

REVISED 03-11 - ADDED STANDARD 1021W TO LIST. ADDED A HYPHEN TO THE 1036 BT BEAM STANDARD NUMBERS. ENGLISHBEAMS.DGN - 100-B - THIS SHEET ISSUED 02-10.

INDEX OF BEAM STANDARDS

STANDARD	DESCRIPTION
1008a	ABUTMENT BEARING STANDARDS
1008b	PIER BEARING STANDARDS
1009a	PIER MASONRY PLATE & ROCKER BEARING STANDARDS
1009b	PIER SOLE PLATE & FIXED SHOE BEARING STANDARDS
1010	LOW PROFILE BEARING STANDARD
1021	WELDING DETAILS FOR WELDED GIRDER BRIDGES
1021W	WEATHERING STEEL WELDING DETAILS FOR WELDED GIRDER BRIDGES
1036	STEEL INTERMEDIATE DIAPHRAGMS FOR PCBM BRIDGES
1036A	CONCRETE INTERMEDIATE DIAPHRAGMS FOR PCBM BRIDGES
1036-1-BTB	STEEL INTERMEDIATE DIAPHRAGM STANDARDS (BTB SHEET 1 OF 2)
1036-2-BTB	STEEL INTERMEDIATE DIAPHRAGM STANDARDS (BTB SHEET 2 OF 2)
1036-1-BTC	STEEL INTERMEDIATE DIAPHRAGM STANDARDS (BTC SHEET 1 OF 2)
1036-2-BTC	STEEL INTERMEDIATE DIAPHRAGM STANDARDS (BTC SHEET 2 OF 2)
1036-1-BTD	STEEL INTERMEDIATE DIAPHRAGM STANDARDS (BTD SHEET 1 OF 2)
1036-2-BTD	STEEL INTERMEDIATE DIAPHRAGM STANDARDS (BTD SHEET 2 OF 2)
1036-1-BTE	STEEL INTERMEDIATE DIAPHRAGM STANDARDS (BTE SHEET 1 OF 2)
1036-2-BTE	STEEL INTERMEDIATE DIAPHRAGM STANDARDS (BTE SHEET 2 OF 2)
4541	STUB ABUTMENT BEARING DETAILS - A & B BEAMS PPCB & STEEL BEAM BRIDGES
4541A	STUB ABUTMENT BEARING DETAILS - C & D BEAM BRIDGES
4541B	STUB ABUTMENT BEARING DETAILS - BTB, BTC, BTD, BTE BEAM PPCB BRIDGES
4541C	A & B BEAM PPC BRIDGES - STUB ABUTMENT BEARING DETAILS
4541D	C & D BEAM PPC BRIGES - STUB ABUTMENT BEARING DETAILS
4541E	BTB, BTC, BTD, BTE BEAM PCC BRIDGES - STUB ABUTMENT BEARING DETAILS
4541F	A & B BEAM PPC BRIDGES - PIER BEARING DETAILS
4541G	C & D BEAM PPC BRIDGES - PIER BEARING DETAILS
4541H	BTB, BTC, BTD, BTE BEAM PPC BEAM BRIDGES - PIER BEARING DETAILS
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4611	B34 - B50 BEAM DETAILS
4612	B55 - B67 BEAM DETAILS
4620	C BEAM 30'-0 - 80'-0 SPANS DATA DETAILS
4621	C30 - C46 BEAM DETAILS
4622	C50 - C67 BEAM DETAILS
4623	C71 - C80 BEAM DETAILS
4630	D BEAM 35'-0 - 105'-0 SPANS DATA DETAILS
4631	D35 - LXD40 BEAM DETAILS
4632	D45 - D60 BEAM DETAILS
4633	D65 - D80 BEAM DETAILS
4634	D85 - D95 BEAM DETAILS
4635	D100 - D105 BEAM DETAILS
4636	D110 BEAM 110'-0 SPANS DATA DETAILS
4700	BULB TEE "C" BEAM - 30'-0 - 115'-0 SPANS DATA DETAILS
4701	BULB TEE "C" BEAM - 30'-0 SPAN
4702	BULB TEE "C" BEAM - 35'-0 SPAN
4703	BULB TEE "C" BEAM - 40'-0 SPAN
4704	BULB TEE "C" BEAM - 45'-0 SPAN
4705	BULB TEE "C" BEAM - 50'-0 SPAN
4706	BULB TEE "C" BEAM - 55'-0 SPAN
4707	BULB TEE "C" BEAM - 60'-0 SPAN
4708	BULB TEE "C" BEAM - 65'-0 SPAN
4709	BULB TEE "C" BEAM - 70'-0 SPAN
4710	BULB TEE "C" BEAM - 75'-0 SPAN
4711	BULB TEE "C" BEAM - 80'-0 SPAN

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STANDARD	DESCRIPTION
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4713	BULB TEE "C" BEAM - 90'-0 SPAN
4714	BULB TEE "C" BEAM - 95'-0 SPAN
4715	BULB TEE "C" BEAM - 100'-0 SPAN
4716	BULB TEE "C" BEAM - 105'-0 SPAN
4717	BULB TEE "C" BEAM - 110'-0 SPAN
4718	BULB TEE "C" BEAM - 115'-0 SPAN
4719s1	BULB TEE "C" BEAM - 120'-0 SPANS DATA DETAILS
4719s2	BULB TEE "C" BEAM - 120'-0 SPAN
4730	BULB TEE "D" BEAM - 50'-0 - 130'-0 SPANS DATA DETAILS
4731	BULB TEE "D" BEAM - 50'-0 SPAN
4732	BULB TEE "D" BEAM - 55'-0 SPAN
4733	BULB TEE "D" BEAM - 60'-0 SPAN
4734	BULB TEE "D" BEAM - 65'-0 SPAN
4735	BULB TEE "D" BEAM - 70'-0 SPAN
4736	BULB TEE "D" BEAM - 75'-0 SPAN
4737	BULB TEE "D" BEAM - 80'-0 SPAN
4738	BULB TEE "D" BEAM - 85'-0 SPAN
4739	BULB TEE "D" BEAM - 90'-0 SPAN
4740	BULB TEE "D" BEAM - 95'-0 SPAN
4741	BULB TEE "D" BEAM - 100'-0 SPAN
4742	BULB TEE "D" BEAM - 105'-0 SPAN
4743	BULB TEE "D" BEAM - 110'-0 SPAN
4744	BULB TEE "D" BEAM - 115'-0 SPAN
4745	BULB TEE "D" BEAM - 120'-0 SPAN
4746	BULB TEE "D" BEAM - 125'-0 SPAN
4747	BULB TEE "D" BEAM - 130'-0 SPAN
4748s1	BULB TEE "D" BEAM - 135'-0 SPANS DATA DETAILS
4748s2	BULB TEE "D" BEAM - 135'-0 SPAN
4750	BULB TEE "B" BEAM - 30'-0 - 95'-0 SPANS DATA DETAILS
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4752	BULB TEE "B" BEAM - 35'-0 SPANS
4753	BULB TEE "B" BEAM - 40'-0 SPANS
4754	BULB TEE "B" BEAM - 45'-0 SPANS
4755	BULB TEE "B" BEAM - 50'-0 SPANS
4756	BULB TEE "B" BEAM - 55'-0 SPANS
4757	BULB TEE "B" BEAM - 60'-0 SPANS
4758	BULB TEE "B" BEAM - 65'-0 SPANS
4759	BULB TEE "B" BEAM - 70'-0 SPANS
4760	BULB TEE "B" BEAM - 75'-0 SPANS
4761	BULB TEE "B" BEAM - 80'-0 SPANS
4762	BULB TEE "B" BEAM - 85'-0 SPANS
4763	BULB TEE "B" BEAM - 90'-0 SPANS
4764	BULB TEE "B" BEAM - 95'-0 SPANS
4765	BULB TEE "B" BEAM - 100'-0 & 105'-0 SPANS DATA DETAILS
4766	BULB TEE "B" BEAM - 100'-0 SPANS
4767	BULB TEE "B" BEAM - 105'-0 SPANS

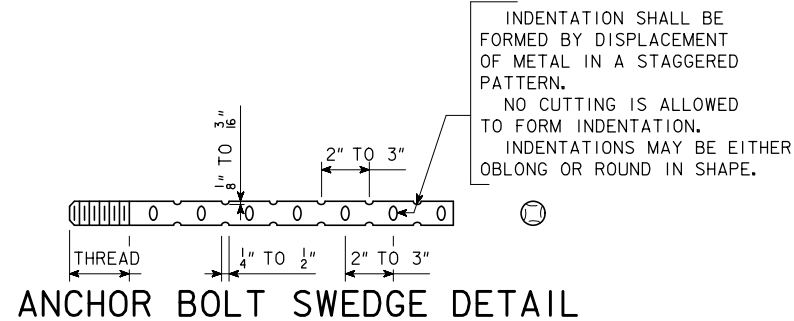
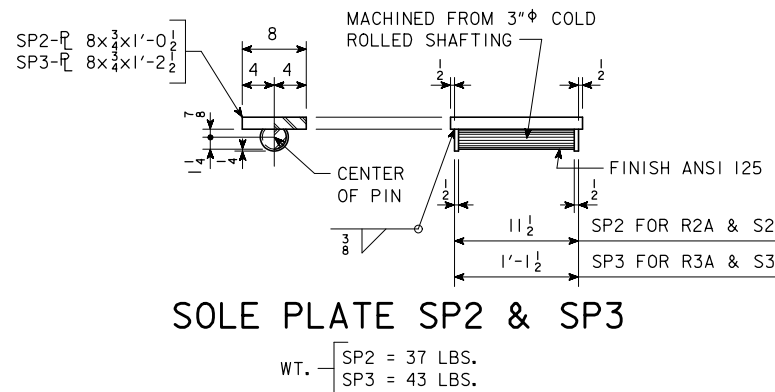
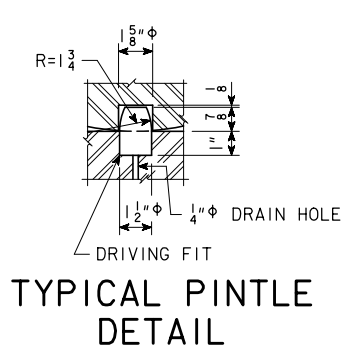
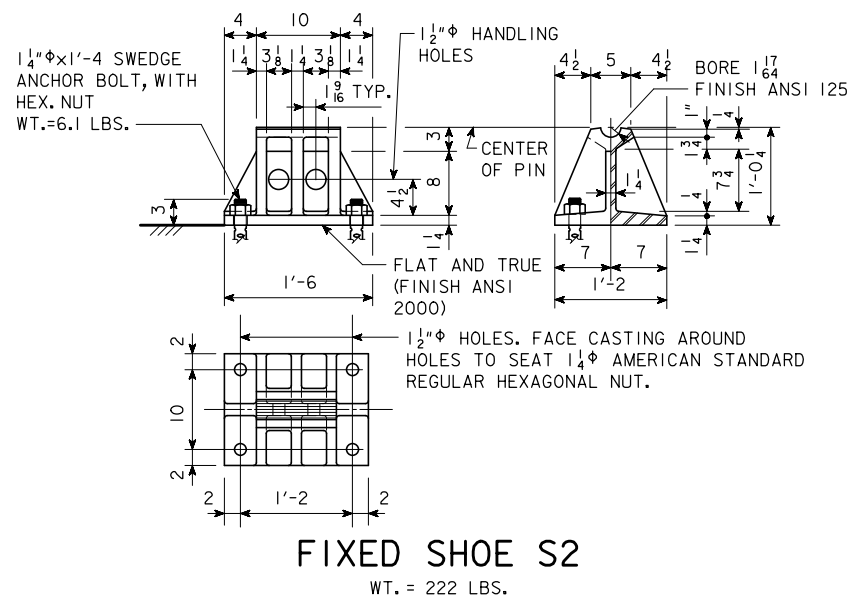
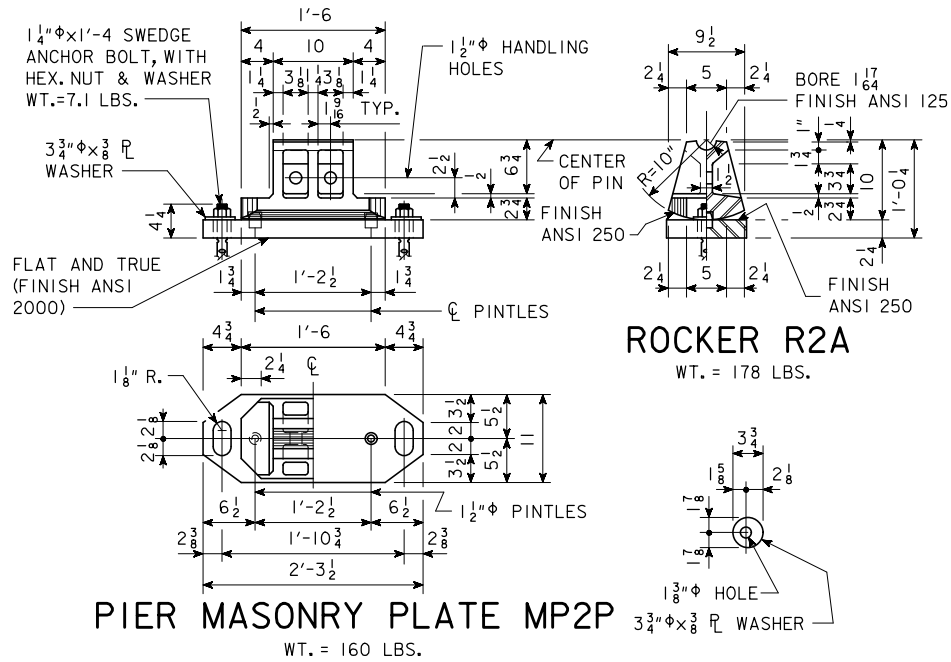
INDEX OF BEAM STANDARDS

STANDARD	DESCRIPTION
4770	BULB TEE "E" BEAM - 60'-0 - 150'-0 SPANS DATA DETAILS - SHEET 1 OF 2
4770	BULB TEE "E" BEAM - 60'-0 - 150'-0 SPANS DATA DETAILS - SHEET 2 OF 2
4771	BULB TEE "E" BEAM - 60'-0 SPANS
4772	BULB TEE "E" BEAM - 65'-0 SPANS
4773	BULB TEE "E" BEAM - 70'-0 SPANS
4774	BULB TEE "E" BEAM - 75'-0 SPANS
4775	BULB TEE "E" BEAM - 80'-0 SPANS
4776	BULB TEE "E" BEAM - 85'-0 SPANS
4777	BULB TEE "E" BEAM - 90'-0 SPANS
4778	BULB TEE "E" BEAM - 95'-0 SPANS
4779	BULB TEE "E" BEAM - 100'-0 SPANS
4780	BULB TEE "E" BEAM - 105'-0 SPANS
4781	BULB TEE "E" BEAM - 110'-0 SPANS
4782	BULB TEE "E" BEAM - 115'-0 SPANS
4783	BULB TEE "E" BEAM - 120'-0 SPANS
4784	BULB TEE "E" BEAM - 125'-0 SPANS
4785	BULB TEE "E" BEAM - 130'-0 SPANS
4786	BULB TEE "E" BEAM - 135'-0 SPANS
4787	BULB TEE "E" BEAM - 140'-0 SPANS
4788	BULB TEE "E" BEAM - 145'-0 SPANS
4789	BULB TEE "E" BEAM - 150'-0 SPANS
4790	BULB TEE "E" BEAM - 155'-0 SPANS DATA DETAILS - SHEET 1 OF 2
4790	BULB TEE "E" BEAM - 155'-0 SPANS - SHEET 2 OF 2

INDEX OF BEAM STANDARDS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 05-14 - ADDED A STATEMENT TO ANCHOR BOLT SWEDGE DETAIL STATING THAT THE SHAPE OF THE INDENTATIONS MAY BE OBLONG OR ROUND IN SHAPE. ENGLISHBEAMS.DGN 1008b - THIS SHEET ISSUED 05-10.



BEARING NOTES:

THE CASTING OF R2A, S2, R3A AND S3 SHALL BE IN ACCORDANCE WITH ARTICLE 4153.04, OF THE STANDARD SPECIFICATIONS. CASTINGS MAY BE GRAY IRON OR NODULAR IRON.

THE PINS SHALL BE IN ACCORDANCE WITH ARTICLE 4153.02, OF THE STANDARD SPECIFICATIONS, AND WITH THE REQUIREMENTS OF ASTM A108 STEEL.

ANCHOR BOLTS SHALL BE SET IN ACCORDANCE WITH ARTICLE 2405.03, H, OF THE STANDARD SPECIFICATIONS.

PREPARATION OF BEARING AREA SHALL BE IN ACCORDANCE WITH ARTICLE 2408.03, M, OF THE STANDARD SPECIFICATIONS. THE BEDDING SHALL BE A SINGLE LAYER OF 1/8 INCH NEOPRENE SHEET.

THE 1/8 INCH NEOPRENE SHEETS ARE TO BE 50, 60, OR 70 DUROMETER HARDNESS AND SHALL BE 1 INCH GREATER IN LENGTH AND WIDTH THAN THE BOTTOM SURFACE OF THE MASONRY PLATES OR STEEL BEARINGS.

AS SOON AS THE SURFACING PROCESS IS DONE, THE SURFACES FINISHED WITH AN ANSI 125 FINISH SHALL BE SHOP COATED WITH AN APPLICATION OF WATERPROOF NATIONAL LUBRICATING GREASE INSTITUTE NO. 3 MULTIPURPOSE GREASE. JUST BEFORE THE ERECTION OF THE STRUCTURAL STEEL IN THE FIELD, THE SHOP COATED SURFACES ARE TO BE WIPED CLEAN AND A FIELD COAT OF NLGI NO. 3 GREASE IS TO BE APPLIED.

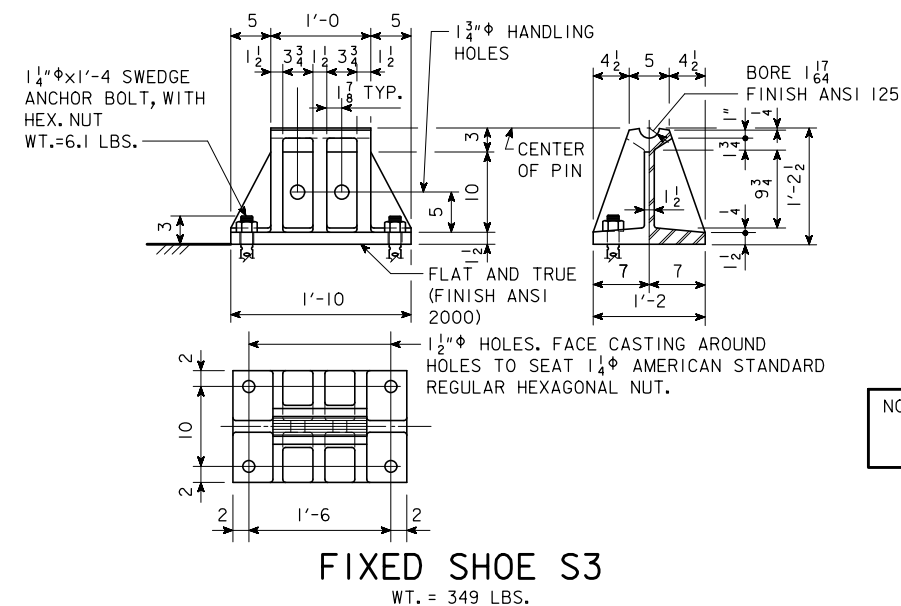
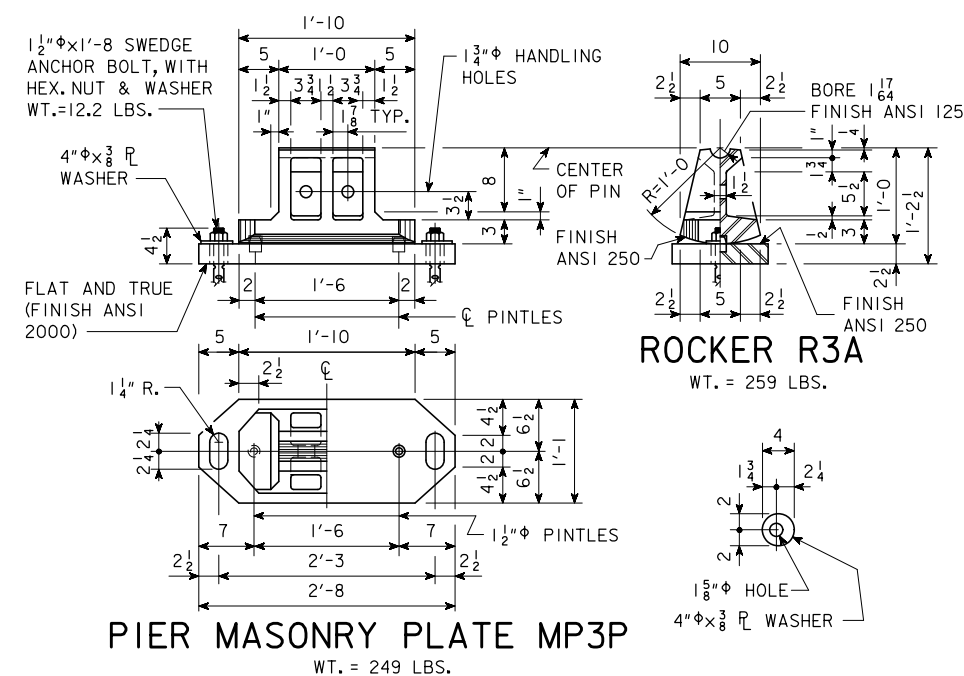
AFTER MASONRY PLATES AND ROCKERS ARE IN CORRECT LOCATION, FILL SLOTTED HOLES AROUND ANCHOR BOLTS WITH A HYDRAULIC CEMENT OR POLYMER GROUT IN ACCORDANCE WITH ARTICLE 2405.03, H, OF THE STANDARD SPECIFICATIONS.

ALL MASONRY PLATES, SWEDGE ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. GALVANIZING SHALL BE IN ACCORDANCE WITH ARTICLE 4100.07, OF THE STANDARD SPECIFICATIONS.

PLATE WASHERS SHALL BE ASTM A709 GRADE 36 (AAHSTO M270 GRADE) STEEL.

DISTANCE FROM TOP OF SOLE PLATE TO BRIDGE SEAT	
ROCKERS & FIXED SHOES	
R2A & S2	1'-2
R3A & S3	1'-4 1/4

* INCLUDING 1/8" NEOPRENE SHEET.

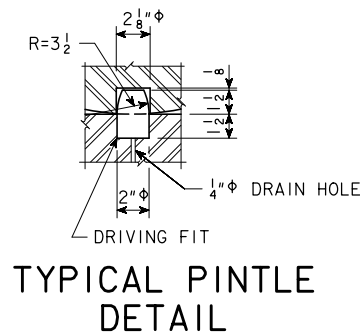
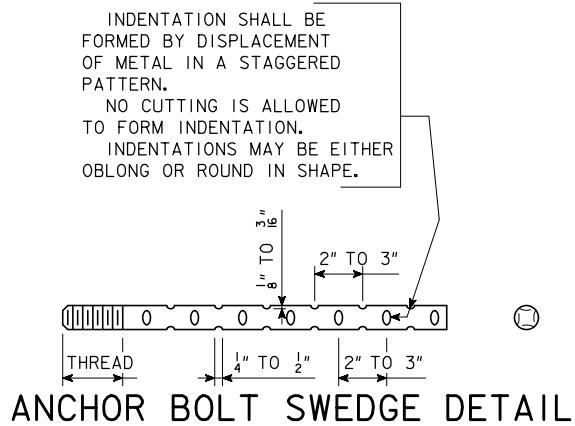
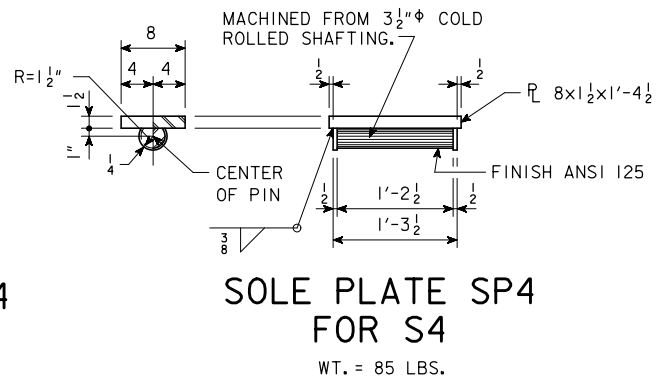
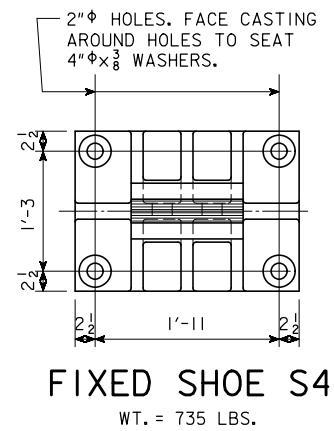
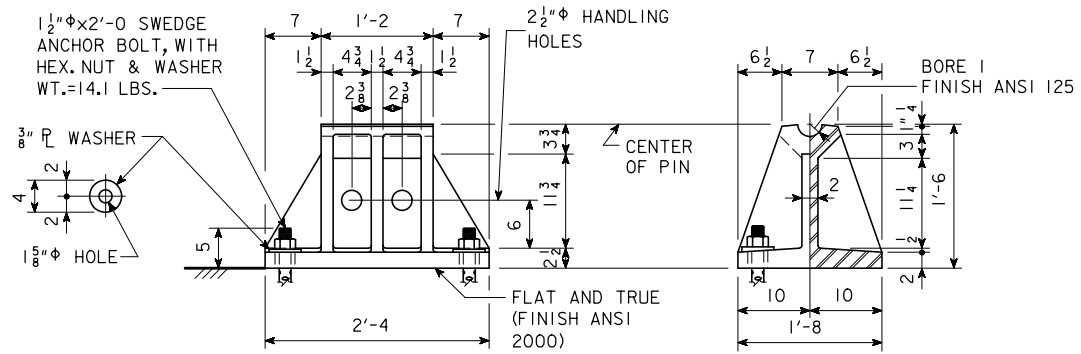


NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.

MAXIMUM REACTION (IN KIPS)	
R2A S2	R3A S3
171	263

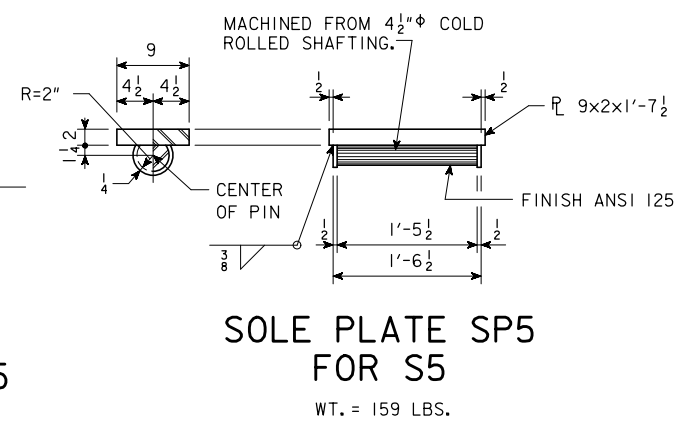
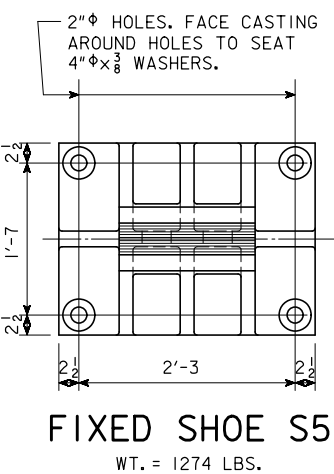
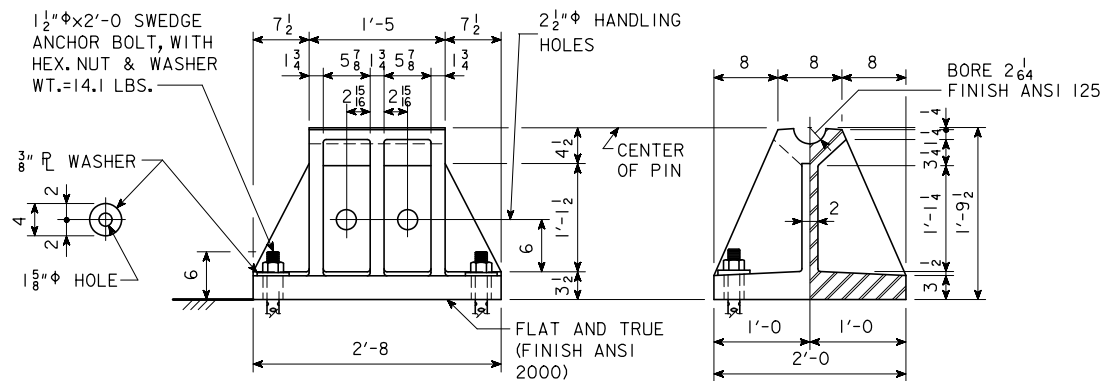
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 05-14 - ADDED A STATEMENT TO ANCHOR BOLT SWEDGE DETAIL STATING THAT THE SHAPE OF THE INDENTATIONS MAY BE OBLONG OR ROUND IN SHAPE. ENGLISHBEAMS.DGN 1009b - THIS SHEET ISSUED 05-10.



BEARING NOTES:

CASTINGS S4 AND S5 SHALL BE NODULAR IRON CASTINGS IN ACCORDANCE WITH ARTICLE 4153.04, OF THE STANDARD SPECIFICATIONS. ANCHOR BOLTS SHALL BE SET IN ACCORDANCE WITH ARTICLE 2405.03, H, OF THE STANDARD SPECIFICATIONS. PREPARATION OF BEARING AREA SHALL BE IN ACCORDANCE WITH ARTICLE 2408.03, M, OF THE STANDARD SPECIFICATIONS. THE BEDDING SHALL BE A SINGLE LAYER OF 1/8 INCH NEOPRENE SHEET. THE 1/8 INCH NEOPRENE SHEETS ARE TO BE 50, 60, OR 70 DUROMETER HARDNESS AND SHALL BE 1 INCH GREATER IN LENGTH AND WIDTH THAN THE BOTTOM SURFACE OF THE MASONRY PLATES OR STEEL BEARINGS. AS SOON AS THE SURFACING PROCESS IS DONE, THE SURFACES FINISHED WITH AN ANSI 125 FINISH SHALL BE SHOP COATED WITH AN APPLICATION OF WATERPROOF NATIONAL LUBRICATING GREASE INSTITUTE NO. 3 MULTIPURPOSE GREASE. JUST BEFORE THE ERECTION OF THE STRUCTURAL STEEL IN THE FIELD, THE SHOP COATED SURFACES ARE TO BE WIPED CLEAN AND A FIELD COAT OF NLGI NO. 3 GREASE IS TO BE APPLIED. ALL MASONRY PLATES, SWEDGE ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. GALVANIZING SHALL BE IN ACCORDANCE WITH ARTICLE 4100.07, OF THE STANDARD SPECIFICATIONS. PLATE WASHERS SHALL BE ASTM A709 GRADE 36 (AAHSTO M270 GRADE) STEEL.



DISTANCE FROM TOP OF SOLE PLATE TO BRIDGE SEAT

	FIXED SHOES
S4	1'-8 5/8
S5	2'-0 7/8

* INCLUDING 1/8" NEOPRENE SHEET.

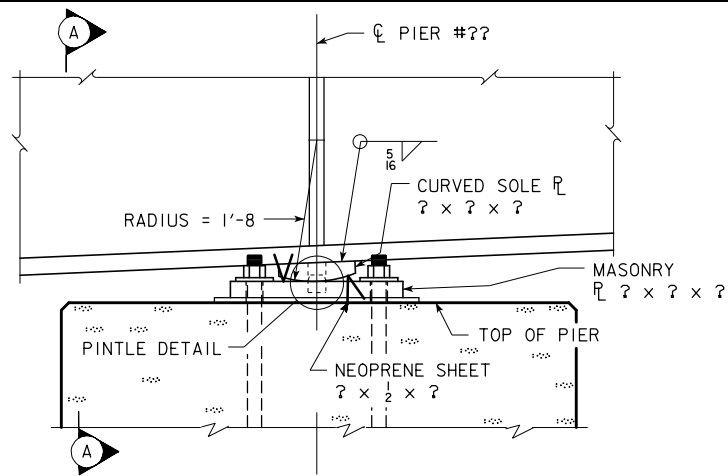
MAXIMUM REACTION (IN KIPS)

S4	S5
475	650

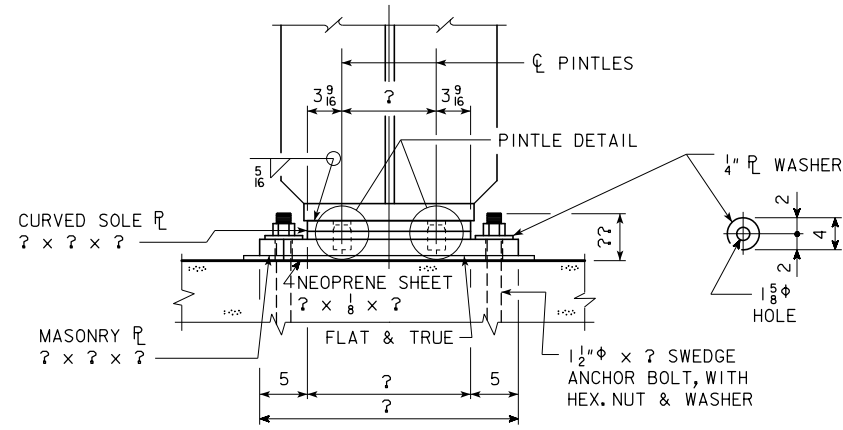
NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
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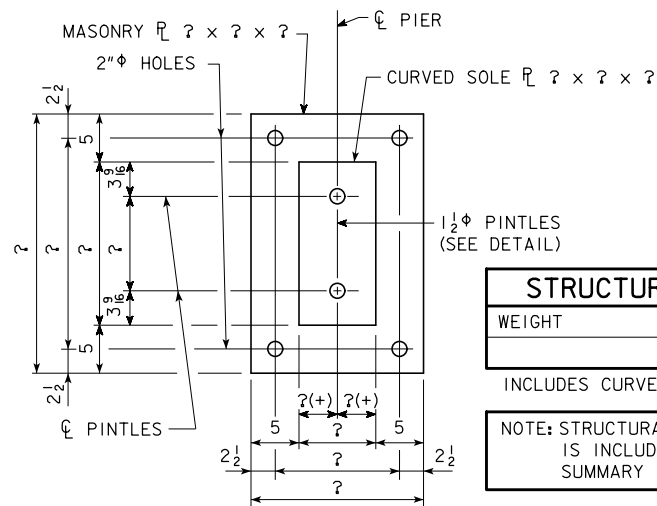
CORRECTION 05-14 - ADDED A STATEMENT TO ANCHOR BOLT SWEDGE DETAIL STATING THAT THE SHAPE OF THE INDENTATIONS MAY BE OBLONG OR ROUND IN SHAPE. ENGLISHBEAMS.DGN 1010 - THIS SHEET ISSUED 09-03



PART ELEVATION



SECTION A-A



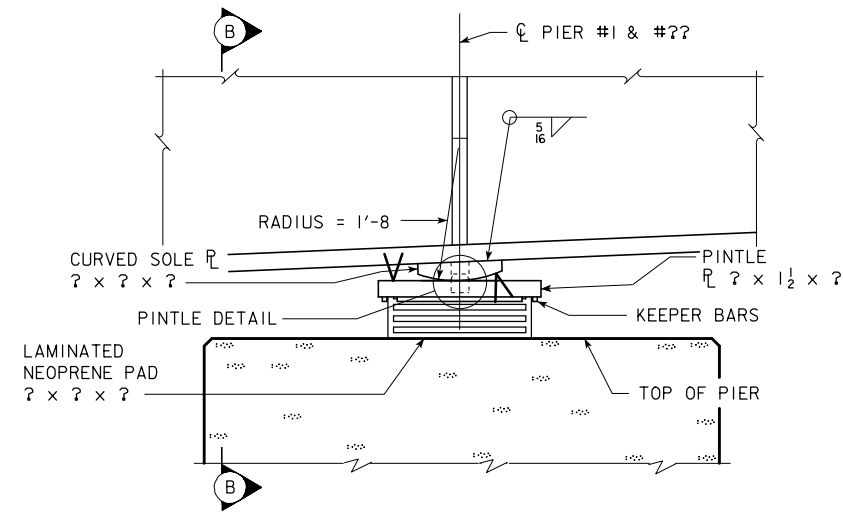
PLAN VIEW OF MASONRY AND SOLE PLATES
FIXED PIER

MASONRY / CURVED SOLE PLATE ASSEMBLY

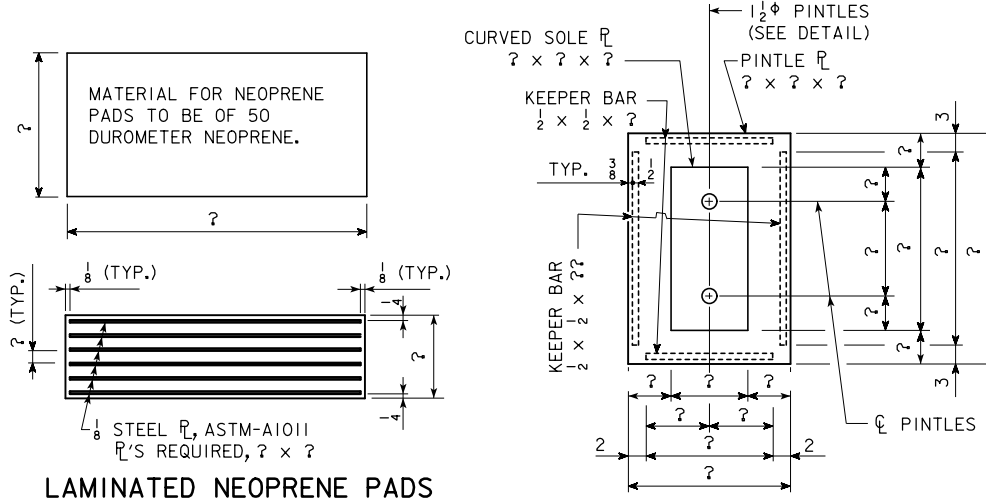
STRUCTURAL STEEL	
WEIGHT	LBS.

INCLUDES CURVED SOLE PLATE

NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.

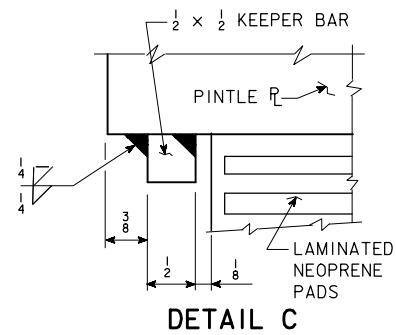


PART ELEVATION

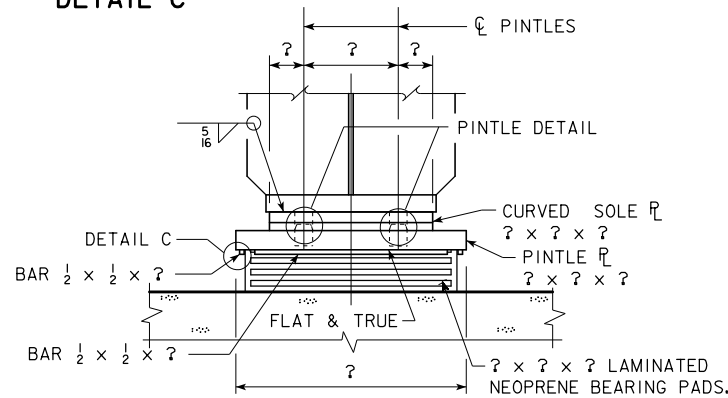


LAMINATED NEOPRENE PADS

PLAN OF PINTLE PLATE

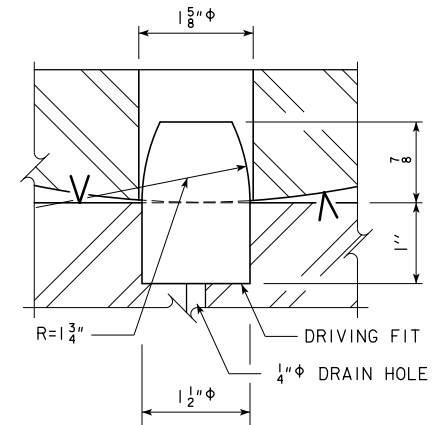


DETAIL C



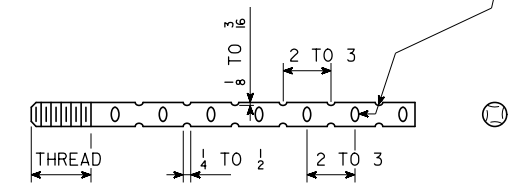
SECTION B-B
EXPANSION PIER

LAMINATED NEOPRENE PAD / CURVED SOLE PLATE ASSEMBLY



PINTLE DETAIL

INDENTATION SHALL BE FORMED BY DISPLACEMENT OF METAL IN A STAGGERED PATTERN. NO CUTTING IS ALLOWED TO FORM INDENTATION. INDENTATIONS MAY BE EITHER OBLONG OR ROUND IN SHAPE.



ANCHOR BOLT SWEDGE DETAIL

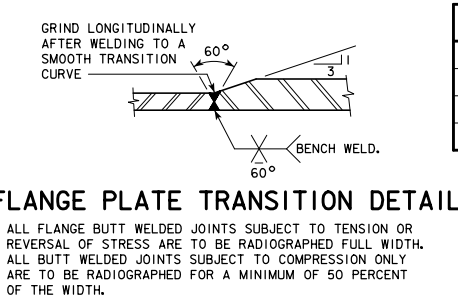
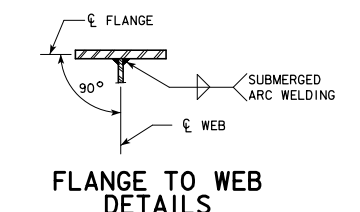
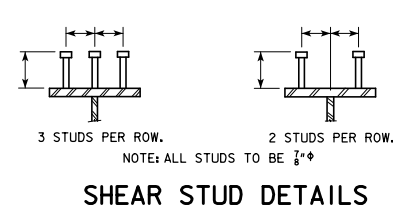
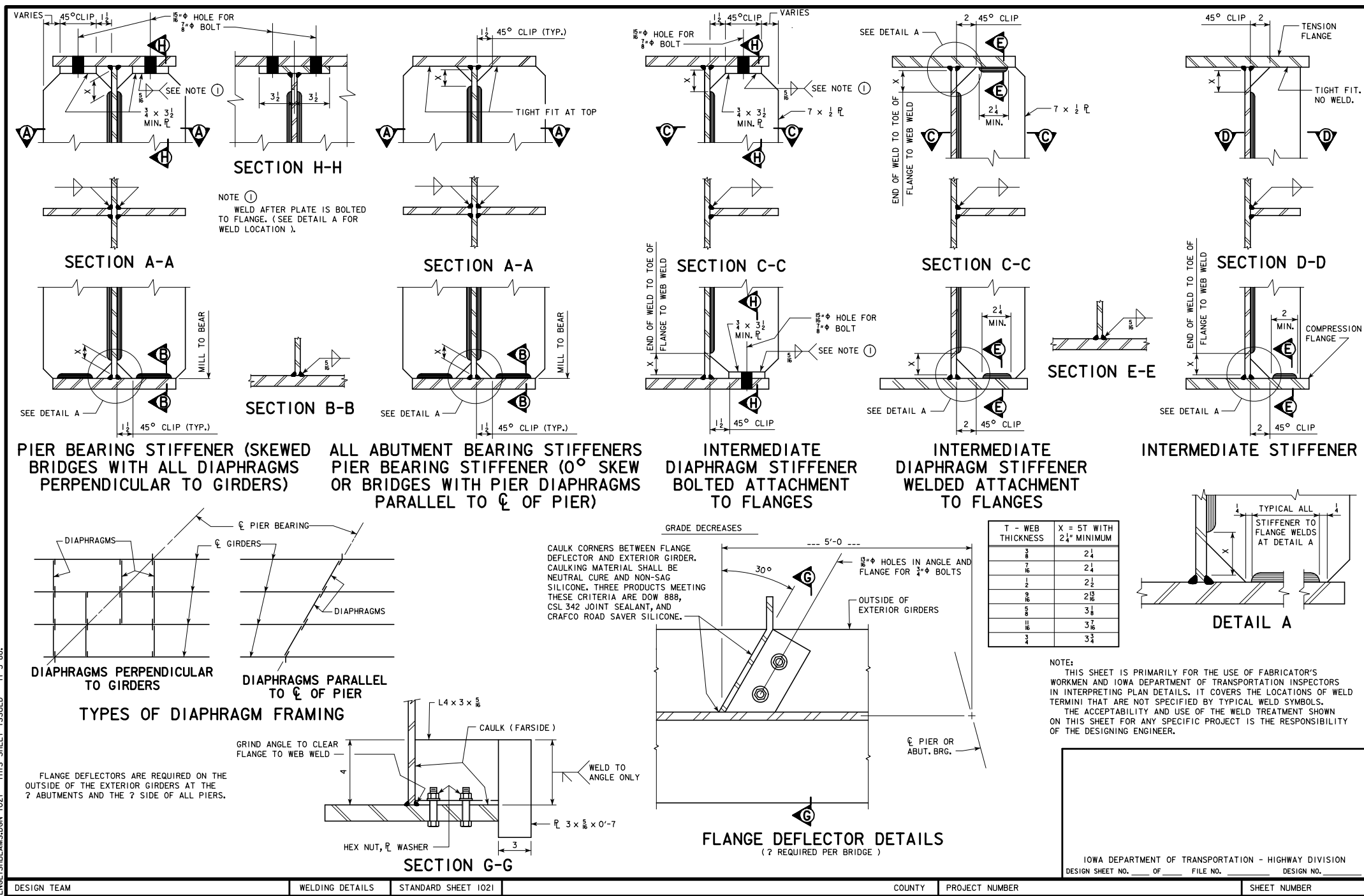
BEARING NOTES:

- SURFACES MARKED "V" SHALL BE FINISHED ANSI 250.
- MASONRY PLATES ARE TO BE SET ON A 1/8 INCH NEOPRENE SHEET.
- THE 1/8 INCH NEOPRENE SHEETS ARE TO BE 50, 60, OR 70 DUROMETER HARDNESS AND SHALL BE 1 INCH GREATER IN LENGTH AND WIDTH THAN THE BOTTOM SURFACE OF THE MASONRY PLATES OR STEEL BEARINGS.
- PINTLE PLATES, SOLE PLATES, ANCHOR BOLTS, AND MASONRY PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. COST OF NEOPRENE BEARING PADS AND 1/8 INCH NEOPRENE SHEETS SHALL BE CONSIDERED INCIDENTAL TO THE BID ITEM "STRUCTURAL STEEL".
- THE PINTLE PLATES, KEEPER BARS, AND MASONRY PLATES SHALL BE GALVANIZED. WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACES OF THE PINTLE PLATE IN CONTACT WITH THE CURVED SOLE PLATE AND THE LAMINATED NEOPRENE PAD SHALL BE FREE OF PROJECTIONS DUE TO GALVANIZING.
- CURVED SOLE PLATES SHALL COMPLY WITH ASTM A709 GRADE 50W AND PAINTED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
- KEEPER BARS, PINTLE PLATES AND MASONRY PLATES SHALL COMPLY WITH ASTM A709 GRADE 50.
- ANCHOR BOLTS, NUTS AND WASHERS SHALL MEET THE REQUIREMENTS OF I.M. 453.08.

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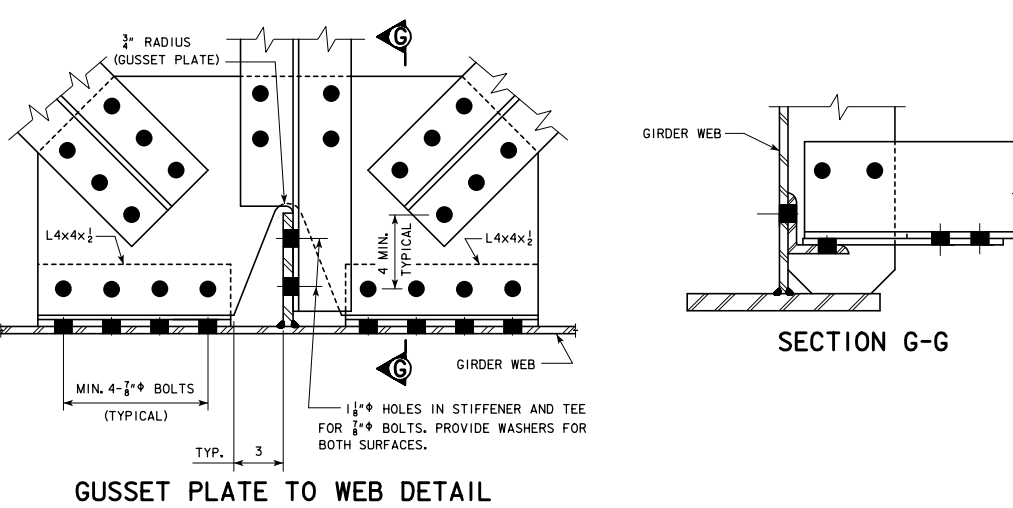
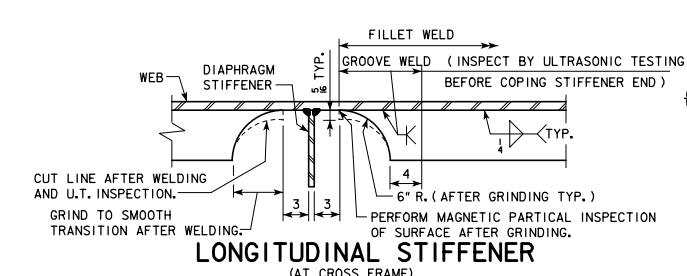
REVISED: LONGITUDINAL STIFFENER DETAIL CHANGED. ARCH. TAPE NO. 91. DATE 7-27-92.
 REVISED: LONGITUDINAL STIFFENER WELD DETAILS CHANGED. ARCH. TAPE NO. 14. DATED 7-27-92.
 REVISED: LONGITUDINAL STIFFENER WELD DETAILS CHANGED. ARCH. TAPE NO. 14. DATED 7-27-92.
 REVISED: 10-10-94: PIER AND ABUTMENT BEARING STIFFENER WELD DETAILS CHANGED.
 REVISED: 10-00: FLANGE DEFLECTOR DETAIL ADDED. LONGIT. STIFFENER GUSSET PLATE TO WEB AND SECTION G-G MOVED OUTSIDE OF BORDER.
 CORRECTION 10-01 - PAINTING NOTE ON FLANGE DEFLECTOR UPDATED.
 REVISED 09-03 - CHANGES SECTION C-G.
 REVISED 03-12 - REVISED THE DESCRIPTION FOR INTERMEDIATE DIAPHRAGM STIFFENERS TO ELIMINATE CASE I & II LIVE LOAD DESCRIPTIONS.

REVISED: 04-12 - ADDED A THIRD CAULKING COMPANY TO THE LISTING FOR THE FLANGE DEFLECTOR.
 ENGLISHBEAMS.DGN 1021 - THIS SHEET ISSUED 11-3-88.



FLANGE TO WEB WELD SIZE

SIZE OF WELD	FLANGE THICKNESS



REVISED 03-12 - REVISED THE DESCRIPTION FOR INTERMEDIATE DIAPHRAGM STIFFENERS TO ELIMINATE CASE I & II LIVE LOAD DESCRIPTIONS.

REVISED 04-12 - ADDED A THIRD CAULKING COMPANY TO THE LISTING FOR THE FLANGE DEFLECTOR.
ENGLISH BEAMS SIGN 1021W - THIS SHEET ISSUED 03-11.

SECTION H-H
VARIES 45° CLIP 1 1/2
HOLE FOR BOLT
SEE NOTE ①
3/4 x 3/4 MIN. R
TIGHT FIT AT TOP

SECTION A-A
NOTE ①
WELD AFTER PLATE IS BOLTED TO FLANGE. (SEE DETAIL A FOR WELD LOCATION).

SECTION B-B
SEE DETAIL A
45° CLIP (TYP.)
MILL TO BEAR

SECTION C-C
VARIES 45° CLIP
HOLE FOR BOLT
SEE NOTE ①
3/4 x 3/4 MIN. R
7 x 1/2 R
END OF WELD TO TOE OF FLANGE TO WEB WELD

SECTION D-D
45° CLIP 2
TENSION FLANGE
TIGHT FIT. NO WELD.

SECTION E-E
2 1/4 MIN.
45° CLIP 2
END OF WELD TO TOE OF FLANGE TO WEB WELD

SECTION G-G
L4 x 3 x 3/8
CAULK (FARSIDE)
GRIND ANGLE TO CLEAR FLANGE TO WEB WELD
WELD TO ANGLE ONLY
HEX NUT, R WASHER
3 x 3/8 x 0'-7"

PIER BEARING STIFFENER (SKEWED BRIDGES WITH ALL DIAPHRAGMS PERPENDICULAR TO GIRDERS)

ALL ABUTMENT BEARING STIFFENERS (0° SKEW OR BRIDGES WITH PIER DIAPHRAGMS PARALLEL TO C OF PIER)

INTERMEDIATE DIAPHRAGM STIFFENER BOLTED ATTACHMENT TO FLANGES

INTERMEDIATE DIAPHRAGM STIFFENER WELDED ATTACHMENT TO FLANGES

INTERMEDIATE STIFFENER

TYPES OF DIAPHRAGM FRAMING

DIAPHRAGMS PERPENDICULAR TO GIRDERS

DIAPHRAGMS PARALLEL TO C OF PIER

FLANGE DEFLECTOR DETAILS
(? REQUIRED PER BRIDGE)

GRADE DECREASES
5'-0"
30°
CAULK CORNERS BETWEEN FLANGE DEFLECTOR AND EXTERIOR GIRDER. CAULKING MATERIAL SHALL BE NEUTRAL CURE AND NON-SAG SILICONE. THREE PRODUCTS MEETING THESE CRITERIA ARE DOW 888, CSL 342 JOINT SEALANT, AND CRAFCO ROAD SAVER SILICONE.

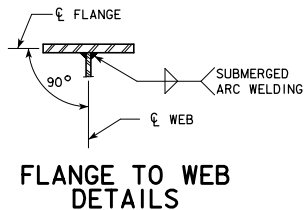
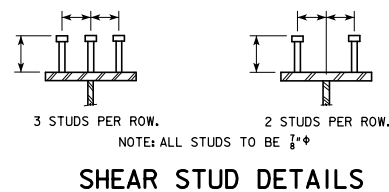
T - WEB THICKNESS	X = 5T WITH 2 1/4" MINIMUM
3/8	2 1/4
7/16	2 1/4
1/2	2 1/2
9/16	2 3/4
5/8	3 1/4
11/16	3 1/2
3/4	3 3/4

NOTE:
THIS SHEET IS PRIMARILY FOR THE USE OF FABRICATOR'S WORKMEN AND IOWA DEPARTMENT OF TRANSPORTATION INSPECTORS IN INTERPRETING PLAN DETAILS. IT COVERS THE LOCATIONS OF WELD TERMINI THAT ARE NOT SPECIFIED BY TYPICAL WELD SYMBOLS. THE ACCEPTABILITY AND USE OF THE WELD TREATMENT SHOWN ON THIS SHEET FOR ANY SPECIFIC PROJECT IS THE RESPONSIBILITY OF THE DESIGNING ENGINEER.

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

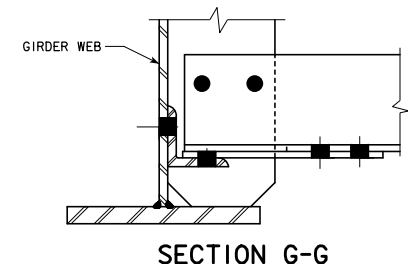
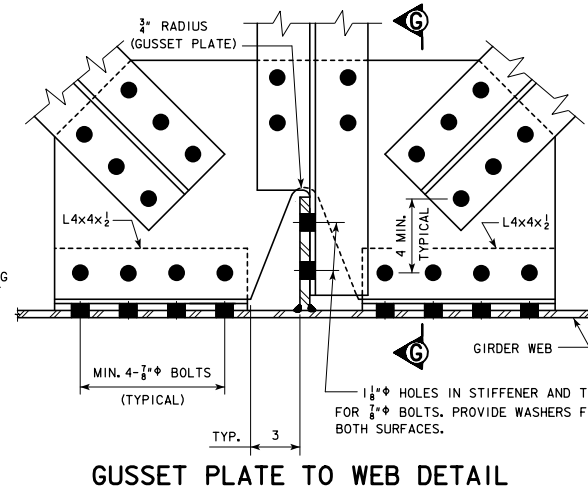
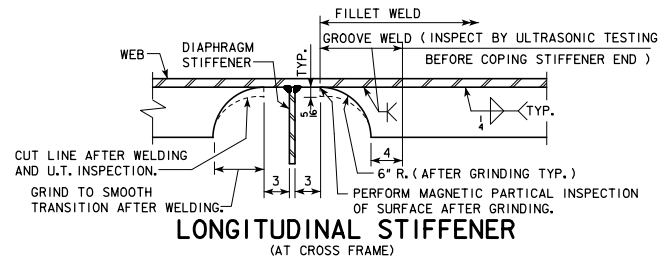
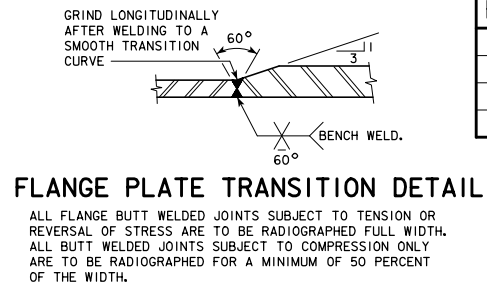
DESIGN TEAM WEATHERING STEEL WELDING DETAILS STANDARD SHEET 1021W COUNTY PROJECT NUMBER SHEET NUMBER

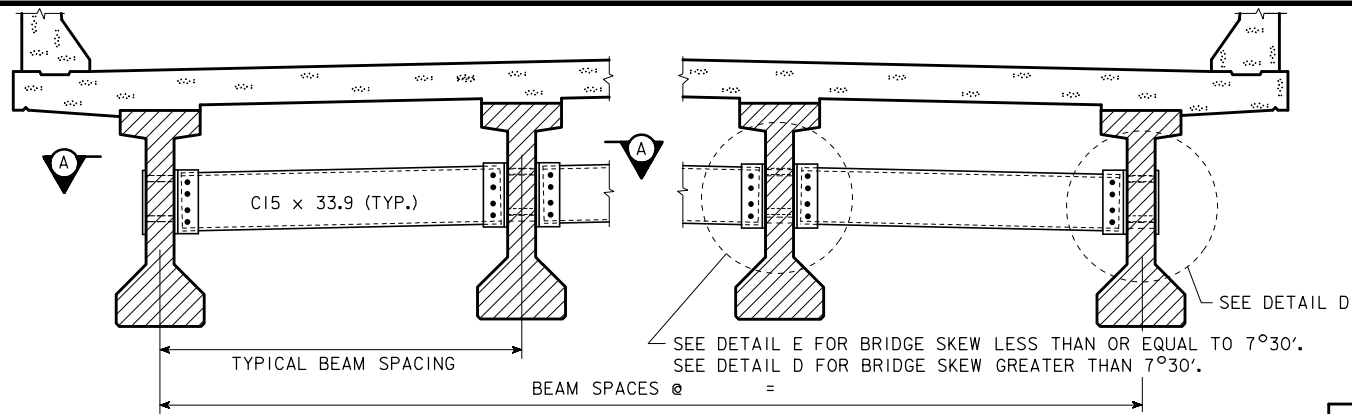
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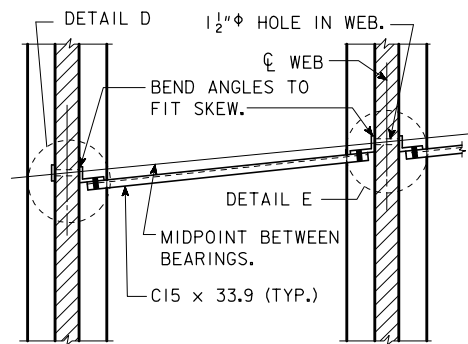
FLANGE TO WEB WELD SIZE

SIZE OF WELD	FLANGE THICKNESS



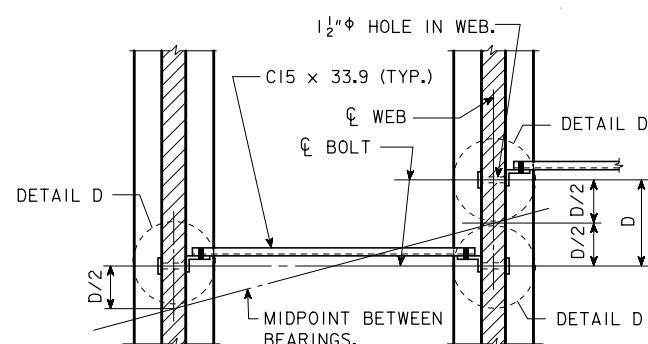


SECTION SHOWING INTERMEDIATE DIAPHRAGM



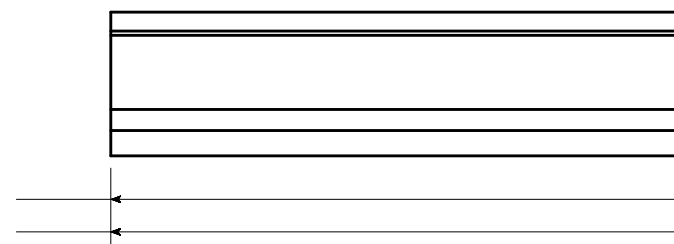
SECTION A-A

FOR BRIDGES SKEWED LESS THAN OR EQUAL TO 7°30'

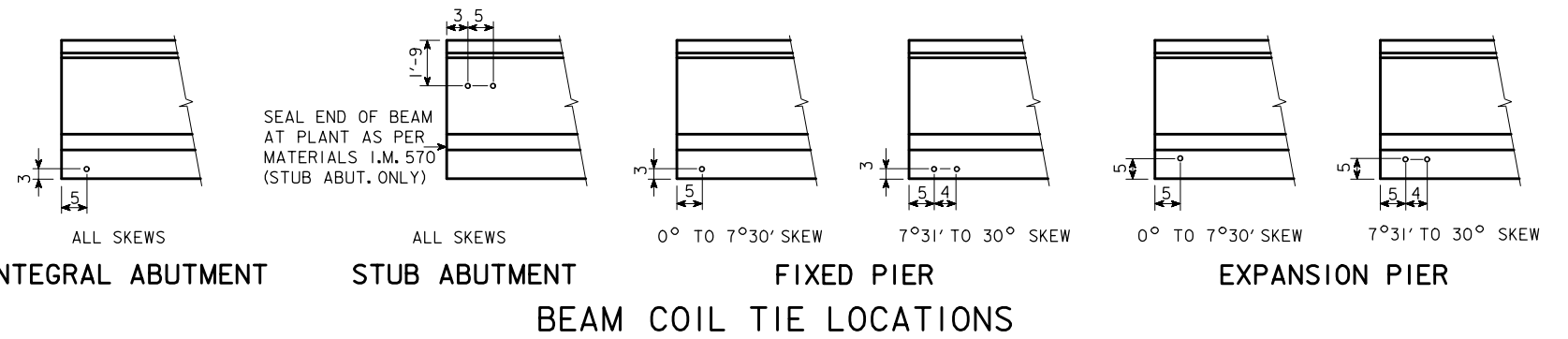


SECTION A-A

FOR BRIDGES SKEWED GREATER THAN 7°30'



INTERMEDIATE DIAPHRAGM BOLT LOCATIONS



INTEGRAL ABUTMENT

STUB ABUTMENT

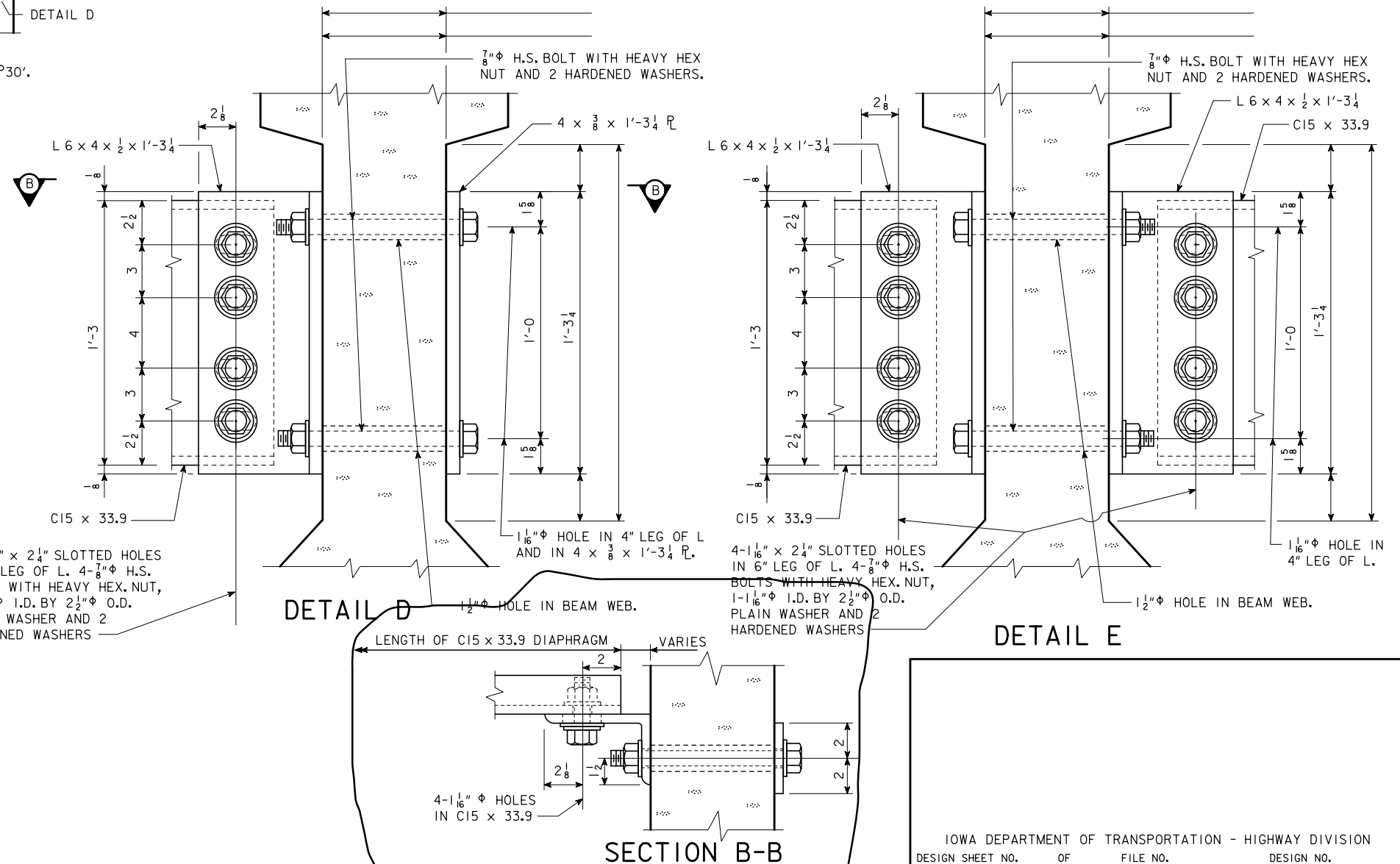
FIXED PIER

EXPANSION PIER

BEAM COIL TIE LOCATIONS

NOTES:
 ALL DIAPHRAGM MATERIALS, INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED.
 SHOP DRAWINGS OF THE STEEL DIAPHRAGMS SHOWING LAYOUT AND DETAILS OF THE DIAPHRAGMS SHALL BE SUBMITTED FOR APPROVAL.
 ALL COSTS FOR FURNISHING AND INSTALLING STEEL INTERMEDIATE DIAPHRAGMS SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.
 THE 1 1/2" H.OLES FOR THE 7/8" H.S. BOLTS SHALL BE CAST INTO THE WEB. DRILLING IS NOT ALLOWED.
 THE 7/8" H.S. BOLTS THROUGH THE WEB SHALL HAVE A THREAD LENGTH OF 3 INCH MIN. AND 4 INCH MAX. AND SHALL MEET THE REQUIREMENTS OF ASTM A449.
 ALL BOLTS ARE TO BE TIGHTENED PRIOR TO PLACING BRIDGE FLOOR CONCRETE WITH THE FOLLOWING EXCEPTION: BOLTS IN DIAPHRAGMS LOCATED UNDER LONGITUDINAL BRIDGE FLOOR CONSTRUCTION JOINTS SHALL NOT BE TIGHTENED UNTIL STAGE TWO OF THE BRIDGE FLOOR HAS BEEN PLACED.

INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL											
ONE CONNECTION DETAIL "E"											WEIGHT
2 - 7/8" x LENGTH H.S. BOLTS WITH NUTS AND WASHERS											
WEB THICKNESS	LENGTH OF H.S. BOLTS		WEIGHT PER DETAIL "E"		NUMBER OF DETAIL "E"						
6"	9"		4.30 LBS.								
7"	10"		4.66 LBS.								
9"	12"		5.34 LBS.								
2 - L 6 x 4 x 1/2 x 1'-3 1/4" = 41.2 LBS.											
ONE CONNECTION DETAIL "D"											WEIGHT
2 - 7/8" x LENGTH H.S. BOLTS WITH NUTS AND WASHERS											
WEB THICKNESS	LENGTH OF H.S. BOLTS		WEIGHT PER DETAIL "D"		NUMBER OF DETAIL "D"						
6"	9"		4.30 LBS.								
7"	10"		4.66 LBS.								
9"	12"		5.34 LBS.								
1 - BACKING PL 4 x 3/8 x 1'-3 1/4" = 6.5 LBS.											
1 - L 6 x 4 x 1/2 x 1'-3 1/4" = 20.6 LBS.											
ONE C15 x 33.9 DIAPHRAGM											
BEAM SPACING	6'-9"		6'-10"		6'-7 3/16"		7'-3"		7'-4 13/16"		
WEB THICKNESS	* LENGTH	UNIT WEIGHT (LBS.)	* LENGTH	UNIT WEIGHT (LBS.)	* LENGTH	UNIT WEIGHT (LBS.)	* LENGTH	UNIT WEIGHT (LBS.)	* LENGTH	UNIT WEIGHT (LBS.)	
6"	5'-11 5/8"	202.3	6'-0 5/8"	205.2	5'-9 3/4"	197.2	6'-5 5/8"	219.3	6'-7 7/16"	224.4	
7"	5'-10 5/8"	199.5	5'-11 5/8"	202.3	5'-8 3/4"	194.4	6'-4 5/8"	216.5	6'-6 7/16"	221.5	
9"	5'-8 5/8"	193.9	5'-9 5/8"	196.7	5'-6 3/4"	188.7	6'-2 5/8"	210.8	6'-4 1/16"	215.5	
* THE LENGTH OF THE C15 x 33.9 SHOWN IN THE TABLE IS BASED ON A VARIABLE CLEARANCE OF 1 1/16" TO 2 1/16" BETWEEN THE FACE OF BEAM WEB AND END OF C15 x 33.9.											
DIAPHRAGM WEIGHTS											
UNIT WEIGHT						NUMBER OF DIAPHRAGMS					
LBS.											
LBS.											
DIAPHRAGM CONNECTION BOLTS											
8 - 7/8" x 0'-2 3/4" H.S. BOLTS WITH NUTS AND WASHERS, PER UNIT DIAPHRAGM						NUMBER OF DIAPHRAGMS					
10.3 LBS.											
INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL (TOTAL LBS.)											



DETAIL D

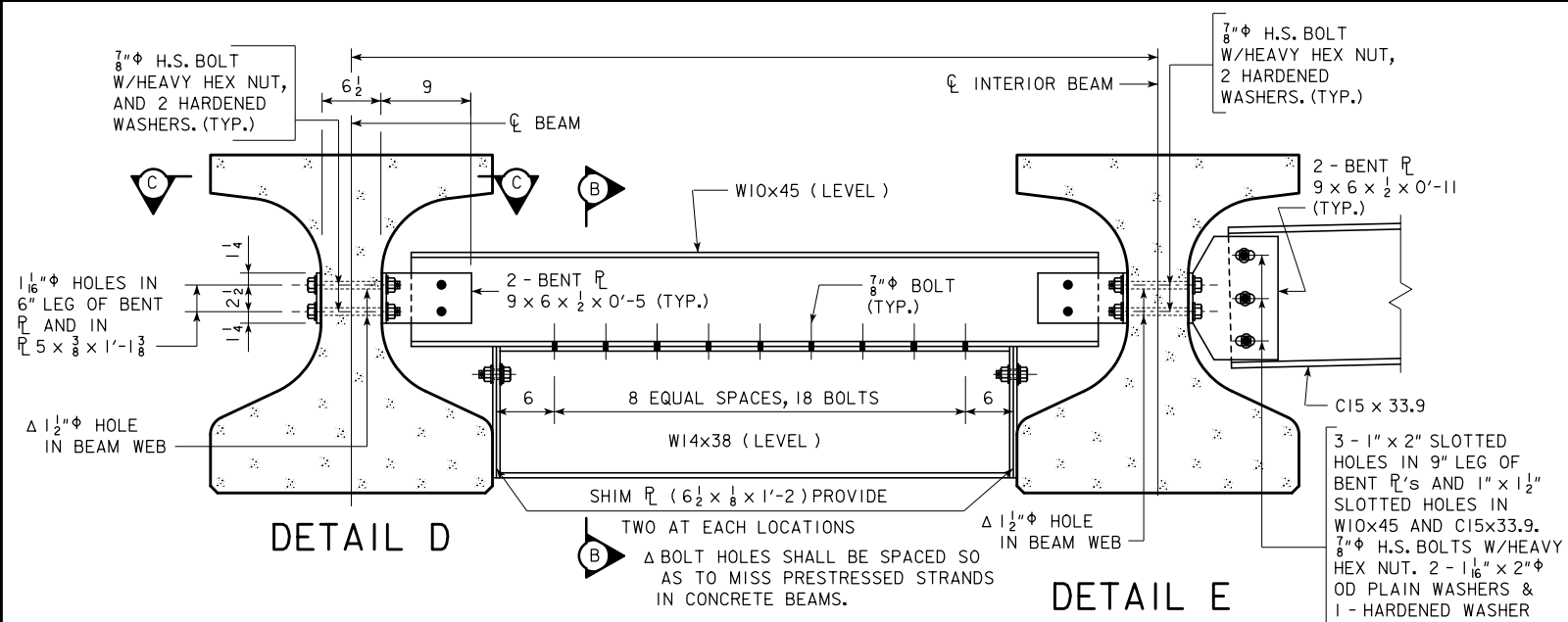
DETAIL E

SECTION B-B

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISION 09-12 - ALTERNATE SECTION B-B ADDED OUTSIDE OF BORDER SHEET.
 ENGLISHBEAMS.DGN 1036 - THIS SHEET ISSUED 9-8-88

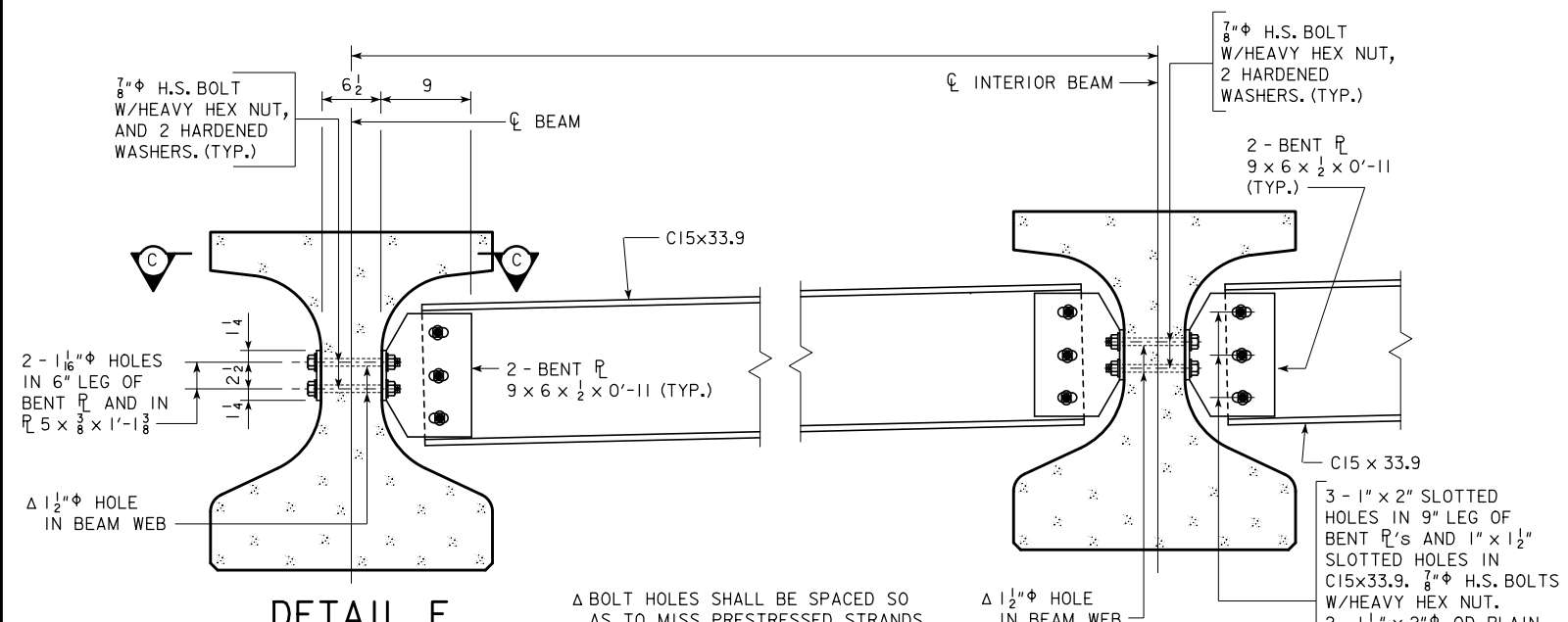
ENGLISHBEAMS.DGN - 1036-2-BTB - THIS SHEET ISSUED 06-14, SHEET 2 OF 2.



DETAIL D

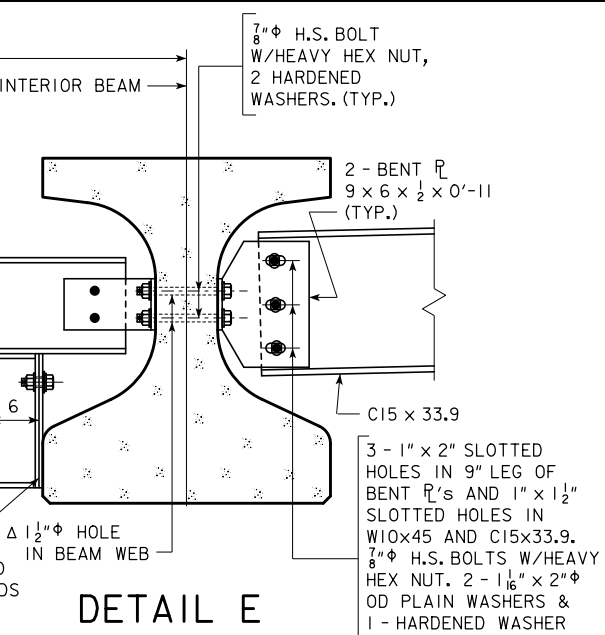
SECTION SHOWING INTERMEDIATE DIAPHRAGMS AT EXTERIOR BAY OVER TRAVELED ROADWAY SPANS

NOTE: W10x45 AND W14x38 SHALL BE INSTALLED ONLY IN THE OUTSIDE BAYS OVER THE TRAVELED ROADWAY.



DETAIL F

SECTION SHOWING INTERMEDIATE DIAPHRAGMS AT EXTERIOR BAY OVER NON-TRAVELED ROADWAY SPANS AND WATERWAYS

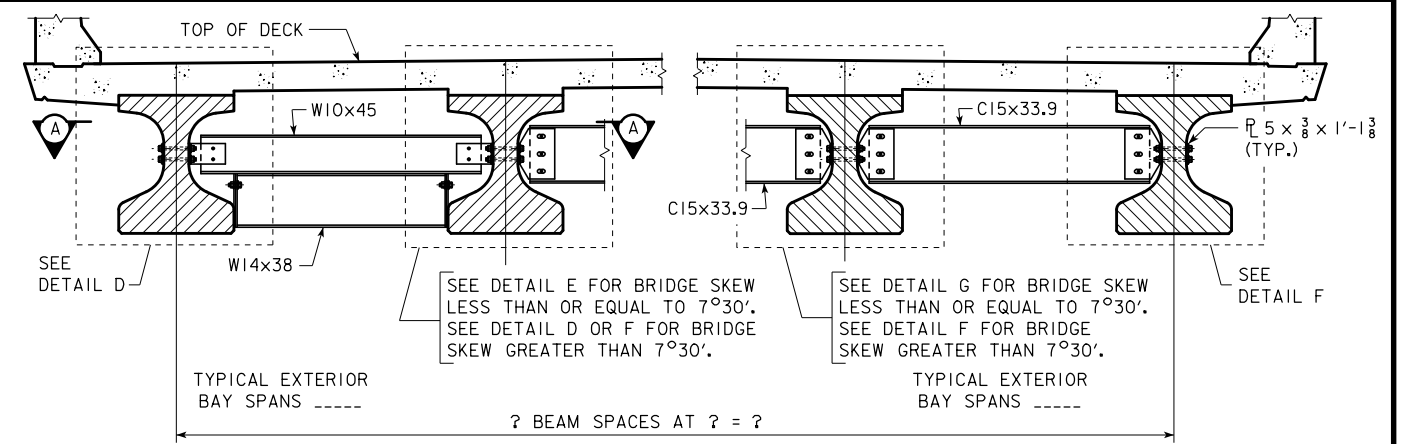


DETAIL E

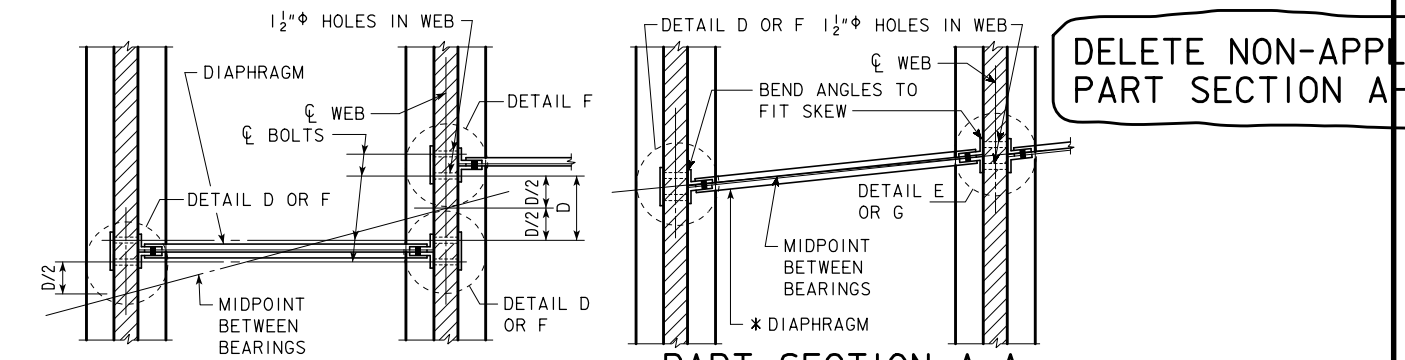
3 - 1" x 2" SLOTTED HOLES IN 9" LEG OF BENT PLATES AND 1" x 1 1/2" SLOTTED HOLES IN W10x45 AND C15x33.9. 7/8" H.S. BOLTS W/HEAVY HEX NUT, 2 - 1 1/8" x 2" OD PLAIN WASHERS & 1 - HARDENED WASHER (TYP.) SEE SLOTTED HOLE DETAILS.

DETAIL G

3 - 1" x 2" SLOTTED HOLES IN 9" LEG OF BENT PLATES AND 1" x 1 1/2" SLOTTED HOLES IN C15x33.9. 7/8" H.S. BOLTS W/HEAVY HEX NUT, 2 - 1 1/8" x 2" OD PLAIN WASHERS AND 1 - HARDENED WASHER (TYP.) SEE SLOTTED HOLE DETAILS.



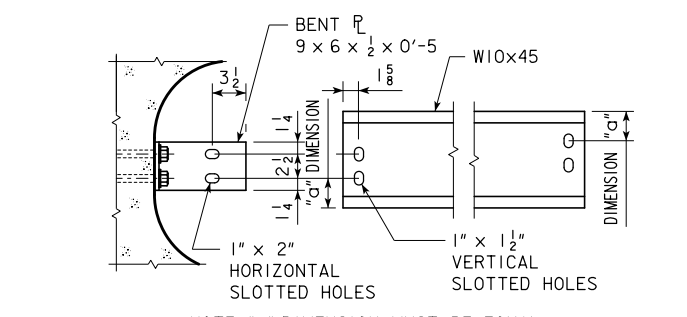
SECTION SHOWING INTERMEDIATE DIAPHRAGMS OVER TRAVELED ROADWAY SPANS



PART SECTION A-A FOR BRIDGES SKEWED GREATER THAN 7°30'

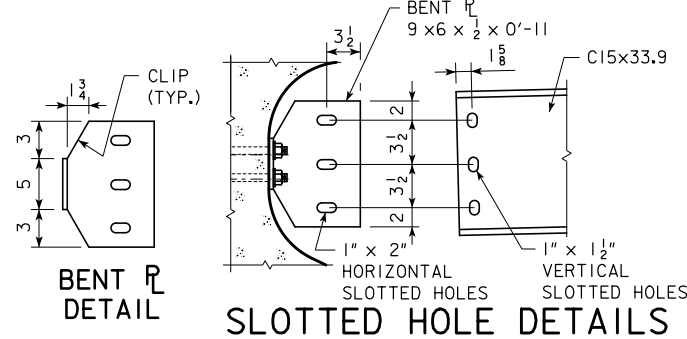
PART SECTION A-A FOR BRIDGES SKEWED LESS THAN OR EQUAL TO 7°30'

* NOTE: THE W 14 x 38 WILL REQUIRE BEVELED ENDS TO MATCH THE SKEW.



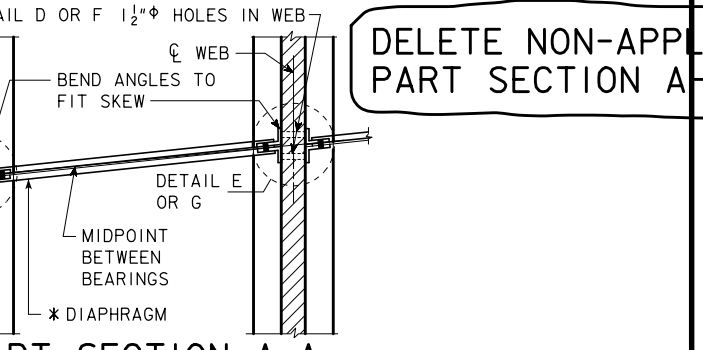
SLOTTED HOLE DETAILS

NOTE: "a" DIMENSION MUST BE EQUAL.



BENT PLATE DETAIL

SLOTTED HOLE DETAILS

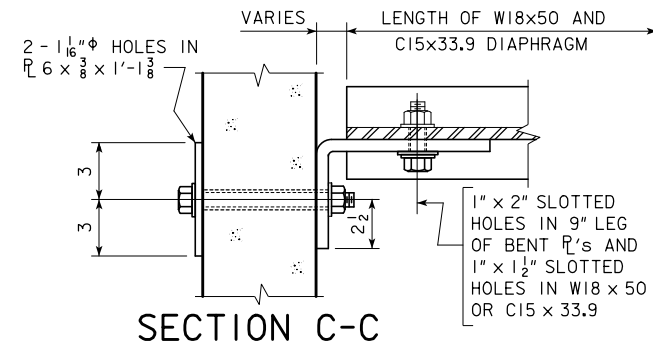


SECTION B-B

DELETE NON-APPLICABLE PART SECTION A-A DET

BULB TEE "C" BEAM INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL

ONE BEAM CONNECTION (DETAIL "D" AND/OR DETAIL "E")		WEIGHT
2 - 7/8" φ × 9 1/4" H.S. BOLTS WITH NUTS & WASHERS = 4.8 LBS.		
NO. OF BEAM CONNECTIONS		
ONE DETAIL "E"	2 - BENT PL 9 × 6 × 1/2 × 1'-1 3/8" = 57.0 LBS.	
ONE DETAIL "D"	1 - BACKING PL 6 × 3/8 × 1'-1 3/8" = 8.5 LBS. 1 - BENT PL 9 × 6 × 1/2 × 1'-1 3/8" = 28.5 LBS.	
ONE DIAPHRAGM		NUMBER OF DIAPHRAGMS
8 - 7/8" φ × 2 3/4" H.S. BOLTS WITH NUTS & WASHERS = 10.3 LBS.		
18 - 7/8" φ × 2 1/2" H.S. BOLTS WITH NUTS & WASHERS = 19.5 LBS.		
4 - 7/8" φ × 2" H.S. BOLTS WITH NUTS & WASHERS = 4.0 LBS.		
2 - PL 6 1/2 × 3/8 × 1'-2" = 19.3 LBS.		
4 - PL 6 1/2 × 1/8 × 1'-2" = 12.9 LBS.		
LENGTH OF MEMBER		
1 - W18 × 50 = 50 LBS./FT.		
1 - C15 × 33.9 = 33.9 LBS./FT.		
1 - W14 × 38 = 38 LBS./FT.		
INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL - TOTAL (LBS.)		

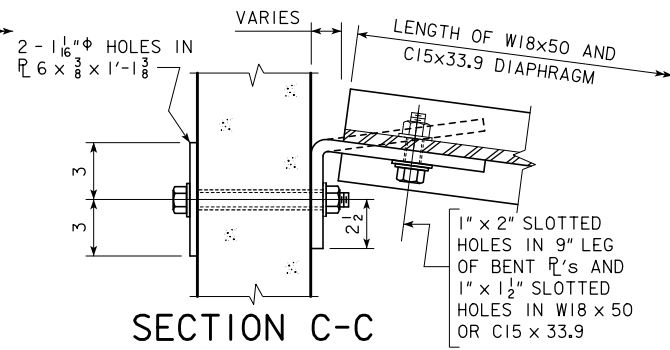


DELETE NON-APPLICABLE SECTION C-C DETAIL.

QTY. BOX FOR THE TRAVELED ROADWAYS

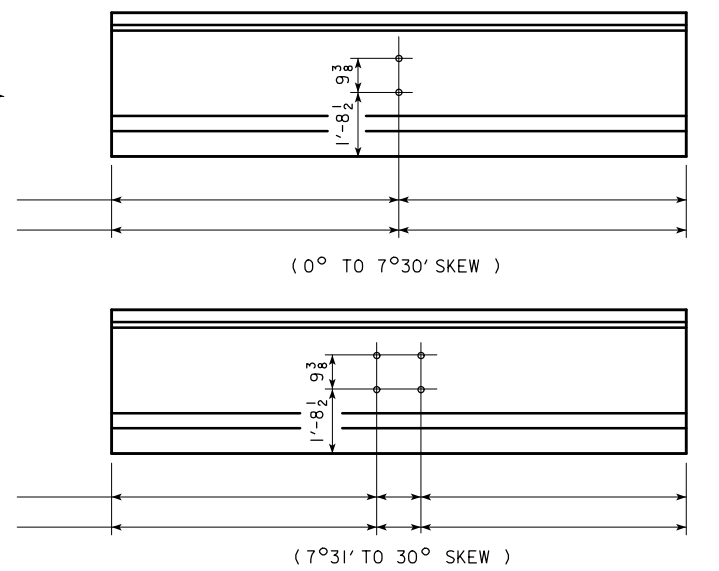
STRUCTURAL STEEL	
WEIGHT	LBS.

NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.

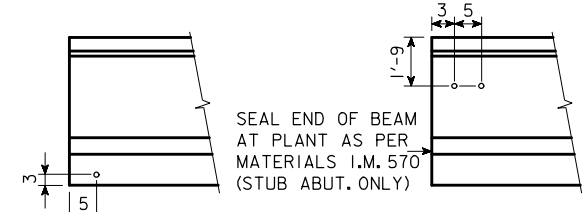


WHEN SKEW IS 7°30' OR LESS

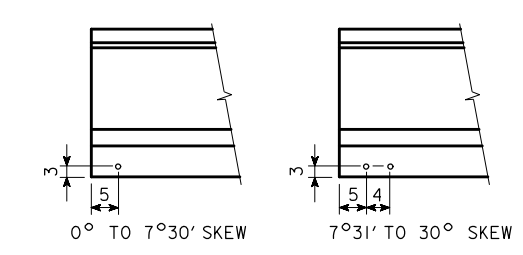
NOTES:
 ALL DIAPHRAGM MATERIALS, INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED.
 SHOP DRAWINGS OF THE STEEL DIAPHRAGMS SHOWING LAYOUT AND DETAILS OF THE DIAPHRAGMS SHALL BE SUBMITTED FOR APPROVAL.
 ALL COSTS FOR FURNISHING AND INSTALLING STEEL INTERMEDIATE DIAPHRAGMS SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.
 THE 1 1/2" φ HOLES FOR THE 7/8" φ H.S. BOLTS SHALL BE CAST INTO THE WEB. DRILLING IS NOT ALLOWED.
 THE 7/8" φ H.S. BOLTS THROUGH THE WEB SHALL HAVE A THREAD LENGTH OF 3" MIN. AND 4" MAX. AND SHALL MEET THE REQUIREMENTS OF ASTM A449.
 ALL BOLTS ARE TO BE TIGHTENED PRIOR TO PLACING BRIDGE FLOOR CONCRETE WITH THE FOLLOWING EXCEPTION: BOLTS IN DIAPHRAGMS LOCATED UNDER LONGITUDINAL BRIDGE FLOOR CONSTRUCTION JOINTS SHALL NOT BE TIGHTENED UNTIL STAGE TWO OF THE BRIDGE FLOOR HAS BEEN PLACED.



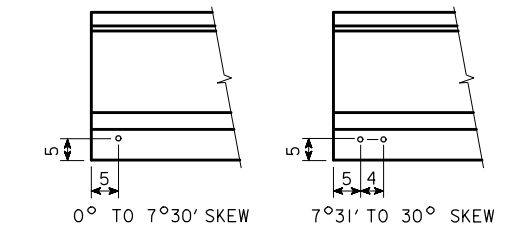
INTERMEDIATE DIAPHRAGM BOLT HOLE LOCATIONS



FIXED PIER



EXPANSION PIER



BEAM COIL TIE LOCATIONS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION			
DESIGN SHEET NO. _____	OF _____	FILE NO. _____	DESIGN NO. _____

BULB TEE "C" BEAM INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL

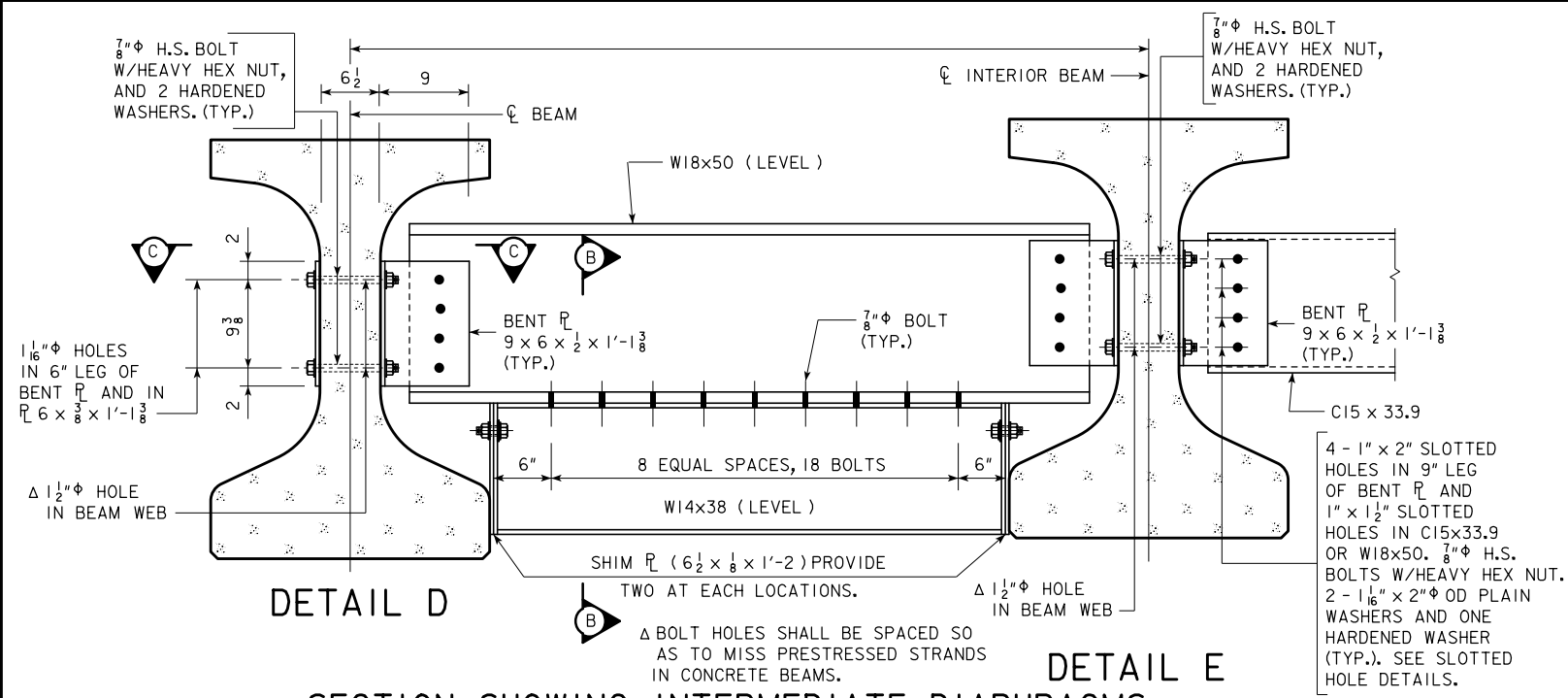
ONE BEAM CONNECTION (DETAIL "F" AND/OR DETAIL "G")		WEIGHT
2 - 7/8" φ × 9 1/4" H.S. BOLTS WITH NUTS & WASHERS = 4.8 LBS.		
NO. OF BEAM CONNECTIONS		
ONE DETAIL "G"	2 - BENT PL 9 × 6 × 1/2 × 1'-1 3/8" = 57.0 LBS.	
ONE DETAIL "F"	1 - BACKING PL 6 × 3/8 × 1'-1 3/8" = 8.5 LBS. 1 - BENT PL 9 × 6 × 1/2 × 1'-1 3/8" = 28.5 LBS.	
ONE DIAPHRAGM		NUMBER OF DIAPHRAGMS
8 - 7/8" φ × 2 3/4" H.S. BOLTS WITH NUTS & WASHERS = 10.3 LBS.		
LENGTH OF MEMBER		
1 - C15 × 33.9 = 33.9 LBS./FT.		
INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL - TOTAL (LBS.)		

CHART OUTSIDE OF BORDER CONTAINS DIAPHRAGM LENGTHS

QTY. BOX FOR THE NON-TRAVELED ROADWAYS

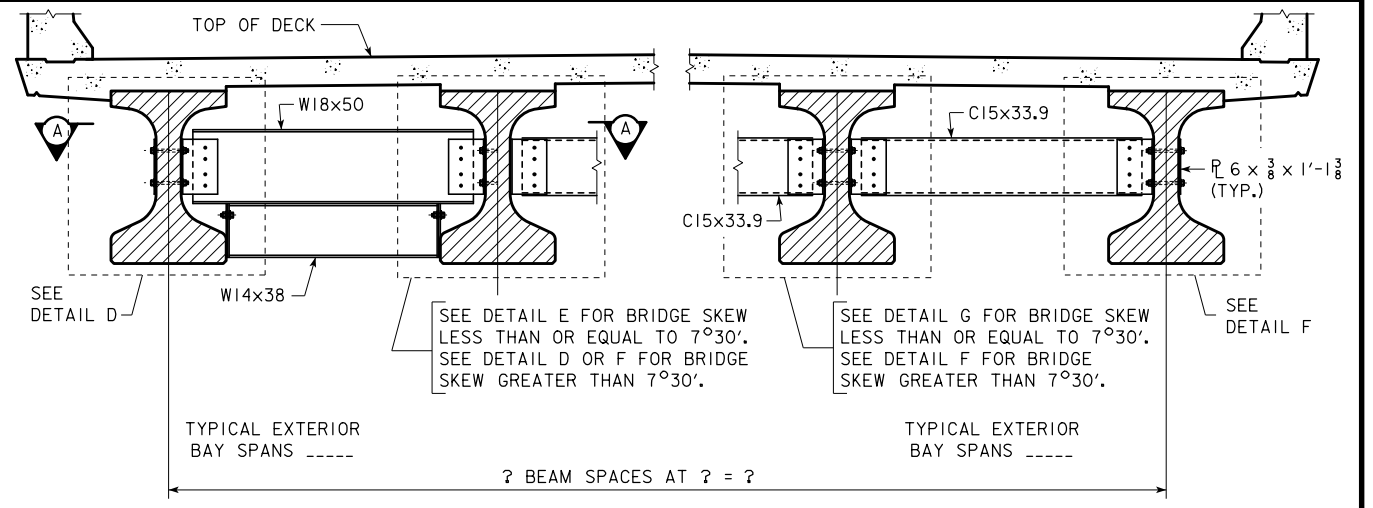
ENGLISHBEAMS.DGN - 1036-1-BTC - THIS SHEET ISSUED 06-14 SHEET 1 OF 2.

ENGLISHBEAMS.DGN - 1036-2-BTC - THIS SHEET ISSUED 06-14, SHEET 2 OF 2.

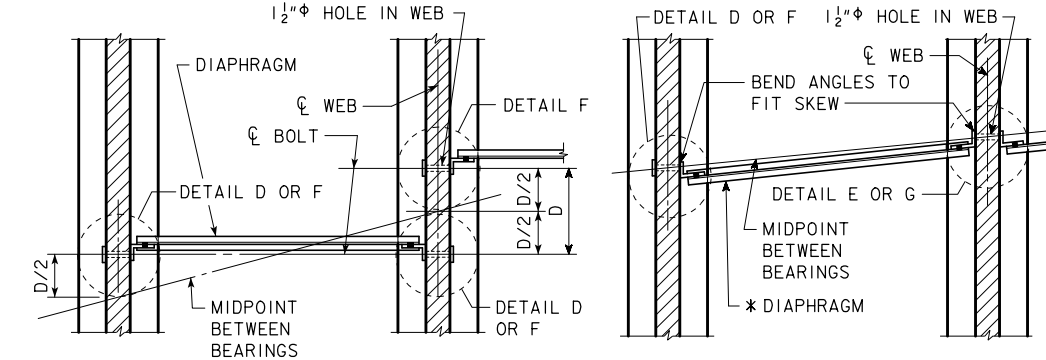


DETAIL D
SECTION SHOWING INTERMEDIATE DIAPHRAGMS AT EXTERIOR BAY OVER TRAVELED ROADWAY SPANS

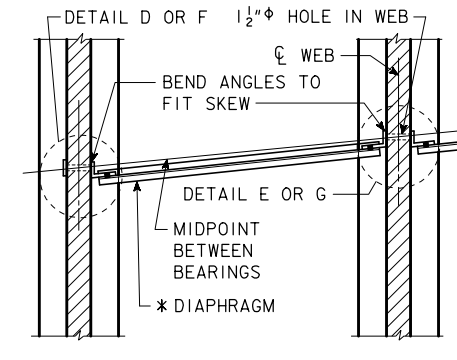
NOTE: W18x50 AND W14x38 SHALL BE INSTALLED ONLY IN THE OUTSIDE BAYS OVER THE TRAVELED ROADWAY.



SECTION SHOWING INTERMEDIATE DIAPHRAGM



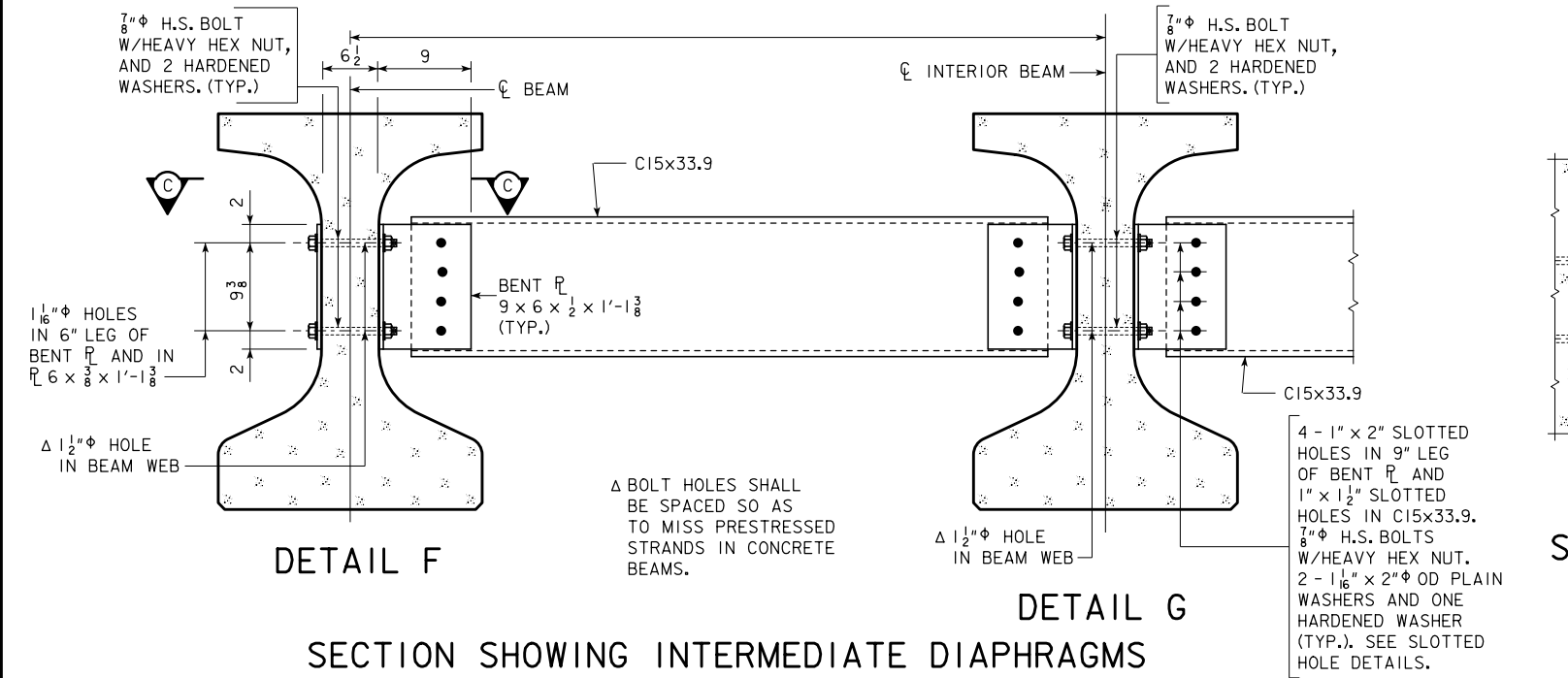
PART SECTION A-A
 FOR BRIDGES SKEWED GREATER THAN 7°30'



PART SECTION A-A
 FOR BRIDGES SKEWED LESS THAN OR EQUAL TO 7°30'

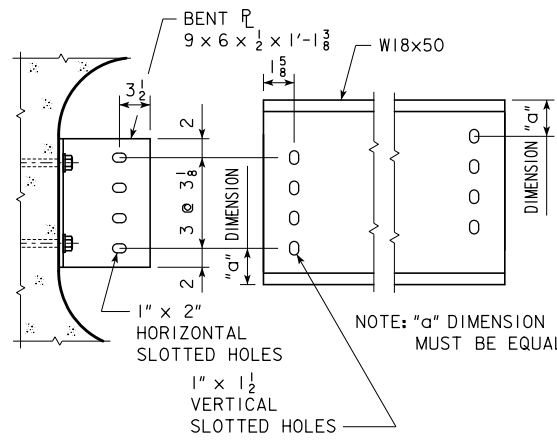
* NOTE: THE W14 x 38 WILL REQUIRE BEVELED ENDS TO MATCH THE SKEW.

DELETE NON-APPLICABLE PART SECTION A-A

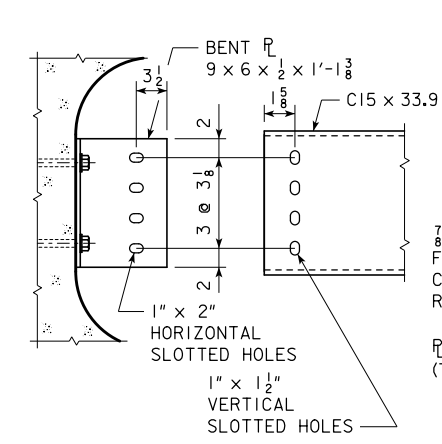


DETAIL F
SECTION SHOWING INTERMEDIATE DIAPHRAGMS AT EXTERIOR BAY OVER NON-TRAVELED ROADWAY SPANS AND WATERWAYS

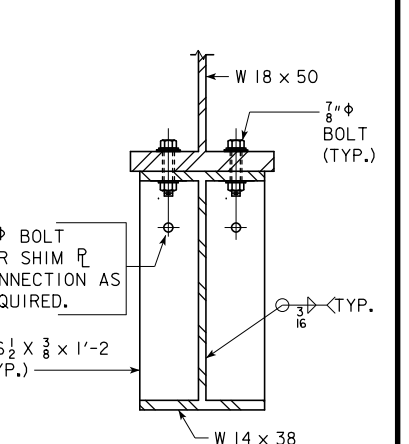
DETAIL G



SLOTTED HOLE DETAILS



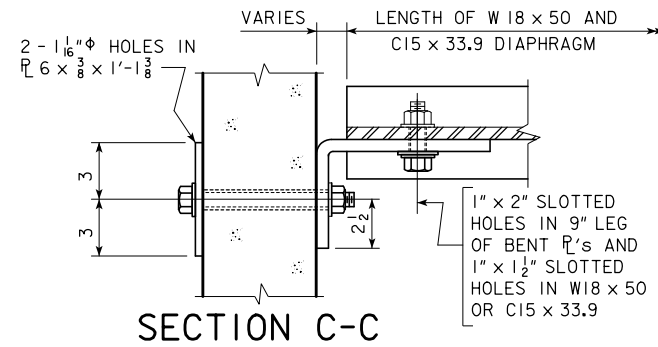
SLOTTED HOLE DETAILS



SECTION B-B

BULB TEE "D" BEAM INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL

ONE BEAM CONNECTION (DETAIL "D" AND/OR DETAIL "E")		WEIGHT
	NO. OF BEAM CONNECTIONS	
2 - 7/8" φ × 9 1/4" H.S. BOLTS WITH NUTS & WASHERS = 4.8 LBS.		
ONE DETAIL "E"	2 - BENT PL 9 × 6 × 1/2 × 1'-1 3/8" = 57.0 LBS.	
ONE DETAIL "D"	1 - BACKING PL 6 × 3/8 × 1'-1 3/8" = 8.5 LBS. 1 - BENT PL 9 × 6 × 1/2 × 1'-1 3/8" = 28.5 LBS.	
ONE DIAPHRAGM		NUMBER OF DIAPHRAGMS
8 - 7/8" φ × 2 3/4" H.S. BOLTS WITH NUTS & WASHERS = 10.3 LBS.		
18 - 7/8" φ × 2 1/2" H.S. BOLTS WITH NUTS & WASHERS = 19.5 LBS.		
4 - 7/8" φ × 2" H.S. BOLTS WITH NUTS & WASHERS = 4.0 LBS.		
2 - PL 6 1/2 × 3/8 × 1'-2" = 19.3 LBS.		
4 - PL 6 1/2 × 1/8 × 1'-2" = 12.9 LBS.		
	LENGTH OF MEMBER	
1 - W18 × 50 = 50 LBS./FT.		
1 - C15 × 33.9 = 33.9 LBS./FT.		
1 - W14 × 38 = 38 LBS./FT.		
INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL - TOTAL (LBS.)		

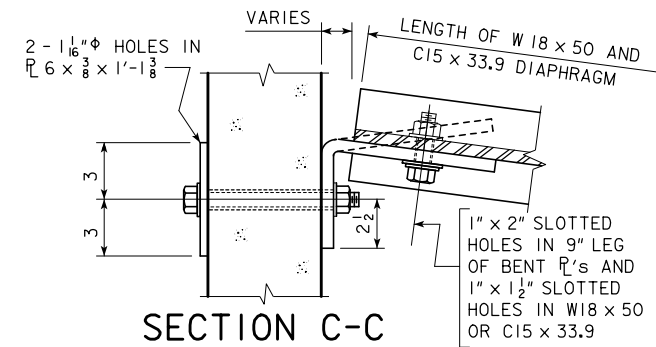


DELETE NON-APPLICABLE SECTION C-C DETAIL.

QTY. BOX FOR THE TRAVELED ROADWAYS

STRUCTURAL STEEL	
WEIGHT	LBS.

NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.



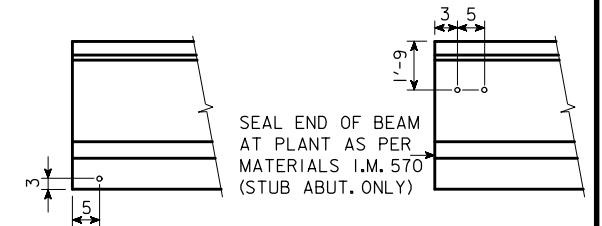
WHEN SKEW IS 7°30' OR LESS

NOTES:

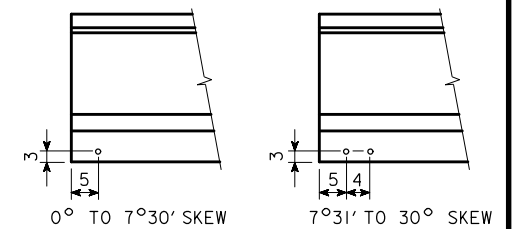
ALL DIAPHRAGM MATERIALS, INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED.
 SHOP DRAWINGS OF THE STEEL DIAPHRAGMS SHOWING LAYOUT AND DETAILS OF THE DIAPHRAGMS SHALL BE SUBMITTED FOR APPROVAL.
 ALL COSTS FOR FURNISHING AND INSTALLING STEEL INTERMEDIATE DIAPHRAGMS SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.
 THE 1 1/2" φ HOLES FOR THE 7/8" φ H.S. BOLTS SHALL BE CAST INTO THE WEB. DRILLING IS NOT ALLOWED.
 THE 7/8" φ H.S. BOLTS THROUGH THE WEB SHALL HAVE A THREAD LENGTH OF 3" MIN. AND 4" MAX. AND SHALL MEET THE REQUIREMENTS OF ASTM A449.
 ALL BOLTS ARE TO BE TIGHTENED PRIOR TO PLACING BRIDGE FLOOR CONCRETE WITH THE FOLLOWING EXCEPTION: BOLTS IN DIAPHRAGMS LOCATED UNDER LONGITUDINAL BRIDGE FLOOR CONSTRUCTION JOINTS SHALL NOT BE TIGHTENED UNTIL STAGE TWO OF THE BRIDGE FLOOR HAS BEEN PLACED.

BEAM EXAMPLES ARE OUTSIDE OF BORDER SHEET.

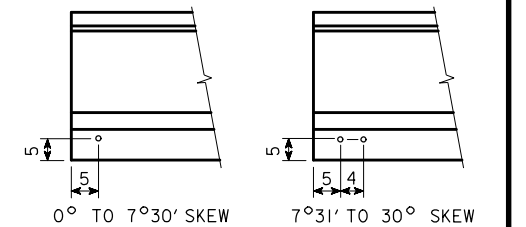
INTERMEDIATE DIAPHRAGM BOLT HOLE LOCATIONS



ALL SKEWS
 INTEGRAL ABUT. ALL SKEWS
 STUB ABUT.



FIXED PIER



EXPANSION PIER
 BEAM COIL TIE LOCATIONS

CHART OUTSIDE OF BORDER CONTAINS DIAPHRAGM LENGTHS

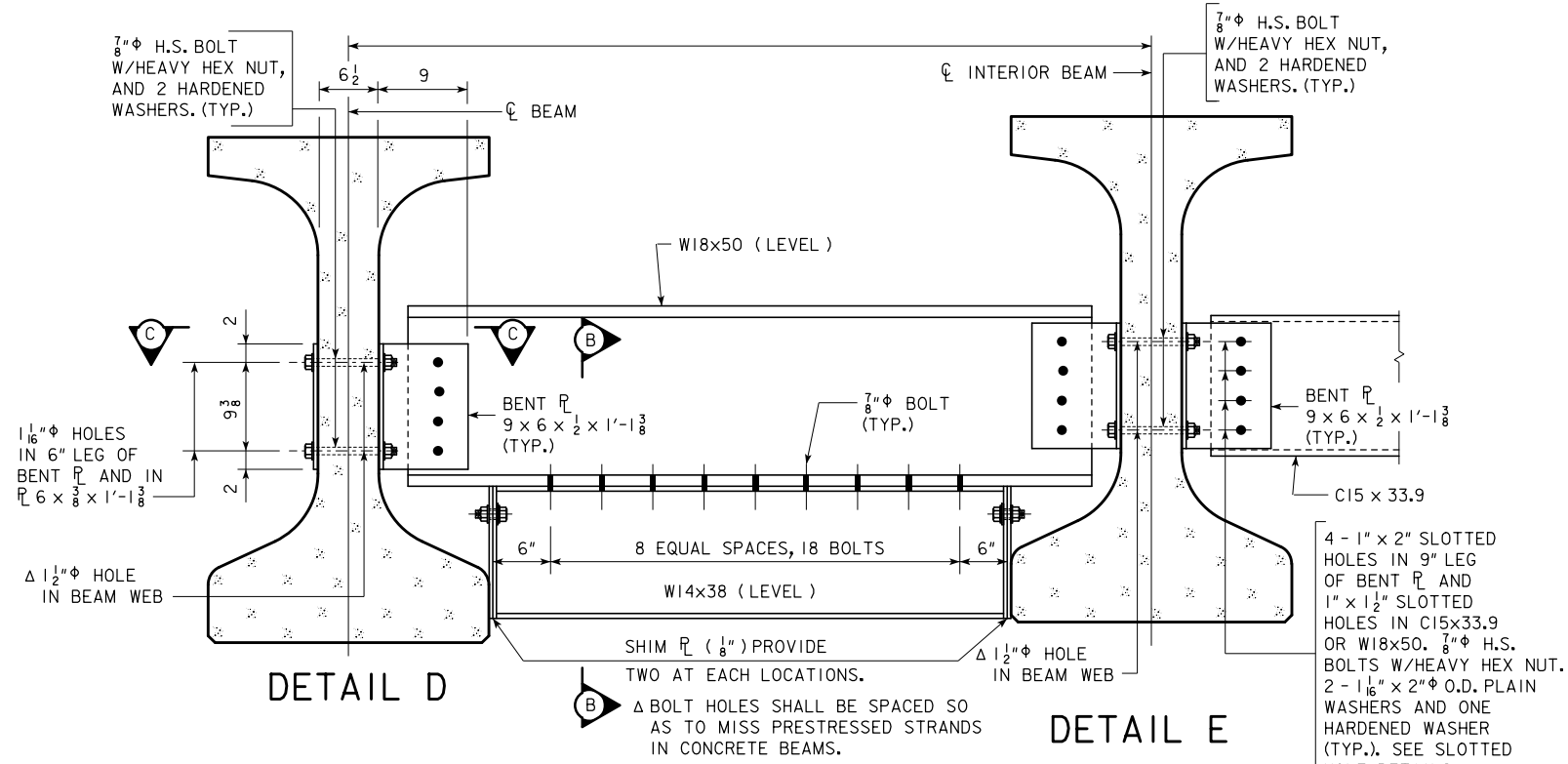
QTY. BOX FOR THE NON-TRAVELED ROADWAYS

BULB TEE "D" BEAM INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL

ONE BEAM CONNECTION (DETAIL "F" AND/OR DETAIL "G")		WEIGHT
	NO. OF BEAM CONNECTIONS	
2 - 7/8" φ × 9 1/4" H.S. BOLTS WITH NUTS & WASHERS = 4.8 LBS.		
ONE DETAIL "G"	2 - BENT PL 9 × 6 × 1/2 × 1'-1 3/8" = 57.0 LBS.	
ONE DETAIL "F"	1 - BACKING PL 6 × 3/8 × 1'-1 3/8" = 8.5 LBS. 1 - BENT PL 9 × 6 × 1/2 × 1'-1 3/8" = 28.5 LBS.	
ONE DIAPHRAGM		NUMBER OF DIAPHRAGMS
8 - 7/8" φ × 2 3/4" H.S. BOLTS WITH NUTS & WASHERS = 10.3 LBS.		
	LENGTH OF MEMBER	
1 - C15 × 33.9 = 33.9 LBS./FT.		
INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL - TOTAL (LBS.)		

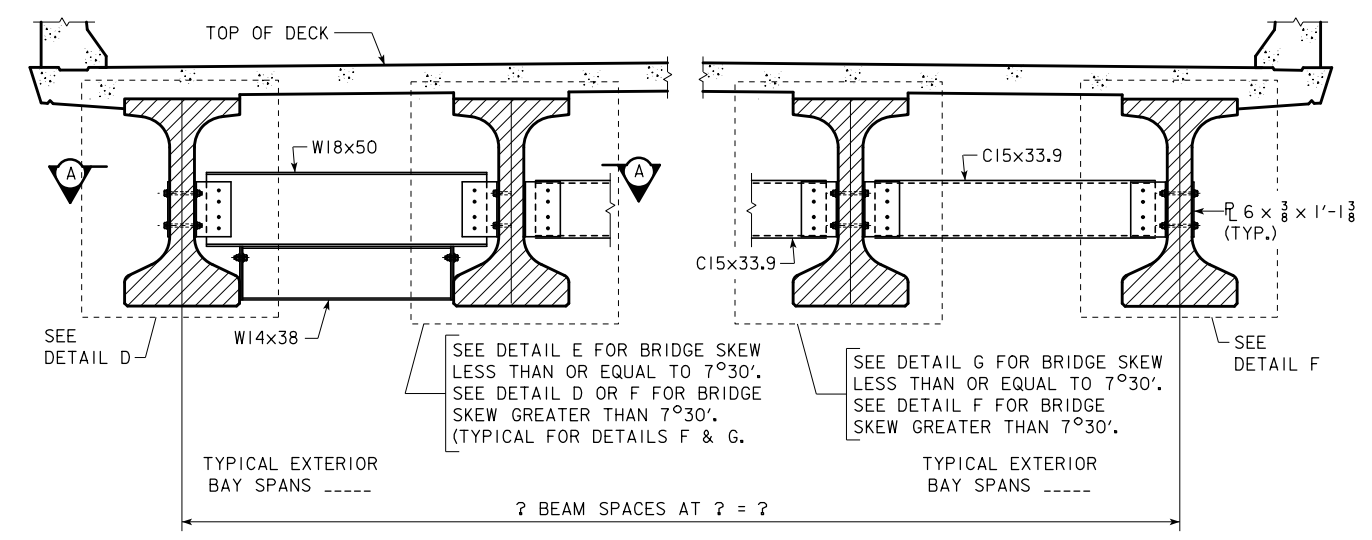
ENGLISHBEAMS.DGN - 1036-1-BTD - THIS SHEET ISSUED 06-14 SHEET 1 OF 2.

ENGLISHBEAMS.DGN - 1036-2-BTD - THIS SHEET ISSUED 06-14, SHEET 2 OF 2.

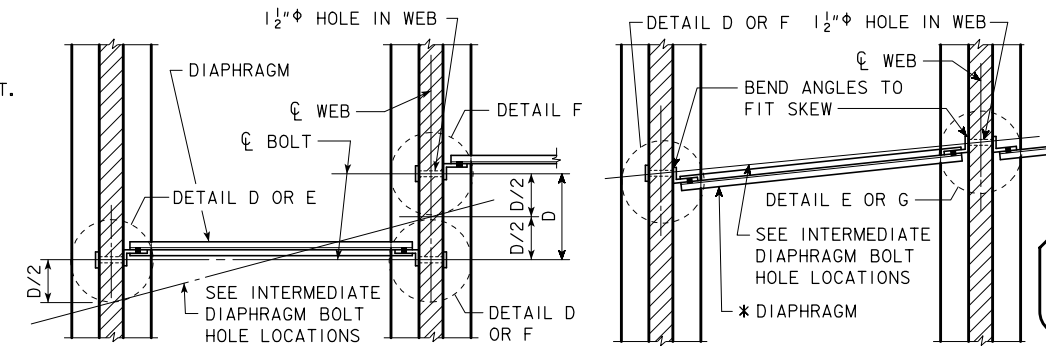


SECTION SHOWING INTERMEDIATE DIAPHRAGMS AT EXTERIOR BAY OVER TRAVELED ROADWAY SPANS

NOTE: W18x50 AND W14x38 SHALL BE INSTALLED ONLY IN THE OUTSIDE BAYS OVER THE TRAVELED ROADWAY.



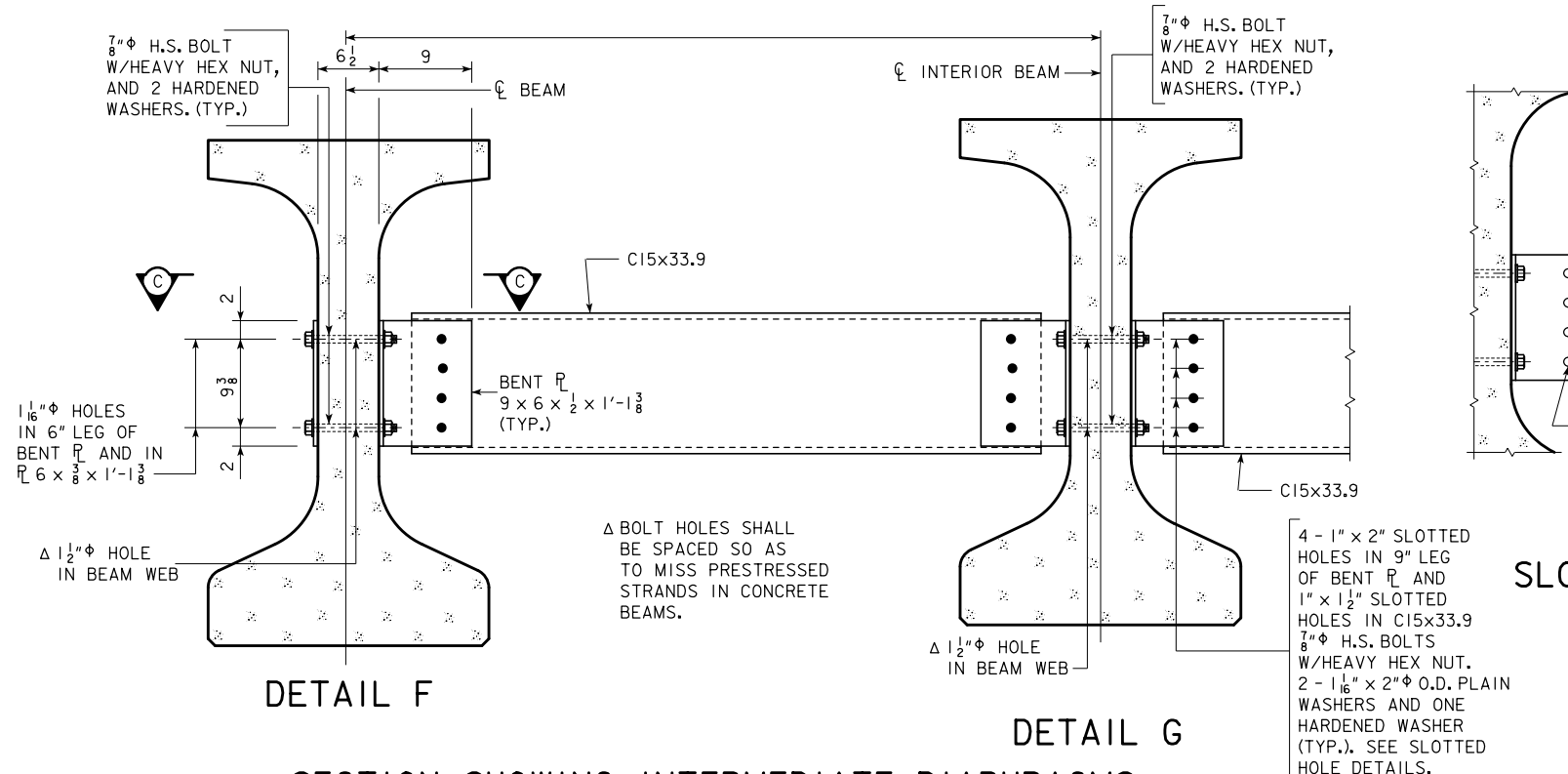
SECTION SHOWING INTERMEDIATE DIAPHRAGM



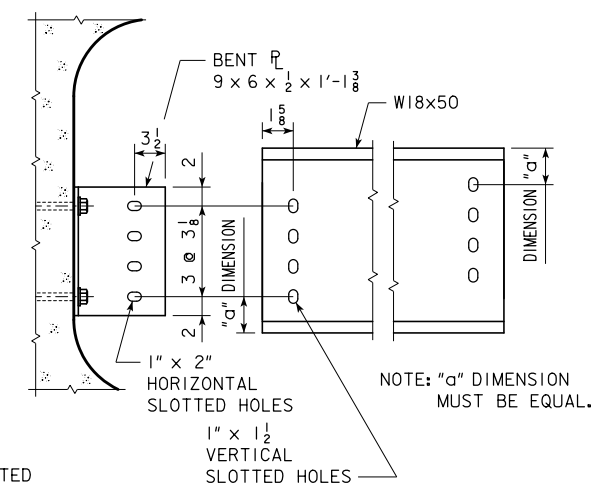
PART SECTION A-A FOR BRIDGES SKEWED GREATER THAN 7°30' AND FOR BRIDGES SKEWED LESS THAN OR EQUAL TO 7°30'

* NOTE: THE W14 x 38 WILL REQUIRE BEVELED ENDS TO MATCH THE SKEW.

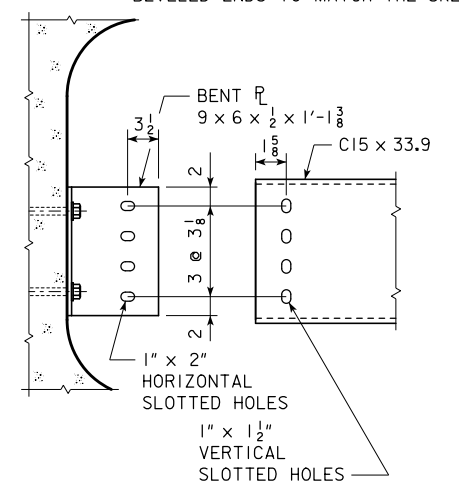
DELETE NON-APPLICABLE PART SECTION A-A DETAIL



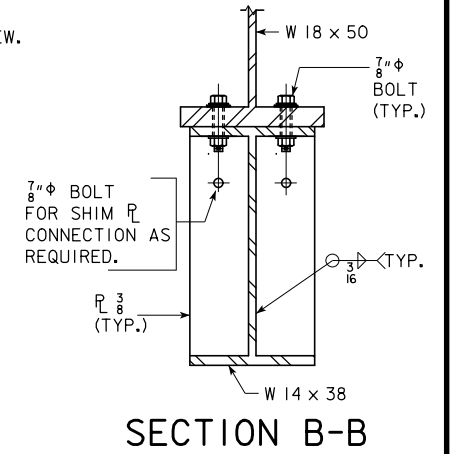
SECTION SHOWING INTERMEDIATE DIAPHRAGMS AT EXTERIOR BAY OVER NON-TRAVELED ROADWAY SPANS AND WATERWAYS



SLOTTED HOLE DETAILS



SLOTTED HOLE DETAILS

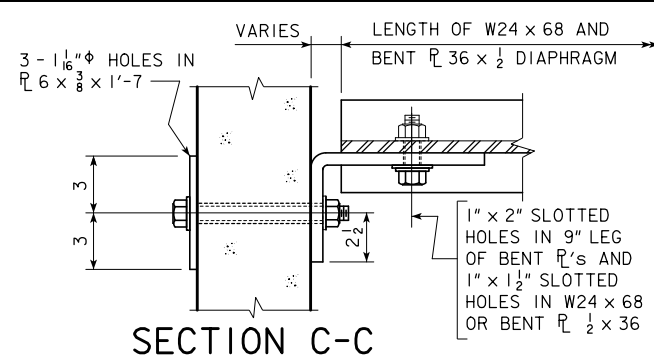


SECTION B-B

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

BULB TEE "E" BEAM INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL

ONE BEAM CONNECTION (DETAIL "D" AND/OR DETAIL "E")		WEIGHT
	NO. OF BEAM CONNECTIONS	
3 - 7/8" φ × 9 1/4" H.S. BOLTS WITH NUTS & WASHERS = 7.2 LBS.		
ONE DETAIL "E"	2 - BENT PL 9 × 6 × 1/2 × 1'-7" = 80.8 LBS.	
ONE DETAIL "D"	1 - BACKING PL 6 × 3/8 × 1'-7" = 12.1 LBS. 1 - BENT PL 9 × 6 × 1/2 × 1'-7" = 40.4 LBS.	
ONE DIAPHRAGM		NUMBER OF DIAPHRAGMS
10 - 7/8" φ × 2 1/4" H.S. BOLTS WITH NUTS & WASHERS = 9.7 LBS.		
18 - 7/8" φ × 2 1/2" H.S. BOLTS WITH NUTS & WASHERS = 19.5 LBS.		
4 - 7/8" φ × 2" H.S. BOLTS WITH NUTS & WASHERS = 4.0 LBS.		
2 - PL 6 1/2 × 3/8 × 1'-2" = 19.5 LBS.		
4 - PL 6 1/2 × 1/8 × 1'-2" = 12.9 LBS.		
	LENGTH OF MEMBER	
1 - W24 × 68 = 68 LBS./FT.		
1 - BENT PL 36 × 1/2 = 61.3 LBS./FT.		
1 - W14 × 38 = 38 LBS./FT.		
INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL - TOTAL (LBS.)		

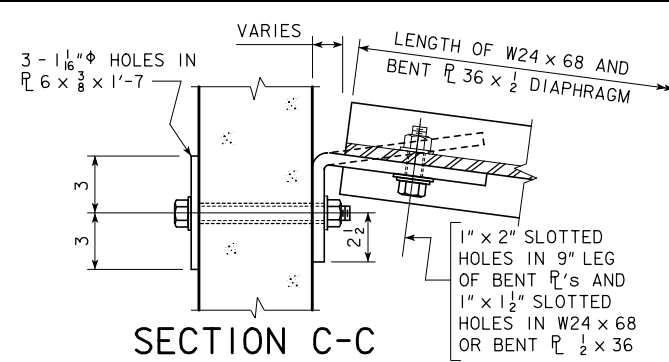


DELETE NON-APPLICABLE SECTION C-C DETAIL.

QTY. BOX FOR THE TRAVELED ROADWAYS

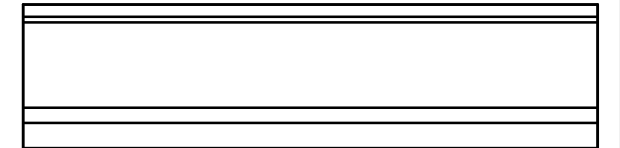
STRUCTURAL STEEL	
WEIGHT	LBS.

NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.



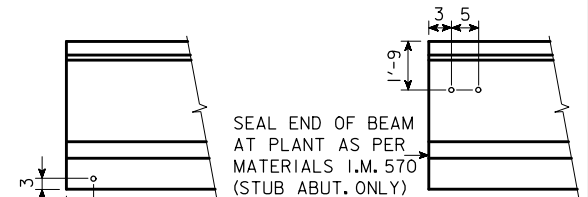
WHEN SKEW IS 7°30' OR LESS

NOTES:
 ALL DIAPHRAGM MATERIALS, INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED.
 SHOP DRAWINGS OF THE STEEL DIAPHRAGMS SHOWING LAYOUT AND DETAILS OF THE DIAPHRAGMS SHALL BE SUBMITTED FOR APPROVAL.
 ALL COSTS FOR FURNISHING AND INSTALLING STEEL INTERMEDIATE DIAPHRAGMS SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.
 THE 1 1/2" φ HOLES FOR THE 7/8" φ H.S. BOLTS SHALL BE CAST INTO THE WEB. DRILLING IS NOT ALLOWED.
 THE 7/8" φ H.S. BOLTS THROUGH THE WEB SHALL HAVE A THREAD LENGTH OF 3" MIN. AND 4" MAX. AND SHALL MEET THE REQUIREMENTS OF ASTM A449.
 ALL BOLTS ARE TO BE TIGHTENED PRIOR TO PLACING BRIDGE FLOOR CONCRETE WITH THE FOLLOWING EXCEPTION: BOLTS IN DIAPHRAGMS LOCATED UNDER LONGITUDINAL BRIDGE FLOOR CONSTRUCTION JOINTS SHALL NOT BE TIGHTENED UNTIL STAGE TWO OF THE BRIDGE FLOOR HAS BEEN PLACED.

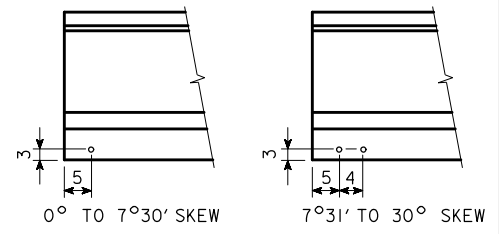


BEAM EXAMPLES ARE OUTSIDE OF BORDER SHEET.

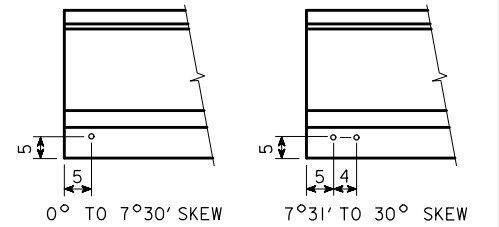
INTERMEDIATE DIAPHRAGM BOLT HOLE LOCATIONS



ALL SKEWS
 INTEGRAL ABUT. ALL SKEWS
 STUB ABUT.



FIXED PIER



EXPANSION PIER

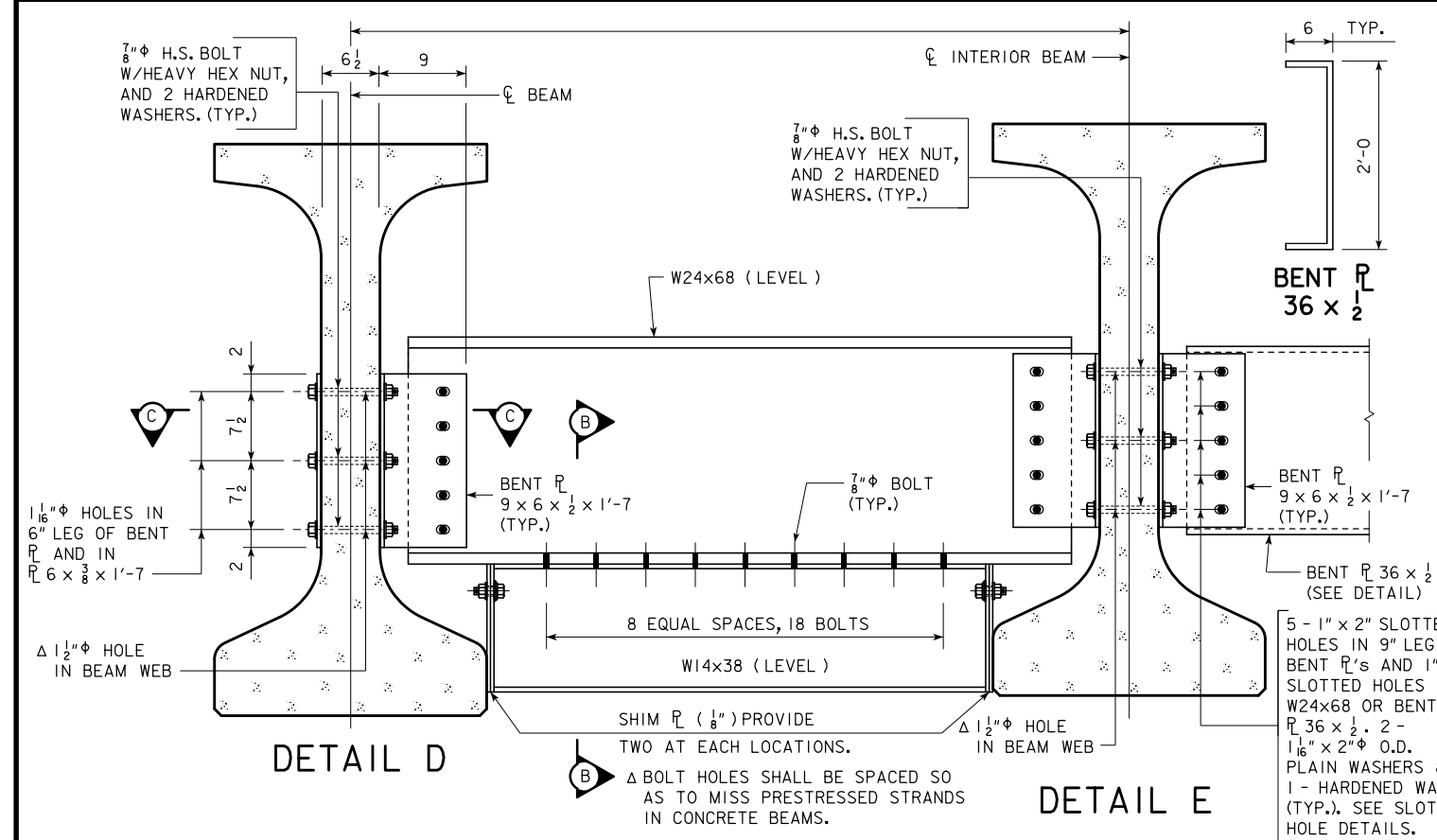
BEAM COIL TIE LOCATIONS

ONE BEAM CONNECTION (DETAIL "F" AND/OR DETAIL "G")		WEIGHT
	NO. OF BEAM CONNECTIONS	
3 - 7/8" φ × 9 1/4" H.S. BOLTS WITH NUTS & WASHERS = 7.2 LBS.		
ONE DETAIL "G"	2 - BENT PL 9 × 6 × 1/2 × 1'-7" = 80.8 LBS.	
ONE DETAIL "F"	1 - BACKING PL 6 × 3/8 × 1'-7" = 12.1 LBS. 1 - BENT PL 9 × 6 × 1/2 × 1'-7" = 40.4 LBS.	
ONE DIAPHRAGM		NUMBER OF DIAPHRAGMS
10 - 7/8" φ × 2 1/4" H.S. BOLTS WITH NUTS & WASHERS = 9.7 LBS.		
	LENGTH OF MEMBER	
1 - BENT PL 36 × 1/2 = 61.3 LBS./FT.		
INTERMEDIATE DIAPHRAGM STRUCTURAL STEEL - TOTAL (LBS.)		

CHART OUTSIDE OF BORDER CONTAINS DIAPHRAGM LENGTHS

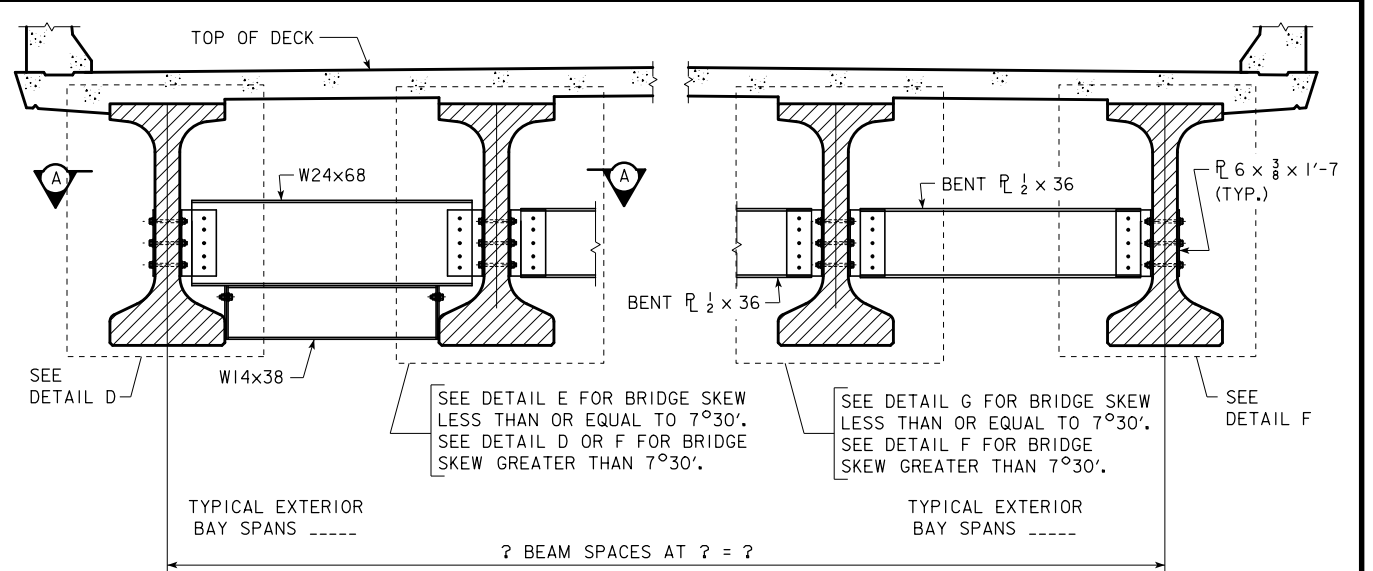
QTY. BOX FOR THE NON-TRAVELED ROADWAYS

ENGLISHBEAMS.DGN - 1036-2-BTE - THIS SHEET ISSUED 06-14, SHEET 2 OF 2.

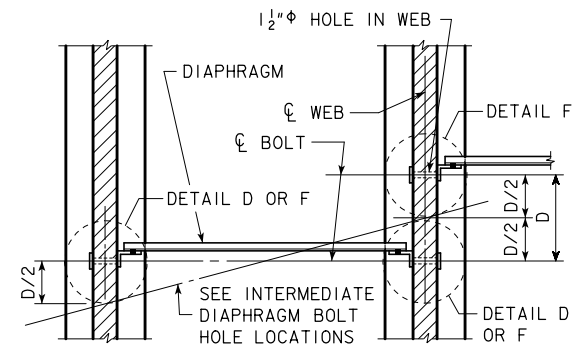


SECTION SHOWING INTERMEDIATE DIAPHRAGMS AT EXTERIOR BAY OVER TRAVELED ROADWAY SPANS

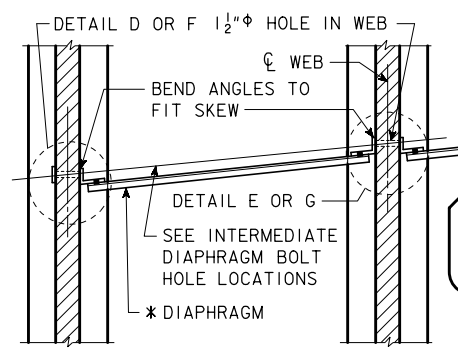
NOTE: W24x68 AND W14x38 SHALL BE INSTALLED ONLY IN THE OUTSIDE BAYS OVER THE TRAVELED ROADWAY.



SECTION SHOWING INTERMEDIATE DIAPHRAGM



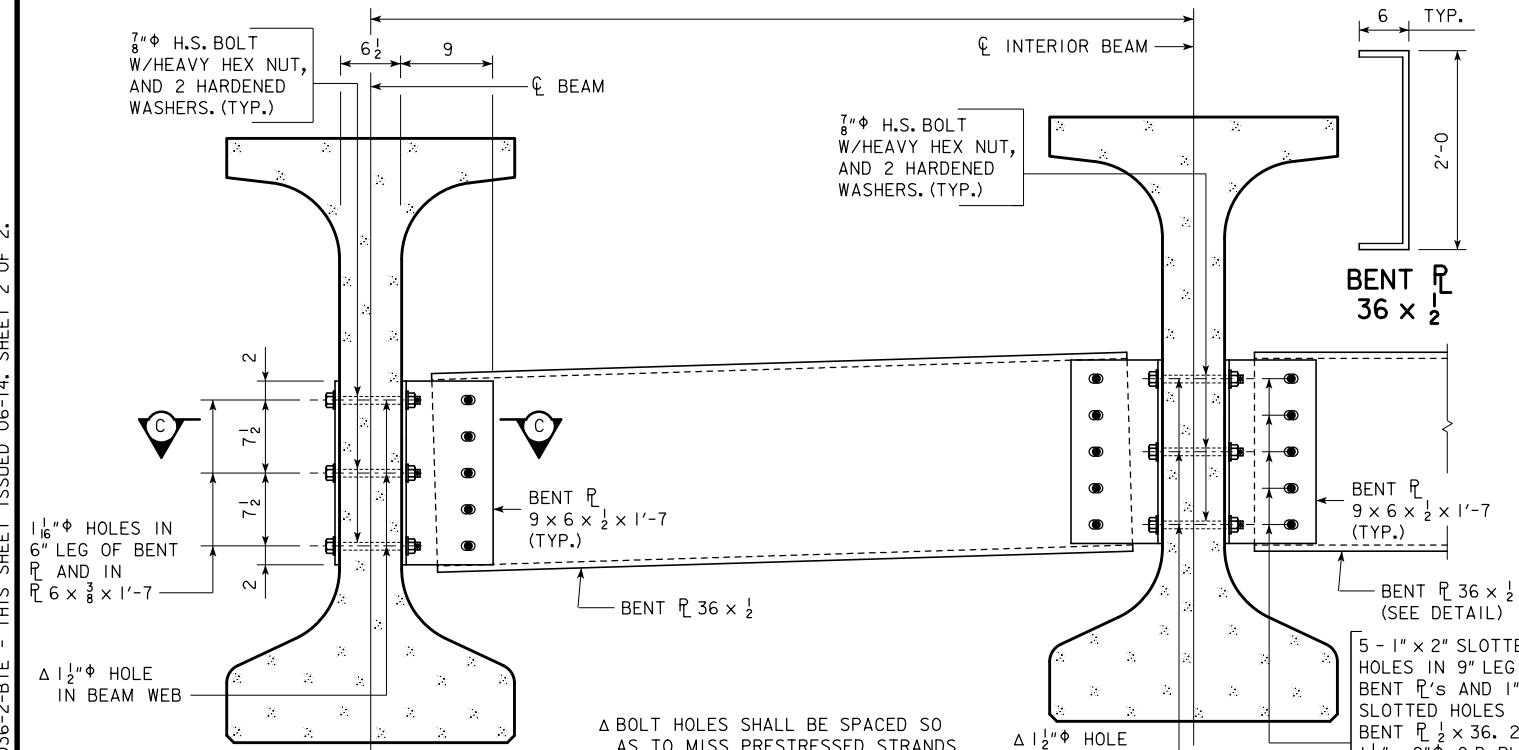
PART SECTION A-A FOR BRIDGES SKEWED GREATER THAN 7°30'



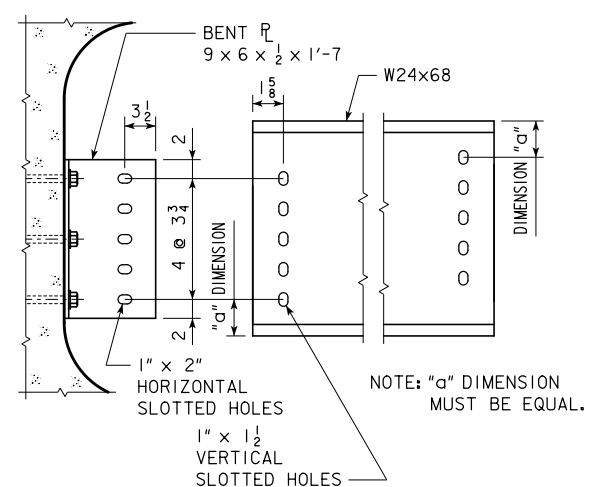
PART SECTION A-A FOR BRIDGES SKEWED LESS THAN OR EQUAL TO 7°30'

* NOTE: THE W14 x 38 WILL REQUIRE BEVELED ENDS TO MATCH THE SKEW.

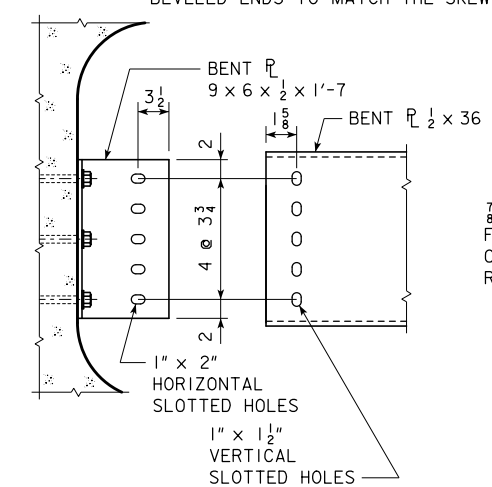
DELETE NON-APPLICABLE PART SECTION A-A



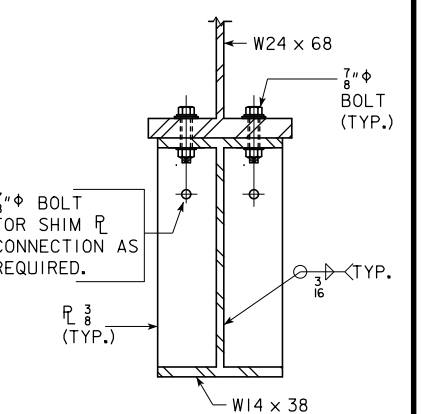
SECTION SHOWING INTERMEDIATE DIAPHRAGMS AT EXTERIOR BAY OVER NON-TRAVELED ROADWAY SPANS AND WATERWAYS



SLOTTED HOLE DETAILS



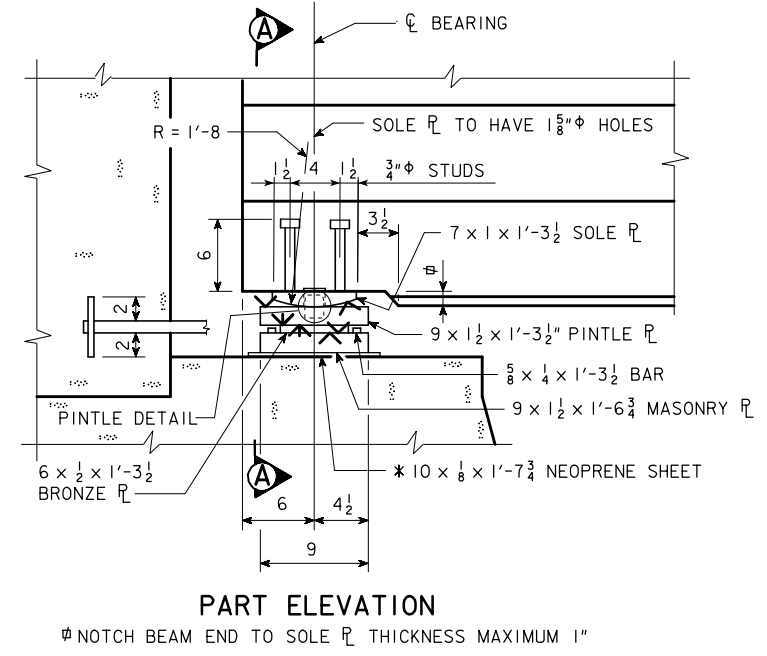
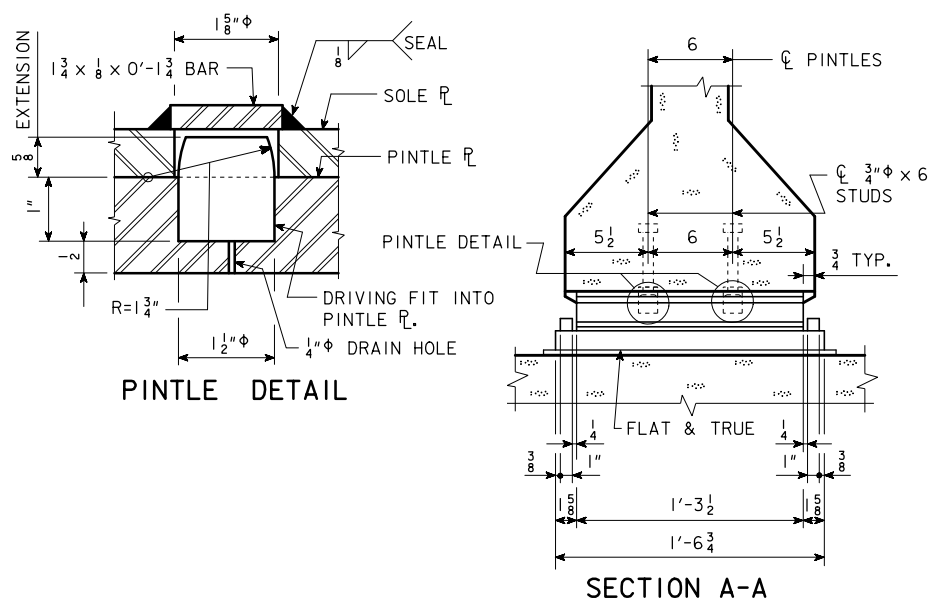
SLOTTED HOLE DETAILS



SECTION B-B

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 04-14 - ADDED WEIGHT TABLE & TITLES/DESCRIPTIONS TO AGREE WITH SUMMARY QUANTITY SHEET. ADDED NOTE REFERRING TO SUMMARY QUANTITIES SHEET. ENGLISH BEAMS.DGN - 4541 - THIS SHEET ISSUED 03-08.



ABUTMENT BEARING NOTES:

THE SLIDING SURFACE OF THE BRONZE PLATE SHALL BE LUBRICATED IN ACCORDANCE WITH ARTICLE 4190.03, OF THE STANDARD SPECIFICATIONS, AND THE BRONZE METAL SHALL BE CAST BRONZE IN ACCORDANCE WITH ARTICLE 4190.03, OF THE STANDARD SPECIFICATIONS. TOP EDGES OF BRONZE PLATE SHALL BE BEVELED 1/8". SURFACES MARKED "V" SHALL BE FINISHED ANSI 250 AND SURFACES MARKED "∇" SHALL BE FINISHED ANSI 125.

MASONRY PLATES ARE TO BE SET ON A 1/8" NEOPRENE SHEET.

PINTLE PLATES, MASONRY PLATES, AND LUBRICATED BRONZE PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. UNIT PRICE BID FOR STRUCTURAL STEEL SHALL INCLUDE ALLOWANCE FOR COST OF BRONZE PLATES. COST OF NEOPRENE SHEETS SHALL BE CONSIDERED INCIDENTAL TO THE STRUCTURAL STEEL BID ITEM. COST OF THE ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.

THE SOLE PLATE, PINTLE PLATE AND THE MASONRY PLATE SHALL BE GALVANIZED. THE SOLE PLATE AND MASONRY PLATE SHALL BE FITTED UP AND WELDED PRIOR TO GALVANIZING. THE SURFACE OF PINTLE PLATE IN CONTACT WITH BRONZE BEARING PLATE SHALL BE SMOOTH AND FREE OF PROJECTIONS DUE TO GALVANIZING.

SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.

SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING SPECIFICATIONS:
 ASTM A514 GRADE B
 ASTM A709 GRADE HPS 70W

DESIGN NOTE:

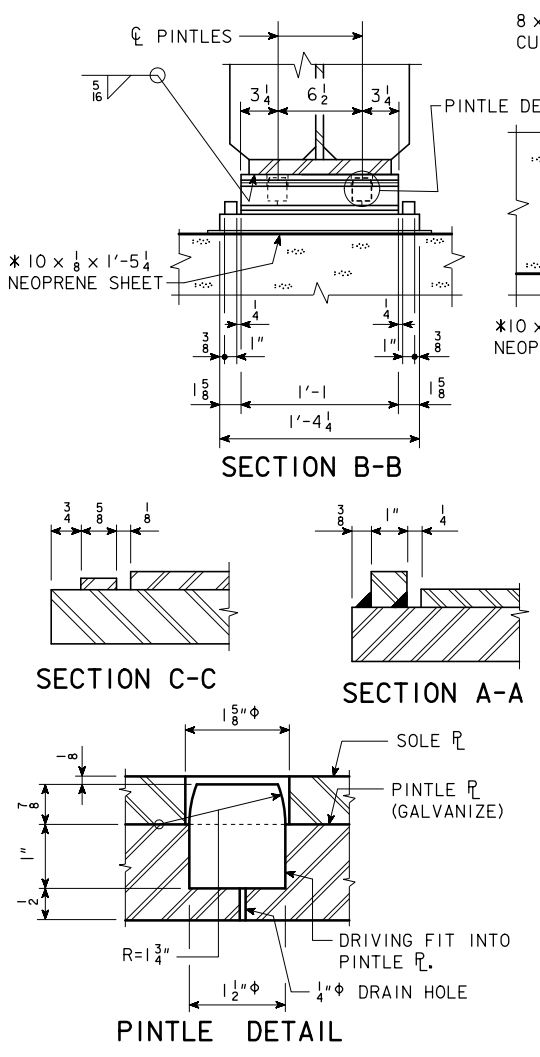
- TOTAL VERTICAL DESIGN LOAD (DC + DW + LL + IM) AT SERVICE LIMIT STATE = 177 k
- BEARINGS AS DESIGNED WILL ALLOW UP TO 1.5 INCHES OF MOVEMENT EACH WAY OF CENTERLINE OF BEARING.

PRETENSIONED PRESTRESSED CONCRETE BEAM ABUTMENT BEARING DETAILS (A & B BEAMS)

MASONRY PLATE / BRONZE BEARING ASSEMBLY

* THE 1/8 INCH NEOPRENE SHEETS ARE TO BE 50, 60, OR 70 DUROMETER HARDNESS AND SHALL BE 1 INCH GREATER IN LENGTH AND WIDTH THAN THE BOTTOM SURFACE OF THE MASONRY PLATES OR STEEL BEARINGS.

STRUCTURAL STEEL	
WEIGHT	LBS.
DOES NOT INCLUDE CURVED SOLE PLATE	
NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.	



STEEL BEAM ABUTMENT BEARING DETAILS

ABUTMENT BEARING NOTES:

SURFACES MARKED "V" SHALL BE FINISHED ANSI 250 AND SURFACES MARKED "∇" SHALL BE FINISHED ANSI 125.

THE SLIDING SURFACE OF THE BRONZE PLATE SHALL BE LUBRICATED IN ACCORDANCE WITH ARTICLE 4190.03, OF THE STANDARD SPECIFICATIONS, AND THE BRONZE METAL SHALL BE CAST BRONZE IN ACCORDANCE WITH ARTICLE 4190.03, OF THE STANDARD SPECIFICATIONS. TOP EDGES OF BRONZE PLATE SHALL BE BEVELED 1/8".

MASONRY PLATES ARE TO BE SET ON A 1/8" NEOPRENE SHEET.

SOLE PLATES, PINTLE PLATES, MASONRY PLATES, AND LUBRICATED BRONZE PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. COST OF NEOPRENE SHEETS SHALL BE CONSIDERED INCIDENTAL TO THE STRUCTURAL STEEL BID ITEM. THE UNIT PRICE BID FOR STRUCTURAL STEEL SHALL INCLUDE ALLOWANCE FOR COST OF BRONZE PLATES.

THE PINTLE PLATE AND MASONRY PLATE SHALL BE GALVANIZED. WELDING SHALL BE DONE BEFORE GALVANIZING.

DESIGN NOTE:

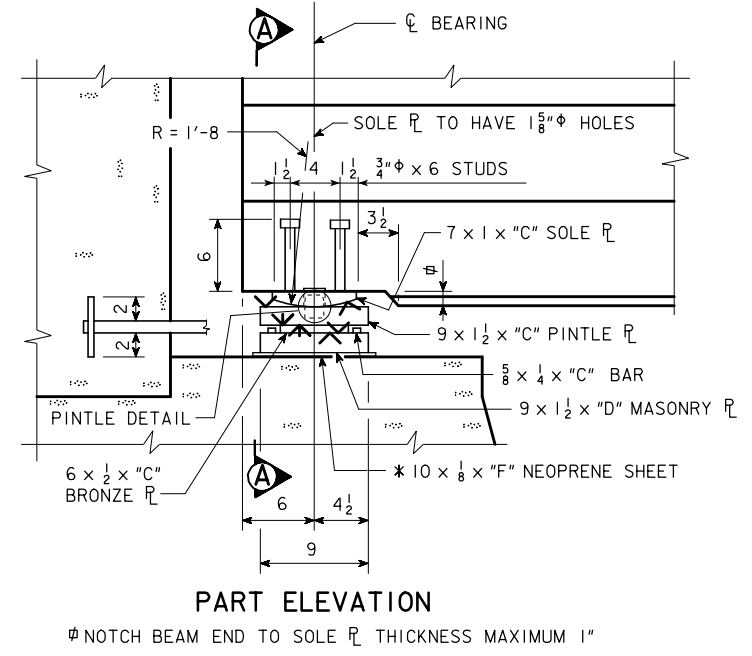
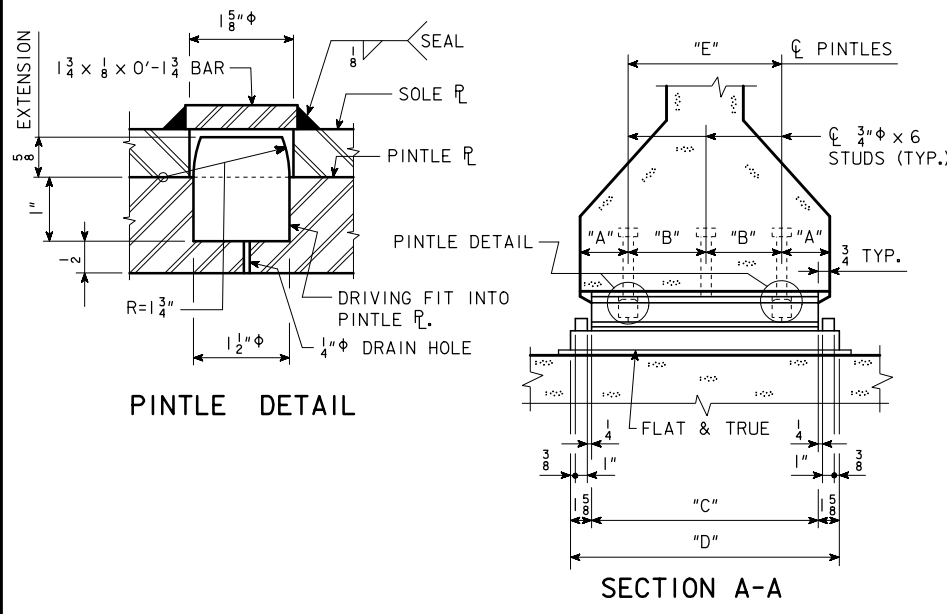
- TOTAL VERTICAL DESIGN LOAD (DC + DW + LL + IM) AT SERVICE LIMIT STATE = 153 k
- BEARINGS AS DESIGNED WILL ALLOW UP TO 1.5 INCHES OF MOVEMENT EACH WAY OF CENTERLINE OF BEARING.

MASONRY PLATE / BRONZE BEARING ASSEMBLY

STRUCTURAL STEEL	
WEIGHT	LBS.
INCLUDES CURVED SOLE PLATE	
NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.	

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 04-14 - ADDED WEIGHT TABLE & TITLES/DESCRIPTIONS TO AGREE WITH SUMMARY QUANTITY SHEET. ADDED NOTE REFERRING TO SUMMARY QUANTITIES SHEET. ENGLISHBEAMS.DGN - 4541A - THIS SHEET ISSUED 03-08.



BEARING DIMENSION	BEAM BOTTOM FLANGE WIDTH	
	1'-8"	1'-10"
"A"	4	5
"B"	6	6
"C"	1'-6 1/2"	1'-8 1/2"
"D"	1'-9 3/4"	1'-11 3/4"
"E"	1'-0"	1'-0"
"F"	1'-10 3/4"	2'-0 3/4"

ABUTMENT BEARING NOTES:

THE SLIDING SURFACE OF THE BRONZE PLATE SHALL BE LUBRICATED IN ACCORDANCE WITH ARTICLE 4190.03, OF THE STANDARD SPECIFICATIONS, AND THE BRONZE METAL SHALL BE CAST BRONZE IN ACCORDANCE WITH ARTICLE 4190.03, OF THE STANDARD SPECIFICATIONS. TOP EDGES OF BRONZE PLATE SHALL BE BEVELED 1/8".

SURFACES MARKED "V" SHALL BE FINISHED ANSI 250 AND SURFACES MARKED "∇" SHALL BE FINISHED ANSI 125.

MASONRY PLATES ARE TO BE SET ON A 1/8" NEOPRENE SHEET.

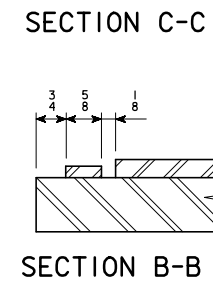
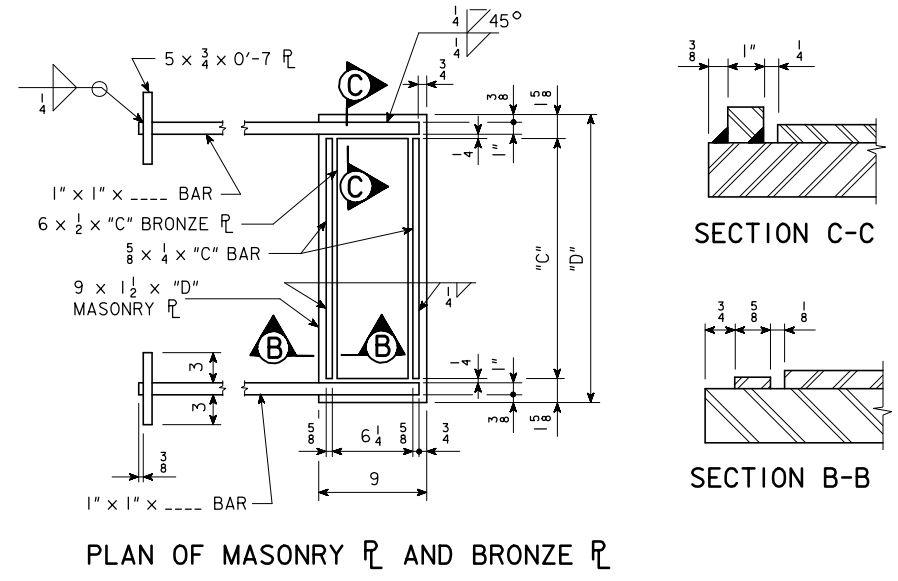
PINTLE PLATES, MASONRY PLATES, AND LUBRICATED BRONZE PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. UNIT PRICE BID FOR STRUCTURAL STEEL SHALL INCLUDE ALLOWANCE FOR COST OF BRONZE PLATES. COST OF NEOPRENE SHEETS SHALL BE CONSIDERED INCIDENTAL TO THE STRUCTURAL STEEL BID ITEM. COST OF THE ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.

THE SOLE PLATE, PINTLE PLATE AND THE MASONRY PLATE SHALL BE GALVANIZED. THE SOLE PLATE AND MASONRY PLATE SHALL BE FITTED UP AND WELDED PRIOR TO GALVANIZING. THE SURFACE OF PINTLE PLATE IN CONTACT WITH BRONZE BEARING PLATE SHALL BE SMOOTH AND FREE OF PROJECTIONS DUE TO GALVANIZING.

SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.

SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING SPECIFICATIONS :

ASTM A514 GRADE B
ASTM A709 GRADE HPS 70W



DESIGN NOTE:

- TOTAL VERTICAL DESIGN LOAD (DC + DW + LL + IM) AT SERVICE LIMIT STATE = 205 k FOR 1'-8" FLANGES AND 224 k FOR 1'-10" FLANGES.
- BEARINGS AS DESIGNED WILL ALLOW UP TO 1.5 INCHES OF MOVEMENT EACH WAY OF CENTERLINE OF BEARING.

PRETENSIONED PRESTRESSED CONCRETE BEAM ABUTMENT BEARING DETAILS (C & D BEAMS)

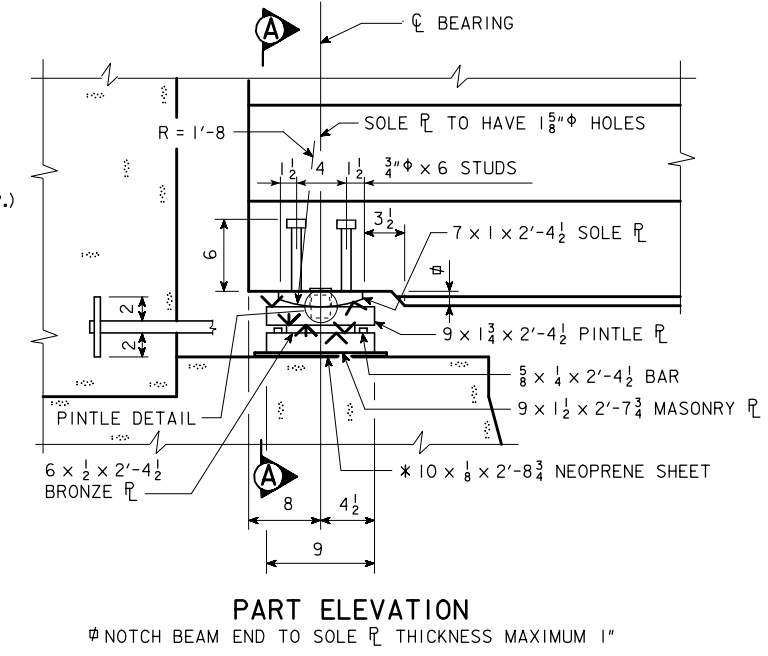
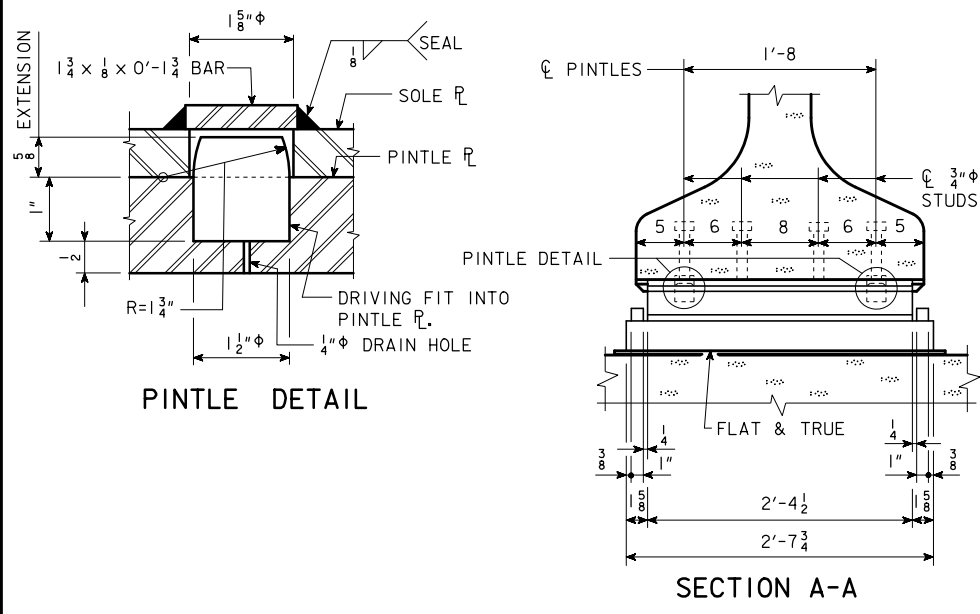
* THE 1/8" INCH NEOPRENE SHEETS ARE TO BE 50, 60, OR 70 DUROMETER HARDNESS AND SHALL BE 1 INCH GREATER IN LENGTH AND WIDTH THAN THE BOTTOM SURFACE OF THE MASONRY PLATES OR STEEL BEARINGS.

MASONRY PLATE / BRONZE BEARING ASSEMBLY

STRUCTURAL STEEL	
WEIGHT	LBS.
DOES NOT INCLUDE CURVED SOLE PLATE	
NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.	

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 04-14 - ADDED WEIGHT TABLE & TITLES/DESCRIPTIONS TO AGREE WITH SUMMARY QUANTITY SHEET. ADDED NOTE REFERRING TO SUMMARY QUANTITIES SHEET. ENGLISHBEAMS.DGN - 4541B - THIS SHEET ISSUED 03-08.



ABUTMENT BEARING NOTES:

THE SLIDING SURFACE OF THE BRONZE PLATE SHALL BE LUBRICATED IN ACCORDANCE WITH ARTICLE 4190.03, OF THE STANDARD SPECIFICATIONS, AND THE BRONZE METAL SHALL BE CAST BRONZE IN ACCORDANCE WITH ARTICLE 4190.03, OF THE STANDARD SPECIFICATIONS. TOP EDGES OF BRONZE PLATE SHALL BE BEVELED 1/8". SURFACES MARKED "V" SHALL BE FINISHED ANSI 250 AND SURFACES MARKED "∇" SHALL BE FINISHED ANSI 125.

MASONRY PLATES ARE TO BE SET ON A 1/8" NEOPRENE SHEET.

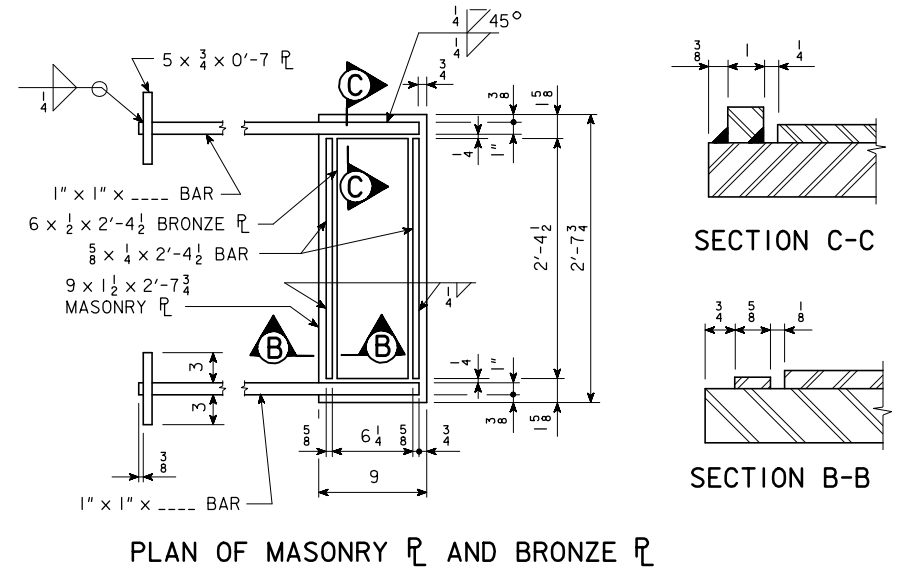
PINTLE PLATES, MASONRY PLATES, AND LUBRICATED BRONZE PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. UNIT PRICE BID FOR STRUCTURAL STEEL SHALL INCLUDE ALLOWANCE FOR COST OF BRONZE PLATES. COST OF NEOPRENE SHEETS SHALL BE CONSIDERED INCIDENTAL TO THE STRUCTURAL STEEL BID ITEM. COST OF THE ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.

THE SOLE PLATE, PINTLE PLATE AND THE MASONRY PLATE SHALL BE GALVANIZED. THE SOLE PLATE AND MASONRY PLATE SHALL BE FITTED UP AND WELDED PRIOR TO GALVANIZING. THE SURFACE OF PINTLE PLATE IN CONTACT WITH BRONZE BEARING PLATE SHALL BE SMOOTH AND FREE OF PROJECTIONS DUE TO GALVANIZING.

SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.

SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING SPECIFICATIONS :

- ASTM A514 GRADE B
- ASTM A709 GRADE HPS 70W



DESIGN NOTE:

- TOTAL VERTICAL DESIGN LOAD (DC + DW + LL + IM) AT SERVICE LIMIT STATE = 300 k
- BEARINGS AS DESIGNED WILL ALLOW UP TO 1.5 INCHES OF MOVEMENT EACH WAY OF CENTERLINE OF BEARING.

PRETENSIONED PRESTRESSED CONCRETE BEAM ABUTMENT BEARING DETAILS (BTB, BTC, BTD & BTE BEAMS)

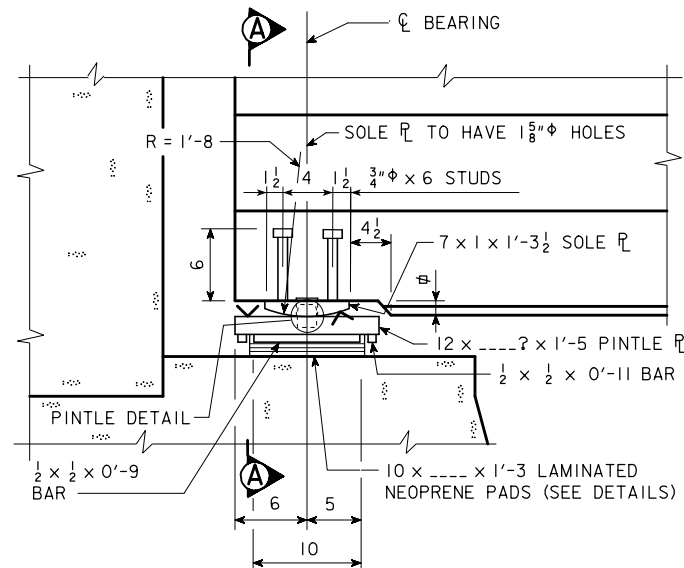
* THE 1/8 INCH NEOPRENE SHEETS ARE TO BE 50, 60, OR 70 DUROMETER HARDNESS AND SHALL BE 1 INCH GREATER IN LENGTH AND WIDTH THAN THE BOTTOM SURFACE OF THE MASONRY PLATES OR STEEL BEARINGS.

MASONRY PLATE / BRONZE BEARING ASSEMBLY

STRUCTURAL STEEL	
WEIGHT	LBS.
DOES NOT INCLUDE CURVED SOLE PLATE	
NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.	

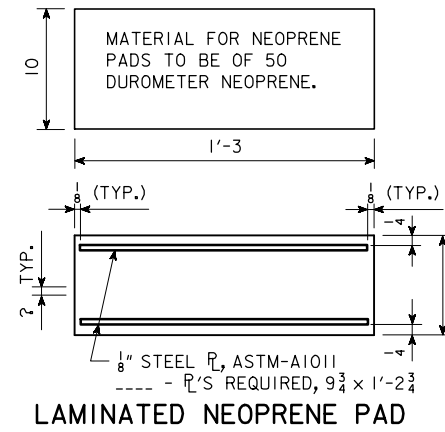
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION			
DESIGN SHEET NO. _____	OF _____	FILE NO. _____	DESIGN NO. _____

CORRECTION 04-14 - ADDED WEIGHT TABLE & TITLES/DESCRIPTIONS TO AGREE WITH SUMMARY QUANTITY SHEET. ADDED NOTE REFERRING TO SUMMARY QUANTITIES SHEET. ENGLISHBEAMS.DGN - 4541C - THIS SHEET ISSUED 03-08.

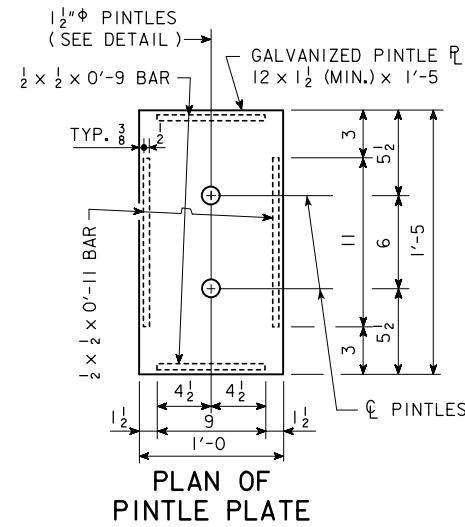


PART ELEVATION

Ø NOTCH BEAM END TO SOLE PLATE THICKNESS MAXIMUM 1"

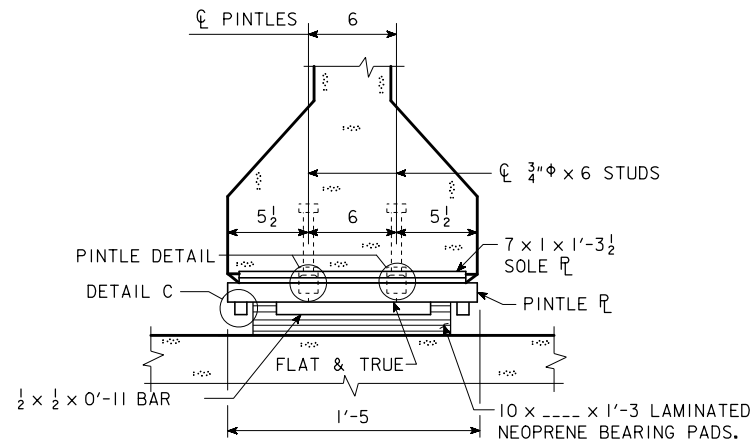


LAMINATED NEOPRENE PAD

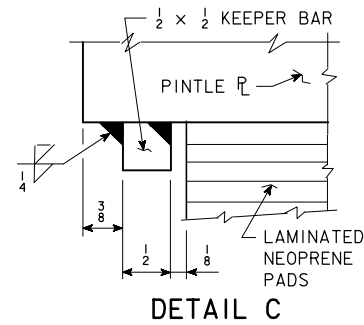


PLAN OF PINTLE PLATE

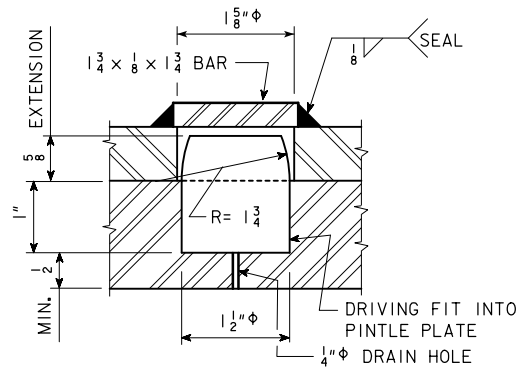
ALLOWABLE PINTLE PLATE THICKNESS	
ALLOW THICKNESS INCHES	MAXIMUM SERVICE VERTICAL LOAD, K
1.5	83
2.0	147



**SECTION A-A
ABUTMENT BEARING (A & B BEAMS)**



DETAIL C



PINTLE DETAIL

LAMINATED NEOPRENE PAD / CURVED SOLE PLATE ASSEMBLY

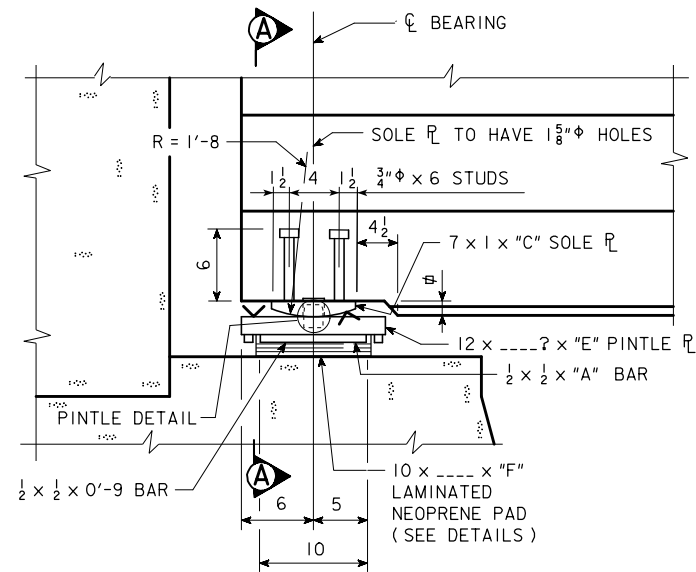
ABUTMENT BEARING NOTES:

- SURFACES MARKED "V" SHALL BE FINISHED ANSI 250.
- PINTLE PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY.
- COST OF ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.
- COST OF NEOPRENE BEARING PADS SHALL BE CONSIDERED INCIDENTAL TO THE BID ITEM FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.
- THE SOLE PLATES AND PINTLE PLATES SHALL BE GALVANIZED. ALL WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACE OF THE PINTLE PLATE IN CONTACT WITH THE LAMINATED NEOPRENE PADS SHALL BE FREE OF PROJECTIONS DUE TO THE GALVANIZING.
- SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.
- SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING :
 - ASTM A514 GRADE B
 - ASTM A709 GRADE HPS 70W

STRUCTURAL STEEL	
WEIGHT	LBS.
DOES NOT INCLUDE CURVED SOLE PLATE	
NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.	

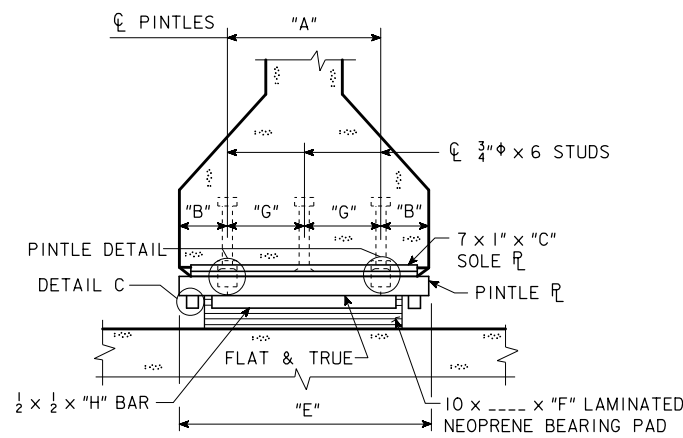
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
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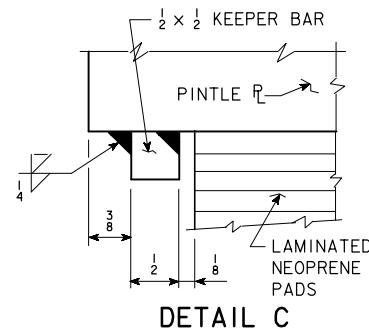


PART ELEVATION

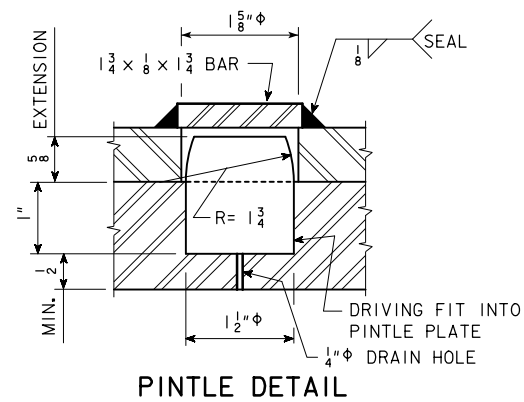
NOTCH BEAM END TO SOLE PLATE THICKNESS MAXIMUM 1"



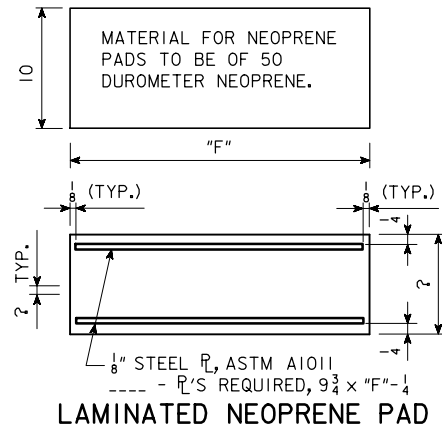
**SECTION A-A
ABUTMENT BEARING (C & D BEAMS)**



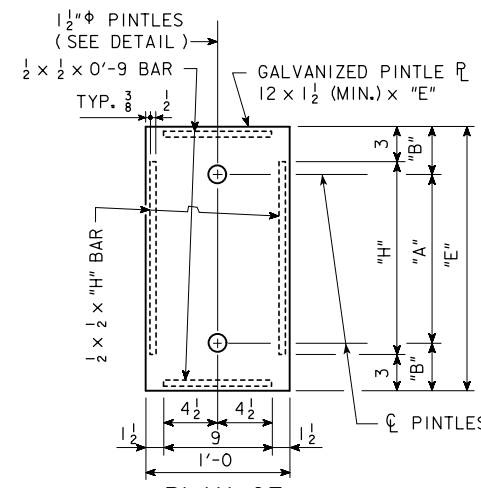
DETAIL C



PINTLE DETAIL



LAMINATED NEOPRENE PAD



**PLAN OF
PINTLE PLATE**

ALLOWABLE PINTLE PLATE THICKNESS		
ALLOW THICKNESS INCHES	MAXIMUM SERVICE VERTICAL LOAD, k	
	1'-8 FLANGE	1'-10 FLANGE
1.5	101	112
2.0	179	200
2.5	280	315

VARIABLE DIMENSIONS		
BEARING DIMENSION	BEAM BOTTOM FLANGE WIDTH	
	1'-8	1'-10
"A"	1'-0	1'-0
"B"	4	5
"C"	1'-6 1/2	1'-8 1/2
"D"	3 1/4	4 1/4
"E"	1'-8	1'-10
"F"	1'-6	1'-8
"G"	6	6
"H"	1'-2	1'-4

LAMINATED NEOPRENE PAD / CURVED SOLE PLATE ASSEMBLY

ABUTMENT BEARING NOTES:

- SURFACES MARKED "V" SHALL BE FINISHED ANSI 250.
- PINTLE PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY.
- COST OF ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.
- COST OF NEOPRENE BEARING PADS SHALL BE CONSIDERED INCIDENTAL TO THE BID ITEM FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.
- THE SOLE PLATES AND PINTLE PLATES SHALL BE GALVANIZED. ALL WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACE OF THE PINTLE PLATE IN CONTACT WITH THE LAMINATED NEOPRENE PADS SHALL BE FREE OF PROJECTIONS DUE TO THE GALVANIZING.
- SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.
- SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING :
 - ASTM A514 GRADE B
 - ASTM A709 GRADE HPS 70W

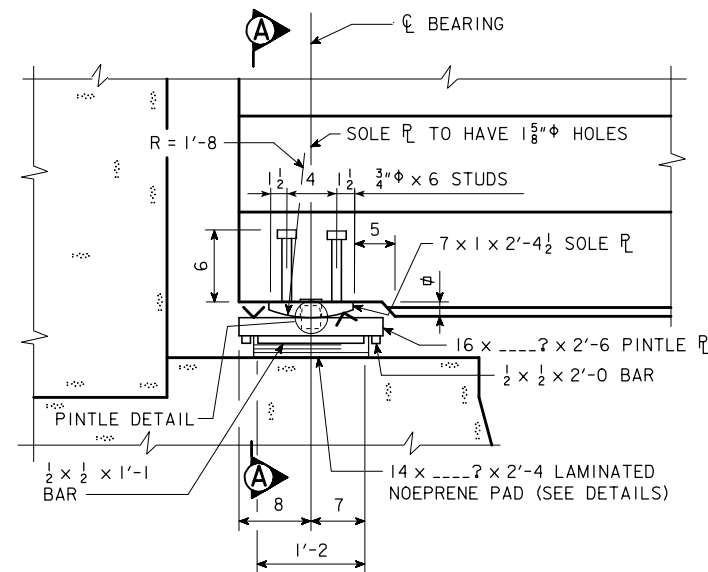
STRUCTURAL STEEL	
WEIGHT	LBS.

DOES NOT INCLUDE CURVED SOLE PLATE

NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.

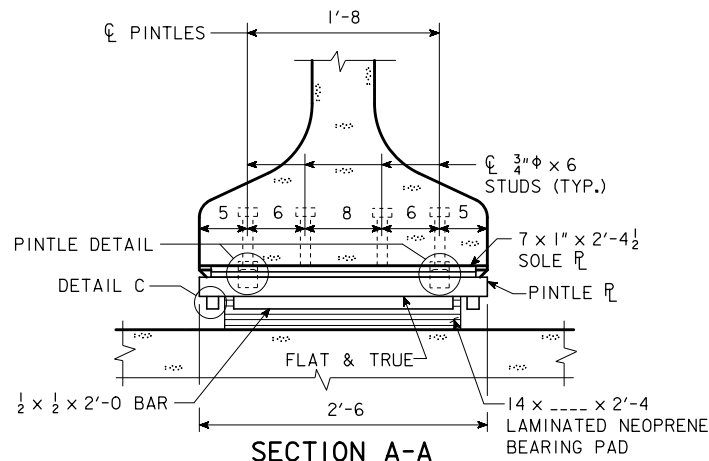
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 04-14 - ADDED WEIGHT TABLE & TITLES/DESCRIPTIONS TO AGREE WITH SUMMARY QUANTITIES SHEET. ADDED NOTE REFERRING TO SUMMARY QUANTITIES SHEET. ENGLISHBEAMS.DGN - 4541E - THIS SHEET ISSUED 03-08.



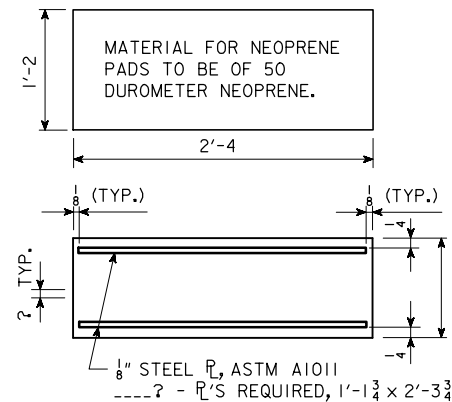
PART ELEVATION

∅ NOTCH BEAM END TO SOLE PLATE THICKNESS MAXIMUM 1"

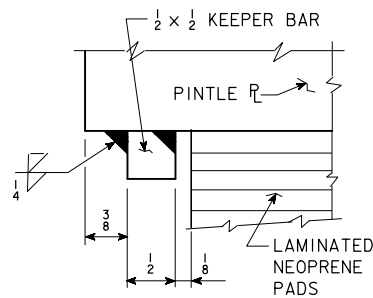


SECTION A-A

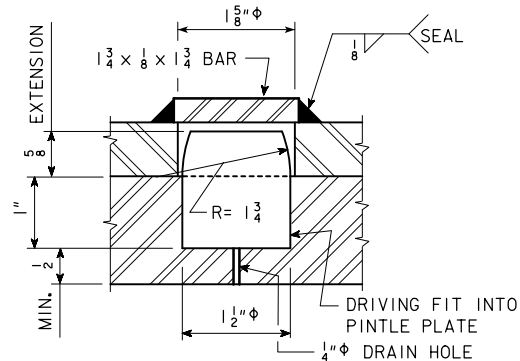
ABUTMENT BEARING BULB TEE BEAMS



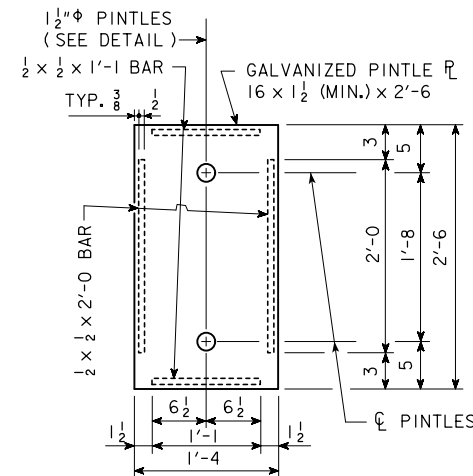
LAMINATED NEOPRENE PAD



DETAIL C



PINTLE DETAIL



PLAN OF PINTLE PLATE

ALLOWABLE PINTLE PLATE THICKNESS	
ALLOW THICKNESS INCHES	MAXIMUM SERVICE VERTICAL LOAD, K
1.5	114
2.0	203
2.5	318

LAMINATED NEOPRENE PAD / CURVED SOLE PLATE ASSEMBLY

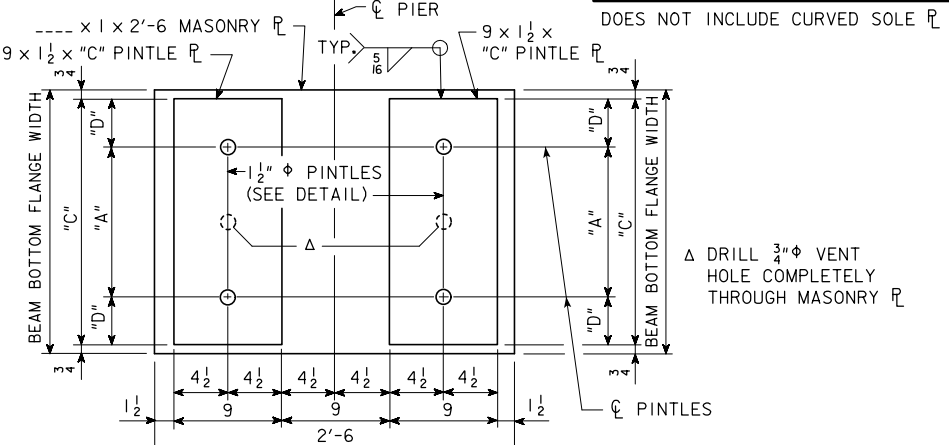
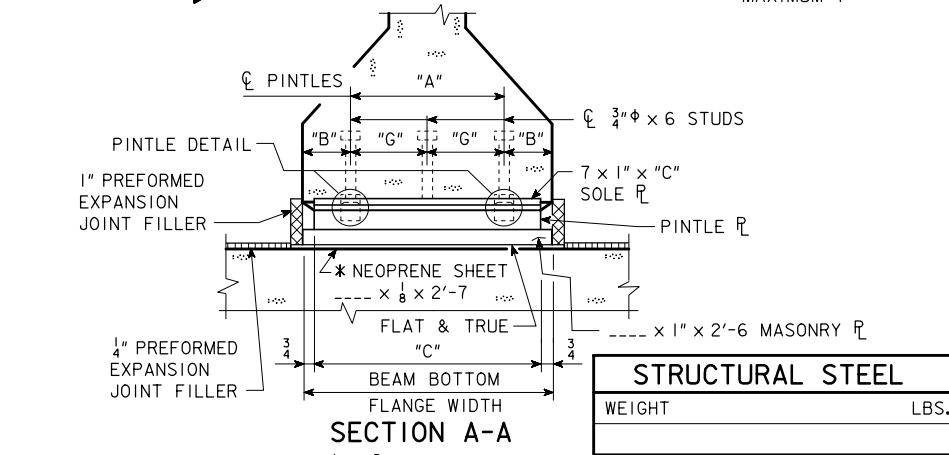
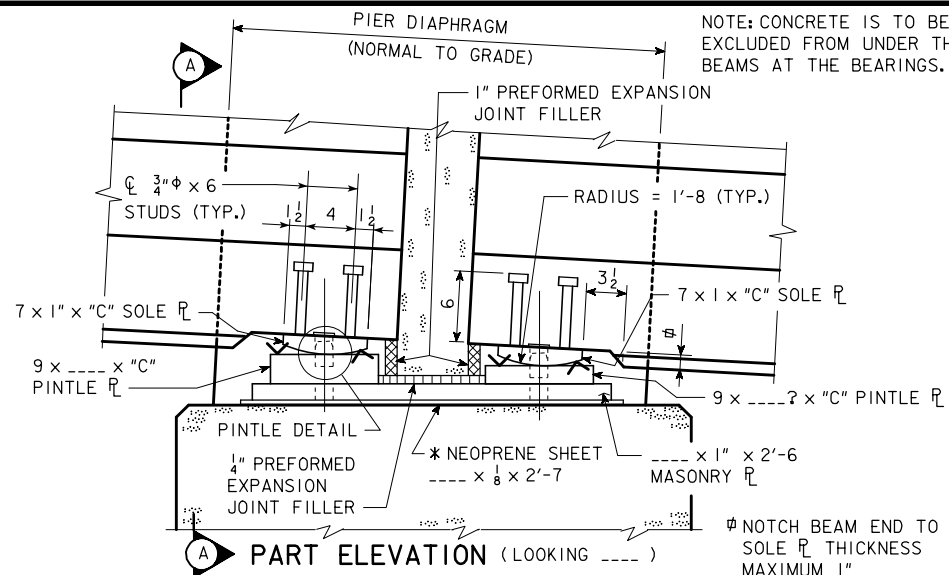
ABUTMENT BEARING NOTES:

- SURFACES MARKED "V" SHALL BE FINISHED ANSI 250.
- PINTLE PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY.
- COST OF ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.
- COST OF NEOPRENE BEARING PADS SHALL BE CONSIDERED INCIDENTAL TO THE BID ITEM FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.
- THE SOLE PLATES AND PINTLE PLATES SHALL BE GALVANIZED. ALL WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACE OF THE PINTLE PLATE IN CONTACT WITH THE LAMINATED NEOPRENE PADS SHALL BE FREE OF PROJECTIONS DUE TO THE GALVANIZING.
- SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.
- SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING :
 - ASTM A514 GRADE B
 - ASTM A709 GRADE HPS 70W

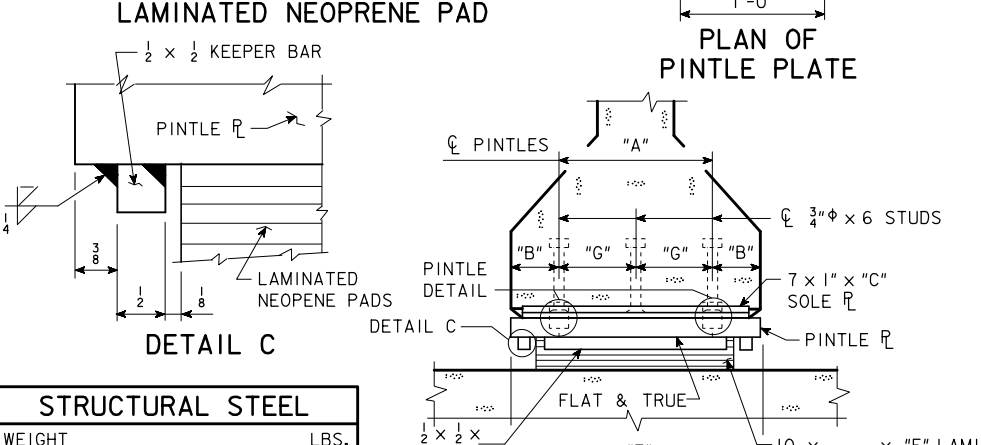
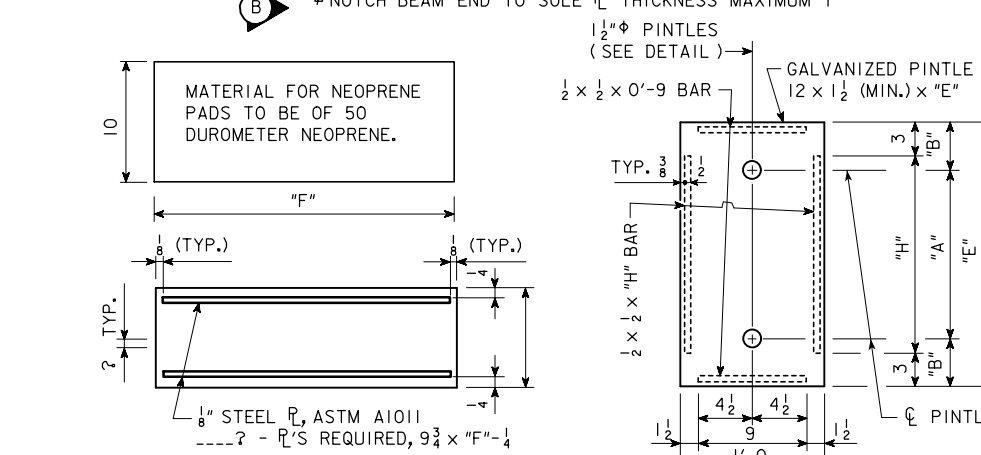
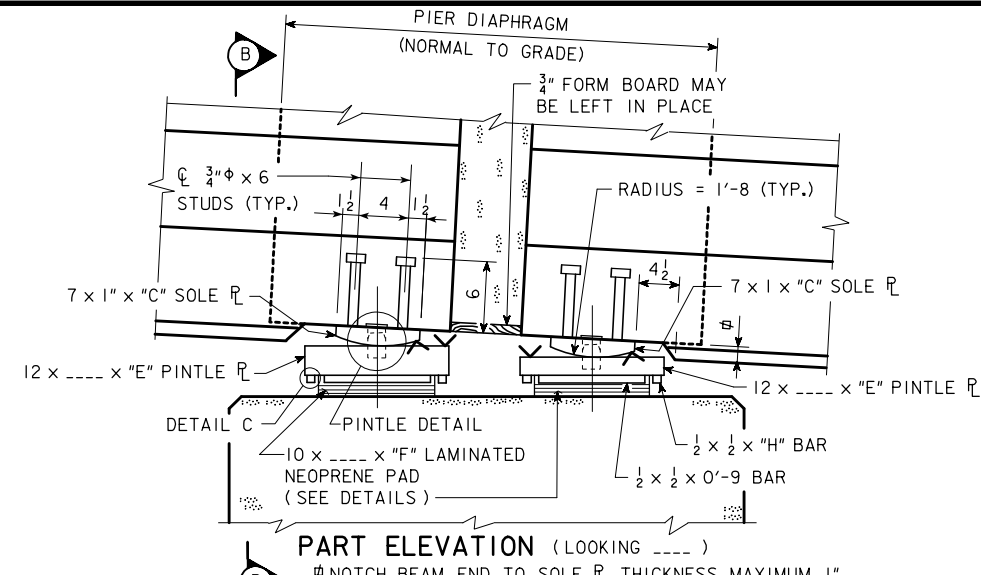
STRUCTURAL STEEL	
WEIGHT	LBS.
DOES NOT INCLUDE CURVED SOLE PLATE	
NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.	

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

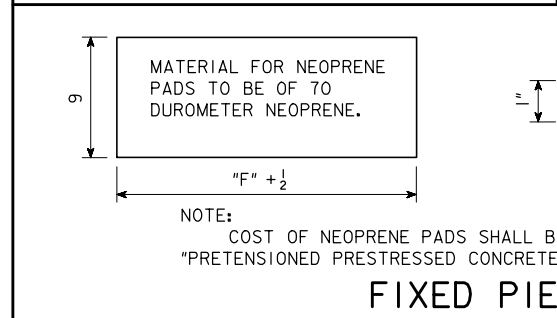
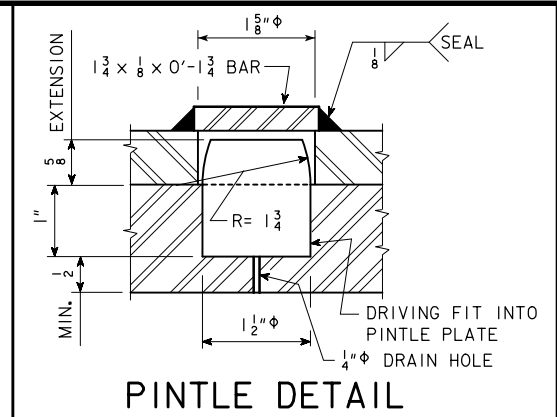
CORRECTION 04-14 - ADDED WEIGHT TABLE & TITLES/DESCRIPTIONS TO AGREE WITH SUMMARY QUANTITY SHEET. ADDED NOTE REFERRING TO SUMMARY QUANTITIES SHEET. ENGLISHBEAMS.DGN - 4541G - THIS SHEET ISSUED 03-08.



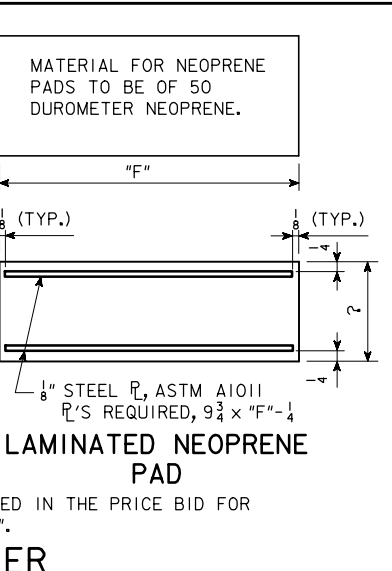
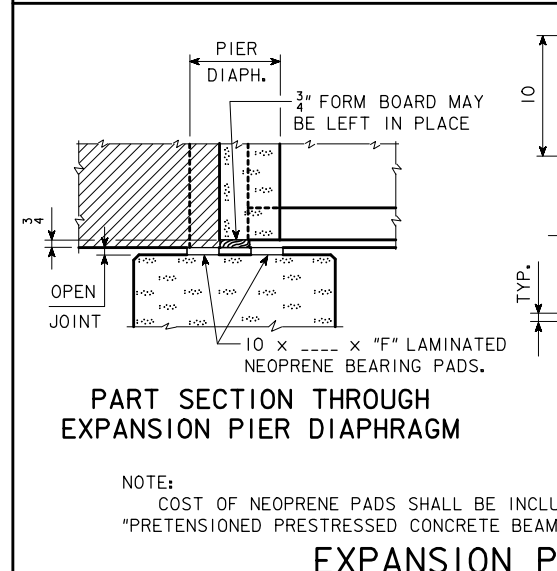
FIXED PIER BEARING NOTES:
 SURFACES MARKED "V" SHALL BE FINISHED ANSI 250.
 MASONRY PLATES ARE TO BE SET ON A 1/8" NEOPRENE SHEET.
 PINTLE PLATES AND MASONRY PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. COST OF NEOPRENE SHEETS SHALL BE CONSIDERED INCIDENTAL TO THE STRUCTURAL STEEL BID ITEM.
 COST OF ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS.
 THE SOLE PLATES, PINTLE PLATES, AND MASONRY PLATES SHALL BE GALVANIZED. ALL WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACE OF THE PINTLE PLATE IN CONTACT WITH THE MASONRY PLATE SHALL BE FREE OF PROJECTIONS DUE TO GALVANIZING.
 SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.
 SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING:
 ASTM A514 GRADE B
 ASTM A709 GRADE HPS 70W
FIXED PIER (C & D BEAMS)
MASONRY PLATE / CURVED SOLE PLATE ASSEMBLY



EXPANSION PIER BEARING NOTES:
 SURFACES MARKED "V" SHALL BE FINISHED ANSI 250.
 PINTLE PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. COST OF ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS. COST FOR NEOPRENE PADS SHALL BE CONSIDERED INCIDENTAL TO THE PRETENSIONED PRESTRESSED CONCRETE BEAM BID ITEM.
 THE SOLE PLATES AND PINTLE PLATES SHALL BE GALVANIZED. ALL WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACE OF THE PINTLE PLATE IN CONTACT WITH THE LAMINATED NEOPRENE PADS SHALL BE FREE OF PROJECTIONS DUE TO THE GALVANIZING.
 SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE.
 SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING:
 ASTM A514 GRADE B
 ASTM A709 GRADE HPS 70W
EXPANSION PIER (C & D BEAMS)
LAMINATED NEOPRENE PAD / CURVED SOLE PLATE ASSEMBLY



VARIABLE DIMENSIONS		
BEARING DIMENSION	BEAM BOTTOM FLANGE WIDTH	
	1'-8"	1'-10"
"A"	1'-0"	1'-0"
"B"	4"	5"
"C"	1'-6 1/2"	1'-8 1/2"
"D"	3 3/4"	4 1/4"
"E"	1'-8"	1'-10"
"F"	1'-6"	1'-8"
"G"	6"	6"
"H"	1'-2"	1'-4"



EXPANSION PIER

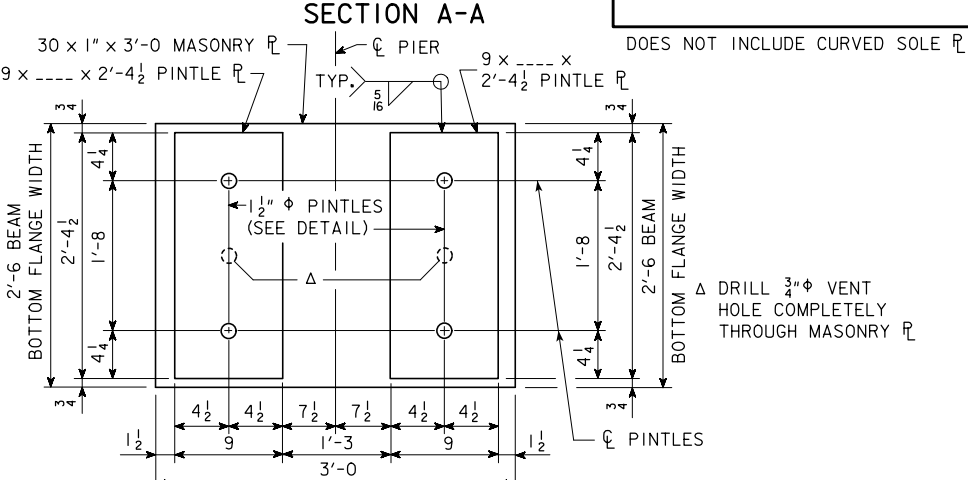
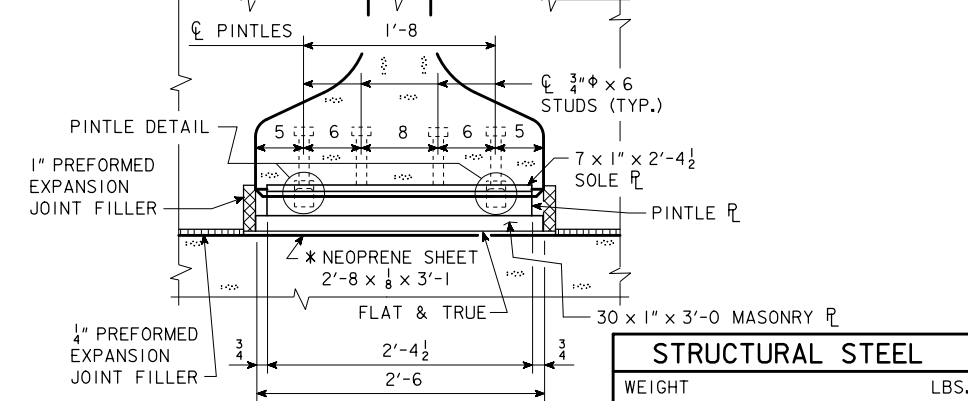
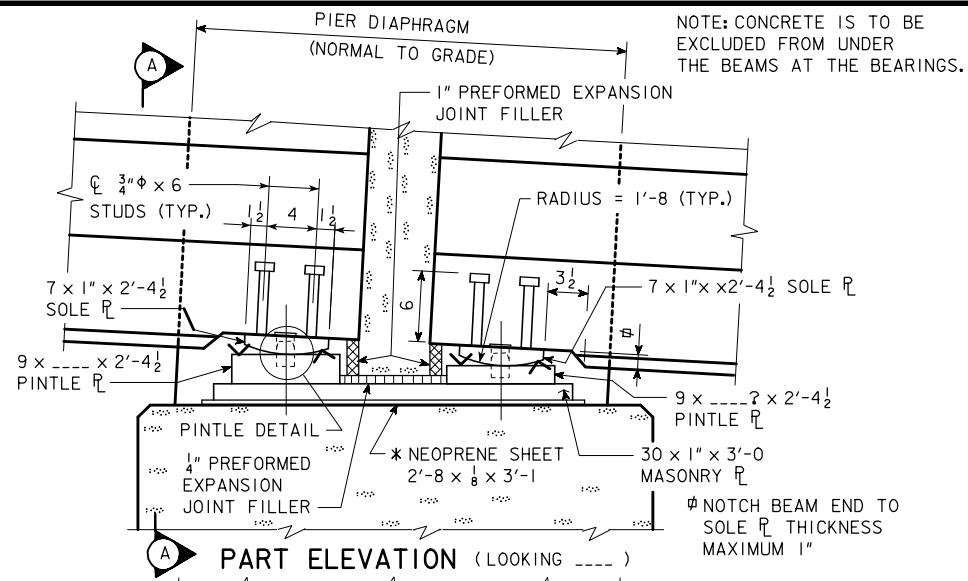
* THE 1/8 INCH NEOPRENE SHEETS ARE TO BE 50, 60, OR 70 DUROMETER HARDNESS AND SHALL BE 1 INCH GREATER IN LENGTH THAN THE BOTTOM SURFACE OF THE MASONRY PLATES OR STEEL BEARINGS.

NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.

ALLOWABLE PINTLE PLATE THICKNESS		
ALLOW THICKNESS INCHES	MAXIMUM SERVICE VERTICAL LOAD, k	
	1'-8" FLANGE	1'-10" FLANGE
1.5	101	112
2.0	179	200
2.5	280	300

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
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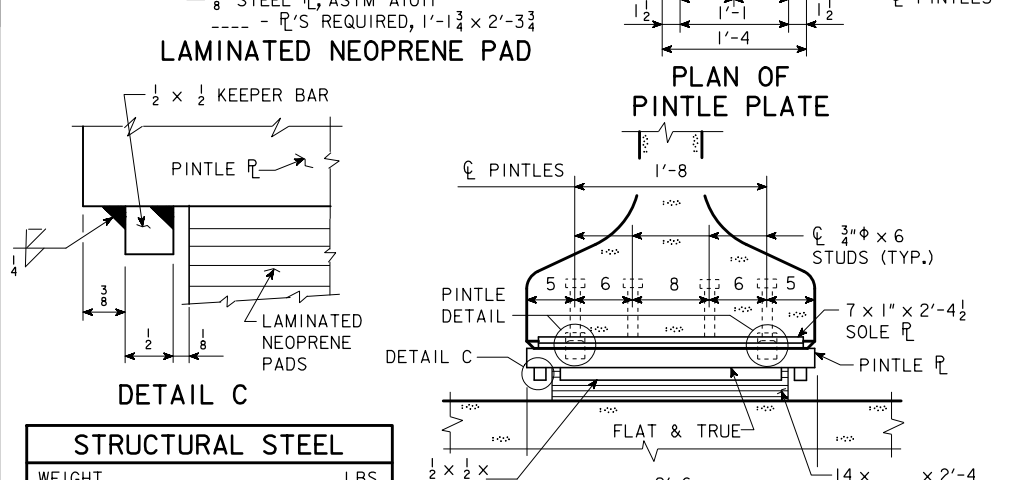
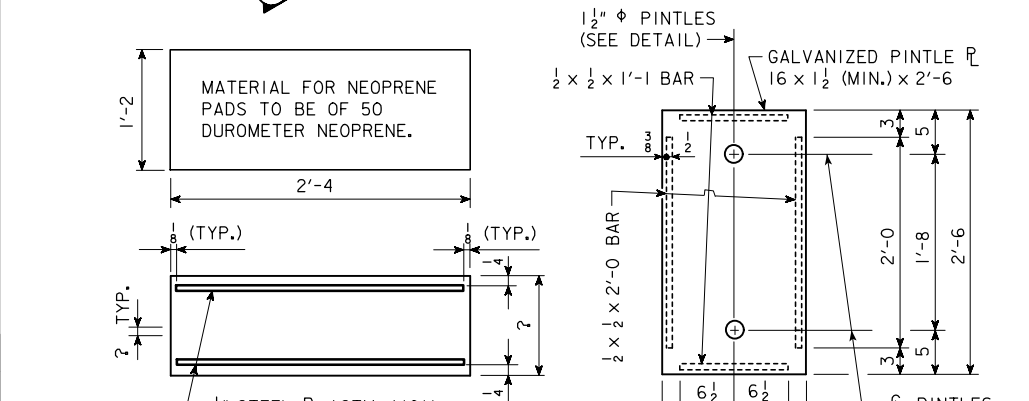
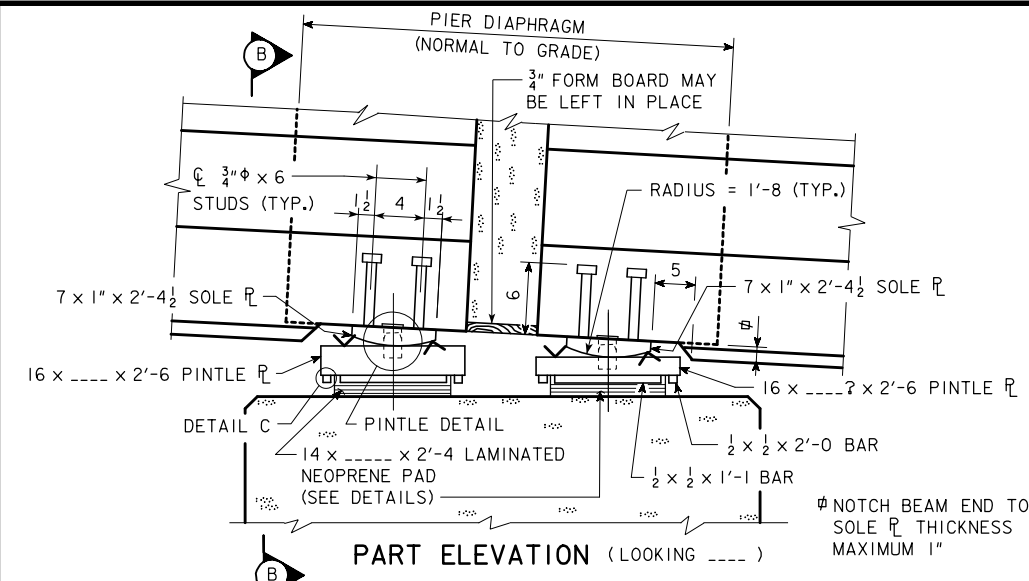
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FIXED PIER BEARING NOTES:

SURFACES MARKED "V" SHALL BE FINISHED ANSI 250. MASONRY PLATES ARE TO BE SET ON A 1/8" NEOPRENE SHEET. PINTLE PLATES, AND MASONRY PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. COST OF NEOPRENE SHEETS SHALL BE CONSIDERED INCIDENTAL TO THE STRUCTURAL STEEL BID ITEM. COST OF ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS. THE SOLE PLATES, PINTLE PLATES, AND MASONRY PLATES SHALL BE GALVANIZED. ALL WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACE OF THE PINTLE PLATE IN CONTACT WITH THE MASONRY PLATE SHALL BE FREE OF PROJECTIONS DUE TO GALVANIZING. SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE. SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING:

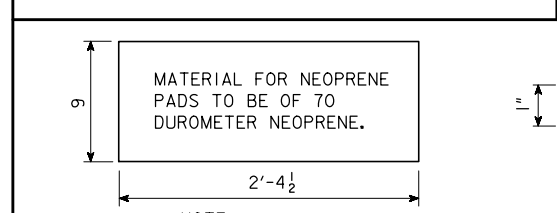
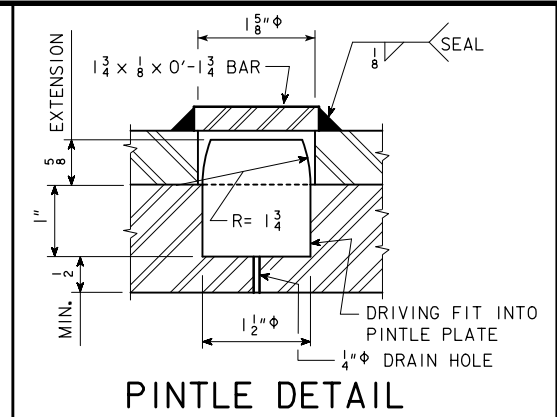
- ASTM A514 GRADE B
 - ASTM A709 GRADE HPS 70W
- FIXED PIER MASONRY PLATE / CURVED SOLE PLATE ASSEMBLY**



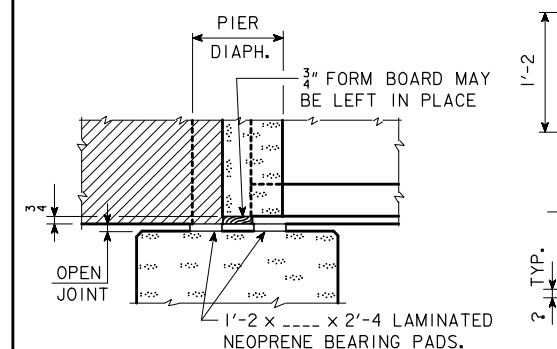
EXPANSION PIER BEARING NOTES:

SURFACES MARKED "V" SHALL BE FINISHED ANSI 250. PINTLE PLATES ARE A PART OF THE SUPERSTRUCTURE STRUCTURAL STEEL QUANTITY. COST OF ANCHORED CURVED SOLE PLATES IS TO BE INCLUDED IN THE PRICE BID FOR PRETENSIONED PRESTRESSED CONCRETE BEAMS. COST FOR NEOPRENE PADS SHALL BE CONSIDERED INCIDENTAL TO THE PRETENSIONED PRESTRESSED CONCRETE BEAM BID ITEM. THE SOLE PLATES AND PINTLE PLATES SHALL BE GALVANIZED. ALL WELDING SHALL BE COMPLETED PRIOR TO GALVANIZING. THE SURFACE OF THE PINTLE PLATE IN CONTACT WITH THE LAMINATED NEOPRENE PADS SHALL BE FREE OF PROJECTIONS DUE TO THE GALVANIZING. SOLE PLATES ARE TO BE SET IN FORMS WHEN BEAMS ARE CAST AND THE BOTTOM OF BEAMS FORMED OUT AS SHOWN TO EXCLUDE CONCRETE. SOLE PLATES SHALL COMPLY WITH ONE OF THE FOLLOWING:

- ASTM A514 GRADE B
 - ASTM A709 GRADE HPS 70W
- EXPANSION PIER LAMINATED NEOPRENE PAD / CURVED SOLE PLATE ASSEMBLY**



NOTE: COST OF NEOPRENE PADS SHALL BE INCLUDED IN THE PRICE BID FOR "PRETENSIONED PRESTRESSED CONCRETE BEAMS".



EXPANSION PIER

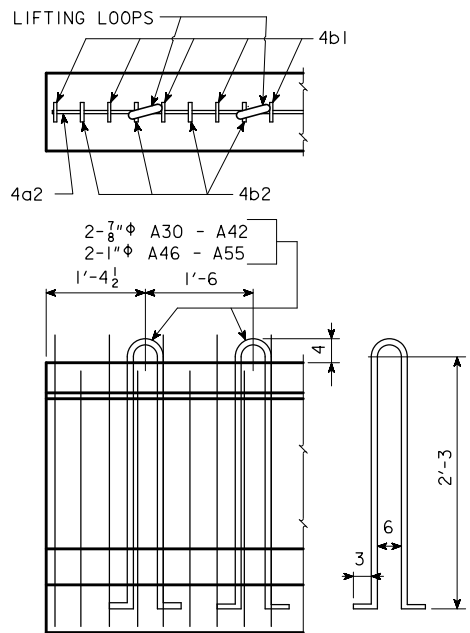
NOTE: COST OF NEOPRENE PADS SHALL BE INCLUDED IN THE PRICE BID FOR "PRETENSIONED PRESTRESSED CONCRETE BEAMS".

* THE 1/8 INCH NEOPRENE SHEETS ARE TO BE 50, 60, OR 70 DUROMETER HARDNESS AND SHALL BE 1 INCH GREATER IN LENGTH THAN THE BOTTOM SURFACE OF THE MASONRY PLATES OR STEEL BEARINGS.

NOTE: STRUCTURAL STEEL WEIGHT IS INCLUDED ON THE SUMMARY QUANTITIES SHEET.

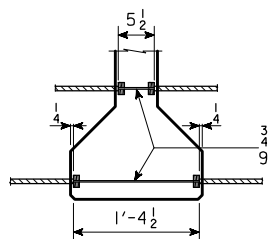
ALLOWABLE PINTLE PLATE THICKNESS	
ALLOW THICKNESS INCHES	MAXIMUM SERVICE VERTICAL LOAD, K
1.5	114
2.0	203
2.5	318

REVISION 08-12 - I.M. REFERENCE NOTE FOR SEALING BEAM ENDS DISTINGUISHES BETWEEN THE FABRICATOR AND CONTRACTOR. ENGLISHBEAMS.DGN - 4600 - LRFD - THIS SHEET RE-ISSUED 09-06.



LIFTING LOOP DETAIL

ALTERNATE TYPES MAY BE SUBSTITUTED WITH THE APPROVAL OF THE ENGINEER. LIFTING LOOPS ARE TO BE STRUCTURAL GRADE.

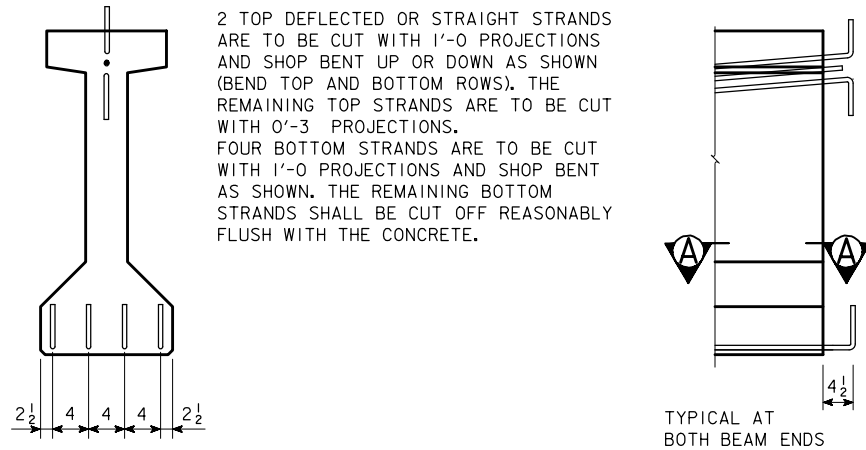


COIL TIE DETAIL

NUMBER AND EXACT LOCATION OF COIL TIES TO BE AS DETAILED ON SPECIFIC BRIDGE DESIGN.

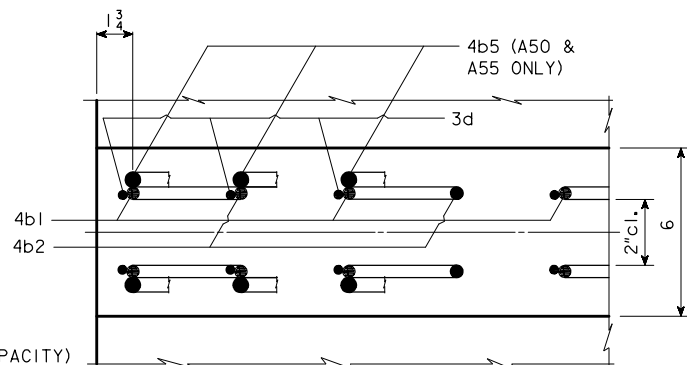
SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.
 DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.



STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS

2 TOP DEFLECTED OR STRAIGHT STRANDS ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT UP OR DOWN AS SHOWN (BEND TOP AND BOTTOM ROWS). THE REMAINING TOP STRANDS ARE TO BE CUT WITH 0'-3 PROJECTIONS. FOUR BOTTOM STRANDS ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT AS SHOWN. THE REMAINING BOTTOM STRANDS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.



SECTION A-A SHOWING PLACEMENT OF STIRRUPS NEAR END OF BEAM

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH A.A.S.H.T.O. LRFD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007:
 REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. CONCRETE IN ACCORDANCE WITH SECTION 5, f'c = 5000 psi (EXCEPT AS NOTED)
 PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, f's = 270,000 psi.

A BEAM DATA

BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	STRAND SIZE DIA. (inches)	NO. OF STRANDS		TOTAL INITIAL PRESTRESS KIPS	HOLD DOWN FORCE-KIPS	CAMBER (in.)		DEFLECTION (in.) Δ _D				PERMISSIBLE SPACING		WEIGHT (TONS)	CONCRETE (C. Y.)	REINFORCING STEEL-(lb)
				STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) Δ _T		TIME (PLASTIC) Δ _T		HL93 LOADING				
										CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.			
A30	30'-0	31'-0	0.60	8	—	340	—	0.16	0.29	0.10	0.09	0.03	0.02	7'-6	7'-6	5.0	2.48	315
A34	34'-2	35'-2	0.60	9	—	383	—	0.26	0.46	0.17	0.15	0.04	0.04	7'-6	7'-6	5.7	2.82	352
A38	38'-4	39'-4	0.60	10	—	426	—	0.38	0.67	0.26	0.24	0.07	0.06	7'-6	7'-6	6.4	3.15	400
A42	42'-6	43'-6	0.60	7	2	383	9.3	0.70	1.24	0.38	0.35	0.09	0.09	7'-6	7'-6	7.1	3.49	452
*A46	46'-8	47'-8	0.60	8	2	426	8.5	0.76	1.35	0.50	0.47	0.13	0.12	7'-6	7'-6	7.7	3.82	488
*A50	50'-10	51'-10	0.60	9	3	511	10.7	1.02	1.82	0.69	0.65	0.17	0.16	7'-6	7'-6	8.4	4.15	503
*A55	55'-0	56'-0	0.60	10	3	553	10.8	1.29	2.30	0.94	0.88	0.23	0.22	7'-6	7'-6	9.1	4.49	547

① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB WEIGHT OF 757 #/FT. (8" SLAB AND 7'-6 BEAM SPACING) AND ONE CONCRETE DIAPHRAGM (1912 #) OR ONE STEEL DIAPHRAGM (285 #) AT CL OF SPAN. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.

② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.

TOTAL BEAM DEFLECTIONS AT CL OF SPAN, Δ_D, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:

- (A) Δ_D = Δ_T + Δ_T FOR SIMPLE SPAN.
- (B) Δ_D = Δ_T + 3/4 Δ_T FOR END SPANS OF CONTINUOUS BRIDGE.
- (C) Δ_D = Δ_T + 1/2 Δ_T FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.

③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi AND A_s = 0.217 sq. in.

* MINIMUM CONCRETE f'c (AT 28 DAYS) SHALL BE 7,000 psi. MINIMUM f'ci AT RELEASE SHALL BE 6,000 psi.

BEAM NOTES:

THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 LB. PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE.

ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION.

ALL PRESTRESSING STRANDS SHALL CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS.

TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570.

BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.

THE PORTIONS OF THE PRESTRESS BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, 1, OF THE STANDARD SPECIFICATIONS.

ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE.

IF THE PRECAST PANEL OPTION IS ALLOWED AND USED FOR BRIDGE DECK FORMATION, THE BEAM STIRRUPS WILL NEED TO BE EXTENDED AND TOP FLANGE BEAM FINISH SHALL BE MODIFIED AS PER DETAILS ON THE PRECAST DECK PANEL SHEET.

IF THE STEEL DIAPHRAGM OPTION IS ALLOWED AND USED, HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.

IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.

IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.

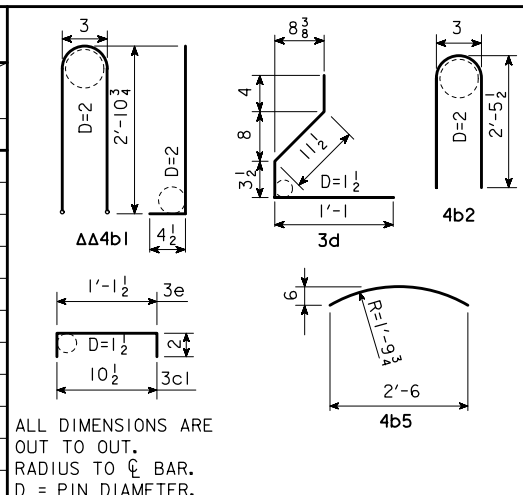
0.6" DIAMETER STRANDS STRESSED TO NOT MORE THAN 5,000 LBS. EACH MAY BE USED IN LIEU OF THE α BARS WHICH RUN THE FULL LENGTH OF THE BEAM IN THE TOP FLANGE.

WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION).

REINFORCING BAR LIST															
BEAM	SPAN	A30	A34	A38	A42	A46	A50	A55							
		30'-0	34'-2	38'-4	42'-6	46'-8	50'-10	55'-0							
BAR	SHAPE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH				
5a1	—	2	30'-9	2	34'-11	2	39'-1	4	22'-10	4	24'-11	4	27'-0	4	29'-1
4a2	—	2	3'-3	2	3'-3	2	3'-3	2	3'-3	2	3'-3	2	3'-3	2	3'-3
ΔΔ 4b1	—	28	6'-8	32	6'-8	36	6'-8	40	6'-8	44	6'-8	46	6'-8	50	6'-8
4b2	—	8	5'-0	8	5'-0	10	5'-0	12	5'-0	12	5'-0	8	5'-0	8	5'-0
4b5	—	—	—	—	—	—	—	—	—	—	—	8	2'-9	12	2'-9
3c1	—	28	1'-3	32	1'-3	36	1'-3	40	1'-3	44	1'-3	46	1'-3	50	1'-3
** 3d	—	72	2'-8	80	2'-8	92	2'-8	104	2'-8	112	2'-8	108	2'-8	116	2'-8
3e	—	18	1'-6	18	1'-6	20	1'-6	20	1'-6	18	1'-6	18	1'-6	18	1'-6

ΔΔ 4b1 BARS TO BE EPOXY COATED.

** WHERE DEFLECTING STRANDS INTERFERE WITH PLACEMENT, SOME IN-PLACE BENDING MAY BE NECESSARY.

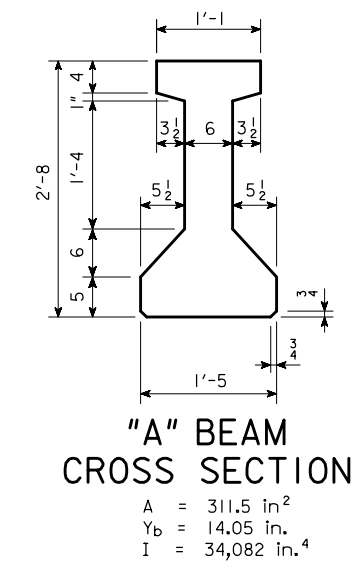
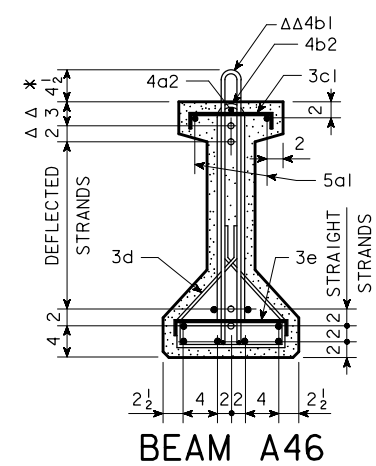
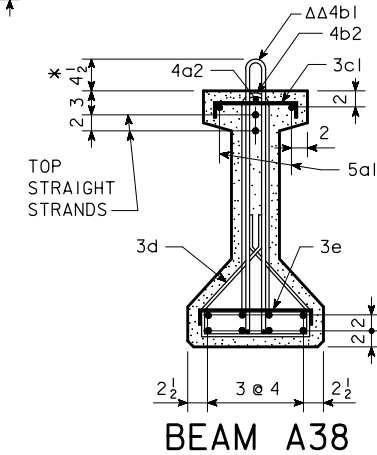
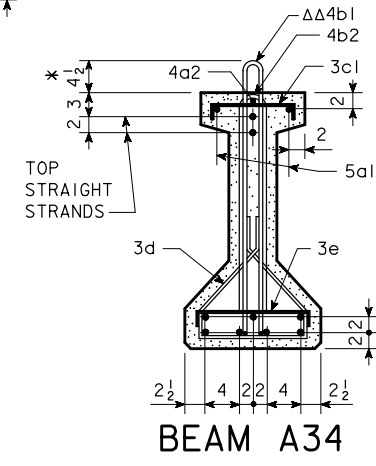
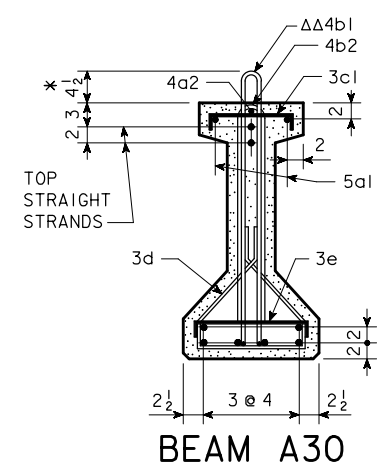
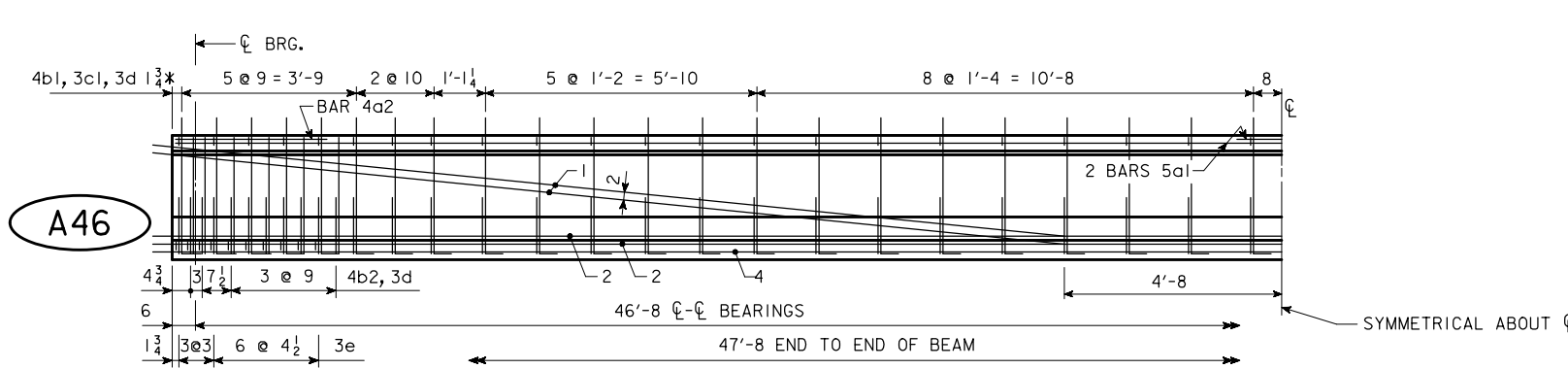
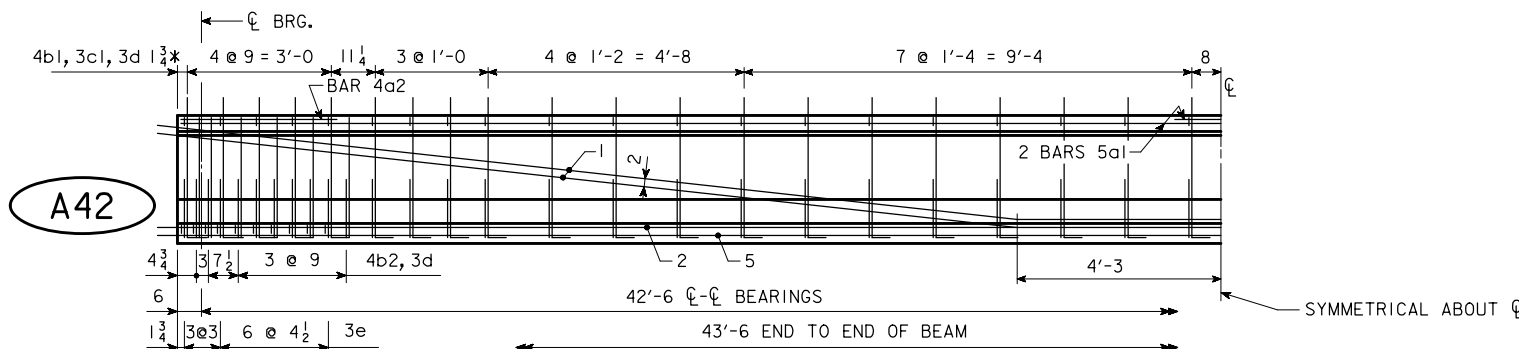
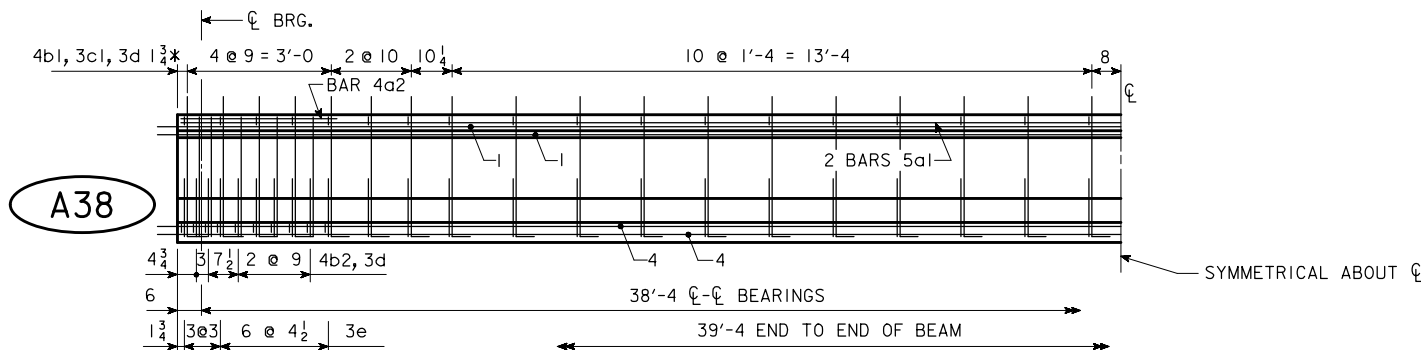
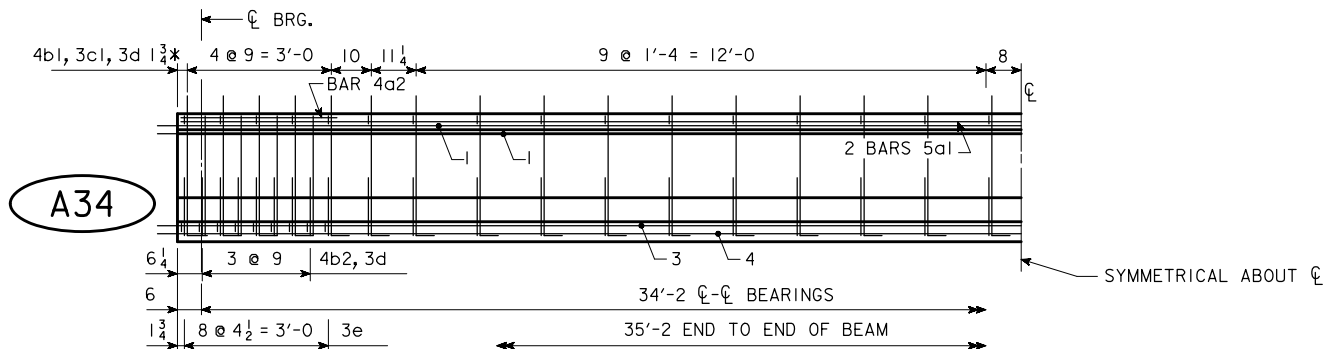
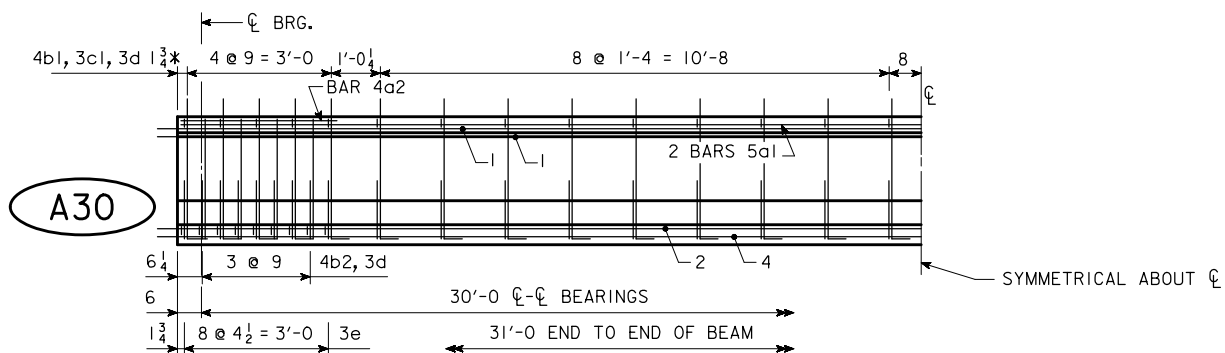


ALL DIMENSIONS ARE OUT TO OUT. RADIUS TO CL BAR. D = PIN DIAMETER.

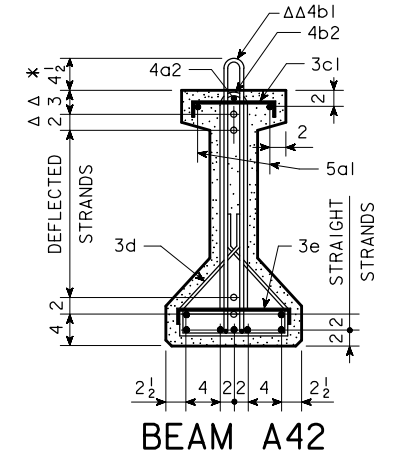
A BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT \bar{C} BEAM AND END OF BEAM.



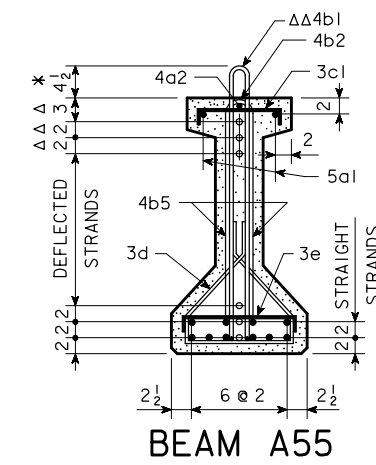
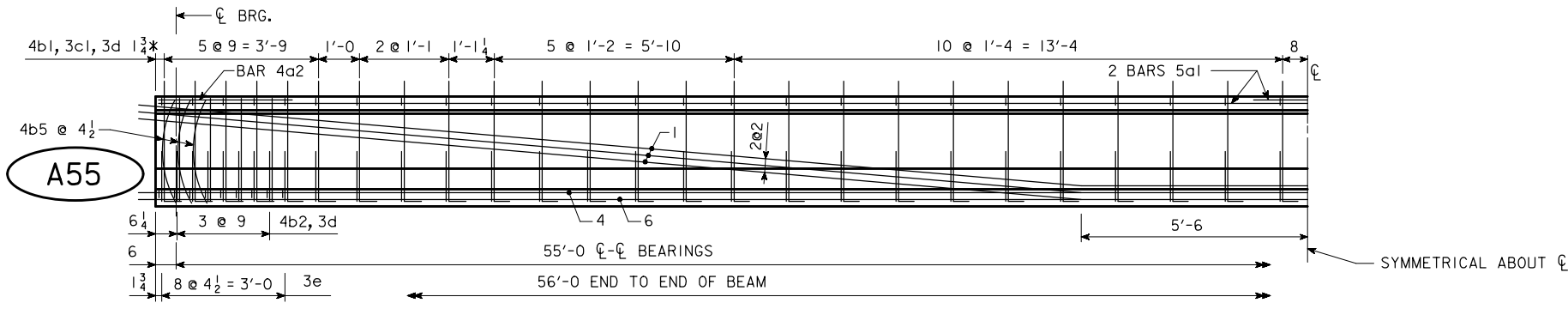
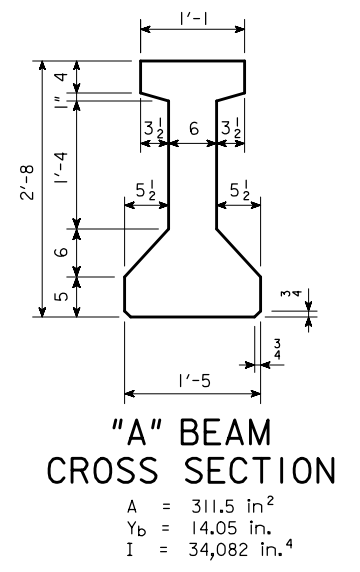
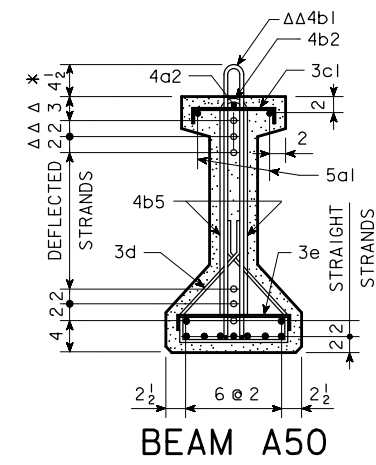
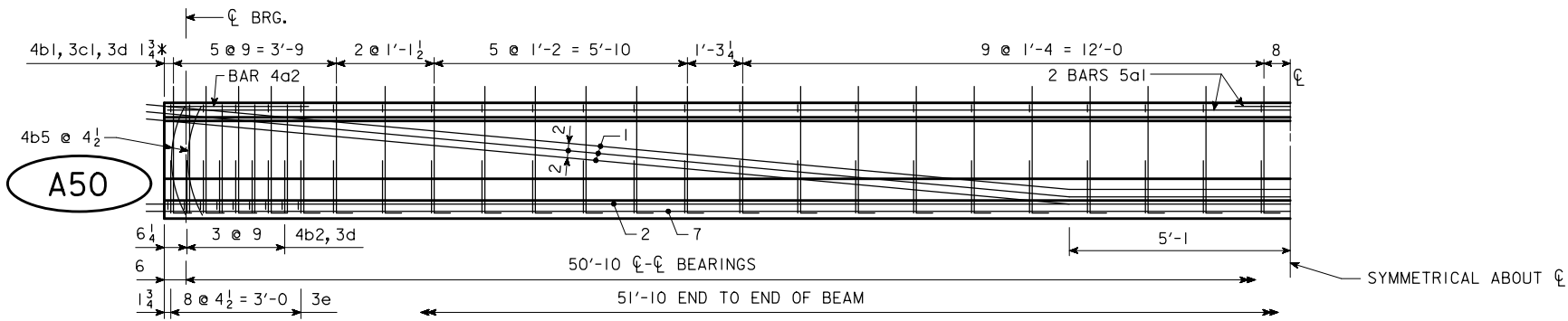
NOTE: BARS 3d ARE TO BE PLACED IN PAIRS.
 * KEEP
 Δ DIMENSIONS AT END OF BEAM
 $\Delta\Delta$ EPOXY COATED BARS



A30-A46 BEAM DETAILS
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISION 05-09 - A42 & A46 BAR SPACINGS WERE CHANGED. ENGLISHBEAMS.DGN - 4601 - LRFD - THIS SHEET RE-ISSUED 09-06.

NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT \bar{C} BEAM AND END OF BEAM.



NOTE: BARS 4b5 AND 3d ARE TO BE PLACED IN PAIRS.

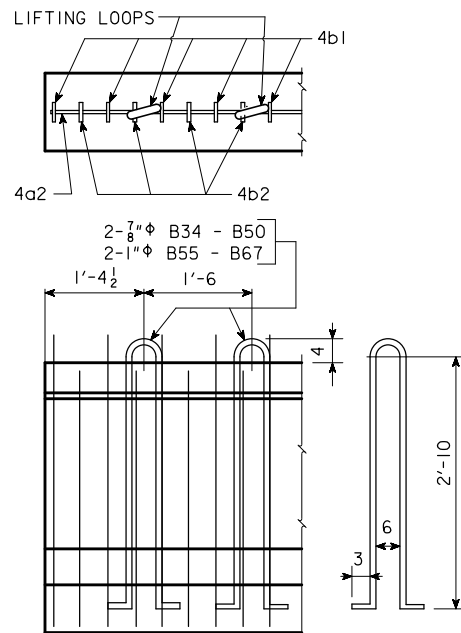
- DEFLECTED STRANDS
- * KEEP
- Δ DIMENSIONS AT END OF BEAM
- ΔΔ EPOXY COATED BARS

A50-A55 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

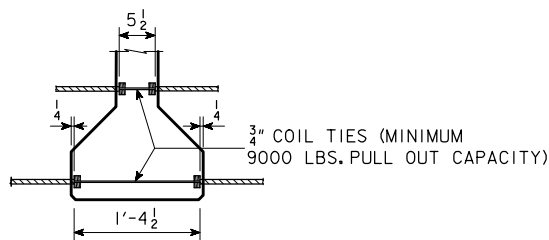
REVISION 05-09 - A50 & A55 BAR SPACINGS WERE CHANGED. ENGLISHBEAMS.DGN - 4602 - LRFD - THIS SHEET RE-ISSUED 09-06.

REVISION 08-12 - I.M. REFERENCE NOTE FOR SEALING BEAM ENDS DISTINGUISHES BETWEEN THE FABRICATOR AND CONTRACTOR. ENGLISHBEAMS.DGN - 4610 - LRFD - THIS SHEET RE-ISSUED 09-06.



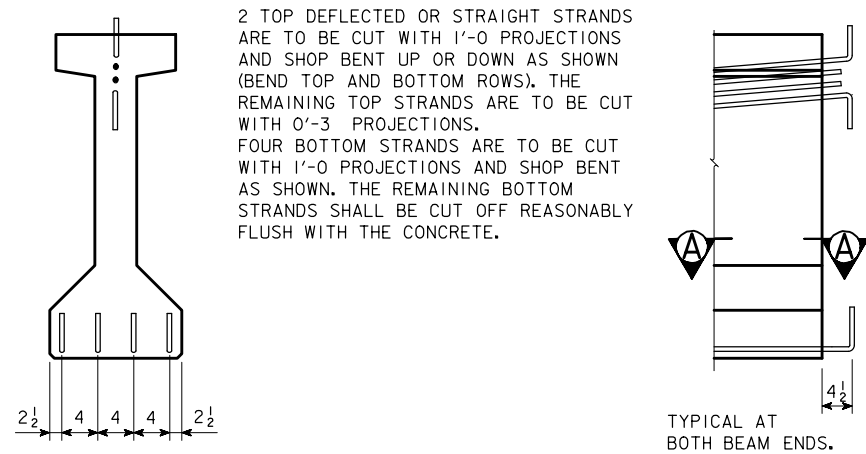
LIFTING LOOP DETAIL

ALTERNATE TYPES MAY BE SUBSTITUTED WITH THE APPROVAL OF THE ENGINEER. LIFTING LOOPS ARE TO BE STRUCTURAL GRADE.

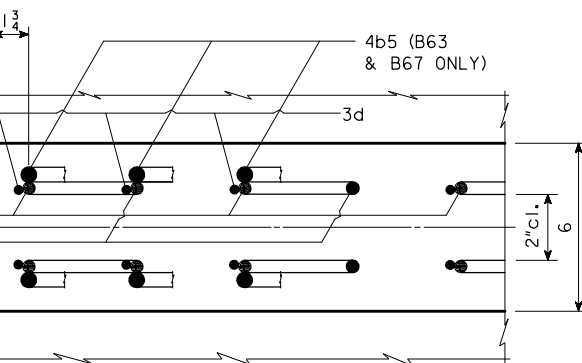


COIL TIE DETAIL

NUMBER AND EXACT LOCATION OF COIL TIES TO BE AS DETAILED ON SPECIFIC BRIDGE DESIGN.



STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS



SECTION A-A SHOWING PLACEMENT OF STIRRUPS NEAR END OF BEAM

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH A.A.S.H.T.O. LRFD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007:
 REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. CONCRETE IN ACCORDANCE WITH SECTION 5, $f'c = 5000$ psi (EXCEPT AS NOTED)
 PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, $f's = 270,000$ psi.

$\Delta\Delta 4b1$ BARS TO BE EPOXY COATED.

** WHERE DEFLECTING STRANDS INTERFERE WITH PLACEMENT, SOME IN-PLACE BENDING MAY BE NECESSARY.

2 TOP DEFLECTED OR STRAIGHT STRANDS ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT UP OR DOWN AS SHOWN (BEND TOP AND BOTTOM ROWS). THE REMAINING TOP STRANDS ARE TO BE CUT WITH 0'-3 PROJECTIONS.
 FOUR BOTTOM STRANDS ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT AS SHOWN. THE REMAINING BOTTOM STRANDS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.

TYPICAL AT BOTH BEAM ENDS.

B BEAM DATA

BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	STRAND SIZE DIA. (inches)	NO. OF STRANDS		TOTAL INITIAL PRESTRESS KIPS	HOLD DOWN FORCE-KIPS	CAMBER (in.)		DEFLECTION (in.) Δ_D				PERMISSIBLE SPACING		WEIGHT (TONS)	CONCRETE (C. Y.)	REINFORCING STEEL-(lb)
				STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) Δ_{1T}		TIME (PLASTIC) Δ_{2T}		HL93 LOADING				
										CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.			
B34	34'-2	35'-2	0.60	8	—	340	—	0.12	0.21	0.09	0.08	0.02	0.02	7'-6	7'-6	7.0	3.46	424
B38	38'-4	39'-4	0.60	8	—	340	—	0.13	0.23	0.15	0.13	0.04	0.03	7'-6	7'-6	7.8	3.87	452
B42	42'-6	43'-6	0.60	10	—	425	—	0.28	0.50	0.22	0.20	0.06	0.05	7'-6	7'-6	8.7	4.28	519
B46	46'-8	47'-8	0.60	7	2	383	10.3	0.53	0.95	0.31	0.28	0.08	0.07	7'-6	7'-6	9.5	4.69	547
B50	50'-10	51'-10	0.60	8	2	425	10.2	0.67	1.24	0.43	0.39	0.11	0.10	7'-6	7'-6	10.3	5.10	607
*B55	55'-0	56'-0	0.60	8	3	468	13.2	0.85	1.51	0.58	0.54	0.14	0.13	7'-6	7'-6	11.2	5.51	635
*B59	59'-2	60'-2	0.60	10	3	553	13.2	1.12	1.99	0.82	0.77	0.21	0.19	7'-6	7'-6	12.0	5.92	680
*B63	63'-4	64'-4	0.60	12	3	638	12.3	1.30	2.32	0.91	0.84	0.23	0.21	7'-6	7'-6	12.8	6.33	733
*B67	67'-6	68'-6	0.60	14	3	723	11.6	1.69	2.98	1.16	1.09	0.29	0.27	7'-6	7'-6	13.6	6.74	778

① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB WEIGHT OF 757 #/FT. (8" SLAB AND 7'-6 BEAM SPACING) AND ONE CONCRETE DIAPHRAGM (2270 #) OR ONE STEEL DIAPHRAGM (285 #) AT $\frac{1}{4}$ OF SPAN. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.

② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.

TOTAL BEAM DEFLECTIONS AT $\frac{1}{4}$ OF SPAN, Δ_D , DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:

- (A) $\Delta_D = \Delta_{1T} + \Delta_{2T}$ FOR SIMPLE SPAN.
- (B) $\Delta_D = \Delta_{1T} + \frac{1}{2}\Delta_{2T}$ FOR END SPANS OF CONTINUOUS BRIDGE.
- (C) $\Delta_D = \Delta_{1T} + \frac{1}{4}\Delta_{2T}$ FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.

③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% $f's$, $f's = 270$ ksi AND $A_s = 0.217$ sq. in.

* MINIMUM CONCRETE $f'c$ (AT 28 DAYS) SHALL BE 7,000 psi. MINIMUM $f'ci$ AT RELEASE SHALL BE 6,000 psi.

BEAM NOTES:

THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 LB. PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE.
 ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION.

ALL PRESTRESSING STRANDS SHALL CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS.

TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570.

BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.

THE PORTIONS OF THE PRESTRESS BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, 1, OF THE STANDARD SPECIFICATIONS.

ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE.

IF THE PRECAST PANEL OPTION IS ALLOWED AND USED FOR BRIDGE DECK FORMATION, THE BEAM STIRRUPS WILL NEED TO BE EXTENDED AND TOP FLANGE BEAM FINISH SHALL BE MODIFIED AS PER DETAILS ON THE PRECAST DECK PANEL SHEET.

IF THE STEEL DIAPHRAGM OPTION IS ALLOWED AND USED, HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.

IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.

IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.

0.6" DIAMETER STRANDS STRESSED TO NOT MORE THAN 5,000 LBS. EACH MAY BE USED IN LIEU OF THE α BARS WHICH RUN THE FULL LENGTH OF THE BEAM IN THE TOP FLANGE.

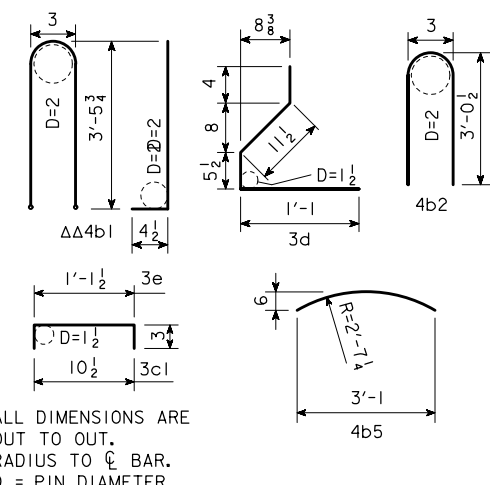
WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION).

SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.
 DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

REINFORCING BAR LIST

BEAM	SPAN	B34	B38	B42	B46	B50	B55	B59	B63	B67									
		NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH				
$\Delta\Delta$	6a1	2	34'-11	2	39'-1	4	23'-1	4	25'-2	4	27'-3	4	29'-4	4	31'-5	4	33'-6	4	35'-7
	4a2	2	4'-2	2	4'-2	2	4'-2	2	4'-2	2	4'-2	2	4'-2	2	4'-2	2	4'-2	2	4'-2
	4b1	30	7'-10	32	7'-10	36	7'-10	38	7'-10	44	7'-10	46	7'-10	50	7'-10	52	7'-10	56	7'-10
	4b2	10	6'-2	10	6'-2	12	6'-2	12	6'-2	12	6'-2	12	6'-2	12	6'-2	12	6'-2	12	6'-2
	4b5											12	3'-3	12	3'-3				
**	3c1	30	1'-5	32	1'-5	36	1'-5	38	1'-5	44	1'-5	46	1'-5	50	1'-5	52	1'-5	56	1'-5
	3d	80	2'-10	84	2'-10	96	2'-10	100	2'-10	112	2'-10	116	2'-10	124	2'-10	128	2'-10	136	2'-10
	3e	22	1'-8	22	1'-8	24	1'-8	24	1'-8	24	1'-8	24	1'-8	24	1'-8	24	1'-8	24	1'-8

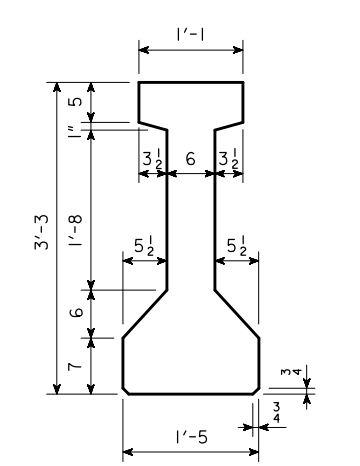
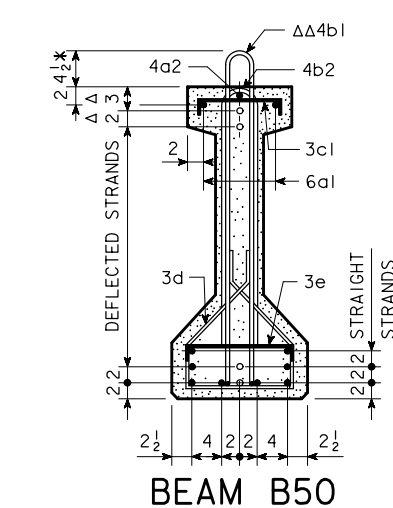
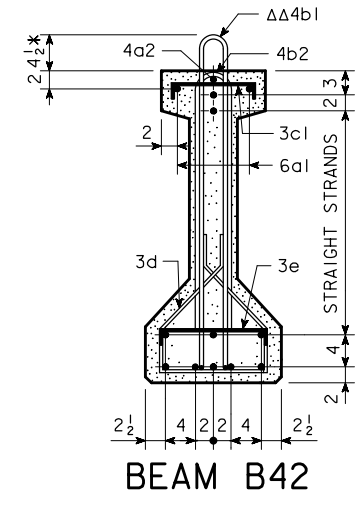
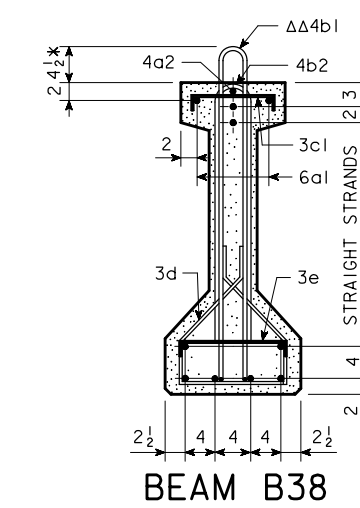
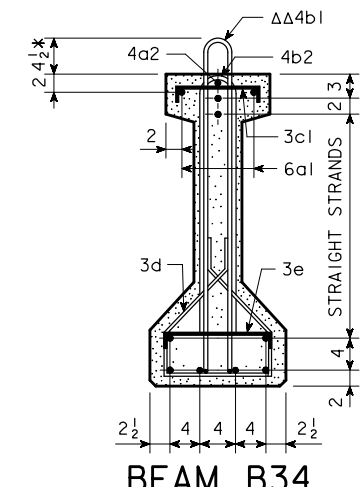
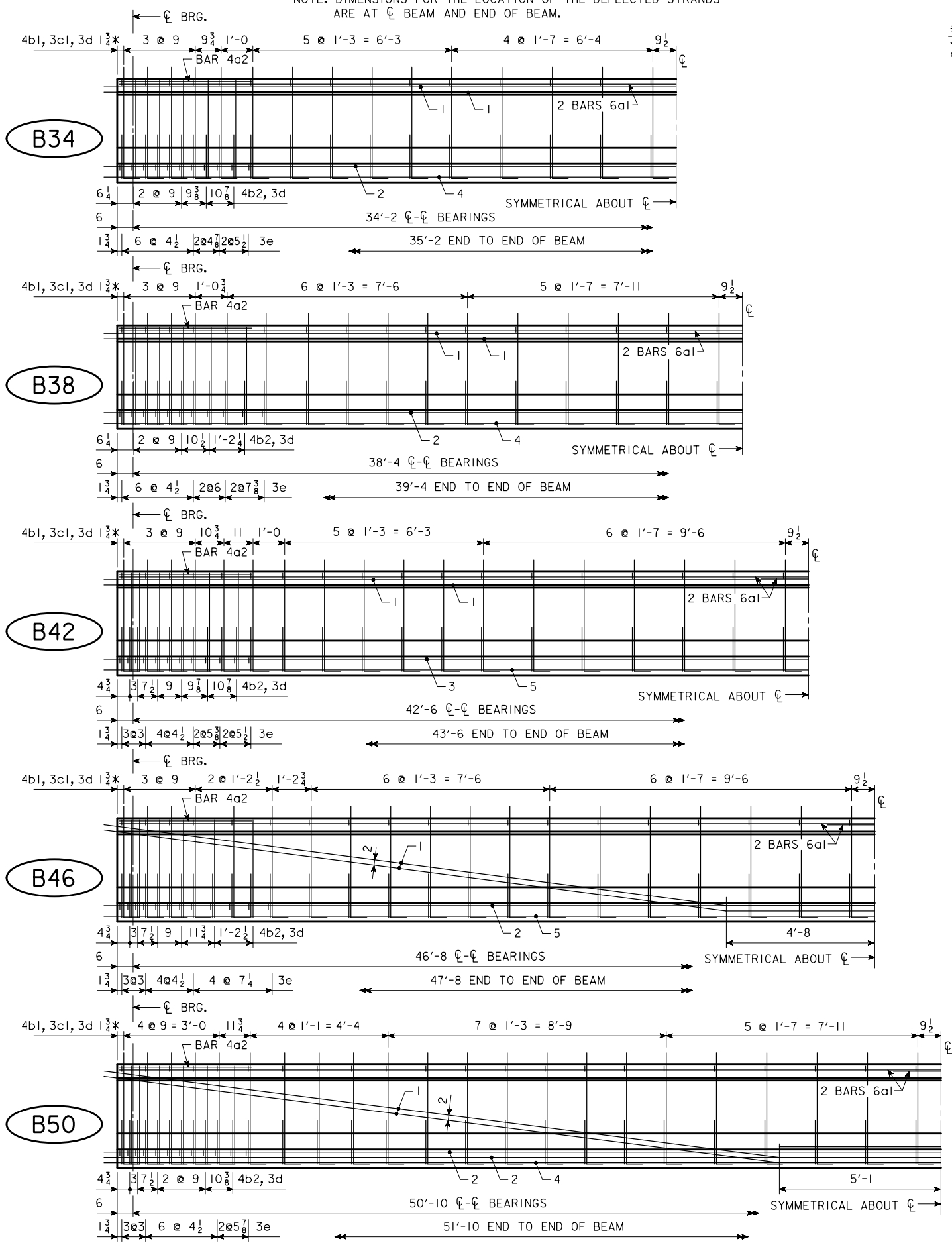


ALL DIMENSIONS ARE OUT TO OUT. RADIUS TO $\frac{1}{4}$ BAR. D = PIN DIAMETER.

B BEAM DETAILS

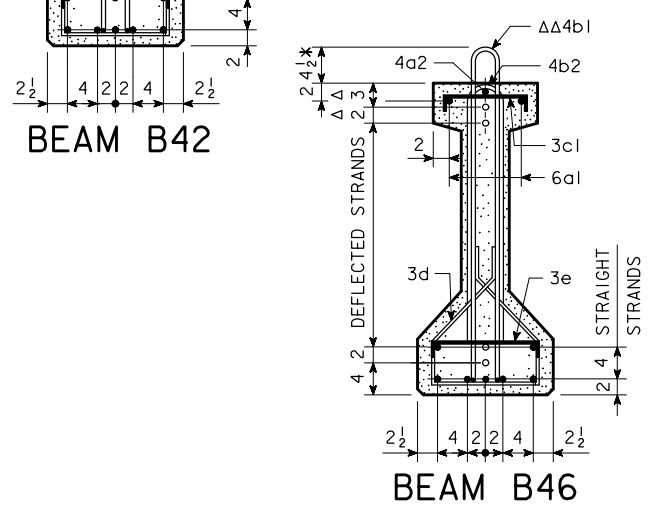
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT \bar{C} BEAM AND END OF BEAM.



**"B" BEAM
CROSS SECTION**
 A = 382.5 in.²
 Y_b = 17.06 in.
 I = 62,000 in.⁴

NOTE: BARS 3d ARE TO BE PLACED IN PAIRS.
 ○ DEFLECTED STRANDS
 * KEEP
 Δ DIMENSIONS AT END OF BEAM
 ΔΔ EPOXY COATED BARS

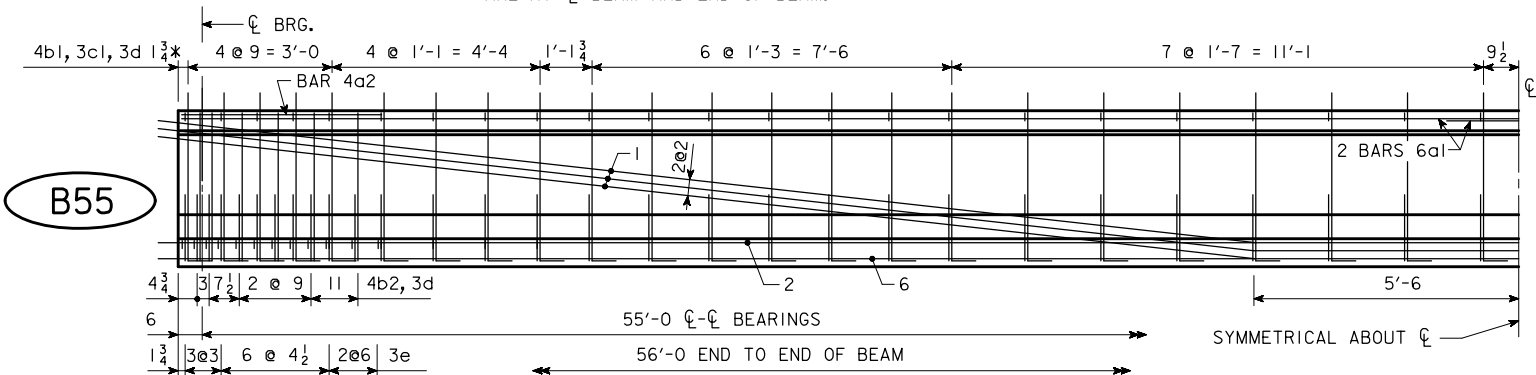


B34-B50 BEAM DETAILS

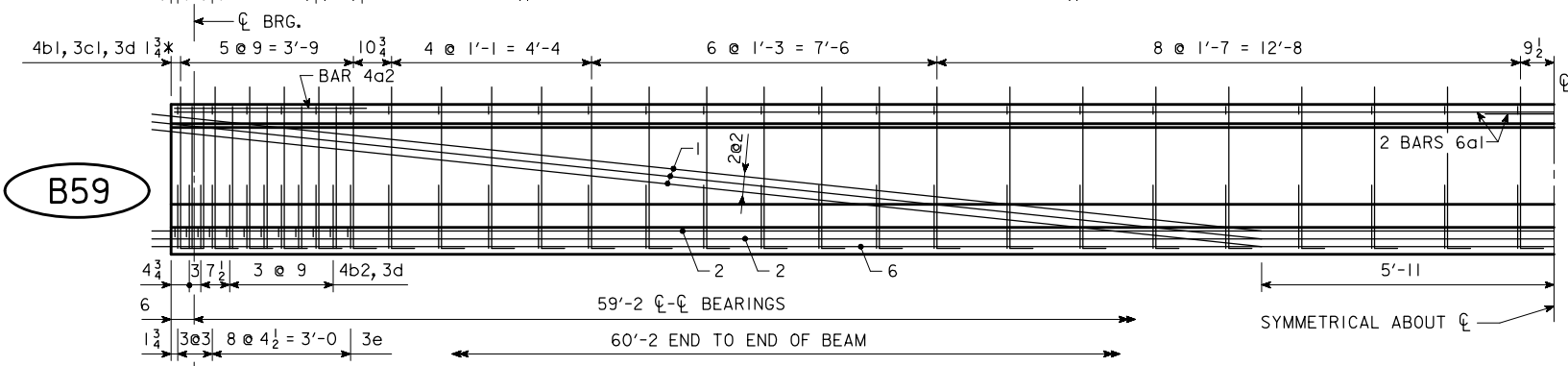
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISION 05-09 - B34, B38, B42, B46, & B50 BAR SPACINGS WERE CHANGED. ENGLISHBEAMS.DGN - 4611 - LRF6 - THIS SHEET RE-ISSUED 09-06.

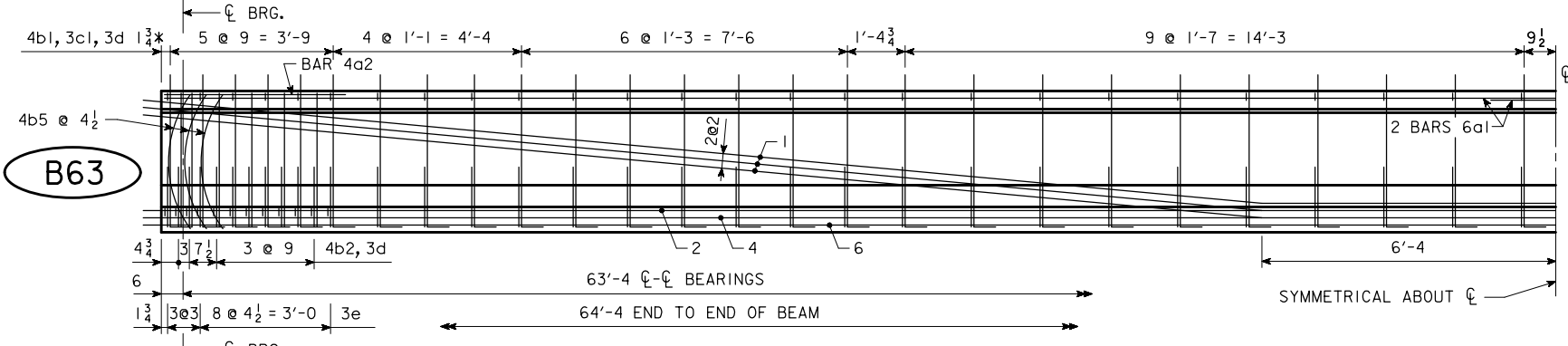
NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT ϕ BEAM AND END OF BEAM.



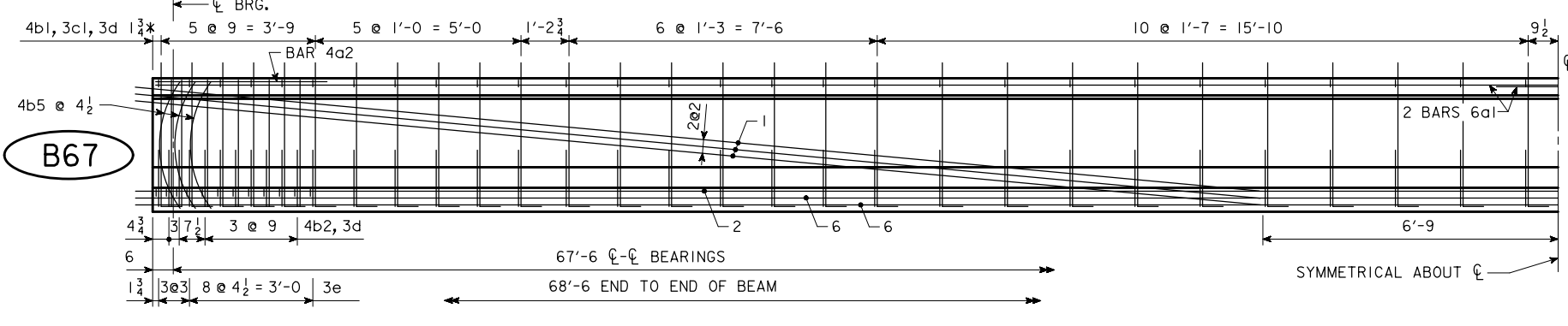
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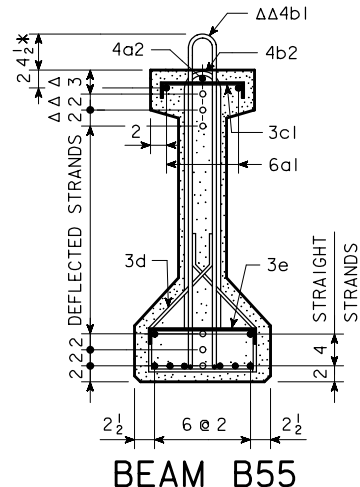
B59



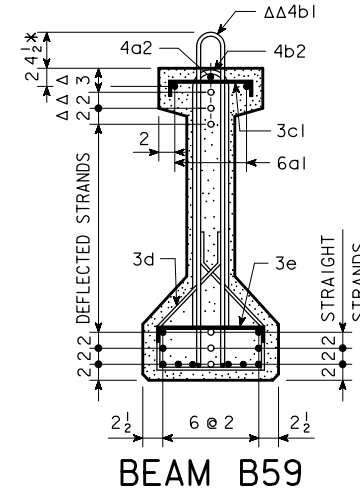
B63



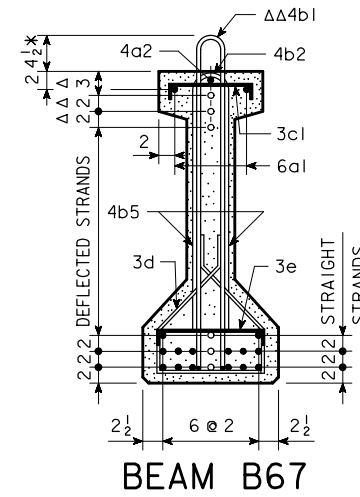
B67



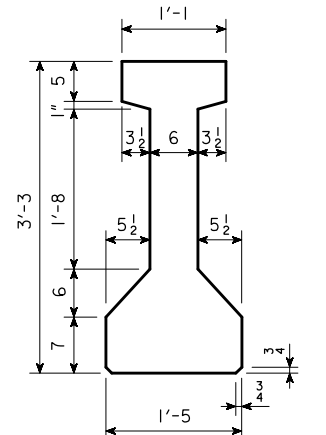
BEAM B55



BEAM B59

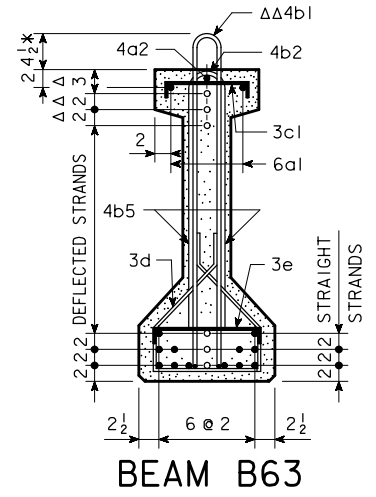


BEAM B67



"B" BEAM CROSS SECTION

A = 382.5 in.²
 Y_b = 17.06 in.
 I = 62,000 in.⁴



BEAM B63

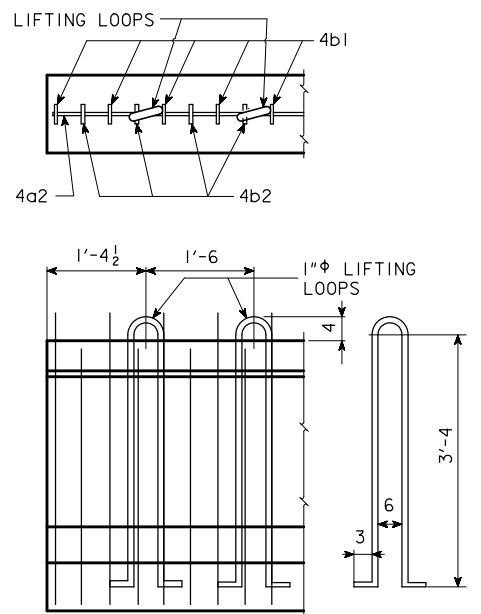
NOTE: BARS 3d AND 4b5 ARE TO BE PLACED IN PAIRS.
 ○ DEFLECTED STRANDS
 * KEEP
 Δ DIMENSIONS AT END OF BEAM
 ΔΔ EPOXY COATED BARS

B55-B67 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

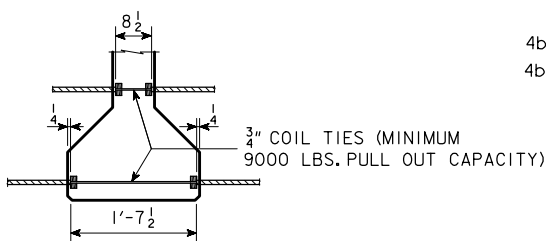
REVISION 05-09 - B55, B59, B63, & B67 BAR SPACINGS WERE CHANGED. ENGLISHBEAMS.DGN - 4612 - LRFD - THIS SHEET RE-ISSUED 09-06.

REVISION 08-12 - I.M. REFERENCE NOTE FOR SEALING BEAM ENDS DISTINGUISHES BETWEEN THE FABRICATOR AND CONTRACTOR. ENGLISHBEAMS.DGN - 4620 - LRFD - THIS SHEET RE-ISSUED 09-06.



LIFTING LOOP DETAIL

ALTERNATE TYPES MAY BE SUBSTITUTED WITH THE APPROVAL OF THE ENGINEER. LIFTING LOOPS ARE TO BE STRUCTURAL GRADE.

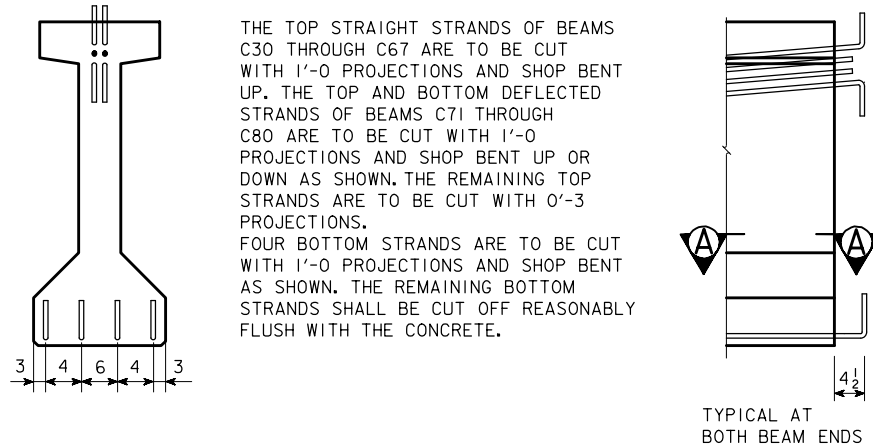


COIL TIE DETAIL

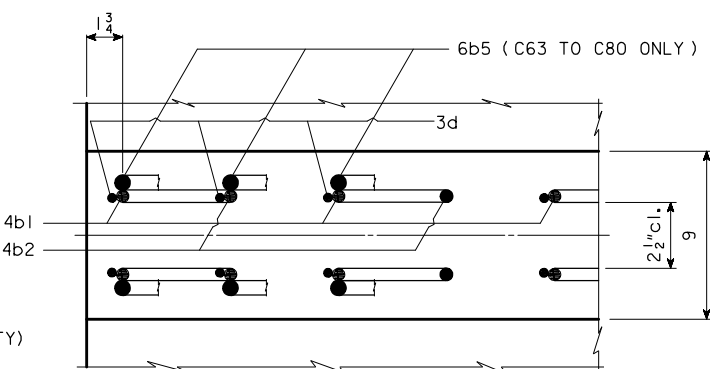
NUMBER AND EXACT LOCATION OF COIL TIES TO BE AS DETAILED ON SPECIFIC BRIDGE DESIGN.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH A.A.S.H.T.O. LRFD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007:
 REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60, CONCRETE IN ACCORDANCE WITH SECTION 5, f'c = 5000 psi (EXCEPT AS NOTED)
 PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, f's = 270,000 psi.



STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS



SECTION A-A SHOWING PLACEMENT OF STIRRUPS NEAR END OF BEAM SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.
 DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

** WHERE DEFLECTING STRANDS INTERFERE WITH PLACEMENT, SOME IN-PLACE BENDING MAY BE NECESSARY.
 ΔΔ 4b1 BARS TO BE EPOXY COATED.

REINFORCING BAR LIST

BEAM	SPAN	C30	C34	C38	C42	C46	C50	C55	C59	C63	C67	C71	C75	C80	
		NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	
6a1												4	37'-8	4	41'-10
4a2		2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0	2 5'-0
8a3															2 40'-0
ΔΔ 4b1		24 8'-10	26 8'-10	30 8'-10	32 8'-10	34 8'-10	38 8'-10	40 8'-10	44 8'-10	46 8'-10	48 8'-10	54 8'-10	58 8'-10	60 8'-10	
4b2		12 7'-2	10 7'-2	12 7'-2	12 7'-2	12 7'-2	12 7'-2	12 7'-2	12 7'-2	12 7'-2	12 7'-2	12 7'-2	12 7'-2	12 7'-2	
6b5										4 3'-9	8 3'-9	8 3'-9	12 3'-9	16 3'-9	
3c1		24 1'-8	26 1'-8	30 1'-8	32 1'-8	34 1'-8	38 1'-8	40 1'-8	44 1'-8	46 1'-8	48 1'-8	54 1'-8	58 1'-8	60 1'-8	
** 3d		72 3'-0	72 3'-0	84 3'-0	88 3'-0	92 3'-0	100 3'-0	104 3'-0	112 3'-0	116 3'-0	120 3'-0	132 3'-0	140 3'-0	144 3'-0	
3e		24 1'-10	22 1'-10	24 1'-10	24 1'-10	24 1'-10	26 1'-10	24 1'-10	26 1'-10	26 1'-10	26 1'-10	26 1'-10	26 1'-10	26 1'-10	

C BEAM DATA

BEAM	SPAN LENGTH ℓ - ℓ BEARING	OVERALL BEAM LENGTH (L)	STRAND SIZE DIA. (inches)	NO. OF STRANDS		TOTAL INITIAL PRESTRESS KIPS	HOLD DOWN FORCE-KIPS	CAMBER (in.)		DEFLECTION (in.) Δ_D				PERMISSIBLE SPACING		WEIGHT (TONS)	CONCRETE (C. Y.)	REINFORCING STEEL-(lb)
				STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) Δ_1		TIME (PLASTIC) Δ_T		HL93 LOADING				
										CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.	CONC. DIAPH.	STEEL DIAPH.			
C30	30'-0	31'-0	0.60	8	—	340	—	0.06	0.11	0.03	0.03	0.01	0.01	7'-6	7'-6	9.1	4.50	319
C34	34'-2	35'-2	0.60	10	—	426	—	0.12	0.22	0.06	0.05	0.01	0.01	7'-6	7'-6	10.3	5.11	321
C38	38'-4	39'-4	0.60	10	—	426	—	0.14	0.24	0.09	0.08	0.02	0.02	7'-6	7'-6	11.6	5.71	371
C42	42'-6	43'-6	0.60	10	—	426	—	0.17	0.29	0.13	0.12	0.03	0.03	7'-6	7'-6	12.8	6.32	389
C46	46'-8	47'-8	0.60	10	—	426	—	0.17	0.31	0.18	0.16	0.05	0.04	7'-6	7'-6	14.0	6.92	406
C50	50'-10	51'-10	0.60	12	—	510	—	0.32	0.57	0.25	0.23	0.06	0.06	7'-6	7'-6	15.2	7.53	443
C55	55'-0	56'-0	0.60	14	—	595	—	0.47	0.83	0.34	0.31	0.09	0.08	7'-6	7'-6	16.5	8.13	459
C59	59'-2	60'-2	0.60	14	—	595	—	0.47	0.87	0.46	0.42	0.11	0.10	7'-6	7'-6	17.7	8.74	496
C63	63'-4	64'-4	0.60	16	—	681	—	0.70	1.24	0.59	0.54	0.15	0.14	7'-6	7'-6	18.9	9.34	536
C67	67'-6	68'-6	0.60	18	—	766	—	0.92	1.62	0.76	0.71	0.19	0.18	7'-6	7'-6	20.1	9.95	576
*C71	71'-8	72'-8	0.60	14	4	766	16	1.21	2.13	0.88	0.82	0.22	0.20	7'-6	7'-6	21.4	10.55	855
*C75	75'-10	76'-10	0.60	14	6	851	22	1.33	2.34	1.07	0.99	0.27	0.25	7'-6	7'-6	22.6	11.16	925
*C80	80'-0	81'-0	0.60	16	6	936	21	1.64	2.90	1.31	1.24	0.33	0.31	7'-6	7'-6	23.8	11.76	1191

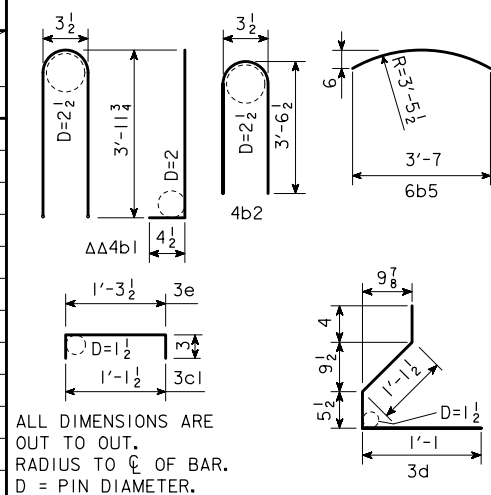
- ① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB WEIGHT OF 757 #/FT. (8" SLAB AND 7'-6 BEAM SPACING) AND ONE CONCRETE DIAPHRAGM (2635 #) OR ONE STEEL DIAPHRAGM (285 #) AT ℓ OF SPAN. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.
- ② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.
 TOTAL BEAM DEFLECTIONS AT ℓ OF SPAN, Δ_D , DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:
 (A) $\Delta_D = \Delta_1 + \Delta_T$ FOR SIMPLE SPAN.
 (B) $\Delta_D = \Delta_1 + \frac{3}{4}\Delta_T$ FOR END SPANS OF CONTINUOUS BRIDGE.
 (C) $\Delta_D = \Delta_1 + \frac{1}{2}\Delta_T$ FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.
- ③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi AND As = 0.217 sq. in.
- * MINIMUM CONCRETE f'c (AT 28 DAYS) SHALL BE 6,000 psi. MINIMUM f'ci AT RELEASE SHALL BE 5,000 psi.

BEAM NOTES:

THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 lb. PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE.
 ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
 HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION.
 ALL PRESTRESSING STRANDS SHALL CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS.
 TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570.
 BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.
 THE PORTIONS OF THE PRESTRESS BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, I, OF THE STANDARD SPECIFICATIONS.
 ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE.
 IF THE PRECAST PANEL OPTION IS ALLOWED AND USED FOR BRIDGE DECK FORMATION, THE BEAM STIRRUPS WILL NEED TO BE EXTENDED AND TOP FLANGE BEAM FINISH SHALL BE MODIFIED AS PER DETAILS ON THE PRECAST DECK PANEL SHEET.
 IF THE STEEL DIAPHRAGM OPTION IS ALLOWED AND USED, HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.
 IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.
 0.6" DIAMETER STRANDS STRESSED TO NOT MORE THAN 5,000 LBS. EACH MAY BE USED IN LIEU OF THE α BARS WHICH RUN THE FULL LENGTH OF THE BEAM IN THE TOP FLANGE.

BEAM NOTES: (CONTINUED)

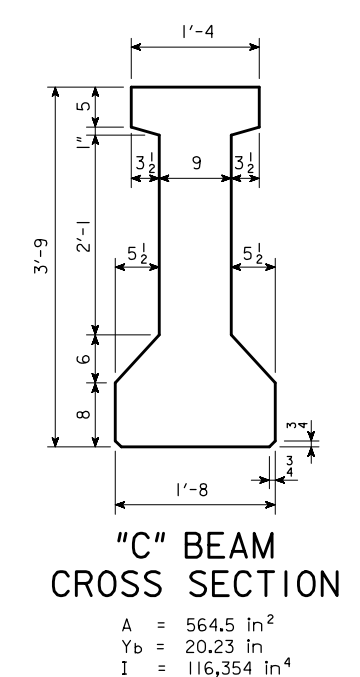
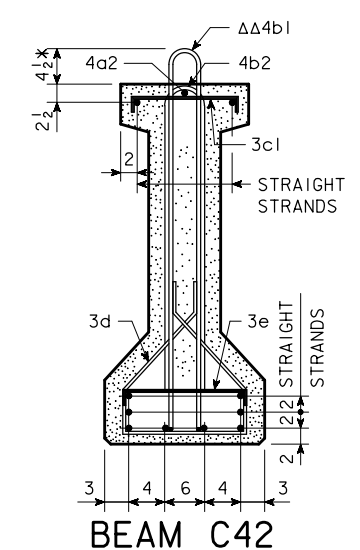
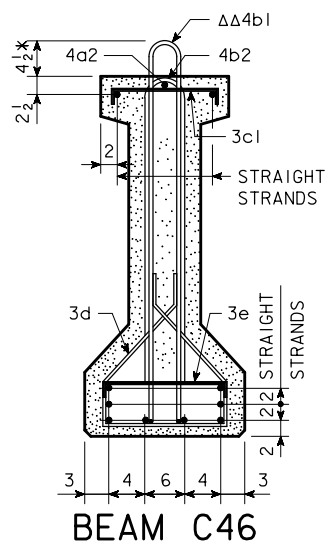
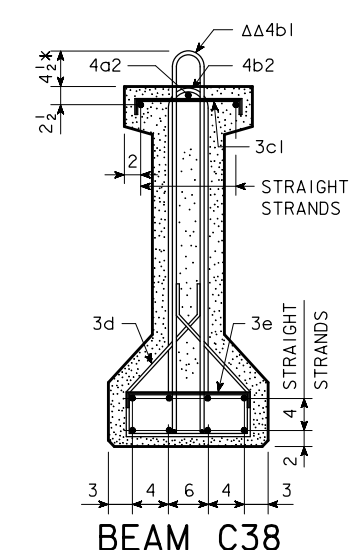
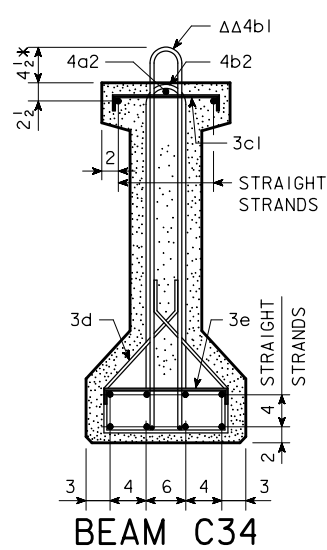
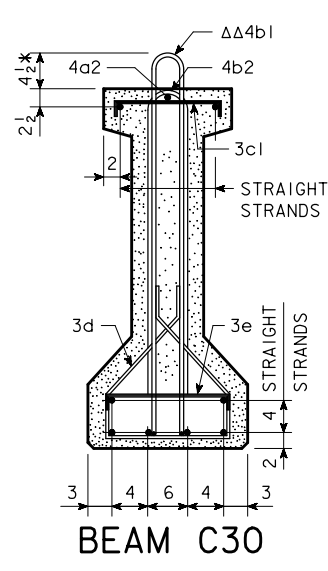
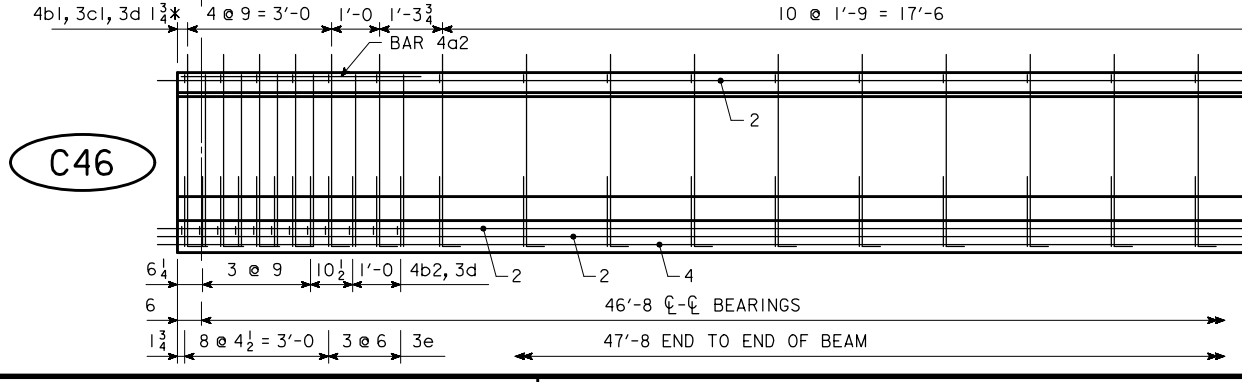
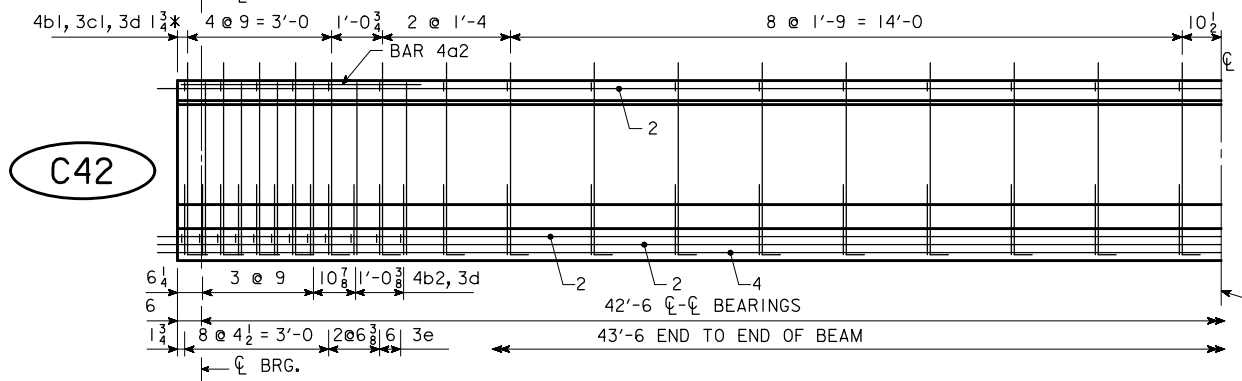
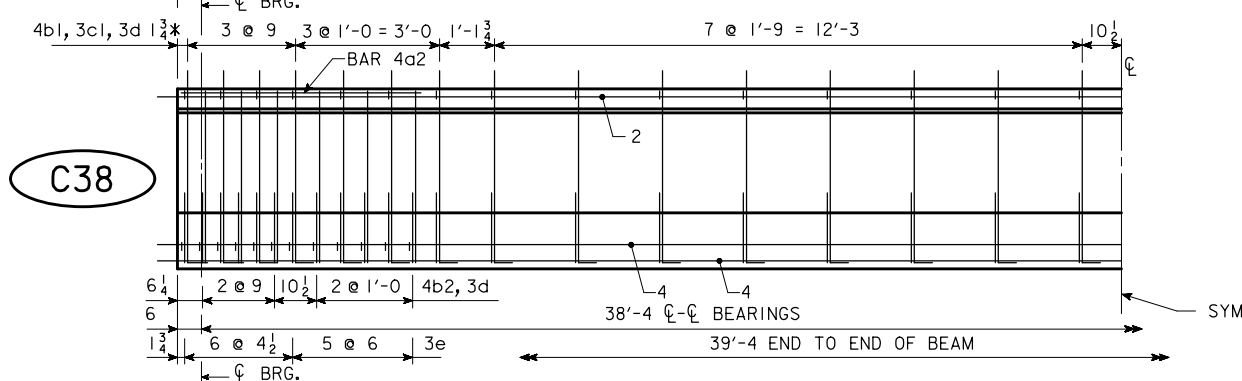
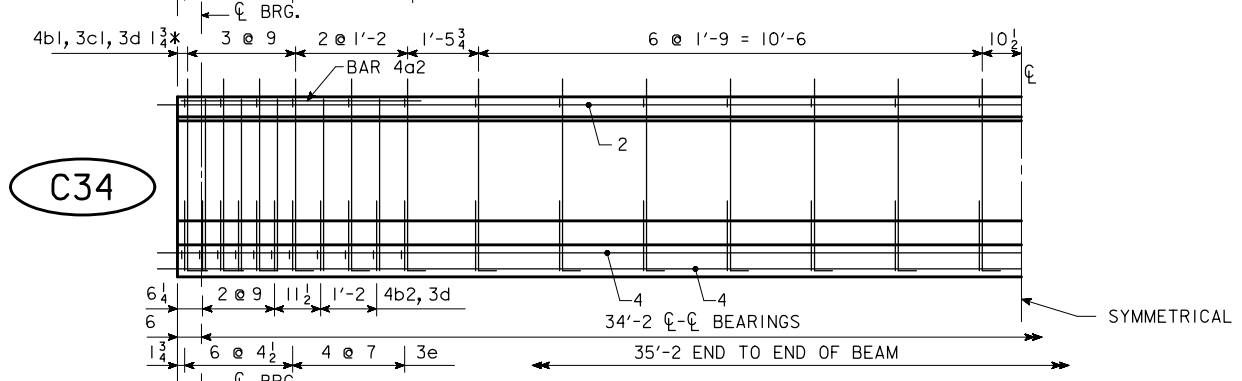
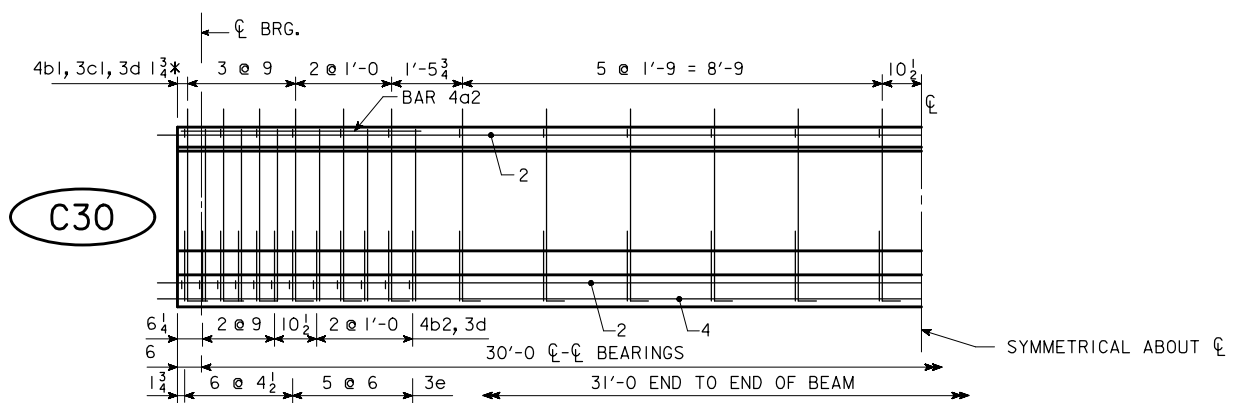
IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.
 WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION).



C BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISION 08-09 - ADDED PRESTRESSED STRANDS TO C34 AND C38 BEAM X-SECTIONS. ENGLISHBEAMS.DGN - 4621 - LRFD - THIS SHEET RE-ISSUED 09-06.

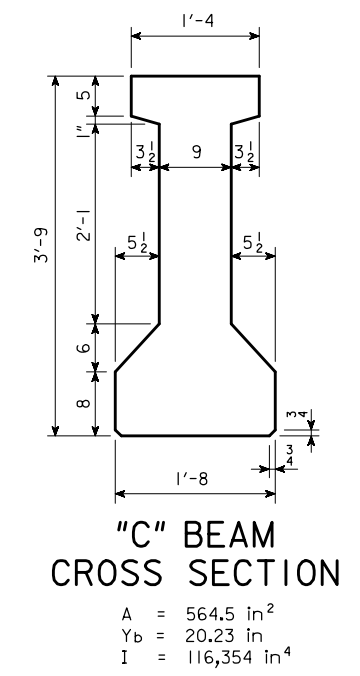
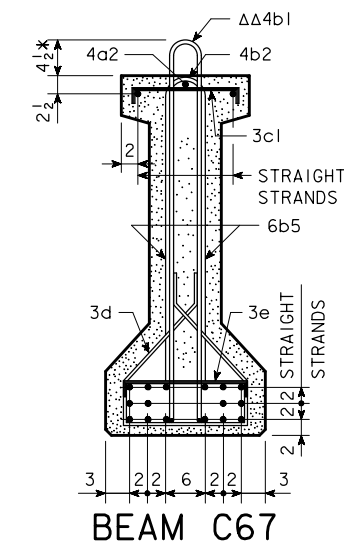
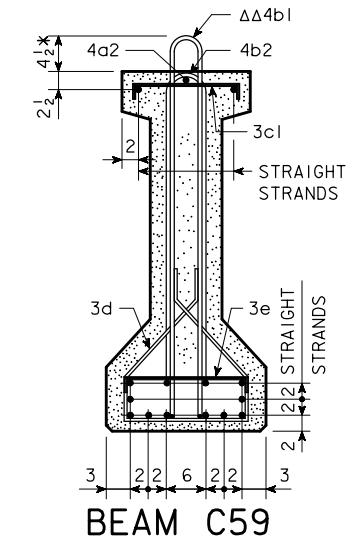
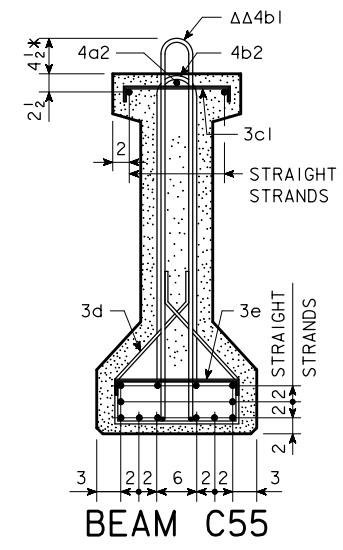
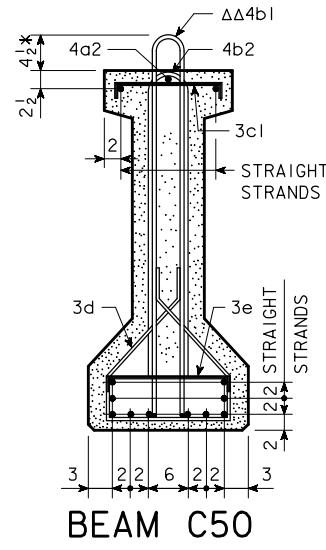
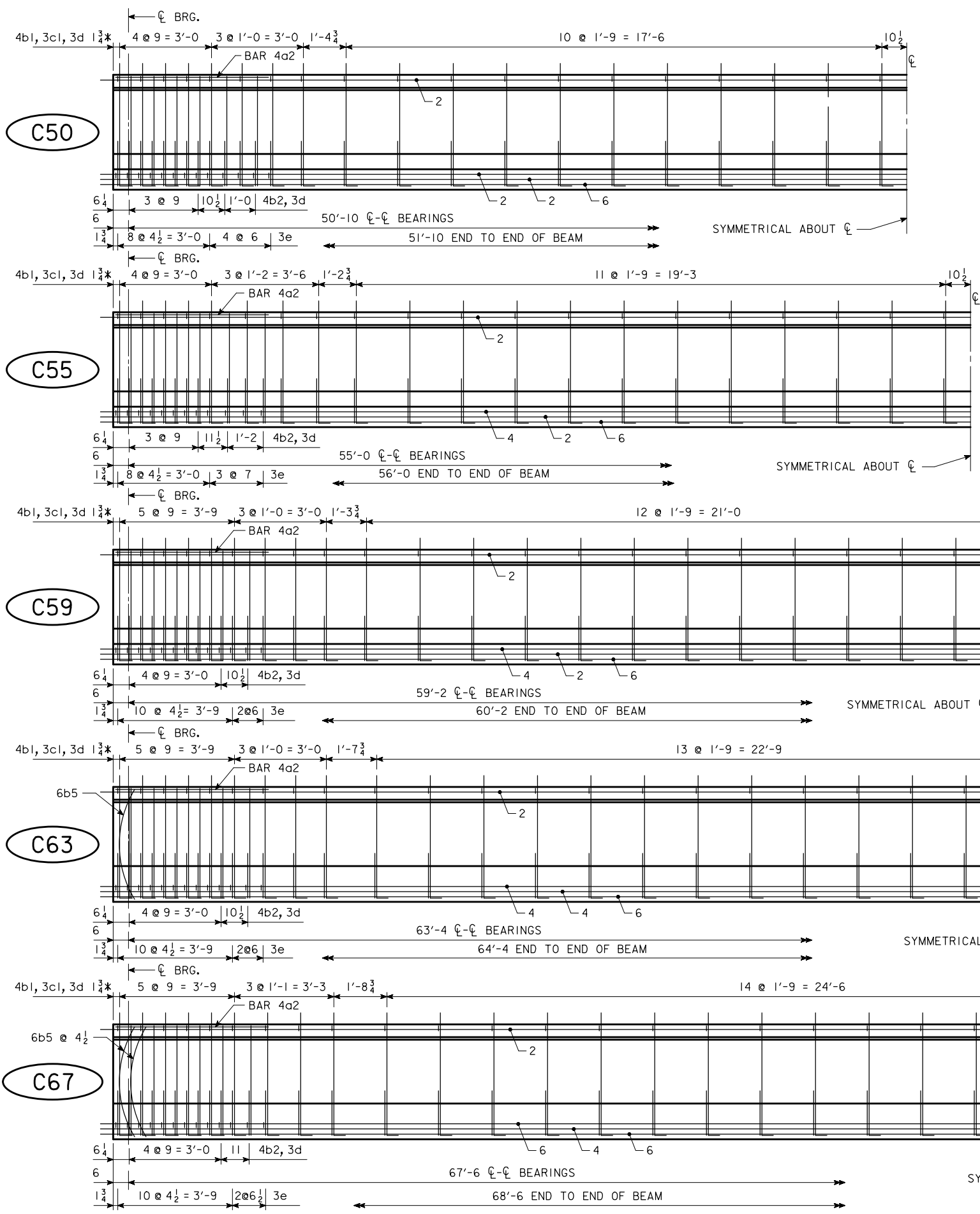


NOTE: BARS 3d ARE TO BE PLACED IN PAIRS.
* KEEP
Δ DIMENSIONS AT END OF BEAM
ΔΔ EPOXY COATED BARS

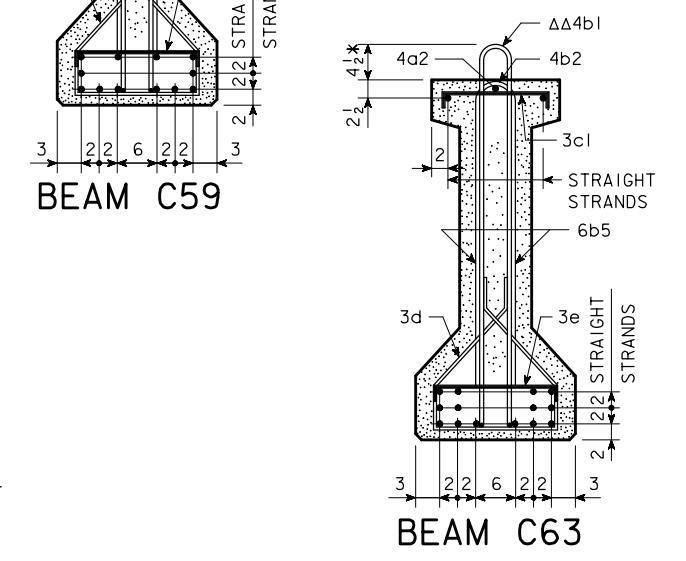
C30-C46 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 07-08 - REMOVED THE DUPLICATE 4b2 BAR LABELING IN THE CROSS SECTIONS FOR C50, C55, & C59 BEAMS. CORRECTED THE 4b2 BARS TO 6b5 BARS FOR C63 & C67 BEAMS. ENGLISHBEAMS.DGN - 4622 - LRFD - THIS SHEET RE-ISSUED 09-06.



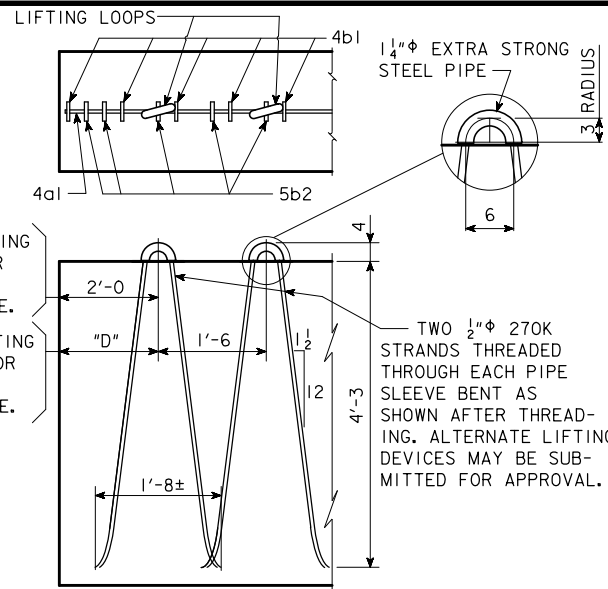
NOTE: BARS 3d ARE TO BE PLACED IN PAIRS.
 * KEEP
 Δ DIMENSIONS AT END OF BEAM
 ΔΔ EPOXY COATED BARS



C50-C67 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

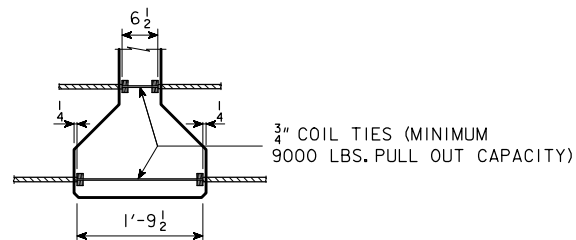
REVISION 08-12 - I.M. REFERENCE NOTE FOR SEALING BEAM ENDS DISTINGUISHES BETWEEN THE FABRICATOR AND CONTRACTOR. ENGLISHBEAMS.DGN - 4630 - LRFD - THIS SHEET RE-ISSUED 09-06.



LIFTING LOOP DETAIL

"D" = 1'-3 FOR D60 - D95
 "D" = 3'-9 FOR D100
 "D" = 6'-3 FOR D105

NUMBER AND EXACT LOCATION OF COIL TIES TO BE AS DETAILED ON SPECIFIC BRIDGE DESIGN.



COIL TIE DETAIL

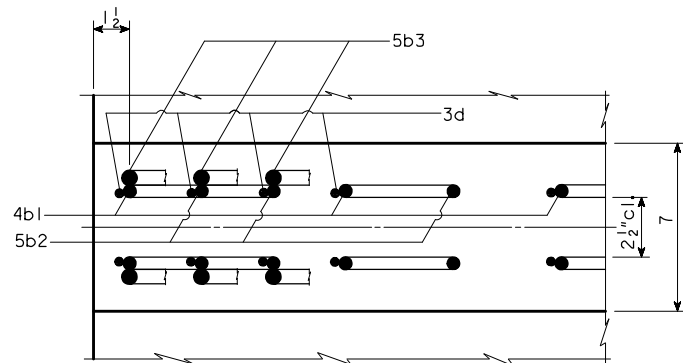
SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.
 DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

ΔΔ 4b1 BARS TO BE EPOXY COATED

THE TOP STRAIGHT STRANDS OF BEAMS D35 THROUGH D60 ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT UP. THE TOP AND BOTTOM DEFLECTED STRANDS OF BEAMS D65 THROUGH D105 ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT UP OR DOWN AS SHOWN. THE REMAINING TOP STRANDS ARE TO BE CUT WITH 0'-3 PROJECTIONS.
 FOUR BOTTOM STRANDS ARE TO BE CUT WITH 1'-0 PROJECTIONS AND SHOP BENT AS SHOWN. THE REMAINING BOTTOM STRANDS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.

STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS



SECTION A-A SHOWING PLACEMENT OF STIRRUPS NEAR END OF BEAM

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH A.A.S.H.T.O. LRFD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007:
 REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. CONCRETE IN ACCORDANCE WITH SECTION 5, f'c = 5000 psi (EXCEPT AS NOTED)
 PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, f's = 270,000 psi.



REINFORCING BAR LIST

BEAM	SPAN	D35	D40	D45	D50	D55	D60	D65	D70	D75	D80	D85	D90	D95	D100	D105	
		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	100'-0	105'-0	
BAR	SHAPE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
4a1	—	2	4'-0	2	4'-0	2	4'-0	2	4'-0	2	4'-0	2	4'-0	2	4'-0	2	4'-0
a2	—							5/4	22'-10	5/4	24'-4	5/4	25'-10	5/4	27'-4	5/4	29'-4
a3	—							6/2	25'-0	6/2	27'-0	6/2	29'-0	6/2	31'-0	6/2	32'-0
ΔΔ 4b1	⊂	33	10'-4	37	10'-4	39	10'-4	43	10'-4	47	10'-4	51	10'-4	53	10'-4	57	10'-4
5b2	⊂	12	8'-8	12	8'-8	12	8'-8	14	8'-8	14	8'-8	14	8'-8	14	8'-8	16	8'-8
5b3	—	4	4'-4	4	4'-4	4	4'-4	4	4'-4	8	4'-4	8	4'-4	8	4'-4	12	4'-4
3c	⊂	33	2'-1	37	2'-1	39	2'-1	43	2'-1	47	2'-1	51	2'-1	53	2'-1	57	2'-1
3d	⊂	45	5'-7	49	5'-7	51	5'-7	57	5'-7	61	5'-7	65	5'-7	67	5'-7	73	5'-7
3e	⊂	26	2'-3	26	2'-3	26	2'-3	28	2'-3	28	2'-3	28	2'-3	28	2'-3	30	2'-3

D BEAM DATA

BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	STRAND SIZE DIA. (inches)	NO. OF STRANDS	TOTAL INITIAL PRESTRESS KIPS	HOLD DOWN FORCE-KIPS	CAMBER (in.)		DEFLECTION (in.) Δ _b				PERMISSIBLE SPACING		WEIGHT (TONS)	CONCRETE (C.Y.)	REINFORCING STEEL (lbs.)	
							AT RELEASE	AFTER LOSSES	IMMEDIATE ^① (ELASTIC) Δ _i		TIME (PLASTIC) Δ _T		HL93 LOADING					
									CONC. DIAPHR.	STEEL DIAPHR.	CONC. DIAPHR.	STEEL DIAPHR.	CONC. DIAPHR.	STEEL DIAPHR.				
D35	35'-0	36'-0	0.60	10	425	—	0.09	0.15	0.03	0.03	0.01	0.01	7'-6	7'-6	12.0	5.9	502	
D40	40'-0	41'-0	0.60	10	425	—	0.10	0.18	0.05	0.05	0.01	0.01	7'-6	7'-6	13.6	6.7	541	
D45	45'-0	46'-0	0.60	12	510	—	0.18	0.31	0.08	0.07	0.02	0.02	7'-6	7'-6	15.3	7.6	561	
D50	50'-0	51'-0	0.60	12	510	—	0.21	0.36	0.12	0.11	0.03	0.03	7'-6	7'-6	17.0	8.4	624	
D55	55'-0	56'-0	0.60	12	510	—	0.24	0.42	0.18	0.16	0.04	0.04	7'-6	7'-6	18.6	9.2	681	
D60	60'-0	61'-0	0.60	14	596	—	0.35	0.62	0.25	0.22	0.06	0.06	7'-6	7'-6	20.3	10.0	720	
D65	65'-0	66'-0	0.60	8	4	510	23.7	0.46	0.80	0.33	0.30	0.08	0.08	7'-6	7'-6	22.0	10.8	910
D70	70'-0	71'-0	0.60	8	6	596	30.0	0.52	0.92	0.45	0.41	0.11	0.10	7'-6	7'-6	23.6	11.7	1004
D75	75'-0	76'-0	0.60	10	6	681	26.7	0.69	1.22	0.58	0.54	0.15	0.13	7'-6	7'-6	25.3	12.5	1064
D80	80'-0	81'-0	0.60	12	6	766	27.2	1.00	1.76	0.74	0.69	0.19	0.17	7'-6	7'-6	27.0	13.3	1116
D85	85'-0	86'-0	0.60	14	6	851	27.3	1.27	2.24	0.94	0.87	0.23	0.22	7'-6	7'-6	28.6	14.1	1159
D90	90'-0	91'-0	0.60	16	6	936	25.8	1.40	2.46	1.07	1.00	0.27	0.25	7'-6	7'-6	30.4	15.0	1310
D95	95'-0	96'-0	0.60	18	6	1021	24.5	1.64	2.89	1.32	1.24	0.33	0.31	7'-6	7'-6	31.9	15.8	1493
*D100	100'-0	101'-0	0.60	22	6	1192	22.3	2.08	3.67	1.61	1.51	0.40	0.38	7'-6	7'-6	33.6	16.6	1521
*D105	105'-0	106'-0	0.60	26	6	1362	22.2	2.42	4.27	1.80	1.70	0.45	0.42	7'-6	7'-6	35.3	17.4	1602

① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB WEIGHT OF 760 #/FT. (8" SLAB AND 7'-6 BEAM SPACING) AND ONE CONCRETE DIAPHRAGM (3191 #) OR ONE STEEL DIAPHRAGM (285 #) AT C OF SPAN. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.

② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.

TOTAL BEAM DEFLECTIONS AT C OF SPAN, Δ_b, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:

- (A) Δ_b = Δ_i + Δ_T FOR SIMPLE SPAN.
- (B) Δ_b = Δ_i + 1/2 Δ_T FOR END SPANS OF CONTINUOUS BRIDGE.
- (C) Δ_b = Δ_i + 1/2 Δ_T FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.

③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi AND A_s = 0.217 sq. in.

* MINIMUM CONCRETE f'c (AT 28 DAYS) SHALL BE 7500 psi. MINIMUM f'ci AT RELEASE SHALL BE 6000 psi.

BEAM NOTES:

THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 lb. PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE.

ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION.

ALL PRESTRESSING STRANDS SHALL CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS.

TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570.

BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.

THE PORTIONS OF THE PRESTRESS BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, 1, OF THE STANDARD SPECIFICATIONS.

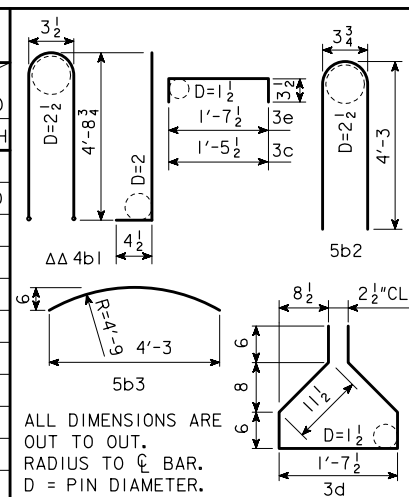
ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE.

FOR TRANSPORTING, THE OVERHANG SHALL BE IN ACCORDANCE WITH ARTICLE 2407.03, K, OF THE STANDARD SPECIFICATIONS, EXCEPT THE OVERHANG MAY BE INCREASED TO A MAXIMUM OF 8 FEET FOR THE D85 BEAM, 9 FEET FOR THE D90 BEAM, 11 FEET FOR THE D95 BEAM, 12 FEET FOR THE D100 BEAM, AND D105 BEAM.

THE CONTRACTOR SHALL ASSURE THE LATERAL STABILITY OF THE D100 AND D105 BEAMS DURING HANDLING, TRANSPORTING AND ERECTION BY PROVIDING TEMPORARY BRACING AS NEEDED.

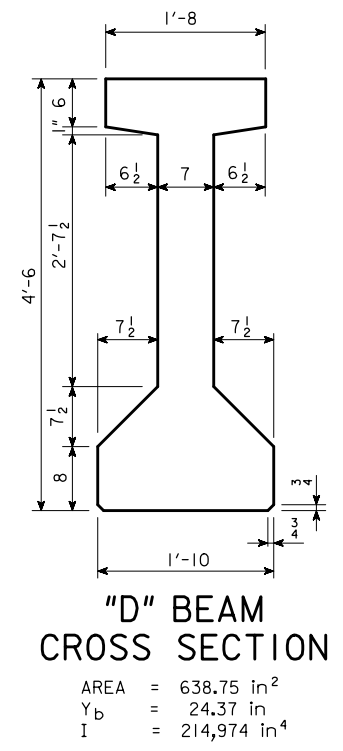
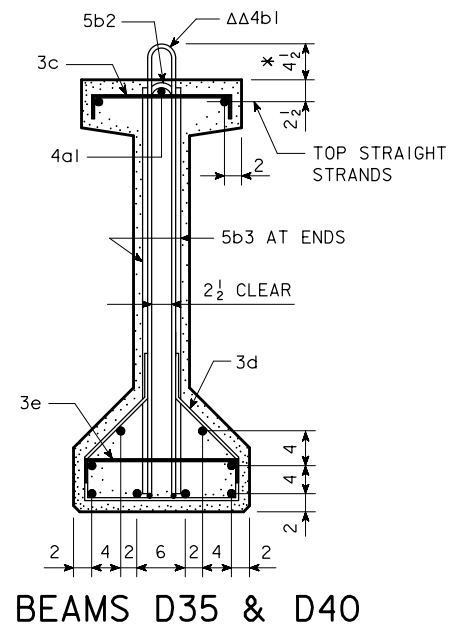
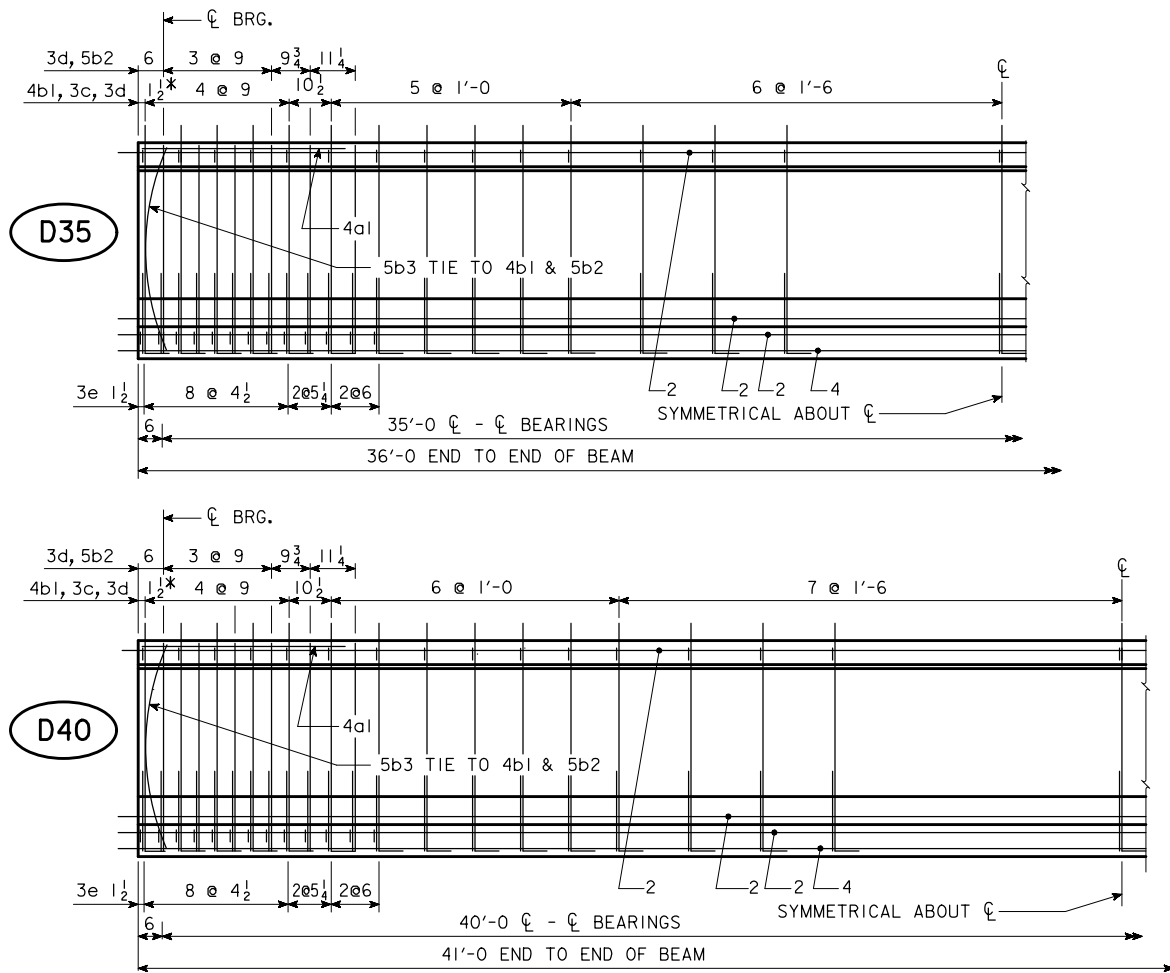
IF THE PRECAST PANEL OPTION IS ALLOWED AND USED FOR BRIDGE DECK FORMATION, THE BEAM STIRRUPS WILL NEED TO BE EXTENDED AND TOP FLANGE BEAM FINISH SHALL BE MODIFIED AS PER DETAILS ON THE PRECAST DECK PANEL SHEET.

0.6" DIAMETER STRANDS STRESSED TO NOT MORE THAN 5,000 LBS. EACH MAY BE USED IN LIEU OF THE a BARS WHICH RUN THE FULL LENGTH OF THE BEAM IN THE TOP FLANGE.



D BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



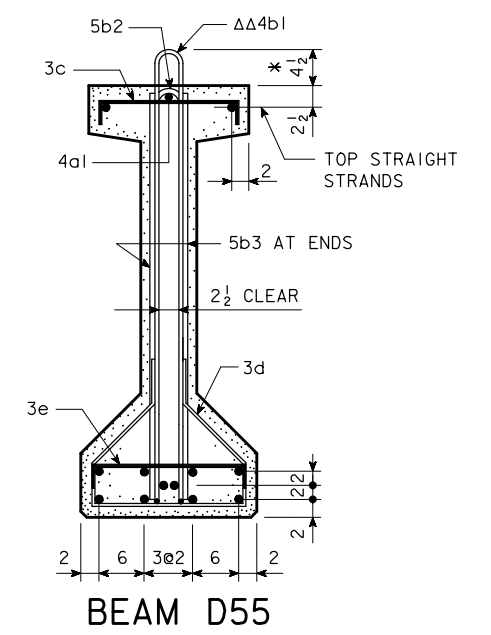
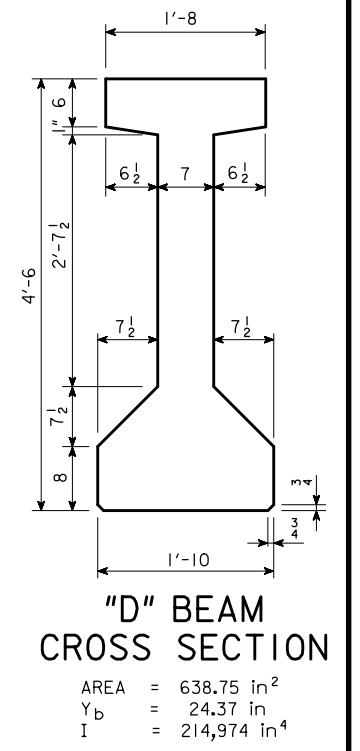
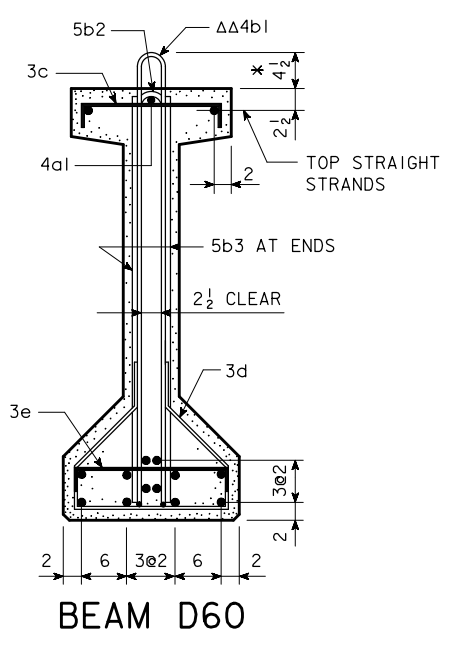
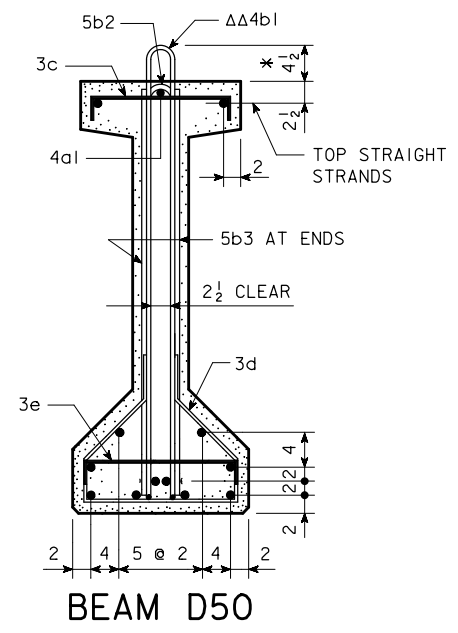
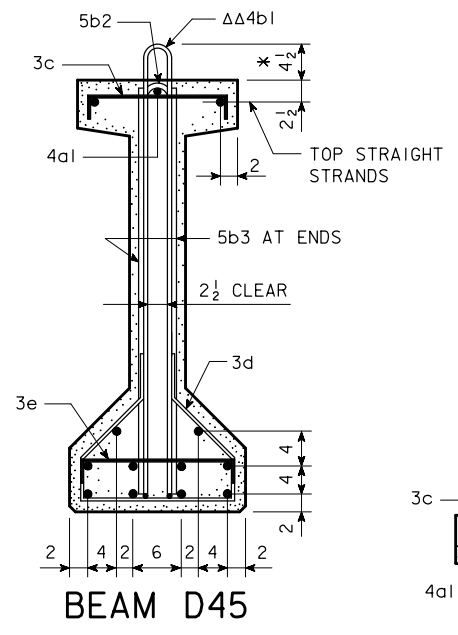
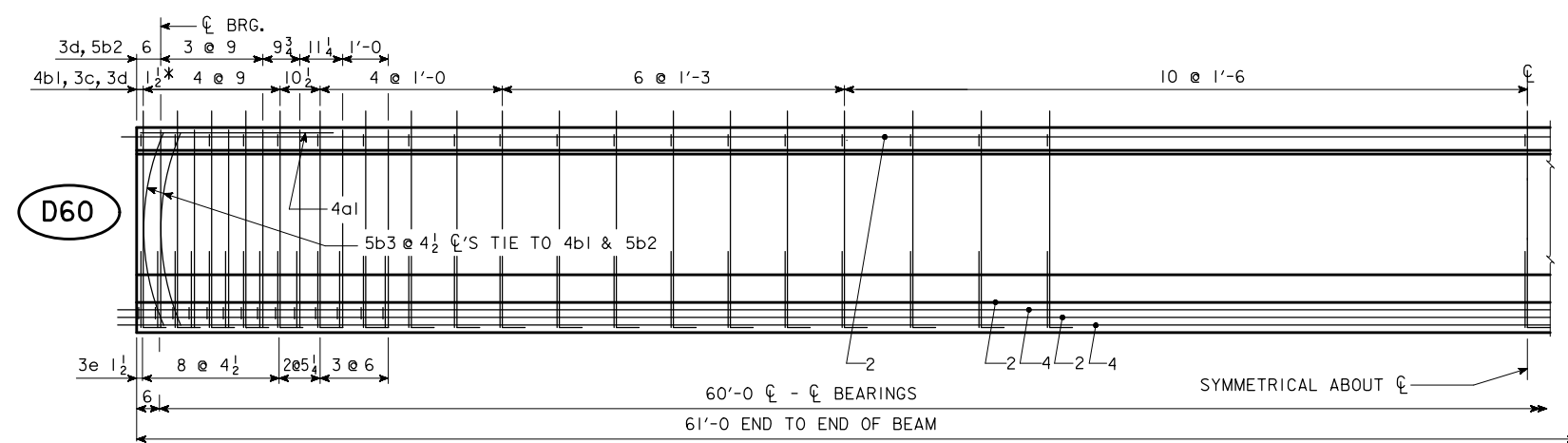
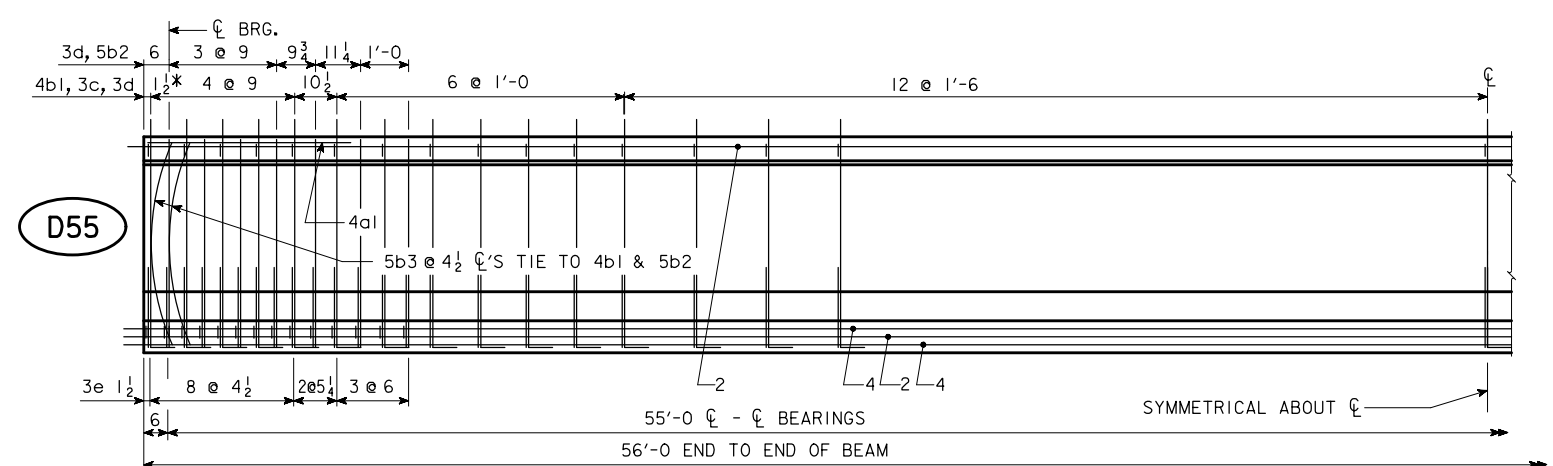
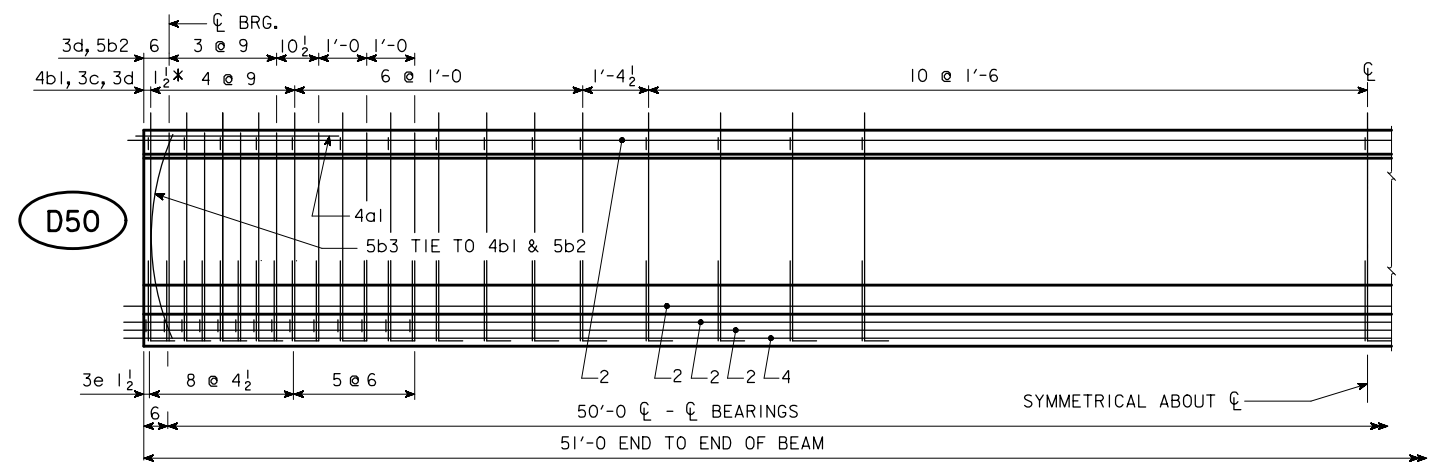
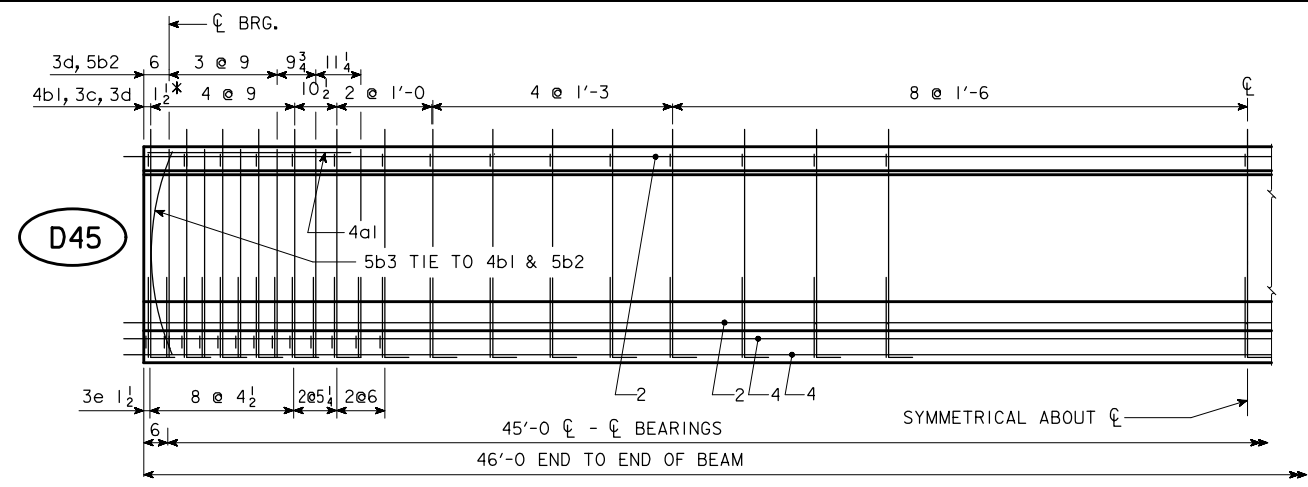
* KEEP
 ΔΔ EPOXY COATED BARS

D35 & D40 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. ____ OF ____ FILE NO. ____ DESIGN NO. ____

ENGLISHBEAMS.DGN - 4631 - LRFD - THIS SHEET RE-ISSUED 09-06.

REVISION 80-09 - ADDED STRANDS TO THE D45 BEAM X-SECTION. ENGLISHBEAMS.DGN - 4632 - LRFD - THIS SHEET RE-ISSUED 09-06.

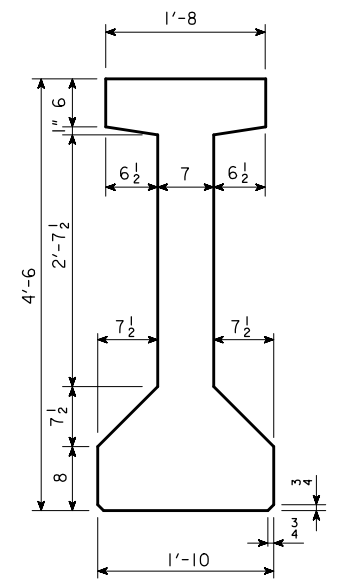
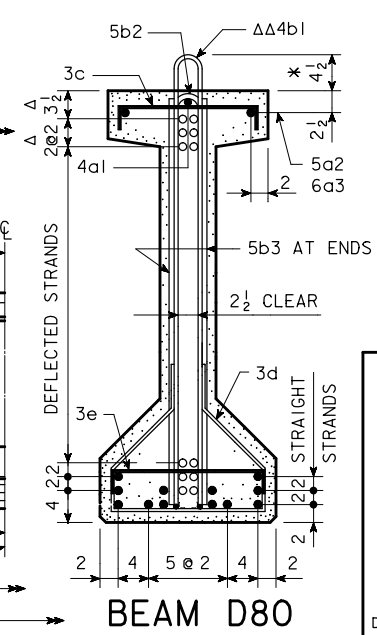
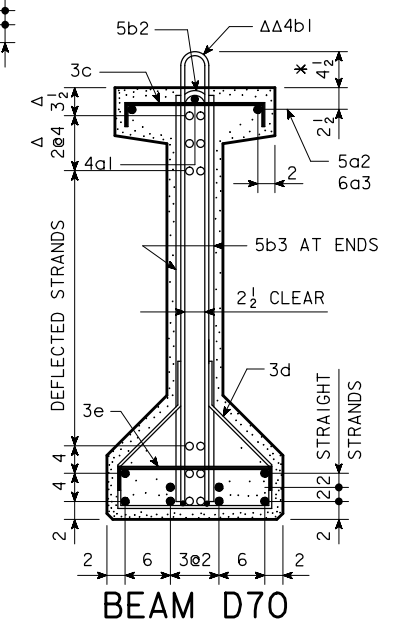
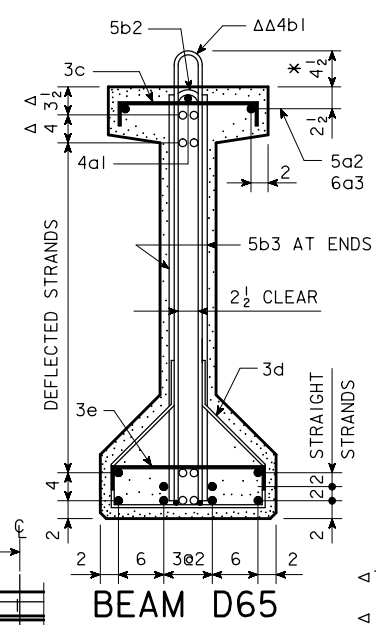
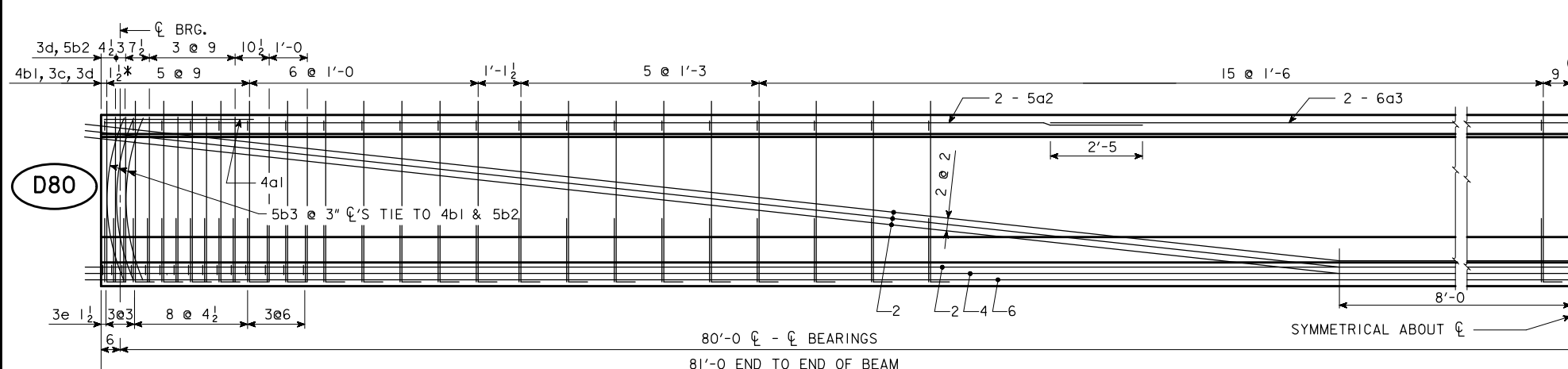
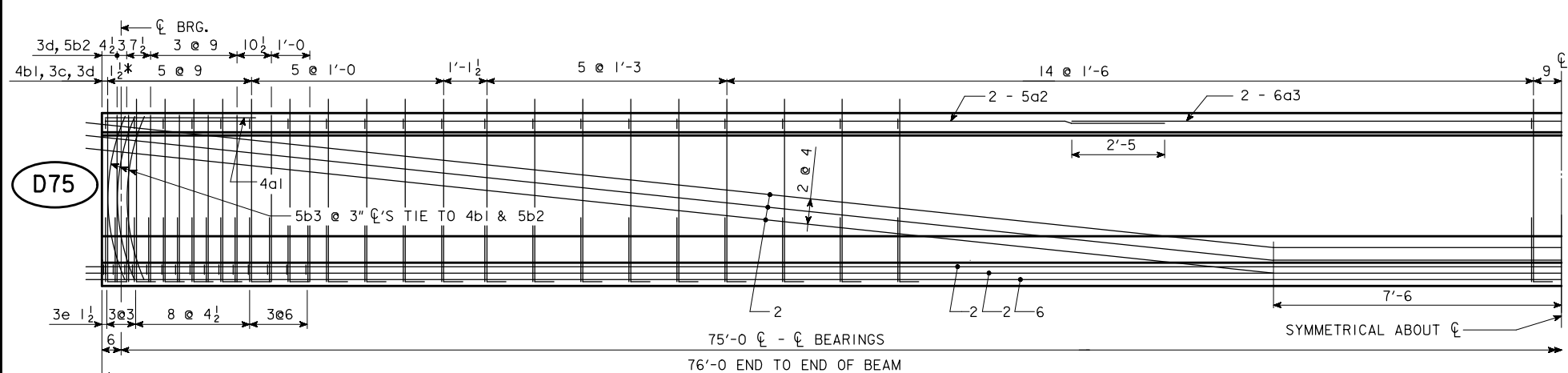
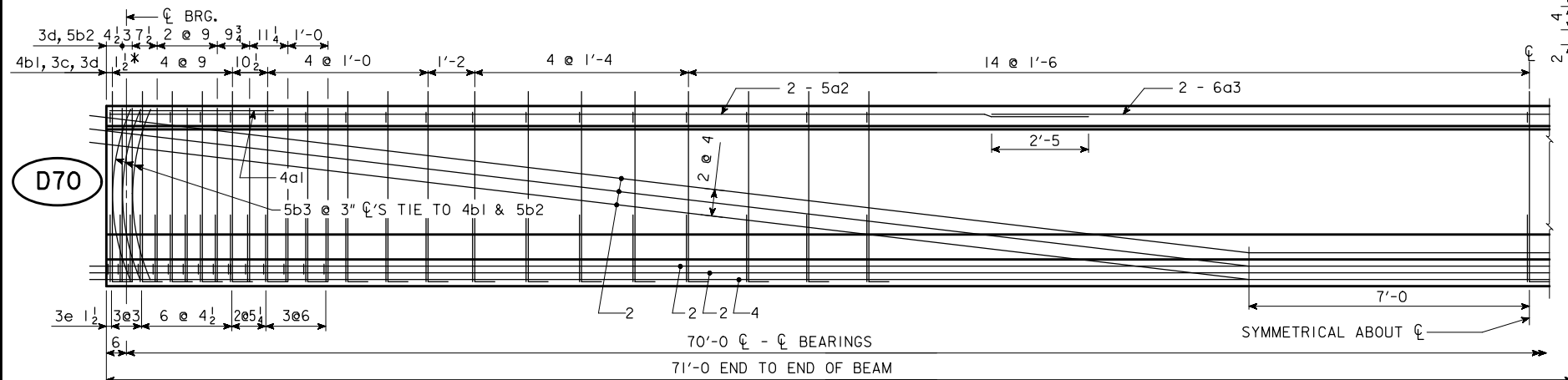
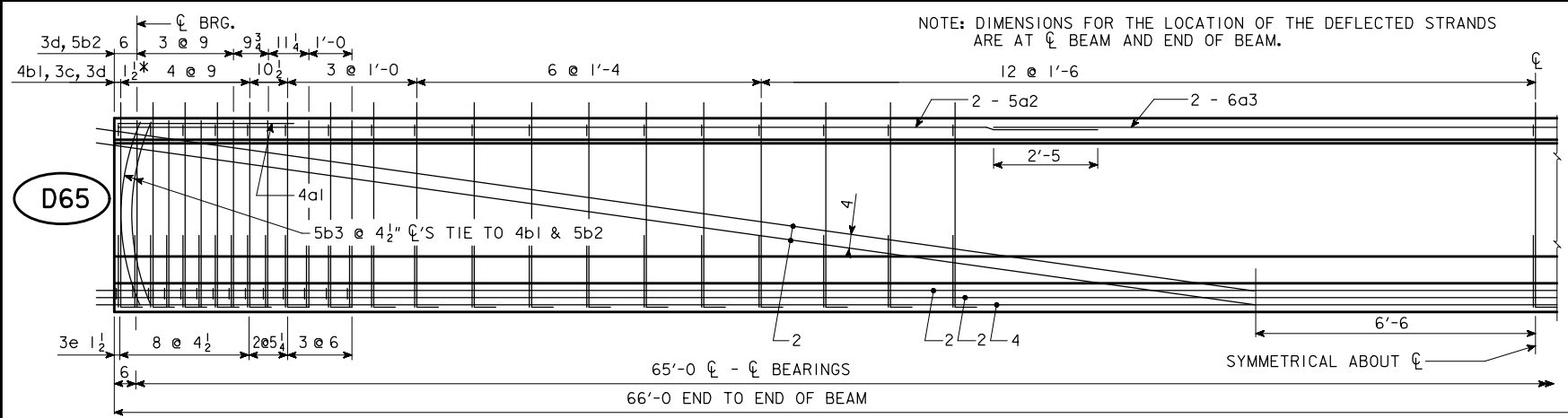


* KEEP ΔΔ EPOXY COATED BARS

D45 - D60 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT \bar{C} BEAM AND END OF BEAM.



"D" BEAM CROSS SECTION
 AREA = 638.75 in²
 Y_b = 24.37 in
 I = 214,974 in⁴

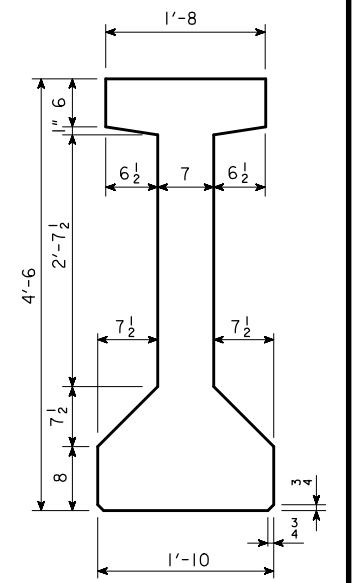
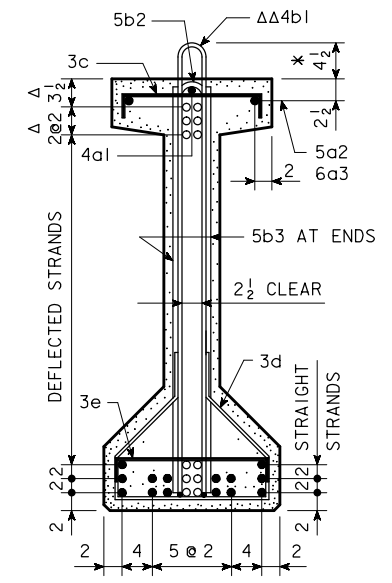
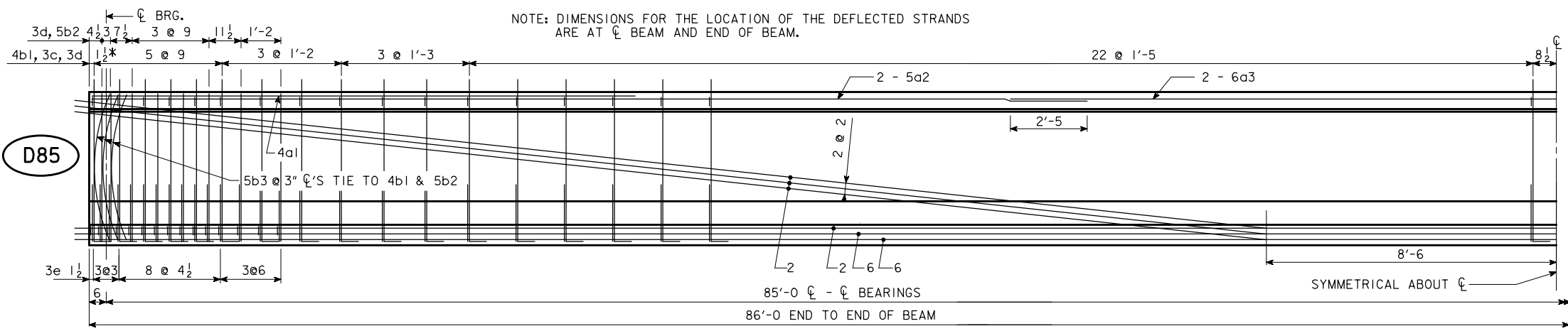
- DEFLECTED STRANDS
- * KEEP
- ΔΔ EPOXY COATED BARS
- Δ DIMENSIONS AT END OF BEAM

D65 - D80 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

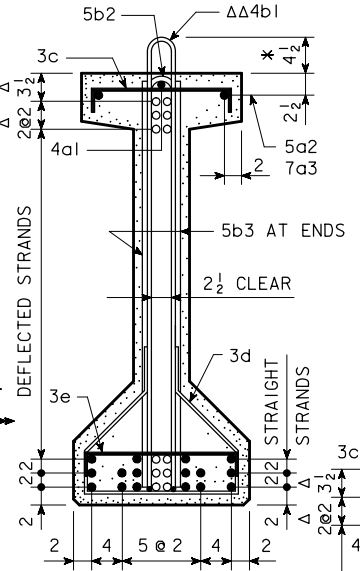
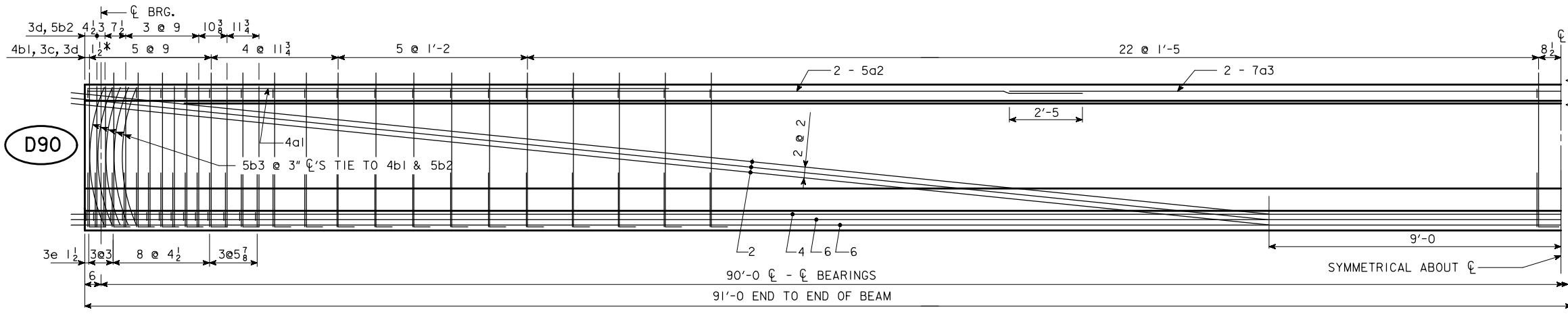
ENGLISHBEAMS.DGN - 4633 - LRFD - THIS SHEET RE-ISSUED 09-06.

NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT \bar{C} BEAM AND END OF BEAM.

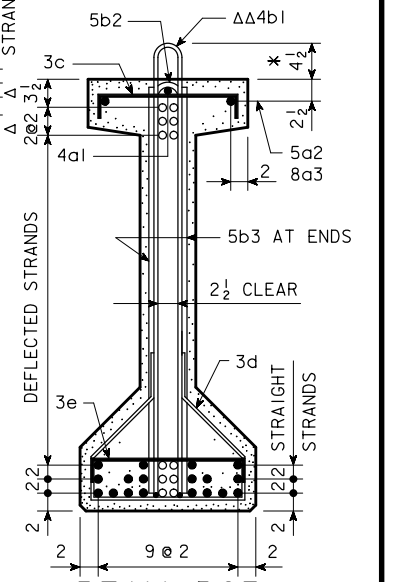
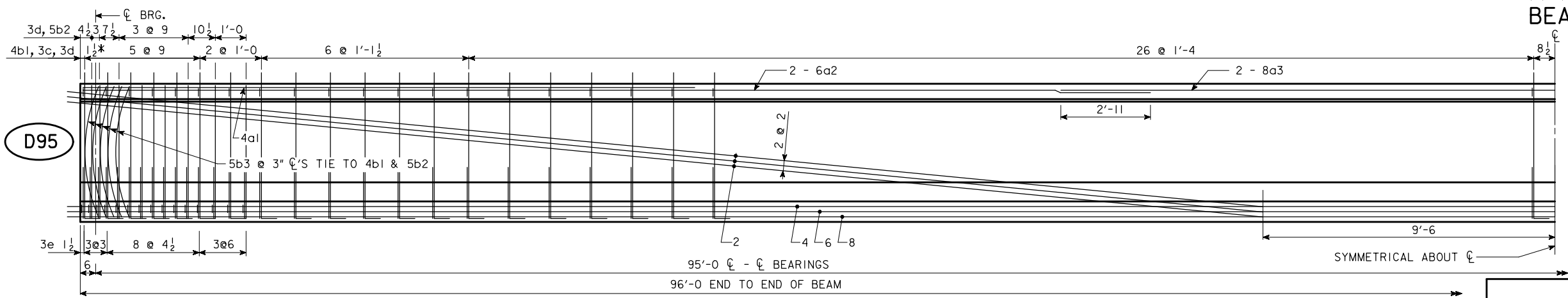


BEAM D85

AREA = 638.75 in²
 Y_b = 24.37 in⁴
 I = 214,974 in⁴



BEAM D90



BEAM D95

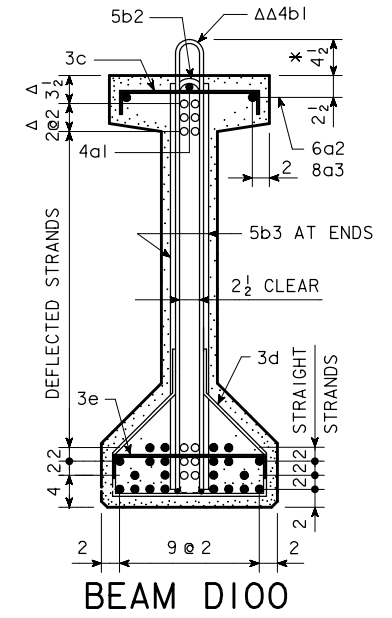
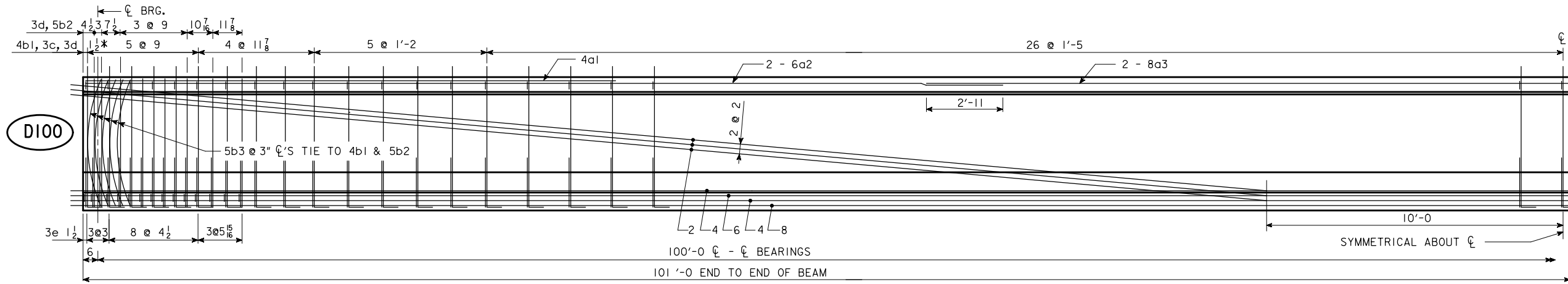
D85 - D95 BEAM DETAILS

- DEFLECTED STRANDS
- * KEEP
- $\Delta\Delta$ EPOXY COATED BARS
- Δ DIMENSIONS AT END OF BEAM

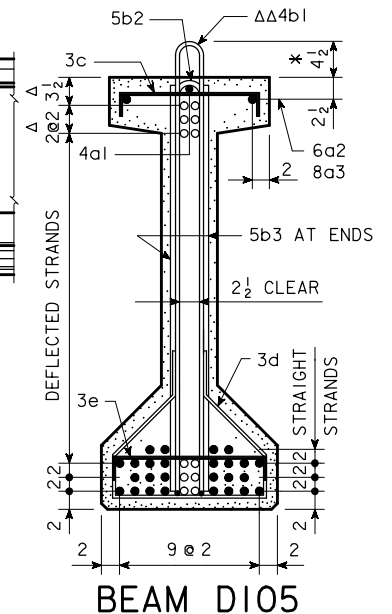
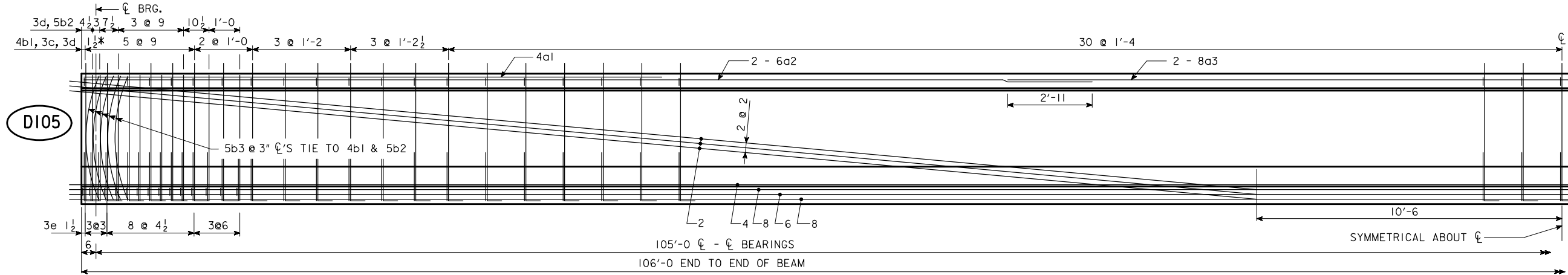
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

ENGLISHBEAMS.DGN - 4634 - LRFD - THIS SHEET RE-ISSUED 09-06.

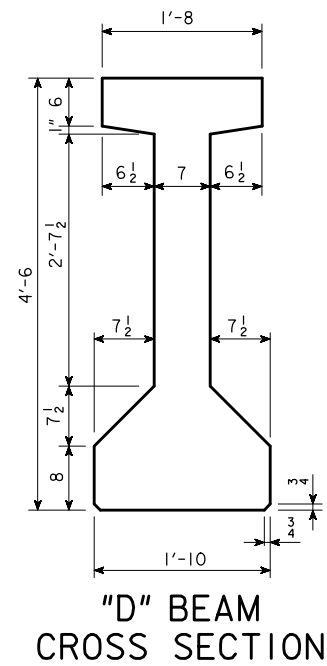
NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS
ARE AT \bar{C} BEAM AND END OF BEAM.



BEAM D100



BEAM D105



"D" BEAM
CROSS SECTION

- DEFLECTED STRANDS
- * KEEP
- ΔΔ EPOXY COATED BARS
- Δ DIMENSIONS AT END OF BEAM

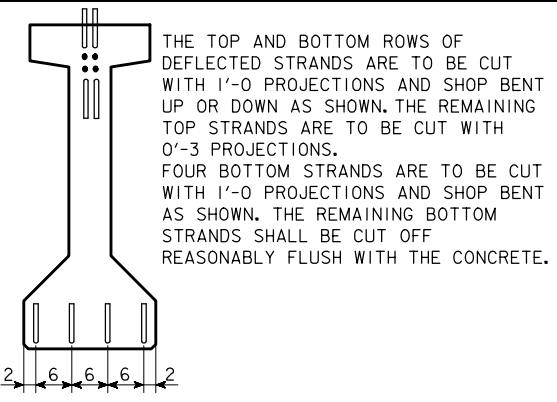
AREA = 638.75 in²
Y_b = 24.37 in
I = 214,974 in⁴

D100 & D105 BEAM DETAILS

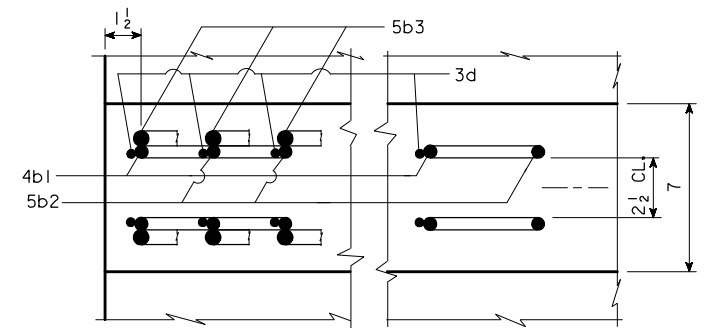
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

ENGLISHBEAMS.DGN - 4635 - LRFD - THIS SHEET RE-ISSUED 09-06.

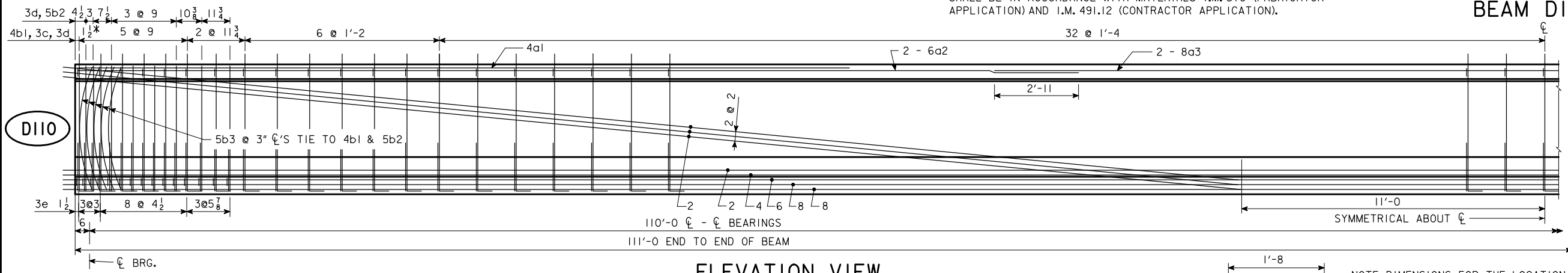
REVISION 08-12 - I.M. REFERENCE NOTE FOR SEALING BEAM ENDS DISTINGUISHES BETWEEN THE FABRICATOR AND CONTRACTOR. ENGLISHBEAMS.DGN - 4636 - LRFD - THIS SHEET RE-ISSUED 09-06.



STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS

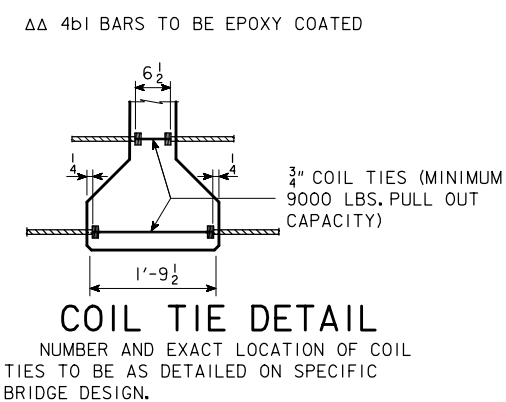
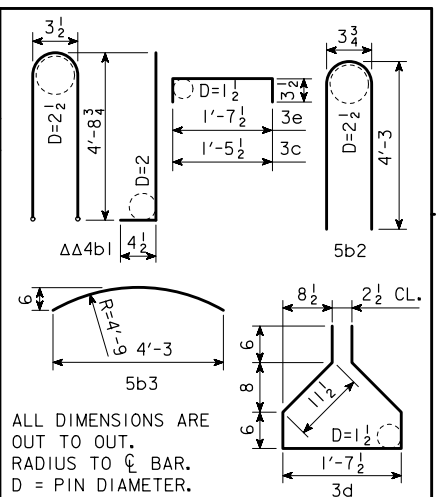


PART SECTION A-A SHOWING PLACEMENT OF STIRRUPS NEAR END OF BEAM



ELEVATION VIEW

REINFORCING BAR LIST BEAM D110			
BAR	SHAPE	NO.	LENGTH
4a1		2	26'-6
6a2		4	38'-4
8a3		2	40'-0
4b1		91	10'-4
5b2		16	8'-8
5b3		20	4'-4
3c		91	2'-1
3d		107	5'-7
3e		30	2'-3



BEAM NOTES:

THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN BEAM DATA TABLE WITH AN ALLOWANCE OF 20 LB. PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE. ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION. ALL PRESTRESSING STRANDS SHALL CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS. TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570. BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER. THE PORTIONS OF THE PRESTRESS BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, I, OF THE STANDARD SPECIFICATIONS. ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE. FOR TRANSPORTING, THE OVERHANG SHALL BE IN ACCORDANCE WITH ARTICLE 2407.03, K, OF STANDARD SPECIFICATIONS, EXCEPT THE OVERHANG MAY BE INCREASED TO 14 FEET. THE CONTRACTOR SHALL ASSURE THE LATERAL STABILITY OF THE BEAMS DURING HANDLING, TRANSPORTING AND ERECTION BY PROVIDING TEMPORARY BRACING AS NEEDED. IF THE PRECAST PANEL OPTION IS ALLOWED AND USED FOR BRIDGE DECK FORMATION, THE BEAM STIRRUPS WILL NEED TO BE EXTENDED AND TOP FLANGE BEAM FINISH SHALL BE MODIFIED AS PER DETAILS ON THE PRECAST DECK PANEL SHEET. 0.6" DIAMETER STRANDS STRESSED TO NOT MORE THAN 5,000 LBS. EACH MAY BE USED IN LIEU OF THE α BARS WHICH RUN THE FULL LENGTH OF THE BEAM IN THE TOP FLANGE.

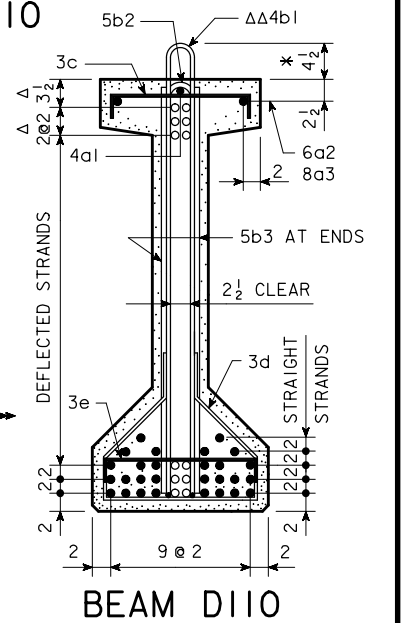
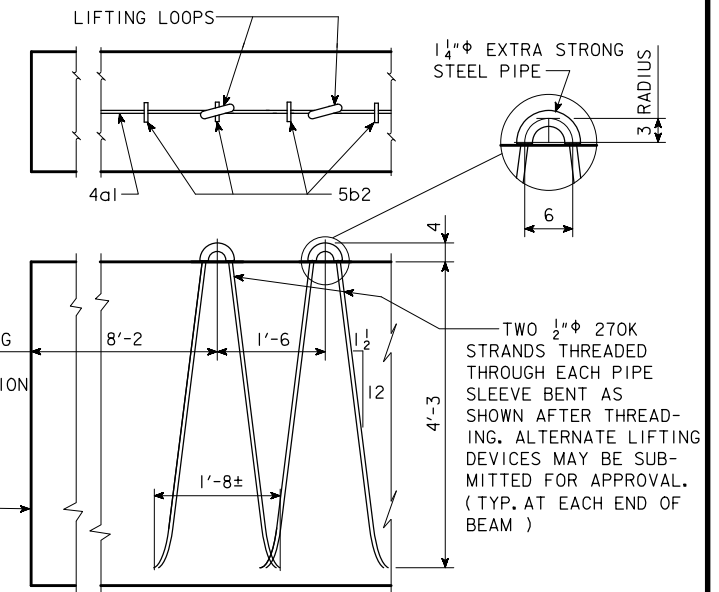
D110 BEAM DATA

BEAM	SPAN LENGTH ℓ - ℓ BEARING	OVERALL BEAM LENGTH (L)	STRAND SIZE	NO. OF STRANDS		TOTAL INITIAL PRESTRESS KIPS $\textcircled{3}$	HOLD DOWN FORCE-KIPS	CAMBER (in.)		DEFLECTION (in.) Δ_D				PERMISSIBLE SPACING		WEIGHT (TONS)	CONCRETE (C.Y.)	REINFORCING STEEL - (lbs.)
				STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE $\textcircled{1}$ (ELASTIC) Δ_i		TIME (PLASTIC) Δ_T		HL93 LOADING				
										CONC. DIAPHR.	STEEL DIAPHR.	CONC. DIAPHR.	STEEL DIAPHR.	CONC. DIAPHR.	STEEL DIAPHR.			
D110	110'-0	111'-0	0.6"	28	6	1446	21.2	2.83	4.83	1.92	1.81	0.48	0.45	7'-6	7'-6	36.9	18.2	1664

$\textcircled{1}$ DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB WEIGHT OF 760 #/FT. (8" SLAB AND 7'-6 BEAM SPACING) AND ONE CONCRETE DIAPHRAGM (3191 #) OR ONE STEEL DIAPHRAGM (285 #) AT ℓ OF SPAN. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.
 $\textcircled{2}$ DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.
 TOTAL BEAM DEFLECTIONS AT ℓ OF SPAN, Δ_D , DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:
 (A) $\Delta_D = \Delta_i + \Delta_T$ FOR SIMPLE SPAN.
 (B) $\Delta_D = \Delta_i + \frac{1}{2}\Delta_T$ FOR END SPANS OF CONTINUOUS BRIDGE.
 (C) $\Delta_D = \Delta_i + \frac{1}{4}\Delta_T$ FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.
 $\textcircled{3}$ TOTAL INITIAL PRESTRESS FOR D110 IS BASED ON 72.6% f'_s . $f'_s = 270$ ksi AND $A_s = 0.217$ sq. in.

BEAM NOTES: (CONTINUED)

IF THE STEEL DIAPHRAGM OPTION IS ALLOWED AND USED, HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.
 IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.
 IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.
 WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION).



NOTE: DIMENSIONS FOR THE LOCATION OF THE DEFLECTED STRANDS ARE AT ℓ BEAM AND END OF BEAM.

AREA = 638.75 in²
 Y_b = 24.37 in
 I = 214,974 in⁴

o DEFLECTED STRANDS
 * KEEP
 $\Delta\Delta$ EPOXY COATED BARS
 Δ DIMENSIONS AT END OF BEAM

SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.
 DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

DESIGN STRESSES:

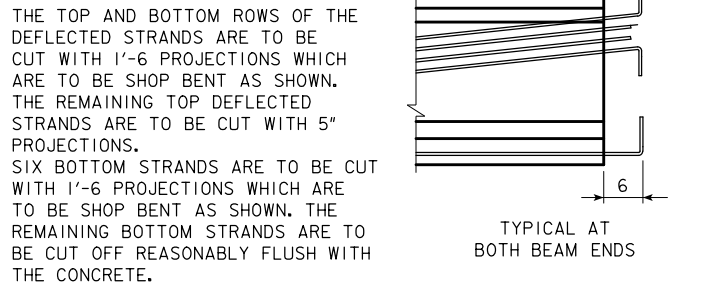
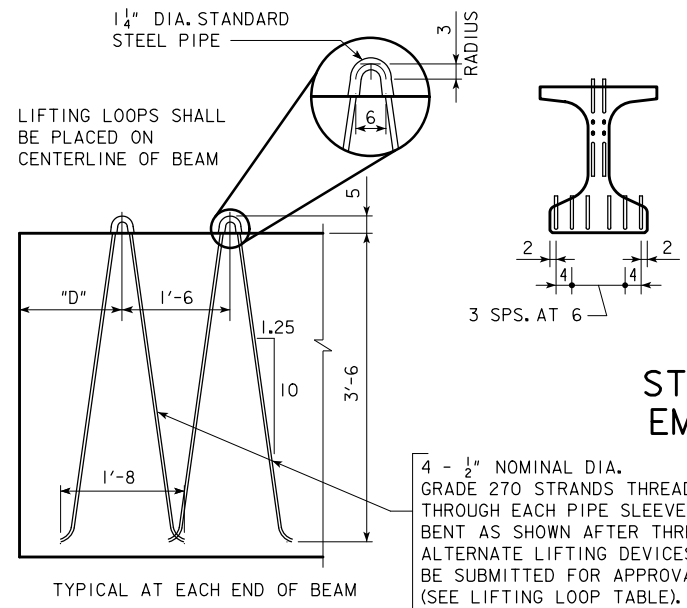
DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH A.A.S.H.T.O. LRFD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007:
 REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60.
 CONCRETE IN ACCORDANCE WITH SECTION 5.
 MINIMUM CONCRETE f'_c (AT 28 DAYS) SHALL BE 7500 psi.
 MINIMUM f'_ci AT RELEASE SHALL BE 6500 psi.
 PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, $f'_s = 270,000$ psi.

D110 CROSS SECTION

D110 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 12-13 - COIL TIE DETAIL WAS CHANGED TO REFLECT THE DISTANCE BETWEEN COIL TIE ANCHORS EMBEDDED 4 INCH. ENGLISHBEAMS.DGN 4700 - THIS SHEET ISSUED 05-04.



STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007. REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. CONCRETE IN ACCORDANCE WITH SECTION 5. PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 270.

SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS. DESIGN: AASHTO LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

ALTERNATE BAR NOTES:

ALTERNATE BARS SHOWN IN BENT BAR DETAILS MAY BE USED IN LIEU OF REINFORCING BARS SHOWN IN BAR LIST. NO ADDITIONAL PAYMENT SHALL BE MADE FOR USE OF ALTERNATE BARS.

BTC BEAM DATA

BTC BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	CONCRETE STRENGTH		STRAIGHT STRAND DIA. (in)	NO. OF STRANDS		TOTAL INITIAL PRESTRESS kips	HOLD DOWN FORCE-kips	CAMBER (in)		DEFLECTION (in) Δ _D		PERMISSIBLE MAXIMUM SPACING HL-93 LOADING	WEIGHT (TONS)	CONCRETE (CU YD.)	REINFORCING STEEL (WEIGHT-LBS)
			f'ci (ksi)	f'c (ksi)		AT RELEASE	AFTER LOSSES			IMMEDIATE (ELASTIC) Δ _i	TIME (PLASTIC) Δ _T						
			STEEL DIAPHRAGM	STEEL DIAPHRAGM		STEEL DIAPHRAGM											
BTC30	30'-0	31'-4	4.50	5.00	0.60	8	—	340	—	0.09	0.17	0.02	—	9'-3	11.3	5.6	1009
BTC35	35'-0	36'-4	4.50	5.00	0.60	8	—	340	—	0.12	0.21	0.04	—	9'-3	13.1	6.5	1089
BTC40	40'-0	41'-4	4.50	5.00	0.60	10	—	425	—	0.20	0.35	0.07	0.02	9'-3	14.9	7.4	1181
BTC45	45'-0	46'-4	4.50	5.00	0.60	10	—	425	—	0.23	0.41	0.12	0.03	9'-3	16.7	8.2	1292
BTC50	50'-0	51'-4	4.50	5.00	0.60	12	—	510	—	0.34	0.60	0.18	0.04	9'-3	18.5	9.1	1389
BTC55	55'-0	56'-4	4.50	5.00	0.60	14	—	596	—	0.45	0.81	0.26	0.06	9'-3	20.3	10.0	1486
BTC60	60'-0	61'-4	4.50	5.00	0.60	14	—	596	—	0.50	0.88	0.37	0.09	9'-3	22.1	10.9	1583
BTC65	65'-0	66'-4	5.00	6.00	0.60	14	2	681	11.5	0.57	1.01	0.47	0.12	9'-3	23.9	11.8	1681
BTC70	70'-0	71'-4	5.00	6.00	0.60	16	2	766	10.7	0.74	1.32	0.63	0.16	9'-3	25.7	12.7	1830
BTC75	75'-0	76'-4	5.00	6.00	0.60	16	4	851	20.0	0.88	1.56	0.83	0.21	9'-3	27.5	13.6	1927
BTC80	80'-0	81'-4	6.00	7.00	0.60	20	4	1021	18.8	1.14	2.02	1.00	0.25	9'-3	29.3	14.5	2065
BTC85	85'-0	86'-4	6.00	7.00	0.60	22	4	1106	17.7	1.36	2.40	1.28	0.32	9'-3	31.1	15.4	2138
BTC90	90'-0	91'-4	6.00	7.00	0.60	24	6	1276	23.8	1.70	3.01	1.61	0.40	9'-3	32.9	16.2	2231
BTC95	95'-0	96'-4	6.50	7.50	0.60	28	6	1446	22.6	2.09	3.70	1.93	0.48	9'-3	34.7	17.1	2395
BTC100	100'-0	101'-4	7.00	8.00	0.60	30	6	1531	21.5	2.30	4.07	2.37	0.59	9'-3	36.5	18.0	2575
BTC105	105'-0	106'-4	7.50	8.50	0.60	34	8	1786	25.8	2.77	4.90	2.78	0.70	9'-3	38.3	18.9	2698
BTC110	110'-0	111'-4	8.00	9.00	0.60	36	8	1872	24.6	2.98	5.26	3.21	0.81	9'-3	40.1	19.8	2795
BTC115	115'-0	116'-4	8.00	9.00	0.60	38	10	2042	27.7	3.32	5.86	3.83	0.96	9'-3	41.9	20.7	2906

① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB (8 in) AND HAUNCH (1.5 in) WEIGHT OF:

0.98 kips/ft FOR 9'-3 BEAM SPACING AND ONE STEEL DIAPHRAGM (0.500 kips) AT C OF SPAN. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.

② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.

TOTAL BEAM DEFLECTIONS AT C OF SPAN, Δ_D, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:

(A) Δ_D = Δ_i + Δ_T FOR SIMPLE SPAN.

(B) Δ_D = Δ_i + 3/4 Δ_T FOR END SPANS OF CONTINUOUS BRIDGE.

(C) Δ_D = Δ_i + 1/2 Δ_T FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.

③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi. AND A_s = 0.217 in².

CALCULATED DESIGN CAMBERS HAVE BEEN REDUCED FROM THEIR THEORETICAL VALUES BY 15% TO AID CONSTRUCTABILITY.

BEAM NOTES: (CONTINUED)

IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.

MINIMUM CONCRETE f'c (AT 28 DAYS) AND MINIMUM f'ci AT RELEASE ARE LOCATED IN THE BTC BEAM DATA TABLE ABOVE.

FOUR 0.60 IN. DIAMETER STRANDS STRESSED TO NOT MORE THAN 5000 LBS EACH MAY BE USED IN LIEU OF BARS 5a1 AND 5a2 IN THE TOP FLANGE.

WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION).

BEAM NOTES:

THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 LBS PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE.

ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION.

ALL PRESTRESSING STRANDS EXCEPT LIFTING LOOP STRANDS SHALL BE 0.60 IN. NOMINAL DIAMETER (NOMINAL STEEL AREA = 0.217 in²) AND CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS. MINIMUM STRAND BREAKING STRENGTH SHALL BE 58.6 kips.

TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570.

BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS.

BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.

THE PORTIONS OF THE PRESTRESSED BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, I, OF THE STANDARD SPECIFICATIONS.

ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE.

FOR TRANSPORTING, THE ALLOWABLE OVERHANG IS SHOWN IN THE LIFTING LOOP AND OVERHANG TABLE.

THE CONTRACTOR SHALL ASSURE THE LATERAL STABILITY OF THE BTC100 TO BTC115 BEAMS DURING HANDLING, TRANSPORTING AND ERECTION BY PROVIDING TEMPORARY BRACING AS NEEDED.

HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.

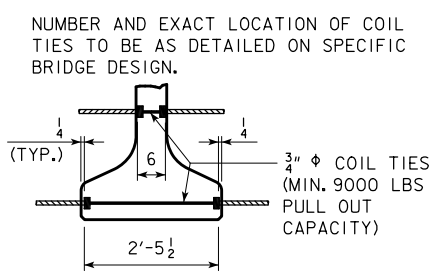
IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.

LIFTING LOOP AND OVERHANG TABLE

BEAMS	LIFTING LOOPS EACH END	# OF STRANDS PER LOOP	D	BEAM OVERHANG (FT)
BTC30-BTC45	1	4	2'-0	**
BTC50-BTC75	1	4	2'-0	**
BTC80-BTC95	2	4	1'-3	11
BTC100	2	4	3'-9	12
BTC105	2	4	6'-3	12
BTC110	2	4	8'-2	12
BTC115	2	4	8'-3	14

** IN ACCORDANCE WITH ARTICLE 2407.03, K OF THE STANDARD SPECIFICATIONS.

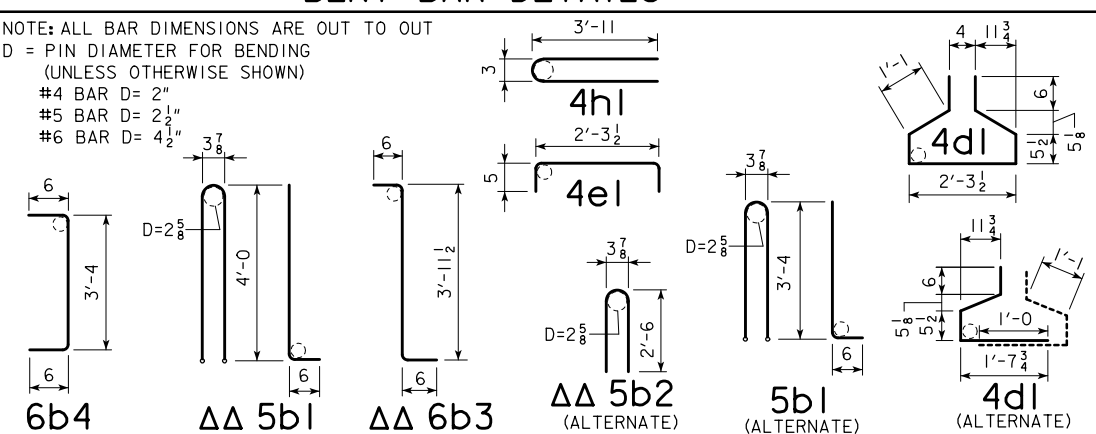
LIFTING LOOPS SHALL CARRY LOADS EQUALLY.



COIL TIE DETAIL

ΔΔ 5b1 AND 6b3 BARS TO BE EPOXY COATED
* 6b3 AND 6b4 BARS TO BE USED IN PAIRS

BENT BAR DETAILS



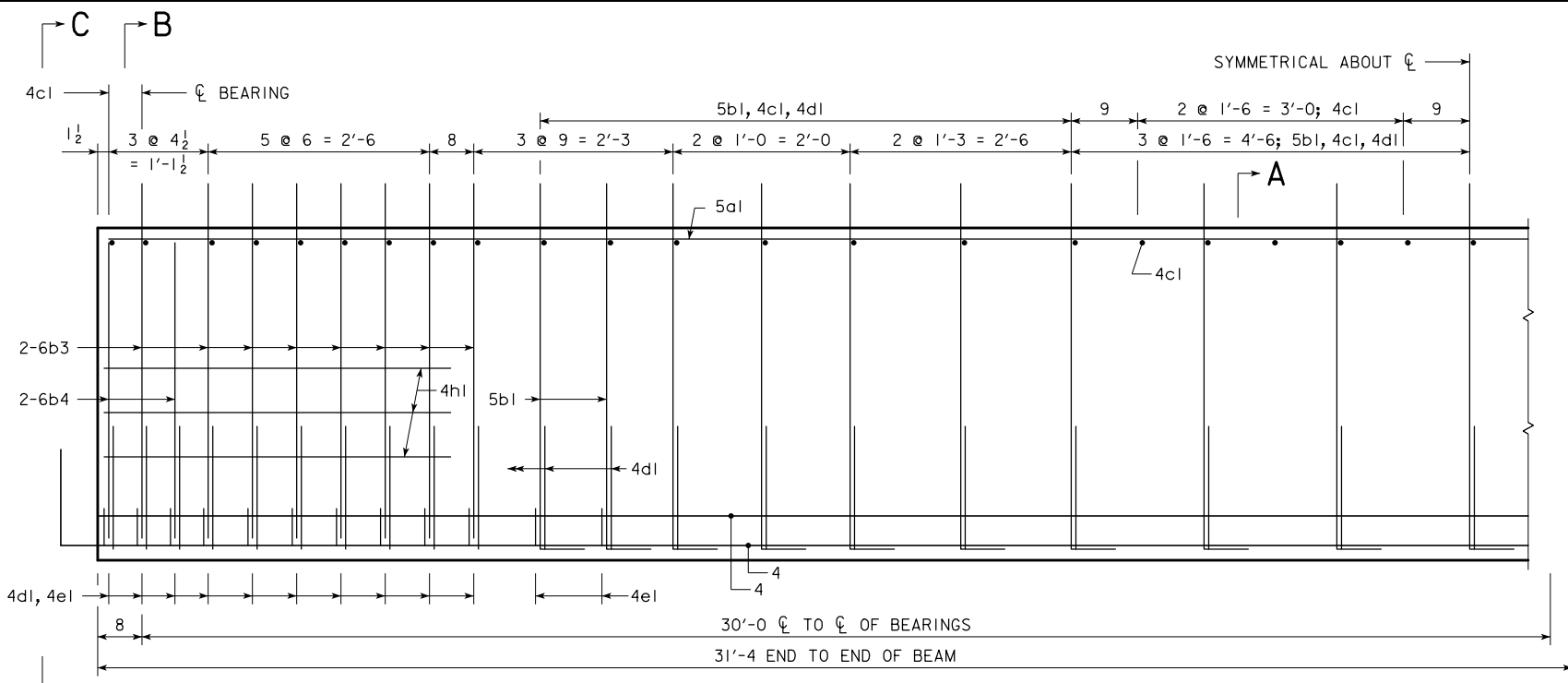
REINFORCING BAR LIST

BEAM	BTC30	BTC35	BTC40	BTC45	BTC50	BTC55	BTC60	BTC65	BTC70	BTC75	BTC80	BTC85	BTC90	BTC95	BTC100	BTC105	BTC110	BTC115	BEAM
BAR SHAPE	6	6	6	12	12	12	12	12	12	12	6	6	6	6	6	6	6	6	BAR
5a1	31'-1	36'-1	41'-1	24'-2	26'-8	29'-2	31'-8	34'-2	36'-8	39'-2	40'-0	40'-0	40'-0	40'-0	40'-0	40'-0	40'-0	40'-0	5a1
5a2											6	6	6	6	6	6	6	6	5a2
ΔΔ 5b1	19	23	27	31	35	39	43	47	51	55	61	63	67	71	81	85	89	93	5b1
ΔΔ * 6b3	32	32	32	32	32	32	32	32	32	32	32	32	32	36	36	36	36	36	6b3
* 6b4	8	8	8	8	8	8	8	8	16	16	16	16	16	20	20	24	24	24	6b4
4c1	43	49	53	59	67	71	77	83	89	95	101	109	113	125	131	137	143	149	4c1
4d1	39	43	47	51	55	59	63	67	71	75	81	83	87	91	101	105	109	113	4d1
4e1	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	4e1
4h1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	4h1

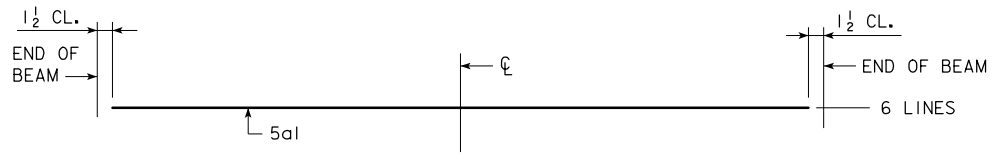
BTC BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

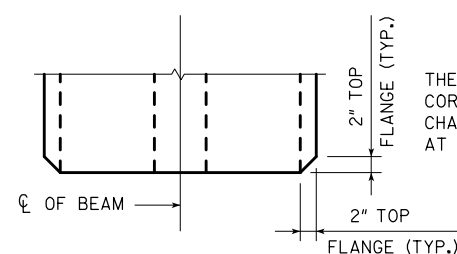
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4701 - THIS SHEET ISSUED 05-04.



BTC30

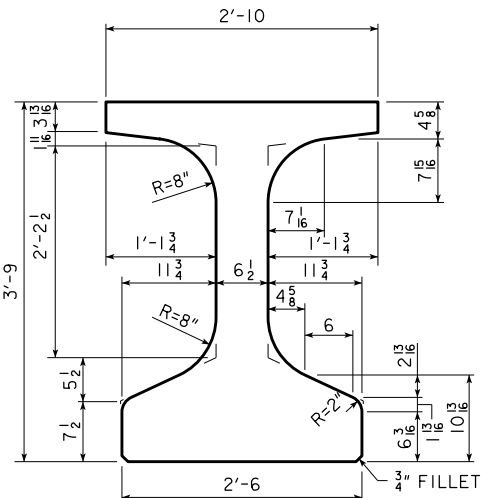


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

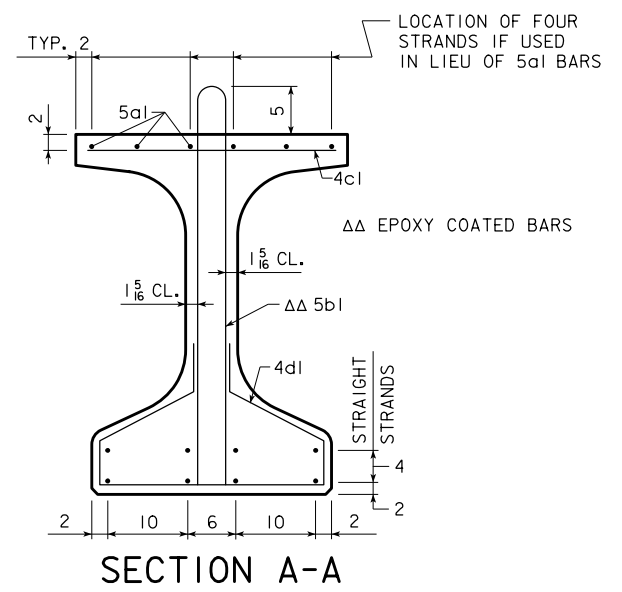
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM



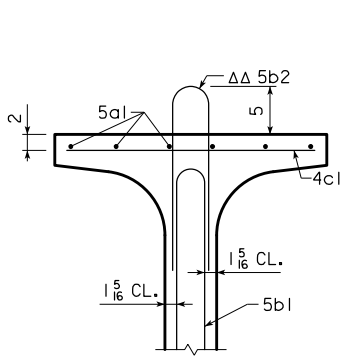
BEAM SECTION PROPERTIES

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

BTC BEAM CROSS SECTION

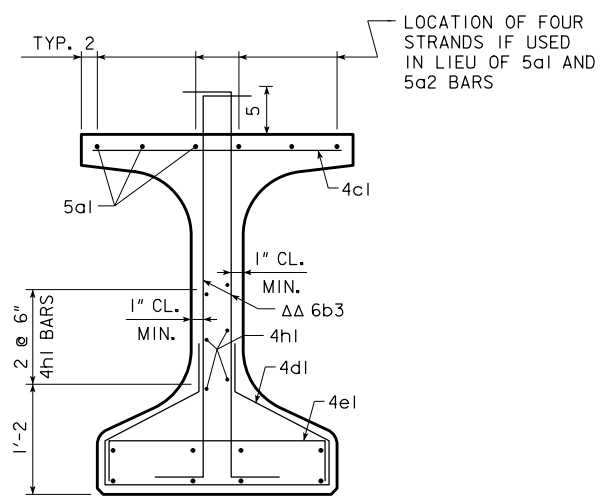


SECTION A-A

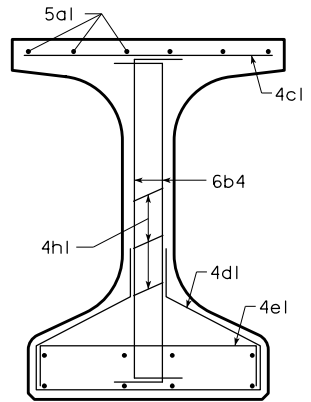


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



SECTION B-B

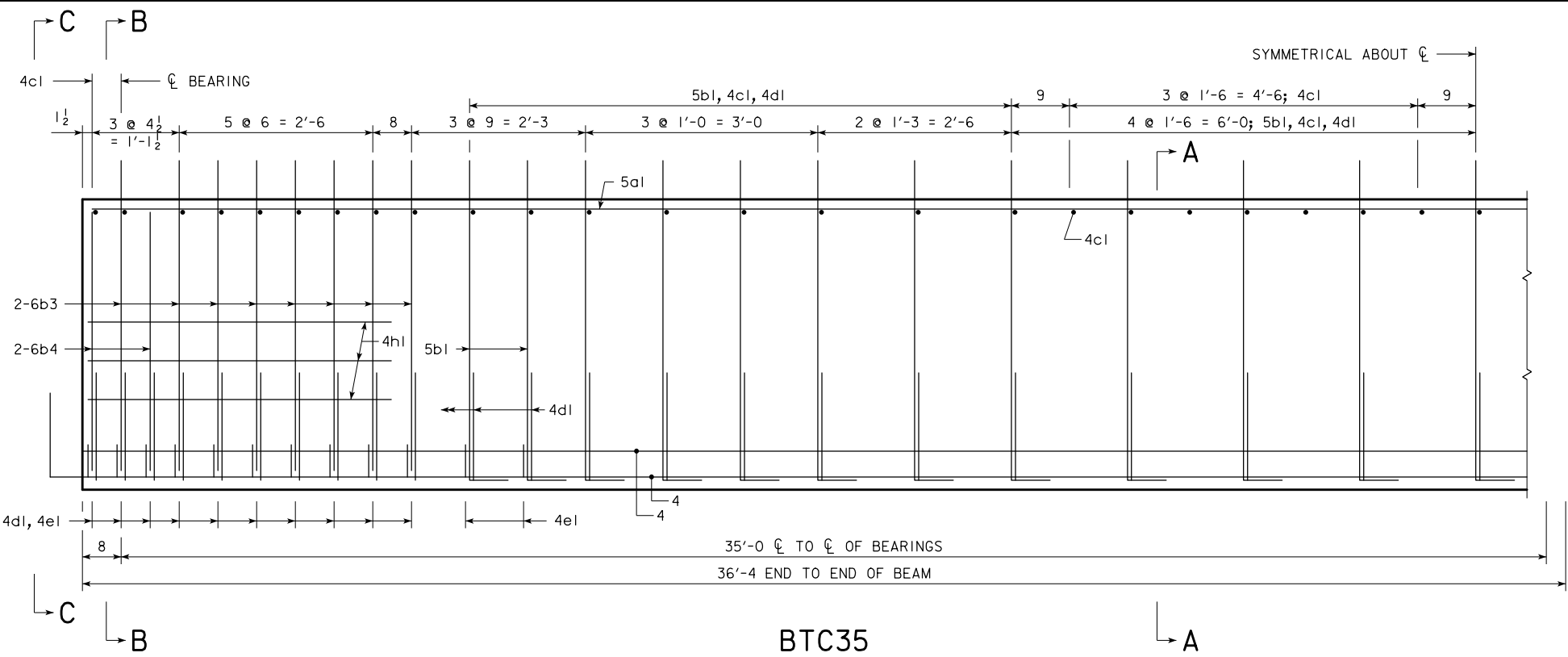


SECTION C-C

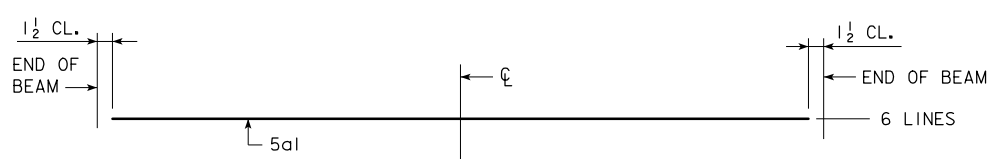
BTC30 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

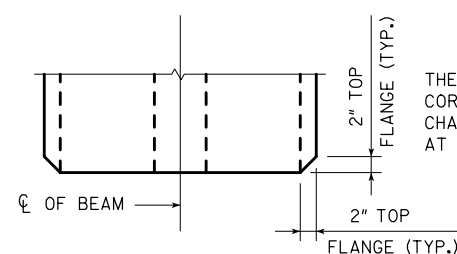
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4702 - THIS SHEET ISSUED 05-04.



BTC35

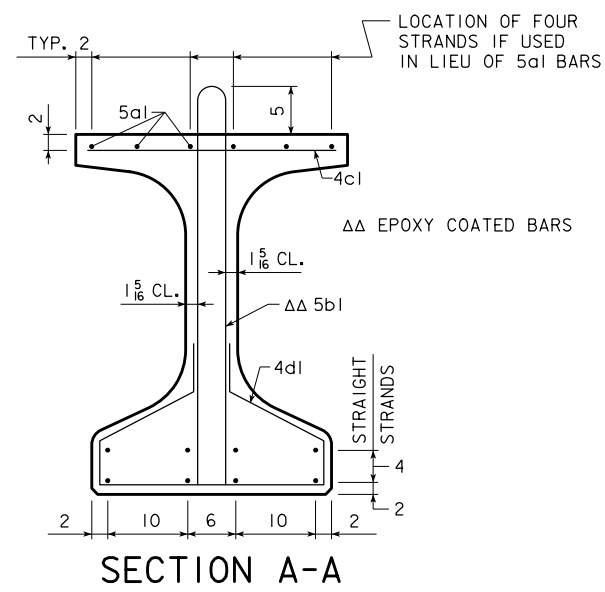


TOP FLANGE LONGITUDINAL BAR LAYOUT

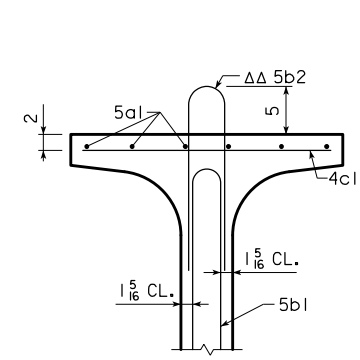


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2\"/>

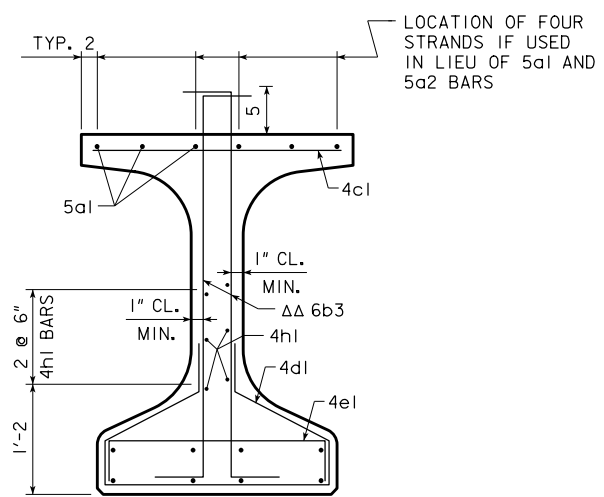


SECTION A-A

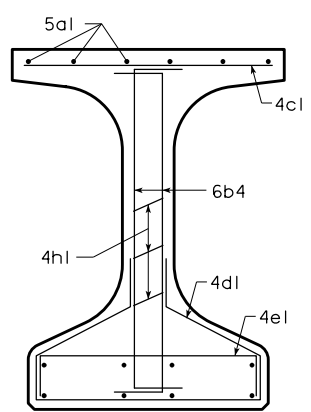


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



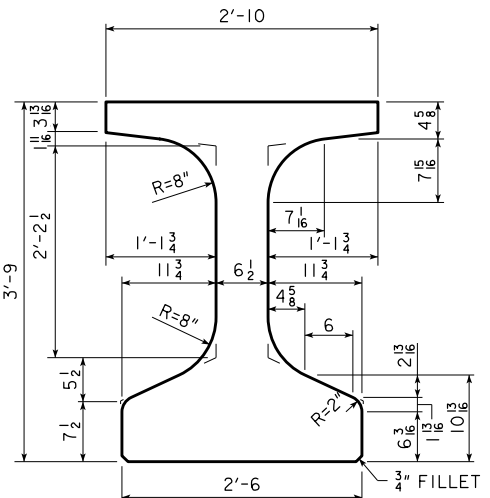
SECTION B-B



SECTION C-C

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

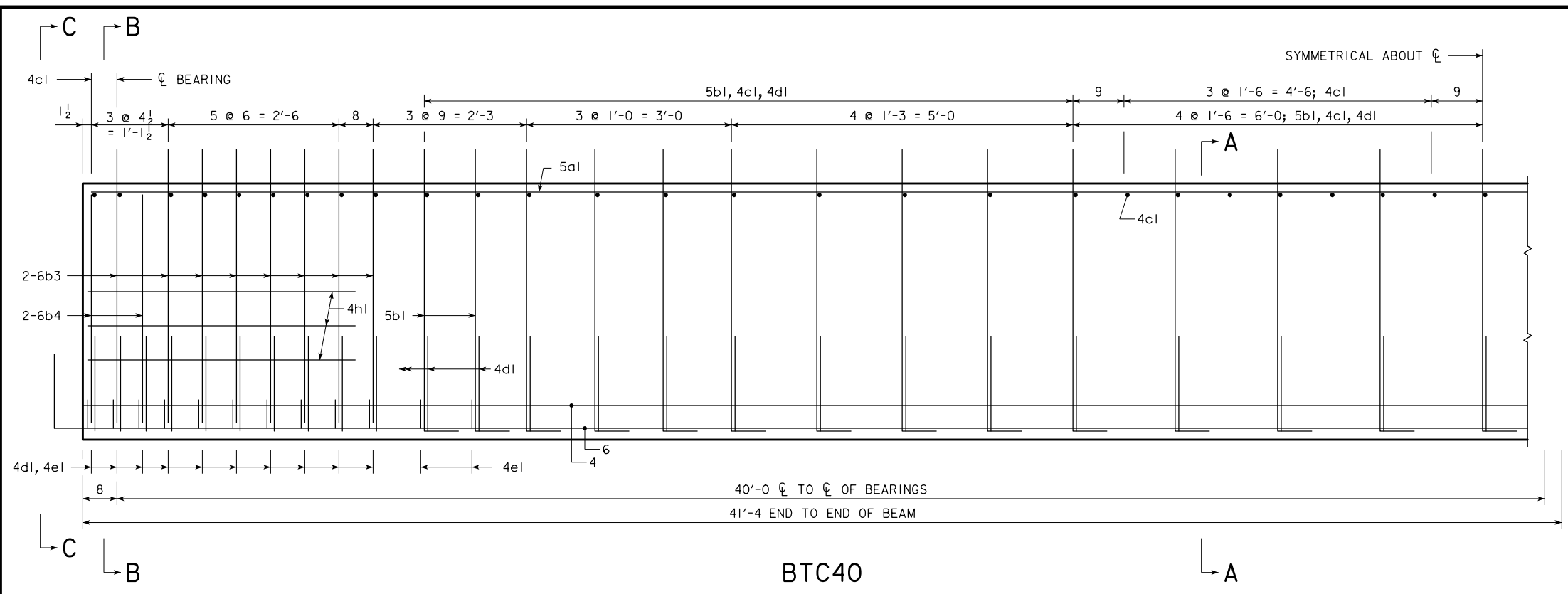
BEAM SECTION PROPERTIES



BTC BEAM CROSS SECTION

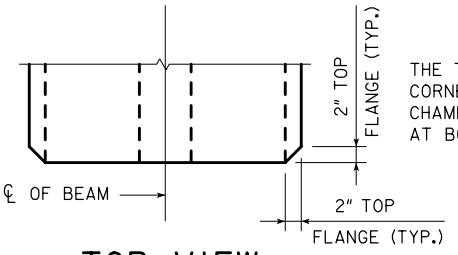
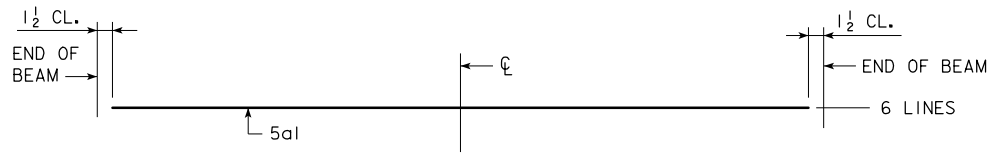
BTC35 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



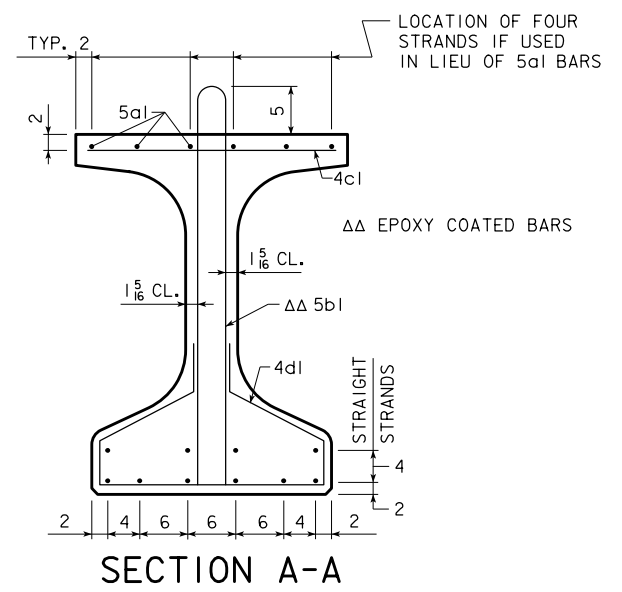
BTC40

TOP FLANGE LONGITUDINAL BAR LAYOUT

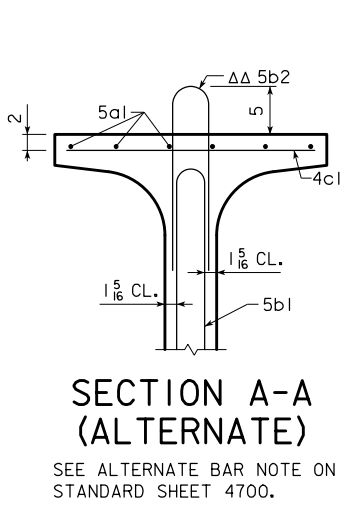


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM

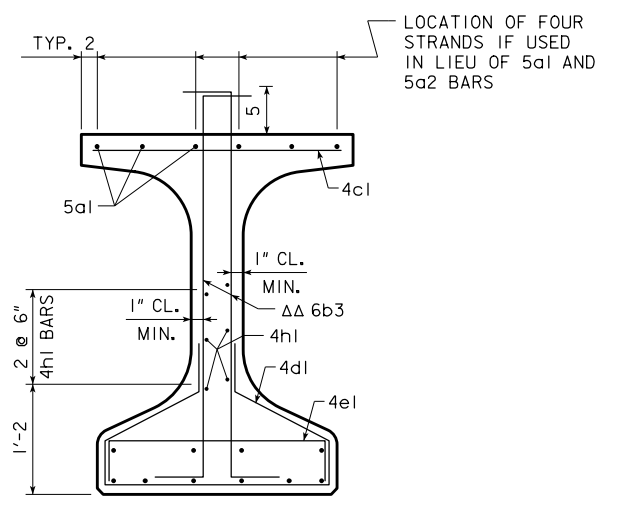


SECTION A-A

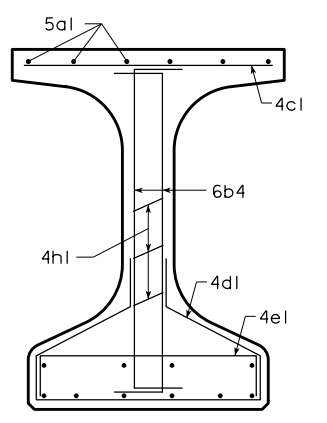


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



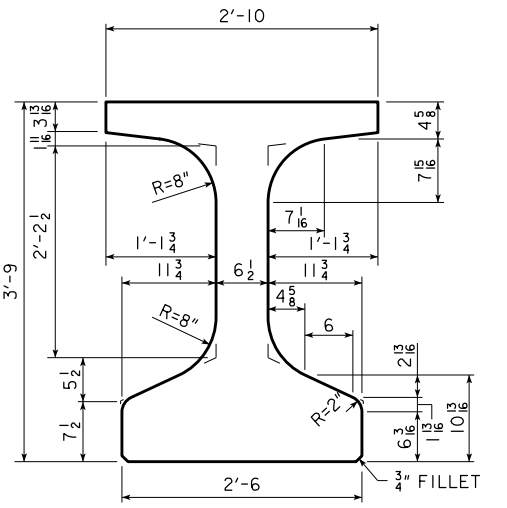
SECTION B-B



SECTION C-C

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

BEAM SECTION PROPERTIES



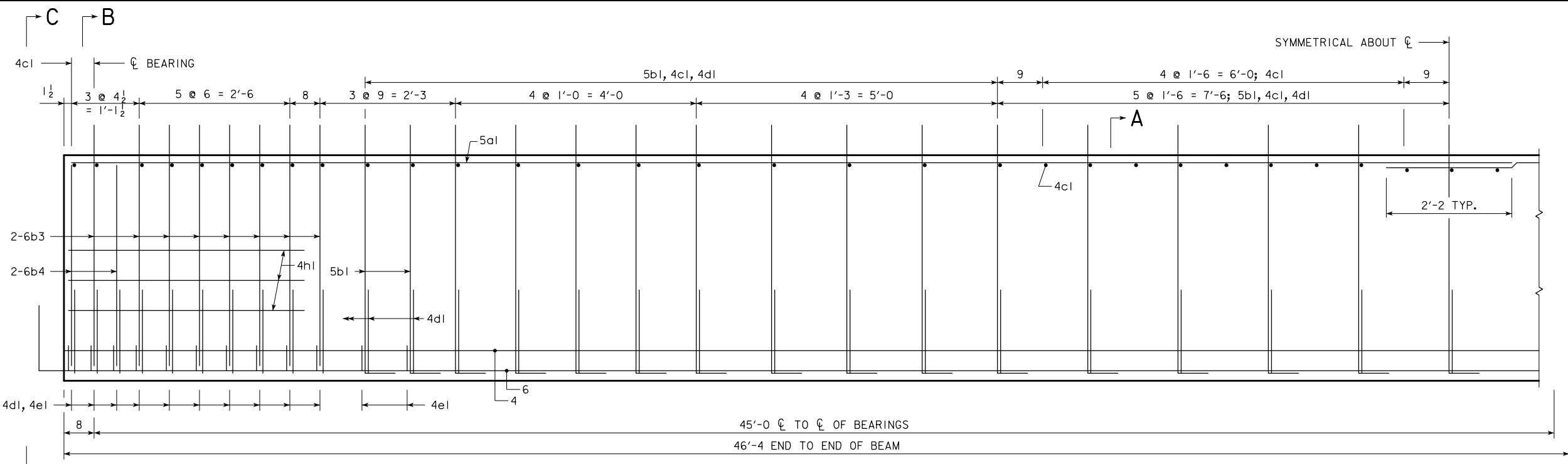
BTC BEAM CROSS SECTION

BTC40 BEAM DETAILS

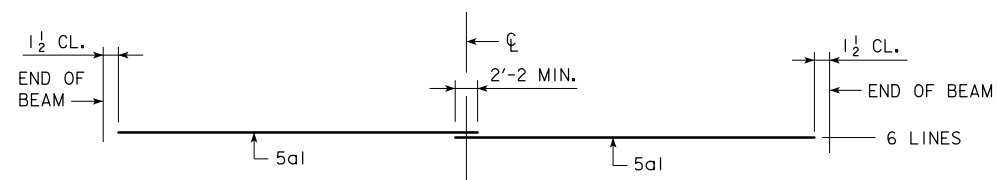
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN 4703 - THIS SHEET ISSUED 05-04.

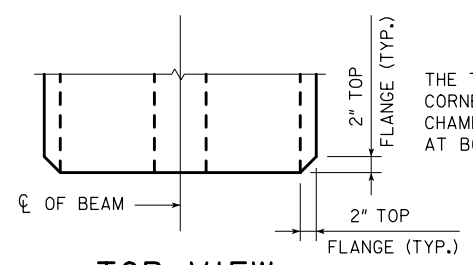
REVISED 10-07 - 5b2 BAR DELETED; 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4704 - THIS SHEET ISSUED 05-04.



BTC45

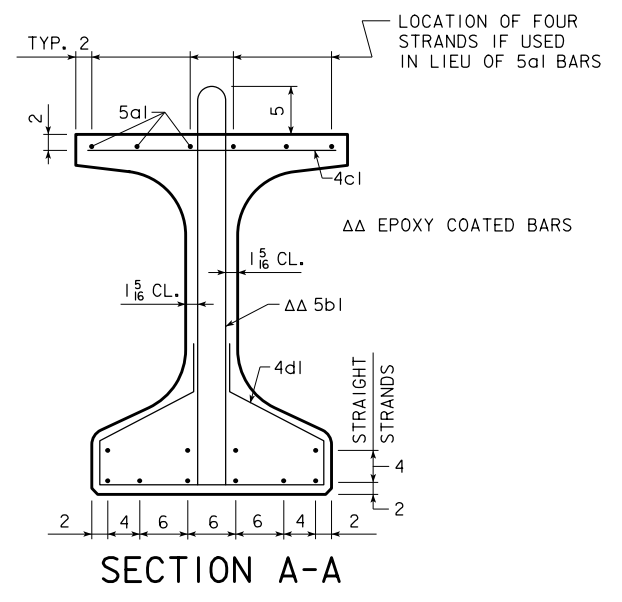


TOP FLANGE LONGITUDINAL BAR LAYOUT

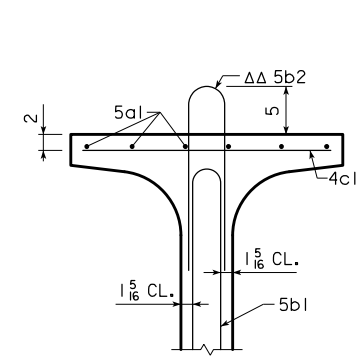


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM

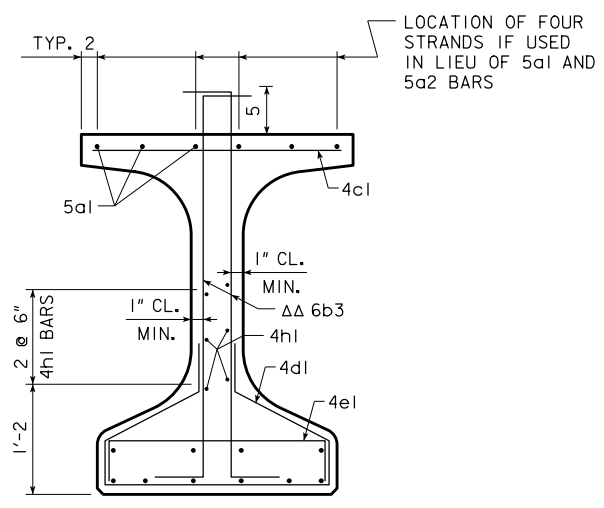


SECTION A-A

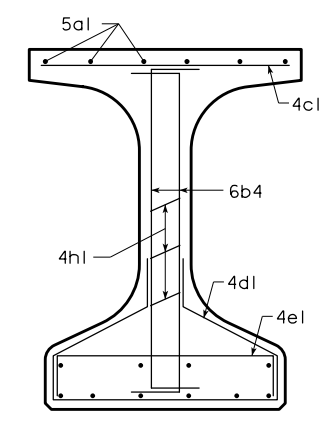


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



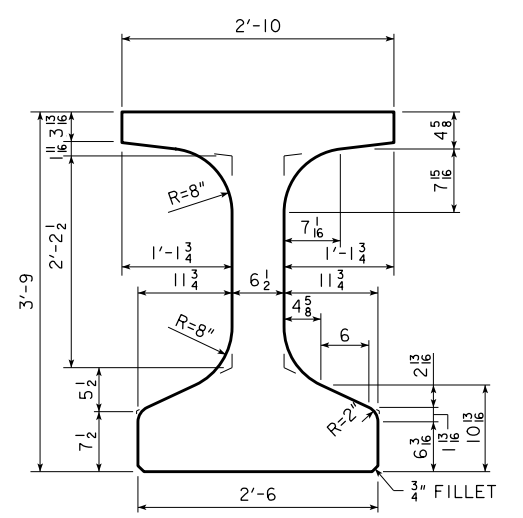
SECTION B-B



SECTION C-C

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 I = 178,971 in⁴

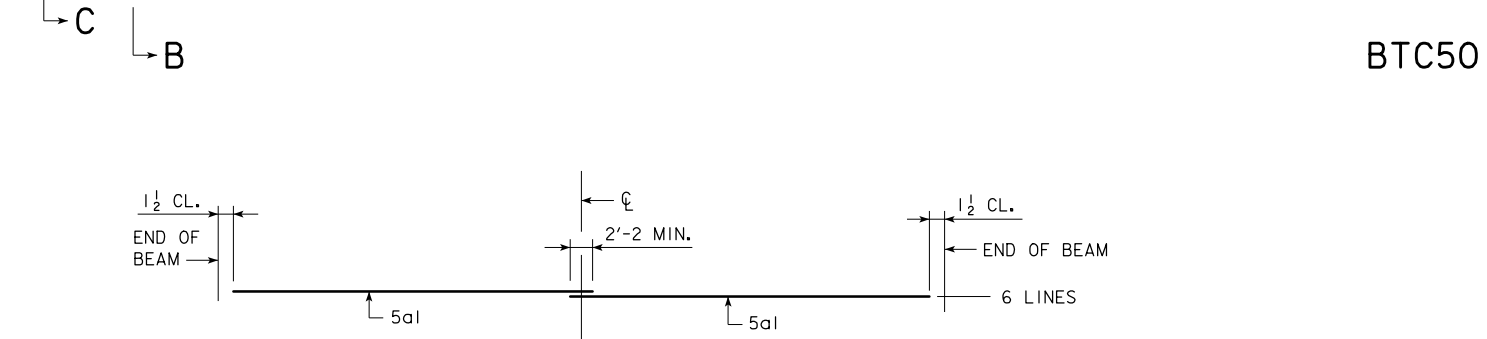
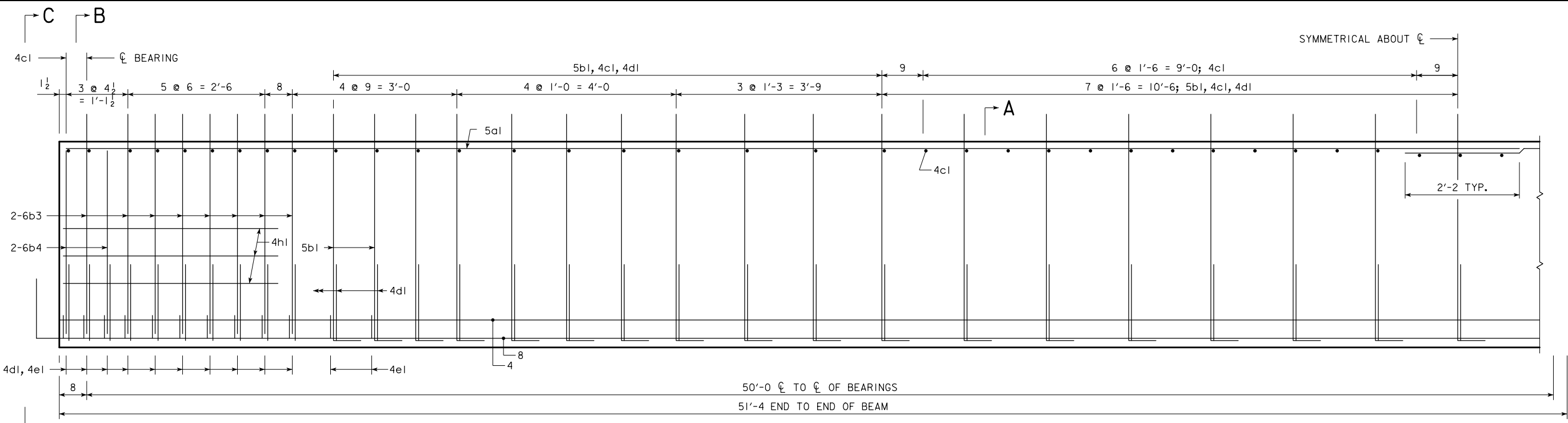
BEAM SECTION PROPERTIES



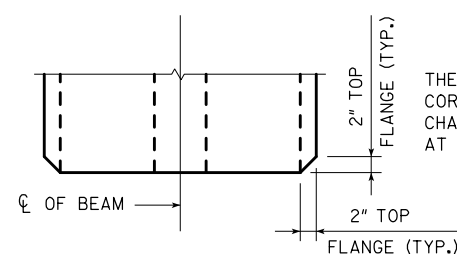
BTC BEAM CROSS SECTION

BTC45 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

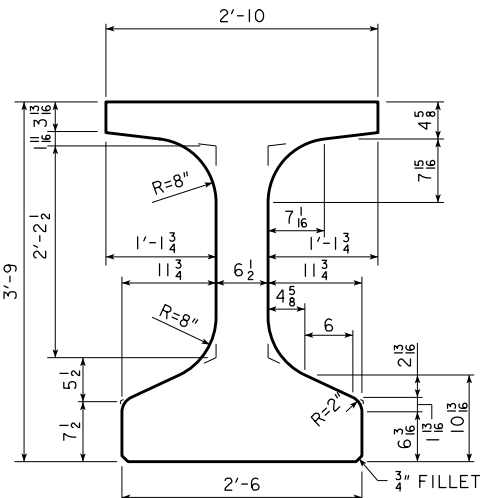


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

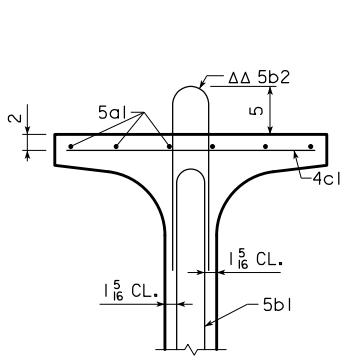
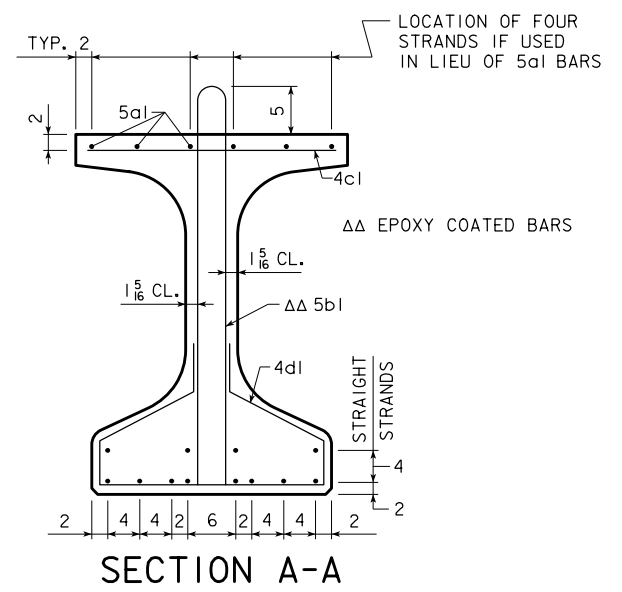
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM



BEAM SECTION PROPERTIES

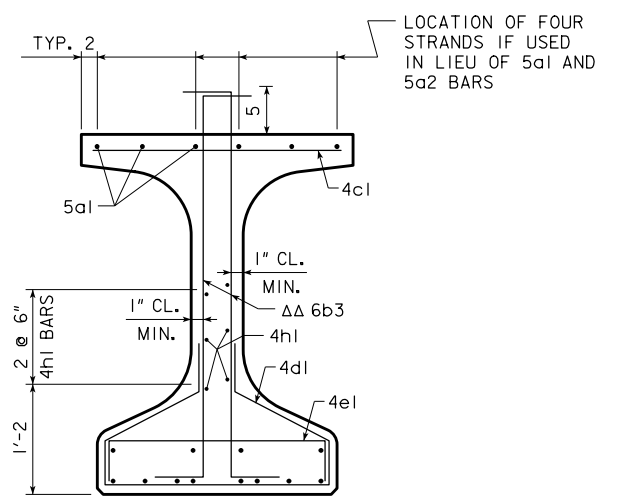
BTC BEAM CROSS SECTION

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 I = 178,971 in⁴

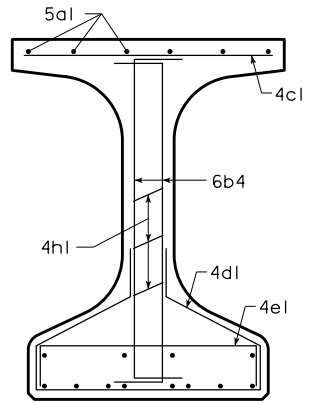


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



SECTION B-B

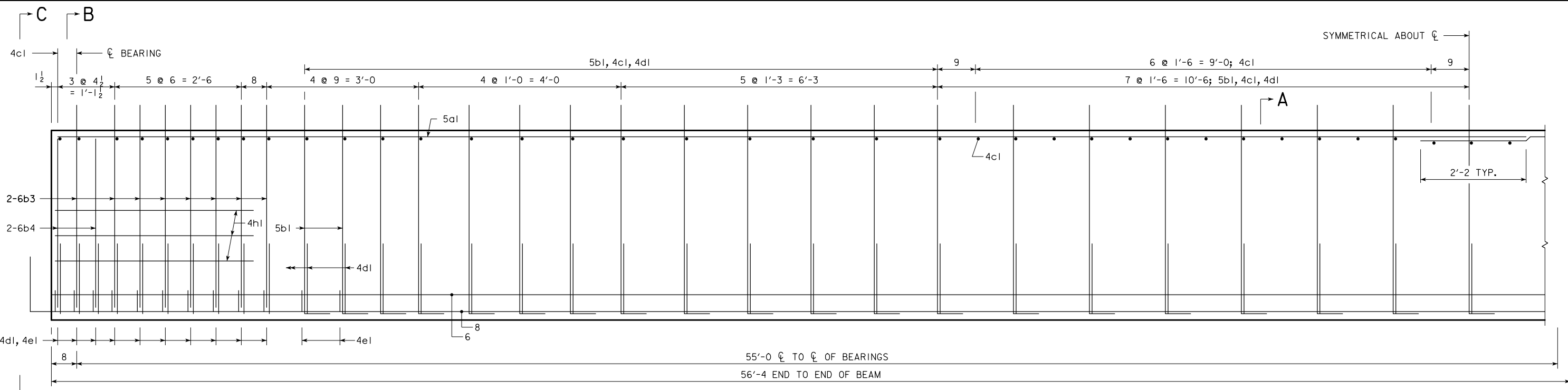


SECTION C-C

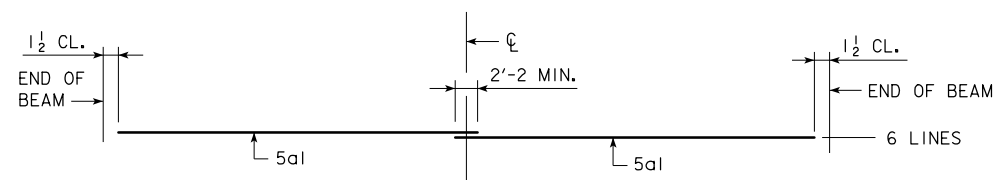
BTC50 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

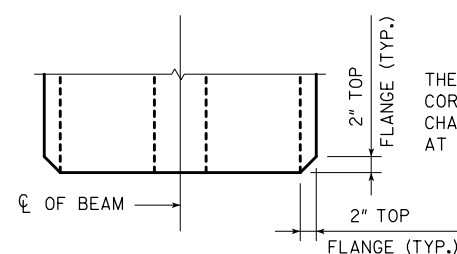
REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN 4705 - THIS SHEET ISSUED 05-04.



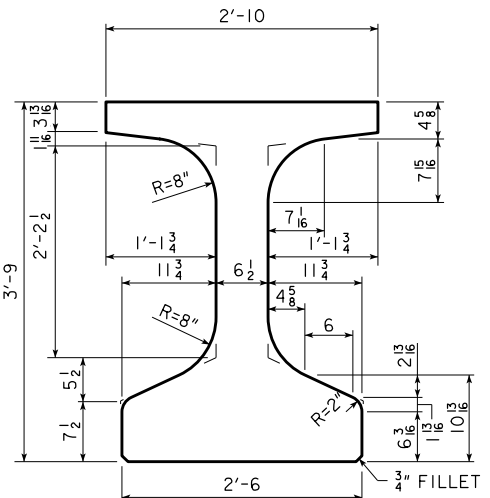
BTC55



TOP FLANGE LONGITUDINAL BAR LAYOUT



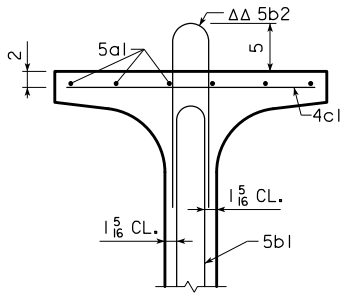
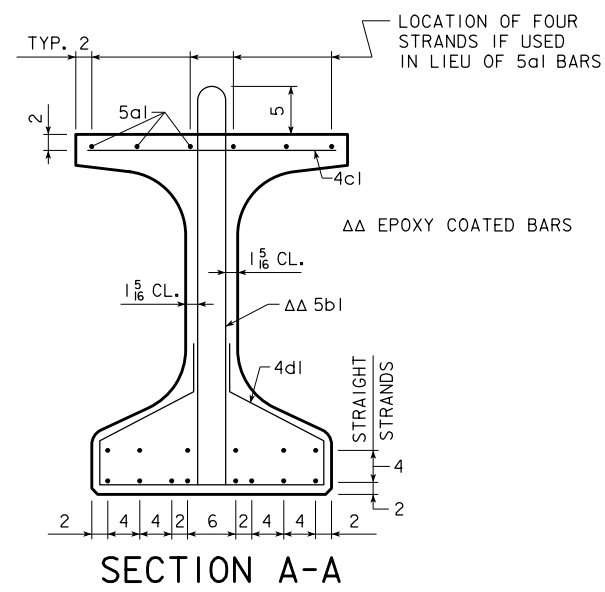
TOP VIEW



BEAM SECTION PROPERTIES

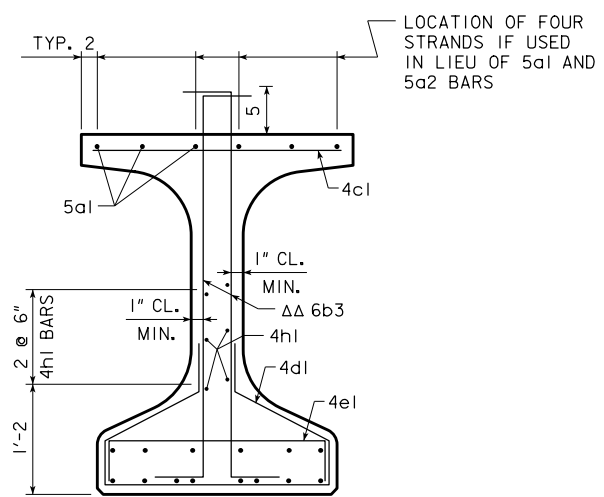
AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

BTC BEAM CROSS SECTION

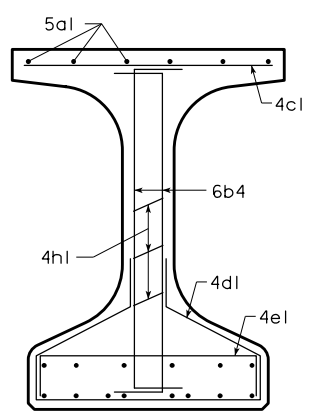


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



SECTION B-B



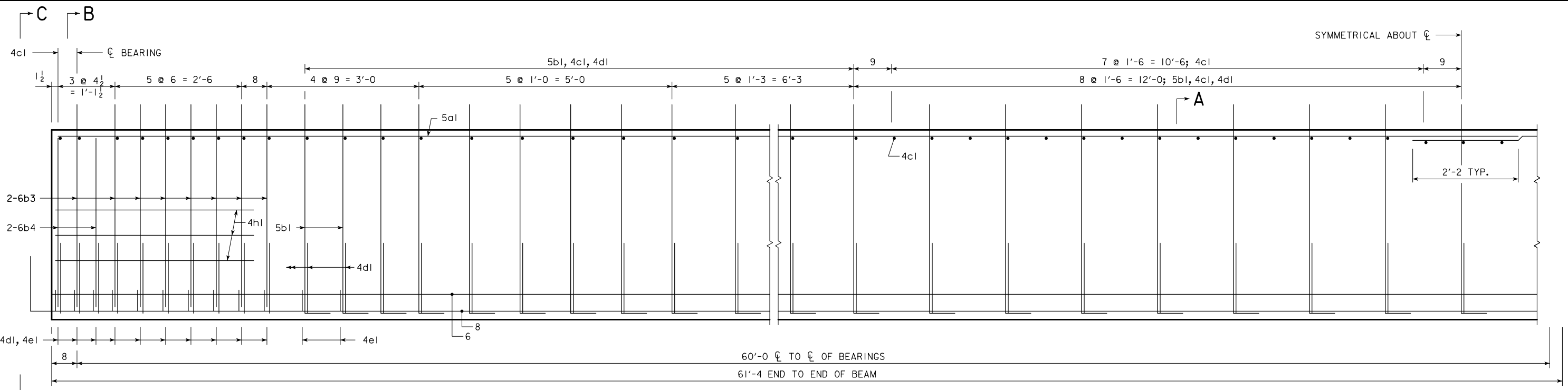
SECTION C-C

BTC55 BEAM DETAILS

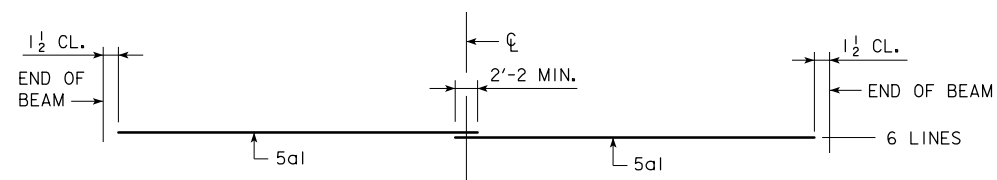
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN 4706 - THIS SHEET ISSUED 05-04.

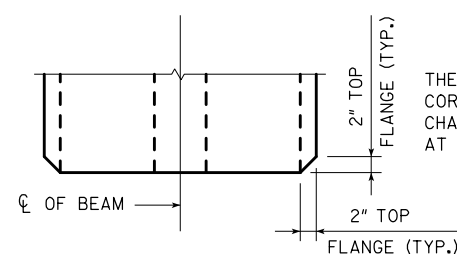
REVISED 10-07 - 5b2 BAR DELETED; 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4707 - THIS SHEET ISSUED 05-04.



BTC60

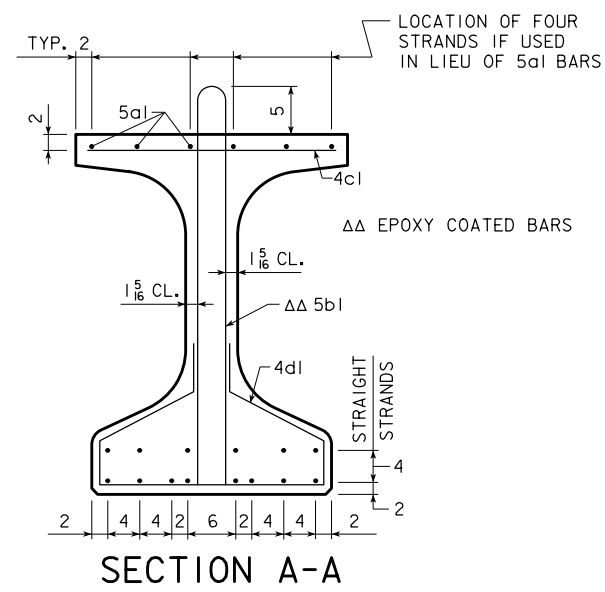


TOP FLANGE LONGITUDINAL BAR LAYOUT

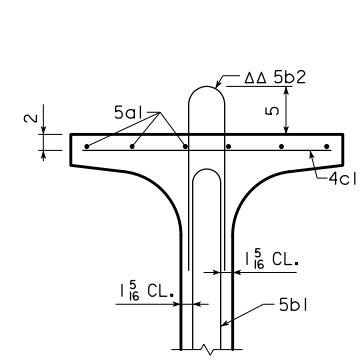


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM

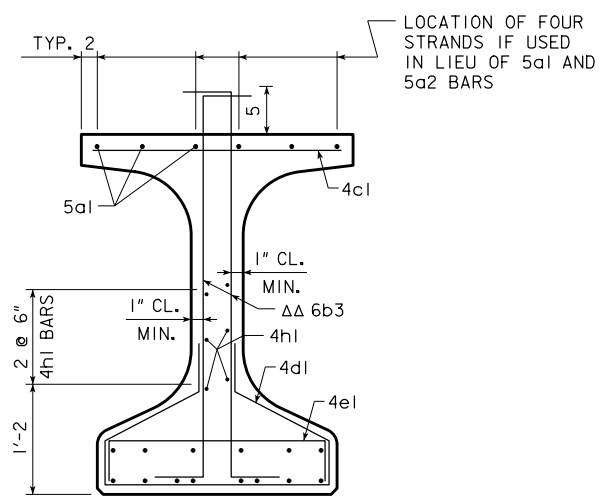


SECTION A-A

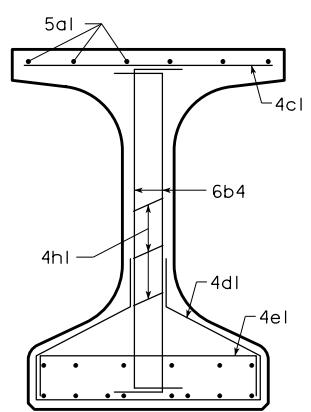


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



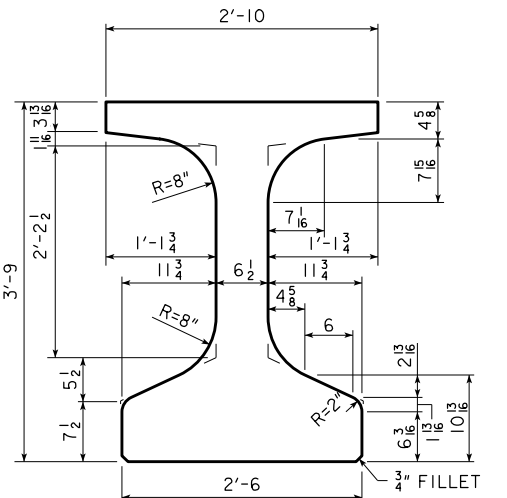
SECTION B-B



SECTION C-C

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

BEAM SECTION PROPERTIES

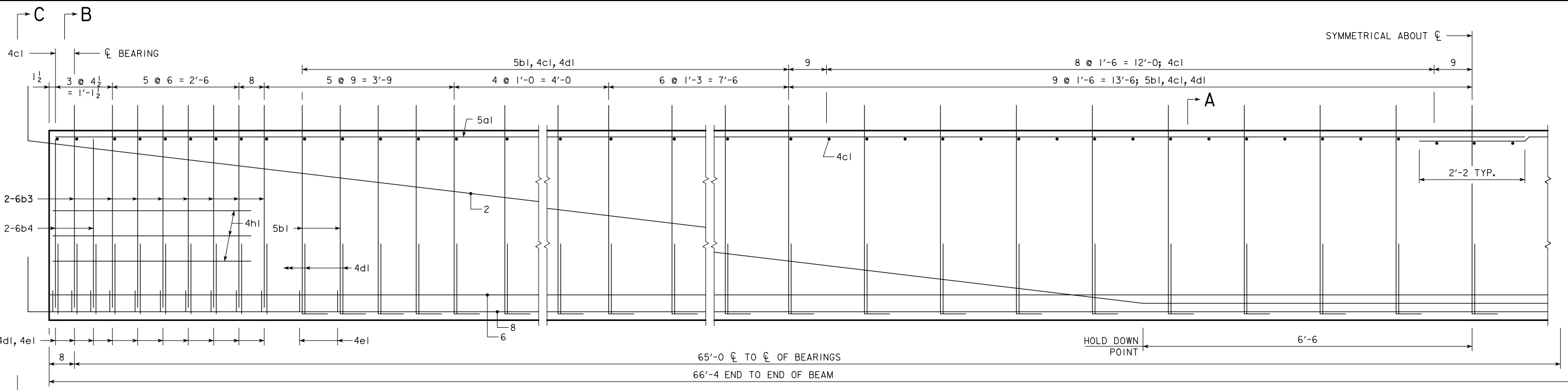


BTC BEAM CROSS SECTION

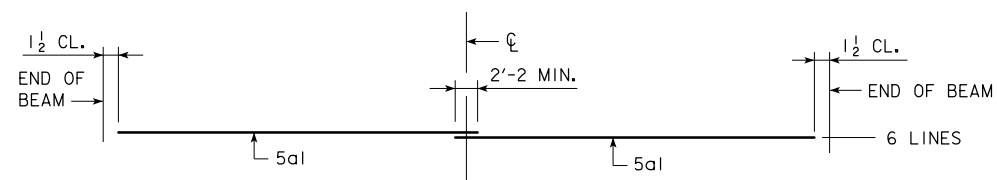
BTC60 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

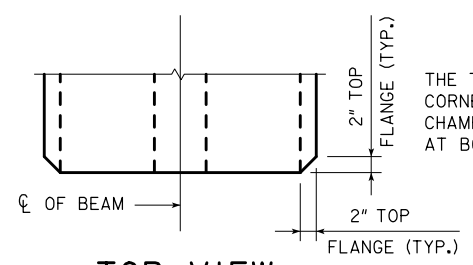
REVISED 10-07 - 5b2 BAR DELETED; 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4708 - THIS SHEET ISSUED 05-04.



BTC65

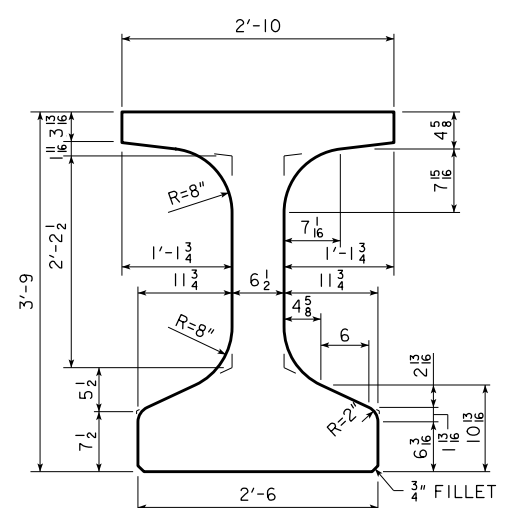


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

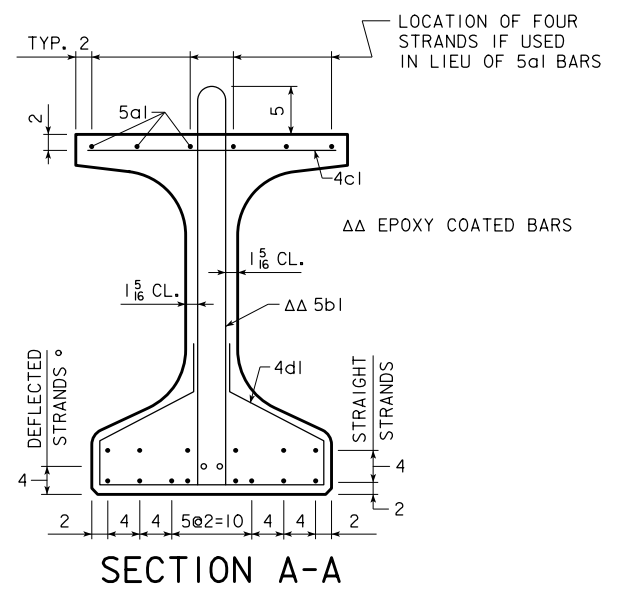
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM



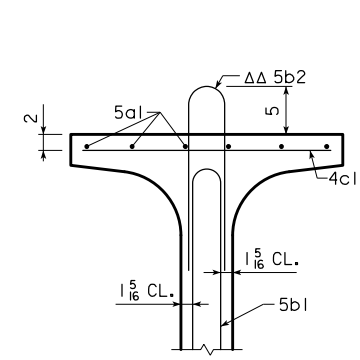
BEAM SECTION PROPERTIES

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

BTC BEAM CROSS SECTION

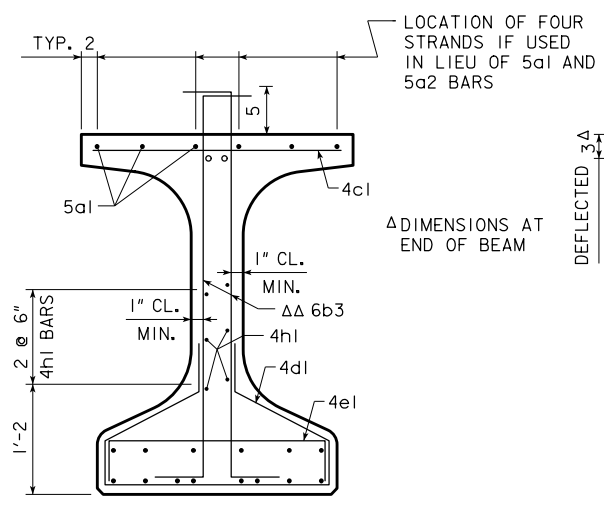


SECTION A-A

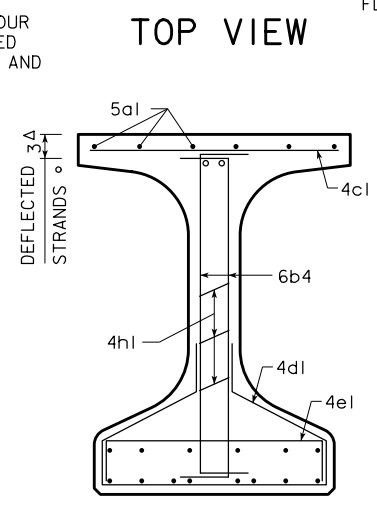


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



SECTION B-B

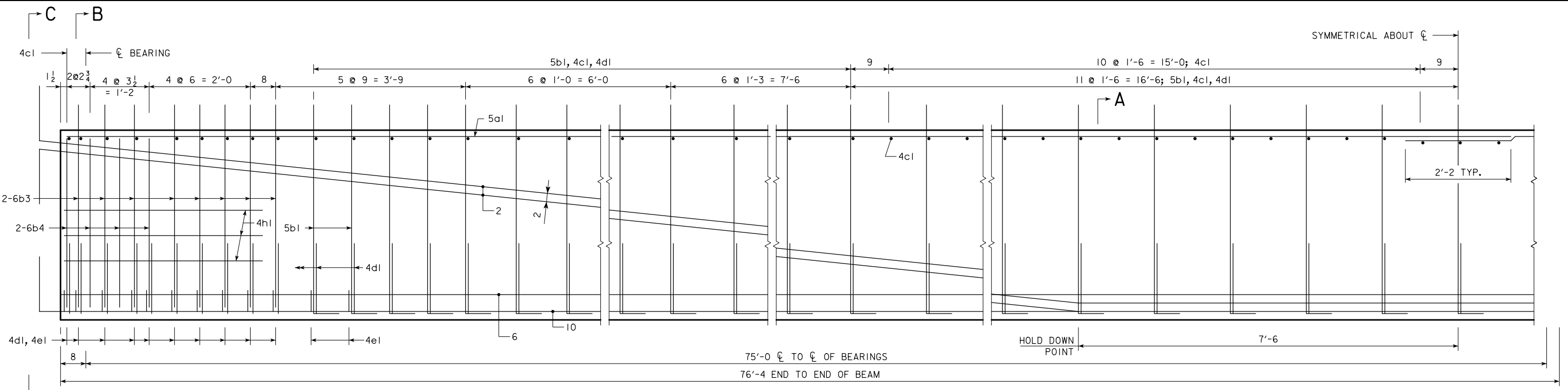


SECTION C-C

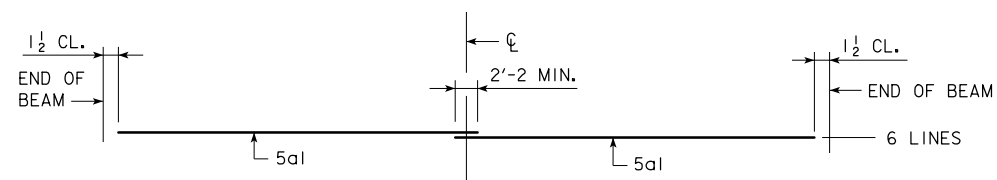
BTC65 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

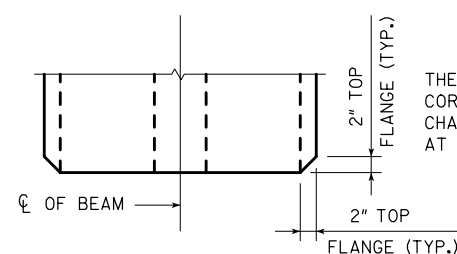
REVISED 10-07 - 5b2 BAR DELETED; 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4710 - THIS SHEET ISSUED 05-04.



BTC75

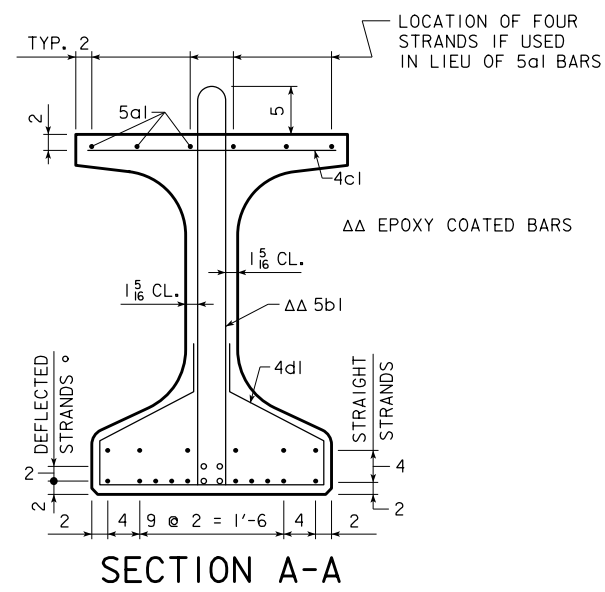


TOP FLANGE LONGITUDINAL BAR LAYOUT

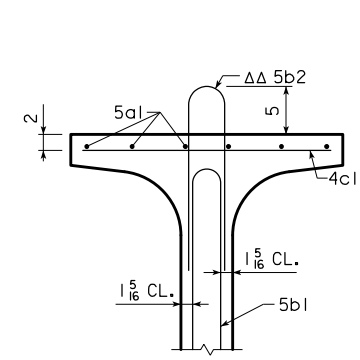


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM

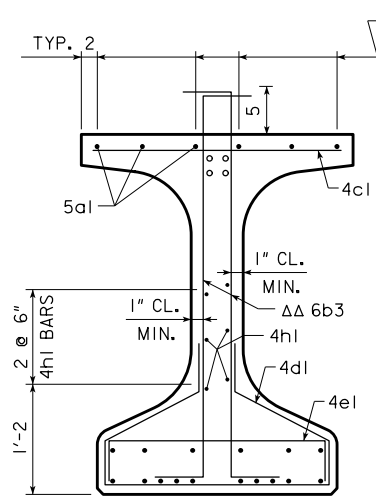


SECTION A-A

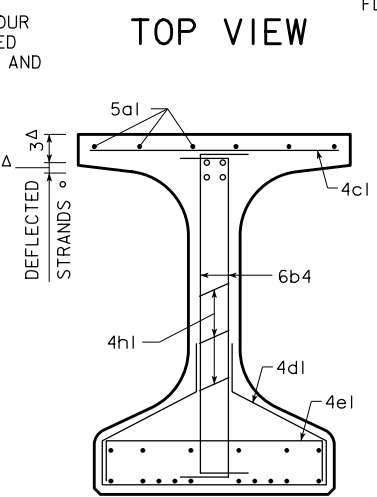


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



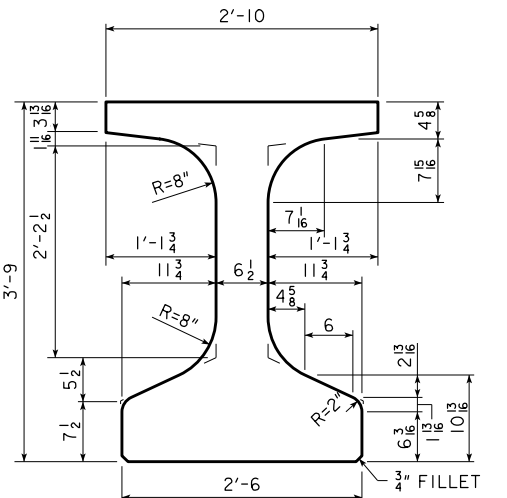
SECTION B-B



SECTION C-C

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

BEAM SECTION PROPERTIES

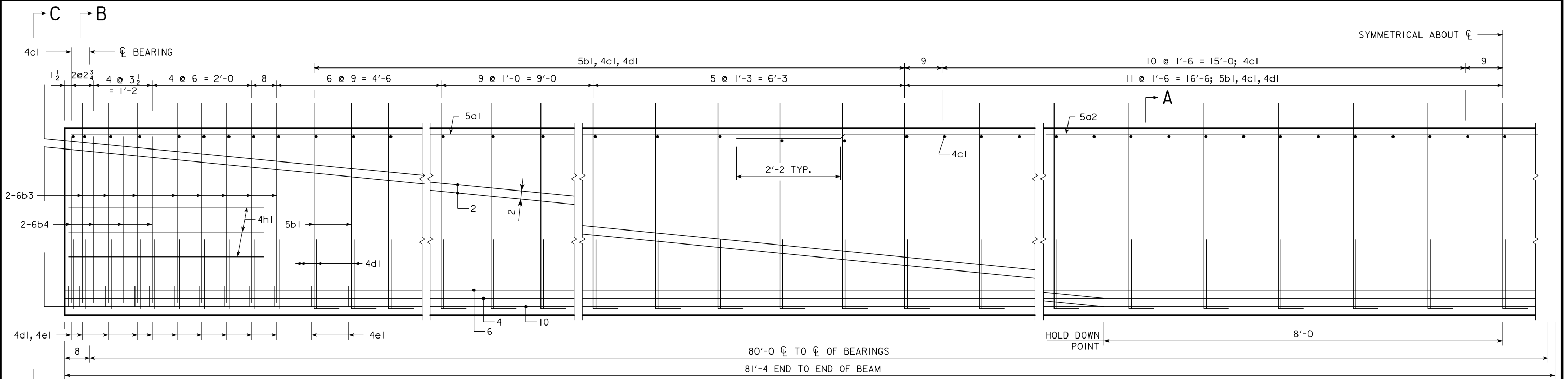


BTC BEAM CROSS SECTION

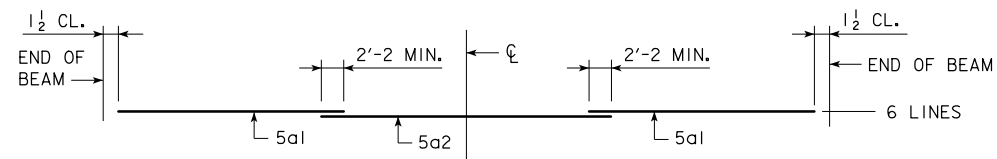
BTC75 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

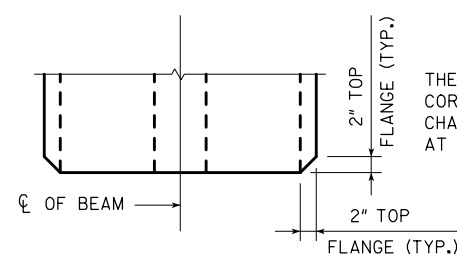
REVISED 10-07 - 5b2 BAR DELETED. 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4711 - THIS SHEET ISSUED 05-04.



BTC80

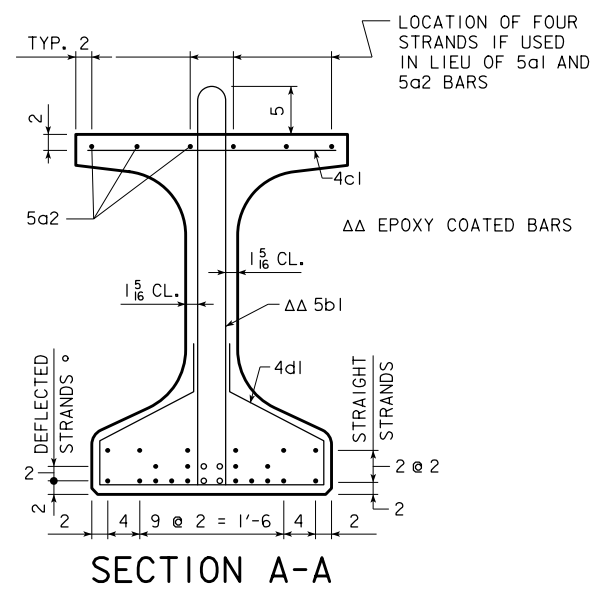


TOP FLANGE LONGITUDINAL BAR LAYOUT

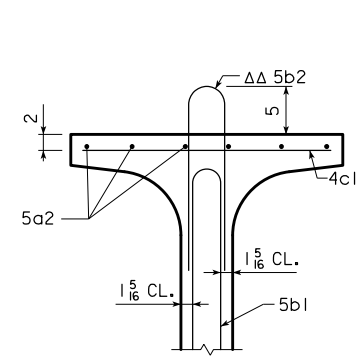


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM

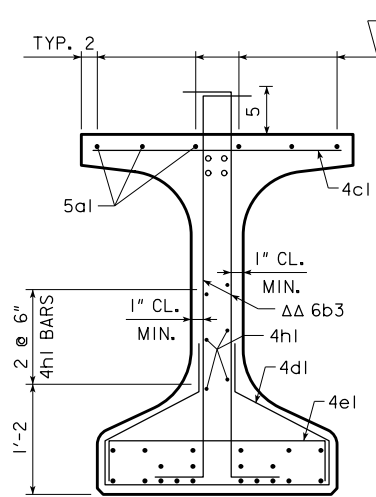


SECTION A-A

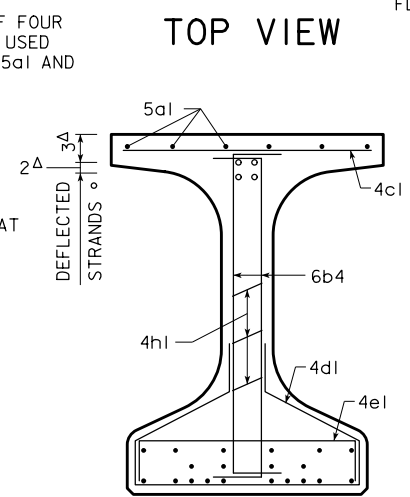


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



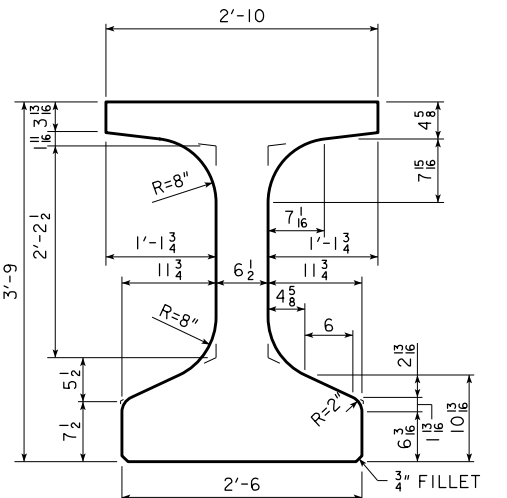
SECTION B-B



SECTION C-C

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

BEAM SECTION PROPERTIES

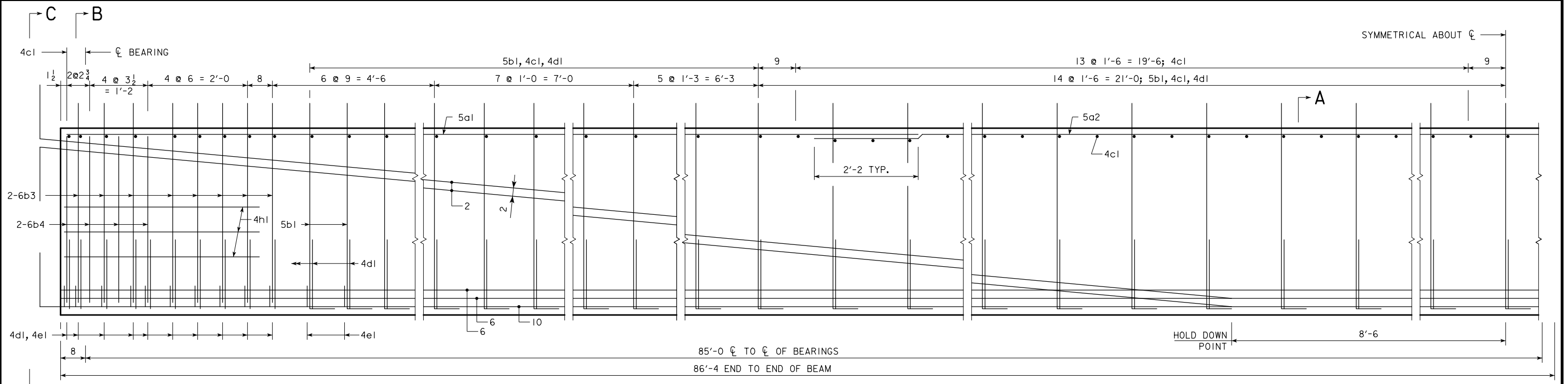


BTC BEAM CROSS SECTION

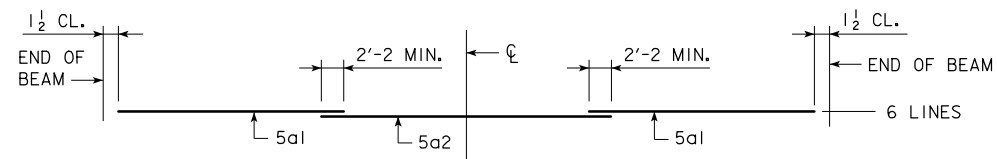
BTC80 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

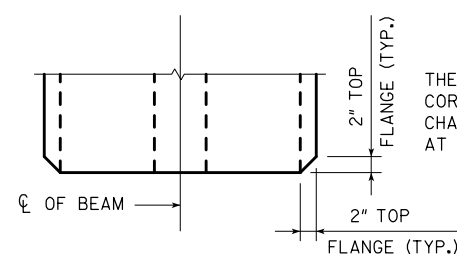
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4712 - THIS SHEET ISSUED 05-04.



BTC85

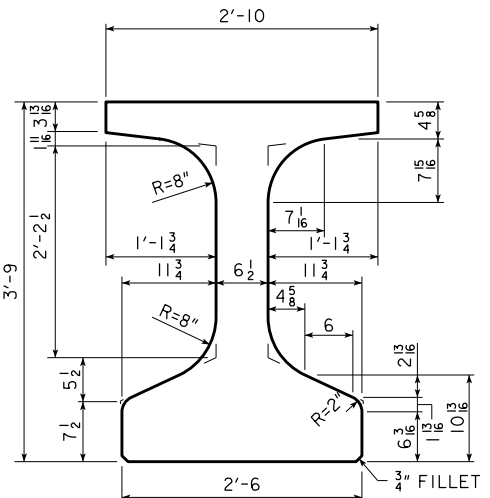


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

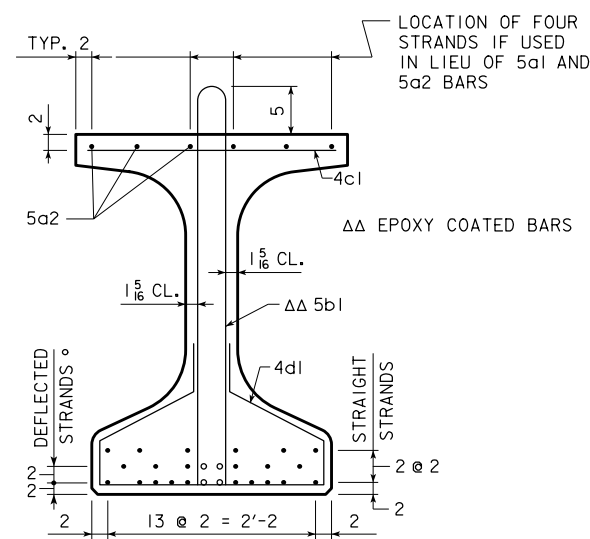
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM



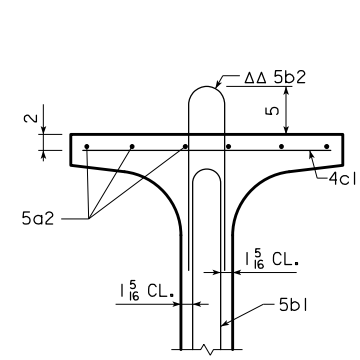
BEAM SECTION PROPERTIES

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

BTC BEAM CROSS SECTION

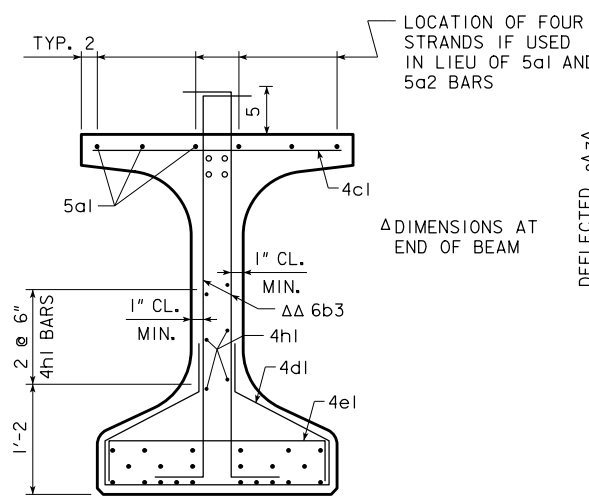


SECTION A-A

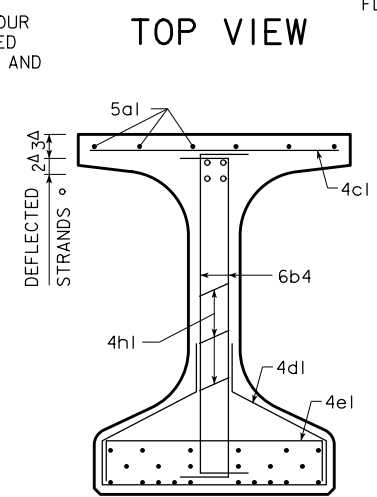


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



SECTION B-B

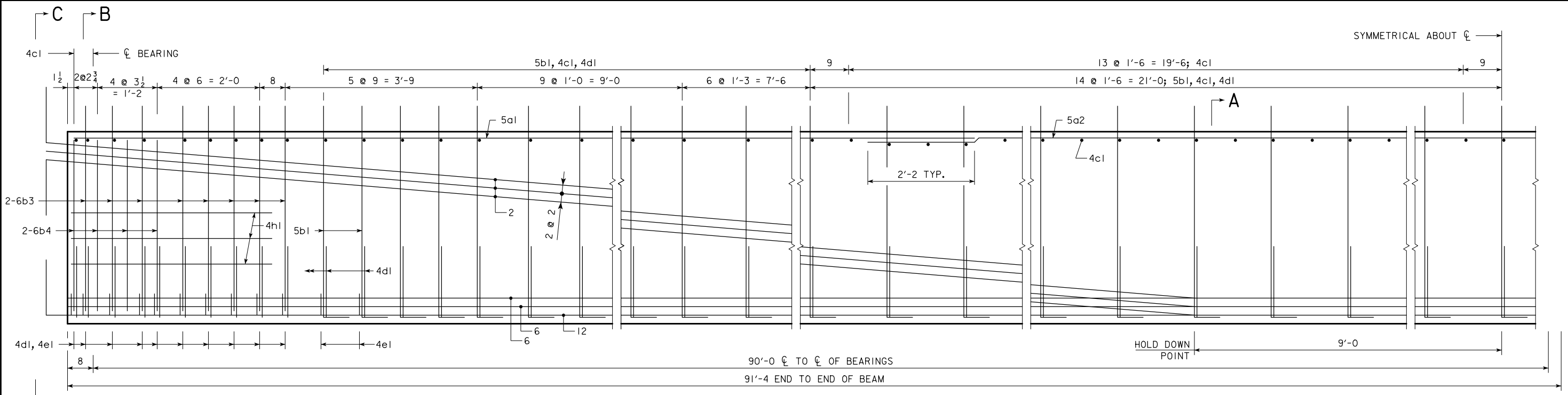


SECTION C-C

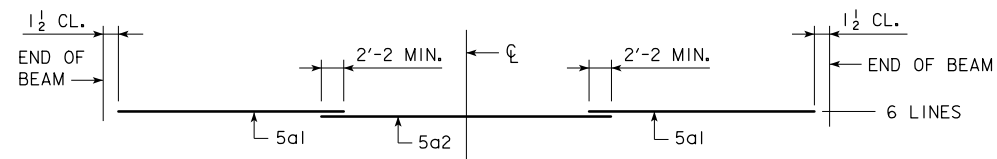
BTC85 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

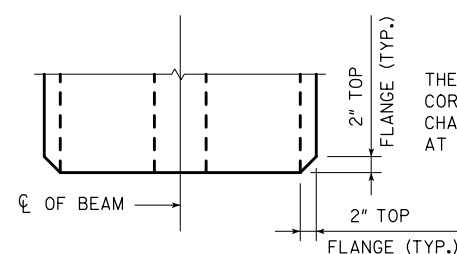
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4713 - THIS SHEET ISSUED 05-04.



BTC90

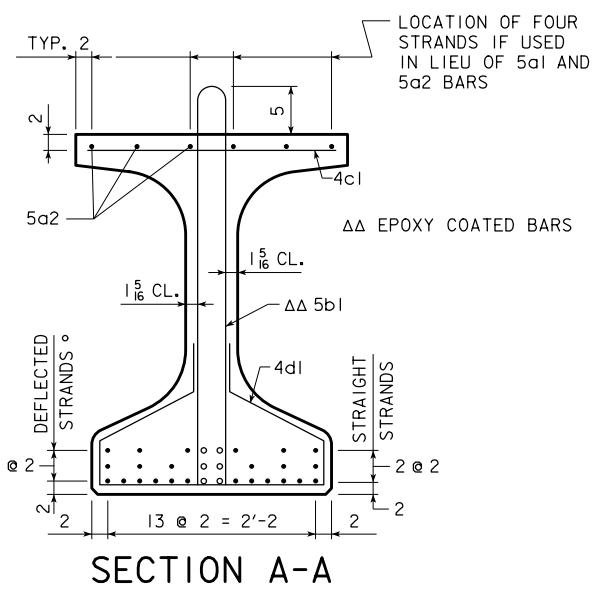


TOP FLANGE LONGITUDINAL BAR LAYOUT

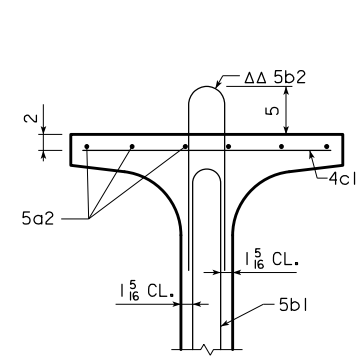


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM

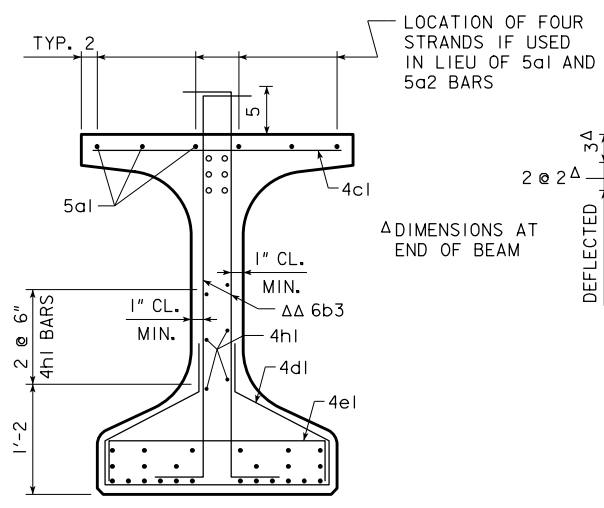


SECTION A-A

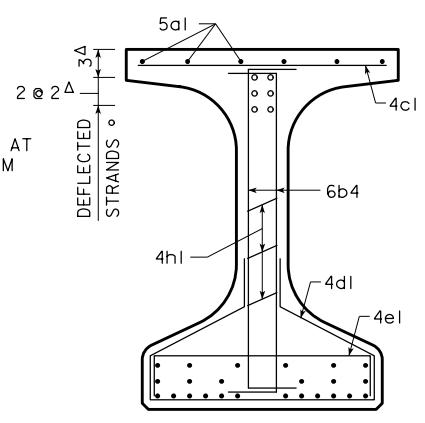


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.

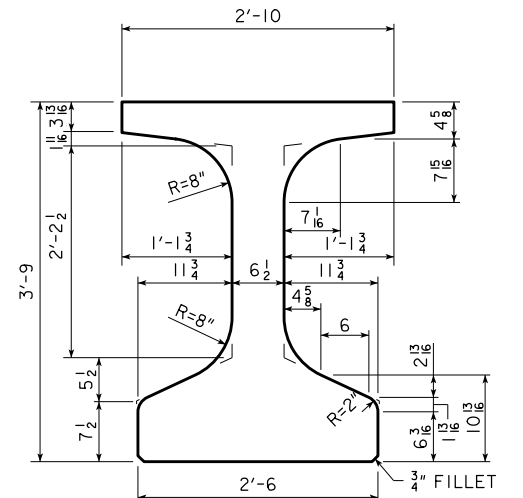


SECTION B-B



SECTION C-C

BEAM SECTION PROPERTIES
 AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

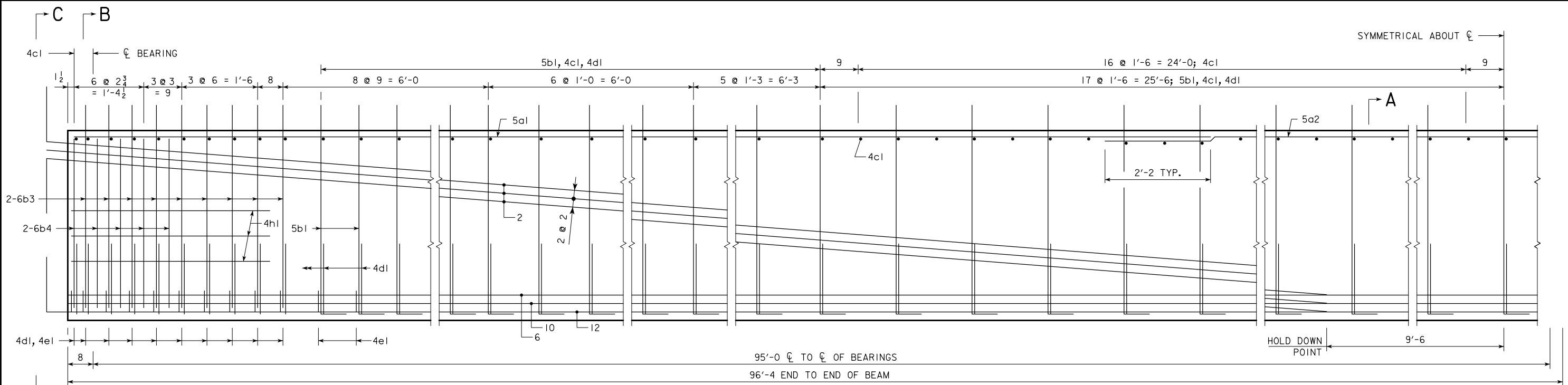


BTC BEAM CROSS SECTION

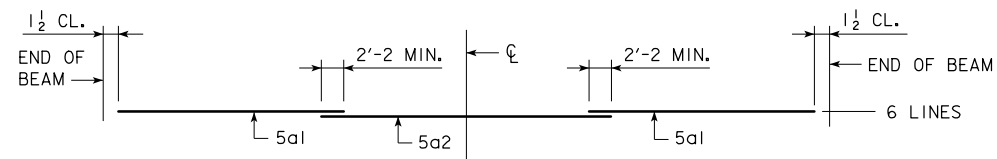
BTC90 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

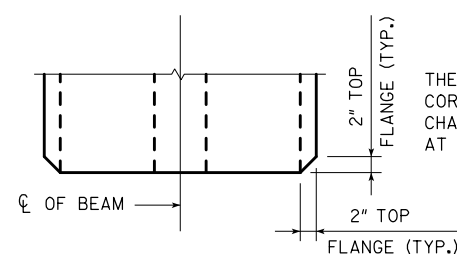
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4714 - THIS SHEET ISSUED 05-04.



BTC95

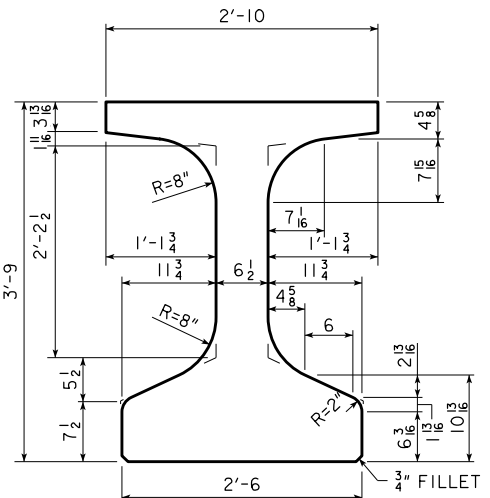


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

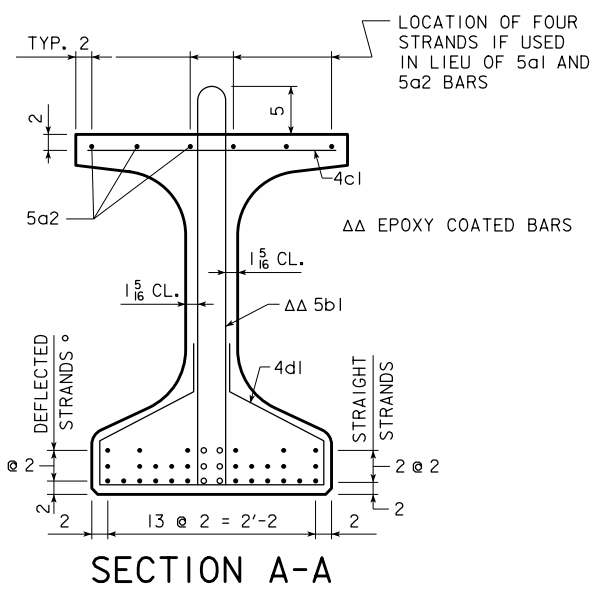
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM



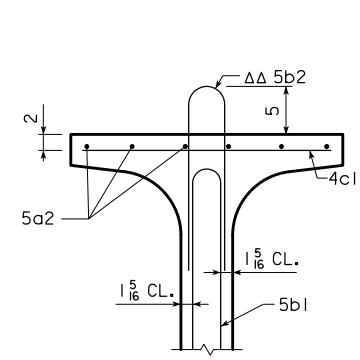
BEAM SECTION PROPERTIES

BTC BEAM CROSS SECTION

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

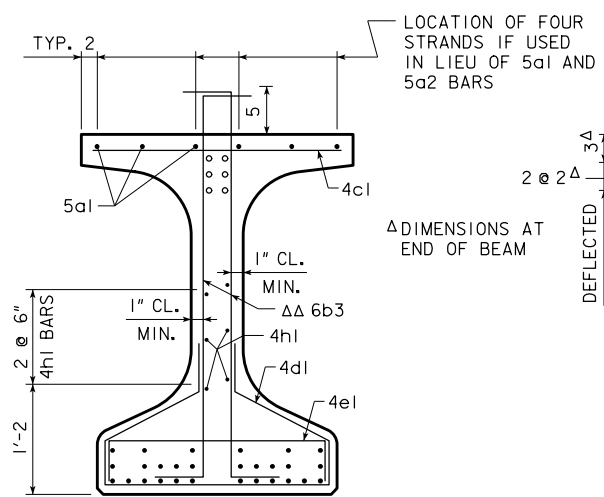


SECTION A-A

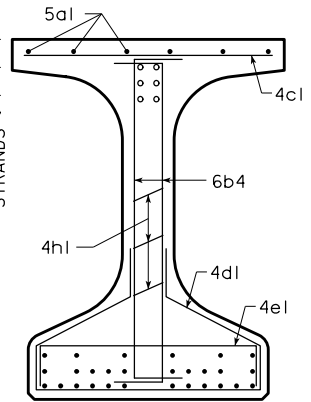


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



SECTION B-B

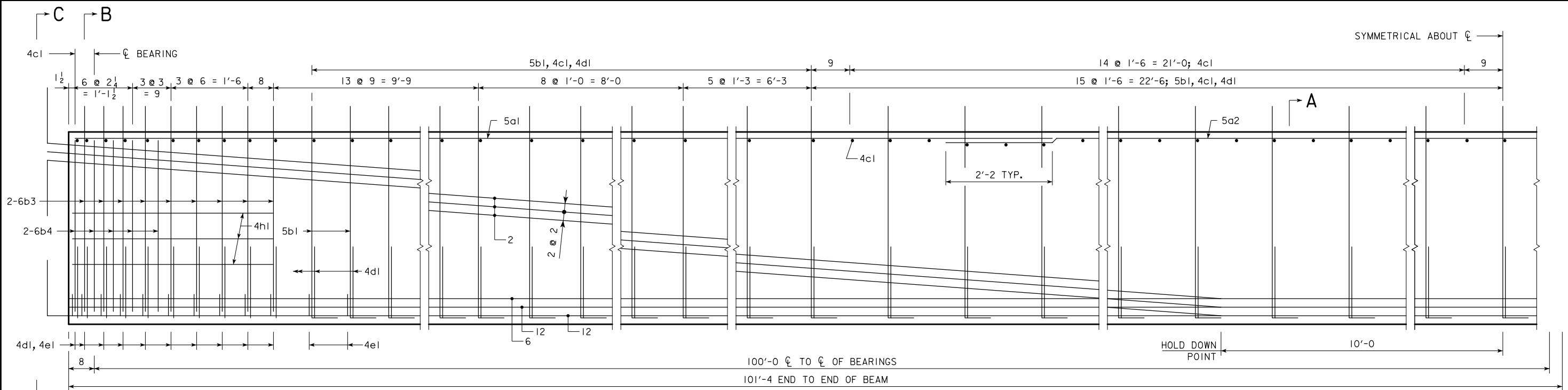


SECTION C-C

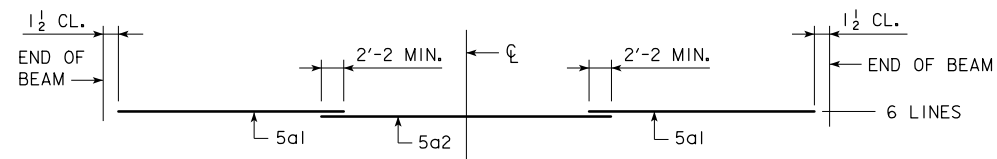
BTC95 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

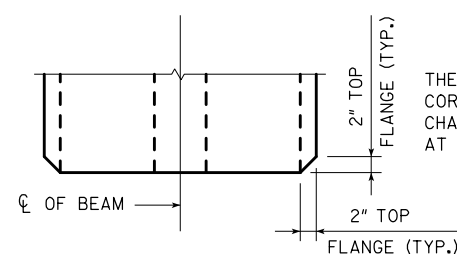
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4715 - THIS SHEET ISSUED 05-04.



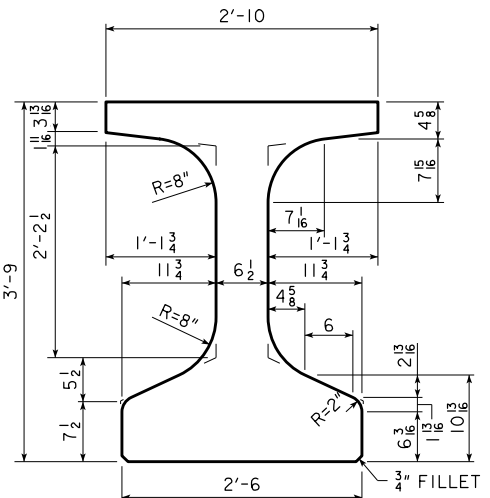
BTC100



TOP FLANGE LONGITUDINAL BAR LAYOUT

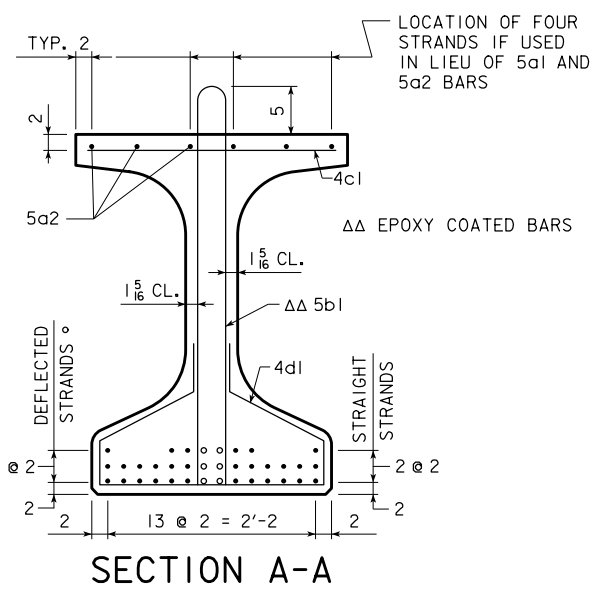


TOP VIEW

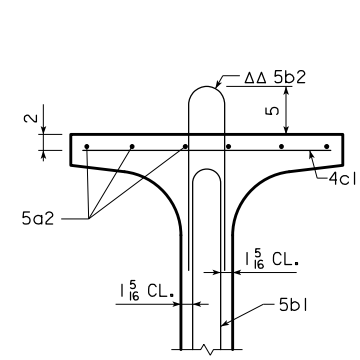


BEAM SECTION PROPERTIES

BTC BEAM CROSS SECTION

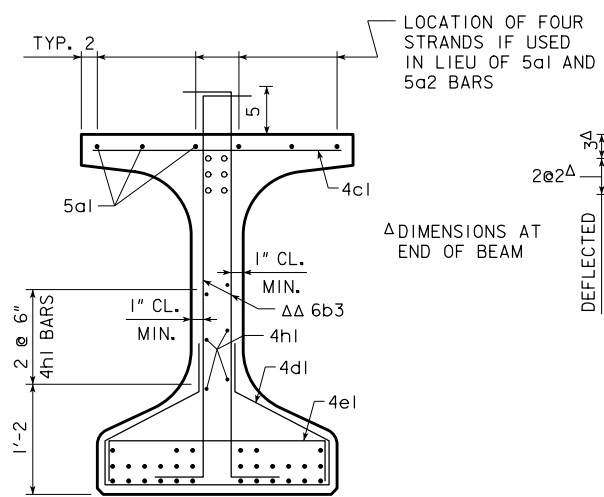


SECTION A-A

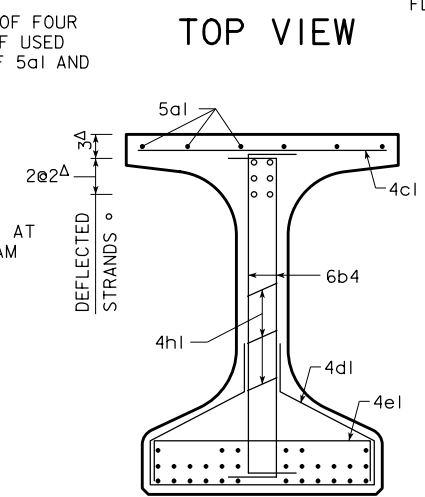


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



SECTION B-B

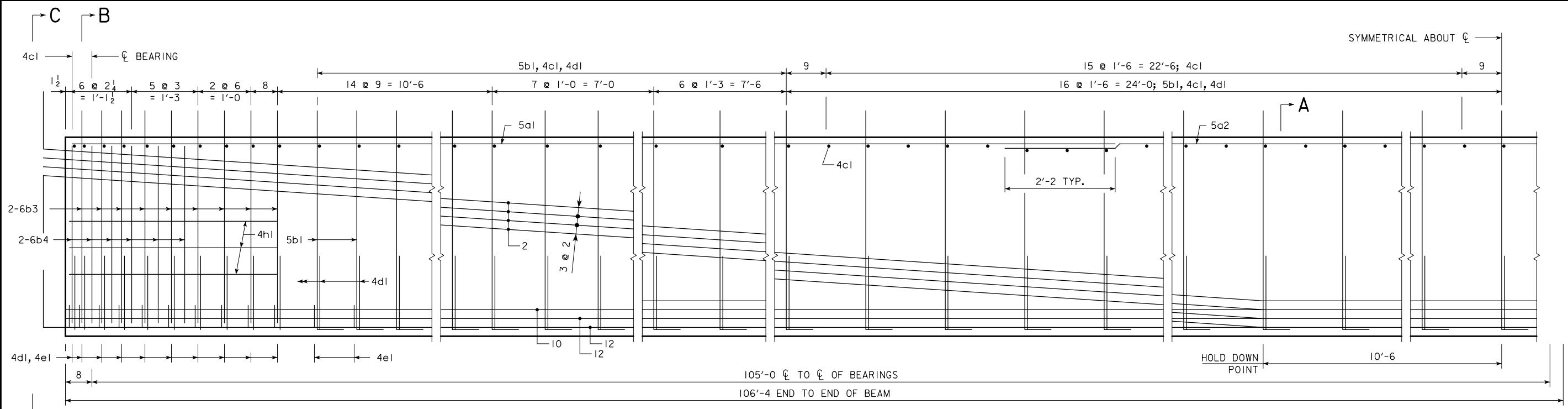


SECTION C-C

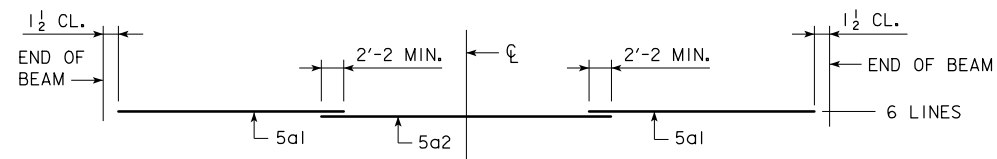
BTC100 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

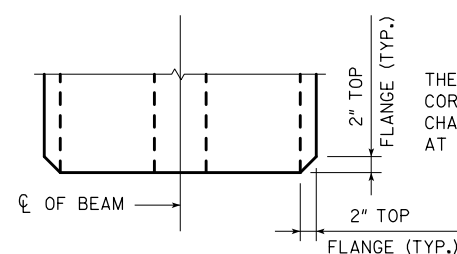
REVISED 10-07 - 5b2 BAR DELETED; 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4716 - THIS SHEET ISSUED 05-04.



BTC105

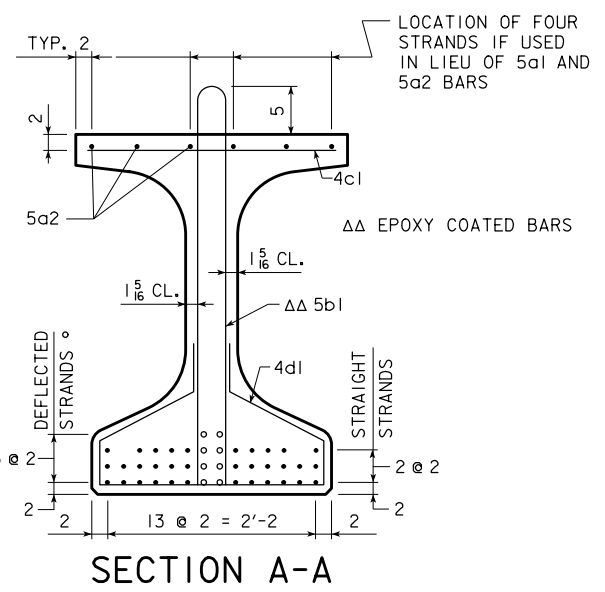


TOP FLANGE LONGITUDINAL BAR LAYOUT

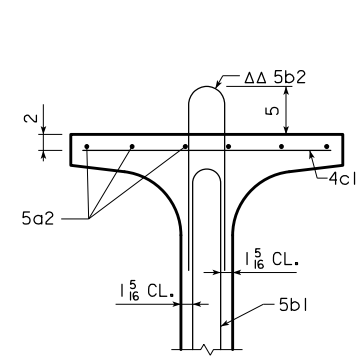


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM

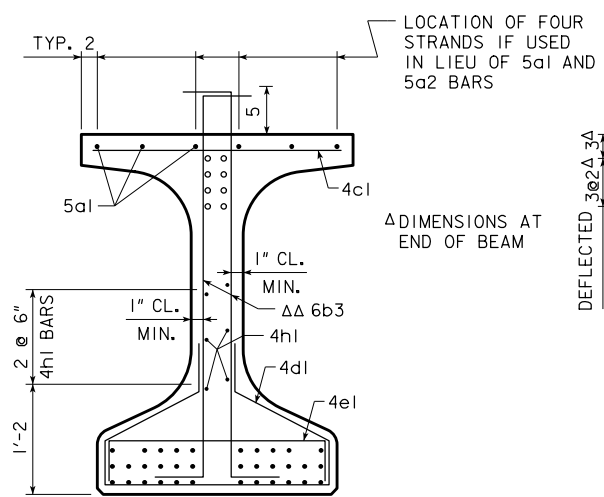


SECTION A-A

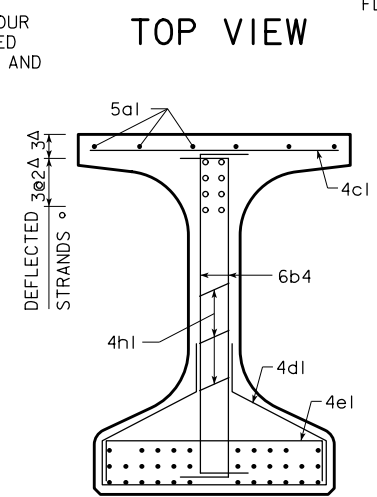


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



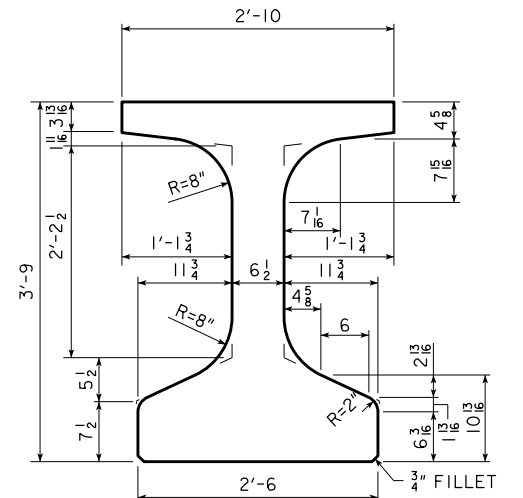
SECTION B-B



SECTION C-C

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

BEAM SECTION PROPERTIES

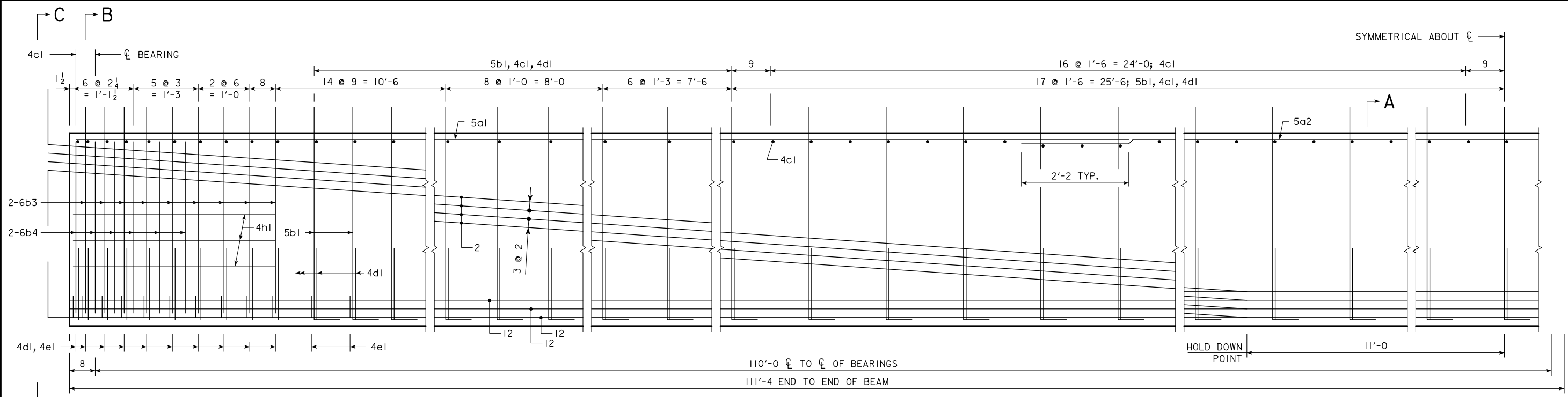


BTC BEAM CROSS SECTION

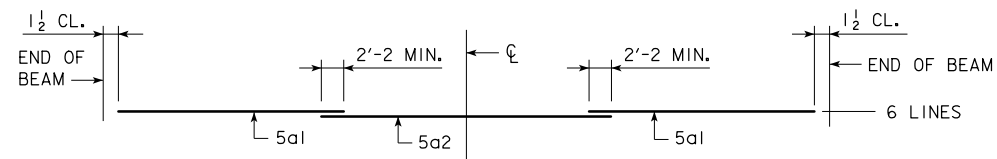
BTC105 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

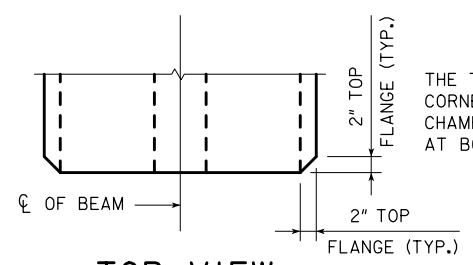
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4717 - THIS SHEET ISSUED 05-04.



BTC110

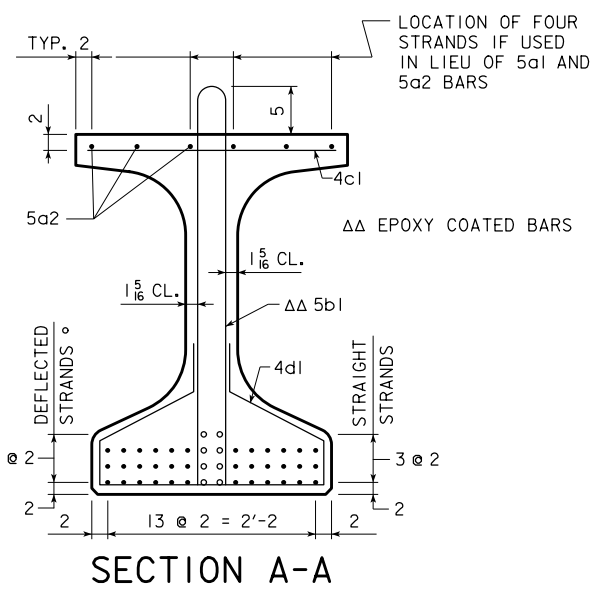


TOP FLANGE LONGITUDINAL BAR LAYOUT



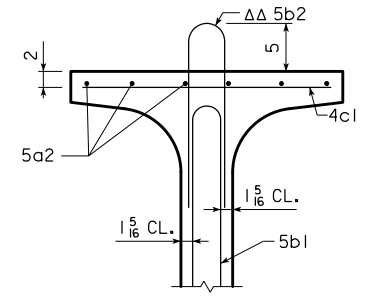
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM



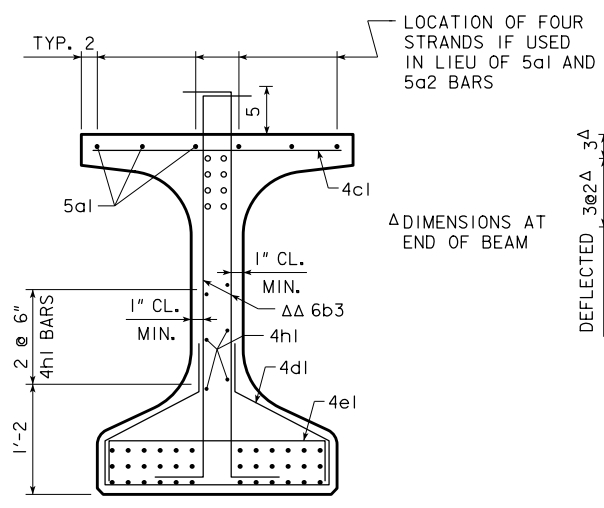
SECTION A-A

LOCATION OF FOUR STRANDS IF USED IN LIEU OF 5a1 AND 5a2 BARS



SECTION A-A (ALTERNATE)

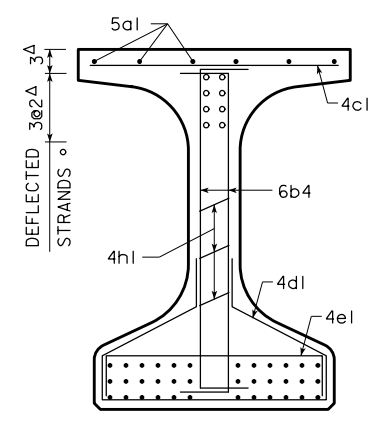
SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



SECTION B-B

LOCATION OF FOUR STRANDS IF USED IN LIEU OF 5a1 AND 5a2 BARS

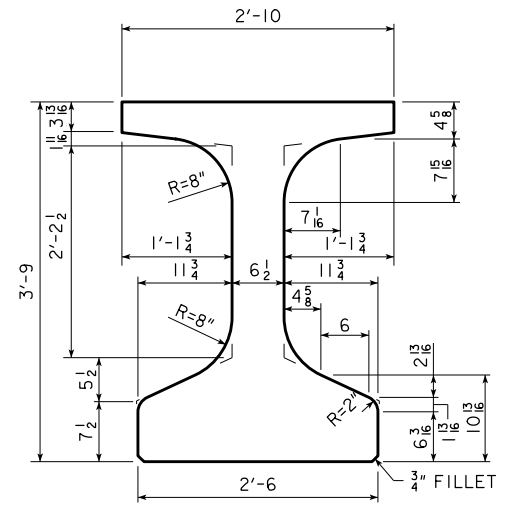
Δ DIMENSIONS AT END OF BEAM



SECTION C-C

BEAM SECTION PROPERTIES

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

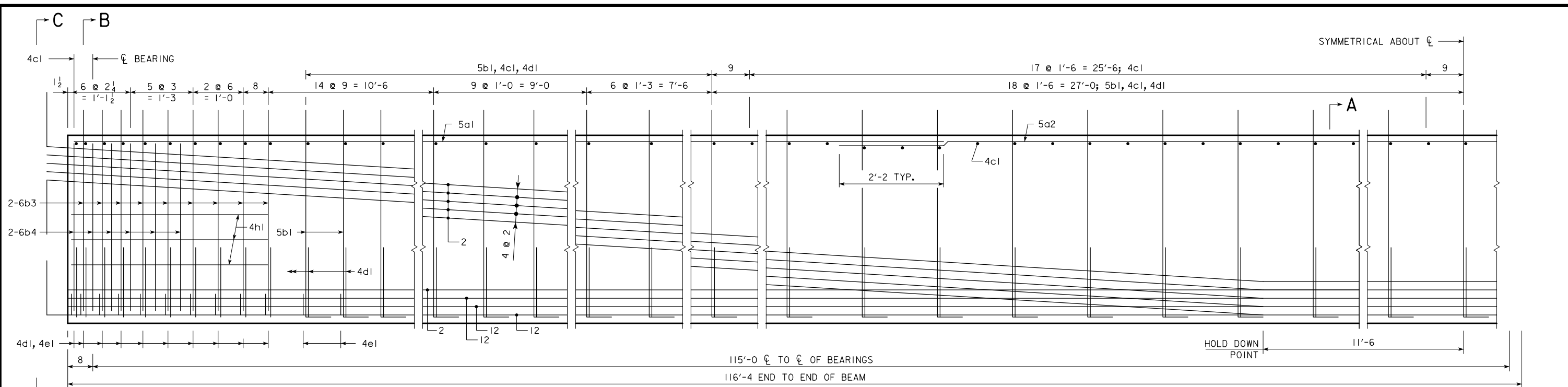


BTC BEAM CROSS SECTION

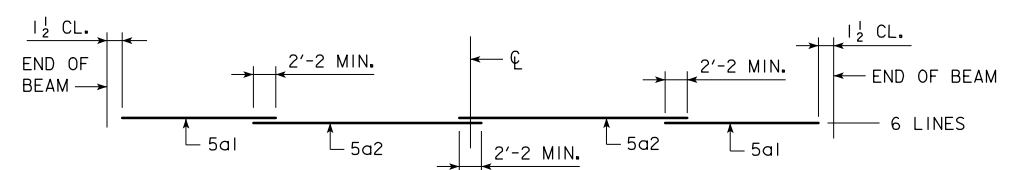
BTC110 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

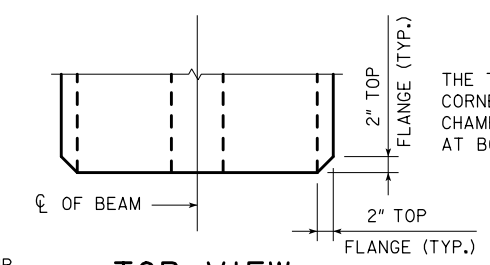
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4718 - THIS SHEET ISSUED 05-04.



BTC115

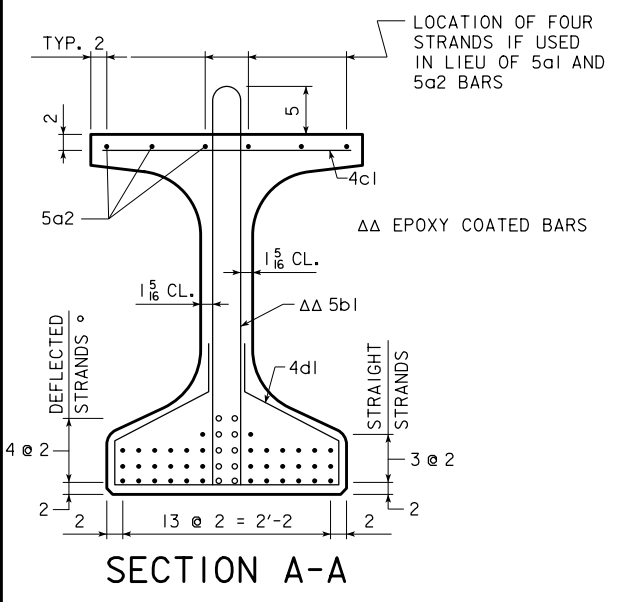


TOP FLANGE LONGITUDINAL BAR LAYOUT

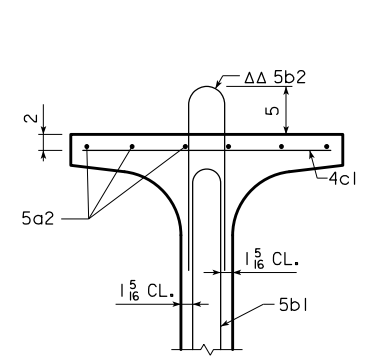


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM

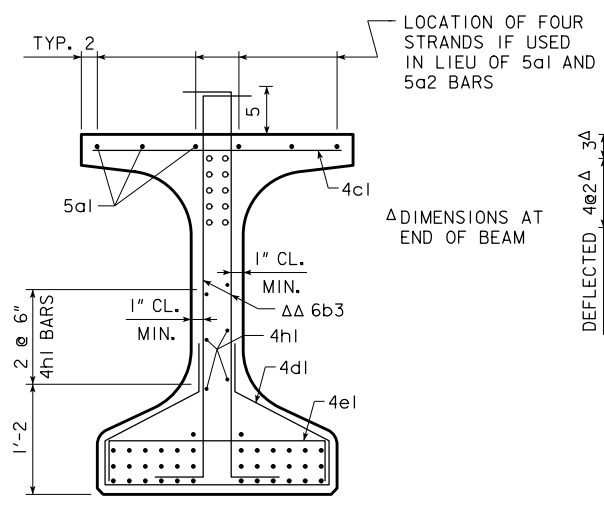


SECTION A-A

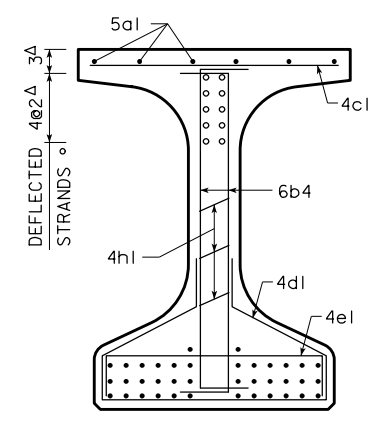


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4700.



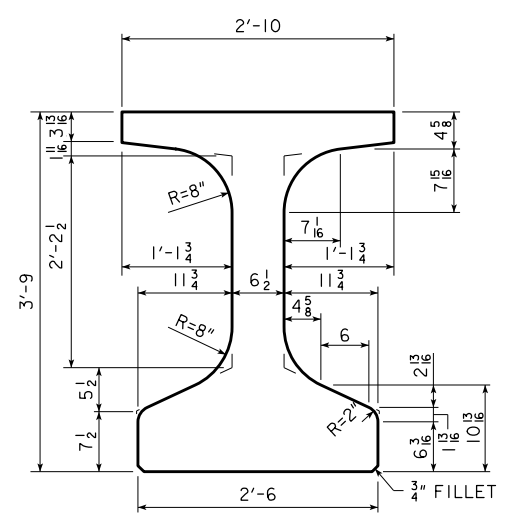
SECTION B-B



SECTION C-C

BEAM SECTION PROPERTIES

AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in⁴

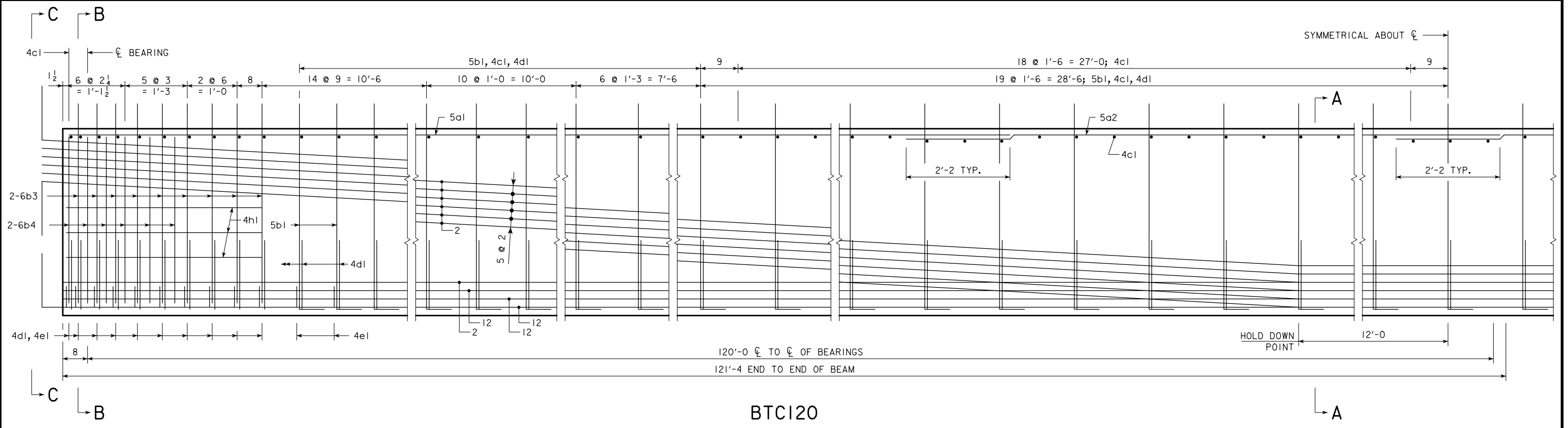


BTC BEAM CROSS SECTION

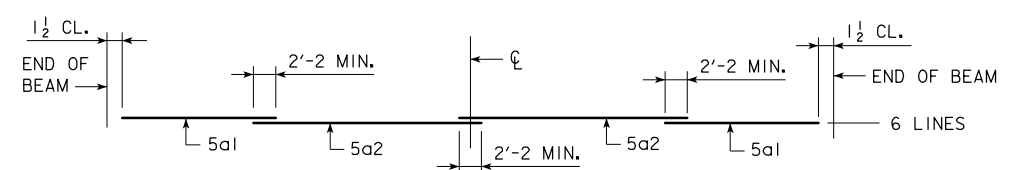
BTC115 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

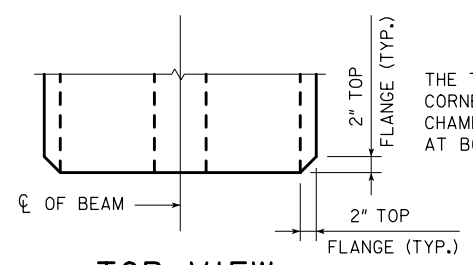
REVISED 10-07 - 5b2 BAR DELETED, 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ALTERNATE SECTION A-A ADDED. ENGLISHBEAMS.DGN 4719S2 - THIS SHEET ISSUED 05-04.



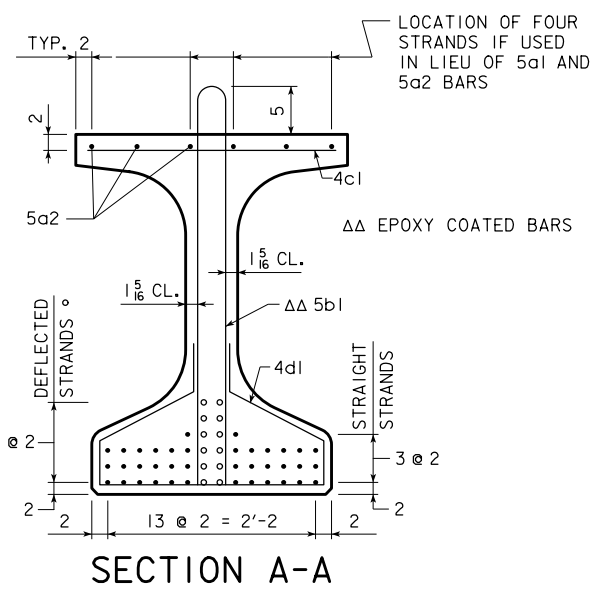
BTC120



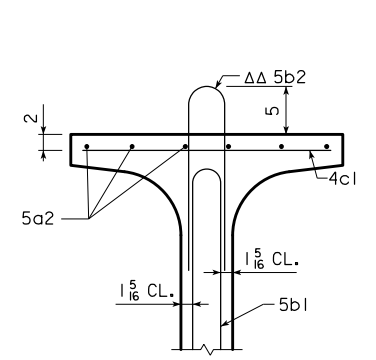
TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

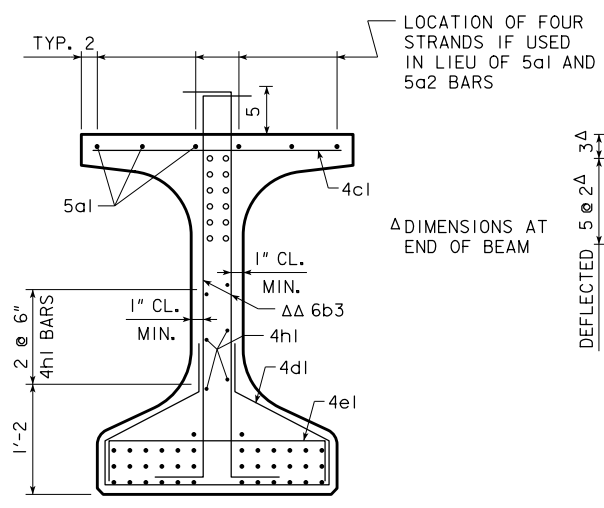


SECTION A-A

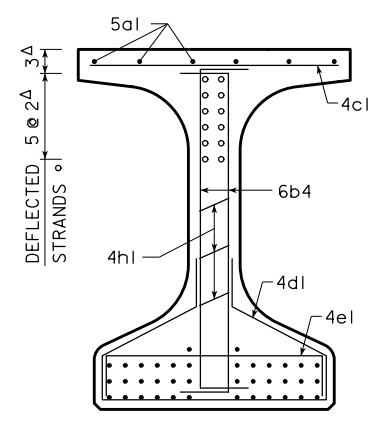


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4719 (SHEET 1).

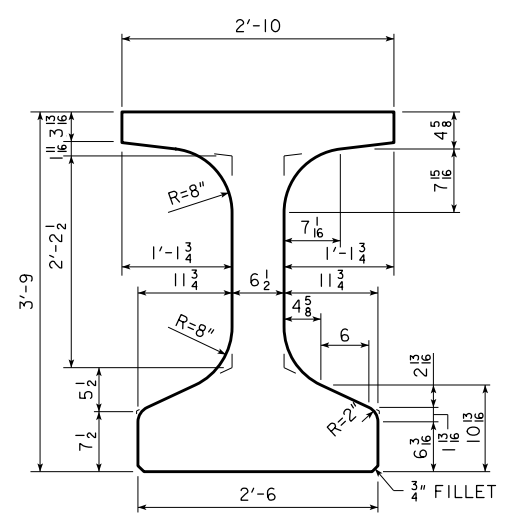


SECTION B-B



SECTION C-C

BEAM SECTION PROPERTIES
 AREA = 691.8 in²
 $\bar{y}_b = 20.74$ in.
 I = 178,971 in⁴

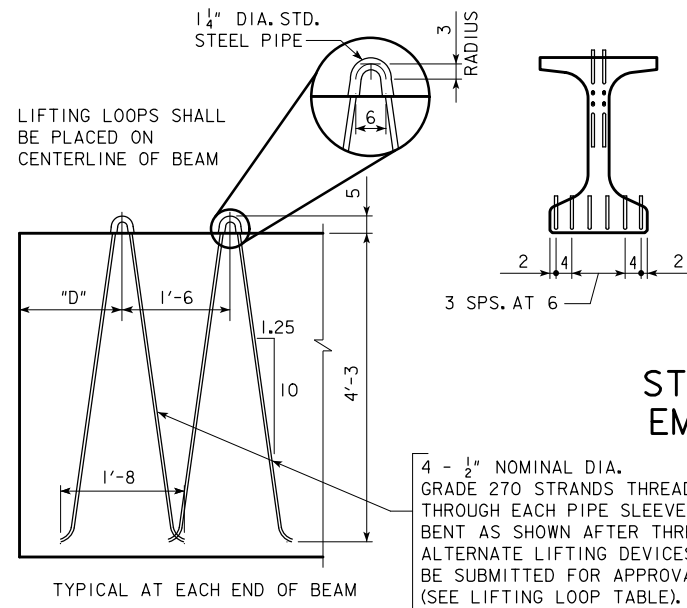


BTC BEAM CROSS SECTION

BTC120 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 12-13 - COIL TIE DETAIL WAS CHANGED TO REFLECT THE DISTANCE BETWEEN COIL TIE ANCHORS EMBEDDED 4 INCH. ENGLISHBEAMS.DGN 4730 - THIS SHEET ISSUED 05-04.



THE TOP AND BOTTOM ROWS OF THE DEFLECTED STRANDS ARE TO BE CUT WITH 1'-6 PROJECTIONS WHICH ARE TO BE SHOP BENT AS SHOWN. THE REMAINING TOP DEFLECTED STRANDS ARE TO BE CUT WITH 5" PROJECTIONS. SIX BOTTOM STRANDS ARE TO BE CUT WITH 1'-6 PROJECTIONS WHICH ARE TO BE SHOP BENT AS SHOWN. THE REMAINING BOTTOM STRANDS ARE TO BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.

TYPICAL AT BOTH BEAM ENDS

STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007. REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 270.

SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS. DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

ALTERNATE BAR NOTES:

ALTERNATE BARS SHOWN IN BENT BAR DETAILS MAY BE USED IN LIEU OF REINFORCING BARS SHOWN IN BAR LIST. NO ADDITIONAL PAYMENT SHALL BE MADE FOR USE OF ALTERNATE BARS.

BTD BEAM DATA

BTD BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	CONCRETE STRENGTH		STRAIGHT STRAND DIA. (in)	NO. OF STRANDS		TOTAL INITIAL PRESTRESS kips	HOLD DOWN FORCE-kips	CAMBER (in)		DEFLECTION (in) Δ ₀		PERMISSIBLE MAXIMUM SPACING HL-93 LOADING	WEIGHT (TONS)	CONCRETE (CU YD.)	REINFORCING STEEL (WEIGHT-LBS)
			f'ci (ksi)	f'c (ksi)		STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) Δ _i	TIME (PLASTIC) Δ _T				
			STEEL DIAPHRAGM	STEEL DIAPHRAGM		STEEL DIAPHRAGM	STEEL DIAPHRAGM										
BTD50	50'-0	51'-4	4.50	5.00	0.60	12	—	510	—	0.26	0.47	0.11	0.03	9'-3	20.0	9.9	1499
BTD55	55'-0	56'-4	4.50	5.00	0.60	14	—	596	—	0.37	0.65	0.17	0.04	9'-3	22.0	10.8	1602
BTD60	60'-0	61'-4	4.50	5.00	0.60	12	2	596	13.6	0.39	0.69	0.24	0.06	9'-3	23.9	11.8	1709
BTD65	65'-0	66'-4	4.50	5.00	0.60	14	2	681	12.6	0.50	0.90	0.32	0.08	9'-3	25.9	12.8	1812
BTD70	70'-0	71'-4	4.50	5.00	0.60	14	2	681	11.3	0.53	0.94	0.44	0.11	9'-3	27.8	13.7	1885
BTD75	75'-0	76'-4	5.00	6.00	0.60	16	2	766	10.5	0.66	1.16	0.52	0.13	9'-3	29.8	14.7	1988
BTD80	80'-0	81'-4	5.00	6.00	0.60	18	2	851	9.9	0.83	1.46	0.68	0.17	9'-3	31.7	15.7	2105
BTD85	85'-0	86'-4	5.00	6.00	0.60	18	4	936	17.9	0.93	1.65	0.86	0.22	9'-3	33.7	16.6	2208
BTD90	90'-0	91'-4	5.50	6.50	0.60	20	4	1021	17.7	1.08	1.91	1.05	0.26	9'-3	35.6	17.6	2403
BTD95	95'-0	96'-4	5.50	6.50	0.60	22	4	1106	16.8	1.27	2.25	1.30	0.32	9'-3	37.6	18.6	2503
BTD100	100'-0	101'-4	6.00	7.00	0.60	26	4	1276	16.0	1.62	2.86	1.53	0.38	9'-3	39.5	19.5	2607
BTD105	105'-0	106'-4	6.00	7.00	0.60	28	6	1446	21.9	1.95	3.45	1.86	0.47	9'-3	41.5	20.5	2741
BTD110	110'-0	111'-4	6.50	7.50	0.60	30	6	1531	20.9	2.13	3.76	2.16	0.54	9'-3	43.4	21.4	2909
BTD115	115'-0	116'-4	7.00	8.00	0.60	34	6	1701	20.3	2.49	4.39	2.54	0.64	9'-3	45.4	22.4	3061
BTD120	120'-0	121'-4	8.00	8.00	0.60	36	8	1872	24.4	2.84	5.01	3.01	0.75	9'-3	47.3	23.4	3191
BTD125	125'-0	126'-4	7.50	8.50	0.60	38	10	2042	27.9	3.09	5.44	3.42	0.86	9'-3	49.3	24.3	3366
BTD130	130'-0	131'-4	8.00	9.00	0.60	40	12	2212	30.6	3.33	5.86	3.89	0.97	9'-3	51.2	25.3	3469

① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB (8 in) AND HAUNCH (1.5 in) WEIGHT OF: 0.98 kips/ft FOR 9'-3 BEAM SPACING AND ONE STEEL DIAPHRAGM (0.500 kips) AT C OF SPAN FOR BTD50 TO BTD120, AND TWO STEEL DIAPHRAGMS (0.500 kips) PLACED 20'-0, ON EITHER SIDE, OF THE BEAM CENTERLINE FOR BTD125 TO BTD130. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.

② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.

TOTAL BEAM DEFLECTIONS AT C OF SPAN, Δ₀, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:

(A) Δ₀ = Δ_i + Δ_T FOR SIMPLE SPAN.
 (B) Δ₀ = Δ_i + 3/4 Δ_T FOR END SPANS OF CONTINUOUS BRIDGE.
 (C) Δ₀ = Δ_i + 1/2 Δ_T FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.

③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi. AND A_s = 0.217 in².

BEAM NOTES:

THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 LBS PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE. ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION. ALL PRESTRESSING STRANDS EXCEPT LIFTING LOOP STRANDS SHALL BE 0.60 in. NOMINAL DIAMETER (NOMINAL STEEL AREA = 0.217 in²) AND CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS. MINIMUM STRAND BREAKING STRENGTH SHALL BE 58.6 kips. TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570. BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER. THE PORTIONS OF THE PRESTRESSED BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, I, OF THE STANDARD SPECIFICATIONS. ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE. FOR TRANSPORTING, THE ALLOWABLE OVERHANG IS SHOWN IN THE "LIFTING LOOP AND OVERHANG TABLE". THE CONTRACTOR SHALL ASSURE THE LATERAL STABILITY OF THE BTD110 TO BTD130 BEAMS DURING HANDLING, TRANSPORTING AND ERECTION BY PROVIDING TEMPORARY BRACING AS NEEDED. HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET. IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.

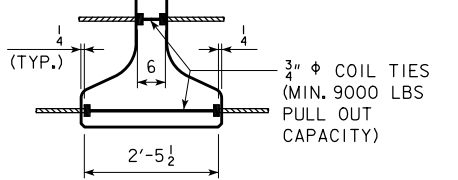
LIFTING LOOP DETAIL

LIFTING LOOP AND OVERHANG TABLE

BEAMS	LIFTING LOOPS EACH END	# OF STRANDS PER LOOP	D	BEAM OVERHANG (FT)
BTD50-BTD80	1	4	2'-0	**
BTD85-BTD90	2	4	2'-0	**
BTD95	2	4	2'-0	11
BTD100	2	4	3'-9	10
BTD105	2	4	6'-3	12
BTD110	2	4	8'-2	12
BTD115	2	4	8'-3	12
BTD120	2	4	9'-3	14
BTD125	2	4	9'-3	16
BTD130	2	4	9'-3	16

** IN ACCORDANCE WITH ARTICLE 2407.03, K OF THE STANDARD SPECIFICATIONS.

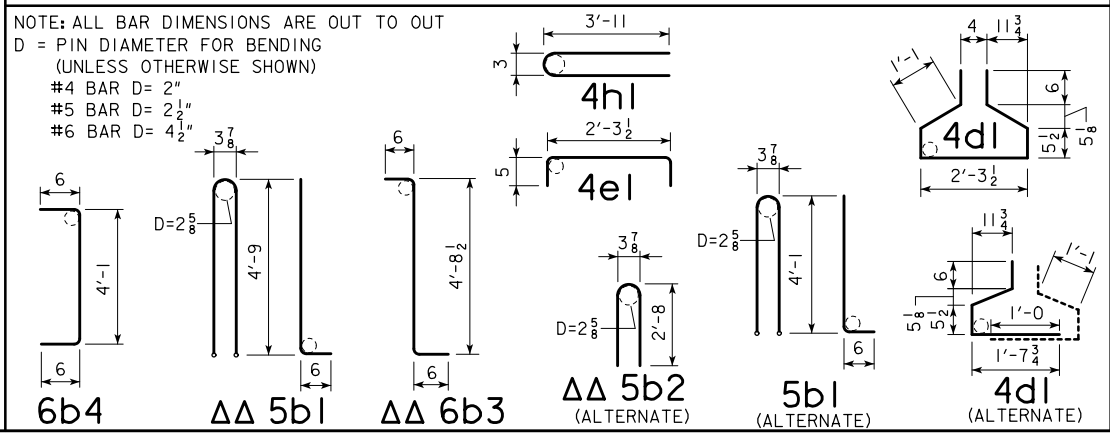
LIFTING LOOPS SHALL CARRY LOADS EQUALLY. NUMBER AND EXACT LOCATION OF COIL TIES TO BE AS DETAILED ON SPECIFIC BRIDGE DESIGN.



COIL TIE DETAIL

ΔΔ 5b1 AND 6b3 BARS TO BE EPOXY COATED
 * 6b3 AND 6b4 BARS TO BE USED IN PAIRS

BENT BAR DETAILS



CALCULATED DESIGN CAMBERS HAVE BEEN REDUCED FROM THEIR THEORETICAL VALUES BY 15% TO AID CONSTRUCTABILITY.

BEAM NOTES: (CONTINUED)

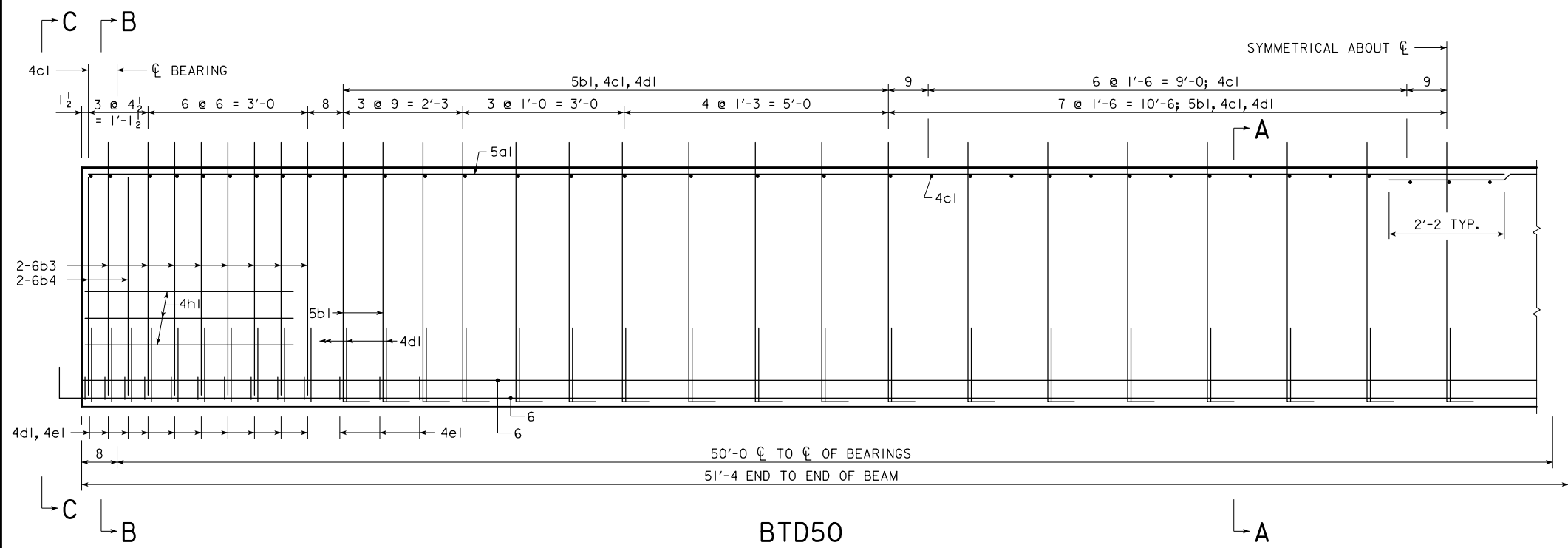
IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE. WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION). MINIMUM CONCRETE f'c (AT 28 DAYS) AND MINIMUM f'ci AT RELEASE ARE LOCATED IN THE BTD BEAM DATA TABLE ABOVE. FOUR 0.60 IN. DIAMETER STRANDS STRESSED TO NOT MORE THAN 5000 LBS. EACH MAY BE USED IN LIEU OF BARS 5a1 AND 5a2 IN THE TOP FLANGE.

REINFORCING BAR LIST

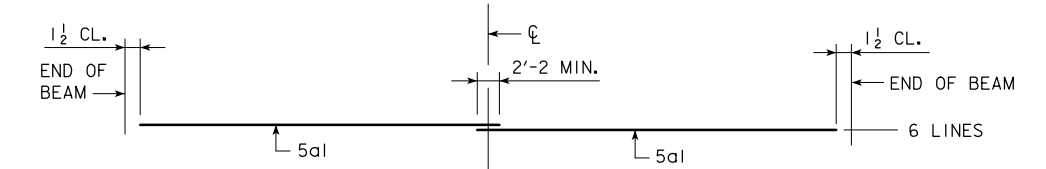
BEAM	BTD50	BTD55	BTD60	BTD65	BTD70	BTD75	BTD80	BTD85	BTD90	BTD95	BTD100	BTD105	BTD110	BTD115	BTD120	BTD125	BTD130	BEAM
BAR SHAPE	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	BAR
5a1	12 26'-8	12 29'-2	12 31'-8	12 34'-2	12 36'-8	12 39'-2	12 42'-0	12 45'-0	12 48'-0	12 51'-0	12 54'-0	12 57'-0	12 60'-0	12 63'-0	12 66'-0	12 69'-0	12 72'-0	5a1
5a2	—	—	—	—	—	—	6 40'-0	6 40'-0	6 40'-0	6 40'-0	6 40'-0	6 40'-0	6 40'-0	6 40'-0	6 40'-0	6 40'-0	6 40'-0	5a2
ΔΔ 5b1	35 10'-8	39 10'-8	43 10'-8	47 10'-8	49 10'-8	53 10'-8	57 10'-8	61 10'-8	67 10'-8	71 10'-8	75 10'-8	81 10'-8	85 10'-8	91 10'-8	97 10'-8	103 10'-8	107 10'-8	5b1 ΔΔ
ΔΔ * 6b3	32 5'-9	32 5'-9	32 5'-9	32 5'-9	32 5'-9	32 5'-9	32 5'-9	32 5'-9	32 5'-9	32 5'-9	32 5'-9	32 5'-9	36 5'-9	36 5'-9	36 5'-9	36 5'-9	36 5'-9	6b3 ΔΔ *
* 6b4	8 5'-1	8 5'-1	8 5'-1	8 5'-1	8 5'-1	8 5'-1	8 5'-1	8 5'-1	16 5'-1	16 5'-1	16 5'-1	16 5'-1	20 5'-1	20 5'-1	20 5'-1	24 5'-1	24 5'-1	6b4 *
4c1	67 2'-7	73 2'-7	81 2'-7	87 2'-7	93 2'-7	99 2'-7	105 2'-7	111 2'-7	117 2'-7	121 2'-7	127 2'-7	133 2'-7	139 2'-7	145 2'-7	151 2'-7	163 2'-7	169 2'-7	4c1
4d1	55 6'-5	59 6'-5	63 6'-5	67 6'-5	69 6'-5	73 6'-5	77 6'-5	81 6'-5	87 6'-5	91 6'-5	95 6'-5	101 6'-5	105 6'-5	111 6'-5	117 6'-5	123 6'-5	127 6'-5	4d1
4e1	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	26 3'-2	4e1
4h1	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	6 8'-0	4h1

BTD BEAM DETAILS

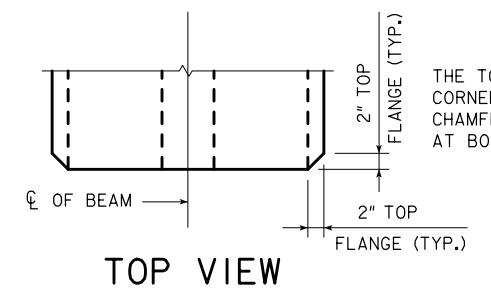
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



BTD50

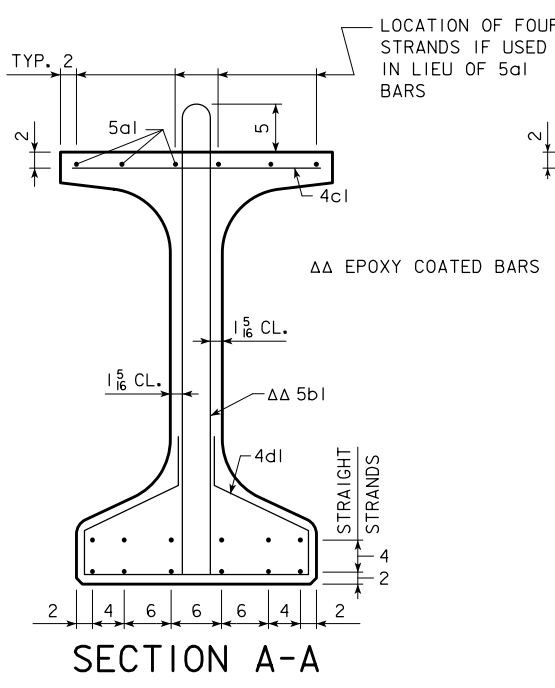


TOP FLANGE LONGITUDINAL BAR LAYOUT

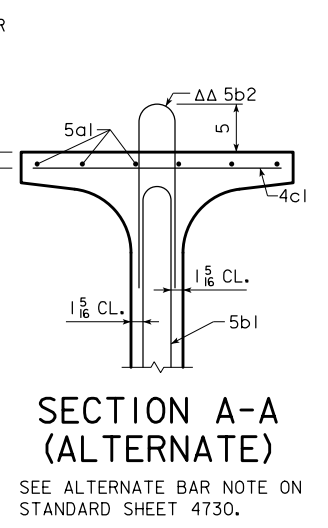


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

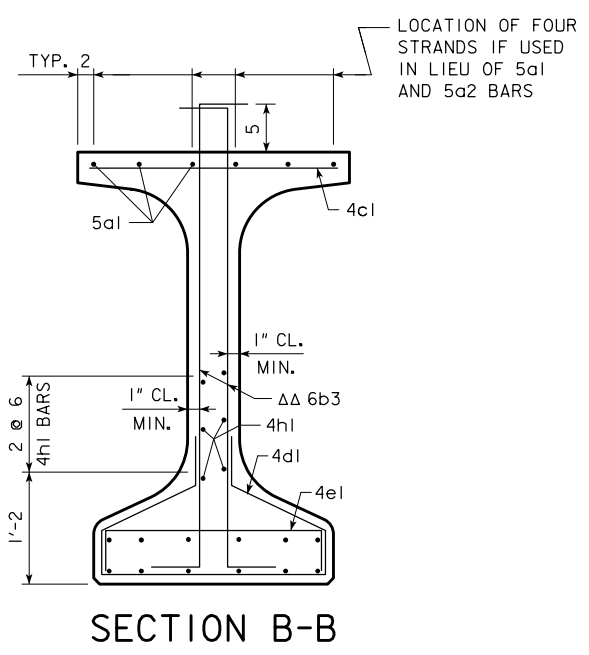


SECTION A-A

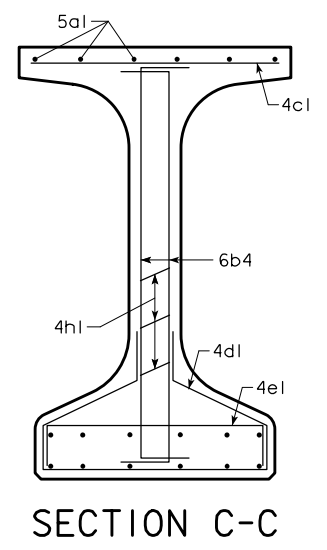


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



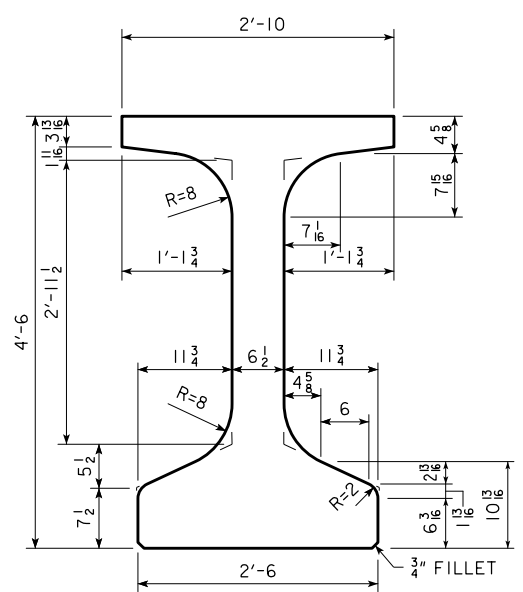
SECTION B-B



SECTION C-C

BEAM SECTION PROPERTIES

AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 I = 285,860 in⁴

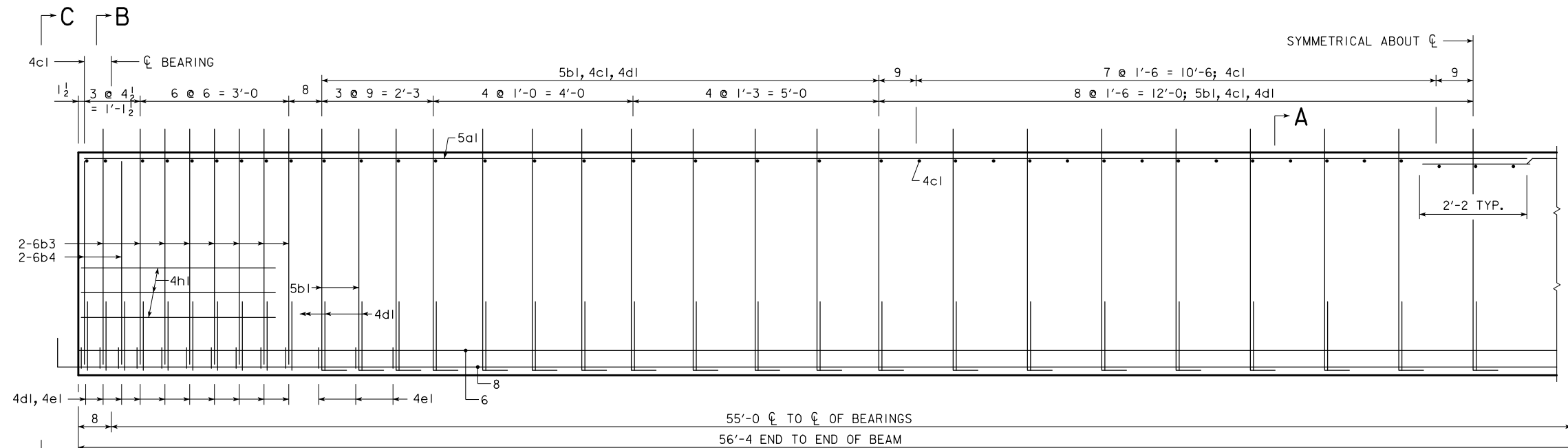


BTD BEAM CROSS SECTION

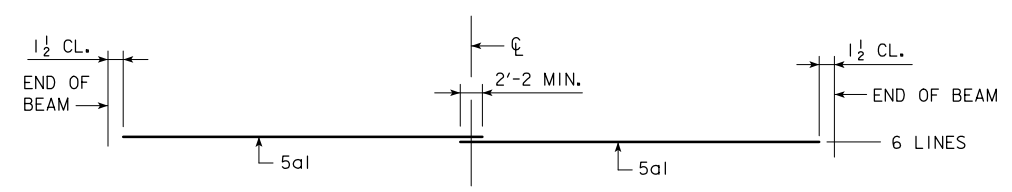
BTD50 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
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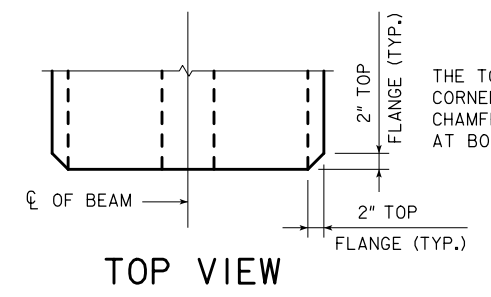
REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN 4731 - THIS SHEET ISSUED 05-04.



BTD55

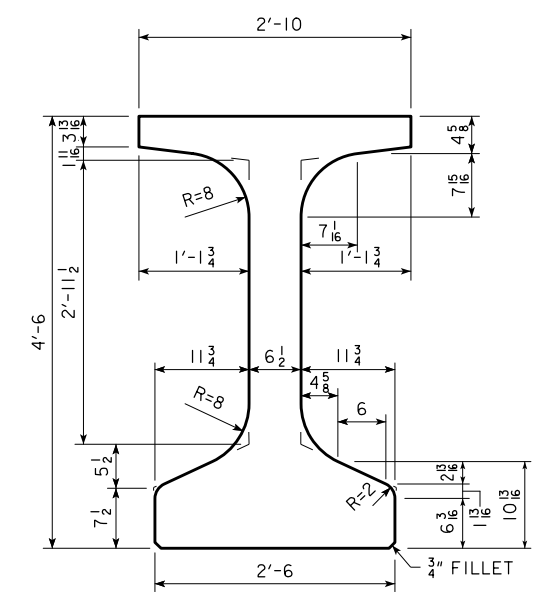


TOP FLANGE LONGITUDINAL BAR LAYOUT



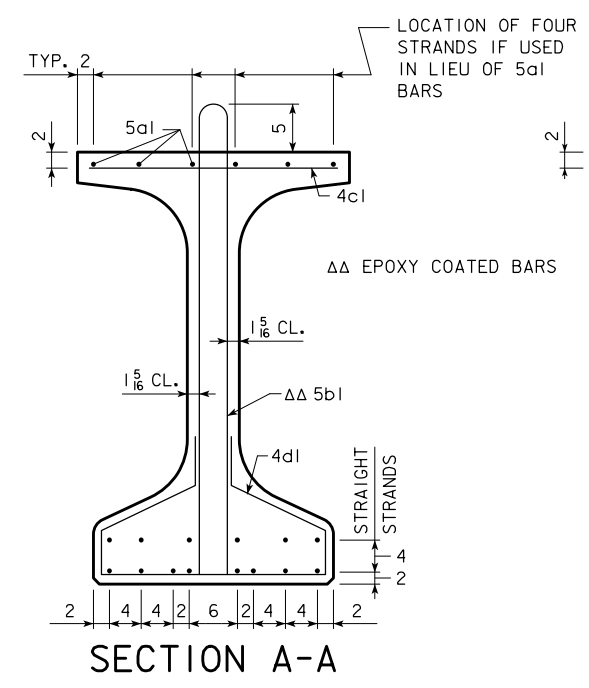
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



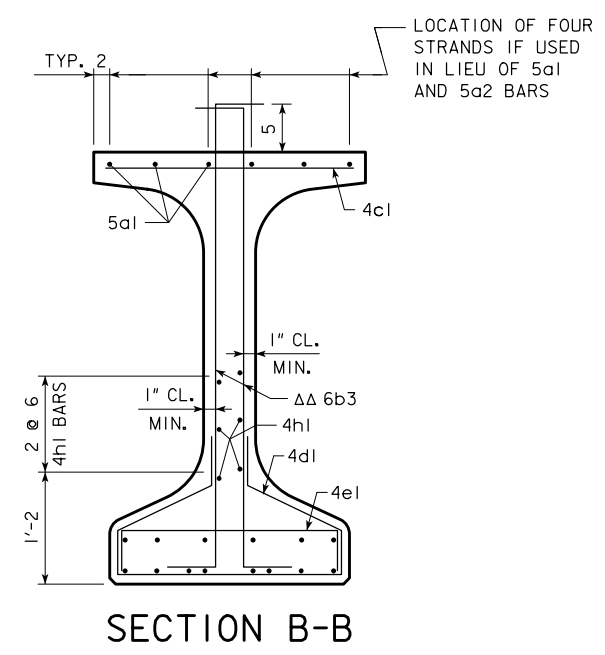
BTD BEAM CROSS SECTION

BEAM SECTION PROPERTIES
 AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 I = 285,860 in⁴

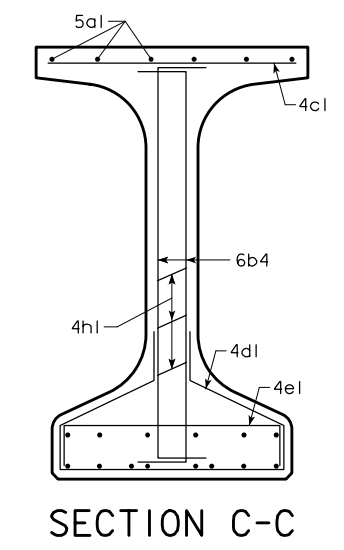


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



SECTION B-B

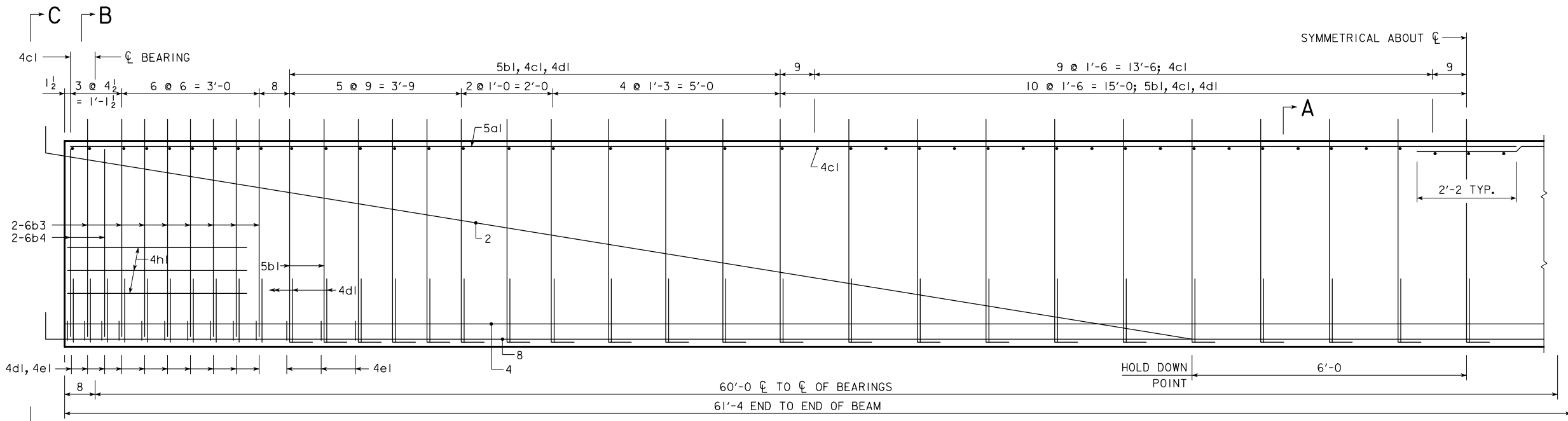


SECTION C-C

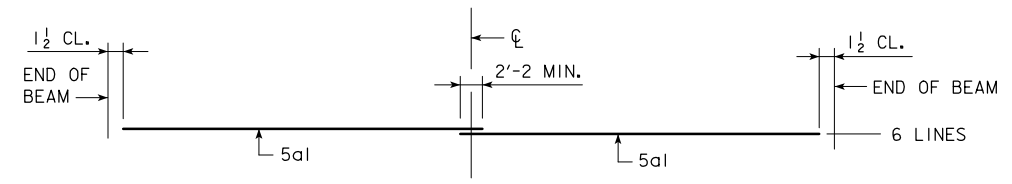
BTD55 BEAM DETAILS

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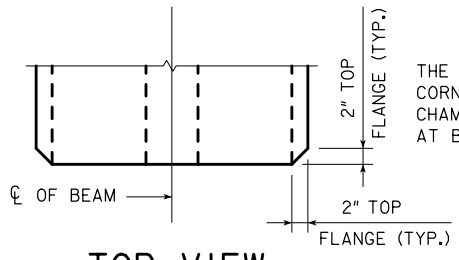
REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN 4732 - THIS SHEET ISSUED 05-04.



BTD60

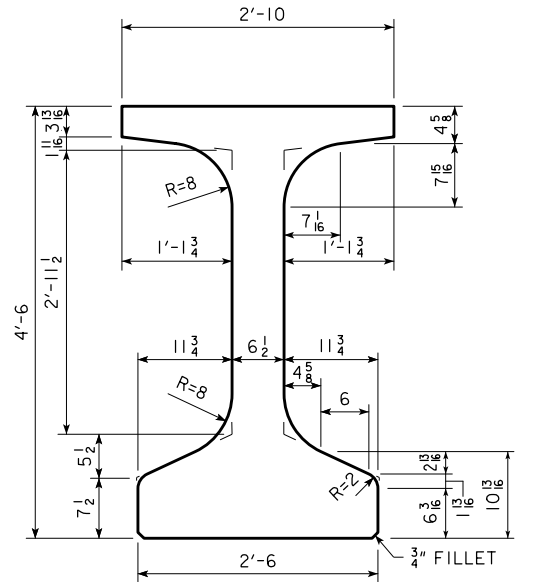


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

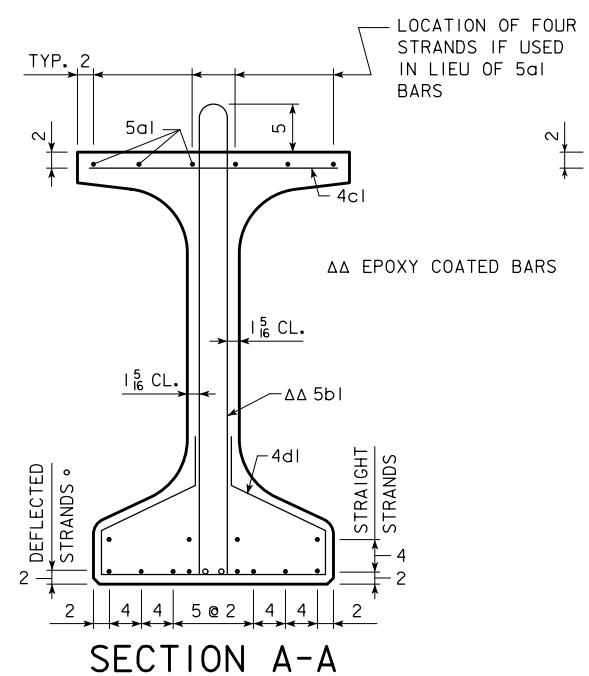
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



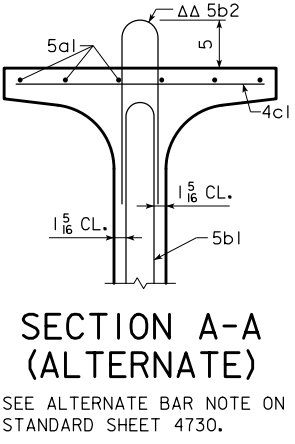
BTD BEAM CROSS SECTION

BEAM SECTION PROPERTIES

AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 $I = 285,860$ in⁴

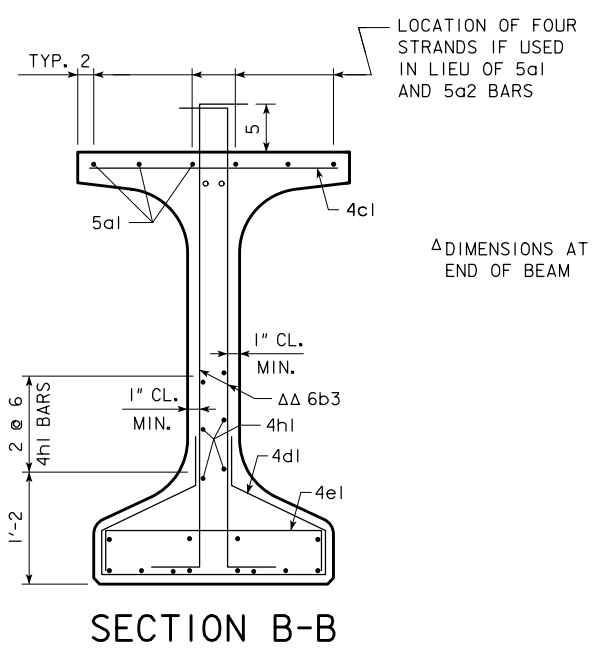


SECTION A-A

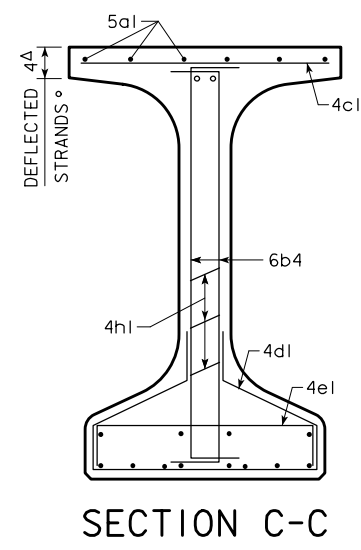


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



SECTION B-B

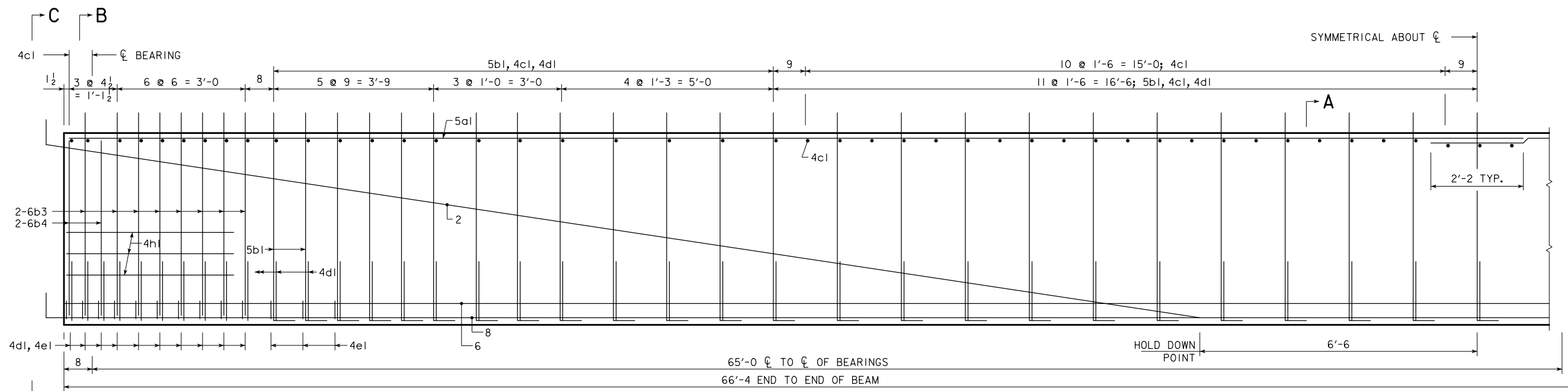


SECTION C-C

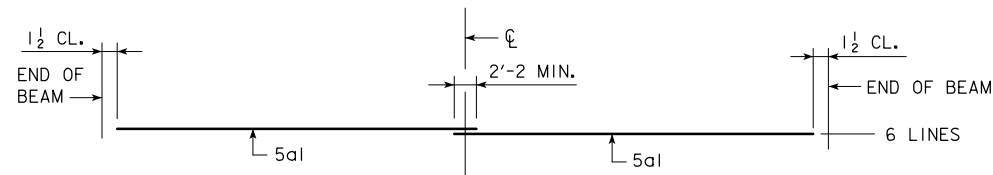
BTD60 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

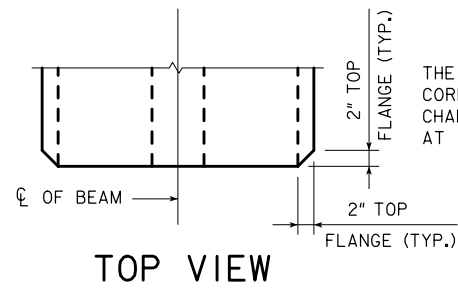
REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN 4733 - THIS SHEET ISSUED 05-04.



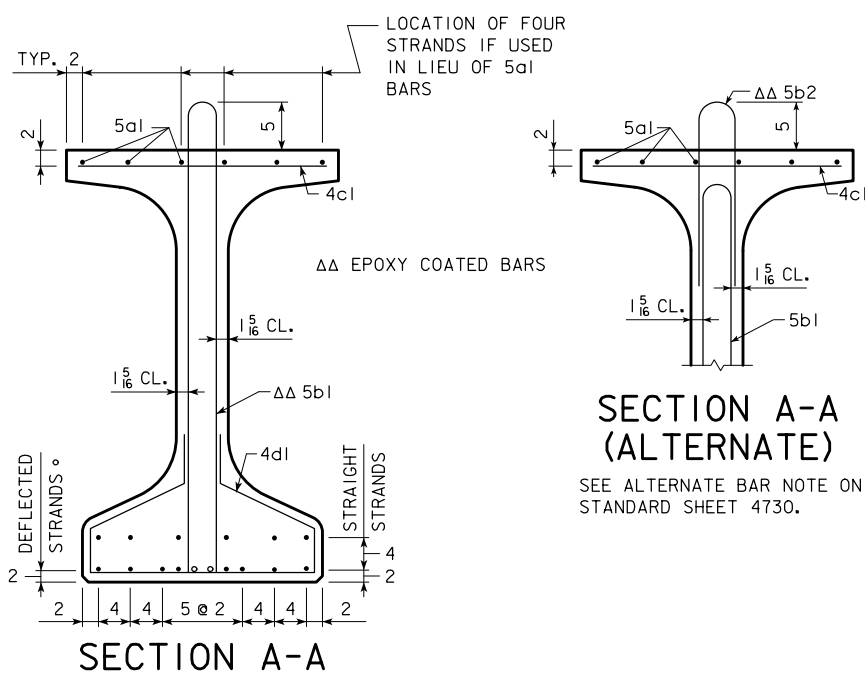
BTD65



TOP FLANGE LONGITUDINAL BAR LAYOUT

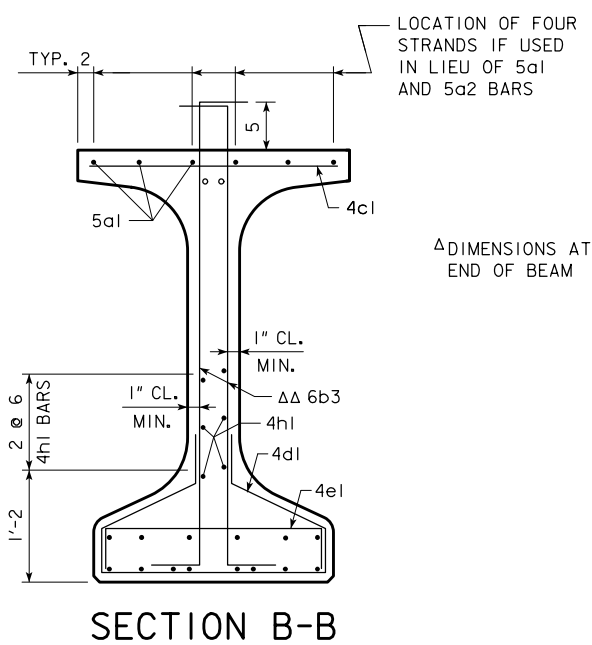


THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

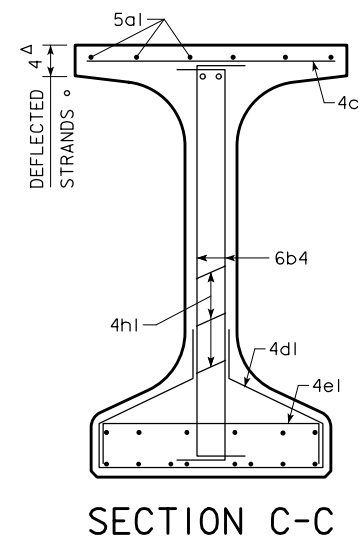


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.

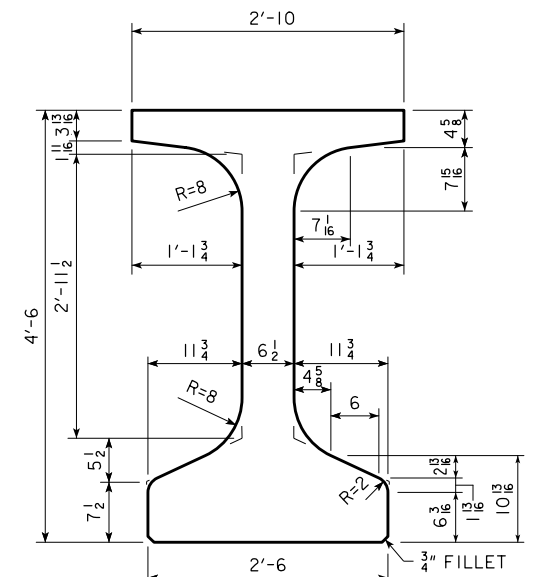


Δ DIMENSIONS AT END OF BEAM



BEAM SECTION PROPERTIES

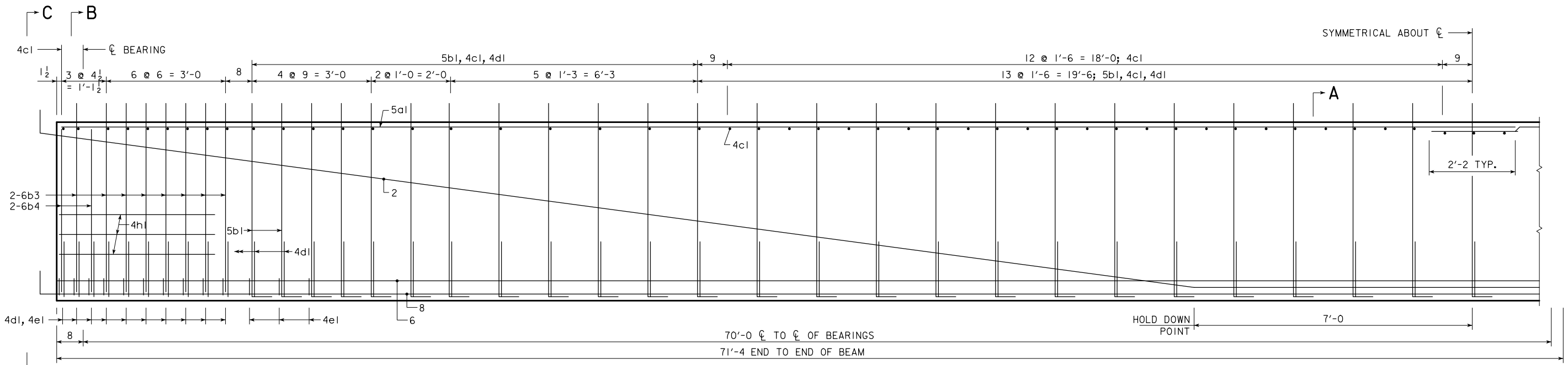
AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
I = 285,860 in⁴



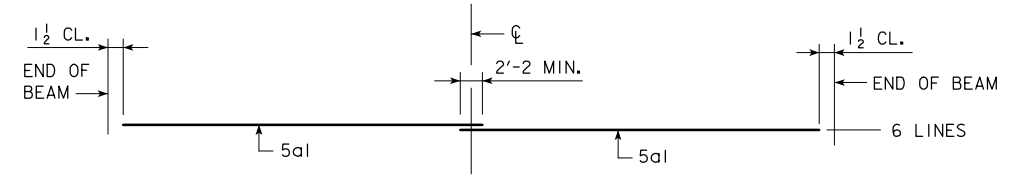
BTD65 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

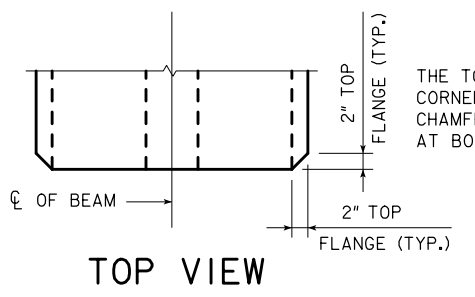
REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN 4734 - THIS SHEET ISSUED 05-04.



BTD70

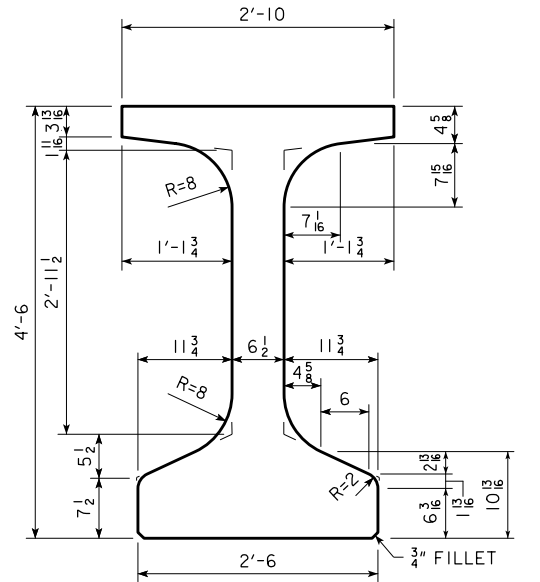


TOP FLANGE LONGITUDINAL BAR LAYOUT



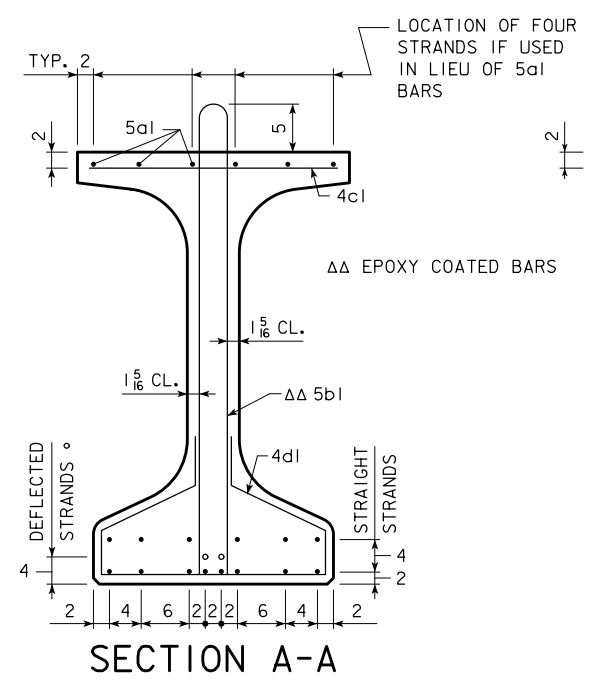
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



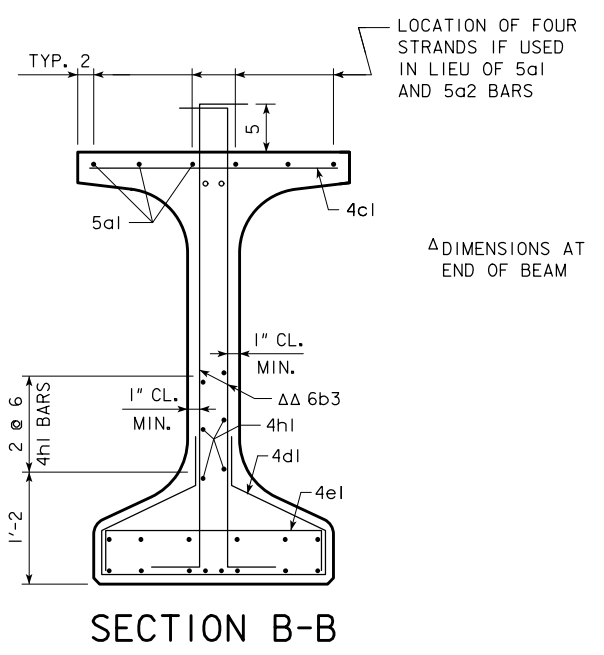
BEAM SECTION PROPERTIES

BTD BEAM CROSS SECTION

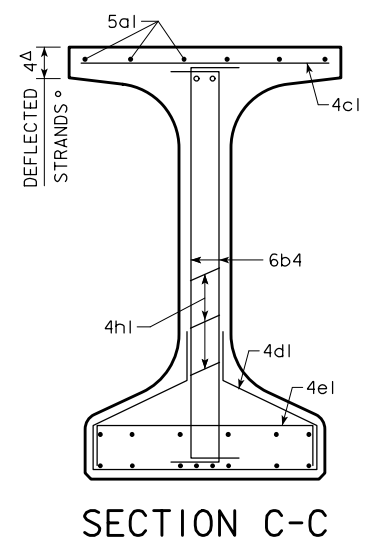


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



SECTION B-B



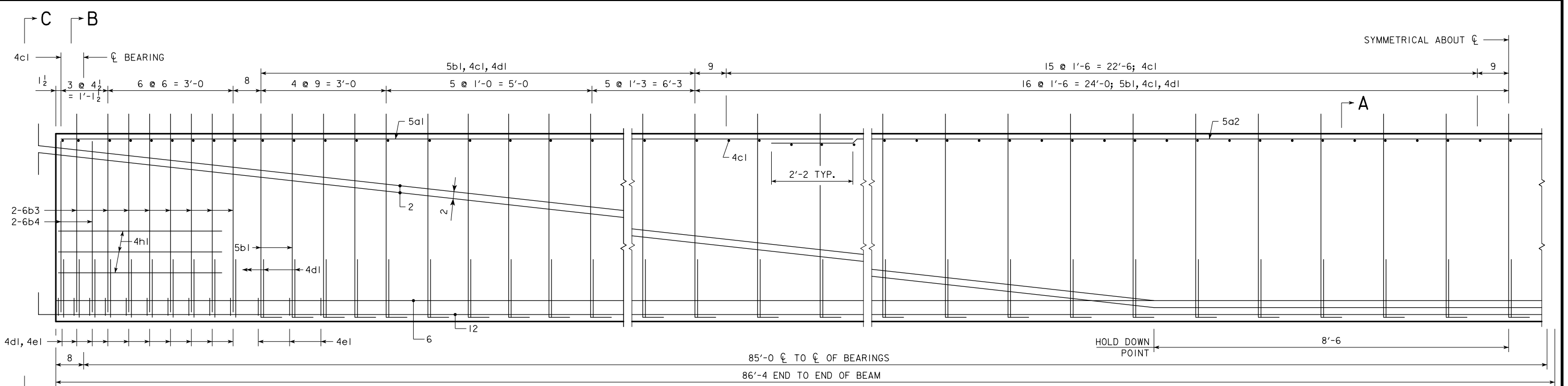
SECTION C-C

BTD70 BEAM DETAILS

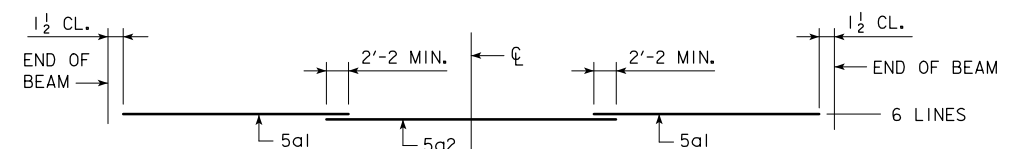
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4735 - THIS SHEET ISSUED 05-04.

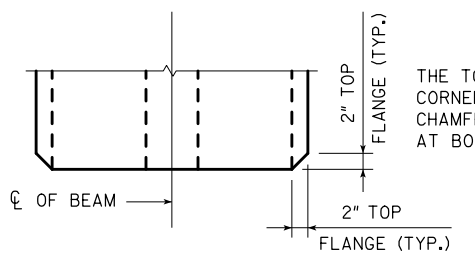
REVISED 05-11 - ADDED THE BEND TO THE 2nd DEFLECTED STRAND AT THE TOP TO BE BENT DOWN AT THE BEAM END. ENGLISHBEAMS.DGN 4738 - THIS SHEET ISSUED 05-04.



BTD85

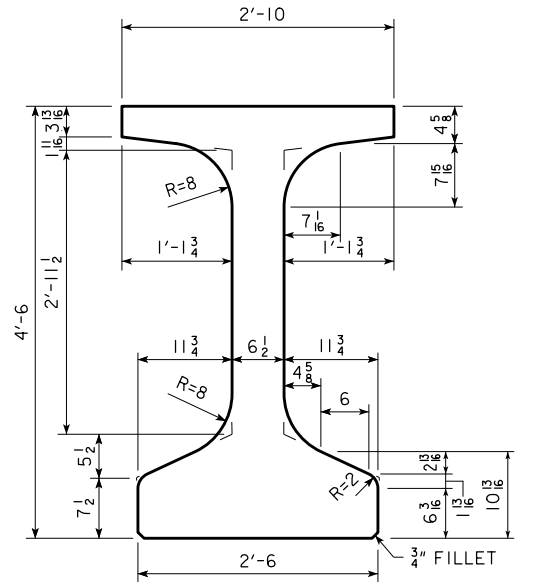


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

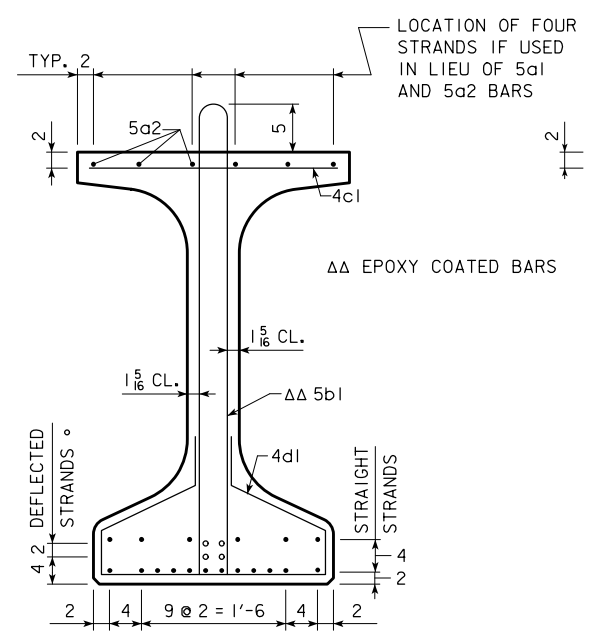
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



BTD BEAM CROSS SECTION

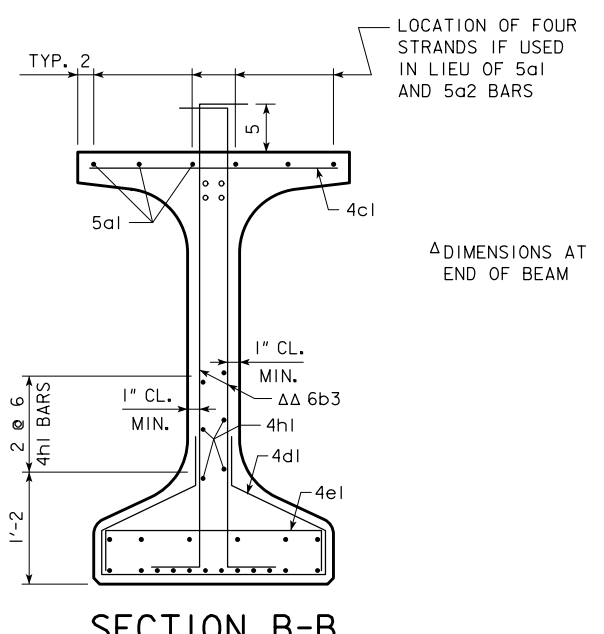
AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 $I = 285,860$ in⁴

BEAM SECTION PROPERTIES

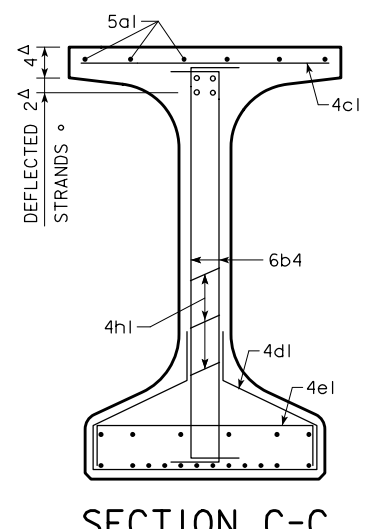


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



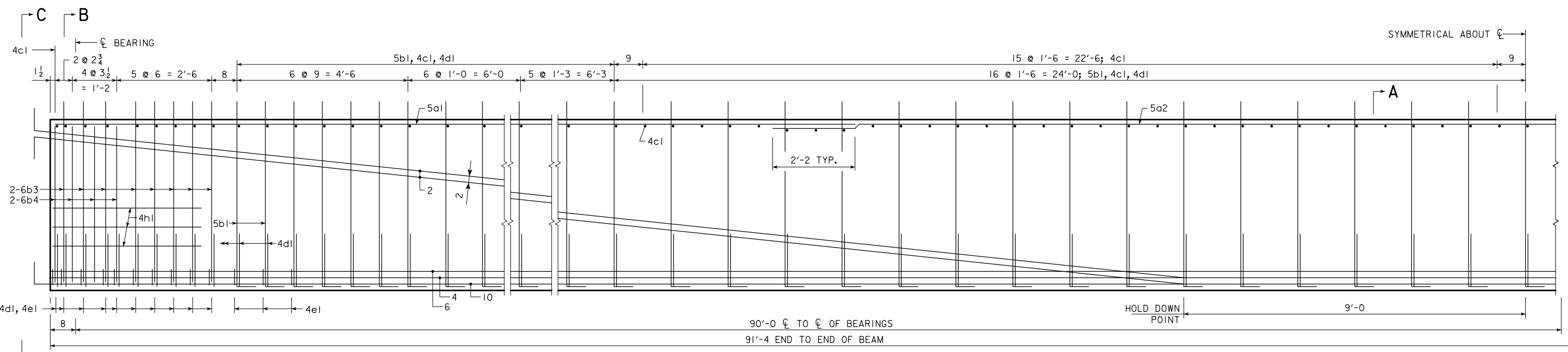
SECTION B-B



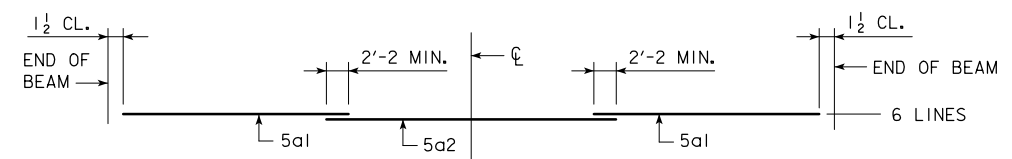
SECTION C-C

BTD85 BEAM DETAILS

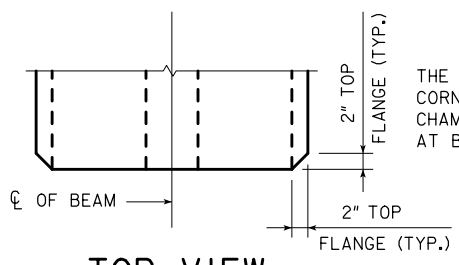
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



BTD90

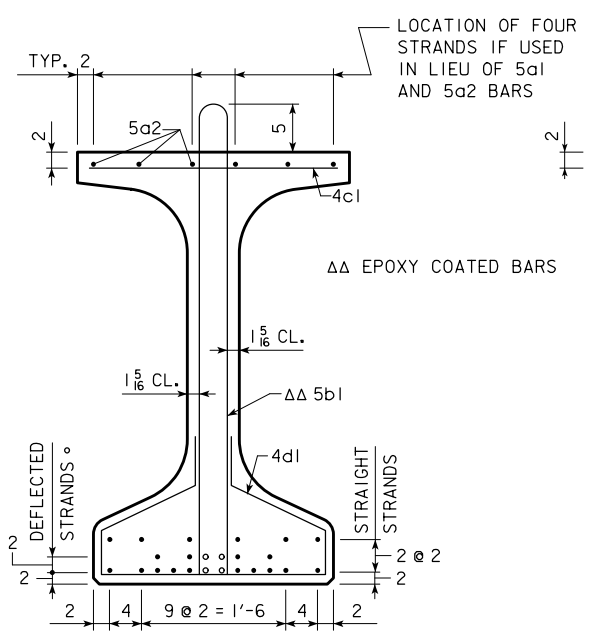


TOP FLANGE LONGITUDINAL BAR LAYOUT



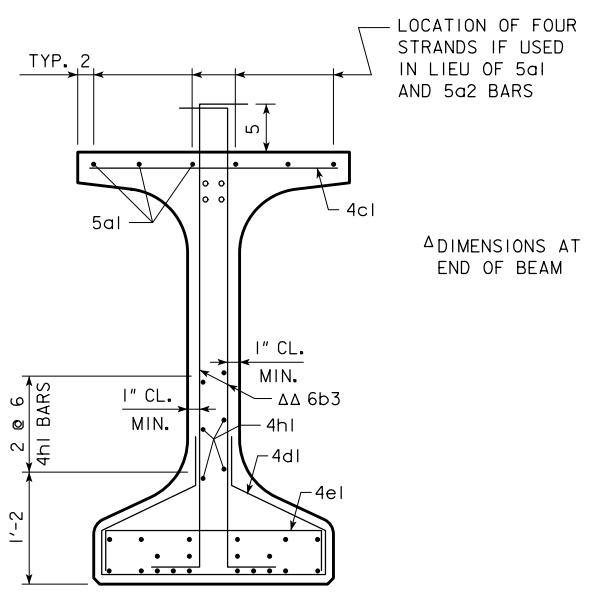
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

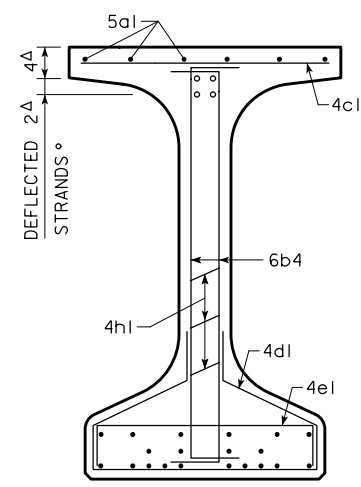


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



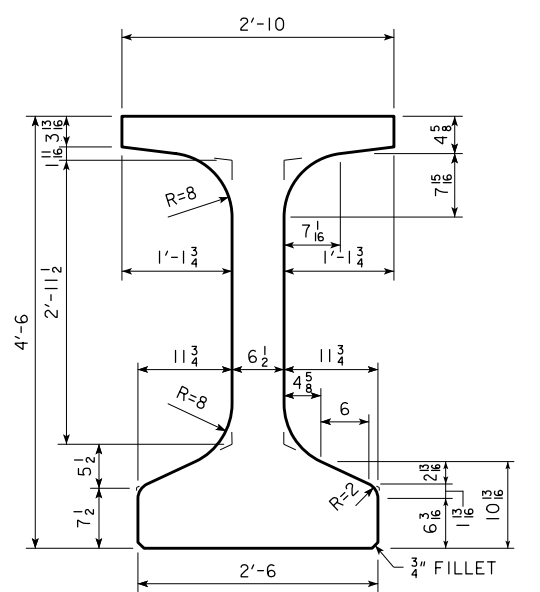
SECTION B-B



SECTION C-C

BEAM SECTION PROPERTIES

AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 $I = 285,860$ in⁴

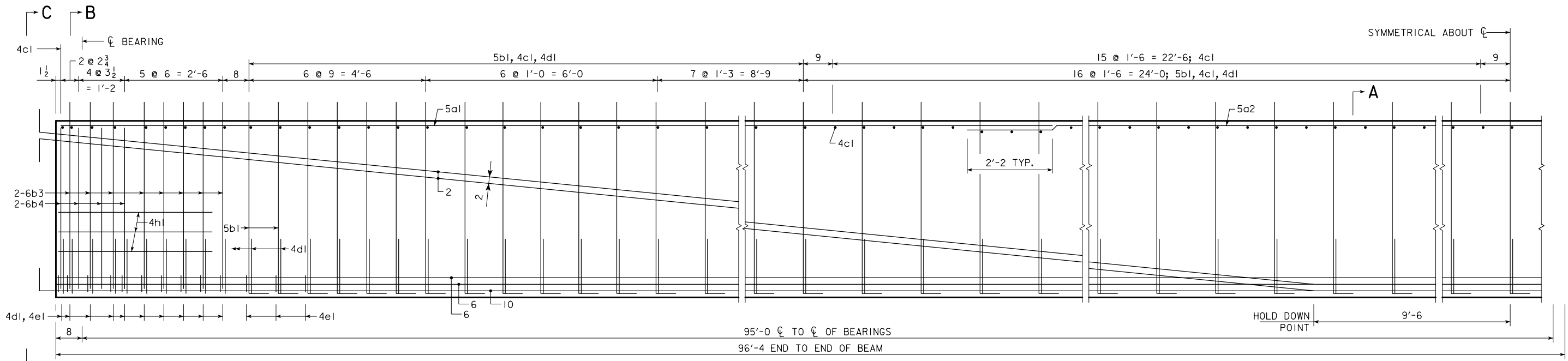


BTD BEAM CROSS SECTION

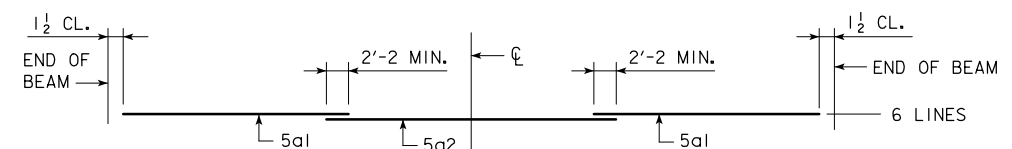
BTD90 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

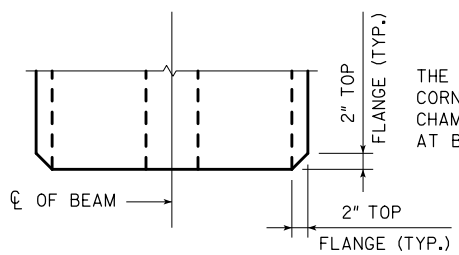
REVISED 10-07 - 5b2 BAR DELETED; 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4739 - THIS SHEET ISSUED 05-04.



BTD95

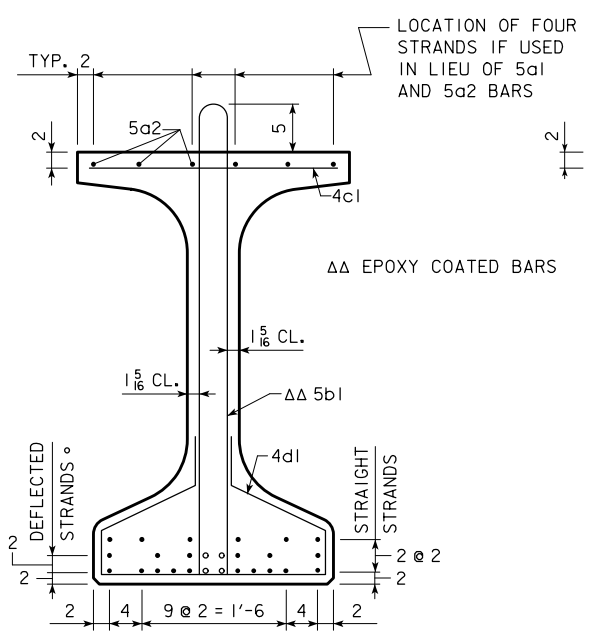


TOP FLANGE LONGITUDINAL BAR LAYOUT



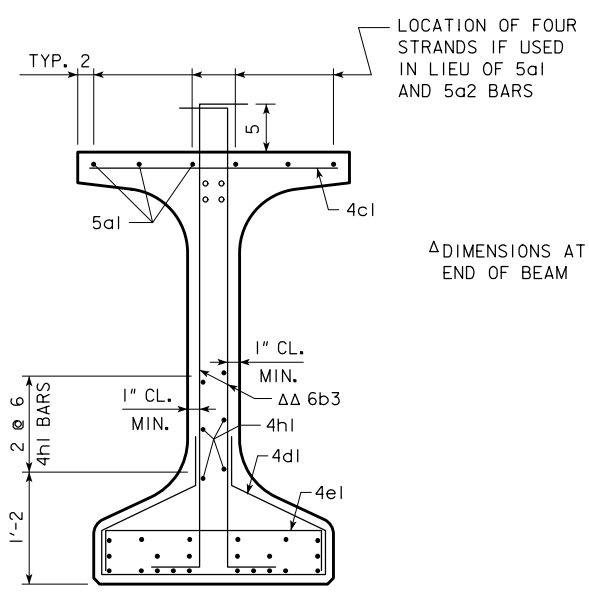
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

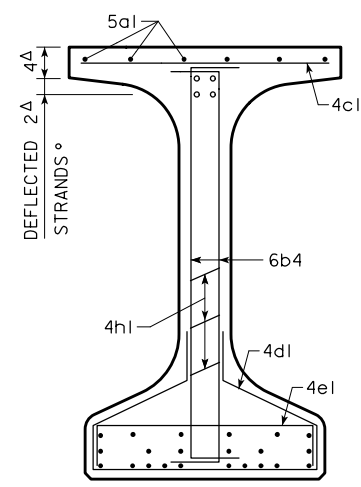


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



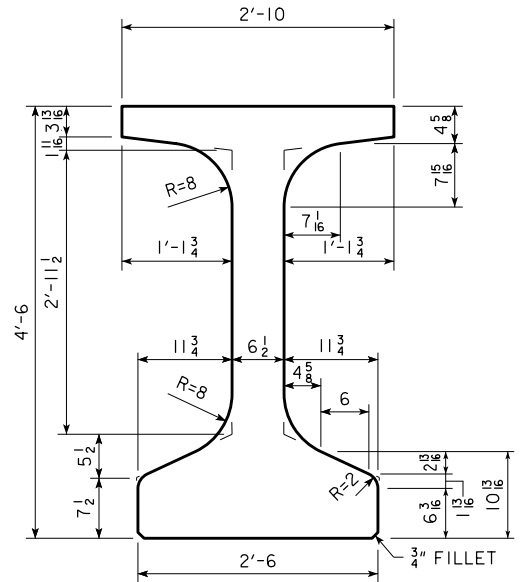
SECTION B-B



SECTION C-C

BEAM SECTION PROPERTIES

AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 $I = 285,860$ in⁴

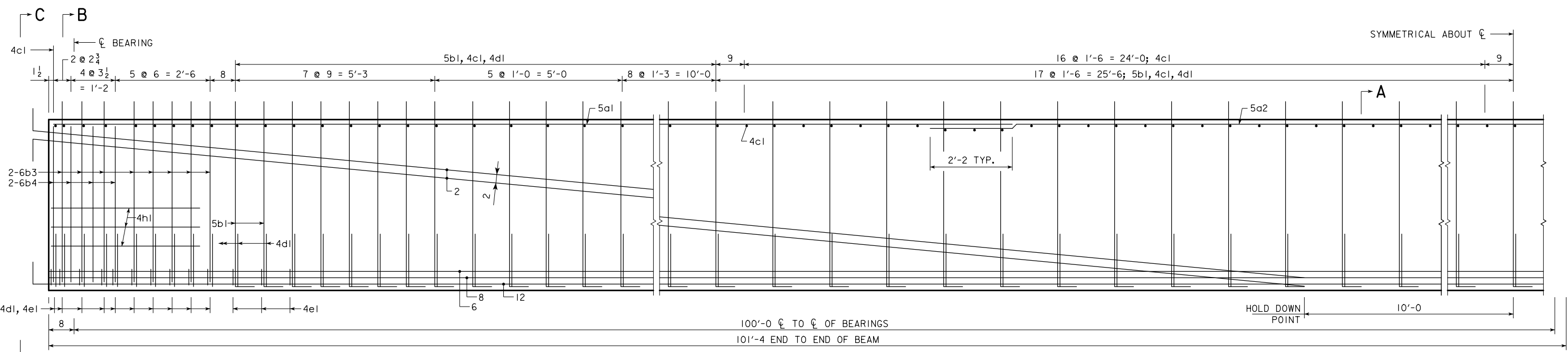


BTD BEAM CROSS SECTION

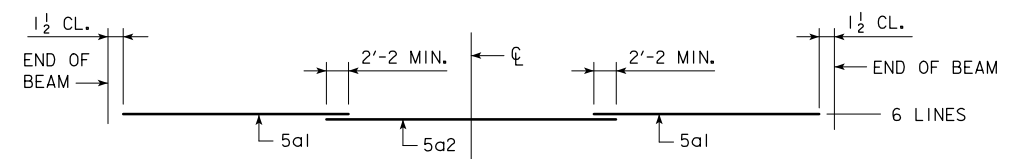
BTD95 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

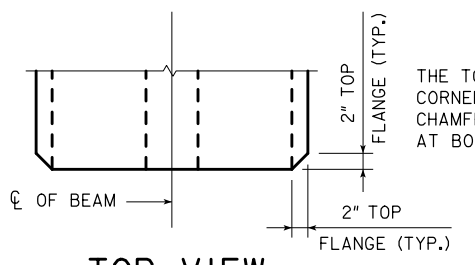
REVISED 10-07 - 5b2 BAR DELETED; 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4740 - THIS SHEET ISSUED 05-04.



BTD100

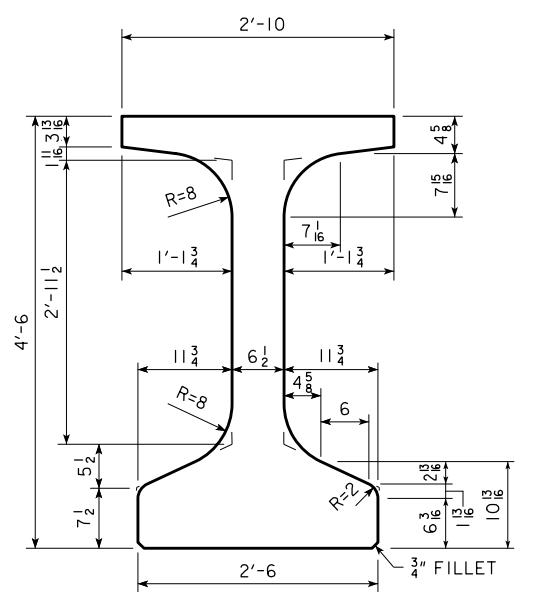


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

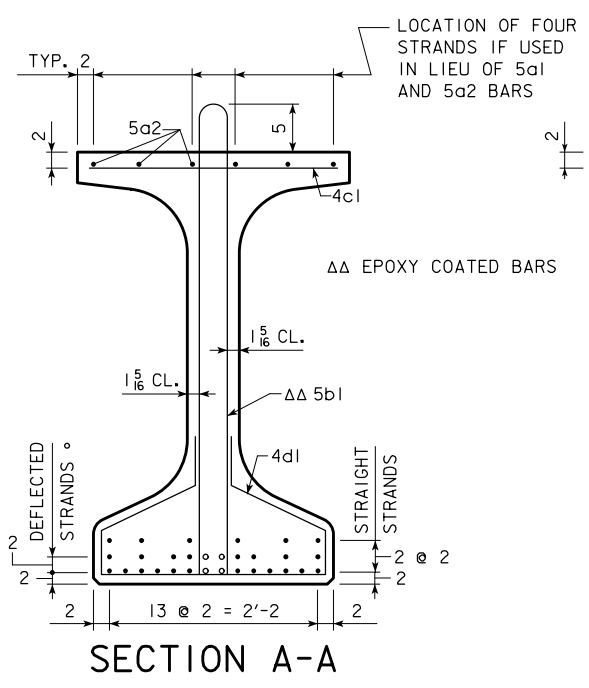
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



BTD BEAM CROSS SECTION

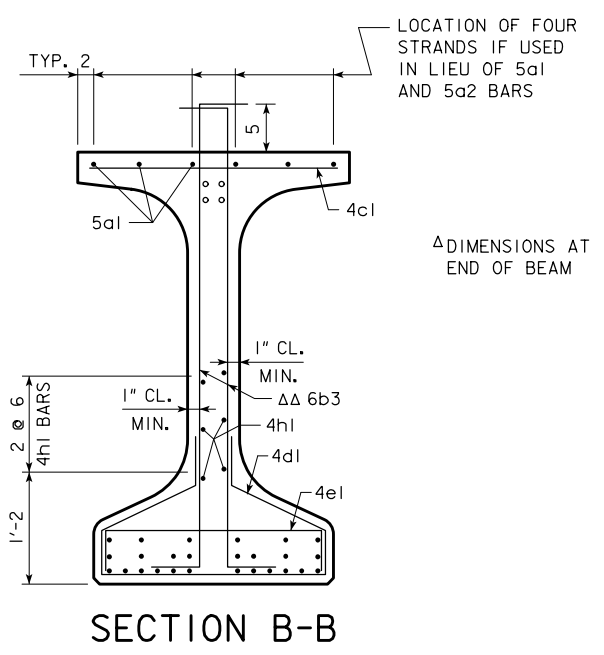
AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 $I = 285,860$ in⁴

BEAM SECTION PROPERTIES

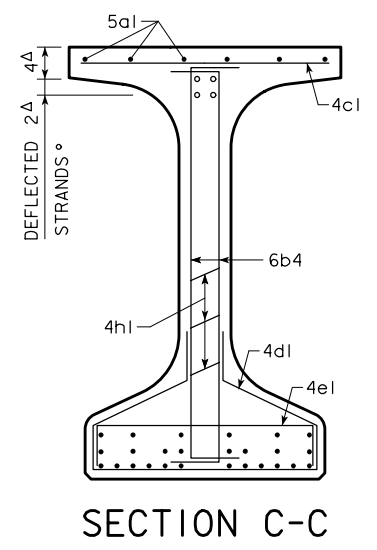


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



SECTION B-B

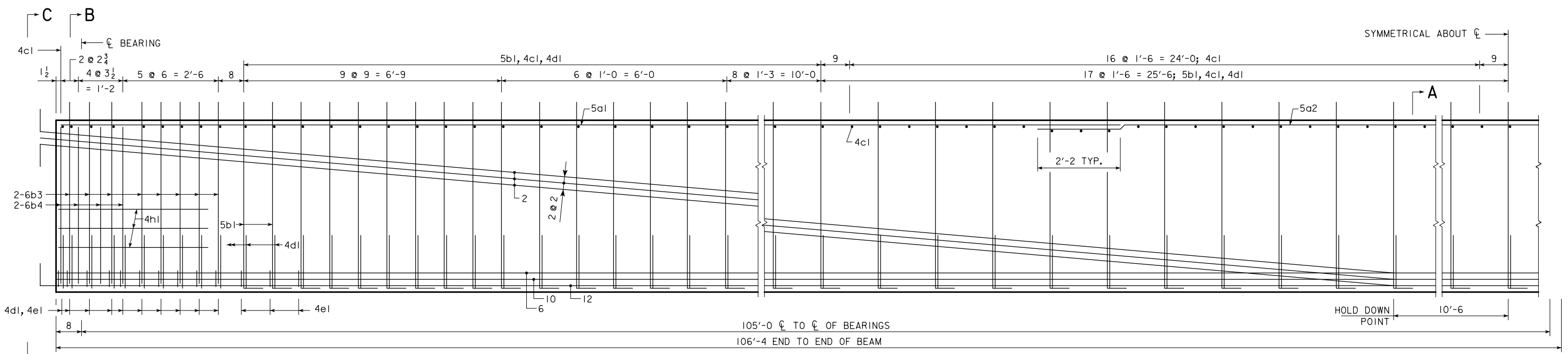


SECTION C-C

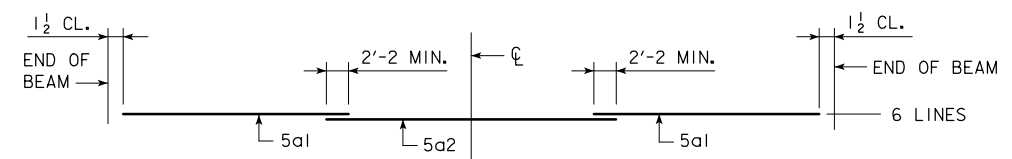
BTD100 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

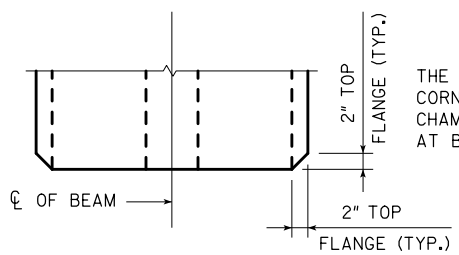
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4741 - THIS SHEET ISSUED 05-04.



BTD105

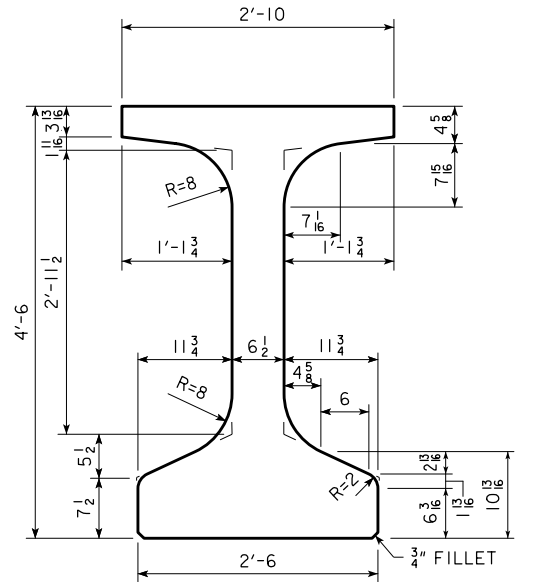


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

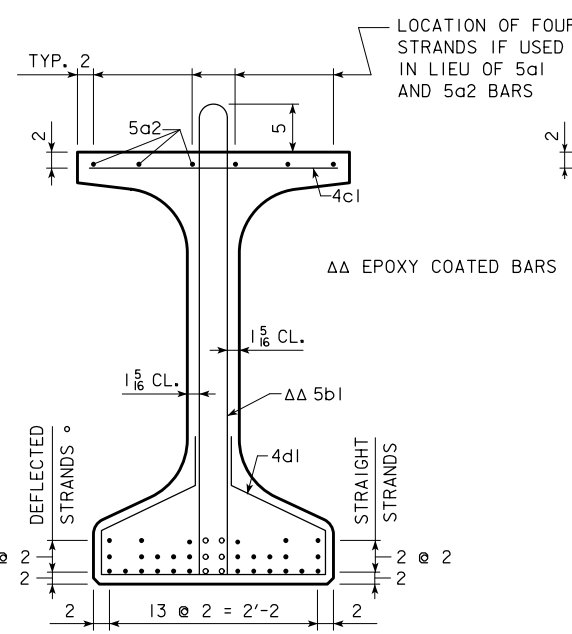
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



BEAM SECTION PROPERTIES

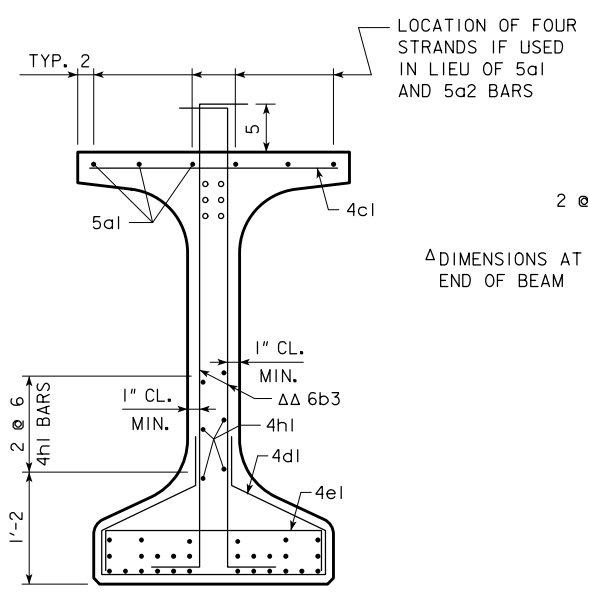
AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 I = 285,860 in⁴

BTD BEAM CROSS SECTION

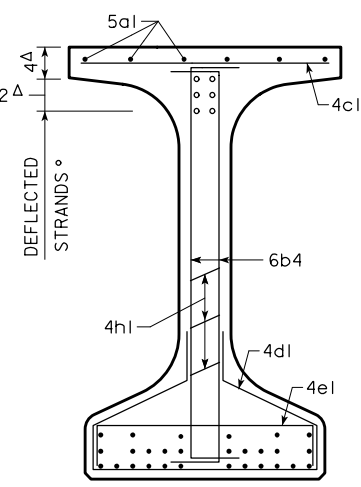


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



SECTION B-B

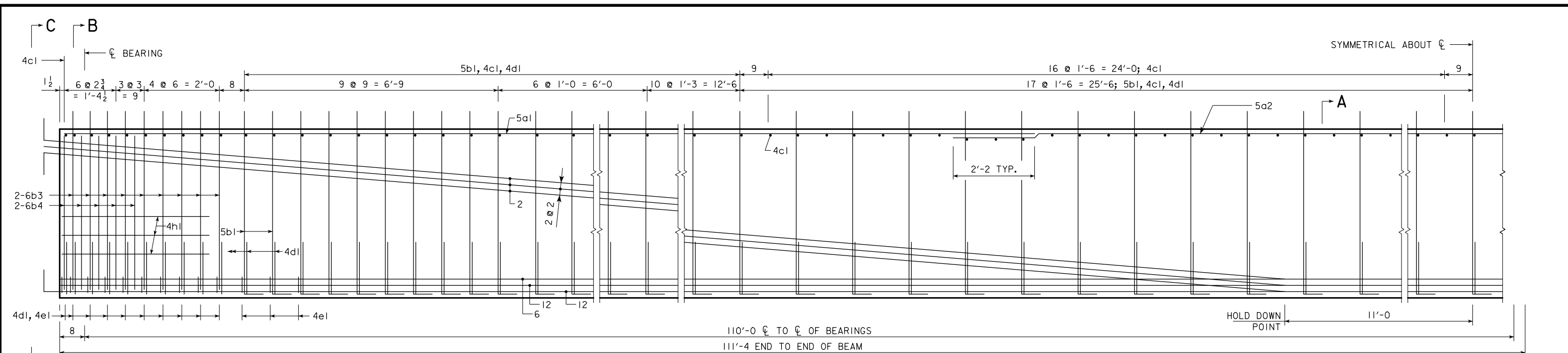


SECTION C-C

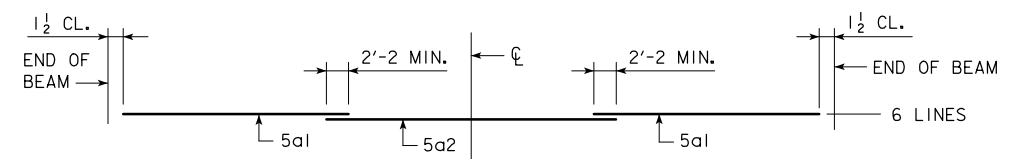
BTD105 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

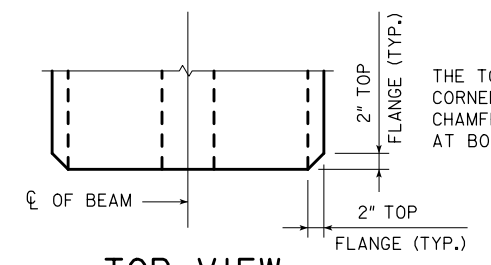
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4742 - THIS SHEET ISSUED 05-04.



BTD110

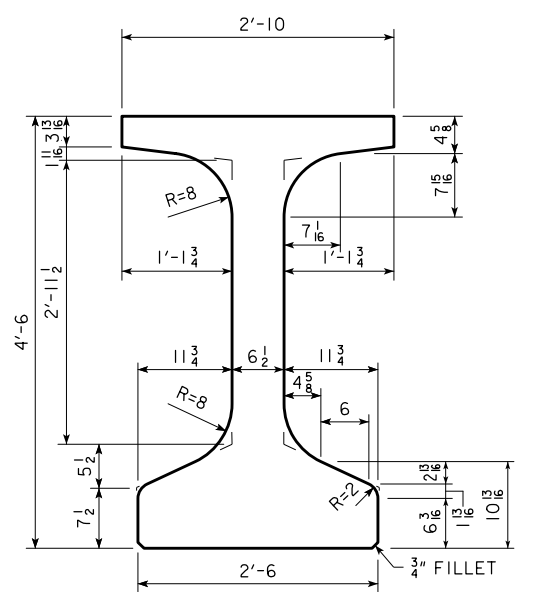


TOP FLANGE LONGITUDINAL BAR LAYOUT



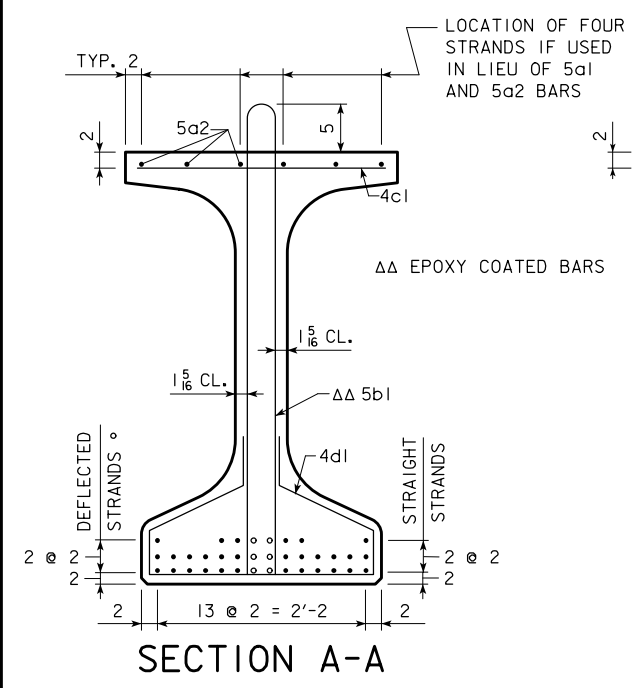
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

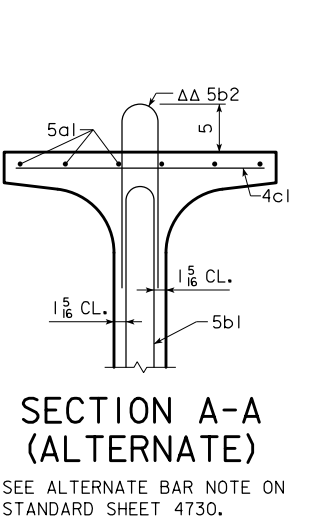


BTD BEAM CROSS SECTION

BEAM SECTION PROPERTIES
 AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 I = 285,860 in⁴

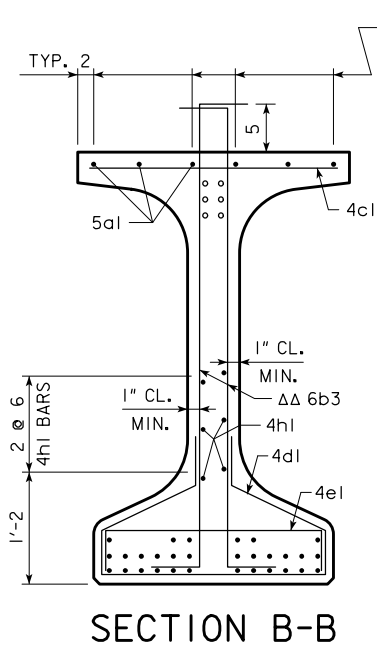


SECTION A-A

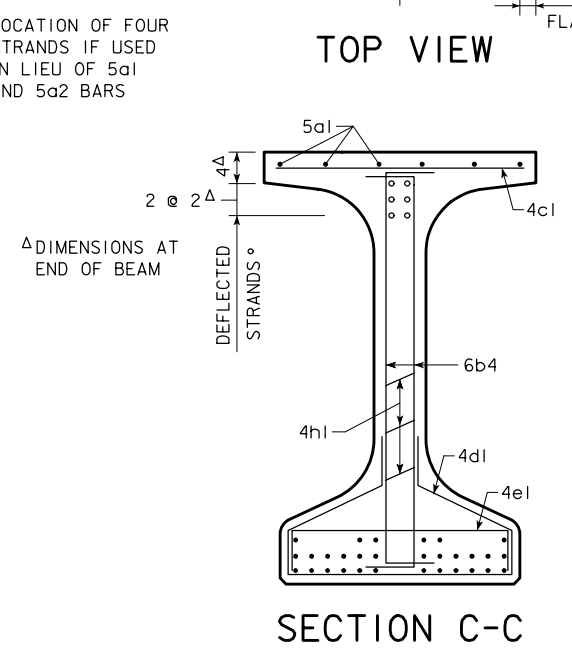


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



SECTION B-B



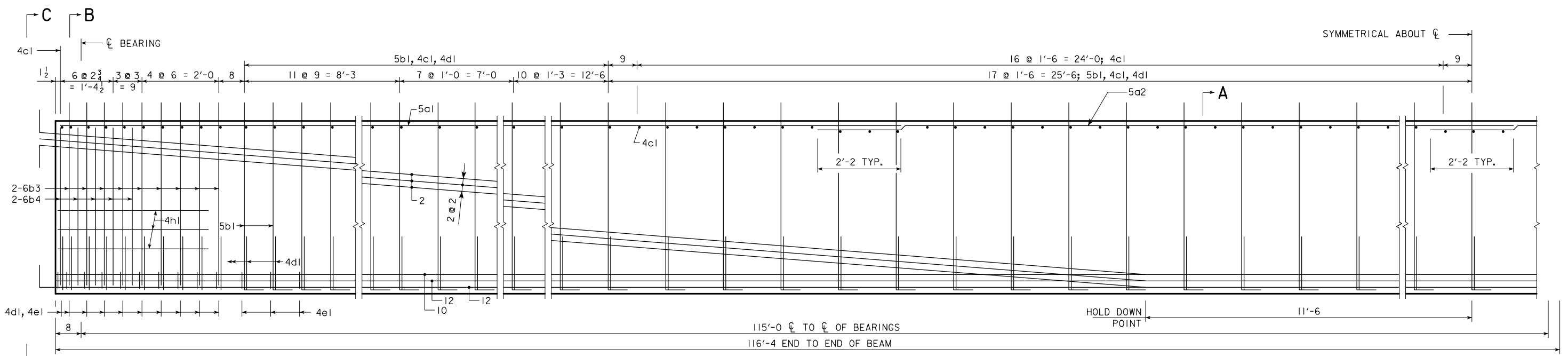
SECTION C-C

BTD110 BEAM DETAILS

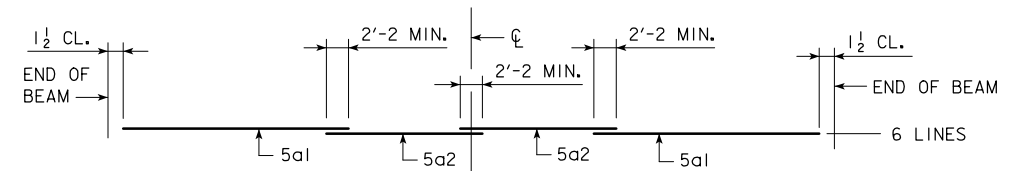
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 10-07 - 5b2 BAR DELETED, 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4743 - THIS SHEET ISSUED 05-04.

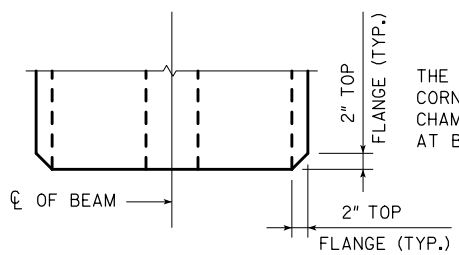
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4744 - THIS SHEET ISSUED 05-04.



BTD115

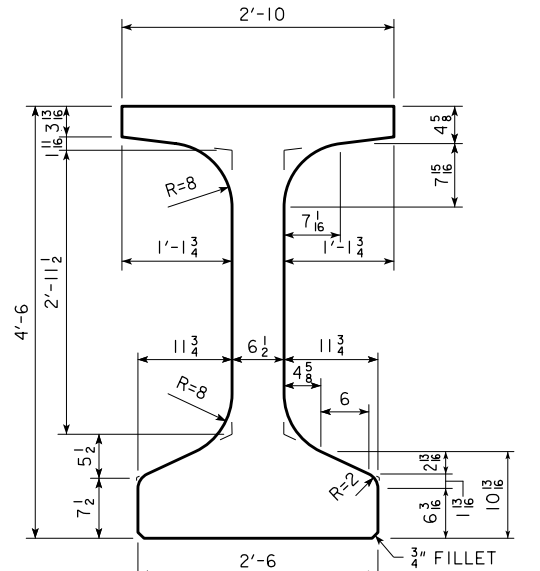


TOP FLANGE LONGITUDINAL BAR LAYOUT



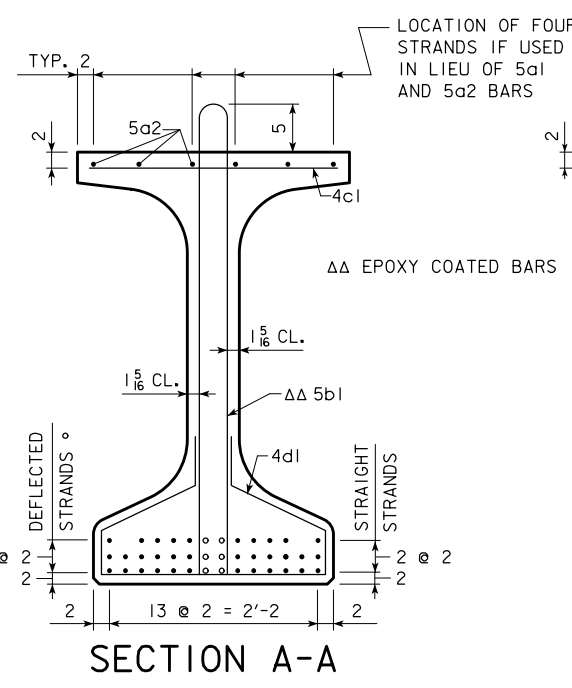
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



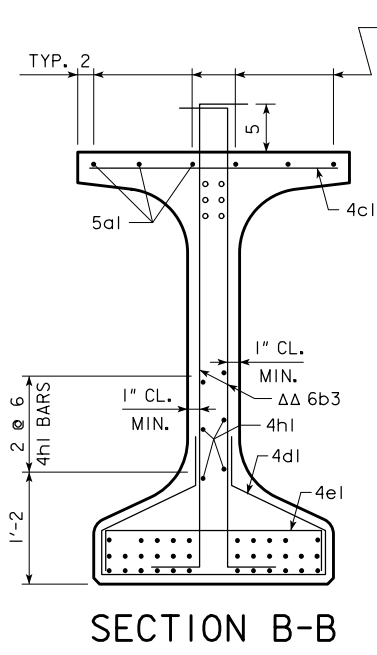
BEAM SECTION PROPERTIES

BTD BEAM CROSS SECTION

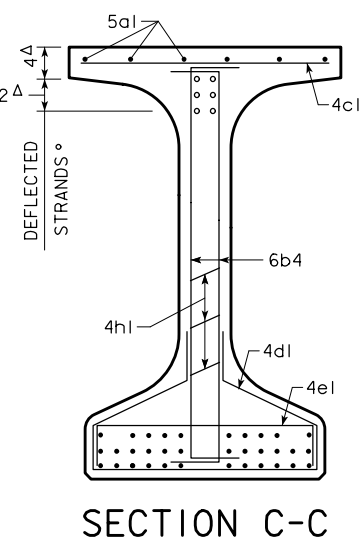


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



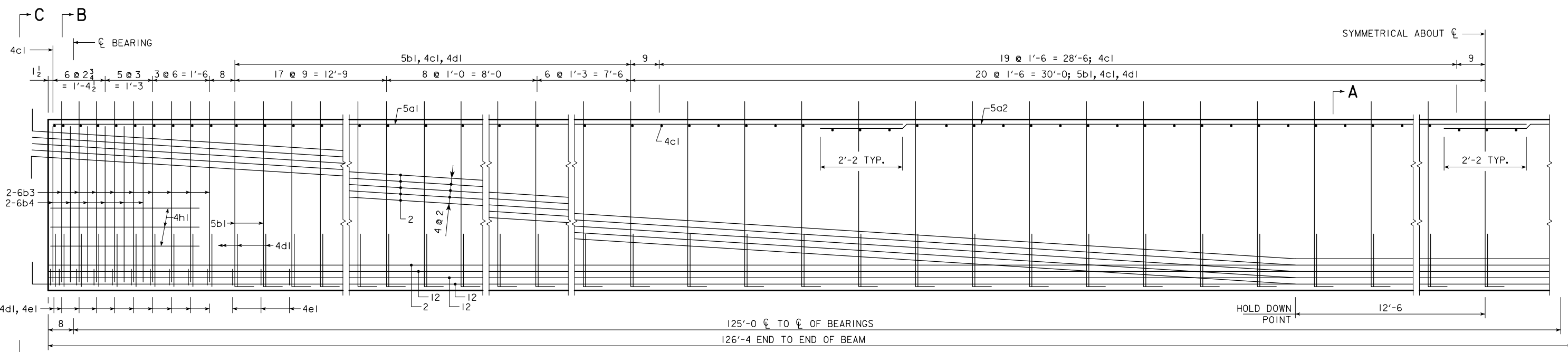
SECTION B-B



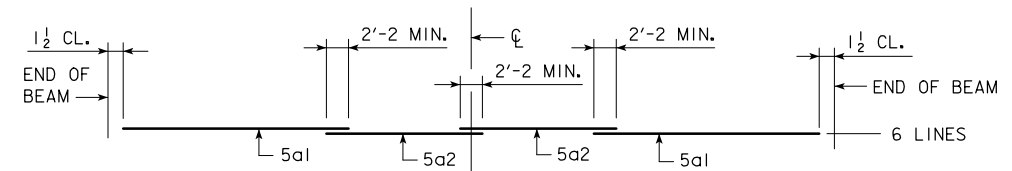
SECTION C-C

BTD115 BEAM DETAILS

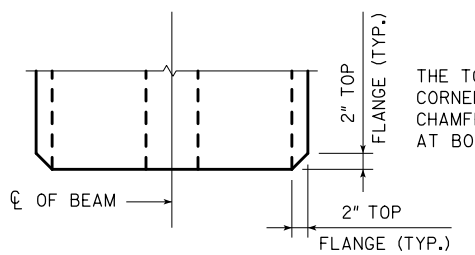
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



BTD125

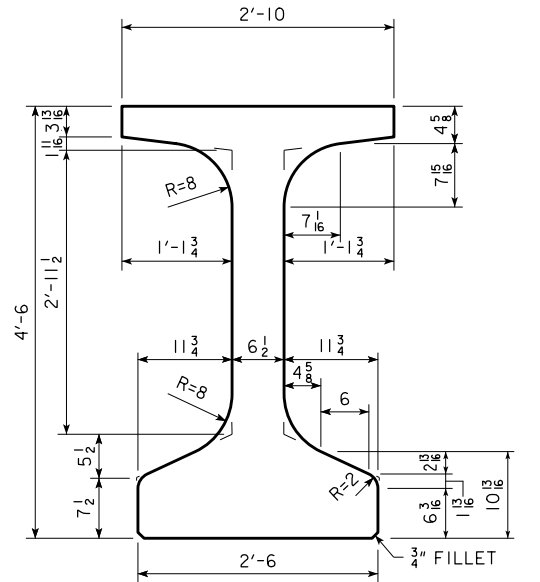


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

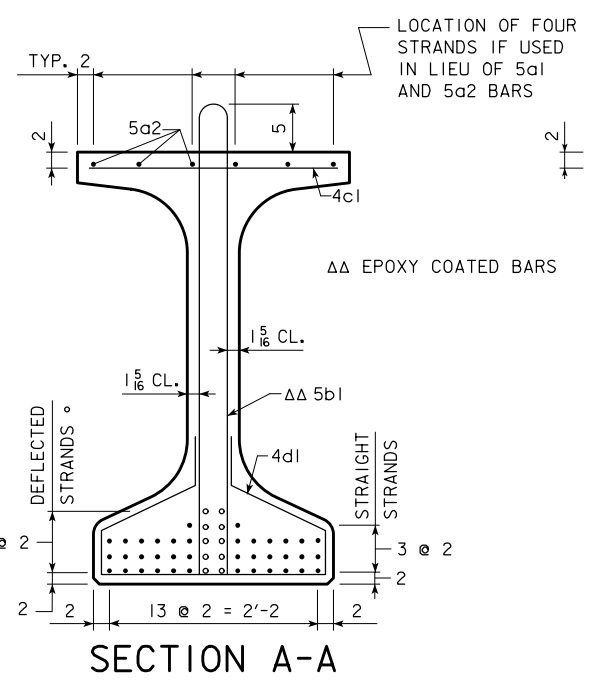
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



BTD BEAM CROSS SECTION

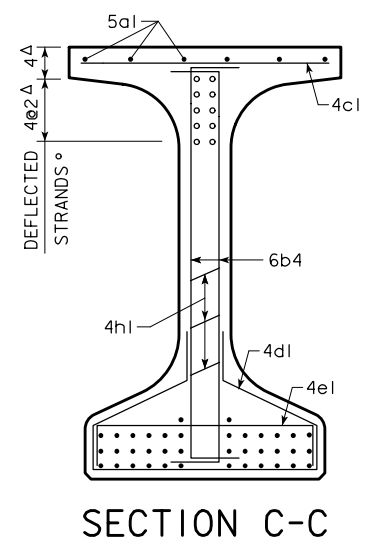
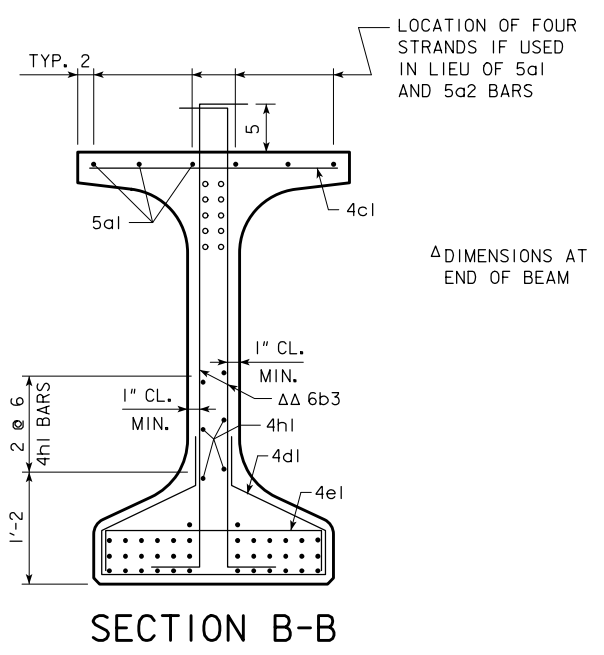
BEAM SECTION PROPERTIES

AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
I = 285,860 in⁴



SECTION A-A (ALTERNATE)

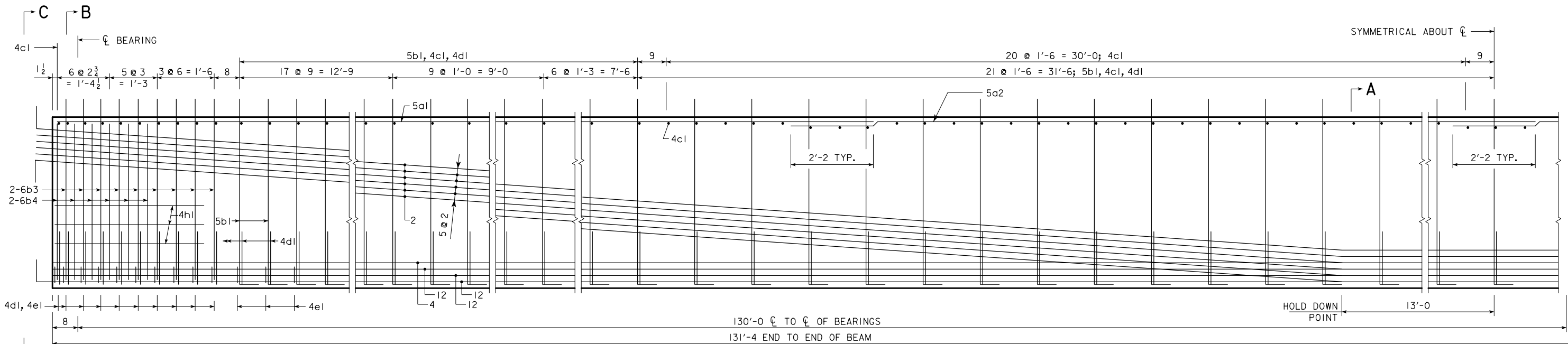
SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



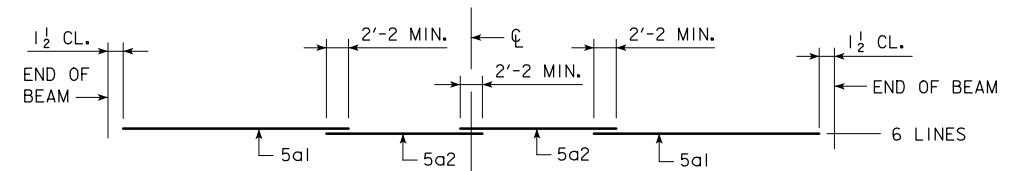
BTD125 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

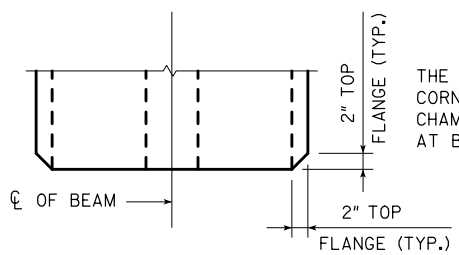
REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4746 - THIS SHEET ISSUED 05-04.



BTD130

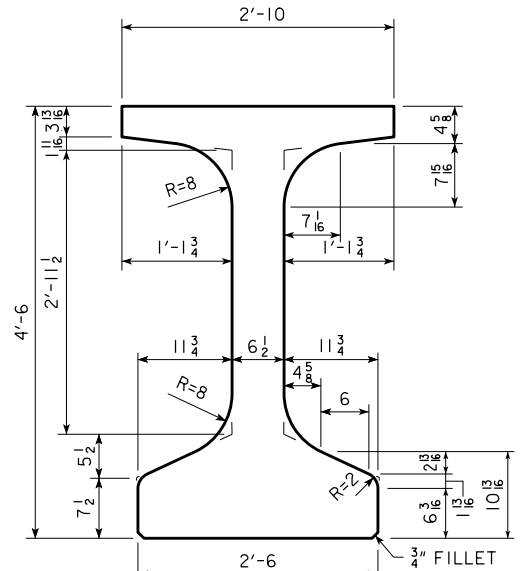


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

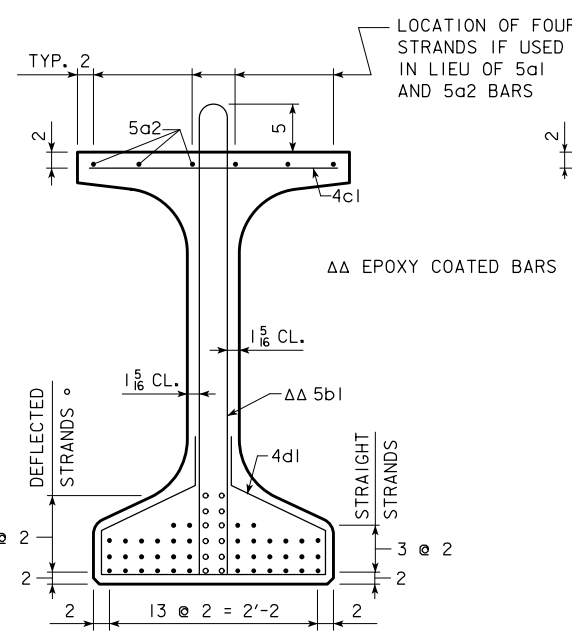
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



BTD BEAM CROSS SECTION

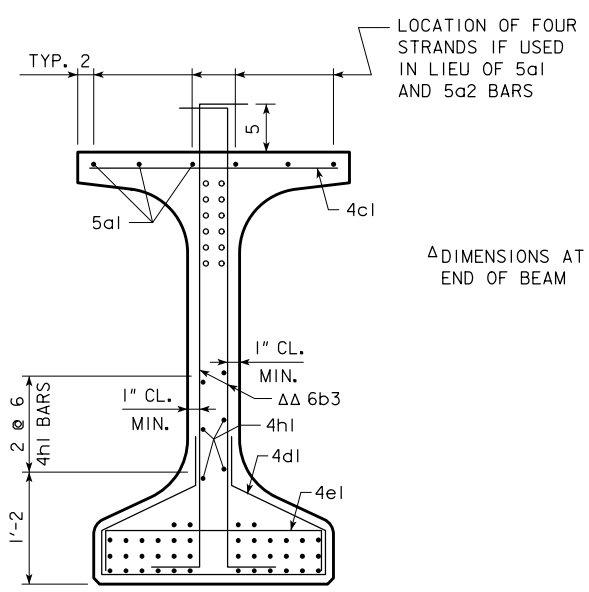
AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
 I = 285,860 in⁴

BEAM SECTION PROPERTIES

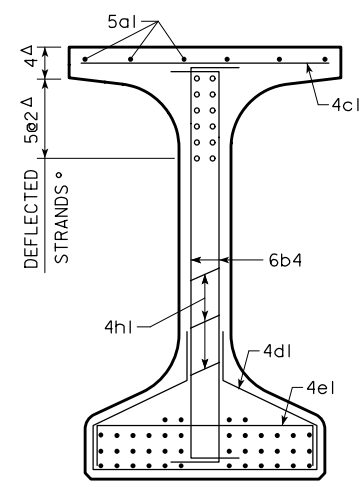


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4730.



SECTION B-B



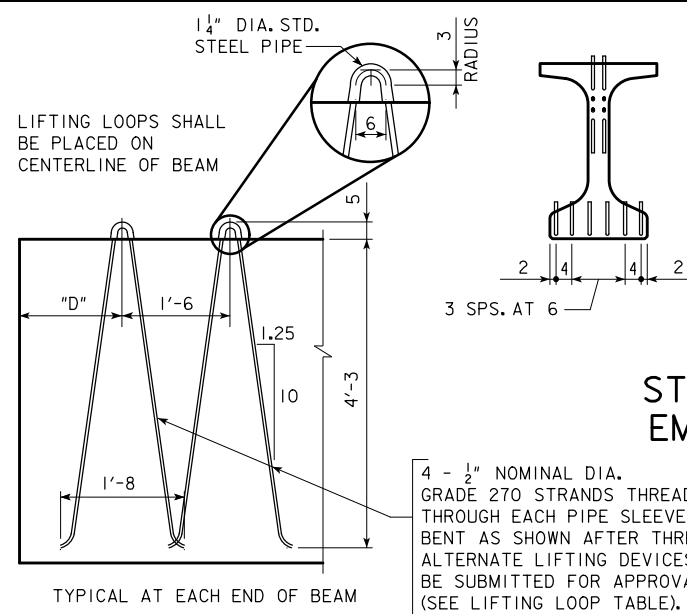
SECTION C-C

BTD130 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 10-07 - 5b2 BAR DELETED-5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4747 - THIS SHEET ISSUED 05-04.

CORRECTION 12-13 - COIL TIE DETAIL WAS CHANGED TO REFLECT THE DISTANCE BETWEEN COIL TIE ANCHORS EMBEDDED 4 INCH. ENGLISHBEAMS.DGN 4748SI - THIS SHEET ISSUED 05-04.



THE TOP AND BOTTOM ROWS OF THE DEFLECTED STRANDS ARE TO BE CUT WITH 1'-6\"/>

STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS

LIFTING LOOP DETAIL

LIFTING LOOP AND OVERHANG TABLE

BEAM	LIFTING LOOPS EACH END	# OF STRANDS PER LOOP	D	BEAM OVERHANG (FT)
BTD135	2	4	9'-3	16

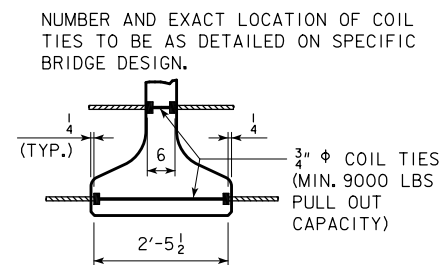
LIFTING LOOPS SHALL CARRY LOADS EQUALLY.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007. REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. CONCRETE IN ACCORDANCE WITH SECTION 5. PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 270.

SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS. DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.



COIL TIE DETAIL

ΔΔ 5b1 AND 6b3 BARS TO BE EPOXY COATED
* 6b3 AND 6b4 BARS TO BE USED IN PAIRS

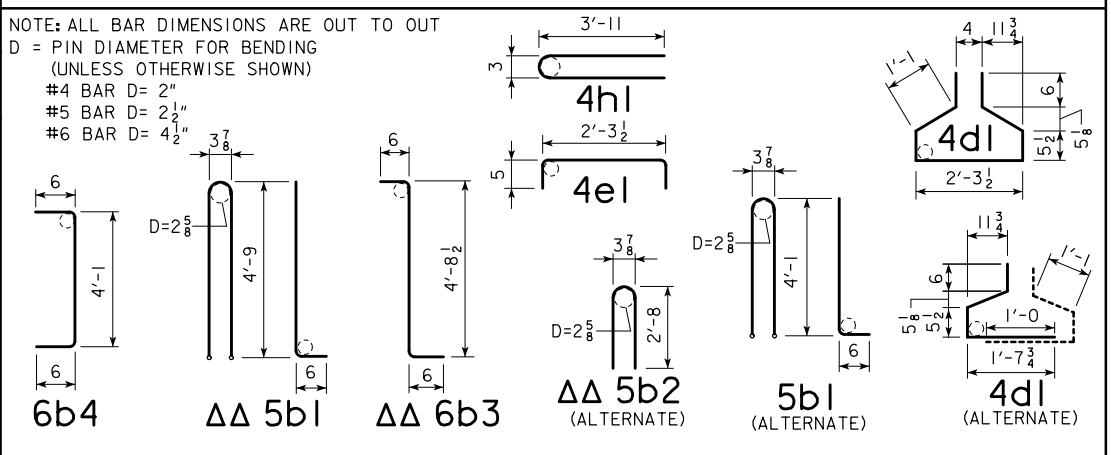
ALTERNATE BAR NOTES:

ALTERNATE BARS SHOWN IN BENT BAR DETAILS MAY BE USED IN LIEU OF REINFORCING BARS SHOWN IN BAR LIST. NO ADDITIONAL PAYMENT SHALL BE MADE FOR USE OF ALTERNATE BARS.

REINFORCING BAR LIST

BEAM	SHAPE	NO.	LENGTH
5a1	—	12	31'-4
5a2	—	12	40'-0
ΔΔ 5b1	—	111	10'-8
ΔΔ * 6b3	—	36	5'-9
* 6b4	—	24	5'-1
4c1	—	175	2'-7
4d1	—	131	6'-5
4e1	—	26	3'-2
4h1	—	6	8'-0

BENT BAR DETAILS



BTD135 BEAM DATA

BTD BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	CONCRETE STRENGTH		STRAND SIZE (in)	NO. OF STRAND		TOTAL INITIAL PRESTRESS kips	HOLD DOWN FORCE-kips	CAMBER (in)		DEFLECTION (in) Δ _D		PERMISSIBLE MAXIMUM SPACING	WEIGHT (TONS)	CONCRETE (CU YD.)	REINFORCING STEEL (WEIGHT-LBS)
			f'ci (ksi)	f'c (ksi)		STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) Δ _i	TIME (PLASTIC) Δ _T				
			STEEL DIAPHRAGM	STEEL DIAPHRAGM		HL-93 LOADING	STEEL DIAPHRAGM										
BTD135	135'-0	136'-4	8.00	9.00	0.60	42	12	2297	29.5	3.57	6.27	4.51	1.13	9'-0 1/2	53.2	26.2	3572

BEAM NOTES:

THIS BEAM IS DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 LBS PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE. ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION. ALL PRESTRESSING STRANDS EXCEPT LIFTING LOOP STRANDS SHALL BE 0.60 IN. NOMINAL DIAMETER (NOMINAL STEEL AREA = 0.217 in²) AND CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS. MINIMUM STRAND BREAKING STRENGTH SHALL BE 58.6 kips. TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570. BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAM TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER. THE PORTIONS OF THE PRESTRESSED BEAM THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, I, OF THE STANDARD SPECIFICATIONS. ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE. FOR TRANSPORTING, THE ALLOWABLE OVERHANG IS SHOWN IN THE "LIFTING LOOP AND OVERHANG TABLE". THE CONTRACTOR SHALL ASSURE THE LATERAL STABILITY OF THE BEAM DURING HANDLING, TRANSPORTING AND ERECTION BY PROVIDING TEMPORARY BRACING AS NEEDED. HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET. IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET. IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE END OF BEAM AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE. WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION). MINIMUM CONCRETE f'c (AT 28 DAYS) AND MINIMUM f'ci AT RELEASE ARE LOCATED IN THE BTD135 BEAM DATA TABLE ABOVE. FOUR 0.60 IN. DIAMETER STRANDS STRESSED TO NOT MORE THAN 5000 lbs. EACH MAY BE USED IN LIEU OF BARS 5a1 AND 5a2 IN THE TOP FLANGE.

① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB (8 in) AND HAUNCH (1.5 in) WEIGHT OF: 0.96 kips/ft FOR 9'-0 1/2 BEAM SPACING AND TWO STEEL DIAPHRAGMS, (0.500 kips) PLACED 20'-0, ON EITHER SIDE, OF THE BEAM CENTERLINE. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHT, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.

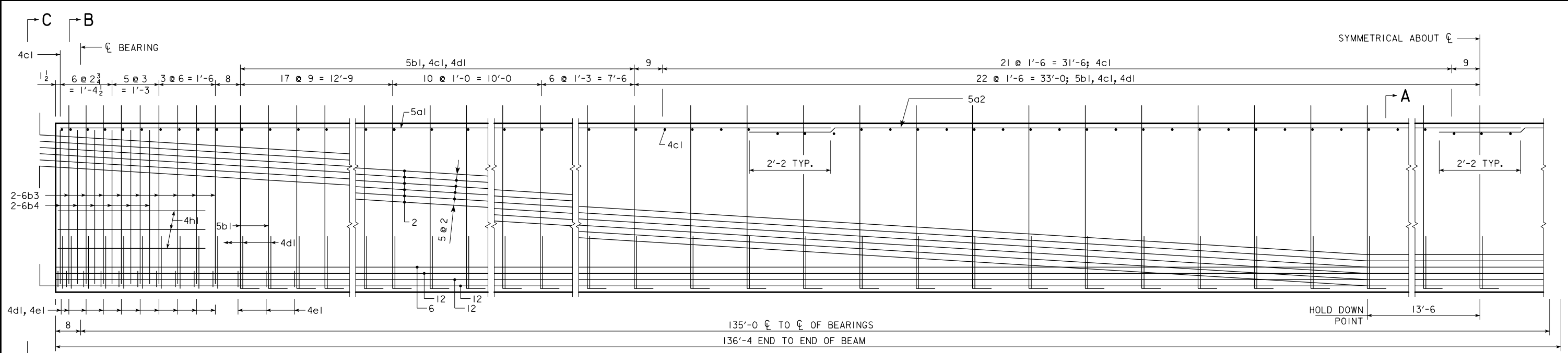
② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB. TOTAL BEAM DEFLECTIONS AT 1/2 OF SPAN, Δ_D, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:
(A) Δ_D = Δ_i + Δ_T FOR SIMPLE SPAN.
(B) Δ_D = Δ_i + 3/4 Δ_T FOR END SPANS OF CONTINUOUS BRIDGE.
(C) Δ_D = Δ_i + 1/2 Δ_T FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.

③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi. AND A_s = 0.217 in².

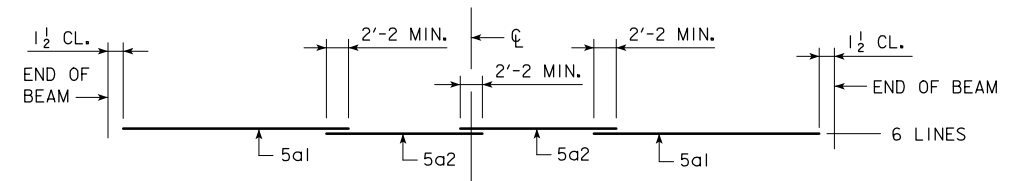
CALCULATED DESIGN CAMBERS HAVE BEEN REDUCED FROM THEIR THEORETICAL VALUES BY 15% TO AID CONSTRUCTABILITY.

BTD135 BEAM DETAILS

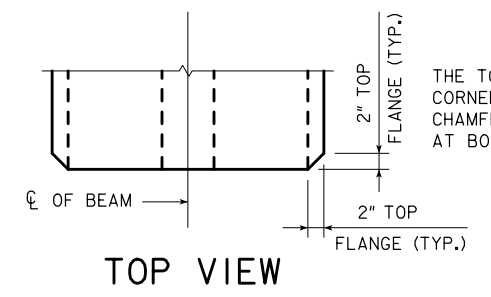
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



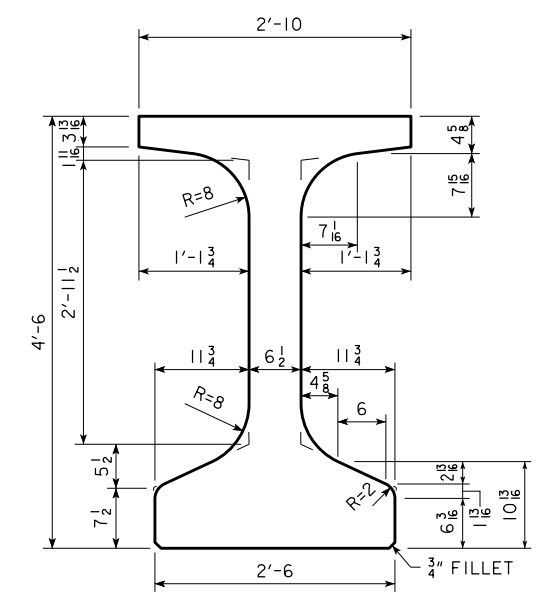
BTDI35



TOP FLANGE LONGITUDINAL BAR LAYOUT



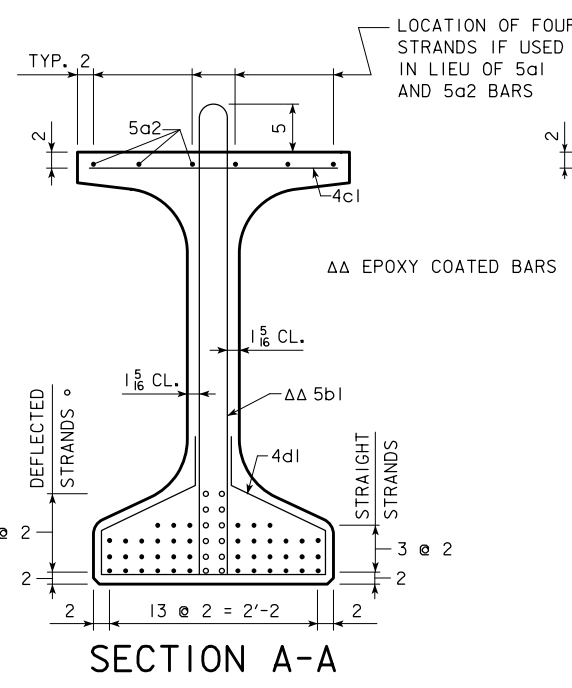
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



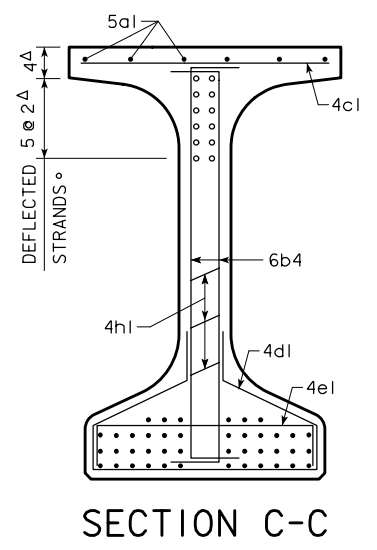
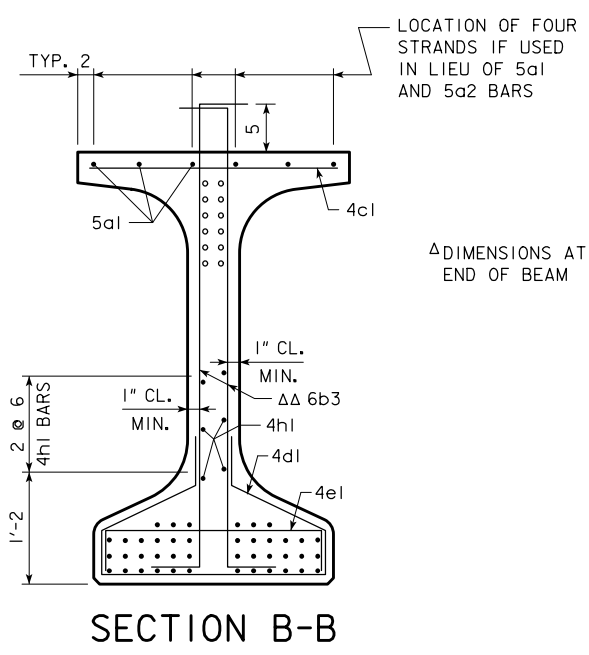
BEAM SECTION PROPERTIES

AREA = 748.8 in²
 $\bar{y}_b = 24.64$ in
I = 285,860 in⁴

BTD BEAM CROSS SECTION



SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4748 (SHEET 1).

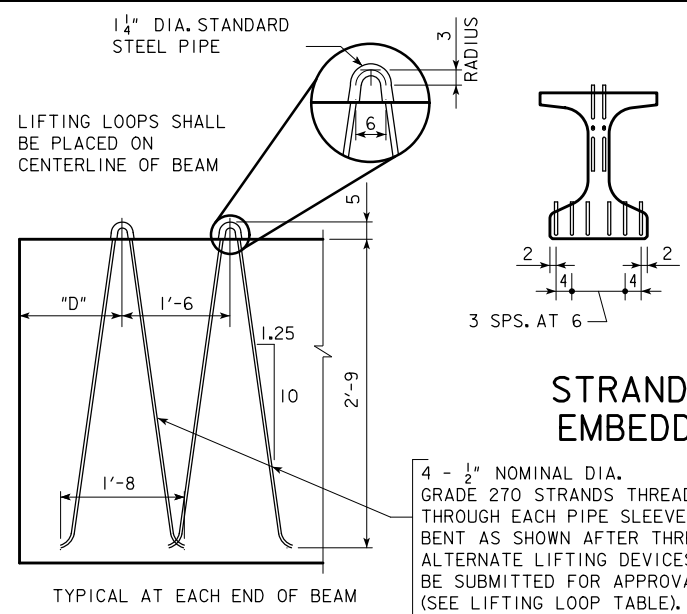


BTDI35 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 10-07 - 5b2 BAR DELETED, 5b1 BAR LENGTHENED TO EXTEND 5 INCHES ABOVE BEAM TOP. ENGLISHBEAMS.DGN 4748S2 - THIS SHEET ISSUED 05-04.

CORRECTION 12-13 - COIL TIE DETAIL WAS CHANGED TO REFLECT THE DISTANCE BETWEEN COIL TIE ANCHORS EMBEDDED 4 INCH. ENGLISHBEAMS.DGN - 4750 - THIS SHEET ISSUED 02-08.



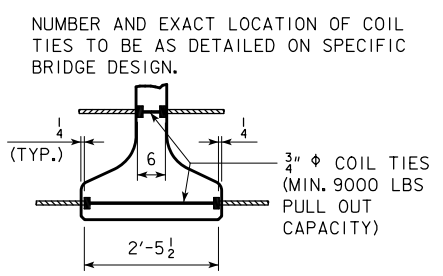
LIFTING LOOP DETAIL

LIFTING LOOP AND OVERHANG TABLE

BEAMS	LIFTING LOOPS EACH END	# OF STRANDS PER LOOP	D	BEAM OVERHANG (FT)
BTB30-BTB75	1	4	2'-0"	**
BTB80-BTB85	2	4	2'-0"	8
BTB90	2	4	2'-6"	9
BTB95	2	4	2'-6"	11

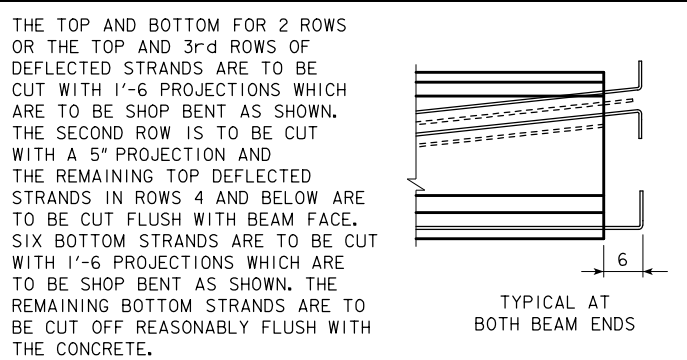
** IN ACCORDANCE WITH ARTICLE 2407.03, K OF THE STANDARD SPECIFICATIONS.

LIFTING LOOPS SHALL CARRY LOADS EQUALLY.



COIL TIE DETAIL

ΔΔ 5b1 AND 6b3 BARS TO BE EPOXY COATED
* 6b3 AND 6b4 BARS TO BE USED IN PAIRS



STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS

DESIGN STRESSES:

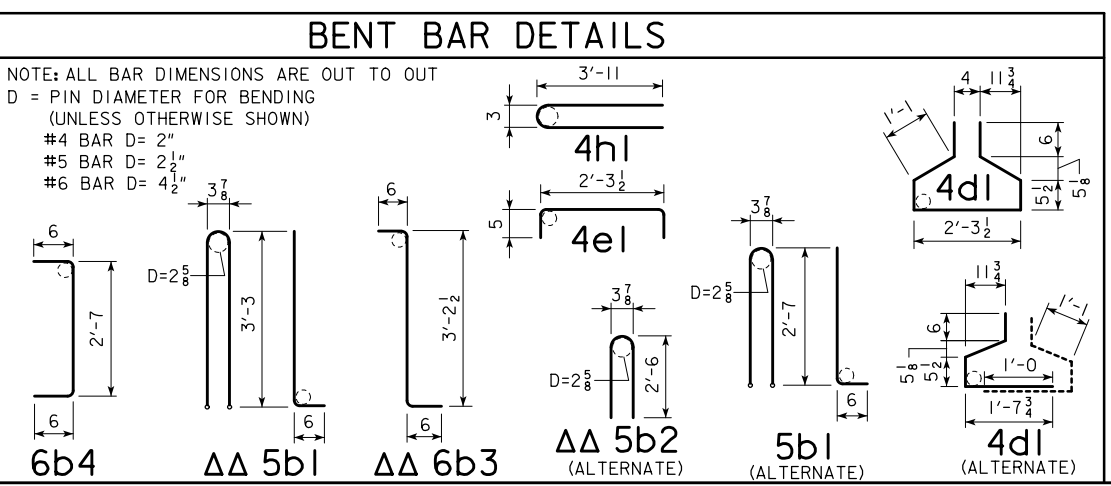
DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007. REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 270.

SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS. DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

ALTERNATE BAR NOTES:

ALTERNATE BARS SHOWN IN BENT BAR DETAILS MAY BE USED IN LIEU OF REINFORCING BARS SHOWN IN BAR LIST. NO ADDITIONAL PAYMENT SHALL BE MADE FOR USE OF ALTERNATE BARS.



REINFORCING BAR LIST

BEAM	BTB30	BTB35	BTB40	BTB45	BTB50	BTB55	BTB60	BTB65	BTB70	BTB75	BTB80	BTB85	BTB90	BTB95	BEAM
BAR SHAPE	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	NO. LENGTH	BAR
5a1	6 31'-1"	6 36'-1"	6 41'-1"	12 24'-2"	12 26'-8"	12 29'-2"	12 31'-8"	12 34'-2"	12 36'-8"	12 39'-2"	12 22'-9"	12 25'-3"	12 27'-9"	12 30'-3"	5a1
5a2											6 40'-0"	6 40'-0"	6 40'-0"	6 40'-0"	5a2
ΔΔ 5b1	17 7'-8"	21 7'-8"	25 7'-8"	29 7'-8"	35 7'-8"	39 7'-8"	43 7'-8"	49 7'-8"	53 7'-8"	57 7'-8"	61 7'-8"	65 7'-8"	69 7'-8"	75 7'-8"	5b1 ΔΔ
ΔΔ * 6b3	36 4'-3"	36 4'-3"	36 4'-3"	36 4'-3"	36 4'-3"	36 4'-3"	36 4'-3"	36 4'-3"	32 4'-3"	32 4'-3"	32 4'-3"	32 4'-3"	32 4'-3"	32 4'-3"	6b3 ΔΔ *
* 6b4	4 3'-7"	4 3'-7"	4 3'-7"	4 3'-7"	4 3'-7"	4 3'-7"	4 3'-7"	4 3'-7"	8 3'-7"	8 3'-7"	8 3'-7"	16 3'-7"	16 3'-7"	16 3'-7"	6b4 *
4c1	45 2'-7"	51 2'-7"	55 2'-7"	61 2'-7"	67 2'-7"	71 2'-7"	77 2'-7"	83 2'-7"	89 2'-7"	95 2'-7"	101 2'-7"	105 2'-7"	109 2'-7"	115 2'-7"	4c1
4d1	37 6'-5"	41 6'-5"	45 6'-5"	49 6'-5"	55 6'-5"	59 6'-5"	63 6'-5"	69 6'-5"	73 6'-5"	77 6'-5"	81 6'-5"	87 6'-5"	91 6'-5"	97 6'-5"	4d1
4e1	24 3'-2"	24 3'-2"	24 3'-2"	24 3'-2"	24 3'-2"	24 3'-2"	24 3'-2"	24 3'-2"	24 3'-2"	24 3'-2"	24 3'-2"	26 3'-2"	26 3'-2"	26 3'-2"	4e1
4h1	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4 8'-0"	4h1

BTB BEAM DATA

BTB BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	CONCRETE STRENGTH		STRAIGHT STRAND DIA. (in)	NO. OF STRAND		TOTAL INITIAL PRESTRESS kips	HOLD DOWN FORCE-kips	CAMBER (in)		DEFLECTION (in) Δ _D		PERMISSIBLE MAXIMUM SPACING HL-93 LOADING	WEIGHT (TONS)	CONCRETE (CU YD.)	REINFORCING STEEL (WEIGHT-LBS)
			f'ci (ksi)	f'c (ksi)		STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) Δ _E	TIME (PLASTIC) Δ _T				
			STEEL DIAPHRAGM	STEEL DIAPHRAGM		STEEL DIAPHRAGM	STEEL DIAPHRAGM										
BTB30	30'-0"	31'-4"	4.5	5.0	0.60	8	—	340	—	0.13	0.23	0.04	0.01	9'-3"	10.3	5.1	890
BTB35	35'-0"	36'-4"	4.5	5.0	0.60	10	—	425	—	0.22	0.39	0.08	0.02	9'-3"	12.0	5.9	981
BTB40	40'-0"	41'-4"	4.5	5.0	0.60	12	—	510	—	0.34	0.61	0.14	0.03	9'-3"	13.6	6.7	1068
BTB45	45'-0"	46'-4"	4.5	5.0	0.60	12	—	510	—	0.40	0.71	0.21	0.05	9'-3"	15.2	7.5	1173
BTB50	50'-0"	51'-4"	4.5	5.0	0.60	14	—	596	—	0.55	0.98	0.31	0.08	9'-3"	16.9	8.3	1288
BTB55	55'-0"	56'-4"	4.5	5.0	0.60	16	—	681	—	0.71	1.27	0.46	0.11	9'-3"	18.5	9.2	1376
BTB60	60'-0"	61'-4"	4.5	5.0	0.60	16	2	765	8.6	0.88	1.56	0.65	0.16	9'-3"	20.2	10.0	1467
BTB65	65'-0"	66'-4"	4.5	5.0	0.60	18	2	851	8.0	1.13	2.01	0.88	0.22	9'-3"	21.8	10.8	1582
BTB70	70'-0"	71'-4"	5.0	5.5	0.60	20	2	936	7.4	1.32	2.35	1.13	0.28	9'-3"	23.5	11.6	1669
BTB75	75'-0"	76'-4"	5.5	6.5	0.60	22	4	1106	13.0	1.65	2.92	1.36	0.34	9'-3"	25.1	12.4	1759
BTB80	80'-0"	81'-4"	6.0	7.0	0.60	24	6	1276	17.0	1.94	3.44	1.70	0.42	9'-3"	26.8	13.2	1864
BTB85	85'-0"	86'-4"	6.5	7.5	0.60	26	8	1446	19.7	2.31	4.09	2.08	0.52	9'-3"	28.4	14.0	2007
BTB90	90'-0"	91'-4"	7.5	8.5	0.60	30	8	1616	18.6	2.71	4.81	2.46	0.62	9'-3"	30.0	14.8	2094
BTB95	95'-0"	96'-4"	8.0	9.0	0.60	32	10	1786	20.1	3.07	5.42	2.96	0.74	9'-3"	31.7	15.7	2210

- ① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB (8 in) AND HAUNCH (1.5 in) WEIGHT OF: 0.98 kips/ft FOR 9'-3" BEAM SPACING AND ONE STEEL DIAPHRAGM (0.500 kips) AT C OF SPAN. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.
- ② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB. TOTAL BEAM DEFLECTIONS AT C OF SPAN, Δ_D, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE: (A) Δ_D = Δ_E + Δ_T FOR SIMPLE SPAN. (B) Δ_D = Δ_E + 3/4 Δ_T FOR END SPANS OF CONTINUOUS BRIDGE. (C) Δ_D = Δ_E + 1/2 Δ_T FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.
- ③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi. AND A_s = 0.217 in².

BEAM NOTES:

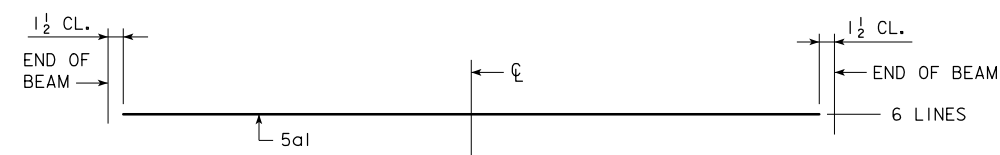
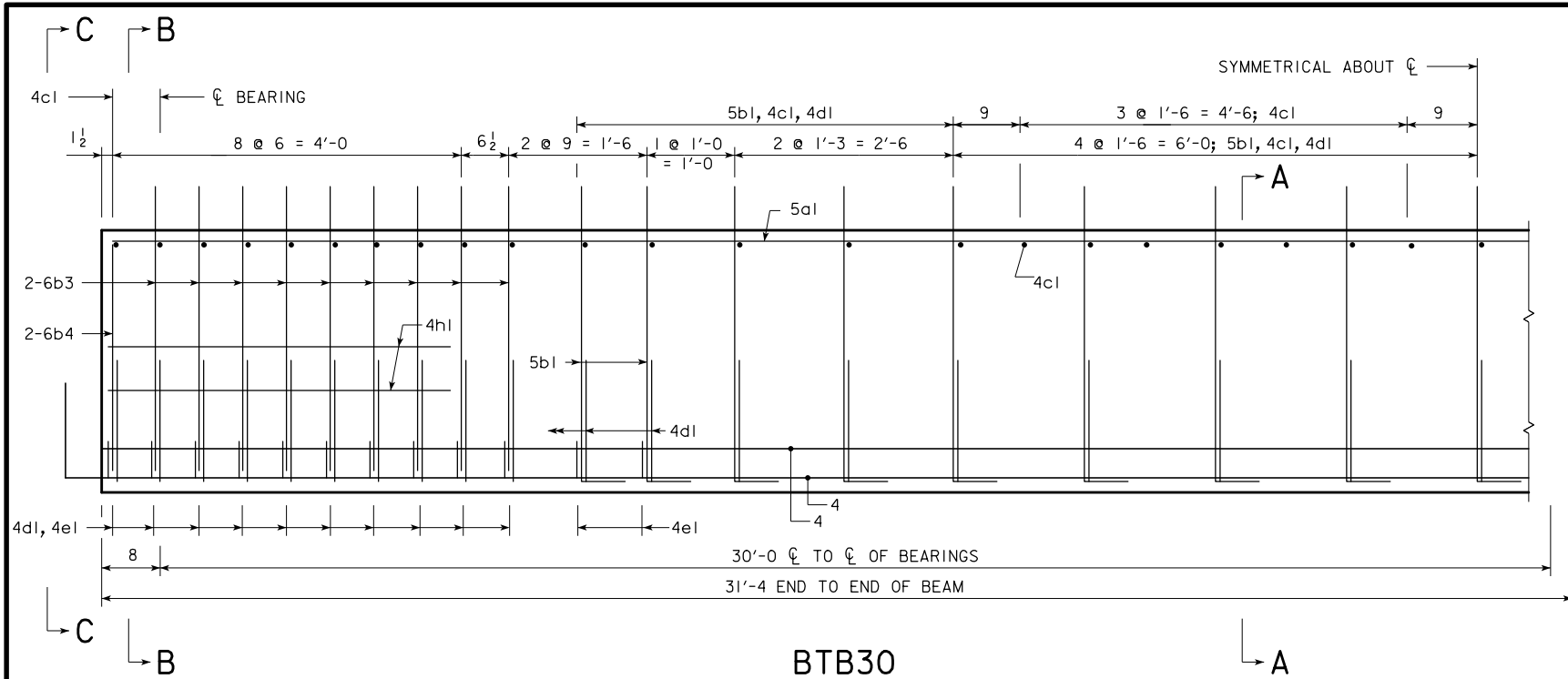
THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 LBS PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE. ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION. ALL PRESTRESSING STRANDS EXCEPT LIFTING LOOP STRANDS SHALL BE 0.60 IN. NOMINAL DIAMETER (NOMINAL STEEL AREA = 0.217 in²) AND CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS. MINIMUM STRAND BREAKING STRENGTH SHALL BE 58.6 kips. TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570. BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER. THE PORTIONS OF THE PRESTRESSED BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, I, OF THE STANDARD SPECIFICATIONS. ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE. FOR TRANSPORTING, THE ALLOWABLE OVERHANG IS SHOWN IN THE LIFTING LOOP AND OVERHANG TABLE. HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET. IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.

BEAM NOTES: (CONTINUED)

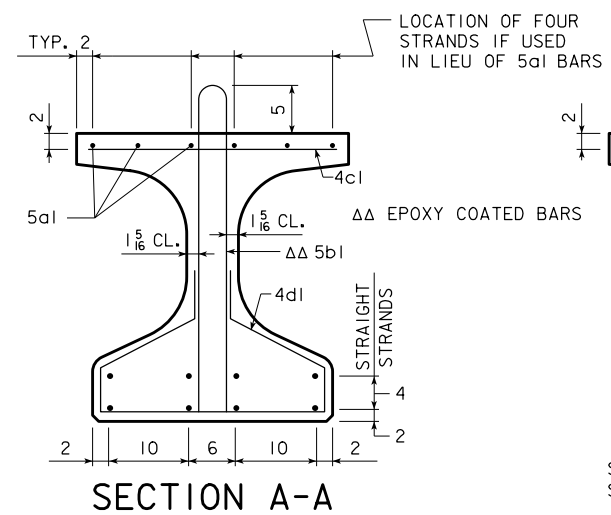
IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE. MINIMUM CONCRETE f'c (AT 28 DAYS) AND MINIMUM f'ci AT RELEASE ARE LOCATED IN THE BTB BEAM DATA TABLE ABOVE. FOUR 0.60 IN. DIAMETER STRANDS STRESSED TO NOT MORE THAN 5000 LBS EACH MAY BE USED IN LIEU OF BARS 5a1 AND 5a2 IN THE TOP FLANGE. WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION).

BTB BEAM DETAILS

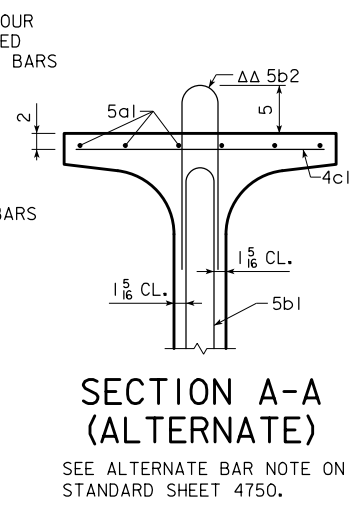
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



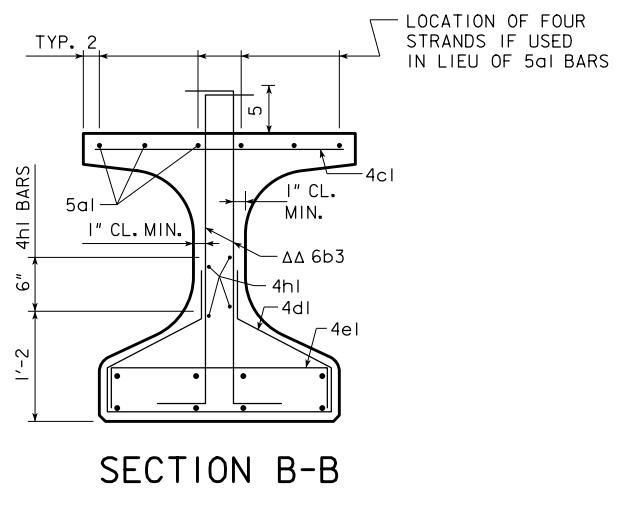
TOP FLANGE LONGITUDINAL BAR LAYOUT



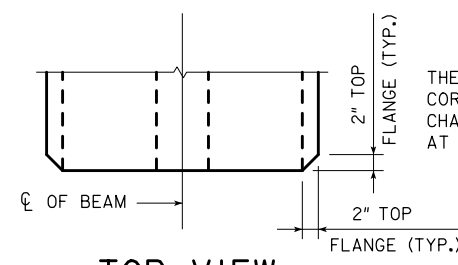
SECTION A-A



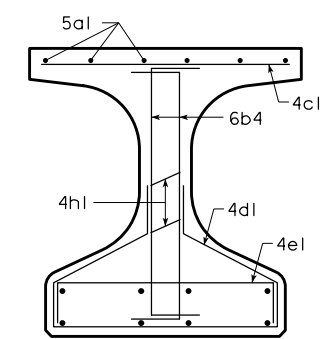
SECTION A-A (ALTERNATE)
SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



SECTION B-B



TOP VIEW

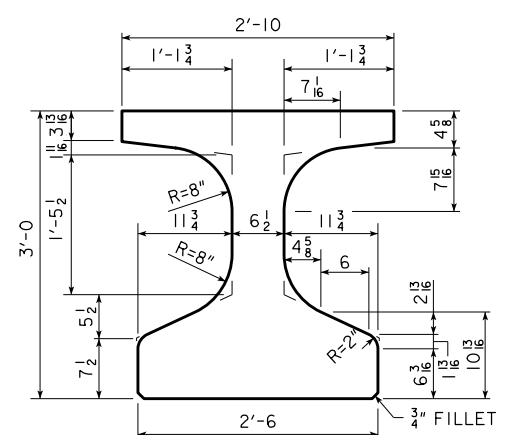


SECTION C-C

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2\"/>

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 I = 99,980 in⁴

BEAM SECTION PROPERTIES

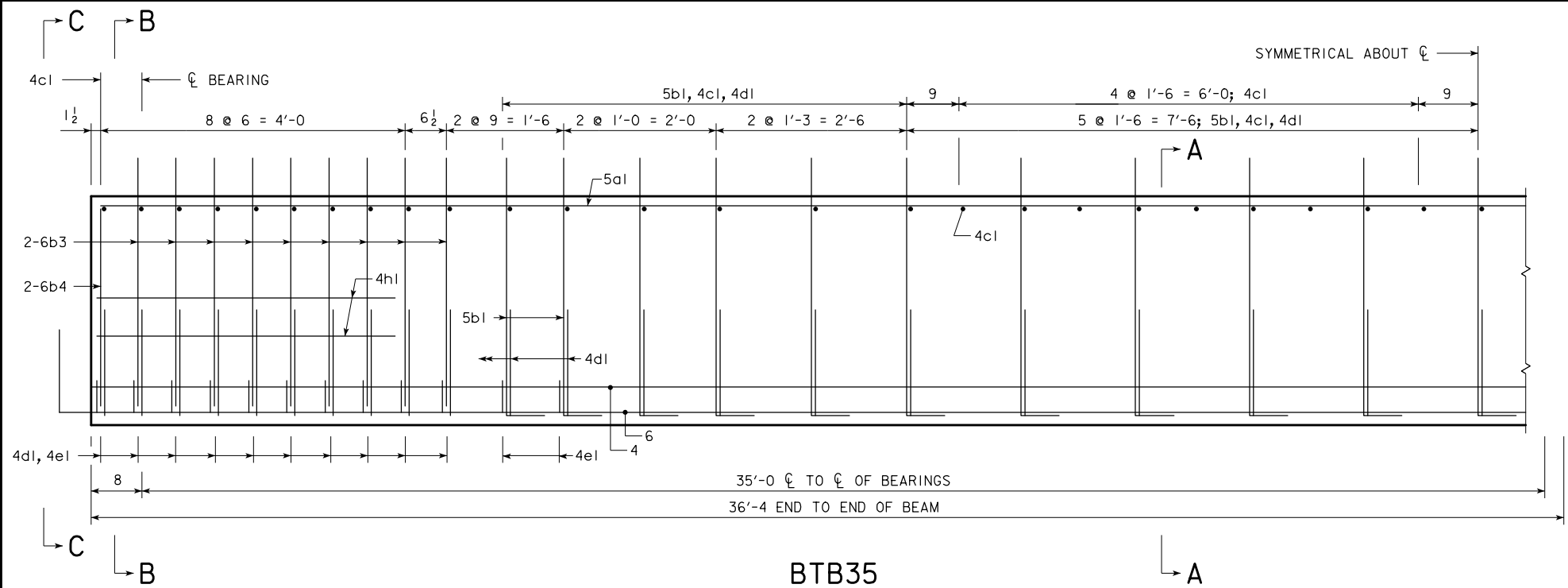


BTB BEAM CROSS SECTION

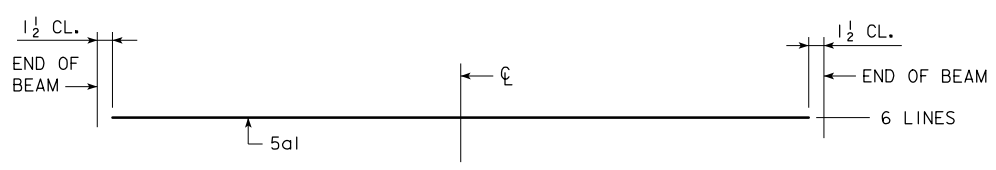
BTB30 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

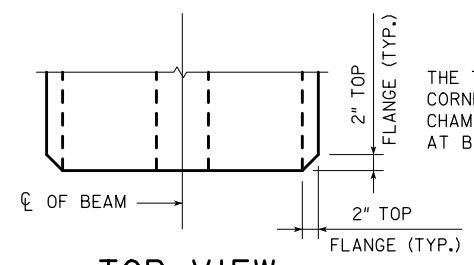
ENGLISHBEAMS.DGN - 4751 - THIS SHEET ISSUED 02-08.



BTB35

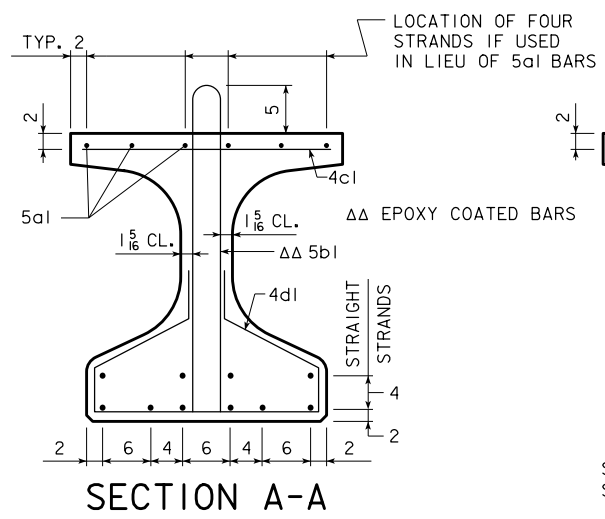


TOP FLANGE LONGITUDINAL BAR LAYOUT

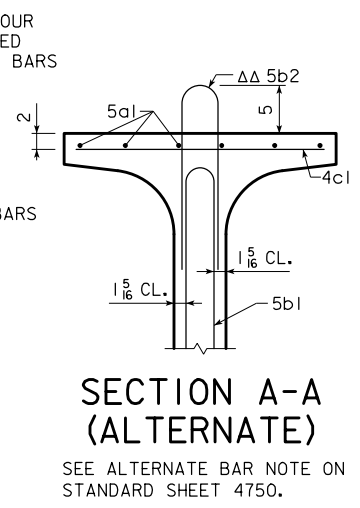


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2\"/>

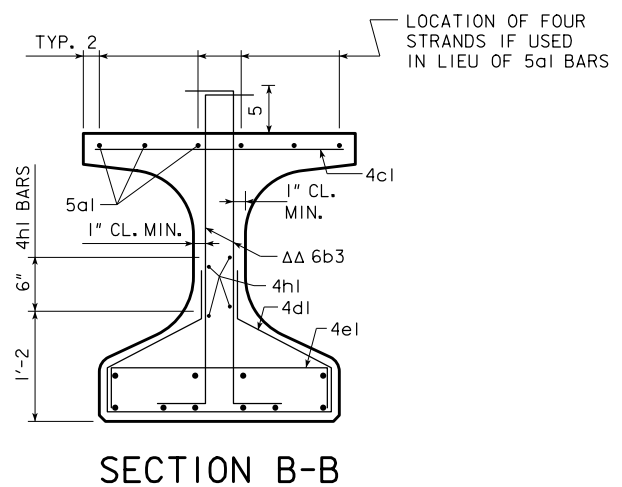


SECTION A-A

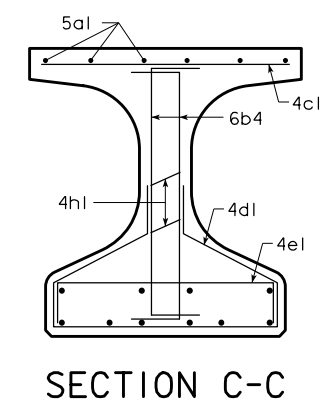


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



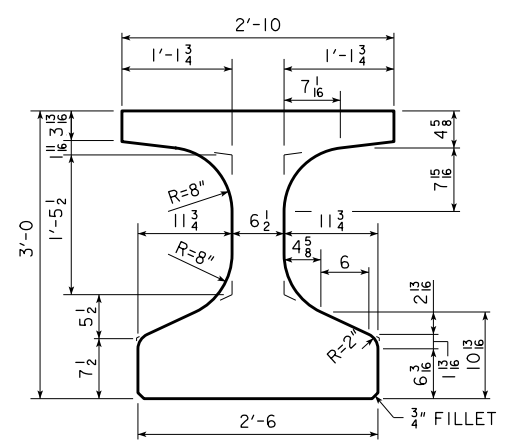
SECTION B-B



SECTION C-C

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 I = 99,980 in⁴

BEAM SECTION PROPERTIES

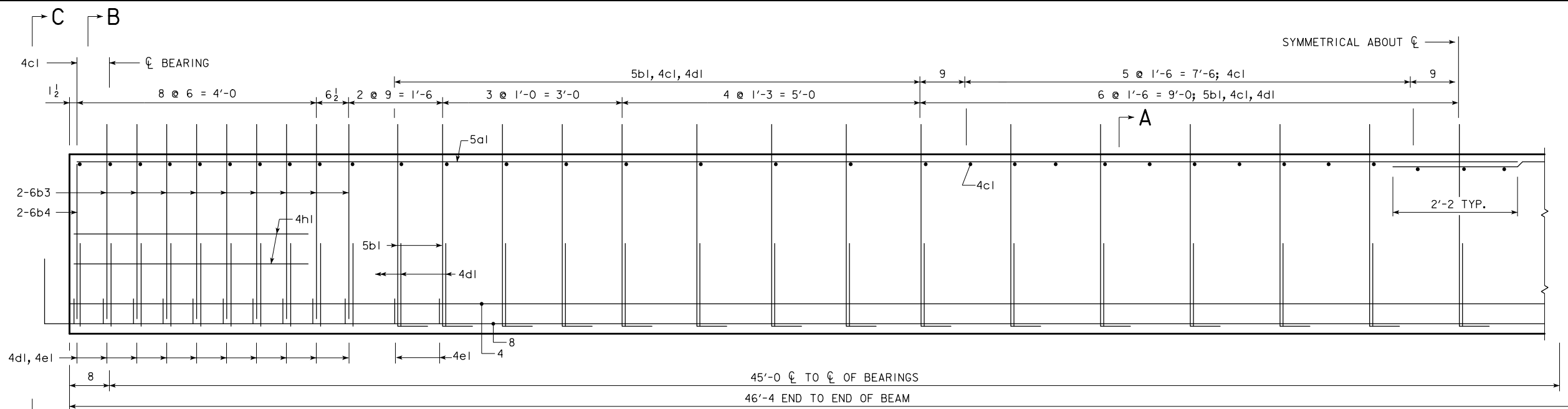


BTB BEAM CROSS SECTION

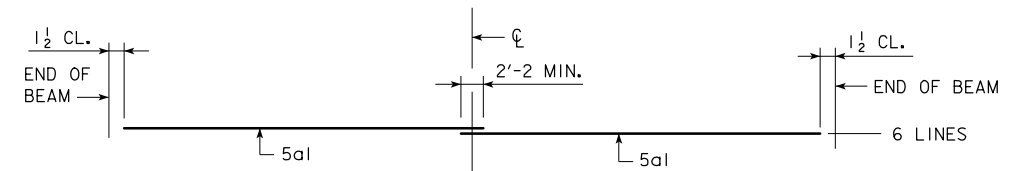
BTB35 BEAM DETAILS

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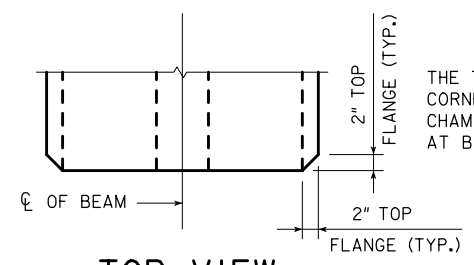
REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN - 4752 - THIS SHEET ISSUED 02-08.



BTB45

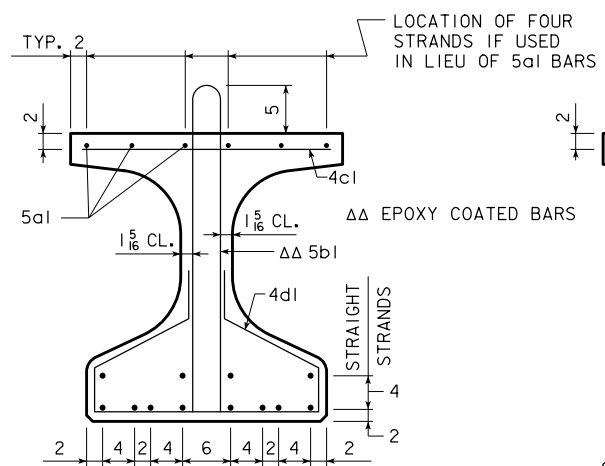


TOP FLANGE LONGITUDINAL BAR LAYOUT

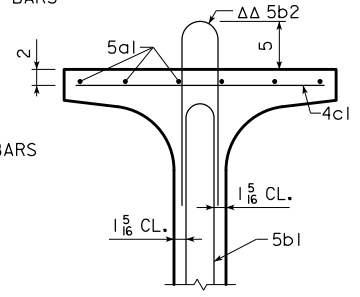


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

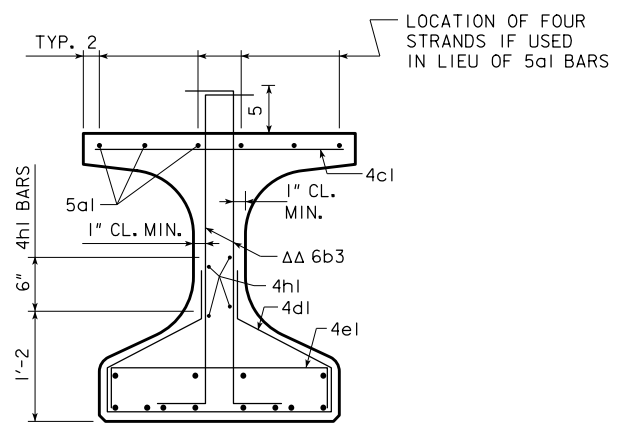


SECTION A-A

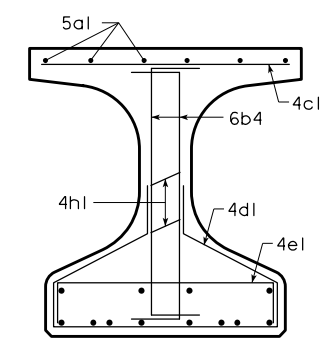


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



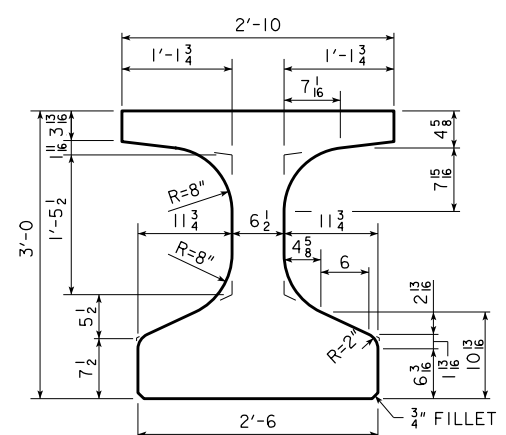
SECTION B-B



SECTION C-C

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 I = 99,980 in⁴

BEAM SECTION PROPERTIES

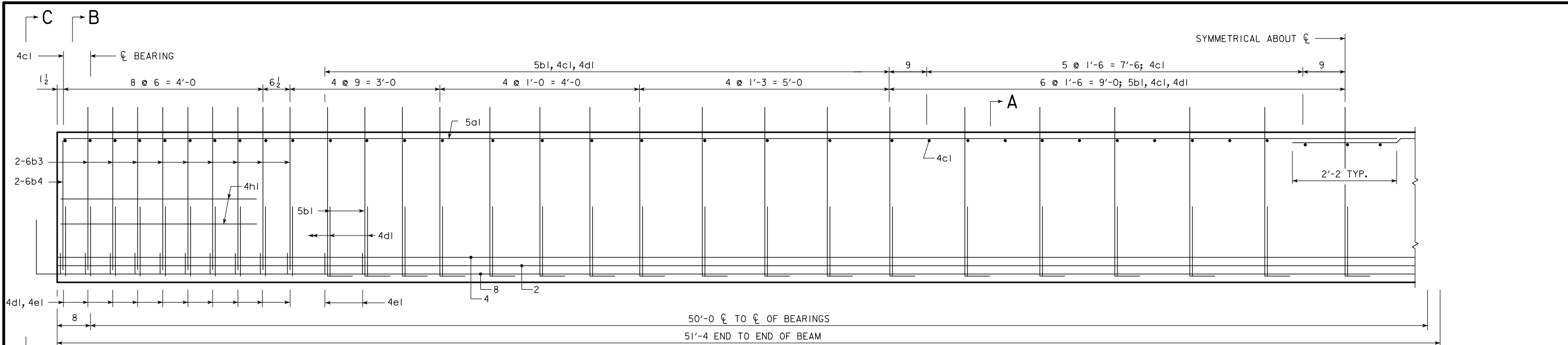


BTB BEAM CROSS SECTION

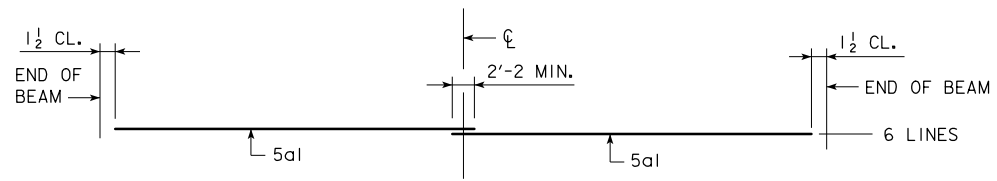
BTB45 BEAM DETAILS

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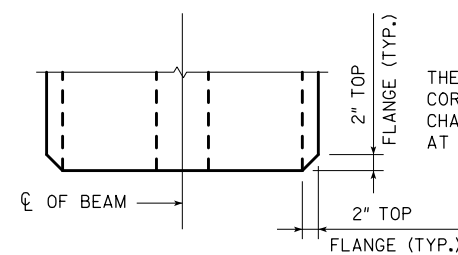
ENGLISHBEAMS.DGN - 4754 - THIS SHEET ISSUED 02-08.



BTB50

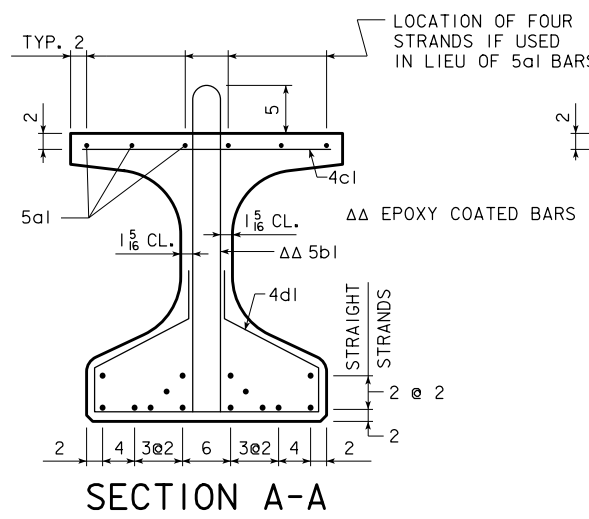


TOP FLANGE LONGITUDINAL BAR LAYOUT

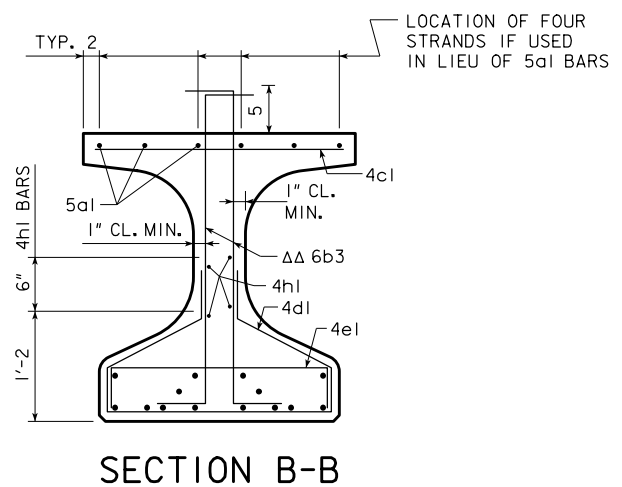


TOP VIEW

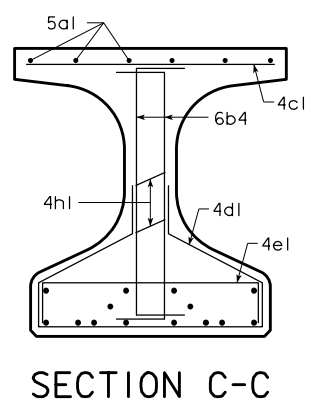
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



SECTION A-A (ALTERNATE)
SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



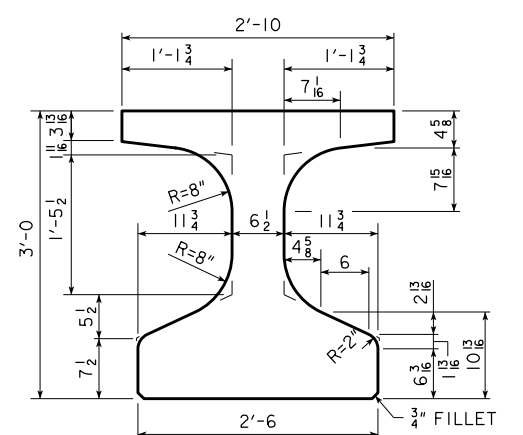
SECTION B-B



SECTION C-C

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 I = 99,980 in⁴

BEAM SECTION PROPERTIES

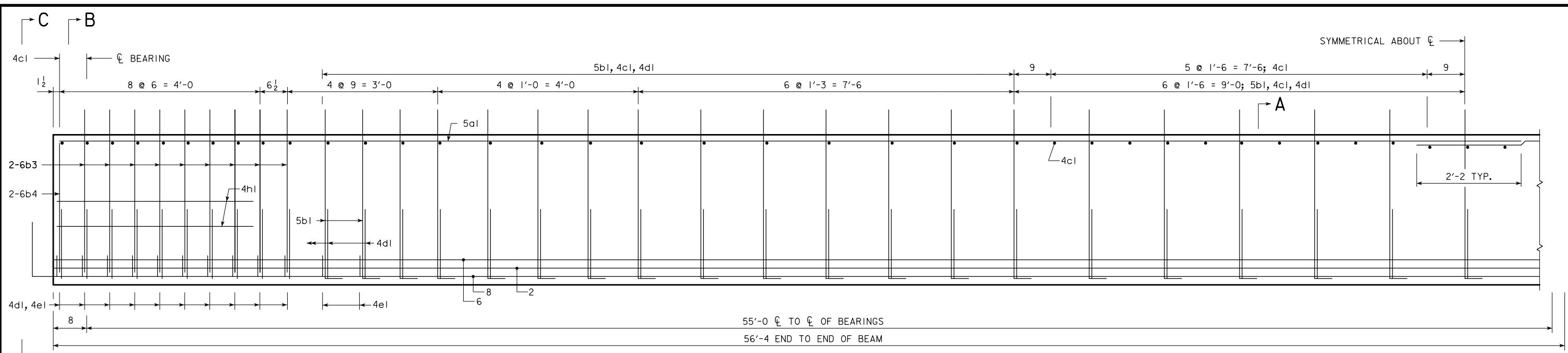


BTB BEAM CROSS SECTION

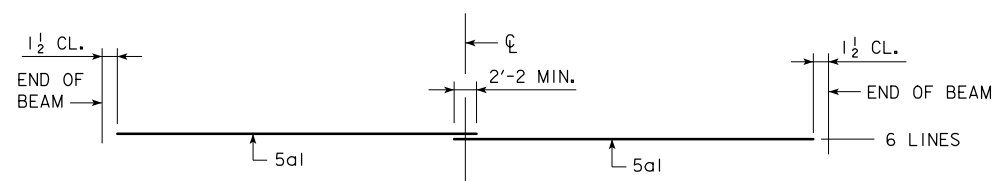
BTB50 BEAM DETAILS

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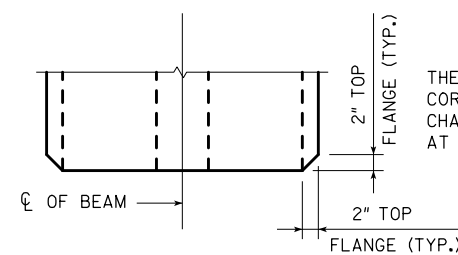
ENGLISHBEAMS.DGN - 4755 - THIS SHEET ISSUED 02-08.



BTB55

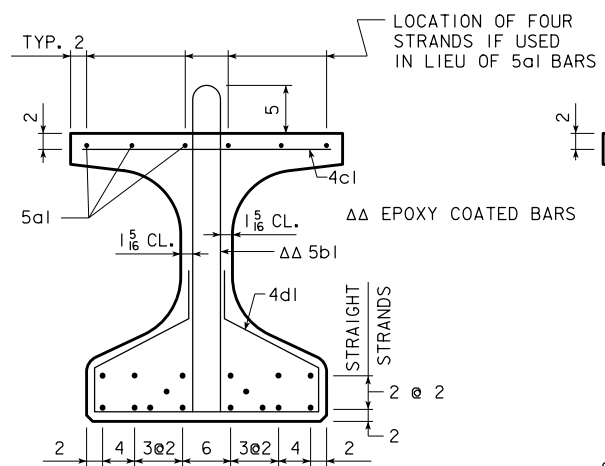


TOP FLANGE LONGITUDINAL BAR LAYOUT

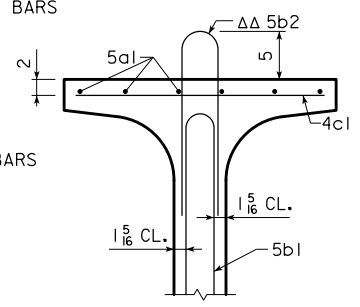


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

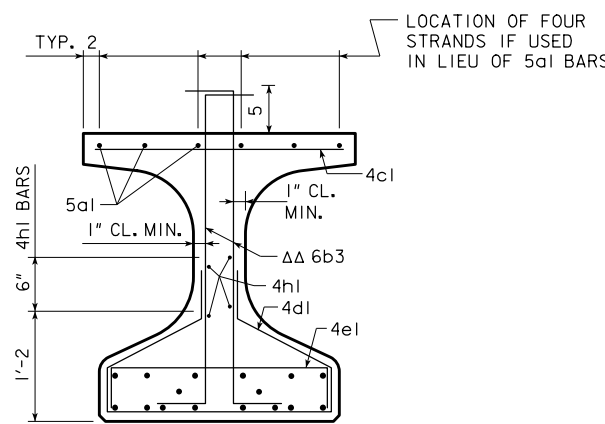


SECTION A-A

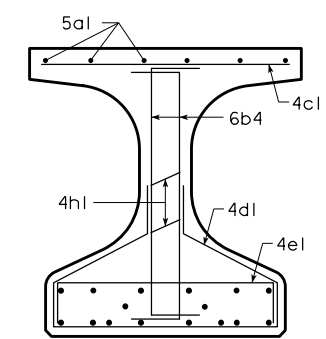


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



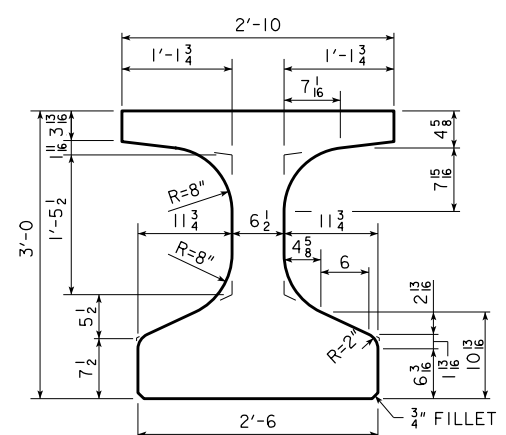
SECTION B-B



SECTION C-C

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in⁴

BEAM SECTION PROPERTIES

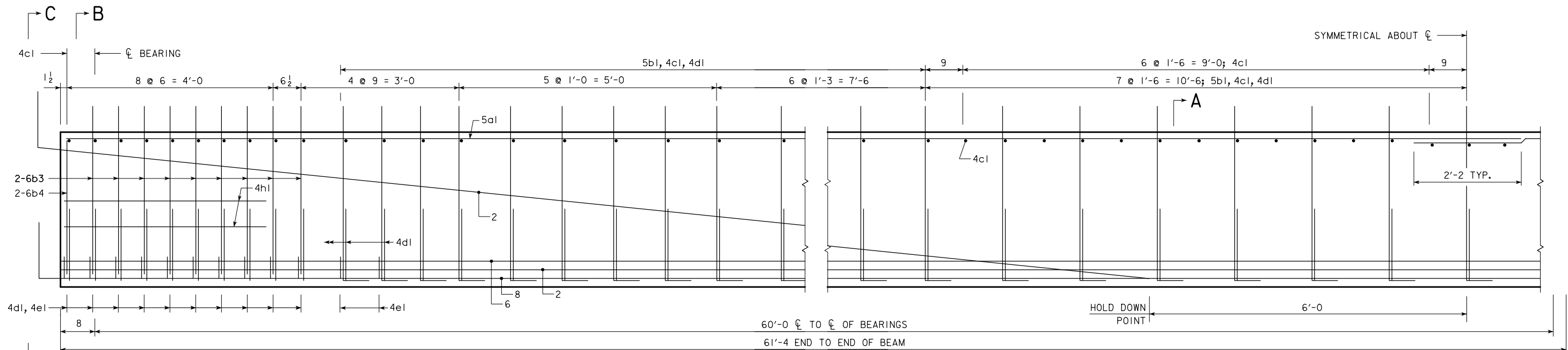


BTB BEAM CROSS SECTION

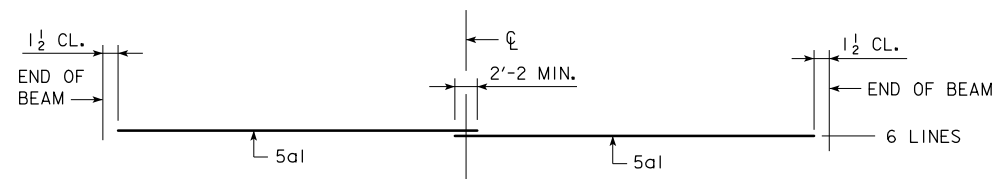
BTB55 BEAM DETAILS

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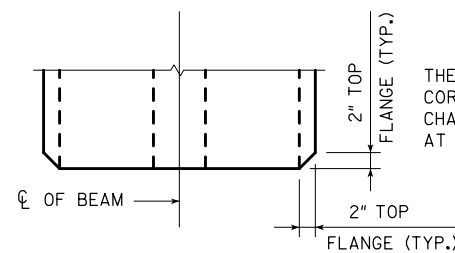
ENGLISHBEAMS.DGN - 4756 - THIS SHEET ISSUED 02-08.



BTB60

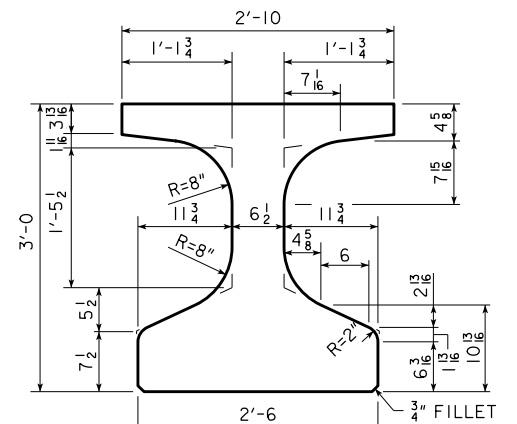


TOP FLANGE LONGITUDINAL BAR LAYOUT



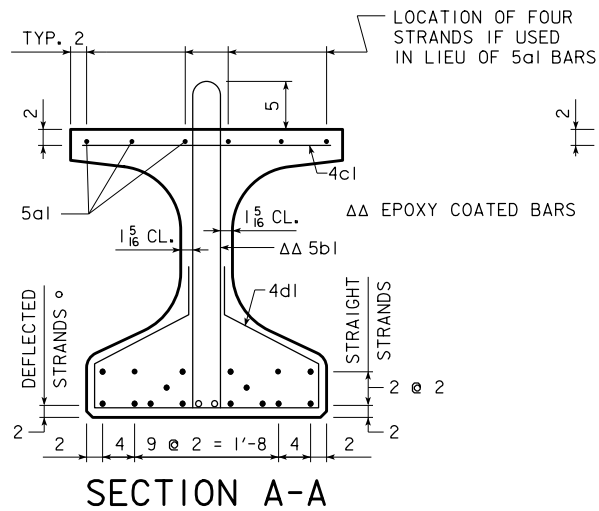
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

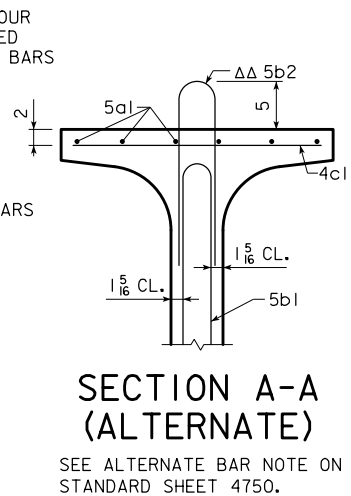


BTB BEAM CROSS SECTION

BEAM SECTION PROPERTIES
 AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 I = 99,980 in⁴

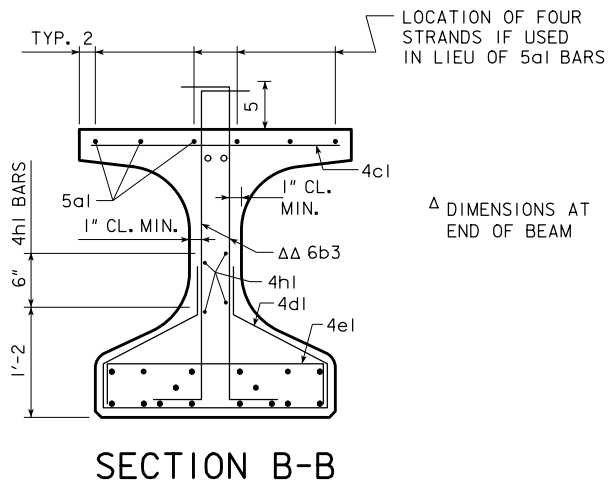


SECTION A-A

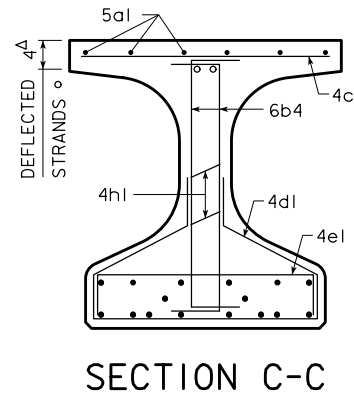


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



SECTION B-B

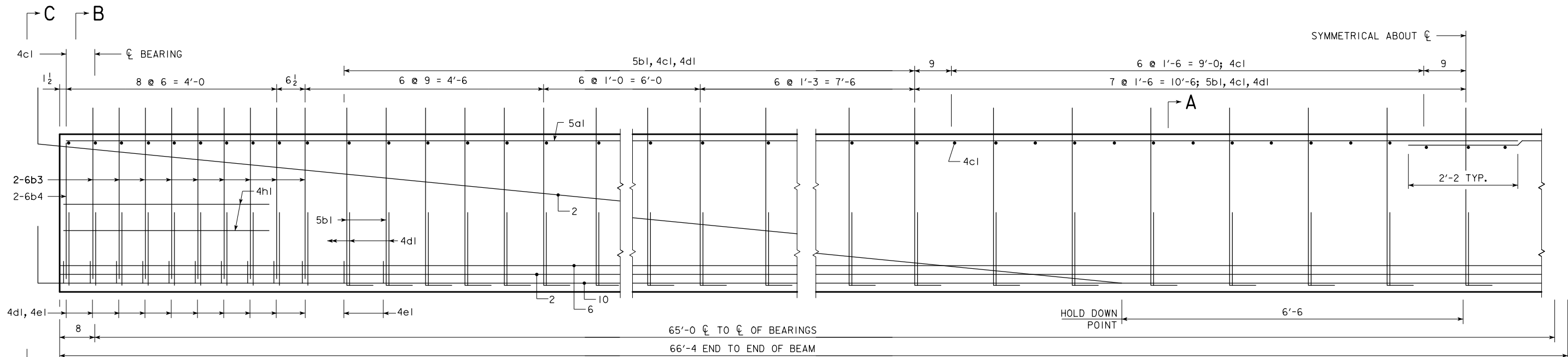


SECTION C-C

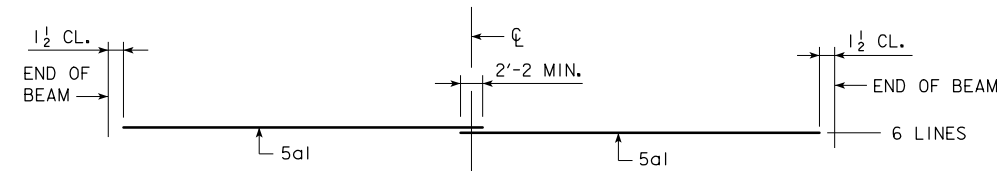
BTB60 BEAM DETAILS

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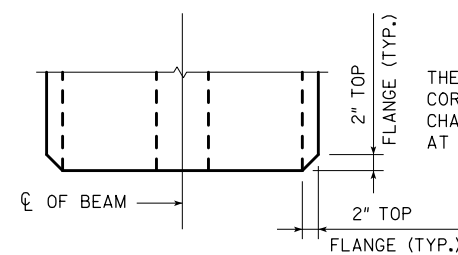
ENGLISHBEAMS.DGN - 4757 - THIS SHEET ISSUED 02-08.



BTB65

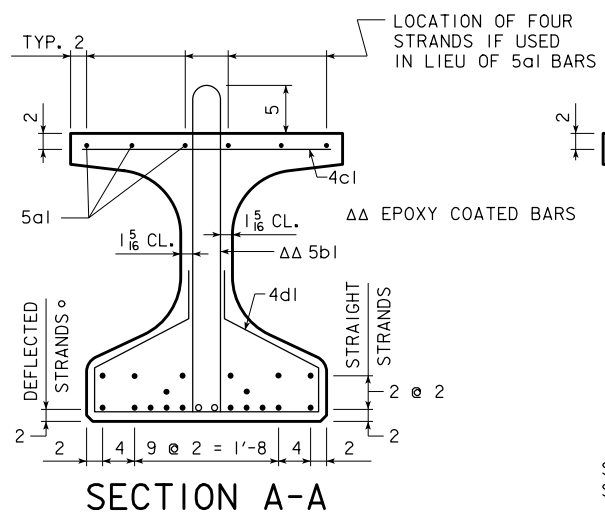


TOP FLANGE LONGITUDINAL BAR LAYOUT

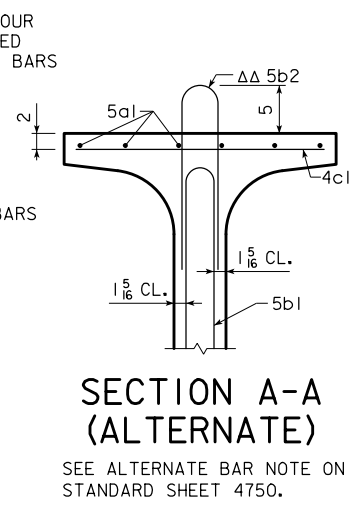


TOP VIEW

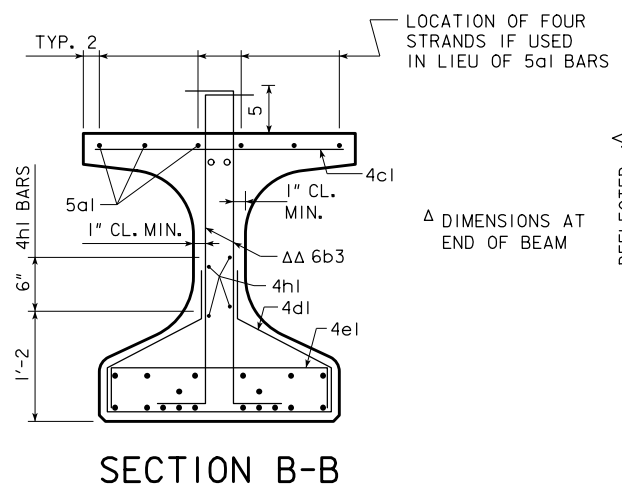
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



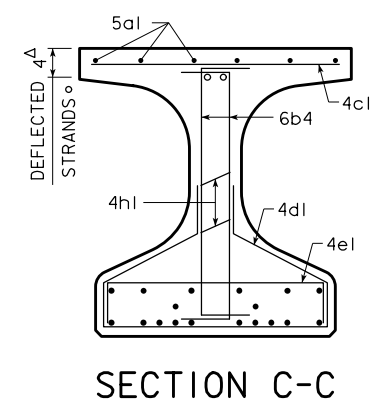
SECTION A-A



SECTION A-A (ALTERNATE)
SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



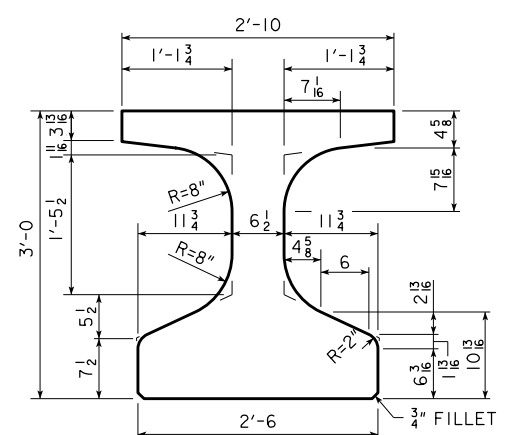
SECTION B-B



SECTION C-C

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in⁴

BEAM SECTION PROPERTIES

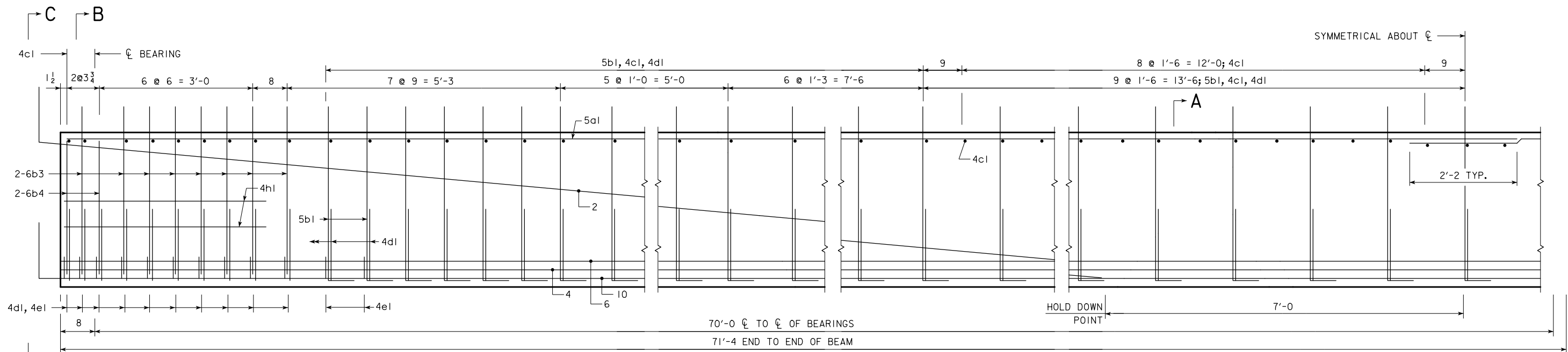


BTB BEAM CROSS SECTION

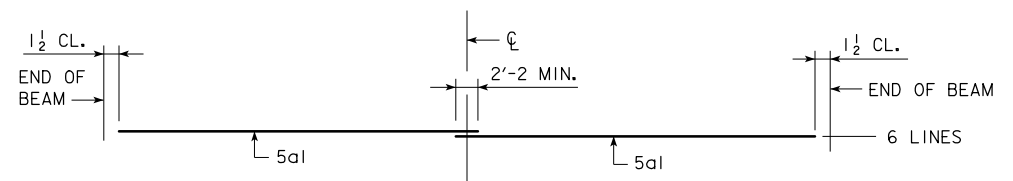
BTB65 BEAM DETAILS

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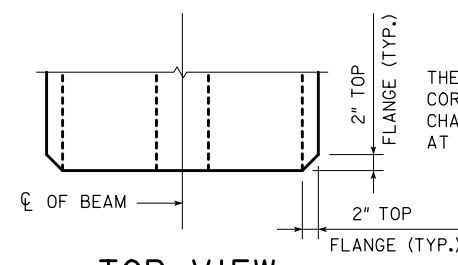
ENGLISHBEAMS.DGN - 4758 - THIS SHEET ISSUED 02-08.



BTB70

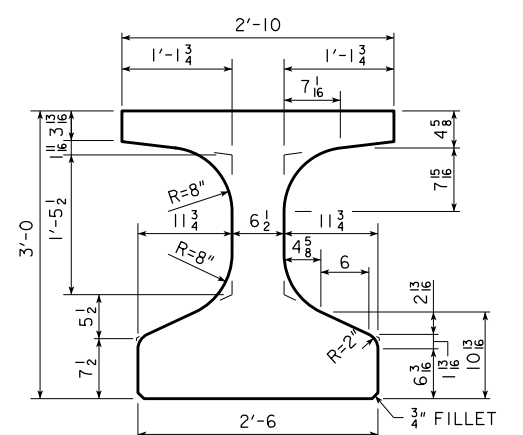


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

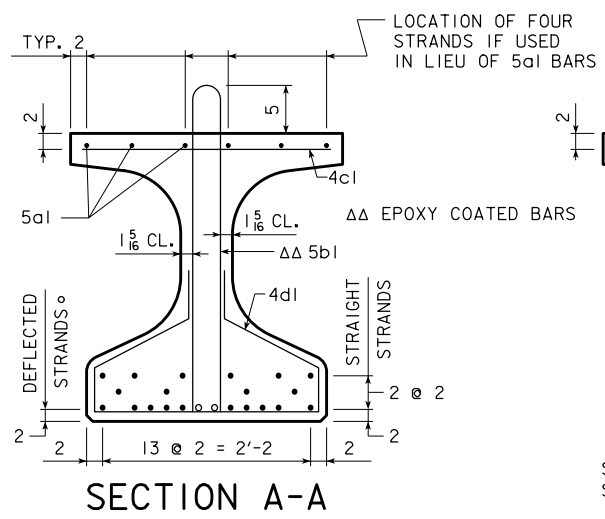
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



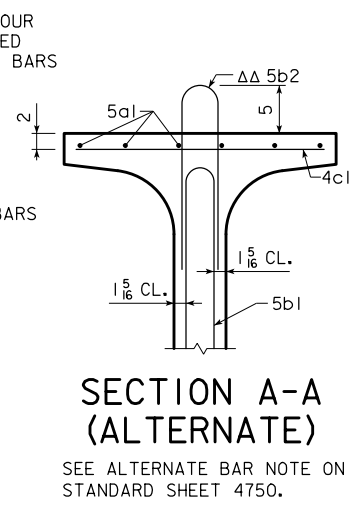
BTB BEAM CROSS SECTION

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 I = 99,980 in⁴

BEAM SECTION PROPERTIES

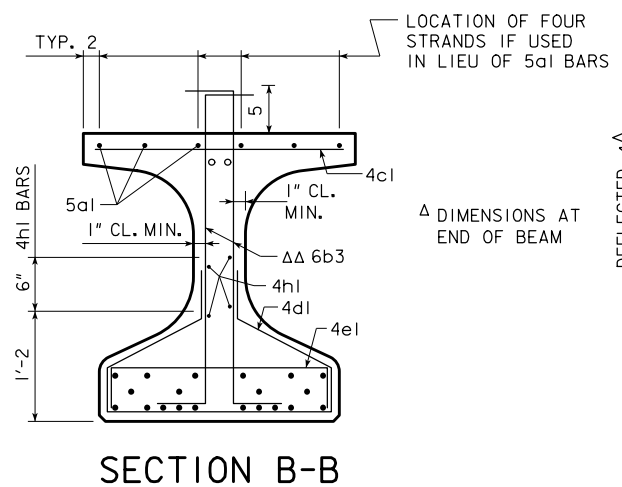


SECTION A-A

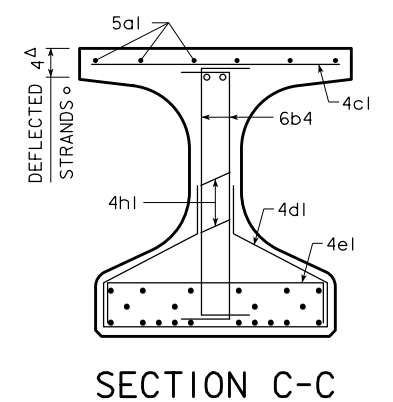


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



SECTION B-B



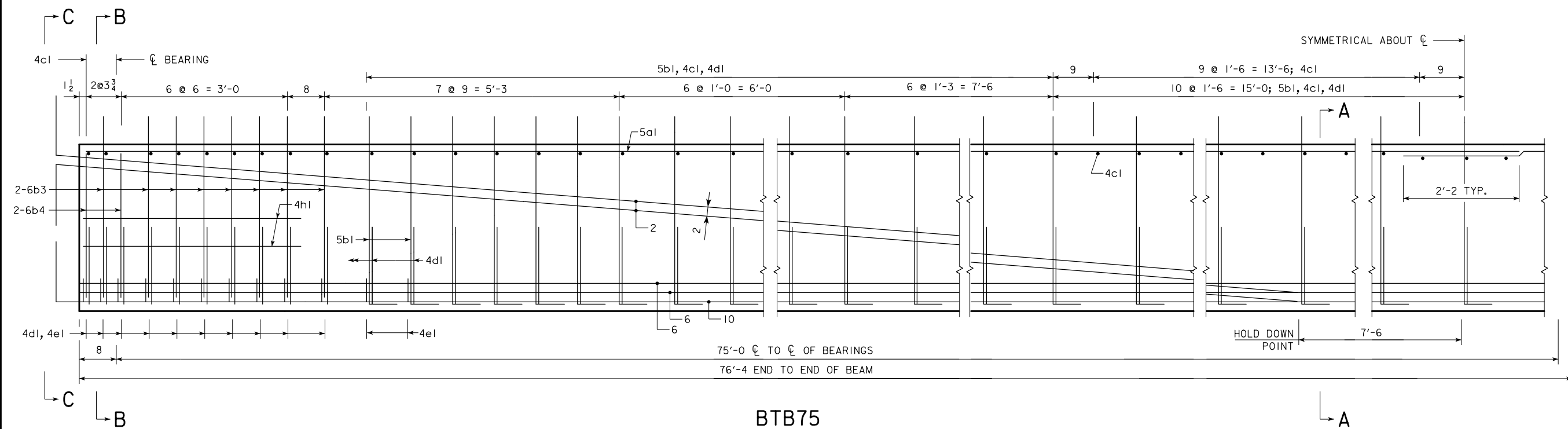
SECTION C-C

BTB70 BEAM DETAILS

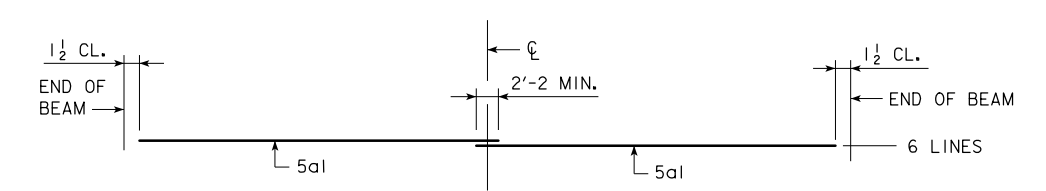
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

ENGLISHBEAMS.DGN - 4759 - THIS SHEET ISSUED 02-08.

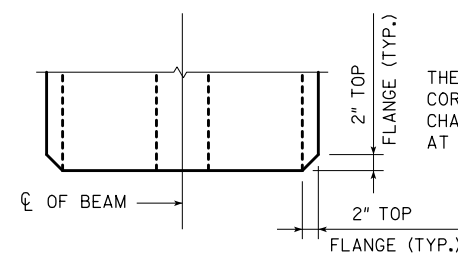
ENGLISHBEAMS.DGN - 4760 - THIS SHEET ISSUED 02-08.



BTB75

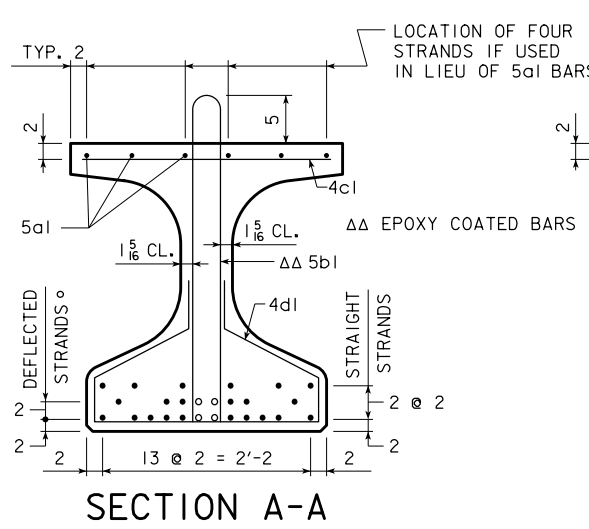


TOP FLANGE LONGITUDINAL BAR LAYOUT

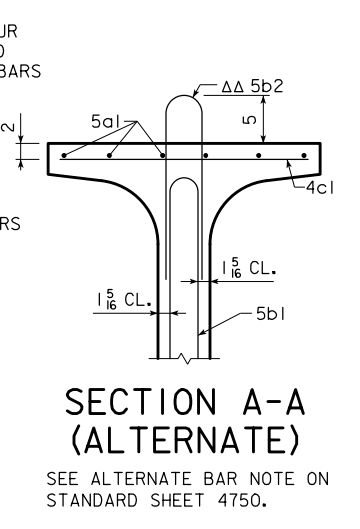


TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

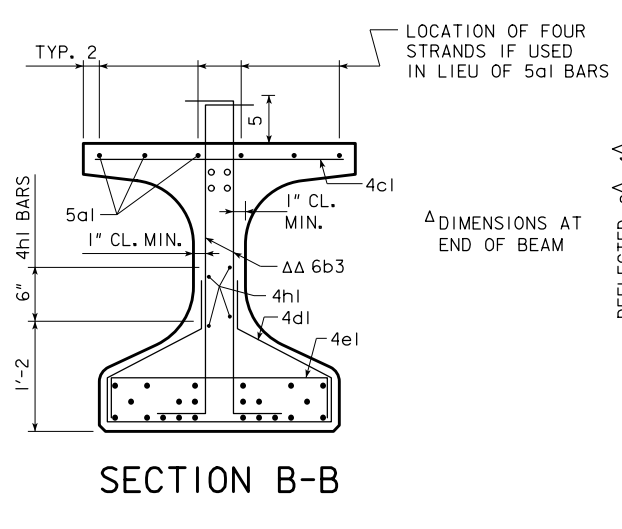


SECTION A-A

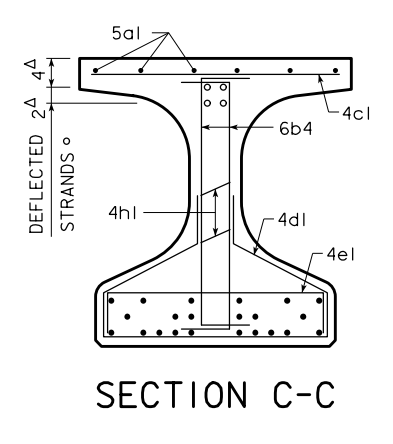


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



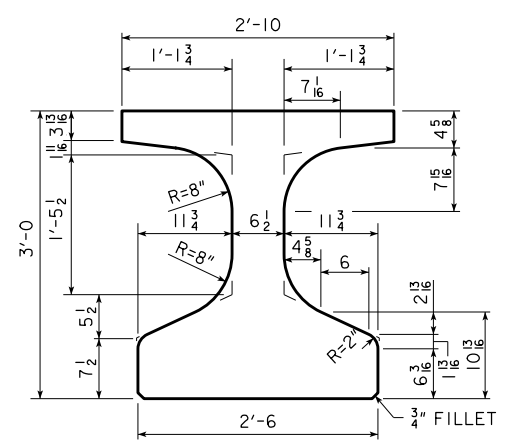
SECTION B-B



SECTION C-C

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in⁴

BEAM SECTION PROPERTIES

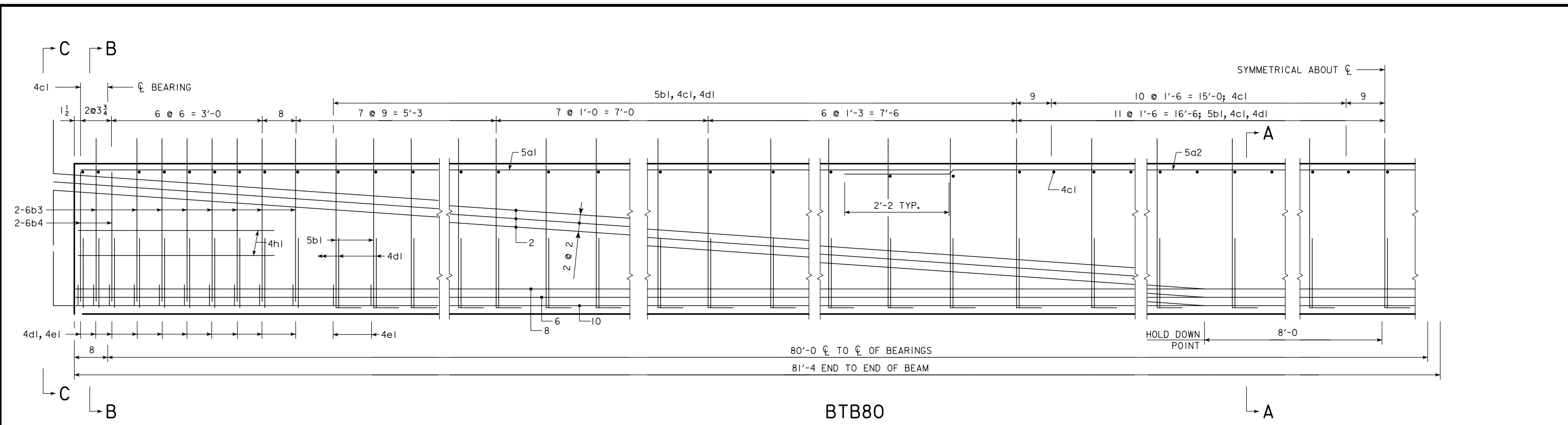


BTB BEAM CROSS SECTION

BTB75 BEAM DETAILS

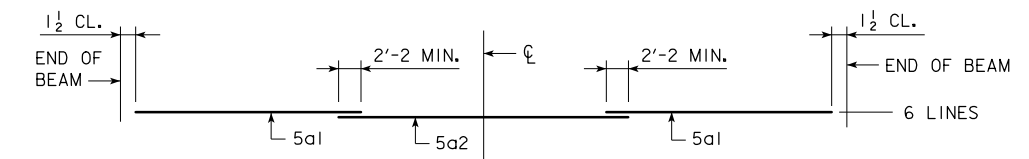
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

ENGLISHBEAMS.DGN - 4761 - THIS SHEET ISSUED 02-08.

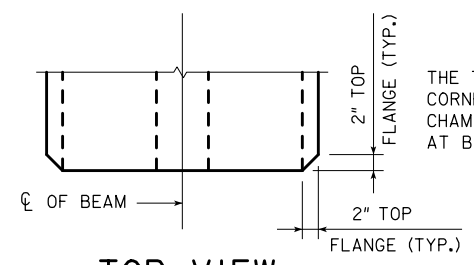


80'-0 CL TO CL OF BEARINGS
81'-4 END TO END OF BEAM

BTB80

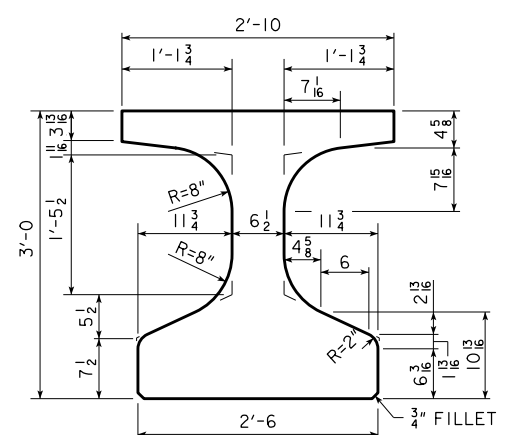


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

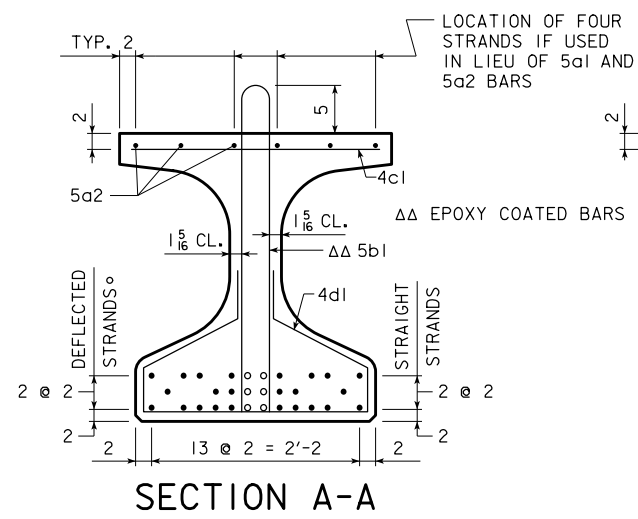
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



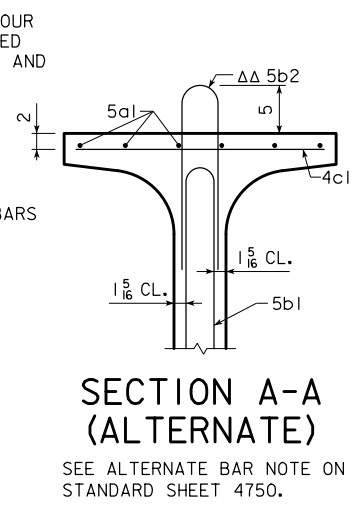
BTB BEAM CROSS SECTION

AREA = 631.7 in²
y_b = 17.14 in.
I = 99,980 in⁴

BEAM SECTION PROPERTIES

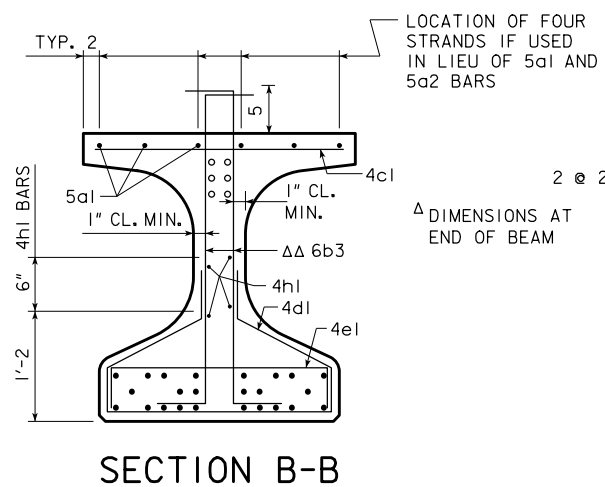


SECTION A-A

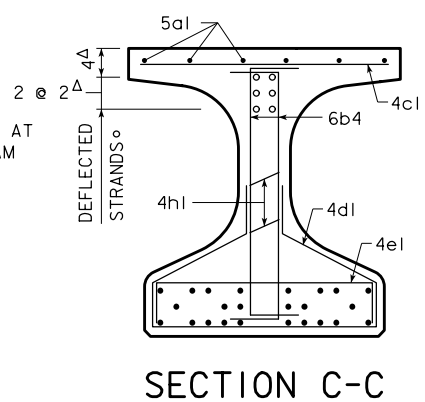


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



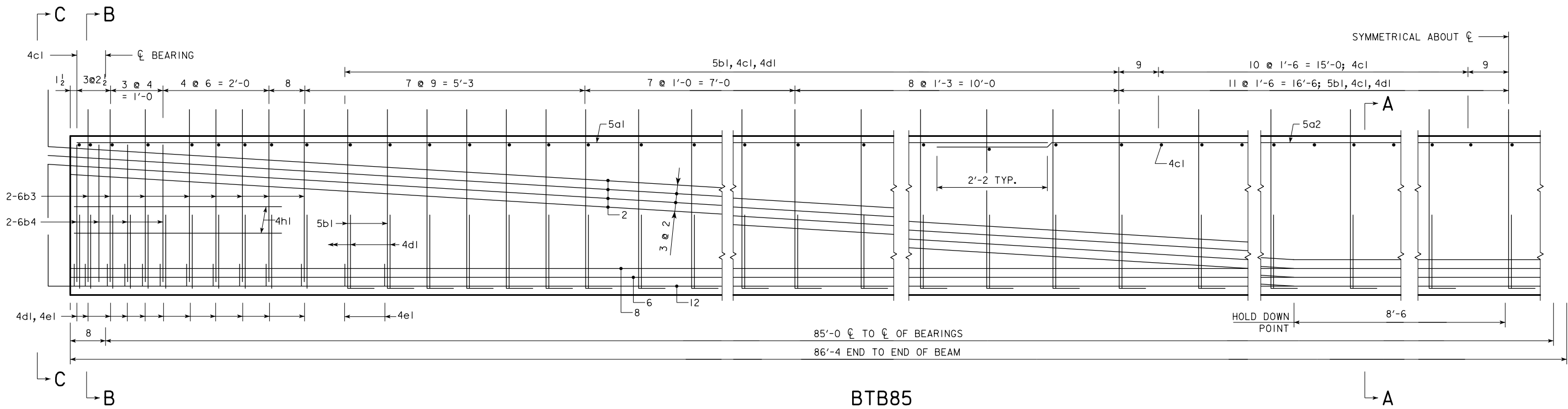
SECTION B-B



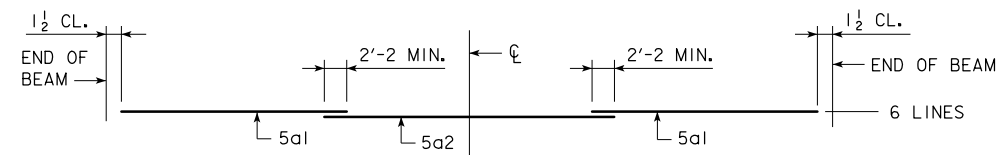
SECTION C-C

BTB80 BEAM DETAILS

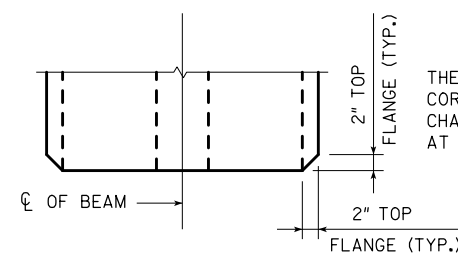
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



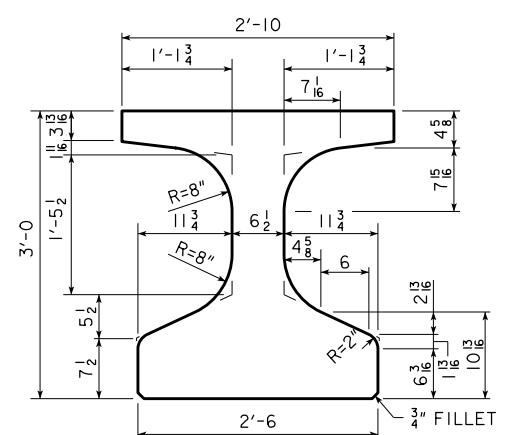
BTB85



TOP FLANGE LONGITUDINAL BAR LAYOUT

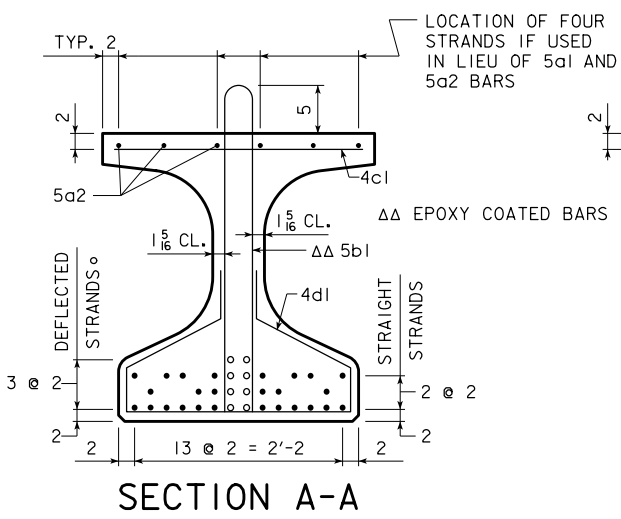


TOP VIEW



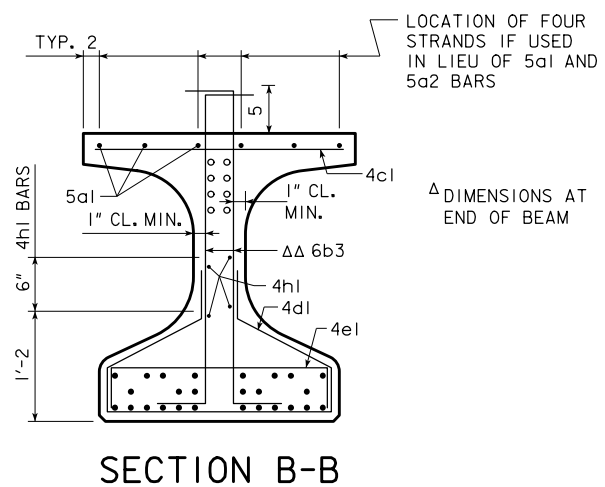
BTB BEAM CROSS SECTION

BEAM SECTION PROPERTIES
 AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 I = 99,980 in⁴

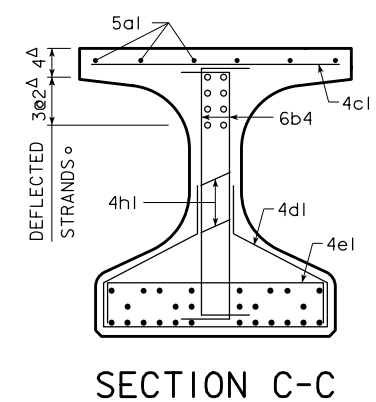


SECTION A-A

SECTION A-A (ALTERNATE)
 SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



SECTION B-B

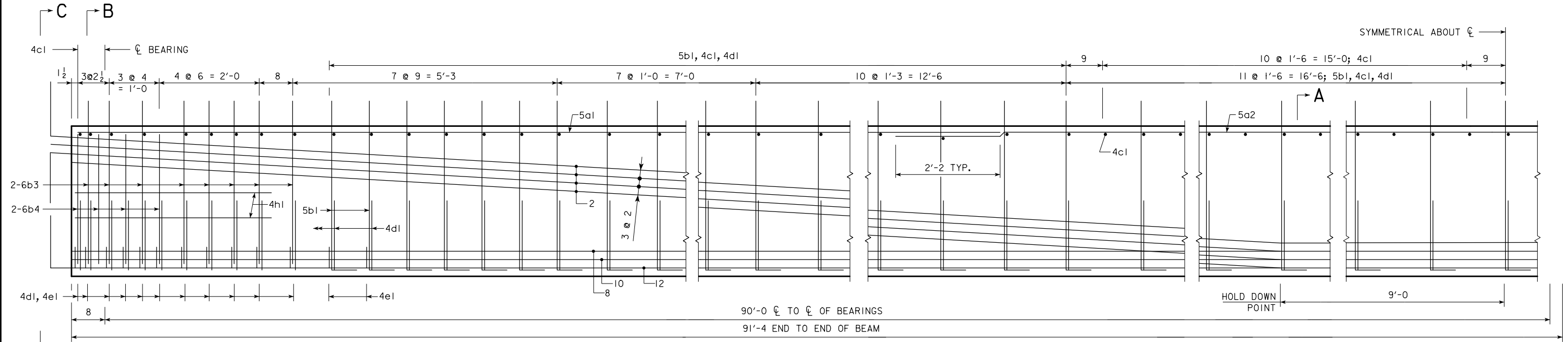


SECTION C-C

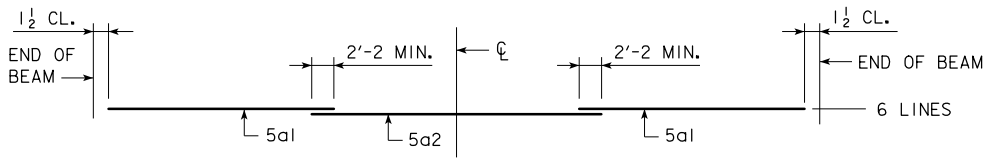
BTB85 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

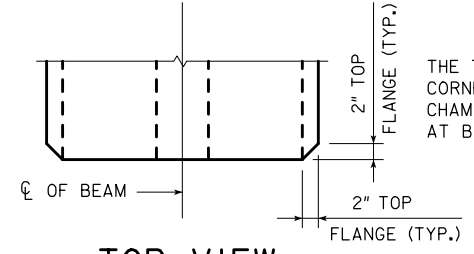
ENGLISHBEAMS.DGN - 4762 - THIS SHEET ISSUED 02-08.



BTB90

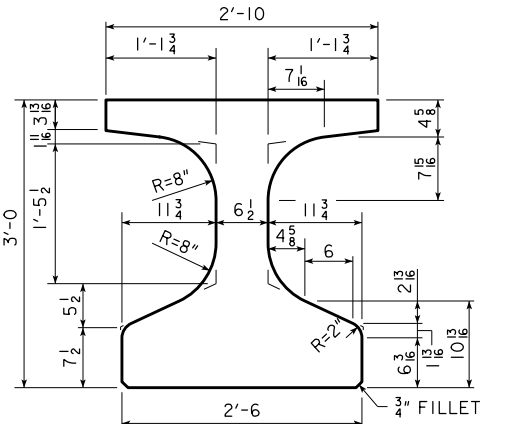


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

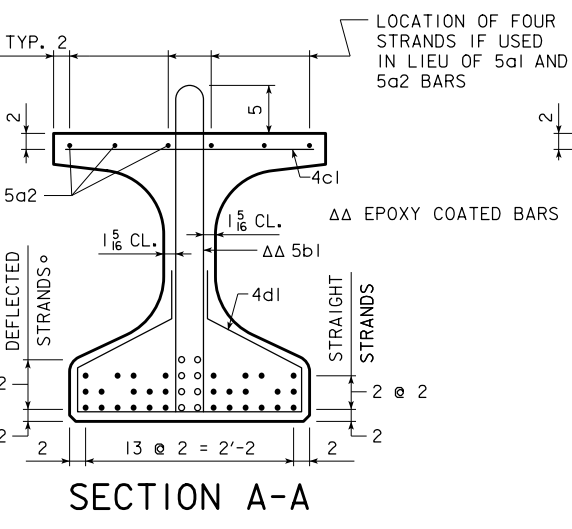
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



BTB BEAM CROSS SECTION

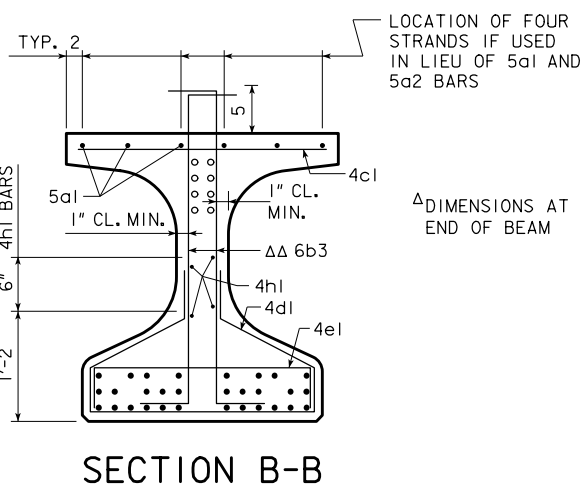
AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in⁴

BEAM SECTION PROPERTIES

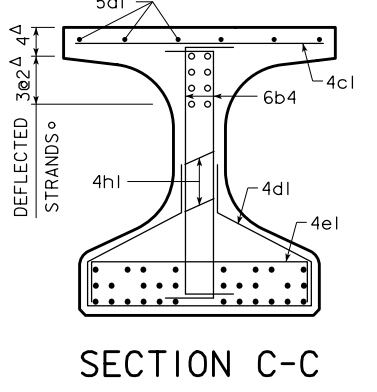


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



SECTION B-B



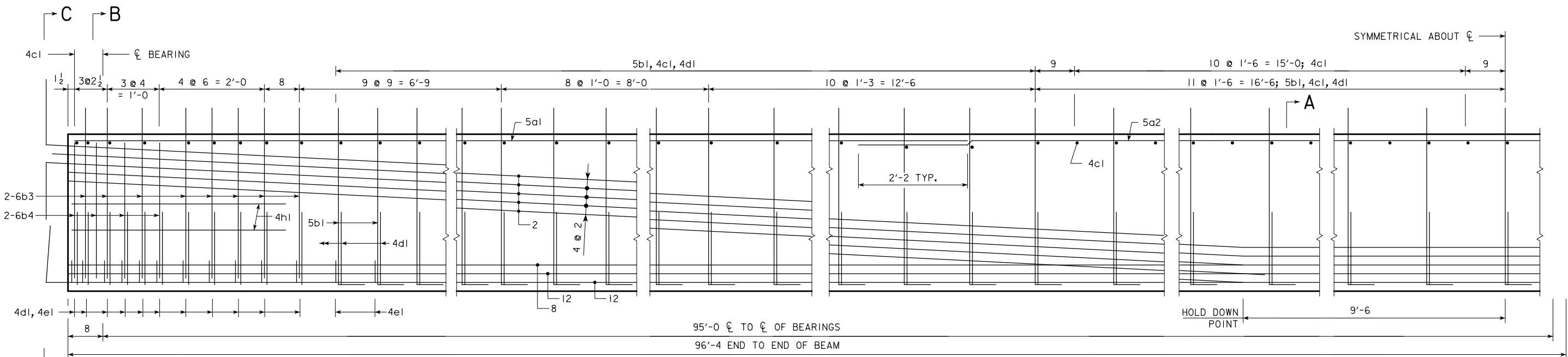
SECTION C-C

BTB90 BEAM DETAILS

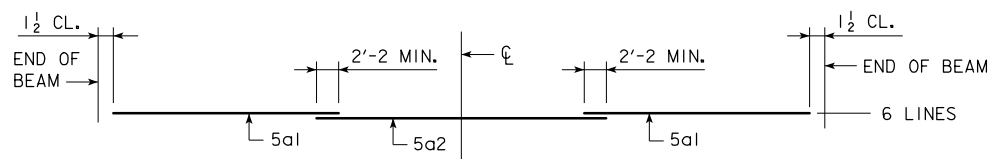
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN - 4763 - THIS SHEET ISSUED 02-08.

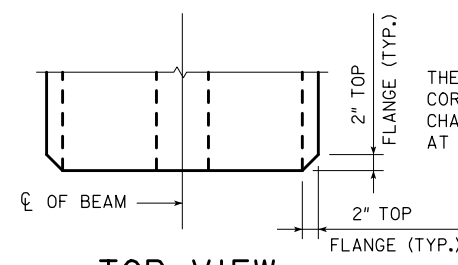
REVISED 05-11 - CHANGED TO THE 3rd DEFLECTED STRAND AT THE TOP TO BE BENT DOWN AT THE BEAM END. ENGLISHBEAMS.DGN - 4764 - THIS SHEET ISSUED 02-08.



BTB95

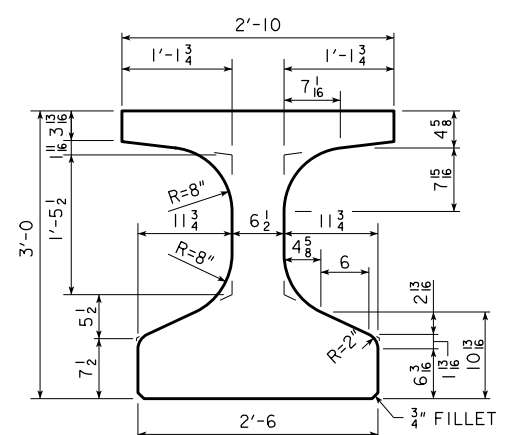


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

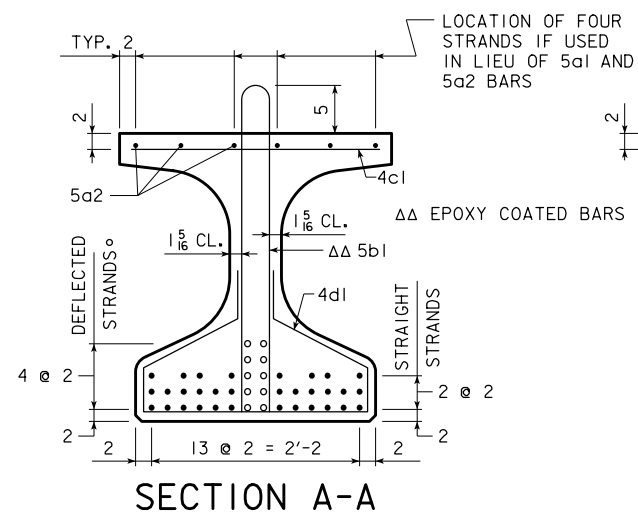
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



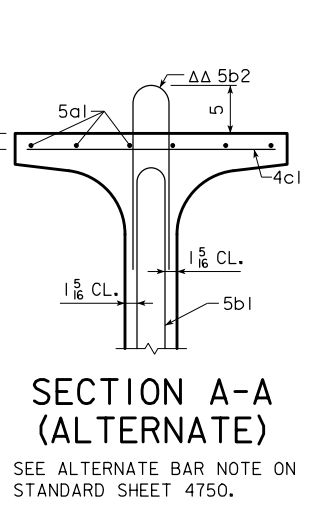
BTB BEAM CROSS SECTION

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in⁴

BEAM SECTION PROPERTIES

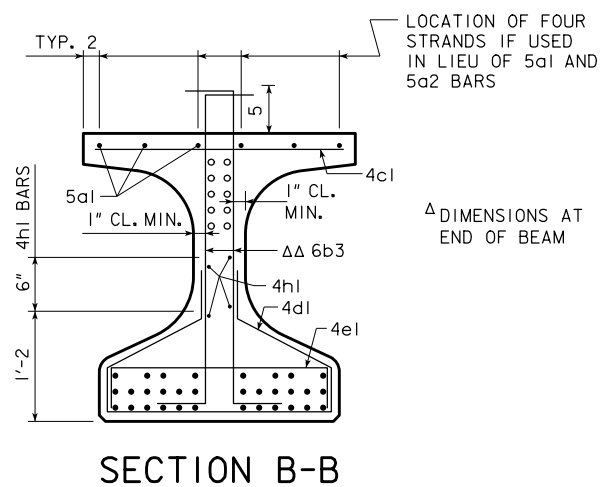


SECTION A-A

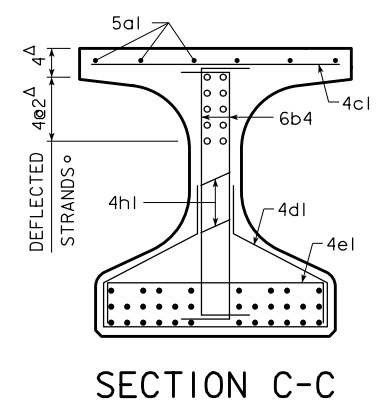


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4750.



SECTION B-B

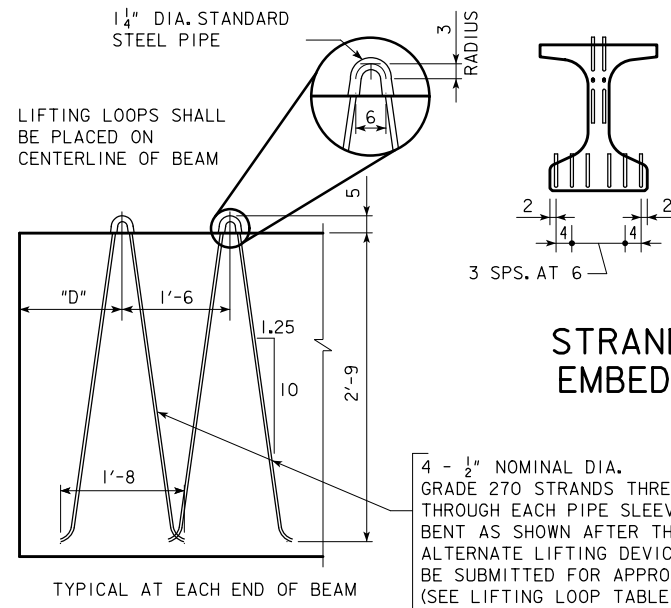


SECTION C-C

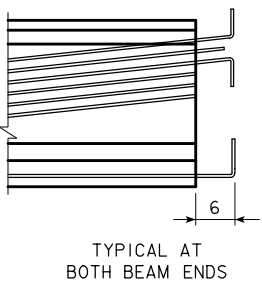
BTB95 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

CORRECTION 12-13 - COIL TIE DETAIL WAS CHANGED TO REFLECT THE DISTANCE BETWEEN COIL TIE ANCHORS EMBEDDED 4 INCH. REMOVED ARTICLE 2407.13 SPEC. NOTE UNDER LIFTING LOOP TABLE. ENGLISHBEAMS.DGN - 4765 - THIS SHEET ISSUED 02-08.



THE TOP AND 3rd ROWS OF THE DEFLECTED STRANDS ARE TO BE CUT WITH 1'-6 PROJECTIONS WHICH ARE TO BE SHOP BENT AS SHOWN. THE SECOND ROW IS TO BE CUT WITH A 5" PROJECTION AND THE REMAINING TOP DEFLECTED STRANDS IN ROWS 4 AND BELOW ARE TO BE CUT FLUSH WITH BEAM FACE. SIX BOTTOM STRANDS ARE TO BE CUT WITH 1'-6 PROJECTIONS WHICH ARE TO BE SHOP BENT AS SHOWN. THE REMAINING BOTTOM STRANDS ARE TO BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.



STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS

4 - 1/2" NOMINAL DIA. GRADE 270 STRANDS THREADED THROUGH EACH PIPE SLEEVE BENT AS SHOWN AFTER THREADING. ALTERNATE LIFTING DEVICES MAY BE SUBMITTED FOR APPROVAL (SEE LIFTING LOOP TABLE).

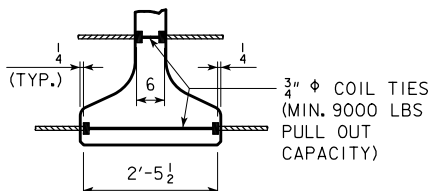
LIFTING LOOP DETAIL

LIFTING LOOP AND OVERHANG TABLE

BEAMS	LIFTING LOOPS EACH END	# OF STRANDS PER LOOP	D	BEAM OVERHANG (FT)
BTB100-BTB105	2	4	6'-3	12

LIFTING LOOPS SHALL CARRY LOADS EQUALLY.

NUMBER AND EXACT LOCATION OF COIL TIES TO BE AS DETAILED ON SPECIFIC BRIDGE DESIGN.



COIL TIE DETAIL

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007. REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. CONCRETE IN ACCORDANCE WITH SECTION 5. PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 270.

SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.

DESIGN: AASHTO LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

ALTERNATE BAR NOTES:

ALTERNATE BARS SHOWN IN BENT BAR DETAILS MAY BE USED IN LIEU OF REINFORCING BARS SHOWN IN BAR LIST. NO ADDITIONAL PAYMENT SHALL BE MADE FOR USE OF ALTERNATE BARS.

BTB BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	CONCRETE STRENGTH		STRAND SIZE DIA. (in)	NO. OF STRAND		TOTAL INITIAL PRESTRESS kips	HOLD DOWN FORCE-kips	CAMBER (in)		DEFLECTION (in) Δ ₀		PERMISSIBLE MAXIMUM SPACING	WEIGHT (TONS)	CONCRETE (CU YD.)	REINFORCING STEEL (WEIGHT-LBS)
			f'ci (ksi)	f'c (ksi)		STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) Δ _i	TIME (PLASTIC) Δ _T				
										STEEL DIAPHRAGM	STEEL DIAPHRAGM	HL-93 LOADING					
										STEEL DIAPHRAGM	STEEL DIAPHRAGM	STEEL DIAPHRAGM					
BTB100	100'-0	101'-4	8.0	9.0	0.60	32	12	1871	20.9	3.19	5.63	3.44	0.86	8'-6	33.3	16.5	2300
BTB105	105'-0	106'-4	8.0	9.0	0.60	32	12	1871	19.9	3.26	5.72	3.63	0.91	7'-4	35.0	17.3	2391

- ① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB (8 in) AND HAUNCH (1.5 in) WEIGHT OF:
 - 0.93 kips/ft FOR 8'-6 BEAM SPACING
 - 0.80 kips/ft FOR 7'-4 BEAM SPACING
 AND ONE STEEL DIAPHRAGM (0.500 kips) AT CL OF SPAN. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.
- ② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.
 - TOTAL BEAM DEFLECTIONS AT CL OF SPAN, Δ₀, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:
 - (A) Δ₀ = Δ_i + Δ_T FOR SIMPLE SPAN.
 - (B) Δ₀ = Δ_i + 3/4 Δ_T FOR END SPANS OF CONTINUOUS BRIDGE.
 - (C) Δ₀ = Δ_i + 1/2 Δ_T FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.
- ③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi. AND A_s = 0.217 in².
- ④ REQUIRES 4000 psi COMPRESSIVE STRENGTH FOR CAST-IN-PLACE SLAB CONCRETE.

CALCULATED DESIGN CAMBERS HAVE BEEN REDUCED FROM THEIR THEORETICAL VALUES BY 15% TO AID CONSTRUCTABILITY.

BEAM NOTES:

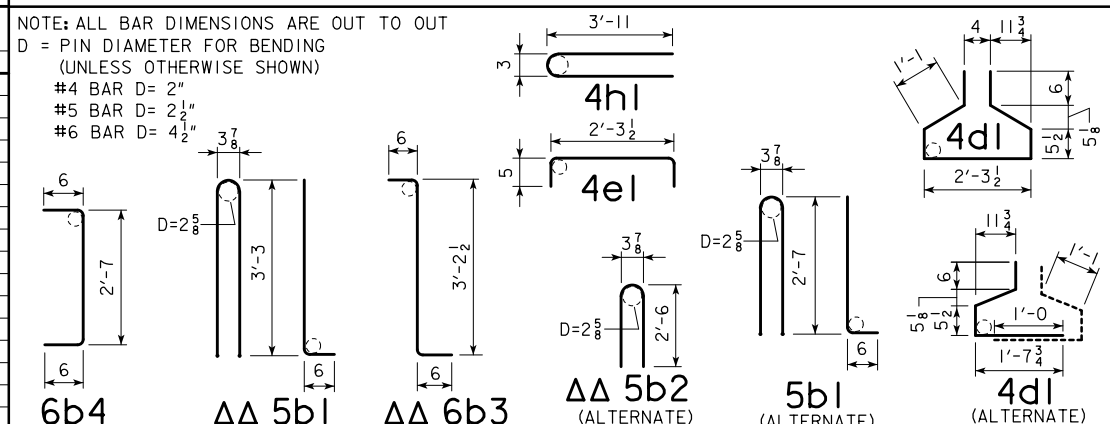
THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 LBS PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE. ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION. ALL PRESTRESSING STRANDS EXCEPT LIFTING LOOP STRANDS SHALL BE 0.60 in. NOMINAL DIAMETER (NOMINAL STEEL AREA = 0.217 in²) AND CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS. MINIMUM STRAND BREAKING STRENGTH SHALL BE 58.6 kips. TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS 1M570. BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER. THE PORTIONS OF THE PRESTRESSED BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, 1, OF THE STANDARD SPECIFICATIONS. ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE. FOR TRANSPORTING, THE ALLOWABLE OVERHANG IS SHOWN IN THE LIFTING LOOP AND OVERHANG TABLE. THE CONTRACTOR SHALL ASSURE THE LATERAL STABILITY OF THE BEAMS DURING HANDLING, TRANSPORTING AND ERECTION BY PROVIDING TEMPORARY BRACING AS NEEDED. HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET. IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET. IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE. MINIMUM CONCRETE f'c (AT 28 DAYS) AND MINIMUM f'ci AT RELEASE ARE LOCATED IN THE BTB BEAM DATA TABLE ABOVE. FOUR 0.60 IN. DIAMETER STRANDS STRESSED TO NOT MORE THAN 5000 lbs EACH MAY BE USED IN LIEU OF BARS 5a1 AND 5a2 IN THE TOP FLANGE. WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION).

ΔΔ 5b1 AND 6b3 BARS TO BE EPOXY COATED
* 6b3 AND 6b4 BARS TO BE USED IN PAIRS

REINFORCING BAR LIST

BEAM	BTB100	BTB105	BEAM
BAR SHAPE	NO. LENGTH	NO. LENGTH	BAR
5a1	12 32'-9	12 35'-3	5a1
5a2	6 40'-0	6 40'-0	5a2
ΔΔ 5b1	79 7'-8	83 7'-8	5b1
ΔΔ * 6b3	32 4'-3	32 4'-3	6b3
* 6b4	16 3'-7	16 3'-7	6b4
4c1	121 2'-7	127 2'-7	4c1
4d1	101 6'-5	105 6'-5	4d1
4e1	26 3'-2	26 3'-2	4e1
4h1	4 8'-0	4 8'-0	4h1

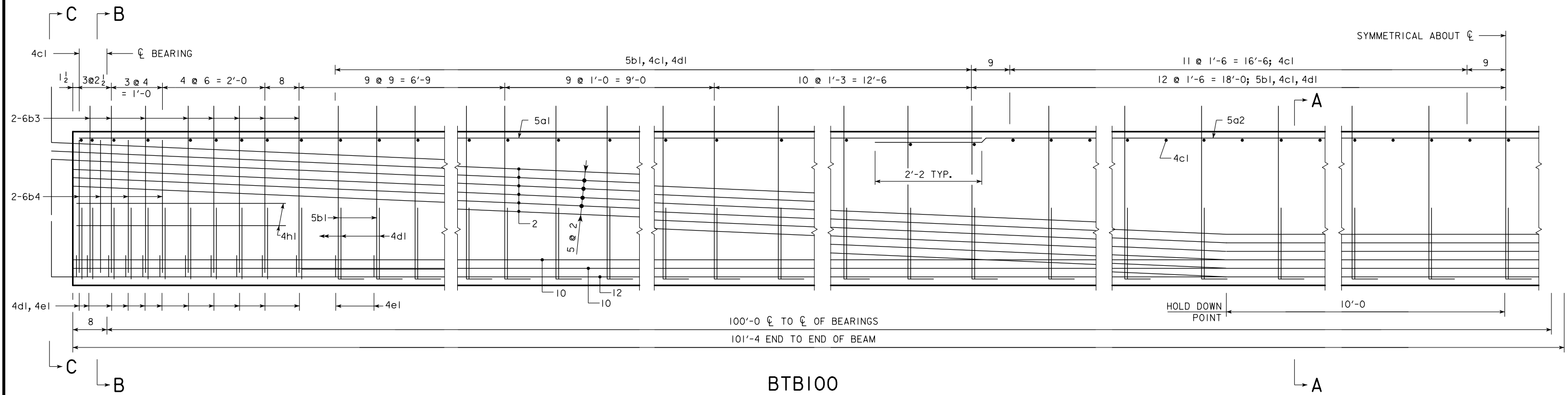
BENT BAR DETAILS



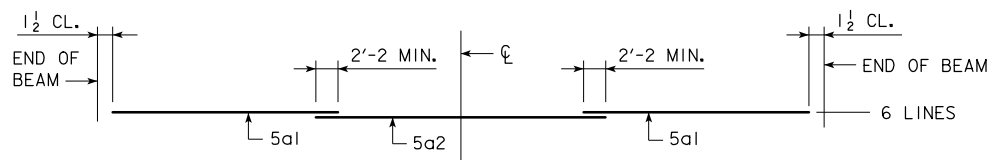
BTB100 & BTB105 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

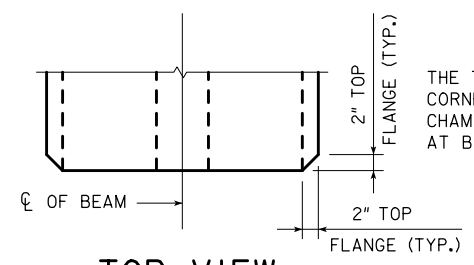
ENGLISHBEAMS.DGN - 4766 - THIS SHEET ISSUED 02-08.



BTB100

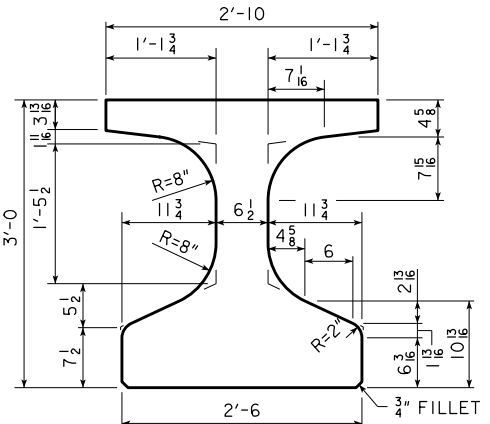


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

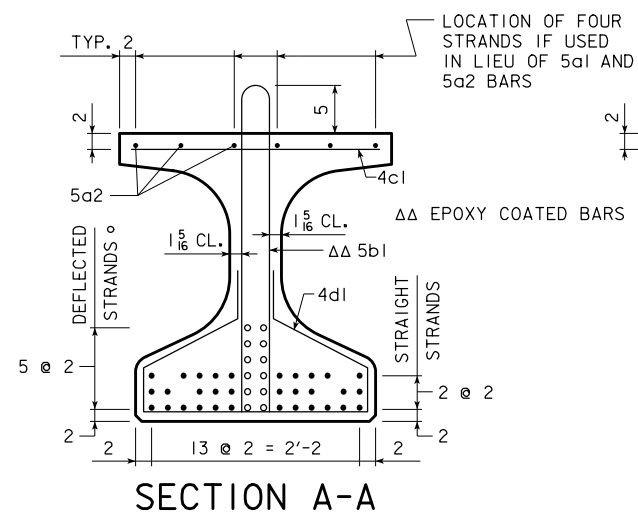
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



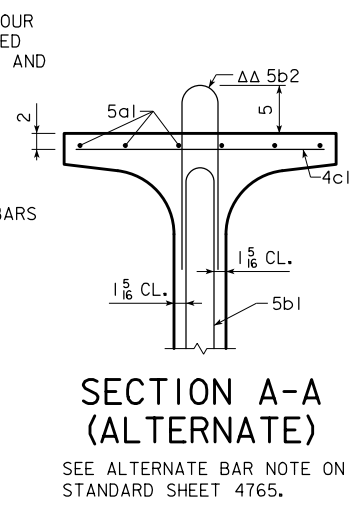
BTB BEAM CROSS SECTION

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in⁴

BEAM SECTION PROPERTIES

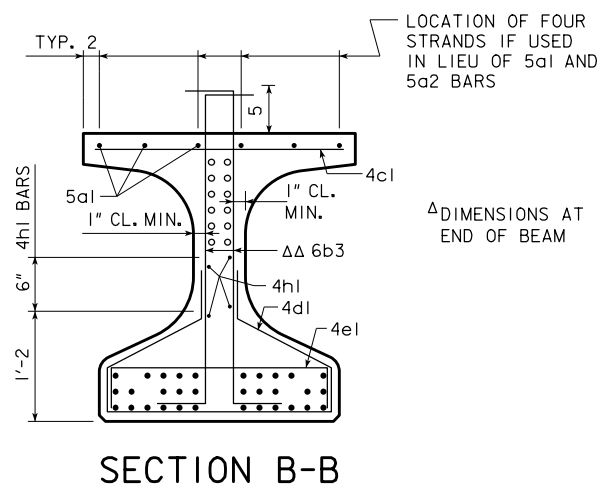


SECTION A-A

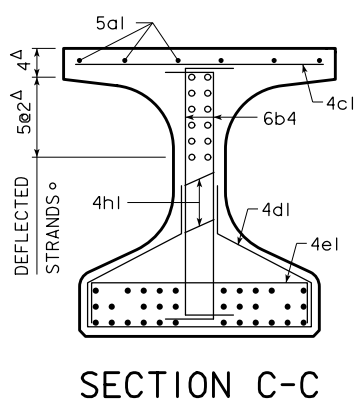


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4765.



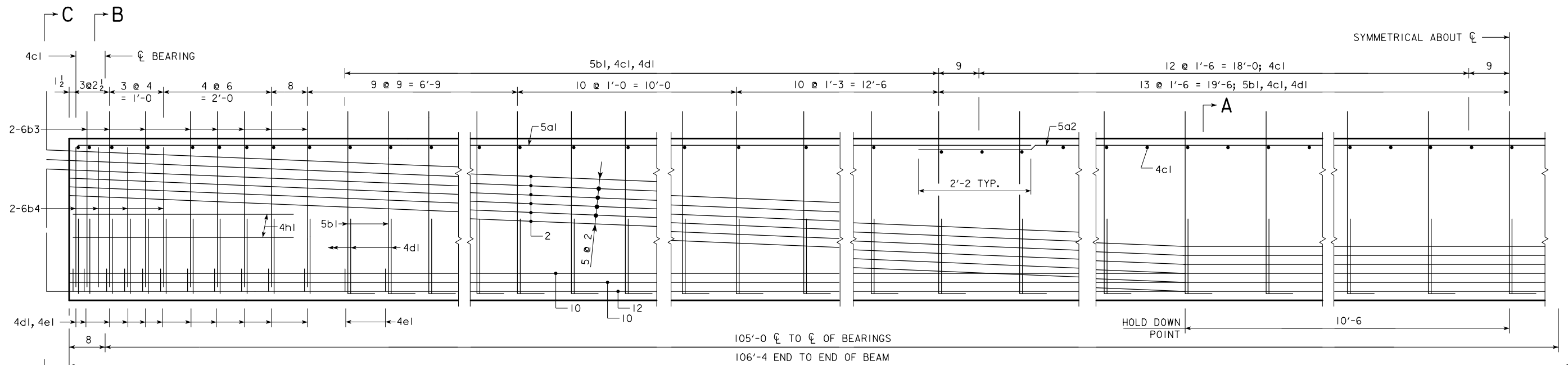
SECTION B-B



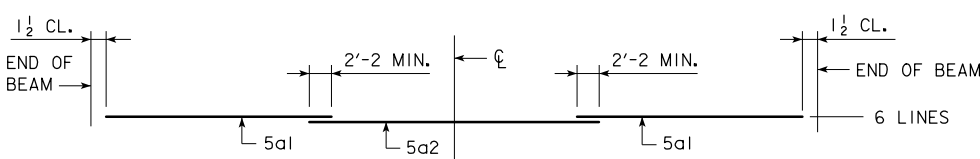
SECTION C-C

BTB100 BEAM DETAILS

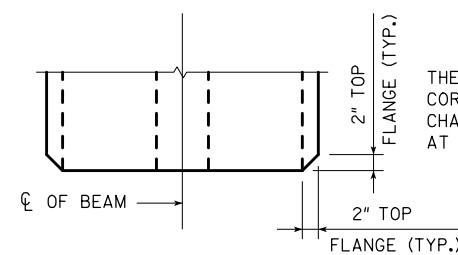
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
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BTB105

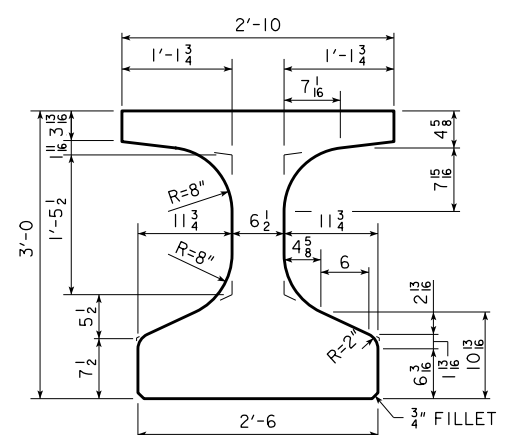


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

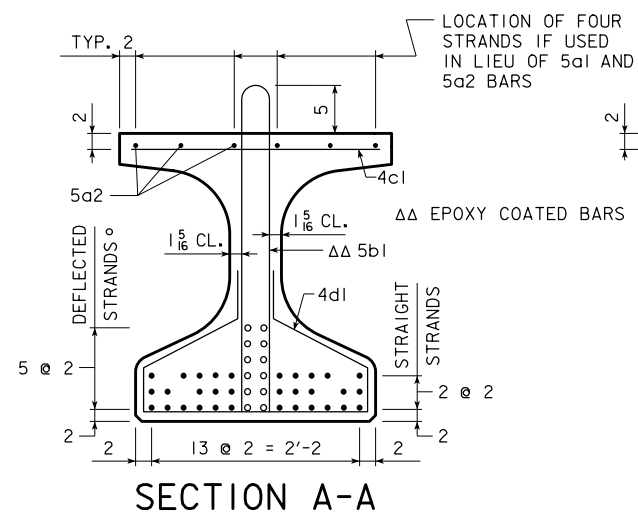
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



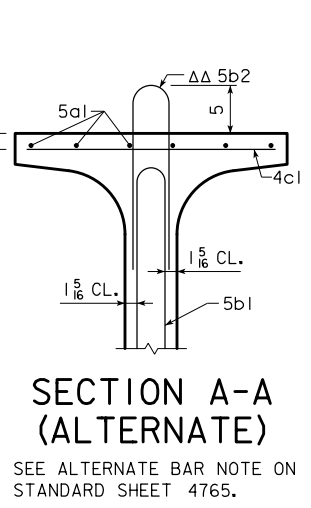
BTB BEAM CROSS SECTION

AREA = 631.7 in²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in⁴

BEAM SECTION PROPERTIES

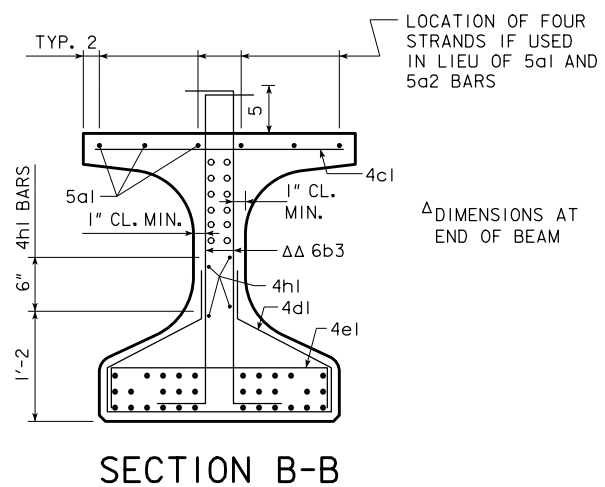


SECTION A-A

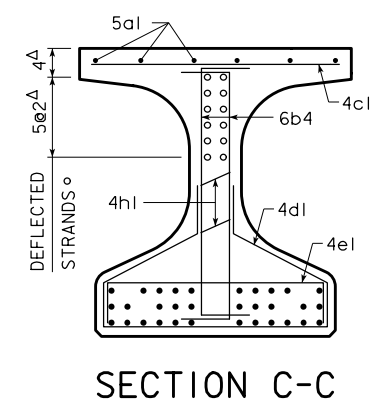


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4765.



SECTION B-B



SECTION C-C

BTB105 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

ENGLISHBEAMS.DGN - 4767 - THIS SHEET ISSUED 02-08.

REVISION 08-12 - I.M. REFERENCE NOTE FOR SEALING BEAM ENDS DISTINGUISHES BETWEEN THE FABRICATOR AND CONTRACTOR. DECK PANEL OPTION NOTE WAS DELETED. ENGLISHBEAMS.DGN - 4770s1 - THIS SHEET ISSUED 02-08.

BEAM NOTES:

THESE BEAMS ARE DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 LBS PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE.

ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION.

ALL PRESTRESSING STRANDS EXCEPT LIFTING LOOP STRANDS SHALL BE 0.60 in. NOMINAL DIAMETER (NOMINAL STEEL AREA = 0.217 in²) AND CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS. MINIMUM STRAND BREAKING STRENGTH SHALL BE 58.6 kips.

TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570.

BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS.

BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.

THE PORTIONS OF THE PRESTRESSED BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, 1, OF THE STANDARD SPECIFICATIONS.

ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE.

FOR TRANSPORTING, THE ALLOWABLE OVERHANG IS SHOWN IN THE LIFTING LOOP AND OVERHANG TABLE.

THE CONTRACTOR SHALL ASSURE THE LATERAL STABILITY OF THE BEAMS DURING HANDLING, TRANSPORTING AND ERECTION BY PROVIDING TEMPORARY BRACING AS NEEDED.

HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.

IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.

IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.

WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION).

MINIMUM CONCRETE f'c (AT 28 DAYS) AND MINIMUM f'ci AT RELEASE ARE LOCATED IN THE BTE BEAM DATA TABLE ABOVE.

FOUR 0.60 IN. DIAMETER STRANDS STRESSED TO NOT MORE THAN 5000 lbs. EACH MAY BE USED IN LIEU OF BARS 5a1 AND 5a2 IN THE TOP FLANGE.

BTE BEAM DATA

BTE BEAM	SPAN LENGTH @ BEARING	OVERALL BEAM LENGTH (L)	CONCRETE STRENGTH		STRAND SIZE DIA. (in)	NO. OF STRAND		TOTAL INITIAL PRESTRESS kips	HOLD DOWN FORCE-kips	CAMBER (in)		DEFLECTION (in) Δ _D		PERMISSIBLE MAXIMUM SPACING	WEIGHT (TONS)	CONCRETE (CU YD.)	REINFORCING STEEL (WEIGHT-LBS)
			f'ci (ksi)	f'c (ksi)		STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE ^① (ELASTIC) Δ _i	TIME ^② (PLASTIC) Δ _T				
			STEEL DIAPHRAGM	STEEL DIAPHRAGM		HL-93 LOADING	STEEL DIAPHRAGM										
BTE60	60'-0	61'-4	4.50	5.00	0.60	14	—	596	—	0.36	0.63	0.16	0.04	9'-3	25.8	12.8	1996
BTE65	65'-0	66'-4	4.50	5.00	0.60	14	—	596	—	0.39	0.69	0.22	0.05	9'-3	27.9	13.8	2105
BTE70	70'-0	71'-4	4.50	5.00	0.60	16	—	681	—	0.50	0.89	0.29	0.07	9'-3	30.0	14.8	2211
BTE75	75'-0	76'-4	4.50	5.00	0.60	16	—	681	—	0.53	0.94	0.38	0.10	9'-3	32.1	15.9	2317
BTE80	80'-0	81'-4	5.00	6.00	0.60	18	—	766	—	0.65	1.14	0.49	0.12	9'-3	34.2	16.9	2440
BTE85	85'-0	86'-4	5.00	6.00	0.60	18	—	766	—	0.67	1.19	0.63	0.16	9'-3	36.3	18.0	2550
BTE90	90'-0	91'-4	5.00	6.00	0.60	18	2	851	11.2	0.78	1.37	0.77	0.19	9'-3	38.4	19.0	2656
BTE95	95'-0	96'-4	5.00	6.00	0.60	20	2	936	10.6	0.93	1.63	0.97	0.24	9'-3	40.5	20.0	2766
BTE100	100'-0	101'-4	5.00	6.00	0.60	20	4	1021	19.5	1.04	1.82	1.12	0.28	9'-3	42.6	21.1	2875
BTE105	105'-0	106'-4	5.00	6.00	0.60	24	4	1191	18.6	1.39	2.44	1.35	0.34	9'-3	44.7	22.1	3019
BTE110	110'-0	111'-4	5.00	6.00	0.60	26	4	1276	17.7	1.61	2.83	1.62	0.41	9'-3	46.8	23.1	3125
BTE115	115'-0	116'-4	5.50	6.00	0.60	28	4	1361	17.0	1.76	3.09	1.85	0.47	9'-3	48.9	24.2	3322
BTE120	120'-0	121'-4	5.50	6.00	0.60	30	6	1531	23.6	2.06	3.62	2.19	0.55	9'-3	51.0	25.2	3428
BTE125	125'-0	126'-4	6.50	7.50	0.60	32	6	1617	22.6	2.17	3.80	2.40	0.61	9'-3	53.1	26.2	3538
BTE130	130'-0	131'-4	6.50	7.50	0.60	36	6	1788	21.8	2.59	4.55	2.71	0.68	9'-3	55.2	27.3	3647
BTE135	135'-0	136'-4	7.00	8.00	0.60	38	8	1958	27.0	2.83	4.97	3.05	0.76	9'-3	57.3	28.3	3753
BTE140	140'-0	141'-4	7.50	8.50	0.60	40	8	2042	26.0	2.97	5.21	3.42	0.85	9'-3	59.4	29.3	3897
BTE145	145'-0	146'-4	7.50	8.50	0.60	42	10	2213	30.2	3.29	5.77	3.79	0.95	9'-3	61.5	30.4	4084
BTE150	150'-0	151'-4	8.00	9.00	0.60	44	12	2383	33.7	3.52	6.17	4.34	1.09	9'-3	63.6	31.4	4194

① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB (8 in) AND HAUNCH (1.5 in) WEIGHT OF:

0.98 kips/ft FOR 9'-3 BEAM SPACING AND ONE STEEL DIAPHRAGM (0.500 kips) AT 1/2 OF SPAN FOR BTE60 TO BTE120, AND TWO STEEL DIAPHRAGMS (0.500 kips) PLACED 20'-0, ON EITHER SIDE, OF THE BEAM CENTERLINE FOR BTE125 TO BTE150. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.

② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.

TOTAL BEAM DEFLECTIONS AT 1/2 OF SPAN, Δ_D, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE:

- (A) Δ_D = Δ_i + Δ_T FOR SIMPLE SPAN.
- (B) Δ_D = Δ_i + 3/4 Δ_T FOR END SPANS OF CONTINUOUS BRIDGE.
- (C) Δ_D = Δ_i + 1/2 Δ_T FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.

③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi. AND A_s = 0.217 in².

④ REQUIRES A 4000 psi, 28 DAY COMPRESSIVE STRENGTH FOR CAST-IN-PLACE SLAB CONCRETE.

CALCULATED DESIGN CAMBERS HAVE BEEN REDUCED FROM THEIR THEORETICAL VALUES BY 15% TO AID CONSTRUCTABILITY.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007. REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. CONCRETE IN ACCORDANCE WITH SECTION 5. PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 270.

SPECIFICATIONS:

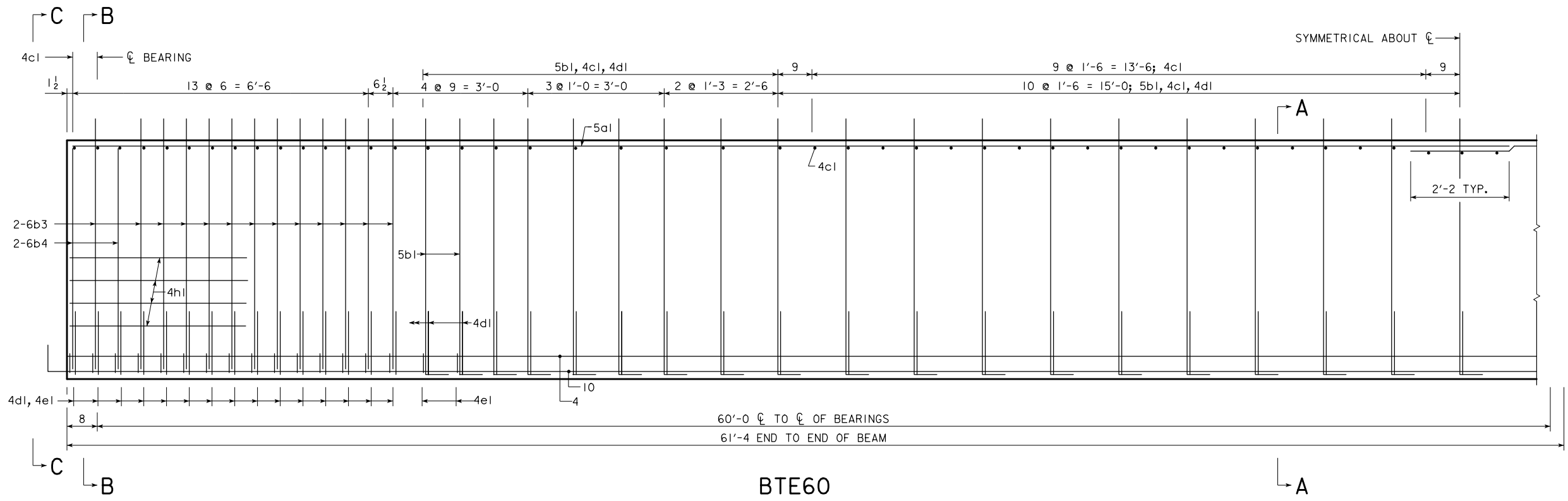
CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS. DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

BTE BEAM DETAILS

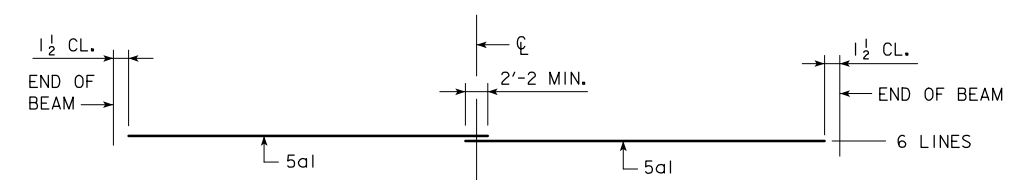
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
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REINFORCING BAR LIST

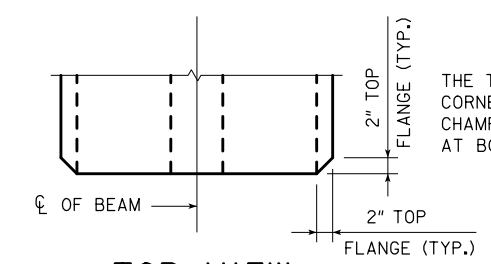
BEAM	BTE60	BTE65	BTE70	BTE75	BTE80	BTE85	BTE90	BTE95	BTE100	BTE105	BTE110	BTE115	BTE120	BTE125	BTE130	BTE135	BTE140	BTE145	BTE150	BEAM																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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5a1	—	12	31'-8	12	34'-2	12	36'-8	12	39'-2	12	22'-9	12	25'-3	12	27'-9	12	30'-3	12	32'-9	12	35'-3	12	37'-9	12	21'-4	12	23'-10	12	26'-4	12	28'-10	12	31'-4	12	33'-10	12	36'-4	12	38'-10	5a1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
5a2	—	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	6	40'-0	5a2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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5b1	≡	37	12'-2	41	12'-2	45	12'-2	49	12'-2	53	12'-2	57	12'-2	61	12'-2	65	12'-2	69	12'-2	73	12'-2	77	12'-2	81	12'-2	85	12'-2	89	12'-2	93	12'-2	97	12'-2	101	12'-2	105	12'-2	109	12'-2	113	12'-2	117	12'-2	121	12'-2	125	12'-2	129	12'-2	133	12'-2	137	12'-2	141	12'-2	145	12'-2	149	12'-2	153	12'-2	157	12'-2	161	12'-2	165	12'-2	169	12'-2	173	12'-2	177	12'-2	181	12'-2	185	12'-2	189	12'-2	193	12'-2	197	12'-2	201	12'-2	205	12'-2	209	12'-2	213	12'-2	217	12'-2	221	12'-2	225	12'-2	229	12'-2	233	12'-2	237	12'-2	241	12'-2	245	12'-2	249	12'-2	253	12'-2	257	12'-2	261	12'-2	265	12'-2	269	12'-2	273	12'-2	277	12'-2	281	12'-2	285	12'-2	289	12'-2	293	12'-2	297	12'-2	301	12'-2	305	12'-2	309	12'-2	313	12'-2	317	12'-2	321	12'-2	325	12'-2	329	12'-2	333	12'-2	337	12'-2	341	12'-2	345	12'-2	349	12'-2	353	12'-2	357	12'-2	361	12'-2	365	12'-2	369	12'-2	373	12'-2	377	12'-2	381	12'-2	385	12'-2	389	12'-2	393	12'-2	397	12'-2	401	12'-2	405	12'-2	409	12'-2	413	12'-2	417	12'-2	421	12'-2	425	12'-2	429	12'-2	433	12'-2	437	12'-2	441	12'-2	445	12'-2	449	12'-2	453	12'-2	457	12'-2	461	12'-2	465	12'-2	469	12'-2	473	12'-2	477	12'-2	481	12'-2	485	12'-2	489	12'-2	493	12'-2	497	12'-2	501	12'-2	505	12'-2	509	12'-2	513	12'-2	517	12'-2	521	12'-2	525	12'-2	529	12'-2	533	12'-2	537	12'-2	541	12'-2	545	12'-2	549	12'-2	553	12'-2	557	12'-2	561	12'-2	565	12'-2	569	12'-2	573	12'-2	577	12'-2	581	12'-2	585	12'-2	589	12'-2	593	12'-2	597	12'-2	601	12'-2	605	12'-2	609	12'-2	613	12'-2	617	12'-2	621	12'-2	625	12'-2	629	12'-2	633	12'-2	637	12'-2	641	12'-2	645	12'-2	649	12'-2	653	12'-2	657	12'-2	661	12'-2	665	12'-2	669	12'-2	673	12'-2	677	12'-2	681	12'-2	685	12'-2	689	12'-2	693	12'-2	697	12'-2	701	12'-2	705	12'-2	709	12'-2	713	12'-2	717	12'-2	721	12'-2	725	12'-2	729	12'-2	733	12'-2	737	12'-2	741	12'-2	745	12'-2	749	12'-2	753	12'-2	757	12'-2	761	12'-2	765	12'-2	769	12'-2	773	12'-2	777	12'-2	781	12'-2	785	12'-2	789	12'-2	793	12'-2	797	12'-2	801	12'-2	805	12'-2	809	12'-2	813	12'-2	817	12'-2	821	12'-2	825	12'-2	829	12'-2	833	12'-2	837	12'-2	841	12'-2	845	12'-2	849	12'-2	853	12'-2	857	12'-2	861	12'-2	865	12'-2	869	12'-2	873	12'-2	877	12'-2	881	12'-2	885	12'-2	889	12'-2	893	12'-2	897	12'-2	901	12'-2	905	12'-2	909	12'-2	913	12'-2	917	12'-2	921	12'-2	925	12'-2	929	12'-2	933	12'-2	937	12'-2	941	12'-2	945	12'-2	949	12'-2	953	12'-2	957	12'-2	961	12'-2	965	12'-2	969	12'-2	973	12'-2	977	12'-2	981	12'-2	985	12'-2	989	12'-2	993	12'-2	997	12'-2	1001	12'-2	1005	12'-2	1009	12'-2	1013	12'-2	1017	12'-2	1021	12'-2	1025	12'-2	1029	12'-2	1033	12'-2	1037	12'-2	1041	12'-2	1045	12'-2	1049	12'-2	1053	12'-2	1057	12'-2	1061	12'-2	1065	12'-2	1069	12'-2	1073	12'-2	1077	12'-2	1081	12'-2	1085	12'-2	1089	12'-2	1093	12'-2	1097	12'-2	1101	12'-2	1105	12'-2	1109	12'-2	1113	12'-2	1117	12'-2	1121	12'-2	1125	12'-2	1129	12'-2	1133	12'-2	1137	12'-2	1141	12'-2	1145	12'-2	1149	12'-2	1153	12'-2	1157	12'-2	1161	12'-2	1165	12'-2	1169	12'-2	1173	12'-2	1177	12'-2	1181	12'-2	1185	12'-2	1189	12'-2	1193	12'-2	1197	12'-2	1201	12'-2	1205	12'-2	1209	12'-2	1213	12'-2	1217	12'-2	1221	12'-2	1225	12'-2	1229	12'-2	1233	12'-2	1237	12'-2	1241	12'-2	1245	12'-2	1249	12'-2	1253	12'-2	1257	12'-2	1261	12'-2	1265	12'-2	1269	12'-2	1273	12'-2	1277	12'-2	1281	12'-2	1285	12'-2	1289	12'-2	1293	12'-2	1297	12'-2	1301	12'-2	1305	12'-2	1309	12'-2	1313	12'-2	1317	12'-2	1321	12'-2	1325	12'-2	1329	12'-2	1333	12'-2	1337	12'-2	1341	12'-2	1345	12'-2	1349	12'-2	1353	12'-2	1357	12'-2	1361	12'-2	1365	12'-2	1369	12'-2	1373	12'-2	1377	12'-2	1381	12'-2	1385	12'-2	1389	12'-2	1393	12'-2	1397	12'-2	1401	12'-2	1405	12'-2	1409	12'-2	1413	12'-2	1417	12'-2	1421	12'-2	1425	12'-2	1429	12'-2	1433	12'-2	1437	12'-2	1441	12'-2	1445	12'-2	1449	12'-2	1453	12'-2	1457	12'-2	1461	12'-2	1465	12'-2	1469	12'-2	1473	12'-2	1477	12'-2	1481	12'-2	1485	12'-2	1489	12'-2	1493	12'-2	1497	12'-2	1501	12'-2	1505	12'-2	1509	12'-2	1513	12'-2	1517	12'-2	1521	12'-2	1525	12'-2	1529	12'-2	1533	12'-2	1537	12'-2	1541	12'-2	1545	12'-2	1549	12'-2	1553	12'-2	1557	12'-2	1561	12'-2	1565	12'-2	1569	12'-2	1573	12'-2	1577	12'-2	1581	12'-2	1585	12'-2	1589	12'-2	1593	12'-2	1597	12'-2	1601	12'-2	1605	12'-2	1609	12'-2	1613	12'-2	1617	12'-2	1621	12'-2	1625	12'-2	1629	12'-2	1633	12'-2	1637	12'-2	1641	12'-2	1645	12'-2	1649	12'-2	1653	12'-2	1657	12'-2	1661	12'-2	1665	12'-2	1669	12'-2	1673	12'-2	1677	12'-2	1681	12'-2	1685	12'-2	1689	12'-2	1693	12'-2	1697	12'-2	1701	12'-2	1705	12'-2	1709	12'-2	1713	12'-2	1717	12'-2	1721	12'-2	1725	12'-2	1729	12'-2	1733	12'-2	1737	12'-2	1741	12'-2	1745	12'-2	1749	12'-2	1753	12'-2	1757	12'-2	1761	12'-2	1765	12'-2	1769	12'-2	1773	12'-2	1777	12'-2	1781	12'-2	1785	12'-2	1789	12'-2	1793	12'-2	1797	12'-2	1801	12'-2	1805	12'-2	1809	12'-2	1813	12'-2	1817	12'-2	1821	12'-2	1825	12'-2	1829	12'-2	1833	12'-2	1837	12'-2	1841	12'-2	1845	12'-2	1849	12'-2	1853	12'-2	1857	12'-2	1861	12'-2	1865	12'-2	1869	12'-2	1873	12'-2	1877	12'-2	1881	12'-2	1885	12'-2	1889	12'-2	1893	12'-2	1897	12'-2	1901	12'-2	1905	12'-2	1909	12'-2	1913	12'-2	1917	12'-2	1921	12'-2	1925	12'-2	1929	12'-2	1933	12'-2	1937	12'-2	1941	12'-2	1945	12'-2	1949	12'-2	1953	12'-2	1957	12'-2	1961	12'-2	1965	12'-2	1969	12'-2	1973	12'-2	1977	12'-2	1981	12'-2	1985	12'-2	1989	12'-2	1993	12'-2	1997	12'-2	2001	12'-2	2005	12'-2	2009	12'-2	2013	12'-2	2017	12'-2	2021	12'-2	2025	12'-2	2029	12'-2	2033	12'-2	2037	12'-2	2041	12'-2	2045	12'-2	2049	12'-2	2053	12'-2	2057	12'-2	2061	12'-2	2065	12'-2	2069	12'-2	2073	12'-2	2077	12'-2	2081	12'-2	2085	12'-2	2089	12'-2	2093	12'-2	2097	12'-2	2101	12'-2	2105	12'-2	2109	12'-2	2113	12'-2	2117	12'-2	2121	12'-2	2125	12'-2	2129	12'-2	2133	12'-2	2137	12'-2	2141	12'-2	2145	12'-2	2149	12'-2	2153	12'-2	2157	12'-2	2161	12'-2	2165	12'-2	2169	12'-2	2173	12'-2	2177	12'-2	2181	12'-2	2185	12'-2	2189	12'-2	2193	12'-2	2197	12'-2	2201	12'-2	2205	12'-2	2209	12'-2	2213	12'-2	2217	12'-2	2221	12'-2	2225	12'-2	2229	12'-2	2233	12'-2	2237	12'-2	2241	12'-2	2245	12'-2	2249	12'-2	2253	12'-2	2257	12'-2	2261	12'-2	2265	12'-2	2269	12'-2	2273	12'-2	2277	12'-2	2281	12'-2	2285	12'-2	2289	12'-2	2293	12'-2	2297	12'-2	2301	12'-2	2305	12'-2	2309	12'-2	2313	12'-



BTE60

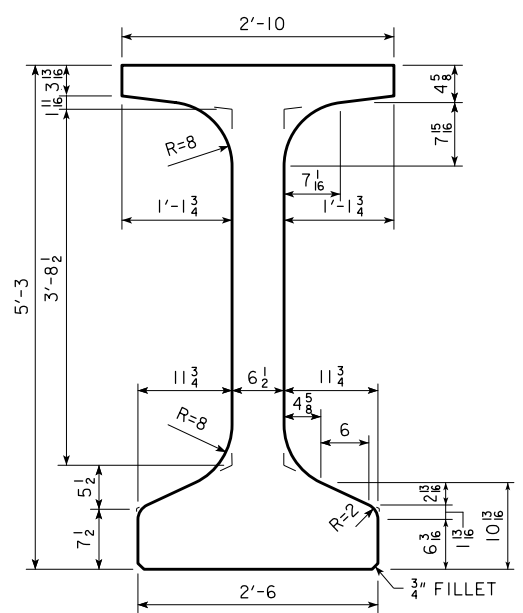


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

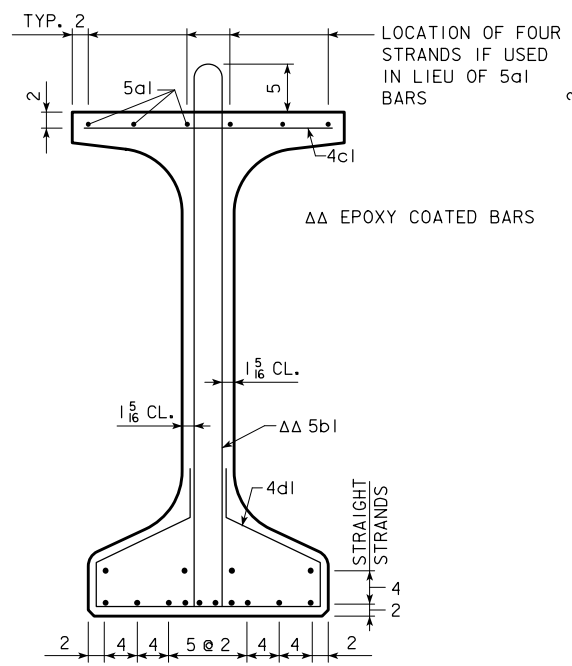
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



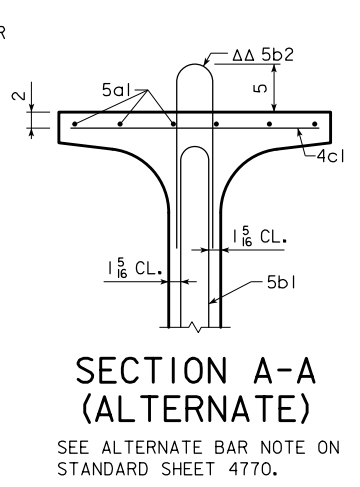
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

BEAM SECTION PROPERTIES

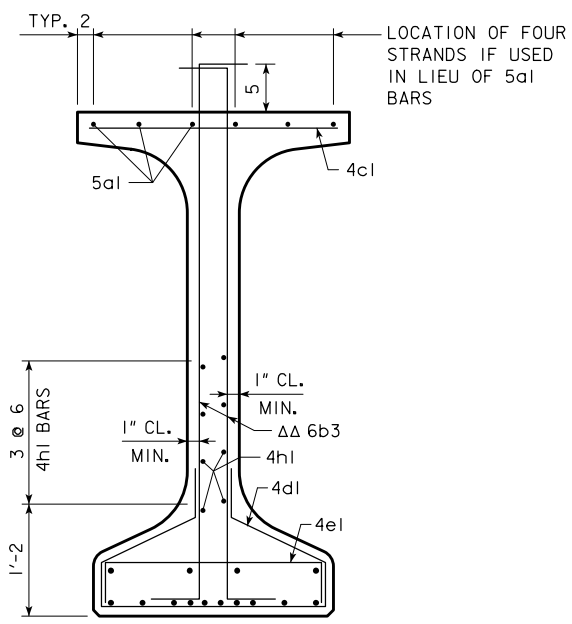


SECTION A-A

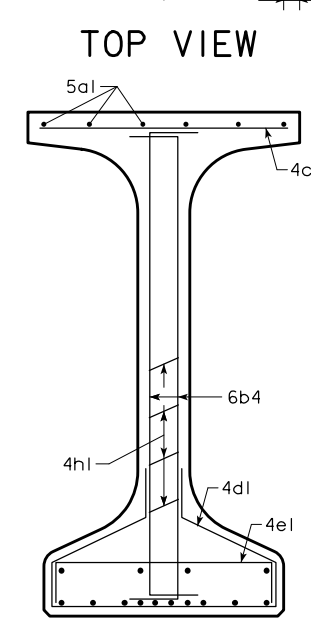


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770.



SECTION B-B

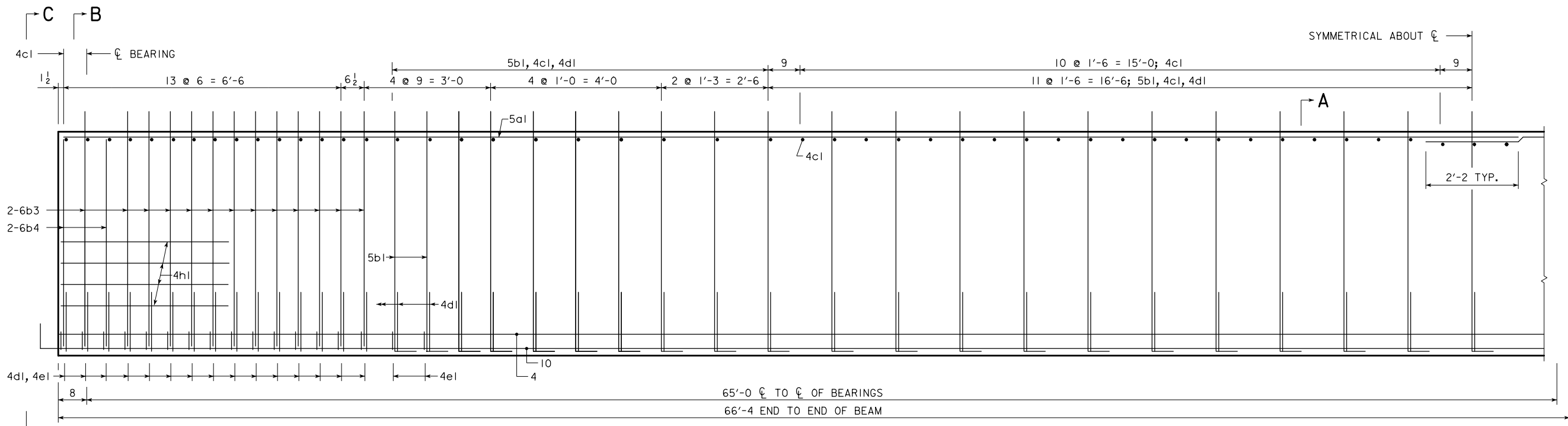


SECTION C-C

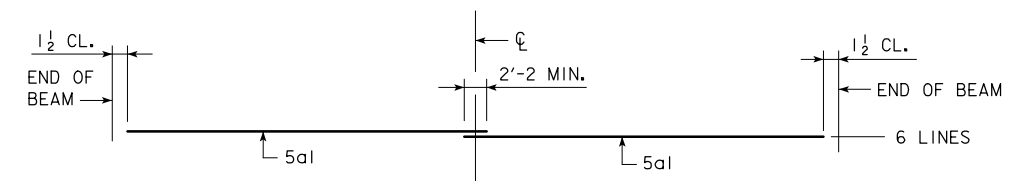
BTE60 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

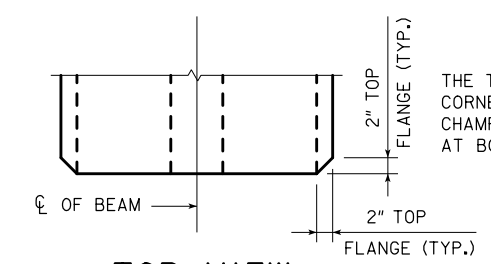
REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN - 4771 - THIS SHEET ISSUED 02-08.



BTE65

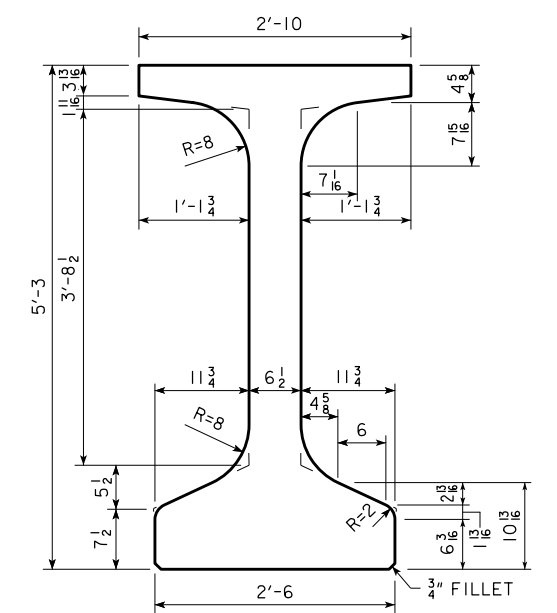


TOP FLANGE LONGITUDINAL BAR LAYOUT



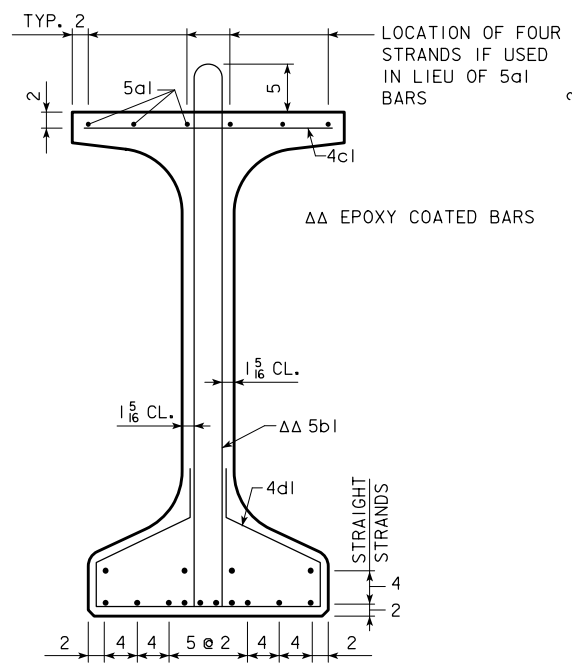
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

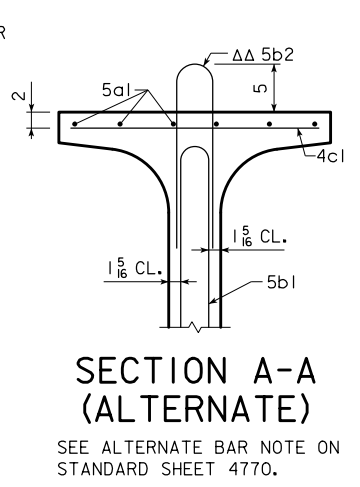


BTE BEAM CROSS SECTION

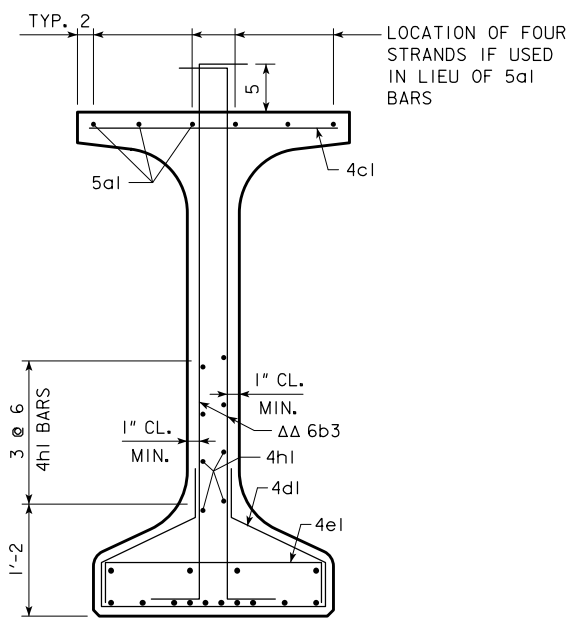
BEAM SECTION PROPERTIES
 AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 I = 422,790 in⁴



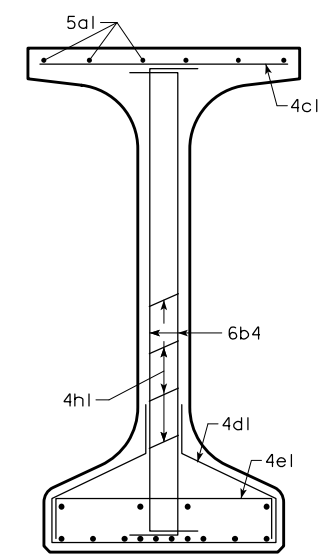
SECTION A-A



SECTION A-A (ALTERNATE)



SECTION B-B

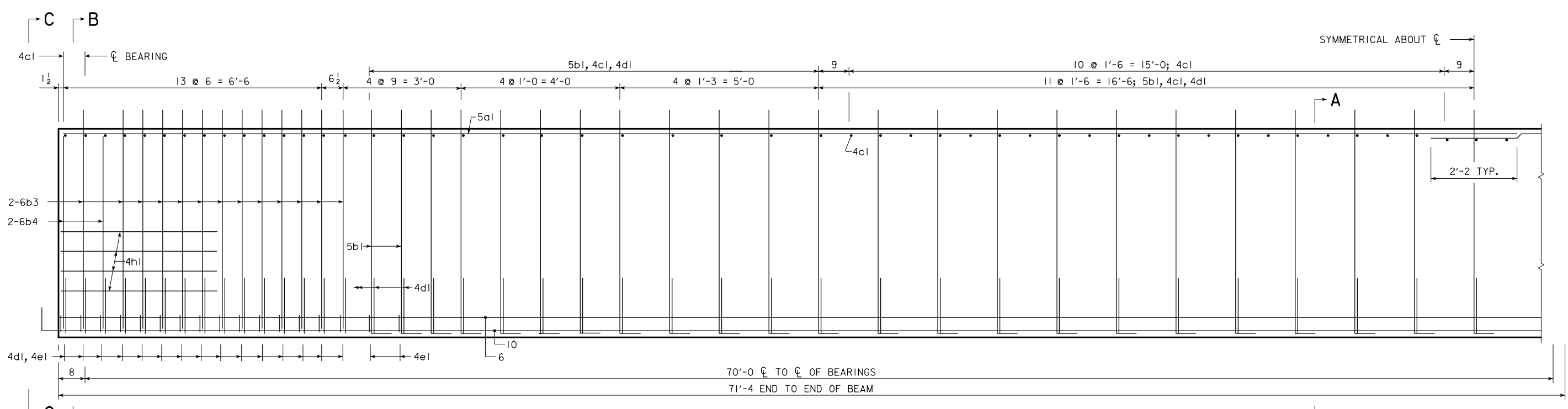


SECTION C-C

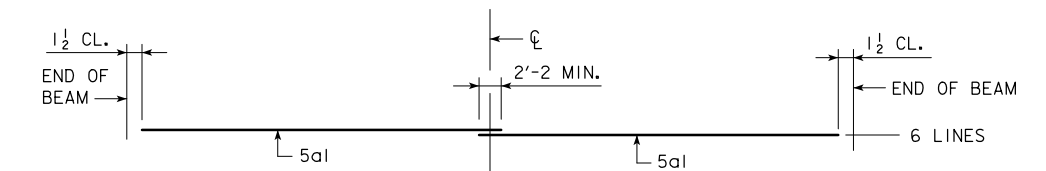
BTE65 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

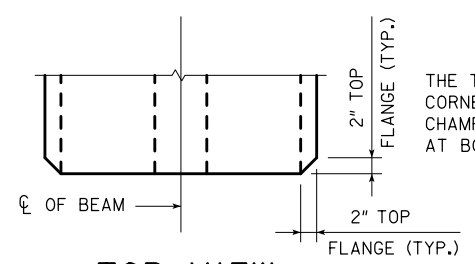
REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN - 4772 - THIS SHEET ISSUED 02-08.



BTE70

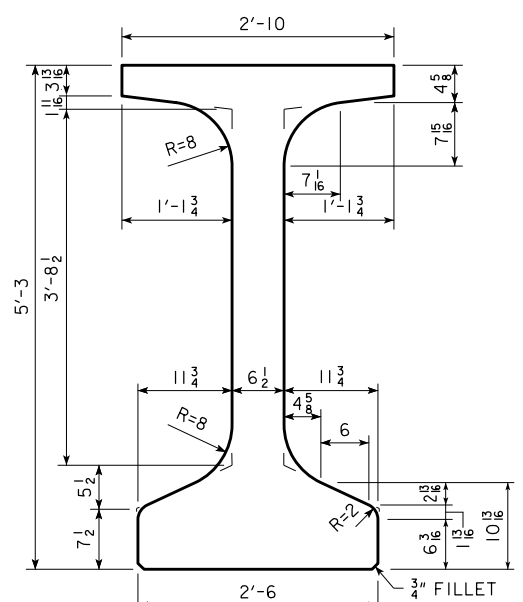


TOP FLANGE LONGITUDINAL BAR LAYOUT



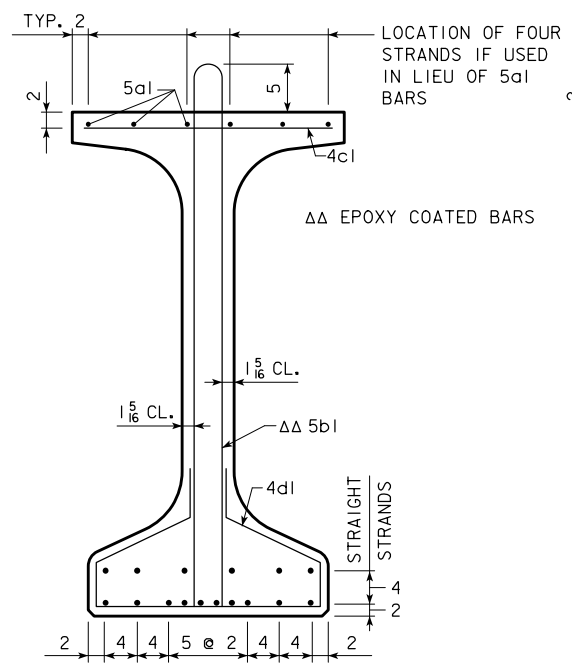
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

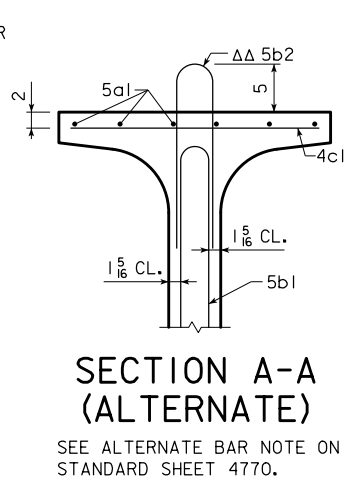


BEAM SECTION PROPERTIES

BTE BEAM CROSS SECTION

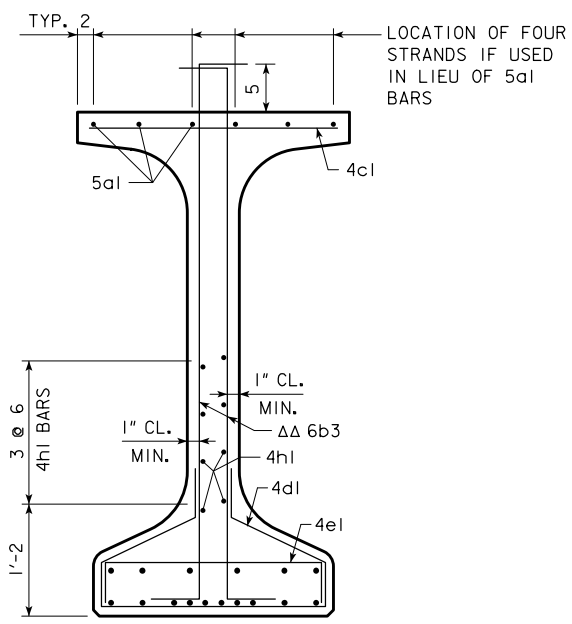


SECTION A-A

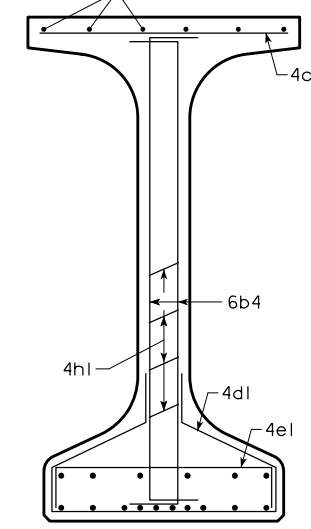


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770.



SECTION B-B

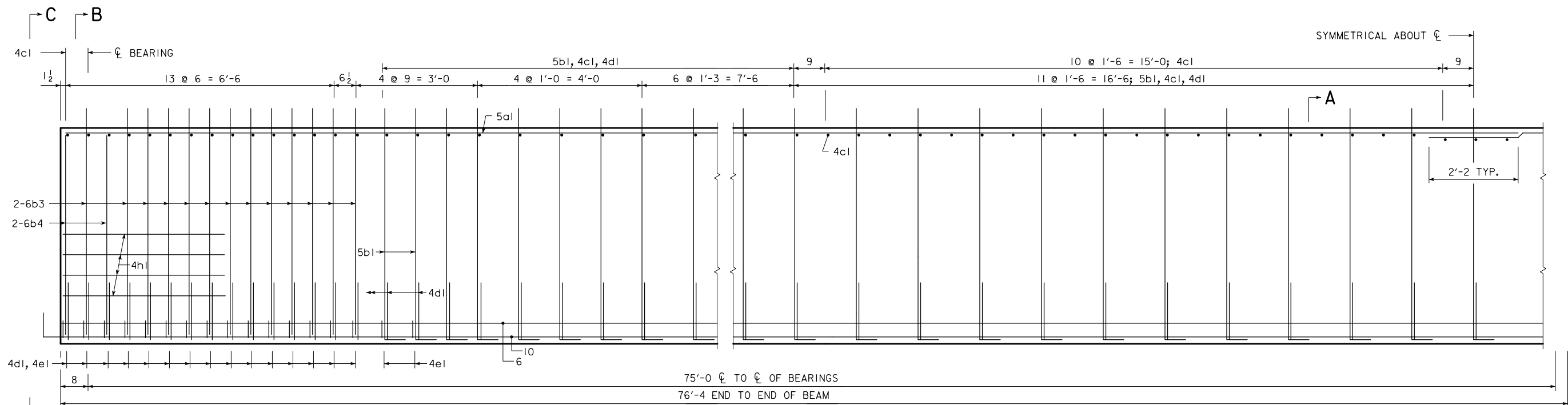


SECTION C-C

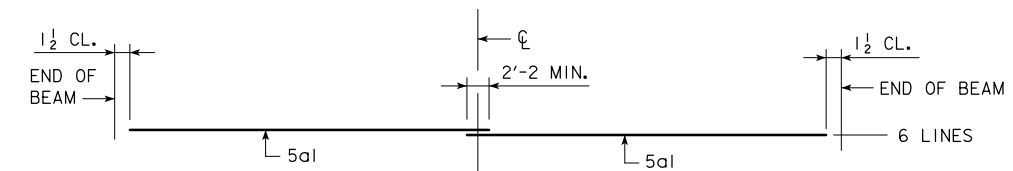
BTE70 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

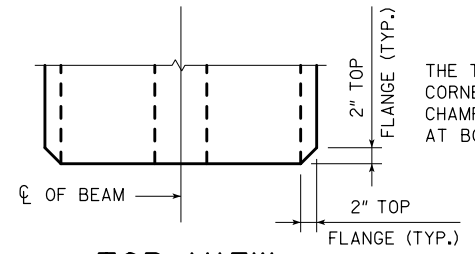
REVISED 08-09 - ADDED STRANDS TO SECTIONS A-A, B-B, & C-C. ENGLISHBEAMS.DGN - 4773 - THIS SHEET ISSUED 02-08.



BTE75

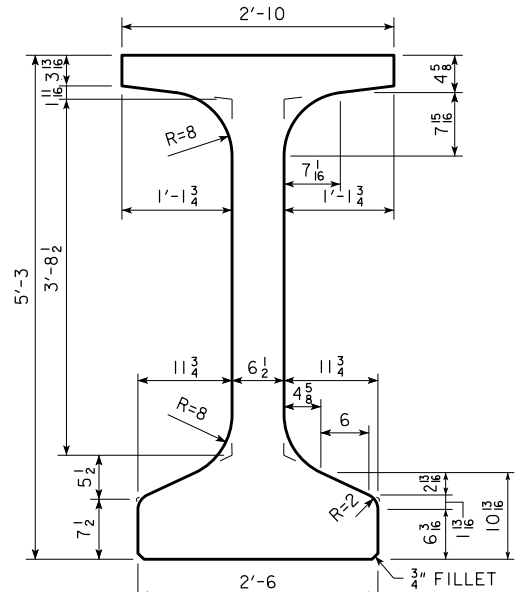


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

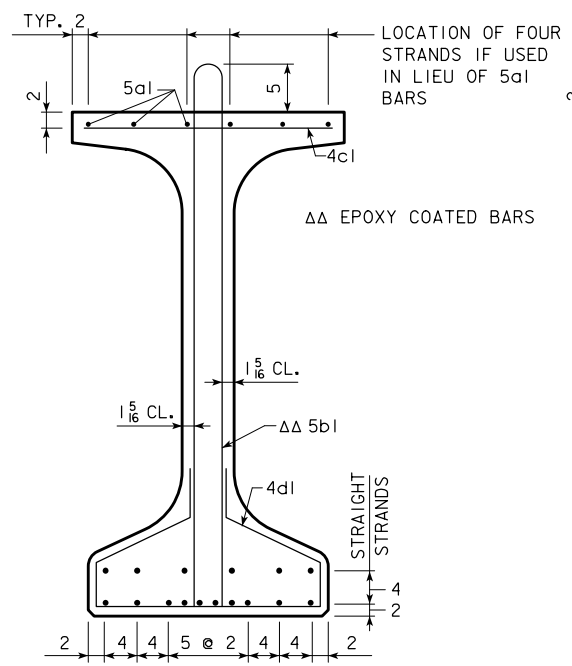
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



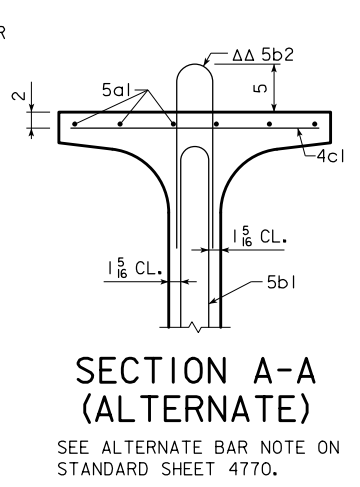
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

BEAM SECTION PROPERTIES

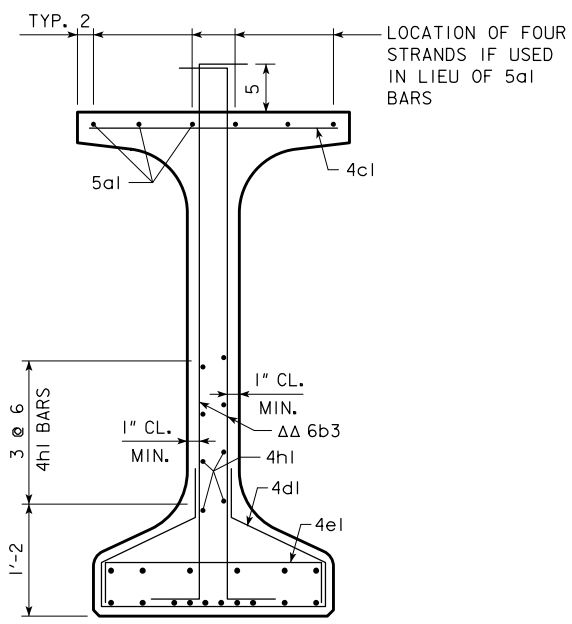


SECTION A-A

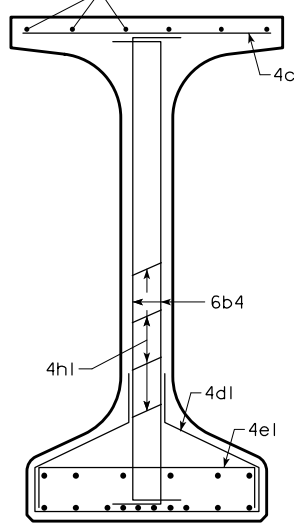


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770.



SECTION B-B

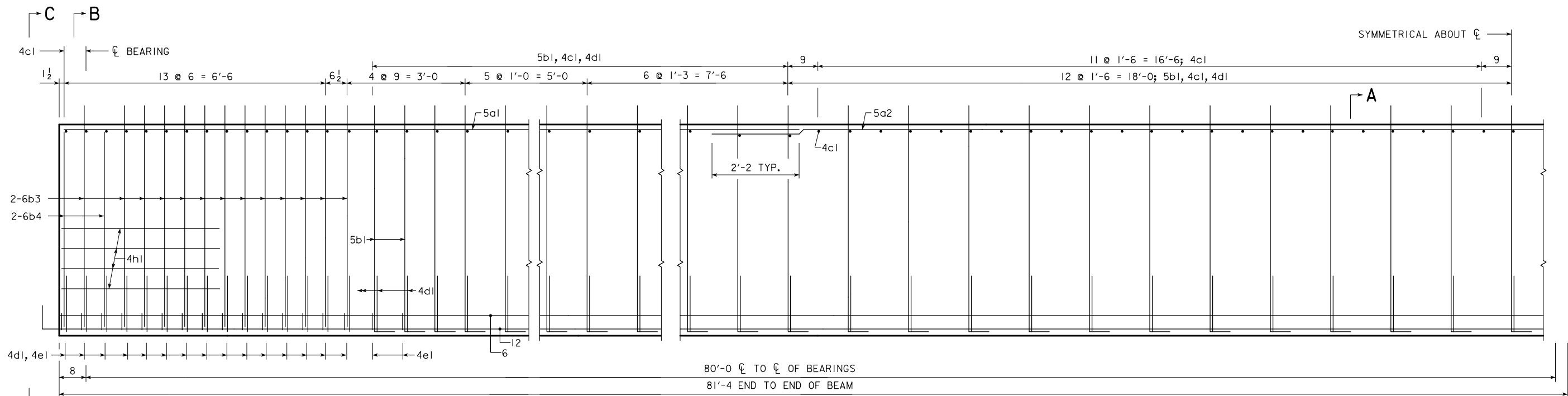


SECTION C-C

BTE75 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

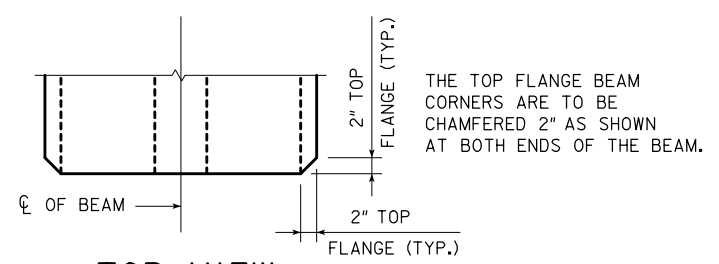
ENGLISHBEAMS.DGN - 4774 - THIS SHEET ISSUED 02-08.



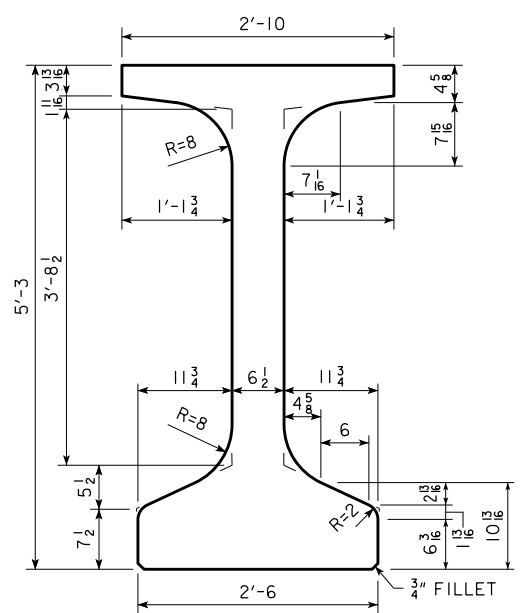
BTE80



TOP FLANGE LONGITUDINAL BAR LAYOUT



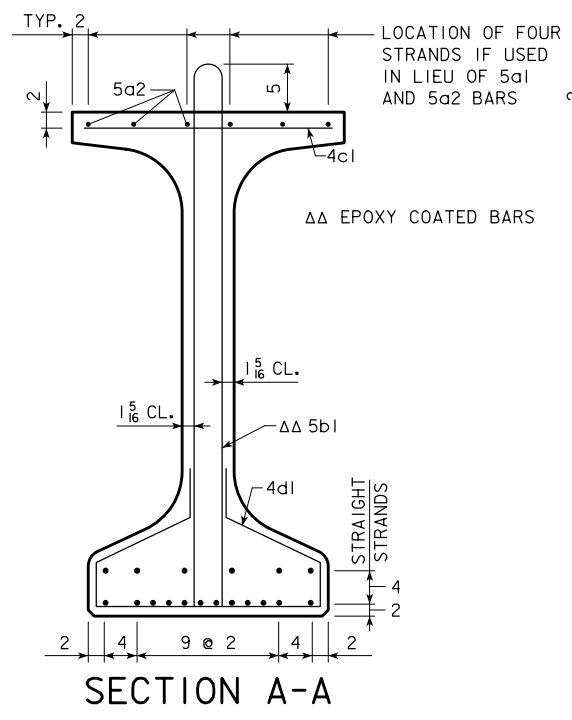
TOP VIEW



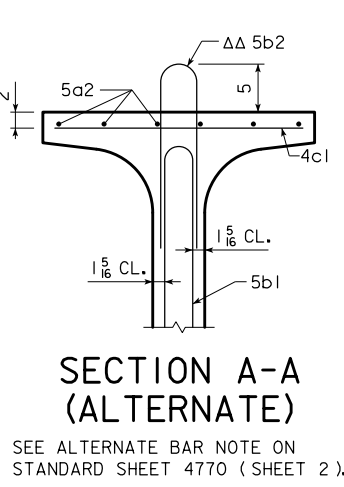
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

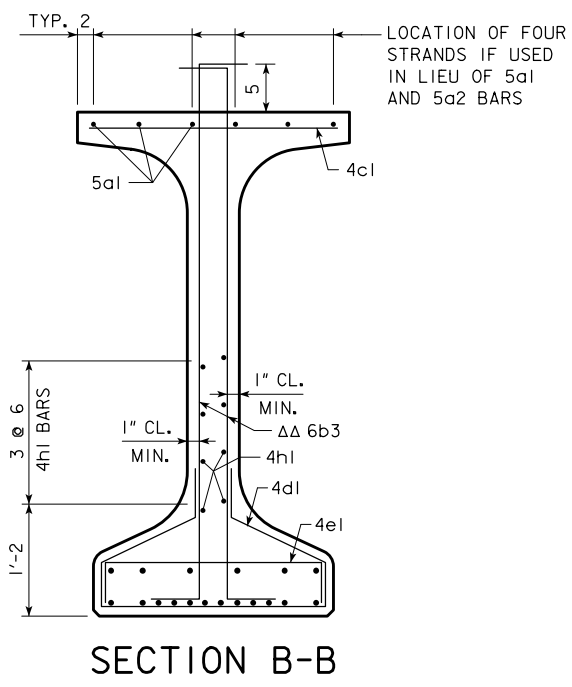
BEAM SECTION PROPERTIES



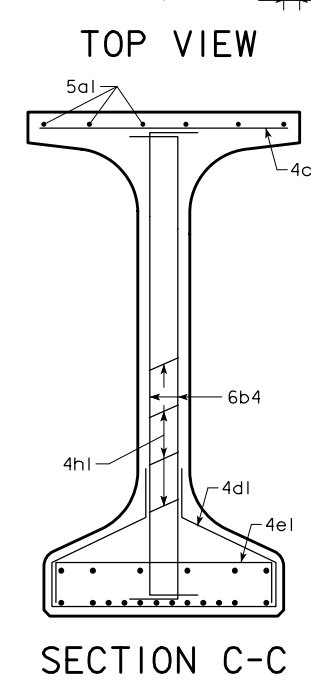
SECTION A-A



SECTION A-A (ALTERNATE)



SECTION B-B

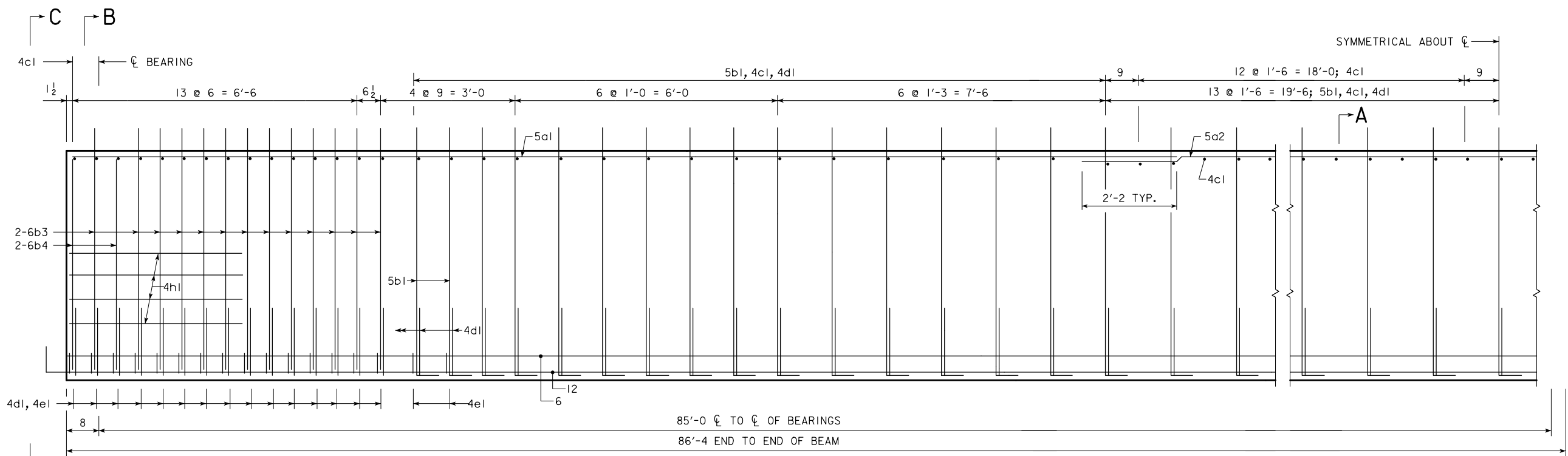


SECTION C-C

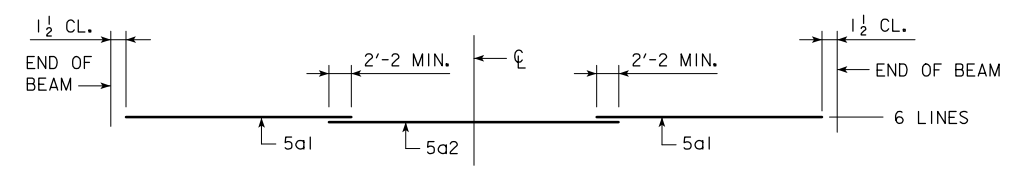
BTE80 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

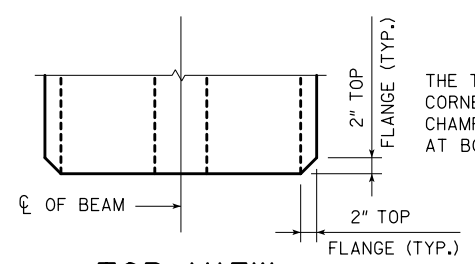
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4775 - THIS SHEET ISSUED 02-08.



BTE85

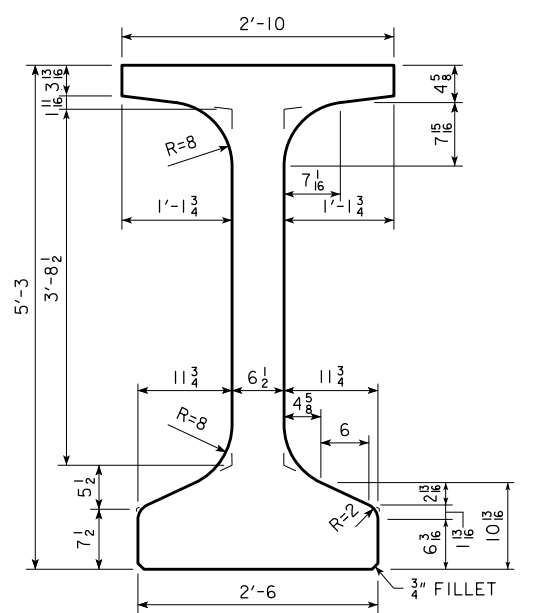


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

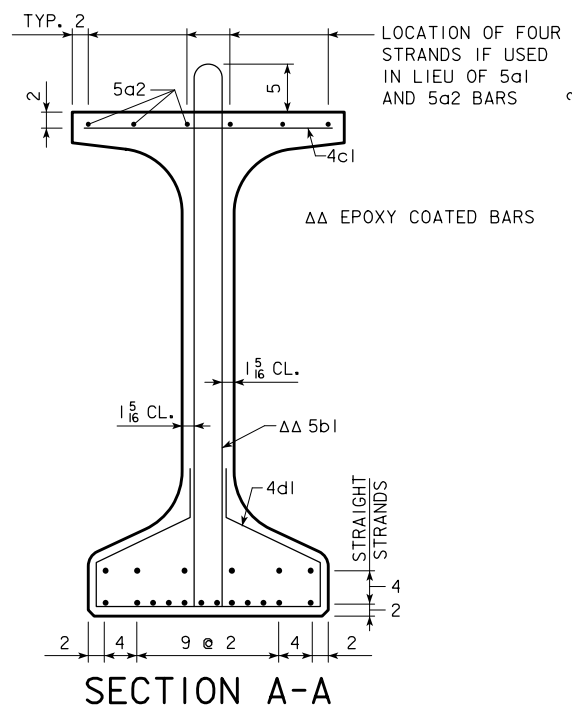
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



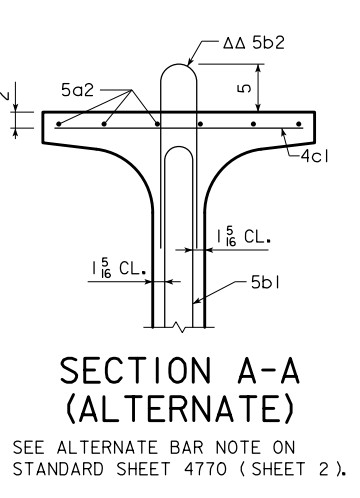
BEAM SECTION PROPERTIES

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 I = 422,790 in⁴

BTE BEAM CROSS SECTION

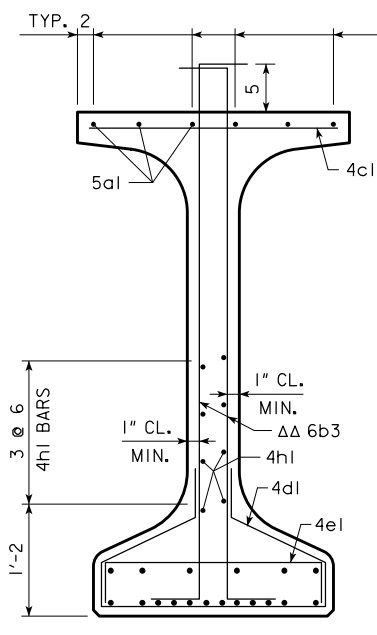


SECTION A-A



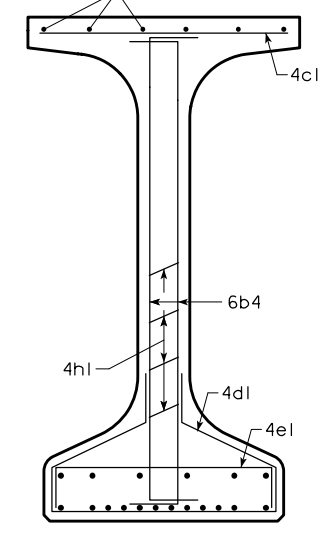
SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B

LOCATION OF FOUR STRANDS IF USED IN LIEU OF 5a1 AND 5a2 BARS

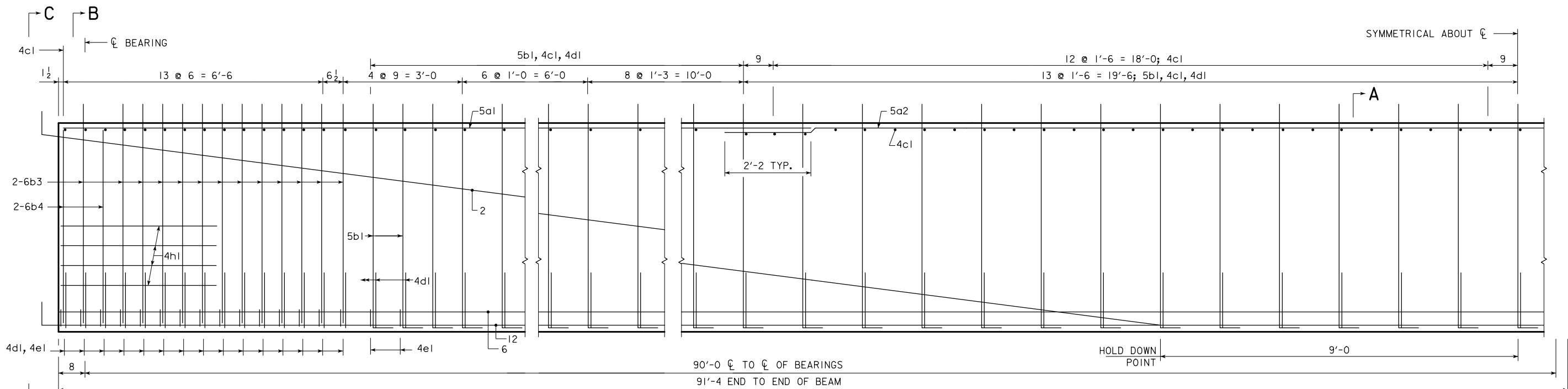


SECTION C-C

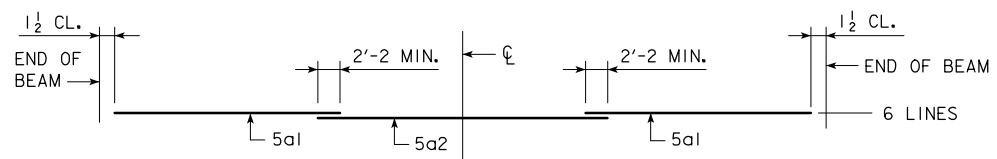
BTE85 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

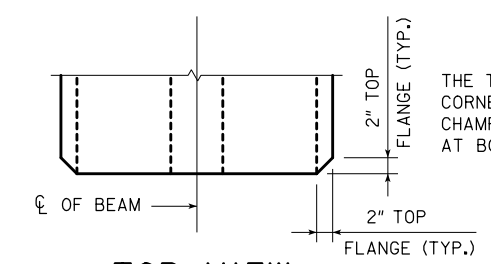
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4776 - THIS SHEET ISSUED 02-08.



BTE90

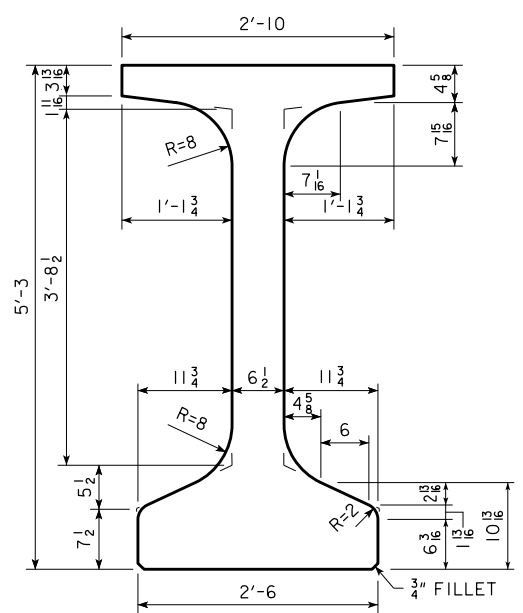


TOP FLANGE LONGITUDINAL BAR LAYOUT



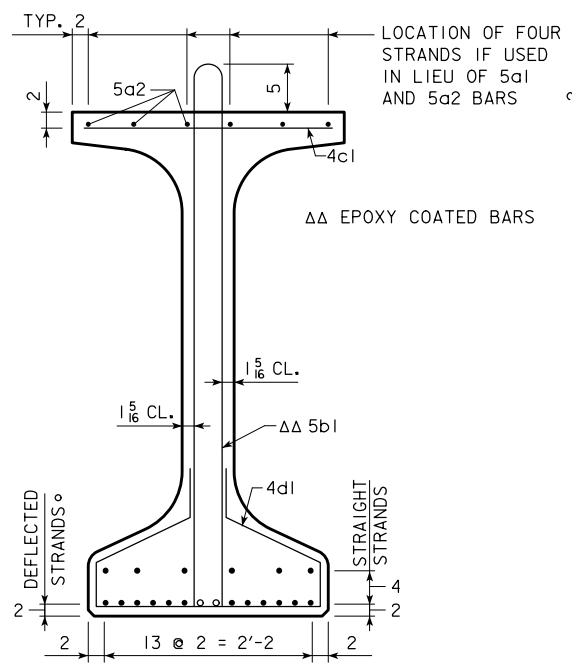
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

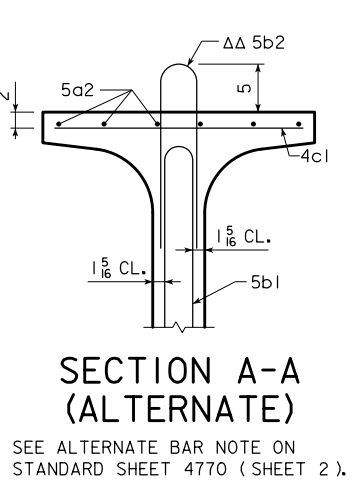


BTE BEAM CROSS SECTION

BEAM SECTION PROPERTIES
 AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 I = 422,790 in⁴

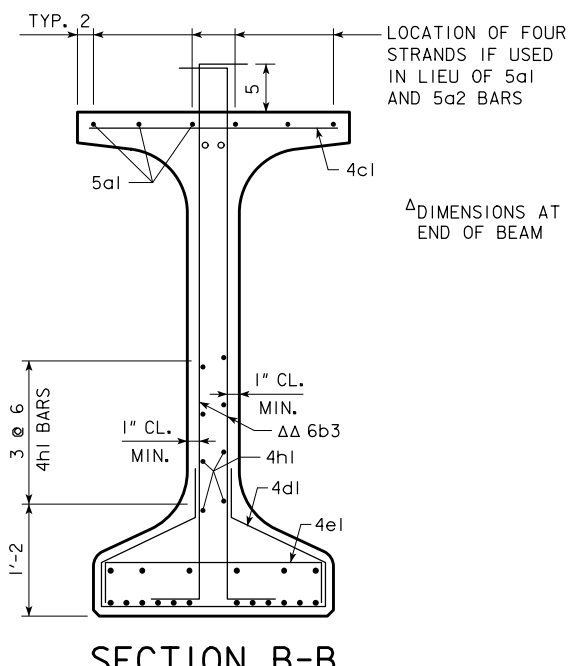


SECTION A-A

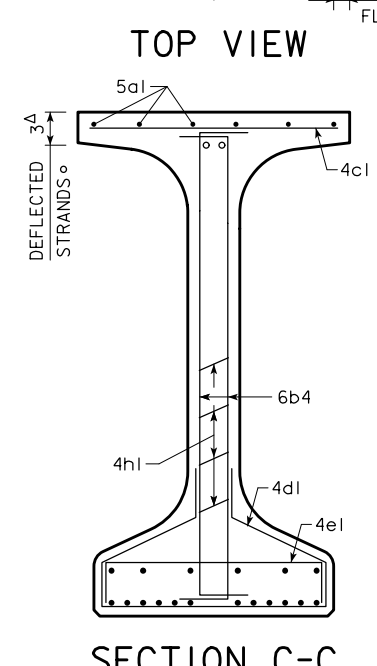


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B

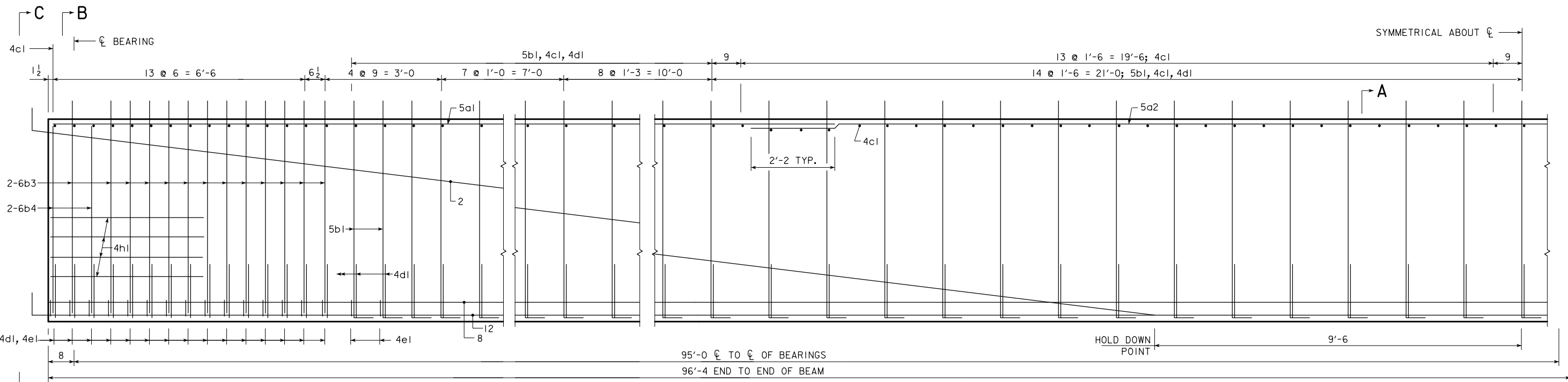


SECTION C-C

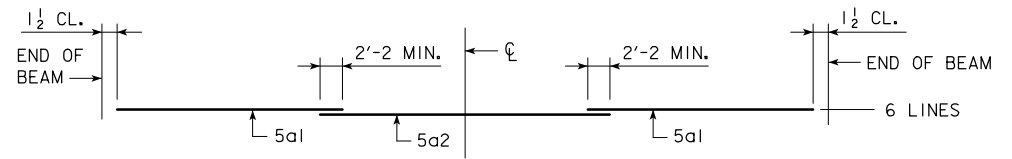
BTE90 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

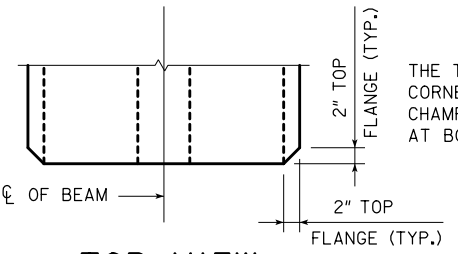
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4777 - THIS SHEET ISSUED 02-08.



BTE95

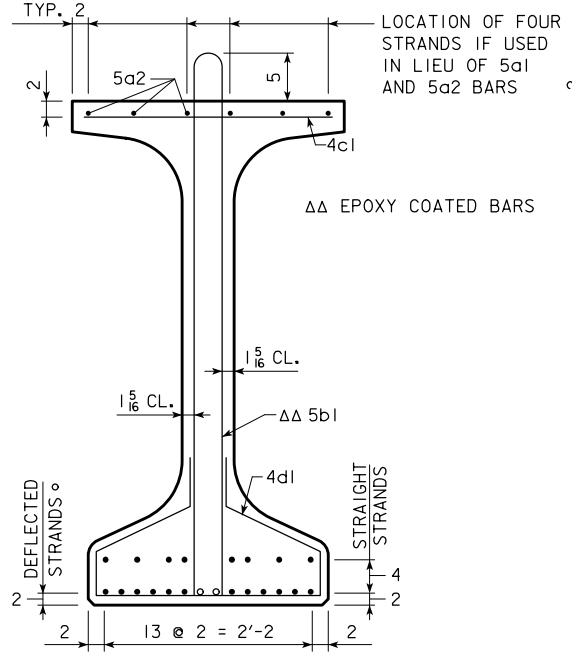


TOP FLANGE LONGITUDINAL BAR LAYOUT

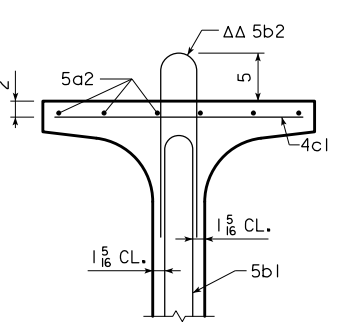


THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

TOP VIEW

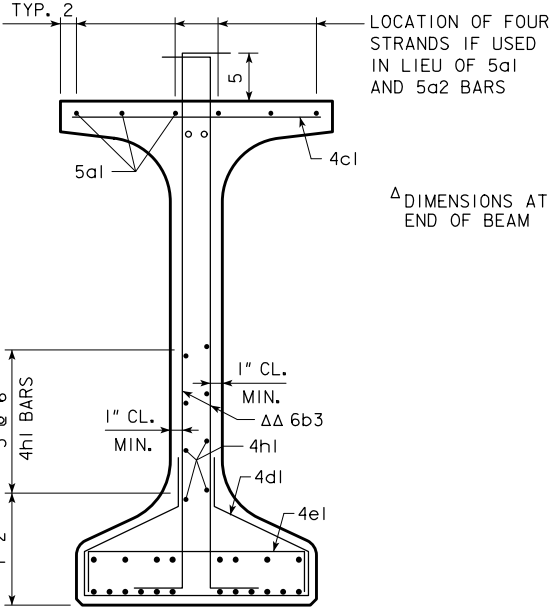


SECTION A-A

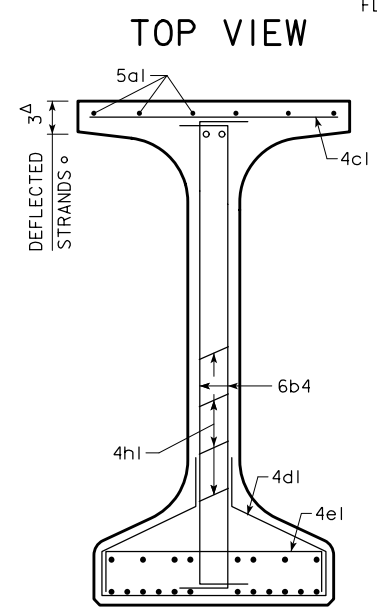


SECTION A-A (ALTERNATE)

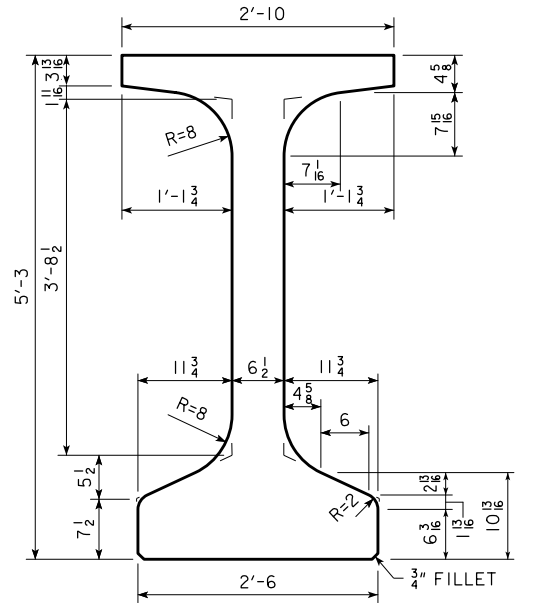
SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B



SECTION C-C



AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

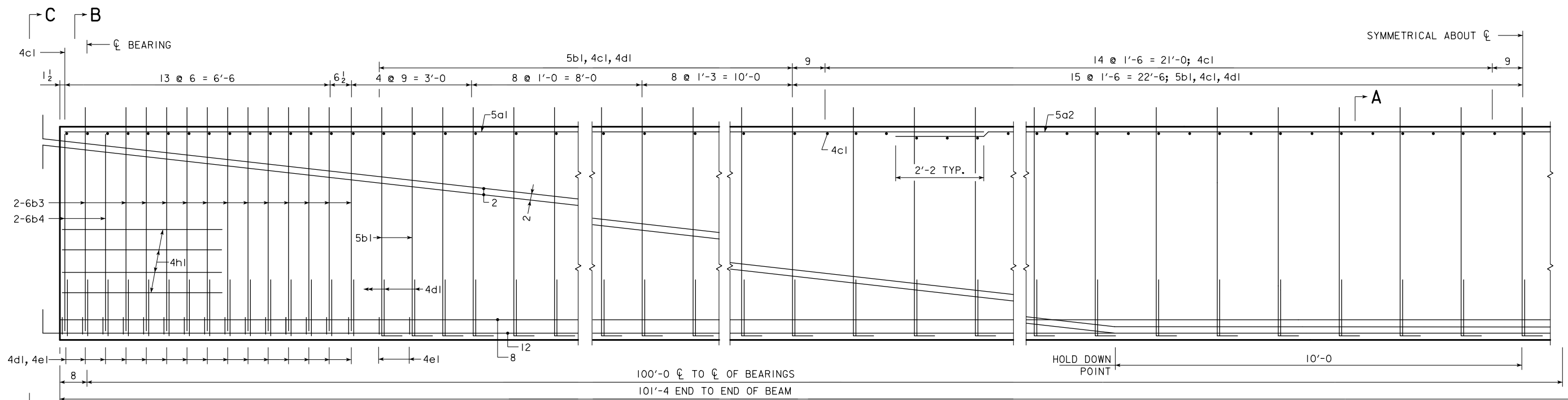
BEAM SECTION PROPERTIES

BTE BEAM CROSS SECTION

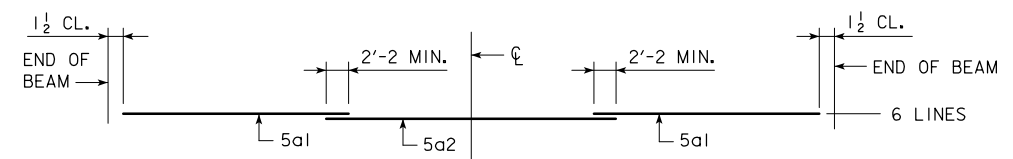
BTE95 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

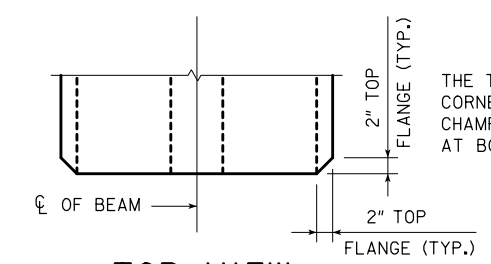
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2.
 ENGLISHBEAMS.DGN - 4778 - THIS SHEET ISSUED 02-08.



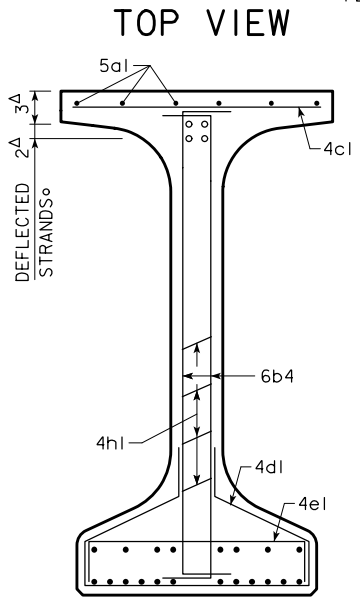
BTE100



TOP FLANGE LONGITUDINAL BAR LAYOUT



THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

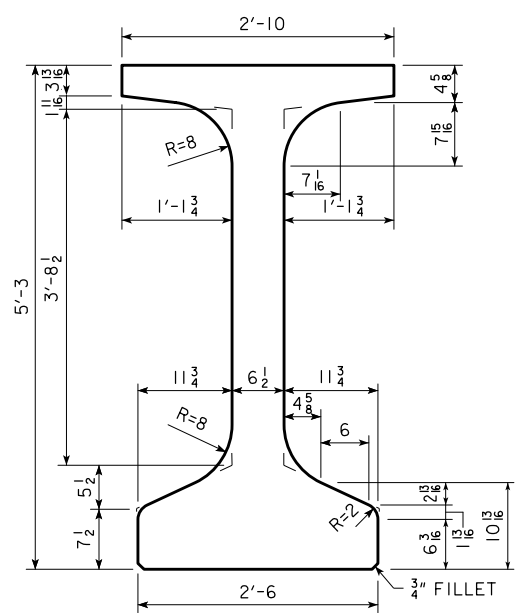


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).

SECTION B-B

SECTION C-C



BTE BEAM CROSS SECTION

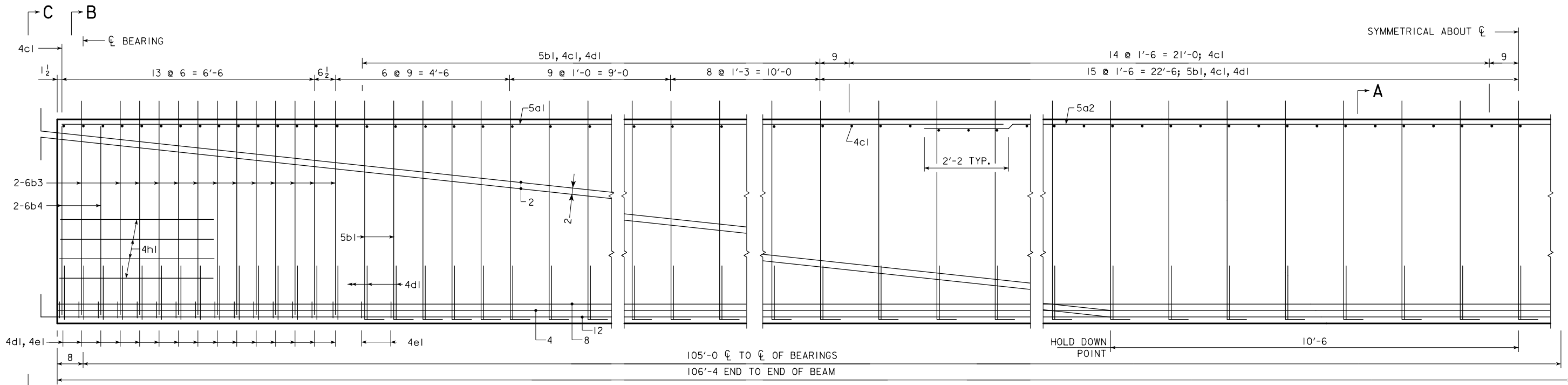
AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 I = 422,790 in⁴

BEAM SECTION PROPERTIES

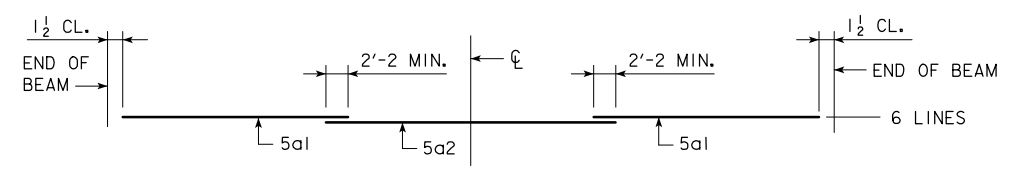
BTE100 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

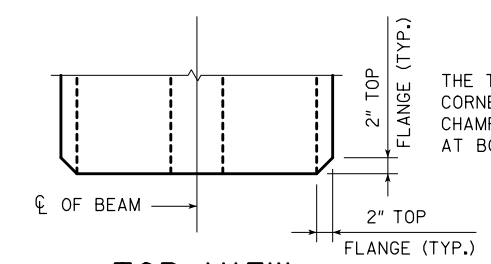
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4779 - THIS SHEET ISSUED 02-08.



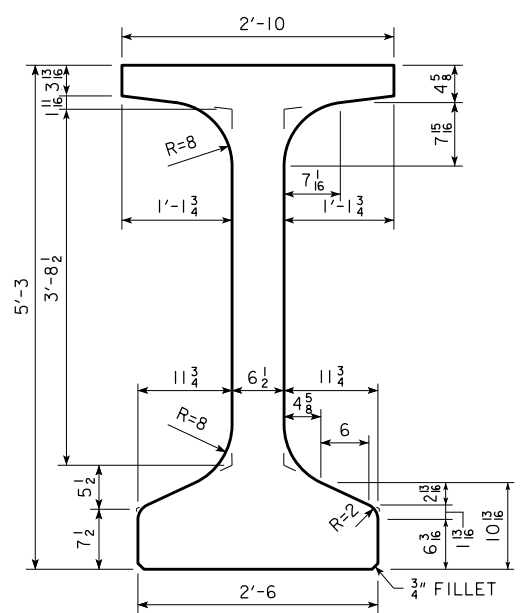
BTE105



TOP FLANGE LONGITUDINAL BAR LAYOUT



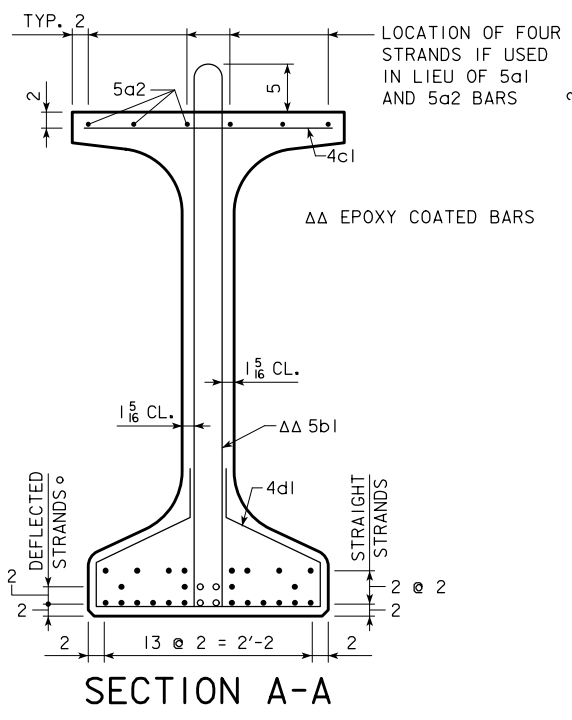
TOP VIEW



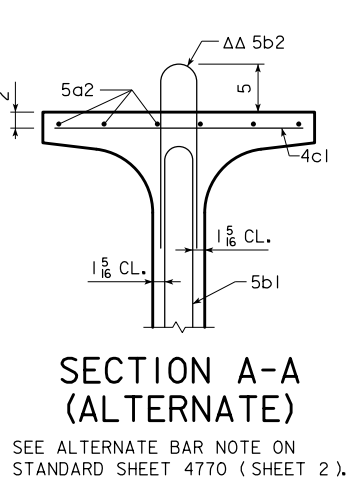
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

BEAM SECTION PROPERTIES

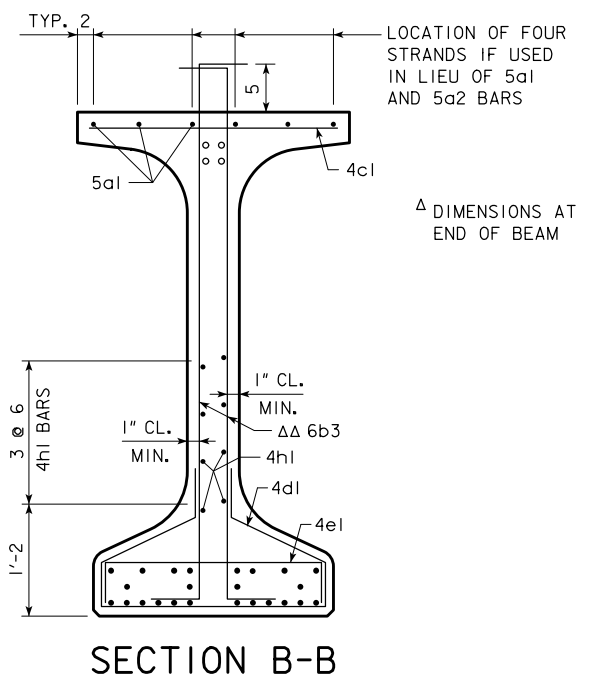


SECTION A-A

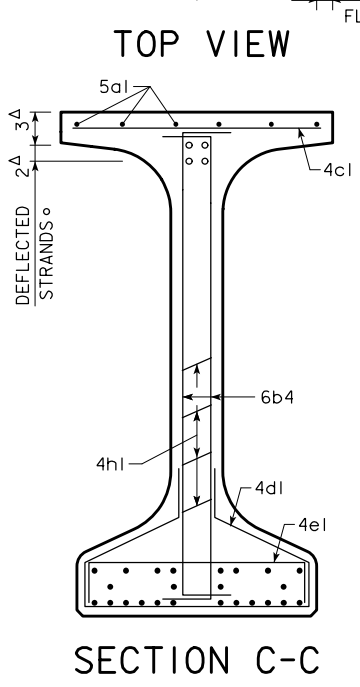


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B

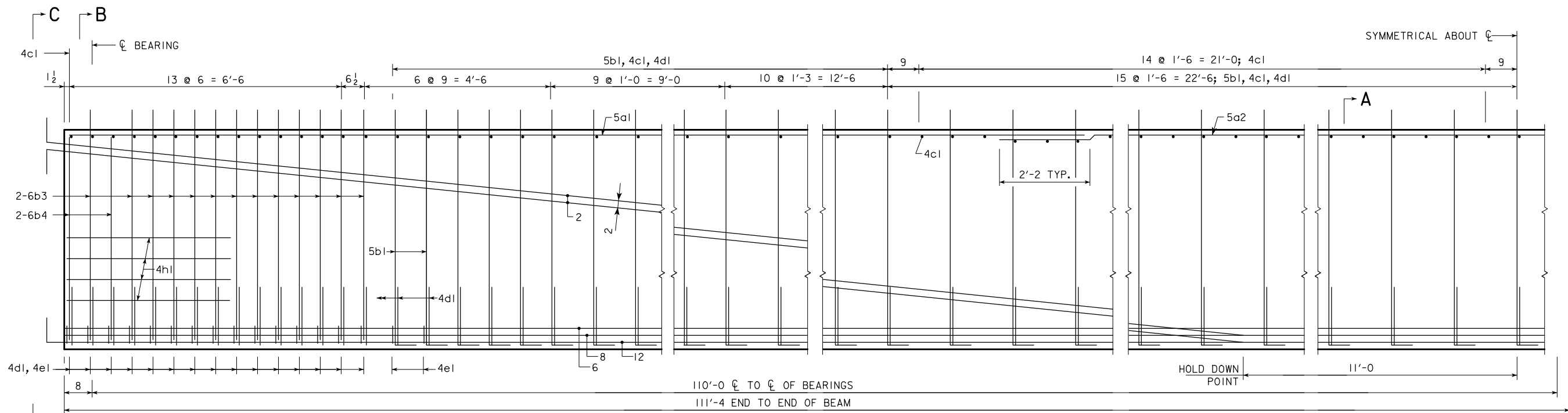


SECTION C-C

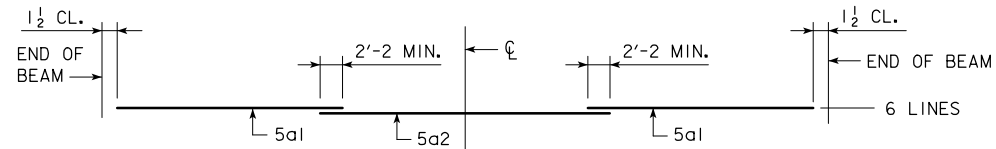
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4780 - THIS SHEET ISSUED 02-08.

BTE105 BEAM DETAILS

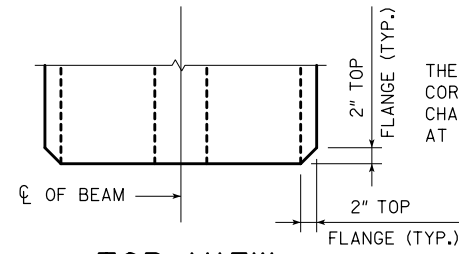
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



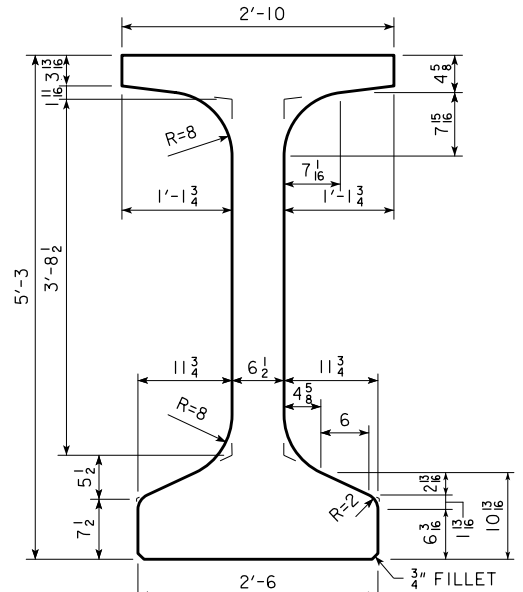
BTE110



TOP FLANGE LONGITUDINAL BAR LAYOUT



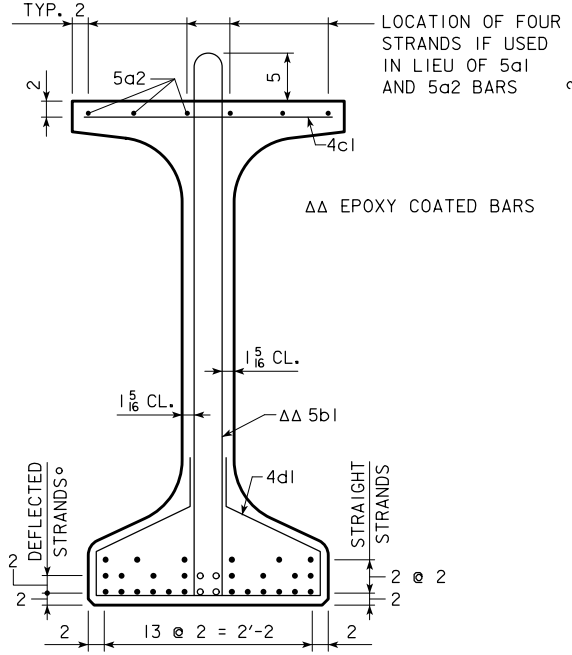
TOP VIEW



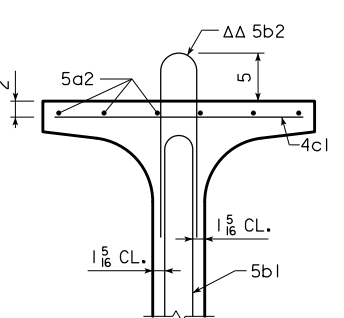
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

BEAM SECTION PROPERTIES

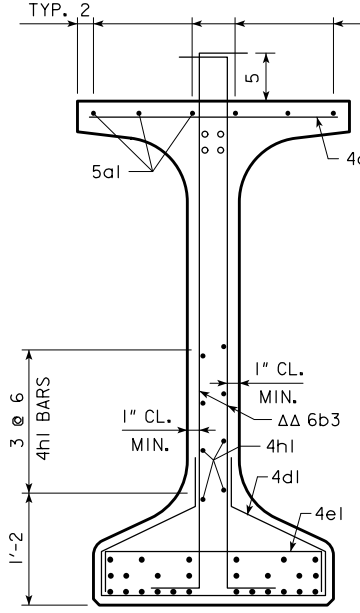


SECTION A-A

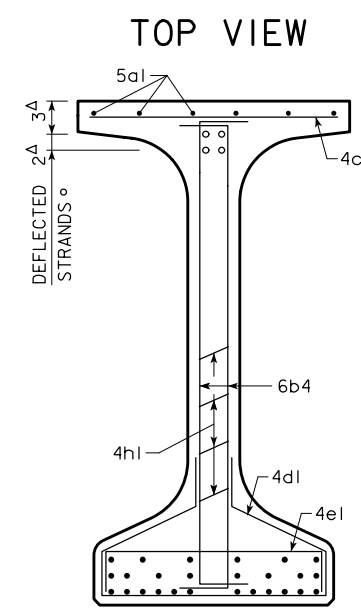


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B

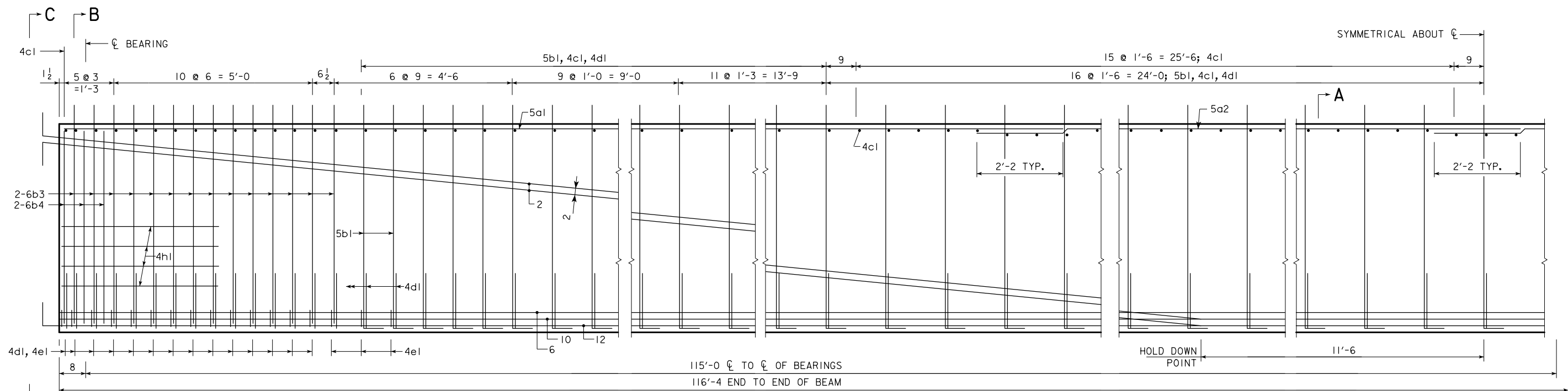


SECTION C-C

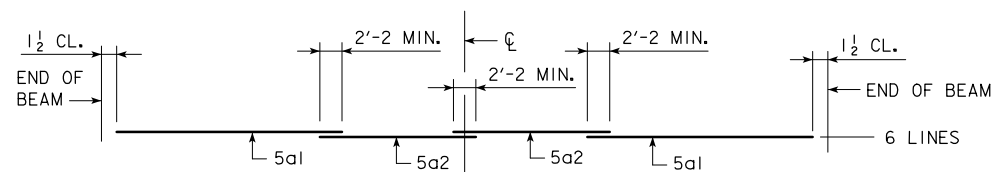
BTE110 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

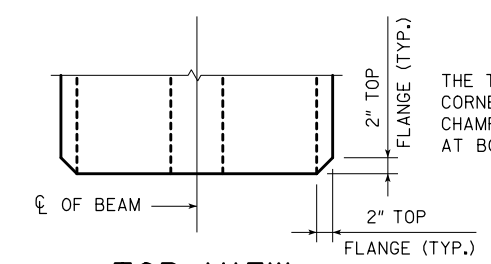
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4781 - THIS SHEET ISSUED 02-08.



BTE115

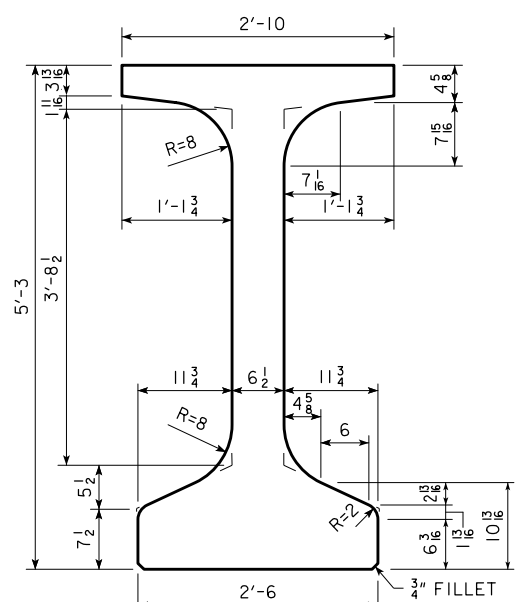


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

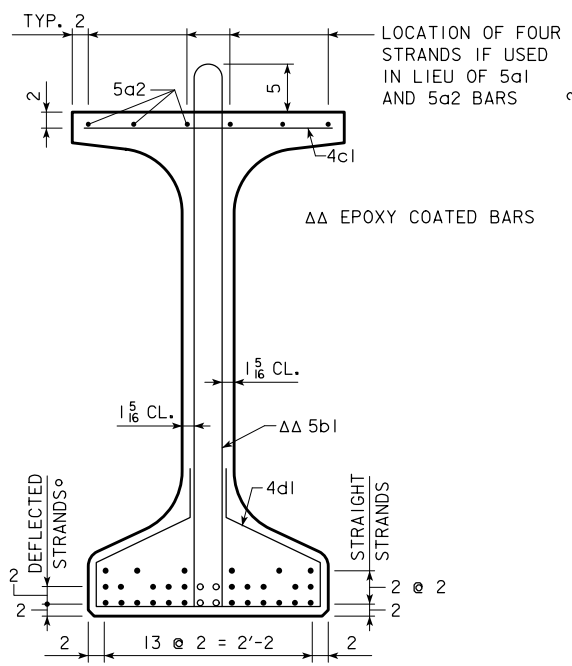
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



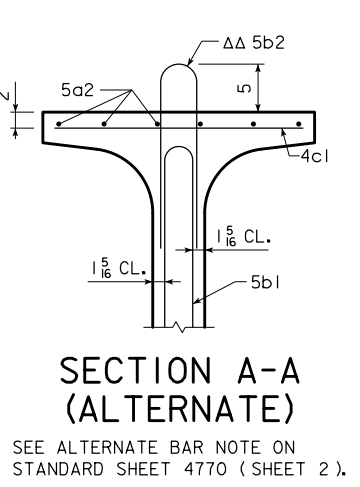
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 I = 422,790 in⁴

BEAM SECTION PROPERTIES

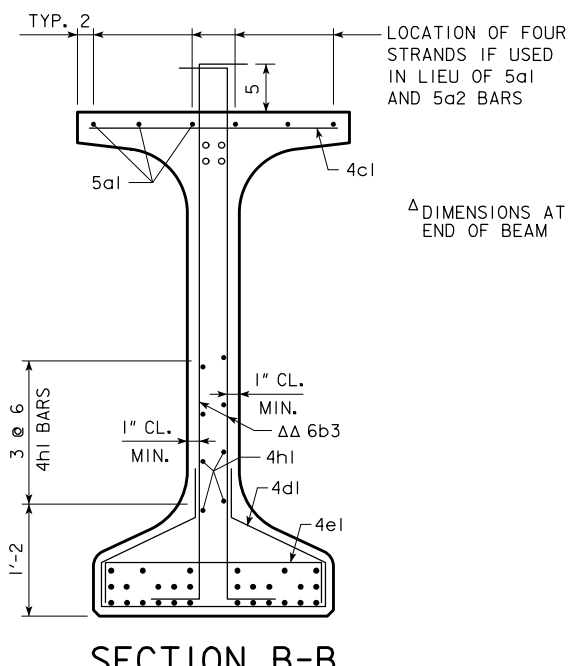


SECTION A-A

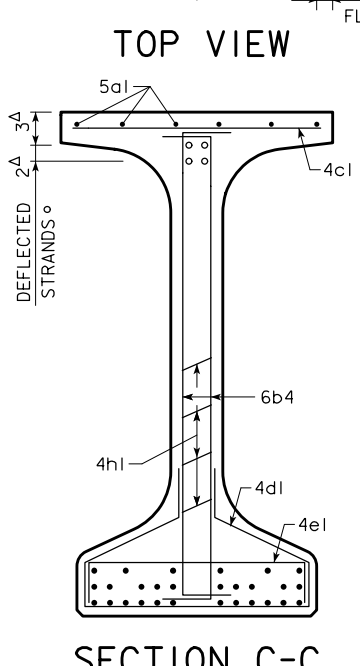


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B

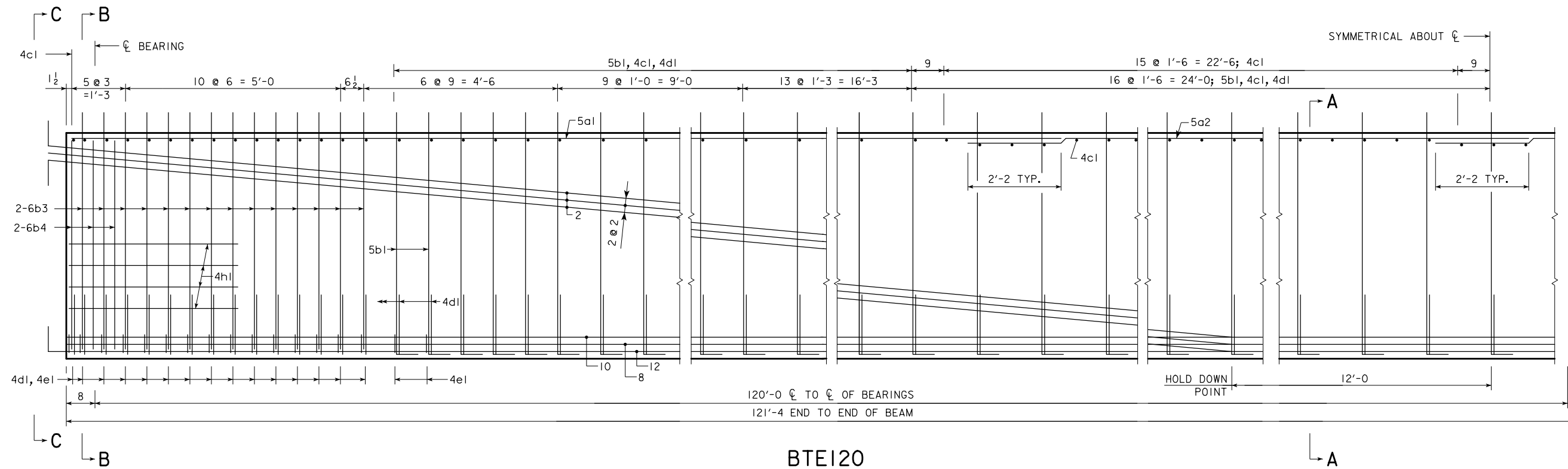


SECTION C-C

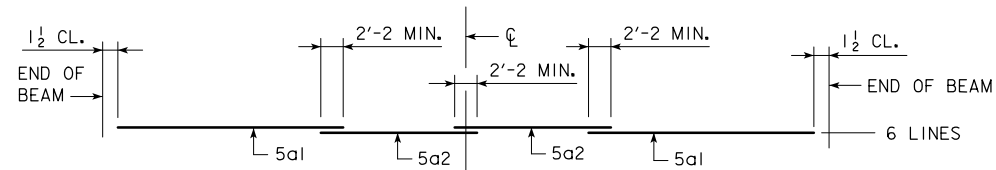
BTE115 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

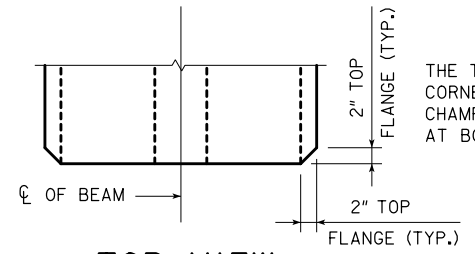
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4782 - THIS SHEET ISSUED 02-08.



BTE120

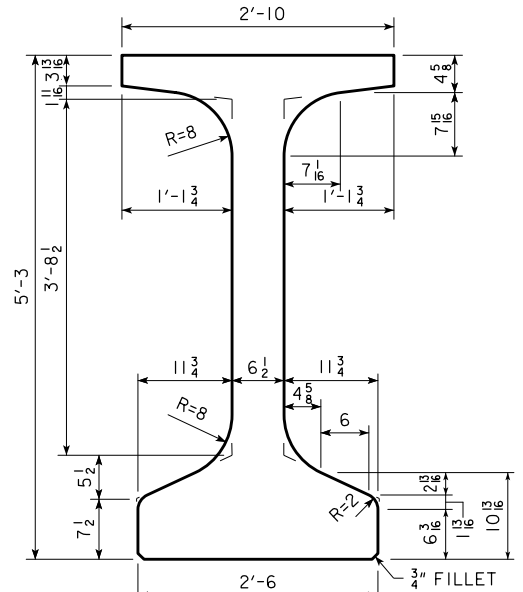


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

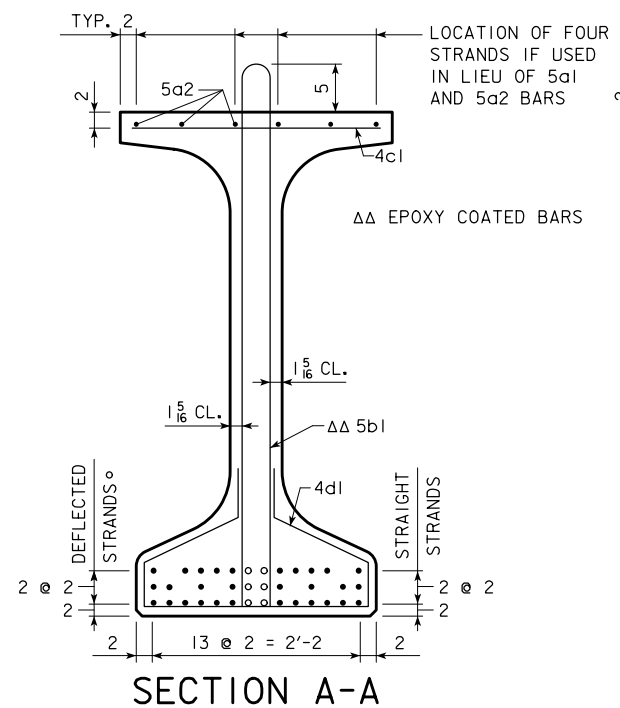
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



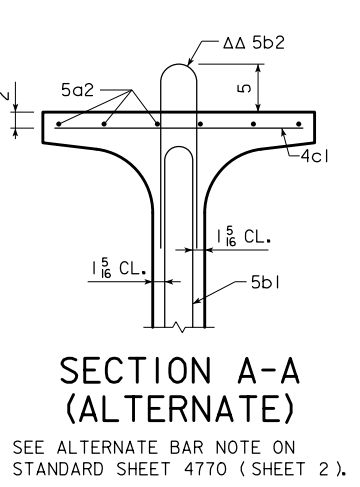
BTE BEAM CROSS SECTION

BEAM SECTION PROPERTIES

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

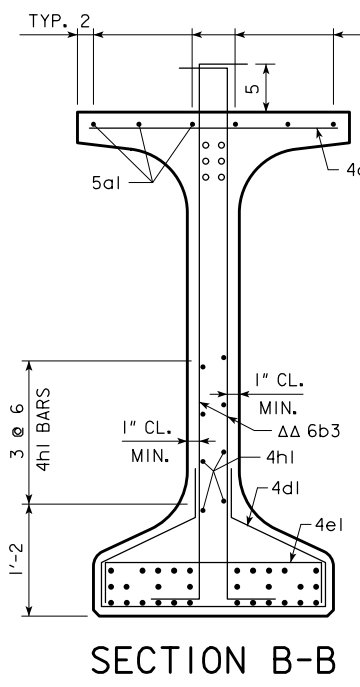


SECTION A-A

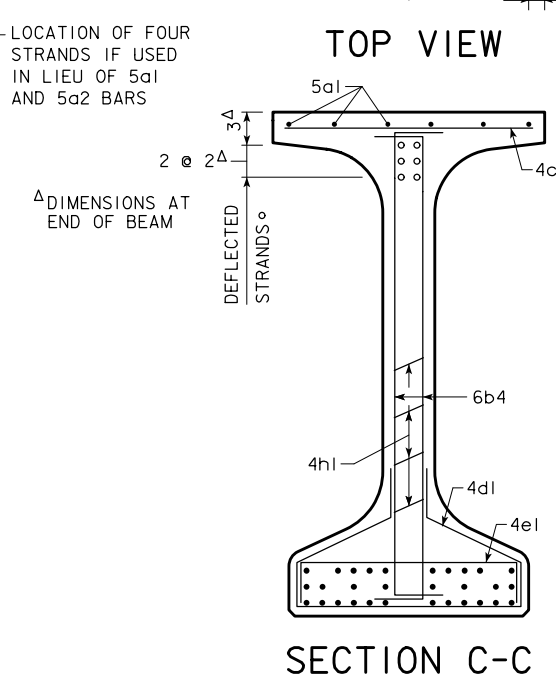


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B

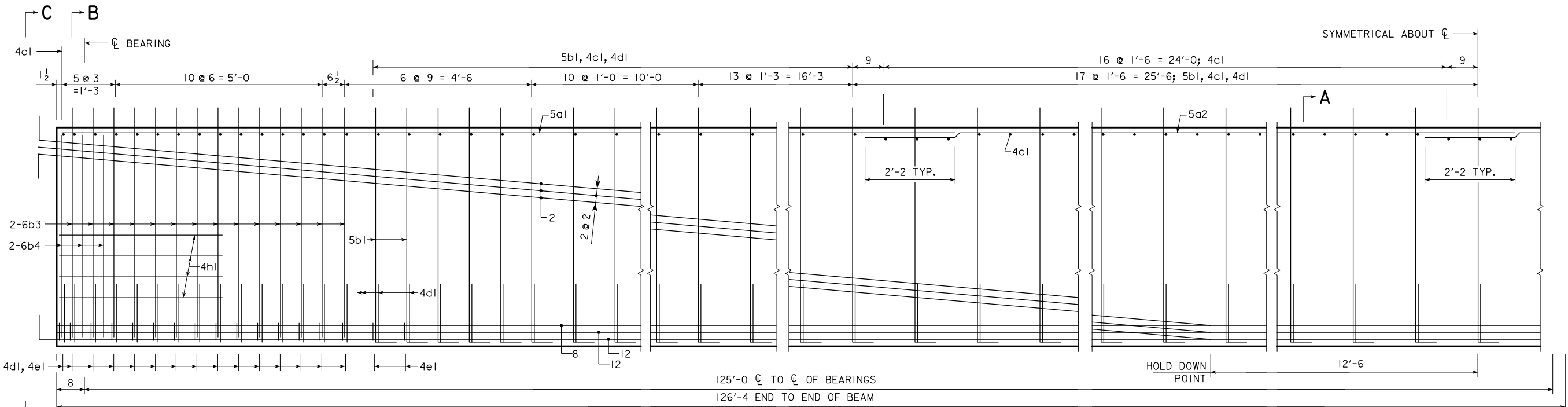


SECTION C-C

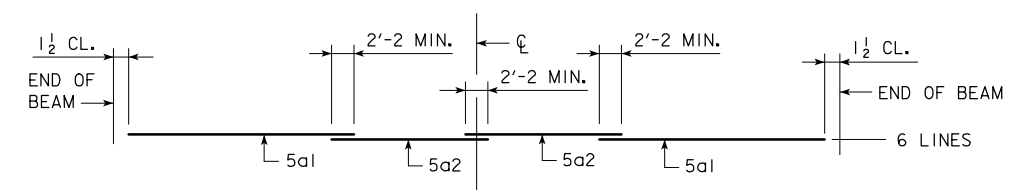
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4783 - THIS SHEET ISSUED 02-08.

BTE120 BEAM DETAILS

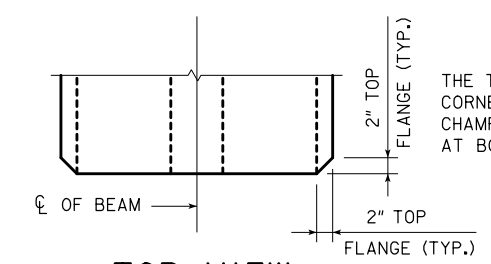
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



BTEI25

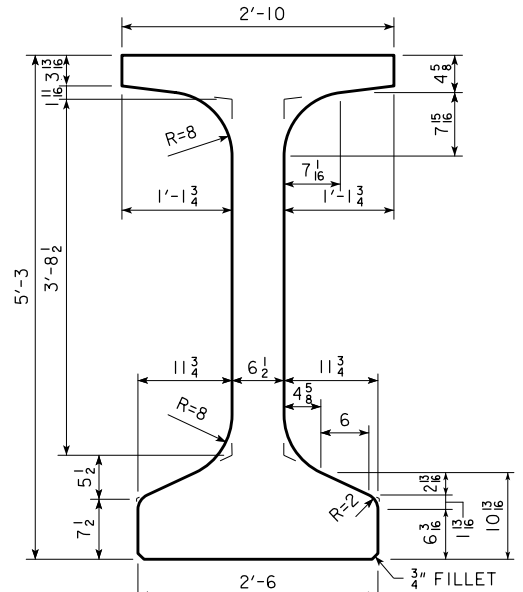


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

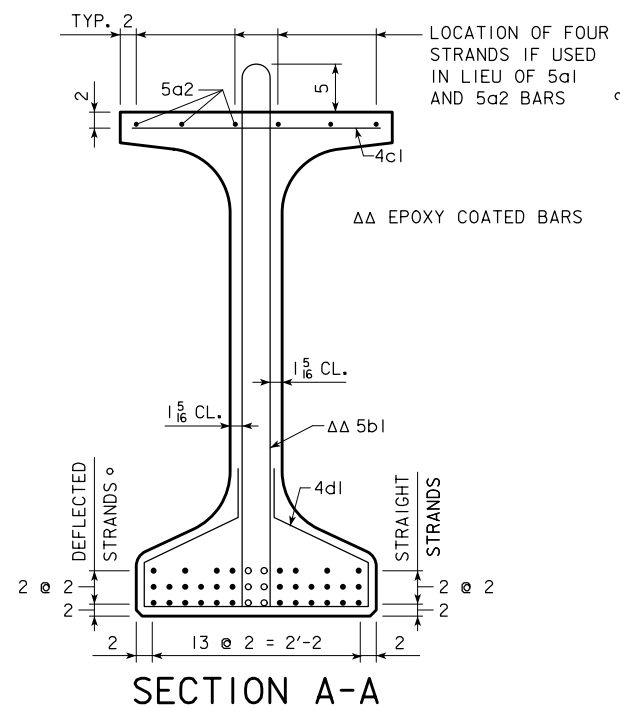
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



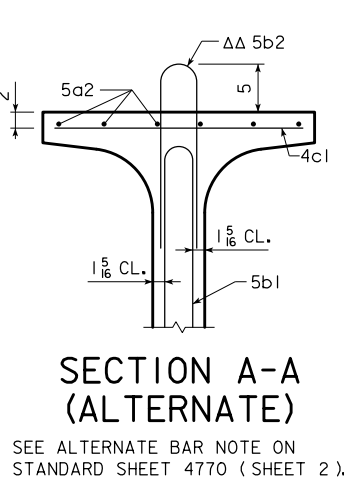
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

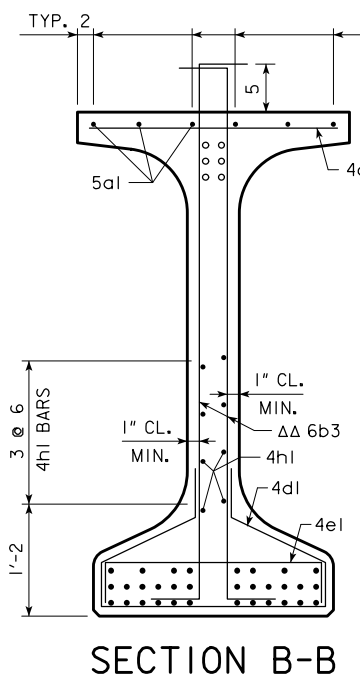
BEAM SECTION PROPERTIES



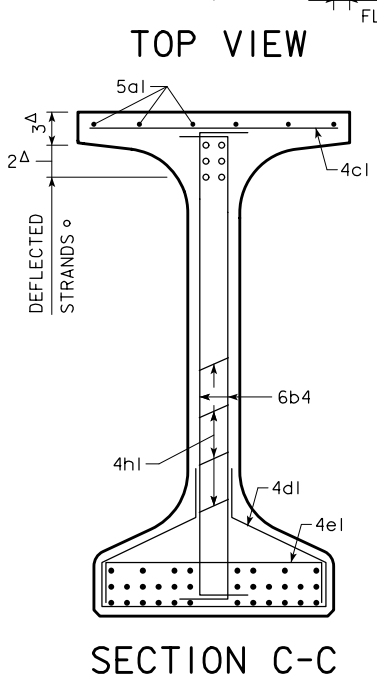
SECTION A-A



SECTION A-A (ALTERNATE)



SECTION B-B

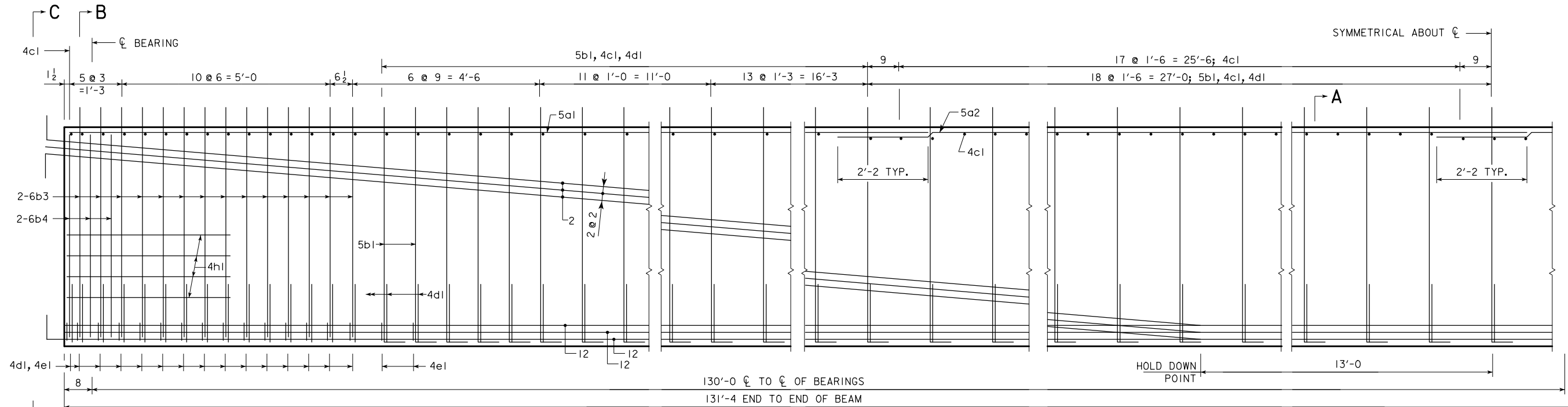


SECTION C-C

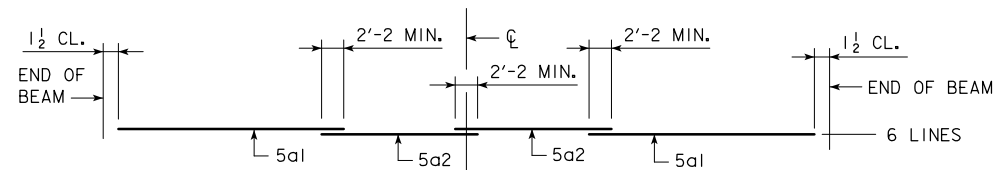
BTEI25 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

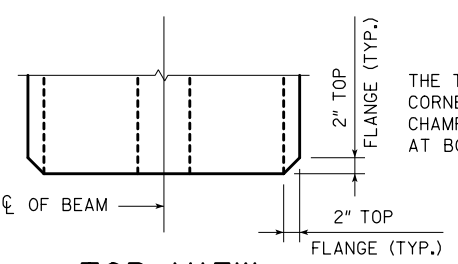
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4784 - THIS SHEET ISSUED 02-08.



BTEI30

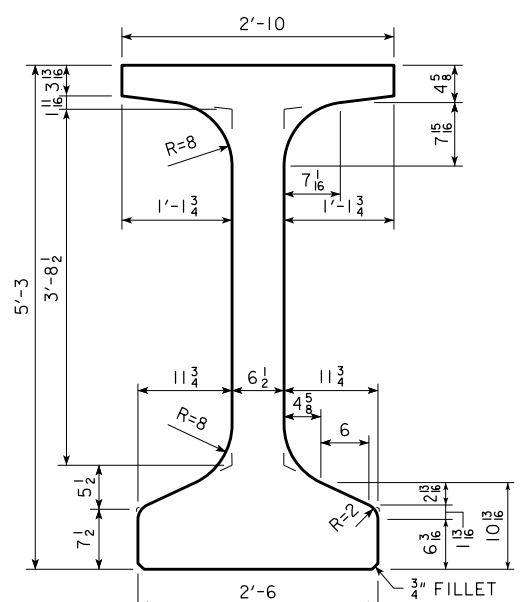


TOP FLANGE LONGITUDINAL BAR LAYOUT



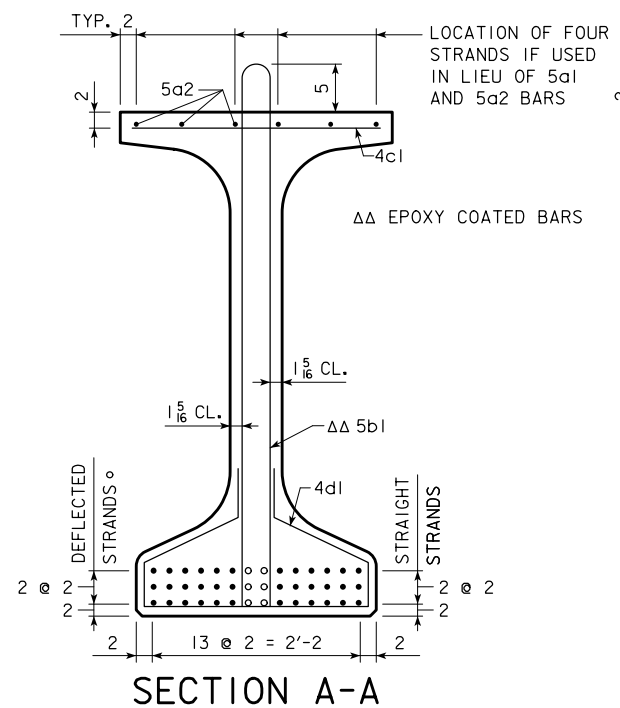
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



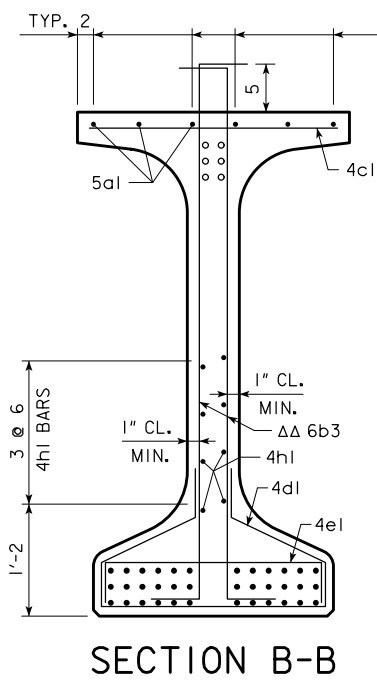
BTE BEAM CROSS SECTION

BEAM SECTION PROPERTIES
 AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 I = 422,790 in⁴

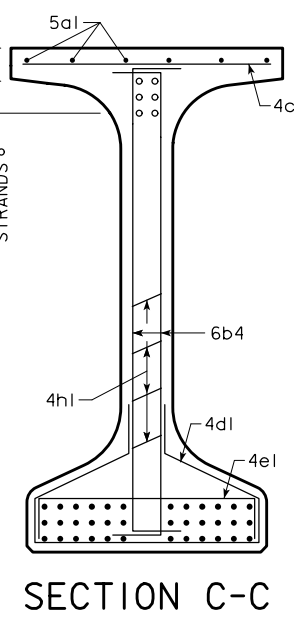


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B

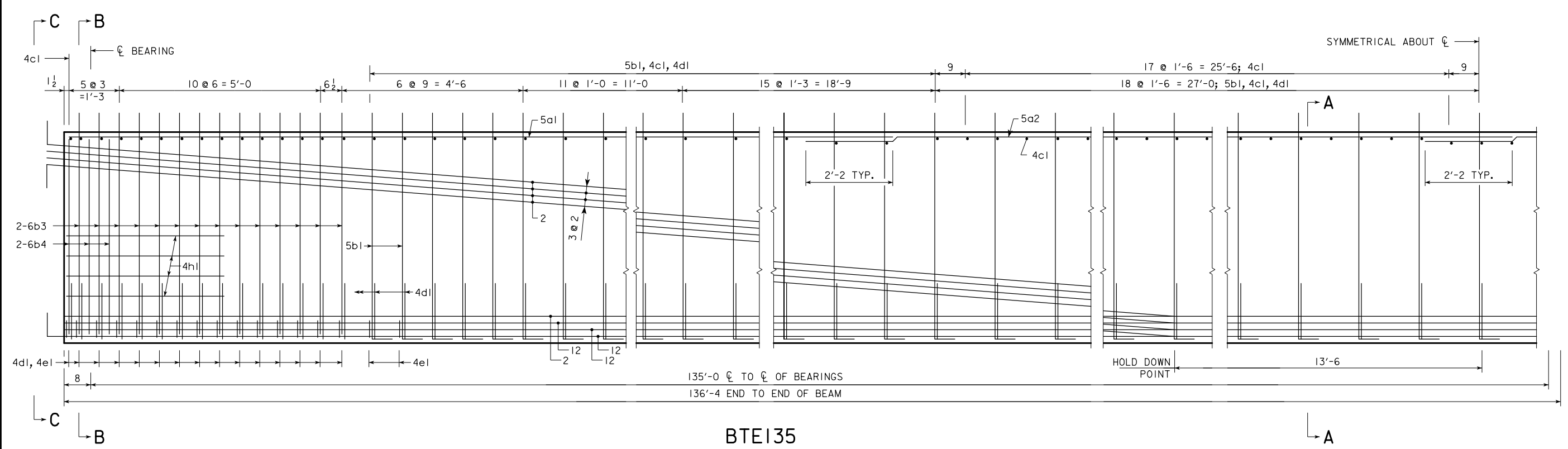


SECTION C-C

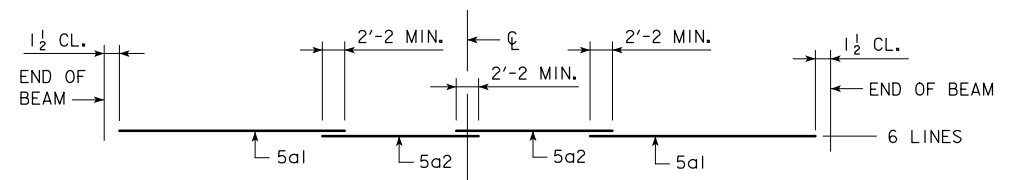
BTEI30 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

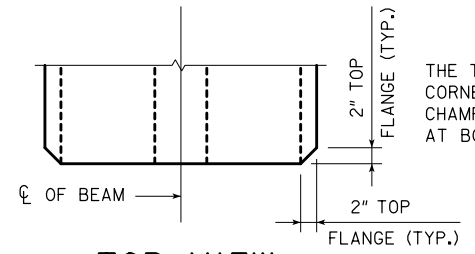
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4785 - THIS SHEET ISSUED 02-08.



BTEI35

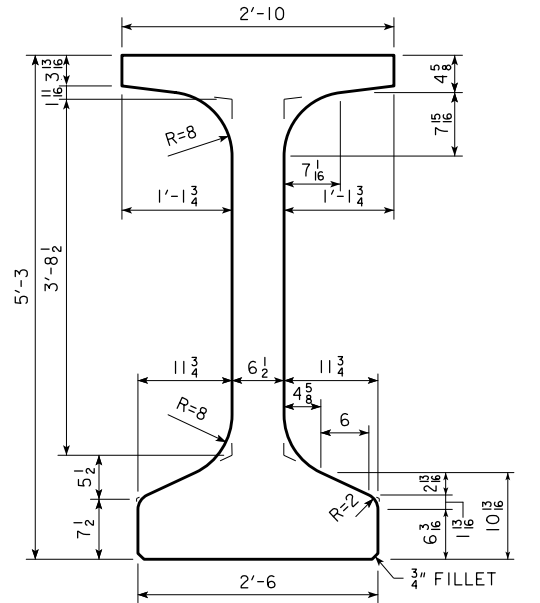


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

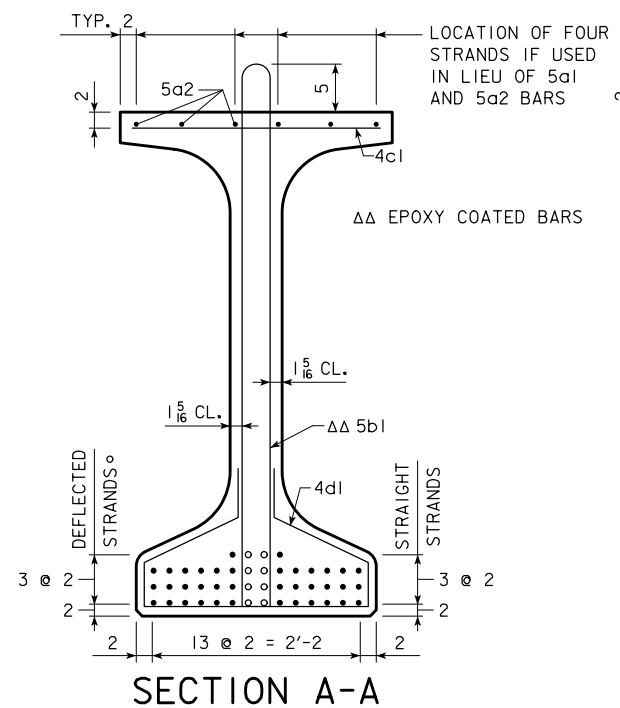
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



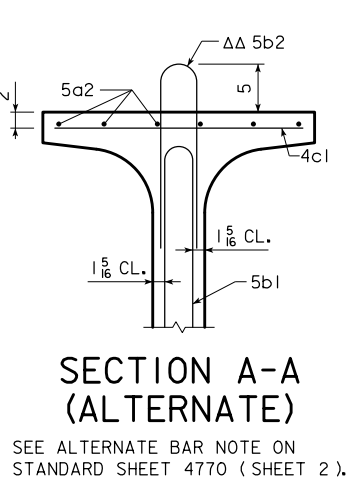
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

BEAM SECTION PROPERTIES

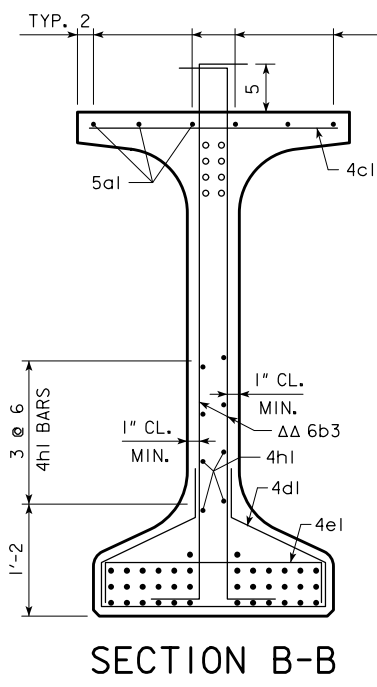


SECTION A-A

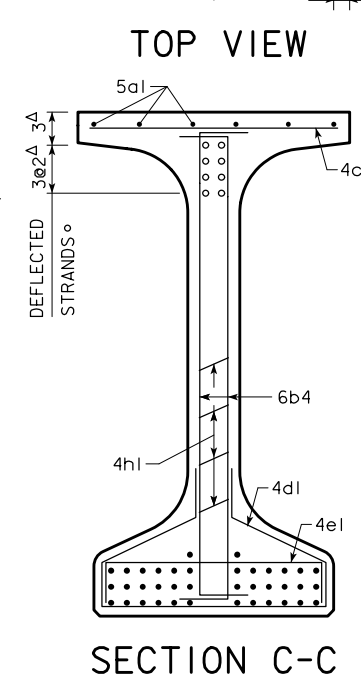


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B



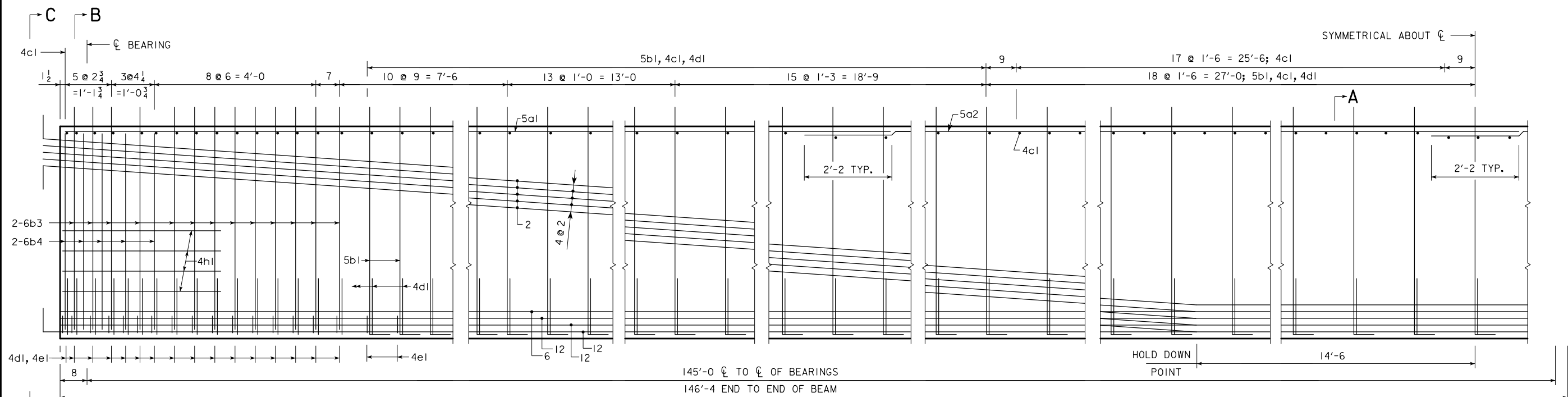
SECTION C-C

BTEI35 BEAM DETAILS

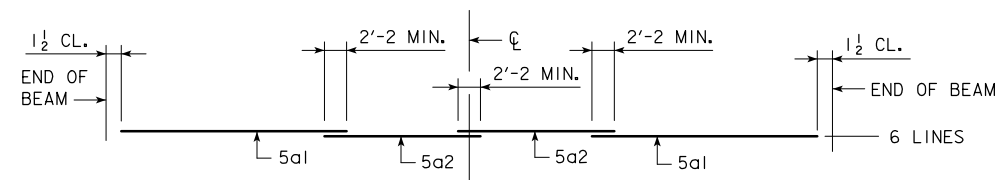
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4786 - THIS SHEET ISSUED 02-08.

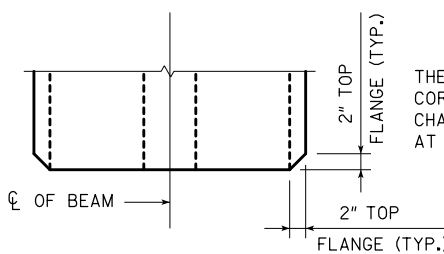
REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. CHANGED THE 5b4 BAR TO 6b4. ENGLISHBEAMS.DGN - 4788 - THIS SHEET ISSUED 02-08.



BTE145

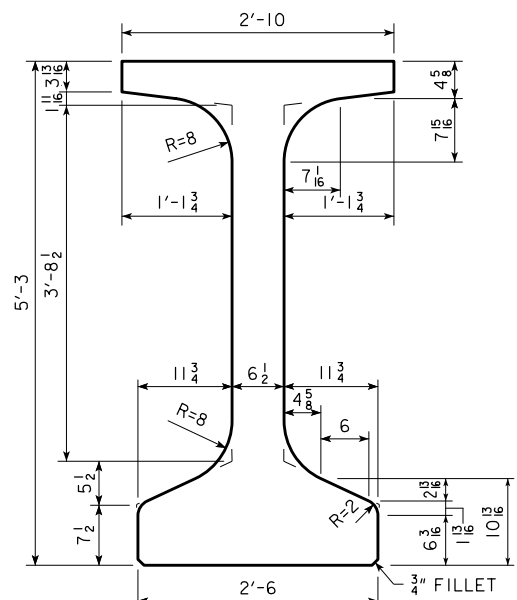


TOP FLANGE LONGITUDINAL BAR LAYOUT



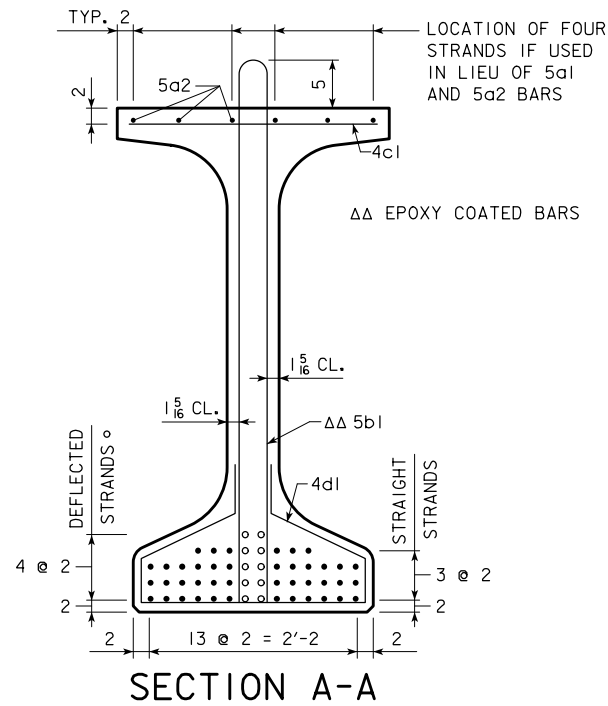
TOP VIEW

THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.

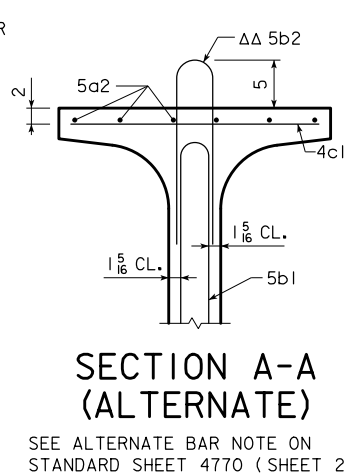


BTE BEAM CROSS SECTION

BEAM SECTION PROPERTIES
 AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 I = 422,790 in⁴

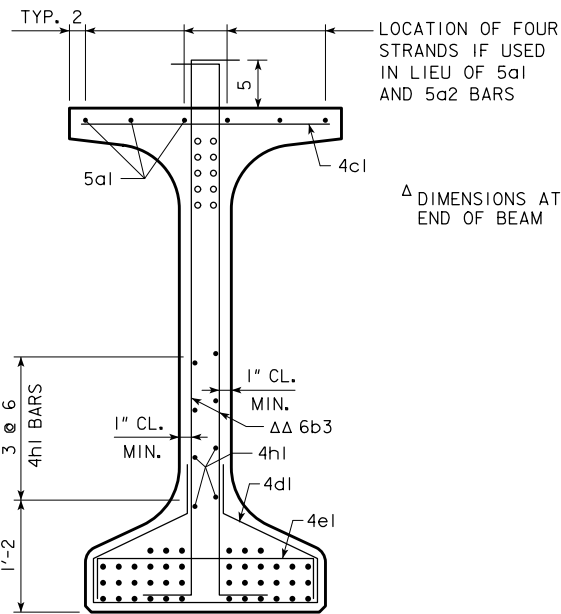


SECTION A-A

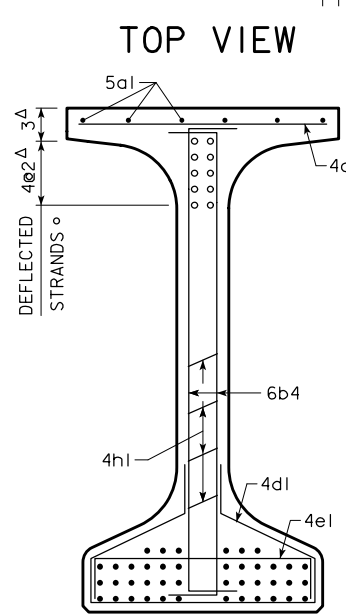


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



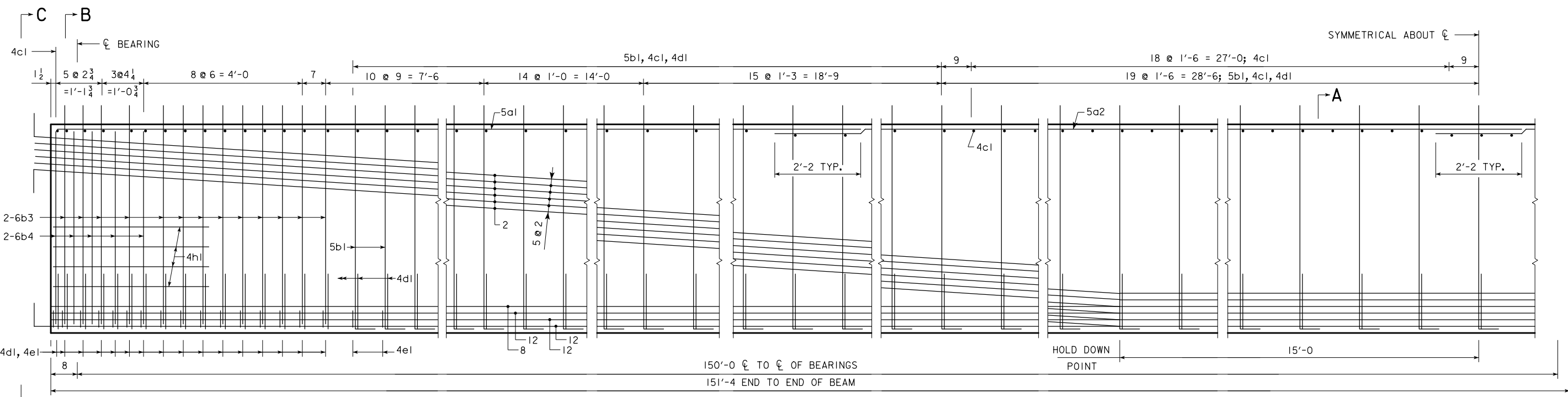
SECTION B-B



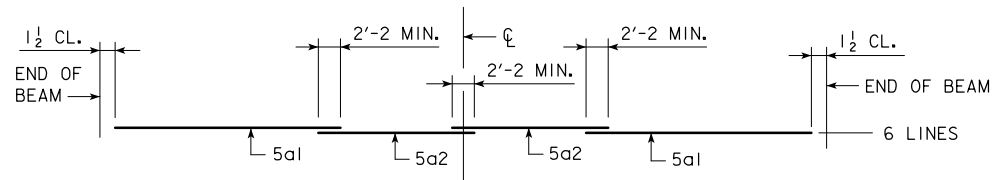
SECTION C-C

BTE145 BEAM DETAILS

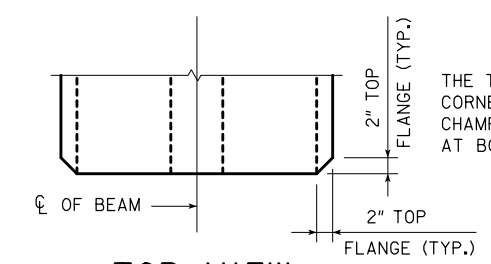
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



BTE150

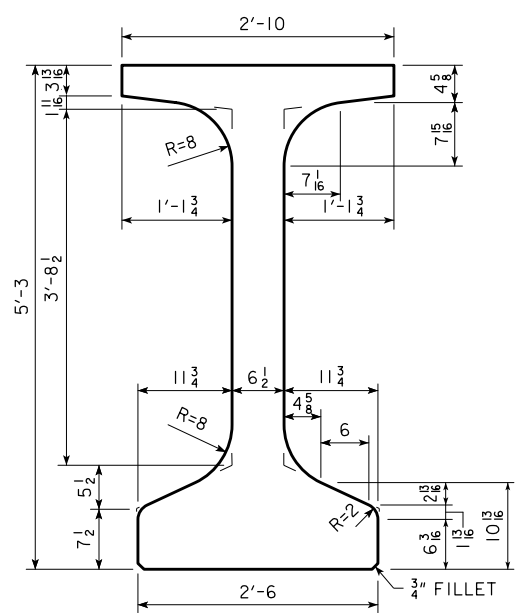


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

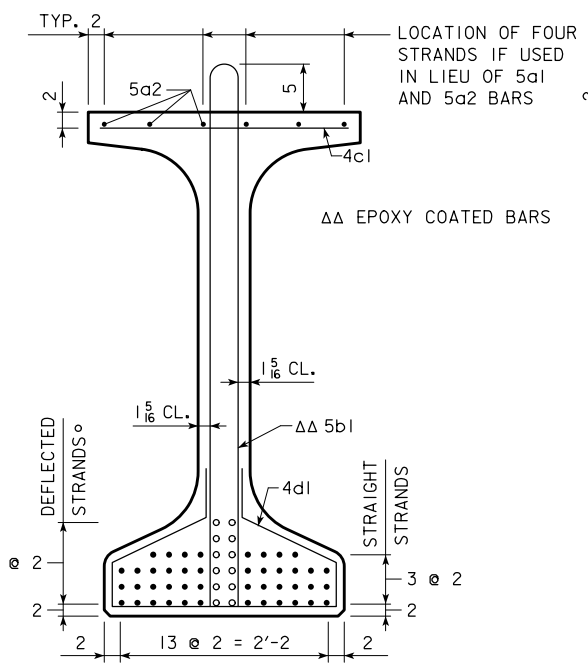
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



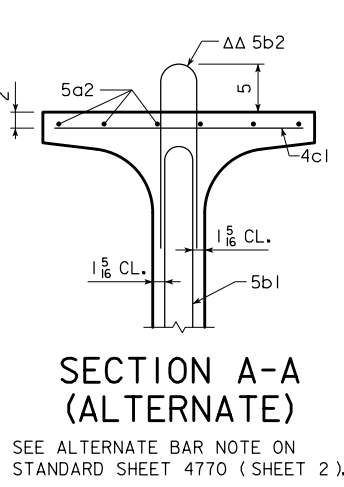
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

BEAM SECTION PROPERTIES

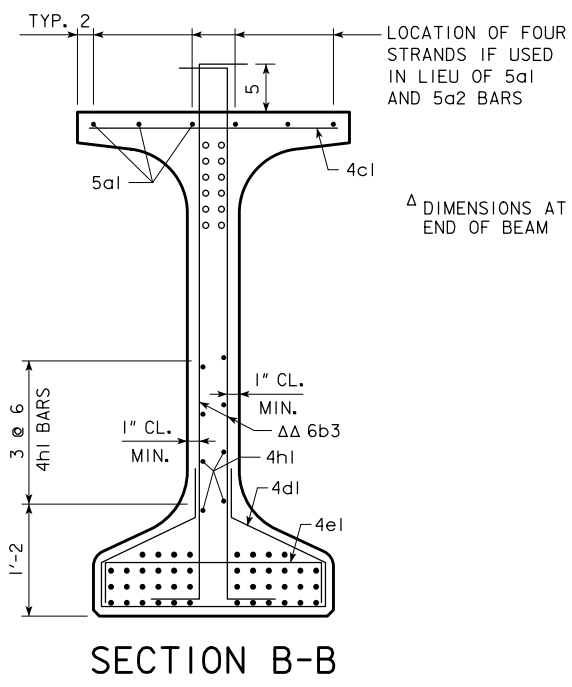


SECTION A-A

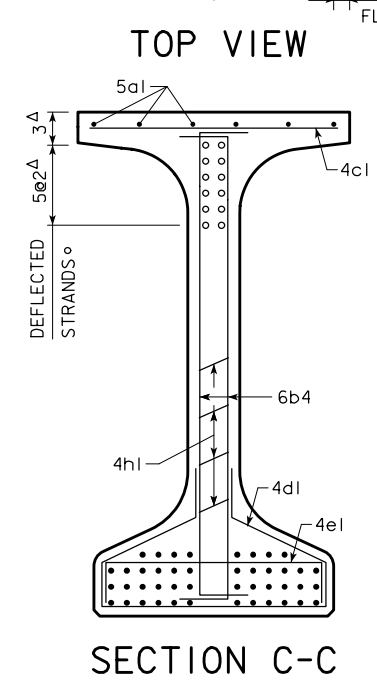


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4770 (SHEET 2).



SECTION B-B



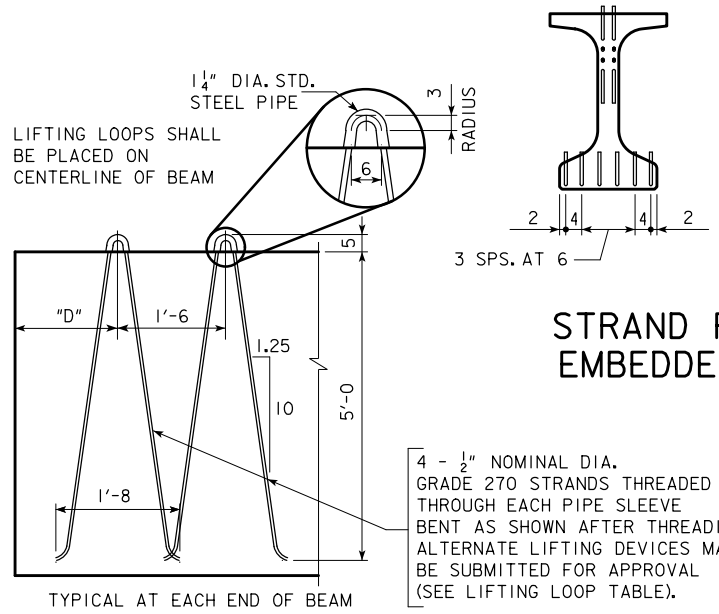
SECTION C-C

BTE150 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4789 - THIS SHEET ISSUED 02-08.

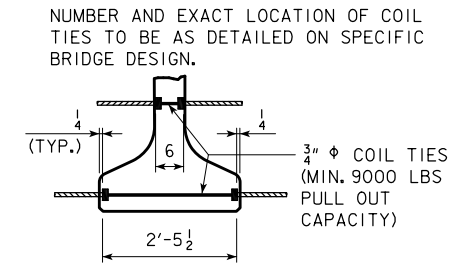
CORRECTION 12-13 - COIL TIE DETAIL WAS CHANGED TO REFLECT THE DISTANCE BETWEEN COIL TIE ANCHORS EMBEDDED 4 INCH. ENGLISHBEAMS.DGN - 4790s1 - THIS SHEET ISSUED 02-08.



LIFTING LOOP DETAIL

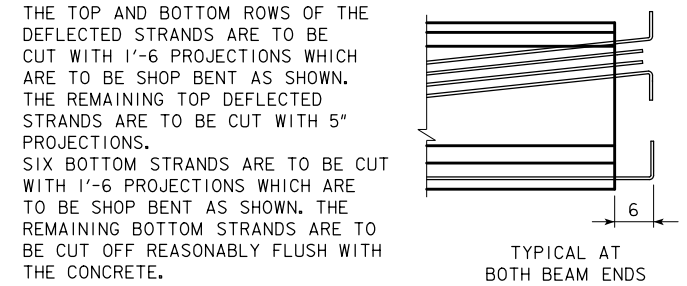
BEAMS	LIFTING LOOPS EACH END	# OF STRANDS PER LOOP	D	BEAM OVERHANG (FT.)
BTE155	2	4	13'-6	16

LIFTING LOOPS SHALL CARRY LOADS EQUALLY.



COIL TIE DETAIL

ΔΔ 5b1 AND 6b3 BARS TO BE EPOXY COATED
 * 6b3 AND 6b4 BARS TO BE USED IN PAIRS



STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS

4 - 1/2" NOMINAL DIA. GRADE 270 STRANDS THREADED THROUGH EACH PIPE SLEEVE BENT AS SHOWN AFTER THREADING. ALTERNATE LIFTING DEVICES MAY BE SUBMITTED FOR APPROVAL (SEE LIFTING LOOP TABLE).

BTE BEAM	SPAN LENGTH & BEARING	OVERALL BEAM LENGTH (L)	CONCRETE STRENGTH		STRAND SIZE (in)	NO. OF STRAND		TOTAL INITIAL PRESTRESS kips	HOLD DOWN FORCE-kips	CAMBER (in)		DEFLECTION (in) Δ ₀		PERMISSIBLE MAXIMUM SPACING	WEIGHT (TONS)	CONCRETE (CU YD.)	REINFORCING STEEL (WEIGHT-LBS)
			f'ci (ksi)	f'c (ksi)		STRAIGHT	DEFLECTED			AT RELEASE	AFTER LOSSES	IMMEDIATE (ELASTIC) Δ _i	TIME (PLASTIC) Δ _T				
			STEEL DIAPHRAGM	STEEL DIAPHRAGM		HL-93 LOADING											
④ BTE155	155'-0	156'-4	8.00	9.00	0.60	46	12	2468	32.6	3.72	6.50	4.36	1.09	8'-0 1/2	65.8	32.5	4318

- ① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB (8 in) AND HAUNCH (1.5 in) WEIGHT OF: 0.85 kips/ft FOR 8'-0 BEAM SPACING AND TWO STEEL DIAPHRAGMS (0.500 kips) PLACED 20'-0, ON EITHER SIDE, OF THE BEAM CENTERLINE. FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.
- ② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB. TOTAL BEAM DEFLECTIONS AT 1/2 OF SPAN, Δ₀, DUE TO WEIGHT OF SLAB AND DIAPHRAGMS FOR DETAILING PURPOSE: (A) Δ₀ = Δ_i + Δ_T FOR SIMPLE SPAN. (B) Δ₀ = Δ_i + 3/4 Δ_T FOR END SPANS OF CONTINUOUS BRIDGE. (C) Δ₀ = Δ_i + 1/2 Δ_T FOR INTERIOR SPANS OF CONTINUOUS BRIDGE.
- ③ TOTAL INITIAL PRESTRESS IS BASED ON 72.6% f's, f's = 270 ksi. AND A_s = 0.217 in².
- ④ REQUIRES A 4000 psi, 28 DAY COMPRESSIVE STRENGTH FOR CAST-IN-PLACE SLAB CONCRETE.

CALCULATED DESIGN CAMBERS HAVE BEEN REDUCED FROM THEIR THEORETICAL VALUES BY 15% TO AID CONSTRUCTABILITY.

BEAM NOTES:
 THIS BEAMS IS DESIGNED FOR AASHTO LIVE LOADS AS INDICATED IN ABOVE TABLE WITH AN ALLOWANCE OF 20 LBS PER SQUARE FOOT OF ROADWAY FOR FUTURE WEARING SURFACE.
 ALL PPC BEAMS SHALL USE HIGH PERFORMANCE CONCRETE (HPC) IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
 HOLD DOWN POINTS FOR DEFLECTED STRANDS MAY BE MOVED TOWARD ENDS OF BEAM A DISTANCE OF 0.05 L MAXIMUM AT PRODUCER'S OPTION.
 ALL PRESTRESSING STRANDS EXCEPT LIFTING LOOP STRANDS SHALL BE 0.60 in. NOMINAL DIAMETER (NOMINAL STEEL AREA = 0.217 in²) AND CONFORM TO ASTM A416 GRADE 270 LOW RELAXATION STRANDS. MINIMUM STRAND BREAKING STRENGTH SHALL BE 58.6 kips.
 TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND FINISHED AS PER MATERIALS IM570.
 BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS. BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.
 THE PORTIONS OF THE PRESTRESSED BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, I, OF THE STANDARD SPECIFICATIONS.
 ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE.
 FOR TRANSPORTING, THE ALLOWABLE OVERHANG IS SHOWN IN THE LIFTING LOOP AND OVERHANG TABLE.
 THE CONTRACTOR SHALL ASSURE THE LATERAL STABILITY OF THE BEAMS DURING HANDLING, TRANSPORTING AND ERECTION BY PROVIDING TEMPORARY BRACING AS NEEDED.
 HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.
 IF SOLE PLATE IS REQUIRED FOR BEARING, SOLE PLATE IS TO BE SET IN FORMS WHEN BEAM IS CAST AND FORMED OUT BELOW TO EXCLUDE CONCRETE AS DETAILED ON THE BEARING SHEET.
 IF STUB ABUTMENTS ARE USED, ALL STRANDS AT THE ENDS OF BEAMS AT STUB ABUTMENTS SHALL BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.
 WHEN EXPANSION JOINTS ARE USED, CONCRETE SEALER SHALL BE APPLIED TO THE PRESTRESSED BEAM END SECTIONS. THE SEALING SHALL BE IN ACCORDANCE WITH MATERIALS I.M. 570 (FABRICATOR APPLICATION) AND I.M. 491.12 (CONTRACTOR APPLICATION).
 MINIMUM CONCRETE f'c (AT 28 DAYS) AND MINIMUM f'ci AT RELEASE ARE LOCATED IN THE BTE BEAM DATA TABLE ABOVE.
 FOUR 0.60 IN. DIAMETER STRANDS STRESSED TO NOT MORE THAN 5000 lbs. EACH MAY BE USED IN LIEU OF BARS 5a1 AND 5a2 IN THE TOP FLANGE.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 2007. REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60. CONCRETE IN ACCORDANCE WITH SECTION 5. PRESTRESSING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 270.

SPECIFICATIONS:

CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES, WITH CURRENT APPLICABLE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.
 DESIGN: A.A.S.H.T.O. LRFD, SERIES OF 2007, WITH MINOR MODIFICATIONS.

ALTERNATE BAR NOTES:

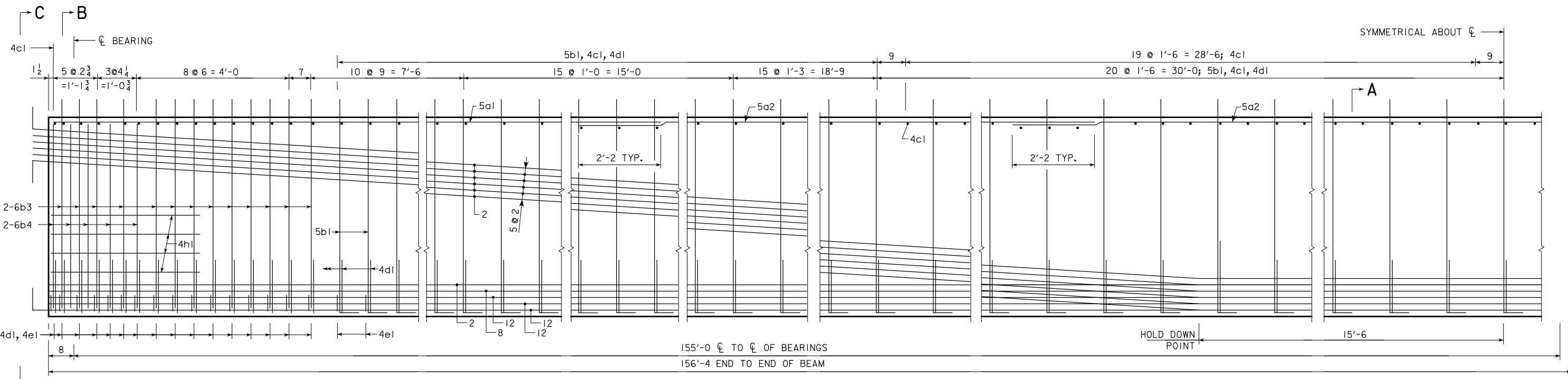
ALTERNATE BARS SHOWN IN BENT BAR DETAILS MAY BE USED IN LIEU OF REINFORCING BARS SHOWN IN BAR LIST. NO ADDITIONAL PAYMENT SHALL BE MADE FOR USE OF ALTERNATE BARS.

BEAM	BTE155		
BAR	SHAPE	NO.	LENGTH
5a1	—	12	22'-6
5a2	—	18	40'-0
ΔΔ 5b1	—	119	12'-2
ΔΔ * 6b3	—	52	6'-6
* 6b4	—	20	5'-10
4c1	—	189	2'-7
4d1	—	151	6'-5
4e1	—	36	3'-2
4h1	—	8	8'-0

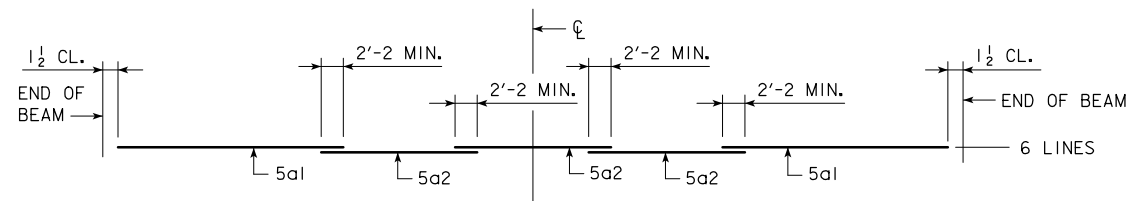
BAR	SHAPE	NO.	LENGTH
4h1	—	8	8'-0
4e1	—	36	3'-2
ΔΔ 5b1	—	119	12'-2
ΔΔ 6b3	—	52	6'-6
ΔΔ 5b2 (ALTERNATE)	—	—	—
5b1 (ALTERNATE)	—	—	—
4d1 (ALTERNATE)	—	—	—

BTE155 BEAM DETAILS

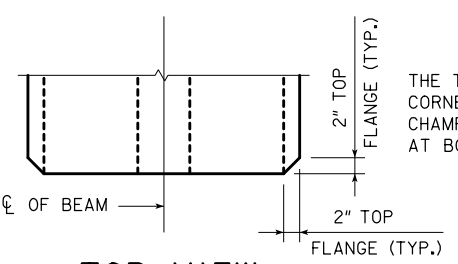
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



BTE155

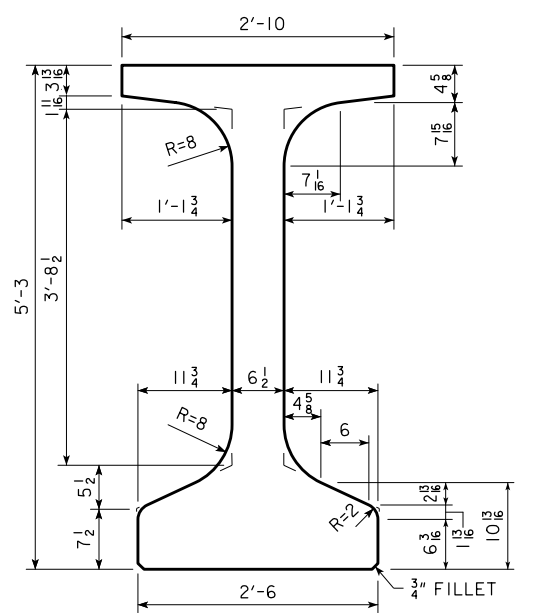


TOP FLANGE LONGITUDINAL BAR LAYOUT



TOP VIEW

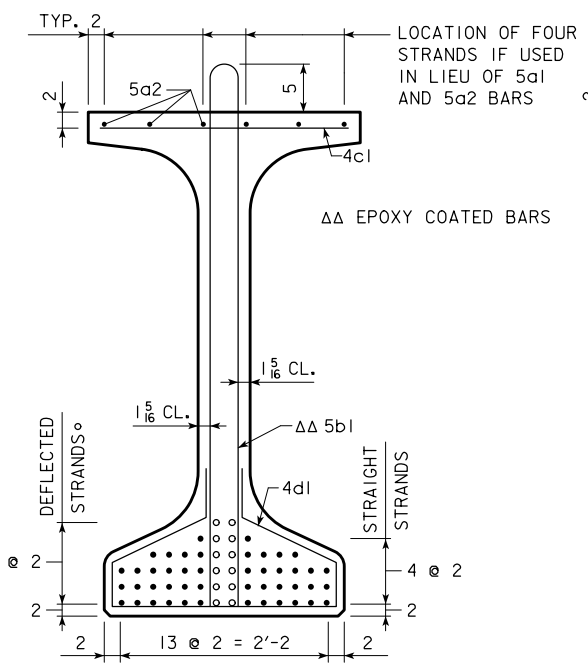
THE TOP FLANGE BEAM CORNERS ARE TO BE CHAMFERED 2" AS SHOWN AT BOTH ENDS OF THE BEAM.



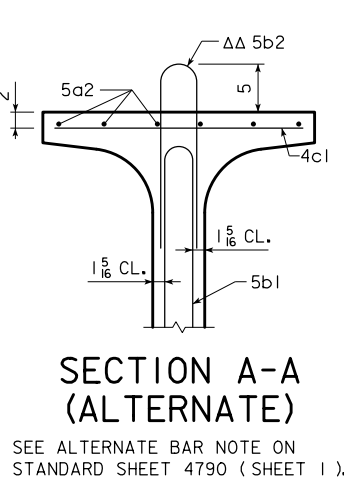
BTE BEAM CROSS SECTION

AREA = 807.4 in²
 $\bar{y}_b = 28.75$ in
 $I = 422,790$ in⁴

BEAM SECTION PROPERTIES

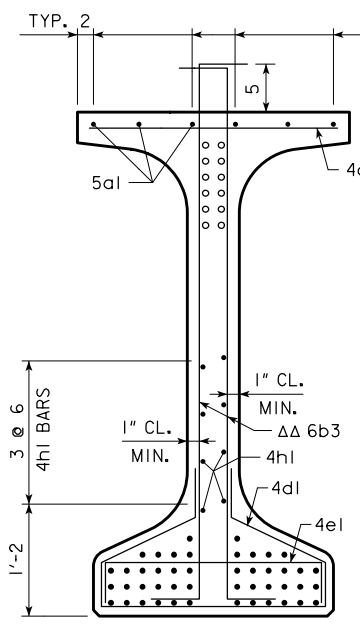


SECTION A-A

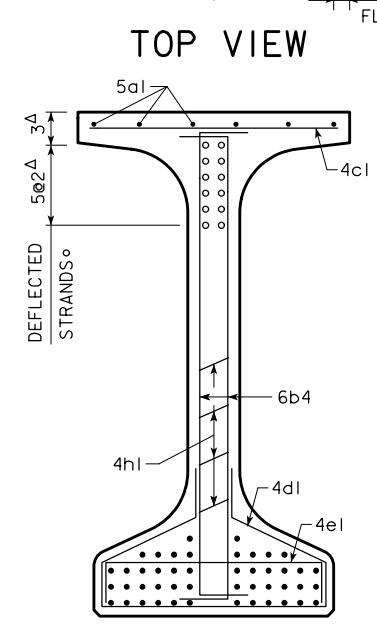


SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON STANDARD SHEET 4790 (SHEET 1).



SECTION B-B



SECTION C-C

BTE155 BEAM DETAILS

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____

REVISED 05-12 - ALTERNATE SECTION A-A 5a1 BAR CHANGED TO 5a2. ENGLISHBEAMS.DGN - 4790s2 - THIS SHEET ISSUED 02-08.