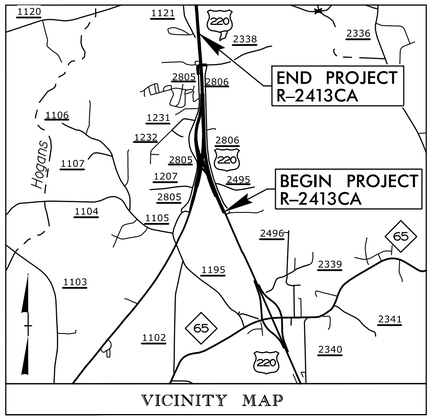
This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

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

9/09/99

CONTRACT: C203645 TIP PROJECT: R-2413CA

4/30/2015
S:\00_R2413C_sd_cv.dgn
ICA Engineering



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

LOCATION: *US 220 /FUTURE I-73 AT NC 68 – CONVERT AT-GRADE INTERSECTION TO INTERCHANGE*

TYPE OF WORK: *GRADING, DRAINAGE, STRUCTURE & PAVING*

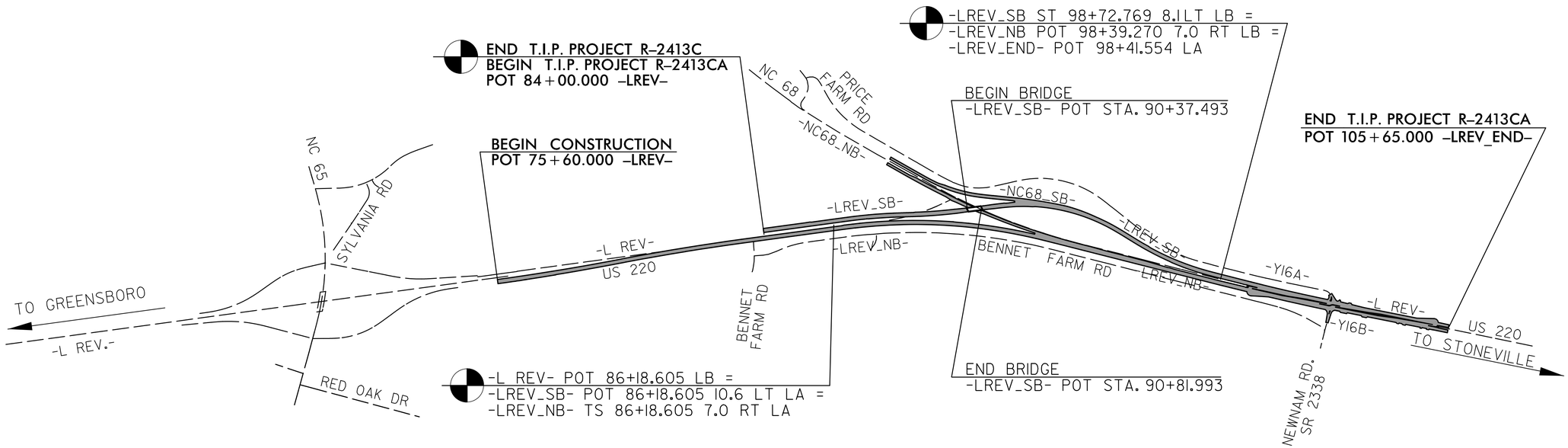
METRIC

ALL DIMENSIONS IN THESE PLANS ARE IN METERS AND/OR MILLIMETERS UNLESS OTHERWISE NOTED

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413CA		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34429.3.S9		PE
34429.3.S9		UTIL
34429.3.S9		CONST

STRUCTURES



DESIGN DATA

ADT 2014	=	22600
ADT 2034	=	48600
DHV	=	12 %
D	=	65 %
T	=	17 % *

*(13% TTST +4% DUALS)

V = 110 km/h

FUNC. CLASS.: INTERSTATE
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY T.I.P PROJECT R-2413CA	2.165 KM
TOTAL LENGTH T.I.P. PROJECT R-2413CA	2.165 KM

NOTE: NB LANE STATIONING USED TO DETERMINE LENGTH OF ROADWAY T.I.P. PROJECT

Prepared In the Office of:

ICA Engineering
5121 Kingsdown Way, Suite 100 Raleigh, NC 27607
NC License No: P-0298
for the

NCDOT STRUCTURES MANAGEMENT UNIT

2012 STANDARD SPECIFICATIONS

LETTING DATE:
JUNE 16, 2015

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E TALLMAN

DocuSigned by:
Thomas E. Tallman
E9B789620EE24D5...

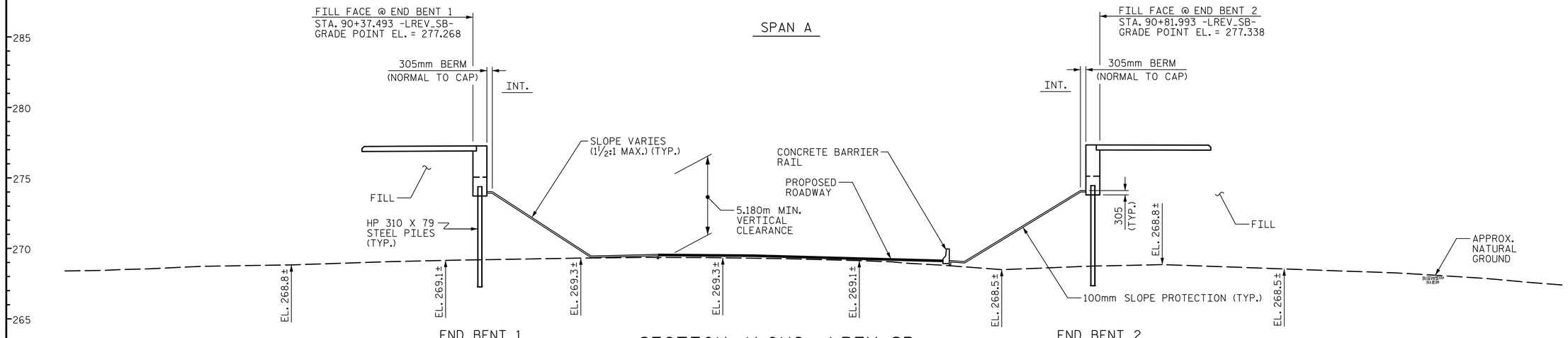
STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

+20 +40 +60 +80 91+00 +20

(+)2.9641% (-)2.1422%

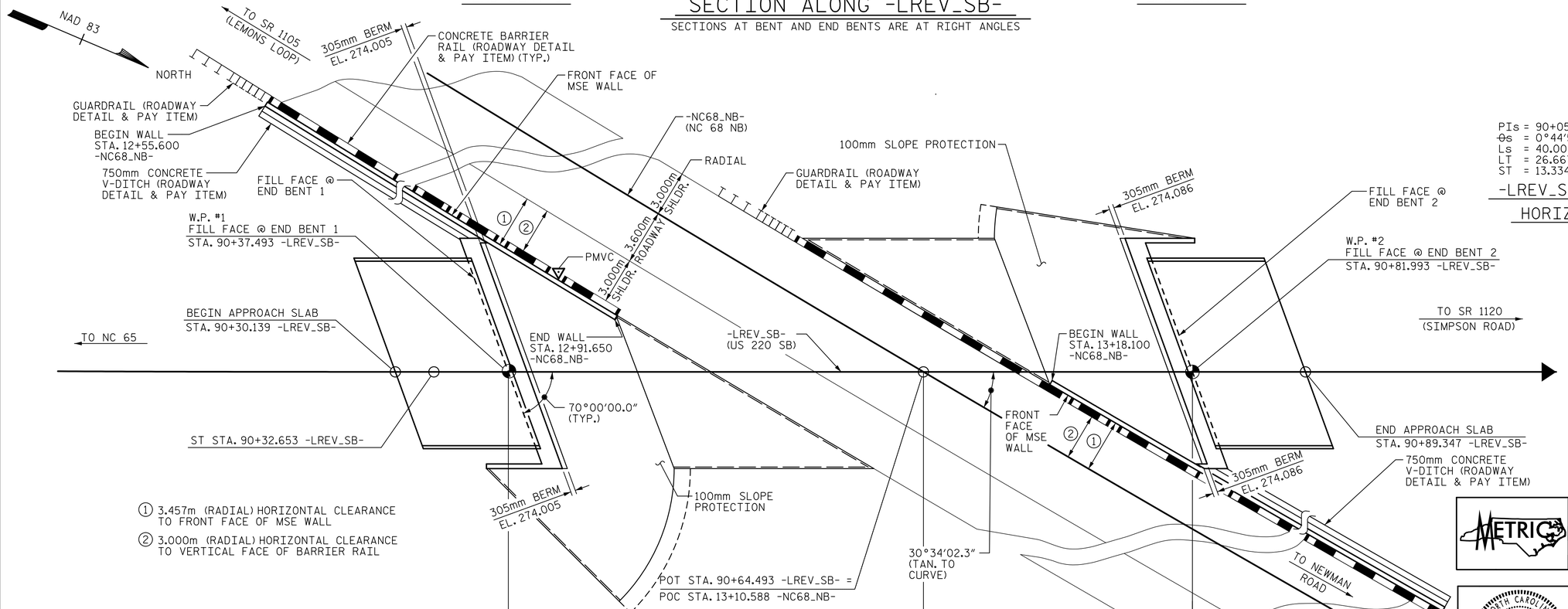
P.I. = 90+40.000 -LREV_SB-
ELEV. = 279.800
VC = 395m

VERTICAL GRADE DATA -LREV_SB-



SECTION ALONG -LREV_SB-

SECTIONS AT BENT AND END BENTS ARE AT RIGHT ANGLES



① 3.457m (RADIAL) HORIZONTAL CLEARANCE TO FRONT FACE OF MSE WALL

② 3.000m (RADIAL) HORIZONTAL CLEARANCE TO VERTICAL FACE OF BARRIER RAIL

PLAN

PILES NOT SHOWN FOR CLARITY

-LREV_SB-	-LREV_SB-	-NC68_NB-
PIs = 90+05.987	PIs = 91+53.664	PI = 13+70.239
~~Os~~ = 0°44'56.3"	~~Os~~ = 3°39'02.5"	△ = 14°31'12.3" (LT)
Ls = 40.000m	Ls = 72.000m	D = 2°36'15.7"
LT = 26.667m	LT = 48.010m	L = 557.531m
ST = 13.334m	ST = 24.009m	T = 280.267m
		R = 2,200.000m

HORIZONTAL CURVE/ SPIRAL DATA

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-
13+10.588 -NC68_NB-

SHEET 1 OF 3 BRIDGE NO. 313

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 220 SB
OVER NC 68 NB
BETWEEN NC 65 AND SR 1120

METRIC

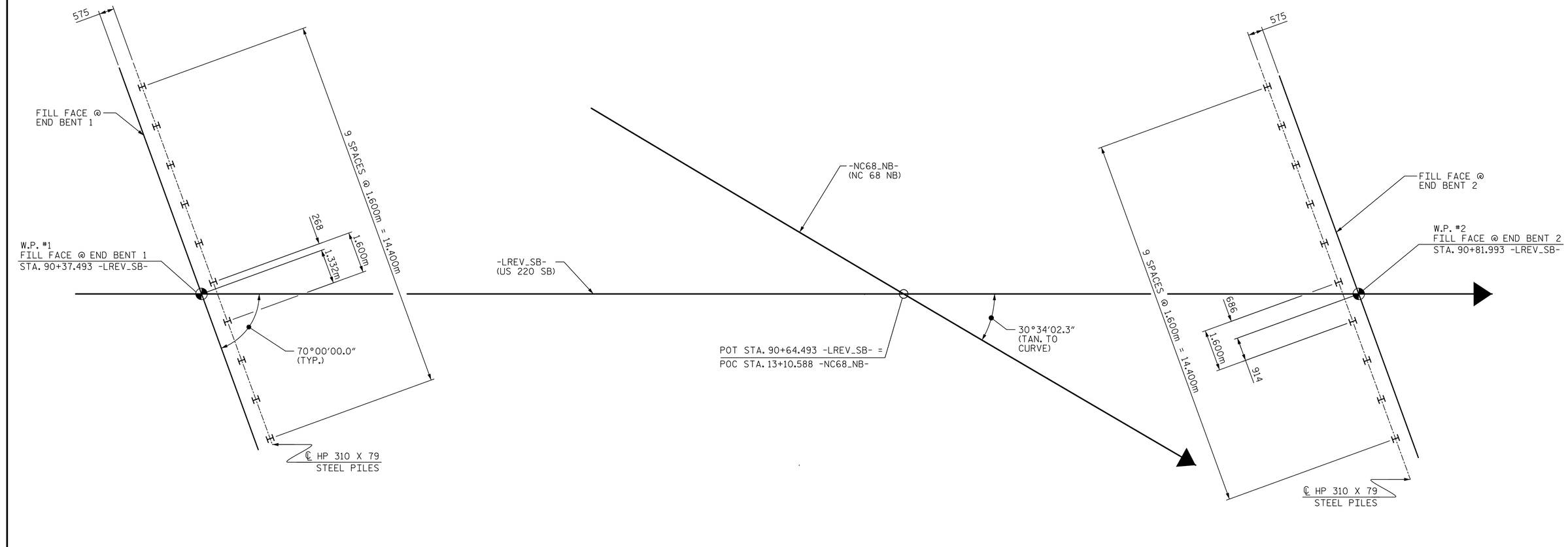
NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-1
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\SI_R2413C_sd_gd.dgn
ICA Engineering



END BENT 1

END BENT 2

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN
TO THE CENTERLINE OF PILES.

NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS

PILES AT BOTH END BENTS ARE DESIGNED FOR A FACTORED RESISTANCE OF 990 kN PER PILE.

DRIVE PILES AT BOTH END BENTS TO A REQUIRED DRIVING RESISTANCE OF 1,650 kN PER PILE.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 65.5 kN-METER TO 81.0 kN-METER PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT 1 AND END BENT 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3 (D) (2) OF THE STANDARD SPECIFICATIONS.

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 2 OF 3

METRIC

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

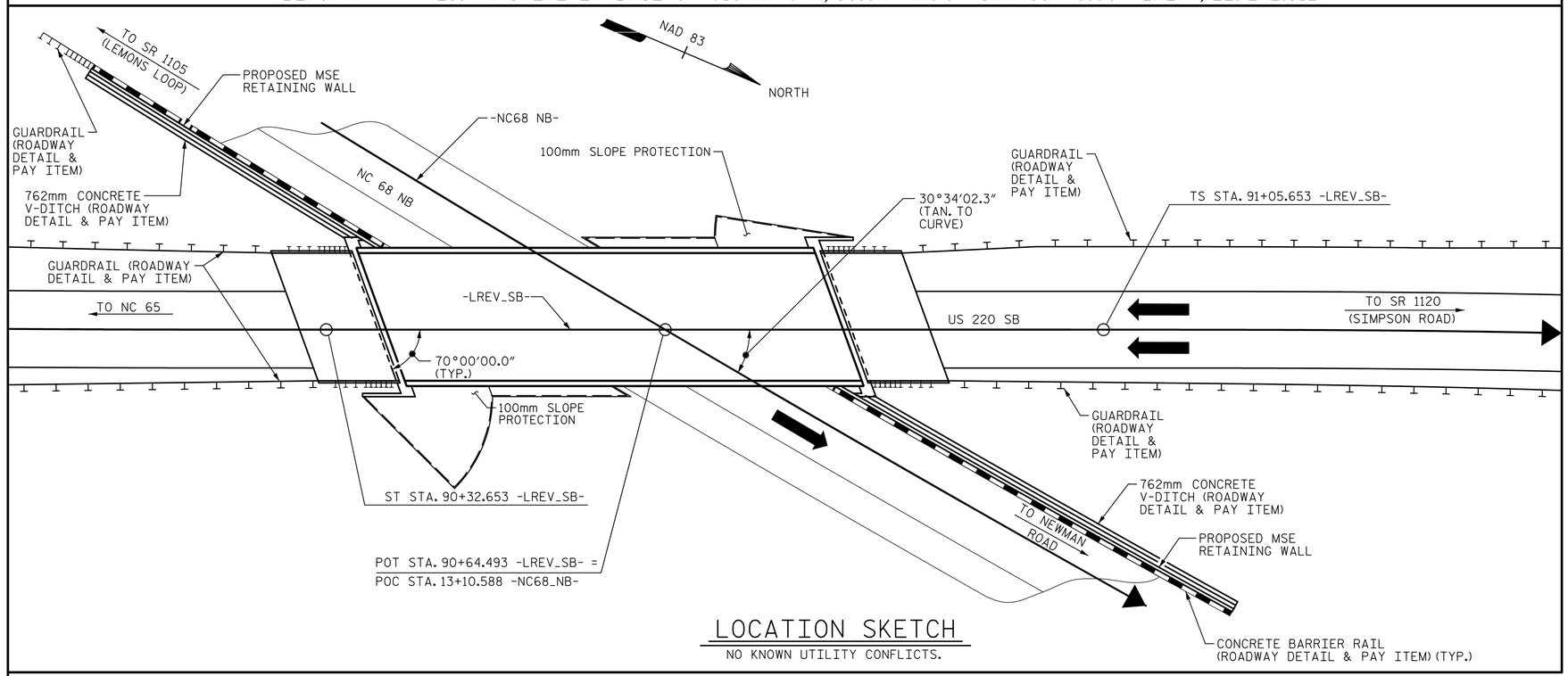
FOR BRIDGE ON US 220 SB
OVER NC 68 NB
BETWEEN NC 65 AND SR 1120

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-2
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\S2_R2413C_sd_fl.dgn
ICA Engineering

BENCH MARK # 25: RR SPIKE IN BASE OF 610mm OAK; 59.0m RT. OF STA 89+70.00 -LREV-, EL. 272.312



LOCATION SKETCH

NO KNOWN UTILITY CONFLICTS.

NOTES

ASSUMED LIVE LOAD= HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

ALL ELEVATIONS ARE IN METERS.

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

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

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

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

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

TOTAL BILL OF MATERIAL

	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	MODIFIED 1880mm PRESTRESSED CONCRETE GIRDERS		HP 310 X 79 STEEL PILES		PILE REDRIVES	CONCRETE BARRIER RAIL	100mm SLOPE PROTECTION	ELASTOMERIC BEARINGS
	SQ. METERS	SQ. METERS	CU. METERS	LUMP SUM	kg	NO.	METERS	NO.	METERS	EACH	METERS	SQ. METERS	LUMP SUM
SUPERSTRUCTURE	571.1	649.3		LUMP SUM		5	218.58				87.936		LUMP SUM
END BENT 1			27.4		2106			10	246	5		252	
END BENT 2			27.1		2069			10	246	5		202	
TOTAL	571.1	649.3	54.5	LUMP SUM	4175	5	218.58	20	492	10	87.936	454	LUMP SUM

TOTAL BILL OF MATERIAL ENGLISH

	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	NO.	LIN. FT.	NO.	LIN. FT.	EACH	LIN. FT.	SQ. YDS.	LUMP SUM
TOTAL	6,147	6,989	71.3	LUMP SUM	9,204	5	717.13	20	1,614	10	288.50	543	LUMP SUM

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 3 OF 3

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON US 220 SB
OVER NC 68 NB
BETWEEN NC 65 AND SR 1120

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-3
1			3			TOTAL SHEETS
2			4			28

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\S3_R2413_sd_ls.dgn
ICA Engineering

NOTE: LOAD RATINGS ARE IN ENGLISH UNITS

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
							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	**1.23**	--	1.75	0.827	1.43	A	EL	71.0	0.920	1.35	A	I	13.6	0.8	0.827	**1.23**	A	EL	71.0	1, 2
		HL-93 (OPERATING)	N/A		1.78	--	1.35	0.827	1.86	A	EL	71.0	0.920	1.78	A	I	13.6	--	--	--	--	--	--	1, 2
		HS-20 (INVENTORY)	36.000	2	**1.89**	68.040	1.75	0.827	2.20	A	EL	71.0	0.920	2.03	A	I	13.6	0.8	0.827	**1.89**	A	EL	71.0	1, 2
		HS-20 (OPERATING)	36.000		2.66	95.760	1.35	0.827	2.85	A	EL	71.0	0.920	2.66	A	I	13.6	--	--	--	--	--	--	1, 2
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.66	62.910	1.4	0.827	6.77	A	EL	71.0	0.920	6.67	A	I	13.6	0.8	0.827	4.66	A	EL	71.0	1, 2
		SNGARBS2	20.000		3.30	66.000	1.4	0.827	4.79	A	EL	71.0	0.920	4.58	A	I	13.6	0.8	0.827	3.30	A	EL	71.0	1, 2
		SNAGRIS2	22.000		3.06	67.320	1.4	0.827	4.44	A	EL	71.0	0.920	4.19	A	I	13.6	0.8	0.827	3.06	A	EL	71.0	1, 2
		SNCOTTS3	27.250		2.31	62.948	1.4	0.827	3.36	A	EL	71.0	0.920	3.25	A	I	13.6	0.8	0.827	2.31	A	EL	71.0	1, 2
		SNAGGRS4	34.925		1.87	65.310	1.4	0.827	2.71	A	EL	71.0	0.920	2.59	A	I	13.6	0.8	0.827	1.87	A	EL	71.0	1, 2
		SNS5A	35.555		1.83	65.066	1.4	0.827	2.66	A	EL	71.0	0.920	2.58	A	I	13.6	0.8	0.827	1.83	A	EL	71.0	1, 2
		SNS6A	39.950		1.65	65.918	1.4	0.827	2.40	A	EL	71.0	0.920	2.31	A	I	13.6	0.8	0.827	1.65	A	EL	71.0	1, 2
		SNS7B	42.000		1.57	65.940	1.4	0.827	2.28	A	EL	71.0	0.920	2.23	A	I	13.6	0.8	0.827	1.57	A	EL	71.0	1, 2
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.01	66.330	1.4	0.827	2.91	A	EL	71.0	0.920	2.80	A	I	13.6	0.8	0.827	2.01	A	EL	71.0	1, 2
		TNT4A	33.075		2.01	66.481	1.4	0.827	2.92	A	EL	71.0	0.920	2.76	A	I	13.6	0.8	0.827	2.01	A	EL	71.0	1, 2
		TNT6A	41.600		1.62	67.392	1.4	0.827	2.35	A	EL	71.0	0.920	2.31	A	I	13.6	0.8	0.827	1.62	A	EL	71.0	1, 2
		TNT7A	42.000		1.61	67.620	1.4	0.827	2.34	A	EL	71.0	0.920	2.27	A	I	13.6	0.8	0.827	1.61	A	EL	71.0	1, 2
		TNT7B	42.000		1.64	68.880	1.4	0.827	2.38	A	EL	71.0	0.920	2.20	A	I	13.6	0.8	0.827	1.64	A	EL	71.0	1, 2
		TNAGRIT4	43.000		1.58	67.940	1.4	0.827	2.29	A	EL	71.0	0.920	2.14	A	I	13.6	0.8	0.827	1.58	A	EL	71.0	1, 2
		TNAGT5A	45.000		1.50	67.500	1.4	0.827	2.18	A	EL	71.0	0.920	2.08	A	I	13.6	0.8	0.827	1.50	A	EL	71.0	1, 2
		TNAGT5B	45.000	3	**1.49**	67.050	1.4	0.827	2.16	A	EL	71.0	0.920	2.03	A	I	13.6	0.8	0.827	**1.49**	A	EL	**71.0**	1, 2

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1. ALL DISTANCES ARE MEASURED FROM THE CENTERLINE OF BEARING.
2. SERVICE III LIMIT STATE NOT APPLICABLE AT OPERATING LEVEL.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

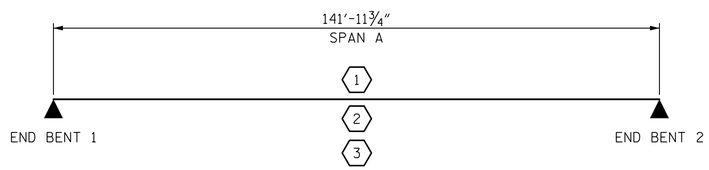
(2) DESIGN LOAD RATING (HS-20)

(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. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS (NON-INTERSTATE TRAFFIC)

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

SHEET NO. S01-4

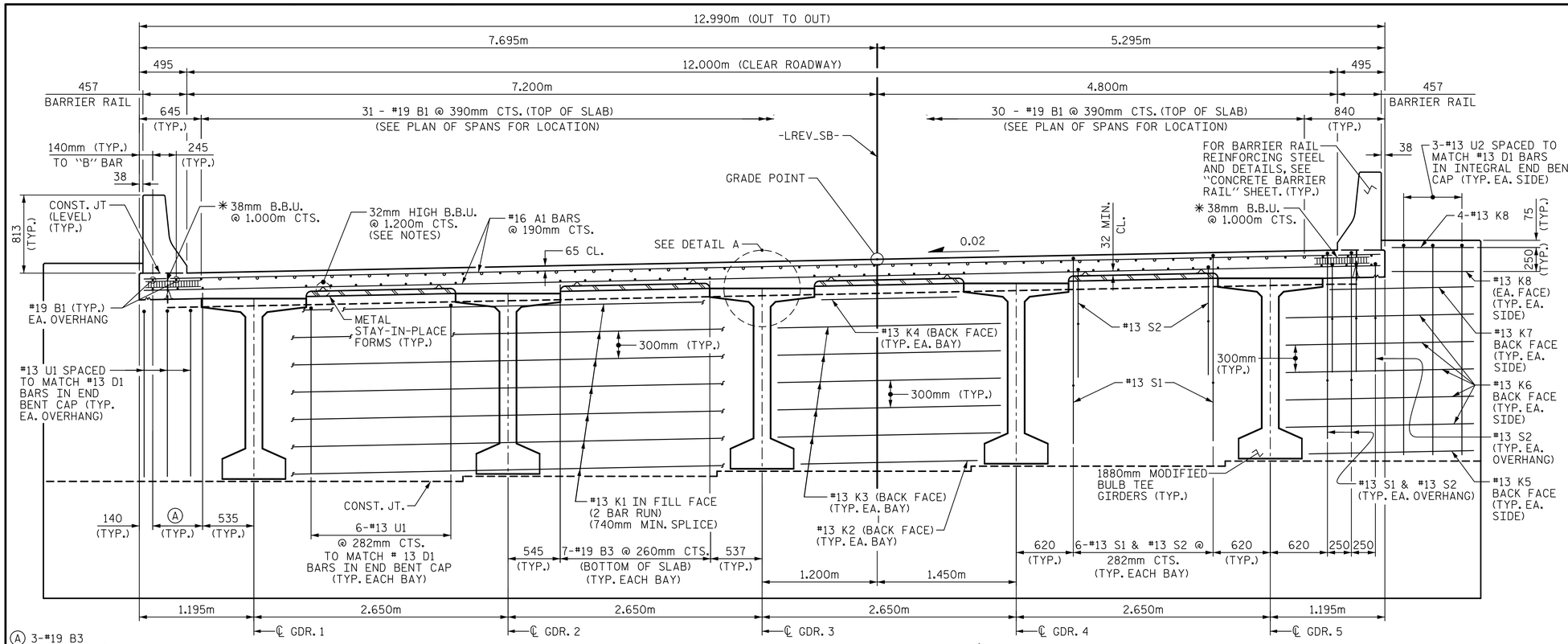
TOTAL SHEETS 28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

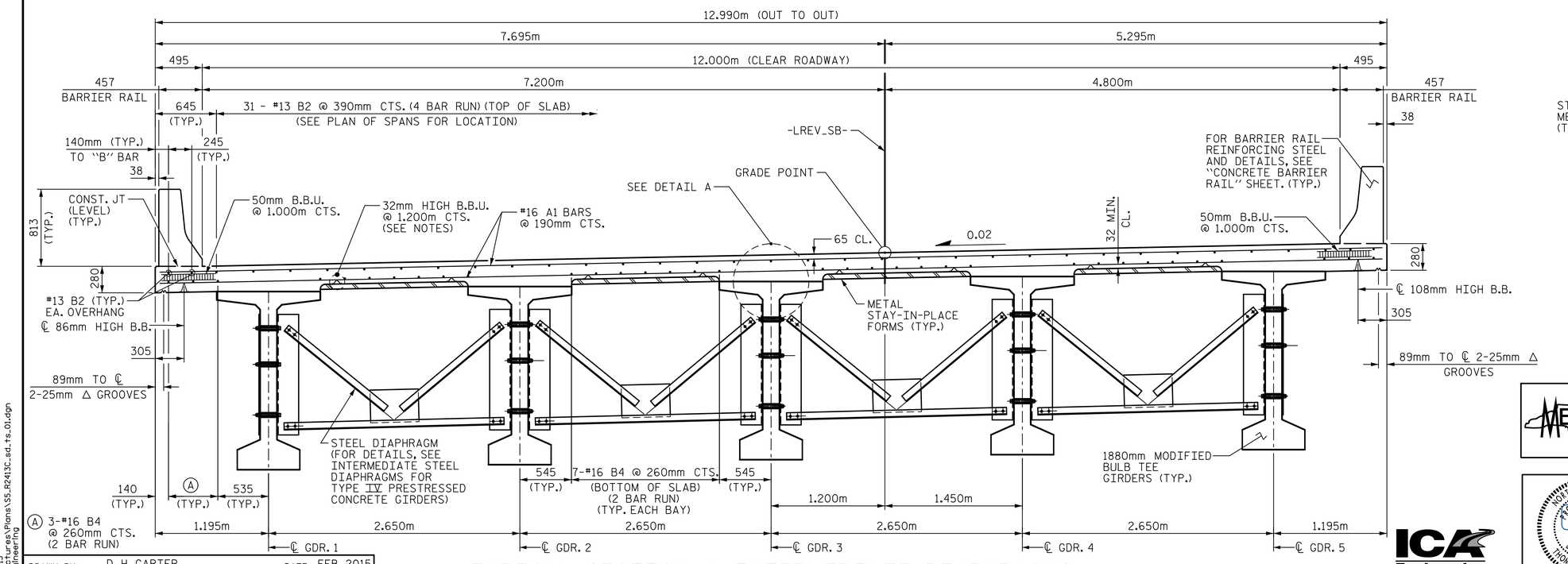
ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No. F-0238

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

2/20/2015
R:\Structures\Plans\S4_R2413C_sd_lr.dgn
ICA Engineering



TYPICAL SECTION @ INTEGRAL END BENT



TYPICAL SECTION @ INTERMEDIATE DIAPHRAGMS

NOTES

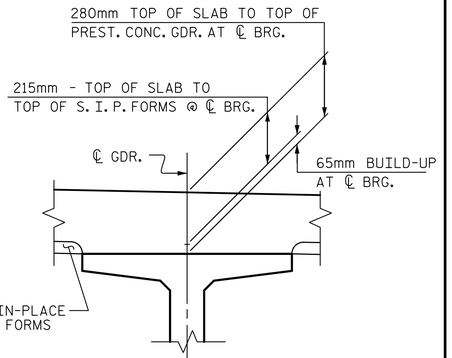
PROVIDE 32mm HIGH BEAM BOLSTERS UPPER AT 1.200m CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 1.200m CTS. WITH A CLEAR DISTANCE OF 65 ABOVE THE TOP OF THE REMOVABLE FORM.

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

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 20.7 MPa BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

BARRIER RAIL IN EACH CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 20.7 MPa.

✳ USE THIS SIZE BAR SUPPORT IN THE AREAS WITH THE #19 "B" BARS. USE THE BAR SUPPORT AS SHOWN IN THE TYPICAL SECTION AT INTERMEDIATE DIAPHRAGM.



DETAIL "A"

(TYPICAL EACH GIRDER @ EACH BENT)

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

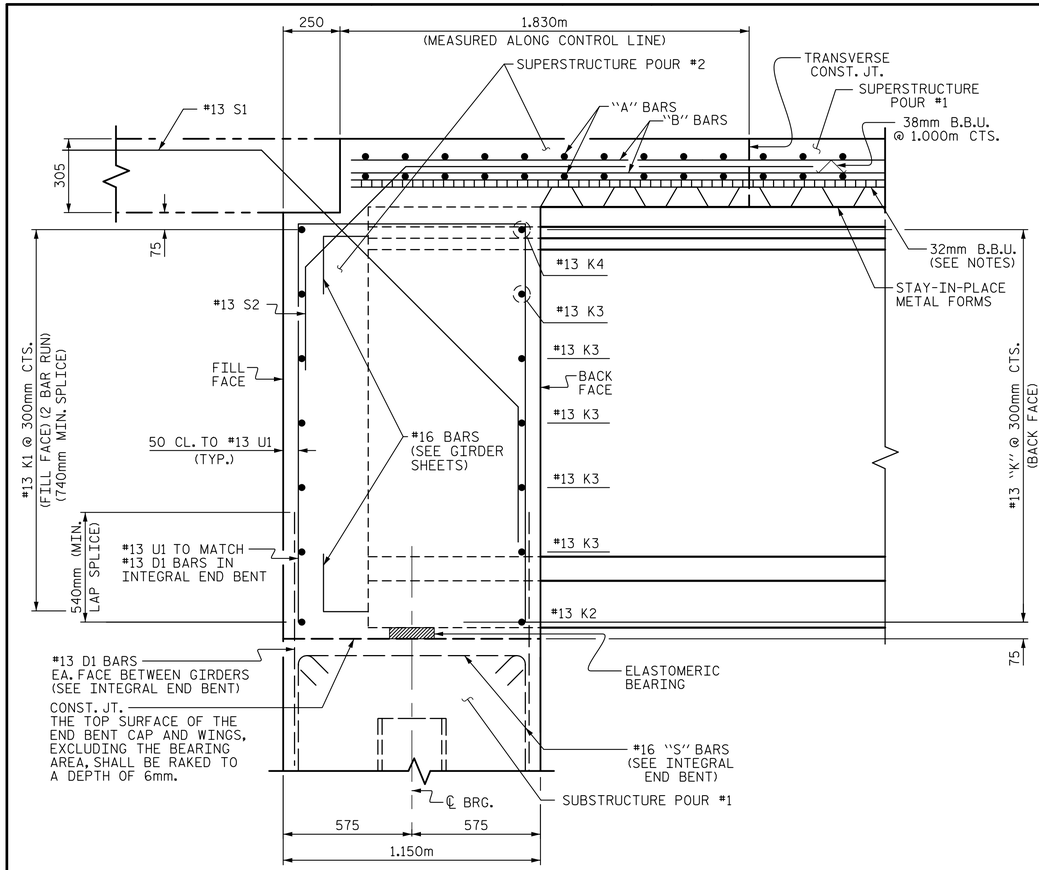
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-5
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

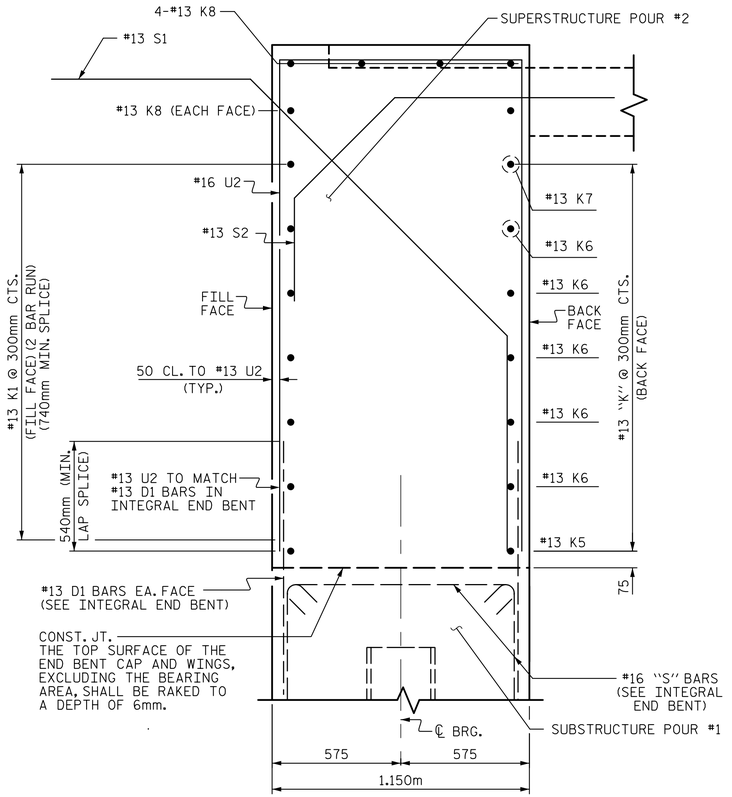
NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E TALLMAN

2/20/2015
R:\Structures\Plans\S5_R2413C_sd_ts_01.dgn
ICA Engineering



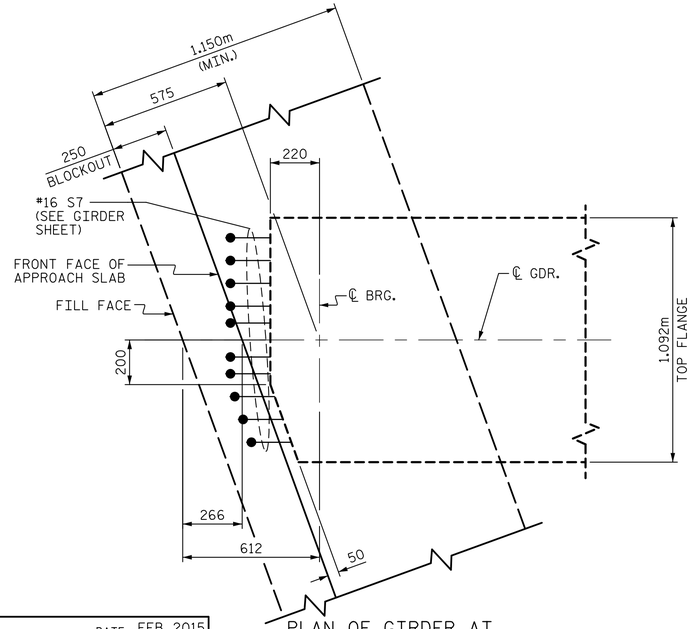
END OF GIRDER DETAIL AT INTEGRAL END BENT-BETWEEN GIRDERS

(DIMENSIONS ARE PERPENDICULAR TO CAP UNLESS NOTED OTHERWISE)



END OF GIRDER DETAIL AT INTEGRAL END BENT-OUTSIDE OF GIRDERS

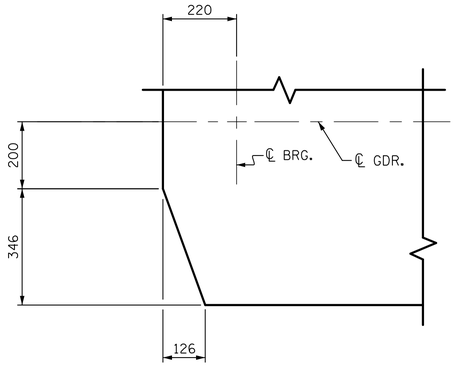
(DIMENSIONS ARE PERPENDICULAR TO CAP UNLESS NOTED OTHERWISE)



PLAN OF GIRDER AT INTEGRAL END BENT

INTEGRAL END BENT DETAILS

PCG SUPERSTRUCTURE



GIRDER TOP FLANGE CLIP DETAILS

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\S6_R2413C_sd_ts_02.dgn
ICA Engineering

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN
Thomas E. Tallman 2/20/2015

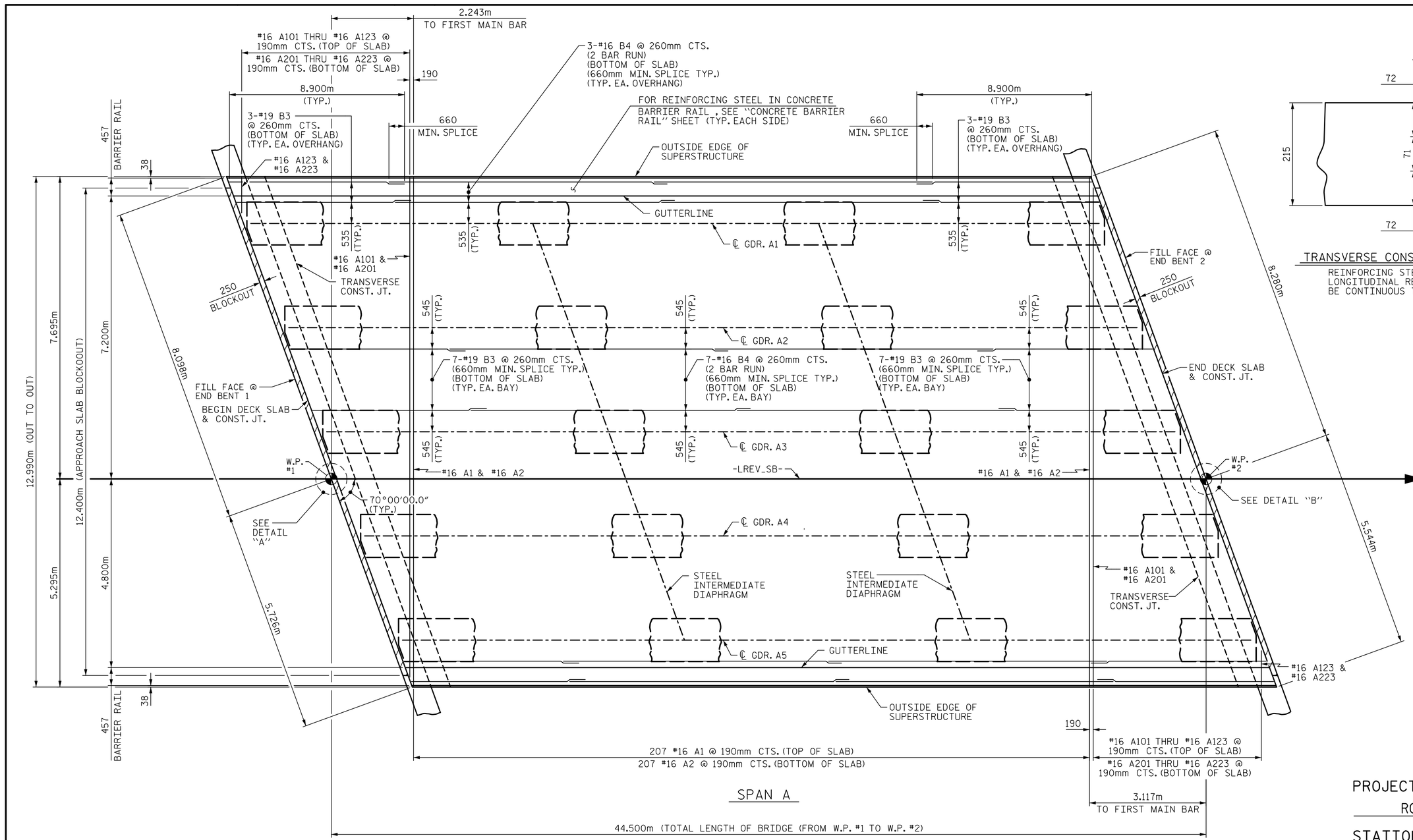
PROJECT NO. R-2413CA
ROCKINGHAM COUNTY
STATION: 90+64.493 -LREV_SB-
SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

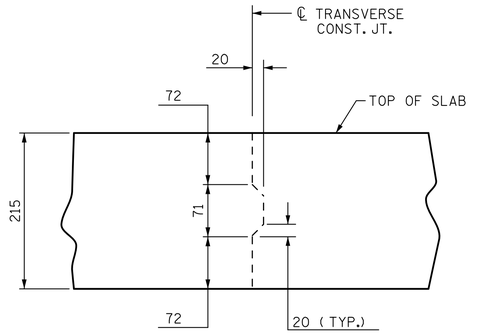
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-6
1			3			TOTAL SHEETS
2			4			28



SPAN A

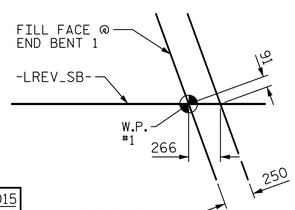
PLAN OF SPAN

FOR REINFORCING STEEL IN END BENTS, SEE "PLAN OF SPAN DETAILS" SHEET.
FOR LONGITUDINAL BARS IN TOP OF SLAB, SEE "B BAR LAYOUT" SHEET.

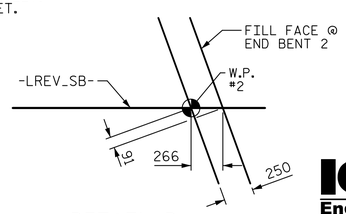


TRANSVERSE CONSTRUCTION JOINT DETAIL

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



DETAIL A



DETAIL B

PROJECT NO. R-2413CA
ROCKINGHAM COUNTY
STATION: 90+64.493 -LREV_SB-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN "A"

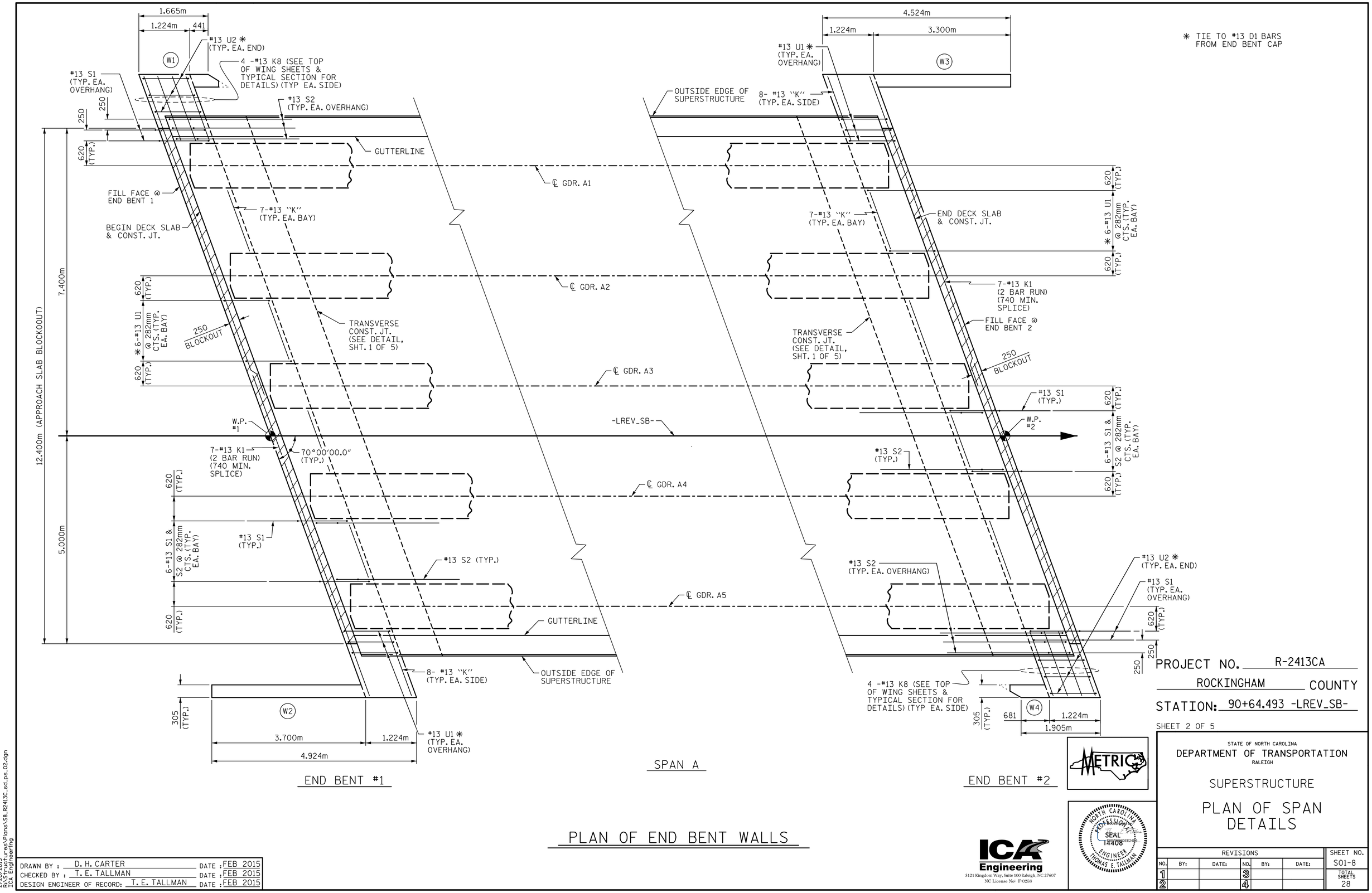
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-7
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

2/20/2015
R:\Structures\Plans\S7_R2413C_sd_ps_01.dgn
ICA Engineering



PLAN OF END BENT WALLS

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN DETAILS

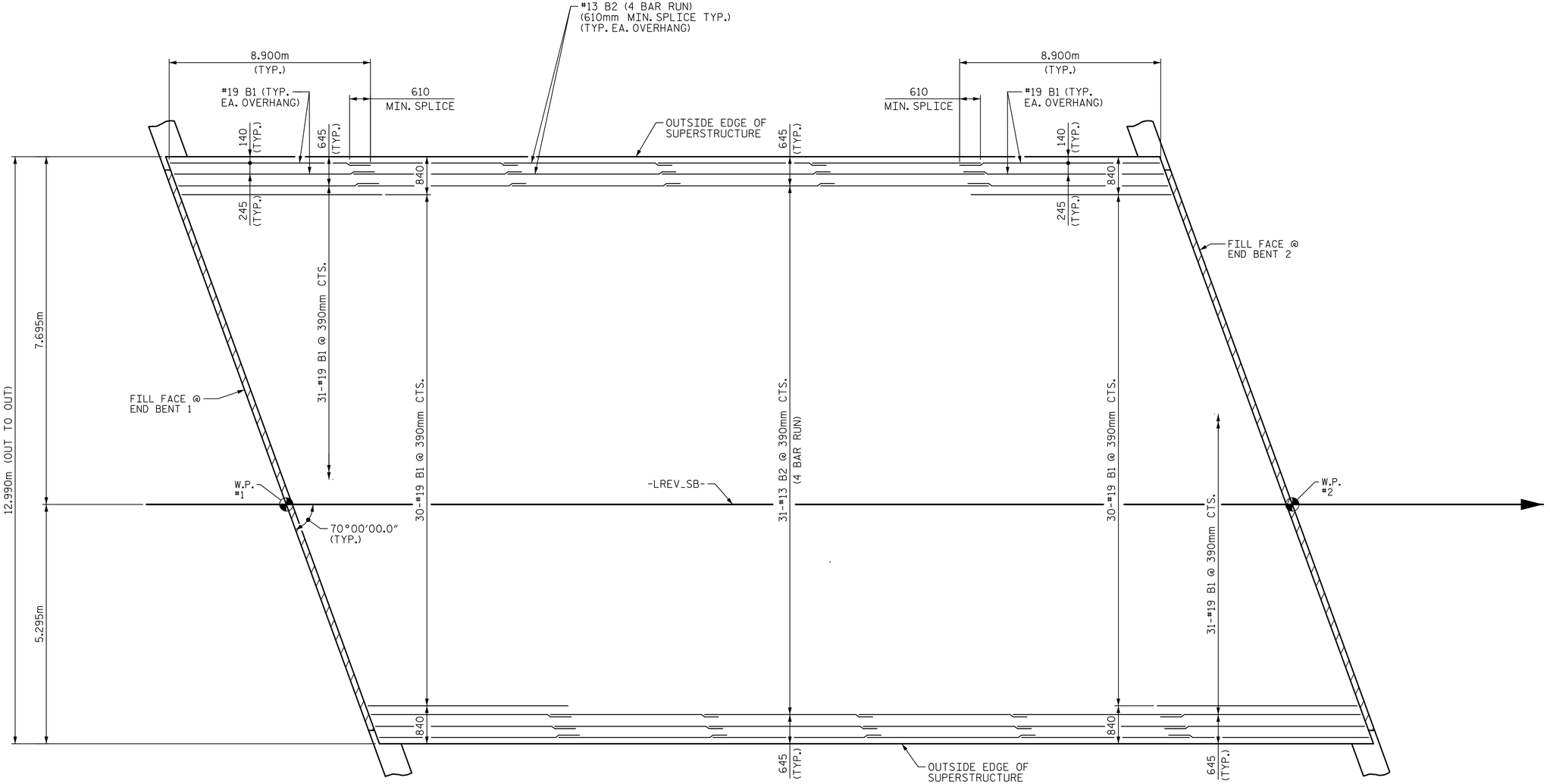
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-8
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

2/20/2015
R:\Structures\Plans\SB_R2413C_sd_ps_02.dgn
ICA Engineering



SPAN A

PLAN OF TOP OF SLAB ''B'' BAR LAYOUT

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

''B'' BAR LAYOUT

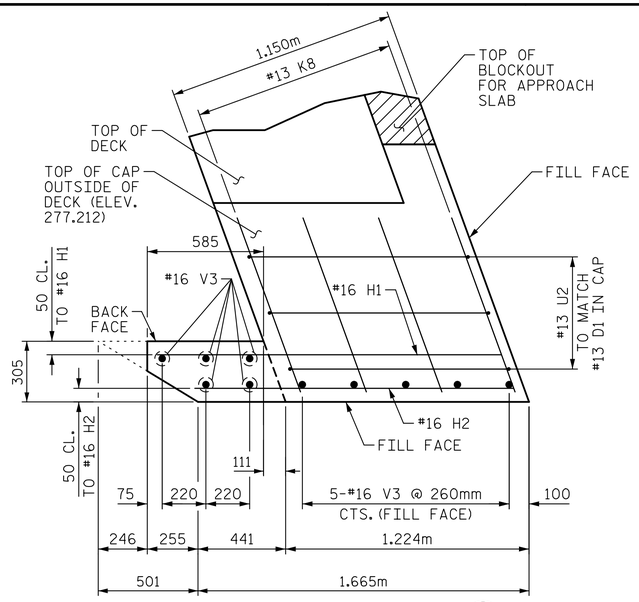
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-9
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

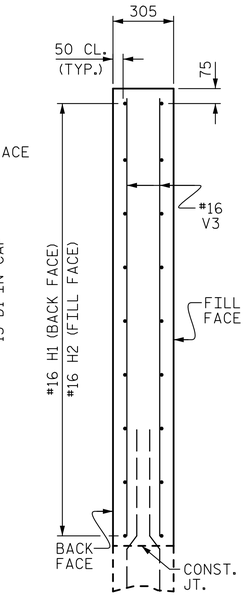
ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

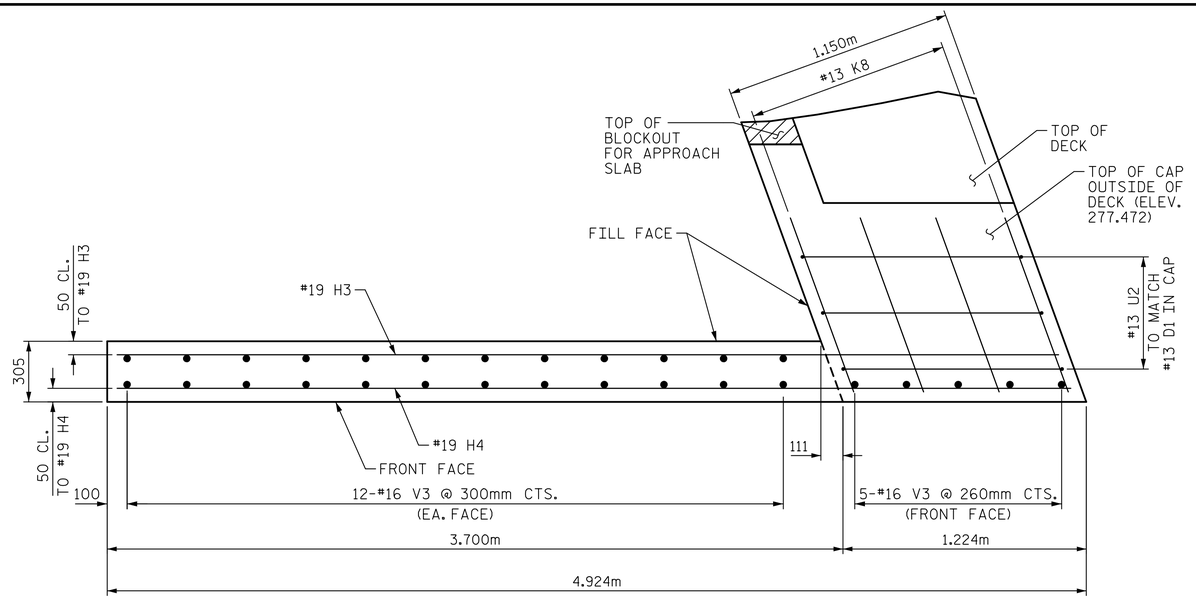
2/20/2015
R:\Structures\Plans\S9_R2413C_sd_ps_03.dgn
ICA Engineering



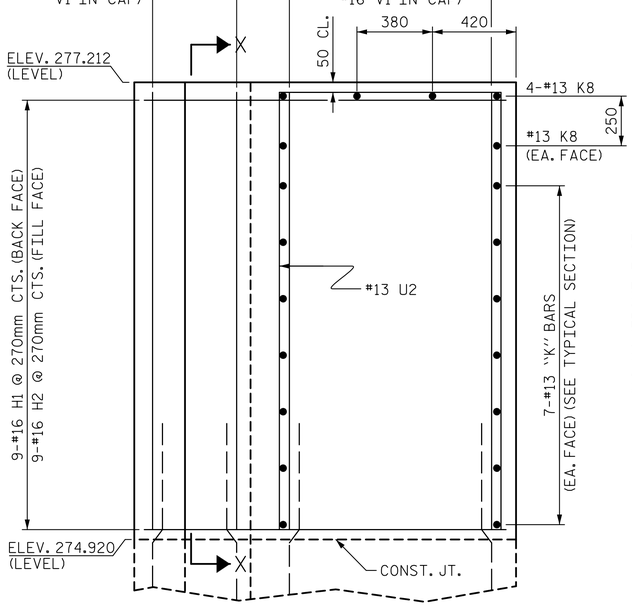
PLAN OF WING (W1)



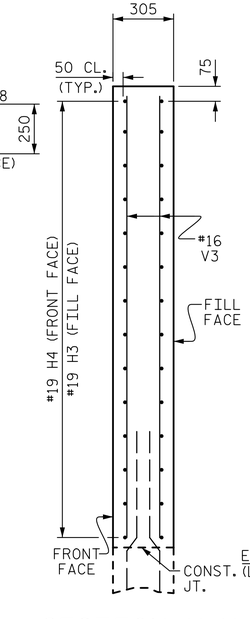
SECTION X-X



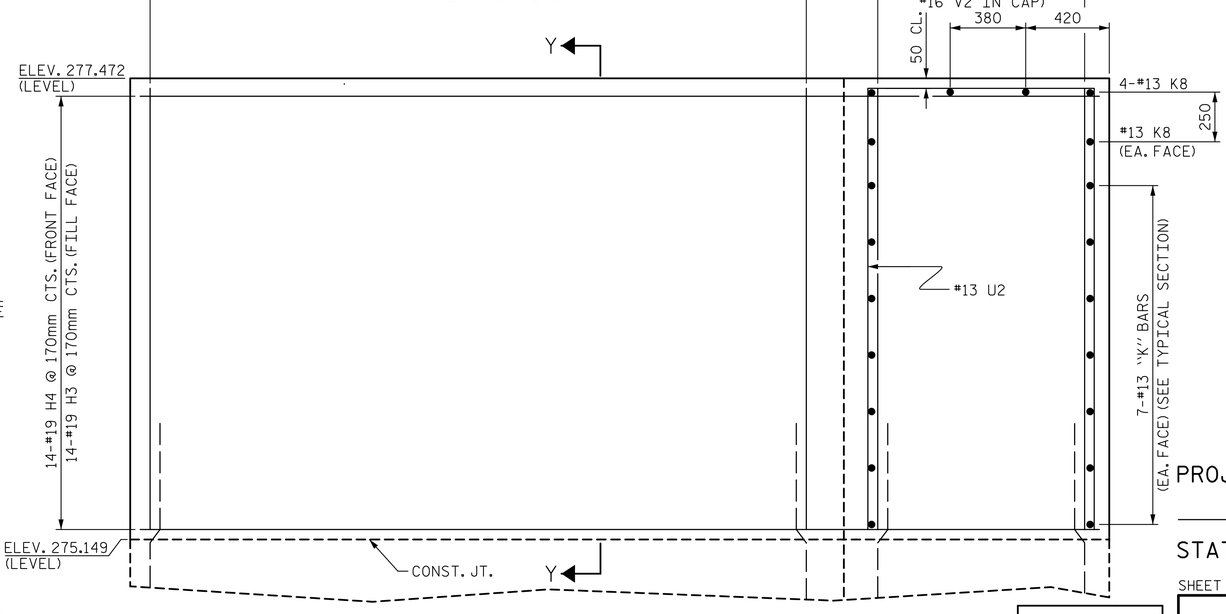
PLAN OF WING (W2)



ELEVATION OF WING (W1)



SECTION Y-Y



ELEVATION OF WING (W2)

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

METRIC

SUBSTRUCTURE

TOP OF WINGS END BENT #1

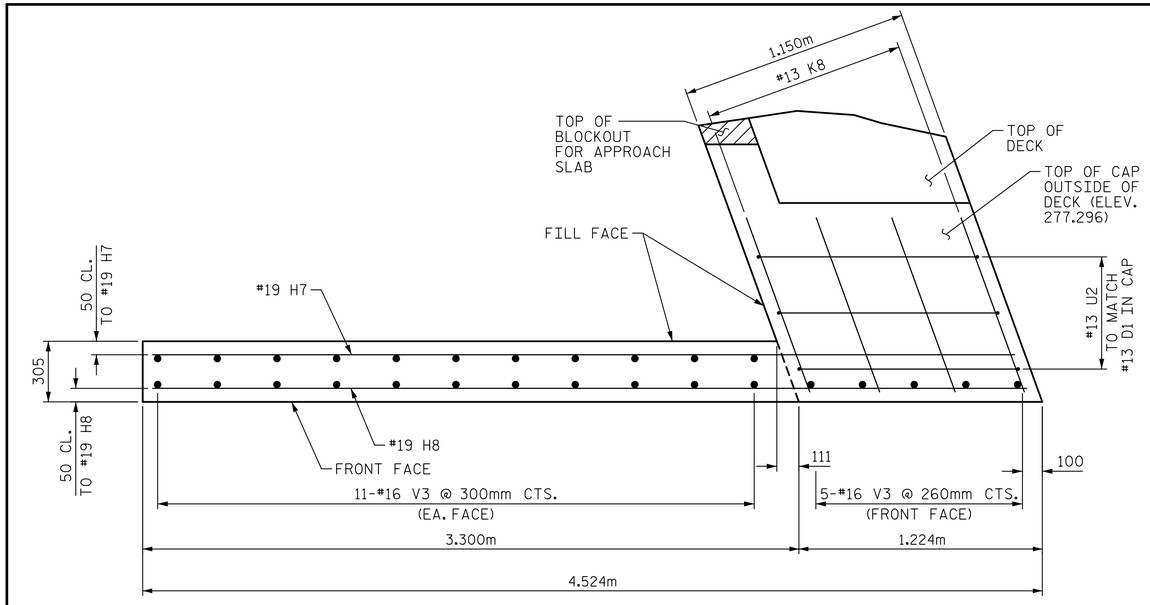
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-10
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

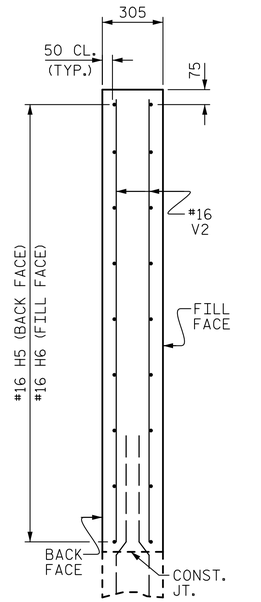
ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

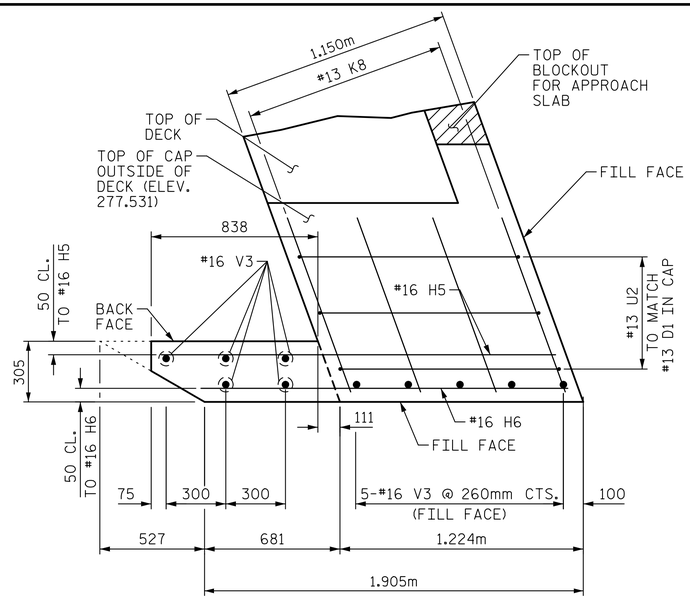
2/20/2015
R:\Structures\Plans\S10_R2413C_sd_ps_04.dgn
ICA Engineering



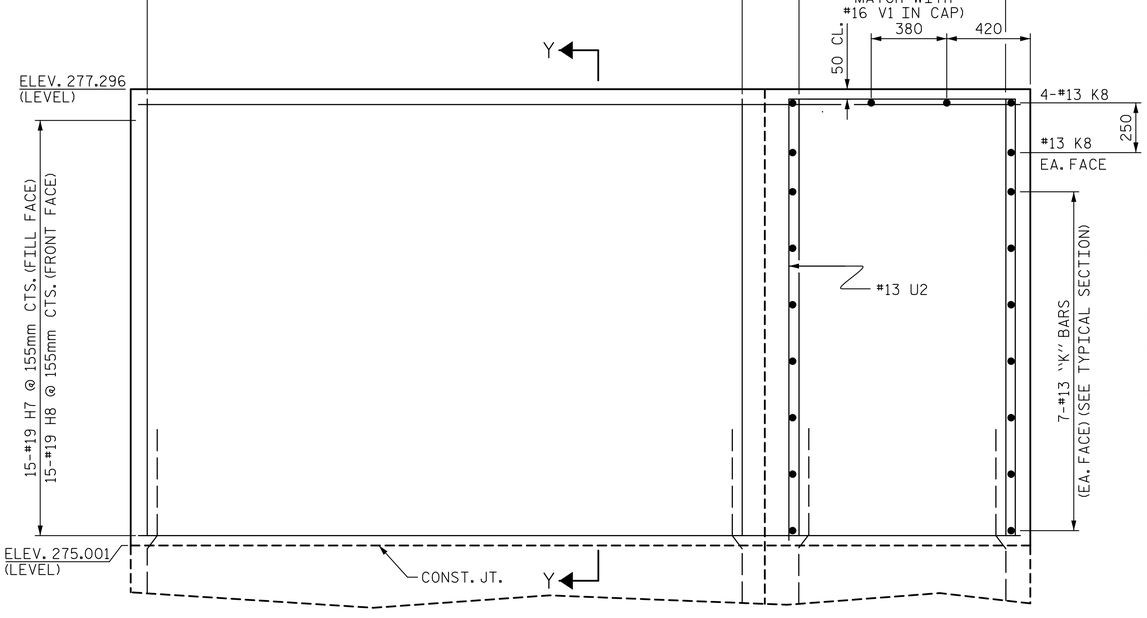
PLAN OF WING (W3)



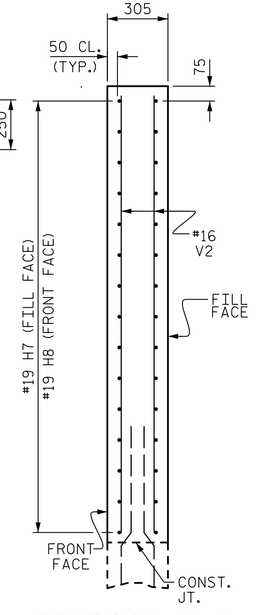
SECTION X-X



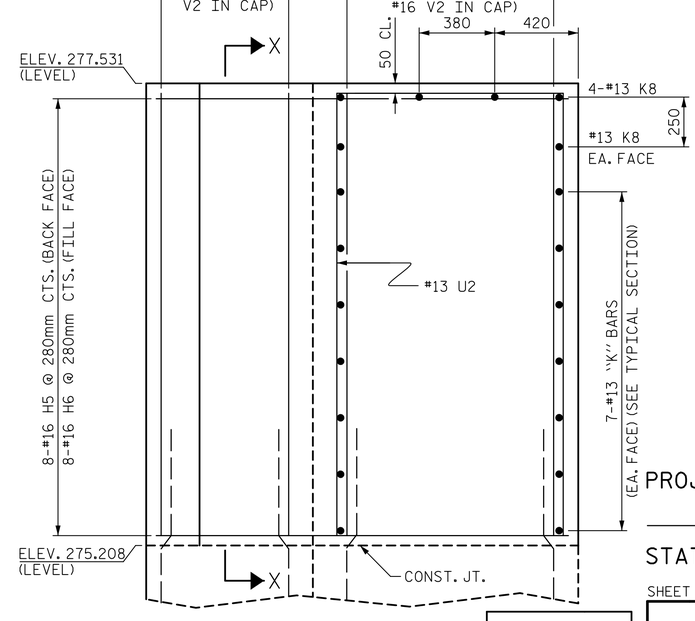
PLAN OF WING (W4)



ELEVATION OF WING (W3)



SECTION Y-Y



ELEVATION OF WING (W4)

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

TOP OF WINGS END BENT #2

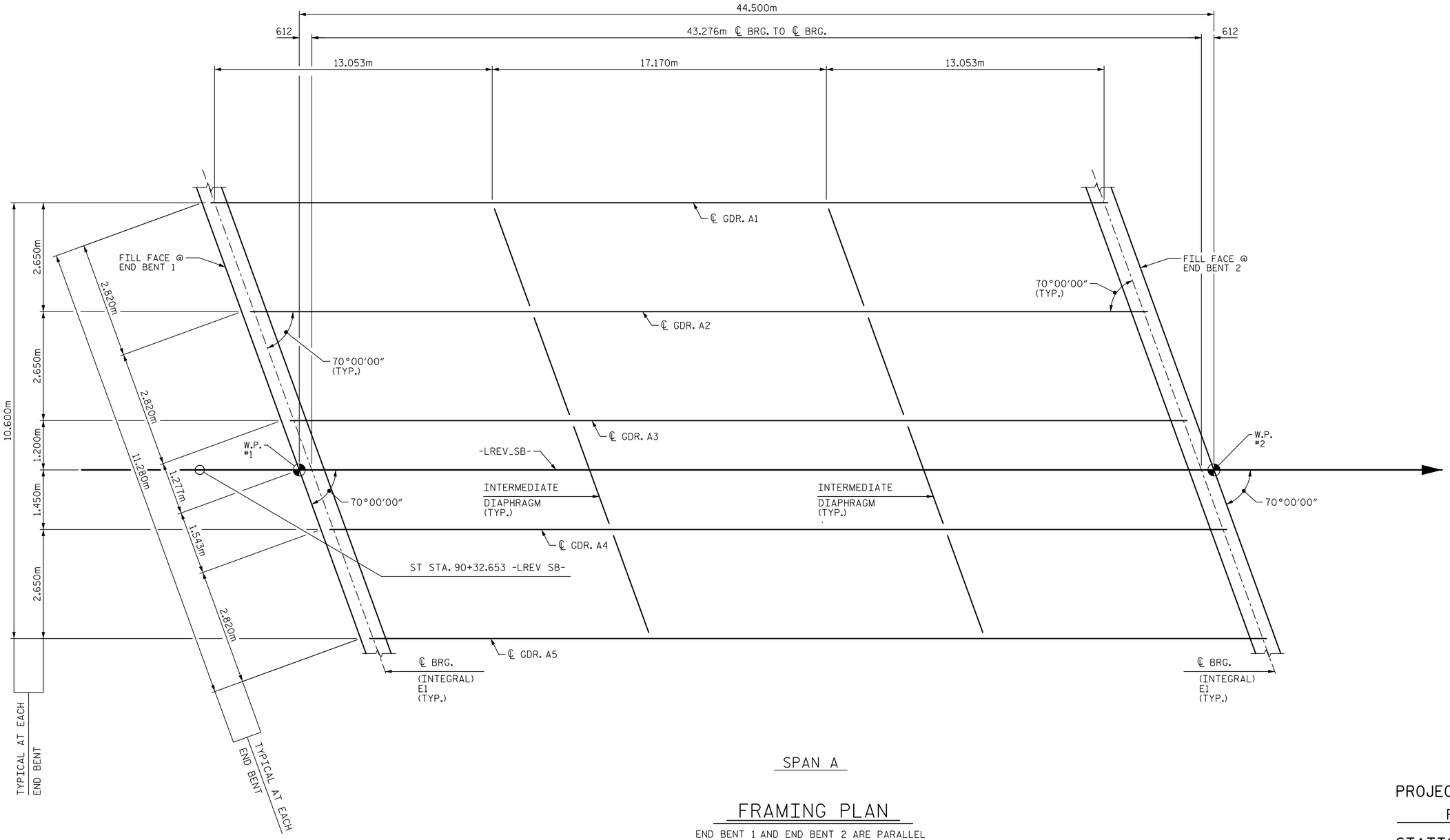
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-11
1			3			TOTAL SHEETS
2			4			28

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\S11.R2413C_sd_ps_05.dgn
ICA Engineering



SPAN A

FRAMING PLAN

END BENT 1 AND END BENT 2 ARE PARALLEL
GIRDERS ARE STRAIGHT AND PARALLEL TO ONE ANOTHER.

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-12
1			3			TOTAL SHEETS
2			4			28

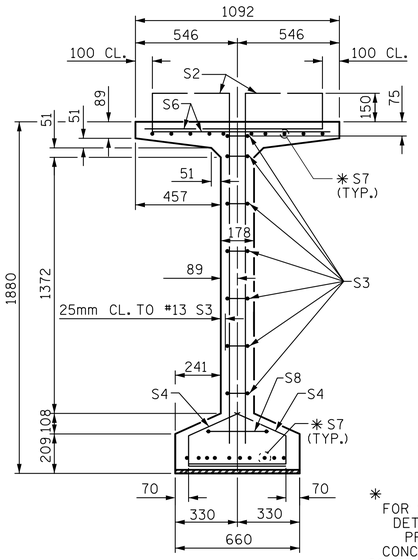
NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

DocuSigned by: Thomas E. Tallman E1B78B620EE2458...

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

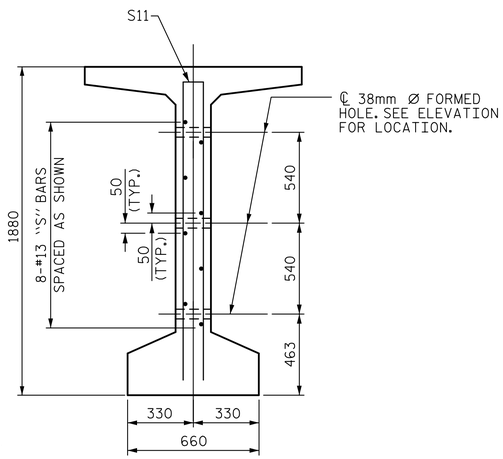
DRAWN BY :	D. H. CARTER	DATE :	APR 2015
CHECKED BY :	T. E. TALLMAN	DATE :	APR 2015
DESIGN ENGINEER OF RECORD:	T. E. TALLMAN	DATE :	APR 2015

4/30/2015
V:\Rdl_FloHut_Server_Files\PROJECTS\R2413C\Structures\Plans\S12_R2413C_sd_fp.dgn
ICA Engineering



SECTION A-A

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

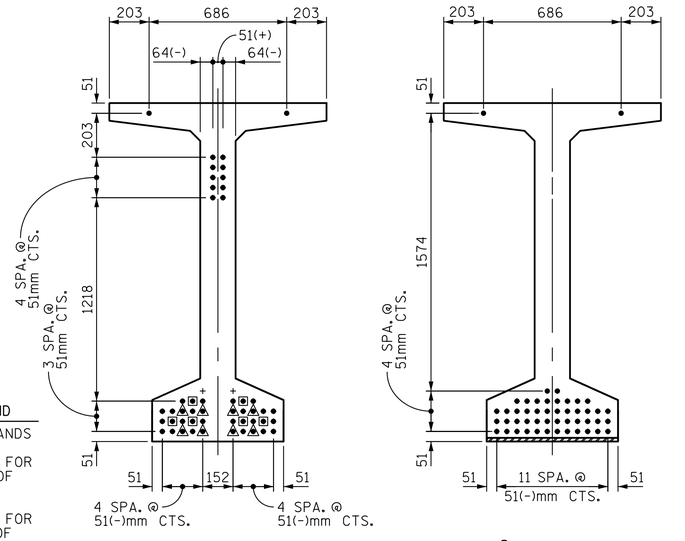


SECTION B-B

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

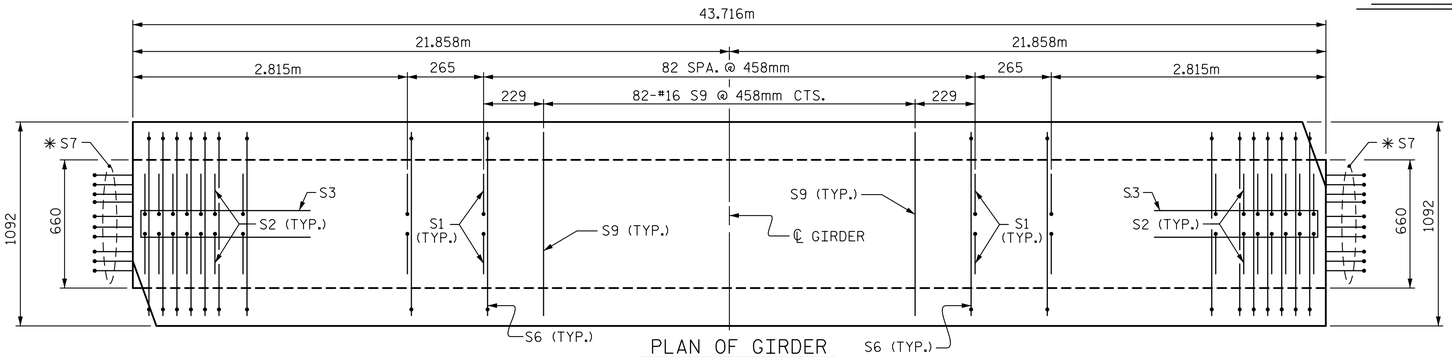
- • FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 0.610m FROM END OF GIRDER
- ◬ STRANDS DEBONDED FOR 1.220m FROM END OF GIRDER



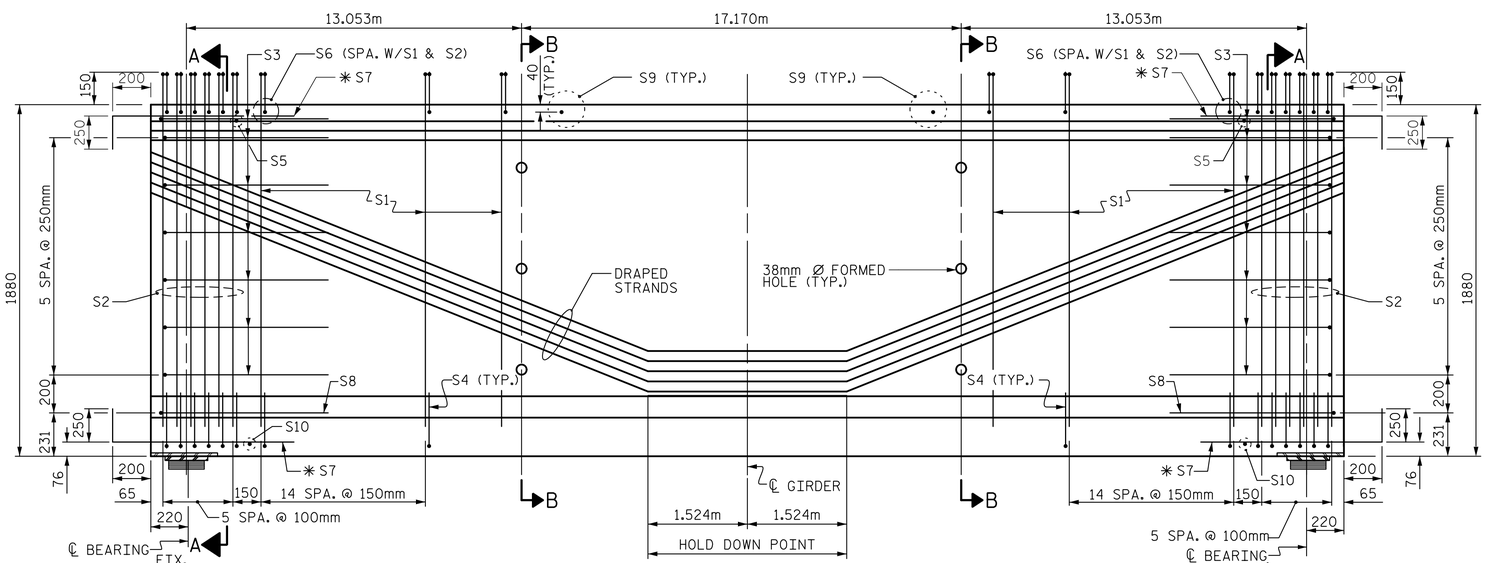
AT END OF GIRDER

AT ℄ OF GIRDER

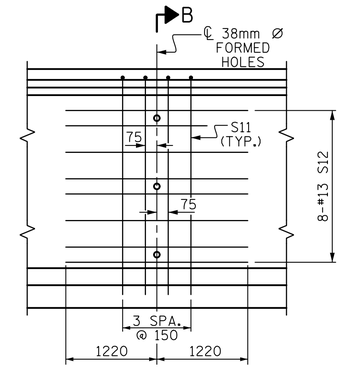
15.24mm Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL

15.24mm Ø L. R. GRADE 270 STRANDS

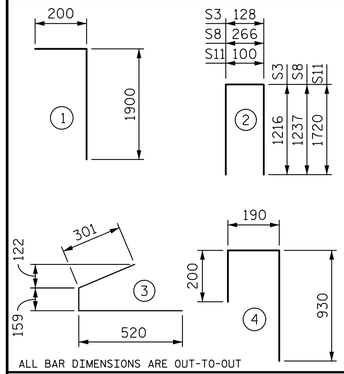
AREA (mm^2)	ULTIMATE STRENGTH (kN PER STRAND)	APPLIED PRESTRESS (kN PER STRAND)
140.00	260.7	195.5

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	226	#13	1	2100	472
S2	24	#19	1	2100	113
S3	14	#13	2	2560	36
S4	84	#13	3	980	82
S5	2	#10	STR	920	1
S6	250	#16	4	1320	512
✳S7	40	#16	STR	1120	70
S8	2	#16	2	2740	9
S9	82	#16	STR	980	125
S10	2	#10	STR	560	1
S11	8	#16	2	3540	44
S12	16	#13	STR	2440	39

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL (kg)	58.6 MPa CONCRETE (m^3)	15.24mm Ø L.R. STRANDS (No.)
SPAN A	1504	25.0	48

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	43.716m	218.580m

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SPAN A
1880mm PRESTRESSED CONCRETE
MODIFIED BULB TEE
CONTINUOUS FOR LIVE LOAD

METRIC

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

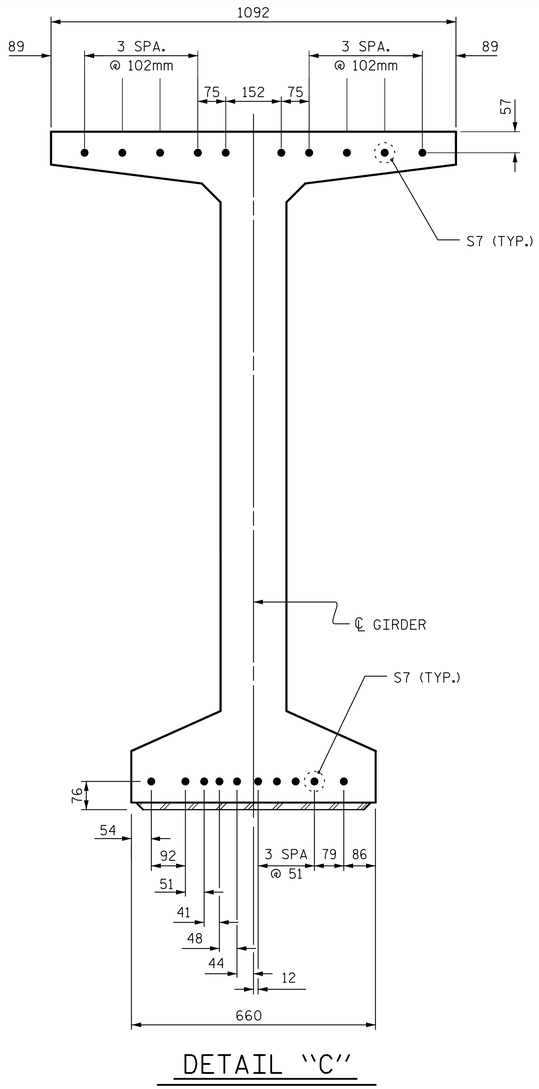
NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

Digitally signed by: Thomas E. Tallman

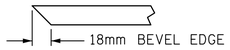
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-13
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : APR 2015
CHECKED BY : T. E. TALLMAN DATE : APR 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : APR 2015

4/30/2015
V:\Rdc_FTPHut_Server_Files\PROJECTS\R2413C\Structures\Plans\S13_R2413C_sd_cg_01.dgn
ICA Engineering

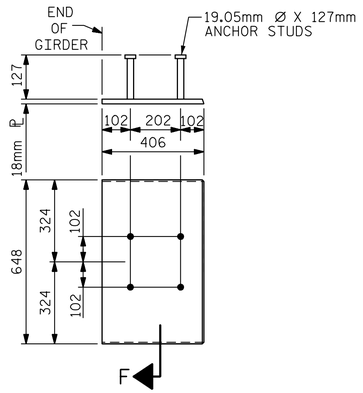


DETAIL ''C''



SECTION ''F''

(SEE NOTES)



EMBEDDED PLATE ''B-1'' DETAILS FOR AASHTO TYPE IV GIRDER 1600mm & 1880 MODIFIED BULB TEES

(2 REQ'D PER GIRDER)

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203M EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL SHALL BE GRADE 420.

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

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

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

AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 50mm BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 46.9 MPa.

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

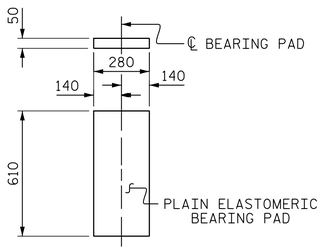
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 100mm, SHALL BE RAKED TO A DEPTH OF 6mm.

WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICES SHALL BE WITHIN 150mm OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN 13mm OF THE THEORETICAL LOCATION SHOWN.

A 51mm x 51mm CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 1600mm AND 1880 MODIFIED BULB TEES ONLY.

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 20 kN.

THE UPLIFT FORCE DUE TO DRAPED STRANDS IS 131.5 kN.



FIXED END-E1

(10 REQ'D)

PLAIN ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-14
1			3			TOTAL SHEETS
2			4			28

ASSEMBLED BY : D. H. CARTER DATE : APR 2015
CHECKED BY : T. E. TALLMAN DATE : APR 2015

DRAWN BY : ELR 11/91
CHECKED BY : GRP 11/91

REV. 10/17/00 RWW/LES
REV. 7/10/01RR LES/RDR
REV. 5/1/06 TLA/GM

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

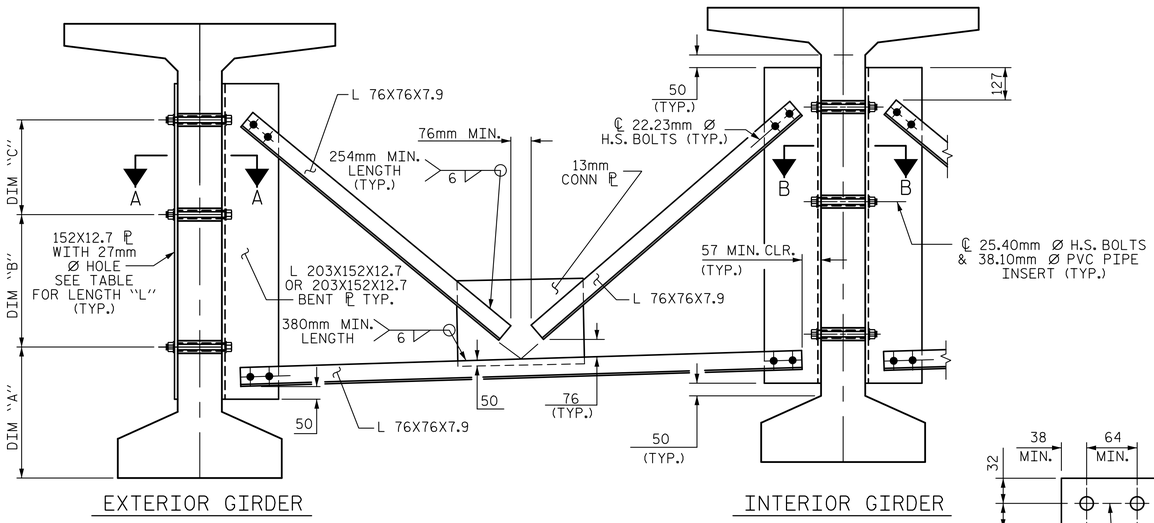
NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

DocuSigned by: Thomas E. Tallman

STD. NO. PCG11SM

4/30/2015
ICA Engineering

V:\Rdl_FloHut_Server_Files\PROJECTS\R2413C\Structures\Plans\S14_R2413C_sd_cg_02.dgn

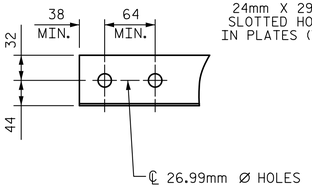


EXTERIOR GIRDER

INTERIOR GIRDER

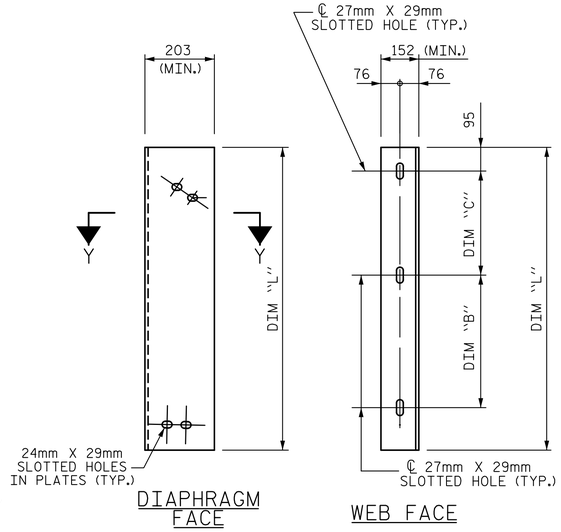
PART SECTION AT INTERMEDIATE DIAPHRAGM

(1600mm BULB TEE OR 1880mm BULB TEE GIRDER SHOWN)



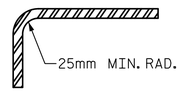
ANGLE END

(L 76 X 76 X 7.9)



DIAPHRAGM FACE

WEB FACE



SECTION Y-Y

CONNECTOR PLATE DETAIL

STRUCTURAL STEEL NOTES

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 345 OR APPROVED EQUAL.

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

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

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

FOR METALLIZATION, APPLY AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

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

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

FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS, DIRECT TENSION INDICATORS, THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 6mm PROJECTION BEYOND THE NUT.

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

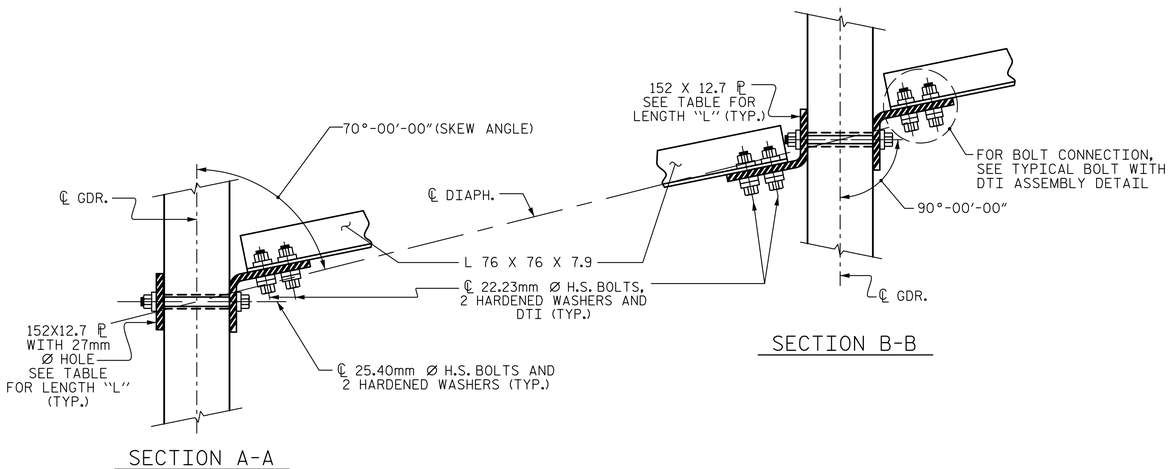
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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

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

TABLE

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
1880mm BULB TEE	463	540	540	1.27m

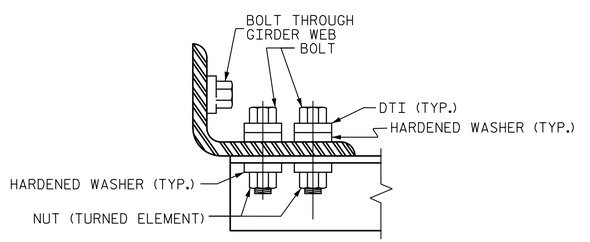


SECTION B-B

SECTION A-A

CONNECTION DETAILS

(FOR 70°≤ SKEW < 90° OR 90°< SKEW ≤ 110°)



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
INTERMEDIATE
STEEL DIAPHRAGMS
FOR 1600mm & 1880mm
MODIFIED BULB TEE
PRESTRESSED CONCRETE
GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-15
1			3			TOTAL SHEETS
2			4			28

STD. NO. PCG13SM

ASSEMBLED BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015

DRAWN BY : RWW 11/09
CHECKED BY : GM 11/09
ADDED 11/23/09

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

2/20/2015
ICA Engineering
R:\Structures\Plans\S15_R2413C_sd_dp.dgn

DEAD LOAD DEFLECTION TABLE FOR GIRDERS SPAN "A"

15.24 mm DIA. LOW RELAXATION STRANDS	GIRDERS 1 & 5																				
TWENTIETH POINTS	0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	0
CAMBER (GIRDER ALONE) (mm)	0	16	32	47	60	72	83	91	97	100	102	100	97	91	83	72	60	47	32	16	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. (mm)	0	-16	-30	-43	-54	-63	-71	-77	-81	-83	-84	-83	-81	-77	-71	-63	-54	-43	-30	-16	0
FINAL CAMBER (mm)	0	0	2	4	6	9	12	14	16	17	18	17	16	14	12	9	6	4	2	0	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS SPAN "A"

15.24 mm DIA. LOW RELAXATION STRANDS	GIRDERS 2-4																				
TWENTIETH POINTS	0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	0
CAMBER (GIRDER ALONE) (mm)	0	16	32	47	60	72	83	91	97	100	102	100	97	91	83	72	60	47	32	16	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. (mm)	0	-16	-31	-44	-55	-64	-72	-78	-82	-85	-86	-85	-82	-78	-72	-64	-55	-44	-31	-16	0
FINAL CAMBER (mm)	0	0	1	3	5	8	11	13	15	15	16	15	15	13	11	8	5	3	1	0	0

✳ INCLUDES FUTURE WEARING SURFACE
ALL VALUES ARE SHOWN IN MILLIMETERS.

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
CAMBER

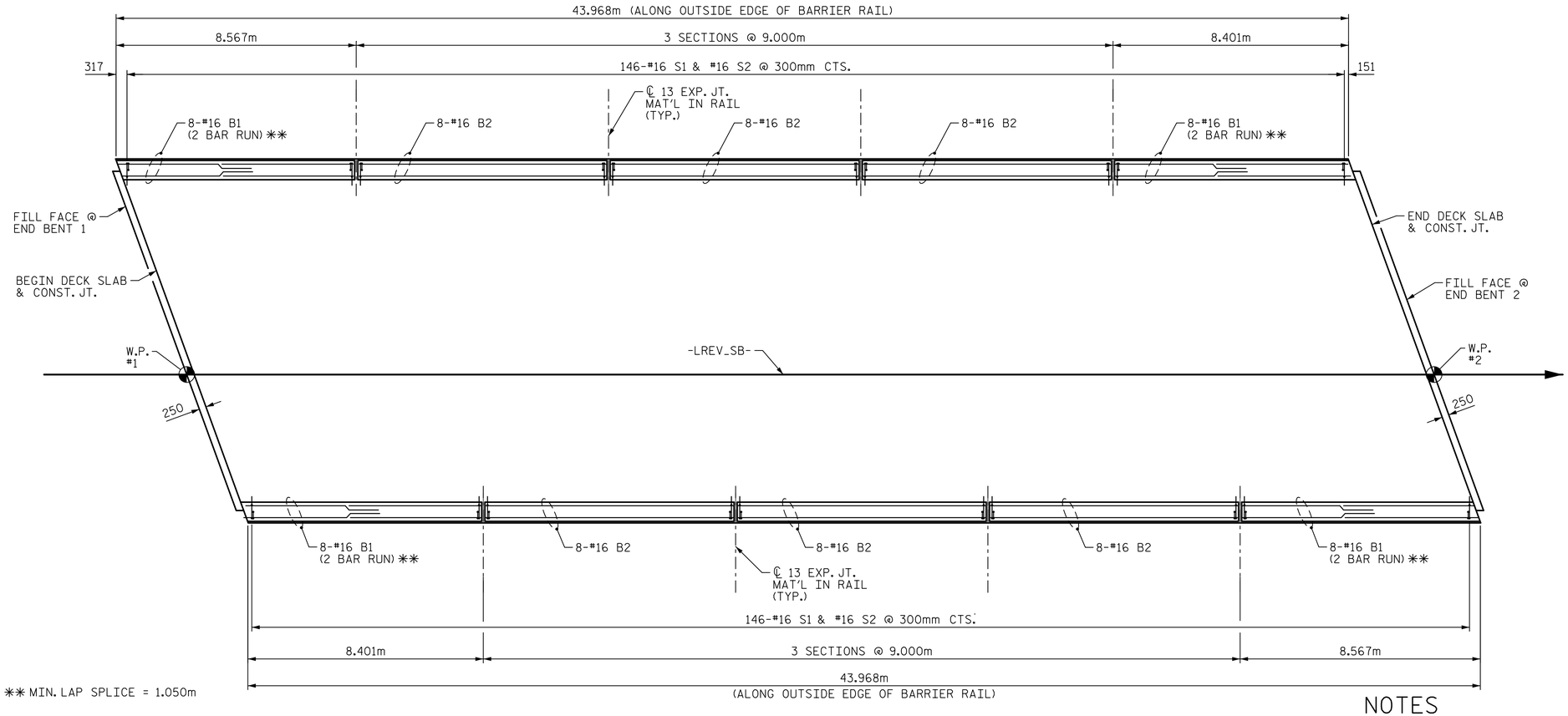
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-16
1			3			TOTAL SHEETS
2			4			28

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E TALLMAN

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

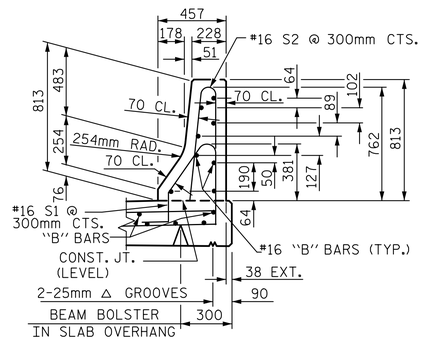
DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\S16_R2413C_sd_co.dgn
ICA Engineering

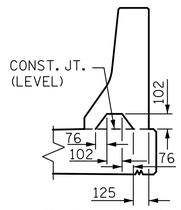


** MIN. LAP SPLICE = 1.050m

PLAN



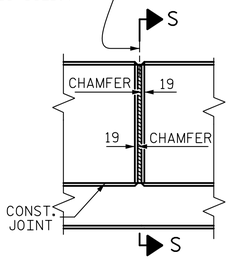
SECTION THRU RAIL



SECTION S-S

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

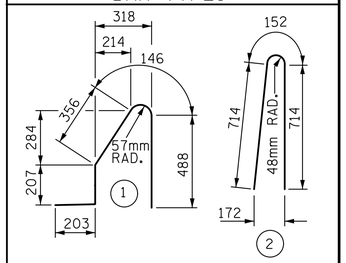
℄ 13mm EXP.JT.MAT'L HELD IN PLACE WITH GALVANIZED NAILS.
(NOTE: OMIT EXP. JT. MAT'L. WHEN SLIP FORM IS USED.)



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	64	#16	STR	4780	475
* B2	48	#16	STR	8880	662
* S1	292	#16	1	1440	653
* S2	292	#16	2	1580	716

* EPOXY COATED REINFORCING STEEL	2506 kg
CLASS AA CONCRETE	22.4 CU. METER
CONCRETE BARRIER RAIL	87.936 METERS

NOTES

THE 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 20.7 MPa.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 12mm 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 6.1m IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 3.5m IN LENGTH.

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-17
1			3			TOTAL SHEETS
2			4			28

ASSEMBLED BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015

DRAWN BY : ARB 5/87	REV. 10/17/00	RWW/LES
CHECKED BY : SJD 9/87	REV. 5/7/03R	RWW/JTE
	REV. 5/1/06	TLA/GM

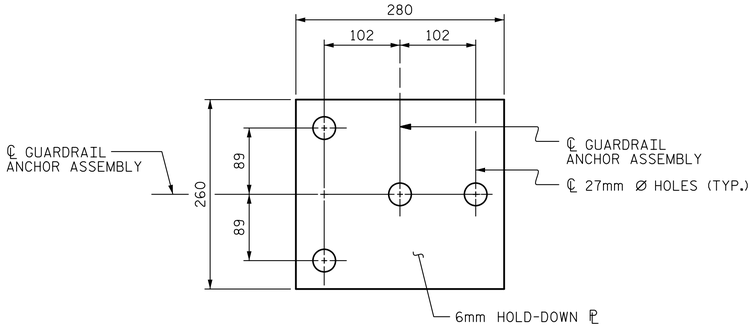
ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

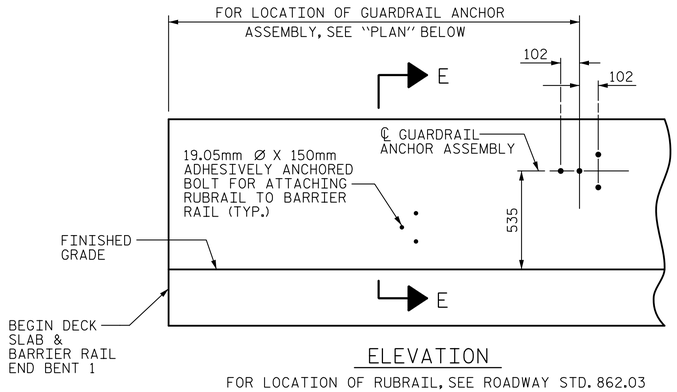
2/20/2015
ICA Engineering

R:\Structures\Plans\S17_R2413C_sd_br.dgn

STD. No. CBR1SM

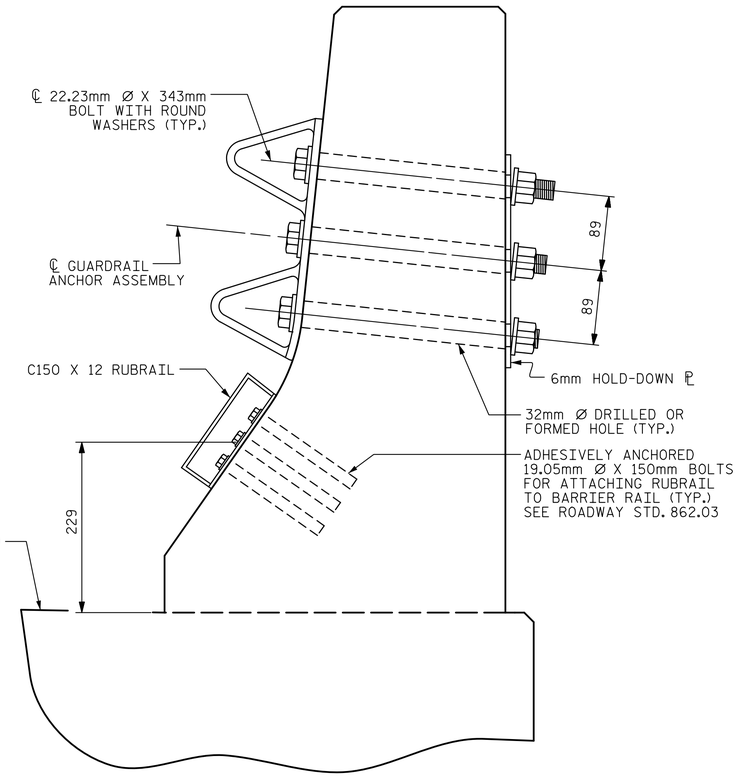


PLAN



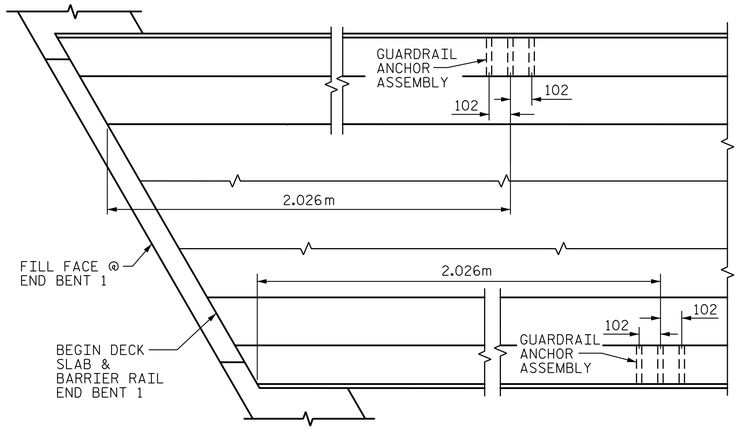
ELEVATION

FOR LOCATION OF RUBRAIL, SEE ROADWAY STD. 862.03

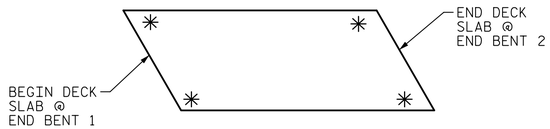


SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN



SKETCH SHOWING POINTS OF ATTACHMENTS

DENOTES GUARDRAIL ANCHOR ASSEMBLY

LOCATION OF ANCHORS FOR GUARDRAIL

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

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 6mm HOLD DOWN PLATE AND 4 - 22.23mm 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 22.23mm 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 32mm 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 C150 X 12 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 19.05mm Ø X 150mm BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 19.05mm Ø BOLTS IS 53.4kN. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

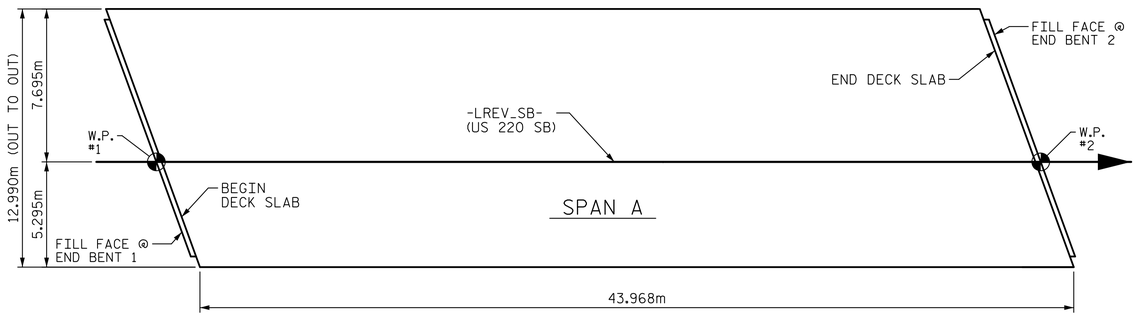
GUARDRAIL ANCHORAGE FOR BARRIER RAIL

ASSEMBLED BY : D. H. CARTER	DATE : FEB 2015
CHECKED BY : T. E. TALLMAN	DATE : FEB 2015
DRAWN BY : TLA 5/06	ADDED 5/1/06RR KMM/GM
CHECKED BY : GM 5/06	

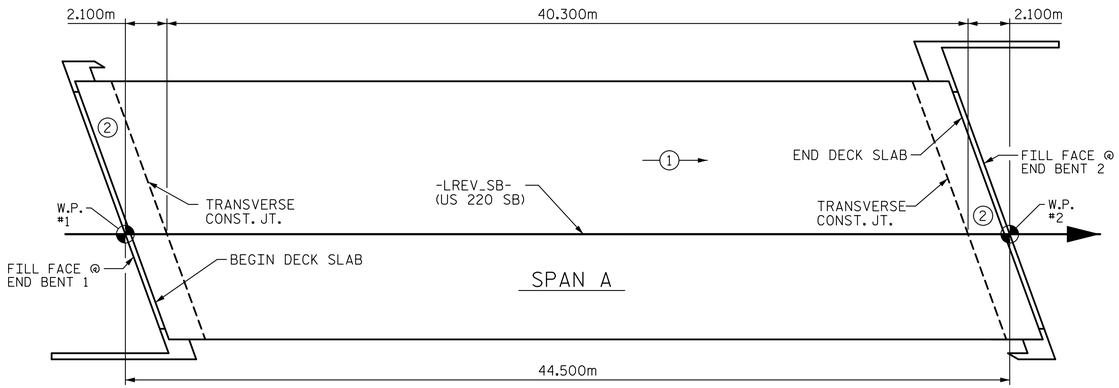
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-18
1			3			TOTAL SHEETS
2			4			28

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER JONAS E TALLMAN



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ.M = 571.1)



POURING SEQUENCE

(#) DENOTES POUR NUMBER AND DIRECTION

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE			REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	CU. METER			(kg)	(kg)
POUR NO.	#1	#2	TOTAL		
DECK	136.5	74.5	211.0	9292	8617
TOTALS**	136.5	74.5	211.0	9292	8617

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED.

GROOVING BRIDGE FLOORS

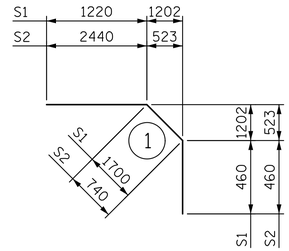
APPROACH SLABS	163.1 SQ.METER
BRIDGE DECK	486.2 SQ.METER
TOTAL	649.3 SQ.METER

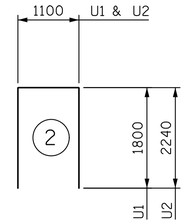
REINFORCING BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	207	#16	STR	12880	4138	* B1	130	#19	STR	8900	2586
A2	207	#16	STR	12880	4138	* B2	140	#13	STR	7280	1013
						B3	68	#19	STR	8900	1353
*A101	2	#16	STR	12400	38	B4	68	#16	STR	14040	1482
*A102	2	#16	STR	11880	37						
*A103	2	#16	STR	11360	35	H1	9	#16	STR	1720	24
*A104	2	#16	STR	10840	34	H2	9	#16	STR	1600	22
*A105	2	#16	STR	10320	32	H3	14	#19	STR	4720	148
*A106	2	#16	STR	9780	30	H4	14	#19	STR	4780	150
*A107	2	#16	STR	9260	29	H5	8	#16	STR	1980	25
*A108	2	#16	STR	8740	27	H6	8	#16	STR	1840	23
*A109	2	#16	STR	8220	26	H7	15	#19	STR	4300	144
*A110	2	#16	STR	7700	24	H8	15	#19	STR	4340	146
* A111	2	#16	STR	7180	22						
*A112	2	#16	STR	6660	21	K1	28	#13	STR	8300	231
*A113	2	#16	STR	6140	19	K2	8	#13	STR	2000	16
*A114	2	#16	STR	5620	17	K3	40	#13	STR	2520	100
*A115	2	#16	STR	5100	16	K4	8	#13	STR	1540	12
*A116	2	#16	STR	4560	14	K5	4	#13	STR	1860	7
*A117	2	#16	STR	4040	13	K6	20	#13	STR	2120	42
*A118	2	#16	STR	3520	11	K7	4	#13	STR	1640	7
*A119	2	#16	STR	3000	9	K8	24	#13	STR	940	22
*A120	2	#16	STR	2480	8						
*A121	2	#16	STR	1960	6	* S1	56	#13	1	3380	188
*A122	2	#16	STR	1440	4	* S2	60	#13	1	3640	217
*A123	2	#16	STR	920	3						
						U1	60	#13	2	4700	280
A201	2	#16	STR	12400	38	U2	12	#13	2	5580	67
A202	2	#16	STR	11880	37						
A203	2	#16	STR	11360	35	V3	76	#16	STR	2240	264
A204	2	#16	STR	10840	34						
A205	2	#16	STR	10320	32						
A206	2	#16	STR	9780	30						
A207	2	#16	STR	9260	29						
A208	2	#16	STR	8740	27						
A209	2	#16	STR	8220	26						
A210	2	#16	STR	7700	24						
A211	2	#16	STR	7180	22						
A212	2	#16	STR	6660	21						
A213	2	#16	STR	6140	19						
A214	2	#16	STR	5620	17						
A215	2	#16	STR	5100	16						
A216	2	#16	STR	4560	14						
A217	2	#16	STR	4040	13						
A218	2	#16	STR	3520	11						
A219	2	#16	STR	3000	9						
A220	2	#16	STR	2480	8						
A221	2	#16	STR	1960	6						
A222	2	#16	STR	1440	4						
A223	2	#16	STR	920	3						

REINFORCING STEEL	kg	9236
*EPOXY COATED REINFORCING STEEL	kg	8617

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

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	
#13	610	540	610	540	840
#16	770	660	770	660	1050
#19	920	790	1190	790	1330
#22	1580	1060			
#25	2080	1390			

ASSEMBLED BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DRAWN BY : JMB 5/87 REV. 5/16/97 EEM/RGW
CHECKED BY : SJD 9/87 REV. 5/1/06 TLA/GM

ICA Engineering
3121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

PROFESSIONAL ENGINEER SEAL 14408 GREGORY ENGINEERING, PLLC NORTH CAROLINA THOMAS E. TALLMAN

PROJECT NO. R-2413CA
ROCKINGHAM COUNTY
STATION: 90+64.493 -LREV_SB-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-19
1			3			TOTAL SHEETS
2			4			28

2/20/2015 ICA Engineering R:\Structures\Plans\S19_R2413C_sd_bm.dgn

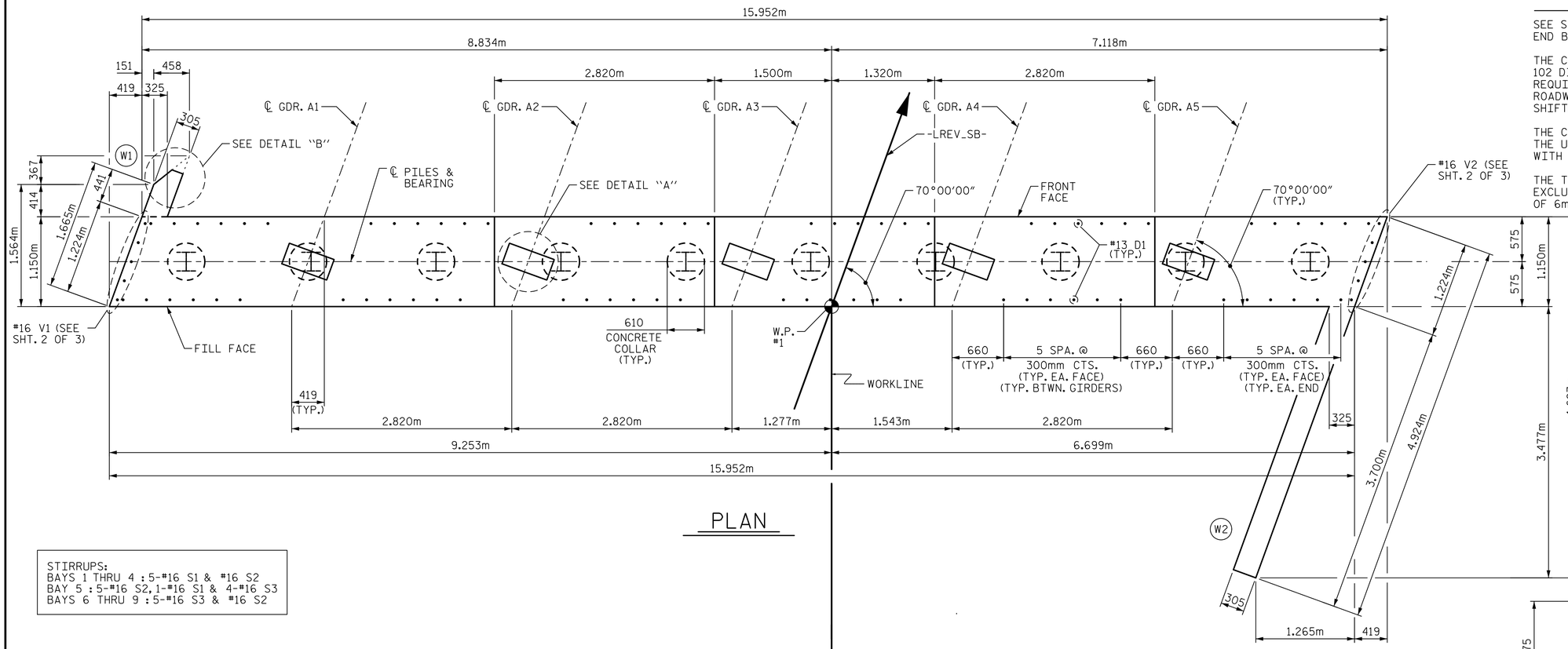
NOTES

SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTERGRAL END BENT DETAILS.

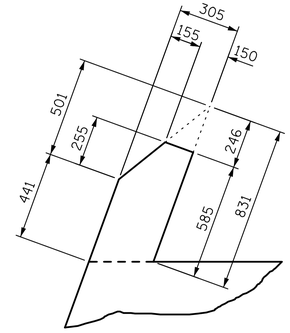
THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 102 DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS. SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WINGS MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE UPPER PART OF THE END BENT WINGS ARE TO BE POURED WITH POUR #2 OF THE SUPERSTRUCTURE.

THE TOP SURFACE OF THE END BENT CAP AND WINGS, EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 6mm.

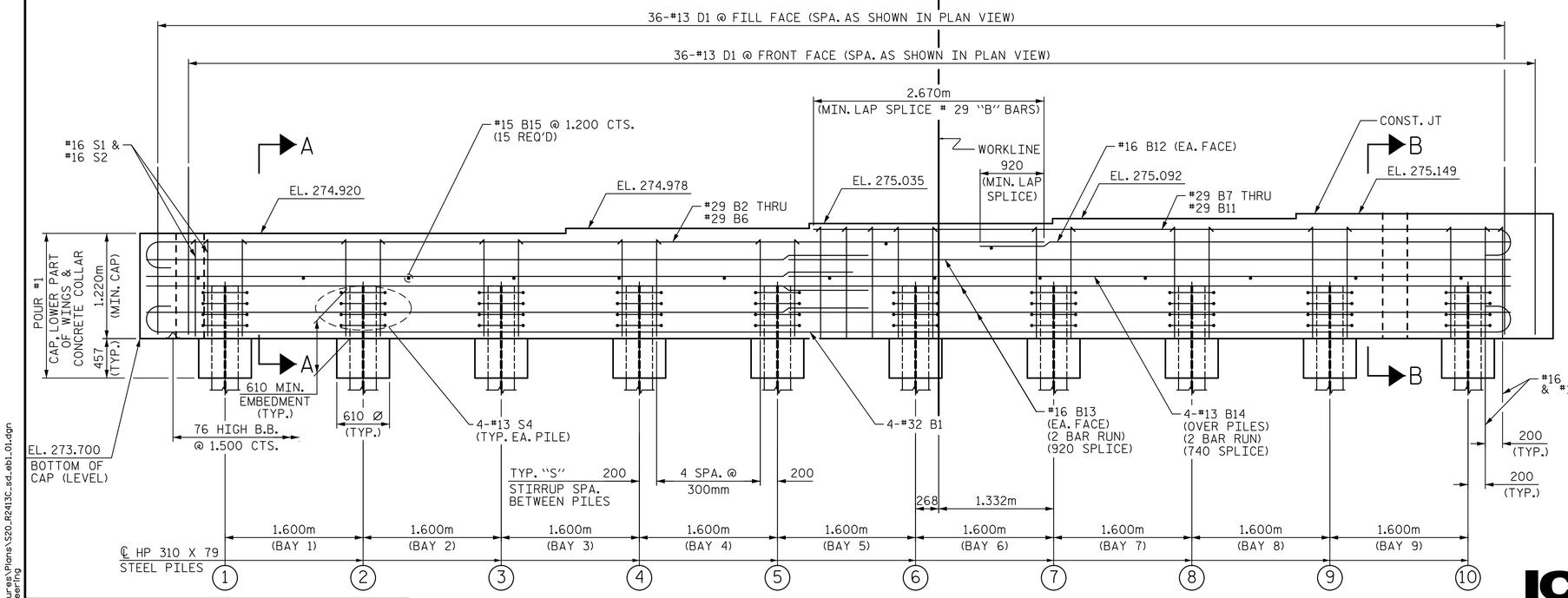


PLAN

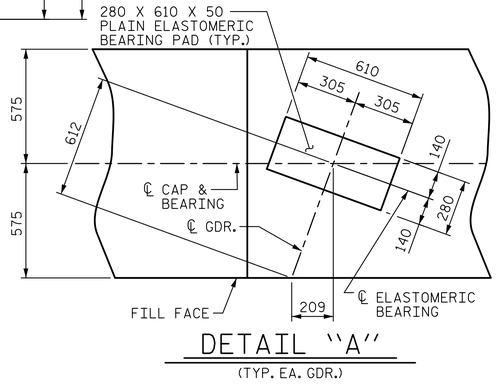


DETAIL "B"

STIRRUPS:
BAYS 1 THRU 4 : 5-#16 S1 & #16 S2
BAY 5 : 5-#16 S2, 1-#16 S1 & 4-#16 S3
BAYS 6 THRU 9 : 5-#16 S3 & #16 S2



ELEVATION



DETAIL "A"
(TYP. EA. GDR.)

PROJECT NO. R-2413CA
ROCKINGHAM COUNTY
STATION: 90+64.493 -LREV_SB-
SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT #1

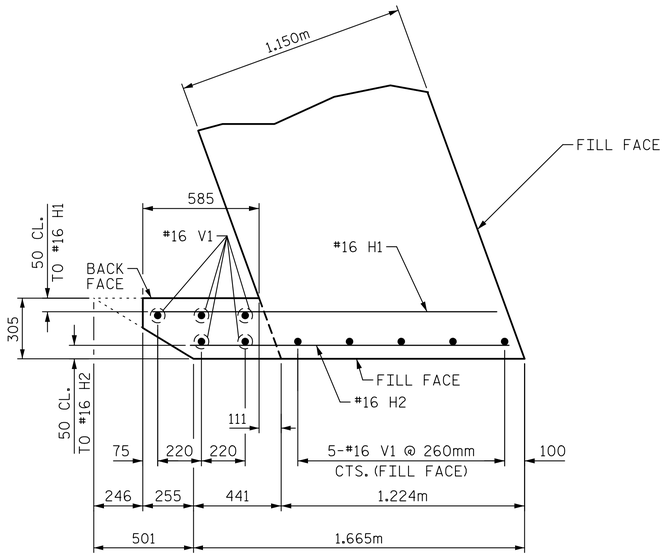
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-20
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

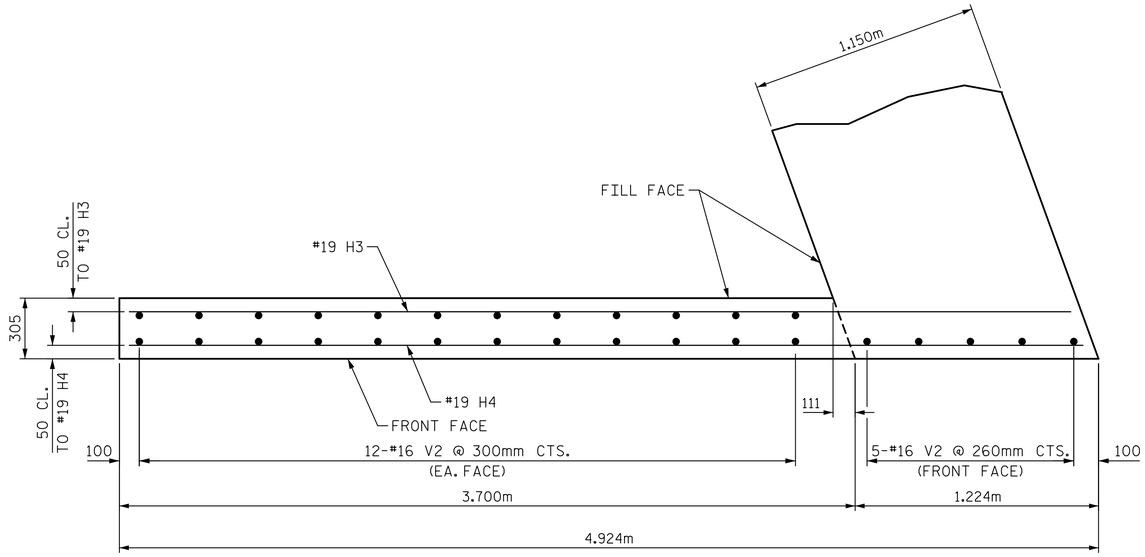
ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

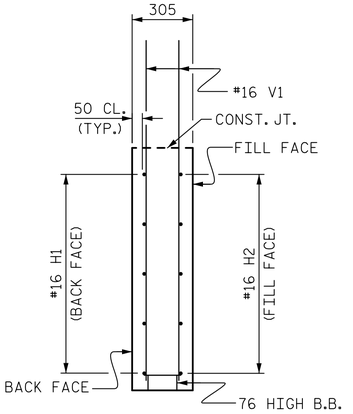
2/20/2015
R:\Structures\Plans\S20_R2413C_sd_eb1_01.dgn
ICA Engineering



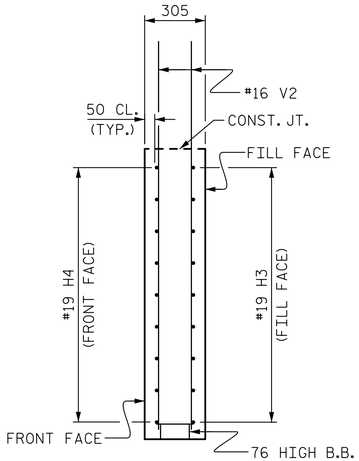
PLAN OF WING (W1)



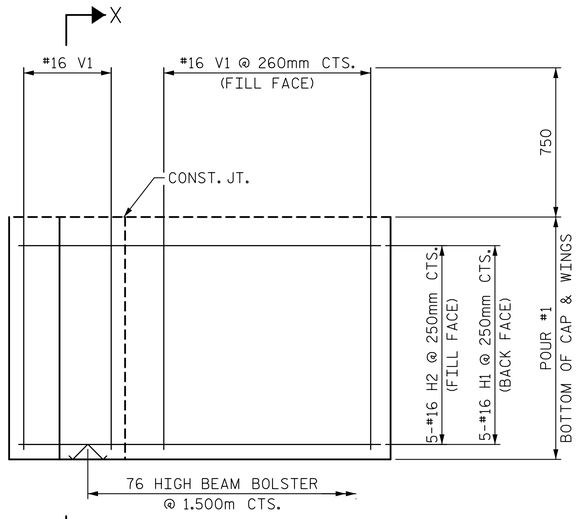
PLAN OF WING (W2)



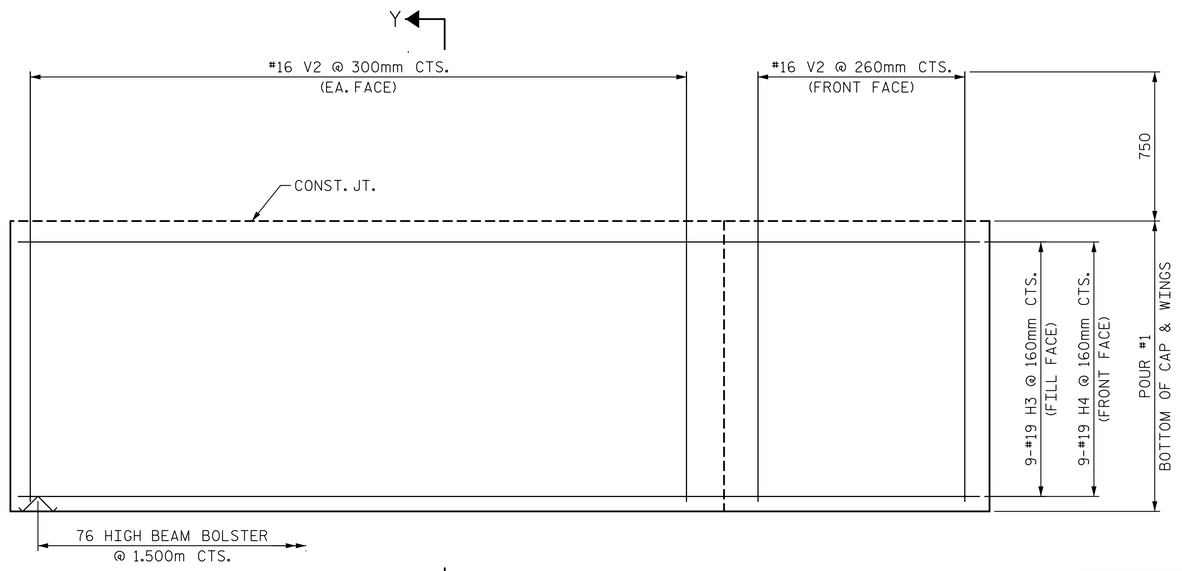
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 2 OF 3

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 1

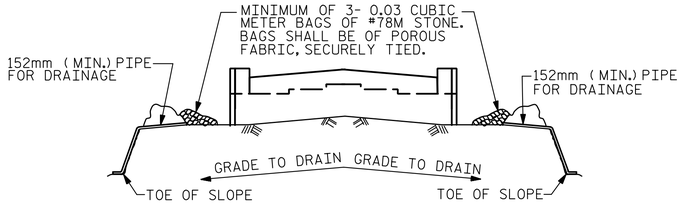
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-21
1			3			TOTAL SHEETS
2			4			28

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E TALLMAN

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\S21_R2413C_sd_eb1_02.dgn
ICA Engineering

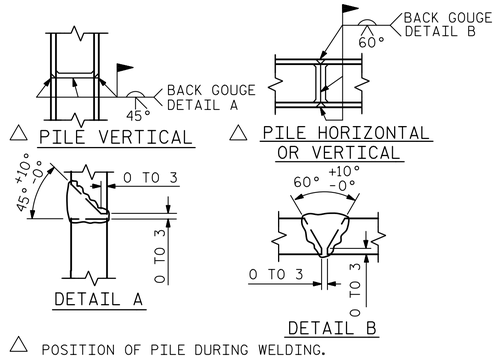


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

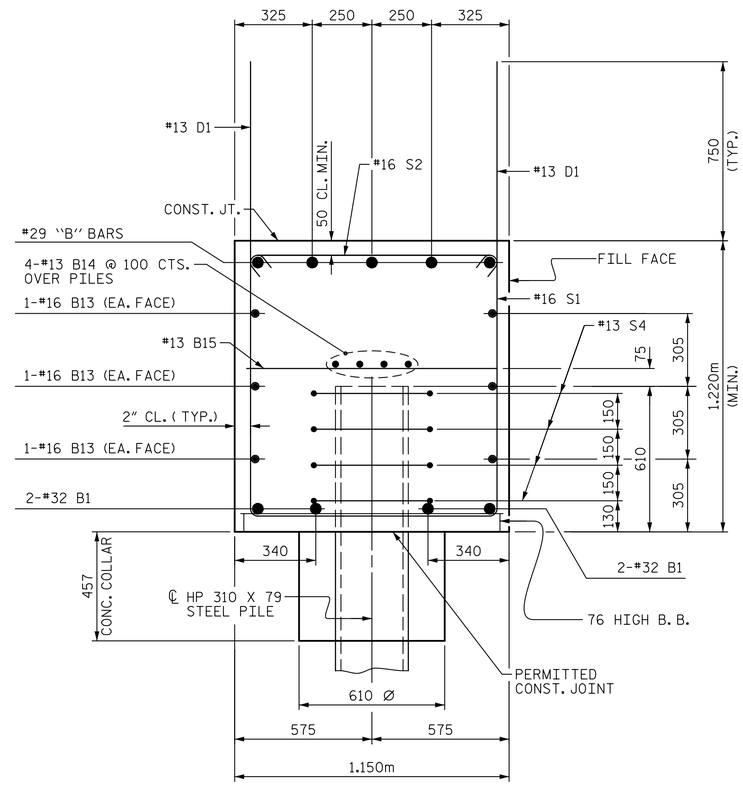
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

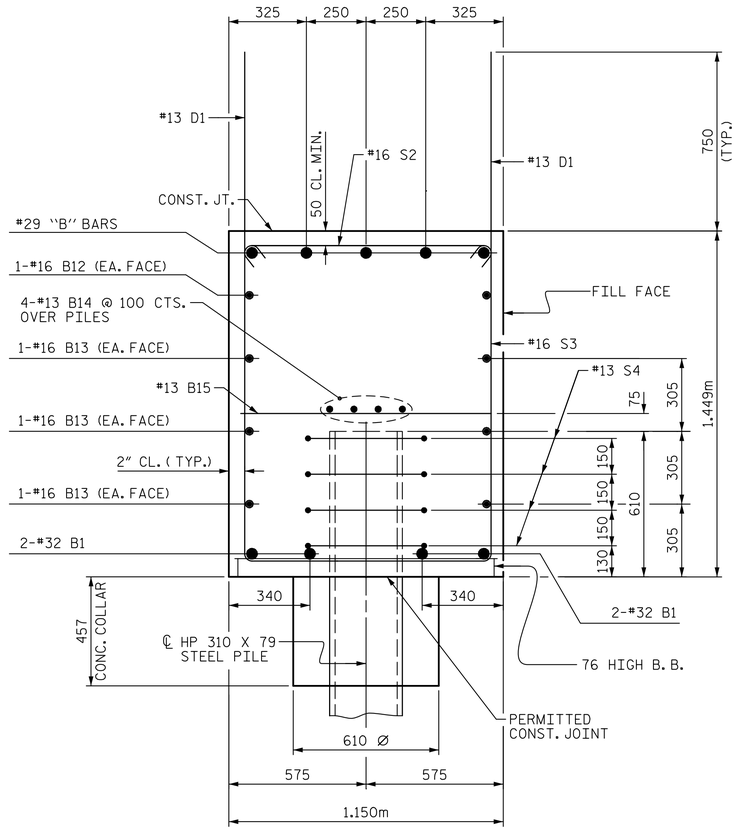


△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

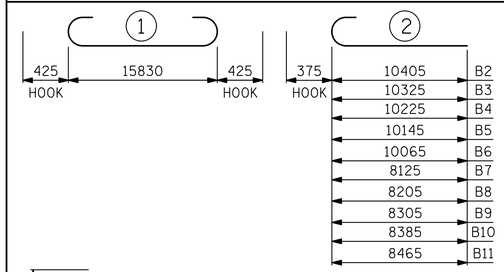


SECTION A-A



SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1
HP 310 X 79 STEEL PILES
NO: 10 METERS = 246

PILE REDRIVES NO. 5

BILL OF MATERIAL
FOR END BENT #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#32	1	16680	427
B2	1	#29	2	10780	55
B3	1	#29	2	10700	54
B4	1	#29	2	10600	54
B5	1	#29	2	10520	53
B6	1	#29	2	10440	53
B7	1	#29	2	8500	43
B8	1	#29	2	8580	43
B9	1	#29	2	8680	44
B10	1	#29	2	8760	44
B11	1	#29	2	8840	45
B12	2	#16	STR	6720	21
B13	12	#16	STR	8400	156
B14	8	#13	STR	8300	66
B15	15	#13	STR	1040	16
D1	72	#13	STR	1880	135
H1	5	#16	STR	1720	13
H2	5	#16	STR	1600	12
H3	9	#19	STR	4720	95
H4	9	#19	STR	4780	96
S1	23	#16	3	3540	126
S2	49	#16	4	1320	100
S3	26	#16	3	3760	152
S4	40	#13	5	2000	80
V1	10	#16	STR	1860	29
V2	29	#16	STR	2080	94

REINFORCING STEEL 2106 kg

CLASS A CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WINGS & COLLARS 27.4m^3

TOTAL CLASS A CONCRETE 27.4m^3

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\S22_R2413C_sd_eb1_03.dgn
ICA Engineering

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

PROJECT NO. R-2413CA
ROCKINGHAM COUNTY
STATION: 90+64.493 -LREV_SB-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT #1 DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-22
1			3			TOTAL SHEETS
2			4			28

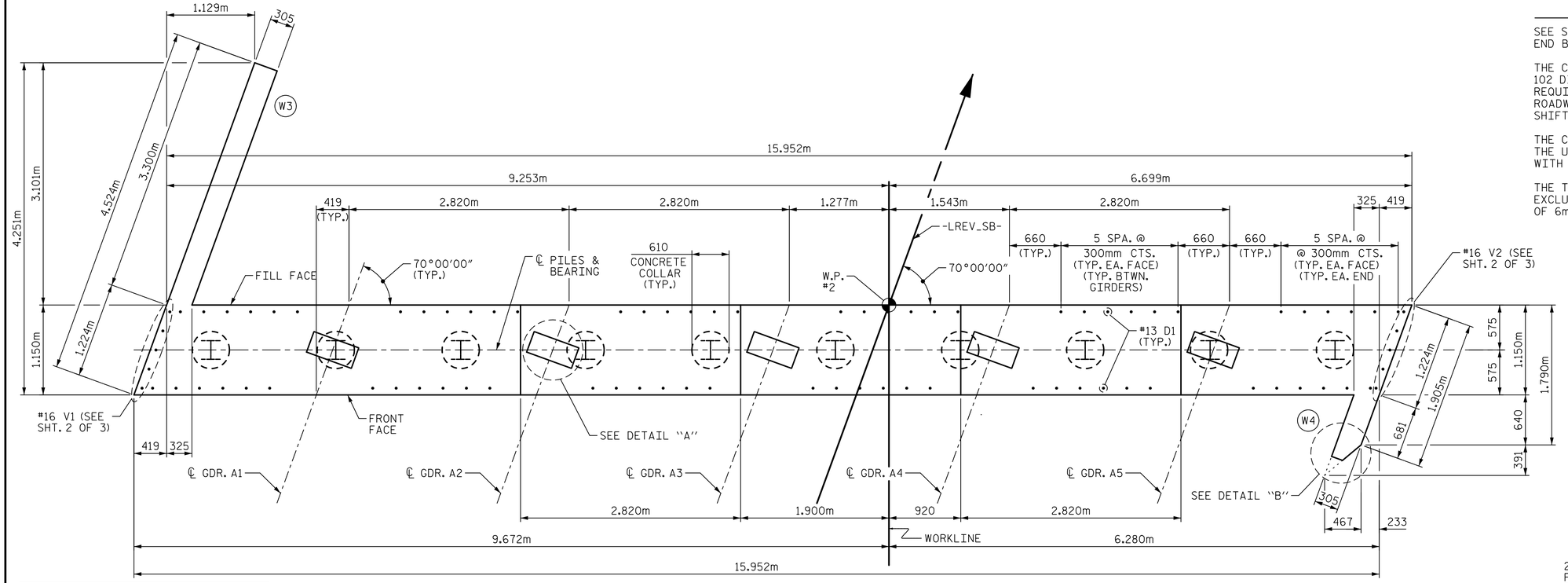
NOTES

SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTERGRAL END BENT DETAILS.

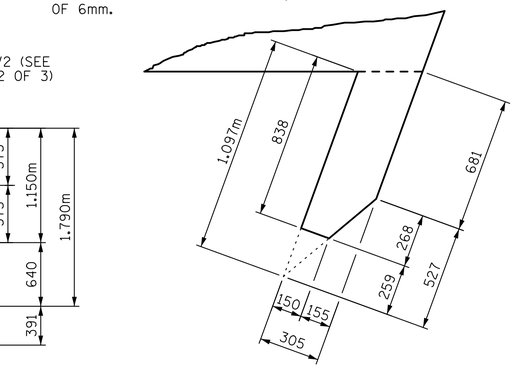
THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 102 DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WINGS MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE UPPER PART OF THE END BENT WINGS ARE TO BE POURED WITH POUR #2 OF THE SUPERSTRUCTURE.

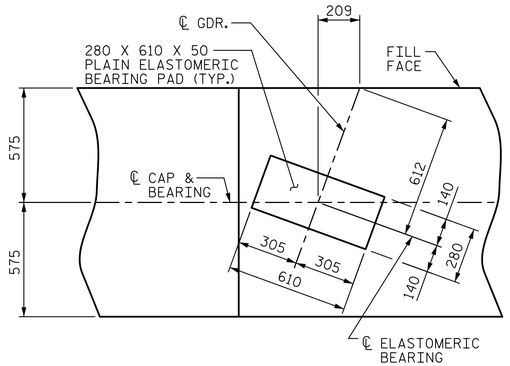
THE TOP SURFACE OF THE END BENT CAP AND WINGS, EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 6mm.



PLAN



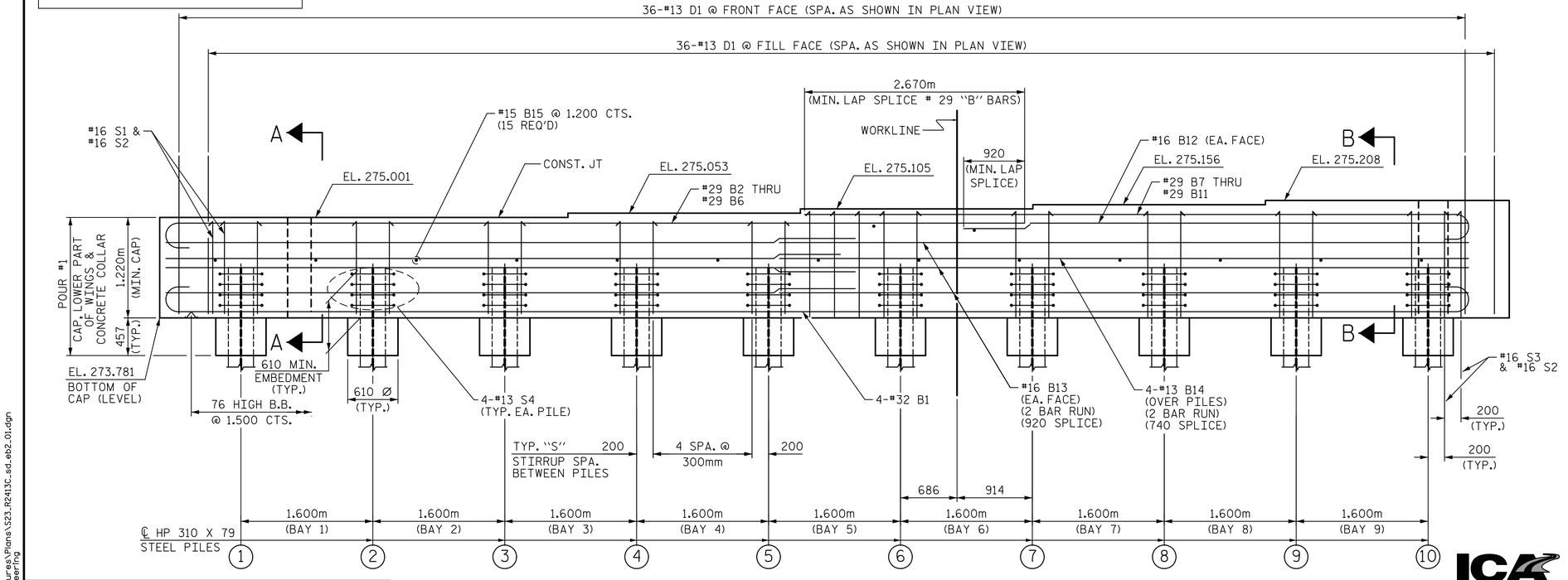
DETAIL "B"



DETAIL "A"

(TYP. EA. GDR.)

STIRRUPS:
BAYS 1 THRU 4 : 5-#16 S1 & #16 S2
BAY 5 : 5-#16 S2, 1-#16 S1 & 4-#16 S3
BAYS 6 THRU 9 : 5-#16 S3 & #16 S2



ELEVATION

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 1 OF 3

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT #2

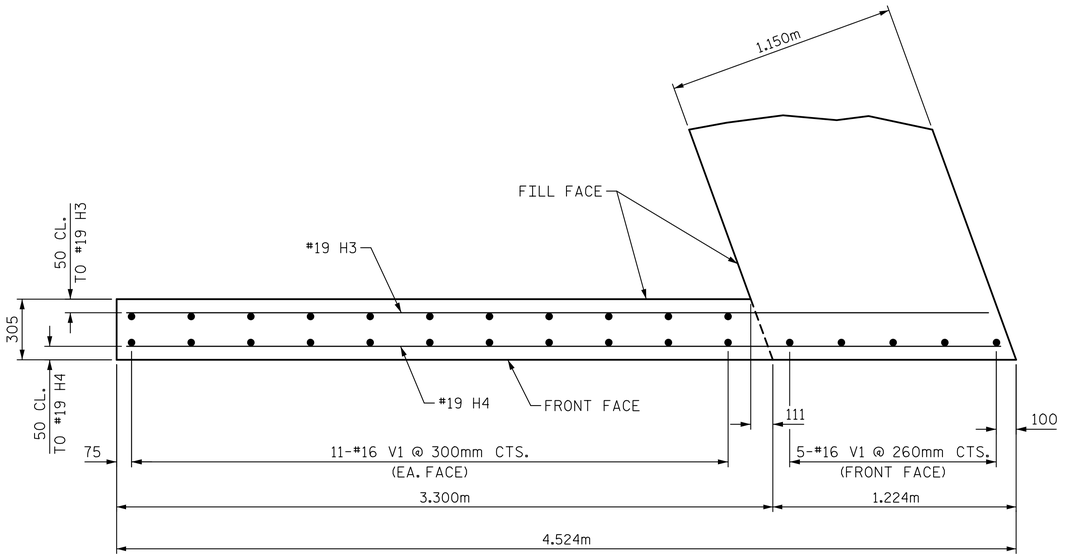
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-23
1			3			TOTAL SHEETS
2			4			28

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

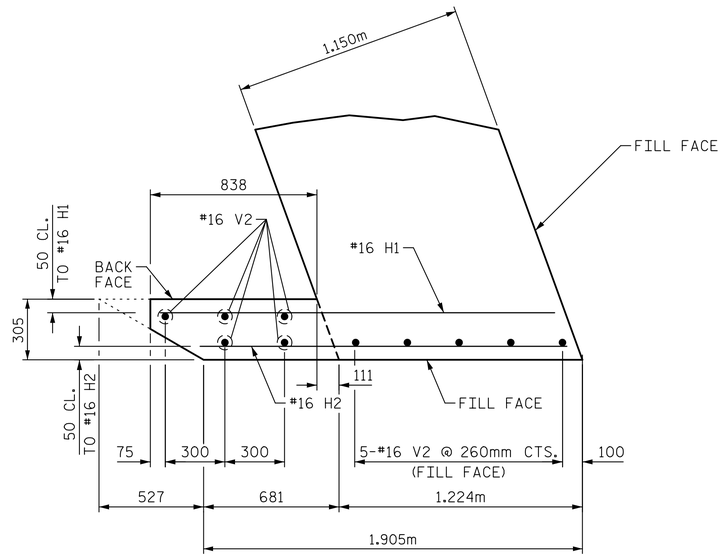
ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

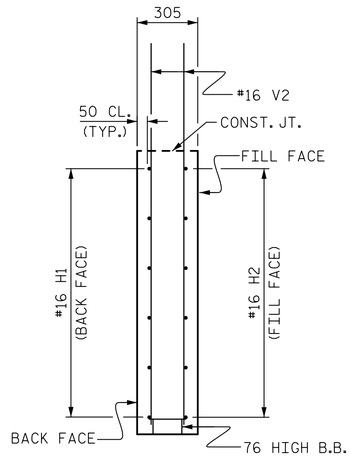
2/20/2015
R:\Structures\Plans\S23.R2413C_sd_eb2_01.dgn
ICA Engineering



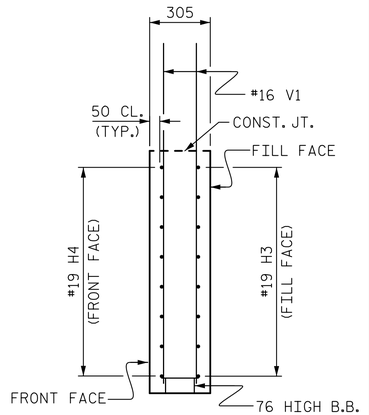
PLAN OF WING (W3)



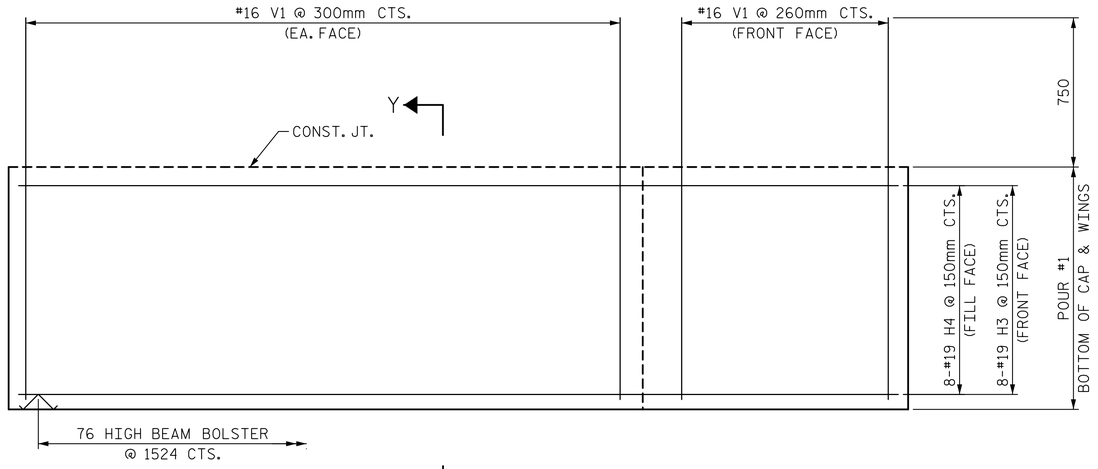
PLAN OF WING (W4)



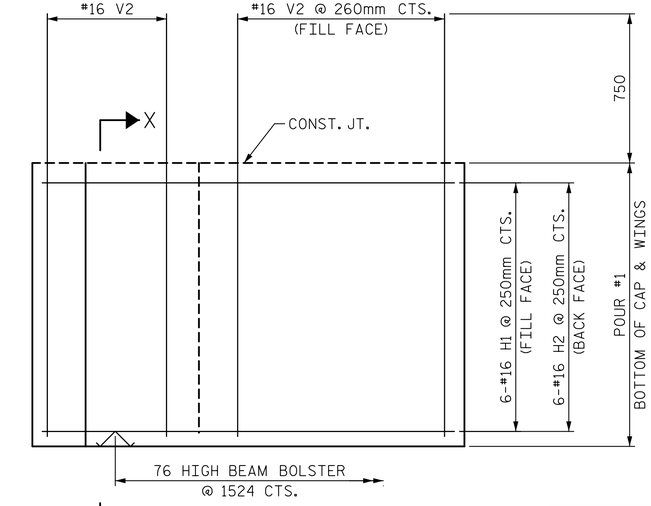
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W3)



ELEVATION OF WING (W4)

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 2 OF 3

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 2

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

ICA Engineering
5121 Kingsdown Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

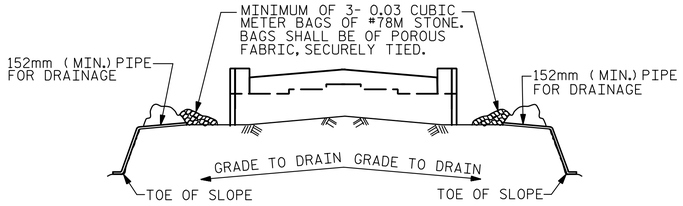
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S01-24

TOTAL SHEETS 28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\S24_R2413C_sd_eb2_02.dgn
ICA Engineering

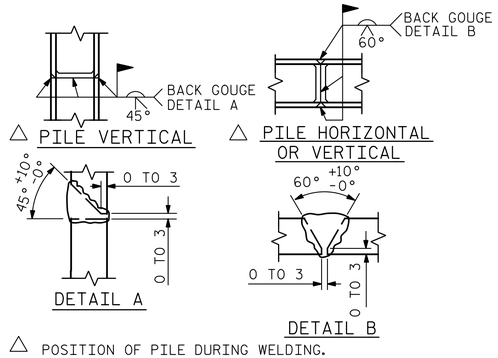


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

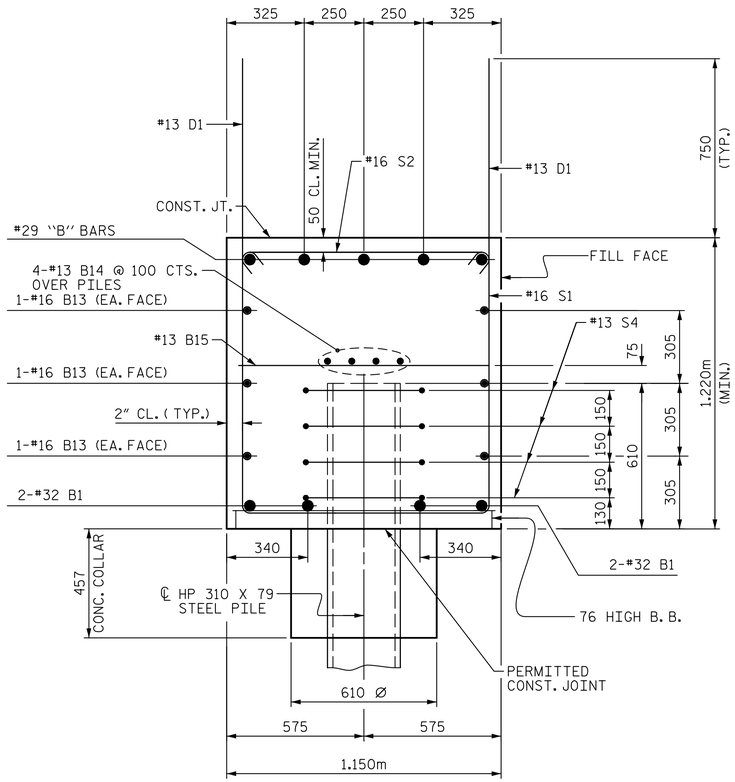
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

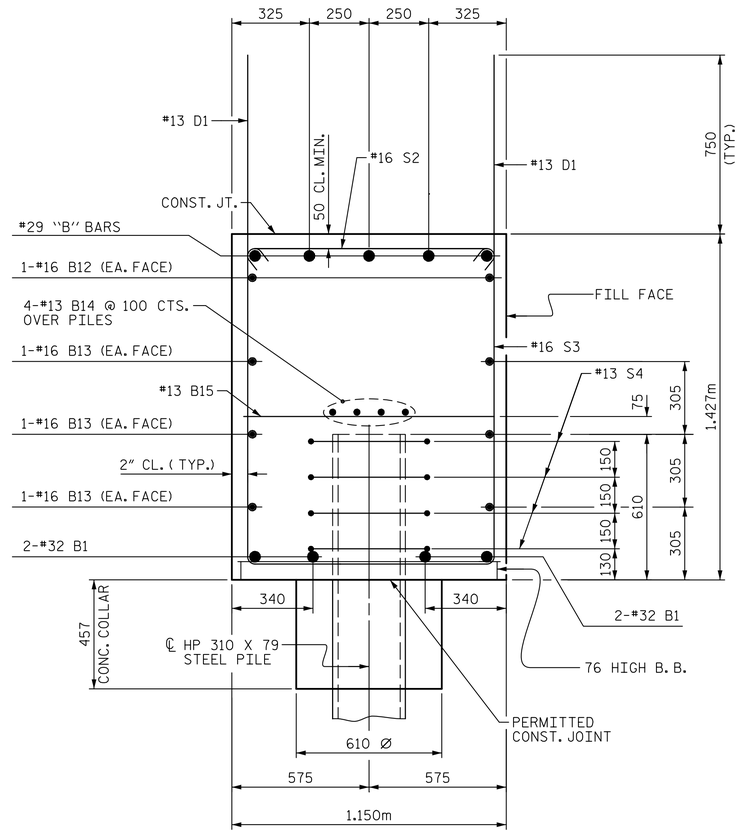


△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

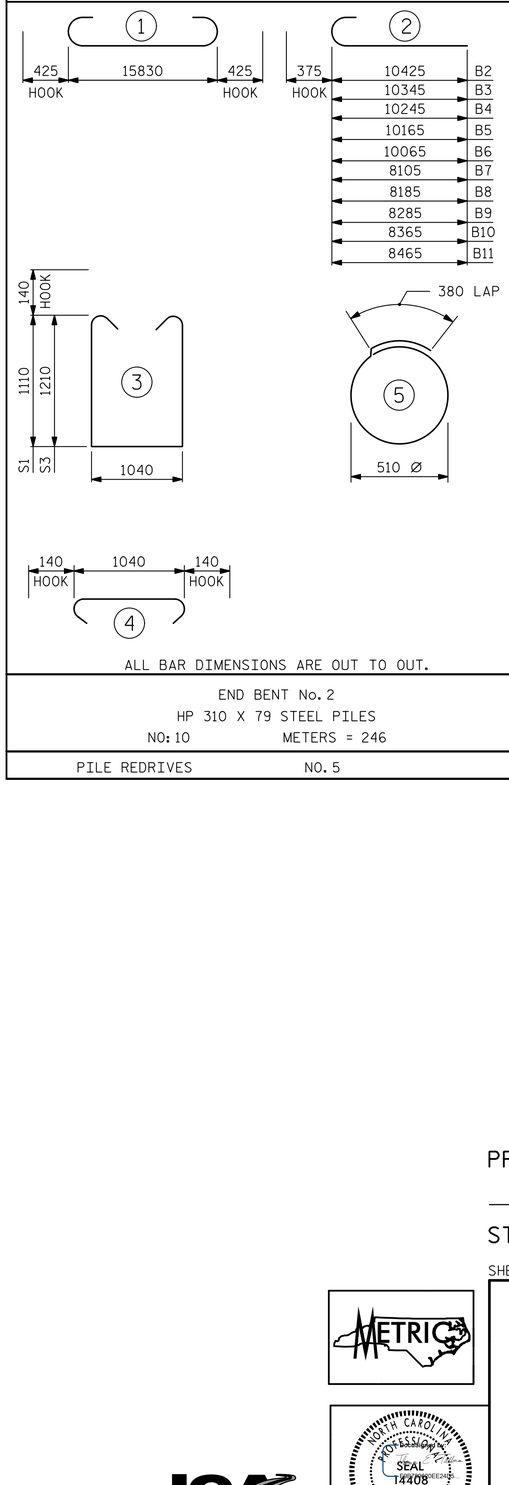


SECTION A-A



SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 2
HP 310 X 79 STEEL PILES
NO: 10 METERS = 246

PILE REDRIVES NO. 5

BILL OF MATERIAL
FOR END BENT #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#32	1	16680	427
B2	1	#29	2	10800	55
B3	1	#29	2	10720	54
B4	1	#29	2	10620	54
B5	1	#29	2	10540	53
B6	1	#29	2	10440	53
B7	1	#29	2	8480	43
B8	1	#29	2	8560	43
B9	1	#29	2	8660	44
B10	1	#29	2	8740	44
B11	1	#29	2	8840	45
B12	2	#16	STR	6700	21
B13	12	#16	STR	8400	156
B14	8	#13	STR	8300	66
B15	15	#13	STR	1040	16
D1	72	#13	STR	1880	135
H1	6	#16	STR	1980	18
H2	6	#16	STR	1840	17
H3	8	#19	STR	4300	77
H4	8	#19	STR	4340	78
S1	23	#16	3	3540	126
S2	49	#16	4	1320	100
S3	26	#16	3	3740	151
S4	40	#13	5	2000	80
V1	27	#16	STR	1900	80
V2	10	#16	STR	2100	33

REINFORCING STEEL 2069 kg

CLASS A CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WINGS & COLLARS 27.1 m^3

TOTAL CLASS A CONCRETE 27.1 m^3

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT #2 DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-25
1			3			TOTAL SHEETS
2			4			28

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

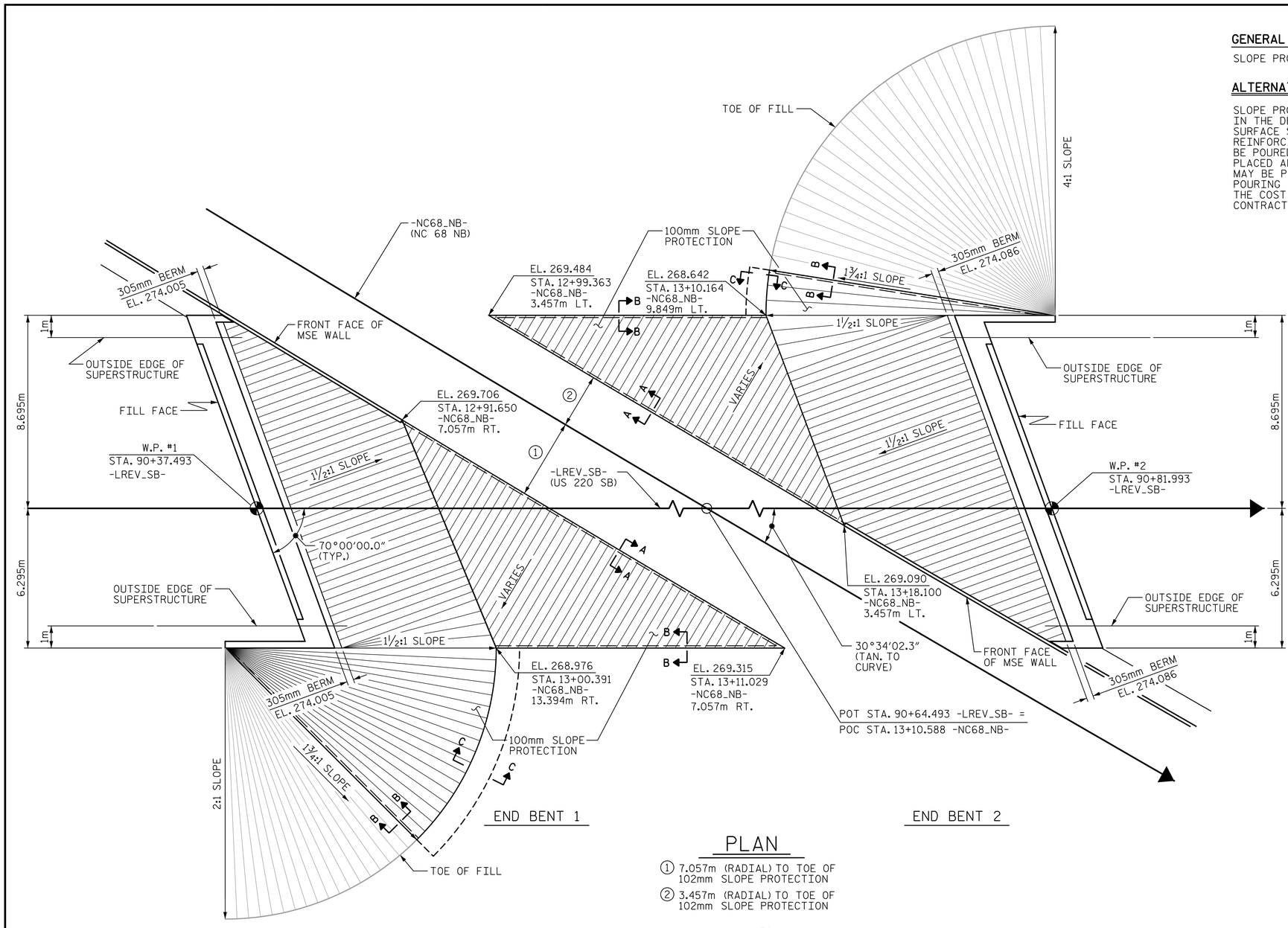
2/20/2015
R:\Structures\Plans\S25.R2413C_sd_eb2_03.dgn
ICA Engineering

GENERAL NOTES

SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS.

ALTERNATE "A"

SLOPE PROTECTION SHALL CONSIST OF 100mm 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 152 X 152 - W9.1 X W9.1, 1520mm WIDE. SLOPE PROTECTION SHALL BE POURED IN 1520mm STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 600mm LONG #13 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 450mm MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 1220mm AND 1520mm STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 152mm. THE COST OF THE WELDED WIRE FABRIC AND #13 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE METER FOR SLOPE PROTECTION.



END BENT 1

END BENT 2

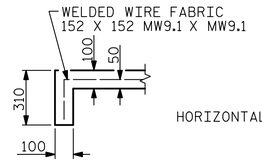
PLAN

① 7.057m (RADIAL) TO TOE OF 102mm SLOPE PROTECTION

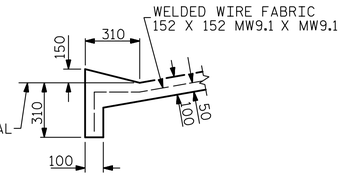
② 3.457m (RADIAL) TO TOE OF 102mm SLOPE PROTECTION

BRIDGE @ STA. 90+64.493 -LREV_SB-	100 mm SLOPE PROTECTION	✳ WELDED WIRE FABRIC 1520mm WIDE
	SQUARE METERS	APPROX. METERS
END BENT 1	252	193
END BENT 2	202	154

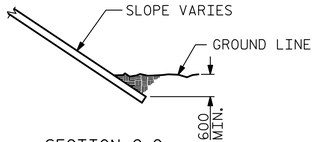
✳ QUANTITY SHOWN IS BASED ON 1520mm POURS.



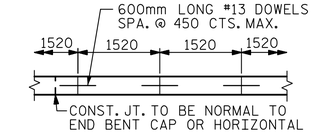
SECTION A-A



SECTION B-B

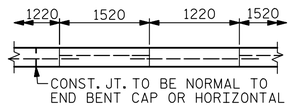


SECTION C-C



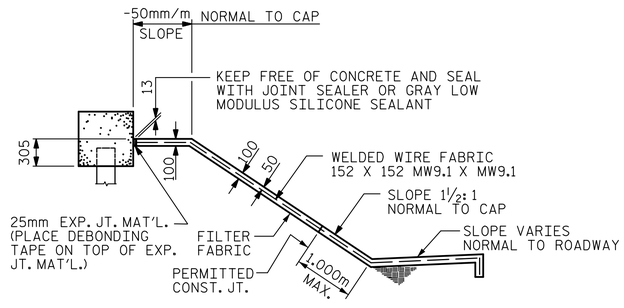
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



POUR A 1220mm STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



SECTION ALONG ℄ ROADWAY

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

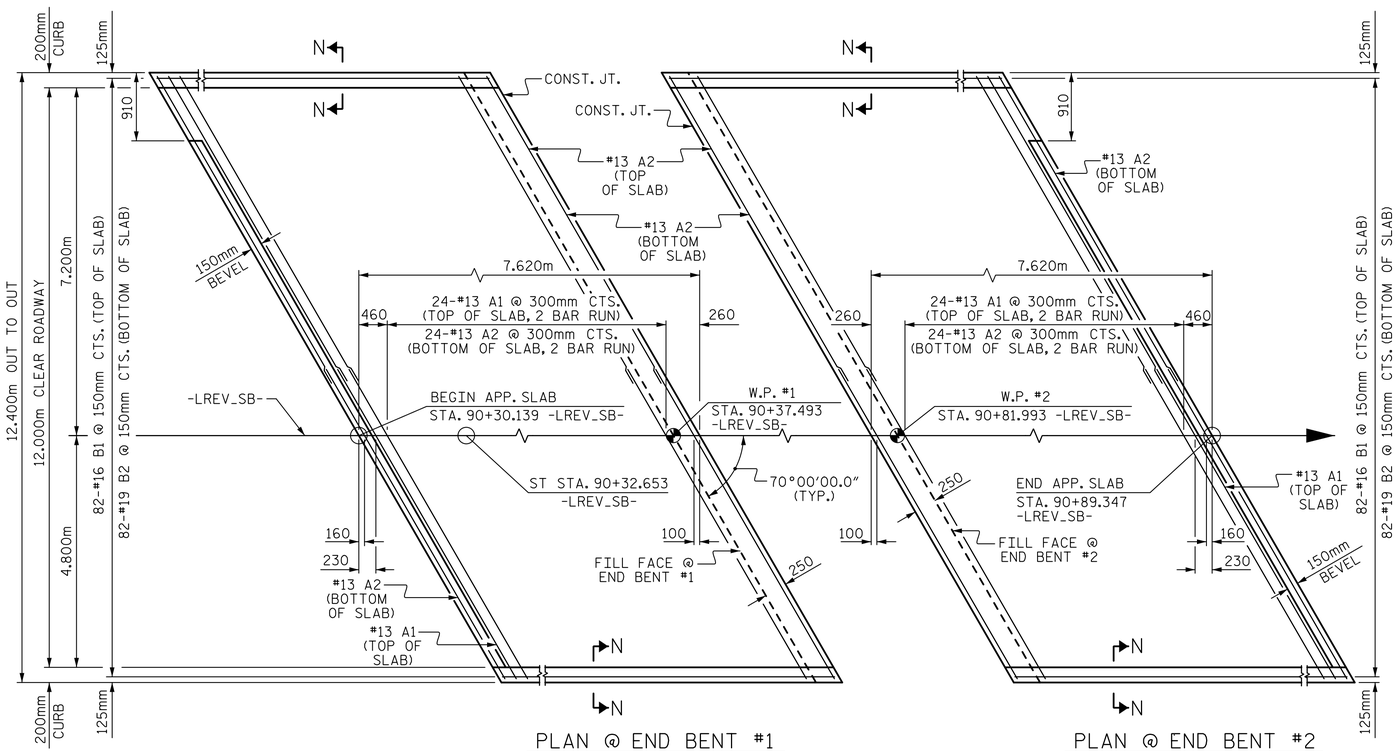
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-26
1			3			TOTAL SHEETS
2			4			28

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0238

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E. TALLMAN

DRAWN BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : FEB 2015

2/20/2015
R:\Structures\Plans\S26_R2413C_sd_sp_01.dgn
ICA Engineering



PLAN @ END BENT #1

PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

NOTES

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

FOR REINFORCED BRIDGE APPROACH FILL INCLUDING FABRIC, IMPERMEABLE GEOMEMBRANE, 102mm 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.

THE VERTICAL JOINT ON THE RIGHT AND LEFT SIDE OF THE APPROACH SLAB AT THE ENDS OF THE FOAM JOINT SHALL BE FILLED WITH SILICONE OR OTHER APPROVED MATERIAL IN ORDER TO PREVENT BACKFILL FROM ENTERING THE JOINT OPENING.

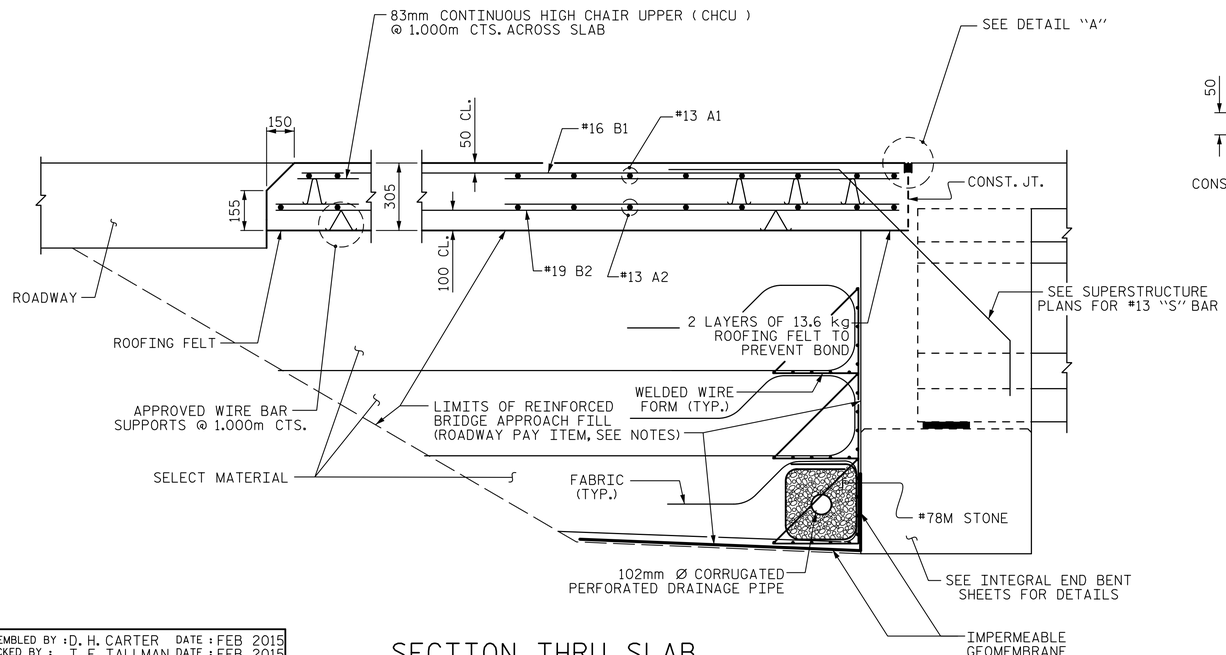
THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF TYPE SL LOW MODULUS SILICONE SEALANT.

BILL OF MATERIAL

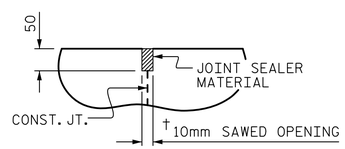
FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	52	#13	STR	6860	355
A2	52	#13	STR	6820	353
✳ B1	82	#16	STR	7340	934
B2	82	#19	STR	7500	1375
REINFORCING STEEL				kg.	1728
✳ EPOXY COATED REINFORCING STEEL				kg.	1289
CLASS AA CONCRETE				C.M.	28.8

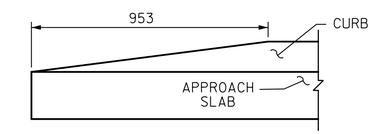
SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#13	610	540
#16	770	660
#19	1190	790



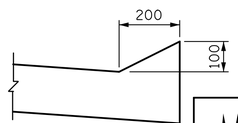
SECTION THRU SLAB



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

METRIC

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-27
1			3			TOTAL SHEETS
2			4			28

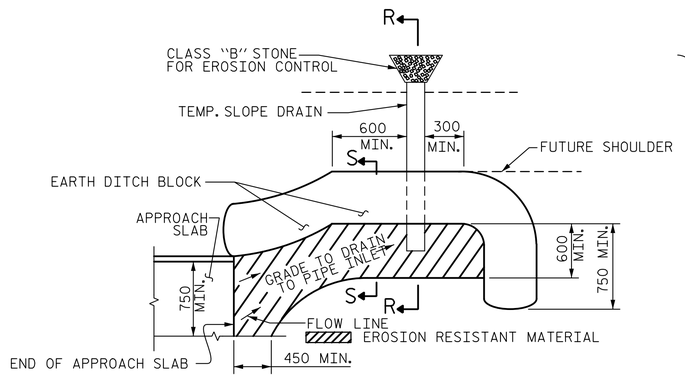
ASSEMBLED BY : D. H. CARTER DATE : FEB 2015
CHECKED BY : T. E. TALLMAN DATE : FEB 2015
DRAWN BY : TLA 6/06
CHECKED BY : GM 6/06
ADDED 5/1/06RR KMM/GM

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14408 THOMAS E. TALLMAN

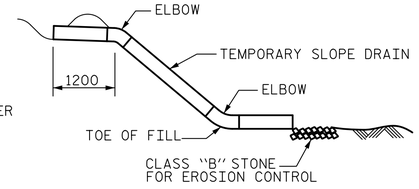
2/20/2015
ICA Engineering
R:\Structures\Plans\S27_R2413C_sd_as_01.dgn

STD. NO. BAS11SM

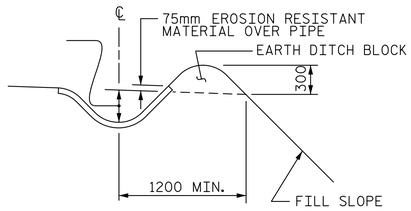


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2 MIN. 50mm 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, 305mm IN DIAMETER.

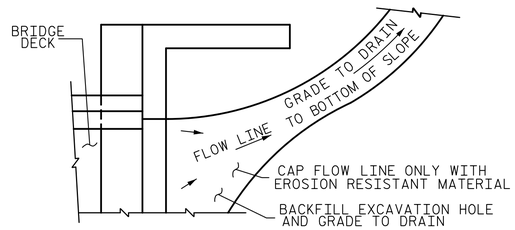
PLAN VIEW



SECTION R-R



SECTION S-S



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

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

ASSEMBLED BY : D. H. CARTER	DATE : FEB 2015	REV. 10/17/00	RWW/LES
CHECKED BY : T. E. TALLMAN	DATE : FEB 2015	REV. 5/7/03	RWW/JTE
DRAWN BY : FCJ 11/88		REV. 5/1/06RRR	MAA/KMM
CHECKED BY : ARB 11/88			

2/20/2015 ICA Engineering R:\Structures\Plans\S28_R2413C_sd_as_02.dgn

PROJECT NO. R-2413CA

ROCKINGHAM COUNTY

STATION: 90+64.493 -LREV_SB-

SHEET 2 OF 2

METRIC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

NORTH CAROLINA PROFESSIONAL SEAL 14408 ENGINEER THOMAS E TALLMAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-28
1			3			TOTAL SHEETS
2			4			28

STD. NO. BAS10SM