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DATE:
FILE:

DESIGNED BEAMS (STRAIGHT STRANDS)

OPTIONAL DESIGN

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in)	NO.OF STRANDS: TOTAL	DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR ②: Moment	Shear
TYPE 5XB20	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	1.221	-1.595	1232	0.679	0.891
X-BEAMS	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	1.544	-1.964	1469	0.658	0.885
40' Roadway	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	1.910	-2.391	1752	0.640	0.879
8" Slab	55	ALL	5XB20		24	0.6	270	7.03	7.03	4	2.50	24	4	2	2	0	0	0	4.000	5.000	2.312	-2.852	2048	0.624	0.875
	60	ALL	5XB20		28	0.6	270	7.03	7.03	6	2.50	28	6	2	2	2	0	0	4.300	5.000	2.752	-3.348	2358	0.610	0.871
	65	ALL	5XB20		36	0.6	270	6.59	6.46	8	2.50	28	8	2	2	2	2	0	4.900	5.000	3.230	-3.880	2685	0.598	0.867
TYPE 5XB28	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	0.794	-1.006	1715	0.709	0.935
X-BEAMS	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	0.997	-1.233	1791	0.687	0.930
40' Roadway	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	1.230	-1.498	1835	0.669	0.925
8" Slab	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	1.484	-1.781	2145	0.652	0.920
	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	1.761	-2.087	2472	0.638	0.917
	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	2.060	-2.412	2813	0.625	0.914
	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	2.382	-2.758	3169	0.613	0.911
	75	ALL	5XB28		30	0.6	270	10.50	10.46	6	2.50	28	6	2	2	2	0	0	4.000	5.000	2.727	-3.125	3540	0.602	0.909
	80	ALL	5XB28		36	0.6	270	10.19	10.06	8	2.50	28	8	2	2	0	2	2	4.300	5.000	3.094	-3.513	3928	0.592	0.907
TYPE 5XB34	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	0.652	-0.765	1785	0.726	0.963
X-BEAMS	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	0.817	-0.938	2132	0.704	0.958
40' Roadway	50	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.006	-1.139	2483	0.685	0.953
8" Slab	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	1.212	-1.355	2430	0.668	0.949
	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	1.435	-1.586	2581	0.653	0.946
	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	1.677	-1.834	2940	0.640	0.943
	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	1.937	-2.098	3315	0.628	0.941
	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	2.215	-2.377	3707	0.617	0.939
	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	2.512	-2.673	4117	0.607	0.937
	85	ALL	5XB34		34	0.6	270	12.75	12.65	8	2.50	28	8	4	2	2	0	0	4.000	5.000	2.825	-2.983	4540	0.597	0.935
	90	ALL	5XB34		38	0.6	270	12.58	12.39	10	2.50	28	10	4	2	0	2	2	4.000	5.000	3.158	-3.311	4987	0.589	0.934
	95	ALL	5XB34		44	0.6	270	12.38	12.17	10	2.50	28	10	2	2	2	2	2	4.600	5.100	3.509	-3.655	5448	0.581	0.933
TYPE 5XB40	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	0.556	-0.619	1852	0.741	0.988
X-BEAMS	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	0.695	-0.760	2214	0.718	0.982
40' Roadway	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	0.854	-0.923	2646	0.699	0.978
8" Slab	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	1.028	-1.099	3003	0.682	0.975
	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	1.217	-1.287	2944	0.667	0.972
	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	1.421	-1.488	3134	0.653	0.969
	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	1.640	-1.703	3456	0.641	0.967
	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	1.873	-1.930	3865	0.629	0.965
	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	2.122	-2.170	4295	0.619	0.964
	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	2.386	-2.424	4744	0.610	0.963
	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	2.665	-2.691	5210	0.601	0.962
	95	ALL	5XB40		36	0.6	270	15.26	15.09	10	2.50	28	10	4	6	0	0	0	4.000	5.000	2.959	-2.969	5692	0.592	0.961
	100	ALL	5XB40		42	0.6	270	15.04	14.77	12	2.50	28	12	2	4	2	2	2	4.000	5.000	3.269	-3.263	6198	0.585	0.960
	105	ALL	5XB40		46	0.6	270	14.92	14.58	14	2.50	28	14	2	6	2	2	2	4.300	5.100	3.594	-3.570	6722	0.578	0.959

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 424.4.2.2.2.4.

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 △.

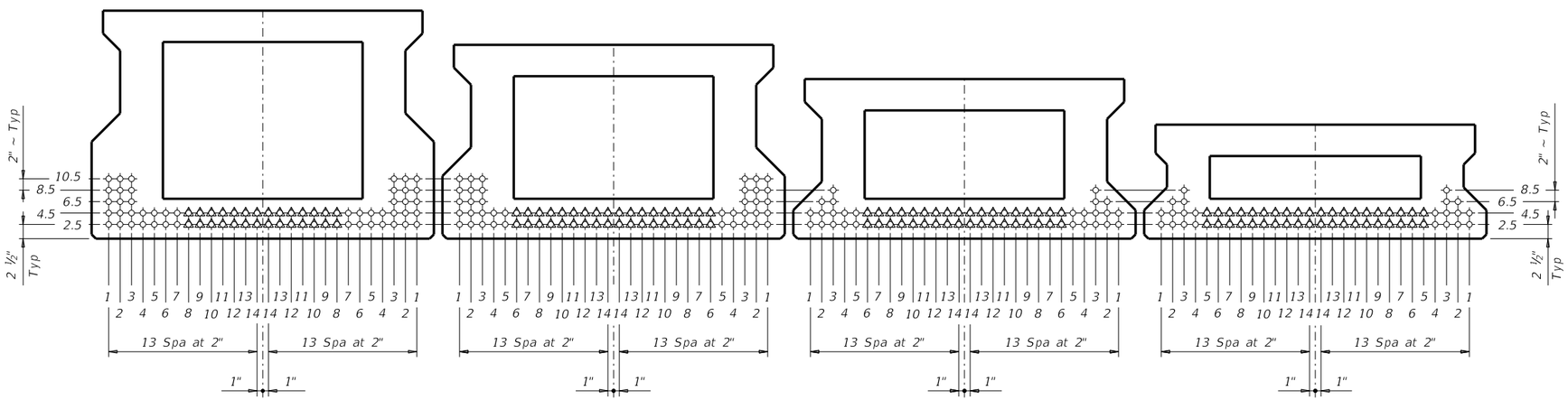
① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

② Portion of full HL93.



TxDOT 5XB40 BEAMS | TxDOT 5XB34 BEAMS | TxDOT 5XB28 BEAMS | TxDOT 5XB20 BEAMS

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM STANDARD DESIGNS

40' ROADWAY

XBSD-40

FILE: xbstds60.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS				
01-16: Notes, 0.6" strand designs.	DIST	COUNTY		SHEET NO.