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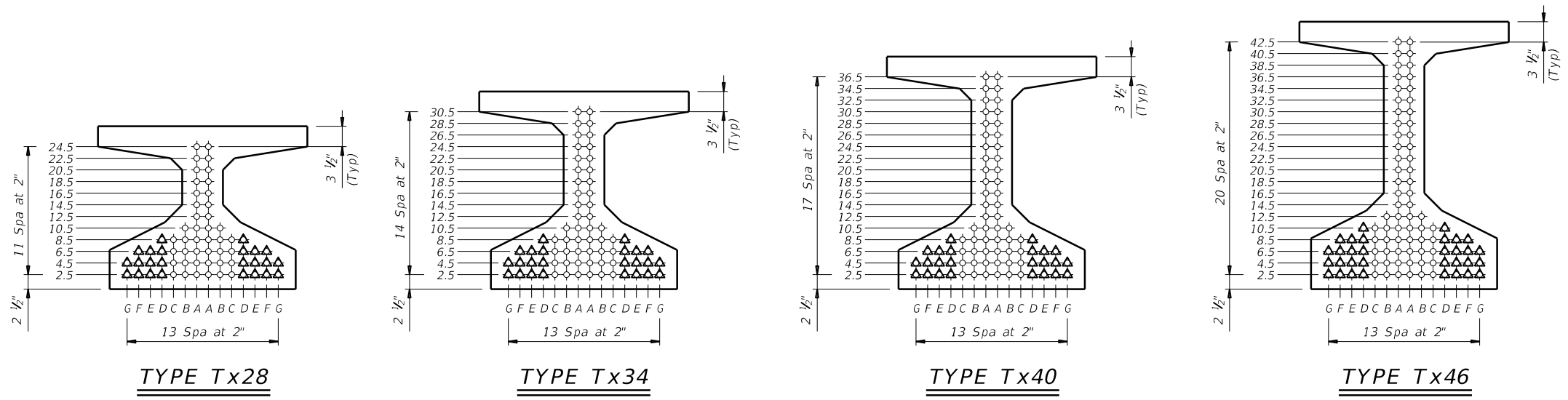
STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					NO.					TO END (in)	RELEASE STRGTH ① f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ϵ) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ϵ) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR ②	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" \bar{c} (in)		"e" END (in)	Moment	Shear	Inv							Opr	Inv
Type Tx28 Girders 32' Roadway 8.5" Slab	40	ALL	Tx28		14	0.6	270	10.48	9.34	2	10.5	4.000	5.000	1.189	-1.700	1731	0.850	1.070	1.58	2.04	2.01
	45	ALL	Tx28		14	0.6	270	10.48	9.34	2	10.5	4.000	5.000	1.507	-2.077	1717	0.820	1.080	1.48	1.91	1.57
	50	ALL	Tx28		16	0.6	270	10.23	9.23	4	8.5	4.000	5.800	1.853	-2.508	2040	0.800	1.080	1.39	1.80	1.30
	55	ALL	Tx28		18	0.6	270	10.04	8.26	4	12.5	4.100	6.400	2.247	-2.980	2377	0.780	1.090	1.26	1.69	1.07
	60	ALL	Tx28		22	0.6	270	9.75	7.57	4	16.5	4.800	6.900	2.655	-3.462	2715	0.760	1.090	1.24	1.82	1.05
	65	ALL	Tx28		26	0.6	270	9.56	7.71	4	16.5	5.600	7.300	3.104	-3.978	3064	0.740	1.100	1.09	1.76	1.07
Type Tx34 Girders 32' Roadway 8.5" Slab	40	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	0.934	-1.303	1975	0.880	1.050	1.77	2.29	2.35
	45	ALL	Tx34		14	0.6	270	13.01	12.15	2	8.5	4.000	5.000	1.180	-1.588	2124	0.850	1.060	1.75	2.27	2.11
	50	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.000	1.437	-1.907	2248	0.830	1.060	1.64	2.13	1.82
	55	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.000	1.739	-2.263	2449	0.810	1.060	1.37	1.77	1.35
	60	ALL	Tx34		18	0.6	270	12.57	11.23	4	10.5	4.000	5.500	2.068	-2.640	2806	0.790	1.070	1.30	1.72	1.17
	65	ALL	Tx34		22	0.6	270	12.28	7.92	4	28.5	4.000	6.000	2.424	-3.039	3173	0.770	1.070	1.59	2.08	1.34
	70	ALL	Tx34		26	0.6	270	12.09	8.09	4	30.5	4.700	6.500	2.807	-3.458	3548	0.750	1.080	1.08	1.81	1.04
	75	ALL	Tx34		30	0.6	270	11.81	7.41	6	28.5	5.200	6.700	3.195	-3.894	3951	0.740	1.080	1.44	1.93	1.12
Type Tx40 Girders 32' Roadway 8.5" Slab	40	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	0.768	-1.053	2052	0.910	1.030	2.02	2.62	2.88
	45	ALL	Tx40		14	0.6	270	15.60	15.60			4.700	5.000	0.967	-1.282	2430	0.880	1.040	2.01	2.61	2.63
	50	ALL	Tx40		14	0.6	270	15.60	15.60			4.500	5.000	1.195	-1.554	2558	0.860	1.040	1.91	2.48	2.29
	55	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.442	-1.834	2685	0.830	1.050	1.60	2.07	1.79
	60	ALL	Tx40		18	0.6	270	15.16	13.82	4	10.5	4.000	5.000	1.687	-2.118	2875	0.810	1.050	1.57	2.03	1.61
	65	ALL	Tx40		18	0.6	270	15.16	13.82	4	10.5	4.000	5.000	1.978	-2.447	3277	0.800	1.060	1.31	1.70	1.22
	70	ALL	Tx40		20	0.6	270	15.00	13.40	4	12.5	4.000	5.200	2.288	-2.783	3666	0.780	1.060	1.13	1.68	1.08
	75	ALL	Tx40		24	0.6	270	14.77	9.77	4	34.5	4.100	5.700	2.619	-3.135	4064	0.760	1.060	1.60	2.07	1.26
	80	ALL	Tx40		28	0.6	270	14.60	10.60	4	32.5	4.900	6.000	2.964	-3.509	4498	0.750	1.070	1.27	1.99	1.14
Type Tx46 Girders 32' Roadway 8.5" Slab	40	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.678	-0.844	2150	0.950	1.020	2.22	2.88	3.41
	45	ALL	Tx46		14	0.6	270	17.60	17.60			4.500	5.000	0.846	-1.024	2543	0.920	1.020	2.22	2.88	3.17
	50	ALL	Tx46		14	0.6	270	17.60	17.60			4.500	5.000	1.041	-1.235	3012	0.890	1.030	1.82	2.36	2.47
	55	ALL	Tx46		16	0.6	270	17.35	16.35	4	8.5	4.000	5.000	1.257	-1.465	3277	0.870	1.030	1.77	2.30	2.22
	60	ALL	Tx46		16	0.6	270	17.35	16.35	4	8.5	4.000	5.000	1.489	-1.701	3221	0.840	1.040	1.51	1.95	1.77
	65	ALL	Tx46		18	0.6	270	17.16	15.83	4	10.5	4.000	5.000	1.732	-1.957	3424	0.830	1.040	1.48	1.92	1.59
	70	ALL	Tx46		18	0.6	270	17.16	15.83	4	10.5	4.000	5.000	2.001	-2.227	3834	0.810	1.040	1.26	1.64	1.23
	75	ALL	Tx46		20	0.6	270	17.00	15.40	4	12.5	4.000	5.000	2.289	-2.510	4254	0.790	1.040	1.16	1.63	1.10
	80	ALL	Tx46		24	0.6	270	16.77	14.10	4	20.5	4.000	5.100	2.579	-2.804	4703	0.780	1.050	1.28	1.83	1.14
	85	ALL	Tx46		28	0.6	270	16.60	11.46	4	40.5	4.200	5.500	2.905	-3.125	5181	0.770	1.050	1.38	1.98	1.14
90	ALL	Tx46		32	0.6	270	16.23	9.48	6	42.5	4.400	5.700	3.234	-3.438	5624	0.750	1.050	1.46	2.11	1.13	
95	ALL	Tx46		34	0.6	270	16.07	11.13	6	34.5	5.000	5.900	3.582	-3.777	6117	0.740	1.060	1.49	2.12	1.12	
100	ALL	Tx46		38	0.6	270	15.81	11.39	6	34.5	5.600	6.600	3.961	-4.139	6635	0.730	1.060	1.31	1.78	1.03	

- 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 according to AASHTO LRFD Bridge Design Specifications. Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation. Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder. Prestress losses for the designed girders have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:
 Provide Class H concrete. Provide Grade 60 reinforcing steel bars. Use low relaxation strands, each pretensioned to 75 percent of fpu. Strand debonding must comply with Item 424.4.2.2.4. Full-length debonded strands are only permitted in positions marked Δ . Double wrap full-length debonded strands in outer most position of each row. When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas. Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:
 Locate strands for the designed girder 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., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.



HL93 LOADING SHEET 1 OF 2

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

32' ROADWAY

IGSD-32

FILE: ig06stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	DIST	COUNTY	SHEET NO.	

DATE: FILE:

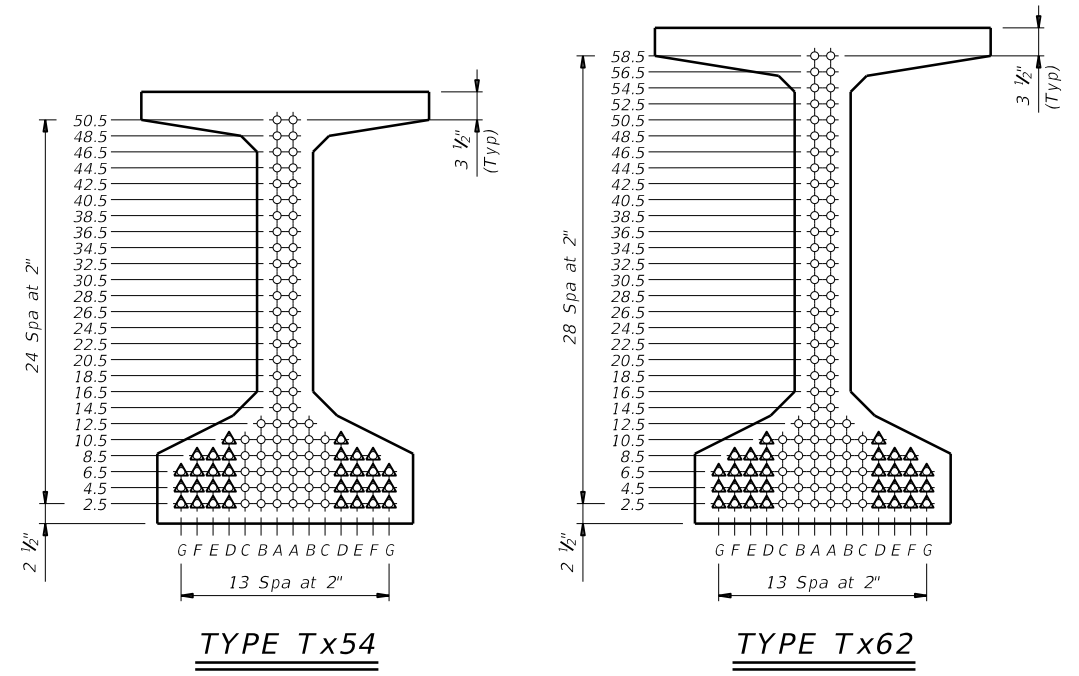
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DATE: FILE:

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					RELEASE STRGTH ① f'ci (ksi)			MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ϵ) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTTOM ϵ) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR ②		STRENGTH I		SERVICE III	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" \bar{c} (in)								"e" END (in)	Moment	Shear	Inv	Opr	Inv
Type Tx54 Girders 32' Roadway 8.5" Slab	40	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.561	-0.686	2216	0.980	1.010	2.55	3.30	4.09
	45	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.703	-0.835	2629	0.950	1.010	2.12	2.75	3.32
	50	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	0.858	-1.003	3108	0.920	1.020	2.10	2.73	3.05
	55	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.035	-1.189	3629	0.900	1.020	2.05	2.66	2.77
	60	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.224	-1.381	3931	0.870	1.020	1.76	2.28	2.27
	65	ALL	Tx54		18	0.6	270	20.56	19.23	4	10.5	4.000	5.000	1.430	-1.588	4159	0.850	1.020	1.75	2.26	2.09
	70	ALL	Tx54		18	0.6	270	20.56	19.23	4	10.5	4.000	5.000	1.653	-1.815	4103	0.840	1.030	1.49	1.93	1.68
	75	ALL	Tx54		20	0.6	270	20.41	18.81	4	12.5	4.000	5.000	1.877	-2.035	4399	0.820	1.030	1.50	1.94	1.56
	80	ALL	Tx54		20	0.6	270	20.41	18.81	4	12.5	4.000	5.000	2.129	-2.284	4880	0.810	1.030	1.29	1.67	1.23
	85	ALL	Tx54		22	0.6	270	20.28	18.46	4	14.5	4.000	5.000	2.392	-2.534	5339	0.790	1.040	1.30	1.68	1.12
	90	ALL	Tx54		26	0.6	270	20.08	16.39	4	28.5	4.000	5.000	2.665	-2.800	5839	0.780	1.040	1.22	1.67	1.00
	95	ALL	Tx54		28	0.6	270	20.01	14.29	4	44.5	4.000	5.000	2.951	-3.075	6353	0.770	1.040	1.38	1.86	1.03
	100	ALL	Tx54		32	0.6	270	19.63	12.51	6	44.5	4.300	5.200	3.262	-3.370	6892	0.760	1.040	1.42	1.99	1.03
	105	ALL	Tx54		36	0.6	270	19.34	12.01	6	50.5	4.700	5.400	3.574	-3.667	7434	0.750	1.040	1.48	2.10	1.05
110	ALL	Tx54		40	0.6	270	19.11	12.51	6	50.5	5.300	6.100	3.899	-3.973	7988	0.740	1.050	1.53	2.19	1.08	
115	ALL	Tx54		44	0.6	270	18.83	11.55	8	48.5	5.600	6.400	4.252	-4.301	8569	0.730	1.050	1.29	1.74	1.03	
120	ALL	Tx54	*	48	0.6	270	18.42	10.09	10	50.5	5.800	7.700	4.619	-4.640	9165	0.720	1.050	1.28	1.69	1.01	
Type Tx62 Girders 32' Roadway 8.5" Slab	60	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	0.961	-1.157	4309	0.900	1.010	1.98	2.56	2.74
	65	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.121	-1.331	4614	0.880	1.010	1.69	2.19	2.26
	70	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.292	-1.514	4894	0.860	1.020	1.71	2.21	2.12
	75	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.475	-1.705	4844	0.840	1.020	1.48	1.92	1.75
	80	ALL	Tx62		20	0.6	270	25.18	24.38	4	8.5	4.000	5.000	1.659	-1.903	5116	0.830	1.020	1.49	1.93	1.64
	85	ALL	Tx62		20	0.6	270	25.18	24.38	4	8.5	4.000	5.000	1.866	-2.120	5578	0.820	1.020	1.29	1.67	1.32
	90	ALL	Tx62		20	0.6	270	25.18	24.38	4	8.5	4.500	5.500	2.080	-2.338	6072	0.800	1.030	1.31	1.70	1.23
	95	ALL	Tx62		24	0.6	270	24.94	22.94	4	16.5	4.000	5.000	2.310	-2.574	6621	0.790	1.030	1.31	1.70	1.12
	100	ALL	Tx62		26	0.6	270	24.85	22.39	4	20.5	4.000	5.000	2.531	-2.805	7159	0.780	1.030	1.27	1.70	1.03
	105	ALL	Tx62		30	0.6	270	24.58	14.18	6	58.5	4.800	5.800	2.771	-3.050	7723	0.770	1.030	1.64	2.16	1.31
	110	ALL	Tx62		34	0.6	270	24.25	15.42	6	56.5	4.200	5.000	3.020	-3.304	8301	0.760	1.030	1.60	2.10	1.21
	115	ALL	Tx62		36	0.6	270	24.11	17.44	6	46.5	4.700	5.600	3.291	-3.576	8909	0.750	1.030	1.53	2.04	1.13
	120	ALL	Tx62		40	0.6	270	23.88	16.68	6	54.5	5.100	6.000	3.545	-3.835	9493	0.740	1.040	1.63	2.12	1.47
	125	ALL	Tx62		44	0.6	270	23.60	14.87	8	56.5	5.300	6.100	3.836	-4.124	10128	0.730	1.040	1.51	2.04	1.35
130	ALL	Tx62		48	0.6	270	23.28	15.28	8	56.5	5.800	6.700	4.144	-4.438	10849	0.730	1.040	1.44	1.80	1.11	

NON-STANDARD STRAND PATTERNS	
PATTERN	STRAND ARRANGEMENT AT \bar{c} OF GIRDER
*	2.5(14),4.5(14),6.5(14),8.5(4),10.5(2)

- 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 SHEET 2 OF 2

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

32' ROADWAY

IGSD-32

FILE: ig06stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS				
10-19: Redesigned girders.				
1-21: Added load rating.				
DIST	COUNTY			SHEET NO.