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 $\Delta f_s = 11{,}175 \cdot (25{,}650/E_{ci} + 11.4)\, f_{cir} - 6.65\, f_{cds}$

4. INTERMEDIATE DIAPHRAGMS:

SPAN ≤ 50 FT. USE ONE DIAPHRAGM

50 FT. < SPAN ≤ 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 D 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:

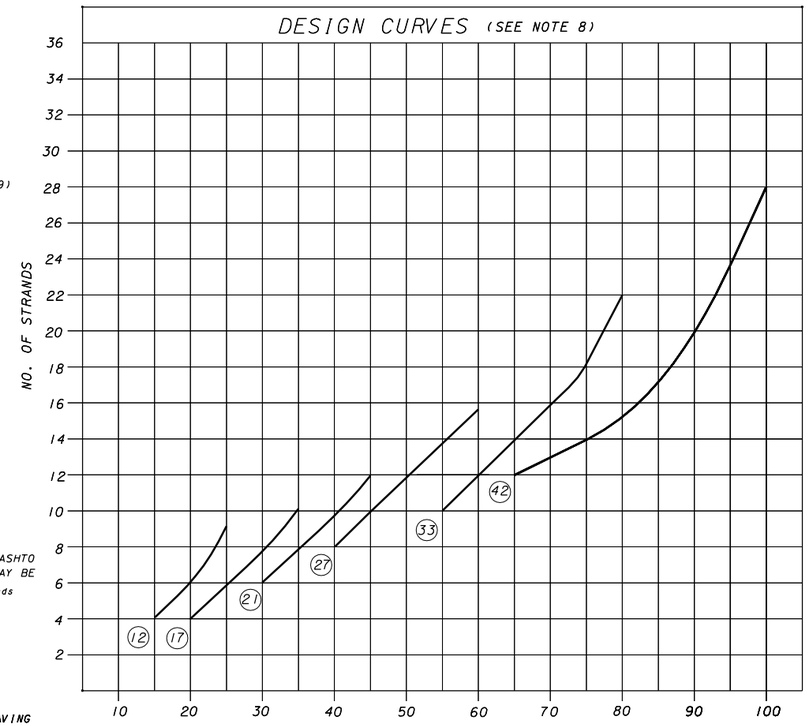
GROUP D

24 FT. ≤ WIDTH ≤ 54 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.

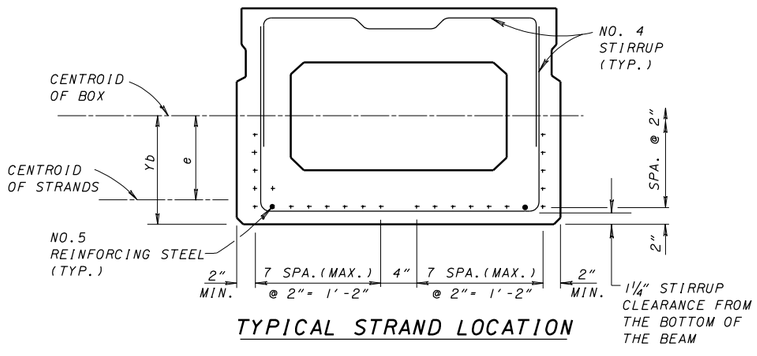
DESIGN CURVES (SEE NOTE 8)



GROUP D DESIGN DATA (SEE NOTE 7)

BOX	SPAN c/c BRG. FT.	MID-SPAN e in.	NO. OF STRANDS	STRAND LOCATION FROM BOTTOM OF BOX 2"	4"	6"	8"	10"	12"	14"	NUMBER AND LENGTH OF STRANDS DEBONDED 1'-6"	2'-6"	3'-6"	4'-6"	TENSILE BARS AT BOTTOM NO.	SIZE	TENSILE BARS AT TOP FULL LENGTH NO.	SIZE	ADDITIONAL BARS EACH END NO.	SIZE	LENGTH▲	CAMBER/DEFLECTION DATA IN. (SEE NOTE 5) B	C	1.8B-1.85C	D
B12-36	15	3.96	4	4											2	5	4	5	-	-	-	0.094	0.023	0.127	0.007
	20	3.96	6	6											2	5	4	5	-	-	-	0.250	0.072	0.317	0.021
	25	3.56	10	8	2										2	5	4	5	-	-	-	0.581	0.176	0.720	0.052
B17-36	20	6.42	4	4											4	5	4	5	-	-	-	0.101	0.029	0.128	0.008
	25	6.42	6	6											2	5	4	5	-	-	-	0.236	0.070	0.295	0.019
	30	6.42	8	8											2	5	4	5	-	-	-	0.450	0.144	0.544	0.040
	35	6.42	10	10											2	5	4	5	-	-	-	0.761	0.264	0.881	0.074
B21-36	30	8.39	6	6											2	5	4	5	-	-	-	0.248	0.091	0.278	0.022
	35	8.39	8	8											2	5	4	5	-	-	-	0.448	0.168	0.492	0.041
	40	8.39	10	10											2	5	4	5	-	-	-	0.727	0.285	0.781	0.070
	45	8.39	12	12											2	5	4	5	2	5	3'-9"	1.098	0.454	1.137	0.112
B27-36	40	11.36	8	8											2	5	4	5	-	-	-	0.408	0.167	0.425	0.036
	45	11.36	10	10											2	5	4	5	2	5	3'-9"	0.641	0.267	0.660	0.057
	50	11.36	12	12											2	5	4	5	2	5	5'-0"	0.944	0.403	0.954	0.088
	55	11.36	14	14											2	5	4	5	4	5	6'-0"	1.325	0.610	1.257	0.128
	60	11.11	16	14	2										2	5	4	5	4	5	6'-0"	1.755	0.857	1.574	0.182
B33-36	50	14.28	10	10											2	5	4	5	2	5	4'-6"	0.592	0.267	0.572	0.052
	55	14.28	12	12											2	5	4	5	2	5	5'-9"	0.855	0.406	0.788	0.076
	60	14.28	14	14											2	5	4	5	4	5	7'-0"	1.181	0.571	1.069	0.108
	65	14.28	14	14											2	5	4	5	4	5	6'-6"	1.391	0.780	1.061	0.148
	70	14.03	16	14	2										2	5	4	5	4	5	7'-0"	1.804	1.043	1.318	0.200
	75	13.84	18	14	4						2				2	5	4	5	4	5	7'-0"	2.287	1.366	1.590	0.263
	80	13.01	22	14	4	2	2				2				2	5	4	5	4	5	6'-3"	2.966	1.853	1.911	0.340
B42-36	65	18.72	12	12											2	5	4	5	4	5	6'-9"	0.849	0.493	0.616	0.080
	70	18.72	14	14											2	5	4	5	4	5	8'-0"	1.143	0.658	0.840	0.107
	75	18.72	14	14											2	5	4	5	4	5	7'-6"	1.317	0.861	0.778	0.142
	80	18.47	16	14	2										2	5	4	5	6	5	8'-3"	1.683	1.149	0.904	0.183
	85	18.28	18	14	4						2				2	5	4	5	6	5	8'-9"	2.107	1.454	1.103	0.233
	90	17.92	20	14	4	2					2				2	5	4	5	6	5	8'-6"	2.566	1.815	1.261	0.293
	95	16.89	24	14	4	2	2	2			2				2	5	4	5	4	5	7'-3"	3.209	2.240	1.632	0.364
	100	15.58	28	14	4	2	2	2	2	2	2				2	5	4	5	4	5	6'-6"	3.810	2.735	1.798	0.447

▲ - LENGTH MEASURED FROM ENDS OF BEAM



TYPICAL STRAND LOCATION

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 ℄ 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.

SECTION PROPERTIES

BOX	A $IN.^2$	I $IN.^4$	Yb IN.	St $IN.^3$	Sb $IN.^3$
B12 - 36	423.8	5122	5.96	848	859
B17 - 36	426.3	13840	8.42	1613	1644
B21 - 36	479.8	24893	10.39	2346	2396
B27 - 36	539.8	48647	13.36	3567	3641
B33 - 36	594.5	82048	16.28	4907	5040
B42 - 36	684.5	152479	20.72	7165	7359

REVISIONS 10-17-03

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
OFFICE OF STRUCTURAL ENGINEERING

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ORIGINAL DESIGN PREPARED BY:
URS CORPORATION - OHIO

DESIGN DATA FOR PRESTRESSED CONCRETE BRIDGE
GROUP D ROADWAY WIDTH
NON-COMPOSITE
36" ADJACENT BOX BEAMS
WITH STRAIGHT STRANDS

MDP	SFW	MAC	RSC	DATE 12/20/02