

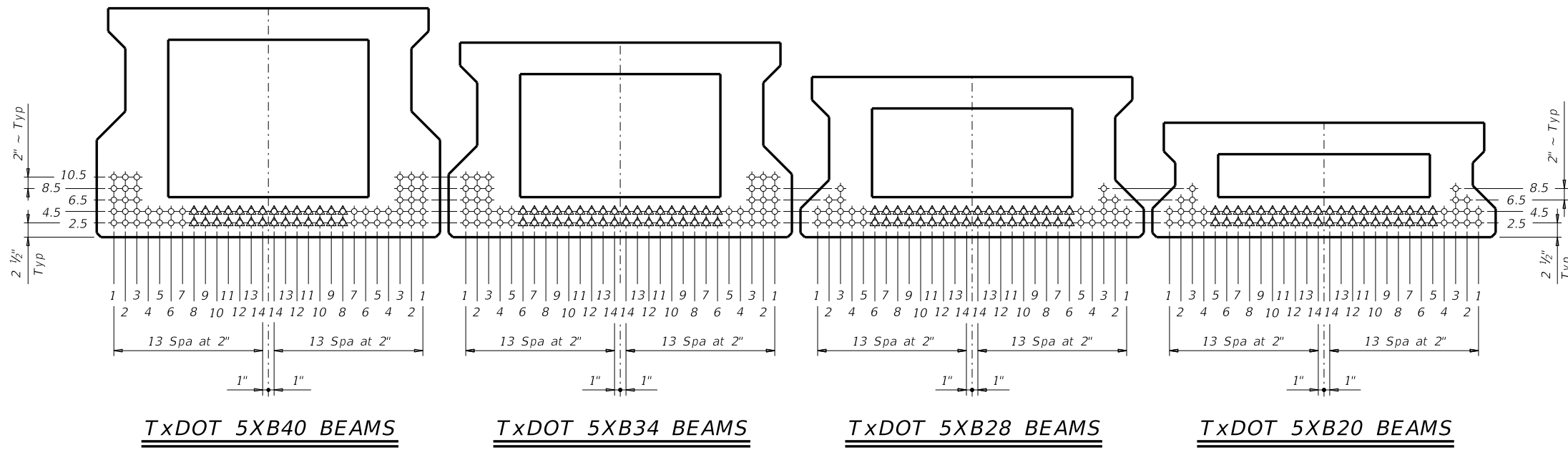
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STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																OPTIONAL DESIGN								
	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS						DEBONDED STRAND PATTERN PER ROW						CONCRETE		DESIGN LOAD COMP STRESS (TOP ϵ) (SERVICE I)	DESIGN TENSILE STRESS (BOT ϵ) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR				
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" $\bar{\epsilon}$ (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)							RELEASE STRGTH f_{ci} (ksi)	MINIMUM 28 DAY COMP STRGTH f_c (ksi)	②		
												TOTAL	DE-BONDED	3	6	9	12				15	①	f_{ci}	f_c	Moment
TYPE 5XB20 X-BEAMS 38' Roadway 8" Slab	40	ALL	5XB20		10	0.6	270	7.03	7.03	0	2.50	10	0	0	0	0	0	4.000	5.000	1.197	-1.547	1185	0.649	0.853	
45	ALL	5XB20		14	0.6	270	7.03	7.03	0	2.50	14	0	0	0	0	0	4.000	5.000	1.512	-1.907	1415	0.630	0.847		
50	ALL	5XB20		18	0.6	270	7.03	7.03	0	2.50	18	0	0	0	0	0	4.000	5.000	1.870	-2.322	1689	0.613	0.842		
55	ALL	5XB20		22	0.6	270	7.03	7.03	2	2.50	22	2	2	0	0	0	4.000	5.000	2.264	-2.770	1975	0.598	0.838		
60	ALL	5XB20		28	0.6	270	7.03	7.03	6	2.50	28	6	2	2	2	0	4.100	5.000	2.693	-3.251	2274	0.584	0.835		
65	ALL	5XB20		34	0.6	270	6.68	6.57	8	2.50	28	8	2	2	2	0	4.600	5.000	3.159	-3.767	2588	0.572	0.831		
TYPE 5XB28 X-BEAMS 38' Roadway 8" Slab	40	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	4.000	5.000	0.780	-0.976	1651	0.678	0.896	
45	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	4.000	5.000	0.979	-1.197	1787	0.658	0.891		
50	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	4.000	5.000	1.206	-1.454	1768	0.640	0.887		
55	ALL	5XB28		14	0.6	270	10.63	10.63	0	2.50	14	0	0	0	0	0	4.000	5.000	1.455	-1.730	2068	0.624	0.883		
60	ALL	5XB28		18	0.6	270	10.63	10.63	0	2.50	18	0	0	0	0	0	4.000	5.000	1.726	-2.026	2382	0.610	0.880		
65	ALL	5XB28		20	0.6	270	10.63	10.63	0	2.50	20	0	0	0	0	0	4.000	5.000	2.019	-2.343	2713	0.598	0.877		
70	ALL	5XB28		24	0.6	270	10.63	10.63	0	2.50	24	0	0	0	0	0	4.000	5.000	2.334	-2.678	3056	0.586	0.875		
75	ALL	5XB28		30	0.6	270	10.50	10.46	6	2.50	28	6	2	2	2	0	4.000	5.000	2.671	-3.036	3417	0.576	0.873		
80	ALL	5XB28		34	0.6	270	10.28	10.17	8	2.50	28	8	2	2	0	2	4.200	5.000	3.030	-3.414	3794	0.567	0.871		
85	ALL	5XB28		40	0.6	270	10.03	9.88	8	2.50	28	8	0	2	2	2	4.700	5.100	3.411	-3.811	4184	0.558	0.869		
TYPE 5XB34 X-BEAMS 38' Roadway 8" Slab	40	ALL	5XB34		10	0.6	270	13.11	13.11	0	2.50	10	0	0	0	0	0	4.000	5.000	0.642	-0.743	1721	0.695	0.923	
45	ALL	5XB34		12	0.6	270	13.11	13.11	0	2.50	12	0	0	0	0	0	4.000	5.000	0.803	-0.911	2057	0.674	0.919		
50	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	4.000	5.000	0.988	-1.106	2454	0.655	0.915		
55	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	4.000	5.000	1.190	-1.317	2425	0.639	0.911		
60	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	4.000	5.000	1.409	-1.543	2492	0.625	0.908		
65	ALL	5XB34		16	0.6	270	13.11	13.11	0	2.50	16	0	0	0	0	0	4.000	5.000	1.646	-1.783	2838	0.612	0.906		
70	ALL	5XB34		20	0.6	270	13.11	13.11	0	2.50	20	0	0	0	0	0	4.000	5.000	1.901	-2.040	3202	0.601	0.904		
75	ALL	5XB34		24	0.6	270	13.11	13.11	0	2.50	24	0	0	0	0	0	4.000	5.000	2.173	-2.312	3580	0.590	0.902		
80	ALL	5XB34		28	0.6	270	13.11	13.11	4	2.50	28	4	2	2	0	0	4.000	5.000	2.463	-2.600	3979	0.581	0.901		
85	ALL	5XB34		32	0.6	270	12.86	12.80	6	2.50	28	6	2	4	0	0	4.000	5.000	2.771	-2.904	4392	0.572	0.899		
90	ALL	5XB34		36	0.6	270	12.66	12.54	8	2.50	28	8	2	2	2	0	4.000	5.000	3.096	-3.222	4819	0.563	0.898		
95	ALL	5XB34		42	0.6	270	12.44	12.23	10	2.50	28	10	2	2	2	2	4.300	5.000	3.439	-3.557	5269	0.556	0.897		
100	ALL	5XB34		46	0.6	270	12.32	12.11	10	2.50	28	10	2	4	0	2	4.900	5.600	3.799	-3.907	5730	0.548	0.896		
TYPE 5XB40 X-BEAMS 38' Roadway 8" Slab	40	ALL	5XB40		10	0.6	270	15.70	15.70	0	2.50	10	0	0	0	0	0	4.000	5.000	0.547	-0.602	1787	0.709	0.947	
45	ALL	5XB40		10	0.6	270	15.70	15.70	0	2.50	10	0	0	0	0	0	4.000	5.000	0.684	-0.740	2138	0.688	0.943		
50	ALL	5XB40		12	0.6	270	15.70	15.70	0	2.50	12	0	0	0	0	0	4.000	5.000	0.840	-0.898	2555	0.669	0.939		
55	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	4.000	5.000	1.011	-1.070	2992	0.653	0.936		
60	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	4.000	5.000	1.196	-1.253	2937	0.638	0.934		
65	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	4.000	5.000	1.396	-1.449	2960	0.625	0.932		
70	ALL	5XB40		16	0.6	270	15.70	15.70	0	2.50	16	0	0	0	0	0	4.000	5.000	1.611	-1.658	3340	0.613	0.930		
75	ALL	5XB40		20	0.6	270	15.70	15.70	0	2.50	20	0	0	0	0	0	4.000	5.000	1.840	-1.880	3738	0.602	0.928		
80	ALL	5XB40		22	0.6	270	15.70	15.70	0	2.50	22	0	0	0	0	0	4.000	5.000	2.084	-2.114	4154	0.592	0.927		
85	ALL	5XB40		26	0.6	270	15.70	15.70	2	2.50	26	2	2	0	0	0	4.000	5.000	2.343	-2.361	4588	0.583	0.926		
90	ALL	5XB40		30	0.6	270	15.57	15.54	6	2.50	28	6	2	4	0	0	4.000	5.000	2.616	-2.622	5043	0.575	0.925		
95	ALL	5XB40		34	0.6	270	15.35	15.24	8	2.50	28	8	2	6	0	0	4.000	5.000	2.905	-2.894	5513	0.567	0.925		
100	ALL	5XB40		40	0.6	270	15.10	14.85	12	2.50	28	12	2	6	2	2	4.000	5.000	3.208	-3.181	6003	0.560	0.924		
105	ALL	5XB40		44	0.6	270	14.98	14.64	14	2.50	28	14	2	6	2	2	4.100	5.000	3.526	-3.479	6511	0.553	0.924		

DESIGN NOTES:
 Designed in accordance with AASHTO LRFD Bridge Design Specifications.
 Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.
 Beam designs are applicable for 8" concrete slabs without overlay and 0 through 30 degree skews.

FABRICATION NOTES:
 Provide Class H concrete.
 Provide Grade 60 reinforcing steel bars.
 Use low relaxation strands, each pretensioned to 75 percent of fpu.
 When shown on this sheet, the fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
 Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:
 1) Locate a strand in each "1" position.
 2) Place strand symmetrically about vertical centerline of box.
 3) Space strands as equally as possible across the entire width.
 Strand debonding must comply with Item 424.4.2.2.4.
 Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.
 Full-length debonded strands are only permitted in positions marked Δ .

- ① Based on the following allowable stresses (ksi):
 Compression = $0.65 f'_{ci}$
 Tension = $0.24 \sqrt{f'_{ci}}$
 Optional designs must likewise conform.
 ② Portion of full HL93.



HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM STANDARD DESIGNS 38' ROADWAY XBSD-38

FILE: xbstds50.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
© TxDOT REVISIONS 01-16: Notes, 0.6" strand designs.	CONT	SECT	JOB	HIGHWAY
DIST	COUNTY			SHEET NO.

DATE:
FILE: