TIP PROJECT: R-5207A

CONTRACT: C203138

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5207A		45

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
14C.045122		PE, R/W
45393.3.2		CONST.

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

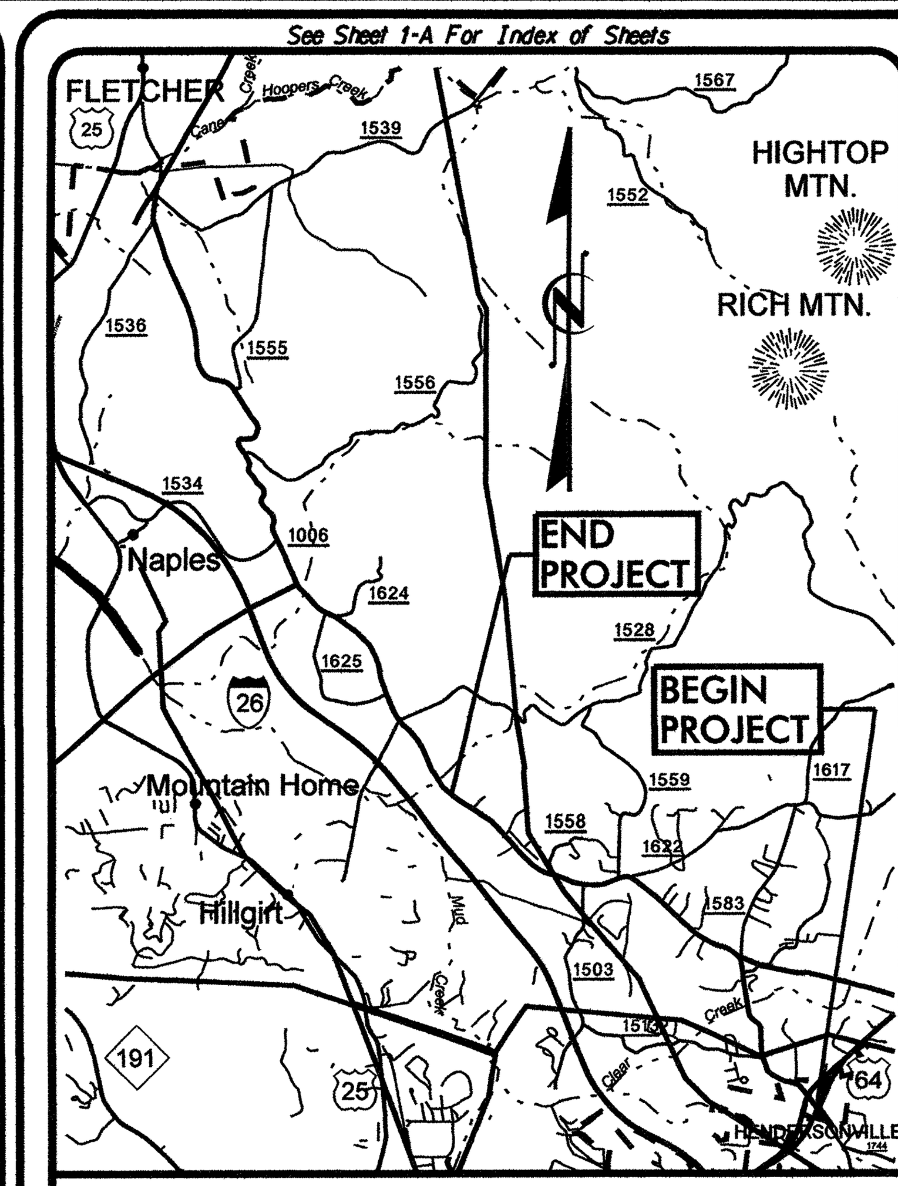
HENDERSON COUNTY

LOCATION: SR 1006 (HOWARD GAP ROAD) FROM US 64 TO BRIDGE 20

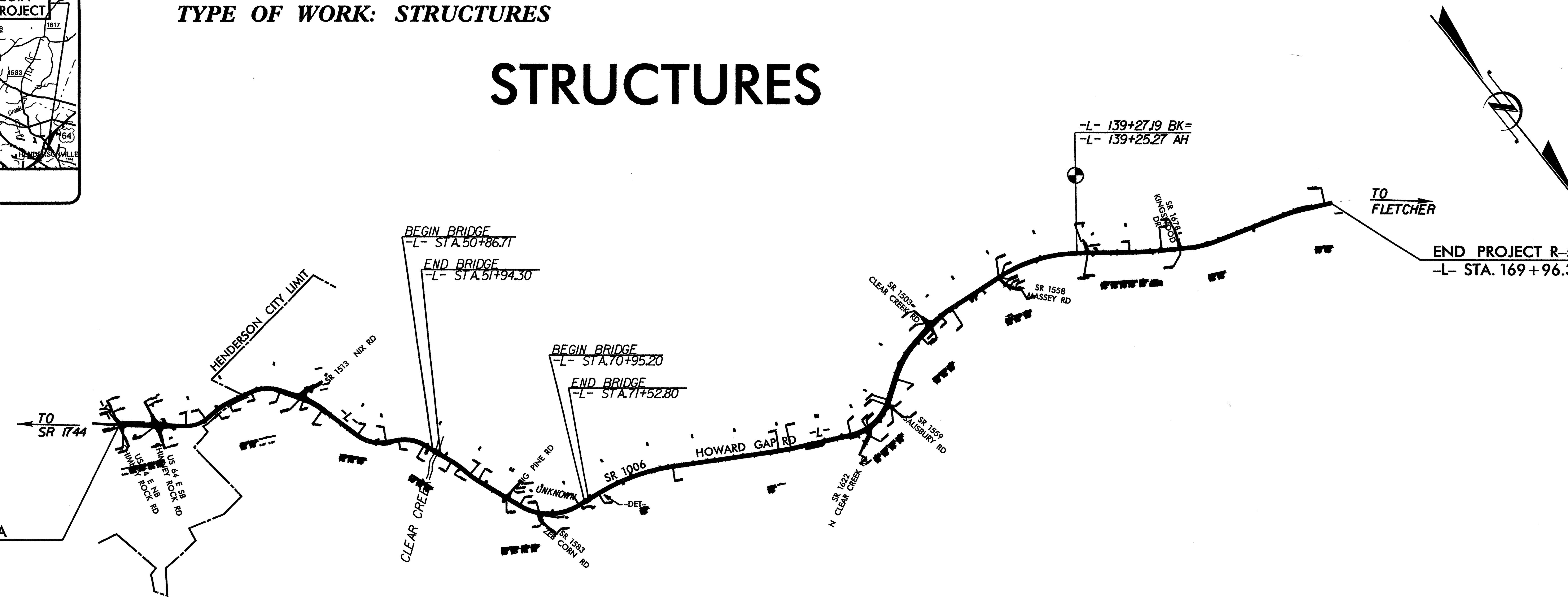
TYPE OF WORK: STRUCTURES

STRUCTURES

See Sheet 1-A For Index of Sheets



VICINITY MAP



BEGIN PROJECT R-5207A
-L- STA. 11+11.64

END PROJECT R-5207A
-L- STA. 169+96.35

DESIGN DATA

ADT 2007 = 8,089
ADT 2027 = 12,549
DHV = 11 %
D = 60 %
T = 5 %
Vd = 50 MPH

* DESIGN EXCEPTION REQUIRED FOR HORIZONTAL & VERTICAL CURVATURE & VERTICAL SSD

PROJECT LENGTH

LENGTH ROADWAY PROJECT R-5207A =	2.968 MILES
LENGTH STRUCTURES PROJECT R-5207A =	0.031 MILES
TOTAL LENGTH PROJECT R-5207A =	2.999 MILES

PLANS PREPARED BY:

TGS ENGINEERS
TGS ENGINEERS
804-C N. LAFAYETTE STREET
SHELBY, NC 28150
PH (704) 476-0003

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 19, 2010

LETTING DATE:
MAY 21, 2013

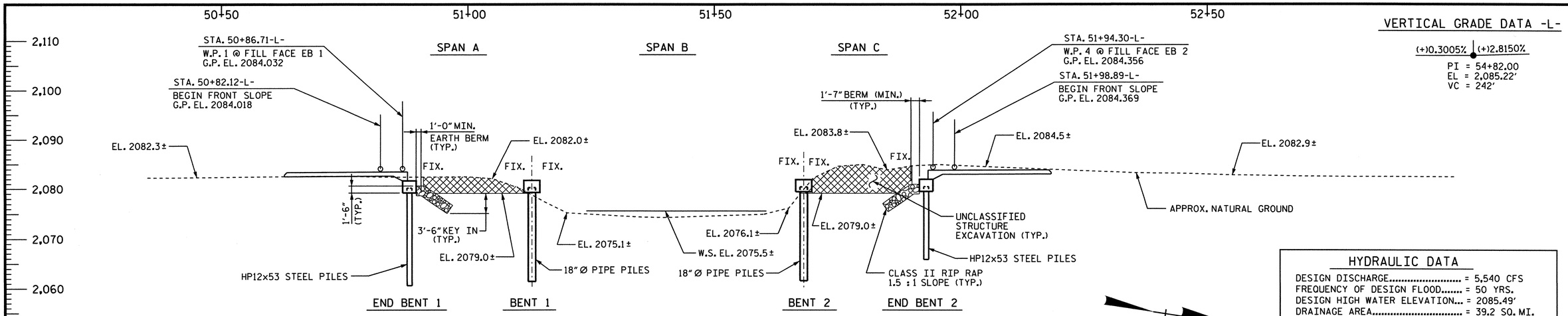
PLANS PREPARED FOR:

NCDOT DIVISION 14
NCDOT Contact:
RALPH CANNADY
DIVISION PROJECT MANAGER

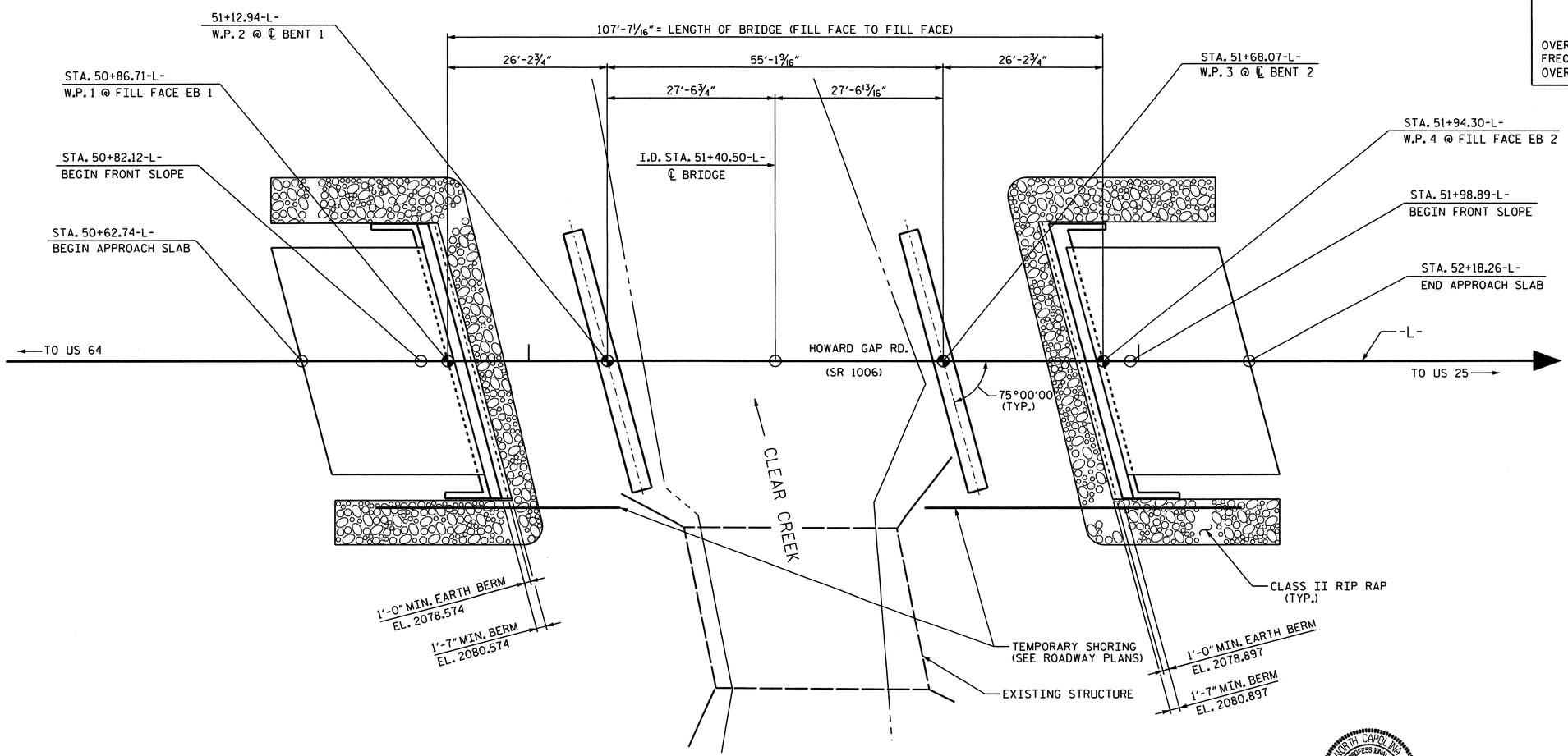
RAY ELLIOTT, PE
PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22992 RAY D. ELLIOTT
Ray D. Elliott
10/8/2012

09/08/99
$$$$$$SYSTIME$$$$
$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$



SECTION ALONG -L-



PLAN

VERTICAL GRADE DATA -L-

(+)0.3005% | (+)2.8150%

PI = 54+82.00
EL = 2,085.22'
VC = 242'

HYDRAULIC DATA

DESIGN DISCHARGE	= 5,540 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 2085.49'
DRAINAGE AREA	= 39.2 SQ. MI.
BASE DISCHARGE	= 6,690 CFS
FREQUENCY OF BASE FLOOD	= 100 YRS.
BASE HIGH WATER ELEVATION	= 2086.11'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 3,290 CFS±
FREQUENCY OF OVERTOPPING FLOOD	= 10 YR.±
OVERTOPPING FLOOD ELEVATION	= 2083.10'

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 1 OF 3

NORTH CAROLINA PROFESS IONAL SEAL 24392 ENGINEER TRAY D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

DRAWN BY : RTJ DATE : 3/12
CHECKED BY : NMW DATE : 6/12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

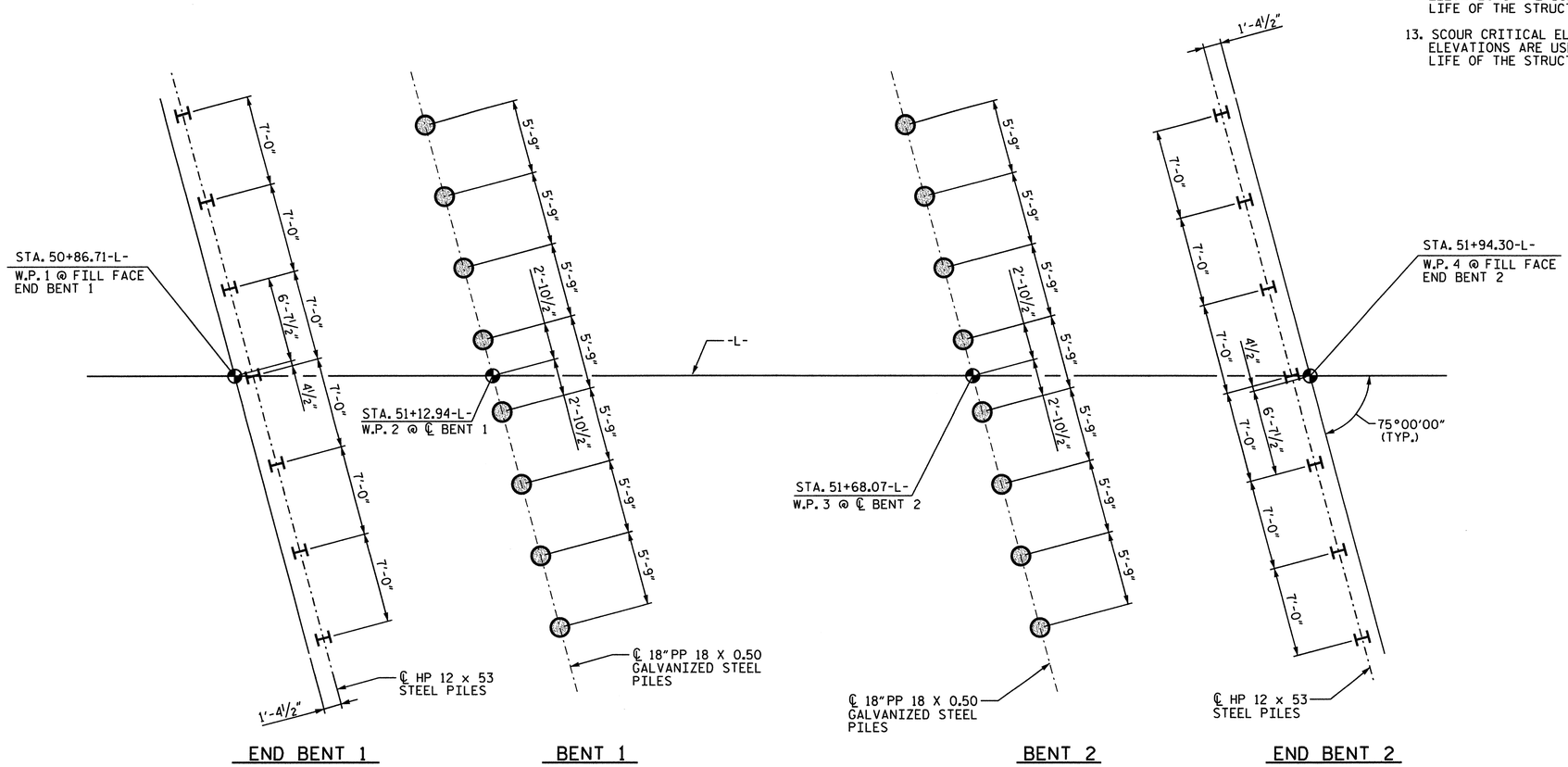
GENERAL DRAWING

FOR BRIDGE OVER CLEAR CREEK
ON HOWARD GAP RD. (SR 1006)
BETWEEN US 64 AND US 25

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-1
1			3			TOTAL SHEETS
2			4			45

NOTES :

1. PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 56 TONS PER PILE.
2. DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 94 TONS PER PILE.
3. PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 50 TONS PER PILE.
4. DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 84 TONS PER PILE.
5. PILES AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.
6. DRIVE PILES AT BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 200 TONS PER PILE.
7. PILES AT BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.
8. DRIVE PILES AT BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.
9. STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT BOTH END BENTS. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
10. STEEL PIPE PILE CUTTING SHOES OR CONICAL POINTS ARE REQUIRED FOR STEEL PIPE AT BOTH INTERIOR BENTS. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
11. FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
12. SCOUR CRITICAL ELEVATIONS FOR BENT 1 IS 2068.0 FEET, NAVD. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
13. SCOUR CRITICAL ELEVATIONS FOR BENT 2 IS 2068.0 FEET, NAVD. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.



NOTE:
DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF THE PILE.

FOUNDATION LAYOUT

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

NORTH CAROLINA PROFESS IONAL SEAL 29982 ENGINEER RAFAL D. ELLIOTT
10/8/2012

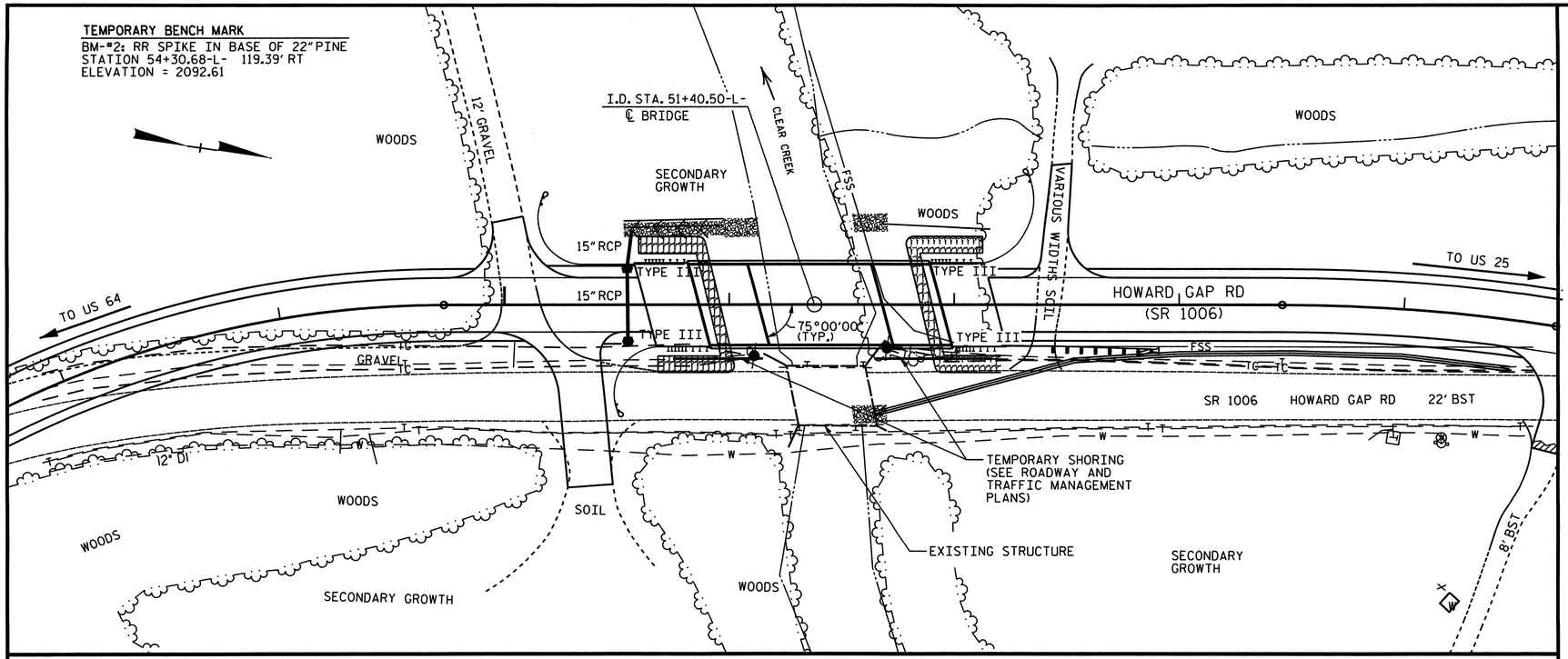
DRAWN BY :	RTJ	DATE :	3/12		
CHECKED BY :	NMW	DATE :	6/12		

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040
SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER CLEAR CREEK
ON HOWARD GAP RD. (SR 1006)
BETWEEN US 64 AND US 25

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-2
1			3			TOTAL SHEETS
2			4			45



LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.

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

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-1 SHALL BE EXCAVATED FOR A DISTANCE OF 25 FT. EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

THE 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.

ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH HEC 18, "EVALUATING SCOUR AT BRIDGES", MAY, 2001.

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 51+40.50-L-."

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

AFTER SERVING AS A TEMPORARY STRUCTURE, THE EXISTING STRUCTURE CONSISTING OF A 37' LONG SINGLE SPAN STEEL BEAM SUPERSTRUCTURE WITH A STEEL PLANK DECK AND A CLEAR ROADWAY WIDTH OF 23.9' SUPPORTED ON MASONRY ABUTMENTS AND BEING LOCATED 40' UPSTREAM FROM THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

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

TOTAL BILL OF MATERIAL

ITEM	REMOVAL OF EXISTING STRUCTURE	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS "A" CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	HP12x53 STEEL PILES		PP 18 X 0.50 GALVANIZED STEEL PILES		
	LUMP SUM	LUMP SUM	C.Y.	LUMP SUM	LBS.	NO.	LIN. FT.	NO.	LIN. FT.	
SUPERSTRUCTURE										
END BENT 1			16.2		2449	7	385			
BENT 1			12.9		2584			8	480	
BENT 2			12.9		2584			8	400	
END BENT 2			16.2		2449	7	385			
TOTALS	LUMP SUM	LUMP SUM	58.2	LUMP SUM	10,066	14	770	16	880	

ITEM	STEEL PILE POINTS	TWO BAR METAL RAIL	1'-2" x 2'-9" CONCRETE PARAPET	RIP RAP, CLASS II (2'-0" THK.)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 1'-9" PRESTRESSED CORED SLABS		
	EA.	LIN. FT.	LIN. FT.	TON	S.Y.	LUMP SUM	NO.	LIN. FT.	
SUPERSTRUCTURE		194.4	210.6			LUMP SUM	39	1365	
END BENT 1	7			108	120				
BENT 1	8								
BENT 2	8								
END BENT 2	7			108	120				
TOTALS	30	194.4	210.6	216	240	LUMP SUM	39	1365	

DRAWN BY : RTJ DATE : 3/12
CHECKED BY : NMW DATE : 6/12

NORTH CAROLINA PROFESSIONAL SEAL 29882 ENGINEER TRAY D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040
SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER CLEAR CREEK
ON HOWARD GAP RD. (SR 1006)
BETWEEN US 64 AND US 25

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-3
1			3			TOTAL SHEETS
2			4			45

LOAD AND RESISTANCE FACTOR RATING (LRFD) 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					
							LIVELOAD FACTORS	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)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	1.233	--	1.75	0.279	2.57	25'	EL	11.982	0.637	**1.23**	25'	EL	**1.198**	0.80	0.279	2.37	25'	EL	11.982	
		HL-93(Opr)	N/A	--	1.598	--	1.35	0.279	3.34	25'	EL	11.982	0.637	1.6	25'	EL	1.198	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	1.428	51.406	1.75	0.279	3.82	25'	EL	11.982	0.637	**1.43**	25'	EL	**1.198**	0.80	0.279	3.52	25'	EL	11.982	
		HS-20(Opr)	36.000	--	1.851	66.637	1.35	0.279	4.95	25'	EL	11.982	0.637	1.85	25'	EL	1.198	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.307	44.639	1.4	0.279	6.95	25'	EL	11.982	0.637	3.31	25'	EL	1.198	0.80	0.279	5.11	25'	EL	11.982	
		SNGARBS2	20.000	--	2.65	53	1.4	0.279	6.5	25'	EL	11.982	0.637	2.65	25'	EL	1.198	0.80	0.279	4.79	25'	EL	11.982	
		SNAGRIS2	22.000	--	2.596	57.117	1.4	0.279	6.95	25'	EL	11.982	0.637	2.6	25'	EL	1.198	0.80	0.279	5.11	25'	EL	11.982	
		SNCOTTS3	27.250	--	1.678	45.729	1.4	0.279	3.64	25'	EL	11.982	0.637	1.68	25'	EL	1.198	0.80	0.279	2.68	25'	EL	11.982	
		SNAGGRS4	34.925	--	1.615	56.393	1.4	0.279	3.62	25'	EL	11.982	0.637	1.61	25'	EL	1.198	0.80	0.279	2.66	25'	EL	11.982	
		SNS5A	35.550	--	1.687	59.981	1.4	0.279	3.51	25'	EL	11.982	0.637	1.69	25'	EL	1.198	0.80	0.279	2.58	25'	EL	11.982	
		SNS6A	39.950	--	1.618	64.639	1.4	0.279	3.29	25'	EL	11.982	0.637	1.62	25'	EL	1.198	0.80	0.279	2.42	25'	EL	11.982	
		SNS7B	42.000	--	1.63	68.445	1.4	0.279	3.29	25'	EL	11.982	0.637	1.63	25'	EL	1.198	0.80	0.279	2.41	25'	EL	11.982	
	TTST	TNAGRIT3	33.000	--	1.982	65.415	1.4	0.279	4.64	25'	EL	11.982	0.637	1.98	25'	EL	1.198	0.80	0.279	3.41	25'	EL	11.982	
		TNT4A	33.075	--	1.798	59.466	1.4	0.279	4.02	25'	EL	11.982	0.637	1.8	25'	EL	1.198	0.80	0.279	2.96	25'	EL	11.982	
		TNT6A	41.600	--	1.694	70.481	1.4	0.279	3.78	25'	EL	11.982	0.637	1.69	25'	EL	1.198	0.80	0.279	2.78	25'	EL	11.982	
		TNT7A	42.000	--	1.687	70.851	1.4	0.279	3.9	25'	EL	11.982	0.637	1.69	25'	EL	1.198	0.80	0.279	2.87	25'	EL	11.982	
		TNT7B	42.000	--	1.628	68.365	1.4	0.279	3.52	25'	EL	11.982	0.637	1.63	25'	EL	1.198	0.80	0.279	2.59	25'	EL	11.982	
		TNAGRIT4	43.000	--	1.625	69.855	1.4	0.279	3.78	25'	EL	11.982	0.637	1.62	25'	EL	1.198	0.80	0.279	2.77	25'	EL	11.982	
		TNAGT5A	45.000	--	1.657	74.558	1.4	0.279	3.78	25'	EL	11.982	0.637	1.66	25'	EL	1.198	0.80	0.279	2.77	25'	EL	11.982	
		TNAGT5B	45.000	3	1.503	67.632	1.4	0.279	3.72	25'	EL	9.586	0.637	**1.5**	25'	EL	**1.198**	0.80	0.279	2.75	25'	EL	9.586	

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:

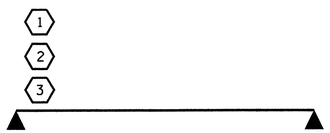
MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

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

FOR SPANS 'A' & 'C'

NORTH CAROLINA PROFESS IONAL SEAL 24592 ENGINEER TRAVIS D. ELLIOTT

10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

ASSEMBLED BY :	RTJ	DATE :	4/12
CHECKED BY :	NMW	DATE :	6/12
DRAWN BY :	CVC	DATE :	6/10
CHECKED BY :	DNS	DATE :	6/10

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR
25' CORED SLAB UNIT
75° SKEW & 105° SKEW
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-4
1			3			TOTAL SHEETS
2			4			45

STD. NO. 21LRFR1_75&105S_25L

LOAD AND RESISTANCE FACTOR RATING (LRFD) 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						
							LIVELOAD FACTORS	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)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	1.065	--	1.75	0.27	1.25	55′	EL	26.982	0.616	1.12	55′	EL	5.396	0.80	0.27	**1.07**	55′	EL	**26.982**	
		HL-93(Opr)	N/A	--	1.452	--	1.35	0.27	1.61	55′	EL	26.982	0.616	1.45	55′	EL	5.396	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	1.335	48.043	1.75	0.27	1.56	55′	EL	26.982	0.616	1.34	55′	EL	5.396	0.80	0.27	**1.33**	55′	EL	**26.982**	
		HS-20(Opr)	36.000	--	1.734	62.425	1.35	0.27	2.02	55′	EL	26.982	0.616	1.73	55′	EL	5.396	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	2.802	37.83	1.4	0.27	4.09	55′	EL	26.982	0.616	3.81	55′	EL	5.396	0.80	0.27	2.80	55′	EL	26.982	
		SNGARBS2	20.000	--	2.175	43.506	1.4	0.27	3.18	55′	EL	26.982	0.616	2.76	55′	EL	5.396	0.80	0.27	2.18	55′	EL	26.982	
		SNAGRIS2	22.000	--	2.099	46.173	1.4	0.27	3.07	55′	EL	26.982	0.616	2.58	55′	EL	5.396	0.80	0.27	2.10	55′	EL	26.982	
		SNCOTTS3	27.250	--	1.397	38.065	1.4	0.27	2.04	55′	EL	26.982	0.616	1.91	55′	EL	5.396	0.80	0.27	1.40	55′	EL	26.982	
		SNAGGRS4	34.925	--	1.2	41.922	1.4	0.27	1.75	55′	EL	26.982	0.616	1.62	55′	EL	5.396	0.80	0.27	1.20	55′	EL	26.982	
		SNS5A	35.550	--	1.172	41.648	1.4	0.27	1.71	55′	EL	26.982	0.616	1.66	55′	EL	5.396	0.80	0.27	1.17	55′	EL	26.982	
		SNS6A	39.950	--	1.089	43.514	1.4	0.27	1.59	55′	EL	26.982	0.616	1.53	55′	EL	5.396	0.80	0.27	1.09	55′	EL	26.982	
		SNS7B	42.000	--	1.038	43.587	1.4	0.27	1.52	55′	EL	26.982	0.616	1.53	55′	EL	5.396	0.80	0.27	1.04	55′	EL	26.982	
	TTST	TNAGRIT3	33.000	--	1.333	43.973	1.4	0.27	1.95	55′	EL	26.982	0.616	1.81	55′	EL	5.396	0.80	0.27	1.33	55′	EL	26.982	
		TNT4A	33.075	--	1.342	44.4	1.4	0.27	1.96	55′	EL	26.982	0.616	1.75	55′	EL	5.396	0.80	0.27	1.34	55′	EL	26.982	
		TNT6A	41.600	--	1.112	46.252	1.4	0.27	1.62	55′	EL	26.982	0.616	1.67	55′	EL	5.396	0.80	0.27	1.11	55′	EL	26.982	
		TNT7A	42.000	--	1.125	47.255	1.4	0.27	1.64	55′	EL	26.982	0.616	1.56	55′	EL	5.396	0.80	0.27	1.13	55′	EL	26.982	
		TNT7B	42.000	--	1.174	49.318	1.4	0.27	1.72	55′	EL	26.982	0.616	1.47	55′	EL	5.396	0.80	0.27	1.17	55′	EL	26.982	
		TNAGRIT4	43.000	--	1.111	47.786	1.4	0.27	1.62	55′	EL	26.982	0.616	1.42	55′	EL	5.396	0.80	0.27	1.11	55′	EL	26.982	
		TNAGT5A	45.000	--	1.041	46.851	1.4	0.27	1.52	55′	EL	26.982	0.616	1.44	55′	EL	5.396	0.80	0.27	1.04	55′	EL	26.982	
		TNAGT5B	45.000	3	1.023	46.02	1.4	0.27	1.49	55′	EL	26.982	0.616	1.35	55′	EL	5.396	0.80	0.27	**1.02**	55′	EL	**26.982**	

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:

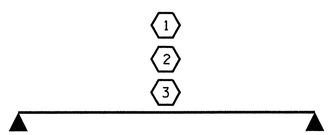
MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

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

FOR SPAN 'B'

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 29882 ENGINEER TARA D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

ASSEMBLED BY :	RTJ	DATE :	4/12
CHECKED BY :	NMW	DATE :	6/12
DRAWN BY :	CVC	DATE :	6/10
CHECKED BY :	DNS	DATE :	6/10

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

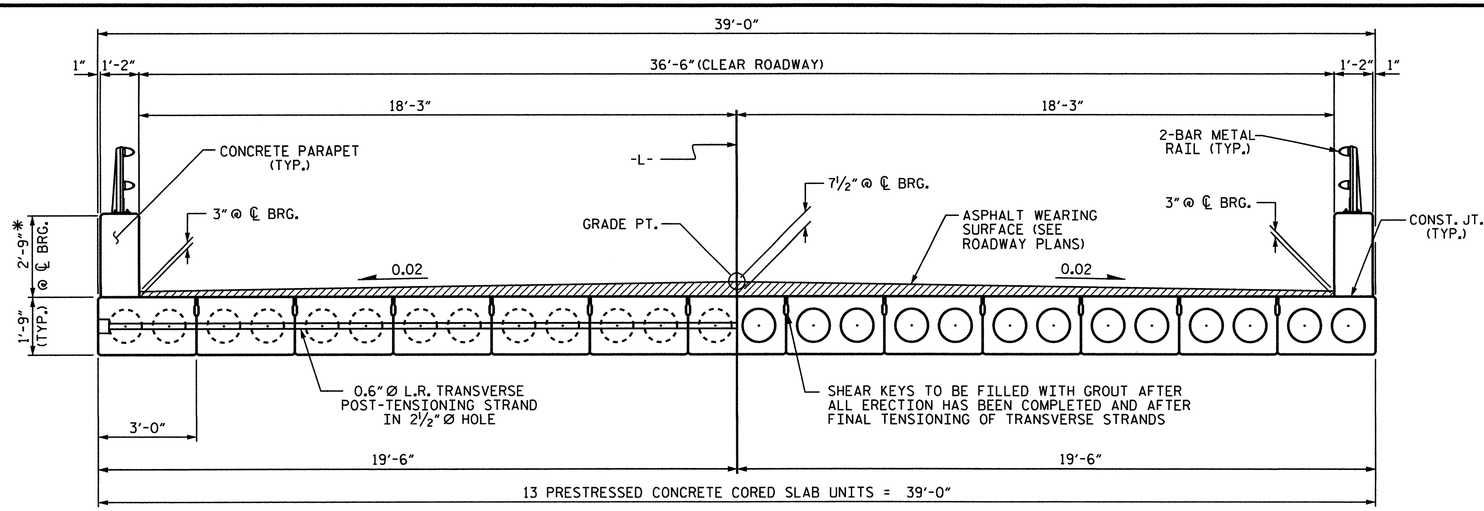
STANDARD

LRFR SUMMARY FOR 55′ CORED SLAB UNIT 75° SKEW & 105° SKEW

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-5
1			3			TOTAL SHEETS
2			4			45

STD. NO. 21LRFR1_75&105S_55L



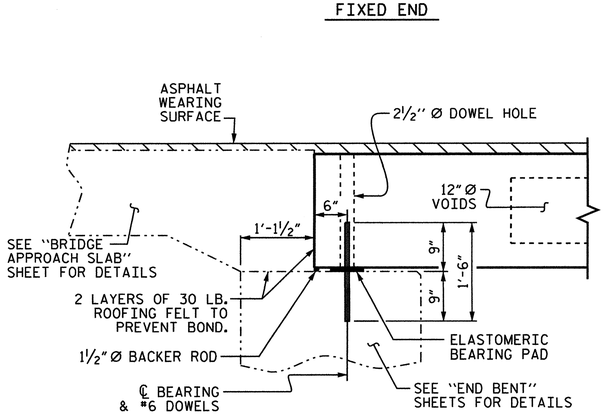
HALF SECTION AT INTERMEDIATE DIAPHRAGMS

HALF SECTION THROUGH VOIDS

TYPICAL SECTION

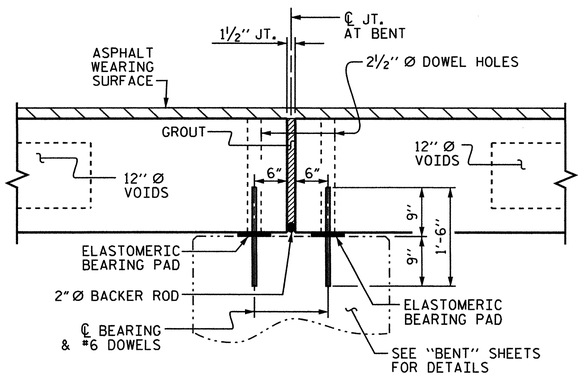
*-THE MAXIMUM PARAPET RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE PARAPET RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE PARAPET RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS SEE THE "CONCRETE PARAPET RAIL SECTION" DETAIL.

FIXED END

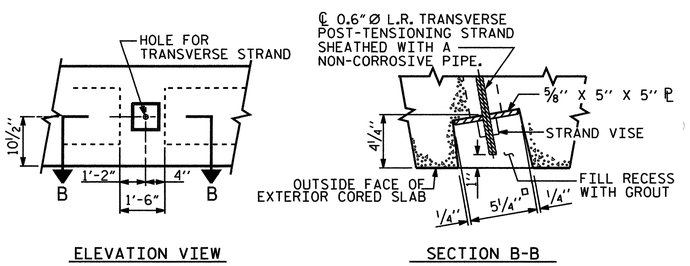


SECTION AT END BENT

FIXED END FIXED END

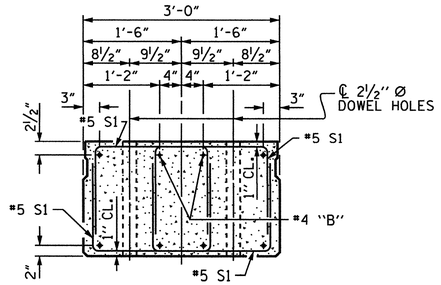


SECTION AT BENT



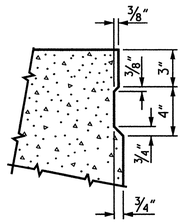
ELEVATION VIEW SECTION B-B

GROUTED RECESS AT END OF POST-TENSIONED STRAND OF CORED SLABS



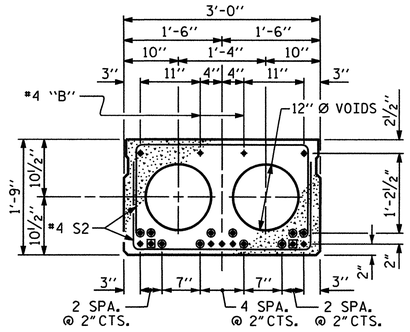
END ELEVATION

SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.) INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.



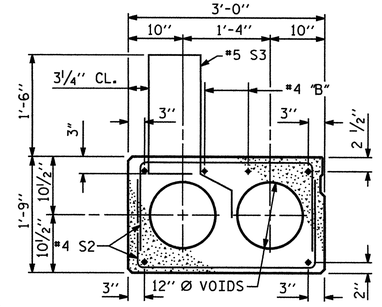
SHEAR KEY DETAIL

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.



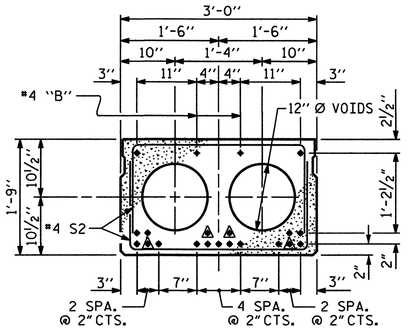
STRAND LAYOUT FOR 25' UNIT

(9 STRANDS REQUIRED)



EXTERIOR SLAB SECTION

(FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)



STRAND LAYOUT FOR 55' UNIT

(19 STRANDS REQUIRED)

INTERIOR SLAB SECTION
0.6" Ø LOW RELAXATION

△ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 6'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

▣ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 2'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

◉ OPTIONAL FULL LENGTH DEBONDED STRANDS. THESE STRANDS ARE NOT REQUIRED. IF THE FABRICATOR CHOOSES TO INCLUDE THESE STRANDS IN THE CORED SLAB UNIT, THE STRANDS SHALL BE DEBONDED FOR THE FULL LENGTH OF THE UNIT AT NO ADDITIONAL COST. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND

ASSEMBLED BY :	RTJ	DATE :	3/12
CHECKED BY :	NMW	DATE :	6/12
DRAWN BY :	DGE	6/09	
CHECKED BY:	BCH	6/09	

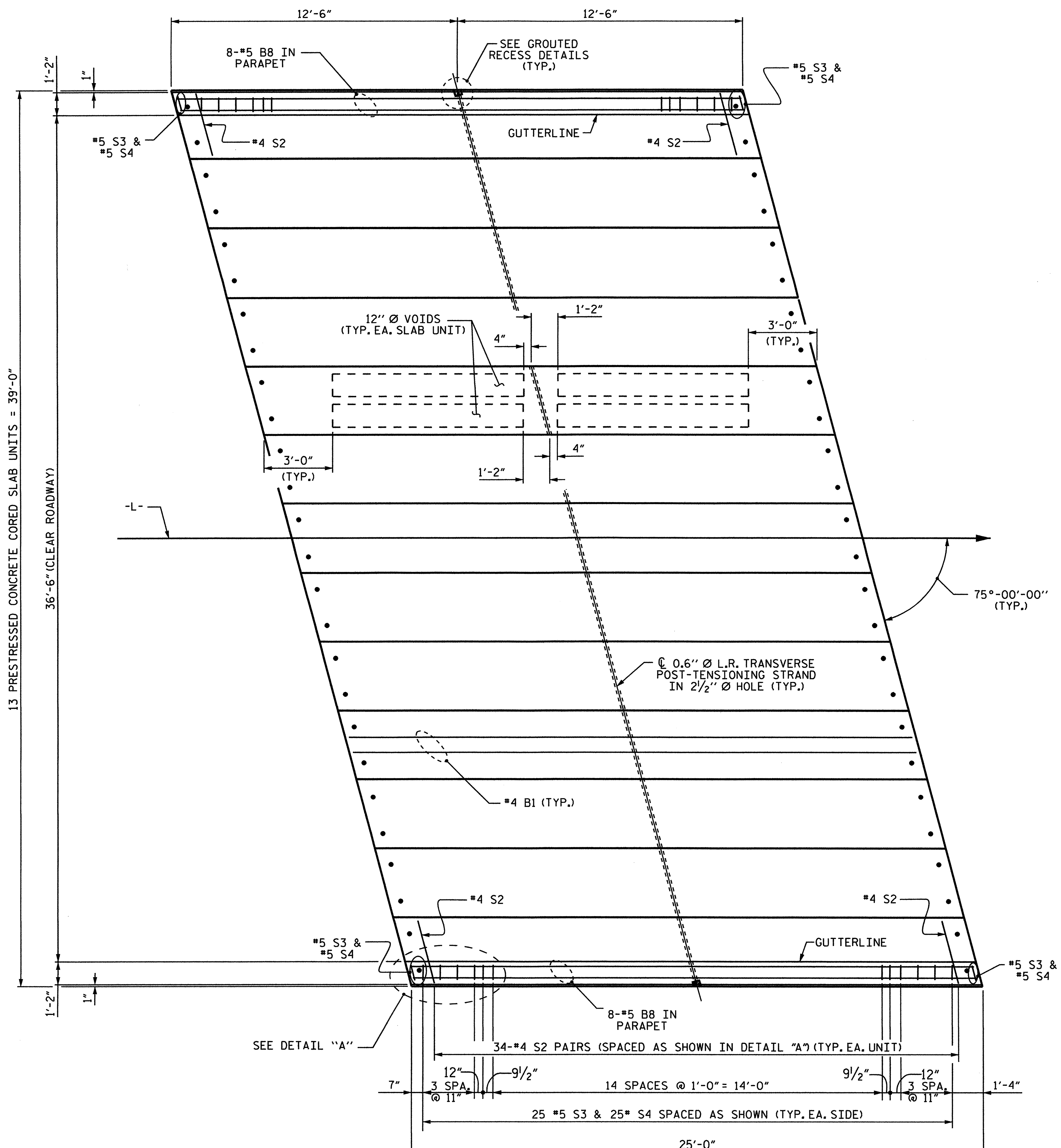
PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040
SHEET 1 OF 5

NORTH CAROLINA PROFESSIONAL SEAL 29282 ENGINEER TRAVIS D. ELLIOTT
10/8/2012

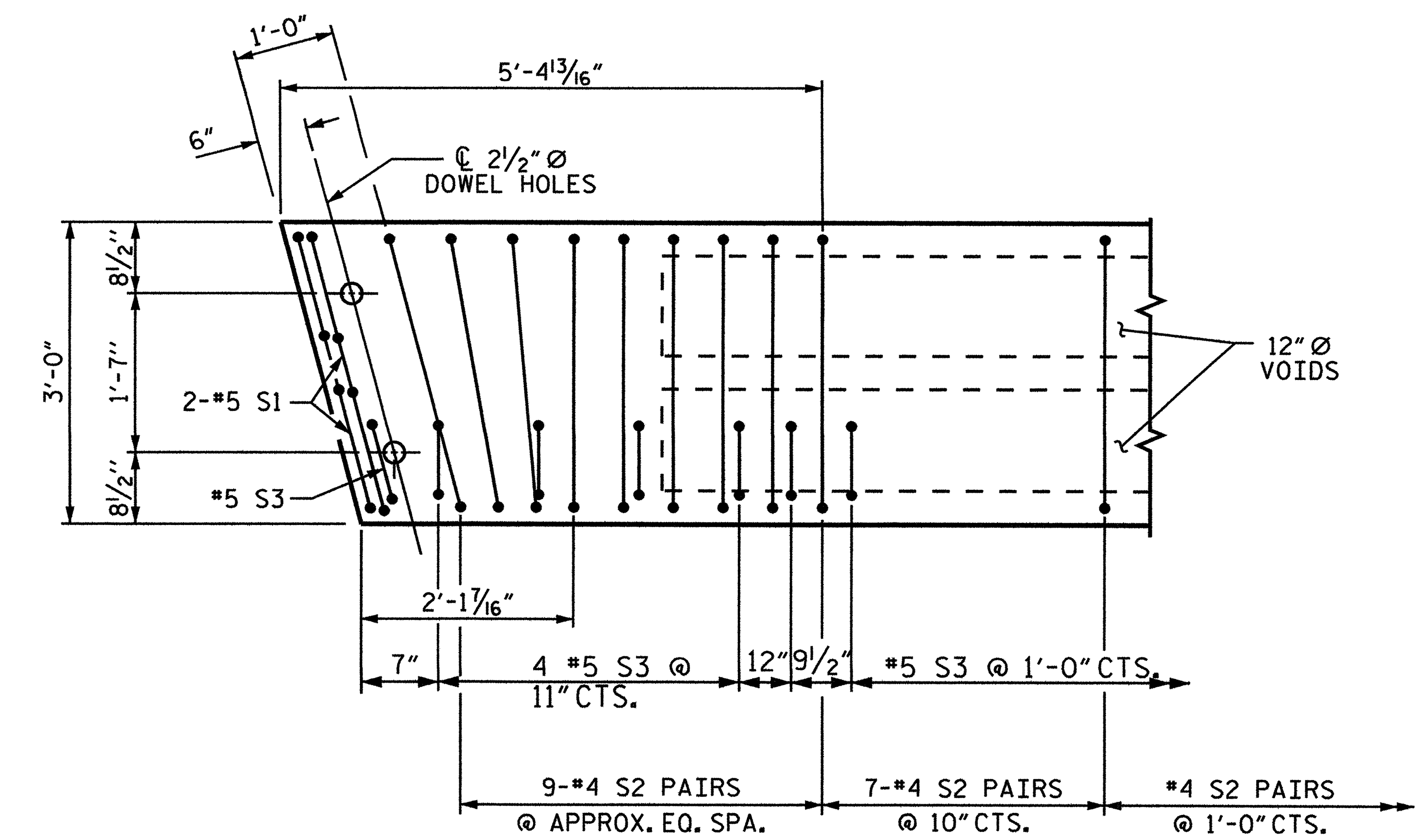
PREPARED BY TGS ENGINEERS 107-A MICA AVENUE MORGANTON, NC 28655

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
3'-0" X 1'-9"
PRESTRESSED CONCRETE CORED SLAB UNIT
75° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			45



PLAN OF UNIT - SPANS A & C



DETAIL "A"

NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S3 BARS.

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 2 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22982 RAY D. ELLIOTT
10/8/2012

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 25' UNIT 36'-6" CLEAR ROADWAY 75° SKEW SPANS A & C

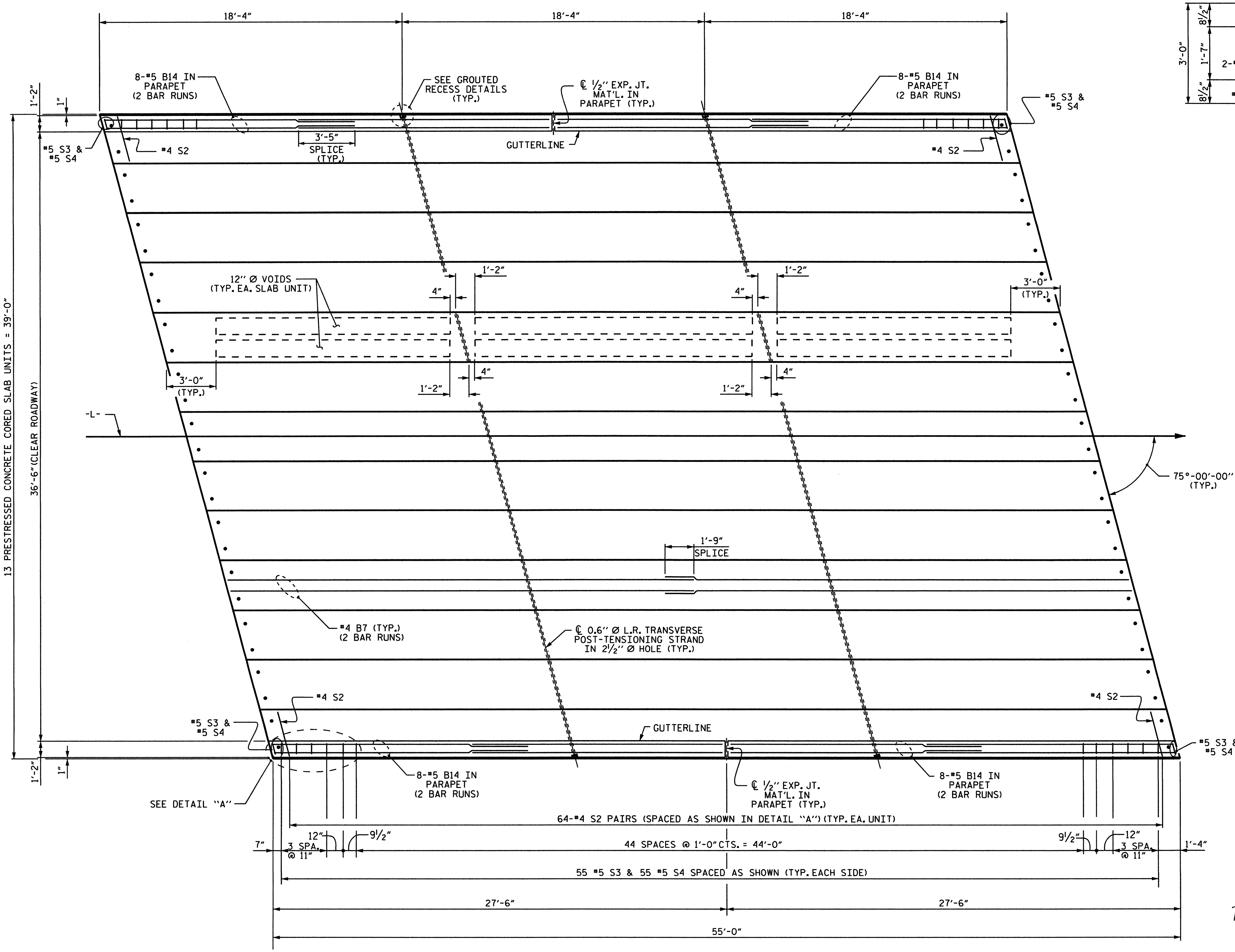
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

ASSEMBLED BY :	RTJ	DATE :	3/12
CHECKED BY :	NMW	DATE :	6/12
DRAWN BY :	DGE	6/09	
CHECKED BY:	BCH	6/09	

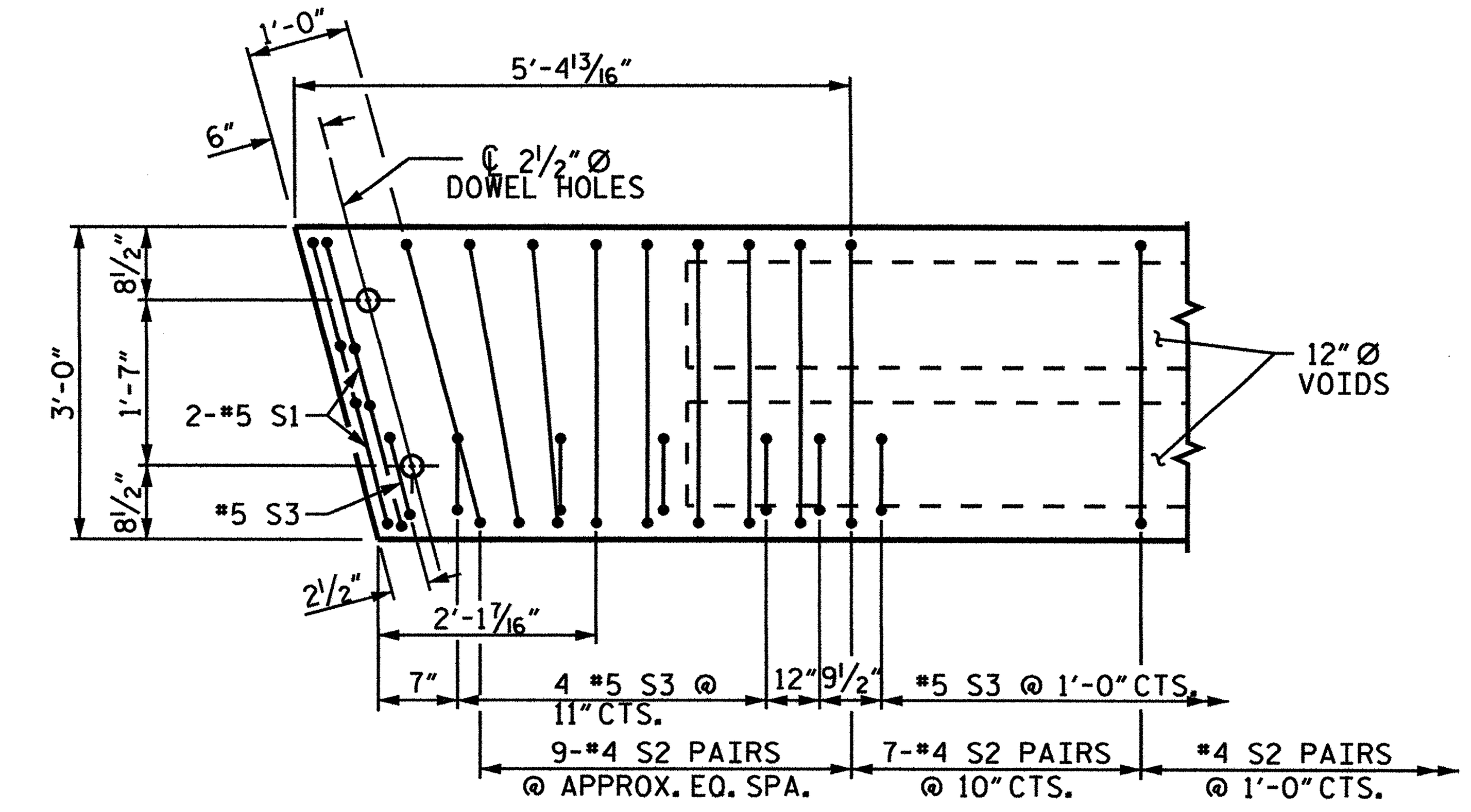
REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-7
1			3				TOTAL SHEETS
2			4				45

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

STD. NO. 21" PCS_39_75S_25L



PLAN OF UNIT - SPAN B



DETAIL "A"

NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S3 BARS.

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 55' UNIT
36'-6" CLEAR ROADWAY
75° SKEW
SPAN B

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22892 RAY D. ELLIOTT
10/8/2012

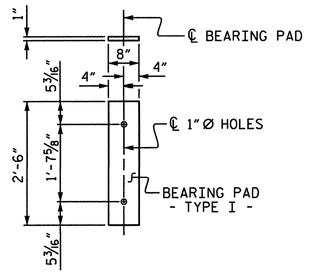
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

ASSEMBLED BY :	RTJ	DATE :	3/12
CHECKED BY :	NMW	DATE :	6/12
DRAWN BY : DGE	6/09		
CHECKED BY: BCH	6/09		

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-8
1			3					TOTAL SHEETS
2			4					45

$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

STD. NO. 21" PCS_39_75S_55L



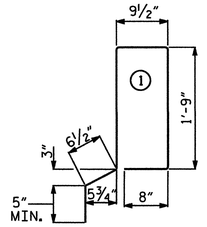
FIXED END
(TYPE I - 52 REQ'D)

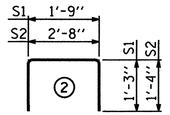
ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS.

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

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE 25' CORED SLAB UNIT

				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
B1	2	#4	STR	24'-7"	33	24'-7"	33
S1	8	#5	2	4'-3"	35	4'-3"	35
S2	68	#4	2	5'-4"	242	5'-4"	242
✱ S3	27	#5	1	5'-11"	167		
REINFORCING STEEL LBS.					310		310
✱ EPOXY COATED REINFORCING STEEL LBS.					167		
5000 P.S.I. CONCRETE CU. YDS.					3.8		3.8
0.6" Ø L.R. STRANDS No.					9		9

NOTES

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

ALL REINFORCING STEEL CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

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

THE 2½" Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

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

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

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

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

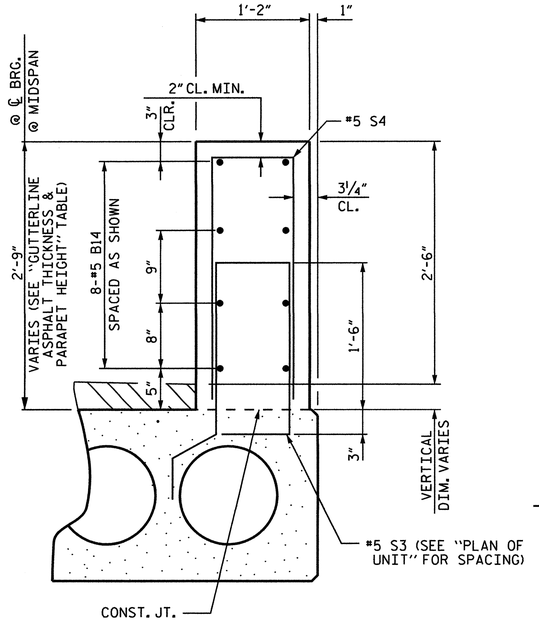
APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

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

TRANSVERSE POST TENSIONING OF THE CORED SLAB UNITS SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

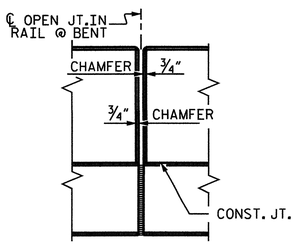
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.



PARAPET SECTION FOR TWO BAR METAL RAIL

QUANTITIES FOR THE #5 S4 AND #5 B8 BARS ARE SHOWN IN THE END POST BILL OF MATERIAL.



ELEVATION AT EXPANSION JOINTS

GUTTERLINE ASPHALT THICKNESS & PARAPET HEIGHT		
36'-6" CLEAR ROADWAY	ASPHALT OVERLAY THICKNESS: @ MID-SPAN	PARAPET HEIGHT @ MID-SPAN
	NORMAL CROWN SECTION	
25' UNITS	2⅝"	2'-8⅝"

DEAD LOAD DEFLECTION AND CAMBER	
	3'-0" x 1'-9"
25' CORED SLAB UNIT	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	½" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD✱✱	⅛" ↓
FINAL CAMBER	⅜" ↑

✱✱ INCLUDES FUTURE WEARING SURFACE

CONCRETE RELEASE STRENGTH	
UNIT	PSI
25' UNITS	4000

CORED SLABS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
25' UNIT			
EXTERIOR C.S.	4	25'-0"	100'-0"
INTERIOR C.S.	22	25'-0"	550'-0"
TOTAL	26		650'-0"

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040
SHEET 4 OF 5

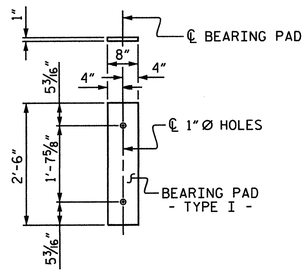
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 1'-9"
PRESTRESSED CONCRETE
CORED SLAB UNIT
75° SKEW 25' SPAN
SPANS A & C

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			45

ASSEMBLED BY :	RTJ	DATE :	3/12
CHECKED BY :	NMW	DATE :	6/12
DRAWN BY : DGE 5/09			
CHECKED BY : BCH 6/09			



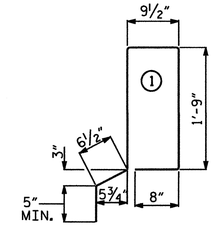
FIXED END
(TYPE I - 26 REQ'D)

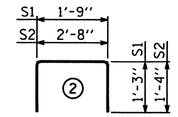
ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS.

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

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE 55' CORED SLAB UNIT

				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
B7	4	#4	STR	28'-3"	75	28'-3"	75
S1	8	#5	2	4'-3"	35	4'-3"	35
S2	128	#4	2	5'-4"	456	5'-4"	456
✱ S3	57	#5	1	5'-11"	352		
REINFORCING STEEL LBS.					566		566
✱ EPOXY COATED REINFORCING STEEL LBS.					352		
6500 P.S.I. CONCRETE CU. YDS.					7.9		7.9
0.6" Ø L.R. STRANDS No.					19		19

NOTES

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

ALL REINFORCING STEEL CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

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

THE 2½"Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

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

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

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

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

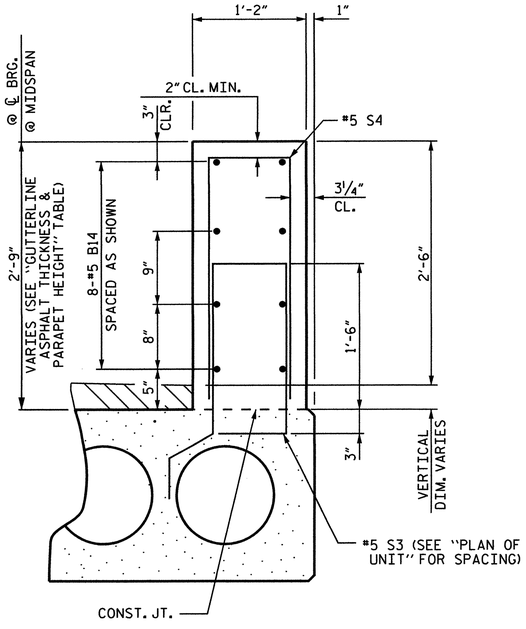
APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

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

TRANSVERSE POST TENSIONING OF THE CORED SLAB UNITS SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

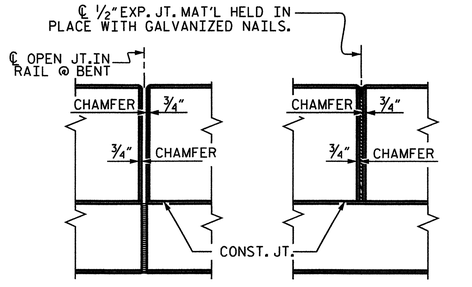
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.



PARAPET SECTION FOR TWO BAR METAL RAIL

QUANTITIES FOR THE #5 S4 AND #5 B14 BARS ARE SHOWN IN THE END POST BILL OF MATERIAL.



ELEVATION AT EXPANSION JOINTS

GUTTERLINE ASPHALT THICKNESS & PARAPET HEIGHT		
36'-6" CLEAR ROADWAY	ASPHALT OVERLAY THICKNESS: @ MID-SPAN NORMAL CROWN SECTION	PARAPET HEIGHT @ MID-SPAN
55' UNITS	3/4"	2'-6 3/4"

CONCRETE RELEASE STRENGTH	
UNIT	PSI
55' UNITS	4900

DEAD LOAD DEFLECTION AND CAMBER	
	3'-0" x 1'-9"
55' CORED SLAB UNIT	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2½" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	¼" ↓
FINAL CAMBER	2¼" ↑

** INCLUDES FUTURE WEARING SURFACE

CORED SLABS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
55' UNIT			
EXTERIOR C.S.	2	55'-0"	110'-0"
INTERIOR C.S.	11	55'-0"	605'-0"
TOTAL	13		715'-0"

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 5 OF 5

NORTH CAROLINA PROFESS IONAL SEAL 24982 ENGINEER TRAV D. ELLIOTT

10/8/2012

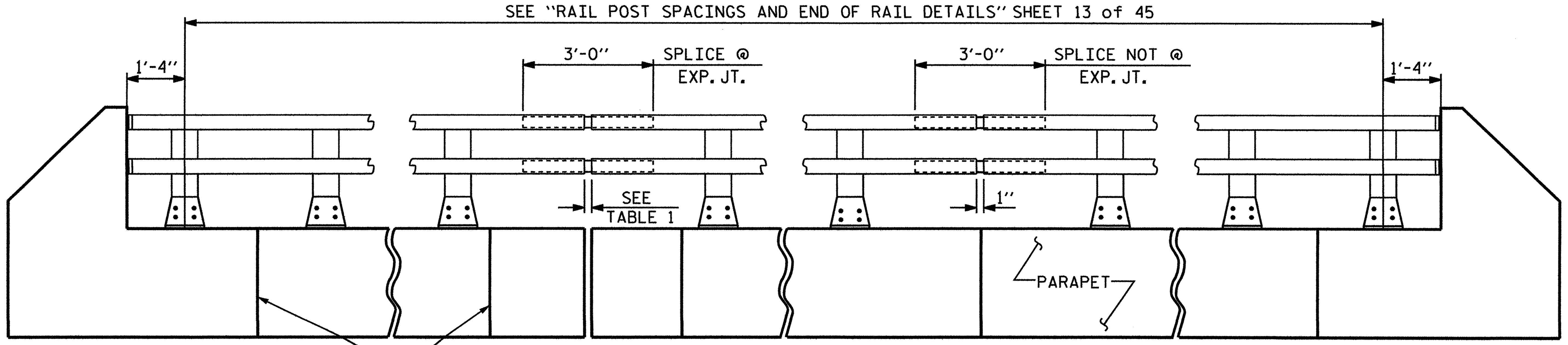
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 1'-9"
PRESTRESSED CONCRETE
CORED SLAB UNIT
75° SKEW 55' SPAN
SPAN B

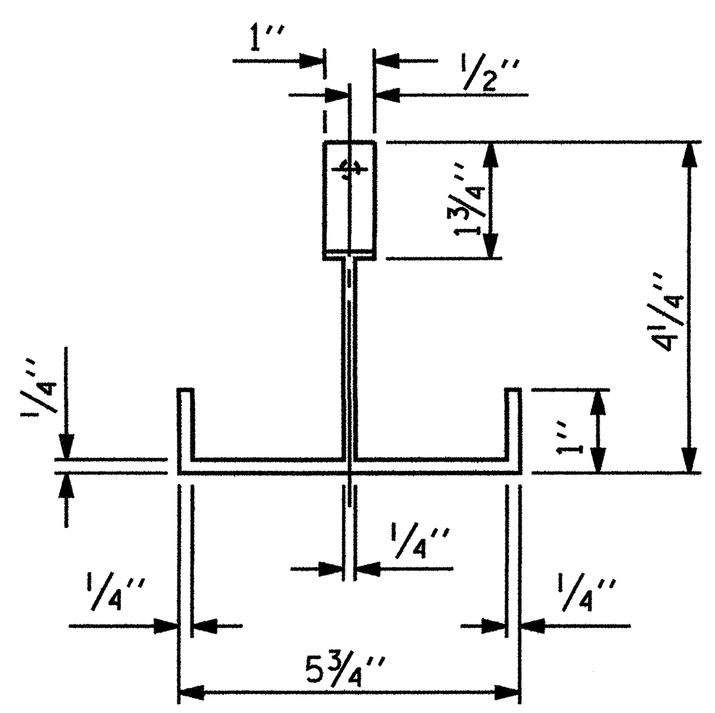
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			45

ASSEMBLED BY :	RTJ	DATE :	3/12
CHECKED BY :	NMW	DATE :	6/12
DRAWN BY :	DGE	5/09	
CHECKED BY :	BCH	6/09	

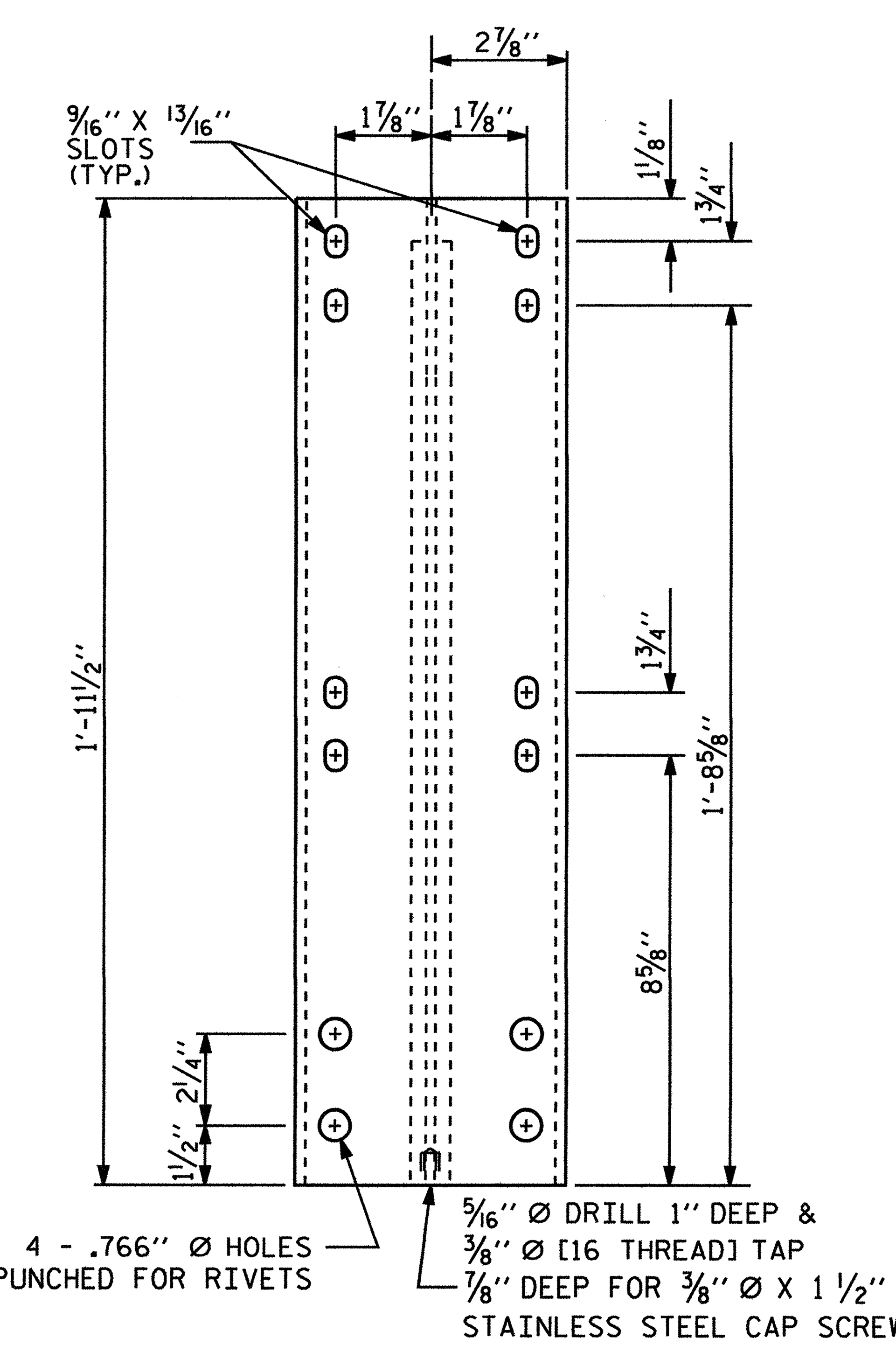


ELEVATION

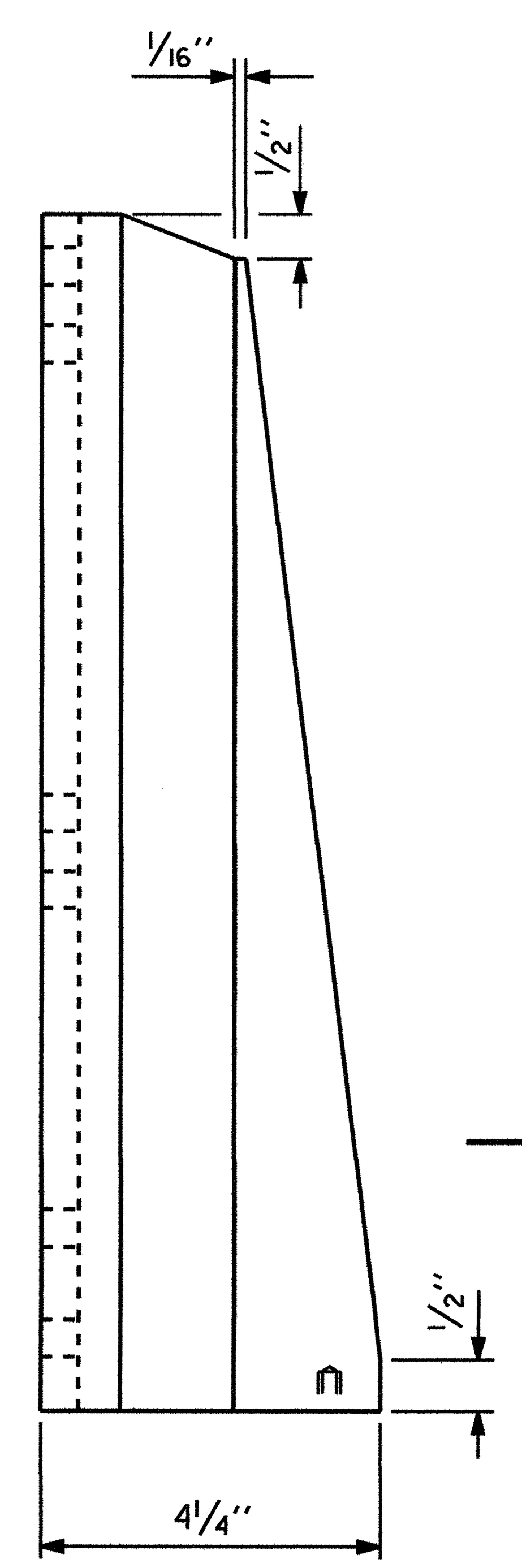
NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE STANDARD NO. BMR2.



PLAN

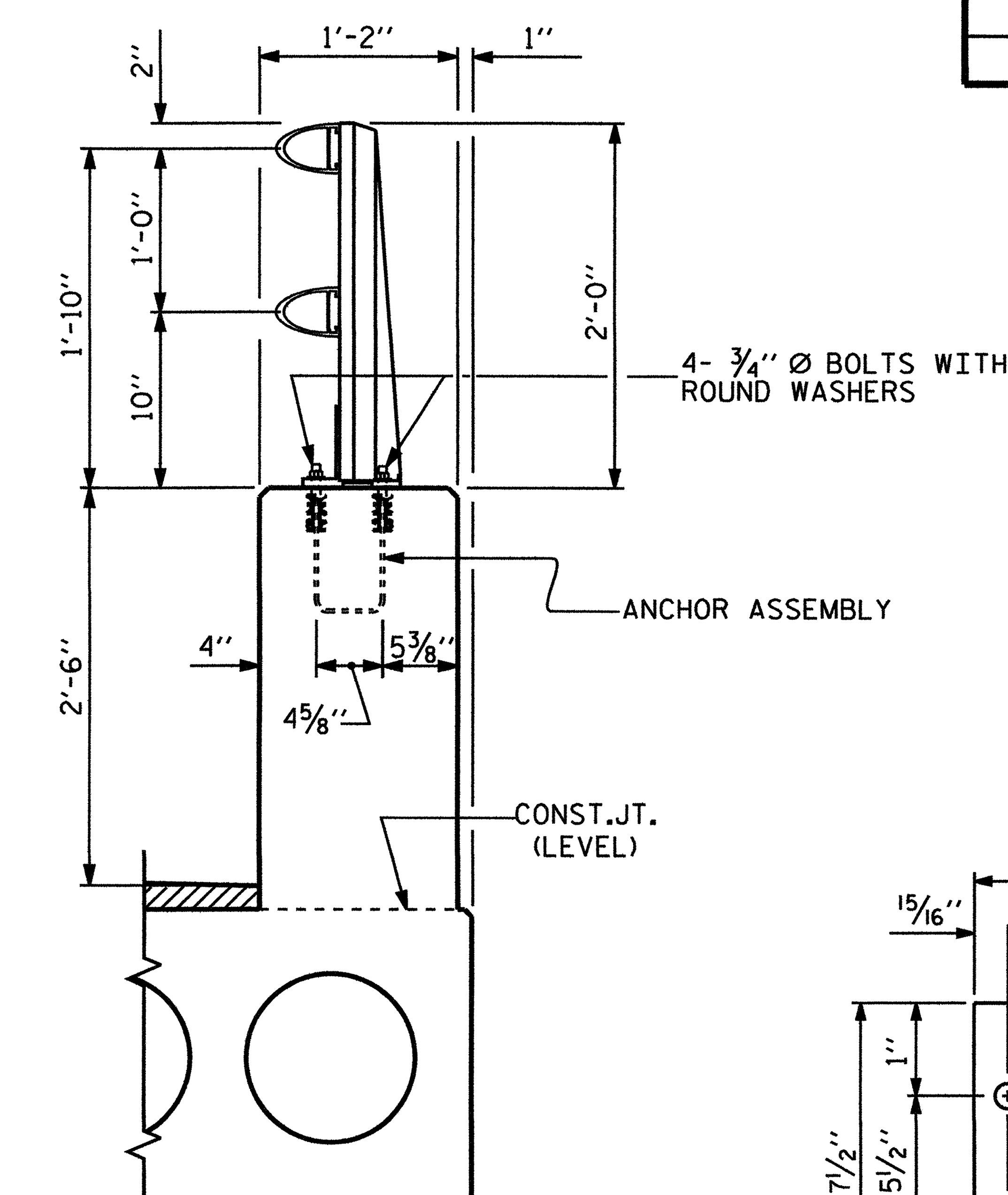


FRONT ELEVATION



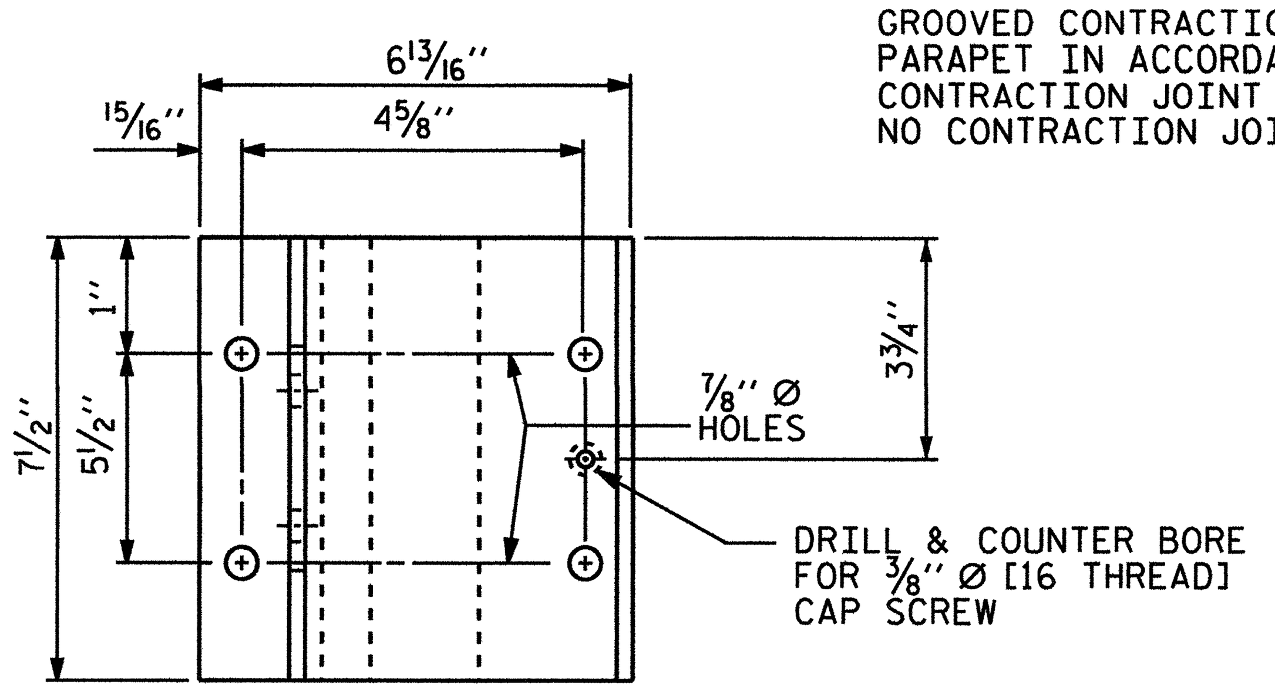
SIDE ELEVATION

DETAILS OF POST

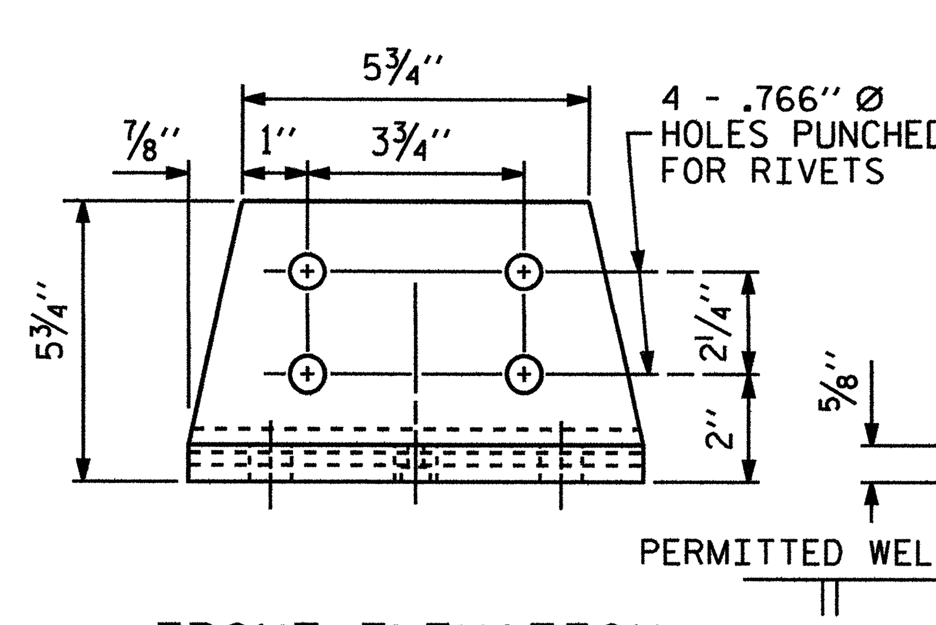


SECTION THRU PARAPET AND RAIL

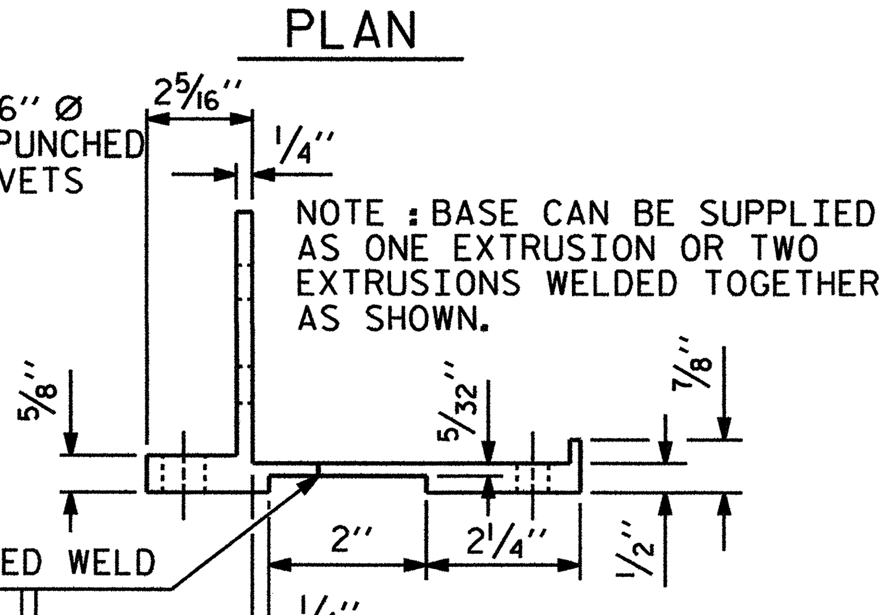
TABLE 1	
℄ EXP. JT. @	RAIL OPENING
BENT No. 1	1 1/2"
BENT No. 2	1 1/2"



PLAN

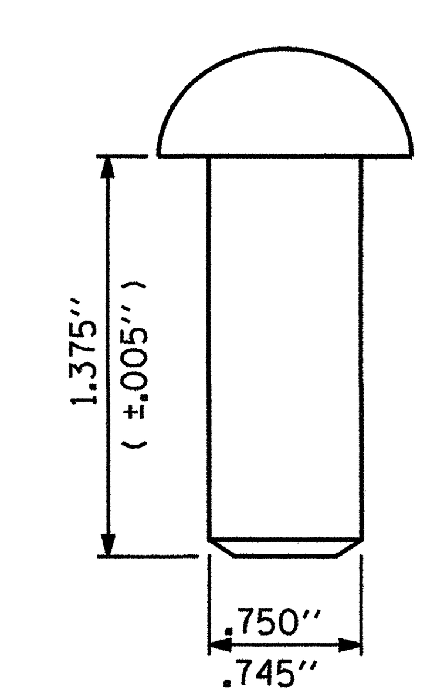


FRONT ELEVATION



SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL

NOTES

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

ALUMINUM RAILS

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6.

MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

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

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

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

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

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

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

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

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

GENERAL NOTES

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

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

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

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

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

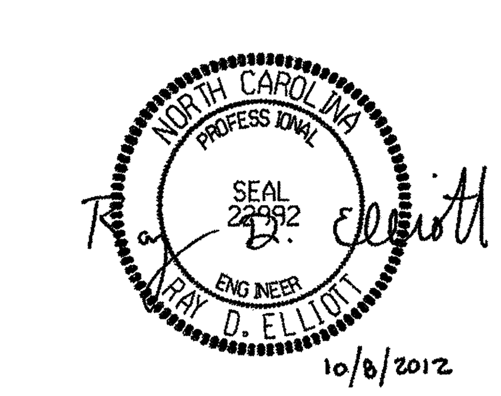
ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

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

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT A SPACING OF 8FT. TO 10FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.

PAY LENGTH = 194.4 LIN. FT.

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040
SHEET 1 OF 2



PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

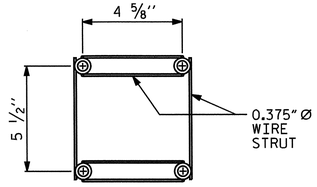
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

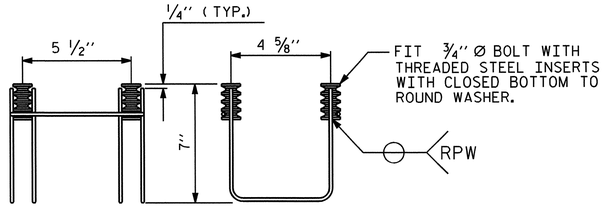
2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-11
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : RTJ DATE : 6/12
CHECKED BY : NMW DATE : 6/12



PLAN



SIDE VIEW ELEVATION

MINIMUM LENGTH OF THREADS IN INSERT (FERRULE): 1 3/4"

4-BOLT METAL RAIL ANCHOR ASSEMBLY

(36 ASSEMBLIES REQUIRED)

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.

B. 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 2 1/2" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

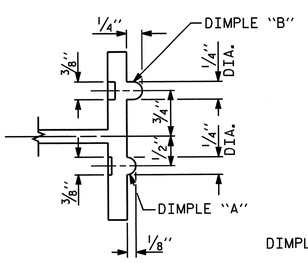
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

E. THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.

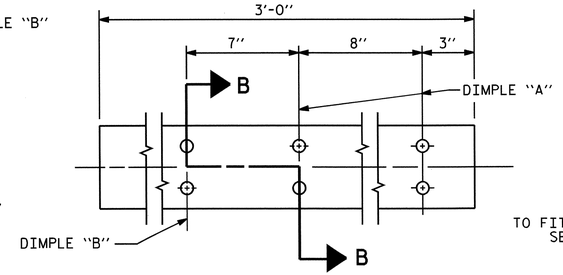
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

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

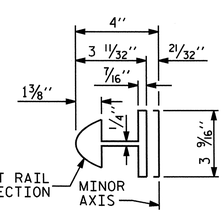
WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY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



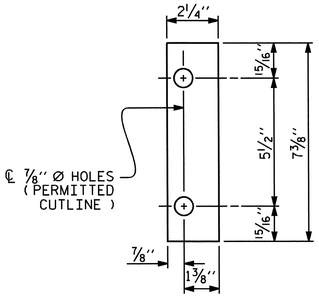
SECTION B - B



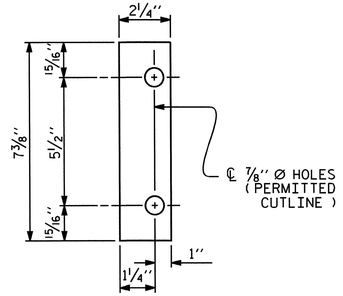
EXPANSION BAR DETAILS



BAR SECTION



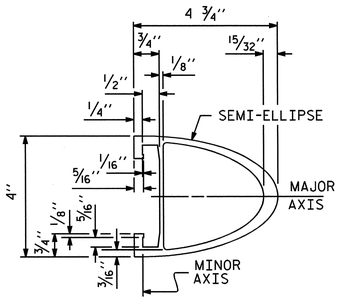
FRONT PLATE



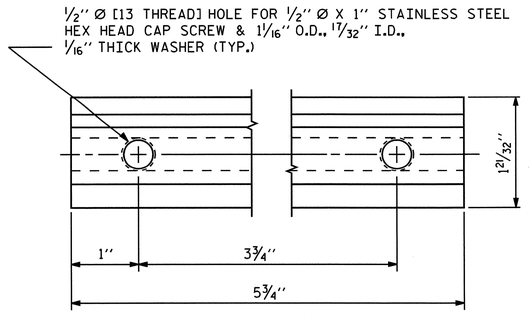
REAR PLATE

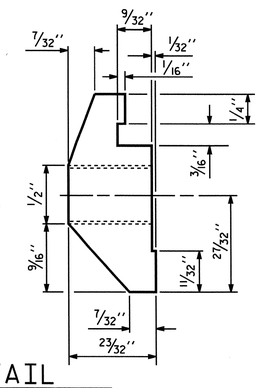
SHIM DETAILS

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



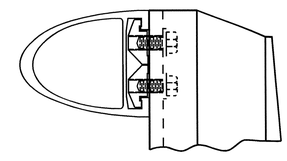
RAIL SECTION



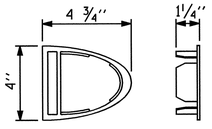


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

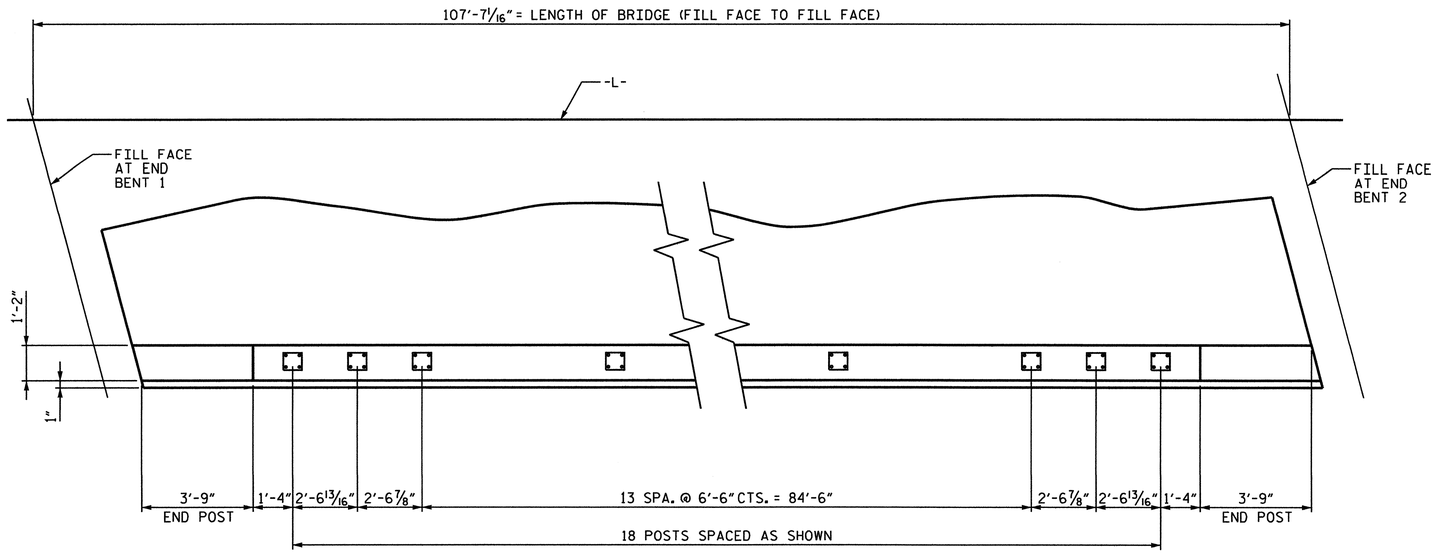
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

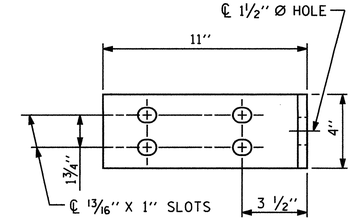
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-12
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : RTJ DATE : 6/12
CHECKED BY : NMW DATE : 6/12

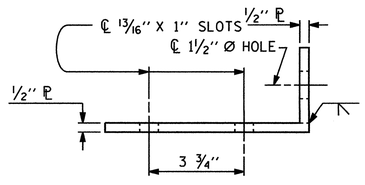


PLAN OF RAIL POST SPACINGS

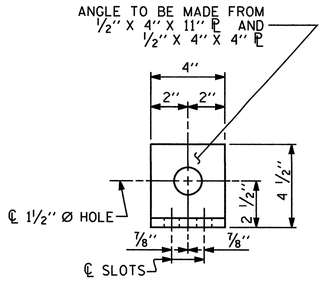
RIGHT SIDE SHOWN; LEFT SIDE SIMILAR.



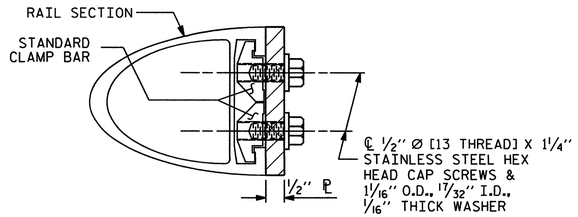
ELEVATION



TOP VIEW

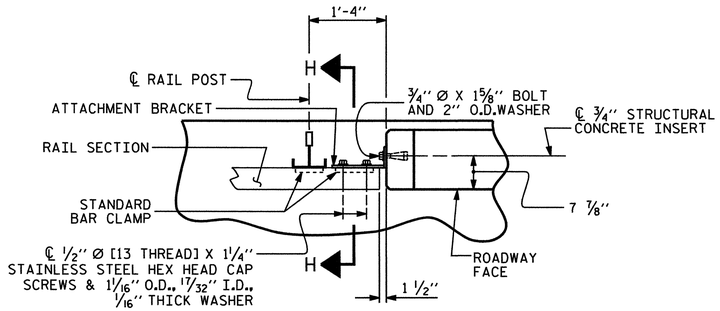


END VIEW (FIX AND EXP.)



SECTION H-H (FIX)

FIXED



PLAN - RAIL AND END POST

DETAILS FOR ATTACHING METAL RAIL TO END POST

NOTES

STRUCTURAL CONCRETE INSERT

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

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1 1/2".

B. 1 - 3/4" Ø X 1 5/8" BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 1 5/8" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

NOTES

METAL RAIL TO END POST CONNECTION

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

A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4"Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4"Ø X 1 5/8" BOLT SHALL HAVE N. C. THREADS.

C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.

D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).

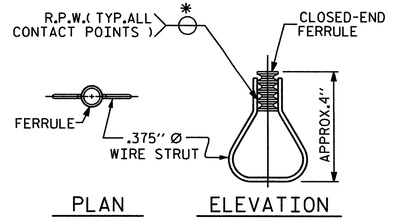
E. 1/2" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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

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

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

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



STRUCTURAL CONCRETE INSERT

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

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

NORTH CAROLINA PROFESSIONAL SEAL 24982 ENGINEER TARA D. ELLIOTT
10/8/2012

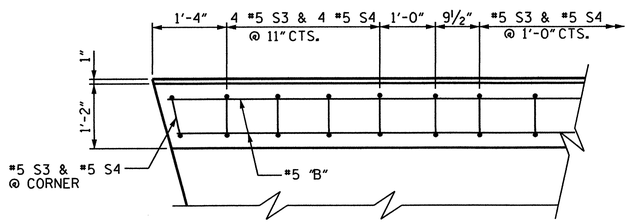
PREPARED BY
TGS ENGINEERS
107-A WICA AVENUE
MORGANTON, NC 28655

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

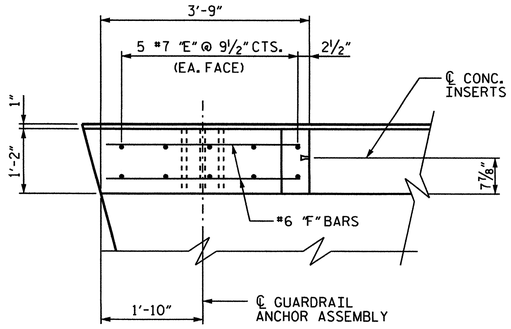
RAIL POST SPACINGS AND END OF RAIL DETAILS
FOR ONE OR TWO BAR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-13
1			3			TOTAL SHEETS
2			4			45

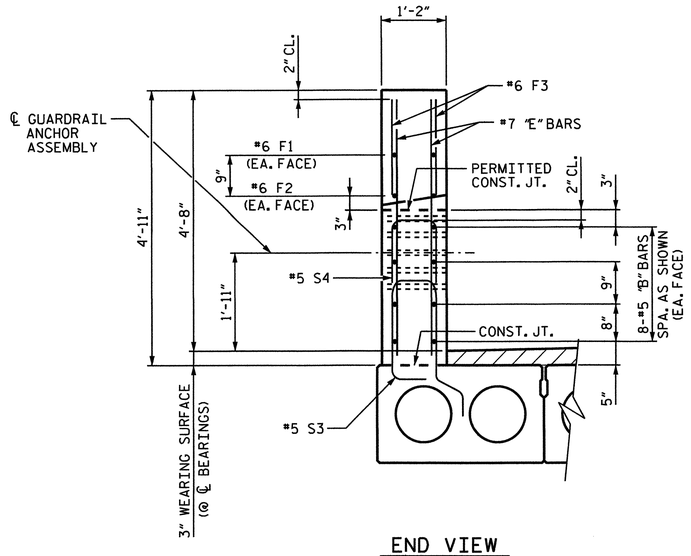
DRAWN BY : RTJ DATE : 6/12
CHECKED BY : NMW DATE : 6/12



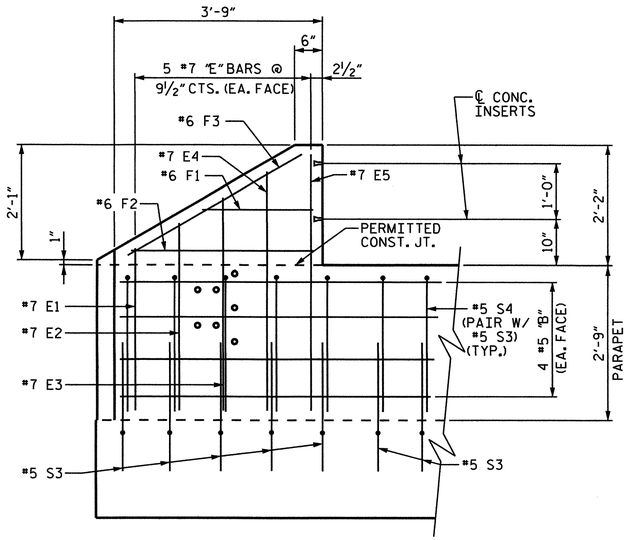
PLAN OF PARAPET



PLAN OF END POST



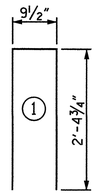
END VIEW



ELEVATION

PARAPET AND END POST FOR TWO BAR METAL RAIL

BAR TYPES



BAR DIMENSIONS ARE OUT TO OUT.

TWO BAR METAL RAIL

BILL OF MATERIAL FOR PARAPET AND TWO END POSTS - 2 REQUIRED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B8	16	#5	STR.	24'-7"	410
✱B14	32	#5	STR.	15'-5"	515
✱E1	4	#7	STR.	2'-10"	23
✱E2	4	#7	STR.	3'-4"	27
✱E3	4	#7	STR.	3'-9"	31
✱E4	4	#7	STR.	4'-3"	35
✱E5	4	#7	STR.	4'-7"	37
✱F1	4	#6	STR.	2'-0"	12
✱F2	4	#6	STR.	3'-3"	20
✱F3	4	#6	STR.	3'-7"	22
✱S4	111	#5	1	5'-7"	646
✱EPOXY COATED REINFORCING STEEL					1,778 LBS.
CLASS "AA" CONCRETE					12.9 C.Y.
1'-2" x 2'-9" CONCRETE PARAPET					105.3 L.F.

NOTES:

QUANTITIES FOR THE #5 S3 BARS ARE SHOWN IN THE CORED SLAB BILL OF MATERIAL.

ALL REINFORCING STEEL IN PARAPETS AND END POSTS SHALL BE EPOXY COATED.

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

NORTH CAROLINA PROFESS ENGL SEAL 29982 ENGINEER MAY D. ELLIOTT

10/8/2012

PREPARED BY
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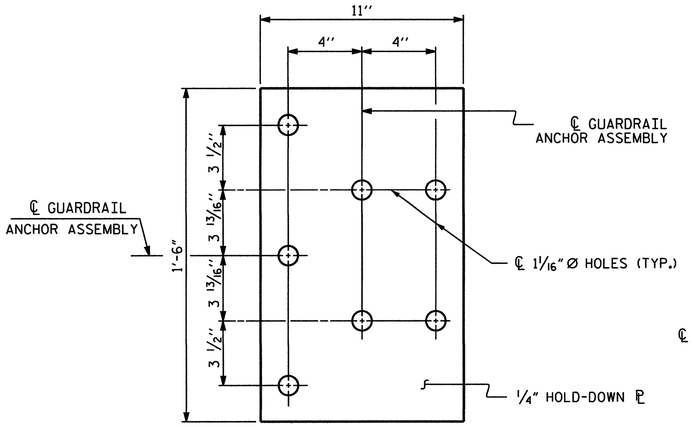
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRELIMINARY

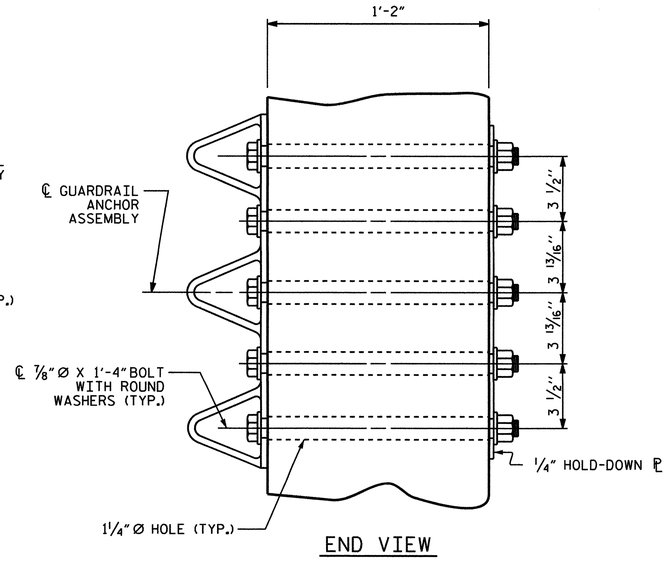
END POST DETAIL

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-14
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : JLA DATE : 2/11
CHECKED BY : NMW DATE : 6/12



PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES (FOR METAL RAILS)

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

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

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

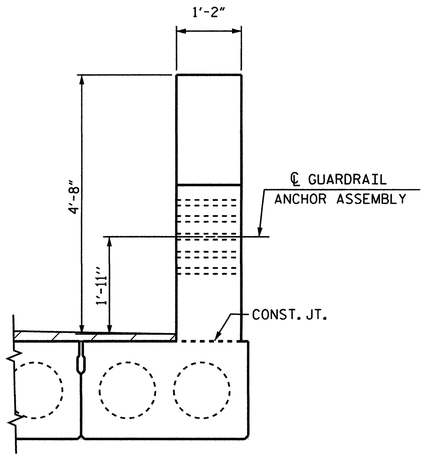
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

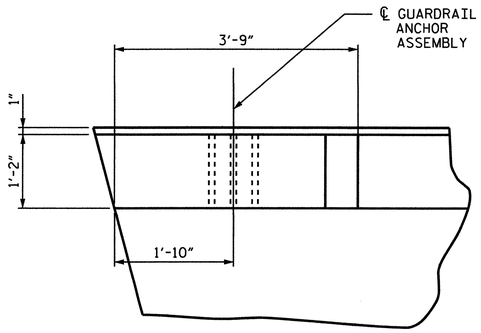
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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

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

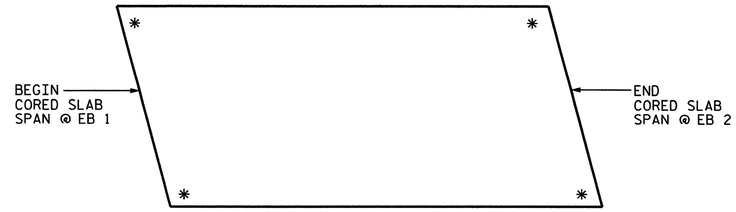


END VIEW
(TWO BAR METAL RAIL)



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST



SKETCH SHOWING POINTS OF ATTACHMENT

*LOCATION OF GUARDRAIL ATTACHMENT

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

ASSEMBLED BY :	RTJ	DATE :	3/12
CHECKED BY :	NMW	DATE :	6/12
DRAWN BY :	MAA	DATE :	5/6/10
CHECKED BY :	GM	DATE :	5/10

NORTH CAROLINA PROFESS IONAL SEAL 32982 ENGINEER TRAM D. ELLIOTT
10/8/2012

PREPARED BY
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107-A WCA AVENUE
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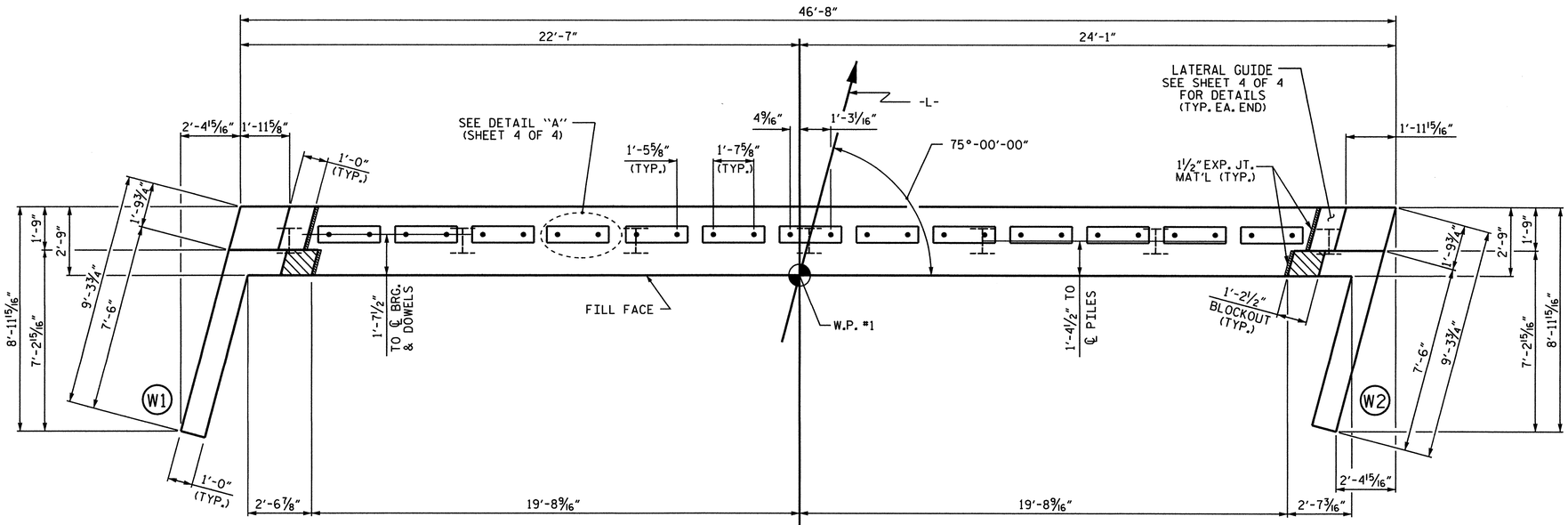
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

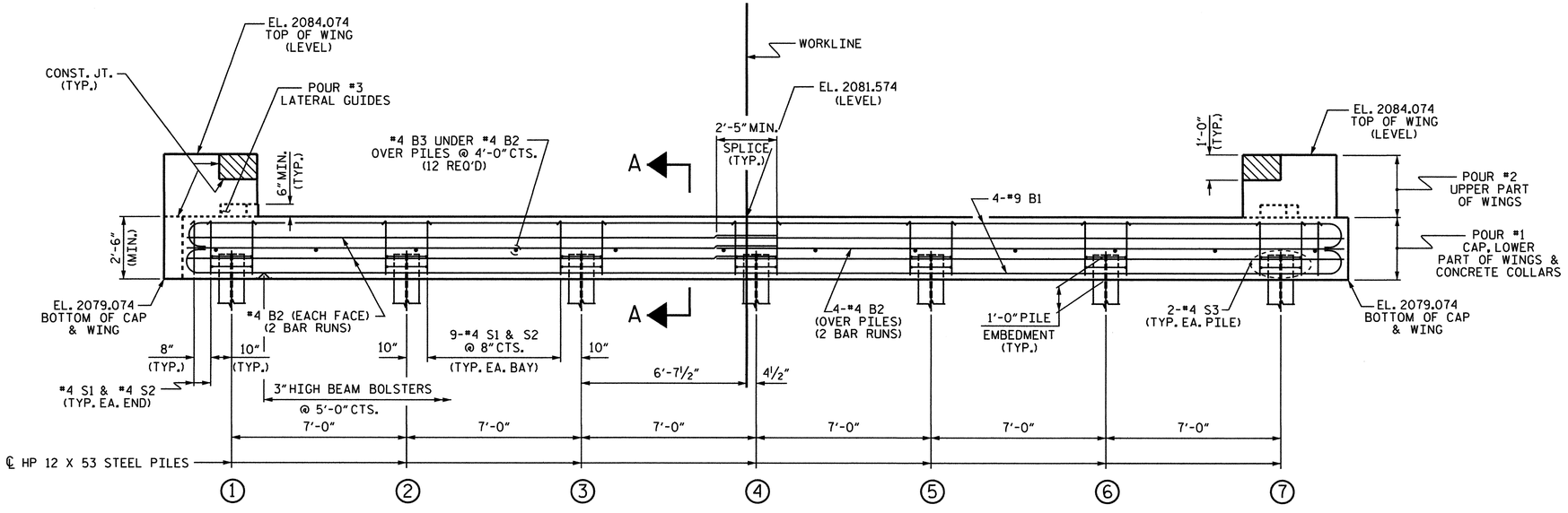
STANDARD
GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-15
1			3			TOTAL SHEETS
2			4			45

STD. NO. GRA3



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

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

THE LATERAL GUIDES ARE NOT TO BE POURED UNTIL AFTER THE CORED SLAB UNITS ARE IN PLACE.

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

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

THE CONTRACTOR HAS THE OPTION TO OMIT THE LATERAL GUIDE IF APPROVED BY THE ENGINEER.

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 1 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 24992 ENGINEER TRAVIS D. ELLIOTT
10/8/2012

PREPARED BY
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

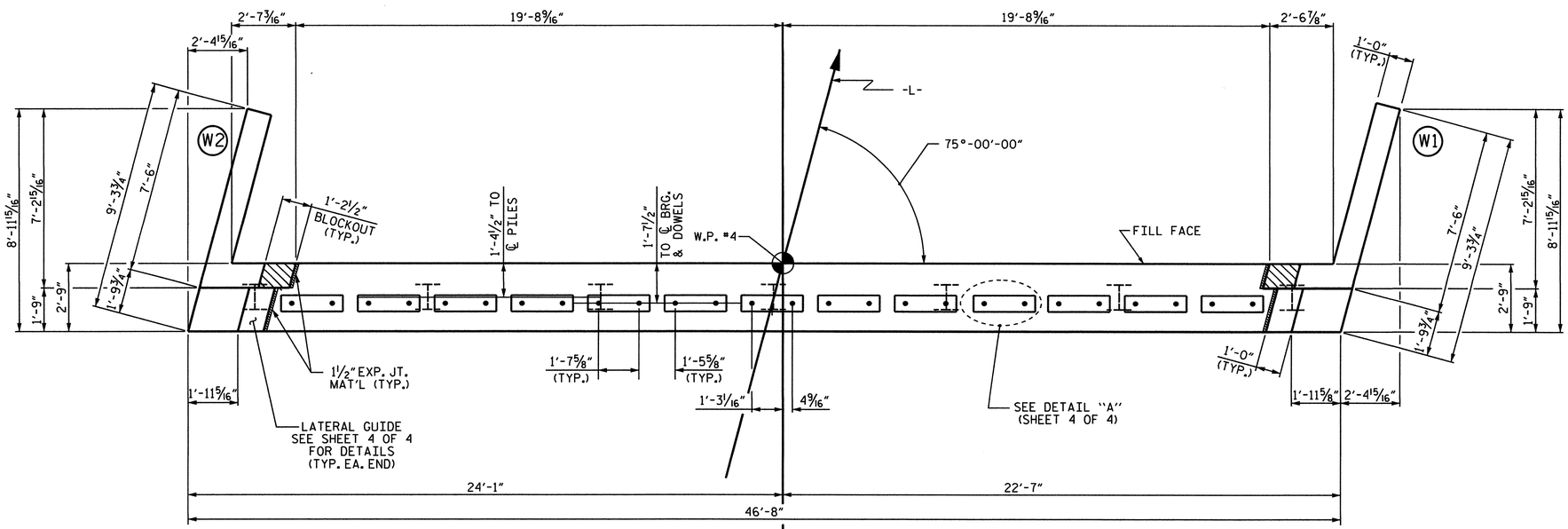
END BENT No. 1

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-16
1			3			TOTAL SHEETS
2			4			45

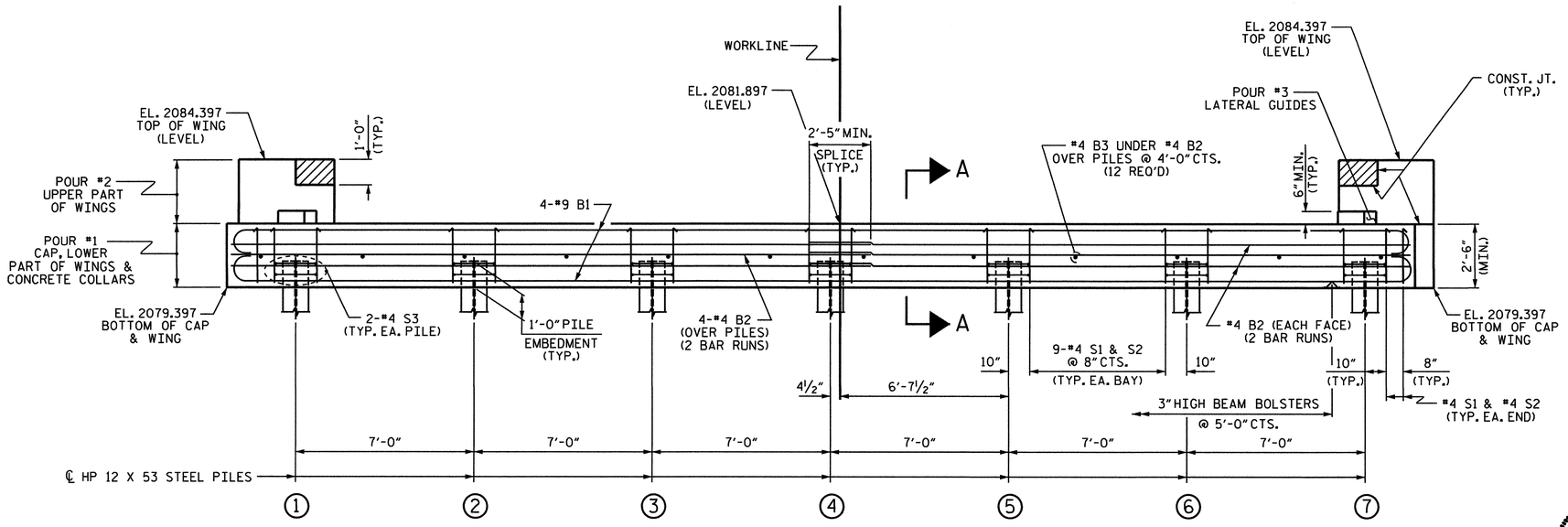
DRAWN BY : RTJ DATE : 3/12
CHECKED BY : NMW DATE : 6/12

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

STD. NO. EB_39_75S



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

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

THE LATERAL GUIDES ARE NOT TO BE POURED UNTIL AFTER THE CORED SLAB UNITS ARE IN PLACE.

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

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

THE CONTRACTOR HAS THE OPTION TO OMIT THE LATERAL GUIDE IF APPROVED BY THE ENGINEER.

NORTH CAROLINA PROFESSIONAL SEAL 24992 ENGINEER NAHAL D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A WCA AVENUE
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PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040
SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

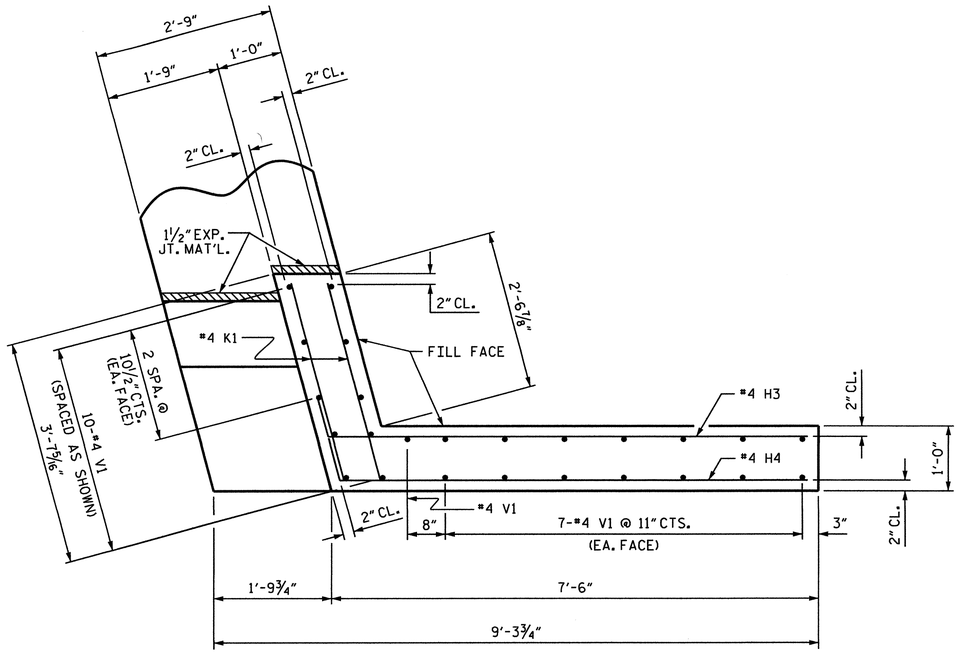
END BENT No. 2

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-17
1			3			TOTAL SHEETS
2			4			45

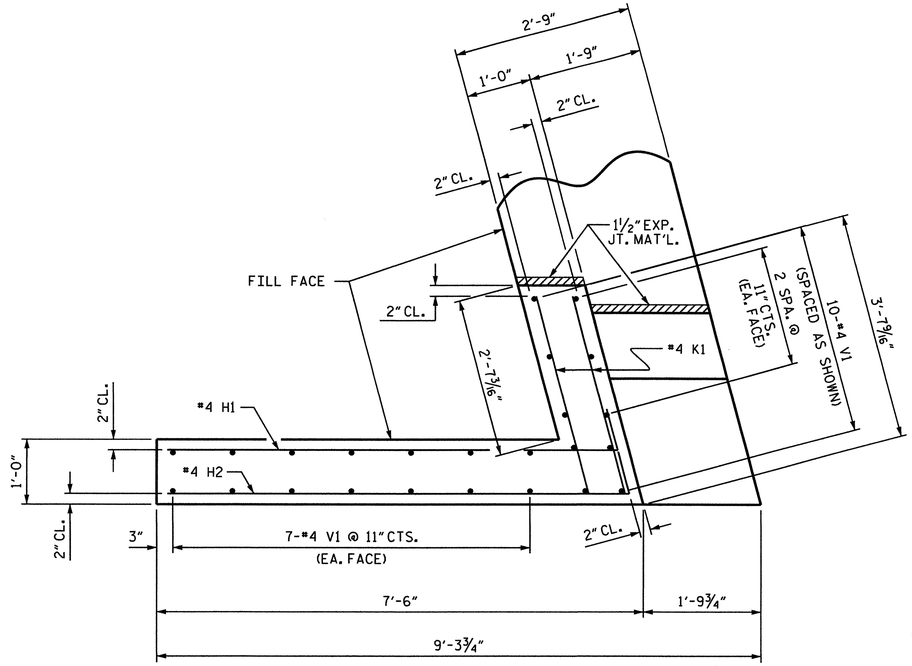
DRAWN BY :	RTJ	DATE :	3/12
CHECKED BY :	NMW	DATE :	6/12

$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

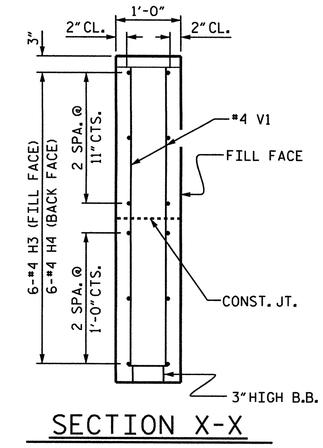
STD. NO. EB_39_75S



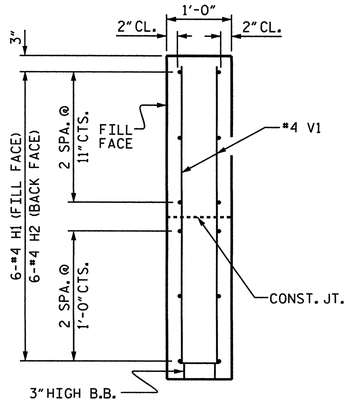
PLAN OF WING (W1)



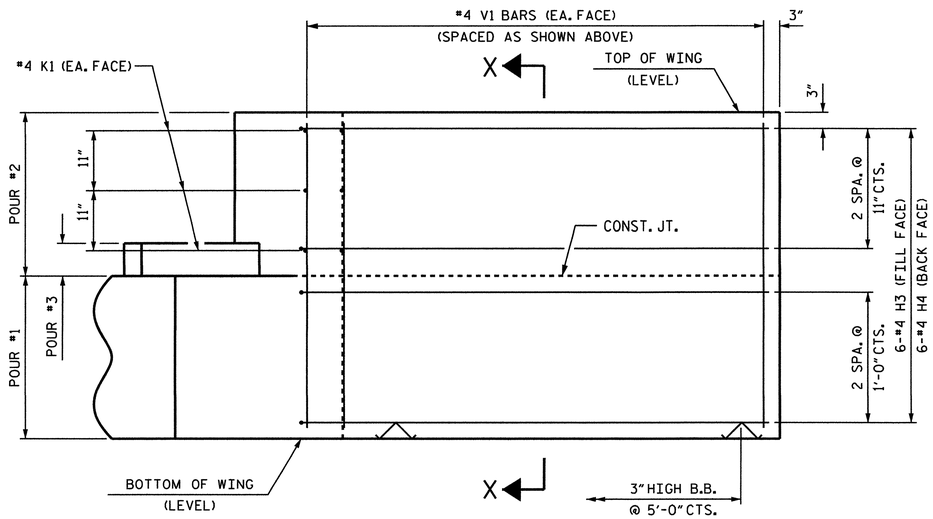
PLAN OF WING (W2)



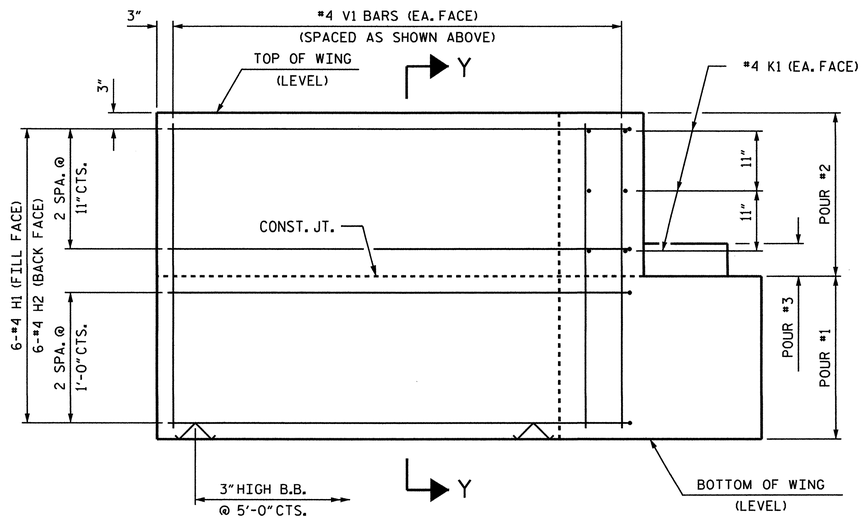
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

DRAWN BY : RTJ DATE : 3/12
CHECKED BY : NMW DATE : 7/12

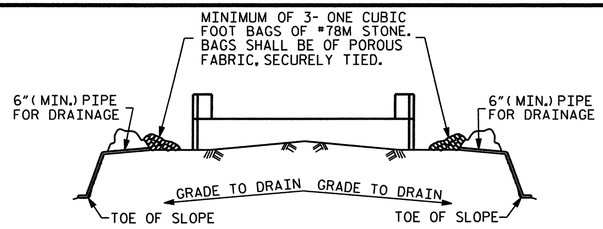
$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040
SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE
END BENT
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-18
1			3			TOTAL SHEETS
2			4			45

STD. NO. EB_39_75S

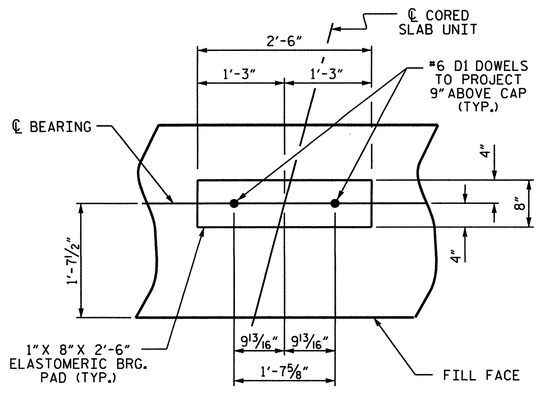


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

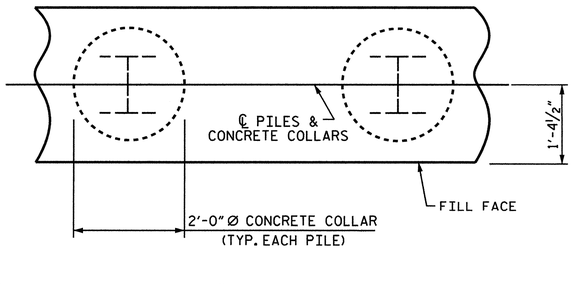
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



DETAIL "A"

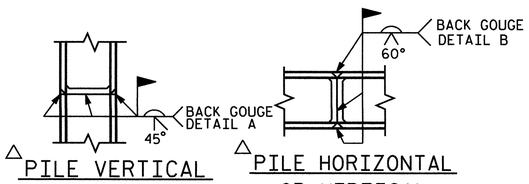
(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



PLAN ELEVATION

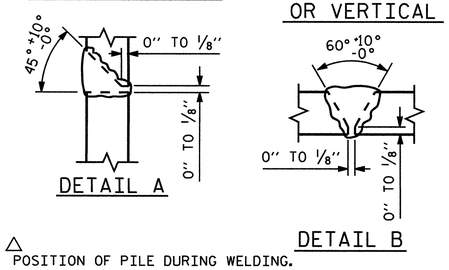
CORROSION PROTECTION FOR STEEL PILES DETAIL

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



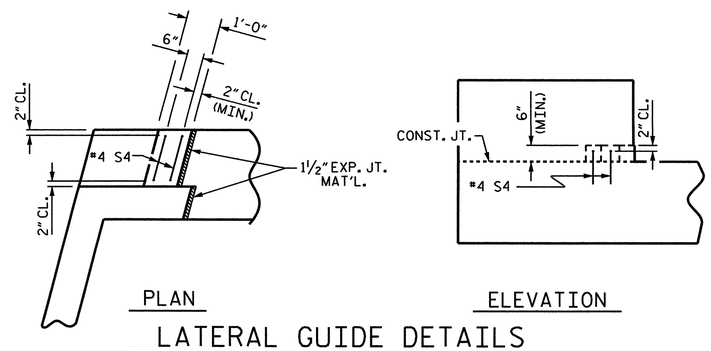
△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL



△ POSITION OF PILE DURING WELDING.

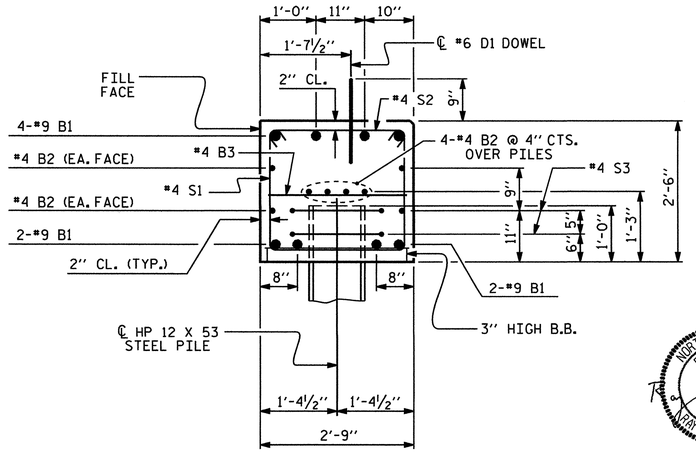
PILE SPLICE DETAILS



PLAN ELEVATION

LATERAL GUIDE DETAILS

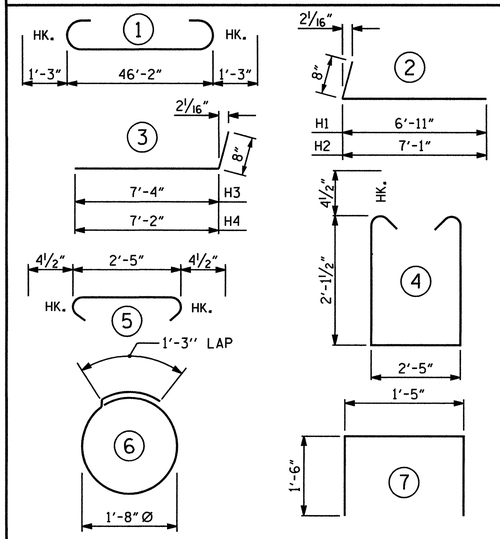
(END BENT No. 1, LEFT LATERAL GUIDE SHOWN, RIGHT END SIMILAR)
(END BENT No. 2 SIMILAR BY ROTATION)



SECTION A-A

(CONCRETE COLLAR NOT SHOWN FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1	END BENT No. 2
HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES
NO: 7 LIN. FT.= 385	NO: 7 LIN. FT.= 385

BILL OF MATERIAL

FOR ONE END BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	48'-8"	1324
B2	16	#4	STR	24'-5"	261
B3	12	#4	STR	2'-5"	19
D1	26	#6	STR	1'-6"	59
H1	6	#4	2	7'-7"	30
H2	6	#4	2	7'-9"	31
H3	6	#4	3	8'-0"	32
H4	6	#4	3	7'-10"	31
K1	12	#4	STR	3'-3"	26
S1	58	#4	4	7'-5"	287
S2	58	#4	5	3'-2"	123
S3	14	#4	6	6'-6"	61
S4	4	#4	7	4'-5"	12
V1	49	#4	STR	4'-8"	153

REINFORCING STEEL (FOR ONE END BENT) 2449 LBS.

CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)

POUR #1	CAP, LOWER PART OF WINGS & COLLARS	14.3 C.Y.
POUR #2	UPPER PART OF WINGS	1.8 C.Y.
POUR #3	LATERAL GUIDES	0.1 C.Y.
TOTAL CLASS A CONCRETE		16.2 C.Y.

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040
SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1 & 2 DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-19
1			3			TOTAL SHEETS
2			4			45

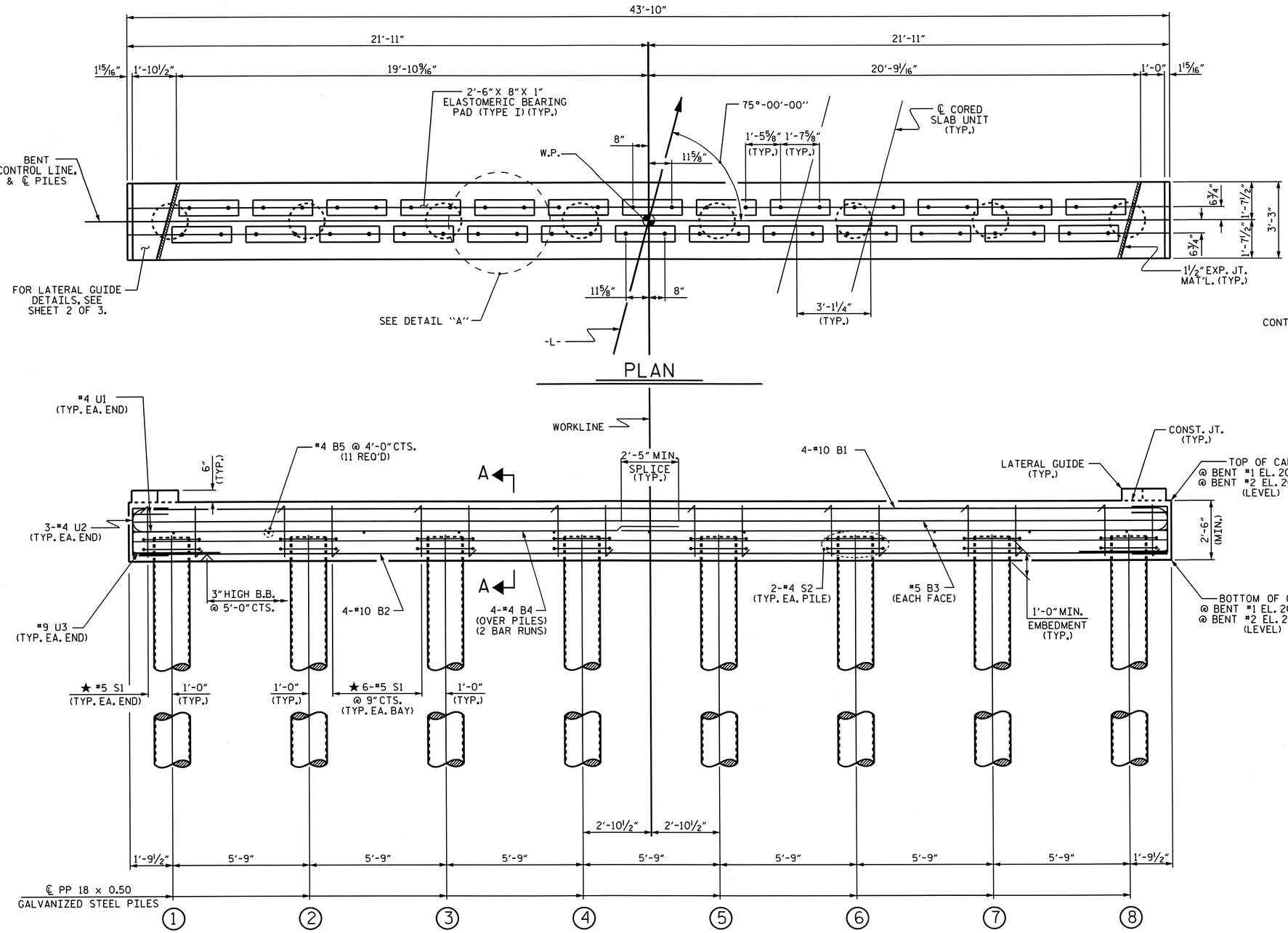
NORTH CAROLINA PROFESSIONAL SEAL 29982 ENGINEER TRAY D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A WCA AVENUE
MORGANTON, NC 28655

DRAWN BY : RTJ DATE : 3/12
CHECKED BY : NMW DATE : 7/12

$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

STD. NO. EB_39_75S



ELEVATION

FOR SECTION A-A, SEE SHEET 2 OF 3

NOTES

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

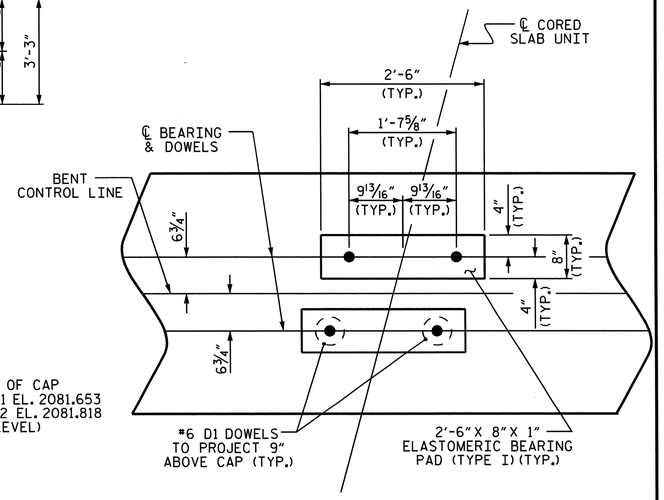
THE LATERAL GUIDES ARE NOT TO BE POURED UNTIL AFTER THE CORED SLAB UNITS ARE IN PLACE.

★ INVERT ALTERNATE STIRRUPS.

FOR ADDITIONAL REINFORCING STEEL IN PP 18 x 0.50 GALVANIZED STEEL PILES, SEE SHEET 3 OF 3.

GALVANIZE THE TOP OF EACH INTERIOR BENT PILE A MINIMUM OF 25 FEET. GALVANIZE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

THE CONTRACTOR HAS THE OPTION TO OMIT THE LATERAL GUIDE IF APPROVED BY THE ENGINEER.



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENTS No. 1 & 2

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-20
1			3			TOTAL SHEETS
2			4			45

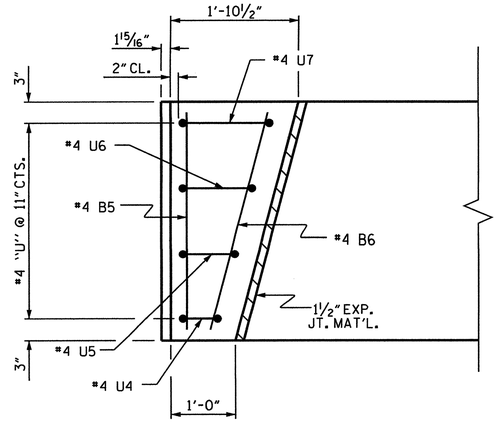
ASSEMBLED BY :	RTJ	DATE :	3/12
CHECKED BY :	NMW	DATE :	7/12
DRAWN BY :	DGE	DATE :	6/10
CHECKED BY :	MKT	DATE :	6/10

NORTH CAROLINA PROFESSIONAL SEAL 23982 ENGINEER RAY D. ELLIOTT
10/8/2012

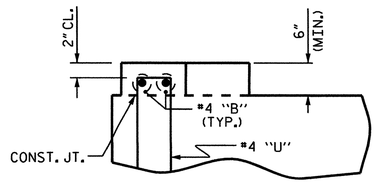
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

STD. NO. 18"PP_BT_39_75S_<60'



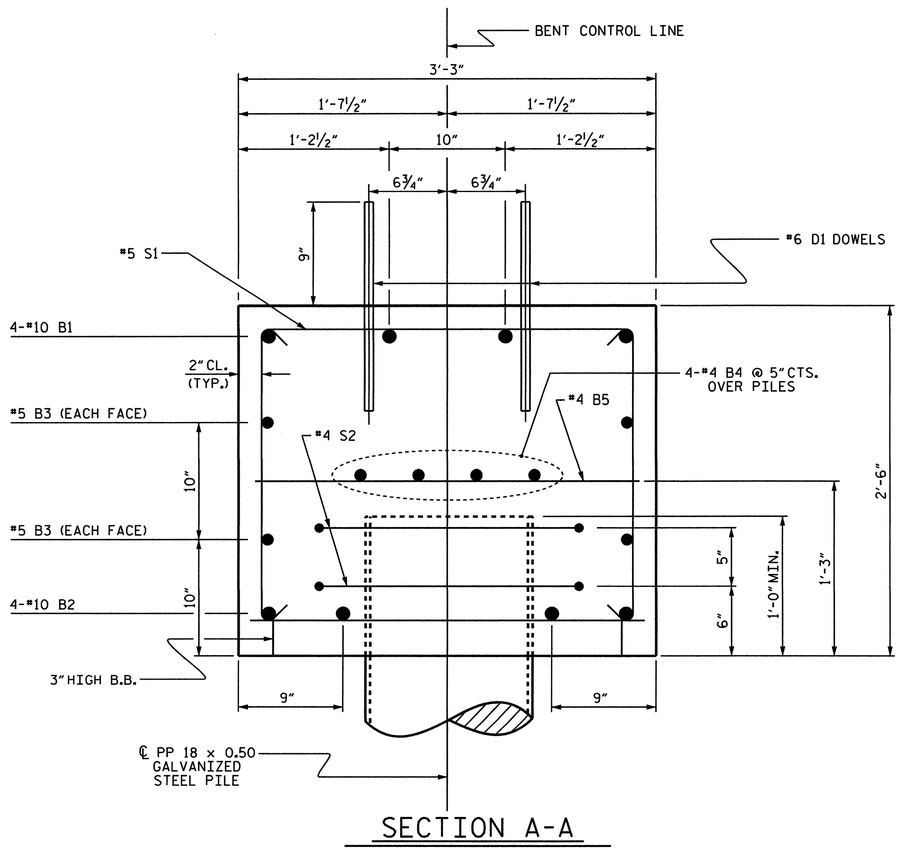
PLAN



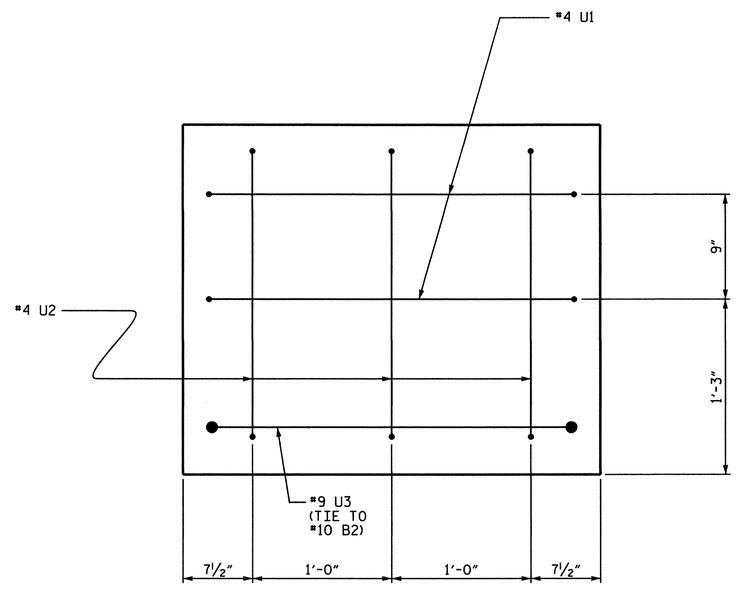
ELEVATION

LATERAL GUIDE DETAILS

(LEFT LATERAL GUIDE SHOWN, RIGHT SIDE SIMILAR)



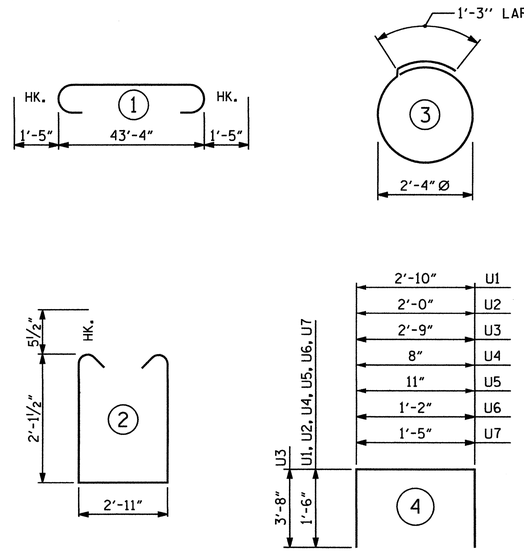
SECTION A-A



END OF CAP VIEW

(TYPICAL BOTH ENDS)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	1	46'-2"	795
B2	4	#10	STR	43'-6"	749
B3	4	#5	STR	43'-6"	181
B4	8	#4	STR	23'-0"	123
B5	13	#4	STR	2'-11"	25
B6	2	#4	STR	3'-0"	4
D1	52	#6	STR	1'-6"	117
S1	44	#5	2	8'-1"	371
S2	16	#4	3	8'-7"	92
U1	4	#4	4	5'-10"	16
U2	6	#4	4	5'-0"	20
U3	2	#9	4	10'-1"	69
U4	2	#4	4	3'-8"	5
U5	2	#4	4	3'-11"	5
U6	2	#4	4	4'-2"	6
U7	2	#4	4	4'-5"	6

REINFORCING STEEL (FOR ONE BENT) 2584 LBS

CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

POUR #1 (CAP)	▲ 12.7 C.Y.
POUR #2 (LATERAL GUIDES)	0.2 C.Y.
TOTAL CLASS A CONCRETE	12.9 C.Y.

PP 18 x 0.50 GALVANIZED STEEL PILES (FOR BENT #1)

No. 8 LIN. FT. 480

PP 18 x 0.50 GALVANIZED STEEL PILES (FOR BENT #2)

No. 8 LIN. FT. 400

PIPE PILE POINTS No. = 16

▲ CONCRETE DISPLACED BY THE PP 18 x 0.50 GALVANIZED STEEL PILES HAS BEEN DEDUCTED FROM THE CONCRETE QUANTITY.

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENTS No. 1 & 2

NORTH CAROLINA PROFESSIONAL SEAL 29982 ENGINEER TRAY D. ELLIOTT
10/8/2012

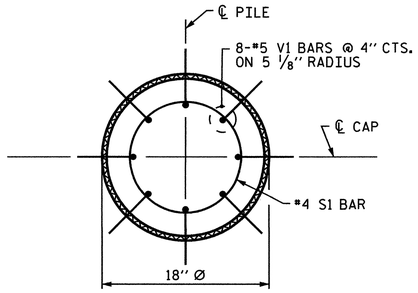
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-21
1			3			TOTAL SHEETS
2			4			45

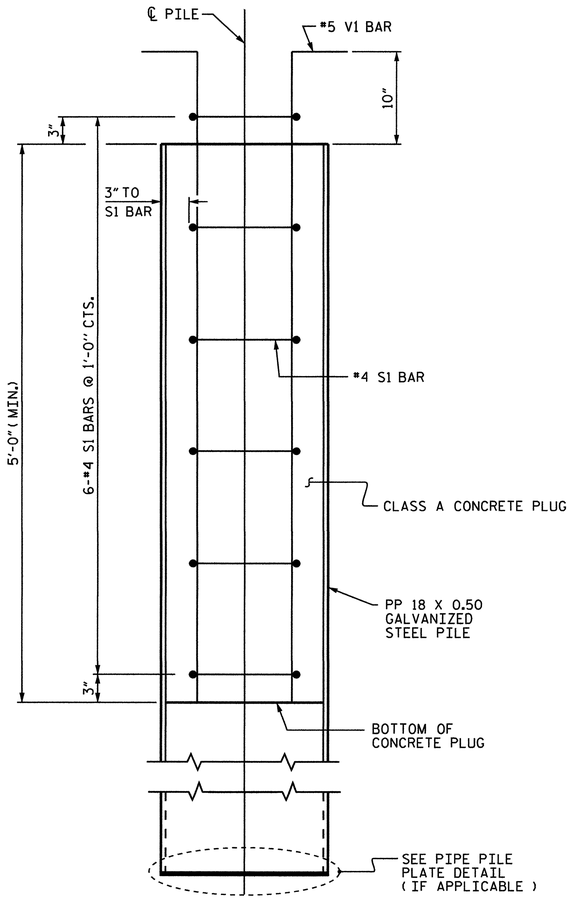
ASSEMBLED BY :	RTJ	DATE :	3/12
CHECKED BY :	NMW	DATE :	7/12
DRAWN BY :	DGE	DATE :	6/10
CHECKED BY :	MKT	DATE :	6/10

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

STD.NO. 18" PP_BT_39_75S_<60'



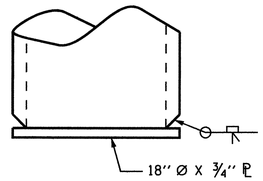
PLAN



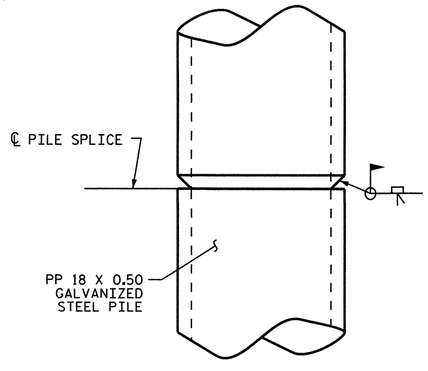
ELEVATION

PP 18 X 0.50 GALVANIZED STEEL PILE

(OPEN OR CLOSED END)



PIPE PILE PLATE DETAIL
(IF APPLICABLE)



PIPE PILE SPLICE DETAIL

NOTES

PIPE PILES SHALL BE IN ACCORDANCE WITH SECTION 1084 OF THE STANDARD SPECIFICATIONS.

GALVANIZE STEEL PIPE PILES IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS UNLESS METALLIZING IS REQUIRED. GALVANIZING OR METALLIZING PIPE PILE PLATES IS NOT REQUIRED.

PIPE PILE PLATES, IF REQUIRED, SHALL BE IN ACCORDANCE WITH SECTION 450 OF THE STANDARD SPECIFICATIONS.

REMOVE AND REPLACE OR REPAIR TO THE SATISFACTION OF THE ENGINEER PILES THAT ARE DAMAGED, DEFORMED OR COLLAPSED DURING INSTALLATION OR DRIVING.

PILE SPLICES SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.

FOR CLOSED END PIPE PILES, REMOVE ALL SOIL AND WATER FROM INSIDE THE PILES JUST PRIOR TO PLACING REINFORCING STEEL AND CONCRETE FOR THE CONCRETE PLUG.

FOR OPEN END PIPE PILES, REMOVE ENOUGH SOIL AND WATER FROM INSIDE THE PILES TO CONSTRUCT THE CONCRETE PLUG WITHOUT FOULING THE CONCRETE.

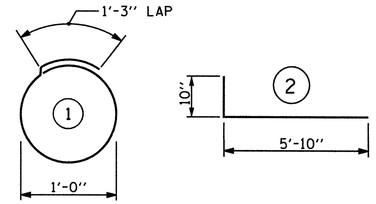
FORM THE CONCRETE PLUG SUCH THAT THE REINFORCING STEEL OR CONCRETE DOES NOT MOVE AND THE CLEARANCE FROM THE REINFORCING STEEL TO THE INSIDE OF THE PILE IS MAINTAINED AFTER CONCRETE PLACEMENT. DO NOT PLACE CONCRETE IN THE BENT CAP UNTIL THE CONCRETE PLUG HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

THE REINFORCING STEEL, CLASS A CONCRETE, AND GALVANIZING ARE CONSIDERED INCIDENTAL TO THE CONTRACT UNIT PRICE BID PER LINEAR FOOT FOR PP 18 X 0.50 GALVANIZED STEEL PILES.

BILL OF MATERIAL FOR ONE PP 18 X 0.50 GALVANIZED STEEL PILE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
S1	6	#4	1	4'-5"	18
V1	8	#5	2	6'-8"	56
REINFORCING STEEL =					74 lbs
CLASS A CONCRETE					
5'-0" MINIMUM PLUG					0.3 CY

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

ASSEMBLED BY :	RTJ	DATE :	3/12		
CHECKED BY :	NMW	DATE :	7/12		
DRAWN BY :	DGE	DATE :	6/10		
CHECKED BY :	MKT	DATE :	6/10		

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 3 OF 3

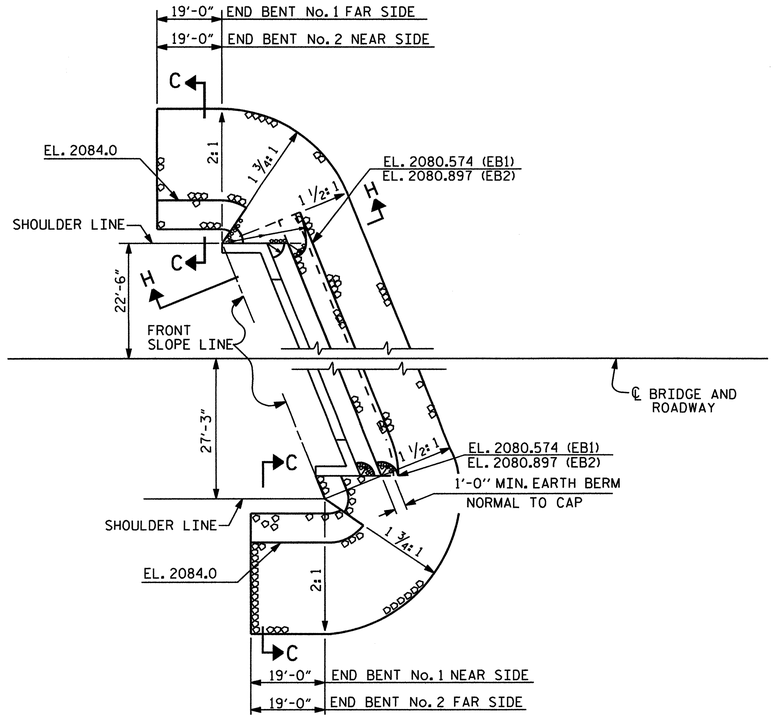
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

18" STEEL PIPE PILE

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-22
1			3			TOTAL SHEETS
2			4			45

STD. NO. SPP3

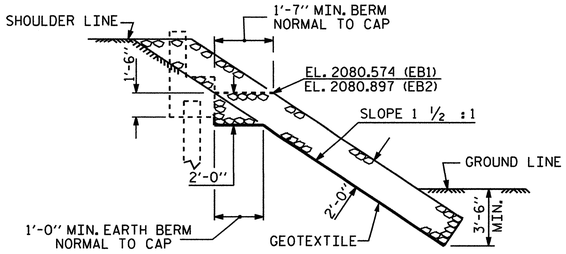


SHOULDER RIP RAP IS HIGHER THAN BERM RIP RAP

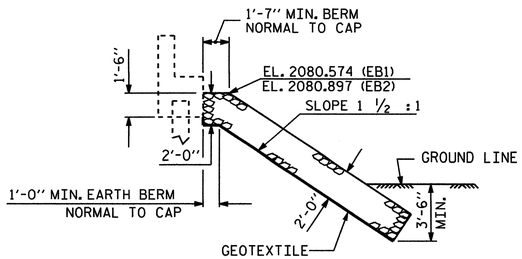
NOTES :

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

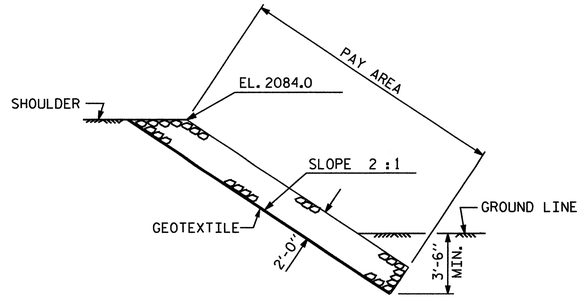
ESTIMATED QUANTITIES		
BRIDGE @ STA. 51+40.50-L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	108	120
END BENT 2	108	120



SECTION H-H



℄ SECTION
BERM RIP RAPPED



SECTION C-C

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

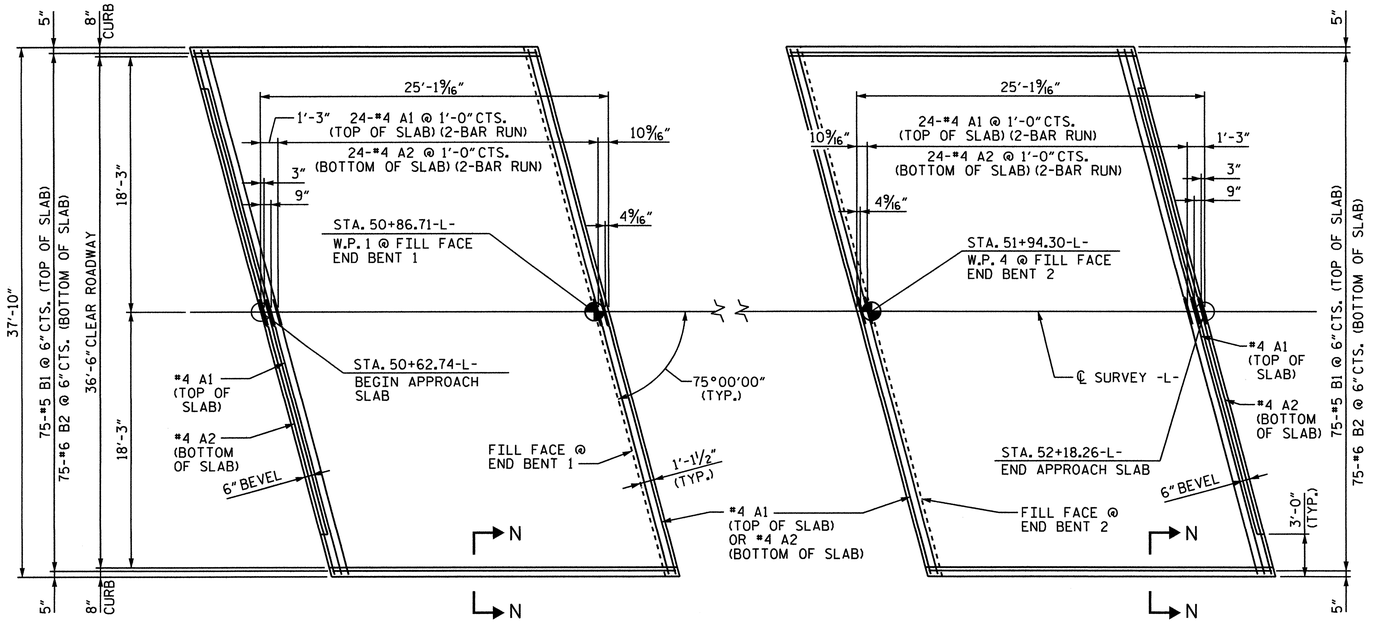
RIP RAP DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 29282 ENGINEER TRAY D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A WCA AVENUE
MORGANTON, NC 28655

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-23
1			3			TOTAL SHEETS
2			4			45

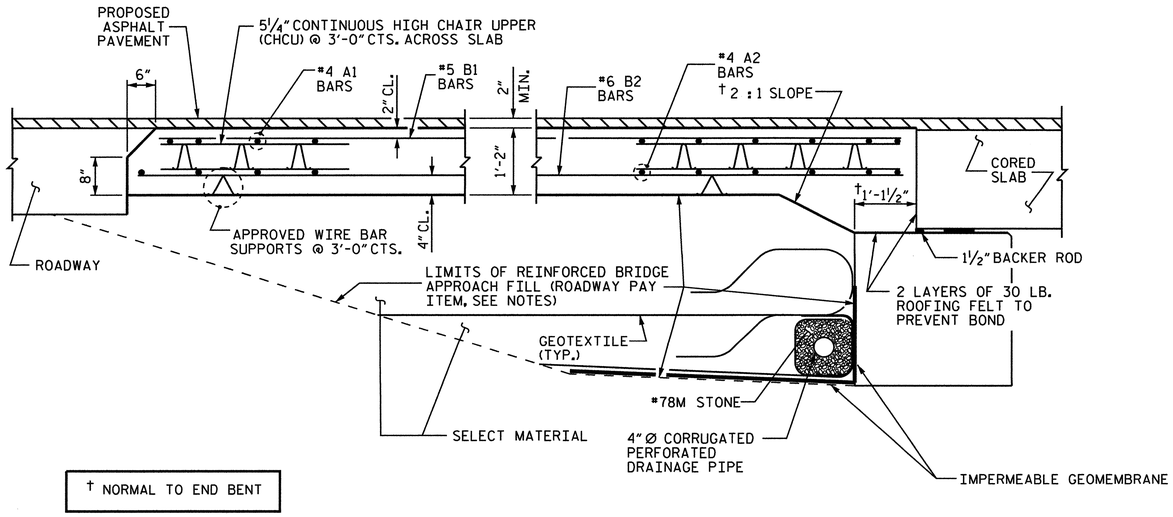
DRAWN BY : RTJ DATE : 3/12
CHECKED BY : NMW DATE : 7/12



PLAN @ END BENT 1

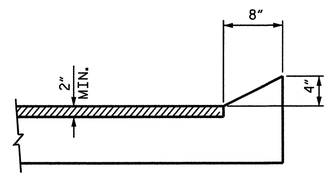
PLAN @ END BENT 2

DIMESIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

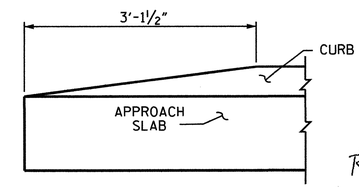


† NORMAL TO END BENT

SECTION THRU SLAB



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

NOTES

FOR REINFORCED BRIDGE APPROACH FILL INCLUDING FABRIC, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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.

APPROACH SLAB GROOVING IS NOT REQUIRED.

BILL OF MATERIAL

APPROACH SLAB AT EB #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	52	#4	STR	20'-5"	709
A2	52	#4	STR	20'-4"	706
* B1	75	#5	STR	24'-2"	1,890
B2	75	#6	STR	24'-7"	2,769
REINFORCING STEEL				LBS.	3,475
* EPOXY COATED REINFORCING STEEL				LBS.	2,599
CLASS AA CONCRETE				C. Y.	43.0

APPROACH SLAB AT EB #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	52	#4	STR	20'-5"	709
A2	52	#4	STR	20'-4"	706
* B1	75	#5	STR	24'-2"	1,890
B2	75	#6	STR	24'-7"	2,769
REINFORCING STEEL				LBS.	3,475
* EPOXY COATED REINFORCING STEEL				LBS.	2,599
CLASS AA CONCRETE				C. Y.	43.0

SPLICE LENGTHS

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

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

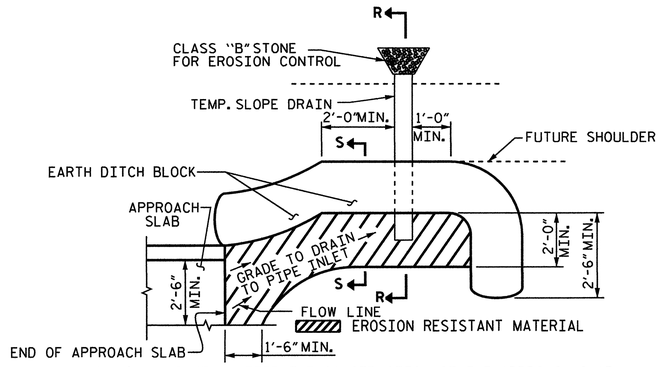
BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

NORTH CAROLINA PROFESSIONAL SEAL 29982 ENGINEER TRAY D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

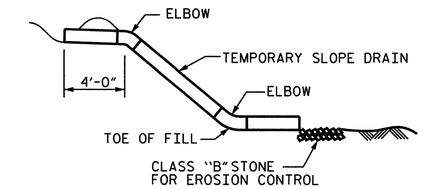
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-24
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : RTJ DATE : 8/10
CHECKED BY : NMW DATE : 7/12

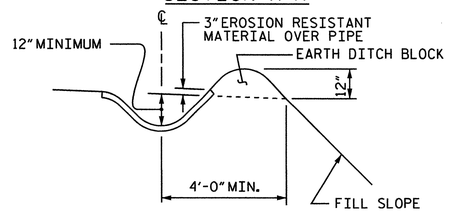


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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



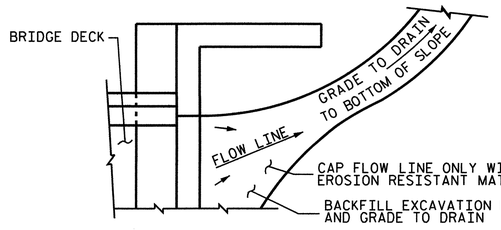
SECTION R-R



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

NORTH CAROLINA PROFESSIONAL SEAL 29982 ENGINEER TODD D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

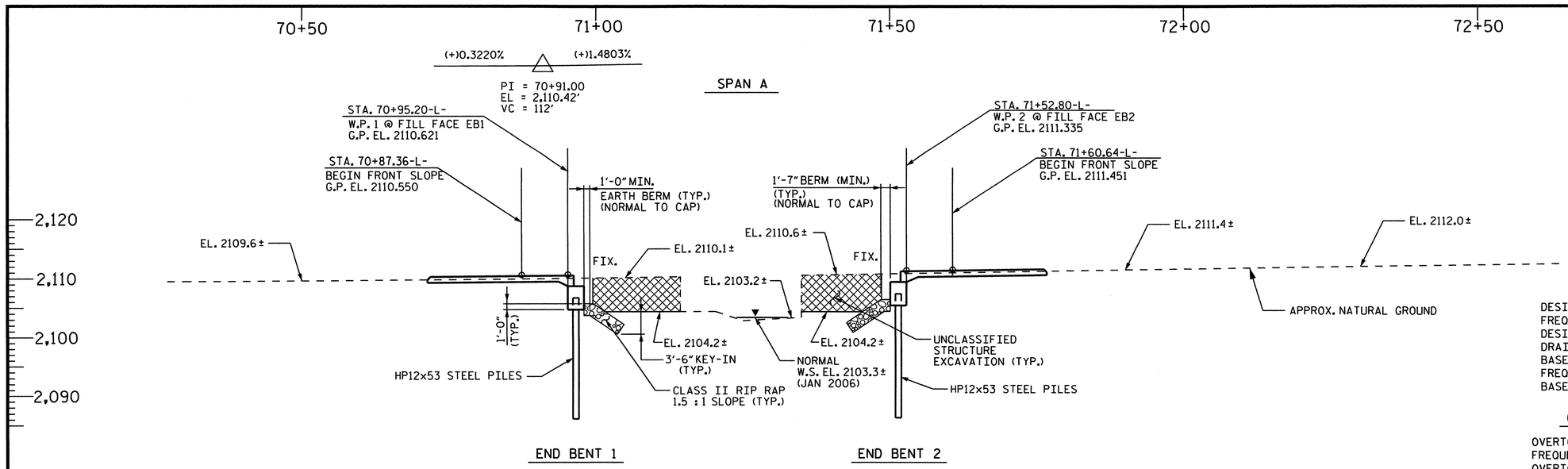
DRAWN BY : RTJ DATE : 8/10
CHECKED BY : NMW DATE : 7/12

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 51+40.50-L-
REPLACES BRIDGE NO. 440040
SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-25
1			3			TOTAL SHEETS
2			4			45



SECTION ALONG -L-

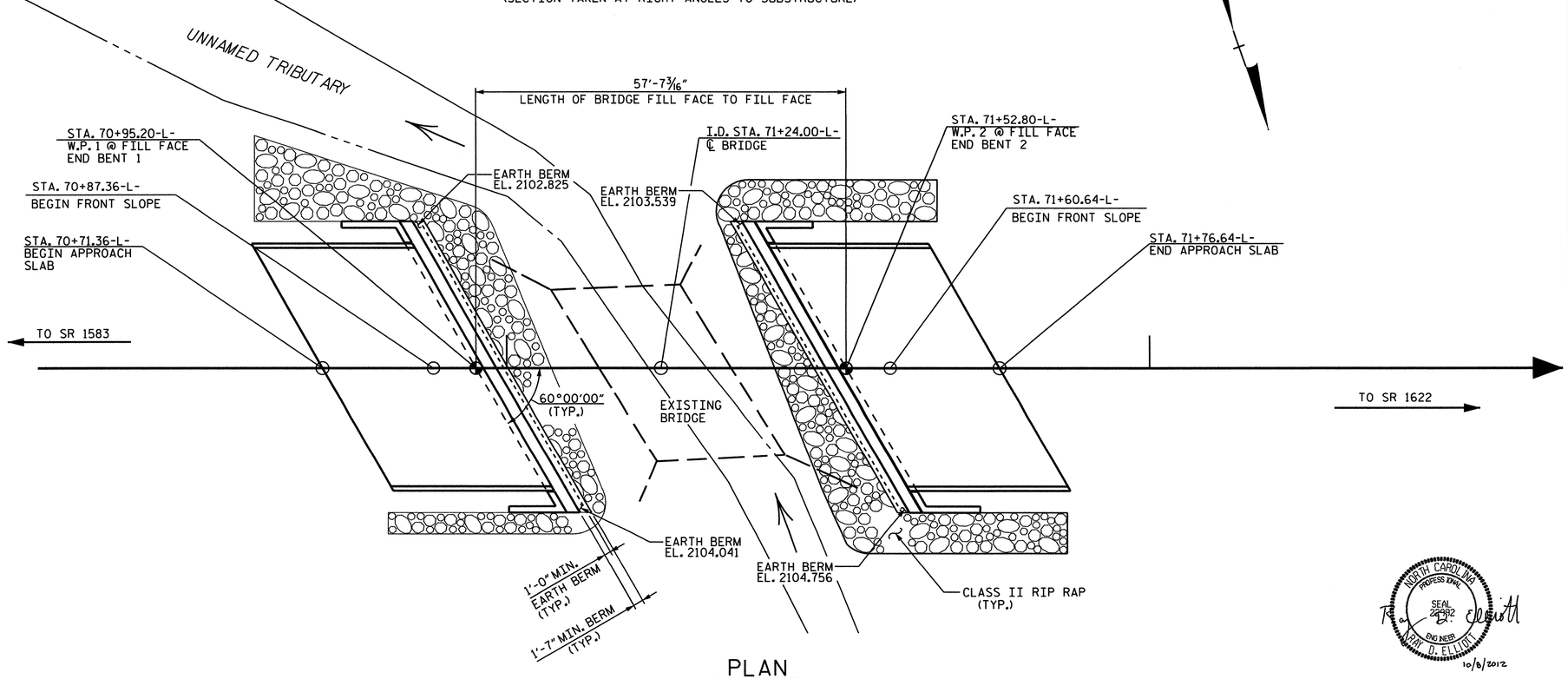
(SECTION TAKEN AT RIGHT ANGLES TO SUBSTRUCTURE)

HYDRAULIC DATA

DESIGN DISCHARGE..... = 430 CFS
FREQUENCY OF DESIGN FLOOD..... = 25 YRS.
DESIGN HIGH WATER ELEVATION... = 2108.1'
DRAINAGE AREA..... = 0.55 SQ. MI.
BASE DISCHARGE ..... = 600 CFS
FREQUENCY OF BASE DISCHARGE.... = 100YRS
BASE HIGH WATER ELEVATION..... = 2108.66'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE..... = 930 CFS
FREQUENCY OF OVERTOPPING FLOOD..... = 500+ YR.
OVERTOPPING FLOOD ELEVATION..... = 2110.5'



PLAN

I HEREBY CERTIFY THESE PLANS
ARE THE AS-BUILT PLANS

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER UNNAMED TRIBUTARY
ON SR 1006 BETWEEN
SR 1583 AND SR 1622

NORTH CAROLINA PROFESSIONAL SEAL 24592 ENGINEER TIMOTHY D. ELLIOTT
10/8/2012

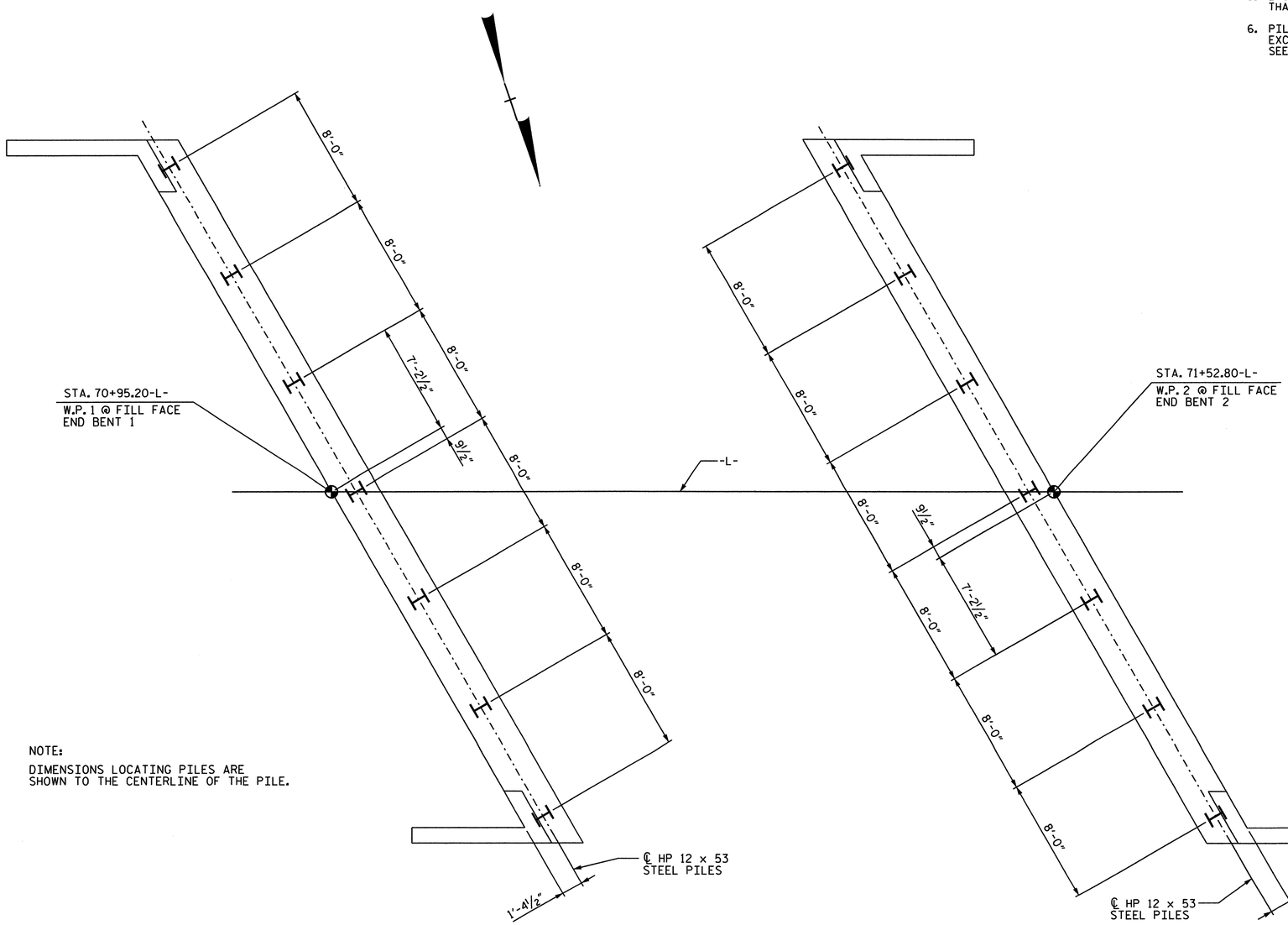
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-26
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: NMW DATE: 7/12
CHECKED BY: RDE DATE: 7/12

NOTES :

1. DRIVE PILES AT END BENTS NO. 1 AND 2 TO A REQUIRED DRIVING RESISTANCE OF 135 TONS PER PILE. A RESISTANCE FACTOR OF 0.6 IS APPLIED.
2. THE FACTORED RESISTANCE FOR PILES AT END BENTS 1 AND 2 IS 81 TONS PER PILE.
3. STEEL PILE POINTS ARE REQUIRED FOR H PILES AT END BENTS 1 AND 2. SEE SECTION 450 OF THE NCDOT STANDARD SPECIFICATIONS.
4. FOR PILES, SEE SECTION 450 OF THE SPECIFICATIONS.
5. INSTALL PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 2096 FEET NAVD.
6. PILE EXCAVATION IS REQUIRED TO INSTALL PILES AT END BENT NO. 1 AND END BENT NO. 2. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATION 2096 FEET, NAVD. FOR PILE EXCAVATION, SEE SECTION 450 OF THE SPECIFICATIONS.



END BENT 1 END BENT 2

NOTE:
DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF THE PILE.

FOUNDATION LAYOUT

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222
SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

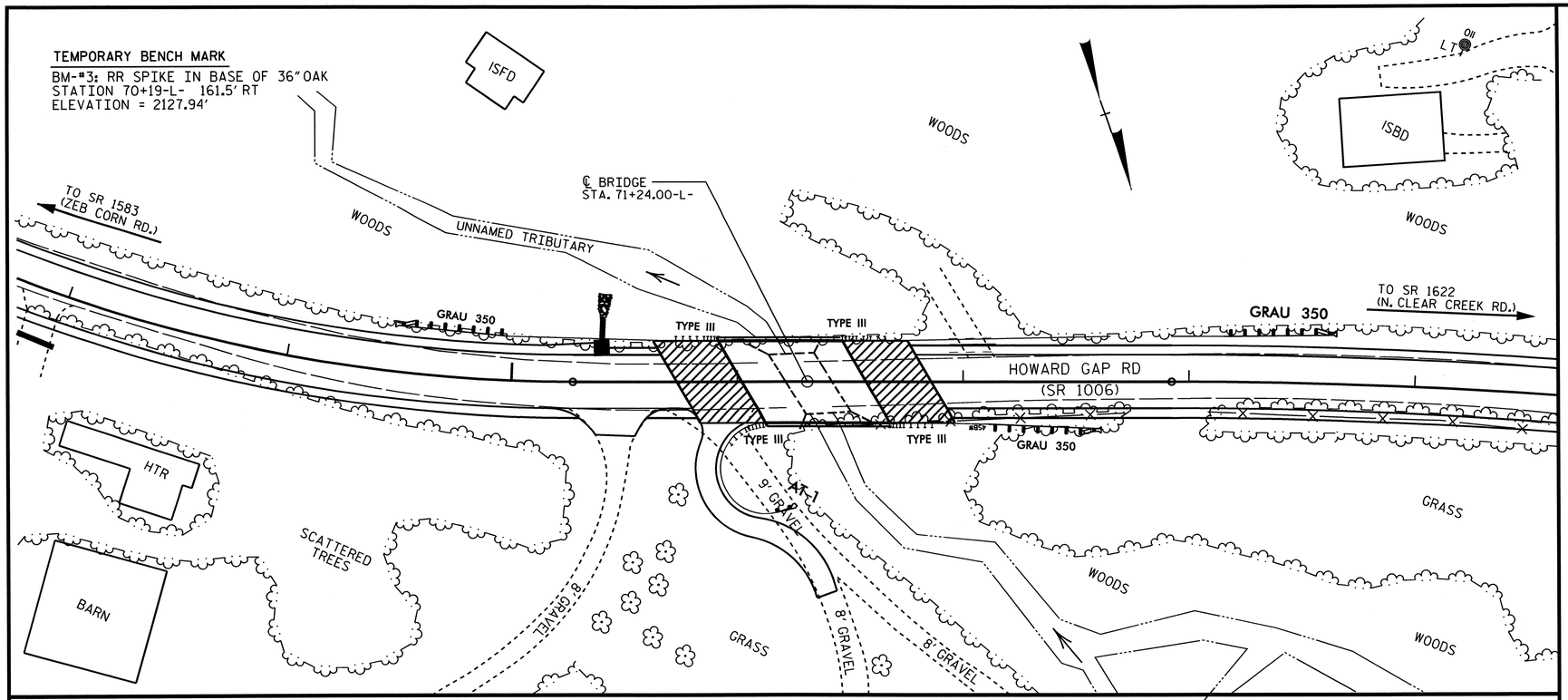
GENERAL DRAWING
FOR BRIDGE OVER UNNAMED TRIBUTARY
ON SR 1006 BETWEEN
SR 1583 AND SR 1622

NORTH CAROLINA PROFESS IONAL SEAL 24982 ENGINEER RYAN D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-27
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: NMW DATE: 7/12
CHECKED BY: RDE DATE: 7/12



LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.

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

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-26 SHALL BE EXCAVATED FOR A DISTANCE OF 25 FT. EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

THE 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.

ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH HEC 18, "EVALUATING SCOUR AT BRIDGES", MAY, 2001.

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 71+24.00-L-."

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

THE EXISTING STRUCTURE CONSISTING OF ONE 26.2' SPAN, STEEL PLANK DECK ON STEEL I BEAMS, 24.0' CLEAR ROADWAY WIDTH, SUPPORTED BY YOUNT MASONRY ABUTMENTS SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR THE LEGAL LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

ITEM	REMOVAL OF EXISTING STRUCTURE	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS "A" CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	HP12x53 STEEL PILES		STEEL PILE POINTS	PILE EXCAVATION IN SOIL
	LUMP SUM	LUMP SUM	C.Y.	LUMP SUM	LBS.	NO.	LIN. FT.	EA.	LIN. FT.
SUPERSTRUCTURE									
END BENT 1			26.9		3295	7	105	7	25
END BENT 2			26.9		3295	7	105	7	44
TOTALS	LUMP SUM	LUMP SUM	53.8	LUMP SUM	6590	14	210	14	69

ITEM	PILE EXCAVATION NOT IN SOIL	TWO BAR METAL RAIL	1'-2" x 2'-10½" CONCRETE PARAPET	RIP RAP, CLASS II (2'-0" THK.)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 1'-9" PRESTRESSED CORED SLABS		
	LIN. FT.	LIN. FT.	LIN. FT.	TON	S.Y.	LUMP SUM	NO.	LIN. FT.	
SUPERSTRUCTURE		93.7	110			LUMP SUM	13	715	
END BENT 1	45			108	120				
END BENT 2	26			144	160				
TOTALS	71	93.7	110	252	280	LUMP SUM	13	715	

DRAWN BY: JLA DATE: 7/12
CHECKED BY: RDE DATE: 7/12

NORTH CAROLINA PROFESSIONAL SEAL 24982 ENGINEER TERRY D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MCA AVENUE
MORGANTON, NC 28655

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222
SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER UNNAMED TRIBUTARY
ON SR 1006 BETWEEN
SR 1583 AND SR 1622

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-28
1			3			TOTAL SHEETS
2			4			45

LOAD AND RESISTANCE FACTOR RATING (LRFD) 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						
							LIVELOAD FACTORS	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)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	1.163	--	1.75	0.249	1.36	55'	EL	26.923	0.659	1.21	55'	EL	10.769	0.80	0.249	**1.16**	55'	EL	**26.923**	
		HL-93(Opr)	N/A	--	1.564	--	1.35	0.249	1.76	55'	EL	26.923	0.659	1.56	55'	EL	10.769	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	1.424	51.265	1.75	0.249	1.7	55'	EL	26.923	0.659	**1.42**	55'	EL	**10.769**	0.80	0.249	1.46	55'	EL	26.923	
		HS-20(Opr)	36.000	--	1.846	66.455	1.35	0.249	2.2	55'	EL	26.923	0.659	1.85	55'	EL	10.769	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.057	41.264	1.4	0.249	4.46	55'	EL	26.923	0.659	3.96	55'	EL	10.769	0.80	0.249	3.06	55'	EL	26.923	
		SNGARBS2	20.000	--	2.374	47.473	1.4	0.249	3.46	55'	EL	26.923	0.659	2.9	55'	EL	10.769	0.80	0.249	2.37	55'	EL	26.923	
		SNAGRIS2	22.000	--	2.291	50.392	1.4	0.249	3.34	55'	EL	26.923	0.659	2.72	55'	EL	10.769	0.80	0.249	2.29	55'	EL	26.923	
		SNCOTTS3	27.250	--	1.524	41.521	1.4	0.249	2.22	55'	EL	26.923	0.659	1.98	55'	EL	10.769	0.80	0.249	1.52	55'	EL	26.923	
		SNAGGRS4	34.925	--	1.31	45.74	1.4	0.249	1.91	55'	EL	26.923	0.659	1.71	55'	EL	10.769	0.80	0.249	1.31	55'	EL	26.923	
		SNS5A	35.550	--	1.278	45.439	1.4	0.249	1.86	55'	EL	26.923	0.659	1.76	55'	EL	10.769	0.80	0.249	1.28	55'	EL	26.923	
		SNS6A	39.950	--	1.189	47.481	1.4	0.249	1.73	55'	EL	26.923	0.659	1.63	55'	EL	10.769	0.80	0.249	1.19	55'	EL	26.923	
		SNS7B	42.000	--	1.132	47.562	1.4	0.249	1.65	55'	EL	26.923	0.659	1.64	55'	EL	10.769	0.80	0.249	1.13	55'	EL	26.923	
	TTST	TNAGRIT3	33.000	--	1.454	47.984	1.4	0.249	2.12	55'	EL	26.923	0.659	1.92	55'	EL	10.769	0.80	0.249	1.45	55'	EL	26.923	
		TNT4A	33.075	--	1.465	48.451	1.4	0.249	2.14	55'	EL	26.923	0.659	1.85	55'	EL	10.769	0.80	0.249	1.46	55'	EL	26.923	
		TNT6A	41.600	--	1.213	50.478	1.4	0.249	1.77	55'	EL	26.923	0.659	1.81	55'	EL	10.769	0.80	0.249	1.21	55'	EL	26.923	
		TNT7A	42.000	--	1.228	51.576	1.4	0.249	1.79	55'	EL	26.923	0.659	1.67	55'	EL	10.769	0.80	0.249	1.23	55'	EL	26.923	
		TNT7B	42.000	--	1.282	53.827	1.4	0.249	1.87	55'	EL	26.923	0.659	1.58	55'	EL	10.769	0.80	0.249	1.28	55'	EL	26.923	
		TNAGRIT4	43.000	--	1.213	52.158	1.4	0.249	1.77	55'	EL	26.923	0.659	1.52	55'	EL	10.769	0.80	0.249	1.21	55'	EL	26.923	
		TNAGT5A	45.000	--	1.136	51.134	1.4	0.249	1.66	55'	EL	26.923	0.659	1.55	55'	EL	10.769	0.80	0.249	1.14	55'	EL	26.923	
		TNAGT5B	45.000	3	1.116	50.224	1.4	0.249	1.63	55'	EL	26.923	0.659	1.44	55'	EL	10.769	0.80	0.249	**1.12**	55'	EL	**26.923**	

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)

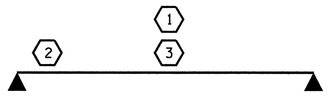
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

FOR SPAN 'A'

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

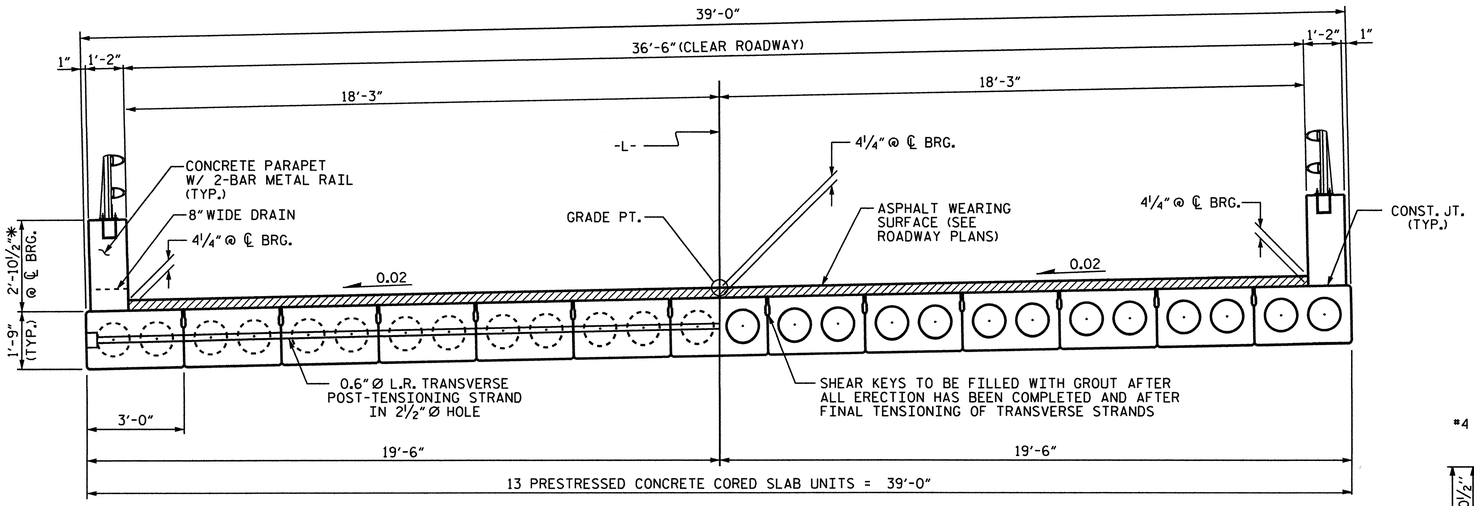
PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR
55' CORED SLAB UNIT
60° SKEW & 120° SKEW
(NON-INTERSTATE TRAFFIC)

REVISIONS							SHEET NO.
NO.	BY	DATE	NO.	BY	DATE		S-29
1			3			TOTAL SHEETS	
2			4			45	

DRAWN BY:	NMW	*DATE:*	7/12
CHECKED BY:	RDE	*DATE:*	7/12

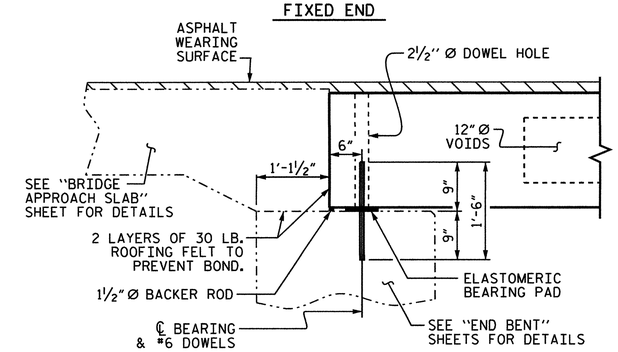


HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

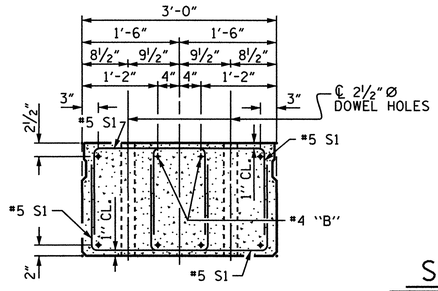
HALF SECTION
THROUGH VOIDS

TYPICAL SECTION

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

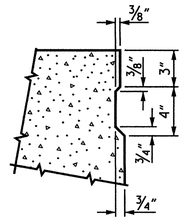


SECTION AT END BENT



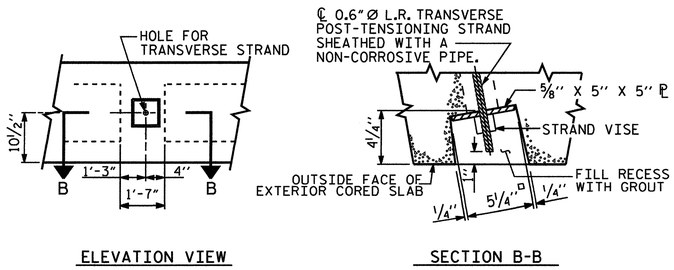
END ELEVATION

SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.)
INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.



SHEAR KEY DETAIL

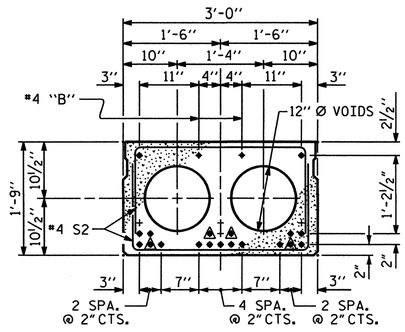
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.



ELEVATION VIEW

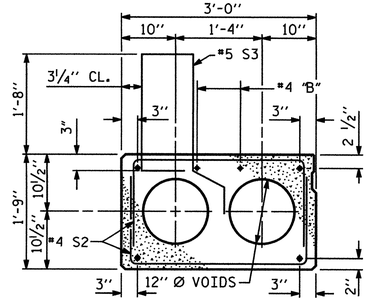
SECTION B-B

GROUTED RECESS AT END OF POST-TENSIONED STRAND OF CORED SLABS



INTERIOR SLAB SECTION (55' UNIT)

(19 STRANDS REQUIRED)



EXT. SLAB SECTION

(FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)

△ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 6'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND

0.6" Ø LOW RELAXATION STRAND LAYOUT

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222
SHEET 1 OF 3

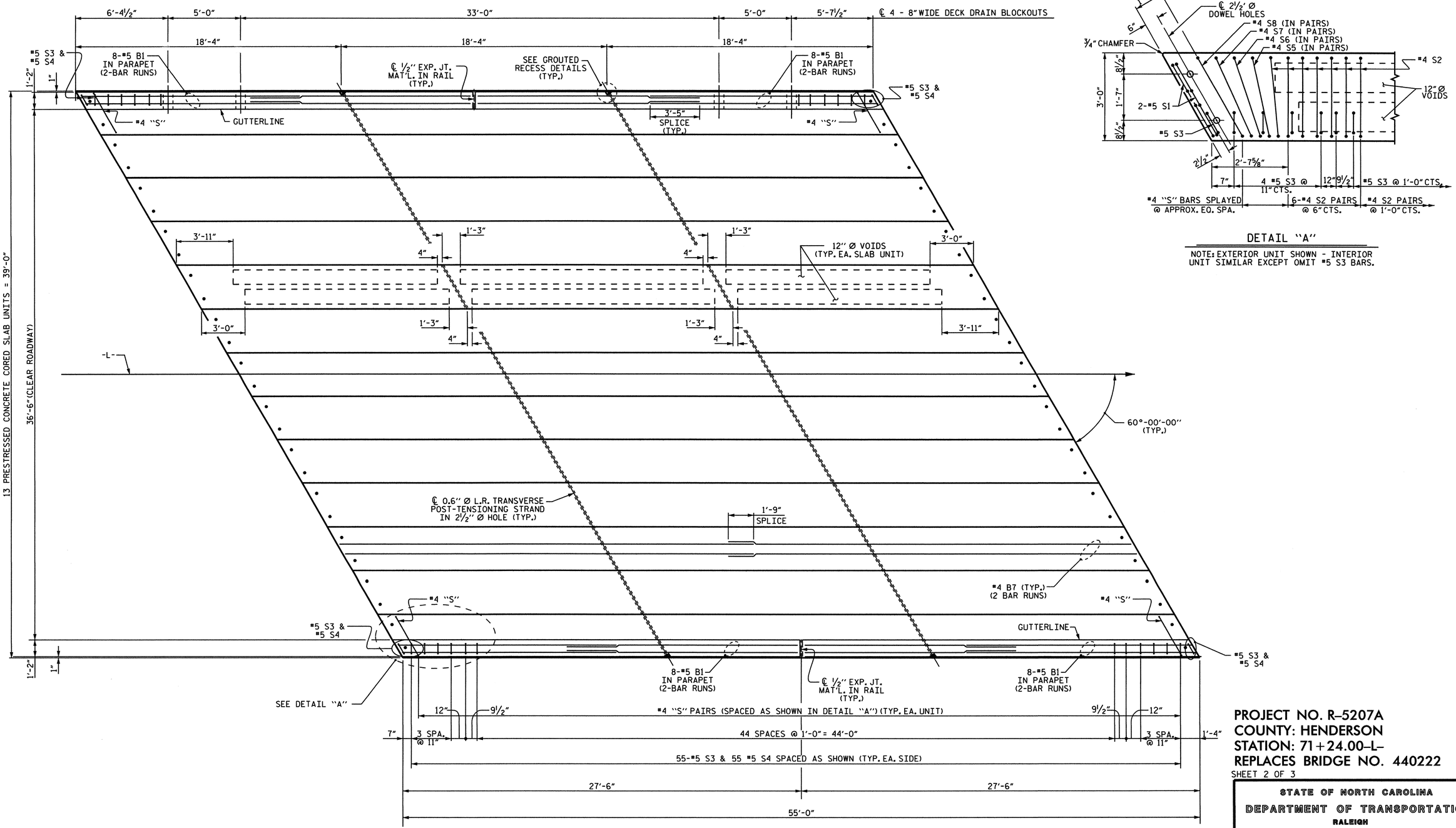
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRELIMINARY
3'-0" x 1'-9"
PRESTRESSED CONCRETE
CORED SLAB UNIT
60° SKEW

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-30
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: NMW DATE: 7/12
CHECKED BY: RTJ DATE: 7/12



PLAN OF UNIT

DETAIL "A"

NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S3 BARS.

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

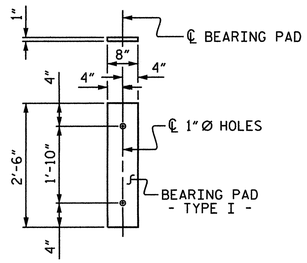
PLAN OF 55' UNIT
36'-6" CLEAR ROADWAY
60° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 24992 ENGINEER RANDY D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-31
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: NMW DATE: 7/12
CHECKED BY: RDE DATE: 7/12



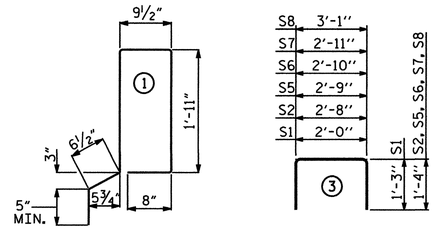
FIXED END
(TYPE I - 26 REQ'D)

ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS.

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE 55' CORED SLAB UNIT

				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
B7	4	#4	STR	28'-2"	75	28'-2"	75
S1	8	#5	3	4'-6"	38	4'-6"	38
S2	112	#4	3	5'-4"	399	5'-4"	399
✱ S3	57	#5	1	6'-3"	372		
S5	4	#4	3	5'-5"	14	5'-5"	14
S6	4	#4	3	5'-6"	15	5'-6"	15
S7	4	#4	3	5'-7"	15	5'-7"	15
S8	4	#4	3	5'-9"	15	5'-9"	15
REINFORCING STEEL			LBS.		571		571
✱EPOXY COATED REINFORCING STEEL			LBS.		372		
6500 P.S.I. CONCRETE			CU. YDS.		8.0		8.0
0.6"Ø L.R. STRANDS			No.		19		19

NOTES

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

ALL REINFORCING STEEL CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

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

THE 2½"Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

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

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

ALL REINFORCING STEEL IN THE CONCRETE PARAPET RAIL SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

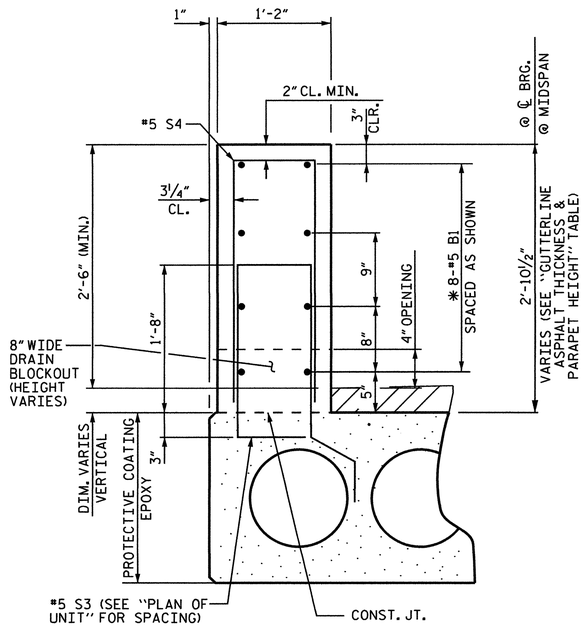
APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

TRANSVERSE POST TENSIONING OF THE CORED SLAB UNITS SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.



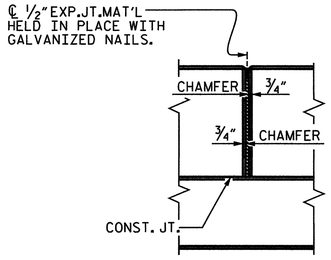
PARAPET SECTION FOR TWO BAR METAL RAIL

(LEFT PARAPET SHOWN)
(RIGHT PARAPET SIMILAR WITHOUT DRAINS)

QUANTITIES FOR THE #5 S4 AND #5 B8 BARS ARE SHOWN IN THE END POST BILL OF MATERIAL.

✱ NOTE:

THE B1 BARS 5" FROM THE TOP OF CORED SLAB SHALL BE FIELD CUT TO ALLOW 2" OF CLEARANCE FROM THE DECK DRAINS.



ELEVATION AT EXPANSION JOINTS

GUTTERLINE ASPHALT THICKNESS & PARAPET HEIGHT		
36'-6" CLEAR ROADWAY	ASPHALT OVERLAY THICKNESS	PARAPET HEIGHT
	@ MID-SPAN	@ MID-SPAN
	SUPERED SECTION	
55' UNITS	1½"	2'-7½"

CONCRETE RELEASE STRENGTH	
UNIT	PSI
55' UNITS	4900

DEAD LOAD DEFLECTION AND CAMBER	
	3'-0" x 1'-9"
55' CORED SLAB UNIT	0.6"Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2½" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD✱✱	¼" ↓
FINAL CAMBER	2¼" ↑

✱✱ INCLUDES FUTURE WEARING SURFACE

CORED SLABS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
55' UNIT			
EXTERIOR C.S.	2	55'-0"	110'-0"
INTERIOR C.S.	11	55'-0"	605'-0"
TOTAL	13		715'-0"

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222
SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

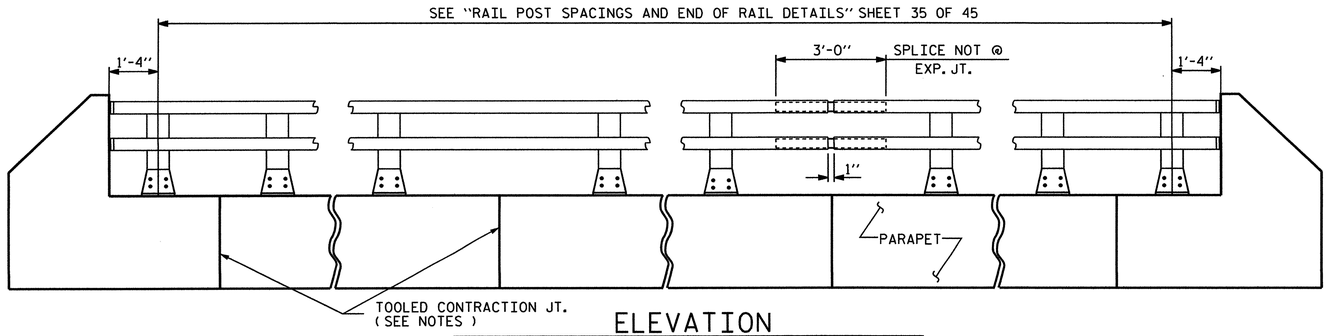
3'-0" x 1'-9"
PRESTRESSED CONCRETE
CORED SLAB UNIT

60° SKEW 55' UNIT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-32
1			3			TOTAL SHEETS
2			4			45

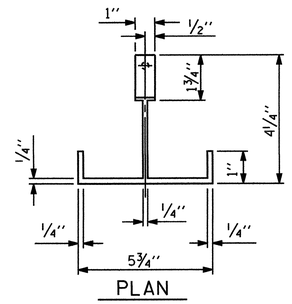
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

DRAWN BY:	NMW	DATE:	7/12
CHECKED BY:	RDE	DATE:	7/12

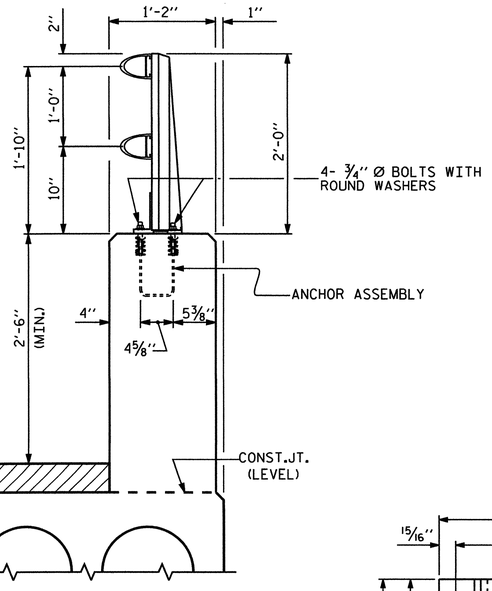


ELEVATION

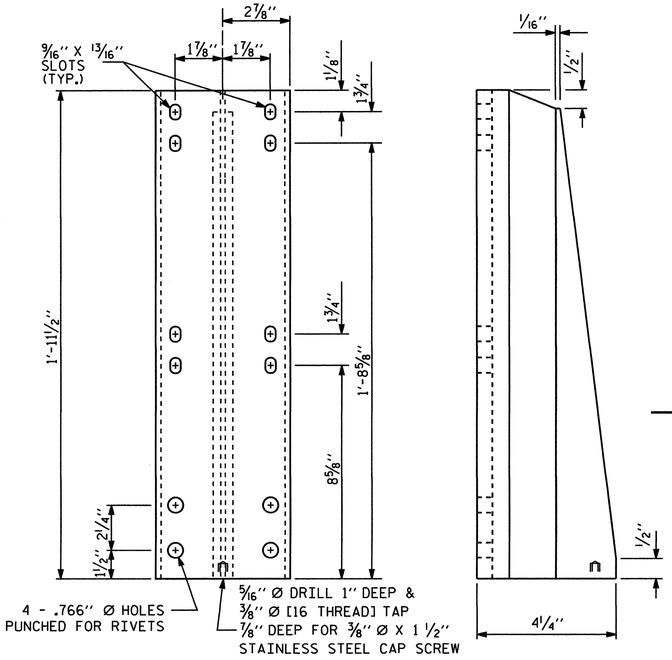
NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE STANDARD NO. BMR3.



PLAN

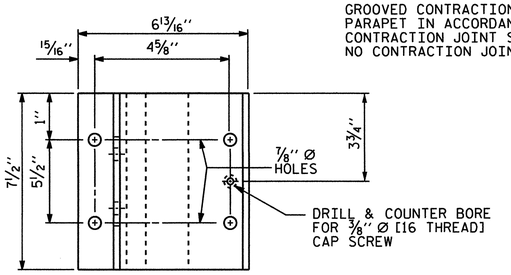


SECTION THRU PARAPET AND RAIL



FRONT ELEVATION SIDE ELEVATION

DETAILS OF POST



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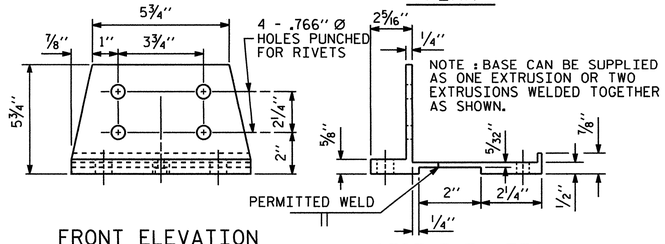
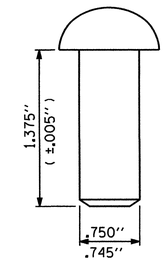


FRONT ELEVATION SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL

NOTES

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

ALUMINUM RAILS

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6.

MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

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

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

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

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

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

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

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

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

GENERAL NOTES

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

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

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

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

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

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

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

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT A SPACING OF 8FT. TO 10FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.

PAY LENGTH = 93.7 LIN. FT.

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 24582 ENGINEER JOHN D. ELLIOTT
10/8/2012

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

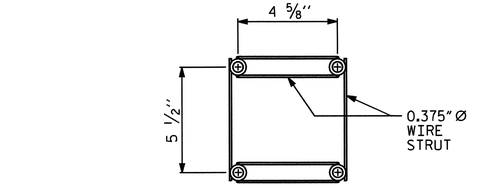
STANDARD

2 BAR METAL RAIL

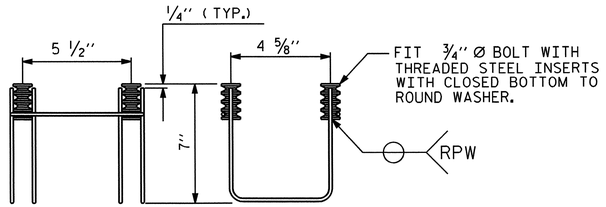
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-33
1			3			TOTAL SHEETS
2			4			45

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

DRAWN BY:	JLA	DATE:	2/11
CHECKED BY:	RDE	DATE:	8/12



PLAN



SIDE VIEW ELEVATION

MINIMUM LENGTH OF THREADS IN INSERT (FERRULE): 1 3/4"

4-BOLT METAL RAIL ANCHOR ASSEMBLY

(20 ASSEMBLIES REQUIRED)

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.

B. 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 2 1/2" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

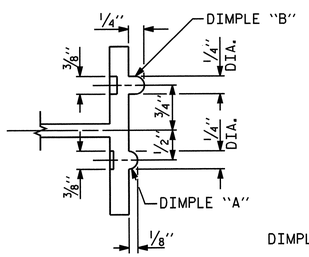
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

E. THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.

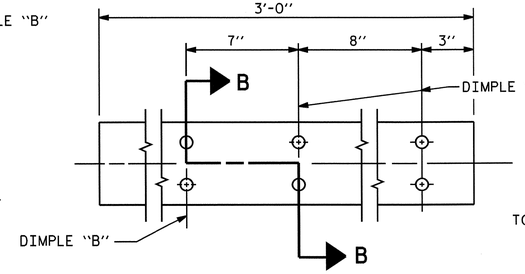
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

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

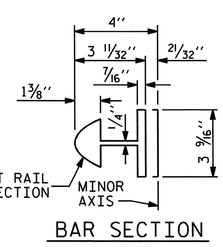
WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY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



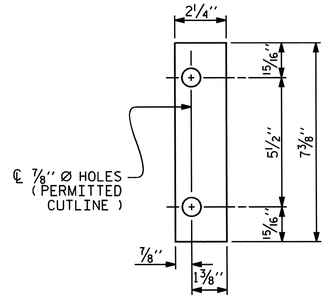
SECTION B - B



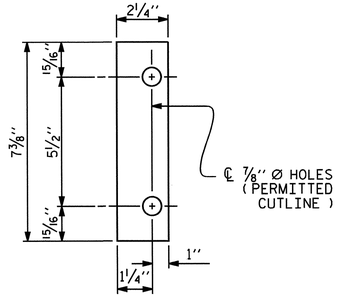
EXPANSION BAR DETAILS



BAR SECTION



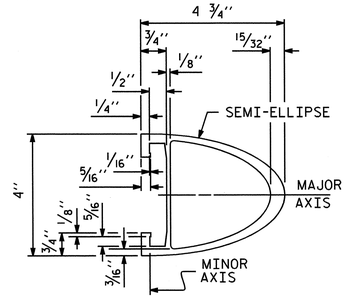
FRONT PLATE



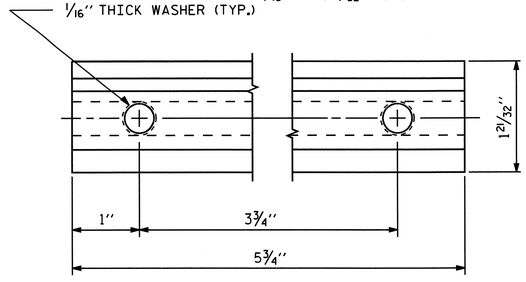
REAR PLATE

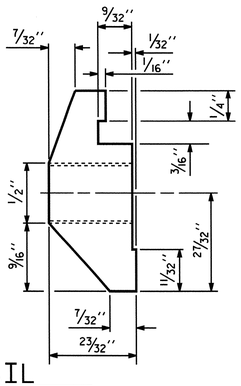
SHIM DETAILS

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



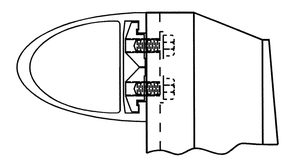
RAIL SECTION



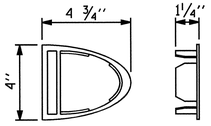


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

SHEET 2 OF 2

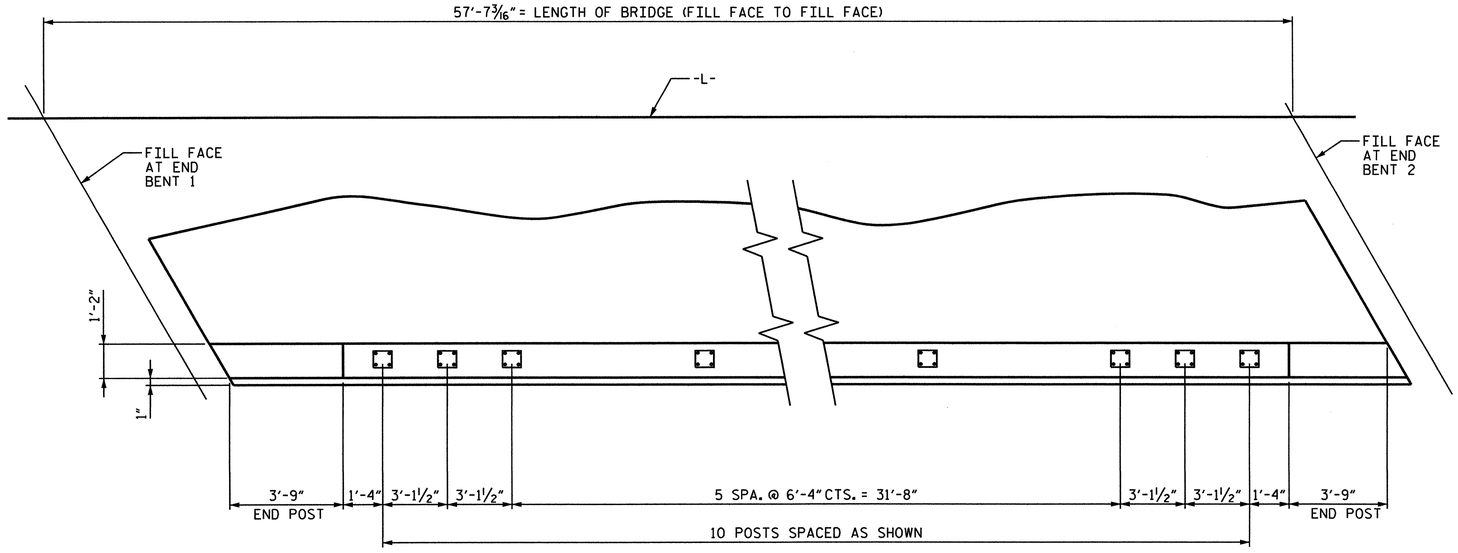
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

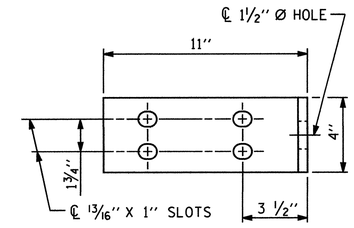
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-34
1			3			TOTAL SHEETS
2			4			45

DRAWN BY:	JLA	DATE:	2/11
CHECKED BY:	RDE	DATE:	8/12

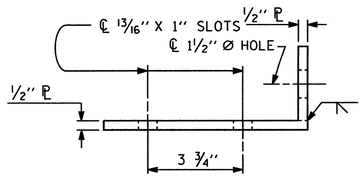


PLAN OF RAIL POST SPACINGS

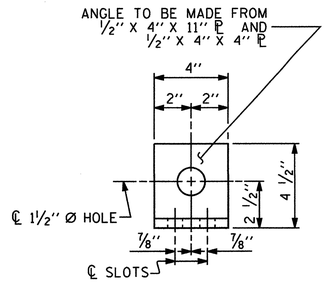
RIGHT SIDE SHOWN; LEFT SIDE SIMILAR.



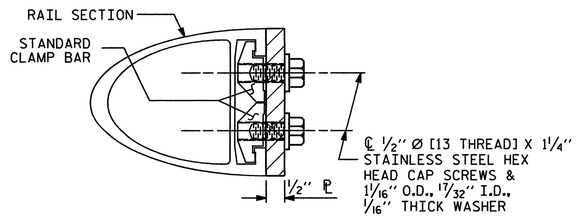
ELEVATION



TOP VIEW



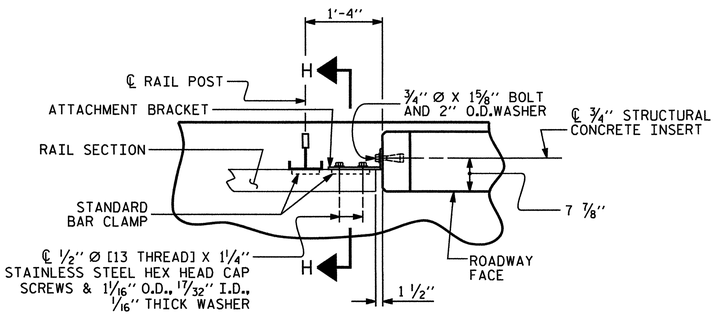
END VIEW (FIX AND EXP.)



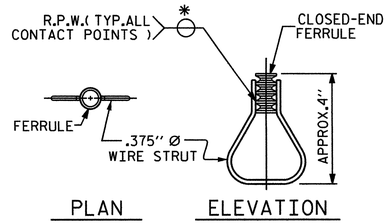
SECTION H-H (FIX)

FIXED

DETAILS FOR ATTACHING METAL RAIL TO END POST



PLAN - RAIL AND END POST



PLAN ELEVATION

STRUCTURAL CONCRETE INSERT

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

NOTES

STRUCTURAL CONCRETE INSERT

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

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1 1/2".

B. 1 - 3/4" Ø X 1 5/8" BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 1 5/8" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 1/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

NOTES

METAL RAIL TO END POST CONNECTION

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

A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4"Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4"Ø X 1 5/8" BOLT SHALL HAVE N. C. THREADS.

C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.

D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).

E. 1/2" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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

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

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

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

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

NORTH CAROLINA PROFESSIONAL SEAL 29982 ENGINEER TRAM D. ELLIOTT
10/8/2012

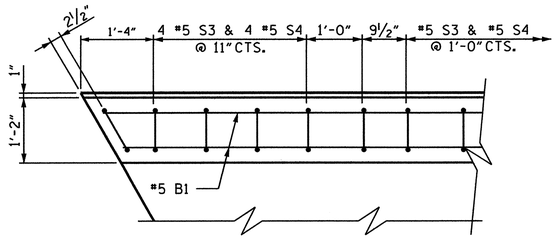
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

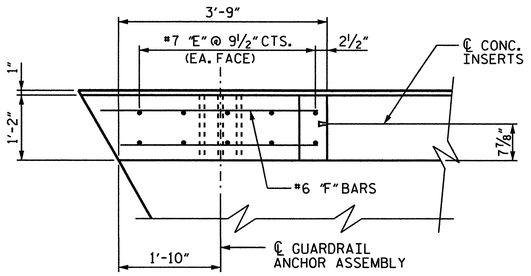
RAIL POST SPACINGS AND END OF RAIL DETAILS
FOR ONE OR TWO BAR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-35
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: NMW DATE: 8/12
CHECKED BY: RDE DATE: 8/12

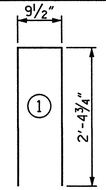


PLAN OF PARAPET



PLAN OF END POST

BAR TYPES



BAR DIMENSIONS ARE OUT TO OUT.

NOTES:

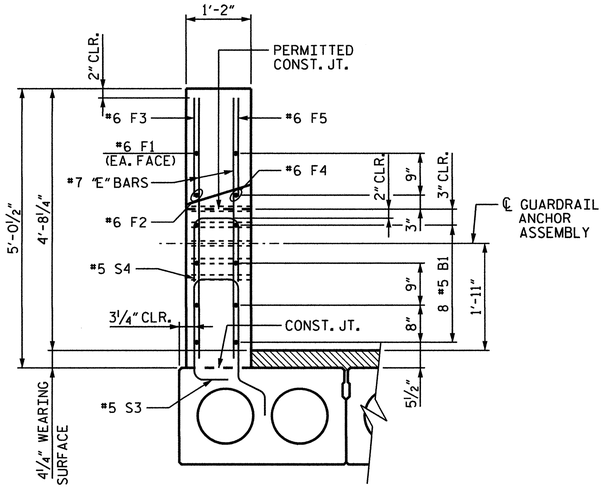
QUANTITIES FOR THE #5 S3 BARS ARE SHOWN IN THE CORED SLAB BILL OF MATERIAL.

ALL REINFORCING STEEL IN PARAPETS AND END POSTS SHALL BE EPOXY COATED.

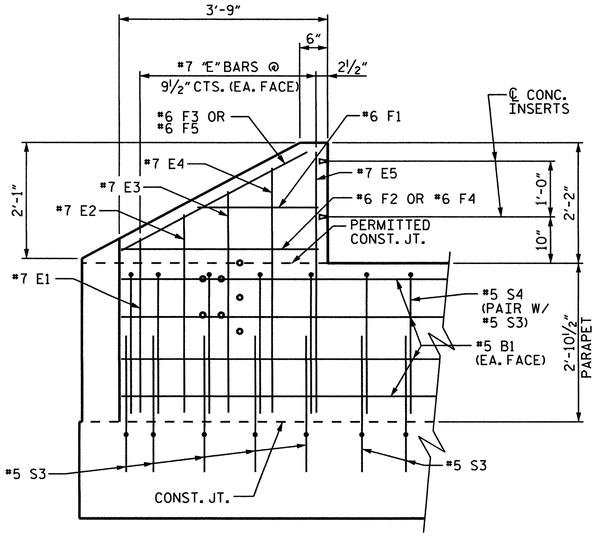
TWO BAR METAL RAIL

BILL OF MATERIAL FOR PARAPET AND TWO END POSTS - 2 REQUIRED

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	32	#5	STR.	15'-6"	517
✱E1	4	#7	STR.	3'-1"	25
✱E2	4	#7	STR.	3'-6"	29
✱E3	4	#7	STR.	3'-11"	32
✱E4	4	#7	STR.	4'-4"	35
✱E5	4	#7	STR.	4'-7"	37
✱F1	4	#6	STR.	1'-11"	13
✱F2	2	#6	STR.	3'-6"	11
✱F3	2	#6	STR.	4'-3"	13
✱F4	2	#6	STR.	3'-4"	10
✱F5	2	#6	STR.	3'-7"	11
✱S4	57	#5	1	5'-7"	332
✱EPOXY COATED REINFORCING STEEL					1,065 LBS.
CLASS "AA" CONCRETE					7.4 C.Y.
1'-2" × 2'-10½" CONCRETE PARAPET					55.0 L.F.



END VIEW



ELEVATION

PARAPET AND END POST FOR TWO BAR METAL RAIL

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

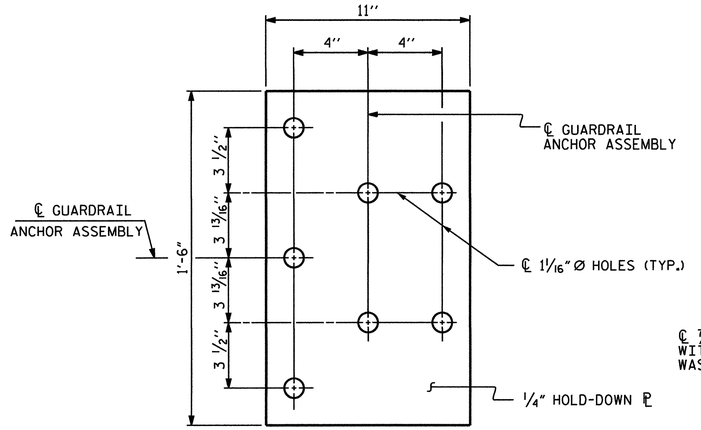
END POST DETAIL

NORTH CAROLINA PROFESSIONAL SEAL 24282 ENGINEER TRAVIS D. ELLIOTT
10/8/2012

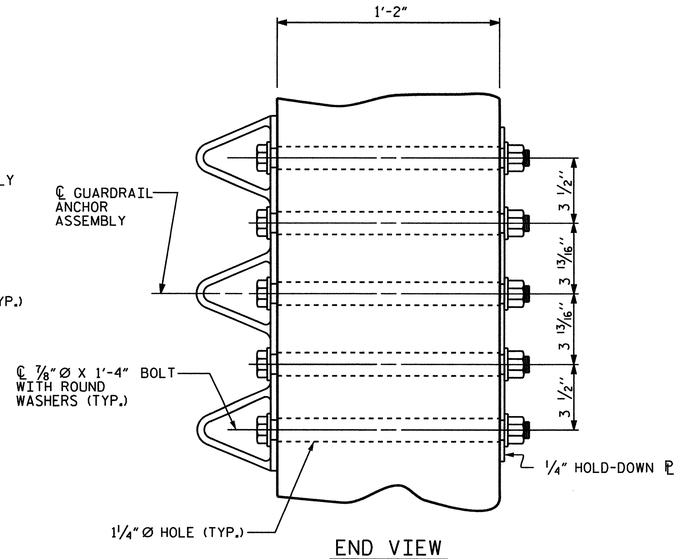
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-36
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: JLA DATE: 2/11
CHECKED BY: RDE DATE: 8/12



PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES

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

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

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

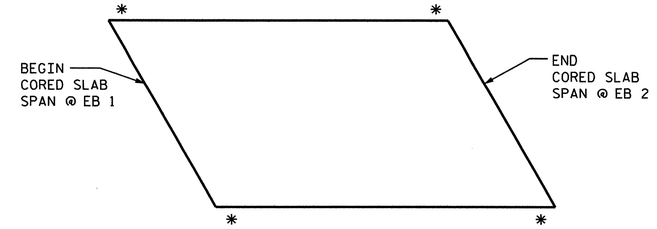
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

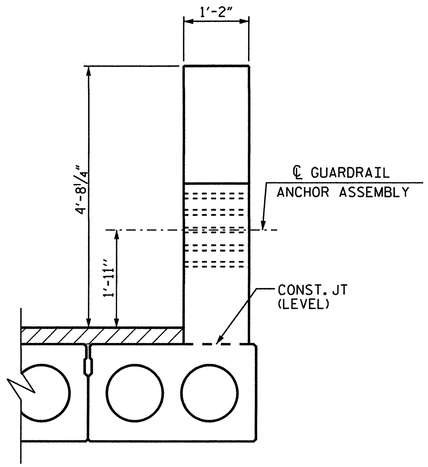
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

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

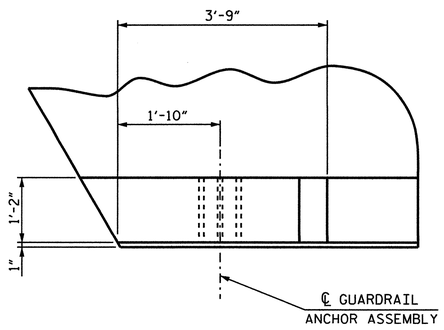


SKETCH SHOWING POINTS OF ATTACHMENT

*LOCATION OF GUARDRAIL ATTACHMENT



END VIEW
(TWO BAR METAL RAIL)



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

NORTH CAROLINA PROFESS IONAL SEAL 24592 ENGINEER TARA D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

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

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-37
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: JLA DATE: 7/12
CHECKED BY: RDE DATE: 7/12

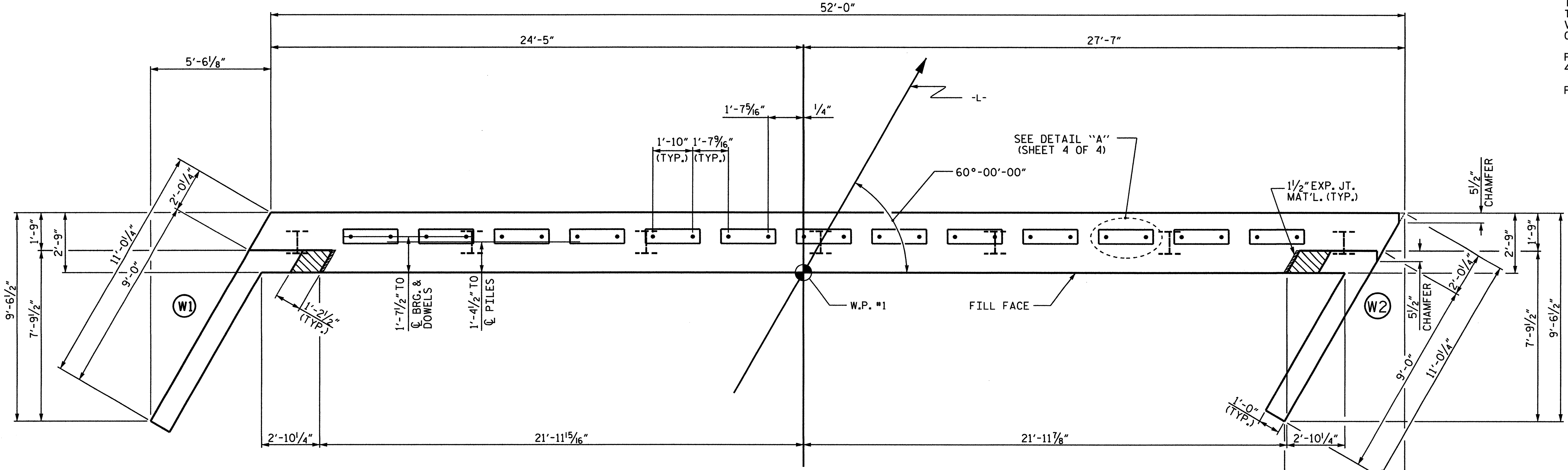
NOTES

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

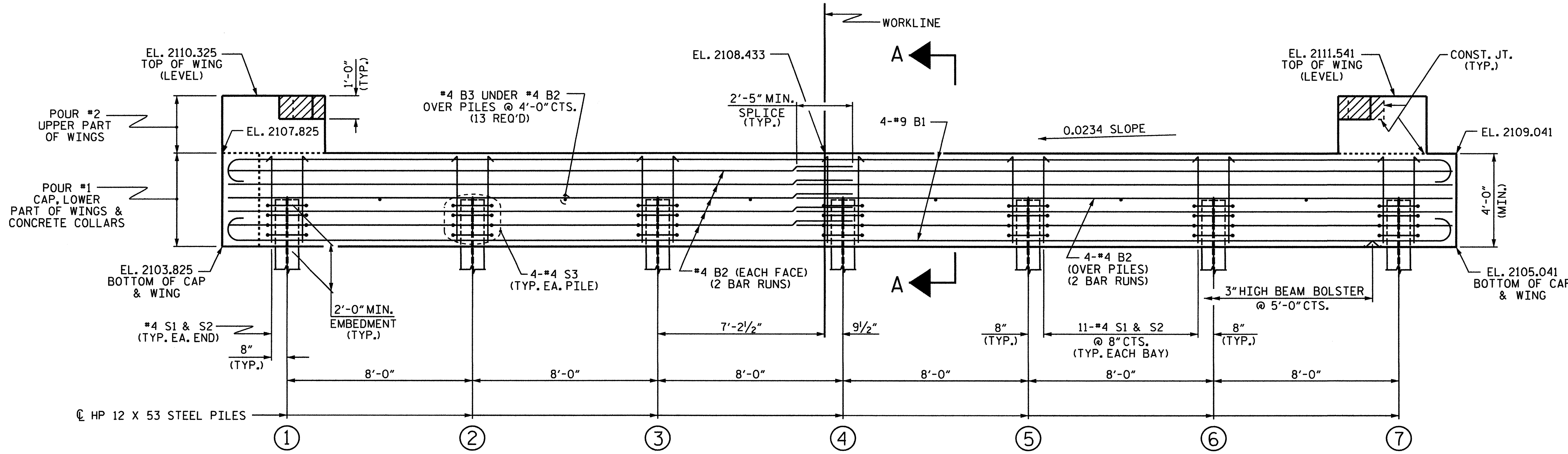
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

TOP OF PILE ELEVATIONS	
①	2105.890
②	2106.077
③	2106.264
④	2106.452
⑤	2106.639
⑥	2106.826
⑦	2107.013

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

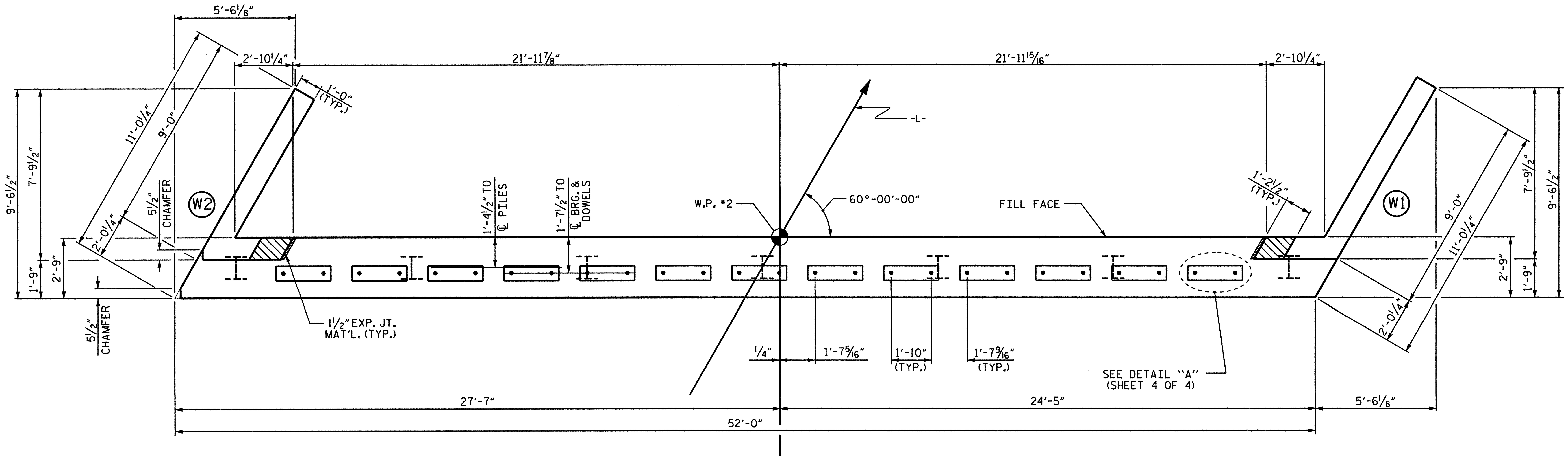
END BENT No. 1

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22882 RAY D. ELLIOTT
10/8/2012

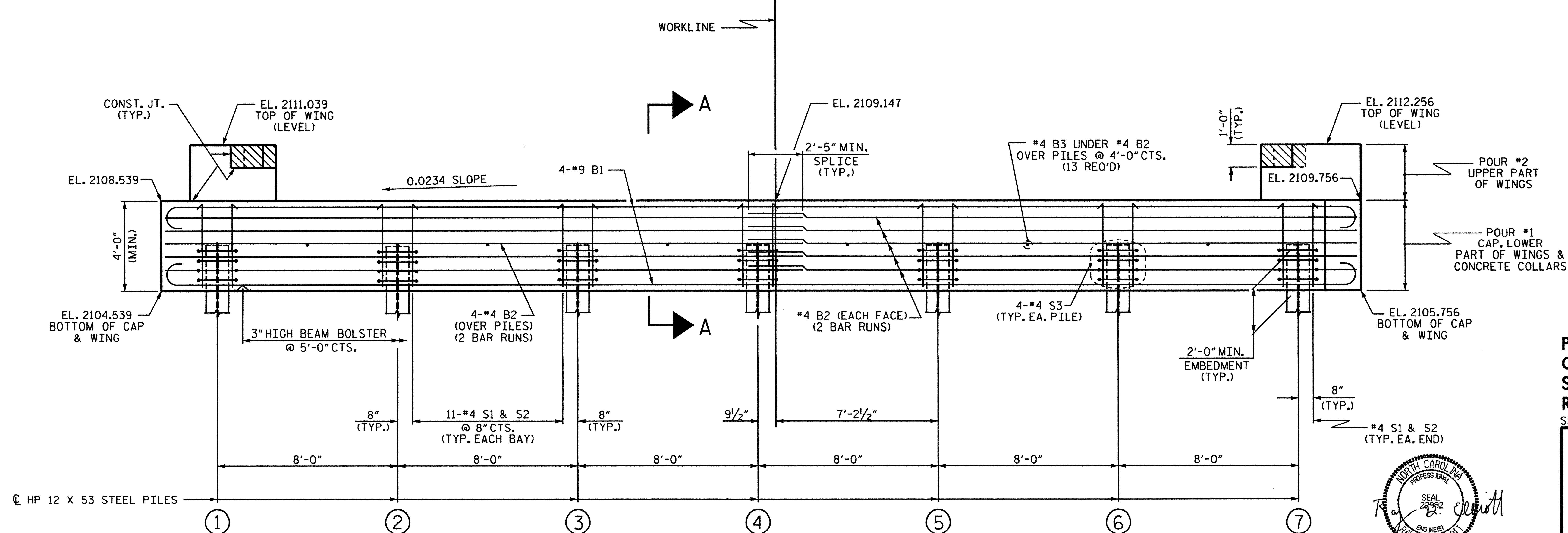
PREPARED BY TGS ENGINEERS 107-A MICA AVENUE MORGANTON, NC 28655

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-38
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: NMW DATE: 7/12
CHECKED BY: RDE DATE: 7/12



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

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

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

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

TOP OF PILE ELEVATIONS	
1	2106.567
2	2106.754
3	2106.941
4	2107.129
5	2107.316
6	2107.503
7	2107.690

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222
SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL RAY D. ELLIOTT
10/8/2012

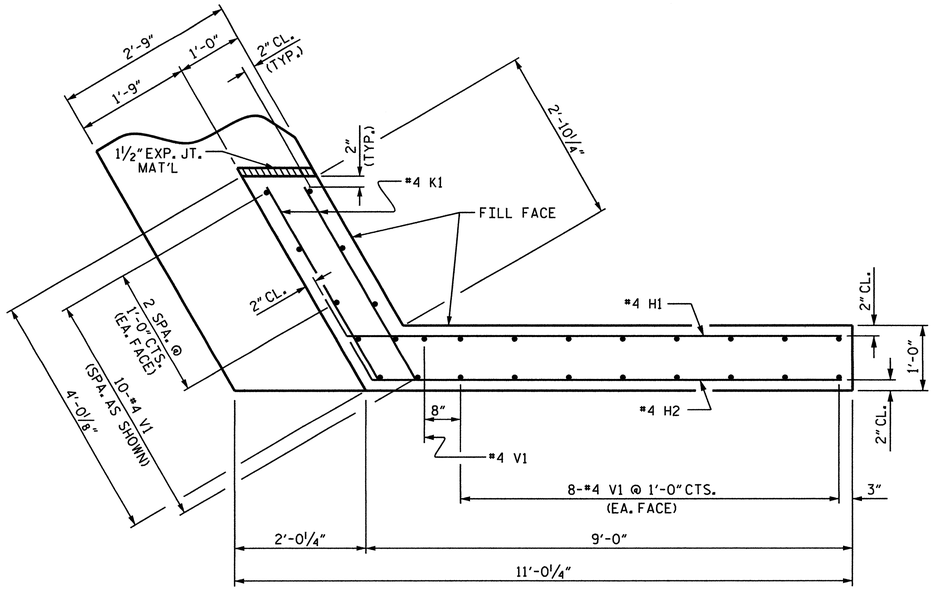
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT No. 2

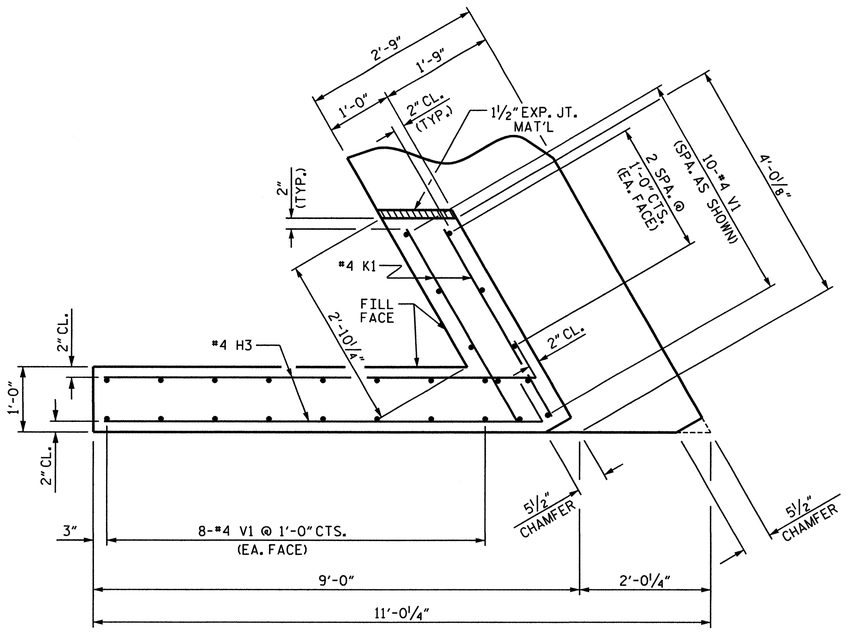
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-39
1			3			TOTAL SHEETS
2			4			45

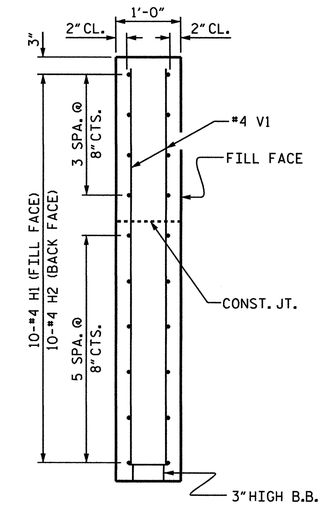
DRAWN BY:	NMW	DATE:	7/12
CHECKED BY:	RDE	DATE:	7/12



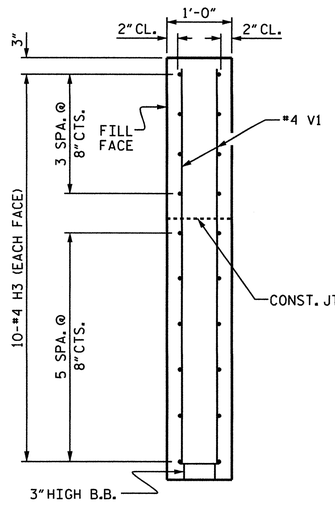
PLAN OF WING (W1)



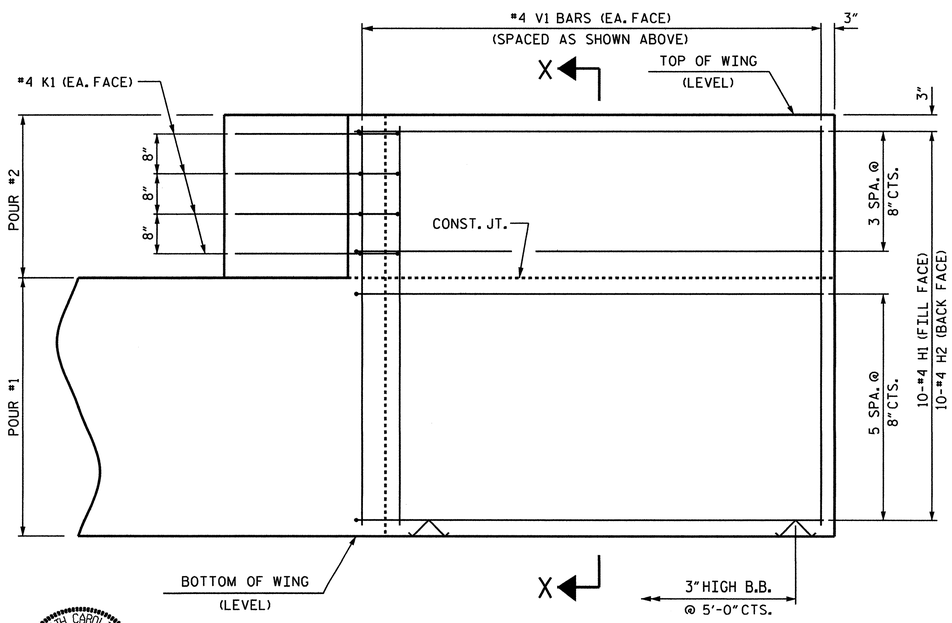
PLAN OF WING (W2)



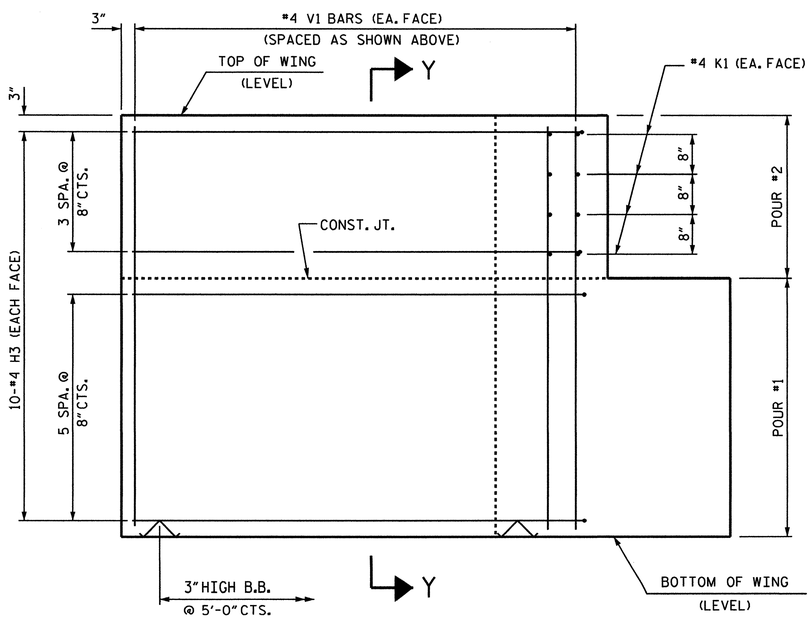
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

DRAWN BY:	NMW	DATE:	7/12
CHECKED BY:	RDE	DATE:	7/12

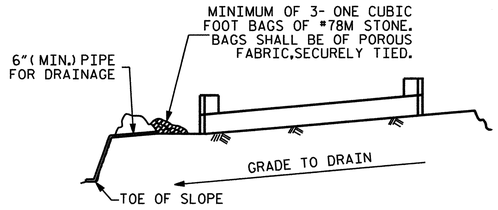
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222
SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-40
1			3			TOTAL SHEETS
2			4			45

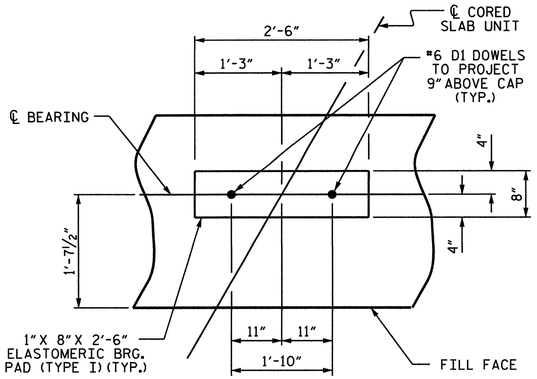


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

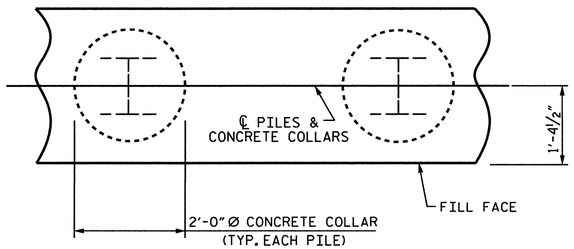
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

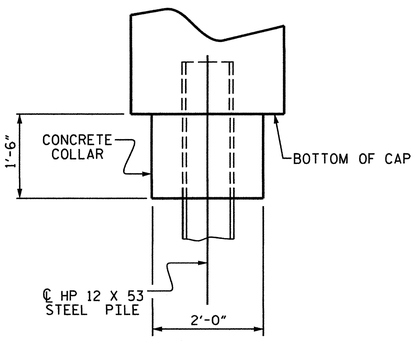


DETAIL "A"

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



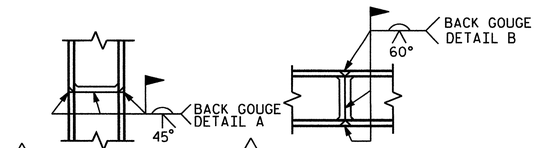
PLAN



ELEVATION

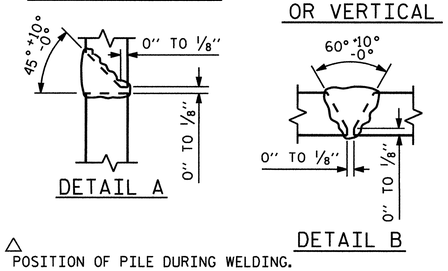
CORROSION PROTECTION FOR STEEL PILES DETAIL

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



△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL



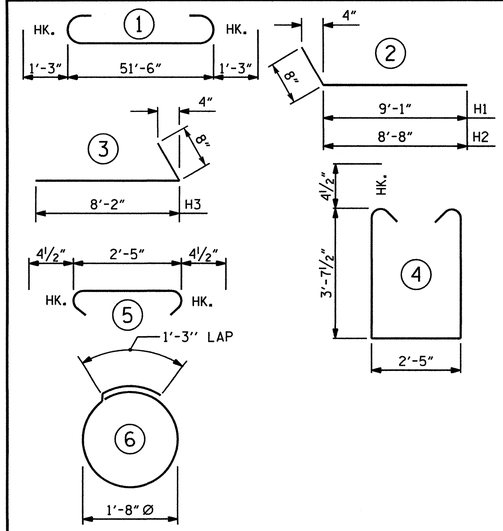
DETAIL A

DETAIL B

△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1	END BENT No. 2
HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES
NO: 7 LIN. FT.= 105	NO: 7 LIN. FT.= 105

BILL OF MATERIAL

FOR ONE END BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	54'-0"	1469
B2	28	#4	STR	27'-1"	507
B3	13	#4	STR	2'-5"	21
D1	26	#6	STR	1'-6"	59
H1	10	#4	2	9'-9"	65
H2	10	#4	2	9'-4"	62
H3	20	#4	3	8'-10"	118
K1	16	#4	STR	3'-6"	37
S1	68	#4	4	10'-5"	473
S2	68	#4	5	3'-2"	144
S3	28	#4	6	6'-6"	122
V1	53	#4	STR	6'-2"	218

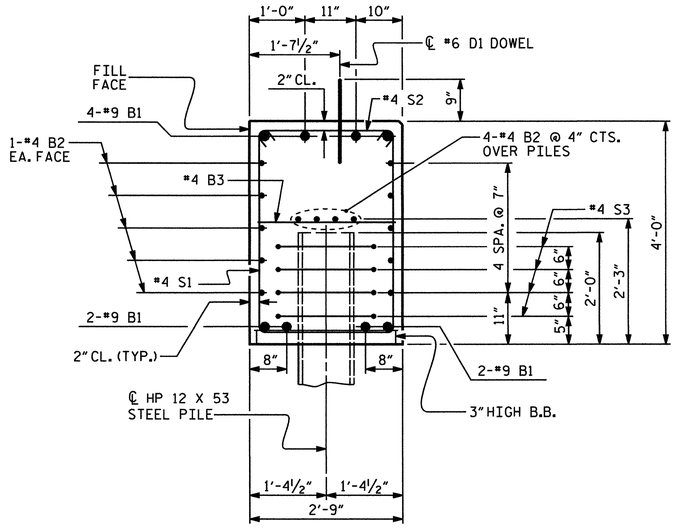
REINFORCING STEEL (FOR ONE END BENT) 3295 LBS.

CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)

POUR #1 CAP, LOWER PART OF WINGS & COLLARS 24.7 C.Y.

POUR #2 UPPER PART OF WINGS 2.2 C.Y.

TOTAL CLASS A CONCRETE 26.9 C.Y.



SECTION A-A

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222
SHEET 4 OF 4

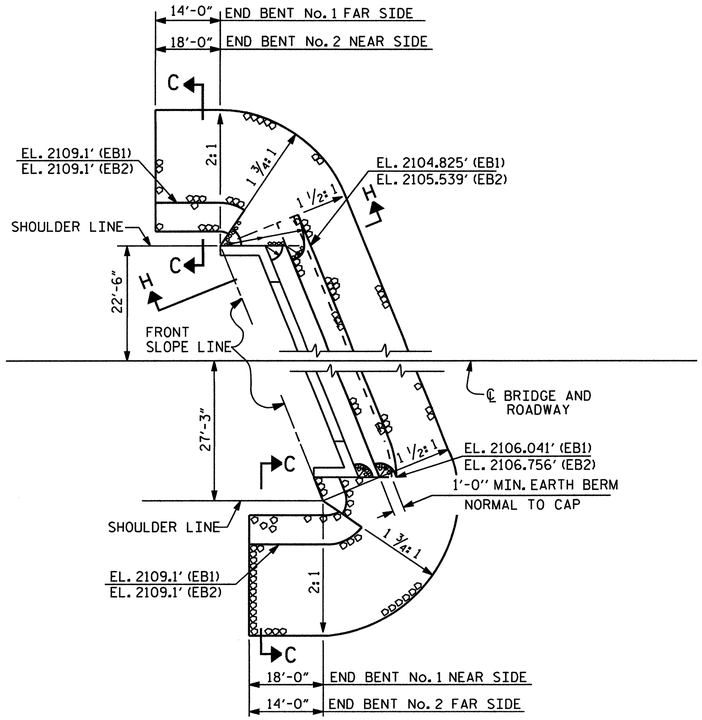
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1 & 2 DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-41
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: NMW DATE: 7/12
CHECKED BY: RDE DATE: 7/12

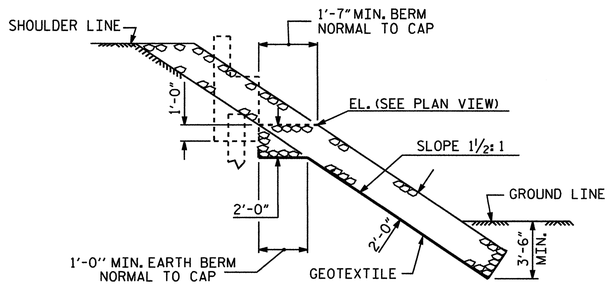


SHOULDER RIP RAP IS HIGHER THAN BERM RIP RAP

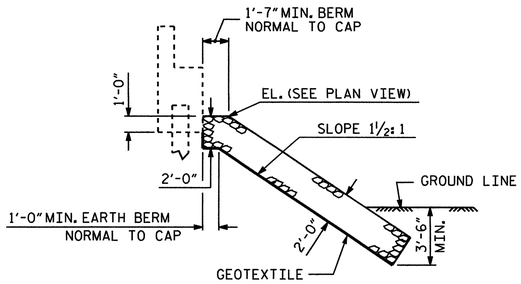
NOTES :

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

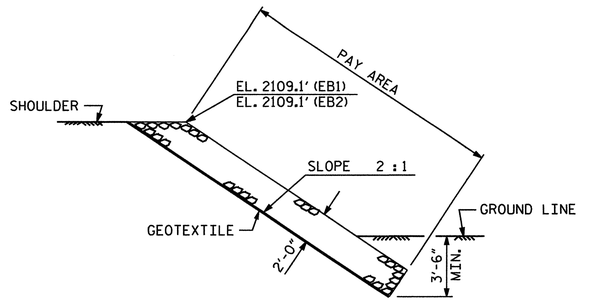
ESTIMATED QUANTITIES		
BRIDGE @ STA. 71+24.00-L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	108	120
END BENT 2	144	160



SECTION H-H



℄ SECTION
BERM RIP RAPPED



SECTION C-C

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

NORTH CAROLINA PROFESS IONAL SEAL 24992 ENGINEER TRAN D. ELLIOTT
10/8/2012

PREPARED BY
TGS ENGINEERS
101-A MICA AVENUE
MORGANTON, NC 28655

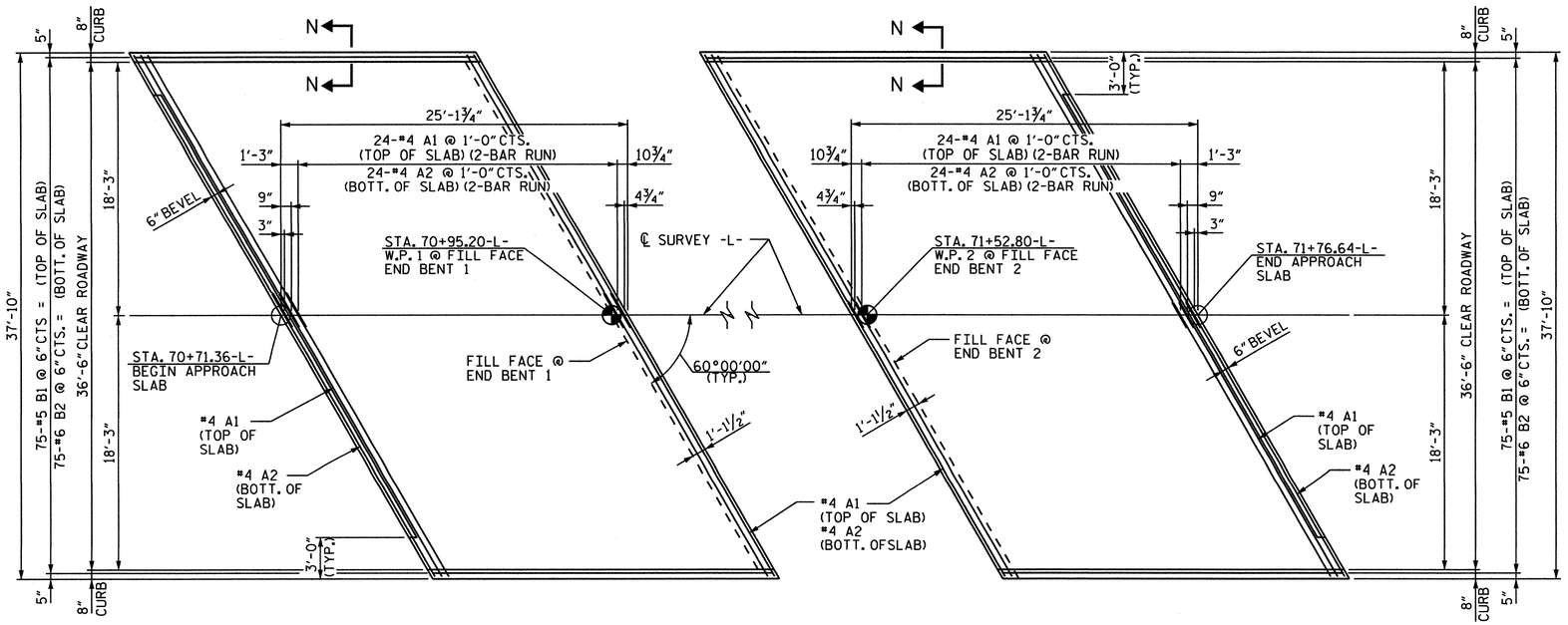
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-42
1			3			TOTAL SHEETS
2			4			45

DRAWN BY:	NMW	DATE:	7/12
CHECKED BY:	RDE	DATE:	7/12



BILL OF MATERIAL												
APPROACH SLAB AT EB #1						APPROACH SLAB AT EB #2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	52	#4	STR	22'-8"	787	✱ A1	52	#4	STR	22'-8"	787
A2	52	#4	STR	22'-7"	784	A2	52	#4	STR	22'-7"	784
✱ B1	75	#5	STR	24'-3"	1,897	✱ B1	75	#5	STR	24'-3"	1,897
B2	75	#6	STR	24'-7"	2,769	B2	75	#6	STR	24'-7"	2,769
REINFORCING STEEL				LBS.	3,553	REINFORCING STEEL				LBS.	3,553
✱ EPOXY COATED REINFORCING STEEL				LBS.	2,684	✱ EPOXY COATED REINFORCING STEEL				LBS.	2,684
CLASS AA CONCRETE				C. Y.	43.0	CLASS AA CONCRETE				C. Y.	43.0

NOTES

FOR REINFORCED BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

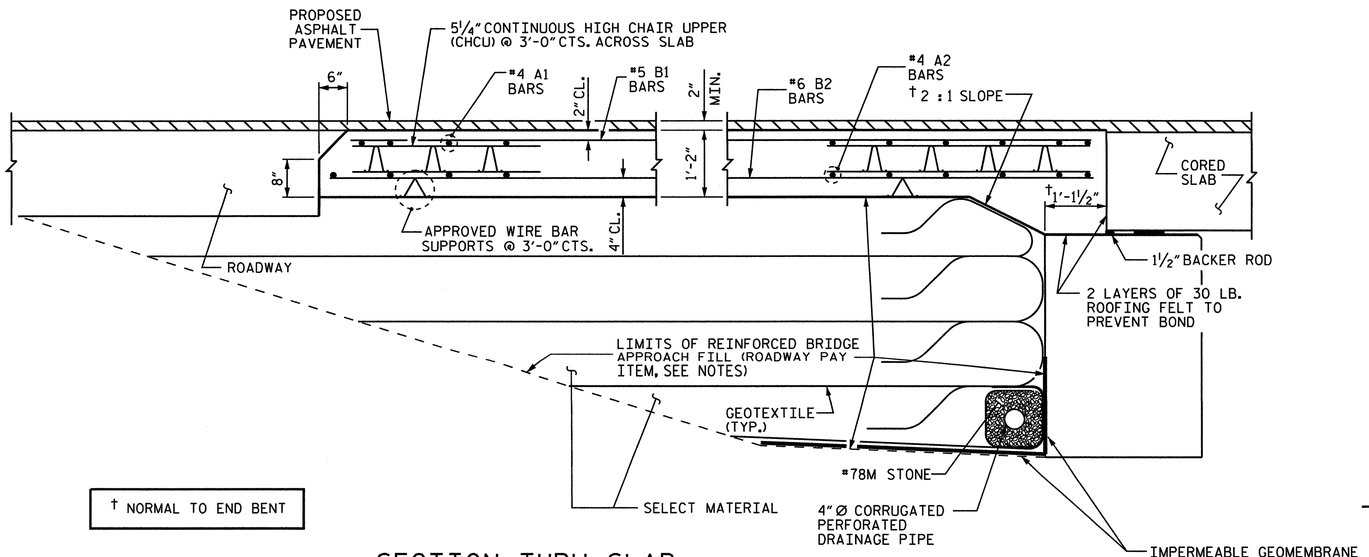
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

APPROACH SLAB GROOVING IS NOT REQUIRED.

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

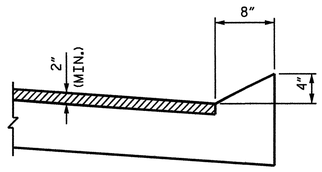
PLAN @ END BENT 1

PLAN @ END BENT 2

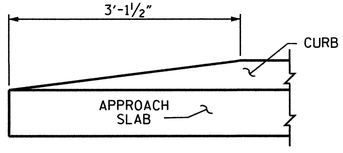


† NORMAL TO END BENT

SECTION THRU SLAB



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 22982 ENGINEER TRAVIS C. ELLIOTT 10/8/2012

PREPARED BY TGS ENGINEERS 107-A MICA AVENUE MORGANTON, NC 28655

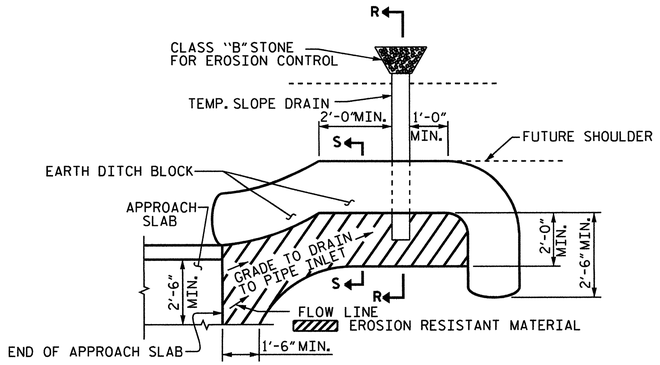
DRAWN BY: JLA DATE: 9/10
CHECKED BY: RDE DATE: 7/12

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222
SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

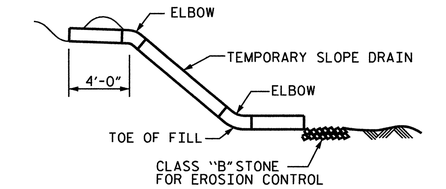
PRELIMINARY
BRIDGE APPROACH SLAB FOR FLEXIBLE PAVMENT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-43
1			3			TOTAL SHEETS
2			4			45

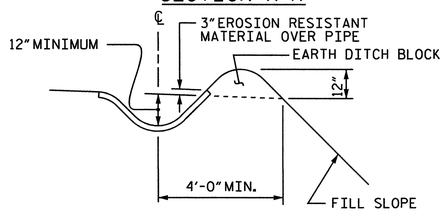


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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



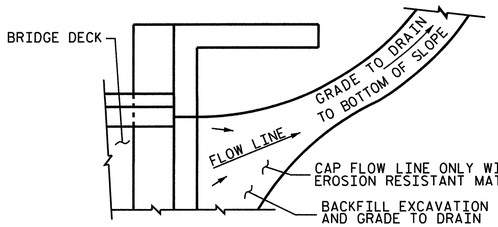
SECTION R-R



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

PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-44
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: JLA DATE: 09/10
CHECKED BY: RDE DATE: 7/12

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2006 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

PROJECT NO. R-5207A
COUNTY: HENDERSON
STATION: 71+24.00-L-
REPLACES BRIDGE NO. 440222

NORTH CAROLINA PROFESS ENGR SEAL 24992 ENGINEER RYAN D. ELLIOTT

10/8/2012

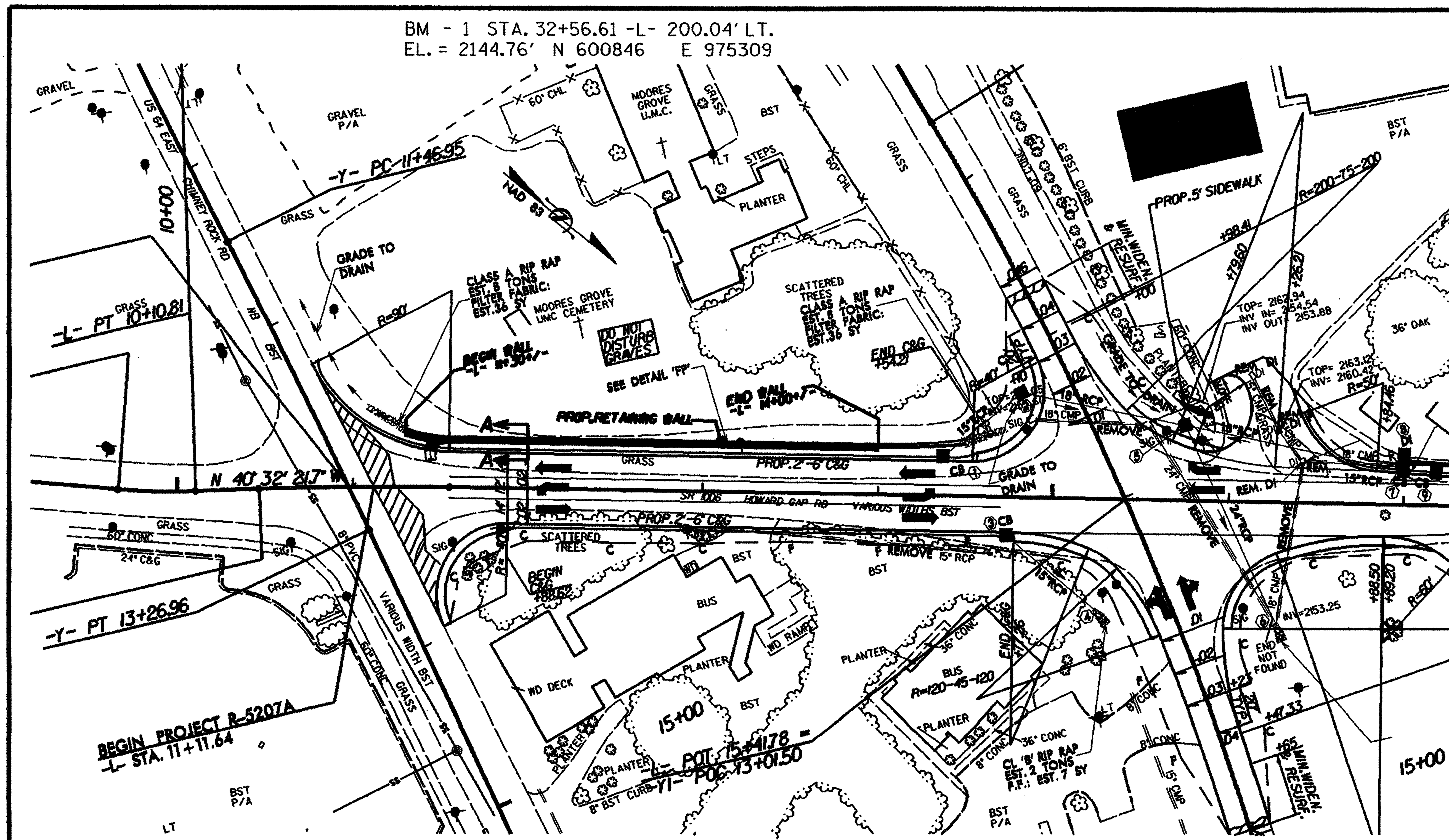
PREPARED BY
TGS ENGINEERS
107-A MICA AVENUE
MORGANTON, NC 28655

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD NOTES

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-45
1			3			TOTAL SHEETS
2			4			45

DRAWN BY: NMW DATE: 7/12
CHECKED BY: RDE DATE: 7/12



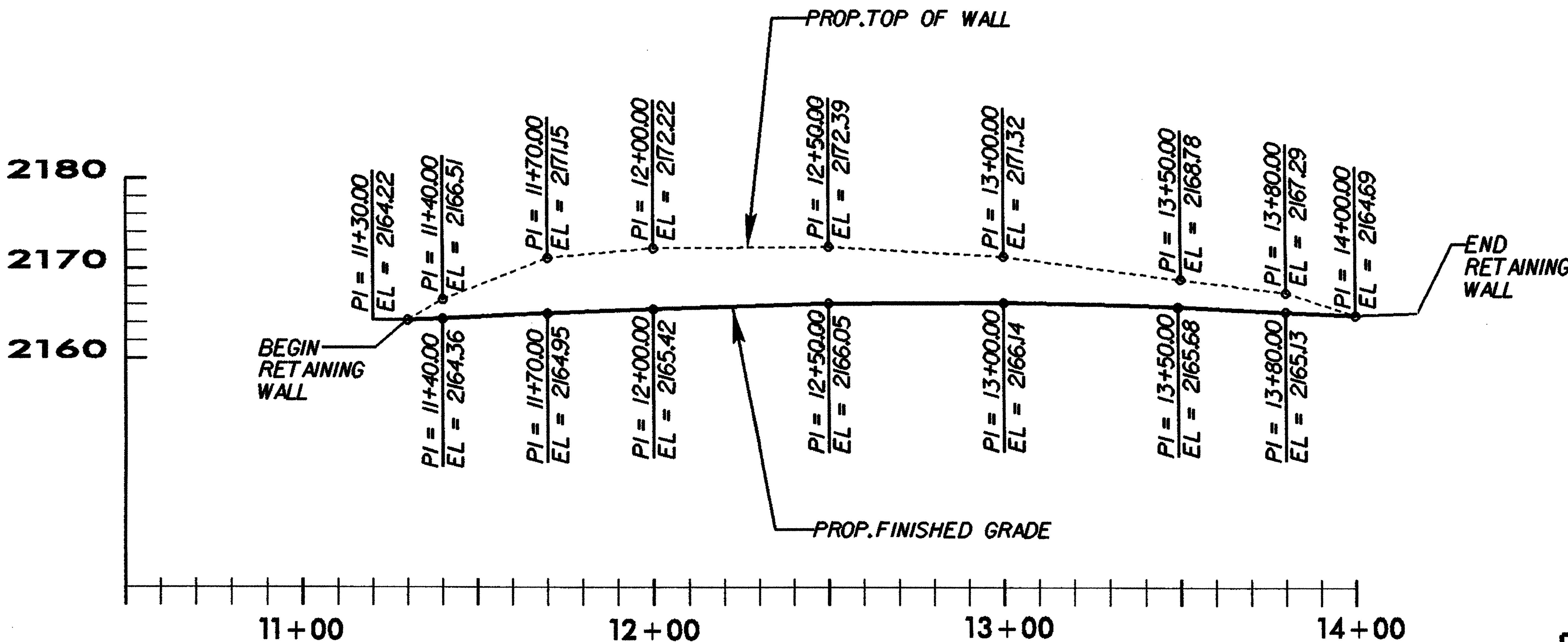
LOCATION SKETCH

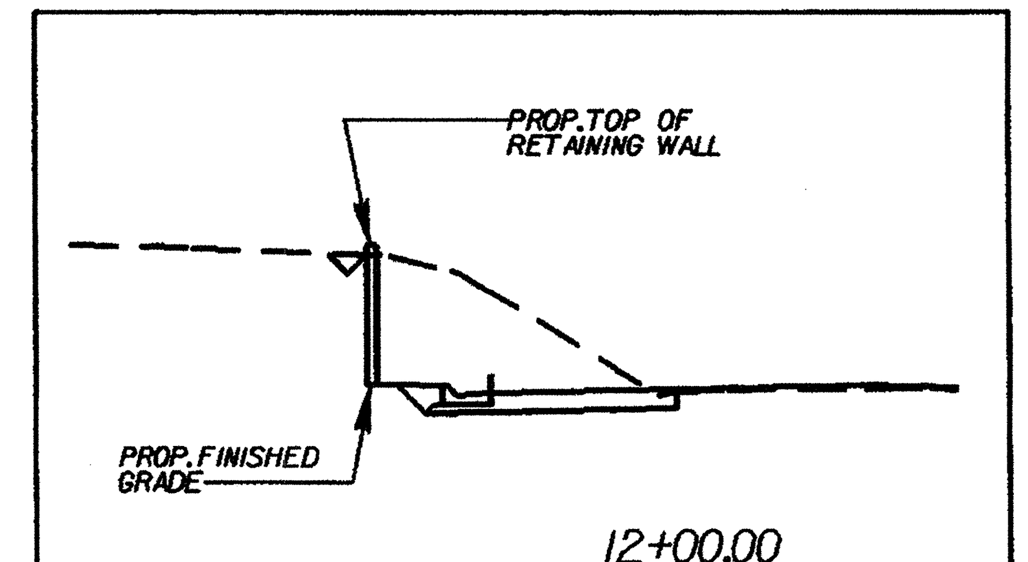
RETAINING WALL ELEVATIONS

-L- STA	OFFSET FROM ℄ (LEFT)	ELEV @ TOP OF WALL	* PROPOSED FINISHED GRADE	* EXPOSED WALL HEIGHT	** DESIGN WALL HEIGHT "H"
11+30.00	30.02	2164.22	2164.22	0.00	0.00
11+40.00	27.41	2166.51	2164.36	2.15	1.65
11+70.00	26.00	2171.15	2164.95	6.20	5.70
12+00.00	26.00	2172.22	2165.42	6.80	6.30
12+50.00	26.00	2172.39	2166.05	6.34	5.84
13+00.00	26.00	2171.32	2166.14	5.18	4.68
13+50.00	26.00	2168.78	2165.68	3.10	2.60
13+80.00	26.00	2167.29	2165.13	2.16	1.66
14+00.00	26.00	2164.69	2164.69	0.00	0.00

* ELEVATION @ PROPOSED FINISHED GRADE AND EXPOSED WALL HEIGHT DO NOT INCLUDE EMBEDMENT DEPTH

** FOR DESIGN WALL HEIGHT "H", SEE THE SOLDIER PILE RETAINING WALL DETAILS ON SHEET 2 OF 2.





SECTION A

TOTAL STRUCTURE QUANTITIES

SOLDIER PILE RETAINING WALL	1255	SQ. FT.

GEOTECHNICAL ENGINEER — SEAL 29869 — NORTH CAROLINA PROFESSIONAL ENGINEER SHANE C CLARK — SIGNATURE — DATE 8/21/12

ENGINEER — SIGNATURE — DATE

PROJECT NO.: R-5207A
HENDERSON COUNTY
STATION: 11+30.00 -L- TO 14+00.00 -L-
SHEET 1 OF 2

GEOTECHNICAL ENGINEERING UNIT
☐ EASTERN REGIONAL OFFICE
☒ WESTERN REGIONAL OFFICE
☐ CONTRACT OFFICE
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SOLDIER PILE RETAINING WALL

REVISIONS

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

SHEET NO. W-1
TOTAL SHEETS 2

PREPARED BY: J.T.W.	DATE: 7.12
REVIEWED BY: S.C.C.	DATE: 8.12

GEOTECHNICAL ENGINEER	ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 29869 ENGINEER FRANK C CLARK — SIGNATURE 8/21/12 DATE	SIGNATURE DATE

NOTES:

FOR SOLDIER PILE RETAINING WALLS, SEE SOLDIER PILE RETAINING WALLS PROVISION.

FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.

A FENCE OR HANDRAIL IS REQUIRED ON TOP OF RETAINING WALL
SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.

AT THE CONTRACTOR'S OPTION, USE DRIVEN H-PILES FOR RETAINING WALL

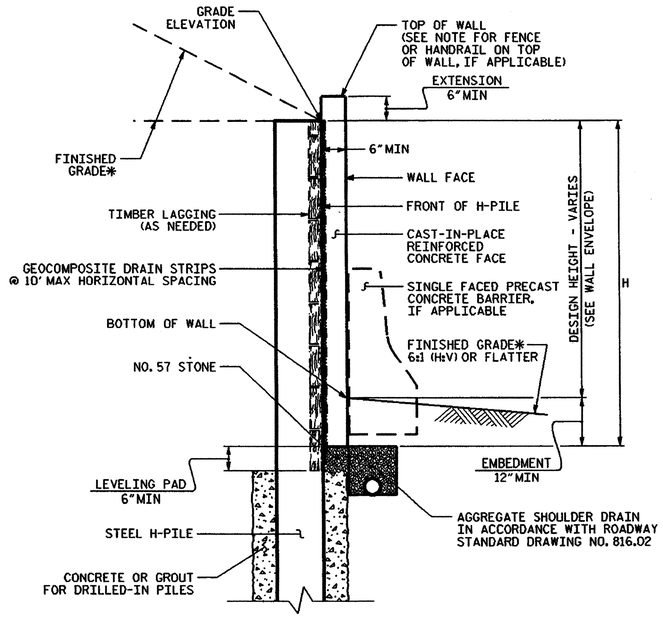
USE A SOLDIER PILE RETAINING WALL WITH A CAST-IN-PLACE REINFORCED CONCRETE FACE FOR RETAINING WALL.

A SIMULATED STONE FINISH THAT MEETS ARTICLE 1000-4 OF THE STANDARD SPECIFICATIONS IS REQUIRED FOR THE CAST IN PLACE FACING FOR RETAINING. SEE SIMULATED STONE FORMLINER FINISH SPECIAL PROVISION.

SUBMIT FORMLINER SAMPLES FOR APPROVAL BEFORE BEGINNING SOLDIER PILE WALL CONSTRUCTION.

BEFORE BEGINNING SOLDIER PILE WALL DESIGN FOR RETAINING WALL, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.

DESIGN RETAINING WALL. FOR THE FOLLOWING:
1) H = DESIGN HEIGHT + EMBEDMENT
2) DESIGN LIFE = 75 YEARS
3) MINIMUM EMBEDMENT ELEVATION = 2 FT
4) IN-SITU ASSUMED MATERIAL PARAMETERS:
   UNIT WEIGHT, γ = 120 LB/CF
   FRICTION ANGLE, ϕ = 30 DEGREES
   COHESION, c = 0 LB/SF



SOLDIER PILE WALL WITH CAST-IN-PLACE FACE - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.

PREPARED BY: J.T.W.	DATE: 7.12
REVIEWED BY: S.C.C.	DATE: 8.12

PROJECT NO.: R-5207A
HENDERSON ***COUNTY***
STATION: 11+30.00 -L- TO 14+00.00 -L-
SHEET 2 OF 2

GEOTECHNICAL ENGINEERING UNIT
☐ ***EASTERN REGIONAL OFFICE***
☒ ***WESTERN REGIONAL OFFICE***
☐ ***CONTRACT OFFICE***
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SOLDIER PILE RETAINING WALL

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

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

REV. 6-16-95 EEM GW RGW REV. 5-7-03 RWW GW JTE REV. 10-1-11 MAA GW GM
REV. 8-16-99 RWW GW LES REV. 5-1-06 TLA GW GM