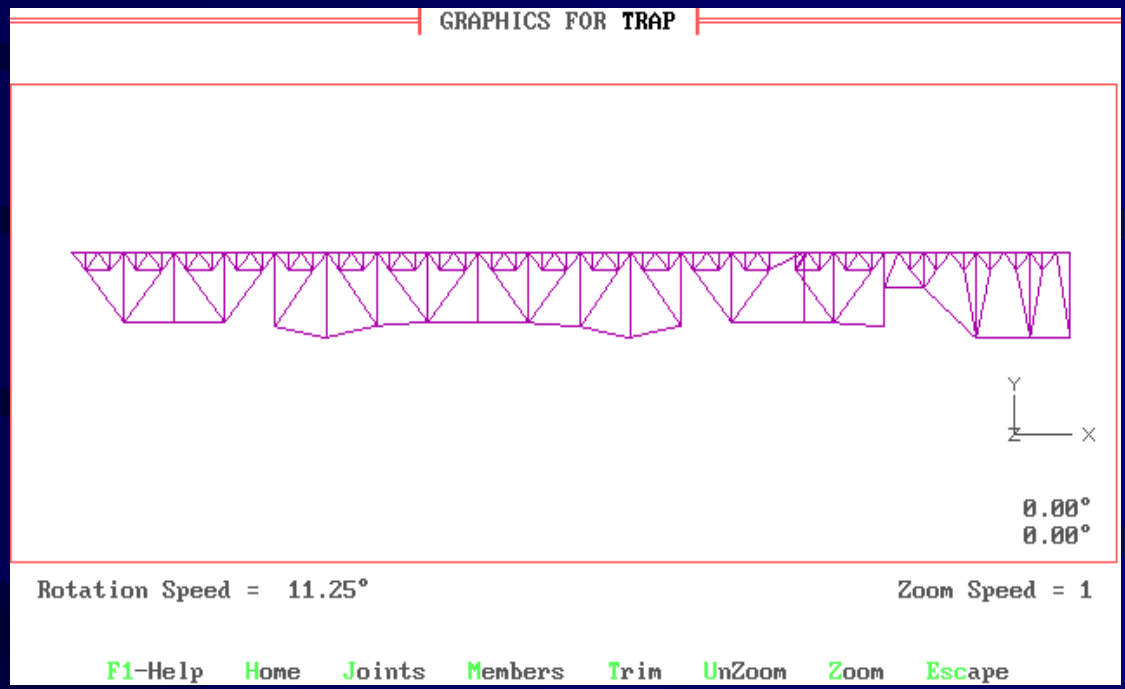
MERLIN-TRAP

Steel Truss Rating and Analysis Program



MERLIN-TRAP Development

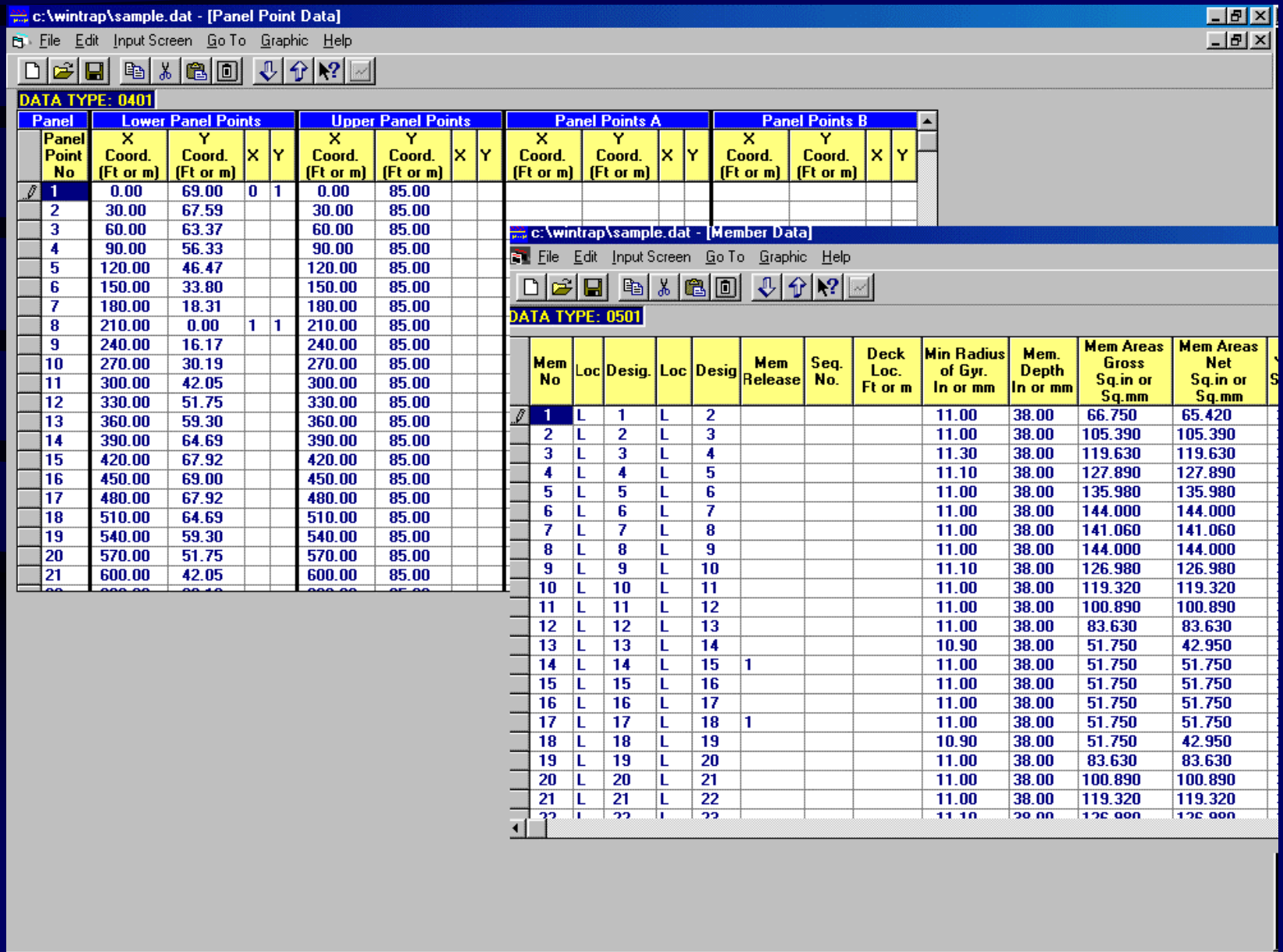
- Began in 1976
- Basic program completed in 1978
- Microcomputer version in 1986
- used in FHWA truss rating study, numerous major truss bridge rating projects by FHWA, state agencies, army corps, consulting firms
- SI version in 1996
- LRFD version in 1998
- WINDOWS, WINDOWS/NT & Network version in 1999

MERLIN-TRAP Banner Page

Trap Program

Exit | Input | Run | Print | Help

MERLIN-TRAP Input Utility



c:\wintrap\sample.dat - [Panel Point Data]

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DATA TYPE: 0401

Panel	Lower Panel Points				Upper Panel Points				Panel Points A				Panel Points B			
Panel Point No	X Coord. (Ft or m)	Y Coord. (Ft or m)	X	Y	X Coord. (Ft or m)	Y Coord. (Ft or m)	X	Y	X Coord. (Ft or m)	Y Coord. (Ft or m)	X	Y	X Coord. (Ft or m)	Y Coord. (Ft or m)	X	Y
1	0.00	69.00	0	1	0.00	85.00										
2	30.00	67.59			30.00	85.00										
3	60.00	63.37			60.00	85.00										
4	90.00	56.33			90.00	85.00										
5	120.00	46.47			120.00	85.00										
6	150.00	33.80			150.00	85.00										
7	180.00	18.31			180.00	85.00										
8	210.00	0.00	1	1	210.00	85.00										
9	240.00	16.17			240.00	85.00										
10	270.00	30.19			270.00	85.00										
11	300.00	42.05			300.00	85.00										
12	330.00	51.75			330.00	85.00										
13	360.00	59.30			360.00	85.00										
14	390.00	64.69			390.00	85.00										
15	420.00	67.92			420.00	85.00										
16	450.00	69.00			450.00	85.00										
17	480.00	67.92			480.00	85.00										
18	510.00	64.69			510.00	85.00										
19	540.00	59.30			540.00	85.00										
20	570.00	51.75			570.00	85.00										
21	600.00	42.05			600.00	85.00										

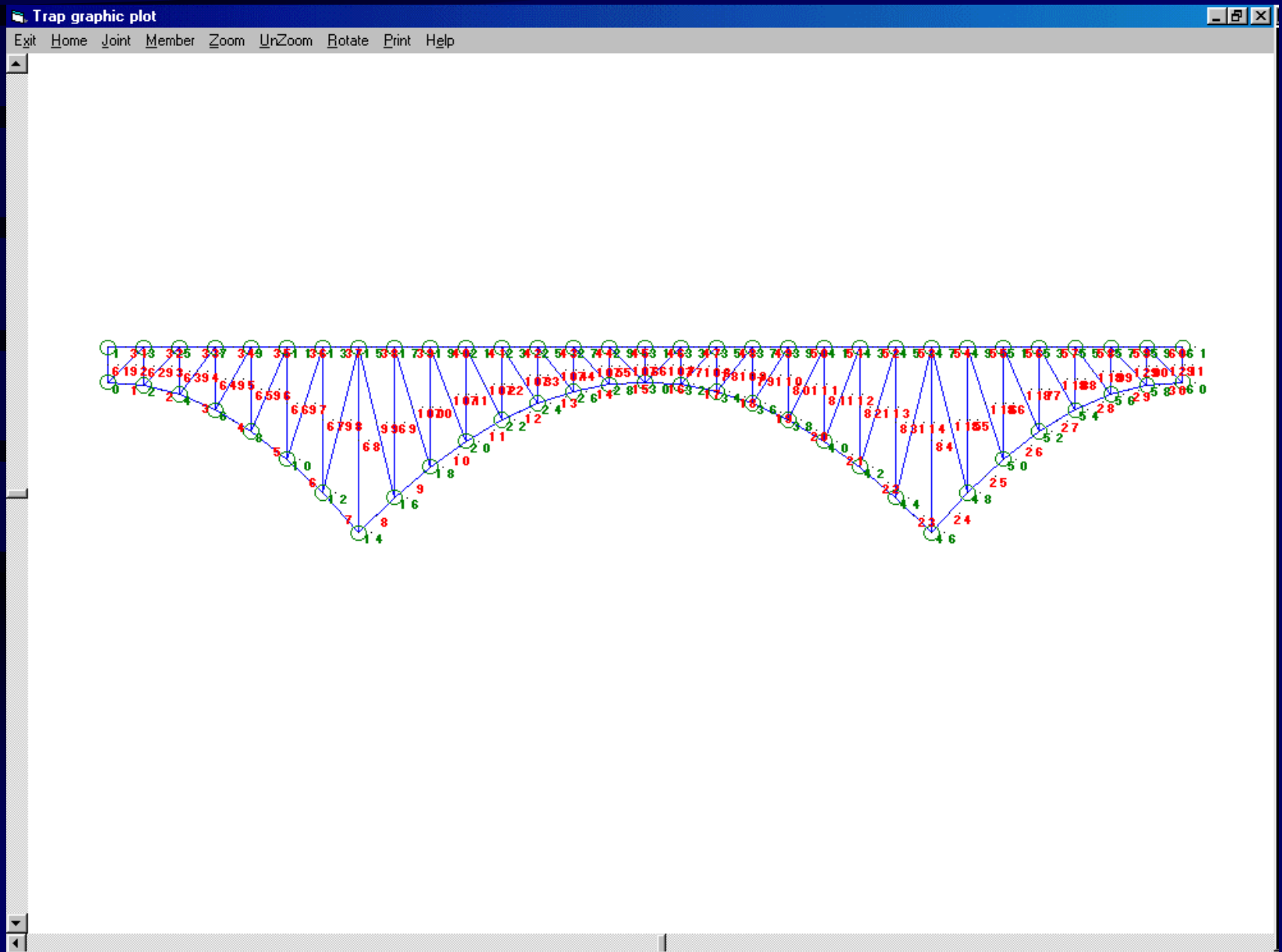
c:\wintrap\sample.dat - [Member Data]

File Edit Input Screen Go To Graphic Help

DATA TYPE: 0501

Mem No	Loc	Desig.	Loc	Desig	Mem Release	Seq. No.	Deck Loc. Ft or m	Min Radius of Gyr. In or mm	Mem. Depth In or mm	Mem Areas Gross Sq.in or Sq.mm	Mem Areas Net Sq.in or Sq.mm
1	L	1	L	2				11.00	38.00	66.750	65.420
2	L	2	L	3				11.00	38.00	105.390	105.390
3	L	3	L	4				11.30	38.00	119.630	119.630
4	L	4	L	5				11.10	38.00	127.890	127.890
5	L	5	L	6				11.00	38.00	135.980	135.980
6	L	6	L	7				11.00	38.00	144.000	144.000
7	L	7	L	8				11.00	38.00	141.060	141.060
8	L	8	L	9				11.00	38.00	144.000	144.000
9	L	9	L	10				11.10	38.00	126.980	126.980
10	L	10	L	11				11.00	38.00	119.320	119.320
11	L	11	L	12				11.00	38.00	100.890	100.890
12	L	12	L	13				11.00	38.00	83.630	83.630
13	L	13	L	14				10.90	38.00	51.750	42.950
14	L	14	L	15	1			11.00	38.00	51.750	51.750
15	L	15	L	16				11.00	38.00	51.750	51.750
16	L	16	L	17				11.00	38.00	51.750	51.750
17	L	17	L	18	1			11.00	38.00	51.750	51.750
18	L	18	L	19				10.90	38.00	51.750	42.950
19	L	19	L	20				11.00	38.00	83.630	83.630
20	L	20	L	21				11.00	38.00	100.890	100.890
21	L	21	L	22				11.00	38.00	119.320	119.320

MERLIN-TRAP Graphic Utility



TRAP Rating Output

- Dead Load Deflection
- Influence Lines
- Force Summary for Lower Chords
- Allowable Force Summary for Lower Chords
- Rating Summary for Lower Chords
- Rating Analysis Summary

SPAN DECK CANTILEVER TRUSS

TABLE 3.5 DEAD LOAD DEFLECTIONS (UNFACTORED)

LOWER PANEL POINT DEFLECTIONS

PANEL POINT NO	DEFLECTIONS DUE TO TOTAL STEEL			TOTAL DEAD LOAD DEFLECTIONS		
	PP LOAD (K)	HORIZONTAL DEFLECTION (IN)	VERTICAL DEFLECTION (IN)	PP LOAD (K)	HORIZONTAL DEFLECTION (IN)	VERTICAL DEFLECTION (IN)
L 1	14.87	.4521	.0000	14.87	.7455	.0000
L 2	21.79	.4369	-.0696	21.79	.7215	-.1581
L 3	25.63	.4176	-.1442	25.63	.6942	-.3091
L 4	27.27	.3833	-.1808	27.27	.6437	-.3849
L 5	33.03	.3220	-.1622	33.03	.5499	-.3612
L 6	39.79	.2316	-.1054	39.79	.4066	-.2624
L 7	45.41	.1082	-.0174	45.41	.2045	-.0982
L 8	53.87	.0000	.0000	53.87	.0000	.0000
L 9	44.40	.2013	.5351	44.40	.2900	.7777
L 10	38.66	.3430	1.0112	38.66	.5103	1.5080
L 11	32.28	.4599	1.4794	32.28	.6979	2.2453
L 12	24.53	.5645	1.9927	24.53	.8679	3.0623
L 13	21.42	.6537	2.5484	21.42	1.0130	3.9499
L 14	18.30	.7225	3.1624	18.30	1.1247	4.9303
L 15	17.06	.9084	3.5191	17.06	1.4284	5.4904
L 16	17.47	.9491	3.6734	17.47	1.4922	5.7342
L 17	17.06	.9899	3.5191	17.06	1.5560	5.4904
L 18	18.30	-.7225	3.1624	18.30	-1.1247	4.9303
L 19	21.42	-.6537	2.5484	21.42	-1.0130	3.9499
L 20	24.53	-.5645	1.9927	24.53	-.8679	3.0623
L 21	32.28	-.4599	1.4795	32.28	-.6979	2.2453
L 22	38.66	-.3430	1.0112	38.66	-.5103	1.5080
L 23	44.40	-.2013	.5351	44.40	-.2900	.7777
L 24	53.87	.0000	.0000	53.87	.0000	.0000
L 25	45.41	-.1082	-.0174	45.41	-.2045	-.0982
L 26	39.79	-.2316	-.1054	39.79	-.4066	-.2624
L 27	33.03	-.3220	-.1622	33.03	-.5499	-.3612
L 28	27.27	-.3833	-.1808	27.27	-.6437	-.3849
L 29	25.63	-.4176	-.1442	25.63	-.6942	-.3091
L 30	21.79	-.4369	-.0696	21.79	-.7215	-.1581
L 31	14.87	-.4521	.0000	14.87	-.7455	.0000

TABLE 4.1 MEMBER INFLUENCE LINE VALUES

INFLUENCE LINE ORDINATES FOR TRUSS MEMBER L 5 L 6

PP NO	ORDINATE	PP NO	ORDINATE	PP NO	ORDINATE	PP NO	ORDINATE	PP NO	ORDINATE
1	.000	2	.182	3	.363	4	.545	5	.727
6	.909	7	.454	8	.000	9	-.454	10	-.909
11	-1.363	12	-1.817	13	-2.272	14	-2.726	15	-2.044
16	-1.363	17	-.681	18	.000	19	.000	20	.000
21	.000	22	.000	23	.000	24	.000	25	.000
26	.000	27	.000	28	.000	29	.000	30	.000
31	.000								

TABLE 4.1 MEMBER INFLUENCE LINE VALUES

INFLUENCE LINE ORDINATES FOR TRUSS MEMBER U 6 U 7

PP NO	ORDINATE	PP NO	ORDINATE	PP NO	ORDINATE	PP NO	ORDINATE	PP NO	ORDINATE
1	.000	2	-.167	3	-.335	4	-.502	5	-.670
6	-.837	7	-.419	8	.000	9	.419	10	.837
11	1.256	12	1.674	13	2.093	14	2.511	15	1.883
16	1.256	17	.628	18	.000	19	.000	20	.000
21	.000	22	.000	23	.000	24	.000	25	.000
26	.000	27	.000	28	.000	29	.000	30	.000
31	.000								

TABLE 4.1 MEMBER INFLUENCE LINE VALUES

INFLUENCE LINE ORDINATES FOR TRUSS MEMBER L 7 U 7

PP NO	ORDINATE	PP NO	ORDINATE	PP NO	ORDINATE	PP NO	ORDINATE	PP NO	ORDINATE
1	.000	2	-.176	3	-.352	4	-.528	5	-.704
6	-.880	7	-.056	8	.000	9	.056	10	.112
11	.169	12	.225	13	.281	14	.337	15	.253
16	.169	17	.084	18	.000	19	.000	20	.000
21	.000	22	.000	23	.000	24	.000	25	.000
26	.000	27	.000	28	.000	29	.000	30	.000
31	.000								

SPAN DECK CANTILEVER TRUSS

TABLE 10.1 DL+LL+I FORCE SUMMARY FOR LOWER CHORD MEMBERS (FACTORED)

AASHTO LOADING RESULTS

MEMBER	TOTAL DEAD LOAD (K)	MAXIMUM TENSION LL+I (K)	TYPE	MAXIMUM COMPRESSION LL+I (K)	TYPE	MAXIMUM MEMBER FORCE DL+LL+I (K)	TYPE	MINIMUM MEMBER FORCE DL+LL+I (K)	TYPE
L 1 L 2	-210.52	827.87	HL	-980.94	HL	617.35	HL	-1191.46	HL
L 2 L 3	-505.87	1113.24	HL	-1592.90	HL	607.37	HL	-2098.77	HL
L 3 L 4	-779.42	1020.82	HL	-1833.56	HL	241.40	HL	-2612.97	HL
L 4 L 5	-999.19	778.41	HL	-1864.21	HL	-220.78	HL	-2863.41	HL
L 5 L 6	-1180.94	505.54	HL	-1808.43	HL	-675.40	HL	-2989.37	HL
L 6 L 7	-1342.63	242.96	HL	-1727.31	HL	-1099.67	HL	-3069.95	HL
L 7 L 8	-1496.35	.00	HL	-1645.87	HL	-1496.35	HL	-3142.23	HL
L 8 L 9	-1450.98	.00	HL	-1595.97	HL	-1450.98	HL	-3046.95	HL
L 9 L10	-1270.78	.00	HL	-1508.39	HL	-1270.78	HL	-2779.17	HL
L10 L11	-1078.68	.00	HL	-1387.87	HL	-1078.68	HL	-2466.55	HL
L11 L12	-866.08	.00	HL	-1220.12	HL	-866.08	HL	-2086.21	HL
L12 L13	-619.76	.00	HL	-962.17	HL	-619.76	HL	-1581.92	HL
L13 L14	-325.64	.00	HL	-572.91	HL	-325.64	HL	-898.55	HL
L14 L15	.00	.00	HL	.00	HL	.00	HL	.00	HL
L15 L16	286.41	580.32	HL	.00	HL	866.73	HL	286.41	HL
L16 L17	286.41	580.32	HL	.00	HL	866.73	HL	286.41	HL
L17 L18	.00	.00	HL	.00	HL	.00	HL	.00	HL
L18 L19	-325.64	.00	HL	-572.91	HL	-325.64	HL	-898.55	HL
L19 L20	-619.76	.00	HL	-962.17	HL	-619.76	HL	-1581.93	HL
L20 L21	-866.08	.00	HL	-1220.12	HL	-866.08	HL	-2086.21	HL
L21 L22	-1078.68	.00	HL	-1387.87	HL	-1078.68	HL	-2466.55	HL
L22 L23	-1270.78	.00	HL	-1508.39	HL	-1270.78	HL	-2779.17	HL
L23 L24	-1450.98	.00	HL	-1595.97	HL	-1450.98	HL	-3046.95	HL
L24 L25	-1496.35	.00	HL	-1645.88	HL	-1496.35	HL	-3142.23	HL
L25 L26	-1342.63	242.96	HL	-1727.32	HL	-1099.67	HL	-3069.95	HL
L26 L27	-1180.94	505.54	HL	-1808.43	HL	-675.40	HL	-2989.38	HL
L27 L28	-999.19	778.41	HL	-1864.22	HL	-220.78	HL	-2863.41	HL
L28 L29	-779.42	1020.82	HL	-1833.56	HL	241.40	HL	-2612.98	HL
L29 L30	-505.87	1113.24	HL	-1592.91	HL	607.37	HL	-2098.78	HL
L30 L31	-210.52	827.87	HL	-980.94	HL	617.35	HL	-1191.46	HL

SPAN DECK CANTILEVER TRUSS

TABLE 15.1 ALLOWABLE FORCE SUMMARY FOR LOWER CHORD MEMBERS (L R F D)

MEMBER	INVENTORY AASHTO TENS.	INVENTORY AASHTO COMP.	OPERATING AASHTO TENS.	OPERATING AASHTO COMP.	POSTING STA. VEH. TENS.	POSTING STA. VEH. COMP.	POSTING SPE. TR. TENS.	POSTING SPE. TR. COMP.
L12 L13	2621.80	2351.92	2621.80	2351.92	2621.80	2402.27	2621.80	2402.27
L13 L14	1346.49	1456.26	1346.49	1456.26	1346.49	1487.09	1346.49	1487.09
L14 L15	1622.37	1459.23	1622.37	1459.23	1622.37	1488.98	1622.37	1488.98
L15 L16	1622.37	1460.00	1622.37	1460.00	1622.37	1489.47	1622.37	1489.47
L16 L17	1622.37	1460.00	1622.37	1460.00	1622.37	1489.47	1622.37	1489.47
L17 L18	1622.37	1459.23	1622.37	1459.23	1622.37	1488.98	1622.37	1488.98
L18 L19	1346.49	1456.26	1346.49	1456.26	1346.49	1487.09	1346.49	1487.09
L19 L20	2621.80	2351.92	2621.80	2351.92	2621.80	2402.27	2621.80	2402.27
L20 L21	3162.90	2831.33	3162.90	2831.33	3162.90	2894.26	3162.90	2894.26
L21 L22	3740.69	3339.66	3740.69	3339.66	3740.69	3417.30	3740.69	3417.30
L22 L23	3980.83	3546.72	3980.83	3546.72	3980.83	3631.99	3980.83	3631.99
L23 L24	4514.40	4002.77	4514.40	4002.77	4514.40	4106.41	4514.40	4106.41
L24 L25	4422.23	3904.58	4422.23	3904.58	4422.23	4011.96	4422.23	4011.96
L25 L26	4514.40	4007.68	4514.40	4007.68	4514.40	4109.56	4514.40	4109.56
L26 L27	4262.98	3801.65	4262.98	3801.65	4262.98	3891.69	4262.98	3891.69
L27 L28	4009.35	3592.07	4009.35	3592.07	4009.35	3670.73	4009.35	3670.73
L28 L29	3750.40	3375.33	3750.40	3375.33	3750.40	3443.35	3750.40	3443.35
L29 L30	3303.98	2970.51	3303.98	2970.51	3303.98	3031.54	3303.98	3031.54
L30 L31	2050.92	1883.10	2050.92	1883.10	2050.92	1921.14	2050.92	1921.14

SPAN DECK CANTILEVER TRUSS

TABLE 16.1 DL+LL+I RATING SUMMARY FOR LOWER CHORD MEMBERS (L R F D)

MEMBER	INVENTORY AASHTO MAX	INVENTORY AASHTO T & C	OPERATING AASHTO MAX	OPERATING AASHTO T & C	STATE VEHICLE 1 MAX	STATE VEHICLE 1 T & C	STATE VEHICLE 2 MAX	STATE VEHICLE 2 T & C	STATE VEHICLE 3 MAX	STATE VEHICLE 3 T & C	SPECIAL VEHICLE 1 MAX	SPECIAL VEHICLE 1 T & C	SPECIAL VEHICLE 2 MAX	SPECIAL VEHICLE 2 T & C
L12 L13	99.00	1.80	99.00	1.80	99.00	4.81	99.00	3.87	99.00	3.68	99.00	6.32	.00	.00
L13 L14	99.00	1.97	99.00	1.97	99.00	4.94	99.00	4.06	99.00	3.89	99.00	6.46	.00	.00
L14 L15	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	.00	.00
L15 L16	2.30	99.00	2.30	99.00	5.23	99.00	4.44	99.00	4.15	99.00	6.81	99.00	.00	.00
L16 L17	2.30	99.00	2.30	99.00	5.23	99.00	4.44	99.00	4.15	99.00	6.81	99.00	.00	.00
L17 L18	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	.00	.00
L18 L19	99.00	1.97	99.00	1.97	99.00	4.94	99.00	4.06	99.00	3.89	99.00	6.46	.00	.00
L19 L20	99.00	1.80	99.00	1.80	99.00	4.81	99.00	3.87	99.00	3.68	99.00	6.32	.00	.00
L20 L21	99.00	1.61	99.00	1.61	99.00	4.59	99.00	3.66	99.00	3.48	99.00	6.04	.00	.00
L21 L22	99.00	1.63	99.00	1.63	99.00	4.94	99.00	3.92	99.00	3.72	99.00	6.48	.00	.00
L22 L23	99.00	1.51	99.00	1.51	99.00	4.84	99.00	3.78	99.00	3.63	99.00	6.36	.00	.00
L23 L24	99.00	1.60	99.00	1.60	99.00	5.42	99.00	4.18	99.00	4.05	99.00	7.13	.00	.00
L24 L25	99.00	1.46	99.00	1.46	99.00	4.98	99.00	3.84	99.00	3.72	99.00	6.55	.00	.00
L25 L26	10.97	1.54	10.97	1.54	31.51	5.21	24.72	4.02	24.55	3.90	41.25	6.86	.00	.00
L26 L27	5.18	1.45	5.18	1.45	14.85	4.88	11.73	3.77	11.28	3.65	19.45	6.42	.00	.00
L27 L28	3.33	1.39	3.33	1.39	9.48	4.66	7.56	3.60	7.18	3.49	12.47	6.14	.00	.00
L28 L29	4.44	1.42	4.44	1.42	7.21	4.73	5.75	3.65	5.46	3.53	9.48	6.22	.00	.00
L29 L30	3.42	1.55	3.42	1.55	6.28	5.16	7.48	3.98	7.20	3.86	8.23	6.79	.00	.00
L30 L31	2.73	1.71	2.73	1.71	7.56	5.68	5.93	4.38	5.89	4.24	9.89	7.47	.00	.00

SPAN DECK CANTILEVER TRUSS

TABLE 16.7 SUMMARY OF INVENTORY AND OPERATING RATING (L R F D)

RATING ANALYSIS SUMMARY

INVENTORY RATING RESULTS			OPERATING RATING RESULTS		
RATING FACTOR	CRITICAL MEMBER	CONTROLLING LIVE LOAD	RATING FACTOR	CRITICAL MEMBER	CONTROLLING LIVE LOAD
.50	L 27 U 27	HL	.50	L 27 U 27	HL

TABLE 16.8 SUMMARY OF POSTING VEHICLE RATING (L R F D)

STATE VEHICULAR LOADING - T1

VEHICLE NAME	SAFE LOAD CAPACITY FACTOR	CRITICAL MEMBER
4S1	1.60	L 27 U 27

STATE VEHICULAR LOADING - T2

VEHICLE NAME	SAFE LOAD CAPACITY FACTOR	CRITICAL MEMBER
5C3	1.31	L 27 U 27

STATE VEHICULAR LOADING - T3

VEHICLE NAME	SAFE LOAD CAPACITY FACTOR	CRITICAL MEMBER
6T1	1.26	L 27 U 27

NOTE: For capacity less than force due to dead load, rating will be 0