



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division Of Highways

1900 Kanawha Boulevard East • Building Five • Room 110
Charleston, West Virginia 25305-0440 • 304/558-3505

Joe Manchin III
Governor

October 25, 2007

MEMORANDUM

TO: ALL HOLDERS OF STANDARD DETAILS BOOK, VOLUME 3

**FROM: GREGORY L. BAILEY, DIRECTOR
ENGINEERING DIVISION**

A handwritten signature in cursive script that reads "Gregory Bailey".

SUBJECT: ADDENDUM 2 TO THE 1999 STANDARD DETAILS BOOK, VOLUME 3

Attached for your use is Addendum 2 to the 1999 Standard Details Book, Volume 3. This addendum is necessary to revise the West Virginia Department of Transportation, Division of Highways, Standard Details Volume 3 dated August 1, 1999.

Also included in this package are the updated index and copies of the Standard Details that are affected. The revisions are as follows:

- Remove and destroy the existing index and replace it with the attached revised index. Revisions to the index are shown in ***bold/italic*** print.
- Add the attached Standard Details, dated October 2007.

Please note that this addendum adds Standard Details BR-B105A & B and BR-B106 which consists of Prestressed Concrete Beam Type F Barrier Details and Approach Slab Transition, Bridge Curb Details with, Barrier/Curb Reinforcement and Type TL-2 Guardrail Systems Design & Assembly Details respectively.

Any questions concerning this addendum should be directed to Mr. Lovell Facemire at (304) 558-9752.

GLB:Ts

Attachment

PROJECT NUMBERS		DISTRICT	COUNTY	SHEET NO.	TOTAL
STATE	FEDERAL				

BR-1	SUPERSTRUCTURE PLAN-NORMAL CROSSING
BR-1	SUPERSTRUCTURE PLAN-LEFT FORWARD SKEW
BR-1	SUPERSTRUCTURE PLAN-RIGHT FORWARD SKEW
BR-1A	SUPERSTRUCTURE PLAN ON PILING NORMAL CROSSING
BR-1A	SUPERSTRUCTURE PLAN ON LEFT FORWARD SKEW
BR-1A	SUPERSTRUCTURE PLAN ON PILING RIGHT FORWARD SKEW
BR-2A	GENERAL NOTES
BR-2B	GENERAL NOTES
BR-7S	CONCRETE ABUTMENT BRIDGE SEAT DETAILS-LT. FORWARD SKEW
BR-7S	CONCRETE ABUTMENT BRIDGE SEAT DETAILS-RT. FORWARD SKEW
BR-10	STEEL BEAM STRINGERS AND TIMBER DECK
BR-10A	DOWEL LAMINATED TIMBER DECK
BR-11	STEEL BEAM STRINGERS AND STEEL GRID DECK
BR-11M	MODIFIED STEEL GRID DETAILS-OPEN TYPE
BR-12	SHOE ASSEMBLY DETAILS-SPAN 60'-0" OR LESS
BR-12L	SHOE ASSEMBLY DETAILS
BR-13	CONCRETE ABUTMENT LAYOUT
BR-P13	CONCRETE ABUTMENT ON PILING
BR-P14	CONCRETE ABUTMENT ON PILING-REINFORCING STEEL DETAILS
BR-P15	CONCRETE ABUTMENT ON PILING-LEFT WINGWALL DETAILS
BR-P16	CONCRETE ABUTMENT ON PILING-RIGHT WINGWALL DETAILS
BR-P17	CONCRETE ABUTMENT ON PILING-RANGE 1, 2, & 3
BR-P17	CONCRETE ABUTMENT ON PILING-RANGE 4 & 5
BR-14	REINFORCED CONCRETE ABUTMENT-REINFORCING STEEL DETAILS
BR-14S	BRIDGE SEAT DETAILS-LEFT FORWARD SKEW
BR-14S	BRIDGE SEAT DETAILS-RIGHT FORWARD SKEW
BR-15	LEFT WINGWALL DETAILS
BR-16	RIGHT WINGWALL DETAILS
BR-17	ABUTMENT FOOTING-RANGE 1, 2, & 3
BR-17	ABUTMENT FOOTING-RANGE 4 & 5
BR-17A	ABUTMENT FOOTING
BR-S12A	12" PRESTRESSED PLANK BEAM DESIGN AND ASSEMBLY DETAILS
BR-S12B	DESIGN TABLE FOR 12" PRESTRESSED PLANK BEAM
BR-B17A	17" PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B17B	DESIGN TABLE FOR 17" PRESTRESSED BOX BEAM
BR-B21A	21" PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B21B	DESIGN TABLE FOR 21" PRESTRESSED BOX BEAM
BR-B27A	27" PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B27B	DESIGN TABLE FOR 27" PRESTRESSED BOX BEAM
BR-B33A	33" PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B33B	DESIGN TABLE FOR 33" PRESTRESSED BOX BEAM
BR-B39A	39" PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B39B	DESIGN TABLE FOR 39" PRESTRESSED BOX BEAM
BR-B42A	42" PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B42B	DESIGN TABLE FOR 42" PRESTRESSED BOX BEAM
BR-B100	PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B101	PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B102A	PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B102B	PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B103	PRESTRESSED BOX BEAM TRANSVERSE POST-TENSIONING DESIGN AND ASSEMBLY DETAILS
BR-B104	PRESTRESSED BOX BEAM DESIGN AND ASSEMBLY DETAILS
BR-B105A	PRESTRESSED CONCRETE BEAM DESIGN AND ASSEMBLY NOTES
BR-B105B	PRESTRESSED CONCRETE BEAM DESIGN AND ASSEMBLY NOTES
BR-B106	PRESTRESSED CONCRETE BEAM SKEWED END REINFORCING MISC. DESIGN AND ASSEMBLY DETAILS
BR-T1	GLULAM TIMBER SUPERSTRUCTURE PLAN-NORMAL CROSSING
BR-T1	GLULAM TIMBER SUPERSTRUCTURE PLAN-RIGHT FORWARD SKEW
BR-T1	GLULAM TIMBER SUPERSTRUCTURE PLAN-LEFT FORWARD SKEW
BR-T2	GLULAM TIMBER SUPERSTRUCTURE PLAN-GENERAL NOTES
BR-T3	GLULAM TIMBER SUPERSTRUCTURE DECK FASTENING DETAILS

BR-PP2	REINFORCED CONCRETE PIER ON PILES LAYOUT
BR-PP3	REINFORCED CONCRETE PIER STEM DETAILS (SQUARE NOSE)
BR-PS1	REINFORCED CONCRETE PIER STEM DETAILS (ROUND NOSE)
BR-PS2	REINFORCED CONCRETE PIER FOOTING ON PILING
BR-PS3	REINFORCED CONCRETE PIER LAYOUT
BR-T4	GLULAM TIMBER SUPERSTRUCTURE DIAPHRAGM DETAILS
BR-T5	GLULAM TIMBER SUPERSTRUCTURE-GUARDRAIL POST DETAILS
BR-T6	GLULAM TIMBER SUPERSTRUCTURE-GIRDER ANCHORAGE DETAILS
BRD-B 17X36	17" P.C. SPREAD BOX BEAM
BRD-B 21X36	21" P.C. SPREAD BOX BEAM
BRD-B 27X36	27" P.C. SPREAD BOX BEAM
BRD-B 33X36	33" P.C. SPREAD BOX BEAM
BRD-B 39X36	39" P.C. SPREAD BOX BEAM
BRD-B 42X36	42" P.C. SPREAD BOX BEAM
BRD-II 36X12	AASHTO TYPE II 36" PRECAST CONCRETE BEAM
BRD-III 45X16	AASHTO TYPE III 45" PRECAST CONCRETE BEAM
BRD-IV 54X20	AASHTO TYPE IV 54" PRECAST CONCRETE BEAM
BRD-IVJ 60X37	AASHTO TYPE IV-J PC BEAM 60" DEEP, 37" TOP FLANGE
BRD-IVJ 60X43	AASHTO TYPE IV-J PC BEAM 60" DEEP, 43" TOP FLANGE
BRD-IVJ 60X49	AASHTO TYPE IV-J PC BEAM 60" DEEP, 49" TOP FLANGE
BRD-IVJ 60X61	AASHTO TYPE IV-J PC BEAM 60" DEEP, 61" TOP FLANGE
BRD-IVJ 66X37	AASHTO TYPE IV-J PC BEAM 66" DEEP, 37" TOP FLANGE
BRD-IVJ 66X43	AASHTO TYPE IV-J PC BEAM 66" DEEP, 49" TOP FLANGE
BRD-IVJ 66X49	AASHTO TYPE IV-J PC BEAM 66" DEEP, 49" TOP FLANGE
BRD-IVJ 66X61	AASHTO TYPE IV-J PC BEAM 66" DEEP, 61" TOP FLANGE
BRD-IVJ 72X37	AASHTO TYPE IV-J PC BEAM 72" DEEP, 37" TOP FLANGE
BRD-IVJ 72X43	AASHTO TYPE IV-J PC BEAM 72" DEEP, 43" TOP FLANGE
BRD-IVJ 72X49	AASHTO TYPE IV-J PC BEAM 72" DEEP, 49" TOP FLANGE
BRD-IVJ 72X61	AASHTO TYPE IV-J PC BEAM 72" DEEP, 61" TOP FLANGE
BRD-IVJ 78X37	AASHTO TYPE IV-J PC BEAM 78" DEEP, 37" TOP FLANGE
BRD-IVJ 78X43	AASHTO TYPE IV-J PC BEAM 78" DEEP, 43" TOP FLANGE
BRD-IVJ 78X49	AASHTO TYPE IV-J PC BEAM 78" DEEP, 49" TOP FLANGE
BRD-IVJ 78X61	AASHTO TYPE IV-J PC BEAM 78" DEEP, 61" TOP FLANGE
BRD-IVJ 84X37	AASHTO TYPE IV-J PC BEAM 84" DEEP, 37" TOP FLANGE
BRD-IVJ 84X43	AASHTO TYPE IV-J PC BEAM 84" DEEP, 43" TOP FLANGE
BRD-IVJ 84X49	AASHTO TYPE IV-J PC BEAM 84" DEEP, 49" TOP FLANGE
BRD-IVJ 84X61	AASHTO TYPE IV-J PC BEAM 84" DEEP, 61" TOP FLANGE
BRD-IVM 60X36	AASHTO TYPE IV MODIFIED 60" PRECAST CONCRETE BEAM
BRD-IVM 66X36	AASHTO TYPE IV MODIFIED 66" PRECAST CONCRETE BEAM
BRD-IVM 72X36	AASHTO TYPE IV MODIFIED 72" PRECAST CONCRETE BEAM
BRD-IVM 78X36	AASHTO TYPE IV MODIFIED 78" PRECAST CONCRETE BEAM
BRD-IVM 84X36	AASHTO TYPE IV MODIFIED 84" PRECAST CONCRETE BEAM

NO.	REVISION	DATE:	BY:

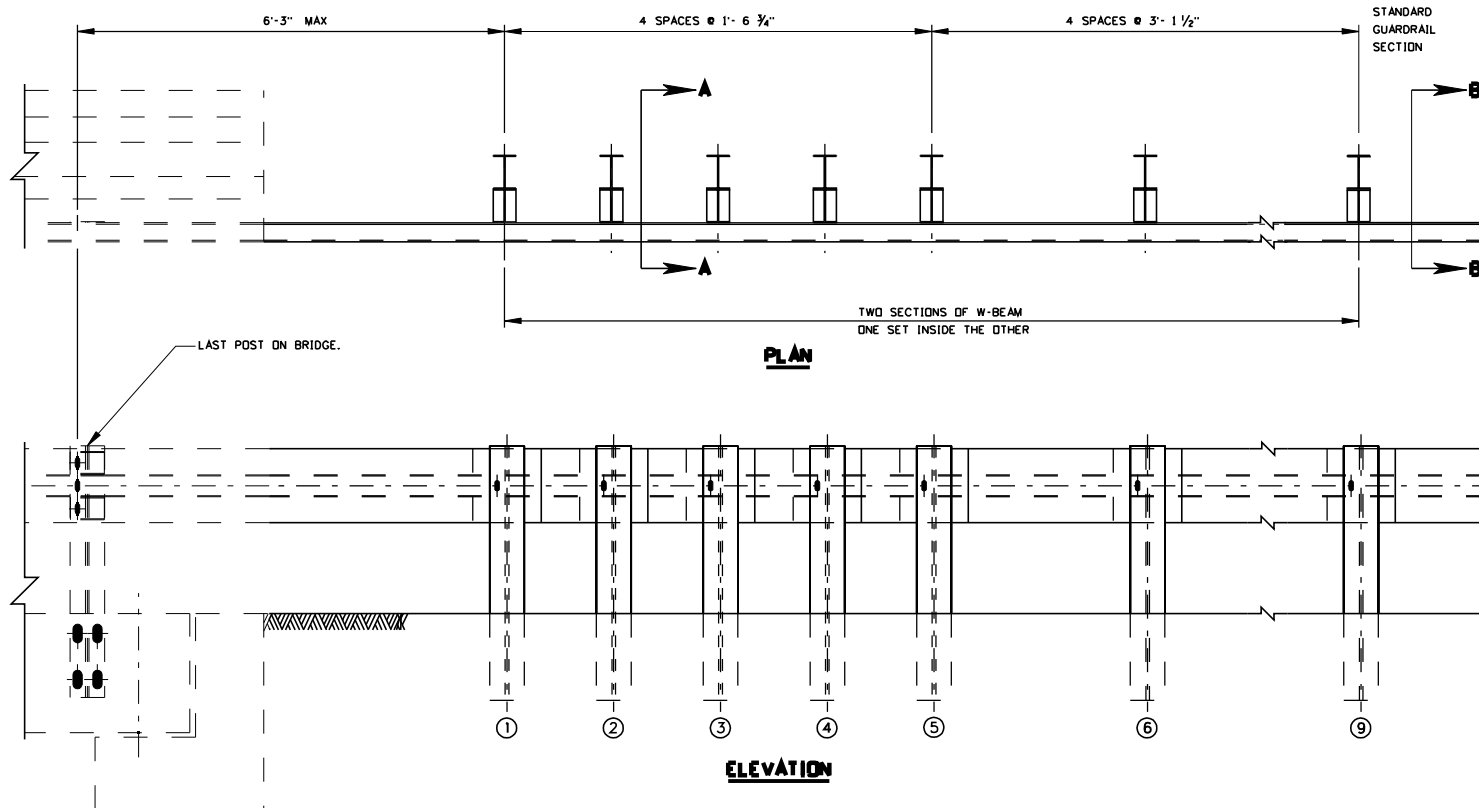
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

DESIGNED	DATE
DRAWN	12/5/06
CHECKED	
REVIEWED	

APPROVED *Gregory Bailey* DATE 10/25/07
DIRECTOR ENGINEERING DIVISION

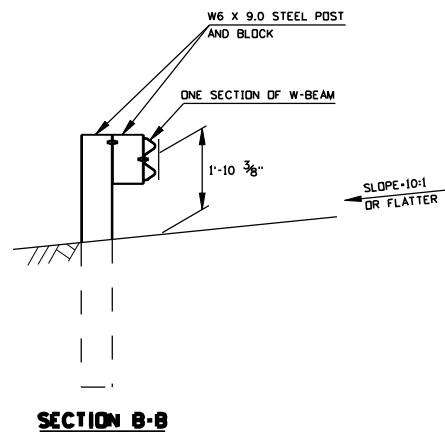
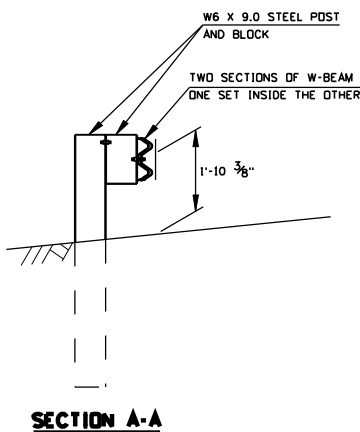
SHEET OF
BRIDGE NO.

PROJECT NUMBERS		DISTRICT	COUNTY	SHEET NO.	TOTAL
STATE	FEDERAL				



NOTES

1. THIS GUARDRAIL TRANSITION IS APPROPRIATE FOR CONNECTION TO GUARDRAIL ON BRIDGE.
2. W-BEAM IS NOT BOLTED TO POSTS AT POSTS 2 THROUGH 4 AND POST 6.
3. SEE STANDARD SHEET BR-B104 FOR ANCHOR DETAILS.
4. THERE IS NO SEPARATE PAY ITEM FOR THIS CONNECTION AND ALL COMPONENTS AS DETAILED HEREIN SHALL BE INCLUDED IN THE CONTRACT PRICE FOR GUARDRAIL.



THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B17A & B THRU BR-B42A & B, BR-B100, BR-B101, BR-B102A & B, BR-B103 AND BR-B104 AS APPLICABLE.

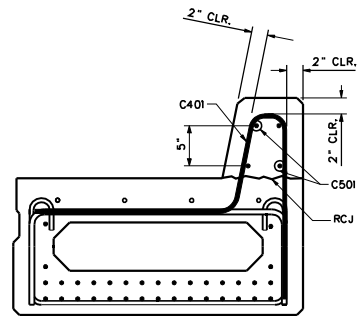
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION

APPROVED: <i>Gregory Bailey</i> DIRECTOR, ENGINEERING DIVISION	DATE: 10-25-07
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION	PREPARED: 07-02-07
PRESTRESSED CONCRETE BEAM TYPE TL-2 GUARDRAIL SYSTEMS DESIGN & ASSEMBLY DETAILS	REVIEWED:
STANDARD SHEET BR-B106	

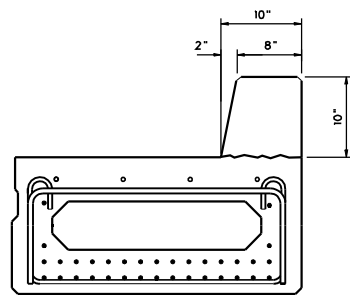
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DRAWN BY: BH/
CHECKED BY: TW/
REVIEWED BY: THB/
DATE:
SCALE:
SHEET OF
BRIDGE NO.

TYPE TL-2 GUARDRAIL TRANSITION

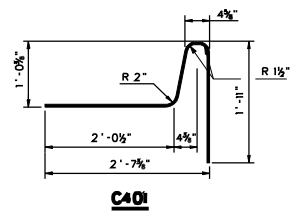
PROJECT NUMBERS		DISTRICT	COUNTY	SHEET NO.	TOTAL
STATE	FEDERAL				



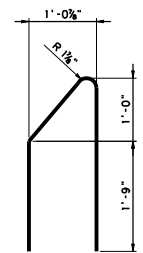
SECTION A-A



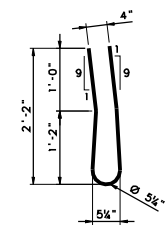
BRIDGE CURB SECTION



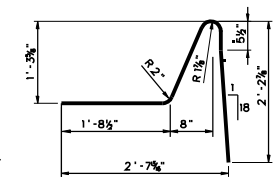
C401



P501

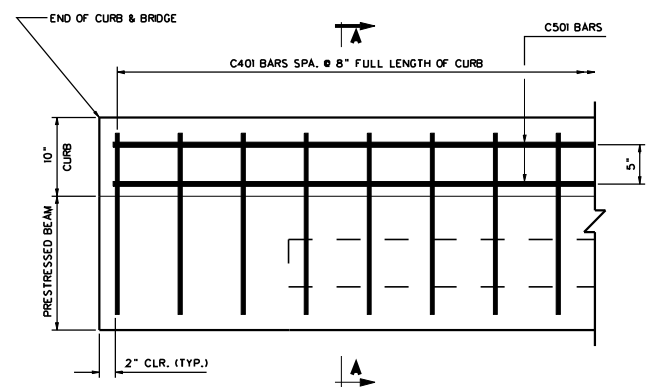


P502

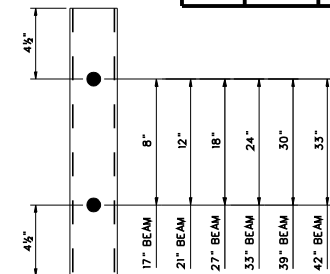


P506

CURB REINFORCING				
MARK	TYPE	NUMBER REQD	LENGTH EACH	TOTAL LENGTH
C401	BENT		10'-5"	
C501	STR	4		

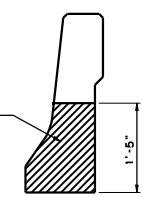


CURB REINFORCEMENT ELEVATION

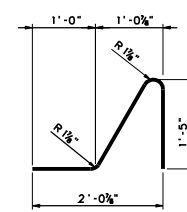


DRAIN DETAIL - ELEVATION VIEW

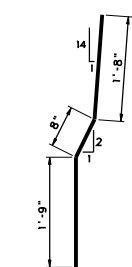
PREFORMED JOINT FILLER
"CEMENT GRAY" COLOR IS
REQUIRED



P501



P501



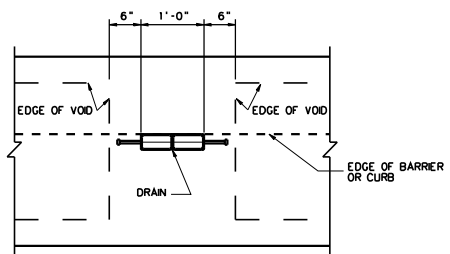
P504

VERTICAL CONTROL JOINT DETAIL

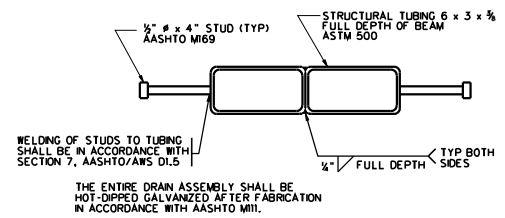
NOTES:

1. WHEN PARAPETS ARE REQUIRED, THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEET BR-B105A.
2. ALL 10" CURBS SHALL BE CONTINUOUS AND CAST-IN-PLACE.
3. ALL REINFORCING STEEL SHALL BE GRADE 60, EPOXY COATED.
4. CURB CONCRETE SHALL BE CLASS K.
5. USE OF 10" CURB ON PRECAST BOX BEAM STRUCTURES IS PERMITTED ONLY WHEN THE APPROVAL OF THE DIRECTOR OF ENGINEERING DIVISION IS OBTAINED.

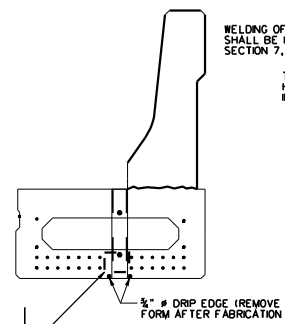
BARRIER REINFORCING				
MARK	TYPE	NUMBER REQD	LENGTH EACH	TOTAL LENGTH
P301	BENT		3'-3"	
P401	STR			
P402	STR			
P501	BENT		4'-4"	
P502	BENT		4'-9"	
P503	BENT		5'-9"	
P504	BENT		4'-2"	
P505	STR		4'-2"	



POSITION OF DRAINS



DRAIN DETAIL - PLAN VIEW



TYPICAL SECTION @ DRAIN

WHEN CONFLICT BETWEEN DRAIN CHUTE AND STRANDS OCCURS, DESIGNER SHALL REPOSITION AFFECTED STRANDS IN A MANNER TO MAINTAIN LATERAL SYMMETRY OF PATTERN AND IN A MANNER TO LEAST AFFECT ECCENTRICITY OF PATTERN.

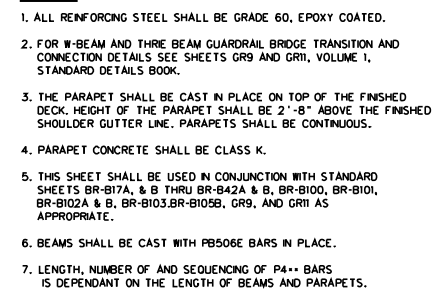
**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION**

APPROVED: _____ DIRECTOR, ENGINEERING DIVISION	DATE: 10-25-07
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION	PREPARED: 07-02-07
PRESTRESSED CONCRETE BEAM BRIDGE CURB DETAILS BARRIER/CURB REINFORCING	REVISION:
STANDARD SHEET BR-B105B	

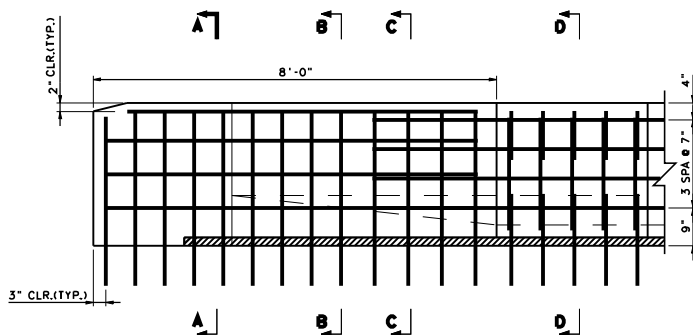
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DRAWN BY: BH/	
CHECKED BY: TW/	
REVIEWED BY: THB/	
DATE:	
SCALE:	
SHEET OF	
BRIDGE NO.	

**PRESTRESSED CONCRETE BEAM
BRIDGE CURB DETAILS
BARRIER/CURB REINFORCING**

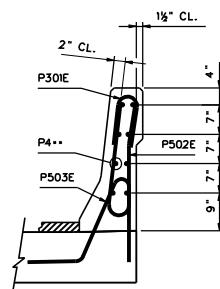
PROJECT NUMBERS		DISTRICT	COUNTY	SHEET NO.	TOTAL
STATE	FEDERAL				



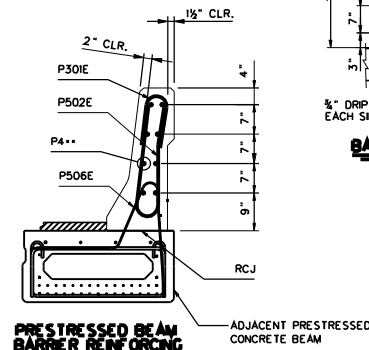
ELEVATION



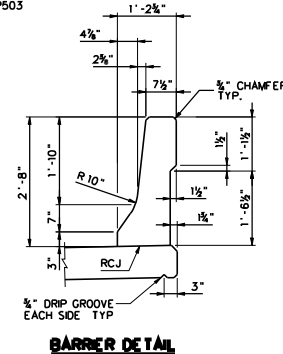
BARRIER REINFORCEMENT ELEVATION



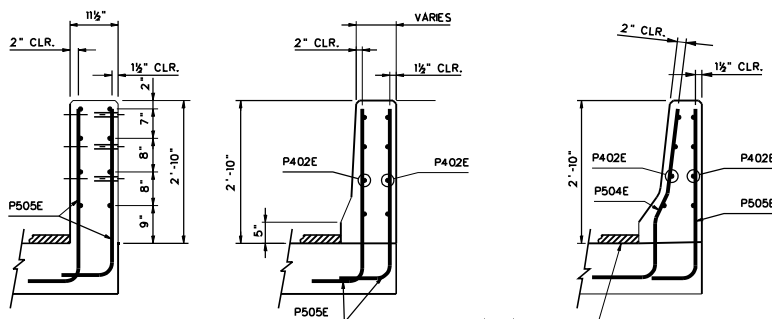
SECTION D-D



PRESTRESSED BEAM BARRIER REINFORCING



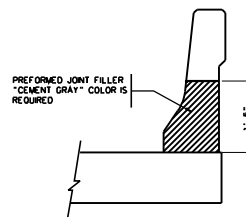
BARRIER DE TAIL



SECTION A-A

SECTION B-B

SECTION C-C



OPEN JOINT DETAIL

SPECIAL REQUIREMENT NOTE:
LENGTH OF VERTICAL LEGS OF PARAPET TO BEAM/SLAB CONNECTION BARS
P503, P504, AND P505 IS BASED ON USE OF 2" HMA AT CURB LINE.
VARIATION FROM THE 2" THICKNESS WILL REQUIRE ADJUSTMENT OF LEG
LENGTH. RELATIVE LOCATION OF BENDS AND POSITION IN BEAMS AND
PARAPET SHALL REMAIN CONSTANT.

APPROVED: _____ <div style="text-align: center; margin-top: -20px;"> DIRECTOR, ENGINEERING DIVISION </div>	DATE: <u>10-25-07</u>
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION	
PRESTRESSED CONCRETE BEAM TYPE F BARRIER DETAILS APPROACH SLAB TRANSITION	
STANDARD SHEET BR-B105A	

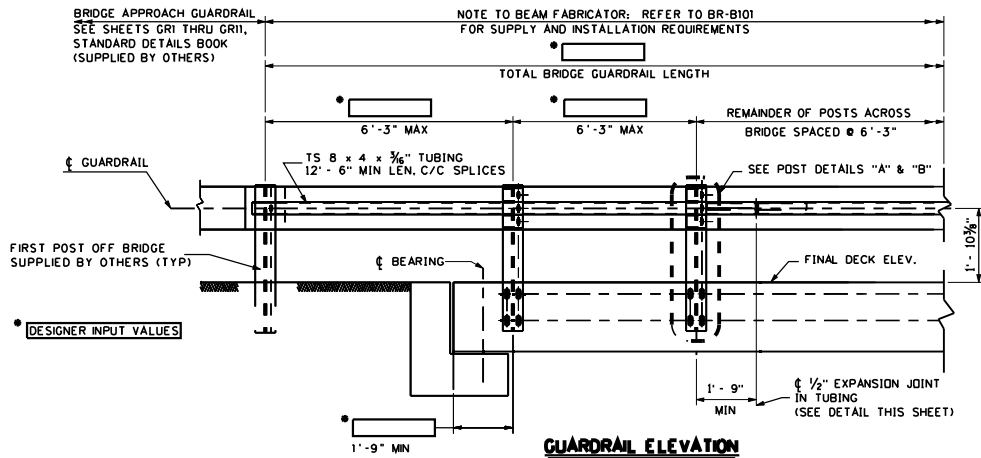
**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION**

PRESTRESSED CONCRETE BEAM
TYPE F BARRIER DETAILS
APPROACH SLAB TRANSITION

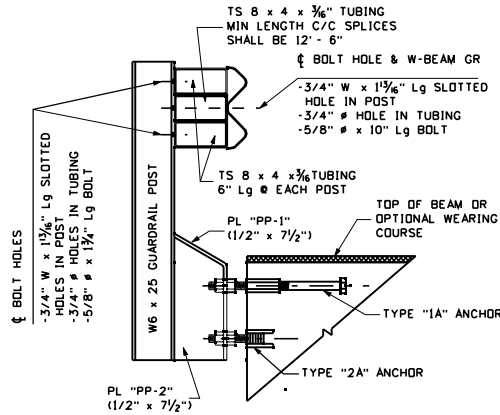
DESIGNED BY: TW/
DRAWN BY: BH/
CHECKED BY: TW/
REVIEWED BY: THB.
DATE:
SCALE:
SHEET OF
BRIDGE NO.

BRIDGE APPROACH GUARDRAIL
SEE SHEETS GR1 THRU GR11,
STANDARD DETAILS BOOK
(SUPPLIED BY OTHERS)

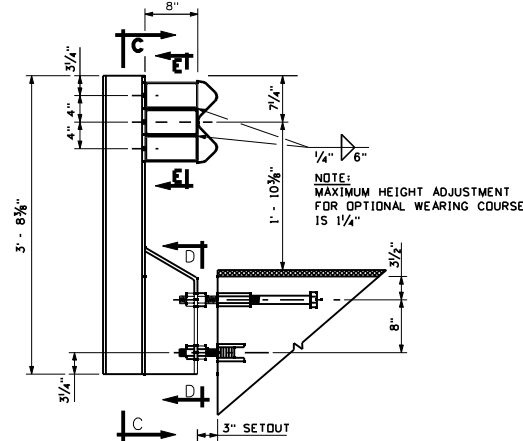
NOTE TO BEAM FABRICATOR: REFER TO BR-B101
FOR SUPPLY AND INSTALLATION REQUIREMENTS



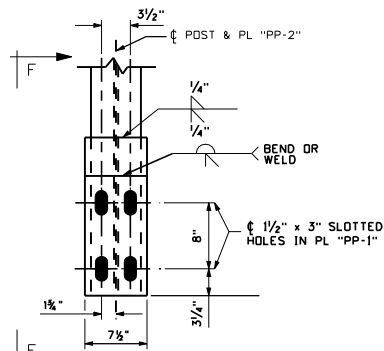
GUARDRAIL ELEVATION



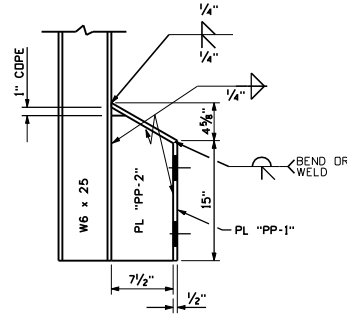
GUARDRAIL POST DETAIL 'A'



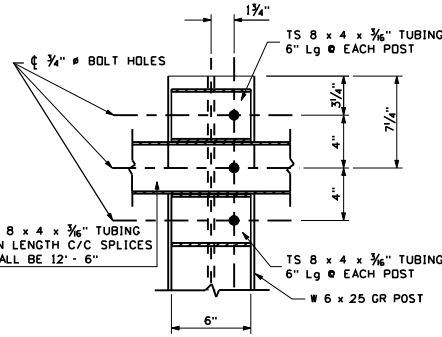
GUARDRAIL POST DETAIL 'B'



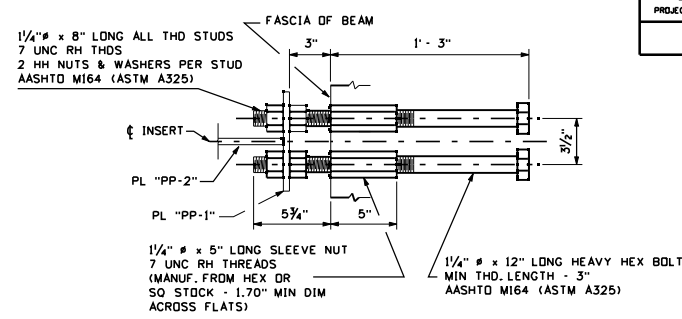
SECTION D-D



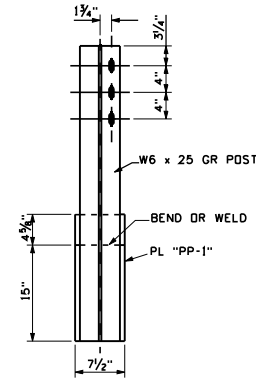
SECTION F-F



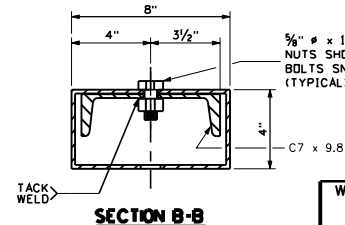
SECTION E-E



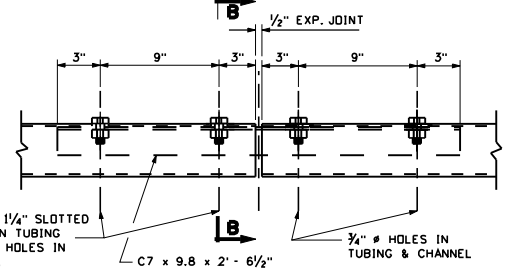
TYPE '1A' ANCHOR DETAIL



SECTION C-C



SECTION B-B

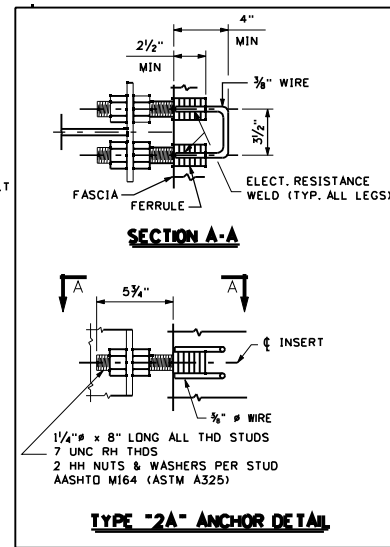


TUBING SPLICE/EXPANSION JOINT DETAIL

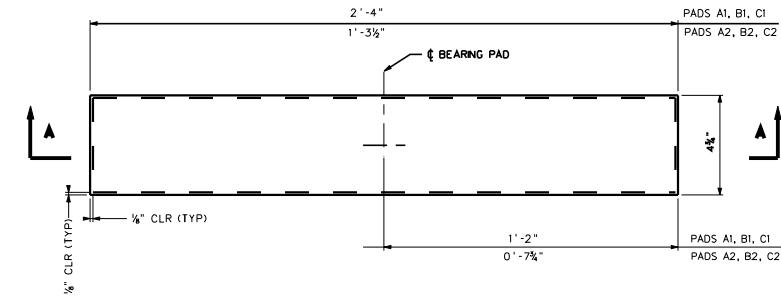
THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD
SHEETS BR-B17A & B THRU BR-B42A & B, BR-B100, BR-B101,
BR-B102A & B, AND BR-B103 AS APPLICABLE.

APPROVED: <i>[Signature]</i> DIRECTOR, ENGINEERING DIVISION	DATE: 10-25-07
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION	PREPARED: 1-14-05
PRESTRESSED CONCRETE BEAM TYPE TL-2 GUARDRAIL SYSTEM DESIGN & ASSEMBLY DETAILS	REVIEWED:
STANDARD SHEET BR-B104	

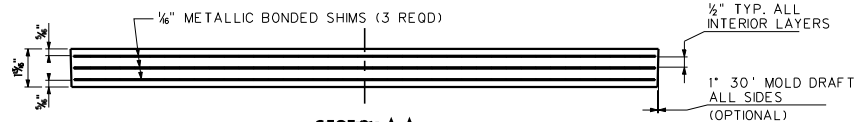
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION	
DESIGNED BY: THB/	
DRAWN BY: THB/	
CHECKED BY: TM/	
REVIEWED BY:	
DATE:	
SCALE:	
SHEET NO. OF	
BRIDGE NUMBER	



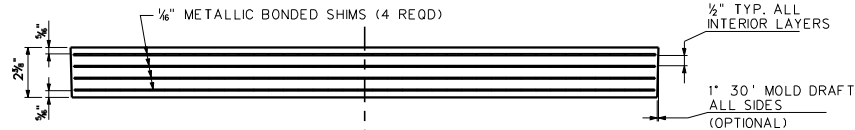
TYPE '2A' ANCHOR DETAIL



SECTION A-A
PADS A1-A2

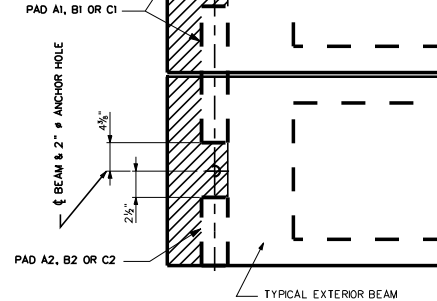


SECTION A-A
PADS B1-B2

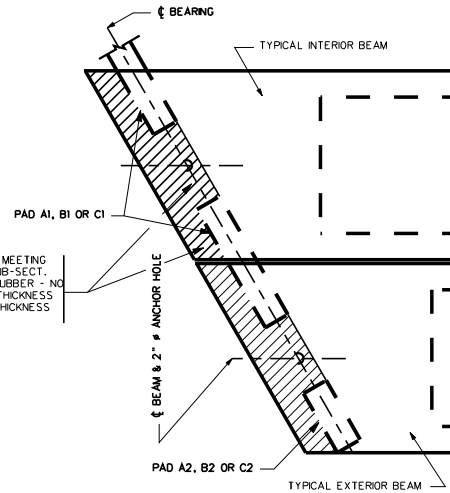


SECTION A-A
PADS C1-C2

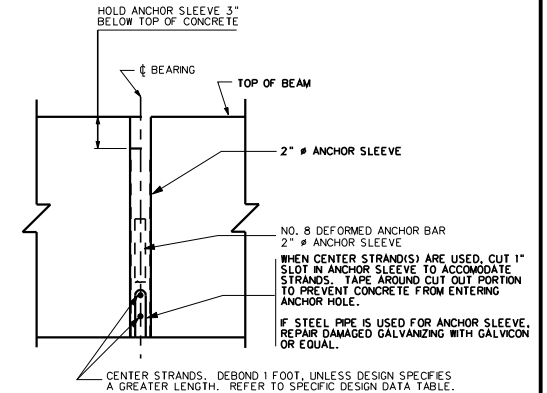
PERFORMED JOINT FILLER MEETING THE REQUIREMENTS OF SUB-SECT. 708.11 (TYPE 1 SPONGE RUBBER - NO COLOR REQUIREMENTS). THICKNESS SHALL BE BEARING PAD THICKNESS PLUS 1/4". (TYPICAL)



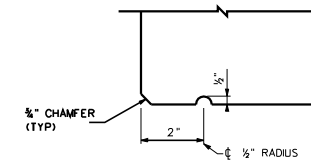
PLAN VIEW - BEARING PLACEMENT
NORMAL BEAMS



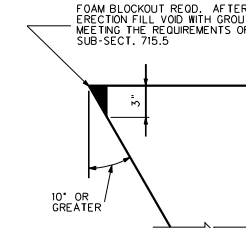
PLAN VIEW - BEARING PLACEMENT
SKEWED BEAMS



ANCHOR SLEEVE DETAIL



DRAIN GROOVE DETAIL
EXTERIOR BEAMS



SKEW BLOCKOUT DETAIL

NOTES:

- ELASTOMERIC BEARING PADS ARE DESIGNED IN ACCORDANCE WITH DESIGN METHOD B CONTAINED IN SECTION 14 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS. FABRICATION SHALL BE IN ACCORDANCE WITH SECTION 15 OF THE AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS.
- ALL BEARINGS ARE DESIGNED FOR A LOW TEMPERATURE ZONE C AND SHALL HAVE A DUROMETER HARDNESS OF 60. METALLIC REINFORCEMENT SHALL HAVE A MINIMUM YIELD STRENGTH OF 36 KSI.
- BEARING PADS ARE DESIGNED FOR ZERO BRIDGE GRADE. FOR BRIDGE GRADES GREATER THAN 5 %, PADS SHALL BE SPECIFICALLY DESIGNED FOR THE GRADE. AS AN ALTERNATE, CAST-IN-PLACE BEVELED SOLE PLATES MAY BE USED.
- DESIGNER, FABRICATOR AND ERECTOR SHALL BE AWARE THAT SKEWED END BEAMS MAY TWIST OR WARP, CAUSING UNEVEN BEAM SEATING AT THE BEARINGS. THE CONTRACTOR IS REQUIRED TO CORRECT AT THE TIME OF ERECTION, BEFORE THE BEAMS ARE SECURED IN PLACE. METHOD OF CORRECTION SHALL PROVIDE AN EVEN, TOTAL BEARING AND A LEVEL TOP BEAM SURFACE. TOLERANCE AFTER CORRECTION SHALL BE 1/8 INCH. THE FABRICATOR SHALL NOTIFY THE CONTRACTOR AND DESIGNER IF CORRECTIONS ARE REQUIRED PRIOR TO SHIPMENT.
- FOR BEAMS WITH STEPPED ENDS USE PADS A2, B2, OR C2 ON BOTH SIDES OF EACH BEAM.
- ELASTOMERIC BEARING PADS SHALL BE INCLUDED IN THE PRICE OF THE BEAMS.
- THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B17A & B THRU BR-B42A & B, BR-B100, BR-B101, BR-B102A, BR-B103, BR-B104, BR-B105A & B AND BR-106 AS APPROPRIATE.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION**

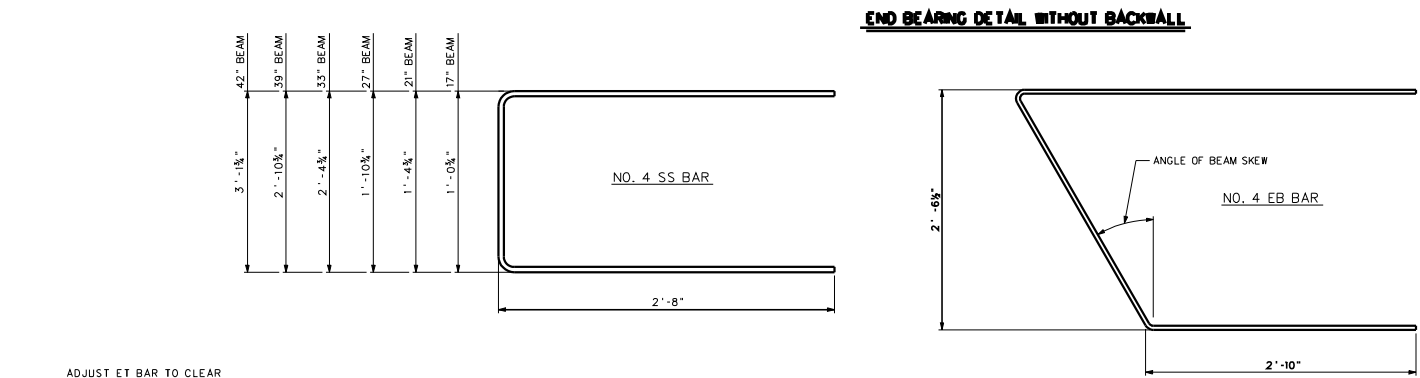
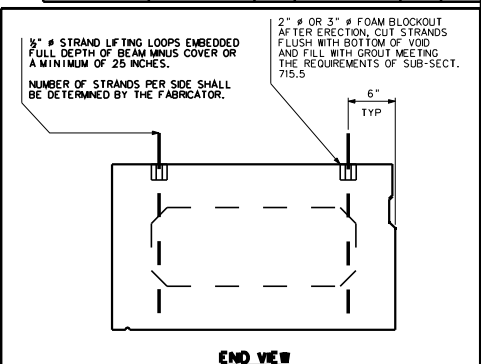
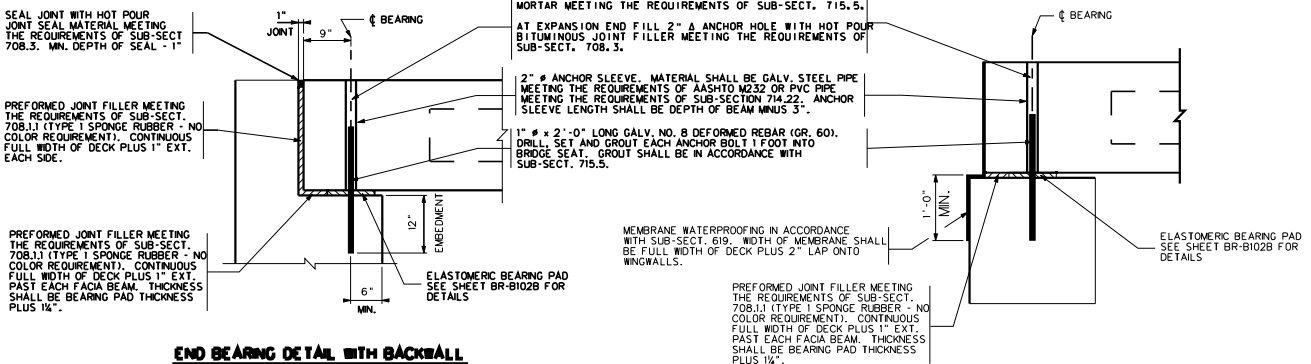
APPROVED: <i>Gregory Bailey</i> DIRECTOR, ENGINEERING DIVISION	DATE: 10-25-07
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION	PREPARED: 07-02-07
PRESTRESSED CONCRETE BEAM ELASTOMERIC BEARING PAD DETAILS MSC. DESIGN AND ASSEMBLY DETAILS	REVIEWED:
STANDARD SHEET BR-B102B	

DESIGNED BY: THB/
DRAWN BY: THB/
CHECKED BY: TM/
REVIEWED BY: THB/
DATE:
SCALE:
SHEET OF BRIDGE NO.

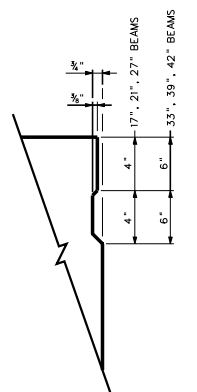
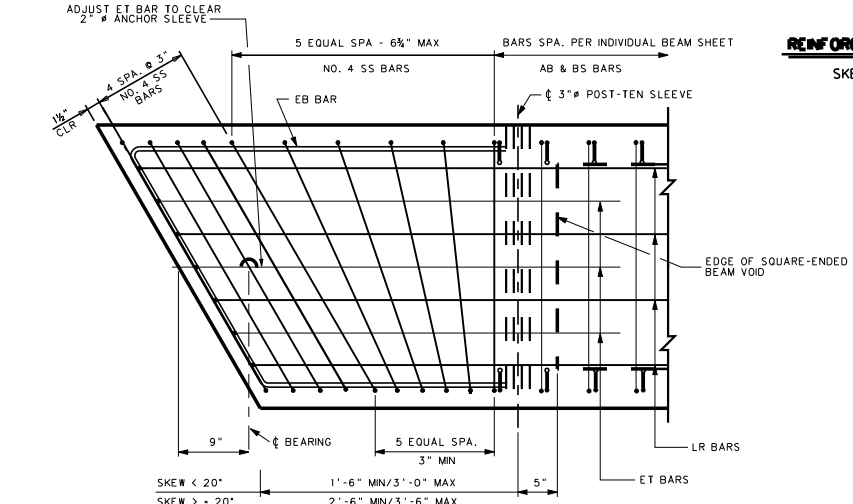
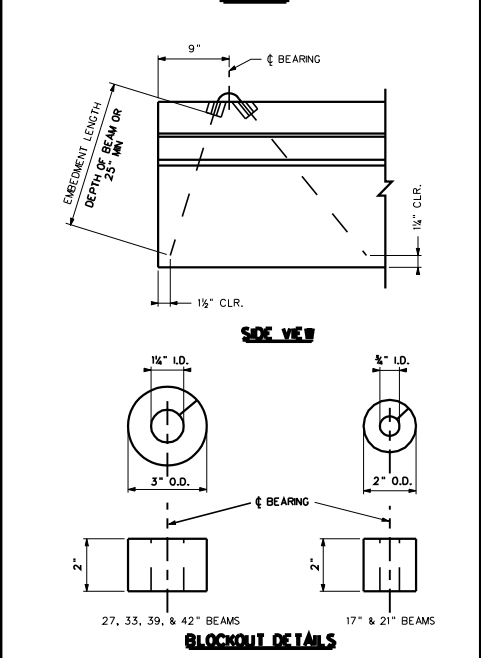
**PRESTRESSED CONCRETE BEAM
ELASTOMERIC BEARING PAD DETAILS
MSC. DESIGN AND ASSEMBLY DETAILS**

BOX BEAM BEARING PAD CONTROL DIMENSIONS								
PAD	LENGTH	WIDTH	HEIGHT	NO. SHIMS	SHIM SIZE	SPAN RANGES	MAXIMUM REACTION	MAXIMUM MOVEMENT ONE DIRECTION
A1	4 1/2"	28"	1 1/4"	2	1/4" x 4 1/2" x 2'-3 1/2"	20' - 38'	55 KIPS	0.39"
B1	4 1/2"	28"	1 1/2"	3	1/4" x 4 1/2" x 2'-3 1/2"	40' - 78'	75 KIPS	0.80"
C1	4 1/2"	28"	2 1/4"	4	1/4" x 4 1/2" x 2'-3 1/2"	80' - 100'	89 KIPS	1.02"
A2	4 1/2"	15 1/2"	1 1/4"	2	1/4" x 4 1/2" x 1'-3 1/2"	20' - 38'	28 KIPS	0.39"
B2	4 1/2"	15 1/2"	1 1/2"	3	1/4" x 4 1/2" x 1'-3 1/2"	40' - 78'	38 KIPS	0.80"
C2	4 1/2"	15 1/2"	2 1/4"	4	1/4" x 4 1/2" x 1'-3 1/2"	80' - 100'	45 KIPS	1.02"

STATE	FEDERAL	STATE	COUNTY	SHEET	TOTAL
PROJECT NUMBER	PROJECT NUMBER	DIST. NO.		NO.	SHEETS



LIFTING DETAILS



APPROVED: *Gregory Bailey* DATE: 10-25-07
DIRECTOR, ENGINEERING DIVISION

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

PREPARED: 07-02-07

REVIEWED:

PRESTRESSED CONCRETE BEAM
SKEWED END REINFORCING
MISC.DESIGN AND ASSEMBLY DETAILS

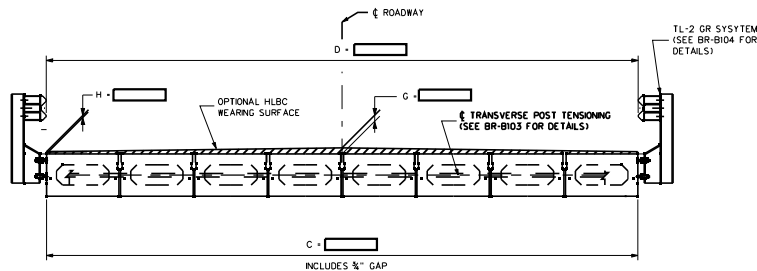
STANDARD SHEET BR-B102A

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

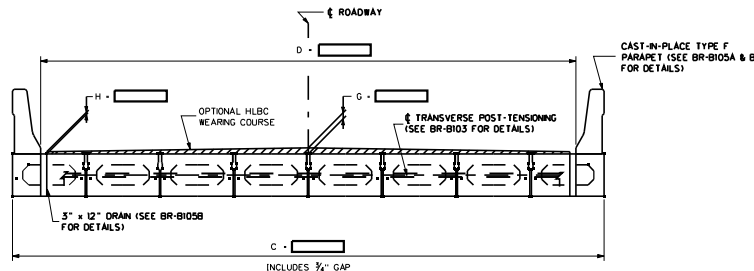
DESIGNED BY: THB/
DRAWN BY: THB/
CHECKED BY: TM/
REVIEWED BY: TW/
DATE:
SCALE:
SHEET OF
BRIDGE NO.

PRESTRESSED CONCRETE BEAM
SKEWED END REINFORCING
MISC.DESIGN AND ASSEMBLY DETAILS

THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B17A & B THRU BR-B42A & B, BR-B100, BR-B101, BR-B102B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPROPRIATE.



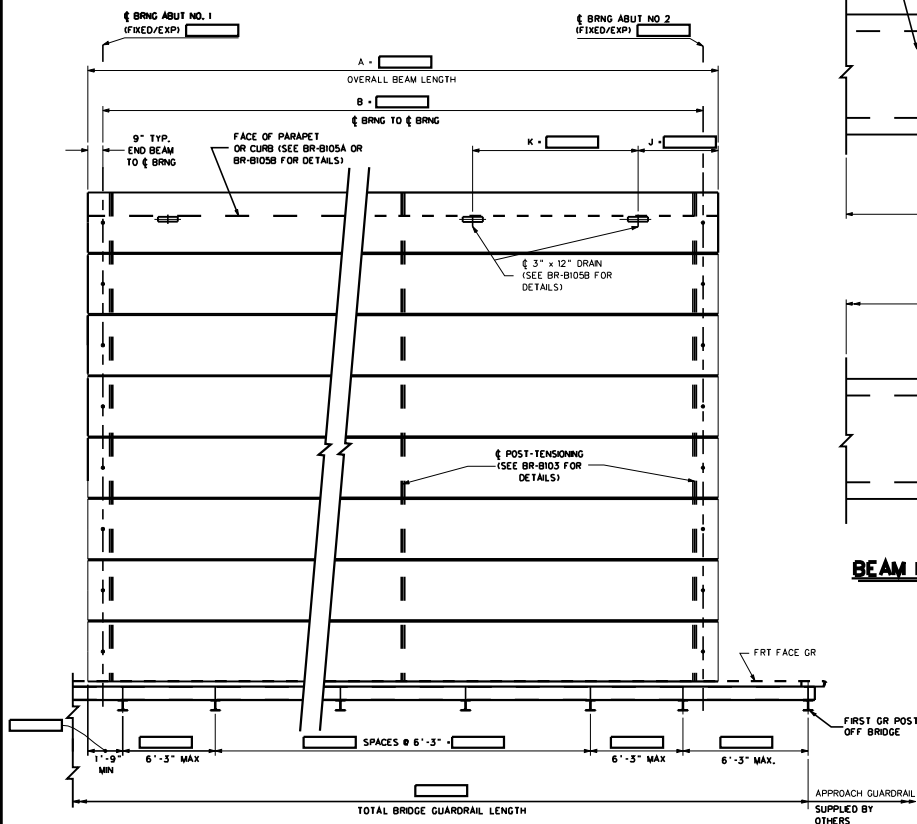
TYPICAL CROSS-SECTION WITH GUARDRAIL



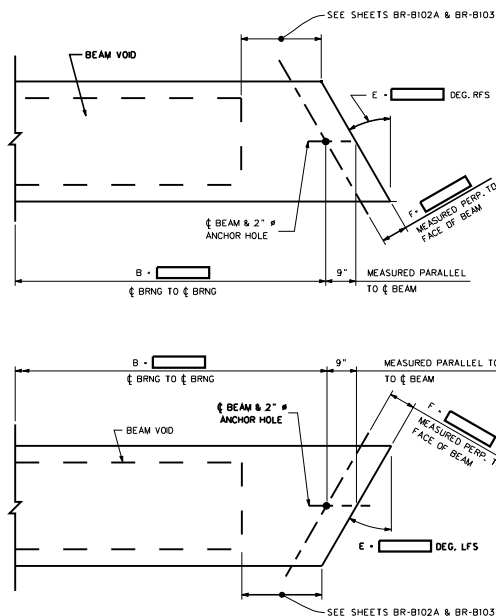
TYPICAL CROSS-SECTION WITH PARAPET OR CURB

STATE	FEDERAL	STATE	COUNTY	SHEET	TOTAL
PROJECT NUMBER	PROJECT NUMBER	DIST. NO.		NO.	SHEETS

CONTROL DIMENSIONS		
DESCRIPTION	CODE	VALUE
OVERALL BEAM LENGTH	A	
SPAN LENGTH, ϕ BEARING TO ϕ BEARING	B	
SUPERSTRUCTURE WIDTH - OUT TO OUT	C	
ROADWAY WIDTH - FACE GR/PARAPET TO FACE GR/PARAPET	D	
NUMBER OF BEAMS REQUIRED	—	
BEAM SIZE (WIDTH x DEPTH)	—	
SKEW ANGLE (NORMAL, DEG. RFS OR DEG. LFS)	E	
PERPENDICULAR DISTANCE FROM FACE OF BEAM TO ϕ BEARING	F	
HLBC WEARING COURSE REQUIRED (YES/NO)	—	
THICKNESS OF WEARING COURSE ϕ ϕ OF DECK OR ROADWAY	G	
THICKNESS OF WEARING COURSE ϕ EDGE OF DECK OR PARAPET	H	
TL-2 BRIDGE GUARDRAIL SYSTEM REQUIRED (YES/NO)	—	
FABRICATOR TO SUPPLY TL-2 BRIDGE GUARDRAIL (YES/NO)	—	
FABRICATOR TO INSTALL BRIDGE GUARDRAIL, PRIOR TO SHIPMENT (YES/NO) (IF NO, FABRICATOR TO SHIP LOOSE)	—	
NUMBER OF GUARDRAIL POST INSERTS REQUIRED PER SIDE	—	
TYPE F PARAPET REQUIRED (YES/NO)	—	
DRAINS REQUIRED (YES/NO)	—	
NUMBER OF DRAINS REQUIRED PER SIDE	—	
10" CURB REQUIRED (YES/NO)		



DECK PLAN VIEW



BEAM PLAN VIEW - SKEWED ENDS

ESTIMATE OF QUANTITIES

ITEM NO.	DESCRIPTION	UNITS	QUANTITY
60306	PRESTRESSED CONCRETE BOX BEAM	LF	

NOTES:

- WHEN BRIDGE GUARDRAIL IS TO BE SUPPLIED BY THE BEAM FABRICATOR, COST OF ALL BRIDGE GUARDRAIL ITEMS TO INCLUDE POSTS, RAIL ELEMENTS, ATTACHMENT HARDWARE, AND MISCELLANEOUS ITEMS NEEDED TO COMPLETELY INSTALL BRIDGE GUARDRAIL SHALL BE INCLUDED IN ITEM 60306 "PRESTRESSED CONCRETE BOX BEAM."
- THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B17A & B THRU BR-B42A & B, BR-B100, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106.

APPROVED: James B. Bell DATE: 10-25-07
DIRECTOR, ENGINEERING DIVISION

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

PREPARED: 07-02-07
REVIEWED: _____

DESIGN AND ASSEMBLY NOTES

STANDARD SHEET BR-B101

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

DESIGNED BY: BYT/M
DRAWN BY: BYT/M
CHECKED BY: BYT/M
REVIEWED BY: BYT/M
DATE: _____
SCALE: _____
SHEET NO. OF _____
BRIDGE NUMBER _____

PRESTRESSED CONCRETE BEAM
DESIGN & ASSEMBLY NOTES

STATE	FEDERAL	STATE	COUNTY	SHEET	TOTAL
PROJECT NUMBER	PROJECT NUMBER	DIST. NO.		NO.	SHEETS

GOVERNING SPECIFICATIONS

THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES, ADOPTED [REDACTED] AS AMENDED BY THE CURRENT SUPPLEMENTAL SPECIFICATIONS. THE CONTRACT PLANS AND CONTRACT SPECIAL PROVISIONS ARE THE GOVERNING PROVISIONS APPLICABLE TO THIS PROJECT.

ALL BEAMS ARE DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, DATED 1998 AS AMENDED BY THE 2003 INTERIM SPECIFICATIONS.

DESIGN NOTES

ALL STANDARD ADJACENT PRESTRESSED CONCRETE BRIDGE BEAMS ARE DESIGNED TO MEET THE FOLLOWING CRITERIA:

1. DESIGN LOADS:

HL-93 LIVE LOAD IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

FUTURE WEARING SURFACE OF 50 PSF OF ROADWAY.

TYPE F PARAPET WEIGHING 321 PLF.

DIAPHRAGM DEAD LOAD, NUMBER REQUIRED BASED ON 15'-0" MAX. SPACING.

2. TWO LANE BRIDGE WITH AN OVERALL WIDTH OF 24'-5" (INCL. 3/4" GAP BETWEEN ADJ. BEAMS), A CURB-TO-CURB WIDTH OF 22'-1", TRANSVERSE POST-TENSIONING, AND ZERO SKEW.

3. DESIGN STRENGTH AND UNIT STRESSES:

MINIMUM CONCRETE STRENGTH @ STRAND RELEASE ———— 6000 PSI
MINIMUM CONCRETE STRENGTH @ 28 DAYS ———— 8000 PSI

TEMPORARY STRESS LIMITS IN CONCRETE BEFORE LOSSES:

COMPRESSION STRESS LIMIT @ STRAND RELEASE ———— - 3600 PSI
TENSION STRESS LIMIT @ STRAND RELEASE ———— -200 PSI

COMPRESSIVE STRESS LIMITS IN CONCRETE @ SERVICE I AFTER LOSSES:

@ FINAL I (PS-DL-LL) ———— 4800 PSI
@ FINAL 2 (PS-DL) ———— 3600 PSI
@ FINAL 3 (50%PS-DL-LL) ———— 3200 PSI

TENSILE STRESS LIMIT IN CONCRETE @ SERVICE III AFTER LOSSES:

@ FINAL I (PS-DL-LL) ———— -270 PSI

TENSION STRESS LIMIT PRIOR TO TRANSFER: ———— - 202.5 KSI

TENSION STRESS LIMIT AFTER ALL LOSSES: ———— 194.4 KSI

4. DEBONDING OR SHIELDING OF STRANDS TO REDUCE TEMPORARY TENSILE STRESSES IS PERMITTED, HOWEVER DEBONDING IS LIMITED TO 40% PER ROW AND 25% TOTAL. IN NO INSTANCES SHALL OUTER STRANDS BE DEBONDED. DEBONDED STRANDS SHALL BE SEPARATED BY AT LEAST ONE FULLY BONDED STRAND AND SHALL BE SYMMETRICAL ABOUT THE C OF THE BEAM.

SHIELDING OF STRANDS SHALL BE ACCOMPLISHED BY TAPING OR TIGHT FITTING PLASTIC TUBES TAPED AT EACH END.

5. THE ELASTOMERIC BEARING PADS PROVIDED IN THE STANDARD DESIGNS ARE BASED ON ZERO GRADE AND ARE LIMITED TO A MAXIMUM OF 5% GRADE. IN INSTANCES OF GRADES EXCEEDING THIS LIMIT, PADS SHALL BE SPECIFICALLY DESIGNED. INDIVIDUAL PAD DESIGNS SHALL BE IN ACCORDANCE WITH SECTION 14, AASHTO LRFD. BEVELED SOLE PLATES ARE PERMITTED.

6. MAXIMUM BEAM SKEW SHALL BE 30 DEGREES.

7. WHEN ALTERNATE DESIGNS OR SITE SPECIFIC DESIGNS ARE PROVIDED, CRITERIA SET FORTH IN THESE STANDARDS SHALL APPLY.

8. NEGATIVE DESIGN CAMBER AFTER ALL LOSSES IS NOT PERMITTED.

9. EACH BEAM PROVIDED IN THESE STANDARD DESIGNS HAS BEEN LOAD RATED IN ACCORDANCE WITH SECTION 3.15 OF THE WEST VIRGINIA DIVISION OF HIGHWAYS BRIDGE DESIGN MANUAL, 2004. ADDITIONALLY, LOAD RATING PROCEDURES ARE IN ACCORDANCE WITH THE AASHTO MANUAL FOR CONDITION EVALUATION AND LOAD AND RESISTANCE FACTOR RATING OF HIGHWAY BRIDGES, 2003.

LAP SPlice TABLE				
BAR SIZE	NO. 3	NO. 4	NO. 5	NO. 6
SPlice LEN.	21"	28"	34"	41"

THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B17A & B THRU BR-B42A & B, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPLICABLE.

MATERIALS & FABRICATION NOTES

* THE PRESTRESSED CONCRETE BEAMS SHALL CONFORM TO ALL APPLICABLE PROVISIONS OF SECTION 603 OF THE STANDARD SPECIFICATIONS.

MILD REINFORCEMENT:

* ALL MILD REINFORCING STEEL SHALL BE GRADE 60, DEFORMED BILLET STEEL AND SHALL BE EPOXY COATED EXCEPT WHERE NOTED. ALL UNCOATED REINFORCING SHALL MEET THE REQUIREMENTS OF AASHTO M31. ALL EPOXY COATED REINFORCING SHALL MEET THE REQUIREMENTS OF AASHTO M284, EXCEPT WHERE AMENDED BY SECTION 709.1 OF THE STANDARD SPECIFICATIONS.

* ALL TENSION LAP SPLICES SHALL BE A CLASS B, CONTACT TYPE. MINIMUM LAP SPlice LENGTHS SHALL BE AS GIVEN IN THE "LAP SPlice TABLE", THIS SHEET. ADDITIONALLY, IF LAP SPlicing OF ET, LR, AND BT BARS IS USED, TERMINATION OF THE SPlice SHALL BE NO CLOSER TO THE END OF THE BEAM THAN 1/10 OF THE SPAN LENGTH.

* MINIMUM BAR BENDING DIAMETER SHALL BE 6 BAR DIAMETERS, EXCEPT THAT NO. 4 AB BARS MAY HAVE A MINIMUM BEND DIAMETER OF 4 BAR DIAMETERS.

* MINIMUM CONCRETE COVER SHALL BE AS SPECIFIED IN SECTION 603.5 OF THE STANDARD SPECIFICATIONS, EXCEPT WHERE NOTED ON THE PLANS.

PRESTRESSING STRAND:

* ALL PRESTRESSING STEEL SHALL BE 1/2" #, GRADE 270, 7 WIRE UNCOATED, LOW-RELAXATION STRAND MEETING THE REQUIREMENTS OF AASHTO M203, SUPPLEMENT S1.

* ALL BEAMS DESIGNED IN THESE STANDARDS UTILIZE STRANDS WITH A NOMINAL AREA OF 0.167 SQ. IN. STRANDS WITH A NOMINAL AREA OF 0.153 SQ. IN. IS PERMITTED FOR INDIVIDUAL OR ALTERNATE DESIGNS. HOWEVER THE DESIGNER IS ENCOURAGED TO USE THE LARGER STRAND FOR UNIFORMITY REASONS. IN NO CASES WILL STRESS-RELIEVED STRAND BE PERMITTED.

* ALL STRANDS SHALL BE ENCLOSED INSIDE THE STIRRUP CAGE FOR THE FULL LENGTH OF THE BEAM.

* ALL EXPOSED PRESTRESSING STRAND AT EACH BEAM END SHALL BE SHOP COATED WITH A LIQUID COLD-APPLIED BITUMINOUS ELASTOMERIC WATERPROOFING MEMBRANE. MATERIAL SHALL MEET ASTM C836-84.

CONCRETE:

* ALL CONCRETE USED IN MANUFACTURING PRESTRESSED CONCRETE BEAMS SHALL MEET THE REQUIREMENTS OF SECTION 603.6 OF THE STANDARD SPECIFICATIONS. DESIGN STRENGTHS SHALL MEET OR EXCEED THE MINIMUM VALUES SET FORTH IN THESE PLANS.

* ALL CONCRETE USED IN PARAPETS AND CURBS SHALL BE CLASS K CONCRETE.

ELASTOMERIC BEARING PADS:

* ALL BEARING PADS SHALL MEET THE APPLICABLE REQUIREMENTS AS SET FORTH IN SECTION 18.2 OF THE AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS, 1998 EDITION WITH CURRENT INTERIMS. ALL BEARINGS SHALL BE STEEL REINFORCED LAMINATED BEARINGS.

* THE ELASTOMER MATERIAL SHALL BE 60 DUROMETERS WITH A MINIMUM LOW TEMPERATURE GRADE OF 3 (ZONE C).

* ALL STEEL REINFORCING SHALL MEET THE REQUIREMENTS OF AASHTO M270, GRADE 36.

GUARDRAIL, GUARDRAIL POSTS, TUBING & INSERTS:

* ALL W-BEAM GUARDRAIL AND ATTACHMENT HARDWARE SHALL BE IN ACCORDANCE WITH SECTION 712.4 OF THE STANDARD SPECIFICATIONS. GUARDRAIL POSTS, STRUCTURAL TUBING, POST ATTACHMENT INSERTS, AND HARDWARE SHALL MEET THE LISTED MATERIAL AND COATING SPECIFICATIONS:

ITEM	DESCRIPTION	MATERIAL SPEC.	COATING SPEC.
POST	W6x25	AASHTO M270, GR 36	AASHTO M111
PLATE	1/2" x 7"	AASHTO M270, GR 36	AASHTO M111
TUBING	TS 8x4x3/16	ASTM A500, GR B	AASHTO M111
CHANNEL	C7x9.8	AASHTO M270, GR 36	AASHTO M111
FERRULE	TYPE 2A ANCHOR	ASTM A108 (11L17 STEEL)	AASHTO M232
WIRE		ASTM A510 (1018 STEEL)	AASHTO M232
STUDS	1/4" # x 8" LONG	ASTM A108 (1045 C.D. STEEL)	AASHTO M232
NUTS	1/4" #	AASHTO M291, CLASS C	AASHTO M232
COUPLERS	TYPE 1A ANCHOR	ASTM A108 (12L14 STEEL)	AASHTO M232
BOLTS		AASHTO M164 (TYPE I, HH)	AASHTO M232
BOLTS	1/4" # x 12" LONG	AASHTO M164 (TYPE I, HH)	AASHTO M232
NUTS	3/8" # x ALL LEN.	AASHTO M164 (TYPE I, HH)	AASHTO M232
NUTS	3/8" #	AASHTO M291, CLASS C	AASHTO M232
WASHERS	ALL	AASHTO M293	AASHTO M232

WELDING:

* TACK WELDING OF REINFORCEMENT IS NOT PERMITTED. REINFORCING CAGES AND LONGITUDINAL STEEL SHALL BE ADEQUATELY TIED WITH APPROVED MEANS TO PREVENT RACKING AND MISALIGNMENT.

* ALL WELDING OF FABRICATED ITEMS, AS SHOWN IN THESE PLANS SHALL BE IN ACCORDANCE WITH ALL APPLICABLE PROVISIONS OF AASHTO/AWS D1.5, 2002.

POST-TENSIONING BARS:

* POST - TENSIONING THREAD BARS SHALL BE ONE INCH DIAMETER, 150 KSI STEEL, AND SHALL CONFORM TO AASHTO M275, TYPE II. STEEL THREAD BARS SHALL BE DESIGNED TO ALLOW THE USE OF HEAVY HEX NUTS AND COUPLERS THAT THREAD ONTO THE END OF THE DEFORMATIONS. HEAVY HEX NUTS AND COUPLERS SHALL BE OF A DESIGN AND MATERIAL RECOMMENDED BY THE BAR MANUFACTURER TO DEVELOP THE FULL TENSILE STRENGTH OF THE BAR. PROPERLY DOCUMENTED CERTIFIED MILL TEST REPORTS SHALL BE PROVIDED FOR EACH HEAT OF STEEL THREAD BARS.

* ALL POST-TENSIONING THREAD BARS, NUTS, BEARING PLATES, COUPLERS, AND ANCILLARY HARDWARE SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH AASHTO M111. THE GALVANIZING PLANT SHALL ADMINISTER ADEQUATE QUALITY CONTROL MEASURES TO SAFEGUARD AGAINST HYDROGEN EMBRITTLEMENT. QUALITY CONTROL MEASURES SHALL COMPLY WITH ASTM A-143. CERTIFICATION FOR HOT-DIP GALVANIZING SHALL BE PROVIDED BY THE GALVANIZING PLANT.

* ALL POST-TENSIONING BEARING PLATES SHALL CONFORM TO AASHTO M270, GRADE 36.

SHEAR KEY GROUT:

* SHEAR KEY GROUT SHALL BE A GROUT THAT IS RECOMMENDED BY THE MANUFACTURER FOR A POURABLE GROUT APPLICATION AND THAT BASED ON THE MANUFACTURER'S TEST DATA WILL ATTAIN A MINIMUM OF 4500 PSI COMPRESSIVE STRENGTH IN 3 DAYS UNDER CONDITIONS REPRESENTATIVE OF THE CONDITIONS TO BE EXPERIENCED AT THE SITE. THE GROUT MUST BE LISTED ON THE APPROVED LIST OF GROUTS PUBLISHED BY THE WEST VIRGINIA DIVISION OF HIGHWAYS, MATERIALS CONTROL, SOIL AND TESTING DIVISION. THE CONTRACTOR SHALL PRE-TEST THE PROPOSED GROUT FOR COMPRESSIVE STRENGTH AT 3 AND 7 DAYS AND SUBMIT THE RESULTS TO THE BRIDGE PROJECT MANAGER FOR APPROVAL PRIOR TO INSTALLATION OF THE GROUT IN THE STRUCTURE. THE TESTS WILL BE BASED ON A POURABLE CONSISTENCY WITH THE SAME WATER/GROUT MIXTURE RATIO TO BE USED IN THE STRUCTURE.

* THE CONTRACTOR SHALL BE REQUIRED TO SUBMIT FOR EACH PROJECT, THE GROUT PRE-TEST RESULTS OBTAINED IN THE NOTE ABOVE. THE CONTRACTOR SHALL BE REQUIRED TO PERFORM A NEW PRE-TEST AND SUBMISSION FOR APPROVAL UNDER ANY OF THE FOLLOWING CONDITIONS:

- * A PERIOD OF 18 MONTHS HAS ELAPSED SINCE LAST PRE-APPROVAL TESTING.
- * GROUT MANUFACTURER HAS REVISED OR CHANGED THE GROUT SPECIFICATIONS.
- * THE CONTRACTOR ALTERS THE WATER/GROUT MIXTURE RATIO.
- * THE CONTRACTOR CHANGES GROUT MANUFACTURER.

* THE CONTRACTOR IS REQUIRED TO COMPLETE THE GROUT STRENGTH TABLE ON BR-B103.

* TEST PROCEDURE FOR DETERMINING THE COMPRESSIVE STRENGTH OF GROUT SHALL USE CUBE SPECIMENS IN ACCORDANCE WITH ASTM C109, AS MODIFIED BY ASTM C1107. GROUT TESTING IN ACCORDANCE WITH AASHTO T23 (STANDARD CYLINDER TEST) IS NOT ACCEPTABLE.

PROTECTIVE SURFACE TREATMENT:

* EACH PRESTRESSED CONCRETE BEAM SHALL BE TREATED BY THE MANUFACTURER AT THE FABRICATION PLANT WITH AN APPROVED CONCRETE SEALER (SILANE). AN APPROVED LIST OF CONCRETE SEALERS ARE ON FILE AT THE WEST VIRGINIA DIVISION OF HIGHWAYS, MATERIALS CONTROL, SOIL AND TESTING DIVISION. COVERAGE SHALL INCLUDE TOP AND BOTTOM OF INTERIOR BEAMS, AND TOP, BOTTOM AND EXTERIOR SIDE OF EXTERIOR BEAM. APPLICATION RATE SHALL BE PER TREATMENT MANUFACTURER'S RECOMMENDATION.

* AFTER COMPLETION OF THE SILANE TREATMENT BY FABRICATOR AND A MAXIMUM OF FIVE WORKING DAYS PRIOR TO SHIPMENT OF THE BEAMS, THE FABRICATOR SHALL BE RESPONSIBLE FOR ABRASIVE BLAST CLEANING TO CLEAN WHITE CONCRETE THE INTERIOR SIDES OF BEAMS FOR THE FULL LENGTH. CLEAN WHITE CONCRETE SHALL MEAN REMOVAL OF ALL DIRT, GREASE, OIL, AND LOOSE CONCRETE LAITANCE AND PROVIDE A ROUGHENED CONCRETE SURFACE. BLASTING MEDIUM SHALL BE APPROVED BY THE DIVISION OF HIGHWAYS.

SHOP DRAWINGS:

THE FABRICATOR SHALL BE RESPONSIBLE FOR THE PREPARATION OF SHOP DRAWINGS IN ACCORDANCE WITH THE WEST VIRGINIA DIVISION OF HIGHWAYS DOCUMENTS, DO-102 AND THE STANDARD SPECIFICATIONS. ADDITIONAL INFORMATION IS PROVIDED IN SECTION 7 OF THE BRIDGE DESIGN MANUAL. SHOP DRAWINGS SHALL INCLUDE THE FABRICATOR'S DETENSIONING PLAN.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION		PREPARED 07-02-07
PRESTRESSED CONCRETE BEAM		REVIEW
DESIGN & ASSEMBLY NOTES		
STANDARD SHEET BR-B100		

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION		DESIGNED BY:THB/
		DRAWN BY:THB/
		CHECKED BY:THB/
		REVIEWED BY:THB/
		DATE:
		SCALE:
PRESTRESSED CONCRETE BEAM		SHEET NO. OF
DESIGN & ASSEMBLY NOTES		BRIDGE NUMBER

DESIGN DATA FOR 42" DEPTH ADJACENT BOX BEAM

SPAN LENGTH $\frac{1}{2}$ TO $\frac{1}{2}$ BEARING	76'-0"	78'-0"	80'-0"	82'-0"	84'-0"	86'-0"	88'-0"	90'-0"	92'-0"	94'-0"	96'-0"	98'-0"	100'-0"		
OVERALL LENGTH OF BEAM	77'-6"	79'-6"	81'-6"	83'-6"	85'-6"	87'-6"	89'-6"	91'-6"	93'-6"	95'-6"	97'-6"	99'-6"	101'-6"		
NO. OF 270 KSI, $\frac{1}{2}$ " ϕ LOW-RELAXATION STRANDS, AREA/STRAND \times 0.167 SQ. IN.	18	20	20	22	22	22	24	24	26	26	28	28	30		
STRAND POSITION NUMBER	ROW 1	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,3,4,7,8,11,12,13,14	1,2,3,4,7,8,11,12,13,14	1,2,3,4,7,8,11,12,13,14	1,2,3,4,7,8,11,12,13,14	1,2,3,4,5,6,9,10,11,12,13,14	1,2,3,4,5,6,9,10,11,12,13,14	1,2,3,4,5,6,9,10,11,12,13,14	1,2,3,4,5,6,9,10,11,12,13,14	1 THRU 14		
	ROW 2	15,16,21,22,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28	15,16,17,18,21,22,25,26,27,28	15,16,17,18,21,22,25,26,27,28	15,16,17,18,21,22,25,26,27,28	15,16,17,18,20,23,24,25,26,27,28	15,16,17,18,20,23,24,25,26,27,28	15,16,17,18,19,20,23,24,25,26,27,28		
	ROW 3	31,32	31,32	31,32	31,32	31,32	31,32	31,32	31,32	31,32	31,32	31,32	31,32		
	ROW 4	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34		
PRESTRESSING FORCE IMMEDIATELY AFTER STRAND RELEASE, P _{pl} (KIPS/BEAM)		587	649	650	711	712	713	774	775	835	836	896	897	956	
EFFECTIVE PRESTRESSING FORCE AFTER ALL LOSSES, P _{pe} (KIPS/BEAM)		531	582	584	632	635	637	685	688	734	738	783	787	830	
REQUIRED FACTORED MOMENT ϕ STRENGTH 1, M _u (FT-KIPS/BEAM)		1861	1945	2031	2118	2207	2297	2388	2482	2585	2682	2780	2879	2981	
FACTORED FLEXURAL RESISTANCE, M _r (FT-KIPS/BEAM)		2179	2420	2420	2603	2603	2603	2803	2803	3007	3007	3186	3186	3370	
TOTAL NO. DEBONDED STRANDS		—	2	2	4	4	4	4	4	6	6	6	6	6	
DEBONDED STRAND POSITION NUMBER & SHIELDING LENGTH FROM EACH END	ROW 1	—	5,6 ϕ 5'-0"	5,6 ϕ 5'-0"	3,4 ϕ 5'-0"	3,4 ϕ 5'-0"	3,4 ϕ 5'-0"	3,4 ϕ 5'-0"	3,4 ϕ 5'-0"	3,4,9,10 ϕ 5'-0"	3,4,9,10 ϕ 5'-0"	3,4,9,10 ϕ 5'-0"	3,4,9,10 ϕ 5'-0"	3,4,9,10 ϕ 5'-0"	
	ROW 2	—	—	—	23,24 ϕ 3'-0"	23,24 ϕ 3'-0"	23,24 ϕ 3'-0"	25,26 ϕ 3'-0"	25,26 ϕ 3'-0"	25,26 ϕ 3'-0"	25,26 ϕ 3'-0"	25,26 ϕ 3'-0"	25,26 ϕ 3'-0"	25,26 ϕ 3'-0"	
NUMBER & LENGTH \times 4 ET TOP TENSION BARS ϕ EACH END		3 - \times 4 \times 9'-0"	3 - \times 4 \times 9'-6"	3 - \times 4 \times 9'-6"	3 - \times 4 \times 9'-6"	3 - \times 4 \times 10'-0"	3 - \times 4 \times 10'-0"	3 - \times 4 \times 10'-6"	3 - \times 4 \times 10'-6"	3 - \times 4 \times 11'-0"	3 - \times 4 \times 11'-0"	3 - \times 4 \times 11'-6"	3 - \times 4 \times 11'-6"		
NUMBER & LENGTH \times 5 BT BOTTOM TENSION BARS ϕ EACH END		4 - \times 5 \times 9'-6"	6 - \times 5 \times 9'-6"	6 - \times 5 \times 10'-0"	6 - \times 5 \times 10'-0"	6 - \times 5 \times 10'-6"	6 - \times 5 \times 10'-6"	4 - \times 5 \times 10'-6"	4 - \times 5 \times 11'-0"	4 - \times 5 \times 11'-0"	4 - \times 5 \times 11'-6"	2 - \times 5 \times 11'-6"	2 - \times 5 \times 11'-6"	2 - \times 5 \times 12'-0"	
DESIGN CAMBER \times POSITIVE (UP) (INCHES)	ϕ RELEASE	0.39	0.52	0.50	0.67	0.65	0.62	0.79	0.76	0.96	0.93	0.97	1.16	1.12	
	ϕ ERECTION	0.42	0.64	0.57	0.84	0.77	0.68	0.94	0.84	1.15	1.04	1.05	1.34	1.20	
	ϕ FINAL	0.04	0.28	0.12	0.43	0.26	0.06	0.34	0.12	0.43	0.17	0.09	0.38	0.07	
NUMBER & SPACING OF TL-2 GUARDRAIL INSERTS	NO OF INSERTS REQD.														
	END OF BEAM TO $\frac{1}{2}$ OF FIRST INSERT E.A. END														
	$\frac{1}{2}$ OF 1st INSERT TO $\frac{1}{2}$ OF 2nd INSERT E.A. END														
SEE NOTE 6															
WEIGHT OF TYPICAL BEAM INCLUDING DIAPHRAGM (TONS)		32.6	33.4	34.1	34.9	35.6	36.4	37.1	37.9	39.0	39.7	40.4	41.1	41.9	

NOTES

1. BEAM WEIGHTS LISTED IN THE DESIGN TABLE ARE BASED ON ZERO SKEW, 2 FT. LONG ENDBLOCK AND DIAPHRAGMS SPACED ϕ 15 FT C/C. WEIGHTS FOR SKEWED BEAMS, LONGER ENDBLOCKS AND ADDITIONAL DIAPHRAGMS SHOULD BE ADJUSTED ACCORDINGLY.
FOR ADDITIONAL DIAPHRAGMS, ADD 700 LBS/DIAPHRAGM.
FOR SKEW ADD 41 LBS/DEGREE OF SKEW/END.
FOR LONGER ENDBLOCK, ADD 840 LBS/LF/END.
2. DESIGNERS SHOULD NOTE THAT DATA IN STANDARD TABLE IS BASED ON EVEN SPAN LENGTHS, A TWO LANE STRUCTURE 8 BEAMS WIDE AND ZERO SKEW. SUPERIMPOSED DEAD LOADS INCLUDE TYPE F PARAPET (321 PLF) AND A FWS OF 50 PSF. FOR NON-STANDARD BRIDGES DATA SHOULD BE VERIFIED AND IF REQUIRED NEW DESIGN DATA ENTERED INTO BLANK COLUMNS. IN NO CASE SHALL THE STANDARD DESIGN TABLE BE ALTERED.
3. PREDICTED DESIGN CAMBER VALUES LISTED IN THE TABLE ARE BASED ON EMPIRICAL FORMULAS AND AS SUCH ARE APPROXIMATE. FOR MEMBERS WITH SPAN-TO-DEPTH RATIOS AT OR EXCEEDING 25, THE TOLERANCE VALUES LISTED IN APPENDIX B OF PCI MANUAL FOR QUALITY CONTROL, MIN. -1/16, MAY NOT APPLY.
MEASUREMENT OF CAMBER FOR COMPARISON TO PREDICTED DESIGN VALUES SHOULD BE COMPLETED WITHIN 72 HOURS OF RELEASE. ADDITIONALLY, CAMBER SHOULD BE EVALUATED UNDER CONDITIONS THAT MINIMIZE THE EFFECT OF TEMPERATURE VARIATION.

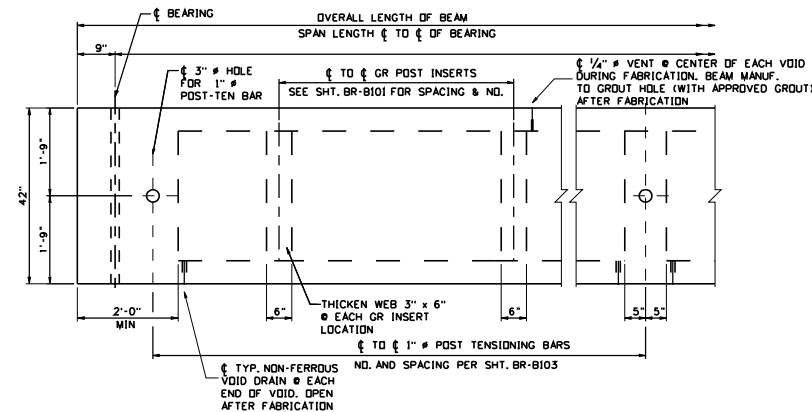
4. DESIGNER, FABRICATOR, AND ERECTOR SHALL BE AWARE THAT SKEWED END BEAMS MAY TWIST OR WARP, CAUSING UNEVEN BEAM SEATING AT THE BEARINGS. THE CONTRACTOR IS REQUIRED TO CORRECT AT THE TIME OF ERECTION, BEFORE THE BEAMS ARE SECURED IN PLACE. METHOD OF CORRECTION SHALL PROVIDE AN EVEN, TOTAL BEARING AND A LEVEL TOP BEAM SURFACE. TOLERANCE, AFTER CORRECTION, SHALL BE (+/-) $\frac{1}{8}$ INCH. THE FABRICATOR SHALL NOTIFY THE CONTRACTOR AND DESIGNER IF CORRECTIONS ARE REQUIRED PRIOR TO SHIPMENT.
5. MAXIMUM BEAM SKEW SHALL BE 30 DEGREES.
6. DESIGNER INPUT VALUES OF NUMBER OF INSERTS, DISTANCE FROM END OF BEAM TO $\frac{1}{2}$ FIRST INSERT, AND $\frac{1}{2}$ FIRST INSERT TO $\frac{1}{2}$ SECOND INSERT. ABOVE VALUES SHALL BE BASED ON THE REQUIRED 6'-3" GUARDRAIL POST SPACING ACROSS THE BRIDGE.
7. THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B42A, BR-B100, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-106 AS APPLICABLE.

APPROVED: <i>[Signature]</i> DIRECTOR/ENGINEERING DIVISION	DATE: 10-25-07						
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION	PREPARED: 07-02-07						
DESIGN TABLE FOR 42" PRESTRESSED BOX BEAM	REVIEW: <table><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr></table>						
STANDARD SHEET BR-B42B							

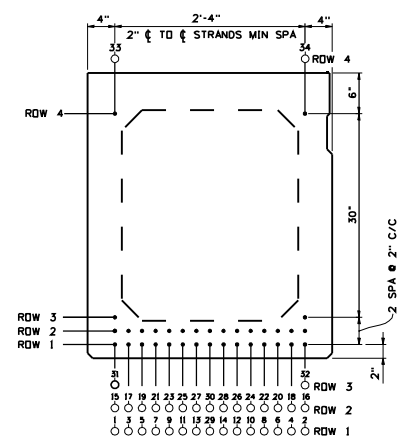
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION	
DESIGNED BY:TWB/	
DRAWN BY:TWB/	
CHECKED BY:TWB/	
REVIEWED BY:TWB/	
DATE:	
SCALE:	
SHEET NO. OF	
BRIDGE NUMBER	
DESIGN TABLE FOR 42" PRESTRESSED BOX BEAM	

MIN. CONCRETE STRENGTH ϕ RELEASE = 5500 PSI
MIN. CONCRETE STRENGTH ϕ 28 DAYS = 8000 PSI
INITIAL PULL/STRAND = 33,820 LBS
CROSS-SECTION AREA/STRAND = 0.167 SQ. IN.

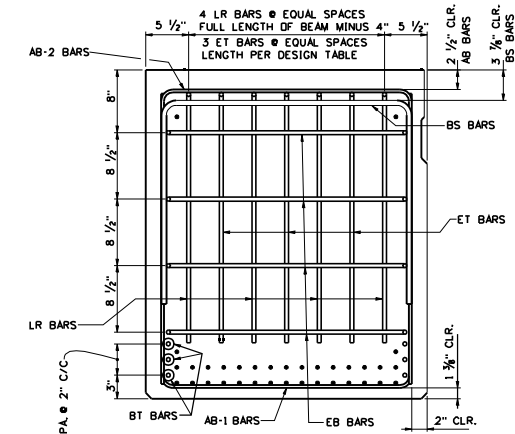
PROJECT NUMBERS	FEDERAL	DISTRICT	COUNTY	SHEET NO.	TOTAL



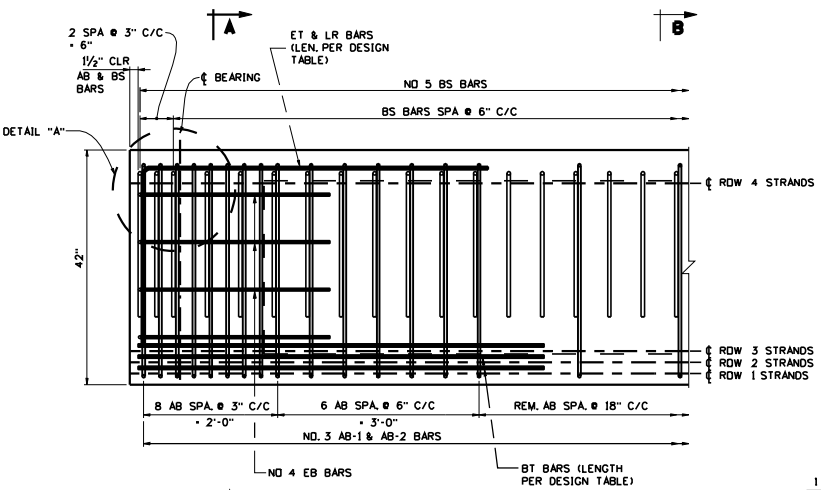
GENERAL ELEVATION VIEW



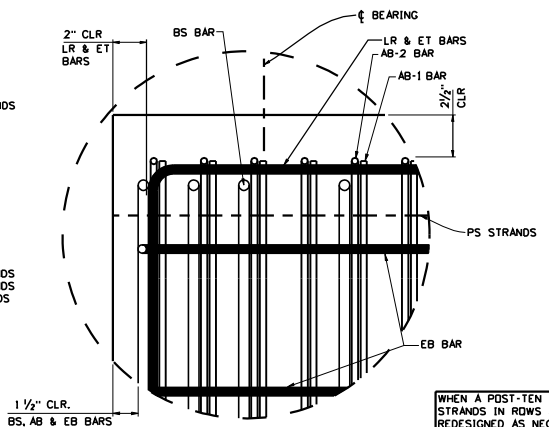
BEAM PRESTRESSING
TYPICAL BEAM END & MIDSPAN



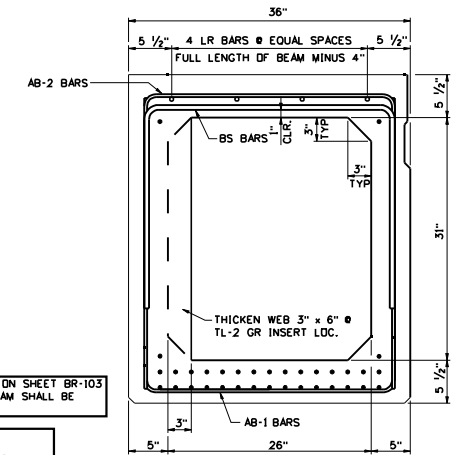
SECTION A-A



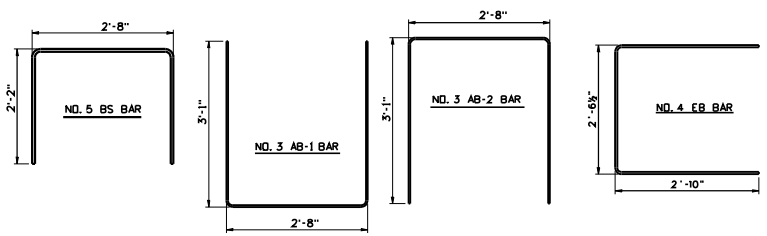
REINFORCING STEEL ELEVATION



DETAIL "A"



SECTION B-B



REINFORCING BAR DETAIL

WHEN A POST-TEN ACCESS POCKET IS USED AS DETAILED ON SHEET BR-103 STRANDS IN ROWS 3 AND 4 SHALL BE ELIMINATED. THE BEAM SHALL BE REDESIGNED AS NECESSARY.

- NOTES:**
1. REFER TO SHEET BR-B102A FOR SHEAR KEY DETAILS.
 2. DESIGNER SHALL USE THE FOLLOWING KEY TO INDICATE STRAND AND DEBONDING PATTERN ON "BEAM PRESTRESSING VIEW", THIS SHEET.
 - - ACTIVE STRAND
 - ▽ - DEBOND STRAND: LENGTH FROM END OF BEAM
 - △ - DEBOND STRAND: LENGTH FROM END OF BEAM
 - - DEBOND STRAND: LENGTH FROM END OF BEAM
 3. THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B42B, BR-B100, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPLICABLE.

APPROVED: *Gregory Bailey* DATE: 10-25-07
DIRECTOR, ENGINEERING DIVISION

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

42" PRESTRESSED CONCRETE
BOX BEAMS
DESIGN AND ASSEMBLY DETAILS

STANDARD SHEET BR-B42A

PREPARED: 07-02-07
REVIEWED:

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

DESIGNED BY: THB/
DRAWN BY: BH/
CHECKED BY: TM/
REVIEWED BY: TW/
DATE:
SCALE:
SHEET OF
BRIDGE NO.

42" PRESTRESSED BOX BEAM
DESIGN AND ASSEMBLY DETAILS

DESIGN DATA FOR 39" DEPTH ADJACENT BOX BEAM													
SPAN LENGTH ℓ TO ℓ BEARING	60'-0"	62'-0"	64'-0"	66'-0"	68'-0"	70'-0"	72'-0"	74'-0"	76'-0"	78'-0"	80'-0"		
OVERALL LENGTH OF BEAM	61'-6"	63'-6"	65'-6"	67'-6"	69'-6"	71'-6"	73'-6"	75'-6"	77'-6"	79'-6"	81'-6"		
NO. OF 270 KSI, 1/2" ϕ LOW-RELAXATION STRANDS, AREA/STRAND = 0.167 SQ. IN.	14	14	16	16	16	16	18	18	20	20	20		
STRAND POSITION NUMBER	ROW 1	1,2,7,8,13,14	1,2,7,8,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,3,4,7,8,11,12,13,14	1,2,3,4,7,8,11,12,13,14	1,2,3,4,7,8,11,12,13,14		
	ROW 2	15,16,21,22,27,28	15,16,21,22,27,28	15,16,21,22,27,28	15,16,21,22,27,28	15,16,21,22,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28		
	ROW 3												
	ROW 4	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34		
PRESTRESSING FORCE IMMEDIATELY AFTER STRAND RELEASE, P _{pl} , (KIPS/BEAM)	459	459	522	522	523	523	585	586	648	648	649		
EFFECTIVE PRESTRESSING FORCE AFTER ALL LOSSES, P _{pe} , (KIPS/BEAM)	417	418	471	472	473	475	527	528	578	580	582		
REQUIRED FACTORED MOMENT ϕ STRENGTH I, M _u (FT-KIPS/BEAM)	1213	1287	1359	1432	1506	1582	1660	1739	1828	1911	1995		
FACTORED FLEXURAL RESISTANCE, M _r (FT-KIPS/BEAM)	1549	1549	1792	1792	1792	1792	2015	2015	2249	2249	2249		
TOTAL NO. DEBONDED STRANDS									2	2	2		
DEBONDED STRAND POSITION NUMBER & SHIELDING LENGTH FROM EACH END	ROW 1								7,8 ϕ 5'-0" EA. END	7,8 ϕ 5'-0" EA. END	7,8 ϕ 5'-0" EA. END		
	ROW 2												
NUMBER & LENGTH *4 ET TOP TENSION BARS ϕ EACH END	3 - *4 x 7'-6"	3 - *4 x 7'-6"	3 - *4 x 8'-0"	3 - *4 x 8'-0"	3 - *4 x 8'-0"	3 - *4 x 8'-6"	3 - *4 x 8'-6"	3 - *4 x 9'-0"	3 - *4 x 9'-0"	3 - *4 x 9'-0"	3 - *4 x 9'-6"		
NUMBER & LENGTH *5 BT BOTTOM TENSION BARS ϕ EACH END	4 - *6 x 8'-0"	4 - *6 x 8'-0"	4 - *6 x 8'-6"	6 - *6 x 8'-6"	4 - *6 x 8'-6"	4 - *6 x 9'-0"	4 - *5 x 9'-0"	4 - *5 x 9'-0"	4 - *6 x 10'-0"	4 - *6 x 10'-0"	4 - *6 x 10'-0"		
DESIGN CAMBER + = POSITIVE (UP) (INCHES)	ϕ RELEASE	0.24	0.23	0.35	0.34	0.33	0.31	0.44	0.58	0.56	0.53		
	ϕ ERECTION	0.30	0.26	0.47	0.43	0.38	0.33	0.53	0.47	0.65	0.56		
	ϕ FINAL	0.17	0.08	0.32	0.23	0.12	0.00	0.23	0.09	0.35	0.19	0.01	
NUMBER & SPACING OF TL-2 GUARDRAIL INSERTS SEE NOTE 6	NO OF INSERTS REQD.												
	END OF BEAM TO ℓ OF FIRST INSERT EA. END												
	ℓ OF 1st INSERT TO ℓ 2nd INSERT EA. END												
WEIGHT OF TYPICAL BEAM INCLUDING DIAPHRAGM (TONS)	24.6	25.7	26.4	27.1	27.8	28.6	29.3	30.0	31.0	31.8	32.8		

NOTES

- BEAM WEIGHTS LISTED IN THE DESIGN TABLE ARE BASED ON ZERO SKEW, 2 FT. LONG ENDBLOCK AND DIAPHRAGMS SPACED ϕ 15 FT C/C. WEIGHTS FOR SKEWED BEAMS, LONGER ENDBLOCKS AND ADDITIONAL DIAPHRAGMS SHOULD BE ADJUSTED ACCORDINGLY.
FOR ADDITIONAL DIAPHRAGMS, ADD 632 LBS/DIAPHRAGM.
FOR SKEW ADD 38 LBS/DEGREE OF SKEW/END.
FOR LONGER ENDBLOCK, ADD 758 LBS/LF/END.
- DESIGNERS SHOULD NOTE THAT DATA IN STANDARD TABLE IS BASED ON EVEN SPAN LENGTHS, A TWO LANE STRUCTURE 8 BEAMS WIDE AND ZERO SKEW. SUPERIMPOSED DEAD LOADS INCLUDE TYPE F PARAPET (321 PLF) AND A FWS OF 50 PSF. FOR NON-STANDARD BRIDGES DATA SHOULD BE VERIFIED AND IF REQUIRED NEW DESIGN DATA ENTERED INTO BLANK COLUMNS. IN NO CASE SHALL THE STANDARD DESIGN TABLE BE ALTERED.
- PREDICTED DESIGN CAMBER VALUES LISTED IN THE TABLE ARE BASED ON EMPIRICAL FORMULAS AND AS SUCH ARE APPROXIMATE. FOR MEMBERS WITH SPAN-TO-DEPTH RATIOS AT OR EXCEEDING 25, THE TOLERANCE VALUES LISTED IN APPENDIX B OF PCI MANUAL FOR QUALITY CONTROL, MNL-116, MAY NOT APPLY.
MEASUREMENT OF CAMBER FOR COMPARISON TO PREDICTED DESIGN VALUES SHOULD BE COMPLETED WITHIN 72 HOURS OF RELEASE. ADDITIONALLY, CAMBER SHOULD BE EVALUATED UNDER CONDITIONS THAT MINIMIZE THE EFFECT OF TEMPERATURE VARIATION.

- DESIGNER, FABRICATOR, AND ERECTOR SHALL BE AWARE THAT SKEWED END BEAMS MAY TWIST OR WARP, CAUSING UNEVEN BEAM SEATING AT THE BEARINGS. THE CONTRACTOR IS REQUIRED TO CORRECT AT THE TIME OF ERECTION, BEFORE THE BEAMS ARE SECURED IN PLACE. METHOD OF CORRECTION SHALL PROVIDE AN EVEN, TOTAL BEARING AND A LEVEL TOP BEAM SURFACE. TOLERANCE, AFTER CORRECTION, SHALL BE (+/-) 1/8 INCH. THE FABRICATOR SHALL NOTIFY THE CONTRACTOR AND DESIGNER IF CORRECTIONS ARE REQUIRED PRIOR TO SHIPMENT.
- MAXIMUM BEAM SKEW SHALL BE 30 DEGREES.
- DESIGNER INPUT VALUES OF NUMBER OF INSERTS, DISTANCE FROM END OF BEAM TO ℓ FIRST INSERT, AND ℓ FIRST INSERT TO ℓ SECOND INSERT. ABOVE VALUES SHALL BE BASED ON THE REQUIRED 6'-3" GUARDRAIL POST SPACING ACROSS THE BRIDGE.
- THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B39A, BR-B100, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPLICABLE.

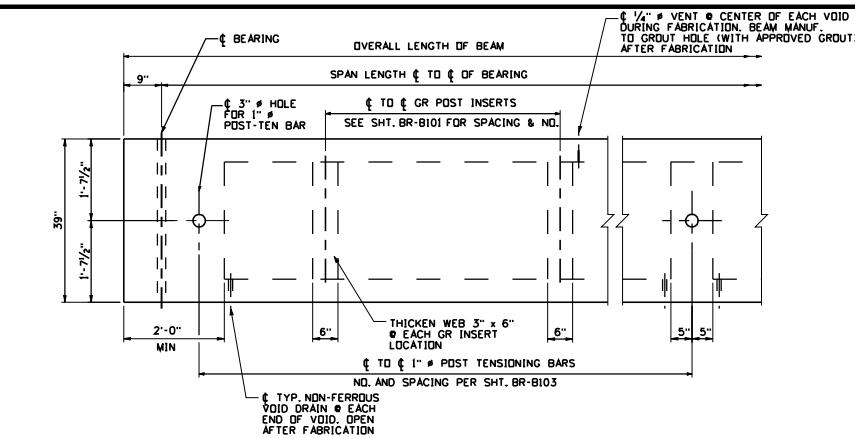
APPROVED: <i>[Signature]</i> DIRECTOR, ENGINEERING DIVISION		DATE: 10-25-07
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION		PREPARED: 07-02-07
DESIGN TABLE FOR 39"		REVIEWED:
PRESTRESSED BOX BEAM		
STANDARD SHEET BR-B39B		

STATE PROJECT NUMBER	FEDERAL PROJECT NUMBER	STATE DIST. NO.	COUNTY	SHEET NO.	TOTAL SHEETS

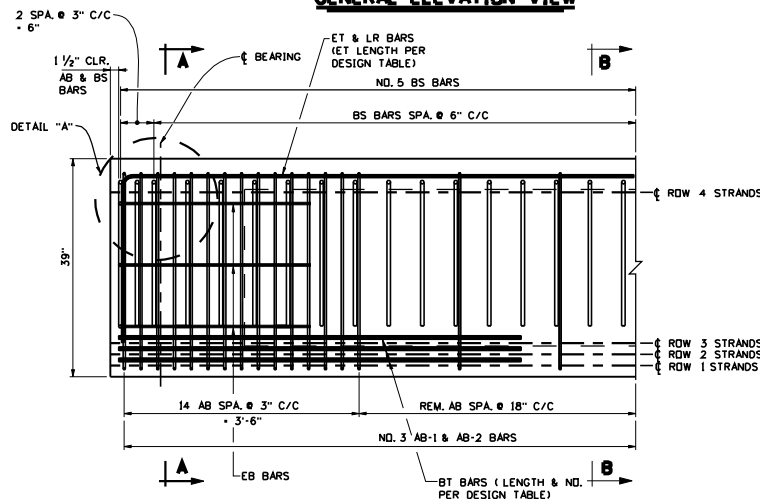
MIN. CONCRETE STRENGTH ϕ RELEASE = 5500 PSI
 MIN. CONCRETE STRENGTH ϕ 28 DAYS = 8000 PSI
 INITIAL PULL/STRAND = 33,820 LBS
 CROSS-SECTION AREA/STRAND = 0.167 SQ. IN.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION		DESIGNED BY:TW/
		DRAWN BY:TW/
		CHECKED BY:TW/
		REVIEWED BY:TW/
		DATE:
		SCALE:
DESIGN TABLE FOR 39"		SHEET NO OF
PRESTRESSED BOX BEAM		BRIDGE NUMBER

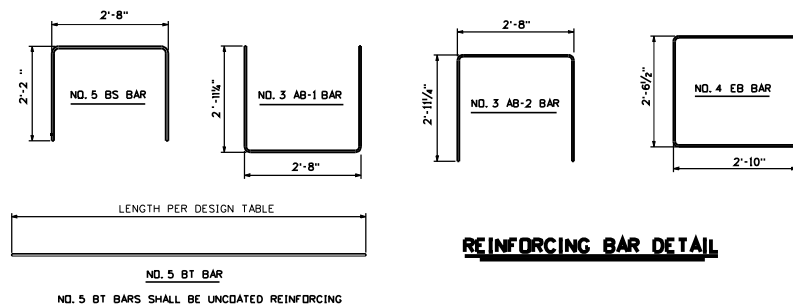
PROJECT NUMBERS				SHEET NO.	TOTAL
STATE	FEDERAL	DISTRICT	COUNTY		



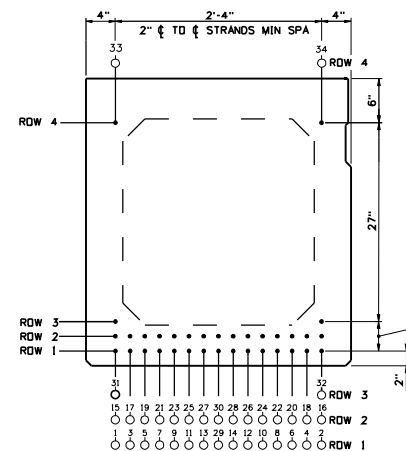
GENERAL ELEVATION VIEW



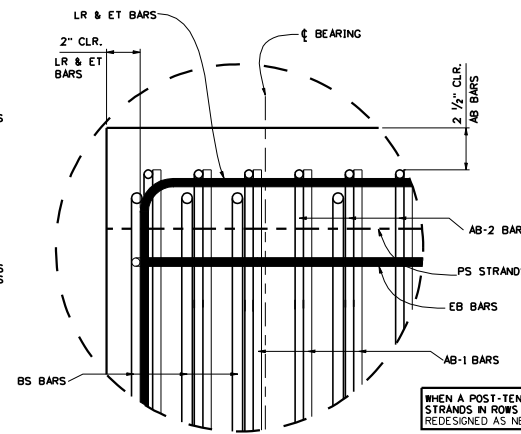
REINFORCING STEEL ELEVATION



REINFORCING BAR DETAIL



BEAM PRESTRESSING
TYPICAL BEAM END & MIDSPAN



DETAIL "A"

WHEN A POST-TEN ACCESS POCKET IS USED AS DETAILED ON SHEET BR-103 STRANDS IN ROWS 3 AND 4 SHALL BE ELIMINATED. THE BEAM SHALL BE REDESIGNED AS NECESSARY.

NOTES:

- REFER TO SHEET BR-B102A FOR SHEAR KEY DETAILS.
- DESIGNER SHALL USE THE FOLLOWING KEY TO INDICATE STRAND AND DEBONDING PATTERN ON "BEAM PRESTRESSING VIEW", THIS SHEET.
 ● ACTIVE STRAND
 ▽ DEBOND STRAND: LENGTH FROM END OF BEAM
 △ DEBOND STRAND: LENGTH FROM END OF BEAM
 □ DEBOND STRAND: LENGTH FROM END OF BEAM
- THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B17B, BR-B100, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPLICABLE.

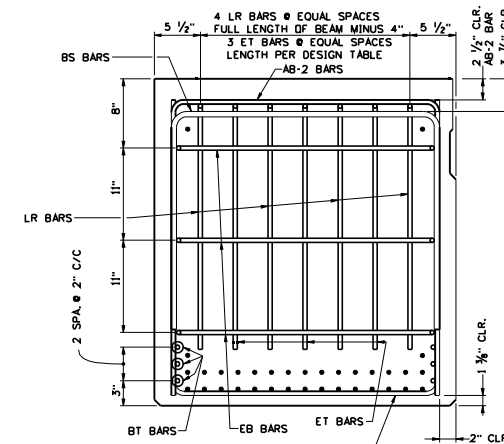
APPROVED: *Shirley Bailey* DIRECTOR, ENGINEERING DIVISION DATE: 10-25-07

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

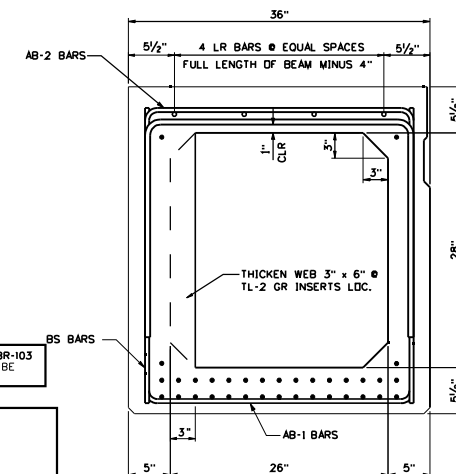
39" PRESTRESSED CONCRETE
BOX BEAMS
DESIGN AND ASSEMBLY DETAILS

STANDARD SHEET BR-B39A

PREPARED: 07-02-07
REVIEWED:



SECTION A-A



SECTION B-B

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

DESIGNED BY:THB/
DRAWN BY:BN/
CHECKED BY:TW/
REVIEWED BY:THB/
DATE:
SCALE:
SHEET OF
BRIDGE NO.

39" PRESTRESSED BOX BEAM
DESIGN AND ASSEMBLY DETAILS

DESIGN DATA FOR 33" DEPTH ADJACENT BOX BEAM														
SPAN LENGTH ϕ TO ϕ BEARING	50'-0"	52'-0"	54'-0"	56'-0"	58'-0"	60'-0"	62'-0"	64'-0"	66'-0"	68'-0"	70'-0"			
OVERALL LENGTH OF BEAM	51'-6"	53'-6"	55'-6"	57'-6"	59'-6"	61'-6"	63'-6"	65'-6"	67'-6"	69'-6"	71'-6"			
NO. OF 270 KSI, 1/2" ϕ LOW-RELAXATION STRANDS, AREA/STRAND = 0.167 SQ. IN.	12	12	12	14	14	14	16	16	18	18	18			
STRAND POSITION NUMBER	ROW 1	1,2,7,8,13,14	1,2,7,8,13,14	1,2,7,8,13,14	1,2,7,8,13,14	1,2,7,8,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14			
	ROW 2	15,16,27,28	15,16,27,28	15,16,27,28	15,16,21,22,27,28	15,16,21,22,27,28	15,16,21,22,27,28	15,16,21,22,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28	15,16,19,20,23,24,27,28			
	ROW 3	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____			
	ROW 4	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34			
PRESTRESSING FORCE IMMEDIATELY AFTER STRAND RELEASE, P _{pl} , (KIPS/BEAM)	394	394	394	457	458	458	521	521	583	584	585			
EFFECTIVE PRESTRESSING FORCE AFTER ALL LOSSES, P _{pe} , (KIPS/BEAM)	359	360	361	414	416	417	468	470	521	522	524			
REQUIRED FACTORED MOMENT ϕ STRENGTH I, M _u (FT-KIPS/BEAM)	858	918	979	1042	1107	1173	1244	1312	1383	1454	1527			
FACTORED FLEXURAL RESISTANCE, M _r (FT-KIPS/BEAM)	1092	1092	1092	1280	1280	1280	1478	1478	1656	1656	1656			
TOTAL NO. DEBONDED STRANDS	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____			
DEBONDED STRAND POSITION NUMBER & SHIELDING LENGTH FROM EACH END	ROW 1	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____			
	ROW 2	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____			
NUMBER & LENGTH *4 ET TOP TENSION BARS ϕ EACH END	3 - *4 x 6'-6"	3 - *4 x 6'-6"	3 - *4 x 7'-0"	3 - *4 x 7'-0"	3 - *4 x 7'-0"	3 - *4 x 7'-6"	3 - *4 x 7'-6"	3 - *4 x 8'-0"	3 - *4 x 8'-0"	3 - *4 x 8'-0"	3 - *4 x 8'-6"			
NUMBER & LENGTH *5 BT BOTTOM TENSION BARS ϕ EACH END	6 - *6 x 7'-0"	6 - *6 x 6'-0"	6 - *6 x 7'-0"	6 - *6 x 8'-0"	6 - *6 x 8'-0"	6 - *6 x 8'-0"	6 - *5 x 8'-0"	6 - *6 x 8'-0"	4 - *6 x 9'-0"	4 - *6 x 9'-0"	6 - *6 x 9'-0"			
DESIGN CAMBER * = POSITIVE (UP) (INCHES)	ϕ RELEASE	0.19	0.18	0.17	0.27	0.26	0.25	0.39	0.38	0.51	0.50	0.48		
	ϕ ERECTION	0.25	0.22	0.19	0.35	0.32	0.27	0.49	0.44	0.66	0.59	0.52		
	ϕ FINAL	0.17	0.10	0.03	0.21	0.12	0.01	0.27	0.14	0.38	0.23	0.06		
NUMBER & SPACING OF TL-2 GUARDRAIL INSERTS SEE NOTE 6	NO OF INSERTS REQD.													
	END OF BEAM TO ϕ OF FIRST INSERT E.A. END													
	ϕ OF 1st INSERT TO ϕ 2nd INSERT E.A. END													
WEIGHT OF TYPICAL BEAM INCLUDING DIAPHRAGM (TONS)	19.9	20.6	21.3	22.0	22.7	23.4	24.4	25.1	25.8	26.5	27.2			

NOTES

- 1.BEAM WEIGHTS LISTED IN THE DESIGN TABLE ARE BASED ON ZERO SKEW, 2 FT. LONG ENDBLOCK AND DIAPHRAGMS SPACED @ 15 FT C/C. WEIGHTS FOR SKEWED BEAMS, LONGER ENDBLOCKS AND ADDITIONAL DIAPHRAGMS SHOULD BE ADJUSTED ACCORDINGLY.
FOR ADDITIONAL DIAPHRAGMS, ADD 497 LBS/DIAPHRAGM.
FOR SKEW ADD 33 LBS/DEGREE OF SKEW/END.
FOR LONGER ENDBLOCK, ADD 596 LBS/LF/END.
- 2.DESIGNERS SHOULD NOTE THAT DATA IN STANDARD TABLE IS BASED ON EVEN SPAN LENGTHS, A TWO LANE STRUCTURE 8 BEAMS WIDE AND ZERO SKEW. SUPERIMPOSED DEAD LOADS INCLUDE TYPE F PARABOL (321 PLF) AND A FWS OF 50 PSF. FOR NON-STANDARD BRIDGES DATA SHOULD BE VERIFIED AND IF REQUIRED NEW DESIGN DATA ENTERED INTO BLANK COLUMNS. IN NO CASE SHALL THE STANDARD DESIGN TABLE BE ALTERED.
- 3.PREDICTED DESIGN CAMBER VALUES LISTED IN THE TABLE ARE BASED ON EMPIRICAL FORMULAS AND AS SUCH ARE APPROXIMATE. FOR MEMBERS WITH SPAN-TO-DEPTH RATIOS AT OR EXCEEDING 25, THE TOLERANCE VALUES LISTED IN APPENDIX B OF PCI MANUAL FOR QUALITY CONTROL, MN-116, MAY NOT APPLY.
MEASUREMENT OF CAMBER FOR COMPARISON TO PREDICTED DESIGN VALUES SHOULD BE COMPLETED WITHIN 72 HOURS OF RELEASE. ADDITIONALLY, CAMBER SHOULD BE EVALUATED UNDER CONDITIONS THAT MINIMIZE THE EFFECT OF TEMPERATURE VARIATION.

- 4.DESIGNER, FABRICATOR, AND ERECTOR SHALL BE AWARE THAT SKEWED END BEAMS MAY TWIST OR WARP, CAUSING UNEVEN BEAM SEATING AT THE BEARINGS. THE CONTRACTOR IS REQUIRED TO CORRECT AT THE TIME OF ERECTION, BEFORE THE BEAMS ARE SECURED IN PLACE. METHOD OF CORRECTION SHALL PROVIDE AN EVEN, TOTAL BEARING AND A LEVEL TOP BEAM SURFACE. TOLERANCE, AFTER CORRECTION, SHALL BE (+/-) 1/8 INCH. THE FABRICATOR SHALL NOTIFY THE CONTRACTOR AND DESIGNER IF CORRECTIONS ARE REQUIRED PRIOR TO SHIPMENT.
- 5.MAXIMUM BEAM SKEW SHALL BE 30 DEGREES.
- 6.DESIGNER INPUT VALUES OF NUMBER OF INSERTS, DISTANCE FROM END OF BEAM TO ϕ FIRST INSERT, AND ϕ FIRST INSERT TO ϕ SECOND INSERT. ABOVE VALUES SHALL BE BASED ON THE REQUIRED 6'-3" GUARDRAIL POST SPACING ACROSS THE BRIDGE.
- 7.THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B33A, BR-B100, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPLICABLE.

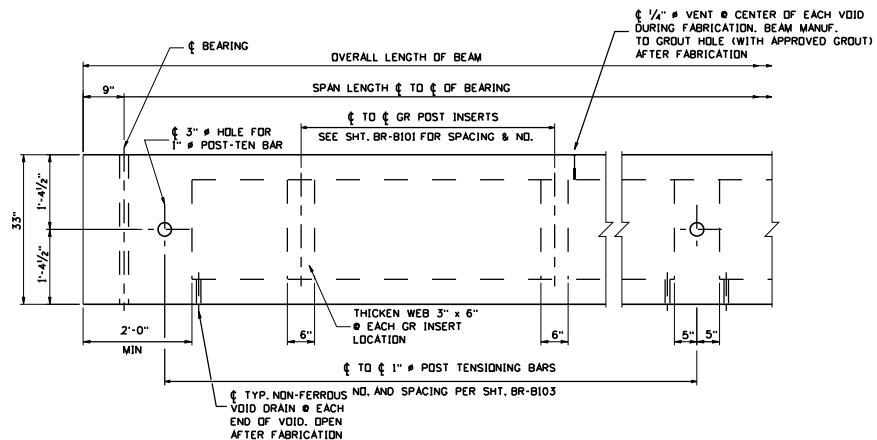
APPROVED: <i>[Signature]</i> DIRECTOR, ENGINEERING DIVISION		DATE: 10-25-07
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION		PREPARED: 07-02-07 REVIEWED:
DESIGN TABLE FOR 33"		
PRESTRESSED BOX BEAM		
STANDARD SHEET BR-B33B		

STATE PROJECT NUMBER	FEDERAL PROJECT NUMBER	STATE DIST. NO.	COUNTY	SHEET NO.	TOTAL SHEETS

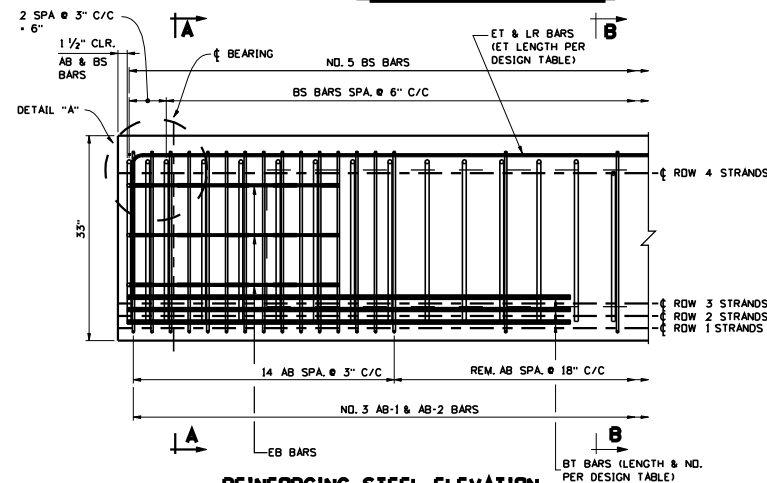
MIN. CONCRETE STRENGTH @ RELEASE = 5500 PSI
MIN. CONCRETE STRENGTH @ 28 DAYS = 8000 PSI
INITIAL PULL/STRAND = 33,820 LBS
CROSS-SECTION AREA/STRAND = 0.167 SQ. IN.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION	
DESIGNED BY:TR/	
DRAWN BY:TR/	
CHECKED BY:TR/	
REVIEWED BY:TR/	
DATE:	
SCALE:	
SHEET NO. OF	BRIDGE NUMBER
DESIGN TABLE FOR 33"	
PRESTRESSED BOX BEAM	

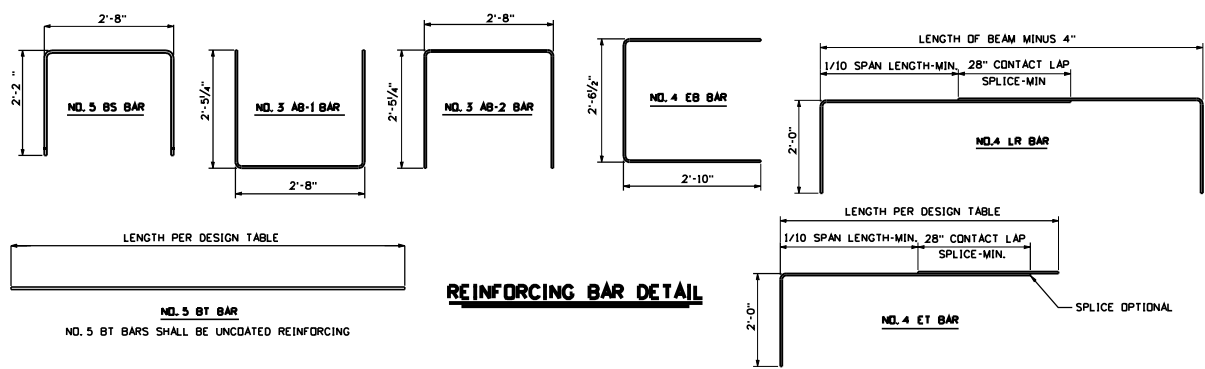
PROJECT NUMBERS		DISTRICT	COUNTY	SHEET NO.	TOTAL
STATE	FEDERAL				



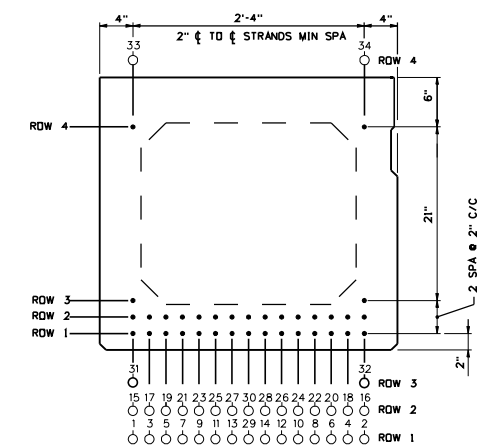
GENERAL ELEVATION VIEW



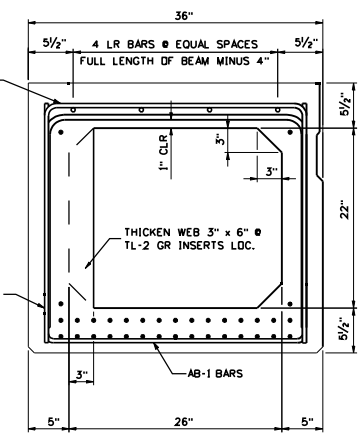
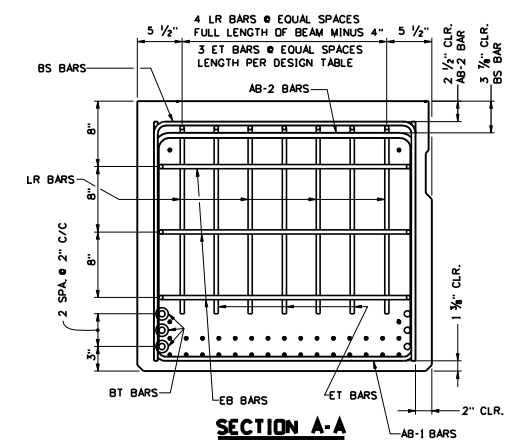
REINFORCING STEEL ELEVATION



REINFORCING BAR DETAIL



BEAM PRESTRESSING
TYPICAL ϕ BEAM END & MIDSPAN



SECTION B-B

NOTES:

1. REFER TO SHEET BR-B102A FOR SHEAR KEY DETAILS.

2. DESIGNER SHALL USE THE FOLLOWING KEY TO INDICATE STRAND AND DEBONDING PATTERN ON "BEAM PRESTRESSING VIEW", THIS SHEET.

● ACTIVE STRAND

▽ DEBOND STRAND: LENGTH FROM END OF BEAM

△ DEBOND STRAND: LENGTH FROM END OF BEAM

□ DEBOND STRAND: LENGTH FROM END OF BEAM

3. THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B33B, BR-B100, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPLICABLE.

WHEN A POST-TEN ACCESS POCKET IS USED AS DETAILED ON SHEET BR-103 STRANDS IN ROWS 3 AND 4 SHALL BE ELIMINATED. THE BEAM SHALL BE REDESIGNED AS NECESSARY.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

APPROVED: *Gregory Bailey* DATE: 10-25-07

DIRECTOR, ENGINEERING DIVISION

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

33" PRESTRESSED CONCRETE
BOX BEAMS
DESIGN AND ASSEMBLY DETAILS

STANDARD SHEET BR-B33A

PREPARED: 07-02-07

REVIEWED:

DESIGNED BY:TW/

DRAWN BY:BW/

CHECKED BY:TW/

REVIEWED BY:TW/

DATE:

SCALE:

SHEET OF

BRIDGE NO.

33" PRESTRESSED BOX BEAM
DESIGN AND ASSEMBLY DETAILS

DESIGN DATA FOR 27" DEPTH ADJACENT BOX BEAM

SPAN LENGTH ϕ TO ϕ BEARING													
OVERALL LENGTH OF BEAM													
NO. OF 270 KSI, 1/2" ϕ LOW-RELAXATION STRANDS, AREA/STRAND = 0.167 SQ. IN.													
STRAND POSITION NUMBER	ROW 1	1,2,11,12	1,2,11,12	1,2,7,8,13,14	1,2,7,8,13,14	1,2,7,8,13,14	1,2,7,8,13,14	1,2,7,8,13,14	1,2,7,8,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	1,2,5,6,9,10,13,14	
	ROW 2	15,16,25,26	15,16,25,26	15,16,27,28	15,16,27,28	15,16,27,28	15,16,27,28	15,16,27,28	15,16,27,28	15,16,21,22,27,28	15,16,21,22,27,28	15,16,21,22,27,28	15,16,19,20,23,24,27,28
	ROW 3	---	---	---	---	---	---	---	---	---	---	---	
	ROW 4	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	33,34	
PRESTRESSING FORCE IMMEDIATELY AFTER STRAND RELEASE, P _{pl} , (KIPS/BEAM)		329	329	392	393	393	393	456	457	519	519	581	
EFFECTIVE PRESTRESSING FORCE AFTER ALL LOSSES, P _{pe} , (KIPS/BEAM)		301	302	355	356	357	358	411	413	463	465	514	
REQUIRED FACTORED MOMENT ϕ STRENGTH I, M _u (FT-KIPS/BEAM)		563	608	660	717	772	829	887	946	1007	1069	1132	
FACTORED FLEXURAL RESISTANCE, M _r (FT-KIPS/BEAM)		706	706	868	868	868	868	1011	1011	1164	1164	1299	
TOTAL NO. DEBONDED STRANDS		---	---	---	---	---	---	---	---	---	---	---	
DEBONDED STRAND POSITION NUMBER & SHIELDING LENGTH FROM EACH END	ROW 1	---	---	---	---	---	---	---	---	---	---	---	
	ROW 2	---	---	---	---	---	---	---	---	---	---	---	
NUMBER & LENGTH *4 ET TOP TENSION BARS ϕ EACH END		3 - *4 x 5'-6"	3 - *4 x 5'-6"	3 - *4 x 6'-0"	3 - *4 x 6'-0"	3 - *4 x 6'-0"	3 - *4 x 6'-0"	3 - *4 x 6'-6"	3 - *4 x 7'-0"	3 - *4 x 7'-0"	3 - *4 x 7'-0"	3 - *4 x 7'-6"	
NUMBER & LENGTH *5 BT BOTTOM TENSION BARS ϕ EACH END		6 - *5 x 7'-0"	6 - *5 x 7'-0"	6 - *5 x 7'-0"	6 - *5 x 7'-0"	6 - *5 x 7'-0"	6 - *5 x 7'-0"	6 - *5 x 7'-0"	6 - *5 x 7'-6"	4 - *5 x 7'-6"	4 - *5 x 7'-6"	4 - *5 x 8'-0"	
DESIGN CAMBER + = POSITIVE (UP) (INCHES)	ϕ RELEASE	0.13	0.13	0.23	0.23	0.22	0.21	0.33	0.32	0.48	0.47	0.62	
	ϕ ERECTION	0.18	0.15	0.34	0.31	0.28	0.24	0.42	0.37	0.64	0.58	0.82	
	ϕ FINAL	0.13	0.07	0.14	0.22	0.14	0.04	0.25	0.13	0.44	0.30	0.55	
NO OF INSERTS REQD.													
NUMBER & SPACING OF TL-2 GUARDRAIL INSERTS	END OF BEAM TO ϕ OF FIRST INSERT E.A. END												
	ϕ OF 1st INSERT TO ϕ 2nd INSERT E.A. END												
SEE NOTE 6													
WEIGHT OF TYPICAL BEAM INCLUDING DIAPHRAGM (TONS)		13.8	14.4	15.0	15.7	16.3	16.9	17.5	18.1	18.7	19.3	19.9	

NOTES

- BEAM WEIGHTS LISTED IN THE DESIGN TABLE ARE BASED ON ZERO SKEW, 2 FT. LONG ENDBLOCK AND DIAPHRAGMS SPACED @ 15 FT C/C. WEIGHTS FOR SKEWED BEAMS, LONGER ENDBLOCKS AND ADDITIONAL DIAPHRAGMS SHOULD BE ADJUSTED ACCORDINGLY.
FOR ADDITIONAL DIAPHRAGMS, ADD 361 LBS/DIAPHRAGM.
FOR SKEW ADD 27 LBS/DEGREE OF SKEW/END.
FOR LONGER ENDBLOCK, ADD 433 LBS/LF/END.
- DESIGNERS SHOULD NOTE THAT DATA IN STANDARD TABLE IS BASED ON EVEN SPAN LENGTHS, A TWO LANE STRUCTURE @ BEAMS WIDE AND ZERO SKEW. SUPERIMPOSED DEAD LOADS INCLUDE TYPE F PARAPET (321 PLF) AND A FWS OF 50 PSF. FOR NON-STANDARD BRIDGES DATA SHOULD BE VERIFIED AND IF REQUIRED NEW DESIGN DATA ENTERED INTO BLANK COLUMNS. IN NO CASE SHALL THE STANDARD DESIGN TABLE BE ALTERED.
- PREDICTED DESIGN CAMBER VALUES LISTED IN THE TABLE ARE BASED ON EMPIRICAL FORMULAS AND AS SUCH ARE APPROXIMATE. FOR MEMBERS WITH SPAN-TO-DEPTH RATIOS AT OR EXCEEDING 25, THE TOLERANCE VALUES LISTED IN APPENDIX B OF PCI MANUAL FOR QUALITY CONTROL, MNL-116, MAY NOT APPLY.
MEASUREMENT OF CAMBER FOR COMPARISON TO PREDICTED DESIGN VALUES SHOULD BE COMPLETED WITHIN 72 HOURS OF RELEASE. ADDITIONALLY, CAMBER SHOULD BE EVALUATED UNDER CONDITIONS THAT MINIMIZE THE EFFECT OF TEMPERATURE VARIATION.

- DESIGNER, FABRICATOR, AND ERECTOR SHALL BE AWARE THAT SKEWED END BEAMS MAY TWIST OR WARP, CAUSING UNEVEN BEAM SEATING AT THE BEARINGS. THE CONTRACTOR IS REQUIRED TO CORRECT AT THE TIME OF ERECTION, BEFORE THE BEAMS ARE SECURED IN PLACE. METHOD OF CORRECTION SHALL PROVIDE AN EVEN, TOTAL BEARING AND A LEVEL TOP BEAM SURFACE. TOLERANCE, AFTER CORRECTION, SHALL BE (+/-) 1/8 INCH. THE FABRICATOR SHALL NOTIFY THE CONTRACTOR AND DESIGNER IF CORRECTIONS ARE REQUIRED PRIOR TO SHIPMENT.
- MAXIMUM BEAM SKEW SHALL BE 30 DEGREES.
- DESIGNER INPUT VALUES OF NUMBER OF INSERTS, DISTANCE FROM END OF BEAM TO ϕ FIRST INSERT, AND ϕ FIRST INSERT TO ϕ SECOND INSERT. ABOVE VALUES SHALL BE BASED ON THE REQUIRED 6'-3" GUARDRAIL POST SPACING ACROSS THE BRIDGE.
- THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B27A, BR-B100, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPLICABLE.

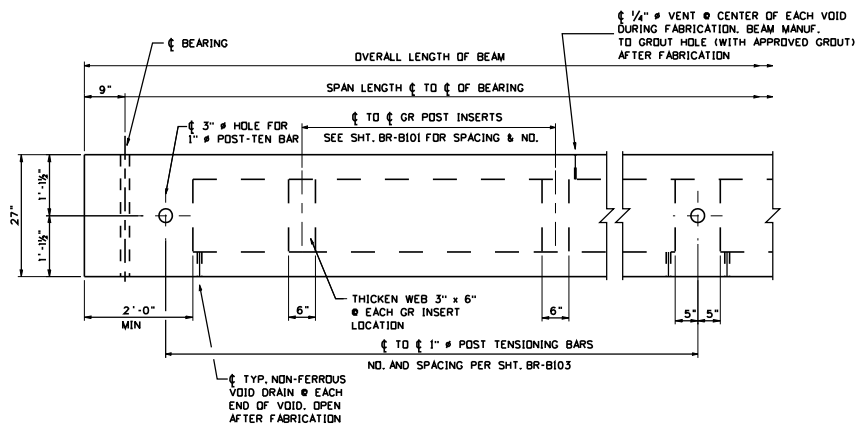
APPROVED: <i>Shirley Bailey</i> DIRECTOR, ENGINEERING DIVISION		DATE: 10-25-07
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION		PREPARED: 07-02-07
DESIGN TABLE FOR 27"		REVIEWED:
PRESTRESSED BOX BEAM		
STANDARD SHEET BR-B27B		

STATE PROJECT NUMBER	FEDERAL PROJECT NUMBER	STATE DIST. NO.	COUNTY	SHEET NO.	TOTAL SHEETS

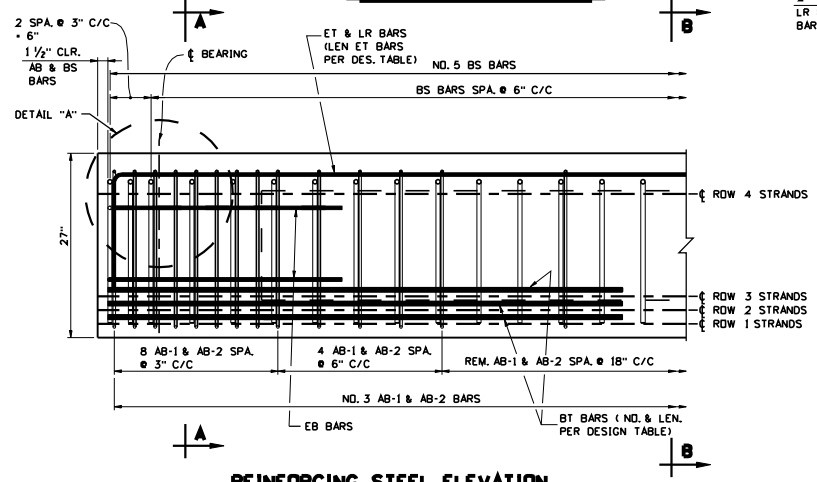
MIN. CONCRETE STRENGTH @ RELEASE = 5500 PSI
 MIN. CONCRETE STRENGTH @ 28 DAYS = 8000 PSI
 INITIAL PULL/STRAND = 33,820 LBS
 CROSS-SECTION AREA/STRAND = 0.167 SQ. IN.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION		DESIGNED BY:TWB/
		DRAWN BY:TWB/
		CHECKED BY:TWB/
		REVIEWED BY:TWB/
		DATE:
		SCALE:
		SHEET NO. OF
		BRIDGE NUMBER
DESIGN TABLE FOR 27"		
PRESTRESSED BOX BEAM		

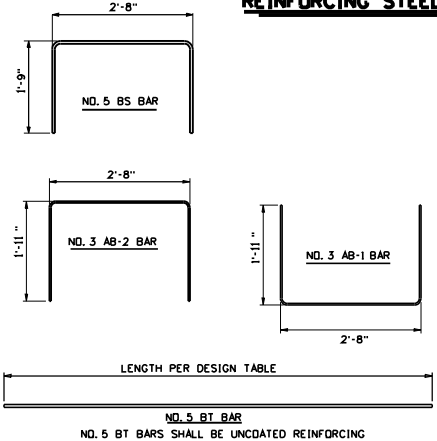
PROJECT NUMBERS				SHEET NO.	TOTAL
STATE	FEDERAL	DISTRICT	COUNTY		



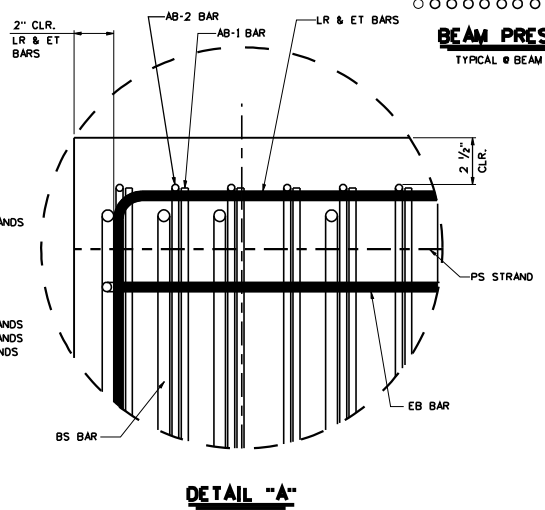
GENERAL ELEVATION VIEW



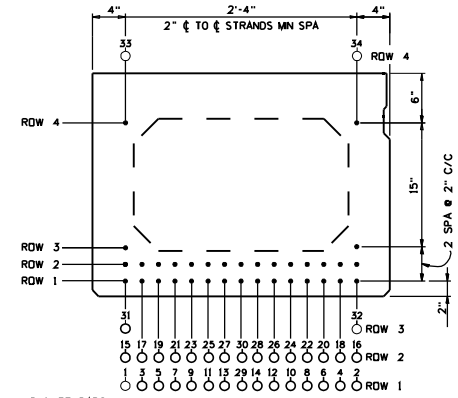
REINFORCING STEEL ELEVATION



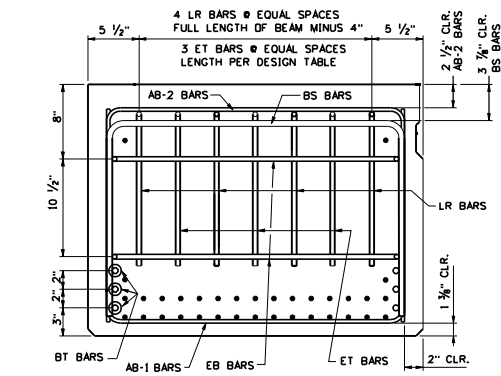
REINFORCING BAR DETAIL



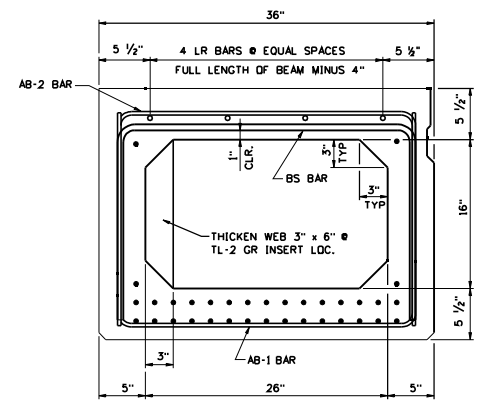
DETAIL 'A'



BEAM PRESTRESSING
TYPICAL BEAM END & MIDSPAN



SECTION A-A



SECTION B-B

- NOTES:**
1. REFER TO SHEET BR-B102A FOR SHEAR KEY DETAILS.
 2. DESIGNER SHALL USE THE FOLLOWING KEY TO INDICATE STRAND AND DEBONDING PATTERN ON "BEAM PRESTRESSING VIEW", THIS SHEET.
 - ACTIVE STRAND
 - ▽ DEBOND STRAND: LENGTH FROM END OF BEAM
 - △ DEBOND STRAND: LENGTH FROM END OF BEAM
 - DEBOND STRAND: LENGTH FROM END OF BEAM
 3. THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B278, BR-B100, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPLICABLE.

APPROVED: _____ DATE: 07-02-07

DIRECTOR, ENGINEERING DIVISION

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

27" PRESTRESSED CONCRETE
BOX BEAMS
DESIGN AND ASSEMBLY DETAILS

STANDARD SHEET BR-B27A

PREPARED: 07-02-07

REVIEWED: _____

WHEN A POST-TEN ACCESS POCKET IS USED AS DETAILED ON SHEET BR-103 STRANDS IN ROWS 3 AND 4 SHALL BE ELIMINATED. THE BEAM SHALL BE REDESIGNED AS NECESSARY.

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION**

DESIGNED BY: TW/

DRAWN BY: BH/

CHECKED BY: TW/

REVIEWED BY: THB/

DATE: _____

SCALE: _____

SHEET _____ OF _____

BRIDGE NO. _____

27" PRESTRESSED BOX BEAM
DESIGN AND ASSEMBLY DETAILS

MIN. CONCRETE STRENGTH @ RELEASE	= 5500 PSI
MIN. CONCRETE STRENGTH @ 28 DAYS	= 8000 PSI
INITIAL PULL/STRAND	= 33,820 LBS
CROSS-SECTION AREA/STRAND	= 0.167 SQ. IN.

NOTES

3. PREDICTED DESIGN CAMBER VALUES LISTED IN THE TABLE ARE BASED ON EMPIRICAL FORMULAS AND AS SUCH ARE APPROXIMATE. FOR MEMBERS WITH SPAN-TO-DEPTH RATIOS AT OR EXCEEDING 25, THE TOLERANCE VALUES LISTED IN APPENDIX B OF PCI MANUAL FOR QUALITY CONTROL, MN-116, MAY NOT APPLY.

MEASUREMENT OF CAMBER FOR COMPARISON TO PREDICTED DESIGN VALUES SHOULD BE COMPLETED WITHIN 72 HOURS OF RELEASE. ADDITIONALLY, CAMBER SHOULD BE EVALUATED UNDER CONDITIONS THAT MINIMIZE THE EFFECT OF TEMPERATURE VARIATION.

7. THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-821A, BR-8100, BR-8101, BR-8102A & B, BR-8103, BR-8104, BR-8105A & B AND BR-8106 AS APPLICABLE.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION		DESIGNED BY:TW/
		DRAWN BY:TWB/
		CHECKED BY:TW/
		REVIEWED BY:TWB/
		DATE:1
		SCALE:1
DESIGN TABLE FOR 21"		SHEET NO. OF
PRESTRESSED BOX BEAM		BRIDGE NUMBER

MIN. CONCRETE STRENGTH @ RELEASE	= 5500 PSI
MIN. CONCRETE STRENGTH @ 28 DAYS	= 8000 PSI
INITIAL PULL/STRAND	= 33,820 LBS
CROSS-SECTION AREA/STRAND	= 0.167 SQ. IN.

NOTES

4. DESIGNER, FABRICATOR, AND ERECTOR SHALL BE AWARE THAT SKEWED END BEAMS MAY TWIST OR WARP. CAUSING UNEVEN BEAM SEATING AT THE BEARINGS. THE CONTRACTOR IS REQUIRED TO CORRECT AT THE TIME OF ERECTION, BEFORE THE BEAMS ARE SECURED IN PLACE. METHOD OF CORRECTION SHALL PROVIDE AN EVEN, TOTAL BEARING AND A LEVEL TOP BEAM SURFACE. TOLERANCE, AFTER CORRECTION, SHALL BE $(+/-) 1/8$ INCH. THE FABRICATOR SHALL NOTIFY THE CONTRACTOR AND DESIGNER IF CORRECTIONS ARE REQUIRED PRIOR TO SHIPMENT.

5. MAXIMUM BEAM SKEW SHALL BE 30 DEGREES.

6. DESIGNER INPUT VALUES OF NUMBER OF INSERTS, DISTANCE FROM END OF BEAM TO ϕ FIRST INSERT, AND ϕ FIRST INSERT TO ϕ SECOND INSERT. ABOVE VALUES SHALL BE BASED ON THE REQUIRED 6'-3" GUARDRAIL POST SPACING ACROSS THE BRIDGE.

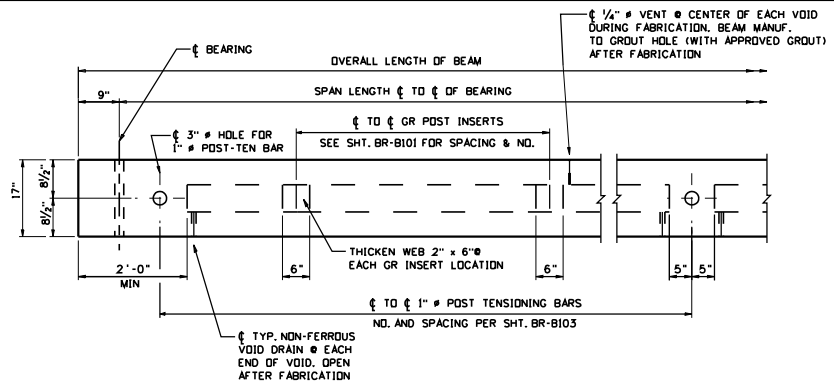
7. SPECIAL STRAND NOTE FOR 17" BOX SECTION ONLY: WHEN TL-2 GUARDRAIL INSERTS ARE REQUIRED THE BOTTOM INSERT (TYPE 2A ANCHOR) CONFLICTS WITH STRAND NO. 15. STRANDS 15 AND 16 HAVE BEEN MOVED TO POSITIONS 17 AND 18. FOR UNIFORMITY PURPOSES, ALL BEAMS OF THE SAME DESIGN SHALL USE SAME STRAND PATTERN.

8. THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B17A, BR-B100, BR-B101, BR-B102A, & BR-B103, BR-B104, BR-B105A & BR-B106 AS APPLICABLE.

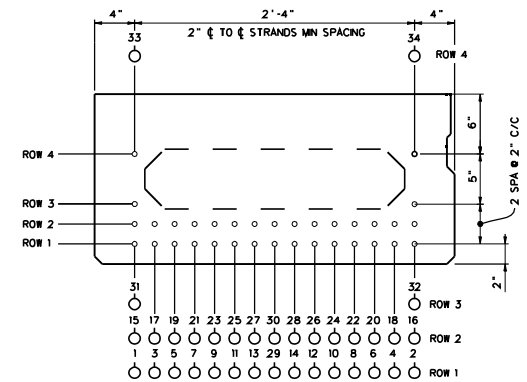
APPROVED _____	DATE _____
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING	

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS ENGINEERING DIVISION		DESIGNED BY:THB/ DRAWN BY:THB/ CHECKED BY:TM/ REVIEWED BY:TW/ DATE: SCALE: SHEET NO. OF BRIDGE NUMBER
7	<div style="border: 1px solid black; height: 150px; width: 100%;"></div>	
07		
	DESIGN TABLE FOR 17"	
	PRESTRESSED BOX BEAM	

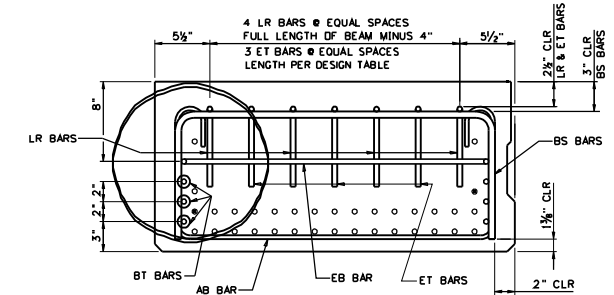
PROJECT NUMBERS		DISTRICT	COUNTY	SHEET NO.	TOTAL
STATE	FEDERAL				



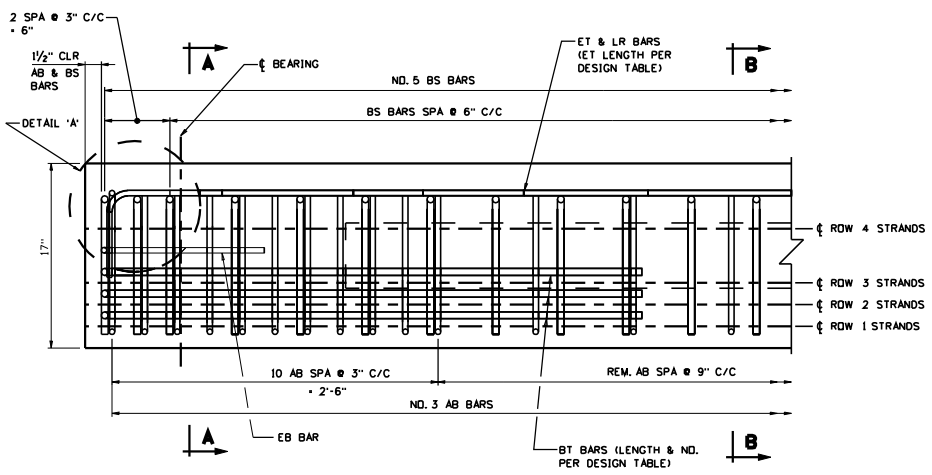
GENERAL ELEVATION VIEW



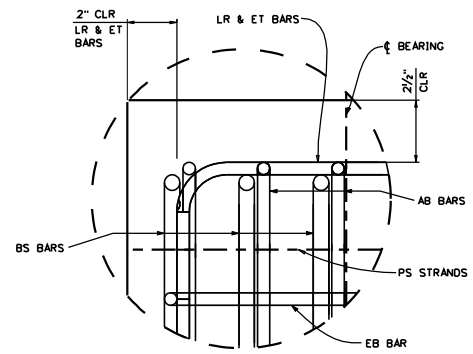
BEAM PRESTRESSING
TYPICAL BEAM END & MIDSPAN



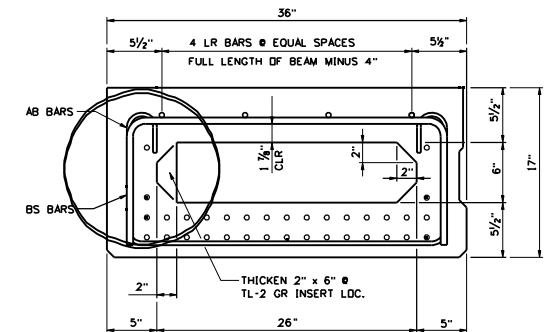
SECTION A-A



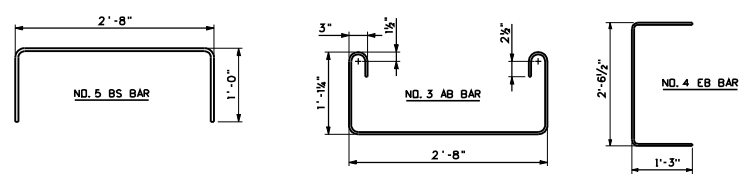
REINFORCING STEEL ELEVATION



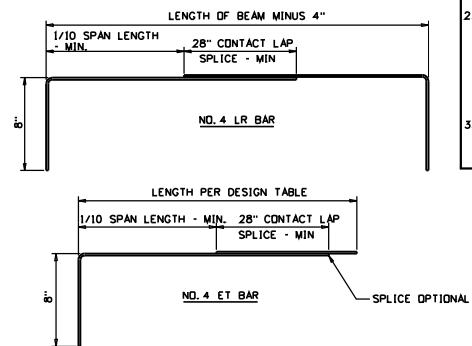
DETAIL "A"



SECTION B-B



REINFORCING BAR DETAIL



NOTES:

- REFER TO SHEET BR-B102A FOR SHEAR KEY DETAILS.
- DESIGNER SHALL USE THE FOLLOWING KEY TO INDICATE STRAND AND DEBONDING PATTERN ON "BEAM PRESTRESSING VIEW", THIS SHEET.
 - ACTIVE STRAND
 - ▽ DEBOND STRAND: LENGTH FROM END OF BEAM
 - △ DEBOND STRAND: LENGTH FROM END OF BEAM
 - DEBOND STRAND: LENGTH FROM END OF BEAM
- THIS SHEET SHALL BE USED IN CONJUNCTION WITH STANDARD SHEETS BR-B178, BR-B100, BR-B101, BR-B102A & B, BR-B103, BR-B104, BR-B105A & B AND BR-B106 AS APPLICABLE.

WHEN A POST-TEN ACCESS POCKET IS USED AS DETAILED ON SHEET BR-B103 STRANDS IN ROWS 3 AND 4 SHALL BE ELIMINATED. THE BEAM SHALL BE REDESIGNED AS NECESSARY.

APPROVED: *Gregory Bailey* DIRECTOR, ENGINEERING DIVISION DATE: 10-25-07

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

17" PRESTRESSED CONCRETE
BOX BEAMS
DESIGN AND ASSEMBLY DETAILS

STANDARD SHEET BR-B17A

PREPARED: 07-02-07

REVISION:

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
ENGINEERING DIVISION

DESIGNED BY:TW/
DRAWN BY:SH/
CHECKED BY:THB/
REVIEWED BY:TW/
DATE:
SCALE:
SHEET
OF
BRIDGE NO.

17" PRESTRESSED BOX BEAM
DESIGN AND ASSEMBLY DETAILS

NO. 5 BT BARS SHALL BE UNCOATED REINFORCING