

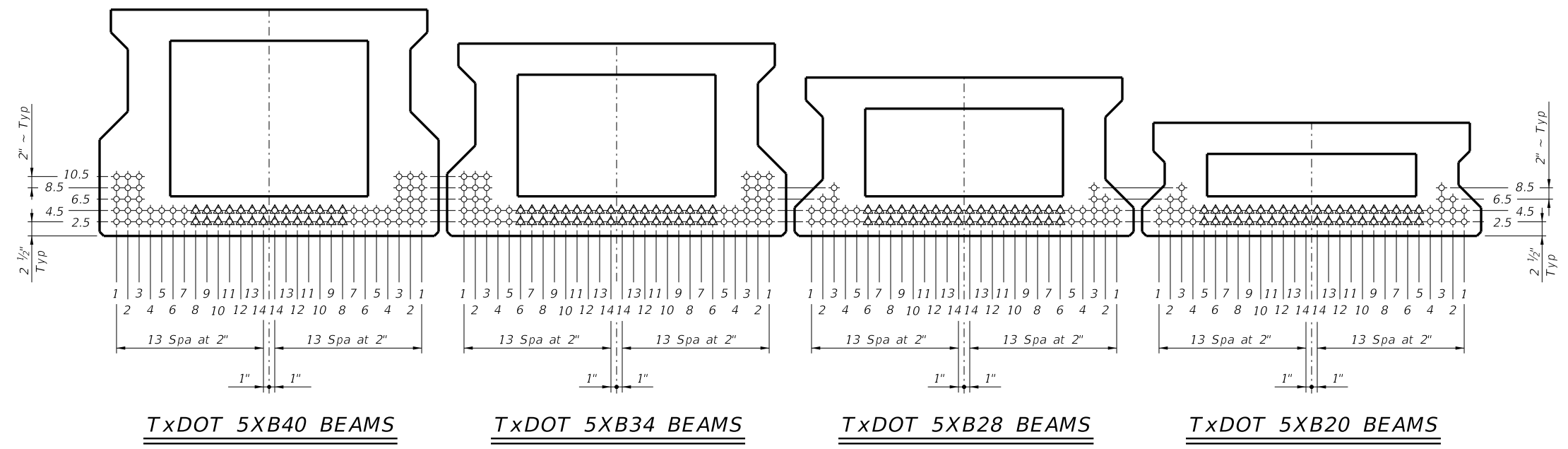
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STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																			OPTIONAL DESIGN					LOAD RATING FACTORS			
	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS							DEBONDED STRAND PATTERN PER ROW					CONCRETE		DESIGN LOAD COMP STRESS (TOP $\bar{\epsilon}$) (SERVICE I)	DESIGN TENSILE STRESS (BOT $\bar{\epsilon}$) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR		STRENGTH I			SERVICE III		
				NOV-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH (ksi)	"e" (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)							RELEASE STRENGTH (1) f'_{ci} (ksi)	MINIMUM 28 DAY COMP STRGTH f'_c (ksi)	②		Inv	Opr	Inv	
												TOTAL	DE-BONDED	3	6	9	12						15	Moment				Shear
Type 5XB20 X-BEAMS 44' Roadway 8.5" Slab	40	ALL	5XB20		12	0.6	270	7.03	7.03	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.271	-1.597	1206	0.626	0.823	1.37	1.78	1.40
	45	ALL	5XB20		14	0.6	270	7.03	7.03	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.610	-1.975	1422	0.607	0.817	1.31	1.69	1.09
	50	ALL	5XB20		18	0.6	270	7.03	7.03	0	2.50	18	0	0	0	0	0	0	4.000	5.000	1.970	-2.387	1690	0.590	0.813	1.44	1.87	1.07
	55	ALL	5XB20		24	0.6	270	7.03	7.03	4	2.50	24	4	4	0	0	0	0	4.000	5.000	2.376	-2.844	1976	0.576	0.809	1.67	2.16	1.16
	60	ALL	5XB20		28	0.6	270	7.03	7.03	6	2.50	28	6	2	2	2	0	0	4.100	5.000	2.817	-3.332	2275	0.563	0.805	1.66	2.16	1.02
65	ALL	5XB20		36	0.6	270	6.59	6.50	6	2.50	28	6	2	0	2	2	0	0	4.900	5.100	3.316	-3.874	2594	0.551	0.803	1.61	2.13	1.11
Type 5XB28 X-BEAMS 44' Roadway 8.5" Slab	40	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.821	-1.004	1653	0.653	0.865	1.89	2.45	2.64
	45	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.035	-1.236	1791	0.634	0.860	1.49	1.93	1.90
	50	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.277	-1.503	1778	0.616	0.856	1.15	1.49	1.27
	55	ALL	5XB28		14	0.6	270	10.63	10.63	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.543	-1.793	2084	0.601	0.853	1.14	1.47	1.06
	60	ALL	5XB28		18	0.6	270	10.63	10.63	0	2.50	18	0	0	0	0	0	0	4.000	5.000	1.813	-2.087	2393	0.588	0.850	1.35	1.74	1.16
	65	ALL	5XB28		22	0.6	270	10.63	10.63	0	2.50	22	0	0	0	0	0	0	4.000	5.000	2.123	-2.417	2728	0.576	0.848	1.48	1.92	1.15
	70	ALL	5XB28		26	0.6	270	10.63	10.63	2	2.50	26	2	2	0	0	0	0	4.000	5.000	2.430	-2.744	3061	0.565	0.845	1.56	2.03	1.12
	75	ALL	5XB28		30	0.6	270	10.50	10.48	4	2.50	28	4	2	0	2	0	0	4.000	5.000	2.790	-3.119	3430	0.555	0.844	1.59	2.07	1.02
	80	ALL	5XB28		36	0.6	270	10.19	10.06	8	2.50	28	8	2	2	2	0	2	4.300	5.000	3.212	-3.550	3839	0.546	0.842	1.59	2.13	1.01
	85	ALL	5XB28		42	0.6	270	9.96	9.81	8	2.50	28	8	2	2	0	2	2	4.900	5.500	3.603	-3.955	4232	0.538	0.841	1.53	2.06	1.07
Type 5XB34 X-BEAMS 44' Roadway 8.5" Slab	40	ALL	5XB34		10	0.6	270	13.11	13.11	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.660	-0.764	1732	0.670	0.892	1.77	2.29	2.96
	45	ALL	5XB34		12	0.6	270	13.11	13.11	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.853	-0.947	2074	0.649	0.887	1.78	2.31	2.61
	50	ALL	5XB34		12	0.6	270	13.11	13.11	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.051	-1.153	2258	0.632	0.883	1.39	1.81	1.87
	55	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.268	-1.375	2420	0.616	0.880	1.39	1.80	1.64
	60	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.504	-1.614	2528	0.602	0.878	1.10	1.42	1.11
	65	ALL	5XB34		18	0.6	270	13.11	13.11	0	2.50	18	0	0	0	0	0	0	4.000	5.000	1.743	-1.855	2871	0.590	0.876	1.34	1.74	1.24
	70	ALL	5XB34		20	0.6	270	13.11	13.11	0	2.50	20	0	0	0	0	0	0	4.000	5.000	2.015	-2.126	3243	0.579	0.874	1.30	1.68	1.04
	75	ALL	5XB34		24	0.6	270	13.11	13.11	0	2.50	24	0	0	0	0	0	0	4.000	5.000	2.283	-2.393	3613	0.569	0.873	1.46	1.89	1.09
	80	ALL	5XB34		28	0.6	270	13.11	13.11	4	2.50	28	4	2	2	0	0	0	4.000	5.000	2.590	-2.693	4016	0.559	0.871	1.55	2.01	1.05
	85	ALL	5XB34		34	0.6	270	12.75	12.68	6	2.50	28	6	2	2	2	0	0	4.000	5.000	2.923	-3.017	4446	0.551	0.870	1.72	2.23	1.11
	90	ALL	5XB34		38	0.6	270	12.58	12.44	8	2.50	28	8	2	2	2	0	2	4.000	5.000	3.255	-3.341	4875	0.543	0.869	1.63	2.17	1.01
	95	ALL	5XB34		44	0.6	270	12.38	12.17	10	2.50	28	10	2	2	2	2	2	4.500	5.500	3.641	-3.711	5350	0.535	0.869	1.57	2.10	1.07
	100	ALL	5XB34		48	0.6	270	12.27	12.05	10	2.50	28	10	2	2	2	2	2	4.900	6.100	4.025	-4.080	5828	0.528	0.868	1.53	2.06	1.00
Type 5XB40 X-BEAMS 44' Roadway 8.5" Slab	40	ALL	5XB40		10	0.6	270	15.70	15.70	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.561	-0.619	1797	0.683	0.915	2.05	2.66	3.72
	45	ALL	5XB40		12	0.6	270	15.70	15.70	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.723	-0.768	2155	0.662	0.911	2.07	2.68	3.31
	50	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000	0.890	-0.936	2583	0.645	0.908	2.04	2.64	2.95
	55	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.073	-1.117	2993	0.629	0.905	1.64	2.12	2.21
	60	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.261	-1.302	2934	0.615	0.903	1.32	1.71	1.63
	65	ALL	5XB40		16	0.6	270	15.70	15.70	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.473	-1.508	3121	0.602	0.901	1.33	1.72	1.45
	70	ALL	5XB40		18	0.6	270	15.70	15.70	0	2.50	18	0	0	0	0	0	0	4.000	5.000	1.702	-1.728	3384	0.591	0.900	1.32	1.71	1.26
	75	ALL	5XB40		20	0.6	270	15.70	15.70	0	2.50	20	0	0	0	0	0	0	4.000	5.000	1.946	-1.961	3792	0.580	0.898	1.29	1.68	1.08
	80	ALL	5XB40		24	0.6	270	15.70	15.70	2	2.50	24	2	2	0	0	0	0	4.000	5.000	2.187	-2.192	4198	0.571	0.897	1.48	1.92	1.14
	85	ALL	5XB40		28	0.6	270	15.70	15.70	4	2.50	28	4	2	2	0	0	0	4.000	5.000	2.460	-2.451	4642	0.562	0.897	1.61	2.09	1.15
	90	ALL	5XB40		32	0.6	270	15.45	15.40	6	2.50	28	6	2	4	0	0	0	4.000	5.000	2.750	-2.724	5106	0.554	0.896	1.68	2.17	1.10
95	ALL	5XB40		36	0.6	270	15.26	15.13	8	2.50	28	8	2	6	0	0	0	4.000	5.000	3.026	-2.985	5554	0.546	0.896	1.73	2.24	1.06	
100	ALL	5XB40		42	0.6	270	15.04	14.77	12	2.50	28	12	2	6	2	0	2	4.000	5.000	3.351	-3.289	6060	0.539	0.895	1.66	2.21	1.10	
105	ALL	5XB40		46	0.6	270	14.92	14.58	14	2.50	28	14	4	4	2	2	2	4.200	5.400	3.708	-3.620	6605	0.533	0.895	1.60	2.13	1.01	
110	ALL	5XB40		52	0.6	270	14.78	14.48	16	2.50	28	14	0	8	2	2	2	4.800	6.000	4.083	-3.966	7167	0.526	0.895	1.58	2.11	1.08	

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.

DESIGN NOTES:
 Designed in accordance with AASHTO LRFD Bridge Design Specifications.
 Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.
 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 1/2" 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 strand 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 . Double wrap full-length debonded strands.



HL93 LOADING

Texas Department of Transportation
 Bridge Division Standard

**PRESTRESSED CONCRETE
 X-BEAM STANDARD DESIGNS
 44' ROADWAY**

XBSD-44

FILE: XB-XBSD44-22.dgn DN: TAR CK: EFC DW: JER CK: TAR
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 DIST COUNTY SHEET NO.

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