

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 $f'_i = 4000$ 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, 1/2" 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 $\Delta f_s = SH \cdot ES \cdot CR_c + CR_s$. BY SUBSTITUTING APPROPRIATE VALUES THIS EQUATION BECOMES $\Delta f_s = 11.75 \cdot 17.98 f_{cr} - 6.65 f_{cds}$ 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-1-93 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 52 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 B

28 FT. TO BUT NOT INCLUDING 32 FT.

40 FT. TO BUT NOT INCLUDING 44 FT.

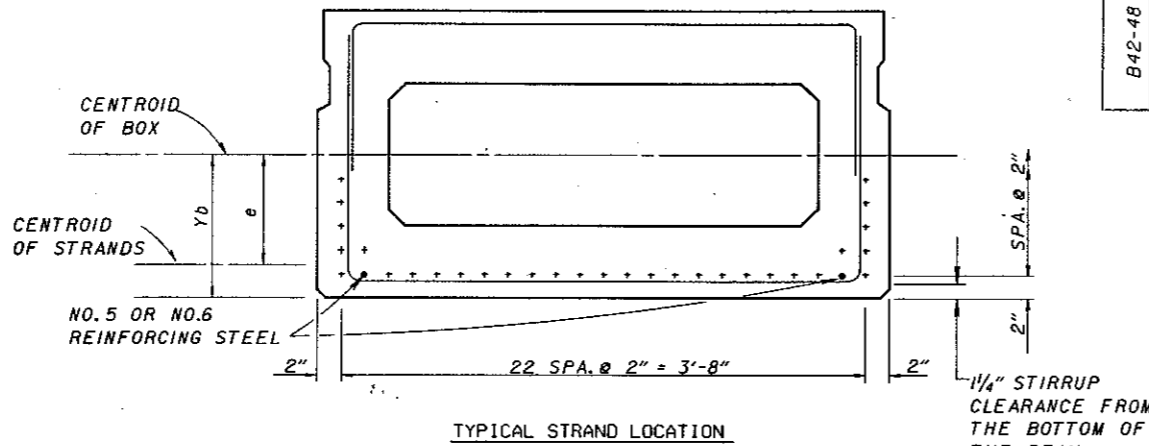
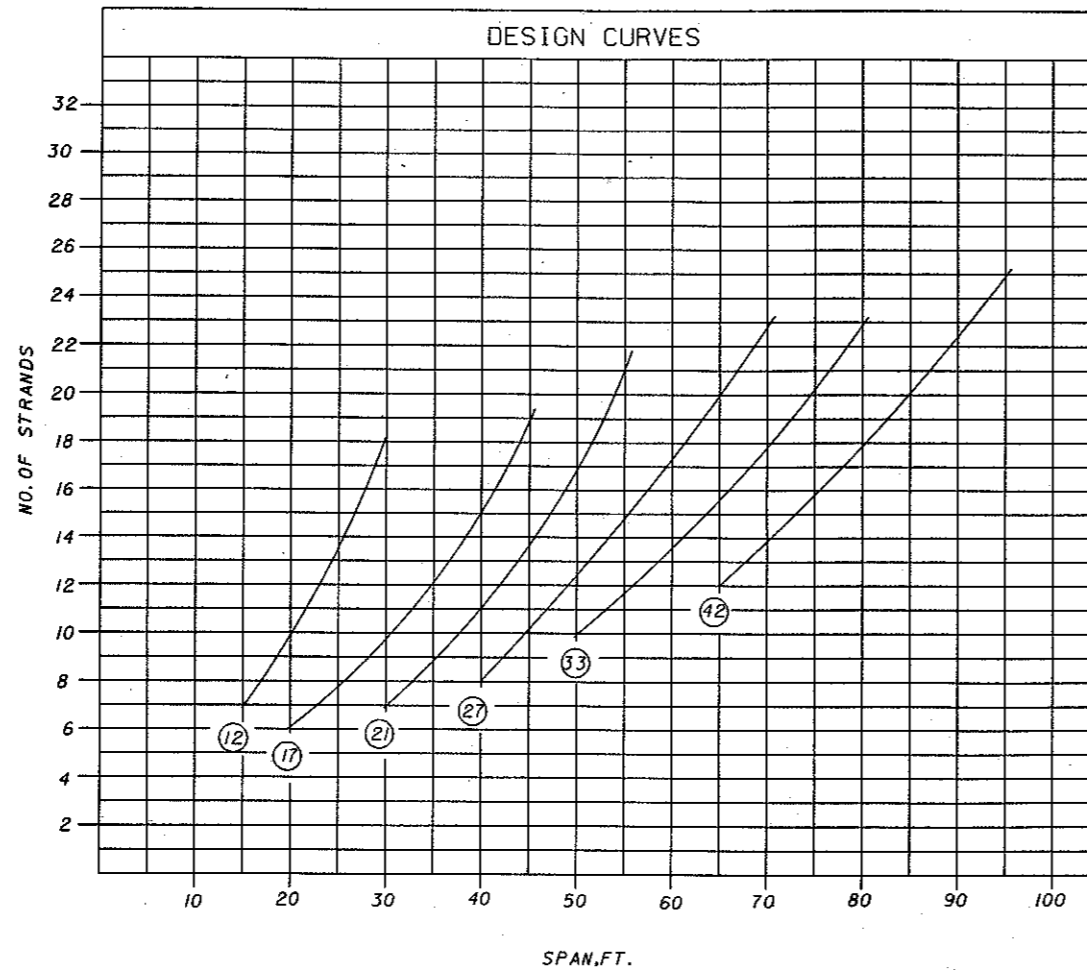
52 FT. TO BUT NOT INCLUDING 58 FT.

68 FT. TO BUT NOT INCLUDING 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.



STRANDS SHALL BE DISTRIBUTED OVER THE BEAM WIDTH AS EVENLY AS POSSIBLE. STRAND PATTERN AND THE DEBONDED LENGTHS SHALL BE SYMMETRICAL ABOUT VERTICAL ϵ 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 SYMMETRICALLY 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.

BOX	SPAN c/c BRG. FT.	MID-SPAN e IN.	NO. OF STRANDS	STRAND LOCATION FROM BOTTOM OF BOX												TENSILE BARS AT BOTTOM		TENSILE BARS AT TOP				INITIAL CAMBER IN.
				NUMBER AND LENGTH OF STRANDS DEBONDED		FULL LENGTH		ADDITIONAL BARS EACH END		NO.	SIZE	NO.	SIZE	NO.	LENGTH							
				1'-6"	2'-6"	3'-6"	4'-6"	5'-6"	6'-6"							NO.	SIZE	NO.	SIZE	NO.	LENGTH	
B12-48	15	3.97	7	7											8	5	6	4	-	-	-	.10
	20	3.97	10	10						2					6	5	7	4	-	-	-	.23
	25	3.40	14	10	4										4	5	7	4	-	-	-	.38
	30	3.53	18	14	4						2	2			2	5	7	4	-	-	-	.71
B17-48	20	6.55	6	6											6	5	6	4	-	-	-	.09
	25	6.55	8	8											4	5	6	4	-	-	-	.17
	30	6.55	10	10											2	5	6	4	-	-	-	.28
	35	6.55	12	12											2	5	6	4	2	4	6'-6"	.43
	40	6.55	15	15							2				2	5	6	4	2	4	8'-0"	.68
B21-48	45	6.55	19	19							2	2	2		2	5	6	4	2	4	10'-0"	1.08
	30	8.57	7	7											2	5	6	4	-	-	-	.13
	35	8.57	9	9											2	5	6	4	-	-	-	.22
	40	8.57	11	11											2	5	6	4	2	4	5'-6"	.33
	45	8.57	14	14											2	5	6	4	4	4	7'-6"	.53
	50	8.57	17	17								2			2	5	6	4	4	4	9'-0"	.79
B27-48	55	8.38	21	19	2							2	2		2	5	6	4	4	4	9'-3"	1.05
	40	11.61	8	8											2	6	4	5	-	-	-	.14
	45	11.61	10	10											2	6	4	5	1	5	4'-6"	.22
	50	11.61	12	12											2	6	4	5	2	5	5'-9"	.32
	55	11.61	15	15											2	6	4	5	3	5	7'-3"	.43
	60	11.61	17	17											2	6	4	5	4	5	8'-3"	.54
	65	11.61	20	20									2		2	6	4	5	4	5	9'-6"	.76
70	11.26	23	19	4									2	2	6	4	5	4	5	10'-0"	.93	
B33-48	50	14.61	10	10											2	6	4	5	1	5	4'-6"	.19
	55	14.61	12	12											2	6	4	5	2	5	5'-6"	.21
	60	14.61	14	14											2	6	4	5	3	5	6'-9"	.29
	65	14.61	16	16											2	6	4	5	4	5	7'-9"	.38
	70	14.61	18	18											2	6	4	5	5	5	8'-9"	.47
	75	14.61	20	20											2	6	4	5	6	5	9'-6"	.56
B42-48	80	14.26	23	19	4								2		2	6	4	5	6	5	10'-0"	.62
	65	19.13	12	12											2	6	4	5	4	5	6'-0"	.12
	70	19.13	14	14											2	6	4	5	5	5	7'-0"	.17
	75	19.13	16	16											2	6	4	5	6	5	8'-0"	.23
	80	19.13	18	18											2	6	4	5	7	5	8'-9"	.24
B42-48	85	19.13	20	20											2	6	4	5	9	5	9'-9"	.29
	90	18.95	22	20	2										2	6	4	5	9	5	10'-6"	.31
	95	18.49	25	19	4	2									2	6	4	5	8	5	11'-0"	.39

BOX	SECTION PROPERTIES				
	A IN. ²	I IN. ⁴	Y_b IN.	Z_t IN. ³	Z_b 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

DESIGNED	DRAWN	CHECKED	REVIEWED
MRG	SEM	SEM	LMW

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

DESIGN DATA FOR
PRESTRESSED CONCRETE BRIDGE
GROUP B ROADWAY WIDTH
NON-COMPOSITE
48' ADJACENT BOX BEAMS
WITH STRAIGHT STRANDS

REVISIONS: 2/5