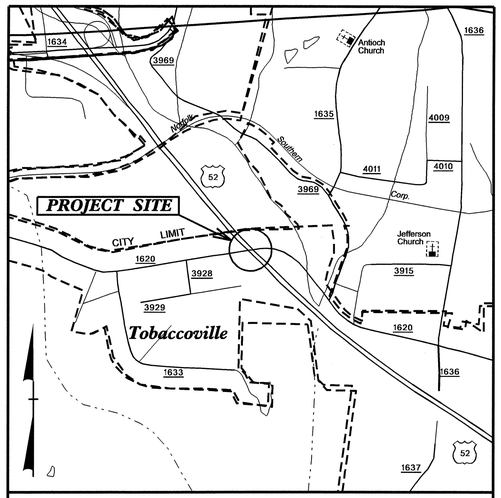
TIP PROJECT: B-4506

CONTRACT: C202812

STRUCTURES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4506		
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
38395.1.1	BRNHS-52(24)	P.E.	
38395.2.1	BRNHS-52(24)	R/W & UTIL	
38395.3.1	BRNHS-52(24)	CONST.	

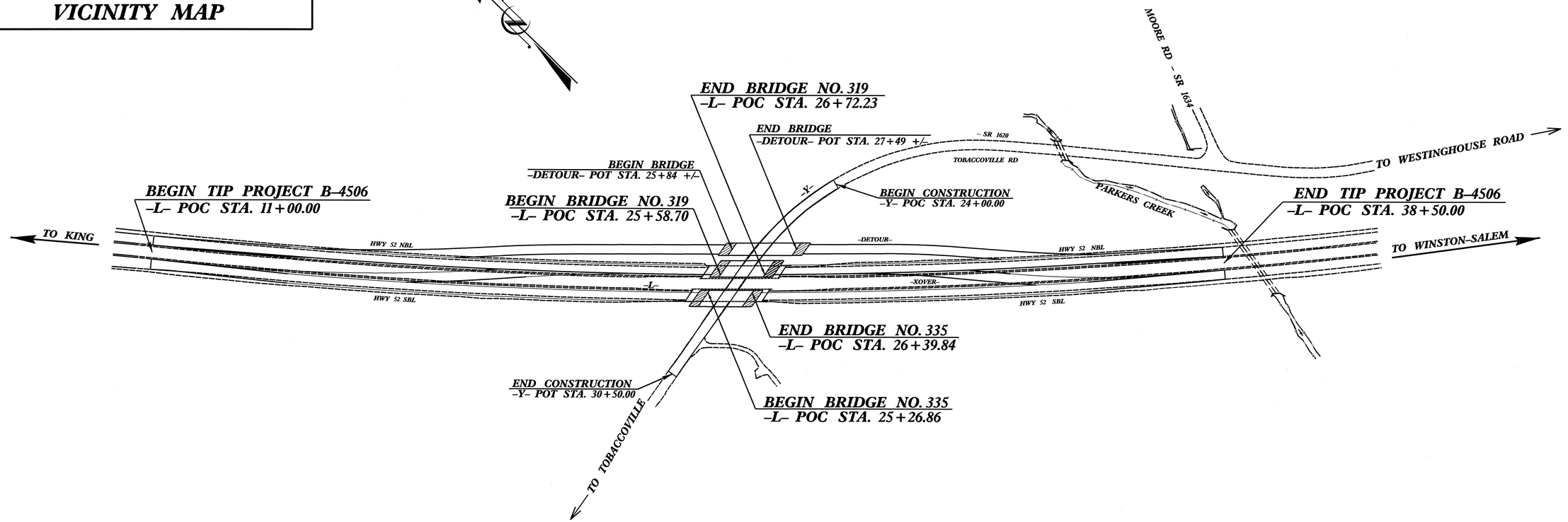


VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
FORSYTH COUNTY

LOCATION: BRIDGE NO. 319 AND NO. 335 ON US 52 OVER SR 1620 (TOBACCOVILLE RD.)

TYPE OF WORK: GRADING, PAVING, DRAINAGE, RETAINING WALLS, AND STRUCTURES



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DESIGN DATA

ADT 2012 = 65,400
ADT 2032 = 109,400
DHV = 10 %
D = 60 %
T = 16 % *
V = 70 MPH
V (DETOUR) = 55 MPH
* TTST 10% DUAL 6%
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4506 = 0.500 MI
LENGTH STRUCTURE TIP PROJECT B-4506 = 0.021 MI
TOTAL LENGTH TIP PROJECT B-4506 = 0.521 MI

Prepared In the Office of:

DIVISION OF HIGHWAYS

2012 STANDARD SPECIFICATIONS

LETTING DATE :

APRIL 17, 2012

J. M. BAILEY, P.E.
PROJECT ENGINEER

T. H. FANG, P.E.
PROJECT DESIGN ENGINEER

STRUCTURE MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

F.A. PROJECT BRNHS-52(24)

GRADE DATA

PI STA. 20+50.00 -L-
EL. = 964.33'
VC. = 914'

-0.4000% -4.1000%

25+50 26+00 26+50 27+00

950 940 930 920

FILL FACE @ END BENT 1
STA. 25+58.70 -L-
GRADE PT. EL. 943.473

BERM VARIES
SEE PLAN VIEW
(TYP.)

EXISTING
STRUCTURE
(TYP.)

FILL

EXP.

4" CONCRETE SLOPE
PROTECTION
(TYP.)

EL. 939.0±
EL. 934.0±
EL. 930.0±
EL. 927.0±
EL. 925.0±
EL. 922.0±
EL. 919.0±
EL. 920.0±
EL. 918.0±

17'-0"
MIN. VERTICAL
CLEARANCE

1 : 1 SLOPE
NORMAL TO CAP
(TYP.)

EL. 920.0±

FIX.

1'-6"
(TYP.)

EL. 921.0±

FILL FACE @ END BENT 2
STA. 26+72.23 -L-
GRADE PT. EL. 938.819

FILL

EL. 924.0±

EL. 928.0±

EL. 934.0±

EL. 936.0±

REINFORCED
SOIL SLOPE
(TYP.)

EXISTING
PAVEMENT

HP 12 X 73
STEEL PILES
(TYP.)

SPAN A

END BENT 1

END BENT 2

SECTION ALONG LEFT LANE CONTROL LINE

SECTIONS @ END BENTS ARE AT RIGHT ANGLES

HORIZONTAL CURVE DATA -L-

PI STA. 26+19.31 -L-
Δ = 12°-52'-07.1" (LT)
D = 0°-23'-56.5"
L = 3225.00'
T = 1619.31'
R = 14,358.86'

HORIZONTAL CURVE DATA -Y-

PI STA. 26+74.42 -Y-
Δ = 5°-08'-55.0" (LT)
D = 11°-27'-33.0"
L = 44.93'
T = 22.48'
R = 500.00'

4" CONCRETE
SLOPE PROTECTION
WITH GEOGRID
REINFORCEMENT
(TYP.)

1¾:1 SLOPE

3'-10" BERM
EL. 930.702

TO SR 3969

-Y-

PT STA. 26+96.87 -Y-

2'-6"
C & G

2'-0"
PAVEMENT

12'-0"

12'-0"

24'-0"
EXISTING PAVEMENT

2'-6"
C & G

1:1
SLOPE

3'-10" BERM
EL. 926.266

1¾:1 SLOPE

EXISTING
STRUCTURE

FILL FACE @
END BENT 1

26'-0" TO
TOE OF SLOPE
PROTECTION

FILL FACE @
END BENT 2

BEGIN APPROACH SLAB
STA. 25+34.88 -L-

W.P. #1
STA. 25+58.70 -L-

1:1
SLOPE

STA. 26+14.24 -L- POC
STA. 27+38.60 -Y- POT

W.P. #2
STA. 26+72.23 -L-

LEFT LANE
CONTROL LINE

TO KING

TO SR 1632

POINT OF
MIN. V.C.
STA. 27+44.16 -Y-
EL. 919.403

124°-45'-32"
(TAN. TO CURVE)

124°-58'-49"
(TAN. TO CURVE)

125°-12'-42"
(TAN. TO CURVE)

END APPROACH SLAB
STA. 26+95.89 -L-

23'-0"

STA. 25+98.15 -L- POC
STA. 27+66.66 -Y- POT

8'-8"
BERM
EL. 926.266

6'-2" BERM
EL. 930.702

-L-

GEOGRID REINFORCED
SLOPE PROTECTION
MATCH LINE

GEOGRID REINFORCED
SLOPE PROTECTION
MATCH LINE

27'-3"

OUTSIDE EDGE
OF EXISTING RIGHT
LANE STRUCTURE

124°-54'-58"
(TAN. TO CURVE)

TO SR 3929

55'-5 5/16" (ALONG CONTROL LINE)

57'-10¾" (ALONG CONTROL LINE)

113'-4 1/16" (W.P. #1 TO W.P. #2) (ALONG CONTROL LINE)

PLAN

PILES & LONG CHORD OF LEFT LANE CONTROL LINE NOT SHOWN IN PLAN VIEW FOR CLARITY.

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING-SHING FANG
2/27/12

DRAWN BY : E.C. LOCKLEAR DATE : 9-29-10
CHECKED BY : T.H. FANG DATE : 9-30-10

24-FEB-2012 15:28
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tfang

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L- POC
= 27+66.66 -Y- POT
SHEET 1 OF 3 REPLACES BRIDGE NO. 319

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 52 OVER
SR 1620 (TOBACCOVILLE RD.)

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-1
1			3			TOTAL SHEETS
2			4			52

STR. #1

NOTES

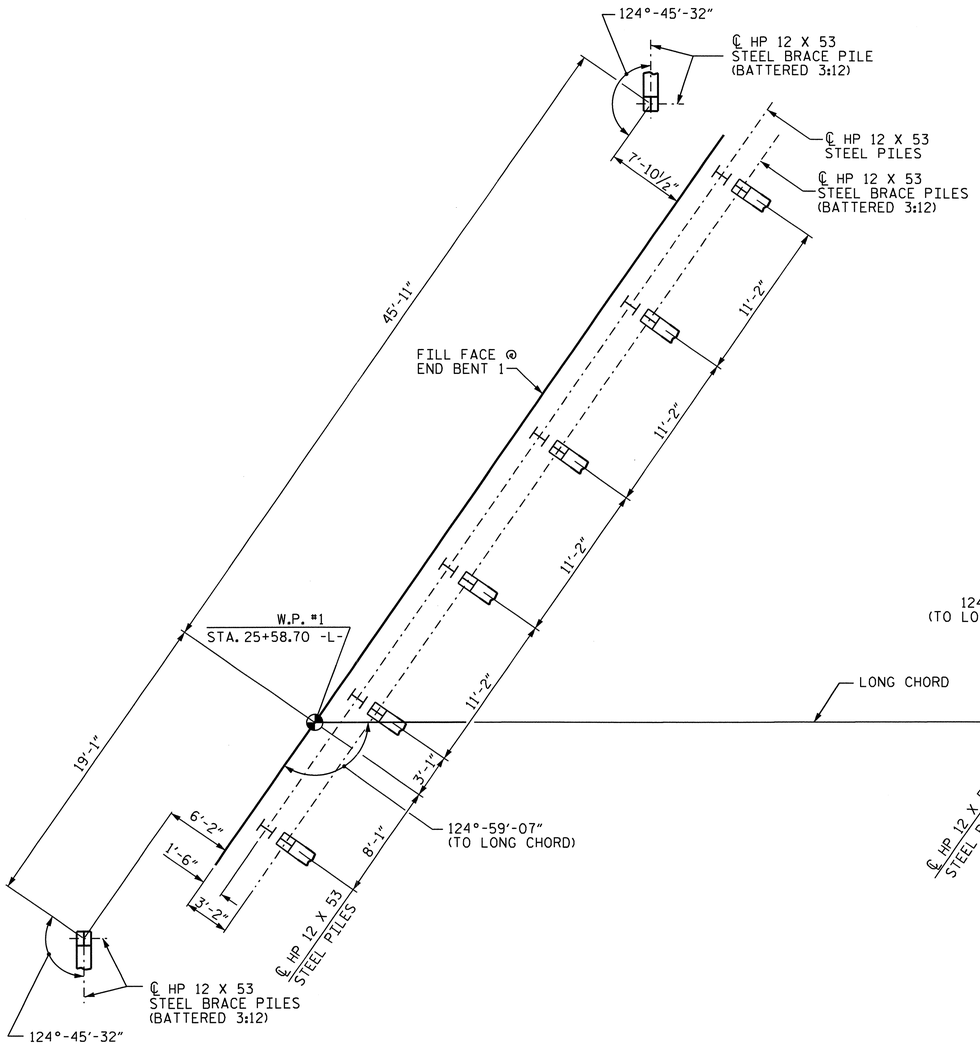
FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENTS 1 & 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 110 TONS PER PILE.

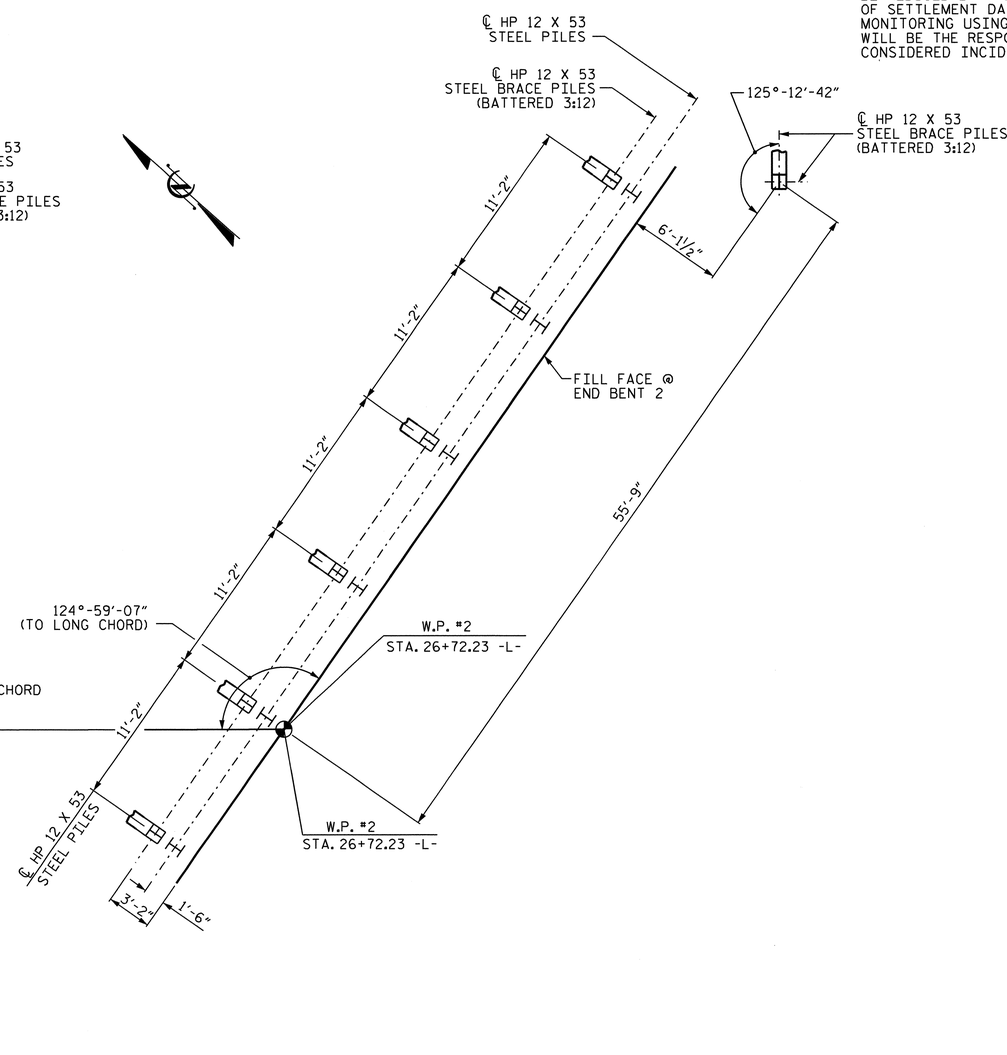
DRIVE PILES AT END BENTS 1 & 2 TO A REQUIRED DRIVING RESISTANCE OF 183 TONS PER PILE.

A 1 : 1 (H:V) REINFORCED SOIL SLOPE WITH SLOPE PROTECTION IS REQUIRED AT EACH END BENT, SEE PLANS AND SPECIAL PROVISIONS.

OBSERVE A 3 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENTS 1 AND 2. THE WAITING PERIODS MAY BE REDUCED BY THE ENGINEER AFTER THE REVIEW AND ACCEPTANCE OF SETTLEMENT DATA THAT HAS BEEN OBTAINED BY EMBANKMENT MONITORING USING SURVEY HUBS. INSTALLATION AND MONITORING WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AND WILL BE CONSIDERED INCIDENTAL TO THE PROJECT.



END BENT 1



END BENT 2

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN TO PILE CENTERLINE AND MEASURED AT CAP BOTTOM.

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG

3/23/12

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 52 OVER SR 1620 (TOBACCOVILLE RD.)

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : OT NGUYEN DATE : 7-20-11
CHECKED BY : T. H. FANG DATE : 12-5-11

23-MAR-2012 12:51
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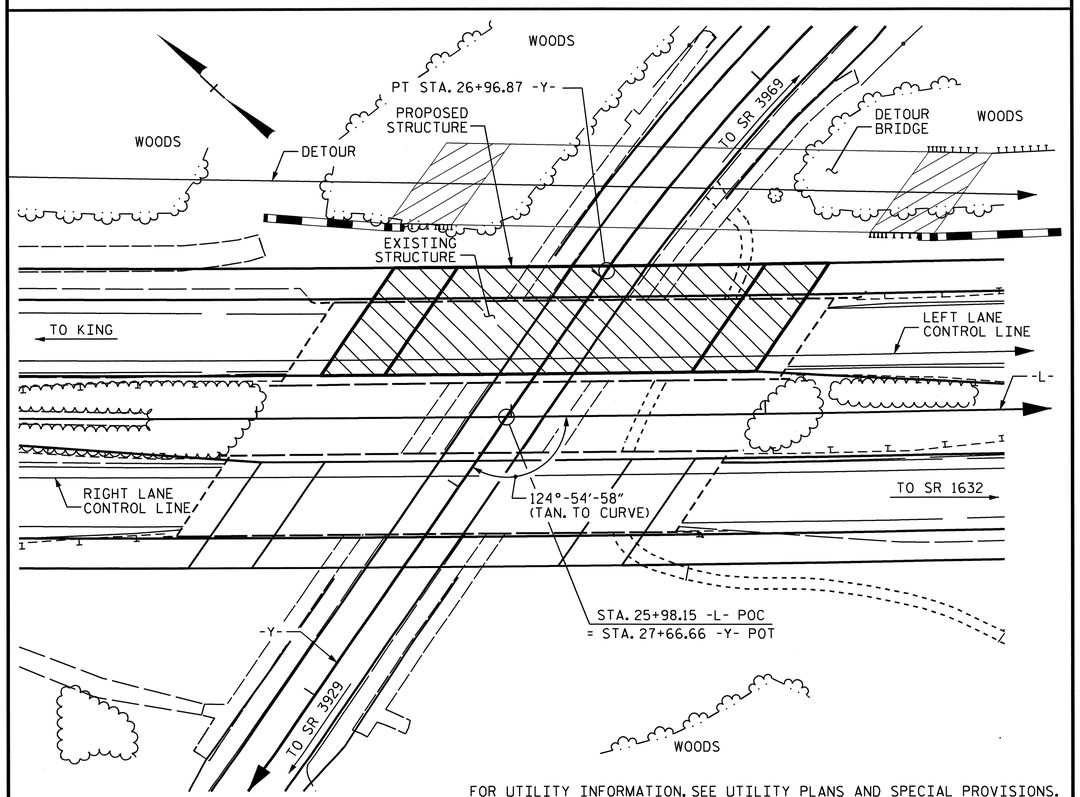
tfang

TOTAL BILL OF MATERIAL

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMP. STRUCTURE	REMOVAL OF EXISTING STRUCTURE	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	STRUCTURAL STEEL	HP 12 X 53 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	REINFORCED SOIL SLOPE
	LUMP SUM	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	APPROX. LBS.	NO.	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM	LUMP SUM	SQ. YDS.
SUPERSTRUCTURE			5,014	6,100				150,000			265.95		LUMP SUM	LUMP SUM	
END BENT 1					113.9		10,171		14	420		330			270
END BENT 2					110.3		10,352		13	390		295			230
TOTAL	LUMP SUM	LUMP SUM	5,014	6,100	224.2	LUMP SUM	20,523	150,000	27	810	265.95	625	LUMP SUM	LUMP SUM	500

BM #3: NORTHERN MOST BOLT ON FIRE HYDRANT, SOUTH OF EOP OF KING/TOBACCOVILLE RD., 472.0' RIGHT OF STA. 23+14.00 -L-, EL. 945.30



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS. FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

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 25+98.15 -L-."

THE EXISTING STRUCTURE CONSISTS OF RC FLOOR ON I-BEAMS @ 8'-0" CENTER IN 3 SPANS @ 65'-6" WITH A CLEAR ROADWAY WIDTH OF 28'-0". THE SUBSTRUCTURE: END BENTS: RC CAP ON PPC PILES, INTERIOR BENTS: RC POST AND BEAM LOCATED AT THE SITE OF 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.

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

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

THE BRIDGE RAILS ON THE TEMPORARY STRUCTURE SHALL BE DESIGNED FOR THE AASHTO LRFD TEST LEVEL 3 (TL-3) CRASH TEST CRITERIA. FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY STRUCTURE, SEE SPECIAL PROVISIONS.

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

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W AND PAINTED IN ACCORDANCE WITH SYSTEM 4 OF ARTICLE 442-8 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

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

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

THE CONTRACTOR WILL BE REQUIRED TO CONSTRUCT, MAINTAIN AND AFTERWARDS REMOVE A TEMPORARY STRUCTURE AT STATION 25+98.15 L- FOR USE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE. FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY STRUCTURE, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER T. H. FANG
2/27/12

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 52 OVER SR 1620 (TOBACCOVILLE RD.)

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-3
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : QT NGUYEN DATE : 7-20-11
CHECKED BY : T. H. FANG DATE : 12-05-11

27-FEB-2012 12:54
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tfang

STR. #1

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR STEEL GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE II LIMIT STATE						COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT					SHEAR					LIVE-LOAD FACTORS (γ_{LL})	MOMENT					
								DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	⟨1⟩	1.34	--	1.75	0.775	1.48	A	ER	53.82	1.075	1.34	A	I	107.66	1.30	0.775	1.60	A	ER	53.82	1
		HL-93 (OPERATING)	N/A		1.74	--	1.35	0.775	1.92	A	ER	53.82	1.075	1.74	A	I	107.66	1.00	0.775	2.08	A	ER	53.82	1
		HS-20 (INVENTORY)	36.00	⟨2⟩	1.60	57.60	1.75	0.775	1.81	A	ER	53.82	1.075	1.60	A	I	0.00	1.30	0.775	1.95	A	ER	21.53	1
		HS-20 (OPERATING)	36.00		2.08	74.88	1.35	0.775	2.35	A	ER	53.82	1.075	2.08	A	I	0.00	1.00	0.775	2.54	A	ER	21.53	1
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.68	63.18	1.40	0.775	5.43	A	ER	53.82	1.075	4.99	A	I	0.00	1.30	0.775	4.68	A	ER	53.82	1
		SNGARBS2	20.000		3.35	67.00	1.40	0.775	3.91	A	ER	53.82	1.075	3.47	A	I	0.00	1.30	0.775	3.35	A	ER	21.53	1
		SNAGRIS2	22.000		3.09	67.98	1.40	0.775	3.64	A	ER	53.82	1.075	3.20	A	I	0.00	1.30	0.775	3.09	A	ER	21.53	1
		SNCOTTS3	27.250		2.33	63.49	1.40	0.775	2.70	A	ER	53.82	1.075	2.48	A	I	0.00	1.30	0.775	2.33	A	ER	53.82	1
		SNAGGRS4	34.925		1.90	66.36	1.40	0.775	2.20	A	ER	53.82	1.075	2.01	A	I	0.00	1.30	0.775	1.90	A	ER	53.82	1
		SNS5A	35.550		1.86	66.12	1.40	0.775	2.15	A	ER	53.82	1.075	2.01	A	I	0.00	1.30	0.775	1.86	A	ER	53.82	1
		SNS6A	39.950		1.69	67.52	1.40	0.775	1.95	A	ER	53.82	1.075	1.81	A	I	0.00	1.30	0.775	1.69	A	ER	53.82	1
		SNS7B	42.000		1.61	67.62	1.40	0.775	1.86	A	ER	53.82	1.075	1.76	A	I	0.00	1.30	0.775	1.61	A	ER	53.82	1
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.05	67.65	1.40	0.775	2.38	A	ER	53.82	1.075	2.17	A	I	0.00	1.30	0.775	2.05	A	ER	53.82	1
		TNT4A	33.075		2.06	68.13	1.40	0.775	2.38	A	ER	53.82	1.075	2.15	A	I	0.00	1.30	0.775	2.06	A	ER	53.82	1
		TNT6A	41.600		1.66	69.06	1.40	0.775	1.93	A	ER	53.82	1.075	1.83	A	I	0.00	1.30	0.775	1.66	A	ER	53.82	1
		TNT7A	42.000		1.66	69.72	1.40	0.775	1.93	A	ER	53.82	1.075	1.80	A	I	0.00	1.30	0.775	1.66	A	ER	53.82	1
		TNT7B	42.000		1.69	70.98	1.40	0.775	1.97	A	ER	53.82	1.075	1.74	A	I	0.00	1.30	0.775	1.69	A	ER	21.53	1
		TNAGRIT4	43.000		1.63	70.09	1.40	0.775	1.89	A	ER	53.82	1.075	1.68	A	I	0.00	1.30	0.775	1.63	A	ER	53.82	1
		TNAGT5A	45.000		1.55	69.75	1.40	0.775	1.79	A	ER	53.82	1.075	1.65	A	I	0.00	1.30	0.775	1.55	A	ER	53.82	1
		TNAGT5B	45.000	⟨3⟩	1.53	68.85	1.40	0.775	1.77	A	ER	53.82	1.075	1.61	A	I	0.00	1.30	0.775	1.53	A	ER	53.82	1
FATIGUE		HL-93 (INVENTORY)	γ_{LL}=0.75																				

LOAD FACTORS:

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

NOTES:

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

ALLOWABLE STRESS FOR SERVICE II LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1. ALL GIRDERS HAVE SLIGHTLY DIFFERENT LENGTHS. GIRDER 4 CONTROLS THE STRENGTH I SHEAR RATING.
2.
3.
4.

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93) **

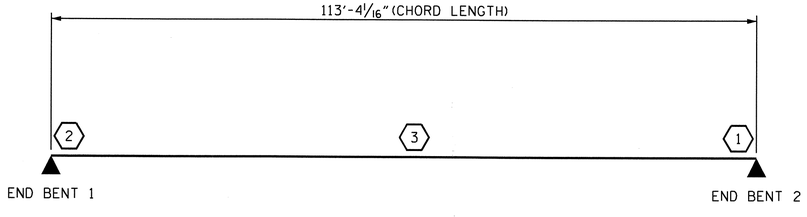
⟨2⟩ DESIGN LOAD RATING (HS-20) **

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

NORTH CAROLINA PROFESSIONAL SEAL 029445 ENGINEER KOREY NEWTON

1/10/2012

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR STEEL GIRDERS
(LEFT LANE)
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-4
1			3			TOTAL SHEETS
2			4			52

STD. NO. LRFR3

ASSEMBLED BY : P. K. NEWTON	DATE : 12/12/11
CHECKED BY : T. H. FANG	DATE : 1/5/2012
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	

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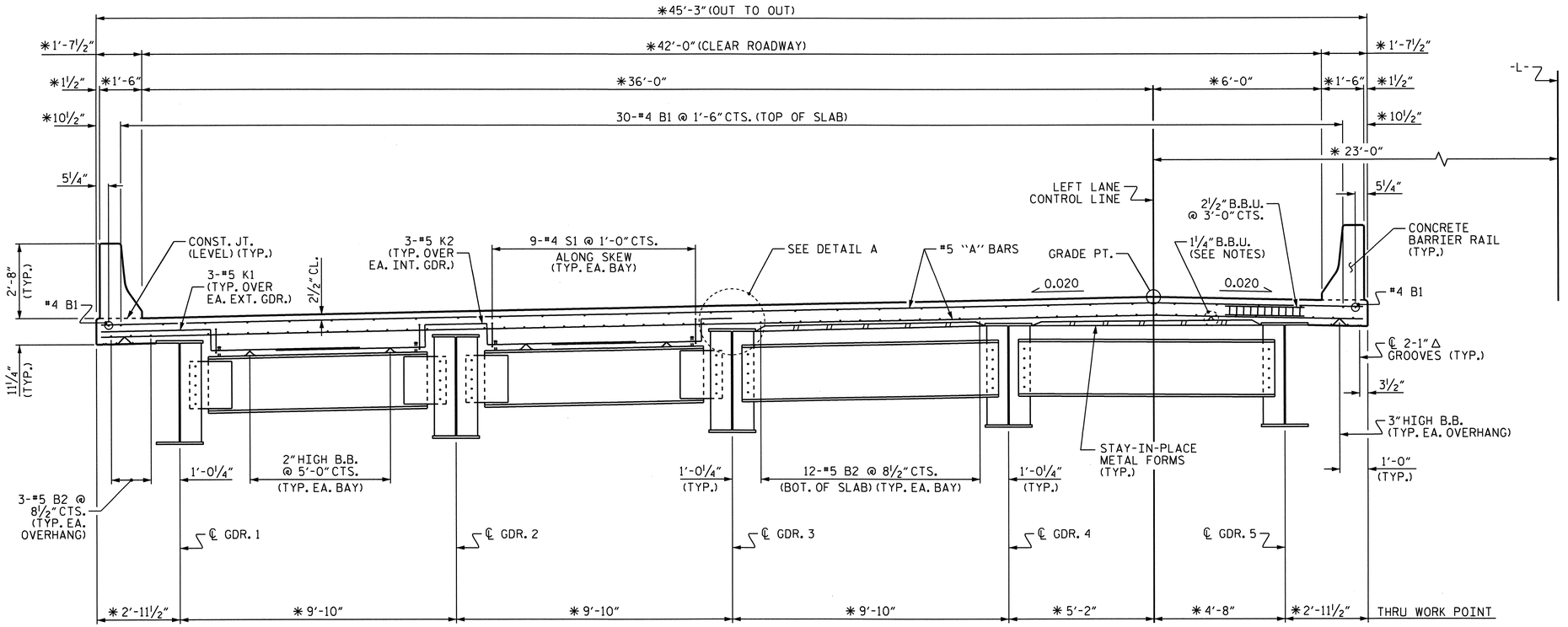


PARTIAL TYPICAL SECTION
SHOWING END BENT DIAPHRAGMS

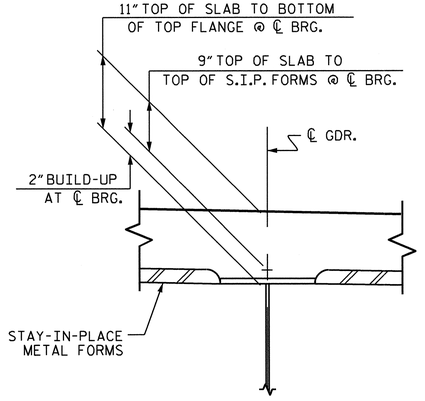
PARTIAL TYPICAL SECTION
SHOWING INTERMEDIATE DIAPHRAGMS

NOTES

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

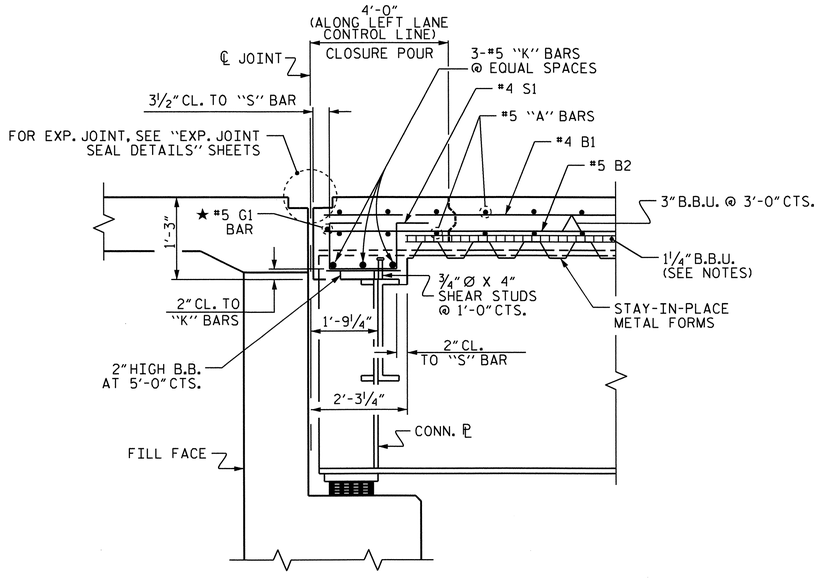
THE CONTRACTOR MAY, WHEN NECESSARY, PROPOSE A SCHEME FOR AVOIDING INTERFERENCE BETWEEN METAL STAY-IN-PLACE FORM SUPPORTS OR FORMS AND BEAM/GIRDER STIFFENERS OR CONNECTOR PLATES. THE PROPOSAL SHALL BE INDICATED, AS APPROPRIATE, ON EITHER THE STEEL WORKING DRAWINGS OR THE METAL STAY-IN-PLACE FORM WORKING DRAWINGS.

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



DETAIL "A"

*RADIAL DIMENSIONS



SECTION @ END BENT

★ #5 G1 BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY TO CLEAR DIAPHRAGM AND REINFORCING STEEL.

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION (LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			26

STR. #1

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIANG FANG
2/27/12

DRAWN BY : QT NGUYEN DATE : 7-11
CHECKED BY : T.H. FANG DATE : 1-6-2012

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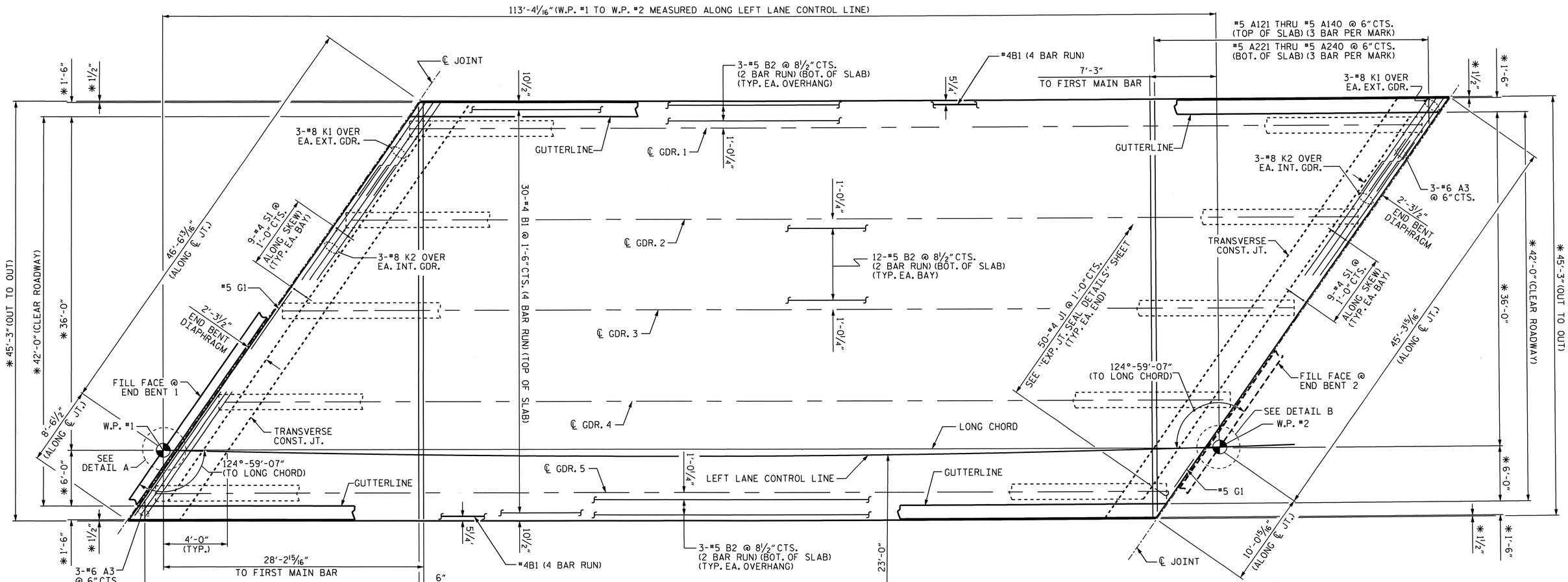
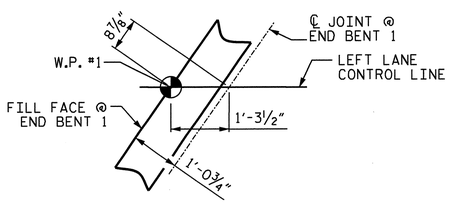
ttfang

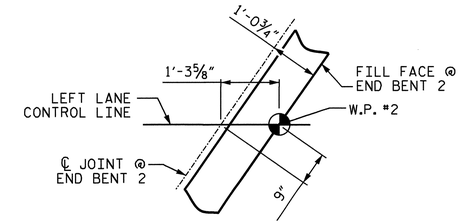


* RADIAL DIMENSIONS

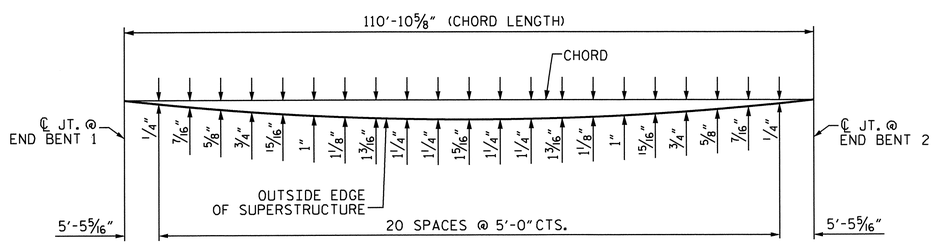
PLAN OF SPAN



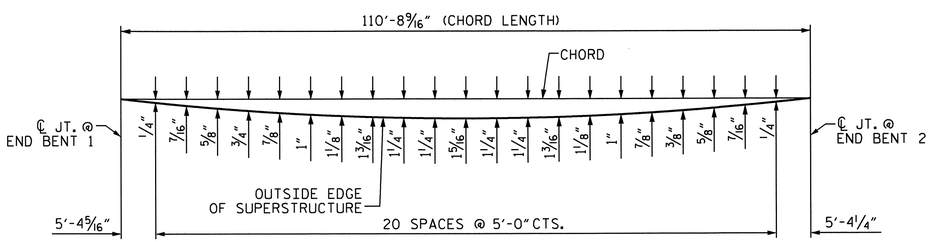
DETAIL A



DETAIL B



LEFT OUTSIDE EDGE



RIGHT OUTSIDE EDGE

ARC OFFSETS

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSILING FANG
2/27/12

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			52

STR. #1

DRAWN BY : QT NGUYEN DATE : 7-11
CHECKED BY : T.H. FANG DATE : 7-11

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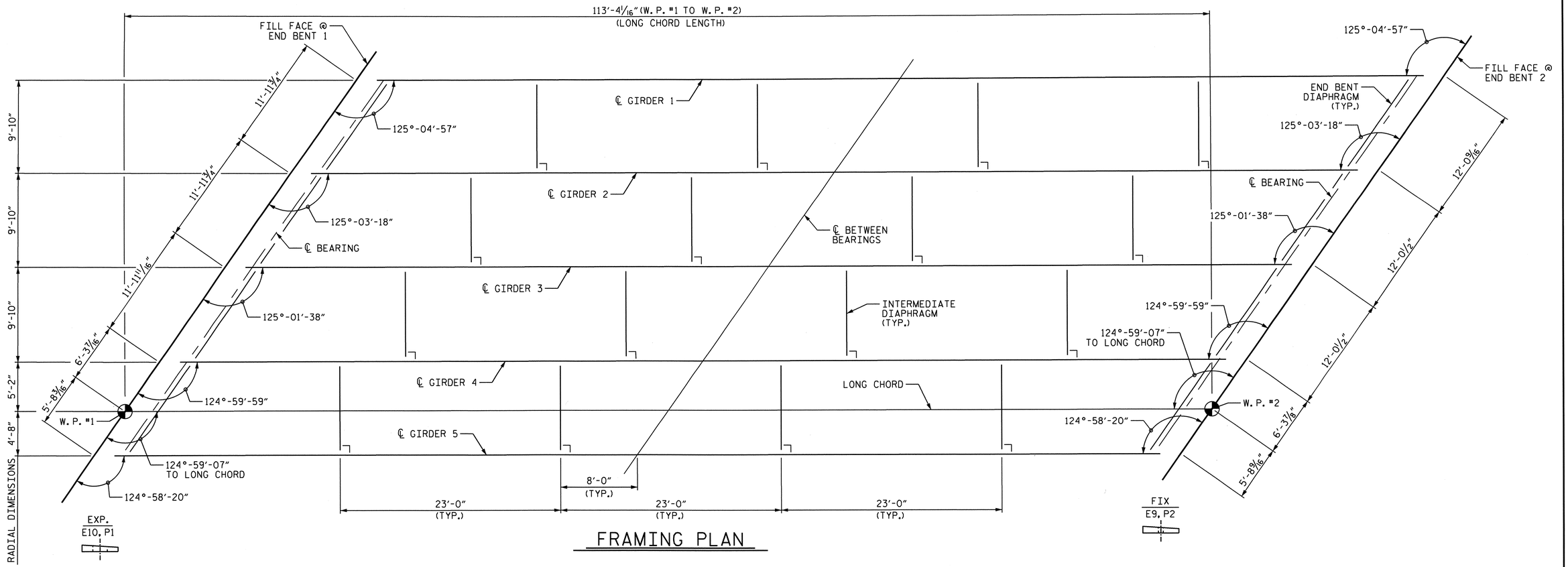

FRAMING PLAN

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPAN A																				
	GIRDERS 1 & 5																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.015	0.029	0.042	0.053	0.064	0.072	0.079	0.084	0.087	0.088	0.087	0.084	0.079	0.072	0.064	0.053	0.042	0.029	0.015	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.061	0.126	0.186	0.240	0.287	0.327	0.359	0.382	0.396	0.401	0.396	0.382	0.359	0.327	0.287	0.240	0.186	0.125	0.061	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.005	0.010	0.014	0.018	0.021	0.024	0.026	0.028	0.029	0.029	0.029	0.028	0.026	0.024	0.021	0.018	0.014	0.010	0.005	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.081	0.165	0.242	0.311	0.372	0.423	0.464	0.494	0.512	0.518	0.512	0.494	0.464	0.423	0.372	0.311	0.242	0.165	0.081	0.000
REQUIRED CAMBER	0	1"	2"	2 7/8"	3 3/4"	4 7/16"	5 1/16"	5 9/16"	5 15/16"	6 1/8"	6 3/16"	6 1/8"	5 15/16"	5 9/16"	5 1/16"	4 7/16"	3 3/4"	2 7/8"	2"	1"	0
	GIRDERS 2 & 4																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.015	0.029	0.042	0.053	0.064	0.072	0.079	0.084	0.087	0.088	0.087	0.084	0.079	0.072	0.064	0.053	0.042	0.029	0.015	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.058	0.120	0.178	0.230	0.275	0.313	0.344	0.366	0.379	0.384	0.379	0.366	0.343	0.313	0.274	0.229	0.178	0.120	0.058	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.005	0.009	0.013	0.017	0.020	0.022	0.025	0.026	0.027	0.027	0.027	0.026	0.025	0.022	0.020	0.017	0.013	0.009	0.005	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.078	0.158	0.233	0.300	0.359	0.407	0.448	0.476	0.493	0.499	0.493	0.476	0.448	0.407	0.359	0.300	0.233	0.158	0.078	0.000
REQUIRED CAMBER	0	0 15/16"	1 7/8"	2 13/16"	3 5/8"	4 5/16"	4 7/8"	5 3/8"	5 11/16"	5 15/16"	6"	5 15/16"	5 11/16"	5 3/8"	4 7/8"	4 5/16"	3 5/8"	2 13/16"	1 7/8"	0 15/16"	0
	GIRDER 3																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.015	0.029	0.042	0.053	0.064	0.072	0.079	0.084	0.087	0.088	0.087	0.084	0.079	0.072	0.064	0.053	0.042	0.029	0.015	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.055	0.114	0.170	0.219	0.262	0.299	0.328	0.349	0.362	0.367	0.362	0.349	0.328	0.299	0.262	0.219	0.169	0.114	0.055	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.005	0.009	0.013	0.017	0.020	0.022	0.025	0.026	0.027	0.027	0.027	0.026	0.025	0.022	0.020	0.017	0.013	0.009	0.005	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.075	0.152	0.225	0.289	0.346	0.393	0.432	0.459	0.476	0.482	0.476	0.459	0.432	0.393	0.346	0.289	0.225	0.152	0.075	0.000
REQUIRED CAMBER	0	0 7/8"	1 13/16"	2 11/16"	3 7/16"	4 1/8"	4 11/16"	5 3/16"	5 1/2"	5 11/16"	5 13/16"	5 11/16"	5 1/2"	5 3/16"	4 11/16"	4 1/8"	3 7/16"	2 11/16"	1 13/16"	0 7/8"	0

* INCLUDES SLAB, BUILDUPS & STAY-IN-PLACE FORMS.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "REQUIRED CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSILANG FANG
3/24/12

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

FRAMING PLAN & DEAD LOAD DEFLECTIONS
(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 8/19/11
CHECKED BY : T. H. FANG DATE : 12/01/11

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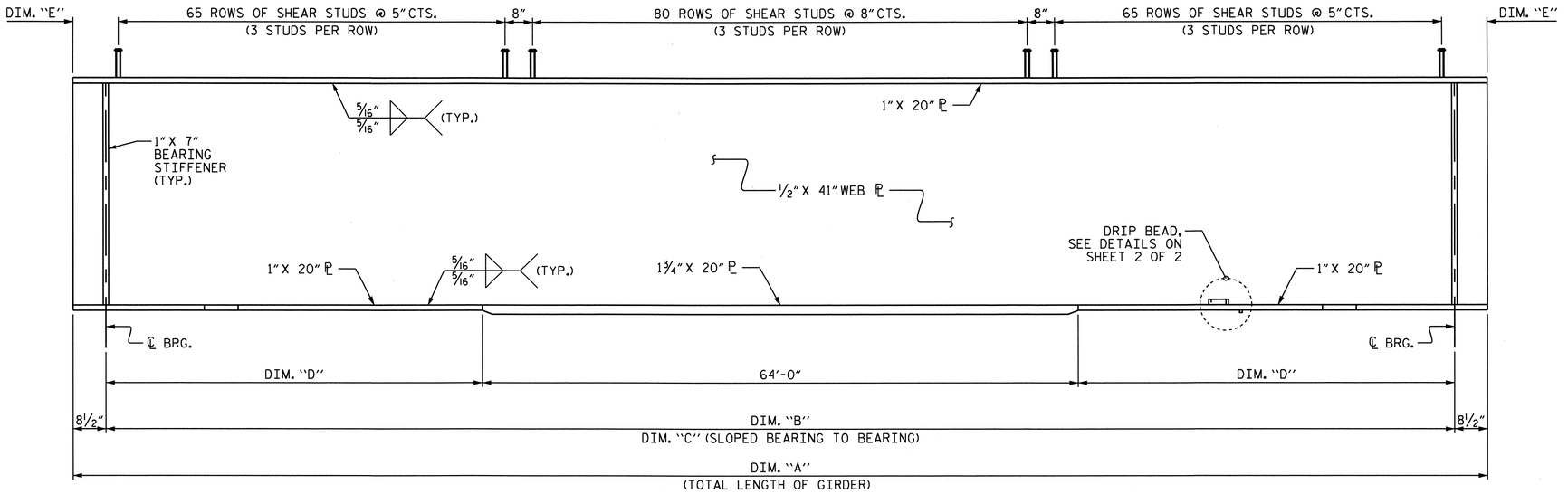
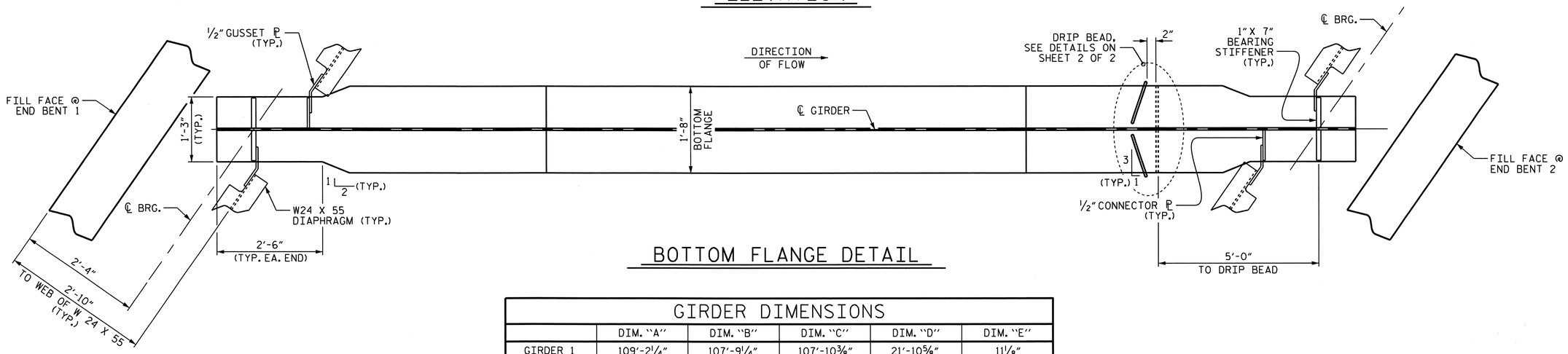


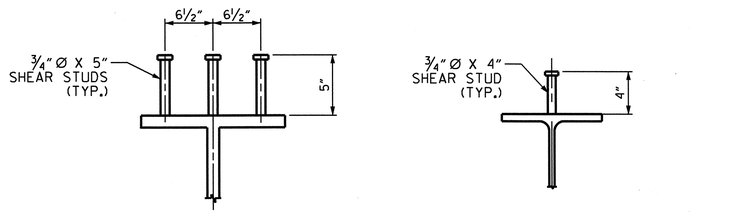
ELEVATION



BOTTOM FLANGE DETAIL

GIRDER DIMENSIONS

	DIM. "A"	DIM. "B"	DIM. "C"	DIM. "D"	DIM. "E"
GIRDER 1	109'-2 1/4"	107'-9 1/4"	107'-10 3/8"	21'-10 5/8"	11 1/8"
GIRDER 2	109'-1 7/8"	107'-8 7/8"	107'-9 15/16"	21'-10 7/16"	10 15/16"
GIRDER 3	109'-1 3/8"	107'-8 3/8"	107'-9 7/16"	21'-7 3/16"	10 11/16"
GIRDER 4	109'-1"	107'-8"	107'-9 1/16"	21'-10"	10 1/2"
GIRDER 5	109'-0 5/8"	107'-7 5/8"	107'-8 11/16"	21'-9 13/16"	10 5/16"



ALONG EACH GIRDER

ALONG END BENT DIAPHRAGM

SHEAR STUD DETAILS

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

STRUCTURAL STEEL DETAILS

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			52

NORTH CAROLINA PROFESSIONAL SEAL 030993 ENGINEER KOREY NEWTON

1/10/2012

DRAWN BY : P. K. NEWTON DATE : 9/7/11

CHECKED BY : T. H. FANG DATE : 12/7/11

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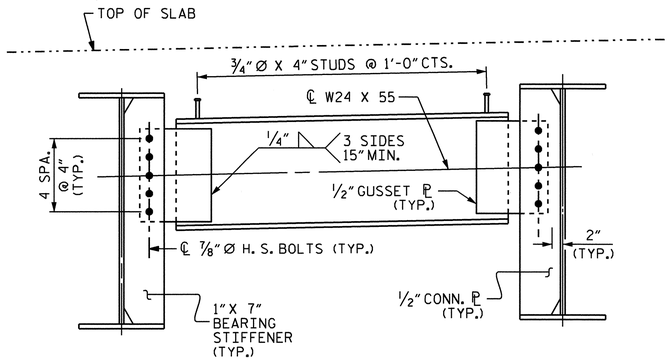
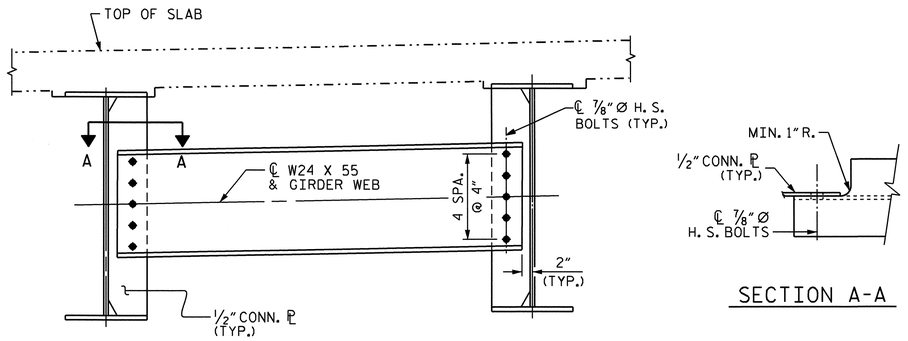
STR #1

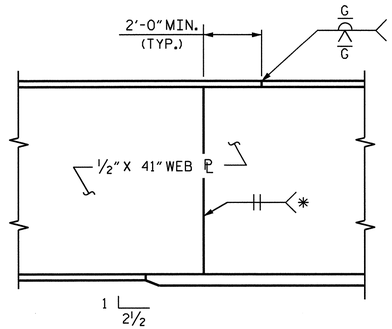


END BENT DIAPHRAGM



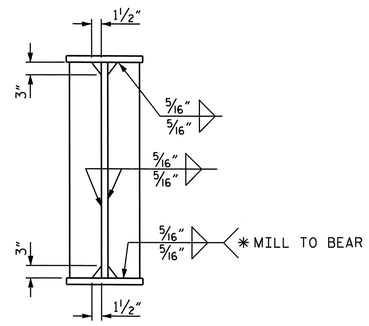
INTERMEDIATE DIAHPRAGM

SECTION A-A



TYPICAL FLANGE AND WEB BUTT JOINT

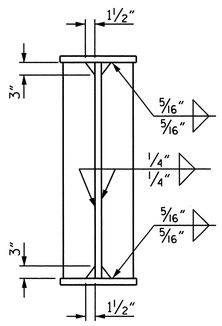
* GRIND SMOOTH AND FLUSH ON OUTER FACE OF EXTERIOR GIRDERS



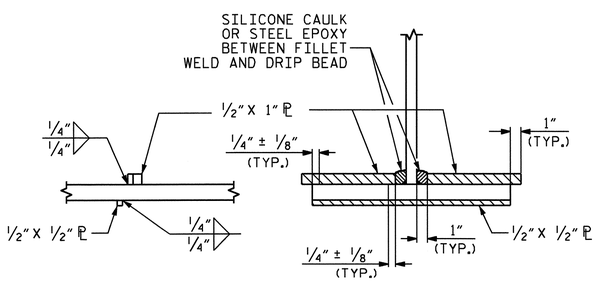
BEARING STIFFENER

NOTE: DO NOT CLIP PLATE AT TOP OUTSIDE CORNER OF STIFFENER PLATE.

* WELD TO BOTTOM FLANGE IS ONLY REQUIRED WHEN BEARING STIFFENER IS ALSO CONNECTOR PLATE

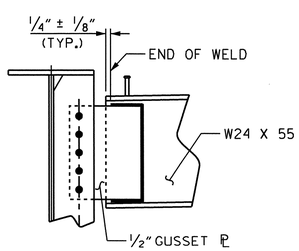


CONNECTOR PLATE

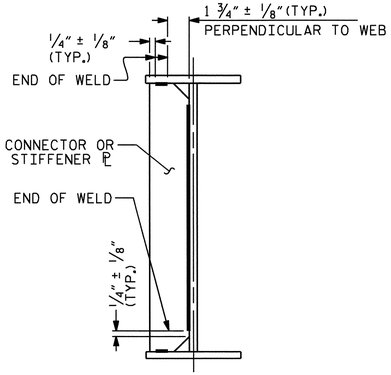


SIDE VIEW SECTION

DRIP BEAD DETAILS



TYPICAL GUSSET PL CONNECTIONS



TYPICAL STIFFENER OR CONNECTOR PL CONNECTIONS

WELD TERMINATION DETAILS

NOTES

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W AND PAINTED IN ACCORDANCE WITH SYSTEM 4 OF ARTICLE 442-7 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

PERMITTED FLANGE AND WEB SHOP SPLICES SHALL NOT BE LOCATED WITHIN 15 FEET OF MAXIMUM DEAD LOAD DEFLECTION. KEEP 2 FEET MINIMUM BETWEEN WEB AND FLANGE SHOP SPLICES. KEEP 6" MINIMUM BETWEEN CONNECTOR PLATE AND WEB OR FLANGE SHOP SPLICES.

ALL DIMENSIONS SHOWN ARE HORIZONTAL OR VERTICAL, UNLESS OTHERWISE NOTED. ALL FIELD CONNECTIONS TO BE 7/8" DIA. HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.

BEARING STIFFENERS ARE TO BE PLACED NORMAL TO THE WEB OF THE GIRDER AND SHALL BE PLUMB.

STUDS ON GIRDERS MAY BE SHIFTED UP TO 1" IF NECESSARY TO CLEAR FLANGE SPLICE WELD.

TENSION ON THE AASHTO M164 BOLTS SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH ARTICLE 440-8 OF THE STANDARD SPECIFICATIONS.

A CHARPY V-NOTCH TEST IS REQUIRED FOR WEB PLATES AND BOTTOM FLANGE PLATES FOR ALL GIRDERS AND IN ACCORDANCE WITH ARTICLE 1072-7 OF THE STANDARD SPECIFICATIONS.

BEARING STIFFENER MAY REQUIRE COPING IF WIDER THAN BOTTOM FLANGE TO AVOID INTERFERENCE WITH THE ANCHOR BOLT.

END OF GIRDERS SHALL BE PLUMB.

FABRICATORS SHALL DETAIL DIAPHRAGM MEMBERS AND CONNECTIONS FOR FULL DEAD LOAD FIT UP. GIRDERS SHALL BE PLUMB AFTER THE FULL AMOUNT OF DEAD LOAD IS APPLIED.

NORTH CAROLINA PROFESSIONAL SEAL 032445 ENGINEER KOREY NEWTON
2/27/2012

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

STRUCTURAL STEEL DETAILS

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 9/7/11
CHECKED BY : T. H. FANG DATE : 12/7/11

24-FEB-2012 15:27
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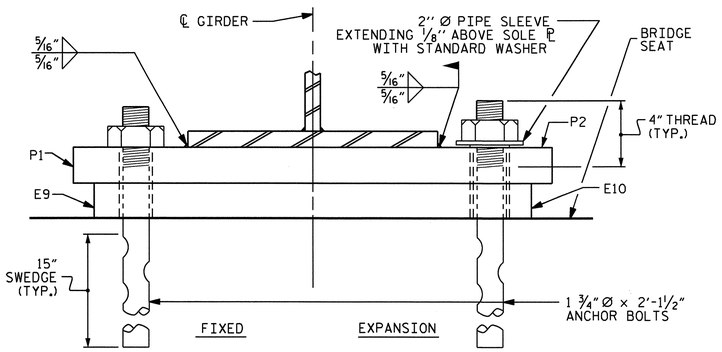
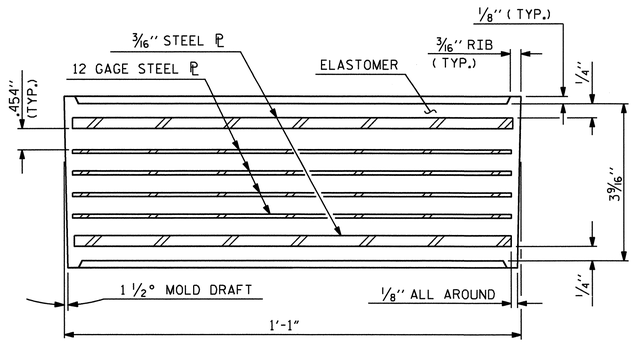
tfang

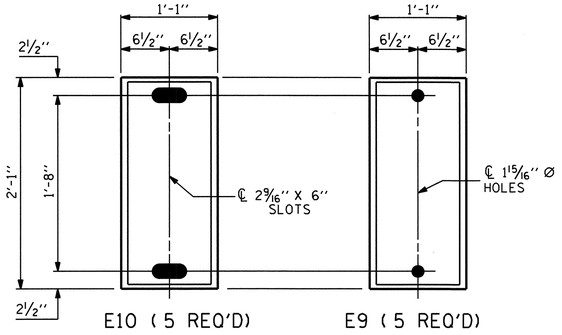
STR #1



END VIEW

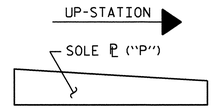


TYPICAL SECTION OF ELASTOMERIC BEARING

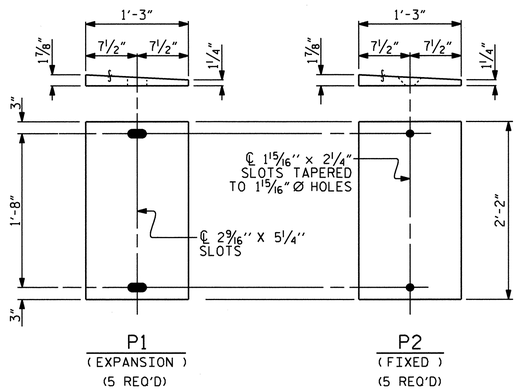


PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



SOLE ℙ PLACEMENT DETAIL



SOLE PLATE DETAILS

NOTES

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

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

THE PAYMENT FOR THE PIPE SLEEVES SHALL BE INCLUDED IN THE SEVERAL PAY ITEMS.

FOR AASHTO M270 GRADE 50W STRUCTURAL STEEL, SOLE PLATE SHALL BE AASHTO M270 GRADE 50W AND SHALL NOT BE GALVANIZED. ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

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

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

ASSEMBLED BY : O.T. NGUYEN	DATE : 7-18-11		
CHECKED BY : T. H. FANG	DATE : 12-07-11		
DRAWN BY : EEM 10/95	REV. 10/17/00	RWW/LES	
CHECKED BY : PEK 10/95	REV. 7/10/01	LES/RDR	
	REV. 5/1/06	TLA/GM	

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG

2/24/12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

ELASTOMERIC BEARING DETAILS

(STEEL SUPERSTRUCTURE)
(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			52

STR #1 STD. NO. EB2 (SHT 2a)

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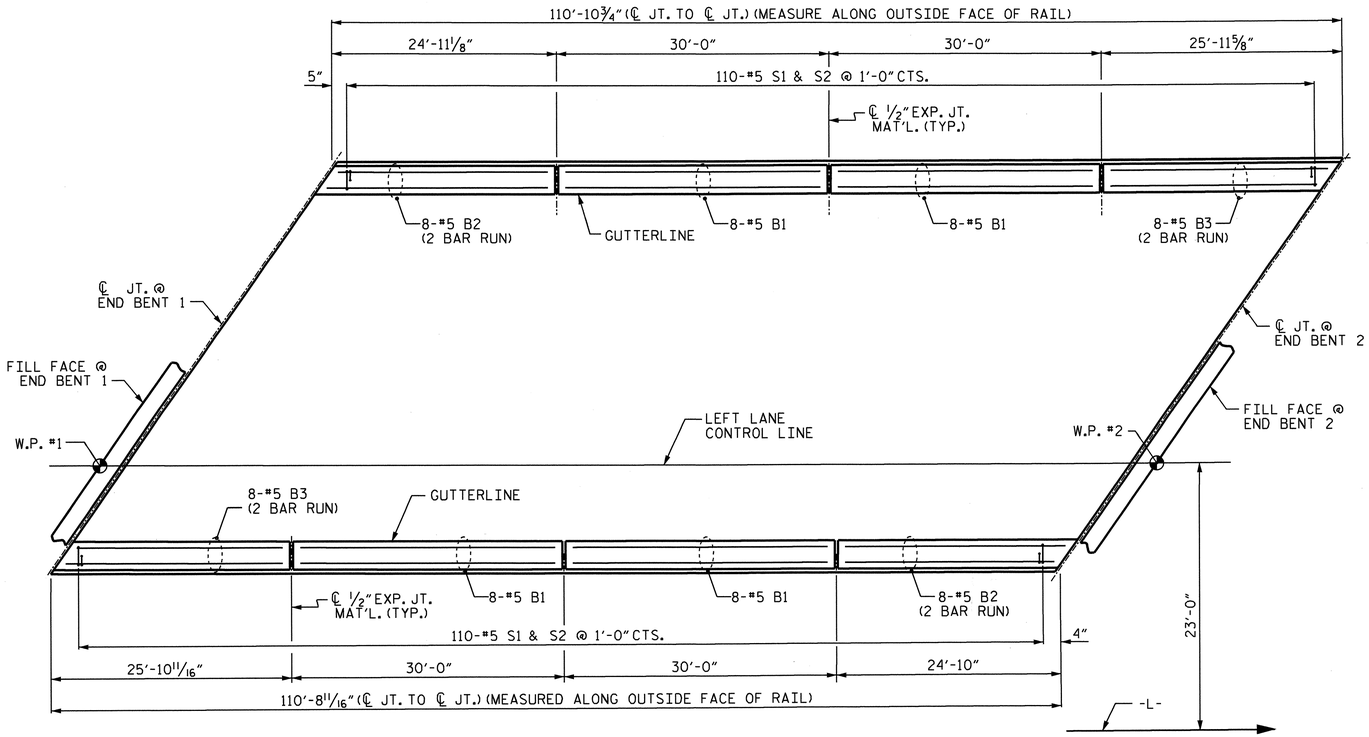
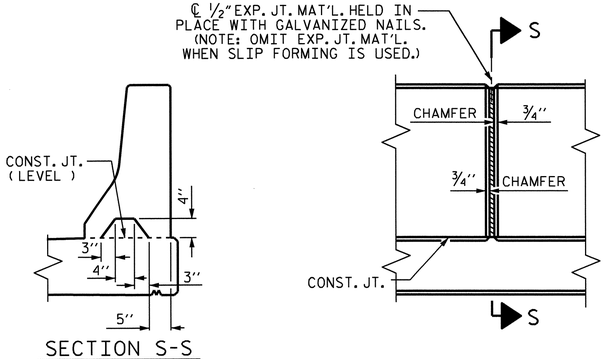
ttfang



PLAN OF BARRIER RAIL

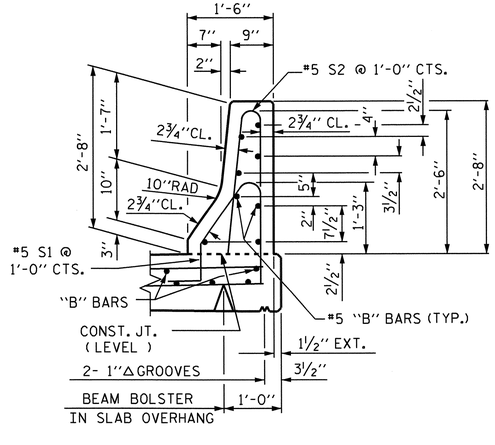


SECTION S-S

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

ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS



SECTION THRU RAIL

NOTES

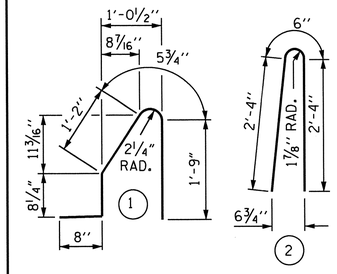
THE BARRIER RAIL IN SPAN A SHALL NOT BE CAST UNTIL THE SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

VERTICAL 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. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	32	#5	STR	29'-7"	987
* B2	32	#5	STR	14'-0"	467
* B3	32	#5	STR	14'-6"	484
* S1	220	#5	1	4'-9"	1090
* S2	220	#5	2	5'-2"	1186

* EPOXY COATED REINFORCING STEEL	4,214 LBS.
CLASS AA CONCRETE	22.2 CU. YDS.
CONCRETE BARRIER RAIL	
DECK	221.62 LIN. FT.
APPROACH SLABS	44.33 LIN. FT.
TOTAL	265.95 LIN. FT.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG

1/9/12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			52

ASSEMBLED BY :	QT NGUYEN	DATE :	7-18-11
CHECKED BY :	T. H. FANG	DATE :	12-05-11
DRAWN BY : ARB 5/87	REV. 10/17/00		RWW/LES
CHECKED BY : SJD 9/87	REV. 5/7/03R		RWW/JTE
	REV. 5/1/06R		TLA/GM

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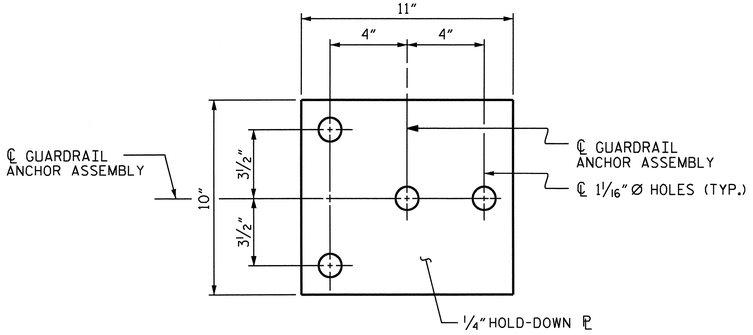
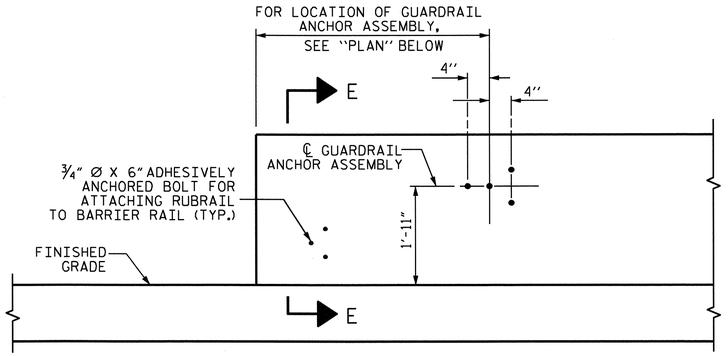
kpnewton

STR #1

STD. NO. CBR1

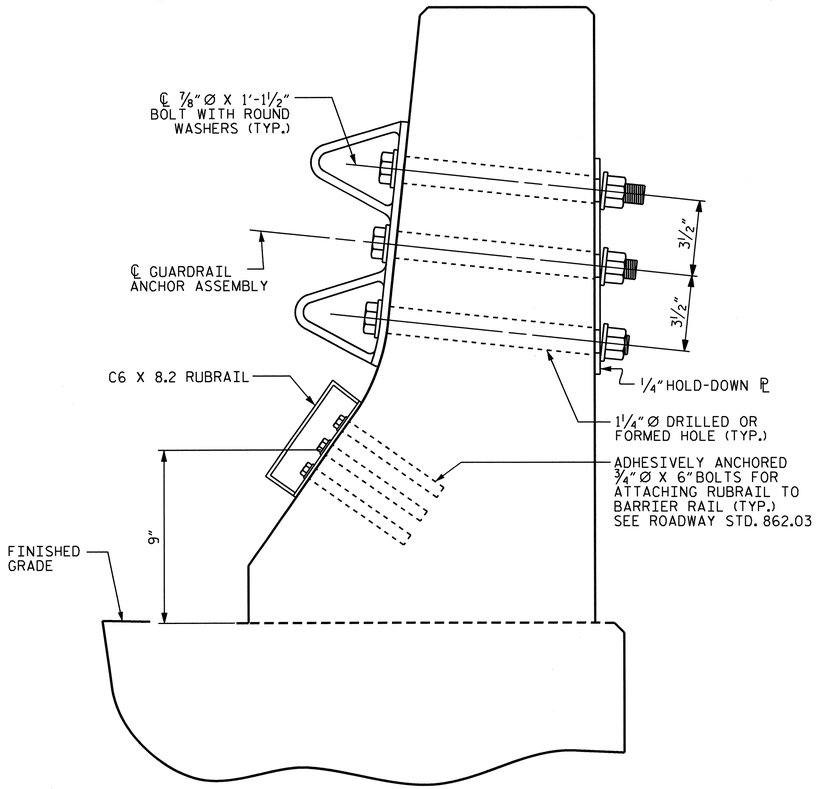


PLAN



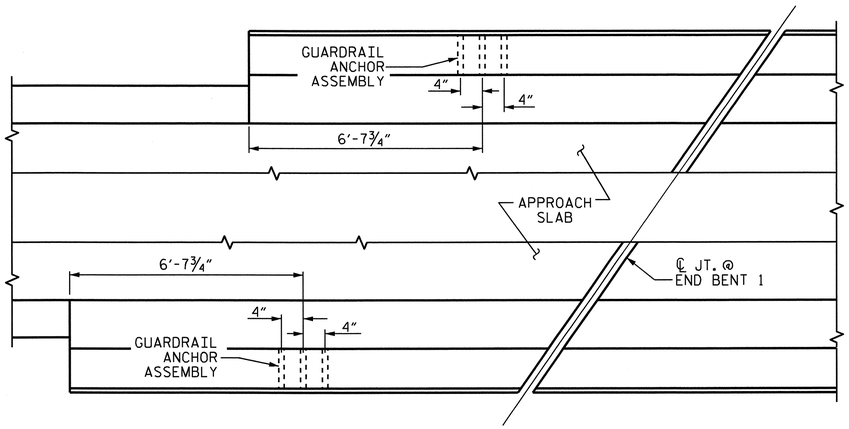
ELEVATION

FOR LOCATION OF RUBRAIL, SEE ROADWAY STD. 862.03



SECTION E-E

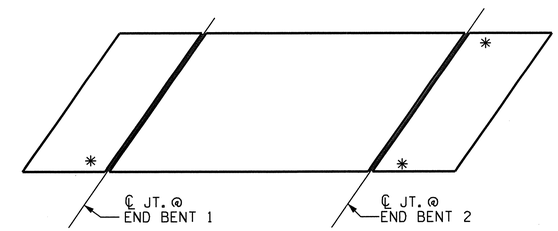
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR



SKETCH SHOWING POINTS OF ATTACHMENTS

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

NOTES

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

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

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

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

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

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

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

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

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSUNG FANG

1/9/12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			26

STR #1 STD. NO. GRA2

ASSEMBLED BY : O. T. NGUYEN	DATE : 7-18-11
CHECKED BY : T. H. FANG	DATE : 12-02-11
DRAWN BY : TLA 5/06	ADDED 5/1/06R KMM/GM
CHECKED BY : GM 5/06	

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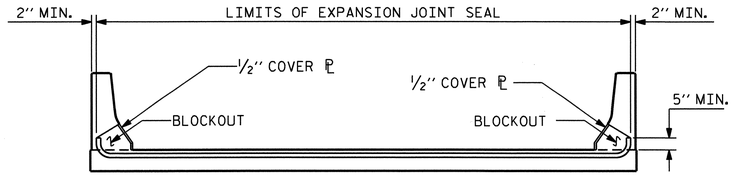
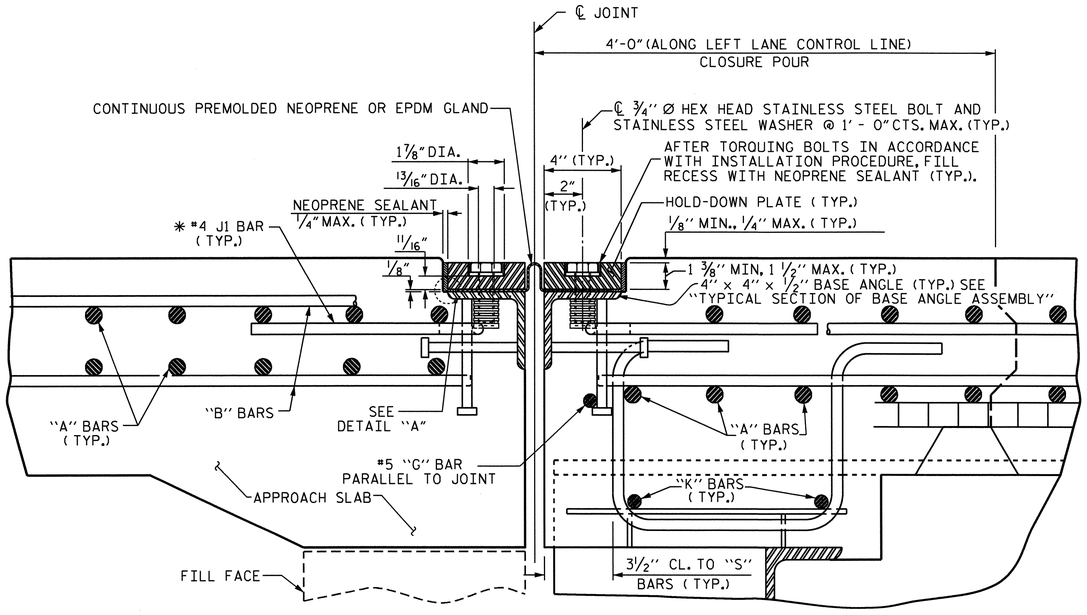
MOVEMENT AND SETTING AT EXPANSION JOINT

END BENT	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	124°-45'-32"	1⅛"	1⅝"	1½"	1¼"
2	125°-12'-42"	0"	1½"	1½"	1½"

TOTAL MOVEMENT IS CALCULATED ALONG THE CENTERLINE OF ROADWAY.
JOINT OPENINGS ARE MEASURED PERPENDICULAR TO THE JOINT.



SKETCH SHOWING LIMITS OF EXPANSION JOINT SEAL



EXPANSION JOINT DETAILS

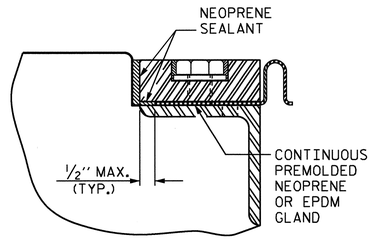
THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS.
* J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

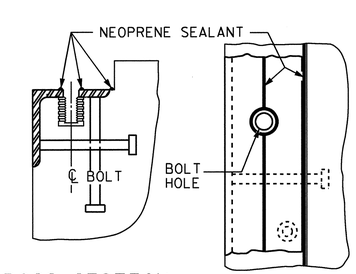
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO THE BASE ANGLE ASSEMBLY WITH THE ¾" Ø HEX HEAD BOLTS PROVIDED FOR THE HOLD-DOWN PLATES. A 1" Ø HOLE SHALL BE PROVIDED IN THE TEMPLATE CENTERED OVER EACH WEEP HOLE IN THE 4"X 4"X ½" BASE ANGLE. OTHER METHODS OF INSURING DRAINAGE THROUGH WEEP HOLES MAY BE EMPLOYED SUBJECT TO ENGINEER'S APPROVAL.
2. AFTER THE CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE THE TEMPLATE. THOROUGHLY CLEAN THE BOLT HOLES AND THE ANGLE PLATE. REMOVE ANY EXCESS CONCRETE THAT COMES OUT OF THE WEEP HOLES. ANY DAMAGED STEEL SHALL BE COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅞" IN DIAMETER WITH A HAND PUNCH.
4. IN ORDER TO CHECK FOR PROPER ALIGNMENT, PLACE THE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. DO NOT APPLY NEOPRENE SEALANT. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE BUT DO NOT TIGHTEN. THE ENGINEER SHALL INSPECT THE JOINT SEAL DEVICE FOR PROPER ALIGNMENT.
5. AFTER INSPECTION, REMOVE THE HOLD-DOWN PLATES AND GLAND. APPLY NEOPRENE SEALANT TO THE BASE ANGLE IN ACCORDANCE WITH THE "INSTALLATION SKETCH". PLACE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE ASSEMBLY AND TORQUE THE BOLTS TO 88 FT-LBS WITH A TORQUE WRENCH. THE TORQUE WRENCH SHALL BE CALIBRATED IN ACCORDANCE WITH SECTION 440-10 (D) OF THE STANDARD SPECIFICATIONS. CHECK THE TORQUE AFTER THREE (3) HOURS AND, IF NECESSARY, RETIGHTEN TO 88 FT-LBS. A FINAL CHECK SHALL BE MADE AT SEVEN (7) DAYS. TORQUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.
6. AFTER PROPER TOROUING, CLEAN THE BOLT HOLE RECESSES AND THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, COMPLETELY FILL THESE RECESSES WITH NEOPRENE SEALANT.

GENERAL NOTES

1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MIN.
3. A PREMOLDED CORRUGATED OR NON-CORRUGATED GLAND SHALL BE USED FOR JOINTS SKEWED BETWEEN 50° THRU 130°. FOR JOINTS SKEWED LESS THAN 50° OR MORE THAN 130°, ONLY A CORRUGATED GLAND SHALL BE USED.
4. CLOSED END FERRULES AND STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.
5. SURFACES COMING IN CONTACT WITH NEOPRENE SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.
6. UPON COMPLETION OF SHOP FABRICATION, THE HOLD DOWN PLATE AND BASE ANGLE ASSEMBLY, AS SHOWN IN THE "TYPICAL SECTION OF BASE ANGLE ASSEMBLY", SHALL BE METALLIZED. SEE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
7. BASE ANGLE ASSEMBLY SHALL BE CONTINUOUS FOR THE LENGTH OF THE JOINT. AT CROWN BREAKS, THE ENDS OF THE BASE ANGLE ASSEMBLY SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE FOR SKEWS LESS THAN 80° AND GREATER THAN 100°. FINISHED WELD SHALL BE GROUND SMOOTH AND COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
8. FIELD SPLICES OF HOLD-DOWN PLATES SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. HOLD-DOWN PLATES SHALL NOT EXCEED 20' LENGTHS UNLESS APPROVED BY THE ENGINEER.
9. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
10. THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE ¾" Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



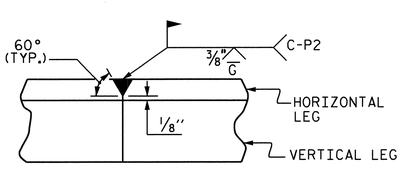
DETAIL "A"



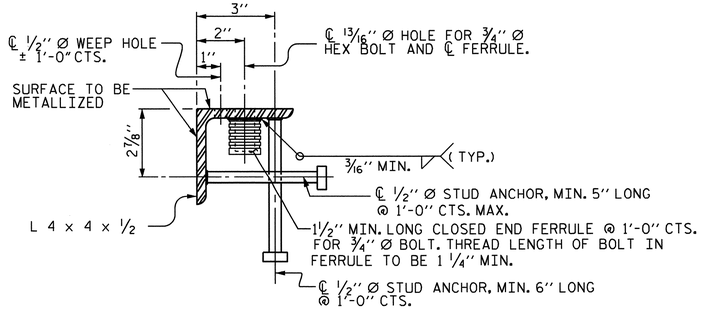
CROSS SECTION

PLAN VIEW

INSTALLATION SKETCH



DETAIL- FIELD WELD SPLICE OF BASE ANGLE



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG
1/9/12

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

EXPANSION JOINT SEAL DETAILS

(LEFT LANE)

ASSEMBLED BY : O. T. NGUYEN	DATE : 10/3/11
CHECKED BY : T. H. FANG	DATE : 10/10/11
DRAWN BY : REK 9/87	REV. 10/17/00 RWW/LES
CHECKED BY : CRK 10/87	REV. 5/7/03R RWW/JTE
	REV. 5/1/06 TLA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			52

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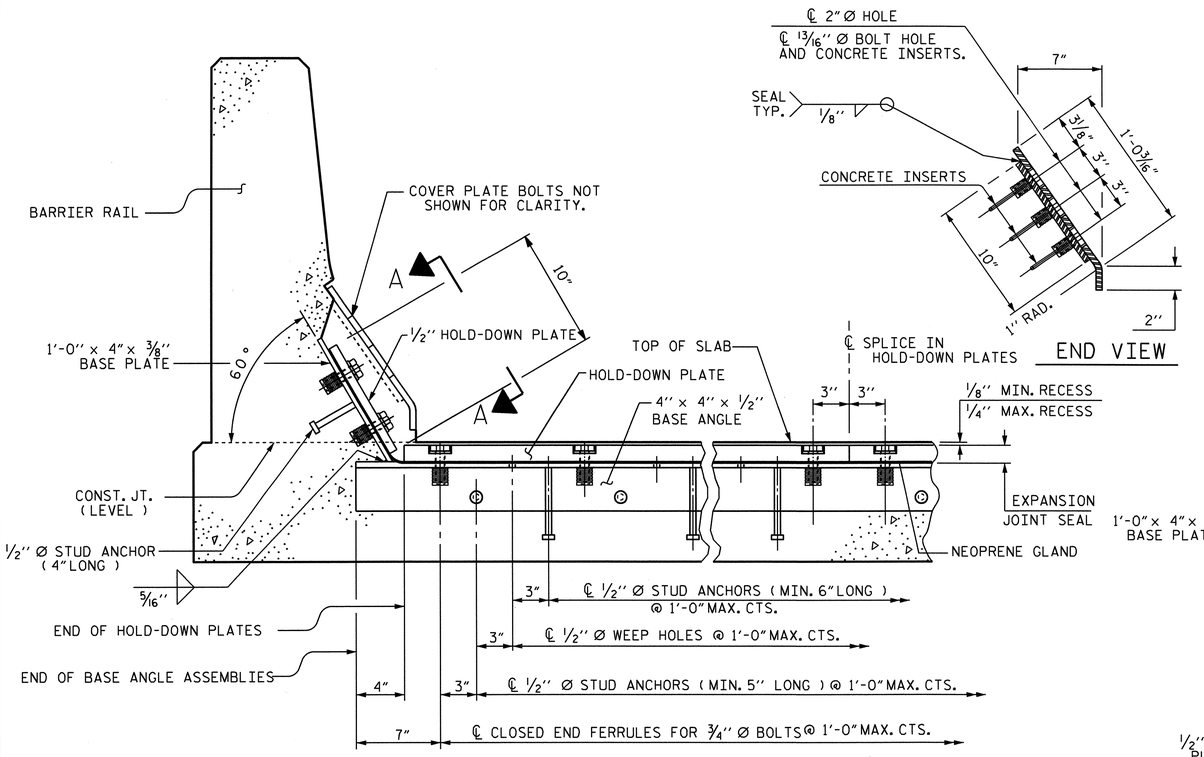
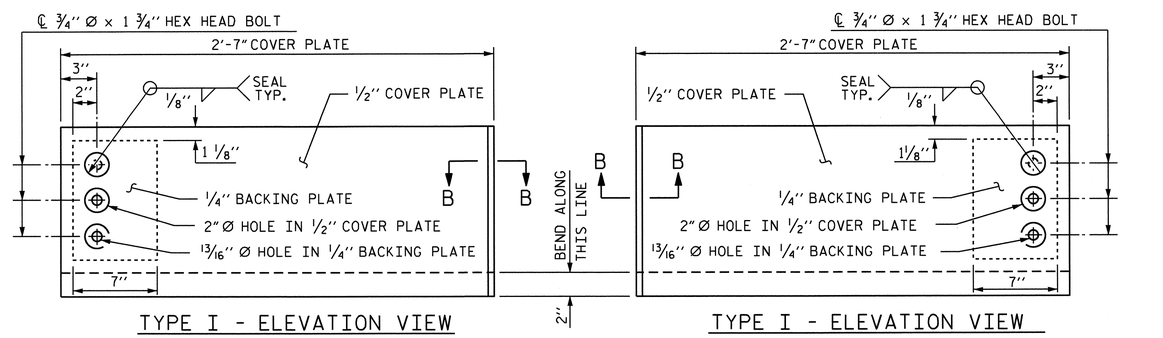
kpnewton

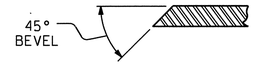
STR #1 STD. NO. EJS1



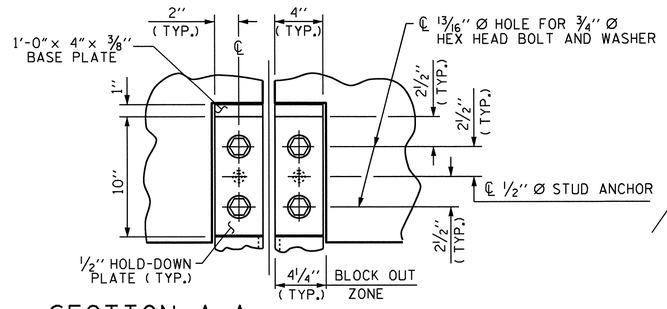
SECTION THRU RAIL NORMAL TO JOINT



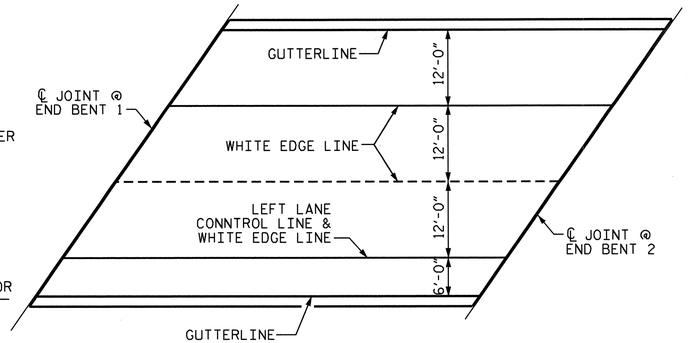
COVER PLATE DETAILS



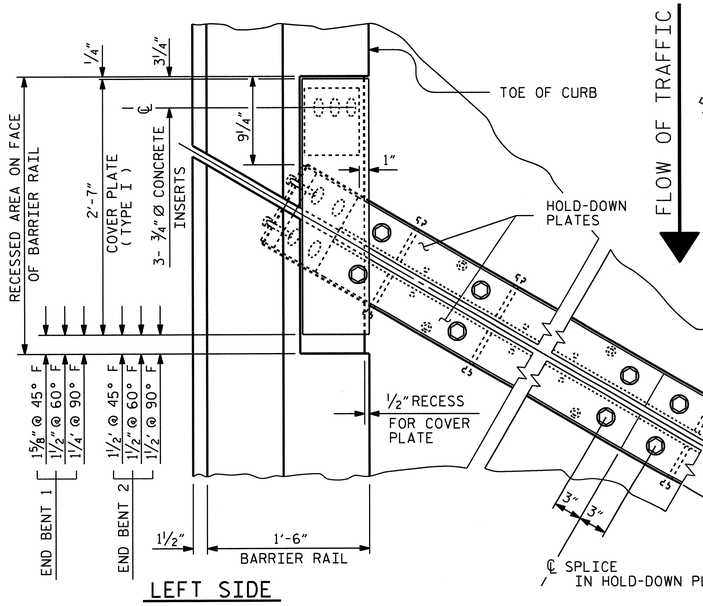
SECTION B-B



SECTION A-A

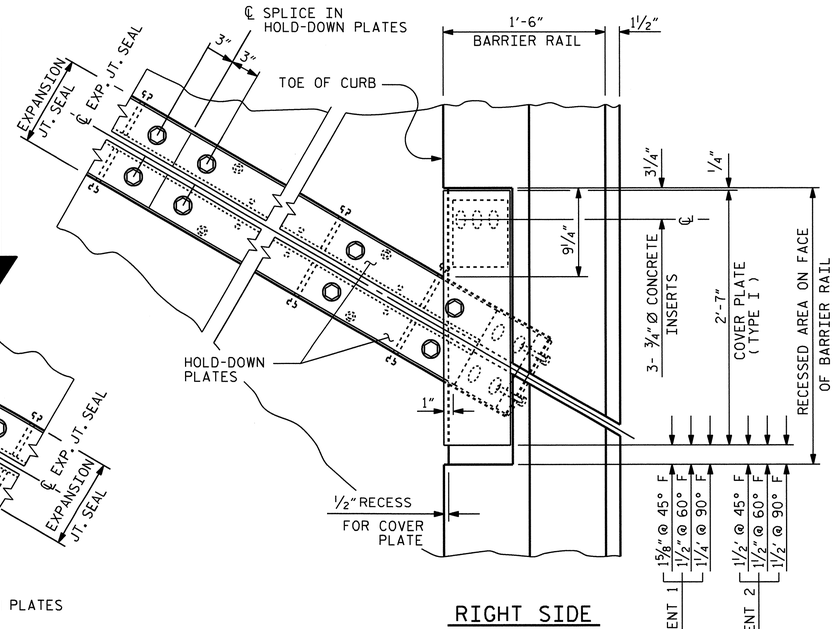


PAVEMENT MARKING ALIGNMENT



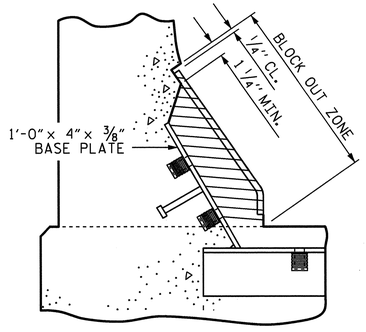
LEFT SIDE

FLOW OF TRAFFIC



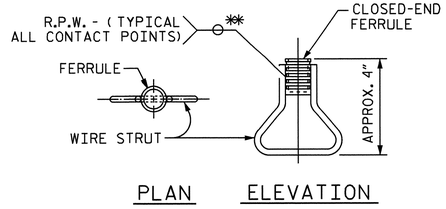
RIGHT SIDE

PLAN OF EXPANSION JOINT SEAL



BLOCK OUT DETAIL

SEE "SECTION A-A" FOR OTHER DETAILS.



CONCRETE INSERT

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

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSING FANG
2/24/12

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-
SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL
(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			52

ASSEMBLED BY :	O. T. NGUYEN	DATE :	10/03/11
CHECKED BY :	T. H. FANG	DATE :	10/10/11
DRAWN BY : REK 9/87	REV. 7/17/98	RWW/LES	
CHECKED BY : CRK 10/87	REV. 10/17/00	RWW/LES	
	REV. 5/1/06	TLA/GM	

24-FEB-2012 15:27
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ttfang

STR #1 STD. NO. EJS2

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

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

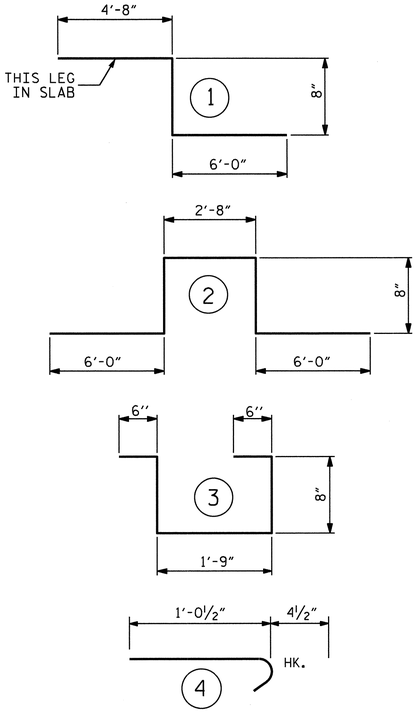
GROOVING BRIDGE FLOORS

APPROACH SLABS	1,834	SQ.FT.
BRIDGE DECK	4,266	SQ.FT.
TOTAL	6,100	SQ.FT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	157	#5	STR	44'-11"	7355	A206	3	#5	STR	32'-9"	102
A2	157	#5	STR	44'-11"	7355	A207	3	#5	STR	30'-7"	96
✳ A3	6	#6	STR	16'-7"	149	A208	3	#5	STR	28'-5"	89
						A209	3	#5	STR	26'-3"	82
✳ A101	3	#5	STR	42'-10"	134	A210	3	#5	STR	24'-2"	76
✳ A102	3	#5	STR	40'-8"	127	A211	3	#5	STR	22'-0"	69
✳ A103	3	#5	STR	38'-7"	121	A212	3	#5	STR	19-10"	62
✳ A104	3	#5	STR	36'-5"	114	A213	3	#5	STR	17'-8"	55
✳ A105	3	#5	STR	34'-3"	107	A214	3	#5	STR	15'-6"	48
✳ A106	3	#5	STR	32'-1"	100	A215	3	#5	STR	13'-5"	42
✳ A107	3	#5	STR	29'-11"	94	A216	3	#5	STR	11'-3"	35
✳ A108	3	#5	STR	27'-10"	87	A217	3	#5	STR	9'-1"	28
✳ A109	3	#5	STR	25'-8"	80	A218	3	#5	STR	6'-11"	22
✳ A110	3	#5	STR	23'-6"	74	A219	3	#5	STR	4'-9"	15
✳ A111	3	#5	STR	21'-4"	67	A220	3	#5	STR	2'-8"	8
✳ A112	3	#5	STR	19'-3"	60						
✳ A113	3	#5	STR	17'-1"	53	A221	3	#5	STR	43'-6"	136
✳ A114	3	#5	STR	14'-11"	47	A222	3	#5	STR	41'-4"	129
✳ A115	3	#5	STR	12'-9"	40	A223	3	#5	STR	39'-2"	123
✳ A116	3	#5	STR	10'-7"	33	A224	3	#5	STR	37'-1"	116
✳ A117	3	#5	STR	8'-6"	27	A225	3	#5	STR	34'-11"	109
✳ A118	3	#5	STR	6'-4"	20	A226	3	#5	STR	32'-9"	102
✳ A119	3	#5	STR	4'-2"	13	A227	3	#5	STR	30'-8"	96
✳ A120	3	#5	STR	2'-0"	6	A228	3	#5	STR	28'-6"	89
✳ A121	3	#5	STR	42'-10"	134	A229	3	#5	STR	26'-4"	82
✳ A122	3	#5	STR	40'-9"	128	A230	3	#5	STR	24'-3"	76
✳ A123	3	#5	STR	38'-7"	121	A231	3	#5	STR	22'-1"	69
✳ A124	3	#5	STR	36'-5"	114	A232	3	#5	STR	20'-0"	63
✳ A125	3	#5	STR	34'-4"	107	A233	3	#5	STR	17'-10"	56
✳ A126	3	#5	STR	32'-2"	101	A234	3	#5	STR	15'-8"	49
✳ A127	3	#5	STR	30'-0"	94	A235	3	#5	STR	13'-7"	43
✳ A128	3	#5	STR	27'-11"	87	A236	3	#5	STR	11'-5"	36
✳ A129	3	#5	STR	25'-9"	81	A237	3	#5	STR	9'-3"	29
✳ A130	3	#5	STR	23'-7"	74	A238	3	#5	STR	7'-2"	22
✳ A131	3	#5	STR	21'-6"	67	A239	3	#5	STR	5'-0"	16
✳ A132	3	#5	STR	19'-4"	60	A240	3	#5	STR	2'-11"	9
✳ A133	3	#5	STR	17'-3"	54						
✳ A134	3	#5	STR	15'-1"	47	✳ B1	128	#4	STR	29'-1"	2487
✳ A135	3	#5	STR	12'-11"	40	B2	108	#5	STR	56'-3"	6336
✳ A136	3	#5	STR	10'-10"	34						
✳ A137	3	#5	STR	8'-8"	27	✳ G1	2	#5	STR	54'-7"	114
✳ A138	3	#5	STR	6'-6"	20						
✳ A139	3	#5	STR	4'-5"	14	✳ J1	100	#4	4	1'-5"	95
✳ A140	3	#5	STR	2'-3"	7						
						✳ K1	12	#5	1	11'-4"	142
A201	3	#5	STR	43'-5"	136	✳ K2	18	#5	2	16'-0"	300
A202	3	#5	STR	41'-4"	129						
A203	3	#5	STR	39'-2"	123	✳ S1	72	#5	3	4'-1"	307
A204	3	#5	STR	37'-0"	116	REINFORCING STEEL = 16,583 LBS					
A205	3	#5	STR	34'-10"	109	✳ EPOXY COATED REINF. STEEL = 13,764 LBS					

BAR TYPES

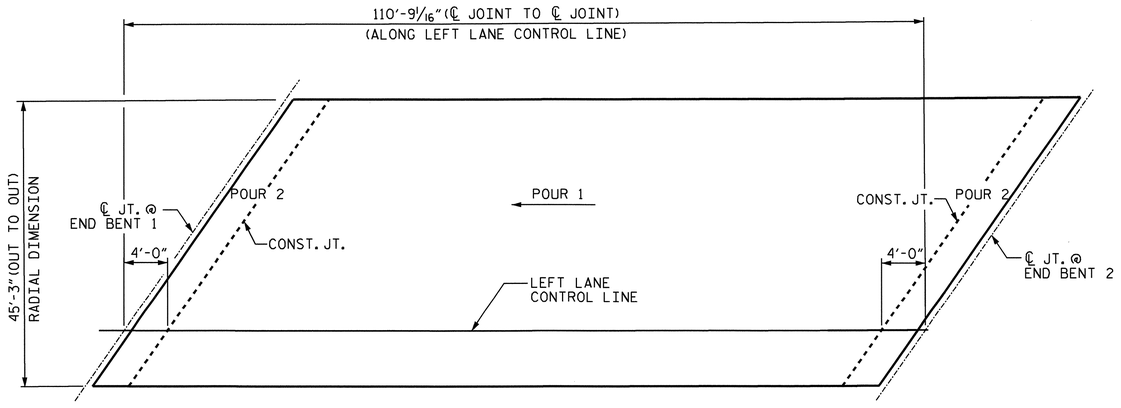


ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	✳ EPOXY COATED REINFORCING STEEL
	(CU.YDS.)	(LBS.)	(LBS.)
SPAN A			
POUR 1	150.6		
POUR 2	13.6		
TOTALS ✳✳	164.2	16,583	13,764

✳✳ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 5,014)

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG
2/27/12

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			52

ASSEMBLED BY :	OT NGUYEN	DATE :	7-19-11
CHECKED BY :	T. H. FANG	DATE :	12-7-11
DRAWN BY : JMB	5/87	REV. 6/1/94	EEM/GRP
CHECKED BY : SJD	9/87	REV. 8/16/99	RWW/LES
		REV. 5/1/06	TLA/GM

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tfang

STR #1 STD. NO. BOM1

NOTES

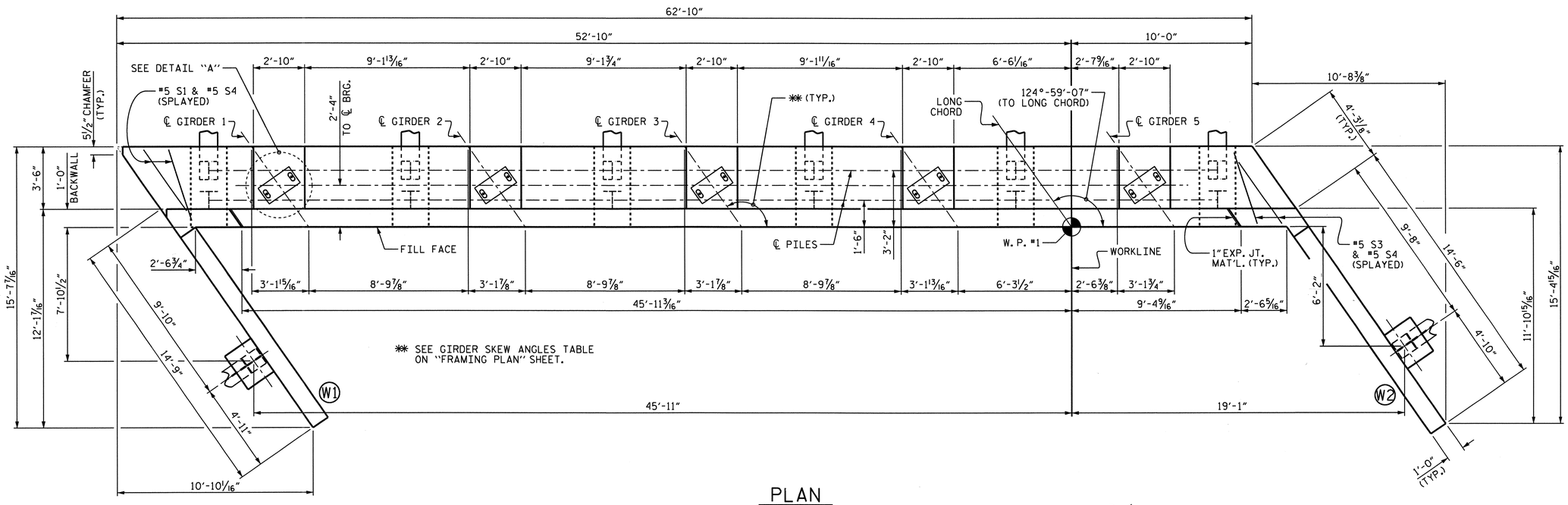
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

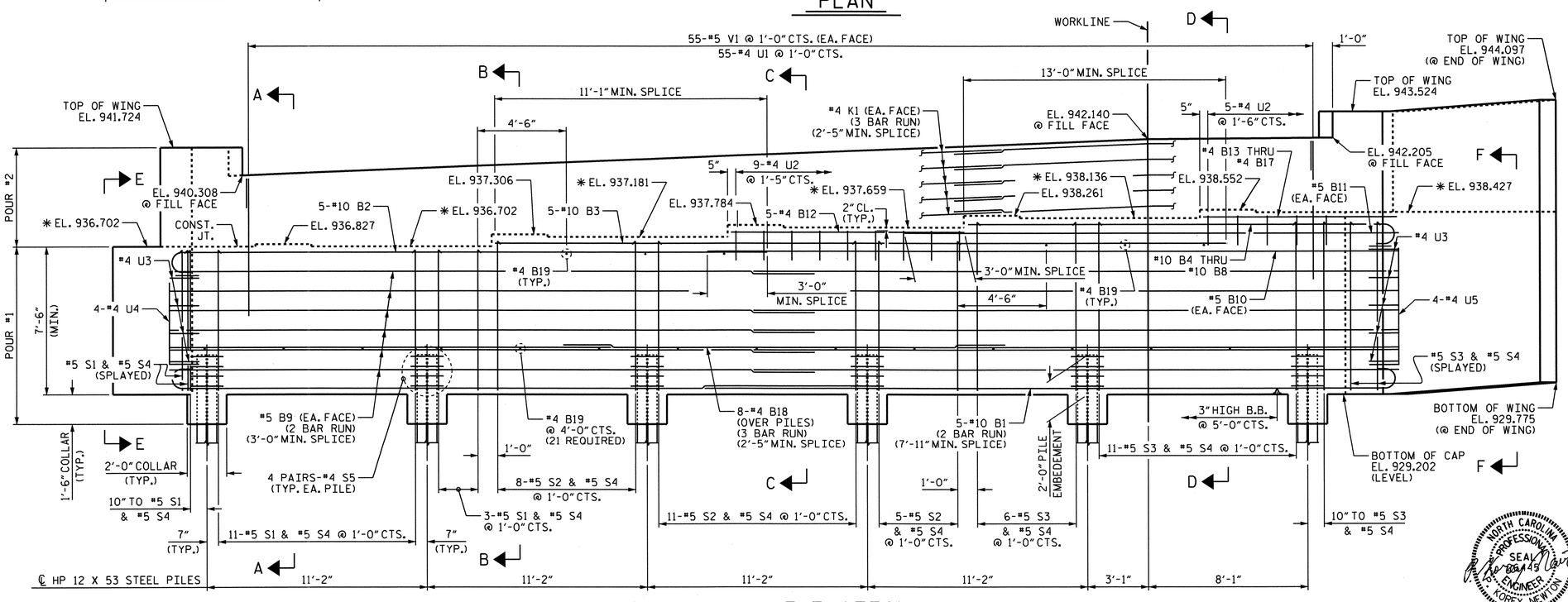
* THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THAT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

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

THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

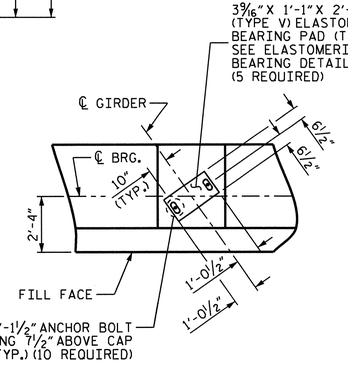


PLAN



ELEVATION

LEFT WING NOT SHOWN FOR CLARITY.
BRACE PILES IN WINGS NOT SHOWN FOR CLARITY.



DETAIL "A"

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			52

NORTH CAROLINA PROFESSIONAL SEAL 036445 ENGINEER KOREY NEWTON
1/10/2012

DRAWN BY : P. K. NEWTON DATE : 7/13/11
CHECKED BY : T. H. FANG DATE : 12/20/11

10-JAN-2012 16:58
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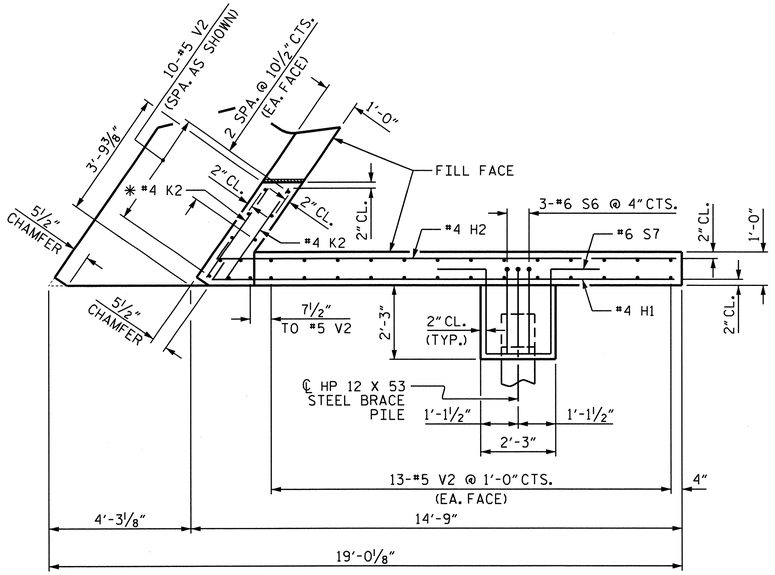
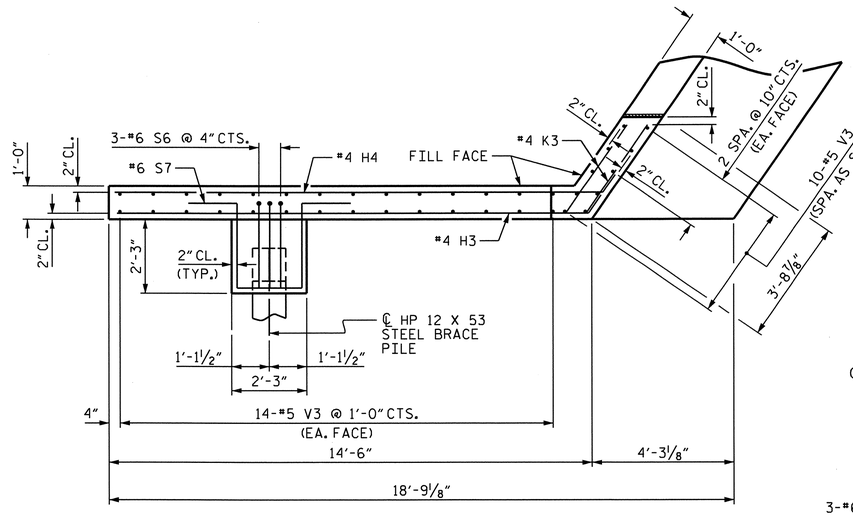
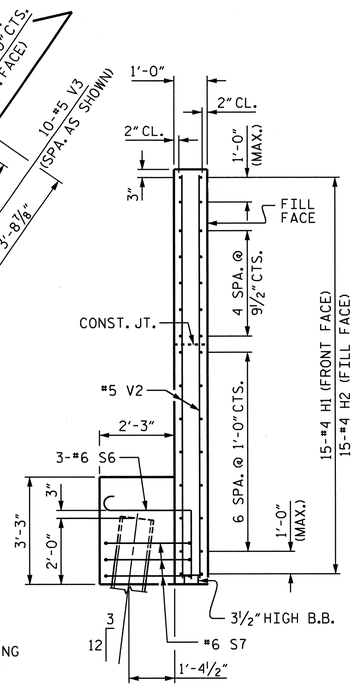


PLAN OF WING W1

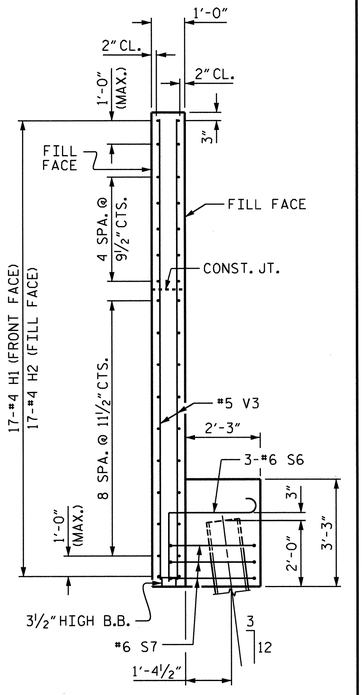
* FIELD CUT #4 K2 AS NECESSARY TO PROVIDE 2" MIN. CLEARANCE TO CHAMFER.



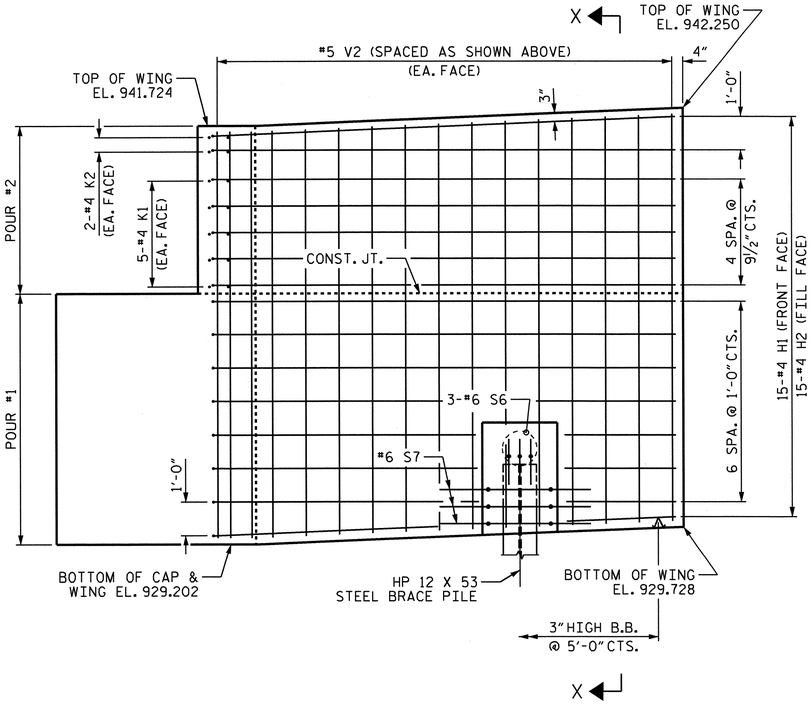
PLAN OF WING W2



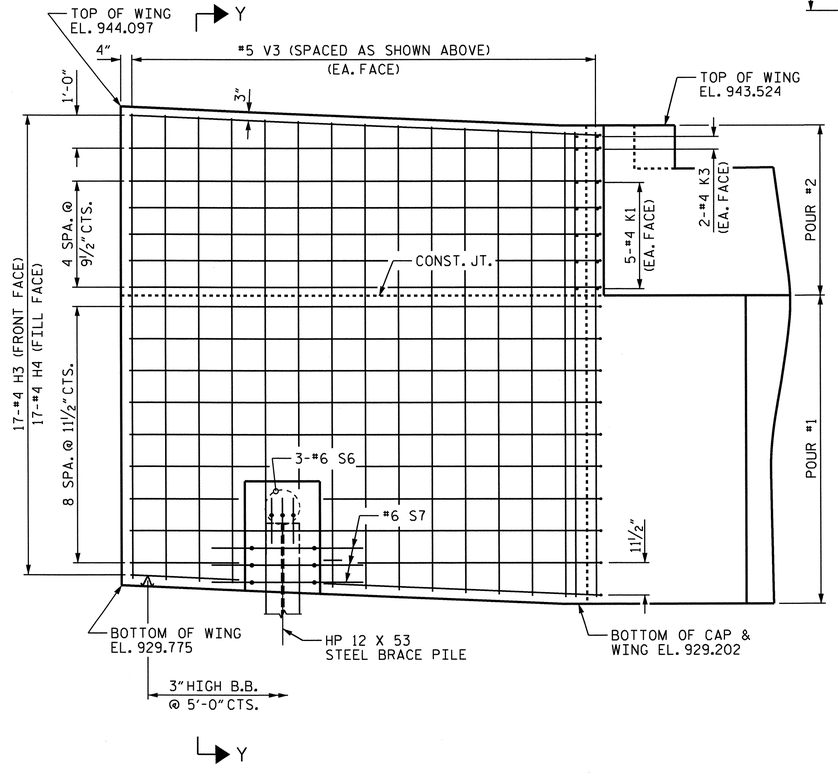
SECTION X-X



SECTION Y-Y



ELEVATION OF WING W1



ELEVATION OF WING W2

STATE OF NORTH CAROLINA
PROFESSIONAL SEAL 029435 ENGINEER KOREY NEWTON
1/10/2012

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 11/1/11
CHECKED BY : T. H. FANG DATE : 12/20/11

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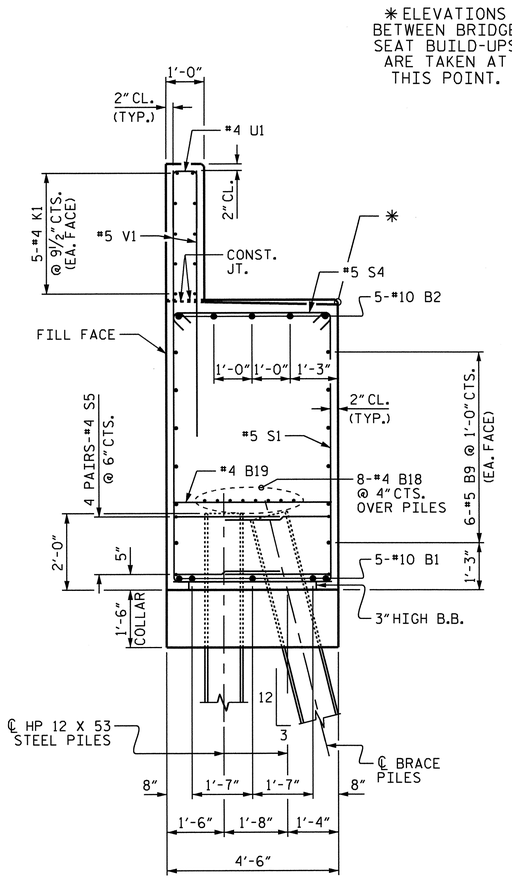
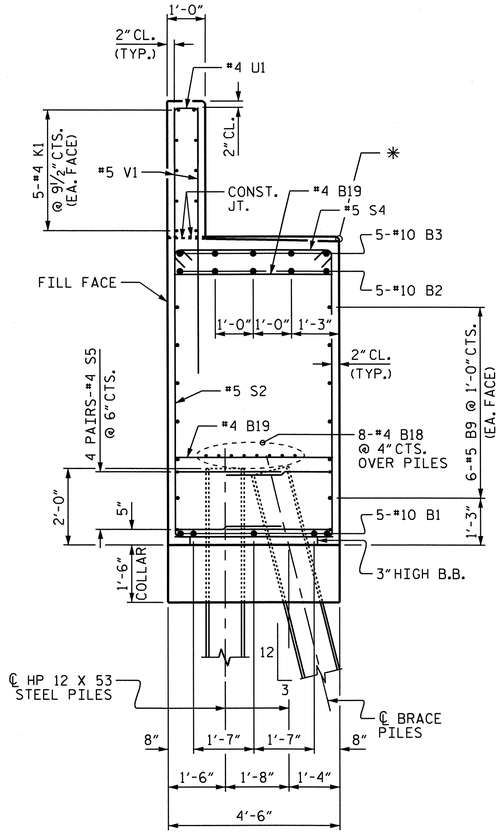
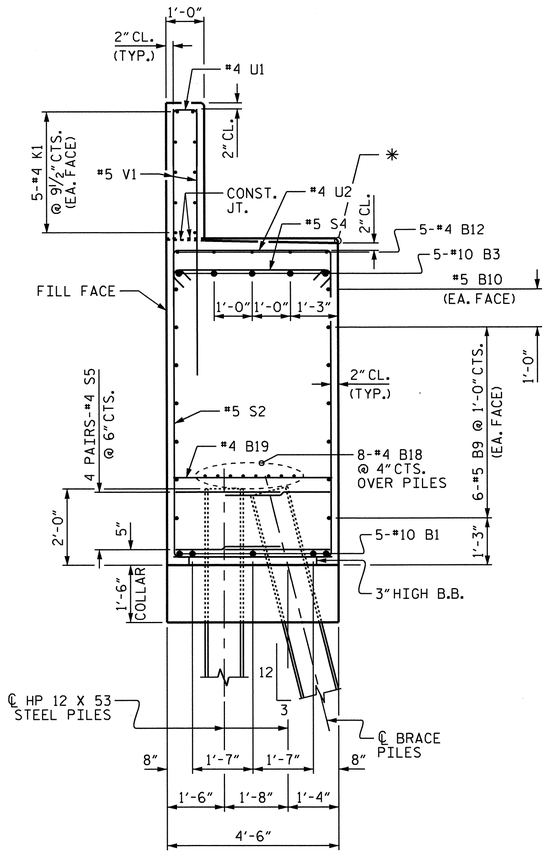


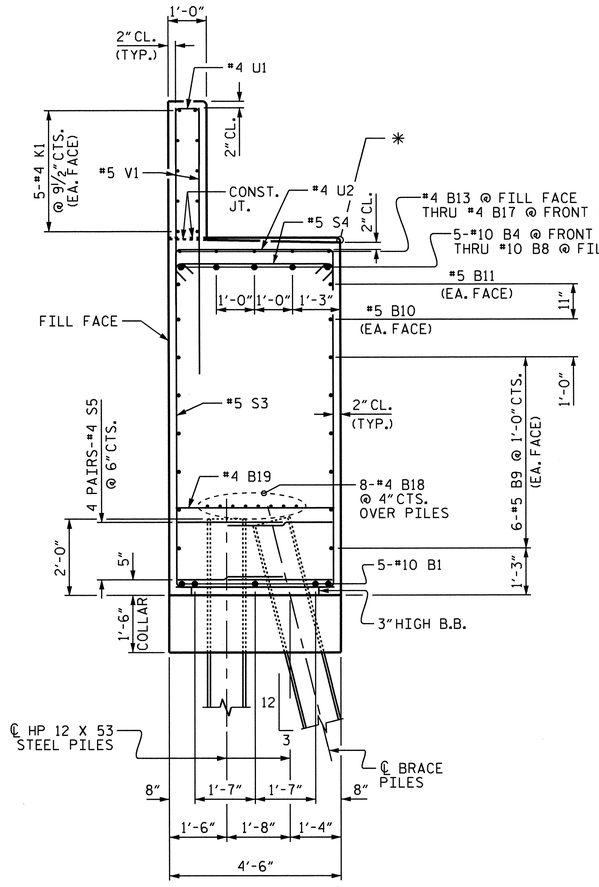
SECTION A-A



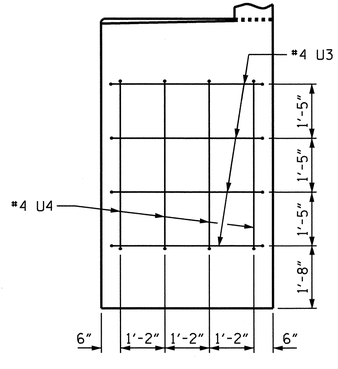
SECTION B-B



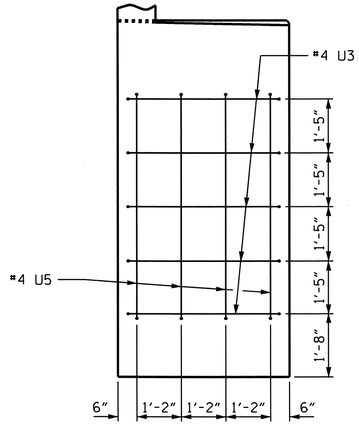
SECTION C-C



SECTION D-D



VIEW E-E



VIEW F-F

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 26045 ENGINEER KOREY NEWTON

1/10/2012

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 11/3/11
CHECKED BY : T. H. FANG DATE : 12/20/11

09-JAN-2012 16:34
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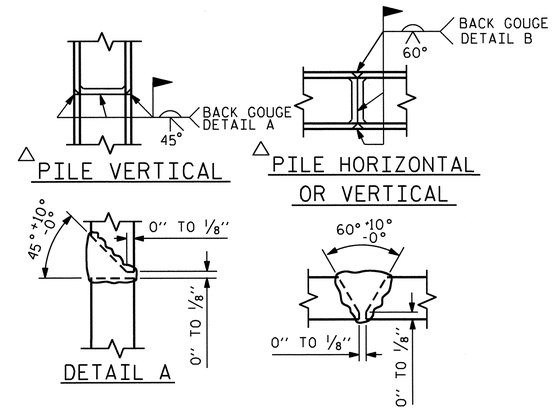
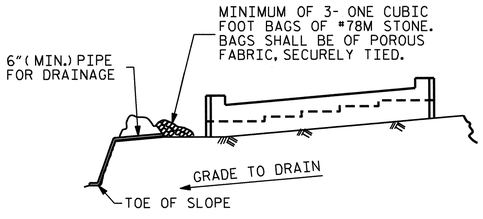
kpnewton



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



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

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#10	1	36'-6"	1571
B2	5	#10	1	31'-8"	681
B3	5	#10	STR	37'-1"	798
B4	1	#10	1	23'-1"	99
B5	1	#10	1	22'-5"	96
B6	1	#10	1	21'-9"	94
B7	1	#10	1	21'-1"	91
B8	1	#10	1	20'-5"	88
B9	24	#5	STR	32'-9"	820
B10	2	#5	STR	35'-1"	73
B11	2	#5	STR	25'-1"	52
B12	5	#4	STR	11'-10"	40
B13	1	#4	STR	9'-10"	7
B14	1	#4	STR	9'-2"	6
B15	1	#4	STR	8'-6"	6
B16	1	#4	STR	7'-10	5
B17	1	#4	STR	7'-2"	5
B18	24	#4	STR	22'-6"	361
B19	21	#4	STR	4'-2"	58
H1	15	#4	8	14'-7"	146
H2	15	#4	8	14'-6"	145
H3	17	#4	9	14'-10"	168
H4	17	#4	9	15'-4"	174
K1	30	#4	STR	22'-5"	449
K2	4	#4	STR	3'-4"	9
K3	4	#4	STR	3'-3"	9
S1	17	#5	2	19'-4"	343
S2	24	#5	2	20'-3"	507
S3	20	#5	2	22'-2"	462
S4	61	#5	3	5'-1"	323
S5	48	#4	4	7'-2"	230
S6	6	#6	6	5'-2"	47
S7	6	#6	7	10'-1"	91
U1	55	#4	4	3'-8"	135
U2	14	#4	4	7'-2"	67
U3	9	#4	5	7'-11"	48
U4	4	#4	4	7'-6"	20
U5	4	#4	4	9'-0"	24
V1	110	#5	STR	7'-0"	803
V2	37	#5	STR	12'-2"	470
V3	38	#5	STR	13'-11"	552

REINFORCING STEEL LBS. 10171

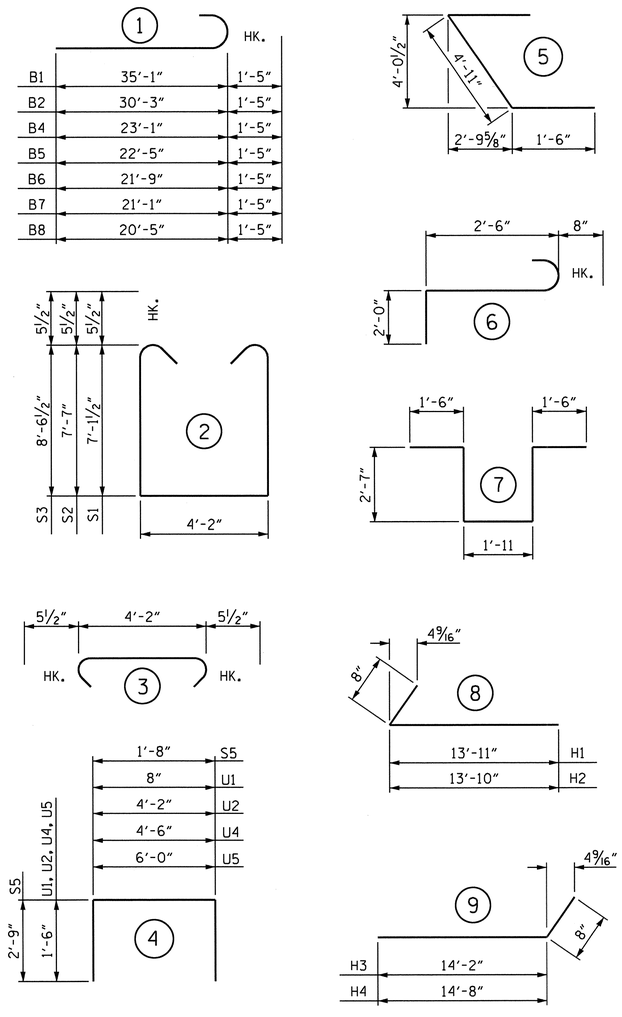
CLASS A CONCRETE

POUR 1	(COLLARS, CAP, & LOWER WINGS)	99.4 C.Y.
POUR 2	(BACKWALL & UPPER WINGS)	14.5 C.Y.
TOTAL		113.9 C.Y.

HP 12 X 53 STEEL PILES

NUMBER = 14 LIN. FT. = 420

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			52

NORTH CAROLINA PROFESSIONAL SEAL P.E. ENGINEER KOREY NEWTON

2/27/2012

DRAWN BY : P. K. NEWTON DATE : 11/10/11
CHECKED BY : T. H. FANG DATE : 12/20/11

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tfang

NOTES

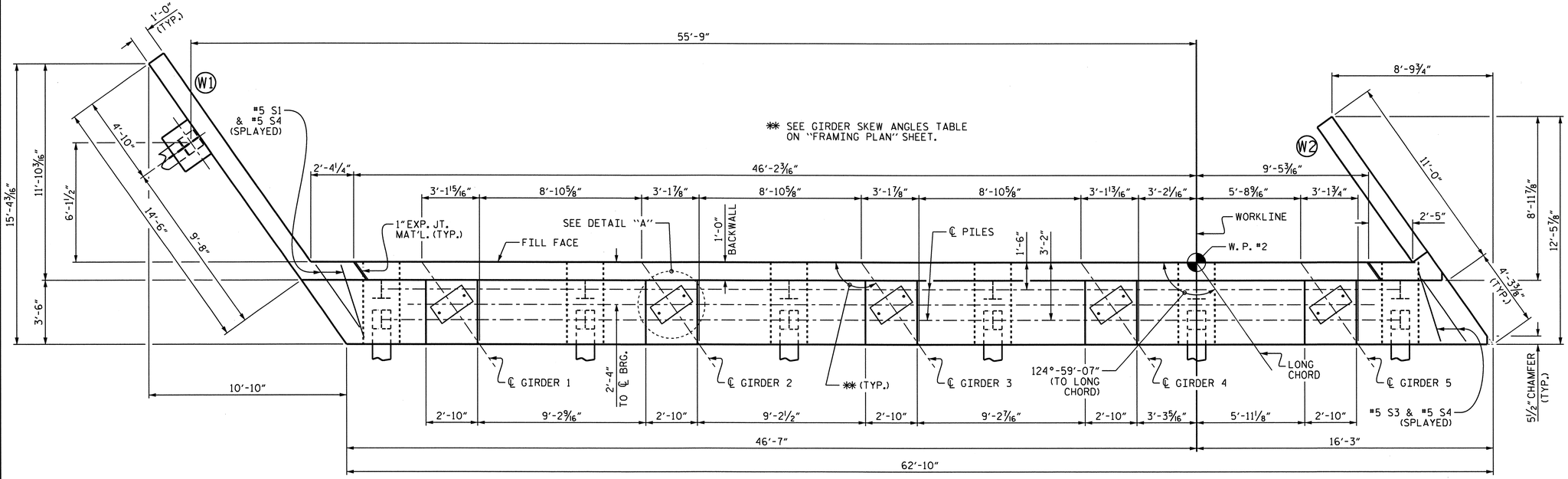
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

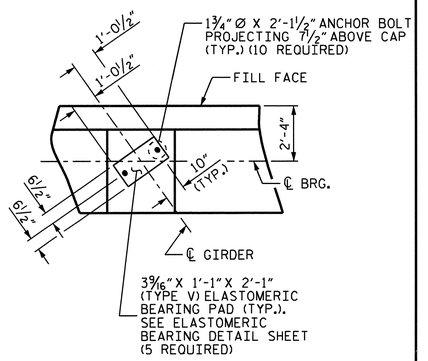
* THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THAT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

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

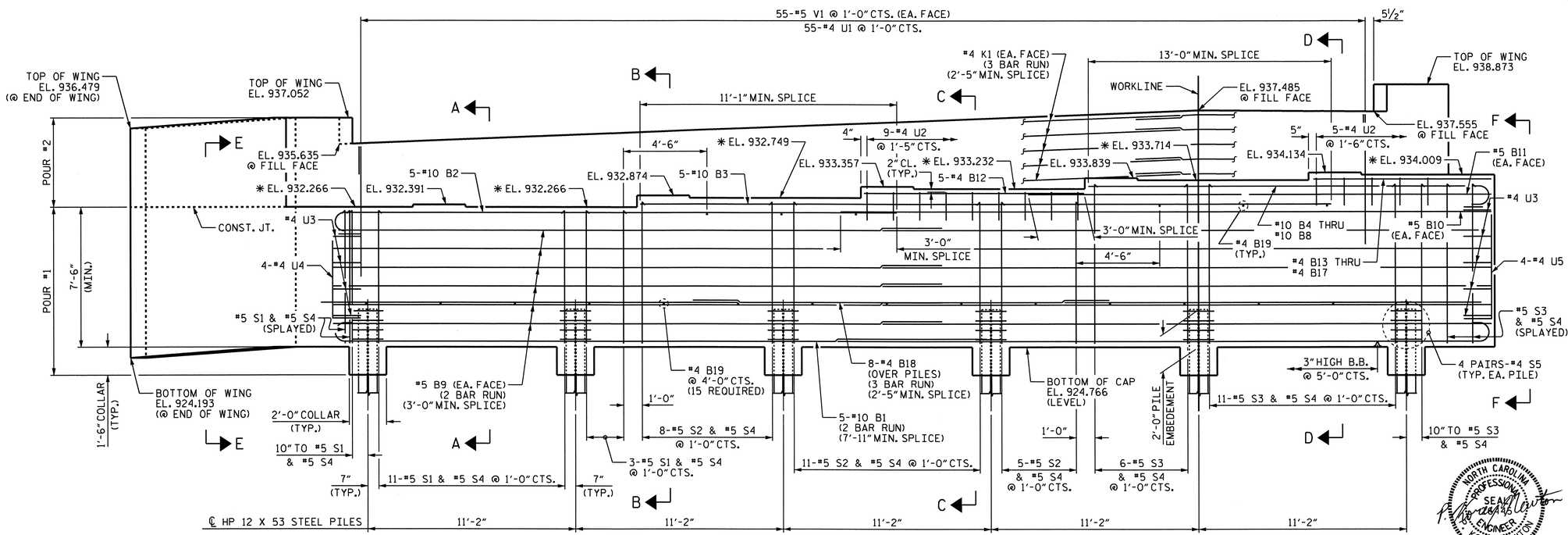
THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS. SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.



PLAN



DETAIL "A"



ELEVATION

LEFT WING NOT SHOWN FOR CLARITY.
BRACE PILES IN WINGS NOT SHOWN FOR CLARITY.

NORTH CAROLINA PROFESSIONAL SEAL 024411 ENGINEER KORPEY NEWTON
1/10/2012

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 10/11/11
CHECKED BY : R. P. PATEL DATE : 1/5/12

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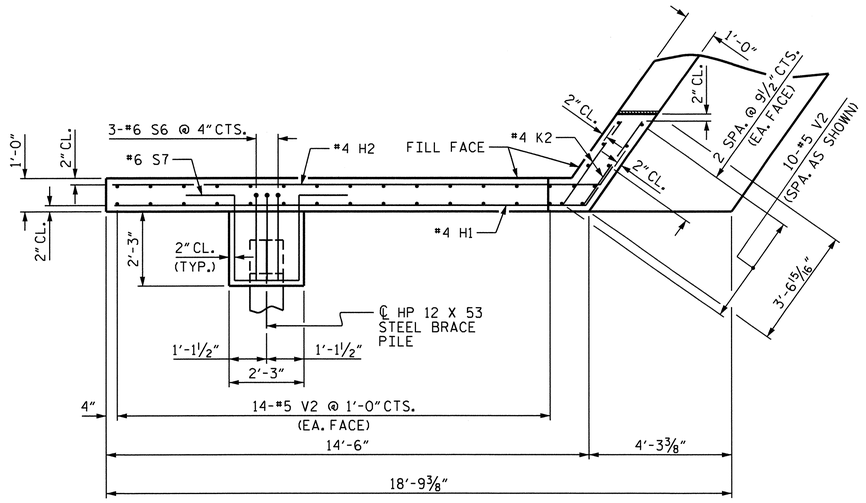
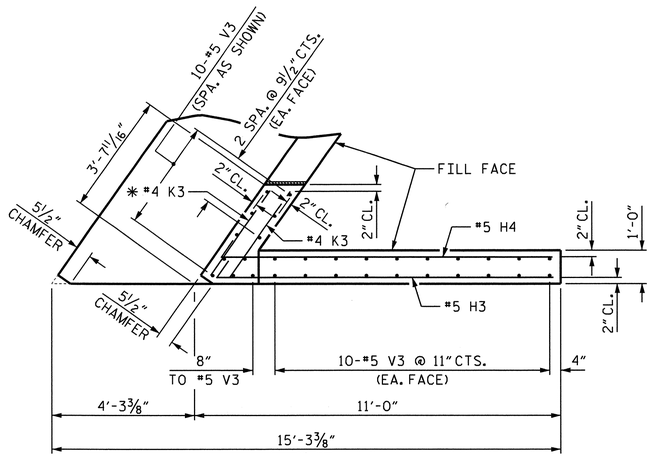
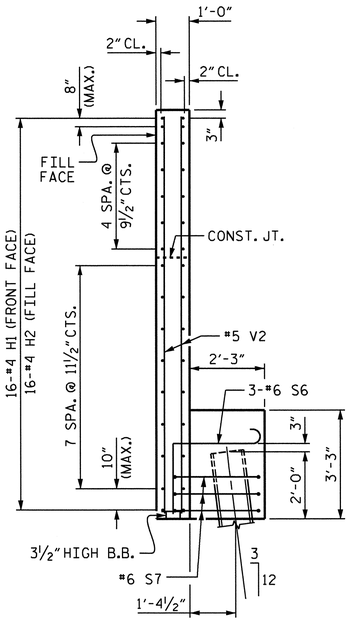


PLAN OF WING W1

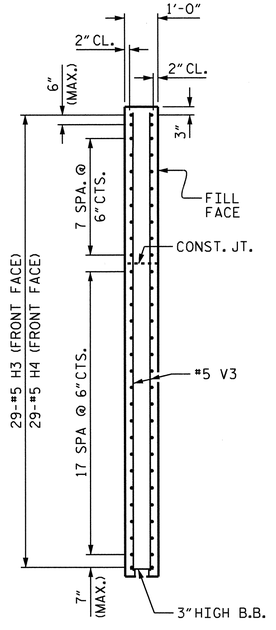


PLAN OF WING W2

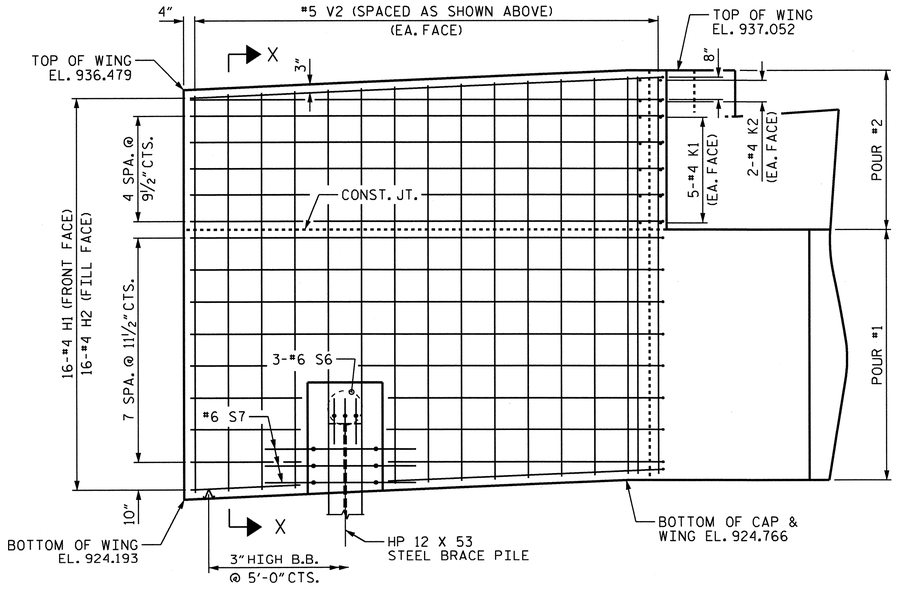
✱ FIELD CUT #4 K3 AS NECESSARY TO PROVIDE 2"MIN. CLEARANCE TO CHAMFER.



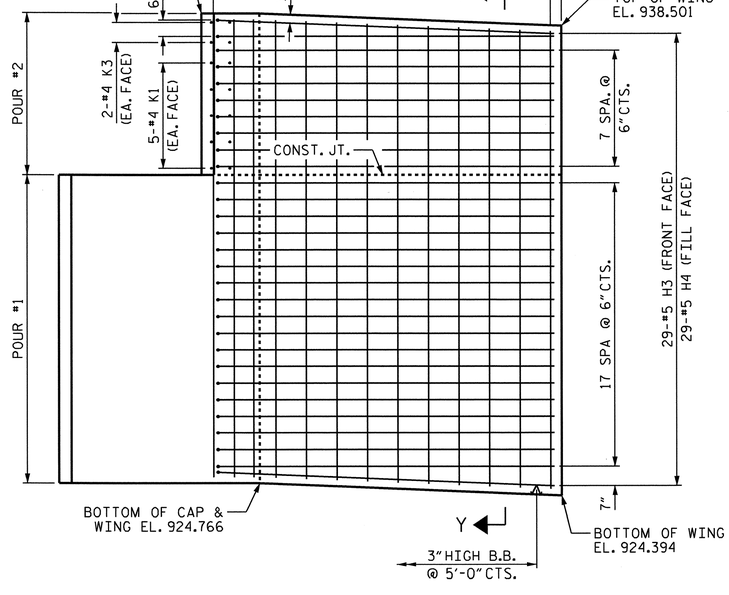
SECTION X-X



SECTION Y-Y



ELEVATION OF WING W1



ELEVATION OF WING W2

NORTH CAROLINA PROFESSIONAL SEAL 026445 ENGINEER KOREY NEWTON
2/27/2012

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 11/17/11
CHECKED BY : R. P. PATEL DATE : 1/5/12

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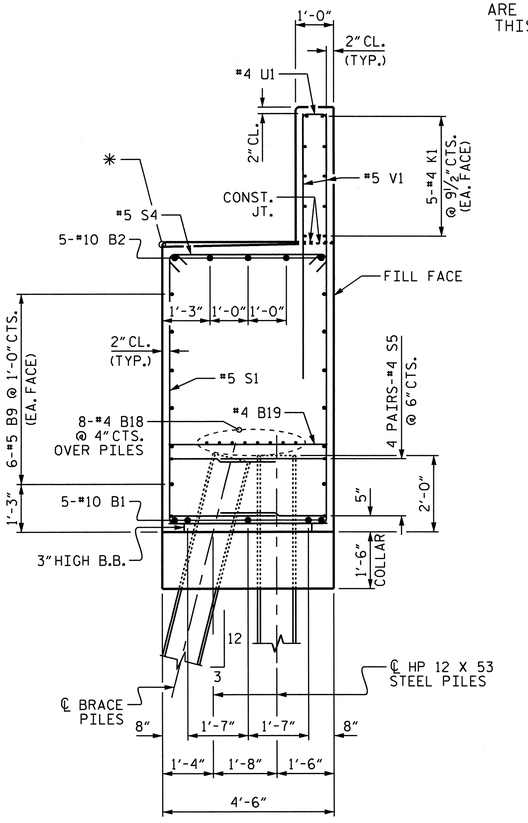
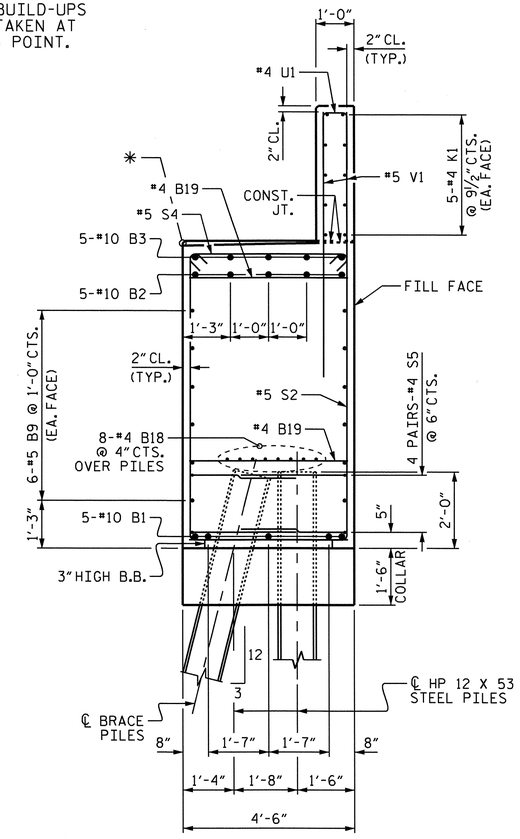
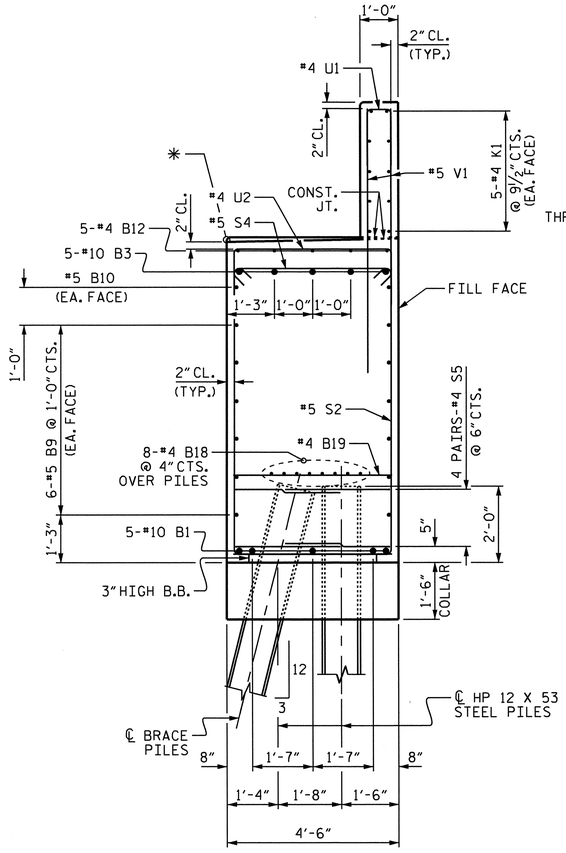
* ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS ARE TAKEN AT THIS POINT.



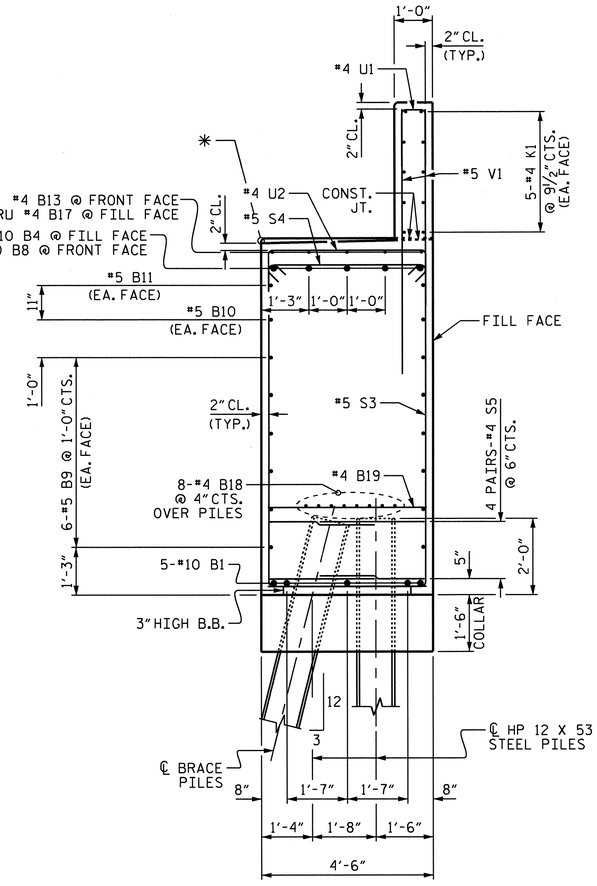
SECTION A-A



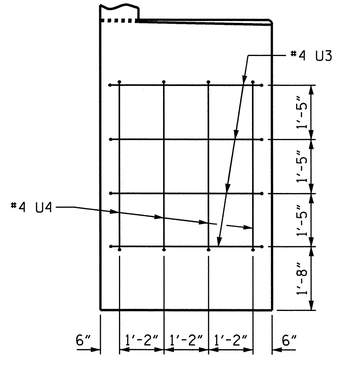
SECTION B-B



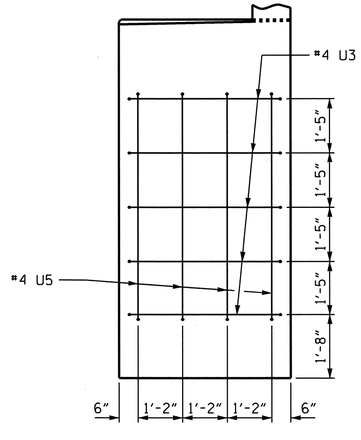
SECTION C-C



SECTION D-D



VIEW E-E



VIEW F-F

NORTH CAROLINA PROFESSIONAL SEAL 26445 ENGINEER R. KORREY NEWTON

1/10/2012

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 11/17/11
CHECKED BY : R. P. PATEL DATE : 1/5/12

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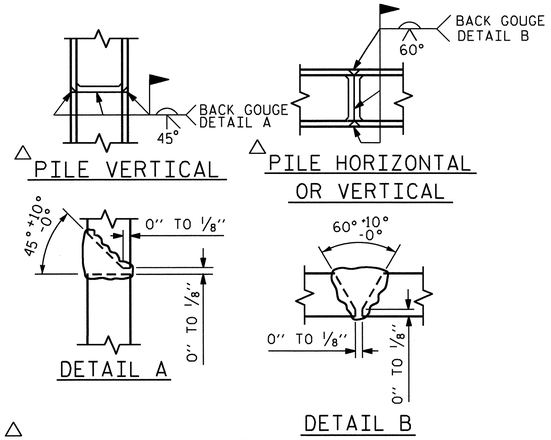
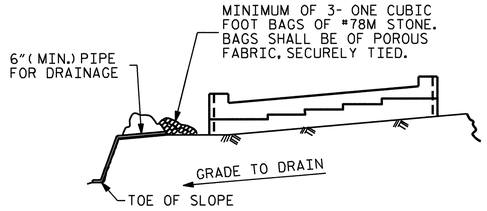


△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



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

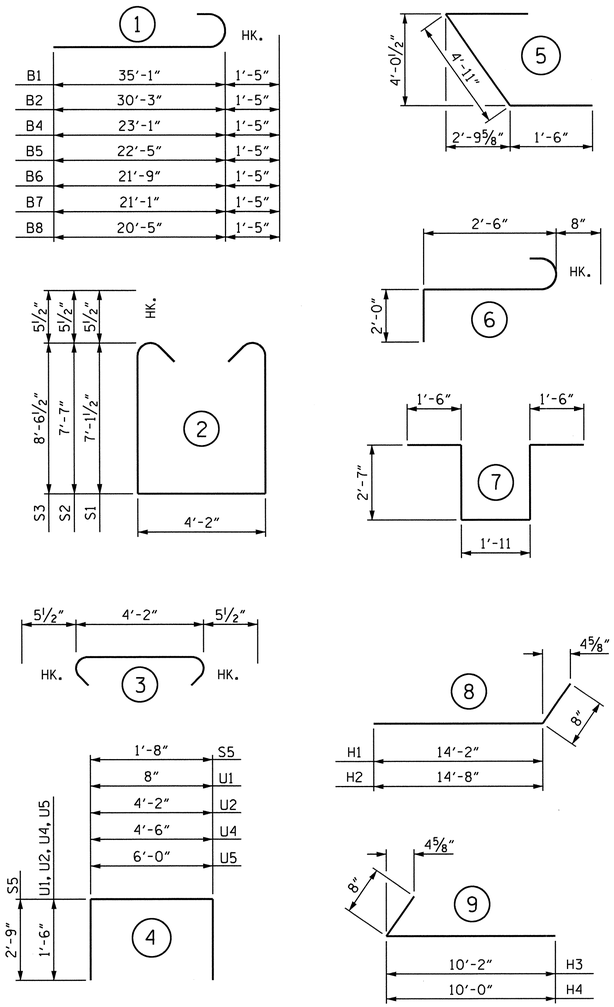
BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#10	1	36'-6"	1571
B2	5	#10	1	31'-8"	681
B3	5	#10	STR	37'-2"	800
B4	1	#10	1	23'-0"	99
B5	1	#10	1	22'-4"	96
B6	1	#10	1	21'-8"	93
B7	1	#10	1	20'-11"	90
B8	1	#10	1	20'-3"	87
B9	24	#5	STR	32'-9"	820
B10	2	#5	STR	35'-0"	73
B11	2	#5	STR	24'-11"	52
B12	5	#4	STR	11'-10"	40
B13	1	#4	STR	9'-7"	6
B14	1	#4	STR	9'-0"	6
B15	1	#4	STR	8'-4"	6
B16	1	#4	STR	7'-7	5
B17	1	#4	STR	6'-11"	5
B18	24	#4	STR	22'-5"	359
B19	21	#4	STR	4'-2"	58
H1	17	#4	8	14'-10"	168
H2	17	#4	8	15'-4"	174
H3	29	#5	9	10'-10"	328
H4	29	#5	9	10'-8"	323
K1	30	#4	STR	22'-5"	449
K2	4	#4	STR	3'-1"	8
K3	4	#4	STR	3'-2"	8
S1	17	#5	2	19'-4"	343
S2	24	#5	2	20'-3"	507
S3	20	#5	2	22'-2"	462
S4	61	#5	3	5'-1"	323
S5	48	#4	4	7'-2"	230
S6	3	#6	6	5'-2"	23
S7	3	#6	7	10'-1"	45
U1	55	#4	4	3'-8"	135
U2	14	#4	4	7'-2"	67
U3	9	#4	5	7'-11	48
U4	4	#4	4	7'-6"	20
U5	4	#4	4	9'-0"	24
V1	110	#5	STR	7'-0"	803
V2	38	#5	STR	11'-11"	472
V3	31	#5	STR	13'-9"	445

REINFORCING STEEL	LBS.	10352
CLASS A CONCRETE		
POUR 1 (COLLARS, CAP, & LOWER WINGS)		97.6 C.Y.
POUR 2 (BACKWALL & UPPER WINGS)		12.7 C.Y.
TOTAL		110.3 C.Y.
HP 12 X 53 STEEL PILES		
NUMBER = 13	LIN. FT. = 390	

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 026445 ENGINEER KOREY NEWTON

2/27/2012

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 11/17/11
CHECKED BY : R. P. PATEL DATE : 1/5/12

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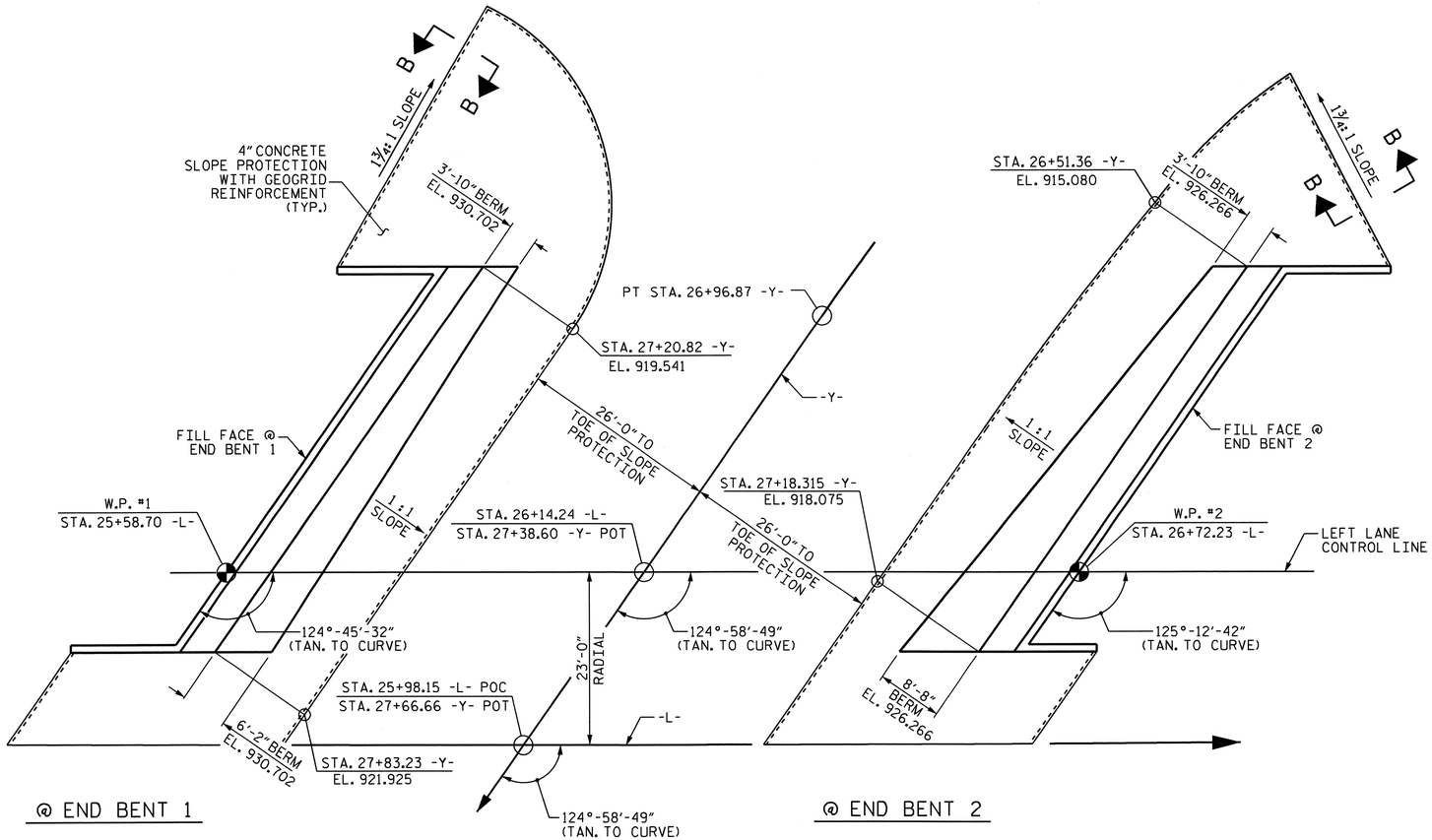
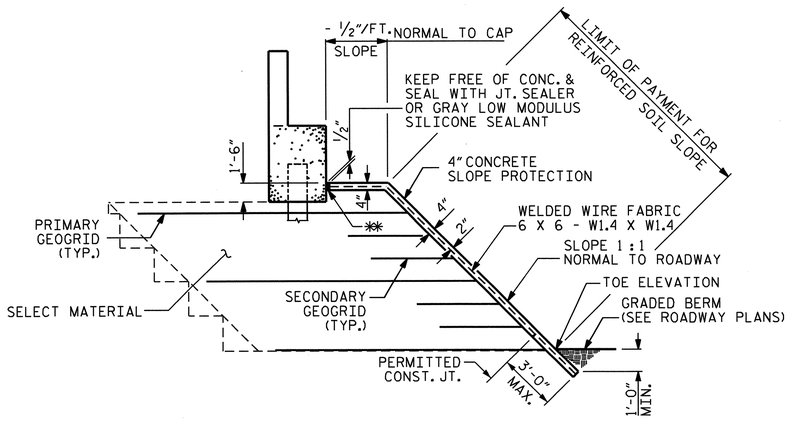


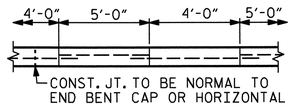
PLAN



SECTION ALONG ℄ ROADWAY

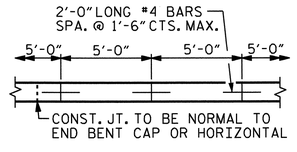
SHOWING 4" CONCRETE SLOPE PROTECTION WITH GEOGRID REINFORCEMENT.
FOR TOP BERM AND TOE ELEVATIONS OF SLOPE PROTECTION, SEE PLAN VIEW.

** PLACE DEBONDING TAPE ON TOP OF THE 1" EXP. JT. MAT'L.



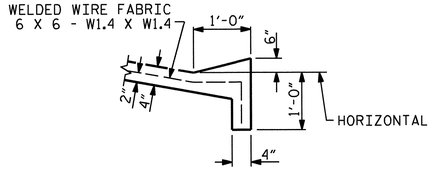
POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



SECTION B-B

GENERAL NOTES

SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS.

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

THE ENTIRE AREA UNDER THE 4" CONCRETE SLOPE PROTECTION SHALL BE REINFORCED WITH THE GEOGRID REINFORCEMENT AS DETAILED IN THE PLANS. FOR DETAILS AND PAY ITEMS, SEE "REINFORCED SOIL SLOPE" ON SHEET S-24A.

BRIDGE @ STA. 25+98.15 -L- LEFT LANE	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	330	660
END BENT 2	295	590

* QUANTITY SHOWN IS BASED ON 5' POURS.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-24
1			3			TOTAL SHEETS
2			4			52

ASSEMBLED BY : HARISH SHAH	DATE : 1-13-10	
CHECKED BY : T. H. FANG	DATE : 12-07-11	
DRAWN BY : ELR 5/92	REV. 7/10/01	LES/RDR
CHECKED BY : GRP 6/92	REV. 5/7/03	RWW/JTE
	REV. 5/1/06	TLA/GM

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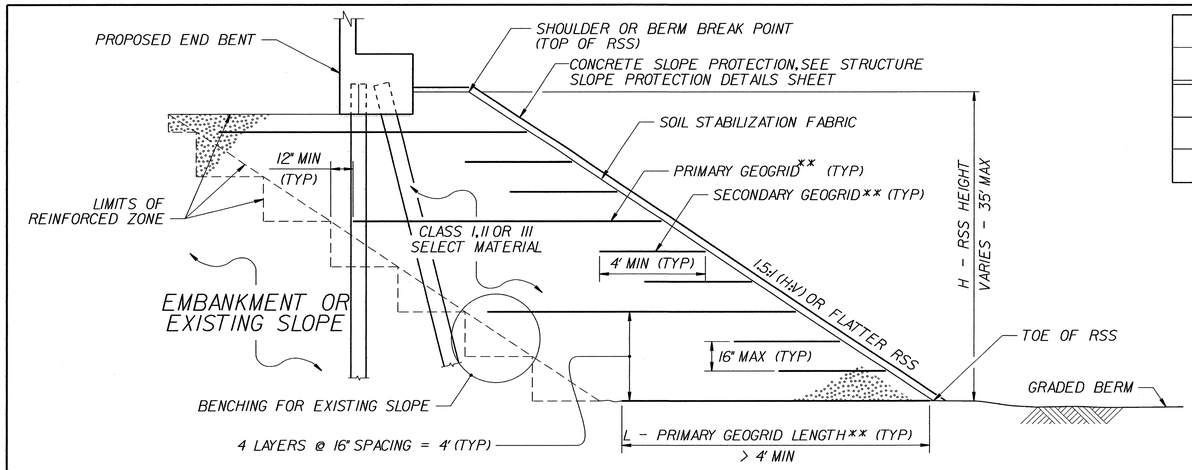
tfang

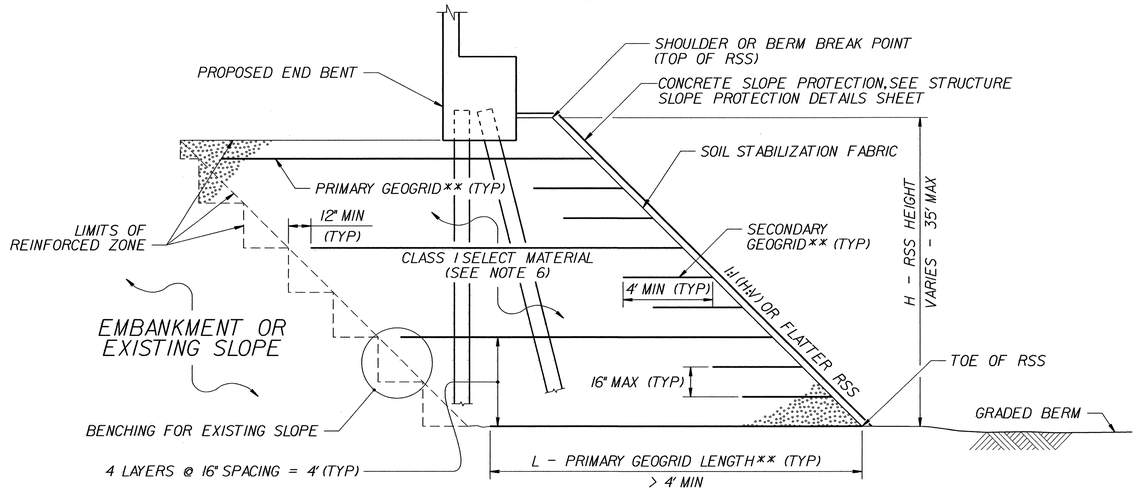
STR #1

STD. NO. SP1



STANDARD RSS WITH SELECT MATERIAL THAT DOES NOT MEET ARTICLE 1019-2 OF THE STANDARD SPECIFICATIONS

****SEE TABLES AND GEOGRID PLACEMENT DETAILS.**



STANDARD RSS WITH SELECT MATERIAL THAT MEETS ARTICLE 1019-2 OF THE STANDARD SPECIFICATIONS

****SEE TABLES AND GEOGRID PLACEMENT DETAILS.**

NOTES:

1. FOR STANDARD REINFORCED SOIL SLOPES, SEE REINFORCED SOIL SLOPE SPECIAL PROVISION.
2. STANDARD RSS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
   UNIT WEIGHT, γ = 120 LB/CF
   FRICTION ANGLE, ϕ = 30 DEGREES
   COHESION, c = 0 LB/SF
3. DO NOT USE STANDARD RSS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR GROUNDWATER IS ABOVE TOE OF RSS.
4. DO NOT USE STANDARD RSS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW RSS.
5. FOR 1:1 TO < 1.5:1 (H:V) RSS, USE CLASS I SELECT MATERIAL IN THE REINFORCED ZONE THAT MEETS ARTICLE 1019-2 OF THE STANDARD SPECIFICATIONS EXCEPT FOR SELECT MATERIAL THAT MEETS AASHTO M 145 FOR SOIL CLASSIFICATIONS A-4 AND A-5. DO NOT USE A-4 OR A-5 SOIL OR CLASS II OR III SELECT MATERIAL FOR 1:1 TO < 1.5:1 (H:V) RSS.
6. EXCEPT FOR TENSAR UX GEOGRIDS, DO NOT SPLICE OR OVERLAP PRIMARY GEOGRIDS IN THE MACHINE DIRECTION (MD) SO SPLICES OR OVERLAPS ARE PARALLEL TO THE TOE OF RSS. TENSAR UX GEOGRIDS MAY BE SPLICED ONCE PER PRIMARY GEOGRID LENGTH IN ACCORDANCE WITH TENSAR'S BODKIN CONNECTION DETAIL. USE TENSAR UX GEOGRID PIECES AT LEAST 4' LONG.
7. EXCEPT FOR TENSAR UX GEOGRIDS, PLACE PRIMARY GEOGRIDS SO GEOGRIDS ARE ADJACENT TO EACH OTHER IN THE CROSS-MACHINE DIRECTION (CD). TENSAR UX GEOGRIDS MAY BE PLACED WITH A MAXIMUM SPACING BETWEEN GEOGRIDS OF 1.64' IN THE CD. STAGGER TENSAR UX GEOGRIDS SO GEOGRIDS ARE CENTERED OVER GAPS IN THE PRIMARY GEOGRID LAYER BELOW.
8. DO NOT PLACE PRIMARY GEOGRIDS UNTIL EXCAVATION DIMENSIONS AND IN-SITU MATERIAL ARE APPROVED.
9. REINFORCED SOIL SLOPE IS TO BE CONSTRUCTED FIRST AND THEN PILES FOR THE END BENTS TO BE DRIVEN THROUGH THE GEOGRID LAYERS.
10. REINFORCED SOIL SLOPE IS TO BE FACED WITH CONCRETE SLOPE PROTECTION. FOR QUANTITIES AND DETAILS SEE SLOPE PROTECTION DETAILS SHEET.
11. REINFORCED SOIL SLOPE FACE IS TO BE STABILIZED WITH TYPE II ENGINEERING FABRIC WHEN COMPLETED AND IS TO REMAIN INTACT UNTIL THE SLOPE ARE FACED WITH CONCRETE SLOPE PROTECTION.

PREPARED BY: EJS	DATE: 1/19/12
REVIEWED BY: SCC	DATE: 2/23/12

ESTIMATED QUANTITIES	
BRIDGE @ STA. 25+98.15 -L- LEFT LANE	EXPOSED SLOPE AREA SQ. YARDS
REINFORCED SOIL SLOPE AT END BENT 1	270
REINFORCED SOIL SLOPE AT END BENT 2	230

H (FT)	0 - < 10		10 - 20		> 20 - 35	
SELECT MATERIAL CLASS	I	II OR III	I	II OR III	I	II OR III
1:1 TO < 1.5:1 (H:V) RSS	1.20	SEE NOTE 6	1.10	SEE NOTE 6	1.00	SEE NOTE 6
1.5:1 TO 1.75:1 (H:V) RSS	1.15	1.00	1.05	0.95	0.95	0.90
> 1.75:1 TO < 2:1 (H:V) RSS	1.10	0.75	1.00	0.70	0.90	0.65

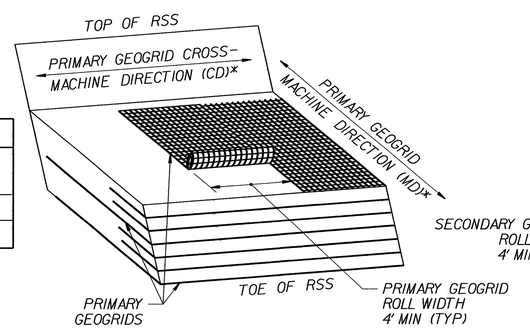
L /H RATIO (L > 4' MIN)

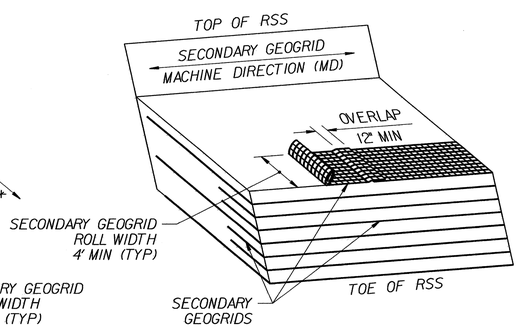
IF L ≤ 4', USE SECONDARY GEOGRID INSTEAD OF PRIMARY GEOGRID.

H (FT)		0 - < 10		10 - 20		> 20 - 35	
SELECT MATERIAL CLASS		I	II OR III	I	II OR III	I	II OR III
PRIMARY GEOGRID (SUBSTITUTE SECONDARY GEOGRID FOR PRIMARY GEOGRID FOR ≥ 2:1 (H:V) RSS)	1:1 TO < 1.5:1 (H:V) RSS	2XT SG150 SF20 UX1100HS	SEE NOTE 6	3XT SG200 SF35 UX1400HS	SEE NOTE 6	5XT SG350 SF55 UX1500HS	SEE NOTE 6
	1.5:1 TO 1.75:1 (H:V) RSS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	3XT SG200 SF35 UX1400HS	2XT SG150 SF20 UX1100HS	3XT SG200 SF35 UX1400HS	2XT SG150 SF20 UX1100HS
	> 1.75:1 TO < 2:1 (H:V) RSS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS
SECONDARY GEOGRID	1:1 (H:V) OR FLATTER RSS	2XT SG150 SF11 BX1100					

PRIMARY AND SECONDARY GEOGRIDS

#XT REFERS TO MIRAFI SERIES GEOGRID.
SG### REFERS TO STRATAGRID SERIES GEOGRID.
SF## REFERS TO SYNTEEN SERIES GEOGRID.
UX####HS AND BX#### REFER TO TENSAR SERIES GEOGRID.





GEOGRID PLACEMENT DETAILS

***SEE NOTES 6 AND 7.**

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 029869 ENGINEER SHANE C. CLARK

SIGNATURE 2/23/12 DATE

ENGINEER

SIGNATURE DATE

PROJECT NO.: B-4506

FORSYTH ***COUNTY***

STATION: 25+98.15 -L-

GEOTECHNICAL ENGINEERING UNIT

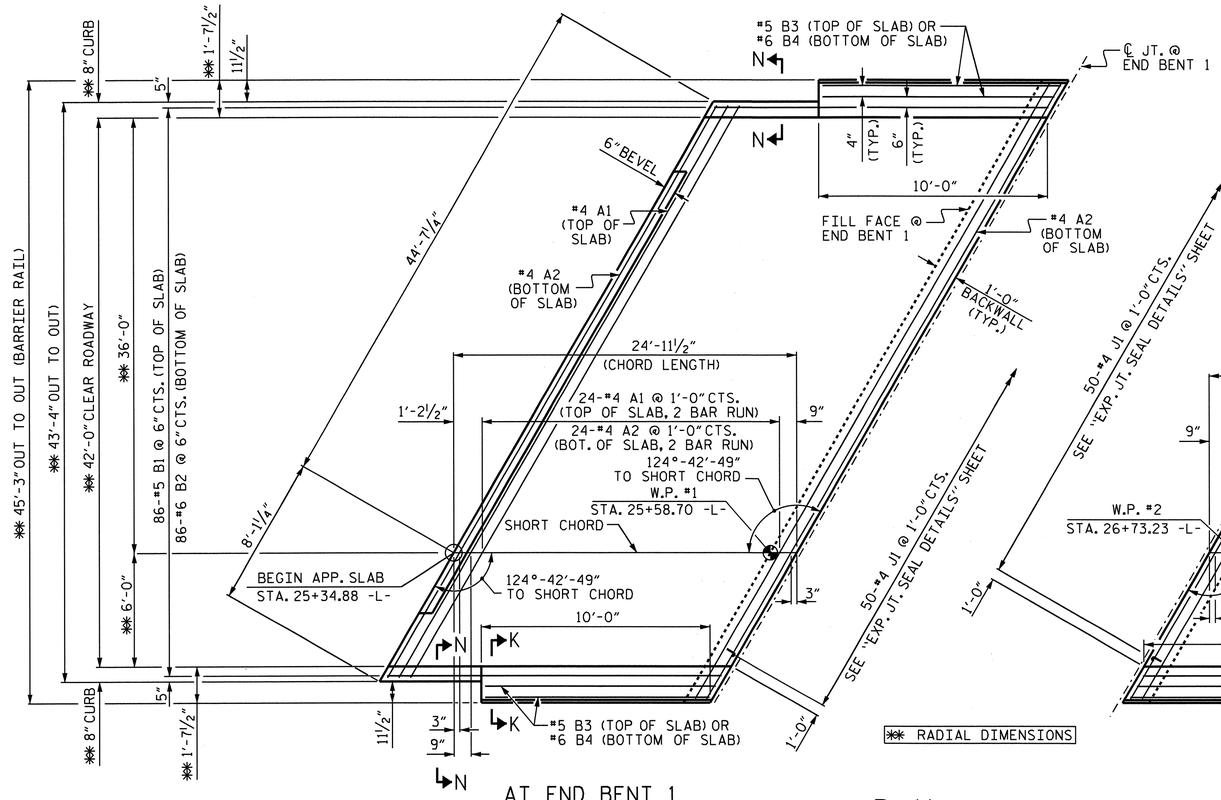
☐ ***EASTERN REGIONAL OFFICE***
☒ ***WESTERN REGIONAL OFFICE***
☐ ***CONTRACT OFFICE***

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

REINFORCED SOIL SLOPE (RSS) AT END BENTS

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-24A
1	-	-	3	-	-	TOTAL SHEETS
2	-	-	4	-	-	52



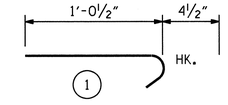
AT END BENT 1

PLAN

AT END BENT 2

BILL OF MATERIAL FOR ONE APPROACH SLAB (2 REQ'D)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
** A1	50	#4	STR	28'-5"	949
A2	52	#4	STR	28'-3"	981
** B1	86	#5	STR	23'-4"	2093
B2	86	#6	STR	24'-7"	3175
** B3	4	#5	STR	9'-8"	40
B4	4	#6	STR	9'-8"	58
** J1	50	#4	1	1'-5"	47
REINFORCING STEEL				LBS.	4,214
** EPOXY COATED REINFORCING STEEL				LBS.	3,129
CLASS AA CONCRETE				C. Y.	48.0

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

NOTE: QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE SHEET 2 OF 2.

SPLICE CHART		
BAR	SIZE	SPLICE
** A1	#4	2'-0"
A2	#4	1'-9"

NOTES

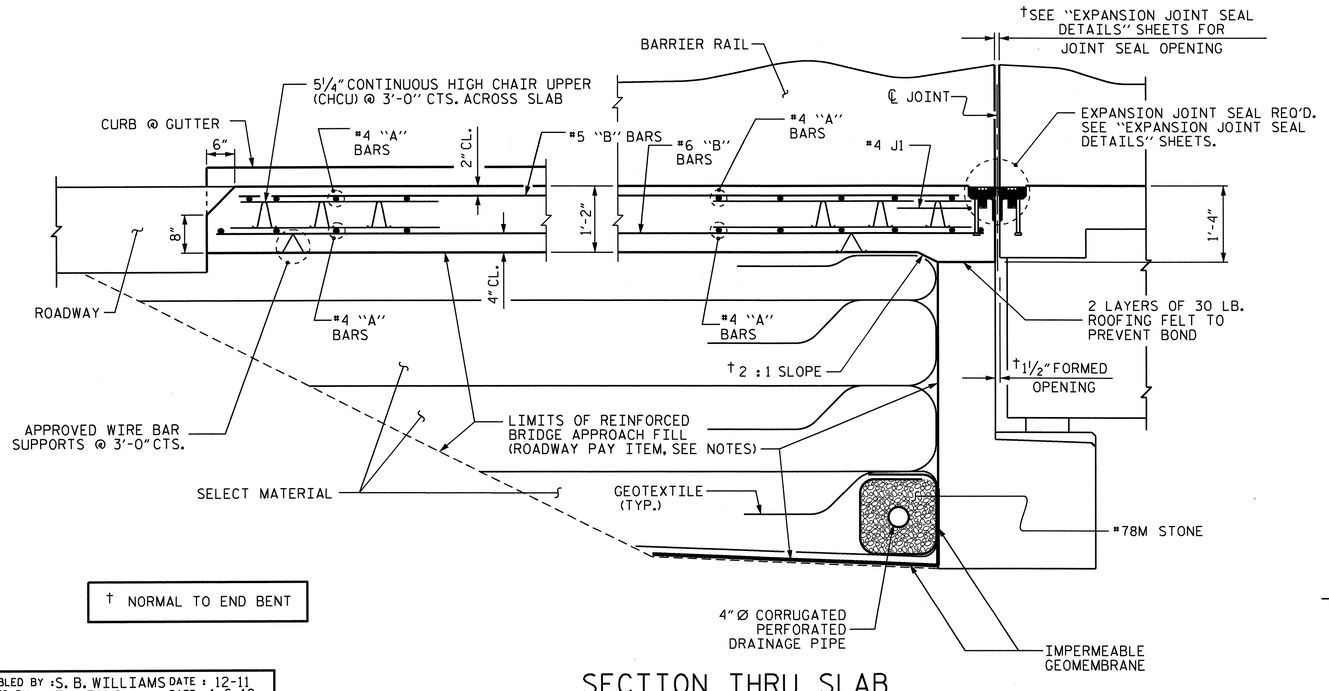
APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

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.

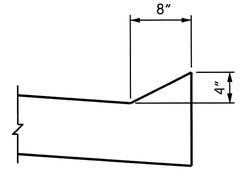
FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

ARC OFFSETS ARE NEGLIGIBLE, THEREFORE NOT SHOWN.

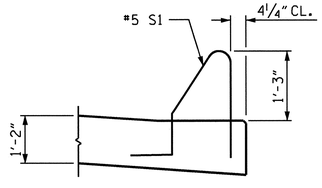


† NORMAL TO END BENT

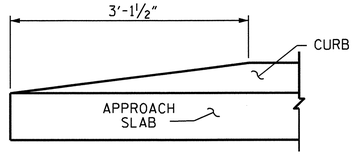
SECTION THRU SLAB



SECTION N-N



SECTION K-K



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS
2			4			52

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIANG FANG

2/24/12

ASSEMBLED BY : S. B. WILLIAMS	DATE : 12-11	REV. 5/7/03R	RWW/JTE
CHECKED BY : T.H. FANG	DATE : 1-6-12	REV. 5/1/06RR	KMM/GM
DRAWN BY : EEM 3/95		REV. 10/1/11	MAA/GM
CHECKED BY : VAP 3/95			

24-FEB-2012 15:27
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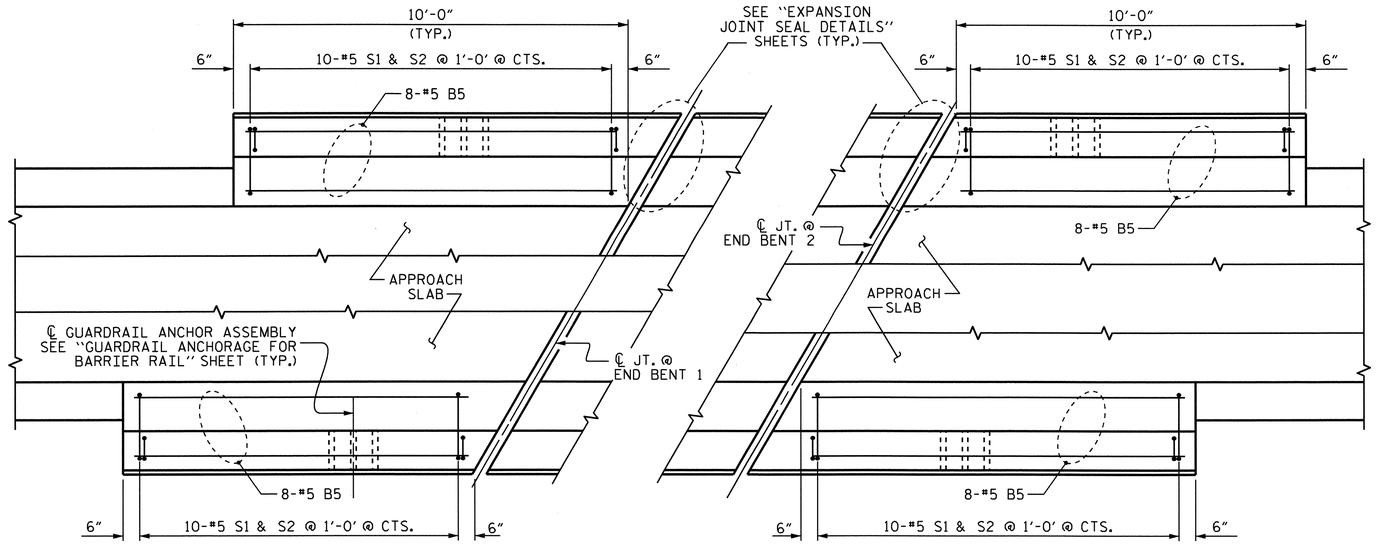
tfang

STR #1

STD. NO. BAS2 (SHT 4b)



AT END BENT 1

AT END BENT 2

PLAN OF BARRIER RAIL

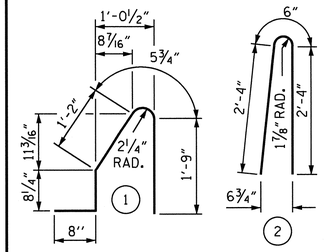
FOR EXPANSION JOINT SEAL, SEE "EXPANSION JOINT SEAL DETAILS" SHEET

NOTES

THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES



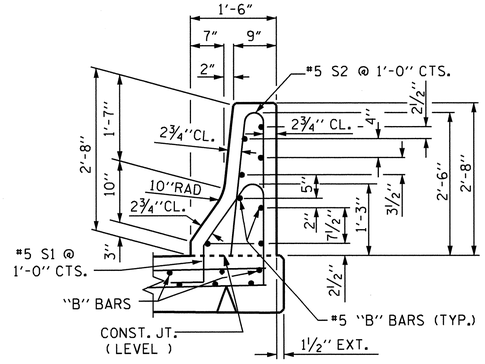
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

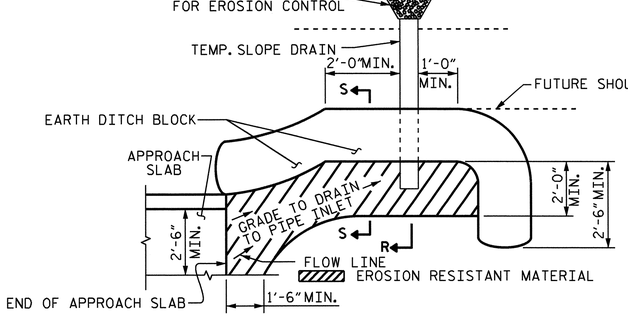
BARRIER RAILS ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B5	32	#5	STR	9'-8"	323
✱S1	40	#5	1	4'-9"	198
✱S2	40	#5	2	5'-2"	216
✱EPOXY COATED REINFORCING STEEL				LBS.	737
CLASS AA CONCRETE				C.Y.	4.4
CONCRETE BARRIER RAIL				44.33	LIN.FT.

✱✱ PAYMENT FOR CONCRETE BARRIER RAIL TO BE INCLUDED IN THE LINEAR FT. QUANTITY ON "CONCRETE BARRIER RAIL" SHEET.

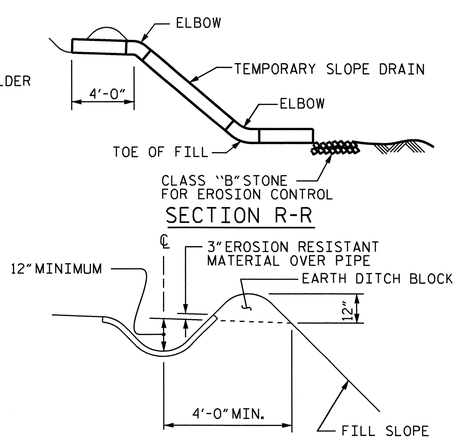


SECTION THRU RAIL



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

PLAN VIEW

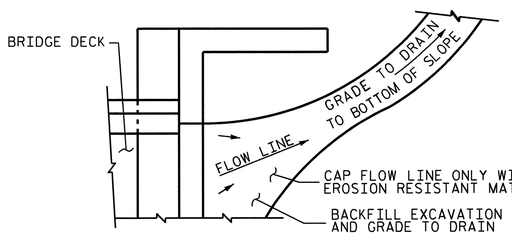


SECTION R-R

SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



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

TEMPORARY DRAINAGE DETAIL

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

(LEFT LANE)

ASSEMBLED BY : S. B. WILLIAMS	DATE : 12-01-11
CHECKED BY : T. H. FANG	DATE : 12-08-11

DRAWN BY : FCJ 11/88	REV. 10/17/00 RWW/LES
CHECKED BY : ARB 11/88	REV. 5/7/03 RWW/JTE
	REV. 5/1/06R MAA/KMM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-26
1			3			TOTAL SHEETS
2			4			52

STR.#1 STD. NO. BAS10

09-JAN-2012 16:34
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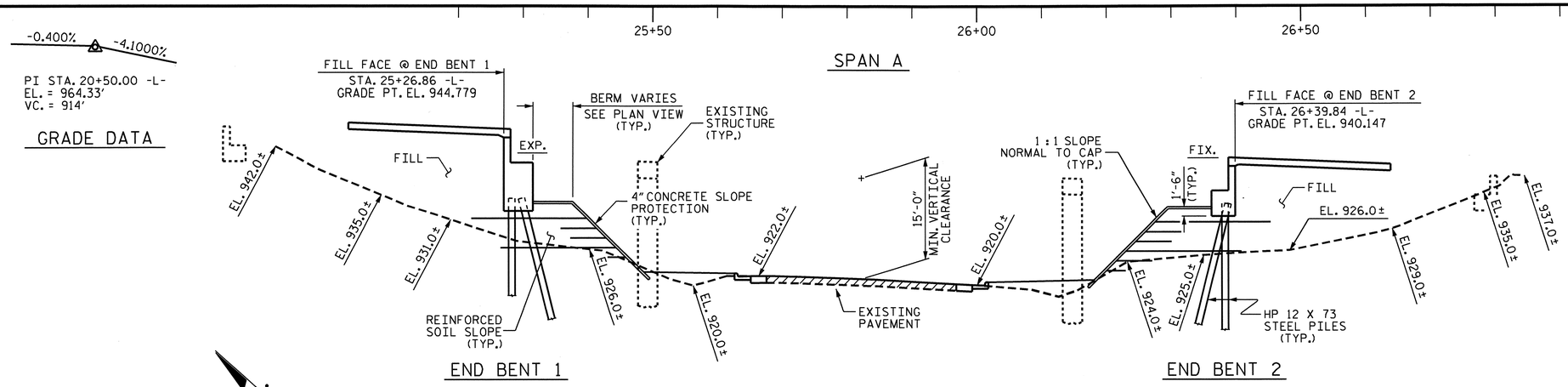
kpnewton

F.A. PROJECT BRNHS-52(24)

GRADE DATA

PI STA. 20+50.00 -L-
EL. = 964.33'
VC. = 914'



SECTION ALONG RIGHT LANE CONTROL LINE

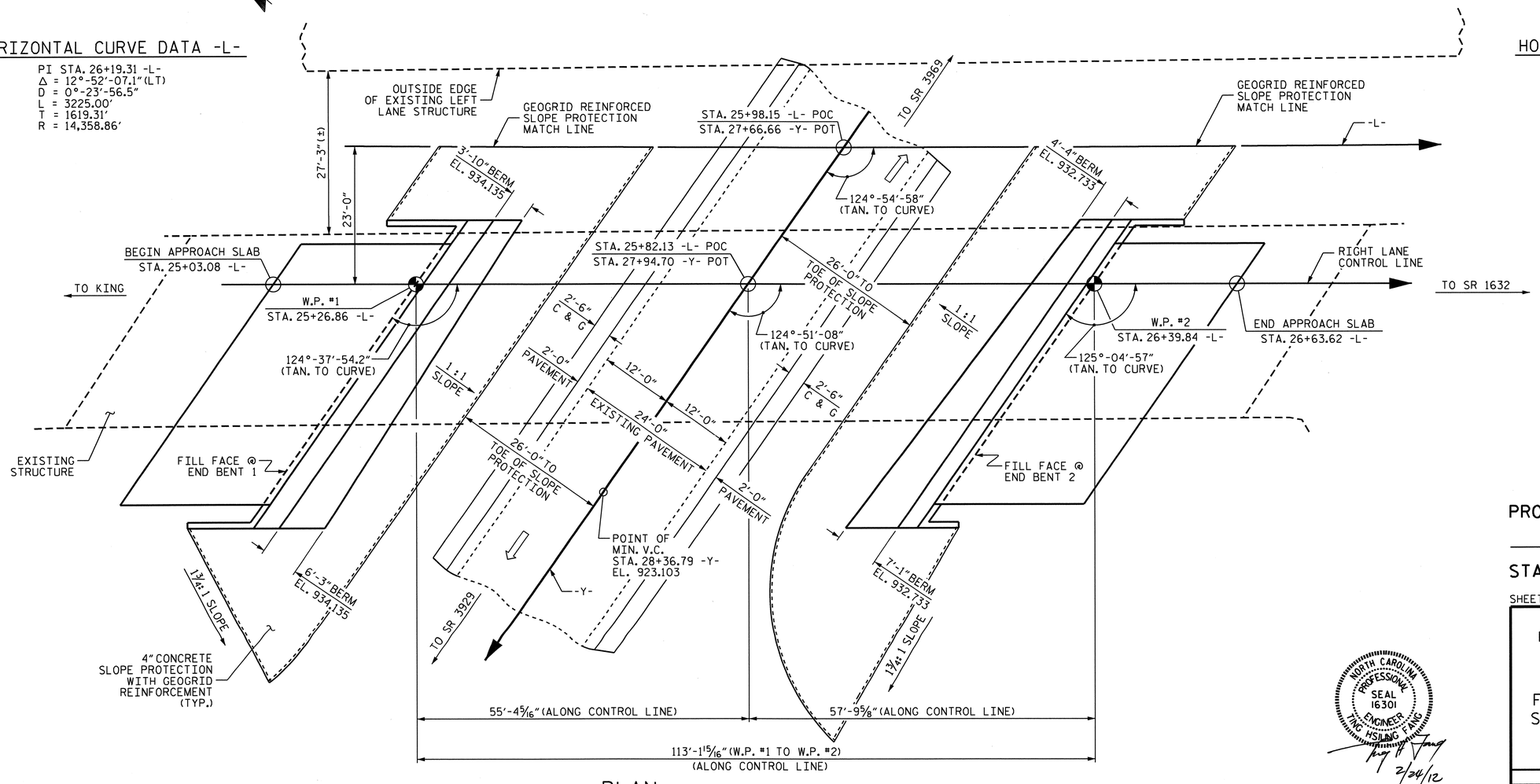
SECTIONS @ END BENTS ARE AT RIGHT ANGLES

HORIZONTAL CURVE DATA -L-

PI STA. 26+19.31 -L-
Δ = 12°-52'-07.1" (LT)
D = 0°-23'-56.5"
L = 3225.00'
T = 1619.31'
R = 14,358.86'

HORIZONTAL CURVE DATA -Y-

PI STA. 26+74.42 -Y-
Δ = 5°-08'-55.0" (LT)
D = 11°-27'-33.0"
L = 44.93'
T = 22.48'
R = 500.00'



PLAN

PILES NOT SHOWN FOR CLARITY.

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSING FANG
2/24/12

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L- POC
= 27+66.66 -Y- POT
SHEET 1 OF 3
REPLACES BRIDGE NO. 335

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 52 OVER
SR 1620 (TOBACCOVILLE RD.)

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : E.C. LOCKLEAR DATE : 9-29-10
CHECKED BY : T.H. FANG DATE : 9-30-10

24-FEB-2012 16:42
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tfang

STR. #2

NOTES

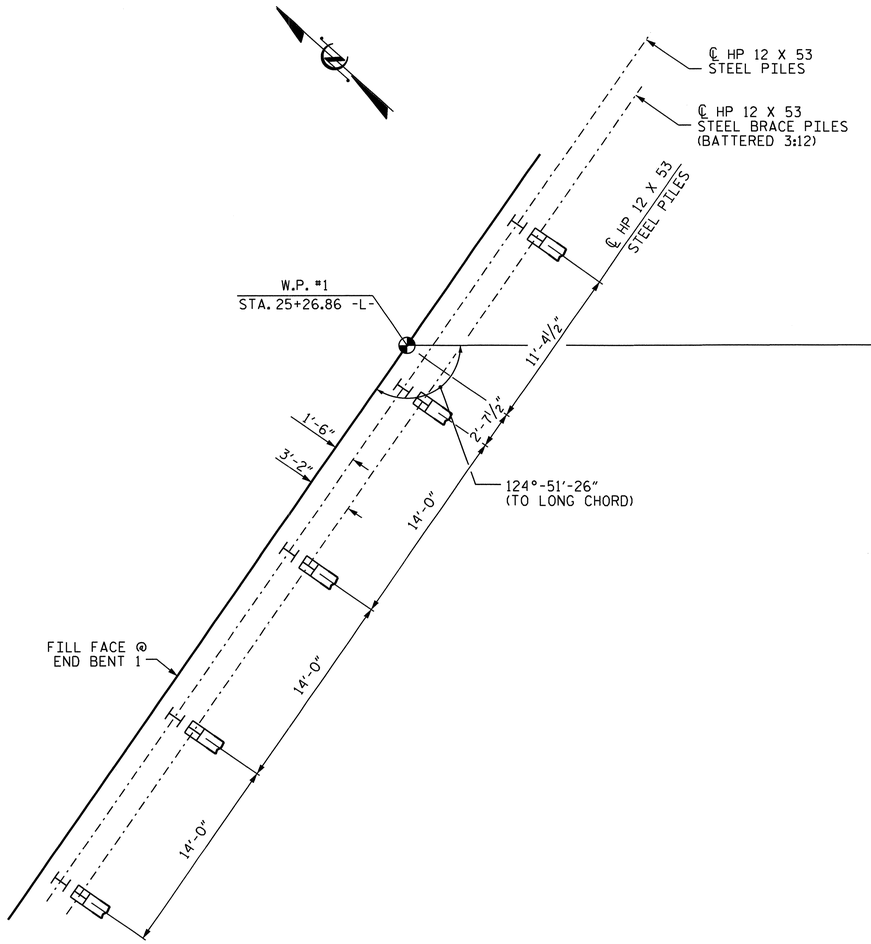
FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENTS 1 & 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 110 TONS PER PILE.

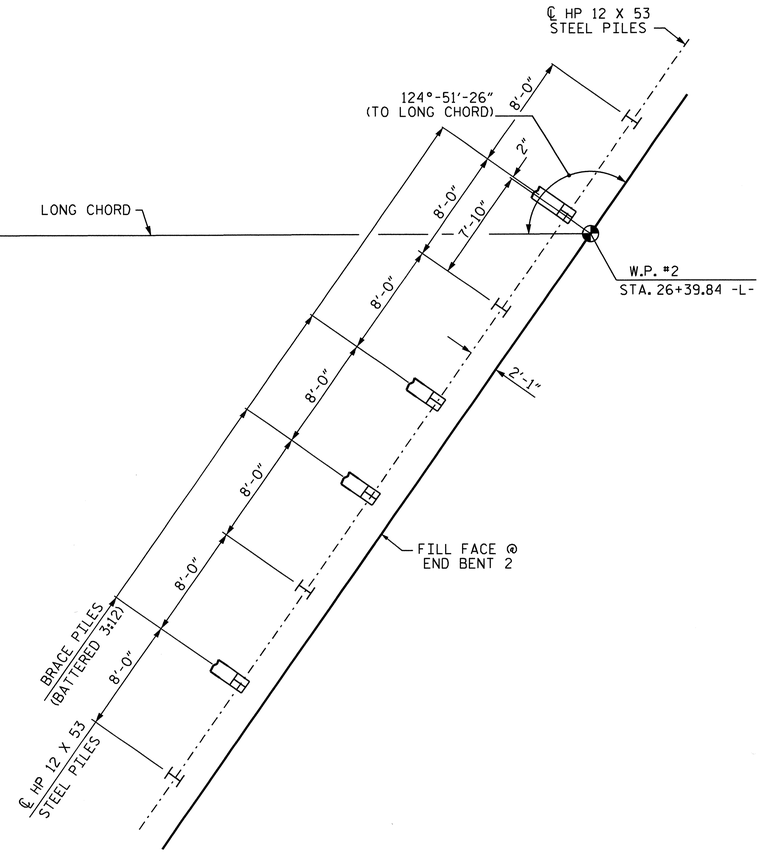
DRIVE PILES AT END BENTS 1 & 2 TO A REQUIRED DRIVING RESISTANCE OF 183 TONS PER PILE.

A 1 : 1 (H:V) REINFORCED SOIL SLOPE WITH SLOPE PROTECTION IS REQUIRED AT EACH END BENT. SEE PLANS AND SPECIAL PROVISIONS.

OBSERVE A 3 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENTS 1 AND 2. THE WAITING PERIODS MAY BE REDUCED BY THE ENGINEER AFTER THE REVIEW AND ACCEPTANCE OF SETTLEMENT DATA THAT HAS BEEN OBTAINED BY EMBANKMENT MONITORING USING SURVEY HUBS. INSTALLATION AND MONITORING WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AND WILL BE CONSIDERED INCIDENTAL TO THE PROJECT.



END BENT 1



END BENT 2

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN TO PILE CENTERLINE AND MEASURED AT CAP BOTTOM.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 52 OVER SR 1620 (TOBACCOVILLE RD.)

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG

3/23/12

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-28
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : QT NGUYEN DATE : 7-20-11
CHECKED BY : T. H. FANG DATE : 12-5-11

23-MAR-2012 12:42
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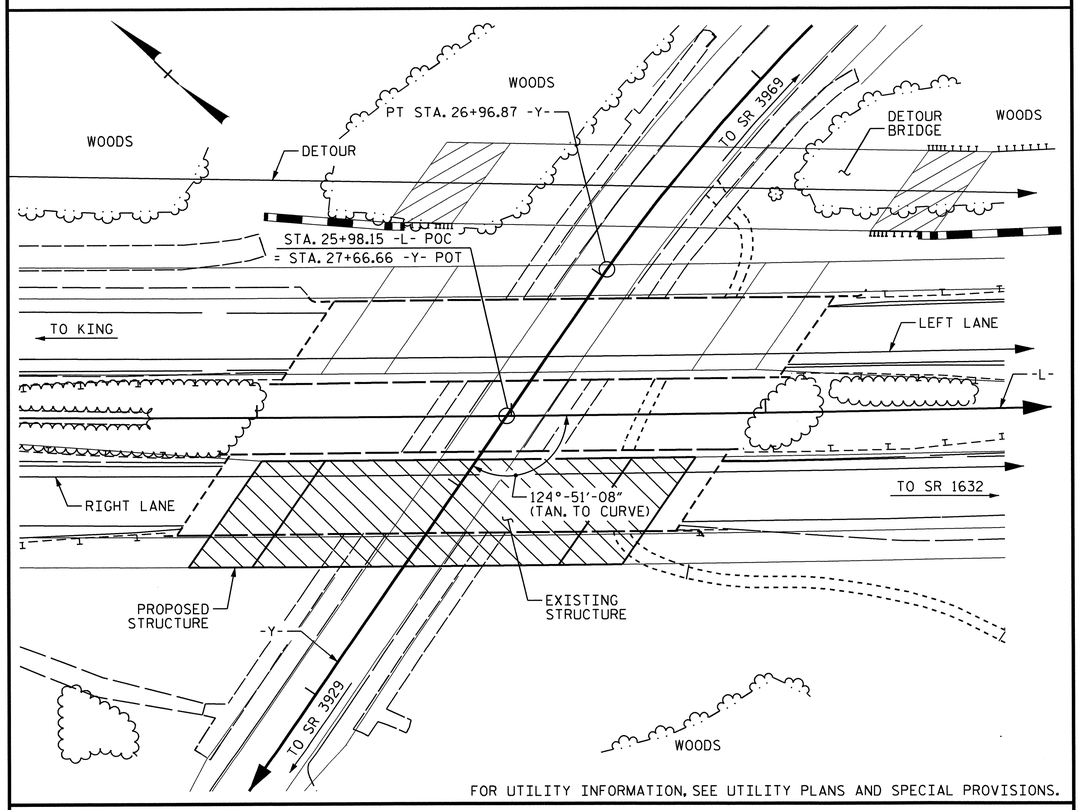
tfang

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	STRUCTURAL STEEL	HP 12 X 53 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	REINFORCED SOIL SLOPE
	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	APPROX. LBS.	NO.	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM	LUMP SUM	SQ. YDS.
SUPERSTRUCTURE		5,001	6,087				149,700			265.38		LUMP SUM	LUMP SUM	
END BENT 1				96.5		10,008		10	400		270			215
END BENT 2				48.6		6,333		8	220		300			240
TOTAL	LUMP SUM	5,001	6,087	145.1	LUMP SUM	16,341	149,700	18	620	265.38	570	LUMP SUM	LUMP SUM	455

BM #3: NORTHERN MOST BOLT ON FIRE HYDRANT, SOUTH OF EOP OF KING/TOBACCOVILLE RD., 472.0' RIGHT OF STA. 23+14.00 -L-, EL. 945.30



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

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 25+98.15 -L-."

THE EXISTING STRUCTURE CONSISTS OF RC FLOOR ON I-BEAMS @ 8'-0" CENTER IN 3 SPANS @ 65'-6" WITH A CLEAR ROADWAY WIDTH OF 28'-0". THE SUBSTRUCTURE; END BENTS: RC CAP ON PPC PILES, INTERIOR BENTS: RC POST AND BEAM LOCATED AT THE SITE OF 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.

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

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

THE BRIDGE RAILS ON THE TEMPORARY STRUCTURE SHALL BE DESIGNED FOR THE AASHTO LRFD TEST LEVEL 3 (TL-3) CRASH TEST CRITERIA. FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY STRUCTURE, SEE SPECIAL PROVISIONS.

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

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W AND PAINTED IN ACCORDANCE WITH SYSTEM 4 OF ARTICLE 442-8 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

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

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

THE CONTRACTOR WILL BE REQUIRED TO CONSTRUCT, MAINTAIN AND AFTERWARDS REMOVE A TEMPORARY STRUCTURE AT STATION 25+98.15 L- FOR USE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE. FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY STRUCTURE, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG

2/28/12

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 52 OVER SR 1620 (TOBACCOVILLE RD.)

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-29
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : E.C. LOCKLEAR DATE : 9-29-10
CHECKED BY : T.H. FANG DATE : 9-30-10

28-FEB-2012 10:08
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tfang

STR. #2

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR STEEL GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE II LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR					MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	⟨1⟩	1.34	--	1.75	0.776	1.50	A	EL	53.75	1.075	1.34	A	I	107.46	1.30	0.776	1.62	A	EL	53.75	
		HL-93 (OPERATING)	N/A		1.74	--	1.35	0.776	1.94	A	EL	53.75	1.075	1.74	A	I	107.46	1.00	0.776	2.11	A	EL	53.75	
		HS-20 (INVENTORY)	36.00	⟨2⟩	1.60	57.60	1.75	0.776	1.83	A	EL	53.75	1.075	1.60	A	I	107.46	1.30	0.776	1.97	A	EL	21.50	
		HS-20 (OPERATING)	36.00		2.08	74.88	1.35	0.776	2.37	A	EL	53.75	1.075	2.08	A	I	107.46	1.00	0.776	2.56	A	EL	21.50	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.74	63.99	1.40	0.776	5.48	A	EL	53.75	1.075	5.00	A	I	107.46	1.30	0.776	4.74	A	EL	53.75	
		SNGARBS2	20.000		3.39	67.80	1.40	0.776	3.95	A	EL	53.75	1.075	3.48	A	I	107.46	1.30	0.776	3.39	A	EL	86.00	
		SNAGRIS2	22.000		3.13	68.86	1.40	0.776	3.68	A	EL	53.75	1.075	3.20	A	I	107.46	1.30	0.776	3.13	A	EL	86.00	
		SNCOTTS3	27.250		2.36	64.31	1.40	0.776	2.73	A	EL	53.75	1.075	2.49	A	I	107.46	1.30	0.776	2.36	A	EL	53.75	
		SNAGGRS4	34.925		1.92	67.06	1.40	0.776	2.22	A	EL	53.75	1.075	2.02	A	I	0.00	1.30	0.776	1.92	A	EL	53.75	
		SNS5A	35.550		1.88	66.83	1.40	0.776	2.17	A	EL	53.75	1.075	2.02	A	I	0.00	1.30	0.776	1.88	A	EL	53.75	
		SNS6A	39.950		1.71	68.31	1.40	0.776	1.98	A	EL	53.75	1.075	1.81	A	I	0.00	1.30	0.776	1.71	A	EL	53.75	
		SNS7B	42.000		1.63	68.46	1.40	0.776	1.88	A	EL	53.75	1.075	1.76	A	I	0.00	1.30	0.776	1.63	A	EL	53.75	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.08	68.64	1.40	0.776	2.40	A	EL	53.75	1.075	2.19	A	I	107.46	1.30	0.776	2.08	A	EL	53.75	
		TNT4A	33.075		2.08	68.80	1.40	0.776	2.40	A	EL	53.75	1.075	2.15	A	I	107.46	1.30	0.776	2.08	A	EL	53.75	
		TNT6A	41.600		1.68	69.89	1.40	0.776	1.94	A	EL	53.75	1.075	1.83	A	I	107.46	1.30	0.776	1.68	A	EL	53.75	
		TNT7A	42.000		1.68	70.56	1.40	0.776	1.94	A	EL	53.75	1.075	1.80	A	I	107.46	1.30	0.776	1.68	A	EL	53.75	
		TNT7B	42.000		1.71	71.82	1.40	0.776	1.99	A	EL	53.75	1.075	1.74	A	I	0.00	1.30	0.776	1.71	A	EL	86.00	
		TNAGRIT4	43.000		1.65	70.95	1.40	0.776	1.90	A	EL	53.75	1.075	1.68	A	I	0.00	1.30	0.776	1.65	A	EL	53.75	
		TNAGT5A	45.000		1.57	70.65	1.40	0.776	1.81	A	EL	53.75	1.075	1.65	A	I	0.00	1.30	0.776	1.57	A	EL	53.75	
		TNAGT5B	45.000	⟨3⟩	1.55	69.75	1.40	0.776	1.80	A	G1	53.75	1.075	1.61	A	I	0.00	1.30	0.776	1.55	A	EL	53.75	
FATIGUE		HL-93 (INVENTORY)	γ_{LL}=0.75																				

LOAD FACTORS:

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

NOTES:

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

ALLOWABLE STRESS FOR SERVICE II LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1. ALL GIRDERS HAVE SLIGHTLY DIFFERENT LENGTHS. GIRDER 2 CONTROLS THE STRENGTH I SHEAR RATING.
2.
3.
4.

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93) **

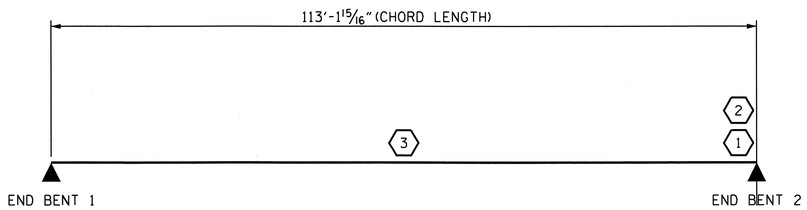
⟨2⟩ DESIGN LOAD RATING (HS-20) **

⟨3⟩ LEGAL LOAD RATING **

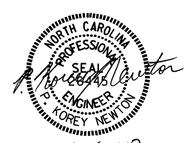
** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY



1/10/2012

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR STEEL GIRDERS
(RIGHT LANE)
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-30
1			3			TOTAL SHEETS
2			4			52

STD. NO. LRFR3

ASSEMBLED BY : P. K. NEWTON	DATE : 12/12/11
ASSEMBLED BY : P. K. NEWTON	DATE :
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	

10-JAN-2012 15:28
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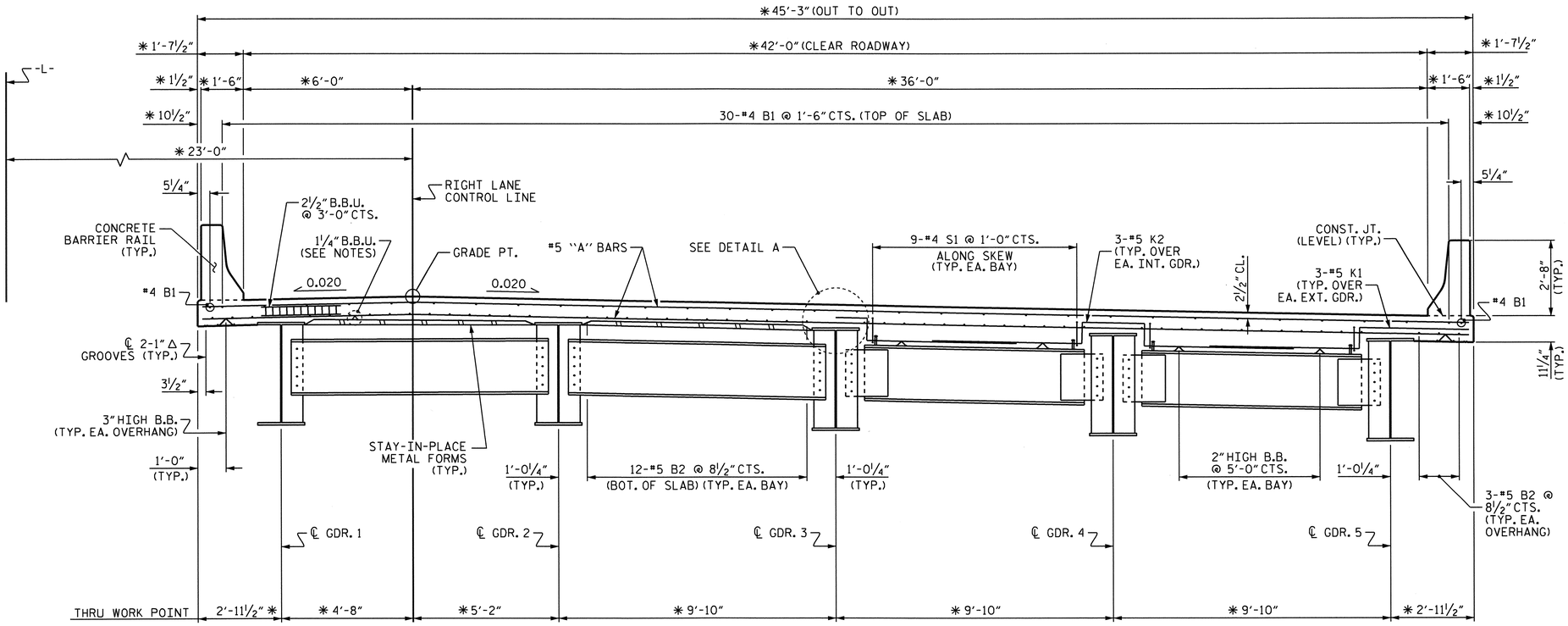
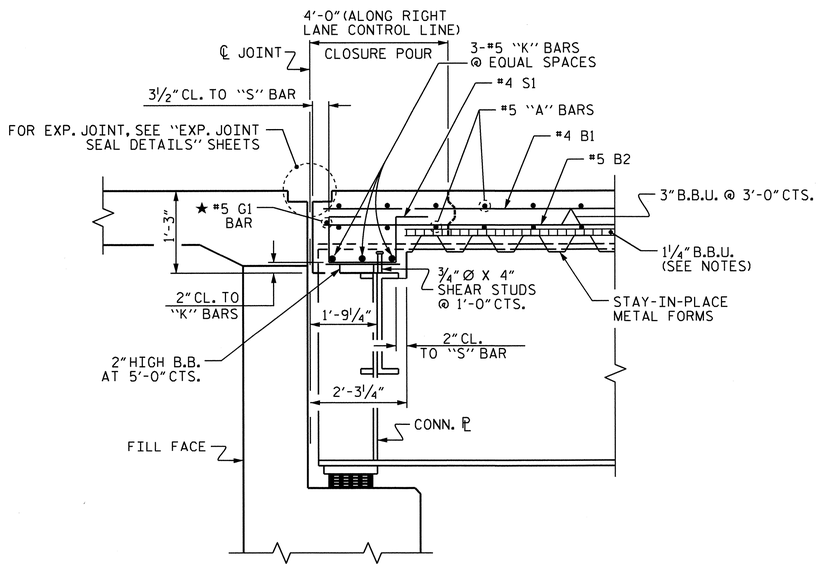
kpnewton



PARTIAL TYPICAL SECTION
SHOWING INTERMEDIATE DIAPHRAGMS

PARTIAL TYPICAL SECTION
SHOWING END BENT DIAPHRAGMS

*RADIAL DIMENSIONS

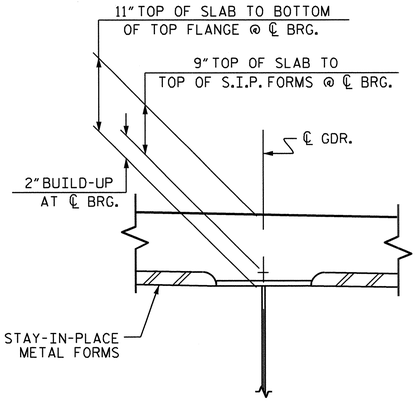


SECTION @ END BENT
★ #5 G1 BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY TO CLEAR DIAPHRAGM AND REINFORCING STEEL.

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

THE CONTRACTOR MAY, WHEN NECESSARY, PROPOSE A SCHEME FOR AVOIDING INTERFERENCE BETWEEN METAL STAY-IN-PLACE FORM SUPPORTS OR FORMS AND BEAM/GIRDER STIFFENERS OR CONNECTOR PLATES. THE PROPOSAL SHALL BE INDICATED, AS APPROPRIATE, ON EITHER THE STEEL WORKING DRAWINGS OR THE METAL STAY-IN-PLACE FORM WORKING DRAWINGS.

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



DETAIL "A"

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-31
1			3			TOTAL SHEETS
2			4			52

STR. #2

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING-HSIENG FANG
2/27/12

DRAWN BY : QT NGUYEN DATE : 7-11
CHECKED BY : T.H. FANG DATE : 1-12

27-FEB-2012 16:37
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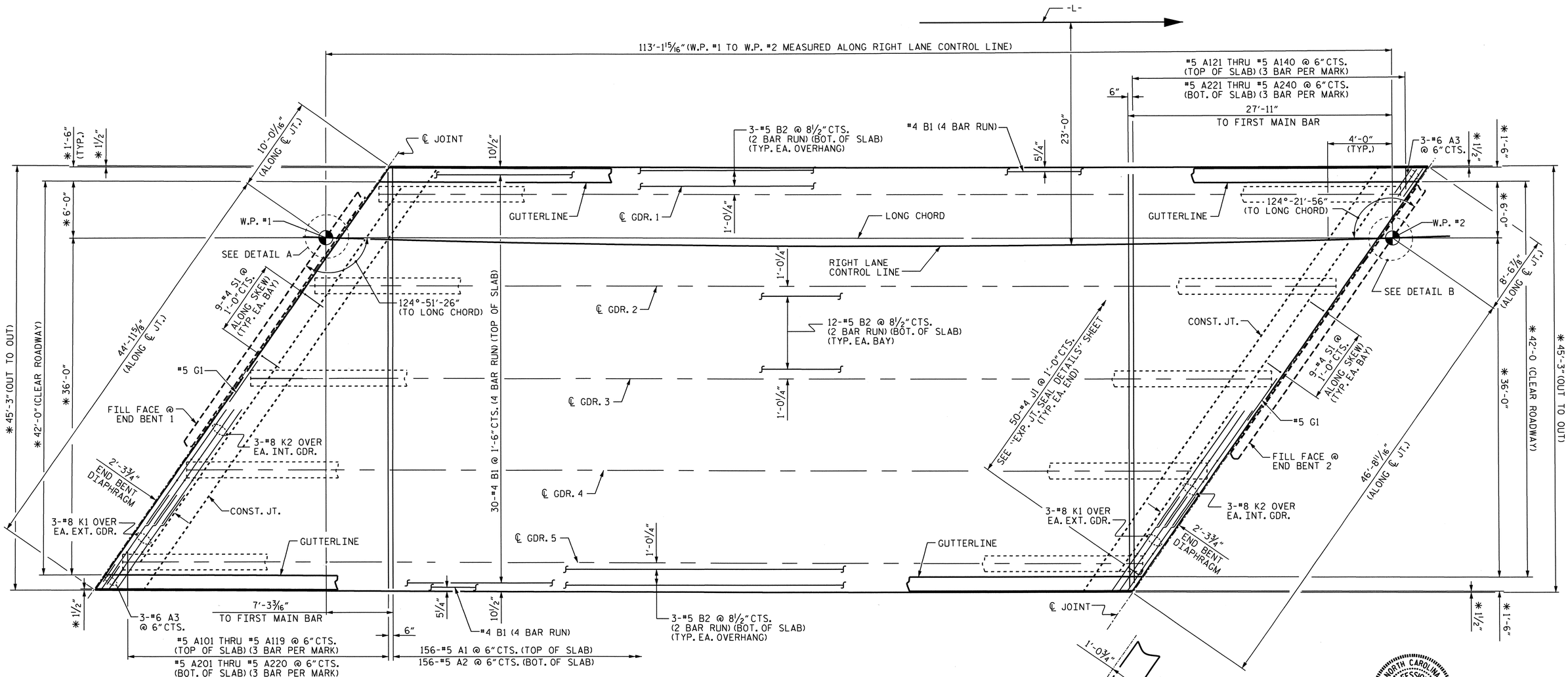
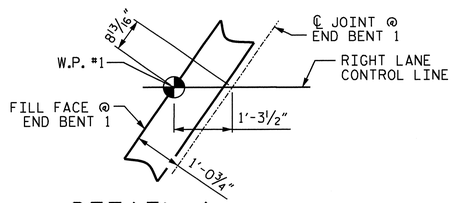
ttfang

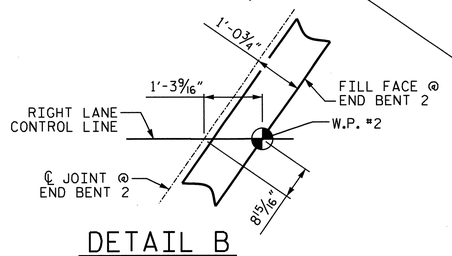


*RADIAL DIMENSIONS

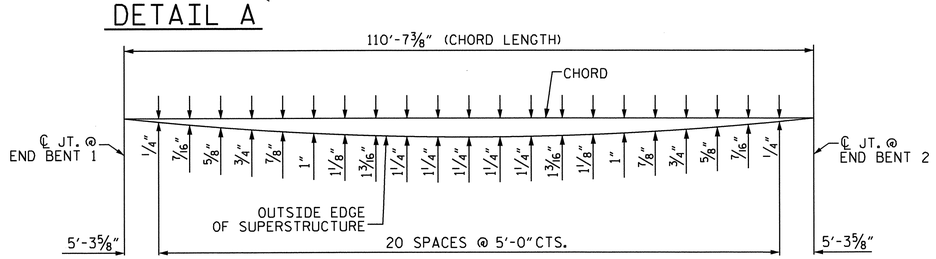
PLAN OF SPAN



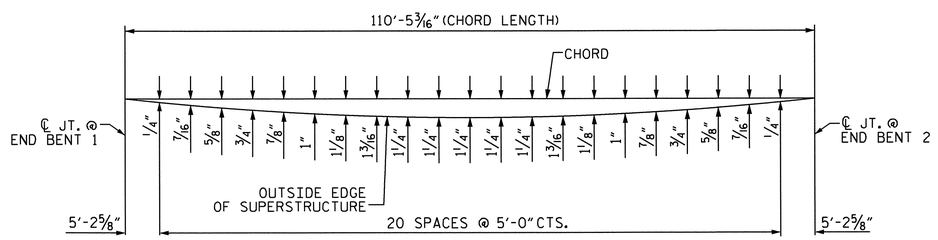
DETAIL A



DETAIL B



LEFT OUTSIDE EDGE



RIGHT OUTSIDE EDGE

ARC OFFSETS

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIANG FANG 2/27/12

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET OF

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-32
1			3			TOTAL SHEETS
2			4			52

STR. #2

DRAWN BY : QT NGUYEN DATE : 7-13-11
CHECKED BY : T.H. FANG DATE : 1-12

27-FEB-2012 10:23
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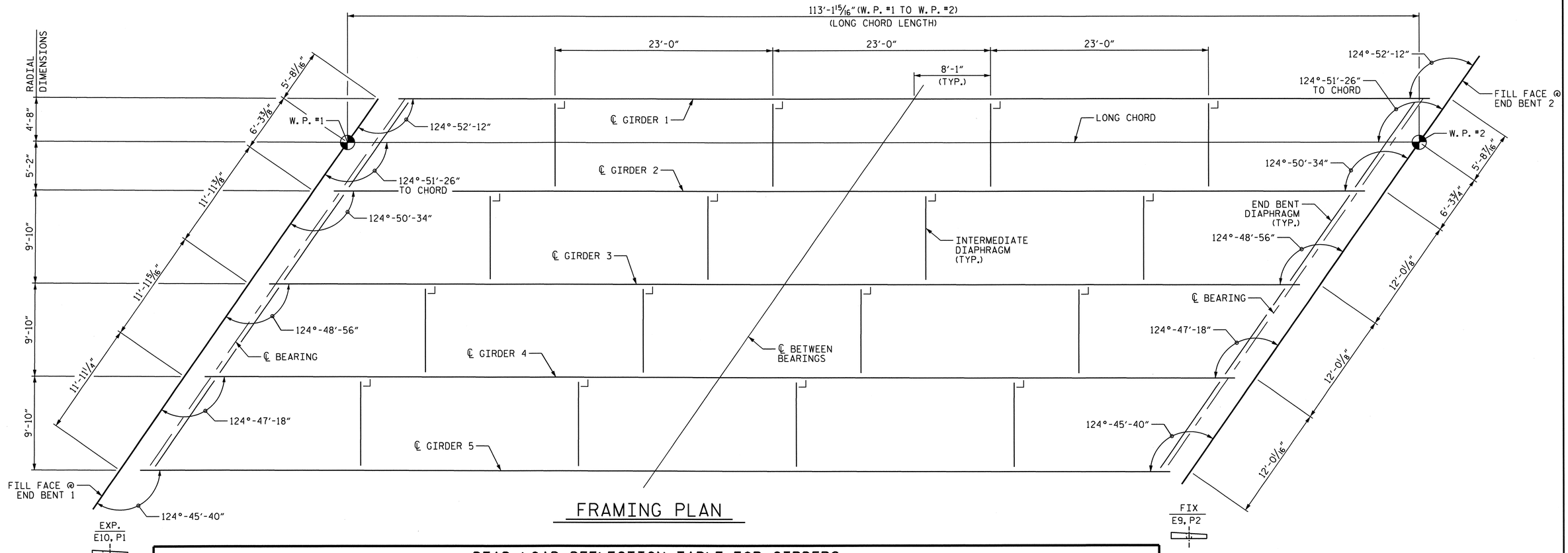

FRAMING PLAN

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	GIRDERS 1 & 5																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.014	0.028	0.041	0.053	0.063	0.071	0.078	0.083	0.086	0.087	0.086	0.083	0.078	0.071	0.063	0.053	0.041	0.028	0.014	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.060	0.124	0.184	0.237	0.284	0.324	0.355	0.378	0.393	0.397	0.393	0.378	0.355	0.324	0.284	0.237	0.184	0.124	0.060	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.005	0.009	0.014	0.018	0.021	0.024	0.026	0.028	0.029	0.029	0.029	0.028	0.026	0.024	0.021	0.018	0.014	0.009	0.005	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.079	0.161	0.239	0.308	0.368	0.419	0.459	0.489	0.508	0.513	0.508	0.489	0.459	0.419	0.368	0.308	0.239	0.161	0.079	0.000
REQUIRED CAMBER	0	0 15/16″	1 15/16″	2 7/8″	3 11/16″	4 7/16″	5″	5 1/2″	5 7/8″	6 1/8″	6 1/8″	6 1/8″	5 7/8″	5 1/2″	5″	4 7/16″	3 11/16″	2 7/8″	1 15/16″	0 15/16″	0
	GIRDERS 2 & 4																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.014	0.028	0.041	0.053	0.063	0.071	0.078	0.083	0.086	0.087	0.086	0.083	0.078	0.071	0.063	0.053	0.041	0.028	0.014	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.057	0.119	0.176	0.227	0.272	0.310	0.340	0.362	0.376	0.380	0.376	0.362	0.340	0.310	0.272	0.227	0.176	0.119	0.057	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.005	0.009	0.013	0.016	0.020	0.022	0.024	0.026	0.027	0.027	0.027	0.026	0.024	0.022	0.020	0.016	0.013	0.009	0.005	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.076	0.156	0.230	0.296	0.355	0.403	0.442	0.471	0.489	0.494	0.489	0.471	0.442	0.403	0.355	0.296	0.230	0.156	0.076	0.000
REQUIRED CAMBER	0	0 15/16″	1 7/8″	2 3/4″	3 9/16″	4 1/4″	4 13/16″	5 5/16″	5 5/8″	5 7/8″	5 15/16″	5 7/8″	5 5/8″	5 5/16″	4 13/16″	4 1/4″	3 9/16″	2 3/4″	1 7/8″	0 15/16″	0
	GIRDER 3																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
DEFLECTION DUE TO WEIGHT OF GIRDER	0.000	0.014	0.028	0.041	0.053	0.063	0.071	0.078	0.083	0.086	0.087	0.086	0.083	0.078	0.071	0.063	0.053	0.041	0.028	0.014	0.000
DEFLECTION DUE TO WEIGHT OF SLAB *	0.000	0.054	0.113	0.168	0.217	0.260	0.296	0.325	0.346	0.359	0.363	0.359	0.346	0.325	0.296	0.260	0.217	0.168	0.113	0.054	0.000
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL	0.000	0.005	0.009	0.013	0.016	0.020	0.022	0.024	0.026	0.027	0.027	0.027	0.026	0.024	0.022	0.020	0.016	0.013	0.009	0.005	0.000
TOTAL DEAD LOAD DEFLECTION	0.000	0.073	0.150	0.222	0.286	0.343	0.389	0.427	0.455	0.472	0.477	0.472	0.455	0.427	0.389	0.343	0.286	0.222	0.150	0.073	0.000
REQUIRED CAMBER	0	0 7/8″	1 13/16″	2 11/16″	3 7/16″	4 1/8″	4 11/16″	5 1/8″	5 7/16″	5 11/16″	5 3/4″	5 11/16″	5 7/16″	5 1/8″	4 11/16″	4 1/8″	3 7/16″	2 11/16″	1 13/16″	0 7/8″	0

* INCLUDES SLAB, BUILDUPS & STAY-IN-PLACE FORMS.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "REQUIRED CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSILING FANG
2/27/12

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

FRAMING PLAN & DEAD LOAD DEFLECTIONS
(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-33
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 8/25/11
CHECKED BY : T. H. FANG DATE : 12/01/11

27-FEB-2012 15:52
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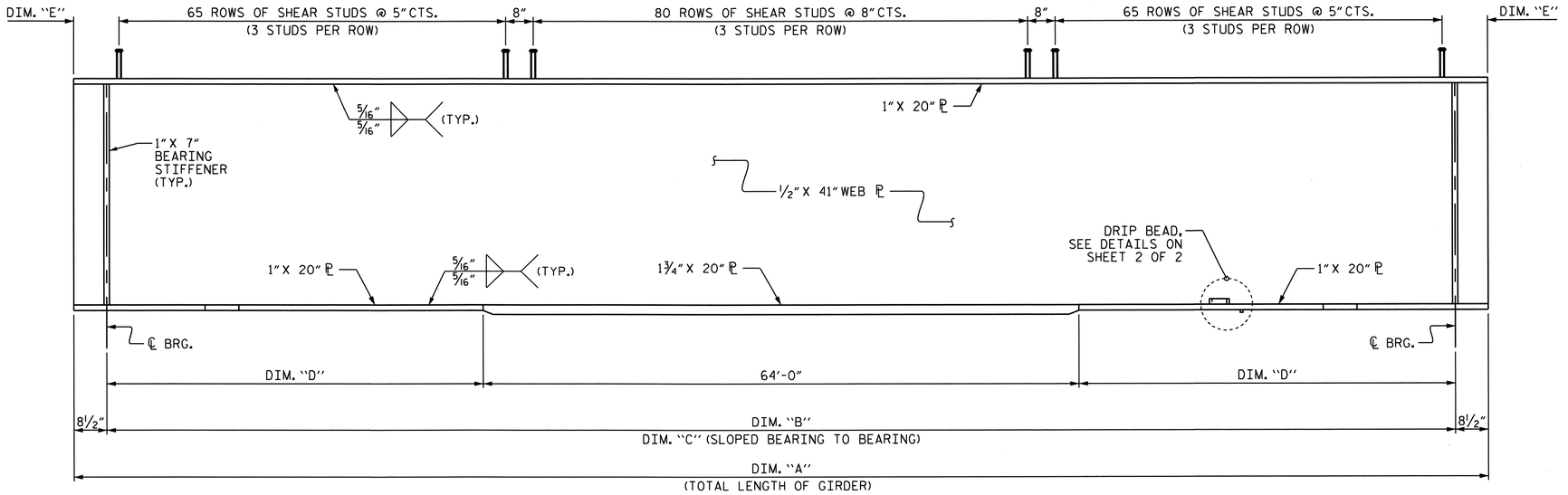
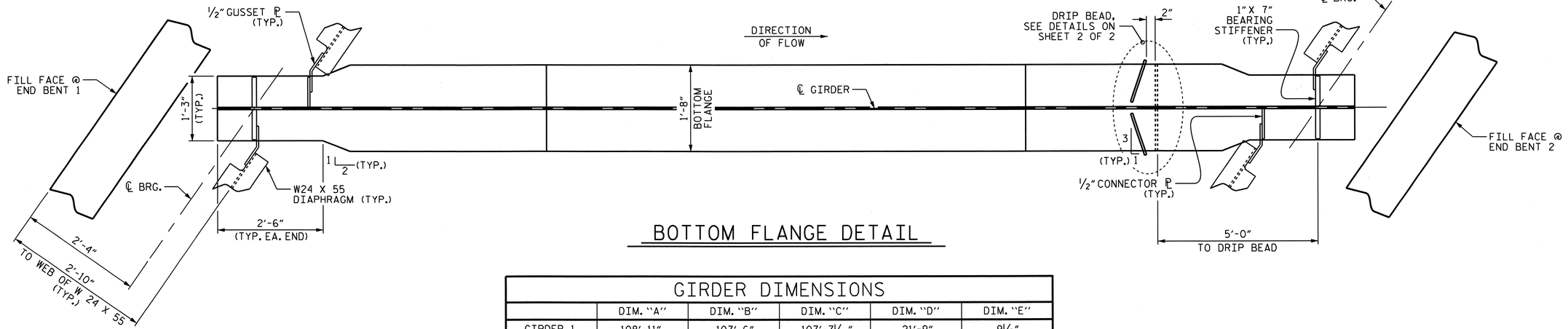
tfang

STR #2 NC005

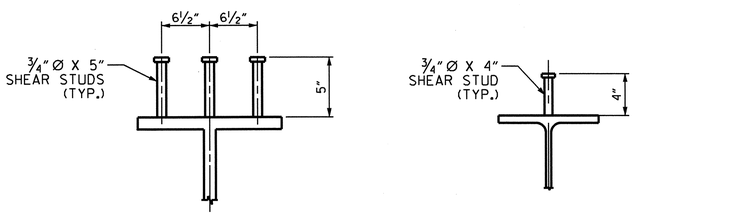


ELEVATION



BOTTOM FLANGE DETAIL

GIRDER DIMENSIONS					
	DIM. "A"	DIM. "B"	DIM. "C"	DIM. "D"	DIM. "E"
GIRDER 1	108'-11"	107'-6"	107'-7 1/16"	21'-9"	9 1/2"
GIRDER 2	108'-10 1/2"	107'-5 1/2"	107'-6 9/16"	21'-8 3/4"	9 1/4"
GIRDER 3	108'-10 1/8"	107'-5 1/8"	107'-6 3/16"	21'-8 9/16"	9 1/16"
GIRDER 4	108'-9 5/8"	107'-4 5/8"	107'-5 1/16"	21'-8 5/16"	8 13/16"
GIRDER 5	108'-9 1/4"	107'-4 1/4"	107'-5 5/16"	21'-8 1/8"	8 5/8"



ALONG EACH GIRDER

ALONG END BENT DIAPHRAGM

SHEAR STUD DETAILS

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

STRUCTURAL STEEL DETAILS

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-34
1			3			TOTAL SHEETS
2			4			52

NORTH CAROLINA PROFESSIONAL SEAL 28445 ENGINEER KOREY NEWTON

1/10/2012

DRAWN BY : P. K. NEWTON DATE : 9/7/11
CHECKED BY : T. H. FANG DATE : 12/7/11

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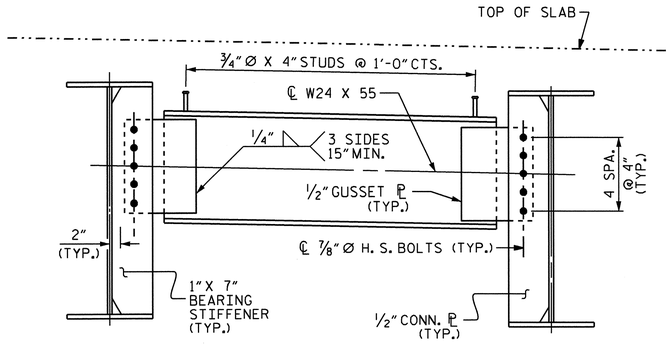
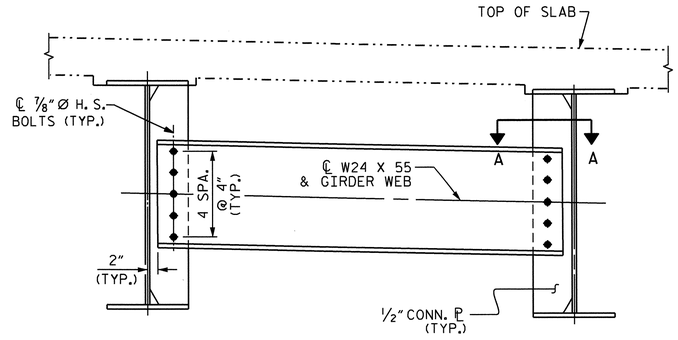
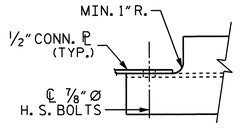
STR #2



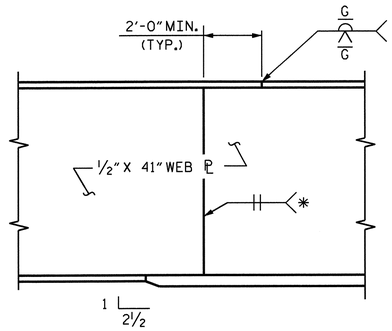
END BENT DIAPHRAGM





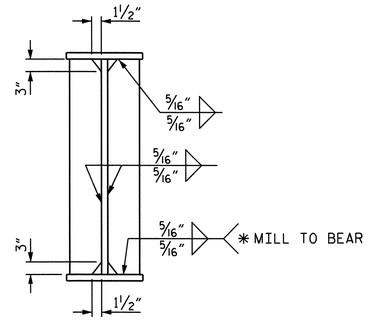
SECTION A-A

INTERMEDIATE DIAHPRAGM



TYPICAL FLANGE AND WEB BUTT JOINT

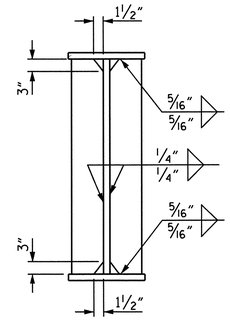
* GRIND SMOOTH AND FLUSH ON OUTER FACE OF EXTERIOR GIRDERS



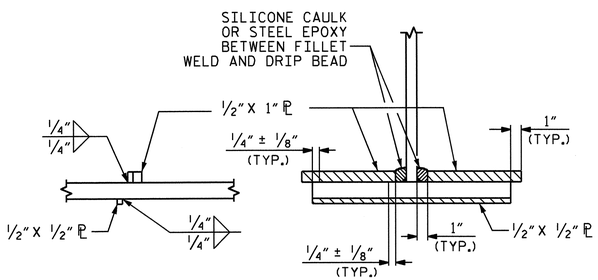
BEARING STIFFENER

NOTE: DO NOT CLIP PLATE AT TOP OUTSIDE CORNER OF STIFFENER PLATE.

* WELD TO BOTTOM FLANGE IS ONLY REQUIRED WHEN BEARING STIFFENER IS ALSO CONNECTOR PLATE

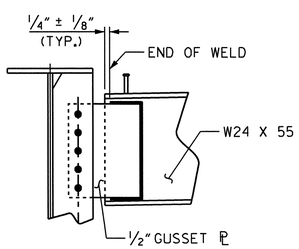


CONNECTOR PLATE

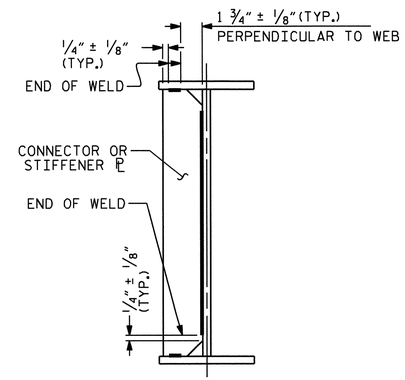


SIDE VIEW SECTION

DRIP BEAD DETAILS



TYPICAL GUSSET ℙ CONNECTIONS



TYPICAL STIFFENER OR CONNECTOR ℙ CONNECTIONS

WELD TERMINATION DETAILS

NOTES

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W AND PAINTED IN ACCORDANCE WITH SYSTEM 4 OF ARTICLE 442-7 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

PERMITTED FLANGE AND WEB SHOP SPLICES SHALL NOT BE LOCATED WITHIN 15 FEET OF MAXIMUM DEAD LOAD DEFLECTION. KEEP 2 FEET MINIMUM BETWEEN WEB AND FLANGE SHOP SPLICES. KEEP 6" MINIMUM BETWEEN CONNECTOR PLATE AND WEB OR FLANGE SHOP SPLICES.

ALL DIMENSIONS SHOWN ARE HORIZONTAL OR VERTICAL, UNLESS OTHERWISE NOTED. ALL FIELD CONNECTIONS TO BE 7/8" DIA. HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.

BEARING STIFFENERS ARE TO BE PLACED NORMAL TO THE WEB OF THE GIRDER AND SHALL BE PLUMB.

STUDS ON GIRDERS MAY BE SHIFTED UP TO 1" IF NECESSARY TO CLEAR FLANGE SPLICE WELD.

TENSION ON THE AASHTO M164 BOLTS SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH ARTICLE 440-8 OF THE STANDARD SPECIFICATIONS.

A CHARPY V-NOTCH TEST IS REQUIRED FOR WEB PLATES AND BOTTOM FLANGE PLATES FOR ALL GIRDERS AND IN ACCORDANCE WITH ARTICLE 1072-7 OF THE STANDARD SPECIFICATIONS.

BEARING STIFFENER MAY REQUIRE COPING IF WIDER THAN BOTTOM FLANGE TO AVOID INTERFERENCE WITH THE ANCHOR BOLT.

END OF GIRDERS SHALL BE PLUMB.

FABRICATORS SHALL DETAIL DIAPHRAGM MEMBERS AND CONNECTIONS FOR FULL DEAD LOAD FIT UP. GIRDERS SHALL BE PLUMB AFTER THE FULL AMOUNT OF DEAD LOAD IS APPLIED.

NORTH CAROLINA PROFESSIONAL SEAL 26095 ENGINEER KOREY NEWTON
2/28/2012

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

STRUCTURAL STEEL DETAILS

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-35
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 9/7/11
CHECKED BY : T. H. FANG DATE : 12/7/11

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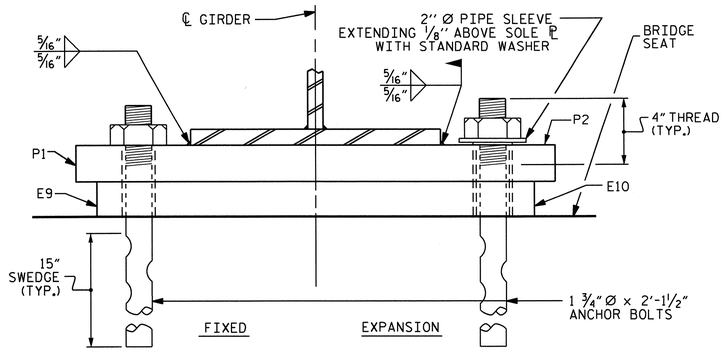
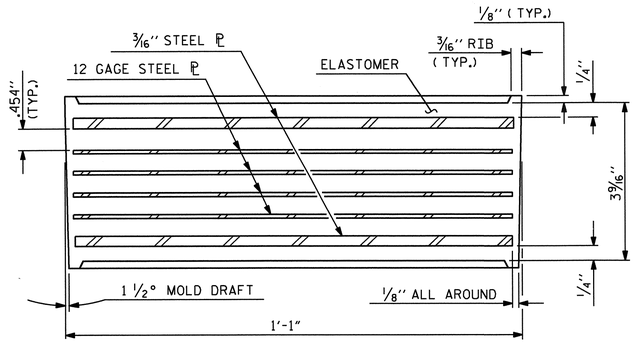
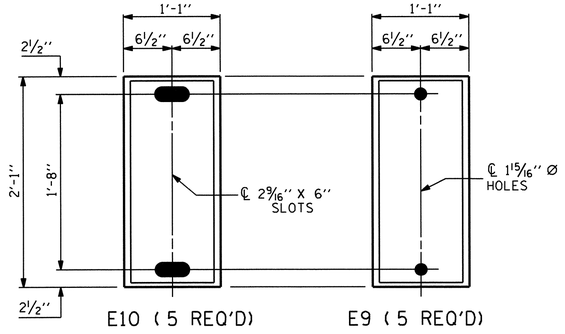
STR #2



END VIEW

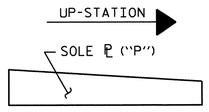


TYPICAL SECTION OF ELASTOMERIC BEARING

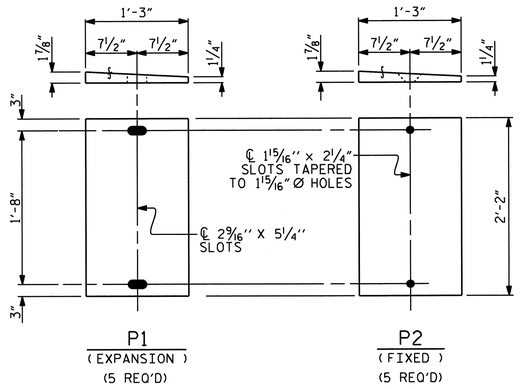


PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



SOLE ℙ PLACEMENT DETAIL



SOLE PLATE DETAILS

NOTES

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

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

THE PAYMENT FOR THE PIPE SLEEVES SHALL BE INCLUDED IN THE SEVERAL PAY ITEMS.

FOR AASHTO M270 GRADE 50W STRUCTURAL STEEL, SOLE PLATE SHALL BE AASHTO M270 GRADE 50W AND SHALL NOT BE GALVANIZED. ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

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

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

ASSEMBLED BY : O.T. NGUYEN	DATE : 7-18-11		
CHECKED BY : T. H. FANG	DATE : 12-07-11		
DRAWN BY : EEM 10/95	REV. 10/17/00	RWW/LES	
CHECKED BY : PEK 10/95	REV. 7/10/01	LES/RDR	
	REV. 5/1/06	TLA/GM	

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NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING-HSIONG FANG
2/27/12

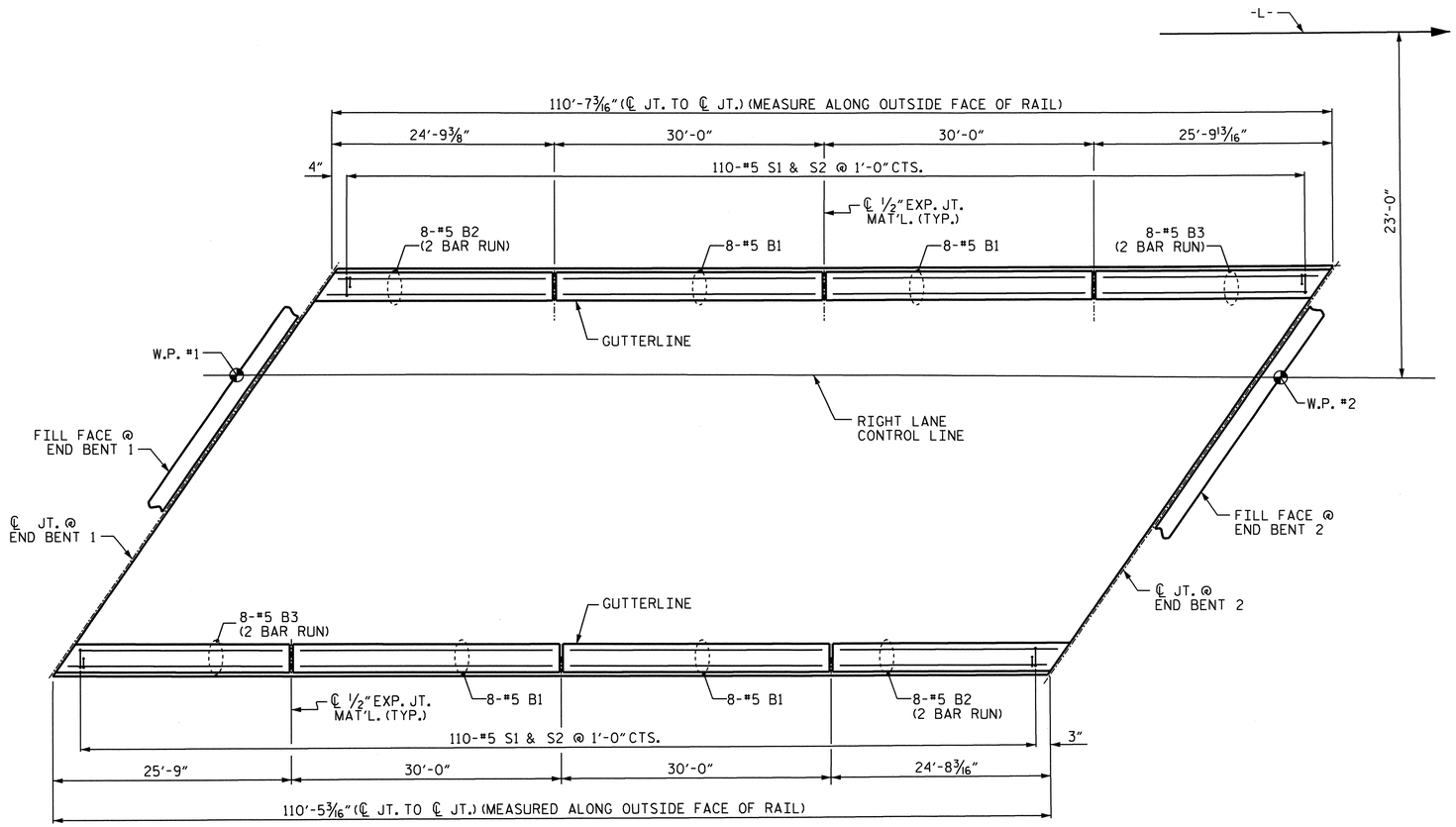
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

ELASTOMERIC BEARING DETAILS

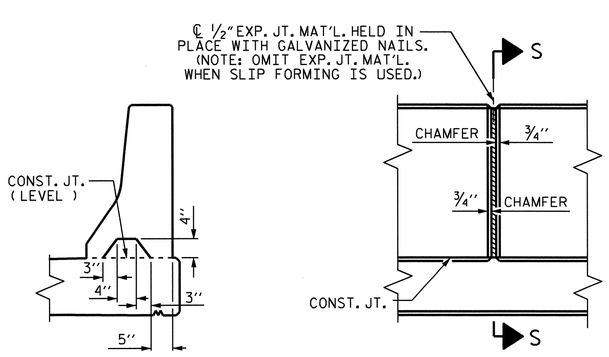
(STEEL SUPERSTRUCTURE)
(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-36
1			3			TOTAL SHEETS
2			4			52

STR #2 STD. NO. EB2 (SHT 2a)



PLAN OF BARRIER RAIL

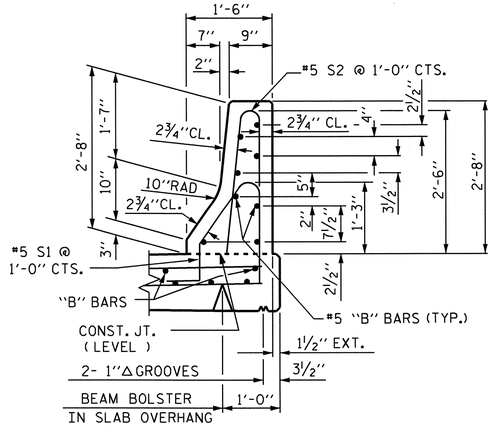


SECTION S-S

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

ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS



SECTION THRU RAIL

NOTES

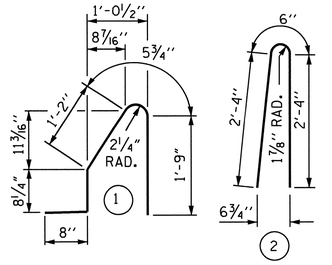
THE BARRIER RAIL IN SPAN A SHALL NOT BE CAST UNTIL THE SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	32	#5	STR	29'-7"	987
* B2	32	#5	STR	14'-0"	467
* B3	32	#5	STR	14'-6"	484
* S1	220	#5	1	4'-9"	1090
* S2	220	#5	2	5'-2"	1186

* EPOXY COATED REINFORCING STEEL	4,214 LBS.
CLASS AA CONCRETE	22.2 CU. YDS.
CONCRETE BARRIER RAIL	
DECK	221.03 LIN. FT.
APPROACH SLABS	44.35 LIN. FT.
TOTAL	265.38 LIN. FT.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG

1/10/12

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-37
1			3			TOTAL SHEETS
2			4			52

ASSEMBLED BY :	QT NGUYEN	DATE :	7-18-11
CHECKED BY :	T. H. FANG	DATE :	12-05-11
DRAWN BY : ARB 5/87	REV. 10/17/00		RWW/LES
CHECKED BY : SJD 9/87	REV. 5/7/03R		RWW/JTE
	REV. 5/1/06R		TLA/GM

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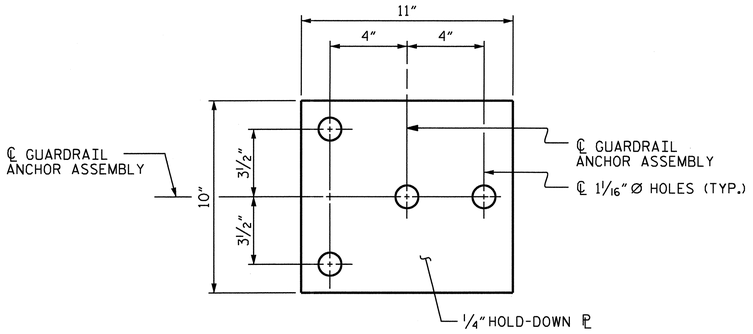
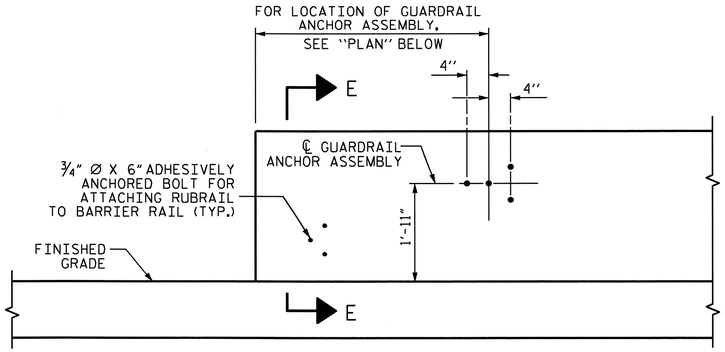
STR #2

STD. NO. CBR1

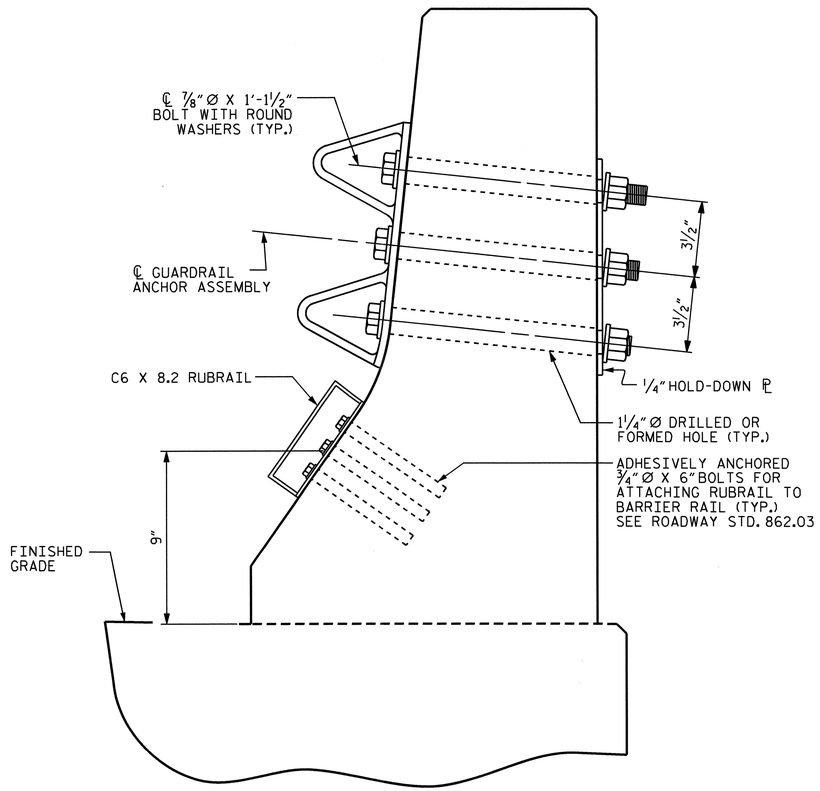


PLAN



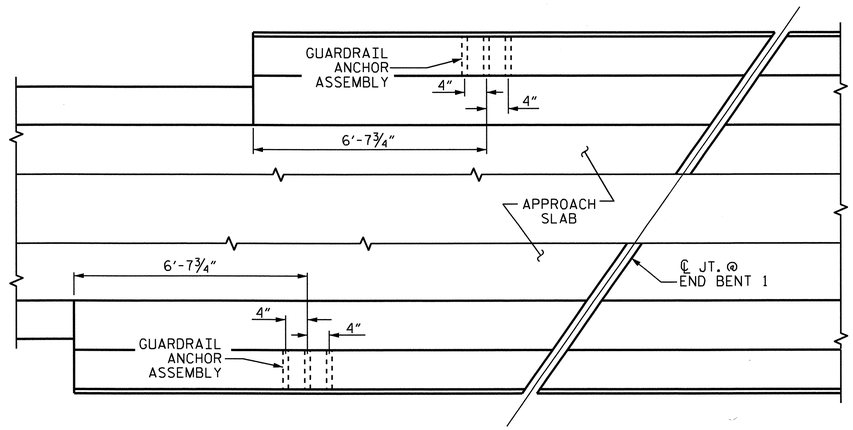
ELEVATION

FOR LOCATION OF RUBRAIL, SEE ROADWAY STD. 862.03



SECTION E-E

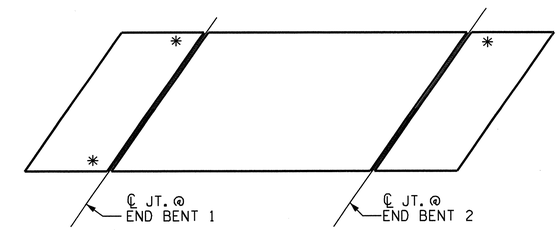
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR



SKETCH SHOWING POINTS OF ATTACHMENTS

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

NOTES

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

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

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

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

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

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

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

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

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSILING FANG

1/10/12

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-38
1			3			TOTAL SHEETS
2			4			52

ASSEMBLED BY : O. T. NGUYEN	DATE : 7-18-11
CHECKED BY : T. H. FANG	DATE : 12-02-11
DRAWN BY : TLA 5/06	ADDED 5/1/06R KMM/GM
CHECKED BY : GM 5/06	

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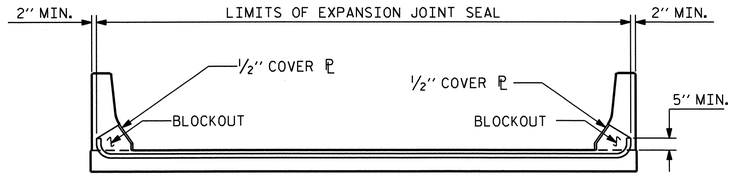
STR #2

STD. NO. GRA2

MOVEMENT AND SETTING AT EXPANSION JOINT					
END BENT	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	124°-45'-32"	1⅛"	1⅝"	1½"	1¼"
2	125°-12'-42"	0"	1½"	1½"	1½"

TOTAL MOVEMENT IS CALCULATED ALONG THE CENTERLINE OF ROADWAY.
JOINT OPENINGS ARE MEASURED PERPENDICULAR TO THE JOINT.



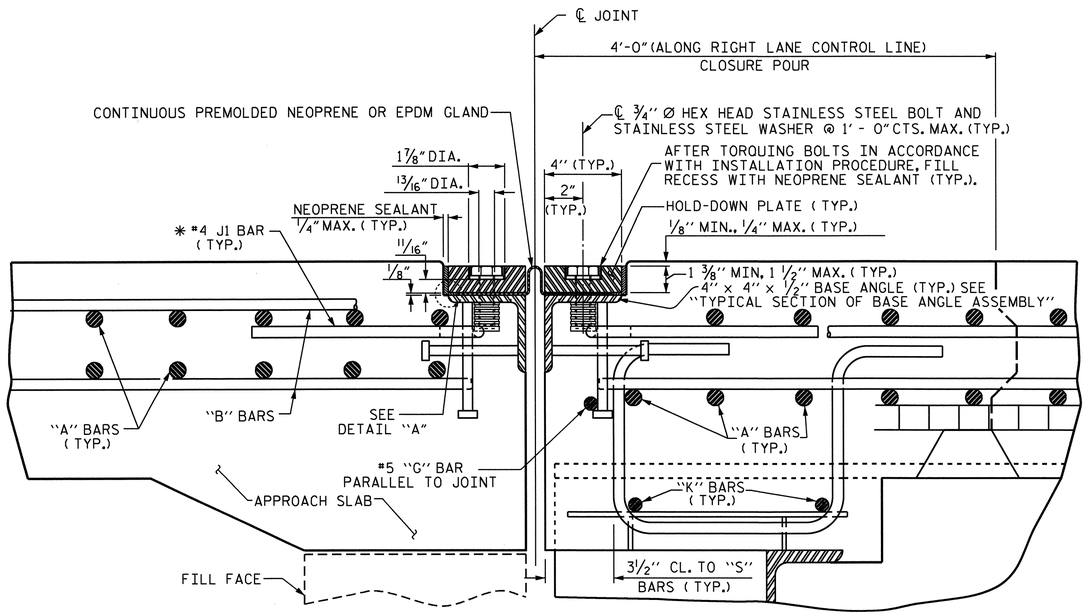
SKETCH SHOWING LIMITS OF EXPANSION JOINT SEAL

INSTALLATION PROCEDURE

1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO THE BASE ANGLE ASSEMBLY WITH THE ¾" Ø HEX HEAD BOLTS PROVIDED FOR THE HOLD-DOWN PLATES. A 1" Ø HOLE SHALL BE PROVIDED IN THE TEMPLATE CENTERED OVER EACH WEEP HOLE IN THE 4"X 4"X ½"BASE ANGLE. OTHER METHODS OF INSURING DRAINAGE THROUGH WEEP HOLES MAY BE EMPLOYED SUBJECT TO ENGINEER'S APPROVAL.
2. AFTER THE CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE THE TEMPLATE. THOROUGHLY CLEAN THE BOLT HOLES AND THE ANGLE PLATE. REMOVE ANY EXCESS CONCRETE THAT COMES OUT OF THE WEEP HOLES. ANY DAMAGED STEEL SHALL BE COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅛" IN DIAMETER WITH A HAND PUNCH.
4. IN ORDER TO CHECK FOR PROPER ALIGNMENT, PLACE THE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. DO NOT APPLY NEOPRENE SEALANT. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE BUT DO NOT TIGHTEN. THE ENGINEER SHALL INSPECT THE JOINT SEAL DEVICE FOR PROPER ALIGNMENT.
5. AFTER INSPECTION, REMOVE THE HOLD-DOWN PLATES AND GLAND. APPLY NEOPRENE SEALANT TO THE BASE ANGLE IN ACCORDANCE WITH THE "INSTALLATION SKETCH". PLACE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE ASSEMBLY AND TORQUE THE BOLTS TO 88 FT-LBS WITH A TORQUE WRENCH. THE TORQUE WRENCH SHALL BE CALIBRATED IN ACCORDANCE WITH SECTION 440-10 (D) OF THE STANDARD SPECIFICATIONS. CHECK THE TORQUE AFTER THREE (3) HOURS AND, IF NECESSARY, RETIGHTEN TO 88 FT-LBS. A FINAL CHECK SHALL BE MADE AT SEVEN (7) DAYS. TORQUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.
6. AFTER PROPER TORQUING, CLEAN THE BOLT HOLE RECESSES AND THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, COMPLETELY FILL THESE RECESSES WITH NEOPRENE SEALANT.

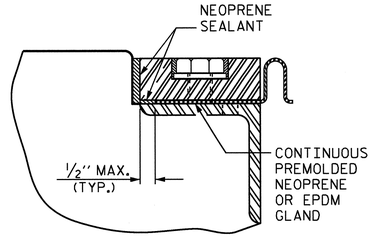
GENERAL NOTES

1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MIN.
3. A PREMOLDED CORRUGATED OR NON-CORRUGATED GLAND SHALL BE USED FOR JOINTS SKEWED BETWEEN 50° THRU 130°. FOR JOINTS SKEWED LESS THAN 50° OR MORE THAN 130°, ONLY A CORRUGATED GLAND SHALL BE USED.
4. CLOSED END FERRULES AND STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.
5. SURFACES COMING IN CONTACT WITH NEOPRENE SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.
6. UPON COMPLETION OF SHOP FABRICATION, THE HOLD DOWN PLATE AND BASE ANGLE ASSEMBLY, AS SHOWN IN THE " TYPICAL SECTION OF BASE ANGLE ASSEMBLY", SHALL BE METALLIZED. SEE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
7. BASE ANGLE ASSEMBLY SHALL BE CONTINUOUS FOR THE LENGTH OF THE JOINT. AT CROWN BREAKS, THE ENDS OF THE BASE ANGLE ASSEMBLY SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE FOR SKEWS LESS THAN 80° AND GREATER THAN 100°. FINISHED WELD SHALL BE GROUND SMOOTH AND COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
8. FIELD SPLICES OF HOLD-DOWN PLATES SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. HOLD-DOWN PLATES SHALL NOT EXCEED 20' LENGTHS UNLESS APPROVED BY THE ENGINEER.
9. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
10. THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE ¾" Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

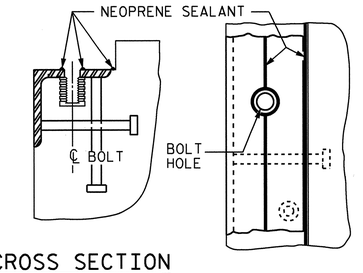


EXPANSION JOINT DETAILS

THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0"CENTERS.
* J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

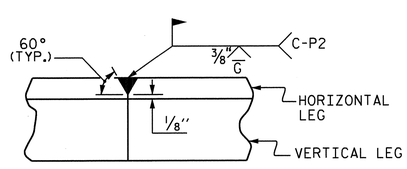


DETAIL "A"

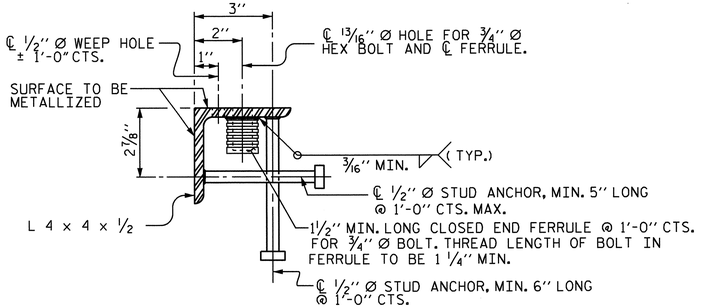


CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



DETAIL- FIELD WELD SPLICE OF BASE ANGLE



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG
1/10/12

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

EXPANSION JOINT SEAL DETAILS

(RIGHT LANE)

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

SHEET NO. S-39
TOTAL SHEETS 52

ASSEMBLED BY : Q. T. NGUYEN	DATE : 10/3/11	REV. 10/17/00	RWW/LES
CHECKED BY : T. H. FANG	DATE : 10/10/11	REV. 5/7/03R	RWW/JTE
DRAWN BY : REK 9/87		REV. 5/1/06	TLA/GM
CHECKED BY : CRK 10/87			

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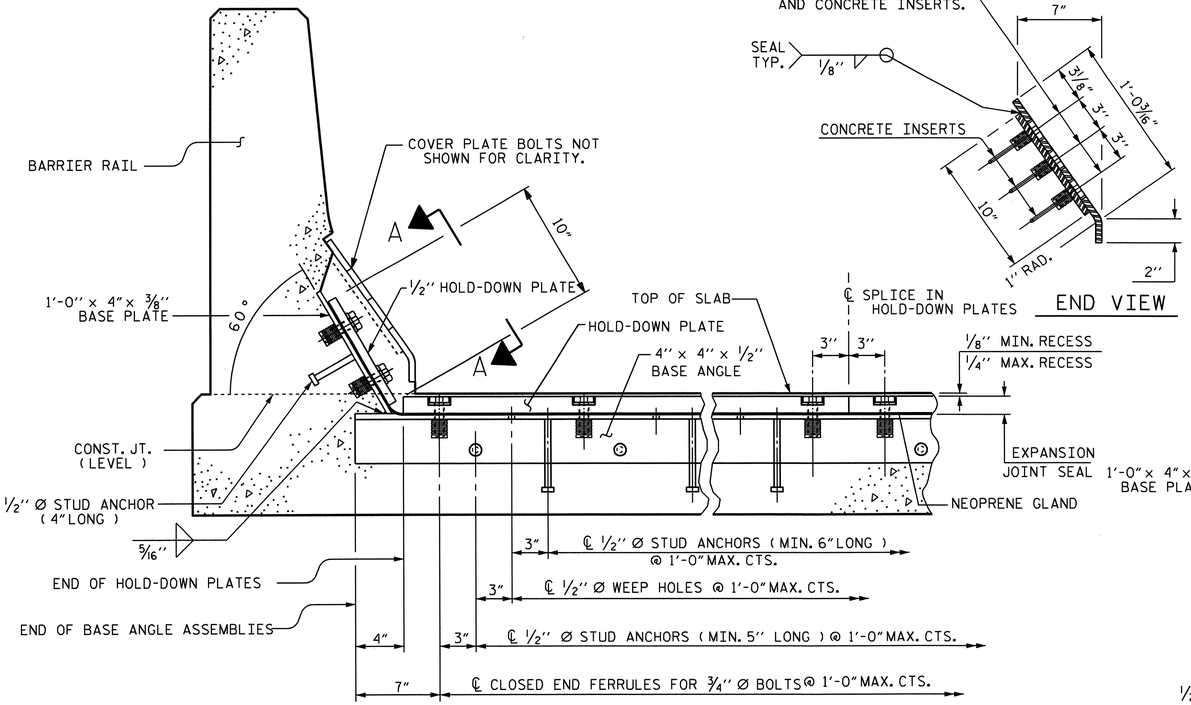
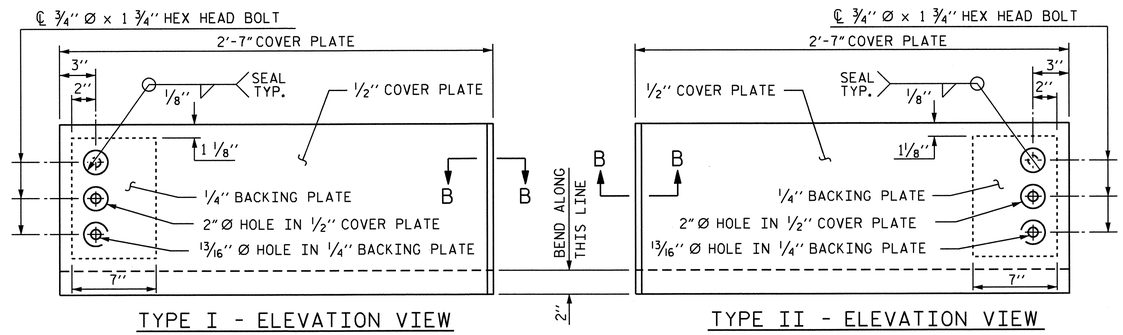
kpnewton

STR #2 STD. NO. EJS1



SECTION THRU RAIL NORMAL TO JOINT

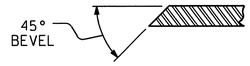
END VIEW



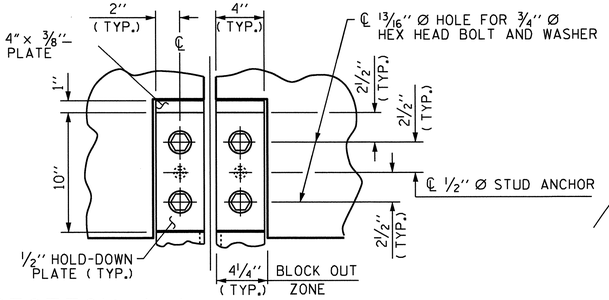
TYPE I - ELEVATION VIEW

TYPE II - ELEVATION VIEW

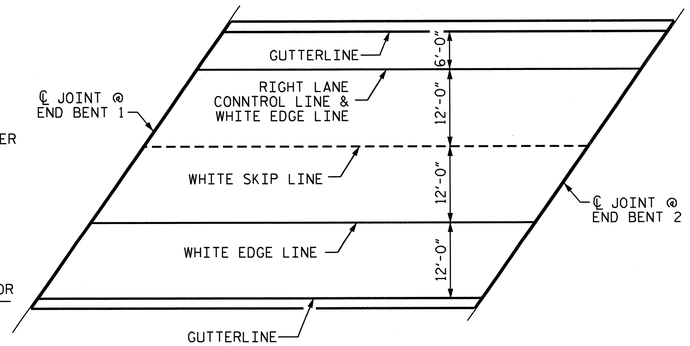
COVER PLATE DETAILS



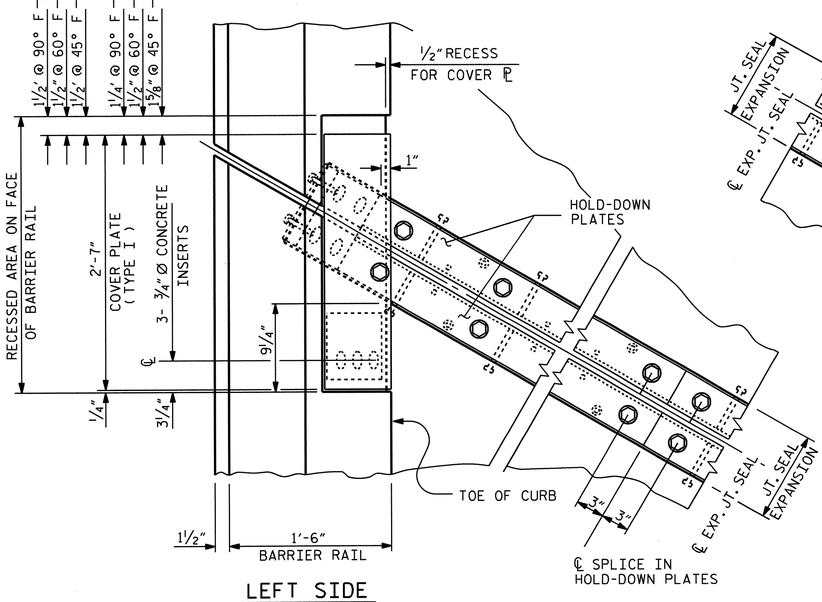
SECTION B-B



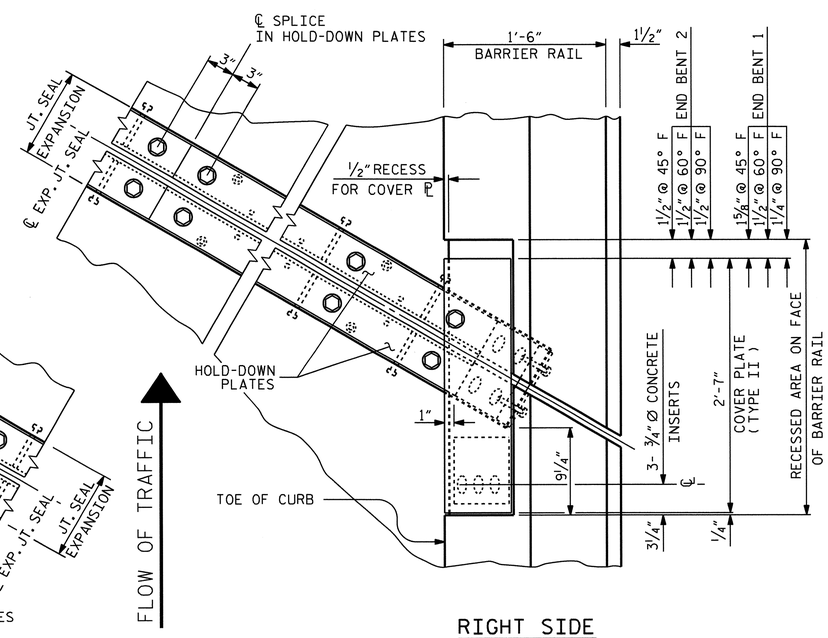
SECTION A-A



PAVEMENT MARKING ALIGNMENT

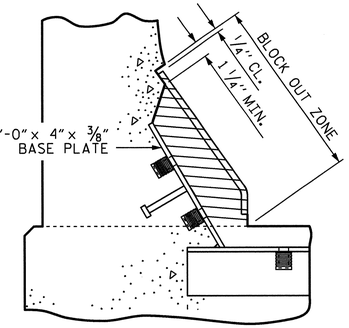


LEFT SIDE



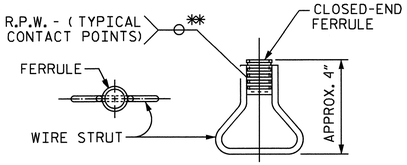
RIGHT SIDE

PLAN OF EXPANSION JOINT SEAL



BLOCK OUT DETAIL

SEE "SECTION A-A" FOR OTHER DETAILS.



PLAN ELEVATION

CONCRETE INSERT

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

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIANG FANG

3/24/12

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-40
1			3			TOTAL SHEETS
2			4			52

STR #2 STD. NO. EJS2

ASSEMBLED BY :	O. T. NGUYEN	DATE : 10/03/11	
CHECKED BY :	T. H. FANG	DATE : 10/10/11	
DRAWN BY : REK 9/87	REV. 7/17/98	RWW/LES	
CHECKED BY : CRK 10/87	REV. 10/17/00	RWW/LES	
	REV. 5/1/06	TLA/GM	

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tfang

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

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

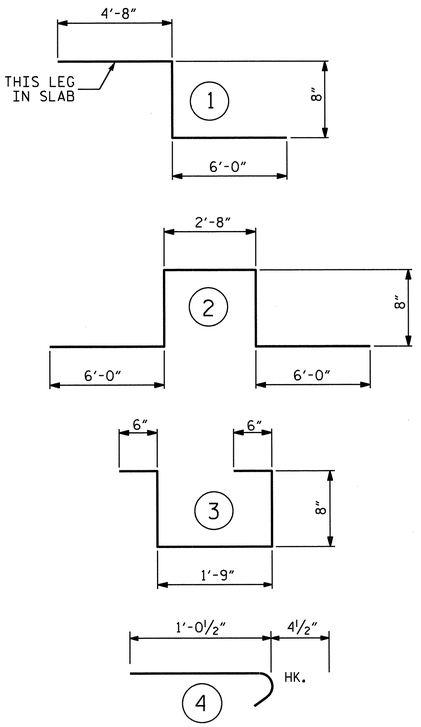
GROOVING BRIDGE FLOORS

APPROACH SLABS	1,832	SQ.FT.
BRIDGE DECK	4,255	SQ.FT.
TOTAL	6,087	SQ.FT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	157	#5	STR	44'-11"	7355	A206	3	#5	STR	32'-8"	102
A2	157	#5	STR	44'-11"	7355	A207	3	#5	STR	30'-6"	95
✱ A3	6	#6	STR	16'-7"	149	A208	3	#5	STR	28'-4"	89
						A209	3	#5	STR	26'-2"	82
✱ A101	3	#5	STR	42'-10"	134	A210	3	#5	STR	24'-0"	75
✱ A102	3	#5	STR	40'-8"	127	A211	3	#5	STR	21'-10"	68
✱ A103	3	#5	STR	38'-6"	120	A212	3	#5	STR	19-8"	62
✱ A104	3	#5	STR	36'-4"	114	A213	3	#5	STR	17'-6"	55
✱ A105	3	#5	STR	34'-2"	107	A214	3	#5	STR	15'-4"	48
✱ A106	3	#5	STR	32'-0"	100	A215	3	#5	STR	13'-2"	41
✱ A107	3	#5	STR	29'-10"	93	A216	3	#5	STR	11'-1"	35
✱ A108	3	#5	STR	27'-9"	87	A217	3	#5	STR	8'-11"	28
✱ A109	3	#5	STR	25'-7"	80	A218	3	#5	STR	6'-9"	21
✱ A110	3	#5	STR	23'-5"	73	A219	3	#5	STR	4'-7"	14
✱ A111	3	#5	STR	21'-3"	66	A220	3	#5	STR	2'-5"	8
✱ A112	3	#5	STR	19'-1"	60						
✱ A113	3	#5	STR	16'-11"	53	A221	3	#5	STR	43'-6"	136
✱ A114	3	#5	STR	14'-9"	46	A222	3	#5	STR	41'-4"	129
✱ A115	3	#5	STR	12'-7"	39	A223	3	#5	STR	39'-2"	123
✱ A116	3	#5	STR	10'-5"	33	A224	3	#5	STR	37'-0"	116
✱ A117	3	#5	STR	8'-3"	26	A225	3	#5	STR	34'-10"	109
✱ A118	3	#5	STR	6'-1"	19	A226	3	#5	STR	32'-9"	102
✱ A119	3	#5	STR	3'-11"	12	A227	3	#5	STR	30'-7"	96
						A228	3	#5	STR	28'-5"	89
✱ A121	3	#5	STR	42'-10"	134	A229	3	#5	STR	26'-3"	82
✱ A122	3	#5	STR	40'-8"	127	A230	3	#5	STR	24'-1"	75
✱ A123	3	#5	STR	38'-7"	121	A231	3	#5	STR	22'-0"	69
✱ A124	3	#5	STR	36'-5"	114	A232	3	#5	STR	19'-10"	62
✱ A125	3	#5	STR	34'-3"	107	A233	3	#5	STR	17'-8"	55
✱ A126	3	#5	STR	32'-1"	100	A234	3	#5	STR	15'-6"	48
✱ A127	3	#5	STR	29'-11"	94	A235	3	#5	STR	13'-4"	42
✱ A128	3	#5	STR	27'-10"	87	A236	3	#5	STR	11'-3"	35
✱ A129	3	#5	STR	25'-8"	80	A237	3	#5	STR	9'-1"	28
✱ A130	3	#5	STR	23'-6"	74	A238	3	#5	STR	6'-11"	22
✱ A131	3	#5	STR	21'-4"	67	A239	3	#5	STR	4'-9"	15
✱ A132	3	#5	STR	19'-2"	60	A240	3	#5	STR	2'-8"	8
✱ A133	3	#5	STR	17'-1"	53						
✱ A134	3	#5	STR	14'-11"	47	✱ B1	128	#4	STR	29'-1"	2487
✱ A135	3	#5	STR	12'-9"	40	B2	108	#5	STR	56'-3"	6336
✱ A136	3	#5	STR	10'-7"	33						
✱ A137	3	#5	STR	8'-6"	27	✱ G1	2	#5	STR	54'-7"	114
✱ A138	3	#5	STR	6'-4"	20						
✱ A139	3	#5	STR	4'-2"	13	✱ J1	100	#4	4	1'-5"	95
✱ A140	3	#5	STR	2'-0"	6						
						✱ K1	12	#5	1	11'-4"	142
A201	3	#5	STR	43'-5"	136	✱ K2	18	#5	2	16'-0"	300
A202	3	#5	STR	41'-3"	129						
A203	3	#5	STR	39'-2"	123	✱ S1	72	#5	3	4'-1"	307
A204	3	#5	STR	37'-0"	116	REINFORCING STEEL = 16,568 LBS					
A205	3	#5	STR	34'-10"	109	✱ EPOXY COATED REINF. STEEL = 13,741 LBS					

BAR TYPES

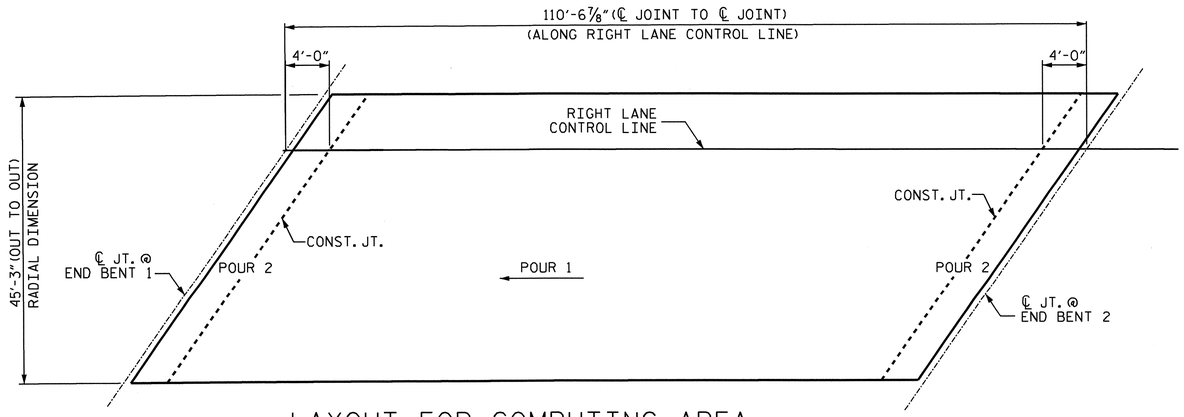


ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	✱ EPOXY COATED REINFORCING STEEL
	(CU.YDS.)	(LBS.)	(LBS.)
POUR 1	150.2		
POUR 2	13.6		
TOTALS ✱✱	163.8	16,568	13,741

✱✱ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB
(SQ. FT. = 5,001)

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG 6/28/12

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-41
1			3			TOTAL SHEETS
2			4			52

ASSEMBLED BY :	QT NGUYEN	DATE :	7-19-11
CHECKED BY :	T. H. FANG	DATE :	12-7-11
DRAWN BY : JMB 5/87	REV. 6/1/94		EEM/GRP
CHECKED BY : SJD 9/87	REV. 8/16/99		RWW/LES
	REV. 5/1/06		TLA/GM

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ttfang

STR #2 STD. NO. BOM1

NOTES

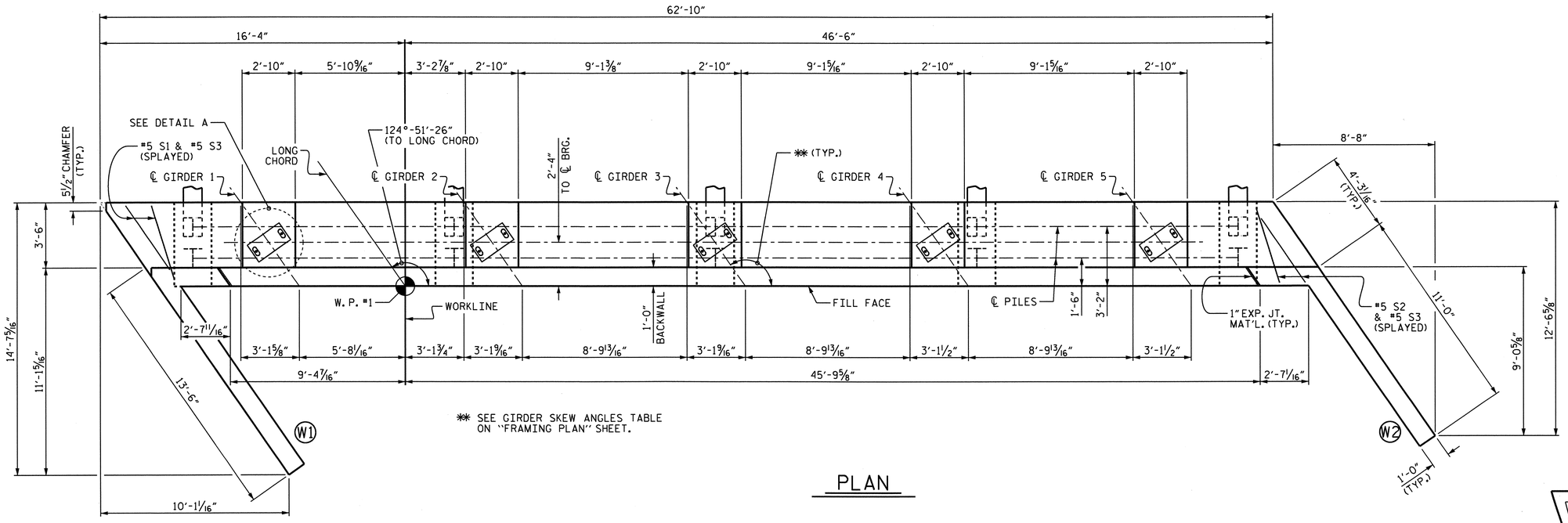
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

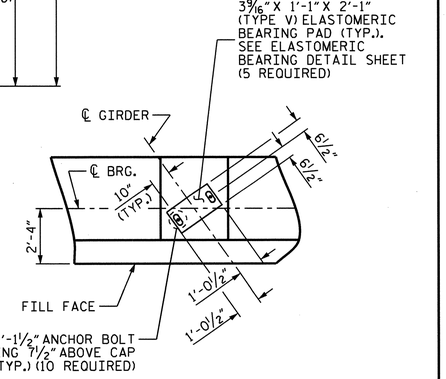
THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

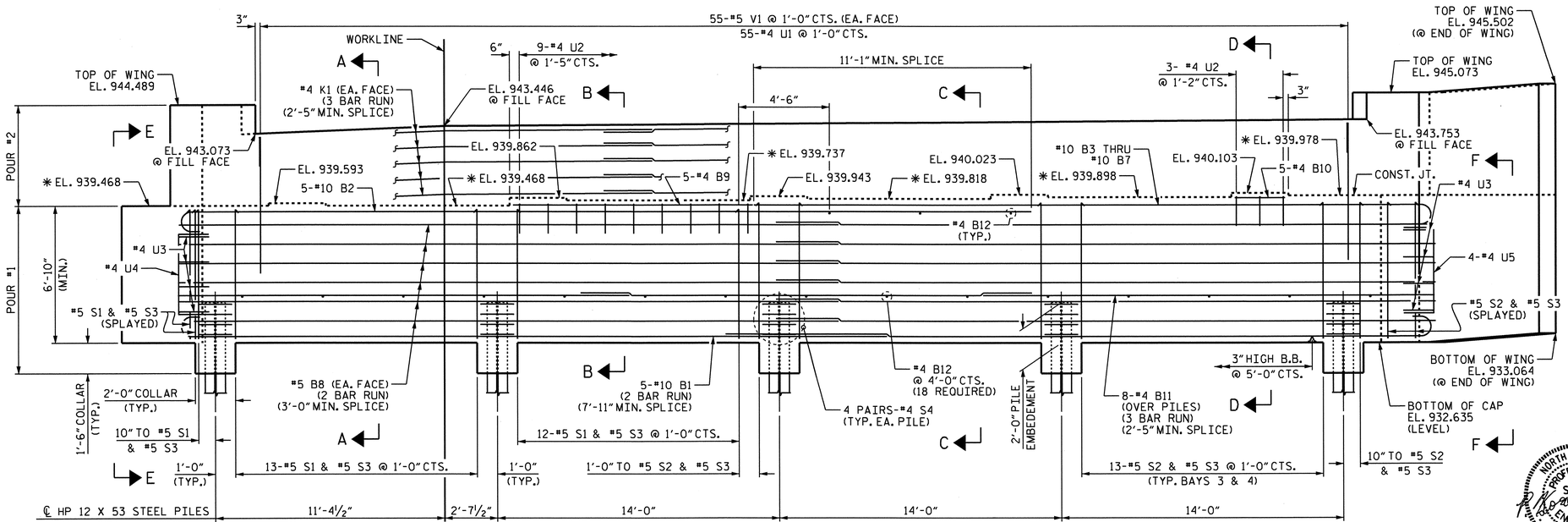


** SEE GIRDER SKEW ANGLES TABLE ON "FRAMING PLAN" SHEET.

PLAN



DETAIL A



ELEVATION

LEFT WING NOT SHOWN FOR CLARITY.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 036445 ENGINEER KOREY NEWTON

1/10/2012

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-42
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 10/19/11
CHECKED BY : R. P. PATEL DATE : 1/4/12

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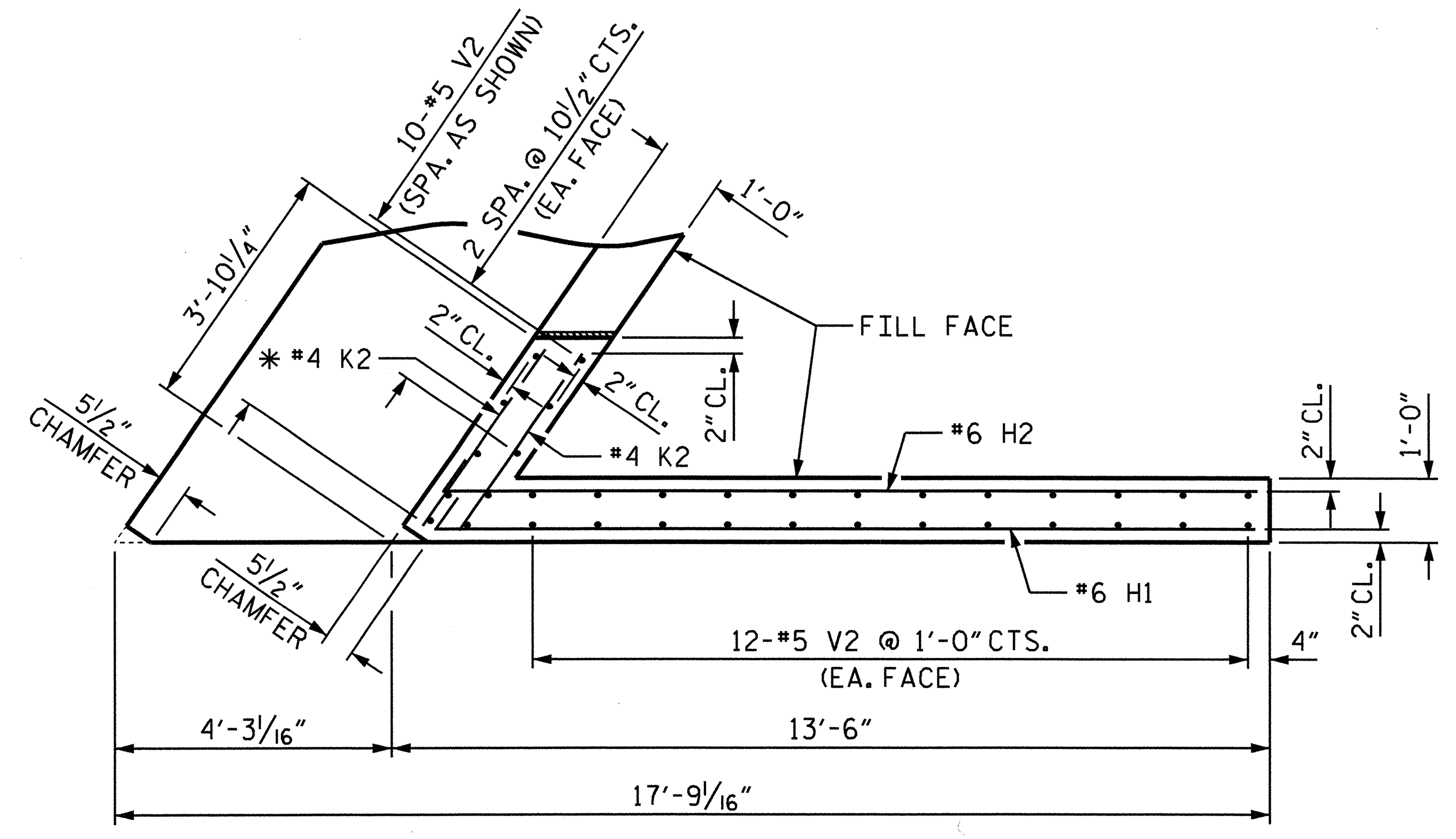
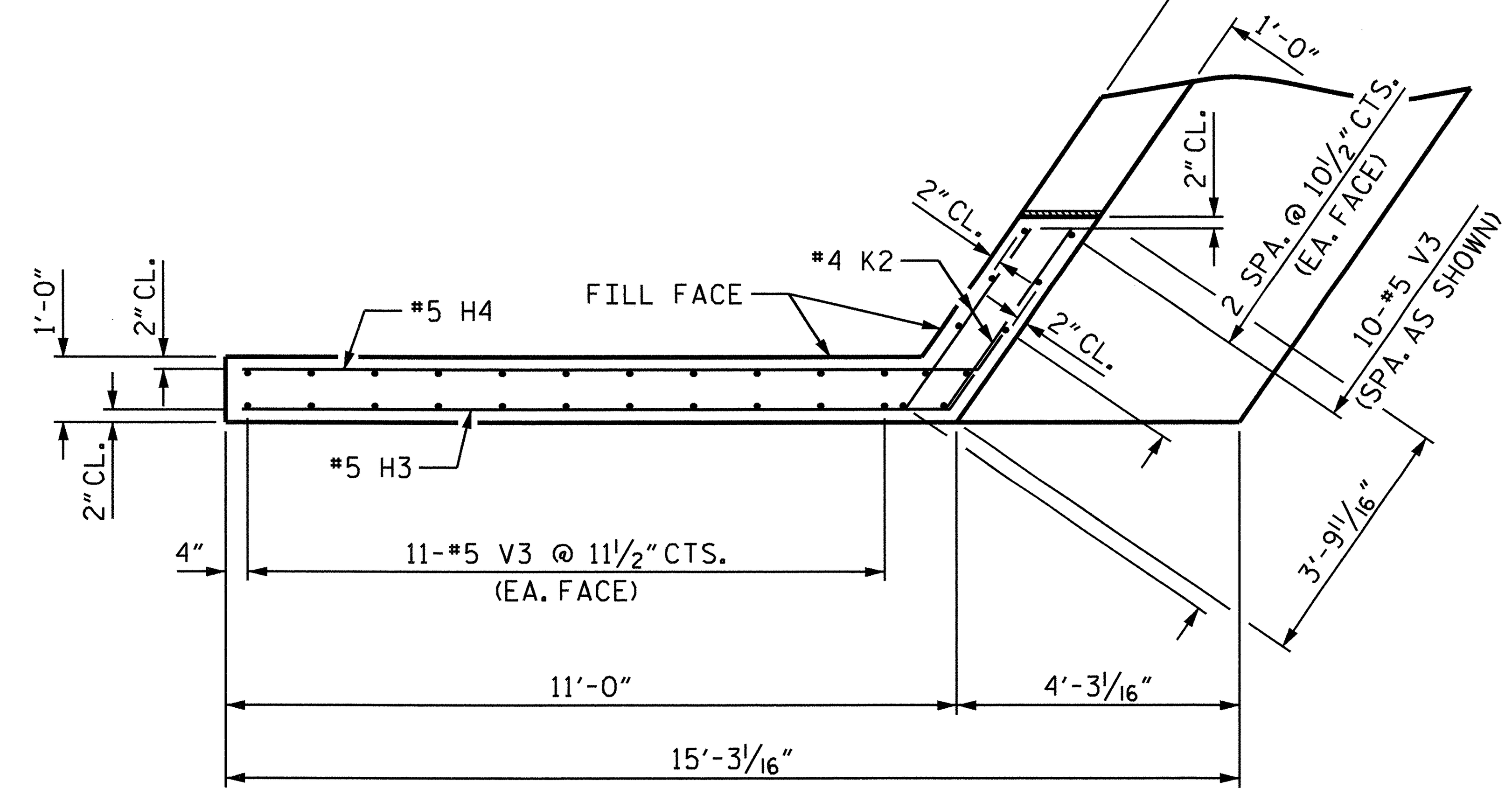
kpnewton

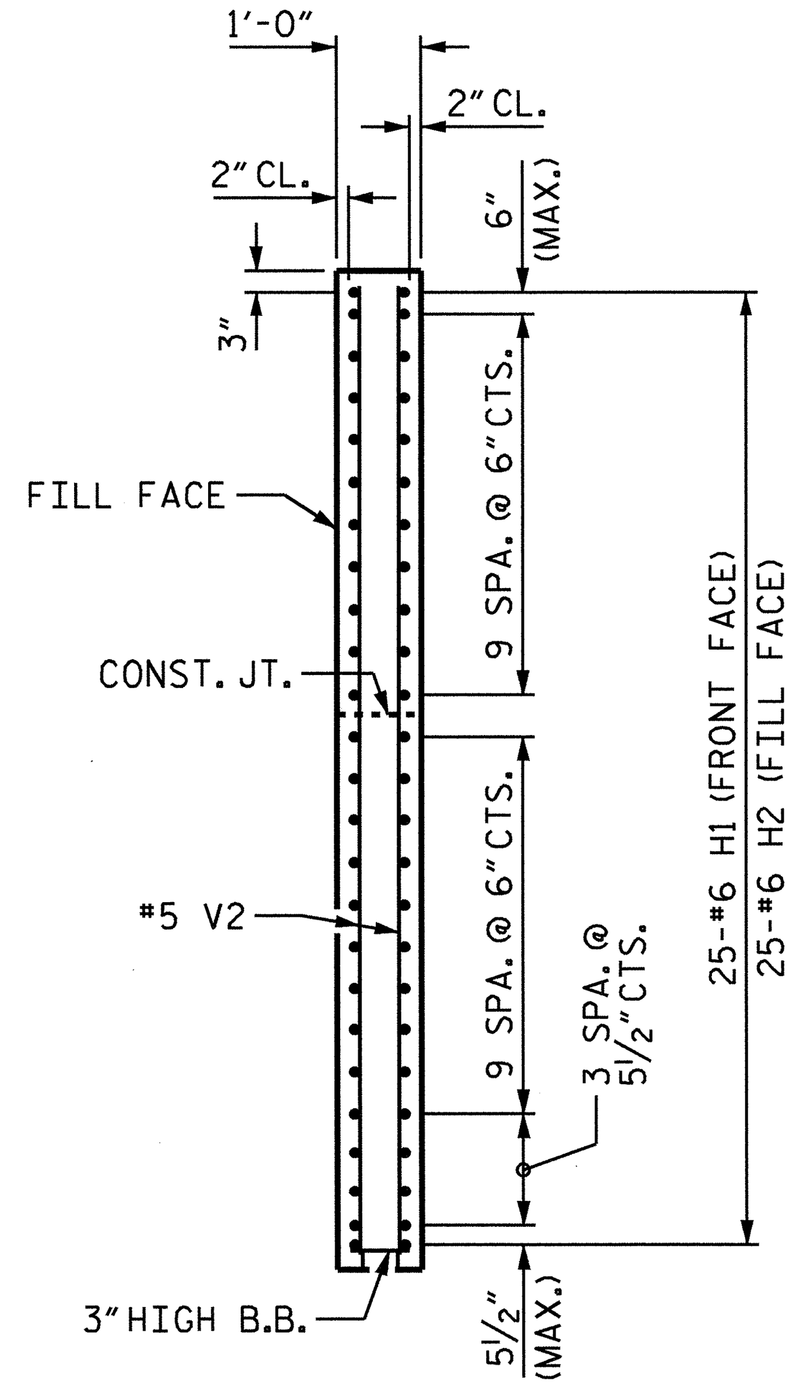


PLAN OF WING W1

✱ FIELD CUT #4 K2 AS NECESSARY TO PROVIDE 2" MIN. CLEARANCE TO CHAMFER.



PLAN OF WING W2



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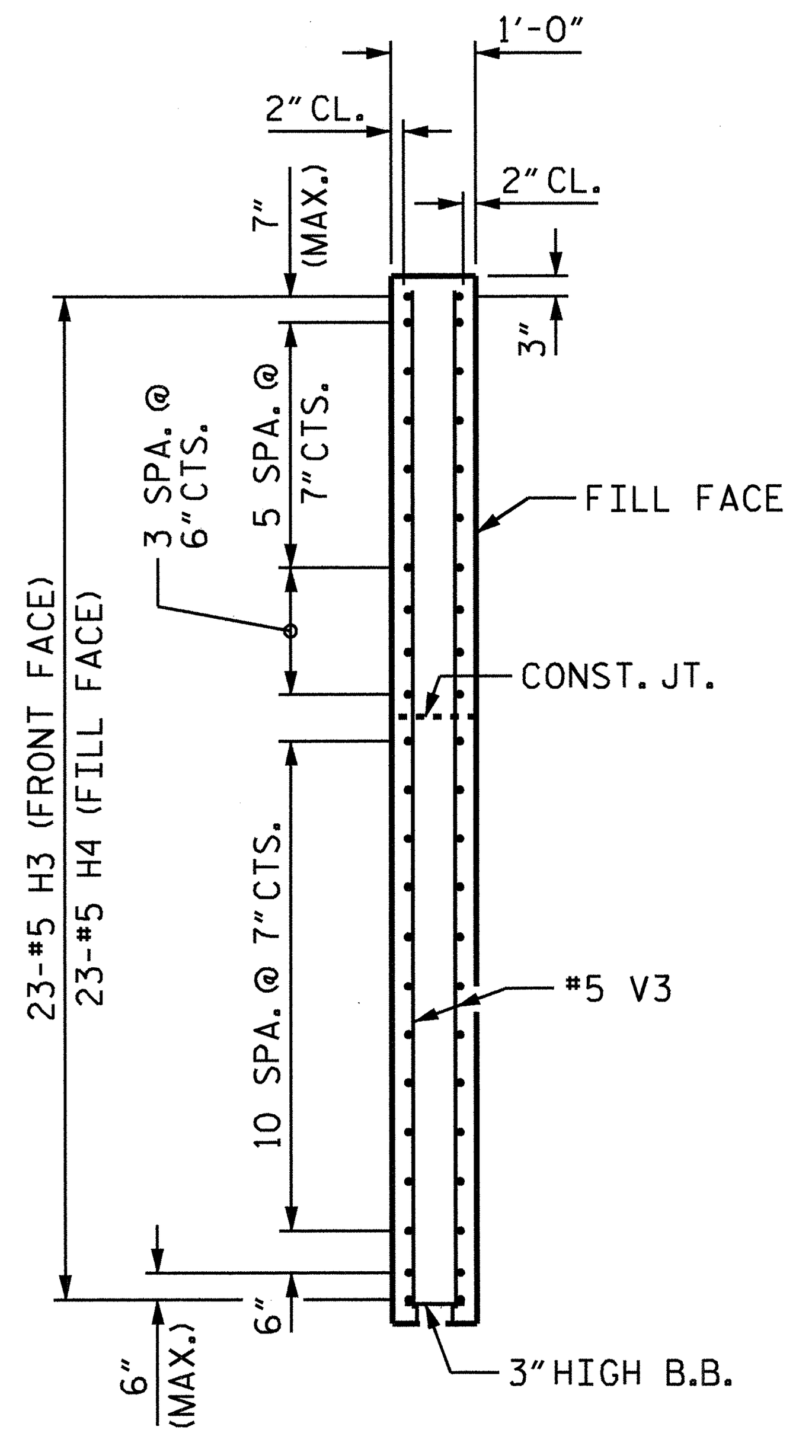

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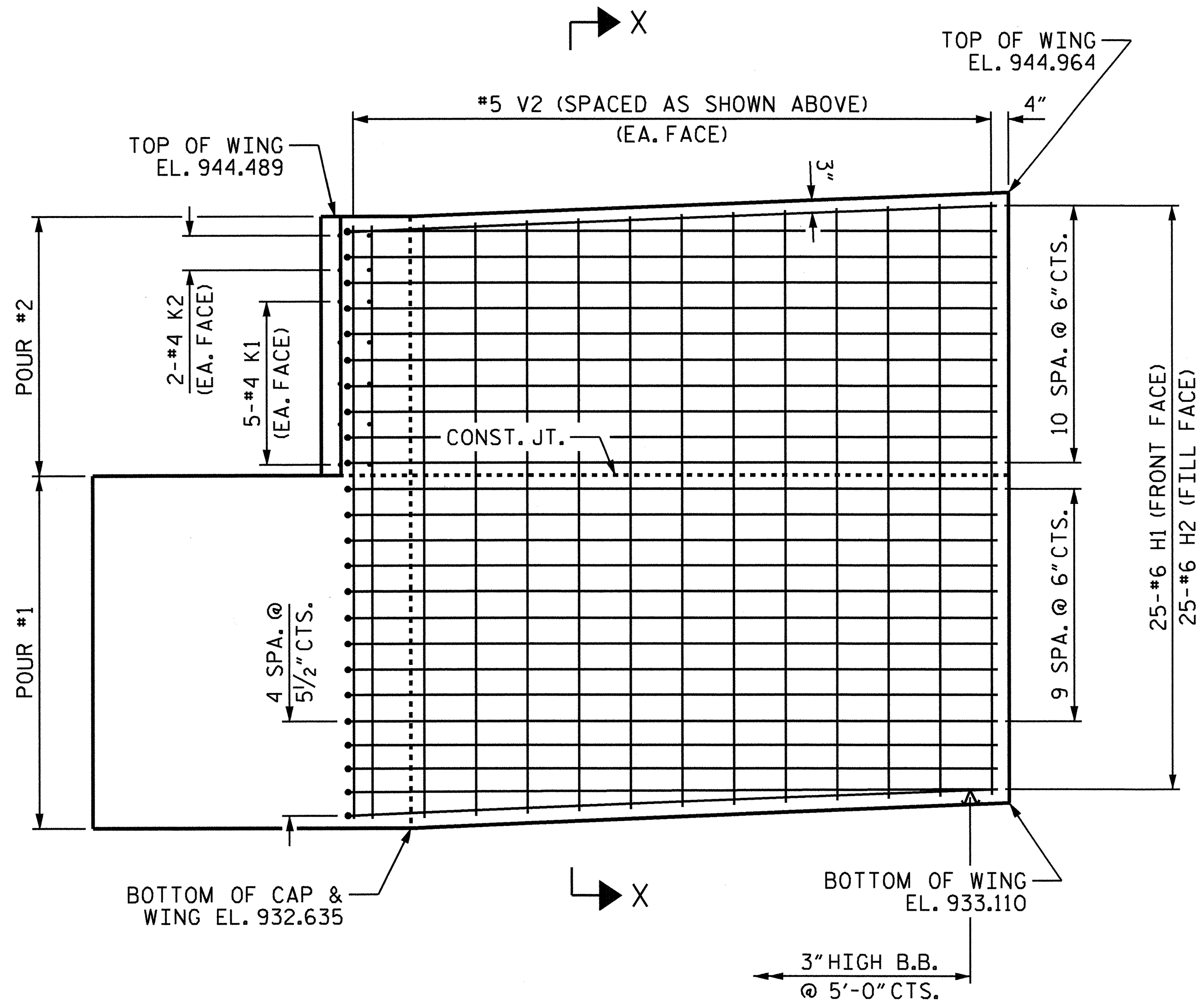
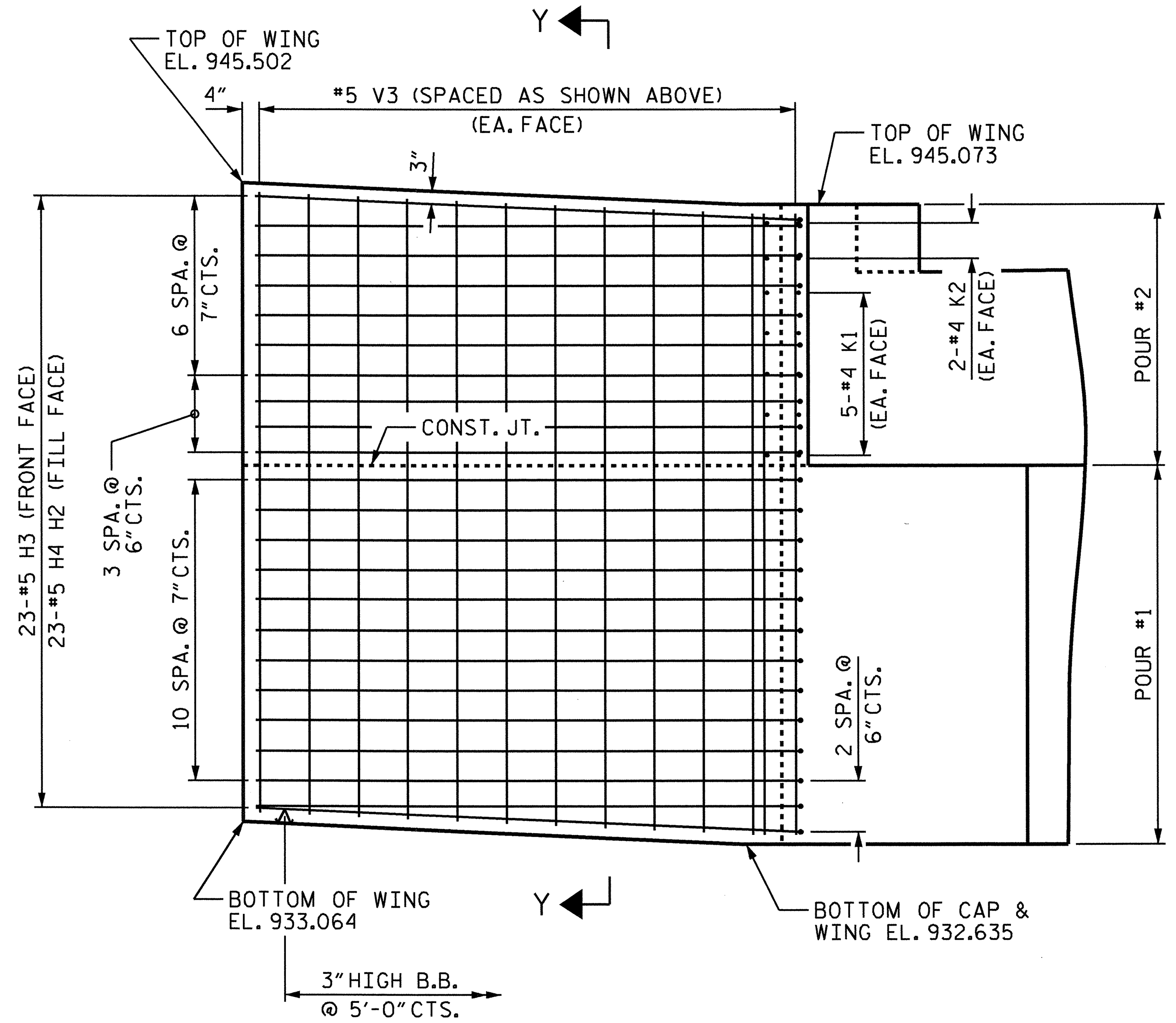


ELEVATION OF WING W1



ELEVATION OF WING W2

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER P. KOREY NEWTON

1/10/2012

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(RIGHT LANE)

REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		S-43
1				3				TOTAL SHEETS
2				4				52

DRAWN BY : P. K. NEWTON DATE : 11/30/11
CHECKED BY : R. P. PATEL DATE : 1/4/12

10-JAN-2012 15:28
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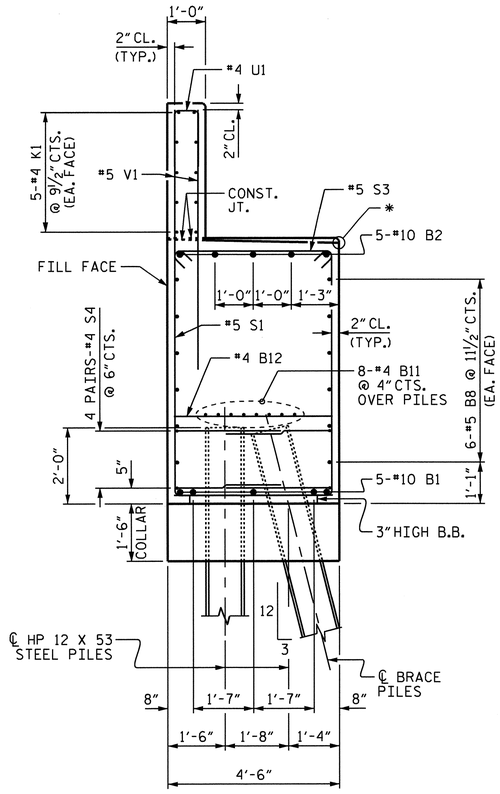
kpnewton



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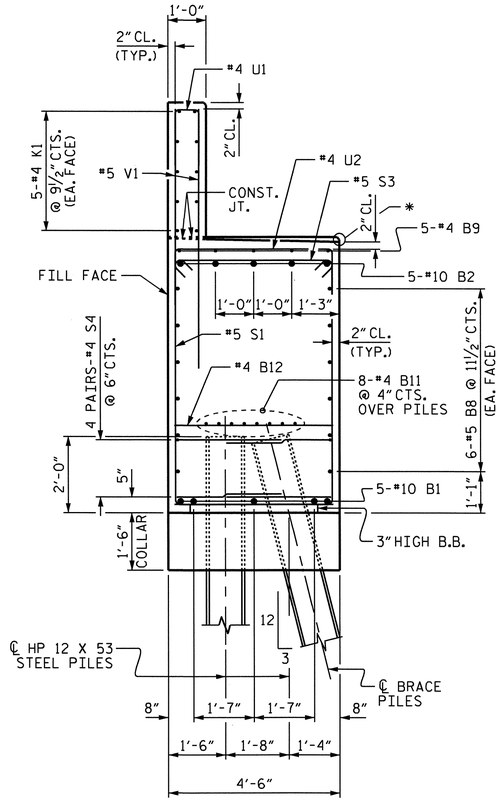

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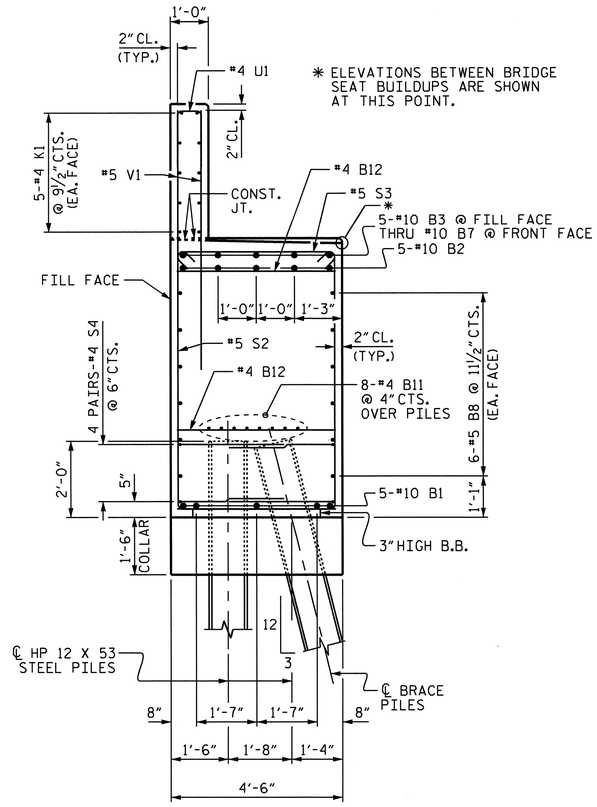

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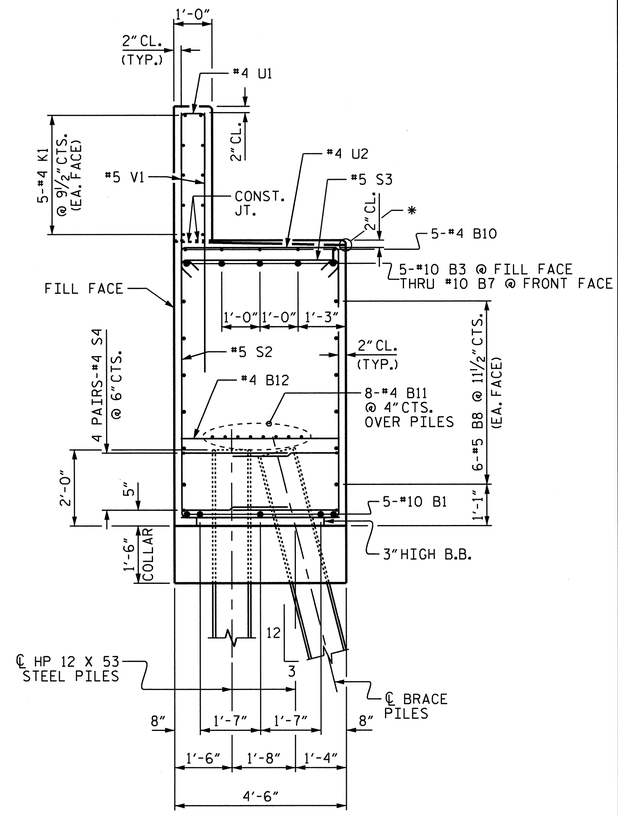

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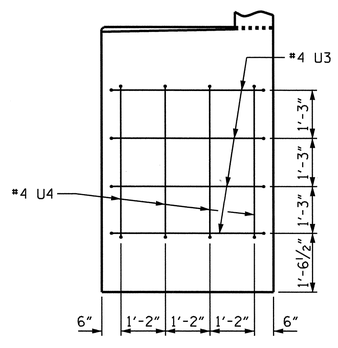
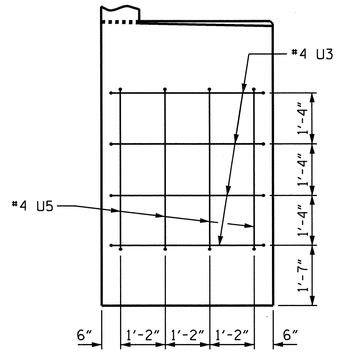


VIEW E-E



VIEW F-F

NORTH CAROLINA PROFESSIONAL SEAL 025945 ENGINEER KOREY NEWTON

1/10/2012

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-44
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 11/29/11
CHECKED BY : R. P. PATEL DATE : 1/4/12

10-JAN-2012 15:28
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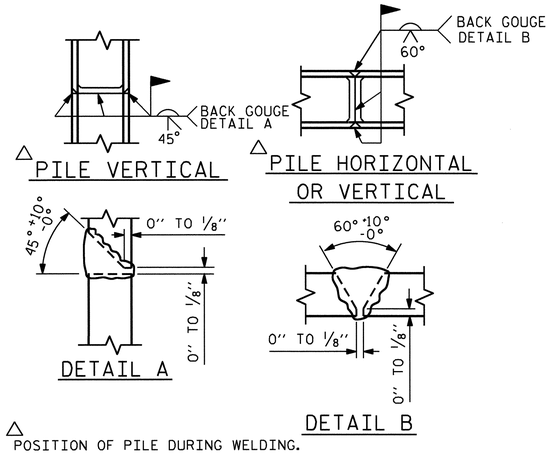
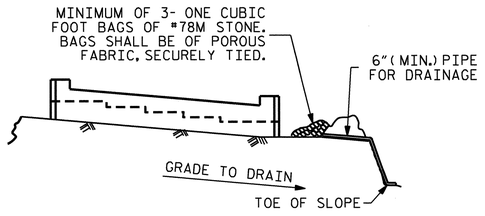
kpnewton



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



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.

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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

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#10	1	36'-6"	1571
B2	5	#10	1	43'-8"	939
B3	1	#10	1	35'-1"	151
B4	1	#10	1	34'-5"	148
B5	1	#10	1	33'-9"	145
B6	1	#10	1	33'-0"	142
B7	1	#10	1	32'-5"	139
B8	24	#5	STR	32'-9"	820
B9	5	#4	STR	11'-11"	40
B10	5	#4	STR	2'-6"	8
B11	24	#4	STR	22'-5"	359
B12	18	#4	STR	4'-2"	50
H1	25	#6	6	13'-4"	501
H2	25	#6	6	13'-3"	498
H3	23	#5	7	11'-4"	272
H4	23	#5	7	11'-9"	282
K1	30	#4	STR	22'-5"	449
K2	8	#4	STR	3'-4"	18
S1	28	#5	2	18'-0"	526
S2	30	#5	2	18'-8"	584
S3	58	#5	3	5'-1"	308
S4	40	#4	4	7'-2"	191
U1	55	#4	4	3'-8"	135
U2	12	#4	4	7'-2"	57
U3	8	#4	5	7'-11	42
U4	4	#4	4	7'-0"	19
U5	4	#4	4	7'-3"	19
V1	110	#5	STR	6'-10"	784
V2	34	#5	STR	11'-6"	408
V3	32	#5	STR	12'-1"	403

REINFORCING STEEL LBS. 10008

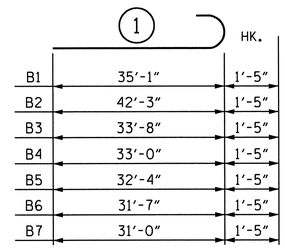
CLASS A CONCRETE

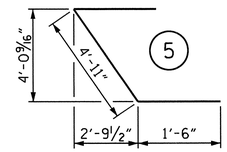
POUR 1	(COLLARS, CAP, & LOWER WINGS)	83.0 C.Y.
POUR 2	(BACKWALL & UPPER WINGS)	13.5 C.Y.
TOTAL		96.5 C.Y.

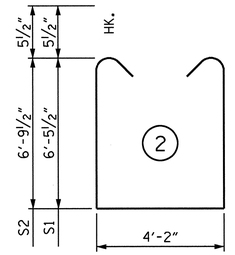
HP 12 X 53 STEEL PILES

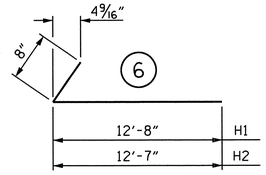
NUMBER = 10 LIN. FT. = 400

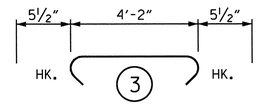
BAR TYPES

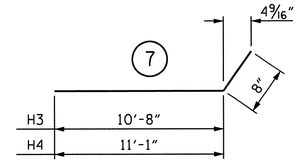


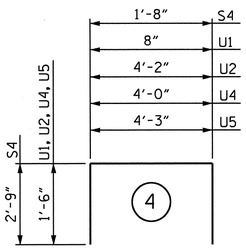












ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER K. NEWTON

2/28/2012

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-45
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 11/30/11
CHECKED BY : R. P. PATEL DATE : 1/4/12

27-FEB-2012 17:00
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ttang

NOTES

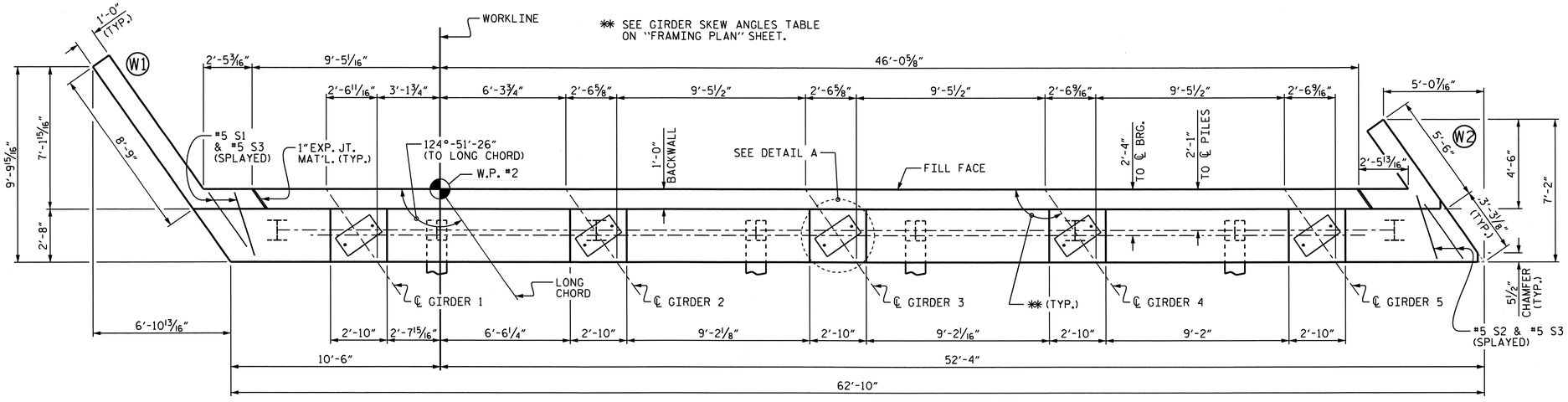
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

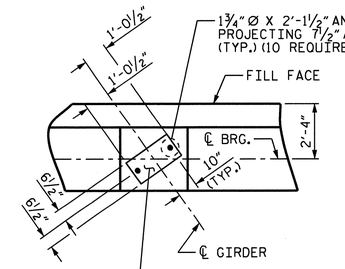
* THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THAT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

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

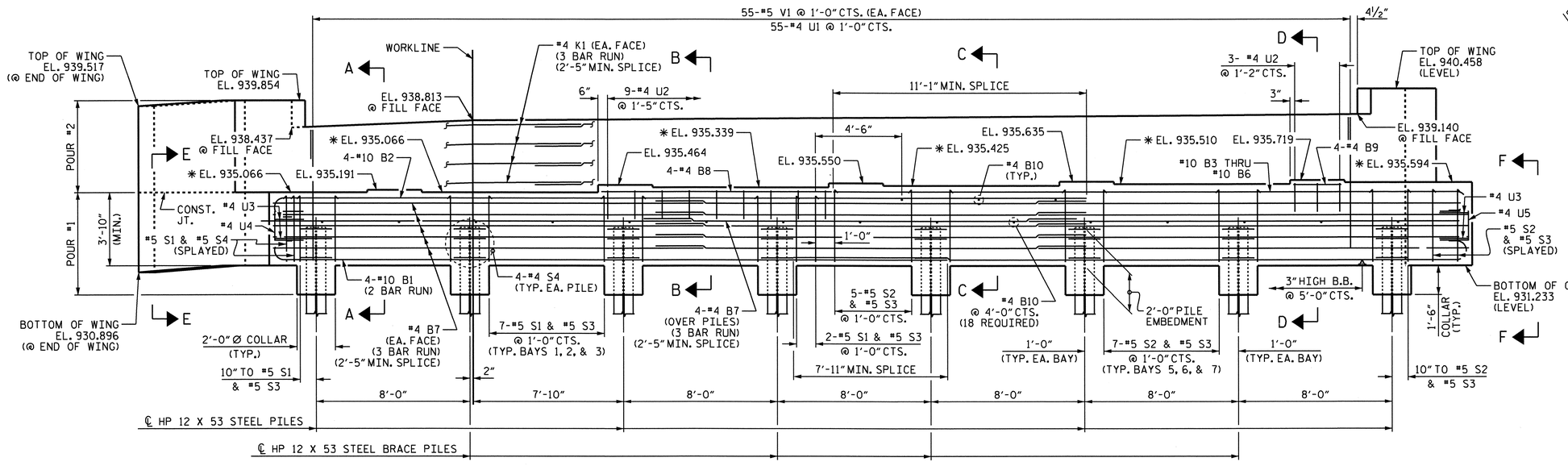
THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.



PLAN



DETAIL A



ELEVATION

RIGHT WING NOT SHOWN FOR CLARITY

NORTH CAROLINA PROFESSIONAL SEAL 036443 ENGINEER KOREY NEWTON
1/10/2012

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-46
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 10/25/11
CHECKED BY : R. P. PATEL DATE : 1/5/12

10-JAN-2012 15:28
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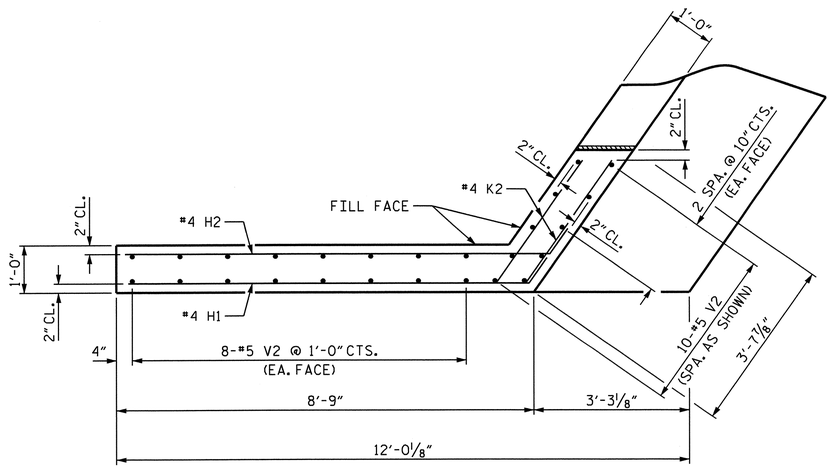
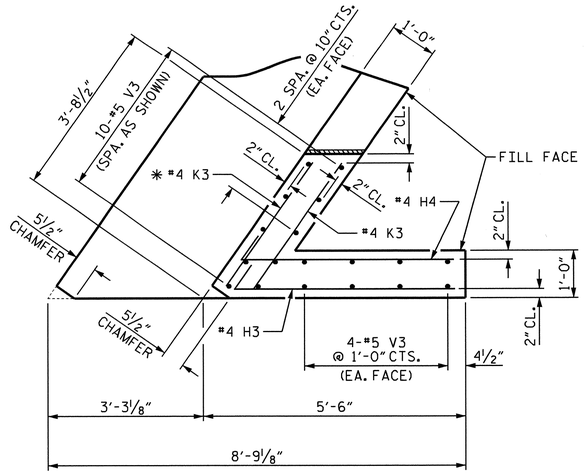
kpnewton

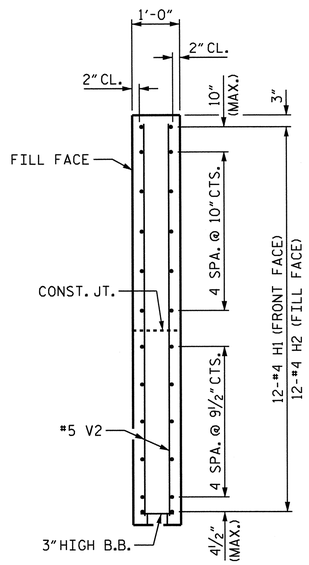


PLAN OF WING W1



PLAN OF WING W2

* FIELD CUT #4 K3 AS NECESSARY TO PROVIDE 2" MIN. CLEARANCE TO CHAMFER



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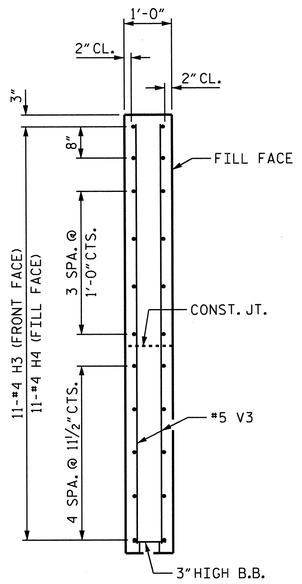

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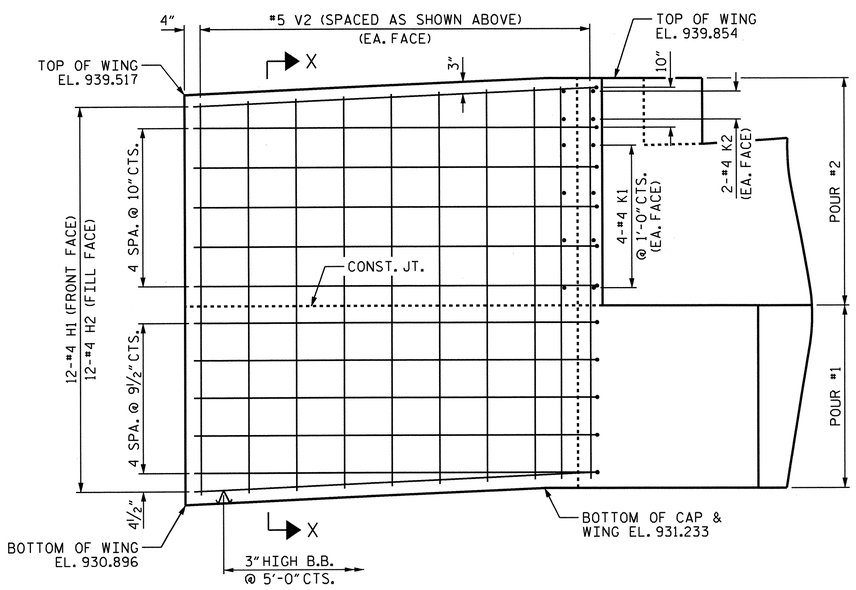
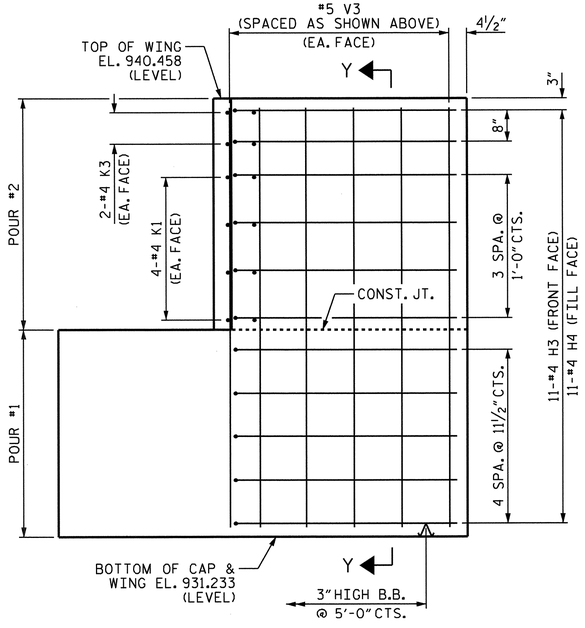


ELEVATION OF WING W1



ELEVATION OF WING W2

NORTH CAROLINA PROFESSIONAL SEAL 030283 ENGINEER KOREY NEWTON
2/28/2012

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-47
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 12/6/11
CHECKED BY : R. P. PATEL DATE : 1/5/12

24-FEB-2012 16:42
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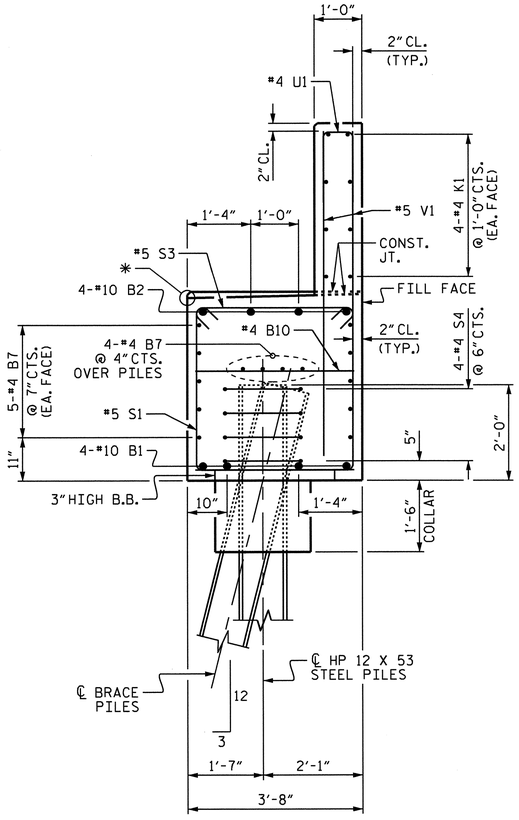
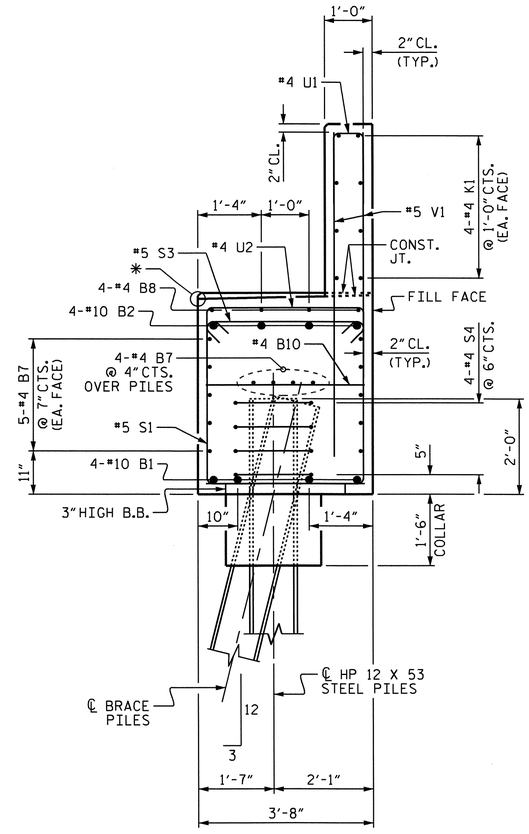


SECTION A-A



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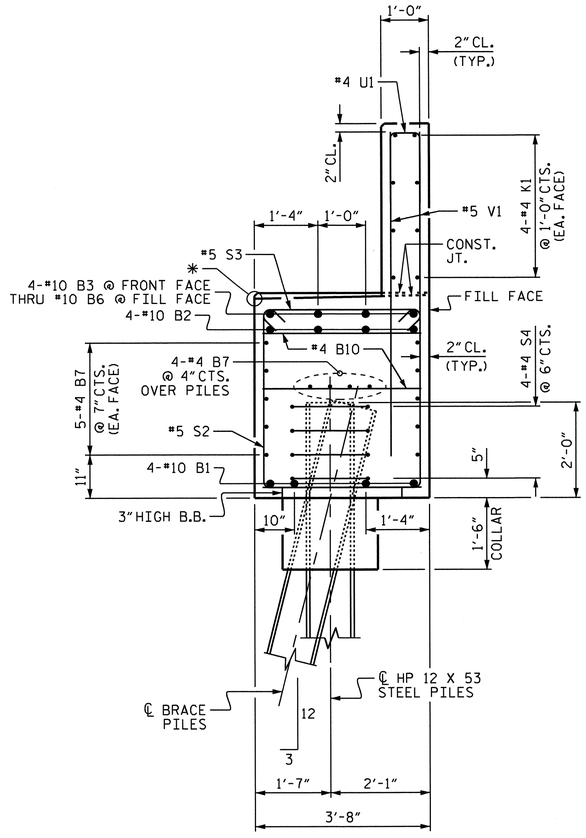
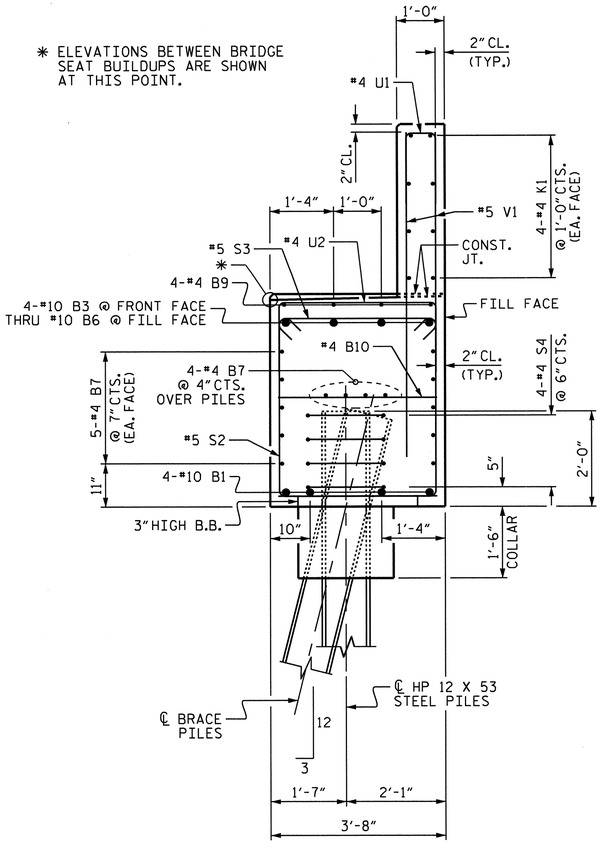
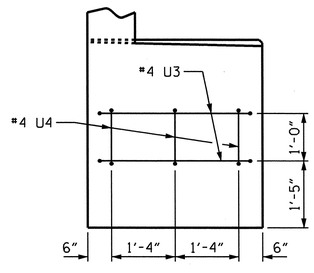


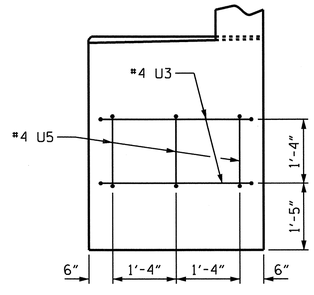
SECTION C-C



SECTION D-D



VIEW E-E



VIEW F-F

NORTH CAROLINA PROFESSIONAL SEAL 029466 ENGINEER KOREY NEWTON
1/10/2012

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-48
1			3			TOTAL SHEETS
2			4			52

DRAWN BY : P. K. NEWTON DATE : 12/6/11
CHECKED BY : R. P. PATEL DATE : 1/5/12

10-JAN-2012 15:28
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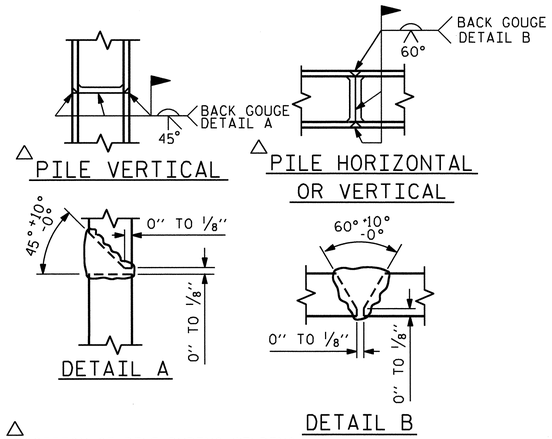
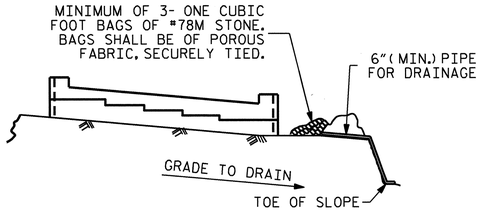
kpnewton



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



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.

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TEMPORARY DRAINAGE AT END BENT

BILL OF MATERIAL

END BENT 2

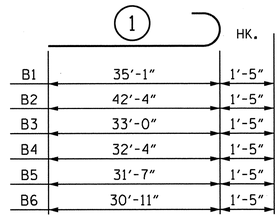
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	1	36'-6"	1256
B2	4	#10	1	43'-9"	753
B3	1	#10	1	34'-5"	148
B4	1	#10	1	33'-9"	145
B5	1	#10	1	33'-0"	142
B6	1	#10	1	32'-4"	139
B7	42	#4	STR	22'-5"	629
B8	4	#4	STR	12'-0"	32
B9	4	#4	STR	2'-6"	7
B10	18	#4	STR	3'-4"	40
H1	12	#4	6	9'-1"	73
H2	12	#4	6	9'-7"	77
H3	11	#4	7	5'-4"	39
H4	11	#4	7	5'-2"	38
K1	24	#4	STR	22'-5"	359
K2	4	#4	STR	3'-2"	8
K3	4	#4	STR	3'-3"	9
S1	26	#5	2	11'-2"	303
S2	29	#5	2	11'-10"	358
S3	55	#5	3	4'-3"	244
S4	32	#4	8	6'-6"	139
U1	55	#4	4	3'-8"	135
U2	12	#4	4	6'-4"	51
U3	4	#4	5	6'-11	18
U4	3	#4	4	4'-2"	8
U5	3	#4	4	4'-6"	9
V1	110	#5	STR	6'-10"	784
V2	26	#5	STR	8'-3"	224
V3	18	#5	STR	8'-10"	166
REINFORCING STEEL				LBS.	6333

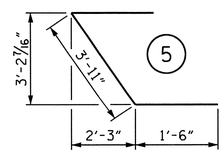
CLASS A CONCRETE		
POUR 1	(COLLARS, CAP, & LOWER WINGS)	38.3 C.Y.
POUR 2	(BACKWALL & UPPER WINGS)	10.3 C.Y.
TOTAL		48.6 C.Y.

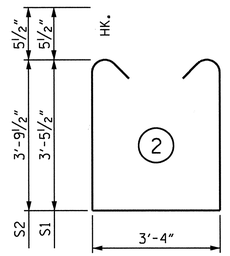
HP 12 X 53 STEEL PILES

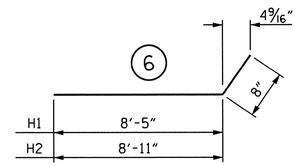
NUMBER = 8 LIN. FT. = 220

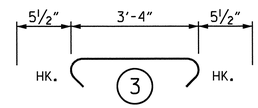
BAR TYPES

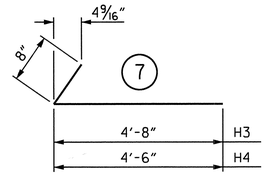


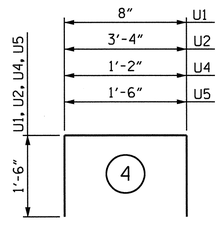


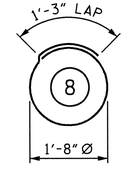












ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-49
1			3			TOTAL SHEETS
2			4			52

NORTH CAROLINA PROFESSIONAL SEAL 028445 ENGINEER KOREY NEWTON

2/28/2012

DRAWN BY : P. K. NEWTON DATE : 12/6/11
CHECKED BY : R. P. PATEL DATE : 1/5/12

27-FEB-2012 17:00
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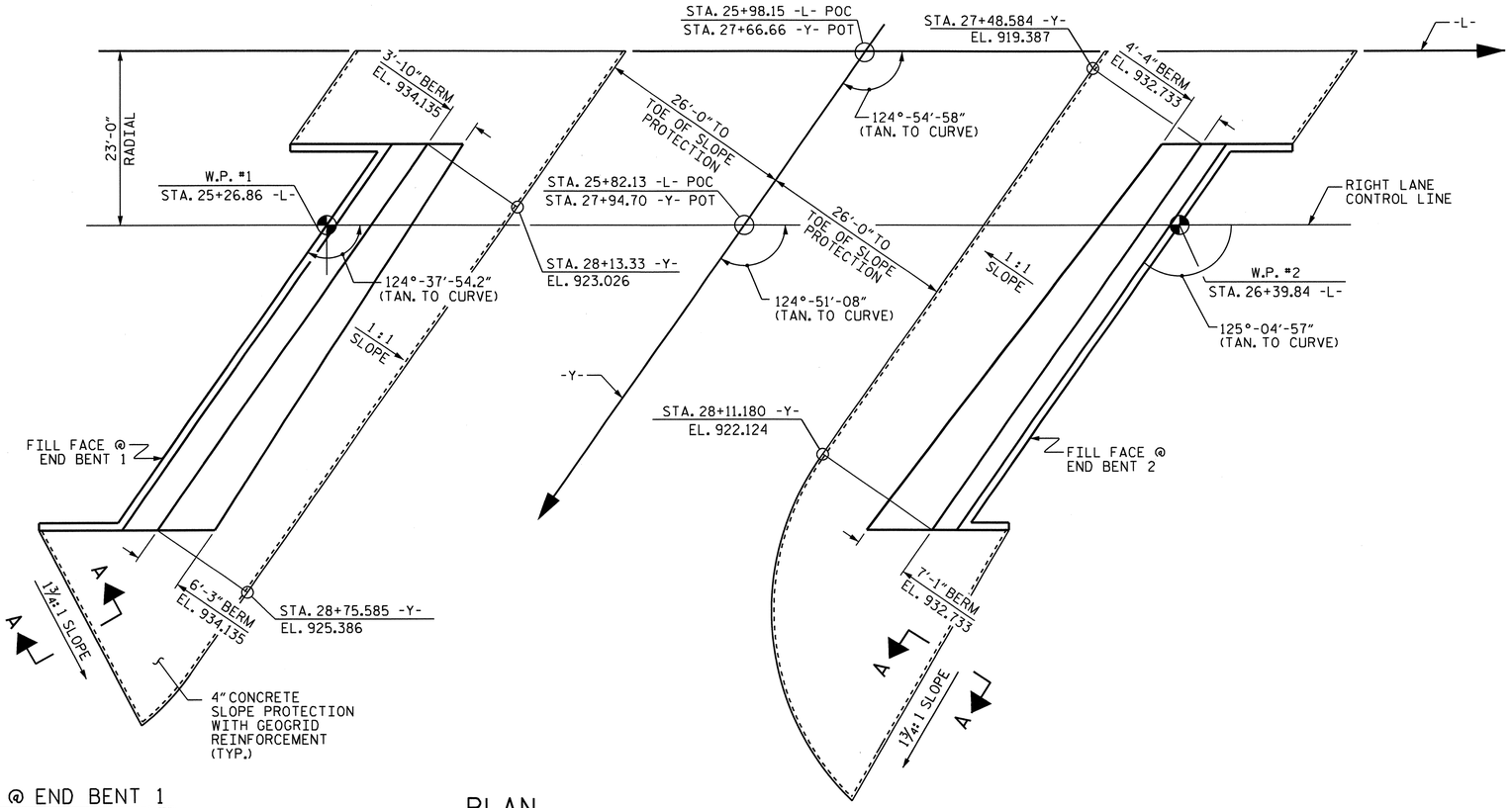
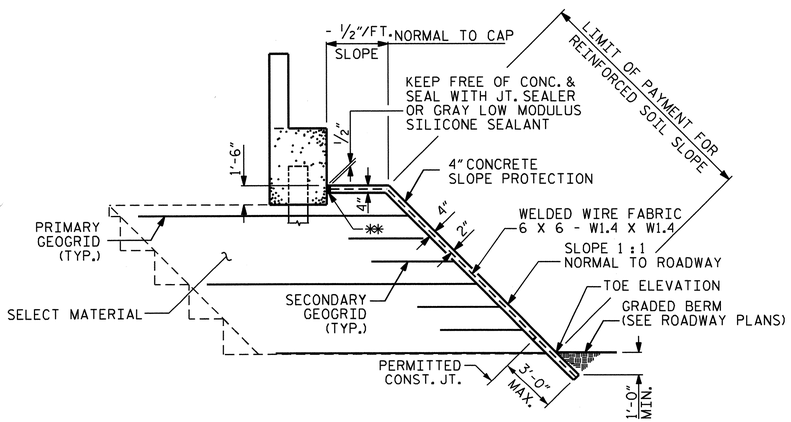


@ END BENT 1

PLAN

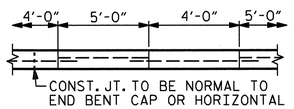
@ END BENT 2



SECTION ALONG ℄ ROADWAY

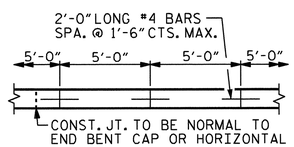
SHOWING 4" CONCRETE SLOPE PROTECTION WITH GEOGRID REINFORCEMENT.
FOR TOP BERM AND TOE ELEVATIONS OF SLOPE PROTECTION, SEE PLAN VIEW.

✱✱ PLACE DEBONDING TAPE ON TOP OF THE 1" EXP. JT. MAT'L.



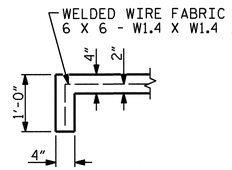
POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



SECTION A-A

GENERAL NOTES

SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS.

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

THE ENTIRE AREA UNDER THE 4" CONCRETE SLOPE PROTECTION SHALL BE REINFORCED WITH THE GEOGRID REINFORCEMENT AS DETAILED IN THE PLANS. FOR DETAILS AND PAY ITEMS, SEE "REINFORCED SOIL SLOPE" ON SHEET S-50A.

BRIDGE @ STA. 25+98.15 -L- RIGHT LANE	4 INCH SLOPE PROTECTION	✱ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	270	540
END BENT 2	300	600

✱ QUANTITY SHOWN IS BASED ON 5' POURS.

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIANG FANG
2/24/12

PROJECT NO. B-4506
FORSYTH COUNTY
STATION: 25+98.15 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
SLOPE PROTECTION DETAILS
(RIGHT LANE)

ASSEMBLED BY : HARISH SHAH	DATE : 1-13-10
CHECKED BY : T. H. FANG	DATE : 12-07-11

DRAWN BY : ELR 5/92	REV. 7/10/01 LES/RDR
CHECKED BY : GRP 6/92	REV. 5/7/03 RWW/JTE
	REV. 5/1/06 TLA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-50
1			3			TOTAL SHEETS
2			4			52

STD. NO. SP1

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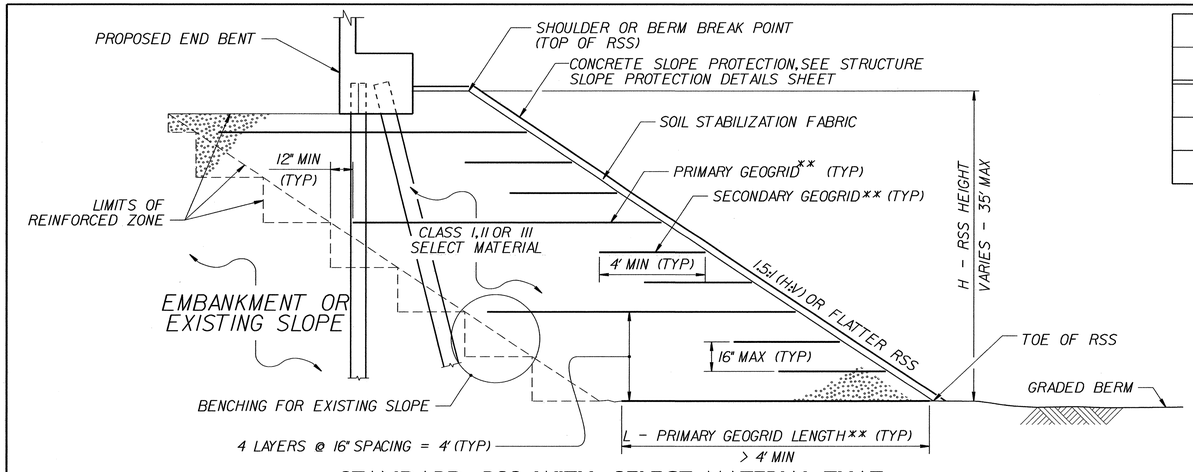
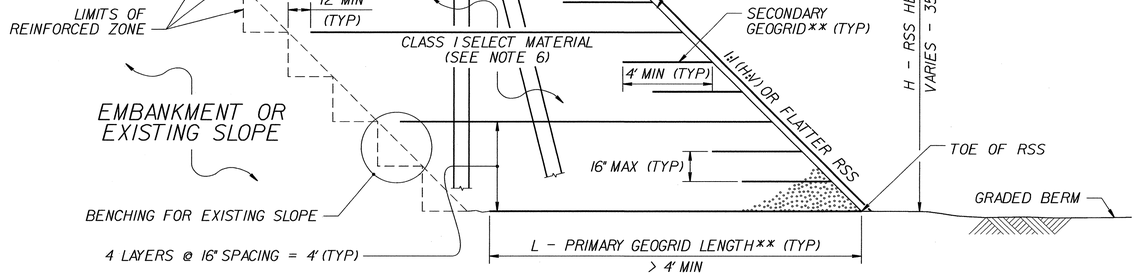


STANDARD RSS WITH SELECT MATERIAL THAT DOES NOT MEET ARTICLE 1019-2 OF THE STANDARD SPECIFICATIONS

****SEE TABLES AND GEOGRID PLACEMENT DETAILS.**



STANDARD RSS WITH SELECT MATERIAL THAT MEETS ARTICLE 1019-2 OF THE STANDARD SPECIFICATIONS

****SEE TABLES AND GEOGRID PLACEMENT DETAILS.**

NOTES:

1. FOR STANDARD REINFORCED SOIL SLOPES, SEE REINFORCED SOIL SLOPE SPECIAL PROVISION.
2. STANDARD RSS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
   UNIT WEIGHT, γ = 120 LB/CF
   FRICTION ANGLE, ϕ = 30 DEGREES
   COHESION, c = 0 LB/SF
3. DO NOT USE STANDARD RSS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR GROUNDWATER IS ABOVE TOE OF RSS.
4. DO NOT USE STANDARD RSS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW RSS.
5. FOR 1:1 TO < 1.5:1 (H:V) RSS, USE CLASS I SELECT MATERIAL IN THE REINFORCED ZONE THAT MEETS ARTICLE 1019-2 OF THE STANDARD SPECIFICATIONS EXCEPT FOR SELECT MATERIAL THAT MEETS AASHTO M 145 FOR SOIL CLASSIFICATIONS A-4 AND A-5. DO NOT USE A-4 OR A-5 SOIL OR CLASS II OR III SELECT MATERIAL FOR 1:1 TO < 1.5:1 (H:V) RSS.
6. EXCEPT FOR TENSAR UX GEOGRIDS, DO NOT SPLICE OR OVERLAP PRIMARY GEOGRIDS IN THE MACHINE DIRECTION (MD) SO SPLICES OR OVERLAPS ARE PARALLEL TO THE TOE OF RSS. TENSAR UX GEOGRIDS MAY BE SPLICED ONCE PER PRIMARY GEOGRID LENGTH IN ACCORDANCE WITH TENSAR'S BODKIN CONNECTION DETAIL. USE TENSAR UX GEOGRID PIECES AT LEAST 4' LONG.
7. EXCEPT FOR TENSAR UX GEOGRIDS, PLACE PRIMARY GEOGRIDS SO GEOGRIDS ARE ADJACENT TO EACH OTHER IN THE CROSS-MACHINE DIRECTION (CD). TENSAR UX GEOGRIDS MAY BE PLACED WITH A MAXIMUM SPACING BETWEEN GEOGRIDS OF 1.64' IN THE CD. STAGGER TENSAR UX GEOGRIDS SO GEOGRIDS ARE CENTERED OVER GAPS IN THE PRIMARY GEOGRID LAYER BELOW.
8. DO NOT PLACE PRIMARY GEOGRIDS UNTIL EXCAVATION DIMENSIONS AND IN-SITU MATERIAL ARE APPROVED.
9. REINFORCED SOIL SLOPE IS TO BE CONSTRUCTED FIRST AND THEN PILES FOR THE END BENTS TO BE DRIVEN THROUGH THE GEOGRID LAYERS.
10. REINFORCED SOIL SLOPE IS TO BE FACED WITH CONCRETE SLOPE PROTECTION. FOR QUANTITIES AND DETAILS SEE SLOPE PROTECTION DETAILS SHEET.
11. REINFORCED SOIL SLOPE FACE IS TO BE STABILIZED WITH TYPE II ENGINEERING FABRIC WHEN COMPLETED AND IS TO REMAIN INTACT UNTIL THE SLOPE ARE FACED WITH CONCRETE SLOPE PROTECTION.

PREPARED BY: EJS	DATE: 1/19/12
REVIEWED BY: SCC	DATE: 2/23/12

ESTIMATED QUANTITIES	
BRIDGE @ STA. 25+98.15 -L- RIGHT LANE	EXPOSED SLOPE AREA SQ. YARDS
REINFORCED SOIL SLOPE AT END BENT 1	215
REINFORCED SOIL SLOPE AT END BENT 2	240

H (FT)	0 - < 10		10 - 20		> 20 - 35	
SELECT MATERIAL CLASS	I	II OR III	I	II OR III	I	II OR III
1:1 TO < 1.5:1 (H:V) RSS	1.20	SEE NOTE 6	1.10	SEE NOTE 6	1.00	SEE NOTE 6
1.5:1 TO 1.75:1 (H:V) RSS	1.15	1.00	1.05	0.95	0.95	0.90
> 1.75:1 TO < 2:1 (H:V) RSS	1.10	0.75	1.00	0.70	0.90	0.65

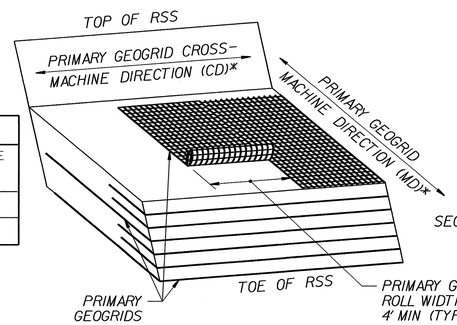
L/H RATIO (L > 4' MIN)

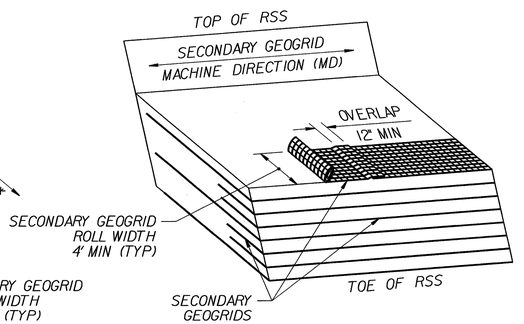
IF L ≤ 4', USE SECONDARY GEOGRID INSTEAD OF PRIMARY GEOGRID.

H (FT)		0 - < 10		10 - 20		> 20 - 35	
SELECT MATERIAL CLASS		I	II OR III	I	II OR III	I	II OR III
PRIMARY GEOGRID (SUBSTITUTE SECONDARY GEOGRID FOR PRIMARY GEOGRID FOR ≥ 2:1 (H:V) RSS)	1:1 TO < 1.5:1 (H:V) RSS	2XT SG150 SF20 UX1100HS	SEE NOTE 6	3XT SG200 SF35 UX1400HS	SEE NOTE 6	5XT SG350 SF55 UX1500HS	SEE NOTE 6
	1.5:1 TO 1.75:1 (H:V) RSS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	3XT SG200 SF35 UX1400HS	2XT SG150 SF20 UX1100HS	3XT SG200 SF35 UX1400HS	2XT SG150 SF20 UX1100HS
	> 1.75:1 TO < 2:1 (H:V) RSS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS	2XT SG150 SF20 UX1100HS
SECONDARY GEOGRID	1:1 (H:V) OR FLATTER RSS	2XT SG150 SF11 BX1100					

PRIMARY AND SECONDARY GEOGRIDS

#XT REFERS TO MIRAFI SERIES GEOGRID.
SG### REFERS TO STRATAGRID SERIES GEOGRID.
SF## REFERS TO SYNTEEN SERIES GEOGRID.
UX####HS AND BX#### REFER TO TENSAR SERIES GEOGRID.





GEOGRID PLACEMENT DETAILS

***SEE NOTES 6 AND 7.**

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 029869 ENGINEER SHANE C. CLARK

SIGNATURE 2/23/12 DATE

ENGINEER

SIGNATURE DATE

PROJECT NO.: B-4506

FORSYTH ***COUNTY***

STATION: 25+98.15 -L-

GEOTECHNICAL ENGINEERING UNIT

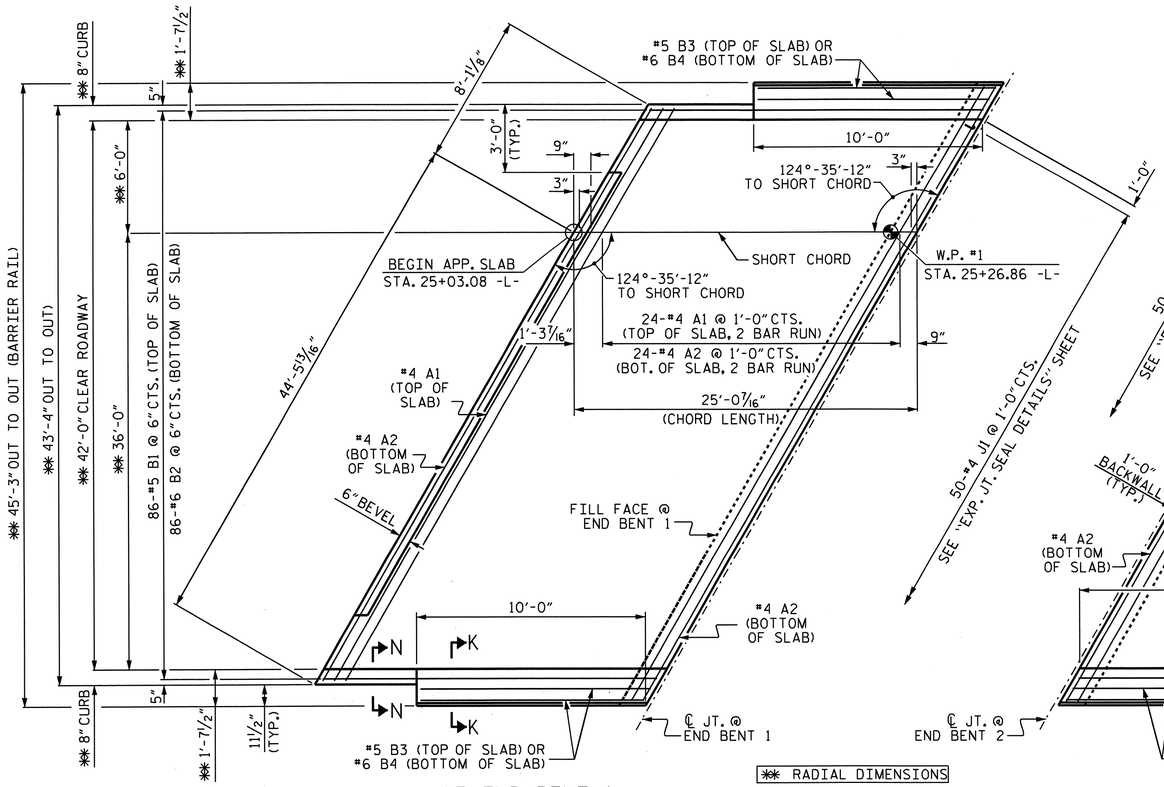
☐ ***EASTERN REGIONAL OFFICE***
☒ ***WESTERN REGIONAL OFFICE***
☐ ***CONTRACT OFFICE***

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

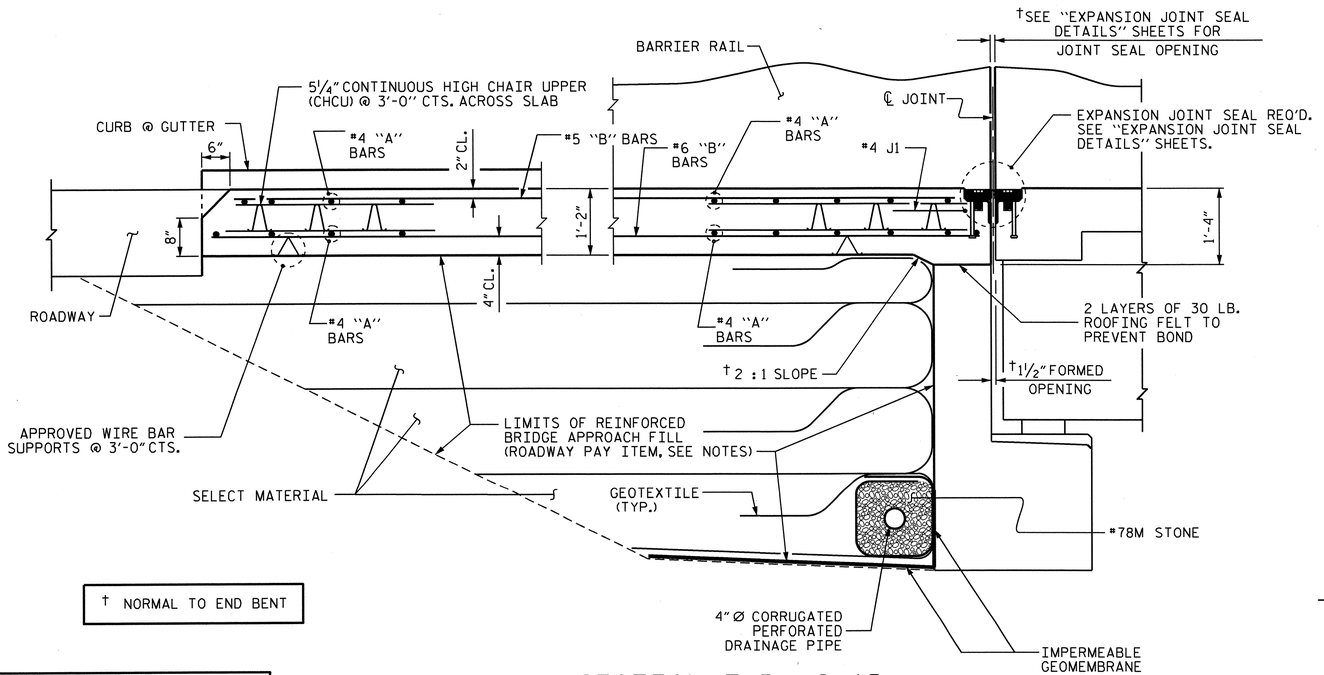
REINFORCED SOIL SLOPE (RSS) AT END BENTS

(RIGHT LANE)

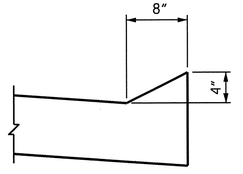
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-50A
1			3			TOTAL SHEETS
2			4			52



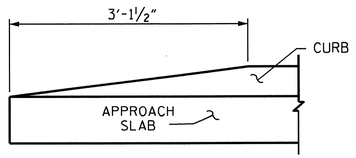
PLAN



SECTION THRU SLAB

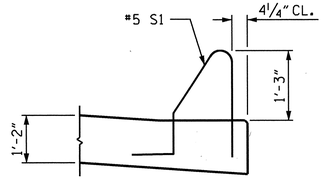


SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS



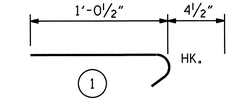
SECTION K-K

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	50	#4	STR	28'-5"	949
A2	52	#4	STR	28'-3"	981
✱ B1	86	#5	STR	23'-4"	2093
B2	86	#6	STR	24'-7"	3176
✱ B3	4	#5	STR	9'-8"	40
B4	4	#6	STR	9'-8"	58
✱ J1	50	#4	1	1'-5"	47
REINFORCING STEEL				LBS.	4214
✱ EPOXY COATED REINFORCING STEEL				LBS.	3129
CLASS AA CONCRETE				C. Y.	48.0

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

NOTE: QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE SHEET 2 OF 2.

SPLICE CHART

BAR	SIZE	SPLICE
✱ A1	#4	2'-0"
A2	#4	1'-9"

NOTES

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

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.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 16301 ENGINEER TING HSIUNG FANG
2/28/12

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-51
1			3			TOTAL SHEETS
2			4			52

ASSEMBLED BY : S. B. WILLIAMS	DATE : 12-11		
CHECKED BY : T.H. FANG	DATE : 1-6-12		
DRAWN BY : EEM 3/95		REV. 5/7/03R	RWW/JTE
CHECKED BY : VAP 3/95		REV. 5/1/06RR	KMM/GM
		REV. 10/1/11	MAA/GM

28-FEB-2012 08:55
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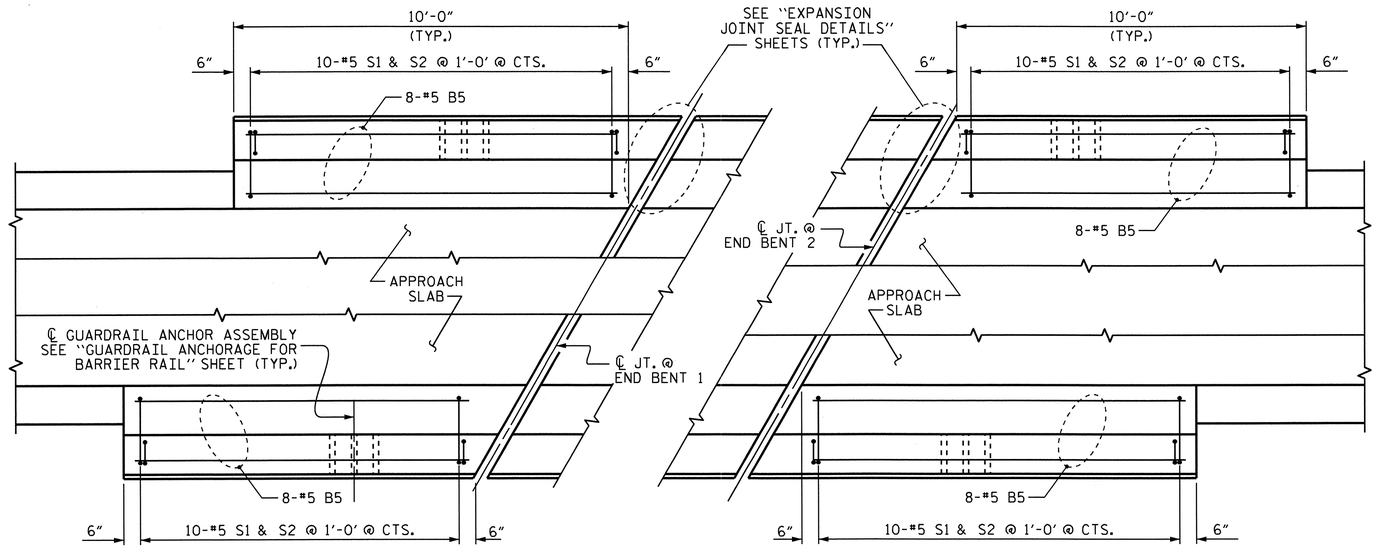
tfang

STR #2 STD. NO. BAS2 (SHT 4b)



AT END BENT 1

AT END BENT 2

PLAN OF BARRIER RAIL

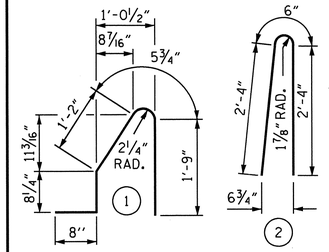
FOR EXPANSION JOINT SEAL SEE "EXPANSION JOINT SEAL DETAILS" SHEET

NOTES

THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES



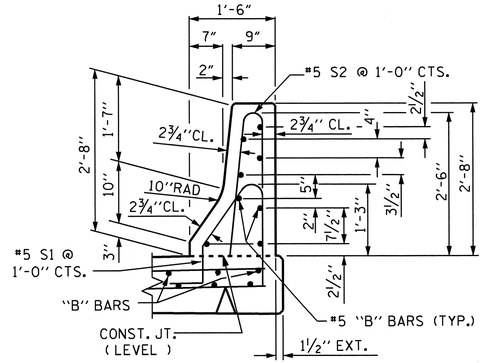
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

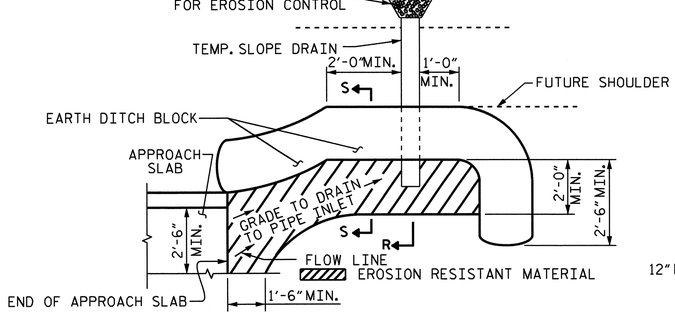
BARRIER RAILS ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ B5	32	#5	STR	9'-8"	323
✱ S1	40	#5	1	4'-9"	198
✱ S2	40	#5	2	5'-2"	216
✱ EPOXY COATED REINFORCING STEEL				LBS.	737
CLASS AA CONCRETE				C. Y.	4.4
CONCRETE BARRIER RAIL				44.31	LIN. FT.

✱✱ PAYMENT FOR CONCRETE BARRIER RAIL TO BE INCLUDED IN THE LINEAR FT. QUANTITY ON "CONCRETE BARRIER RAIL" SHEET.

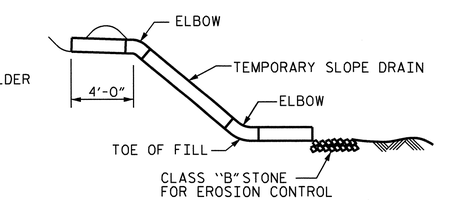


SECTION THRU RAIL

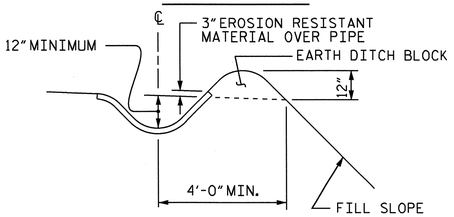


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

PLAN VIEW



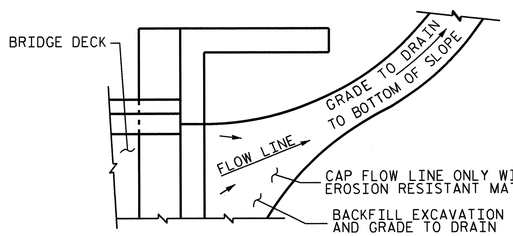
SECTION R-R



SECTION S-S

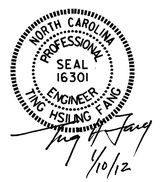
TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



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

TEMPORARY DRAINAGE DETAIL



PROJECT NO. B-4506

FORSYTH COUNTY

STATION: 25+98.15 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-52
1			3			TOTAL SHEETS
2			4			52

STR.#2

STD. NO. BAS10

ASSEMBLED BY : S. B. WILLIAMS	DATE : 12-01-11		
CHECKED BY : T. H. FANG	DATE : 12-08-11		
DRAWN BY : FCJ 11/88	REV. 10/17/00	RWW/LES	
CHECKED BY : ARB 11/88	REV. 5/7/03	RWW/JTE	
	REV. 5/1/06R	MAA/KMM	

10-JAN-2012 15:28
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kpnewton

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 SMEAR 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

STD. NO. SN

REV. 8-16-95 BBM @ RGW REV. 5-7-03 RWW @ JTE
REV. 8-16-99 RWW @ LES REV. 5-1-06 TLA @ GM

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