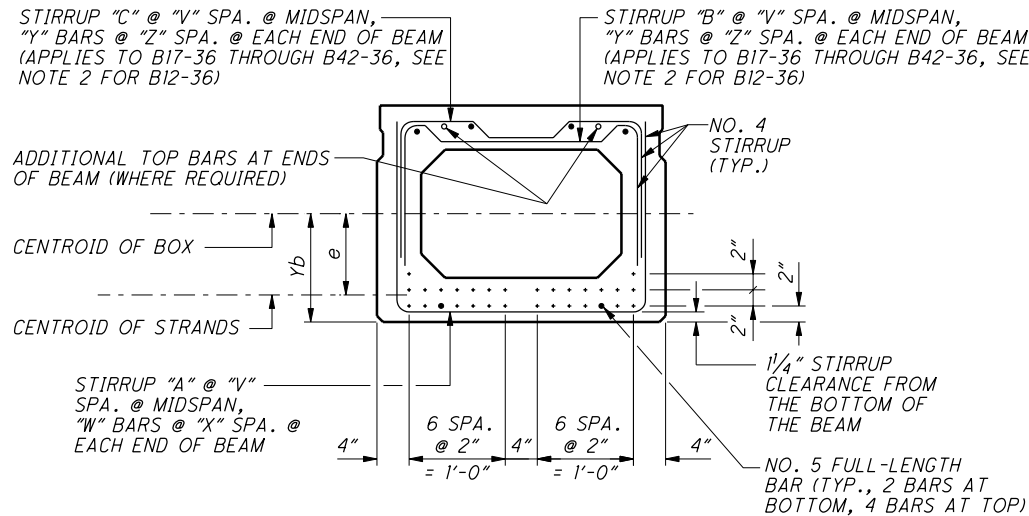


**DESIGN NOTES**

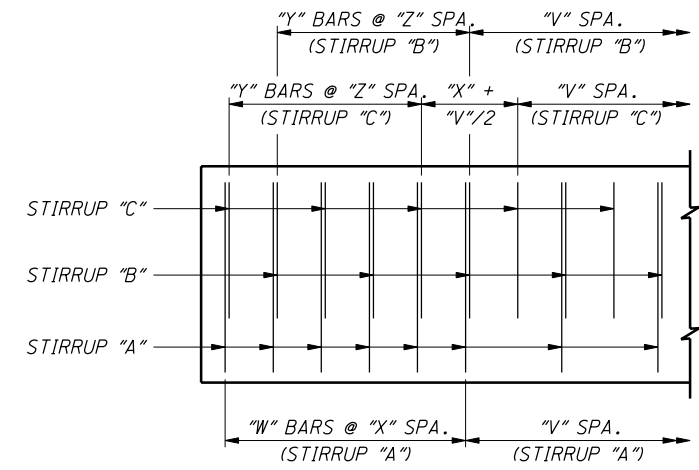
- THIS DRAWING PROVIDES INFORMATION FOR THE DESIGNER AND IS NOT INTENDED FOR USE AS A STANDARD DRAWING. REFERENCE SHALL BE MADE TO STANDARD DRAWING PSBD-2-07 FOR DETAILS OF BEAMS.
- DESIGN SPECIFICATIONS: "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 2004, INCLUDING THE 2005 AND 2006 INTERIM REVISIONS AND THE ODOT BRIDGE DESIGN MANUAL.
- DESIGN DATA:
  - SKIEW - THE DESIGN DATA ARE APPLICABLE TO STRUCTURES WITH SKIEW ANGLES OF 30° OR LESS.
  - LIVE LOADING - HL-93
  - LIVE LOAD - THE APPROXIMATE METHODS OF ANALYSIS GIVEN IN AASHTO LRFD ARTICLE 4.6.2.2 HAVE BEEN USED. THE APPLICABLE CROSS SECTION ON TABLE 4.6.2.2.1-1 IS "g". THE DESIGNS ARE FOR BRIDGES WITHOUT TRANSVERSE POST-TENSIONING (i.e. BEAMS ARE CONNECTED ONLY ENOUGH TO PREVENT RELATIVE VERTICAL DISPLACEMENT AT THE INTERFACE). ALL DESIGNS SHOWN HEREIN ARE BASED ON EXTERIOR BEAMS (HIGHER DISTRIBUTION FACTORS). THESE DESIGNS MAY ALSO BE USED FOR INTERIOR BEAMS (LOWER DISTRIBUTION FACTORS).
  - SUPERIMPOSED - ASPHALT OVERLAY = 3 1/2" THICK (AVG.)
  - DEAD LOADS - RAILING WEIGHT = 0.10 KLF PER RAIL (TST-1-99)
  - FWS = 0.060 KSF
  - DEAD LOAD - INTERMEDIATE DIAPHRAGM WEIGHT IS BASED ON 3'-0" LONG DIAPHRAGMS AND NUMBER OF DIAPHRAGMS SHOWN ON STANDARD DRAWING PSBD-2-07.
  - CONCRETE - MIN. COMPRESSIVE STRENGTH AT 28 DAYS  $f'_c = 7$  KSI
  - MIN. COMPRESSIVE STRENGTH AT TIME OF INITIAL PRESTRESS  $f'_{ci} = 5$  KSI
  - REINFORCING - GRADE 60
  - STEEL - MINIMUM YIELD STRENGTH = 60 KSI
  - PRESTRESSING - ASTM A416 LOW RELAXATION STRANDS
  - STEEL - 1/2" DIAMETER
  - $A_{ps} = 0.167$  SQ. IN. PER STRAND
  - $f_{pu} = 270$  KSI
  - $E_p = 28,500$  KSI
  - RELATIVE HUMIDITY,  $H = 70\%$
  - INITIAL STRESS  $0.75 f_{pu} = 202.5$  KSI
  - INITIAL TENSION LOAD = 33.82 KIPS/STRAND
- A SEVERE CORROSIVE ENVIRONMENT WAS ASSUMED IN DETERMINING THE TENSILE STRESS LIMITS AFTER LOSSES (AASHTO LRFD ARTICLE 5.9.4.2.2).
- LOAD MODIFIERS FOR DUCTILITY, REDUNDANCY, AND OPERATIONAL IMPORTANCE WERE TAKEN AS 1.0 (AASHTO LRFD ARTICLE 1.3).
- STRAND AREAS WERE NOT TRANSFORMED IN SECTION PROPERTY CALCULATIONS.
- MILD REINFORCING BARS WERE NOT CONSIDERED IN DETERMINING THE STRENGTH OF THE SECTIONS.
- ALL DESIGNS MEET THE CRITERIA FOR DEFLECTION GIVEN IN AASHTO LRFD ARTICLE 2.5.2.6.2 AND THE CRITERIA FOR SPAN-TO-DEPTH RATIOS GIVEN IN AASHTO LRFD ARTICLE 2.5.2.6.3.
- PRESTRESS LOSSES HAVE BEEN COMPUTED IN ACCORDANCE WITH AASHTO LRFD EQUATIONS 5.9.5.1-1, 5.9.5.2.3a-1, AND 5.9.5.3-1 (APPROXIMATE ESTIMATE OF TIME-DEPENDENT LOSSES).
- CAMBER DATA GIVEN IS THE CALCULATED CAMBER AT TIME OF RELEASE (B-C), CAMBER AT TIME OF ERECTION (1.8B-1.85C), AND LONG TERM CAMBER (2.45B-2.4C), WHERE B = CAMBER DUE TO PRESTRESSING AT RELEASE AND C = DEFLECTION DUE TO WEIGHT OF BEAM INCLUDING DIAPHRAGMS. PROVIDE THE CAMBER AT RELEASE, CAMBER AT ERECTION, AND LONG TERM CAMBER IN THE PLANS. D = CALCULATED DEFLECTION AT MIDSPAN DUE TO A 3 1/2" THICK ASPHALT WEARING SURFACE AND TWO (2) BRIDGE RAILS WEIGHING 0.10 KLF PER RAIL. THE VALUE SHOWN IS THE MAXIMUM INITIAL SUPERIMPOSED DEAD LOAD DEFLECTION FOR THE APPLICABLE ROADWAY WIDTHS (SEE NOTE 6).
- ROADWAY WIDTH: THE BEAMS ON THIS SHEET ARE DESIGNED FOR THE FOLLOWING ROADWAY WIDTHS, MEASURED BETWEEN FACE OF BRIDGE RAILS:
  - 24 FT.  $\leq$  WIDTH  $\leq$  60 FT.
  - THESE DESIGNS SHALL NOT BE USED FOR ROADWAY WIDTHS LESS THAN 24 FT. OR GREATER THAN 60 FT. SPECIAL DESIGN IS REQUIRED FOR ROADWAY WIDTHS LESS THAN 24 FT. OR GREATER THAN 60 FT.
- INTERPOLATION: FOR BEAM SPANS NOT SPECIFICALLY LISTED IN THE DESIGN DATA TABLE, THE DESIGN DATA MAY BE OBTAINED FROM THE TABLE BY USING STRAIGHT LINE INTERPOLATION BETWEEN GIVEN VALUES. HOWEVER, THE NUMBER OF STRANDS USED SHALL ALWAYS BE ROUNDED UP TO THE NEAREST EVEN NUMBER. DO NOT EXTRAPOLATE BEYOND THE GIVEN DATA.

DESIGN DATA (SEE NOTE 6)																												
BOX	SPAN c/c BRG. (FT.)	MIDSPAN e (IN.)	NO. OF STRANDS	STRAND LOC. FROM BOTTOM OF BOX			NUMBER AND LENGTH OF STRANDS DEBONDED			TENSILE BARS AT BOTTOM		TENSILE BARS AT TOP			CAMBER/DEFLECTION DATA (IN.) (SEE NOTE 5)					STIRRUP DATA								
				2"	4"	6"	1'-6"	2'-6"	3'-6"	NO.	SIZE	NO.	SIZE	NO.	SIZE	LENGTH ▲	B	C	B-C	1.8B-1.85C	2.45B-2.4C	D	V	W	X	Y	Z	
B12-36	20	3.96	8	8						2	5	4	5	-	-	-	0.37	0.07	0.30	0.54	0.74	0.02						
	25	3.56	10	8	2					2	5	4	5	-	-	-	0.63	0.18	0.45	0.80	1.11	0.05	18"	4	6"	*	*	
B17-36	20	6.42	6	6						2	5	4	5	-	-	-	0.16	0.03	0.13	0.23	0.32	0.01						
	25	6.42	8	8						2	5	4	5	-	-	-	0.33	0.07	0.26	0.46	0.64	0.02						
	30	6.42	10	10						2	5	4	5	-	-	-	0.59	0.15	0.44	0.78	1.09	0.04	10.5"	4	6"	2	12"	
	35	6.42	10	10						2	5	4	5	-	-	-	0.80	0.28	0.52	0.92	1.29	0.07						
B21-36	40	8.40	10	10						2	5	4	5	-	-	-	0.43	0.10	0.33	0.59	0.81	0.02						
	35	8.40	10	10						2	5	4	5	-	-	-	0.58	0.18	0.40	0.71	0.99	0.04						
	40	8.40	10	10						2	5	4	5	-	-	-	0.75	0.30	0.45	0.80	1.12	0.07	13.5"	6	7.5"	3	15"	
	45	8.40	12	12						2	5	4	5	-	-	-	1.13	0.47	0.66	1.16	1.64	0.11						
B27-36	50	7.90	16	12	4					2	5	4	5	-	-	-	1.73	0.72	1.01	1.78	2.51	0.17						
	40	11.37	10	10						2	5	4	5	-	-	-	0.52	0.18	0.34	0.60	0.84	0.04						
	45	11.37	12	12						2	5	4	5	2	4	5'-6"	0.78	0.28	0.50	0.89	1.24	0.06						
	50	11.37	12	12						2	5	4	5	2	4	5'-0"	0.96	0.42	0.54	0.95	1.34	0.09	13.5"	8	5.5"	4	11"	
	55	11.08	14	12	2					2	5	4	5	2	4	5'-6"	1.31	0.63	0.68	1.19	1.70	0.12						
B33-36	60	10.87	16	12	4			2		2	5	4	5	-	-	-	1.73	0.89	0.84	1.47	2.10	0.18						
	65	10.37	20	10	10			2		2	5	4	5	2	4	5'-0"	2.40	1.21	1.19	2.08	2.98	0.24						
	50	14.30	12	12						2	5	4	5	2	4	6'-3"	0.71	0.28	0.43	0.76	1.07	0.05						
	55	13.73	14	10	4					2	5	4	5	2	4	6'-0"	0.96	0.42	0.54	0.95	1.34	0.07						
	60	14.01	14	12	2					2	5	4	5	2	4	6'-6"	1.16	0.59	0.57	1.00	1.43	0.10						
B42-36	65	13.30	16	8	8			2		2	5	4	5	2	4	5'-9"	1.47	0.80	0.67	1.17	1.68	0.14	15"	10	6"	5	12"	
	70	13.41	18	10	8			2		2	5	4	5	2	4	6'-3"	1.92	1.07	0.85	1.48	2.14	0.19						
	75	13.50	20	12	8			4		2	5	4	5	2	4	5'-3"	2.45	1.40	1.05	1.82	2.64	0.25						
	80	13.13	24	12	10	2		4		2	5	4	5	2	4	6'-3"	3.22	1.85	1.37	2.37	3.45	0.33						
	65	17.75	16	8	8			2		2	5	4	5	2	5	8'-3"	1.05	0.50	0.55	0.97	1.37	0.08						



**TYPICAL STRAND LOCATION & STIRRUP SPACING**

STRANDS SHALL BE PLACED AS SHOWN AND SHALL BE DISTRIBUTED SYMMETRICALLY OVER THE BEAM WIDTH. STRAND PATTERN AND THE DEBONDED LENGTHS SHALL BE SYMMETRICAL ABOUT VERTICAL  $\bar{C}$  OF BEAM. DEBONDED STRANDS SHALL BE IN THE BOTTOM LAYER. EXTERIOR STRANDS SHALL BE FULLY BONDED. LENGTH OF STRANDS TO BE DEBONDED IS MEASURED FROM ENDS OF BEAM. TWO BOTTOM REINFORCING BARS (#5, FULL LENGTH OF BEAM) SHALL BE LOCATED AS SHOWN. A LAP OF 3'-3" FOR BOTTOM BARS SHOULD BE PROVIDED WITHIN THE OUTER QUARTER OF THE SPAN, IF NEEDED. FOUR TOP REINFORCING BARS (#5, FULL LENGTH OF BEAM) SHALL BE LOCATED AT THE STIRRUP CORNERS AS SHOWN. A LAP OF 3'-8" FOR TOP BARS SHOULD BE PROVIDED WITHIN THE MIDDLE HALF OF THE SPAN, IF NEEDED. ADDITIONAL TOP REINFORCING BARS AT ENDS OF BEAM, WHERE REQUIRED, SHALL BE PLACED SYMMETRICALLY OVER THE BEAM WIDTH AND SHALL BE PLACED MIDWAY BETWEEN FULL LENGTH BARS.



**PARTIAL ELEVATION AT BEAM END**  
(APPLIES TO B17-36 THROUGH B42-36)  
(SEE NOTE 2 FOR B12-36)

**NOTES:**

- ▲ - LENGTH MEASURED FROM ENDS OF BEAM
- \* - FOR B12-36, PROVIDE A STRAIGHT #4 BAR AT THE TOP OF THE BEAM AT EACH LOCATION WHERE STIRRUP "A" IS PROVIDED.
- FOR B17-36 THROUGH B42-36, STIRRUP "A" AND STIRRUP "B" SHALL BE PLACED AT THE SAME LOCATION AT MIDSPAN.
- FOR B17-36 THROUGH B42-36, STIRRUP "C" SHALL BE PLACED HALF-WAY BETWEEN STIRRUPS "B" AT MIDSPAN.

DESIGN AGENCY: OFFICE OF STRUCTURAL ENGINEERING ORIGINAL DESIGN PREPARED BY: BURGESS & NIPLE, INC.  
 STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 DATE: 10-19-07  
 ADMINISTRATOR: [Signature]  
 REVIEWED: [Signature] TAB PSBDD-2-07  
 CHECKED: JHL  
 DESIGNED: BES  
 DRAWN: AAA  
 REVISIONS:  
 DESIGN DATA: PRESTRESSED CONCRETE NON-COMPOSITE ADJACENT BOX BEAMS (36" WIDE) WITH STRAIGHT STRANDS  
 2 / 2