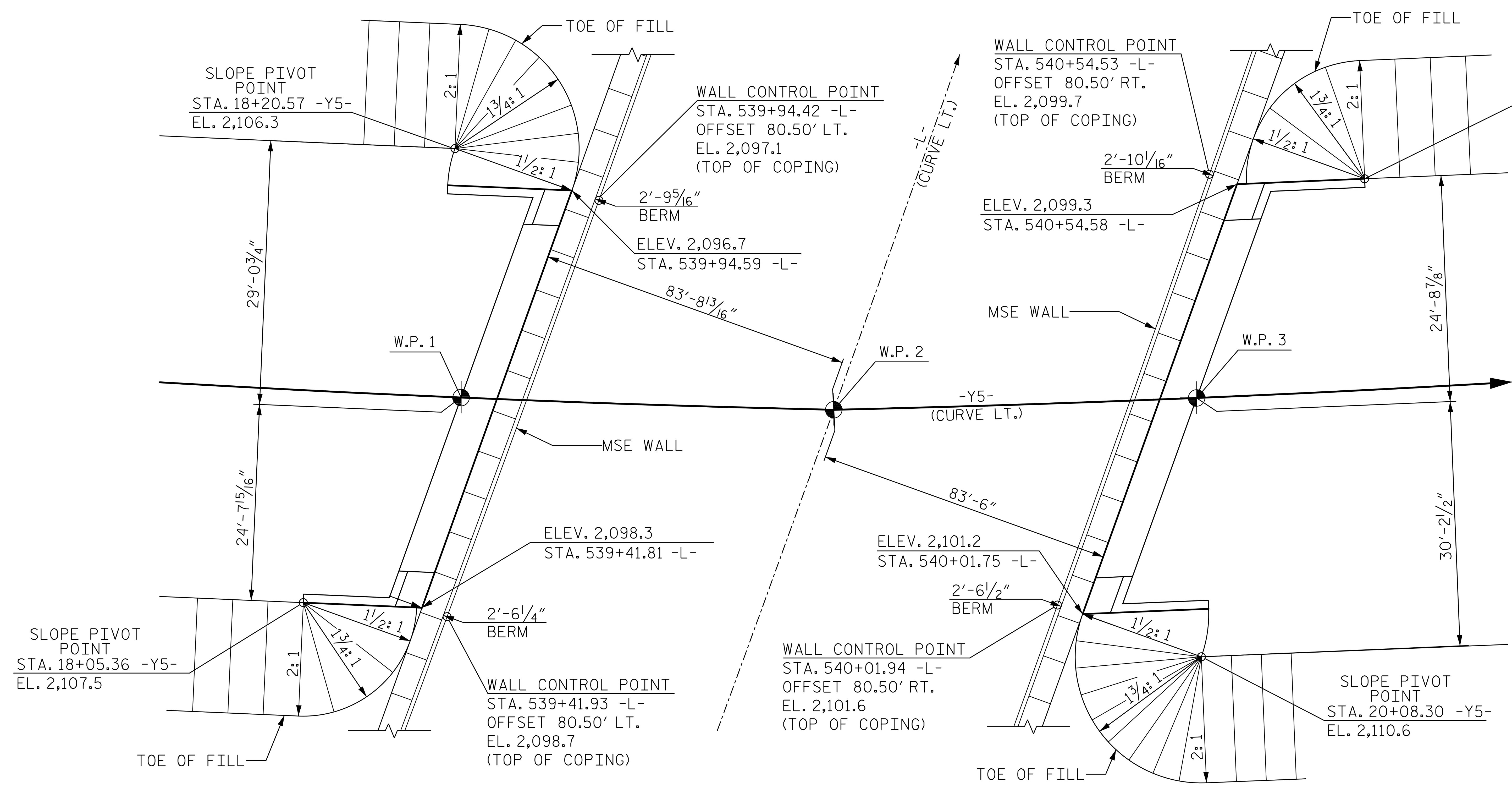
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

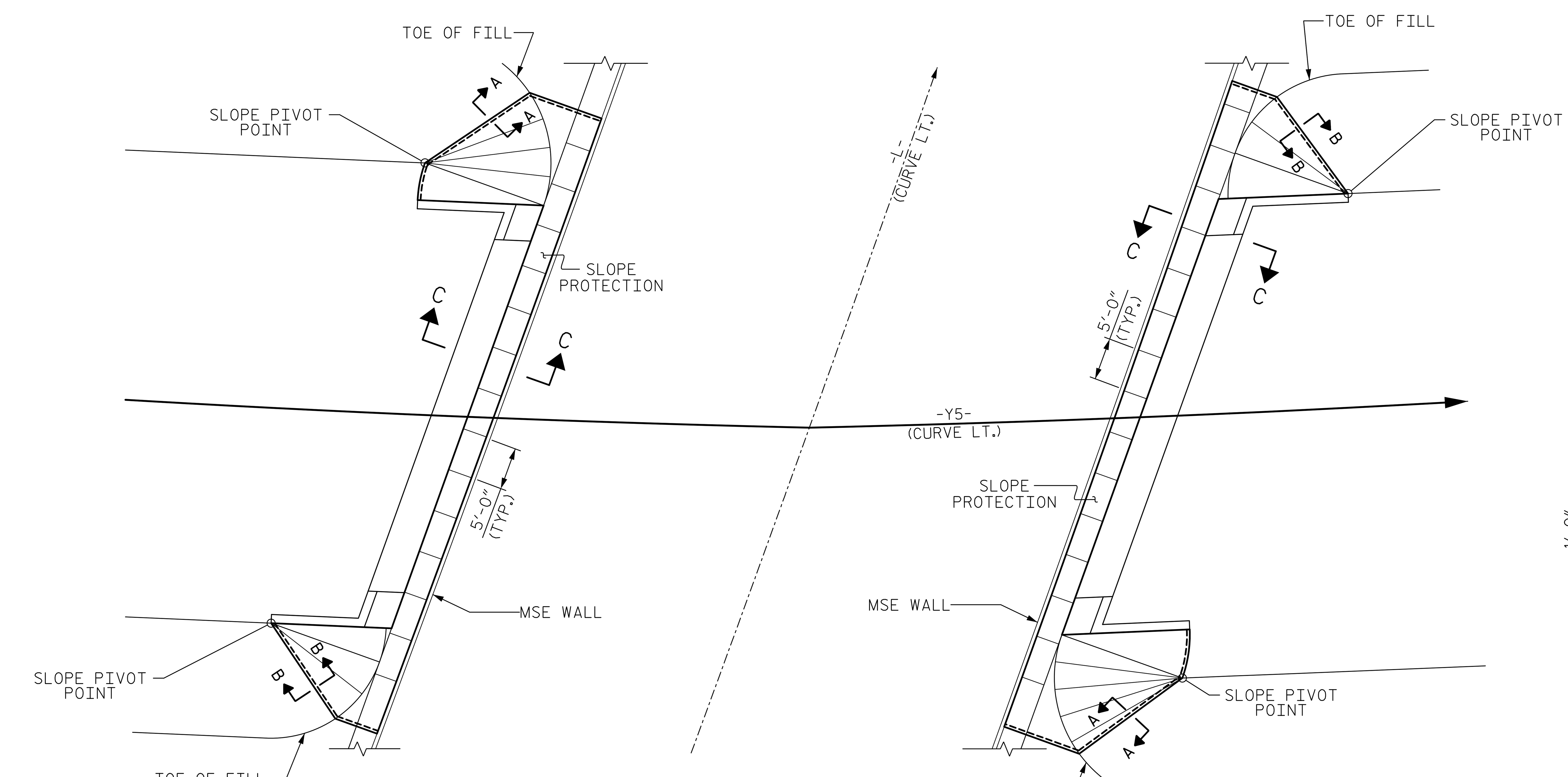
END BENT 2 DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-27
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404_053_I4400BB_SMU_E06_027_44022I.dgn



PLAN - GRADING



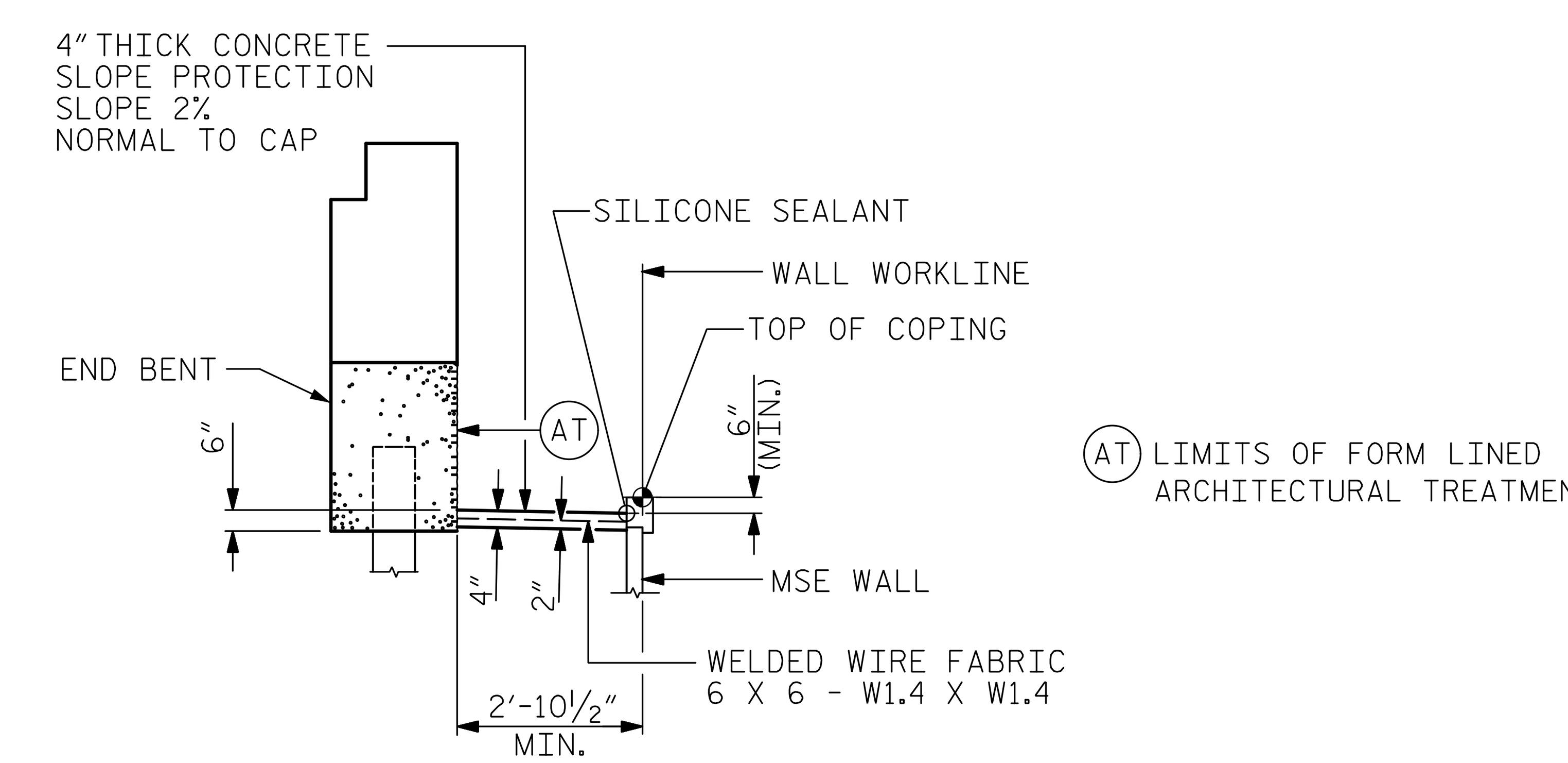
PLAN - CONCRETE PLACEMENT

NOTE:

SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

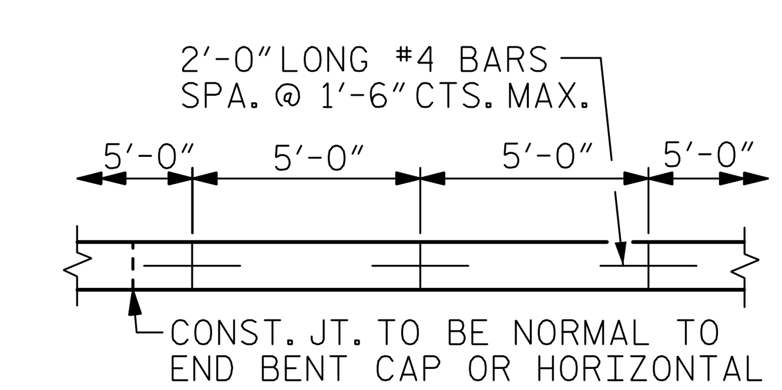
BRIDGE @ POC STA. 19+15.21 -Y5- POC STA. 539+96.72 -L-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	62	180
END BENT 2	69	222

* QUANTITY SHOWN IS BASED ON 5' POURS.



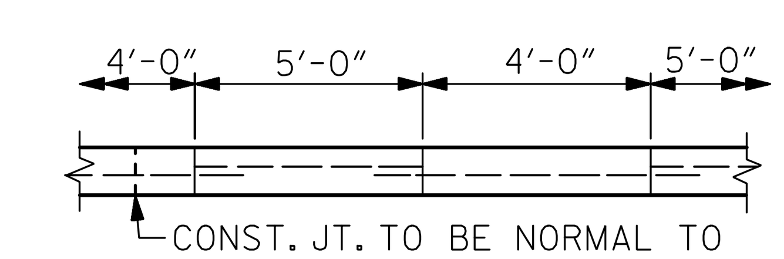
(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

SECTION C-C



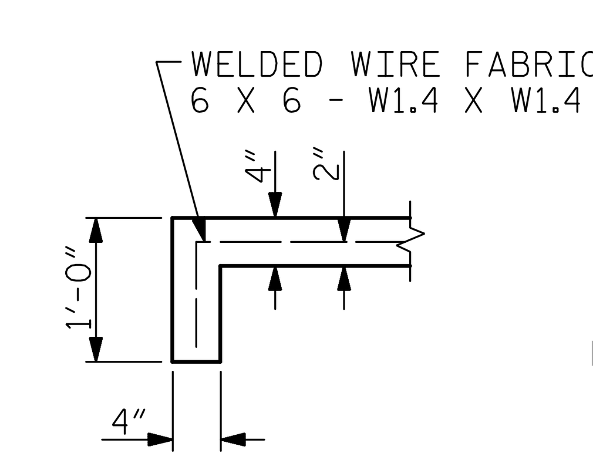
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

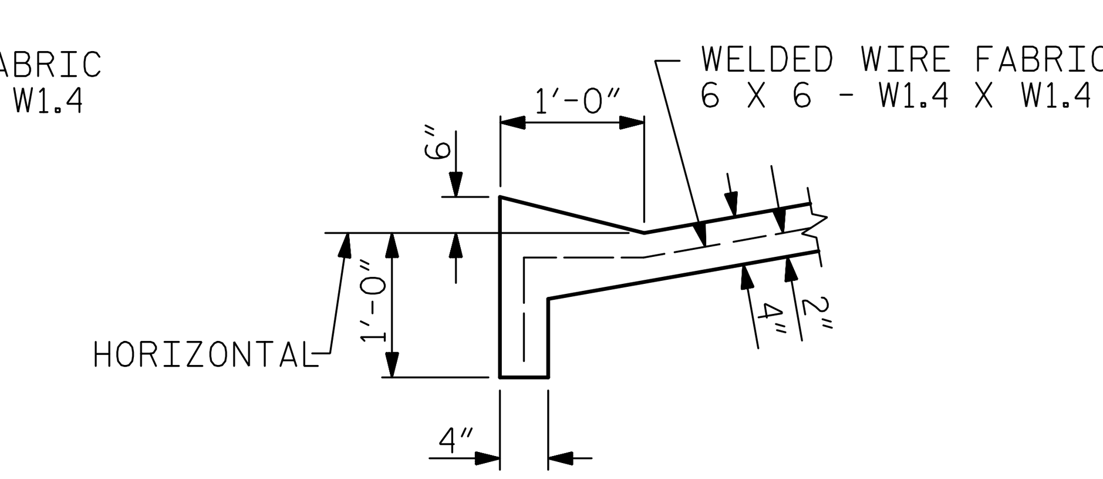


POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



SECTION A-A

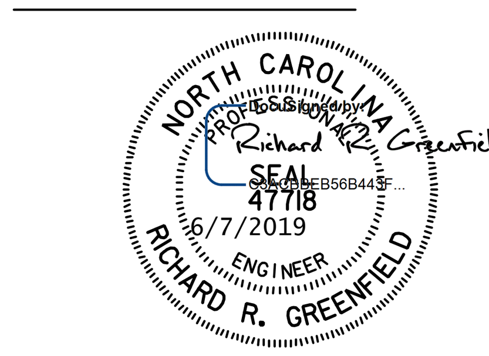


SECTION B-B

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION

HNTB — HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	A. WAGNER	DATE	12/18
CHECKED BY	L. DICKENS	DATE	1/19
DESIGN ENGINEER OF RECORD	R. GREENFIELD	DATE	4/19

DWG. NO. 28

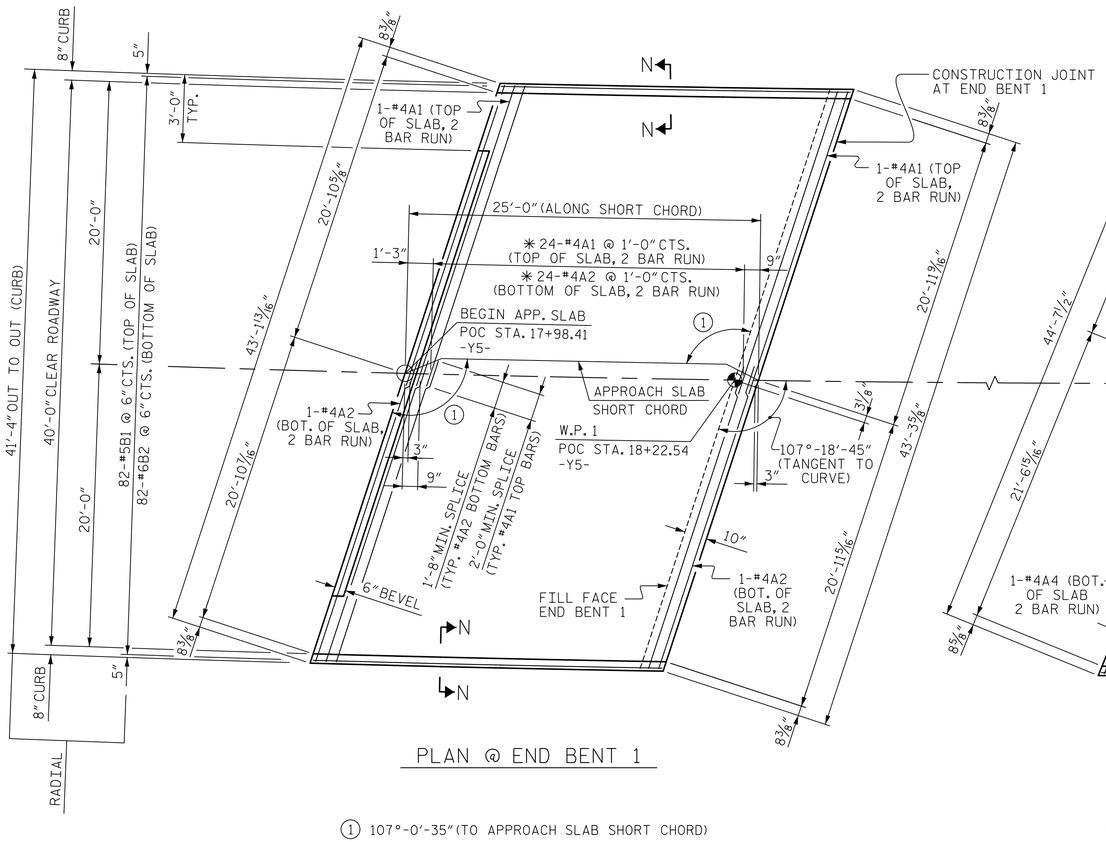
REVISIONS

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

SHEET NO. S4-28

TOTAL SHEETS 31

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



NOTES:

FOR SECTION N-N, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 3.

FOR APPROACH SLAB BILL OF MATERIAL, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 3.

FOR SECTION THROUGH SLAB, SEE "BRIDGE APPROACH SLAB DETILS" SHEET 2 OF 3.

✳ "A" BARS ARE SPACED ALONG APPROACH SLAB SHORT CHORD AND PLACED PARALLEL TO FILL FACE.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL END BENT

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 4/1/2019 RICHARD R. GREENFIELD

Signed by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

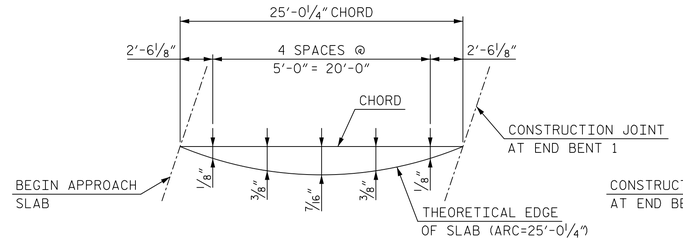
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 11/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

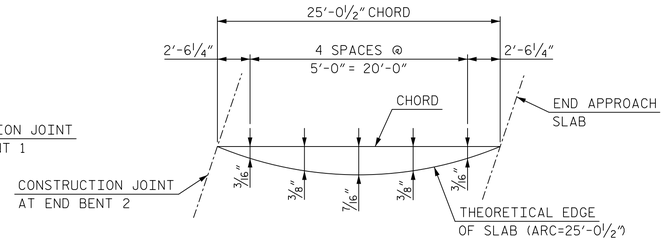
DWG. NO. 29

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-29
1			3			TOTAL SHEETS
2			4			31

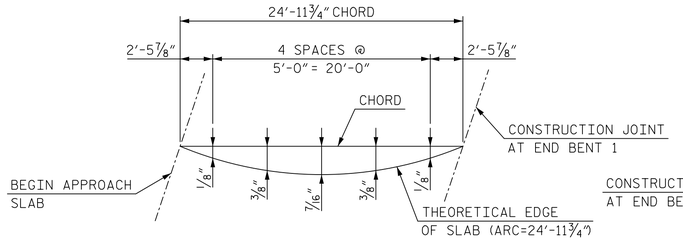
4/1/2019
...\404_057_I4400BB_SMU_ASOI_029_44022it.dgn



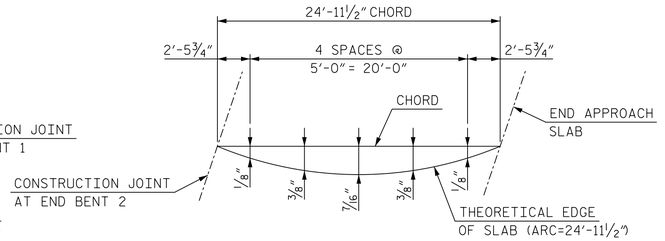
LEFT EDGE OF SLAB
(R = 2,179.333′)



LEFT EDGE OF SLAB
(R = 2,179.333′)



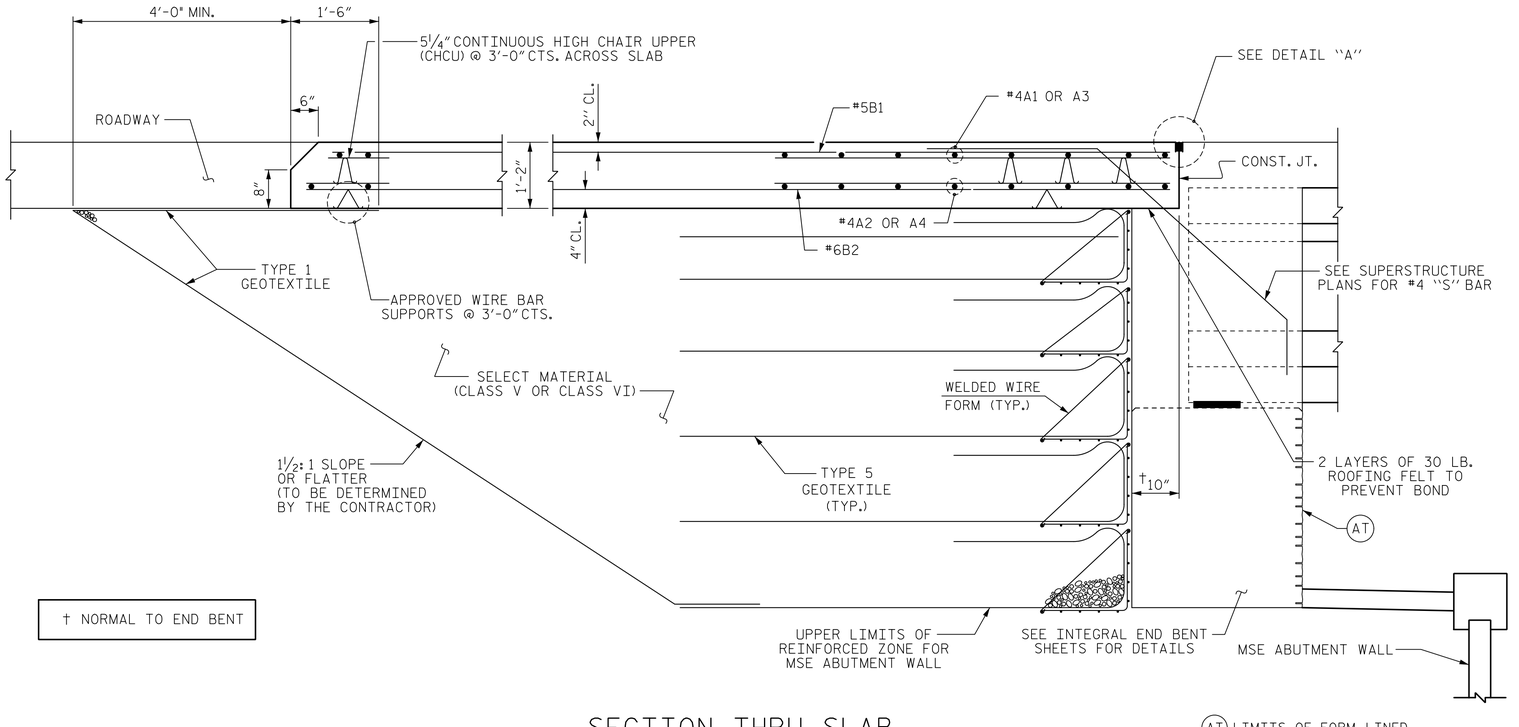
RIGHT EDGE OF SLAB
(R = 2,220.671′)



RIGHT EDGE OF SLAB
(R = 2,220.671′)

CURVE OFFSETS - APPROACH SLAB AT END BENT 1

CURVE OFFSETS - APPROACH SLAB AT END BENT 2



SECTION THRU SLAB

(TYPE A - ALTERNATE APPROACH FILL)

NOTES

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

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE 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.

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.

FOR PLAN VIEW OF APPROACH SLAB AT END BENT 1 AND END BENT 2, SEE SHEET 1 OF 3.

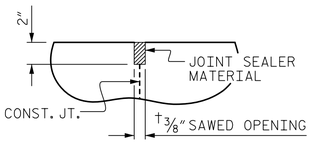
BILL OF MATERIAL

APPROACH SLAB AT END BENT 1

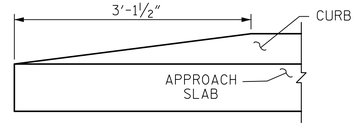
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	52	#4	STR	22′-6″	782
A2	52	#4	STR	22′-5″	779
✳ B1	82	#5	STR	24′-1″	2,060
B2	82	#6	STR	24′-7″	3,028
REINFORCING STEEL				LBS.	3,807
✳ EPOXY COATED REINFORCING STEEL				LBS.	2,842
CLASS AA CONCRETE				C. Y.	44.7

APPROACH SLAB AT END BENT 2

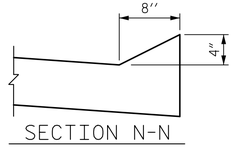
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A3	52	#4	STR	23′-3″	808
A4	52	#4	STR	23′-2″	805
✳ B1	82	#5	STR	24′-1″	2,060
B2	82	#6	STR	24′-7″	3,028
REINFORCING STEEL				LBS.	3,833
✳ EPOXY COATED REINFORCING STEEL				LBS.	2,868
CLASS AA CONCRETE				C. Y.	44.7



DETAIL ″A″



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 10/7/2019 RICHARD R. GREENFIELD

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 19+15.21 -Y5-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

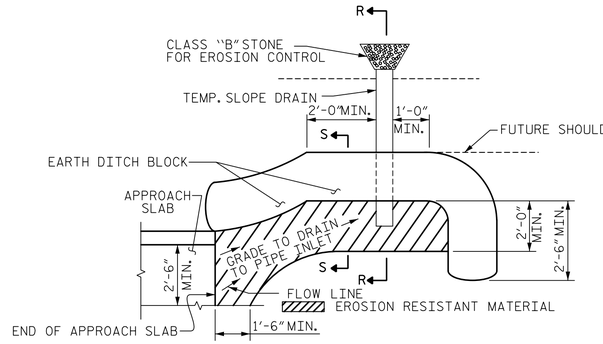
DRAWN BY T. THOMPSON DATE 11/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 30

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

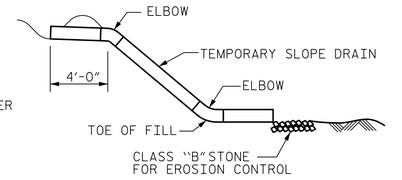
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-30
1			3			TOTAL SHEETS
2			4			31

6/7/2019
...\404_059_I4400BB_SMU_AS02_030_44022d.dgn

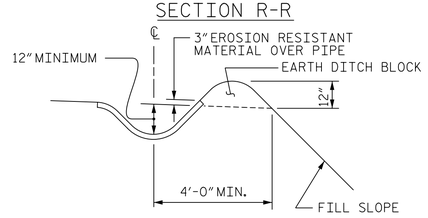


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 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.

PLAN VIEW



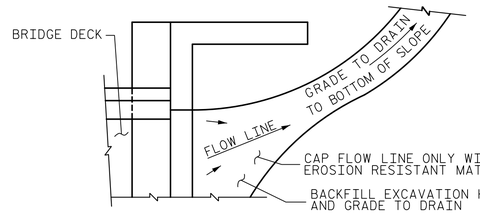
SECTION R-R



SECTION S-S

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.

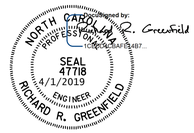
TEMPORARY DRAINAGE DETAIL

PROJECT NO. I-4400BB

HENDERSON **COUNTY**

STATION: POC STA. 19+15.21 -Y5-

SHEET 3 OF 3



Signed by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 11/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 4/19

DWG. NO. 31

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

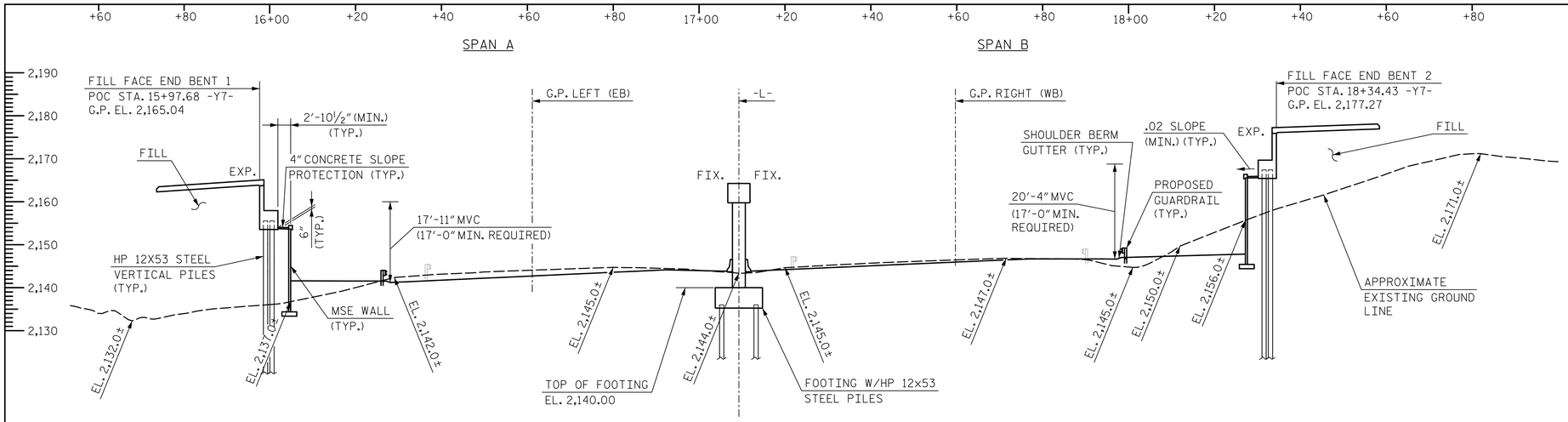
STANDARD

BRIDGE APPROACH SLAB DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S4-31
1			3			TOTAL SHEETS
2			4			31

4/1/2019
...\404.06\I4400BB_SMU_AS03_03L.44022Id.dgn

F.A. PROJECT NO. NHP-0026(015)



END BENT 1 | BENT 1 | END BENT 2

SECTION ALONG -Y7-

(END BENTS AND BENT ON SECTION AT RIGHT ANGLES TO END BENTS AND BENT)

NOTES:

FOR GENERAL NOTES, SEE SHEET 4 OF 4.

MVC = MIN. VERTICAL CLEARANCE
MHC = MIN. HORIZONTAL CLEARANCE

FUTURE MVC OF 17'-8" IS AT POC STA. 16+21.42 -Y7- OFFSET 17.62' RT. = POC STA. 639+65.07 -L- OFFSET 79.00' LT.

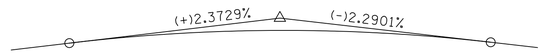
EXISTING PAVEMENT MVC OF 16'-9" IS AT POC STA. 16+52.53 -Y7- OFFSET 18.71' RT. = POC STA. 639+45.84 -L- OFFSET 15.22' LT.

EXISTING PAVEMENT MVC OF 19'-7" IS AT POC STA. 17+56.61 -Y7= OFFSET 18.74' RT. = POC STA. 638+79.21 -L- OFFSET 21.76' RT.

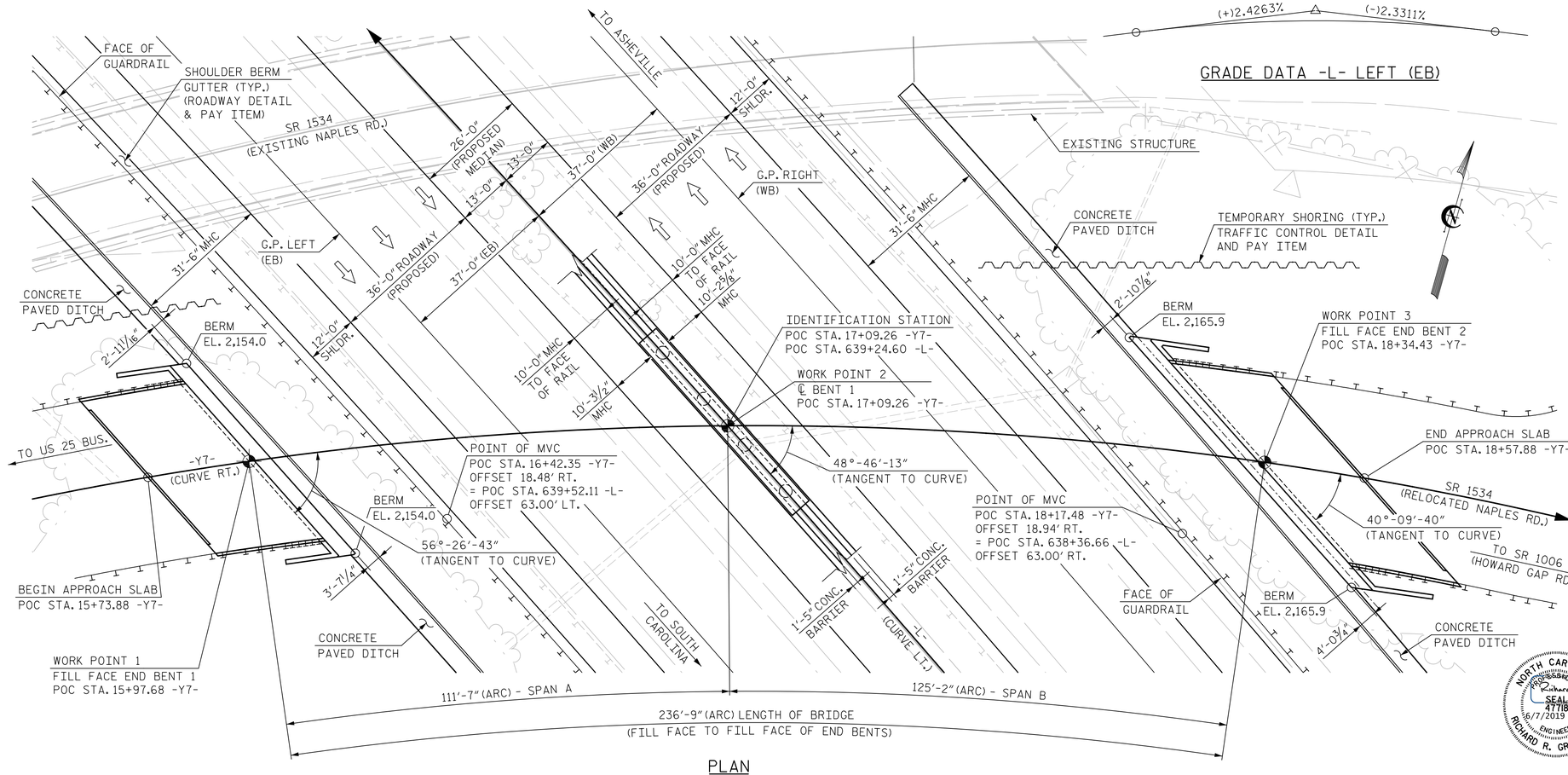
PI STA. = 632+25.00
ELEV = 2,159.75
V.C. = 1,350'

GRADE DATA -L- LEFT (EB)

PI STA. = 632+60.00
ELEV = 2,160.42
V.C. = 1,350'



GRADE DATA -L- RIGHT (WB)

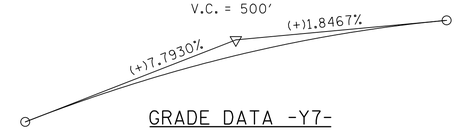


PLAN

PILES NOT SHOWN FOR CLARITY.

END BENTS AND BENT ARE PARALLEL.

PI STA. = 17+45.00
ELEV = 2,177.15
V.C. = 500'



GRADE DATA -Y7-

CURVE DATA -Y7-	
PI STA.	22+74.01
Δ	89°-14'-12" (RT)
D	6°-52'-42"
L	1,297.38'
T	821.98'
R	833.00'
SE	0.060

CURVE DATA -L-	
PI STA.	627+34.48
Δ	43°-49'-19" (LT)
D	1°-00'-09"
L	4,371.82'
T	2,299.10'
R	5,716.00'
SE	0.040

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-
POC STA. 639+24.60 -L-

SHEET 1 OF 4 REPLACES BRIDGE NO. 223

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING BRIDGE ON SR 1534 (NAPLES ROAD) OVER I-26 BETWEEN US 25 BUS. AND SR 1006

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 10/7/2019

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

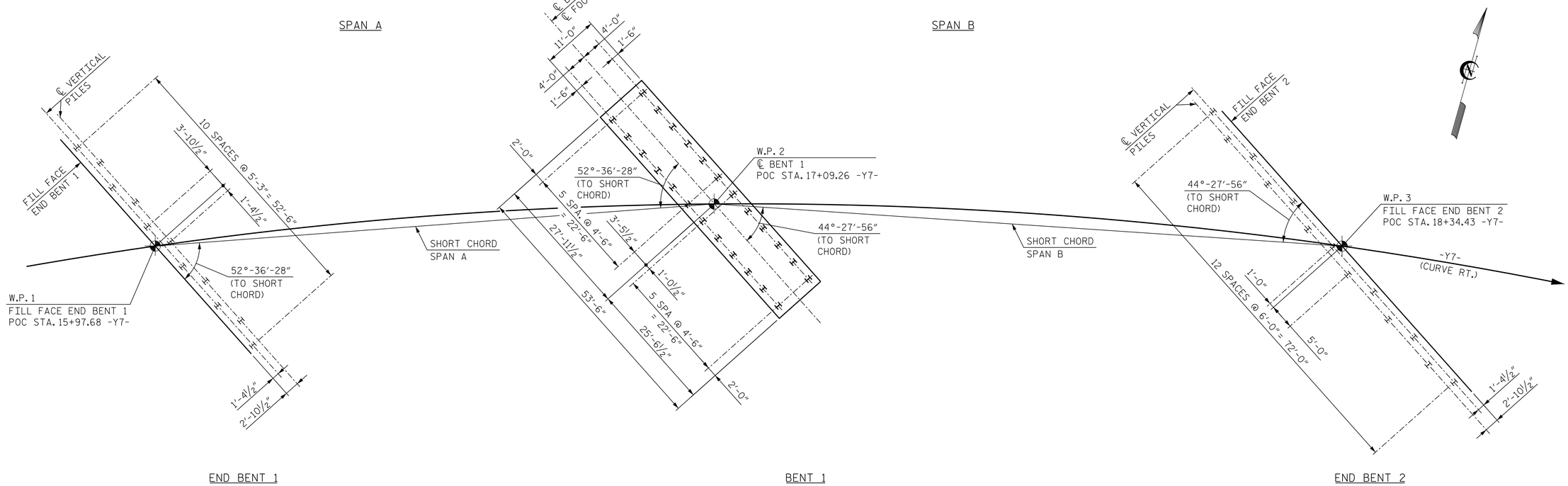
DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY C. SUTARIA DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-1
1			3			TOTAL SHEETS
2			4			36

6/7/2019
...\405_001_I4400BB_SMU_GD01_001_440223.dgn



FOUNDATION LAYOUT

FOUNDATION NOTES:

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.

DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

PILES AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 130 TONS PER PILE.

DRIVE PILES AT BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 217 TONS PER PILE.

PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE.

DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 167 TONS PER PILE.

NOTES:

ALL DIMENSIONS ARE PARALLEL OR NORMAL TO ℄ BENTS AND FILL FACES.

ALL END BENT PILES ARE HP 12x53 STEEL PILES.

ALL BENT PILES ARE HP 12X53 STEEL PILES.

FOR FOUNDATION ELEVATIONS AND DETAILS, SEE BENT AND END BENT DETAILS.

ALL PILE DIMENSIONS ARE TO ℄ OF PILES.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 4

Signed by: Richard R. Greenfield

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 5/20/2019 ENGINEER RICHARD R. GREENFIELD

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 2/19
CHECKED BY A. WAGNER DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 2

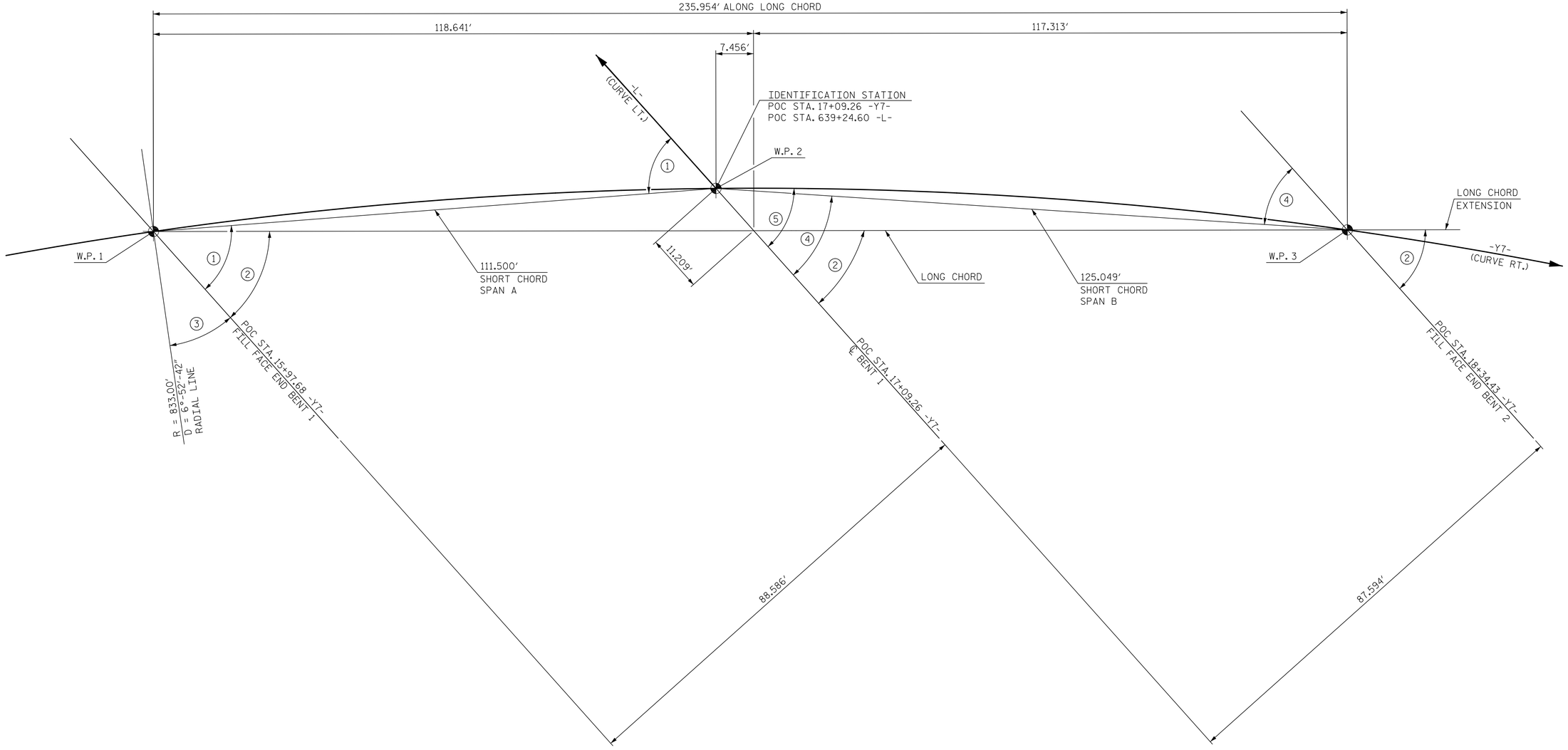
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-2
1			3			TOTAL SHEETS
2			4			36

5/17/2019
...\1405_003_I4400BB_SMU_GD02_002_440223.dgn



① 52°-36'-28"(TO SHORT CHORD)
② 48°-18'-11"(TO LONG CHORD)
③ 33°-33'-17"
④ 44°-27'-56"(TO SHORT CHORD)
⑤ 48°-46'-13"(TANGENT TO CURVE)

LONG CHORD LAYOUT

NOTE: ALL BENTS ARE PARALLEL

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 17+09.26 -Y7-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LONG CHORD LAYOUT

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 5/20/2019 ENGINEER RICHARD R. GREENFIELD
Digitally signed by: R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

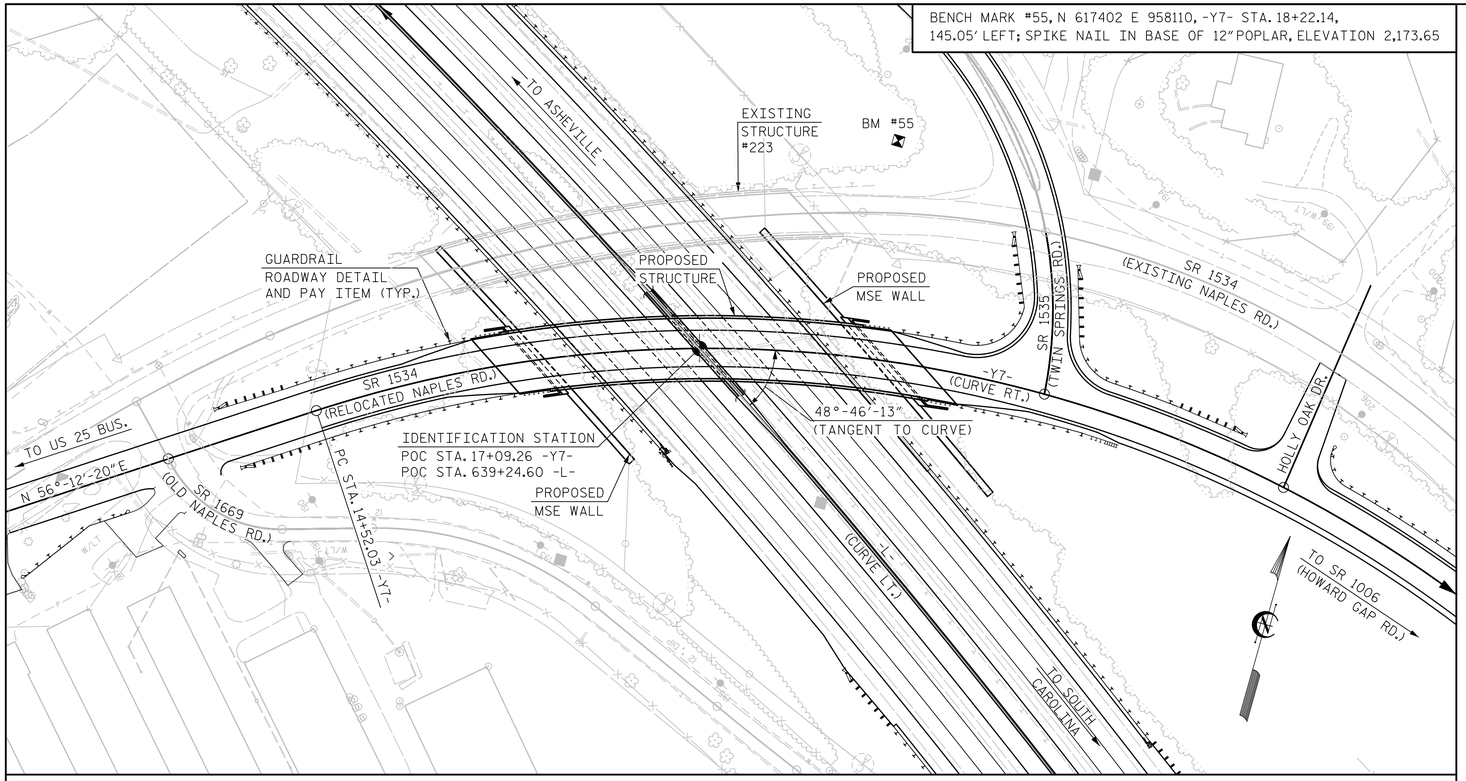
HNTB
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 3

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-3
1			3			TOTAL SHEETS
2			4			36

5/17/2019
...\405_005_I4400BB_SMU_GD03_003_440223.dgn



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC 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.

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 SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

THE ELEVATIONS AND CLEARANCES SHOWN ON THE PLANS AT THE POINTS OF MINIMUM VERTICAL CLEARANCE ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE ELEVATIONS ON THE EXISTING PAVEMENT AND CHECK THE CLEARANCE. REPORT ANY VARIATIONS TO THE ENGINEER. ANY PLAN REVISIONS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM VERTICAL CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.

FOR MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE, SEE SPECIAL PROVISIONS.

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

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 BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 17+09.26 -Y7-".

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.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

AFTER SERVING AS A TEMPORARY STRUCTURE, THE EXISTING STRUCTURE CONSISTING OF 4 SPANS AT 44'-8", 69'-1", 68'-8" AND 65'-11" WITH REINFORCED CONCRETE DECK; ON 4 LINES OF 36" STEEL I-BEAMS WITH A CLEAR ROADWAY WIDTH OF 28'-0"; ON REINFORCED CONCRETE END BENTS WITH PILE FOOTINGS AND REINFORCED CONCRETE POST AND BEAM BENTS WITH PILE AND SPREAD FOOTINGS, LOCATED ADJACENT TO THE PROPOSED STRUCTURE SITE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF 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.

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 TRANSPORATION 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.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

FOR ARCHITECTURAL CONCRETE SURFACE TREATMENT, SEE SPECIAL PROVISIONS.

FOR APPLICATION OF BRIDGE COATING SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE AT STATION 17+09.26 -Y7-	ASBESTOS ASSESSMENT	FOUNDATION EXCAVATION FOR BENT 1, AT STATION 17+09.26 -Y7-	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS, STATION 17+09.26 -Y7-	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL
	LUMP SUM	LUMP SUM	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.
SUPERSTRUCTURE	———	———	———	10,116	11,355	———	LUMP SUM	———	———
END BENT 1	———	———	———	———	———	64.4	———	9,110	———
BENT 1	———	———	LUMP SUM	———	———	175.1	———	18,548	1,808
END BENT 2	———	———	———	———	———	83.9	———	11,528	———
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	10,116	11,355	323.4	LUMP SUM	39,186	1,808

TOTAL BILL OF MATERIAL

	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	HP 12x53 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	FOAM JOINT SEALS	ARCHITECTURAL CONCRETE SURFACE TREATMENT	APPLICATION OF BRIDGE COATING
	NO.	L.F.	EACH	NO.	L.F.	L.F.	SQ. YD.	LUMP SUM	LUMP SUM	SQ. FT.	LUMP SUM
SUPERSTRUCTURE	10	1,145.77	———	—	———	468.20	———	LUMP SUM	LUMP SUM	2,060	LUMP SUM
END BENT 1	—	———	11	11	650	———	86	———	———	537	———
BENT 1	—	———	24	24	600	———	———	———	———	562	LUMP SUM
END BENT 2	—	———	13	13	520	———	126	———	———	677	———
TOTAL	10	1,145.77	48	48	1,770	468.20	212	LUMP SUM	LUMP SUM	3,836	LUMP SUM

SAMPLE BAR REPLACEMENT	
SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE:

SAMPLE BAR REPLACEMENT LENGTHS BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND fy = 60ksi. BAR LENGTHS IN THIS TABLE ARE A GUIDE. THE ENGINEER SHALL APPROVE FINAL LENGTHS BASED ON THE TYPE AND LOCATION OF SAMPLE BAR.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 47718 ENGINEER RICHARD R. GREENFIELD

Docusigned by: Richard R. Greenfield 8/14/2019

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH AND TOTAL BILL OF MATERIAL

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 2/19
CHECKED BY R. GREENFIELD DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 4

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-4
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

8/14/2019
...\405_007_I4400BB_SMU_GD04_004_440223.dgn

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	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)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	⟨1⟩	1.03	--	1.75	0.87	1.26	B	EL	58.4	1.07	1.03	B	EL	81.9	0.80	0.87	1.08	B	EL	58.4	
		HL-93 (OPERATING)	N/A	--	1.51	--	1.35	0.87	1.63	B	EL	58.4	1.10	1.51	B	I	96.8	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.58	56.9	1.75	0.87	1.84	B	EL	58.4	1.10	1.70	B	I	96.8	0.80	0.87	1.58	B	EL	58.4	
		HS-20 (OPERATING)	36.000	--	2.25	81.0	1.35	0.87	2.39	B	EL	58.4	1.10	2.25	B	I	96.8	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	--	3.85	52.0	1.40	0.87	5.61	B	EL	58.4	1.10	5.68	B	I	96.8	0.80	0.87	3.85	B	EL	58.4	
		SNGARBS2	20.000	--	2.75	55.0	1.40	0.87	4.00	B	EL	58.4	1.10	3.93	B	I	96.8	0.80	0.87	2.75	B	EL	58.4	
		SNAGRIS2	22.000	--	2.55	56.1	1.40	0.87	3.71	B	EL	58.4	1.10	3.62	B	I	96.8	0.80	0.87	2.55	B	EL	58.4	
		SNCOTTS3	27.250	--	1.91	52.0	1.40	0.87	2.78	B	EL	58.4	1.10	2.67	B	I	96.8	0.80	0.87	1.91	B	EL	58.4	
		SNAGGRS4	34.925	--	1.55	54.1	1.40	0.87	2.26	B	EL	58.4	1.10	2.04	B	I	96.8	0.80	0.87	1.55	B	EL	58.4	
		SNS5A	35.550	--	1.52	54.0	1.40	0.87	2.21	B	EL	58.4	1.10	2.03	B	I	96.8	0.80	0.87	1.52	B	EL	58.4	
		SNS6A	39.950	--	1.37	54.7	1.40	0.87	2.00	B	EL	58.4	1.10	1.84	B	I	96.8	0.80	0.87	1.37	B	EL	58.4	
		SNS7B	42.000	--	1.31	55.0	1.40	0.87	1.90	B	EL	58.4	1.10	1.78	B	I	96.8	0.80	0.87	1.31	B	EL	58.4	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	--	1.67	55.1	1.40	0.87	2.43	B	EL	58.4	1.10	2.20	B	I	96.8	0.80	0.87	1.67	B	EL	58.4	
		TNT4A	33.075	--	1.67	55.2	1.40	0.87	2.44	B	EL	58.4	1.10	2.14	B	I	96.8	0.80	0.87	1.67	B	EL	58.4	
		TNT6A	41.600	--	1.35	56.2	1.40	0.87	1.97	B	EL	58.4	1.10	1.85	B	I	96.8	0.80	0.87	1.35	B	EL	58.4	
		TNT7A	42.000	--	1.35	56.7	1.40	0.87	1.96	B	EL	58.4	1.10	1.80	B	I	96.8	0.80	0.87	1.35	B	EL	58.4	
		TNT7B	42.000	--	1.37	57.5	1.40	0.87	2.00	B	EL	58.4	1.10	1.72	B	I	96.8	0.80	0.87	1.37	B	EL	58.4	
		TNAGRIT4	43.000	--	1.32	56.8	1.40	0.87	1.93	B	EL	58.4	1.10	1.66	B	I	96.8	0.80	0.87	1.32	B	EL	58.4	
		TNAGT5A	45.000	⟨3⟩	1.25	56.3	1.40	0.87	1.83	B	EL	58.4	1.10	1.62	B	I	96.8	0.80	0.87	1.25	B	EL	58.4	
		TNAGT5B	45.000	⟨3⟩	1.25	56.3	1.40	0.87	1.81	B	EL	58.4	1.10	1.68	B	I	96.8	0.80	0.87	1.25	B	EL	58.4	

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.

COMMENTS:

1.
2.
3.
4.

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

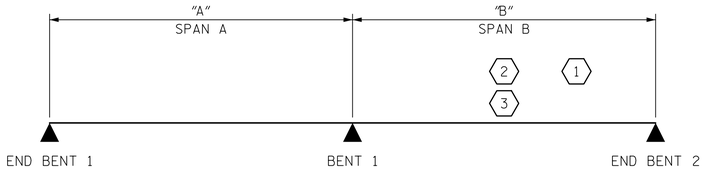
⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



	"A"	"B"
GIRDER 1	105'-3 1/16"	116'-9 15/16"
GIRDER 2	105'-10 9/16"	118'-0 9/16"
GIRDER 3	106'-6 7/16"	119'-4 3/16"
GIRDER 4	107'-2 3/4"	120'-8 7/8"
GIRDER 5	107'-11 1/2"	122'-2 3/4"

LRFR SUMMARY

NOTE: SPAN LENGTHS PROVIDED ARE (HORIZONTAL) BEARING TO BEARING LENGTHS

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 5/20/2019 RICHARD R. GREENFIELD

Digitally signed by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

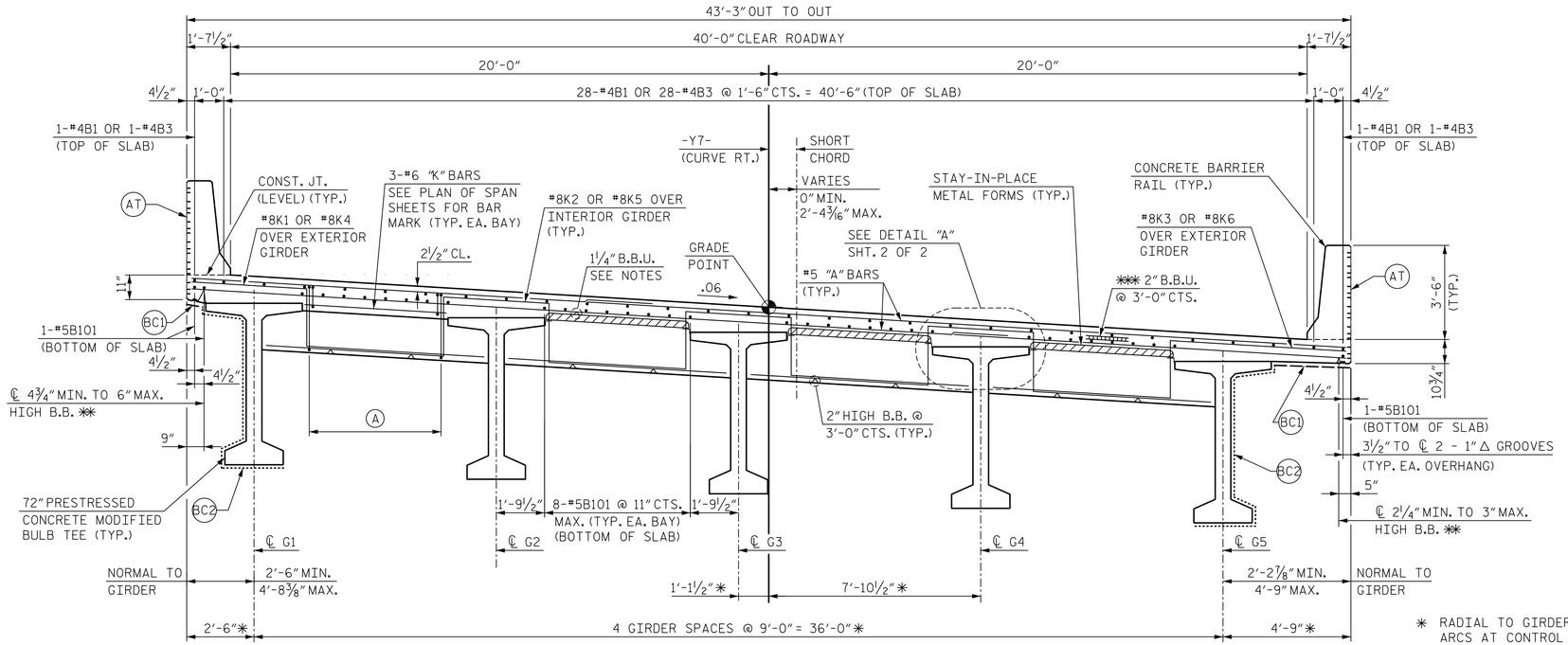
GENERAL DRAWING

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-5
1			3			TOTAL SHEETS
2			4			36

5/17/2019
...\405_009_I4400BB_SMU_0005_005_440223.dgn

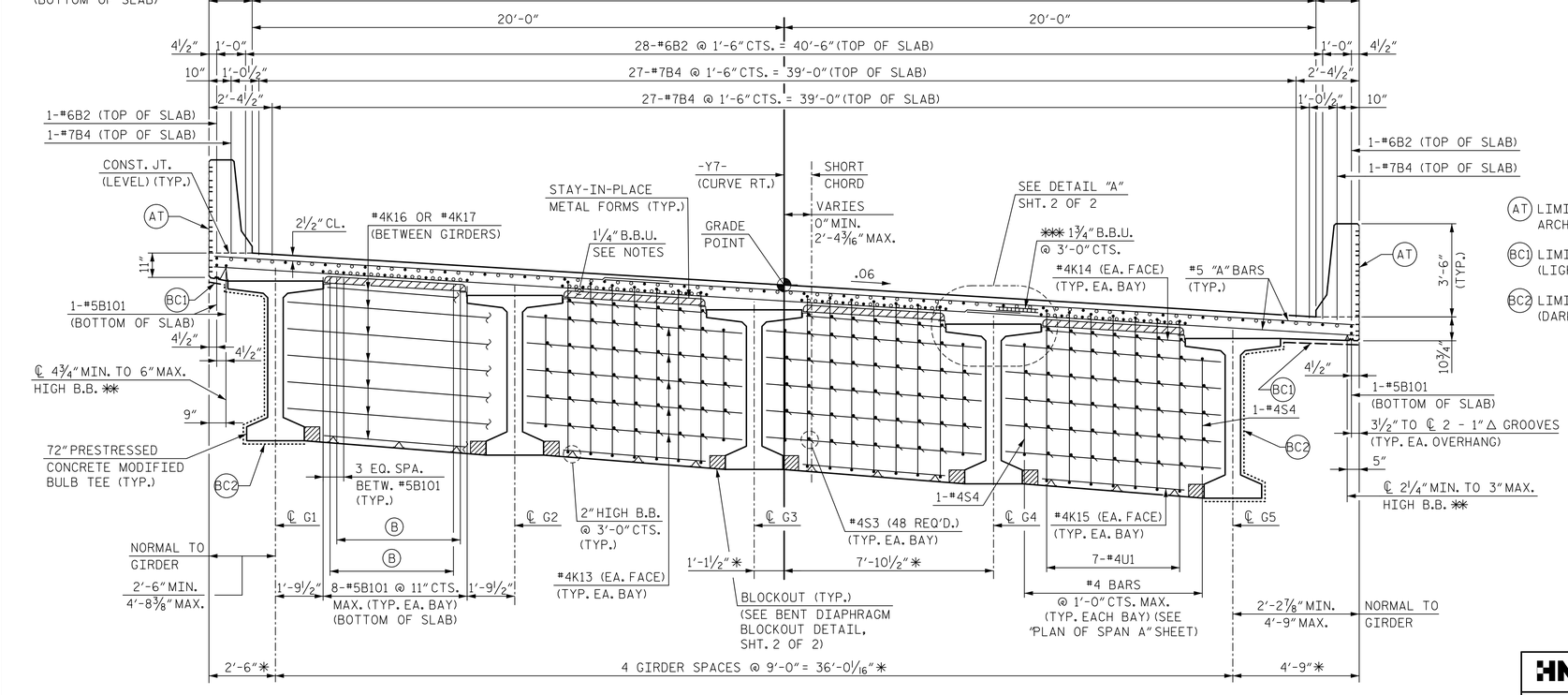


Ⓐ #5S1 & #4S2 OR #4S5 @ 1'-0" CTS. MAX. (TYP. EACH BAY) (SEE PLAN OF SPANS FOR QTY.)

PART SECTION AT END OF SLAB

PART SECTION AT END DIAPHRAGM

TYPICAL SECTION AT END BENT



TYPICAL SECTION AT CONTINUOUS BENT DIAPHRAGM

✱ RADIAL TO GIRDER CONCENTRIC ARCS AT CONTROL LINES

NOTE: GIRDER CENTERLINE LAYOUT WAS ESTABLISHED BY CHORDS THROUGH INTERSECTIONS OF CONCENTRIC ARCS OFFSET FROM -Y7- AND BENT CONTROL LINES/FILL FACE OF END BENTS.

NOTES:

ALL HORIZONTAL DIMENSIONS SHOWN NORMAL (RADIAL) TO -Y7- UNLESS NOTED OTHERWISE.

PROVIDE 1¼" 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 (CHCM) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2½" 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 IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

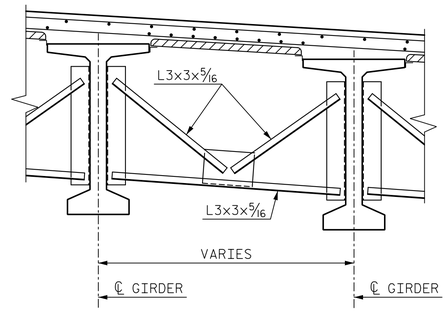
BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

NO CHAMFER IS REQUIRED ON CORNERS OF GIRDER BUILDUPS.

#5 "G" BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.

✱✱ THE HEIGHT OF THE BEAM BOLSTER VARIES ALONG THE LENGTH OF THE SPAN DUE TO CAMBER AND THE VARYING HEIGHT REQUIRED FOR THE BUILDUP. THE CONTRACTOR SHALL HAVE SUFFICIENT SIZES TO PROPERLY SUPPORT THE REINFORCING STEEL.

✱✱✱ TO MAINTAIN PROPER LOCATION OF "A" BARS IN TOP OF SLAB, B.B.U. DEPTH MUST VARY IN UNIT AS THE MAXIMUM SIZE OF THE "B" BARS IN THE TOP OF SLAB VARIES. A 2" B.B.U. SHALL BE USED WHERE ONLY #4 "B" BARS ARE PRESENT. WHERE #6 OR #7 "B" BARS ARE PRESENT, A 1¾" B.B.U. SHALL BE USED.



PART SECTION AT INTERMEDIATE DIAPHRAGM
(FOR DETAILS OF DIAPHRAGM, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS")

Ⓐ LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

Ⓑ1 LIMITS OF BRIDGE COATING (LIGHT GRAY)

Ⓑ2 LIMITS OF BRIDGE COATING (DARK GRAY)

"B" BAR KEY

- CONTINUOUS BAR RUN SEE PLAN OF SPAN SHEETS.
- ○ NON-CONTINUOUS BAR RUN FOR NEGATIVE MOMENT REGIONS, SEE PLAN OF SPAN SHEETS.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTIONS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 ENGINEER RICHARD R. GREENFIELD
Richard R. Greenfield
6/7/2019

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

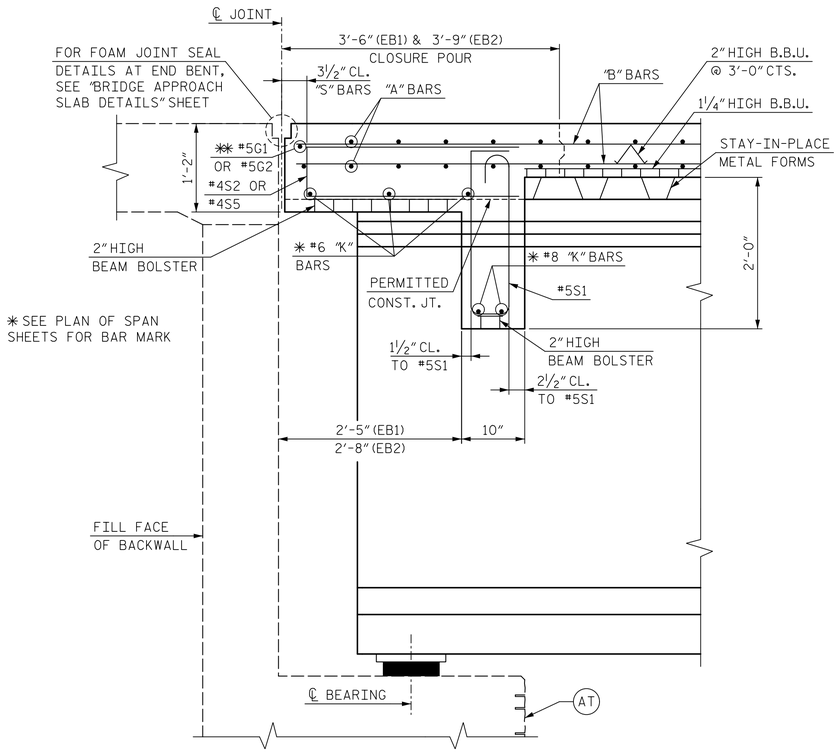
DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 6

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-6
1			3			TOTAL SHEETS
2			4			36

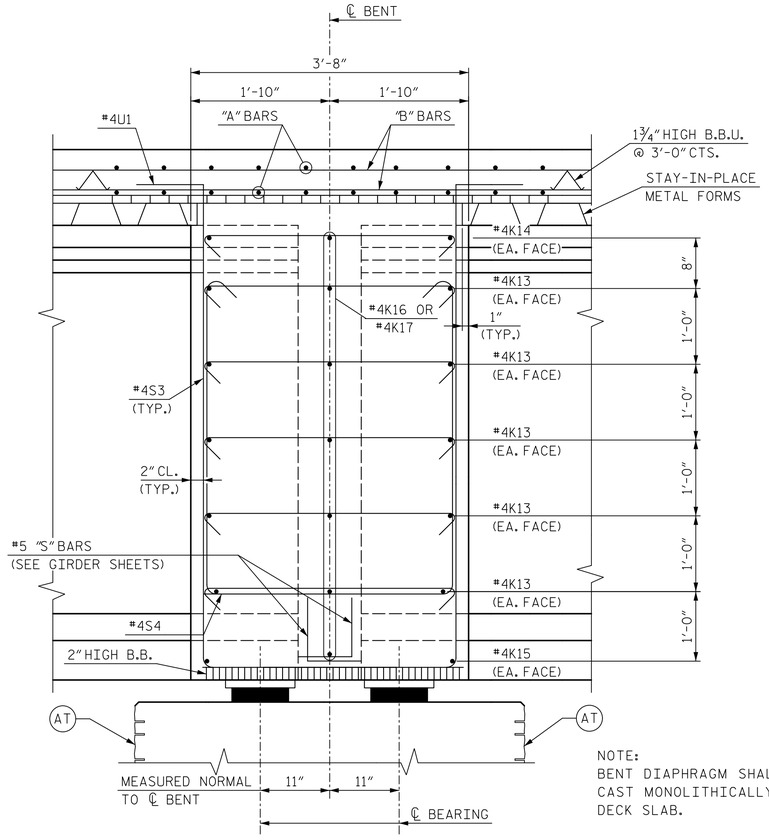
6/7/2019
405_DII_I4400BB_SMU_TS01_006_440223.dgn



SECTION A-A

SECTION NORMAL THRU END BENT 1 DIAPHRAGM, END BENT 2 SIMILAR

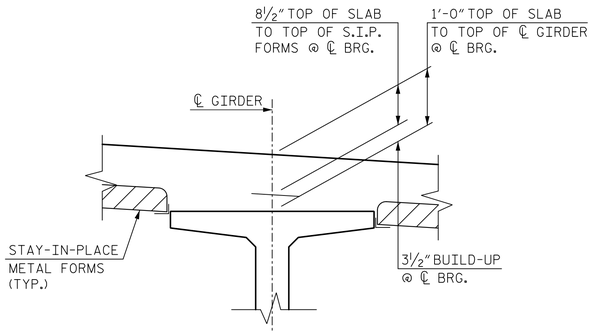
✳✳ #5 "G" BAR MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR REINFORCING STEEL AND STIRRUPS.



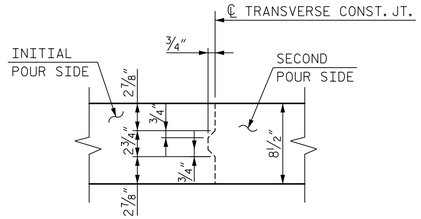
NOTE:
BENT DIAPHRAGM SHALL BE CAST MONOLITHICALLY WITH DECK SLAB.

SECTION B-B

SECTION NORMAL THRU BENT 1 DIAPHRAGM



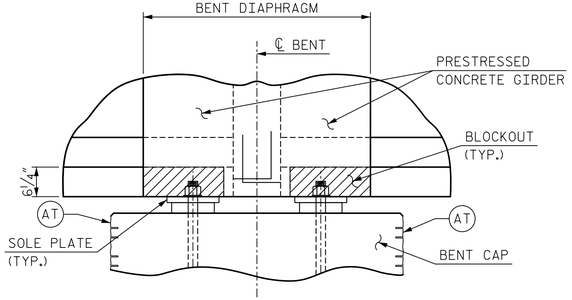
DETAIL "A"



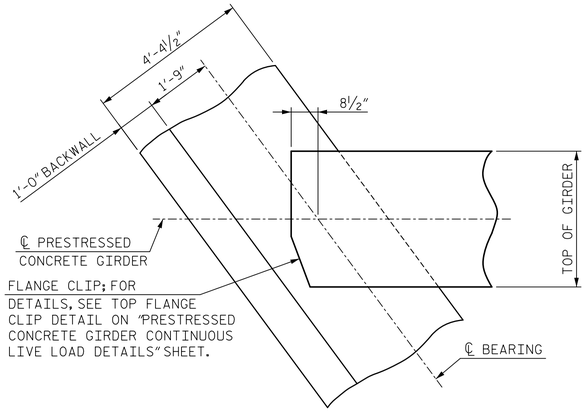
TRANSVERSE CONSTRUCTION JOINT DETAIL

REINFORCING STEEL IN SLAB NOT SHOWN.
REINFORCING STEEL SHALL BE CONTINUOUS THROUGH JOINT.

Ⓐ LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

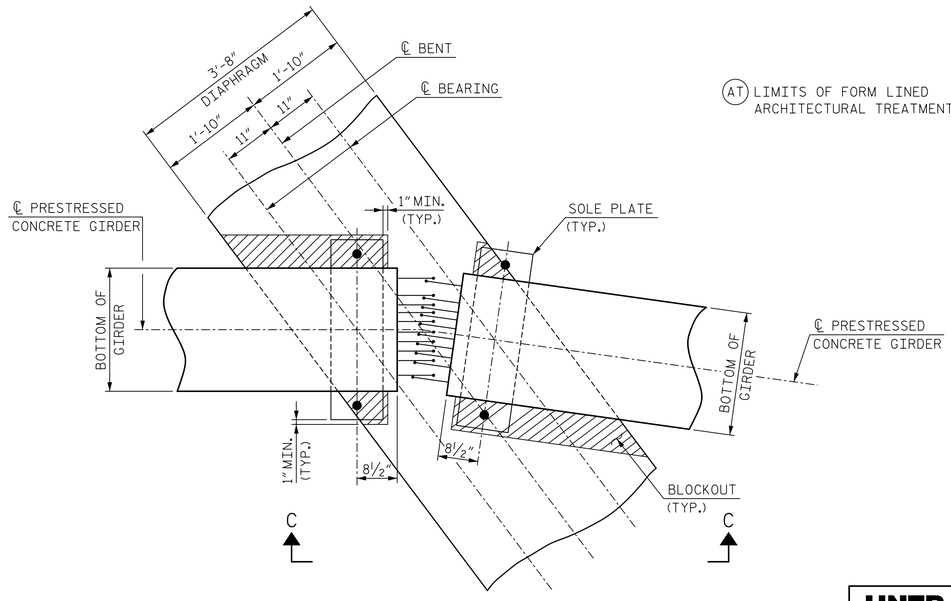


SECTION C-C



PLAN OF GIRDER AT END BENT 1

(END BENT 2 SIMILAR)



BENT DIAPHRAGM BLOCKOUT DETAIL

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PROJECT NO. I-4400BB
HENDERSON **COUNTY**
STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 2

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 ENGINEER RICHARD R. GREENFIELD
Richard R. Greenfield
6/7/2019

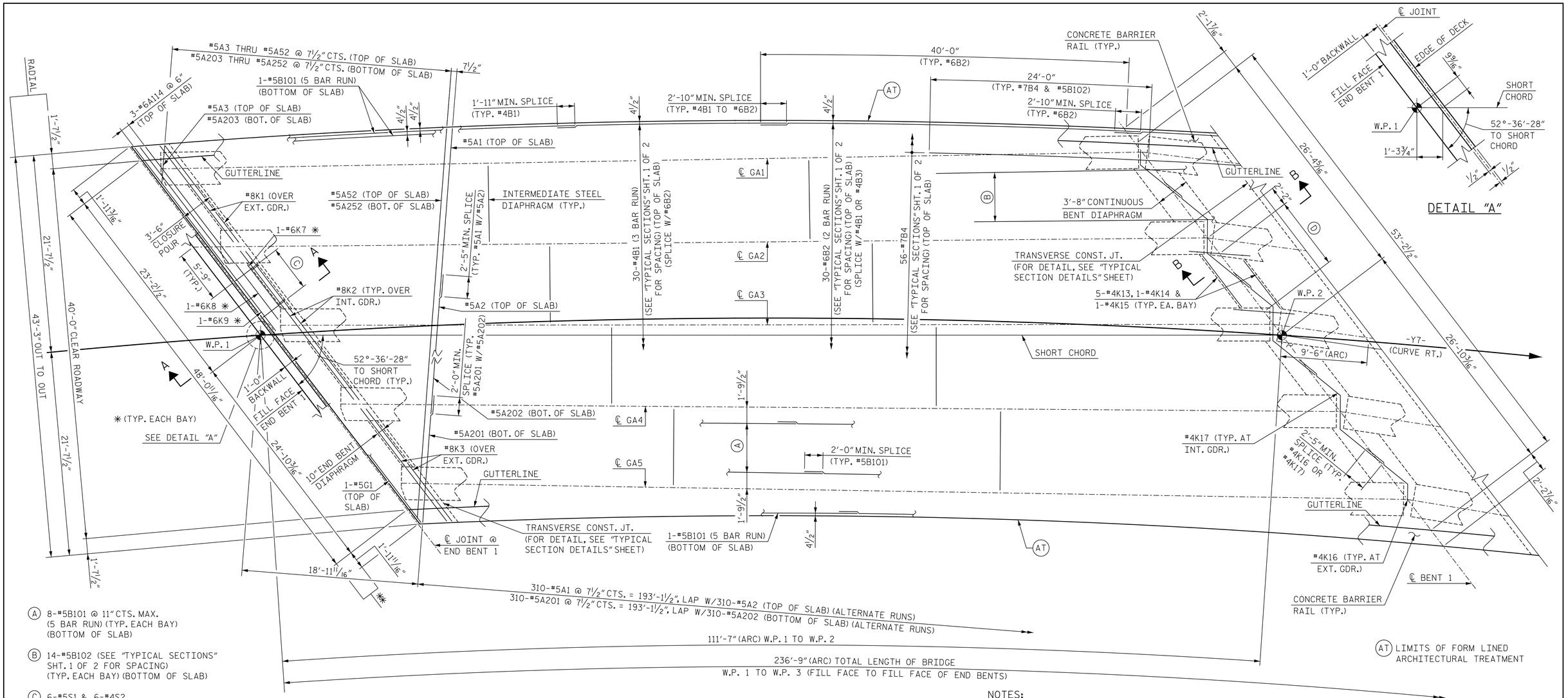
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 7

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-7
1			3			TOTAL SHEETS
2			4			36

6/7/2019
...\405_013_I4400BB_SMU_TS02_007_440223.dgn



(A) 8-#5B101 @ 11" CTS. MAX. (5 BAR RUN) (TYP. EACH BAY) (BOTTOM OF SLAB)

(B) 14-#5B102 (SEE "TYPICAL SECTIONS" SHT. 1 OF 2 FOR SPACING) (TYP. EACH BAY) (BOTTOM OF SLAB)

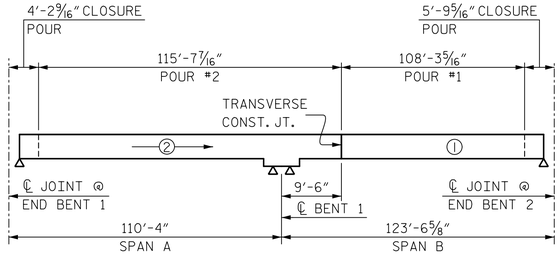
(C) 6-#5S1 & 6-#4S2 @ 1'-0" CTS. = 5'-0" (TYP. EACH BAY)

(D) 8 SPACES @ 1'-0" = 8'-0" 7-#4U1, 2-#4S4 & 48-#4S3 (TYP. EACH BAY)

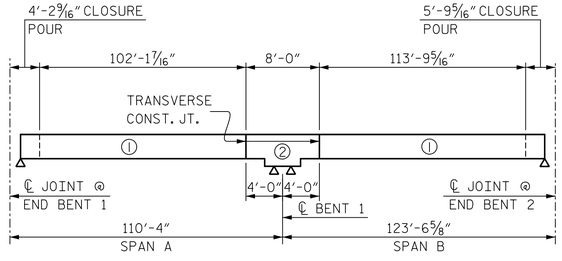
✳✳ MEASURED ALONG ℄ JOINT

PLAN OF SPAN A

NOTE: POUR ② CAN NOT BE STARTED UNTIL BOTH ADJACENT ① POURS REACH A MINIMUM OF 3000 PSI.



POURING SEQUENCE



OPTIONAL POURING SEQUENCE

NOTE: ALL DIMENSIONS FOR POURING SEQUENCE AND OPTIONAL POURING SEQUENCE ARE ALONG -Y7-.

NOTES:

FOR CONCRETE BARRIER RAIL DIMENSIONS, REINFORCING STEEL, AND JOINT SPACING, SEE "CONCRETE BARRIER RAIL" SHEET.

FOR SECTION VIEWS, SEE "TYPICAL SECTION DETAILS" SHEET.

FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET FOR DETAILS. FOR LOCATION, SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET.

FOR EDGE OF SLAB ARC OFFSETS, SEE SHEET 3 OF 3.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 6/7/2019

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN A

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-8
1			3			TOTAL SHEETS
2			4			36

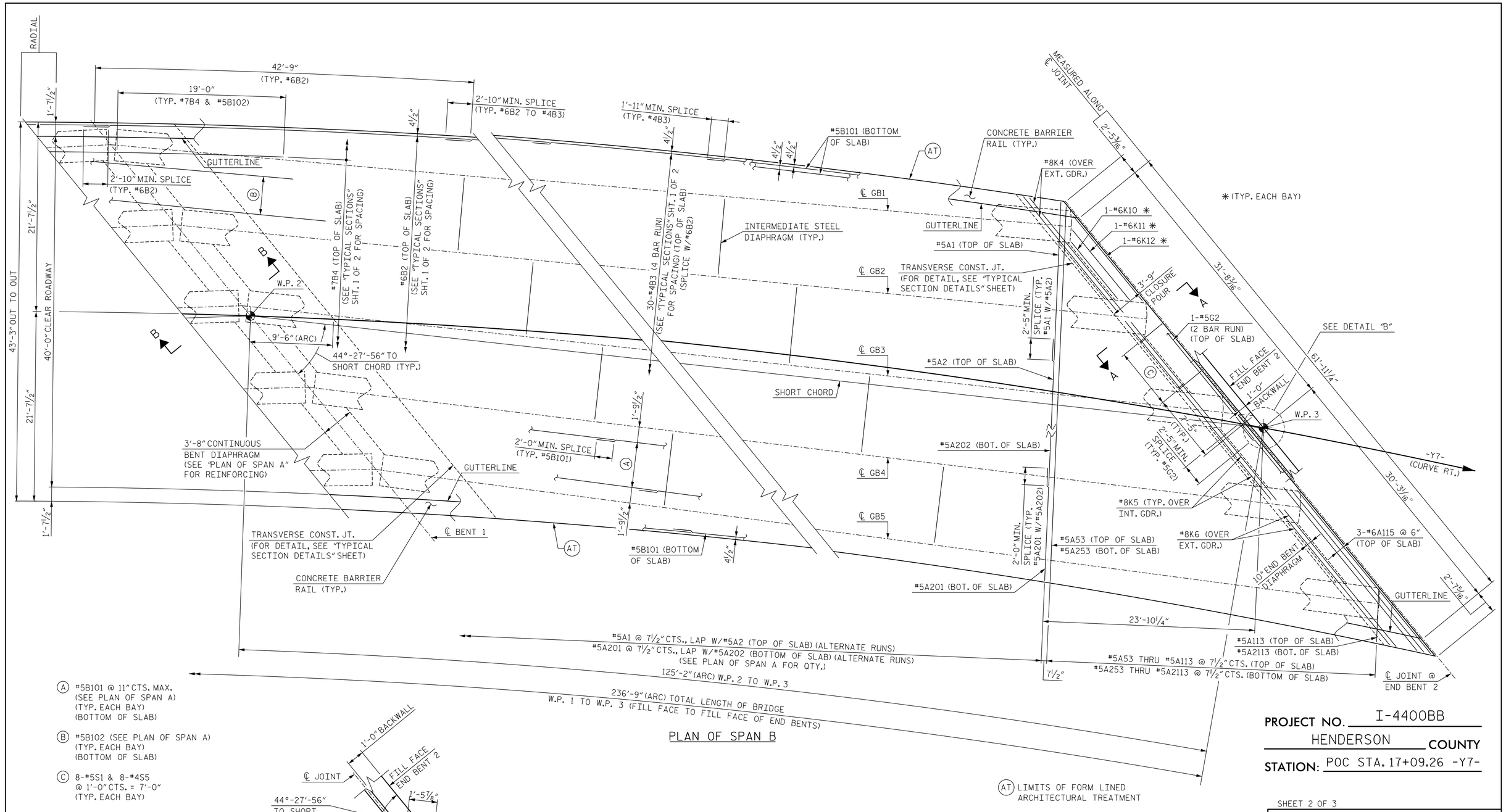
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 8

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\405_015_I4400BB_SMU_S01_008_440223.dgn



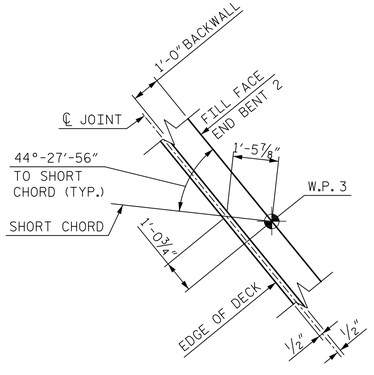
(A) #5B101 @ 11" CTS. MAX.
(SEE PLAN OF SPAN A)
(TYP. EACH BAY)
(BOTTOM OF SLAB)

(B) #5B102 (SEE PLAN OF SPAN A)
(TYP. EACH BAY)
(BOTTOM OF SLAB)

(C) 8-#5S1 & 8-#4S5
@ 1'-0" CTS. = 7'-0"
(TYP. EACH BAY)

PLAN OF SPAN B

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT



DETAIL "B"

NOTES:

FOR NOTES, SEE "PLAN OF SPAN A" SHEET.

FOR SECTION VIEWS, SEE "TYPICAL SECTION DETAILS" SHEET.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 6/7/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 9

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 3

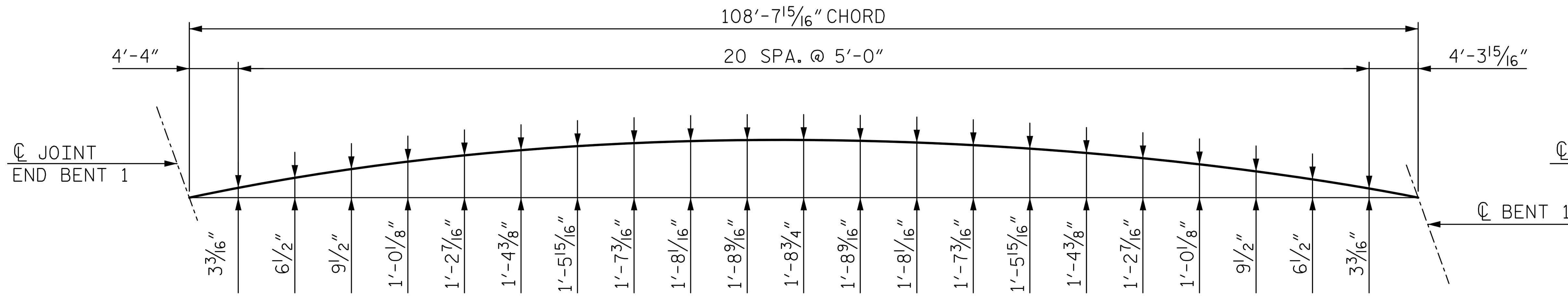
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

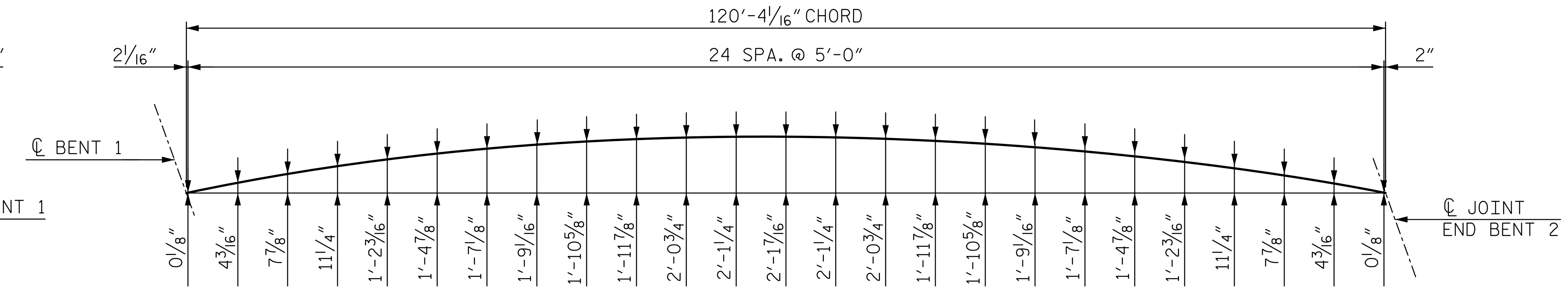
PLAN OF SPAN B

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-9
1			3			TOTAL SHEETS
2			4			36

6/7/2019
...\405_017_I4400BB_SMU_S02_009_440223.dgn



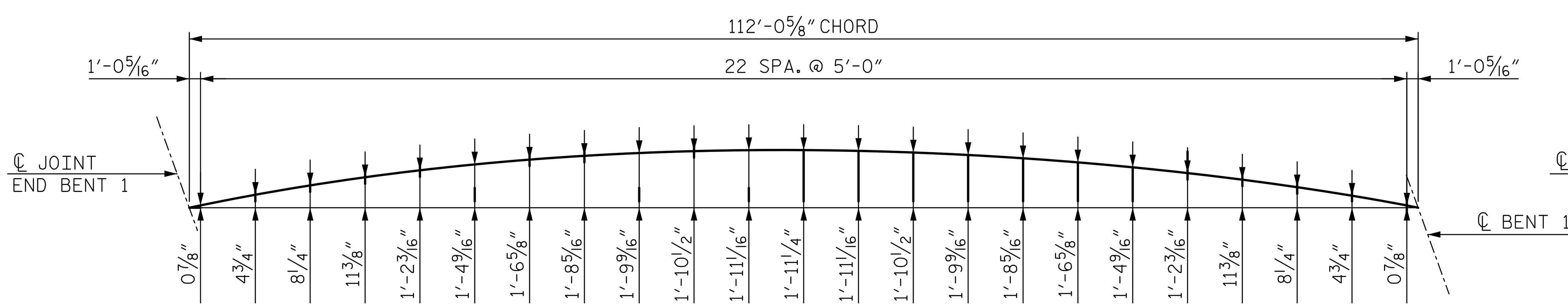
SPAN A



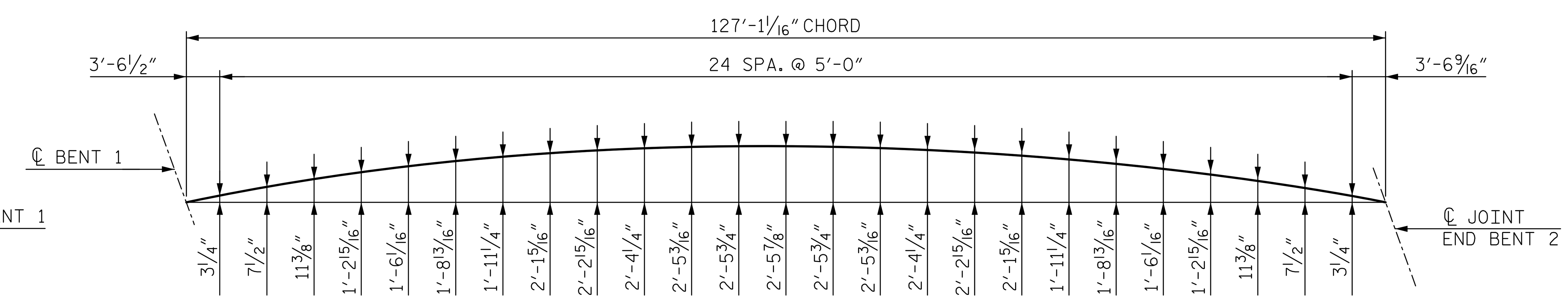
SPAN B

LEFT EDGE OF SLAB

(R = 854'-7 1/2")



SPAN A



SPAN B

RIGHT EGDE OF SLAB

(R = 811'-4 1/2")

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DECK ARC OFFSETS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 5/20/2019
DocuSigned by: Richard R. Greenfield C5ACBBEB56B443F...

HNTB

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	A. WAGNER	DATE	12/18
CHECKED BY	R. GREENFIELD	DATE	12/18
DESIGN ENGINEER OF RECORD	R. GREENFIELD	DATE	5/19

DWG. NO. 10

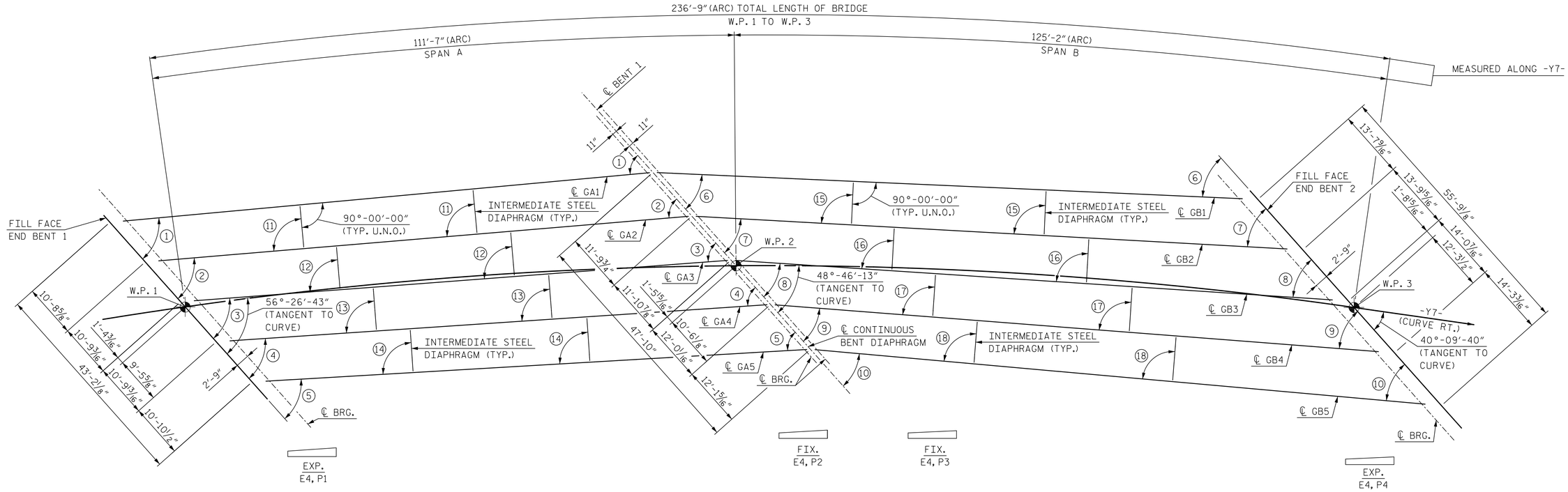
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S5-10

TOTAL SHEETS 36

5/17/2019
...\405_09_I4400BB_SMU_S03_010_440223.dgn



SPAN A

SPAN B

FRAMING PLAN

①	53°-35'-27"	⑩	43°-13'-47"
②	53°-08'-08"	⑪	89°-32'-41"
③	52°-40'-02"	⑫	89°-31'-54"
④	52°-11'-08"	⑬	89°-31'-06"
⑤	51°-41'-23"	⑭	89°-30'-15"
⑥	45°-46'-29"	⑮	89°-23'-43"
⑦	45°-10'-12"	⑯	89°-22'-31"
⑧	44°-32'-43"	⑰	89°-21'-13"
⑨	43°-53'-56"	⑱	89°-19'-51"

NOTES:

FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.

FOR GIRDER ELEVATIONS AND DETAILS, SEE "72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD" SHEETS.

GIRDERS ARE SET ON CONCENTRIC ARCS AT FILL FACE OF END BENTS AND CENTRELINE OF BENT 1.

FOR LOCATION OF FORMED HOLES FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD" SHEETS.

"EXP."	DENOTES EXPANSION BEARING ASSEMBLY.
"FIX."	DENOTES FIXED BEARING ASSEMBLY.
"E"	DENOTES ELASTOMERIC BEARING PAD MARK.
"P"	DENOTES STEEL SOLE PLATE MARK.
U.N.O.	UNLESS NOTED OTHERWISE.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 5/20/2019 RICHARD R. GREENFIELD

Signed by: Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	T. THOMPSON	DATE	12/18
CHECKED BY	C. SUTARIA	DATE	12/18
DESIGN ENGINEER OF RECORD	R. GREENFIELD	DATE	5/19

DWG. NO. 11

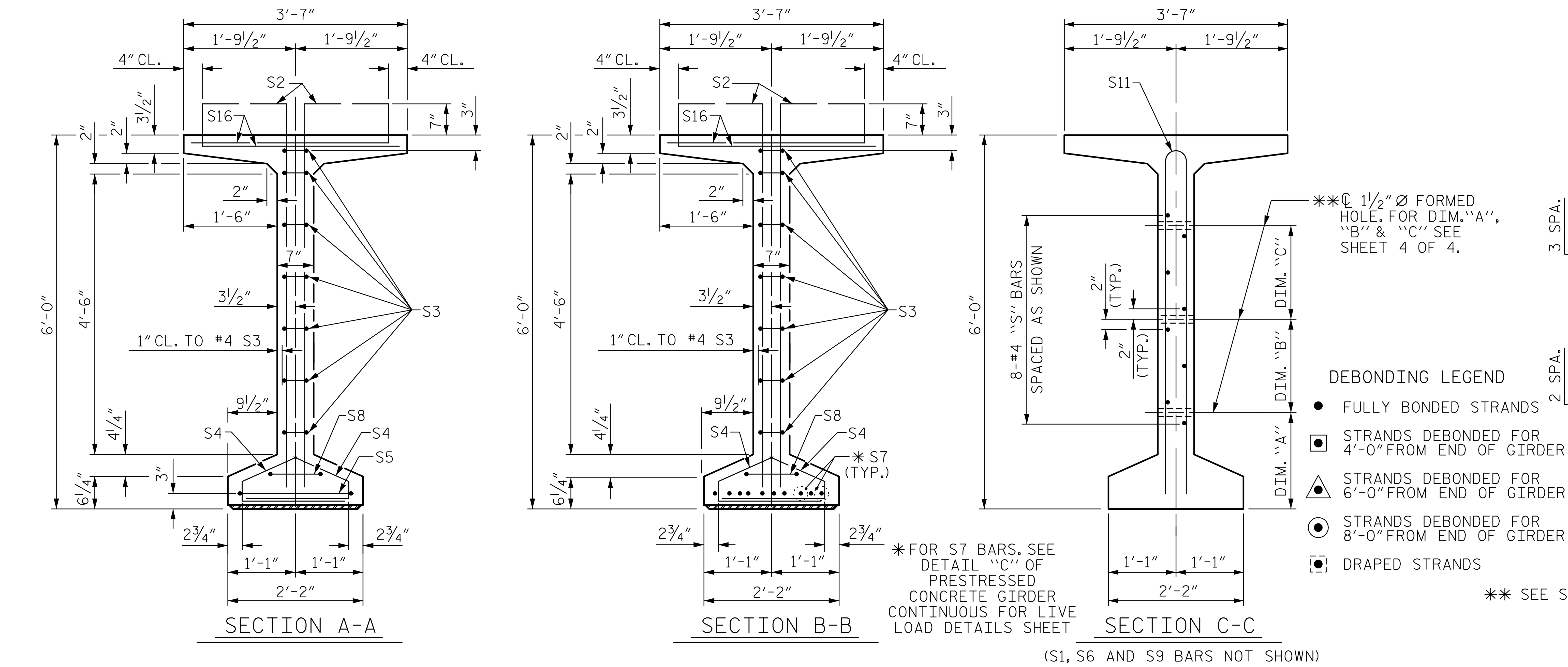
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

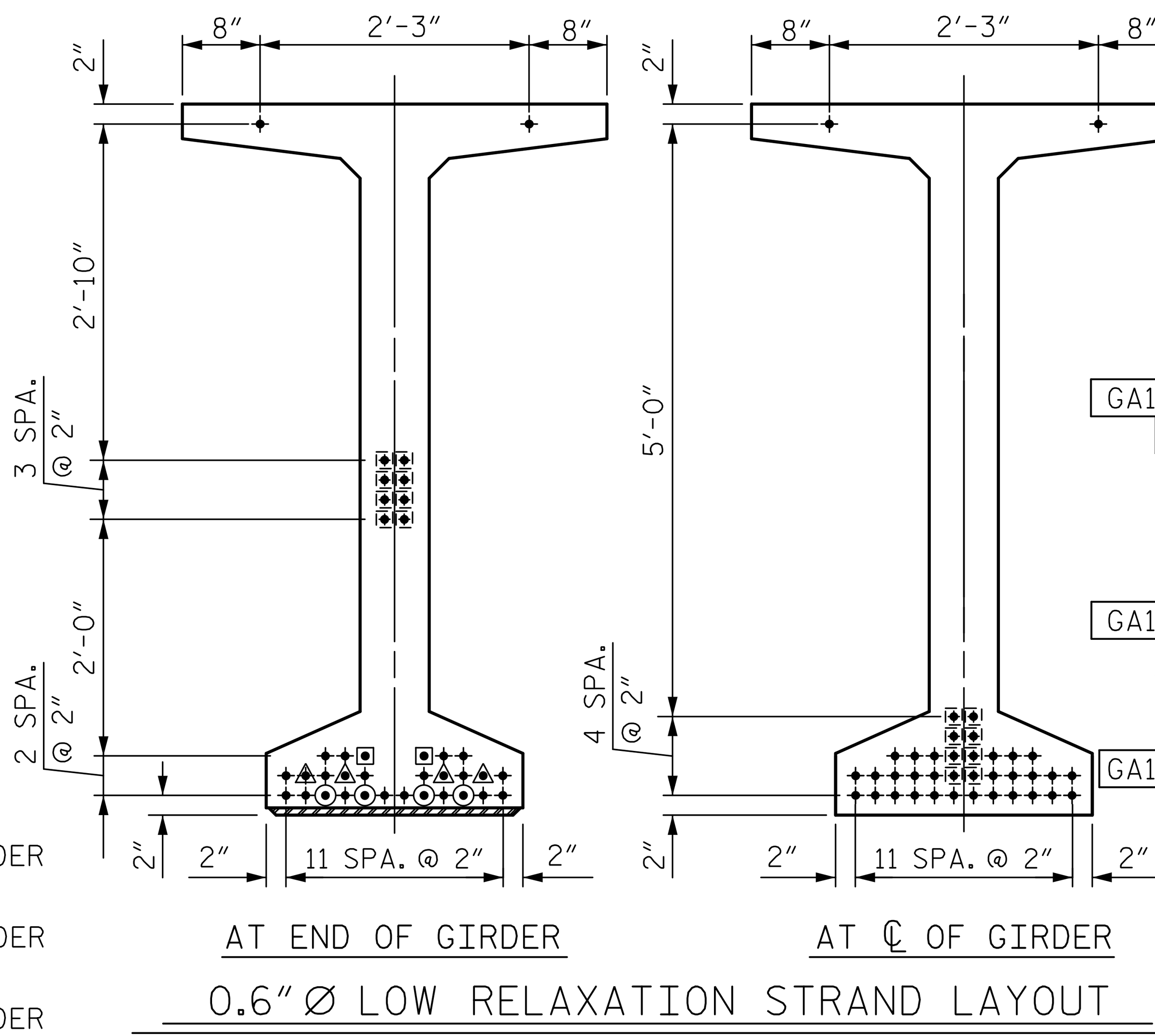
SUPERSTRUCTURE

FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-11
1			3			TOTAL SHEETS
2			4			36

5/17/2019
...\1405_02\I4400BB_SMU_FP_01I_440223.dgn





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 GDR

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
GA1, GA2 & GA3	S1	108	#4	1	6′-10″	493
GA4 & GA5	S1	110	#4	1	6′-10″	502
	S2	84	#5	1	6′-11″	606
	S3	14	#4	2	8′-5″	79
	S4	152	#4	3	3′-0″	305
	S5	1	#5	2	9′-10″	10
GA1, GA2 & GA3	S6	108	#5	4	4′-4″	488
GA4 & GA5	S6	110	#5	4	4′-4″	497
	*S7	10	#5	STR	3′-8″	38
	S8	2	#5	2	9′-0″	19
GA1, GA2 & GA3	S9	31	#5	STR	3′-3″	105
GA4 & GA5	S9	32	#5	STR	3′-3″	108
	S10	1	#3	STR	1′-10″	1
EXTERIOR	S11	8	#5	5	11′-6″	96
INTERIOR	S11	16	#5	5	11′-6″	192
EXTERIOR	S12	16	#4	STR	8′-0″	86
INTERIOR	S13	16	#4	STR	15′-1″	161
	S14	48	#4	1	6′-11″	222
	S15	2	#4	STR	2′-4″	3
	S16	130	#5	4	4′-5″	599

* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

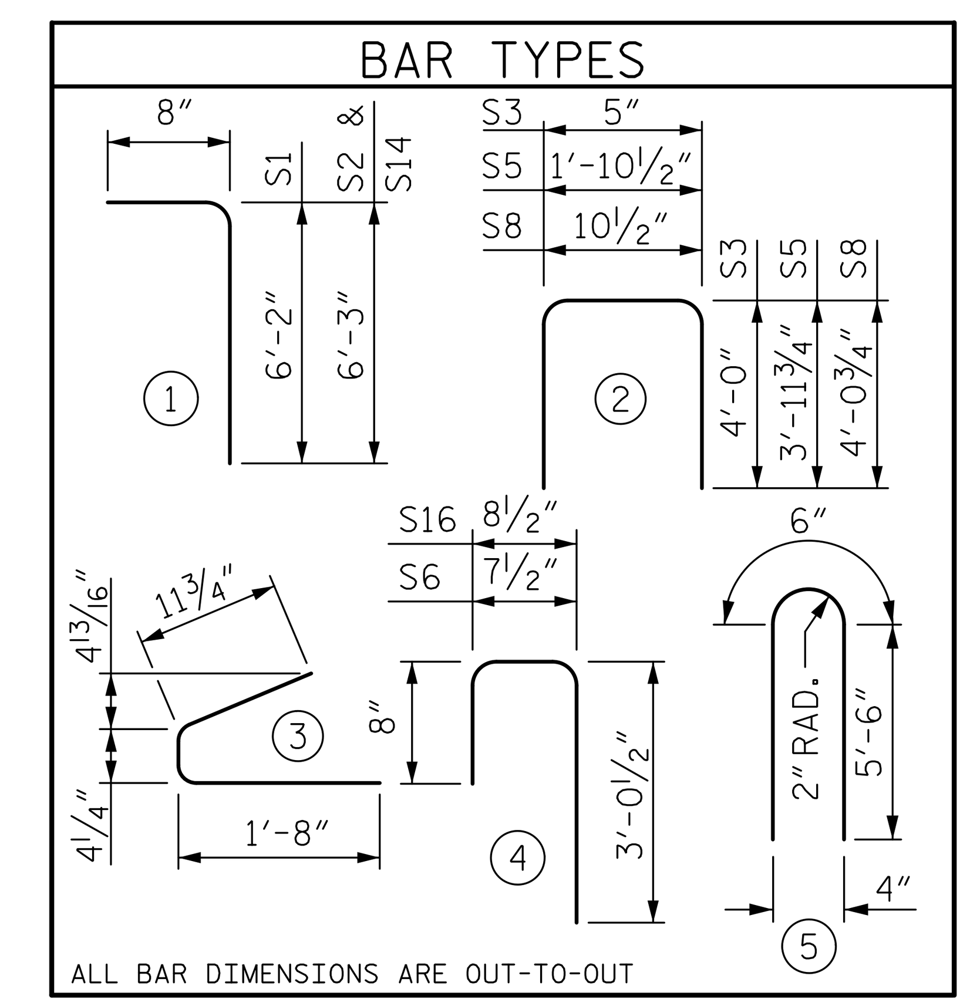
GIRDER QUANTITIES

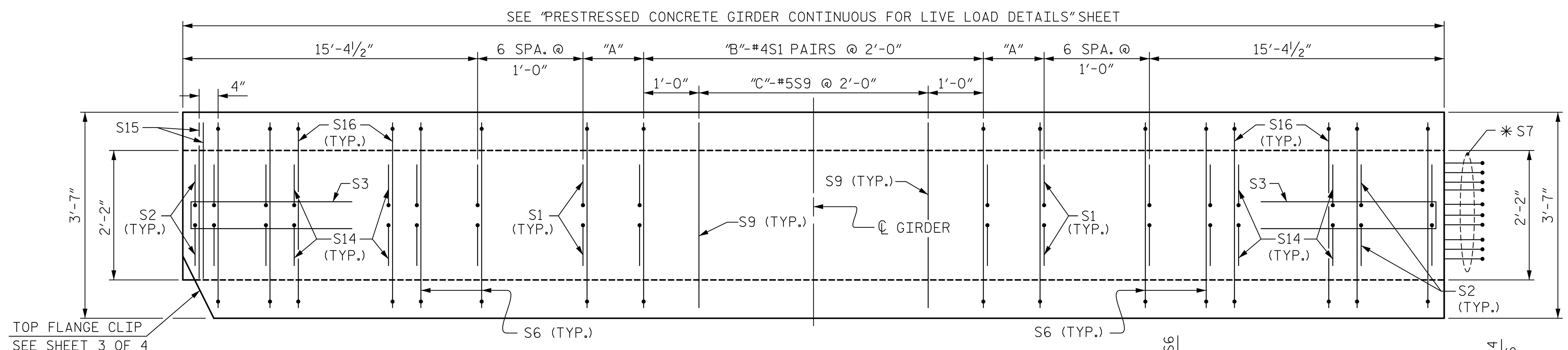
GIRDER	REINFORCING STEEL LB.	8,000 PSI CONCRETE C.Y.	0.6″ Ø L.R. STRANDS No.
GA1	3,150	23.0	38
GA2	3,321	23.1	38
GA3	3,321	23.2	38
GA4	3,342	23.4	38
GA5	3,171	23.5	38

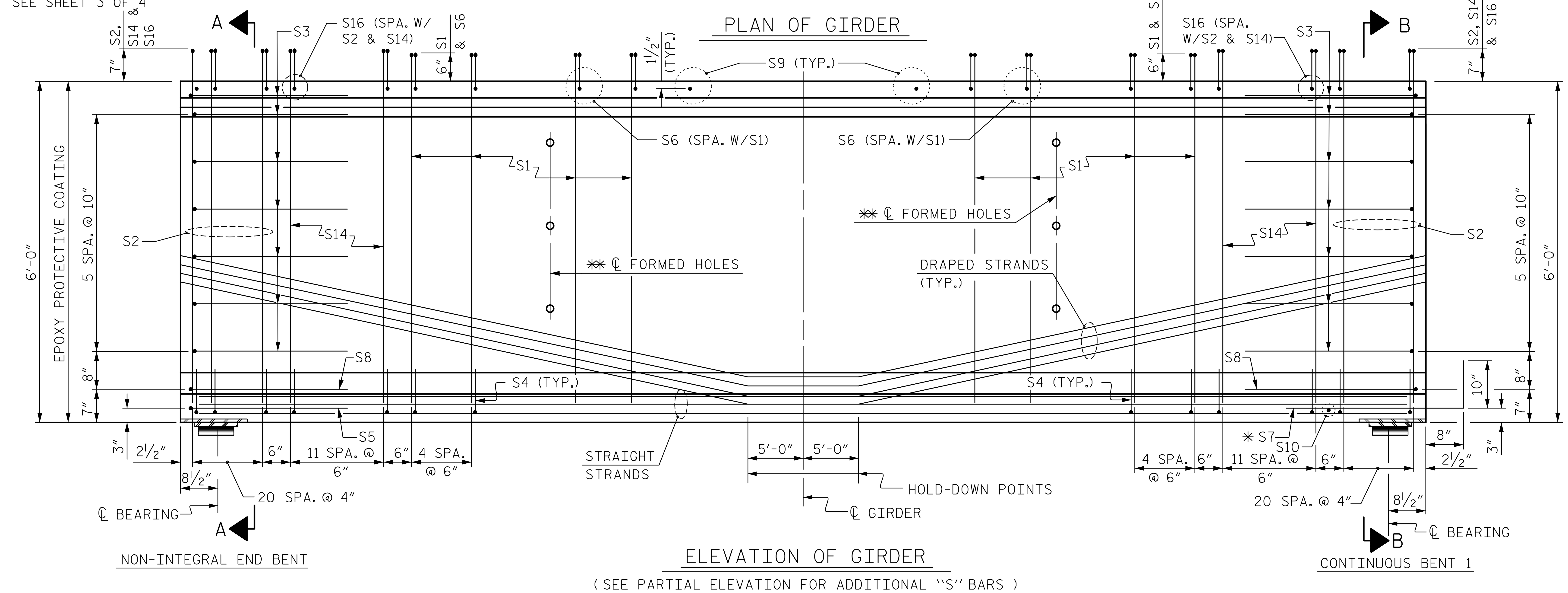
GIRDERS REQUIRED

GIRDER	LENGTH	TOTAL LENGTH
GA1-GA5	***	542.34′

*** SEE SHEET 3 OF 4.







NOTES:

FOR PARTIAL ELEVATION SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL AND FOR LOCATION OF SECTION C-C, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72″ MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.

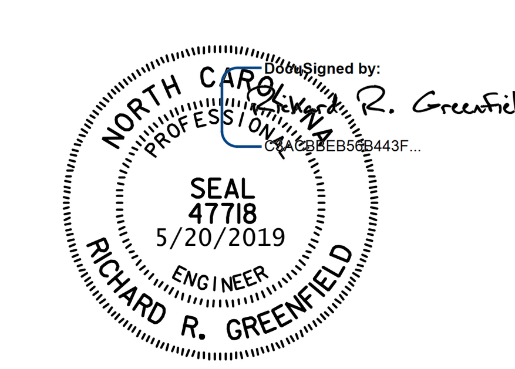
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6,000 PSI.

GIRDER CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 8,000 PSI AT THE AGE OF 28 DAYS.

FOR TOP FLANGE CLIP DETAIL AT END BENTS, SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET.

GIRDER DIMENSION TABLE			
GIRDERS	"A"	"B"	"C"
GA1	1′-2¼″ (-)	32	31
GA2	1′-6″ (-)	32	31
GA3	1′-9 15/16″	32	31
GA4	1′-2 1/16″ (+)	33	32
GA5	1′-6½″ (-)	33	32

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 17+09.26 -Y7-



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
72″ PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN A

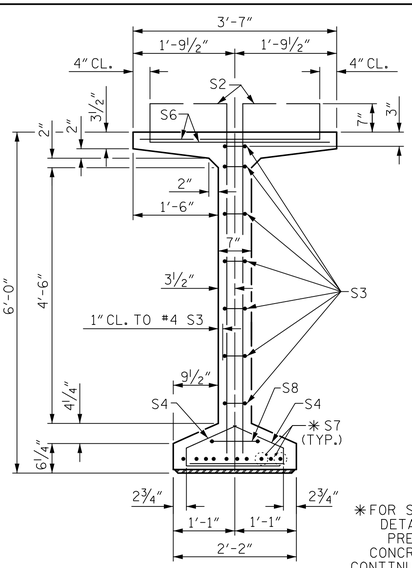
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 12/18
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19
DWG. NO. 12

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

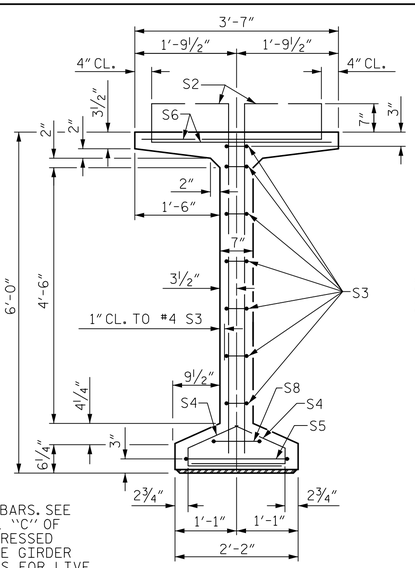
SHEET NO. S5-12
TOTAL SHEETS 36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

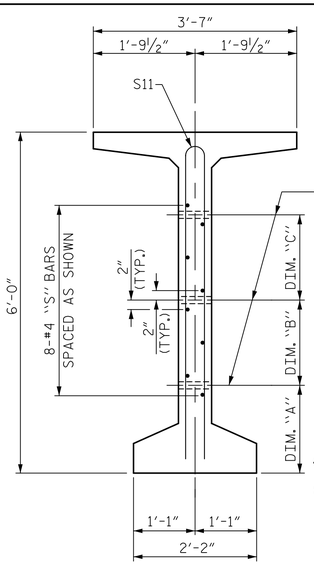


SECTION A-A

✱FOR S7 BARS, SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET



SECTION B-B



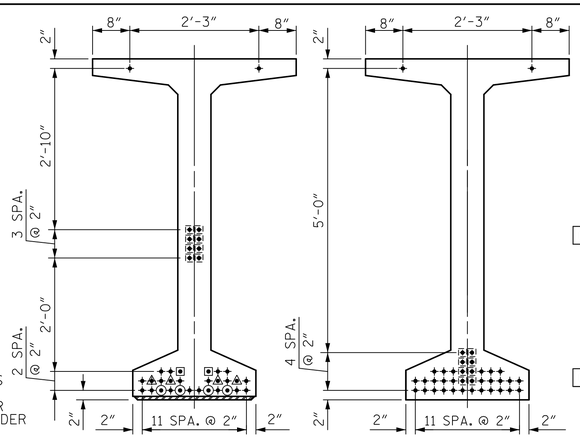
SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

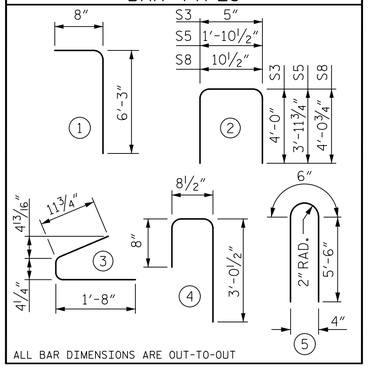
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- DRAPED STRANDS

✱✱ SEE SHEET 3 OF 4 FOR LOCATION.



0.6" Ø LOW RELAXATION STRAND LAYOUT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

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 GDR

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
GB1	S1	166	#4	1	6'-11"	767
GB2	S1	168	#4	1	6'-11"	776
GB3 & GB4	S1	170	#4	1	6'-11"	785
GB5	S1	172	#4	1	6'-11"	795
	S2	84	#5	1	6'-11"	606
	S3	14	#4	2	8'-5"	79
	S4	152	#4	3	3'-0"	305
	S5	1	#5	2	9'-10"	10
GB1	S6	248	#5	4	4'-5"	1,142
GB2	S6	250	#5	4	4'-5"	1,152
GB3 & GB4	S6	252	#5	4	4'-5"	1,161
GB5	S6	254	#5	4	4'-5"	1,170
	✱ S7	10	#5	STR	3'-8"	38
	S8	2	#5	2	9'-0"	19
GB1	S9	36	#5	STR	3'-3"	122
GB2	S9	37	#5	STR	3'-3"	125
GB3 & GB4	S9	38	#5	STR	3'-3"	129
GB5	S9	39	#5	STR	3'-3"	132
	S10	1	#3	STR	1'-10"	1
EXTERIOR	S11	8	#5	5	11'-6"	96
INTERIOR	S11	16	#5	5	11'-6"	192
EXTERIOR	S12	16	#4	STR	8'-0"	86
INTERIOR	S13	16	#4	STR	17'-7	188
	S15	2	#4	STR	2'-8"	4

✱NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

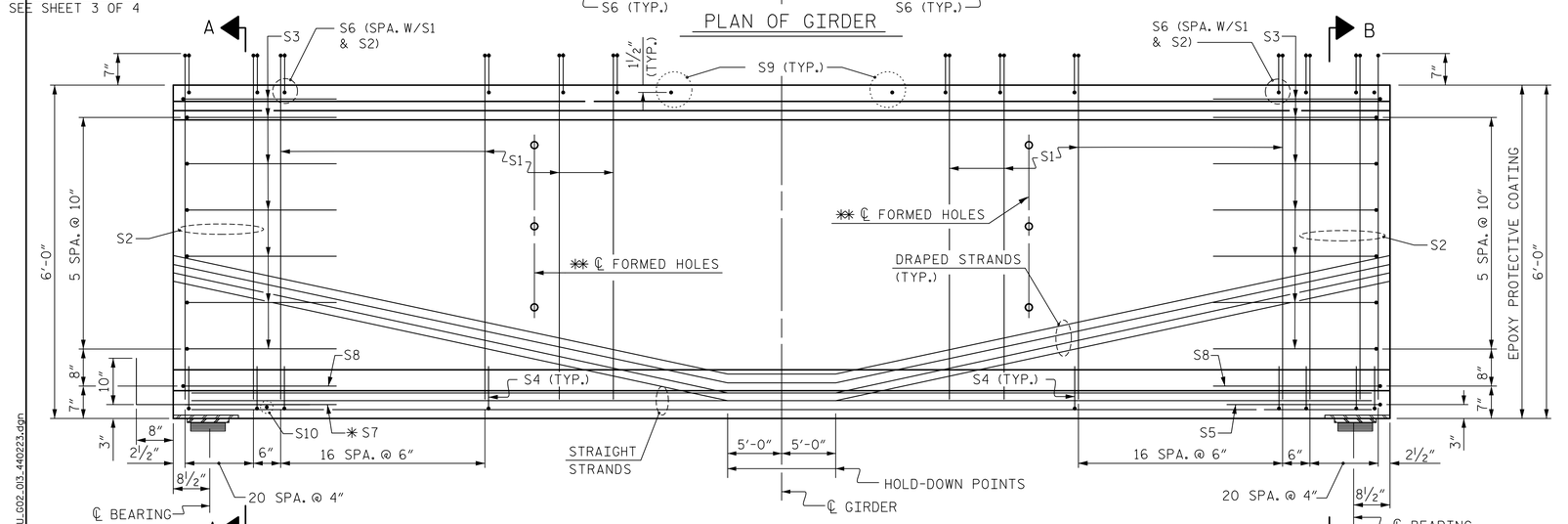
GIRDER QUANTITIES

GIRDER	REINFORCING STEEL (LB.)	8,000 PSI CONCRETE (C.Y.)	0.6" Ø L.R. STRANDS (No.)
GB1	3,275	25.4	38
GB2	3,495	25.7	38
GB3	3,517	26.0	38
GB4	3,517	26.3	38
GB5	3,341	26.6	38

GIRDERS REQUIRED

GIRDER	LENGTH	TOTAL LENGTH
GB1-GB5	✱✱✱	606.34'

✱✱✱ SEE SHEET 3 OF 4.



PLAN OF GIRDER

CONTINUOUS BENT 1

ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

NON-INTEGRAL END BENT

NOTES:

FOR PARTIAL ELEVATION SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL AND FOR LOCATION OF SECTION C-C, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.

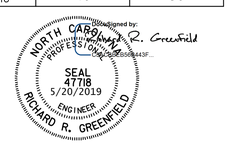
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6,000 PSI.

GIRDER CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 8,000 PSI AT THE AGE OF 28 DAYS.

FOR TOP FLANGE CLIP DETAIL AT END BENTS, SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET.

GIRDER DIMENSION TABLE

GIRDERS	"A"	"B"	"C"
GB1	1'-11 7/16" (+)	37	36
GB2	1'-6 3/4" (+)	38	37
GB3	1'-2 5/8" (-)	39	38
GB4	1'-11"	39	38
GB5	1'-7 15/16"	40	39



PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD 72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN B

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

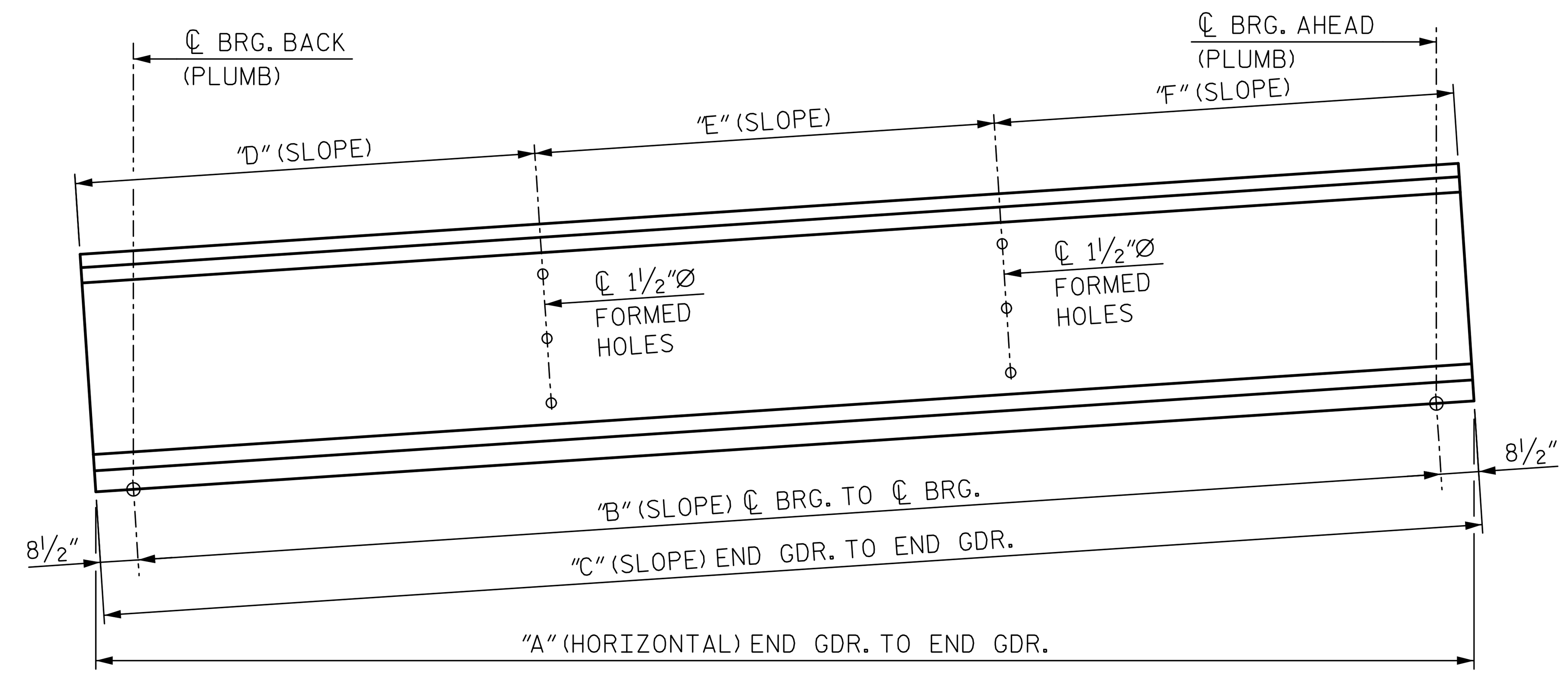
DRAWN BY T. THOMPSON DATE 12/18
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 13

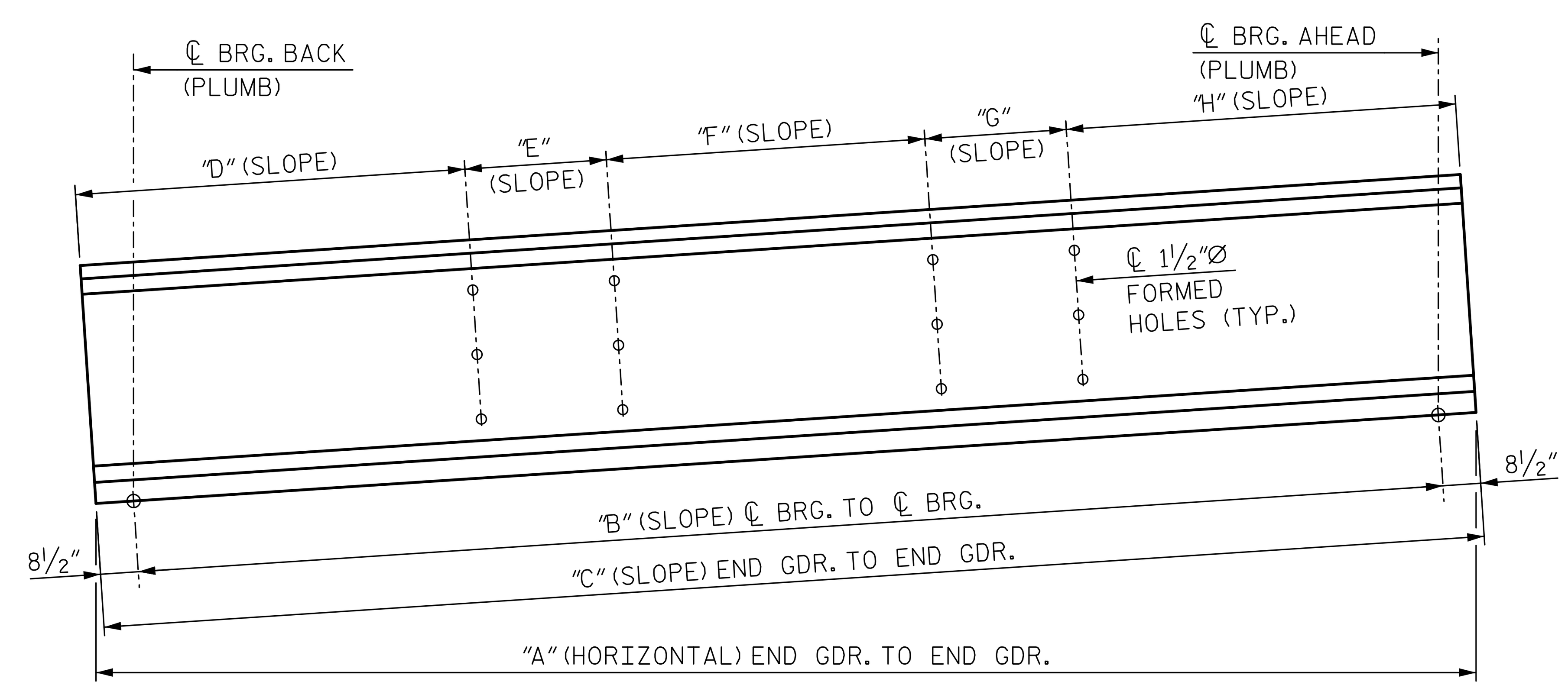
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-13
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

5/17/2019
...\405_025_I4400BB_SMU_G02_013_440223.dgn



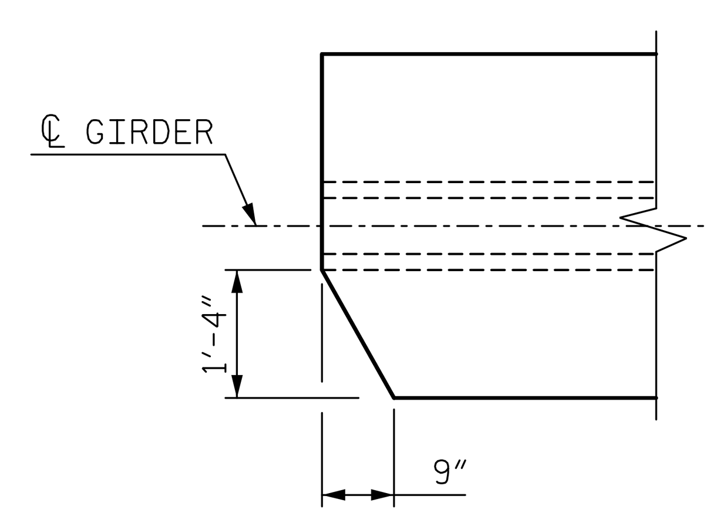
GIRDERS GA1, GA5, GB1 & GB5



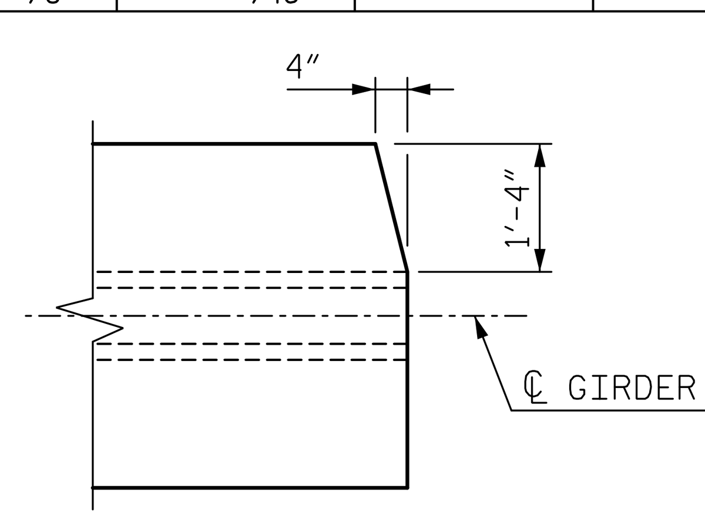
GIRDERS GA2-GA4 & GB2-GB4

GIRDER ELEVATION

GIRDER DIMENSION TABLE								
GIRDERS	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"
GA1	106'-11 3/16"	105'-8 7/16"	107'-1 7/16"	35'-11 5/16"	35'-2 13/16"	35'-11 5/16"	——	——
GA2	107'-6 11/16"	106'-3 15/16"	107'-8 15/16"	29'-6 5/8"	6'-7 3/16"	28'-7 5/8"	6'-9 11/16"	36'-1 13/16"
GA3	108'-2 5/8"	106'-11 7/8"	108'-4 7/8"	29'-7 15/16"	6'-8 1/2"	28'-8 13/16"	6'-11 3/16"	36'-4 7/16"
GA4	108'-10 15/16"	107'-8 3/16"	109'-1 3/16"	29'-9 5/16"	6'-9 15/16"	28'-10 1/16"	7'-0 5/8"	36'-7 1/4"
GA5	109'-7 11/16"	108'-4 15/16"	109'-9 15/16"	29'-10 13/16"	35'-10 11/16"	44'-0 7/16"	——	——
GB1	118'-6 7/16"	117'-2 15/16"	118'-7 15/16"	39'-9 1/2"	39'-0 15/16"	39'-9 1/2"	——	——
GB2	119'-9 1/16"	118'-5 9/16"	119'-10 9/16"	31'-6 3/8"	8'-8"	30'-4 15/16"	9'-0 7/8"	40'-2 3/8"
GB3	121'-0 3/4"	119'-9 3/16"	121'-2 3/16"	31'-9 3/8"	8'-10 3/16"	30'-7 5/8"	9'-3 7/16"	40'-7 9/16"
GB4	122'-5 9/16"	121'-2"	122'-7"	32'-0 5/8"	9'-0 9/16"	30'-10 5/8"	9'-6"	41'-1 3/16"
GB5	123'-11 7/16"	122'-7 7/8"	124'-0 7/8"	32'-4 3/16"	40'-4 5/8"	51'-4 1/16"	——	——

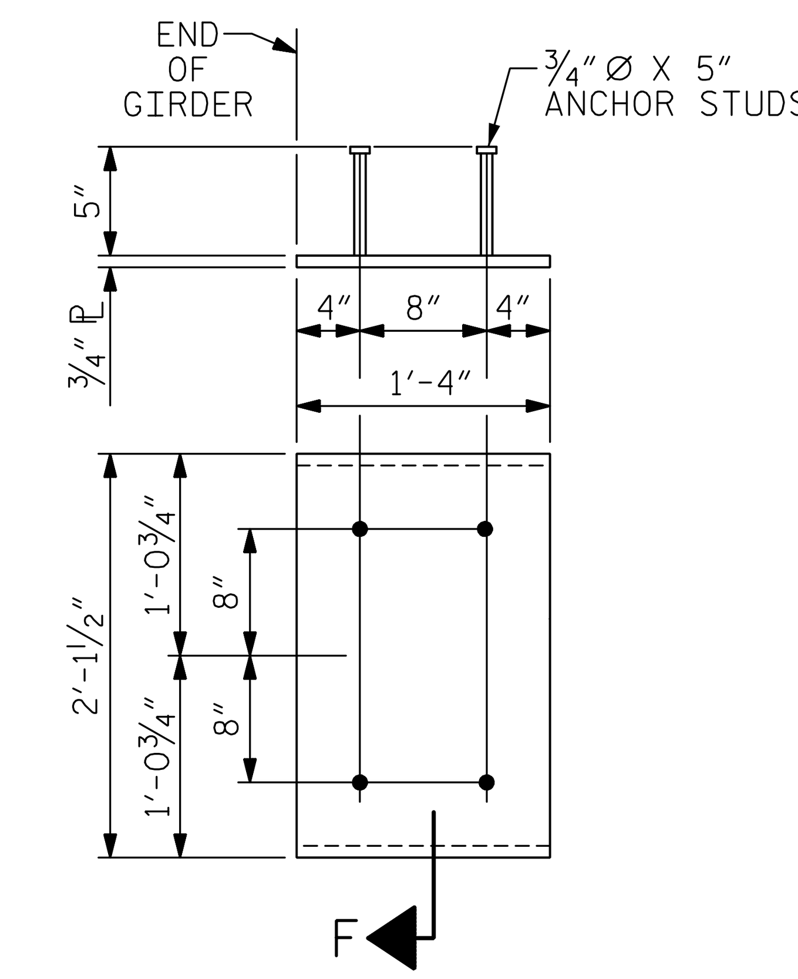


END BENT 1



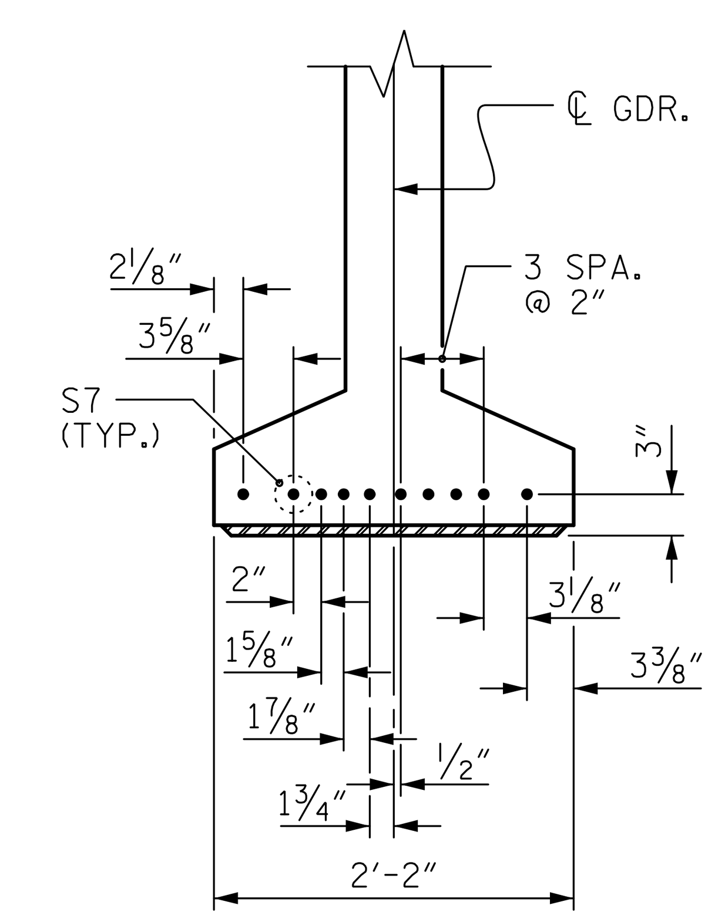
END BENT 2

TOP FLANGE CLIP DETAIL



EMBEDDED PLATE "B-1" DETAILS

(2 REQ'D PER GIRDER)



DETAIL "C"

(AT BENT)

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.

APPLY EPOXY PROTECTIVE COATING TO END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

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.

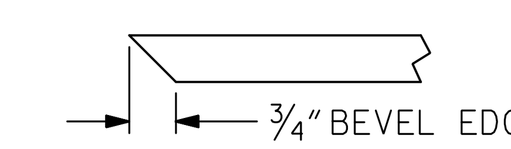
DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF ¼".

WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICES SHALL BE WITHIN 6" OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN ½" OF THE THEORETICAL LOCATION SHOWN.

A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 72" MODIFIED BULB TEES.

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.



SECTION "F"

(SEE NOTES)

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 47718 5/20/2019 ENGINEER RICHARD R. GREENFIELD

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	T. THOMPSON	DATE	12/18
CHECKED BY	C. SUTARIA	DATE	1/19
DESIGN ENGINEER OF RECORD	R. GREENFIELD	DATE	5/19

DWG. NO. 14

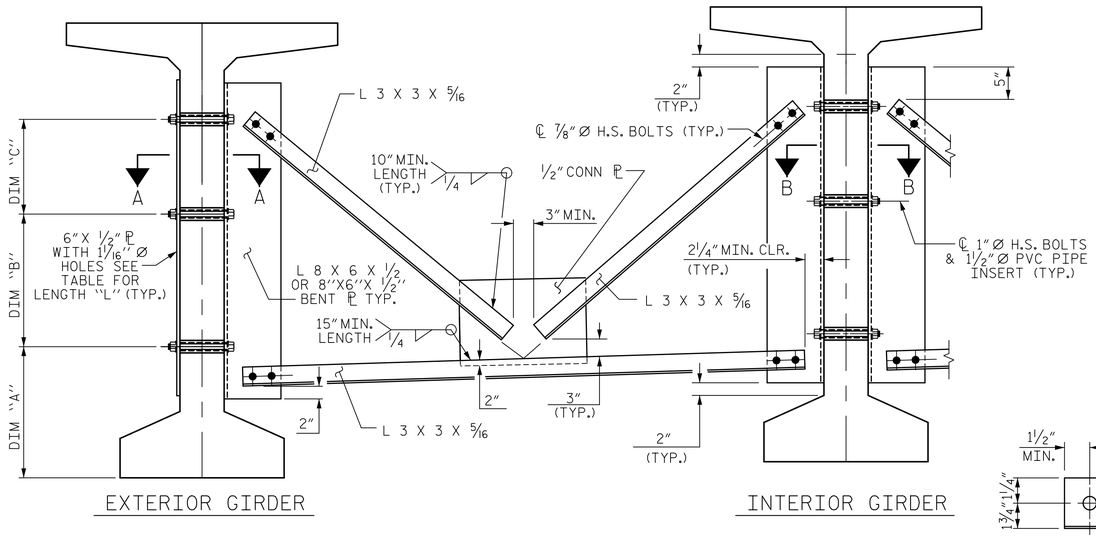
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S5-14

TOTAL SHEETS 36

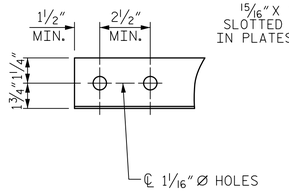
5/17/2019
...1405.027_I4400BB_SMU_G03_014_440223.dgn



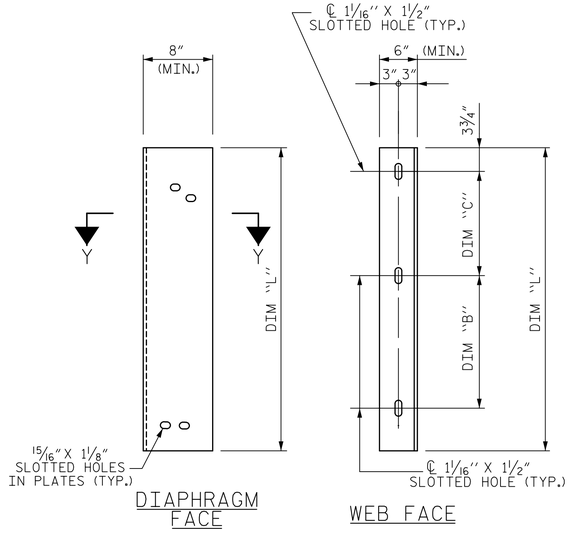
EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

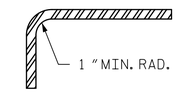


ANGLE END
(L 3 X 3 X 5/16)



DIAPHRAGM FACE

WEB FACE



SECTION Y-Y

CONNECTOR PLATE DETAIL

STRUCTURAL STEEL NOTES

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

TENSION ON THE ASTM F3125 A325 TYPE 1 BOLTS THROUGH THE ANGLE 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 ¼ TURN.

THE PLATES, BENT PLATES, 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 ¼" PROJECTION BEYOND THE NUT.

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

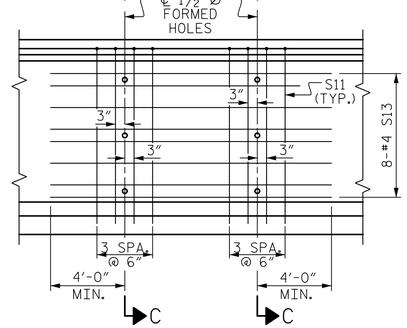
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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.

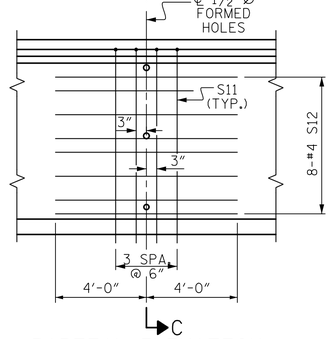
TABLE

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
72" BULB TEE	2'-0"	1'-5½"	1'-5¼"	4'-2"



PARTIAL ELEVATION

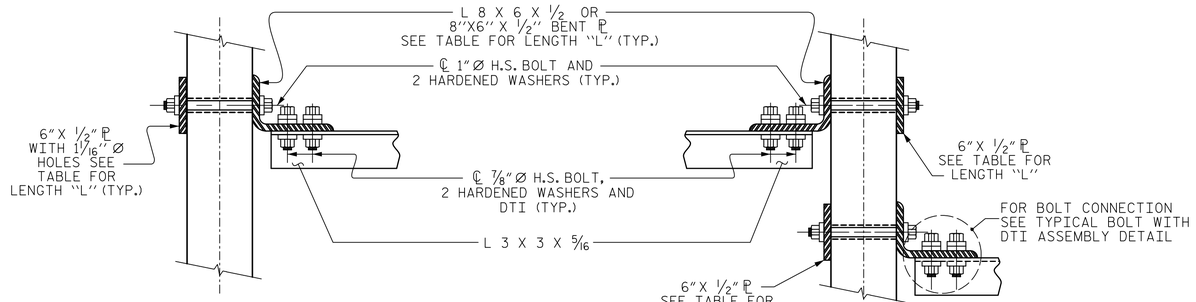
SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDERS GA2, GA3, GA4, GB2, GB3, AND GB4



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDERS GA1, GA5, GB1, AND GB5

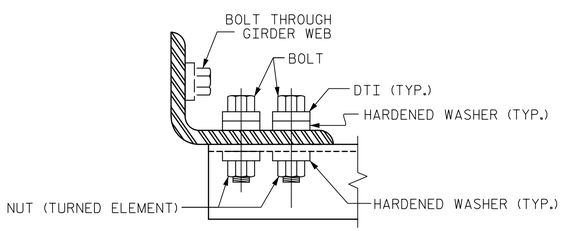
NOTE: FOR REINFORCING STEEL AND FORMED HOLE LOCATION INFORMATION, SEE "72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD" SHEETS.



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 5/20/2019 ENGINEER RICHARD R. GREENFIELD

Digitally signed by: Richard R. Greenfield

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

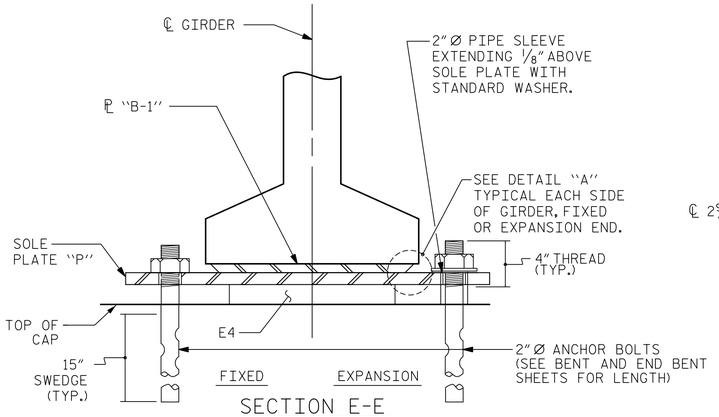
DRAWN BY T. THOMPSON DATE 12/18
CHECKED BY L. DICKENS DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 15

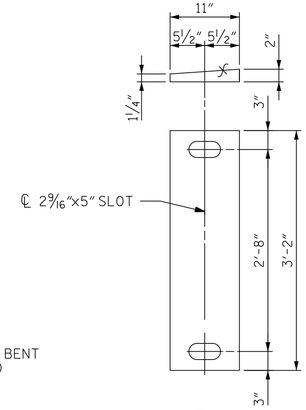
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-15
1			3			TOTAL SHEETS
2			4			36

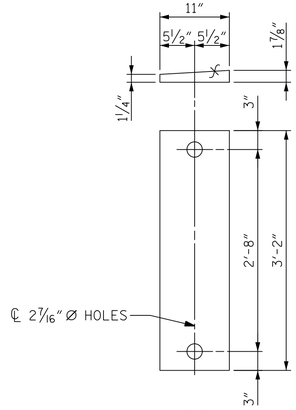
5/17/2019
...\405_029_I4400BB_SMU_604_015_440223.dgn



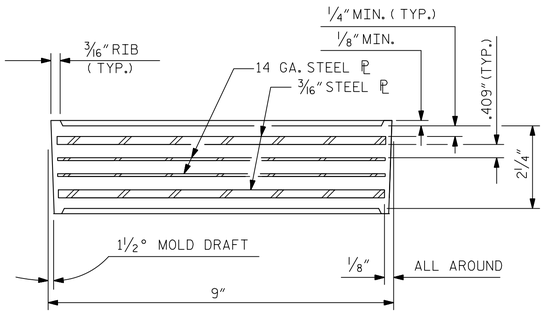
SECTION E-E



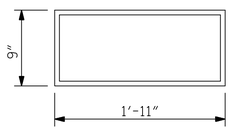
P1
(EXPANSION)
P1 (5 REQ'D)



P2
(FIXED)
P2 (5 REQ'D)



TYPICAL SECTION OF ELASTOMERIC BEARINGS



E4 (20 REQ'D)

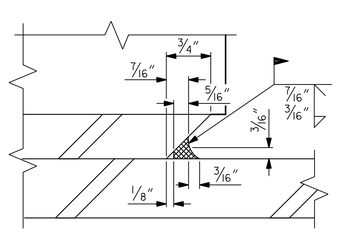
PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

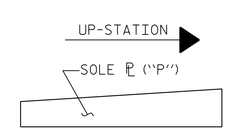
P3
(FIXED)
P3 (5 REQ'D)

P4
(EXPANSION)
P4 (5 REQ'D)

SOLE PLATE DETAILS ("P")

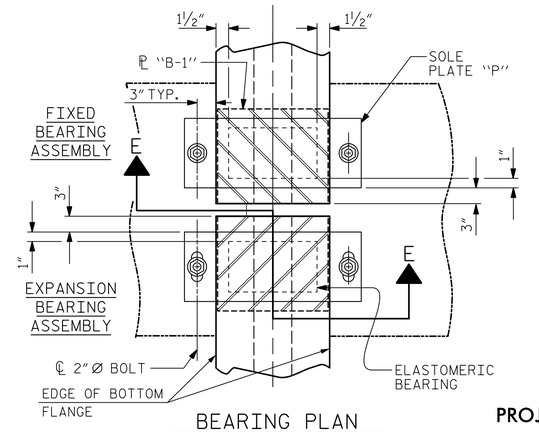


DETAIL "A"



SOLE ℄ PLACEMENT DETAIL

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE V	365 k



BEARING PLAN

NOTES

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF ½ TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

THE 2" Ø PIPE SLEEVE SHALL BE CUT FROM SCHEDULE 40 PVC PLASTIC PIPE. THE PVC PLASTIC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

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.

SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

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. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

FOR BEARING AND SOLE PLATE LOCATIONS, SEE "FRAMING PLAN" SHEET.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 5/20/2019 ENGINEER RICHARD R. GREENFIELD

Signed by: R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 16

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-16
1			3			TOTAL SHEETS
2			4			36

5/17/2019
...\405_03\I4400BB_SMU_BG_016_440223.dgn

DEAD LOAD DEFLECTION TABLE FOR SPAN A

0.6" Ø LOW RELAXATION STRANDS	GIRDER 1																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.041	0.080	0.118	0.152	0.182	0.208	0.228	0.243	0.252	0.256	0.252	0.243	0.228	0.208	0.182	0.152	0.118	0.080	0.041	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. * ↓	0.000	0.017	0.033	0.049	0.064	0.077	0.089	0.096	0.104	0.107	0.110	0.107	0.105	0.097	0.089	0.077	0.065	0.049	0.034	0.017	0.000
FINAL CAMBER ↑	0	5/16	9/16	13/16	1 1/16	1 1/4	1 7/16	1 9/16	1 11/16	1 3/4	1 3/4	1 3/4	1 11/16	1 9/16	1 7/16	1 1/4	1 1/16	13/16	9/16	5/16	0

DEAD LOAD DEFLECTION TABLE FOR SPAN A

0.6" Ø LOW RELAXATION STRANDS	GIRDER 2																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.041	0.081	0.118	0.153	0.183	0.209	0.230	0.245	0.254	0.257	0.254	0.245	0.230	0.209	0.183	0.153	0.118	0.081	0.041	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. * ↓	0.000	0.017	0.035	0.051	0.067	0.080	0.093	0.101	0.109	0.112	0.115	0.112	0.110	0.101	0.093	0.081	0.068	0.052	0.035	0.018	0.000
FINAL CAMBER ↑	0	5/16	9/16	13/16	1	1 1/4	1 3/8	1 9/16	1 5/8	1 11/16	1 11/16	1 11/16	1 5/8	1 9/16	1 3/8	1 1/4	1	13/16	9/16	1/4	0

DEAD LOAD DEFLECTION TABLE FOR SPAN A

0.6" Ø LOW RELAXATION STRANDS	GIRDER 3																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.041	0.081	0.119	0.154	0.185	0.210	0.231	0.246	0.256	0.259	0.256	0.246	0.231	0.210	0.185	0.154	0.119	0.081	0.041	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. * ↓	0.000	0.018	0.036	0.052	0.069	0.082	0.095	0.103	0.112	0.115	0.117	0.115	0.112	0.104	0.095	0.082	0.069	0.053	0.036	0.018	0.000
FINAL CAMBER ↑	0	1/4	9/16	13/16	1	1 1/4	1 3/8	1 9/16	1 5/8	1 11/16	1 11/16	1 11/16	1 5/8	1 9/16	1 3/8	1 1/4	1	13/16	9/16	1/4	0

DEAD LOAD DEFLECTION TABLE FOR SPAN A

0.6" Ø LOW RELAXATION STRANDS	GIRDER 4																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.041	0.082	0.120	0.155	0.186	0.212	0.233	0.248	0.258	0.261	0.258	0.248	0.233	0.212	0.186	0.155	0.120	0.082	0.041	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. * ↓	0.000	0.018	0.036	0.053	0.070	0.084	0.097	0.106	0.114	0.117	0.120	0.117	0.114	0.106	0.098	0.084	0.071	0.054	0.037	0.018	0.000
FINAL CAMBER ↑	0	1/4	9/16	13/16	1	1 1/4	1 3/8	1 1/2	1 5/8	1 11/16	1 11/16	1 11/16	1 5/8	1 1/2	1 3/8	1 1/4	1	13/16	9/16	1/4	0

DEAD LOAD DEFLECTION TABLE FOR SPAN A

0.6" Ø LOW RELAXATION STRANDS	GIRDER 5																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.042	0.082	0.121	0.156	0.187	0.213	0.235	0.250	0.259	0.262	0.259	0.250	0.235	0.213	0.187	0.156	0.121	0.082	0.042	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. * ↓	0.000	0.017	0.033	0.049	0.065	0.077	0.089	0.097	0.105	0.107	0.110	0.108	0.105	0.097	0.089	0.077	0.065	0.049	0.034	0.017	0.000
FINAL CAMBER ↑	0	5/16	9/16	7/8	1 1/8	1 5/16	1 1/2	1 5/8	1 3/4	1 13/16	1 13/16	1 13/16	1 3/4	1 5/8	1 1/2	1 5/16	1 1/8	7/8	9/16	5/16	0

* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD. DOES NOT INCLUDE WEIGHT OF FORM LINER.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 6/7/2019

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
GIRDER
DEAD LOAD DEFLECTIONS AND CAMBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 17

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-17
1			3			TOTAL SHEETS
2			4			36

6/7/2019
...\405.033.I4400BB_SMU_DI_DI_017_440223.dgn

DEAD LOAD DEFLECTION TABLE FOR SPAN B																						
0.6"Ø LOW RELAXATION STRANDS	GIRDER 1																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.045	0.088	0.130	0.167	0.201	0.229	0.252	0.268	0.278	0.282	0.278	0.268	0.252	0.229	0.201	0.167	0.130	0.088	0.045	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.027	0.054	0.079	0.103	0.123	0.142	0.154	0.167	0.171	0.175	0.171	0.167	0.154	0.142	0.123	0.104	0.079	0.054	0.027	0.000
FINAL CAMBER ↑	0	3/16	7/16	5/8	3/4	15/16	1 1/16	1 3/16	1 1/4	1 5/16	1 5/16	1 5/16	1 1/4	1 3/16	1 1/16	15/16	3/4	5/8	7/16	3/16	0

DEAD LOAD DEFLECTION TABLE FOR SPAN B																						
0.6"Ø LOW RELAXATION STRANDS	GIRDER 2																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.045	0.089	0.131	0.169	0.202	0.231	0.254	0.270	0.281	0.284	0.281	0.270	0.254	0.231	0.202	0.169	0.131	0.089	0.045	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.028	0.056	0.081	0.107	0.127	0.147	0.159	0.172	0.176	0.181	0.176	0.172	0.159	0.147	0.127	0.107	0.081	0.056	0.028	0.000
FINAL CAMBER ↑	0	3/16	3/8	9/16	3/4	15/16	1	1 1/8	1 3/16	1 1/4	1 1/4	1 1/4	1 3/16	1 1/8	1	15/16	3/4	9/16	3/8	3/16	0

DEAD LOAD DEFLECTION TABLE FOR SPAN B																						
0.6"Ø LOW RELAXATION STRANDS	GIRDER 3																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.045	0.090	0.132	0.170	0.204	0.233	0.256	0.272	0.283	0.286	0.283	0.272	0.256	0.233	0.204	0.170	0.132	0.090	0.045	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.029	0.058	0.084	0.111	0.132	0.152	0.166	0.179	0.183	0.188	0.183	0.179	0.166	0.153	0.132	0.111	0.084	0.058	0.029	0.000
FINAL CAMBER ↑	0	3/16	3/8	9/16	11/16	7/8	15/16	1 1/16	1 1/8	1 3/16	1 3/16	1 3/16	1 1/8	1 1/16	15/16	7/8	11/16	9/16	3/8	3/16	0

DEAD LOAD DEFLECTION TABLE FOR SPAN B																						
0.6"Ø LOW RELAXATION STRANDS	GIRDER 4																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.046	0.091	0.133	0.171	0.206	0.234	0.258	0.274	0.285	0.288	0.285	0.274	0.258	0.234	0.206	0.171	0.133	0.091	0.046	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.030	0.060	0.088	0.116	0.137	0.159	0.173	0.186	0.191	0.196	0.191	0.186	0.173	0.159	0.137	0.116	0.088	0.060	0.030	0.000
FINAL CAMBER ↑	0	3/16	3/8	9/16	11/16	13/16	15/16	1	1 1/16	1 1/8	1 1/8	1 1/8	1 1/16	1	15/16	13/16	11/16	9/16	3/8	3/16	0

DEAD LOAD DEFLECTION TABLE FOR SPAN B																						
0.6"Ø LOW RELAXATION STRANDS	GIRDER 5																					
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.046	0.091	0.134	0.172	0.207	0.236	0.260	0.276	0.287	0.290	0.287	0.276	0.260	0.236	0.207	0.172	0.134	0.091	0.046	0.000
DEFLECTION DUE TO SUPERIMPOSED D.L. ✳ ↓	0.000	0.027	0.054	0.079	0.104	0.123	0.143	0.155	0.168	0.172	0.176	0.172	0.168	0.155	0.142	0.123	0.103	0.078	0.054	0.027	0.000
FINAL CAMBER ↑	0	1/4	7/16	5/8	13/16	1	1 1/8	1 1/4	1 5/16	1 3/8	1 3/8	1 3/8	1 5/16	1 1/4	1 1/8	1	13/16	11/16	7/16	1/4	0

✳ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD. DOES NOT INCLUDE WEIGHT OF FORM LINER.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 10/7/2019

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
GIRDER
DEAD LOAD DEFLECTIONS AND CAMBER

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

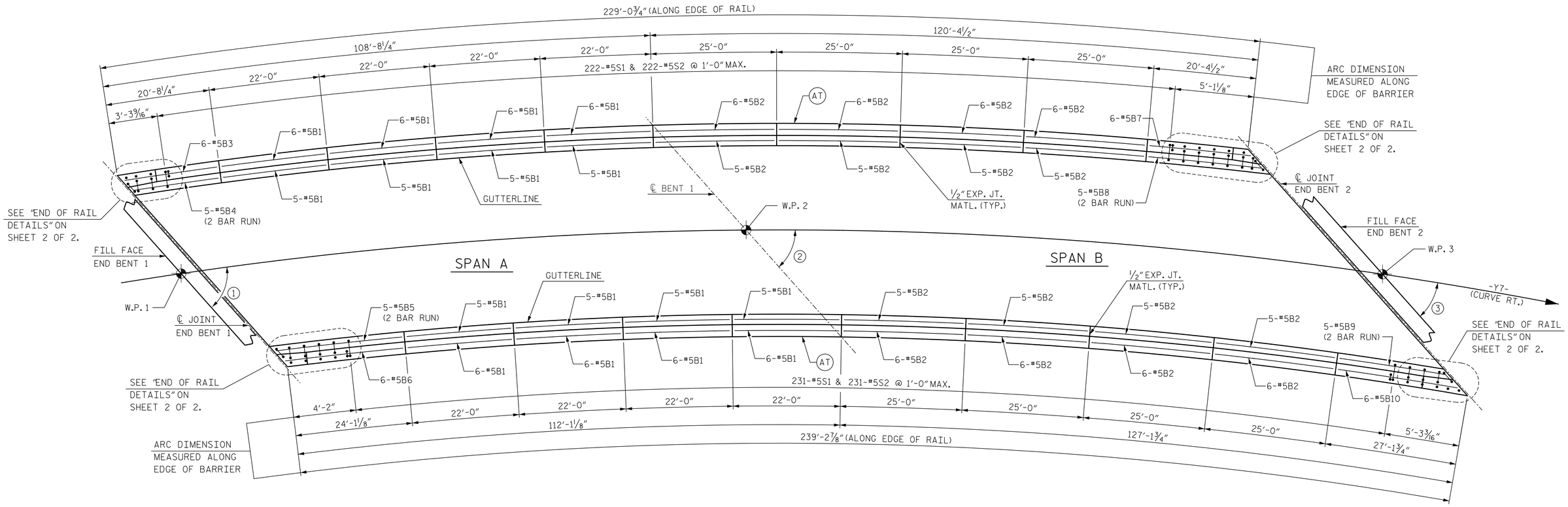
DRAWN BY T. THOMPSON DATE 12/18
CHECKED BY C. SUTARIA DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 18

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-18
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\405_035_I4400BB_SMU_DL02_018_440223.dgn



PLAN OF BARRIER RAIL

① 56°-26'-43" (TANGENT TO CURVE)
② 48°-46'-13" (TANGENT TO CURVE)
③ 40°-09'-40" (TANGENT TO CURVE)

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 17+09.26 -Y7-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47118 RICHARD R. GREENFIELD 10/7/2019

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

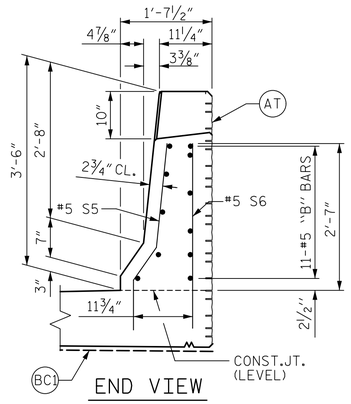
DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 19

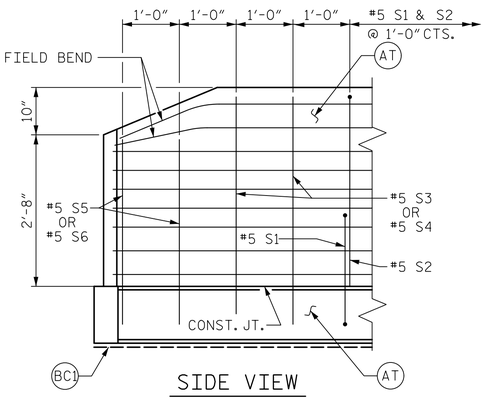
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-19
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\405_037_I4400BB_SMU_BRDI_019_440223.dgn

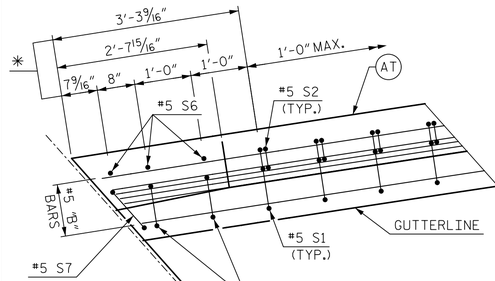


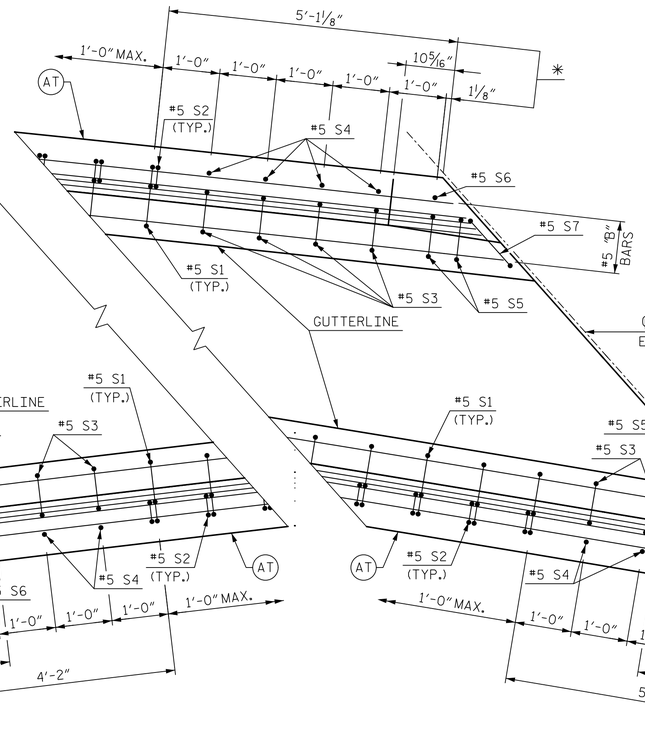
END VIEW



SIDE VIEW

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)





PLAN AT END BENT 1

PLAN AT END BENT 2

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS

✳ ARC DIMENSION MEASURED ALONG EDGE OF BARRIER.

NOTES

THE BARRIER RAIL 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.

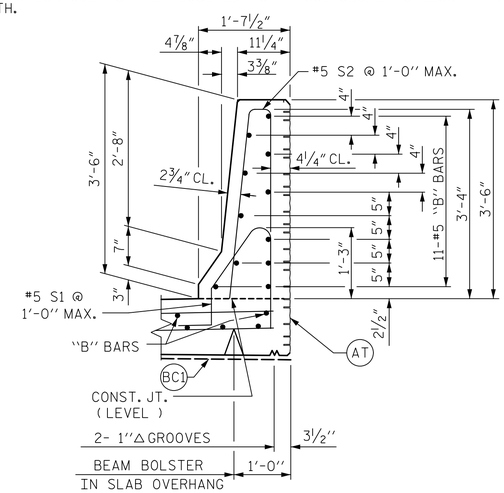
WHEN FOAM JOINT SEAL IS REQUIRED, THE JOINT IN THE DECK SHALL BE SAWED PRIOR TO THE CASTING OF BARRIER RAIL.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

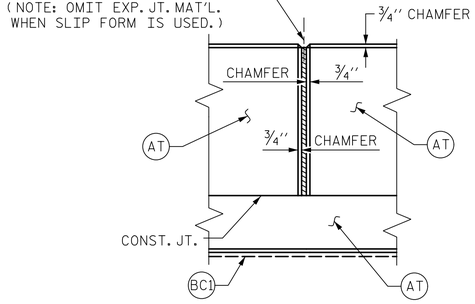
THE #5S1 AND #5S2 BARS MAY BE SHIFTED SLIGHLTY AS REQUIRED TO PROVIDE 2" MINIMUM CONCRETE AT THE ½ INCH EXPANSION JOINT IN THE BARRIER RAIL.

THE #5 S3, S4, S5 AND S6 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE #5 S3, S4, S5 AND S6 BARS IS 18.6 KIPS. FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

GROOVED CONTRACTION JOINTS, 1#2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL OTHER THAN FACES WITH ARCHITECTURAL TREATMENT AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE 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.



SECTION THRU RAIL

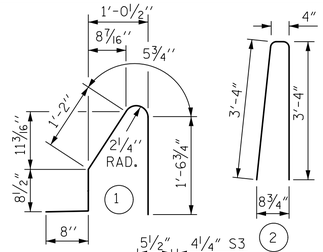


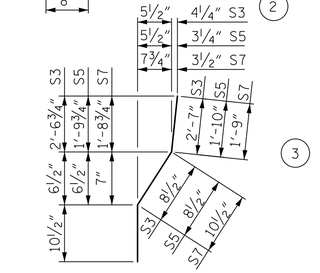
ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ S1	453	#5	1	4'-7"	2,166
✳ S2	453	#5	2	7'-0"	3,307
✳ S3	8	#5	3	4'-2"	35
✳ S4	8	#5	STR	4'-0"	33
✳ S5	7	#5	3	3'-5"	25
✳ S6	9	#5	STR	3'-3"	31
✳ S7	4	#5	3	3'-6"	15
✳ B1	88	#5	STR	21'-8"	1,989
✳ B2	88	#5	STR	24'-8"	2,264
✳ B3	6	#5	STR	20'-1"	126
✳ B4	10	#5	STR	11'-8"	122
✳ B5	10	#5	STR	14'-0"	146
✳ B6	6	#5	STR	23'-10"	149
✳ B7	6	#5	STR	20'-3"	127
✳ B8	10	#5	STR	12'-4"	129
✳ B9	10	#5	STR	14'-9"	154
✳ B10	6	#5	STR	26'-3"	164

✳ EPOXY COATED REINFORCING STEEL	LBS.	10,982
CLASS AA CONCRETE	CU. YDS.	71.3
CONCRETE BARRIER RAIL	LIN. FT.	468.30
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	1,636

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD
Richard R. Greenfield
6/7/2019
ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

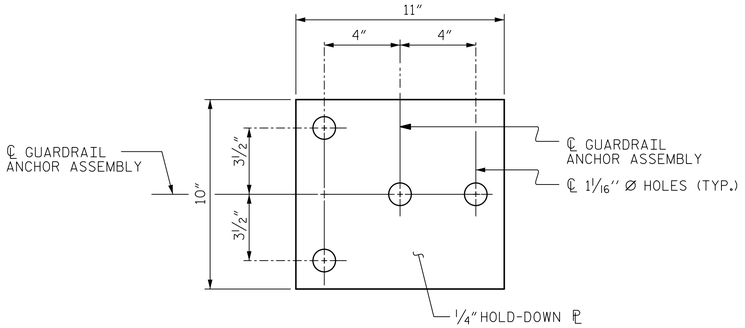
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

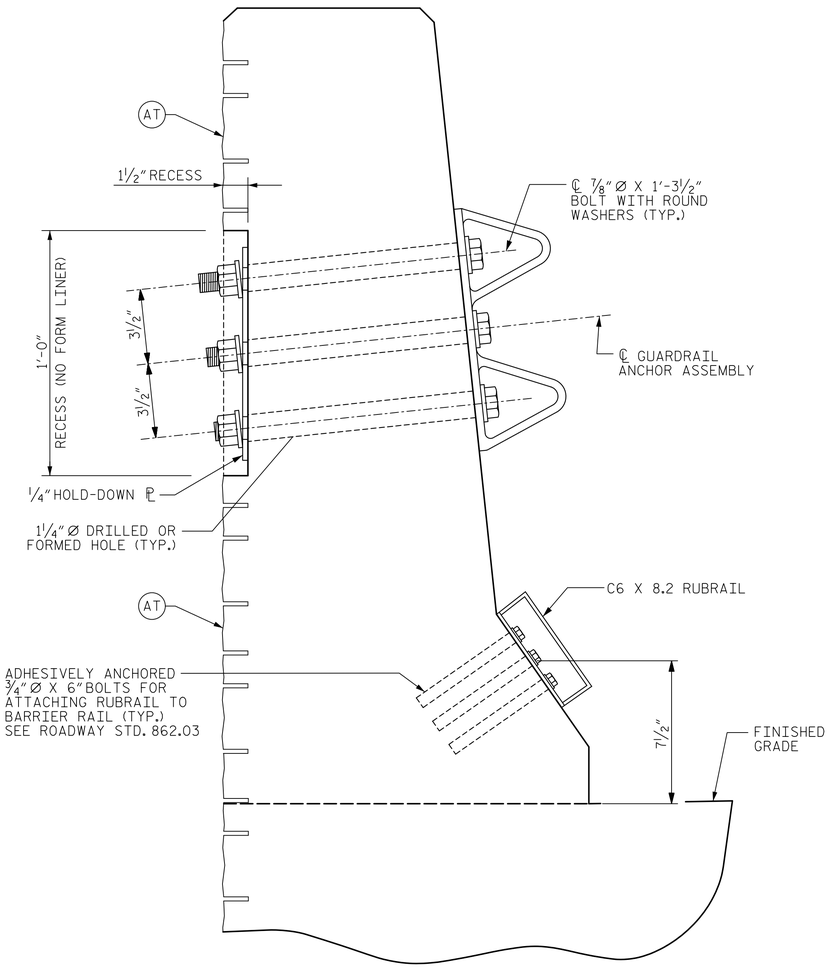
DWG. NO. 20

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-20
1			3			TOTAL SHEETS
2			4			36

6/7/2019
...\405.039_I4400BB_SMU_BR02_020_440223.dgn

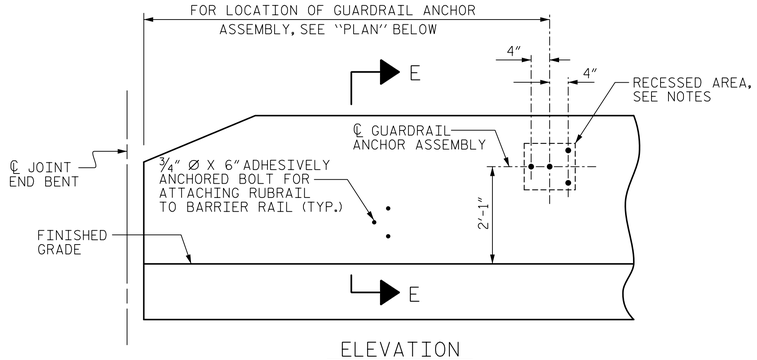


PLAN

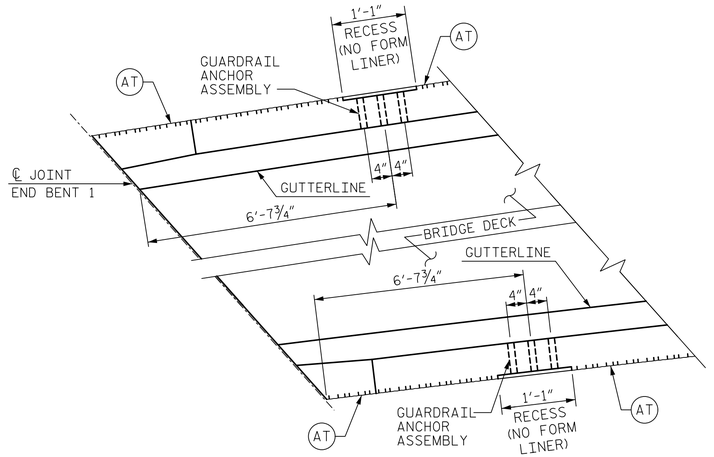


SECTION E-E

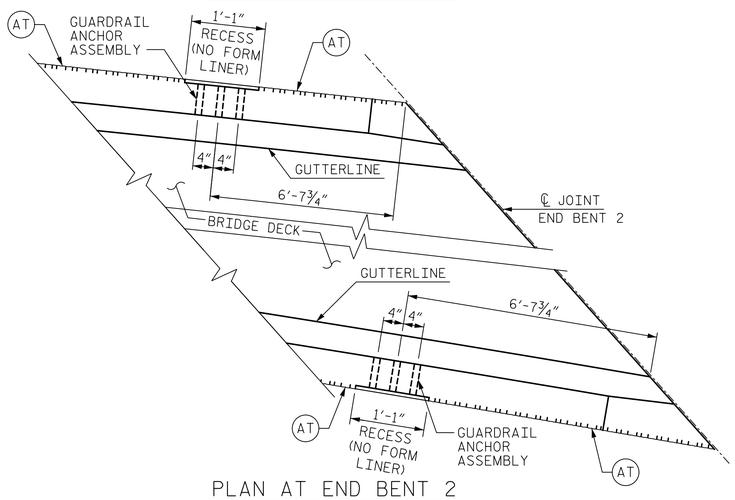
GUARDRAIL ANCHOR ASSEMBLY DETAILS



ELEVATION



PLAN AT END BENT 1



PLAN AT END BENT 2

LOCATION OF ANCHORS FOR GUARDRAIL

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A ¼″ HOLD-DOWN PLATE AND 4 - ⅞″ Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

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 ⅞″ 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.

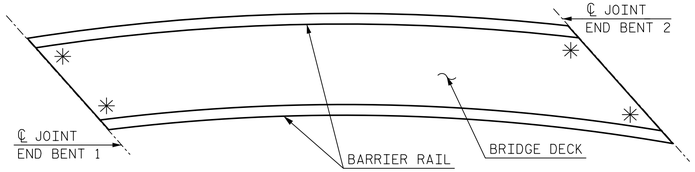
AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

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

THE 1 ¼″ 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.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE ¾″ Ø X 6″ BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ¾″ Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.

RECESSED AREA BELOW HOLD DOWN PLATE SHALL BE FINISHED SMOOTH TO ALLOW FOR COMPLETE SEATING OF PLATE AGAINST BACK OF CONCRETE BARRIER.



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY (4 REQUIRED)

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 Richard R. Greenfield 10/7/2019 ENGINEER RICHARD R. GREENFIELD

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 21

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-21
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\405_04\i4400BB_SMU_GR_02i.440223.dgn

REINFORCING BAR SCHEDULE

EPOXY COATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A1	310	5	STR.	18′-0″	5,820
A2	310	5	STR.	27′-5″	8,865
A3	1	5	STR.	4′-0″	4
A4	1	5	STR.	4′-10″	5
A5	1	5	STR.	5′-7″	6
A6	1	5	STR.	6′-5″	7
A7	1	5	STR.	7′-3″	8
A8	1	5	STR.	8′-0″	8
A9	1	5	STR.	8′-10″	9
A10	1	5	STR.	9′-7″	10
A11	1	5	STR.	10′-5″	11
A12	1	5	STR.	11′-2″	12
A13	1	5	STR.	12′-0″	13
A14	1	5	STR.	12′-9″	13
A15	1	5	STR.	13′-7″	14
A16	1	5	STR.	14′-5″	15
A17	1	5	STR.	15′-2″	16
A18	1	5	STR.	15′-11″	17
A19	1	5	STR.	16′-9″	17
A20	1	5	STR.	17′-6″	18
A21	1	5	STR.	18′-4″	19
A22	1	5	STR.	19′-1″	20
A23	1	5	STR.	19′-11″	21
A24	1	5	STR.	20′-8″	22
A25	1	5	STR.	21′-6″	22
A26	1	5	STR.	22′-3″	23
A27	1	5	STR.	23′-1″	24
A28	1	5	STR.	23′-10″	25
A29	1	5	STR.	24′-7″	26
A30	1	5	STR.	25′-5″	27
A31	1	5	STR.	26′-2″	27
A32	1	5	STR.	26′-11″	28
A33	1	5	STR.	27′-9″	29
A34	1	5	STR.	28′-6″	30
A35	1	5	STR.	29′-4″	31
A36	1	5	STR.	30′-1″	31
A37	1	5	STR.	30′-11″	32
A38	1	5	STR.	31′-8″	33
A39	1	5	STR.	32′-6″	34
A40	1	5	STR.	33′-3″	35
A41	1	5	STR.	34′-0″	35
A42	1	5	STR.	34′-10″	36
A43	1	5	STR.	35′-7″	37
A44	1	5	STR.	36′-4″	38
A45	1	5	STR.	37′-2″	39
A46	1	5	STR.	37′-11″	40
A47	1	5	STR.	38′-10″	41
A48	1	5	STR.	39′-6″	41
A49	1	5	STR.	40′-3″	42
A50	1	5	STR.	41′-0″	43
A51	1	5	STR.	41′-10″	44
A52	1	5	STR.	42′-7″	44
A53	1	5	STR.	42′-8″	45
A54	1	5	STR.	42′-0″	44
A55	1	5	STR.	41′-5″	43
A56	1	5	STR.	40′-9″	43
A57	1	5	STR.	40′-1″	42
A58	1	5	STR.	39′-6″	41
A59	1	5	STR.	38′-10″	41
A60	1	5	STR.	38′-2″	40
A61	1	5	STR.	37′-7″	39
A62	1	5	STR.	36′-11″	39
A63	1	5	STR.	36′-4″	38
A64	1	5	STR.	35′-9″	37
A65	1	5	STR.	35′-1″	37
A66	1	5	STR.	34′-6″	36
A67	1	5	STR.	33′-10″	35
A68	1	5	STR.	33′-3″	35
A69	1	5	STR.	32′-8″	34
A70	1	5	STR.	32′-0″	33
A71	1	5	STR.	31′-5″	33
A72	1	5	STR.	30′-9″	32

REINFORCING BAR SCHEDULE

EPOXY COATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A73	1	5	STR.	30′-2″	31
A74	1	5	STR.	29′-7″	31
A75	1	5	STR.	28′-11″	30
A76	1	5	STR.	28′-4″	30
A77	1	5	STR.	27′-8″	29
A78	1	5	STR.	27′-1″	28
A79	1	5	STR.	26′-6″	28
A80	1	5	STR.	25′-10″	27
A81	1	5	STR.	25′-3″	26
A82	1	5	STR.	24′-8″	26
A83	1	5	STR.	24′-0″	25
A84	1	5	STR.	23′-5″	24
A85	1	5	STR.	22′-9″	24
A86	1	5	STR.	22′-2″	23
A87	1	5	STR.	21′-7″	23
A88	1	5	STR.	20′-11″	22
A89	1	5	STR.	20′-4″	21
A90	1	5	STR.	19′-8″	21
A91	1	5	STR.	19′-1″	20
A92	1	5	STR.	18′-6″	19
A93	1	5	STR.	17′-10″	19
A94	1	5	STR.	17′-4″	18
A95	1	5	STR.	16′-8″	17
A96	1	5	STR.	16′-1″	17
A97	1	5	STR.	15′-5″	16
A98	1	5	STR.	14′-10″	15
A99	1	5	STR.	14′-3″	15
A100	1	5	STR.	13′-7″	14
A101	1	5	STR.	13′-0″	14
A102	1	5	STR.	12′-5″	13
A103	1	5	STR.	11′-10″	12
A104	1	5	STR.	11′-3″	12
A105	1	5	STR.	10′-8″	11
A106	1	5	STR.	10′-0″	10
A107	1	5	STR.	9′-4″	10
A108	1	5	STR.	8′-9″	9
A109	1	5	STR.	8′-2″	9
A110	1	5	STR.	7′-7″	8
A111	1	5	STR.	7′-0″	7
A112	1	5	STR.	6′-5″	7
A113	1	5	STR.	5′-10″	6
A114	3	6	STR.	15′-11″	72
A115	3	6	STR.	23′-10″	107
B1	90	4	STR.	26′-3″	1,578
B2	60	6	STR.	42′-10″	3,860
B3	120	4	STR.	23′-2″	1,857
B4	56	7	STR.	43′-0″	4,922
G1	1	5	STR.	51′-3″	53
G2	2	5	STR.	34′-3″	71
K1	2	8	1	15′-4″	82
K2	6	8	2	24′-9″	396
K3	2	8	1	17′-6″	93
K4	2	8	1	18′-11″	101
K5	6	8	2	30′-3″	485
K6	2	8	1	21′-11″	117
S1	56	5	3	5′-11″	346
S2	24	4	4	6′-2″	99
S5	32	4	4	6′-8″	143
U1	28	4	2	17′-8″	330
EPOXY COATED REINFORCING STEEL TOTAL:					32,153

REINFORCING BAR SCHEDULE

UNCOATED

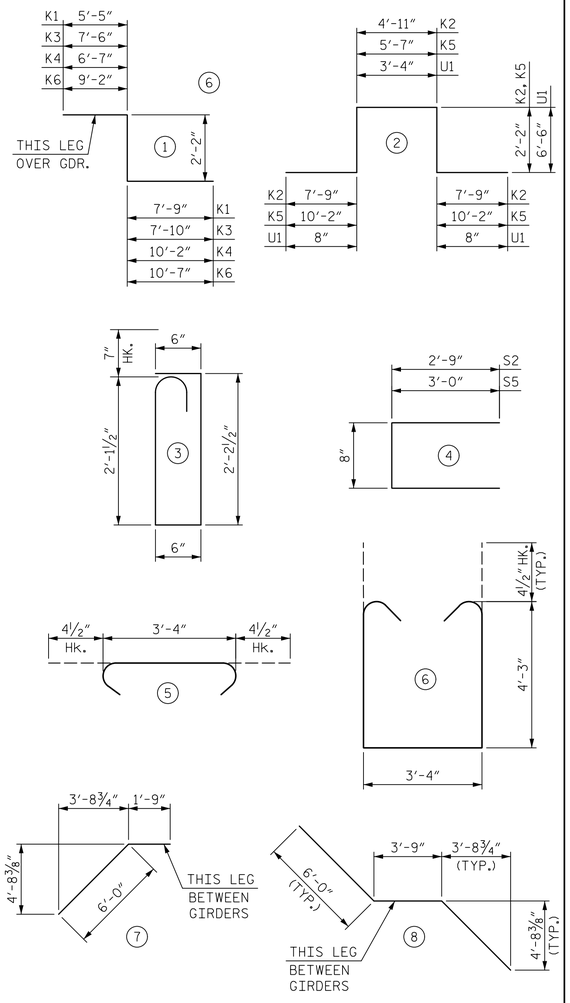
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A201	310	5	STR.	13′-2″	4,257
A202	310	5	STR.	31′-10″	10,293
A203	1	5	STR.	4′-0″	4
A204	1	5	STR.	4′-10″	5
A205	1	5	STR.	5′-7″	6
A206	1	5	STR.	6′-5″	7
A207	1	5	STR.	7′-3″	8
A208	1	5	STR.	8′-0″	8
A209	1	5	STR.	8′-10″	9
A210	1	5	STR.	9′-7″	10
A211	1	5	STR.	10′-5″	11
A212	1	5	STR.	11′-2″	12
A213	1	5	STR.	12′-0″	13
A214	1	5	STR.	12′-9″	13
A215	1	5	STR.	13′-7″	14
A216	1	5	STR.	14′-5″	15
A217	1	5	STR.	15′-2″	16
A218	1	5	STR.	15′-11″	17
A219	1	5	STR.	16′-9″	17
A220	1	5	STR.	17′-6″	18
A221	1	5	STR.	18′-4″	19
A222	1	5	STR.	19′-1″	20
A223	1	5	STR.	19′-11″	21
A224	1	5	STR.	20′-8″	22
A225	1	5	STR.	21′-6″	22
A226	1	5	STR.	22′-3″	23
A227	1	5	STR.	23′-1″	24
A228	1	5	STR.	23′-10″	25
A229	1	5	STR.	24′-7″	26
A230	1	5	STR.	25′-5″	27
A231	1	5	STR.	26′-2″	27
A232	1	5	STR.	26′-11″	28
A233	1	5	STR.	27′-9″	29
A234	1	5	STR.	28′-6″	30
A235	1	5	STR.	29′-4″	31
A236	1	5	STR.	30′-1″	31
A237	1	5	STR.	30′-11″	32
A238	1	5	STR.	31′-8″	33
A239	1	5	STR.	32′-6″	34
A240	1	5	STR.	33′-3″	35
A241	1	5	STR.	34′-0″	35
A242	1	5	STR.	34′-10″	36
A243	1	5	STR.	35′-7″	37
A244	1	5	STR.	36′-4″	38
A245	1	5	STR.	37′-2″	39
A246	1	5	STR.	37′-11″	40
A247	1	5	STR.	38′-10″	41
A248	1	5	STR.	39′-6″	41
A249	1	5	STR.	40′-3″	42
A250	1	5	STR.	41′-0″	43
A251	1	5	STR.	41′-10″	44
A252	1	5	STR.	42′-7″	44
A253	1	5	STR.	42′-8″	45
A254	1	5	STR.	42′-0″	44
A255	1	5	STR.	41′-5″	43
A256	1	5	STR.	40′-9″	43
A257	1	5	STR.	40′-1″	42
A258	1	5	STR.	39′-6″	41
A259	1	5	STR.	38′-10″	41
A260	1	5	STR.	38′-2″	40
A261	1	5	STR.	37′-7″	39
A262	1	5	STR.	36′-11″	39
A263	1	5	STR.	36′-4″	38
A264	1	5	STR.	35′-9″	37
A265	1	5	STR.	35′-1″	37
A266	1	5	STR.	34′-6″	36
A267	1	5	STR.	33′-10″	35
A268	1	5	STR.	33′-3″	35
A269	1	5	STR.	32′-8″	34
A270	1	5	STR.	32′-0″	33
A271	1	5	STR.	31′-5″	33
A272	1	5	STR.	30′-9″	32

REINFORCING BAR SCHEDULE

UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
A273	1	5	STR.	30′-2″	31
A274	1	5	STR.	29′-7″	31
A275	1	5	STR.	28′-11″	30
A276	1	5	STR.	28′-4″	30
A277	1	5	STR.	27′-8″	29
A278	1	5	STR.	27′-1″	28
A279	1	5	STR.	26′-6″	28
A280	1	5	STR.	25′-10″	27
A281	1	5	STR.	25′-3″	26
A282	1	5	STR.	24′-8″	26
A283	1	5	STR.	24′-0″	25
A284	1	5	STR.	23′-5″	24
A285	1	5	STR.	22′-9″	24
A286	1	5	STR.	22′-2″	23
A287	1	5	STR.	21′-7″	23
A288	1	5	STR.	20′-11″	22
A289	1	5	STR.	20′-4″	21
A290	1	5	STR.	19′-8″	21
A291	1	5	STR.	19′-1″	20
A292	1	5	STR.	18′-6″	19
A293	1	5	STR.	17′-10″	19
A294	1	5	STR.	17′-4″	18
A295	1	5	STR.	16′-8″	17
A296	1	5	STR.	16′-1″	17
A297	1	5	STR.	15′-5″	16
A298	1	5	STR.	14′-10″	15
A299	1	5	STR.	14′-3″	15
A2100	1	5	STR.	13′-7″	14
A2101	1	5	STR.	13′-0″	14
A2102	1	5	STR.	12′-5″	13
A2103	1	5	STR.	11′-10″	12
A2104	1	5	STR.	11′-3″	12
A2105	1	5	STR.	10′-8″	11
A2106	1	5	STR.	10′-0″	10
A2107	1	5	STR.	9′-4″	10
A2108	1	5	STR.	8′-9″	9
A2109	1	5	STR.	8′-2″	9
A2110	1	5	STR.	7′-7″	8
A2111	1	5	STR.	7′-0″	7
A2112	1	5	STR.	6′-5″	7
A2113	1	5	STR.	5′-10″	6
B101	175	5	STR.	49′-4″	9,005
B102	56	5	STR.	43′-0″	2,512
K7	4	6	STR.	5′-10″	35
K8	4	6	STR.	7′-4″	44
K9	4	6	STR.	9′-6″	57
K10	4	6	STR.	8′-0″	48
K11	4	6	STR.	9′-9″	59
K12	4	6	STR.	12′-1″	73
K13	40	4	STR.	10′-10″	289
K14	8	4	STR.	6′-10″	37
K15	8	4	STR.	6′-9″	36
K16	14	4	7	7′-9″	72
K17	21	4	8	15′-9″	221
S3	192	4	5	4′-1″	524
S4	8	4	6	12′-7″	67
				REINFORCING STEEL TOTAL:	30,385

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE
BILL OF MATERIAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 ENGINEER RICHARD R. GREENFIELD
Richard R. Greenfield
6/7/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

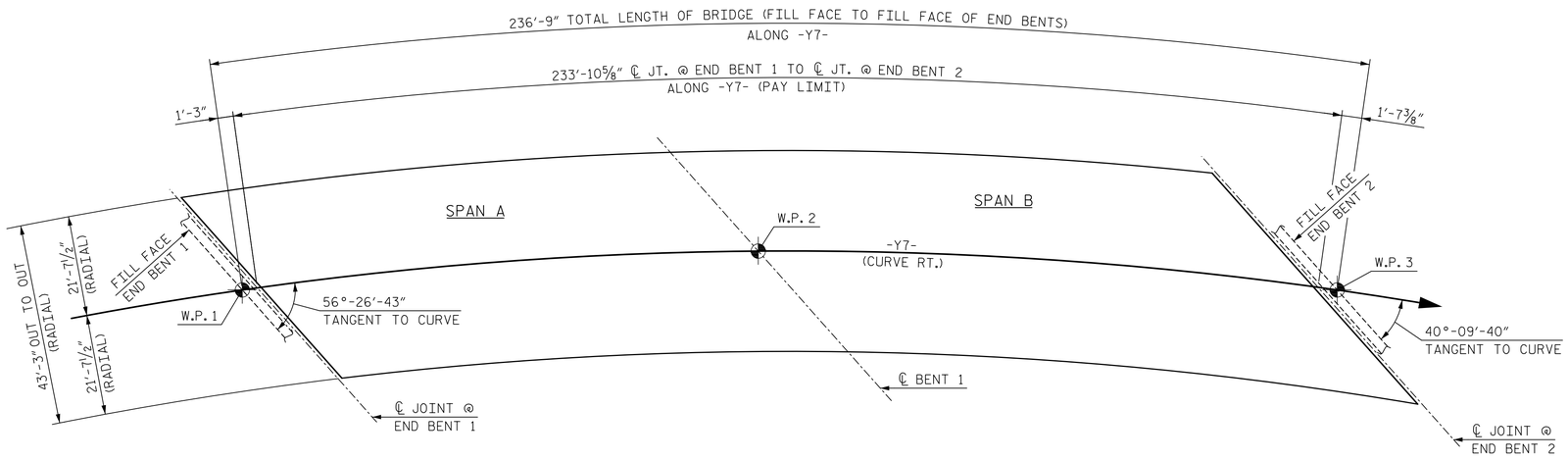
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 22

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-22
1			3			TOTAL SHEETS
2			4			36

6/7/2019
...\405_043_I4400BB_SMU_BMOI_022_440223.dgn



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 10,116)

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	1′-11″	1′-7″	2′-0″	1′-8″	2′-9″
#5	2′-5″	2′-0″	2′-5″	2′-0″	3′-5″
#6	2′-10″		3′-7″	2′-5″	
#7	4′-2″				

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	166.2	30,510	32,288
POUR 2	214.3		
TOTALS**	380.5	30,510	32,288

ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	424
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	SQ. FT.	818
APPLICATION OF BRIDGE COATING (DARK GRAY)	SQ. FT.	4,563

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

GROOVING BRIDGE FLOORS

APPROACH SLABS	2,000	SQ.FT.
BRIDGE DECK	9,355	SQ.FT.
TOTAL	11,355	SQ.FT.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 ENGINEER RICHARD R. GREENFIELD 6/7/2019

Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 1/19
CHECKED BY C. SUTARIA DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 23

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-23
1			3			TOTAL SHEETS
2			4			36

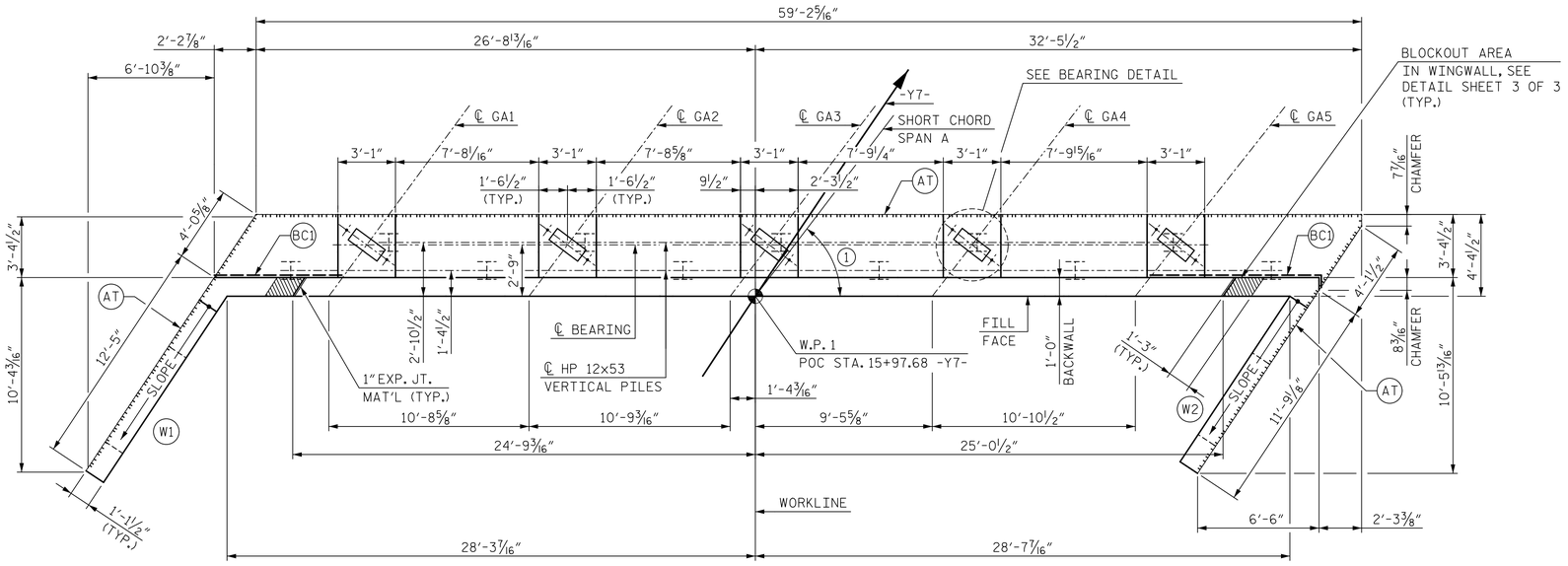
6/7/2019
...\405_045_I4400BB_SMU_BM02_023_440223.dgn

NOTES:

FOR WINGWALL DETAILS AND SECTION A-A, SEE SHEET 2 OF 3.

FOR NOTES AND PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

VARIABLE DIMENSION TABLE					
GIRDER	"A"	"B"	"C"	"X"	"Y"
GA1	2'-0 5/16"	1'-2 3/8"	53°-35'-27"	1'-0 7/8"	9 1/2"
GA2	2'-0 3/4"	1'-2 5/8"	53°-08'-08"	1'-0 13/16"	9 5/8"
GA3	2'-1 3/16"	1'-2 7/8"	52°-40'-02"	1'-0 3/4"	9 11/16"
GA4	2'-1 5/8"	1'-3 1/8"	52°-11'-08"	1'-0 5/8"	9 13/16"
GA5	2'-2 1/16"	1'-3 3/8"	51°-41'-23"	1'-0 9/16"	9 15/16"



PLAN

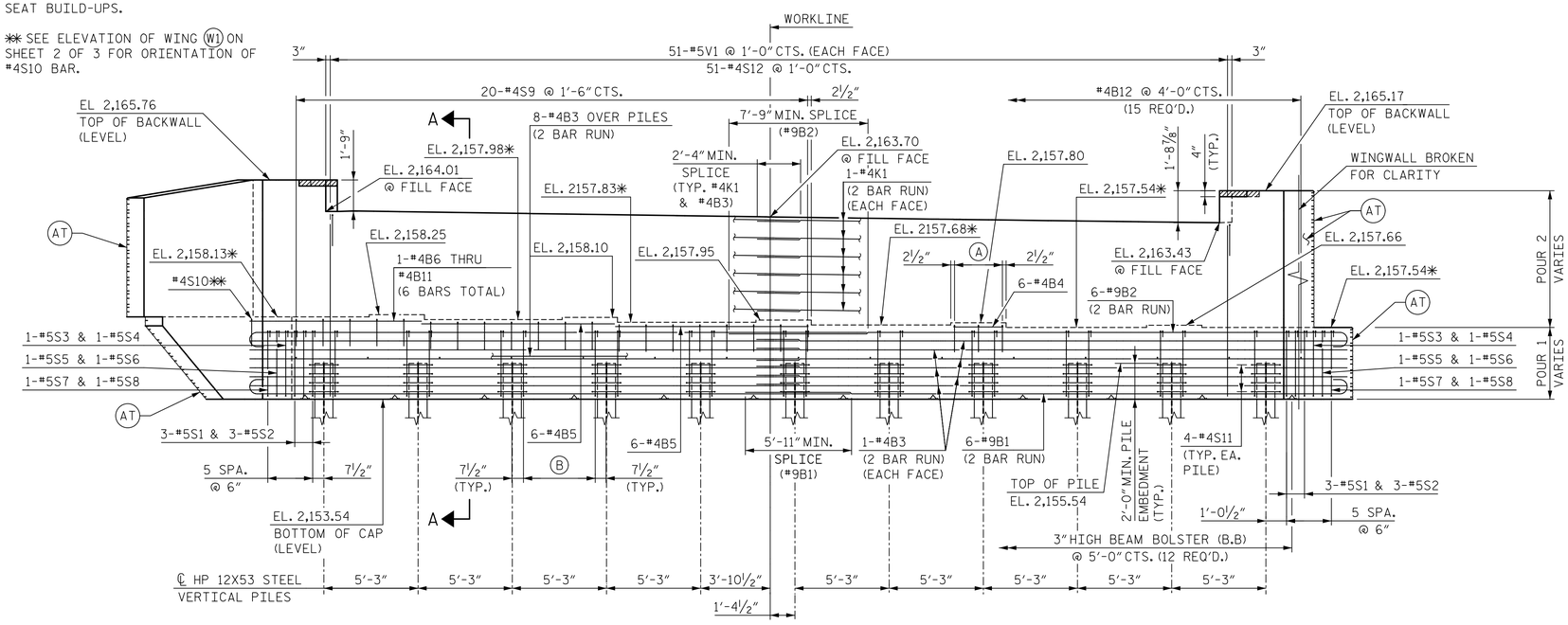
(1) 52°-36'-28" (TO SHORT CHORD)

(A) 3-#4S9 @ 1'-4" CTS.

(B) 9-#5S1 & 9-#5S2 @ 6" CTS. (TYP. EACH BAY)

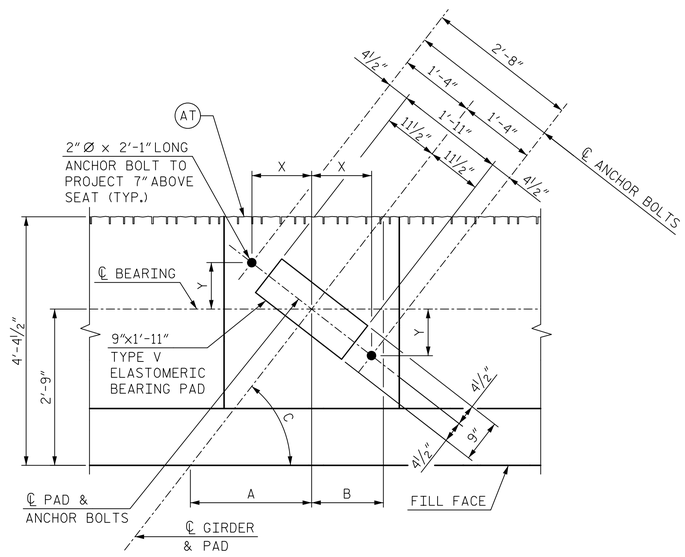
✳ SEE SHEET 2 OF 3 FOR LOCATIONS OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS.

✳✳ SEE ELEVATION OF WING (W1) ON SHEET 2 OF 3 FOR ORIENTATION OF #4S10 BAR.



ELEVATION

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)



BEARING DETAIL

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD ENGINEER
Richard R. Greenfield
6/7/2019

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

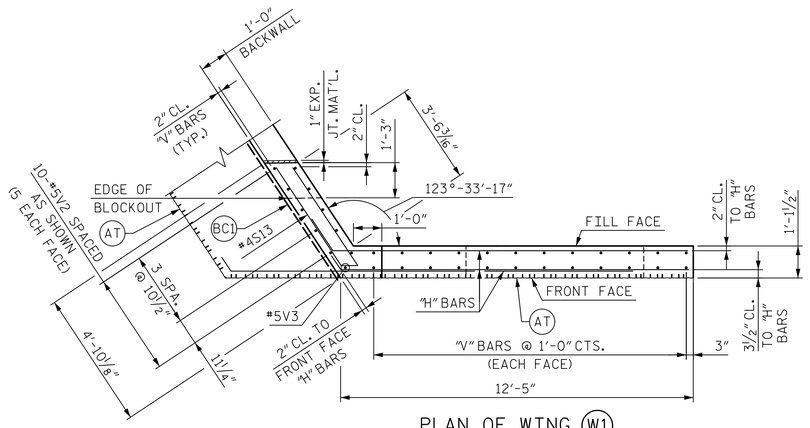
DRAWN BY A. WAGNER DATE 1/19
CHECKED BY R. GREENFIELD DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 24

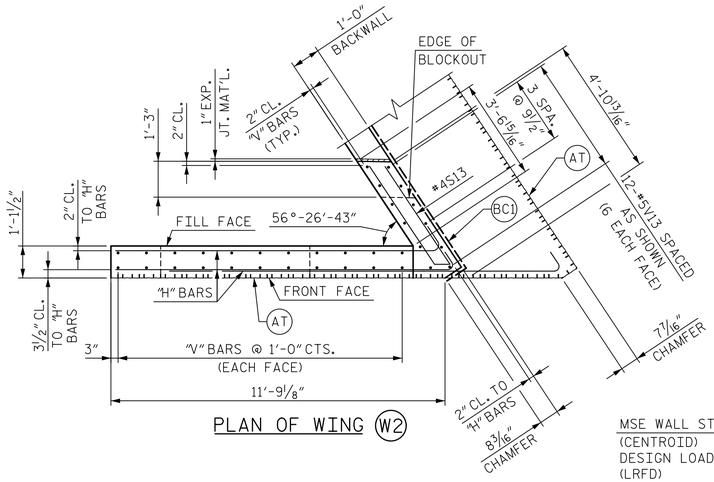
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-24
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

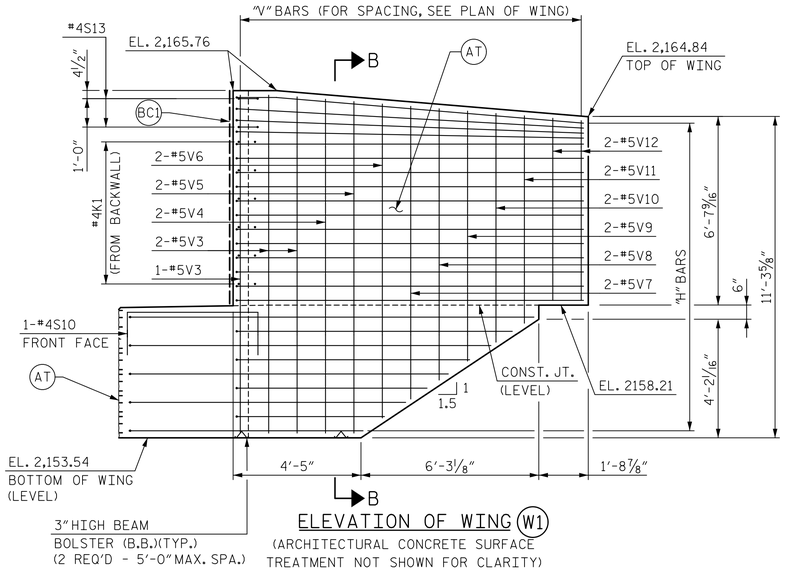
6/7/2019
...\405_047_I4400BB_SMU_EOI_024_440223.dgn



PLAN OF WING (W1)

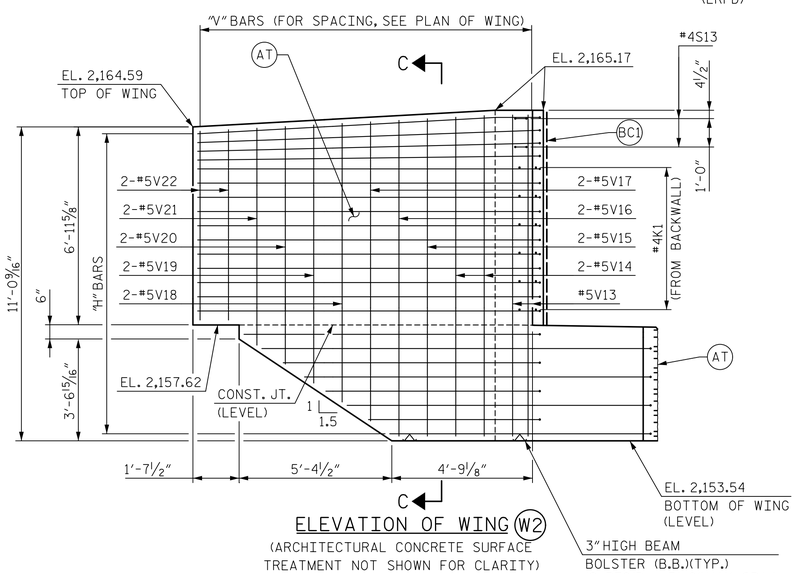


PLAN OF WING (W2)



ELEVATION OF WING (W1)

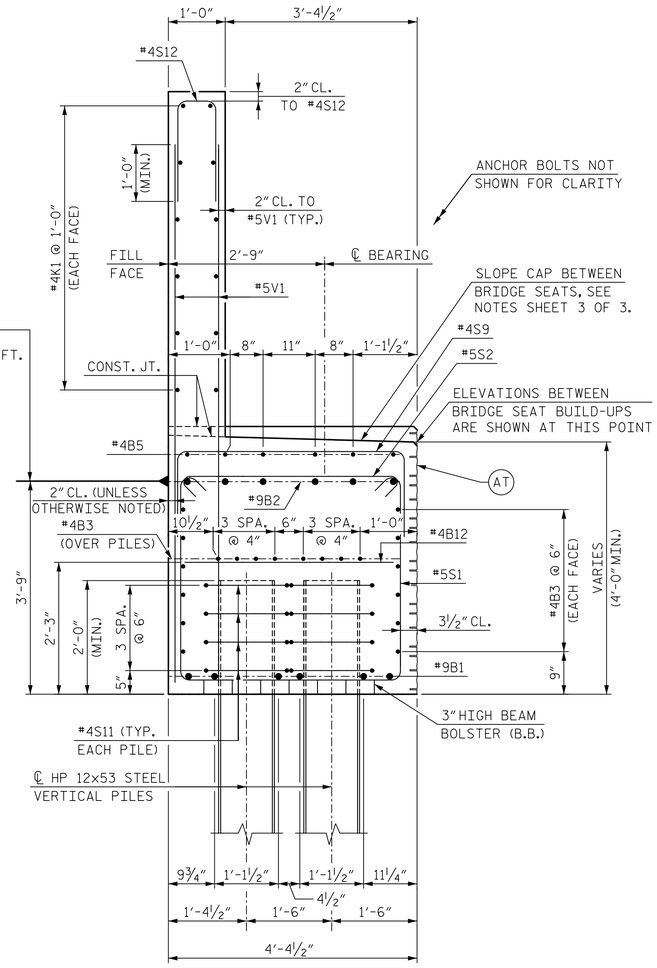
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)



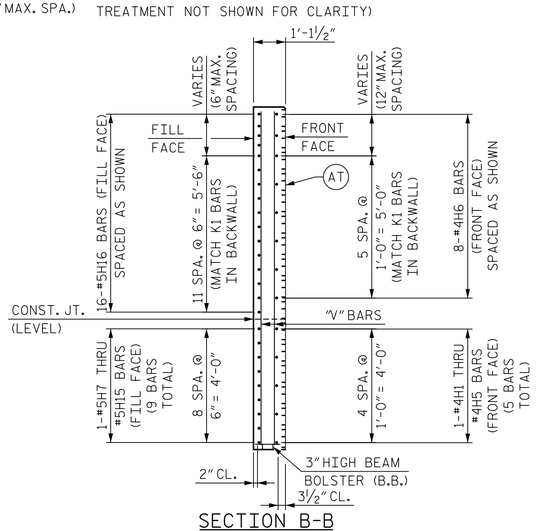
ELEVATION OF WING (W2)

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

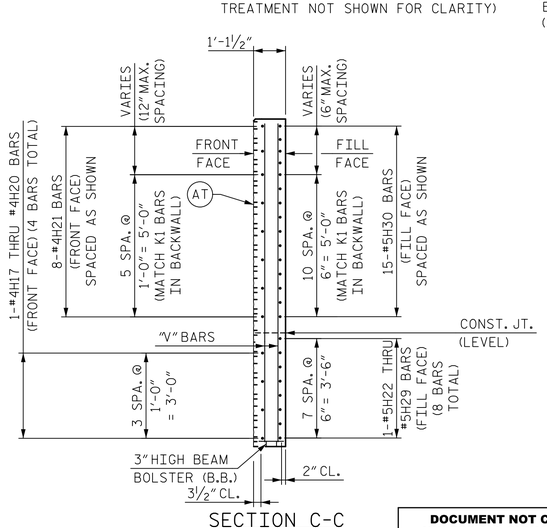
MSE WALL STRAPS (CENTROID) DESIGN LOAD = 3.5 K/FT. (LRFD)



SECTION A-A



SECTION B-B



SECTION C-C

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

NOTES:

FOR NOTES, SEE SHEET 3 OF 3.

FOR BLOCKOUT IN WINGWALL, SEE SHEET 3 OF 3.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 6/7/2019 ENGINEER

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

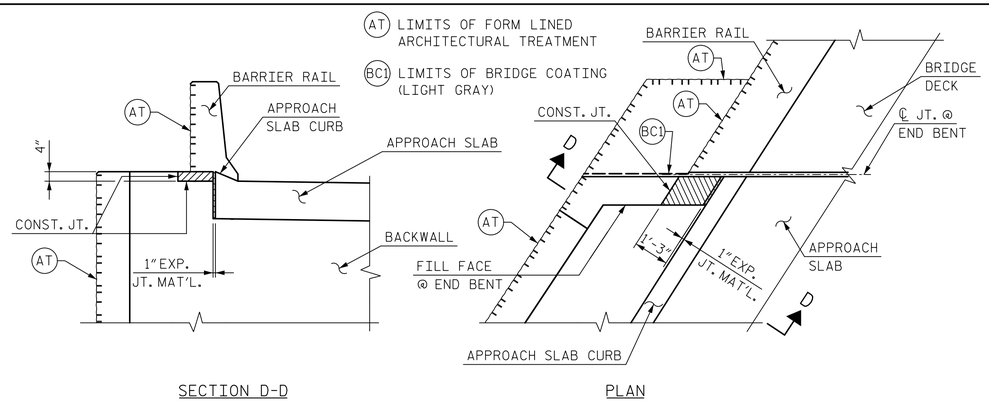
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 1/19
CHECKED BY R. GREENFIELD DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 25

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-25
1			3			TOTAL SHEETS
2			4			36

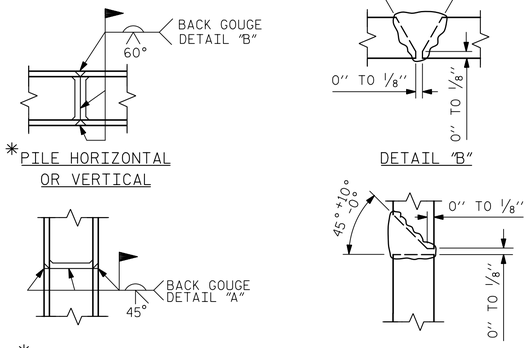
6/7/2019
...\405_049_I4400BB_SMU_E02_025_440223.dgn



SECTION D-D PLAN

NOTE:
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

BLOCKOUT IN WINGWALL



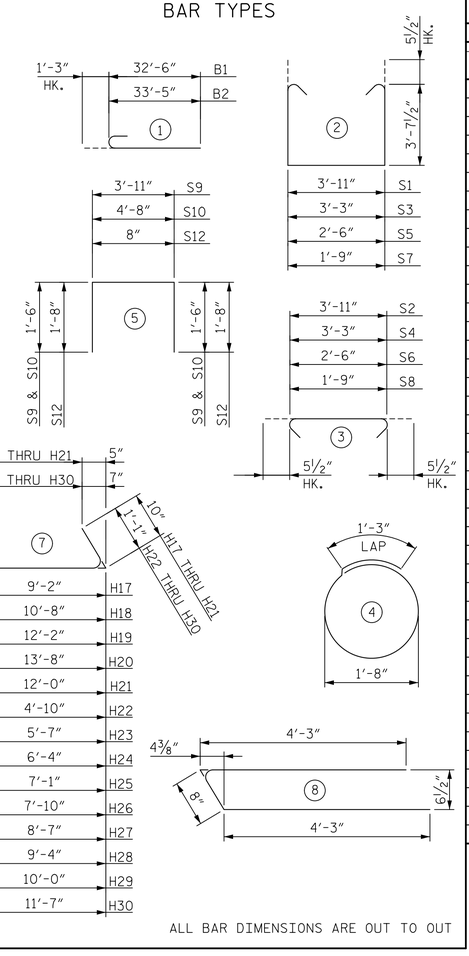
*PILE HORIZONTAL OR VERTICAL — DETAIL "B"

*PILE VERTICAL — DETAIL "A"

* POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	9	1	33'-9"	1,377	H29	1	5	7	11'-1"	12
B2	12	9	1	34'-8"	1,414	H30	15	5	7	12'-8"	198
B3	40	4	STR	30'-8"	819						
B4	6	4	STR	2'-9"	11	K1	24	4	STR	30'-8"	492
B5	12	4	STR	10'-9"	86						
B6	1	4	STR	7'-3"	5	S1	96	5	2	12'-1"	1,210
B7	1	4	STR	7'-8"	5	S2	96	5	3	4'-10"	484
B8	1	4	STR	8'-1"	5	S3	2	5	2	11'-5"	24
B9	1	4	STR	8'-9"	6	S4	2	5	3	4'-2"	9
B10	1	4	STR	9'-2"	6	S5	2	5	2	10'-8"	22
B11	1	4	STR	9'-8"	6	S6	2	5	3	3'-5"	7
B12	15	4	STR	3'-11"	39	S7	2	5	2	9'-11"	21
						S8	2	5	3	2'-8"	6
H1	1	4	6	9'-1"	6	S9	23	4	5	6'-11"	106
H2	1	4	6	10'-7"	7	S10	1	4	5	7'-8"	5
H3	1	4	6	12'-1"	8	S11	44	4	4	6'-6"	191
H4	1	4	6	13'-7"	9	S12	51	4	5	4'-0"	136
H5	1	4	6	15'-1"	10	S13	4	4	8	9'-2"	24
H6	8	4	6	12'-11"	69						
H7	1	5	6	6'-4"	7	V1	102	5	STR	9'-6"	1,011
H8	1	5	6	7'-1"	7	V2	10	5	STR	11'-8"	122
H9	1	5	6	7'-10"	8	V3	5	5	STR	11'-10"	62
H10	1	5	6	8'-7"	9	V4	2	5	STR	11'-9"	25
H11	1	5	6	9'-4"	10	V5	2	5	STR	11'-8"	24
H12	1	5	6	10'-1"	11	V6	2	5	STR	11'-0"	23
H13	1	5	6	10'-10"	11	V7	2	5	STR	10'-3"	21
H14	1	5	6	11'-7"	12	V8	2	5	STR	9'-6"	20
H15	1	5	6	12'-4"	13	V9	2	5	STR	8'-9"	18
H16	16	5	6	14'-1"	235	V10	2	5	STR	8'-0"	17
H17	1	4	7	10'-0"	7	V11	2	5	STR	7'-3"	15
H18	1	4	7	11'-6"	8	V12	4	5	STR	6'-4"	26
H19	1	4	7	13'-0"	9	V13	12	5	STR	11'-1"	139
H20	1	4	7	14'-6"	10	V14	4	5	STR	11'-3"	47
H21	8	4	7	12'-10"	69	V15	2	5	STR	11'-2"	23
H22	1	5	7	5'-11"	6	V16	2	5	STR	11'-1"	23
H23	1	5	7	6'-8"	7	V17	2	5	STR	10'-6"	22
H24	1	5	7	7'-5"	8	V18	2	5	STR	9'-9"	20
H25	1	5	7	8'-2"	9	V19	2	5	STR	9'-0"	19
H26	1	5	7	8'-11"	9	V20	2	5	STR	8'-4"	17
H27	1	5	7	9'-8"	10	V21	2	5	STR	7'-8"	16
H28	1	5	7	10'-5"	11	V22	4	5	STR	6'-8"	28

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

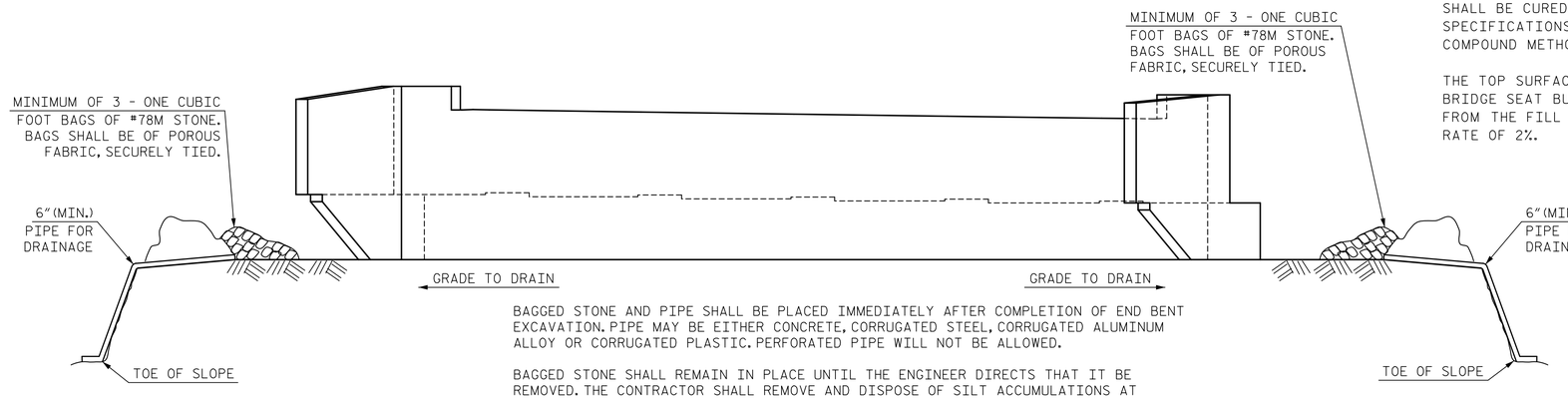
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

QUANTITIES

REINFORCING STEEL	LBS.	9,110
CLASS "A" CONCRETE BREAKDOWN		
POUR 1 - CAP & BOT. OF WINGS	CU. YDS.	44.2
POUR 2 - TOP OF WINGS & BACKWALL	CU. YDS.	20.2
TOTAL	CU. YDS.	64.4
HP 12x53 STEEL PILES	NO.	11
	LIN. FT.	650
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	537
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	SQ. FT.	103



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 FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT 1

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD ENGINEER 6/7/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

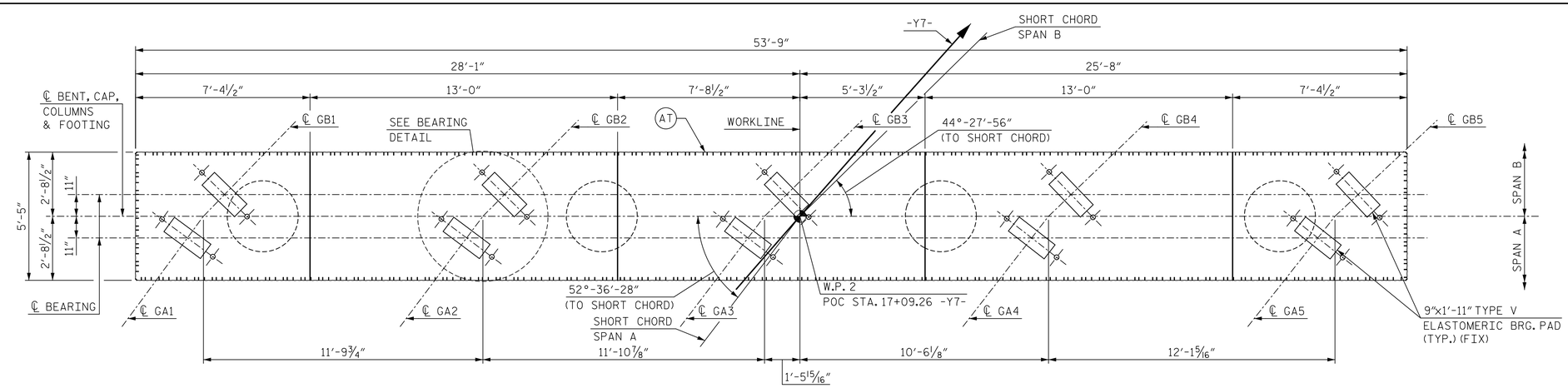
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 1/19
CHECKED BY R. GREENFIELD DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

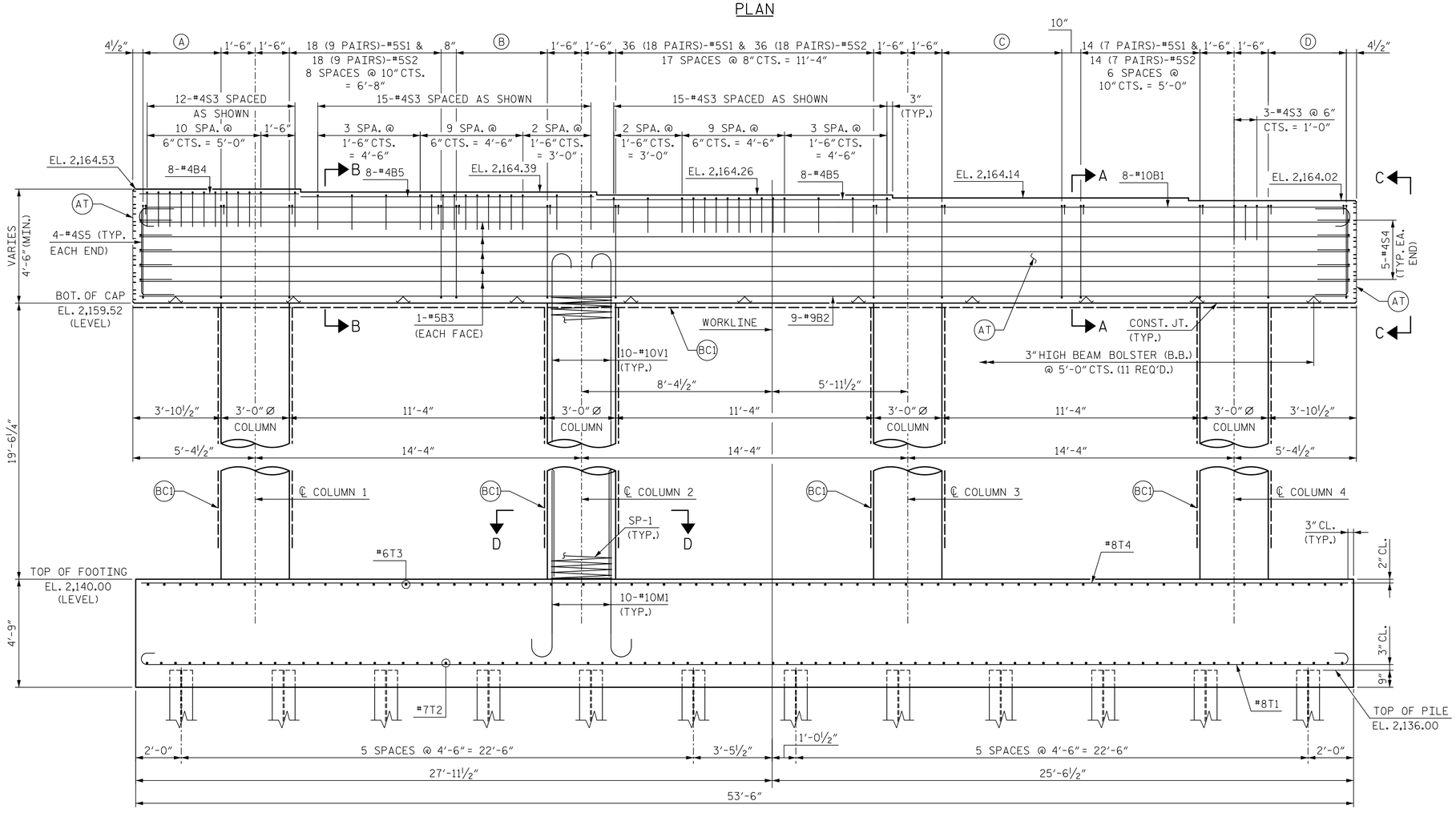
DWG. NO. 26

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-26
1			3			TOTAL SHEETS
2			4			36

6/7/2019
...\405_05\I4400BB_SMU_E03_026_440223.dgn



PLAN



ELEVATION

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

(A) 14 (7 PAIRS)-#5S1 & 14 (7 PAIRS)-#5S2 6 SPACES @ 7" CTS. = 3'-6"

(B) 18 (9 PAIRS)-#5S1 & 18 (9 PAIRS)-#5S2 8 SPACES @ 6" CTS. = 4'-0"

(C) 24 (12 PAIRS)-#5S1 & 24 (12 PAIRS)-#5S2 11 SPACES @ 6" CTS. = 5'-6"

(D) 16 (8 PAIRS)-#5S1 & 16 (8 PAIRS)-#5S2 7 SPACES @ 6" CTS. = 3'-6"

NOTES:

FOR NOTES, SEE SHEET 3 OF 3.

FOR SECTION VIEWS, SEE SHEET 3 OF 3.

FOR FOOTING PLAN, SEE SHEET 2 OF 3.

FOR BEARING DETAIL SEE SHEET 2 OF 3.

FOR END VIEW, SEE SHEET 2 OF 3.

LIMITS OF BRIDGE COATING SHALL EXTEND A MINIMUM OF 1 FT BELOW THE PROPOSED GROUND LINE.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 10/7/2019 RICHARD R. GREENFIELD

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

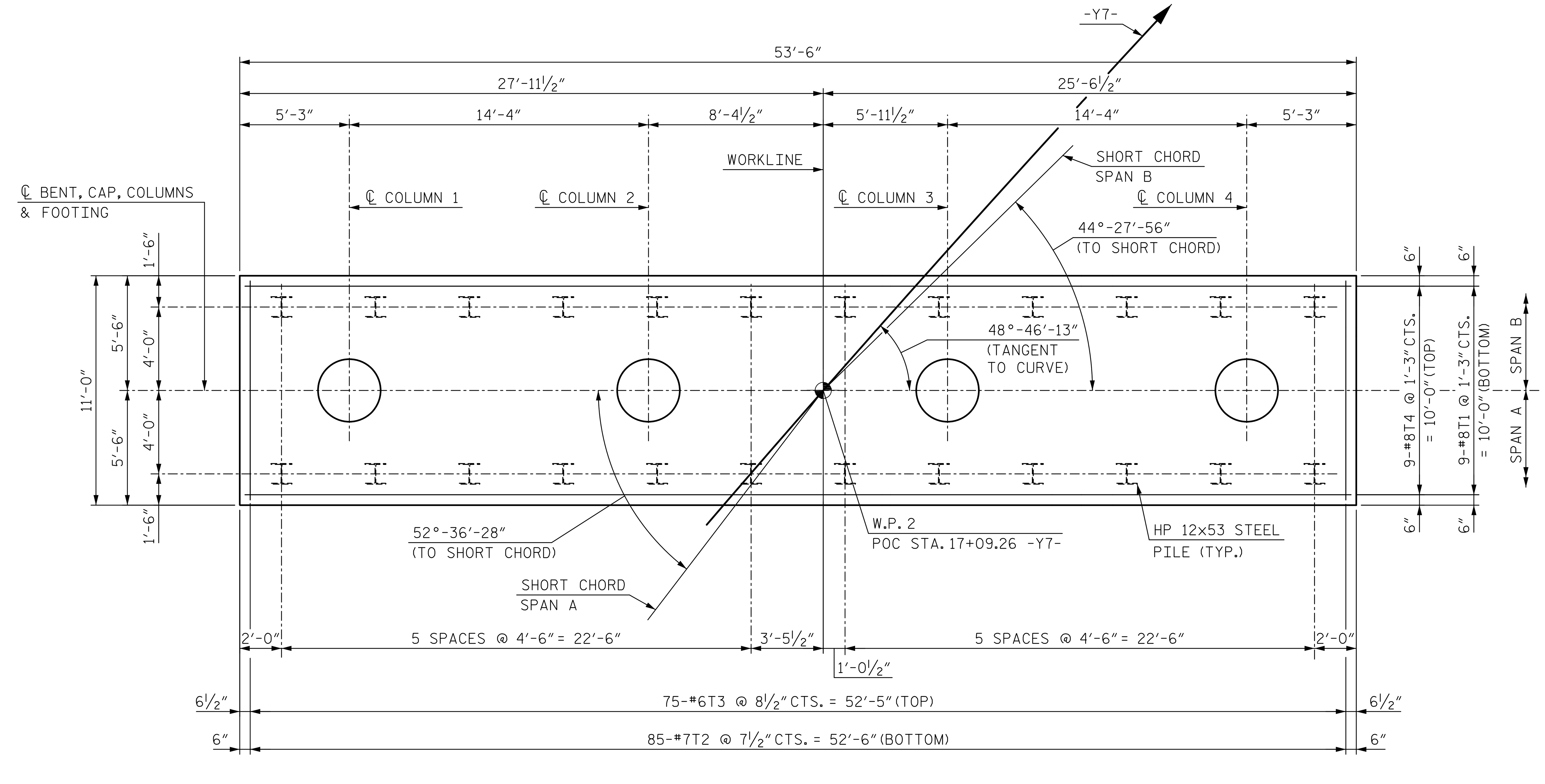
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 2/19
CHECKED BY A. WAGNER DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

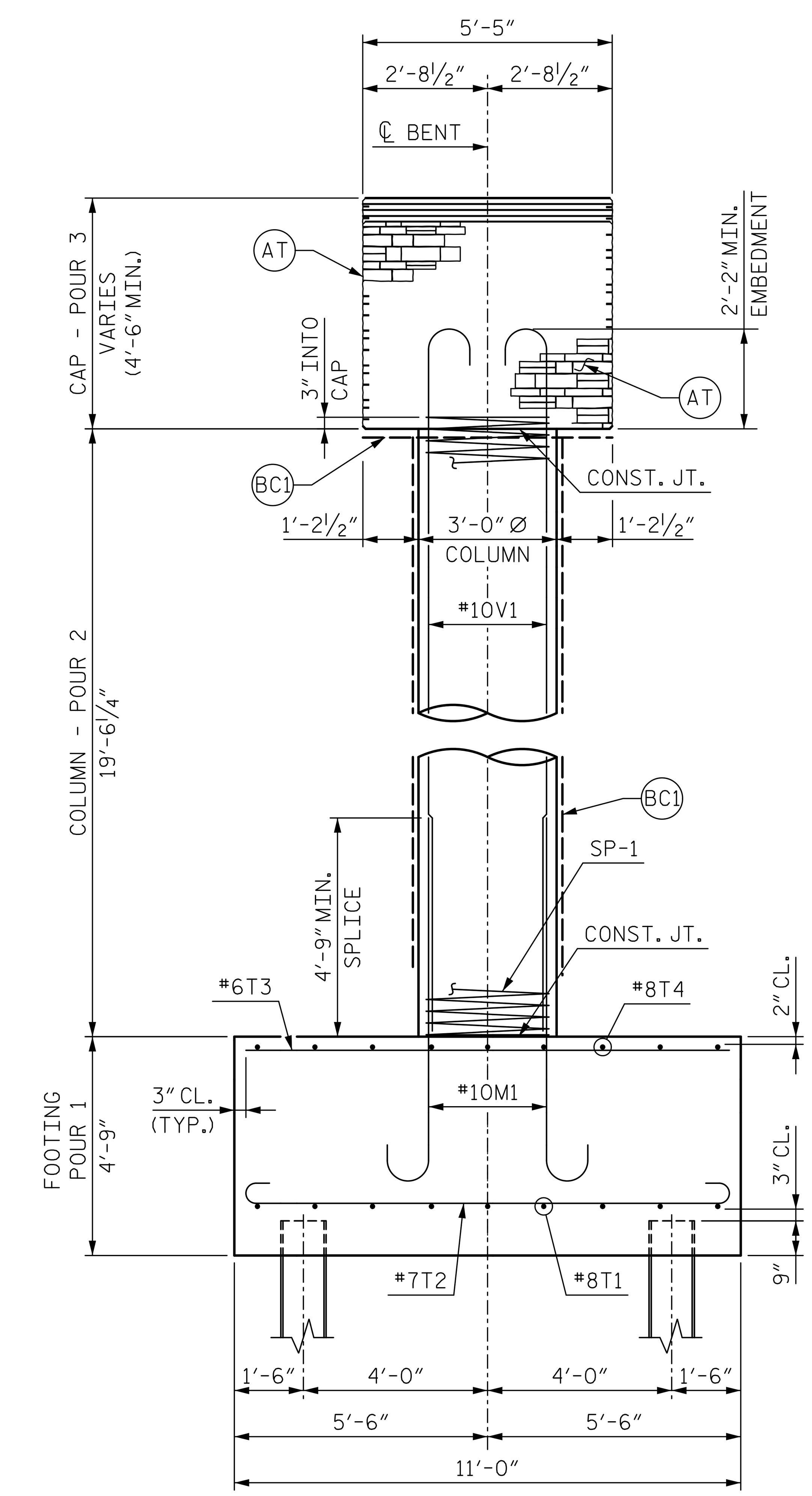
DWG. NO. 27

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-27
1			3			TOTAL SHEETS
2			4			36

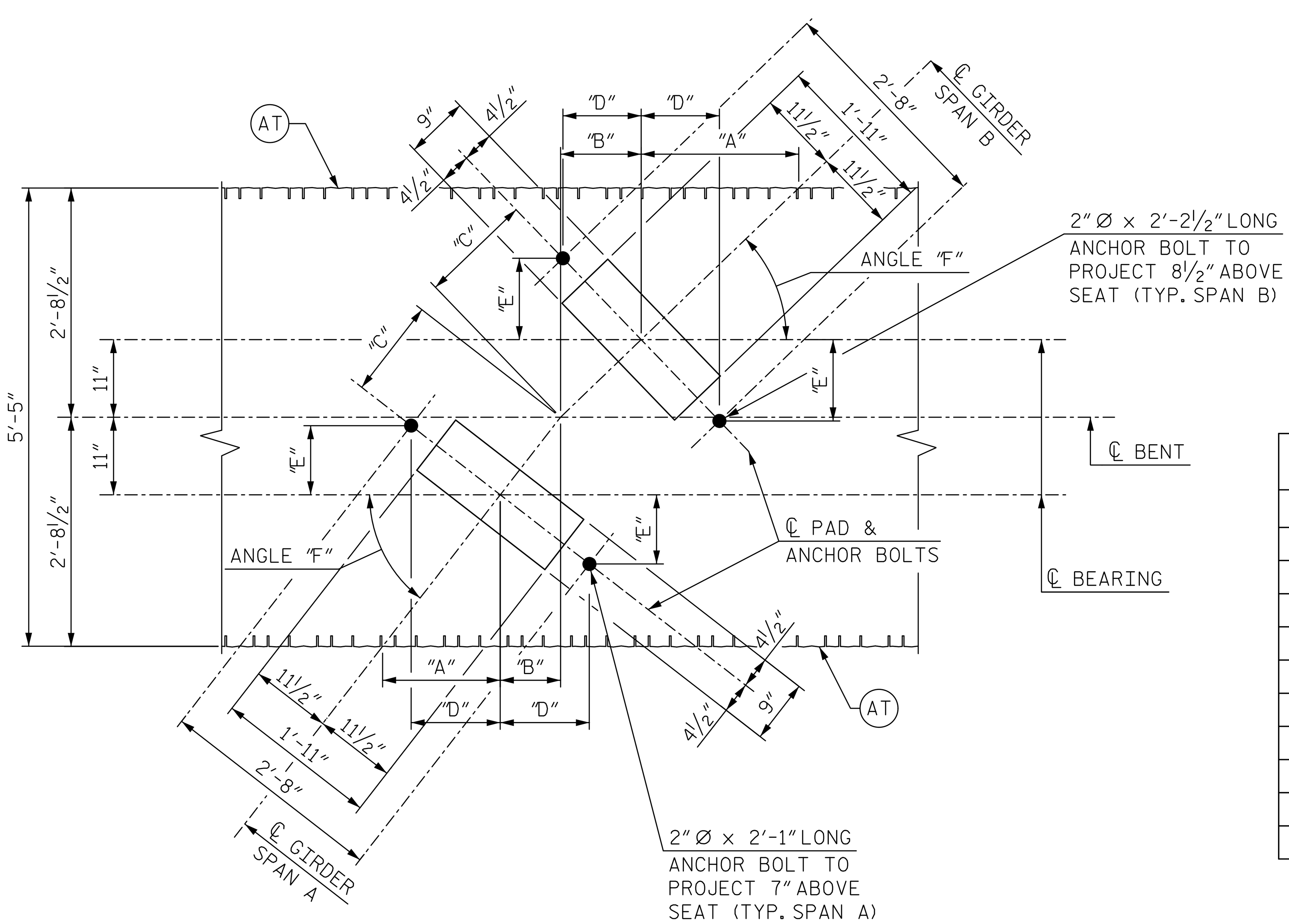
6/7/2019
...\405_053_I4400BB_SMU_BOI_027_440223.dgn



FOOTING PLAN



END VIEW



BEARING DETAIL

VARIABLE DIMENSION TABLE						
GIRDER	"A"	"B"	"C"	"D"	"E"	"F"
GA1	1'-3⅞"	8⅛"	1'-1 11/16"	1'-0⅞"	9½"	53°-35'-27"
GA2	1'-4⅛"	8¼"	1'-1¾"	1'-0 13/16"	9⅝"	53°-08'-08"
GA3	1'-4⅜"	8⅜"	1'-1 13/16"	1'-0¾"	9 11/16"	52°-40'-02"
GA4	1/-4 11/16"	8 9/16"	1'-1 15/16"	1'-0⅝"	9 13/16"	52°11'-08"
GA5	1'-5"	8 11/16"	1'-2"	1'-0 9/16"	9 15/16"	51°-41'-23"
GB1	1'-8 15/16"	10 11/16"	1'-3⅜"	11 7/16"	11 3/16"	45°-46'-29"
GB2	1'-9⅜"	10 15/16"	1'-3½"	11⅜"	11¼"	45°-10'-12"
GB3	1'-9⅞"	11 3/16"	1'-3 11/16"	11¼"	11⅜"	44°-32'-43"
GB4	1'-10 5/16"	11 7/16"	1'-3⅞"	11⅛"	11½"	43°-53'-56"
GB5	1'-10⅞"	11 11/16"	1'-4 1/16"	10 15/16"	11 11/16"	43°-13'-47"

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

NOTE:

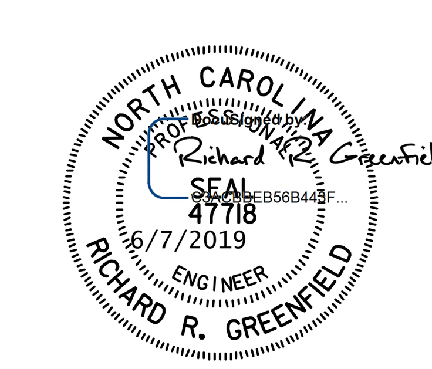
FOR NOTES, SEE SHEET 3 OF 3.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 3



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1 DETAILS

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY	C. TOMPKINS	DATE	2/19
CHECKED BY	A. WAGNER	DATE	2/19
DESIGN ENGINEER OF RECORD	R. GREENFIELD	DATE	5/19

DWG. NO. 28

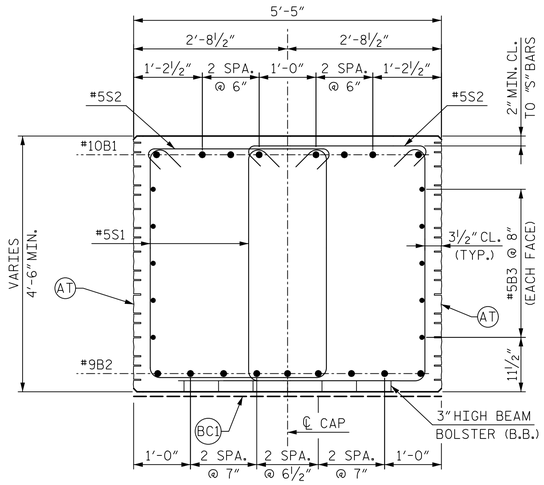
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

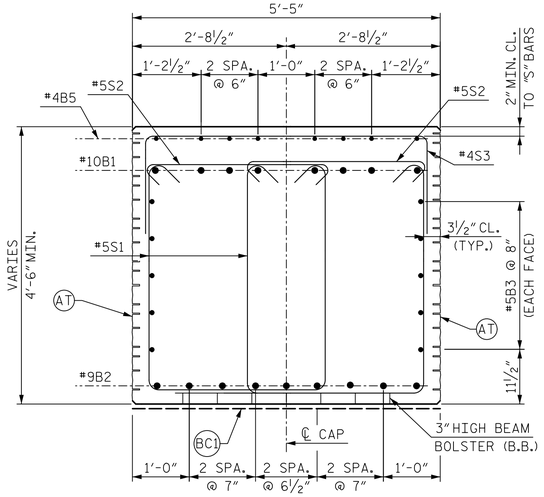
SHEET NO. S5-28

TOTAL SHEETS 36

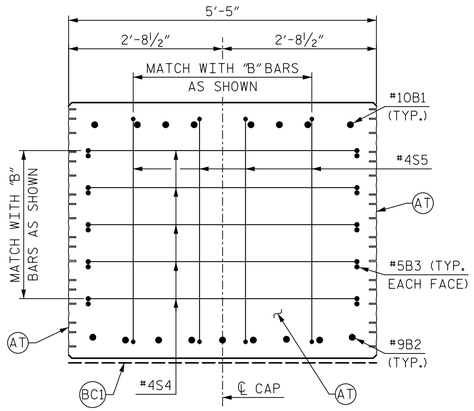
6/7/2019
...1405_055_I4400BB_SMU_B02_028_440223.dgn



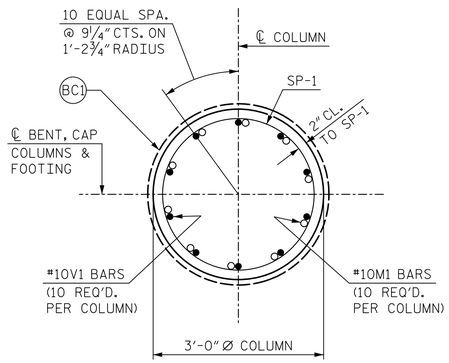
SECTION A-A



SECTION B-B

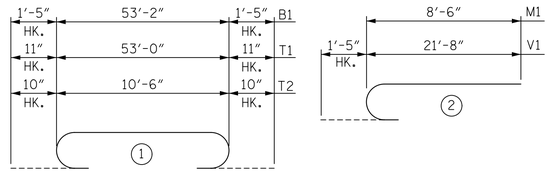


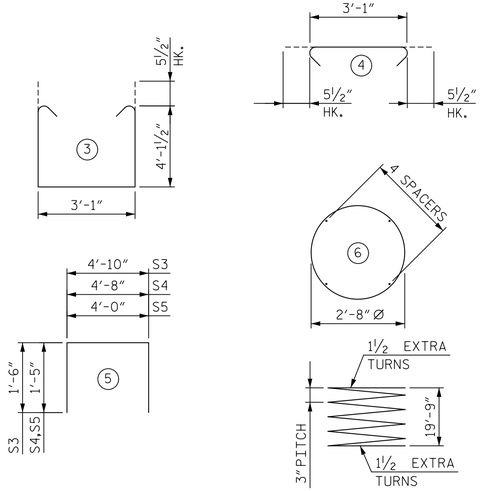
SECTION C-C
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)



SECTION D-D

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT (LBS.)
B1	8	10	1	56′-0″	1,928
B2	9	9	STR.	53′-2″	1,627
B3	10	5	STR.	53′-2″	555
B4	8	4	STR	6′-11″	37
B5	16	4	STR.	12′-10″	137
M1	40	10	2	9′-11″	1,707
S1	140	5	3	12′-3″	1,789
S2	140	5	4	4′-0″	584
S3	45	4	5	7′-10″	235
S4	10	4	5	7′-6″	50
S5	8	4	4	6′-10″	37
T1	9	8	1	54′-10″	1,318
T2	85	7	1	12′-2″	2,114
T3	75	6	STR.	10′-6″	1,183
T4	9	8	STR.	53′-0″	1,274
V1	40	10	2	23′-1″	3,973
SP-1	4	✳	6	676′-7″	1,808

QUANTITIES

REINFORCING STEEL	LBS.	18,548
SPIRAL COLUMN REINFORCING STEEL	LBS.	1,808
CLASS "A" CONCRETE BREAKDOWN		
FOOTING POUR 1	CU. YDS.	103.5
COLUMNS POUR 2	CU. YDS.	20.4
CAP POUR 3	CU. YDS.	51.2
TOTAL	CU. YDS.	175.1
HP 12x53 STEEL PILES	NO.	24
	LIN. FT.	600
FOUNDATION EXCAVATION	LUMP SUM	LUMP SUM
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	562
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	SQ. FT.	999

✳ THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

FOR PILE SPLICE DETAILS, SEE "SUBSTRUCTURE END BENT 1 DETAILS" SHEET 3 OF 3.

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 47718 ENGINEER RICHARD R. GREENFIELD

DocuSigned by: Richard R. Greenfield 8/14/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY C. TOMPKINS DATE 2/19
CHECKED BY A. WAGNER DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 29

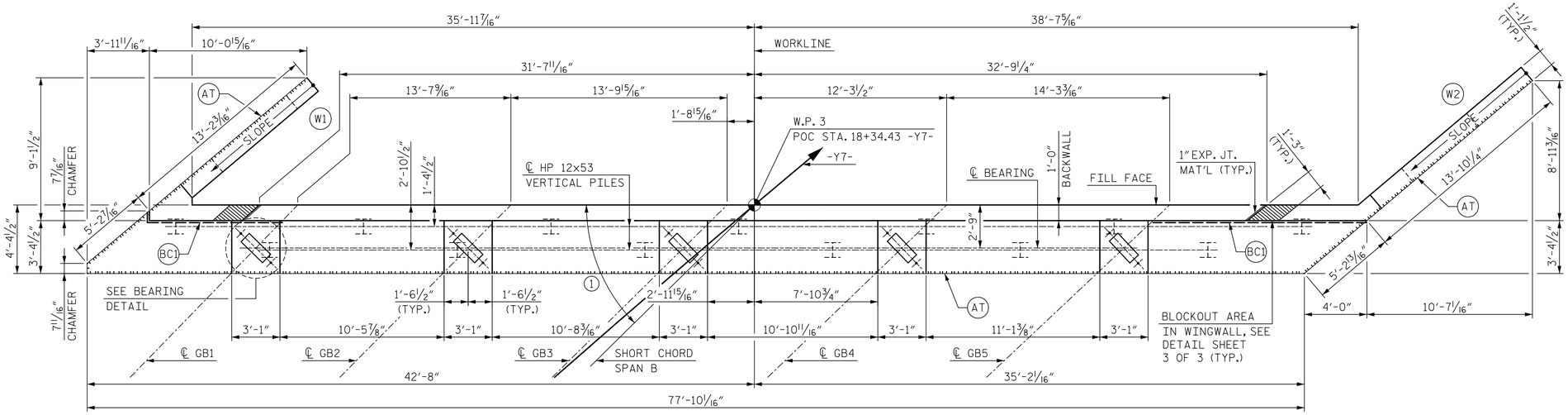
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1 DETAILS

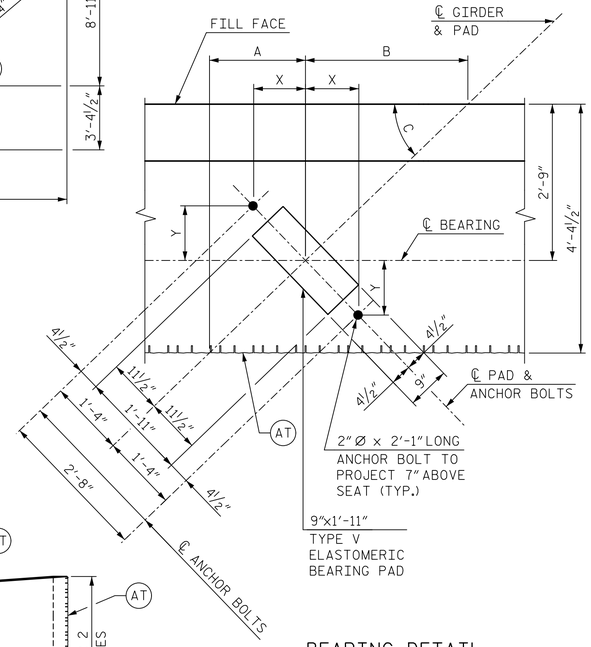
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-29
1			3			TOTAL SHEETS
2			4			36

8/14/2019
...\405_057_I4400BB_SMU_B03_029_440223.dgn

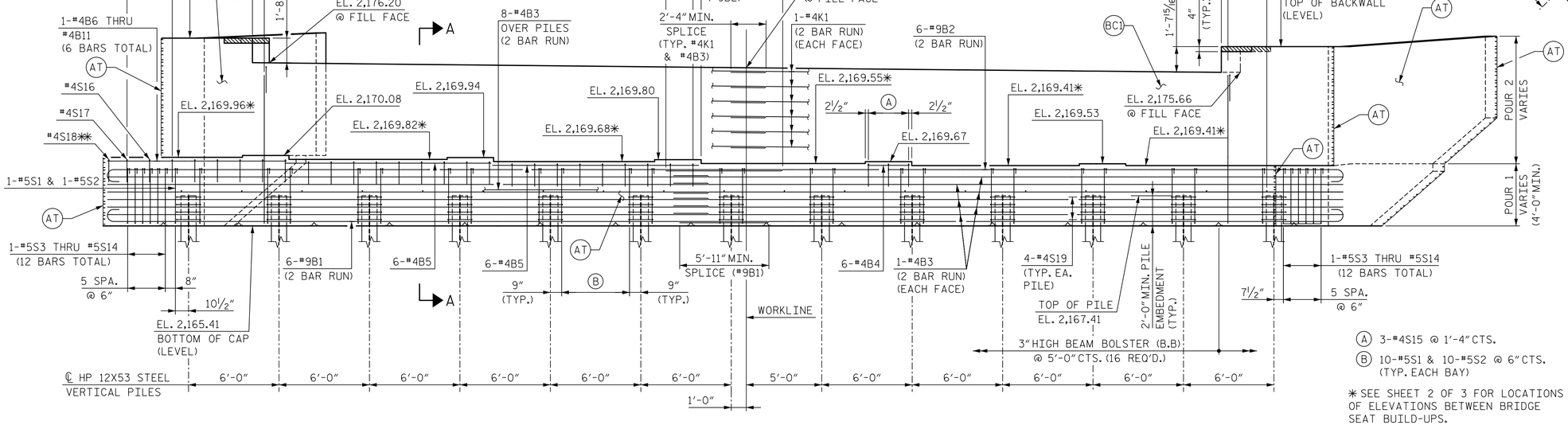


PLAN

(1) 44°-27'-56" (TO SHORT CHORD)



BEARING DETAIL



ELEVATION

(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

VARIABLE DIMENSION TABLE					
GIRDER	"A"	"B"	"C"	"X"	"Y"
GB1	1'-7"	2'-8 1/8"	45°-46'-29"	11 7/16"	11 3/16"
GB2	1'-7 3/8"	2'-8 13/16"	45°-10'-12"	11 3/8"	11 1/4"
GB3	1'-7 13/16"	2'-9 1/2"	44°-32'-43"	11 1/4"	11 3/8"
GB4	1'-8 1/4"	2'-10 5/16"	43°-53'-56"	11 1/8"	11 1/2"
GB5	1'-8 3/4"	2'-11 1/8"	43°-13'-47"	10 15/16"	11 11/16"

(A) 3-#4S15 @ 1'-4" CTS.

(B) 10-#5S1 & 10-#5S2 @ 6" CTS. (TYP. EACH BAY)

✻ SEE SHEET 2 OF 3 FOR LOCATIONS OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS.

✻✻ SEE ELEVATION OF WING (W1) ON SHEET 2 OF 3 FOR ORIENTATION OF #4S18 BAR.

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

NOTES:

FOR WINGWALL DETAILS AND SECTION A-A, SEE SHEET 2 OF 3.

FOR NOTES AND PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 6/7/2019

Richard R. Greenfield

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

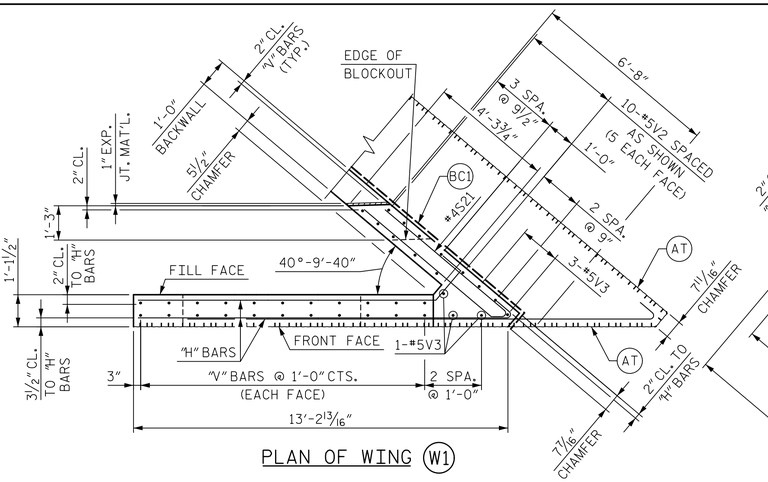
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY A. WAGNER DATE 1/19
CHECKED BY R. GREENFIELD DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

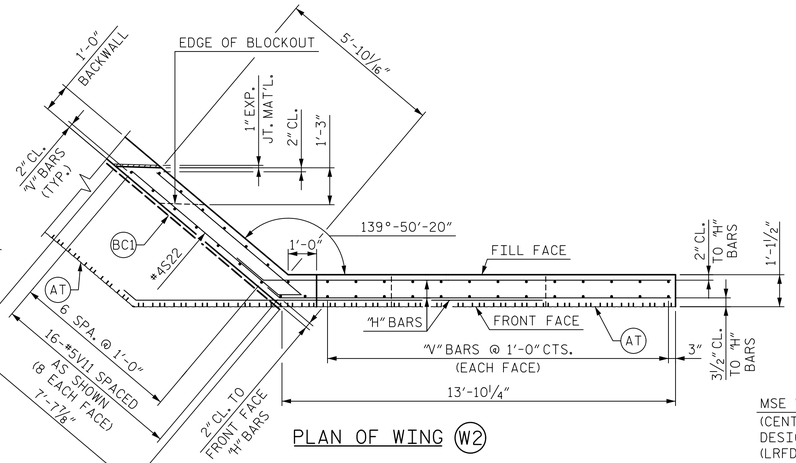
DWG. NO. 30

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-30
1			3			TOTAL SHEETS
2			4			36

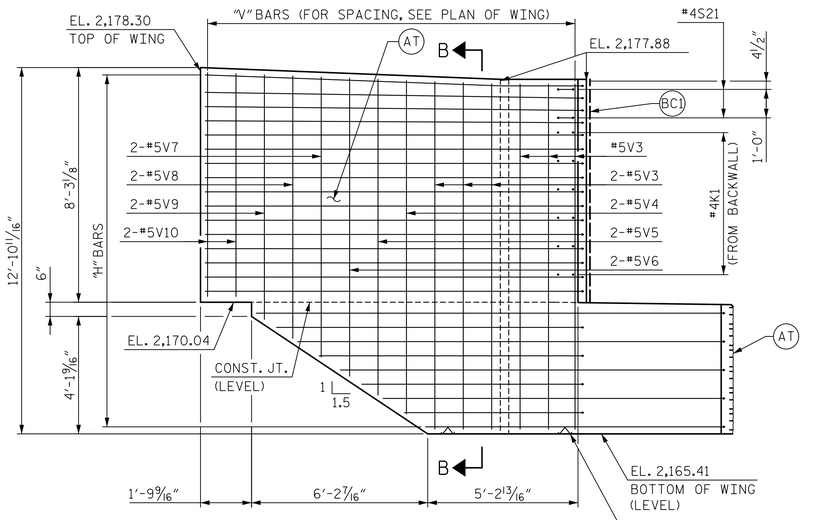
6/7/2019
...\405_059_I4400BB_SMU_E04_030_440223.dgn



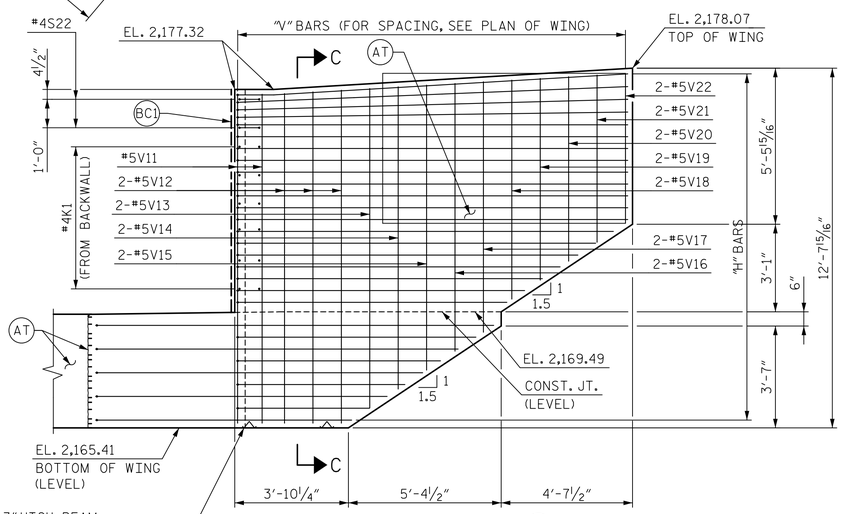
PLAN OF WING (W1)



PLAN OF WING (W2)

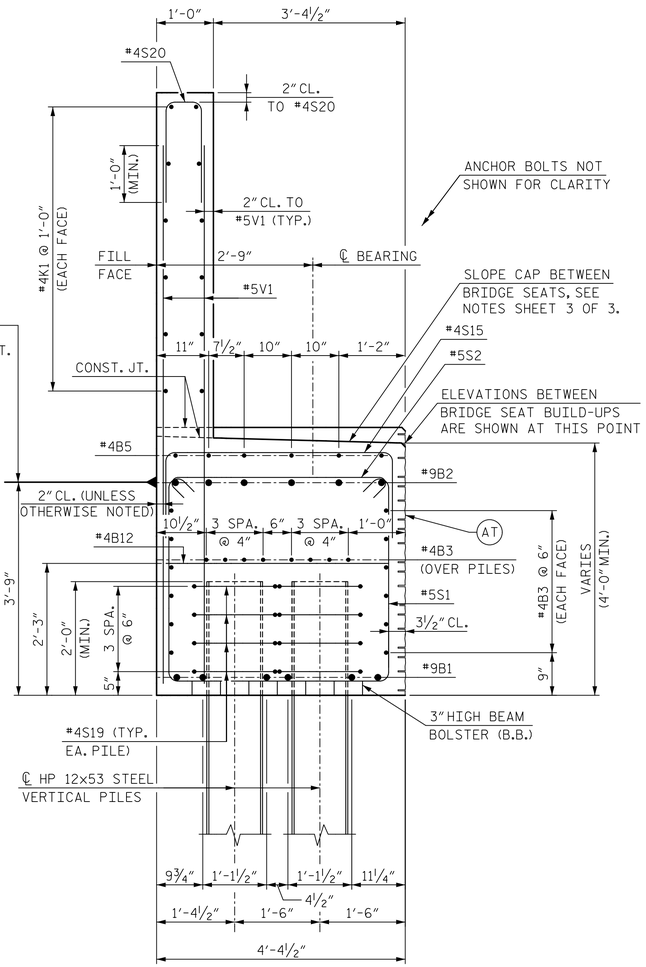


ELEVATION OF WING (W1)
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

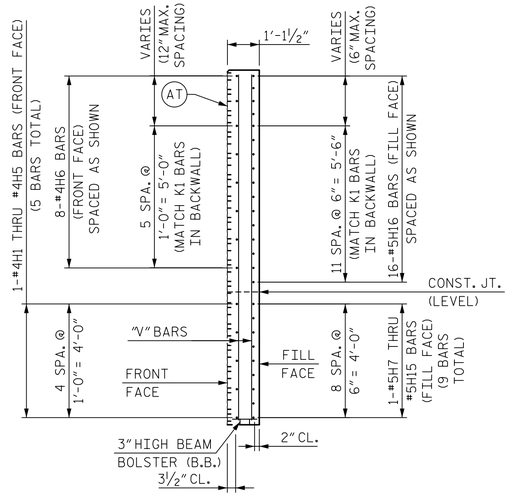


ELEVATION OF WING (W2)
(ARCHITECTURAL CONCRETE SURFACE TREATMENT NOT SHOWN FOR CLARITY)

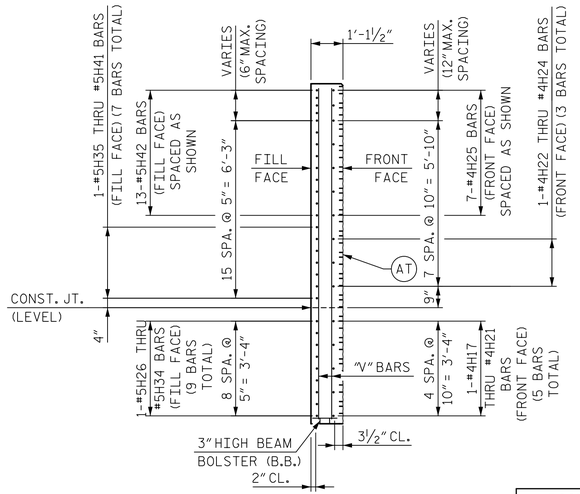
MSE WALL STRAPS
(CENTROID)
DESIGN LOAD = 3.5 K/FT.
(LRFD)



SECTION A-A



SECTION B-B



SECTION C-C

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

(BC1) LIMITS OF BRIDGE COATING (LIGHT GRAY)

NOTES:

FOR NOTES, SEE SHEET 3 OF 3.

FOR BLOCKOUT IN WINGWALL, SEE SHEET 3 OF 3.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 10/7/2019

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

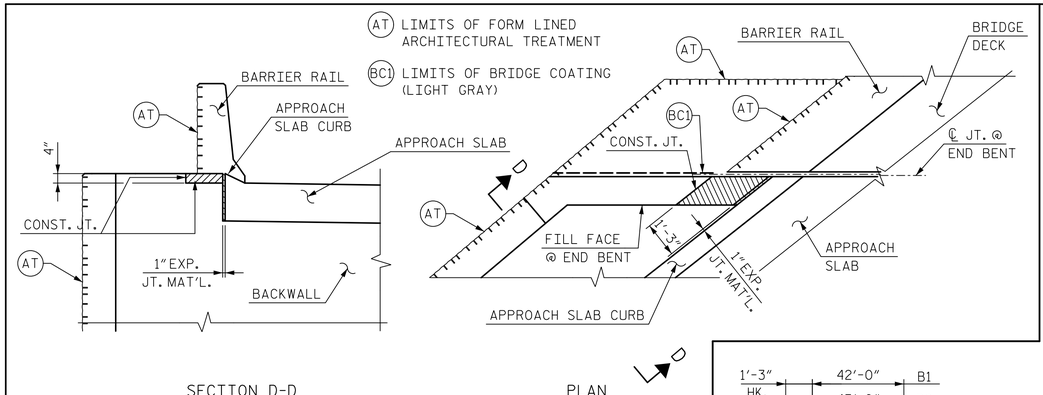
DRAWN BY A. WAGNER DATE 1/19
CHECKED BY R. GREENFIELD DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 31

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-31
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\405_06\I4400BB_SMU_E05_03_440223.dgn

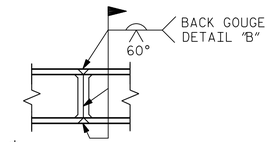


SECTION D-D

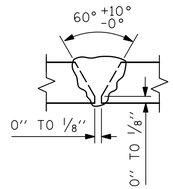
PLAN

NOTE:
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

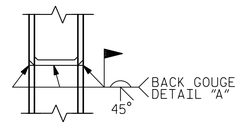
BLOCKOUT IN WINGWALL



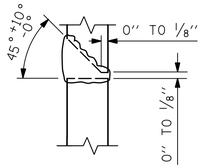
*PILE HORIZONTAL OR VERTICAL



DETAIL "B"



*PILE VERTICAL

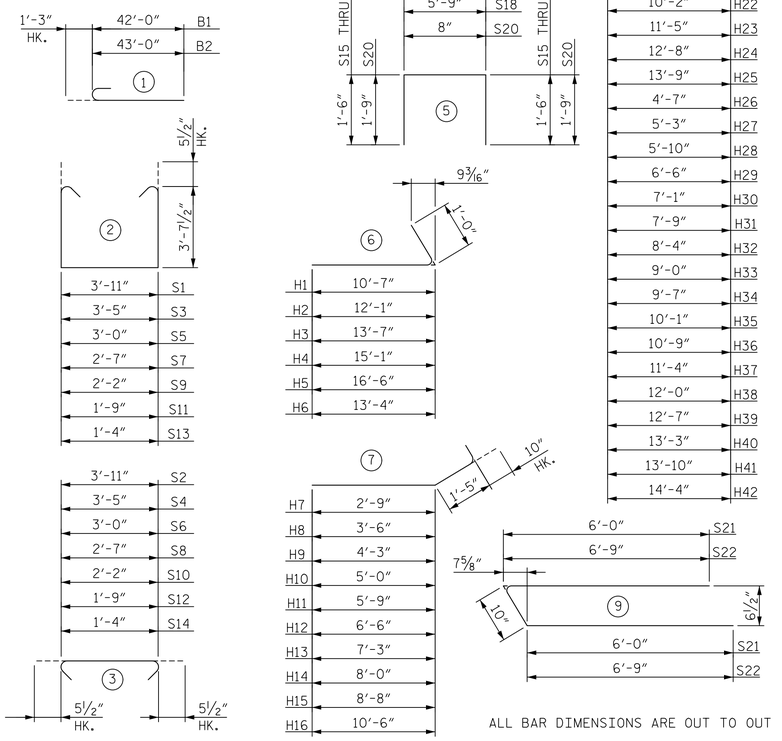


DETAIL "A"

* POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

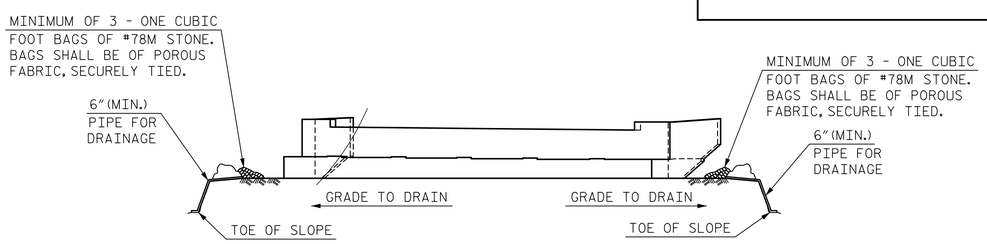
BILL OF MATERIAL

UNCOATED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	9	1	43'-3"	1,765	H40	1	5	8	14'-9"	15
B2	12	9	1	44'-3"	1,805	H41	1	5	8	15'-4"	16
B3	40	4	STR	40'-2"	1,073	H42	13	5	8	15'-10"	215
B4	6	4	STR	2'-9"	11						
B5	12	4	STR	13'-7"	109	K1	24	4	STR	40'-2"	644
B6	1	4	STR	7'-7"	5						
B7	1	4	STR	8'-4"	6	S1	121	5	2	12'-1"	1,525
B8	1	4	STR	9'-1"	6	S2	121	5	3	4'-10"	610
B9	1	4	STR	10'-1"	7	S3	2	5	2	11'-7"	24
B10	1	4	STR	11'-1"	7	S4	2	5	3	4'-4"	9
B11	1	4	STR	11'-10"	8	S5	2	5	2	11'-2"	23
B12	19	4	STR	3'-11"	50	S6	2	5	3	3'-11"	8
						S7	2	5	2	10'-9"	22
H1	1	4	6	11'-7"	8	S8	2	5	3	3'-6"	7
H2	1	4	6	13'-1"	9	S9	2	5	2	10'-4"	22
H3	1	4	6	14'-7"	10	S10	2	5	3	3'-1"	6
H4	1	4	6	16'-1"	11	S11	2	5	2	9'-11"	21
H5	1	4	6	17'-6"	12	S12	2	5	3	2'-8"	6
H6	8	4	6	14'-4"	77	S13	2	5	2	9'-6"	20
H7	1	5	7	5'-0"	5	S14	2	5	3	2'-3"	5
H8	1	5	7	5'-9"	6	S15	27	4	5	6'-11"	125
H9	1	5	7	6'-6"	7	S16	1	4	5	5'-7"	4
H10	1	5	7	7'-3"	8	S17	1	4	5	4'-4"	3
H11	1	5	7	8'-0"	8	S18	1	4	5	8'-9"	6
H12	1	5	7	8'-9"	9	S19	52	4	4	6'-6"	226
H13	1	5	7	9'-6"	10	S20	65	4	5	4'-2"	181
H14	1	5	7	10'-3"	11	S21	2	4	9	12'-10"	17
H15	1	5	7	10'-11"	11	S22	2	4	9	14'-4"	19
H16	16	5	7	12'-9"	213						
H17	1	4	8	9'-8"	6	V1	130	5	STR	9'-10"	1,333
H18	1	4	8	10'-11"	7	V2	10	5	STR	11'-11"	124
H19	1	4	8	12'-2"	8	V3	12	5	STR	12'-1"	151
H20	1	4	8	13'-5"	9	V4	2	5	STR	11'-8"	24
H21	1	4	8	14'-8"	10	V5	2	5	STR	11'-1"	23
H22	1	4	8	10'-10"	7	V6	2	5	STR	10'-6"	22
H23	1	4	8	12'-1"	8	V7	2	5	STR	9'-10"	21
H24	1	4	8	13'-4"	9	V8	2	5	STR	9'-3"	19
H25	7	4	8	14'-5"	67	V9	2	5	STR	8'-7"	18
H26	1	5	8	6'-1"	6	V10	4	5	STR	7'-10"	33
H27	1	5	8	6'-9"	7	V11	16	5	STR	11'-5"	191
H28	1	5	8	7'-4"	8	V12	6	5	STR	11'-7"	72
H29	1	5	8	8'-0"	8	V13	2	5	STR	11'-3"	23
H30	1	5	8	8'-7"	9	V14	2	5	STR	10'-8"	22
H31	1	5	8	9'-3"	10	V15	2	5	STR	10'-0"	21
H32	1	5	8	9'-10"	10	V16	2	5	STR	9'-5"	20
H33	1	5	8	10'-6"	11	V17	2	5	STR	8'-10"	18
H34	1	5	8	11'-1"	12	V18	2	5	STR	7'-8"	16
H35	1	5	8	11'-7"	12	V19	2	5	STR	7'-1"	15
H36	1	5	8	12'-3"	13	V20	2	5	STR	6'-6"	14
H37	1	5	8	12'-10"	13	V21	2	5	STR	5'-10"	12
H38	1	5	8	13'-6"	14	V22	2	5	STR	5'-3"	11
H39	1	5	8	14'-1"	15						

QUANTITIES

REINFORCING STEEL	LBS.	11,528
CLASS "A" CONCRETE BREAKDOWN		
POUR 1 - CAP & BOT. OF WINGS	CU. YDS.	56.9
POUR 2 - TOP OF WINGS & BACKWALL	CU. YDS.	27.0
TOTAL	CU. YDS.	83.9
HP 12x53 STEEL PILES	NO.	13
	LIN. FT.	520
ARCHITECTURAL CONCRETE SURFACE TREATMENT	SQ. FT.	677
APPLICATION OF BRIDGE COATING (LIGHT GRAY)	SQ. FT.	170



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 FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT 2

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

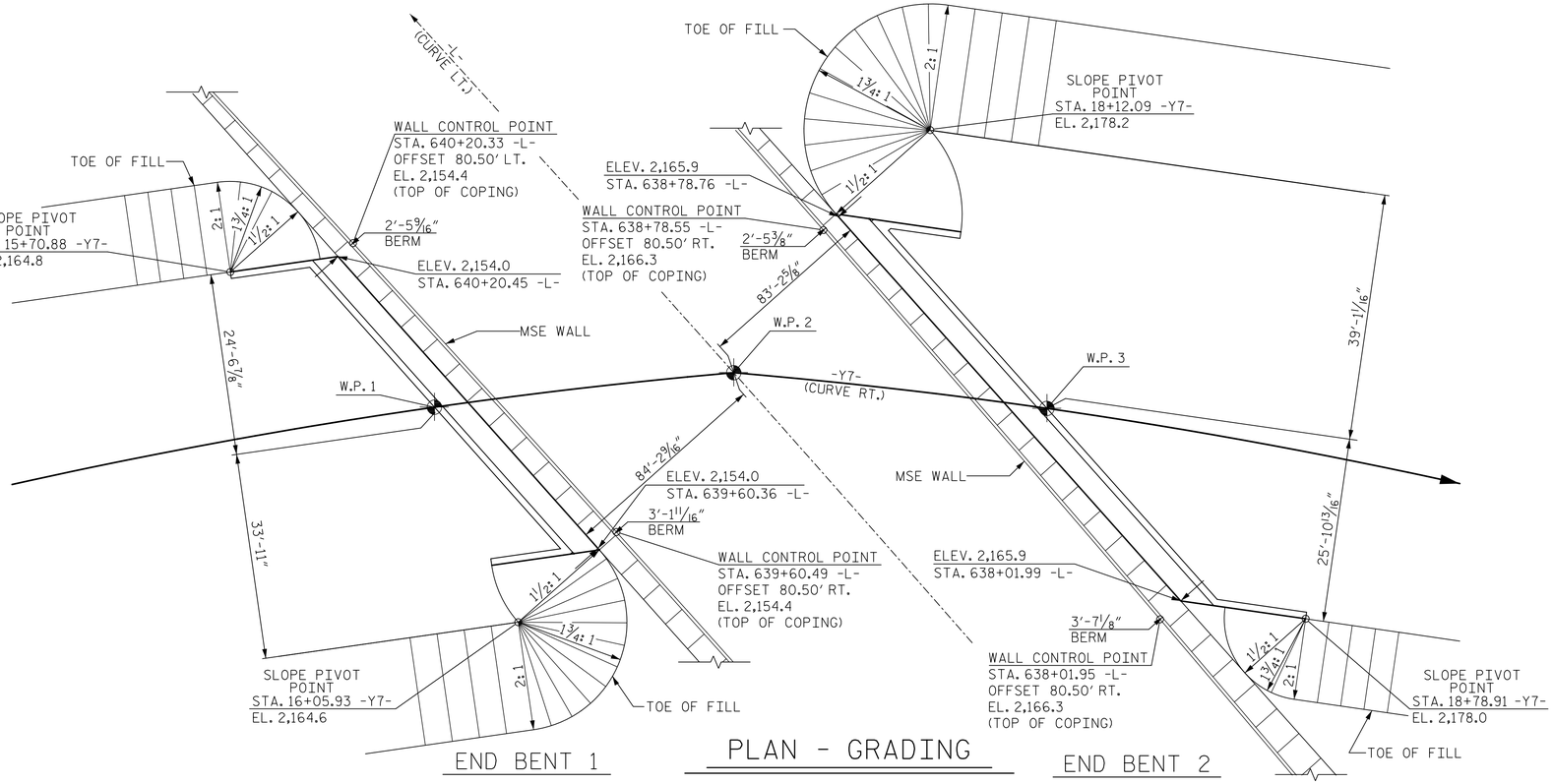
DRAWN BY A. WAGNER DATE 1/19
CHECKED BY R. GREENFIELD DATE 2/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 32

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-32
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

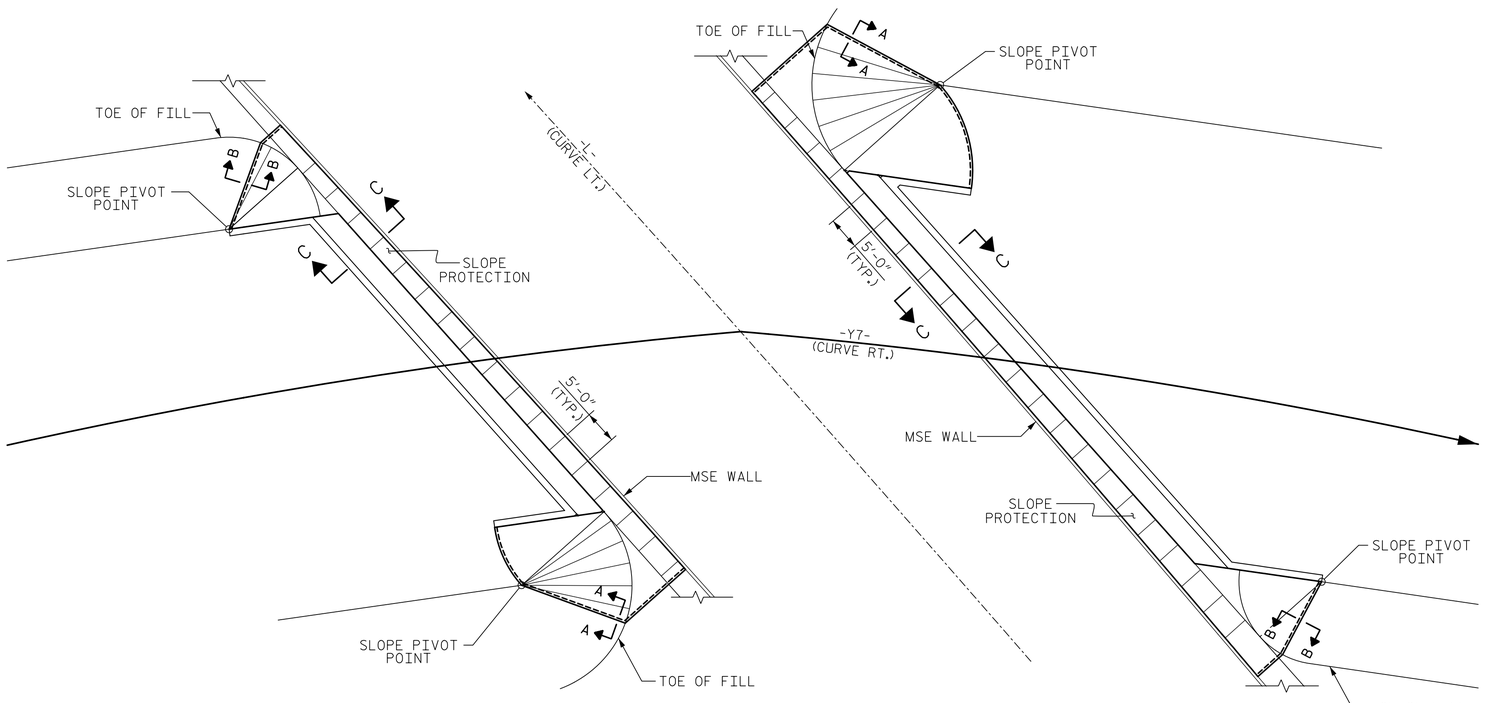
6/7/2019
...\405_063_I4400BB_SMU_E06_032_440223.dgn



END BENT 1

PLAN - GRADING

END BENT 2



END BENT 1

PLAN - CONCRETE PLACEMENT

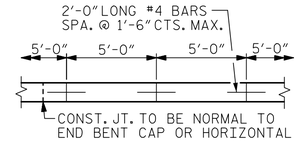
END BENT 2

NOTE:

SLOPE PROTECTION SHALL CONSIST OF 4'' POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS ''B''. THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60'' WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE ''POURING DETAIL'' WITH 2'-0'' LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6'' MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE ''OPTIONAL POURING DETAIL'' WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6''. THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

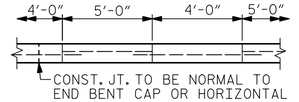
BRIDGE @ POC STA. 17+09.26 -Y7- POC STA. 639+24.60 -L-	4 INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	86	262
END BENT 2	126	353

✳ QUANTITY SHOWN IS BASED ON 5' POURS.



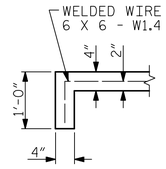
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

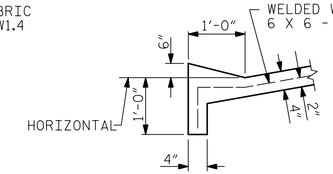


POUR A 4'-0'' STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

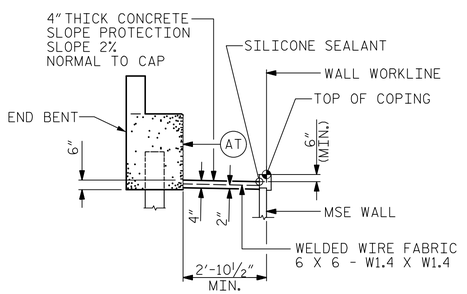
OPTIONAL POURING DETAIL



SECTION A-A



SECTION B-B



SECTION C-C

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION

NORTH CAROLINA PROFESSIONAL SEAL 047118 ENGINEER RICHARD R. GREENFIELD
Richard R. Greenfield
6/7/2019

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

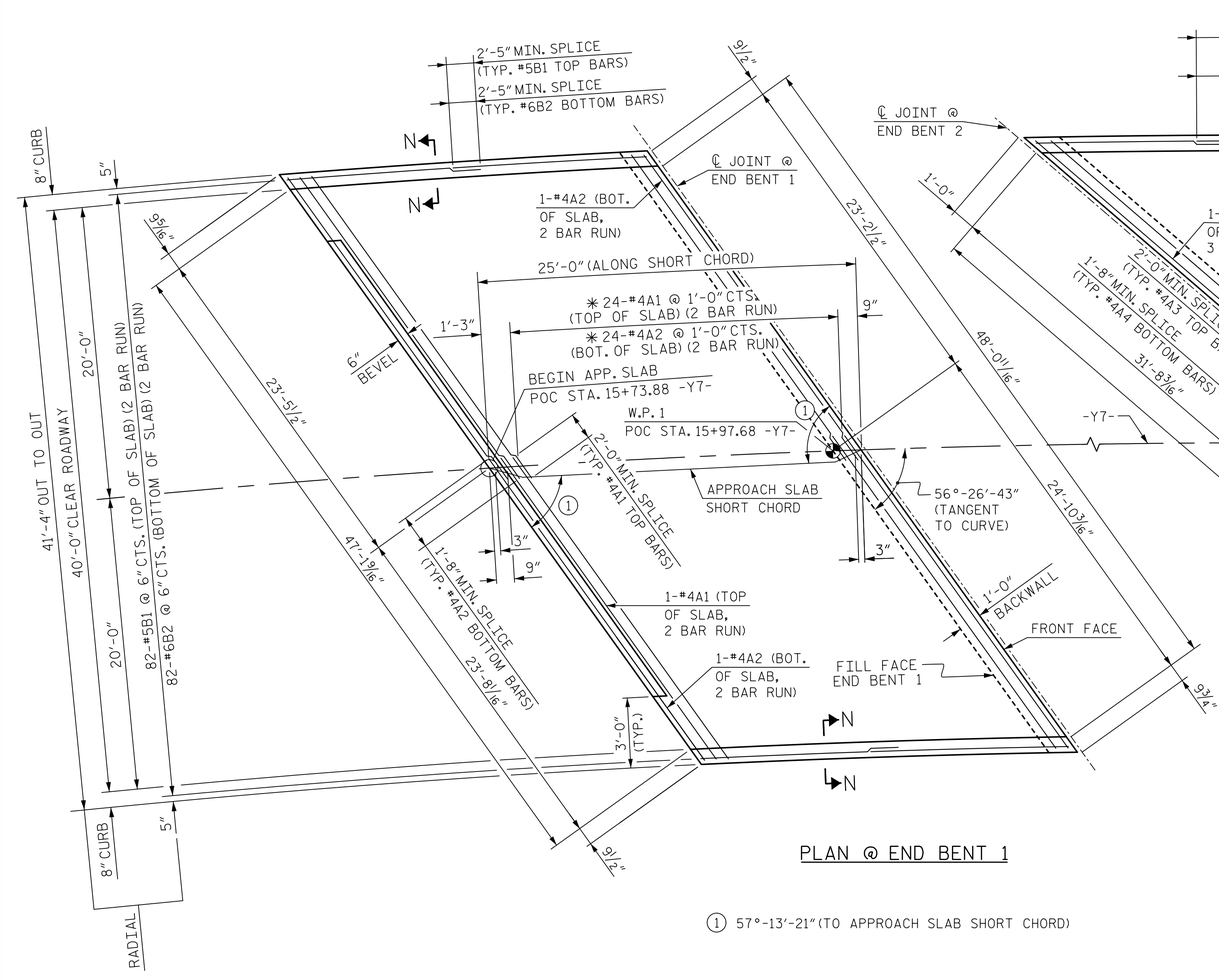
DRAWN BY A. WAGNER DATE 12/18
CHECKED BY L. DICKENS DATE 1/19
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 33

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-33
1			3			TOTAL SHEETS
2			4			36

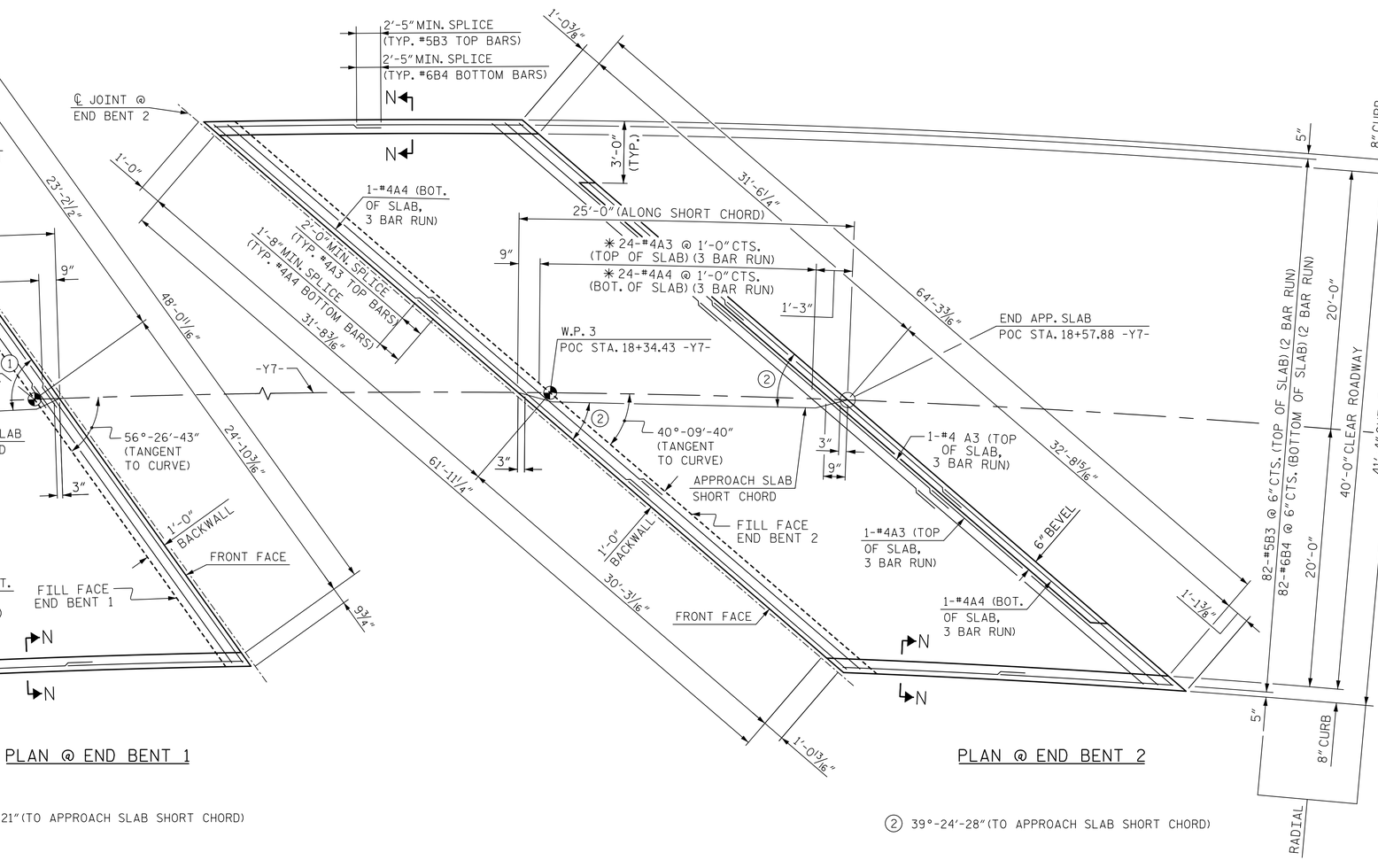
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/7/2019
...\405_065_I4400BB_SMU_SP_033_440223.dgn



PLAN @ END BENT 1

① 57°-13'-21" (TO APPROACH SLAB SHORT CHORD)



PLAN @ END BENT 2

② 39°-24'-28" (TO APPROACH SLAB SHORT CHORD)

NOTES:

FOR SECTION N-N, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 3.

FOR APPROACH SLAB BILL OF MATERIAL, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 3.

FOR SECTION THROUGH SLAB, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 3.

✳ "A" BARS ARE SPACED ALONG APPROACH SLAB SHORT CHORD AND PLACED PARALLEL TO FILL FACE.

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 5/20/2019 ENGINEER RICHARD R. GREENFIELD

Electronically signed by: Richard R. Greenfield

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

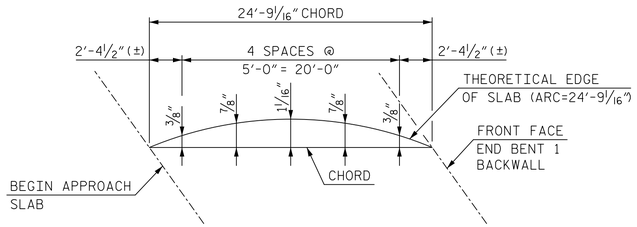
DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY L. DICKENS DATE 12/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 34

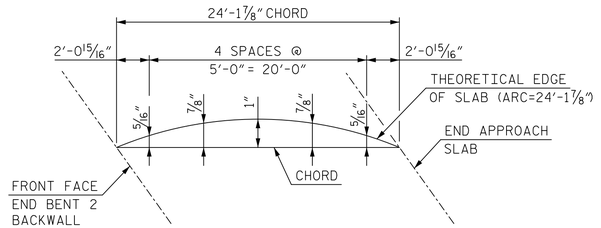
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-34
1			3			TOTAL SHEETS
2			4			36

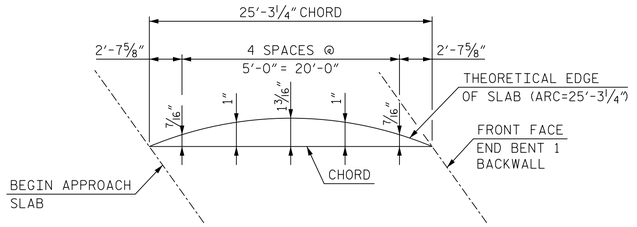
5/17/2019
...\405_067_I4400BB_SMU_ASO1_034_440223.dgn



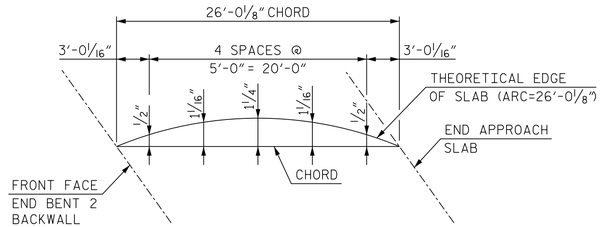
LEFT EDGE OF SLAB
(R = 853.667′)



LEFT EDGE OF SLAB
(R = 853.667′)



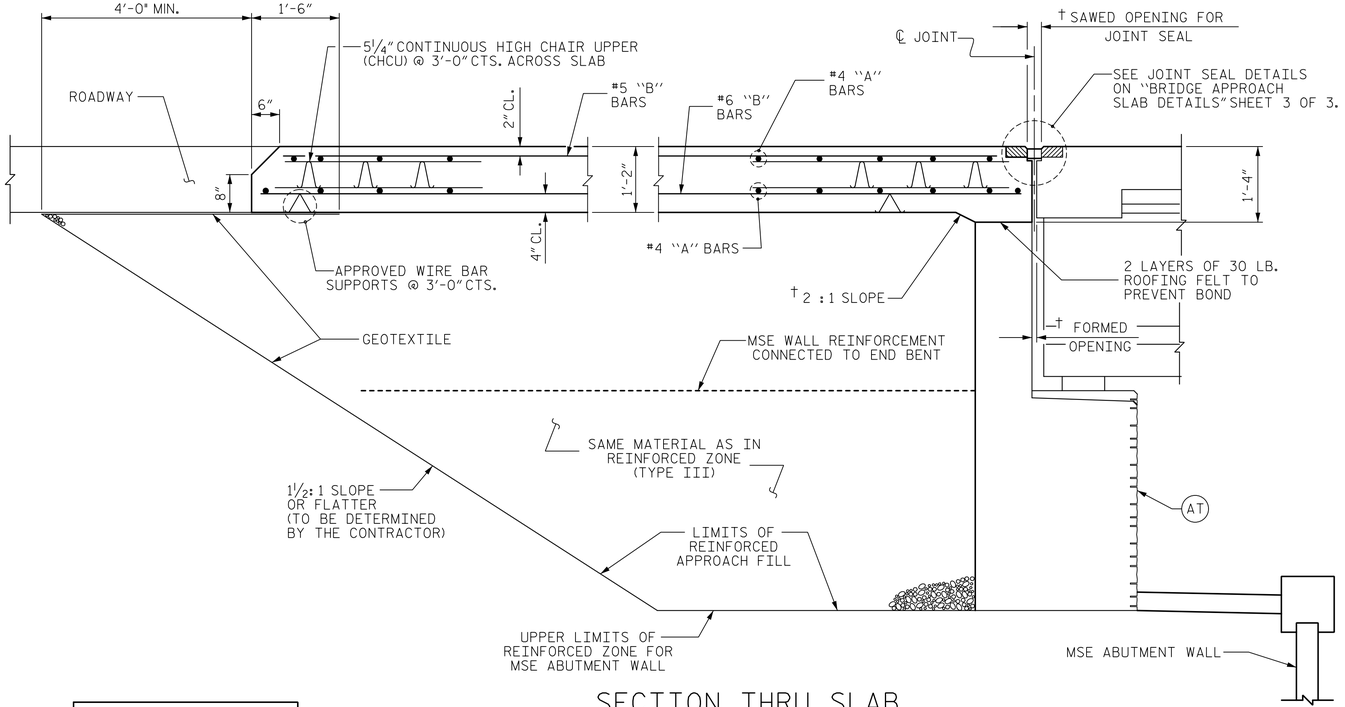
RIGHT EDGE OF SLAB
(R = 812.333′)



RIGHT EDGE OF SLAB
(R = 812.333′)

CURVE OFFSETS - APPROACH SLAB AT END BENT 1

CURVE OFFSETS - APPROACH SLAB AT END BENT 2

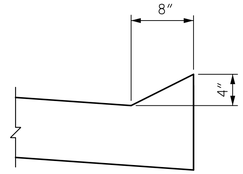


SECTION THRU SLAB

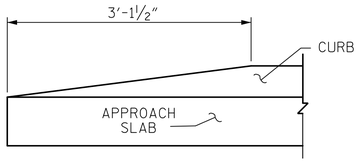
(TYPE III - REINFORCED APPROACH FILL)

† NORMAL TO END BENT

(AT) LIMITS OF FORM LINED ARCHITECTURAL TREATMENT



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, MSE WALL REINFORCEMENT AND BACKFILL MATERIAL, SEE ROADWAY PLANS.

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

BACKFILL MATERIAL SHALL BE THE SAME MATERIAL USED IN THE MSE REINFORCED ZONE.

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

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL OR PARAPET AND END POST.

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 FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 2″.

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

BILL OF MATERIAL

APPROACH SLAB AT BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	50	4	STR	25′-8″	857
A2	52	4	STR	25′-7″	889
✳ B1	164	5	STR	13′-3″	2,267
B2	164	6	STR	13′-9″	3,387
REINFORCING STEEL				LBS.	4,276
✳ EPOXY COATED REINFORCING STEEL				LBS.	3,124
CLASS AA CONCRETE				C. Y.	45.2

APPROACH SLAB AT BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A3	75	4	STR	23′-5″	1,173
A4	78	4	STR	23′-3″	1,211
✳ B3	164	5	STR	13′-7″	2,323
B4	164	6	STR	14′-2″	3,490
REINFORCING STEEL				LBS.	4,701
✳ EPOXY COATED REINFORCING STEEL				LBS.	3,496
CLASS AA CONCRETE				C. Y.	45.4

PROJECT NO. I-4400BB

HENDERSON COUNTY

STATION: POC STA. 17+09.26 -Y7-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 47718 RICHARD R. GREENFIELD 10/7/2019

HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

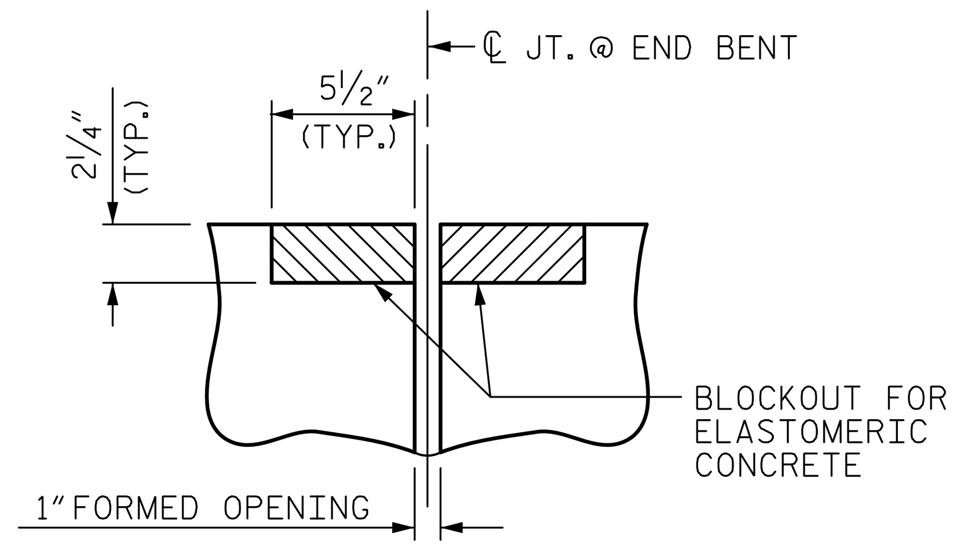
DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY L. DICKENS DATE 11/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 35

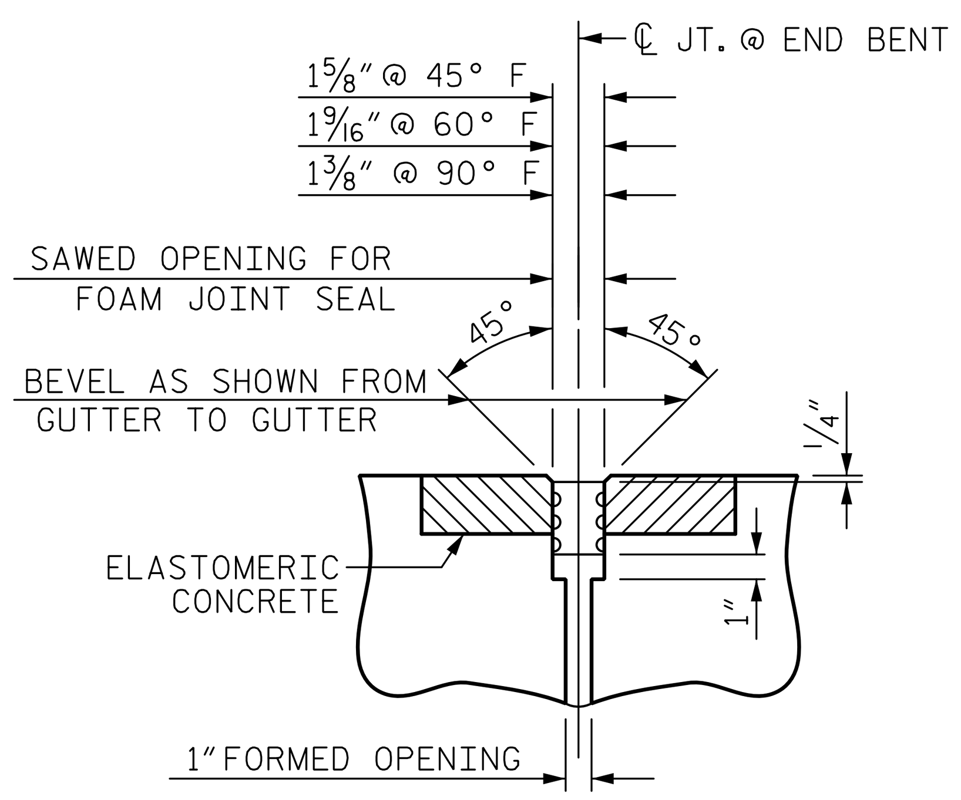
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S5-35
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

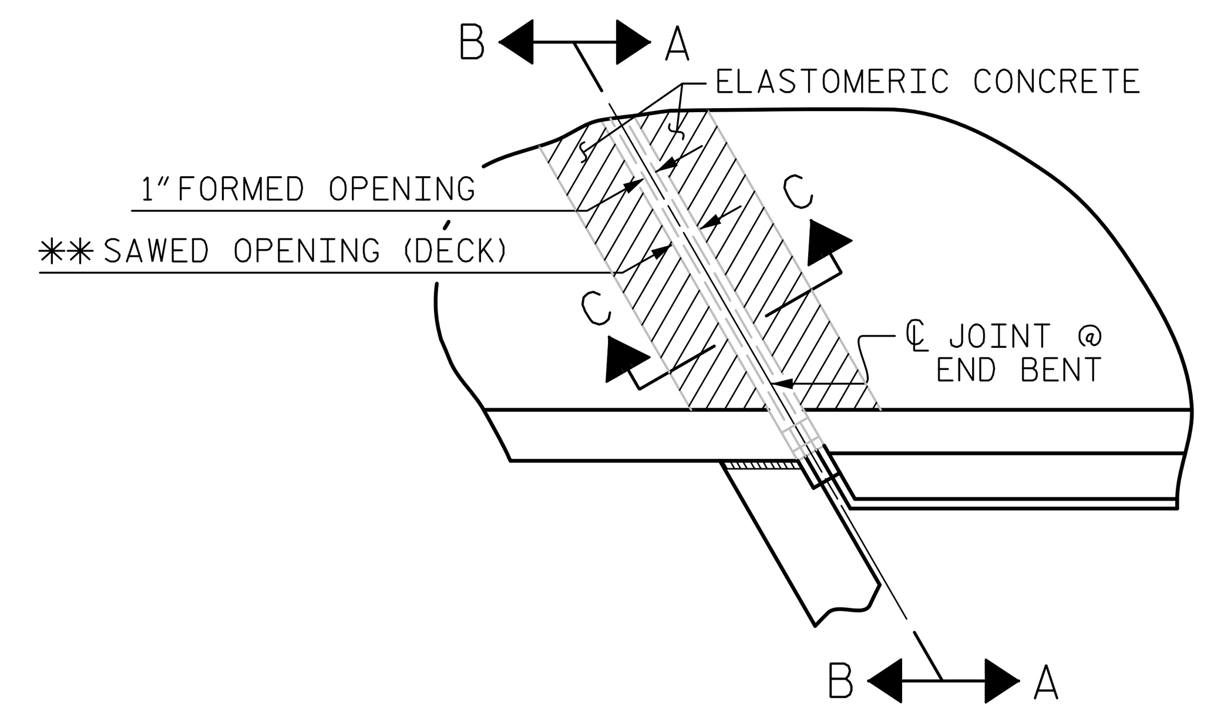
6/7/2019
...\405_069_I4400BB_SMU_AS02_035_440223.dgn



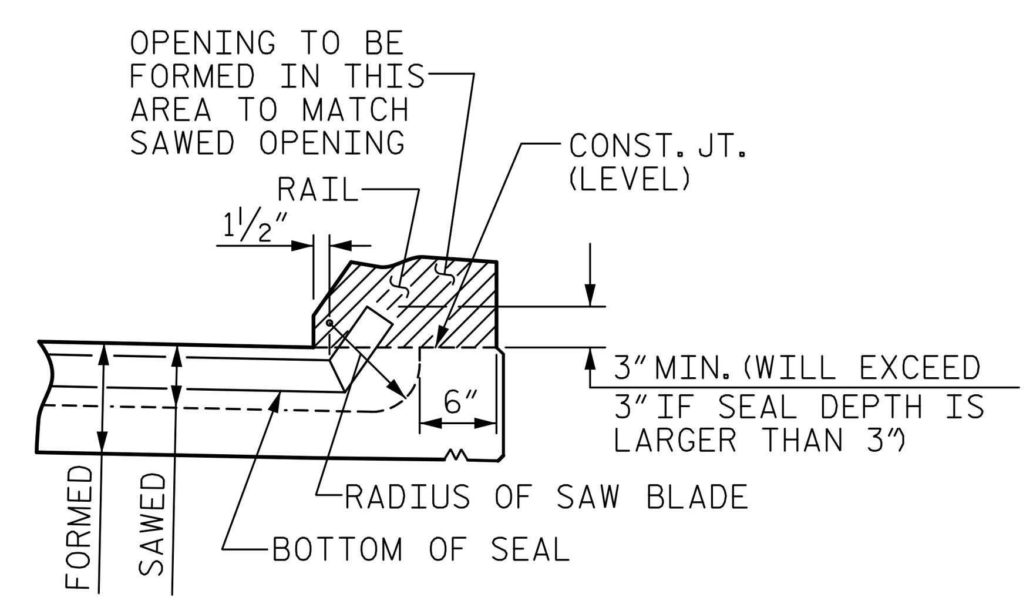
SECTION C-C
FOAM JOINT SEAL
(PRE-SAWED ELASTOMERIC CONCRETE DIMENSIONS)



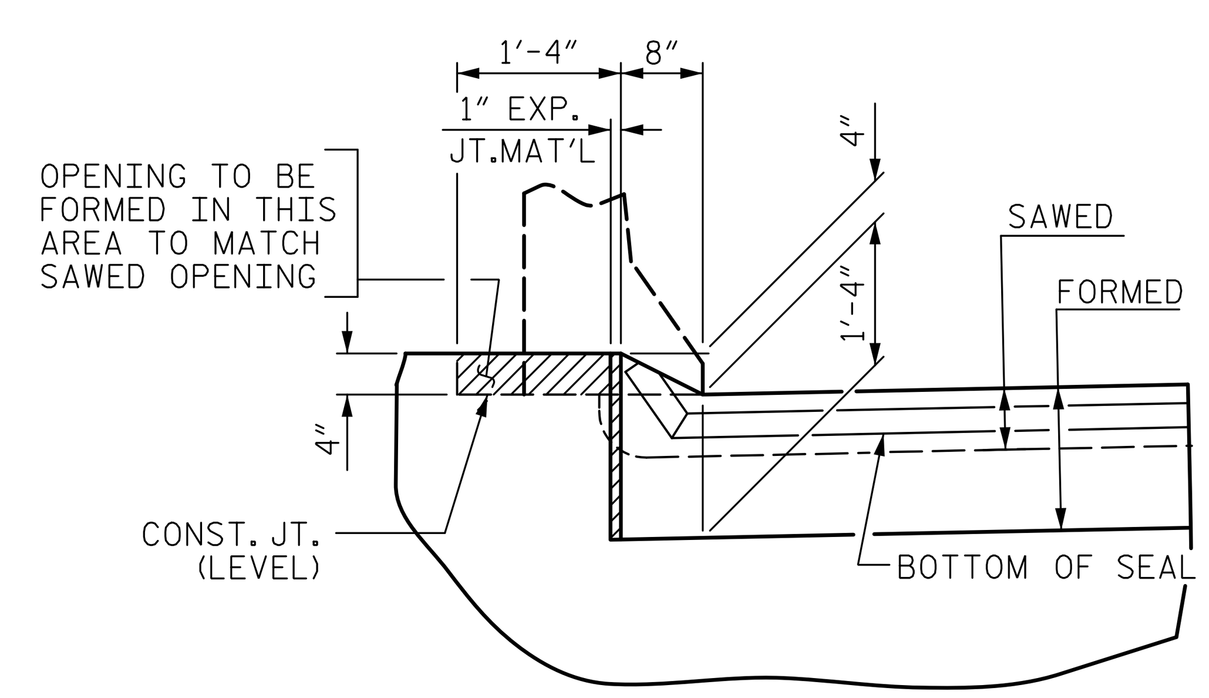
SECTION C-C
FOAM JOINT SEAL



PLAN
✱✱ SEE SECTION C-C FOR SAWED OPENING DIMENSIONS.



SECTION A-A



SECTION B-B

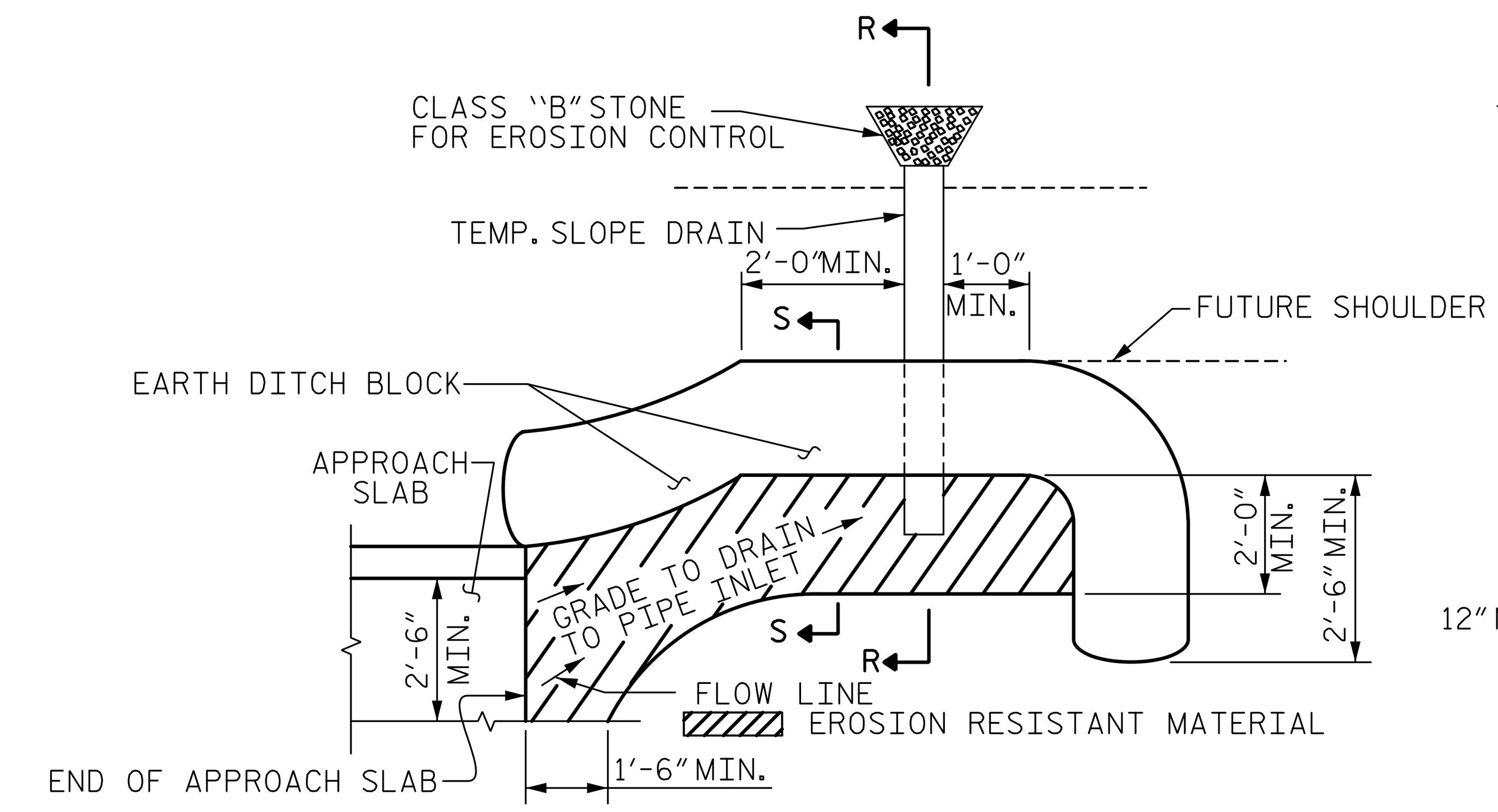
JOINT SEAL DETAILS @ END BENT

FOAM JOINT SEAL TO BE CUT, HEAT WELDED AND TURNED UP PARALLEL TO SLOPED FACE OF THE BARRIER RAIL.

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL.

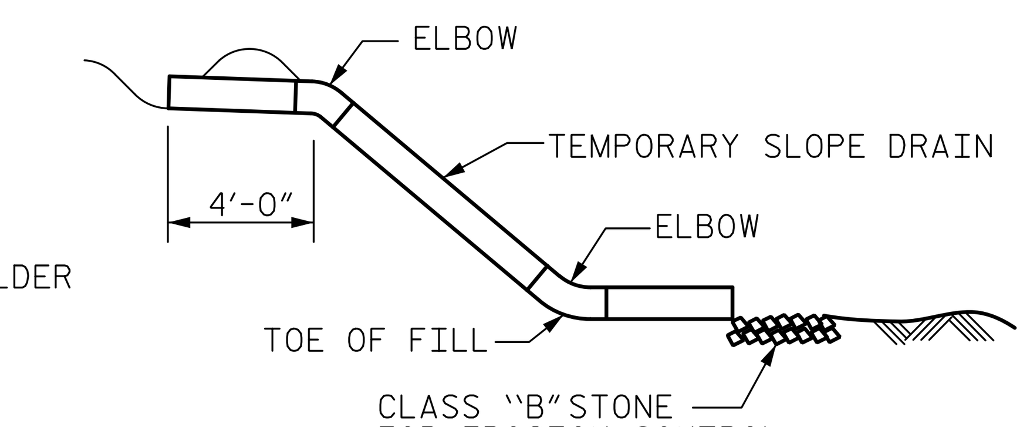
ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE ✱ (CU. FT.)
1	8.5
2	11.0
TOTAL	19.5

✱ BASED ON THE MINIMUM BLOCKOUT SHOWN.

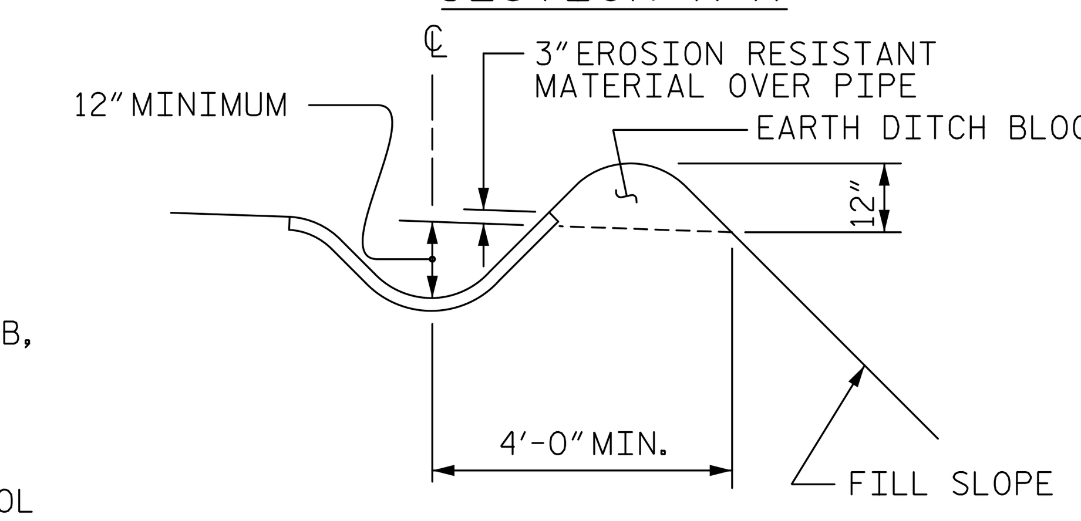


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 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.

PLAN VIEW



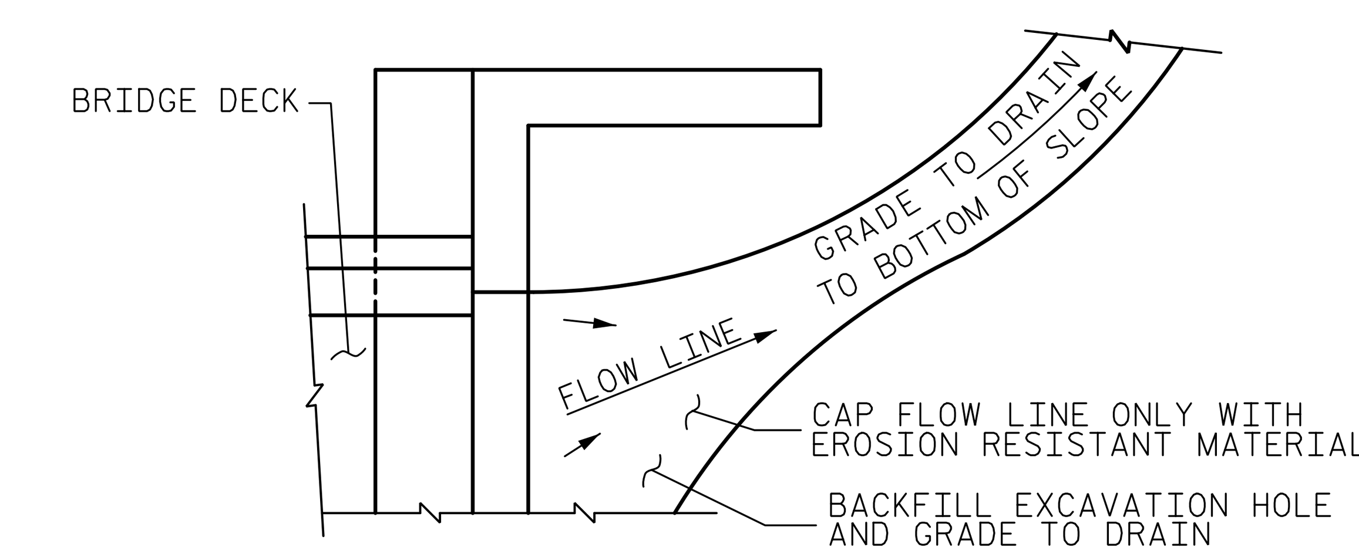
SECTION R-R



SECTION S-S

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

PROJECT NO. I-4400BB
HENDERSON COUNTY
STATION: POC STA. 17+09.26 -Y7-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 47718 5/20/2019 ENGINEER RICHARD R. GREENFIELD
DocuSigned by: Richard R. Greenfield

HNTB
HNTB NORTH CAROLINA, P.C.
NC License No. C-1554
343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609

DRAWN BY T. THOMPSON DATE 10/18
CHECKED BY L. DICKENS DATE 11/18
DESIGN ENGINEER OF RECORD R. GREENFIELD DATE 5/19

DWG. NO. 36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS							
NO.	BY	DATE	NO.	BY	DATE	SHEET NO.	S5-36
1			3			TOTAL SHEETS	36
2			4				

5/17/2019
...\405_071_I4400BB_SMU_AS03_036_440223.dgn