DATE:
FILE:

DESIGNED BEAMS (STRAIGHT STRANDS)

OPTIONAL DESIGN

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	PRESTRESSING STRANDS: TOT NO. DEB	DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRAND PATTERN PER ROW: NO.OF STRANDS: TOTAL	DEBONDED STRAND PATTERN PER ROW: NO.OF STRANDS: DE-BONDED	DEBONDED STRAND PATTERN PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	CONCRETE: 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	LIVE LOAD DISTRIBUTION FACTOR (2): 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	1.231	-1.621	1255	0.688	0.903
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	1.557	-1.997	1498	0.667	0.897
32' Roadway	50	ALL	5XB20		20	0.6	270	7.03	7.03	0	2.50	20	0	0	0	0	0	0	4.000	5.000	1.926	-2.432	1787	0.649	0.891
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	2.333	-2.901	2090	0.633	0.887
	60	ALL	5XB20		30	0.6	270	6.90	6.87	6	2.50	28	6	2	2	2	0	0	4.400	5.000	2.777	-3.406	2407	0.619	0.883
	65	ALL	5XB20		36	0.6	270	6.59	6.46	8	2.50	28	8	2	2	2	2	0	4.900	5.200	3.259	-3.946	2739	0.606	0.879
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	0.800	-1.023	1748	0.719	0.948
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	1.006	-1.255	1793	0.697	0.942
32' 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	1.240	-1.523	1870	0.678	0.937
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	1.497	-1.812	2187	0.661	0.933
	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	1.777	-2.124	2521	0.647	0.929
	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	2.079	-2.454	2867	0.633	0.926
	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	2.404	-2.807	3231	0.621	0.923
	75	ALL	5XB28		32	0.6	270	10.38	10.32	6	2.50	28	6	0	2	2	2	0	4.000	5.000	2.753	-3.182	3614	0.611	0.921
	80	ALL	5XB28		36	0.6	270	10.19	10.10	6	2.50	28	6	2	2	0	2	0	4.600	5.000	3.124	-3.578	4011	0.601	0.919
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	0.657	-0.777	1818	0.736	0.976
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	0.824	-0.953	2172	0.714	0.971
32' 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	1.014	-1.158	2487	0.695	0.966
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	1.222	-1.378	2432	0.678	0.962
	60	ALL	5XB34		16	0.6	270	13.11	13.11	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.449	-1.614	2632	0.663	0.958
	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	1.693	-1.866	2997	0.649	0.956
	70	ALL	5XB34		22	0.6	270	13.11	13.11	0	2.50	22	0	0	0	0	0	0	4.000	5.000	1.955	-2.134	3381	0.637	0.953
	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	2.236	-2.419	3781	0.626	0.951
	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	2.535	-2.718	4197	0.615	0.949
	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	2.853	-3.036	4634	0.606	0.947
	90	ALL	5XB34		40	0.6	270	12.51	12.31	10	2.50	28	10	2	2	2	2	2	4.200	5.000	3.188	-3.369	5086	0.597	0.946
	95	ALL	5XB34		44	0.6	270	12.38	12.17	10	2.50	28	10	2	2	2	2	2	4.600	5.200	3.542	-3.719	5558	0.589	0.945
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	0.560	-0.629	1886	0.752	1.001
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	0.701	-0.772	2255	0.729	0.996
32' 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	0.861	-0.938	2694	0.709	0.991
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	1.037	-1.117	3007	0.692	0.988
	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	1.227	-1.308	2947	0.676	0.984
	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	1.433	-1.513	3137	0.662	0.982
	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	1.654	-1.731	3521	0.650	0.980
	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	1.890	-1.962	3939	0.638	0.978
	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	2.142	-2.207	4378	0.628	0.976
	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	2.408	-2.464	4834	0.618	0.975
	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	2.690	-2.735	5310	0.609	0.974
	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	2.988	-3.020	5806	0.601	0.973
	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	3.300	-3.318	6319	0.593	0.972
	105	ALL	5XB40		48	0.6	270	14.87	14.58	16	2.50	28	14	2	6	2	0	4	4.500	5.100	3.628	-3.630	6854	0.586	0.971
											4.50	20	2	2	0	0	0	0							

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 △.

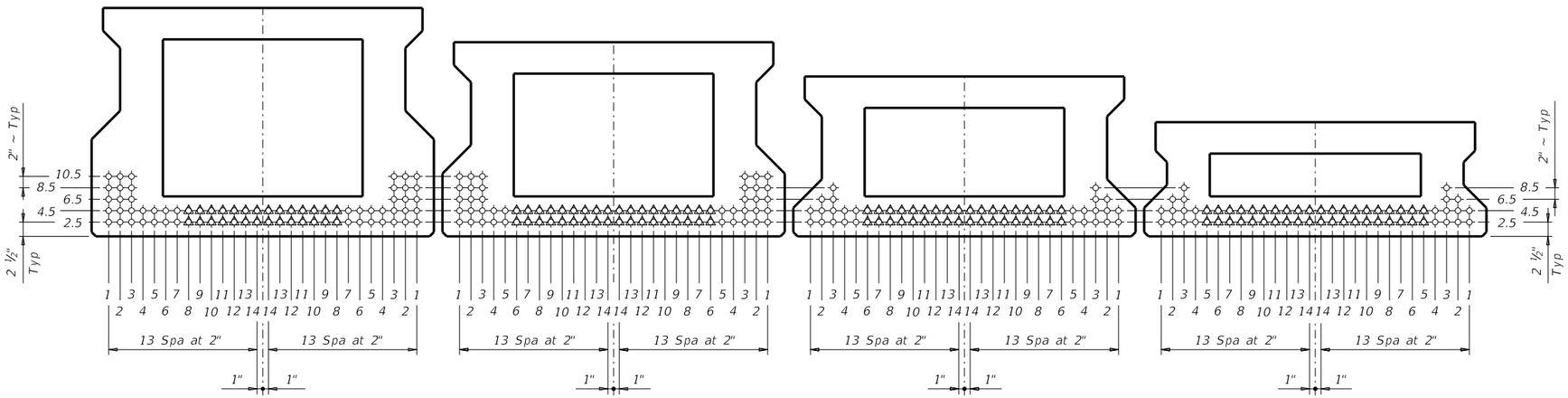
(1) Based on the following allowable stresses (ksi):

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

32' ROADWAY

XBSD-32

FILE: xbstds40.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.
01-16: Notes, 0.6" strand designs.				