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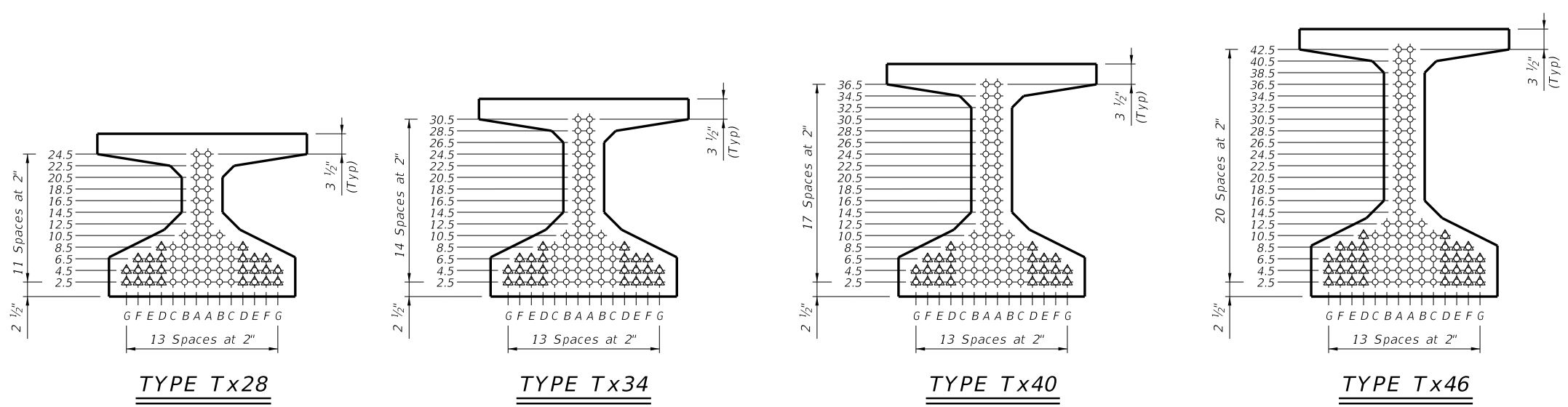
STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN	CONCRETE		OPTIONAL DESIGN				LOAD RATING FACTORS			NON-STANDARD STRAND PATTERNS			
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					NO.		TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ̵) (SERVICE I) fct(ksi)	DESIGN TENSILE STRESS (BOT ̵) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III	PATTERN	STRAND ARRANGEMENT AT ̵ OF GIRDER
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ̵ (in)									"e" END (in)	Moment	Shear	Inv	Opr		
Type Tx28 Girders 34' Roadway 8.5' Slab	40	ALL	Tx28		12	0.6	270	10.48	10.48			4.700	5.000	1.095	-1.501	1584	0.730	0.920	1.78	2.31	2.23		
	45	ALL	Tx28		12	0.6	270	10.48	10.48			4.500	5.000	1.382	-1.829	1527	0.700	0.920	1.46	1.89	1.65		
	50	ALL	Tx28		14	0.6	270	10.48	10.19	2	4.5	5.300	5.300	1.693	-2.204	1753	0.680	0.930	1.42	1.84	1.49		
	55	ALL	Tx28		16	0.6	270	10.23	9.23	4	8.5	4.000	5.300	2.049	-2.615	2038	0.660	0.930	1.38	1.78	1.18		
	60	ALL	Tx28		20	0.6	270	9.88	6.28	4	22.5	4.000	6.100	2.418	-3.048	2343	0.650	0.940	1.48	1.99	1.16		
	65	ALL	Tx28		24	0.6	270	9.65	6.31	4	24.5	4.700	6.200	2.807	-3.485	2633	0.630	0.940	1.44	1.97	1.17		
	70	ALL	Tx28		26	0.6	270	9.56	7.10	4	20.5	5.400	6.700	3.254	-3.985	2964	0.620	0.950	1.20	1.84	1.02		
Type Tx34 Girders 34' Roadway 8.5' Slab	40	ALL	Tx34		10	0.6	270	13.01	13.01			4.000	5.000	0.863	-1.147	1714	0.750	0.900	1.70	2.20	2.38		
	45	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	1.088	-1.403	1917	0.730	0.910	1.73	2.24	2.18		
	50	ALL	Tx34		14	0.6	270	13.01	13.01			5.100	5.100	1.342	-1.699	2123	0.710	0.910	1.68	2.18	2.01		
	55	ALL	Tx34		14	0.6	270	13.01	13.01			4.900	5.000	1.607	-2.002	2116	0.690	0.910	1.40	1.81	1.52		
	60	ALL	Tx34		14	0.6	270	13.01	12.44	2	6.5	4.000	5.000	1.907	-2.333	2420	0.670	0.920	1.16	1.50	1.06		
	65	ALL	Tx34		18	0.6	270	12.57	11.23	4	10.5	4.000	5.000	2.216	-2.680	2747	0.660	0.920	1.31	1.75	1.12		
	70	ALL	Tx34		22	0.6	270	12.28	7.92	4	28.5	4.000	5.600	2.565	-3.062	3093	0.650	0.930	1.36	1.93	1.13		
	75	ALL	Tx34		24	0.6	270	12.18	9.51	4	20.5	4.700	5.700	2.921	-3.436	3414	0.630	0.930	1.23	1.89	1.04		
Type Tx40 Girders 34' Roadway 8.5' Slab	40	ALL	Tx40		10	0.6	270	15.60	15.60			4.000	5.000	0.719	-0.935	1780	0.780	0.890	1.93	2.50	2.89		
	45	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	0.894	-1.130	2096	0.750	0.890	2.00	2.60	2.74		
	50	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	1.102	-1.367	2286	0.730	0.900	1.61	2.08	2.09		
	55	ALL	Tx40		14	0.6	270	15.60	15.60			4.300	5.000	1.329	-1.619	2488	0.710	0.900	1.63	2.12	1.95		
	60	ALL	Tx40		14	0.6	270	15.60	15.60			4.200	5.000	1.565	-1.886	2511	0.700	0.900	1.35	1.75	1.50		
	65	ALL	Tx40		16	0.6	270	15.35	15.35			5.000	5.000	1.828	-2.166	2835	0.680	0.910	1.37	1.77	1.42		
	70	ALL	Tx40		18	0.6	270	15.16	14.27	4	8.5	4.000	5.000	2.115	-2.473	3194	0.670	0.910	1.35	1.76	1.20		
	75	ALL	Tx40		20	0.6	270	15.00	13.40	4	12.5	4.000	5.000	2.396	-2.767	3521	0.650	0.910	1.31	1.76	1.09		
	80	ALL	Tx40		24	0.6	270	14.77	9.43	4	36.5	4.000	5.100	2.718	-3.103	3899	0.640	0.920	1.37	1.96	1.10		
	85	ALL	Tx40		26	0.6	270	14.68	9.76	4	36.5	4.400	5.300	3.034	-3.435	4273	0.630	0.920	1.29	1.92	1.01		
Type Tx46 Girders 34' Roadway 8.5' Slab	40	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.632	-0.746	1857	0.810	0.880	2.14	2.78	3.45		
	45	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.791	-0.908	2196	0.780	0.880	1.77	2.29	2.76		
	50	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.966	-1.093	2608	0.760	0.880	1.79	2.32	2.54		
	55	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	1.163	-1.296	2737	0.740	0.890	1.48	1.92	2.00		
	60	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	1.367	-1.502	2690	0.720	0.890	1.23	1.60	1.56		
	65	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	1.598	-1.735	2973	0.710	0.890	1.01	1.31	1.16		
	70	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.843	-1.972	3322	0.690	0.900	1.08	1.40	1.11		
	75	ALL	Tx46		16	0.6	270	17.35	16.85	4	6.5	4.000	5.000	2.100	-2.225	3704	0.680	0.900	1.11	1.44	1.02		
	80	ALL	Tx46		20	0.6	270	17.00	15.40	4	12.5	4.000	5.000	2.372	-2.489	4098	0.670	0.900	1.32	1.72	1.13		
	85	ALL	Tx46		22	0.6	270	16.88	15.06	4	14.5	4.000	5.000	2.668	-2.773	4510	0.660	0.900	1.32	1.71	1.01		
	90	ALL	Tx46		26	0.6	270	16.68	12.07	4	34.5	4.000	5.000	2.964	-3.046	4885	0.640	0.900	1.47	1.93	1.05		
	95	ALL	Tx46		30	0.6	270	16.40	9.20	6	42.5	4.100	5.000	3.298	-3.369	5363	0.640	0.910	1.50	2.05	1.02		
	100	ALL	Tx46		34	0.6	270	16.07	9.72	6	42.5	4.700	5.400	3.628	-3.680	5800	0.630	0.910	1.48	1.99	1.07		
105	ALL	Tx46		38	0.6	270	15.81	10.13	6	42.5	5.300	6.100	3.988	-4.013	6260	0.620	0.910	1.44	1.94	1.10			
110	ALL	Tx46		40	0.6	270	15.70	11.50	6	34.5	5.900	6.900	4.364	-4.359	6732	0.610	0.910	1.35	1.90	1.02			

- ① Based on the following allowable stresses (ksi):
 Compression = 0.65 f'ci
 Tension = 0.24 √ 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

Texas Department of Transportation Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS
 34' ROADWAY

IGSD-34

FILE: IG-IGSD34-23.dgn	DN: VC	CK: TAR	DW: SFS	CK: TAR
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REVISIONS				
	DIST	COUNTY		SHEET NO.

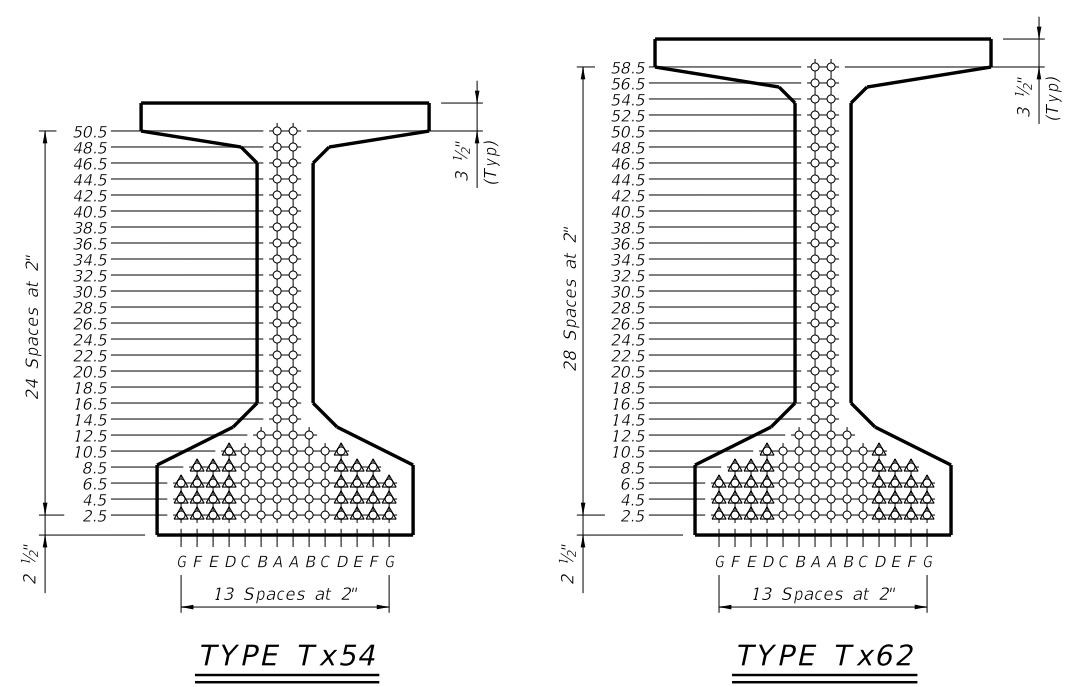
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DATE: FILE:

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN	CONCRETE		OPTIONAL DESIGN				LOAD RATING FACTORS			NON-STANDARD STRAND PATTERNS				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					NO.		TO END (in)	RELEASE STRGTH 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 (BOT ε) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR		STRENGTH I		SERVICE III	PATTERN	STRAND ARRANGEMENT AT ε OF GIRDER	
				TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ε (in)	"e" END (in)									②	Moment	Shear	Inv	Opr			Inv
Type Tx54 Girders 34' Roadway 8.5" Slab	40	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.525	-0.609	1923	0.840	0.870	3.01	3.90	4.78			
	45	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.655	-0.740	2276	0.810	0.870	2.53	3.28	3.94			
	50	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.801	-0.889	2686	0.780	0.870	2.08	2.69	3.15			
	55	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.963	-1.053	3130	0.760	0.880	1.74	2.25	2.55			
	60	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.137	-1.230	3608	0.750	0.880	1.77	2.30	2.40			
	65	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.326	-1.413	3561	0.730	0.880	1.51	1.96	1.94			
	70	ALL	Tx54		16	0.6	270	20.76	20.76			4.200	5.000	1.517	-1.597	3822	0.710	0.880	1.56	2.03	1.87			
	75	ALL	Tx54		16	0.6	270	20.76	20.76			4.100	5.000	1.733	-1.807	3824	0.700	0.890	1.33	1.73	1.48			
	80	ALL	Tx54		18	0.6	270	20.56	20.56			5.000	5.000	1.956	-2.021	4232	0.690	0.890	1.36	1.76	1.45			
	85	ALL	Tx54		18	0.6	270	20.56	19.67		4	8.5	4.000	5.000	2.199	-2.251	4659	0.680	0.890	1.17	1.52	1.07		
	90	ALL	Tx54		22	0.6	270	20.28	18.46		4	14.5	4.000	5.000	2.447	-2.485	5091	0.670	0.890	1.39	1.80	1.19		
	95	ALL	Tx54		24	0.6	270	20.17	17.84		4	18.5	4.000	5.000	2.716	-2.735	5544	0.660	0.890	1.39	1.80	1.08		
	100	ALL	Tx54		28	0.6	270	20.01	14.29		4	44.5	4.000	5.000	2.987	-2.987	5999	0.650	0.900	1.52	2.01	1.12		
	105	ALL	Tx54		30	0.6	270	19.81	13.01		6	40.5	4.100	5.000	3.281	-3.257	6476	0.640	0.900	1.37	1.98	1.00		
	110	ALL	Tx54		34	0.6	270	19.48	11.71		6	50.5	4.400	5.200	3.575	-3.526	6952	0.630	0.900	1.41	2.10	1.04		
115	ALL	Tx54		38	0.6	270	19.22	12.27		6	50.5	5.000	5.800	3.895	-3.816	7452	0.620	0.900	1.50	2.07	1.09			
120	ALL	Tx54		40	0.6	270	19.11	13.11		6	46.5	5.400	6.300	4.219	-4.120	8011	0.620	0.900	1.38	2.02	1.01			
125	ALL	Tx54		44	0.6	270	18.83	12.64		8	42.5	5.800	6.900	4.564	-4.430	8537	0.610	0.900	1.47	1.98	1.02			
Type Tx62 Girders 34' Roadway 8.5" Slab	60	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	0.898	-1.031	3755	0.770	0.870	2.01	2.60	2.89			
	65	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	1.045	-1.184	4235	0.750	0.870	1.72	2.23	2.40			
	70	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	1.197	-1.342	4194	0.730	0.870	1.48	1.92	1.98			
	75	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.367	-1.517	4489	0.720	0.880	1.53	1.98	1.89			
	80	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.541	-1.697	4446	0.710	0.880	1.31	1.70	1.53			
	85	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.730	-1.890	4869	0.700	0.880	1.35	1.75	1.46			
	90	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.923	-2.085	5322	0.690	0.880	1.17	1.52	1.16			
	95	ALL	Tx62		20	0.6	270	25.18	24.78		4	6.5	4.000	5.000	2.132	-2.295	5799	0.680	0.880	1.20	1.56	1.10		
	100	ALL	Tx62		22	0.6	270	25.05	23.96		4	10.5	4.000	5.000	2.342	-2.506	6277	0.670	0.880	1.23	1.60	1.03		
	105	ALL	Tx62		26	0.6	270	24.85	22.70		4	18.5	4.000	5.000	2.571	-2.732	6781	0.660	0.890	1.42	1.85	1.12		
	110	ALL	Tx62		28	0.6	270	24.78	20.21		4	36.5	4.000	5.000	2.799	-2.957	7281	0.650	0.890	1.34	1.86	1.03		
	115	ALL	Tx62		32	0.6	270	24.40	15.40		6	54.5	4.000	5.000	3.047	-3.199	7810	0.640	0.890	1.40	2.04	1.05		
	120	ALL	Tx62		34	0.6	270	24.25	16.84		6	48.5	4.400	5.200	3.292	-3.438	8332	0.630	0.890	1.32	2.02	1.00		
	125	ALL	Tx62		38	0.6	270	23.99	16.09		6	56.5	4.800	5.700	3.566	-3.712	8951	0.630	0.890	1.40	2.13	1.04		
	130	ALL	Tx62		40	0.6	270	23.88	17.88		6	46.5	5.300	6.300	3.827	-3.966	9497	0.620	0.890	1.38	2.09	1.01		
135	ALL	Tx62		44	0.6	270	23.60	15.96		8	50.5	5.500	6.500	4.114	-4.240	10077	0.610	0.890	1.46	2.07	1.01			

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



HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS
 34' ROADWAY

IGSD-34

FILE: IG-IGSD34-23.dgn	DN: VC	CK: TAR	DW: SFS	CK: TAR
CONT	SECT	JOB	HIGHWAY	
REVISIONS				
DIST	COUNTY	SHEET NO.		