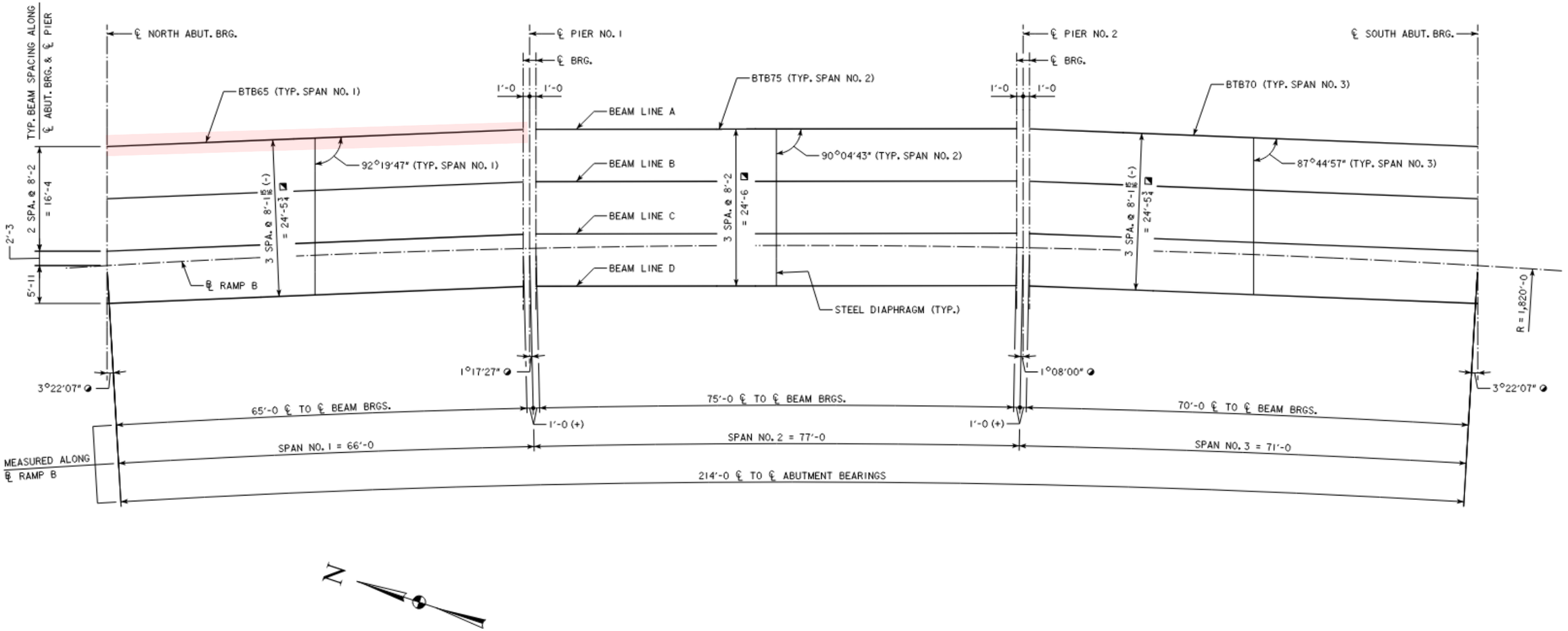


BEAM LAYOUT

NOTES:

1. For the full plan set and additional structure information, see Br1-Precast and Cast Concrete-Iowa DOT.pdf.

NOTES:

◕ MEASURED PERPENDICULAR TO LOCAL TANGENT OF ℄ RAMP B.

◪ MEASURED PERPENDICULAR TO ℄ BEAM.

Unit Test Instruction for the Design-to-Construction Data Exchange

No.	Date	Issue / Revision Notes
1	12/13/23	.

BIM FOR BRIDGES AND STRUCTURES TPF-5(372)

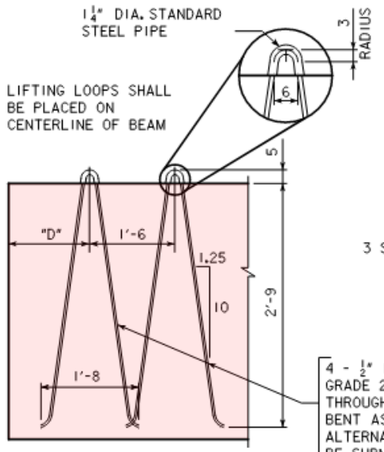
HDR | jo consulting

Unit Test Description: Level 1 Prestressed Concrete Beam

Unit Test / Sheet No.: L1-Br01-Girder01 / 01

Drawn By: AMN

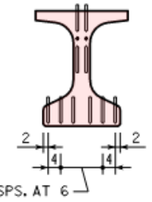
Reviewed By: .



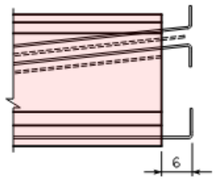
TYPICAL AT EACH END OF BEAM

4 - ½" NOMINAL DIA. GRADE 270 STRANDS THREADED THROUGH EACH PIPE SLEEVE BENT AS SHOWN AFTER THREADING. ALTERNATE LIFTING DEVICES MAY BE SUBMITTED FOR APPROVAL (SEE LIFTING LOOP TABLE).

LIFTING LOOP DETAIL



THE TOP AND BOTTOM FOR 2 ROWS OR THE TOP AND 3rd ROWS OF DEFLECTED STRANDS ARE TO BE CUT WITH 1'-6 PROJECTIONS WHICH ARE TO BE SHOP BENT AS SHOWN. THE SECOND ROW IS TO BE CUT WITH A 5" PROJECTION AND THE REMAINING TOP DEFLECTED STRANDS IN ROWS 4 AND BELOW ARE TO BE CUT FLUSH WITH BEAM FACE. SIX BOTTOM STRANDS ARE TO BE CUT WITH 1'-6 PROJECTIONS WHICH ARE TO BE SHOP BENT AS SHOWN. THE REMAINING BOTTOM STRANDS ARE TO BE CUT OFF REASONABLY FLUSH WITH THE CONCRETE.



TYPICAL AT BOTH BEAM ENDS

STRAND PROJECTION AT BEAM ENDS WHEN EMBEDDED IN CONCRETE END DIAPHRAGMS

LIFTING LOOP AND OVERHANG TABLE				
BEAMS	LIFTING LOOPS EACH END	# OF STRANDS PER LOOP	D	BEAM OVERHANG (FT)
BTB65-BTB75	1	4	2'-0	**

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

LIFTING LOOPS SHALL CARRY LOADS EQUALLY.

DESIGN STRESSES:

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

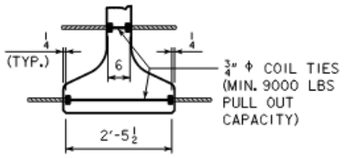
SPECIFICATIONS:

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

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 DESIGN SHEET 23.



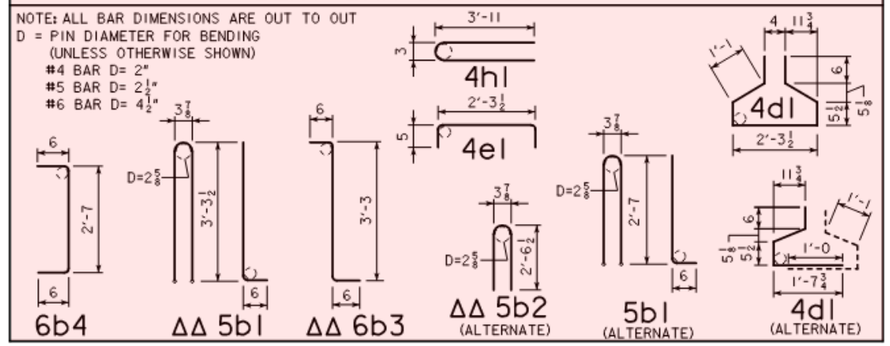
COIL TIE DETAIL

ΔΔ 5b1 AND 6b3 BARS TO BE EPOXY COATED
* 6b3 AND 6b4 BARS TO BE USED IN PAIRS
◕ STANDARD BAR LENGTH WAS INCREASED TO SATISFY THE REQUIRED PROJECTION INTO THE DECK.

REINFORCING BAR LIST							
BEAM		BTB65		BTB70		BTB75	
BAR	SHAPE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
5a1		12	34'-2	12	36'-8	12	39'-2
5a2		—	—	—	—	—	—
ΔΔ ◕ 5b1		49	7'-9	53	7'-9	57	7'-9 ◕ ΔΔ
ΔΔ * ◕ 6b3		36	4'-3	32	4'-3	32	4'-3 ◕ ΔΔ *
* 6b4		4	3'-7	8	3'-7	8	3'-7 *
4c1		83	2'-7	89	2'-7	95	2'-7
4d1		69	6'-5	73	6'-5	77	6'-5
4e1		24	3'-2	24	3'-2	24	3'-2
4h1		4	8'-0	4	8'-0	4	8'-0

BENT BAR DETAILS

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"



BTB BEAM DATA

BTB BEAM	SPAN LENGTH ℄-℄ BEARING	OVERALL BEAM LENGTH (L)	CONCRETE STRENGTH f'ci (ksi)	CONCRETE STRENGTH f'c (ksi)	STRAND SIZE DIA. (in)	NO. OF STRAND STRAIGHT	NO. OF STRAND DEFLECTED	TOTAL INITIAL PRESTRESS ③ kips	HOLD DOWN FORCE-kips	CAMBER (in) AT RELEASE	CAMBER (in) AFTER LOSSES	DEFLECTION (in) Δ_D IMMEDIATE ① (ELASTIC) Δ_i STEEL DIAPHRAGM	DEFLECTION (in) Δ_D TIME ② (PLASTIC) Δ_T STEEL DIAPHRAGM	PERMISSIBLE MAXIMUM SPACING HL-93 LOADING STEEL DIAPHRAGM	WEIGHT (TONS)	CONCRETE (CU YD.)	REINFORCING STEEL (WEIGHT-LBS)
BTB65	65'-0	66'-4	4.5	5.0	0.60	18	2	851	8.0	1.13	2.01	0.83	0.21	8'-2	21.8	10.8	1586
BTB70	70'-0	71'-4	5.0	5.5	0.60	20	2	936	7.4	1.32	2.35	1.06	0.26	8'-2	23.5	11.6	1674
BTB75	75'-0	76'-4	5.5	6.5	0.60	22	4	1106	13.0	1.65	2.92	1.28	0.32	8'-2	25.1	12.4	1764

① DEFLECTIONS AT MID-SPAN DUE TO WEIGHT OF SLAB AND DIAPHRAGM. THE DEFLECTIONS SHOWN ARE FOR A SLAB (8.5 in) AND HAUNCH (1.5 in) WEIGHT OF:
0.92 kips/ft FOR 8'-2 BEAM SPACING
AND ONE STEEL DIAPHRAGM (0.500 kips) AT ℄ OF SPAN.
FOR DIFFERENT SLAB AND DIAPHRAGM WEIGHTS, DEFLECTIONS WILL BE DIRECTLY PROPORTIONAL.
② DEFLECTIONS DUE TO THE COMBINED EFFECT OF CREEP DUE TO WEIGHT OF SLAB AND SHRINKAGE OF SLAB.
TOTAL BEAM DEFLECTIONS AT ℄ 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 As = 0.217 in^2.

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

NOTE:
THE EXTERIOR SURFACES OF THE EXTERIOR (FASCIA) BEAM ENDS OVER THE PIER SHALL NOT BE ROUGHEND.

NOTE:
FOR MODIFIED STIRRUP EXTENSIONS, SEE "BENT BAR DETAILS" AND BEAM DETAILS SHEET FOR DIMENSIONS AND LOCATIONS.

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 IM570.
BEARINGS SHALL BE AS DETAILED ON OTHER DESIGN SHEETS.
BEAMS TO BE USED IN BRIDGES MADE CONTINUOUS BY THE POURED IN PLACE FLOOR, ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FLOOR IS PLACED UNLESS A SHORTER CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.
THE PORTIONS OF THE PRESTRESSED BEAMS THAT ARE TO BE EMBEDDED IN THE ABUTMENT AND PIER DIAPHRAGMS SHALL BE ROUGHENED FOR A DISTANCE OF 10" FROM THE BEAM END BY SANDBLASTING OR OTHER APPROVED METHODS TO PROVIDE SUITABLE BOND BETWEEN THE BEAM AND THE DIAPHRAGM IN ACCORDANCE WITH ARTICLE 2403.03, I, OF THE STANDARD SPECIFICATIONS.
ALL BEAMS ARE TO BE INCREASED IN LENGTH TO COMPENSATE FOR ELASTIC SHORTENING, CREEP AND SHRINKAGE.
FOR TRANSPORTING, THE ALLOWABLE OVERHANG IS SHOWN IN THE LIFTING LOOP AND OVERHANG TABLE.
HOLES MUST BE CAST IN THE WEB TO ACCOMMODATE THE STEEL DIAPHRAGM ATTACHMENTS AS DETAILED ON THE STEEL DIAPHRAGM DETAIL SHEET.
MINIMUM CONCRETE f'c (AT 28 DAYS) AND MINIMUM f'ci AT RELEASE ARE LOCATED IN THE BTB BEAM DATA TABLE ABOVE.
FOUR 0.60 IN. DIAMETER STRANDS STRESSED TO NOT MORE THAN 5000 lbs EACH MAY BE USED IN LIEU OF BARS 5a1 AND 5a2 IN THE TOP FLANGE.

NOTES:
1.

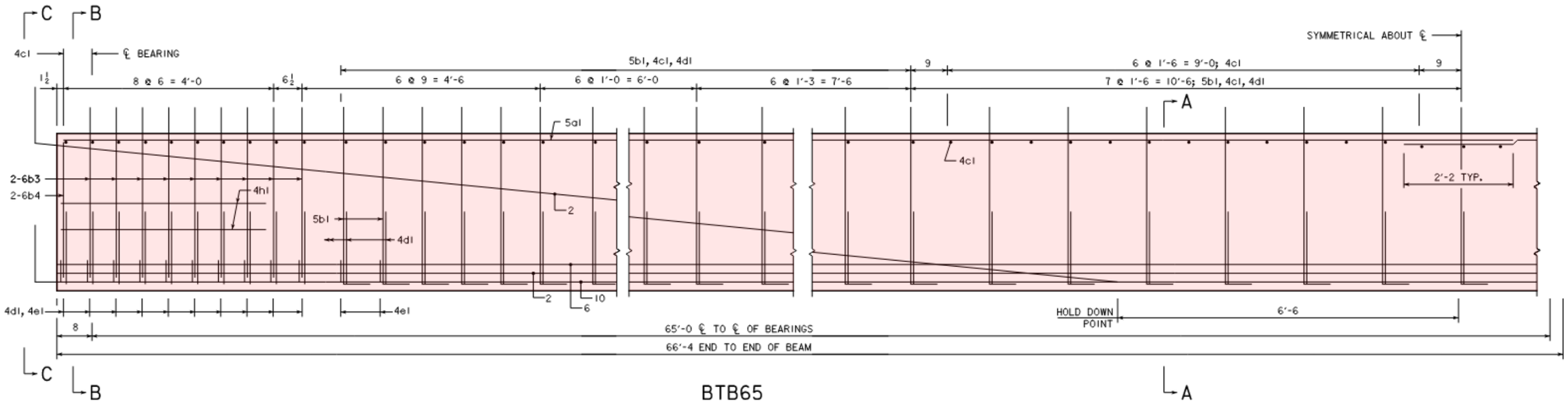
Unit Test Instruction for the Design-to-Construction Data Exchange

BIM FOR BRIDGES AND STRUCTURES TPF-5(372)

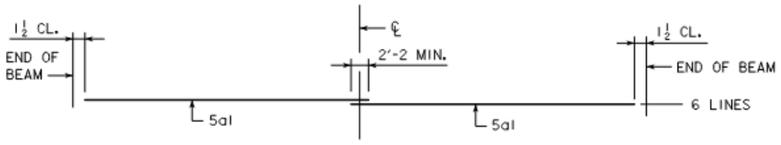
HDR jo consulting

No.	Date	Issue / Revision Notes
.	.	.
.	.	.
.	.	.
1	12/13/23	.

Unit Test Description: Level 1 Prestressed Concrete Beam
Drawn By: AMN
Reviewed By: .
Unit Test / Sheet No.: L1-Br01-Girder01 / 02



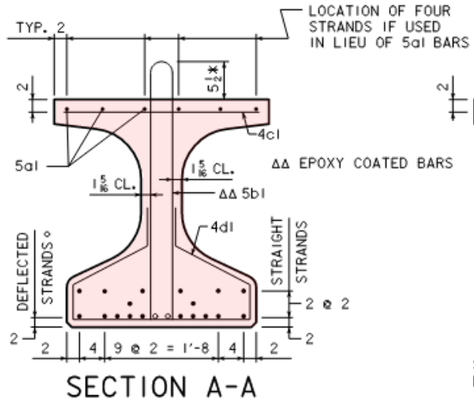
BTB65



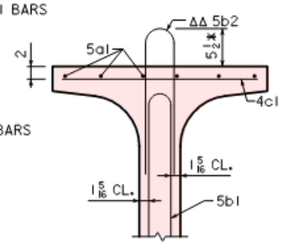
TOP FLANGE LONGITUDINAL BAR LAYOUT

NOTE: STIRRUP EXTENSION

* THE STANDARD 5" PROJECTION HAS BEEN INCREASED.

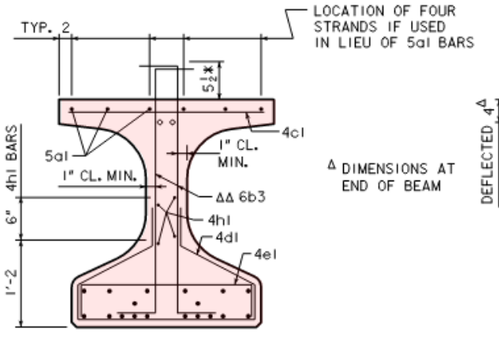


SECTION A-A



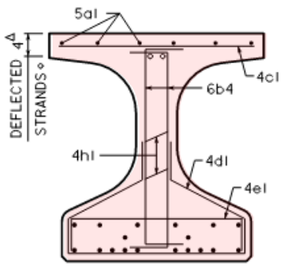
SECTION A-A (ALTERNATE)

SEE ALTERNATE BAR NOTE ON DESIGN SHEET 19.

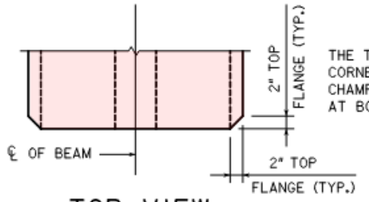


SECTION B-B

Δ DIMENSIONS AT END OF BEAM



SECTION C-C

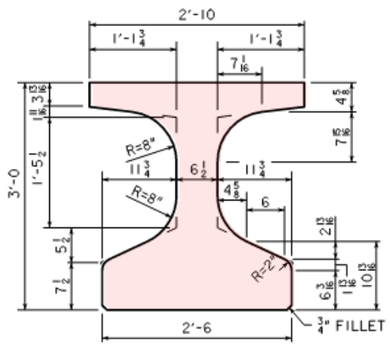


TOP VIEW

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

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

BEAM SECTION PROPERTIES



BTB BEAM CROSS SECTION

BTB65 BEAM DETAILS

NOTES:

1.

Unit Test Instruction for the Design-to-Construction Data Exchange			BIM FOR BRIDGES AND STRUCTURES TPF-5(372)
1	12/13/23		HDR jō consulting
No.	Date	Issue / Revision Notes	
Unit Test Description: Level 1 Prestressed Concrete Beam			Unit Test / Sheet No.: L1-Br01-Girder01 / 03
Drawn By: AMN		Reviewed By: .	