

# DESIGN NOTES

1. DESIGN SPECIFICATIONS: "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1996, INCLUDING THE 1997 THROUGH 2001 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

## 2. DESIGN DATA:

- LIVE LOADING - HS25 AND THE ALTERNATE MILITARY LOADING
- SUPERIMPOSED DEAD LOADS - ASPHALT OVERLAY - 3 1/2" THICK (AVG.)  
RAILING WEIGHT - 90 PLF PER RAIL (TST-1-99)  
FWS - 60 PSF
- DEAD LOAD - DIAPHRAGM WEIGHT IS BASED ON 3'-0" LONG DIAPHRAGMS.
- CONCRETE - MIN. COMPRESSIVE STRENGTH AT 28 DAYS  $f'_c = 7000$  P.S.I.  
MIN. COMPRESSIVE STRENGTH AT TIME OF INITIAL PRESTRESS  $f'_c = 5000$  P.S.I.
- REINFORCING STEEL - GRADE 60  
MINIMUM YIELD STRENGTH 60,000 P.S.I.
- PRESTRESSING STEEL - ASTM A416  
1/2" DIAMETER  
 $A_s = 0.167$  SQ. IN.  
 $f_s = 270,000$  P.S.I.  
 $E_s = 28,500$  K.S.I.  
 $R_H = 70\%$   
INITIAL STRESS  $0.75 f_s = 202,500$  P.S.I.  
INITIAL TENSION LOAD = 33,818 LBS/STRAND

3. PRESTRESS LOSSES HAVE BEEN COMPUTED IN ACCORDANCE WITH AASHTO ARTICLE 9.16.2. TOTAL LOSSES DETERMINED BY THIS METHOD MAY BE EXPRESSED AS  $\Delta f_s = 11,175 + (25,650/E_c) + (11.4) f_{cir} - 6.65 f_{cbs}$

## 4. INTERMEDIATE DIAPHRAGMS:

- SPAN  $\leq 50$  FT. USE ONE DIAPHRAGM
- 50 FT.  $<$  SPAN  $\leq 75$  FT. USE TWO DIAPHRAGMS
- SPAN  $> 75$  FT. USE THREE DIAPHRAGMS

5. CAMBER DATA GIVEN IS THE CALCULATED CAMBER AT TIME OF PAVING (1.8B - 1.85C), WHERE B = CAMBER DUE TO PRESTRESSING AT RELEASE AND C = DEFLECTION DUE TO WEIGHT OF BEAM INCLUDING DIAPHRAGMS. D = CALCULATED DEFLECTION AT MIDSPAN DUE TO A 3 1/2" THICK ASPHALT WEARING SURFACE AND TWO (2) BRIDGE RAILS WEIGHING 90LB/FT. PER RAIL. THE VALUE SHOWN IS THE MAXIMUM INITIAL SUPERIMPOSED DEAD LOAD DEFLECTION FOR GROUP A ROADWAY WIDTHS.

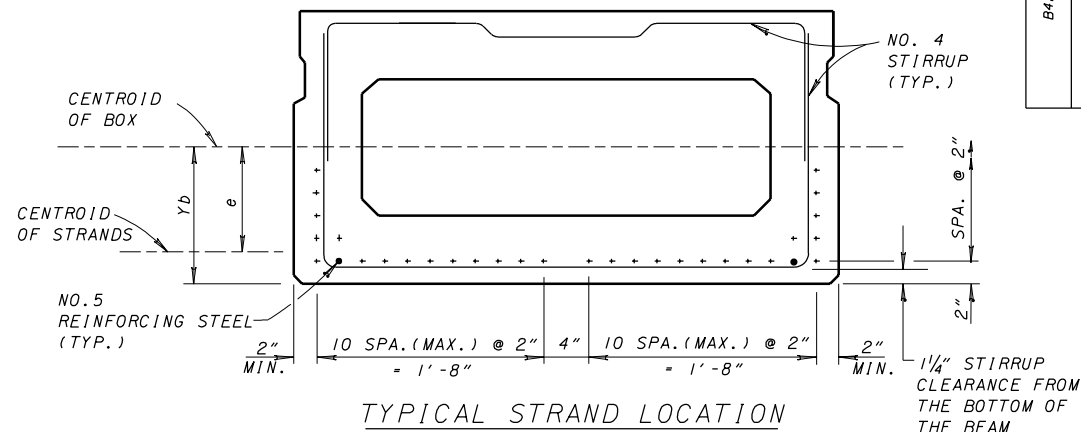
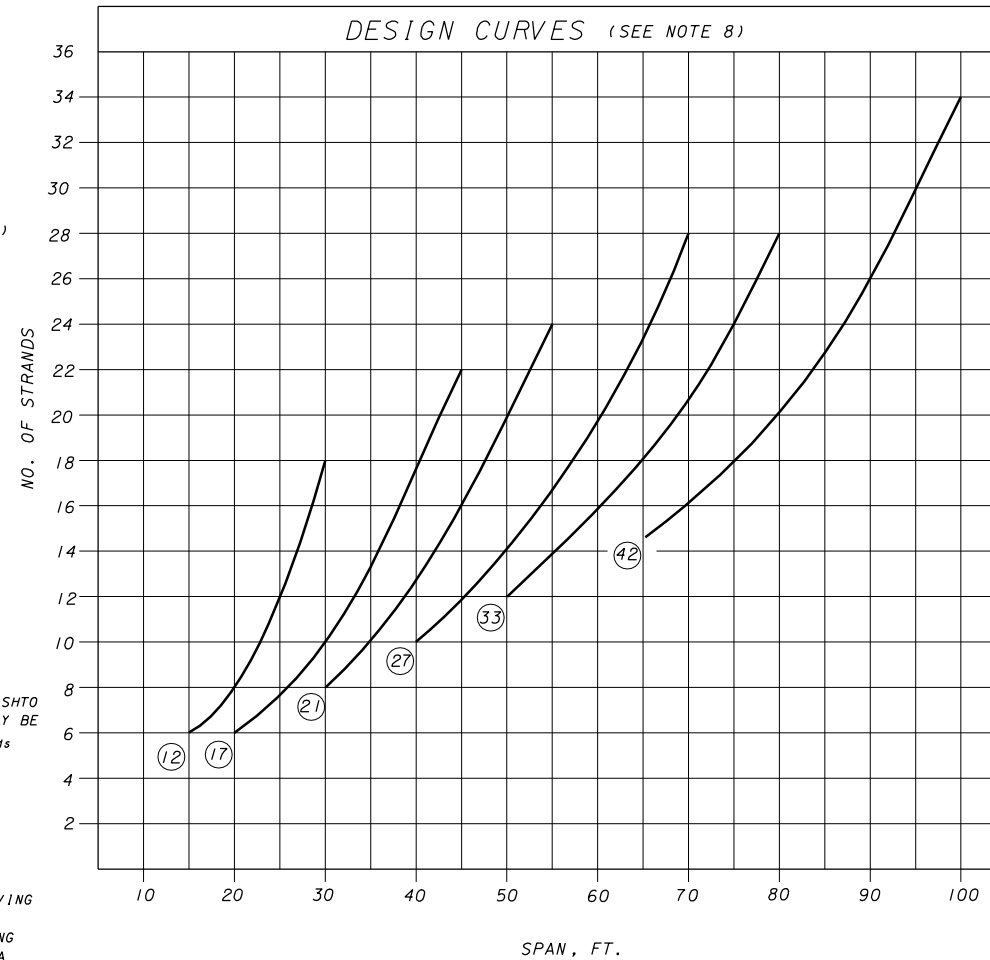
6. THIS DRAWING PROVIDES INFORMATION FOR THE DESIGNER AND IS NOT INTENDED FOR USE AS A STANDARD DRAWING. REFERENCE SHALL BE MADE TO STANDARD DRAWING PSBD-1-93 FOR DETAILS OF BEAMS.

7. ROADWAY WIDTH: THE BEAMS ON THIS SHEET ARE DESIGNED FOR THE FOLLOWING ROADWAY WIDTHS, MEASURED BETWEEN FACE OF BRIDGE RAILS:

GROUP A  
24 FT.  $\leq$  WIDTH  $\leq$  36 FT.

8. INTERPOLATION: THE DESIGN CURVES SHALL BE USED TO DETERMINE THE NUMBER OF STRANDS REQUIRED FOR BEAM SPANS NOT SPECIFICALLY LISTED IN THE DESIGN DATA TABLE. HOWEVER, THE NUMBER OF STRANDS USED SHALL ALWAYS BE ROUNDED UP TO THE NEAREST EVEN NUMBER. THE REMAINING DESIGN DATA MAY BE OBTAINED FROM THE TABLE BY USING STRAIGHT LINE INTERPOLATION BETWEEN GIVEN VALUES. DO NOT EXTRAPOLATE BEYOND THE CURVES OR GIVEN DATA.

9. NARROW ROADWAY: THESE DESIGNS SHALL NOT BE USED FOR ROADWAY WIDTHS LESS THAN 24 FT. SPECIAL DESIGN IS REQUIRED FOR ROADWAY WIDTHS LESS THAN 24 FT.



STRANDS SHALL BE PLACED PER BDM 302.5.1.2.b 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 BOTTOM LAYER. LENGTH OF STRANDS TO BE DEBONDED IS MEASURED FROM ENDS OF BEAM. TWO BOTTOM REINFORCING BARS SHALL BE LOCATED AT THE CORNER OF THE STIRRUPS. A LAP OF 3'-3" FOR #5 BARS AND 4'-0" FOR #6 BARS SHOULD BE PROVIDED WITHIN THE OUTER QUARTER OF THE SPAN, IF NEEDED.

## GROUP A DESIGN DATA (SEE NOTE 7)

BOX	SPAN c/c BRG. FT.	MID-SPAN e in.	NO. OF STRANDS	STRAND LOCATION 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)					
												NO.	SIZE	FULL LENGTH		ADDITIONAL BARS EACH END		B	C	1.8B-1.85C	D				
				2"	4"	6"	8"	10"	12"	14"	1'-6"			2'-6"	3'-6"	4'-6"	NO.					SIZE	NO.	SIZE	LENGTH
B12-48	15	3.97	6	6											2	5	6	4	-	-	-	0.105	0.023	0.146	0.007
	20	3.97	8	8											2	5	6	4	-	-	-	0.250	0.072	0.317	0.021
	25	3.97	12	12											2	5	6	4	2	4	4'-3"	0.581	0.177	0.718	0.052
	30	3.53	18	14	4								2		2	5	6	4	-	-	-	1.100	0.367	1.301	0.108
B17-48	20	6.55	6	6											2	5	6	4	-	-	-	0.116	0.028	0.157	0.008
	25	6.55	8	8											2	5	6	4	-	-	-	0.242	0.070	0.306	0.019
	30	6.55	10	10											2	5	6	4	-	-	-	0.435	0.142	0.520	0.040
	35	6.55	14	14											2	5	6	4	2	4	3'-9"	0.818	0.261	0.990	0.075
	40	6.33	18	16	2										2	5	6	4	2	4	4'-6"	1.314	0.443	1.546	0.127
45	6.19	22	18	4									2		2	5	6	4	2	4	4'-3"	1.964	0.706	2.229	0.204
B21-48	30	8.57	8	8											2	5	6	4	-	-	-	0.259	0.090	0.300	0.023
	35	8.57	10	10											2	5	6	4	-	-	-	0.439	0.165	0.485	0.042
	40	8.57	14	14											2	5	6	4	2	4	4'-6"	0.793	0.278	0.913	0.072
	45	8.57	16	16											2	5	6	4	4	4	5'-3"	1.142	0.444	1.234	0.115
	50	8.17	20	16	4										2	5	6	4	4	4	5'-3"	1.666	0.672	1.756	0.175
55	8.24	24	20	4									2		2	5	6	4	4	4	6'-3"	2.405	1.010	2.461	0.256
B27-48	40	11.61	10	10											2	5	4	5	-	-	-	0.392	0.160	0.410	0.036
	45	11.61	12	12											2	5	4	5	2	5	3'-6"	0.593	0.254	0.598	0.058
	50	11.61	16	16											2	5	4	5	2	5	5'-6"	0.964	0.385	1.023	0.088
	55	11.61	18	18											2	5	4	5	4	5	6'-3"	1.308	0.584	1.274	0.129
	60	11.61	20	20											2	5	4	5	4	5	6'-9"	1.723	0.821	1.583	0.182
65	10.94	24	18	4	2									2	5	4	5	4	5	6'-0"	2.273	1.122	2.016	0.251	
70	10.61	28	20	4	2	2								2	5	4	5	2	5	5'-3"	2.959	1.500	2.551	0.338	
B33-48	50	14.61	12	12											2	5	4	5	2	5	3'-9"	0.552	0.253	0.526	0.053
	55	14.61	14	14											2	5	4	5	2	5	4'-6"	0.776	0.388	0.679	0.077
	60	14.61	16	16											2	5	4	5	4	5	6'-0"	1.052	0.543	0.889	0.109
	65	14.61	18	18											2	5	4	5	4	5	6'-6"	1.384	0.742	1.119	0.150
	70	14.43	22	20	2										2	5	4	5	6	5	7'-6"	1.919	0.990	1.623	0.202
	75	14.28	24	20	4										2	5	4	5	6	5	7'-9"	2.373	1.296	1.874	0.266
80	13.61	28	20	4	2	2								2	5	4	5	4	5	7'-3"	2.985	1.728	2.176	0.344	
B42-48	65	19.13	16	16											2	5	4	5	4	5	7'-3"	0.884	0.467	0.727	0.082
	70	19.13	16	16											2	5	4	5	4	5	5'-9"	1.029	0.622	0.702	0.110
	75	19.13	18	18											2	5	4	5	6	5	6'-6"	1.324	0.813	0.879	0.145
	80	18.95	22	20	2										2	5	4	5	8	5	9'-0"	1.808	1.089	1.240	0.188
	85	18.80	24	20	4										2	5	4	5	8	5	9'-3"	2.203	1.376	1.420	0.239
	90	18.51	26	20	4	2									2	5	4	5	8	5	9'-3"	2.631	1.717	1.559	0.301
95	17.66	30	20	4	2	2	2							2	5	4	5	8	5	8'-0"	3.210	2.116	1.863	0.373	
100	16.54	34	20	4	2	2	2	2	2	2	2			2	5	4	5	4	5	7'-0"	3.762	2.582	1.995	0.458	

▲ - LENGTH MEASURED FROM ENDS OF BEAM

## SECTION PROPERTIES

BOX	A IN. <sup>2</sup>	I IN. <sup>4</sup>	Yb IN.	S <sub>t</sub> IN. <sup>3</sup>	S <sub>b</sub> IN. <sup>3</sup>
B12 - 48	567.8	6850	5.97	1136	1147
B17 - 48	554.3	18307	8.55	2167	2141
B21 - 48	606.3	32456	10.57	3112	3071
B27 - 48	678.8	64649	13.61	4828	4750
B33 - 48	733.5	108150	16.61	6599	6511
B42 - 48	823.5	198418	21.13	9507	9390

REVISIONS

STATE OF OHIO  
DEPARTMENT OF TRANSPORTATION  
OFFICE OF STRUCTURAL ENGINEERING

ORIGINAL DESIGN PREPARED BY:  
URS CORPORATION - OHIO

**DESIGN DATA FOR  
PRESTRESSED CONCRETE BRIDGE  
GROUP A ROADWAY WIDTH  
NON-COMPOSITE  
48" ADJACENT BOX BEAMS  
WITH STRAIGHT STRANDS**

DESIGNED	DRAWN	CHECKED	REVIEWED	DATE
MDP	SFW	MAC	RSC	12/20/02