

DESIGN NOTES

1. DESIGN SPECIFICATIONS: "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1992 AND THE OHIO "SUPPLEMENT" TO THESE SPECIFICATIONS.

2. DESIGN DATA:

DESIGN LOADING - HS20-44 AND THE ALTERNATE MILITARY LOADING
 SUPERIMPOSED DEAD LOAD 270 LBS. PER LIN. FT.
 DIAPHRAGM WEIGHT IS BASED ON 3'-0" LONG DIAPHRAGMS.

CONCRETE - MIN. COMPRESSIVE STRENGTH AT 28 DAYS $f'_c = 5500$ P.S.I.
 MIN. COMPRESSIVE STRENGTH AT TIME OF INITIAL PRESTRESS $f'_c = 4000$ P.S.I.

REINFORCING STEEL - ASTM A615, A616 OR A617 GRADE 60 UNIT STRESS 24,000 P.S.I.

PRESTRESSING STEEL - ASTM 416 GRADE 270, $\frac{1}{8}$ " DIAMETER, SEVEN-WIRE, UNCOATED, LOW-RELAXATION STRANDS

$A_s = .153$ SQ. IN.
 $f_s = 270,000$ P.S.I.
 INITIAL STRESS $0.75 f_s = 202,500$ P.S.I.
 INITIAL TENSION LOAD = 30,982 LBS./STRAND
 STRESS AT RELEASE = $0.69 f_s = 186,300$ P.S.I. (ASSUMED AT SECTION OF MAX. MOMENT)

3. PRESTRESS LOSSES HAVE BEEN COMPUTED IN ACCORDANCE WITH ARTICLE 9.16. TOTAL LOSSES DETERMINED BY THIS METHOD MAY BE EXPRESSED AS $\Delta f_s = SH + ES + CR_c + CR_s$. BY SUBSTITUTING APPROPRIATE VALUES THIS EQUATION BECOMES $\Delta f_s = 11.175 + 17.98 f_{pr} - 6.65 f_{ps}$, WHICH IS THE EQUATION FOR TOTAL LOSSES USED FOR THESE DESIGNS.

4. INTERMEDIATE DIAPHRAGMS: BEAMS ARE DESIGNED FOR 3 FT. LONG DIAPHRAGMS.

SPAN $<$ 50 FT. ONE DIAPHRAGM
 50 FT. $<$ SPAN $<$ 75 FT. TWO DIAPHRAGMS
 75 FT. $<$ SPAN THREE DIAPHRAGMS

5. INITIAL CAMBER GIVEN IS AT TIME OF TRANSFER OF STRESS AND INCLUDES DEFLECTION DUE TO WEIGHT OF BEAM BUT DOES NOT INCLUDE AN ALLOWANCE FOR CREEP.

6. REFERENCE SHALL BE MADE TO STANDARD DRAWING PSBD-I-93 FOR DETAILS OF BEAMS.

7. THIS DRAWING PROVIDES INFORMATION FOR THE DESIGNER AND IS NOT INTENDED FOR USE AS A STANDARD DRAWING.

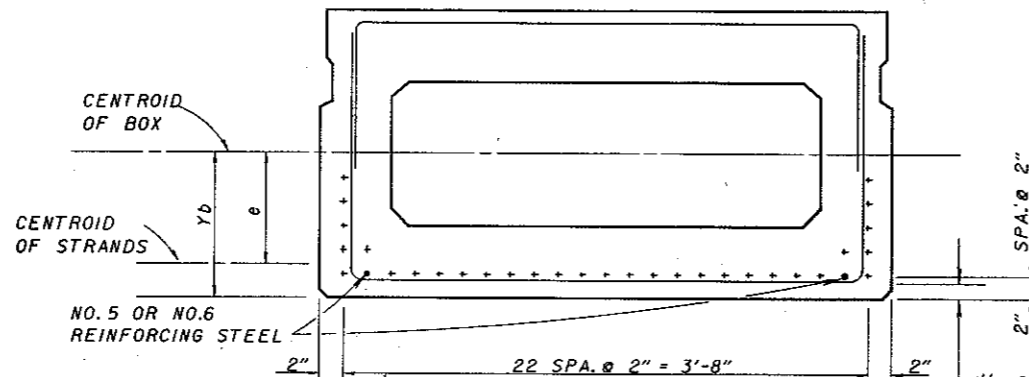
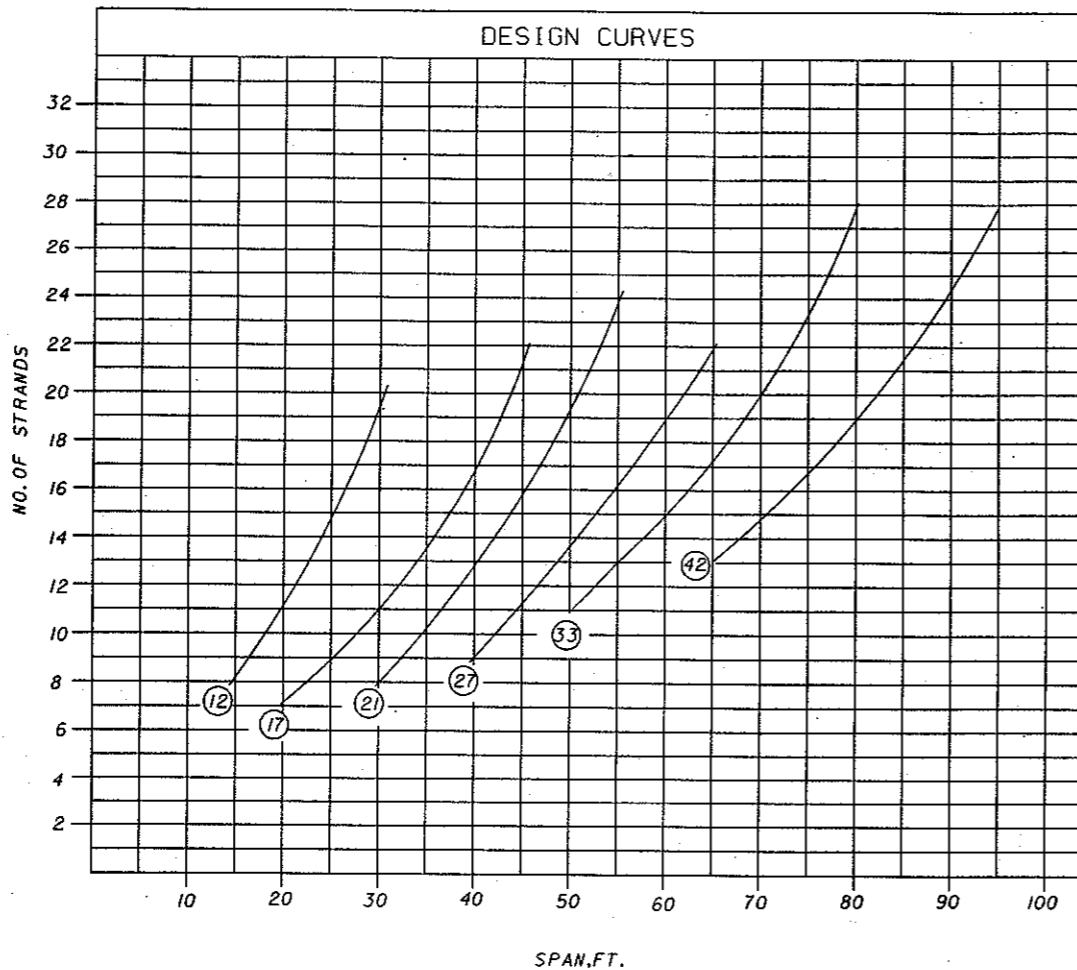
8. ROADWAY WIDTH: THE BEAMS ON THIS SHEET ARE DESIGNED FOR A ROADWAY WIDTH OF 24 FT. BETWEEN FACE OF CURBS, FACE OF GUARDRAILS FOR BRIDGES WITHOUT CURBS, AND TOE OF PARAPETS. THE BEAM DESIGNS ON THIS SHEET SHALL ALSO BE USED FOR THE FOLLOWING ROADWAY WIDTHS:

- GROUP A
 24 FT. TO BUT NOT INCLUDING 28 FT.
 36 FT. TO BUT NOT INCLUDING 40 FT.
 48 FT. TO BUT NOT INCLUDING 52 FT.
 60 FT. TO BUT NOT INCLUDING 68 FT.
 72 FT.

36" WIDE BEAMS USED IN THE SAME STRUCTURE WITH THE BEAM DESIGNS ON THIS SHEET, SHALL ALSO BE DESIGNED FOR A ROADWAY WIDTH OF 24 FT.

9. 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. 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.

10. 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.



TYPICAL STRAND LOCATION

STRANDS SHALL BE DISTRIBUTED OVER THE BEAM WIDTH AS EVENLY AS POSSIBLE. STRAND PATTERN AND THE DEBONDED LENGTHS SHALL BE SYMMETRICAL ABOUT VERTICAL 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. ANY ADDITIONAL REQUIRED BOTTOM REINFORCING BARS SHALL BE DISTRIBUTED SYMMETRICAL OVER THE BEAM WIDTH. A LAP 3'-3" FOR #5 AND 4'-0" FOR #6 BARS SHOULD BE PROVIDED WITHIN THE OUTER QUARTER OF THE SPAN, IF NEEDED. NO TACK WELDING OF THE BOTTOM #5 OR #6 BARS WILL BE PERMITTED.

DESIGN DATA

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			INITIAL CAMBER IN.	
				2"	4"	6"	8"	10"	1'-6"	2'-6"	3'-6"	4'-6"	5'-6"	6'-6"	NO.	SIZE	FULL LENGTH NO.	SIZE	ADDITIONAL BARS EACH END NO.	LENGTH		
B12-48	15	3.97	8	8											8	5	6	4				.11
	20	3.97	11	11											6	5	7	4				.26
	25	3.44	15	11	4					2					4	5	7	4				.43
	30	3.57	20	16	4					2	2	2			2	5	7	4				.85
B17-48	20	6.55	7	7											6	5	6	4				.10
	25	6.55	9	9											4	5	6	4				.20
	30	6.55	11	11											2	5	6	4	1	4		.32
	35	6.55	13	13											2	5	6	4	2	4	7'-3"	.48
	40	6.55	17	17						2	2				2	5	6	4	2	4	9'-6"	.83
45	6.37	22	20	2					2	2				2	5	6	4	3	4	11'-0"	1.32	
B21-48	30	8.57	8	8											2	5	6	4				.16
	35	8.57	10	10											2	5	6	4	1	4		.26
	40	8.57	13	13											2	5	6	4	3	4	7'-0"	.44
	45	8.57	16	16						2					2	5	6	4	4	4	8'-9"	.68
	50	8.57	19	19						2	2				2	5	6	4	4	4	10'-3"	.96
	55	8.24	24	20	4					2	2				2	5	6	4	4	4	11'-0"	1.32
B27-48	40	11.61	9	9											2	6	4	5				.18
	45	11.61	11	11											2	6	4	5	1	5	5'-3"	.27
	50	11.61	14	14											2	6	4	5	3	5	7'-0"	.44
	55	11.61	16	16											2	6	4	5	4	5	7'-9"	.50
	60	11.61	19	19						2					2	6	4	5	4	5	9'-3"	.71
65	11.43	22	20	2					2	2				2	6	4	5	4	5	10'-3"	.93	
B33-48	50	14.61	11	11											2	6	4	5	2	5	5'-3"	.24
	55	14.61	13	13											2	6	4	5	3	5	6'-3"	.27
	60	14.61	15	15											2	6	4	5	4	5	7'-3"	.36
	65	14.61	17	17											2	6	4	5	5	5	8'-3"	.45
	70	14.61	19	19											2	6	4	5	6	5	9'-3"	.56
	75	14.43	22	20	2					2					2	6	4	5	6	5	10'-3"	.74
80	13.99	26	20	4	2				2	2				2	6	4	5	5	5	10'-6"	.91	
B42-48	65	19.13	13	13											2	6	4	5	4	5	6'-6"	.17
	70	19.13	15	15											2	6	4	5	6	5	7'-6"	.24
	75	19.13	17	17											2	6	4	5	7	5	8'-9"	.31
	80	19.13	19	19											2	6	4	5	8	5	9'-3"	.32
	85	18.95	22	20	2					2					2	6	4	5	9	5	10'-6"	.45
	90	18.80	24	20	4					2					2	6	4	5	9	5	11'-0"	.50
	95	18.13	28	20	4	2	2			2					2	6	4	5	9	5	11'-6"	.67

SECTION PROPERTIES					
BOX	A IN. ²	I IN. ⁴	Yb IN.	Zt IN. ³	Zb IN. ³
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 BUREAU OF BRIDGES AND STRUCTURAL DESIGN				1/5
	DESIGN DATA FOR PRESTRESSED CONCRETE BRIDGE				
	GROUP A ROADWAY WIDTH NON-COMPOSITE 48" ADJACENT BOX BEAMS WITH STRAIGHT STRANDS				
	DESIGNED MRC	DRAWN SEM	CHECKED SEM	REVIEWED LMW	