

Revised 03-11: Added Standard 1021W to List. Added a Hyphen to the 1036 BT Beam Standard Numbers.
Issued 02-10.
Beams.dgn - 100-B - This Sheet Re-Issued 04-2024. Sheet Format Update.

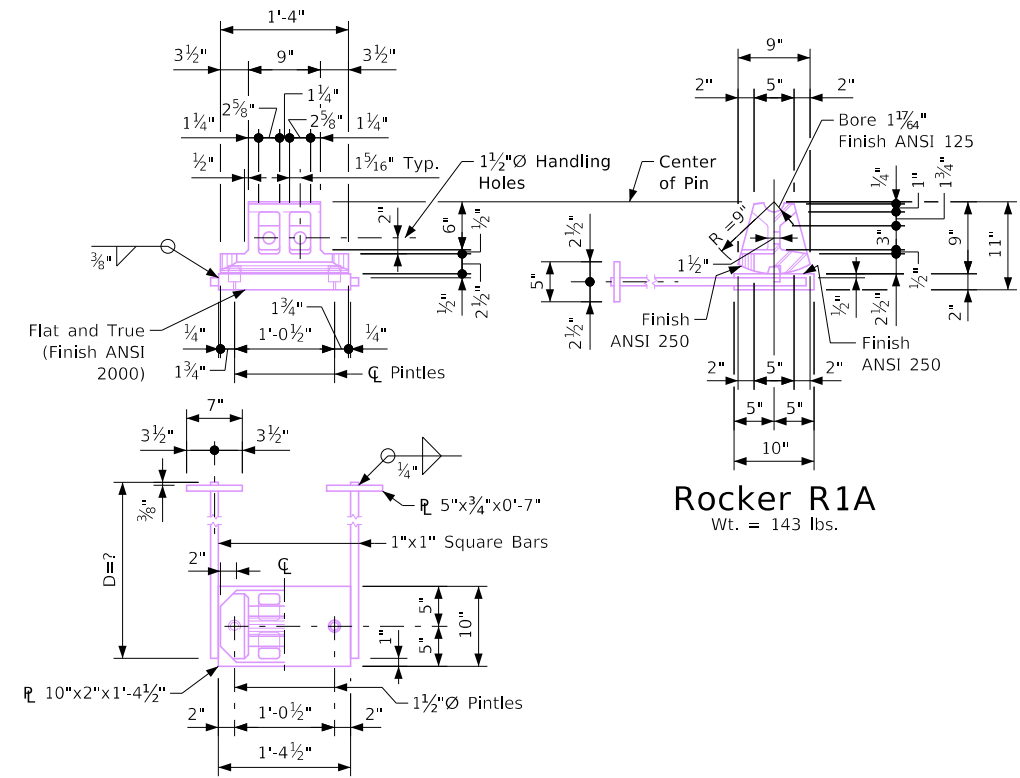
Index of Beam Standards	
Standard	Description
1008a	Abutment Bearing Standards
1008b	Pier Bearing Standards
1009a	Pier Masonry Plate & Rocker Bearing Standards
1009b	Pier Sole Plate & Fixed Shoe Bearing Standards
1010	Low Profile Bearing Standard
1021	Welding Details for Welded Girder Bridges
1021W	Weathering Steel Welding Details for Welded Girder Bridges
1036	Steel Intermediate Diaphragm 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
4600	"A" Beam 30'-0" - 55'-0" Spans Data Details
4601-A30	"A" Beam - 30'-0" Span
4601-A34	"A" Beam - 34'-2" Span
4601-A38	"A" Beam - 38'-4" Span
4601-A42	"A" Beam - 42'-6" Span
4601-A46	"A" Beam - 46'-8" Span
4602-A50	"A" Beam - 50'-10" Span
4602-A55	"A" Beam - 55'-0" Span
4610	"B" Beam 34'-2" - 67'-6" Spans Data Details
4611-B34	"B" Beam - 34'-2" Span
4611-B38	"B" Beam - 38'-4" Span
4611-B42	"B" Beam - 42'-6" Span
4611-B46	"B" Beam - 46'-8" Span
4611-B50	"B" Beam - 50'-10" Span
4612-B55	"B" Beam - 55'-0" Span
4612-B59	"B" Beam - 59'-2" Span
4612-B63	"B" Beam - 64'-4" Span
4612-B67	"B" Beam - 67'-6" Span
4620	"C" Beam 30'-0" - 80'-0" Spans Data Details
4621-C30	"C" Beam - 30'-0" Span
4621-C34	"C" Beam - 34'-2" Span
4621-C38	"C" Beam - 38'-4" Span
4621-C42	"C" Beam - 42'-6" Span
4621-C46	"C" Beam - 46'-8" Span
4622-C50	"C" Beam - 50'-10" Span
4622-C55	"C" Beam - 55'-0" Span
4622-C59	"C" Beam - 59'-2" Span
4622-C63	"C" Beam - 64'-4" Span
4622-C67	"C" Beam - 67'-6" Span
4623-C71	"C" Beam - 71'-8" Span
4623-C75	"C" Beam - 75'-10" Span
4623-C80	"C" Beam - 80'-10" Span
4630	"D" Beam 35'-0" - 105'-0" Spans Data Details
4631-D35	"D" Beam - 35'-0" Span
4631-D40	"D" Beam - 40'-0" Span
4632-D45	"D" Beam - 45'-0" Span
4632-D50	"D" Beam - 50'-0" Span
4632-D55	"D" Beam - 55'-0" Span
4632-D60	"D" Beam - 60'-0" Span
4633-D65	"D" Beam - 65'-0" Span
4633-D70	"D" Beam - 70'-0" Span

Index of Beam Standards	
Standard	Description
4633-D75	"D" Beam - 75'-0" Span
4633-D80	"D" Beam - 80'-0" Span
4634-D85	"D" Beam - 85'-0" Span
4634-D90	"D" Beam - 90'-0" Span
4634-D95	"D" Beam - 95'-0" Span
4635-D100	"D" Beam - 100'-0" Span
4635-D105	"D" Beam - 105'-0" Span
4636-D110s1	"D" Beam - 110'-0" Span Data Details - Sheet 1 of 2
4636-D110s2	"D" Beam - 110'-0" Span - Sheet 2 of 2
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
4712	Bulb Tee "C" Beam - 85'-0" Span
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 - Sheet 1 of 2
4719s2	Bulb Tee "C" Beam - 120'-0" Span - Sheet 2 of 2
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 - Sheet 1 of 2
4748s2	Bulb Tee "D" Beam - 135'-0" Span - Sheet 2 of 2
4750	Bulb Tee "B" Beam - 30'-0" - 95'-0" Spans Data Details
4751	Bulb Tee "B" Beam - 30'-0" Spans
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

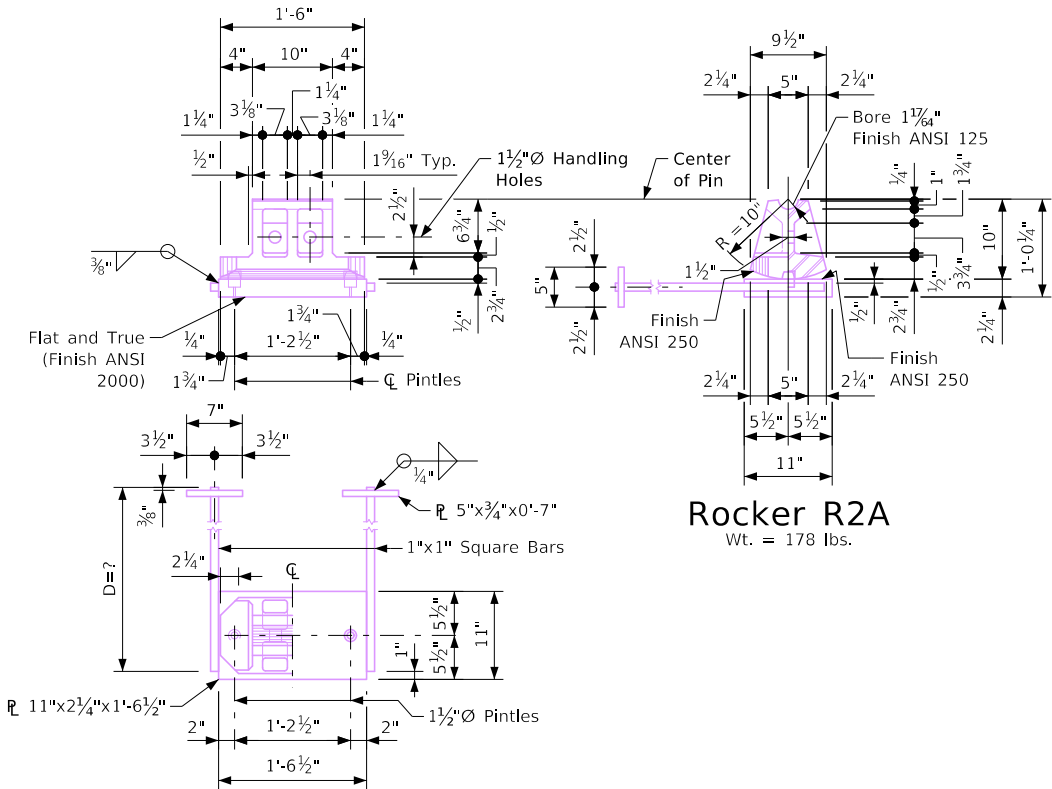
Index of Beam Standards	
Standard	Description
4766	Bulb Tee "B" Beam - 100'-0" Span
4767	Bulb Tee "B" Beam - 105'-0" Spans
4770s1	Bulb Tee "E" Beam - 60'-0" - 150'-0" Spans Data Details - Sheet 1 of 2
4770s2	Bulb Tee "E" Beam - 60'-0" - 150'-0" Spans Data Details - Sheet 2 of 2
4771	Bulb Tee "E" Beam - 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
4790s1	Bulb Tee "E" Beam - 155'-0" Spans Data Details - Sheet 1 of 2
4790s2	Bulb Tee "E" Beam - 155'-0" Spans - Sheet 2 of 2

Index of Beam Standards

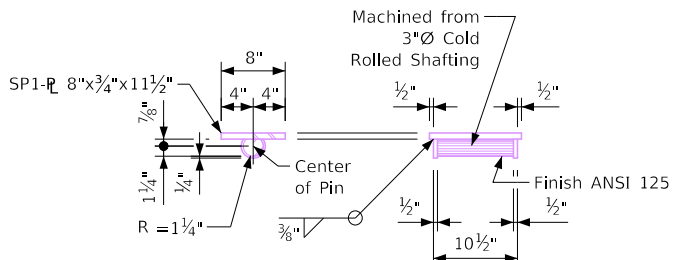
Correction 04-14 - Added Reference to Summary Quantities Sheet for Bearing Weights.
Issued 05-10.
Beams.dgn - 1008a - This Sheet Re-Issued 04-2024. Sheet Format Update.



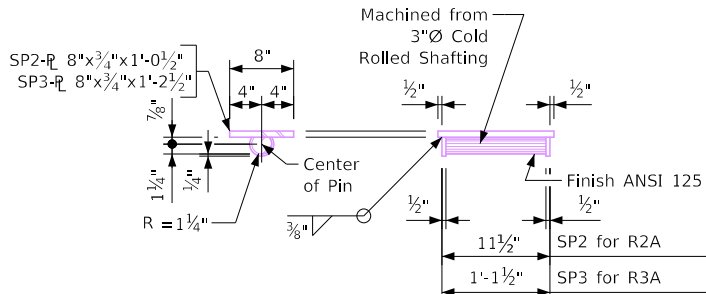
Abutment Masonry Plate MP1A
Wt. = 110 lbs. (Does Not Include 1"x1" Square Bars)
Wt. = ? lbs. for 1"x1" Square Bars



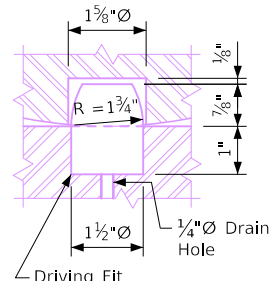
Abutment Masonry Plate MP2A
Wt. = 146 lbs. (Does Not Include 1"x1" Square Bars)
Wt. = ? lbs. for 1"x1" Square Bars



Sole Plate SP1 for R1A
Wt. = SP1 = 34 lbs.



Sole Plate SP2 & SP3
Wt. SP2 = 37 lbs.
SP3 = 43 lbs.



Typical Pintle Detail

Bearing Notes:

The casting of R1A, R2A, & R3A 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.

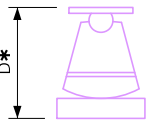
Preparation of bearing area shall be in accordance with Article 2408.03, M, of the Standard Specifications. The bedding shall be a single layer of 1/8 inch neoprene sheet.

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 (NLGI) 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.

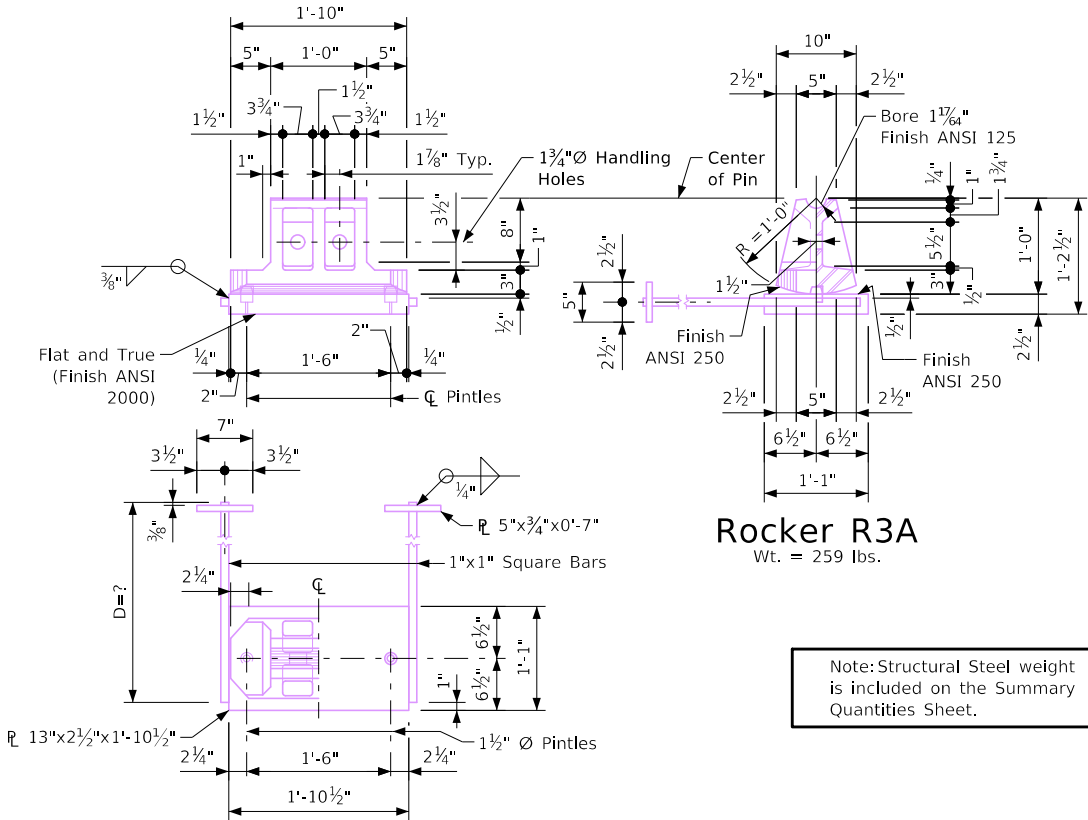
Masonry Plates MP1A, MP2A and MP3A shall be galvanized after the 1"x1" square bars have been welded to the masonry plate and the pintles have been installed.

All masonry plate assemblies shall be galvanized. Galvanizing shall be in accordance with Article 4100.07, of the Standard Specifications.

Distance From Top of Sole Plate to Bridge Seat	
Rockers	
R1A	1'-0 3/4"
R2A	1'-2"
R3A	1'-4 1/4"

* Including 3/4" Neoprene Sheet.

Maximum Reaction (In KIPS)		
R1A	R2A	R3A
132	171	263



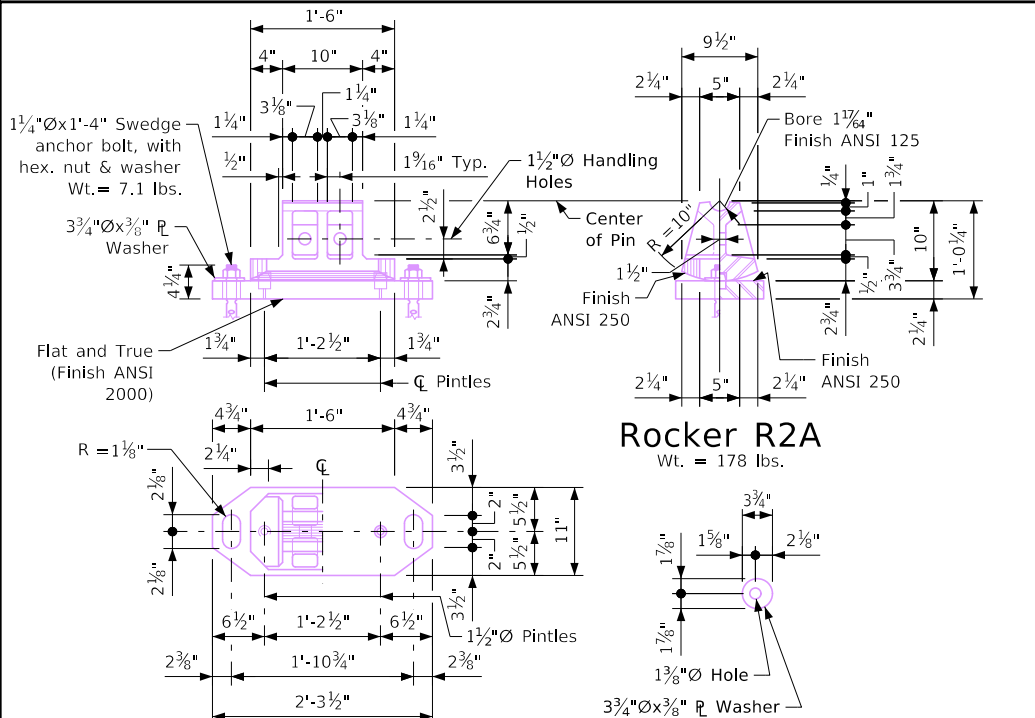
Abutment Masonry Plate MP3A
Wt. = 224 lbs. (Does Not Include 1"x1" Square Bars)
Wt. = ? lbs. for 1"x1" Square Bars

Rocker R3A
Wt. = 259 lbs.

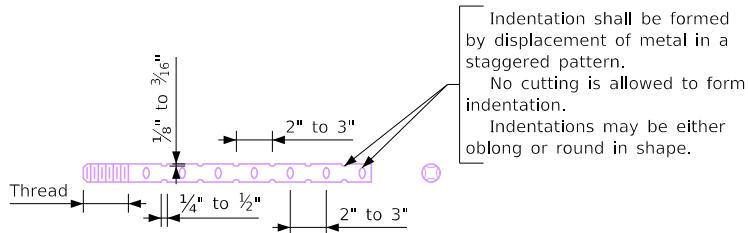
Note: Structural Steel weight is included on the Summary Quantities Sheet.

Abutment Bearing

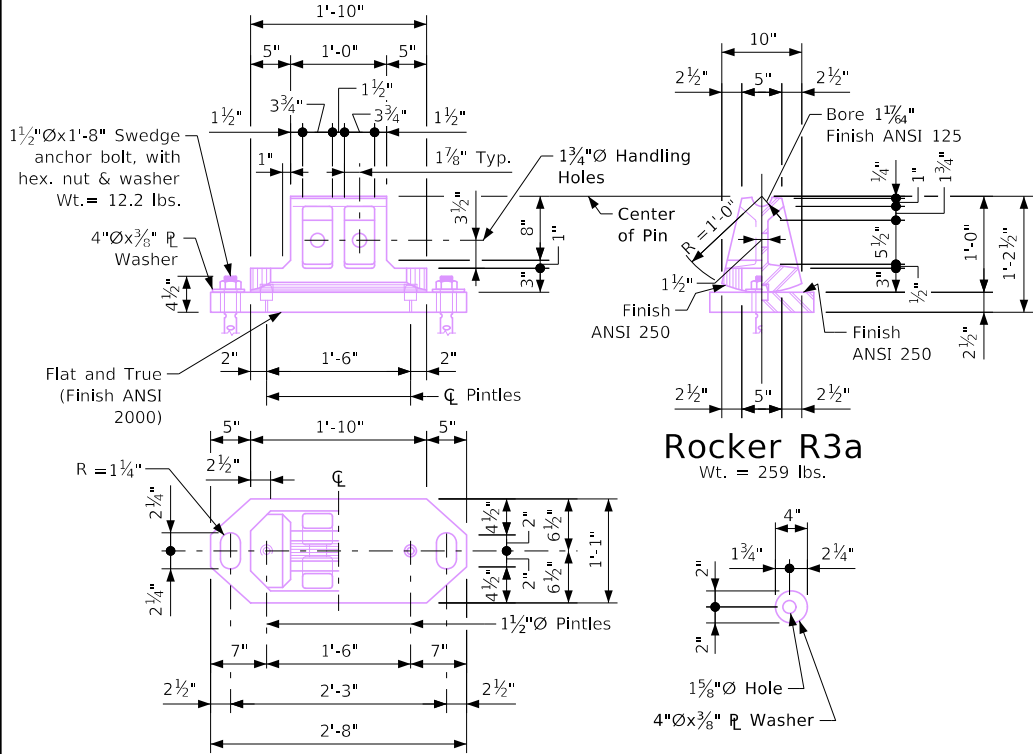
Correction 05-14: Added a Statement to Anchor Bolt Swedge Detail Stating that the Shape of the Indentations may be Oblong or Round in Shape.
Issued 05-10.
Beams.dgn - 1008b - This Sheet Re-Issued 04-2024. Sheet Format Update.



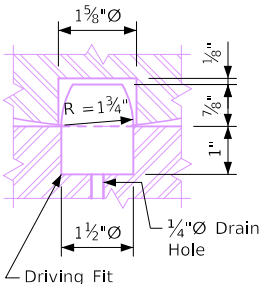
Pier Masonry Plate MP2P
Wt. = 160 lbs.



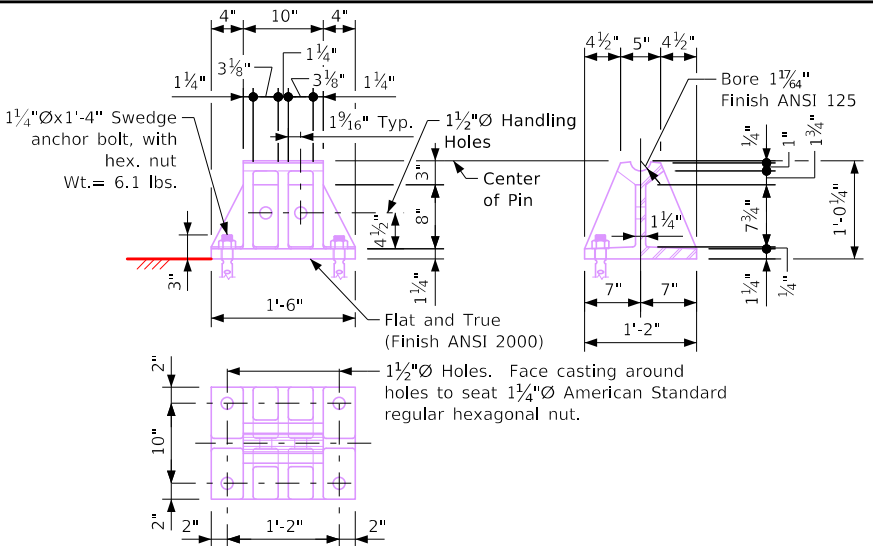
Anchor Bolt Swedge Detail



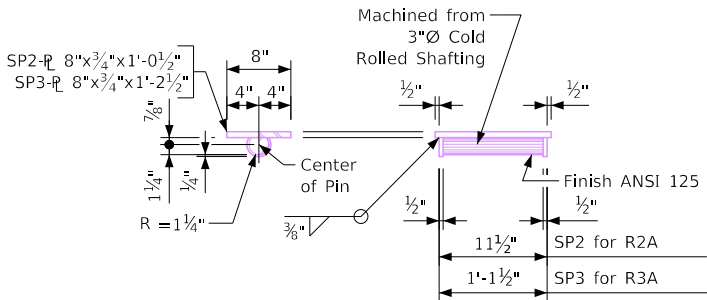
Pier Masonry Plate MP3P
Wt. = 249 lbs.



Typical Pintle
Detail

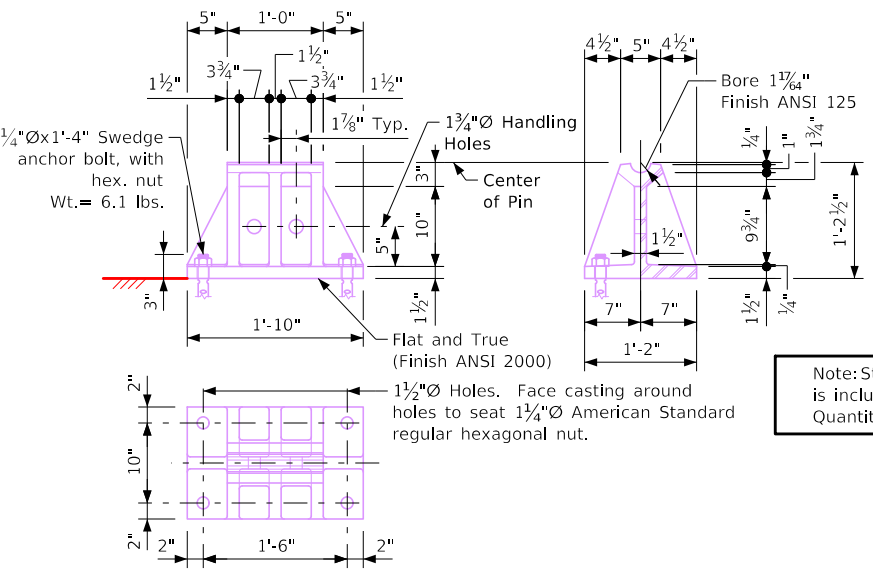


Fixed Shoe S2
Wt. = 222 lbs.



Sole Plate SP2 & SP3

Wt. SP2 = 37 lbs.
SP3 = 43 lbs.



Fixed Shoe S3
Wt. = 349 lbs.

Note: Structural Steel weight
is included on the Summary
Quantities Sheet.

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.

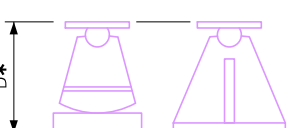
The 1/8 inch neoprene sheets are to be 50, 60, or 70 durometer hardness and shall be 1 inch greater in length and width than the bottom surface of the masonry plates or steel bearings.

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 (NLGI) 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 pintles, masonry plates, swedge anchor bolts, nuts and washers shall be galvanized. The pintles and masonry plates shall be assembled prior to galvanizing. Galvanizing shall be in accordance with Article 4100.07, of the Standard Specifications.

Plate washers shall be ASTM A709 Grade 36 (AASHTO M270 Grade) steel.

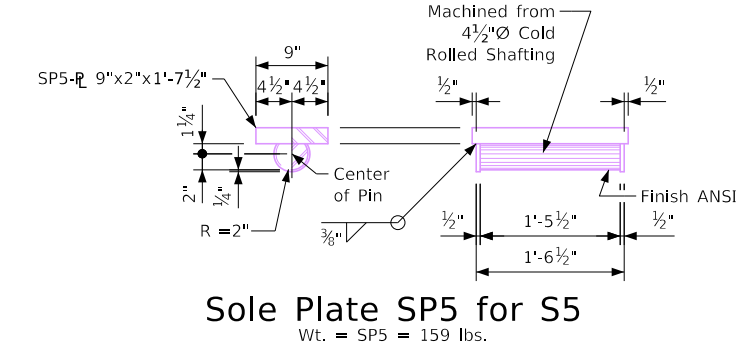
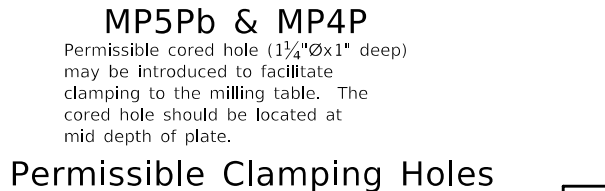
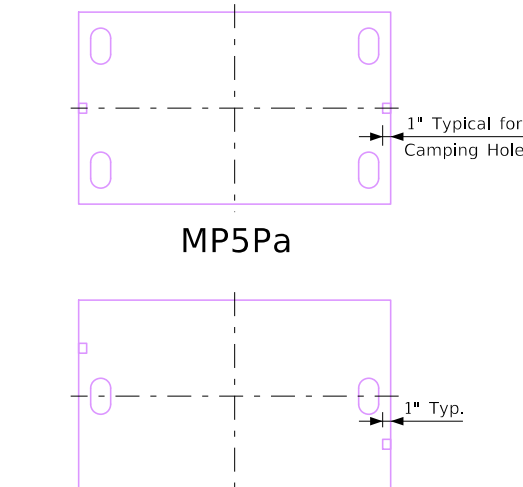
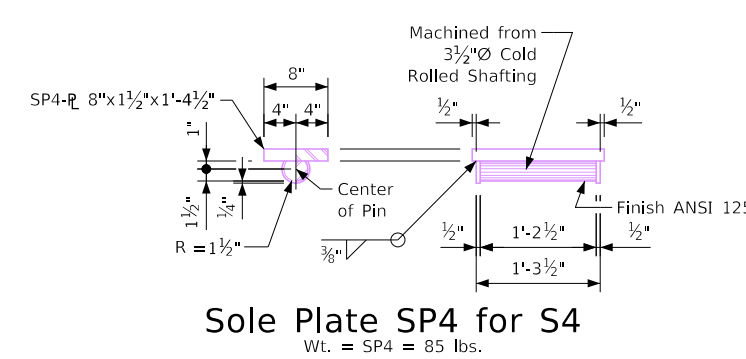
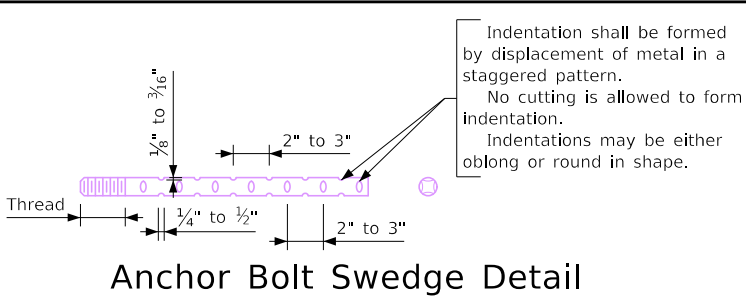
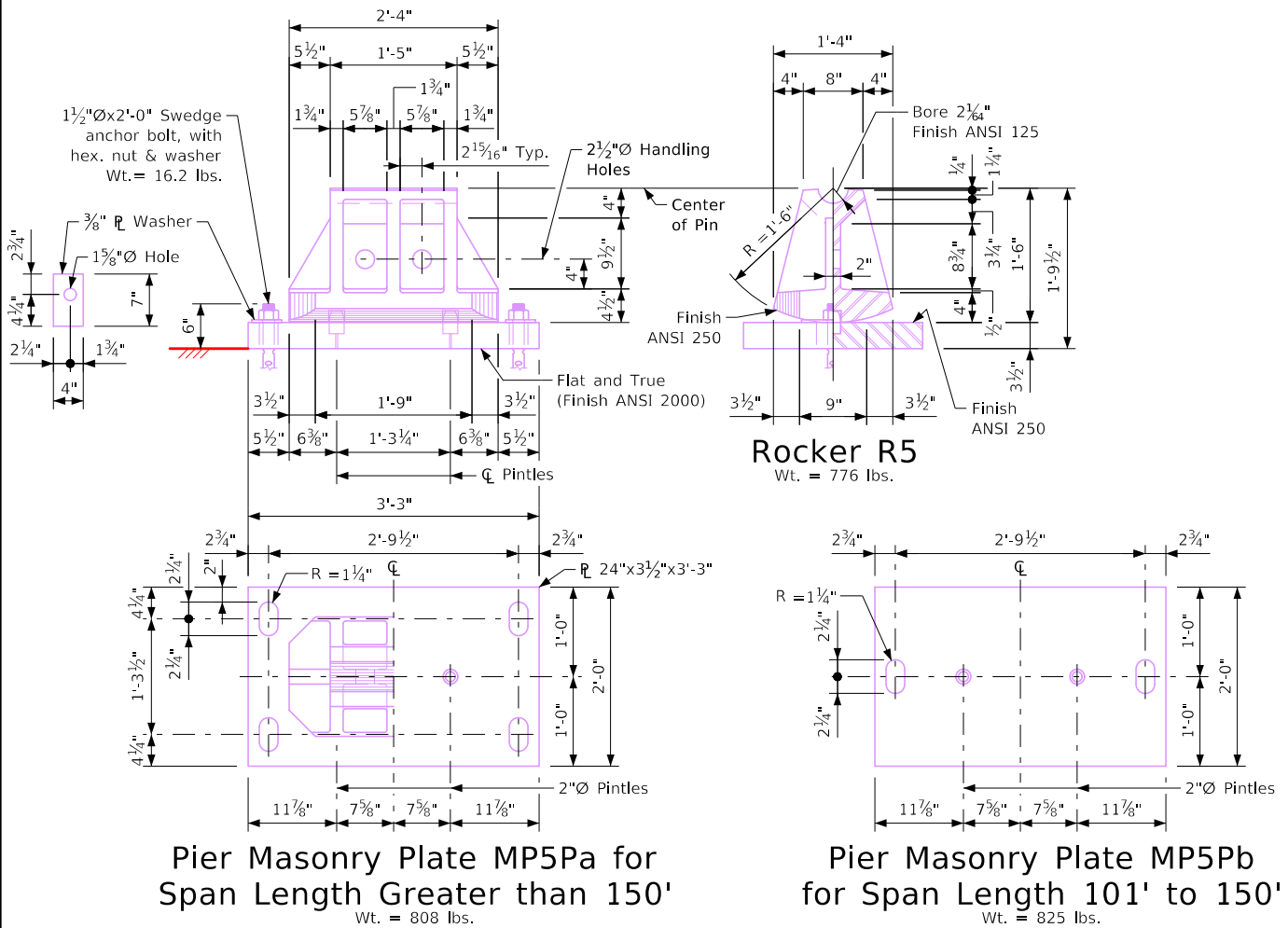
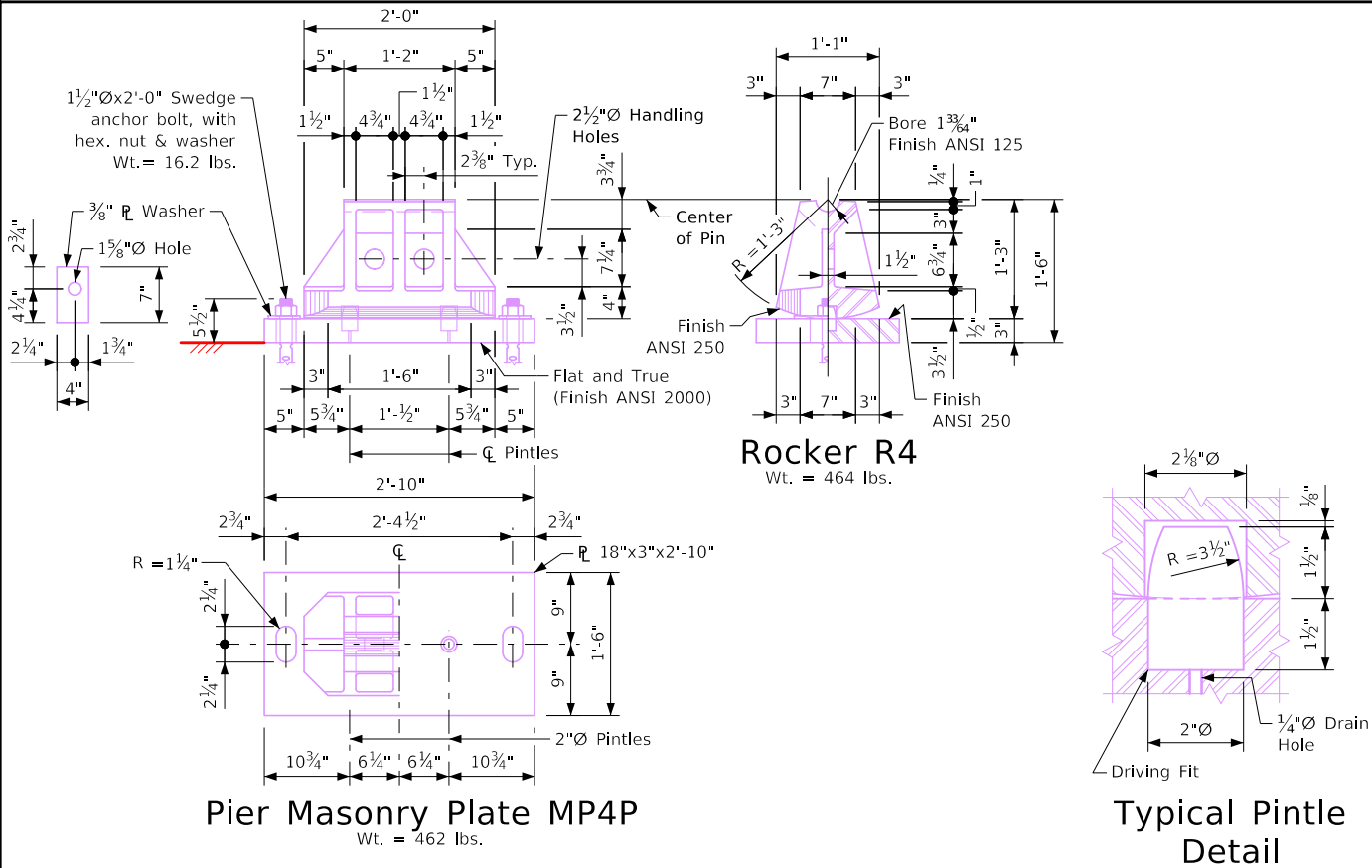
Distance from Top of Sole Plate to Bridge Seat	
Rockers & Fixed Shoes	
	R2A & S2
	R3A & S3

* Including 3/4" Neoprene Sheet.

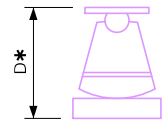
Maximum Reaction (In KIPS)	
R2A S2	R3A S3
171	263

Pier Bearing

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.
Issued 05-10.
Beams.dgn - 1009a - This Sheet Re-Issued 04-2024. Sheet Format Update.



Bearing Notes:
Castings R4 and R5 shall be nodular iron castings in accordance with Article 4153.04, of the Standard Specifications. Masonry plates MP4P and MP5P shall be either nodular iron castings in accordance with Article 4153.04, of the Standard Specifications or structural steel complying with ASTM A572 grade 50. Pins shall be in accordance with Article 4153.02, of the Standard Specifications, and with ASTM A108. 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 pintles, masonry plates, swedge anchor bolts, nuts and washers shall be galvanized. The pintles and masonry plates shall be assembled prior to galvanizing. 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	
R4	1'-8 3/8"
R5	2'-0 7/8"

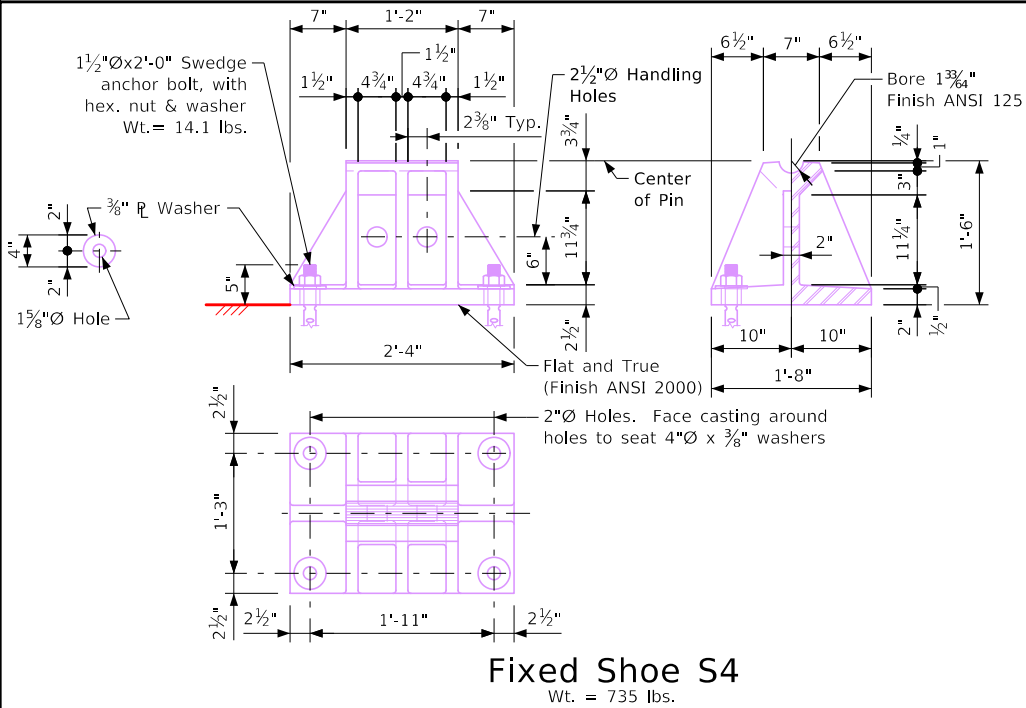
* Including 3/4" Neoprene Sheet.

Maximum Reaction (In KIPS)	
R4	R5
475	650

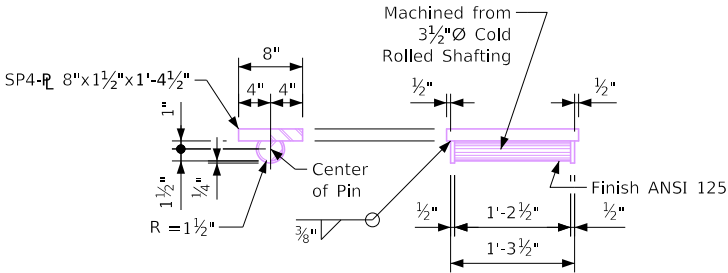
Note: Structural Steel weight is included on the Summary Quantities Sheet.

Pier Masonry Plate & Rocker Bearing

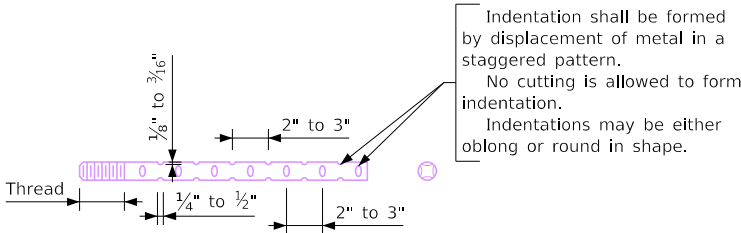
Correction 05-14: Added a Statement to Anchor Bolt Swedge Detail Stating that the Shape of the Indentations May be Oblong or Round in Shape.
Issued 05-10.
Beams.dgn - 1009b - This Sheet Re-Issued 04-2024. Sheet Format Update.



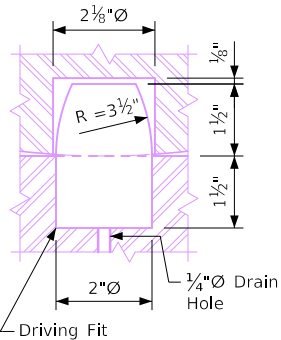
Fixed Shoe S4
Wt. = 735 lbs.



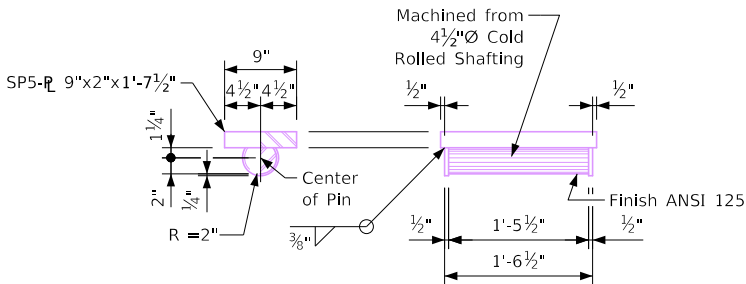
Sole Plate SP4 for S4
Wt. = SP4 = 85 lbs.



Anchor Bolt Swedge Detail



Typical Pintle
Detail



Sole Plate SP5 for S5
Wt. = SP5 = 159 lbs.

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.

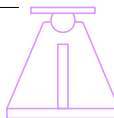
Preparation of bearing area shall be in accordance with Article 2408.03, M, of the Standard Specifications. The bedding shall be a single layer of 1/8 inch neoprene sheet.

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 pintles, 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 3/8"
S5	2'-0 7/8"

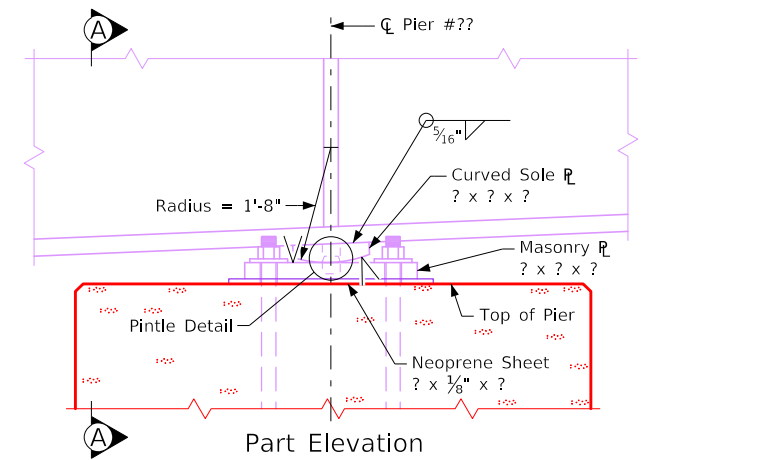
* Including 3/4" Neoprene Sheet.

Maximum Reaction (In KIPS)	
S4	S5
475	650

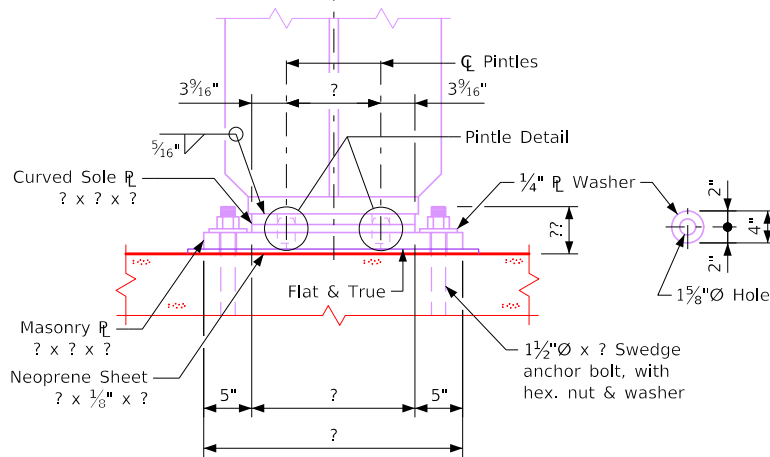
Note: Structural Steel weight is included on the Summary Quantities Sheet.

Pier Sole Plate & Fixed Shoe Bearing

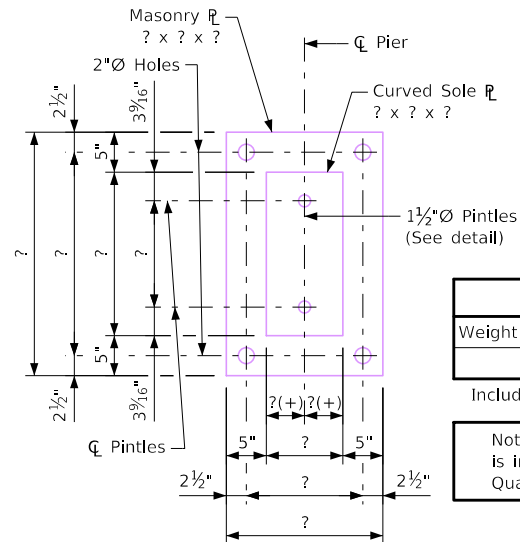
Correction 05-14: Added a Statement to Anchor Bolt Swedge Detail Stating that the Shape of the Indentations may be Oblong or Round in Shape.
Issued 09-03.
Beams.dgn - 1010 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Part Elevation



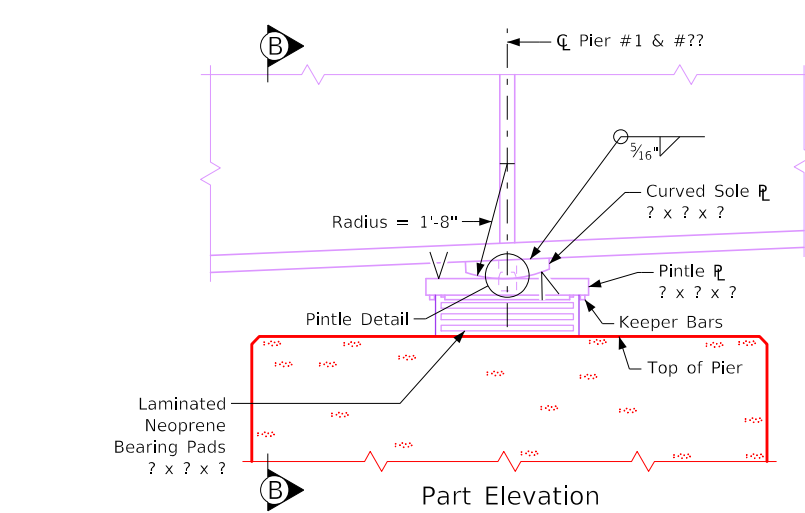
Section A-A



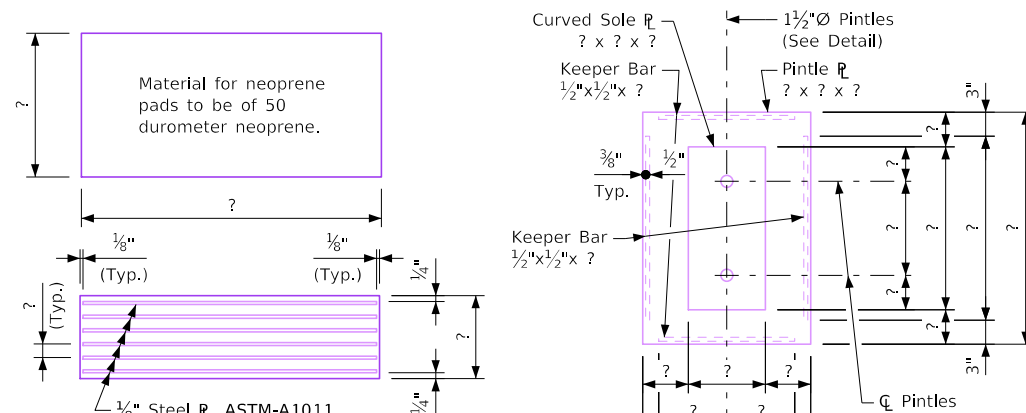
Plan View of Masonry and Sole Plates
Fixed Pier

Masonry / Curved Sole Assembly

Structural Steel	
Weight	? lbs.
Includes Curved Sole	
Note: Structural Steel weight is included on the Summary Quantities Sheet.	



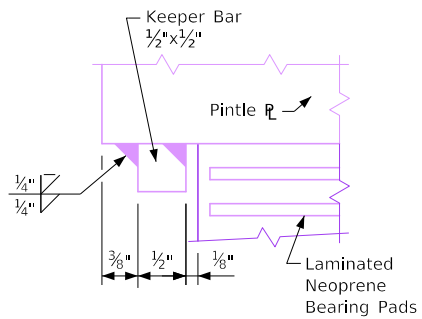
Part Elevation



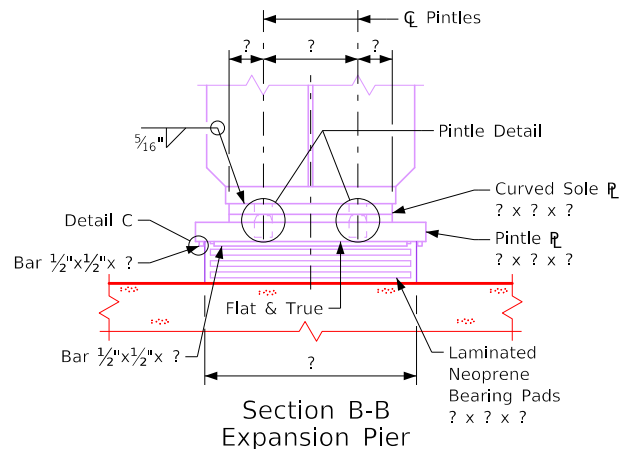
Plan of
Pintle Plate

Structural Steel	
Weight	? lbs.
Includes Curved Sole	
Note: Structural Steel weight is included on the Summary Quantities Sheet.	

Laminated Neoprene Pads

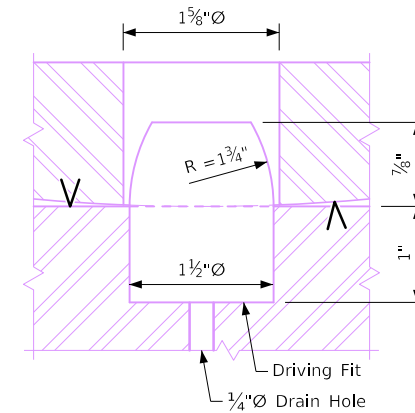


Detail C

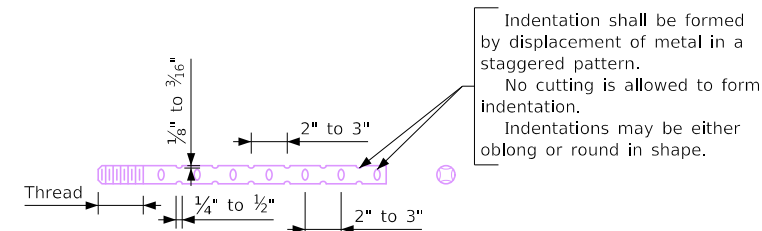


Section B-B
Expansion Pier

Laminated Neoprene Pad / Curved Sole Assembly



Pintle Detail



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 pintles, pintle plates, keeper bars, and masonry plates shall be galvanized. Welding shall be completed prior to galvanizing. The pintles and pintle plates shall be assembled prior to galvanizing. The surfaces of the pintle plate assembly 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.

Low Profile Bearing

Bulb Tee "B" Beam Intermediate Diaphragm Structural Steel		
One Beam Connection Information		
Beam Spacing	Diaphragm Length	C15x33.9 Weight (Lbs.)
6'-6 $\frac{1}{2}$ "	5'-4 $\frac{1}{2}$ "	182
7'-2 $\frac{13}{16}$ "	6'-0 $\frac{7}{8}$ "	205
8'-0 $\frac{1}{2}$ "	6'-10 $\frac{1}{2}$ "	232
8'-8 $\frac{9}{16}$ "	7'-6 $\frac{3}{8}$ "	255
9'-0 $\frac{1}{2}$ "	7'-10 $\frac{1}{2}$ "	266

One Beam Connection Information		
Beam Spacing	Diaphragm Length	C15x33.9 Weight (lbs.)
6'-6 $\frac{1}{2}$ "	5'-4 $\frac{1}{2}$ "	182
7'-2 $\frac{3}{8}$ "	6'-0 $\frac{3}{8}$ "	205
8'-0 $\frac{1}{2}$ "	6'-10 $\frac{1}{2}$ "	232
8'-8 $\frac{3}{8}$ "	7'-6 $\frac{3}{8}$ "	255
9'-0 $\frac{1}{2}$ "	7'-10 $\frac{1}{4}$ "	266

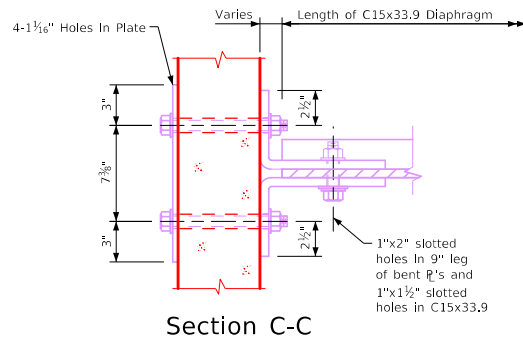
Revision 12-10: Alternate Section C-C Added Outside of Border Sheet.
Revision 04-13: Corrected the 'D' Dimensions Locating the Holes in the Beam Web in Part Section A-A.
Revision 11-13: Added Detail F Outside of the Sheet to be Used when Skew is Greater than 7°30'.
ENGLISHBEAMS.DGN - 1036-BTRR - This Sheet issued 02-08

This Sheet Issued 06-14, Sheet 1 of 2.
Beams.dgn - 1036-1-BTB - This Sheet Re-Issued 04-2024, Sheet Format Update.

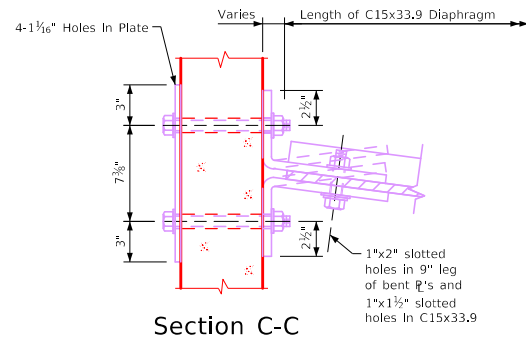
[illegible]

One Beam Connection (Detail "F" and/or Detail "G")		Weight
Four - $\frac{7}{8}$ " \varnothing X 9 $\frac{1}{4}$ " H.S. Bolts with Nuts & Washers = 9.6 Lbs.	No. of Beam Connections ?	?
One Detail "G"	Four - Bent $\bar{\text{R}}$ 9" x 6" x $\frac{1}{2}$ " x 0'-11" = 93.6 Lbs.	?
One Detail "F"	One - Backing $\bar{\text{P}}$ 5" x $\frac{3}{8}$ " x 1'-1 $\frac{3}{4}$ " = 7.1 Lbs.	?
	Two - Bent $\bar{\text{R}}$ 9" x 6" x $\frac{1}{2}$ " x 0'-11" = 46.8 Lbs.	?
One Diaphragm		
Six - $\frac{3}{4}$ " \varnothing X 3" H.S. Bolts with Nuts & Washers = 7.8 Lbs.	Number of Diaphragms ?	?
One - C15 x 33.9 = 33.9 Lbs./Ft.	Length of Member 2'-2"	?
Intermediate Diaphragm Structural Steel - Total (Lbs.)		?

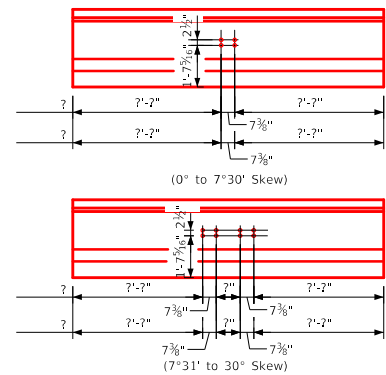
Note to Designer: Chart outside of border contains diaphragm lengths



Note to Designer: Delete or Cross-Out non-applicable section C-C detail.



Note to Designer: Use when skew is 7°30' or less.



Intermediate Diaphragm Bolt Hole Locations

Notes:

All diaphragm materials, including bolts, nuts and washers shall be galvanized.

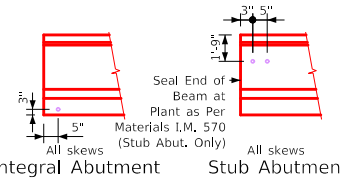
Shop drawings of the steel diaphragms showing layout and details of the diaphragms shall be submitted for approval.

All costs for furnishing and installing steel intermediate diaphragms shall be included in the price bid for Structural Steel.

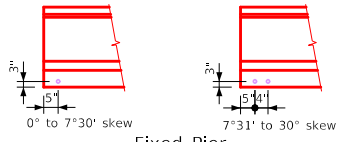
The 1½"Ø holes for the ¾"Ø H.S. bolts shall be cast into the web. Drilling is not allowed.

The ¾"Ø 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.

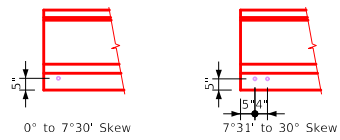
All bolts are to be tightened prior to placing bridge deck concrete with the following exception: Bolts in diaphragms located under longitudinal bridge deck construction joints shall not be tightened until stage two of the bridge deck has been placed.



Integral Abutment Stub Abutment



Fixed Pier



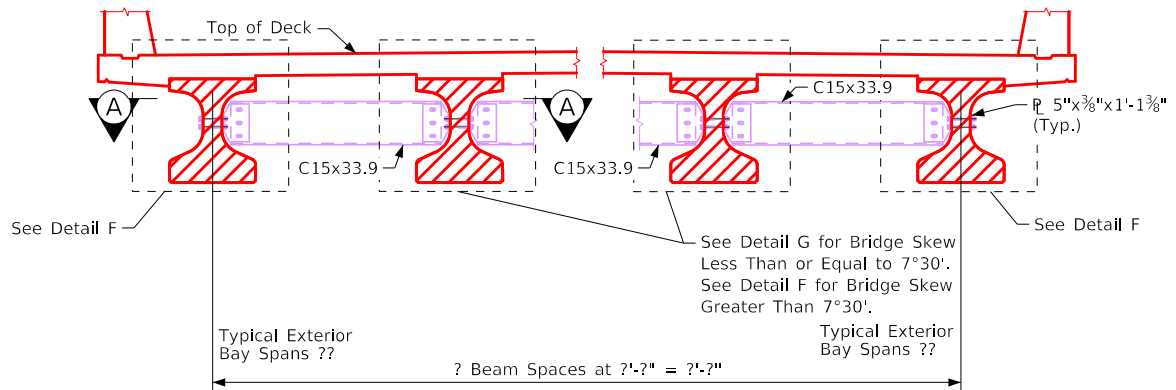
Expansion Pier

Beam Coil Tie Locations

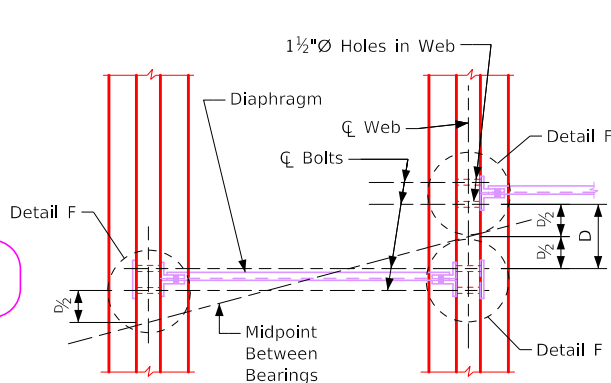
Steel Interm. Diaphragm - BTB Beam

FILE NO.	ENGLISH	DESIGN TEAM	Steel Intermediate Diaphragms for "BTB" Beam Bridges - Sheet 1 of 2	Standard Sheet 1036-1-BTB	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:55:41 AM	10/2/2024	bkloss	pw:\NT\pint1.dot.int.lan:PWMain\Documents\Highway\Bridg\Standards\Bridges\Beams.dgn				

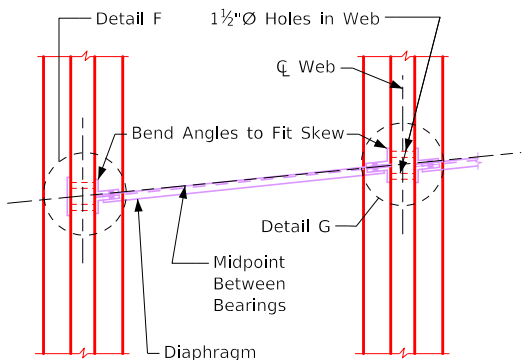
This Sheet Issued 06-14, Sheet 2 of 2.
Beams.dgn - 1036-2-BTB - This Sheet Re-Issued 04-2024, Sheet Format Update.



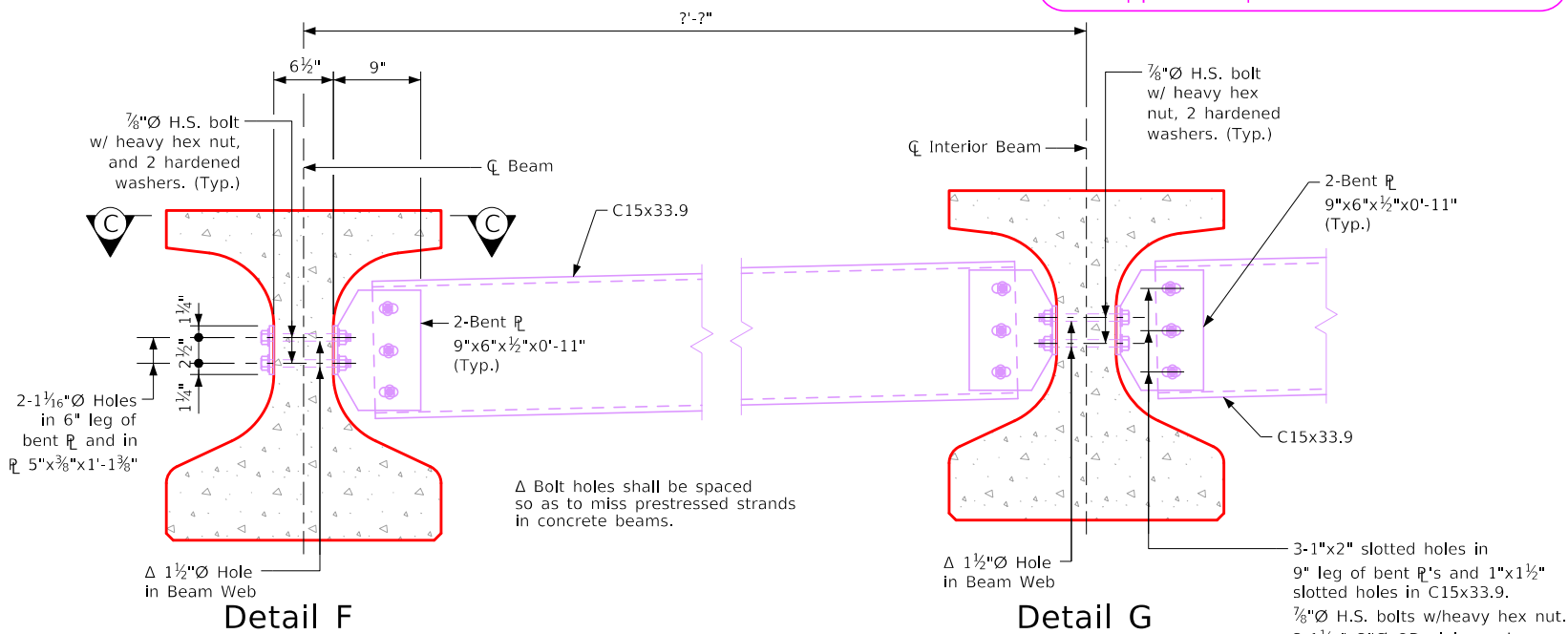
Section Showing Intermediate Diaphragms



Part Section A-A
For Bridges Skewed Greater Than 7°30'

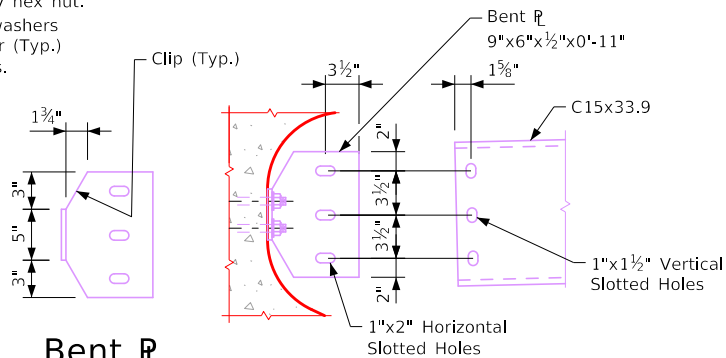


Part Section A-A
For Bridges Skewed Less Than or Equal to 7°30'



Section Showing Intermediate Diaphragms
At Exterior Bay

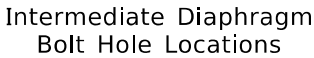
Note to Designer: Delete or Cross-Out
non-applicable part section A-A detail.



Bent PL
Detail

Slotted Hole Details

Steel Interm. Diaphragm - BTB Beam



Steel Interm. Diaphragm - BTC Beam

Bulb Tee "C" Beam Intermediate Diaphragm Structural Steel		
One Beam Connection Information		
Beam Spacing	Diaphragm Length	C15x33.9 Weight (Lbs.)
6'-6 $\frac{1}{2}$ "	5'-4 $\frac{1}{2}$ "	182
7'-2 $\frac{13}{16}$ "	6'-0 $\frac{7}{8}$ "	205
8'-0 $\frac{3}{8}$ "	6'-10 $\frac{1}{16}$ "	232
8'-8 $\frac{5}{16}$ "	7'-6 $\frac{3}{8}$ "	255
9'-0 $\frac{1}{2}$ "	7'-10 $\frac{1}{4}$ "	266

NOTE: Structural Steel weight
Is Included on the Summary
Quantities Sheet.

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.

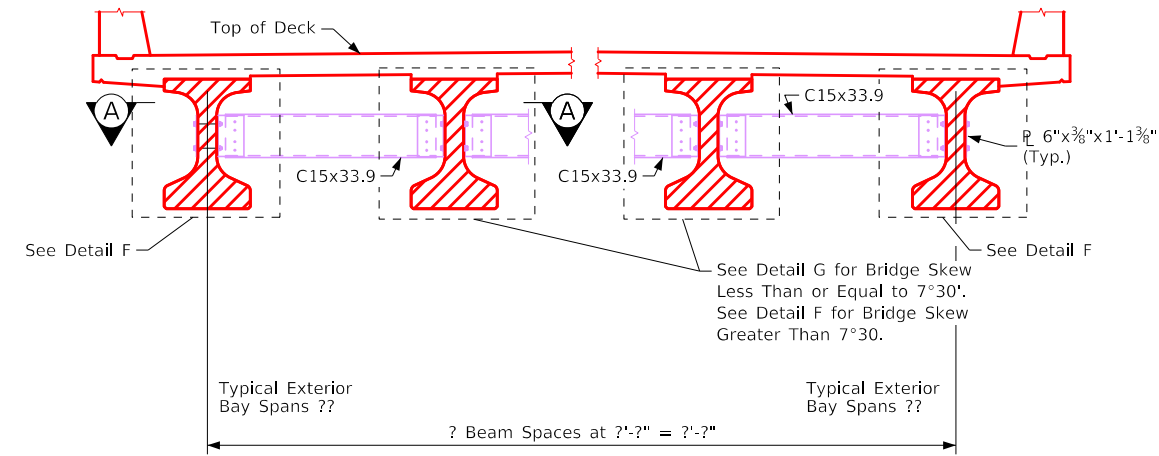
All costs for furnishing and installing steel intermediate diaphragms shall be included in the price bid for Structural Steel.

The 1½"Ø holes for the ⅞"Ø H.S. bolts shall be cast into the web. Drilling is not allowed.

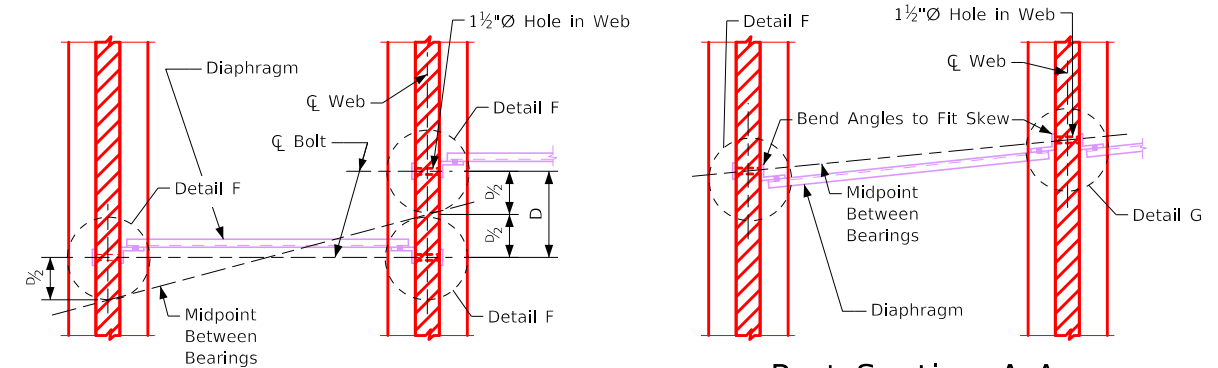
The $\frac{7}{8}$ "Ø H.S. bolts through the web shall have a thread length of 3" min. and 4" max. and shall meet the requirements of ASTM A449.

All bolts are to be tightened prior to placing bridge deck concrete with the following exception: Bolts in diaphragms located under longitudinal bridge deck construction joints shall not be tightened until stage two of the bridge deck has been placed.

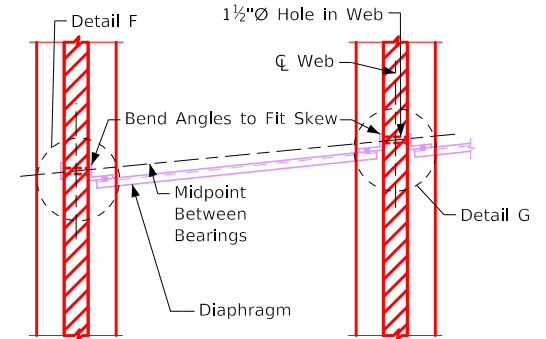
This Sheet Issued 06-14, Sheet 2 of 2.
Beams.dgn - 1036-2-BTC - This Sheet Re-Issued 04-2024, Sheet Format Update.



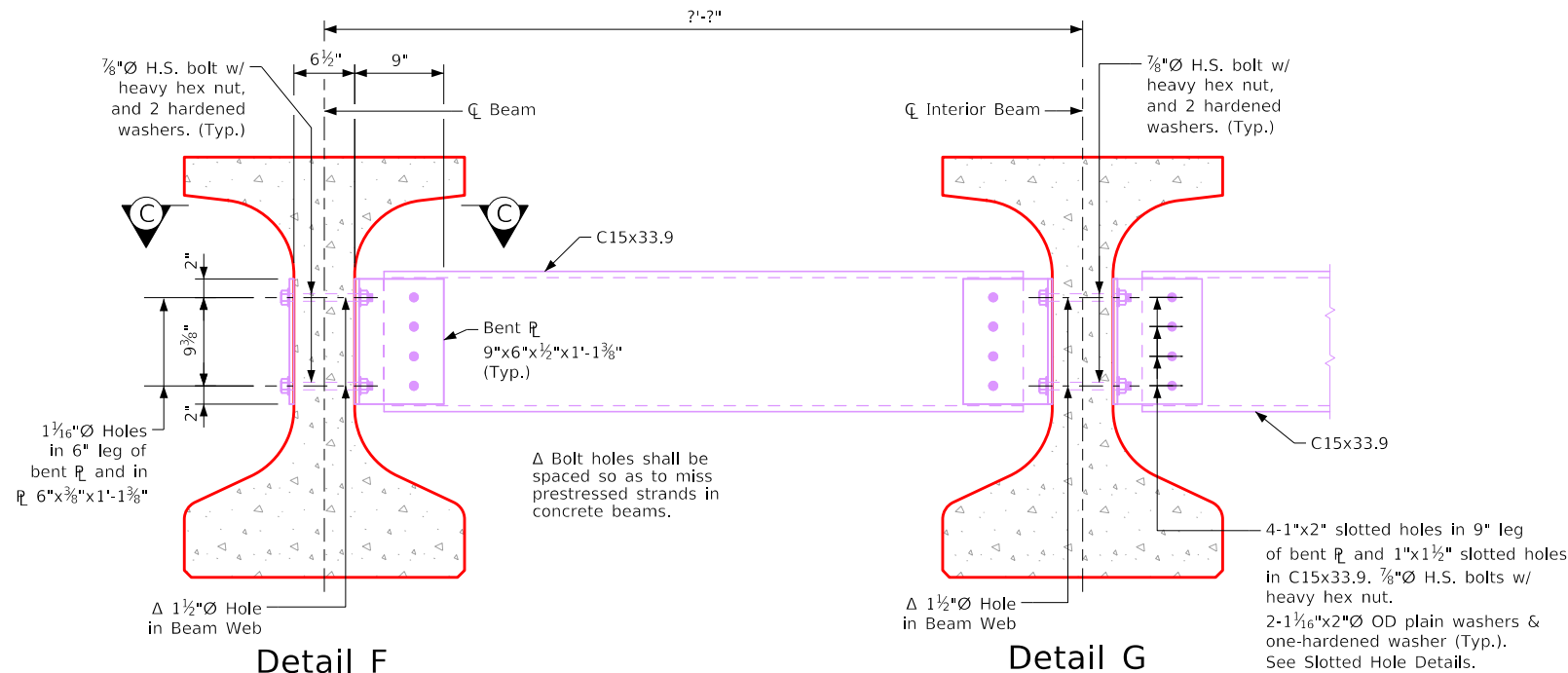
Section Showing Intermediate Diaphragms



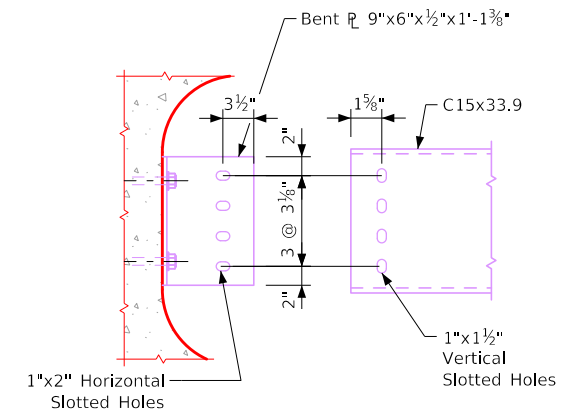
Part Section A-A
For Bridges Skewed Greater Than 7°30'



Part Section A-A
For Bridges Skewed Less Than or Equal to 7°30'



Section Showing Intermediate Diaphragms
At Exterior Bay



Slotted Hole Details

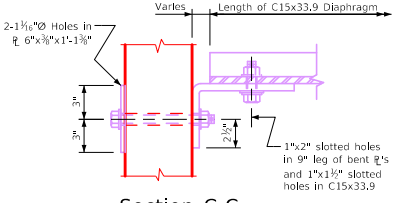
Steel Intern. Diaphragm - BTC Beam

Note to Designer: Delete or Cross-Out
non-applicable part section A-A detail.

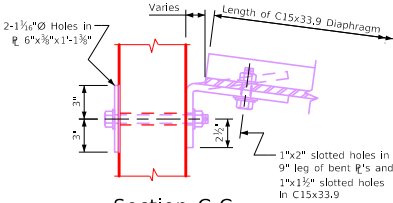
FILE NO.	ENGLISH	DESIGN TEAM	Steel Intermediate Diaphragms for "BTC" Beam Bridges - Sheet 2 of 2	Standard Sheet 1036-2-BTC	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:55:45 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Bulb Tee "D" Beam Intermediate Diaphragm Structural Steel		
One Beam Connection Information		
Beam Spacing	Diaphragm Length	C15x33.9 Weight (Lbs.)
6'-6 1/2"	5'-4 1/2"	182
7'-2 1/2"	6'-0 1/2"	205
8'-0 1/2"	6'-10 1/2"	232
8'-8 1/2"	7'-4 1/2"	255
9'-0 1/2"	7'-10 1/4"	266

Bulb Tee "D" Beam Intermediate Diaphragm Structural Steel		
One Beam Connection (Detail "F" and/or Detail "G")		
	No. of Beam Connections	Weight
Two - 7/8"Ø X 9 1/2" H.S. Bolts with Nuts & Washers = 4.8 Lbs.	?	?
One Detail "G"	?	?
One Detail "F"	?	?
One - Bent 8" x 6" x 1/2" x 1'-1 1/2" = 57.0 Lbs.	?	?
One - Bent 8" x 6" x 1/2" x 1'-1 1/2" = 8.5 Lbs.	?	?
One - Bent 8" x 6" x 1/2" x 1'-1 1/2" = 28.5 Lbs.	?	?
One Diaphragm		
	Number of Diaphragms	
Eight - 7/8"Ø X 2 1/2" H.S. Bolts with Nuts & Washers = 10.3 Lbs.	?	?
One - C15 x 33.9 = 33.9 Lbs./Ft.	Length of Member	?
Intermediate Diaphragm Structural Steel - Total (Lbs.)		?



Note to Designer: Delete or Cross-Out non-applicable section C-C detail.



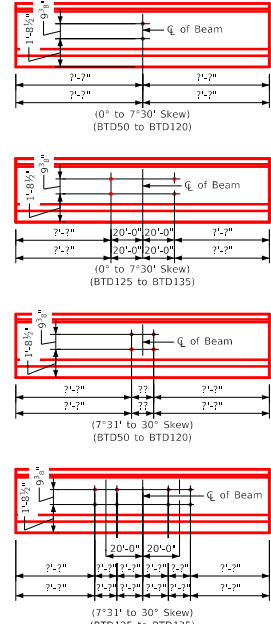
Note to Designer: Use when skew is 7°30' or less.

STRUCTURAL STEEL	
Weight	? lbs.

NOTE: Structural Steel weight Is Included on the Summary Quantities Sheet.

Note to Designer: Chart outside of border contains diaphragm lengths

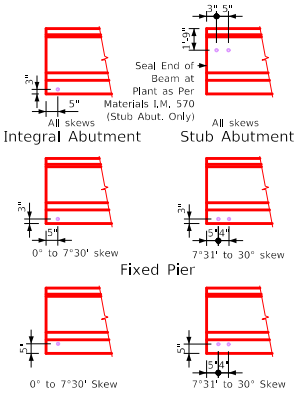
Notes:
All diaphragm materials, including bolts, nuts and washers shall be galvanized.
Shop drawings of the steel diaphragms showing layout and details of the diaphragms shall be submitted for approval.
All costs for furnishing and installing steel Intermediate diaphragms shall be included in the price bid for Structural Steel.
The 1 1/2"Ø holes for the 7/8"Ø H.S. bolts shall be cast into the web. Drilling is not allowed.
The 7/8"Ø 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 deck concrete with the following exception: Bolts in diaphragms located under longitudinal bridge deck construction joints shall not be tightened until stage two of the bridge deck has been placed.



Intermediate Diaphragm Bolt Hole Locations



Note to Designer: Beam examples are outside of border sheet



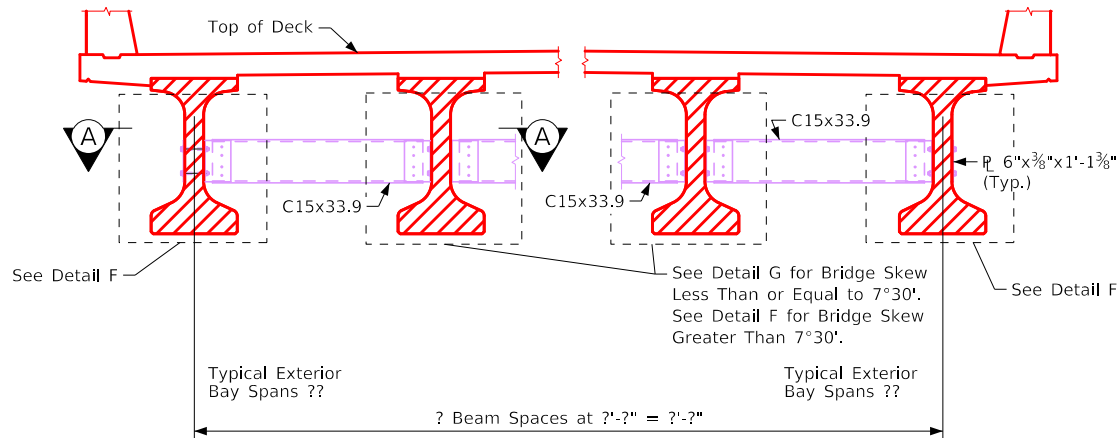
Beam Coil Tie Locations

Steel Intern. Diaphragm - BTD Beam

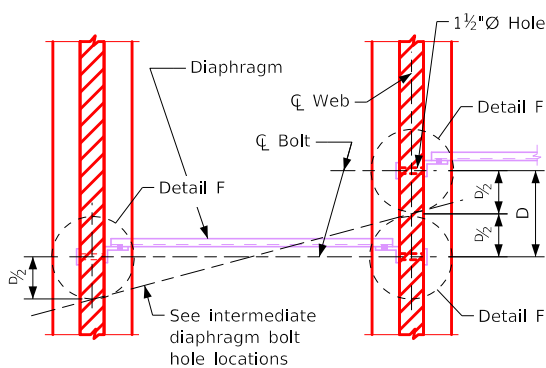
This Sheet Issued 06-14, Sheet 1 of 2.
Beams.dgn - 1036-1-BTD - This Sheet Re-Issued 04-2024, Sheet Format Update.

FILE NO.	ENGLISH	DESIGN TEAM	Steel Intermediate Diaphragms for "BTD" Beam Bridges - Sheet 1 of 2	Standard Sheet 1036-1-BTD	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:55:46 AM	10/2/2024	bkloss	pwc\NTP\wnt11.dot\JtcJan\P\WMain\Documents\Highway\Bridges\Standards\Bridges\Beams.dgn				

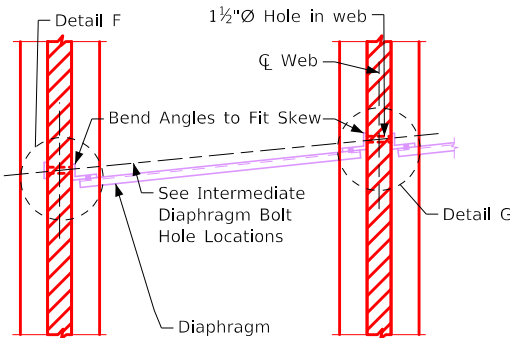
This Sheet Issued 06-14, Sheet 2 of 2.
Beams.dgn - 1036-2-BTD - This Sheet Re-Issued 04-2024, Sheet Format Update.



Section Showing Intermediate Diaphragms

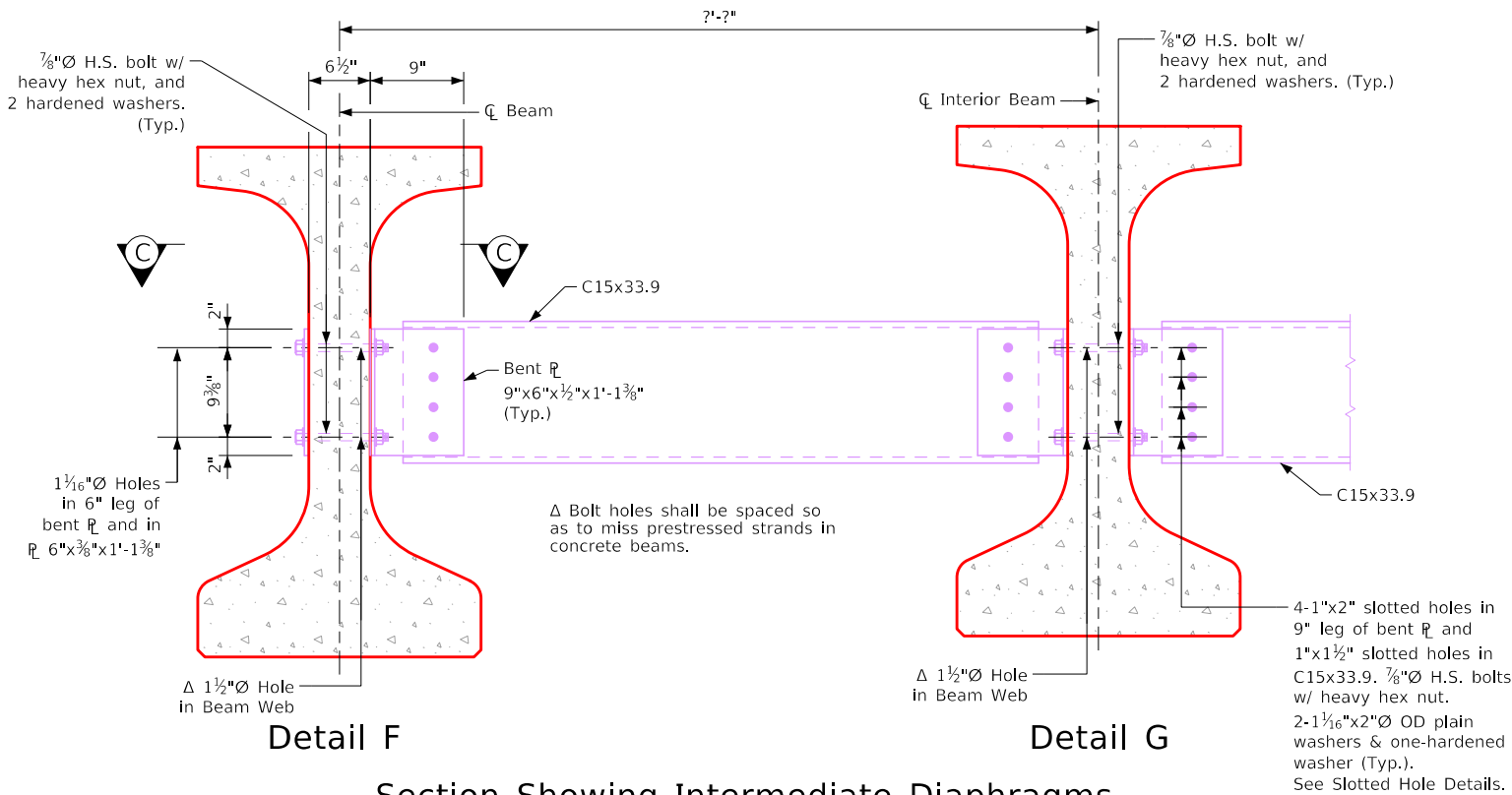


Part Section A-A
For Bridges Skewed Greater Than 7°30'

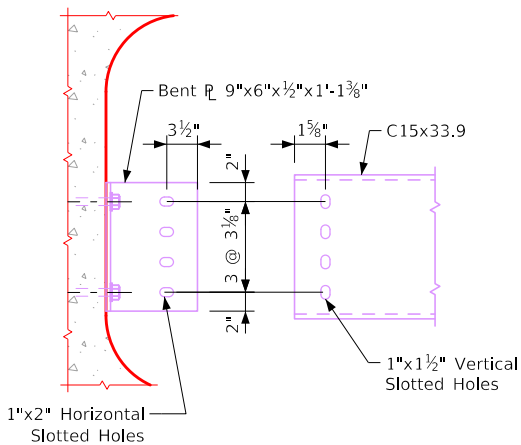


Part Section A-A
For Bridges Skewed Less Than or Equal to 7°30'

Note to Designer: Delete or Cross-Out non-applicable part section A-A detail.



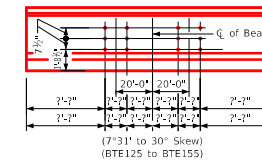
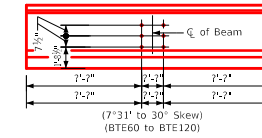
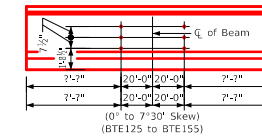
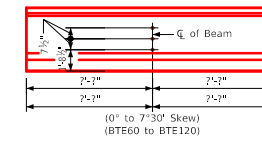
Section Showing Intermediate Diaphragms
At Exterior Bay



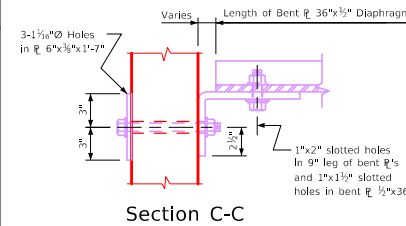
Slotted Hole Details

Steel Intern. Diaphragm - BTD Beam

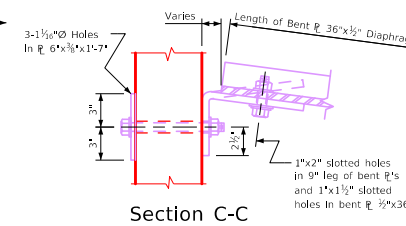
FILE NO.	ENGLISH	DESIGN TEAM	Steel Intermediate Diaphragms for "BTD" Beam Bridges - Sheet 2 of 2	Standard Sheet 1036-2-BTD	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:55:48 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				



Intermediate Diaphragm Bolt Hole Locations

[illegible]

(Note to Designer: Delete or Cross-Out non-applicable section C-C detail.)



Note to Designer: Use when skew is 7°30' or less.

Note to Designer: Beam examples are outside of border sheet

STRUCTURAL STEEL	
Weight	? lb

NOTE: Structural Steel weight is included on the Summary Quantities Sheet.

Notes:

All diaphragm materials, including bolts, nuts and washers shall be galvanized.

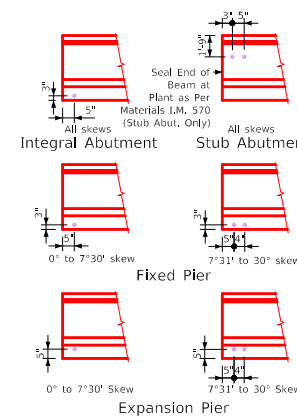
Shop drawings of the steel diaphragms showing layout and details of the diaphragms shall be submitted for approval.

All costs for furnishing and installing steel intermediate diaphragms shall be included in the price bid for Structure.

The 1½" O.H. holes for the ¾" O.H.S. bolts shall be cast into the web. Drilling is not allowed.

The ¾" O.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.

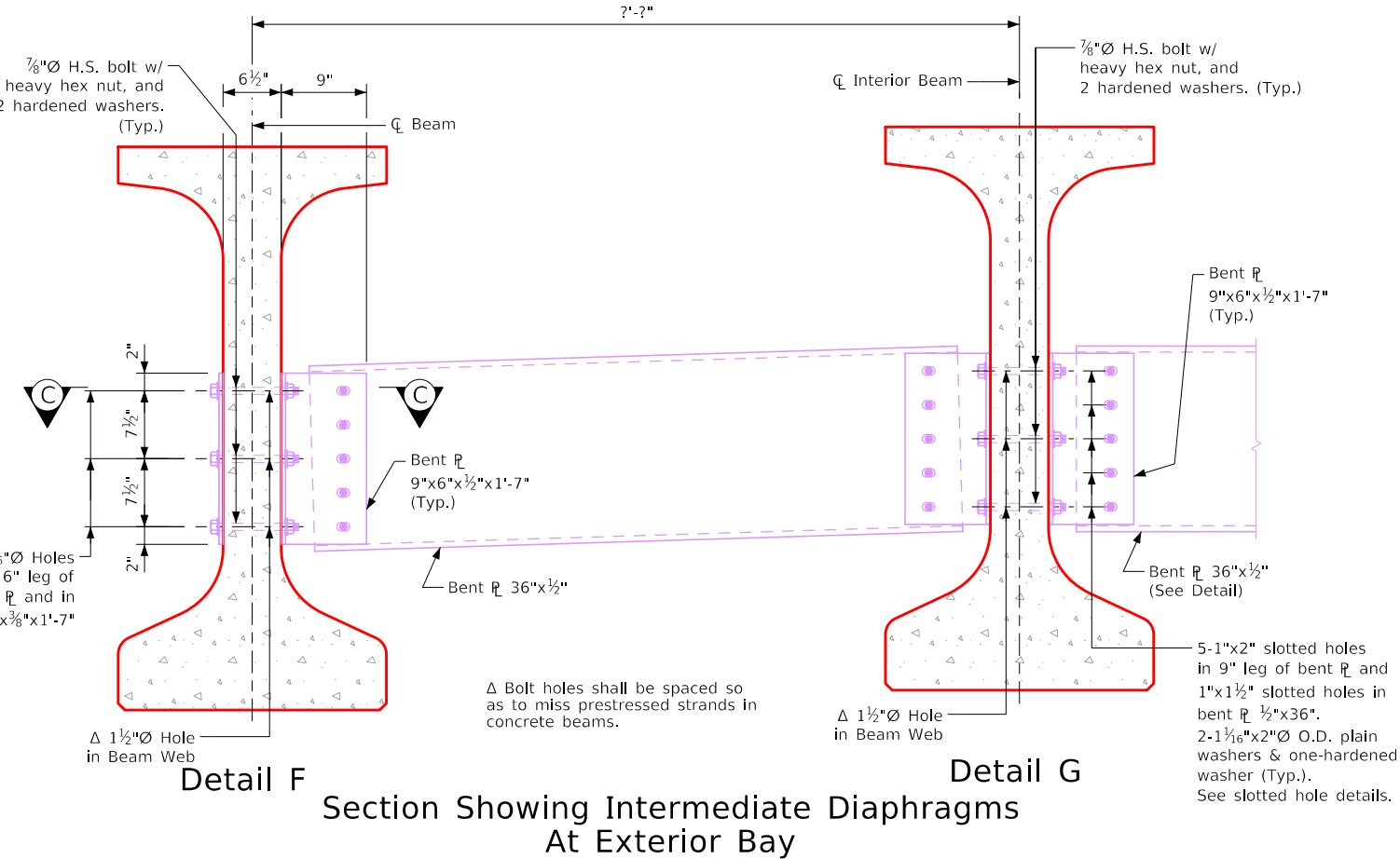
All bolts are to be tightened prior to placing bridge concrete and before installing excorators. Bolts in diaphragms located under longitudinal bridge deck construction joints shall not be tightened until stage two of the bridge deck has been placed.



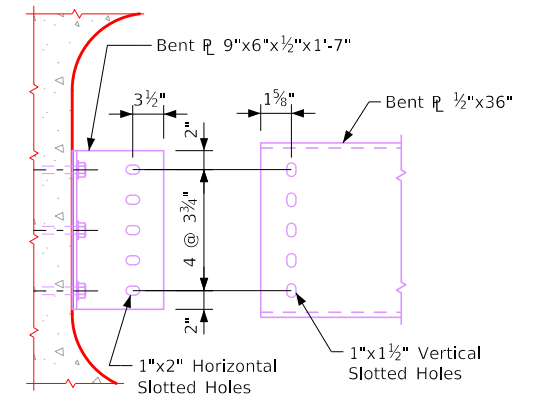
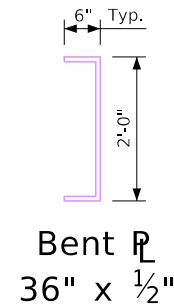
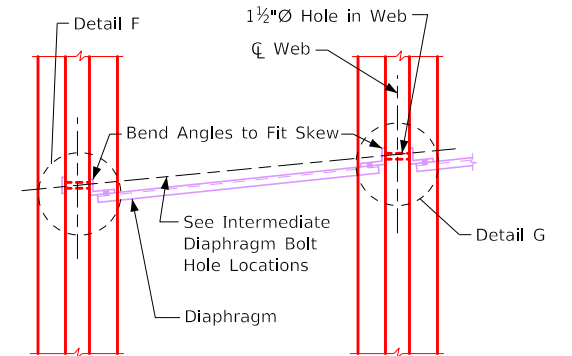
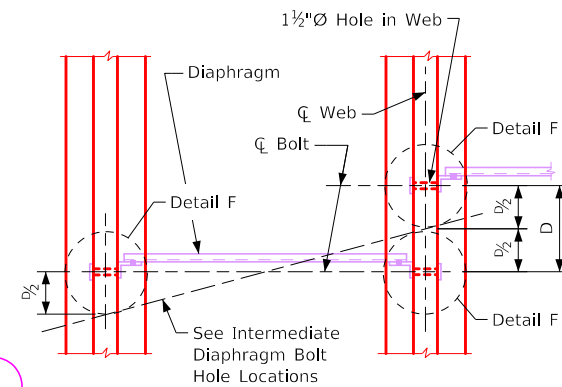
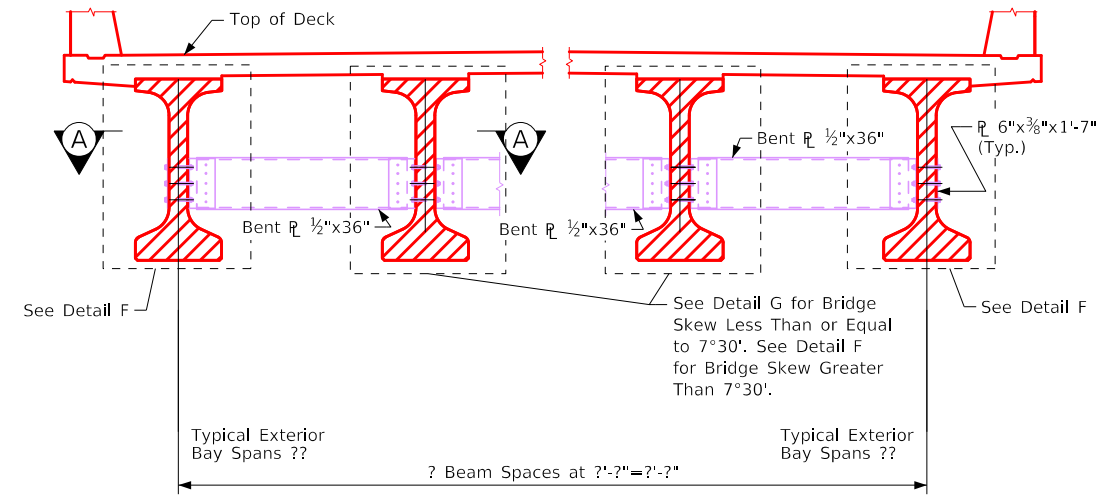
Beam Coil Tie Locations

Steel Interm. Diaphragm - BTE Beam

This Sheet Issued 06-14, Sheet 2 of 2.
Beams.dgn - 1036-2-BTE - This Sheet Re-Issued 04-2024, Sheet Format Update.



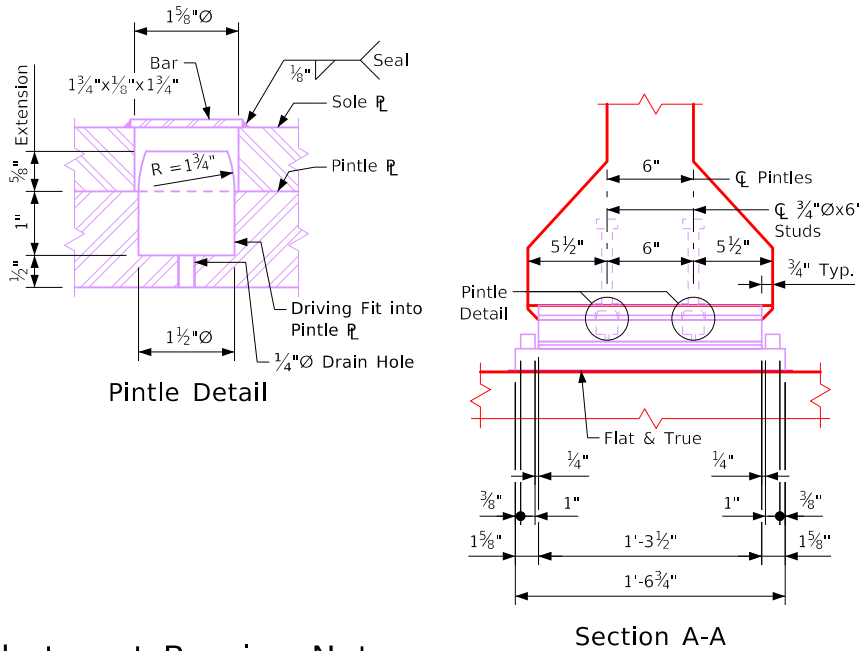
Note to Designer: Delete or Cross-Out non-applicable part section A-A detail.



Steel Intern. Diaphragm - BTE Beam

FILE NO.	ENGLISH	DESIGN TEAM	Steel Intermediate Diaphragms for "BTE" Beam Bridges - Sheet 2 of 2	Standard Sheet 1036-2-BTE	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:55:50 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Correction 05-14: Added Weight Table & Titles/Descriptions to Agree with Summary Quantities Sheet. Added Note Referring to Summary Quantities Sheet.
Issued 03-08.
Beams.dgn - 4541 - This Sheet Re-Issued 04-2024. Sheet Format Update.



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 "V" 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, pintle plate and the masonry plate shall be galvanized. The pintle and pintle plate shall be assembled prior to galvanizing. 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.

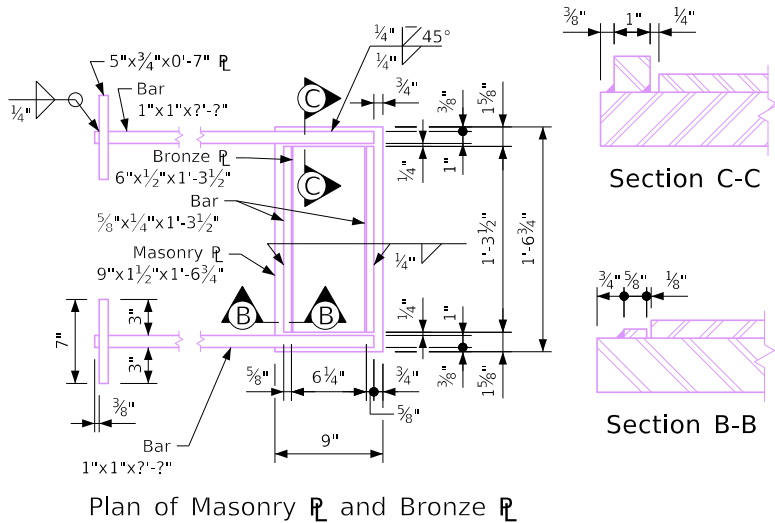
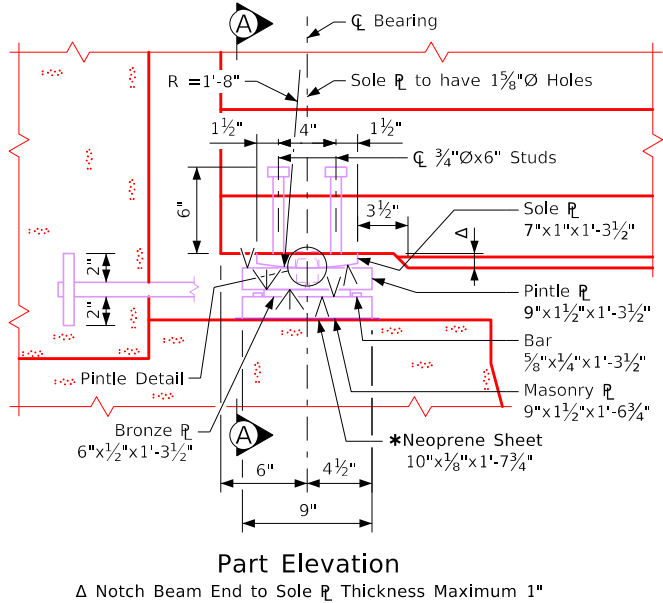
Sole plates shall comply with one of the following specifications:
ASTM A514 Grade B
ASTM A709 Grade HPS 70W

Design Note:

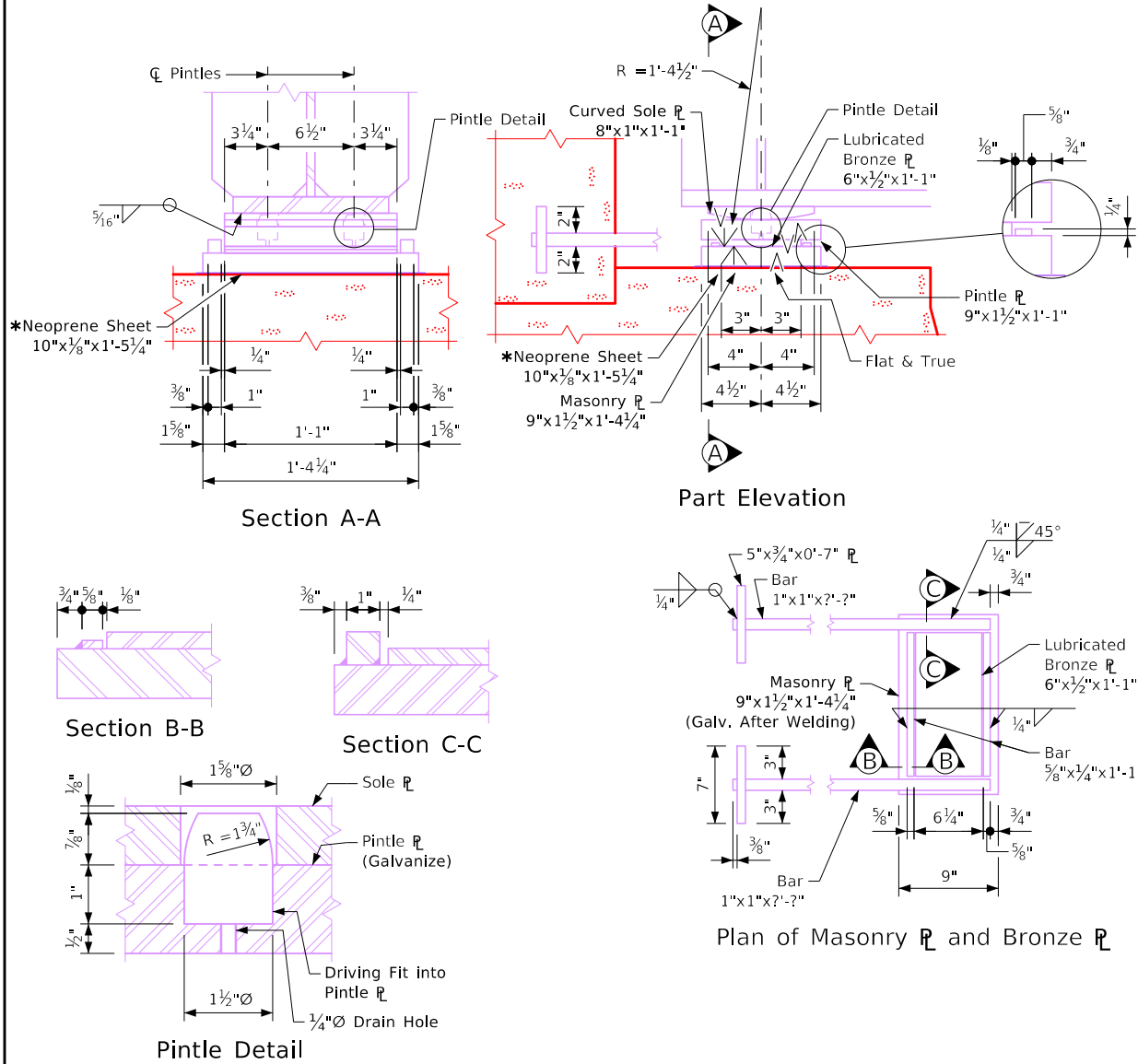
- Total vertical design load (DC+ DW + LL + IM) at service limit state = 177 k.
- Bearings as designed will allow up to 1.5 inches of movement each way of centerline of bearing.

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 "V" 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 plate, 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. The pintle and pintle plate shall be assembled prior to galvanizing. Welding shall be done before galvanizing.

Design Note:

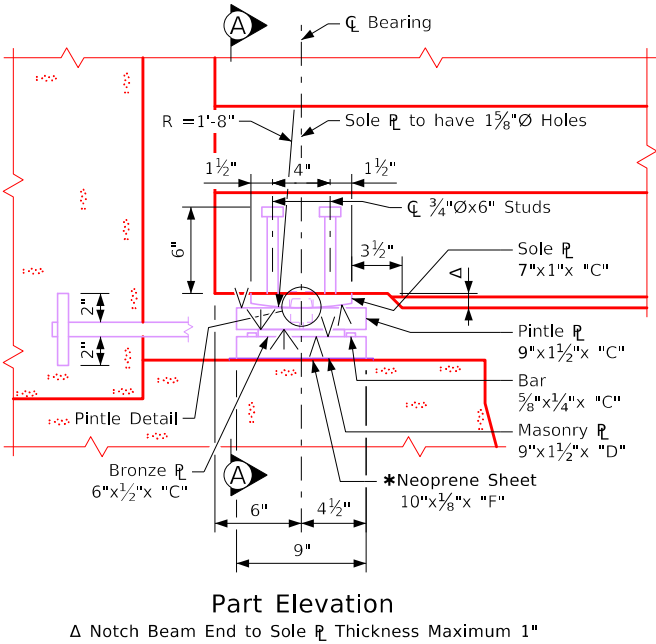
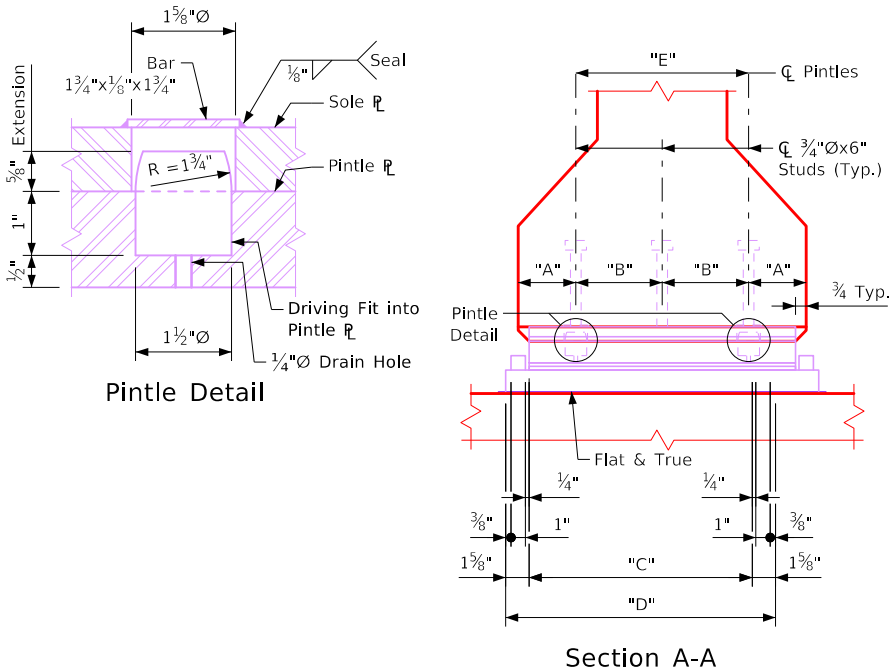
- Total vertical design load (DC+ DW + LL + IM) at service limit state = 153 k.
- Bearings as designed will allow up to 1.5 inches of movement each way of centerline of bearing.

Masonry Plate / Bronze Bearing Assembly

Structural Steel	
Weight	? lbs.
Includes Curved Sole Plate	
Note: Structural Steel weight is included on the Summary Quantities Sheet.	

Stub Abutment Bearing Details

Correction 05-14: Added Weight Table & Titles/Descriptions to Agree with Summary Quantities Sheet. Added Note Referring to Summary Quantities Sheet.
Issued 03-08.
Beams.dgn - 4541A - This Sheet Re-Issued 04-2024. Sheet Format Update.



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, 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 pintle and pintle plate shall be assembled prior to galvanizing. The surface of pintle plate in contact with bronze bearing plate shall be smooth and free of projections due to galvanizing.

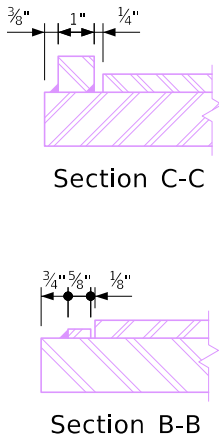
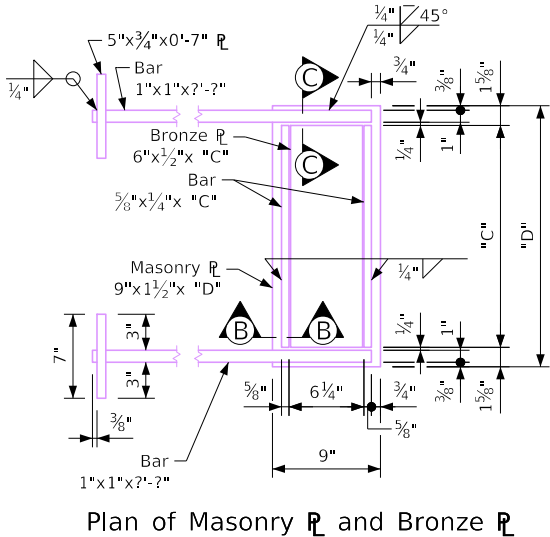
Sole plates are to be set in forms when beams are cast and the bottom of beams formed out as shown to exclude concrete.

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.

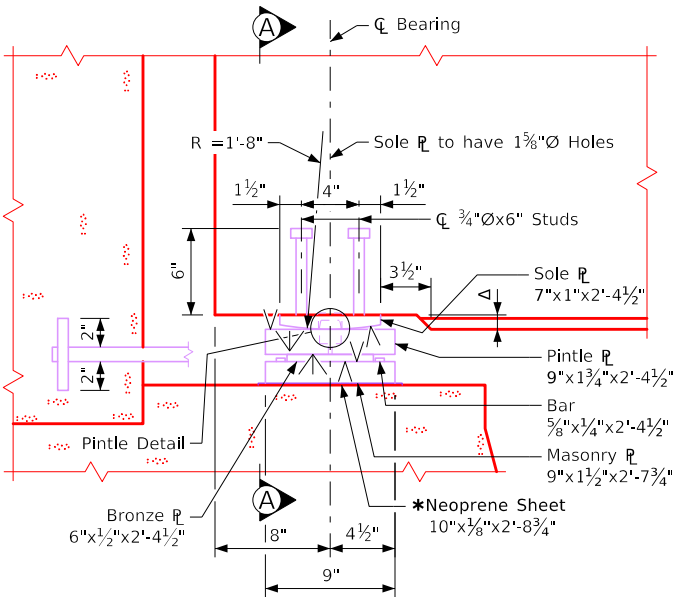
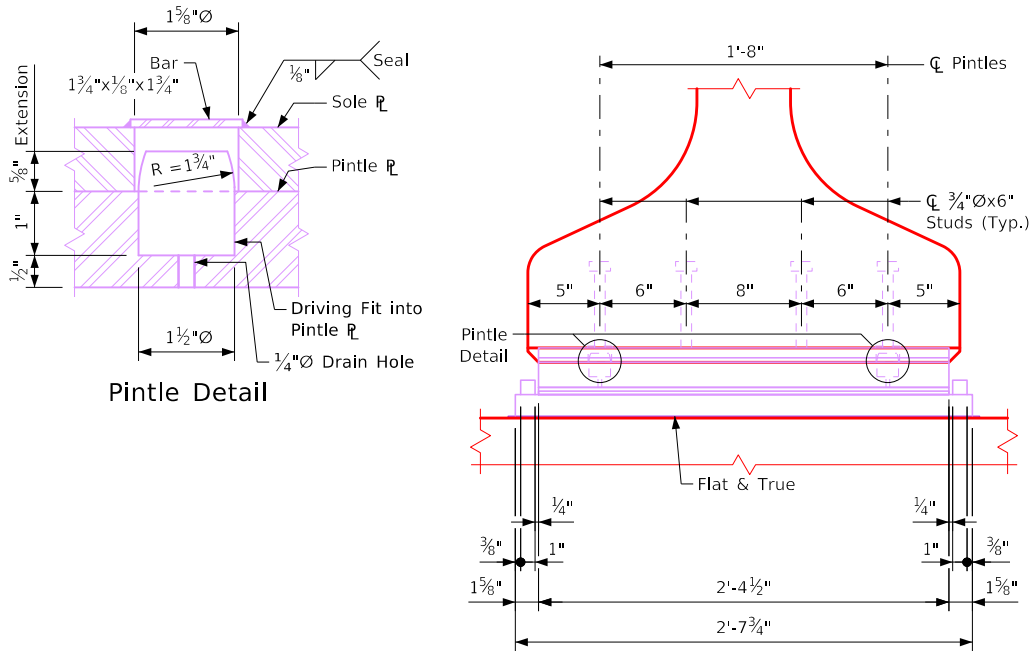
Masonry Plate / Bronze Bearing Assembly

Structural Steel	
Weight	? lbs.
Does Not Include Curved Sole Plate	
Note: Structural Steel weight is included on the Summary Quantities Sheet.	

Stub Abutment Bearing Details

FILE NO.	ENGLISH	DESIGN TEAM	Stub Abut. Bearing Details - C & D PPCB Bridges	Standard Sheet 4541A	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:55:52 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Correction 05-14: Added Weight Table & Titles/Descriptions to Agree with Summary Quantities Sheet. Added Note Referring to Summary Quantities Sheet.
Issued 03-08.
Beams.dgn - 4541B - This Sheet Re-Issued 04-2024. Sheet Format Update.



Part Elevation

Δ Notch Beam End to Sole PL Thickness Maximum 1"

Abutment Bearing Notes:

The sliding surface of the bronze PL 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 PL shall be beveled $\frac{1}{8}"$.

Surfaces marked "V" shall be finished ANSI 250 and surfaces marked "V" shall be finished ANSI 125.

Masonry plates are to be set on a $\frac{1}{8}"$ 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, 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 pintle and pintle plate shall be assembled prior to galvanizing. The surface of pintle plate in contact with bronze bearing plate shall be smooth and free of projections due to galvanizing.

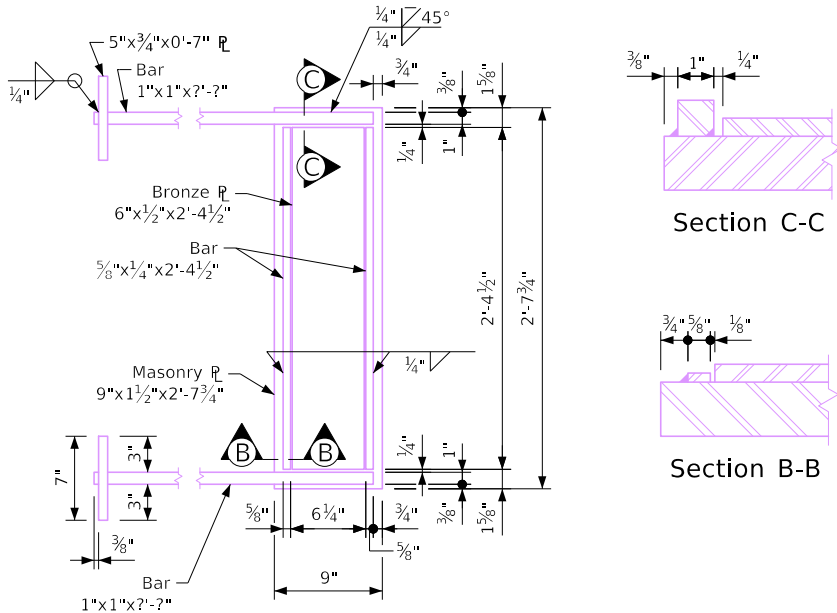
Sole plates are to be set in forms when beams are cast and the bottom of beams formed out as shown to exclude concrete.

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.



Plan of Masonry PL and Bronze PL

Section C-C

Section B-B

Pretensioned Prestressed Concrete Beam Abutment Bearing Details (BTB, BTC, BTD & BTE Beams)

*The $\frac{1}{8}"$ 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 PL / Bronze Bearing Assembly

Structural Steel

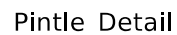
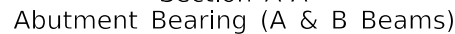
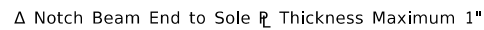
Weight ? lbs.

Does Not Include Curved Sole PL

Note: Structural Steel weight is included on the Summary Quantities Sheet.

Stub Abutment Bearing Details

FILE NO.	ENGLISH	DESIGN TEAM	Stub Abut. Bearing Details - BTB, BTC, BTD, BTE Beam PPCB Bridges	Standard Sheet 4541B	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:55:53 AM	10/2/2024	bkloss	pw:\(NTP\int1.dot.int.lan:P\WMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				



Allowable Pintle
P Thickness

Allow Thickness Inches	Maximum Service Vertical Load, k
1.5	83
2.0	147

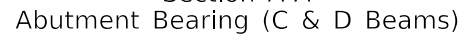
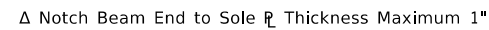
Abutment Bearing Notes:

Sole plates shall comply with one
ASTM A514 Grade B
ASTM A709 Grade HPS 70W

Structural Steel	
Weight	? lbs.

Note: Structural Steel weight is included on the Summary Quantities Sheet.

Stub Abutment Bearing Details

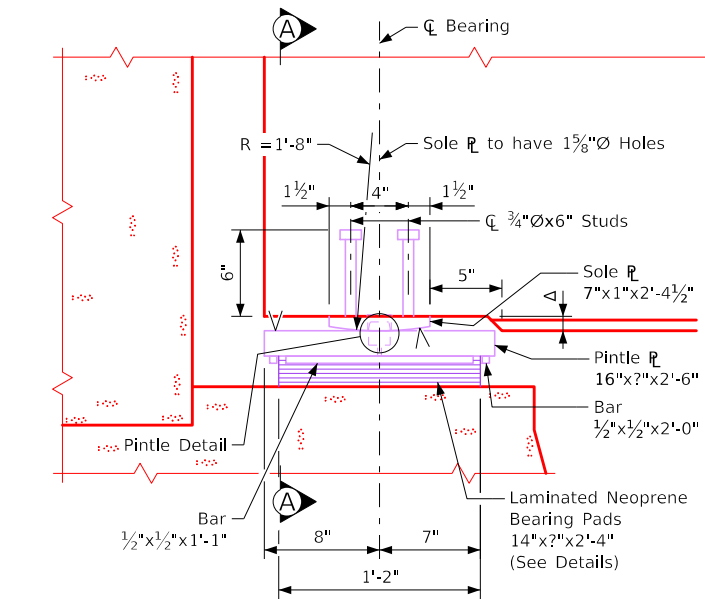


Allowable Pintle
 P_L Thickness

Variable Dimensions

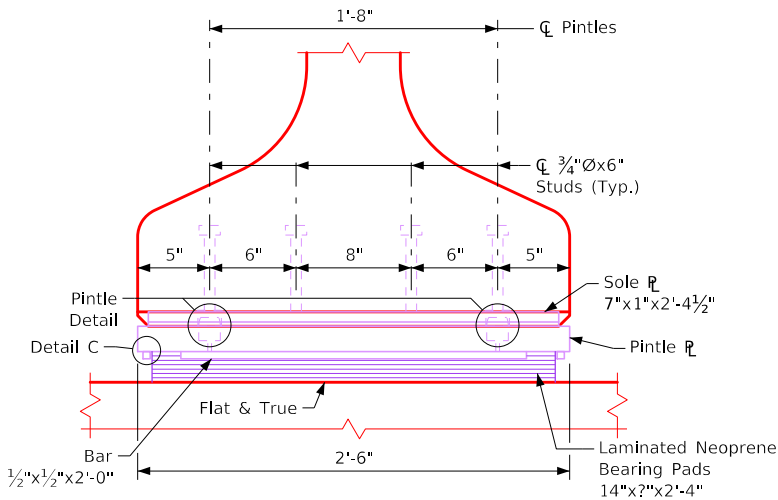
Bearing	Beam Bottom Flange Width
---------	-----------------------------

Correction 05-14: Added Weight Table & titles/descriptions to agree with Summary Quantities Sheet. Added note referring to Summary Quantities Sheet.
Issued 03-08.
Beams.dgn - 4541E - This Sheet Re-Issued 04-2024. Sheet Format Update.



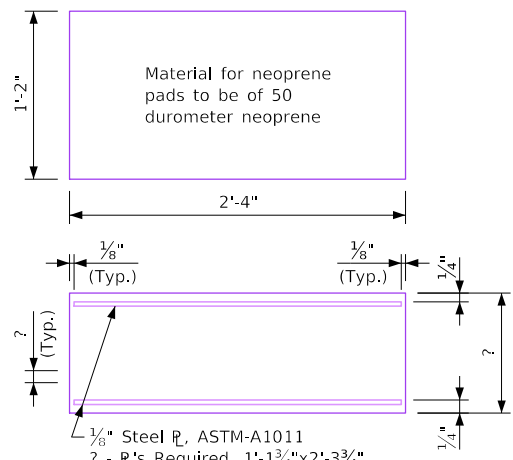
Part Elevation

Δ Notch Beam End to Sole Plate Thickness Maximum 1"

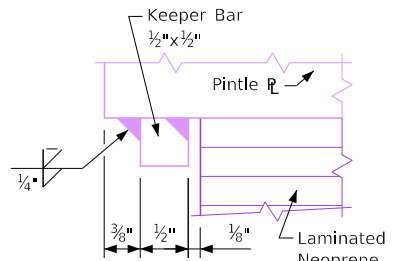


Section A-A

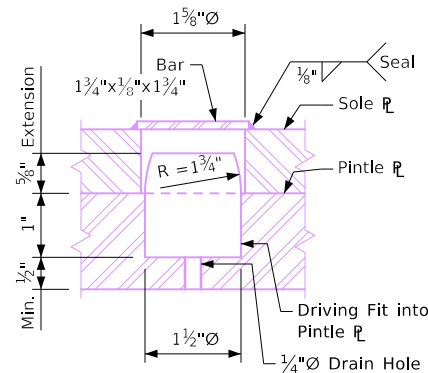
Abutment Bearing Bulb Tee Beams



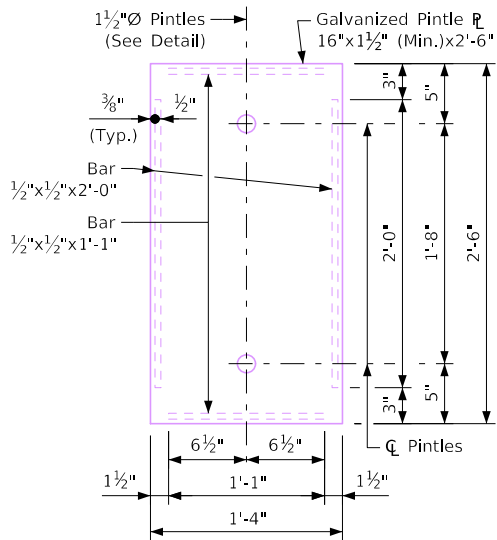
Laminated Neoprene Pad



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:

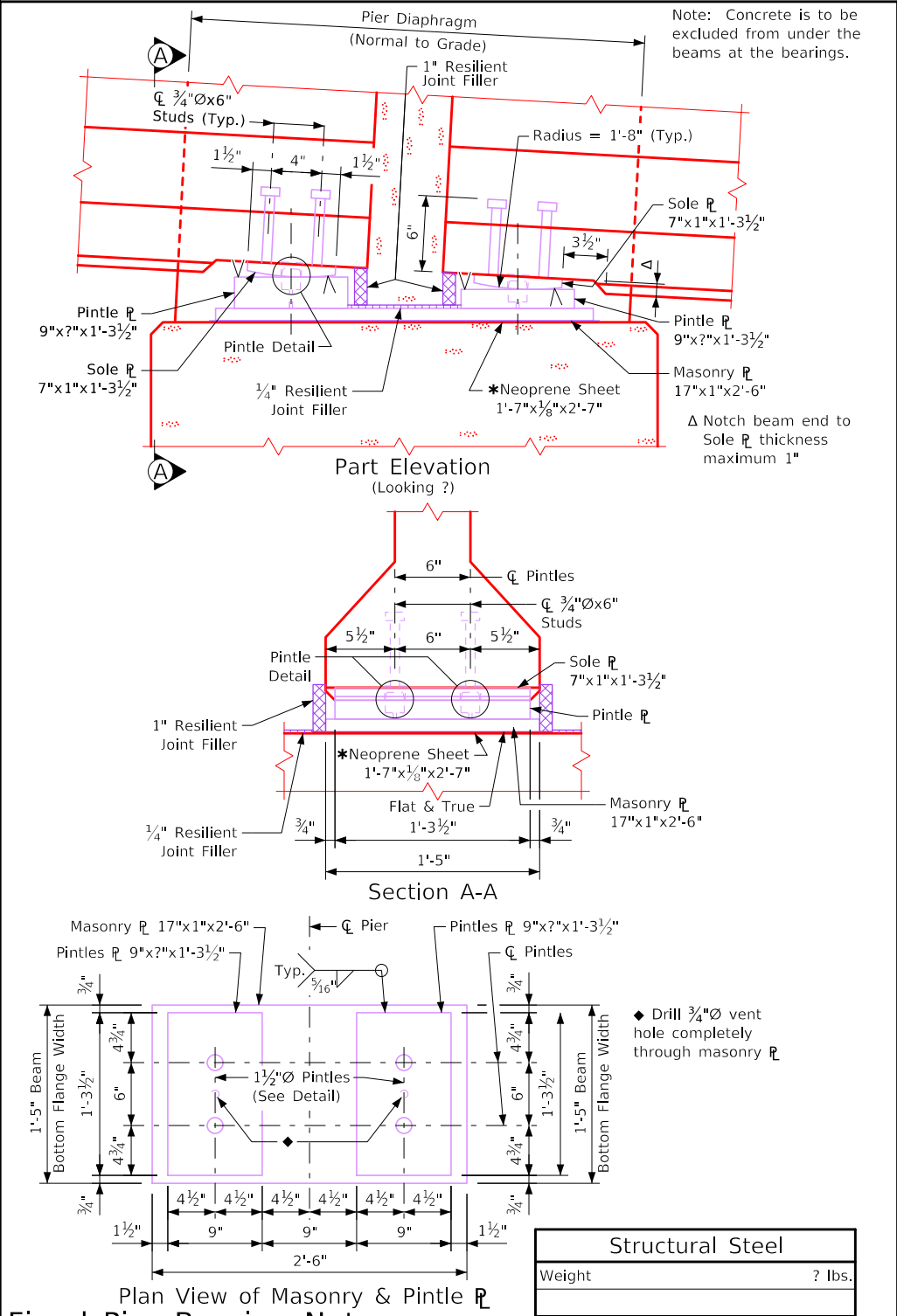
Surfaces marked "V" shall be finished ANSI 250.
Pintle plates are a part of the superstructure Structural Steel quantity.
Cost of anchored curved sole plates is to be included in the price bid for Prestensioned Prestressed Concrete Beams.
Cost of neoprene bearing pads shall be considered incidental to the bid item for Prestensioned Prestressed Concrete Beams.
The sole plates, pintle, and pintle plates shall be galvanized. All welding shall be completed prior to galvanizing. The pintle and pintle plate shall be assembled 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 specifications:
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.	

Stub Abutment Bearing Details

FILE NO.	ENGLISH	DESIGN TEAM	BTB, BTC, BTD, BTE Beam PPC Bridges - Stub Abutment Bearing Details	Standard Sheet 4541E	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:55:57 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Correction 05-14: Added Weight Table & Titles/Descriptions to Agree with Summary Quantities Sheet. Added Note Referring to Summary Quantities Sheet.
Issued 03-08.
Beams.dgn - 4541F - This Sheet Re-Issued 04-2024. Sheet Format Update.



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, pintle plates, and masonry plates shall be galvanized. The pintle and pintle plate shall be assembled prior to galvanizing. All welding shall be completed prior to galvanizing. The pintle and pintle plate shall be assembled 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.

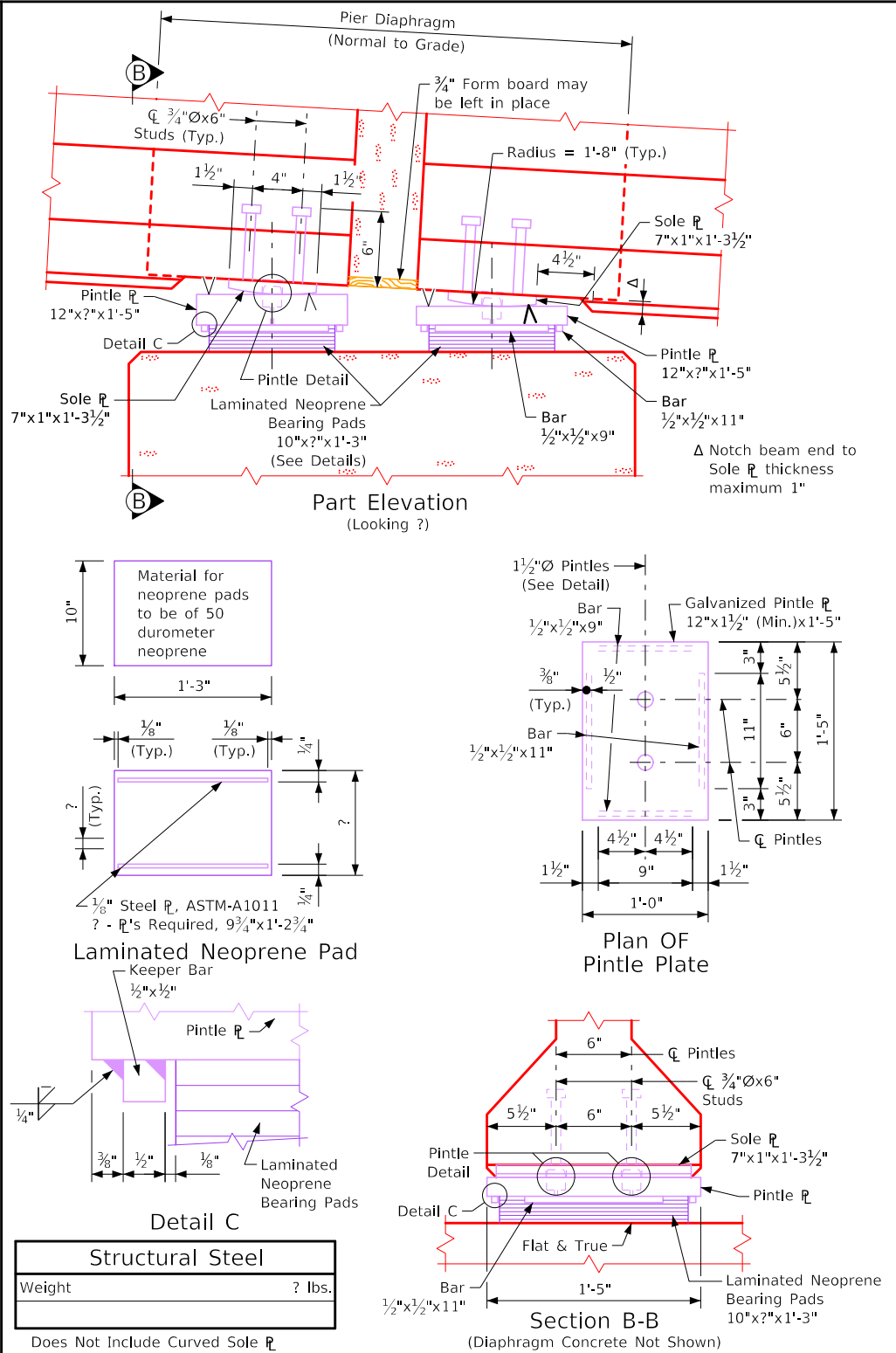
Sole plates shall comply with one of the following specifications:

ASTM A514 Grade B

ASTM A709 Grade HPS 70W

Fixed Pier (A & B Beams)

Masonry PL/Curved Sole PL 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 Beams bid item.

The sole plates, pintle, and pintle plates shall be galvanized. The pintle and pintle plate shall be assembled prior to galvanizing. 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.

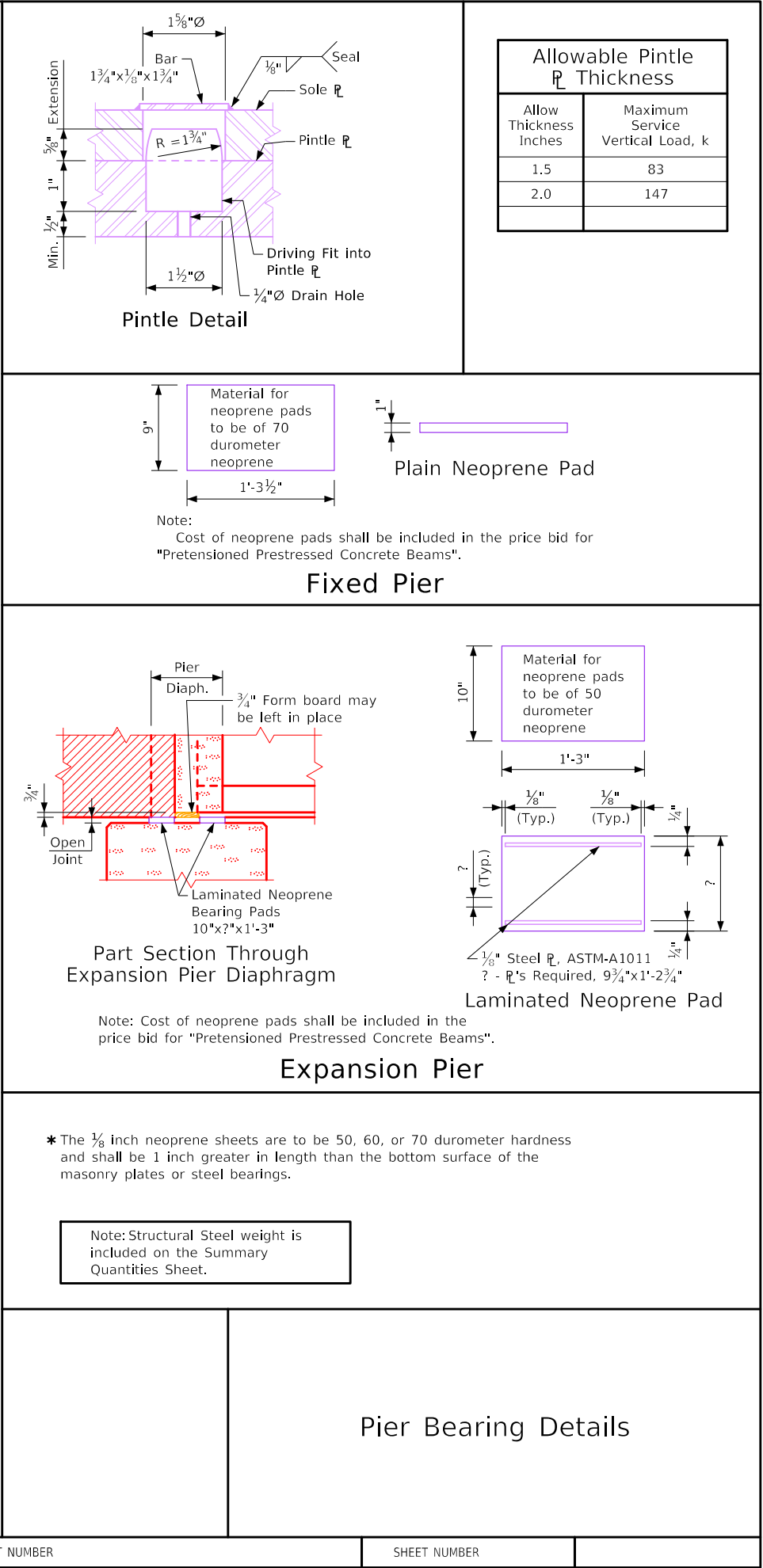
Sole plates shall comply with one of the following specifications:

ASTM A514 Grade B

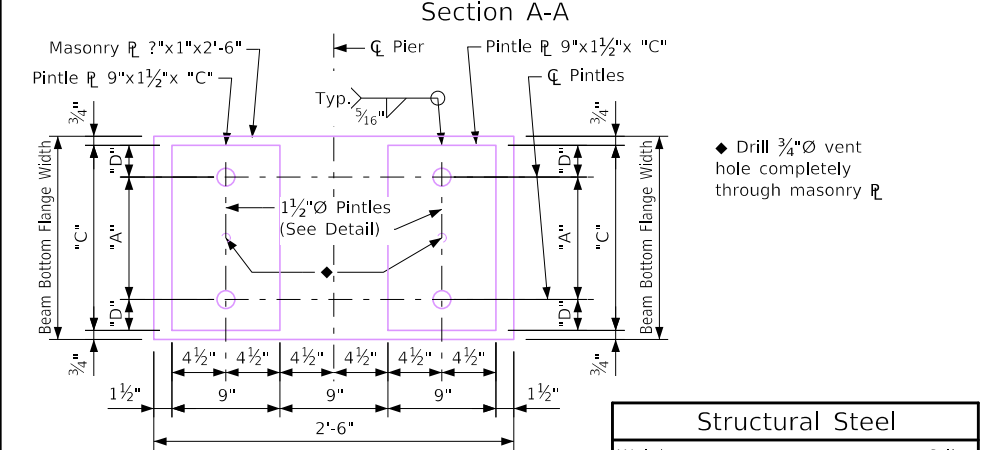
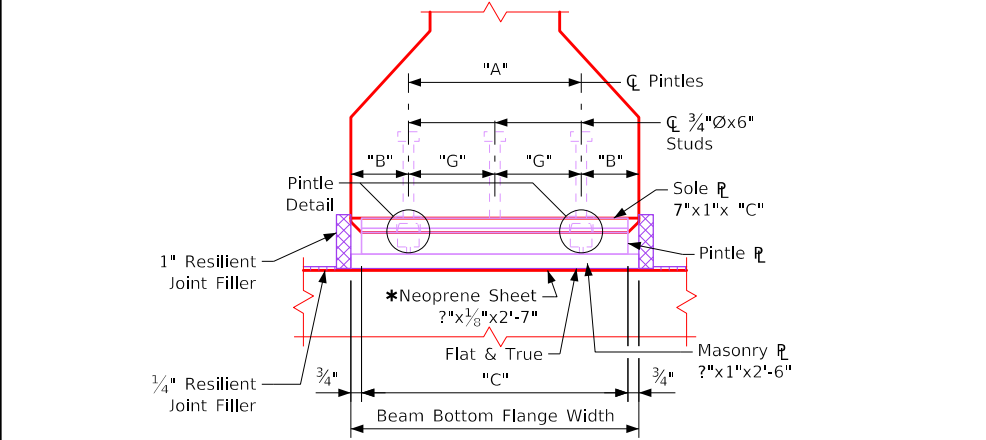
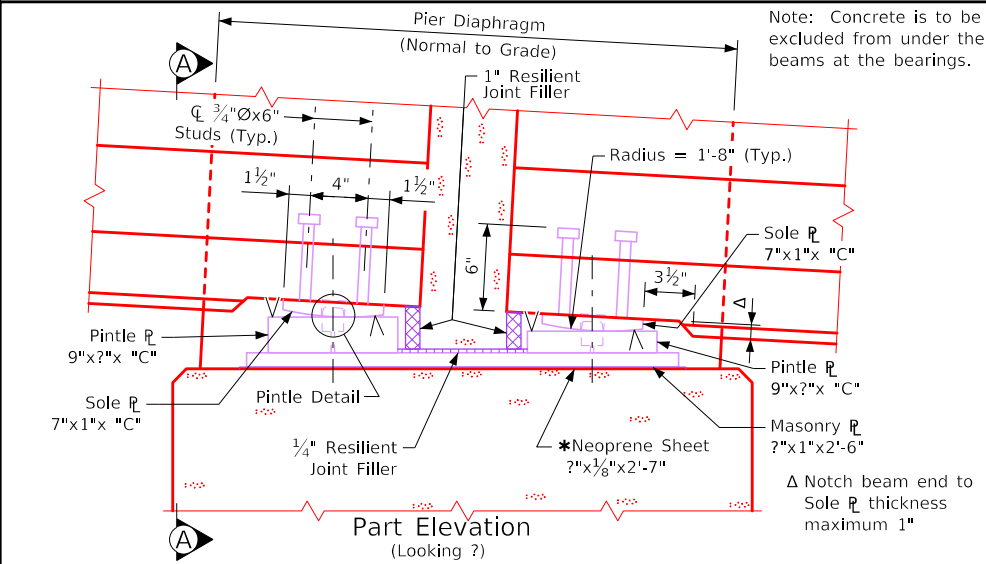
ASTM A709 Grade HPS 70W

Expansion Pier (A & B Beams)

Laminated Neoprene Pad / Curved Sole PL Assembly



Correction 05-14: Added Weight Table & Titles/Descriptions to Agree with Summary Quantities Sheet. Added Note Referring to Summary Quantities Sheet.
Issued 03-08.
Beams.dgn - 4541G - This Sheet Re-Issued 04-2024. Sheet Format Update.



Structural Steel	
Weight	? lbs.
Does Not Include Curved Sole PL	

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, pintle plates, and masonry plates shall be galvanized. The pintle and pintle plate shall be assembled prior to galvanizing. 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.

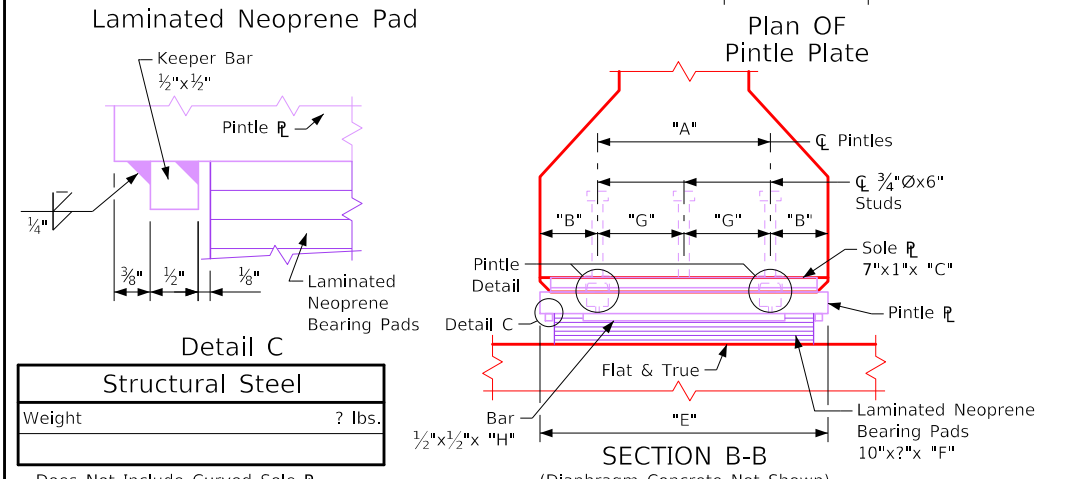
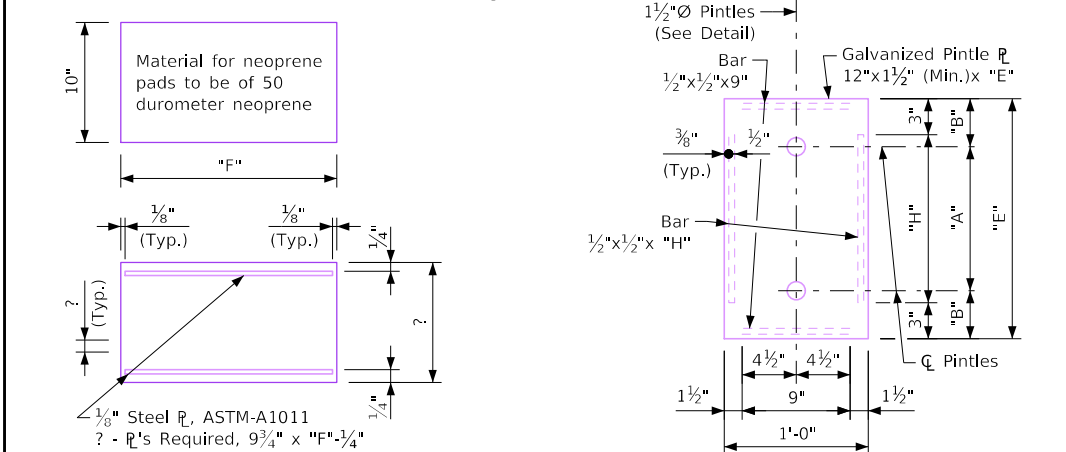
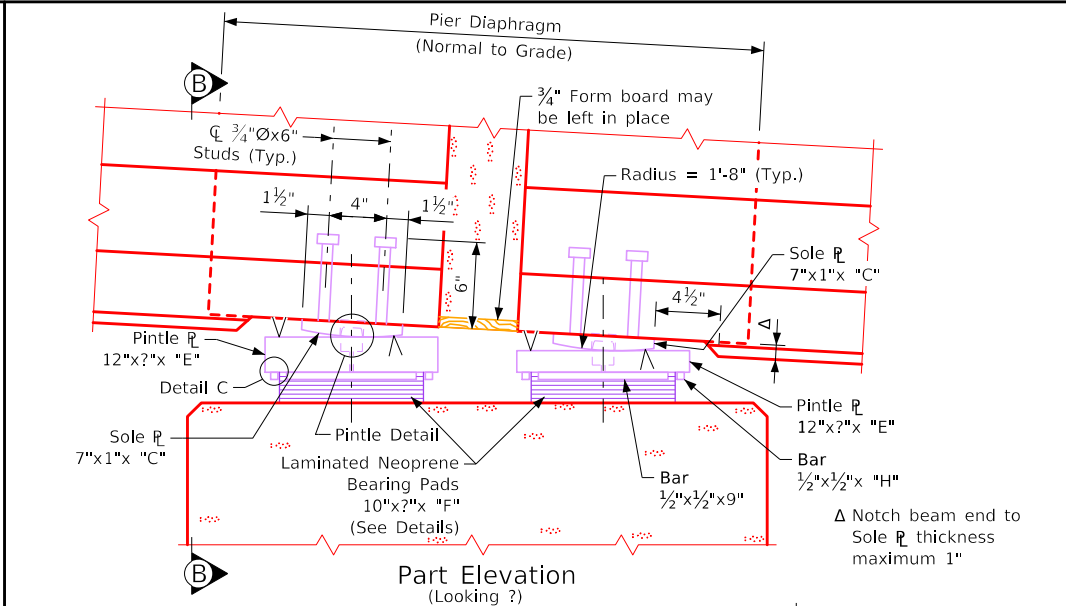
Sole plates shall comply with one of the following specifications:

ASTM A514 Grade B

ASTM A709 Grade HPS 70W

Fixed Pier (C & D Beams)

Masonry PL / Curved Sole PL 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 Beams bid item.

The sole plates, pintle, and pintle plates shall be galvanized. The pintle and pintle plate shall be assembled prior to galvanizing. 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.

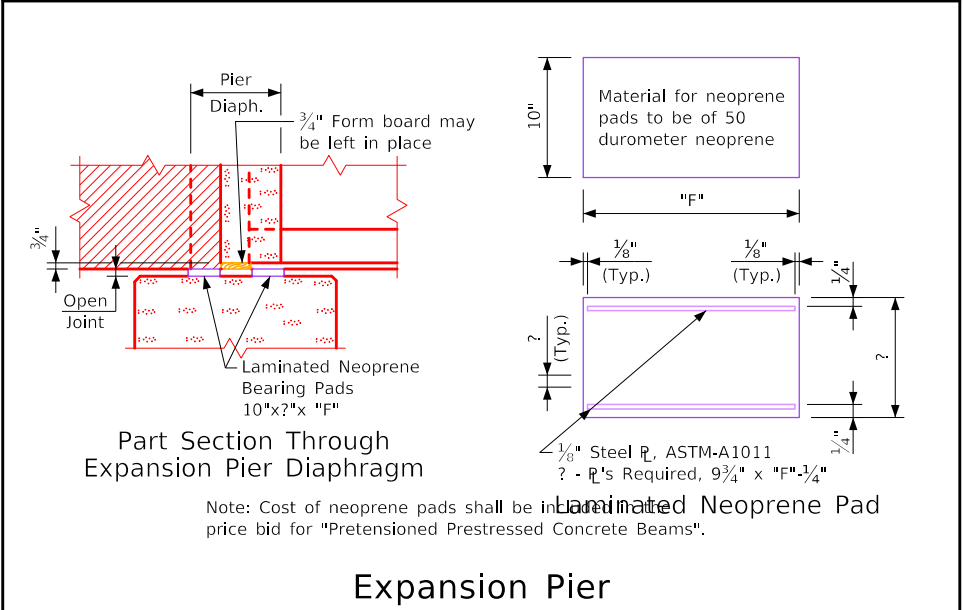
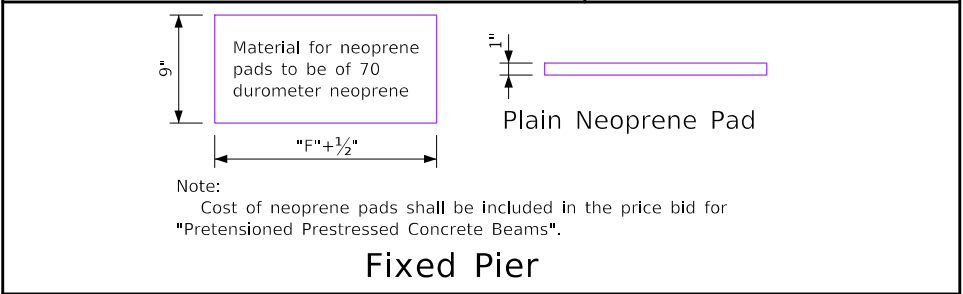
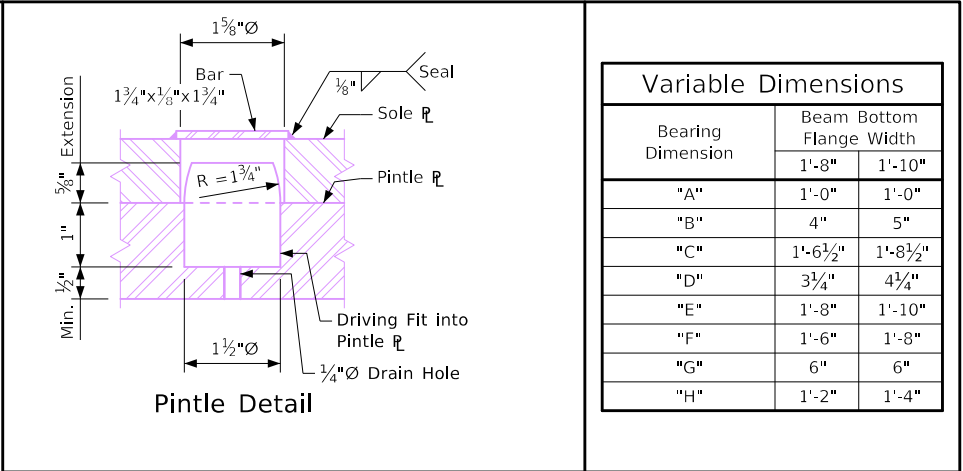
Sole plates shall comply with one of the following specifications:

ASTM A514 Grade B

ASTM A709 Grade HPS 70W

Expansion Pier (C & D Beams)

Laminated Neoprene Pad / Curved Sole PL Assembly

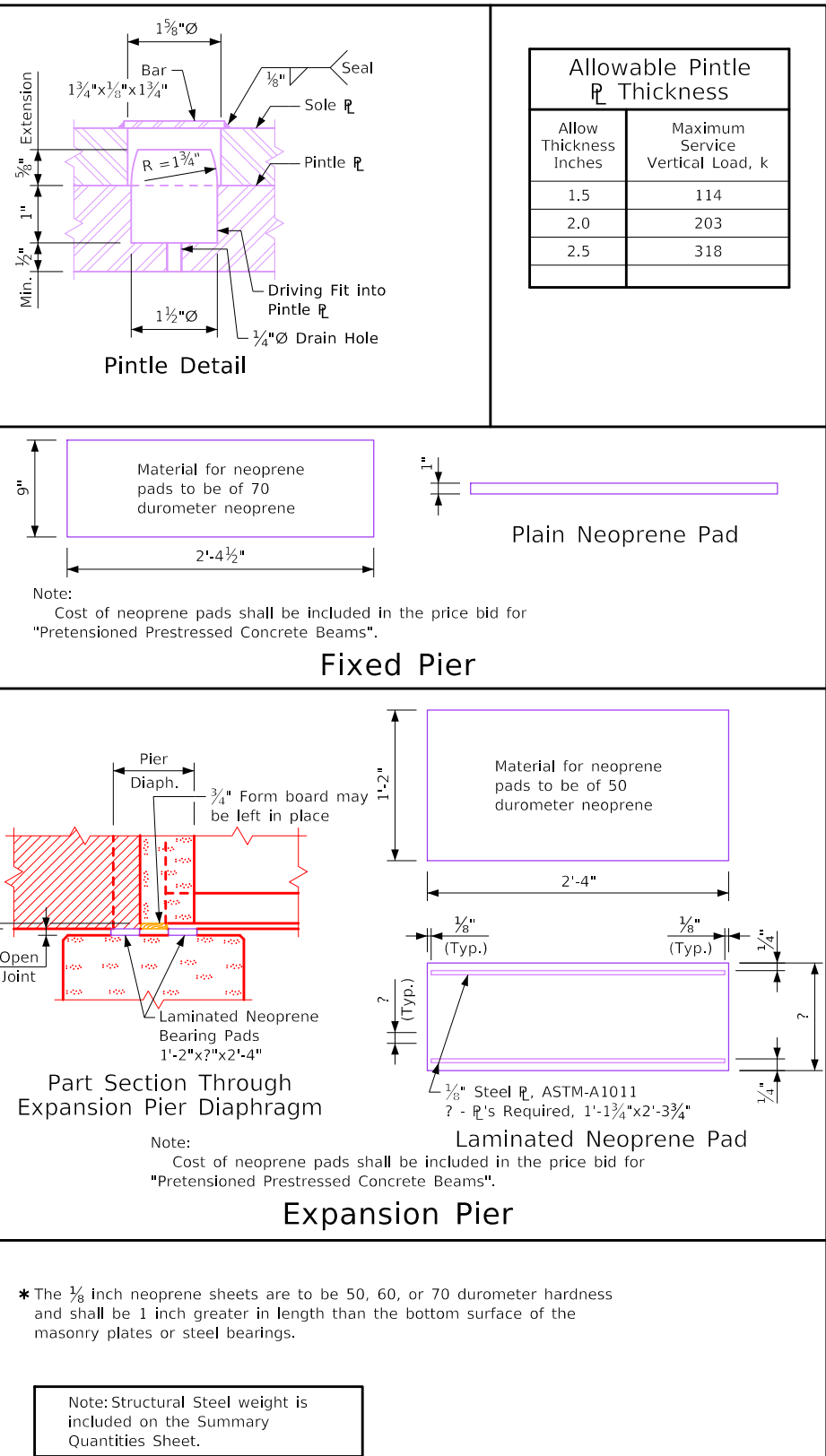
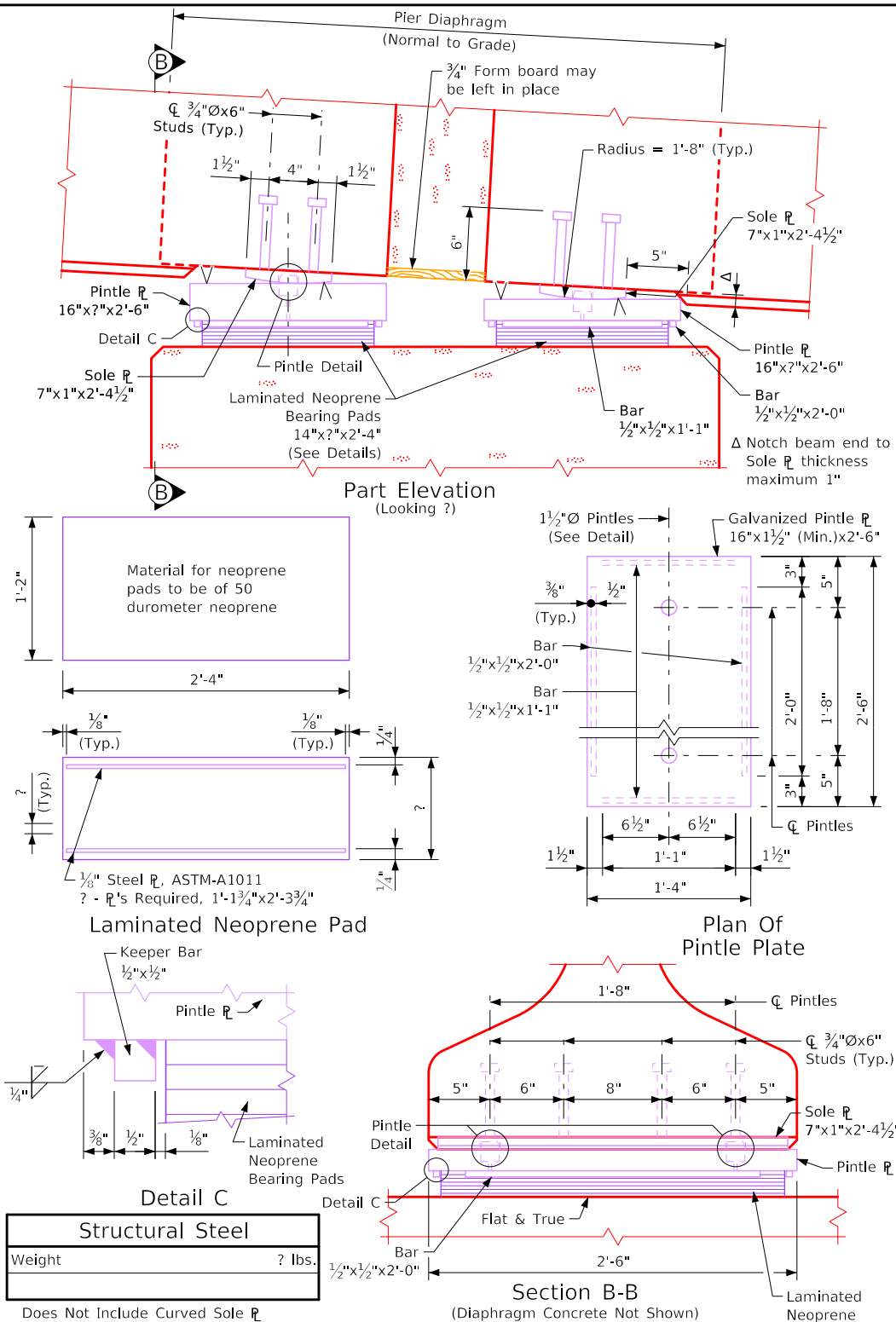
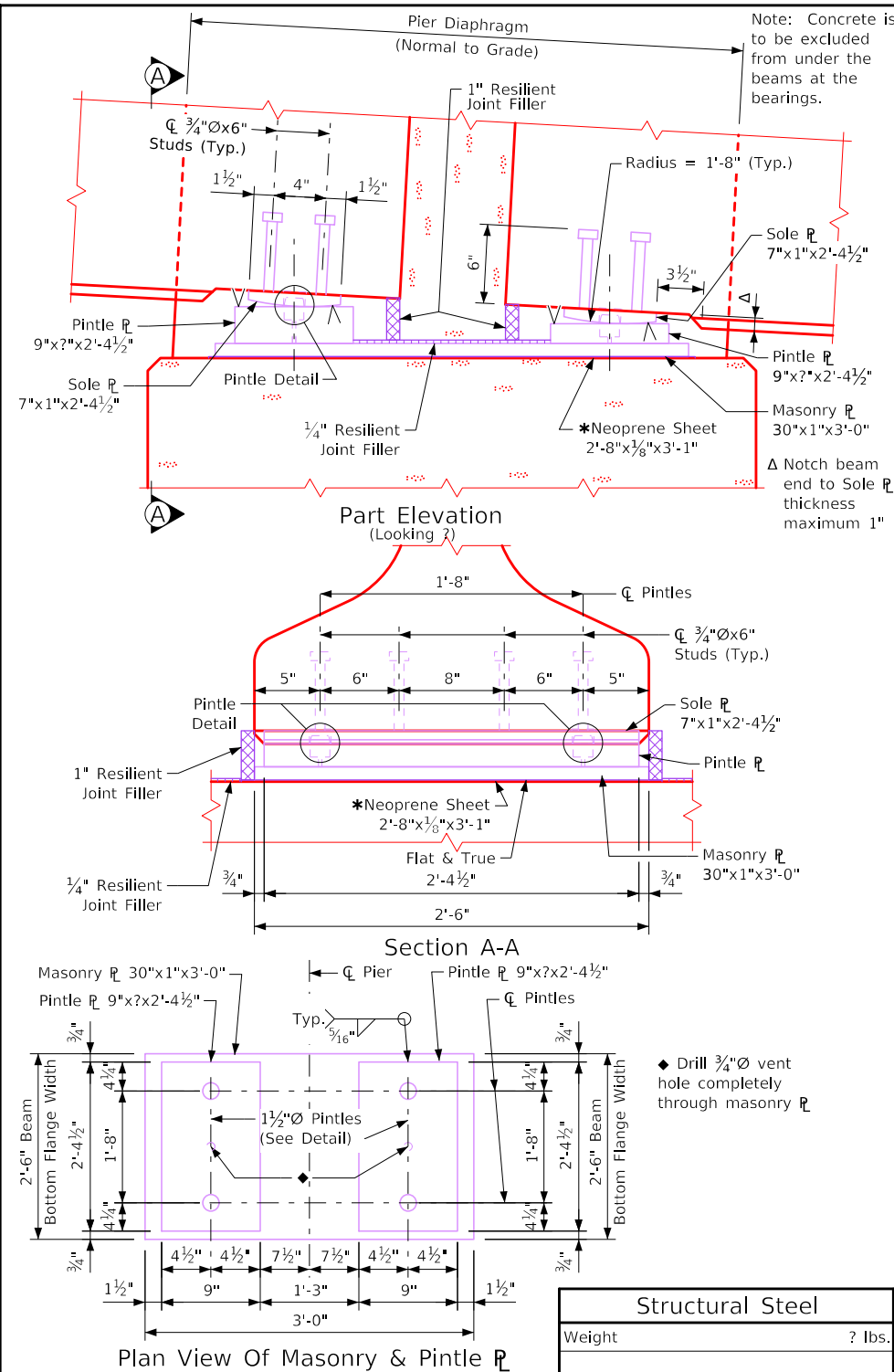


Allowable Pintle PL Thickness		
Allow Thickness Inches	Maximum Service Vertical Load, k	
	1'-8" Flange	1'-10" Flange
1.5	101	112
2.0	179	200
2.5	280	300

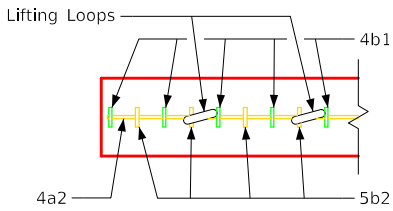
* The 1/8 inch neoprene sheets are to be 50, 60, or 70 durometer hardness and shall be 1 inch greater in length than the bottom surface of the masonry plates or steel bearings.

Note: Structural Steel weight is included on the Summary Quantities Sheet.

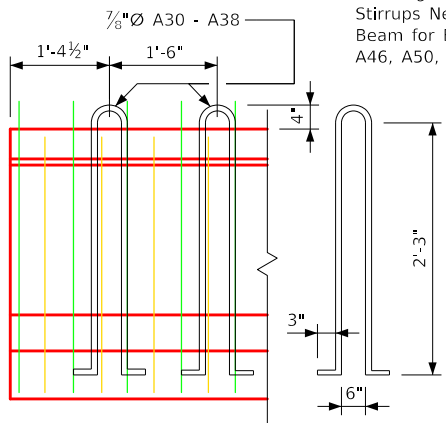
Pier Bearing Details		
FILE NO.	ENGLISH	DESIGN TEAM
8:55:59 AM	10/2/2024	bkloss
C & D Beam PPC Bridges - Pier Bearing Details		
Standard Sheet 4541G		
COUNTY		
PROJECT NUMBER		
SHEET NUMBER		



Revised 08-12: I.M. Reference Note for Sealing Beam Ends Distinguishes Between the Fabricator and Contractor.
Re-issued 09-06.
Revised 06-2024: Epoxy Coated 5b3 Bars Replace Uncoated 5b2 bars at Beam Ends in the "Reinforcing Bar List". Reinforcing Steel Quantities Updated for A42, A46, A50, and A55 Beams.
Loop Details being Provided on A42, A46, A50, and A55 Beam Sheets.
Revised 10-2024: Revised "Reinforcing Bar List" and "Reinforcing Steel weight in the "A Beam Data" table for A30, A34, and A46 beams, due to changes of 5b2, 3e, and 3d bars.
Beams.dgn - 4600 - This Sheet Re-issued 04-2024. Sheet Format Update.



*** See Sheets 4601-A42, 4601-A46, 4602-A50, and 4602-A55 for Lifting Loop Detail and Section Showing Placement of Stirrups Near End of Beam for Beams A42, A46, A50, and A55.



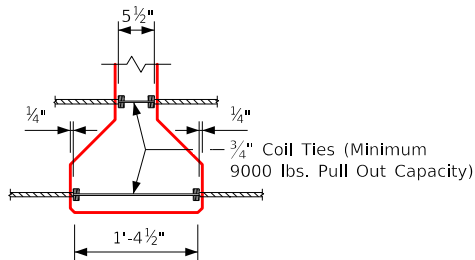
***Lifting Loop Detail

Alternate types may be substituted with the approval of the Engineer. Lifting loops are to be structural grade.

Lifting Loop And Overhang Table

Beams	Lifting Loops Each End	Beam Overhang (ft.)
A30-A42	2 - 7/8" Ø	*
A46-A55	2 - 1" Ø	*

* In accordance with Article 2407.03, K of the Standard Specifications.



Coil Tie Detail

Number and exact location of coil ties to be as detailed on specific bridge design.

ΔΔ 4b1 and 5b3 bars to be epoxy coated.

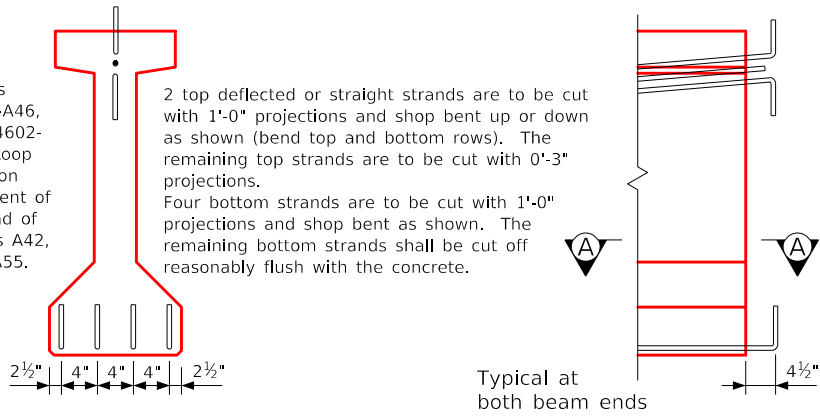
** Where deflecting strands interfere with placement, some in-place bending may be necessary.

Note: All mild reinforcing steel can be epoxy coated at Contractor's option without modification to bar length or details at no additional cost to the State.

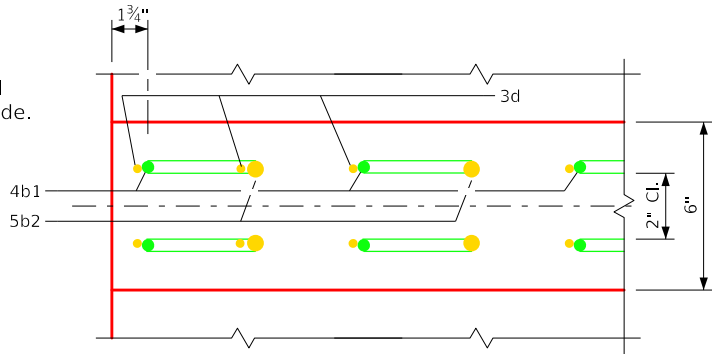
ΔΔ

**

ΔΔ



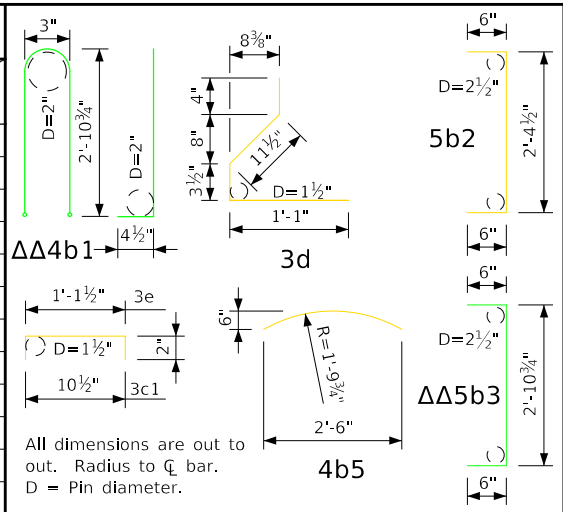
Strand Projection at Beam Ends When Embedded in Concrete End Diaphragms



***Section A-A Showing Placement of Stirrups Near End of Beam

Reinforcing Bar List

Beam	A30	A34	A38	A42	A46	A50	A55		
Span	30'-0"	34'-2"	38'-4"	42'-6"	46'-8"	50'-10"	55'-0"		
Bar	Shape	No.	Length	No.	Length	No.	Length	No.	Length
5a1		2	30'-9"	2	34'-11"	2	39'-1"	4	23'-4"
4a2		2	3'-3"	2	3'-3"	2	3'-3"	2	3'-3"
4b1		28	6'-8"	32	6'-8"	36	6'-8"	42	6'-8"
5b2		52	3'-5"	56	3'-5"	60	3'-5"	36	3'-5"
4b5		—	—	—	—	—	—	16	2'-9"
3c1		28	1'-3"	32	1'-3"	36	1'-3"	42	1'-3"
3d		108	2'-8"	120	2'-8"	132	2'-8"	152	2'-8"
3e		22	1'-6"	22	1'-6"	22	1'-6"	20	1'-6"
5b3		—	—	—	—	—	—	32	3'-11"



All dimensions are out to out. Radius to \bar{C} bar. D = Pin diameter.

A Beam Data

A Beam	Span Length C-C Bearing	Overall Beam Length (L)	Concrete Strength		Strand Size Dia. (in.)	Number of Strands		Total Initial Prestress (kips) ③	Hold Down Force (kips)	Camber (in.) ④		Deflection (in.) Δ _D		Permissible Maximum Spacing	Weight (tons)	Concrete (cu. yd.)	Reinforcing Steel (weight-lb.)
			f' _{ci} (ksi.)	f' _c (ksi.)		Straight	Deflected			At Release	After Losses	Immediate ① (elastic) Δ _I	Time ② (plastic) Δ _T	HL-93 Loading			
A30	30'-0"	31'-0"	4.5	5.0	0.60"	8	—	340	—	0.13"	0.24"	0.11"	0.03"	7'-6"	5.0	2.48	512
A34	34'-2"	35'-2"	4.5	5.0	0.60"	9	—	383	—	0.21"	0.39"	0.19"	0.05"	7'-6"	5.7	2.82	566
A38	38'-4"	39'-4"	4.5	5.0	0.60"	10	—	426	—	0.30"	0.55"	0.30"	0.07"	7'-6"	6.4	3.15	622
A42	42'-6"	43'-6"	4.5	5.0	0.60"	7	2	383	9.3	0.59"	1.09"	0.44"	0.11"	7'-6"	7.1	3.49	732
A46	46'-8"	47'-8"	6.0	7.0	0.60"	8	2	426	8.5	0.60"	1.10"	0.54"	0.14"	7'-6"	7.7	3.82	836
A50	50'-10"	51'-10"	6.0	7.0	0.60"	9	3	511	10.7	0.88"	1.62"	0.75"	0.19"	7'-6"	8.4	4.15	871
A55	55'-0"	56'-0"	6.0	7.0	0.60"	10	3	553	10.8	1.17"	2.17"	1.03"	0.26"	7'-6"	9.1	4.49	987

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 in.²) 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 I.M.570.

Bearings shall be as detailed on other design sheets.

Beams to be used in bridges made continuous by the poured in place deck, are to be at least 28 days old before the deck 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".

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.

Minimum concrete f'c (at 28 days) and minimum f'ci at release are located in the A Beam Data Table above.

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.

Holes must be cast in the web to accommodate the steel diaphragm attachments as detailed on the Steel Diaphragm Detail Sheet.

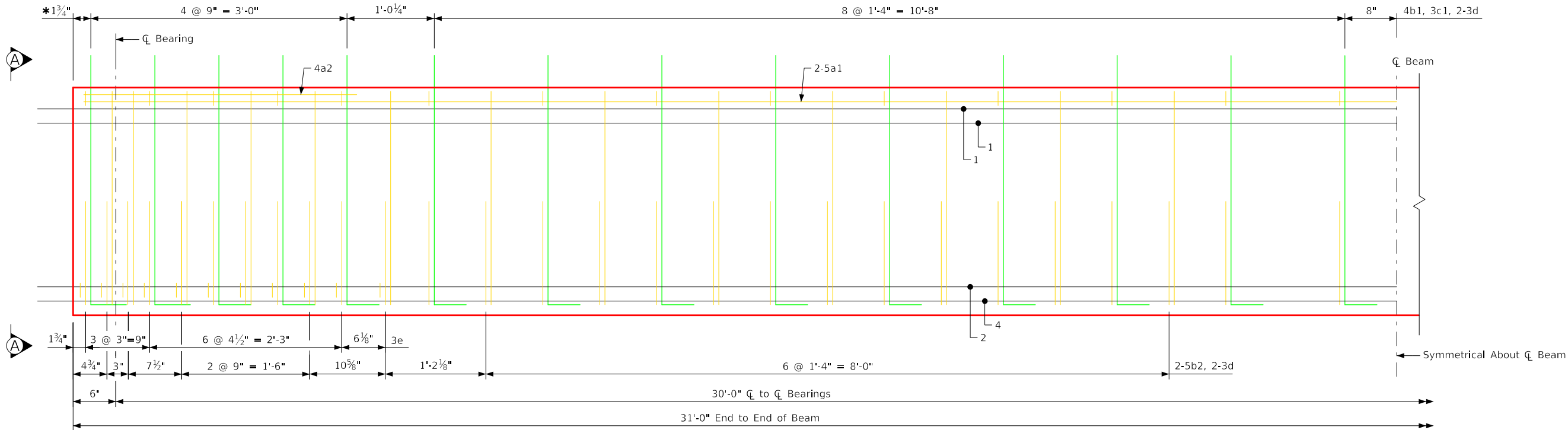
If sole plate is required for bearing, sole plate is to be set in forms when beam is cast and formed out below to exclude concrete as detailed on the Bearing Sheet.

If stub abutments are used, all strands at the ends of beams at stub abutments shall be cut off reasonably flush with the concrete.

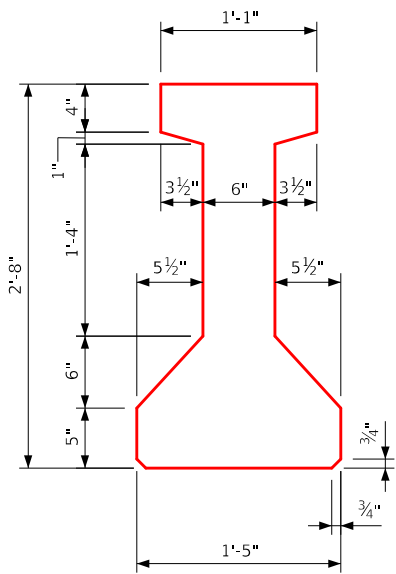
When expansion joints are used, concrete sealer shall be applied to the prestressed beam end sections. The sealing shall be in accordance with Materials I.M. 570 (Fabricator Application) and I.M. 491.12 (Contractor Application).

A Beam - Data Details

Revised 10-2024: Added one extra set of 5b2, 3e, and 3d bars at each beam end and revised rebar spacing.
Beams.dgn - 4601-A30 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4601).



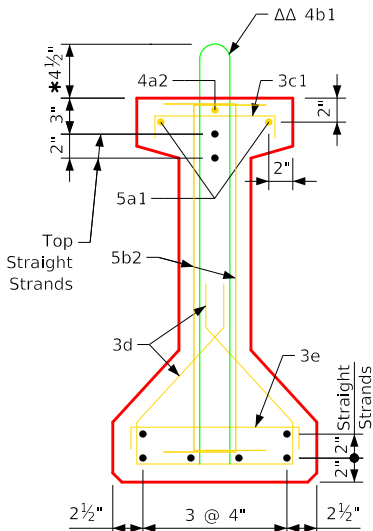
A30 Beam



"A" Beam
Cross Section

Area = 311.5 in.²
 $\bar{y}_b = 14.05$ in.
 $I = 34,082$ in.⁴

Beam Section
Properties



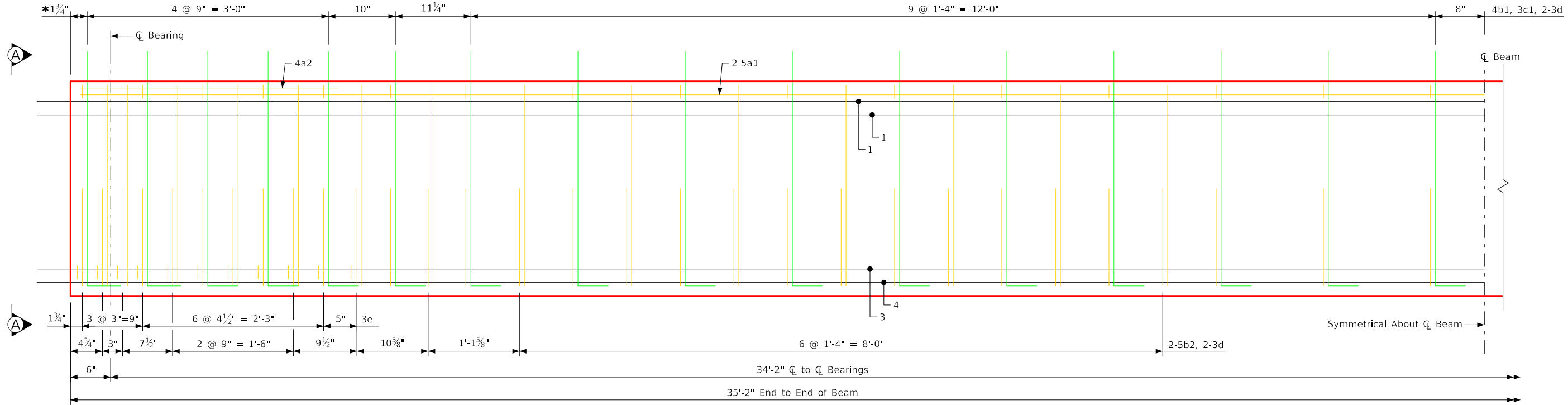
View A-A

Note: Bars 3d and 5b2 are to be placed in pairs.

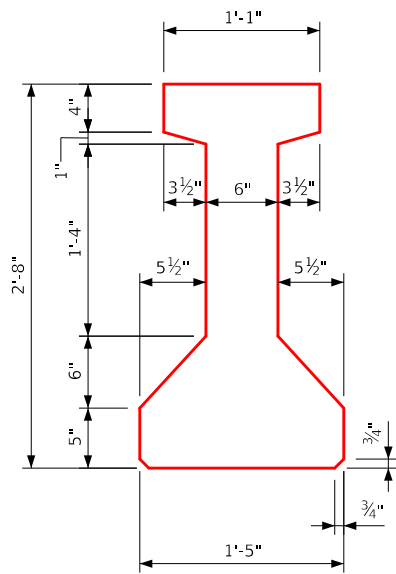
* Keep
ΔΔ Epoxy Coated Bars

A30 Beam Details

Revised 10-2024: Added one extra set of 5b2, 3e, and 3d bars at each beam end and revised rebar spacing.
Beams.dgn - 4601-A34 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4601).

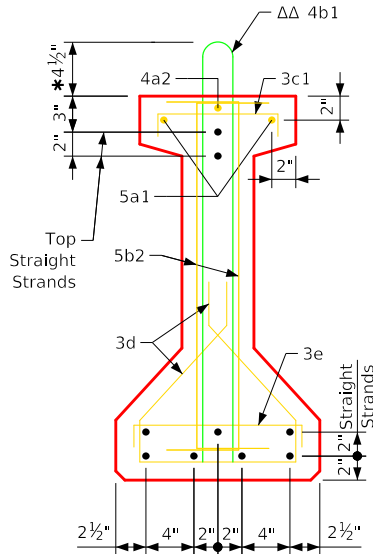


A34 Beam



"A" Beam
Cross Section

Area = 311.5 in.²
 $\bar{y}_b = 14.05$ in.
 $I = 34,082$ in.⁴
**Beam Section
Properties**



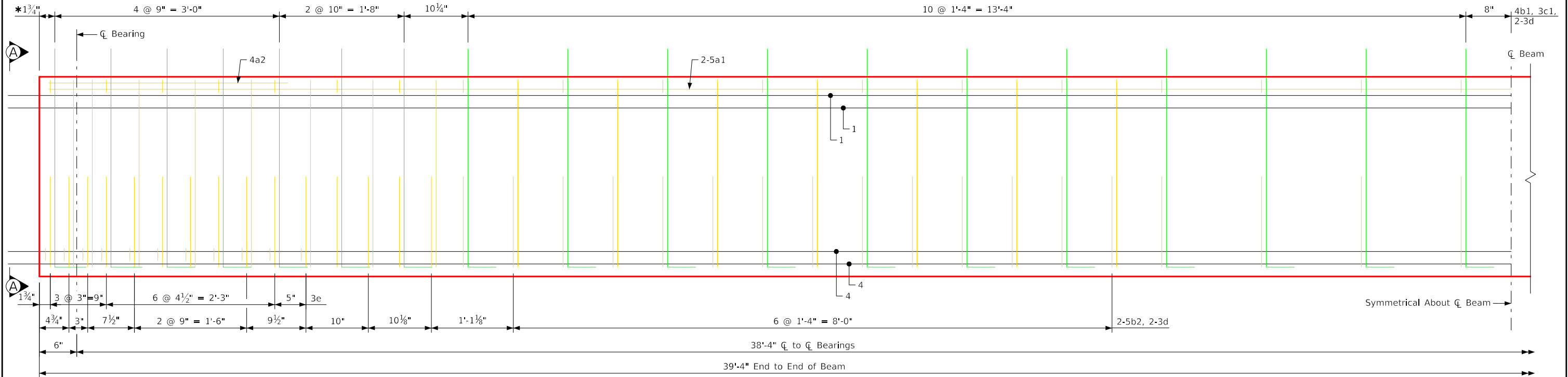
View A-A

Note: Bars 3d and 5b2 are to be placed in pairs.

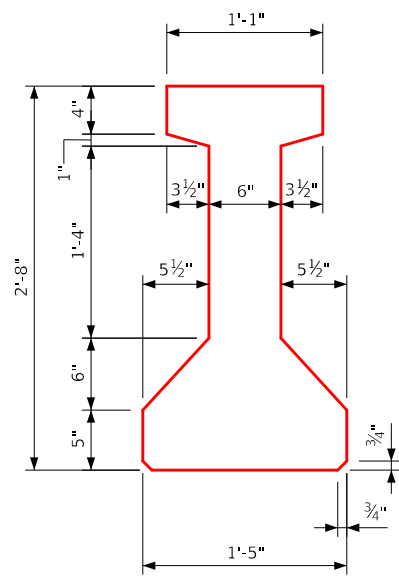
* Keep
ΔΔ Epoxy Coated Bars

A34 Beam Details

Beams.dgn - 4601-A38 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4601).

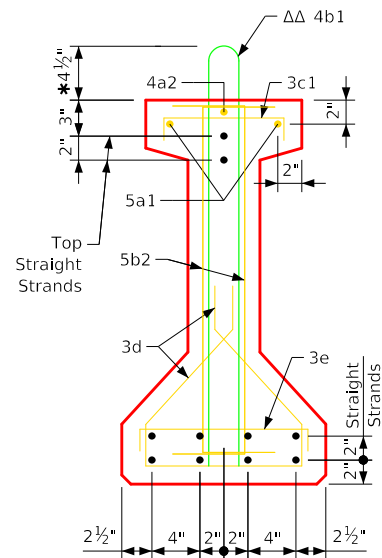


A38 Beam



Beam Section Properties

Area = 311.5 in.²
 \bar{y}_b = 14.05 in.
 I = 34,082 in.⁴



View A-A

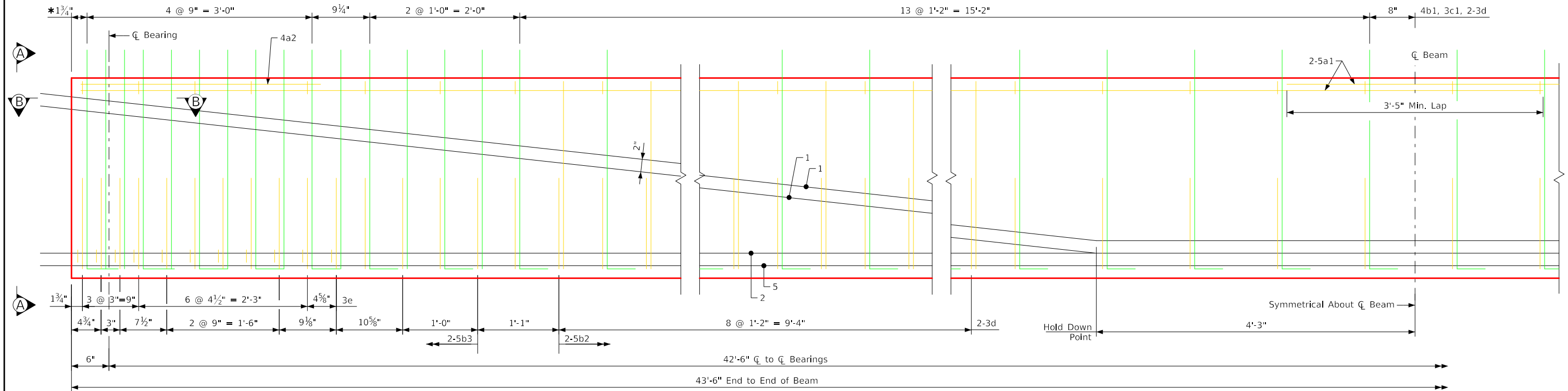
Note: Bars 3d and 5b2 are to be placed in pairs.

* Keep
 $\Delta\Delta$ Epoxy Coated Bars

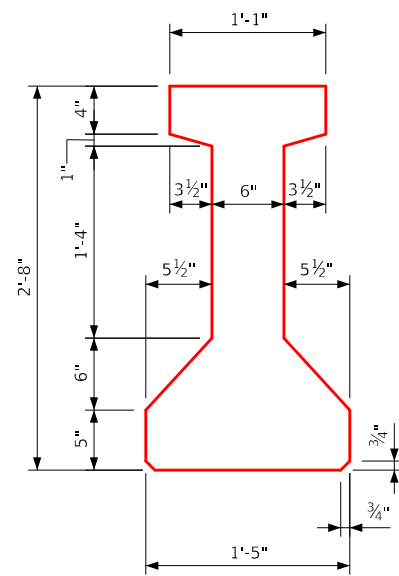
A38 Beam Details

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Revised 05-09: A42 Bar Spacings were Changed.
Revised 06-2024: Epoxy Coated 5b3 Bars Replace Uncoated 5b2 Bars at Beam Ends. Revised Lifting Loop Details Added.
Beams.dgn - 4601-A42 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4601).



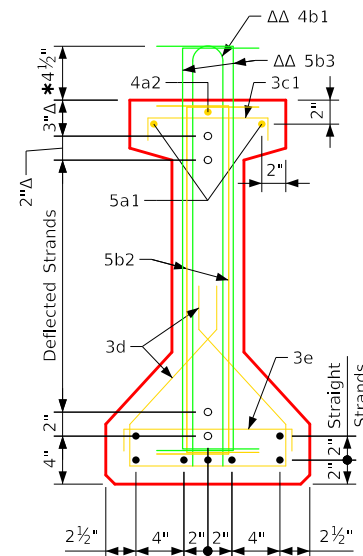
A42 Beam



"A" Beam
Cross Section

Area = 311.5 in.²
 $\bar{y}_b = 14.05$ in.
 $I = 34,082$ in.⁴

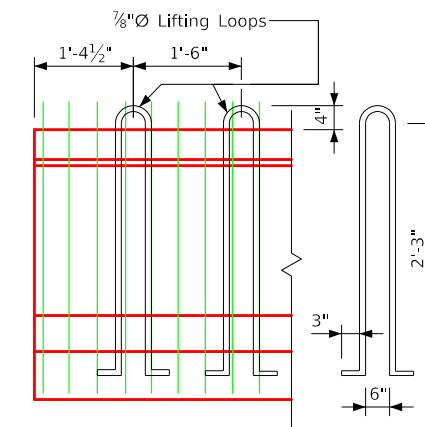
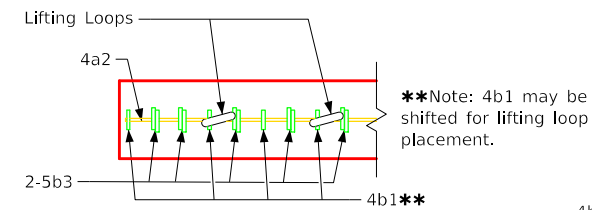
Beam Section
Properties



View A-A

Note: Bars 3d, 5b2, and 5b3 are to be placed in pairs.

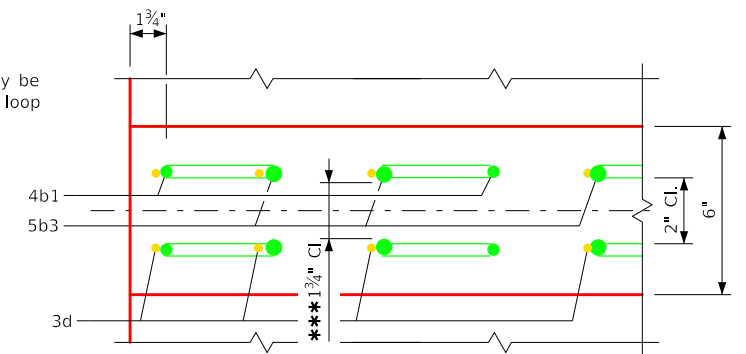
- Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- $\Delta\Delta$ Epoxy Coated Bars



Lifting Loop Detail

Alternate types may be substituted with the approval of the Engineer. Lifting loops are to be structural grade.

Note: Dimensions for the location of the deflected strands are at \bar{C} beam and end of beam.

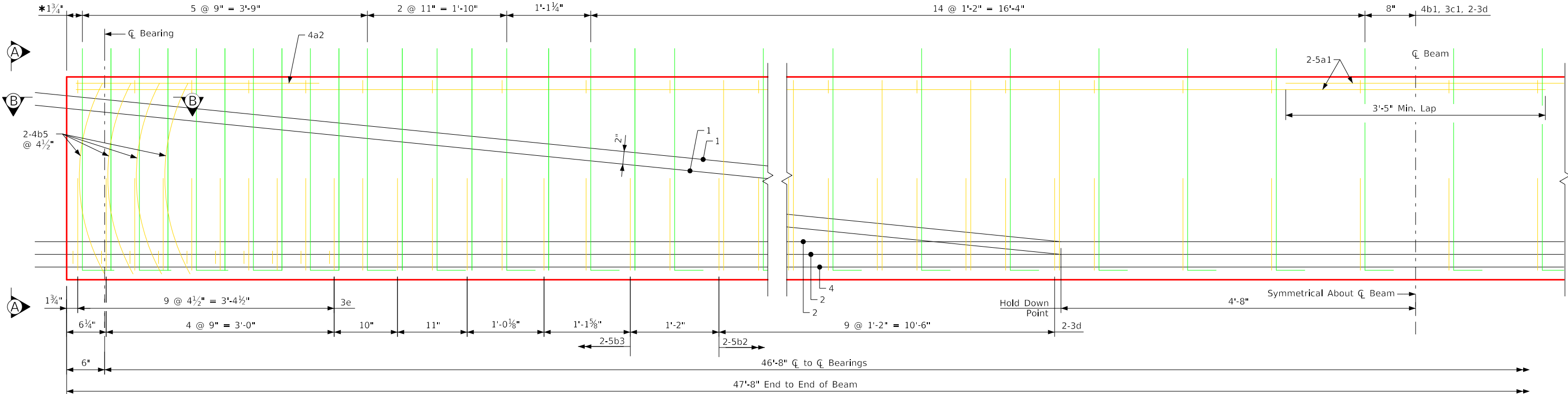


Section B-B
(Showing Placement Of Stirrups Near End Of Beam)
*** $1\frac{3}{4}"$ CI for 5b3 bars.

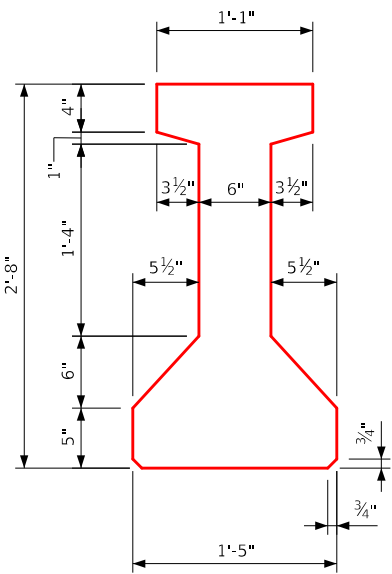
A42 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"A" Beam - 42'-6" Span	Standard Sheet 4601-A42	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:06 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revised 05-09: A46 Bar Spacings were Changed.
Revised 06-2024: Epoxy Coated 5b3 Bars Replace Uncoated 5b2 Bars at Beam Ends. Revised Lifting Loop Details Added.
Revised 10-2024: Removed one set of 5b2, 3e, and 3d bars from each beam end and revised rebar spacing.
Beams.dgn - 4601-A46 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4601).



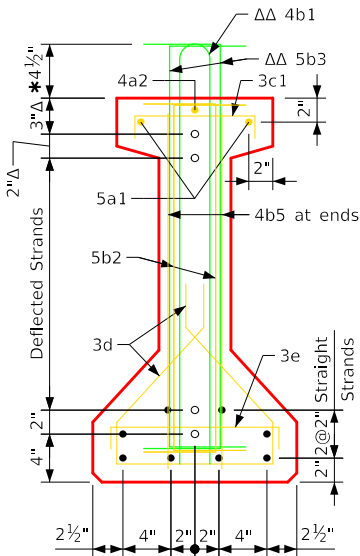
A46 Beam



"A" Beam
Cross Section

Area = 311.5 in.²
 $\bar{y}_b = 14.05$ in.
 $I = 34,082$ in.⁴

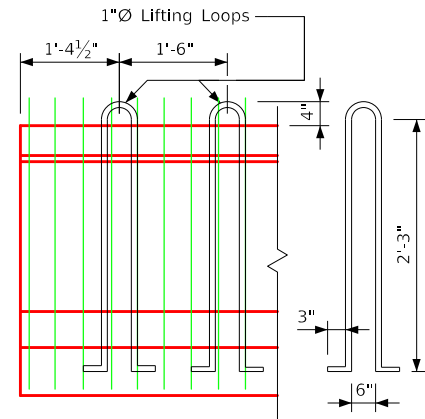
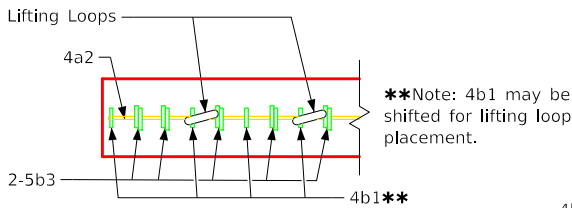
Beam Section
Properties



View A-A

Note: Bars 3d, 4b5, 5b2, and 5b3 are to be placed in pairs. Tie 4b5 bars to 4b1 & 5b3.

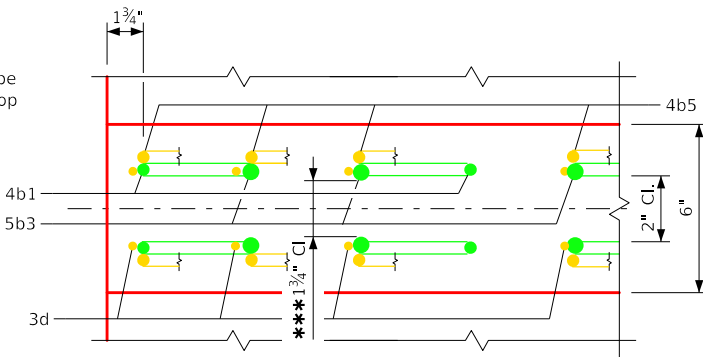
- Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars



Lifting Loop Detail

Alternate types may be substituted with the approval of the Engineer. Lifting loops are to be structural grade.

Note: Dimensions for the location of the deflected strands are at CL beam and end of beam.



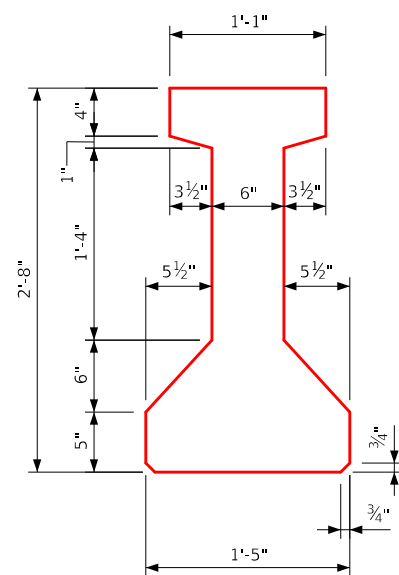
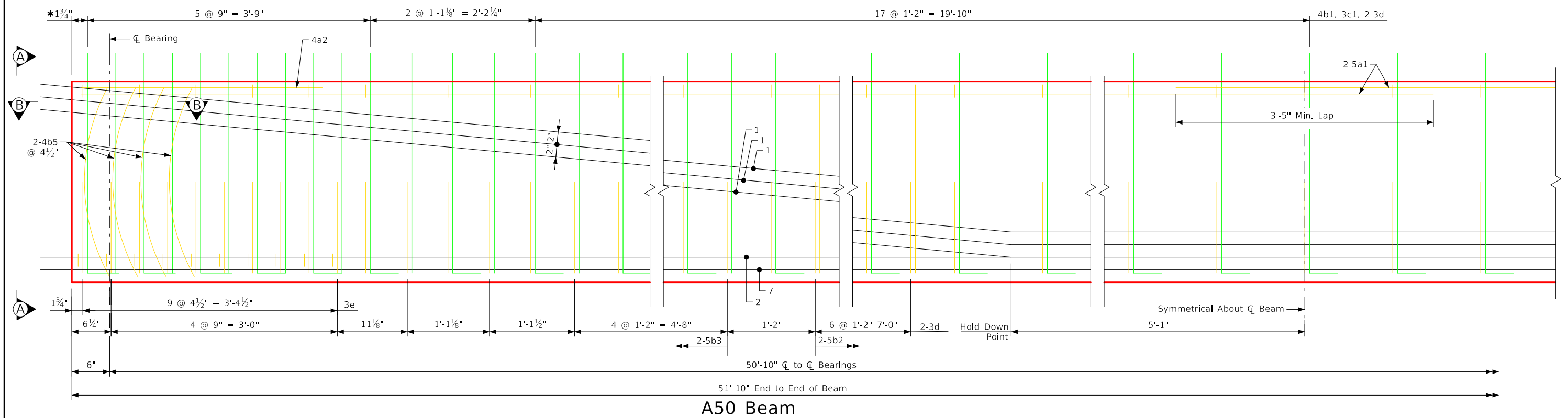
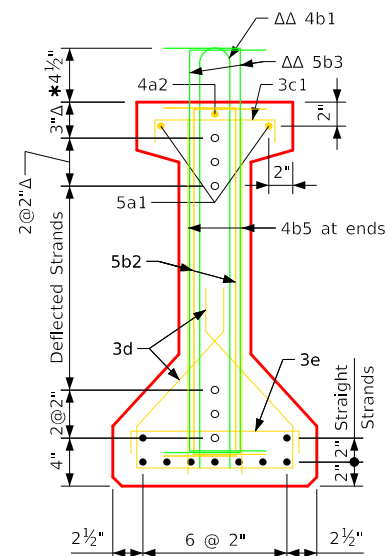
Section B-B

(Showing Placement Of Stirrups Near End Of Beam)

***1 3/4" CL for 5b3 bars.

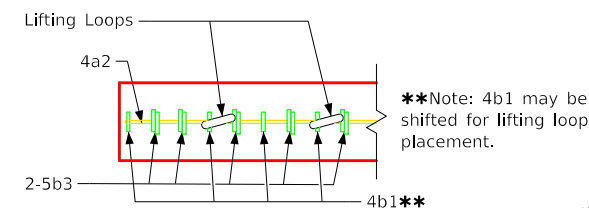
A46 Beam Details

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8:56:08 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

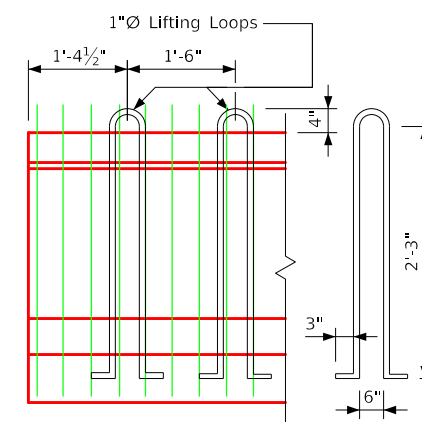

$$\begin{aligned} \text{Area} &= 311.5 \text{ in.}^2 \\ \bar{y}_b &= 14.05 \text{ in.} \\ I &= 34,082 \text{ in.}^4 \end{aligned}$$


Note: Bars 3d, 4b5, 5b2, and 5b3 are to be placed in pairs. Tie 4b5 bars to 4b1 & 5b3.

- Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

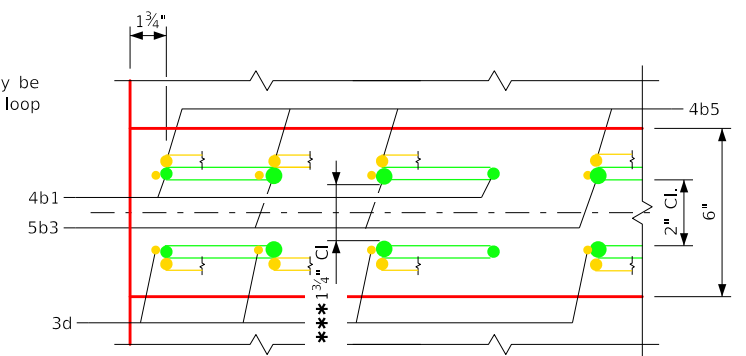


****Note:** 4b1 may be shifted for lifting loop placement.



Alternate types may be substituted with the approval of the Engineer. Lifting loops are to be structural grade.

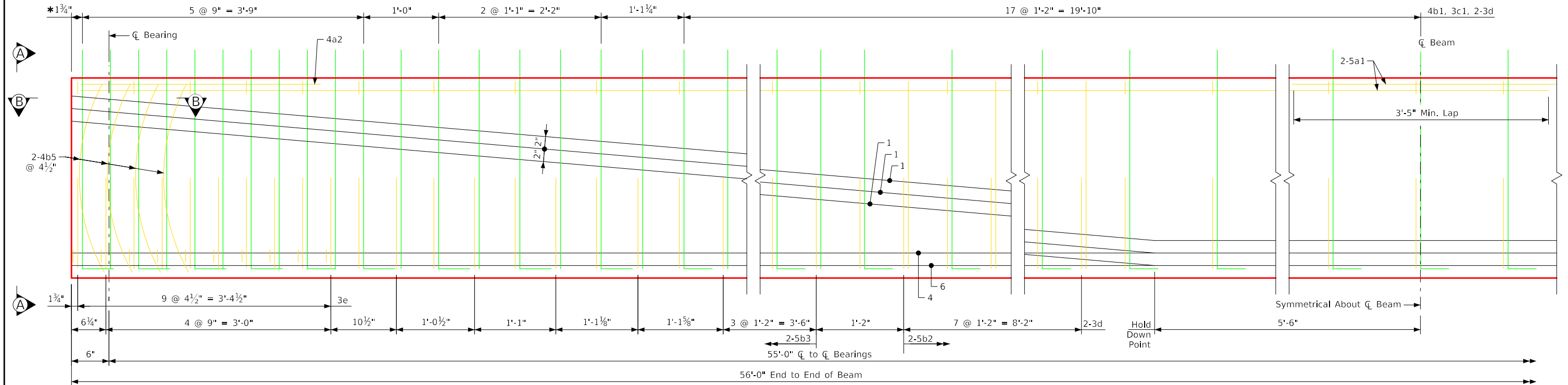
Note: Dimensions for the location of the deflected strands are at C beam and end of beam.



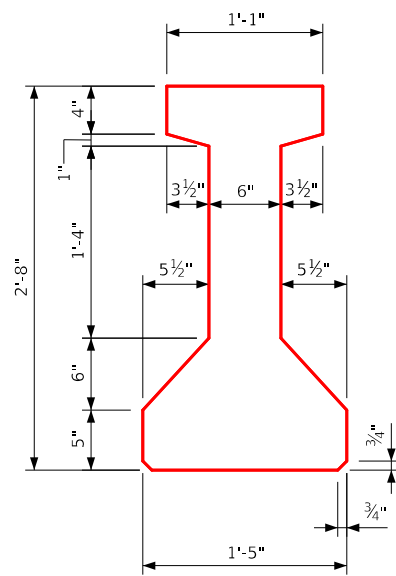
Section B-B
(Showing Placement Of Stirrups Near End Of Beam)
*****1 $\frac{3}{4}$ "** CI for 5b3 bars.

A50 Beam Details

Revised 05-09: A55 Bar Spacings were Changed.
Revised 06-2024: Epoxy Coated 5b3 Bars Replace Uncoated 5b2 bars at Beam Ends. Revised Lifting Loop Details added.
Beams.dgn - 4602-A55 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4602).



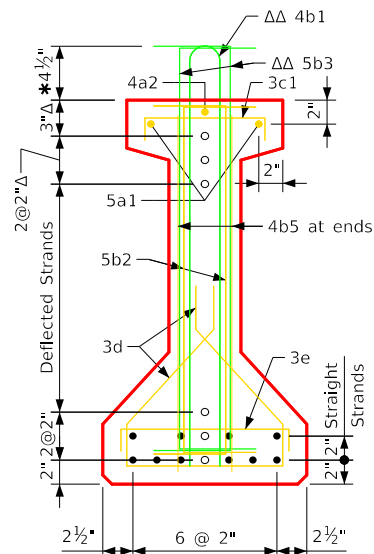
A55 Beam



"A" Beam
Cross Section

Area = 311.5 in.²
 \bar{y}_b = 14.05 in.
I = 34,082 in.⁴

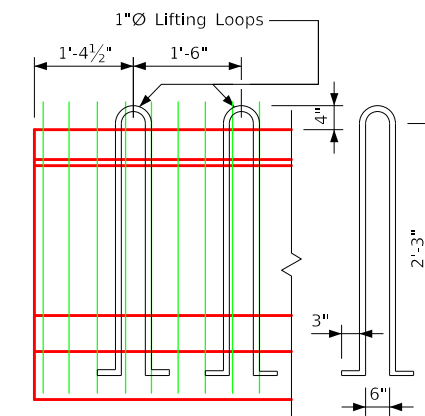
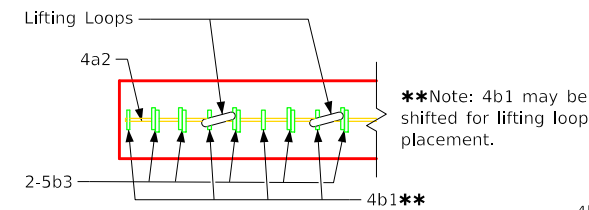
Beam Section
Properties



View A-A

Note: Bars 3d, 4b5, 5b2, and 5b3 are to be placed in pairs. Tie 4b5 bars to 4b1 & 5b3.

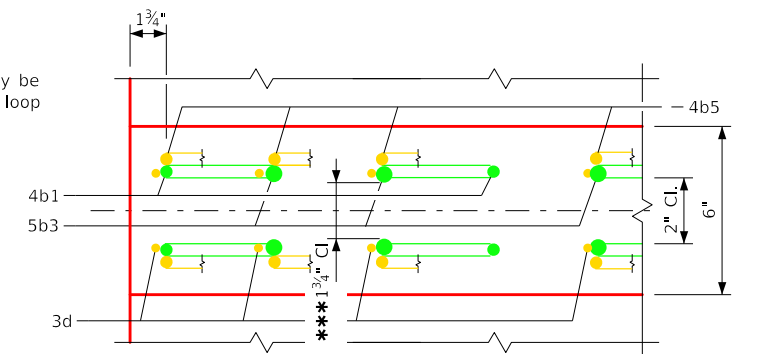
- Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- $\Delta\Delta$ Epoxy Coated Bars



Lifting Loop Detail

Alternate types may be substituted with the approval of the Engineer. Lifting loops are to be structural grade.

Note: Dimensions for the location of the deflected strands are at \bar{C} beam and end of beam.



Section B-B

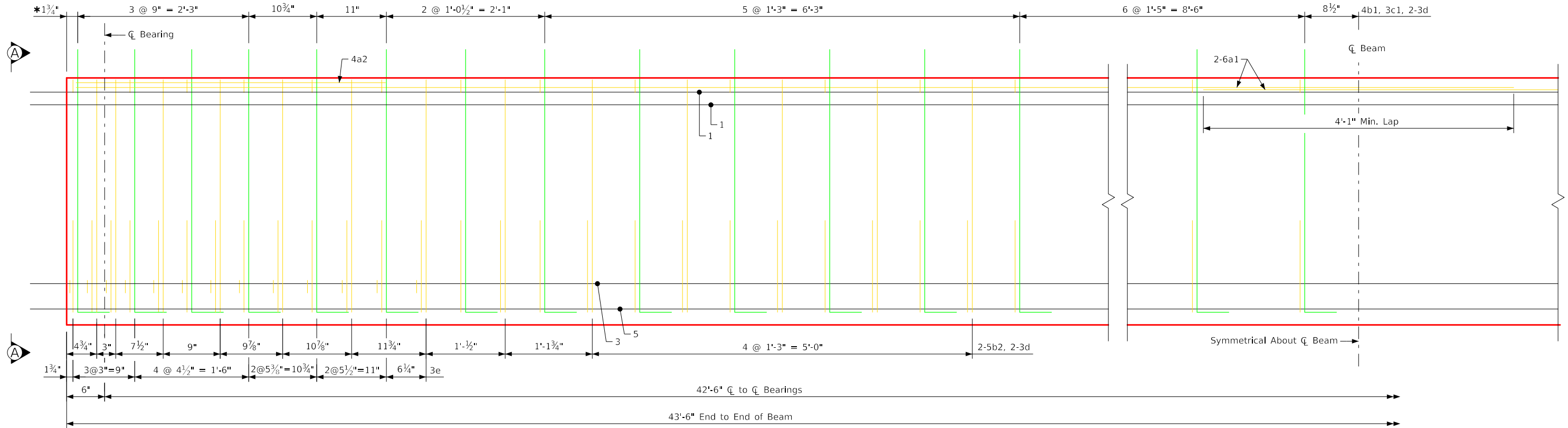
(Showing Placement Of Stirrups Near End Of Beam)

***1 3/4" CI for 5b3 bars.

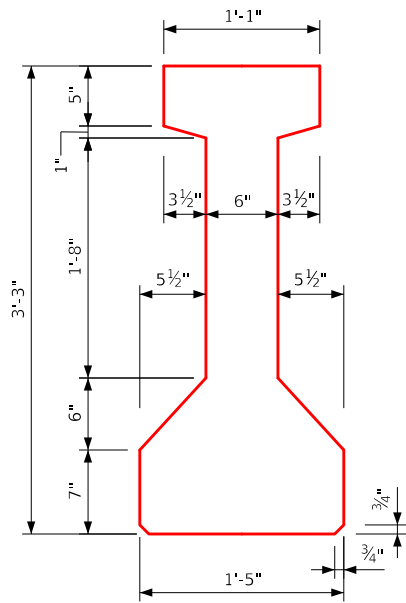
A55 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"A" Beam - 55'-0" Span	Standard Sheet 4602-A55	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:10 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revised 05-09: B42 bar spacings were changed.
Beams.dgn - 4611-B42 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4611).



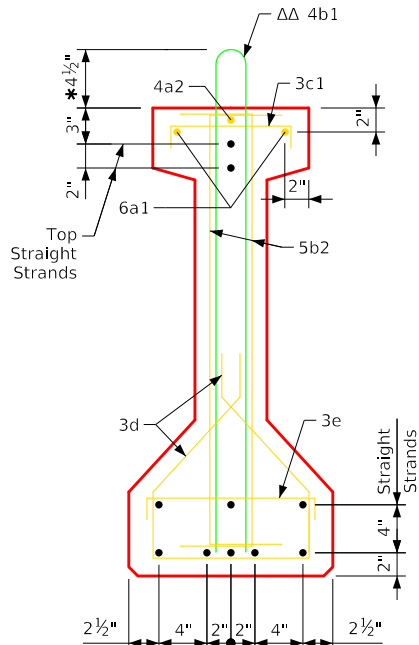
B42 Beam



"B" Beam
Cross Section

Area = 382.5 in.²
 $\bar{y}_b = 17.06$ in.
 $I = 62,000$ in.⁴

Beam Section
Properties



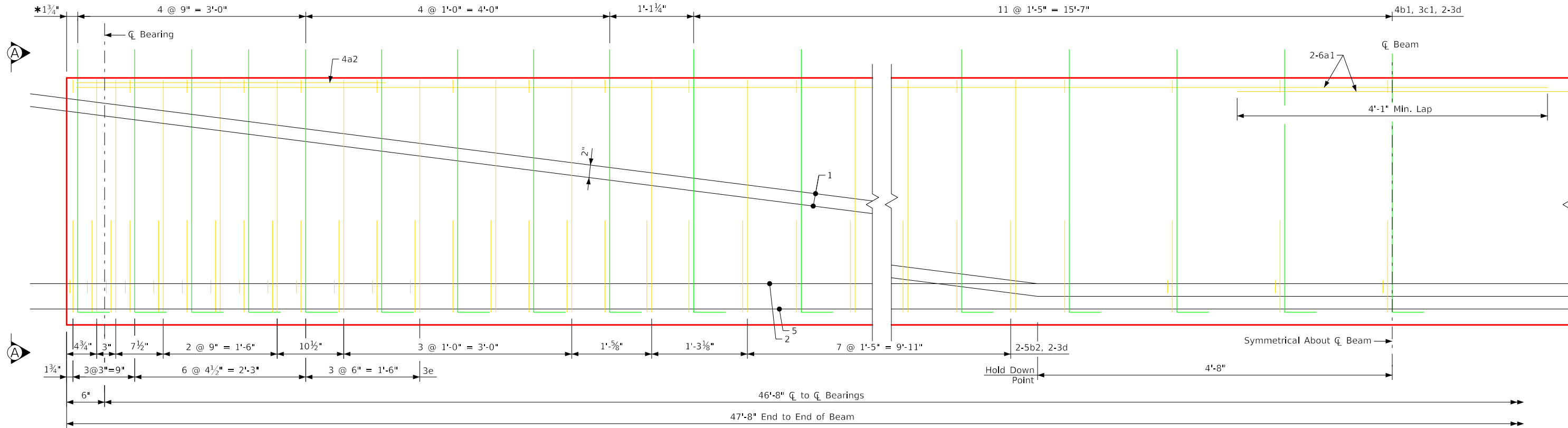
View A-A

Note: Bars 5b2 and 3d are to be placed in pairs.

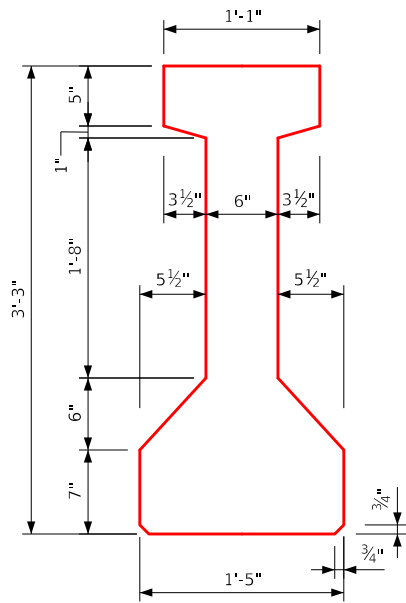
* Keep
ΔΔ Epoxy Coated Bars

B42 Beam Details

Revised 05-09: B46 Bar Spacings were Changed.
Beams.dgn - 4611-B46 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4611).



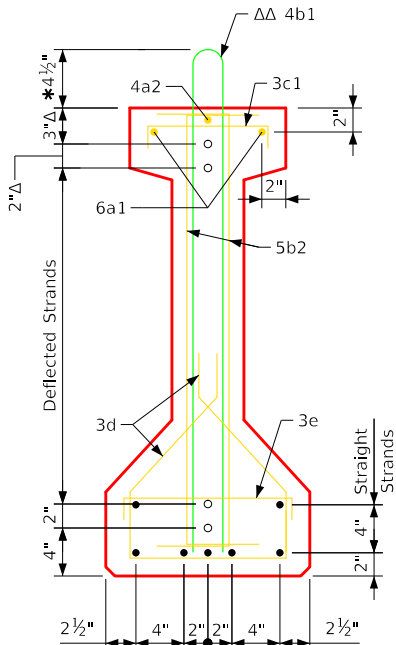
B46 Beam



"B" Beam
Cross Section

Area = 382.5 in.²
 \bar{y}_b = 17.06 in.
 I = 62,000 in.⁴

Beam Section
Properties



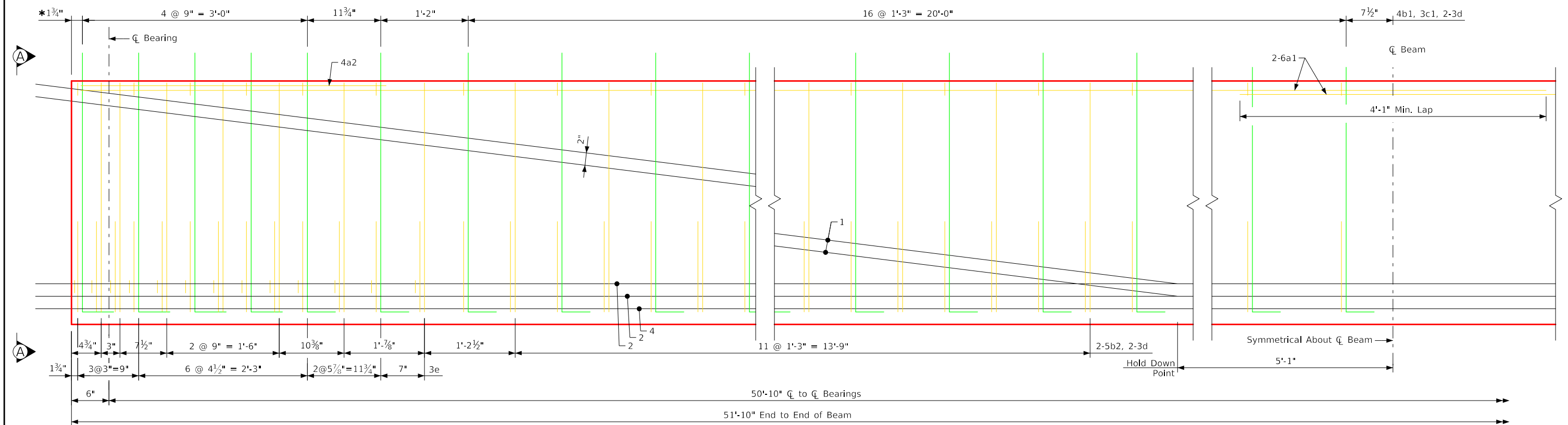
View A-A

Note: Bars 5b2 and 3d are to be placed in pairs.

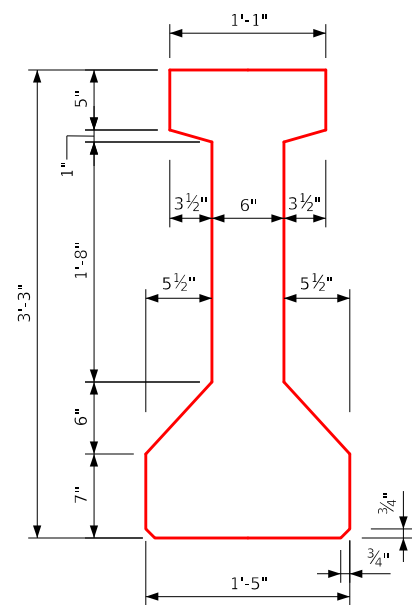
- Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

Note: Dimensions for the location of the deflected strands are at \bar{C} beam and end of beam.

B46 Beam Details



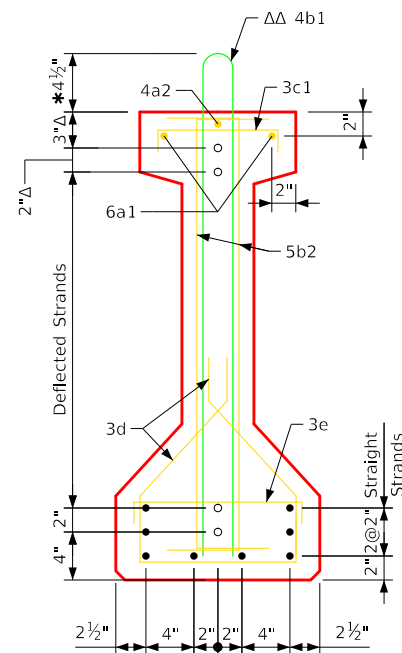
B50 Beam



"B" Beam
Cross Section

Area = 382.5 in.²
 $\bar{y}_b = 17.06$ in.
 $I = 62,000$ in.⁴

Beam Section Properties



View A-A

Note: Bars 5b2 and 3d are to be placed in pairs.

- Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

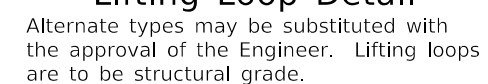
Note: Dimensions for the location of the deflected strands are at ζ_L beam and end of beam.

B50 Beam Details



View A-A

- Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

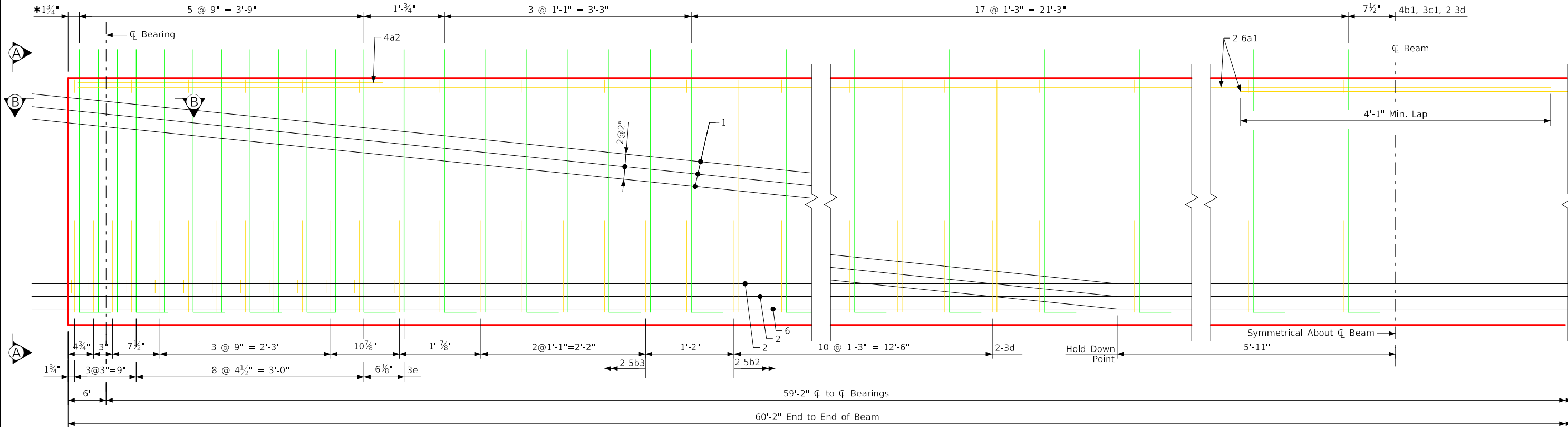


***1 $\frac{3}{4}$ " CI for 5b3 bars.

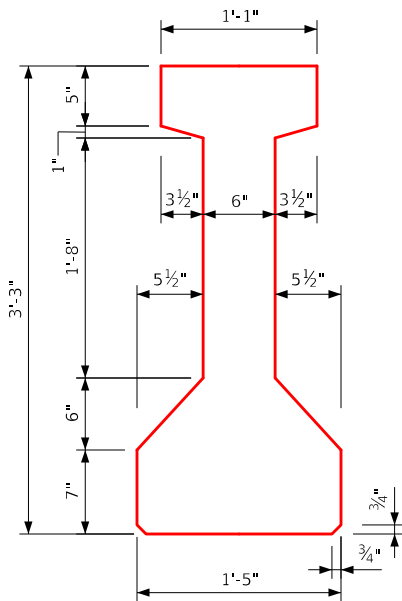
Note: Dimensions for the location of the deflected strands are at C beam and end of beam.

B55 Beam Details

Revised 05-09: B59 Bar Spacings were Changed.
Revised 06-2024: Epoxy Coated 5b3 Bars Replace Uncoated 5b2 Bars at Beam Ends. Revised Lifting Loop Details added.
Beams.dgn - 4612-B59 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4612).



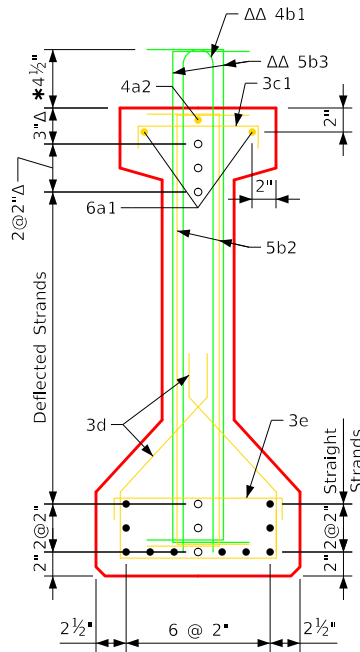
B59 Beam



"B" Beam
Cross Section

Area = 382.5 in.²
 $\bar{y}_b = 17.06$ in.
 $I = 62,000$ in.⁴

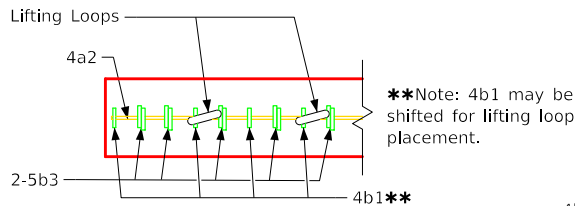
Beam Section
Properties



View A-A

Note: Bars 5b2, 5b3, and 3d are to be placed in pairs.

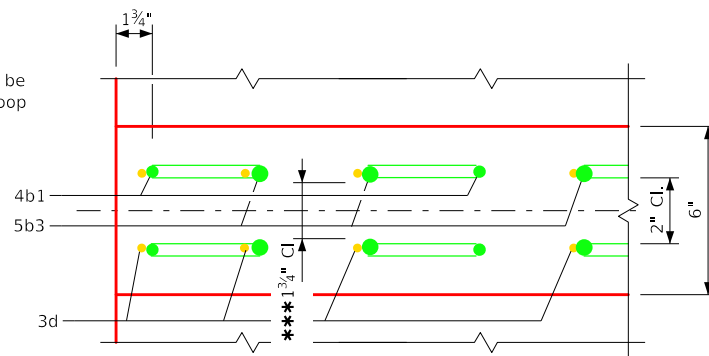
- Deflected Strands
- * Keep
- △ Dimensions at End of Beam
- △△ Epoxy Coated Bars



Lifting Loop Detail

Alternate types may be substituted with the approval of the Engineer. Lifting loops are to be structural grade.

Note: Dimensions for the location of the deflected strands are at \bar{y}_b beam and end of beam.



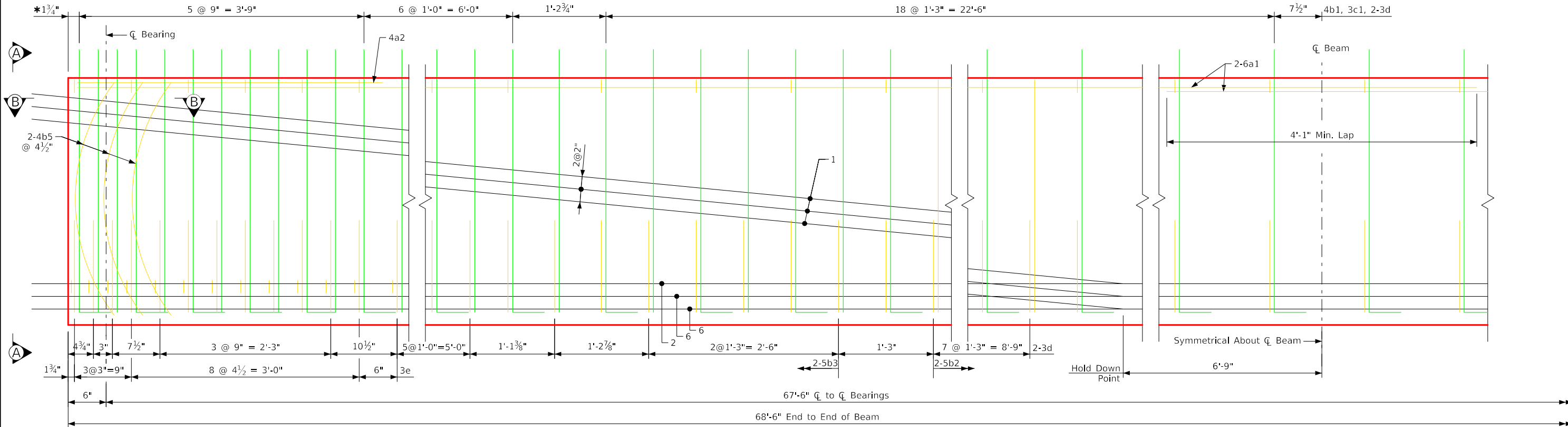
Section B-B

(Showing Placement Of Stirrups Near End Of Beam)

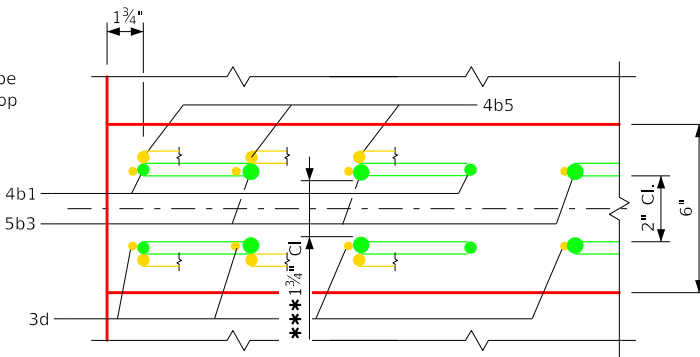
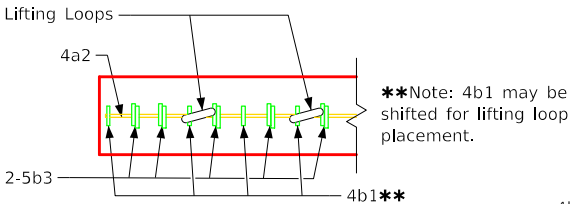
***1 3/4" CI for 5b3 bars.

B59 Beam Details

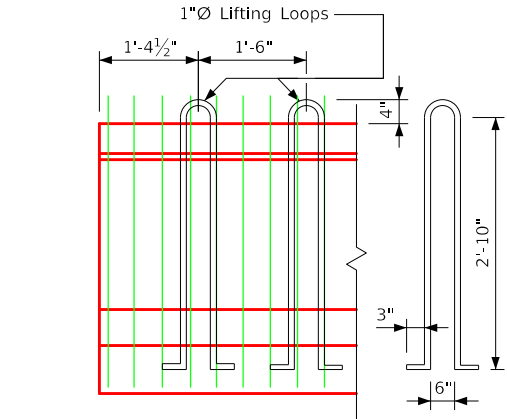
Revised 05-09: B67 Bar Spacings were Changed.
Revised 06-2024: Epoxy Coated 5b3 Bars Replace Uncoated 5b2 bars at Beam Ends. Revised Lifting Loop Details added.
Beams.dgn - 4612-B67 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4612).



B67 Beam

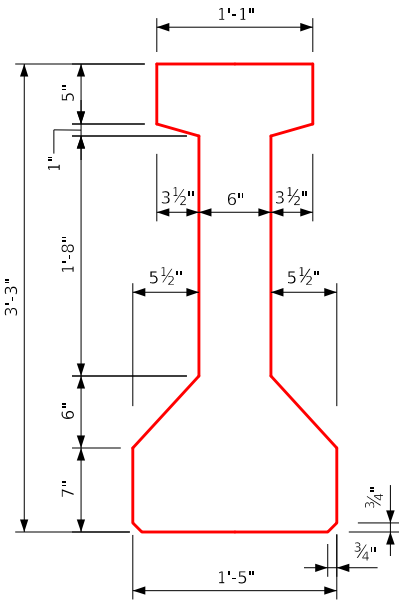


Section B-B
(Showing Placement Of Stirrups Near End Of Beam)
***1 3/4" CI for 5b3 bars.



Lifting Loop Detail
Alternate types may be substituted with the approval of the Engineer. Lifting loops are to be structural grade.

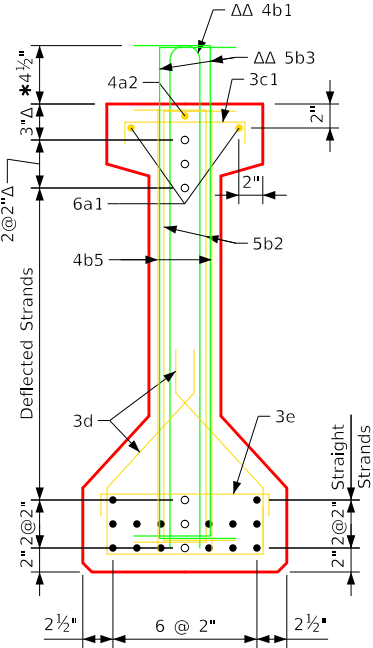
Note: Dimensions for the location of the deflected strands are at \bar{C} beam and end of beam.



"B" Beam
Cross Section

Area = 382.5 in.²
 $\bar{y}_b = 17.06$ in.
 $I = 62,000$ in.⁴

Beam Section
Properties



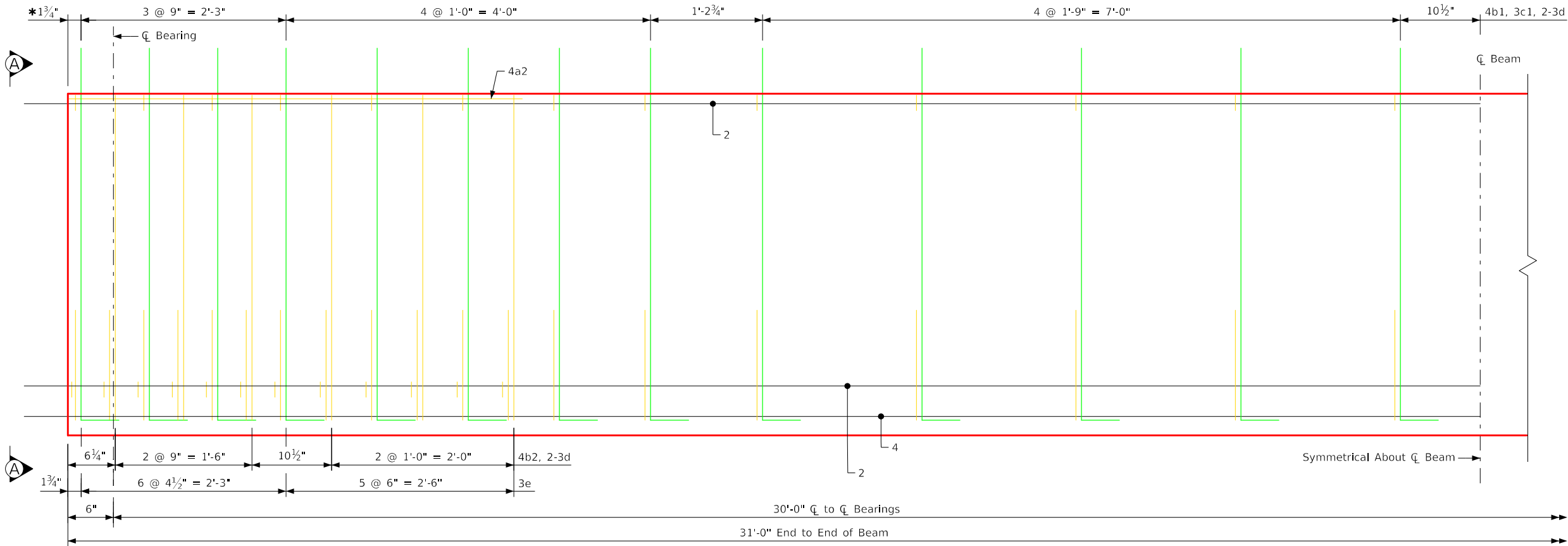
View A-A

Note: Bars 4b5, 5b2, 5b3, and 3d are to be placed in pairs. Tie 4b5 bars to 4b1 & 5b3.

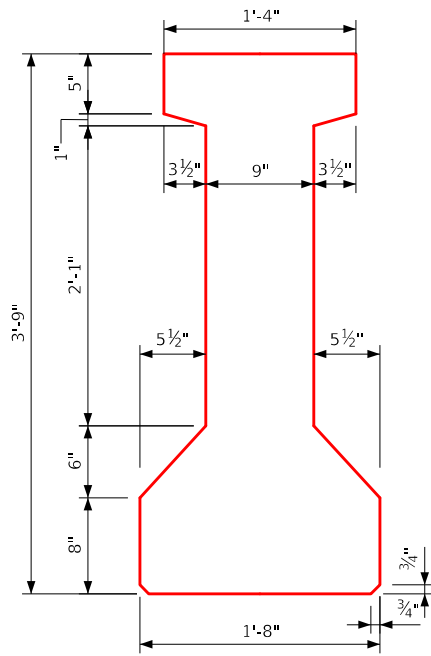
- Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

B67 Beam Details

Beams.dgn - 4621-C30 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4621).

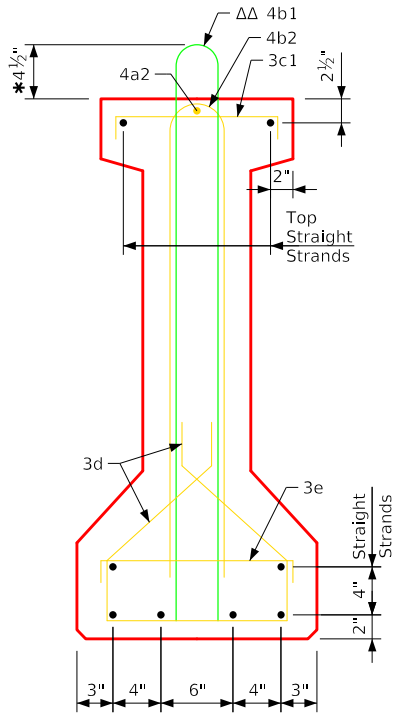


C30 Beam



"C" Beam
Cross Section

Area = 564.5 in.²
 $\bar{y}_b = 20.23$ in.
 $I = 116,354$ in.⁴
**Beam Section
Properties**



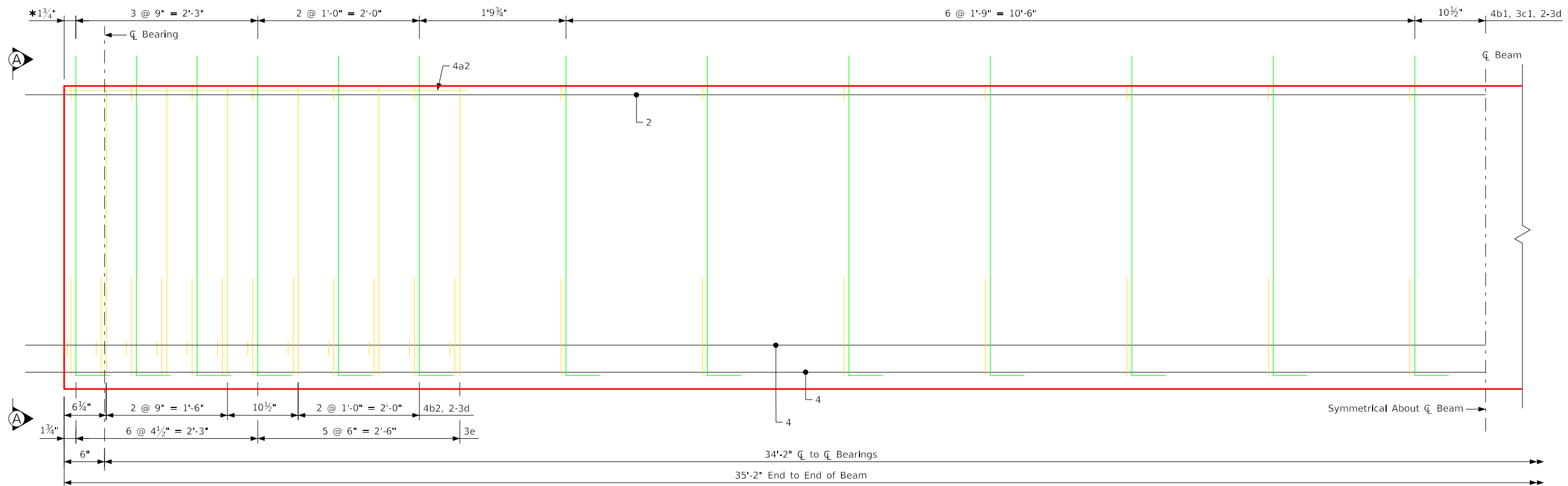
View A-A

Note: Bars 3d
are to be placed in pairs.

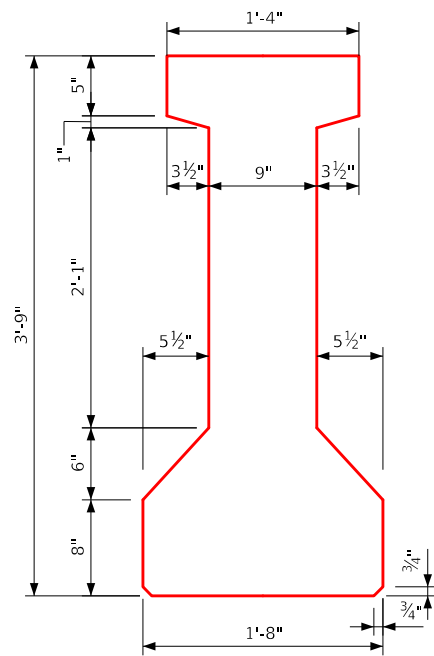
* Keep
ΔΔ Epoxy Coated Bars

C30 Beam Details

Revised 08-09: Added Prestressed Strands to C34 Beam X-Sections.
Beams den - 4621-C34 - This Sheet Issued 04-2024 Additional Sheet



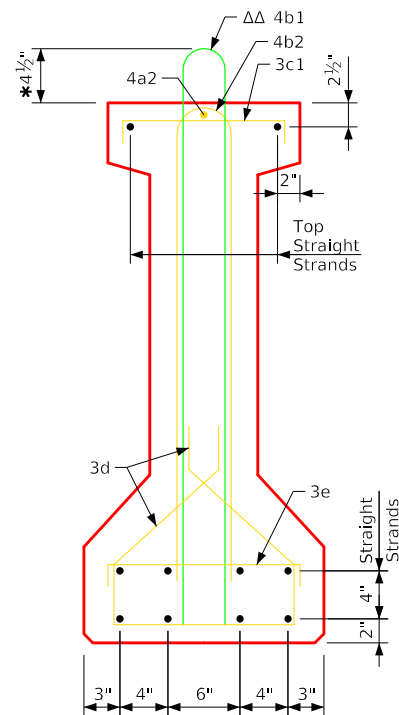
C34 Beam



"C" Beam
Cross Section

$$\begin{aligned} \text{Area} &= 564.5 \text{ in.}^2 \\ \bar{y}_b &= 20.23 \text{ in.} \\ I &= 116,354 \text{ in.}^4 \end{aligned}$$

Beam Section Properties



View A-A

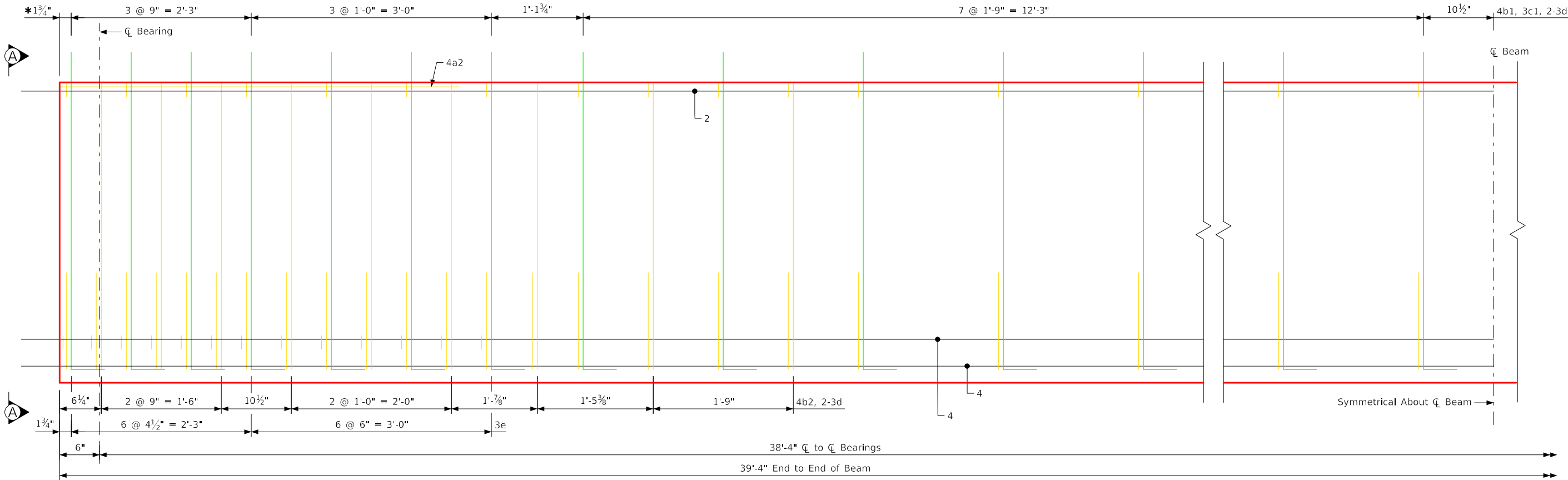
Note: Bars 3d
are to be placed in pairs.

* Keep
ΔΔ Epoxy Coated Bars

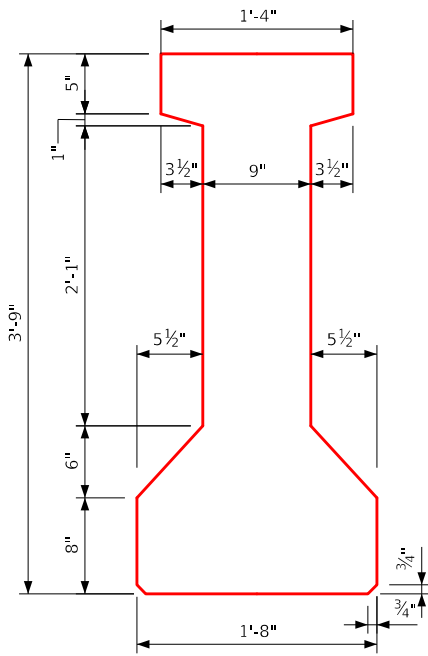
C34 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"C" Beam - 34'-2" Span	Standard Sheet 4621-C34	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:24 AM	10/2/2024	bktoss	pw:\\NTP\\wint1.dot.int.lan\\PW\\Main\\Documents\\Highway\\Bridge\\Standards\\Bridges\\Beams.dgn				

Revised 08-09: Added Prestressed Strands to C38 Beam X-Sections.
Beams.dgn - 4621-C38 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4621).

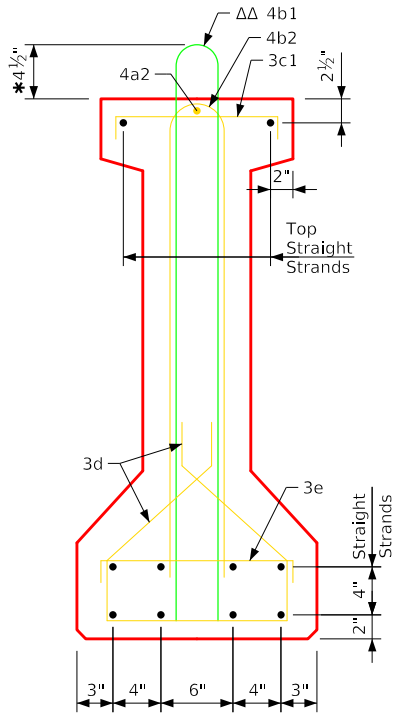


C38 Beam



"C" Beam
Cross Section

Area = 564.5 in.²
 \bar{y}_b = 20.23 in.
 I = 116,354 in.⁴
**Beam Section
Properties**



View A-A

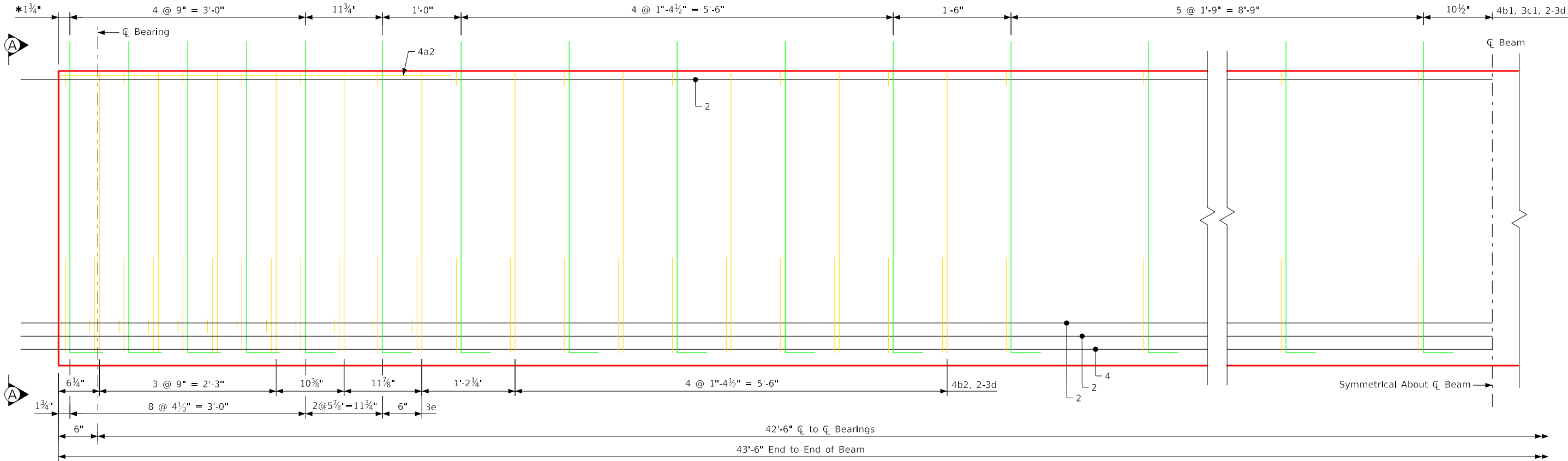
Note: Bars 3d
are to be placed in pairs.

* Keep
 $\Delta\Delta$ Epoxy Coated Bars

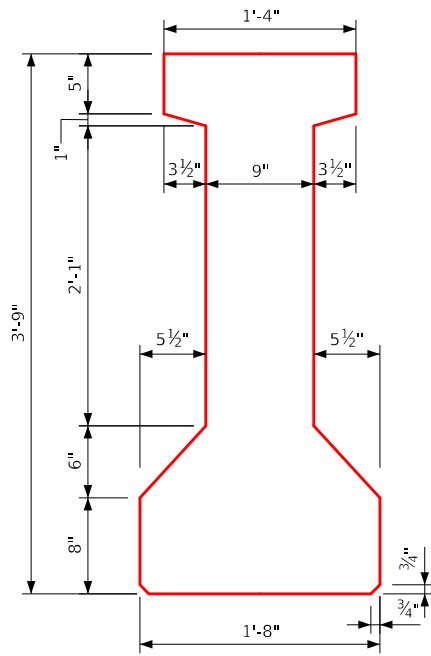
C38 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"C" Beam - 38'-4" Span	Standard Sheet 4621-C38	COUNTY	PROJECT NUMBER	SHEET NUMBER	
8:56:25 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn					

Beams.dgn - 4621-C42 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4621).

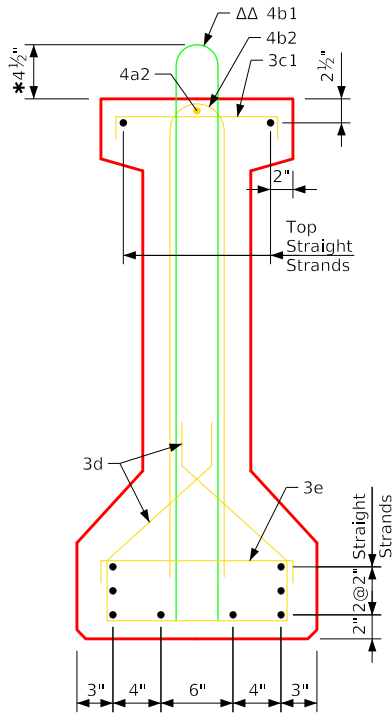


C42 Beam



"C" Beam
Cross Section

Area = 564.5 in.²
 $y_b = 20.23$ in.
 $I = 116,354$ in.⁴
**Beam Section
Properties**



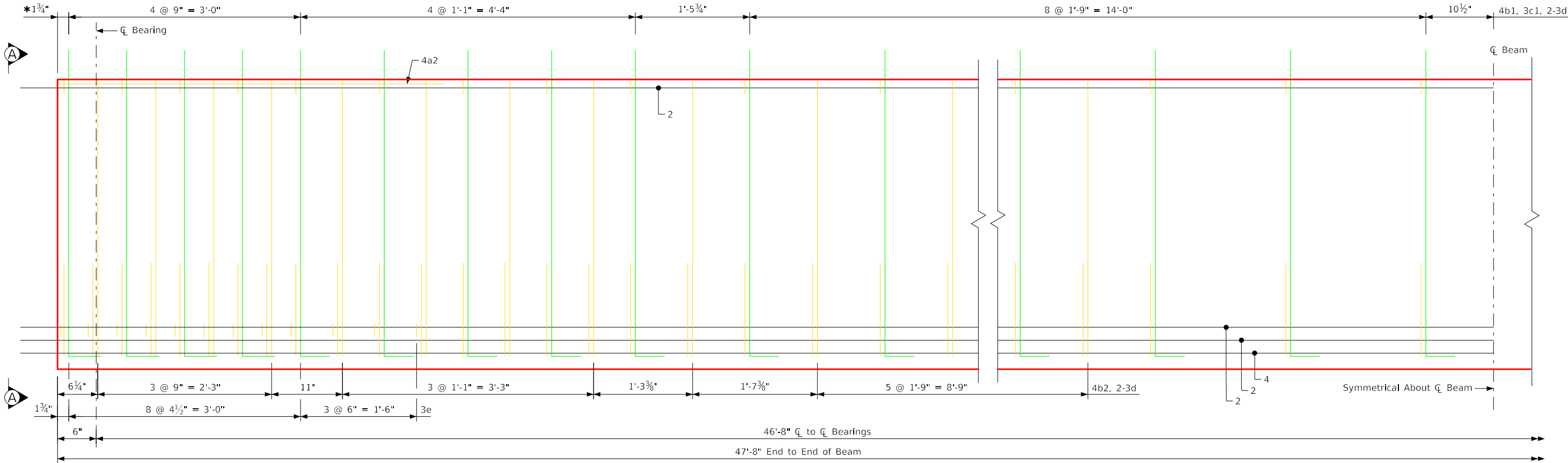
View A-A

Note: Bars 3d
are to be placed in pairs.

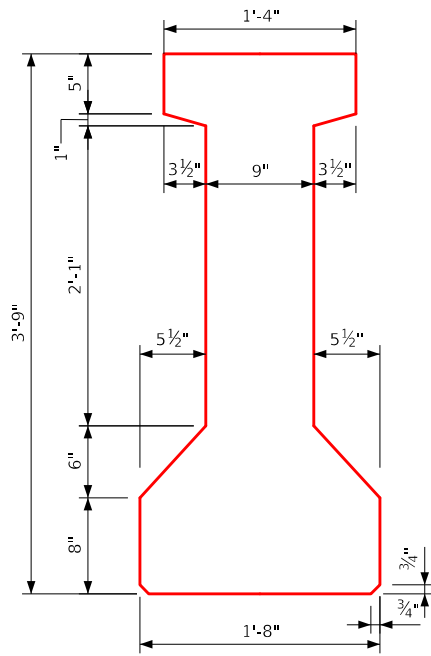
* Keep
 $\Delta\Delta$ Epoxy Coated Bars

C42 Beam Details

Beams.dgn - 4621-C46 - This Sheet Issued 04-2024, Additional Sheet for Clarity. (Sheet Number was Originally 4621).

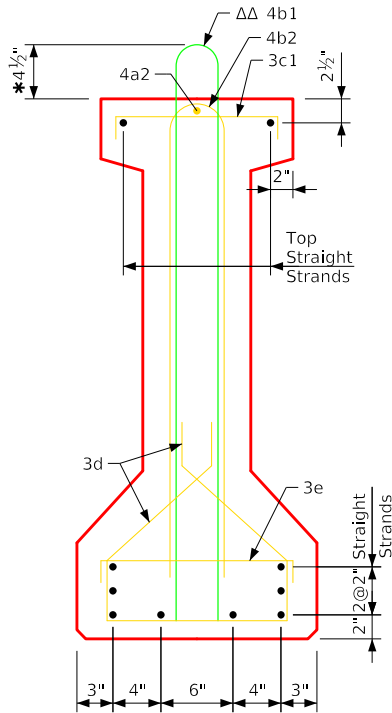


C46 Beam



"C" Beam
Cross Section

Area = 564.5 in.²
 $y_b = 20.23$ in.
 $I = 116,354$ in.⁴
**Beam Section
Properties**



View A-A

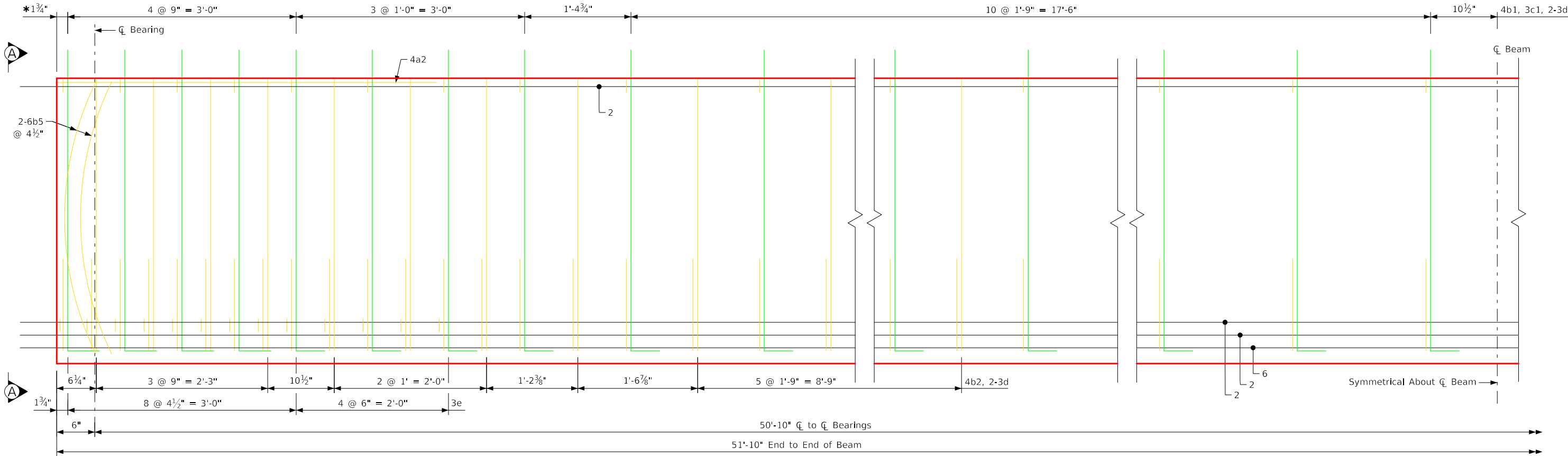
Note: Bars 3d
are to be placed in pairs.

* Keep
ΔΔ Epoxy Coated Bars

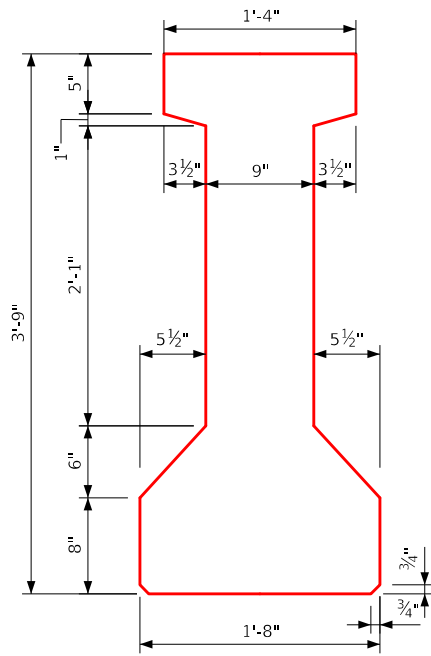
C46 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"C" Beam - 46'-8" Span	Standard Sheet 4621-C46	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:27 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Correction 07-08: Removed the Duplicate 4b2 Bar Labeling in the Cross Sections for C50 Beams.
Revised 10-2024: Added 6b5 bars to "C55 Beam" and "View A-A" details.
Beams.dgn - 4622-C50 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4622).

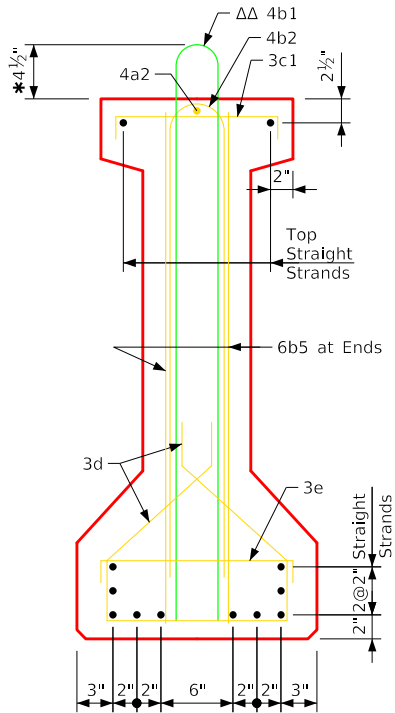


C50 Beam



"C" Beam
Cross Section

Area = 564.5 in.²
 $y_b = 20.23$ in.
 $I = 116,354$ in.⁴
**Beam Section
Properties**



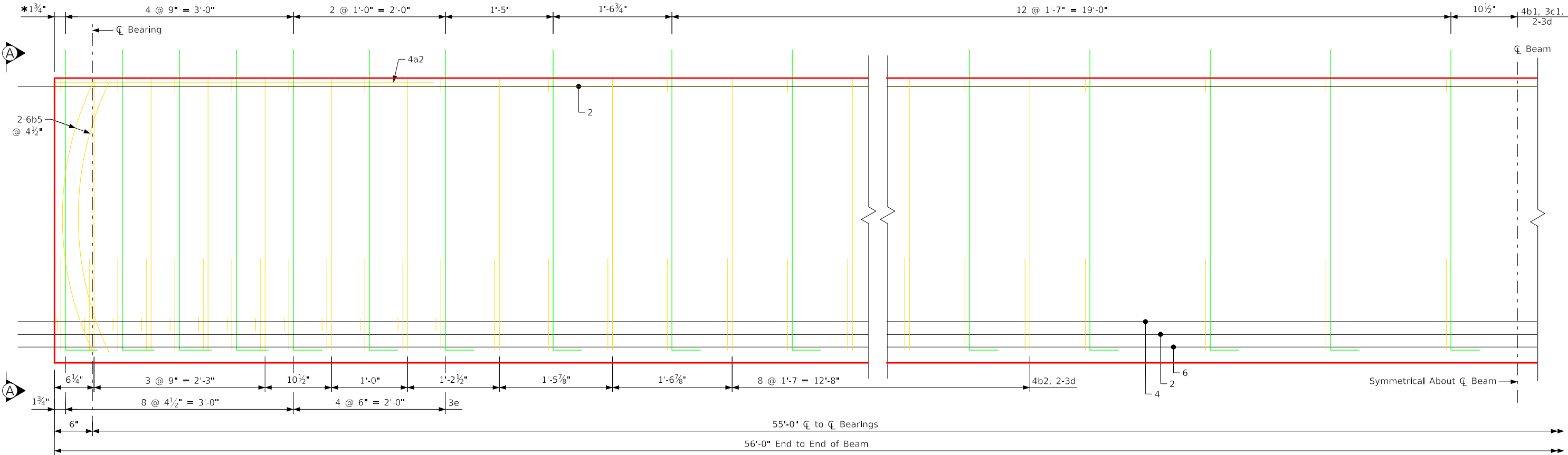
View A-A

Note: Bars 3d and 6b5
are to be placed in pairs.
Tie 6b5 bars to 4b1 & 4b2.

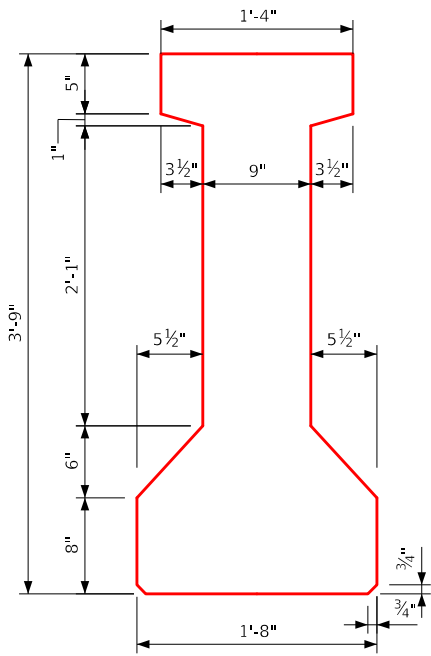
* Keep
ΔΔ Epoxy Coated Bars

C50 Beam Details

Correction 07-08: Removed the Duplicate 4b2 Bar Labeling in the Cross Sections for C55 Beams.
Revised 10-2024: Added 6b5 bars to "C55 Beam" and "View A-A" details.
Beams.dgn - 4622-C55 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4622).

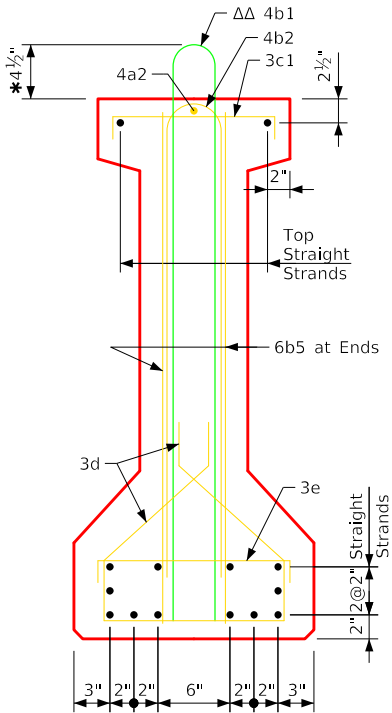


C55 Beam



Area = 564.5 in.²
 $\bar{y}_b = 20.23$ in.
 $I = 116,354$ in.⁴

Beam Section Properties



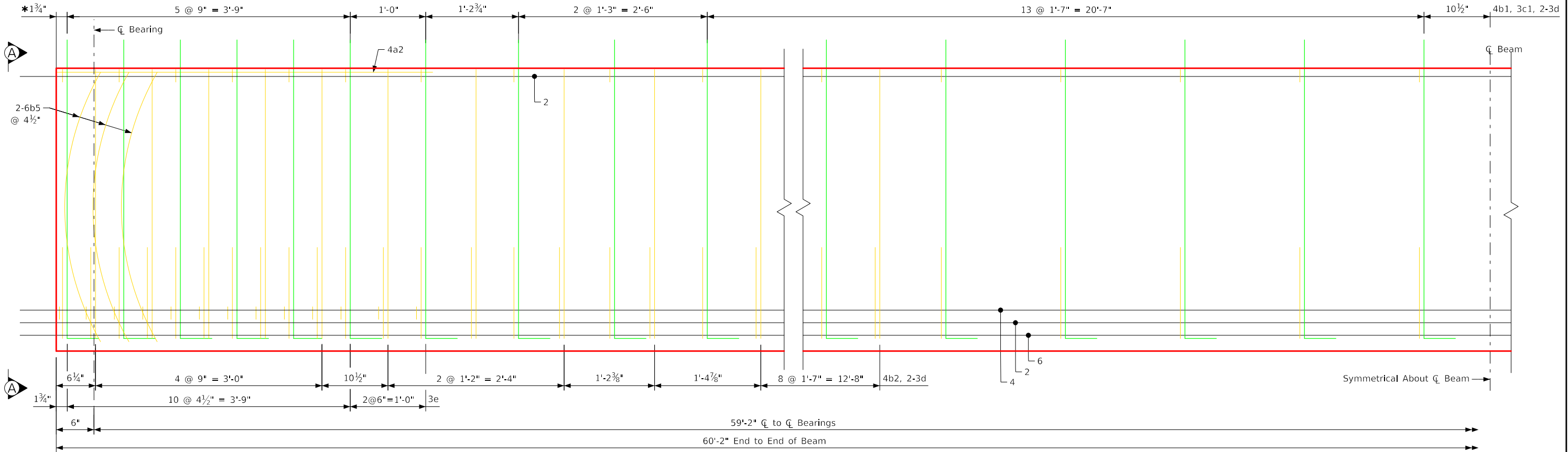
Note: Bars 3d and 6b5 are to be placed in pairs.
Tie 6b5 bars to 4b1 & 4b2.

* Keep
ΔΔ Epoxy Coated Bars

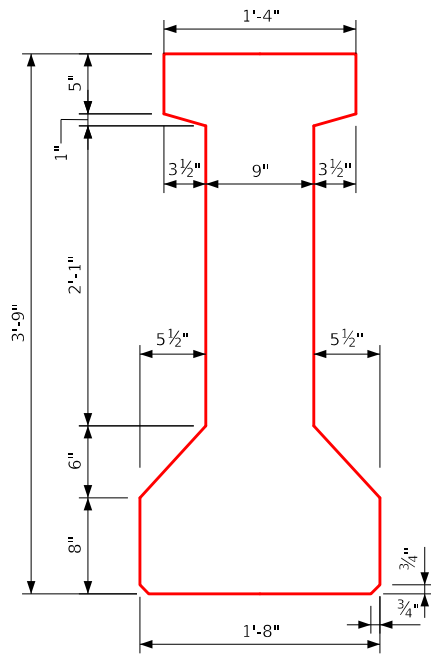
C55 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"C" Beam - 55'-0" Span	Standard Sheet 4622-C55	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:29 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Correction 07-08: Removed the Duplicate 4b2 Bar Labeling in the Cross Sections for C59 Beams.
Beams.dgn - 4622-C59 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4622).

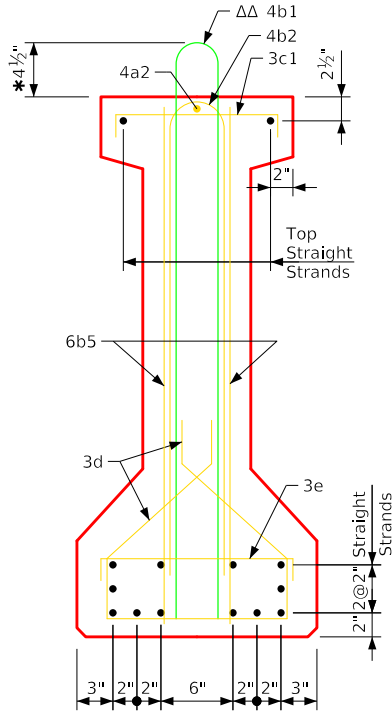


C59 Beam



Area = 564.5 in.²
 \bar{y}_b = 20.23 in.
 I = 116,354 in.⁴

Beam Section Properties



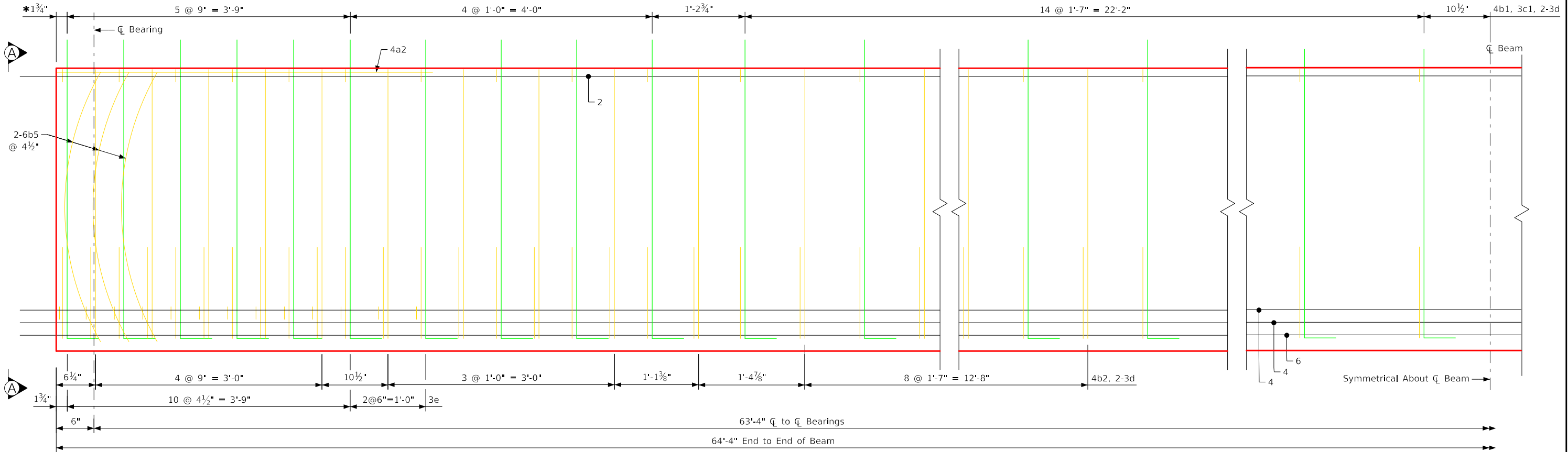
Note: Bars 6b5 and 3d are to be placed in pairs. Tie 6b5 bars to 4b1 & 4b2.

* Keep
 $\Delta\Delta$ Epoxy Coated Bars

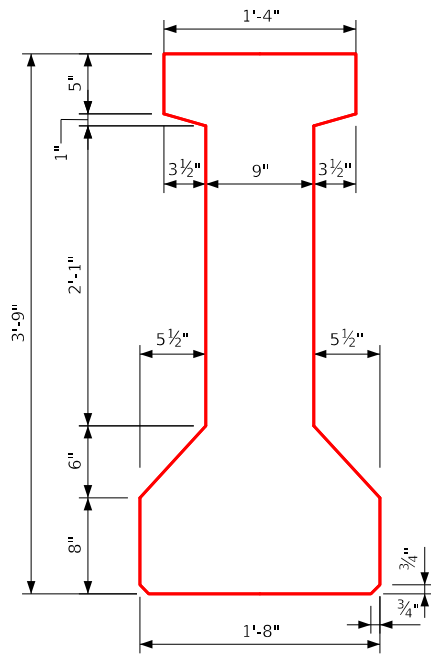
C59 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"C" Beam - 59'-2" Span	Standard Sheet 4622-C59	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:30 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Correction 07-08: Corrected the 4b2 Bars to 6b5 Bars for C63 Beams.
Revised 06-2024: Added the straight strands to the lower part of beam in View A-A.
Beams.dgn - 4622-C63 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4622).

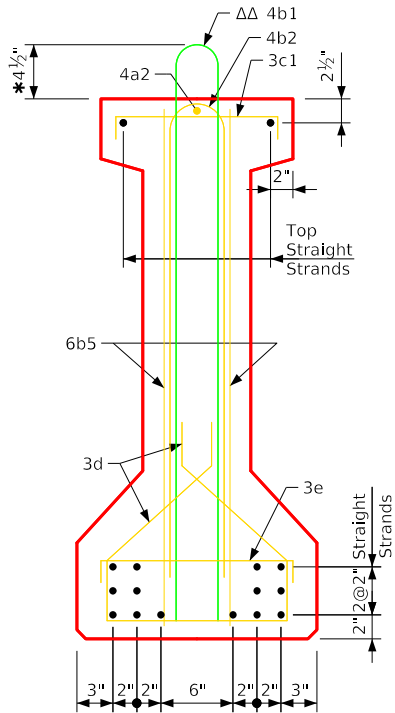


C63 Beam



Area = 564.5 in.²
 $y_b = 20.23$ in.
 $I = 116,354$ in.⁴

Beam Section Properties



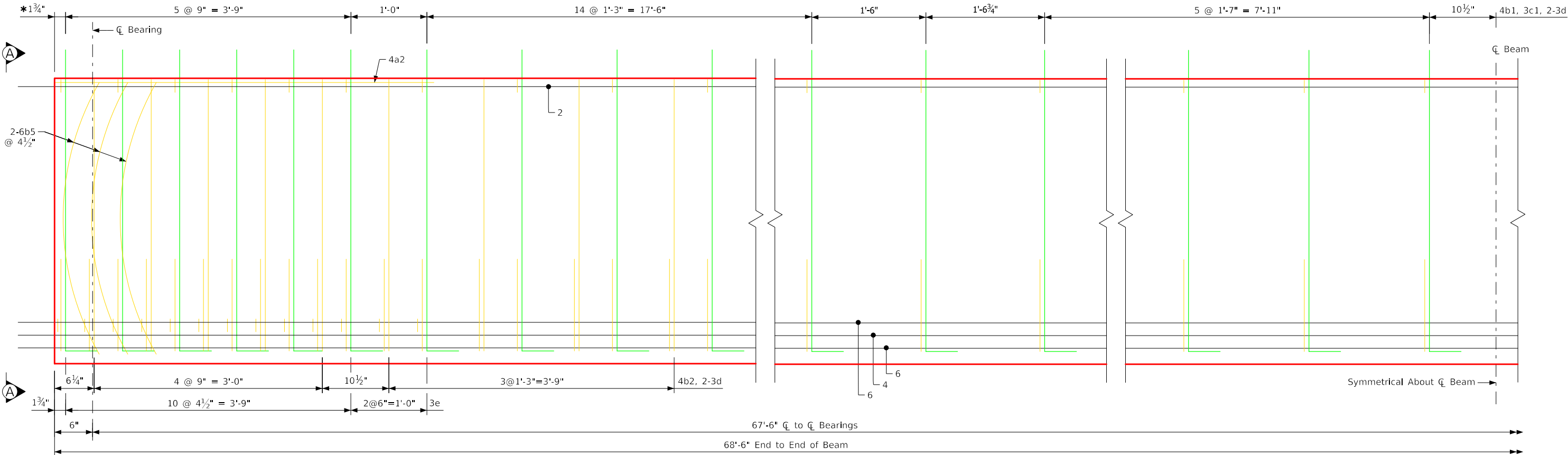
Note: Bars 6b5 and 3d are to be placed in pairs. Tie 6b5 bars to 4b1 & 4b2.

* Keep
ΔΔ Epoxy Coated Bars

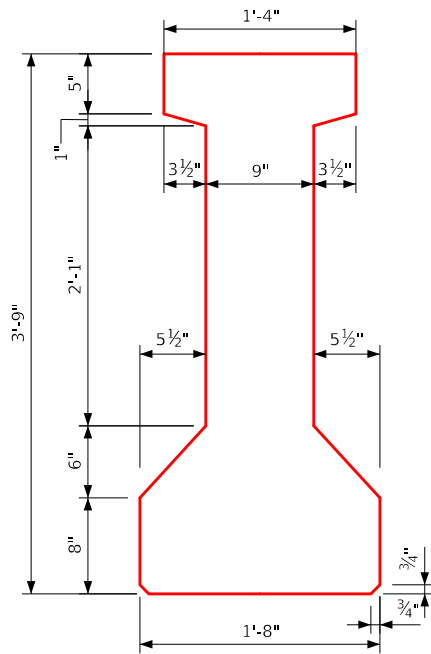
C63 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"C" Beam - 63'-4" Span	Standard Sheet 4622-C63	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:32 AM	10/2/2024	bkloss	pw:\\NTPwint1.dot.int.lan:PWMain\\Documents\\Highway\\Bridge\\Standards\\Bridges\\Beams.dgn				

Correction 07-08: Corrected the 4b2 Bars to 6b5 Bars for C67 Beams.
Beams.dgn - 4622-C67 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4622).



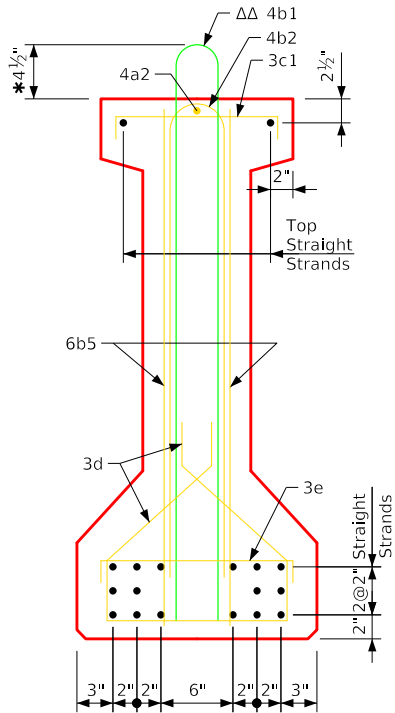
C67 Beam



"C" Beam
Cross Section

Area = 564.5 in.²
 $y_b = 20.23$ in.
 $I = 116,354$ in.⁴

Beam Section
Properties



View A-A

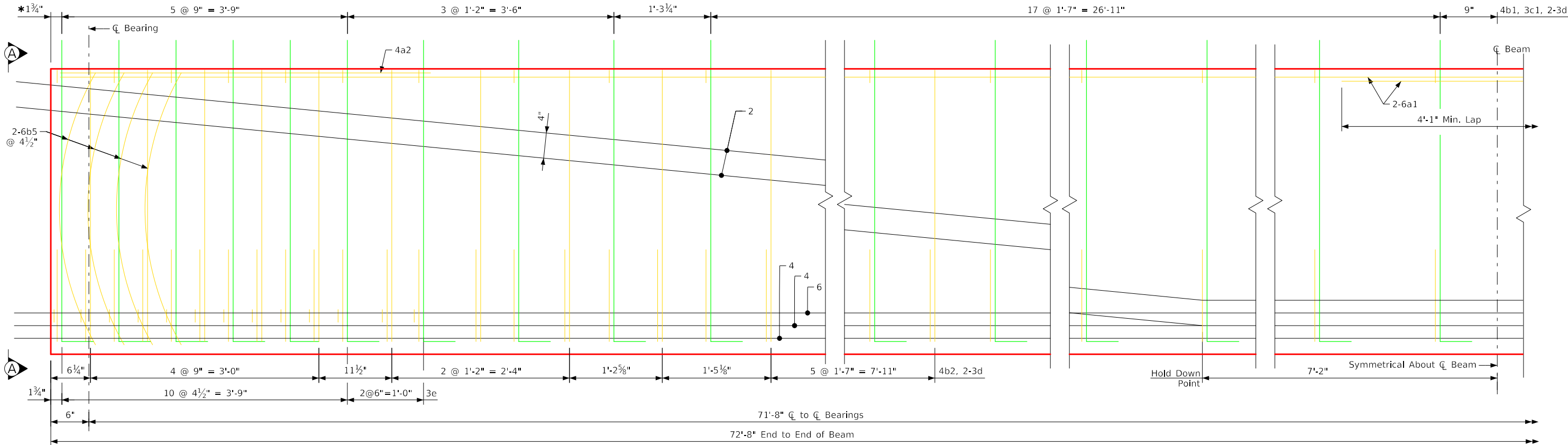
Note: Bars 6b5 and 3d
are to be placed in pairs.
Tie 6b5 bars to 4b1 & 4b2.

* Keep
Epoxy Coated Bars

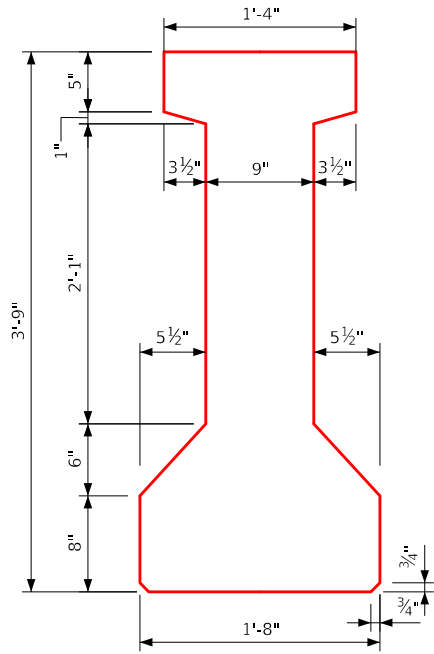
C67 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"C" Beam - 67'-6" Span	Standard Sheet 4622-C67	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:33 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Correction 07-08: The 6d5 Bars Were Corrected to 6b5.
Beams.dgn - 4623-C71 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4623).

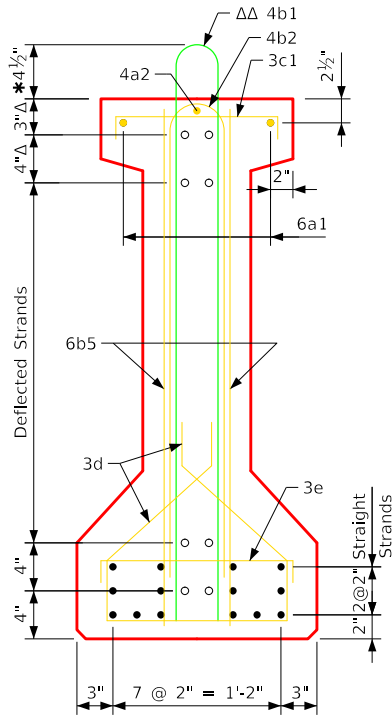


C71 Beam



"C" Beam
Cross Section

Area = 564.5 in.²
 \bar{y}_b = 20.23 in.
 I = 116,354 in.⁴
**Beam Section
Properties**



View A-A

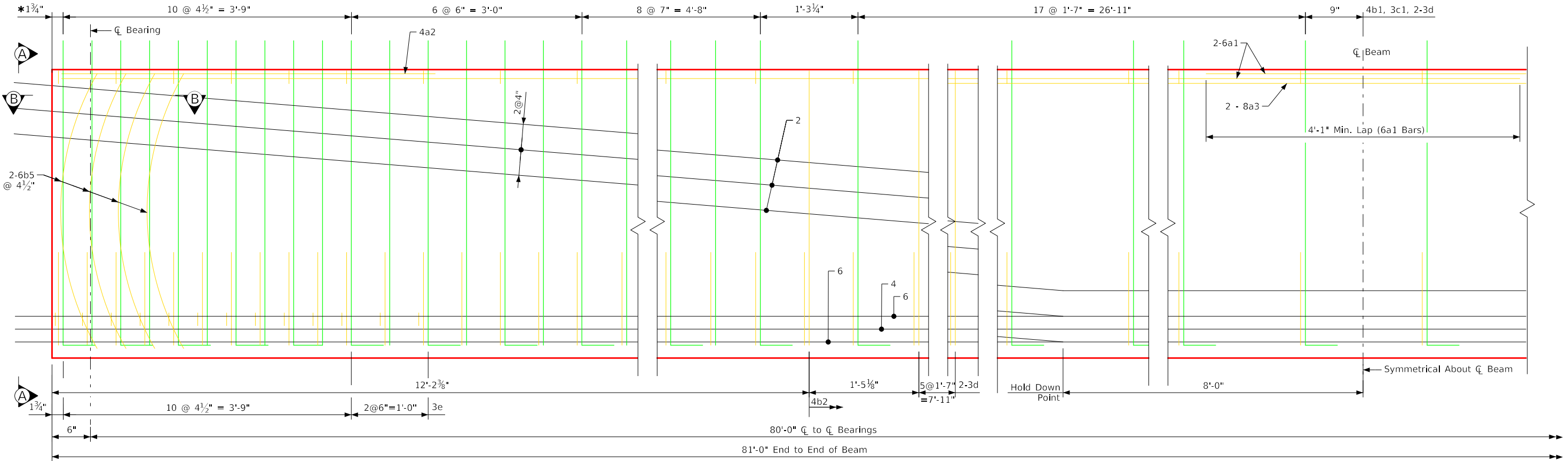
Note: Bars 6b5 and 3d
are to be placed in pairs.
Tie 6b5 bars to 4b1 & 4b2.

- Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- $\Delta\Delta$ Epoxy Coated Bars

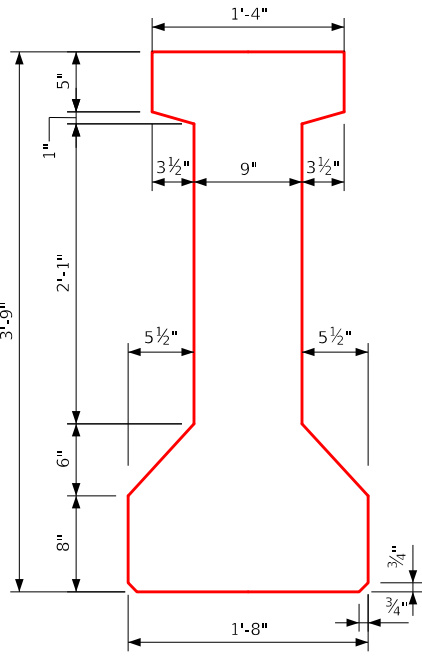
Note: Dimensions for the location of the deflected
strands are at \bar{C} beam and end of beam.

C71 Beam Details

Correction 07-08: The 6d5 bars were corrected to 6b5
Revised 06-2024: Epoxy Coated 4b1 Bars Replace Uncoated 4b2 Bars at Beam Ends. Revised Lifting Loop Details Added.
Beams.dgn - 4623-C80 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4623).



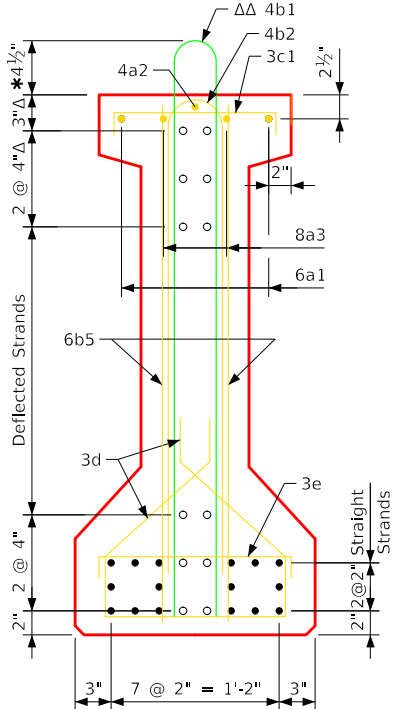
C80 Beam



"C" Beam
Cross Section

Area = 564.5 in.²
 $\bar{y}_b = 20.23$ in.
 $I = 116,354$ in.⁴

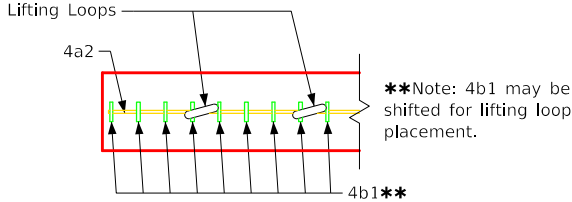
Beam Section
Properties



View A-A

Note: Bars 6b5 and 3d
are to be placed in pairs.
Tie 6b5 bars to 4b1.

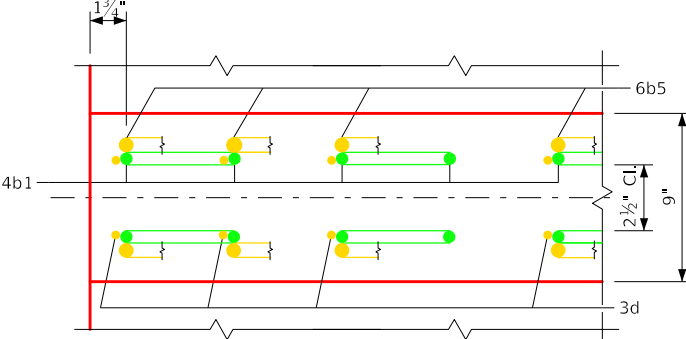
- ◊ Deflected Strands
- * Keep
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars



Lifting Loop Detail

Alternate types may be substituted with
the approval of the Engineer. Lifting loops
are to be structural grade.

Note: Dimensions for the location of the deflected
strands are at CL beam and end of beam.

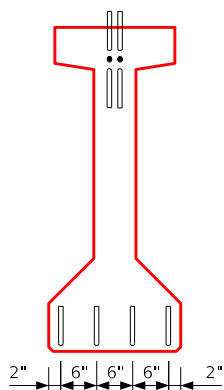


Section B-B

(Showing Placement Of Stirrups Near End Of Beam)

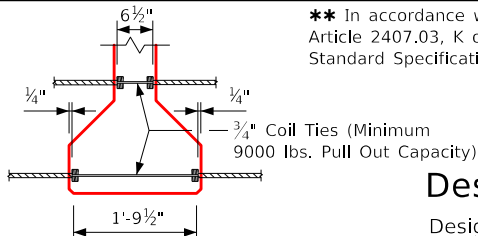
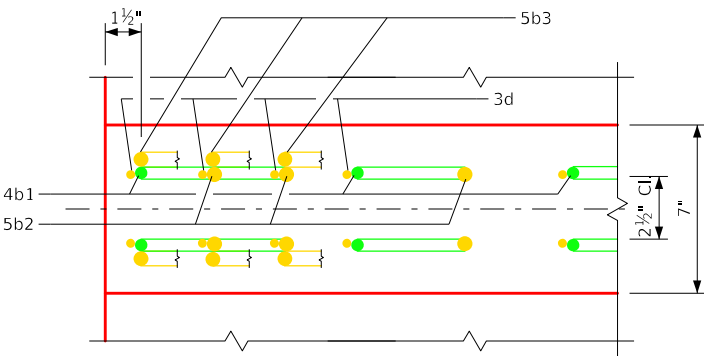
C80 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	"C" Beam - 80'-0" Span	Standard Sheet 4623-C80	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:36 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:P\WMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

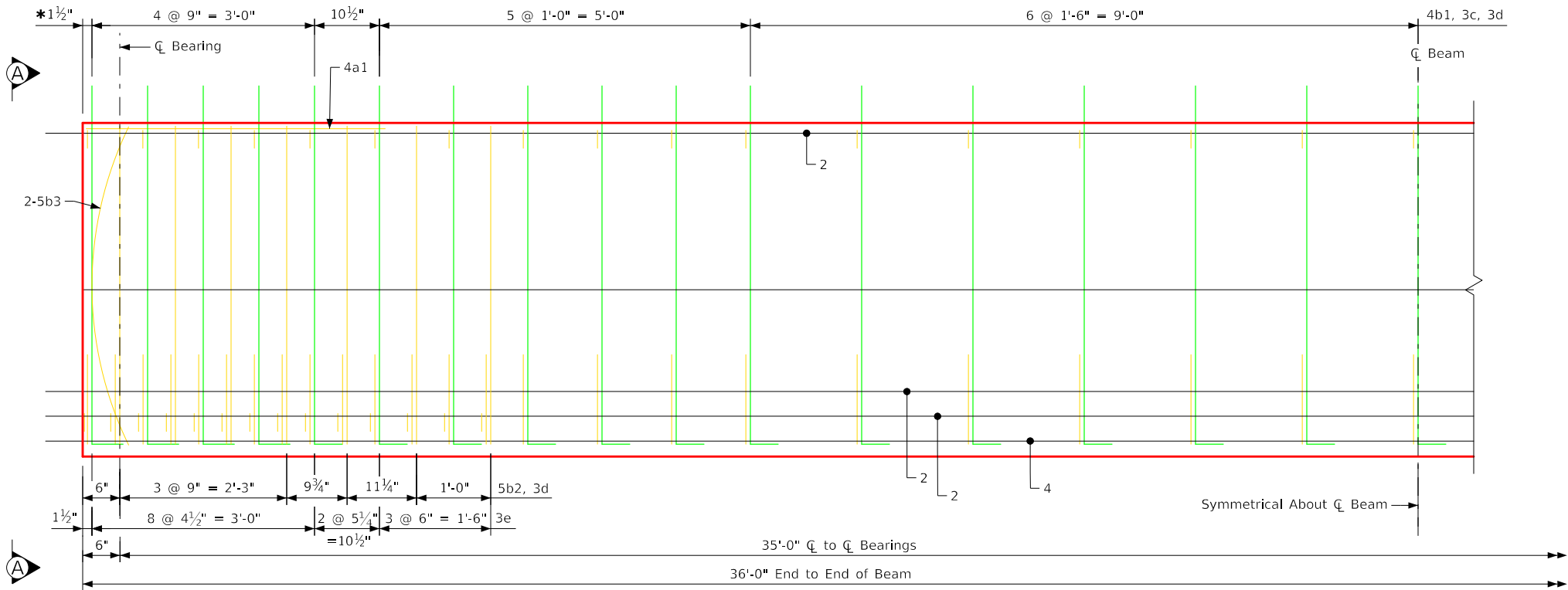


Typical at both beam ends

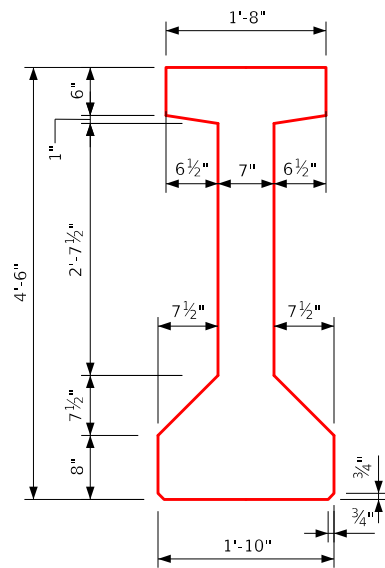
$4l/2$

[illegible]

Beams.dgn - 4631-D35 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4631).



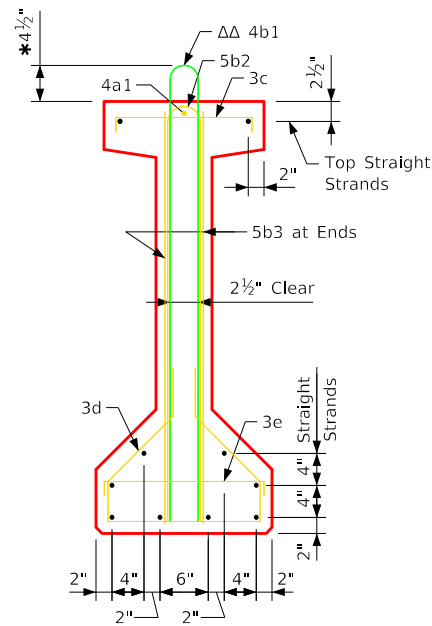
D35 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴

Beam Section
Properties



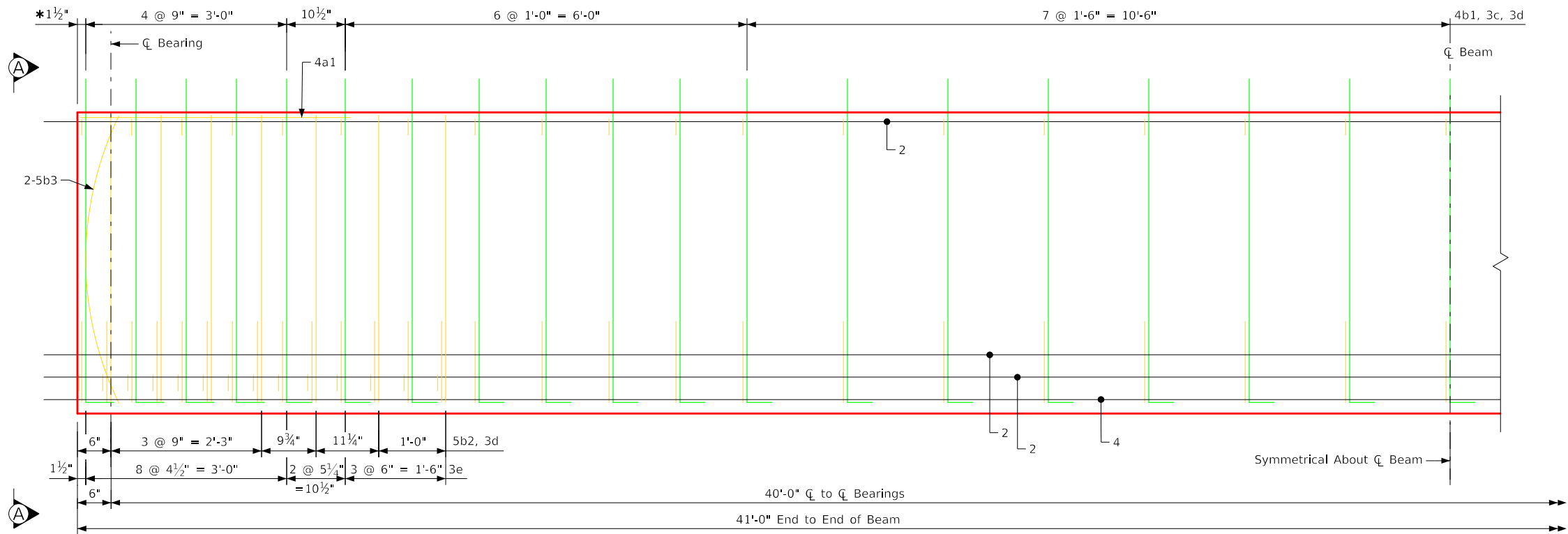
View A-A

Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

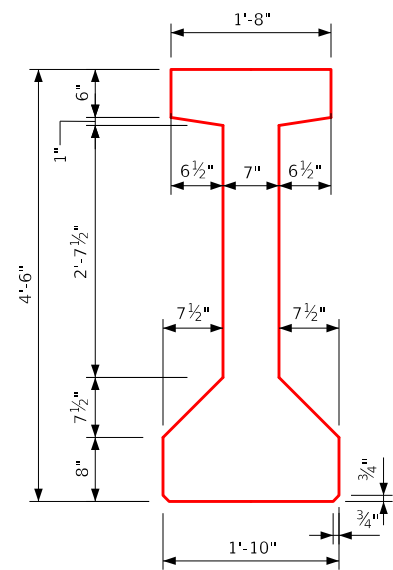
* Keep
 $\Delta\Delta$ Epoxy Coated Bars

D35 Beam Details

Beams.dgn - 4631-D40 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4631).



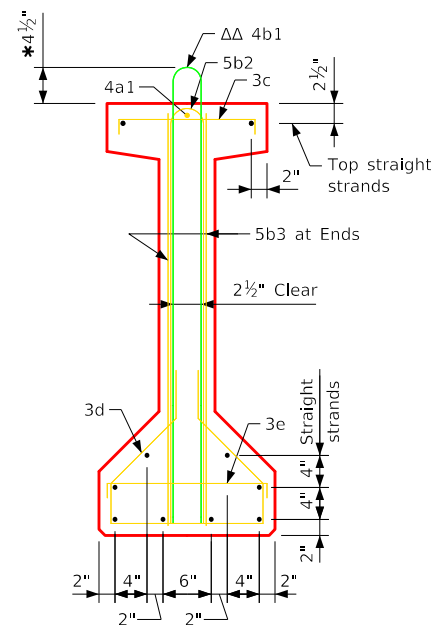
D40 Beam



Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴

Beam Section Properties

"D" Beam Cross Section



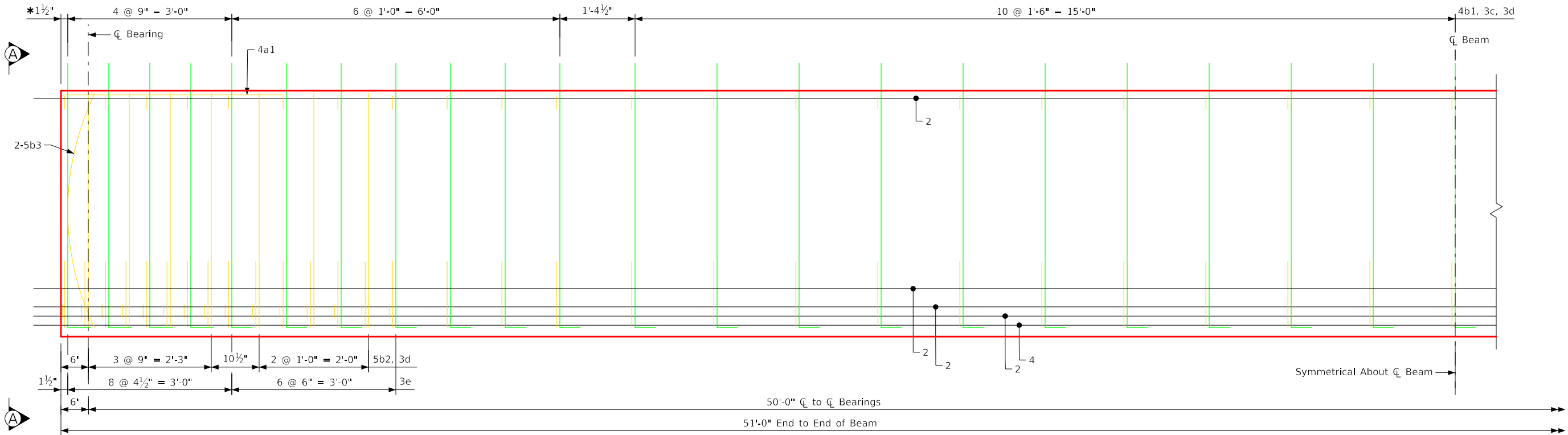
View A-A

Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

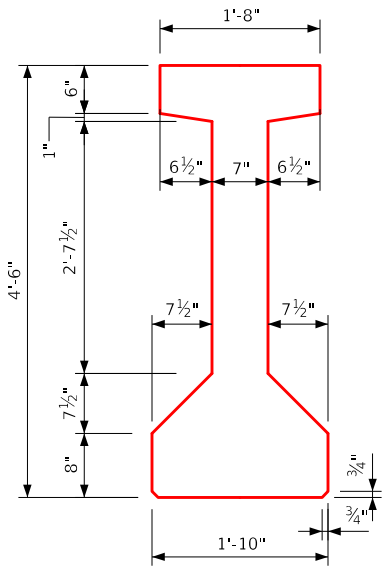
* Keep
ΔΔ Epoxy Coated Bars

D40 Beam Details

Beams.dgn - 4632-D50 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4632).

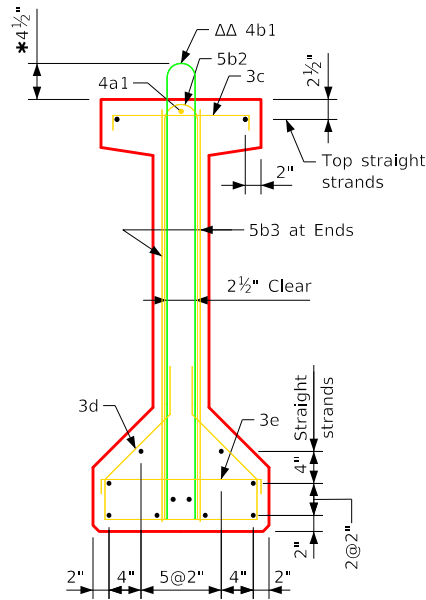


D50 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴
**Beam Section
Properties**



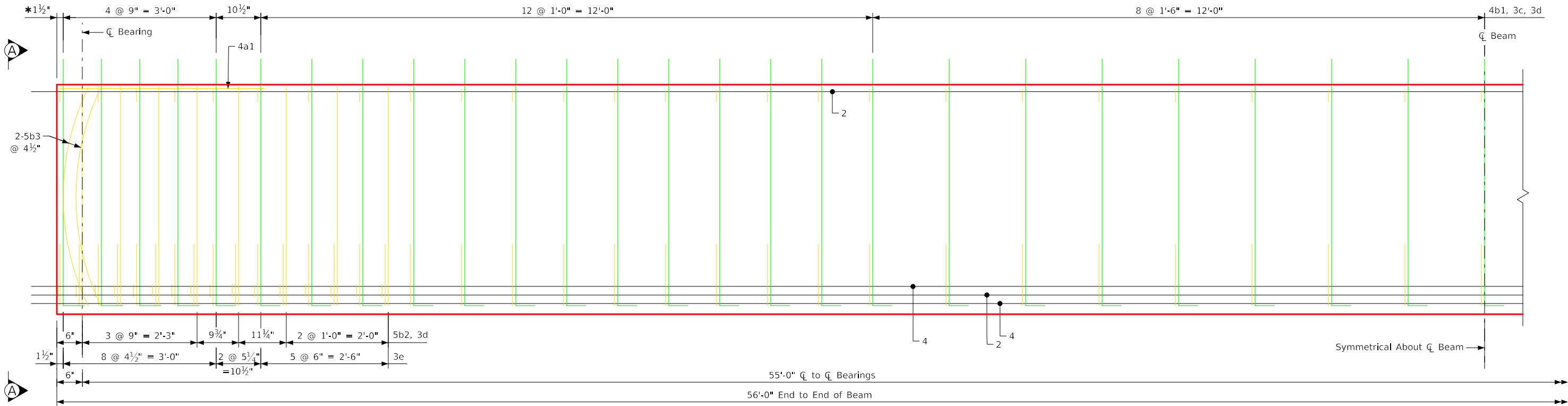
View A-A

Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

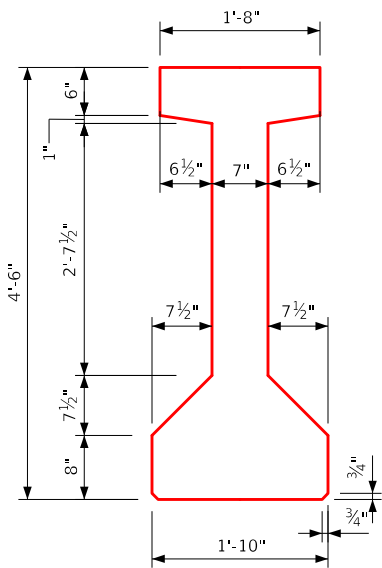
* Keep
ΔΔ Epoxy coated bars

D50 Beam Details

Beams.dgn - 4632-D55 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4632).

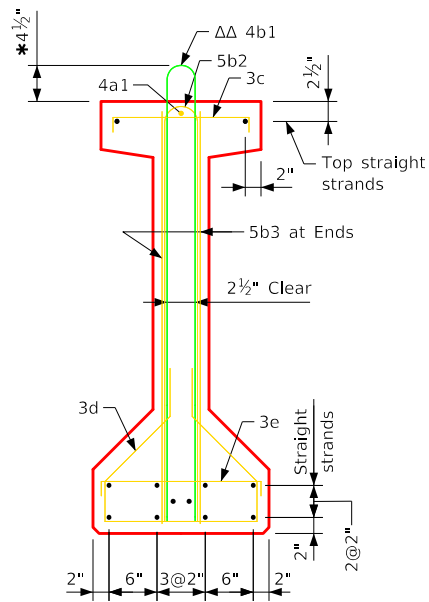


D55 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴
**Beam Section
Properties**



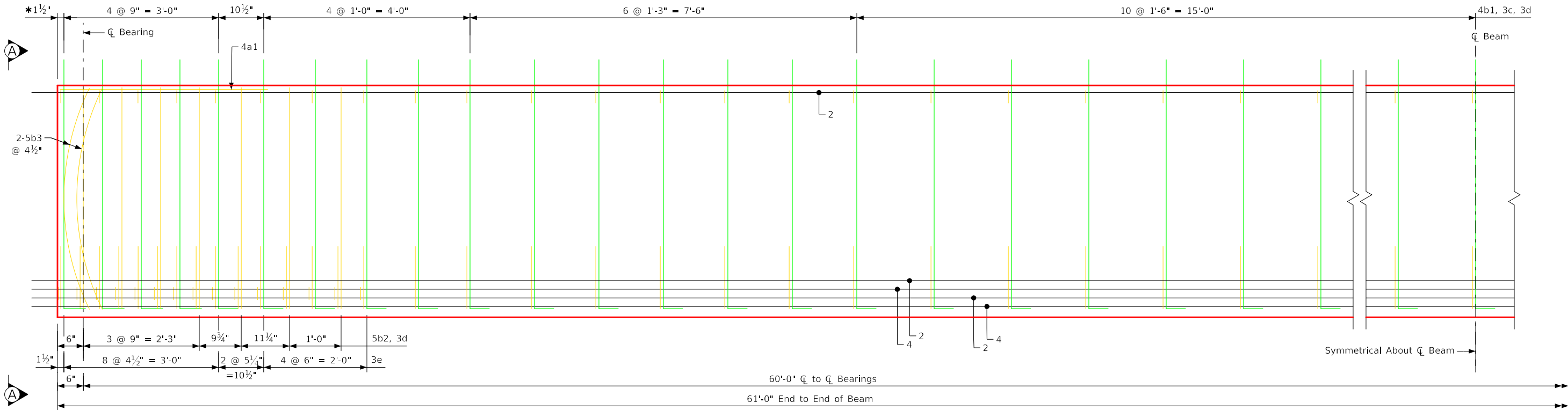
View A-A

Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

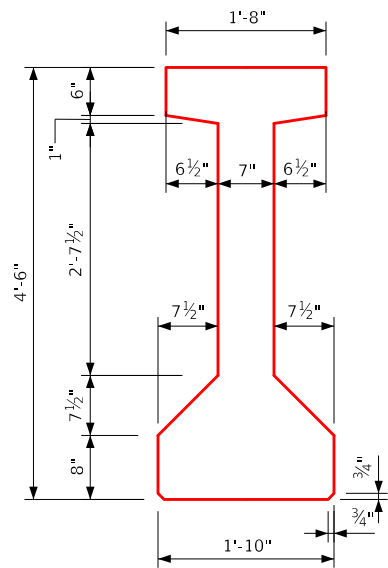
* Keep
ΔΔ Epoxy coated bars

D55 Beam Details

Beams.dgn - 4632-D60 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4632).



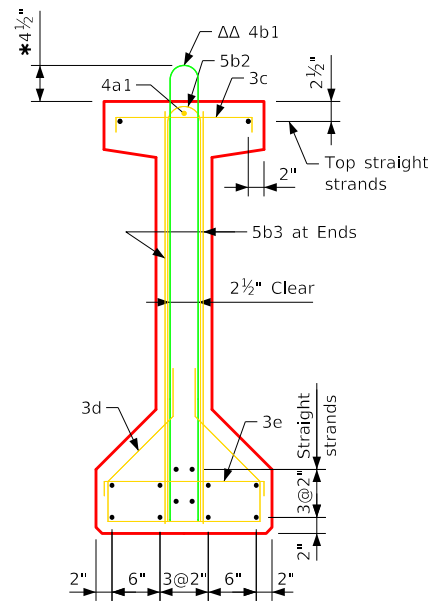
D60 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴

Beam Section
Properties



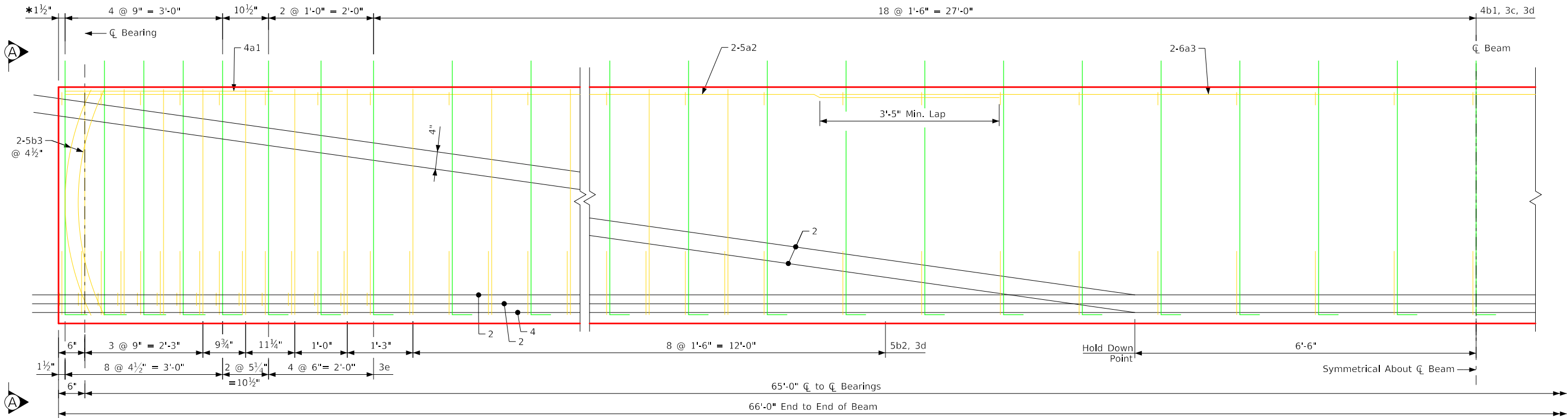
View A-A

Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

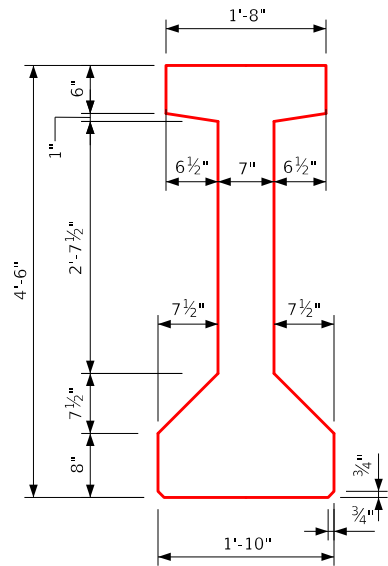
* Keep
ΔΔ Epoxy coated bars

D60 Beam Details

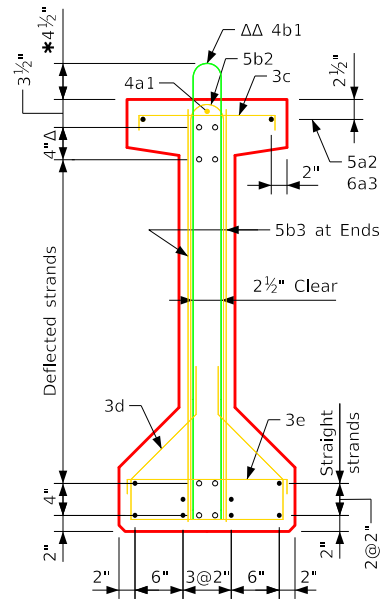
Beams.dgn - 4633-D65 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4633).



D65 Beam



Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴
Beam Section Properties



View A-A

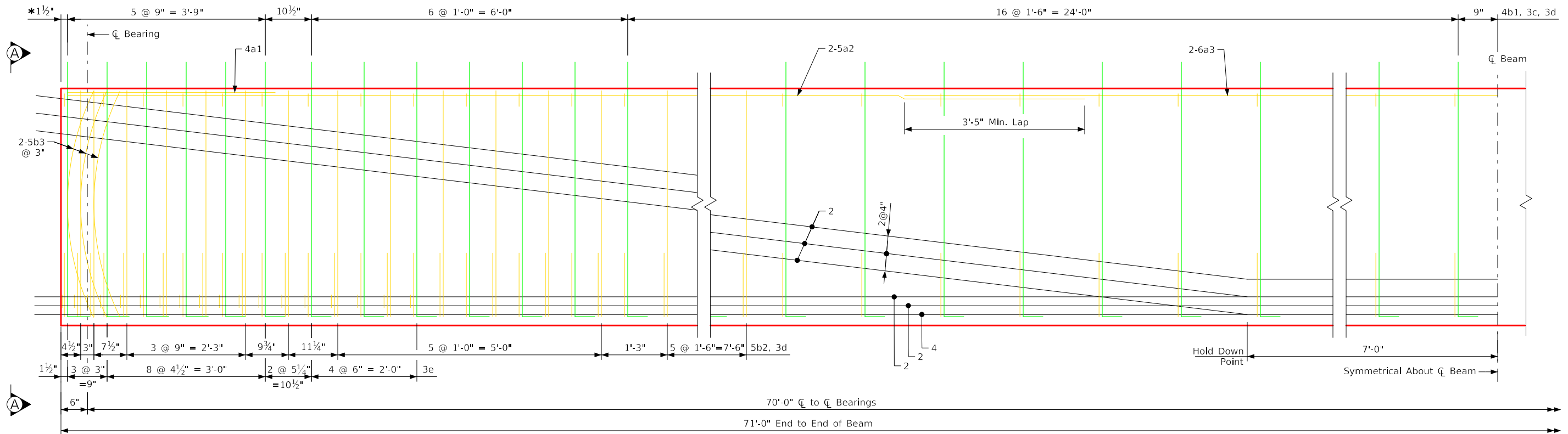
Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

- ° Deflected strands
- * Keep
- Δ Dimensions at end of beam
- ΔΔ Epoxy coated bars

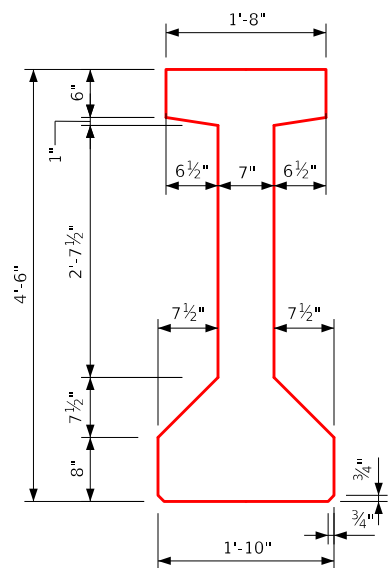
Note: Dimensions for the location of the deflected strands are at \bar{y}_b beam and end of beam.

D65 Beam Details

Beams.dgn - 4633-D70 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4633).

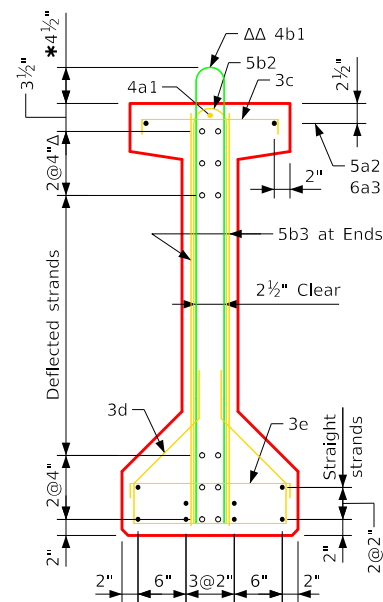


D70 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴
**Beam Section
Properties**



View A-A

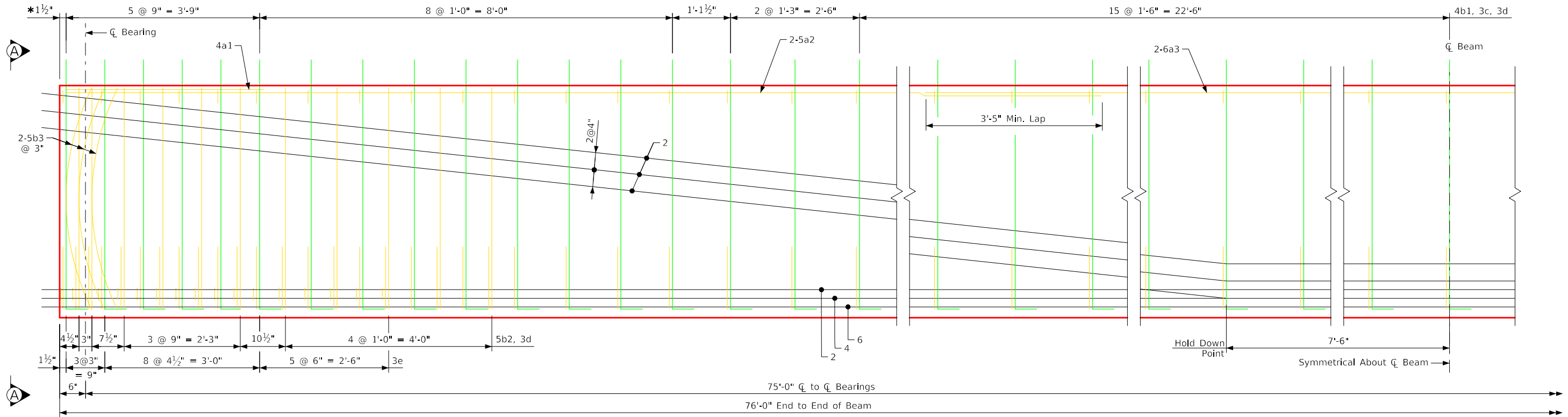
Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

- ◊ Deflected strands
- * Keep
- Δ Dimensions at end of beam
- ΔΔ Epoxy coated bars

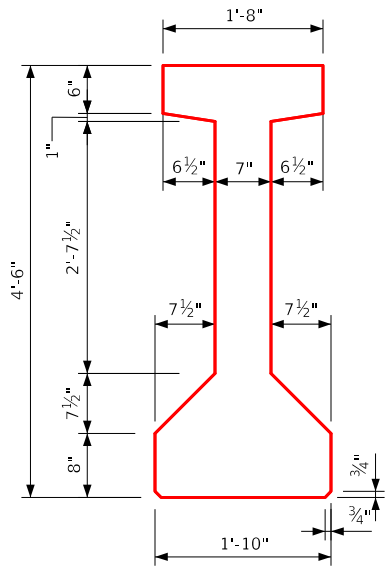
Note: Dimensions for the location of the deflected strands are at \bar{y}_b beam and end of beam.

D70 Beam Details

Beams.dgn - 4633-D75 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4633).

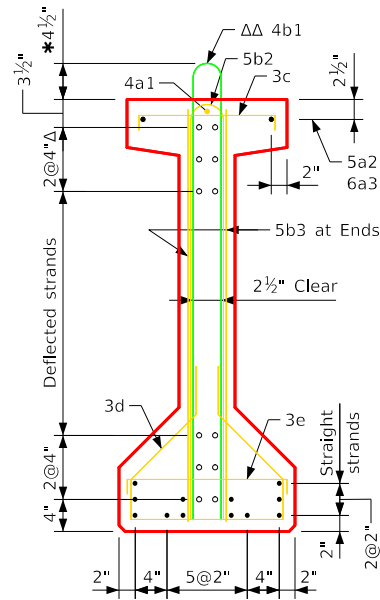


D75 Beam



Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴

Beam Section Properties



View A-A

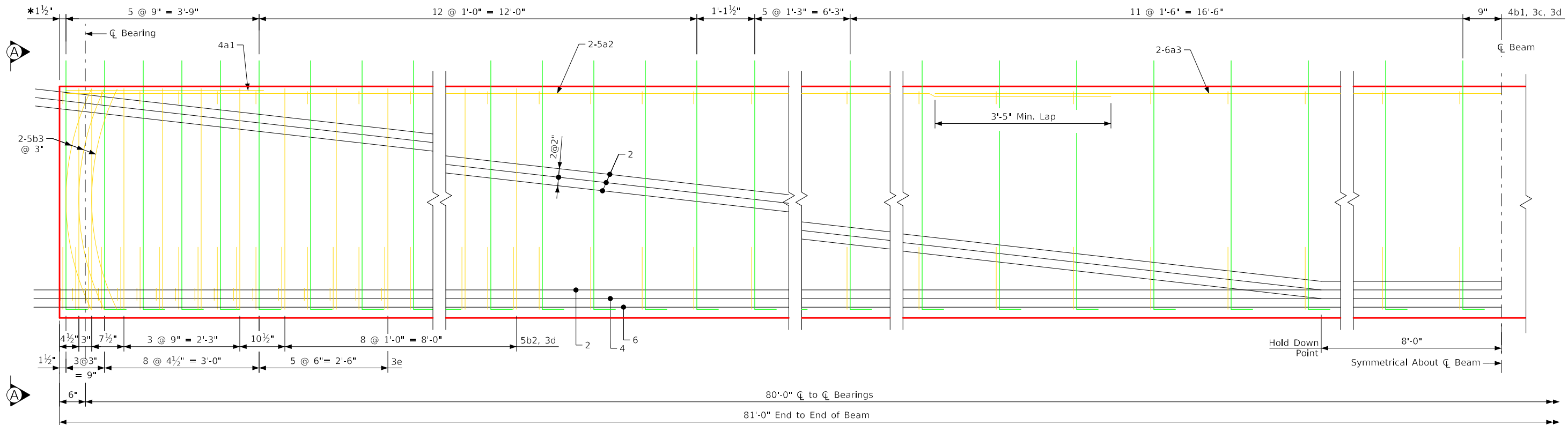
Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

- Deflected strands
- * Keep
- Δ Dimensions at end of beam
- ΔΔ Epoxy coated bars

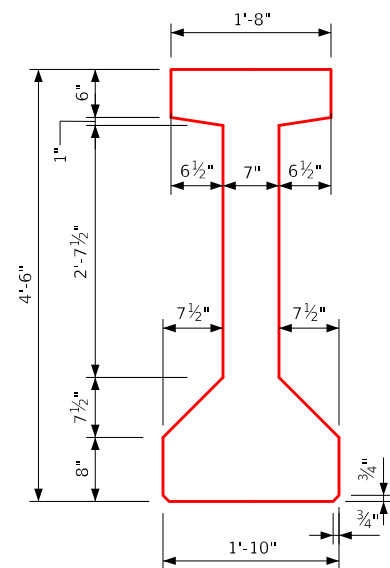
Note: Dimensions for the location of the deflected strands are at CL beam and end of beam.

D75 Beam Details

Beams.dgn - 4633-D80 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4633).

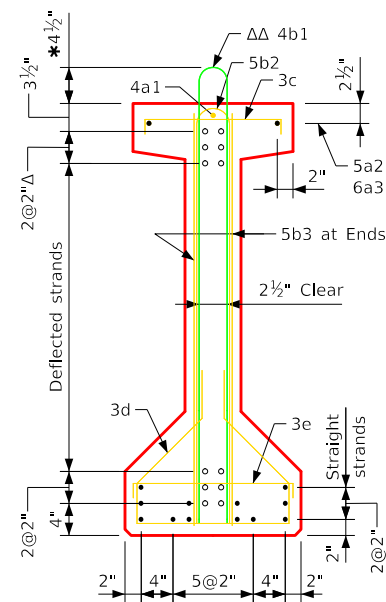


D80 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴
**Beam Section
Properties**



View A-A

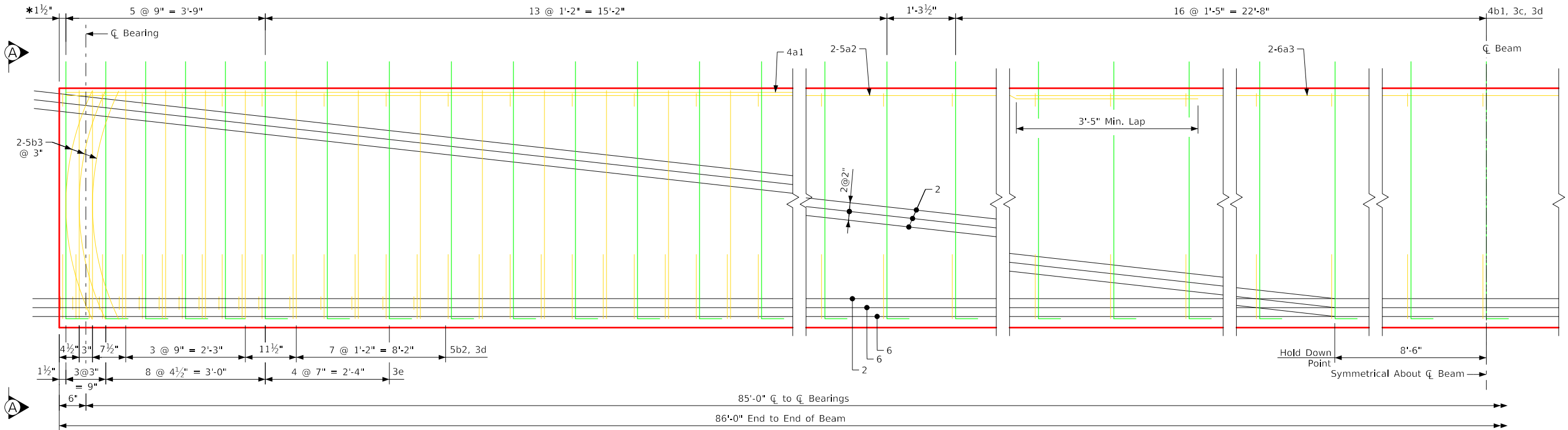
Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

- ° Deflected strands
- * Keep
- Δ Dimensions at end of beam
- ΔΔ Epoxy coated bars

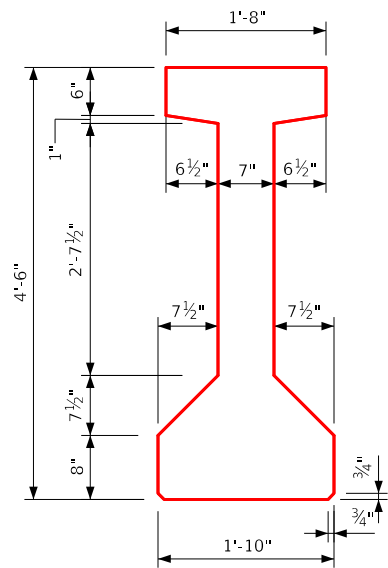
Note: Dimensions for the location of the deflected strands are at CL beam and end of beam.

D80 Beam Details

Beams.dgn - 4634-D85 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4634).

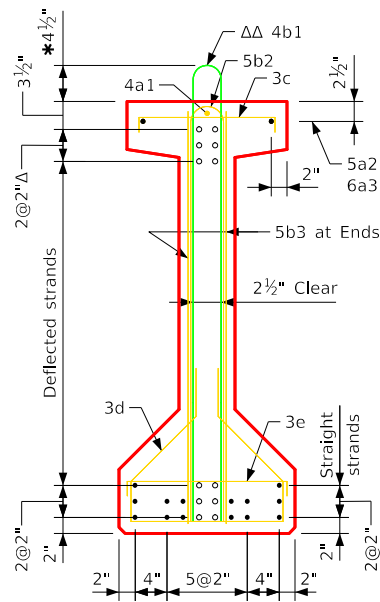


D85 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴
**Beam Section
Properties**



View A-A

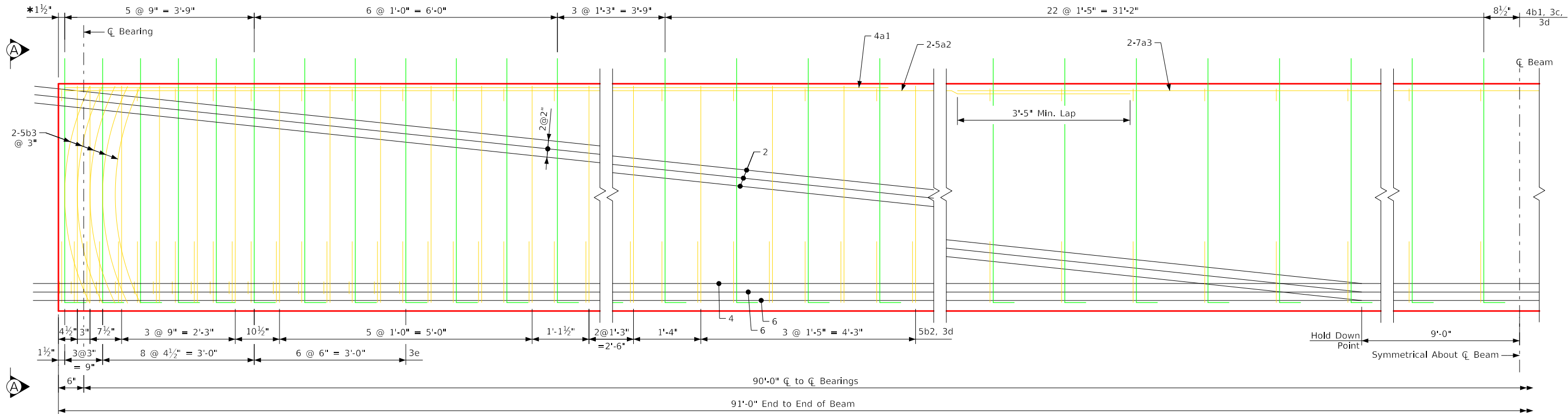
Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

- Deflected strands
- * Keep
- Δ Dimensions at end of beam
- ΔΔ Epoxy coated bars

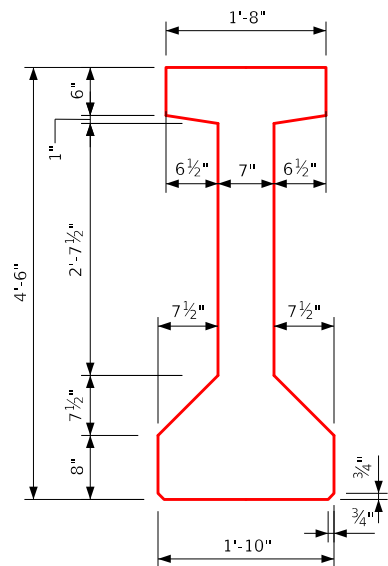
Note: Dimensions for the location of the deflected strands are at \bar{y}_b beam and end of beam.

D85 Beam Details

Beams.dgn - 4634-D90 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4634).

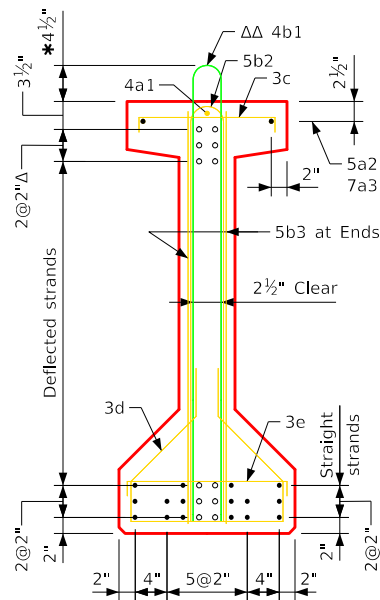


D90 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴
**Beam Section
Properties**



View A-A

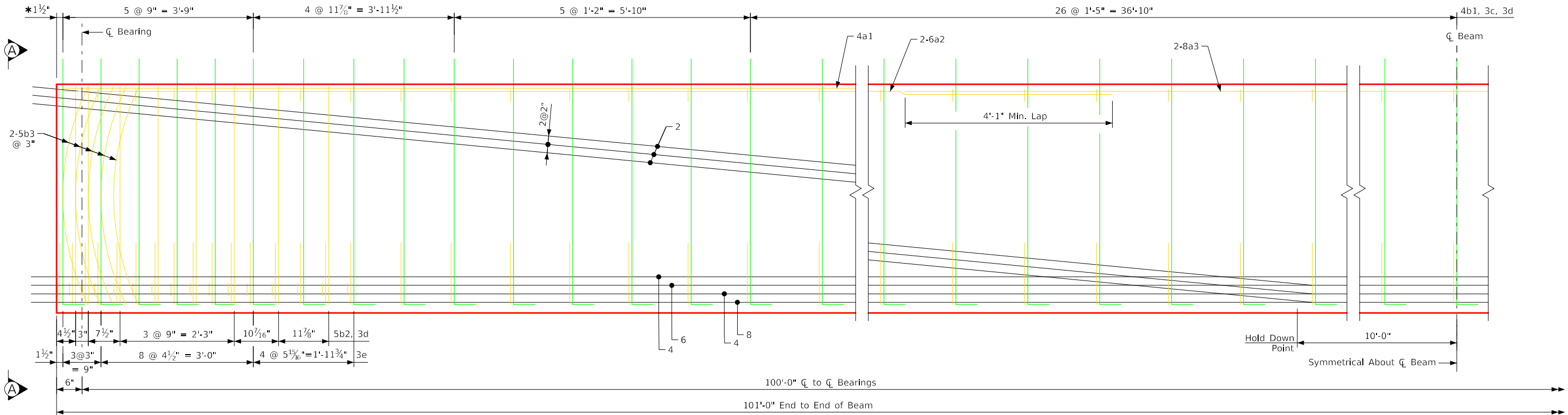
Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

- Deflected strands
- * Keep
- Δ Dimensions at end of beam
- ΔΔ Epoxy coated bars

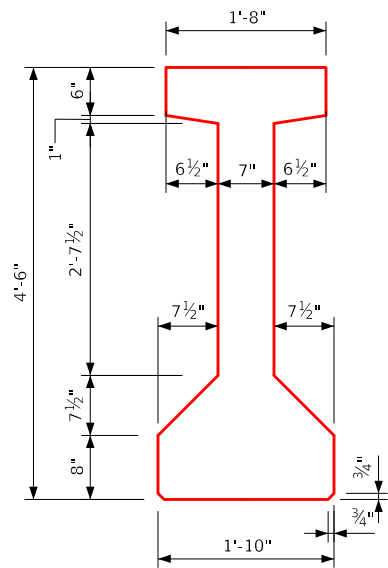
Note: Dimensions for the location of the deflected strands are at \bar{C}_L beam and end of beam.

D90 Beam Details

Beams.dgn - 4635-D100 - This Sheet Issued 04-2024. Additional Sheet for Clarity. (Sheet Number was Originally 4635).

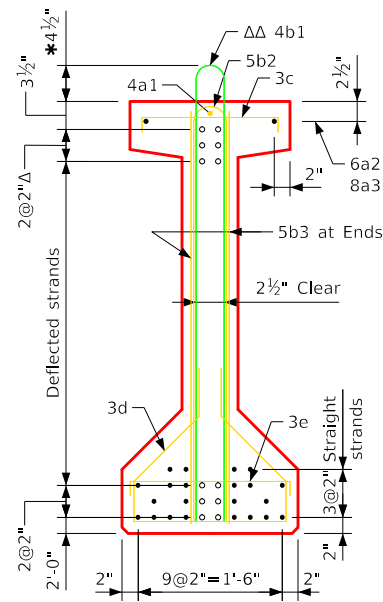


D100 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴
**Beam Section
Properties**



View A-A

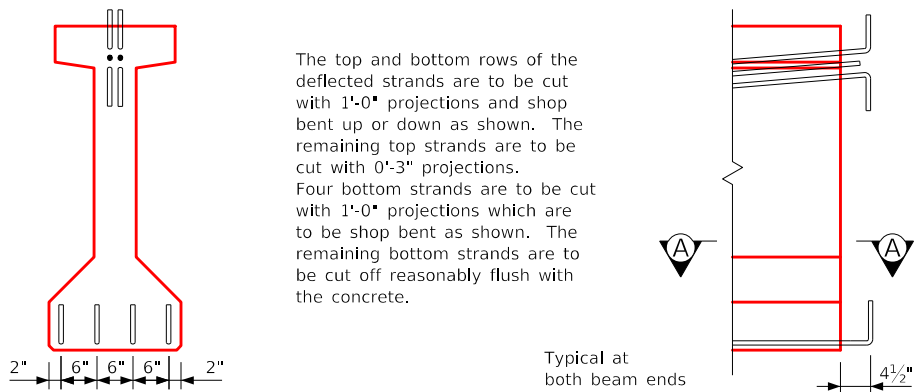
Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

- Deflected strands
- * Keep
- Δ Dimensions at end of beam
- ΔΔ Epoxy coated bars

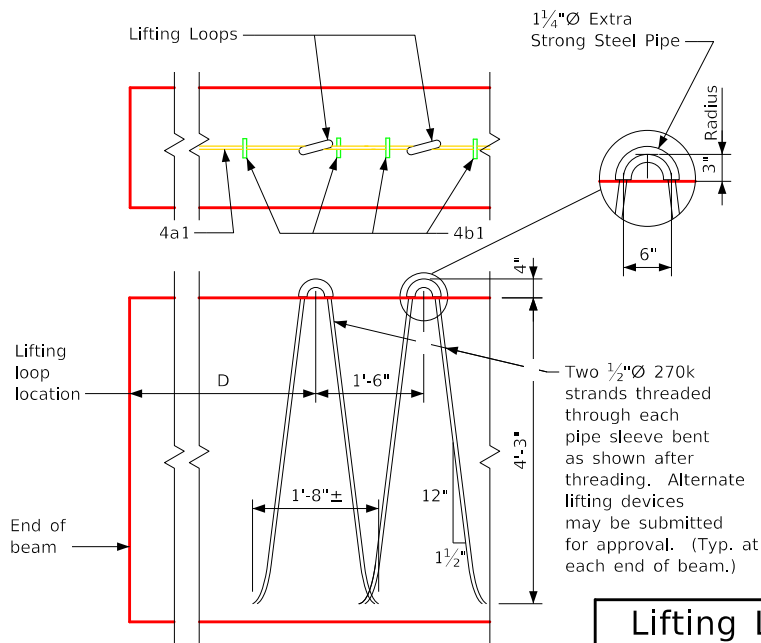
Note: Dimensions for the location of the deflected strands are at \bar{y}_b beam and end of beam.

D100 Beam Details

Revised 12-99.
Issued 02-92.
Beams.dgn - 4636-D110s1 - This Sheet Issued 04-2024. Additional Sheet For Clarity. (Sheet Number was Originally 4636).



Strand Projection at Beam Ends When Embedded in Concrete End Diaphragms



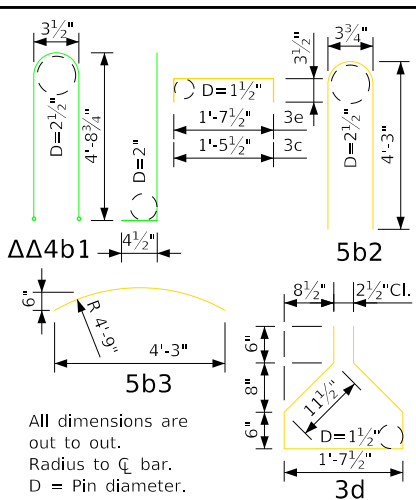
Lifting Loop Detail Beam D110

Lifting Loop And Overhang Table

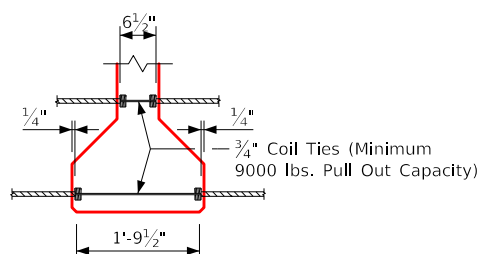
Beams	Lifting Loops Each End	# of Strands Per Loop	D	Beam Overhang (ft.)
D110	2	2	6'-3"	10.00'

ΔΔ 4b1 bars to be epoxy coated

Reinforcing Bar List Beam D110			
Bar	Shape	No.	Length
4a1		2	26'-6"
6a2		4	39'-6"
8a3		2	40'-0"
ΔΔ 4b1		91	10'-4"
5b2		16	8'-8"
5b3		20	4'-4"
3c		91	2'-1"
3d		107	5'-7"
3e		32	2'-3"



Note: All mild reinforcing steel can be epoxy coated at Contractor's option without modification to bar length or details at no additional cost to the State.



Coil Tie Detail

Number and exact location of coil ties to be as detailed on specific bridge design.

D110 Beam Data

D Beam	Span Length ℄-℄ Bearing	Overall Beam Length (L)	Concrete Strength		Strand Size Dia. (in.)	No. of Strands		③ Total Initial Prestress (kips)	Hold Down Force (kips)	Camber (in.) ④		Deflection (in.) Δ _D		Permissible Maximum Spacing	Weight (tons)	Concrete (cu. yd.)	Reinforcing Steel (weight-lb.)		
			f'ci (ksi.)	f'c (ksi.)		Straight	Deflected			At Release	After Losses	Immediate ① (elastic) Δ _I	Time ② (plastic) Δ _T	HL-93 Loading					
														Steel Diaphragm				Steel Diaphragm	Steel Diaphragm
D110	110'-0"	111'-0"	6.5	7.5	0.60"	28	6	1446	21.2	2.74"	4.38"	2.68"	0.67"	7'-6"	36.9	18.2	1672		

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 in.²) 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 I.M.570.

Bearings shall be as detailed on other design sheets.

Beams to be used in bridges made continuous by the poured in place deck, are to be at least 28 days old before the deck 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 D110 beam 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.

Minimum concrete f'c (at 28 days) and minimum f'ci at release are located in the D Beam Data Table above.

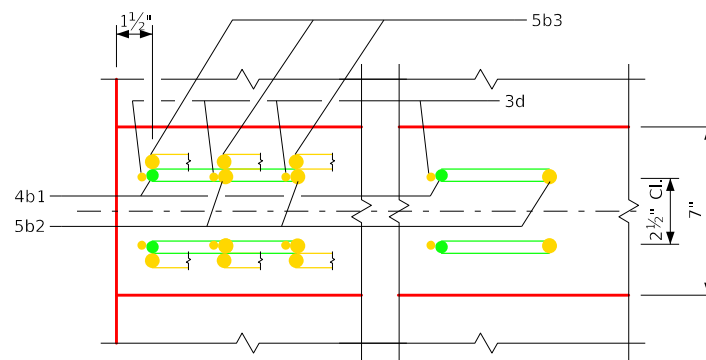
0.6" diameter strands stressed to not more than 5,000 lbs. each may be used in lieu of the a bars which run the full length of the beam in the top flange.

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.

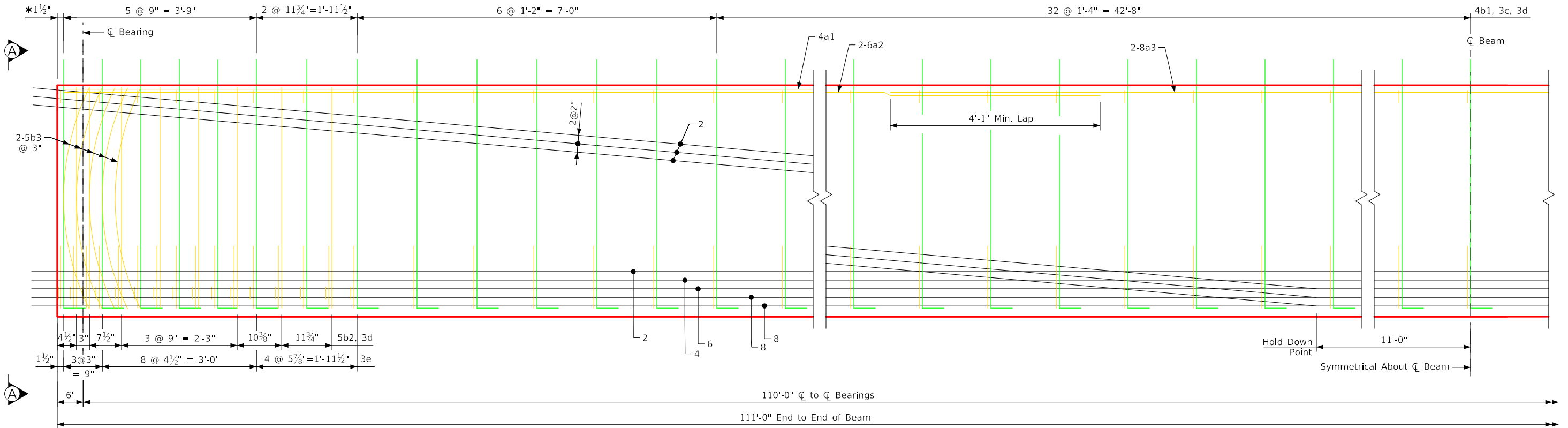
When expansion joints are used, concrete sealer shall be applied to the prestressed beam end sections. The sealing shall be in accordance with Materials I.M. 570 (Fabricator Application) and I.M. 491.12 (Contractor Application).



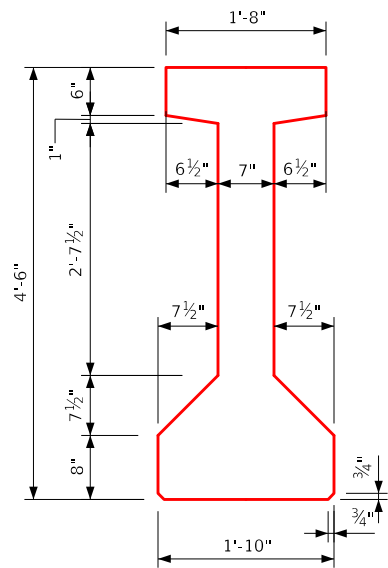
Part Section A-A Showing Placement of Stirrups Near End of Beam

D110 Beam - Data Details

Beams.dgn - 4636-D110s2 - This Sheet Issued 04-2024. Additional Sheet For Clarity. (Sheet Number was Originally 4636).

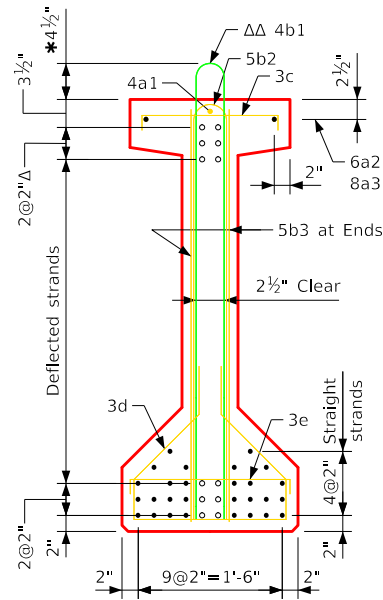


D110 Beam



"D" Beam
Cross Section

Area = 638.75 in.²
 $\bar{y}_b = 24.37$ in.
 $I = 214,974$ in.⁴
**Beam Section
Properties**



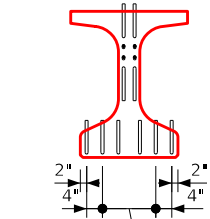
View A-A

Note: Bars 5b3 are to be placed in pairs. Tie 5b3 bars to 4b1 & 5b2.

- ◊ Deflected strands
- * Keep
- Δ Dimensions at end of beam
- ΔΔ Epoxy coated bars

Note: Dimensions for the location of the deflected strands are at \bar{y}_b beam and end of beam.

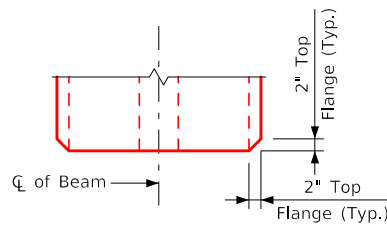
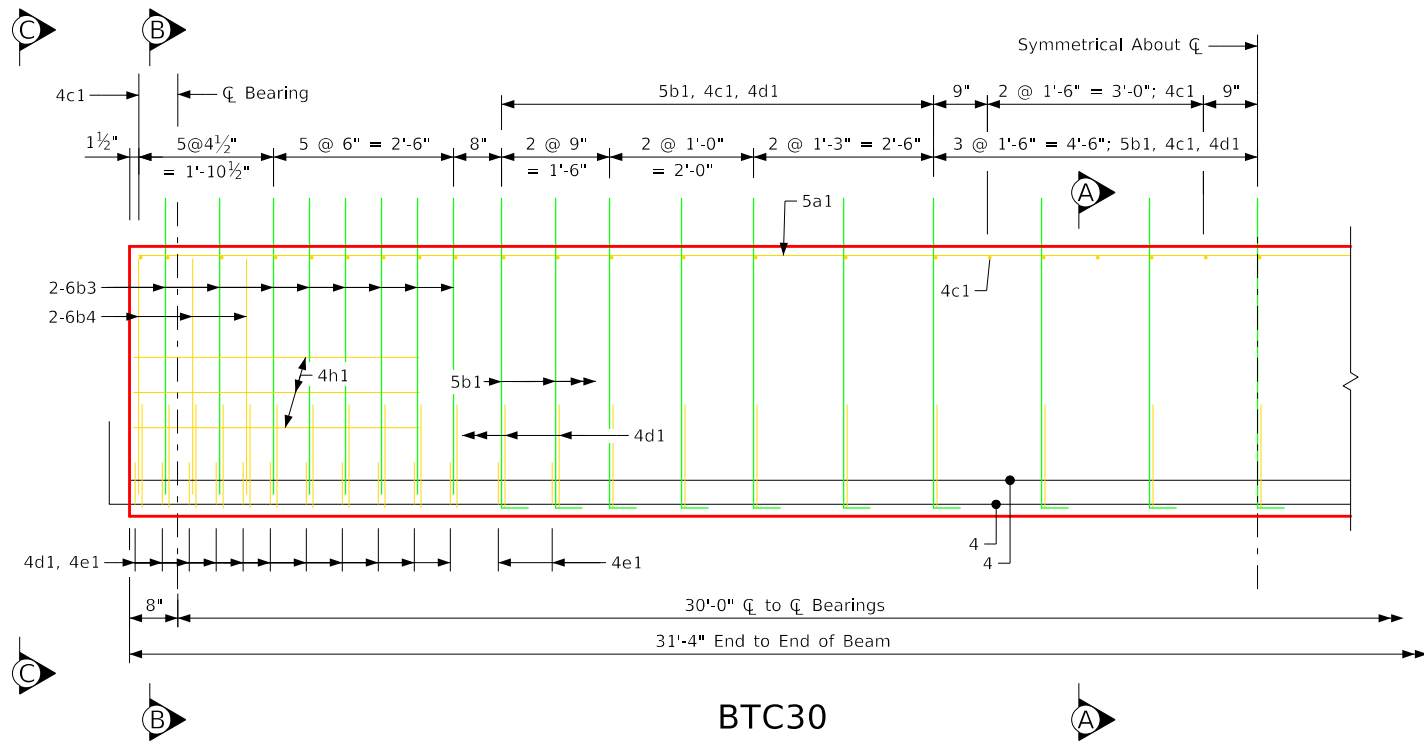
D110 Beam Details



Typical at both beam ends

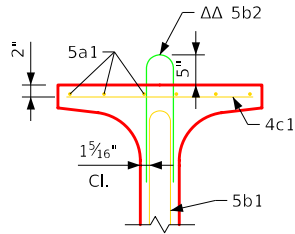
6"

Revision 10-07: 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A Added.
Issued 05-04.
Beams.dgn - 4701 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

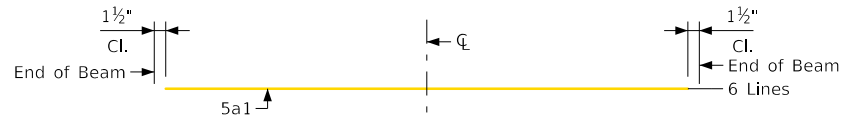


Section A-A (Alternate)

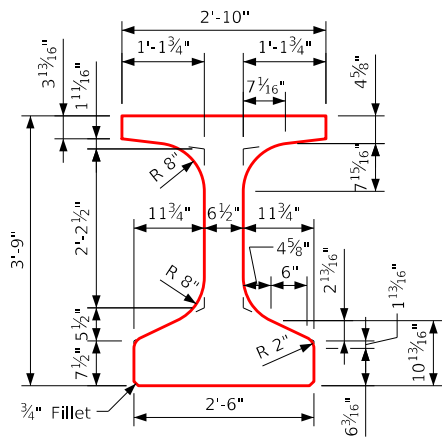
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

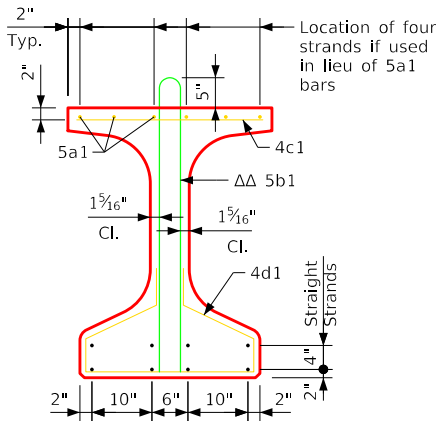
Beam Section Properties



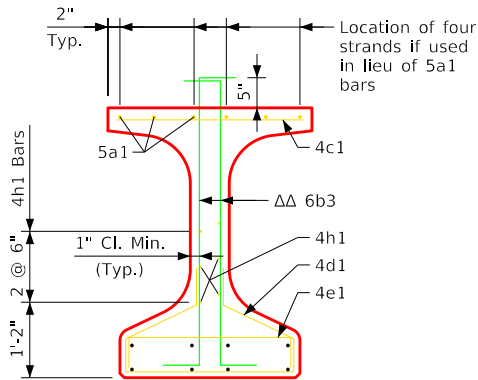
Top Flange Longitudinal Bar Layout



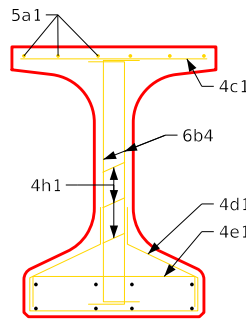
BTC Beam Cross Section



Section A-A



Section B-B

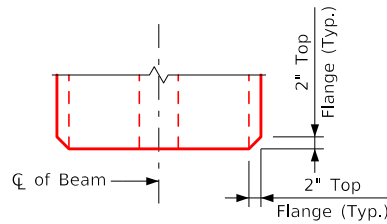
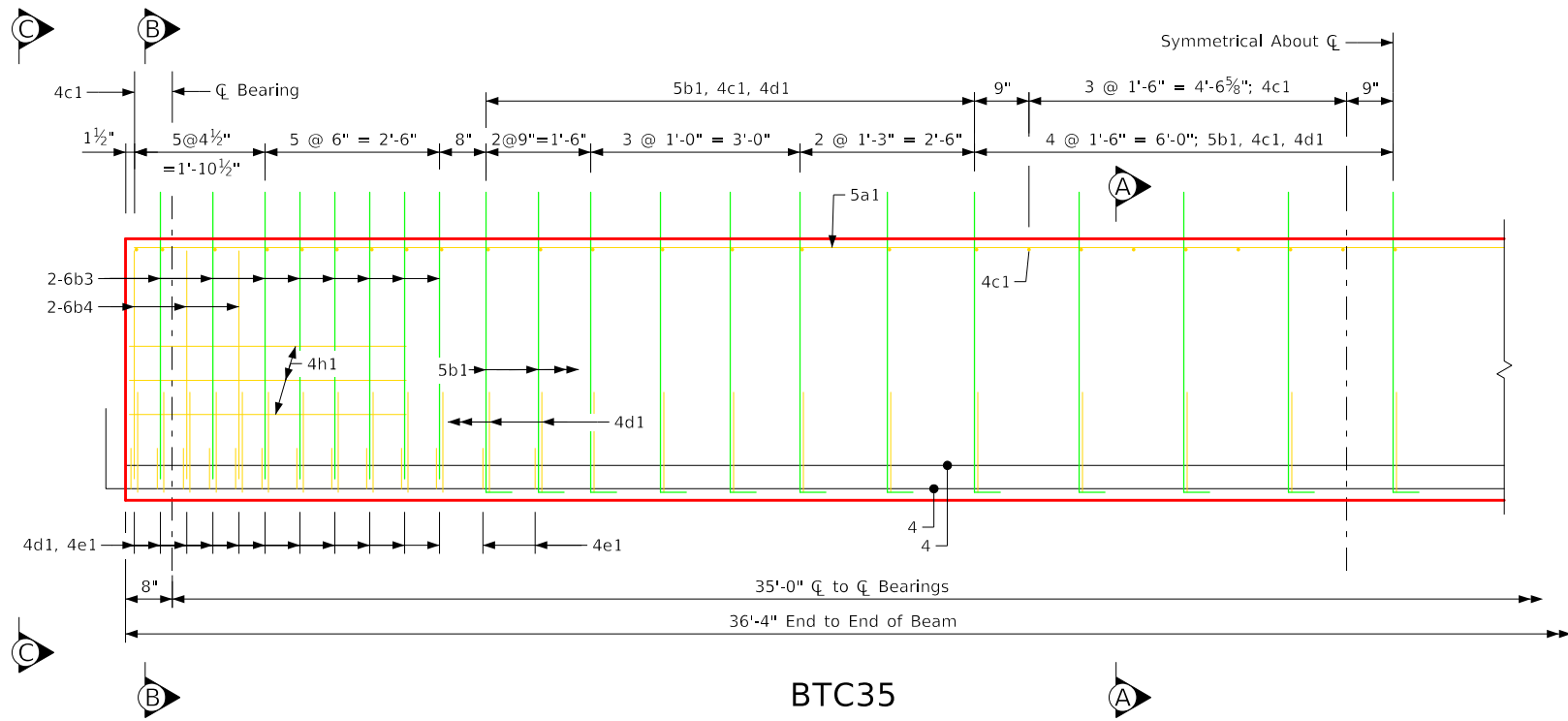


View C-C

ΔΔ Epoxy Coated Bars

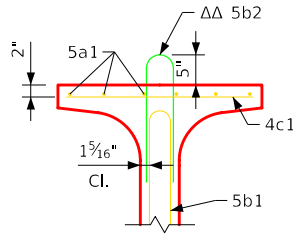
BTC30 Beam Details

Revision 10-07: 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A Added.
Issued 05-04.
Beams.dgn - 4702 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

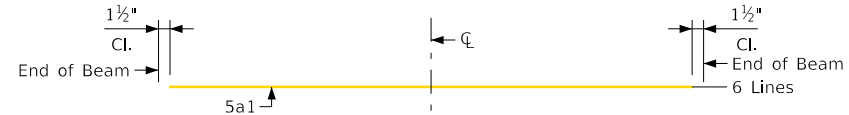


Section A-A
(Alternate)

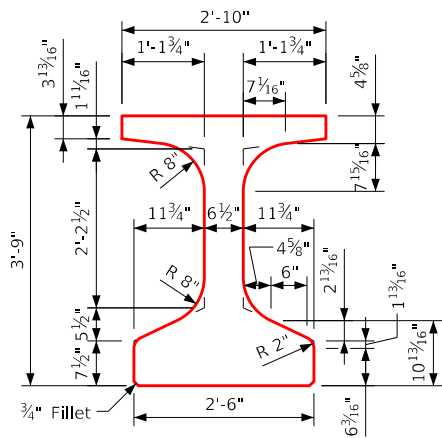
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

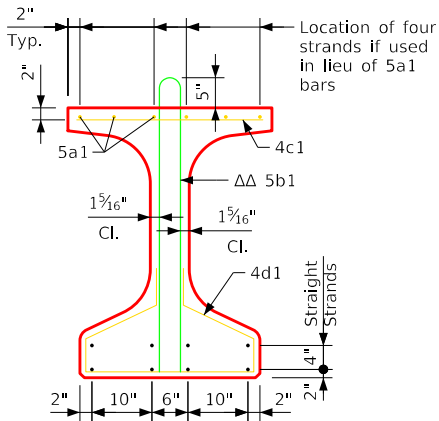
Beam Section Properties



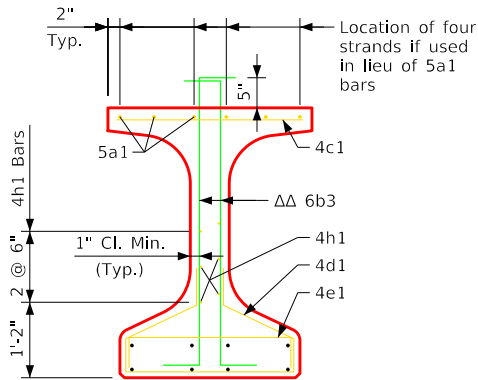
Top Flange Longitudinal Bar Layout



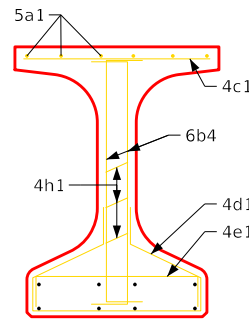
BTC Beam Cross
Section



Section A-A



Section B-B

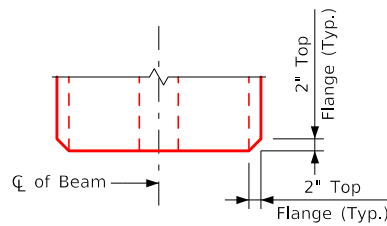
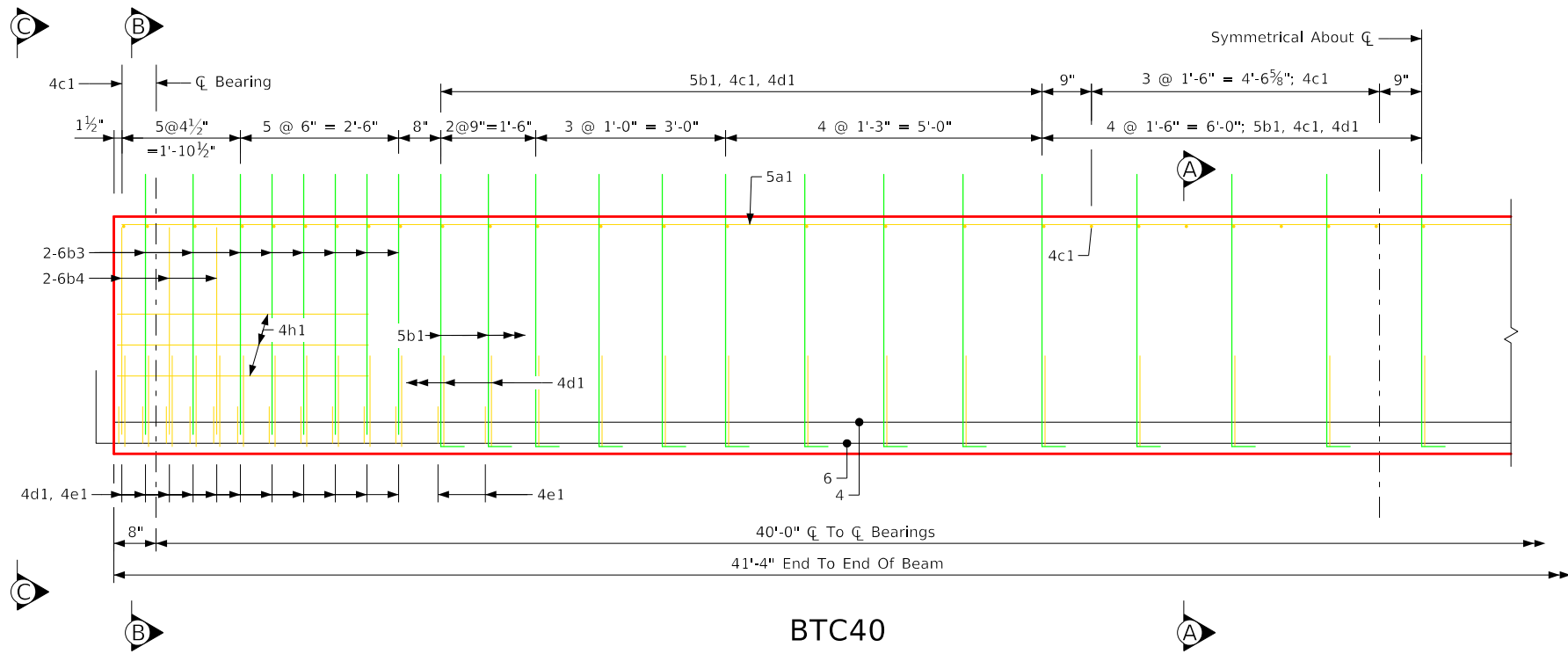


View C-C

ΔΔ Epoxy Coated Bars

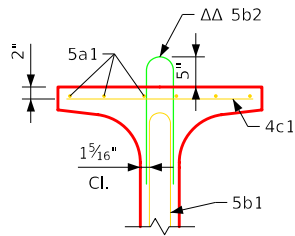
BTC35 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "C" Beam - 35'-0" Span	Standard Sheet 4702	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:56:58 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

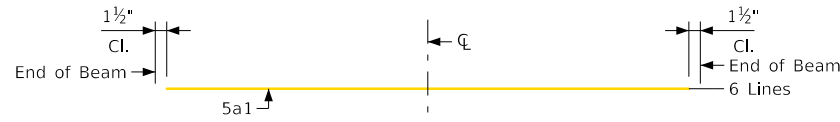


Section A-A
(Alternate)

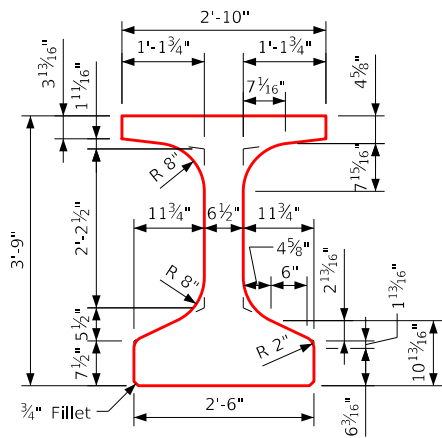
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

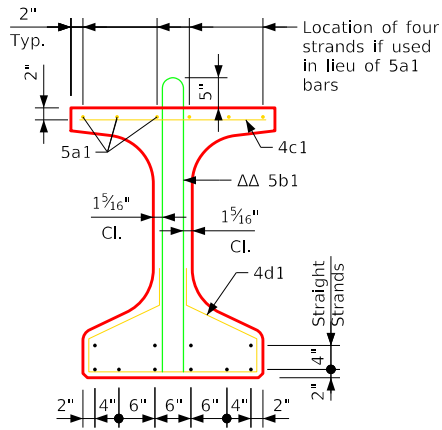
Beam Section Properties



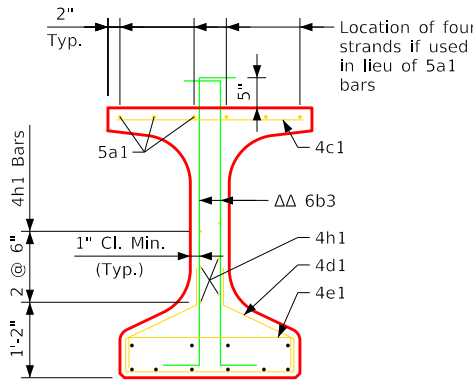
Top Flange Longitudinal Bar Layout



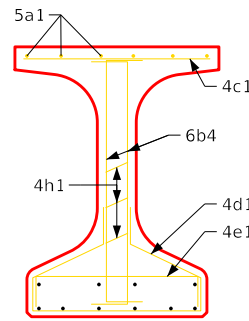
BTC Beam Cross Section



Section A-A



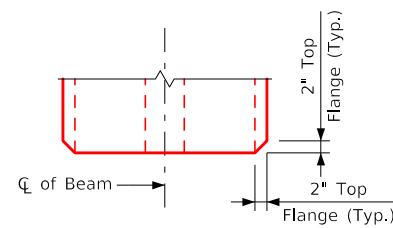
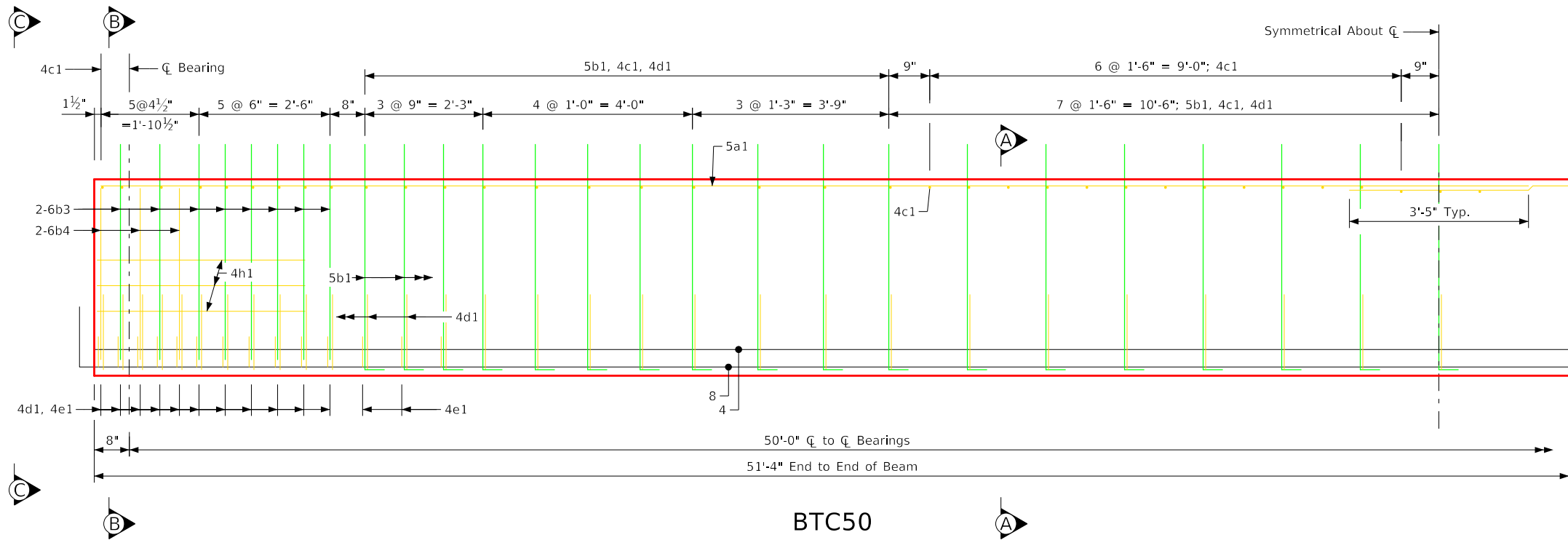
Section B-B



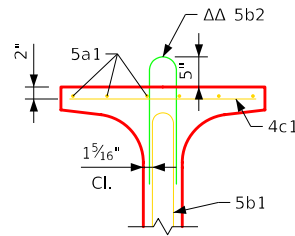
View C-C

ΔΔ Epoxy Coated Bars

BTC40 Beam Details



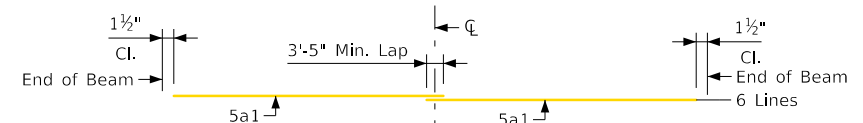
Top View The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



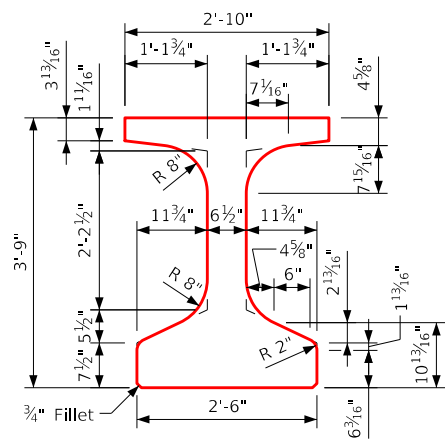
Section A-A (Alternate) See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

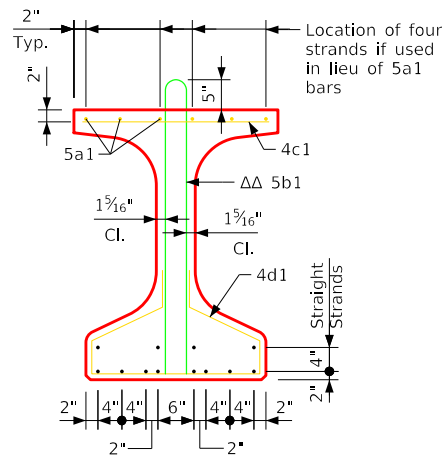
Beam Section Properties



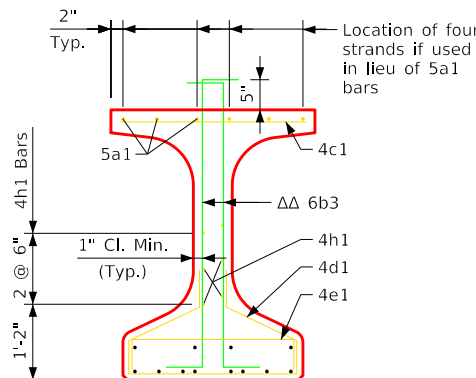
Top Flange Longitudinal Bar Layout



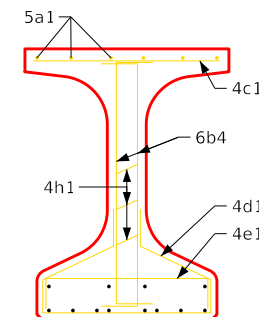
BTC Beam Cross Section



Section A-A



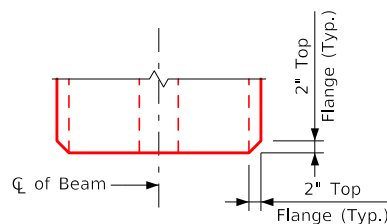
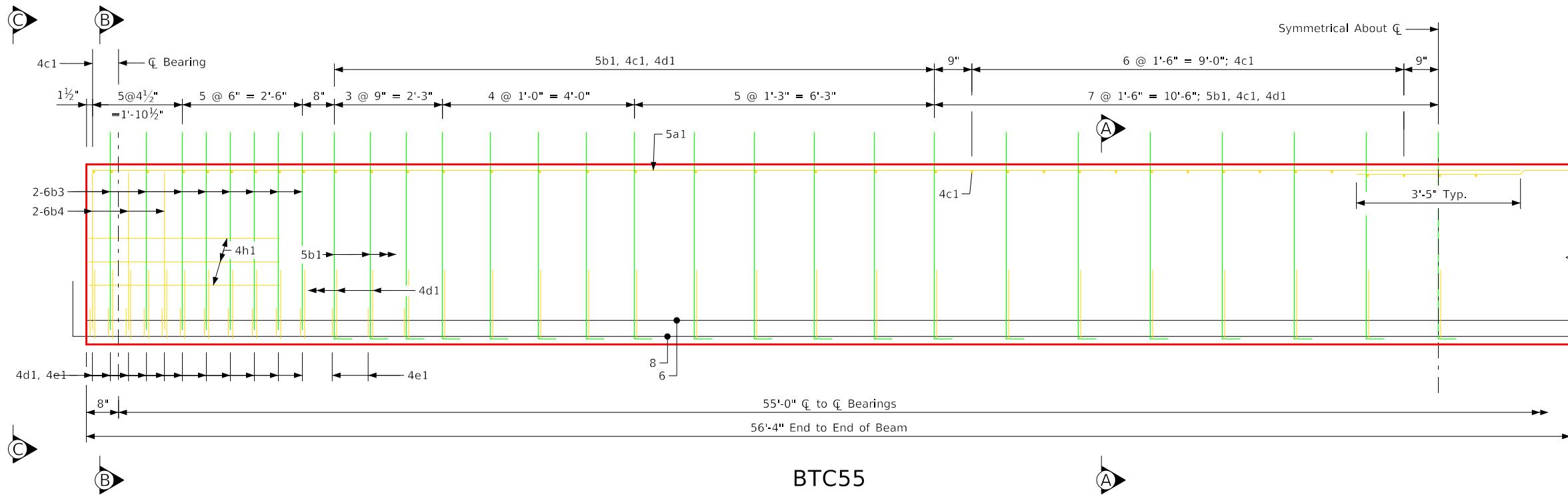
Section B-B



View C-C

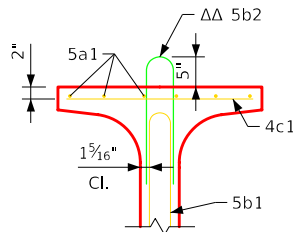
ΔΔ Epoxy Coated Bars

BTC50 Beam Details



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

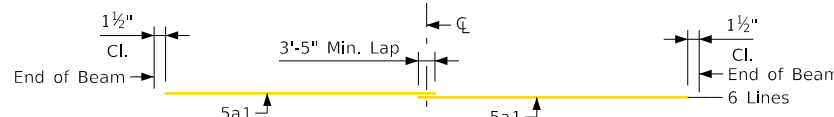


Section A-A (Alternate)

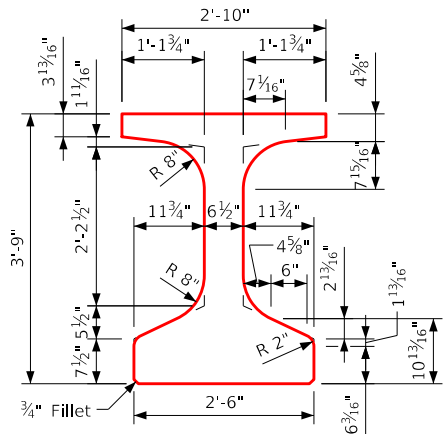
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

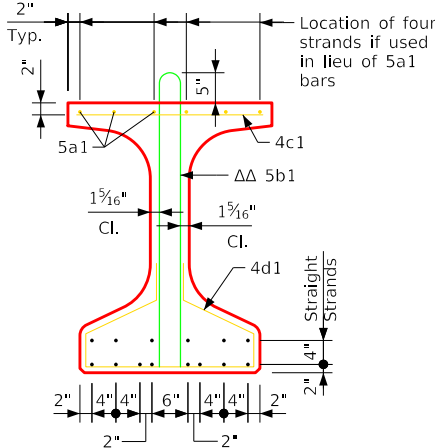
Beam Section Properties



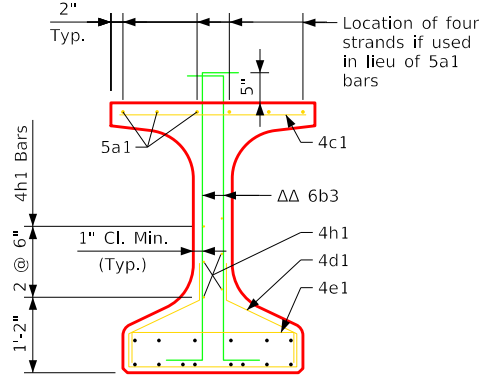
Top Flange Longitudinal Bar Layout



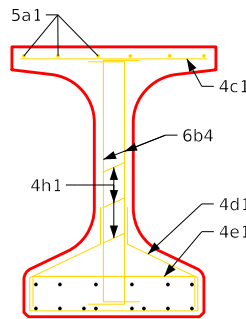
BTC Beam Cross Section



Section A-A



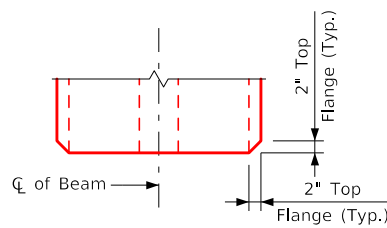
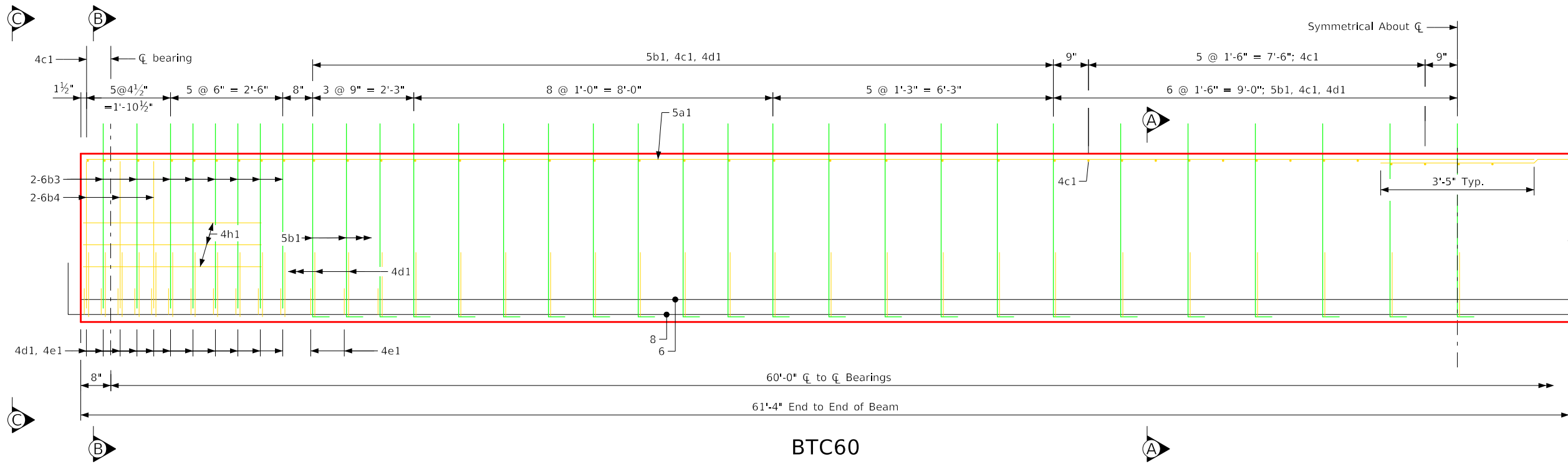
Section B-B



View C-C

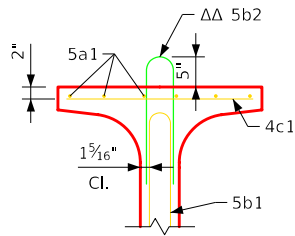
ΔΔ Epoxy Coated Bars

BTC55 Beam Details



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

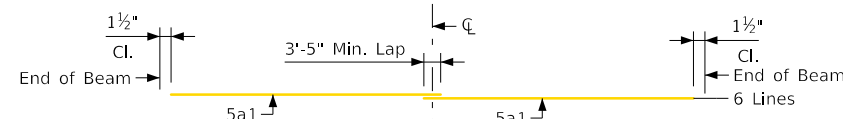


Section A-A (Alternate)

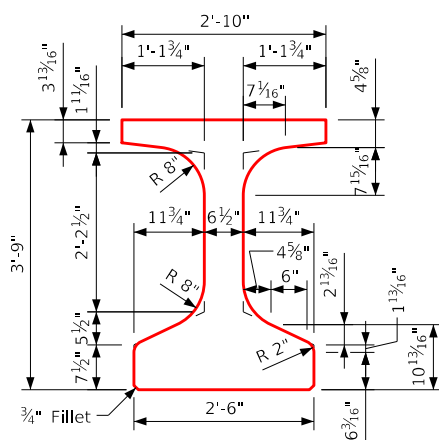
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

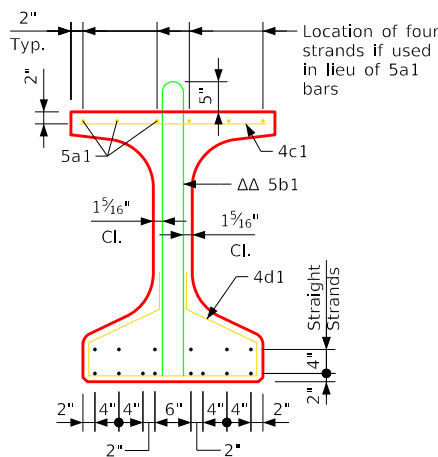
Beam Section Properties



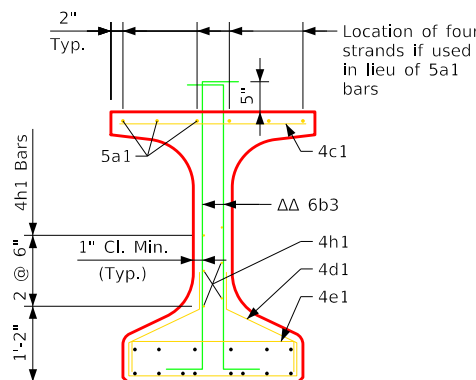
Top Flange Longitudinal Bar Layout



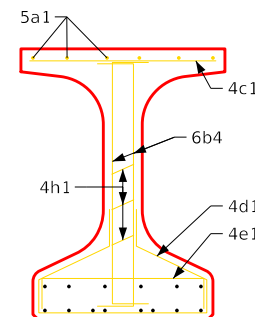
BTC Beam Cross Section



Section A-A



Section B-B

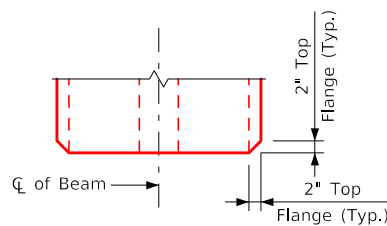
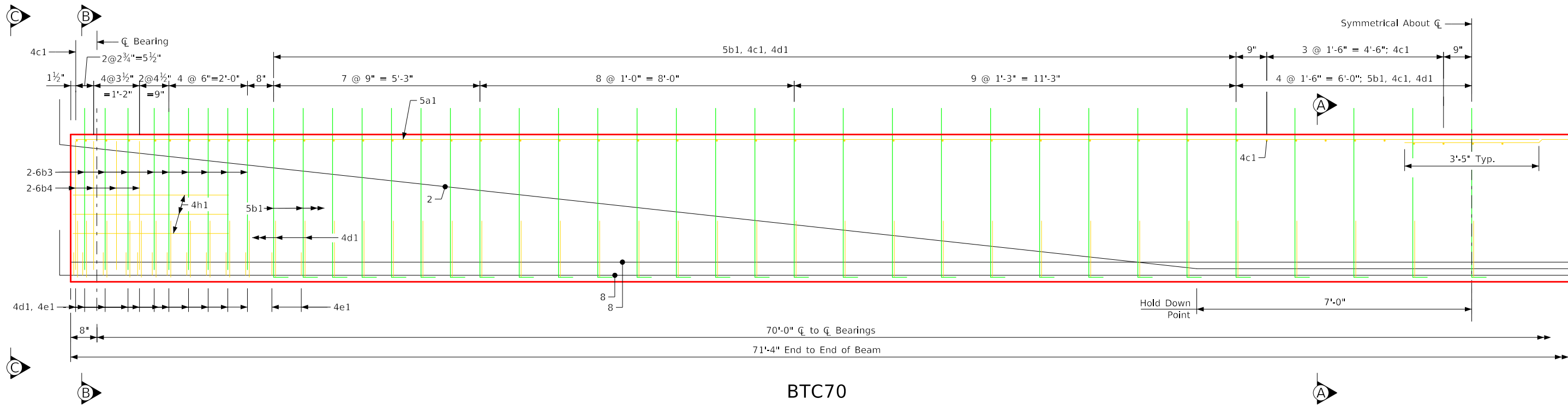


View C-C

ΔΔ Epoxy coated bars

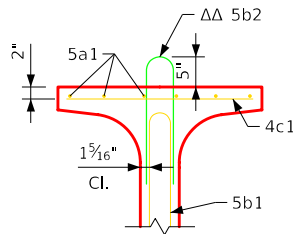
BTC60 Beam Details

Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A Added.
Issued 05-04.
Beams.dgn - 4709 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

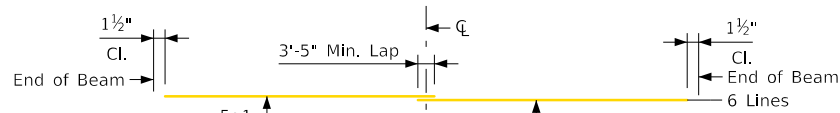


Section A-A (Alternate)

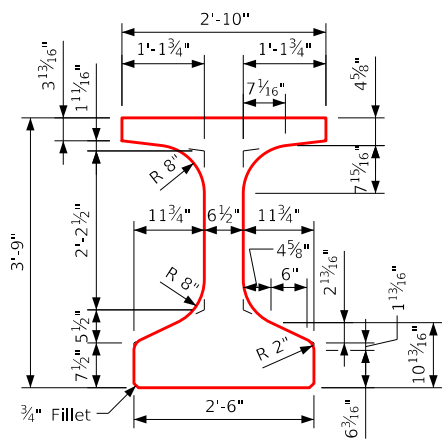
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

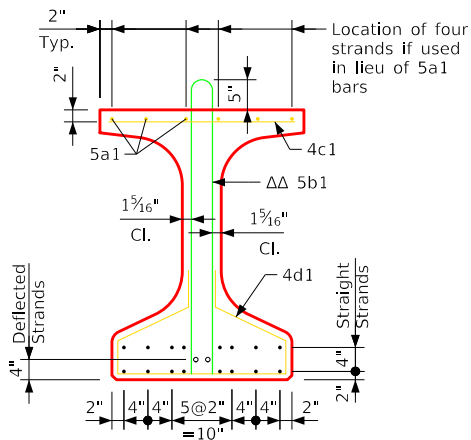
Beam Section Properties



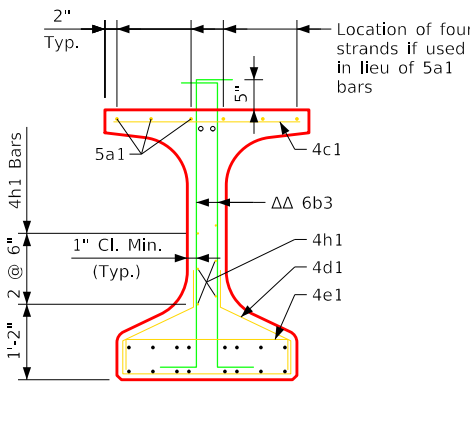
Top Flange Longitudinal Bar Layout



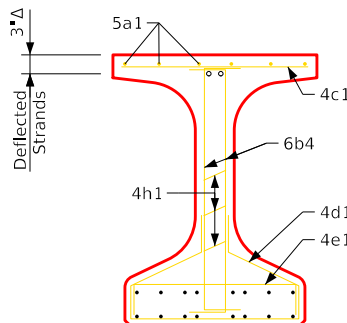
BTC Beam Cross Section



Section A-A



Section B-B



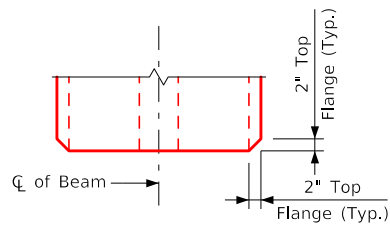
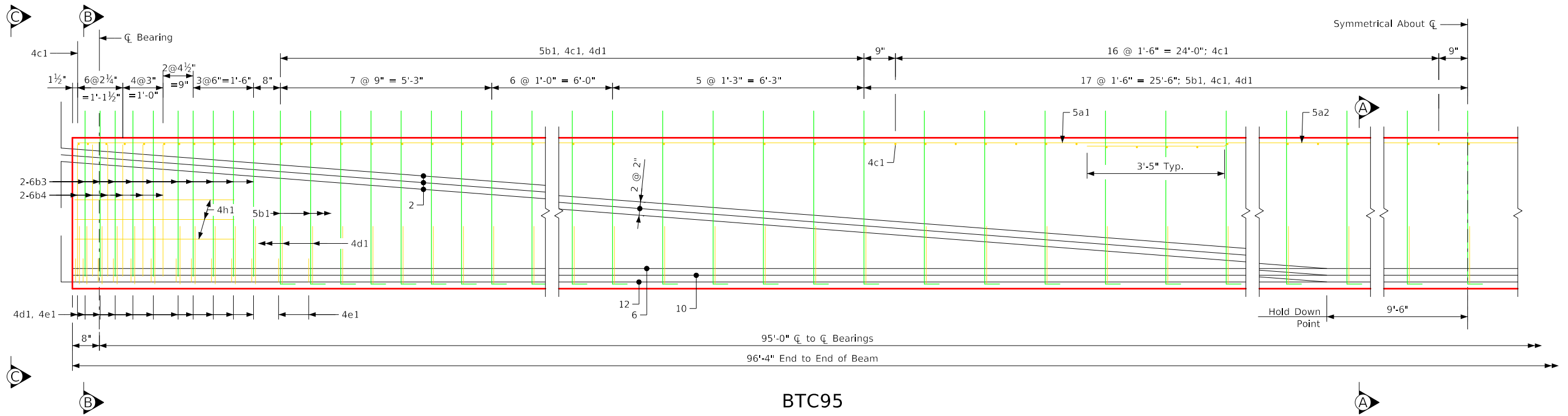
View C-C

° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTC70 Beam Details

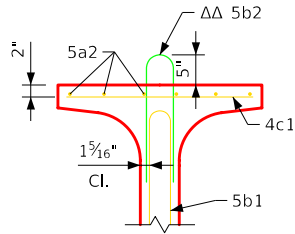
FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "C" Beam - 70'-0" Span	Standard Sheet 4709	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:04 AM	10/2/2024	bkloss	pww:\NTP\wint1.dot.int.lan:PWWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A Added.
Revised 10-2024: Added one set of 6b4 to each beam end and revised rebar spacing.
Issued 05-04.
Beams.dgn - 4714 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

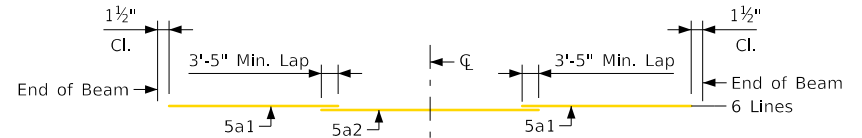


Section A-A
(Alternate)

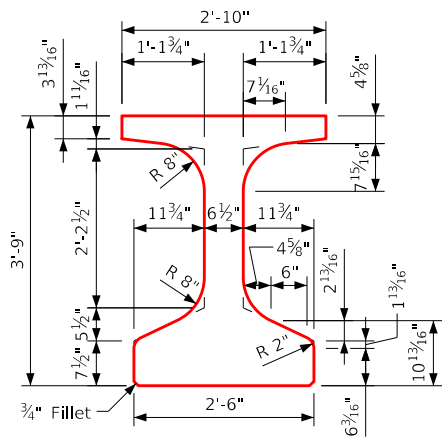
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

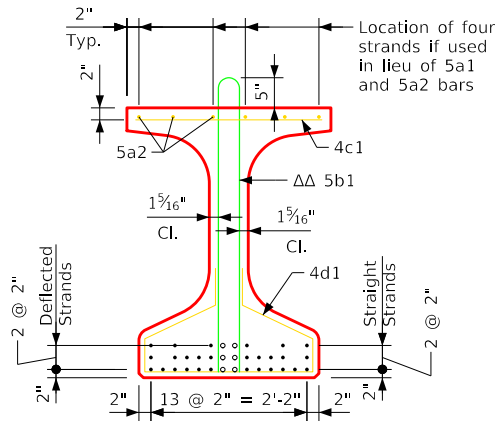
Beam Section
Properties



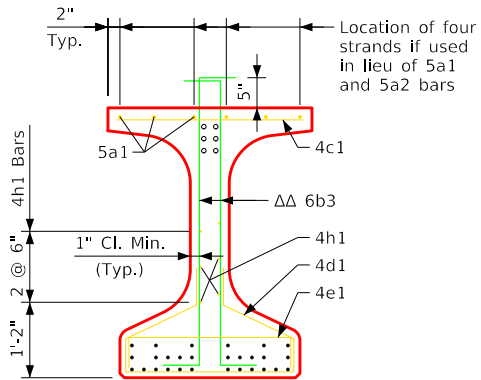
Top Flange Longitudinal Bar Layout



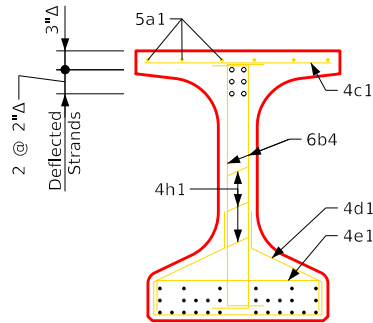
BTC Beam Cross
Section



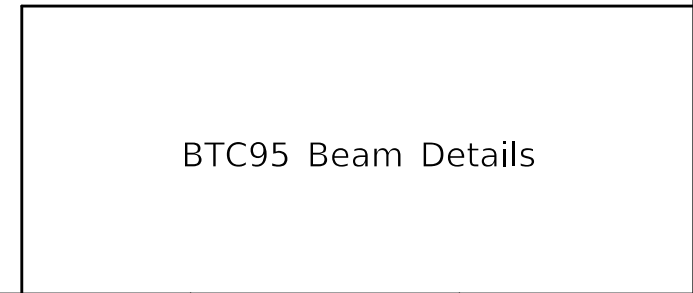
Section A-A



Section B-B



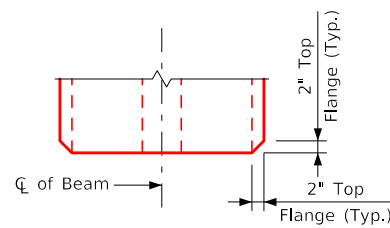
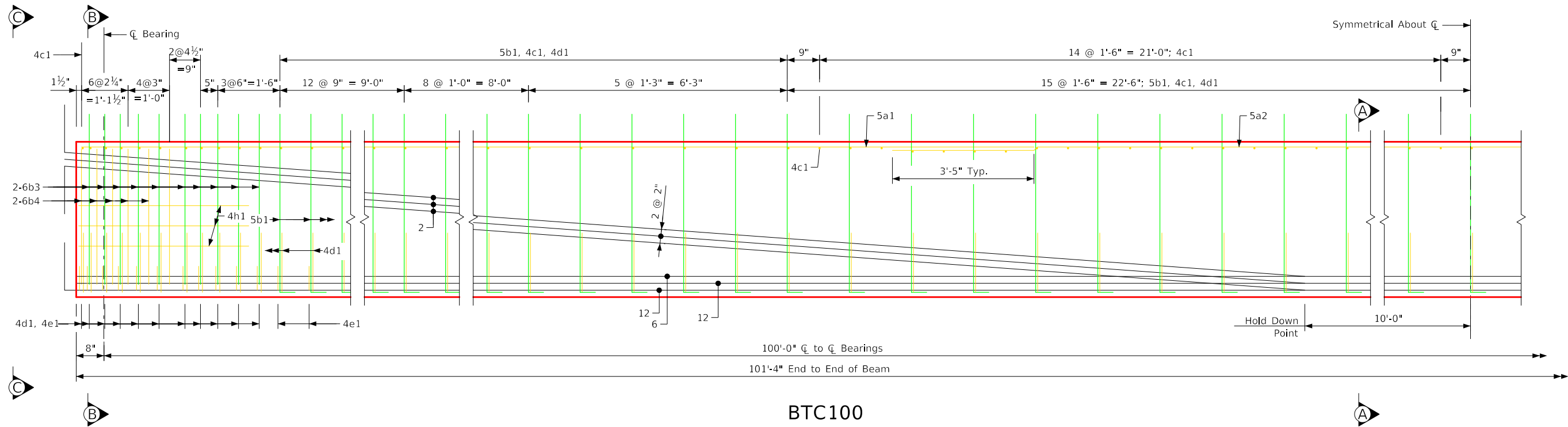
View C-C



BTC95 Beam Details

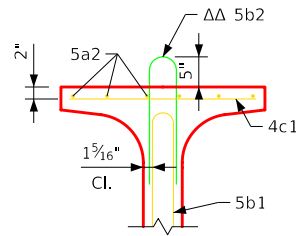
FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "C" Beam - 95'-0" Span	Standard Sheet 4714	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:09 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A Added.
Issued 05-04.
Beams.dgn - 4715 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

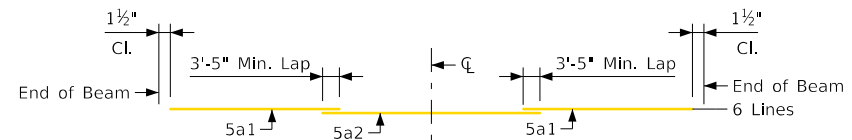


Section A-A (Alternate)

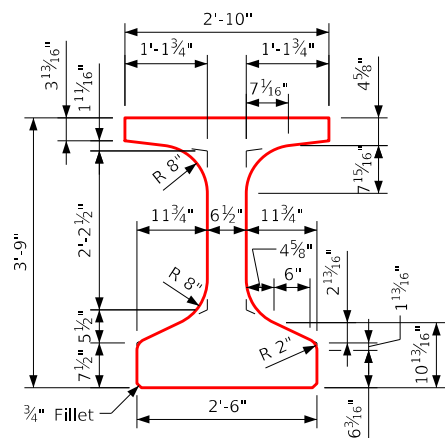
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

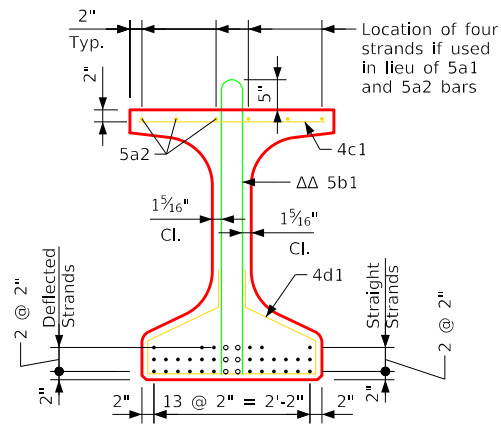
Beam Section Properties



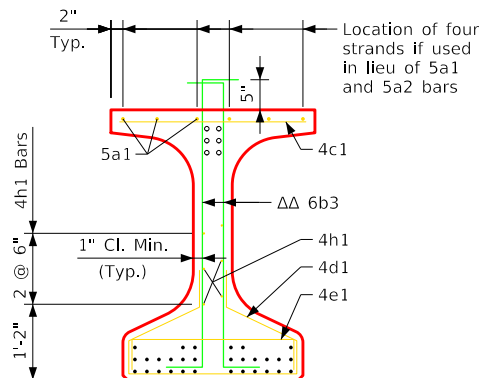
Top Flange Longitudinal Bar Layout



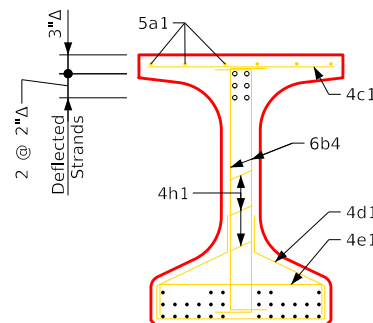
BTC Beam Cross Section



Section A-A



Section B-B



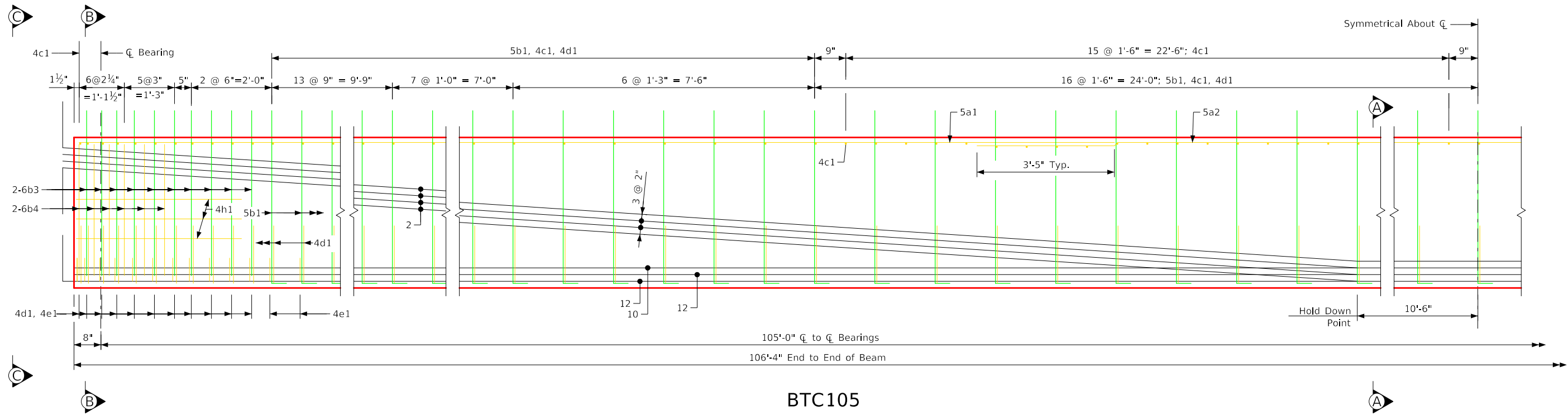
View C-C

° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

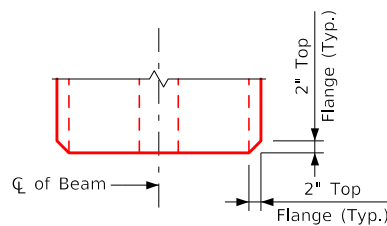
BTC100 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "C" Beam - 100'-0" Span	Standard Sheet 4715	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:10 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revision 10-07: 5b2 bar deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A Added.
Issued 05-04.
Beams.dgn - 4716 - This Sheet Re-Issued 04-2024. Sheet Format Update.

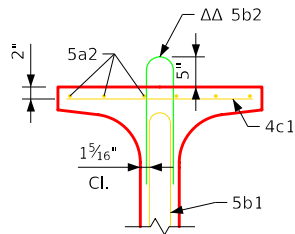


BTC105



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

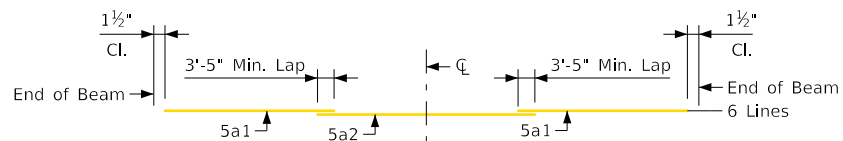


Section A-A
(Alternate)

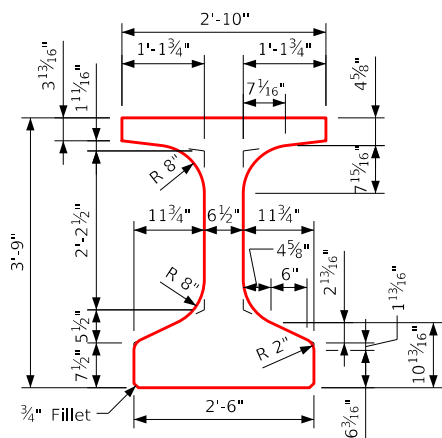
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

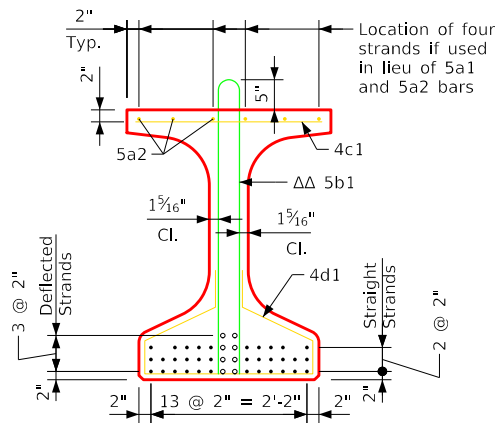
Beam Section Properties



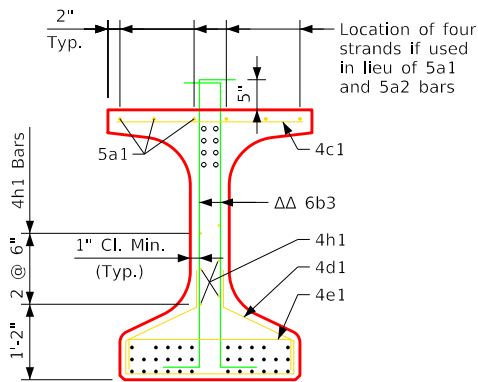
Top Flange Longitudinal Bar Layout



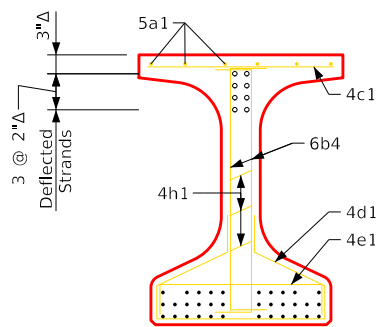
BTC Beam Cross Section



Section A-A



Section B-B

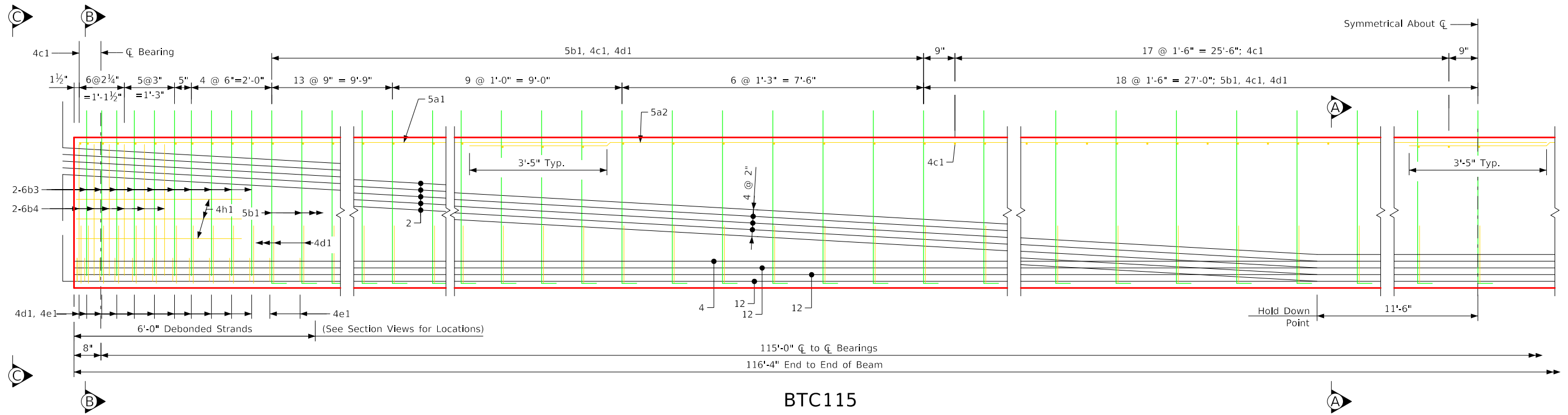


View C-C

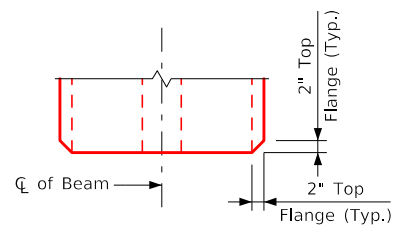
° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTC105 Beam Details

Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A Added.
Issued 05-04.
Beams.dgn - 4718 - This Sheet Re-Issued 04-2024. Sheet Format Update.

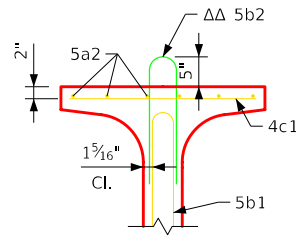


BTC115



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

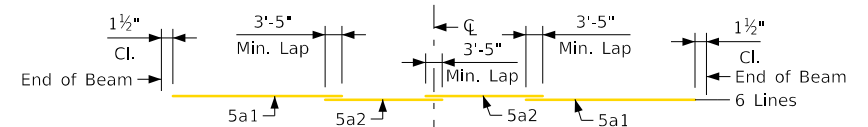


Section A-A
(Alternate)

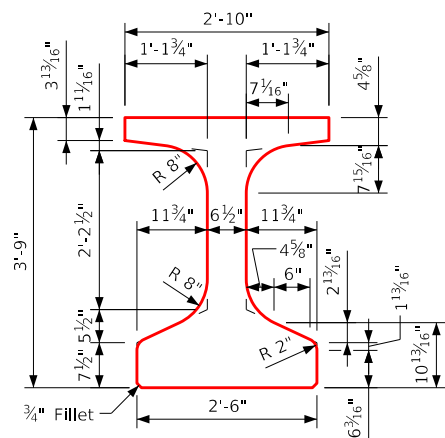
See Alternate Bar Note on Standard Sheet 4700.

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

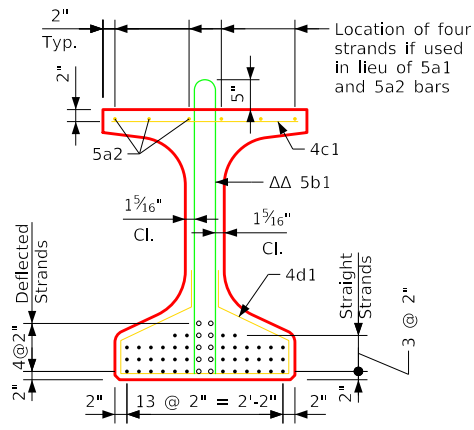
Beam Section Properties



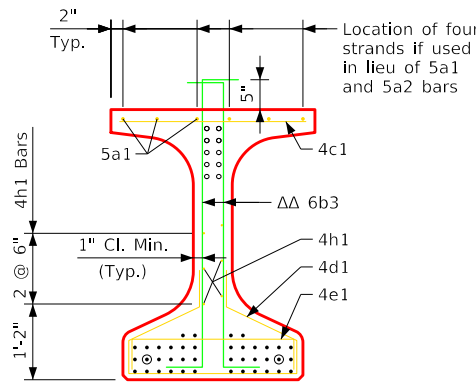
Top Flange Longitudinal Bar Layout



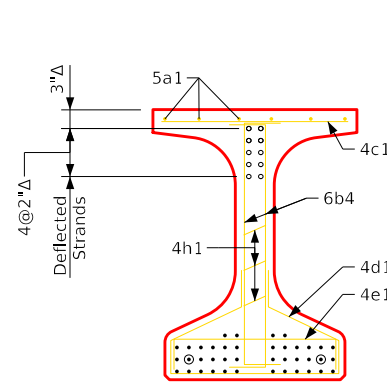
BTC Beam Cross Section



Section A-A



Section B-B

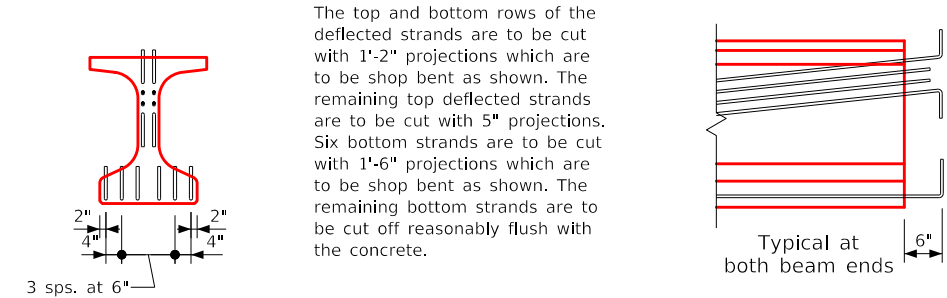


View C-C

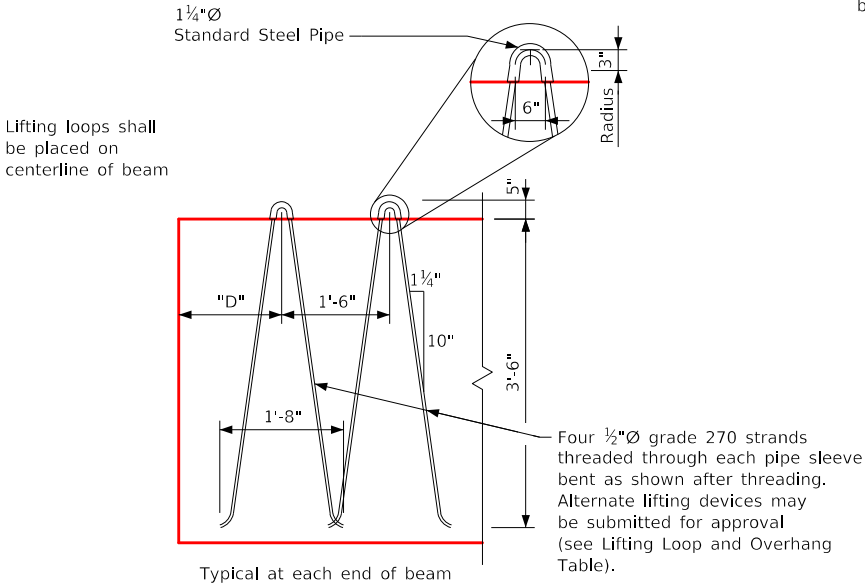
- ◊ Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars
- Strands Debonded 6'-0" from Beam Ends

BTC115 Beam Details

Correction 12-13: Coil Tie Detail was changed to reflect the distance between Coil Tie Anchors embedded ¼ inch.
Revised 10-2024: Revised "At Release" and "After Losses" Camber Values.
Issued 05-04.
Beams.dgn - 4719s1 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Strand Projection at Beam Ends When Embedded in Concrete End Diaphragms



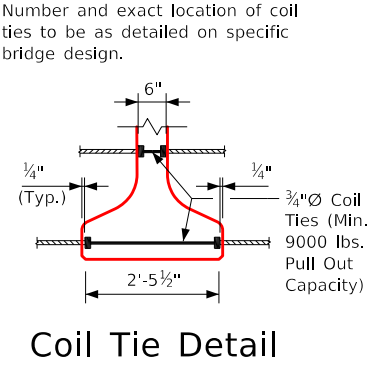
Lifting Loop Detail

Lifting Loop and Overhang Table				
Beam	Lifting Loops Each End	# of Strands Per Loop	D	Beam Overhang (ft.)
BTC120	2	4	8'-3"	14

Lifting loops shall carry loads equally.

ΔΔ 5b1 and 6b3 bars to be epoxy coated
★ 6b3 and 6b4 bars to be used in pairs

Note: All mild reinforcing steel can be epoxy coated at Contractor's option without modification to bar length or details at no additional cost to the State.



Coil Tie Detail

Reinforcing Bar List				Bent Bar Details			
Beam		BTC120		Note: All bar dimensions are out to out D = Pin diameter for bending (unless otherwise shown) #4 Bar D= 2" #5 Bar D= 2½" #6 Bar D= 4½"			
Bar	Shape	No.	Length				
5a1		12	25'-8"				
5a2		12	40'-0"				
5b1		97	9'-2"				
6b3		40	5'-0"				
6b4		24	4'-4"				
4c1		157	2'-7"				
4d1		119	6'-5"				
4e1		26	3'-2"				
4h1		6	8'-0"				
ΔΔ 5b1							
ΔΔ 6b3							
ΔΔ 5b2 (Alternate)							
5b1 (Alternate)							
4d1 (Alternate)							

BTC120 Beam Data

BTC Beam	Span Length ℓ-ℓ Bearing	Overall Beam Length (L)	Concrete Strength		Strand Size Dia. (in.)	No. of Strands		Total Initial Prestress ③ (kips)	Hold Down Force (kips)	Camber (in.) ⑥		Deflection (in.) Δ _D		Permissible Maximum Spacing	Weight (tons)	Concrete (cu. yd.)	Reinforcing Steel (weight-lb.)
			f'ci (ksi.)	f'c (ksi.)		Straight	Deflected			At Release	After Losses	Immediate ① (elastic) Δ _I	Time ② (plastic) Δ _T	HL-93 Loading			
												Steel Diaphragm	Steel Diaphragm				
④ ⑤ BTC120	120'-0"	121'-4"	8.00	10.00	0.60"	44	10	2297	26.6	4.48"	7.17"	4.77"	1.19"	8'-6"	43.7	21.7	3074

- ① Deflections at mid-span due to weight of deck and diaphragm. The deflections shown are for a deck (8.5") and haunch (1.5") weight of:
0.96 kips/ft. for 8'-6" beam spacing and one steel diaphragm (0.500 kips) at \bar{C} of span. For different deck and diaphragm weights, deflections will be directly proportional.
- ② Deflections due to the combined effect of creep due to weight of deck and shrinkage of deck.
Total beam deflections at \bar{C} 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) $\Delta_D = \Delta_I + \frac{3}{4}\Delta_T$ for end spans of continuous bridge.
(C) $\Delta_D = \Delta_I + \frac{1}{2}\Delta_T$ for interior spans of continuous bridge.
- ③ Total initial prestress is based on 72.6% f's, f's= 270 ksi. and $A_s = 0.217 \text{ in.}^2$.
- ④ Requires a 4500 psi., 28 day compressive strength for cast-in-place deck concrete.
- ⑤ Includes partial length debonded strands, see individual Beam Sheet for locations and details.
- ⑥ Calculated design cambers are based on multipliers developed from research in Iowa.

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 in.²) 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 I.M.570.

Bearings shall be as detailed on other design sheets.

Beams to be used in bridges made continuous by the poured in place deck, are to be at least 28 days old before the deck 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 BTC120 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 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).

Design Stresses:

Design stresses for the following materials are to be in accordance with AASHTO LRFD Bridge Design Specifications, Series of 2017.

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.

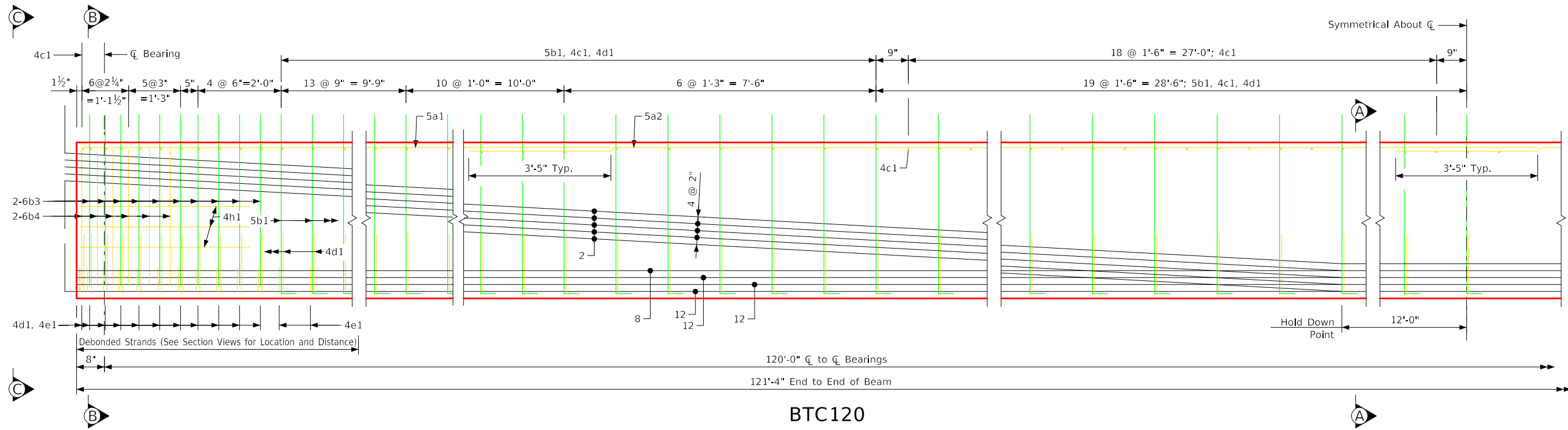
Design: AASHTO LRFD, Series of 2017 with minor modifications.

Alternate Bar Notes:

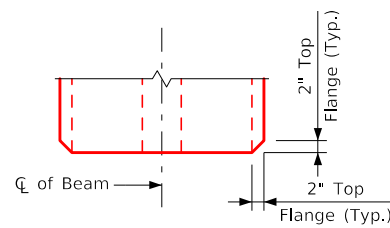
Alternate bars shown in Bent Bar Details may be used in lieu of reinforcing bars shown in bar list. No additional payment shall be made for use of alternate bars.

BTC120 Beam - Data Details

Revision 10-07: 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A added.
Issued 05-04.
Beams.dgn - 4719s2 - This Sheet Re-Issued 04-2024. Sheet Format Update.

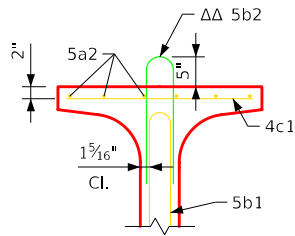


BTC120



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

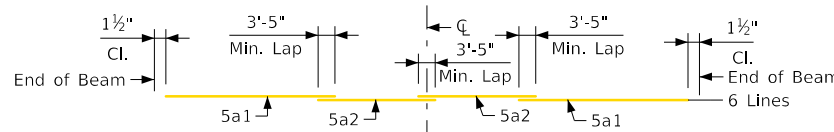


Section A-A
(Alternate)

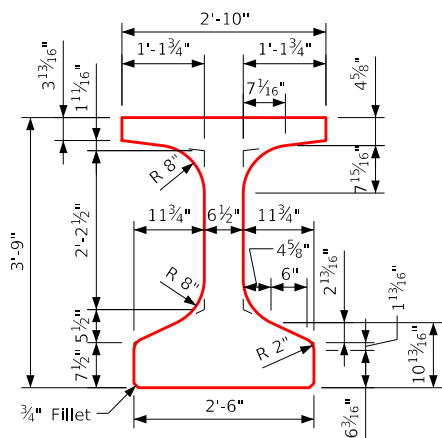
See Alternate Bar Note on Standard Sheet 4719 (sheet 1).

Area = 691.8 in.²
 $\bar{y}_b = 20.74$ in.
 $I = 178,971$ in.⁴

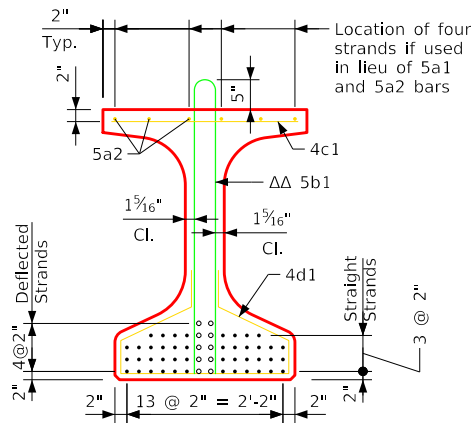
Beam Section Properties



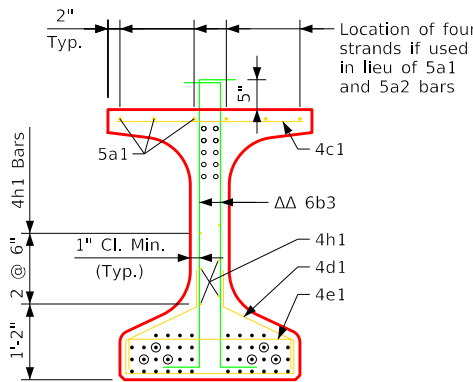
Top Flange Longitudinal Bar Layout



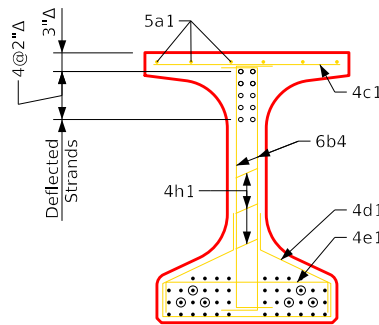
BTC Beam Cross Section



Section A-A



Section B-B

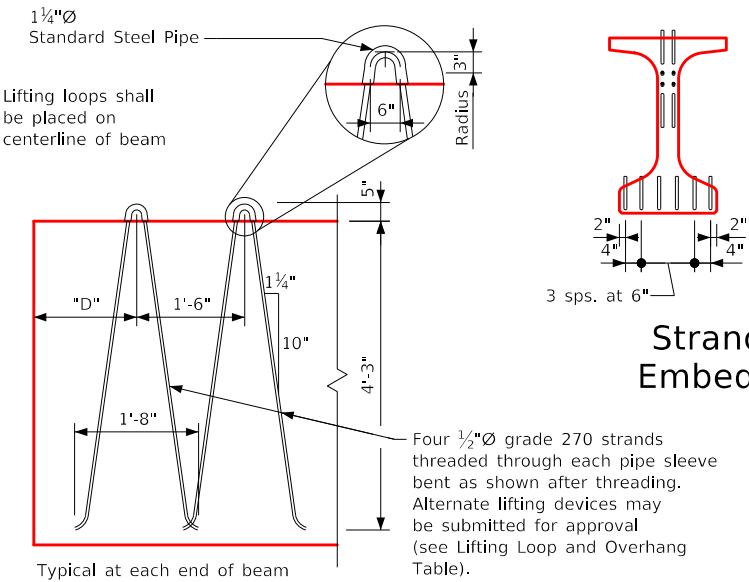


View C-C

- ° Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars
- ⊙ Strands Debonded
- 3'-0" from Beam Ends - 3rd Row from Bottom
- 6'-0" from Beam Ends - 2nd Row from Bottom

BTC120 Beam Details

Correction 12-13: Coil Tie Detail was Changed to Reflect the Distance Between Coil Tie Anchors Embedded ¼ Inch.
Revised 10-2024: Revised "At Release" and "After Losses" Camber Values for BTD110 to BTD130.
Issued 05-04.
Beams.dgn - 4730 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Lifting Loop Detail

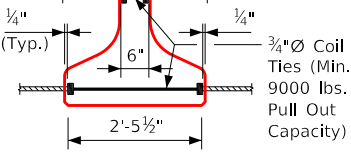
Lifting Loop And Overhang Table

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"	10
BTD100	2	4	3'-9"	9
BTD105	2	4	6'-3"	11
BTD110	2	4	8'-2"	11
BTD115	2	4	8'-3"	11
BTD120	2	4	9'-3"	14
BTD125	2	4	9'-3"	14
BTD130	2	4	9'-3"	14

** In accordance with Article 2407.03, K of the Standard Specifications.

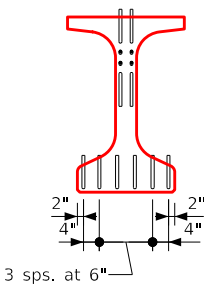
Lifting loops shall carry loads equally.

Number and exact location of coil ties to be as detailed on specific bridge design.



Coil Tie Detail

The top and bottom rows of the deflected strands are to be cut with 1'-2" 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.



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, Series of 2017.
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.

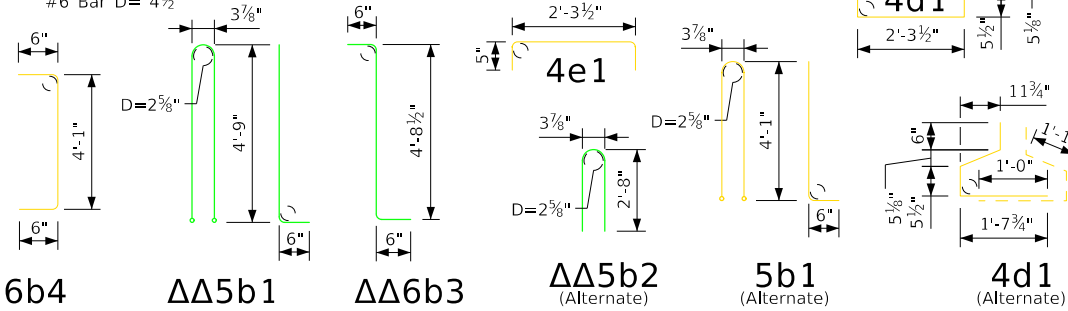
Design: AASHTO LRFD, Series of 2017 with minor modifications.

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.

Bent Bar Detail

Note: All bar dimensions are out to out
D = Pin diameter for bending (unless otherwise shown)
#4 Bar D= 2"
#5 Bar D= 2½"
#6 Bar D= 4½"



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	27'-3"	12	29'-9"	12	32'-3"	12	34'-9"	12	37'-3"	12	39'-9"	12	24'-0"	12	26'-6"	12	29'-0"	12	31'-6"	12	34'-0"	12	36'-6"	12	39'-0"	12	23'-2"	12	25'-8"	12	28'-2"	12	30'-8"	5a1
5a2		—	—	—	—	—	—	—	—	—	—	—	—	6	40'-0"	6	40'-0"	6	40'-0"	6	40'-0"	6	40'-0"	6	40'-0"	6	40'-0"	12	40'-0"	12	40'-0"	12	40'-0"	12	40'-0"	5a2
5b1		35	10'-8"	39	10'-8"	43	10'-8"	47	10'-8"	51	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
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"	36	5'-9"	36	5'-9"	36	5'-9"	36	5'-9"	40	5'-9"	40	5'-9"	40	5'-9"	40	5'-9"	40	5'-9"	6b3
6b4		16	5'-1"	16	5'-1"	16	5'-1"	16	5'-1"	16	5'-1"	16	5'-1"	16	5'-1"	16	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"	95	2'-7"	99	2'-7"	105	2'-7"	111	2'-7"	119	2'-7"	123	2'-7"	129	2'-7"	135	2'-7"	141	2'-7"	147	2'-7"	153	2'-7"	165	2'-7"	171	2'-7"	4c1
4d1		59	6'-5"	63	6'-5"	67	6'-5"	71	6'-5"	75	6'-5"	77	6'-5"	81	6'-5"	85	6'-5"	89	6'-5"	93	6'-5"	97	6'-5"	103	6'-5"	107	6'-5"	113	6'-5"	119	6'-5"	125	6'-5"	129	6'-5"	4d1
4e1		30	3'-2"	30	3'-2"	30	3'-2"	30	3'-2"	30	3'-2"	30	3'-2"	30	3'-2"	30	3'-2"	28	3'-2"	28	3'-2"	28	3'-2"	28	3'-2"	28	3'-2"	28	3'-2"	28	3'-2"	28	3'-2"	28	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 Data

BTD Beam	Span Length ℓ _c -ℓ _b Bearing	Overall Beam Length (L)	Concrete Strength		Strand Size Dia. (in.)	Number of Strands		Total Initial Prestress (kips) ③	Hold Down Force (kips)	Camber (in.) ⑤		Deflection (in.) Δ _D		Permissible Maximum Spacing	Weight (tons)	Concrete (cu. yd.)	Reinforcing Steel (weight lb.)
			f'ci (ksi.)	f'c (ksi.)		Straight	Deflected			At Release	After Losses	Immediate ① (elastic) Δ _I	Time ② (plastic) Δ _T				
														Steel Diaphragm			
												HL-93 Loading					
Steel Diaphragm																	
BTD50	50'-0"	51'-4"	4.50	5.00	0.60"	12	—	510	—	0.24"	0.45"	0.12"	0.03"	9'-3"	20.0	9.9	1585
BTD55	55'-0"	56'-4"	4.50	5.00	0.60"	14	—	596	—	0.34"	0.63"	0.18"	0.04"	9'-3"	22.0	10.8	1696
BTD60	60'-0"	61'-4"	4.50	5.00	0.60"	12	2	596	13.6	0.36"	0.67"	0.25"	0.06"	9'-3"	23.9	11.8	1803
BTD65	65'-0"	66'-4"	4.50	5.00	0.60"	14	2	681	12.6	0.47"	0.87"	0.35"	0.09"	9'-3"	25.9	12.8	1906
BTD70	70'-0"	71'-4"	4.50	5.00	0.60"	14	2	681	11.3	0.49"	0.91"	0.46"	0.12"	9'-3"	27.8	13.7	2013
BTD75	75'-0"	76'-4"	5.00	6.00	0.60"	16	2	766	10.5	0.62"	1.14"	0.58"	0.14"	9'-3"	29.8	14.7	2082
BTD80	80'-0"	81'-4"	5.00	6.00	0.60"	18	2	851	9.9	0.78"	1.44"	0.74"	0.19"	9'-3"	31.7	15.7	2207
BTD85	85'-0"	86'-4"	5.00	6.00	0.60"	18	4	936	17.9	0.90"	1.66"	0.94"	0.24"	9'-3"	33.7	16.6	2311
BTD90	90'-0"	91'-4"	5.50	6.50	0.60"	20	4	1021	17.7	1.03"	1.91"	1.15"	0.29"	9'-3"	35.6	17.6	2470
BTD95	95'-0"	96'-4"	5.50	6.50	0.60"	24	4	1191	16.8	1.38"	2.55"	1.42"	0.36"	9'-3"	37.6	18.6	2570
BTD100	100'-0"	101'-4"	6.00	7.00	0.60"	26	4	1276	16.0	1.57"	2.86"	1.70"	0.43"	9'-3"	39.5	19.5	2673
BTD105	105'-0"	106'-4"	6.00	7.00	0.60"	28	6	1446	21.9	1.89"	3.03"	2.06"	0.52"	9'-3"	41.5	20.5	2795
BTD110	110'-0"	111'-4"	6.50	7.50	0.60"	30	6	1531	20.9	2.34"	3.74"	2.43"	0.61"	9'-3"	43.4	21.4	2976
BTD115	115'-0"	116'-4"	7.00	8.00	0.60"	34	6	1701	20.3	2.75"	4.40"	2.83"	0.71"	9'-3"	45.4	22.4	3130
BTD120	120'-0"	121'-4"	7.00	8.00	0.60"	36	8	1872	24.4	3.14"	5.03"	3.25"	0.81"	9'-3"	47.3	23.4	3265
BTD125	125'-0"	126'-4"	7.50	8.50	0.60"	38	10	2042	27.9	3.46"	5.53"	3.86"	0.97"	9'-3"	49.3	24.3	3440
④ BTD130	130'-0"	131'-4"	7.50	9.00	0.60"	42	12	2297	30.6	4.04"	6.46"	4.43"	1.11"	9'-3"	51.2	25.3	3543

- ① Deflections at mid-span due to weight of deck and diaphragm. The deflections shown are for a deck (8.5") and haunch (1.5") weight of:
1.04 kips/ft for 9'-3" beam spacing and one steel diaphragm (0.500 kips) at ℓ_c of span for BTD50 to BTD120, and two steel diaphragms (0.500 kips) placed 20'-0", on either side, of the beam ℓ_c for BTD125 to BTD130. For different deck and diaphragm weights, deflections will be directly proportional.
- ② Deflections due to the combined effect of creep due to weight of deck and shrinkage of deck.
Total beam deflections at ℓ_c of span, Δ_D, due to weight of deck and diaphragms for detailing purpose:
(A) Δ_D=Δ_I +Δ_T for simple span.
(B) Δ_D=Δ_I +¾Δ_T for end spans of continuous bridge.
(C) Δ_D=Δ_I +½Δ_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 in.².

- ④ Includes partial length debonded strands, see individual Beam Sheets for locations and details.

- ⑤ Calculated design cambers are based on multipliers developed from research in Iowa.

Beam Notes: (continued)

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: All mild reinforcing steel can be epoxy coated at Contractor's option without modification to bar length or details at no additional cost to the State.

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 in.²) 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 I.M.570.

Bearings shall be as detailed on other design sheets.

Beams to be used in bridges made continuous by the poured in place deck, are to be at least 28 days old before the deck 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 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 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 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.

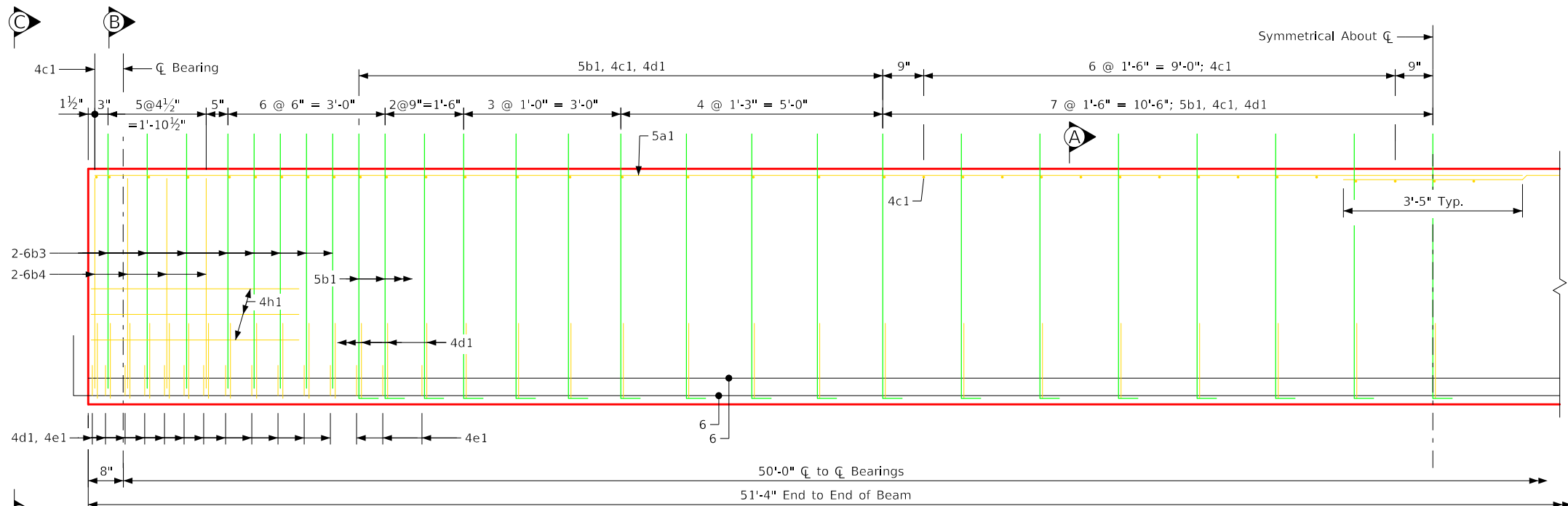
BTD Beam - Data Details

ΔΔ

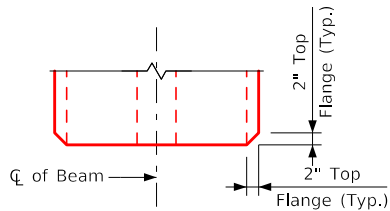
ΔΔ*

*

ΔΔ 5b1 and 6b3 bars to be epoxy coated
* 6b3 and 6b4 bars to be used in pairs

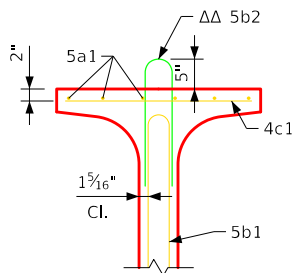


BTD50



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

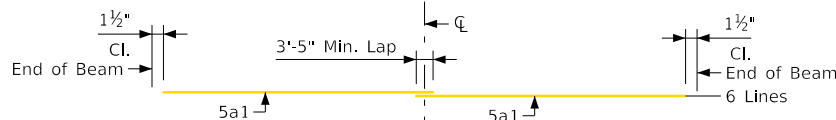


Section A-A
(Alternate)

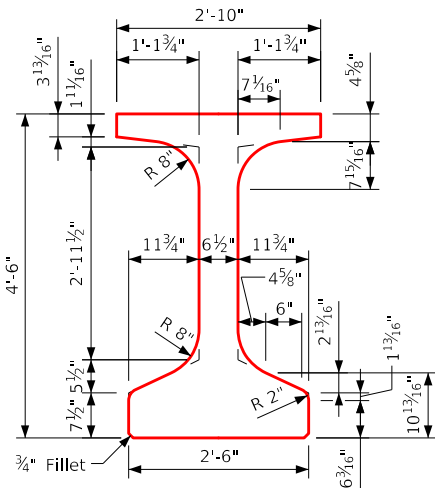
See Alternate Bar Note on Standard Sheet 4730.

Beam Section Properties

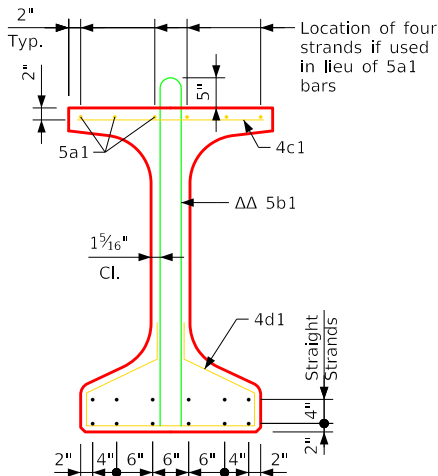
Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴



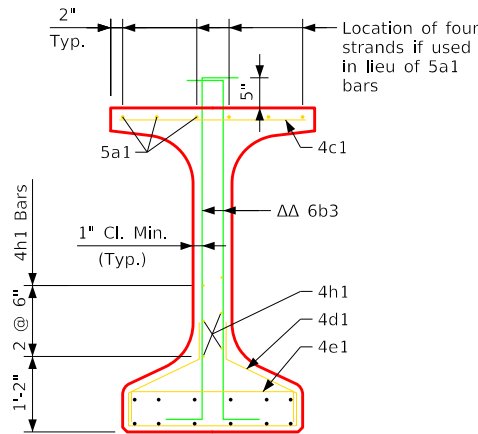
Top Flange Longitudinal Bar Layout



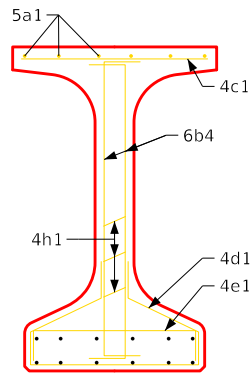
BTD Beam Cross Section



Section A-A



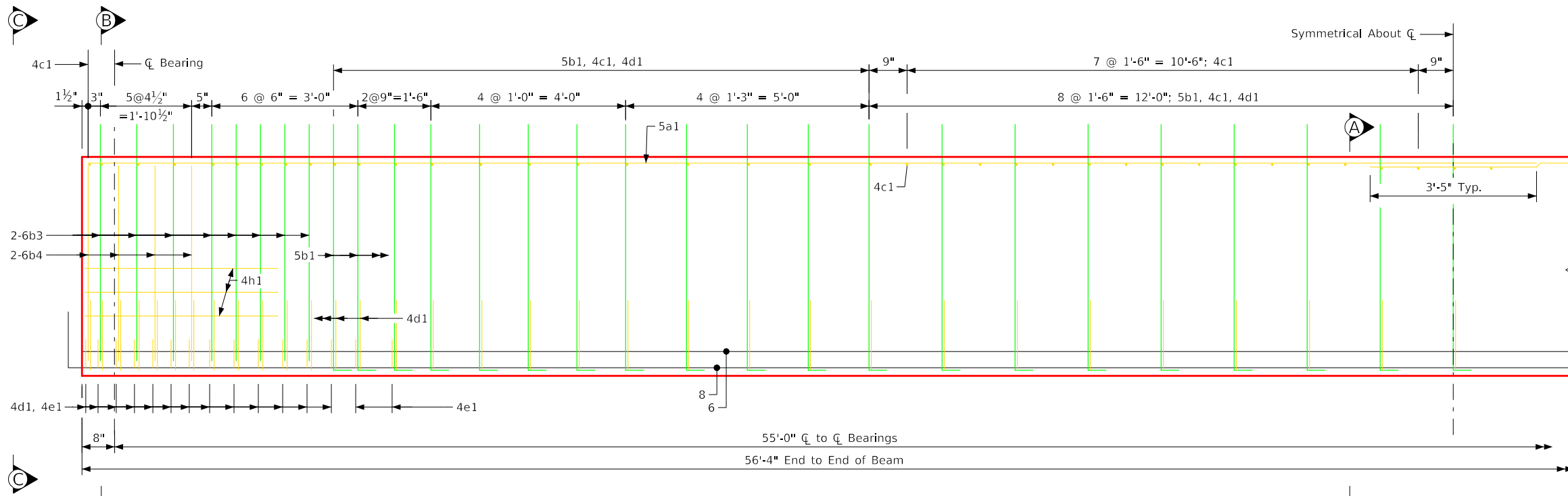
Section B-B



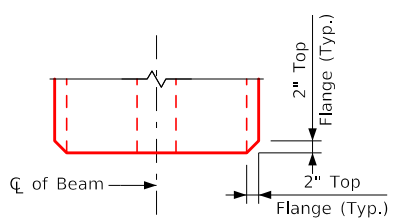
View C-C

ΔΔ Epoxy Coated Bars

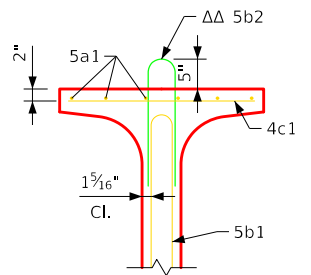
BTD50 Beam Details



BTD55

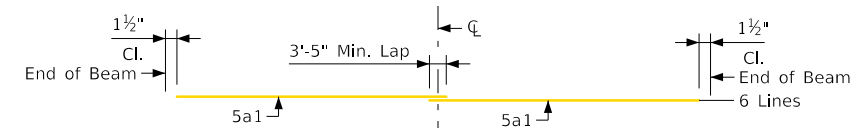


Top View
The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

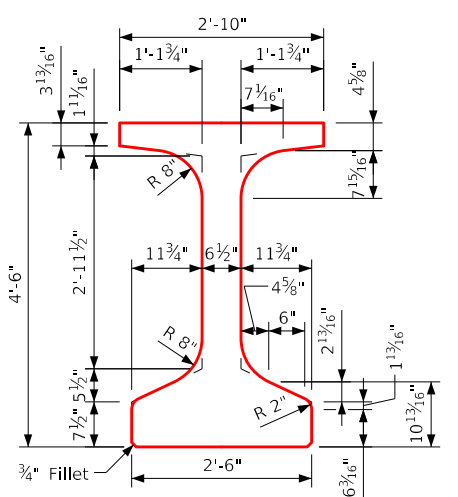


Section A-A
(Alternate)
See Alternate Bar Note on Standard Sheet 4730.

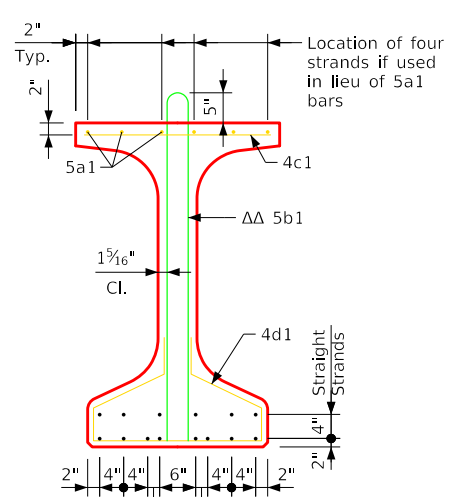
Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴
Beam Section Properties



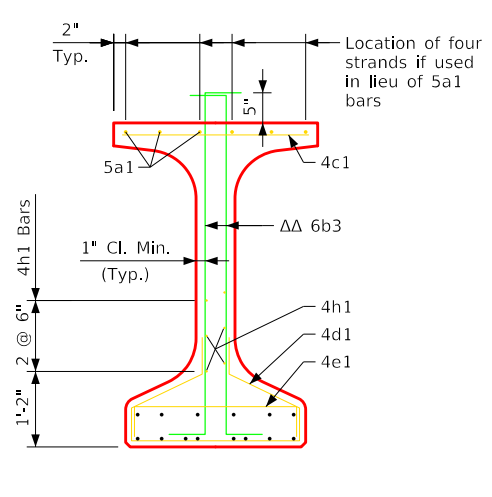
Top Flange Longitudinal Bar Layout



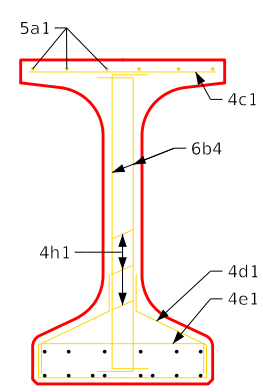
BTD Beam Cross Section



Section A-A



Section B-B



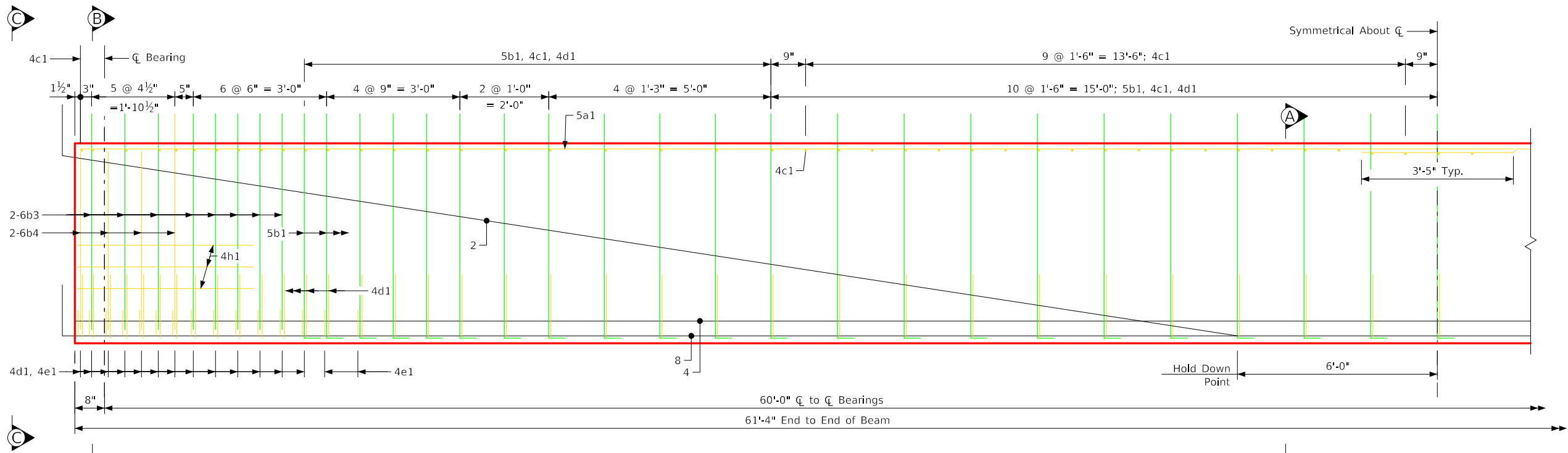
View C-C

ΔΔ Epoxy Coated Bars

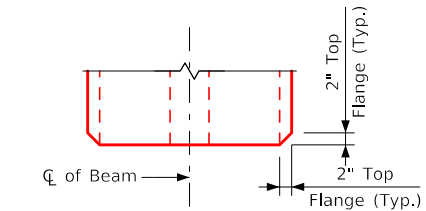
BTD55 Beam Details

Revision 08-09: Added Strands to Sections A-A, B-B, & C-C.
Issued 05-04
Beams.dgn - 4732 - This Sheet Re-Issued 04-2024. Sheet Format Update.

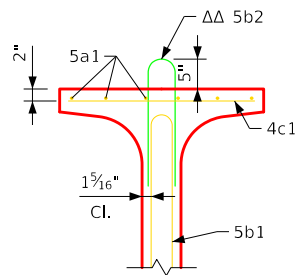
FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "D" Beam - 55'-0" Span	Standard Sheet 4732	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:18 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				



BTD60



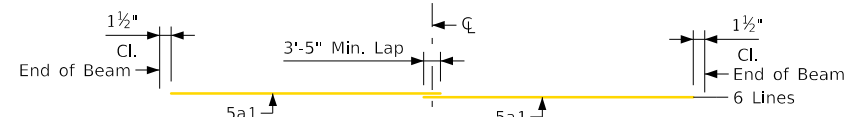
Top View
The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



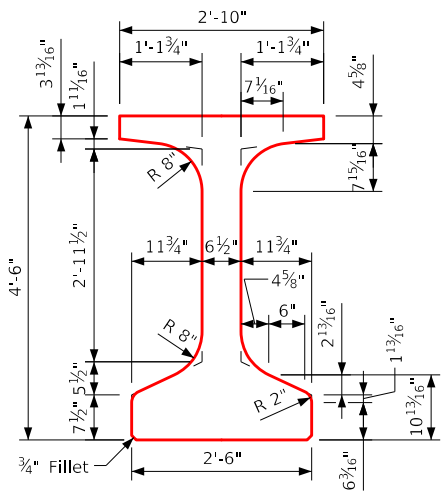
Section A-A (Alternate)
See Alternate Bar Note on Standard Sheet 4730.

Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴

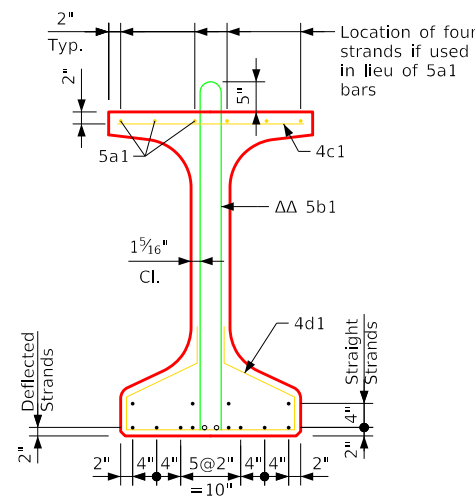
Beam Section Properties



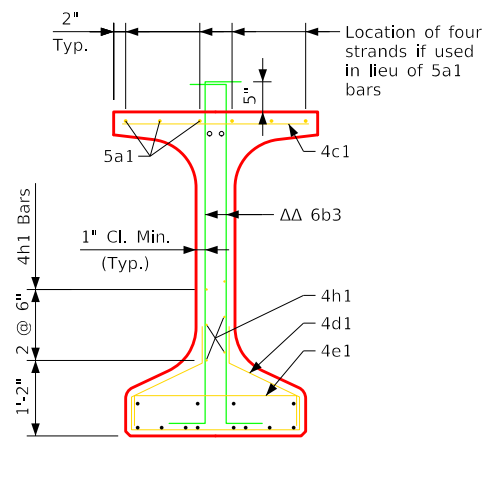
Top Flange Longitudinal Bar Layout



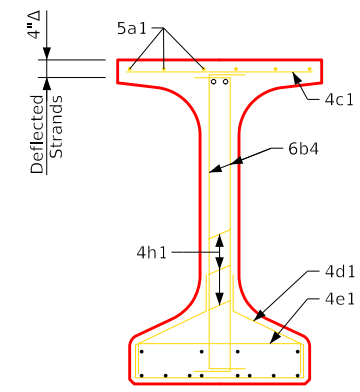
BTD Beam Cross Section



Section A-A



Section B-B



View C-C

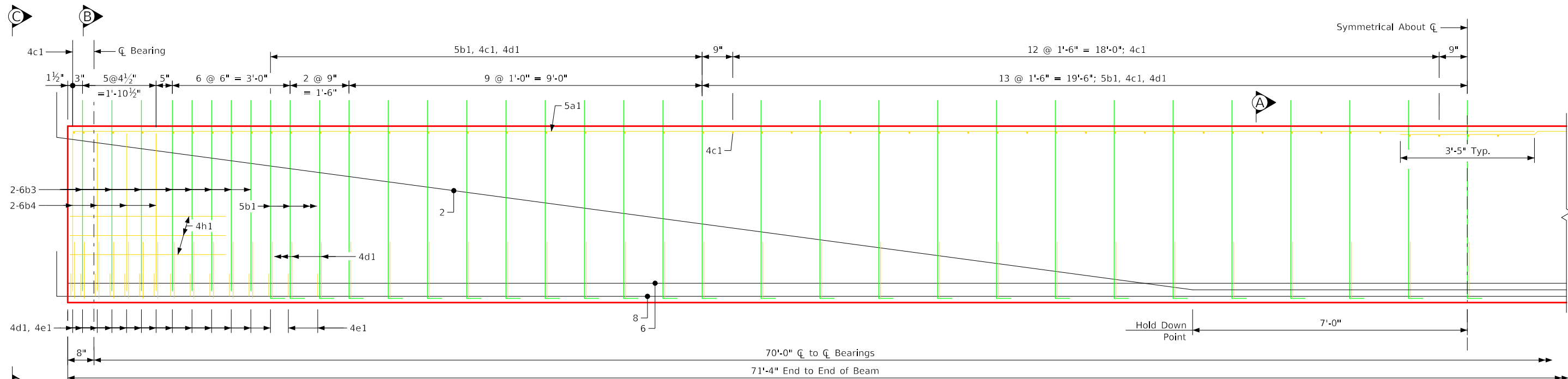
- Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

BTD60 Beam Details

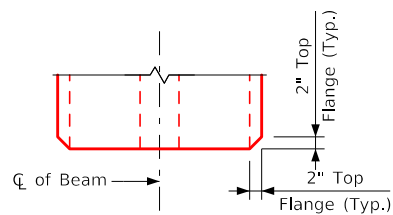
Revision 08-09: Added Strands to Sections A-A, B-B, & C-C.
Issued 05-04
Beams.dgn - 4733 - This Sheet Re-Issued 04-2024. Sheet Format Update.

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "D" Beam - 60'-0" Span	Standard Sheet 4733	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:18 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top. Alternate Section A-A Added.
Issued 05-04.
Beams.dgn - 4735 - This Sheet Re-Issued 04-2024. Sheet Format Update.

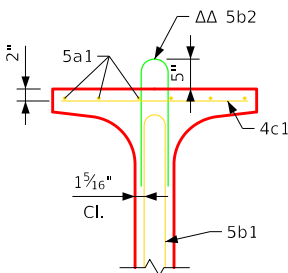


BTD70



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

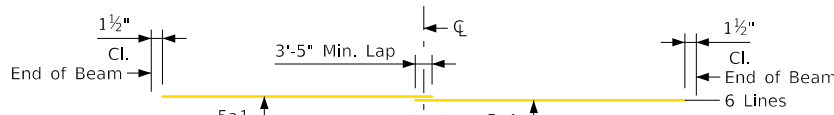


Section A-A
(Alternate)

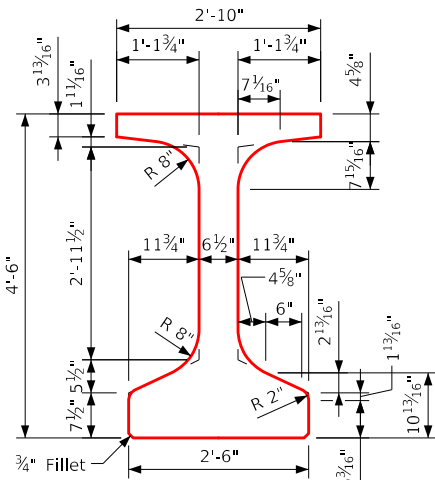
See Alternate Bar Note on Standard Sheet 4730.

Beam Section
Properties

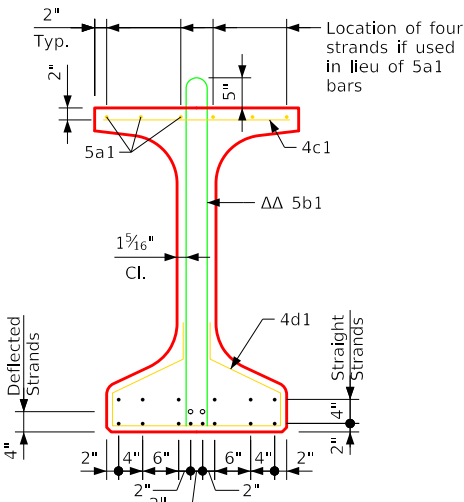
Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴



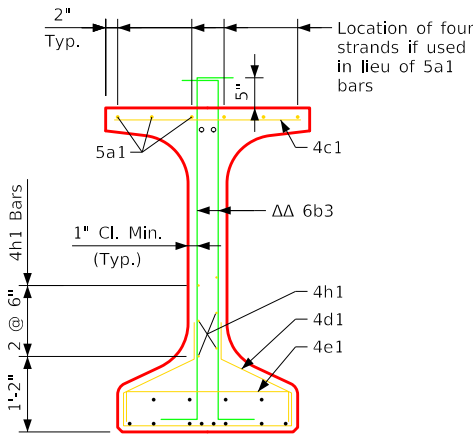
Top Flange Longitudinal Bar Layout



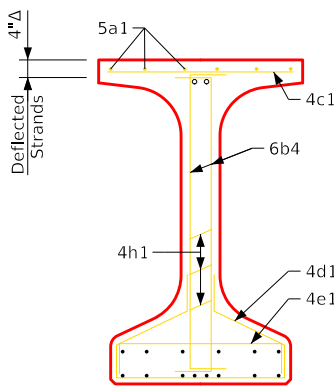
BTD Beam Cross
Section



Section A-A



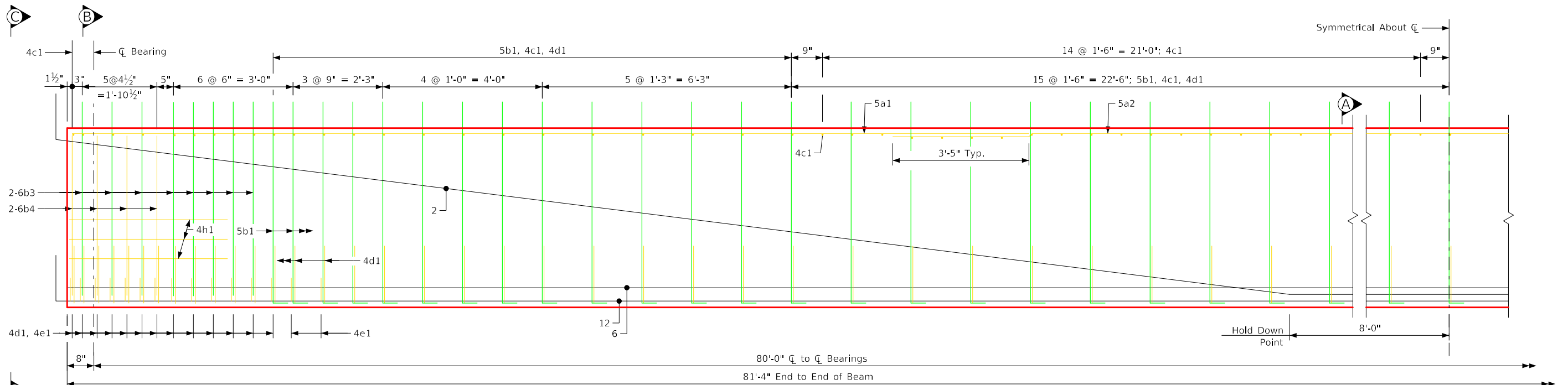
Section B-B



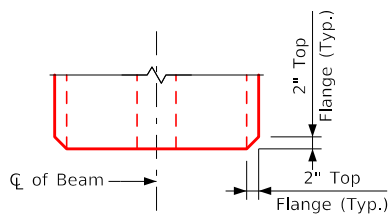
View C-C

◦ Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTD70 Beam Details

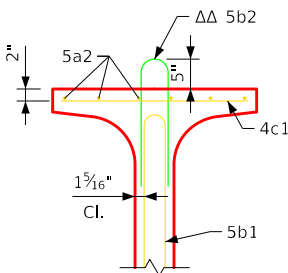


BTD80



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

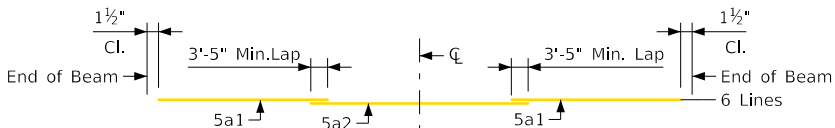


Section A-A
(Alternate)

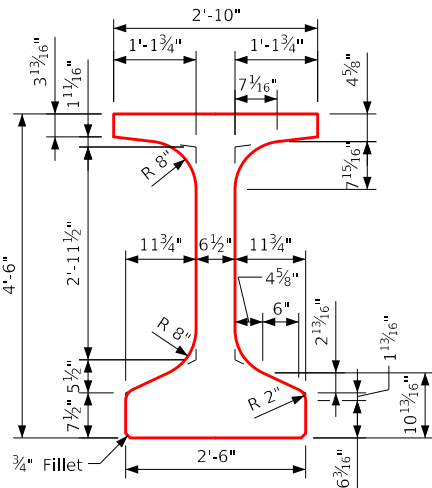
See Alternate Bar Note on Standard Sheet 4730.

Beam Section Properties

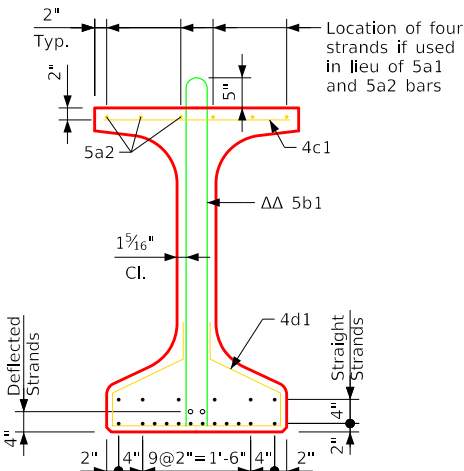
Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴



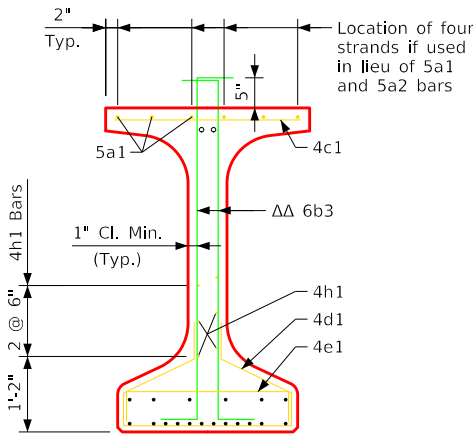
Top Flange Longitudinal Bar Layout



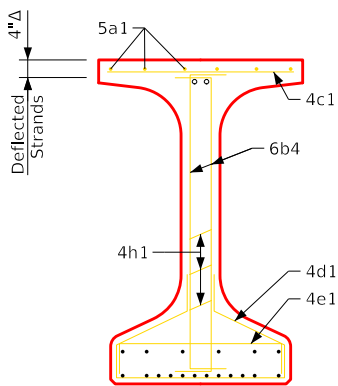
BTD Beam Cross Section



Section A-A



Section B-B

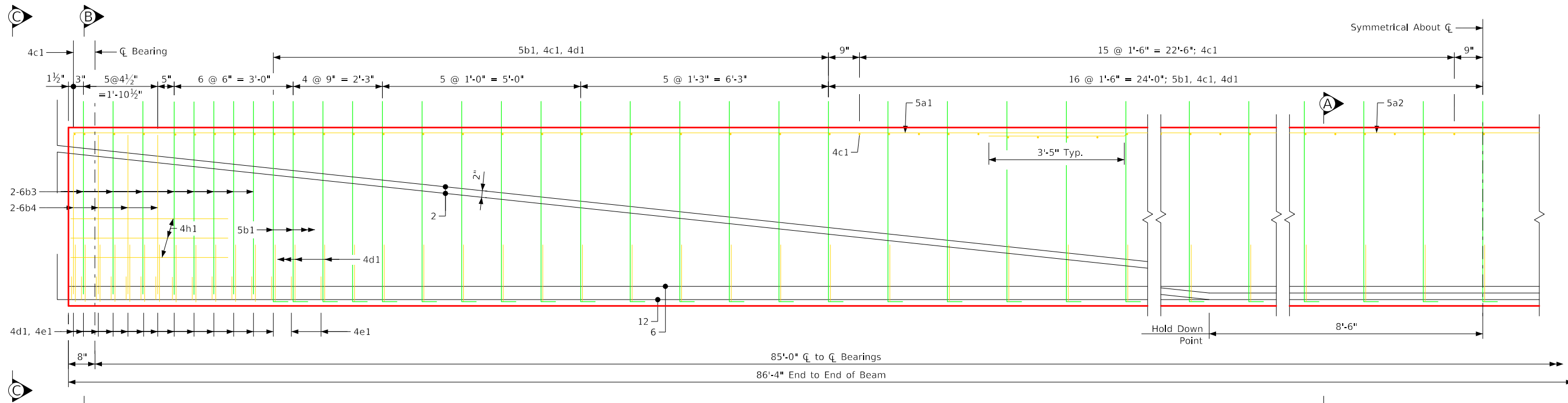


View C-C

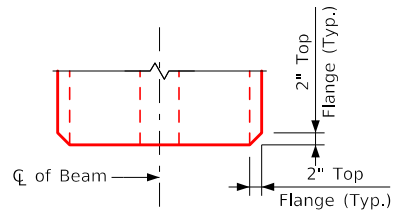
◊ Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTD80 Beam Details

Revision 05-11: Added the Bend to the 2nd Deflected Strand at the Top to be Bent Down at the Beam End.
Issued 05-04.
Beams.dgn - 4738 - This Sheet Re-Issued 04-2024. Sheet Format Update.

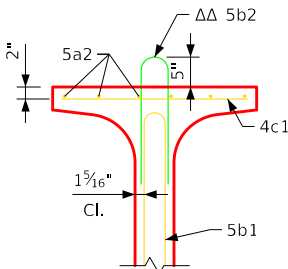


BTD85



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

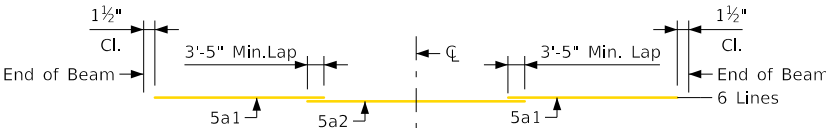


Section A-A (Alternate)

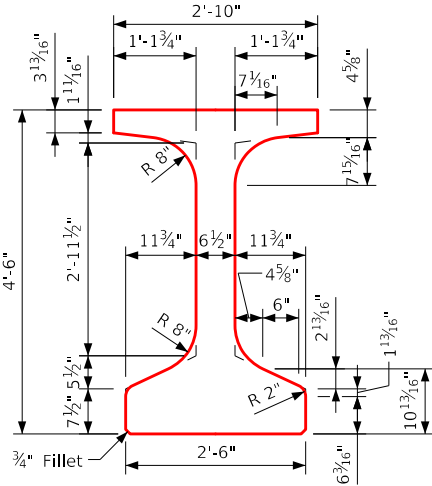
See Alternate Bar Note on Standard Sheet 4730.

Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴

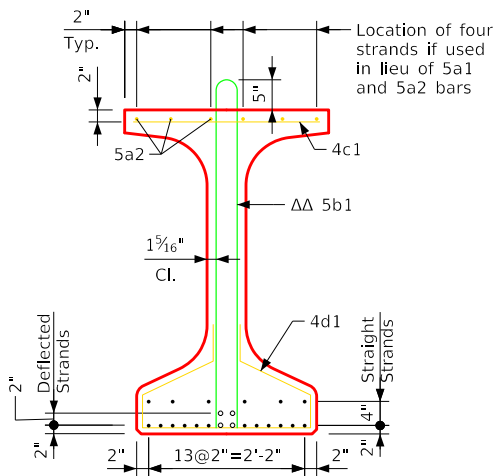
Beam Section Properties



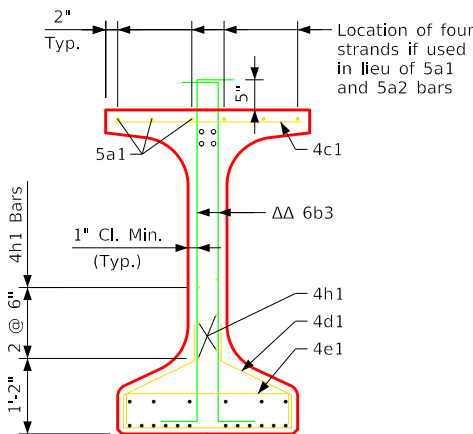
Top Flange Longitudinal Bar Layout



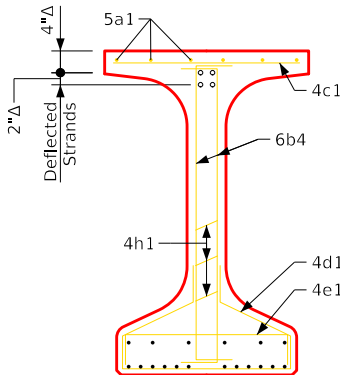
BTD Beam Cross Section



Section A-A



Section B-B

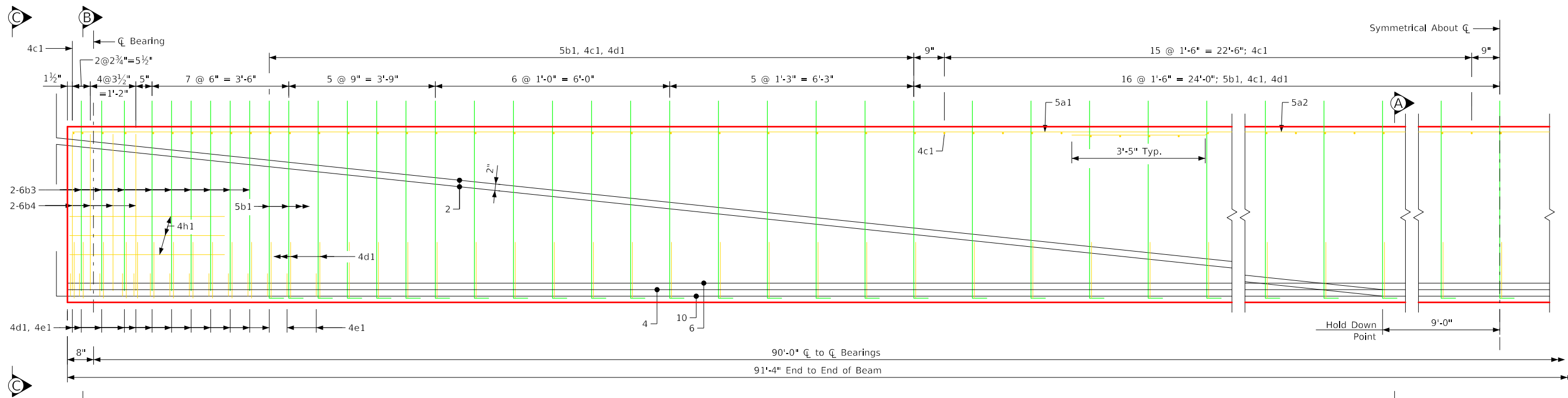


View C-C

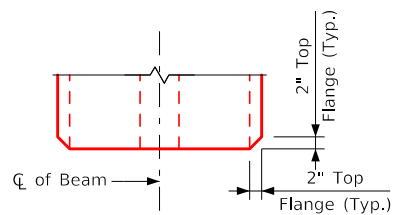
° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTD85 Beam Details

Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top.
Issued 05-04.
Beams.dgn - 4739 - This Sheet Re-Issued 04-2024. Sheet Format Update.

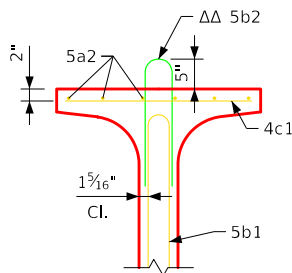


BTD90



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

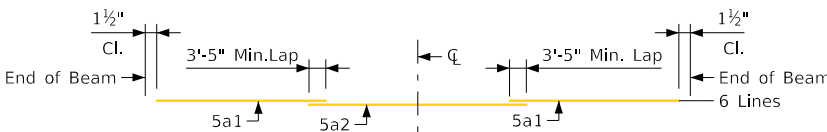


Section A-A
(Alternate)

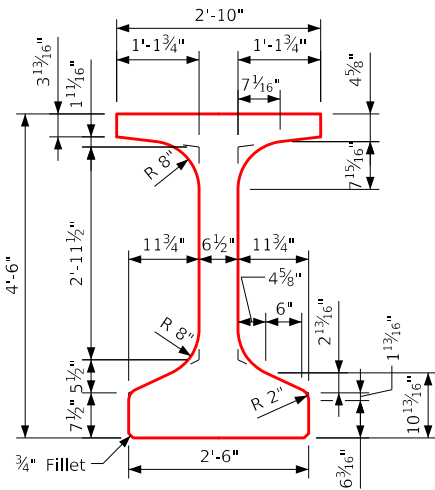
See Alternate Bar Note on Standard Sheet 4730.

Beam Section Properties

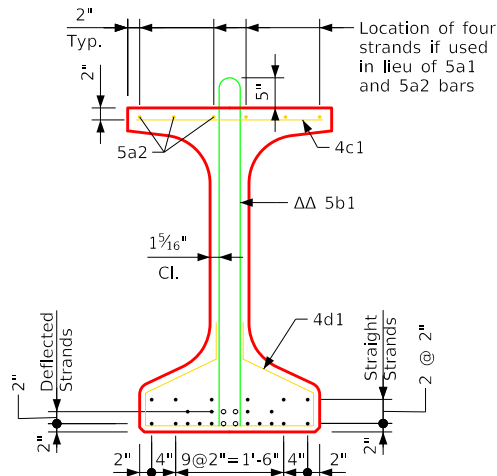
Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴



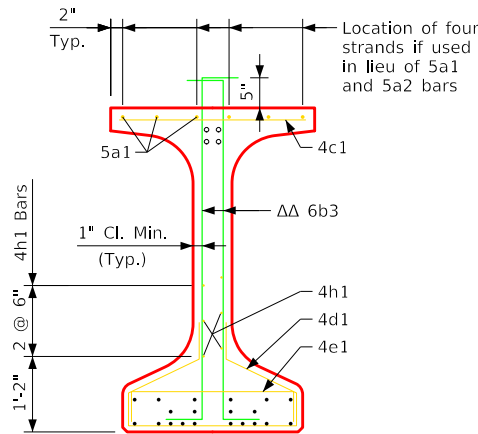
Top Flange Longitudinal Bar Layout



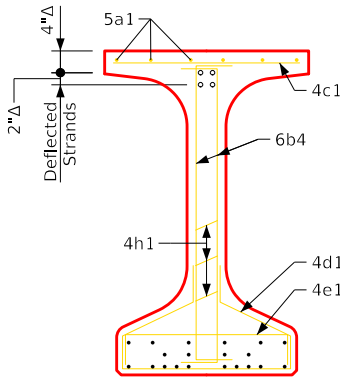
BTD Beam Cross
Section



Section A-A



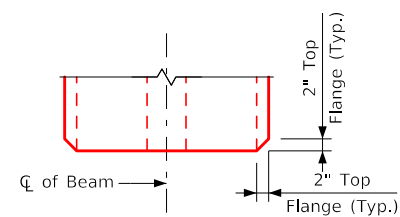
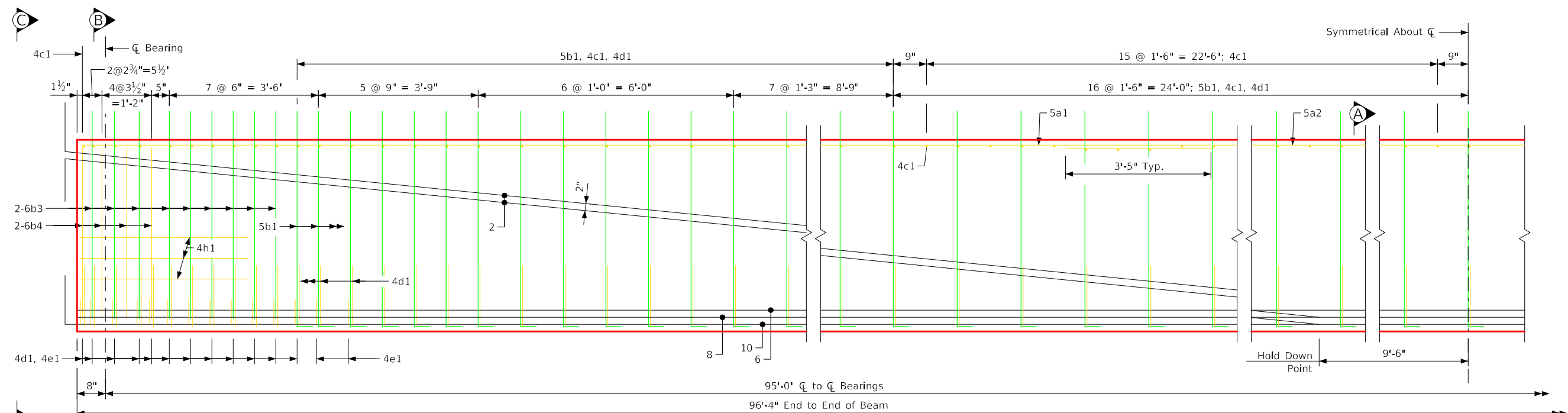
Section B-B



View C-C

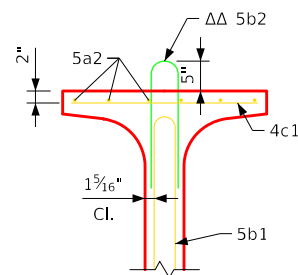
◊ Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTD90 Beam Details



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

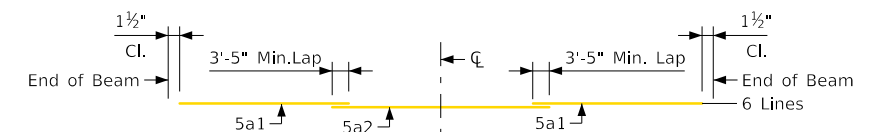


Section A-A
(Alternate)

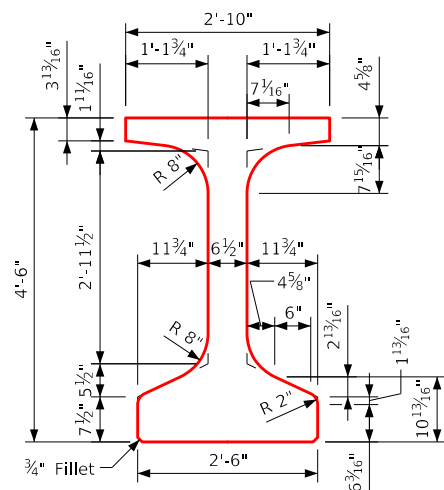
See Alternate Bar Note on
Standard Sheet 4730.

$$\text{Area} = 748.8 \text{ in.}^2$$
$$\bar{y}_b = 24.64 \text{ in.}$$
$$I = 285,860 \text{ in.}^4$$

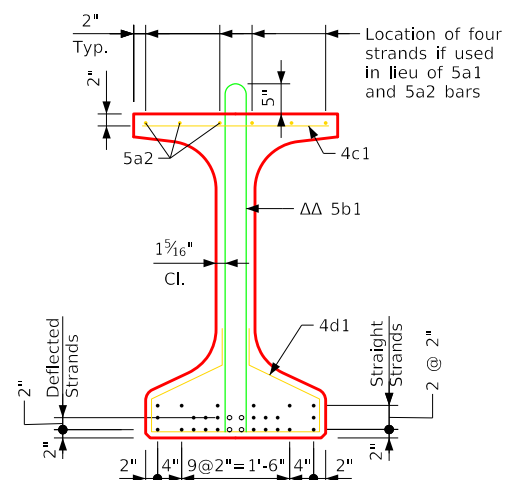
Beam Section Properties



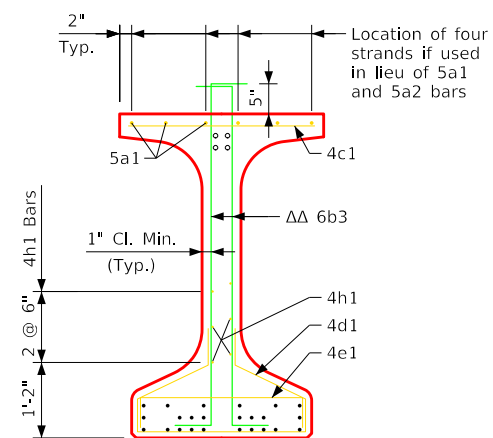
Top Flange Longitudinal Bar Layout



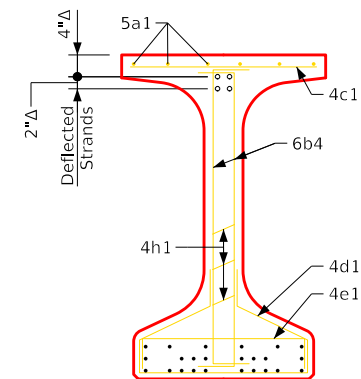
BTD Beam Cross
Section



Section A-A



Section B-B

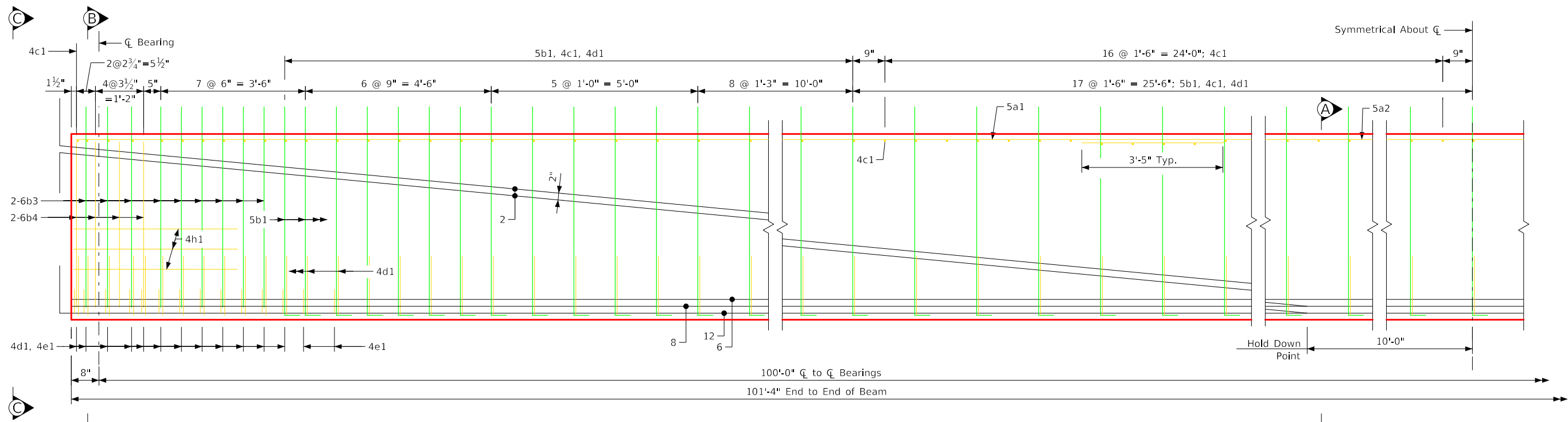


View C-C

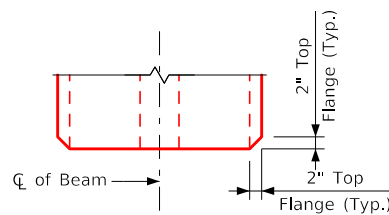
- Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

BTD95 Beam Details

Revision 10-07: 5b2 Bar Lengthened to Extend 5 Inches Above Beam Top.
Issued 05-04.
Beams.dgn - 4741 - This Sheet Re-Issued 04-2024. Sheet Format Update.

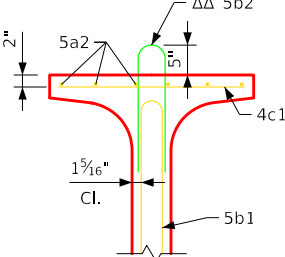


BTD100



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

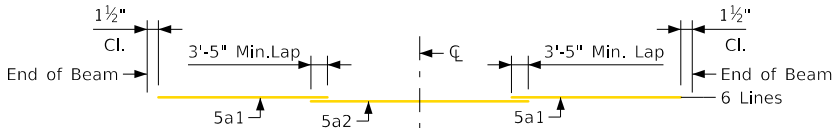


Section A-A (Alternate)

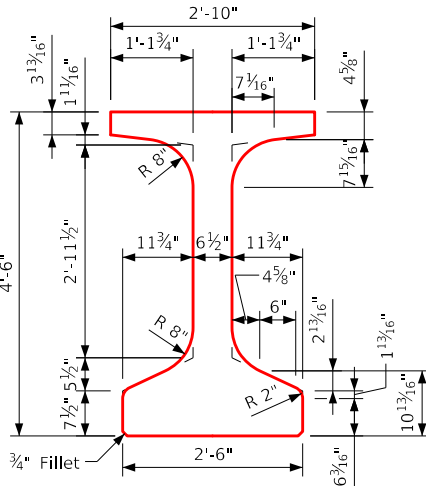
See Alternate Bar Note on Standard Sheet 4730.

Beam Section Properties

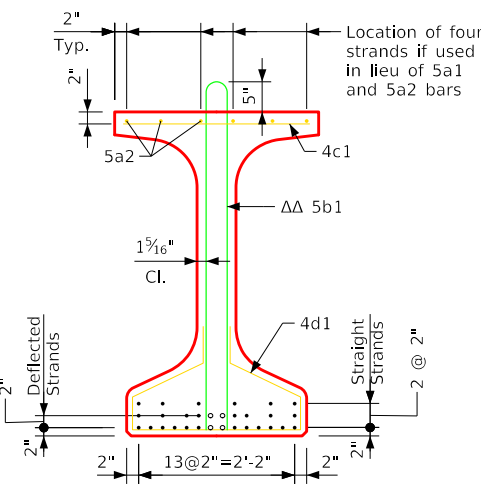
Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴



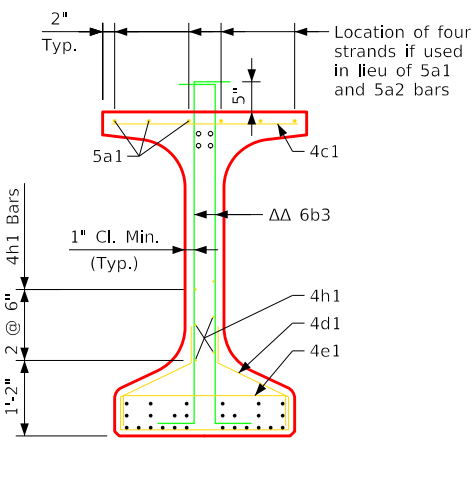
Top Flange Longitudinal Bar Layout



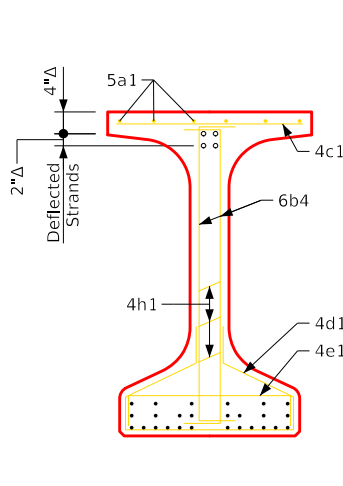
BTD Beam Cross Section



Section A-A



Section B-B



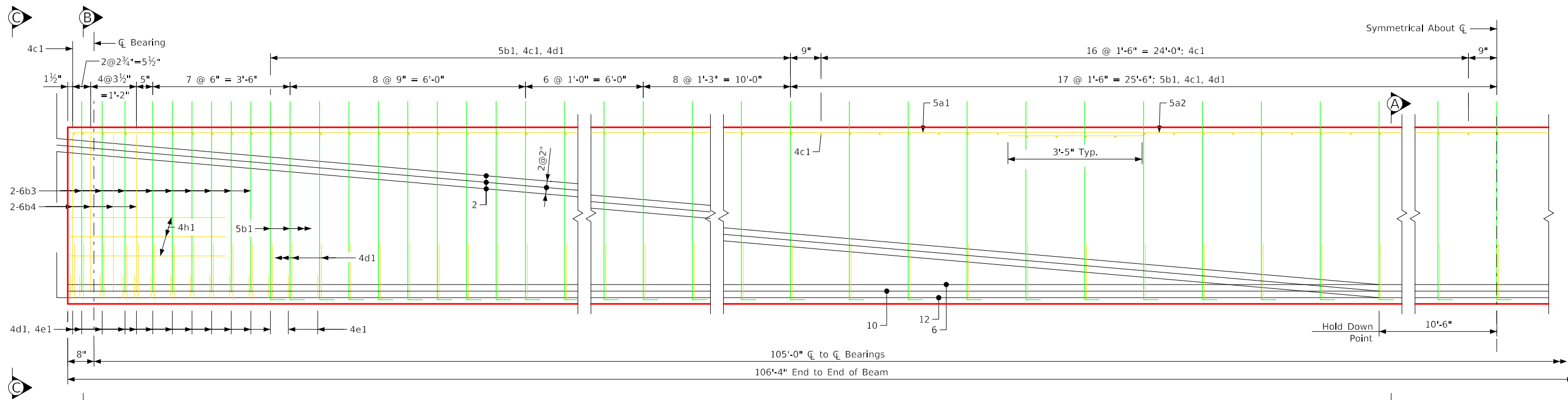
View C-C

° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

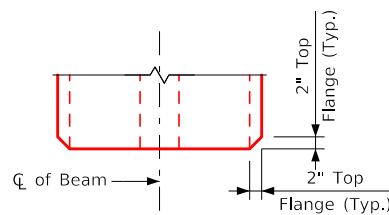
BTD100 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "D" Beam - 100'-0" Span	Standard Sheet 4741	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:28 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top.
Issued 05-04.
Beams.dgn - 4742 - This Sheet Re-Issued 04-2024. Sheet Format Update.

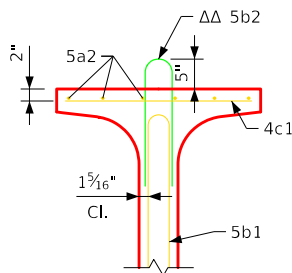


BTD105



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

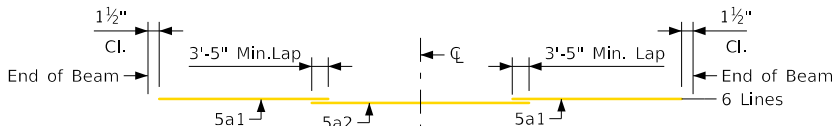


Section A-A
(Alternate)

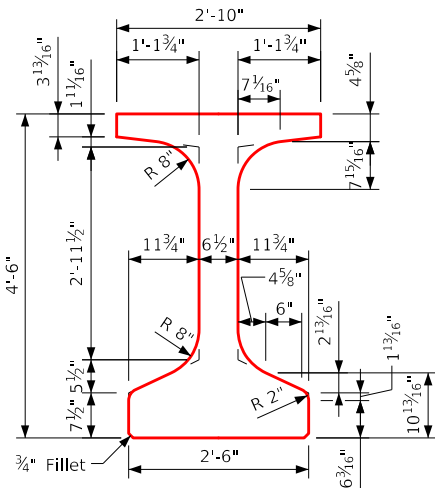
See Alternate Bar Note on Standard Sheet 4730.

Beam Section Properties

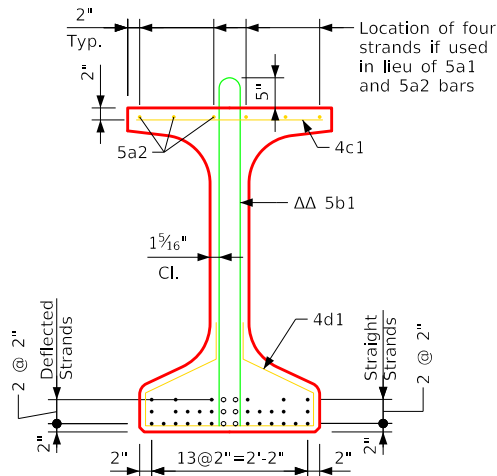
Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴



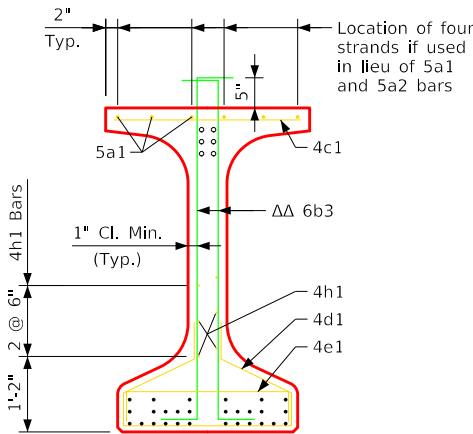
Top Flange Longitudinal Bar Layout



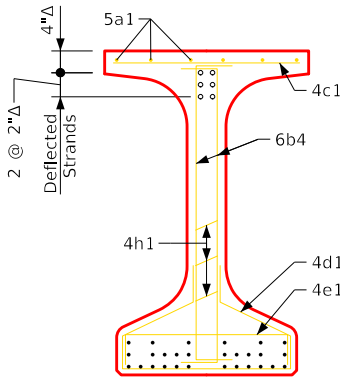
BTD Beam Cross
Section



Section A-A



Section B-B

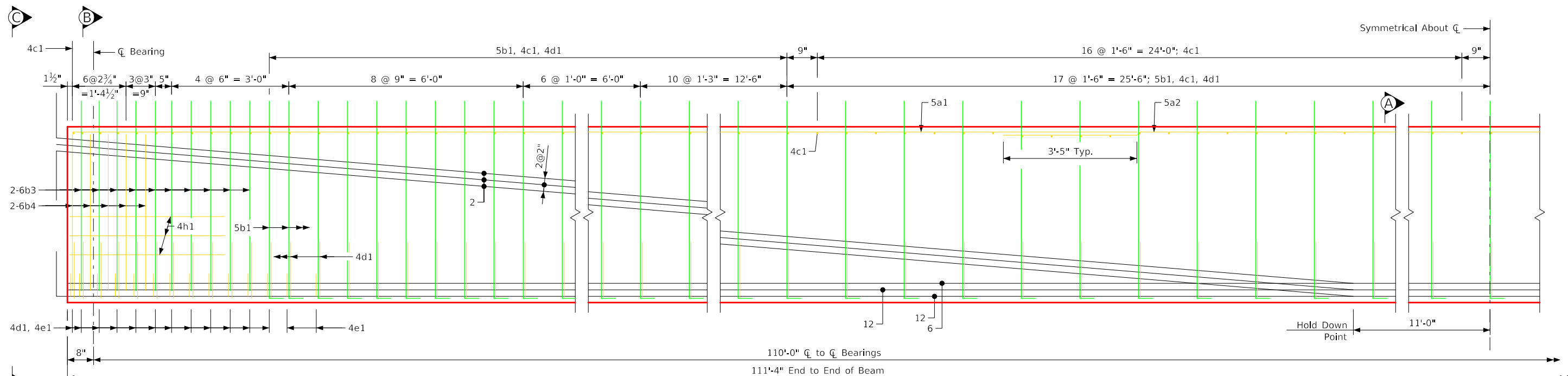


View C-C

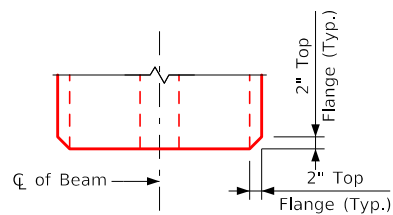
° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTD105 Beam Details

Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top.
Issued 05-04.
Beams.dgn - 4743 - This Sheet Re-Issued 04-2024. Sheet Format Update.

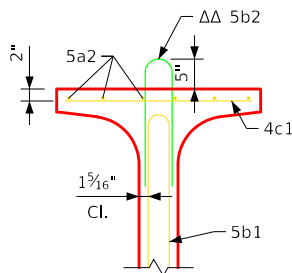


BTD110



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

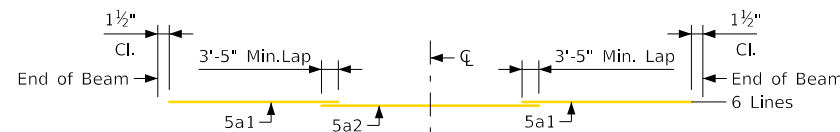


Section A-A
(Alternate)

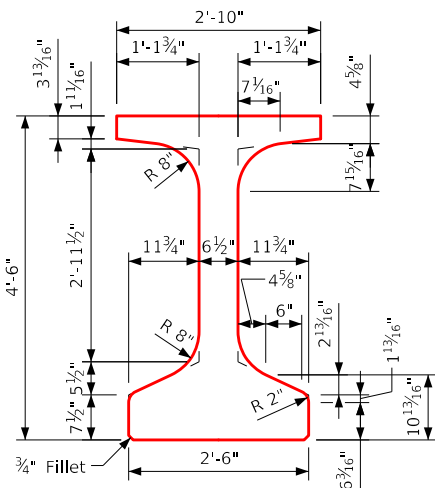
See Alternate Bar Note on Standard Sheet 4730.

Beam Section Properties

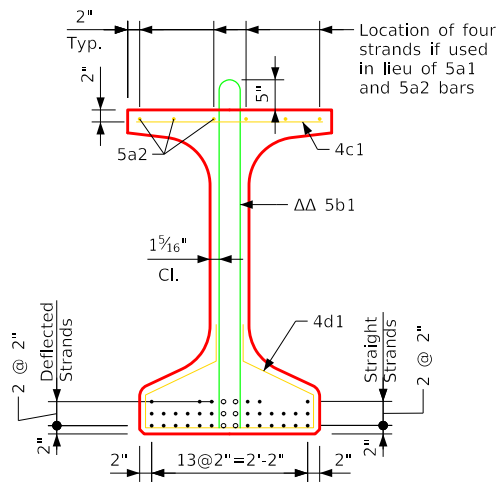
Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴



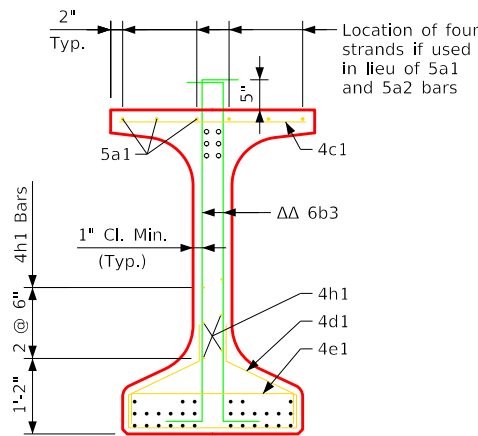
Top Flange Longitudinal Bar Layout



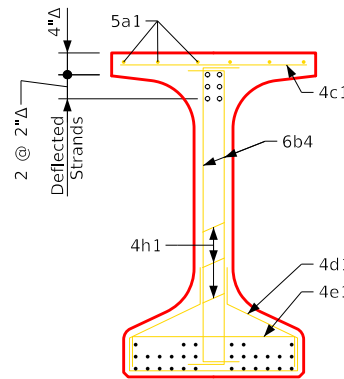
BTD Beam Cross Section



Section A-A



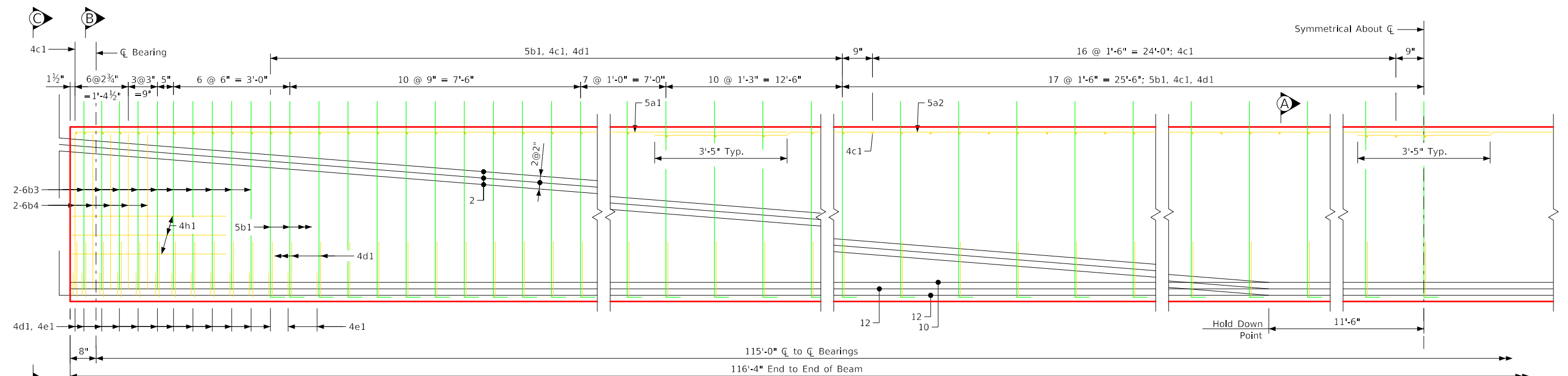
Section B-B



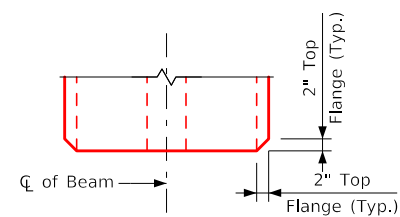
View C-C

° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTD110 Beam Details

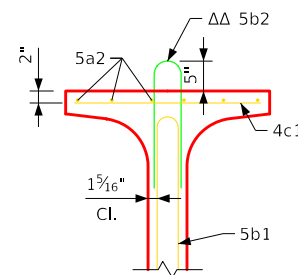


BTD115

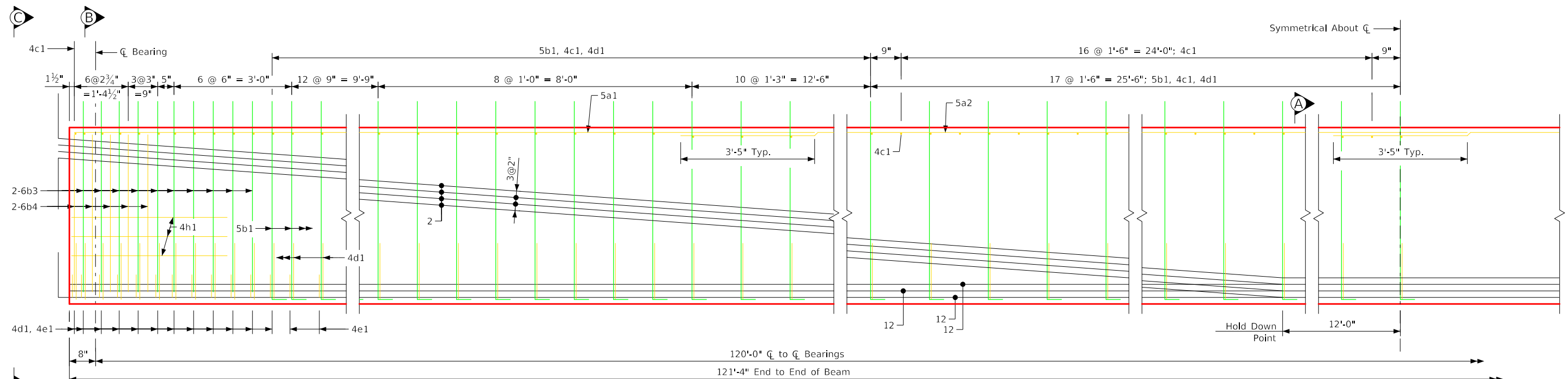


Top View

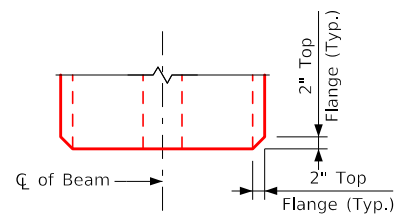
The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top.
Issued 05-04.
Beams.dgn - 4745 - This Sheet Re-Issued 04-2024. Sheet Format Update.

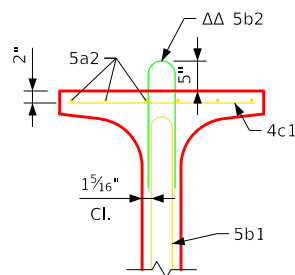


BTD120



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

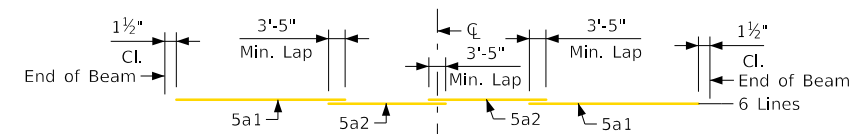


Section A-A (Alternate)

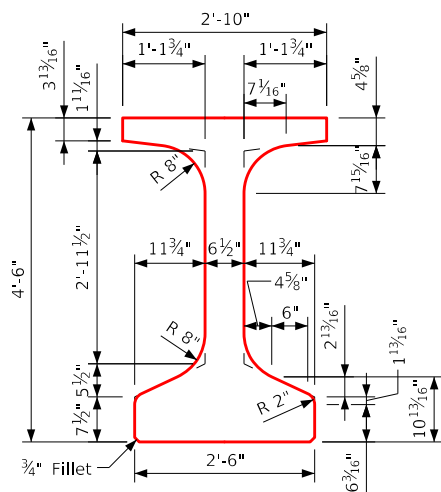
See Alternate Bar Note on Standard Sheet 4730.

Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴

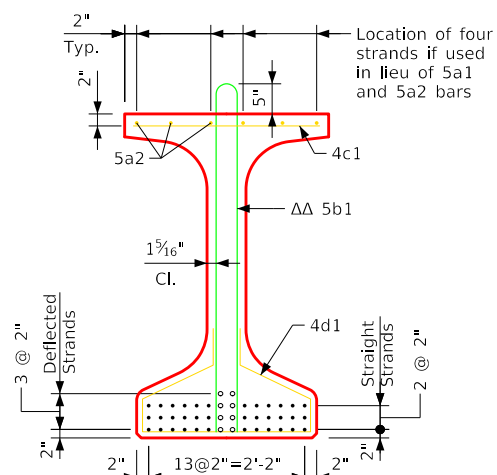
Beam Section Properties



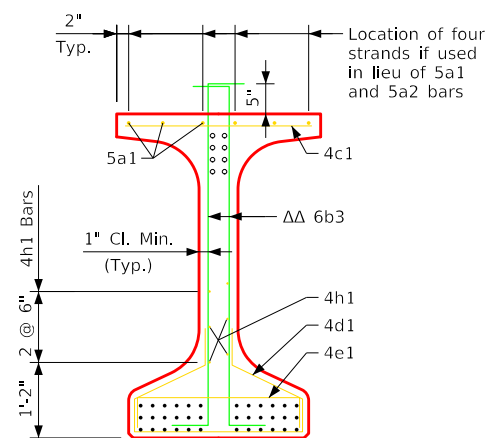
Top Flange Longitudinal Bar Layout



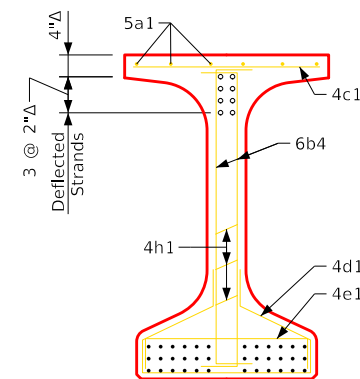
BTD Beam Cross Section



Section A-A



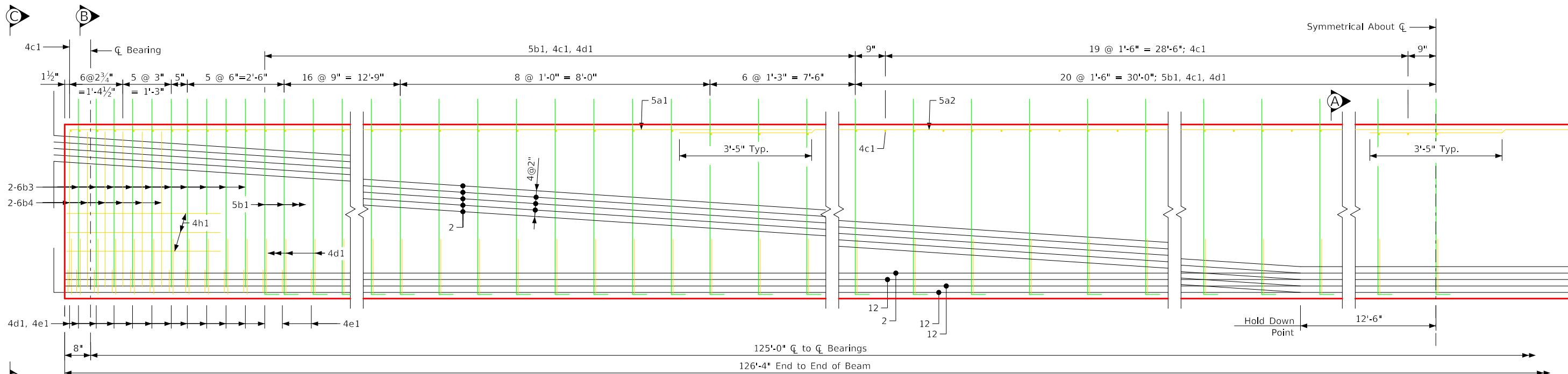
Section B-B



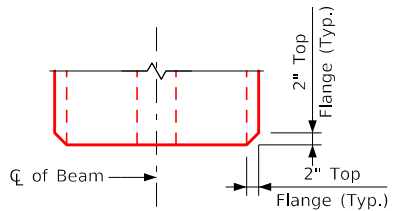
View C-C

° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTD120 Beam Details

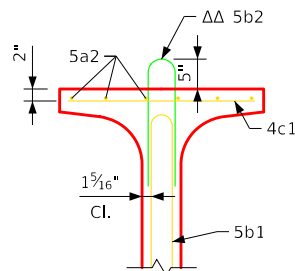


BTD125



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

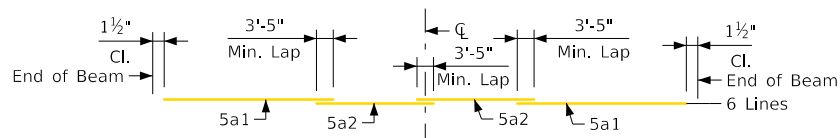


Section A-A (Alternate)

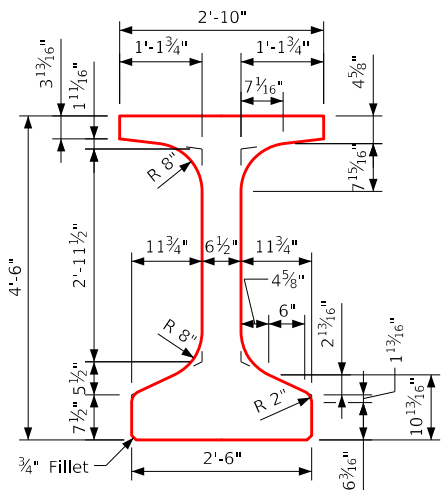
See Alternate Bar Note on Standard Sheet 4730.

Beam Section Properties

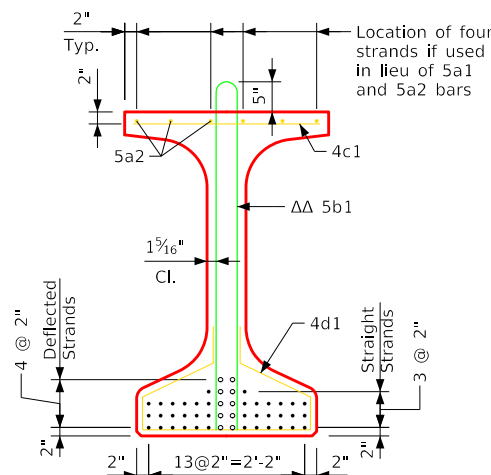
Area = 748.8 in.²
 $\bar{y}_b = 24.64$ in.
 $I = 285,860$ in.⁴



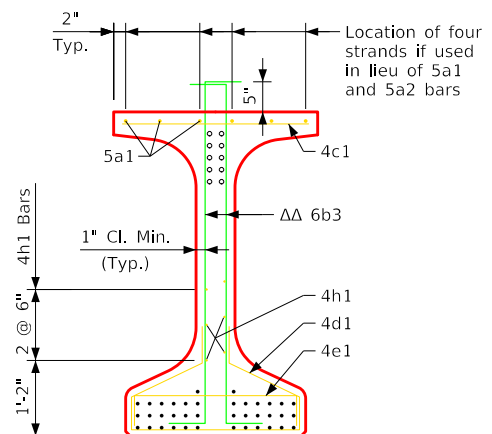
Top Flange Longitudinal Bar Layout



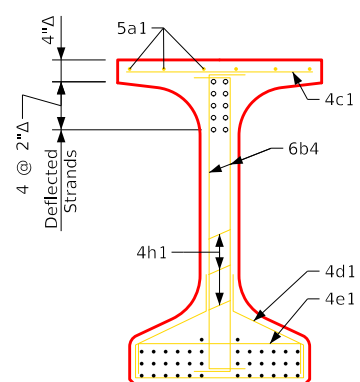
BTD Beam Cross Section



Section A-A



Section B-B



View C-C

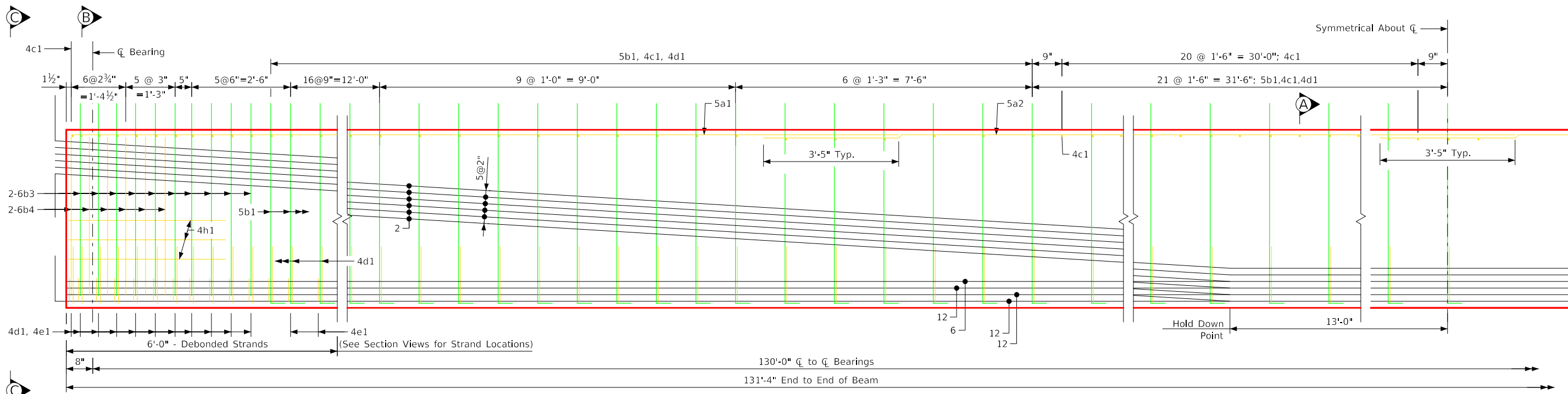
BTD125 Beam Details

° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

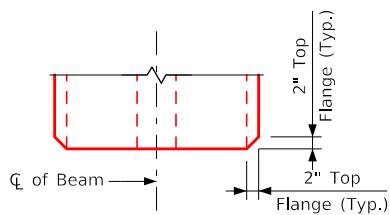
Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top.
Issued 05-04.
Beams.dgn - 4746 - This Sheet Re-Issued 04-2024. Sheet Format Update.

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "D" Beam - 125'-0" Span	Standard Sheet 4746	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:34 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revision 10-07: 5b2 Bar Deleted. 5b1 Bar Lengthened to Extend 5 Inches Above Beam Top.
Issued 05-04.
Beams.dgn - 4747 - This Sheet Re-Issued 04-2024. Sheet Format Update.

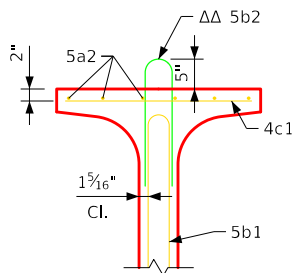


BTD130



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



Section A-A
(Alternate)

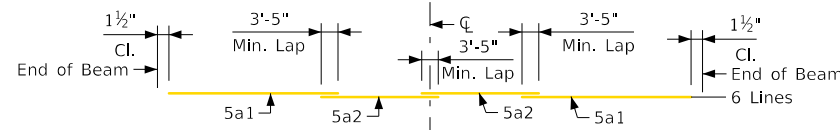
See Alternate Bar Note on Standard Sheet 4730.

Area = 748.8 in.²

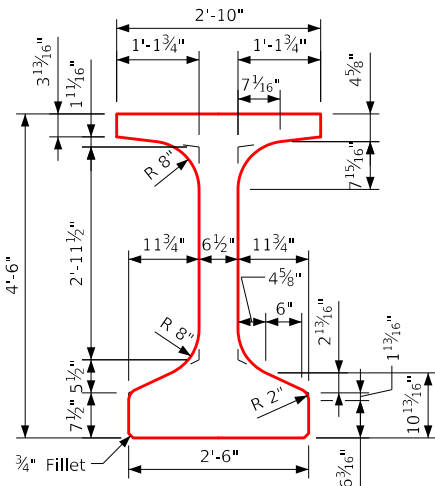
$\bar{y}_b = 24.64$ in.

I = 285,860 in.⁴

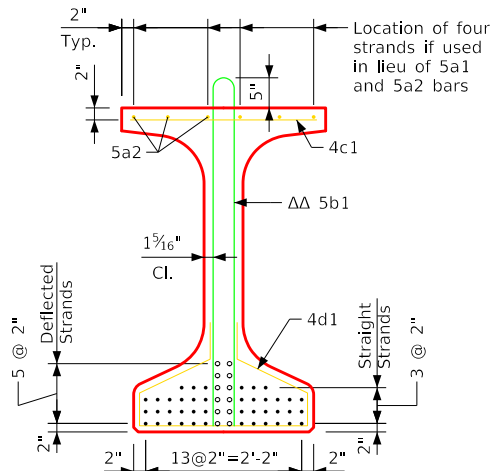
Beam Section
Properties



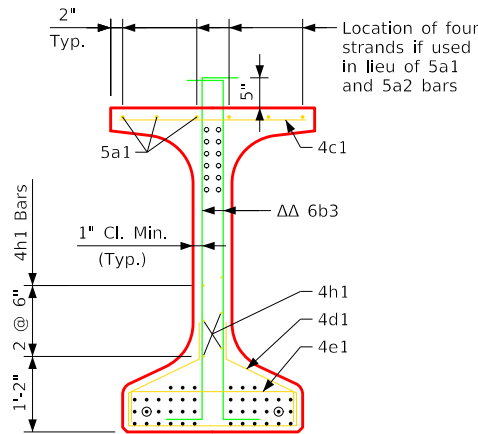
Top Flange Longitudinal Bar Layout



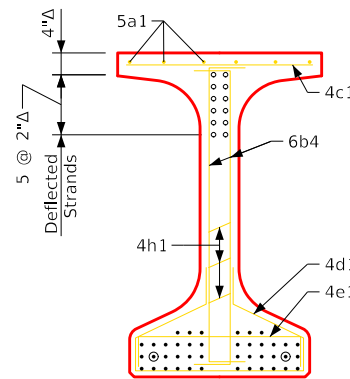
BTD Beam Cross
Section



Section A-A



Section B-B



View C-C

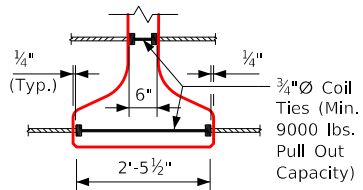
BTD130 Beam Details

- Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars
- ⊙ Strands Debonded 6'-0" from Beam Ends

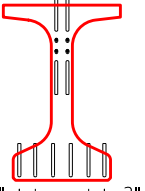
Correction 12-13: Coil Tie Detail was Changed to Reflect the Distance Between Coil Tie Anchors Embedded $\frac{1}{2}$ inch.
Revised 10-2024: Revised "At Release" and "After Losses" Camber Values, revised "Reinforcing Bar List" and "Reinforcing Steel, Weight" in the "BTD135 Beam Data" Table due to changes in 604, 4d1, and 4e1 bar quantity.
Added note for Debonded strands.

Issued 05-04.
Beams.dgn - 4748s1 - This Sheet Re-Issued 04-2024. Sheet Format Update.

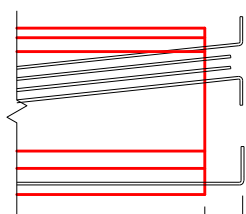
Number and exact location of coil ties to be as detailed on specific bridge design.



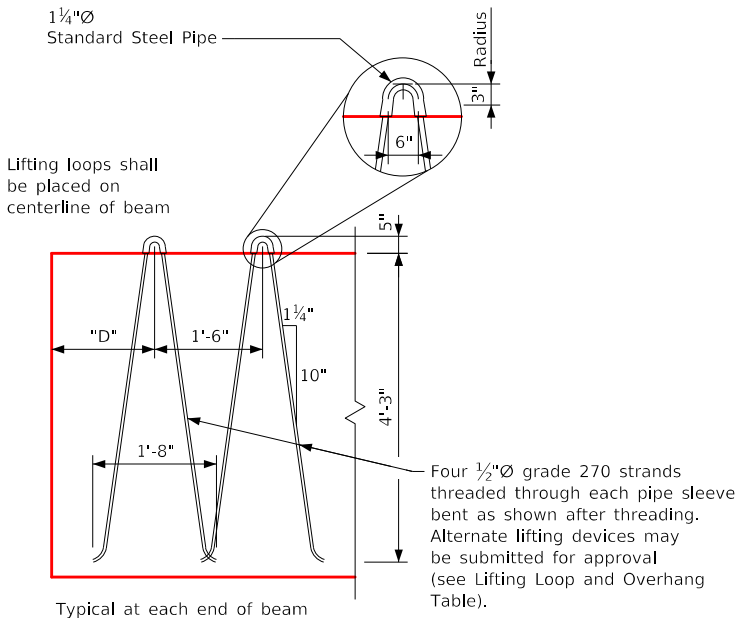
Coil Tie Detail



The top and bottom rows of the deflected strands are to be cut with 1'-2" 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.



Strand Projection at Beam Ends When Embedded in Concrete End Diaphragm



Lifting Loop Detail

Beams	Lifting Loops Each End	# of Strands Per Loop	D	Beam Overhang (ft.)
BTD135	2	4	9'-3"	16

Lifting loops shall carry loads equally.

ΔΔ 5b1 and 6b3 bars to be epoxy coated
* 6b3 and 6b4 bars to be used in pairs

Note: All mild reinforcing steel can be epoxy coated at Contractor's option without modification to bar length or details at no additional cost to the State.

Reinforcing Bar List				Bent Bar Details				
				Note: All bar dimensions are out to out D = Pin diameter for bending (unless otherwise shown)				
Beam		BTD135						
Bar	Shape	No.	Length					
5a1		12	33'-2"					
5a2		12	40'-0"					
				#4 Bar D= 2"				
				#5 Bar D= 2½"				
				#6 Bar D= 4½"				
ΔΔ ΔΔ* *	5b1		111	10'-8"				
	6b3		40	5'-9"				
	6b4		24	5'-1"				
	4c1		179	2'-7"				
	4d1		132	6'-5"				
	4e1		28	3'-2"				
	4h1		6	8'-0"				
				6b4				
				ΔΔ5b1				
				ΔΔ6b3				
				ΔΔ5b2 (Alternate)				
				5b1 (Alternate)				
				4d1 (Alternate)				

BTD135 Beam Data

⑤	BTD Beam	Span Length ℓ _{CL} Bearing	Overall Beam Length (L)	Concrete Strength		Strand Size Dia. (in.)	Number of Strands		Total Initial Prestress (kips) ③	Hold Down Force (kips)	Camber (in.) ④		Deflection (in.) Δ _D		Permissible Maximum Spacing	Weight (tons)	Concrete (cu. yd.)	Reinforcing Steel (weight lb.)
				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													
	BTD135	135'-0"	136'-4"	8.00	9.50	0.60"	46	12	2467	29.5	4.46"	7.14"	5.00"	1.25"	9'-0½"	53.2	26.2	3645

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 in.²) 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

Materials I.M.570.
Bearings shall be as detailed on other design sheets.

Beams to be used in bridges made continuous by the poured in place deck, are to be at least 28 days old before the deck 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 Load and Overhang Table".

The contractor shall assure the lateral stability of the BTD135 beam during handling, transporting and erection by providing temporary

Holes must be cast in the web to accommodate the steel diaphragm.

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.

Design Stresses:

Design stresses for the following materials are to be in accordance with AASHTO LRFD Bridge Design Specifications, Series of 2017.

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:

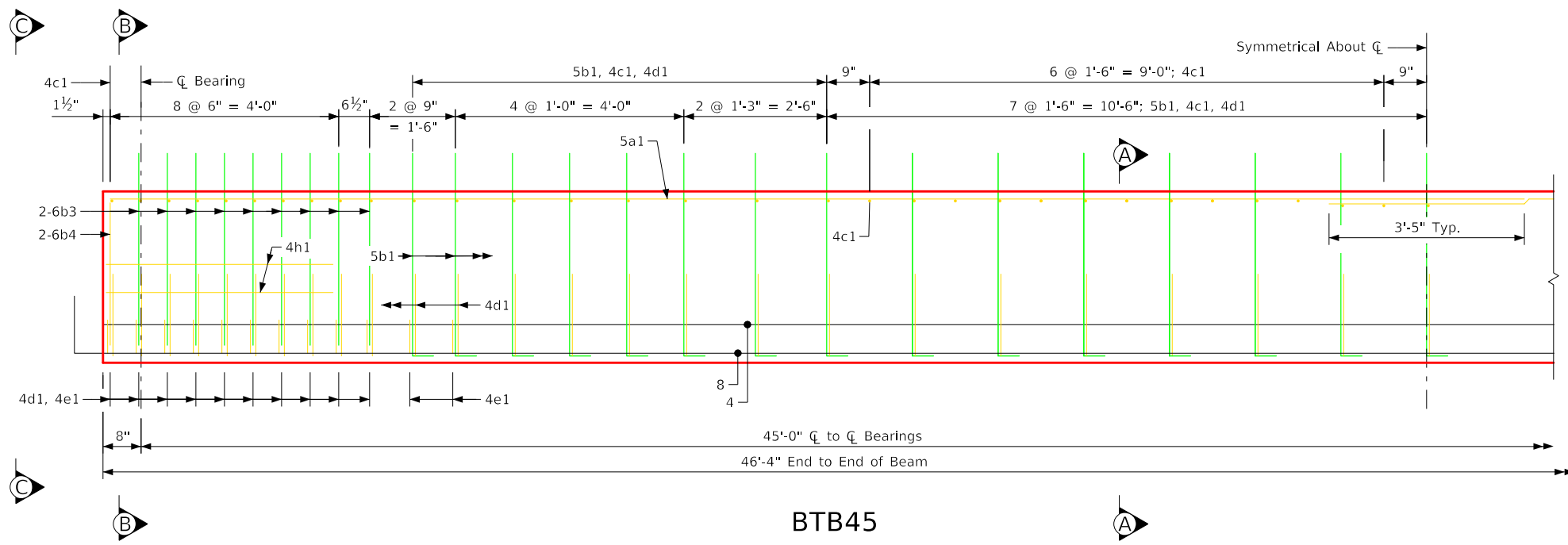
Construction: Standard Specifications of the Iowa Department of Transportation, current series, with current applicable special provisions and supplemental specifications.

Design: AASHTO LRFD, Series of 2017 with minor modifications.

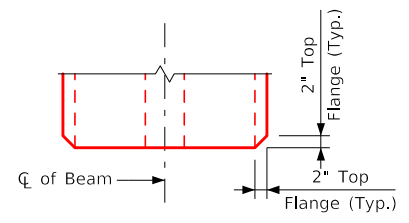
Alternate Bar Notes:

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.

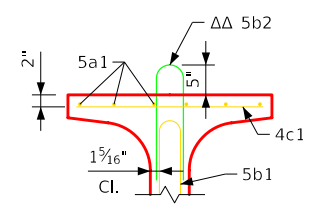
BTD135 Beam - Data Details



BTB45



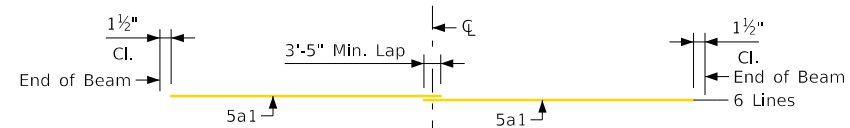
Top View
The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



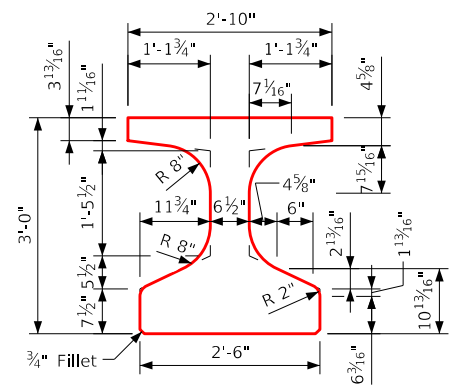
Section A-A (Alternate)
See Alternate Bar Note on Standard Sheet 4750.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

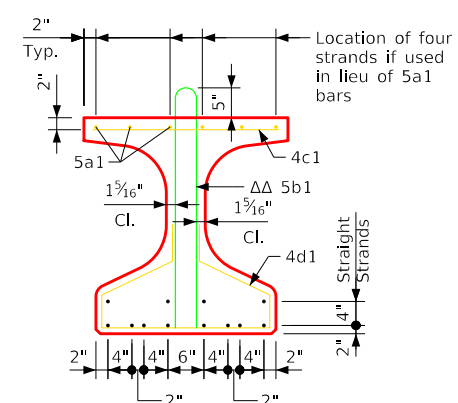
Beam Section Properties



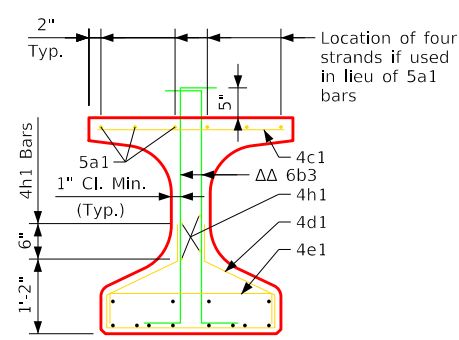
Top Flange Longitudinal Bar Layout



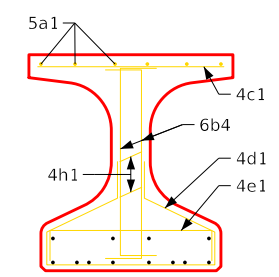
BTB Beam Cross Section



Section A-A



Section B-B



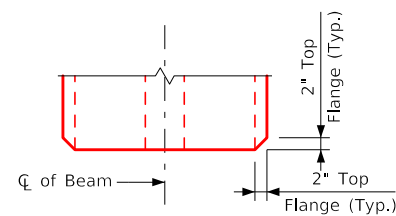
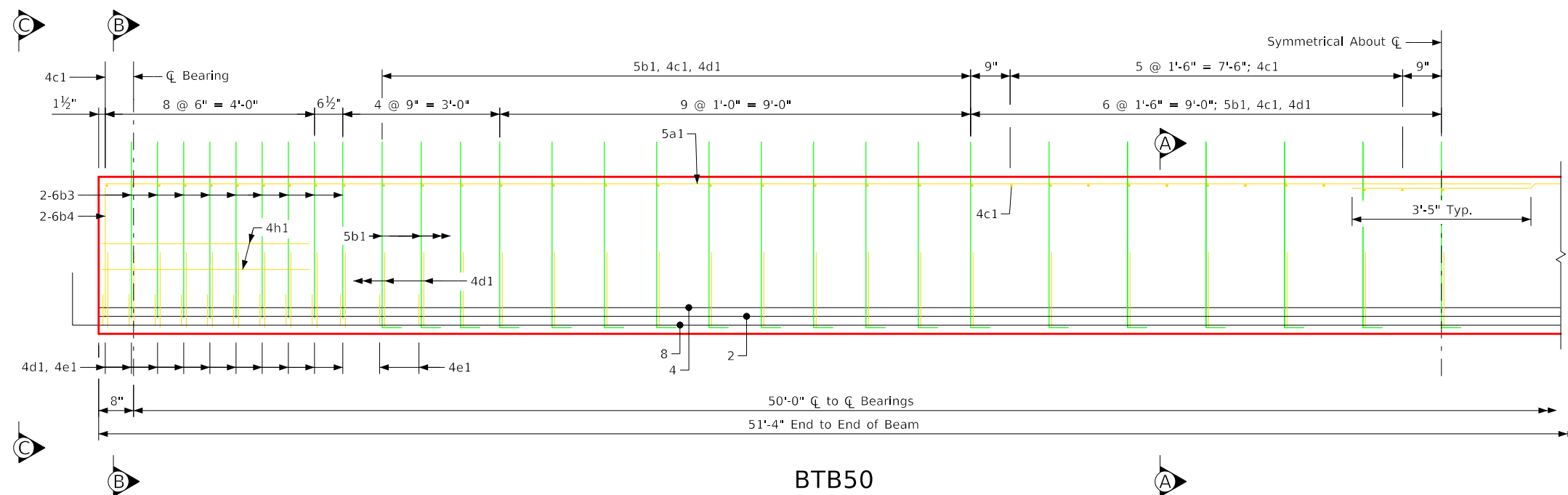
View C-C

ΔΔ Epoxy Coated Bars

BTB45 Beam Details

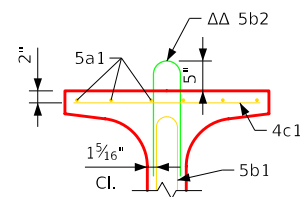
Issued 02-08.
Beams.dgn - 4754 - This Sheet Re-Issued 04-2024. Sheet Format Update.

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "B" Beam - 45'-0" Span	Standard Sheet 4754	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:44 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

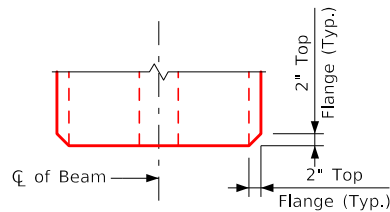
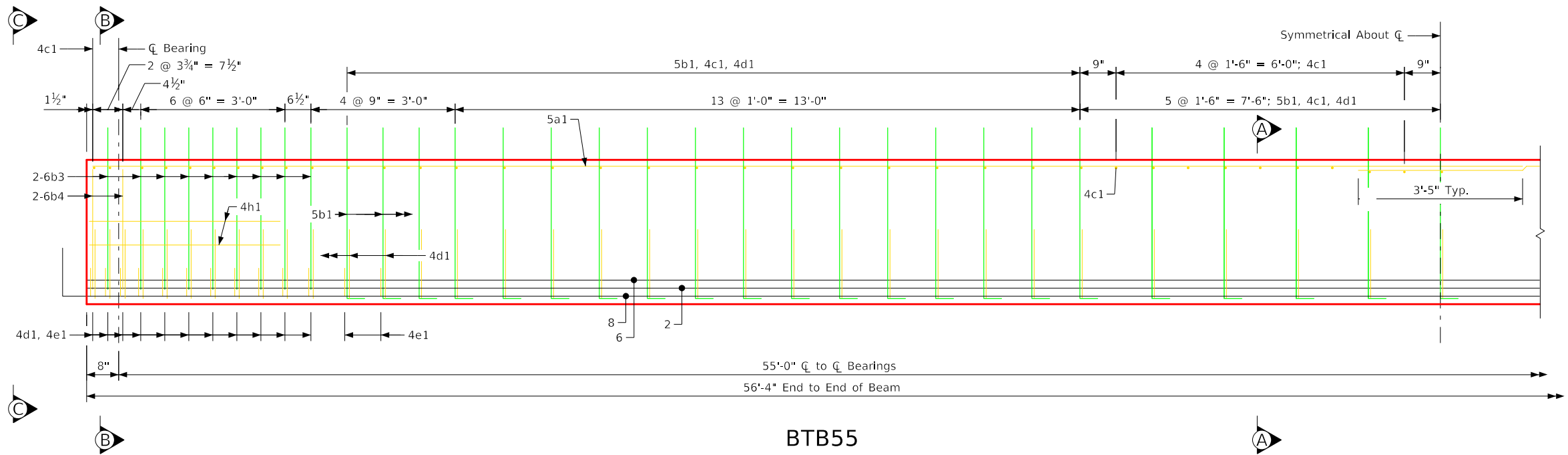


Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

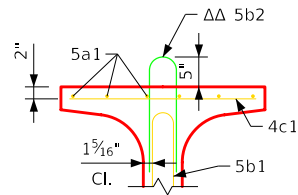


Revised 10-2024: Added one set of 6b4, 4d1, and 4e1 to each beam end and revised rebar spacing.
Issued 02-08.
Beams.dgn - 4756 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

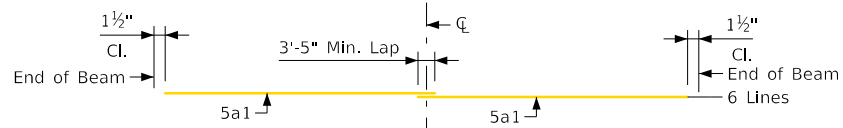


Section A-A
(Alternate)

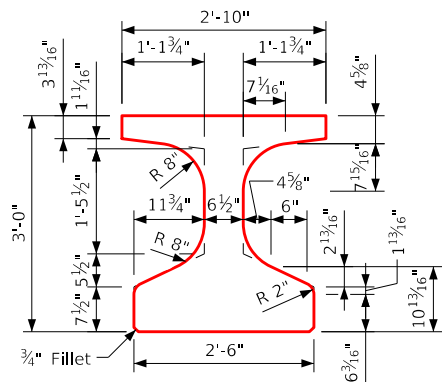
See Alternate Bar Note on Standard Sheet 4750.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

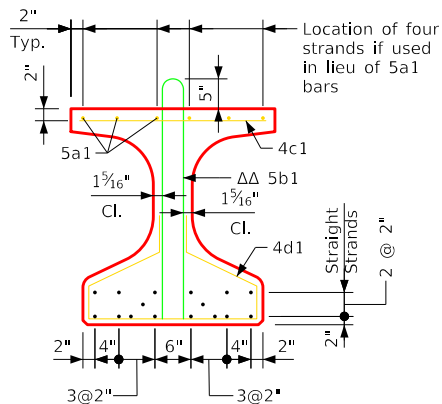
Beam Section Properties



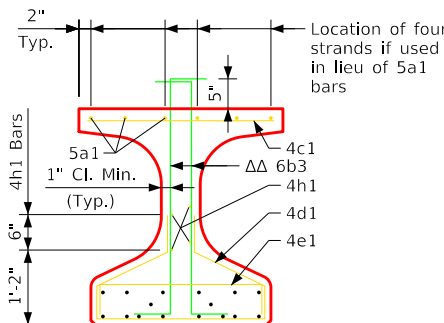
Top Flange Longitudinal Bar Layout



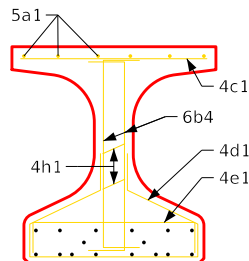
BTB Beam Cross Section



Section A-A



Section B-B



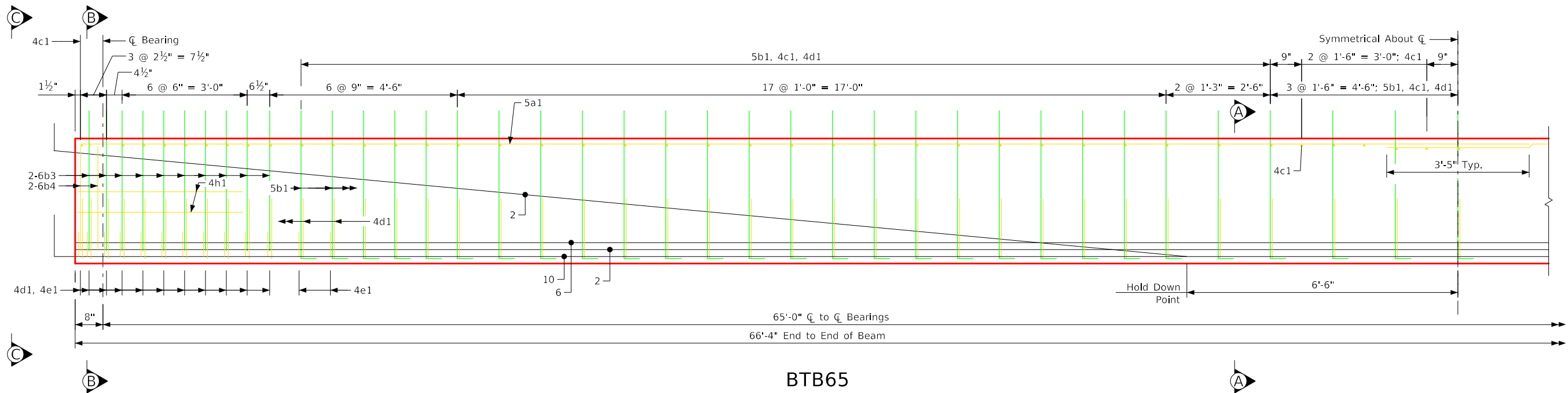
View C-C

ΔΔ Epoxy Coated Bars

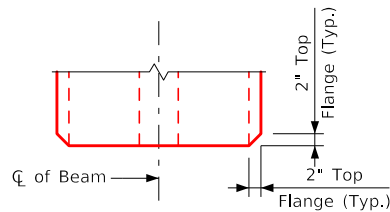
BTB55 Beam Details

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "B" Beam - 55'-0" Span	Standard Sheet 4756	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:46 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revised 10-2024: Added one set of 6b3, 4d1, 4e1 and one set of 6b4 to each beam end and revised rebar spacing.
Issued 02-08.
Beams.dgn - 4758 - This Sheet Re-Issued 04-2024. Sheet Format Update.

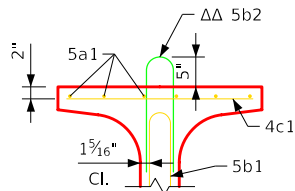


BTB65



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

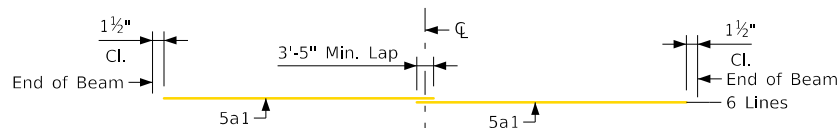


Section A-A
(Alternate)

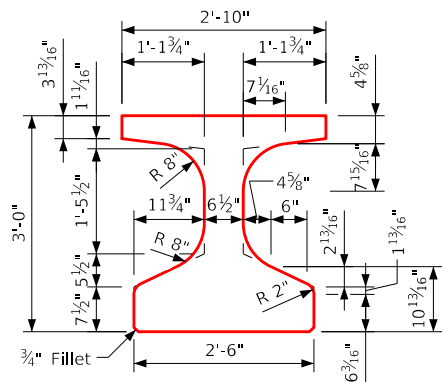
See Alternate Bar Note on Standard Sheet 4750.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

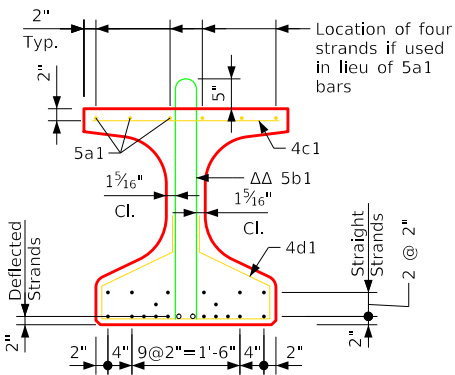
Beam Section Properties



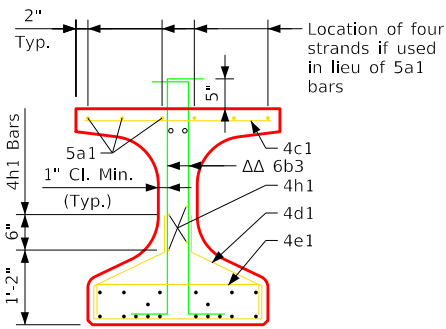
Top Flange Longitudinal Bar Layout



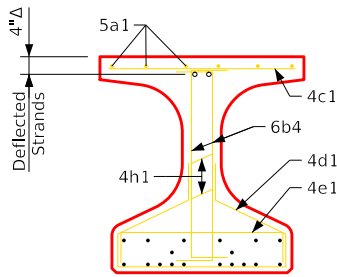
BTB Beam Cross Section



Section A-A



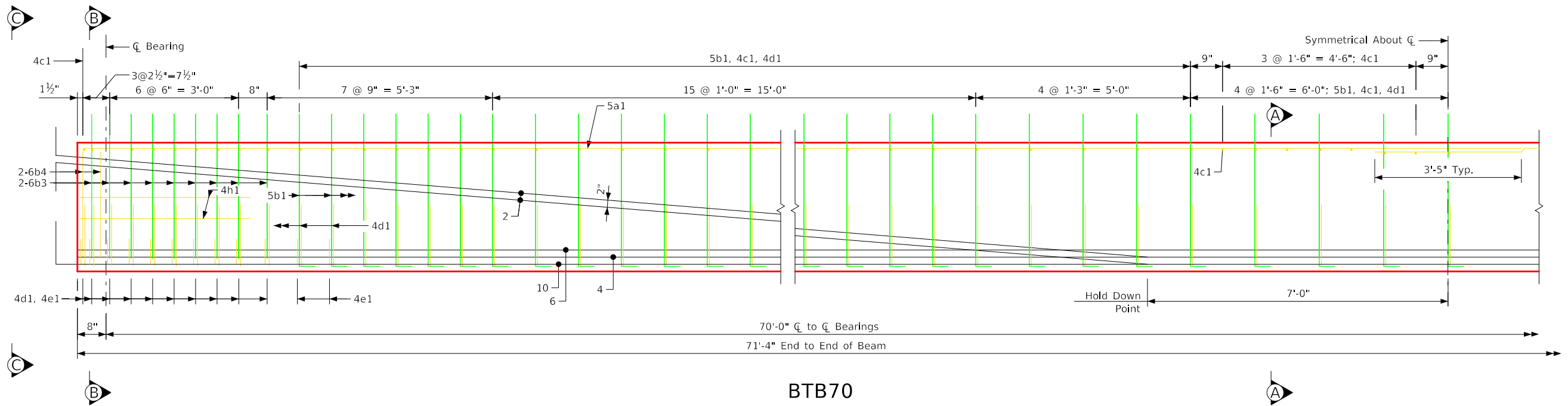
Section B-B



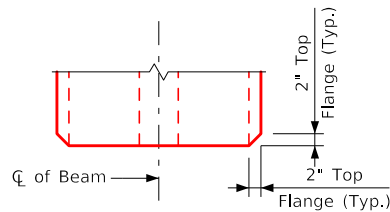
View C-C

° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTB65 Beam Details

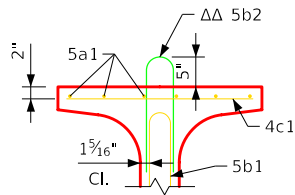


BTB70



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

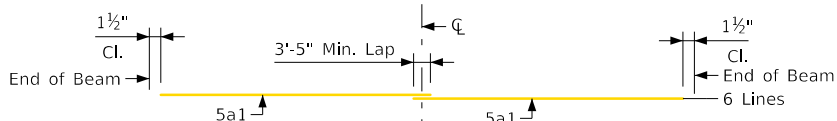


Section A-A (Alternate)

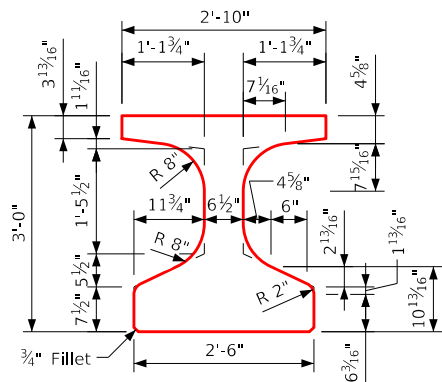
See Alternate Bar Note on Standard Sheet 4750.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

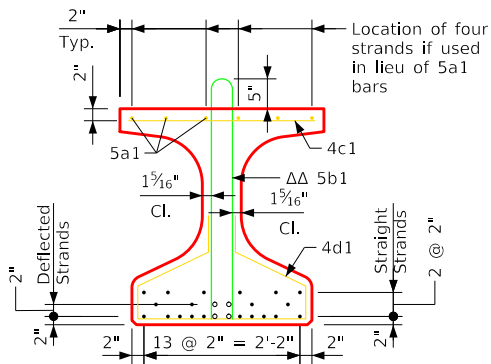
Beam Section Properties



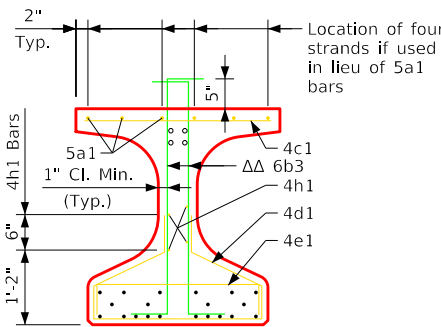
Top Flange Longitudinal Bar Layout



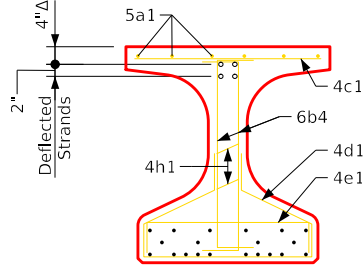
BTB Beam Cross Section



Section A-A



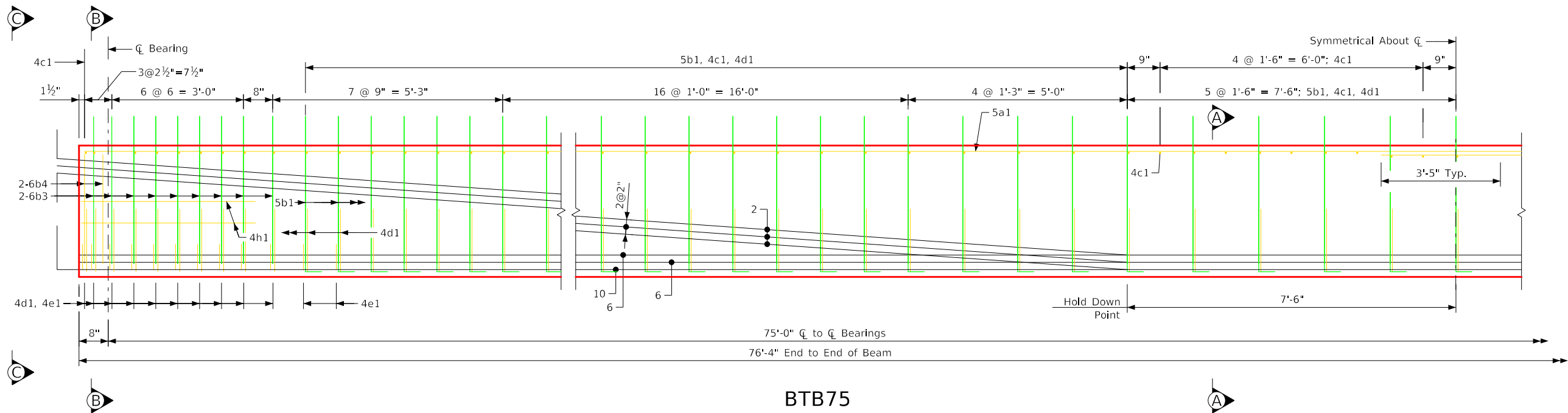
Section B-B



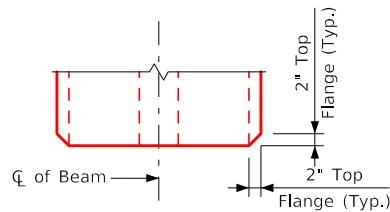
View C-C

° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTB70 Beam Details

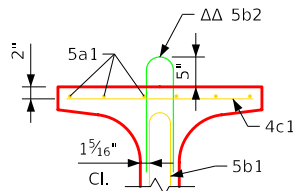


BTB75



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

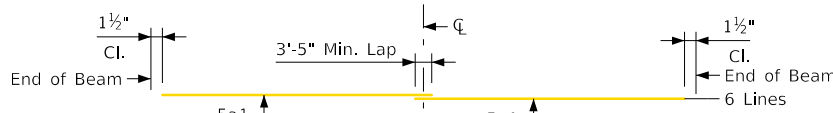


Section A-A (Alternate)

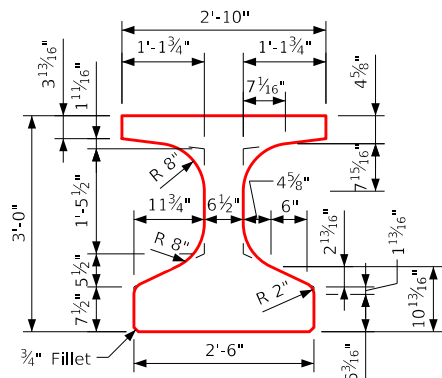
See Alternate Bar Note on Standard Sheet 4750.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

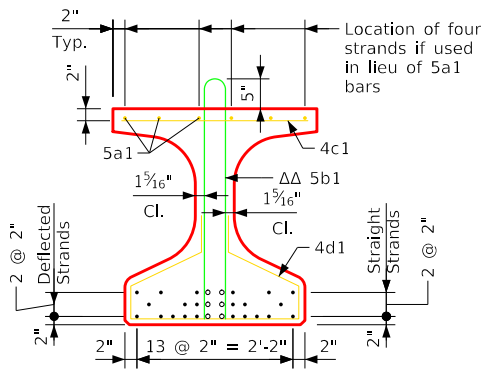
Beam Section Properties



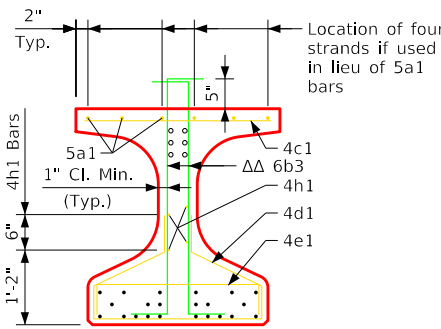
Top Flange Longitudinal Bar Layout



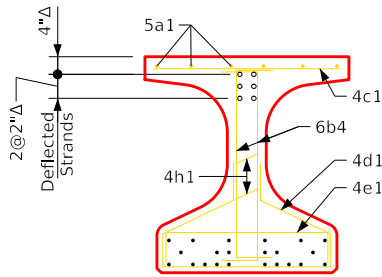
BTB Beam Cross Section



Section A-A



Section B-B

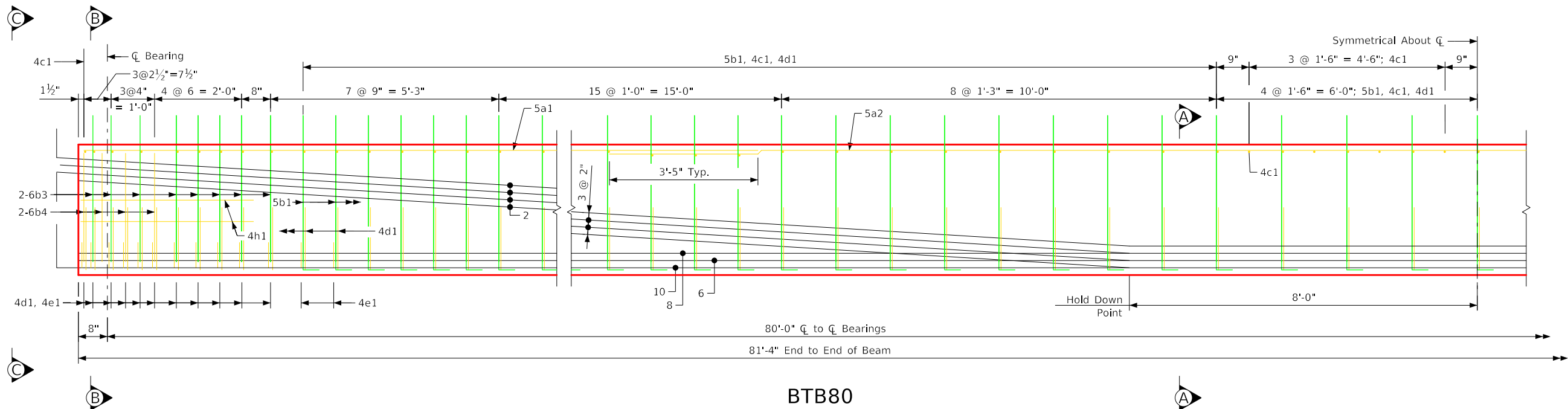


View C-C

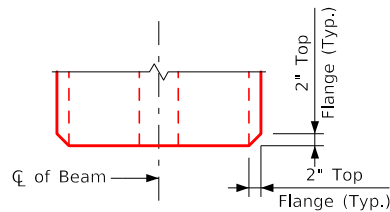
° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTB75 Beam Details

Issued 02-08.
Beams.dgn - 4761 - This Sheet Re-Issued 04-2024. Sheet Format Update.

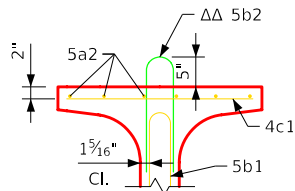


BTB80



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

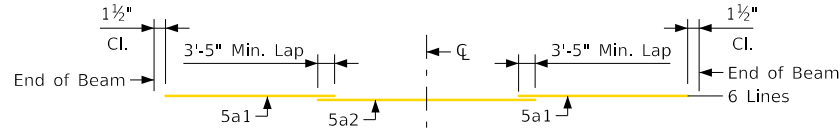


Section A-A (Alternate)

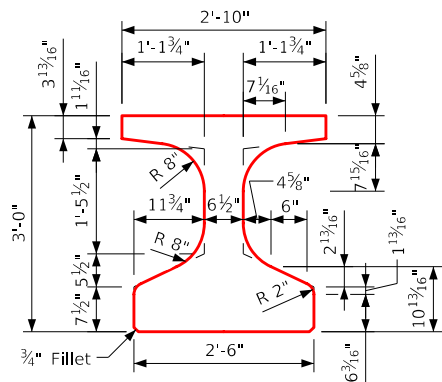
See Alternate Bar Note on Standard Sheet 4750.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

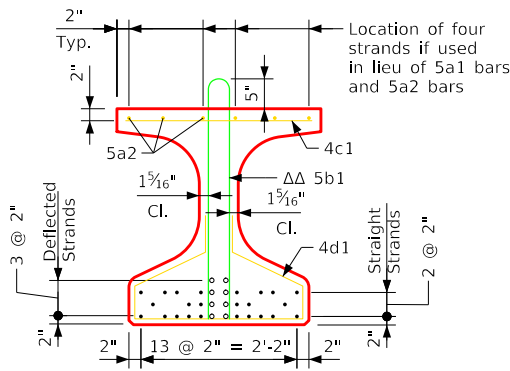
Beam Section Properties



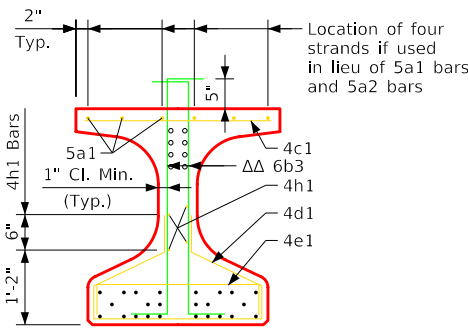
Top Flange Longitudinal Bar Layout



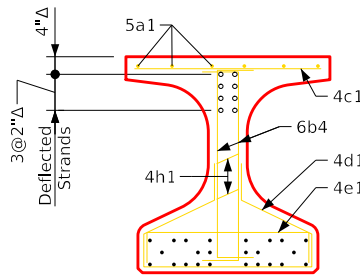
BTB Beam Cross Section



Section A-A



Section B-B

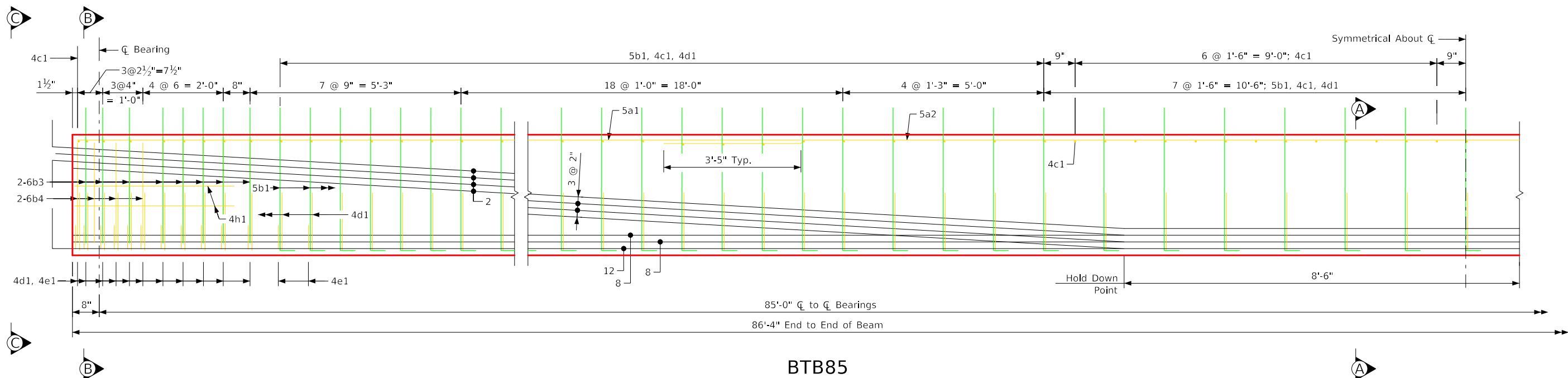


View C-C

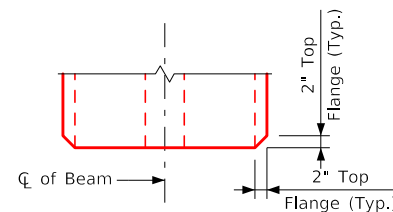
° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTB80 Beam Details

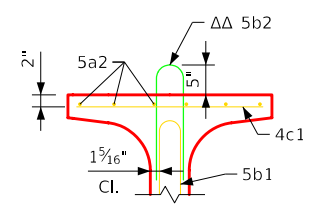
FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "B" Beam - 80'-0" Span	Standard Sheet 4761	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:52 AM	10/2/2024	bkloss	pw:\NTPwint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				



BTB85



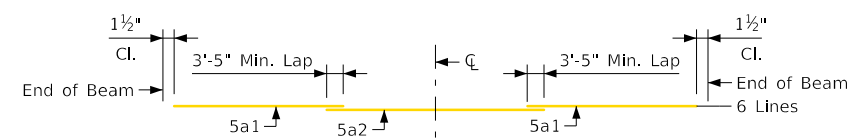
Top View
The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



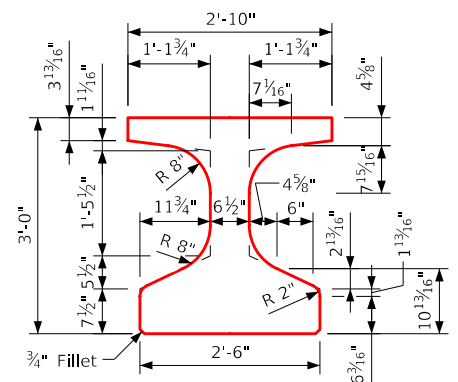
Section A-A (Alternate)
See Alternate Bar Note on Standard Sheet 4750.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

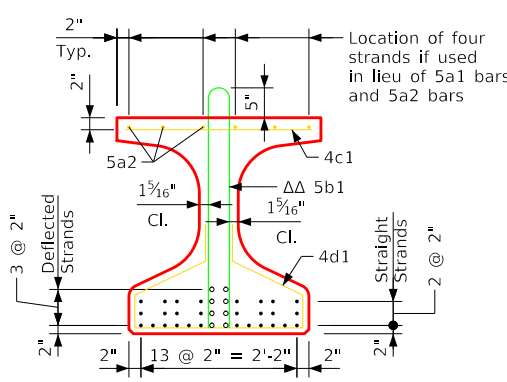
Beam Section Properties



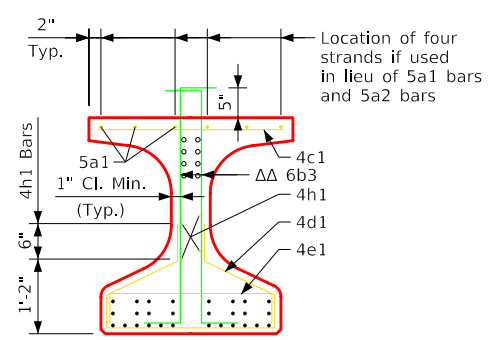
Top Flange Longitudinal Bar Layout



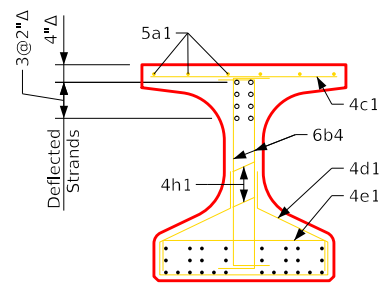
BTB Beam Cross Section



Section A-A



Section B-B



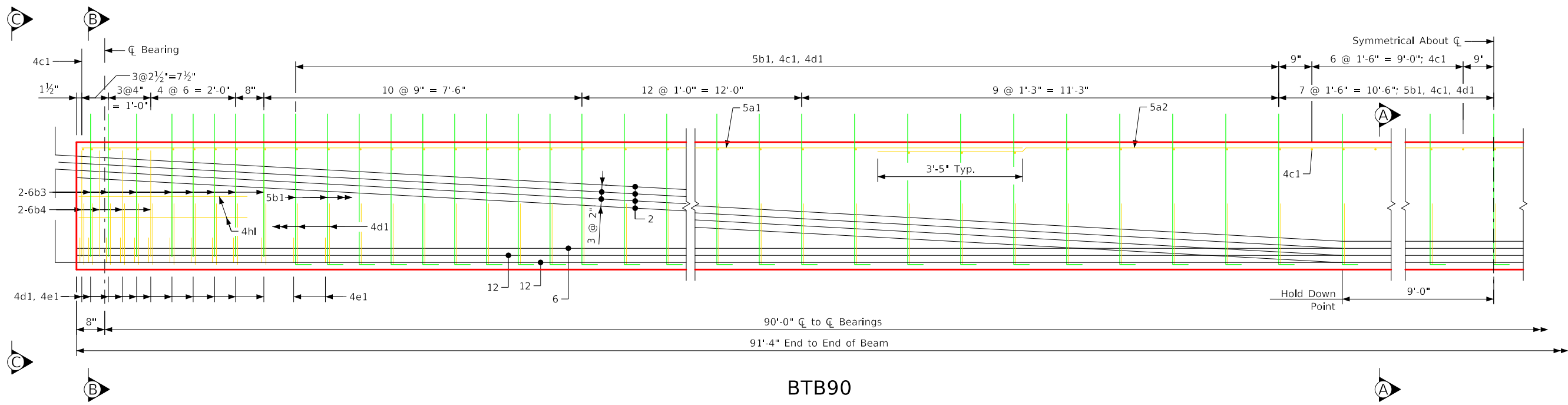
View C-C

- ° Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

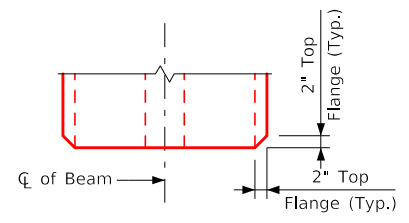
BTB85 Beam Details

Issued 02-08.
Beams.dgn - 4762 - This Sheet Re-Issued 04-2024. Sheet Format Update.

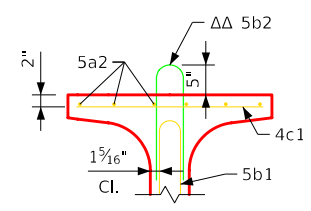
FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "B" Beam - 85'-0" Span	Standard Sheet 4762	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:53 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				



BTB90



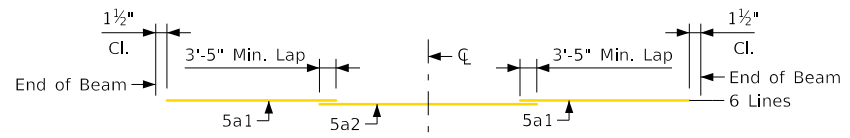
Top View
The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



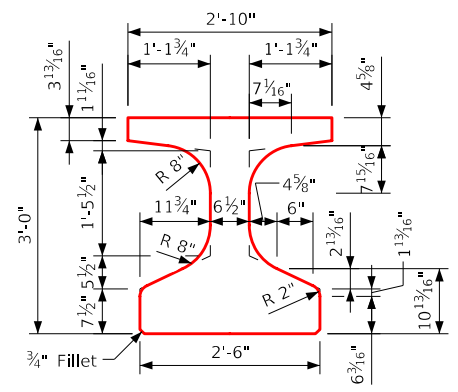
Section A-A (Alternate)
See Alternate Bar Note on Standard Sheet 4750.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

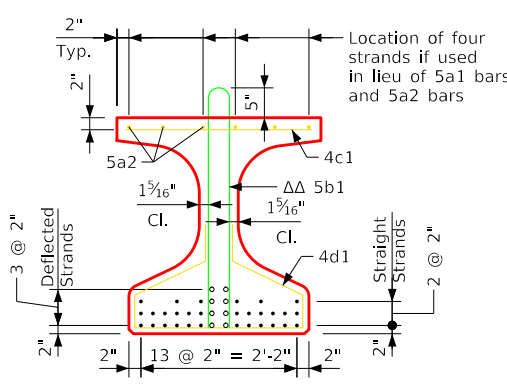
Beam Section Properties



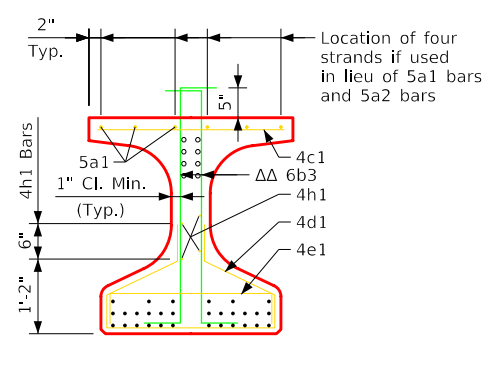
Top Flange Longitudinal Bar Layout



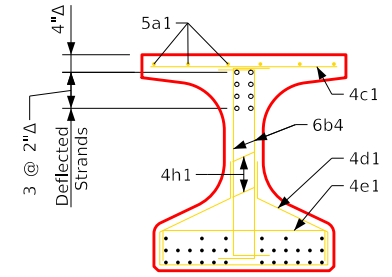
BTB Beam Cross Section



Section A-A



Section B-B

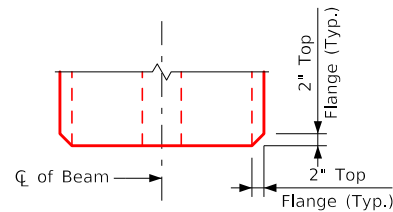
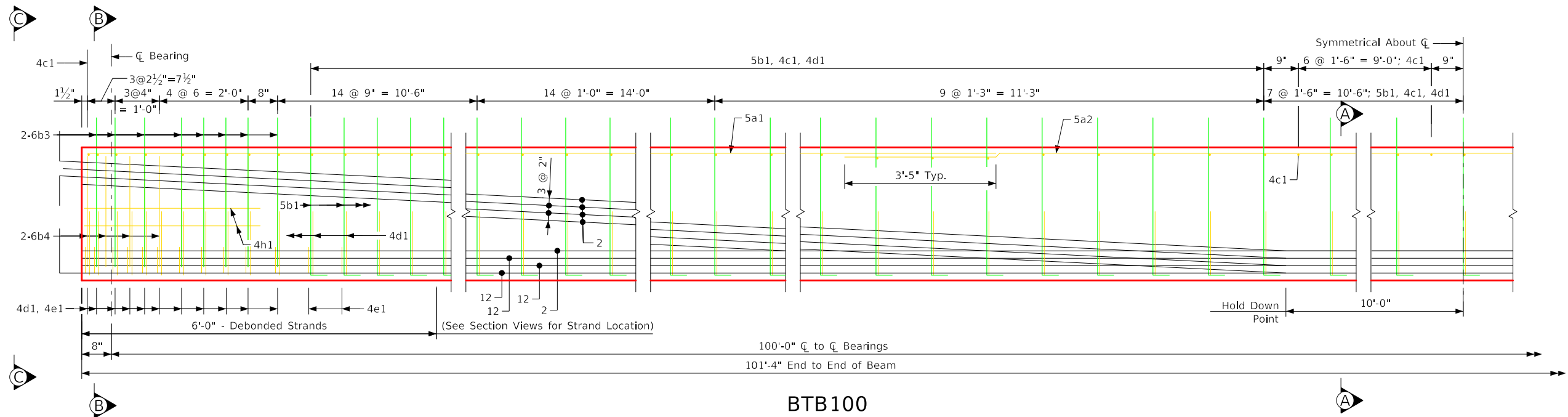


View C-C

- Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

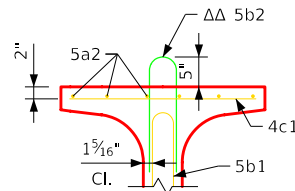
BTB90 Beam Details

Issued 02-08.
Beams.dgn - 4766 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

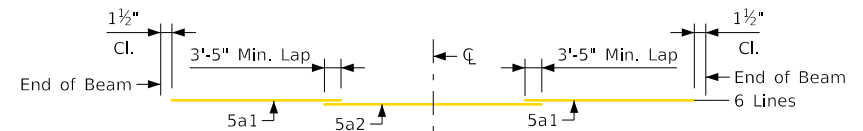


Section A-A (Alternate)

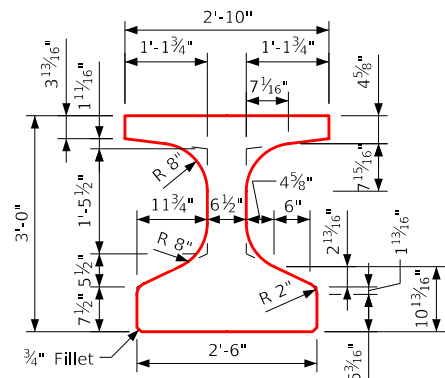
See Alternate Bar Note on Standard Sheet 4765.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

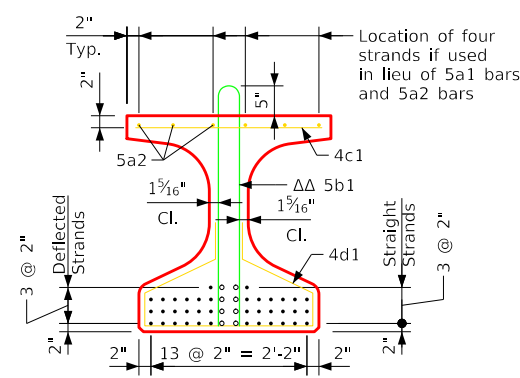
Beam Section Properties



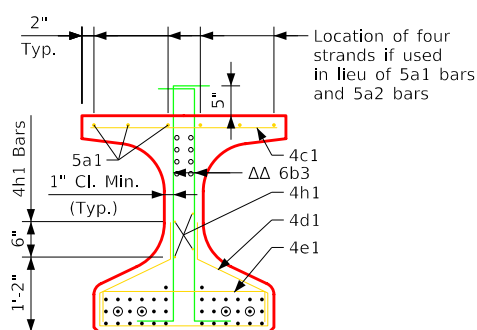
Top Flange Longitudinal Bar Layout



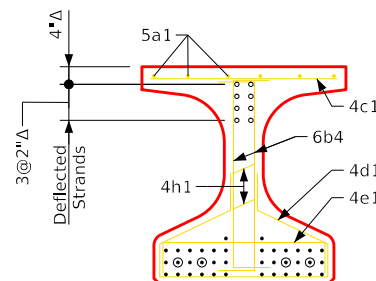
BTB Beam Cross Section



Section A-A



Section B-B

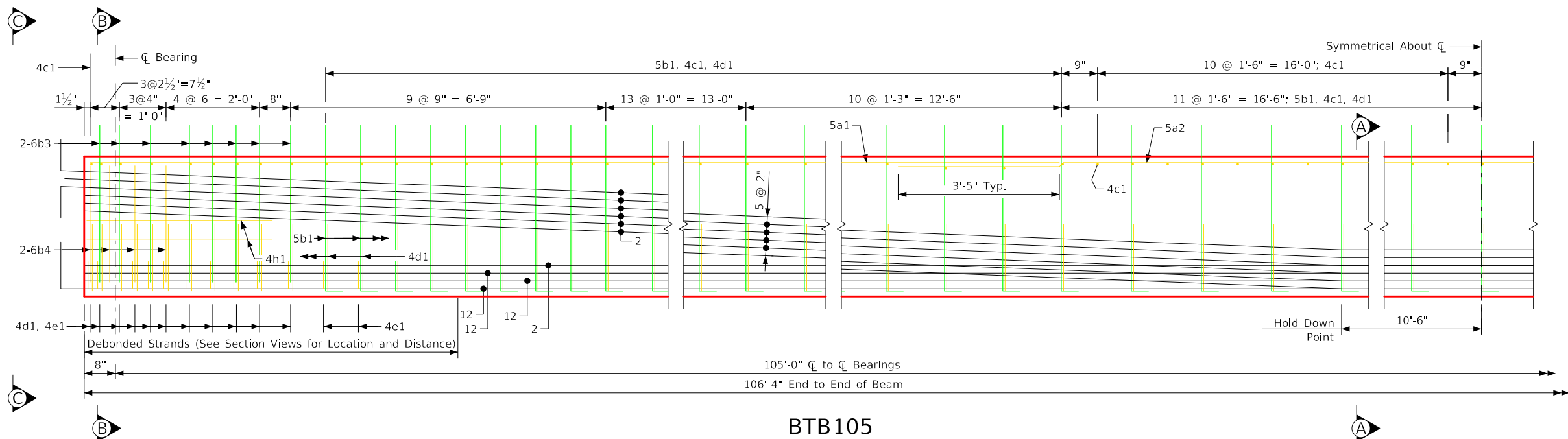


View C-C

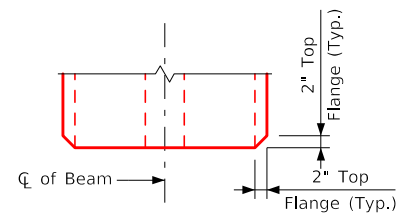
- ° Deflected Strands
- Δ Dimensions at End of Beam
- $\Delta\Delta$ Epoxy Coated Bars
- ⊙ Strands Debonded 6'-0" from Beam Ends

BTB100 Beam Details

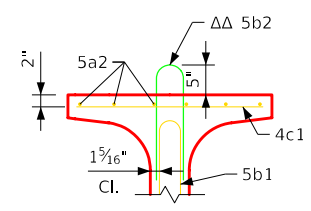
FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "B" Beam - 100'-0" Span	Standard Sheet 4766	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:57 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				



BTB105



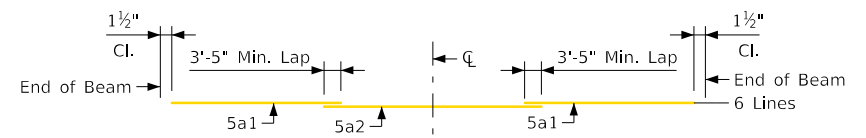
Top View
The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



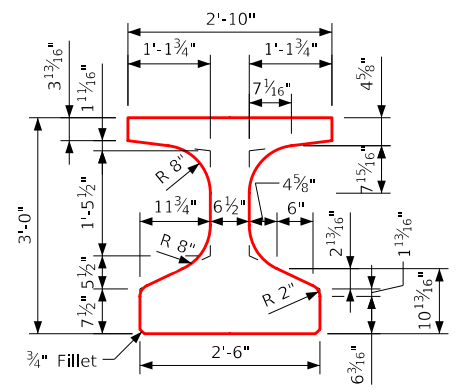
Section A-A (Alternate)
See Alternate Bar Note on Standard Sheet 4765.

Area = 631.7 in.²
 $\bar{y}_b = 17.14$ in.
 $I = 99,980$ in.⁴

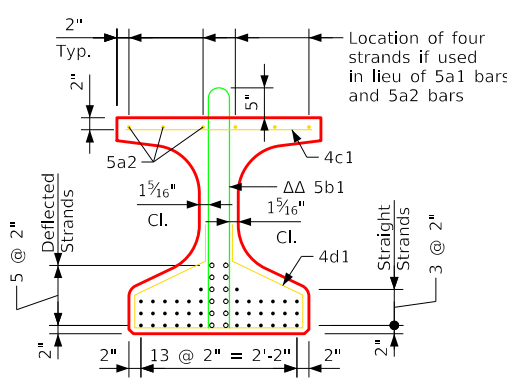
Beam Section Properties



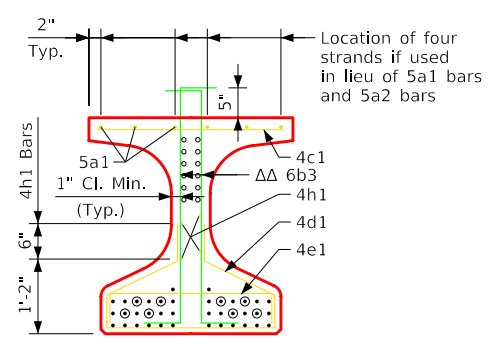
Top Flange Longitudinal Bar Layout



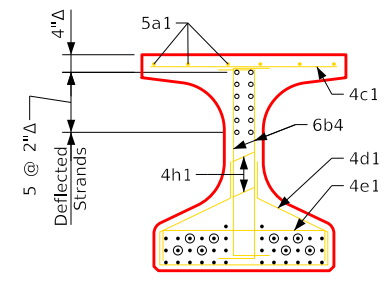
BTB Beam Cross Section



Section A-A



Section B-B



View C-C

- ◊ Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars
- ⊙ Strands Debonded:
 - 3'-0" from Beam Ends - 3rd Row from Bottom
 - 6'-0" from Beam Ends - 2nd Row from Bottom

BTB105 Beam Details

Issued 02-08.
Beams.dgn - 4767 - This Sheet Re-Issued 04-2024. Sheet Format Update.

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "B" Beam - 105'-0" Span	Standard Sheet 4767	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:57:59 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revision 08-12 - I.M. Reference Note for Sealing Beam Ends Distinguishes Between the Fabricator and Contractor. Deck Panel Option Note was Deleted.
Revised 10-2024: Revised "At Release" and "After Losses" Camber Values for BTE125 to BTE150.
Issued 02-08.
Beams.dgn - 4770s1 - This Sheet Re-Issued 04-2024, Sheet Format Update.

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 in.²) 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 I.M.570.

Bearings shall be as detailed on other design sheets.

Beams to be used in bridges made continuous by the poured in place deck, are to be at least 28 days old before the deck 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 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 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, Series of 2017.
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 2017 with minor modifications.

④ ⑤

BTE Beam Data																			
BTE Beam	Span Length ℄-℄ Bearing	Overall Beam Length (L)	Concrete Strength		Strand Size Dia (in.)	Number of Strands		Total Initial Prestress ③ (kips)	Hold Down Force (kips)	Camber (in.) ⑥		Deflection (in.) Δ _D		Permissible Maximum Spacing	Weight (tons)	Concrete (cu. yd.)	Reinforcing Steel (weight lb.)		
						Straight	Deflected					Immediate ① (elastic) Δ _I	Time ② (plastic) Δ _T						
			f'ci (ksi.)	f'c (ksi.)						At Release	After Losses			Steel Diaphragm				Steel Diaphragm	HL-93 Loading
														Steel Diaphragm				Steel Diaphragm	Steel Diaphragm
BTE60	60'-0"	61'-4"	4.50	5.00	0.60"	14	—	596	—	0.33"	0.61"	0.17"	0.04"	9'-3"	25.8	12.8	2003		
BTE65	65'-0"	66'-4"	4.50	5.00	0.60"	14	—	596	—	0.36"	0.67"	0.23"	0.06"	9'-3"	27.9	13.8	2112		
BTE70	70'-0"	71'-4"	4.50	5.00	0.60"	16	—	681	—	0.46"	0.85"	0.32"	0.08"	9'-3"	30.0	14.8	2218		
BTE75	75'-0"	76'-4"	4.50	5.00	0.60"	16	—	681	—	0.49"	0.91"	0.40"	0.10"	9'-3"	32.1	15.9	2324		
BTE80	80'-0"	81'-4"	5.00	6.00	0.60"	18	—	766	—	0.61"	1.12"	0.49"	0.12"	9'-3"	34.2	16.9	2456		
BTE85	85'-0"	86'-4"	5.00	6.00	0.60"	18	2	851	11.8	0.71"	1.31"	0.65"	0.16"	9'-3"	36.3	18.0	2566		
BTE90	90'-0"	91'-4"	5.00	6.00	0.60"	18	2	851	11.2	0.73"	1.36"	0.81"	0.20"	9'-3"	38.4	19.0	2672		
BTE95	95'-0"	96'-4"	5.00	6.00	0.60"	20	4	1021	20.4	0.96"	1.77"	1.06"	0.27"	9'-3"	40.5	20.0	2782		
BTE100	100'-0"	101'-4"	5.00	6.00	0.60"	22	4	1106	19.5	1.11"	2.06"	1.23"	0.31"	9'-3"	42.6	21.1	2891		
BTE105	105'-0"	106'-4"	5.00	6.00	0.60"	24	4	1191	18.6	1.31"	2.42"	1.48"	0.37"	9'-3"	44.7	22.1	3035		
BTE110	110'-0"	111'-4"	5.00	6.00	0.60"	26	6	1361	25.6	1.61"	2.58"	1.78"	0.45"	9'-3"	46.8	23.1	3192		
BTE115	115'-0"	116'-4"	5.50	6.00	0.60"	28	6	1446	24.6	1.78"	2.85"	2.12"	0.53"	9'-3"	48.9	24.2	3409		
BTE120	120'-0"	121'-4"	5.50	6.00	0.60"	30	8	1617	30.0	2.07"	3.31"	2.50"	0.63"	9'-3"	51.0	25.2	3451		
BTE125	125'-0"	126'-4"	6.50	7.50	0.60"	32	8	1702	29.0	2.48"	3.97"	2.75"	0.69"	9'-3"	53.1	26.2	3561		
BTE130	130'-0"	131'-4"	6.50	7.50	0.60"	36	8	1872	28.0	2.95"	4.72"	3.21"	0.80"	9'-3"	55.2	27.3	3670		
BTE135	135'-0"	136'-4"	7.00	8.00	0.60"	40	8	2042	27.0	3.34"	5.35"	3.65"	0.91"	9'-3"	57.3	28.3	3776		
BTE140	140'-0"	141'-4"	7.50	8.50	0.60"	42	10	2213	31.2	3.65"	5.84"	4.14"	1.03"	9'-3"	59.4	29.3	3920		
BTE145	145'-0"	146'-4"	7.50	9.00	0.60"	44	12	2383	34.7	4.02"	6.43"	4.66"	1.17"	9'-3"	61.5	30.4	4107		
BTE150	150'-0"	151'-4"	7.50	9.50	0.60"	48	12	2553	33.7	4.48"	7.17"	5.17"	1.29"	9'-0½"	63.6	31.4	4239		

① Deflections at mid-span due to weight of deck and diaphragm. The deflections shown are for a deck (8.5") and haunch (1.5") weight of:
1.04 kips/ft. for 9'-3" beam spacing
1.01 kips/ft. for 9'-0½" beam spacing
And one steel diaphragm (0.500 kips) at ℄ of span for BTE60 to BTE120, and two steel diaphragms (0.500 kips) placed 20'-0", on either side of the beam ℄ for BTE125 to BTE150. For different deck and diaphragm weights, deflections will be directly proportional.

② Deflections due to the combined effect of creep due to weight of deck and shrinkage of deck.
Total beam deflections at ℄ of span, Δ_D , due to weight of deck and diaphragms for detailing purpose:
(A) Δ_D=Δ_I +Δ_T for simple span.
(B) Δ_D=Δ_I +¾Δ_T for end spans of continuous bridge.
(C) Δ_D=Δ_I +½Δ_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 in.².

④ Requires a 4500 psi., 28 day compressive strength for cast-in-place slab concrete.










⑤ Includes partial length debonded strands, see individual Beam Sheet for locations and details.

⑥ Calculated design cambers are based on multipliers developed from research in Iowa.

BTE Beam - Data Details

Correction 12-13: Coil Tie Detail was Changed to Reflect the Distance Between Coil Tie Anchors Embedded ¼ inch.
Issued 02-08.
Beams.dgn - 4770s2 - This Sheet Re-Issued 04-2024. Sheet Format Update.

Reinforcing Bar List

Beam		BTE60		BTE65		BTE70		BTE75		BTE80		BTE85		BTE90		BTE95		BTE100		BTE105		BTE110		BTE115		BTE120		BTE125		BTE130		BTE135		BTE140		BTE145		BTE150		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	No.	Length	No.	Length	Bar
5a1		12	32'-3"	12	34'-9"	12	37'-3"	12	39'-9"	12	24'-0"	12	26'-6"	12	29'-0"	12	31'-6"	12	34'-0"	12	36'-6"	12	39'-0"	12	23'-2"	12	25'-8"	12	28'-2"	12	30'-8"	12	33'-2"	12	35'-8"	12	38'-2"	12	22'-5"	5a1
5a2		—	—	—	—	—	—	—	—	6	40'-0"	6	40'-0"	6	40'-0"	6	40'-0"	6	40'-0"	6	40'-0"	6	40'-0"	12	40'-0"	12	40'-0"	12	40'-0"	12	40'-0"	12	40'-0"	12	40'-0"	12	40'-0"	18	40'-0"	5a2
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"	75	12'-2"	79	12'-2"	87	12'-2"	87	12'-2"	91	12'-2"	95	12'-2"	99	12'-2"	105	12'-2"	111	12'-2"	115	12'-2"	5b1
6b3		52	6'-6"	52	6'-6"	52	6'-6"	52	6'-6"	52	6'-6"	52	6'-6"	52	6'-6"	52	6'-6"	52	6'-6"	52	6'-6"	52	6'-6"	56	6'-6"	56	6'-6"	56	6'-6"	56	6'-6"	56	6'-6"	56	6'-6"	52	6'-6"	52	6'-6"	6b3
6b4		8	5'-10"	8	5'-10"	8	5'-10"	8	5'-10"	8	5'-10"	8	5'-10"	8	5'-10"	8	5'-10"	8	5'-10"	8	5'-10"	12	5'-10"	12	5'-10"	12	5'-10"	12	5'-10"	12	5'-10"	12	5'-10"	20	5'-10"	20	5'-10"	20	5'-10"	6b4
4c1		87	2'-7"	93	2'-7"	97	2'-7"	101	2'-7"	107	2'-7"	113	2'-7"	117	2'-7"	123	2'-7"	129	2'-7"	135	2'-7"	141	2'-7"	143	2'-7"	149	2'-7"	155	2'-7"	161	2'-7"	165	2'-7"	171	2'-7"	177	2'-7"	183	2'-7"	4c1
4d1		67	6'-5"	71	6'-5"	75	6'-5"	79	6'-5"	83	6'-5"	87	6'-5"	91	6'-5"	95	6'-5"	99	6'-5"	105	6'-5"	111	6'-5"	117	6'-5"	117	6'-5"	121	6'-5"	125	6'-5"	129	6'-5"	135	6'-5"	143	6'-5"	147	6'-5"	4d1
4e1		34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	36	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	34	3'-2"	36	3'-2"	36	3'-2"	4e1
4h1		8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	8	8'-0"	4h1

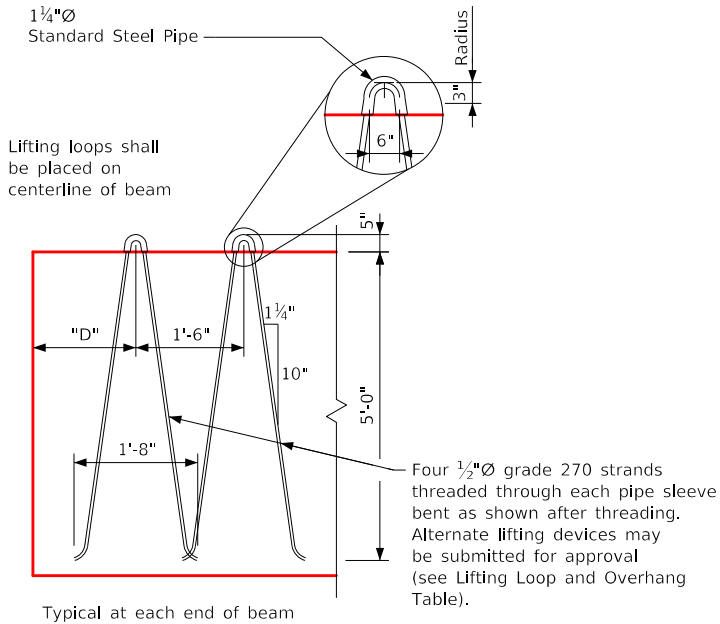
ΔΔ 5b1 and 6b3 bars to be epoxy coated
* 6b3 and 6b4 bars to be used in pairs

Lifting Loop and Overhang Table

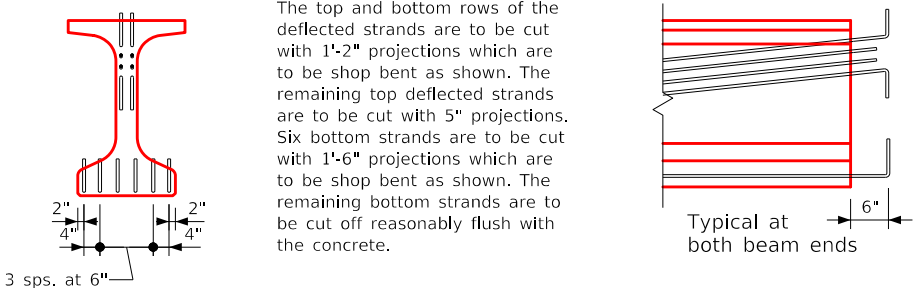
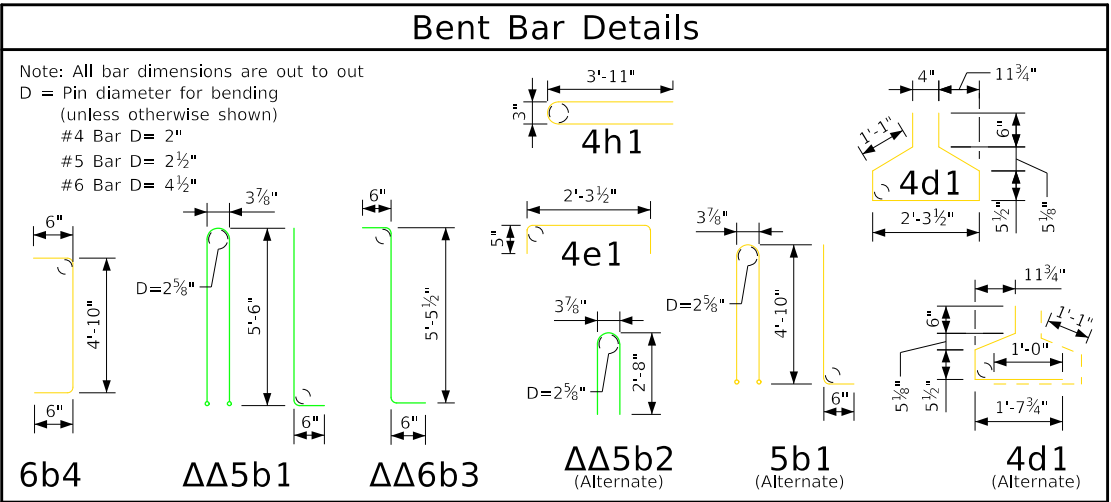
Beams	Lifting Loops Each End	# of Strands Per Loop	D	Beam Overhang (ft.)
BTE60-BTE75	1	4	2'-0"	**
BTE80-BTE90	2	4	2'-0"	**
BTE95	2	4	2'-0"	10
BTE100	2	4	3'-9"	10
BTE105	2	4	6'-3"	10
BTE110-BTE120	2	4	8'-3"	10
BTE125-BTE135	2	4	9'-3"	14
BTE140	2	4	9'-3"	16
BTE145	2	4	10'-0"	16
BTE150	2	4	12'-3"	16

** In accordance with Article 2407.03, K of the Standard Specifications.

Lifting loops shall carry loads equally.



Lifting Loop Detail

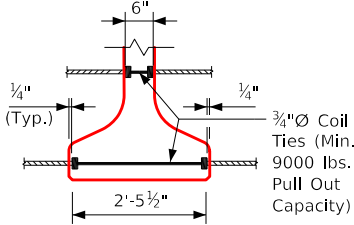


Strand Projection At Beam Ends When Embedded In Concrete End Diaphragms

Alternate Bar Notes:

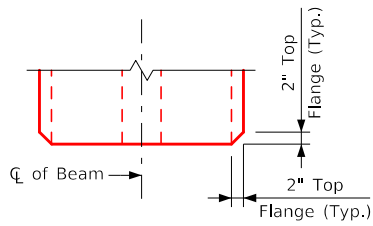
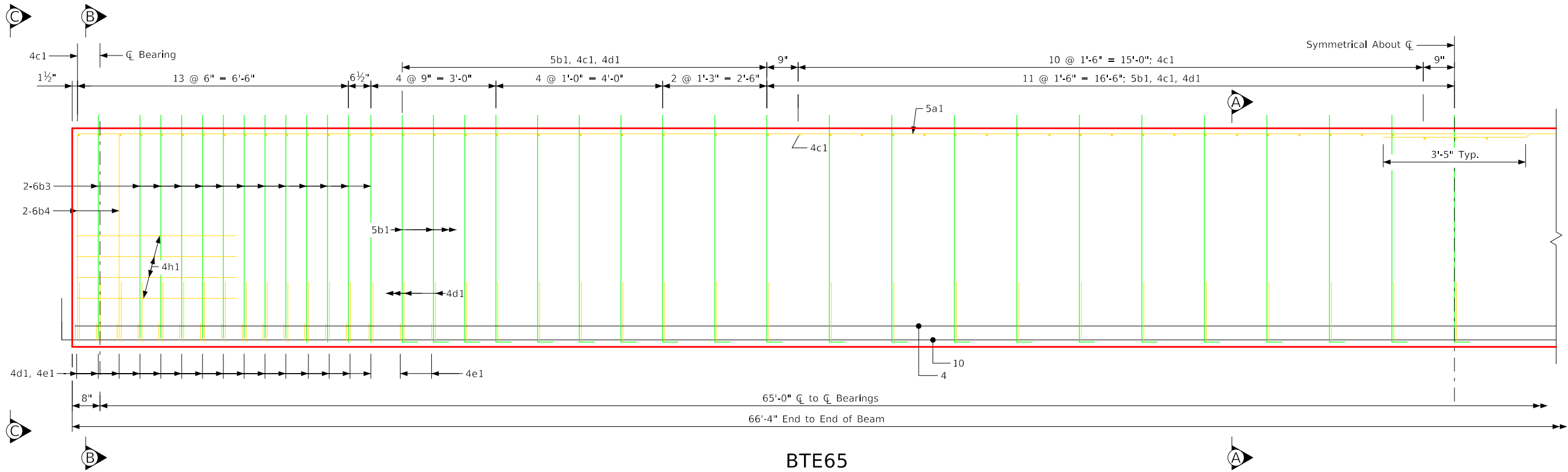
Alternate bars shown in Bent Bar Details may be used in lieu of reinforcing bars shown in bar list. No additional payment shall be made for use of alternate bars.

Number and exact location of coil ties to be as detailed on specific bridge design.



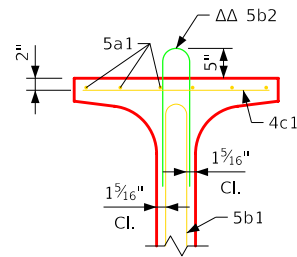
Coil Tie Detail

BTE Beam - Data Details



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

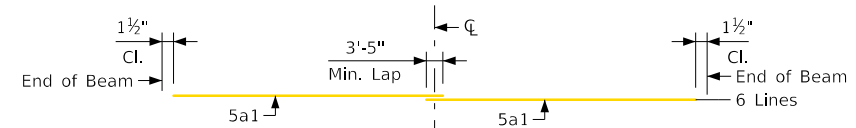


Section A-A (Alternate)

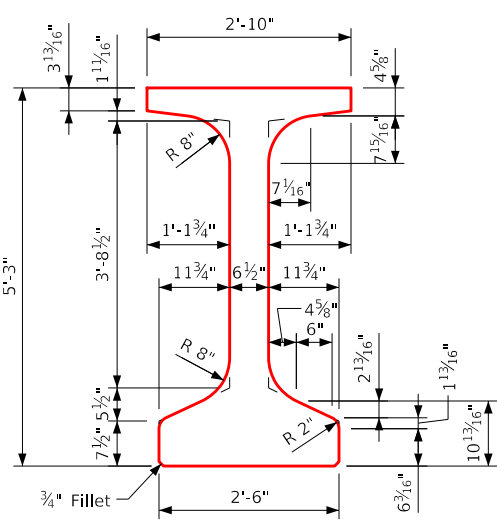
See Alternate Bar Note on Design Sheet No. 4770s2.

Area = 807.4 in.²
y_b = 28.75 in.
I = 422.790 in.⁴

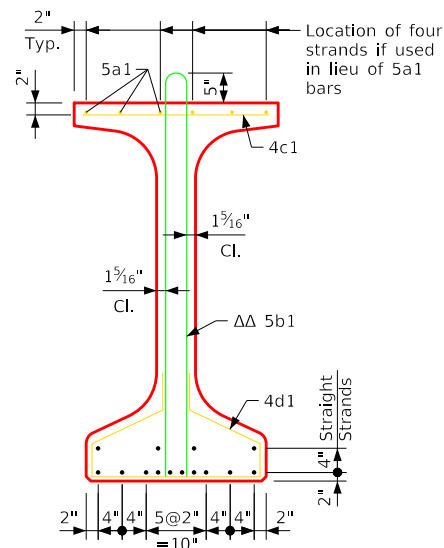
Beam Section Properties



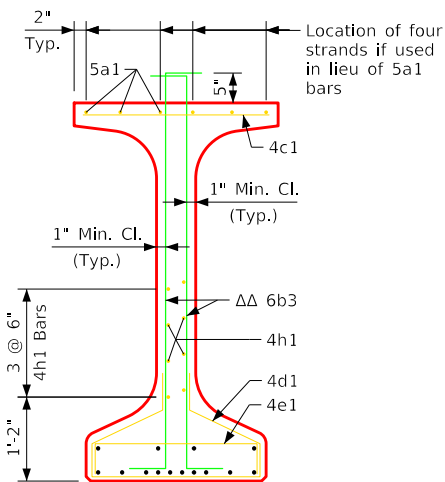
Top Flange Longitudinal Bar Layout



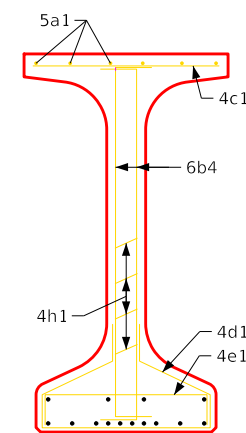
BTE Beam Cross Section



Section A-A



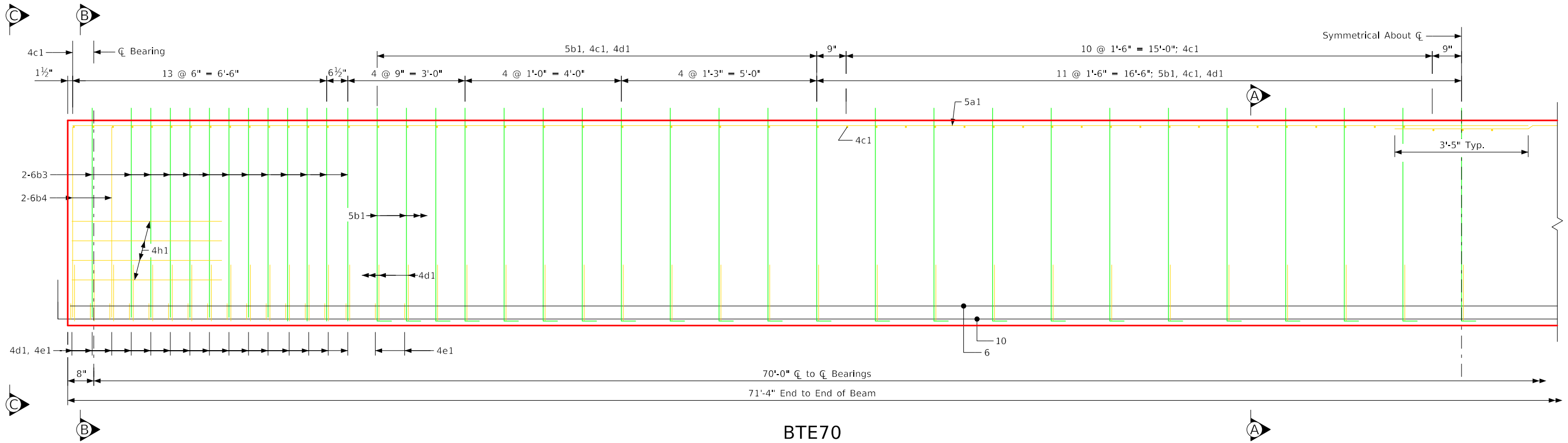
Section B-B



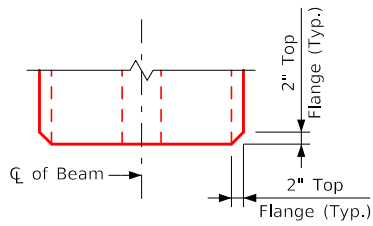
View C-C

ΔΔ Epoxy Coated Bars

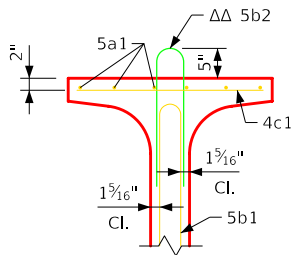
BTE65 Beam Details



BTE70



Top View
The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

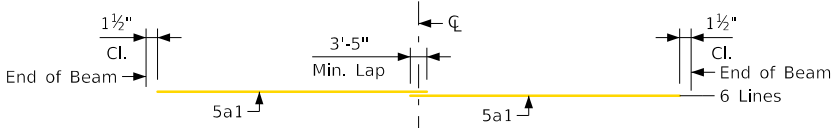


Section A-A
(Alternate)

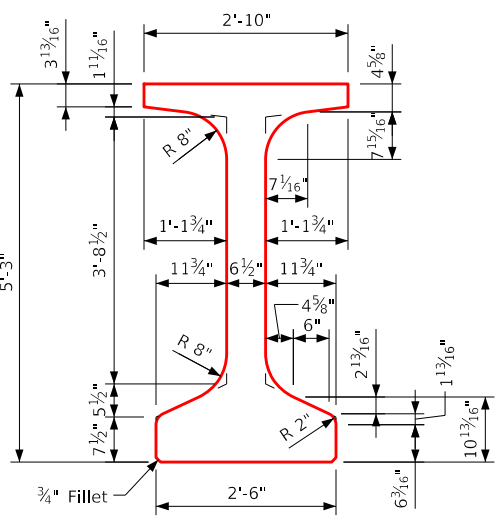
See Alternate Bar Note on Design Sheet No. 4770s2.

Area = 807.4 in.²
 $\bar{y}_b = 28.75$ in.
 $I = 422.790$ in.⁴

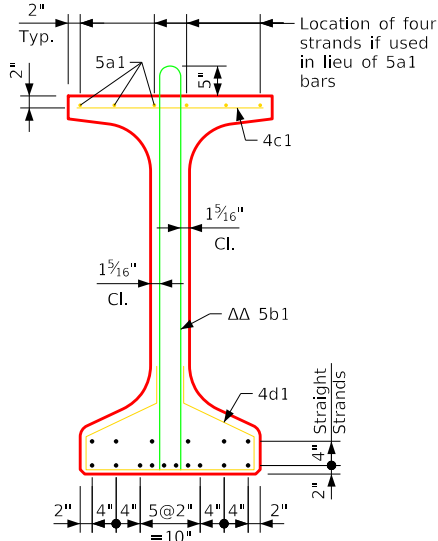
Beam Section Properties



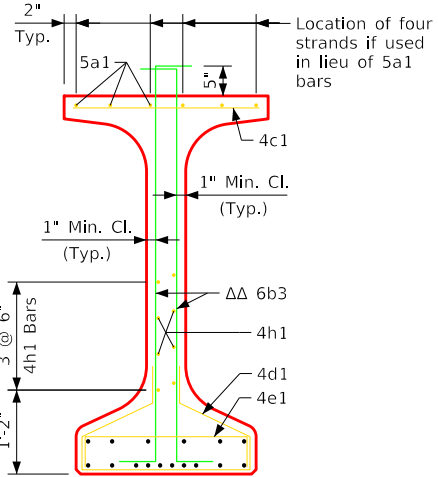
Top Flange Longitudinal Bar Layout



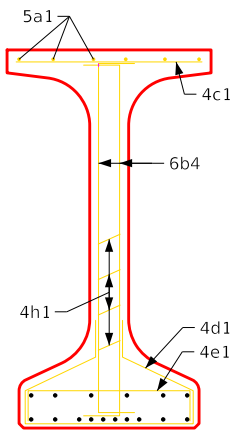
BTE Beam Cross Section



Section A-A



Section B-B



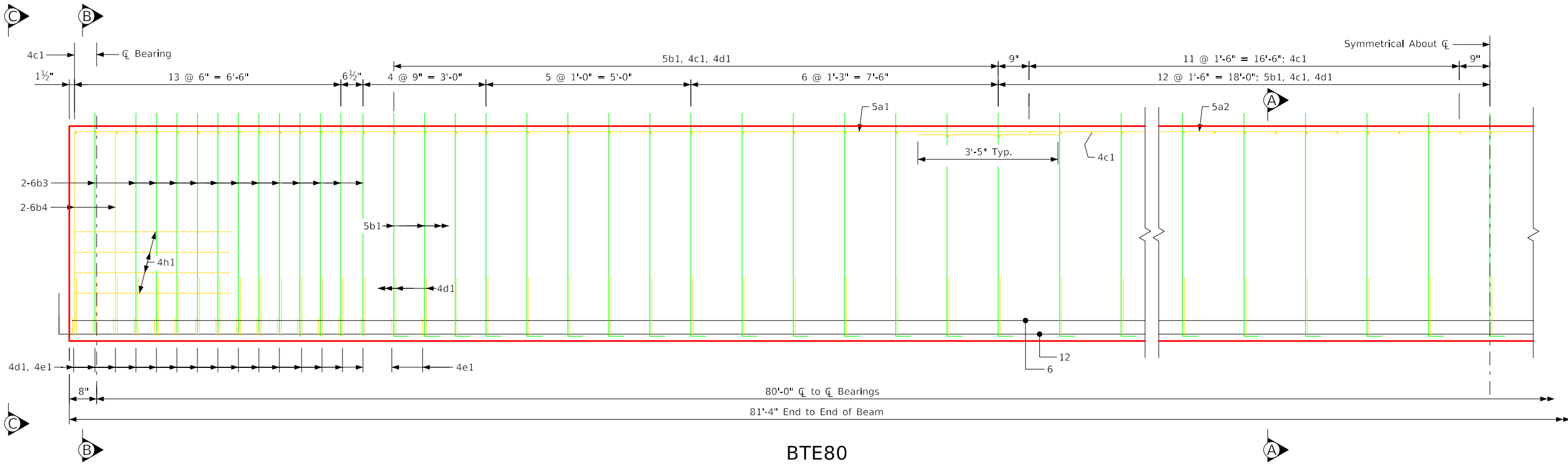
View C-C

ΔΔ Epoxy Coated Bars

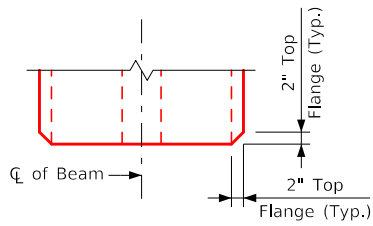
BTE70 Beam Details

Revision 08-09: Added Strands to Sections A-A, B-B, & C-C.
Issued 02-08.
Beams.dgn - 4773 - This Sheet Re-Issued 04-2024. Sheet Format Update.

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "E" Beam - 70'-0" Span	Standard Sheet 4773	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:58:05 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

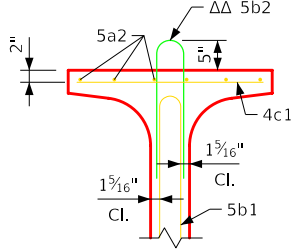


BTE80



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

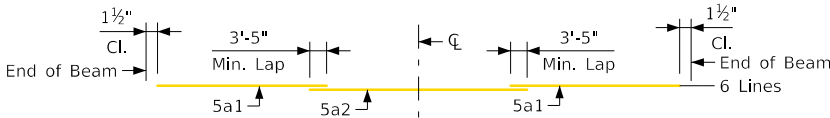


Section A-A (Alternate)

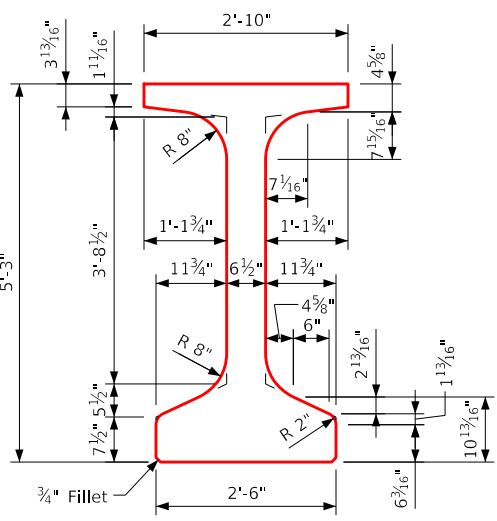
See Alternate Bar Note on Design Sheet No. 4770s2.

Area = 807.4 in.²
 $\bar{y}_b = 28.75$ in.
 $I = 422.790$ in.⁴

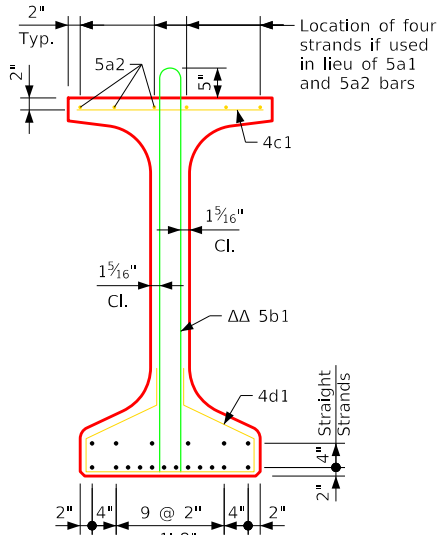
Beam Section Properties



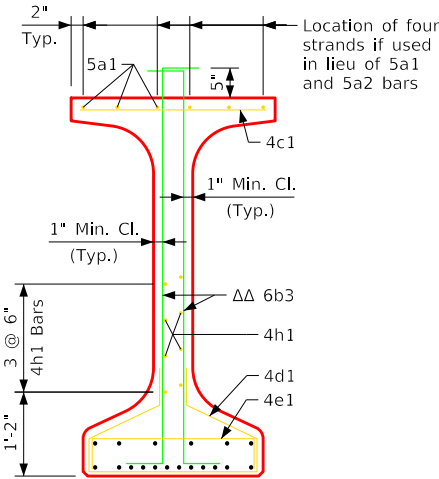
Top Flange Longitudinal Bar Layout



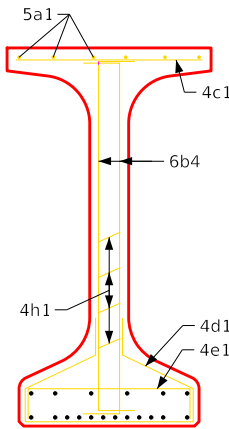
BTE Beam Cross Section



Section A-A



Section B-B

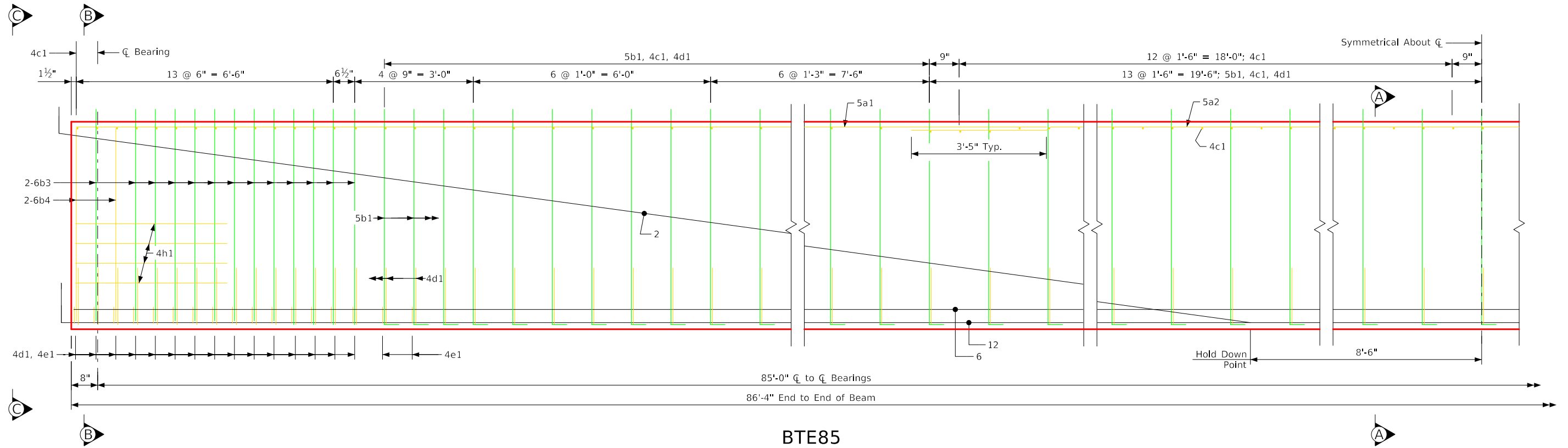


View C-C

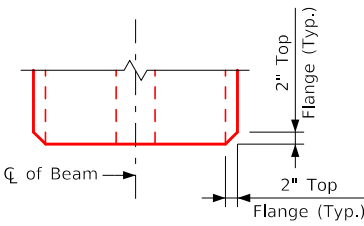
ΔΔ Epoxy Coated Bars

BTE80 Beam Details

Revision 05-12: Alternate Section A-A 5a1 Bar Changed to 5a2.
Issued 02-08.
Beams.dgn - 4776 - This Sheet Re-Issued 04-2024. Sheet Format Update.

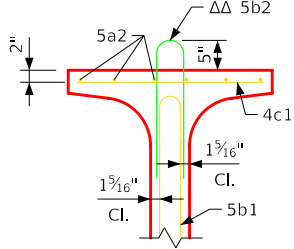


BTE85



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

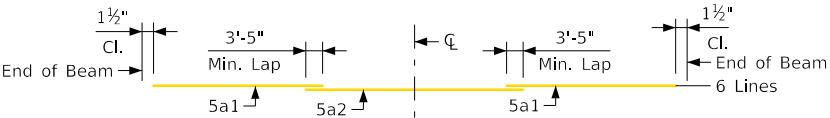


Section A-A (Alternate)

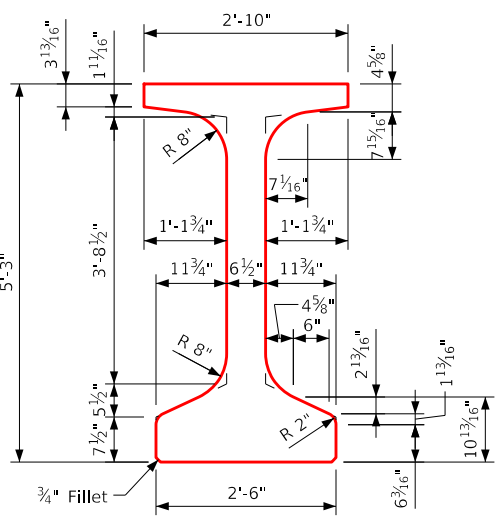
See Alternate Bar Note on Design Sheet No. 4770s2.

Area = 807.4 in.²
 $\bar{y}_b = 28.75$ in.
 $I = 422.790$ in.⁴

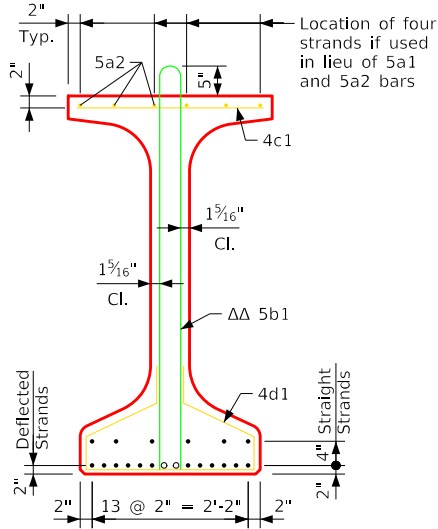
Beam Section Properties



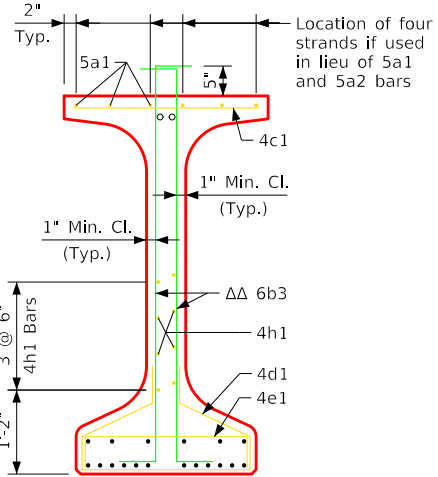
Top Flange Longitudinal Bar Layout



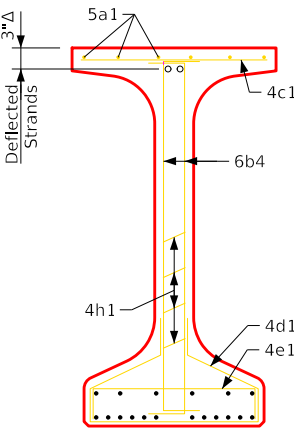
BTE Beam Cross Section



Section A-A



Section B-B

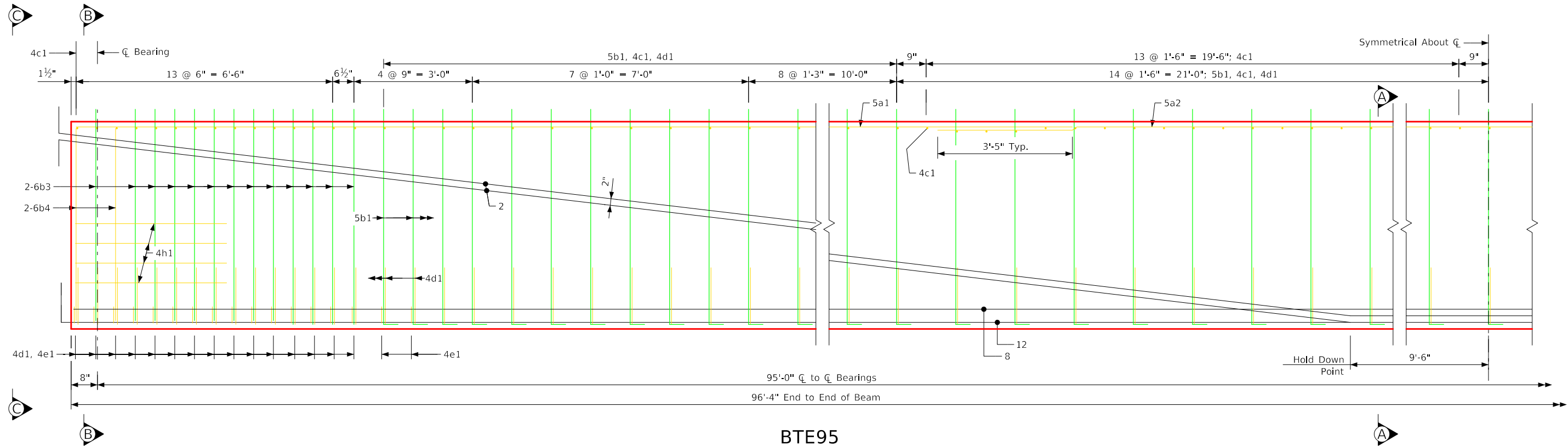


View C-C

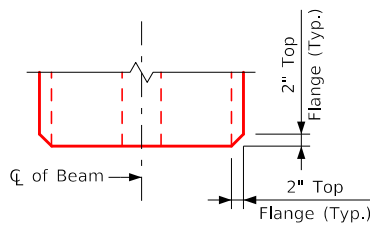
° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTE85 Beam Details

Revision 05-12: Alternate Section A-A 5a1 Bar Changed to 5a2.
Issued 02-08.
Beams.dgn - 4778 - This Sheet Re-Issued 04-2024. Sheet Format Update.

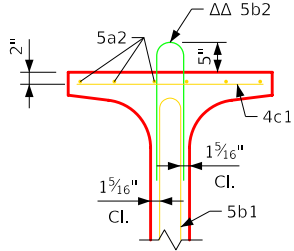


BTE95



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

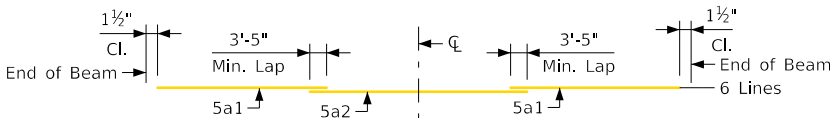


Section A-A
(Alternate)

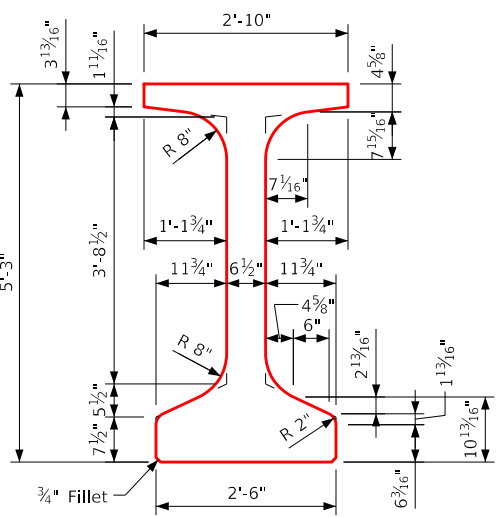
See Alternate Bar Note on Design Sheet No. 4770s2.

Area = 807.4 in.²
 $\bar{y}_b = 28.75$ in.
 $I = 422.790$ in.⁴

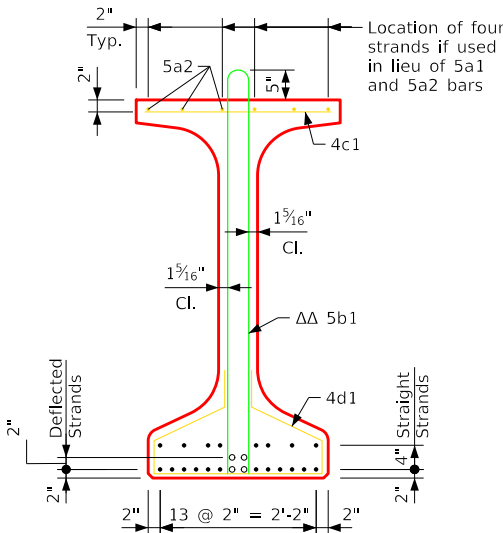
Beam Section Properties



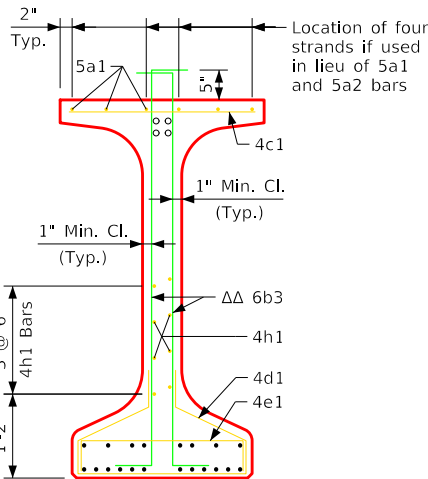
Top Flange Longitudinal Bar Layout



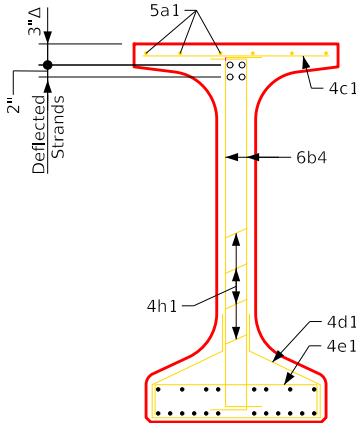
BTE Beam Cross Section



Section A-A



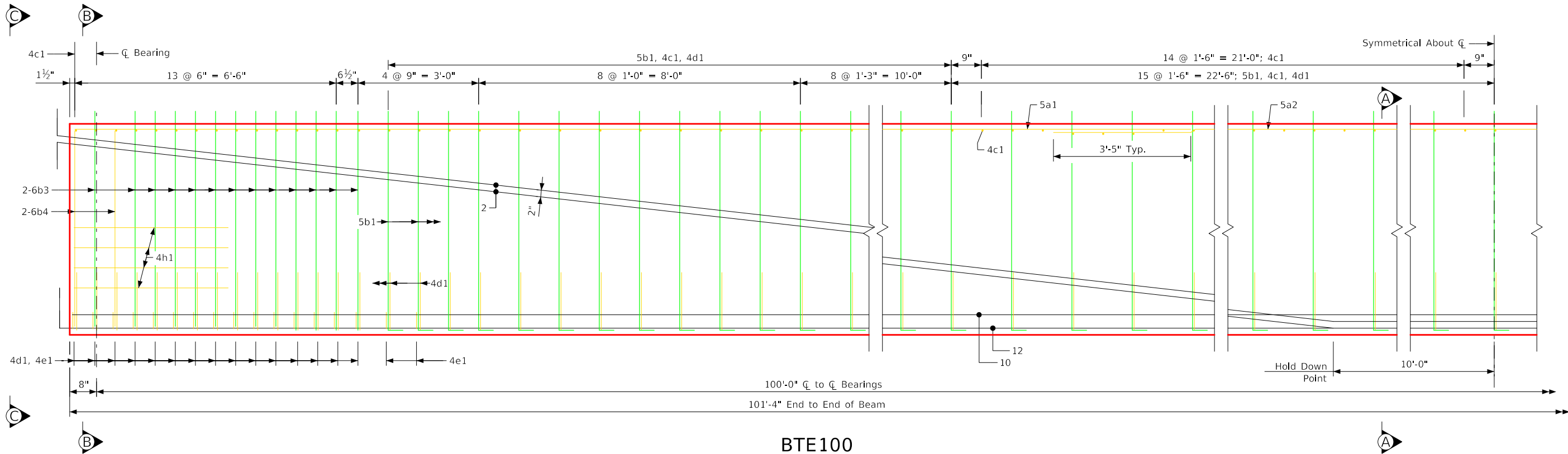
Section B-B



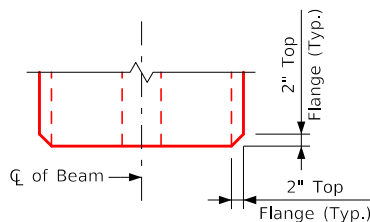
View C-C

° Deflected Strands
Δ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTE95 Beam Details

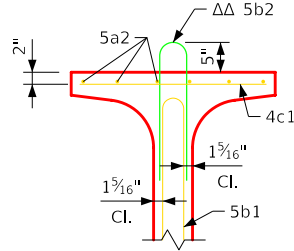


BTE100



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

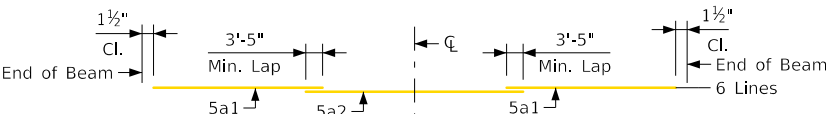


Section A-A (Alternate)

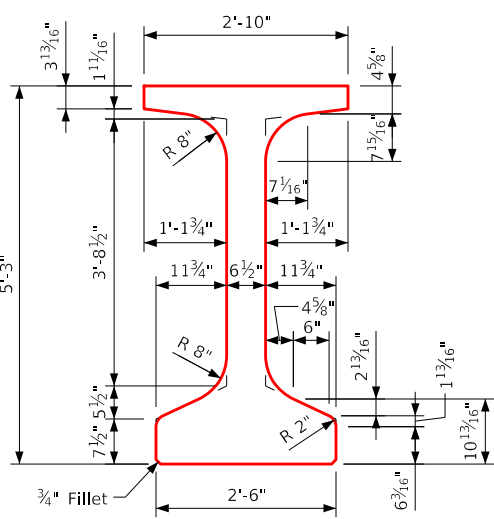
See Alternate Bar Note on Design Sheet No. 4770s2.

Area = 807.4 in.²
 $\bar{y}_b = 28.75$ in.
 $I = 422.790$ in.⁴

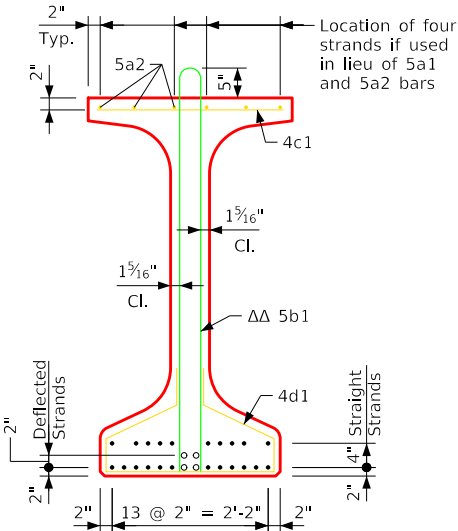
Beam Section Properties



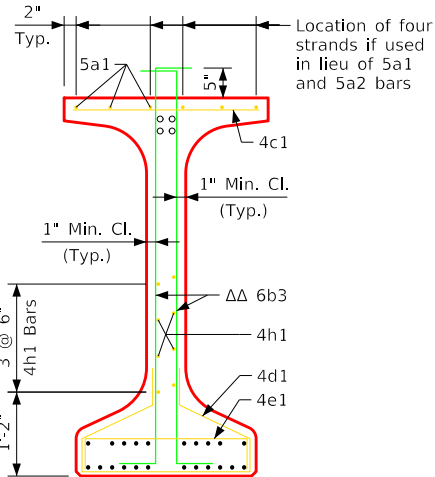
Top Flange Longitudinal Bar Layout



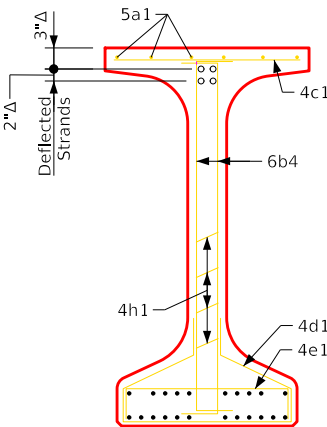
BTE Beam Cross Section



Section A-A



Section B-B



View C-C

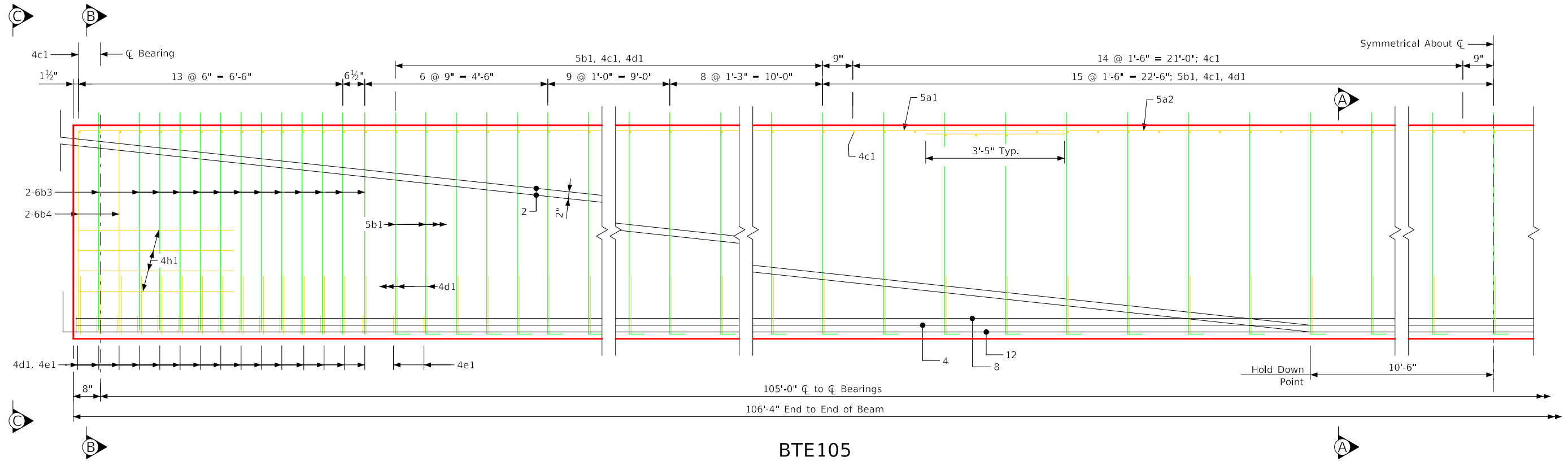
- ° Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars

BTE100 Beam Details

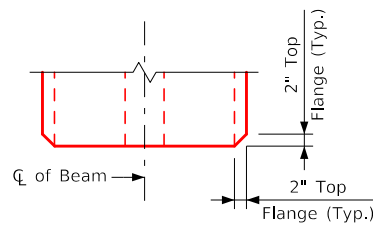
Revision 05-12: Alternate Section A-A 5a1 Bar Changed to 5a2.
Issued 02-08.
Beams.dgn - 4779 - This Sheet Re-Issued 04-2024. Sheet Format Update.

FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "E" Beam - 100'-0" Span	Standard Sheet 4779	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:58:10 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revision 05-12: Alternate Section A-A 5a1 Bar Changed to 5a2.
Issued 02-08.
Beams.dgn - 4780 - This Sheet Re-Issued 04-2024. Sheet Format Update.

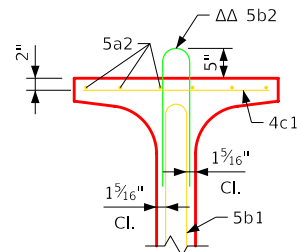


BTE105



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

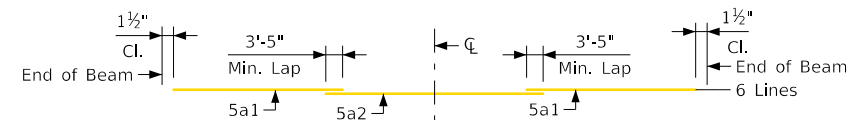


Section A-A (Alternate)

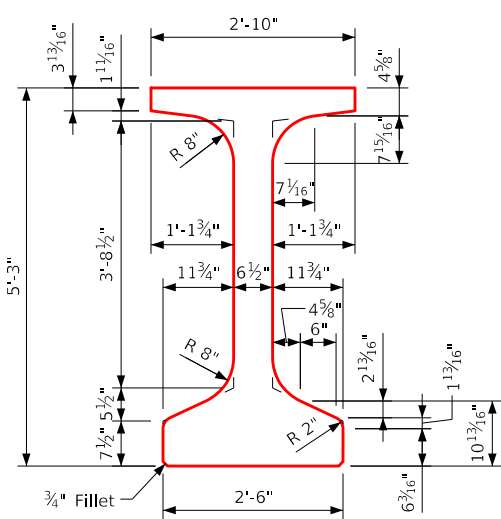
See Alternate Bar Note on Design Sheet No. 4770s2.

Area = 807.4 in.²
 \bar{y}_b = 28.75 in.
I = 422.790 in.⁴

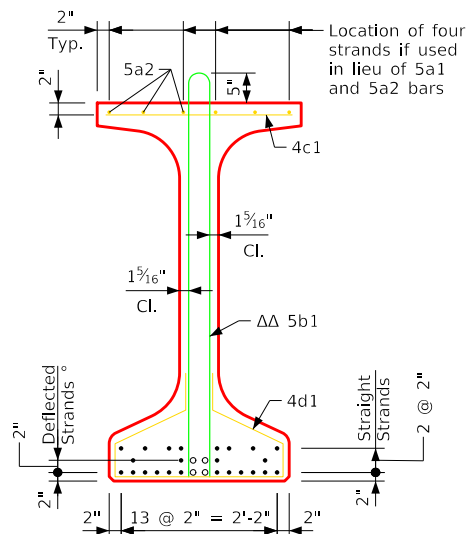
Beam Section Properties



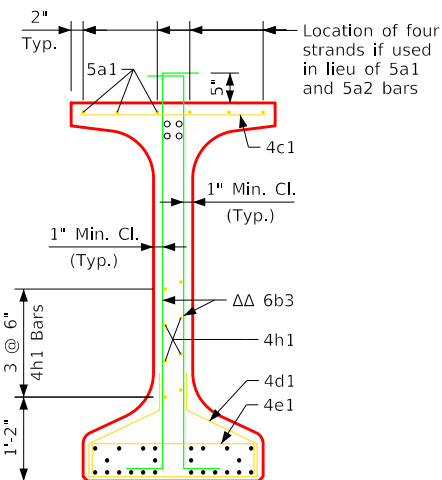
Top Flange Longitudinal Bar Layout



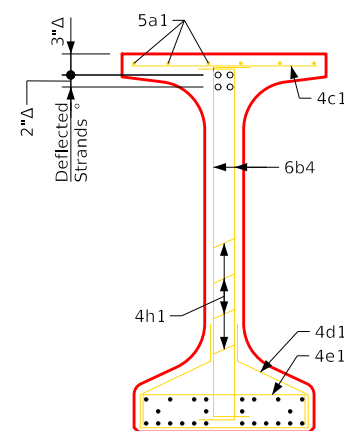
BTE Beam Cross Section



Section A-A



Section B-B

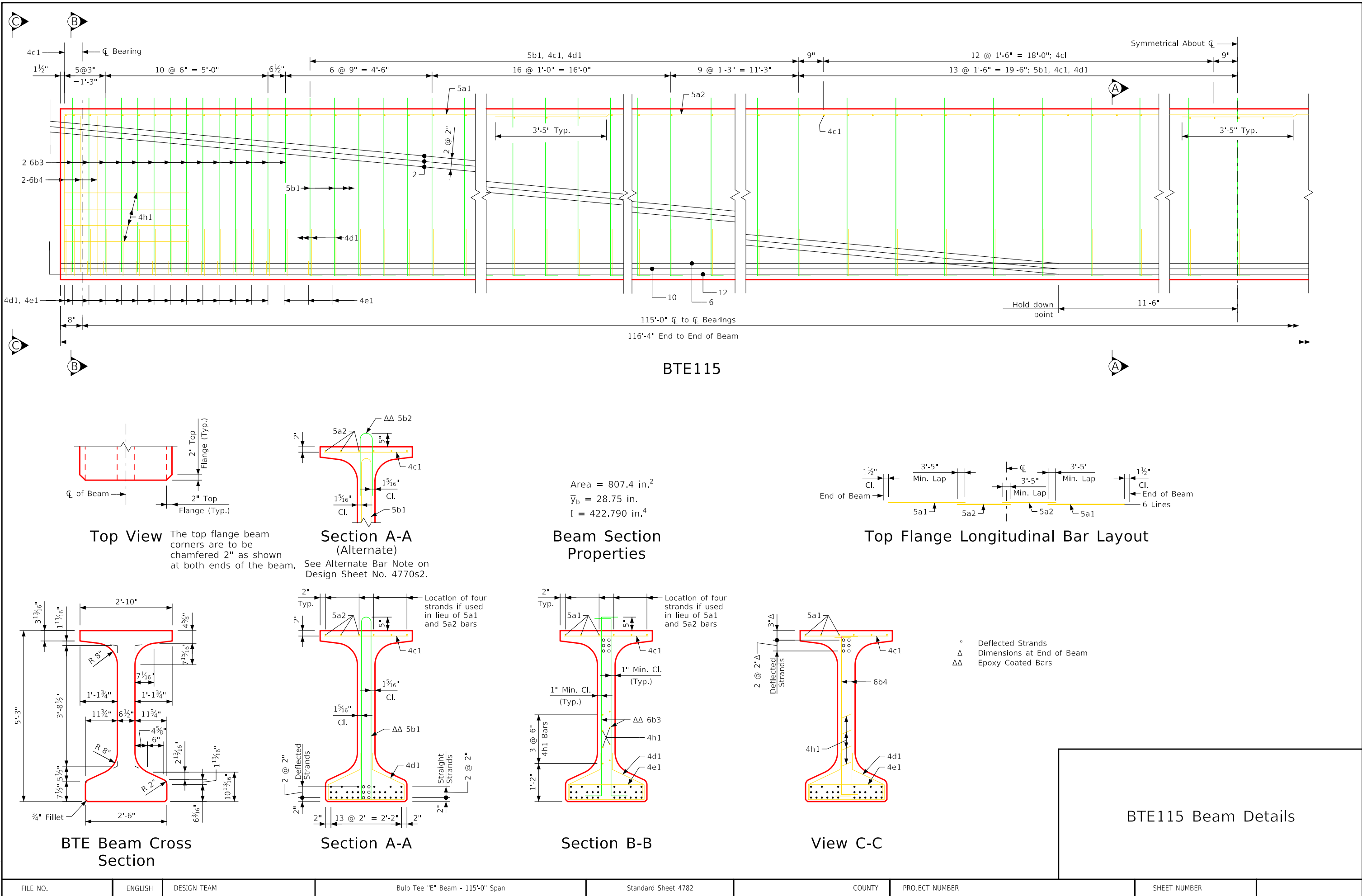


View C-C

° Deflected Strands
 Δ Dimensions at End of Beam
 $\Delta\Delta$ Epoxy Coated Bars

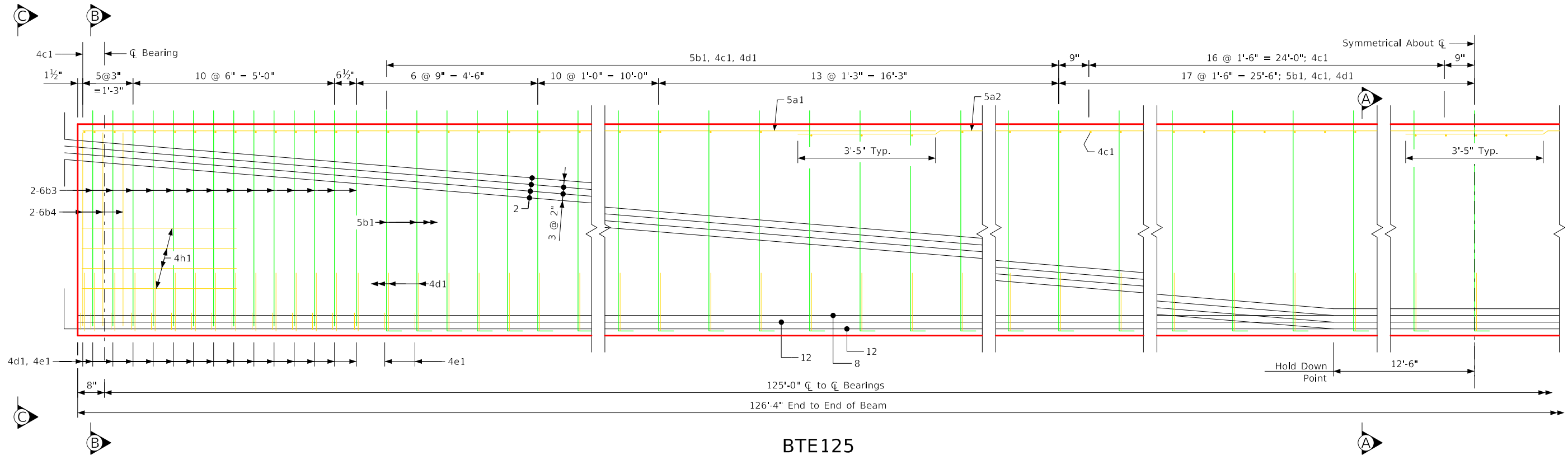
BTE105 Beam Details

Revision 05-12: Alternate Section A-A 5a1 Bar Changed to 5a2.
Issued 02-08.
Beams.dgn - 4782 - This Sheet Re-Issued 04-2024. Sheet Format Update.

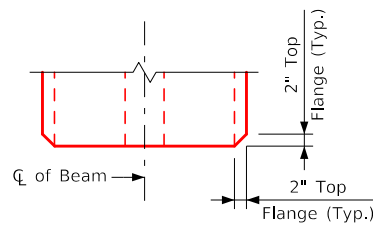


FILE NO.	ENGLISH	DESIGN TEAM	Bulb Tee "E" Beam - 115'-0" Span	Standard Sheet 4782	COUNTY	PROJECT NUMBER	SHEET NUMBER
8:58:13 AM	10/2/2024	bkloss	pw:\NTP\wint1.dot.int.lan:PWMain\Documents\Highway\Bridge\Standards\Bridges\Beams.dgn				

Revision 05-12: Alternate Section A-A 5a1 Bar Changed to 5a2.
Issued 02-08.
Beams.dgn - 4784 - This Sheet Re-Issued 04-2024. Sheet Format Update.

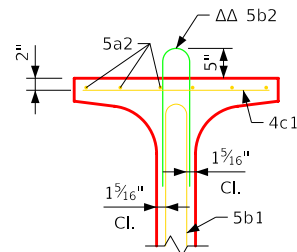


BTE125



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

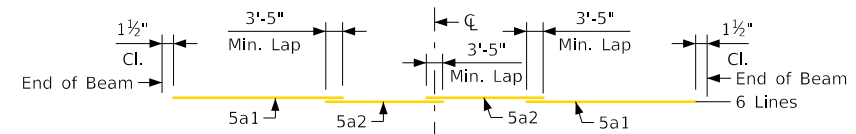


Section A-A
(Alternate)

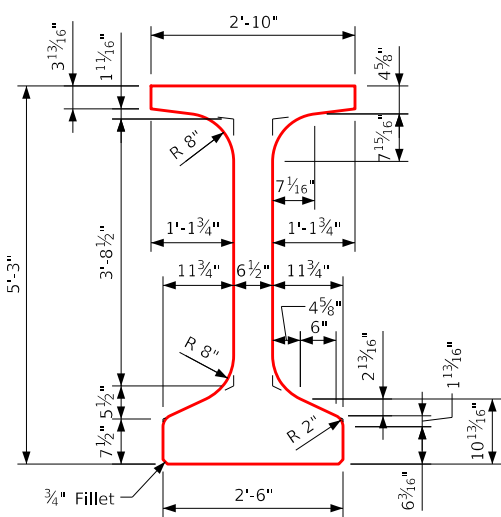
See Alternate Bar Note on Design Sheet No. 4770s2.

Area = 807.4 in.²
 $\bar{y}_b = 28.75$ in.
 $I = 422.790$ in.⁴

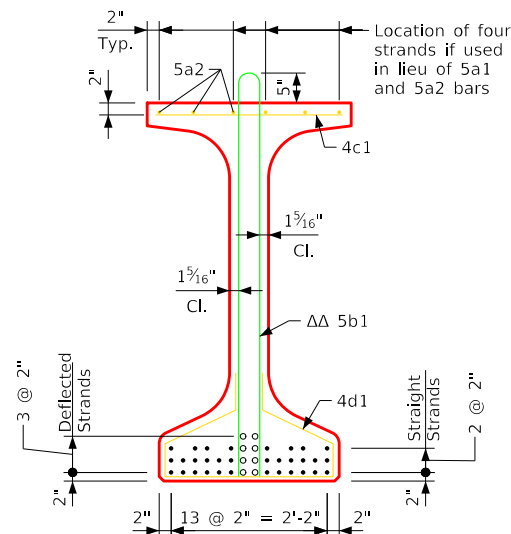
Beam Section Properties



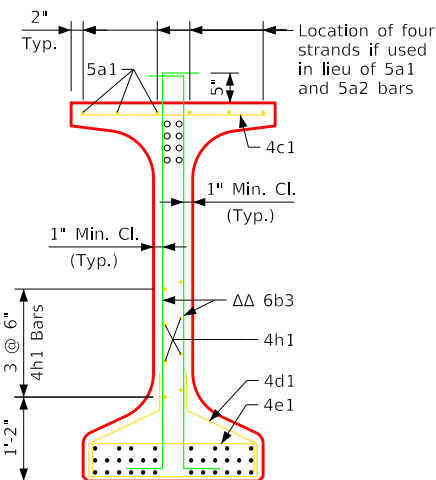
Top Flange Longitudinal Bar Layout



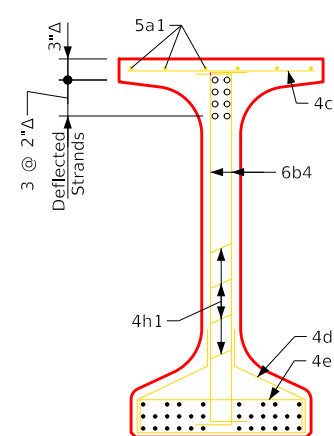
BTE Beam Cross Section



Section A-A



Section B-B

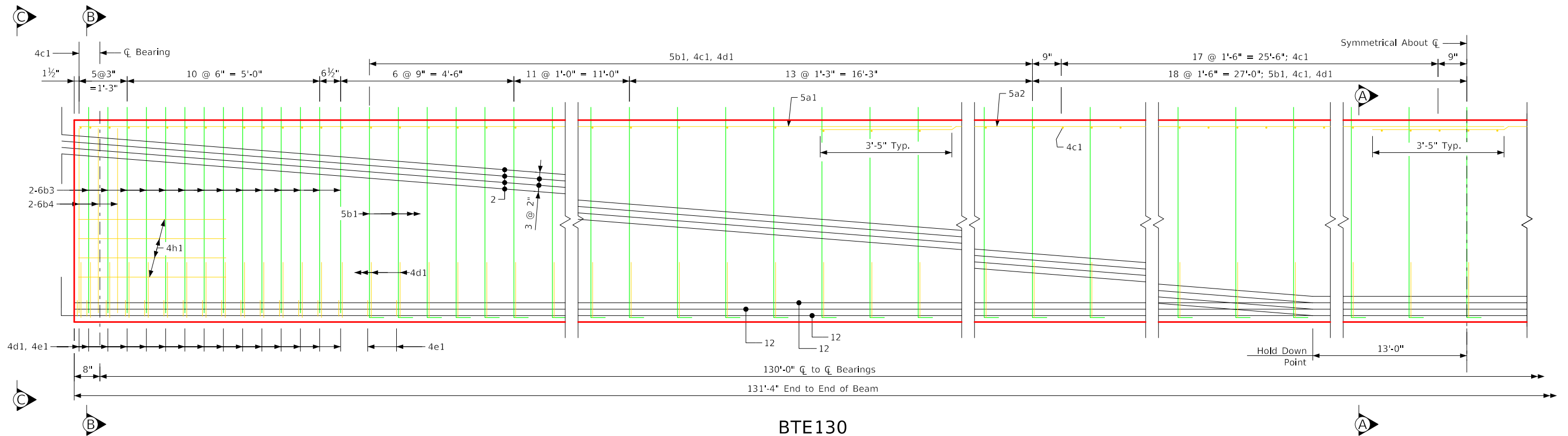


View C-C

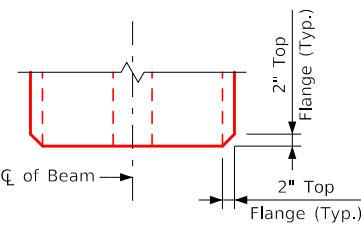
° Deflected Strands
ΔΔ Dimensions at End of Beam
ΔΔ Epoxy Coated Bars

BTE125 Beam Details

Revision 05-12: Alternate Section A-A 5a1 Bar Changed to 5a2.
Issued 02-08.
Beams.dgn - 4785 - This Sheet Re-Issued 04-2024. Sheet Format Update.

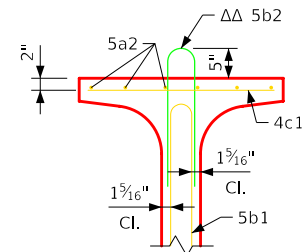


BTE130



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

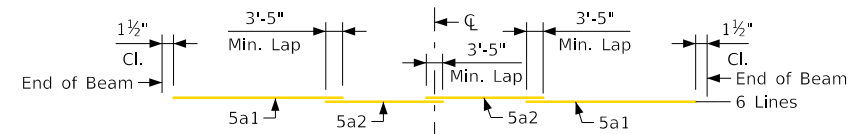


Section A-A (Alternate)

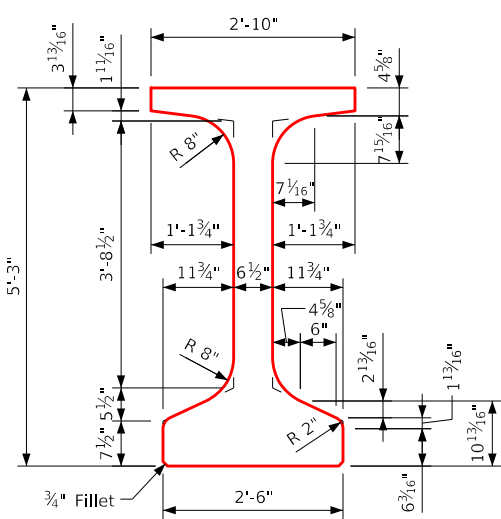
See Alternate Bar Note on Design Sheet No. 4770s2.

Area = 807.4 in.²
 \bar{y}_b = 28.75 in.
 I = 422.790 in.⁴

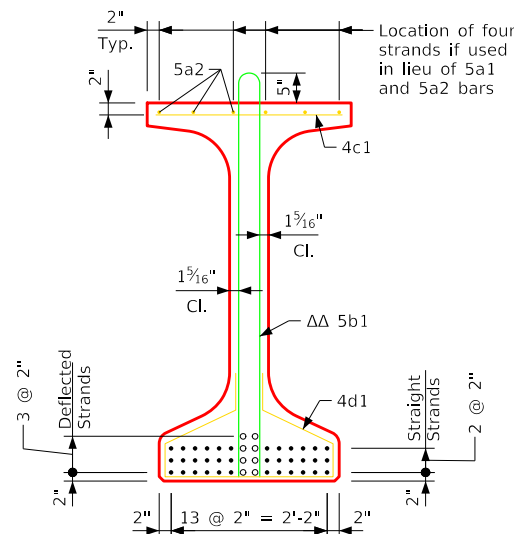
Beam Section Properties



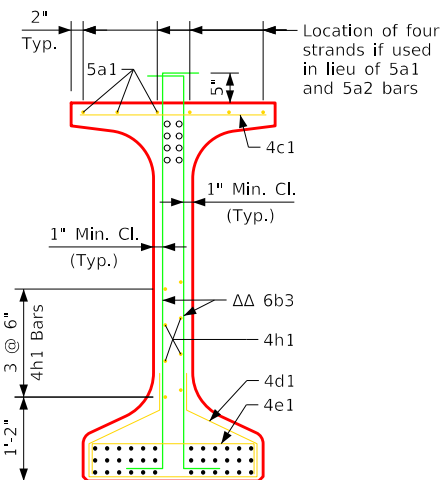
Top Flange Longitudinal Bar Layout



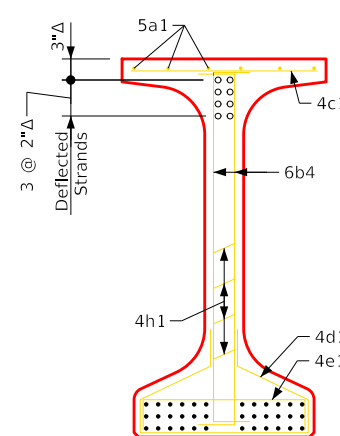
BTE Beam Cross Section



Section A-A



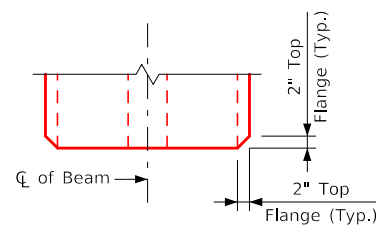
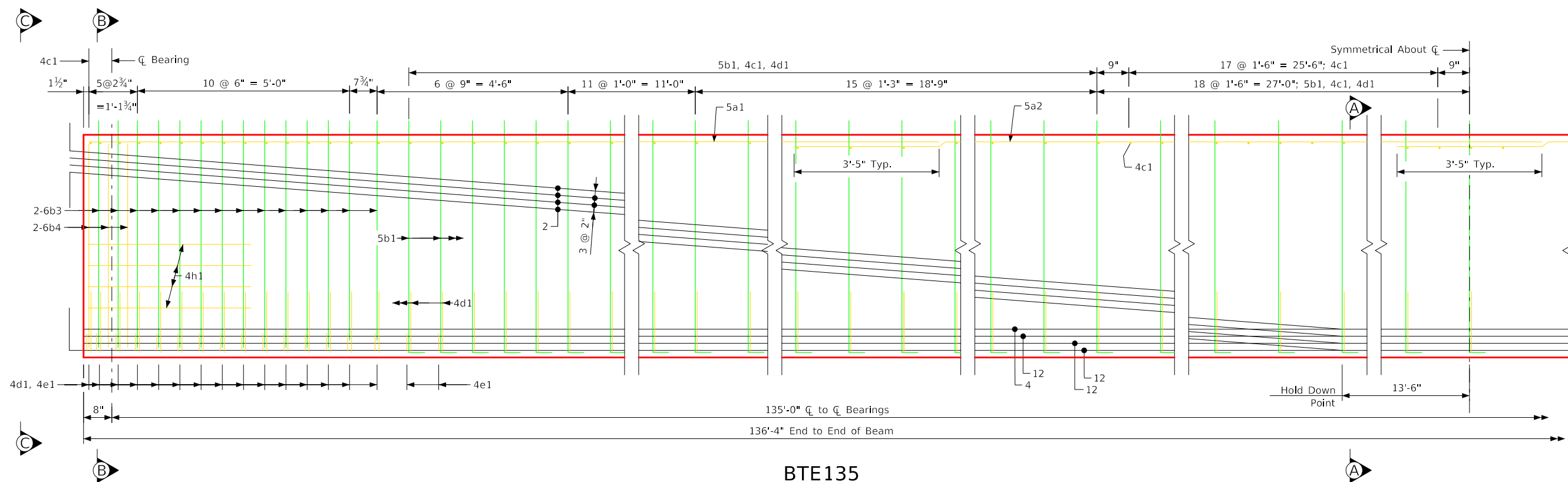
Section B-B



View C-C

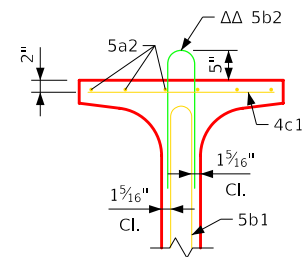
\circ Deflected Strands
 Δ Dimensions at End of Beam
 $\Delta\Delta$ Epoxy Coated Bars

BTE130 Beam Details

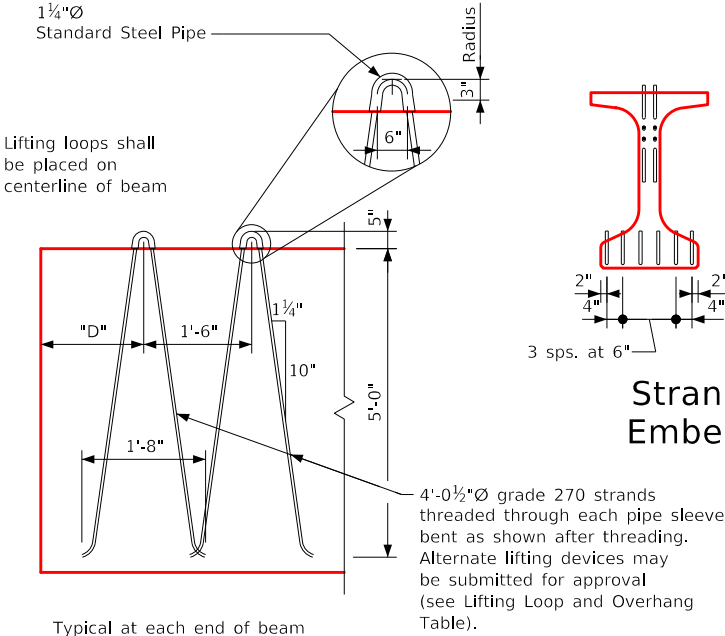


Top View

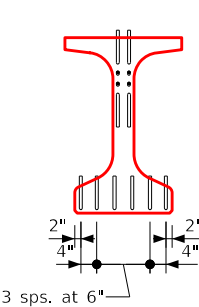
7 The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.



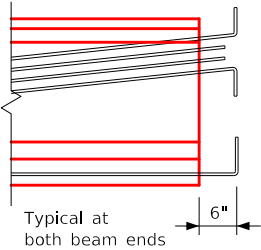
Correction 12-13: Coil Tie Detail was Changed to Reflect the Distance Between Coil Tie Anchors Embedded ¼ Inch.
Revised 10-2024: Revised "At Release" and "After Losses" Camber Values.
Issued 02-08.
Beams.dgn - 4790s1 - This Sheet Re-Issued 04-2024. Sheet Format Update.



Lifting Loop Detail



Strand Projection at Beam Ends When Embedded in Concrete End Diaphragm



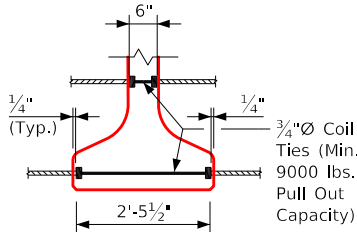
The top and bottom rows of the deflected strands are to be cut with 1'-2" projections which are to be shop bent as shown. The remaining top deflected strands are to be cut with 5" projections. Six bottom strands are to be cut with 1'-6" projections which are to be shop bent as shown. The remaining bottom strands are to be cut off reasonably flush with the concrete.

Lifting Loop and Overhang Table

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.

Number and exact location of coil ties to be as detailed on specific bridge design.

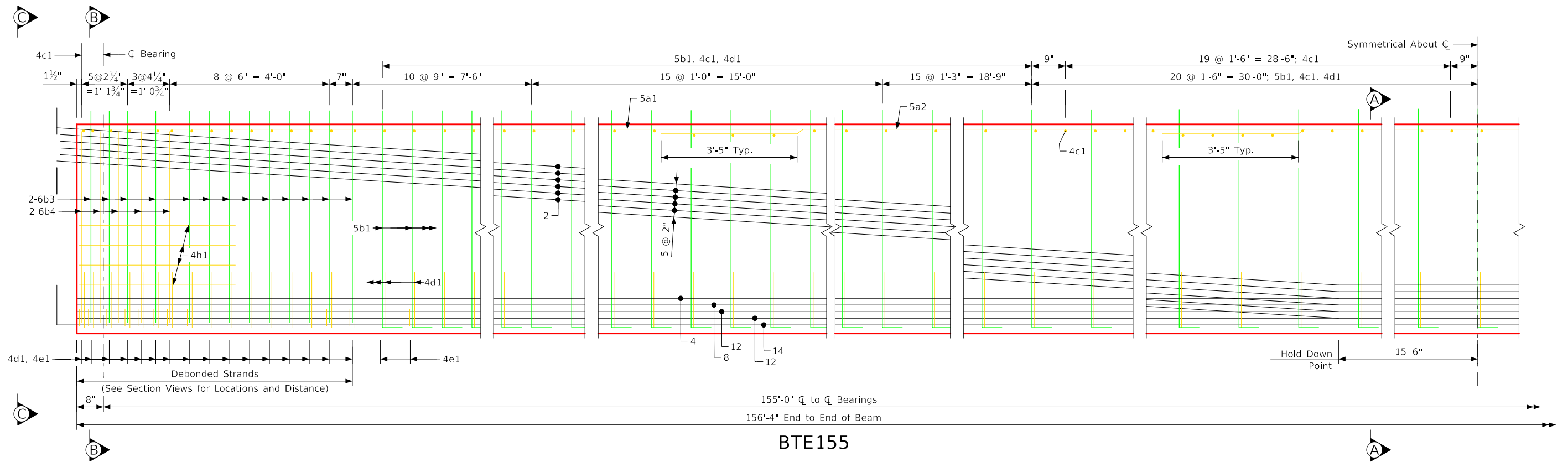


Coil Tie Detail

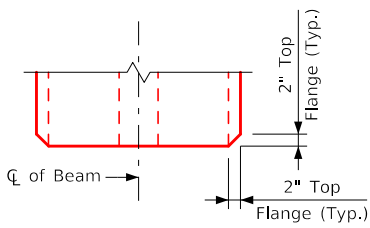
ΔΔ 5b1 and 6b3 bars to be epoxy coated
★ 6b3 and 6b4 bars to be used in pairs

Reinforcing Bar List				Bent Bar Detail			
Beam		BTE155		Note: All bar dimensions are out to out D = Pin diameter for bending (unless otherwise shown) #4 Bar D= 2" #5 Bar D= 2½" #6 Bar D= 4½"			
Bar	Shape	No.	Length				
5a1		12	24'-11"				
5a2		18	40'-0"				
5b1		119	12'-2"				
6b3		52	6'-6"				
6b4		20	5'-10"				
4c1		189	2'-7"				
4d1		151	6'-5"				
4e1		36	3'-2"				
4h1		8	8'-0"				
ΔΔ							
ΔΔ*							
*							

Revision 05-12: Alternate Section A-A 5a1 Bar Changed to 5a2.
Revised 10-2024: Shifted the deflected strands up 2" and add 2 straight strands in the bottom row for a total of 14 straight strands. Added 2 debonded strands in row 2 and row 3.
Issued 02-08.
Beams.dgn - 4790s2 - This Sheet Re-Issued 04-2024. Sheet Format Update.

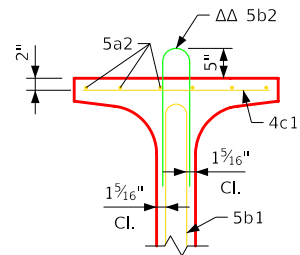


BTE155



Top View

The top flange beam corners are to be chamfered 2" as shown at both ends of the beam.

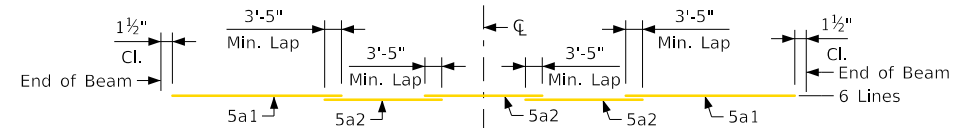


Section A-A (Alternate)

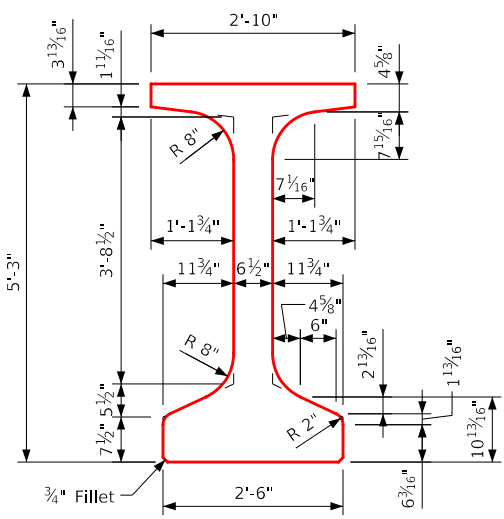
See Alternate Bar Note on Design Sheet No. 4790s1.

Area = 807.4 in.²
 $\bar{y}_b = 28.75$ in.
 $I = 422.790$ in.⁴

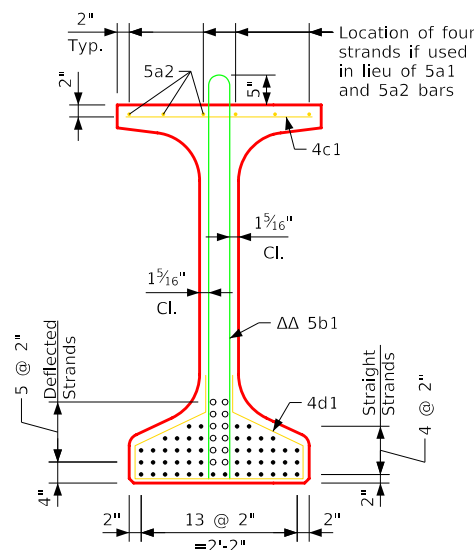
Beam Section Properties



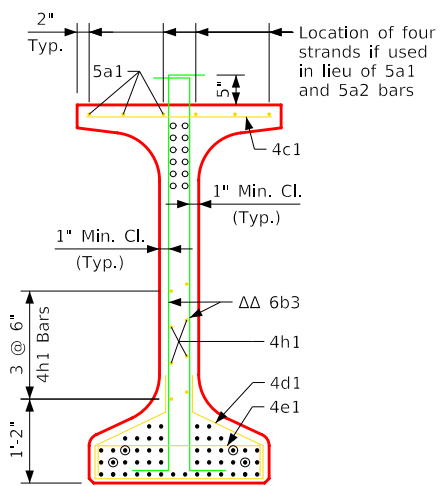
Top Flange Longitudinal Bar Layout



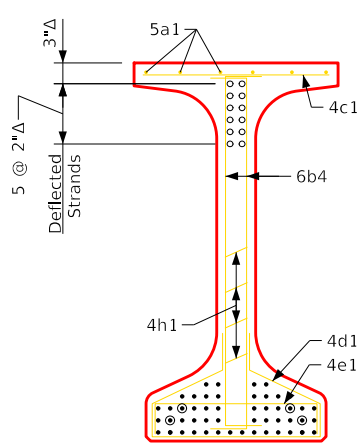
BTE Beam Cross Section



Section A-A



Section B-B



View C-C

- ◊ Deflected Strands
- Δ Dimensions at End of Beam
- ΔΔ Epoxy Coated Bars
- Strands Debonded:
- 3'-0" from Beam Ends - 3rd Row from Bottom
- 6'-0" from Beam Ends - 2nd Row from Bottom

BTE155 Beam Details